

FCC CFR47 PART 15 SUBPART C(15.249)
CERTIFICATION
TEST REPORT

FOR

Meet (China) Ltd.

2.4GHz Wireless Module

Model No.: MS-RF005

Prepared for : Meet (China) Ltd.
Address : Flat C, 11/F., China Trade Centre, 122-124 Wai Yip St., Kwun Tong,
Kowloon, Hong Kong

Prepared by : Shenzhen LCS Compliance Testing Laboratory Ltd.
Address : 1F., Xingyuan Industrial Park, Tongda Road, Bao'an Blvd., Bao'an
District, Shenzhen, Guangdong, China

Date of receipt of test sample : December 23, 2011
Number of tested samples : 1
Serial number : Prototype
Date of Test : December 23, 2011 - February 17, 2012
Date of Report : February 17, 2012

TEST REPORT
FCC CFR 47 PART 15 C(15.249)**Report Reference No. : LCS1112233657F**

Date of issue : February 17, 2012

Testing Laboratory Name..... : Shenzhen LCS Compliance Testing Laboratory Ltd.Address : 1F., Xingyuan Industrial Park, Tongda Road, Bao'an Blvd.,
Bao'an District, Shenzhen, Guangdong, ChinaTesting location/ procedure : Full application of Harmonised standards ☒
Partial application of Harmonised standards ☐
Other standard testing method ☐**Applicant's name : Meet (China) Ltd.**Address : Flat C, 11/F., China Trade Centre, 122-124 Wai Yip St., Kwun
Tong, Kowloon, Hong Kong**Test specification**

Standard : FCC CFR 47 PART 15 Subpart C: 2011, ANSI C63.4-2009

Test Report Form No. : LCSEMC-1.0

TRF Originator : Shenzhen LCS Compliance Testing Laboratory Ltd.

Master TRF : Dated 2011-03

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Test item description. : 2.4GHz Wireless Module

Trade Mark : MEET

Manufacturer : Meet (China) Ltd.

Model/Type reference : MS-RF005

Ratings : DC 3.3V

Result : **Positive****Compiled by:**

Bobo Li/ File administrators

Supervised by:

Vito Cao/ Technique principal

Approved by:

Gavin Liang/ Manager

EMC -- TEST REPORT**Test Report No. : LCS1112233657F**February 17, 2012

Date of issue

Type / Model..... : MS-RF005

EUT..... : 2.4GHz Wireless Module

Applicant..... : Meet (China) Ltd.Address..... : Flat C, 11/F., China Trade Centre, 122-124 Wai Yip St., Kwun
Tong, Kowloon, Hong Kong

Telephone..... : /

Fax..... : /

Manufacturer..... : Meet (China) Ltd.Address..... : Flat C, 11/F., China Trade Centre, 122-124 Wai Yip St., Kwun
Tong, Kowloon, Hong Kong

Telephone..... : /

Fax..... : /

Factory..... : /

Address..... : /

Telephone..... : /

Fax..... : /

Test Result:**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. GENERAL INFORMATION

1.1. Description of Device (EUT)

EUT	: 2.4GHz Wireless Module
Model Number	: MS-RF005
Power Supply	: DC 3.3V
Frequency Range/ Modulation Type	: 2401.00-2479.00MHz,/GFSK (Channel Number: 79, Channel Frequency=2401+1(K-1), K=1, 2, 379)

1.2. Description of Test Facility

Site Description	
EMC Lab.	: Accredited by CNAS, June 04, 2010 The Certificate Registration Number. is L4595. Accredited by FCC, July 14, 2011 The Certificate Registration Number. is 899208. Accredited by Industry Canada, May. 02, 2011 The Certificate Registration Number. is 9642A-1

1.3. 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 LCS 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.

1.4. Measurement Uncertainty

Test Item		Frequency Range	Uncertainty	Note
Radiation Uncertainty	:	30MHz~200MHz	$\pm 2.96\text{dB}$	(1)
		200MHz~1000MHz	$\pm 3.10\text{dB}$	(1)
		1GHz~26.5GHz	$\pm 4.20\text{dB}$	(1)
Conduction Uncertainty	:	150kHz~30MHz	$\pm 1.63\text{dB}$	(1)
Power disturbance	:	30MHz~300MHz	$\pm 1.60\text{dB}$	(1)

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

2. TEST METHODOLOGY

All measurements contained in this report were conducted with ANSI C63.4-2009, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

The radiated testing was performed at an antenna-to-EUT distance of 3 meters. All radiated and conducted emissions measurement was performed at Shenzhen LCS Compliance Testing Laboratory Ltd..

2.1. EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

2.2. EUT Exercise

The EUT was operated in the engineering mode to fix the TX frequency that was for the purpose of the measurements.

According to its specifications, the EUT must comply with the requirements of the Section 15.203, 15.205, 15.207, 15.209 and 15.249 under the FCC Rules Part 15 Subpart C.

2.3. General Test Procedures

2.3.1 Conducted Emissions

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 13.1.4.1 of ANSI C63.4 Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using Quasi-peak and average detector modes.

2.3.2 Radiated Emissions

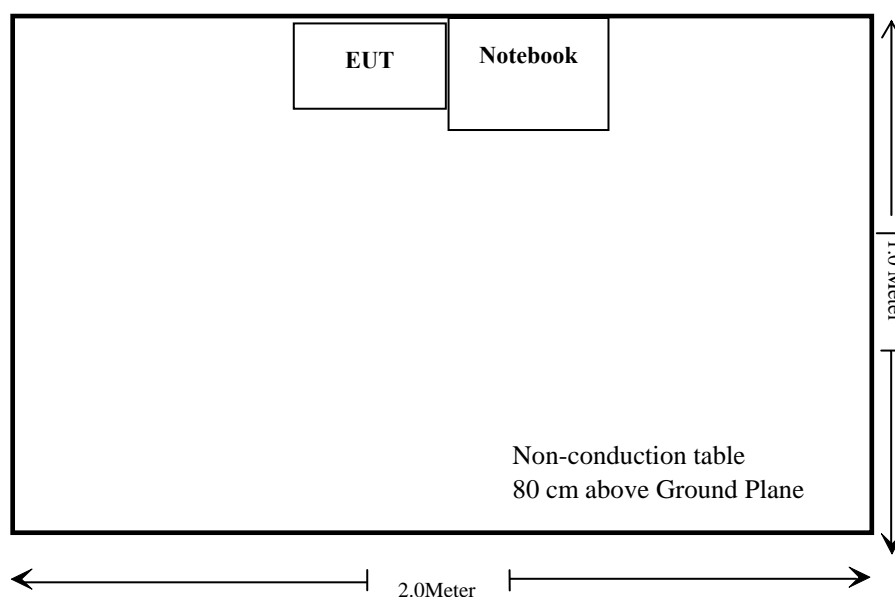
The EUT is placed on a turn table, which is 0.8 m above ground plane. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna, which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the maximum emissions, exploratory radiated emission measurements were made according to the requirements in Section 13.1.4.1 of ANSI C63.4

2.4. Description Of Test Modes

The EUT has been tested under operating condition.

After verification, all tests were carried out with the worst case test modes as shown below except radiated spurious emission below 1GHz, which worst case was in normal link mode only. GFSK modulation mode the worst case is Channel Low (2401MHz), Mid Channel (2441MHz) and High Channel (2479MHz), these were chosen for full testing.

3. CONNECTION DIAGRAM OF TEST SYSTEM



4. SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT
§15.203	Antenna Requirement	Compliant
§15.207(a)	Conduction Emissions	Compliant
§15.205(a)§15.209(a), §15.249(a), §15.249(c)	Radiated Emissions	Compliant
§15.215&§15.249	20 dB Bandwidth emissions	Compliant
§15.249	Band Edges emissions	Compliant

5. §15.203 ANTENNA REQUIREMENT

5.1. Standard Applicable

According to §15.203, Antenna requirement.

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. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be re-placed by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of Sections 15.211, 15.213, 15.217, 15.219, or 15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with Section 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this Part are not exceeded.

5.2. Antenna Connected Construction

The directional gains of antenna used for transmitting is 1.84dBi, and EUT is equipped with an onboard PCB antenna and no consideration of replacement. Please see EUT photo for details.

Result: Compliance.

6. §15.205 §15.209(A) §15.249(A) §15.249(C) - RADIATED EMISSIONS

6.1. Standard Applicable

1. Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.
2. 20dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) and 15.249 limit in the table below has to be followed.

