FCC TEST REPORT

For

EXTECH EX845 TRUE RMS 1000 Amp Clamp Meter with IR Thermometer

Model Number: EX845

FCC ID: IWK-EX845

Report Number: WT108000074

Test Laboratory	:	Shenzhen Academy of Metrology and Quality Inspection National Testing Center for Digital Electronic Products
Site Location	:	Bldg. Metrology and Quality Inspection, Longzhu Road, Shenzhen, Guangdong, China
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Test report declaration

Applicant	:	Extech Instruments Corporation
Address	:	285 Bear Hill Road Waltham, MA 02451, USA
Manufacturer	:	SHENZHEN EVERBEST MACHINERY INDUSTRY CO.,LTD.
Address	:	19th Building, 5th Region, Baiwangxin Industrial Park, Songbai Rd., Baimang, Xili,Nanshan, Shenzhen, China
EUT Description	:	EXTECH EX845 TRUE RMS 1000 Amp Clamp Meter with IR Thermometer
Model No	:	EX845
Trade mark	:	EXTECH
Serial Number	:	090604238
FCC ID	:	IWK-EX845

Test Standards:

FCC Part 15, Subpart C, §15.247

The EUT described above is tested by Shenzhen Academy of Metrology and Quality Inspection EMC Laboratory to determine the maximum emissions from the EUT. Shenzhen Academy of Metrology and Quality Inspection EMC Laboratory is assumed full responsibility for the accuracy of the test results. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in **ANSI C63.4 (2003)** and the energy emitted by the sample EUT tested as described in this report is in compliance with FCC Rules §15.109, §15.203, §15.205, §15.209 and §15.247.

The test report is valid for above tested sample only and shall not be reproduced in part without written approval of the laboratory.

Project Engineer:	Bill Yi	Date:	April 8, 2010
	(Bill Yi)		
Checked by:	Ryan Chen	Date:	April 8, 2010
	(Ryan Chen)		
Approved by:	Peter	Date:	April 8, 2010
	(Peter Lin)		

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1. TEST RESULTS SUMMARY

Table 1 Test Results Summary

FCC Rules	Description of Test	Results
§15.247 (i), §2.1093	RF Exposure	Compliant
§15.203	Antenna Requirement	Compliant
§15.107 (a), §15.207 (a)	Conducted Emissions Test	N/A
§15.205, §15.209, §15.109, §15.247(d)	Radiated Emissions Test	Compliant
§15.247 (a)(1)	20 dB Bandwidth Test	Compliant
§15.247(a)(1)	Channel Separation Test	Compliant
§15.247(a)(1)(iii)	Time of occupancy (Dwell Time)	Compliant
§15.247(a)(1)(iii)	Quantity of hopping channel Test	Compliant
§15.247(b)(1)	Peak Output Power Measurement	Compliant
§15.247(d)	Band edges Test	Compliant

Remark:

“ N/A” means “ Not applicable” ;

The EUT is powered by non-rechargeable battery.

The hopping sequence pseudorandom, and the each channel is used equally on average;

2. GENERAL INFORMATION

2.1. Report information

2.1.1. This report is not a certificate of quality; it only applies to the sample of the specific product/equipment given at the time of its testing. The results are not used to indicate or imply that they are application to the similar items. In addition, such results must not be used to indicate or imply that SMQ approves recommends or endorses the manufacture, supplier or use of such product/equipment, or that SMQ in any way guarantees the later performance of the product/equipment.

2.1.2. The sample/s mentioned in this report is/are supplied by Applicant, SMQ therefore assumes no responsibility for the accuracy of information on the brand name, model number, origin of manufacture or any information supplied.

2.1.3. Additional copies of the report are available to the Applicant at an additional fee. No third part can obtain a copy of this report through SMQ, unless the applicant has authorized SMQ in writing to do so.

2.2. Laboratory Accreditation and Relationship to Customer

The testing report were performed by the Shenzhen Academy of Metrology and quality Inspection EMC Laboratory (Guangdong EMC compliance testing center), in their facilities located at Bldg. of Metrology & Quality Inspection, Longzhu Road, Nanshan District, Shenzhen, Guangdong, China. At the time of testing, Laboratory is accredited by the following organizations:

China National Accreditation Service for Conformity Assessment (CNAS) accredits the Laboratory for conformance to FCC standards, EMC international standards and EN standards. The Registration Number is CNAS L0579.

The Laboratory is listed in the United States of American Federal Communications Commission (FCC), and the registration number are 97379(open area test site) and 274801(semi anechoic chamber).

The Laboratory is listed in Voluntary Control Council for Interference by Information Technology Equipment (VCCI), and the registration number are R-1974(open area test site), R-1966(semi anechoic chamber), C-2117(mains ports conducted interference measurement) and T-180(telecommunication ports conducted interference measurement).

The Laboratory is registered to perform emission tests with Industry Canada (IC), and the registration number is IC4174.

TUV Rhineland accredits the Laboratory for conformance to IEC and EN standards, the registration number is E2024086Z02.

2.3. Measurement Uncertainty

Radiated Emission

30MHz~1000MHz 4.5dB

1GHz~25GHz 4.6dB

RF power (conducted)

±0.5 dB

3. PRODUCT DESCRIPTION

3.1. EUT Description

Description	:	EXTECH EX845 TRUE RMS 1000 Amp Clamp Meter with IR Thermometer
Manufacturer	:	SHENZHEN EVERBEST MACHINERY INDUSTRY CO.,LTD.
Model Number	:	EX845
Frequency Band	:	2400 MHz to 2483.5 MHz
Channel Spacing	:	1MHz
EIRP (Max.)		-4dBm
Modulation	:	GFSK
Antenna Designation	:	Integral
Antenna Gain (Max.)	:	0dBi
Power Type	:	DC9V non-rechargeable battery

Remark: --

3.2. Related Submittal(s) / Grant (s)

This Type approval report is prepared on behalf of EXTECH EX845 TRUE RMS 1000 Amp Clamp Meter with IR Thermometer, in accordance with Part 15, Subparts A, B and C of the Federal Communication Commissions rules.

The tests were performed in order to determine compliance with FCC Part 15, Subpart B, Subpart C, and sections15.109, 15.203, 15.205, 15.209 and 15.247 of the FCC Part 15, Subpart C Rules.

