(2004)量认(国)字(H2402)号 No.L1659

FCC Part 15C TEST REPORT

of

GSM TRIBAND GPRS MOBILE PHONE

FCC ID:	S2VOM1T1Q400
Model No.:	Q400
Serial No.:	358731009980986 (IMEI)
Report No.:	FCC06-8060
Date:	September 4, 2006

Prepared for

YuHua TelTech (Shanghai) Co., Ltd.

YuHua R&D Building, 27 XinJinQiao Road, Pudong, Shanghai, China

Prepared by

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1 Test Report Certification

Product: GSM TRIBAND GPRS MOBILE PHONE

FCC ID: S2VOM1T1Q400

Model No.: Q400

Applicant: YuHua TelTech (Shanghai) Co., Ltd.

Applicant Address: YuHua R&D Building, 27 XinJinQiao Road, Pudong, Shanghai, China

Manufacturer: YuHua TelTech (Shanghai) Co., Ltd.

Manufacturer Address: YuHua R&D Building, 27 XinJinQiao Road, Pudong, Shanghai, China

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: Sept. 4, 2006
Lin Xingsun

Checked by: Smart Li, Date: Sep. 4. 2006
Smart Li

Approved by: Wu Li An, Date: Sep. 4. 2006
Wu Li An

2 General Information

2.1 Description of EUT

Description:	GSM TRIBAND GPRS MOBILE PHONE
Model No.:	Q400
Serial No.:	358731009980986 (IMEI)
Hardware Version:	OM1-V5T5-01
Software Version:	OM1-V3.02
Modulation	FHSS
Frequency:	2402MHz – 2480 MHz
Number of Channels:	79
Power:	≦6dBm
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(MHz)=2401+1*n, 1≦n≦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 Objective

Perform EMC test according to FCC Part 15 Subpart C (Bluetooth, 2.4GHz ISM band radiator).

2.3 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

2.4 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
Loop Antenna	Rohde & Schwarz	HFH2-Z2	2007.06.05	A0304220
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

2.5 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**.

2.6 Environmental conditions

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

- Temperature: 15-35ºC
- 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 μH/50 ohms line impedance stabilization network (LISN).

Frequency range (MHz)	Conducted Limit (dBμV)	
	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

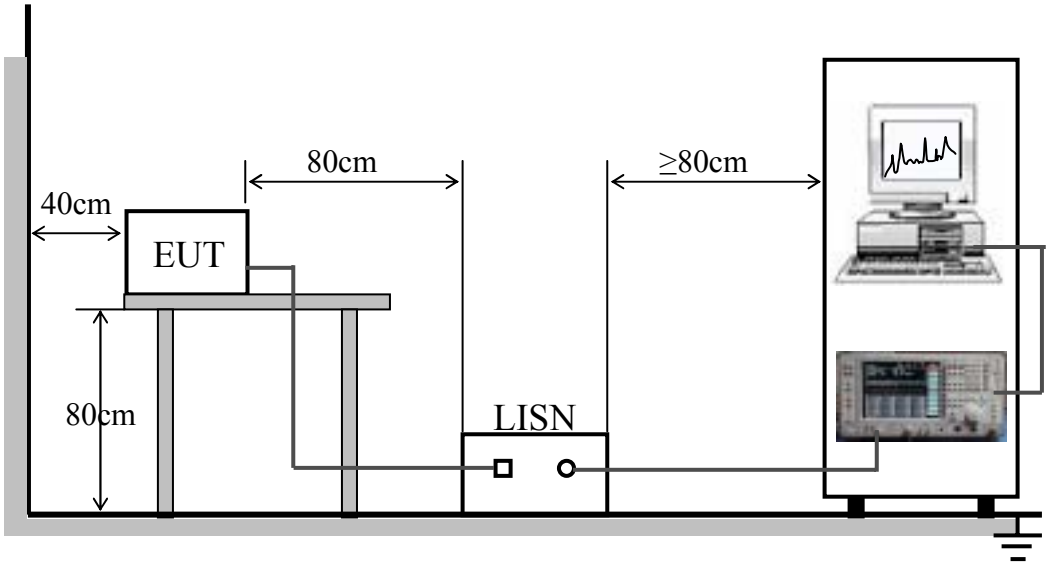
a. The EUT was placed on a 0.8m high insulating table and kept 0.4 meters from the conducting wall of shielded room.

b. The EUT was connected to the power mains through a line impedance stabilization network (LISN). The LISN provide 50Ω/50μH 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

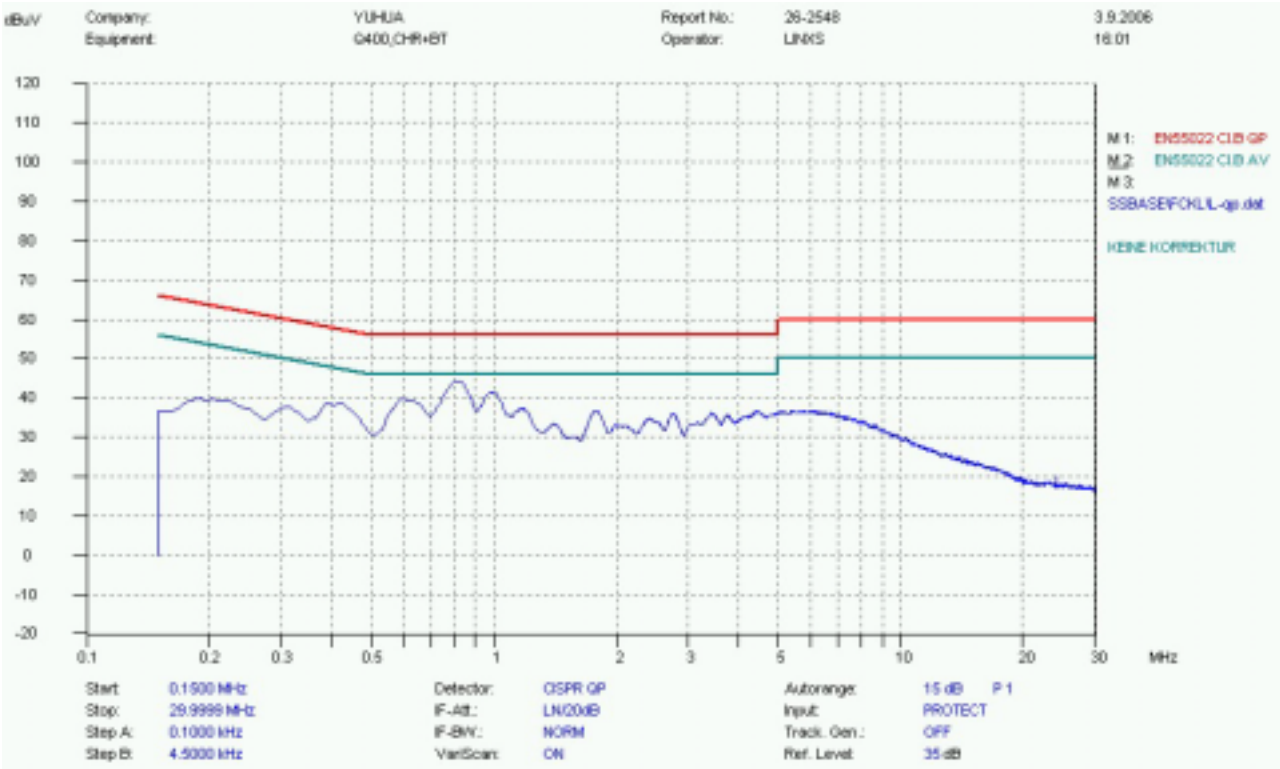
No.	Freq. (MHz)	Limit Value (dBμV)		Emission Level (dBμV)	
		QP	AV	QP	AV
1	0.1905	64.0	54.0	38.7	--
2	0.3120	59.9	49.9	37.7	--
3	0.4200	57.4	47.4	38.9	--
4	0.5955	56.0	46.0	39.8	--
5	0.8025	56.0	46.0	44.3	--
6	1.0005	56.0	46.0	41.4	--

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(μV/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

a. The EUT was placed on the top of a ratable 0.8 meters above the ground at a semi-anechoic chamber.

b. In the frequency range of 9 kHz to 30 MHz, magnetic field was measured with loop antenna. The antenna was positioned with its plane vertical at 1 m distance from the EUT. The center of the loop was 1 m above the ground. During the measurement the loop antenna rotated about its vertical axis for maximum response at each azimuth about the EUT.

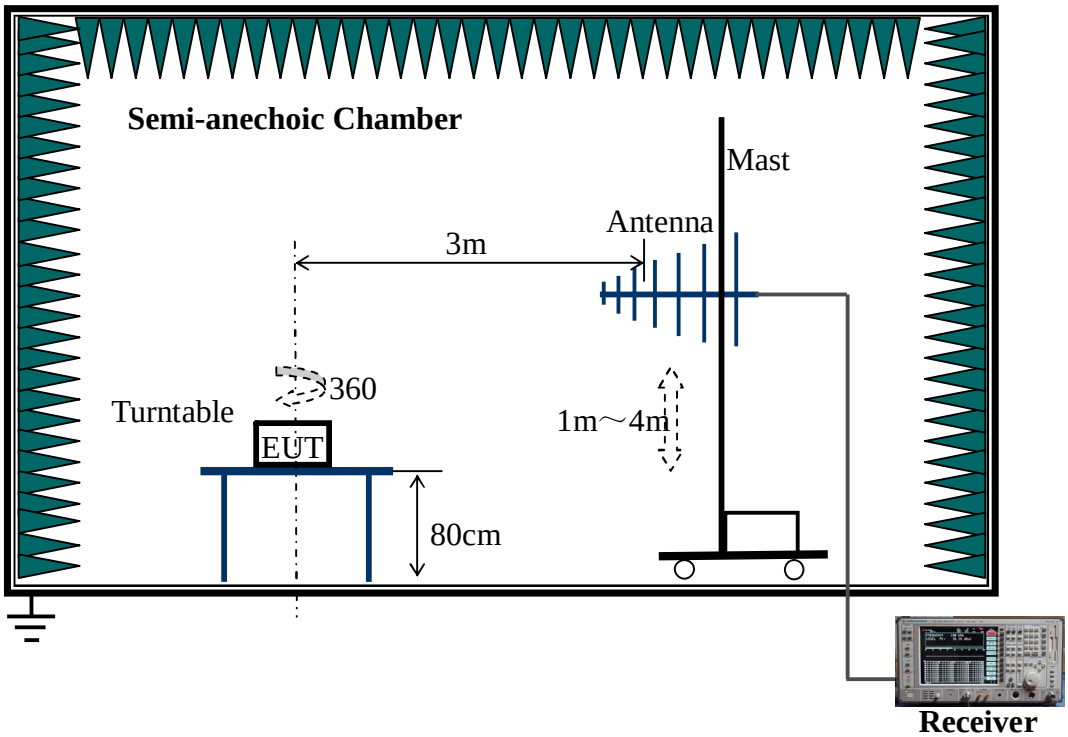
c. In the frequency range above 30MHz, ultra-broadband bi-log antenna (30 MHz to 1 GHz) and horn antenna (above 1GHz) were used. Antenna was 3 meters away from the EUT. Antenna height was varied from one meter to four meter above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

d. The test-receiver system was set to Peak Detector Function and Specified Bandwidth with

Maximum Hold Mode.

e. 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

Controlled by embedded commands provided by the applicant, the Bluetooth function of the EUT was activated and set to test mode: transmitting 339 bytes DH5 packages with maximum power at low/mid/high channels.

4.5 Test Results

EUT Operating Freq. (MHz)	Emissions Falling in Restrict Bands* (MHz)	Antenna Polarization	Emission Level (dBμV/m)		QP Limits (dBμV/m)	
			PK	AV	PK	AV
2402.00	2402.00	Vertical	92.15	67.02	--	--
	2402.00	Horizontal	89.46	65.11	--	--
	4804.00	Vertical	40.41	25.62	74	54

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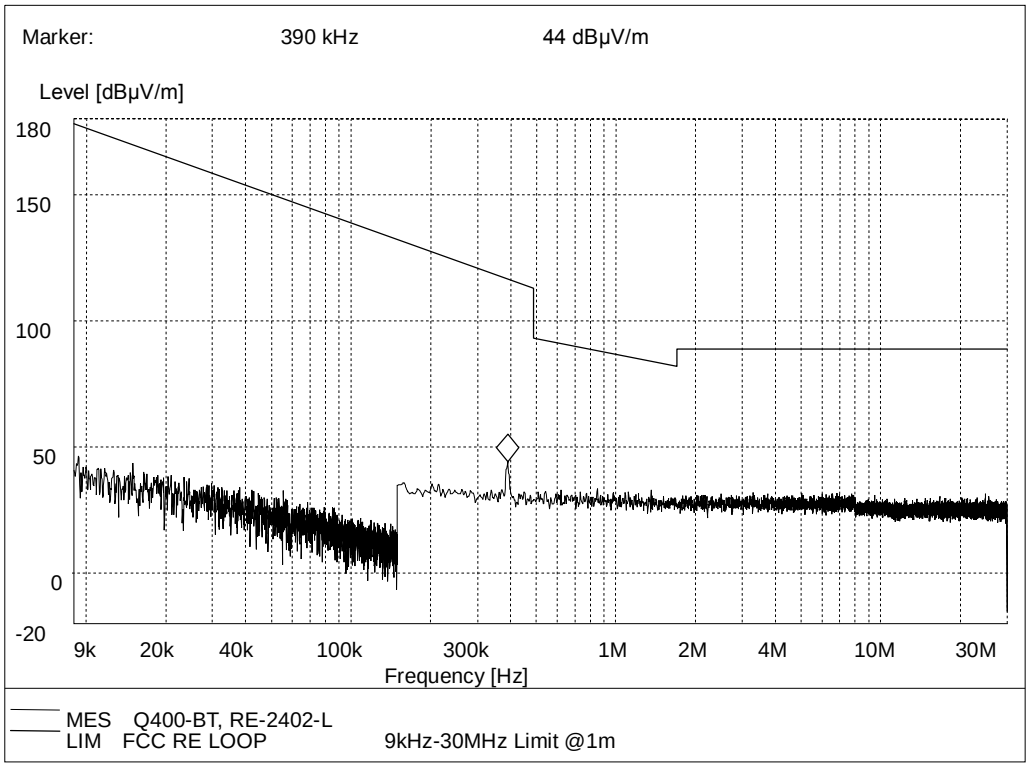
	4804.00	Horizontal	39.15	25.20	74	54
2441.00	2441.00	Vertical	92.64	67.50	--	--
	2441.00	Horizontal	89.17	64.06	--	--
	4882.00	Vertical	40.58	25.64	74	54
	4882.00	Horizontal	39.04	24.99	74	54
	7323.00	Vertical	42.83	29.63	74	54
	7323.00	Horizontal	40.92	28.11	74	54
2480.00	2480.00	Vertical	91.57	66.46	--	--
	2480.00	Horizontal	88..43	63.42	--	--
	4960.00	Vertical	41.13	25.98	74	54
	4960.00	Horizontal	40.01	25.47	74	54
	7440.00	Vertical	43.10	29.15	74	54
	7440.00	Horizontal	40.99	28.85	74	54

NOTE:

1. The spurious Emissions from 9 kHz to 10th harmonic of the fundamental frequency were researched. Only the larger peaks falling in restrict bands were recorded above. Refer to following test plots.
2. Field strength of fundamental emissions were measured and record as a reference for calculation of the band edge emissions according to Marker-Delta Method DA 00-705. See chapter 11.5.