Fundamental Frequency	Field Strength of fundamental (millivolts/meter)	Field Strength of harmonics (micровolts/meter)
902-928MHz	50	500
2400-2483.5MHz	50	500
5725-5875MHz	50	500
24.0-24.25GHz	250	2500

Frequencies (MHz)	Field Strength (micровolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

6.2. Measuring Instruments and Setting

Please refer to section 5 of equipments list in this report. The following table is the setting of spectrum analyzer and receiver.

Spectrum Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RB / VB (Emission in restricted band)	1MHz / 1MHz for Peak, 1 MHz / 10Hz for Average
RB / VB (Emission in non-restricted band)	1000KHz / 1000KHz for peak

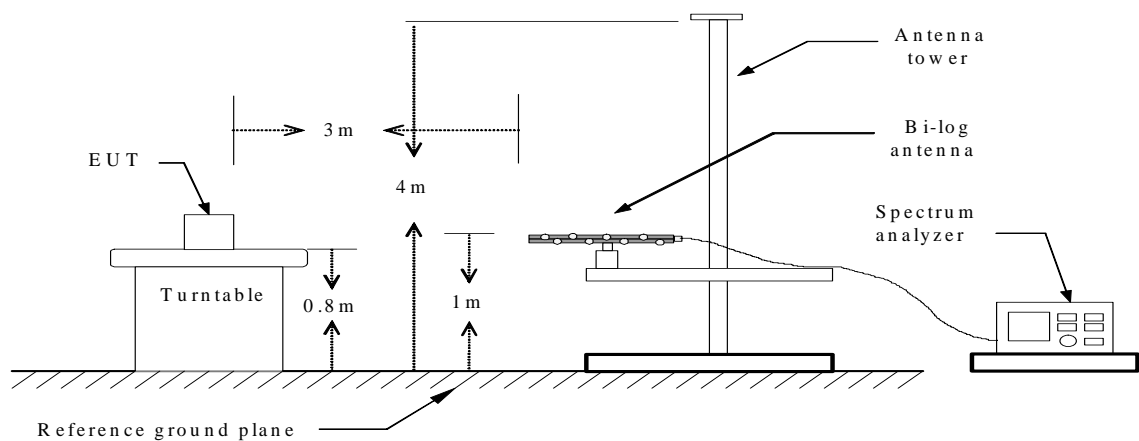
6.3. Test Procedure

1. Configure the EUT according to ANSI C63.4. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emissions, the antenna tower was scan (from 1 m to 4 m) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. For emissions above 1GHz, use 1MHz VBW and RBW for peak reading. Then 1MHz RBW and 10Hz VBW for average reading in spectrum analyzer.
7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value.
8. If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.

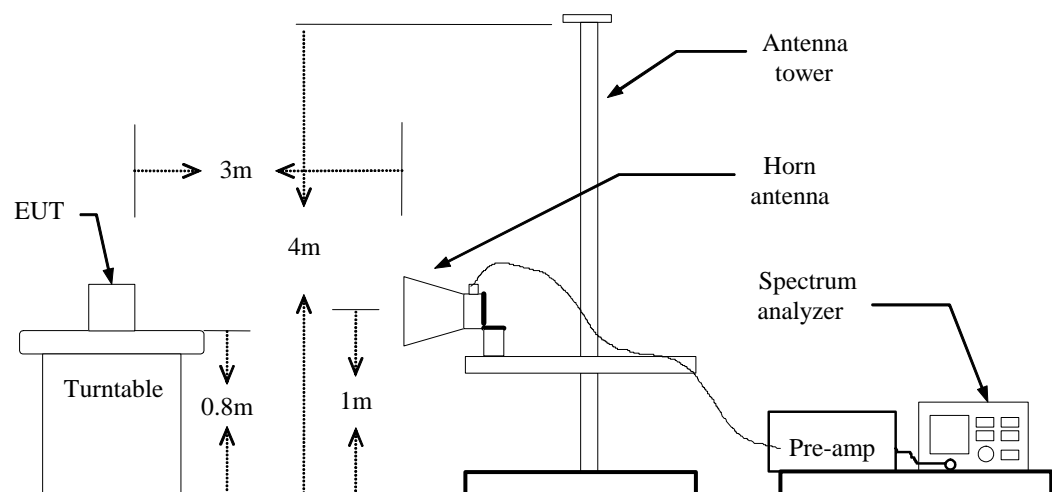
6.4. Test Equipment List and Details

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	Spectrum Analyzer	Agilent	E4407B	MY41440292	2011-06-21
2	Test Receiver	Rohde & Schwarz	ESCS30	828985/018	2011-06-21
3	Loop antenna	EMCO	6502	0042963	2011-06-21
4	Log per Antenna	Schwarzbeck	VULB9163	142	2011-06-21
5	Horn-antenna	SCHWARZBECK	BBHA9120D	D:266	2011-06-21
6	DC Filter	MPE	23872C	N/A	2011-06-21

6.5. Test Setup



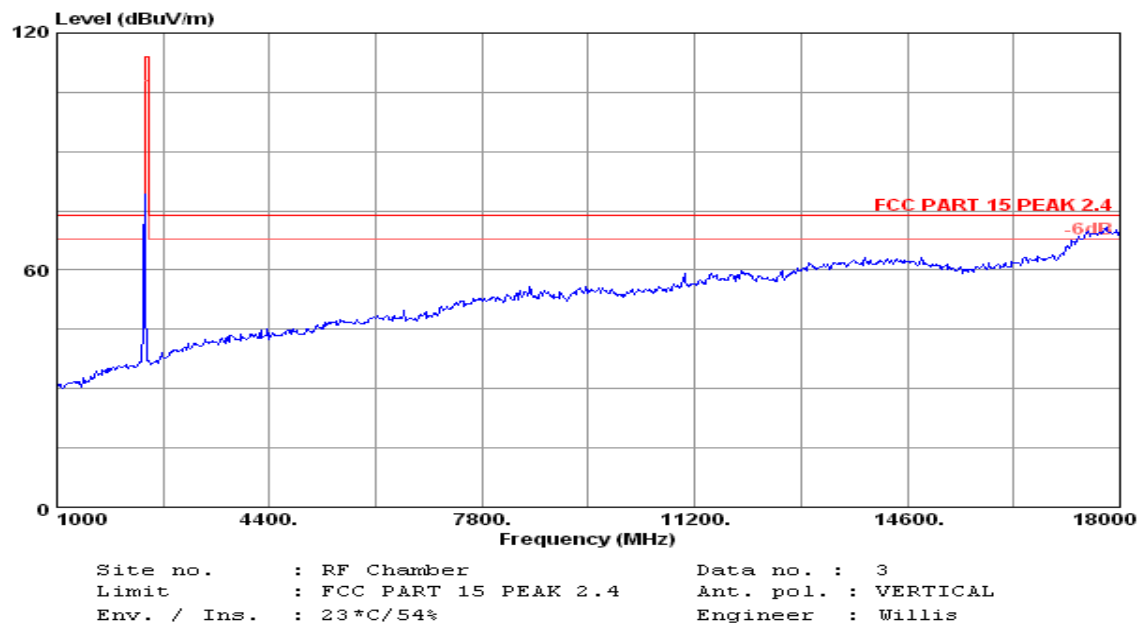
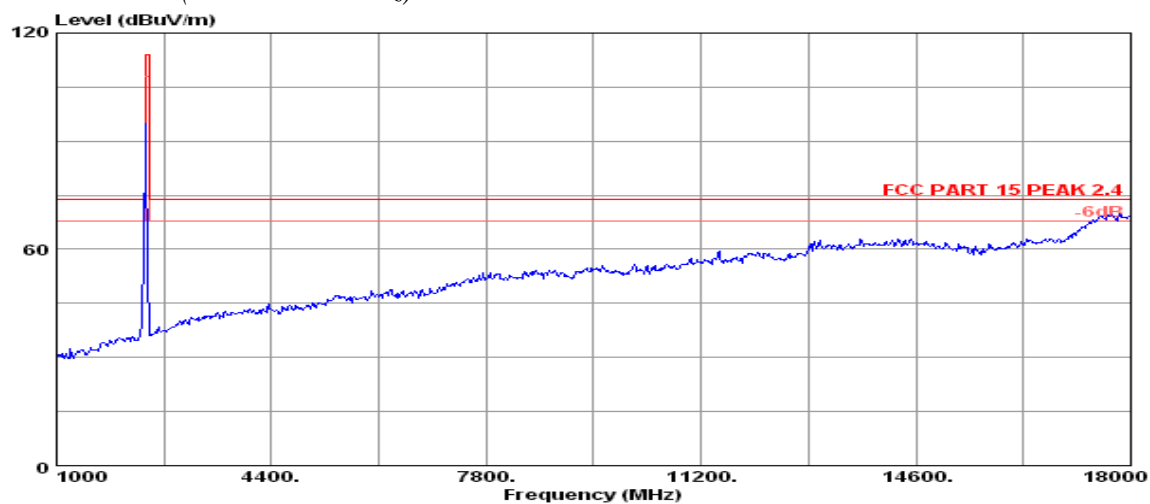
Below 1000MHz