3.3. Block Diagram of EUT Configuration

EUT

Test mode 1, 2, 3, 4

3.4. Operating Condition of EUT

Test mode 1: Measuring

Test mode 2: Tx, Lower CH (2402MHz)

Test mode 3: Tx, Middle CH (2441MHz)

Test mode 4: Tx, Higher CH (2480MHz)

3.5. Support Equipment List

Table 2 Support Equipment List

Name	Model No	S/N	Manufacturer
Computer	9439	L3BDF2K	Lenovo
Keyboard (USB)	SK-8825 (L)	02553778	Lenovo
Mouse (USB)	MO28UOL	4418011108	Lenovo
Monitor	9227-AE1	V1TDB38	Lenovo

3.6. Test Conditions

Date of test: January 18, 2010 to April 8, 2010

Date of EUT Receive: January 12, 2010

Temperature: 20-30 ℃

Relative Humidity: 45-60 %

3.7. Special Accessories

No available for this EUT intended for grant.

3.8. Equipment Modifications

No available for this EUT intended for grant.

3.9. Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-2003, 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.

All emissions measurement was performed. The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

4. TEST EQUIPMENT USED

Table 3 Test Equipment

No.	Equipment	Manufacturer	Model No.	Last Cal.	Cal. Interval
SB2603	EMI Test Receiver	Rohde & Schwarz	ESCS30	Jan.22, 2010	1 Year
SB3321	AMN	Rohde & Schwarz	ESH2-Z5	Jan.22, 2010	1 Year
SB2604	AMN	Rohde & Schwarz	ESH3-Z5	Jan.22, 2010	1 Year
SB3436	EMI Test Receiver	Rohde & Schwarz	ESI26	Jan.22, 2010	1 Year
SB3440	Bilog Antenna	Chase	CBL6112B	Jan.22, 2010	1 Year
SB3435	Horn Antenna	Rohde & Schwarz	HF906	Jan.22, 2010	1 Year
SB3435/01	Amplifier(1-18GHz)	Rohde & Schwarz	---	Jan.22, 2010	1 Year
SB3435/02	Amplifier(18-40GHz)	Rohde & Schwarz	---	May.03, 2009	1 Year
SB3435/03	Horn Antenna	Rohde & Schwarz	AT4560	May.03, 2009	1 Year
SB3450/01	3m Semi-anechoic chamber	Albatross Projects	9X6X6	Jan.29, 2010	2 Years

5. RF EXPOSURE

5.1. Test Standard and Limit

5.1.1. Test Standard

FCC §15.247 (i), §1.1310(b) (1)

5.1.2. Test Limit

According to §15.247 (i) and §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission’ s guidelines, Limits for General Population/Uncontrolled Exposure.

According to FCC Exclusion list, In the following table, f_{GHz} is mid-band frequency in GHz, and d is the distance to a person’ s body, excluding hands, wrists, feet, and ankles.

Table 4: Limits for General Population/Uncontrolled Exposure

Exposure Category	Low Threshold	High Threshold
General Population	$(60/f_{GHz})$mW, d＜2.5 cm $(120/f_{GHz})$mW, d≥2.5 cm	$(900/f_{GHz})$mW, d＜20 cm
Occupational	$(375/f_{GHz})$mW, d＜2.5 cm $(900/f_{GHz})$mW, d≥2.5 cm	$(2250/f_{GHz})$mW, d＜20 cm

Routine SAR evaluation refers to that specifically required by § 2.1093, using measurements or computer simulation. When routine SAR evaluation is not required, portable transmitters with output power greater than the applicable low threshold require SAR evaluation to qualify for TCB approval.

5.2. Test Data

Result: Pass

Routine SAR evaluation refers to that specifically required by § 2.1093, using measurements or computer simulation. When routine SAR evaluation is not required, portable transmitters with output power greater than the applicable low threshold require SAR evaluation to qualify for TCB approval.

Test Results: Compliant

This is a portable device, and the Max peak output power is 0.36mW<24.98mW, (60/2.402GHz) mW.

6. ANTENNA REQUIREMENT

6.1. Test Standard and Limit

6.1.1. Test Standard

FCC § 15.203, §15.247 (c)

6.1.2. Test Limit

According to § 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. 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 replaced by the user, but the user of a standard antenna jack or electrical connector is prohibited. The structure and application of the EUT were analyzed to determine compliance with section §15.203 of the rules. §15.203 state that the subject device must meet the following criteria: Antenna must be permanently attached to the unit.

6.2. Result

Compliant

The EUT has an integral antenna (PCB), end-user can not access.

The maximum gain is 0dBi for Bluetooth Transceiver which, in accordance to about sections, is considered sufficient to comply with the provisions of this section.

7. RADIATED SPURIOUS EMISSIONS TEST

7.1. Test Standard and Limit

7.1.1. Test Standard

FCC Part 15, §15.247 (d), §15.205, §15.109, §15.209

7.1.2. Test Limit

According to FCC §15.247 (d);

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, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

7.2. Test Procedure

The EUT is placed on a turntable, which is 0.8 meter above ground. The turntable can rotate 360 degrees to determine the position of the maximum emission level. EUT is set 3 meters away from the receiving antenna using the setup in accordance with the ANSI C63.4-2003., which is mounted on an antenna tower.

The antenna can move up and down between 1 to 4 meters to find out the maximum emission level. Broadband antenna is used as a receiving antenna. Both horizontal and vertical polarization of the antenna is set on test.

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations. The spacing between the peripherals was 10 centimeters. External I/O cables were draped along the edge of the test table and bundle when necessary.

Data was recorded in Quasi-peak detection mode for frequency range of 30 MHz-1GHz, peak and Average detection modes for frequencies above 1GHz.

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading.

Test Setup

Channel Setup: Execute Blue-Test software, selecting every operating mode (Lower/ Middle/Higher Channels), related Channel, BW, rate, and the maximum RF power, etc.

Software: InstallBlueSuiteCasira1.24

Set the spectrum analyzer in the following setting

Radiated emission below 1GHz: RBW=100 kHz/VBW=300 kHz, Sweep=AUTO

Radiated emission above 1GHz: PEAK;

RBW=1MHz, VBW=1MHz, Sweep=AUTO

Radiated emission above 1GHz: AVERAGE;

RBW=1MHz, VBW=10Hz, Sweep=AUTO

Repeat above procedures until the measurements for all frequencies are complete.

7.3. Test Arrangement

The arrangement of the equipment is installed to meet the standards and operating in a manner, which tends to maximize its emission characteristics in a normal application. The detailed information refers to test plots.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle. The spacing between the peripherals was 10 cm.

7.4. Test Data

Radiated Spurious Emissions: PASS

Radiated Band edges: PASS

The radiated emission tests were performed in accordance with the ANSI C63.4-2003. The specification used was the FCC 15.109, FCC 15.209 and FCC 15.247 limits.

REMARKS:
Emissions don’ t show below are too low against the limits.

Emission level (dBμV/m) =Read Value (dBμV) + Correction Factor (dB/m)
Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
Margin = Limit - Corrected Amplitude

The other emission levels were very low against the limit.