Test Plots

1. Lowest channel 2402MHz, Vertical



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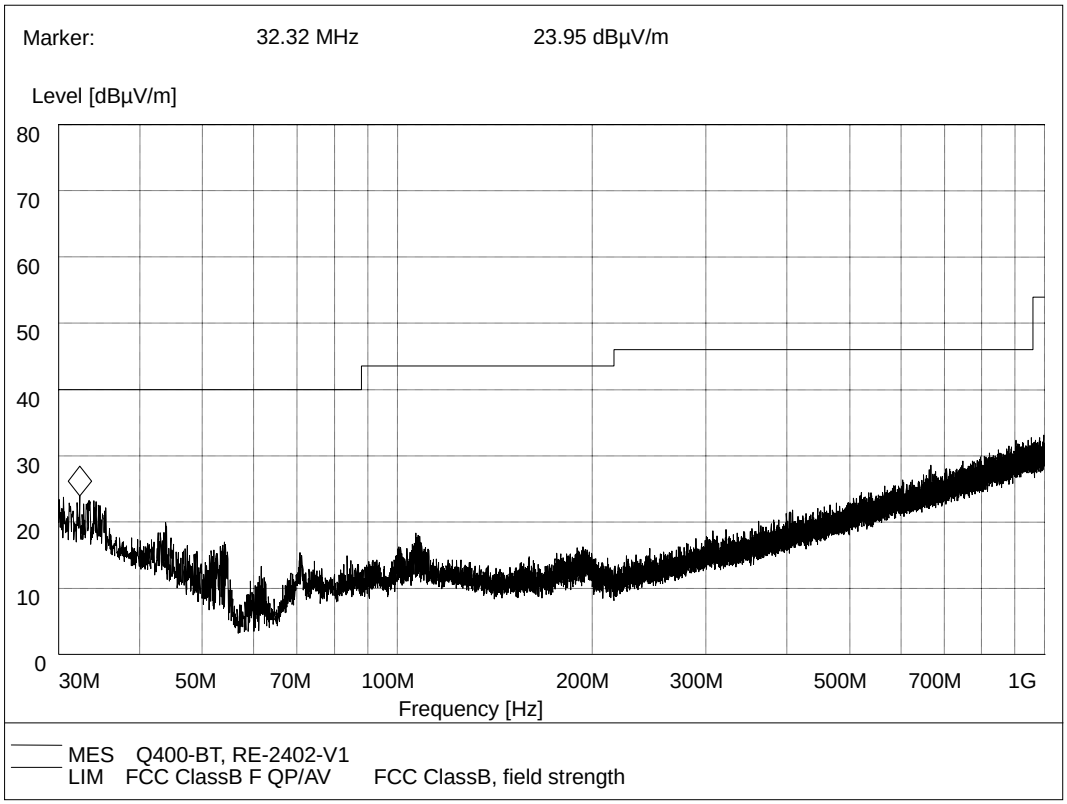
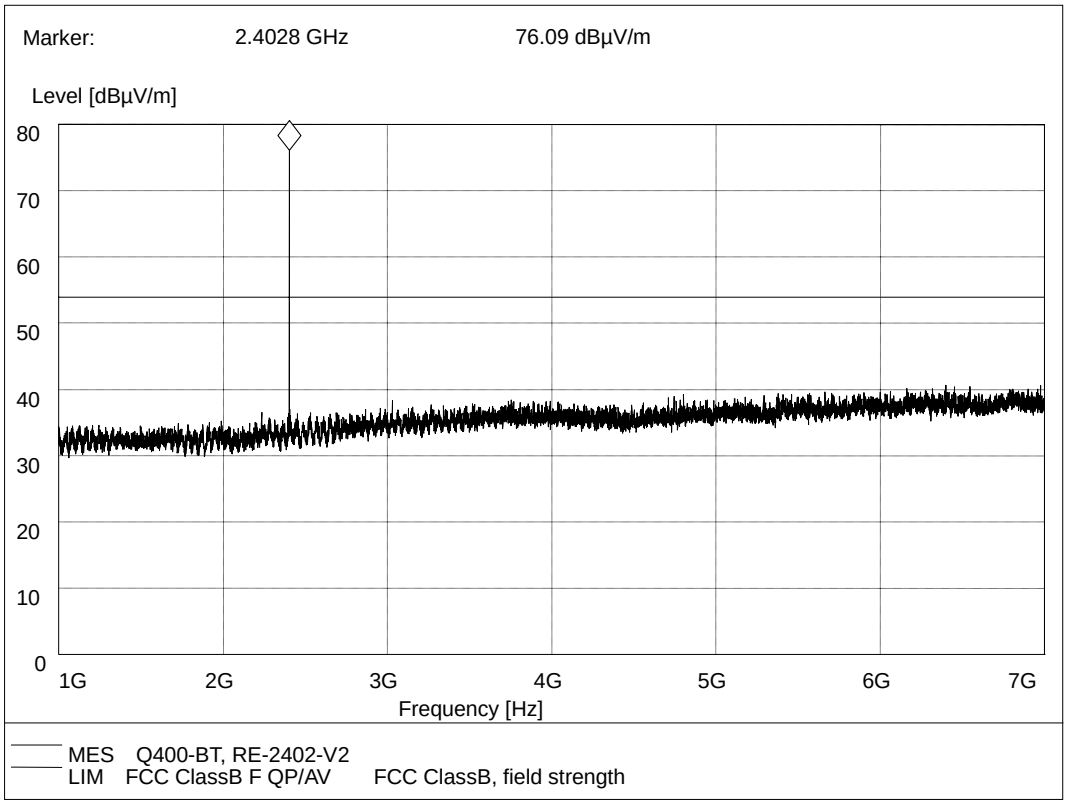
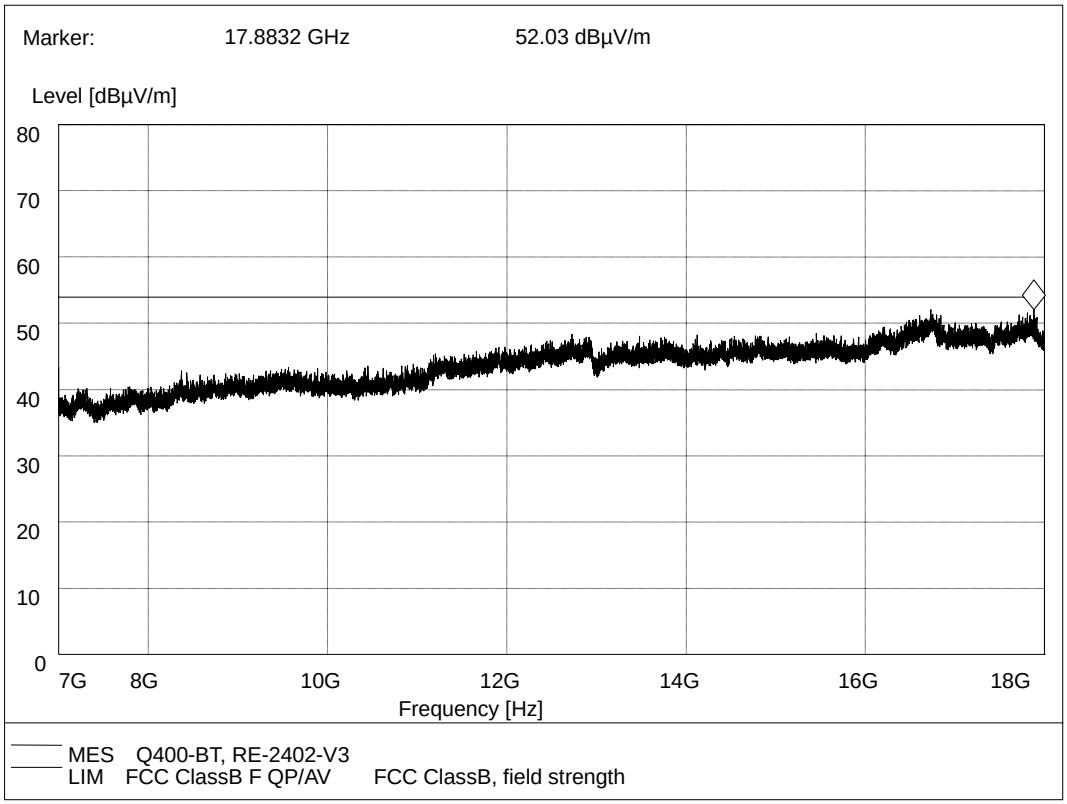
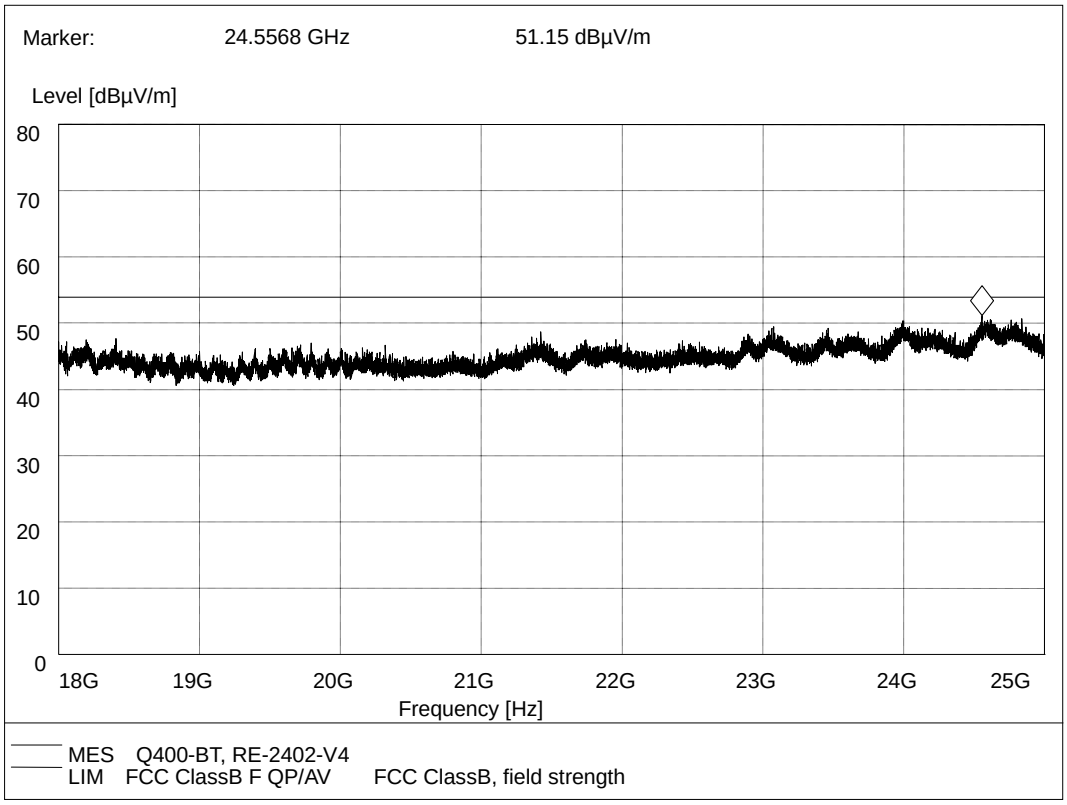
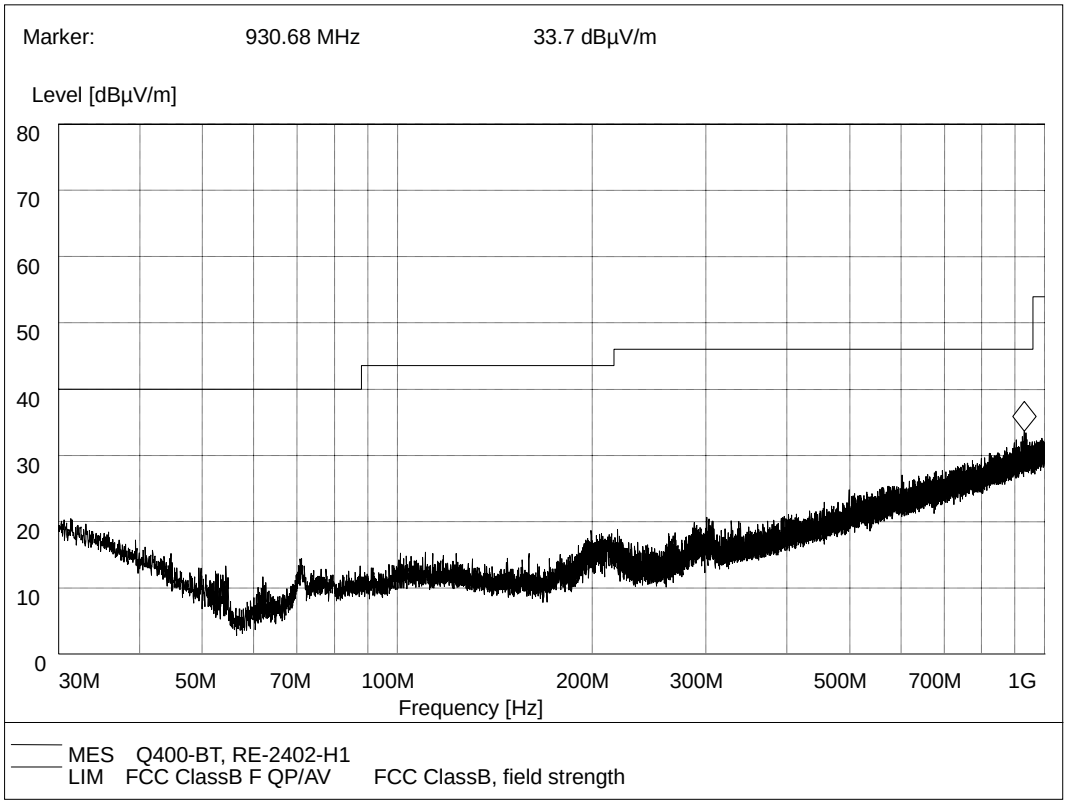

Marker: 32.32 MHz 23.95 dBµV/m
Level [dBµV/m]
80
70
60
50
40
30
20
10
0
30M
50M
70M
100M
200M
300M
500M
700M
1G
Frequency [Hz]
MES Q400-BT, RE-2402-V1
LIM FCC ClassB F QP/AV FCC ClassB, field strength

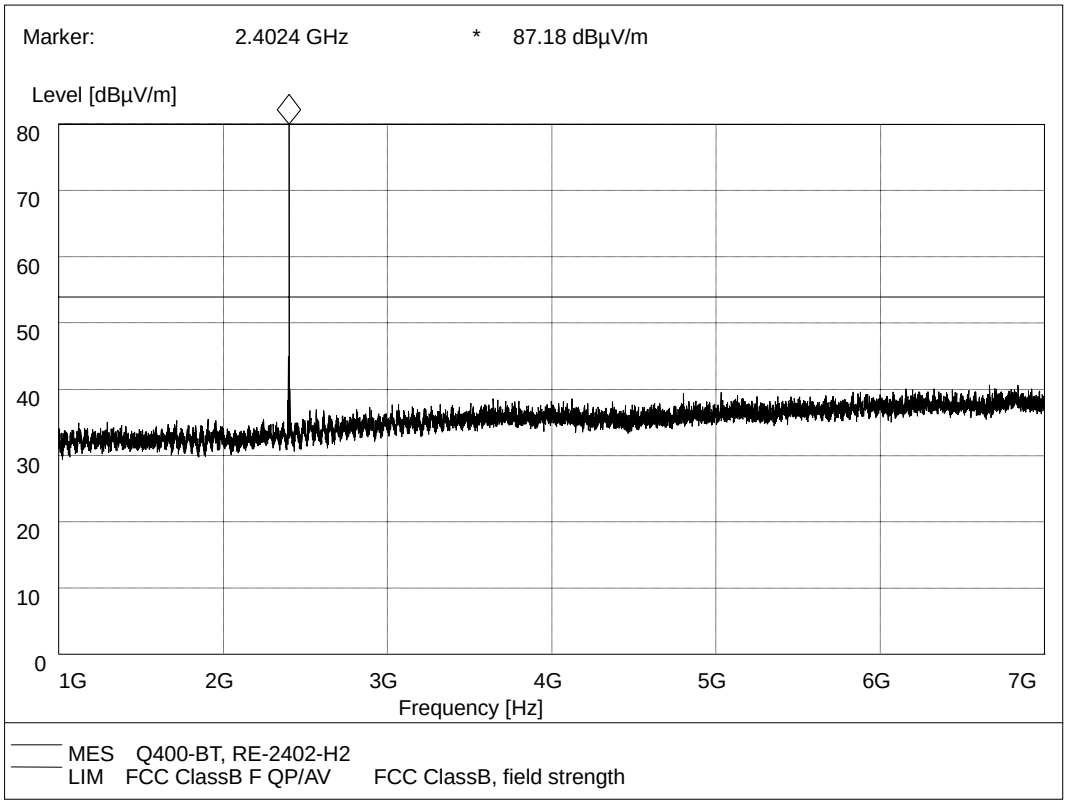

Marker: 2.4028 GHz 76.09 dBµV/m
Level [dBµV/m]
80
70
60
50
40
30
20
10
0
1G
2G
3G
4G
5G
6G
7G
Frequency [Hz]
MES Q400-BT, RE-2402-V2
LIM FCC ClassB F QP/AV FCC ClassB, field strength

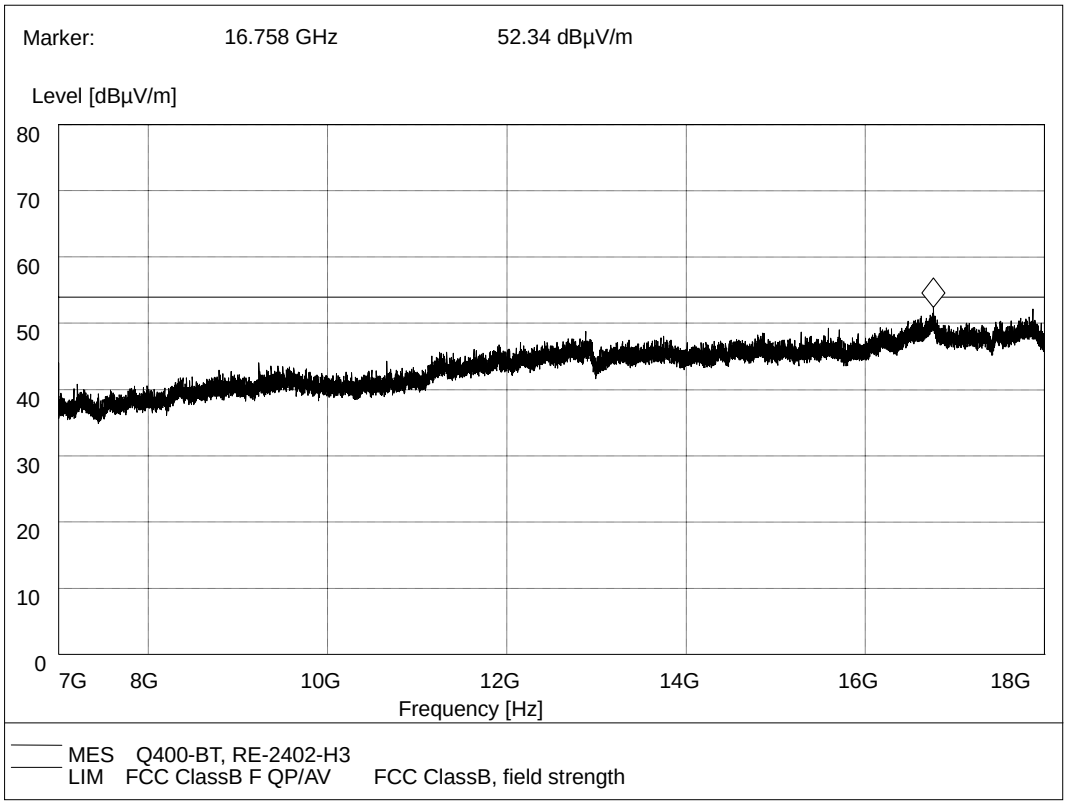

Marker: 17.8832 GHz 52.03 dBµV/m
Level [dBµV/m]
80
70
60
50
40
30
20
10
0
7G
8G
10G
12G
14G
16G
18G
Frequency [Hz]
MES Q400-BT, RE-2402-V3
LIM FCC ClassB F QP/AV FCC ClassB, field strength