Above 1000MHz

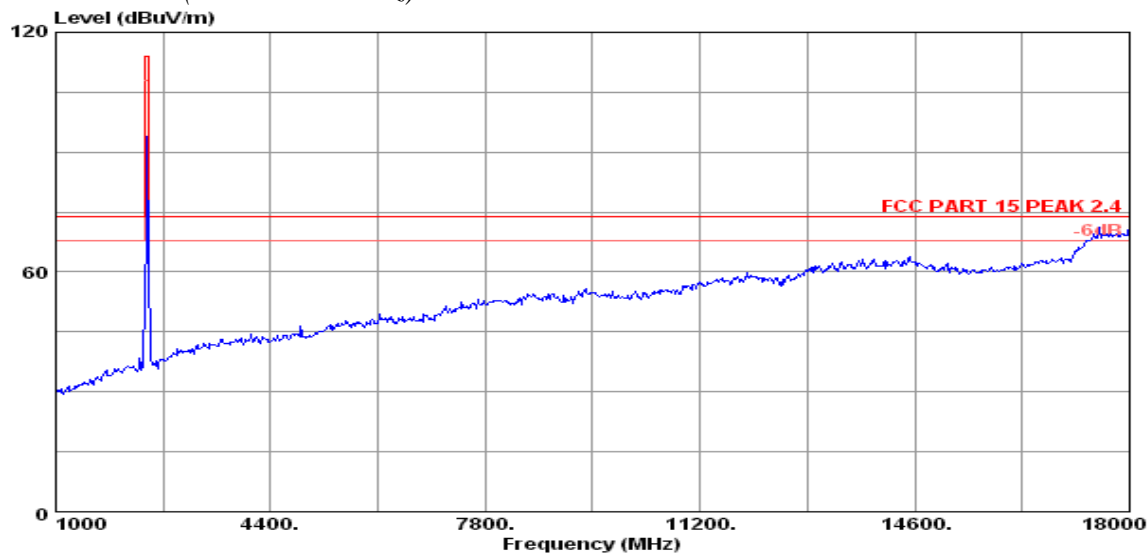
6.6. Test Results

Low channel (above 1000MHz)

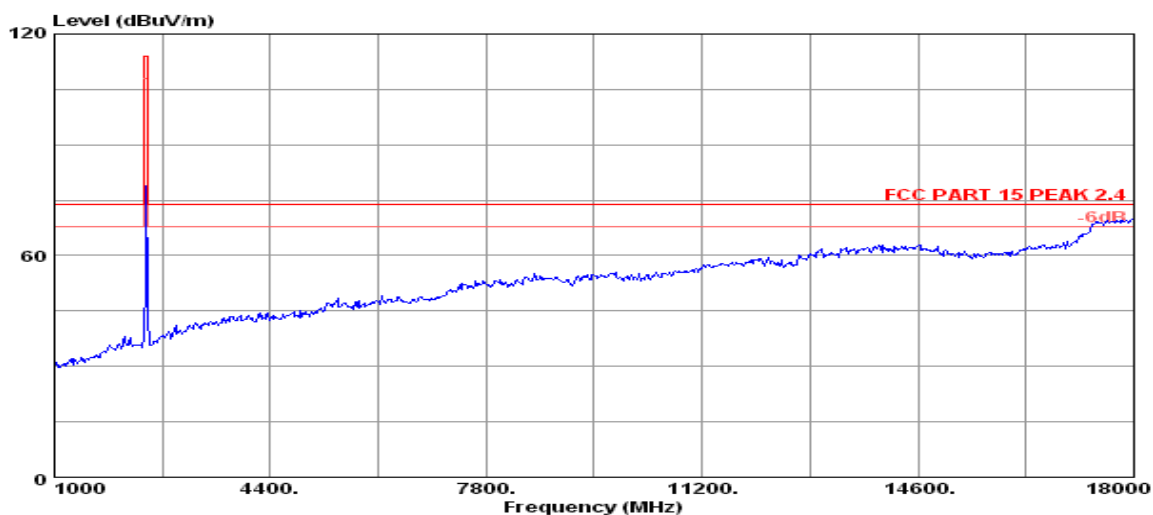


Freq. (MHz)	Level (dBUV/m)	Read Level (dBUV)	Ant. Fac (dB/m)	Pre. Fac (dB)	Cab.Los (dB)	Over limit (dB)	Limits (dBUV/m)	Remark	Pol/Phase
2401.00	94.19	93.76	29.49	36.60	7.54	-19.81	114.00	Peak	Horizontal
2401.00	91.30	90.87	29.49	36.60	7.54	-3.13	94.00	Average	Horizontal
2401.00	86.72	86.29	29.49	36.60	7.54	-27.28	114.00	Peak	Vertical
2401.00	84.99	85.42	29.49	36.60	7.54	-9.01	94.00	Average	Vertical
4802.00	58.89	48.54	34.52	34.95	10.78	-15.11	74.00	Peak	Vertical
4802.00	40.08	29.73	34.52	34.95	10.78	-13.92	54.00	Average	Vertical

Mid channel (above 1000MHz)



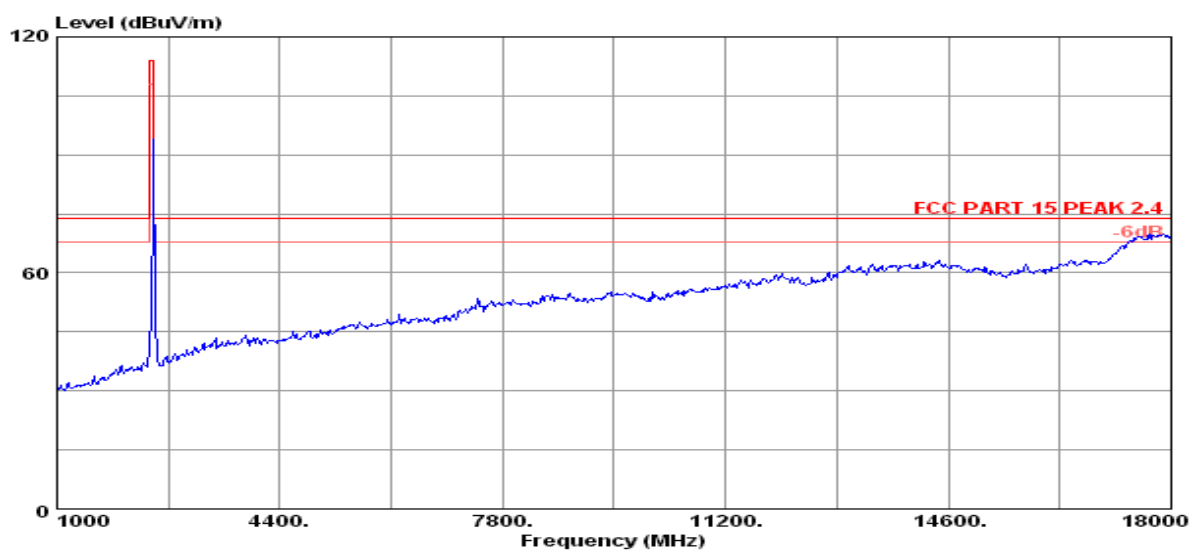
Site no. : RF Chamber Data no. : 5
 Limit : FCC PART 15 PEAK 2.4 Ant. pol. : HORIZONTAL
 Env. / Ins. : 23°C/54% Engineer : Willis



