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FCC Part 15.247 TEST REPORT

of

GSM900/1800/1900 GPRS Mobile Phone

FCC ID: S5D-KMP6J1CL1
Model No.: NEC N6206
Serial No.: 1341605000007427
Report No.: FCC06-8043
Date: July 20, 2006

Prepared for

Wuhan NEC Mobile Communication Co., Ltd.

Building No.3, Optics Valley Construction & Industrial Park, East Lake New
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Prepared by

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1 Test Report Certification

Product: GSM900/1800/1900 GPRS Mobile Phone

Model No.: S5D-KMP6J1CL1

Applicant: NEC N6206

Applicant Address: Wuhan NEC Mobile Communication Co., Ltd.

Manufacturer: Building No.3, Optics Valley Construction & Industrial Park, East Lake New Technology Development Zone, Wuhan, Hubei 430223, China

Manufacturer Address: Wuhan NEC Mobile Communication Co., Ltd.

Test Standards: 47 CFR Part 15, Subpart C

Test Result: PASS

We, Shenzhen Electronic Product Quality Testing Center, hereby certify that the submitted samples of the above item, as detailed in chapter 2.1 of this report, has been tested in our facility. The test record, data evaluation and test configuration represented herein are true and accurate accounts of measurements of the sample's EMC characteristics under the conditions herein specified.

Tested by: Lin Xingsun, Date: Jul. 20, 2006
Lin Xingsun

Checked by: Smart Li, Date: July 20, 2006
Smart Li



Approved by: Wang Keqin, Date: July 20, 2006
Wang Keqin

2 General Information

2.1 Description of EUT

Description:	GSM900/1800/1900 GPRS Mobile Phone
Model No.:	NEC N6206
Serial No.:	1341605000007427
Hardware Version:	P3
Software Version:	NEC-N6206-VER-01.15
Bluetooth Chip:	Philips bgb203
Modulation	FHSS
Frequency:	2402MHz – 2480 MHz
Number of Channels:	79
Power:	10dBm
Bluetooth Antenna:	Permanent attached

NOTE:

1. The EUT is a GSM mobile phone. It supports Bluetooth function, operating at 2.4GHz ISM band. The Bluetooth modulation is Frequency Hopping Spread Spectrum (FHSS). The Channels and transmitter center frequencies are: $F(\text{MHz})=2401+1*n$, $1 \leq n \leq 79$.
2. Please refer to Appendix I for the photographs of the EUT. For a more detailed features description about the EUT, please refer to User's Manual.

2.2 Test Standards and Results

The EUT has been tested according to 47 CFR Part 15, Radio Frequency Devices.

Test items and the results are as bellow:

№	FCC Rules	Test Type	Result
1	§15.207	Conducted Emission	PASS
2	§15.209 §15.247(c)	Radiated Emission	PASS
3	§15.247(a)	Bandwidth and Carrier Frequency Separation	PASS
4	§15.247(a)	Hopping Sequence	PASS
5	§15.247(a)	Equal Hopping Frequency Use	PASS
6	§15.247(a)	Receiver Input Bandwidth and Hopping Capability	PASS
7	§15.247(a)	Time of Occupancy(Dwell time)	PASS
8	§15.247(b)	Peak Output Power	PASS
9	§15.247(c)	Band Edge	PASS
10	§15.247(c)	Conducted Spurious Emission	PASS
11	§15.247(c)	Radiated Spurious Emission	PASS

2.3 List of Test Equipments Used

Description	Manufacturer	Model No.	Cal. Due Date	Serial No.
Test Receiver	Rohde & Schwarz	ESIB26	2007.06.05	A0304218
Spectrum Analyzer	Rohde & Schwarz	FSP13	2006.12.25	M-030176
LISN	Schwarzbeck	NSLK8127	2007.06.05	A0304233
Ultra Broadband Ant.	Rohde & Schwarz	HL562	2007.06.05	A0304224
Horn Ant.	Rohde & Schwarz	HF906	2007.06.05	100150
Mobile Phone Tester	Willtek	4403	2007.02.10	0811211
Shield Room	Nanbo Tech	Site 1	2007.01.17	A0304188
Anechoic Chamber	Albatross	EMC12.8×6.8× 6.4(m)	2007.04.10	A0304210

2.4 Test Facility

Shenzhen Electronic Product Quality Testing Center (SET) is a third party testing organization accredited by China National Accreditation Board for Laboratories (CNAL) according to ISO/IEC 17025. The accreditation certificate number is **L1659**.

The EMC chamber site No.1 (EMC12.8×6.8×6.4(m)), and the radiated and conducted Emission test equipments of SET are constructed and calibrated to meet the FCC requirements ANSI C63.4:2001 and CISPR 22/EN 55022. The FCC Registration Number is **261302**.

The EMC chamber site No.1 (EMC12.8×6.8×6.4(m)) also complies with Canada standard RSS 212, and acceptable to Industry Canada for the performance of radiated measurements. The Industry Canada Registration Number is **IC 5915**.

2.5 Environmental conditions

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

- Temperature: 15-35°C
- Humidity: 30-60 %
- Atmospheric pressure: 86-106 kPa

3 Conducted Emission Test

3.1 Limits of Conducted Emission

According to FCC §15.207, for an intentional radiator that 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 within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μ H/50 ohms line impedance stabilization network (LISN).

Frequency range (MHz)	Conducted Limit (dB μ V)	
	Quasi-peak	Average
0.15 - 0.50	66 to 56	56 to 46
0.50 - 5	56	46
0.50 - 30	60	50

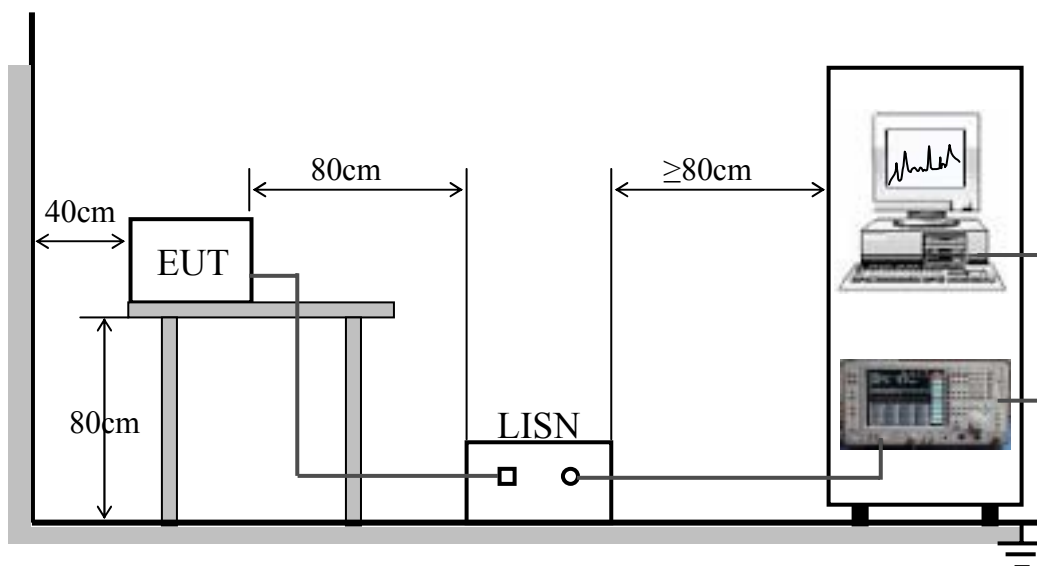
NOTE:

1. The lower limit shall apply at the band edges.
2. The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.50MHz.

3.2 Test Procedure

- a. The EUT was placed on a 0.8m high insulating table and kept 0.4 meters from the conducting wall of shielded room.
- b. The EUT was connected to the power mains through a line impedance stabilization network (LISN). The LISN provide 50 Ω /50 μ H of coupling impedance for the measuring instrument.
- c. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- d. The frequency range from 150 kHz to 30 MHz was searched using CISPR Quasi-Peak and Average detector.

3.3 Test Setup



For the actual test configuration, please refer to the related item - Photographs of the Test Configuration.

3.4 EUT Setup and Operating Conditions

The EUT configuration of the emission tests was MS + Battery + Charger + Bluetooth Headset. During the measurement, the EUT was charging empty battery. The charger was powered by 120V 60Hz AC mains supply.

A communication link was also established between the MS and a System Simulator (SS). The MS operated at PCS 1900MHz mid ARFCN (661) and maximum output power (level 0).

The Bluetooth function was active and an audio link was established between the EUT and a Bluetooth headset.

3.5 Test Results

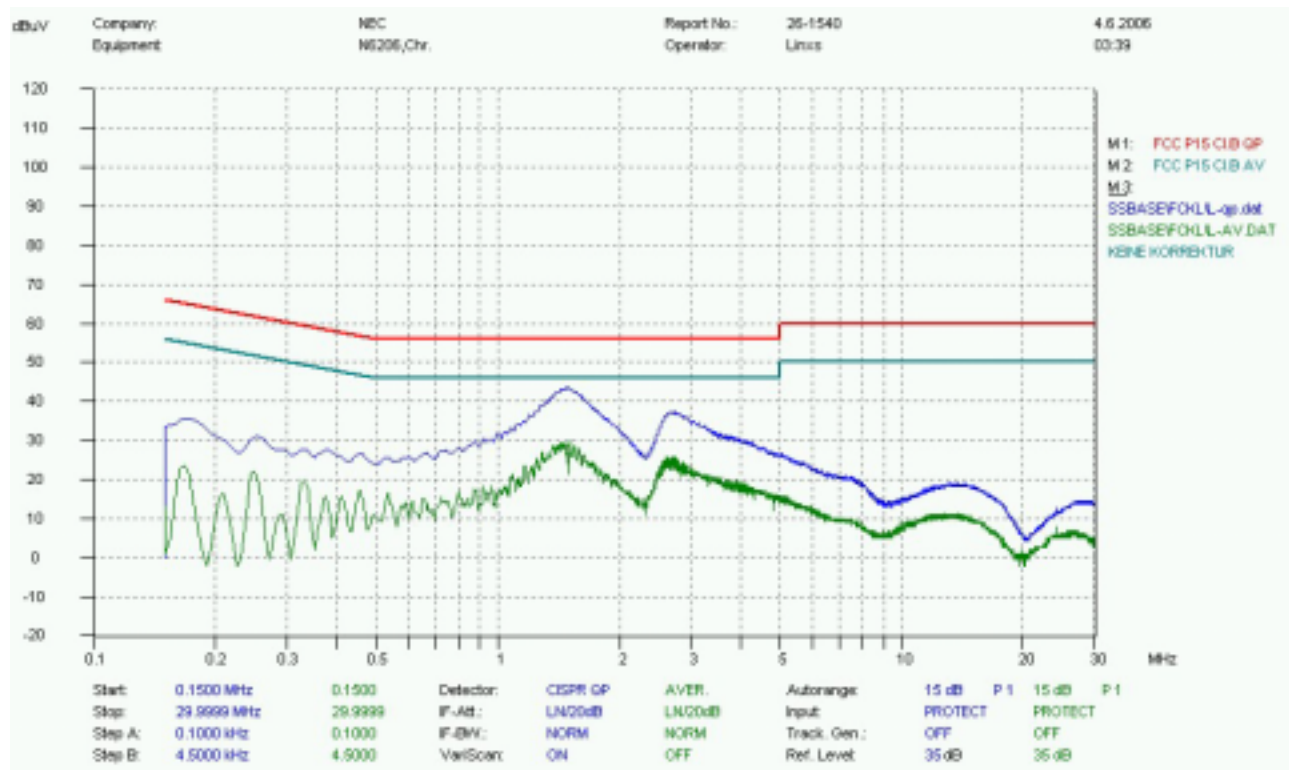
No.	Freq. (MHz)	Limit Value (dB μ V)		Emission Level (dB μ V)	
		QP	AV	QP	AV
1	0.1725	64.8	54.8	31.3	23.4
2	0.2535	61.6	51.6	30.0	22.5
3	0.6675	56.0	46.0	30.6	19.8
4	1.4640	56.0	46.0	46.5	32.4
5	2.6900	56.0	46.0	41.8	27.9
6	3.9650	56.0	46.0	35.2	21.3

NOTE:

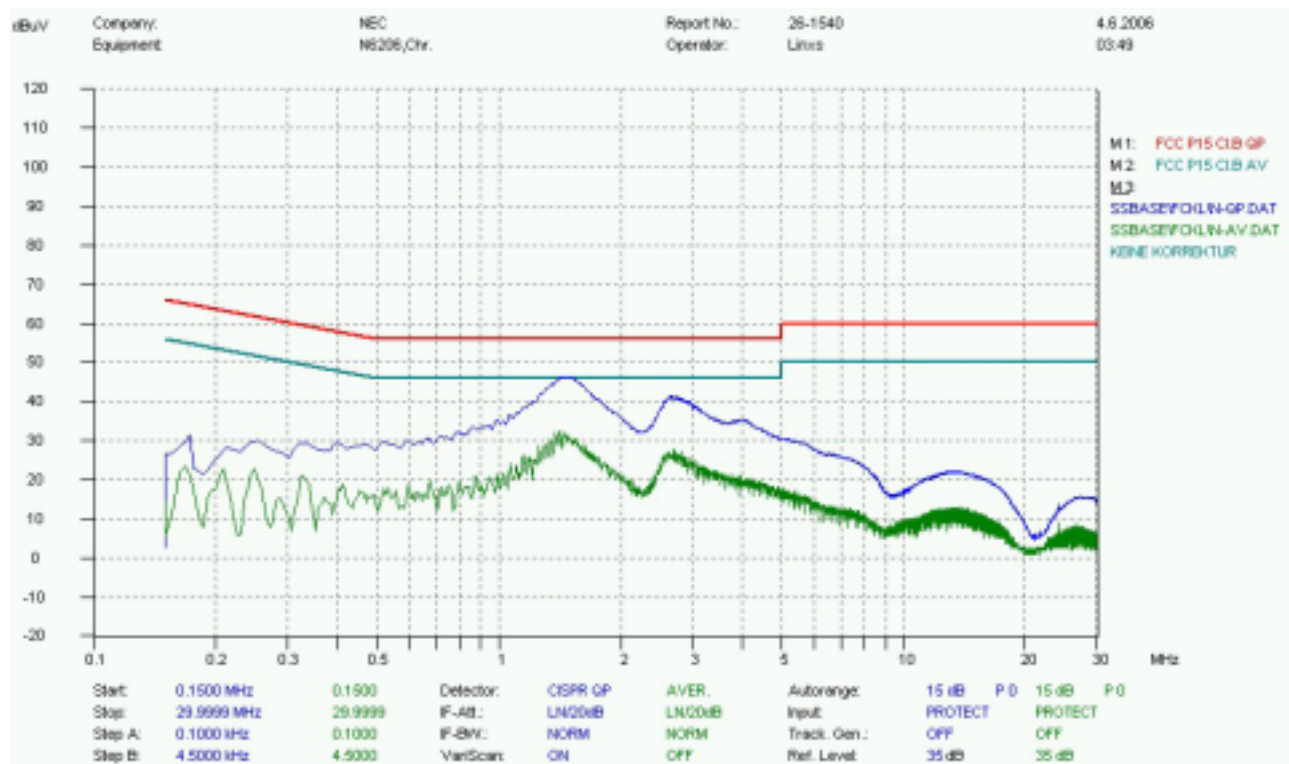
1. QP and AV are abbreviations of the quasi-peak and average individually.
2. If the emission levels measured with QP detector are lower than AV limits, there is unnecessary to measure with AV detector.
3. The emission levels recorded above is the larger ones of both L phase and N phase.