Note: The EUT had been investigated with three planes during radiated spurious emission test, including up-stand, side, and lay down, and the up-stand mode was the worst mode.

Table 5 Radiated Emission Test Data (Below 1GHz)

Temperature: 24℃		**Humidity:** 50%		**Atmosphere Pressure:** 101.7kPa		
Test mode: Measuring						
Frequency	**Readings**	**Correction Factor**	**Field Strength**	**Receiver Antenna Polarity**	**Limits**	**Margin**
(MHz)	(dBμV/m)	(dB)	(dBμV@3m)	(H/V)	(dBμ V@3m)	(dB)
30.000	3.4	19.7	23.1	V	40.0	16.9
68.877	5.1	8.6	13.7	V	40.0	26.3
119.418	4.0	14.6	18.6	V	43.5	24.9
259.378	4.1	16.5	20.6	V	46.0	25.4
416.833	4.6	20.6	25.2	V	46.0	20.8
508.196	6.3	21.3	27.6	V	46.0	18.4
30.000	3.9	19.7	23.6	H	40.0	16.4
98.036	3.9	13.5	17.4	H	43.5	26.1
131.082	4.2	14.2	18.4	H	43.5	25.1
274.929	4.3	16.1	20.4	H	46.0	25.6
506.252	4.5	21.3	25.8	H	46.0	20.2
646.212	5.3	23.1	28.4	H	46.0	17.6

RBW=100 kHz/VBW=300 kHz, Sweep=AUTO

Table 6 Radiated Emission Test Data (Below 1GHz)

Temperature: 24℃		**Humidity:** 50%	**Atmosphere Pressure:** 101.7kPa			
Test mode: Tx, Lower CH (2402 MHz)						
Frequency	**Readings**	**Correction Factor**	**Field Strength**	**Receiver Antenna Polarity**	**Limits**	**Margin**
(MHz)	(dBμV)	(dB)	(dBμ V@3m)	(H/V)	(dBμ V@3m)	(dB)
30.240	13.8	19.7	33.5	V	40.0	6.5
53.931	16.7	8.1	24.8	V	40.0	15.2
83.372	20.6	11.0	31.6	V	40.0	8.4
197.651	11.9	12.7	24.6	V	43.5	18.9
432.030	11.4	20.1	31.5	V	46.0	14.5
766.611	8.7	25.0	33.7	V	46.0	12.3
30.260	6.9	19.7	26.6	H	40.0	13.4
71.432	22.7	8.9	31.6	H	40.0	8.4
83.352	23.9	11.0	34.9	H	40.0	5.1
197.651	20.6	12.7	33.3	H	43.5	10.2
766.511	17.6	25.0	42.6	H	46.0	3.4
815.310	13.1	25.2	38.3	H	46.0	7.7

RBW=100 kHz/VBW=300 kHz, Sweep=AUTO

Table 7 Radiated Emission Test Data (Below 1GHz)

Temperature: 24℃		**Humidity:** 50%	**Atmosphere Pressure:** 101.7kPa			
Test mode: Tx, Middle CH (2441 MHz)						
Frequency	**Readings**	**Correction Factor**	**Field Strength**	**Receiver Antenna Polarity**	**Limits**	**Margin**
(MHz)	(dBμV)	(dB)	(dBμ V@3m)	(H/V)	(dBμ V@3m)	(dB)
30.080	12.4	19.7	32.1	V	40.0	7.9
47.531	13.9	10.6	24.5	V	40.0	15.5
83.352	20.3	11.0	31.3	V	40.0	8.7
197.671	12.2	12.7	24.9	V	43.5	18.6
432.851	11.6	20.1	31.7	V	46.0	14.3
767.513	8.8	25.0	33.8	V	46.0	12.2
30.060	7.4	19.7	27.1	H	40.0	12.9
71.470	22.6	8.9	31.5	H	40.0	8.5
83.390	20.5	11.0	31.5	H	40.0	8.5
192.400	12.2	12.3	24.5	H	43.5	19.0
766.470	17.2	25.0	42.2	H	46.0	3.8
814.705	12.9	25.2	38.1	H	46.0	7.9

RBW=100 kHz/VBW=300 kHz, Sweep=AUTO

Table 8 Radiated Emission Test Data (Below 1GHz)

Temperature: 24℃		**Humidity:** 50%	**Atmosphere Pressure:** 101.7kPa			
Test mode: Tx, Higher CH (2480 MHz)						
Frequency	**Readings**	**Correction Factor**	**Field Strength**	**Receiver Antenna Polarity**	**Limits**	**Margin**
(MHz)	(dBμV)	(dB)	(dBμ V@3m)	(H/V)	(dBμ V@3m)	(dB)
30.070	12.4	19.7	32.1	V	40.0	7.9
47.535	14.1	10.6	24.7	V	40.0	15.3
83.349	20.4	11.0	31.4	V	40.0	8.6
197.677	12.4	12.7	25.1	V	43.5	18.4
432.861	11.8	20.1	31.9	V	46.0	14.1
767.523	8.7	25.0	33.7	V	46.0	12.3
30.060	7.2	19.7	26.9	H	40.0	13.1
71.472	22.8	8.9	31.7	H	40.0	8.3
83.397	20.9	11.0	31.9	H	40.0	8.1
335.991	17.5	17.9	35.4	H	46.0	10.6
767.308	17.1	25.0	42.1	H	46.0	3.9
833.545	12.8	25.4	38.2	H	46.0	7.8

RBW=100 kHz/VBW=300 kHz, Sweep=AUTO

Table 9 Radiated Emission Test Data (Above 1GHz)

Temperature: 24℃			**Humidity:** 50%		**Atmosphere Pressure:** 101.7kPa		
Test mode: Tx							
Frequency	**Measuring Type**	**Receiver Antenna Polarity**	**Readings**	**Correction Factor**	**Field Strength**	**Limits**	**Margin**
(MHz)	(PK/AV)	(H/V)	(dBμV)	(dB)	(dBμ V@3m)	(dBμ V@3m)	(dB)
Lower Channel (2402 MHz)							
4804	PK	V	49.2	2.3	51.5	74	22.5
4804	AV	V	45.5	2.3	47.8	54	6.2
4804	PK	H	51.2	2.3	53.5	74	20.5
4804	AV	H	48.1	2.3	50.4	54	3.6
1601.321	PK	V	33.8	18.1	51.9	74	22.1
1601.321	AV	V	32.6	18.1	50.7	54	3.3
1601.323	PK	H	33.4	18.1	51.5	74	22.5
1601.323	AV	H	32.4	18.1	50.5	54	3.5
Middle Channel (2441 MHz)							
4882	PK	V	53.7	2.3	56.0	74	18.0
4882	AV	V	51.3	2.3	53.6	54	0.4
4882	PK	H	52.3	2.3	54.6	74	19.4
4882	AV	H	49.6	2.3	51.9	54	2.1
1627.343	PK	V	28.2	18.1	46.3	74	27.7
1627.343	AV	V	26.0	18.1	44.1	54	9.9
1627.331	PK	H	27.5	18.1	45.6	74	28.4
1627.331	AV	H	25.2	18.1	43.3	54	10.7
Higher Channel (2480 MHz)							
4960	PK	V	50.9	2.3	53.2	74	20.8
4960	AV	V	47.8	2.3	50.1	54	3.9
4960	PK	H	51.3	2.3	53.6	74	20.4
4960	AV	H	48.2	2.3	50.5	54	3.5
1653.352	PK	V	38.3	18.1	56.4	74	17.6
1653.352	AV	V	34.5	18.1	52.6	54	1.4
1653.330	PK	H	35.8	18.1	53.9	74	20.1
1653.330	AV	H	34.8	18.1	52.9	54	1.1