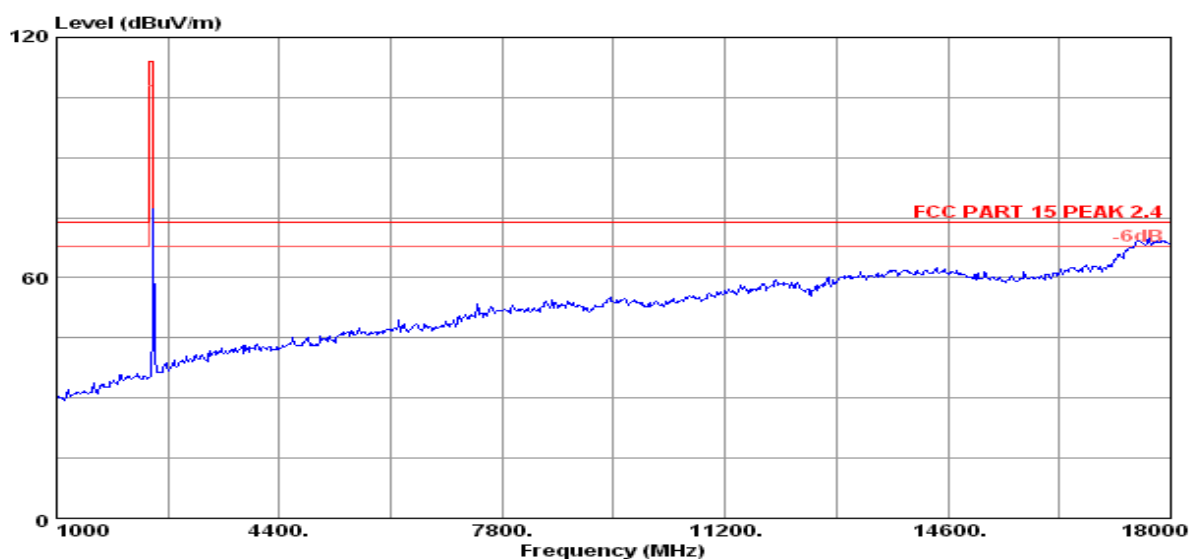
Site no. : RF Chamber Data no. : 7
 Limit : FCC PART 15 PEAK 2.4 Ant. pol. : VERTICAL
 Env. / Ins. : 23°C/54% Engineer : Willis

Freq. (MHz)	Level (dBuV/m)	Read Level (dBuV)	Ant. Fac (dB/m)	Pre. Fac (dB)	Cab.Los (dB)	Over limit (dB)	Limits (dBuV/m)	Remark	Pol/Phase
2441.00	92.80	92.37	29.49	36.60	7.54	-21.20	114.00	Peak	Horizontal
2441.00	89.29	88.86	29.49	36.60	7.54	-5.14	94.00	Average	Horizontal
2441.00	91.26	90.83	29.49	36.60	7.54	-22.74	114.00	Peak	Vertical
2441.00	87.90	87.47	29.49	36.60	7.54	-6.10	94.00	Average	Vertical
4882.00	57.23	46.88	34.52	34.95	10.78	-16.77	74.00	Peak	Vertical
4882.00	37.98	27.63	34.52	34.95	10.78	-16.02	54.00	Average	Vertical

High channel (above 1000MHz)



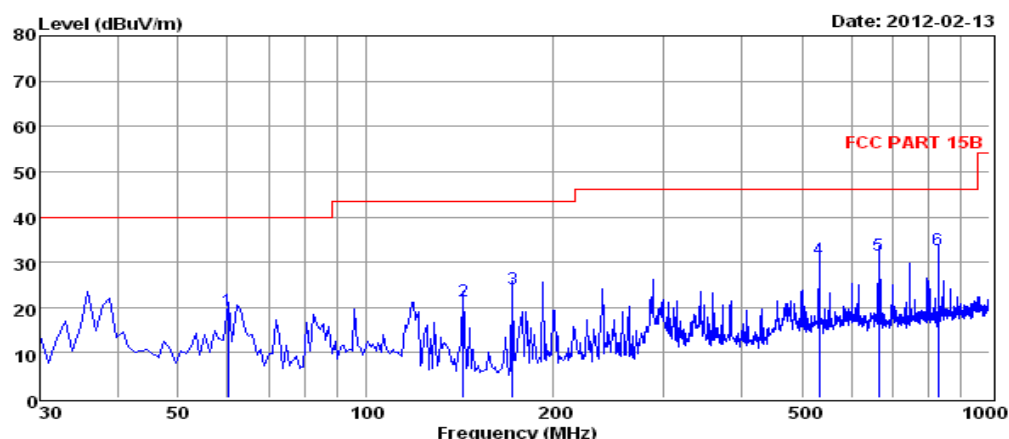
Site no. : RF Chamber Data no. : 11
 Limit : FCC PART 15 PEAK 2.4 Ant. pol. : HORIZONTAL
 Env. / Ins. : 23°C/54% Engineer : Willis



Site no. : RF Chamber Data no. : 9
 Limit : FCC PART 15 PEAK 2.4 Ant. pol. : VERTICAL
 Env. / Ins. : 23°C/54% Engineer : Willis

Freq. (MHz)	Level (dBuV/m)	Read Level (dBuV)	Ant. Fac (dB/m)	Pre. Fac (dB)	Cab.Los (dB)	Over limit (dB)	Limits (dBuV/m)	Remark	Pol/Phase
2479.00	87.60	91.52	25.10	36.70	7.68	-26.40	114.00	Peak	Horizontal
2479.00	86.05	89.97	25.10	36.70	7.68	-7.95	94.00	Average	Horizontal
2479.00	86.42	82.50	25.10	36.70	7.68	-27.58	114.00	Peak	Vertical
2479.00	84.83	80.91	25.10	36.70	7.68	-9.17	94.00	Average	Vertical
4958.00	55.23	44.81	34.63	35.02	10.81	-18.77	74.00	Peak	Vertical
4958.00	35.71	25.29	34.63	35.02	10.81	-18.29	54.00	Average	Vertical

(9kHz-1000MHz, Normal Link)



Site no. : 3m Chamber

Limit : FCC PART 15 C (3M)

Ant. pol. : HORIZONTAL

Env. / Ins. : 24°C/56%

Engineer : Willis

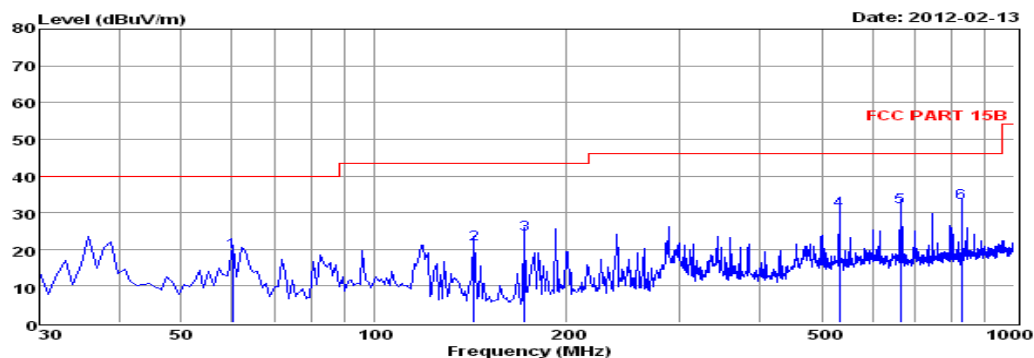
Freq.	Reading	CabLos	AntFac	PreFac	Measured	Limit	Over	Remark	
1	60.07	36.22	0.49	12.66	30.16	19.21	40.00	-20.79	QP
2	143.49	42.77	0.71	8.21	30.20	21.49	43.50	-22.01	QP
3	171.62	44.20	0.91	9.09	30.20	24.00	43.50	-19.50	QP
4	532.46	42.20	1.36	17.19	30.03	30.72	46.00	-15.28	QP
5	663.41	41.15	1.67	18.68	30.03	31.47	46.00	-14.53	QP
6	827.34	40.58	1.80	20.34	30.11	32.61	46.00	-13.39	QP

	MHz	dBuV	dB	dB/m	dB	dBuV/m	dBuV/m	dB	
1	60.07	36.22	0.49	12.66	30.16	19.21	40.00	-20.79	QP
2	143.49	42.77	0.71	8.21	30.20	21.49	43.50	-22.01	QP
3	171.62	44.20	0.91	9.09	30.20	24.00	43.50	-19.50	QP
4	532.46	42.20	1.36	17.19	30.03	30.72	46.00	-15.28	QP
5	663.41	41.15	1.67	18.68	30.03	31.47	46.00	-14.53	QP
6	827.34	40.58	1.80	20.34	30.11	32.61	46.00	-13.39	QP

Note: 1. All readings are Quasi-peak values.