Test Plots

1. Mains terminal disturbance voltage, L phase



2. Mains terminal disturbance voltage, N phase



4 Radiated Emission Test

4.1 Limits of Radiated Emission

According to FCC §15.247(c), radiated emission outside the frequency band attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a).

According to FCC §15.209 (a), Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency(MHz)	Field Strength(μ V/m)	Measurement Distance(m)
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

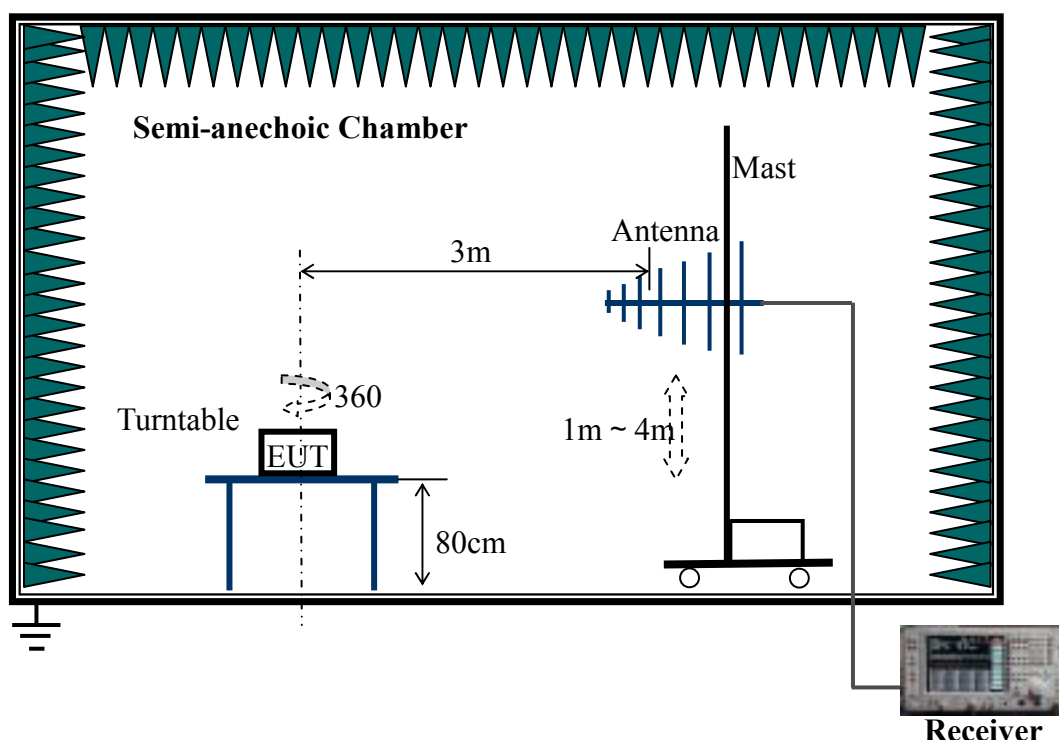
As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector. When average radiated emission measurements are specified in this part, including emission measurements below 1000 MHz, there also is a limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20 dB above the maximum permitted average limit for the frequency being investigated unless a different peak emission limit is otherwise specified in the rules,

4.2 Test Procedure

- The EUT was placed on the top of a ratable 0.8 meters above the ground at a semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- The antenna is a broadband antenna, and its height is varied from one meter to four meter above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to the heights from 1 to 4 meters and the ratable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- The test-receiver system was set to Peak Detector Function and Specified Bandwidth with Maximum Hold Mode.

- f. If the emission level of the EUT in peak mode was 10 dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emission that did not have 10 dB margins would be retested one by one using the quasi-peak method.

4.3 Test Setup



For the actual test configuration, please refer to the related item-Photographs of the Test Configuration.

4.4 EUT Setup and Operating Conditions

The EUT was powered off and connected to a notebook computer. A set of software (provided by the applicant) installed in the computer activated and controlled the Bluetooth module of the EUT. The Bluetooth module was operating at maximum power output and wanted channels.

After setting the notebook computer was moved outside the chamber to avoid radiated disturbance.

4.5 Test Results

Tx Frequency: 2402MHz

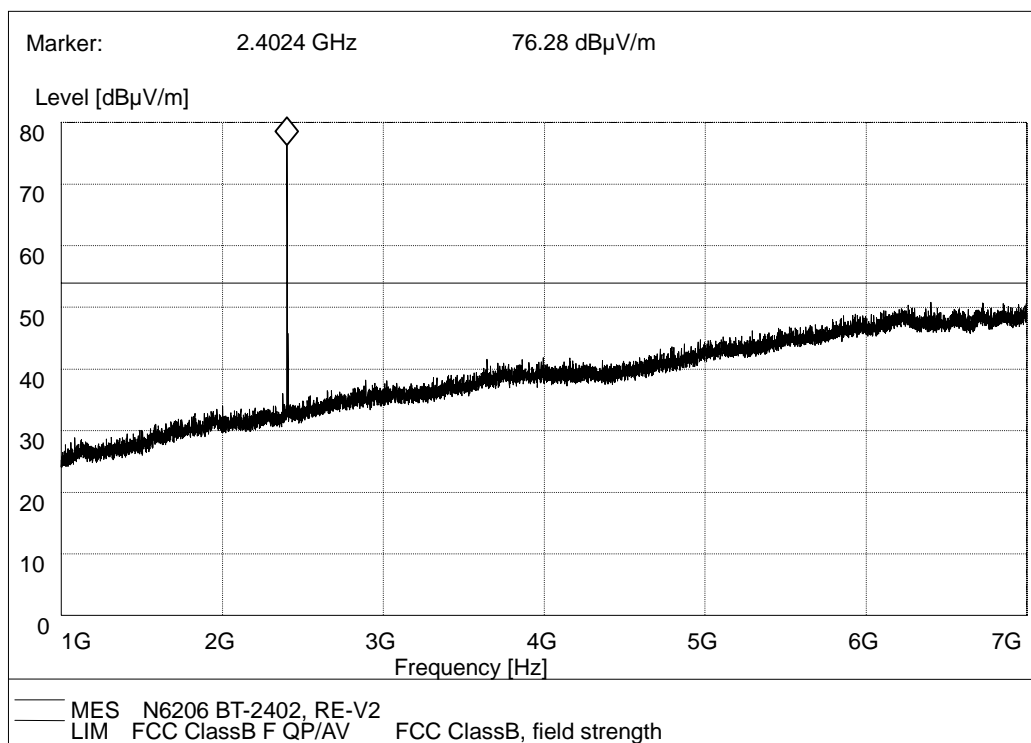
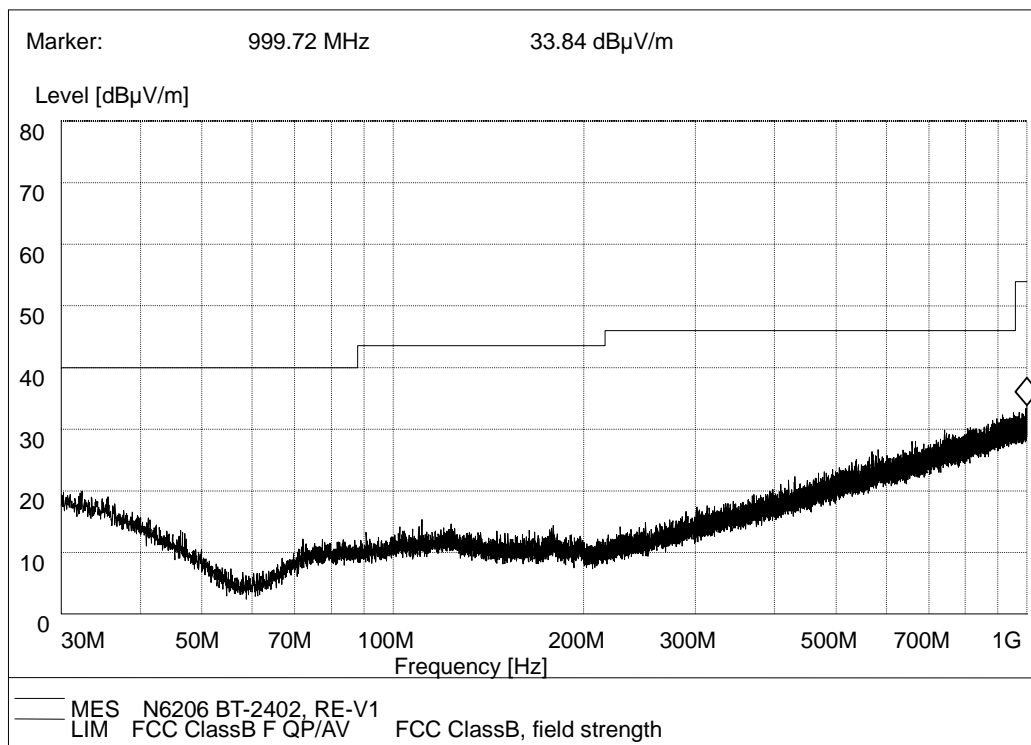
Frequency (MHz)	Antenna Polarization	QP Limits (dBμV/m)	Emission Level (dBμV/m)
No peak found	Vertical	--	--
No peak found	Horizontal	--	--

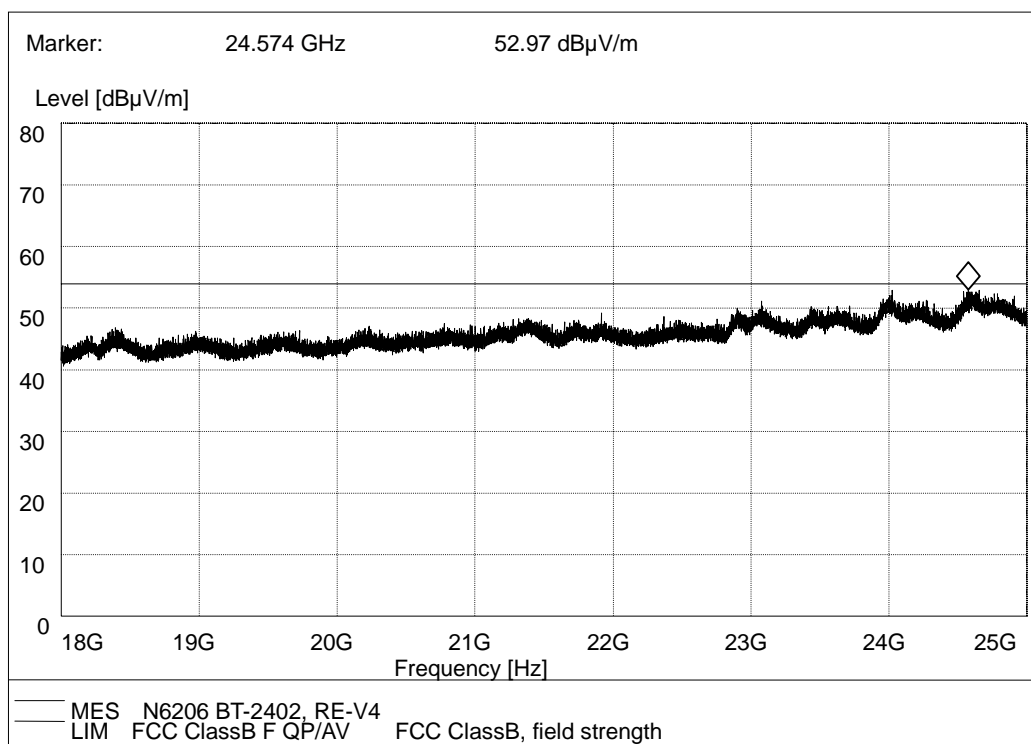
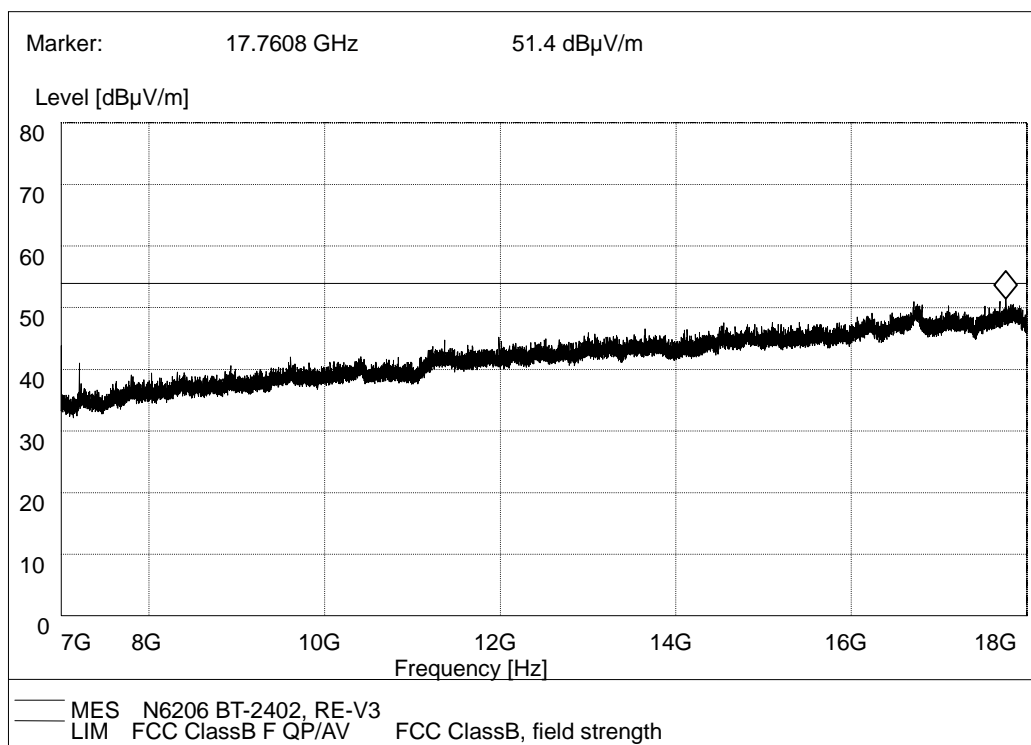
Tx Frequency: 2441MHz

Frequency (MHz)	Antenna Polarization	QP Limits (dBμV/m)	Emission Level (dBμV/m)
No peak found	Vertical	--	--
No peak found	Horizontal	--	--

