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## FCC PART 15 SUBPART C TEST REPORT

Report Reference No.: **CTL1412022878-WF01**

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**Product Name**.....: Wireless USB Microphone

**Model/Type reference**.....: AC-410W-T

**Trade Mark**.....: MXL

**FCC ID**.....: PI2AC-410W-T

**Applicant's name**.....: Marshall Electronics Inc

**Address of applicant**.....: 1910 East Maple Ave. El Segundo CA, 90245

**Test Firm**.....: **Shenzhen CTL Testing Technology Co., Ltd.**

**Address of Test Firm**.....: Floor 1-A, Baisha Technology Park, No.3011, Shahexi Road, Nanshan District, Shenzhen, China 518055

**Test specification**.....:

Standard.....: **FCC Part 15.249:** Operation within the bands 920-928 MHz, 2400-2483.5 MHz, 5725-5850 MHz and 24.0 - 24.25 GHz.

TRF Originator.....: Shenzhen CTL Testing Technology Co., Ltd.

Master TRF.....: Dated 2011-01

**Date of Receipt**.....: Mar. 15, 2015

**Date of Test Date**.....: Mar. 15, 2015 - Mar. 19, 2015

**Data of Issue**.....: July 31, 2015

**Result**.....: **Positive**

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## TEST REPORT

Test Report No. :	CTL1412022878-WF01	July 31, 2015
		Date of issue

Equipment under Test : Wireless USB Microphone

Model /Type : AC-410W-T

Applicant : Marshall Electronics Inc

Address : 1910 East Maple Ave. El Segundo CA, 90245

Manufacturer : Shanghai Senguo Electronics Ltd.

Address : No.386, Lianyi Village, Huanting Town, Jianding District, Shanghai, China

**Test Result** according to the standards on page 4:

**Positive**

The test report merely corresponds to the test sample.

It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

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## 1. TEST STANDARDS

The tests were performed according to following standards:

[\*\*FCC Rules Part 15.249:\*\*](#) Operation within the bands 902 - 928 MHz, 2400 - 2483.5 MHz, 5725 - 5875 MHz, and 24.0 - 24.25 GHz.

[ANSI C63.10-2013](#)

[ANSI C63.4-2014](#)



## 2. SUMMARY

### 2.1. Equipment Under Test

#### Power supply system utilised

Power supply voltage :  120V / 60 Hz  115V / 60Hz  
 5 V DC  24 V DC  
 Other (specified in blank below)

DC 3.0V from battery (2\*AA)

### 2.2. Description of the Equipment under Test (EUT)

Name of EUT	Wireless USB Microphone
Model Number	AC-410W-T
Antenna Type	External
Operation frequency	2404MHz-2473MHz
Modulation Type	GFSK

Channel List:

Channel	Frequency (MHz)
01	2404
02	2417
03	2431
04	2445
05	2459
06	2473

For more details, refer to the user's manual of the EUT.

Serial number: Prototype

### 2.3. EUT operation mode

Test Mode(TM)	Description	Remark
TM1	Bottom Channel Transmitting	/
TM2	Middle Channel Transmitting	/
TM3	Top Channel Transmitting	/

The field strength of radiation emission was measured in the following position: EUT stand-up position (Y axis), lie-down position (X, Z axis).

The following data show only with the worst case setup.

The worst case of Y axis was reported.

Based on client request, all normal using modes of the normal function were tested but only the worst test data of the worst mode is reported by this report.

**Remark:** New battery is used during all test.

### 2.4. EUT configuration

**The following peripheral devices and interface cables were connected during the measurement:**

- supplied by the manufacturer

- supplied by the lab

## 2.5. Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for FCC ID: **PI2AC-410W-T** filing to comply with Section 15.249 of the FCC Part 15, Subpart C Rules.

## 2.6. Modifications

No modifications were implemented to meet testing criteria.



### **3. TEST ENVIRONMENT**

#### **3.1. Address of the test laboratory**

Shenzhen CTL Testing Technology Co., Ltd.  
Floor 1-A, Baisha Technology Park, No. 3011, Shahexi Road, Nanshan, Shenzhen 518055 China

There is one 3m semi-anechoic chamber and two line conducted labs for final test. The Test Sites meet the requirements in documents ANSI C63.4 and CISPR 22/EN 55022 requirements.

#### **3.2. Test Facility**

The test facility is recognized, certified, or accredited by the following organizations:

##### **IC Registration No.: 9618B**

The 3m alternate test site of Shenzhen CTL Testing Technology Co., Ltd. EMC Laboratory has been registered by Certification and Engineer Bureau of Industry Canada for the performance of with Registration No.: 9618B on November 13, 2013.

##### **FCC-Registration No.: 970318**

Shenzhen CTL Testing Technology Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 970318, December 19, 2013.

#### **3.3. Environmental conditions**

During the measurement the environmental conditions were within the listed ranges:

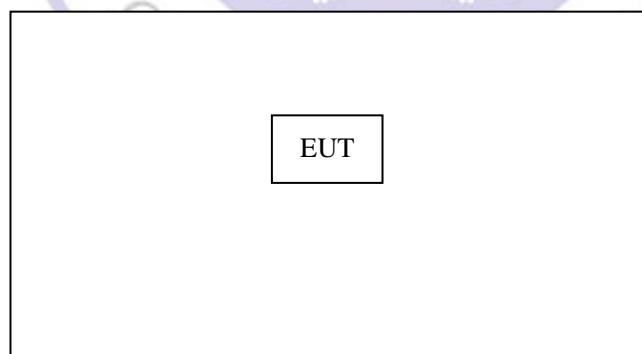
Temperature: 15-35 °C

Humidity: 30-60 %

Atmospheric pressure: 950-1050mbar

#### **3.4. Configuration of Tested System**

**Fig. 2-1 Configuration of Tested System**



### 3.5. Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 „Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements“ and is documented in the Shenzhen CTL Testing Technology Co., Ltd. quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for CTL laboratory is reported:

Test	Range	Measurement Uncertainty	Notes
Radiated Emission	30~1000MHz	4.10dB	(1)
Radiated Emission	1~26.5GHz	4.32dB	(1)
Conducted Disturbance	0.15~30MHz	3.20dB	(1)

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.



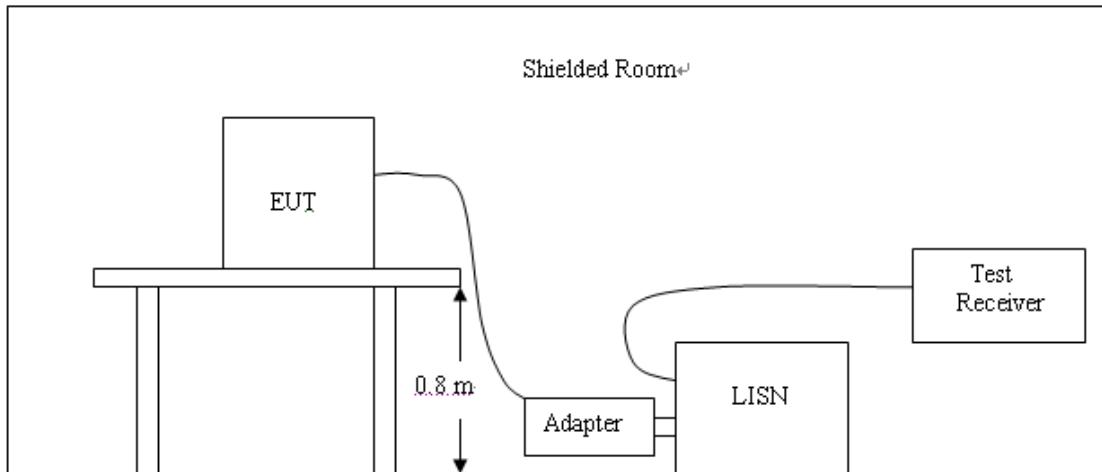
### 3.6. Equipments Used during the Test

Test Equipment	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Due Date
ULTRA-ROADBAND ANTENNA	Sunol Sciences Corp.	JB1	A061713	2015/06/02	2016/06/01
EMI Test Receiver	R&S	ESCI	103710	2015/06/02	2016/06/01
Spectrum Analyzer	Agilent	E4407B	MY41440676	2015/05/21	2016/05/20
Controller	EM Electronics	Controller EM 1000	N/A	2015/05/21	2016/05/20
Horn Antenna	Sunol Sciences Corp.	DRH-118	A062013	2015/05/19	2016/05/18
Active Loop Antenna	Daze	ZN30900A	N/A	2015/05/19	2016/05/18
LISN	R&S	ENV216	3560.6550.12	2015/06/02	2016/06/01
LISN	R&S	ESH2-Z5	860014/010	2015/06/02	2016/06/01
ISN	FCC	F-071115-1057-1-09	11229	2015/05/19	2016/05/18
Amplifier	Agilent	8349B	3008A02306	2015/05/19	2016/05/18
Amplifier	Agilent	8447D	2944A10176	2015/05/19	2016/05/18
Transient Limiter	SCHWARZCECK	VTSD 9561F	9666	2015/06/02	2016/06/01
Radio Communication Tester	R&S	CMU200	115419	2015/05/22	2016/05/21
Temperature/Humidity Meter	Gangxing	CTH-608	02	2015/05/20	2016/05/19
SIGNAL GENERATOR	Agilent	E4421B	US40051744	2015/05/20	2016/05/19
Wideband Peak Power Meter	Anritsu	ML2495A	220.23.35	2015/05/20	2016/05/19
Climate Chamber	ESPEC	EL-10KA	A20120523	2015/05/20	2016/05/19
High-Pass Filter	K&L	9SH10-2700/X12750-O/O	N/A	2015/05/20	2016/05/19
High-Pass Filter	K&L	41H10-1375/U12750-O/O	N/A	2015/05/20	2016/05/19
RF Cable	HUBER+SUHNER	RG214	N/A	2015/05/20	2016/05/19

## 4. TEST CONDITIONS AND RESULTS

### 4.1. Conducted Emissions Test

#### TEST CONFIGURATION



#### TEST PROCEDURE

- 1 The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. The EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10.
- 2 Support equipment, if needed, was placed as per ANSI C63.10.
- 3 All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10.
- 4 If a EUT received DC power from the USB Port of Notebook PC, the PC's adapter received AC120V/60Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
- 5 All support equipments received AC power from a second LISN, if any.
- 6 The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
- 7 Analyzer / Receiver scanned from 150 KHz to 30MHz for emissions in each of the test modes.
- 8 During the above scans, the emissions were maximized by cable manipulation.

**The RBW/VBW for 150KHz to 30MHz: 9KHz**

**CONDUCTED POWER LINE EMISSION LIMIT**

For unintentional device, according to § 15.207(a) Line Conducted Emission Limits is as following :

Frequency (MHz)	Maximum RF Line Voltage (dB $\mu$ V)			
	CLASS A		CLASS B	
	Q.P.	Ave.	Q.P.	Ave.
0.15 - 0.50	79	66	66-56*	56-46*
0.50 - 5.00	73	60	56	46
5.00 - 30.0	73	60	60	50

\* Decreasing linearly with the logarithm of the frequency

For intentional device, according to §15.207(a) Line Conducted Emission Limit is same as above table.

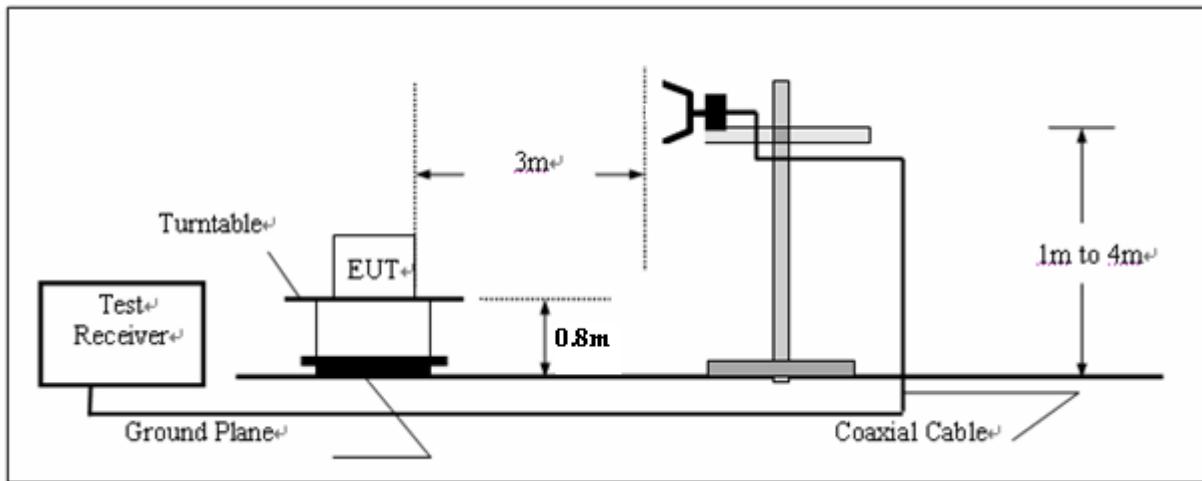
**TEST RESULTS**

Not applicable to this device.



## 4.2. Fundamental Emissions

### TEST CONFIGURATION



### Fundamental Emissions Limit

2400-2483.5 MHz Band: 94 dBuV/m (average)

For the transmitter emissions shall be measured using following options below:

Refer as ANSI C63.10, clause 4.2.3.2.2 measurement procedure peak limit.