2. Measured = Reading + Antenna Factor + Cable Loss - Amp Factor.

3. The emission levels that are 20dB below the official limit are not reported.



Site no. : RF Chamber

Limit : FCC PART 15 PEAK 2.4

Ant. pol. : VERTICAL

Env. / Ins. : 23°C/54%

Engineer : Willis

Freq.	Reading	CabLos	AntFac	PreFac	Measured	Limit	Over	Remark	
1	60.07	36.22	0.49	12.66	30.16	19.21	40.00	-20.79	QP
2	143.49	42.77	0.71	8.21	30.20	21.49	43.50	-22.01	QP
3	171.62	44.20	0.91	9.09	30.20	24.00	43.50	-19.50	QP
4	532.46	42.20	1.36	17.19	30.03	30.72	46.00	-15.28	QP
5	663.41	41.15	1.67	18.68	30.03	31.47	46.00	-14.53	QP
6	827.34	40.58	1.80	20.34	30.11	32.61	46.00	-13.39	QP

	MHz	dBuV	dB	dB/m	dB	dBuV/m	dBuV/m	dB	
1	60.07	36.22	0.49	12.66	30.16	19.21	40.00	-20.79	QP
2	143.49	42.77	0.71	8.21	30.20	21.49	43.50	-22.01	QP
3	171.62	44.20	0.91	9.09	30.20	24.00	43.50	-19.50	QP
4	532.46	42.20	1.36	17.19	30.03	30.72	46.00	-15.28	QP
5	663.41	41.15	1.67	18.68	30.03	31.47	46.00	-14.53	QP
6	827.34	40.58	1.80	20.34	30.11	32.61	46.00	-13.39	QP

Note: 1. All readings are Quasi-peak values.

2. Measured = Reading + Antenna Factor + Cable Loss - Amp Factor.

3. The emission levels that are 20dB below the official limit are not reported.

Notes:

1. *Measuring frequencies from 9k~10th harmonic (ex. 26GHz), No emission found between lowest internal used/generated frequency to 30 MHz.*
2. *Radiated emissions measured in frequency range from 9k~10th harmonic (ex. 26GHz) were made with an instrument using Peak detector mode.*
3. *Data of measurement within this frequency range shown “ --- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.*

7. §15.249 BAND EDGES MEASUREMENT

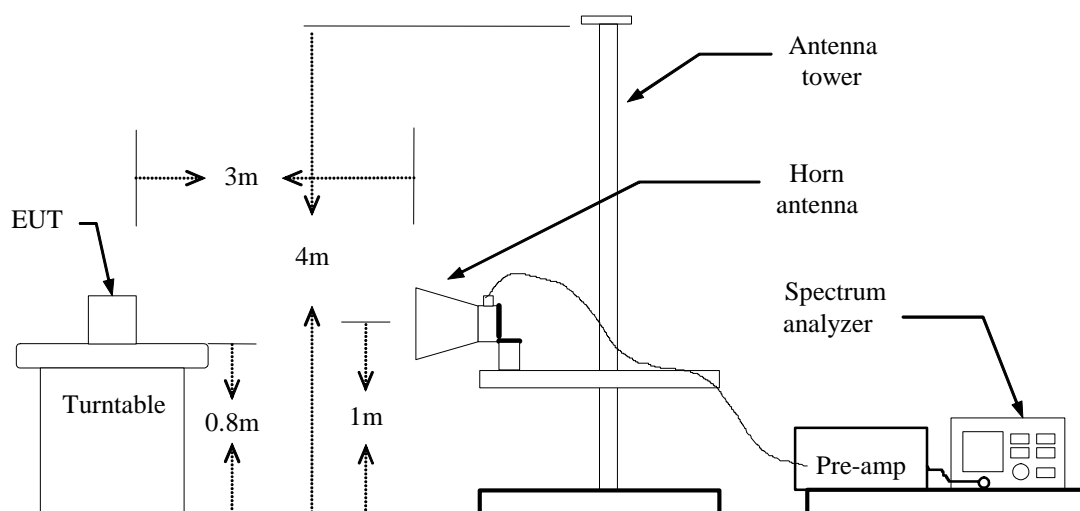
7.1. Standard Applicable

According to §15.249.

7.2. Measuring Instruments and Setting

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	Spectrum Analyzer	Agilent	E4407B	MY41440292	2011-06-21
2	Test Receiver	Rohde & Schwarz	ESCS30	828985/018	2011-06-21
3	Loop antenna	EMCO	6502	0042963	2011-06-21
4	Log per Antenna	Schwarzbeck	VULB9163	142	2011-06-21
5	Horn-antenna	SCHWARZBECK	BBHA9120D	D:266	2011-06-21
6	DC Filter	MPE	23872C	N/A	2011-06-21

7.3. Test Setup



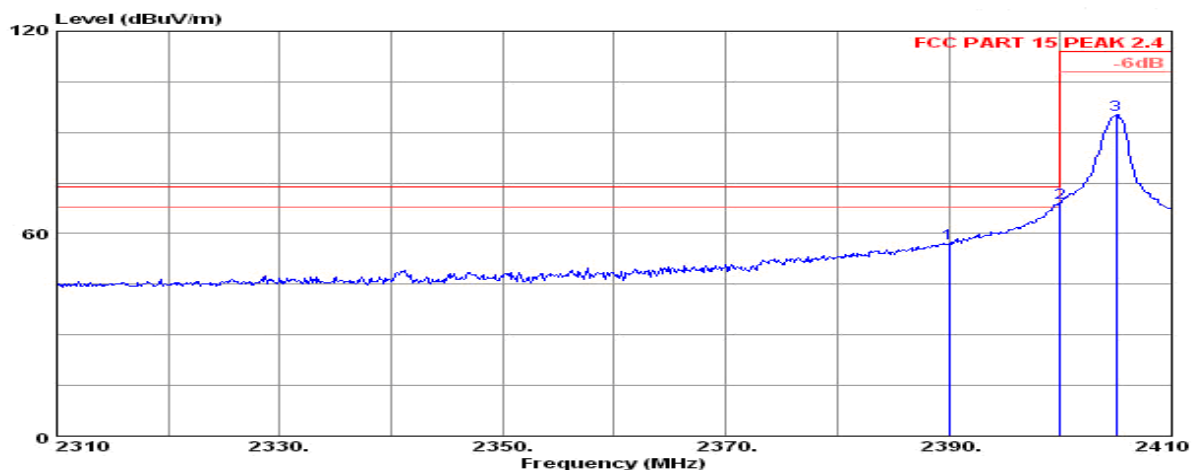
7.4. Test Procedure

The EUT is placed on a turntable, which is 0.8m above the ground plane. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission. Set the spectrum analyzer in the following setting in order to capture the lower and upper band-edges of the emission:

Peak: RBW=VBW=1MHz / Sweep=AUTO

Repeat the procedures until the peak versus polarization are measured.

7.5. Test Results

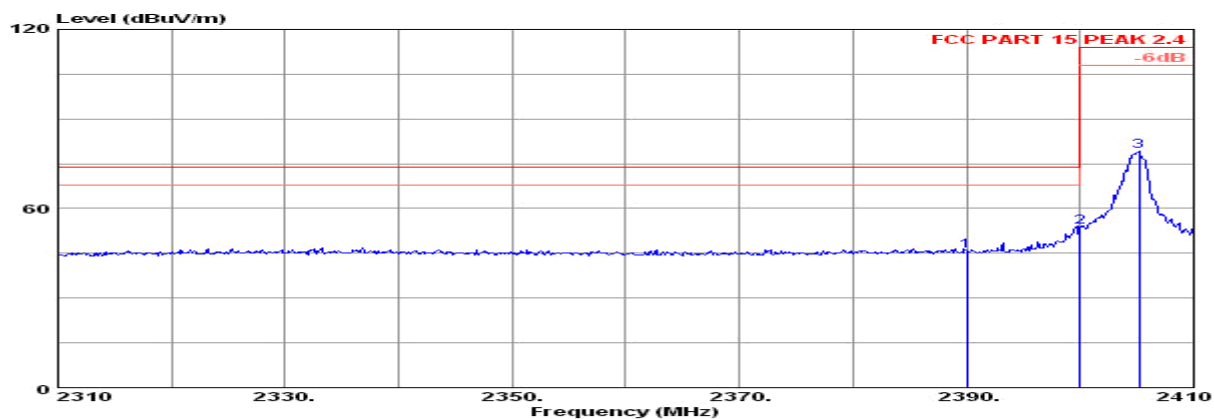


Site no. : RF Chamber Data no. : 13
 Limit : FCC PART 15 PEAK 2.4 Ant. pol. : HORIZONTAL

	Ant. Freq. (MHz)	Factor (dB/m)	Cable loss (dB)	Amp. Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2390.000	29.44	7.39	36.62	56.78	56.99	74.00	17.01	Pk
2	2400.000	29.44	7.43	36.62	68.78	69.03	74.00	4.97	Pk
3	2401.000	29.45	7.43	36.62	94.89	95.15	114.00	18.85	Pk
4	2390.000	29.44	7.39	36.62	54.70	50.99	54.00	3.01	AV
5	2400.000	29.44	7.43	36.62	56.78	51.00	54.00	4.00	AV
6	2401.000	29.45	7.43	36.62	91.89	91.00	94.00	3.00	AV

Remarks:

1. Emission Level= Antenna Factor + Cable Loss -Amp Factor + Reading.
2. The emission levels that are 20dB below the official limit are not reported.