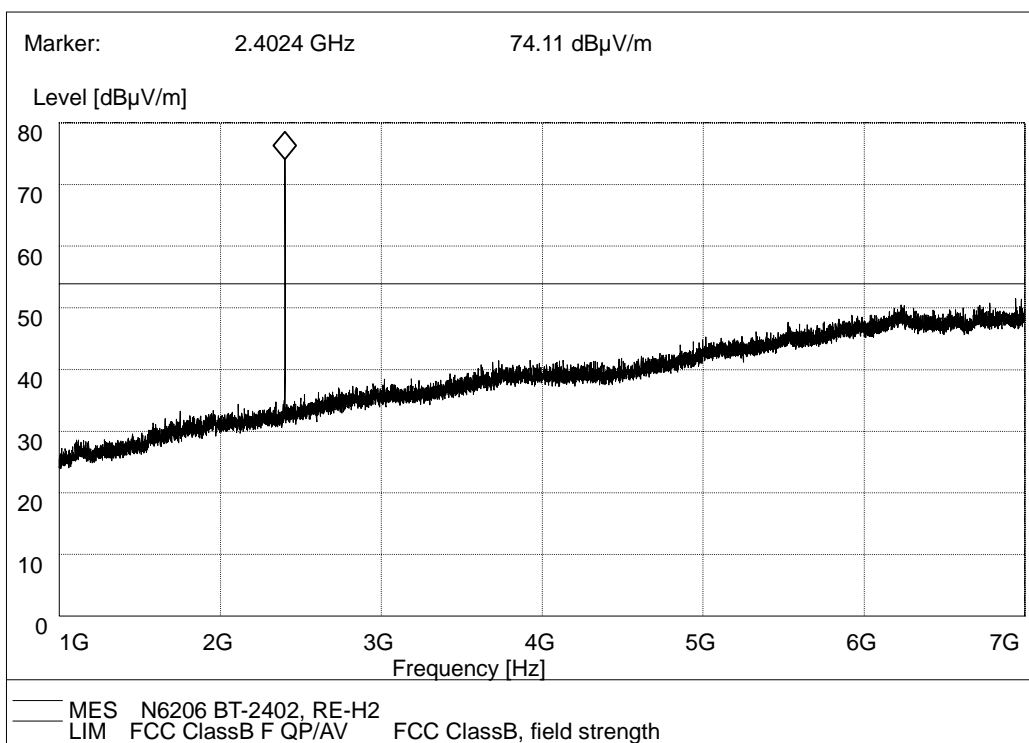
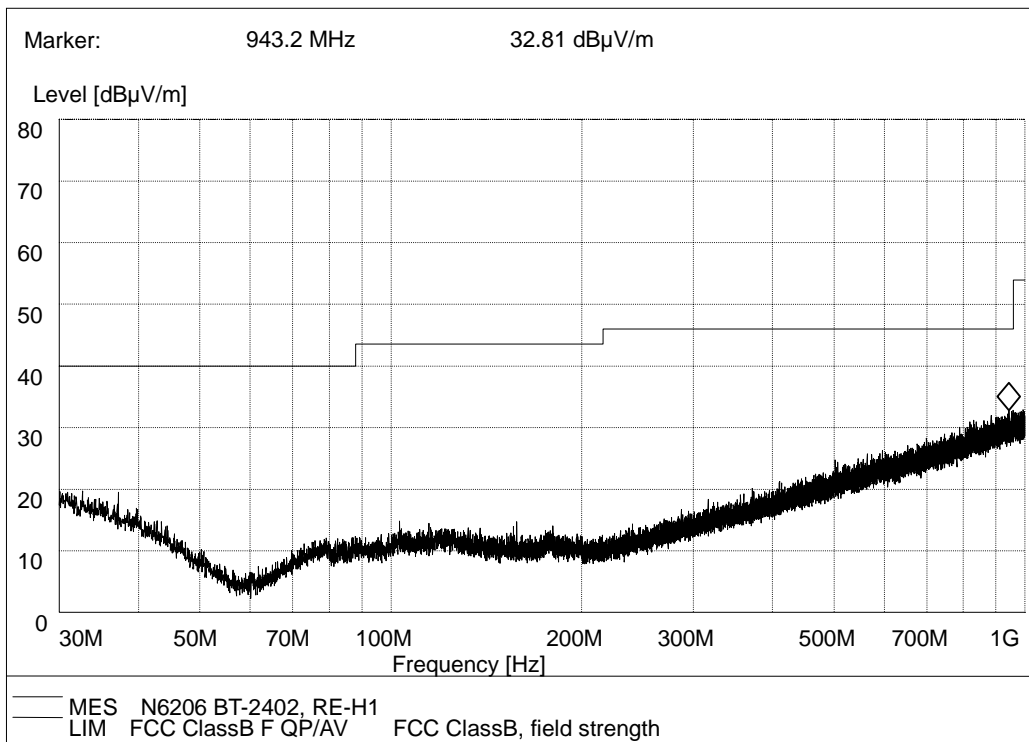
Tx Frequency: 2480MHz

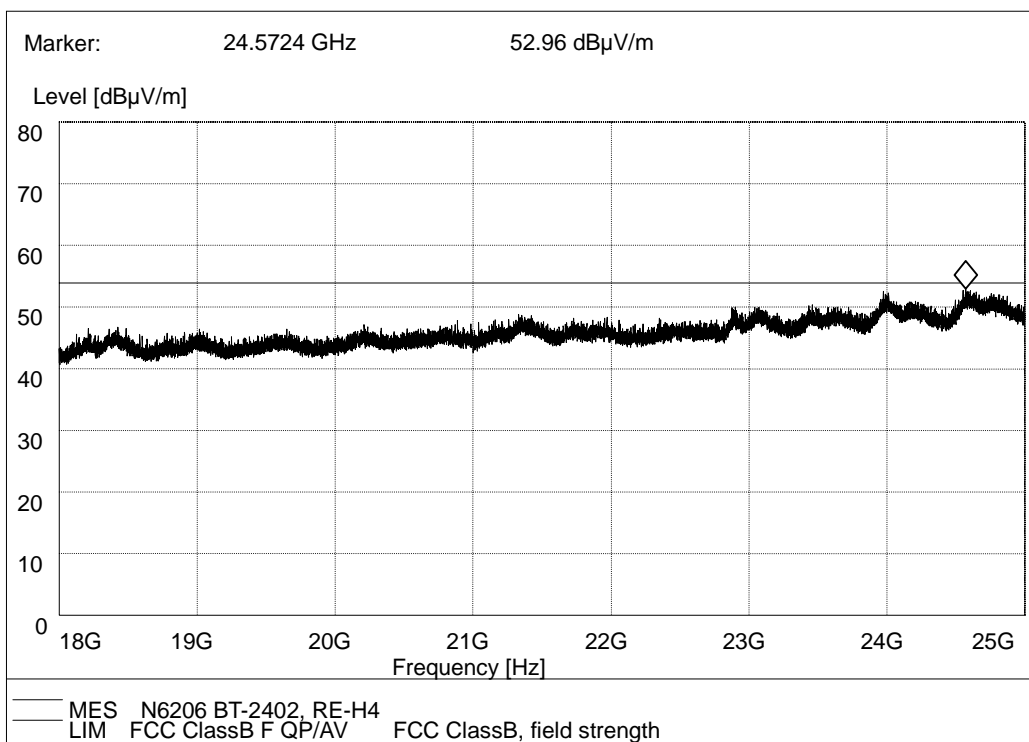
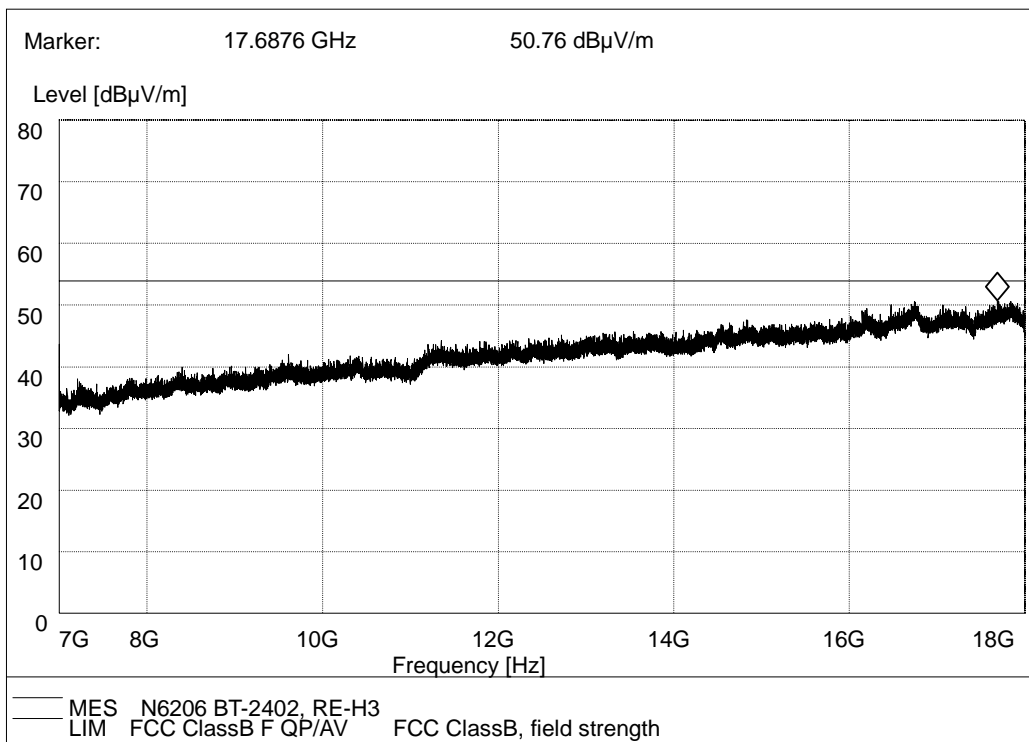
Frequency (MHz)	Antenna Polarization	QP Limits (dBμV/m)	Emission Level (dBμV/m)
No peak found	Vertical	--	--
No peak found	Horizontal	--	--

Test Plots**1. Lowest channel 2402MHz, Vertical**

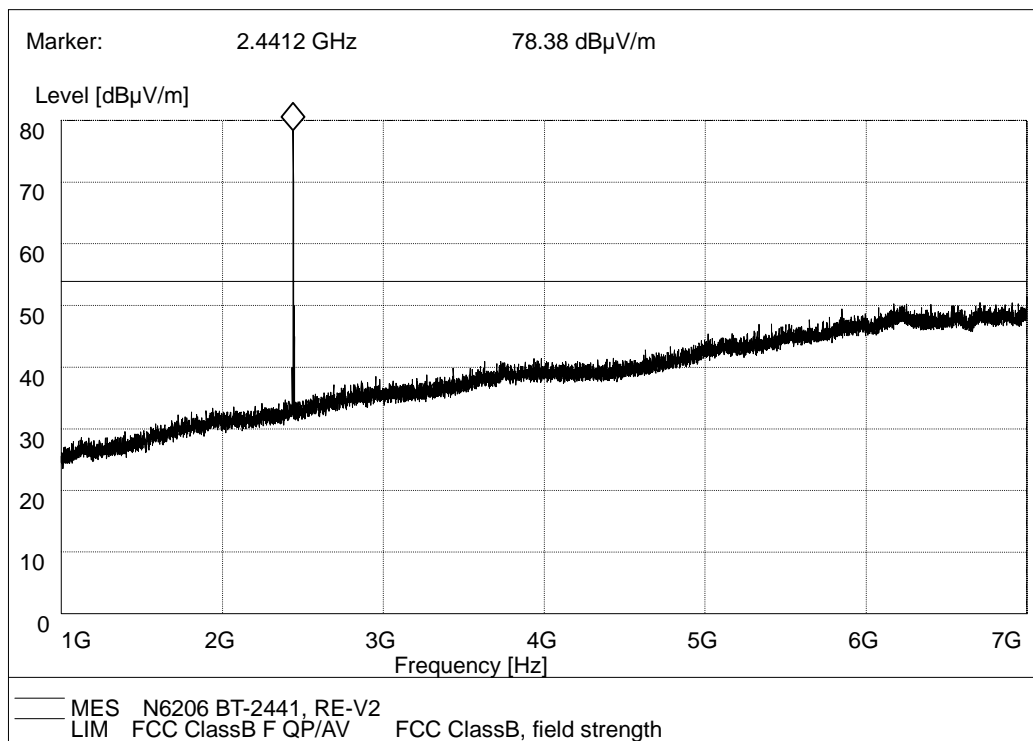
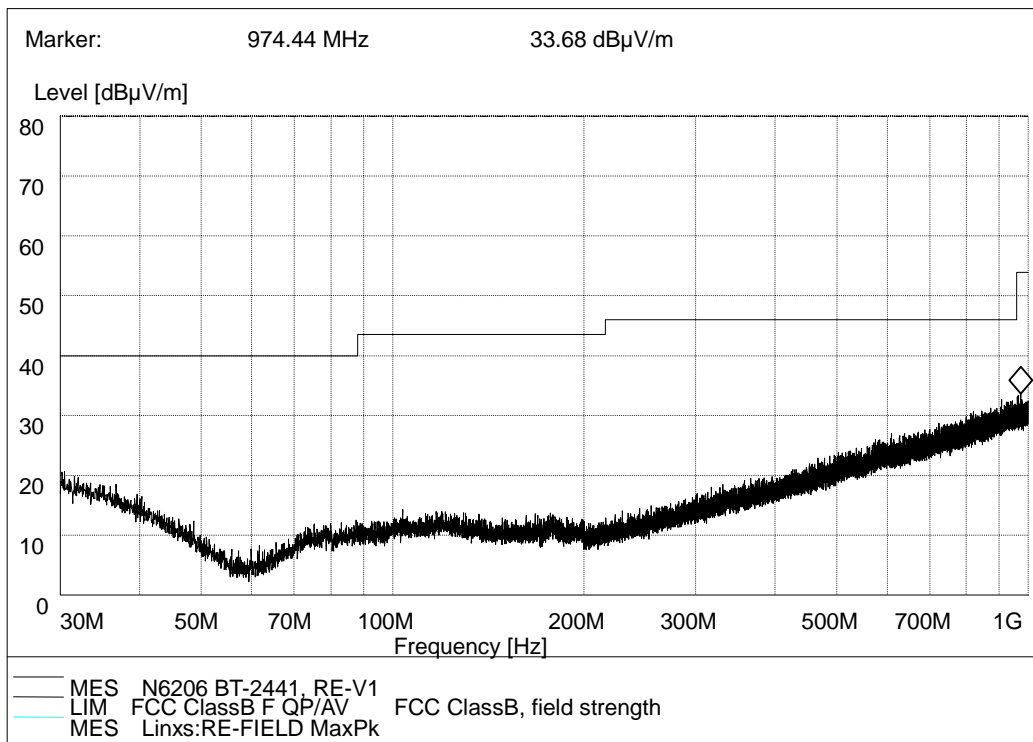