### TEST RESULTS

Field Strength of Fundamental Emissions Result					
Modulation	Frequency	Max.Fundamental	Margin	Limit	Type
Mode	(MHz)	(dBuV/m)@3m	(dB)	(dBuV/m)@3m	
GFSK	2404	85.72	28.28	114	peak
GFSK	2404	61.33	32.67	94	average
GFSK	2445	84.43	29.57	114	peak
GFSK	2445	60.59	33.41	94	average
GFSK	2473	85.46	28.54	114	peak
GFSK	2473	60.04	33.96	94	average

Note: Measurement worst emissions of receive antenna polarization: Vertical.

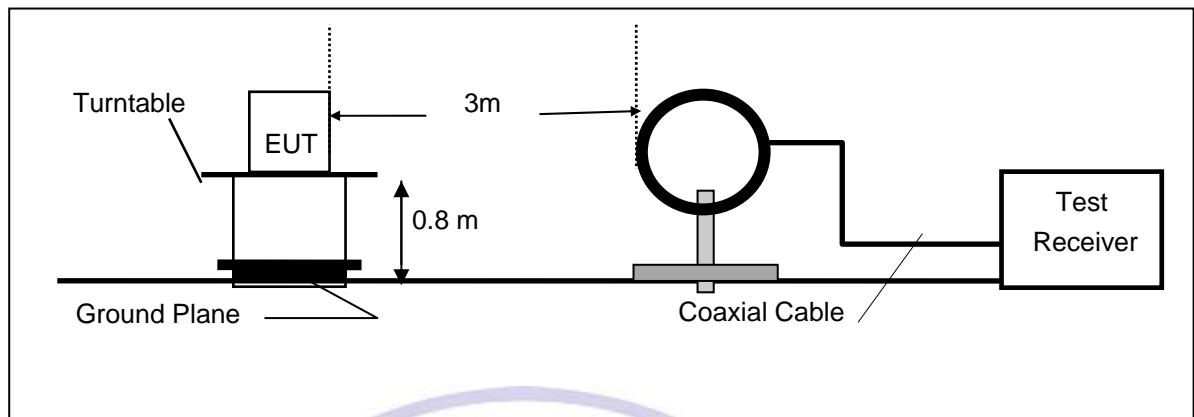
RBW 3MHz VBW 10MHz Peak detector is for PK value ,RMS detector is for AV value

Horizontal and Vertical polarity all have been tested ,only worse case is reported.

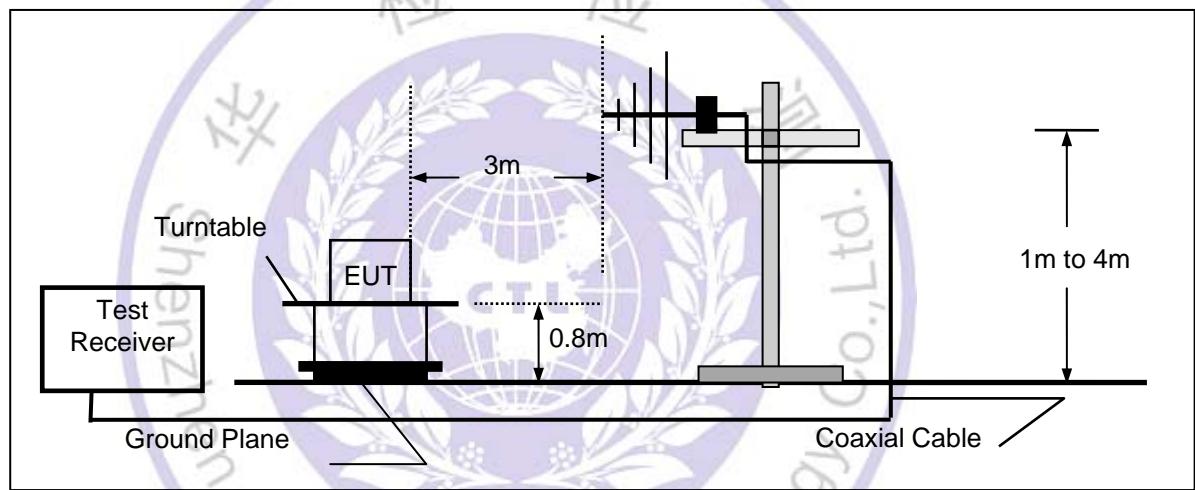
### 4.3. Transmitter Radiated Unwanted Emissions and Bandedge

#### TEST CONFIGURATION

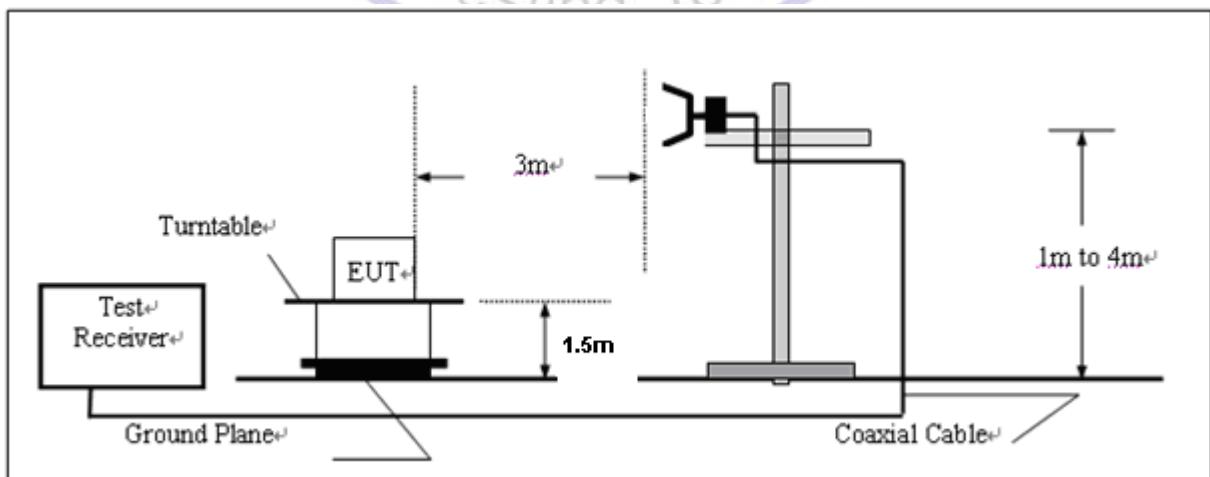
(A) Radiated Emission Test Set-Up, Frequency Below 30MHz



(B) Radiated Emission Test Set-Up, Frequency below 1000MHz



(C) Radiated Emission Test Set-Up, Frequency above 1000MHz



## FIELD STRENGTH CALCULATION

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor(if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CL - AG$$

Where FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
RA = Reading Amplitude	AG = Amplifier Gain
AF = Antenna Factor	

## RADIATION LIMIT

For unintentional device, according to § 15.209(a), except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

Frequency (MHz)	Distance (Meters)	Radiated (dB $\mu$ V/m)	Radiated ( $\mu$ V/m)
30-88	3	40.0	100
88-216	3	43.5	150
216-960	3	46.0	200
Above 960	3	54.0	500

For intentional device, according to § 15.209(a), the general requirement of field strength of radiated emissions from intentional radiators at a distance of 3 meters shall not exceed the above table.

## TEST PROCEDURE

1. The EUT is placed on a turntable, which is 0.8m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until the measurements for all frequencies are complete.
7. Based on the Frequency Generator in the device include 16MHz. The test frequency range from 9KHz to 25GHz per FCC PART 15.33(a).

### Note:

Three axes are chosen for pretest, the Y axis is the worst mode for final test.

For battery operated equipment, the equipment tests shall be performed using a new battery.

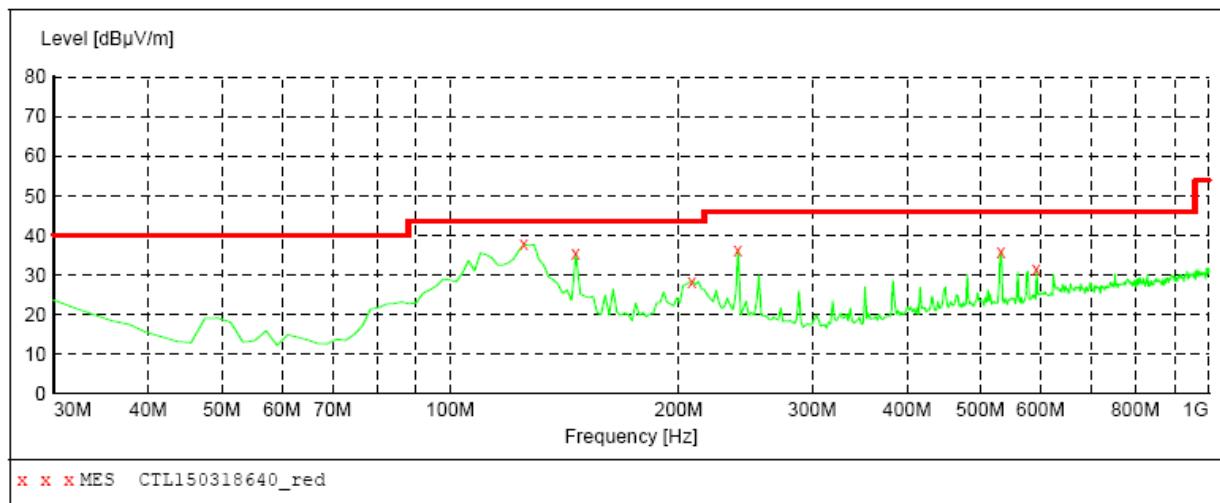
## TEST RESULTS

All the test modes (TM1, TM2, TM3) completed for test. The worst case of Radiated Emission is TM1; the test data of this mode was reported.

Below 1GHz Test Results:

### ***SWEET TABLE: "test (30M-1G)"***

Short Description:		Field Strength			
Start Frequency	Stop Frequency	Detector	Meas.	IF	Transducer
30.0 MHz	1.0 GHz	MaxPeak	Time	Bandw.	
			300.0 ms	120 kHz	JB1



### ***MEASUREMENT RESULT: "CTL150318640\_red"***

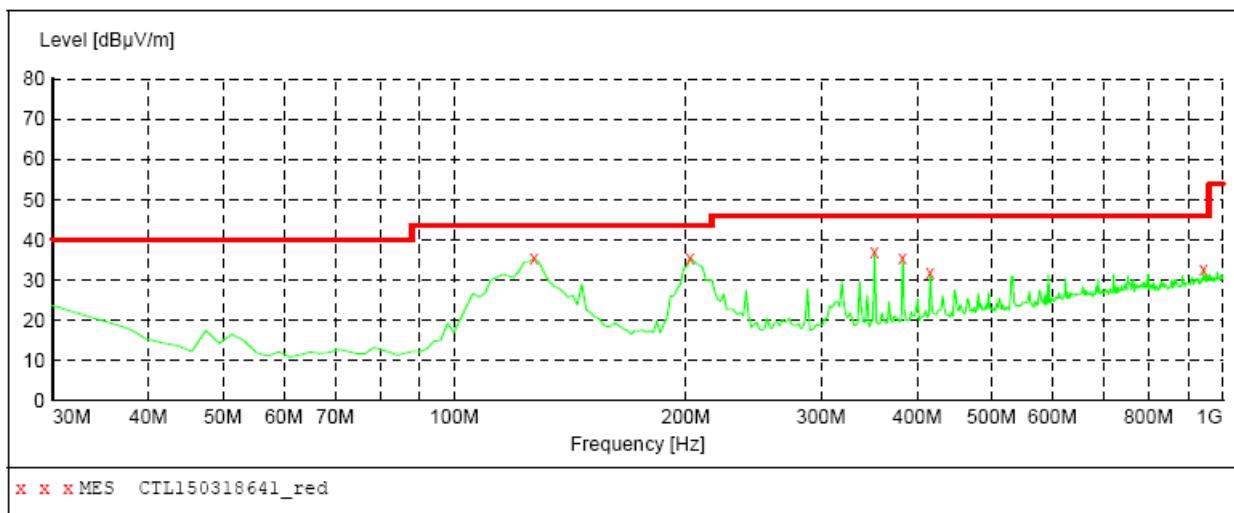
3/18/2015 9:52AM	Frequency	Level	Transd	Limit	Margin	Det.	Height	Azimuth	Polarization
	MHz	dB $\mu$ V/m	dB	dB $\mu$ V/m	dB		cm	deg	
	125.060000	37.70	15.0	43.5	5.8	---	0.0	0.00	VERTICAL
	146.400000	35.20	14.3	43.5	8.3	---	0.0	0.00	VERTICAL
	208.480000	28.40	14.3	43.5	15.1	---	0.0	0.00	VERTICAL
	239.520000	36.40	14.0	46.0	9.6	---	0.0	0.00	VERTICAL
	532.460000	35.90	20.6	46.0	10.1	---	0.0	0.00	VERTICAL
	592.600000	31.30	21.7	46.0	14.7	---	0.0	0.00	VERTICAL

#### Remark:

- (1) Measuring frequencies from 9 KHz to the 1 GHz, Radiated emission test from 9KHz to 30MHz was verified, and no any emission was found except system noise floor.
- (2) \* denotes emission frequency which appearing within the Restricted Bands specified in provision of 15.205, then the general radiated emission limits in 15.209 apply.
- (3) The IF bandwidth of EMI Test Receiver between 30MHz to 1GHz was 120KHz, 1 MHz for measuring above 1 GHz, below 30MHz was 10KHz.