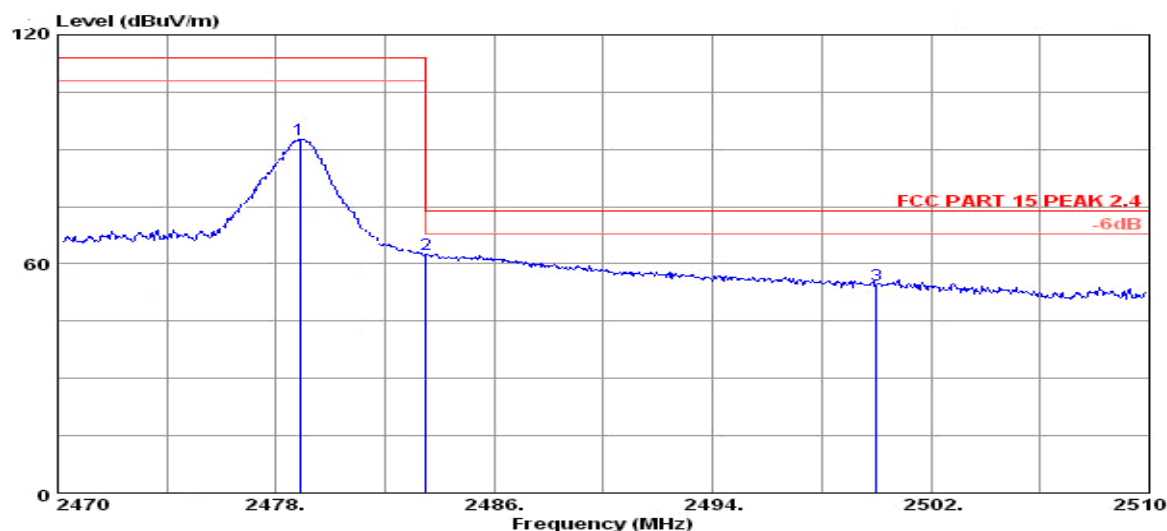


Site no. : RF Chamber Data no. : 14
 Limit : FCC PART 15 PEAK 2.4 Ant. pol. : VERTICAL

	Ant. Freq. (MHz)	Factor (dB/m)	Cable loss (dB)	Amp. Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2390.000	29.44	7.39	36.62	45.66	45.87	74.00	28.13	Pk
2	2400.000	29.44	7.43	36.62	53.46	53.71	74.00	20.29	Pk
3	2401.200	29.45	7.43	36.62	78.98	79.24	114.00	34.76	Pk
4	2390.000	29.44	7.39	36.62	43.66	43.87	54.00	10.13	AV
5	2400.000	29.44	7.43	36.62	52.46	50.71	54.00	3.29	AV
6	2401.000	29.45	7.43	36.62	76.98	77.24	94.00	16.76	AV

Remarks:

1. Emission Level= Antenna Factor + Cable Loss -Amp Factor + Reading.
2. The emission levels that are 20dB below the official limit are not reported.

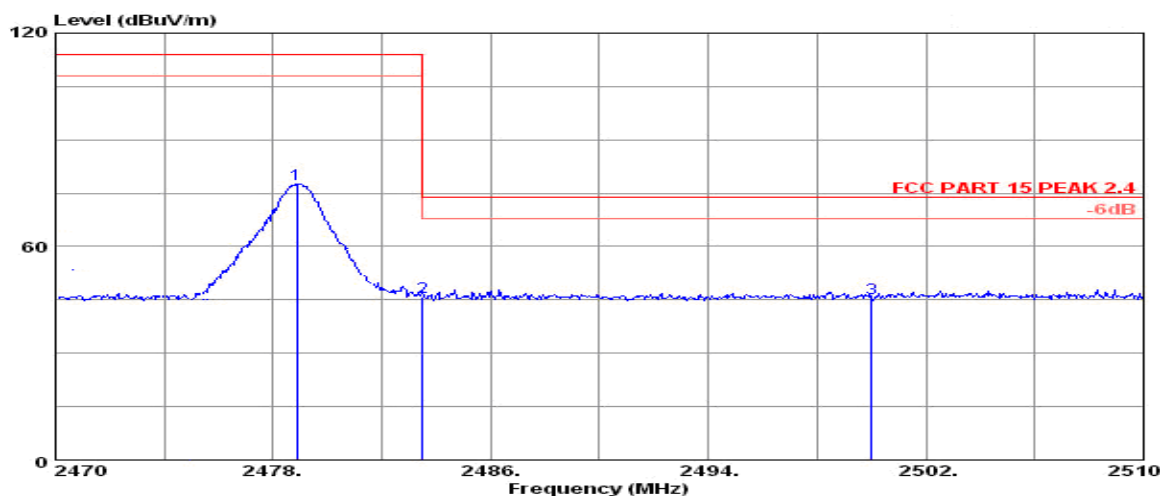


Site no. : RF Chamber Data no. : 16
 Limit : FCC PART 15 PEAK 2.4 Ant. pol. : HORIZONTAL

	Ant. Freq. (MHz)	Factor (dB/m)	Cable loss (dB)	Amp. Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2479.080	29.49	7.54	36.60	93.87	94.30	114.00	19.70	Pk
2	2483.500	29.49	7.58	36.60	62.09	62.56	74.00	11.44	Pk
3	2500.000	29.50	7.62	36.60	54.10	54.62	74.00	19.38	Pk
4	2479.080	29.49	7.54	36.60	89.80	90.00	94.00	4.00	AV
5	2483.500	29.49	7.58	36.60	51.00	50.01	54.00	3.99	AV
6	2500.000	29.50	7.62	36.60	54.10	49.62	54.00	4.38	AV

Remarks:

1. Emission Level= Antenna Factor + Cable Loss -Amp Factor + Reading.
2. The emission levels that are 20dB below the official limit are not reported.



Site no. : RF Chamber Data no. : 15
 Limit : FCC PART 15 PEAK 2.4 Ant. pol. : VERTICAL

	Ant. Freq. (MHz)	Factor (dB/m)	Cable loss (dB)	Amp. Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2479.920	29.49	7.54	36.60	77.05	77.48	114.00	36.52	Pk
2	2483.500	29.49	7.58	36.60	45.40	45.87	74.00	28.13	Pk
3	2500.000	29.50	7.62	36.60	45.10	45.62	74.00	28.38	Pk
4	2479.920	29.49	7.54	36.60	75.05	75.50	94.00	16.50	AV
5	2483.500	29.49	7.58	36.60	44.40	44.80	54.00	9.20	AV
6	2500.000	29.50	7.62	36.60	44.10	43.60	54.00	10.40	AV

Remarks:

1. Emission Level= Antenna Factor + Cable Loss -Amp Factor + Reading.
2. The emission levels that are 20dB below the official limit are not reported.

8. §15.215 20 DB BANDWIDTH MEASUREMENT

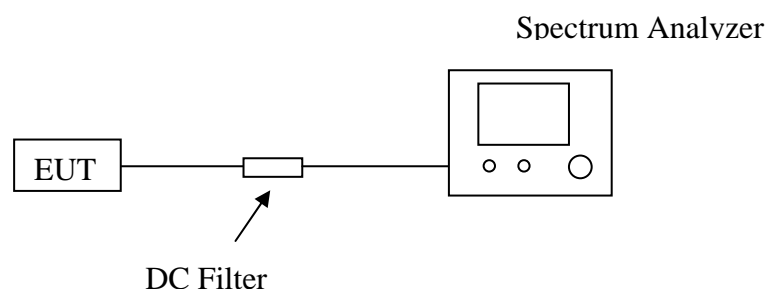
8.1. Standard Applicable

According to §15.215.