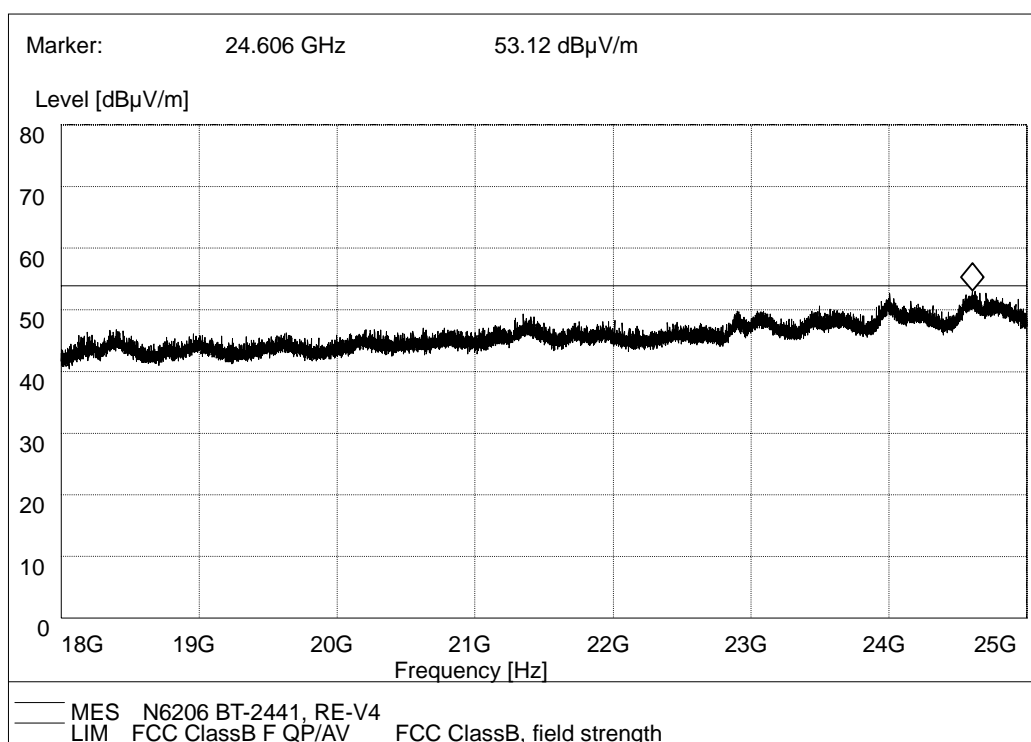
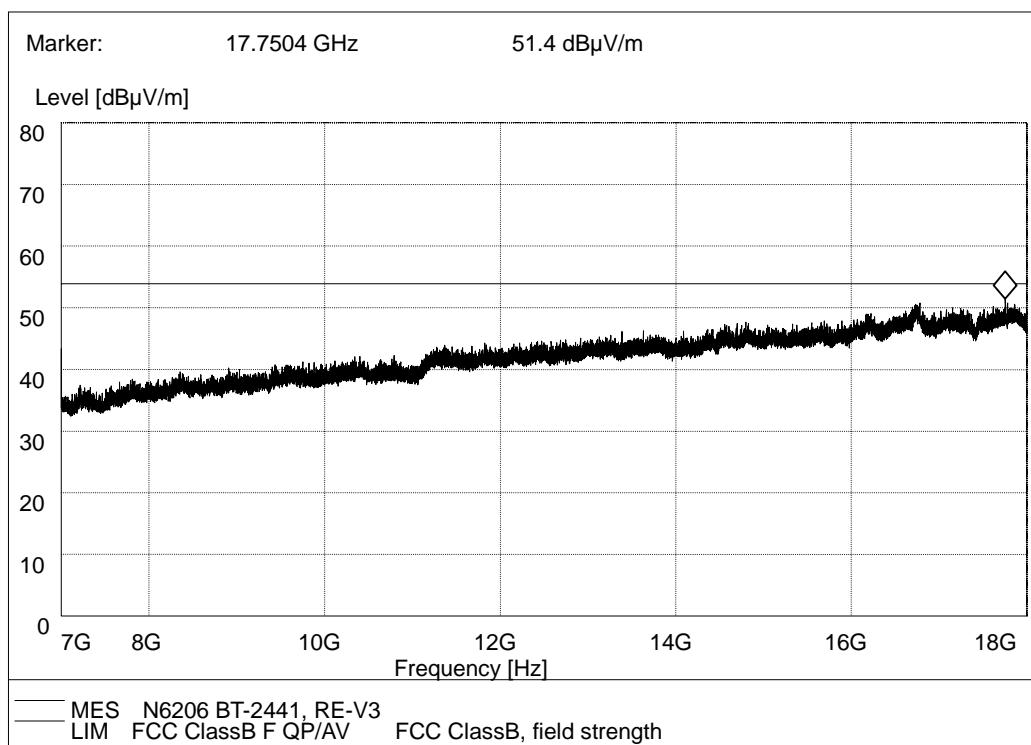
2. Lowest channel 2402MHz, Horizontal



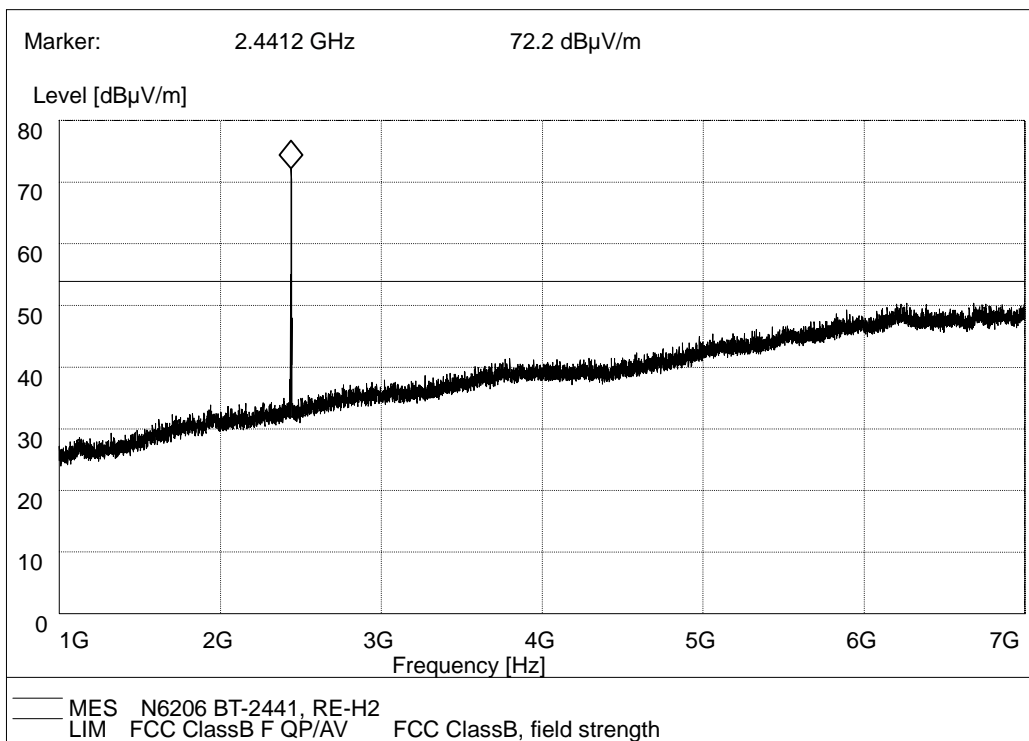
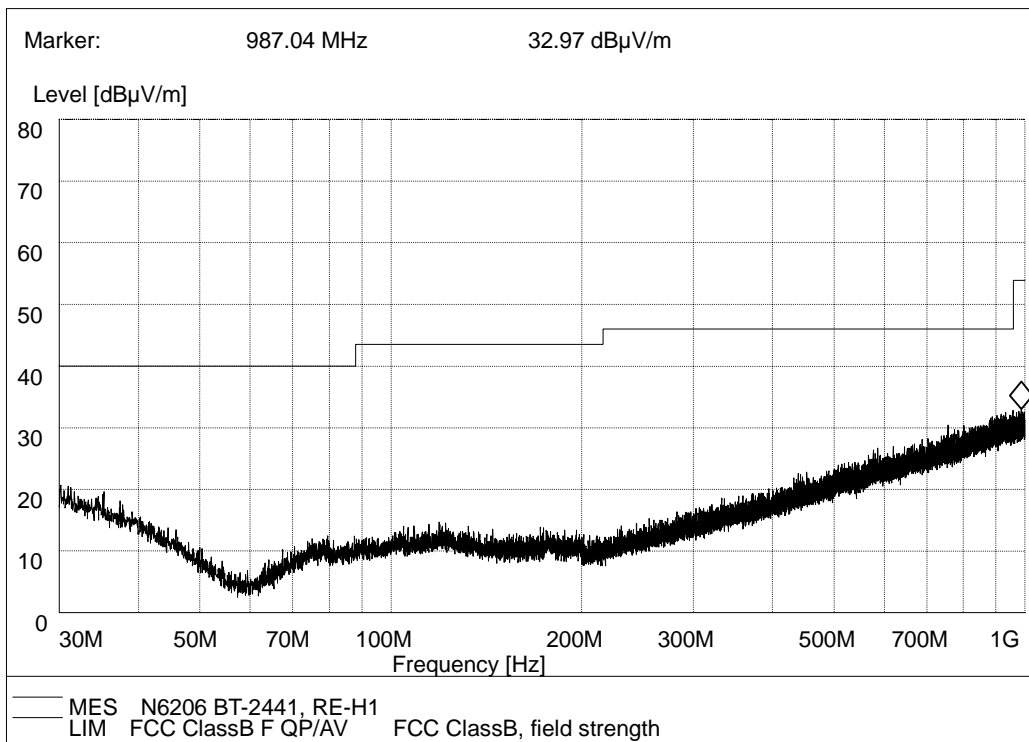


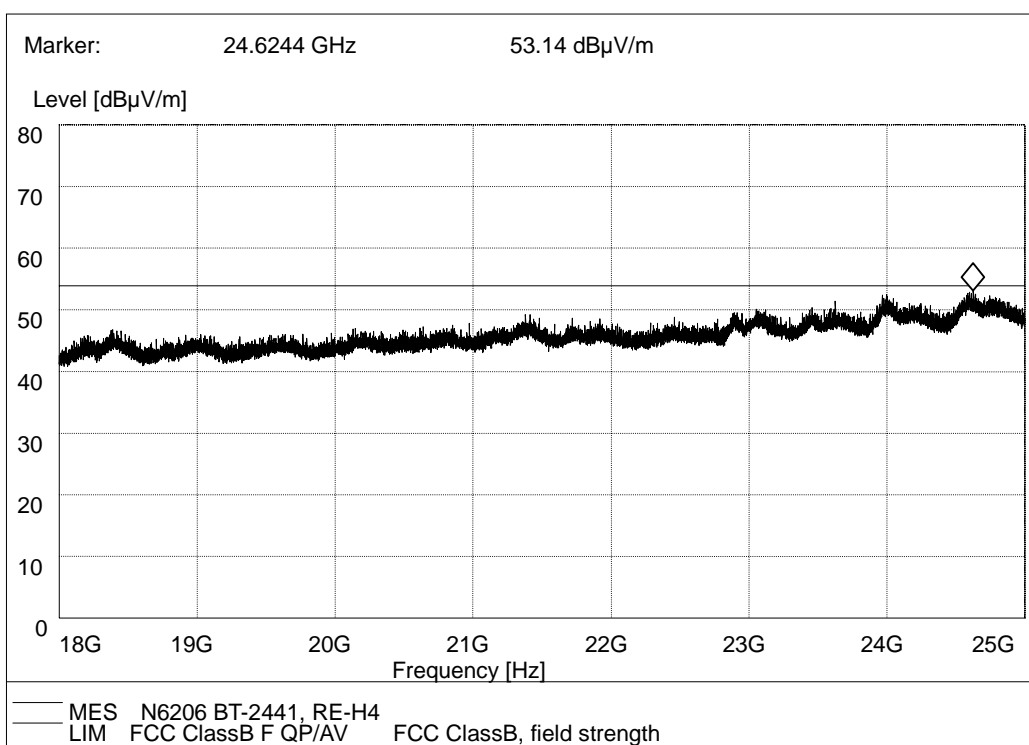
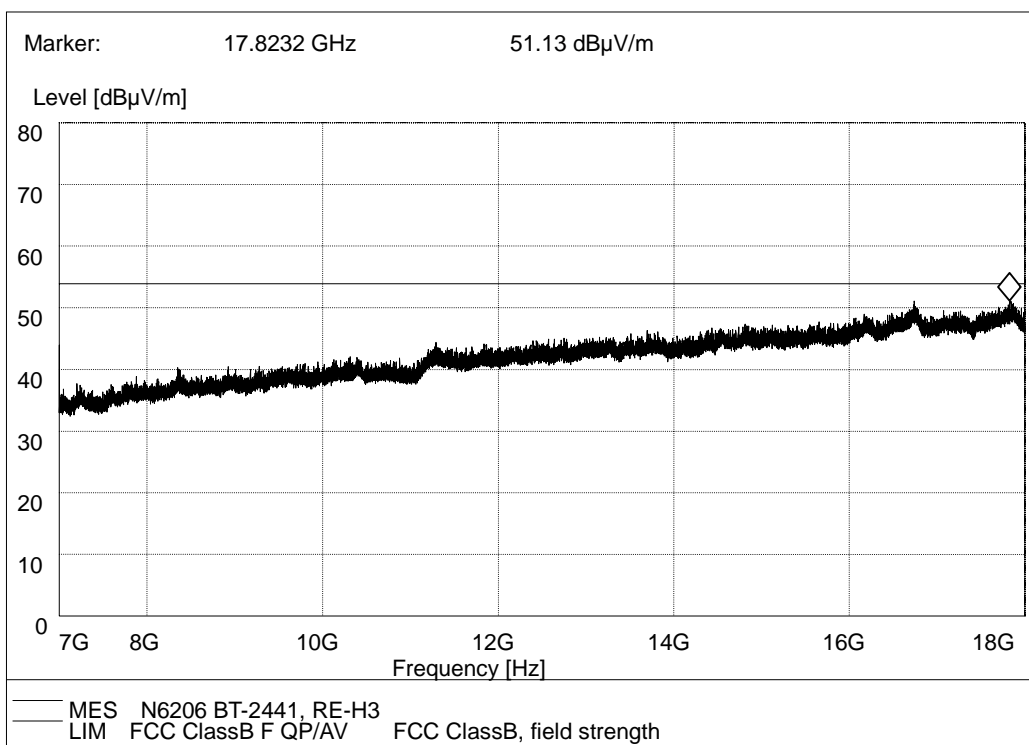
3. Middle channel 2441MHz, Vertical