***SWEET TABLE: "test (30M-1G)"***

Short Description:		Field Strength		
Start Frequency	Stop Frequency	Detector	Meas.	IF
30.0 MHz	1.0 GHz	MaxPeak	Time	Bandw.
			300.0 ms	120 kHz
				JB1

***MEASUREMENT RESULT: "CTL150318641\_red"***

3/18/2015 9:53AM

Frequency MHz	Level dB $\mu$ V/m	Transd dB	Limit dB $\mu$ V/m	Margin dB	Det. ---	Height cm	Azimuth deg	Polarization
127.000000	35.30	15.0	43.5	8.2	---	0.0	0.00	HORIZONTAL
202.660000	35.60	14.4	43.5	7.9	---	0.0	0.00	HORIZONTAL
352.040000	36.90	17.0	46.0	9.1	---	0.0	0.00	HORIZONTAL
383.080000	35.60	17.8	46.0	10.4	---	0.0	0.00	HORIZONTAL
416.060000	31.80	18.6	46.0	14.2	---	0.0	0.00	HORIZONTAL
943.740000	32.70	26.6	46.0	13.3	---	0.0	0.00	HORIZONTAL

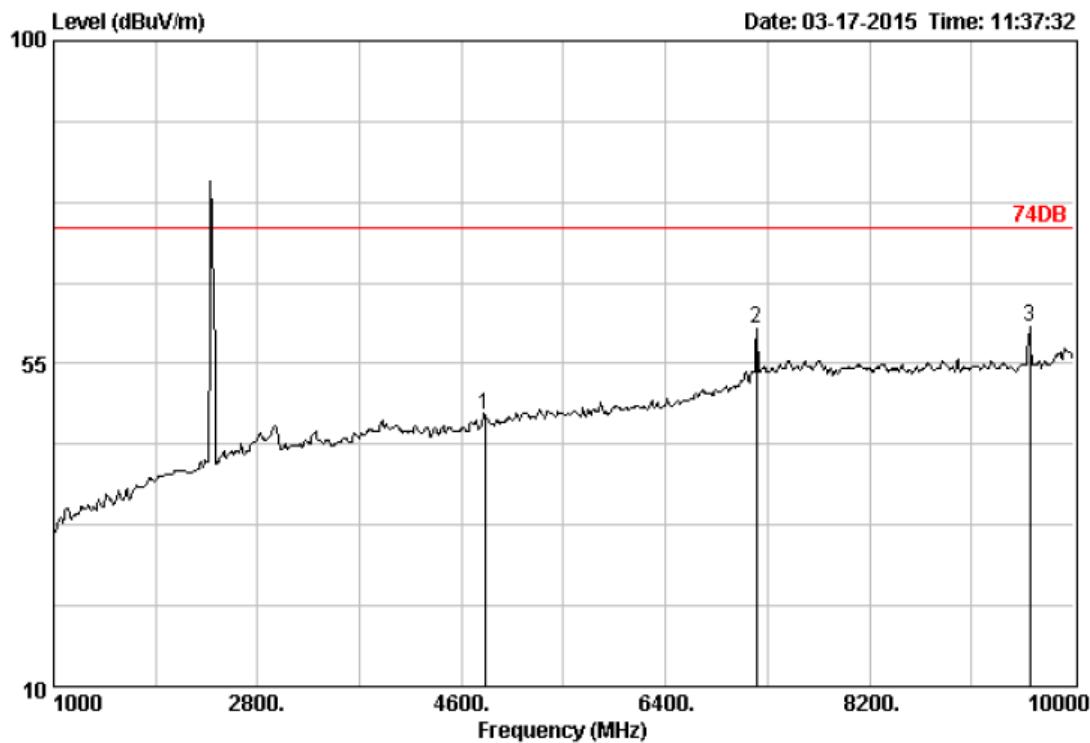
## Remark:

- (1) Measuring frequencies from 9 KHz to the 1 GHz, Radiated emission test from 9KHz to 30MHz was verified, and no any emission was found except system noise floor.
- (2) \* denotes emission frequency which appearing within the Restricted Bands specified in provision of 15.205, then the general radiated emission limits in 15.209 apply.
- (3) The IF bandwidth of EMI Test Receiver between 30MHz to 1GHz was 120KHz, 1 MHz for measuring above 1 GHz, below 30MHz was 10KHz.

Remark: For above 1GHz , RBW 1MHz VBW 3MHz Peak detector is for PK value , RBW 1MHz VBW 10Hz Peak detector is for AV value .

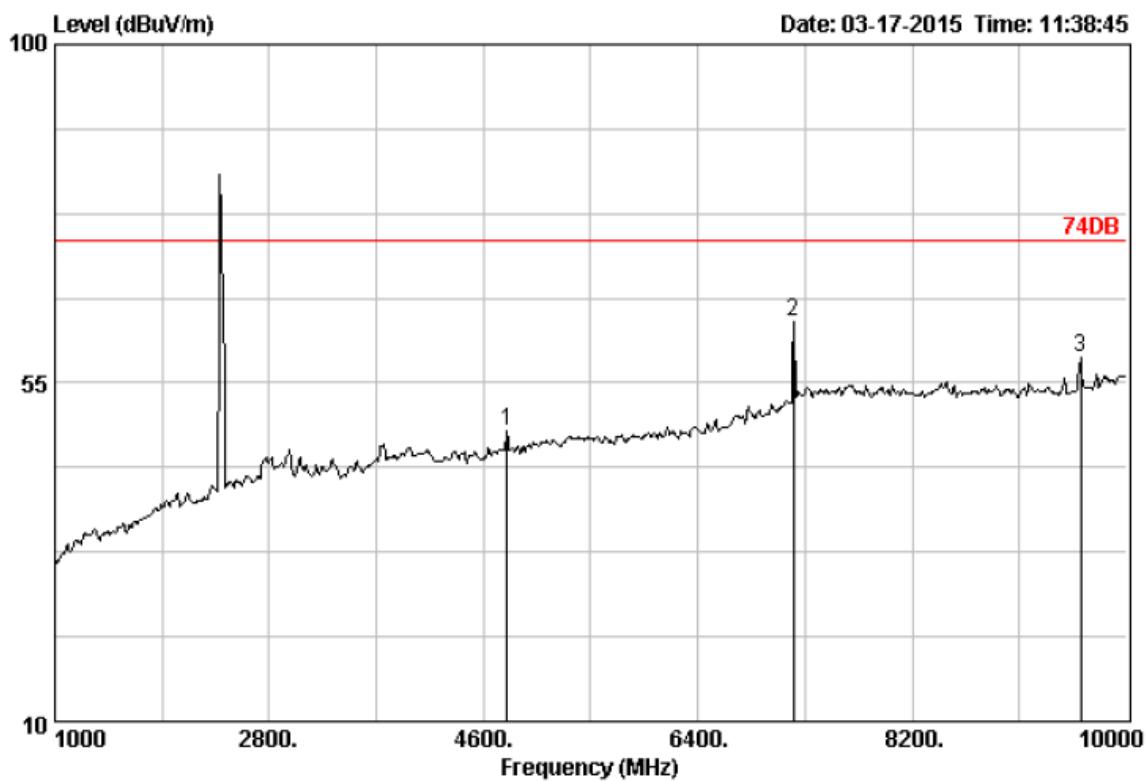
**Above 1 GHz Test Results:**

2404MHz:



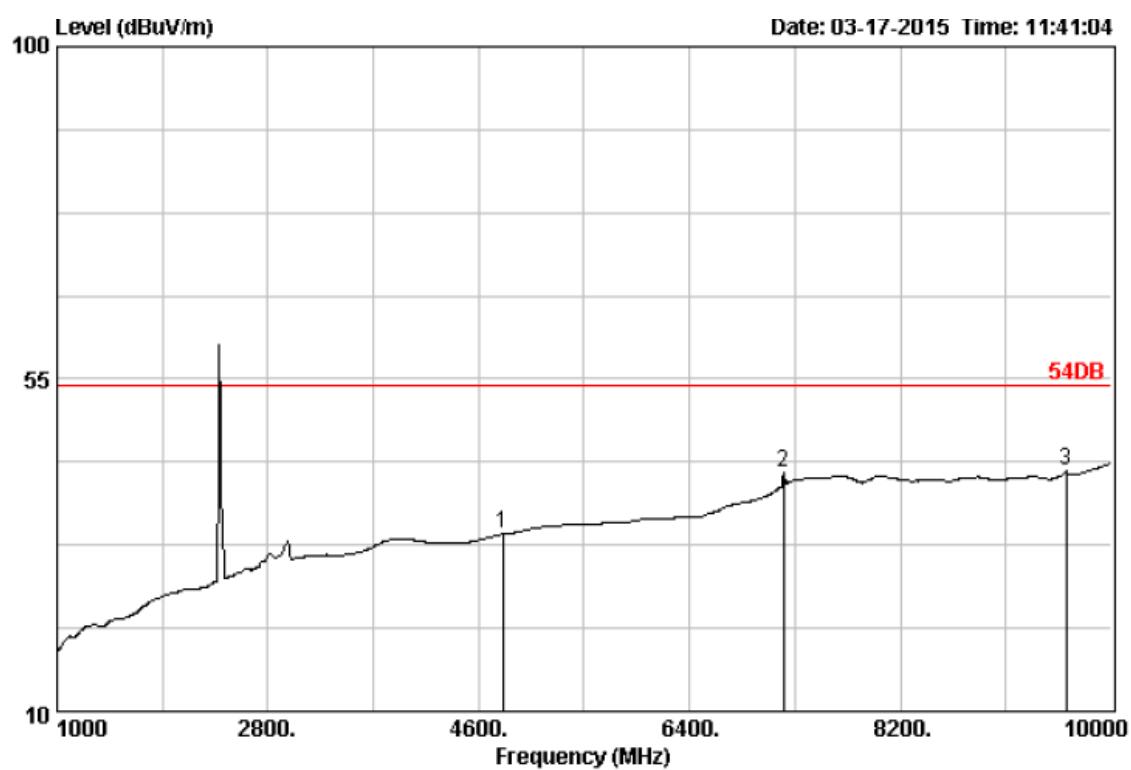
Site no. : 3m Chamber Data no. : 752  
 Dis. / Ant. : 3m DRH-118 Ant. pol. : HORIZONTAL  
 Limit : 74DB  
 Env. / Ins. : 23°C/54%  
 Engineer :  
 EUT :  
 Power :  
 M/N :  
 Test Mode :

Freq. (MHz)	Ant. Factor (dB)	Cable Loss (dB)	Emission				
			Reading (dBuV)	Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1 4808.00	33.48	6.91	41.90	47.95	74.00	26.05	Peak
2 7201.00	36.92	9.18	48.94	60.01	74.00	13.99	Peak
3 9613.00	38.54	10.98	46.53	60.07	74.00	13.93	Peak



Site no. : 3m Chamber Data no. : 753  
 Dis. / Ant. : 3m DRH-118 Ant. pol. : VERTICAL  
 Limit : 74DB  
 Env. / Ins. : 23°C/54%  
 Engineer :  
 EUT :  
 Power :  
 M/N :  
 Test Mode :

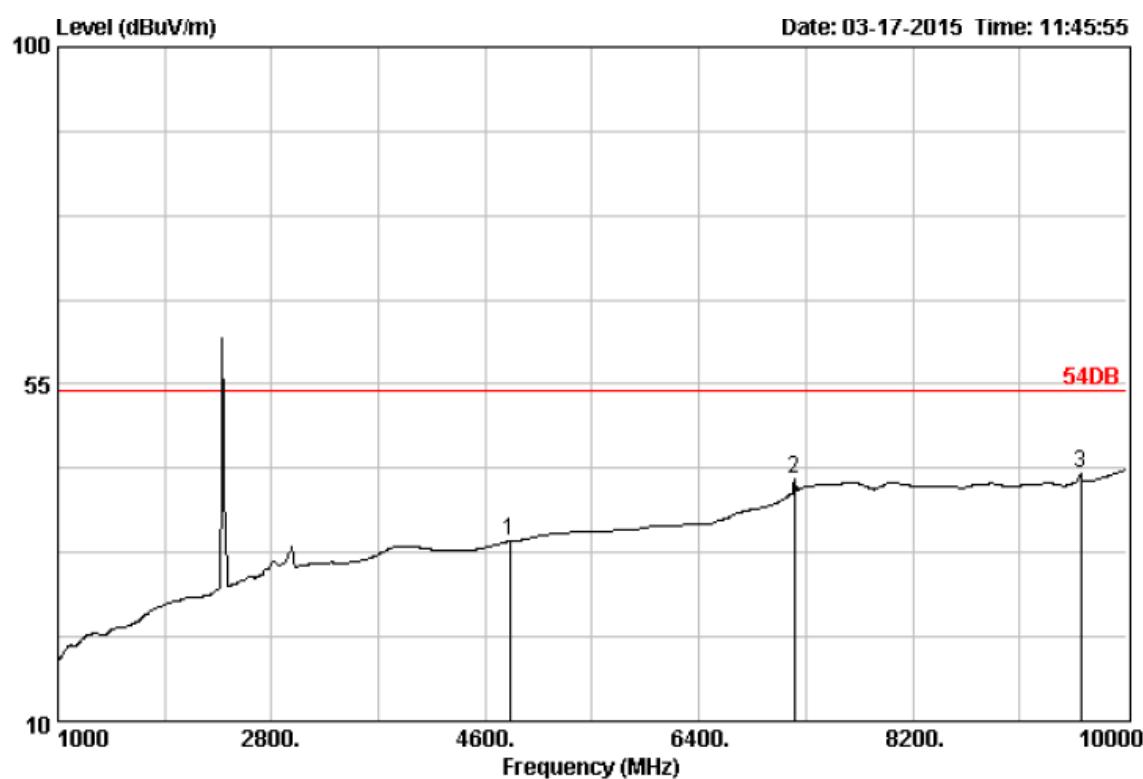
Freq. (MHz)	Ant. Factor (dB)	Cable Loss (dB)	Emission					Remark
			Reading (dBuV)	Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)		
1 4798.00	33.44	6.90	42.53	48.52	74.00	25.48	Peak	
2 7201.00	36.92	9.18	52.04	63.11	74.00	10.89	Peak	
3 9613.00	38.54	10.98	44.86	58.40	74.00	15.60	Peak	