8.2. Measuring Instruments and Setting

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	Spectrum Analyzer	Agilent	E4407B	MY41440292	2011-06-21
2	Power Sensor	Agilent	E9327A	US40441788	2011-06-21
3	Power Meter	Agilent	E4416A	QB41292714	2011-06-21
4	DC Filter	MPE	23872C	N/A	2011-06-21

8.3. Test Setup



8.4. Test Procedure

Use the following spectrum analyzer settings:

Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hopping channel

RBW \geq 1% of the 20 dB bandwidth

VBW \geq RBW

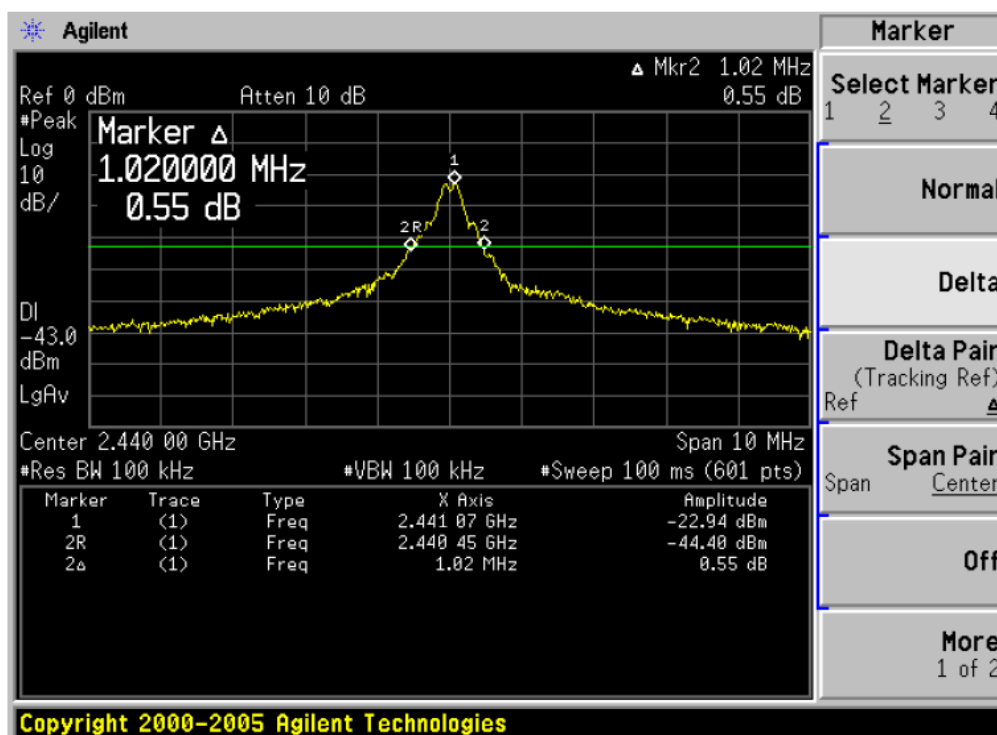
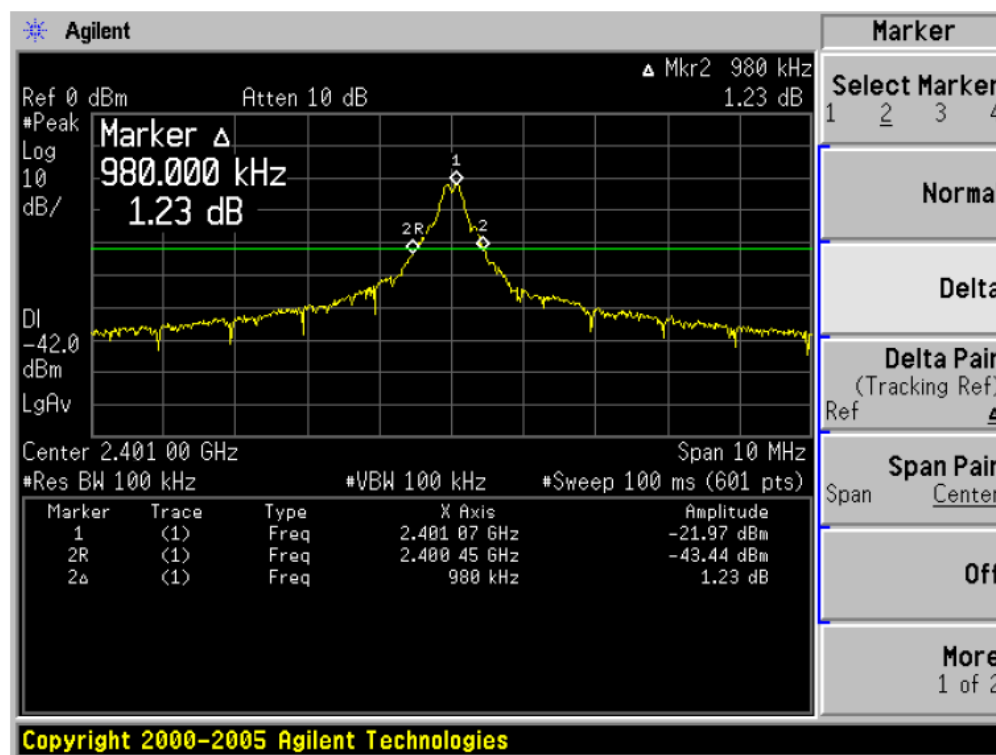
Sweep = auto

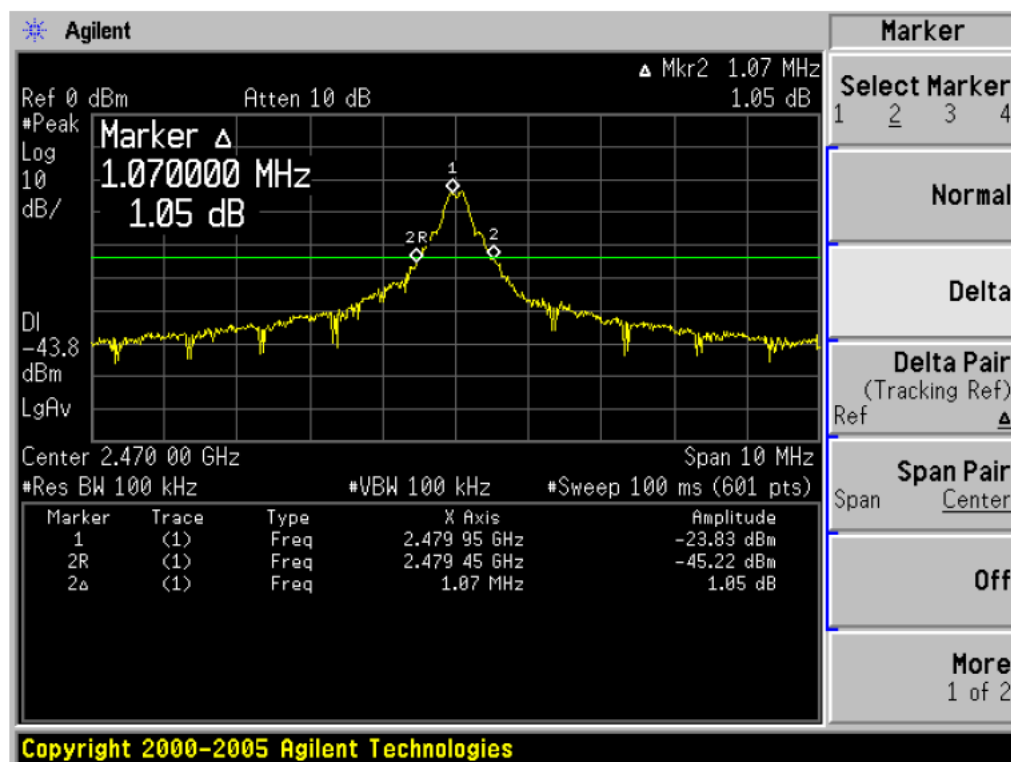
Detector function = peak

Trace = max hold

The EUT should be transmitting at its maximum data rate. Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. Use the marker-delta function to measure 20 dB down one side of the emission. Reset the marker-delta function, and move the marker to the other side of the emission, until it is (as close as possible to) even with the reference marker level. The marker-delta reading at this point is the 20 dB bandwidth of the emission. If this value varies with different modes of operation (e.g., data rate, modulation format, etc.), repeat this test for each variation. The limit is specified in one of the subparagraphs of this Section. Submit this plot(s).