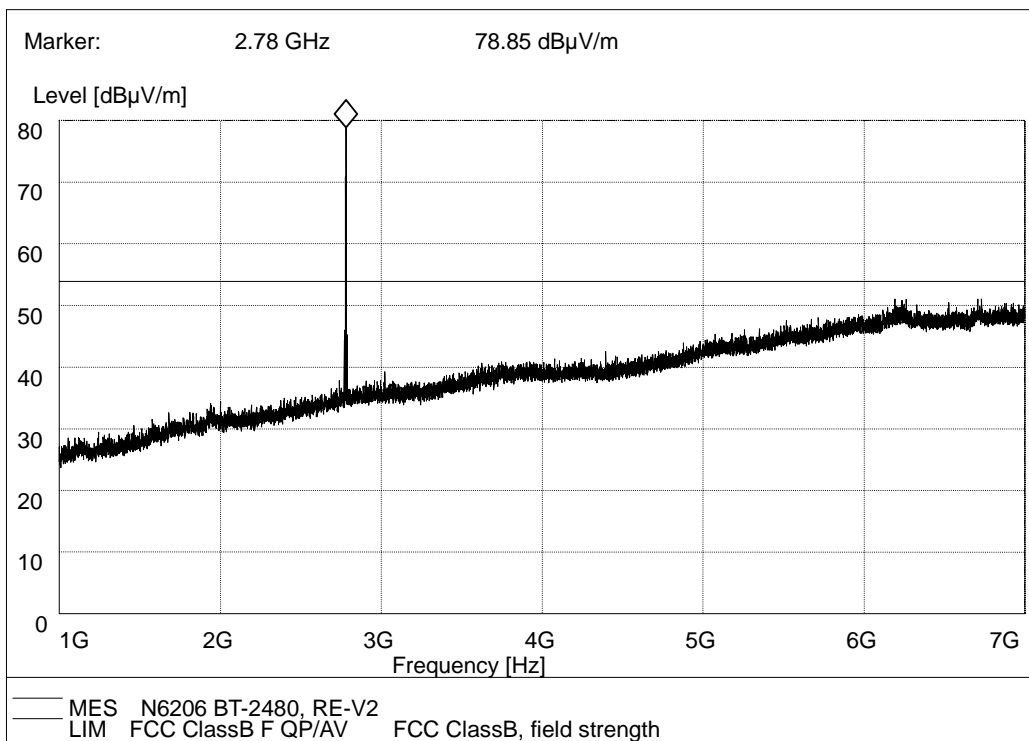
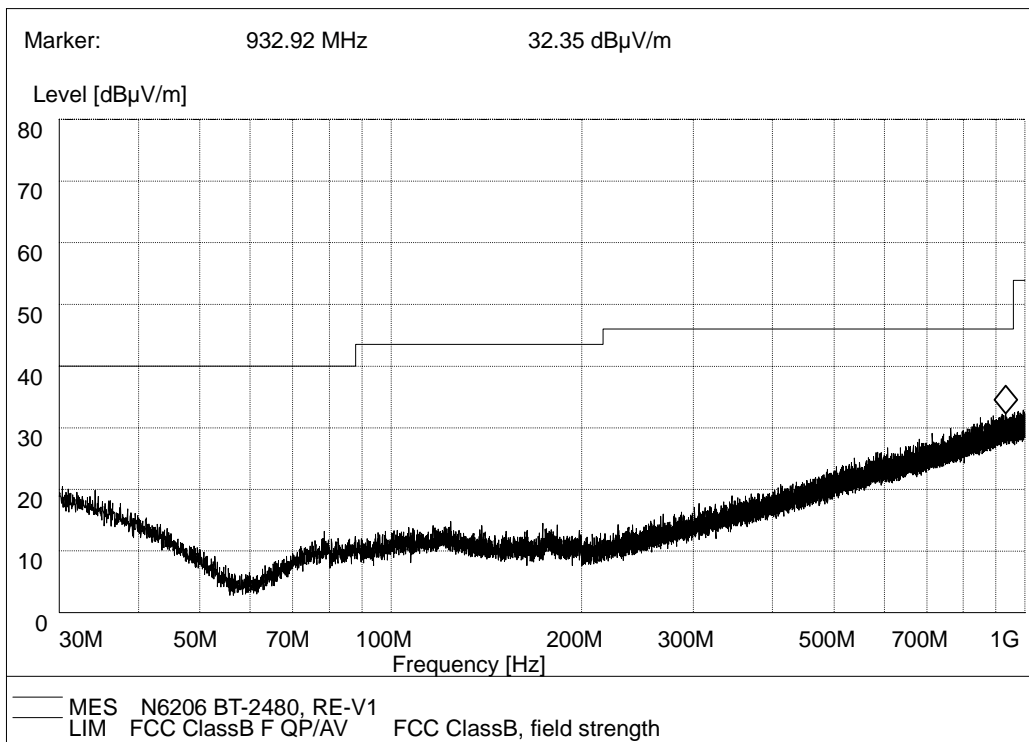


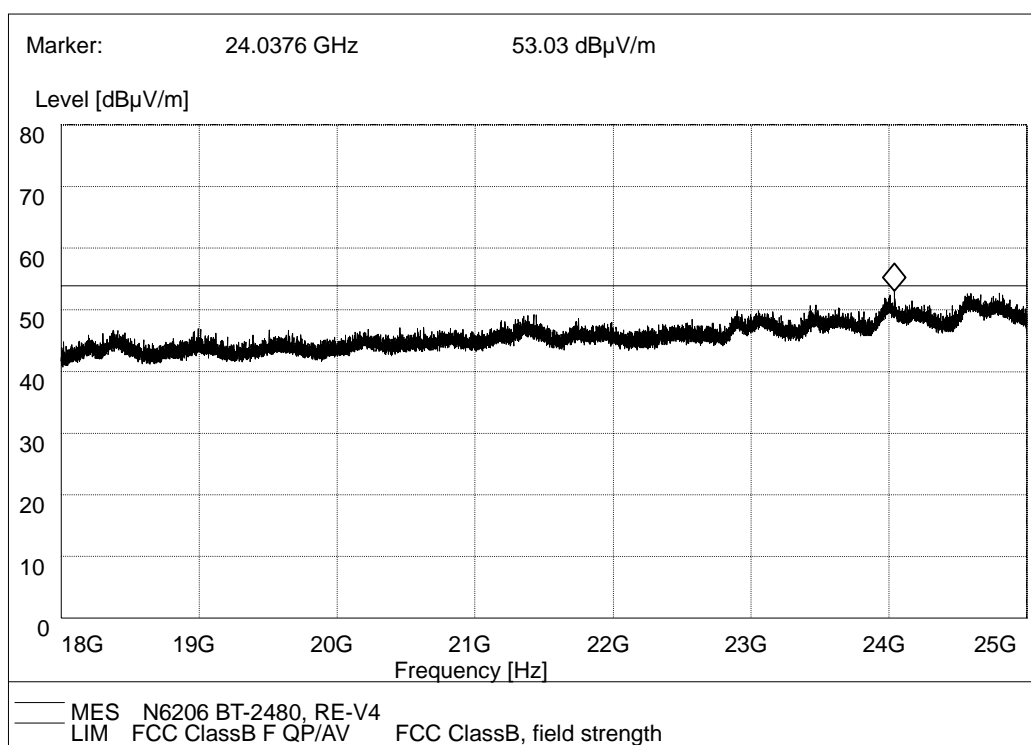
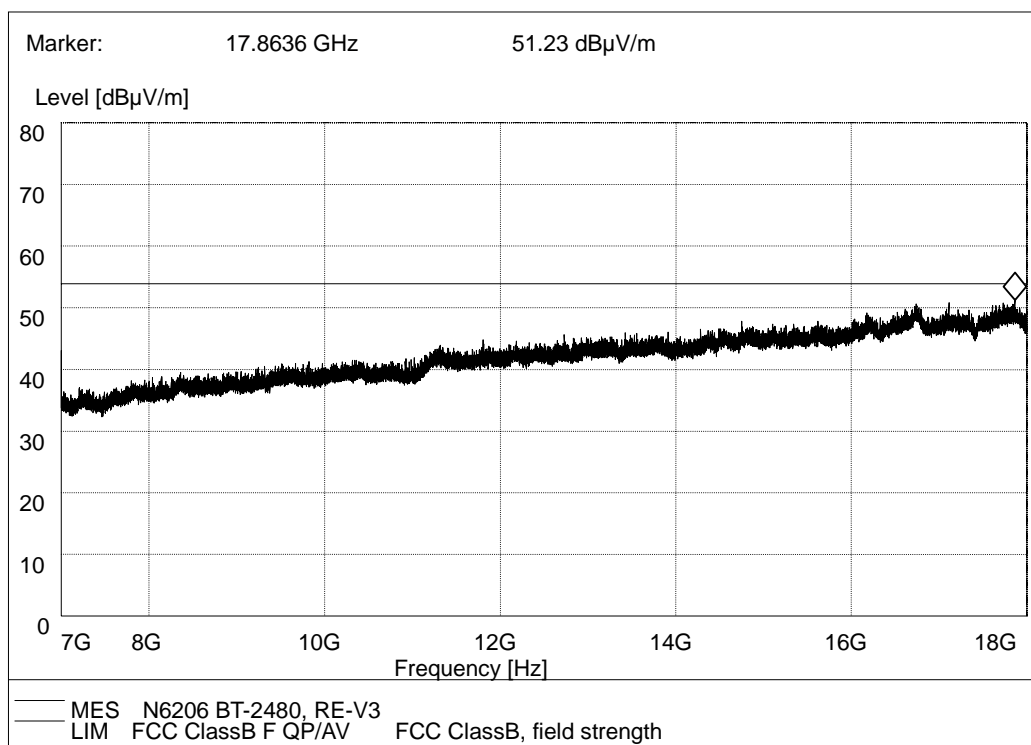
4. Middle channel 2441MHz, Horizontal



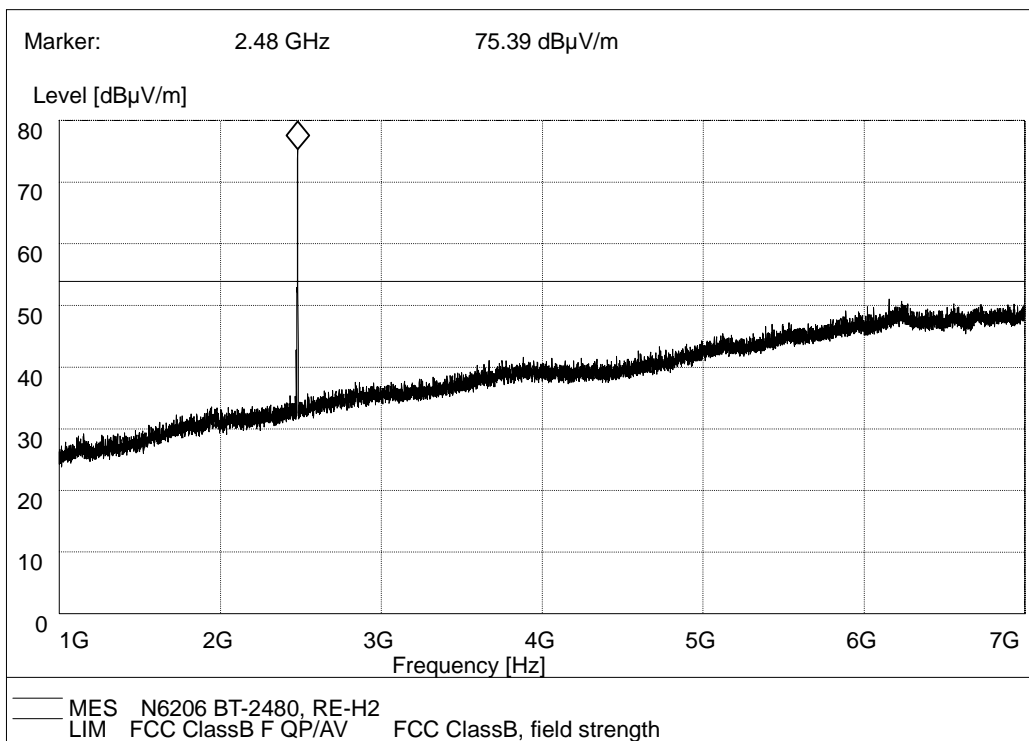
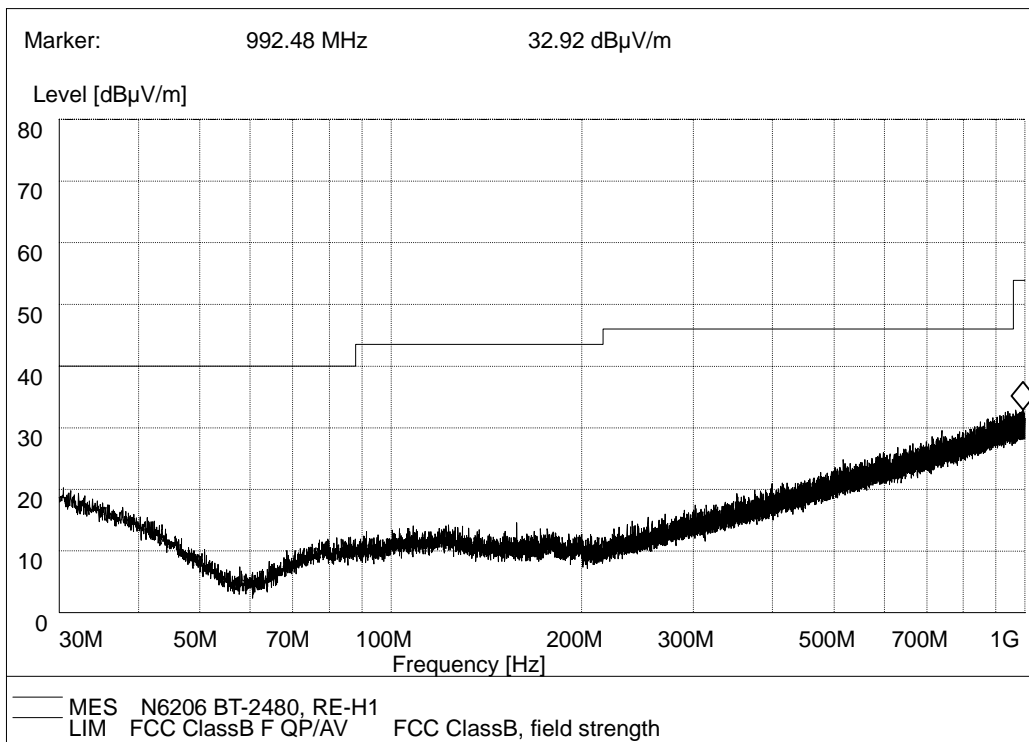


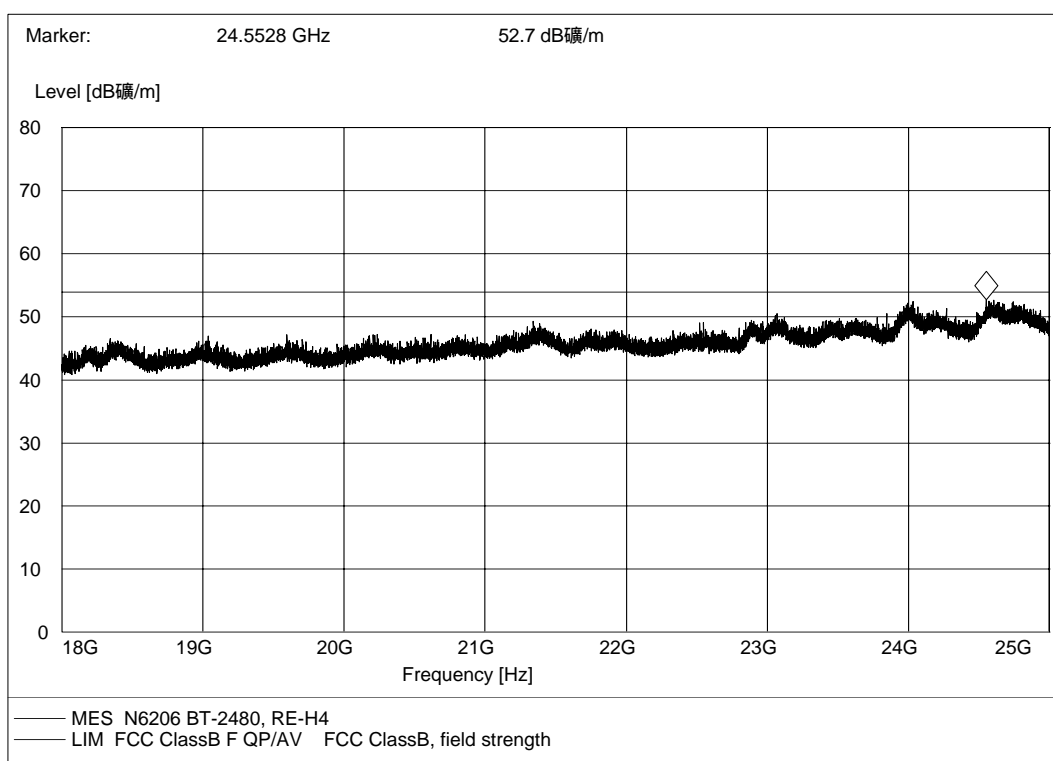
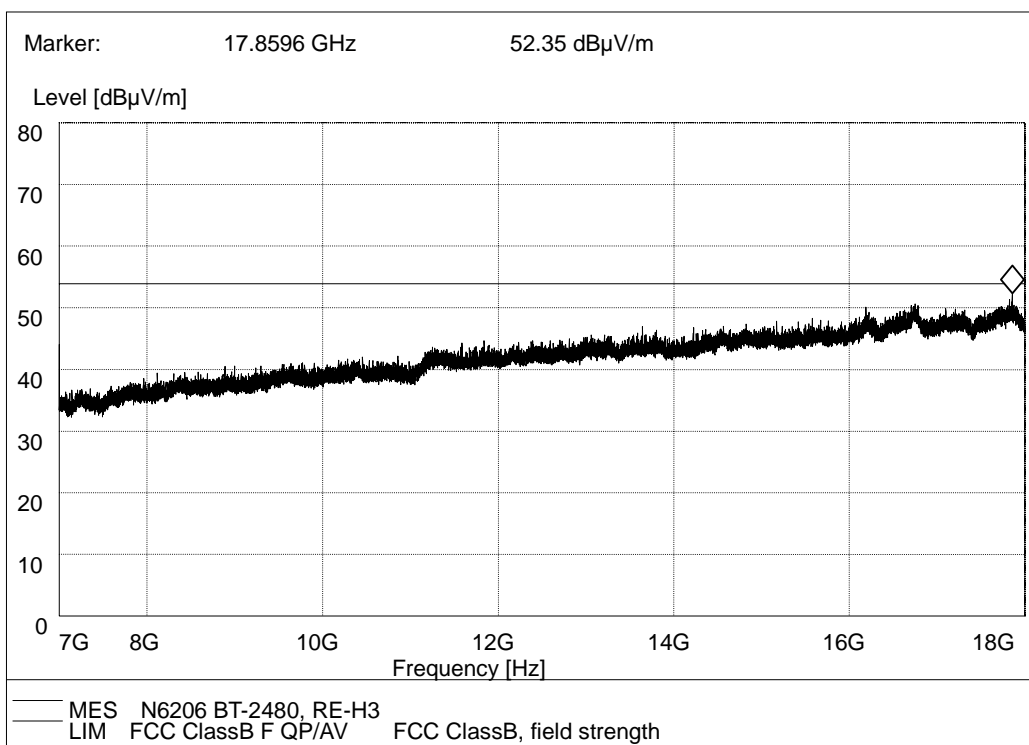
5. Highest channel 2480MHz, Vertical