Site no. : 3m Chamber  
Dis. / Ant. : 3m DRH-118  
Limit : 54DB  
Env. / Ins. : 23°C/54%  
Engineer :  
EUT :  
Power :  
M/N :  
Test Mode :

Data no. : 754  
Ant. pol. : HORIZONTAL

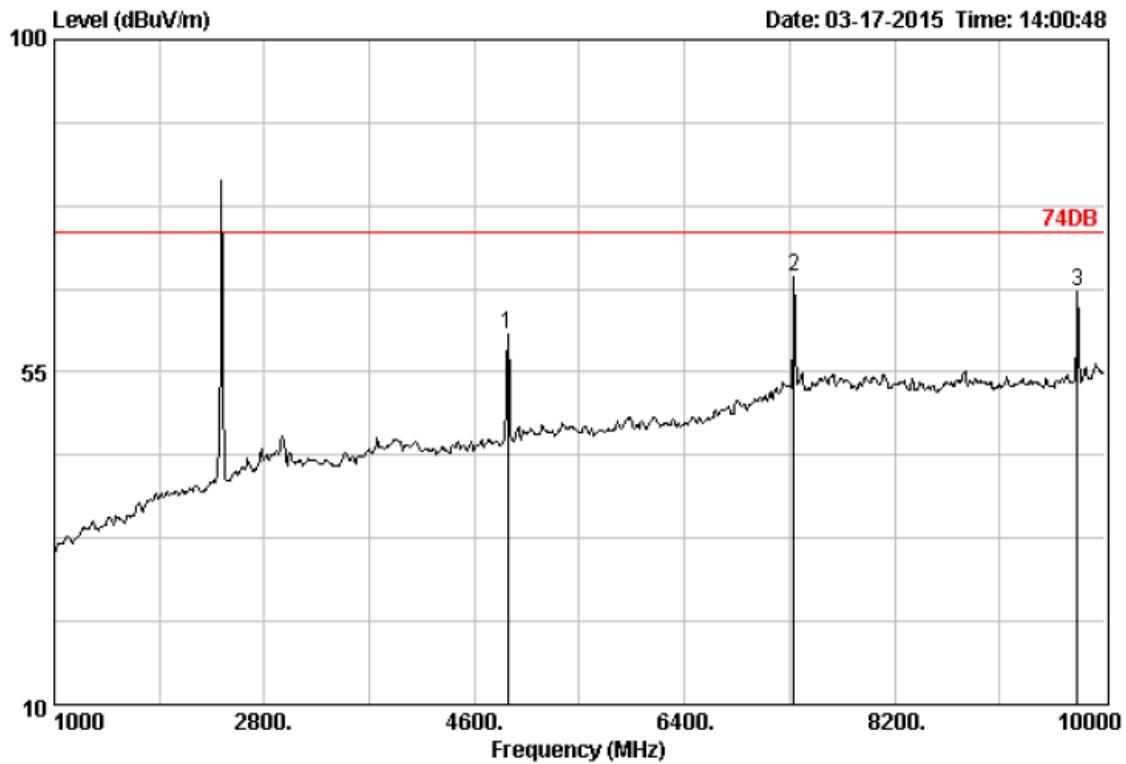
Freq. (MHz)	Ant. Factor (dB)	Cable Loss (dB)	Emission				
			Reading (dBuV)	Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
<hr/>							
1 4808.00	33.48	6.91	28.00	34.05	54.00	19.95	Average
2 7201.00	36.92	9.18	31.21	42.28	54.00	11.72	Average
3 9612.00	38.54	10.98	28.93	42.47	54.00	11.53	Average



Site no. : 3m Chamber Data no. : 755  
Dis. / Ant. : 3m DRH-118 Ant. pol. : VERTICAL  
Limit : 54DB  
Env. / Ins. : 23°C/54%  
Engineer :  
EUT :  
Power :  
M/N :  
Test Mode :

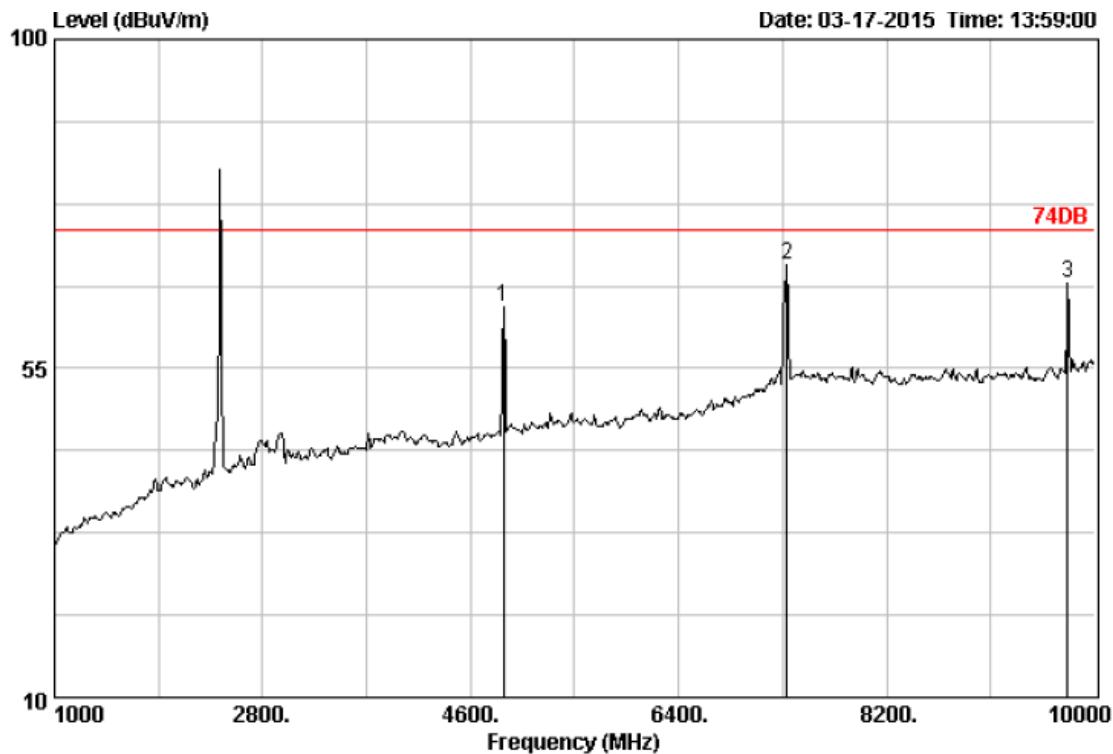
Freq. (MHz)	Ant. Factor (dB)	Cable Loss (dB)	Reading (dBuV)	Emission			
				Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
<hr/>							
1 4808.00	33.48	6.91	28.01	34.06	54.00	19.94	Average
2 7201.00	36.92	9.18	31.15	42.22	54.00	11.78	Average
3 9613.00	38.54	10.98	29.45	42.99	54.00	11.01	Average

2445MHz:



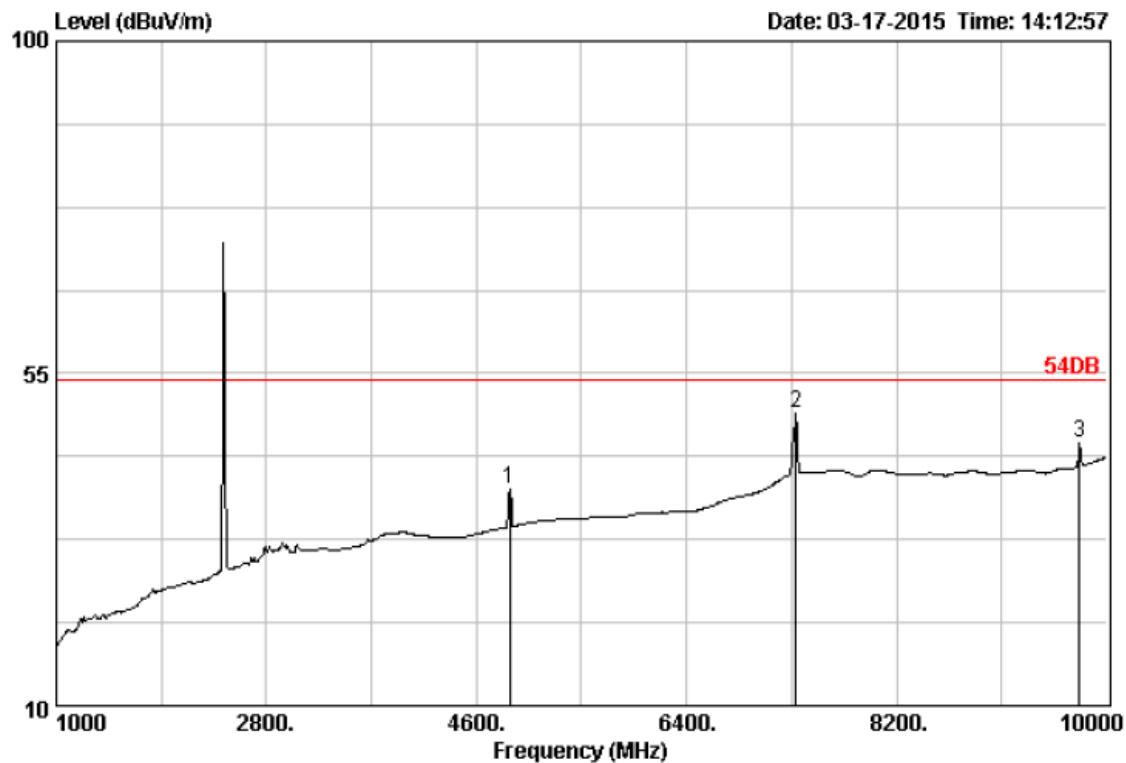
Site no. : 3m Chamber Data no. : 757  
 Dis. / Ant. : 3m DRH-118 Ant. pol. : HORIZONTAL  
 Limit : 74DB  
 Env. / Ins. : 23°C/54%  
 Engineer :  
 EUT :  
 Power :  
 M/N :  
 Test Mode :

Freq. (MHz)	Ant. Factor (dB)	Cable Loss (dB)	Reading (dBuV)	Emission			
				Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1 4888.00	33.63	6.96	53.94	60.24	74.00	13.76	Peak
2 7336.00	37.50	9.24	56.16	67.91	74.00	6.09	Peak
3 9766.00	38.67	11.04	51.81	65.85	74.00	8.15	Peak



Site no. : 3m Chamber Data no. : 756  
 Dis. / Ant. : 3m DRH-118 Ant. pol. : VERTICAL  
 Limit : 74DB  
 Env. / Ins. : 23°C/54%  
 Engineer :  
 EUT :  
 Power :  
 M/N :  
 Test Mode :