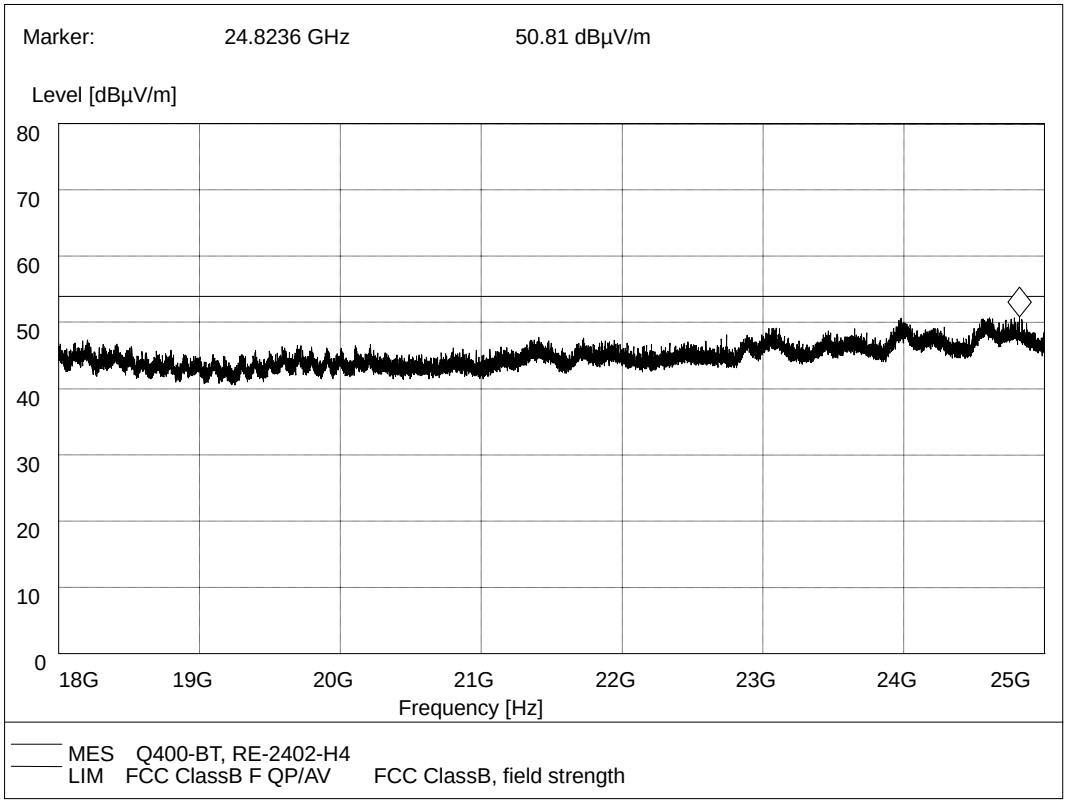

Marker: 24.5568 GHz 51.15 dBµV/m
Level [dBµV/m]
80
70
60
50
40
30
20
10
0
18G
19G
20G
21G
22G
23G
24G
25G
Frequency [Hz]
MES Q400-BT, RE-2402-V4
LIM FCC ClassB F QP/AV FCC ClassB, field strength

2. Lowest channel 2402MHz, Horizontal

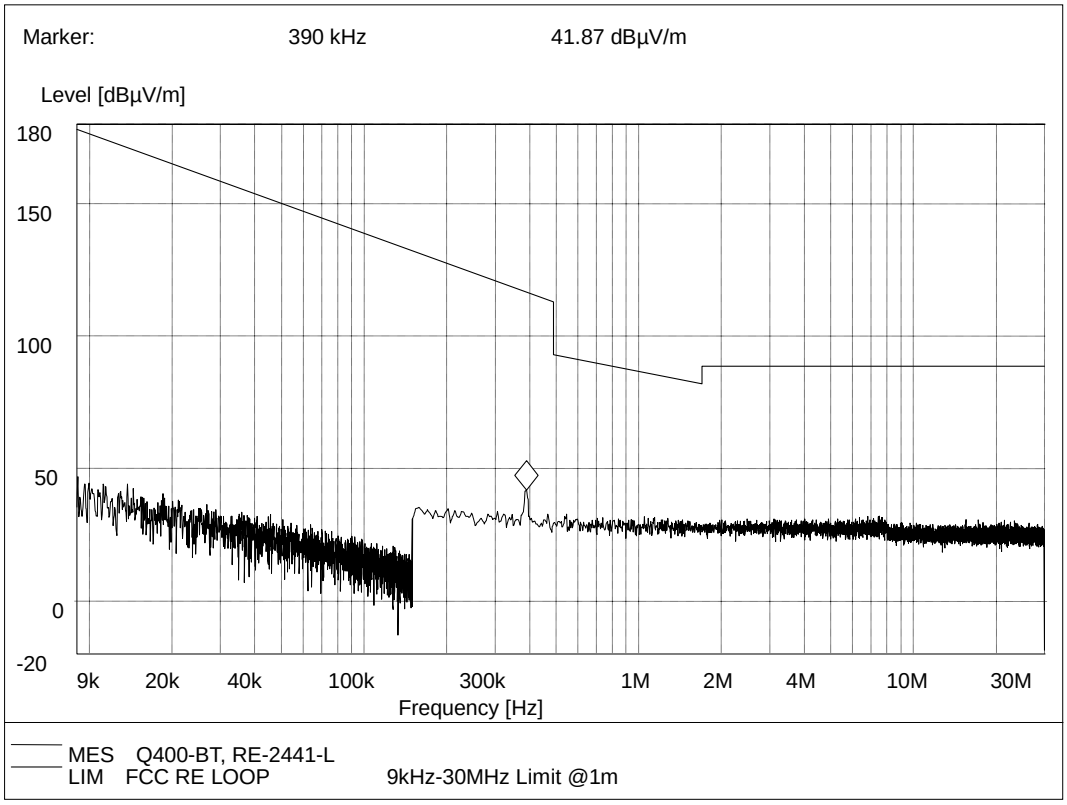


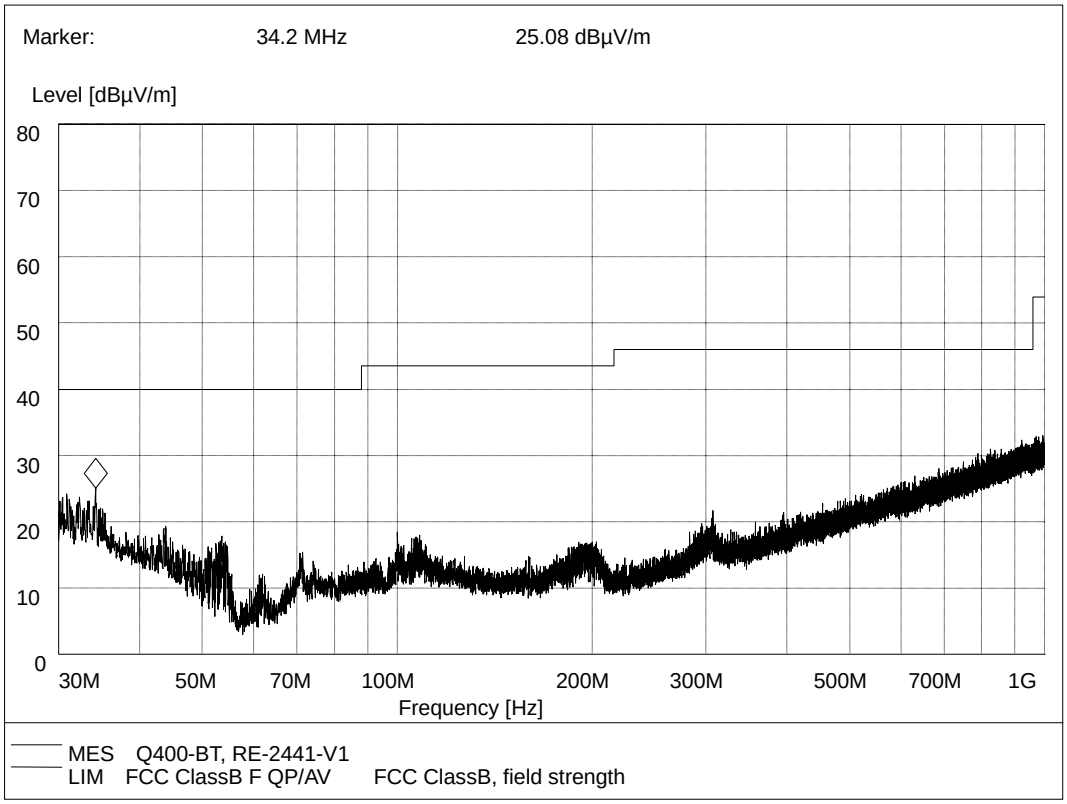


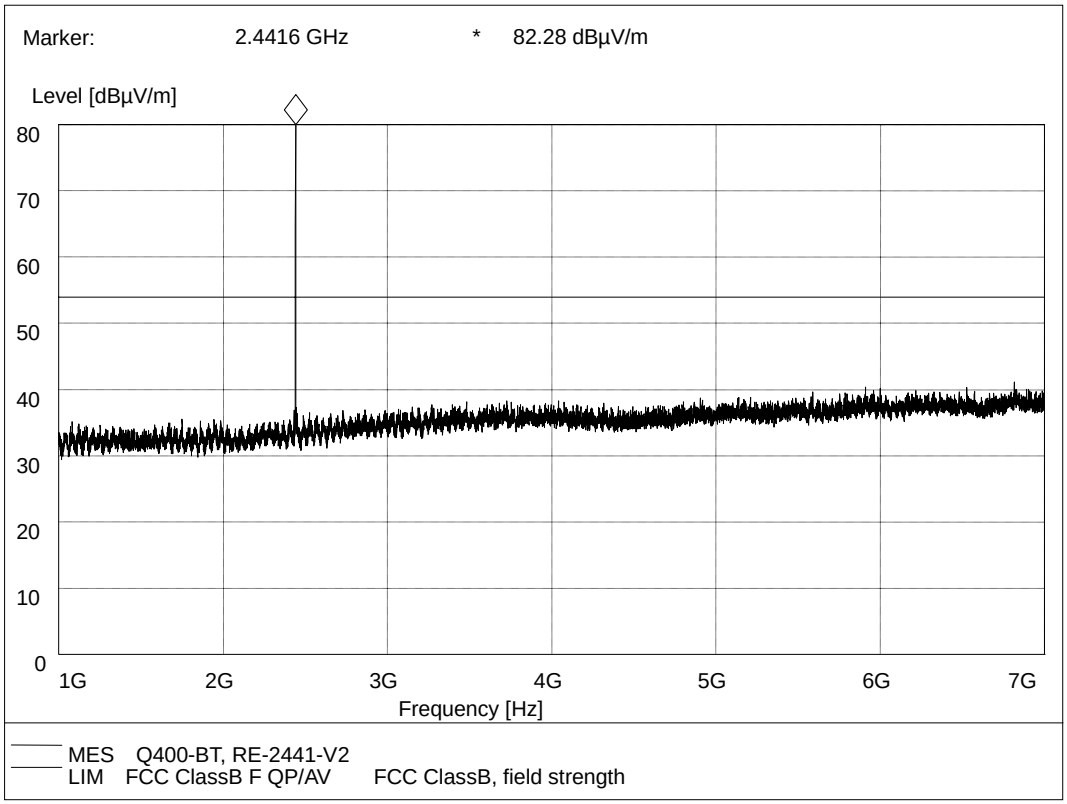

Marker: 16.758 GHz 52.34 dBµV/m
Level [dBµV/m]
80
70
60
50
40
30
20
10
0
7G
8G
10G
12G
14G
16G
18G
Frequency [Hz]
MES Q400-BT, RE-2402-H3
LIM FCC ClassB F QP/AV FCC ClassB, field strength

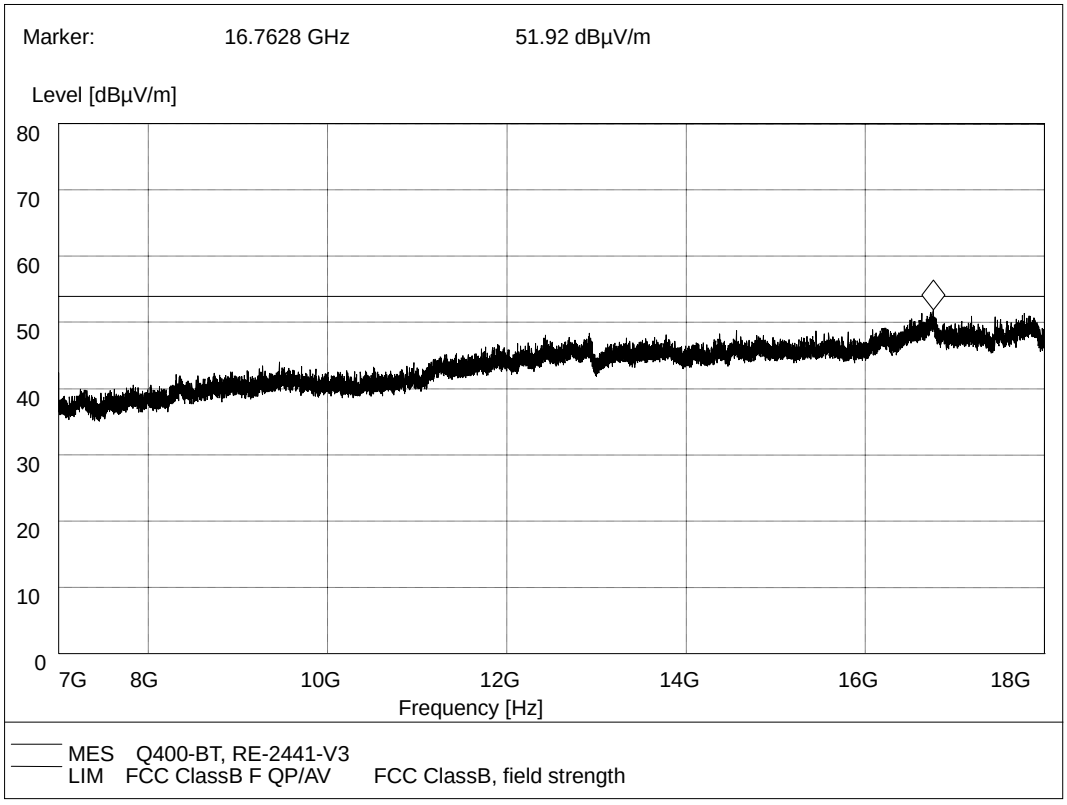

Marker: 24.8236 GHz 50.81 dBµV/m
Level [dBµV/m]
80
70
60
50
40
30
20
10
0
18G
19G
20G
21G
22G
23G
24G
25G
Frequency [Hz]
MES Q400-BT, RE-2402-H4
LIM FCC ClassB F QP/AV FCC ClassB, field strength