6. Highest channel 2480MHz, Horizontal





5 Bandwidth and Carried Frequency Separation

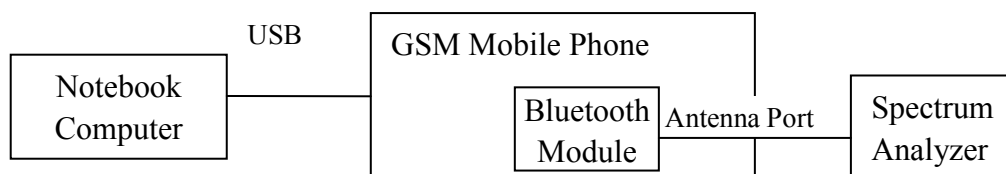
5.1 Definition

According to FCC §15.247(a)(1), Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

5.2 Test Procedure

- The EUT temporary antenna port was coupled to the spectrum analyzer. The loss of the cables the test system is calibrated to correct the reading.
- The spectrum analyzer was set to Maxpeak Detector function and Maximum Hold mode.
- The resolution bandwidth of the spectrum analyzer was set to at least 1% of the EUT emission bandwidth. RBW=10 kHz, VBW=30 kHz.

5.3 Test Setup



For the actual test configuration, please refer to the related item-Photographs of the Test Configuration.

5.4 EUT Setup and Operating Conditions

The EUT was powered off and connected to a notebook computer. A set of software (provided by the applicant) installed in the computer activated and controlled the Bluetooth module of the EUT. The Bluetooth module was operating at maximum power output and wanted channels.

5.5 Test Results

Operating Frequency (MHz)	20dB Bandwidth(MHz)	Channel Separation
2402	0.941	1.00MHz
2441	0.941	
2480	0.943	

The EUT had hopping channel carrier frequencies separated by the 20 dB bandwidth of the hopping channel.

6 Hopping Sequence

6.1 Requirement of the standard

According to FCC §15.247(a)(1), The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudorandomly ordered list of hopping frequencies.

6.2 Test Results

The channel is represented by a pseudo-random hopping sequence hopping through the 79 RF channels. The hopping sequence is unique for the piconet and is determined by the Bluetooth device address of the master. For details refer to the Bluetooth standard.

7 Equal Hopping Frequency Use

7.1 Requirement of the standard

According to FCC §15.247(a)(1), Each frequency must be used equally on the average by each transmitter.

7.2 Test Results

The EUT complies with the Bluetooth RF specifications. For details refer to the Bluetooth standard.

8 Receiver Input Bandwidth and Hopping Capability

8.1 Requirement of the standard

According to FCC §15.247(a)(1), The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals

8.2 Test Results

The EUT complies with the Bluetooth RF specifications. For details refer to the Bluetooth standard.

9 Time of Occupancy (Dwell Time)

9.1 Requirement of the Standard

According to FCC §15.247(a)(1)(iii), Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 non-overlapping channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems which use fewer than 75 hopping frequencies may employ intelligent hopping techniques to avoid interference to other transmissions. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 non-overlapping channels are used.

9.2 Test Procedure

- The EUT temporary antenna port was coupled to the spectrum analyzer. The loss of the cables the test system is calibrated to correct the reading.
- The spectrum analyzer was set to Maxpeak Detector function and Maximum Hold mode.
- The resolution bandwidth of the spectrum analyzer was comparable to the EUT emission bandwidth. RBW=1 MHz, VBW=3 MHz.

9.3 Test Setup

Same as 5.3

9.4 EUT Setup and Operating Conditions

Refer to 5.4. The Bluetooth module was operating at maximum power output and hopping-on mode.

9.5 Test Results

Number of hopping channels is 79.

A channel was used 108 times within $0.4 \times 79 = 31.6$ S.

Dwell time of each occupation in this channel is 2.98mS.

$2.98\text{mS} \times 108 = 0.322 \text{ S} < 0.4 \text{ S}$

10 Peak Output Power

10.1 Requirement of the standard

According to FCC §15.247(b)(1), For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 hopping channels, and all frequency hopping systems in the 5725-5850MHz band, the maximum peak output power of the intentional radiator shall not exceed 1 Watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 Watts.

10.2 Test Procedure

- The EUT was coupled to the spectrum analyzer and the base station simulator through a power divider. The radio frequency load attached to the EUT antenna terminal was 50 Ohm. The loss of the cables the test system is calibrated to correct the reading.
- The spectrum analyzer was set to Maxpeak Detector function and Maximum Hold mode.
- The resolution bandwidth of the spectrum analyzer was comparable to the EUT emission bandwidth. RBW=1 MHz, VBW=3 MHz.

10.3 Test Setup

Same as 5.3

10.4 EUT Setup and Operating Conditions

Same as 5.4

10.5 Test Results

Operating Frequency (MHz)	Peak Output Power (dBm)	Limit (dBm)
2402	6.23	30
2441	6.05	30
2480	5.89	30

11 Band Edge

11.1 Requirement of the standard

According to FCC §15.247(c), In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement..

11.2 Test Procedure

- a. The EUT was coupled to the spectrum analyzer and the base station simulator through a power divider. The radio frequency load attached to the EUT antenna terminal was 50 Ohm. The loss of the cables the test system is calibrated to correct the reading.
- b. The spectrum analyzer was set to Maxpeak Detector function and Maximum Hold mode.
- c. According to the standard requirement, the resolution bandwidth of the spectrum analyzer was set to RBW=100 kHz, VBW=300 kHz.

11.3 Test Setup

Same as 5.3

11.4 EUT Setup and Operating Conditions

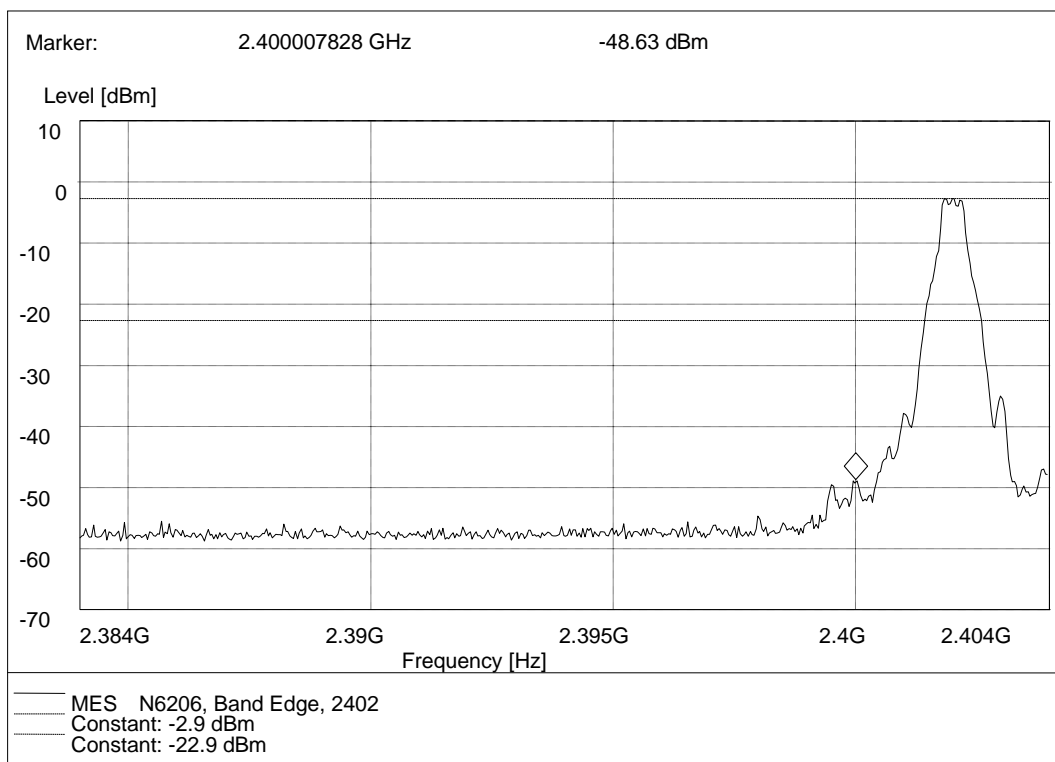
Same as 5.4

11.5 Test Results

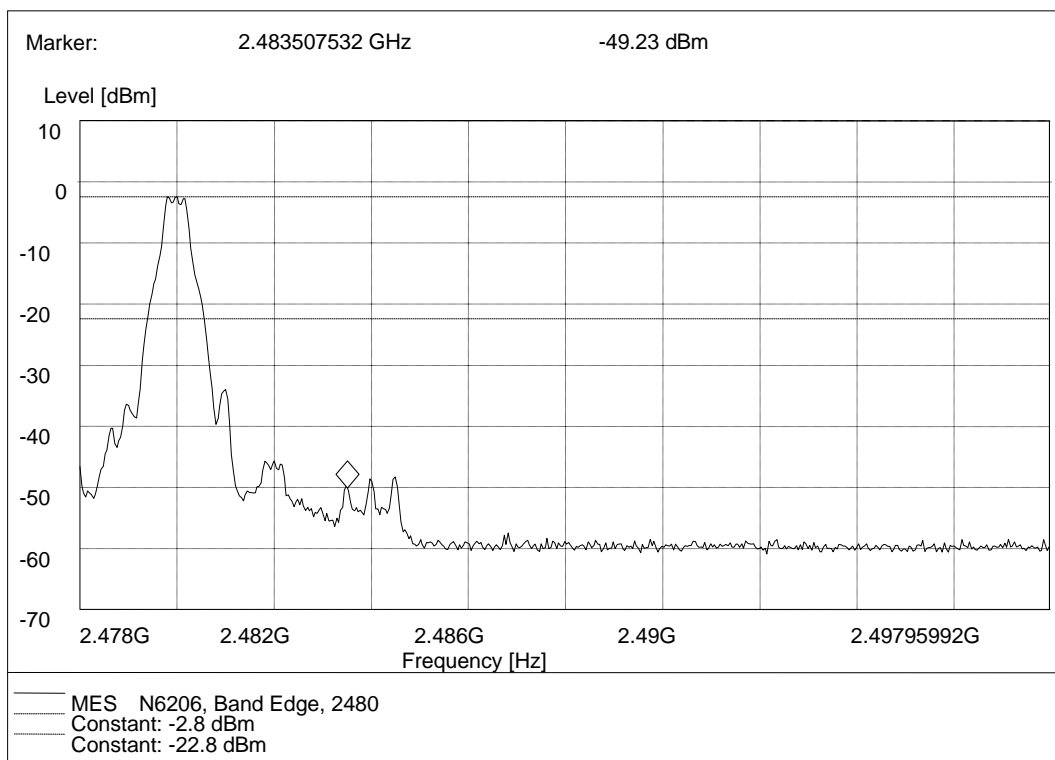
The radio frequency power beyond the band edges 2400 and 2483.5MHz was 20dB below the peak output power, measured with 100 kHz resolution bandwidth. Refer to the following test plots

Band Edge Test Plots

1. Lowest channel, 2402MHz



2. Highest channel, 2480MHz



12 Conducted Spurious Emission

12.1 Requirement of the standard

According to FCC §15.247(c), In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement..

12.2 Test Procedure

- a. The EUT was coupled to the spectrum analyzer and the base station simulator through a power divider. The radio frequency load attached to the EUT antenna terminal was 50 Ohm. The loss of the cables the test system is calibrated to correct the reading.
- b. The spectrum analyzer was set to Maxpeak Detector function and Maximum Hold mode.
- c. According to the standard requirement, the resolution bandwidth of the spectrum analyzer was set to RBW=100 kHz, VBW=300 kHz.