PK: RBW=1MHz, VBW=1MHz, Sweep=AUTO; AV: RBW=1MHz, VBW=10Hz, Sweep=AUTO

REMARKS:

1. Radiated emissions measured in frequency above 1GHz up to 10th harmonic were made with an instrument using peak detector mode.

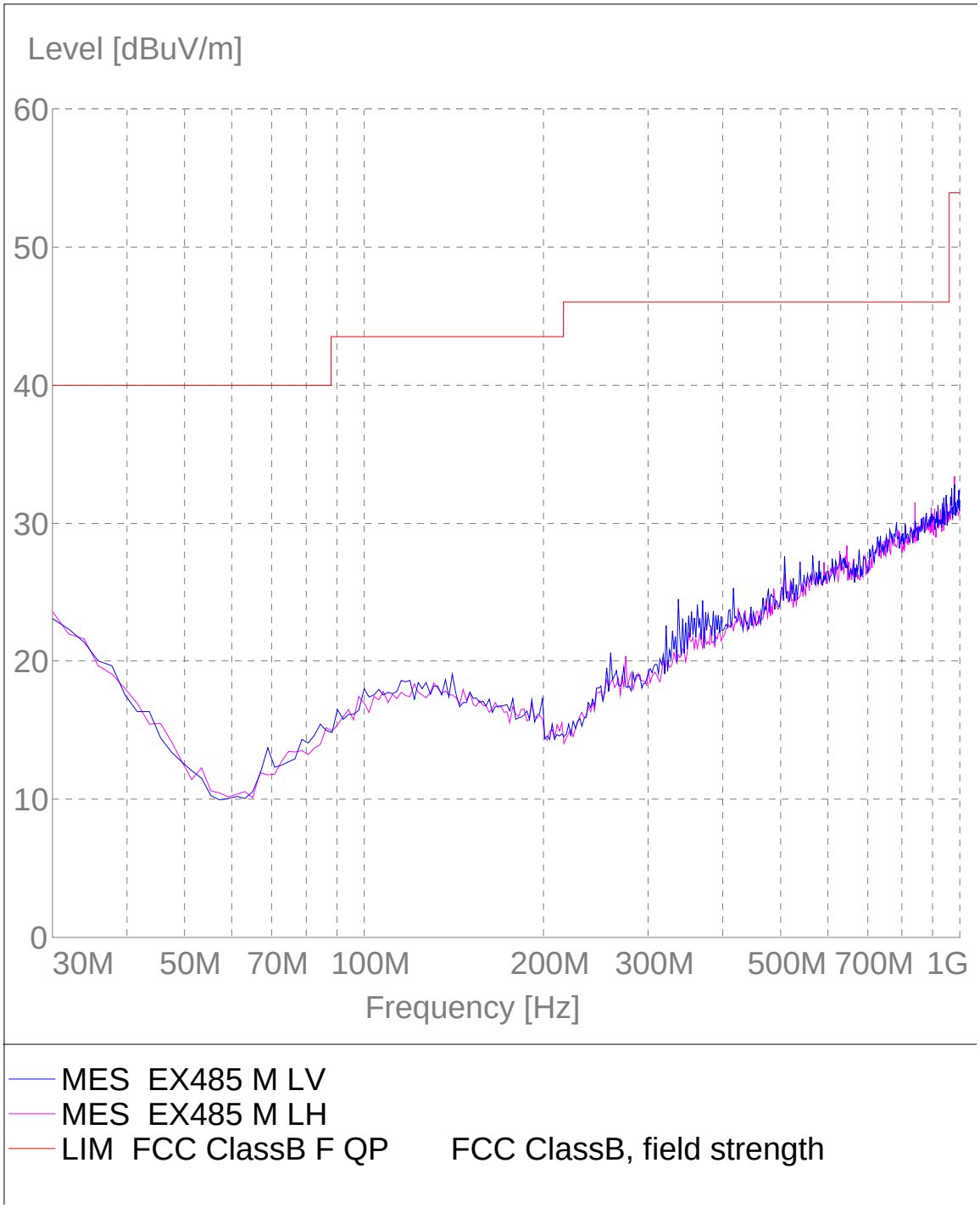
2. Emission level (dBμV/m) =Read Value (dBμV) + Correction Factor (dB/m)

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.

4. Measurements above show only up to 6 maximum emissions, or would be lesser with " N/A" remark, if no specific emissions from the EUT are recorded (i.e. margin ＞20dB from the applicable limit) and considered that is already beyond the background noise floor.