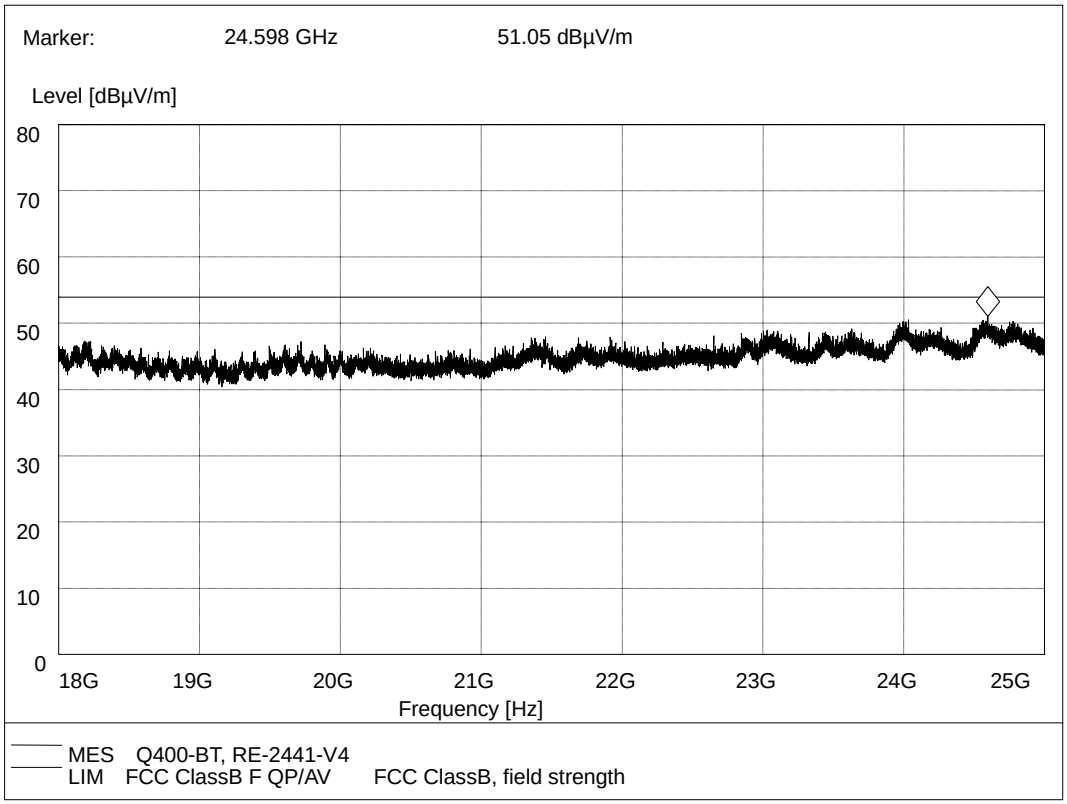
3. Middle channel 2441MHz, Vertical



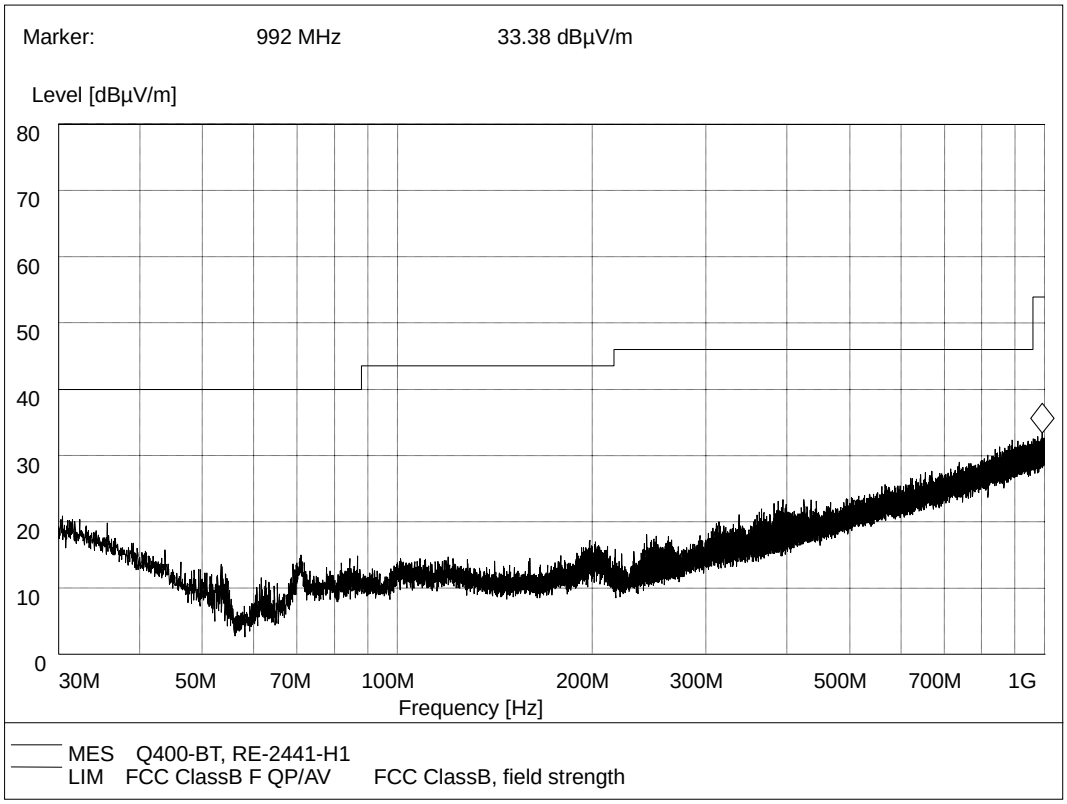


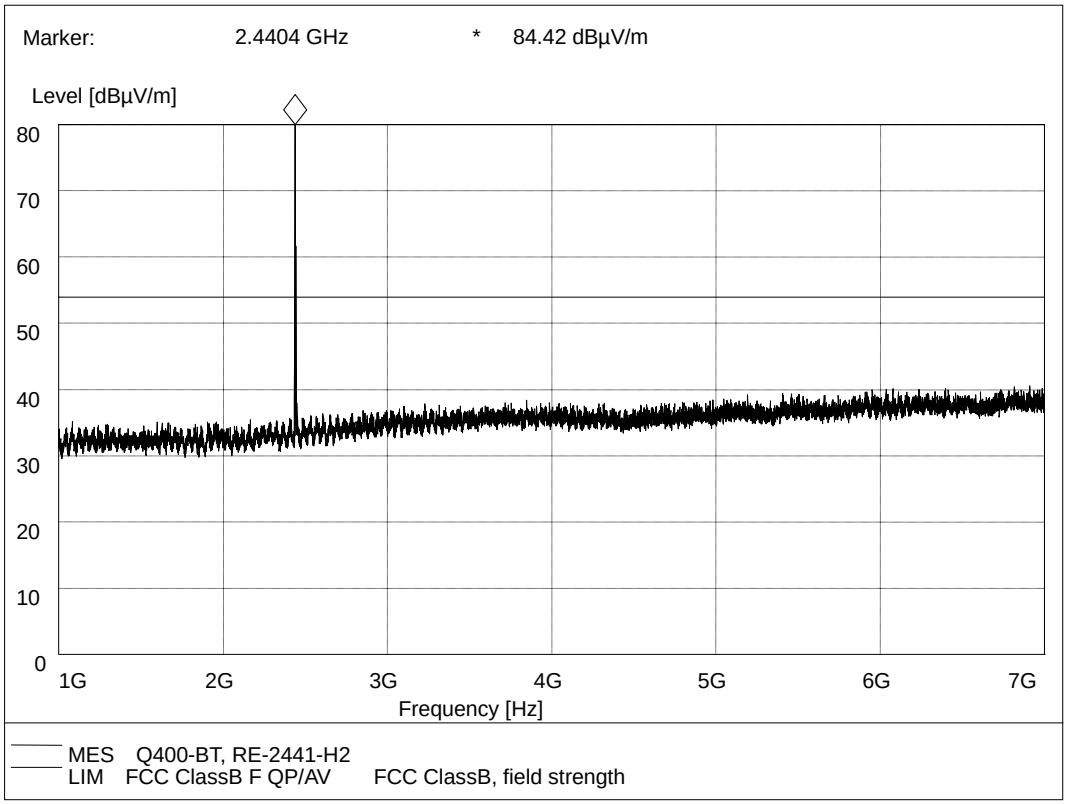

Marker: 2.4416 GHz * 82.28 dBµV/m
Level [dBµV/m]
80
70
60
50
40
30
20
10
0
1G
2G
3G
4G
5G
6G
7G
Frequency [Hz]
MES Q400-BT, RE-2441-V2
LIM FCC ClassB F QP/AV FCC ClassB, field strength

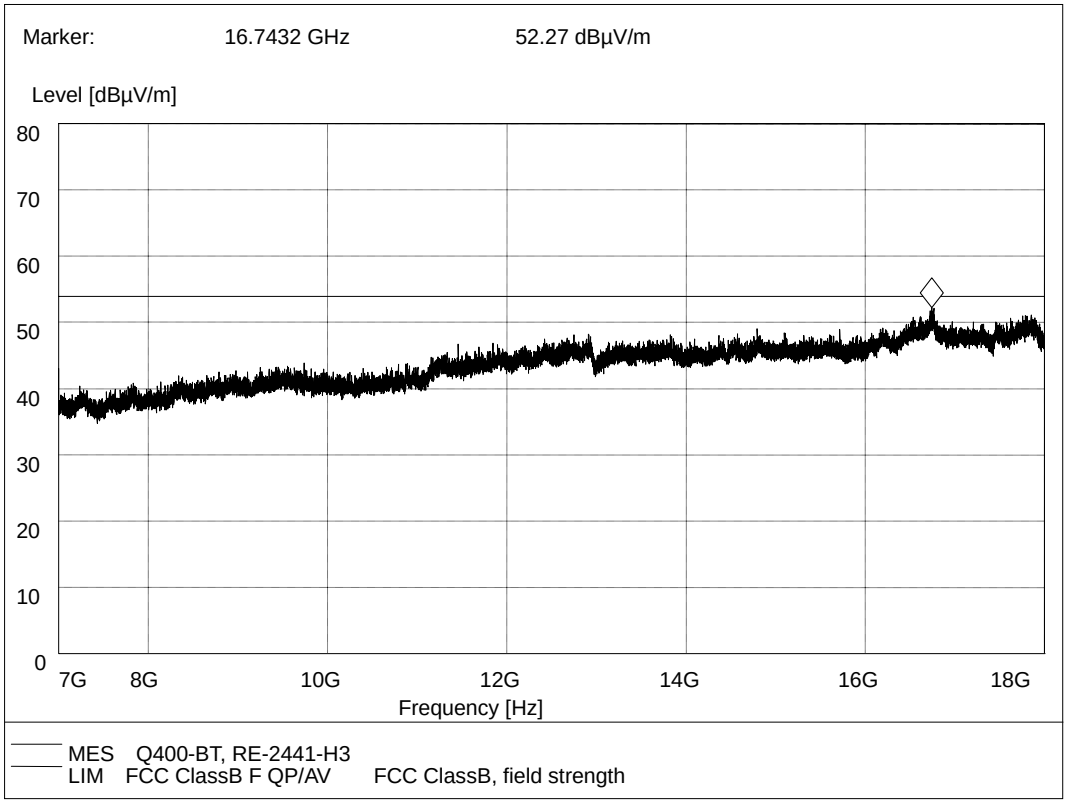

Marker: 16.7628 GHz 51.92 dBµV/m
Level [dBµV/m]
80
70
60
50
40
30
20
10
0
7G
8G
10G
12G
14G
16G
18G
Frequency [Hz]
MES Q400-BT, RE-2441-V3
LIM FCC ClassB F QP/AV FCC ClassB, field strength

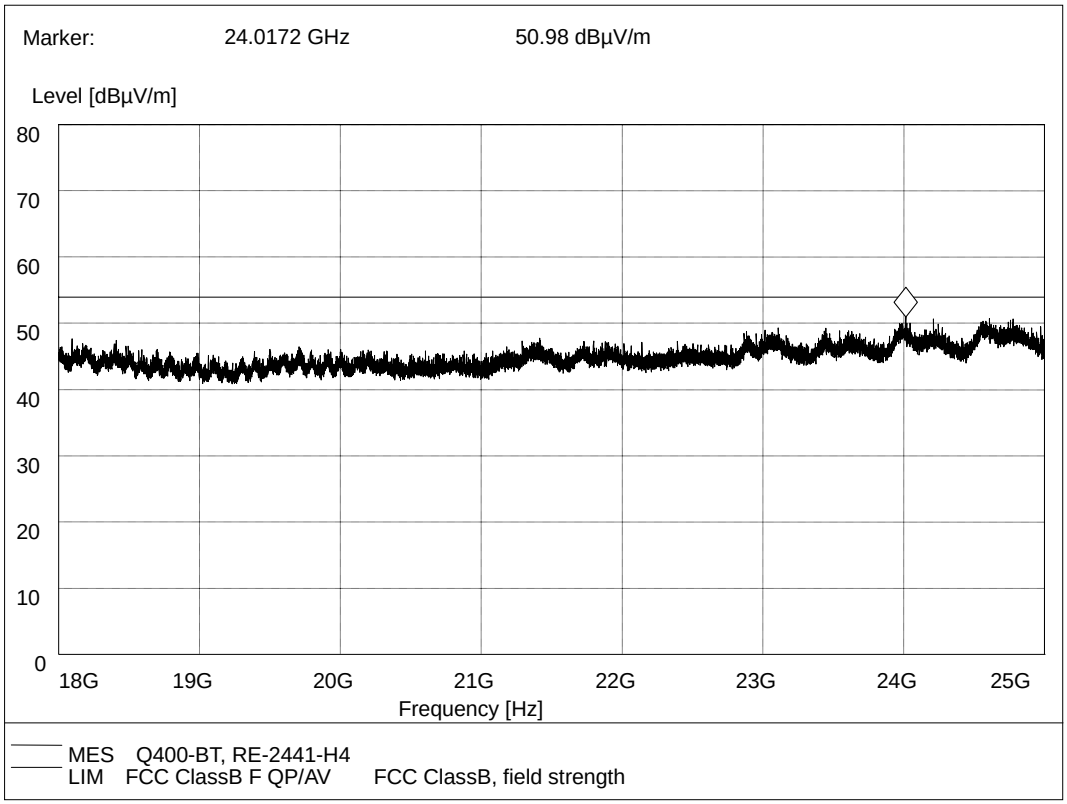


4. Middle channel 2441MHz, Horizontal

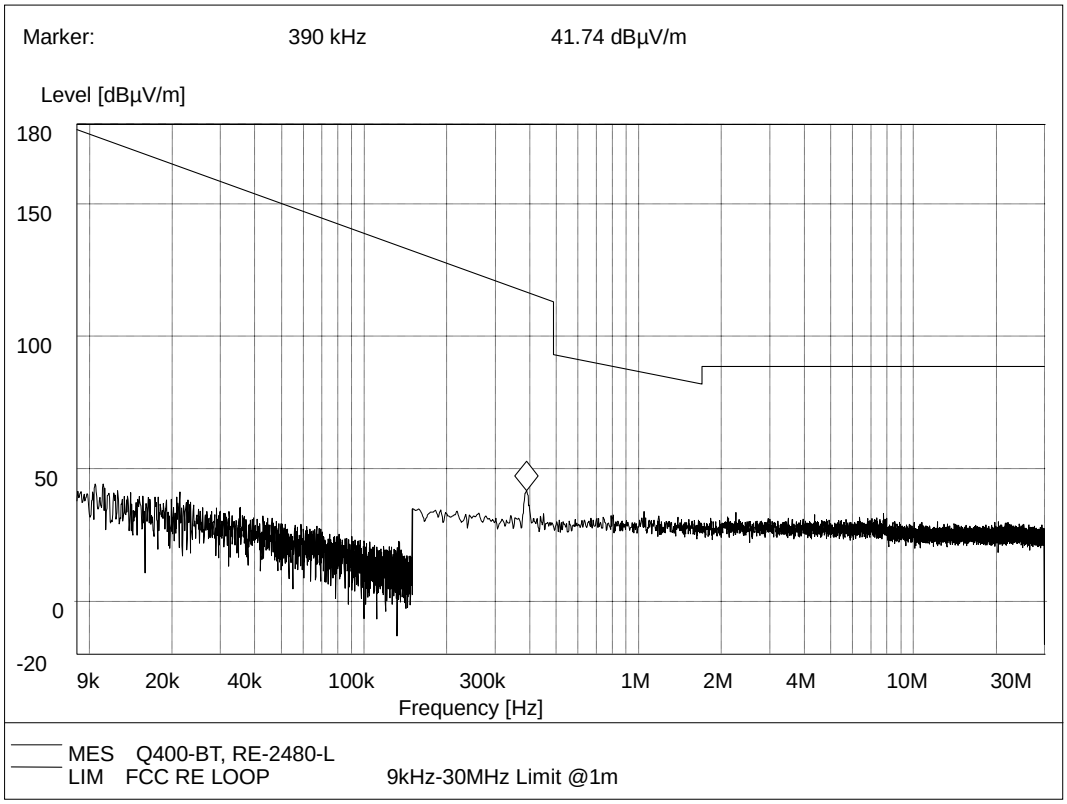


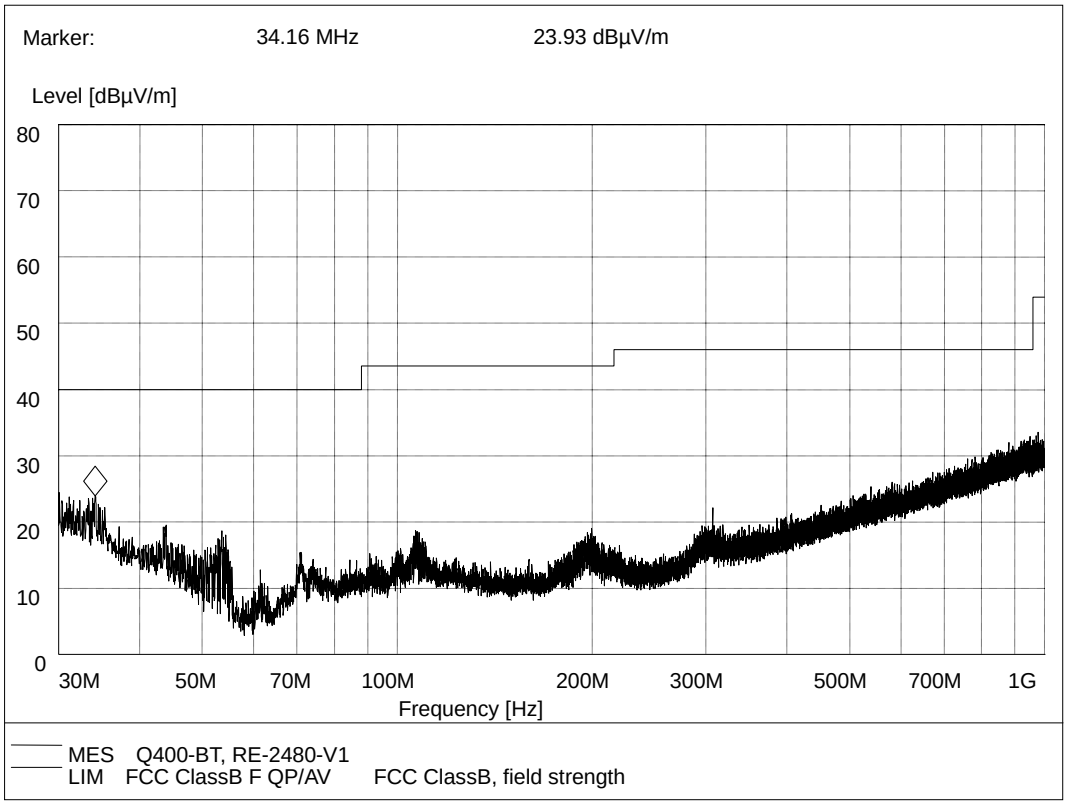

Marker: 2.4404 GHz * 84.42 dBµV/m
Level [dBµV/m]
80
70
60
50
40
30
20
10
0
1G
2G
3G
4G
5G
6G
7G
Frequency [Hz]
MES Q400-BT, RE-2441-H2
LIM FCC ClassB F QP/AV FCC ClassB, field strength