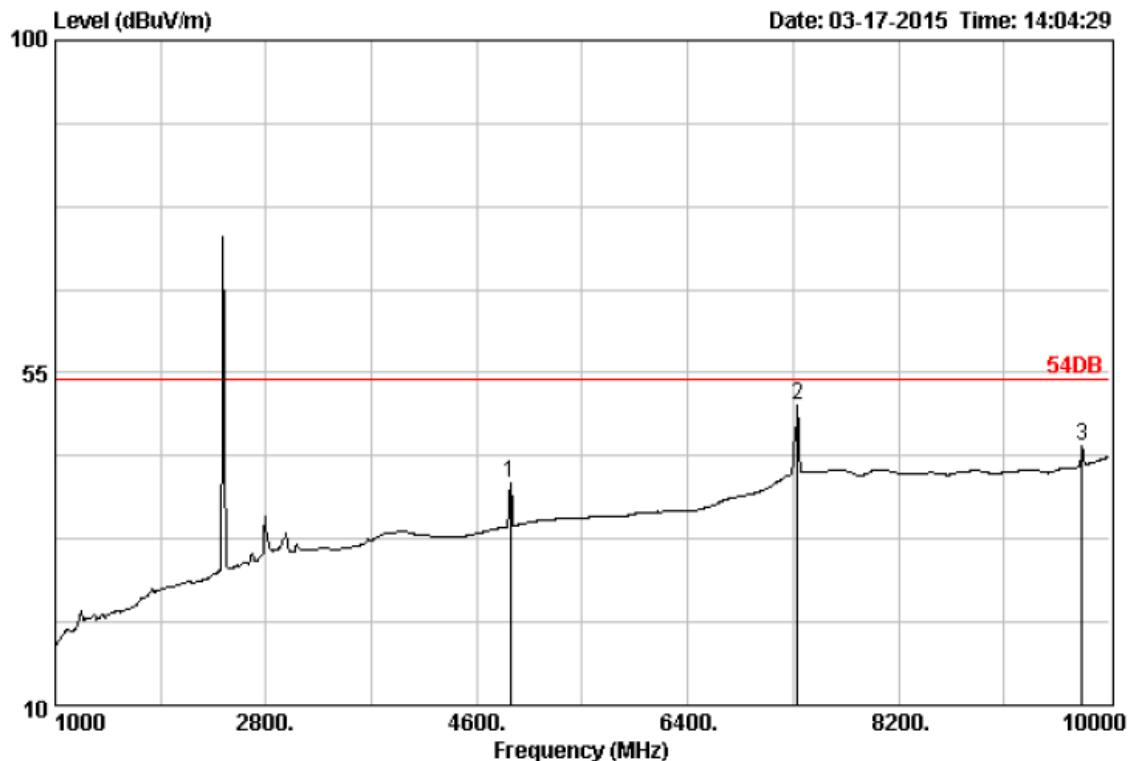
Freq. (MHz)	Ant. Factor (dB)	Cable Loss (dB)	Emission		Limits (dBuV/m)	Margin (dB)	Remark
			Reading (dBuV)	Level (dBuV/m)			
1 4888.00	33.63	6.96	56.99	63.29	74.00	10.71	Peak
2 7336.00	37.50	9.24	57.41	69.16	74.00	4.84	Peak
3 9766.00	38.67	11.04	52.62	66.66	74.00	7.34	Peak



Site no. : 3m Chamber  
 Dis. / Ant. : 3m DRH-118  
 Limit : 54DB  
 Env. / Ins. : 23°C/54%  
 Engineer :  
 EUT :  
 Power :  
 M/N :  
 Test Mode :

Data no. : 759  
 Ant. pol. : HORIZONTAL

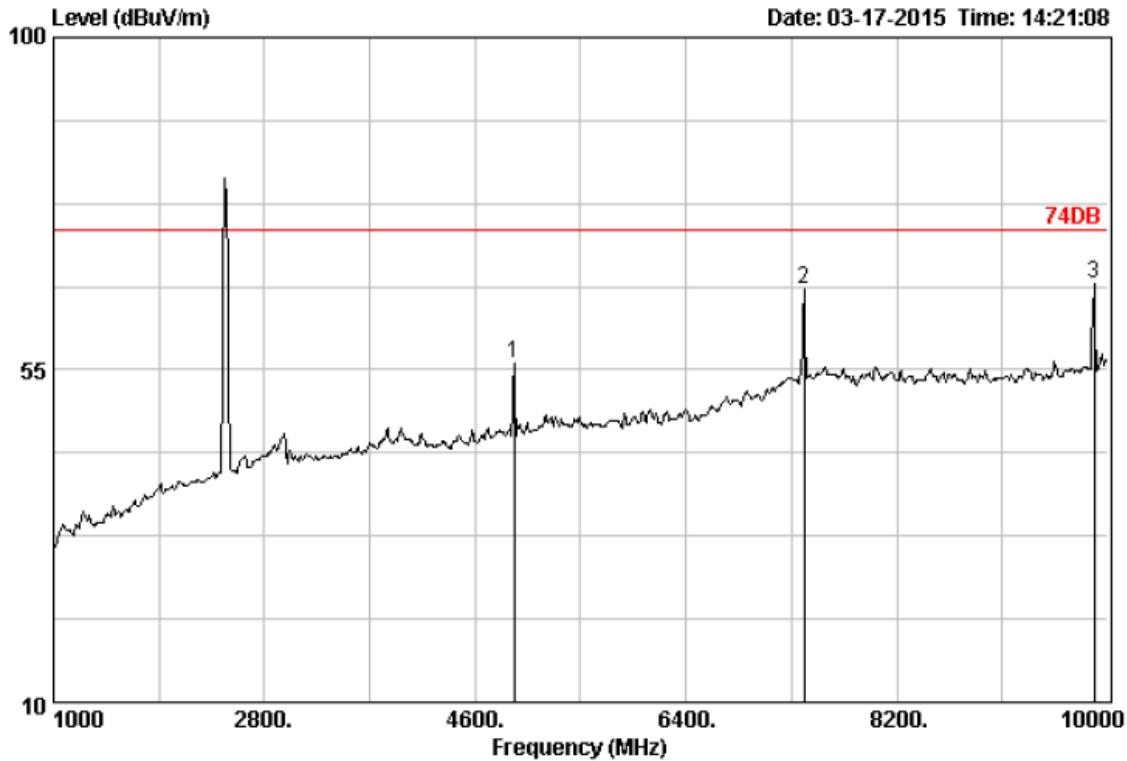
Freq. (MHz)	Ant. Factor (dB)	Cable Loss (dB)	Emission					Remark
			Reading (dBuV)	Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)		
1 4888.00	33.63	6.96	33.02	39.32	54.00	14.68	Average	
2 7336.00	37.50	9.24	37.80	49.55	54.00	4.45	Average	
3 9766.00	38.67	11.04	31.55	45.59	54.00	8.41	Average	



Site no. : 3m Chamber Data no. : 758  
 Dis. / Ant. : 3m DRH-118 Ant. pol. : VERTICAL  
 Limit : 54DB  
 Env. / Ins. : 23°C/54%  
 Engineer :  
 EUT :  
 Power :  
 M/N :  
 Test Mode :

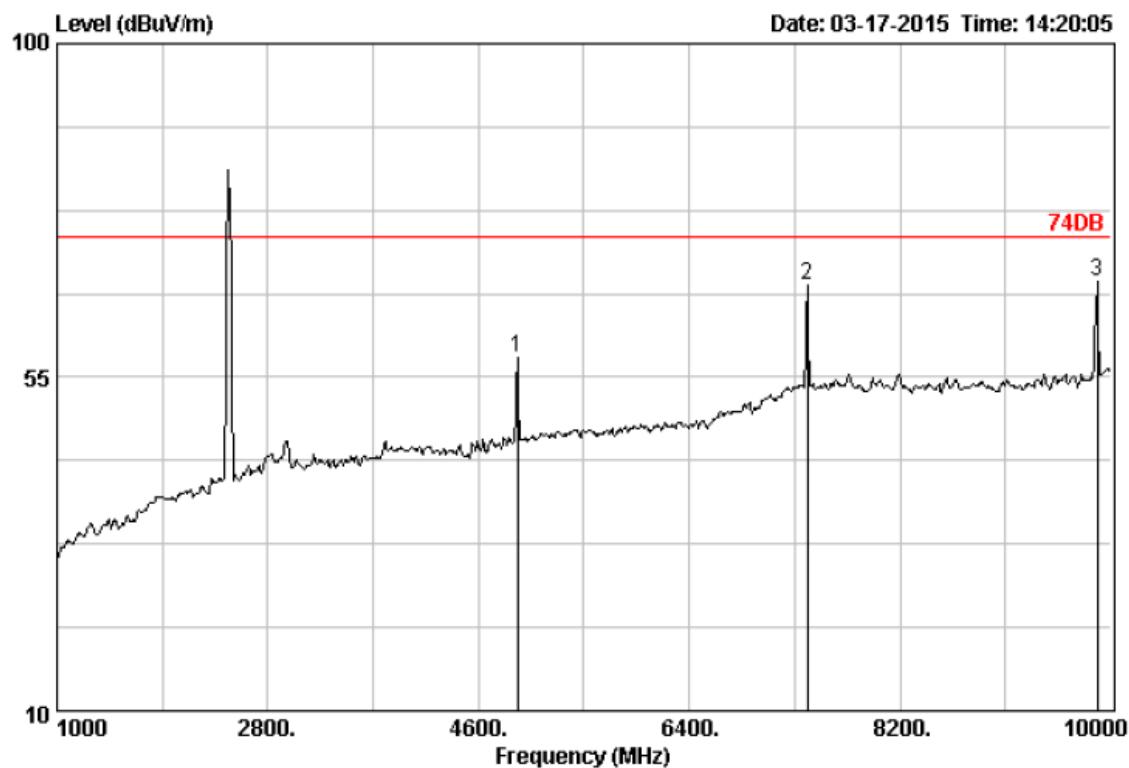
Freq. (MHz)	Ant. Factor (dB)	Cable Loss (dB)	Emission				Remark
			Reading (dBuV)	Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	
1 4888.00	33.63	6.96	33.74	40.04	54.00	13.96	Average
2 7336.00	37.50	9.24	38.76	50.51	54.00	3.49	Average
3 9766.00	38.67	11.04	31.13	45.17	54.00	8.83	Average

2473MHz:



Site no. : 3m Chamber Data no. : 761  
 Dis. / Ant. : 3m DRH-118 Ant. pol. : HORIZONTAL  
 Limit : 74DB  
 Env. / Ins. : 23°C/54%  
 Engineer :  
 EUT :  
 Power :  
 M/N :  
 Test Mode :

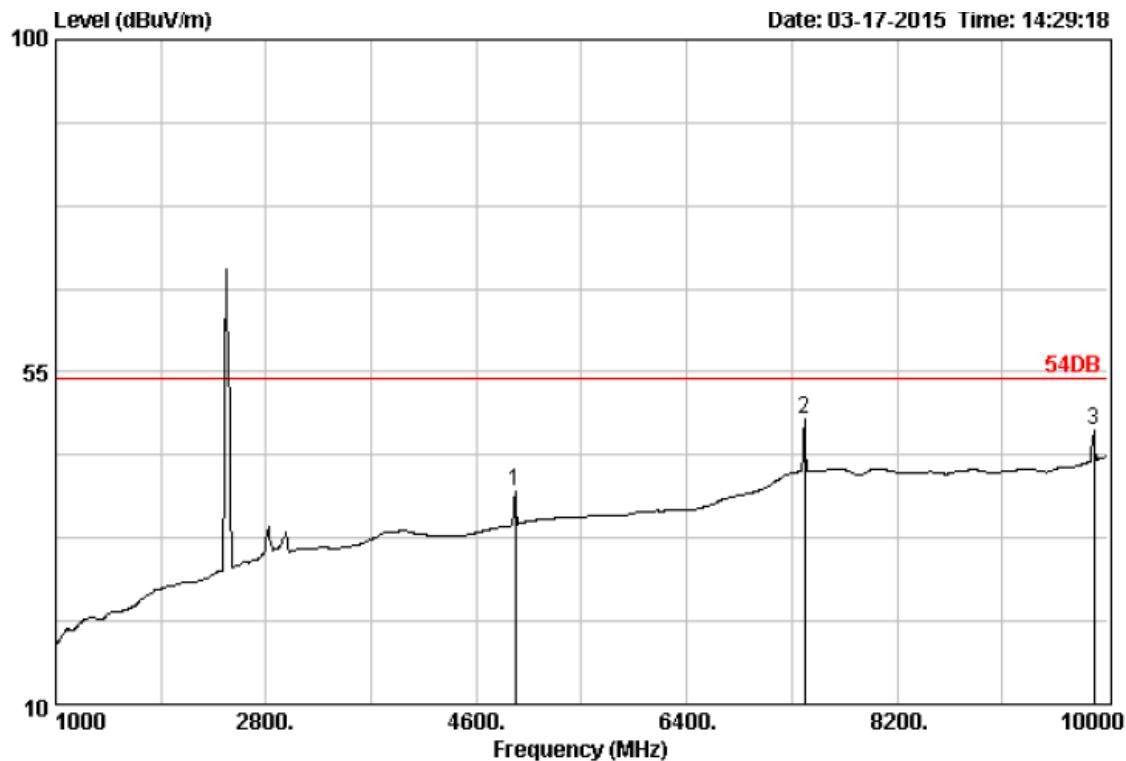
Freq. (MHz)	Ant. Factor (dB)	Cable Loss (dB)	Emission				
			Reading (dBuV)	Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1 4933.00	33.75	6.99	49.43	55.90	74.00	18.10	Peak
2 7408.00	37.64	9.26	53.97	65.90	74.00	8.10	Peak
3 9883.00	38.84	11.09	52.05	66.54	74.00	7.46	Peak



Site no. : 3m Chamber  
 Dis. / Ant. : 3m DRH-118  
 Limit : 74DB  
 Env. / Ins. : 23°C/54%  
 Engineer :  
 EUT :  
 Power :  
 M/N :  
 Test Mode :