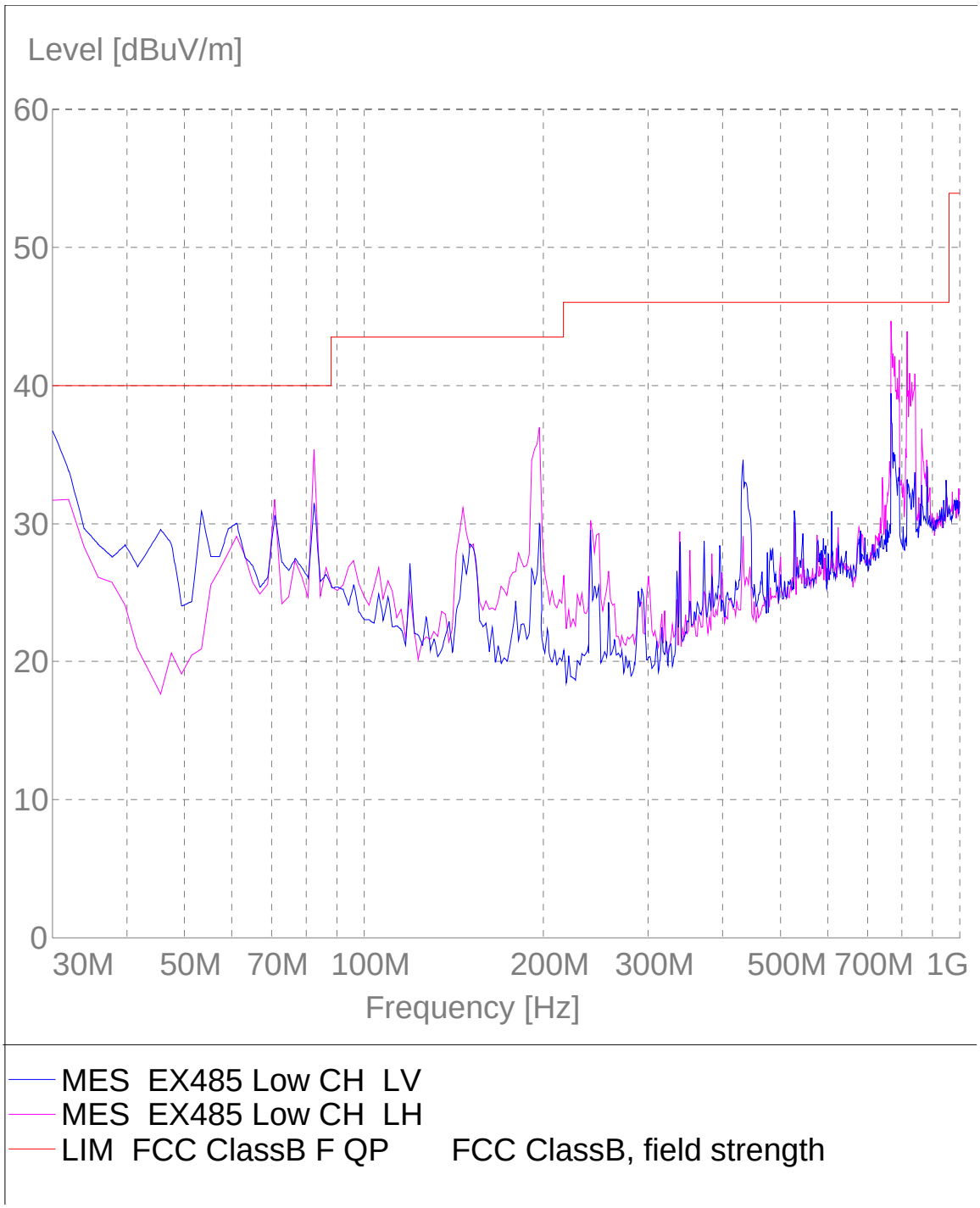
Radiated Emission

M/N:	EX845
Operating Condition:	Measuring
Test Site:	SMQ EMC Lab. SAC
Test Specification:	Horizontal & Vertical
Comment:	DC9V



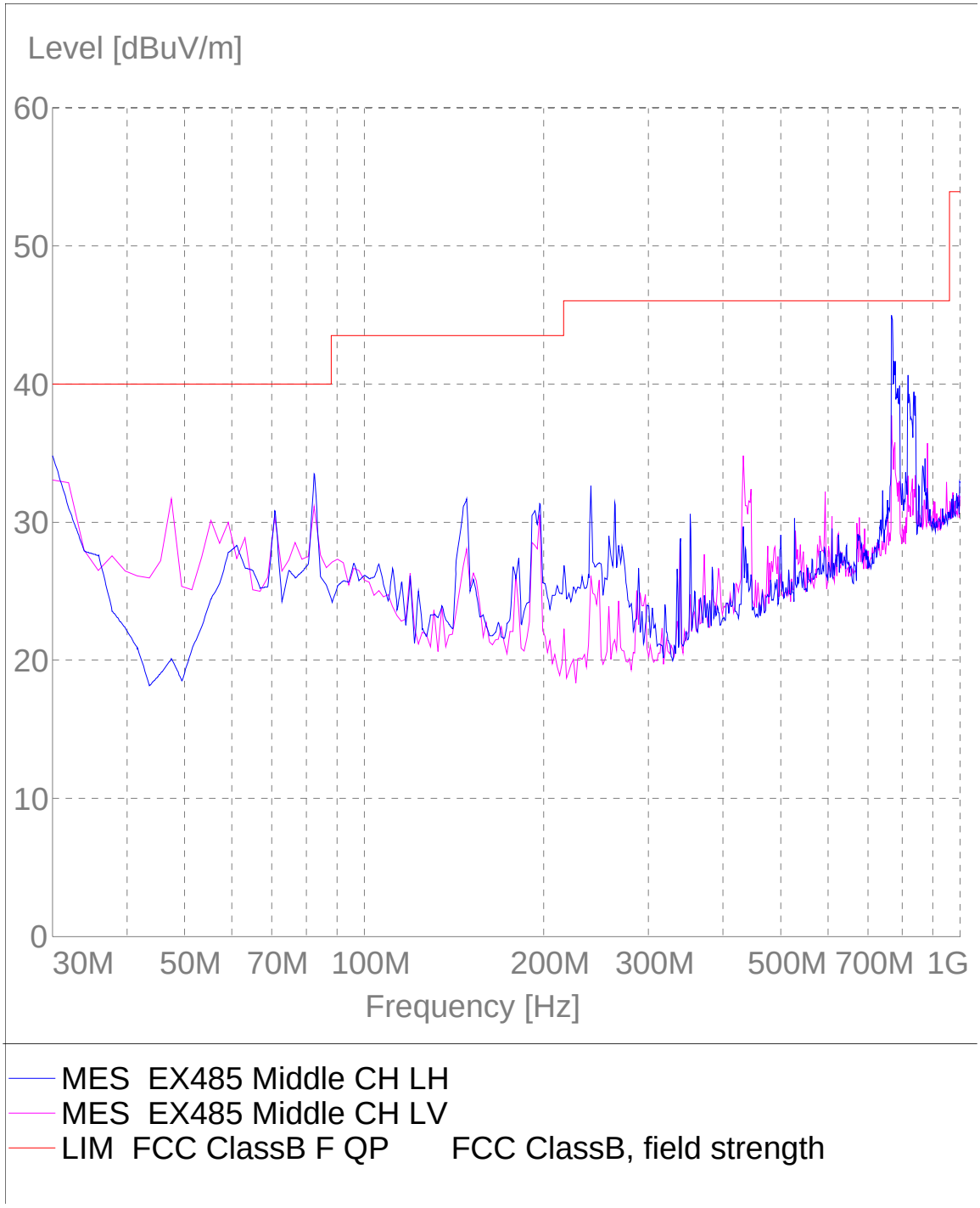
Radiated Emission

M/N:	EX845
Operating Condition:	Tx, Low CH
Test Site:	SMQ EMC Lab. SAC
Test Specification:	Horizontal & Vertical
Comment:	DC9V