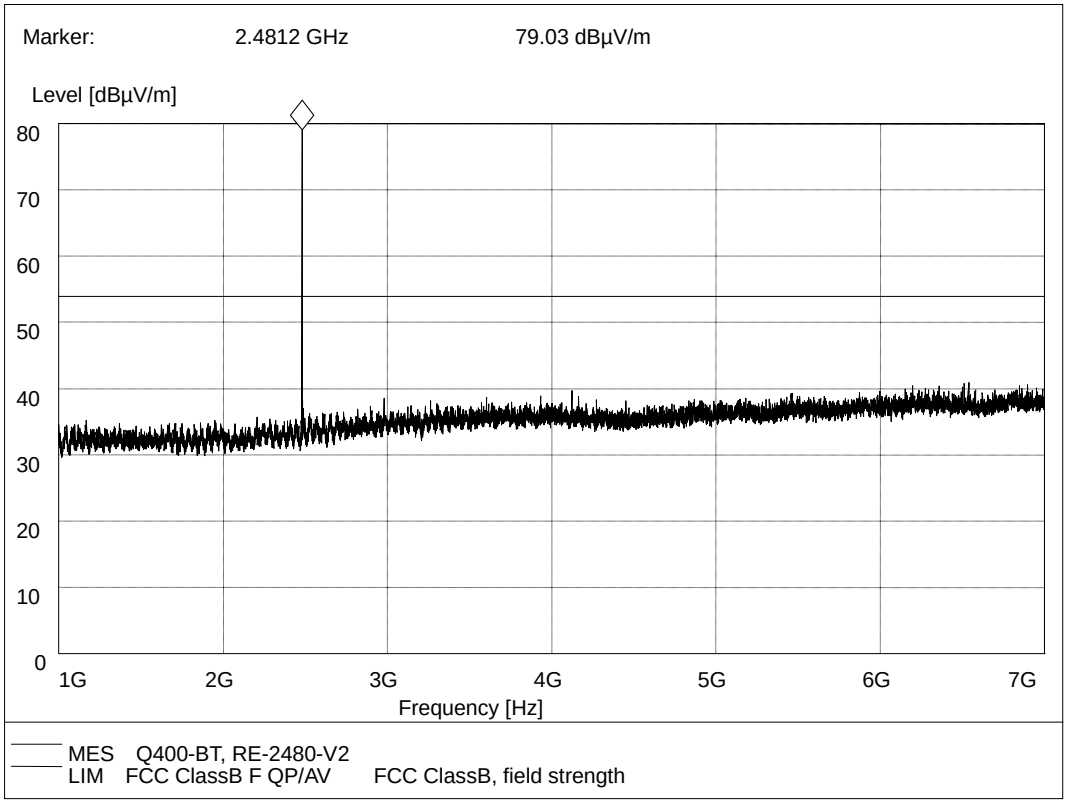

Marker: 16.7432 GHz 52.27 dBµV/m
Level [dBµV/m]
80
70
60
50
40
30
20
10
0
7G
8G
10G
12G
14G
16G
18G
Frequency [Hz]
MES Q400-BT, RE-2441-H3
LIM FCC ClassB F QP/AV FCC ClassB, field strength

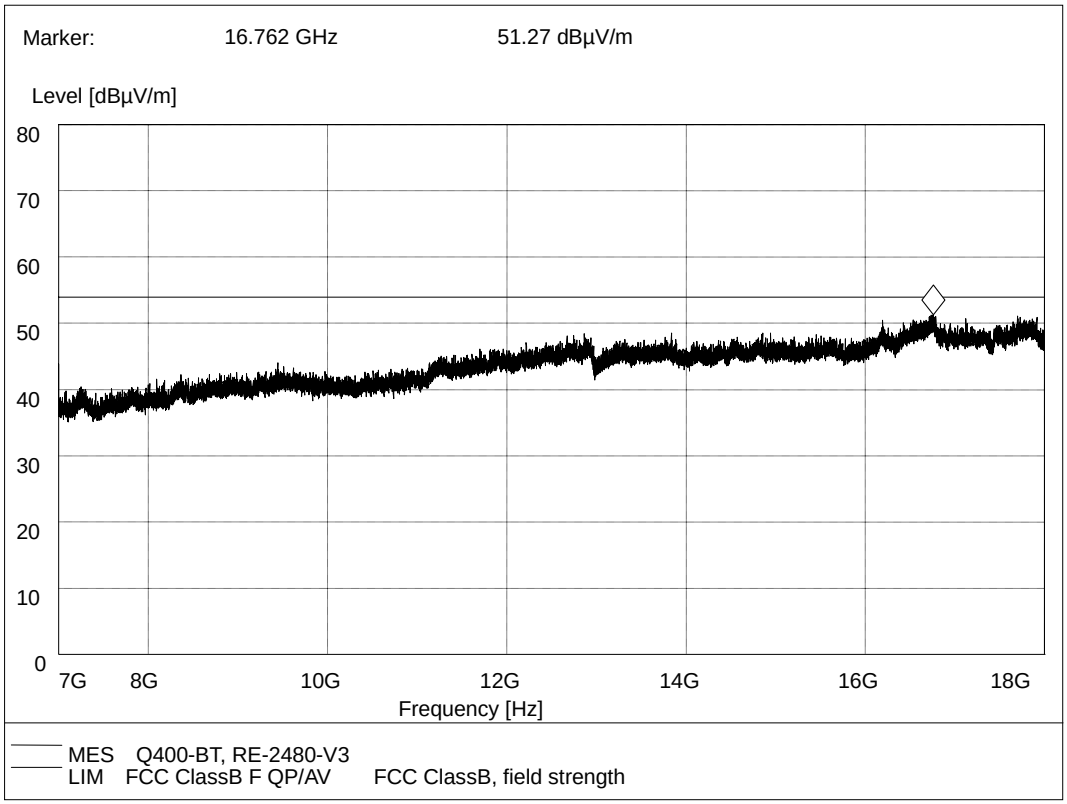


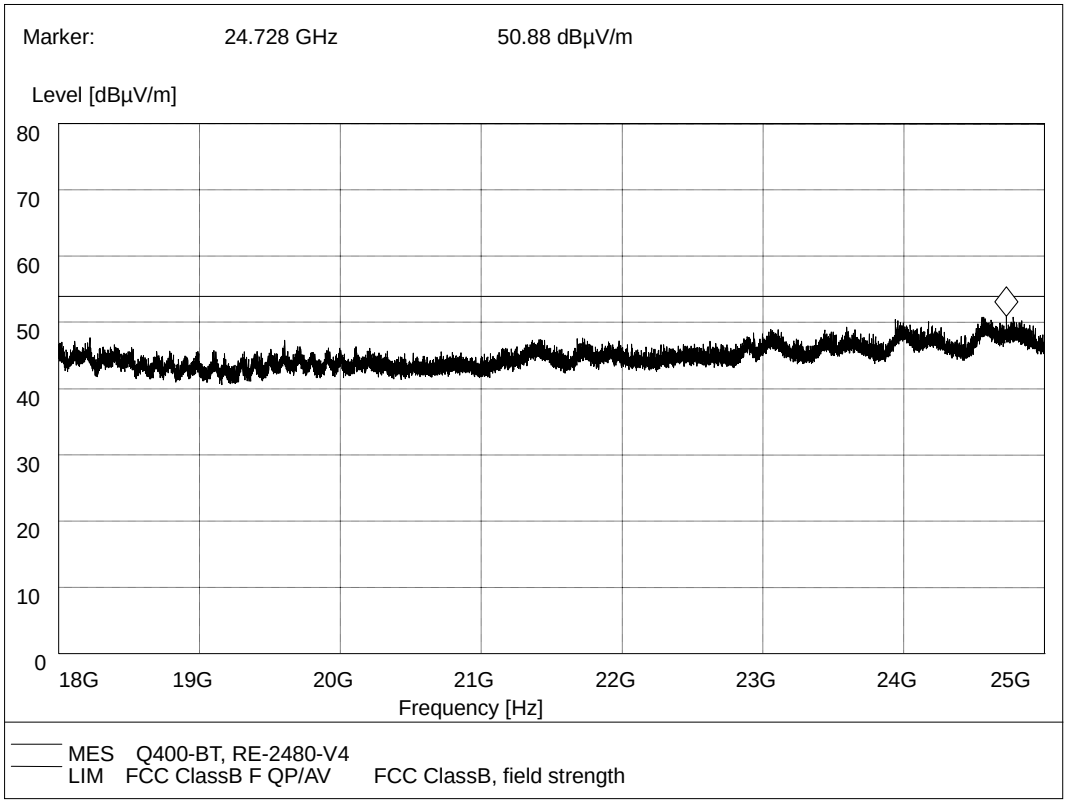
5. Highest channel 2480MHz, Vertical



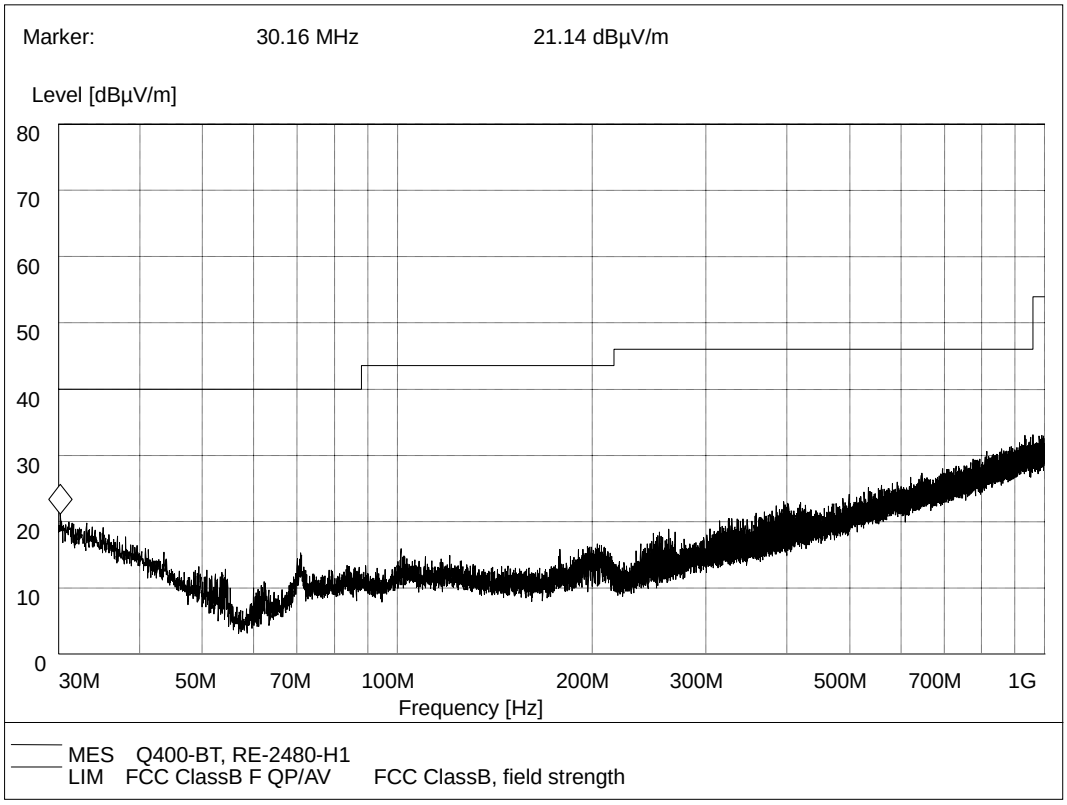

Marker: 34.16 MHz 23.93 dBµV/m
Level [dBµV/m]
80
70
60
50
40
30
20
10
0
30M
50M
70M
100M
200M
300M
500M
700M
1G
Frequency [Hz]
MES Q400-BT, RE-2480-V1
LIM FCC ClassB F QP/AV FCC ClassB, field strength

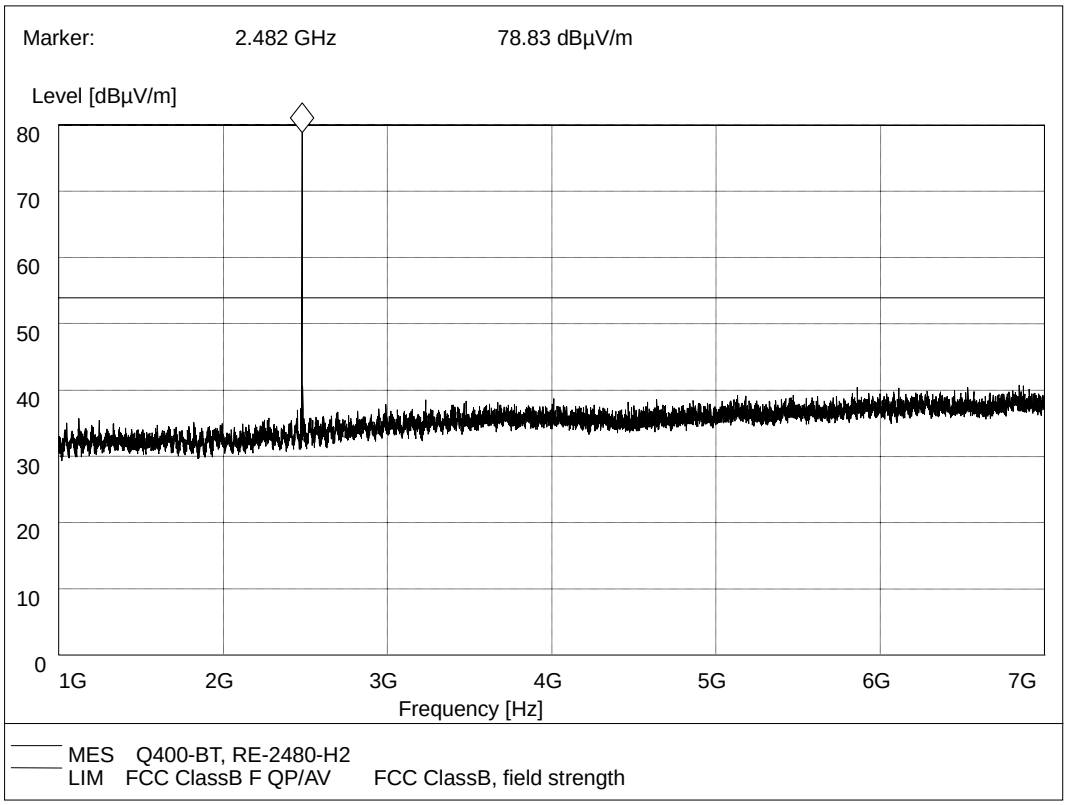

Marker: 2.4812 GHz 79.03 dBµV/m
Level [dBµV/m]
80
70
60
50
40
30
20
10
0
1G
2G
3G
4G
5G
6G
7G
Frequency [Hz]
MES Q400-BT, RE-2480-V2
LIM FCC ClassB F QP/AV FCC ClassB, field strength

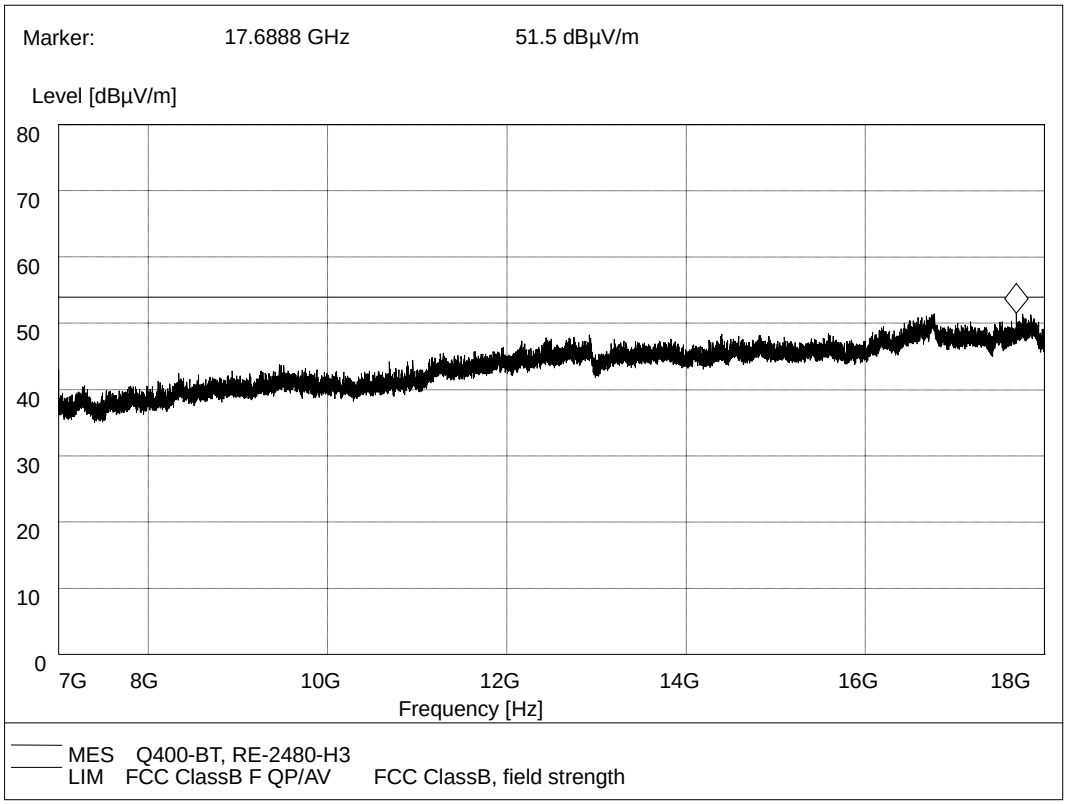

Marker: 16.762 GHz 51.27 dBµV/m
Level [dBµV/m]
80
70
60
50
40
30
20
10
0
7G
8G
10G
12G
14G
16G
18G
Frequency [Hz]
MES Q400-BT, RE-2480-V3
LIM FCC ClassB F QP/AV FCC ClassB, field strength