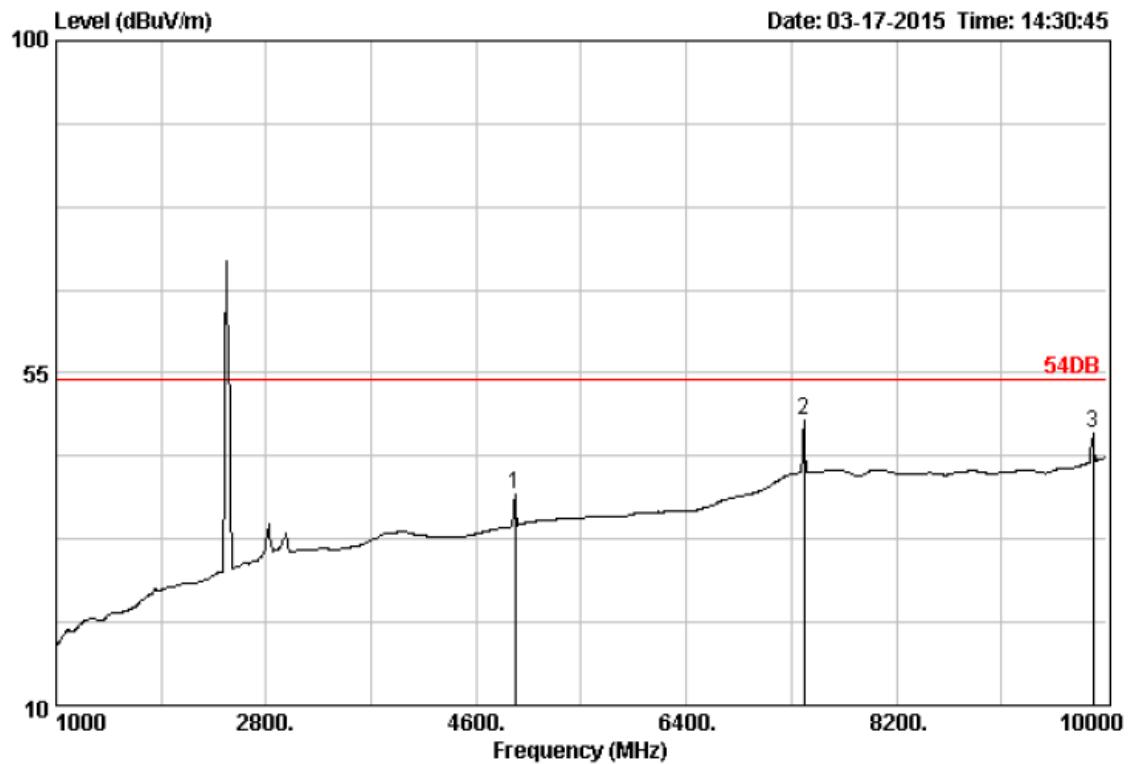
Data no. : 760  
 Ant. pol. : VERTICAL

Freq. (MHz)	Ant. Factor (dB)	Cable Loss (dB)	Reading (dBuV)	Emission			
				Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1 4933.00	33.75	6.99	51.20	57.67	74.00	16.33	Peak
2 7408.00	37.64	9.26	55.37	67.30	74.00	6.70	Peak
3 9883.00	38.84	11.09	53.30	67.79	74.00	6.21	Peak



Site no. : 3m Chamber Data no. : 762  
 Dis. / Ant. : 3m DRH-118 Ant. pol. : HORIZONTAL  
 Limit : 54DB  
 Env. / Ins. : 23°C/54%  
 Engineer :  
 EUT :  
 Power :  
 M/N :  
 Test Mode :

Freq. (MHz)	Ant. Factor (dB)	Cable Loss (dB)	Emission				
			Reading (dBuV)	Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1 4933.00	33.75	6.99	32.47	38.94	54.00	15.06	Average
2 7408.00	37.64	9.26	36.70	48.63	54.00	5.37	Average
3 9883.00	38.84	11.09	32.60	47.09	54.00	6.91	Average



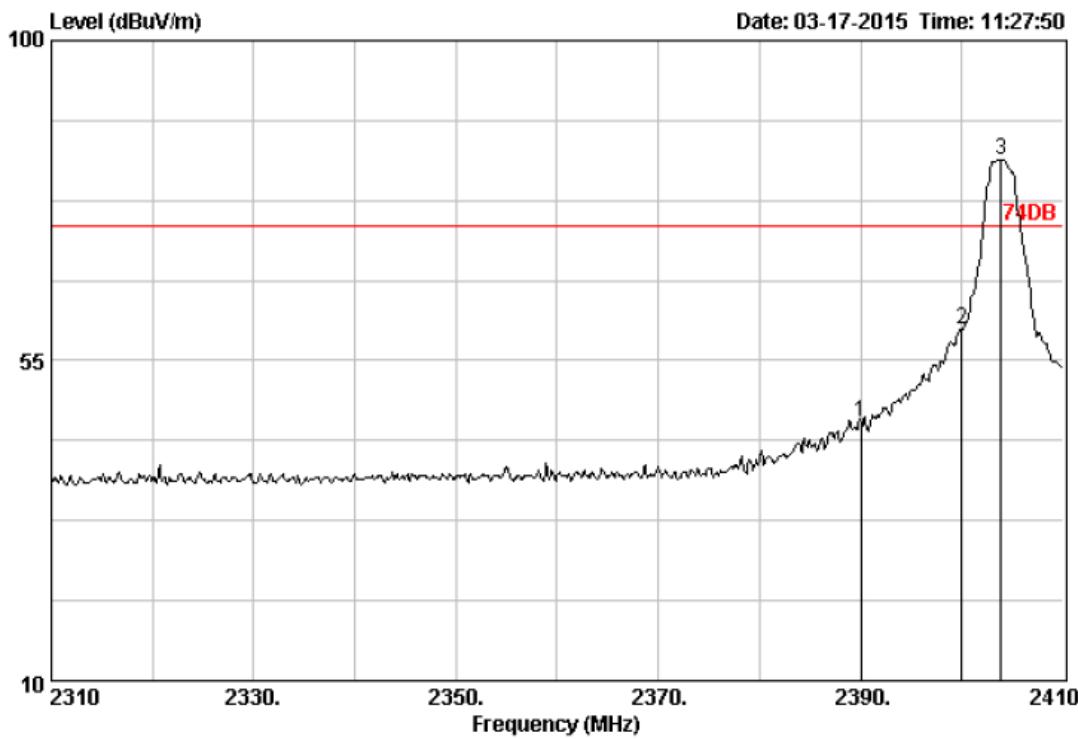
Site no. : 3m Chamber Data no. : 763  
 Dis. / Ant. : 3m DRH-118 Ant. pol. : VERTICAL  
 Limit : 54DB  
 Env. / Ins. : 23°C/54%  
 Engineer :  
 EUT :  
 Power :  
 M/N :  
 Test Mode :

Freq. (MHz)	Ant. Factor (dB)	Cable Loss (dB)	Emission				
			Reading (dBuV)	Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1 4933.00	33.75	6.99	32.21	38.68	54.00	15.32	Average
2 7408.00	37.64	9.26	36.78	48.71	54.00	5.29	Average
3 9883.00	38.84	11.09	32.36	46.85	54.00	7.15	Average

**Note:** above 10GHz up to 25GHz was verified, and no any emission was found except system noise floor.

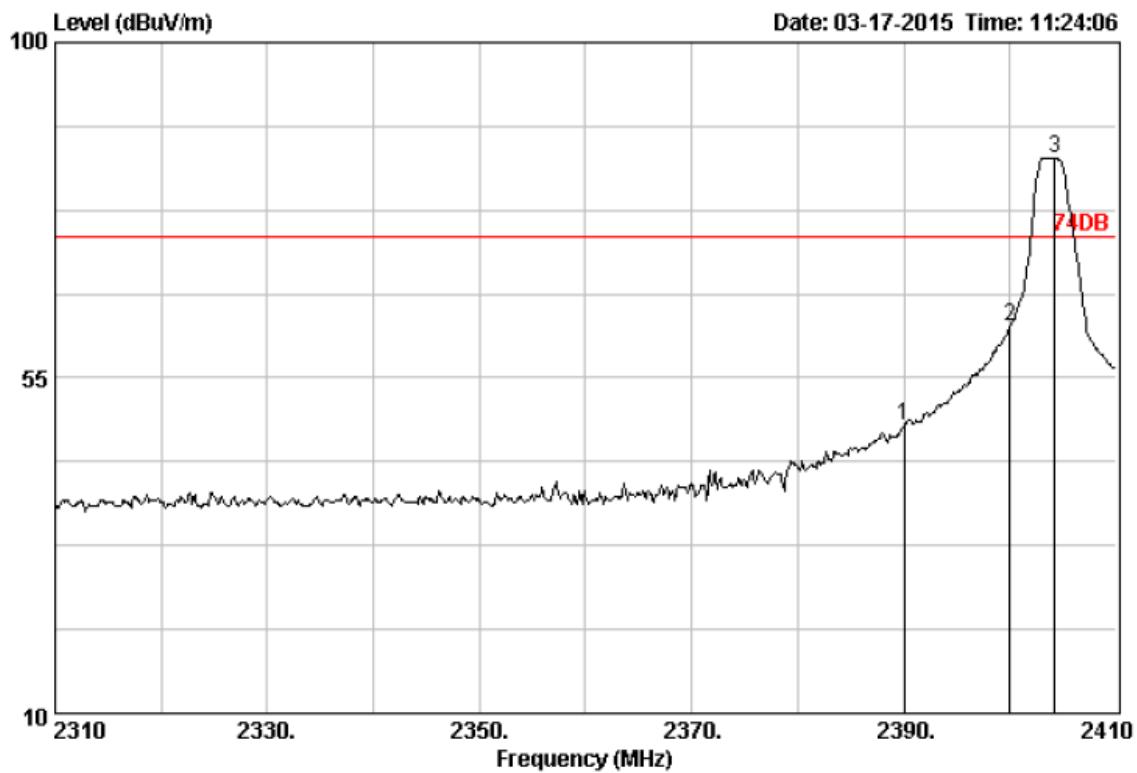
Bandedge:

2404MHz:



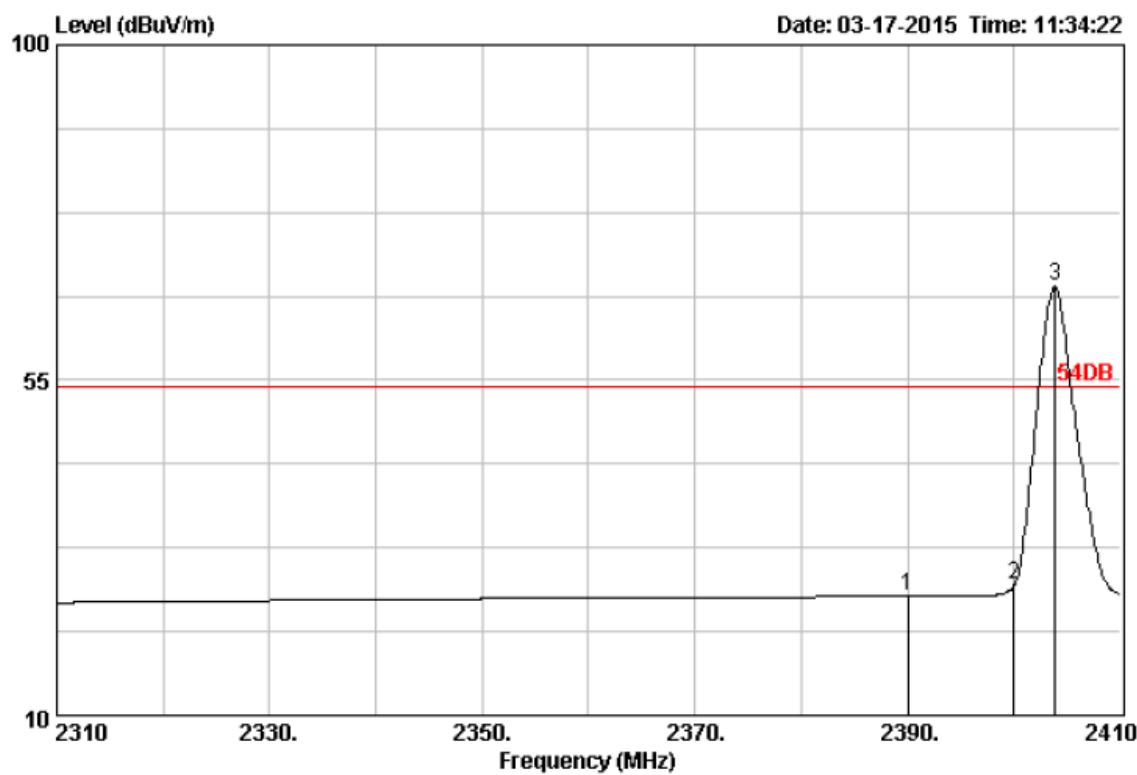
Site no. : 3m Chamber Data no. : 749  
 Dis. / Ant. : 3m DRH-118 Ant. pol. : HORIZONTAL  
 Limit : 74DB  
 Env. / Ins. : 23°C/54%  
 Engineer :  
 EUT :  
 Power :  
 M/N :  
 Test Mode :

Freq. (MHz)	Ant. Factor (dB)	Cable Loss (dB)	Emission				
			Reading (dBuV)	Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
<hr/>							
1 2390.00	28.78	4.61	48.43	46.46	74.00	27.54	Peak
2 2400.00	28.78	4.61	61.26	59.29	74.00	14.71	Peak



Site no. : 3m Chamber Data no. : 748  
 Dis. / Ant. : 3m DRH-118 Ant. pol. : VERTICAL  
 Limit : 74DB  
 Env. / Ins. : 23°C/54%  
 Engineer :  
 EUT :  
 Power :  
 M/N :  
 Test Mode :