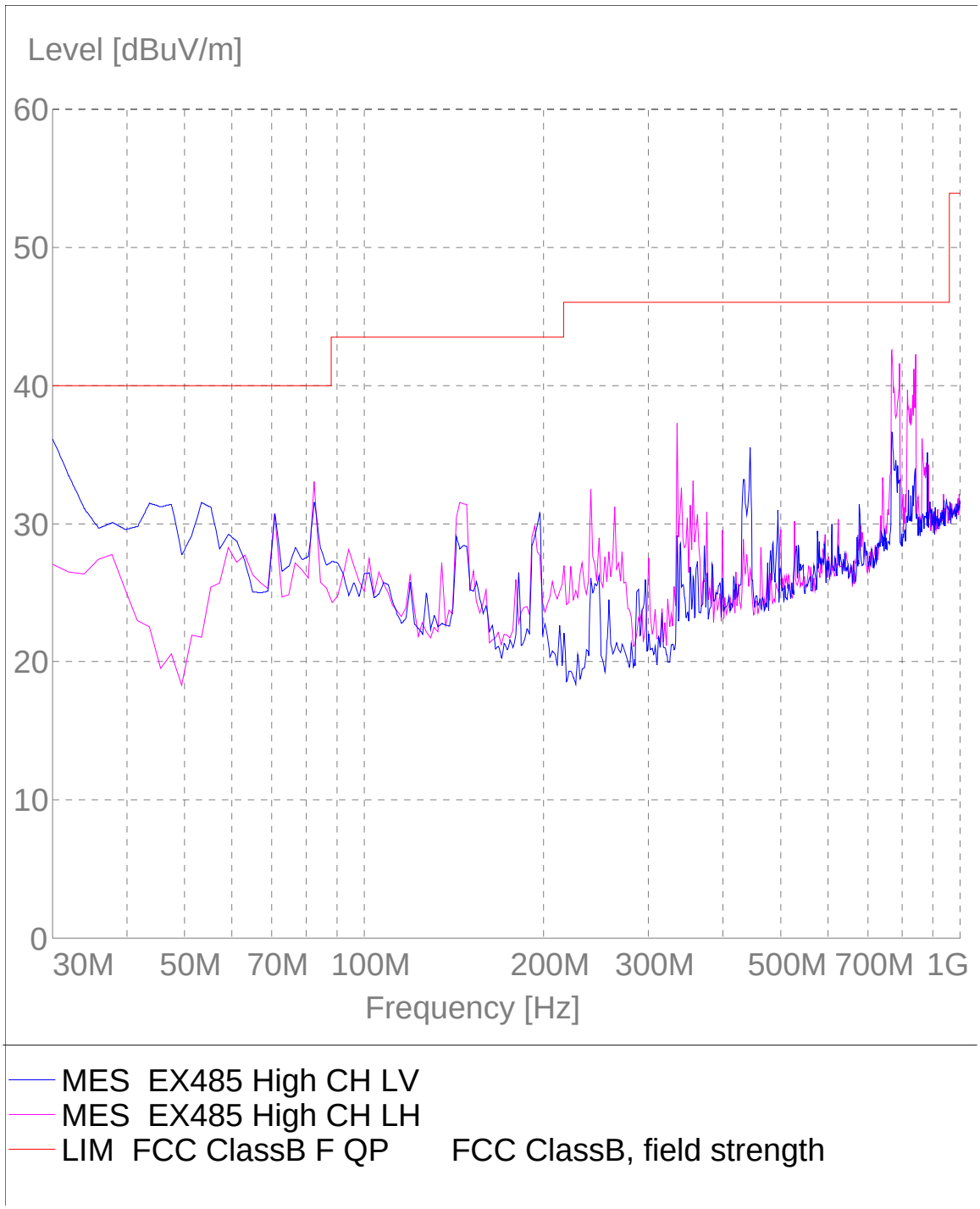
Radiated Emission

M/N:	EX845
Operating Condition:	Tx, Middle CH
Test Site:	SMQ EMC Lab. SAC
Test Specification:	Horizontal & Vertical
Comment:	DC9V