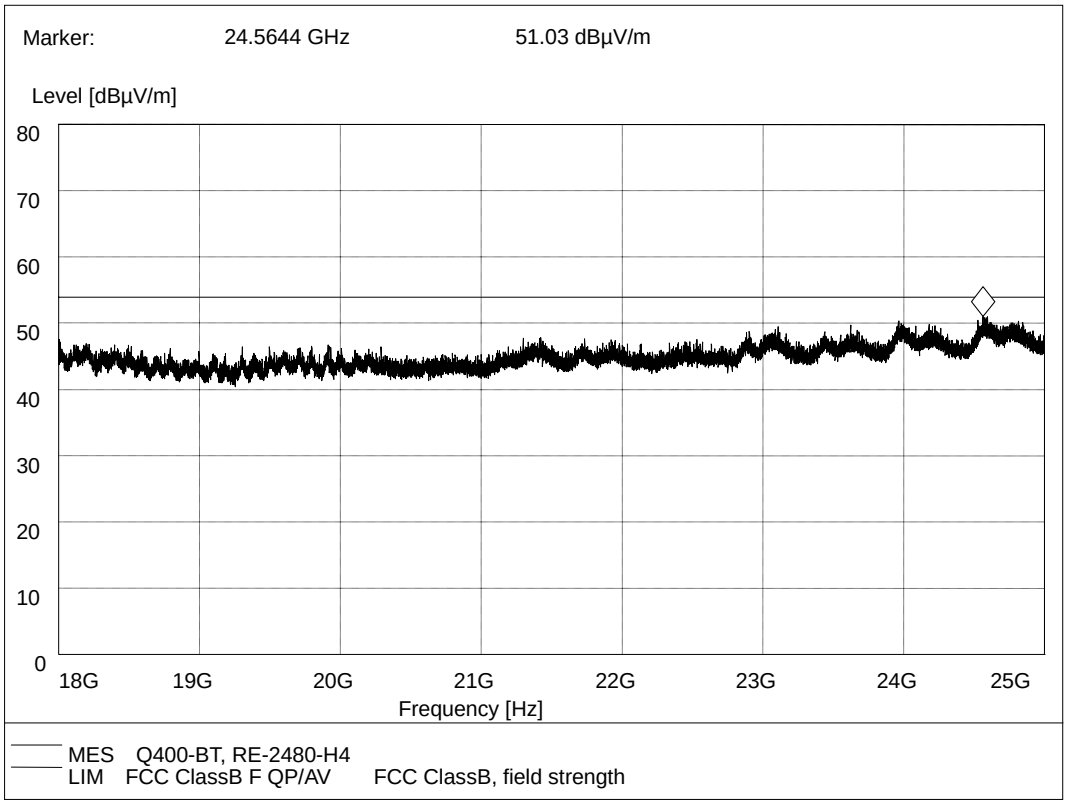

Marker: 24.728 GHz 50.88 dBµV/m
Level [dBµV/m]
80
70
60
50
40
30
20
10
0
18G
19G
20G
21G
22G
23G
24G
25G
Frequency [Hz]
MES Q400-BT, RE-2480-V4
LIM FCC ClassB F QP/AV FCC ClassB, field strength

6. Highest channel 2480MHz, Horizontal






Marker: 17.6888 GHz 51.5 dBµV/m
Level [dBµV/m]
80
70
60
50
40
30
20
10
0
7G
8G
10G
12G
14G
16G
18G
Frequency [Hz]
MES Q400-BT, RE-2480-H3
LIM FCC ClassB F QP/AV FCC ClassB, field strength


Marker: 24.5644 GHz 51.03 dBµV/m
Level [dBµV/m]
80
70
60
50
40
30
20
10
0
18G
19G
20G
21G
22G
23G
24G
25G
Frequency [Hz]
MES Q400-BT, RE-2480-H4
LIM FCC ClassB F QP/AV FCC ClassB, field strength

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.

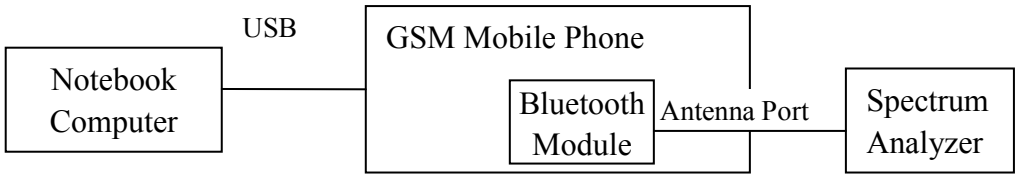
5.2 Test Procedure

a. The EUT temporary antenna port was coupled to the spectrum analyzer. The lost 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. 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

Controlled by embedded commands provided by the applicant, the Bluetooth function of the EUT was activated and set to test mode: transmitting 339 bytes DH5 packages with maximum power at low/mid/high channels.

5.5 Test Results

Operating Frequency (MHz)	20dB Bandwidth(MHz)	Channel Separation
2402	0.943	1.00MHz
2441	0.941	
2480	0.945	

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

a. The EUT temporary antenna port was coupled to the spectrum analyzer. The lost 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. 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 107 times within 0.4×79=31.6 S.

Dwell time of each occupation in this channel is 2.94mS.

2.94mS×107＝0.315 S < 0.4 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

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 lost 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. 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	2.59	30
2441	3.52	30
2480	3.86	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.. 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).

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 lost 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. Tests were also repeated in hopping mode.

11.5 Test Results

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

Field strength of band edge emission falling in adjacent restricted bands (2310MHz-2390MHz and 2483.5MHz-2500MHz) per section 15.205(a) was calculated according to Marker-Delta Method DA 00-705. Refer to chapter 4.5 for step 1 in-band field strength measurement. The following test plots gave the ¡Delta Marker¡ of maximum band edge emissions falling in restricted bands relevant to the fundamental emissions. Calculation results in the following table shows compliance with the radiated emission limits specified in Section 15.209(a).

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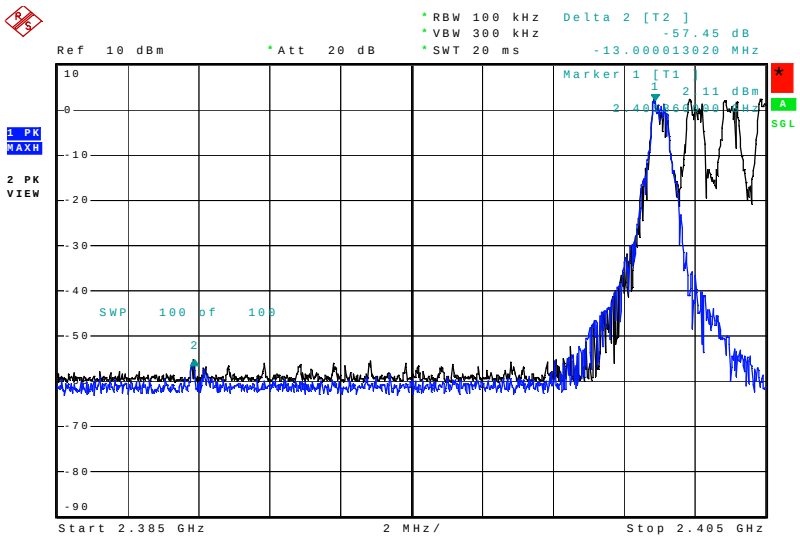
Fundamental Emission			Freq. of Max. Band Edges Emission (MHz)	Delta Marker (dB)	Calculated Max. Band Edges Emission Level (dBμV/m)	Limit (dBμV/m)
Freq.	Field Strength (dBμV/m)	Detector				
2402.00	92.15	PK	2388.86	57.45	34.70	74
2402.00	67.02	AV	2388.86	57.45	9.57	54
2480.00	91.57	PK	2484.86	55.58	35.99	74
2480.00	66.46	AV	2484.86	55.58	10.88	54

Band Edge Test Plots

1. Lowest channel, 2402MHz



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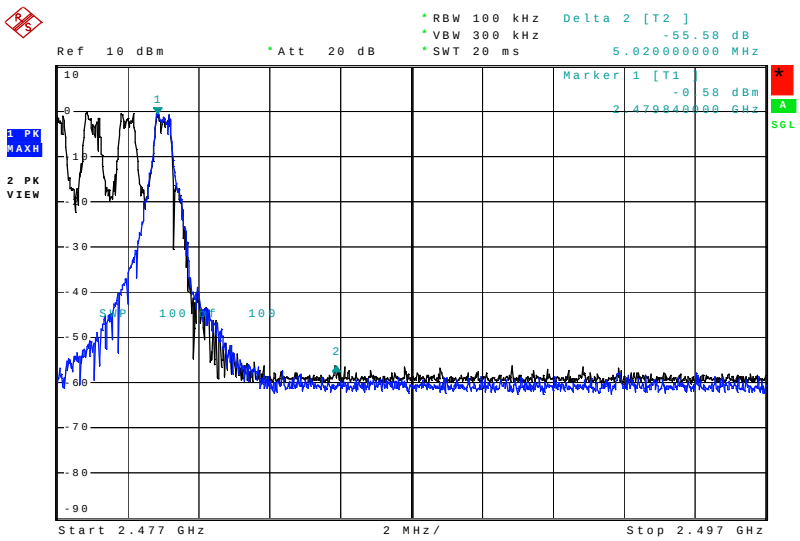
2. Highest channel, 2480MHz



Date: 12.SEP.2006 22:33:56

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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 lost 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

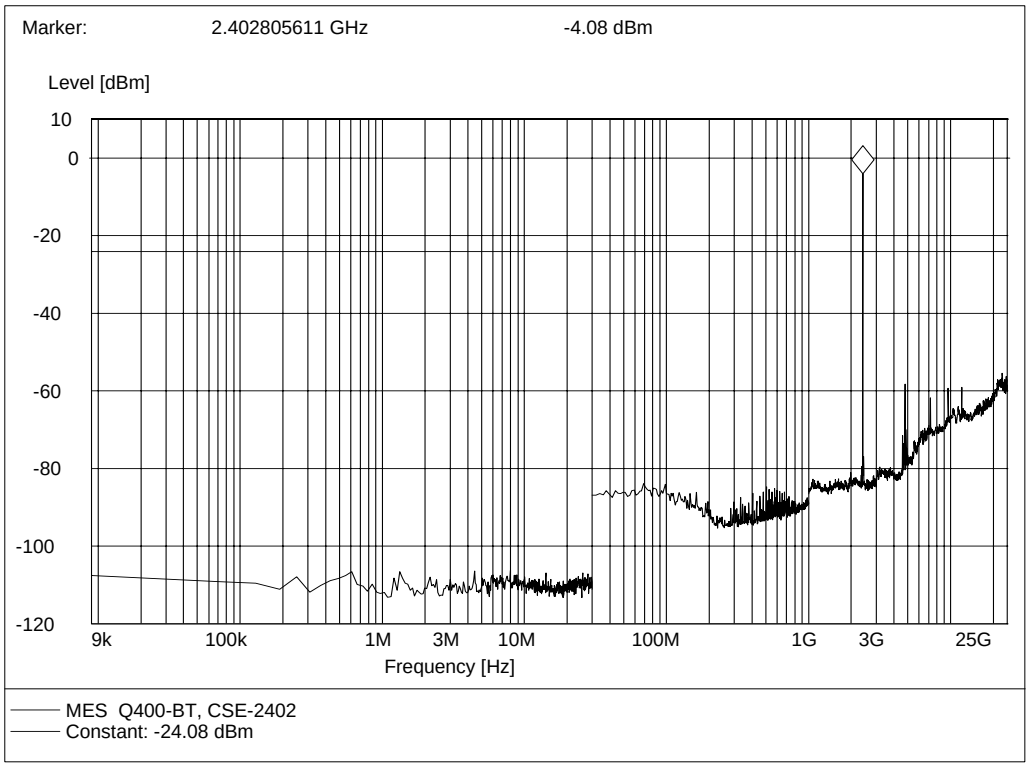
No.	Frequency (MHz)	Level (dBm)	Limit (Ref-20dB)	Margin(dB) (Limit-Level)
2402MHz (Ref=-4.08dBm)				
1	4804.00	-58.17	-24.08	34.09
2	7206.00	-61.83	-24.08	37.75
3	9608.00	-59.35	-24.08	35.27
4	12010.00	-59.08	-24.08	35.00
2441MHz (Ref=-4.22dBm)				
1	4882.00	-53.26	-24.22	29.04
2	7323.00	-64.74	-24.22	40.52
2480MHz (Ref=-4.23dBm)				
1	4960.00	-58.24	-24.23	34.01
2	7440.00	-63.18	-24.23	38.95

NOTE:

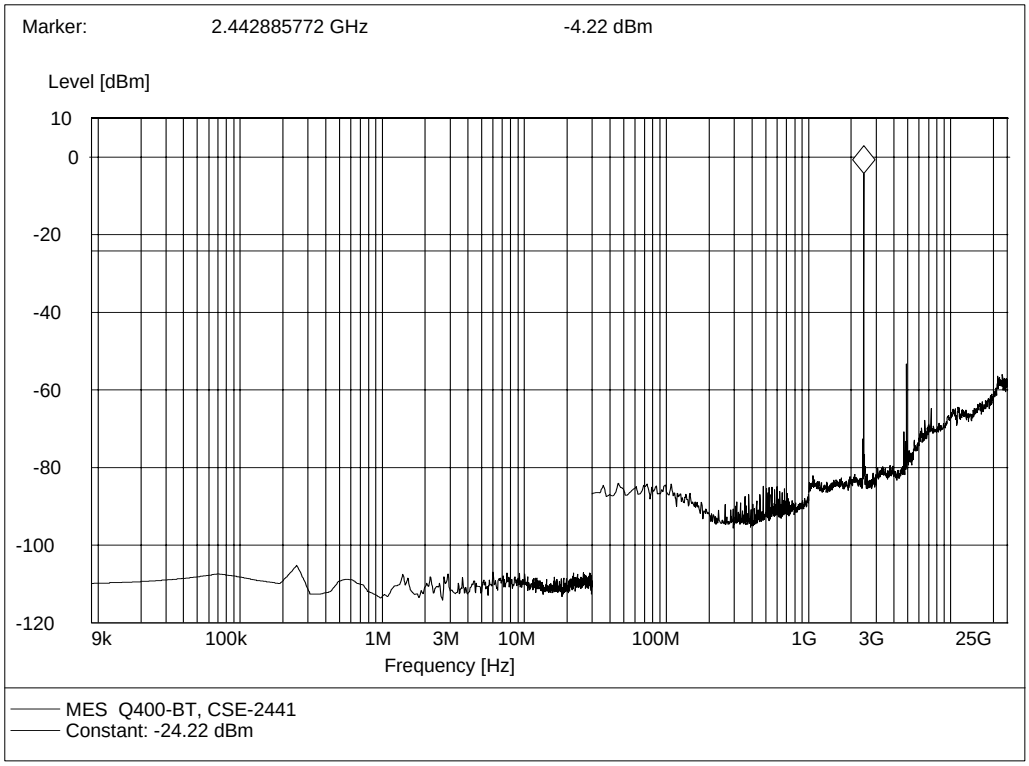
1. The spurious Emissions from 9 KHz to 10th harmonic of the fundamental frequency were researched. Only the larger ones were recorded above.
2. For more details please refer to the following test plots. The marker point is the EUT transmitting frequency which should be ignore

Conducted Spurious Emission Test Plots

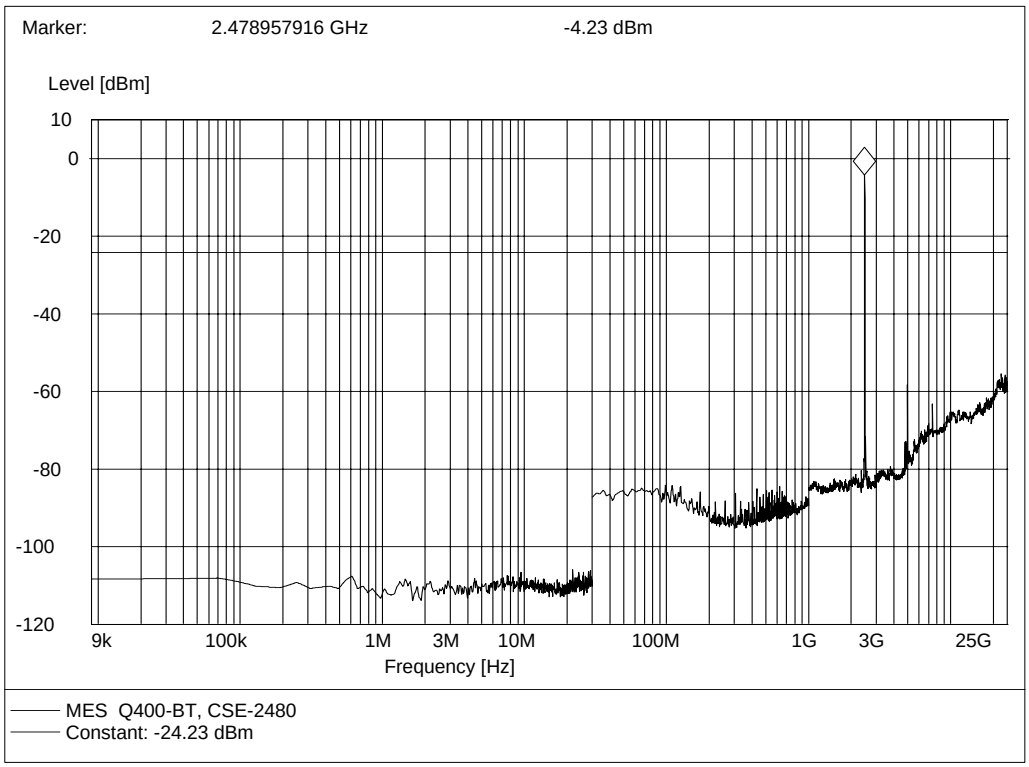
1. Lowest channel, 2402MHz



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.