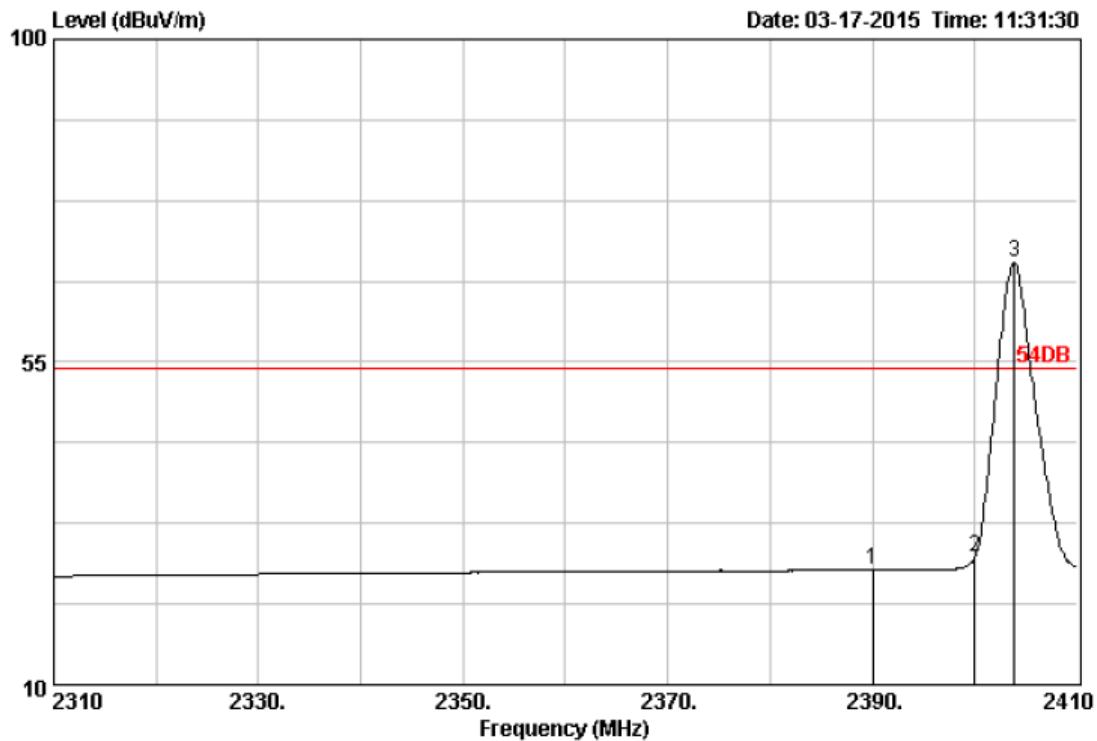
Freq. (MHz)	Ant. Factor (dB)	Cable Loss (dB)	Emission					Remark
			Reading (dBuV)	Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)		
1 2390.00	28.78	4.61	50.57	48.60	74.00	25.40	Peak	
2 2400.00	28.78	4.61	63.75	61.78	74.00	12.22	Peak	



Site no. : 3m Chamber  
Dis. / Ant. : 3m DRH-118  
Limit : 54DB  
Env. / Ins. : 23°C/54%  
Engineer :  
EUT :  
Power :  
M/N :  
Test Mode :

Data no. : 751  
Ant. pol. : HORIZONTAL

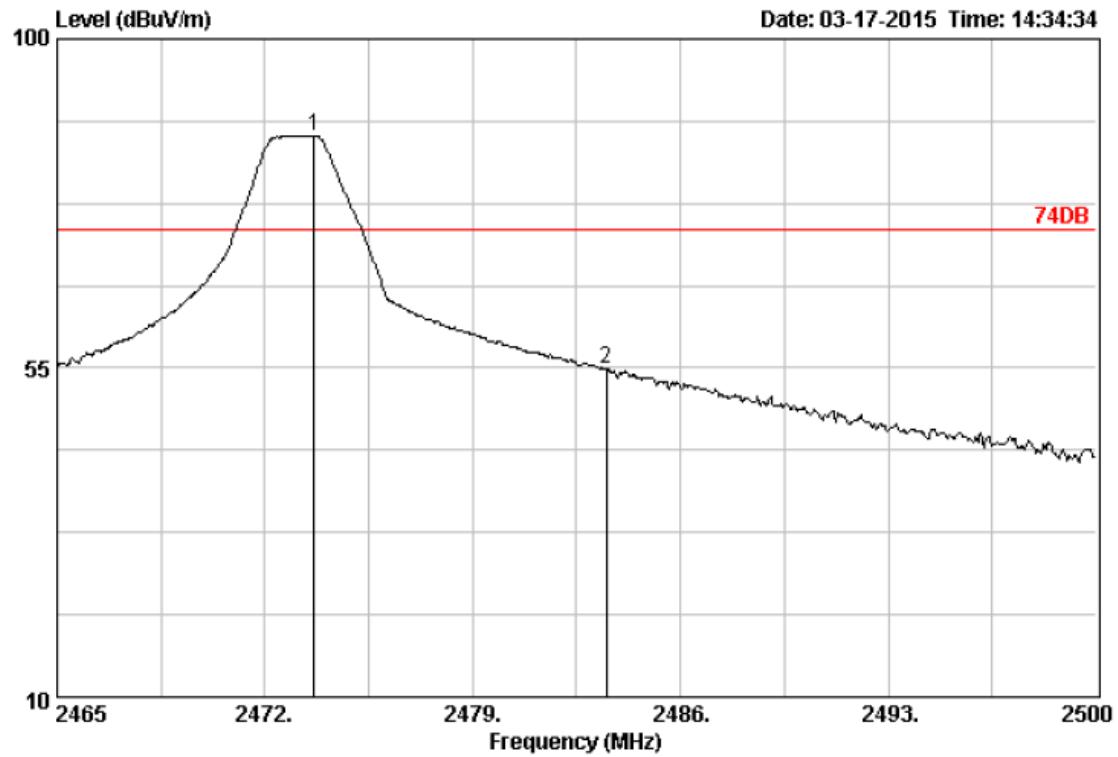
Freq. (MHz)	Ant. Factor (dB)	Cable Loss (dB)	Emission				
			Reading (dBuV)	Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
<hr/>							
1 2390.00	28.78	4.61	27.94	25.97	54.00	28.03	Average
2 2400.00	28.78	4.61	29.45	27.48	54.00	26.52	Average



Site no. : 3m Chamber Data no. : 750  
Dis. / Ant. : 3m DRH-118 Ant. pol. : VERTICAL  
Limit : 54DB  
Env. / Ins. : 23°C/54%  
Engineer :  
EUT :  
Power :  
M/N :  
Test Mode :

Freq. (MHz)	Ant. Factor (dB)	Cable Loss (dB)	Emission				Remark
			Reading (dBuV)	Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	
1 2390.00	28.78	4.61	27.95	25.98	54.00	28.02	Average
2 2400.00	28.78	4.61	29.80	27.83	54.00	26.17	Average

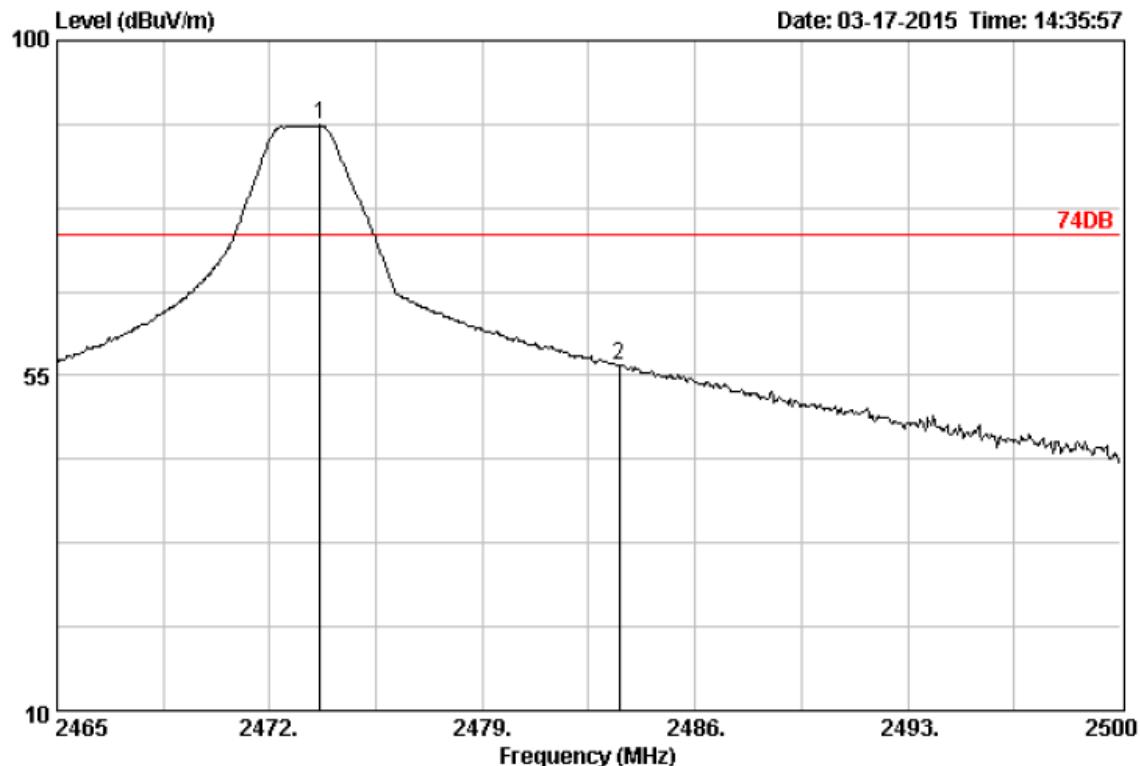
2473MHz:



Site no. : 3m Chamber  
Dis. / Ant. : 3m DRH-118  
Limit : 74DB  
Env. / Ins. : 23°C/54%  
Engineer :  
EUT :  
Power :  
M/N :  
Test Mode :

Data no. : 764  
Ant. pol. : HORIZONTAL

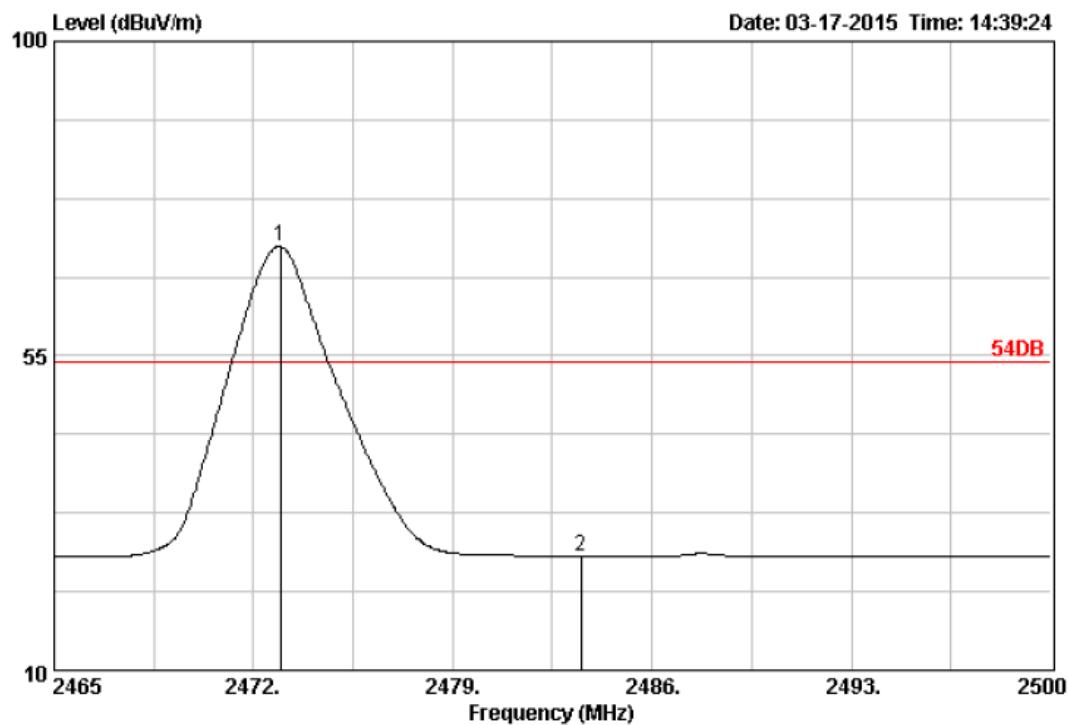
Freq. (MHz)	Ant. Factor (dB)	Cable Loss (dB)	Emission				
			Reading (dBuV)	Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
2 2483.50	28.93	4.70	56.63	54.88	74.00	19.12 Peak	



Site no. : 3m Chamber  
Dis. / Ant. : 3m DRH-118  
Limit : 74DB  
Env. / Ins. : 23°C/54%  
Engineer :  
EUT :  
Power :  
M/N :  
Test Mode :