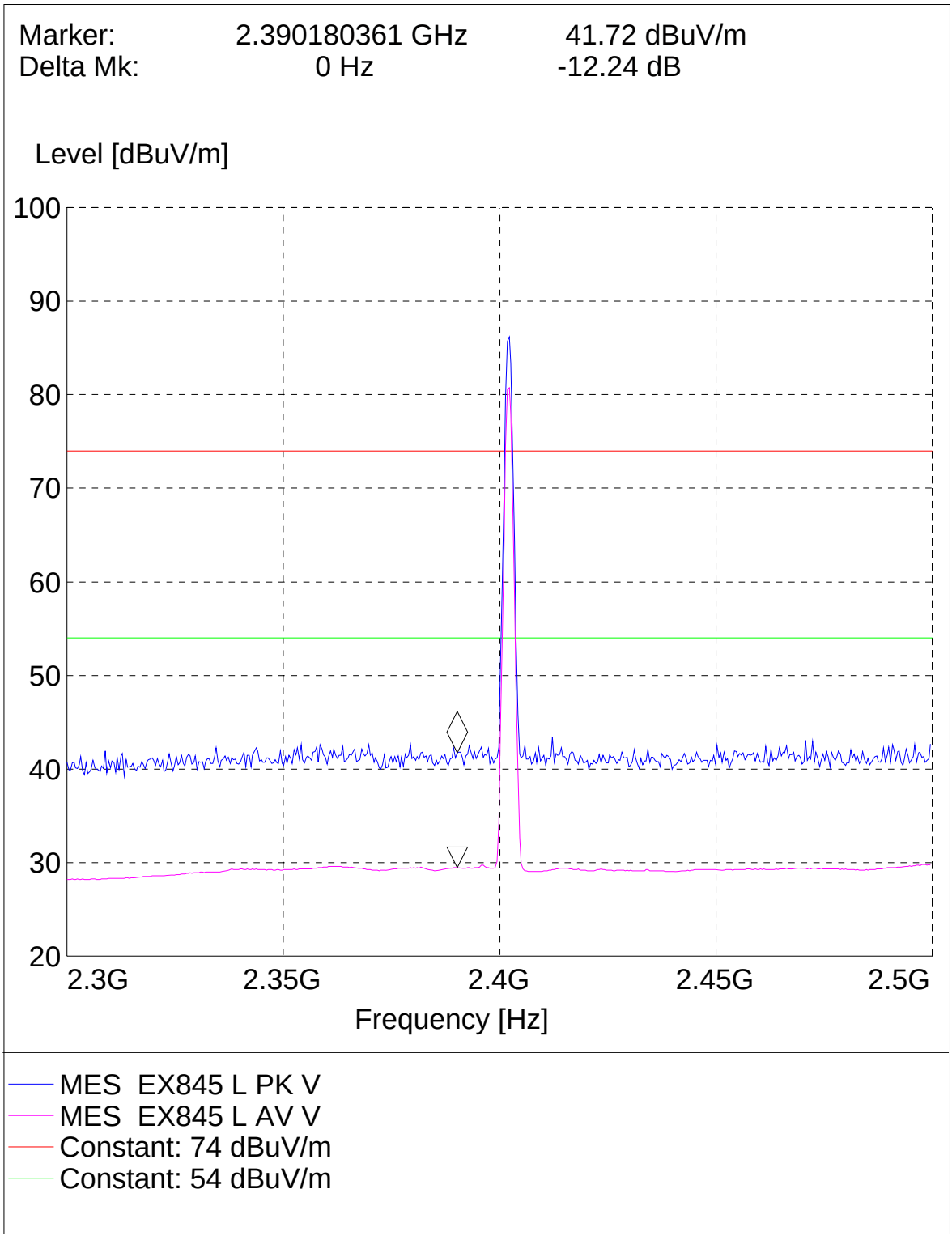
Radiated Emission

M/N:	EX845
Operating Condition:	Tx, High CH
Test Site:	SMQ EMC Lab. SAC
Test Specification:	Horizontal & Vertical
Comment:	DC9V



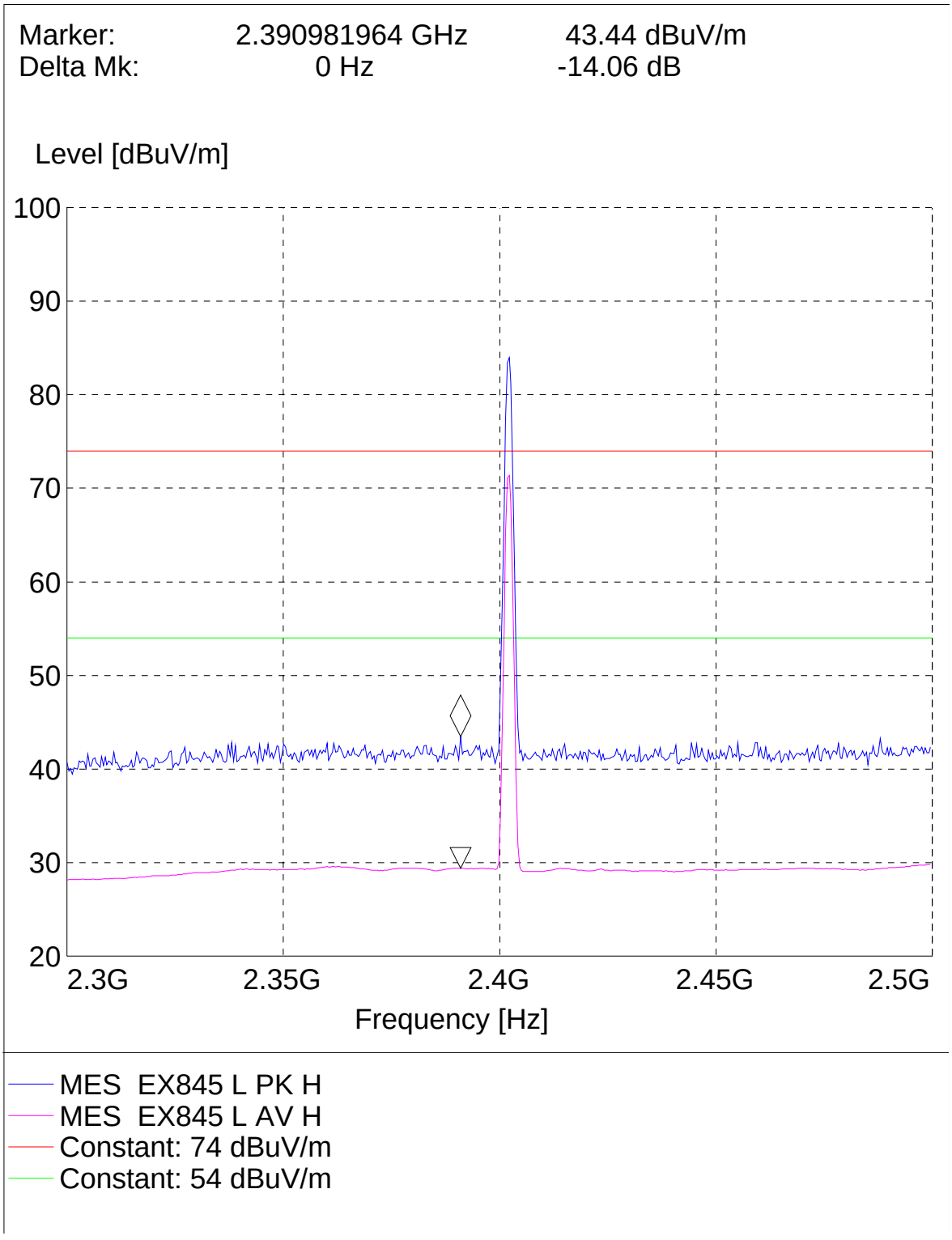
Band Edges (Low CH: 2402MHz)

Peak & Average; Vertical Polarity;