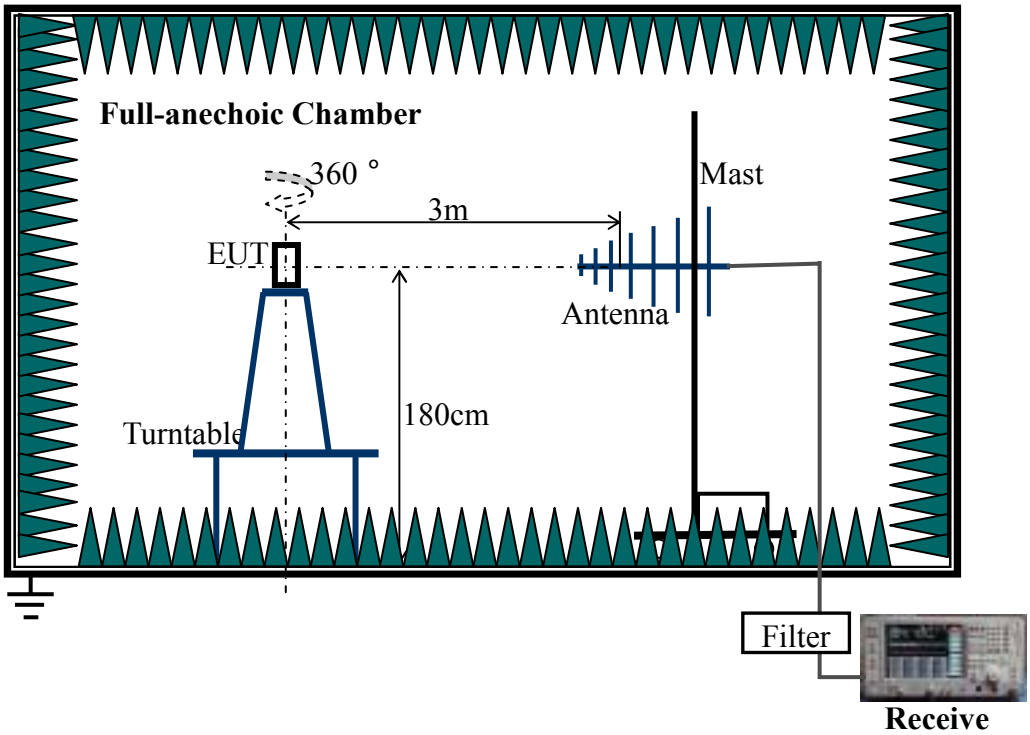
b. The EUT was placed on the vertical axis of a turntable 1.8 meters above the ground. The table was turned from 0 degrees to 360 degrees to find the maximum reading.

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 **V**ertical (Ref=-6.87dBm)				
1	4804.00	-59.09	-26.87	32.22
2402MHz, Antenna **H**ertical (Ref=-7.23dBm)				
1	4804.00	-62.63	-27.23	35.40
2441MHz, Antenna **V**ertical (Ref=-6.93dBm)				
1	4882.00	-56.40	-26.93	29.47
2441MHz, Antenna **H**orizontal (Ref=-8.10dBm)				
1	4882.00	-61.94	-28.10	33.84
2480MHz, Antenna **V**ertical (Ref=-5.48dBm)				
1	4960.00	-59.70	-25.48	34.22
2480MHz, Antenna **H**orizontal (Ref=-8.27dBm)				
1	4960.00	-61.43	-28.27	33.16

NOTE:

1. The spurious Emissions from 30 MHz to 20GHz 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.
3. Results above only show that spurious emission compliance with 20dBc limits. Spurious emissions falling in restrict bands per FCC 15.205(a) must also compliance with FCC 15.209 limits. Please also refer to chapter 4 of this report

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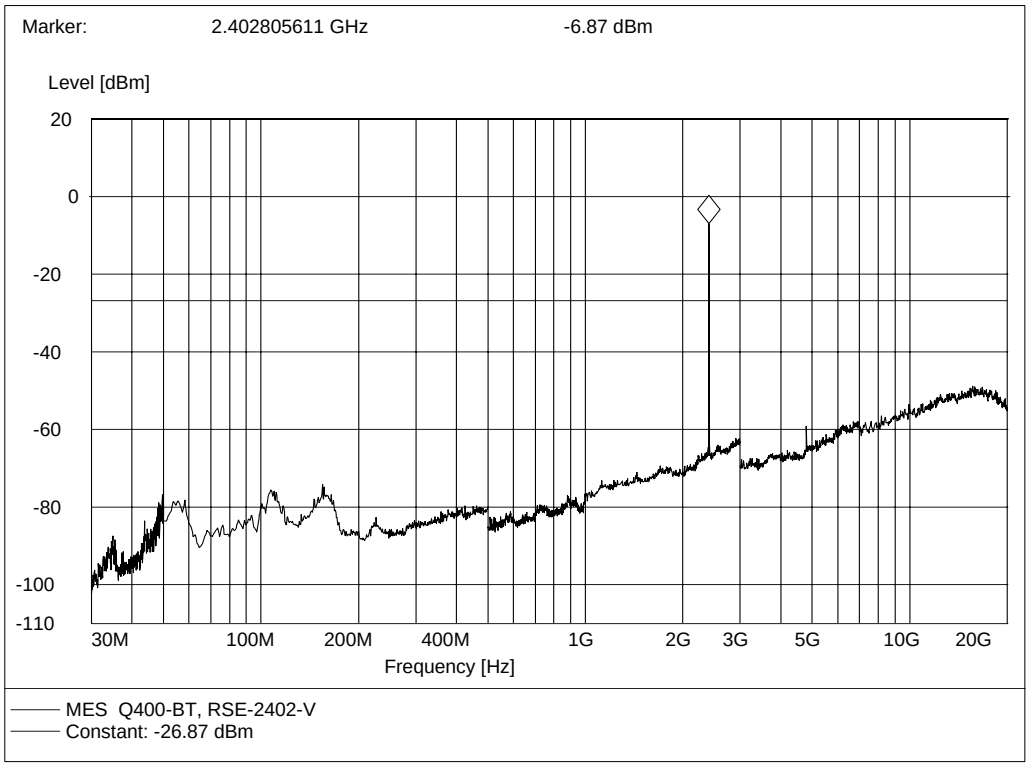
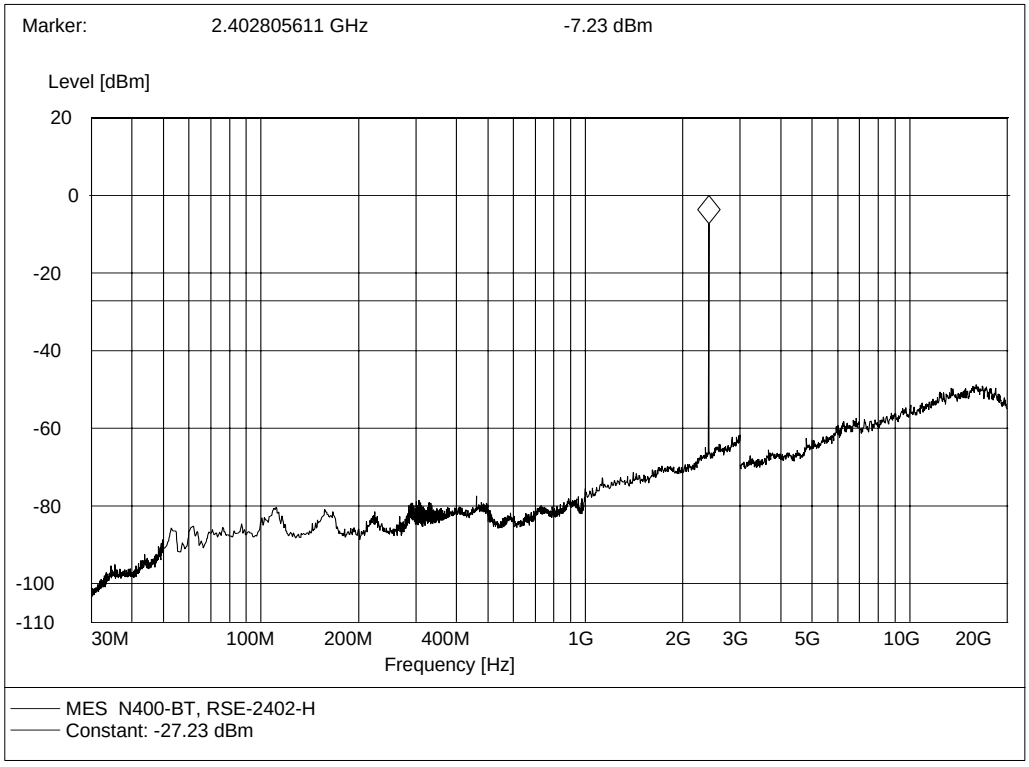
Radiated Spurious Emission Test Plots

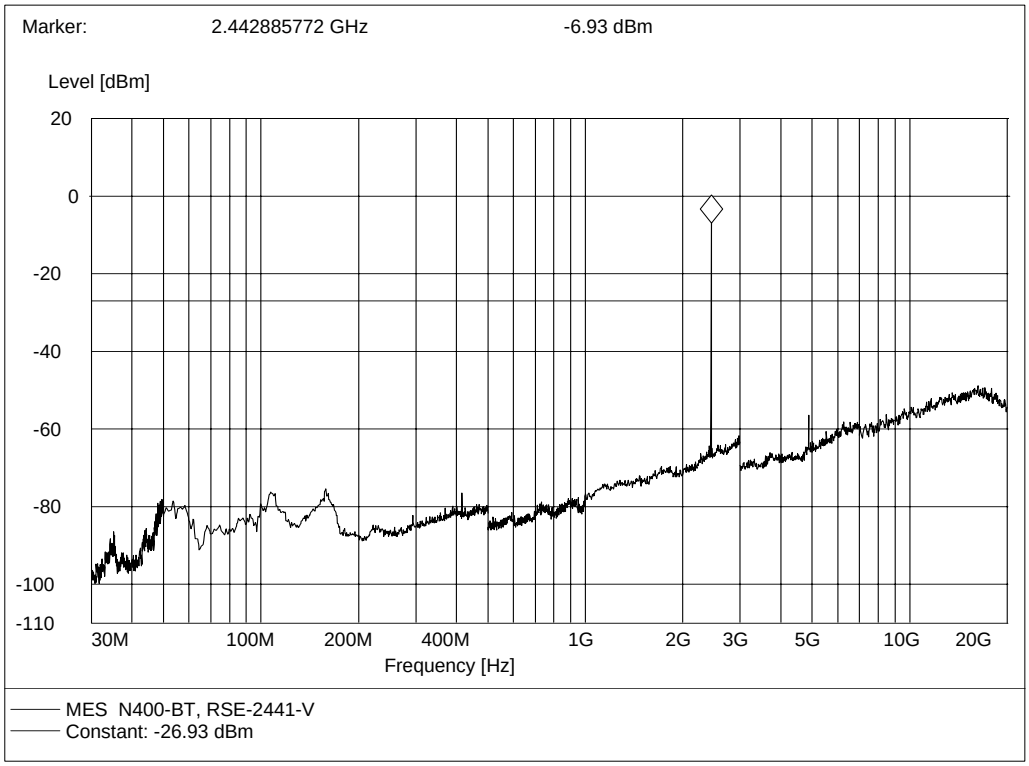
1. Lowest channel, 2402MHz; Antenna Vertical



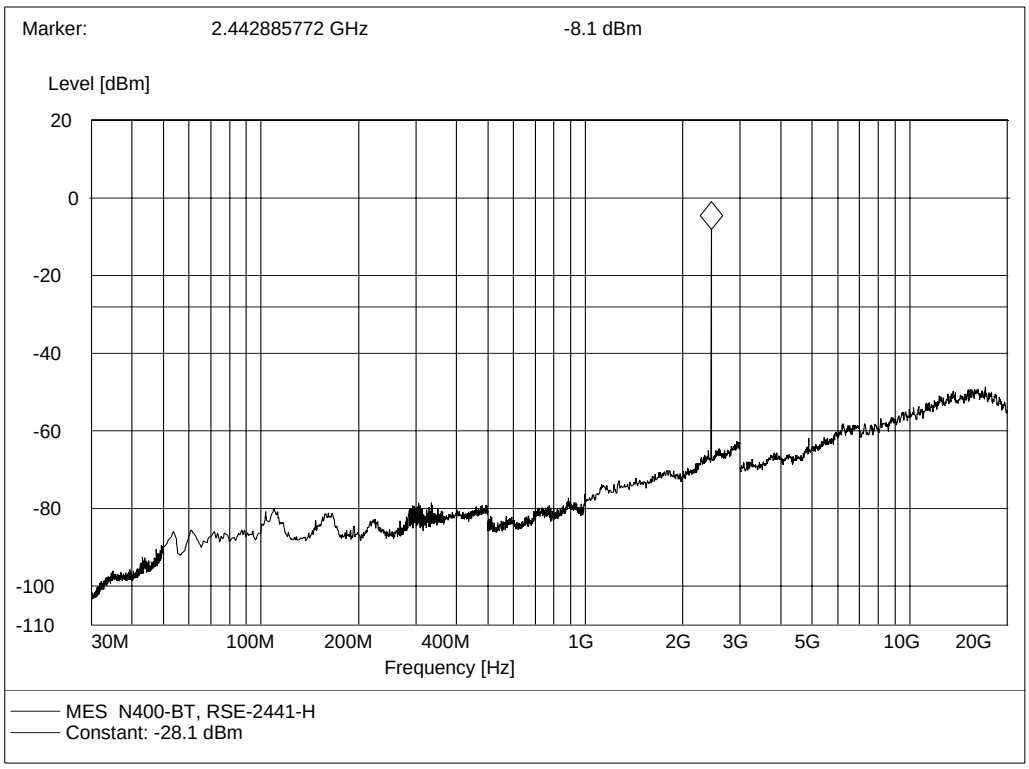
2. Lowest channel, 2402MHz; Antenna Horizontal



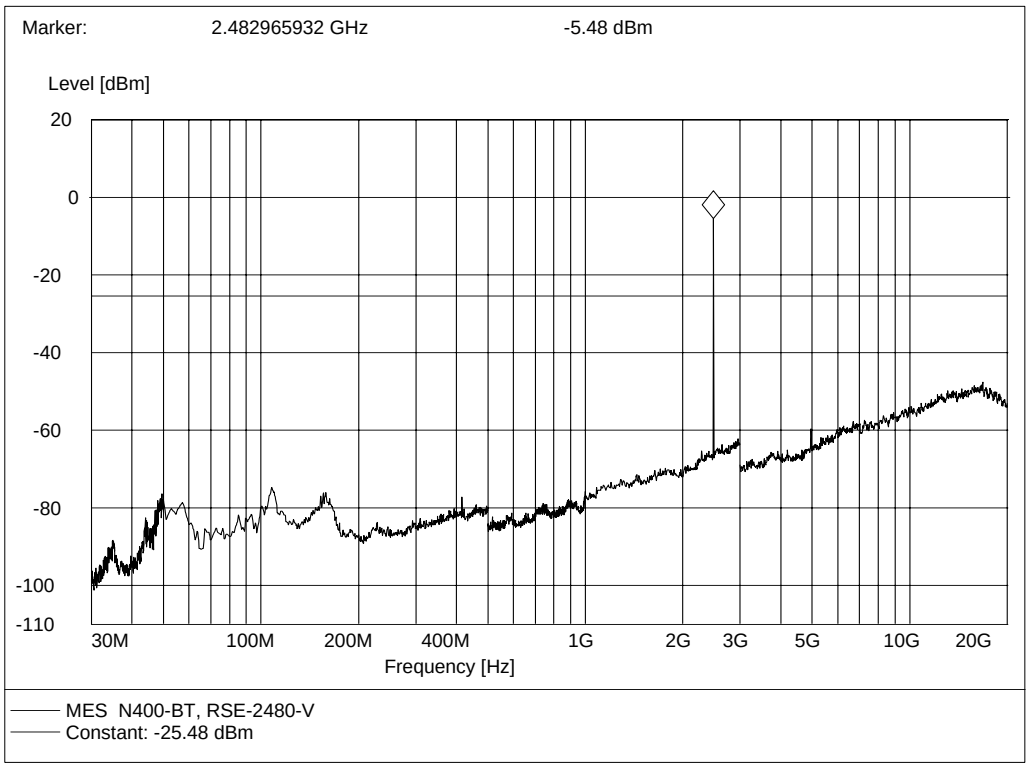
3. Middle channel, 2441MHz; Antenna Vertical



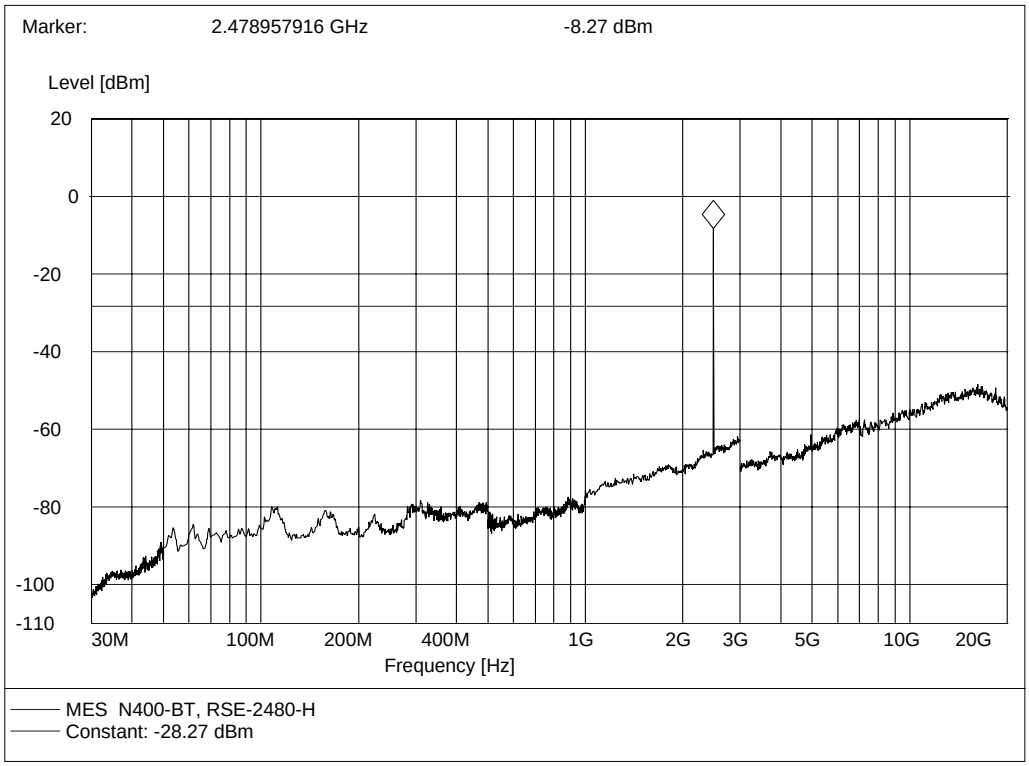
4. Middle channel, 2441MHz; Antenna Horizontal