8.5. Test Results





9. POWER LINE CONDUCTED EMISSIONS

9.1. Standard Applicable

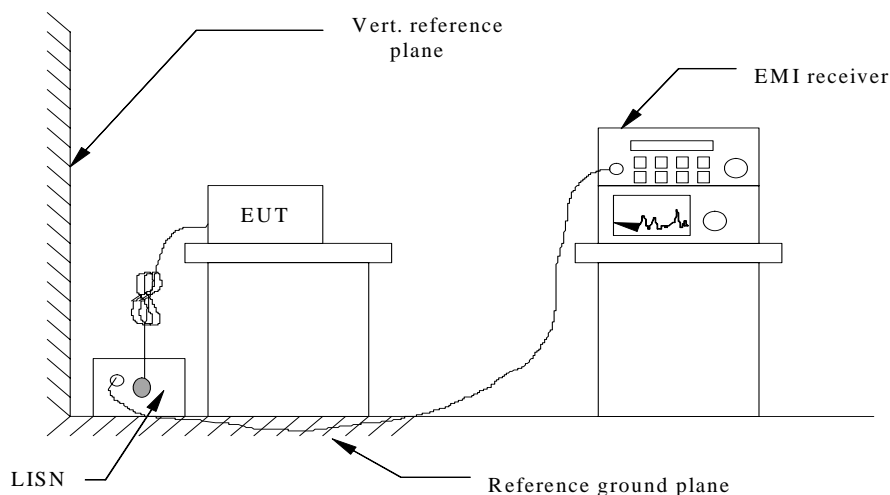
For an intentional radiator which is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed 250 microvolts (The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz). The limits at specific frequency range is listed as follows:

Frequency Range (MHz)	Limits (dBμV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50

9.2. Test Equipment List and Details

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	Test Receiver	Rohde & Schwarz	ESCS30	828985/018	2011-06-21
2	L.I.S.N	Rohde & Schwarz	ESH2-Z5	834549/005	2011-06-21
3	Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100006	2011-06-21
4	50Ω Coaxial Switch	Anritsu	MP59B	M20531	2011-06-21

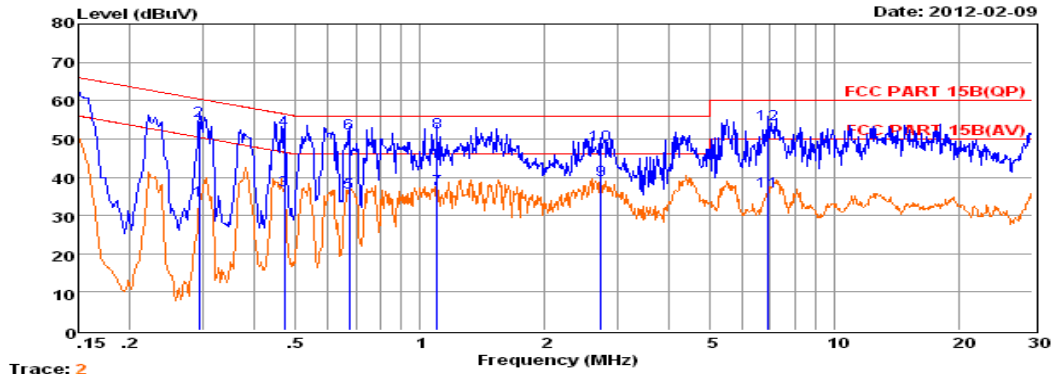
9.3. Test Setup



9.4. Test Results

PASS.

The test data please refer to following page.

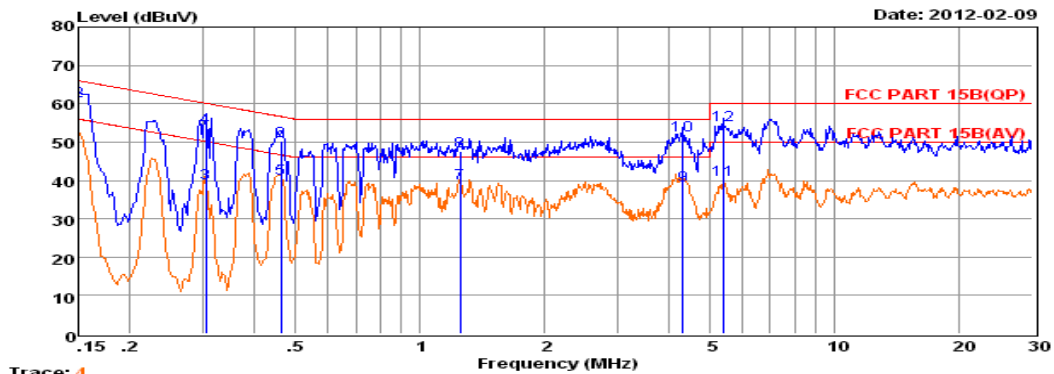


Trace: 2

Env. Ins: 24*/56%
EUT: 2.4GHz Wireless Module
M/N: MS-RF005
Power Rating: DC 3.3V From PC Input AC 120V/60Hz
Test Mode: On
Operator: Bruce
Memo:
Pol: LINE

	Freq	Reading	LisnFac	CabLos	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.29	24.20	9.63	0.03	33.86	50.41	-16.55	Average
2	0.29	44.92	9.63	0.03	54.58	60.41	-5.83	QP
3	0.47	26.91	9.62	0.04	36.57	46.49	-9.92	Average
4	0.47	42.69	9.62	0.04	52.35	56.49	-4.14	QP
5	0.68	26.29	9.64	0.04	35.97	46.00	-10.03	Average
6	0.68	41.63	9.64	0.04	51.31	56.00	-4.69	QP
7	1.10	27.31	9.63	0.05	36.99	46.00	-9.01	Average
8	1.10	41.93	9.63	0.05	51.61	56.00	-4.39	QP
9	2.74	29.44	9.64	0.05	39.13	46.00	-6.87	Average
10	2.74	38.65	9.64	0.05	48.34	56.00	-7.66	QP
11	6.91	26.52	9.68	0.07	36.27	50.00	-13.73	Average
12	6.91	44.15	9.68	0.07	53.90	60.00	-6.10	QP

Remarks: 1. Measured = Reading + Lisn Factor +Cable Loss.
2. The emission levels that are 20dB below the official limit are not reported.



Trace: 4

Env. Ins: 24*/56%
EUT: 2.4GHz Wireless Module
M/N: MS-RF005
Power Rating: DC 3.3V From PC Input AC 120V/60Hz
Test Mode: On
Operator: Bruce
Memo:
Pol: NEUTRAL

	Freq	Reading	LisnFac	CabLos	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.15	39.93	9.70	0.02	49.65	56.00	-6.35	Average
2	0.15	51.08	9.70	0.02	60.80	66.00	-5.20	QP
3	0.31	29.63	9.60	0.03	39.26	50.10	-10.84	Average
4	0.31	44.23	9.60	0.03	53.86	60.10	-6.24	QP
5	0.46	30.74	9.62	0.04	40.40	46.67	-6.27	Average
6	0.46	40.59	9.62	0.04	50.25	56.67	-6.42	QP
7	1.25	29.50	9.63	0.05	39.18	46.00	-6.82	Average
8	1.25	37.97	9.63	0.05	47.65	56.00	-8.35	QP
9	4.31	28.98	9.66	0.06	38.70	46.00	-7.30	Average
10	4.31	42.09	9.66	0.06	51.81	56.00	-4.19	QP
11	5.39	30.28	9.67	0.06	40.01	50.00	-9.99	Average
12	5.39	44.59	9.67	0.06	54.32	60.00	-5.68	QP

Remarks: 1. Measured = Reading + Lisn Factor +Cable Loss.
2. The emission levels that are 20dB below the official limit are not reported.

10. MANUFACTURER/ APPROVAL HOLDER DECLARATION

The following identical model(s):

MS-RF005A	MS-RF005B	--
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Belong to the tested device:

Product description : 2.4GHz Wireless Module
Model name : MS-RF005

No additional models were tested.

-----END REPORT-----