12.3 Test Setup

Same as 5.3

12.4 EUT Setup and Operating Conditions

Same as 5.4

12.5 Test Results

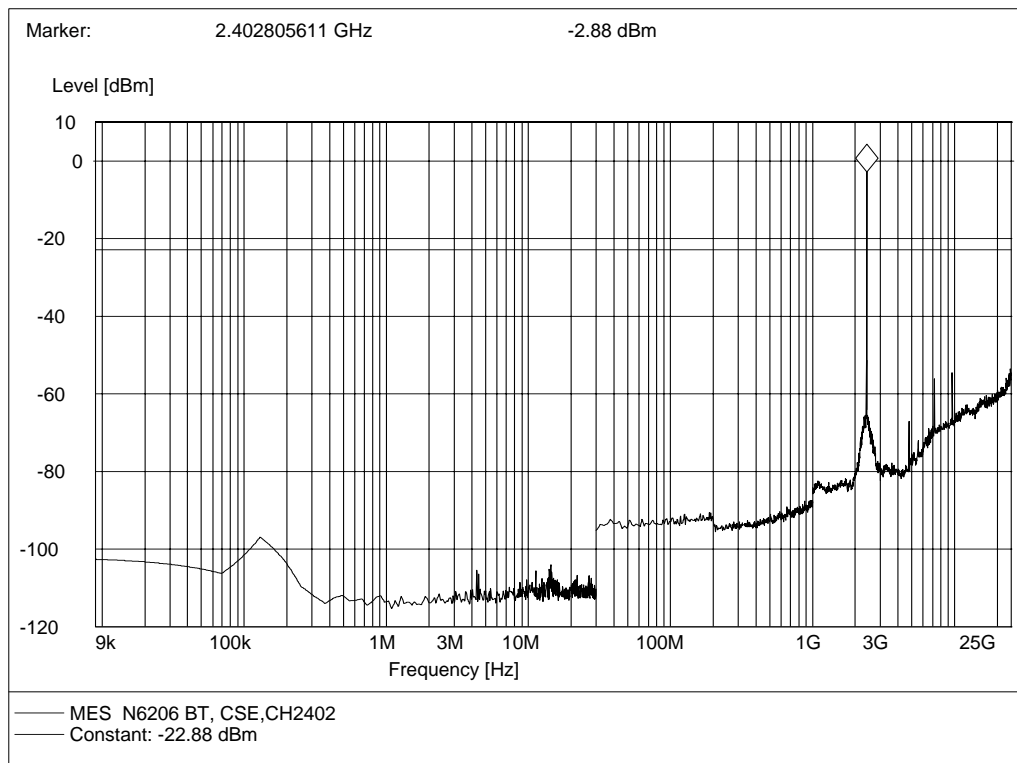
No.	Frequency (MHz)	Level (dBm)	Limit (Ref-20dB)	Margin(dB) (Limit-Level)
2402MHz (Ref=-2.88dBm)				
1	4804.00	-67.09	-22.88	44.21
2	7206.00	-56.14	-22.88	33.26
3	9608.00	-54.55	-22.88	31.67
2441MHz (Ref=-2.87dBm)				
1	4882.00	-68.58	-22.87	45.71
2	7323.00	-49.48	-22.87	26.61
3	9764.00	-57.42	-22.87	34.55
4	12205.00	-61.79	-22.87	38.92
2480MHz (Ref=-2.89dBm)				
1	4960.00	-69.05	-22.89	46.16
2	7440.00	-52.15	-22.89	29.26
3	9920.00	-51.56	-22.89	28.67
4	12400.00	-61.53	-22.89	38.64
5	14880.00	-58.31	-22.89	35.42

NOTE:

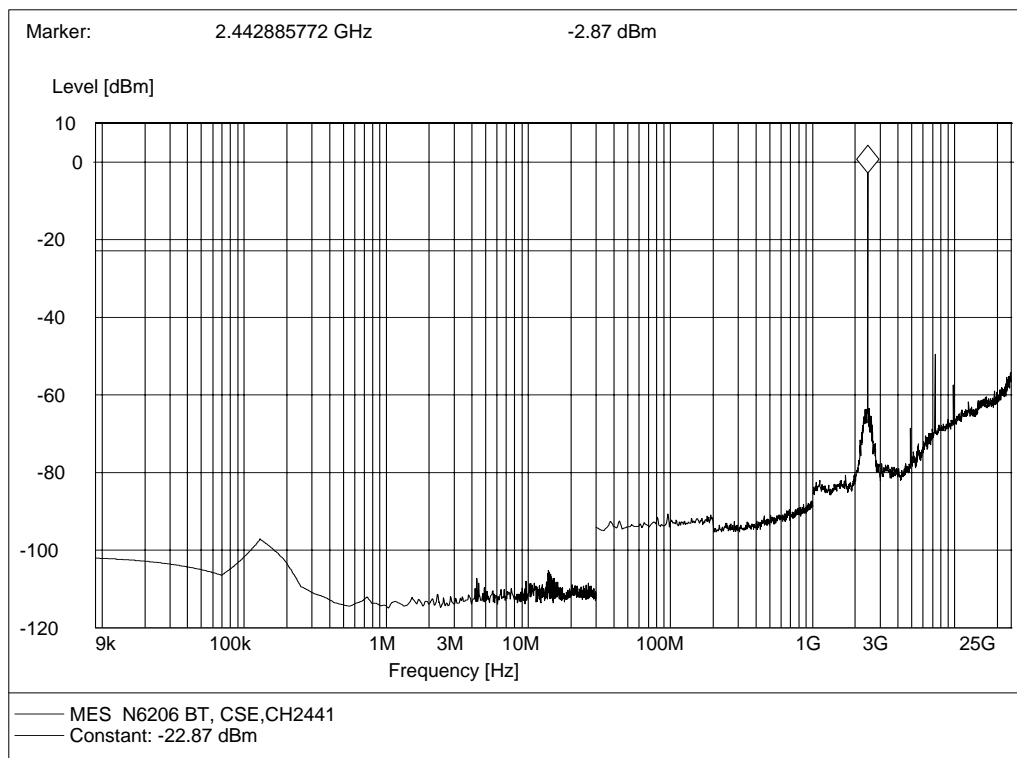
1. The spurious Emissions from 9 KHz to 10th harmonic of the fundamental frequency were researched. Only the larger ones were recorded above.
2. For more details please refer to the following test plots. The marker point is the EUT transmitting frequency which should be ignore

Conducted Spurious Emission Test Plots

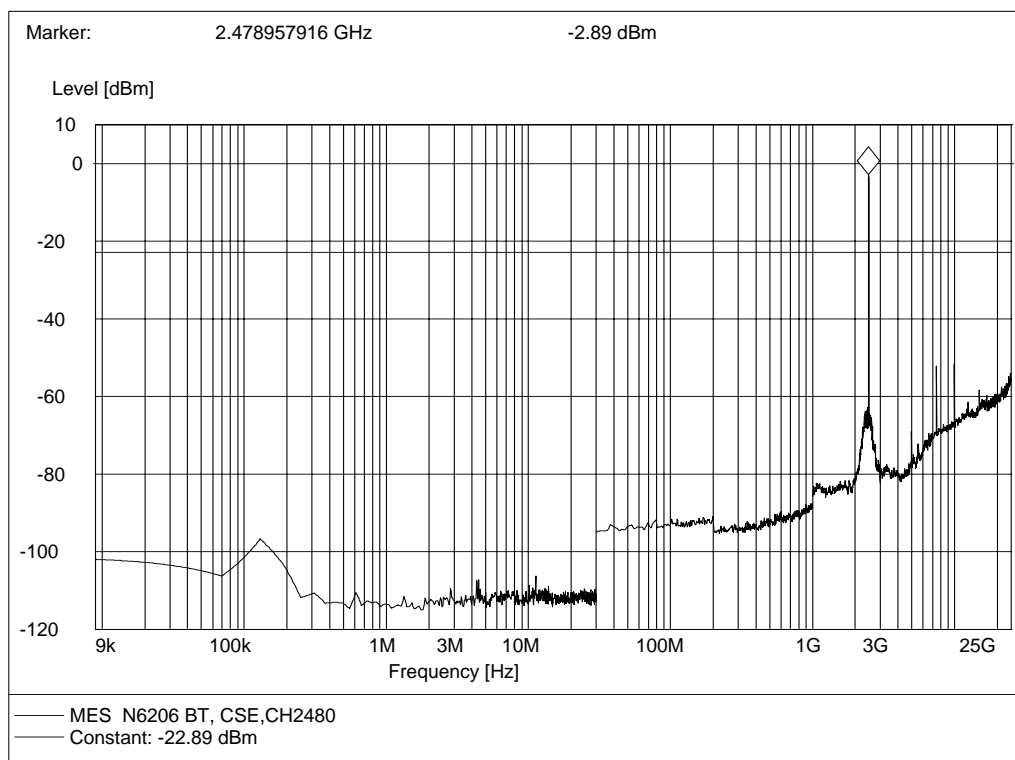
1. Lowest channel, 2402MHz



2. Middle channel, 2441MHz



3. Highest channel, 2480MHz



13 Radiated Spurious Emission

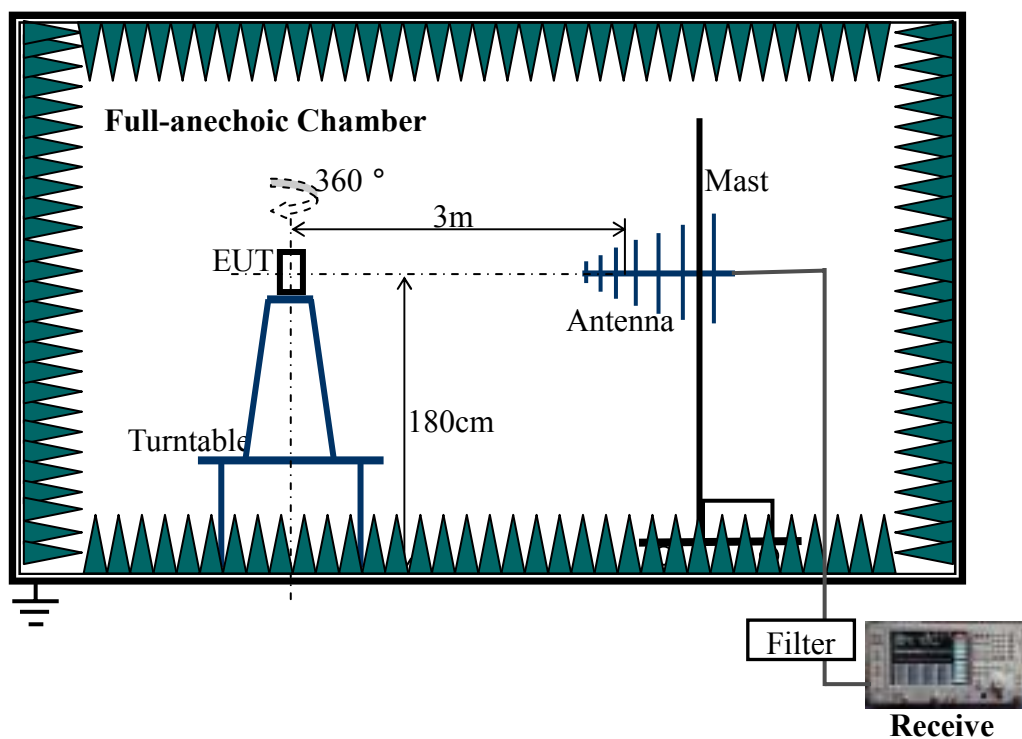
13.1 Requirement of the standard

According to FCC §15.247(c), In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

13.2 Test Procedure

- a. The radiated power measurement was performed in a full anechoic chamber. The air lost of the site and the factors of the test system is pre-calibrated using substitution method.
- b. The EUT was placed on the vertical axis of a turntable 1.8 meters above the ground. The table was turned from 0 degrees to 360 degrees to find the maximum reading.
- d. In the frequency range 30 MHz to 3 GHz, ultra-broadband bi-log antenna was used. In the frequency range above 3 GHz, horn antenna was used. The antenna was at the same height as the EUT. Since the there was no reflection from the chamber floor and the site was pre-calibrated, the antenna height need not to be changed as the open site method. The polarization of the receiving antenna was the same as that of the EUT transmitting antenna.
- e. The spectrum analyzer was set to Maxpeak Detector function and Maximum Hold mode.
- f. According to the standard requirement, the resolution bandwidth of the spectrum analyzer was set to RBW=100 kHz, VBW=300 kHz.

13.3 Test Setup



For the actual test configuration, please refer to the related item-Photographs of the Test Configuration.

13.4 EUT Setup and Operating Conditions

Same as 5.4

13.5 Test Results

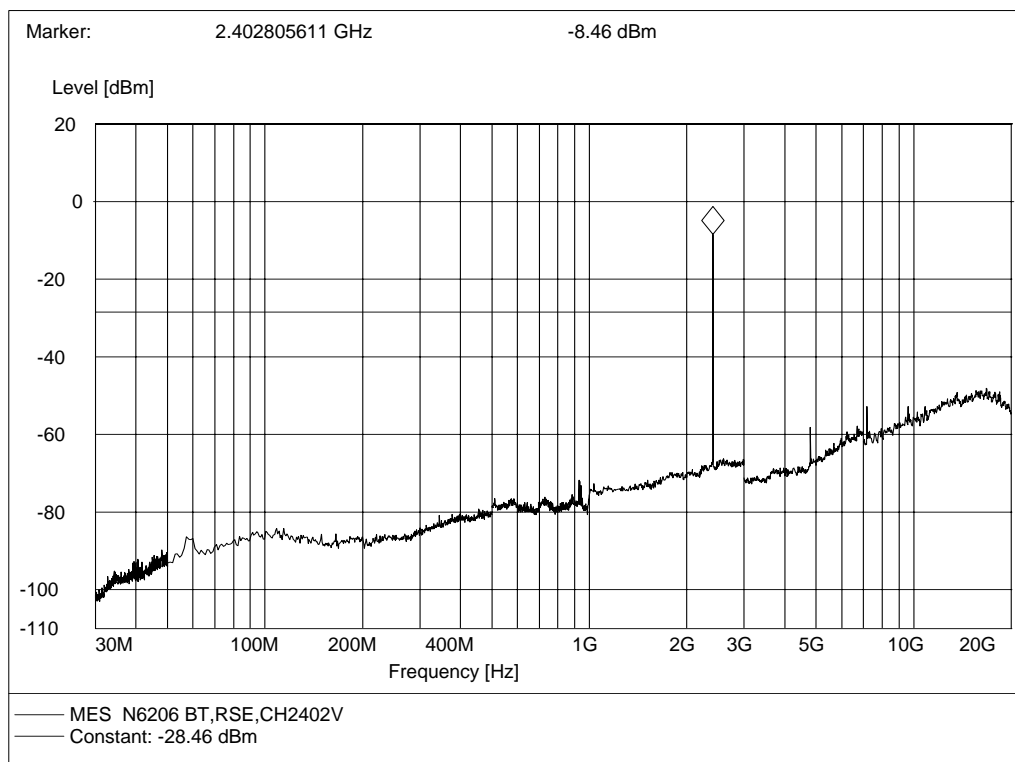
No.	Frequency (MHz)	Level (dBm)	Limit (Ref-20dB)	Margin(dB) (Limit-Level)
2402MHz, Antenna Vertical (Ref=-8.46dBm)				
1	4804.00	-58.09	-28.46	29.63
2	7206.00	-52.78	-28.46	24.32
3	9608.00	-52.81	-28.46	24.35
2402MHz, Antenna Horizontal (Ref=-9.81dBm)				
1	4804.00	-63.78	-29.81	33.97
2	7206.00	-57.09	-29.81	27.28
3	9608.00	-53.09	-29.81	23.28
2441MHz, Antenna Vertical (Ref=-9.44dBm)				
1	4882.00	-60.85	-29.44	31.41
2441MHz, Antenna Horizontal (Ref=-9.73dBm)				
1	4882.00	-63.20	-29.73	33.47
2480MHz, Antenna Vertical (Ref=-9.45dBm)				
1	4960.00	-62.91	-29.45	33.46
2480MHz, Antenna Horizontal (Ref=1.87dBm)				
1	4960.00	-62.88	-28.81	34.07

NOTE:

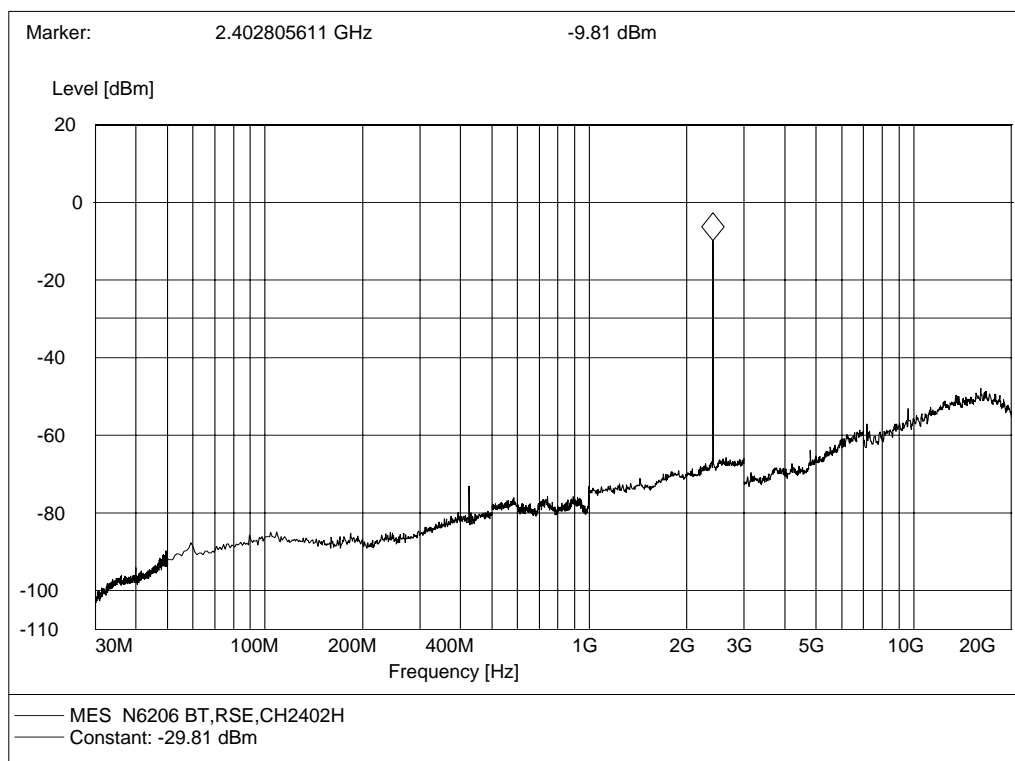
1. The spurious Emissions from 30 MHz to 18GHz. Only the larger ones were recorded above.
2. For more details please refer to the following test plots. The marker point is the EUT transmitting frequency which should be ignore

Radiated Spurious Emission Test Plots

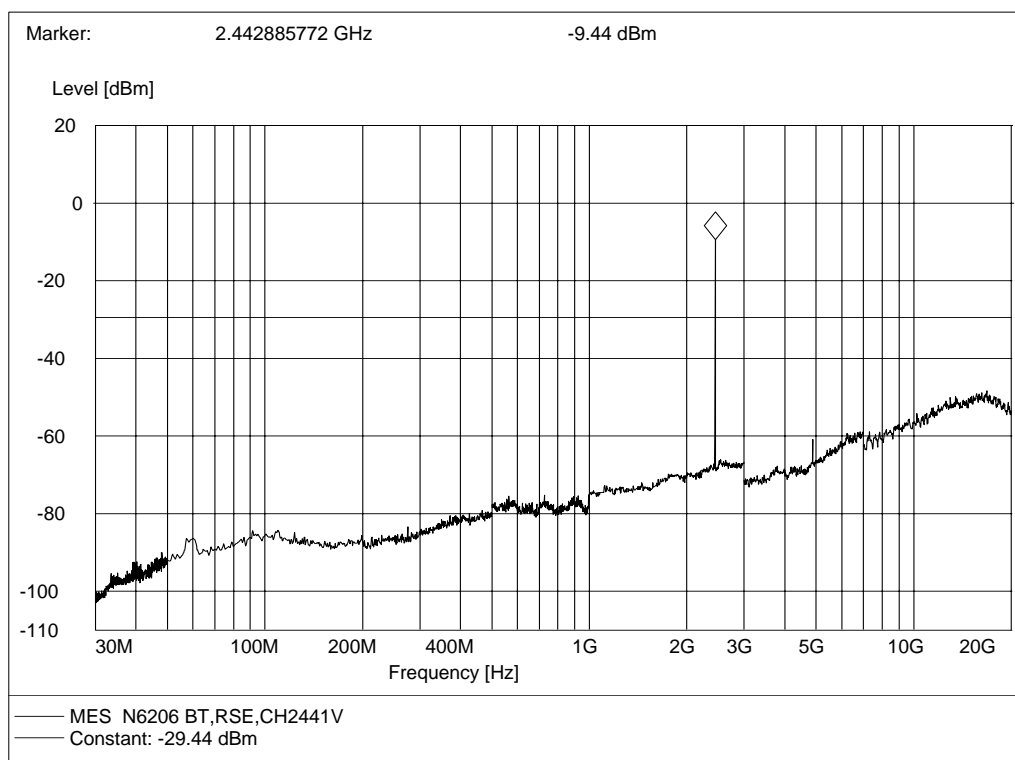
1. Lowest channel, 2402MHz; Antenna Vertical



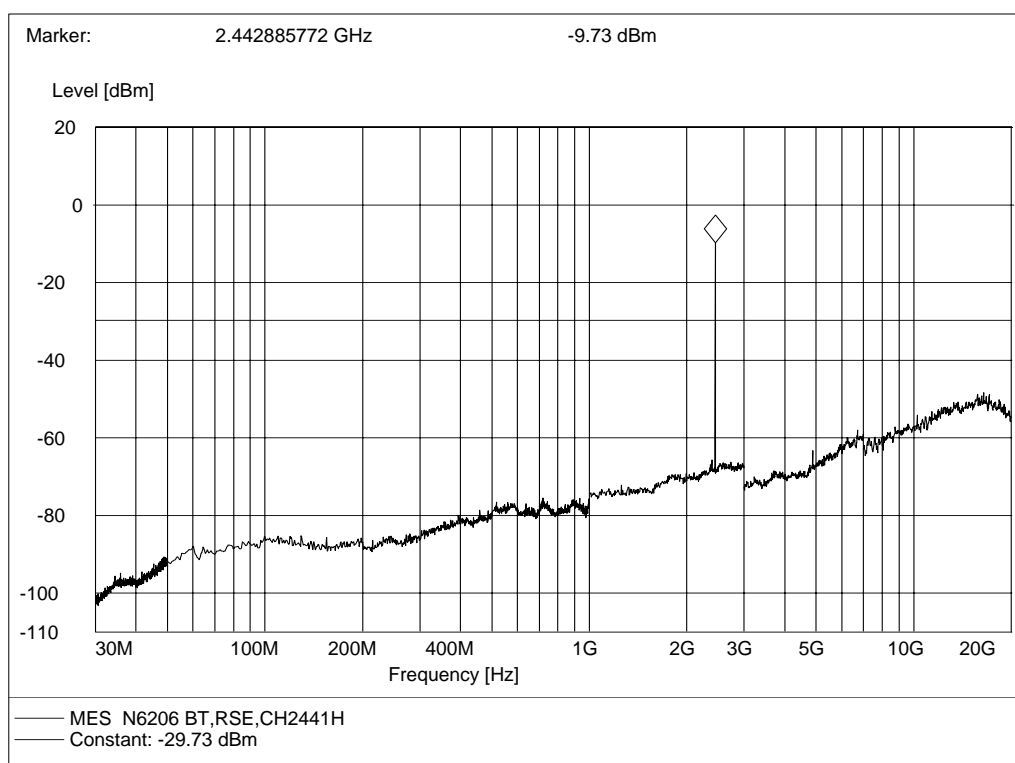
2. Lowest channel, 2402MHz; Antenna Horizontal



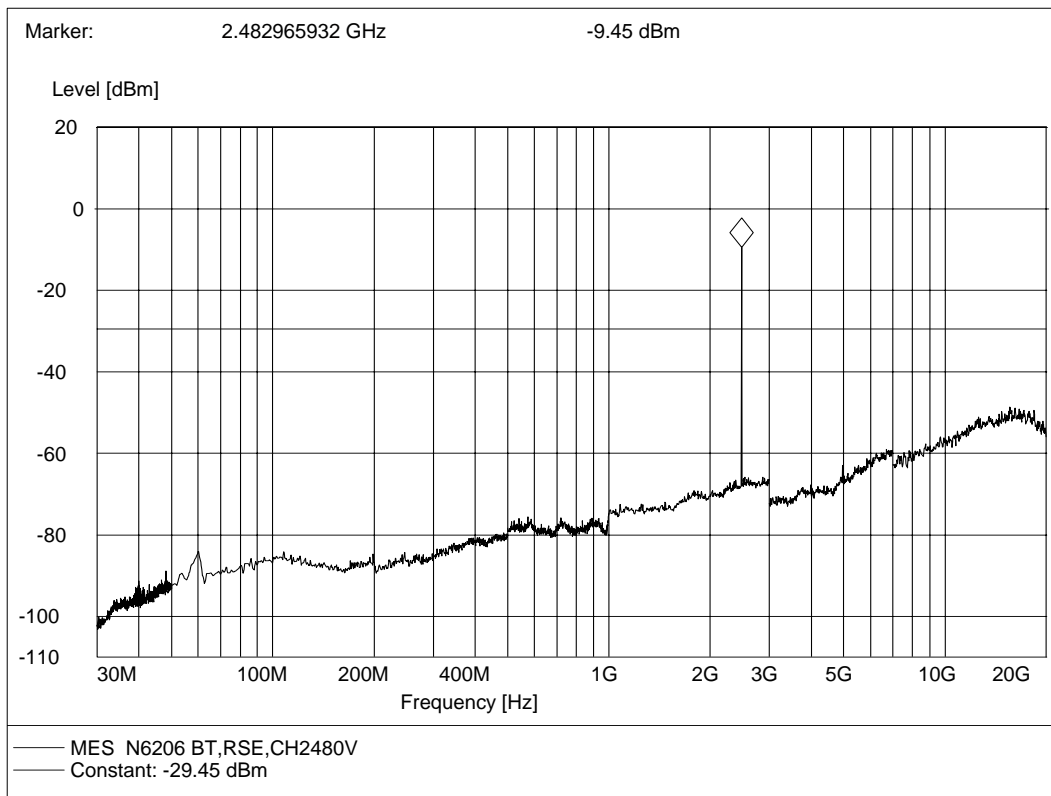
3. Middle channel, 2441MHz; Antenna Vertical



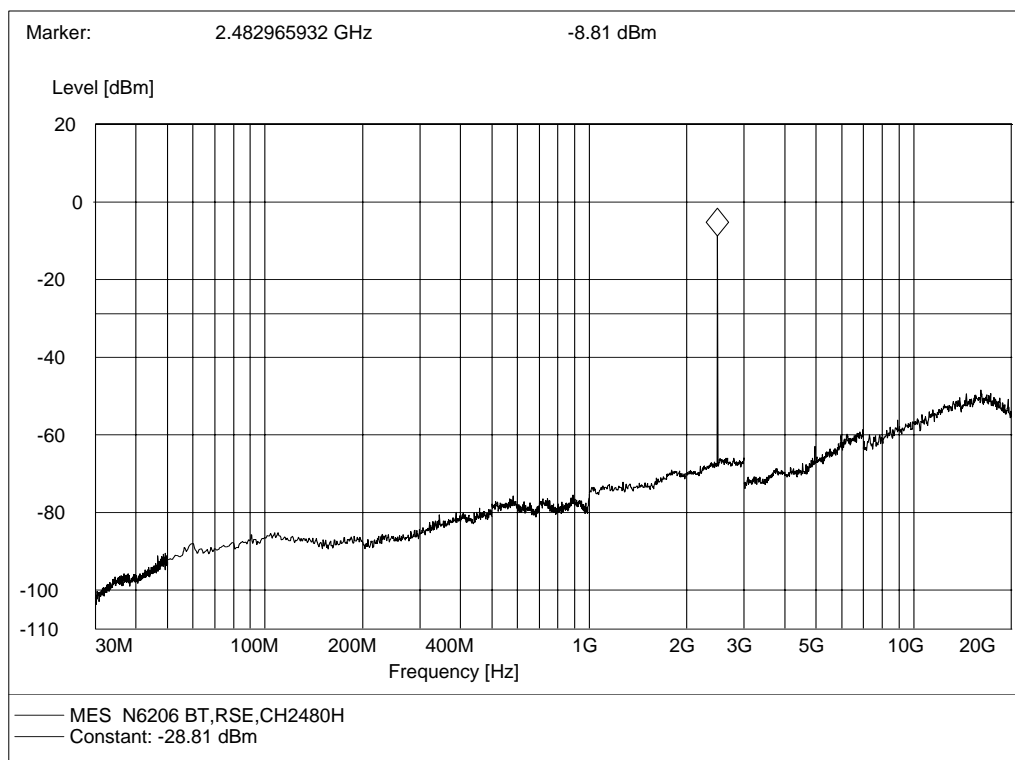
4. Middle channel, 2441MHz; Antenna Horizontal



5. Highest channel, 2480MHz; Antenna Vertical



6. Highest channel, 2480MHz; Antenna Horizontal



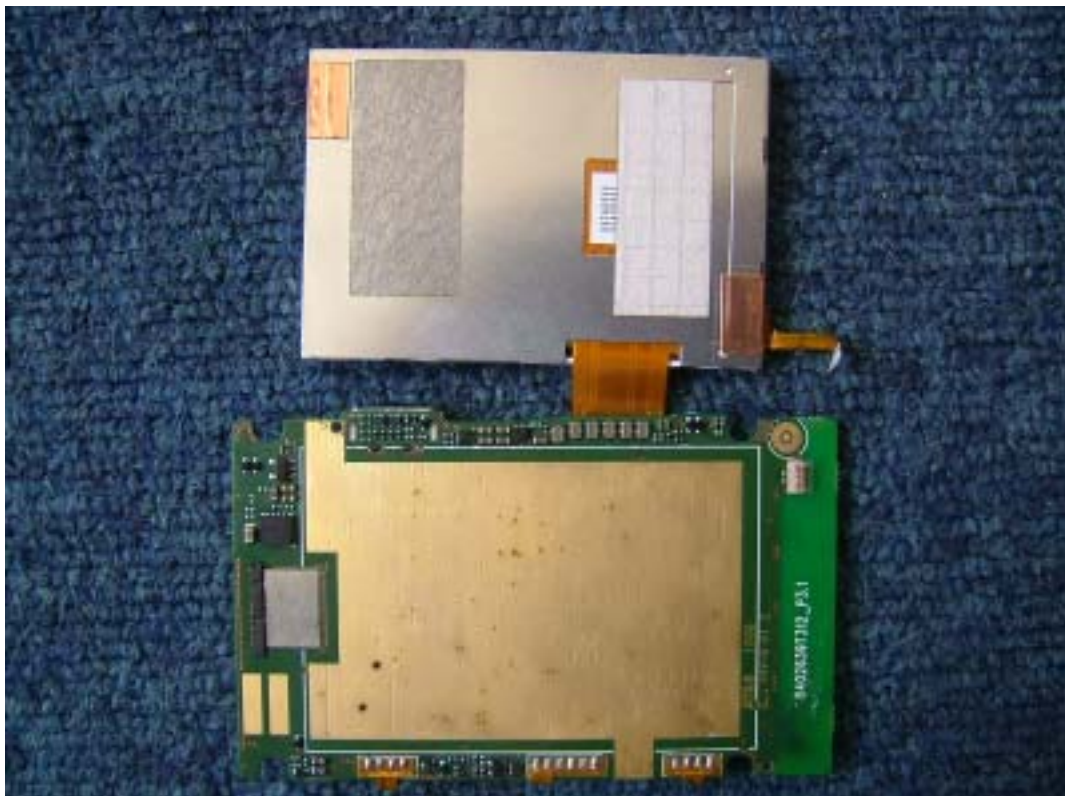
Appendix I : Photographs of the EUT

1. Appearance of the MS



2. Inside of the MS







Appendix II : Photographs of the Test Configuration

1. Conducted Emission Test



3. Radiated Emission Test



3. Conducted RF Test



4. Radiated RF Test