5. Highest channel, 2480MHz; Antenna Vertical



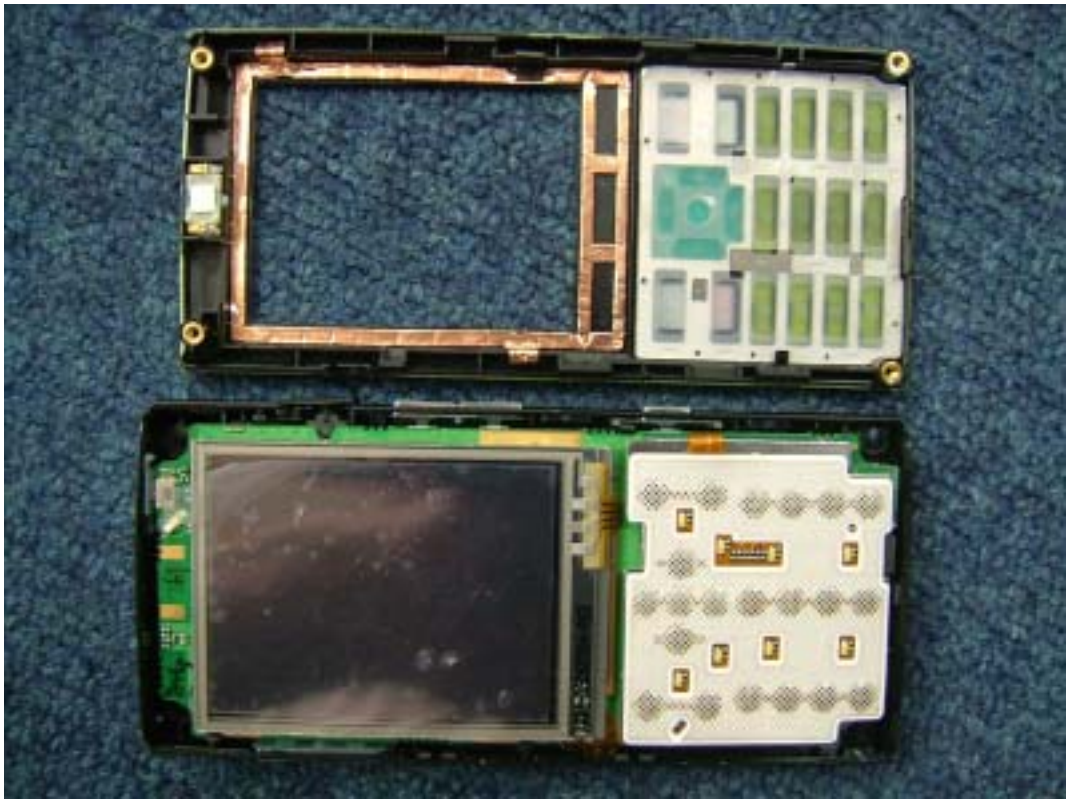
6. Highest channel, 2480MHz; Antenna Horizontal

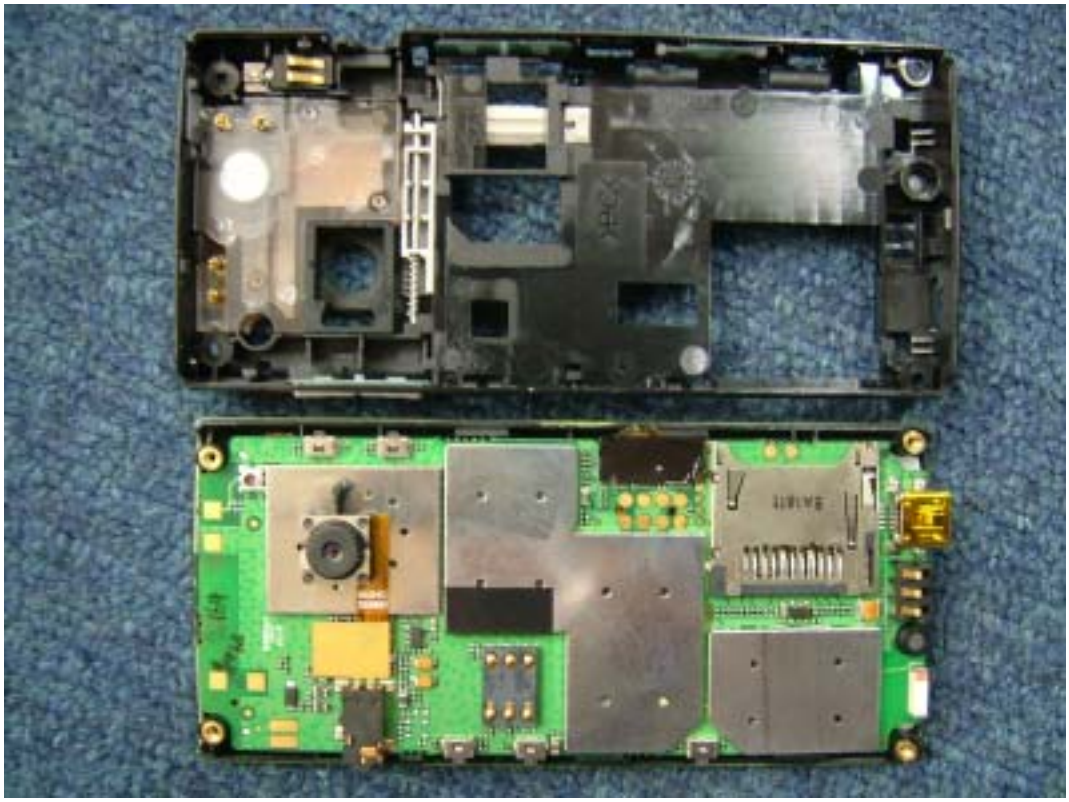


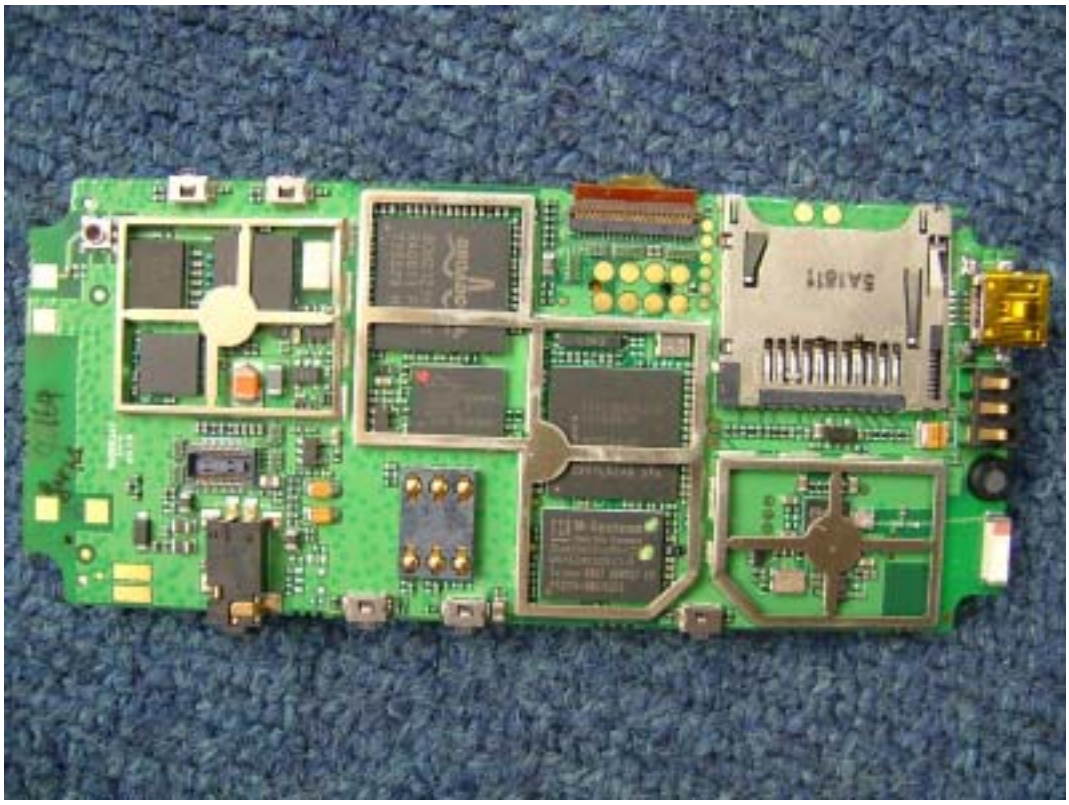
Appendix I：Photographs of the EUT

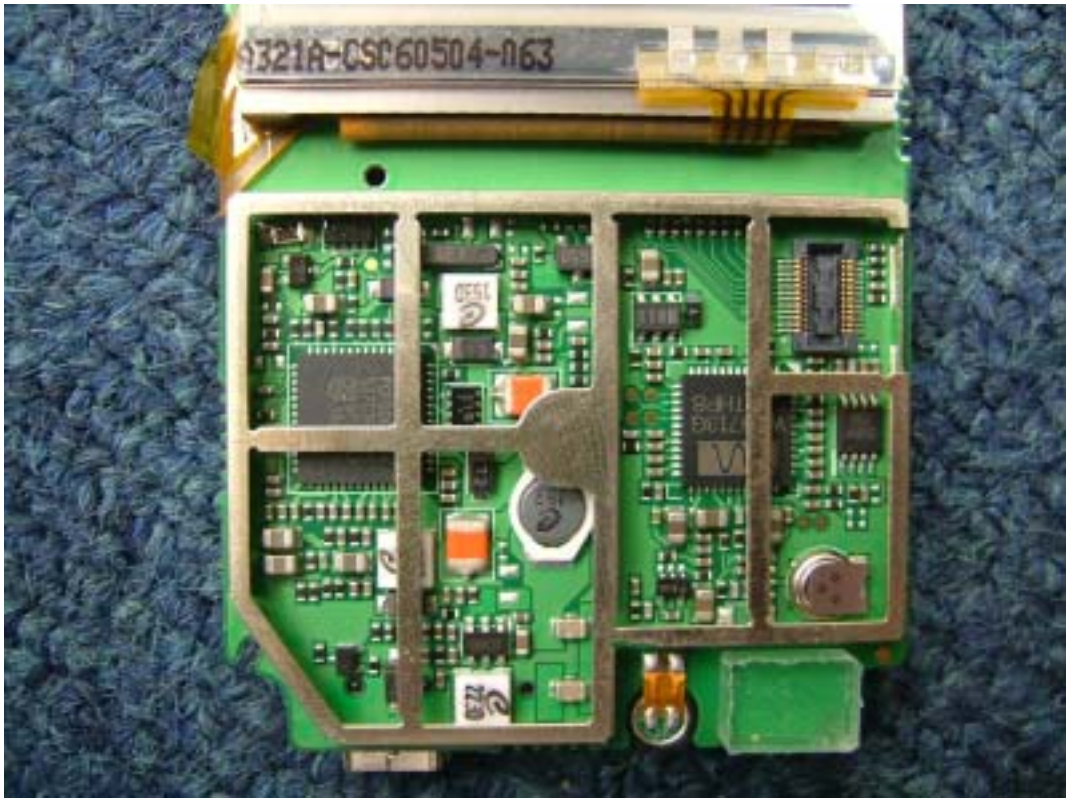
1. Appearance of the MS

2. Inside of the MS





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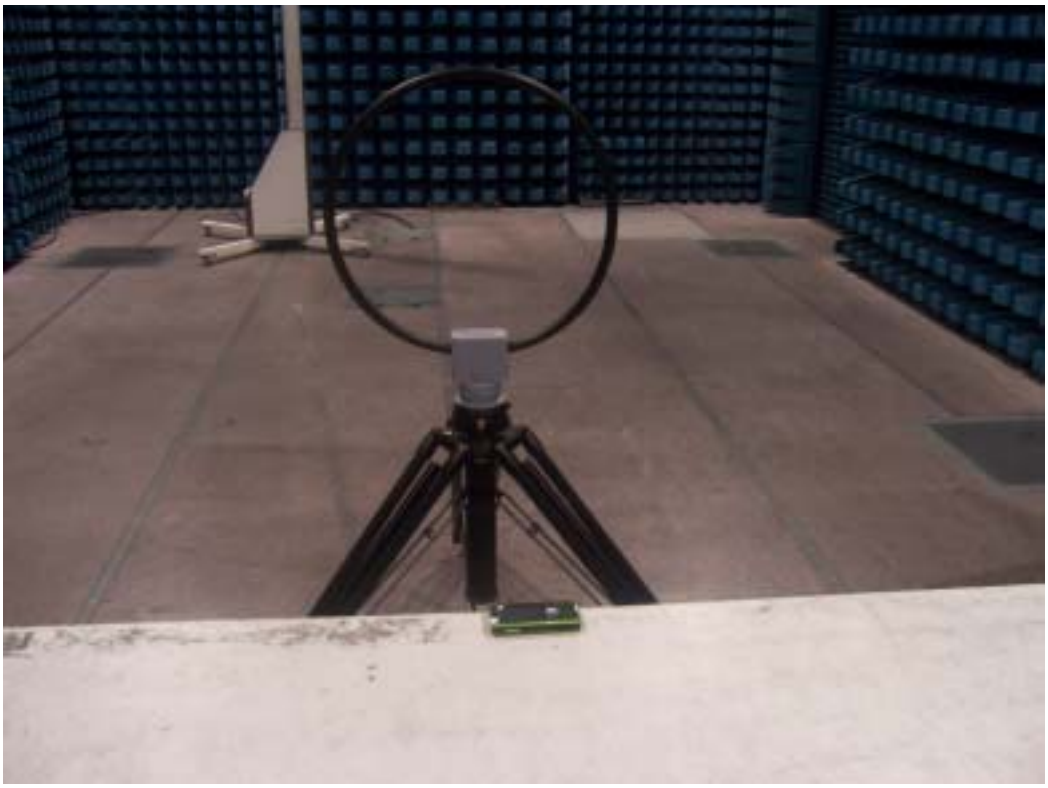
Appendix II：Photographs of the Test Configuration

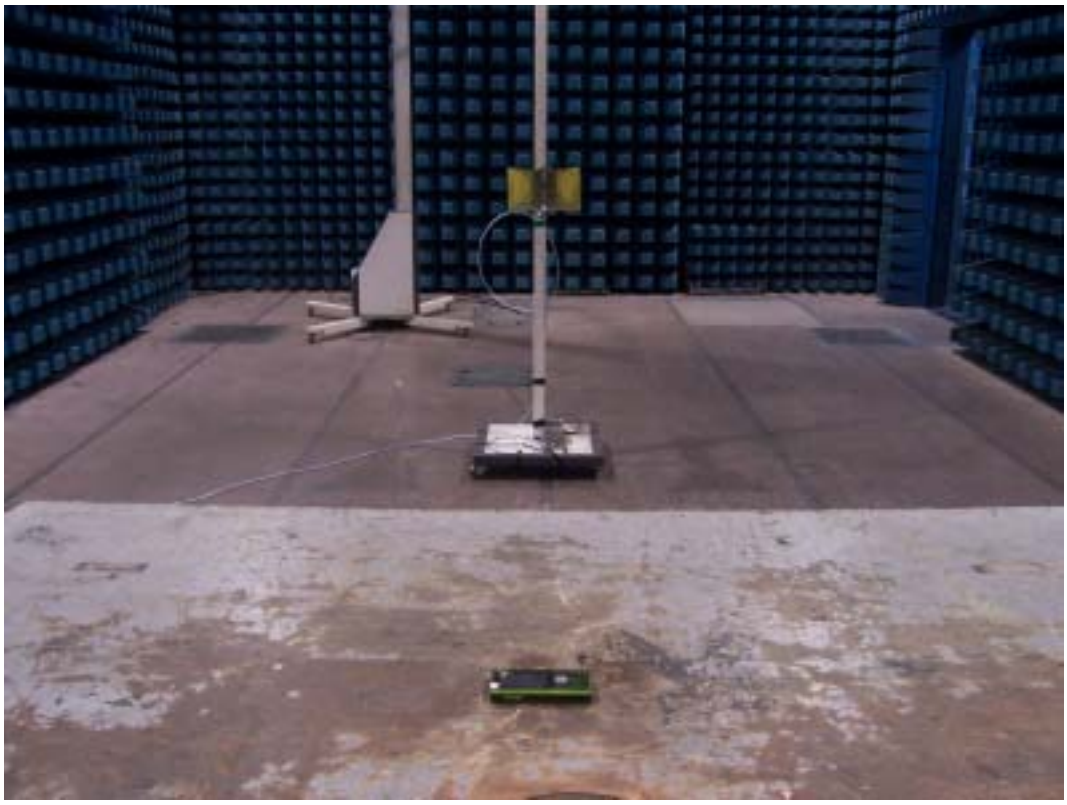
1. Conducted Emission Test

2. Radiated Emission Test (9 kHz -30 MHz)



3. Radiated Emission Test (30 MHz – 1 GHz)

4. Radiated Emission Test (above 1 GHz)



5. Conducted RF Test

6. Radiated RF Test