Data no. : 765  
Ant. pol. : VERTICAL

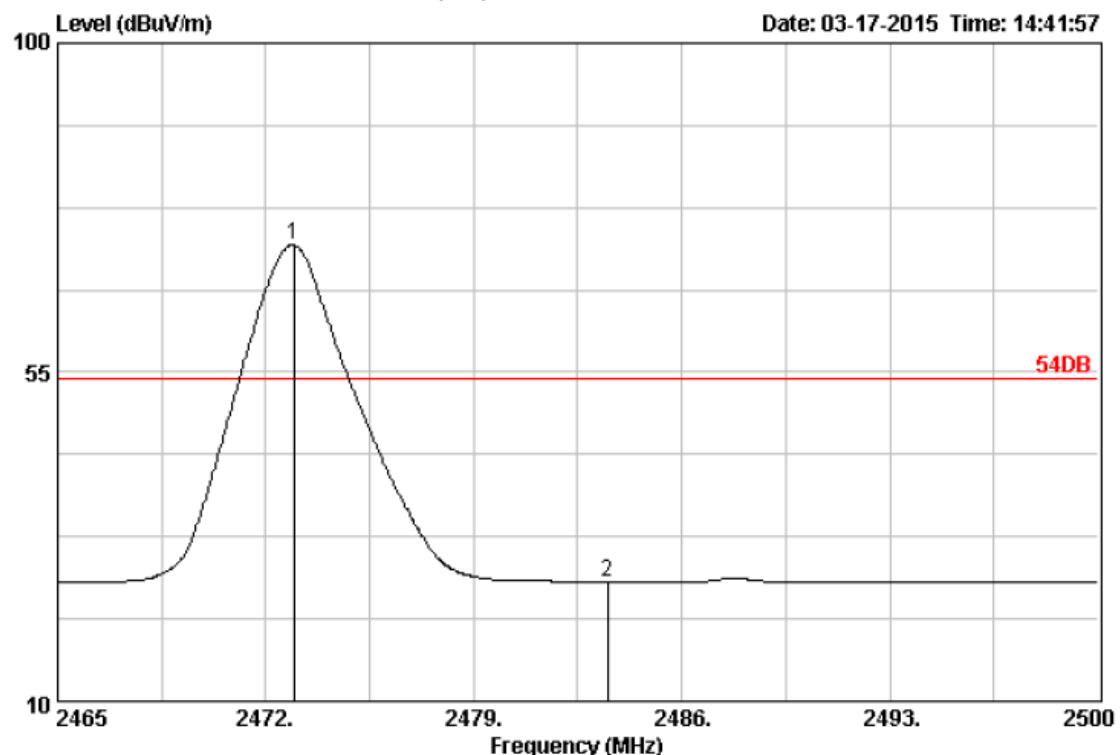
Freq. (MHz)	Ant. Factor (dB)	Cable Loss (dB)	Emission				
			Reading (dBuV)	Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
2 2483.50	28.93	4.70	58.03	56.28	74.00	17.72	Peak



Site no. : 3m Chamber Data no. : 766  
Dis. / Ant. : 3m DRH-118 Ant. pol. : HORIZONTAL  
Limit : 54DB  
Env. / Ins. : 23°C/54%  
Engineer :  
EUT :  
Power :  
M/N :  
Test Mode :

Freq. (MHz)	Ant. Factor (dB)	Cable Loss (dB)	Emission				Remark
			Reading (dBuV)	Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	
2 2483.50	28.93	4.70	28.02	26.27	54.00	27.73	Average

Testing Tech.



Site no. : 3m Chamber  
Dis. / Ant. : 3m DRH-118  
Limit : 54DB  
Env. / Ins. : 23°C/54%  
Engineer :  
EUT :  
Power :  
M/N :  
Test Mode :

Data no. : 767  
Ant. pol. : VERTICAL

Freq. (MHz)	Ant. Factor (dB)	Cable Loss (dB)	Emission				Margin (dB)	Remark
			Reading (dBuV)	Level (dBuV/m)	Limits (dBuV/m)			
2 2483.50	28.93	4.70	28.04	26.29	54.00	27.71	Average	

## 4.4. Occupied Bandwidth Measurement

### Measurement Procedure

1. Set EUT as keeping tx mode.
2. RBW  $\geq 1\%$  of the 20 dB bandwidth, VBW  $\geq$  RBW.
3. The useful radiated emission from the EUT was detected by the spectrum analyser with peak detector.

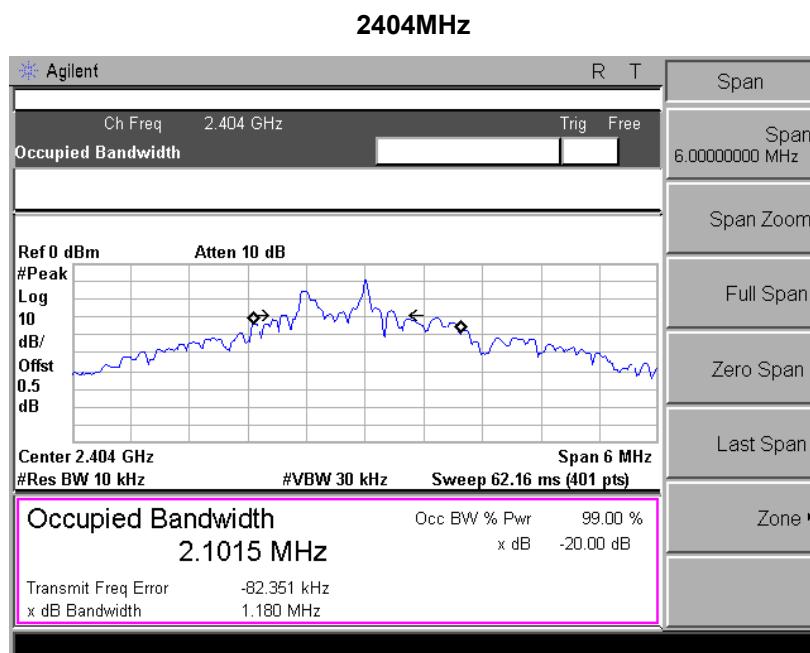
### Test SET-UP (Block Diagram of Configuration)

Same as 4.2 Radiated Emission Measurement.

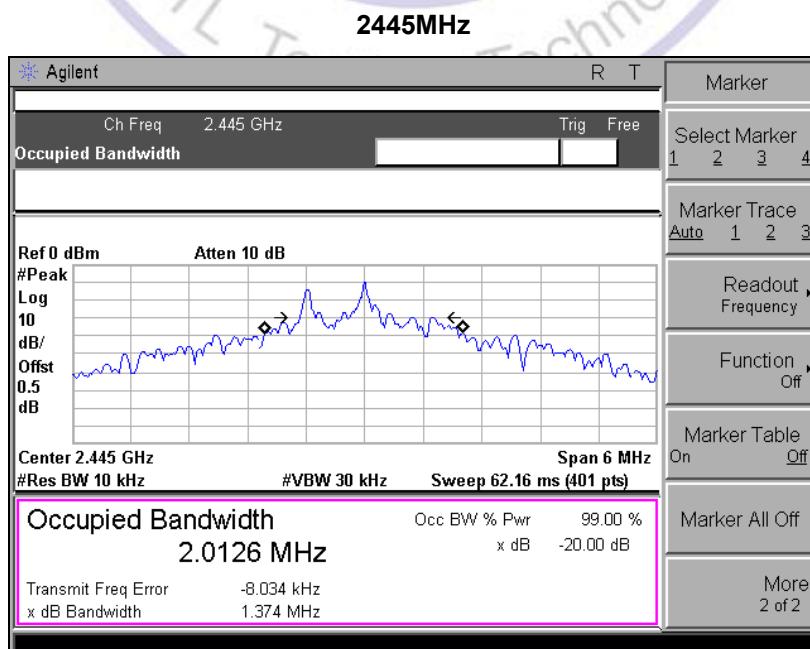
### Measurement Equipment Used:

Same as 4.2 Radiated Emission Measurement.

### Measurement Results

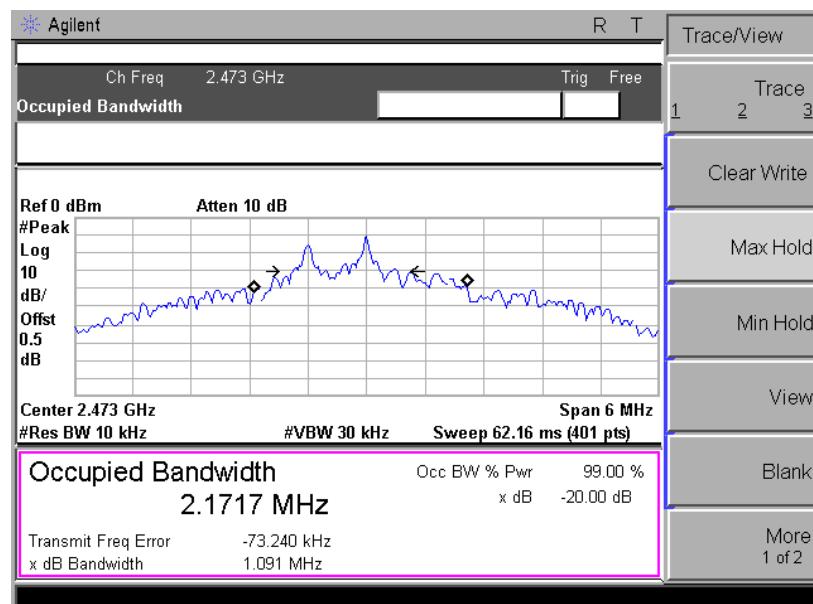


20dB Bandwidth: 1180 KHz



20dB Bandwidth: 1374 KHz

2480MHz



20dB Bandwidth: 1091 KHz



## **5. Antenna Requirement**

### **Standard Applicable**

For intentional device, according to FCC 47 CFR Section 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.

And according to FCC 47 CFR Section 15.247 (c), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

**Refer to statement below for compliance.**

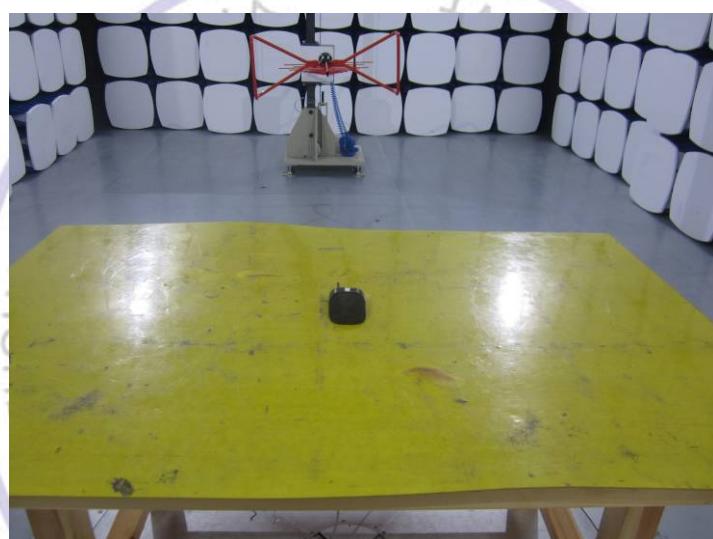
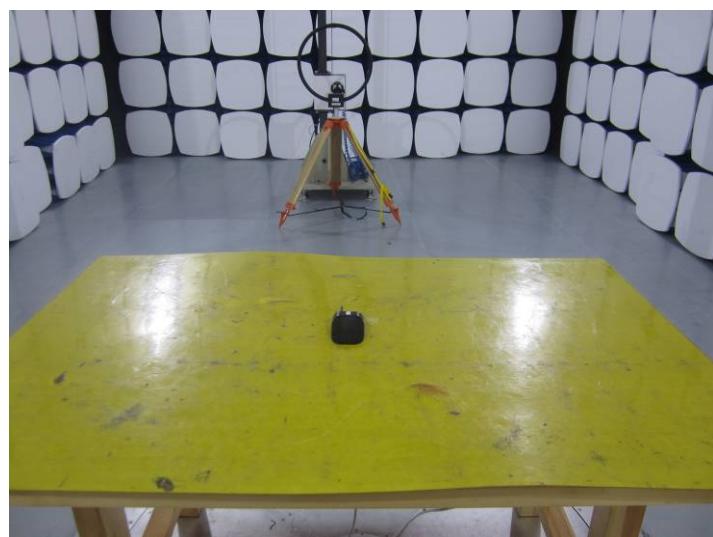
The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited. Further, this requirement does not apply to intentional radiators that must be professionally installed.

### **Antenna Connected Construction**

The antenna used in this product is an internal Antenna, The directional gains of antenna used for transmitting is 1.0 dBi.

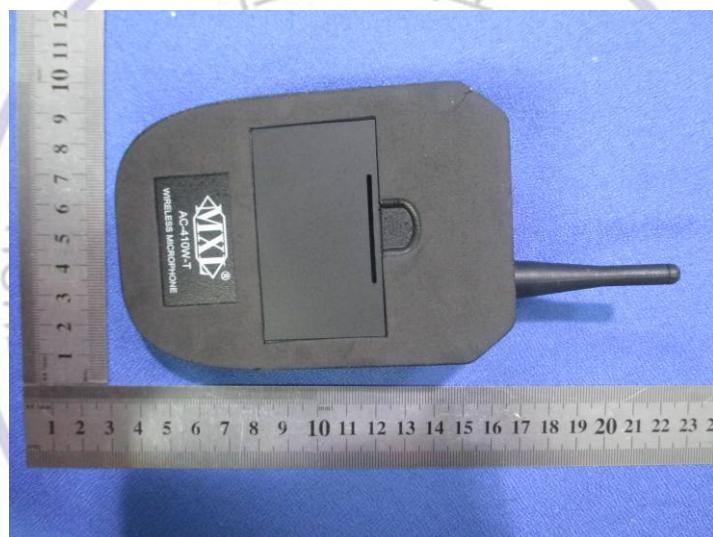


## 6. Test Setup Photos of the EUT



## 7. External and Internal Photos of the EUT

### External Photos of EUT





Internal Photos of EUT