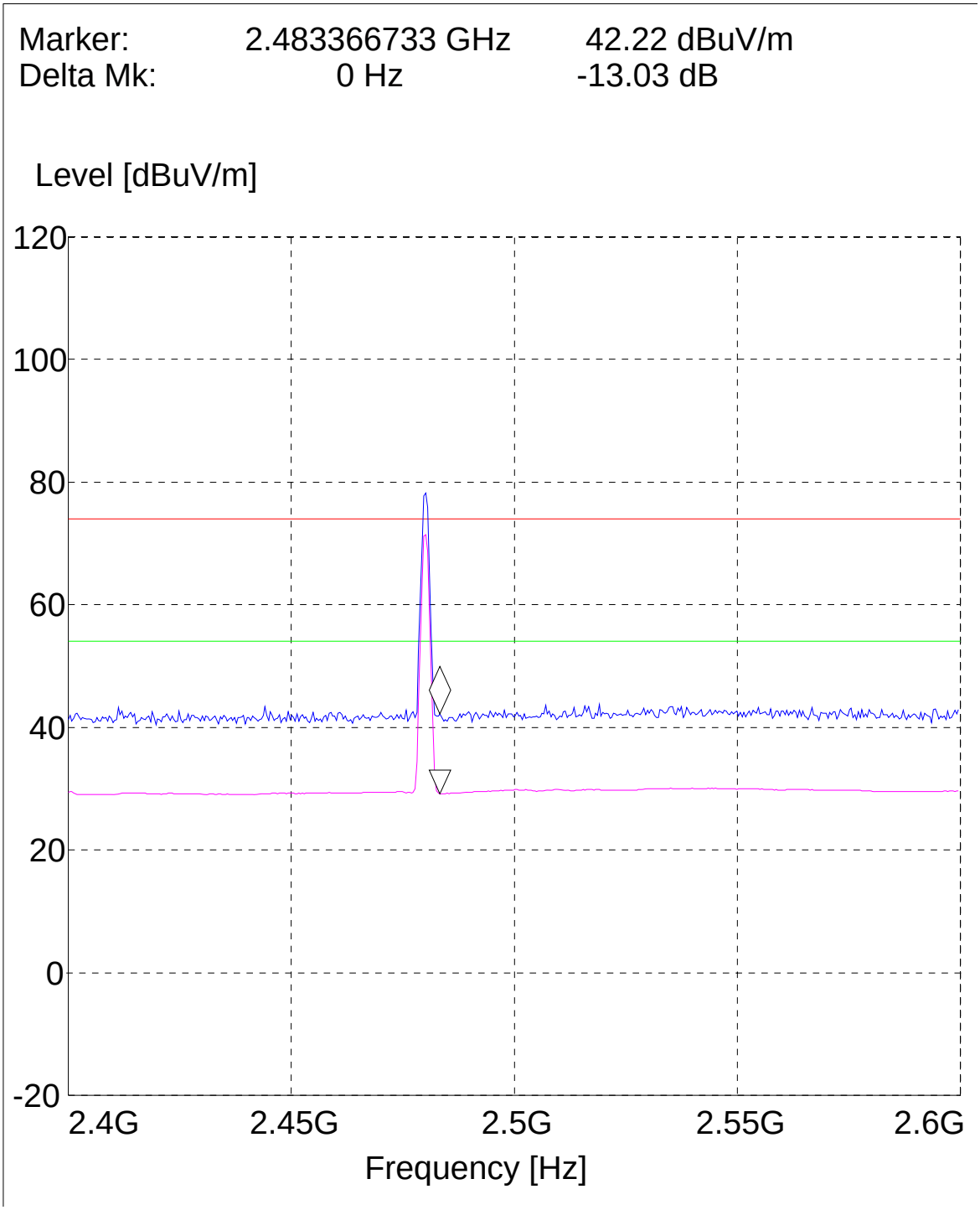
Band Edges (Low CH: 2402MHz)

Peak & Average; Horizontal Polarity;



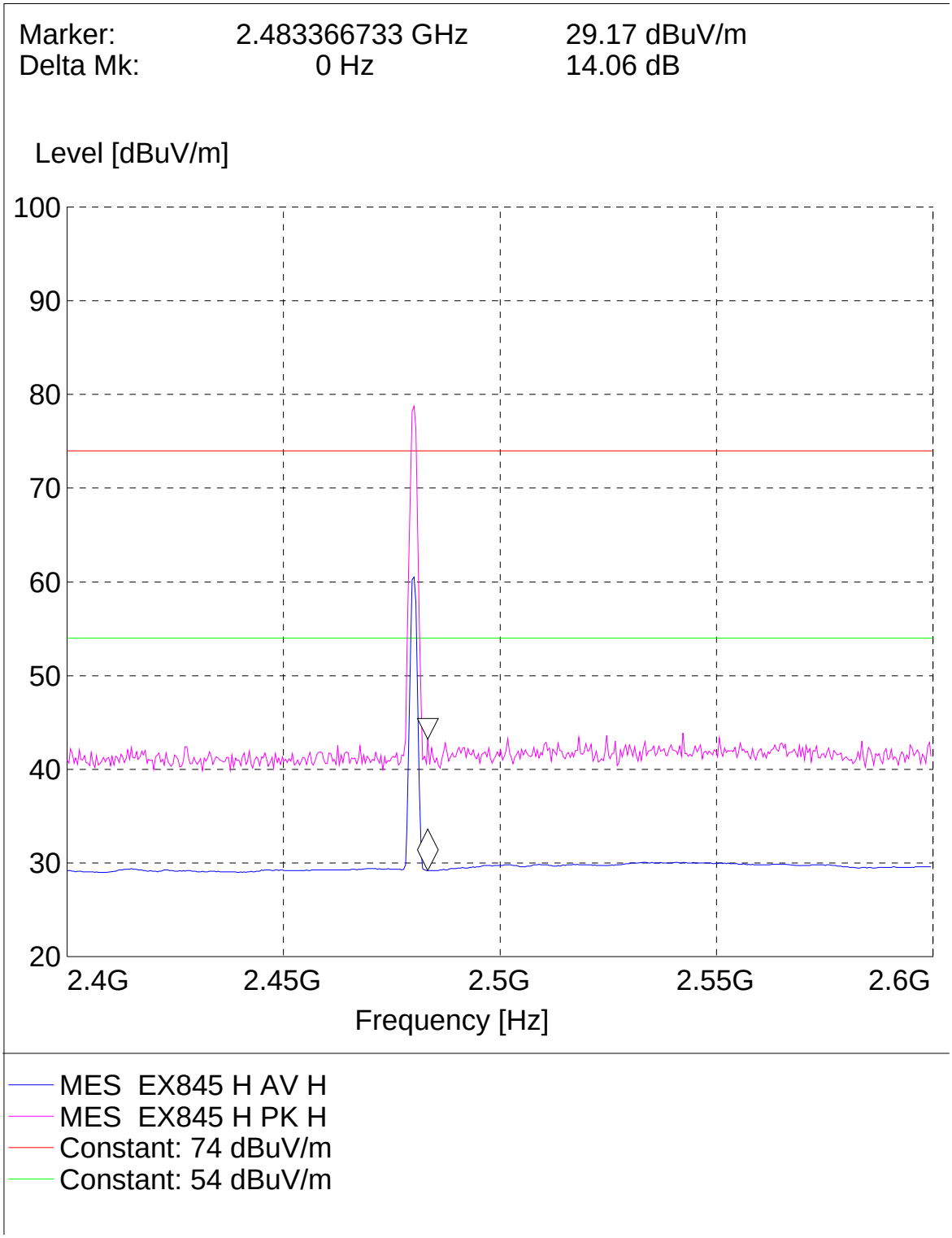
Band Edges (High CH: 2480MHz)

Peak & Average; Vertical Polarity;



Band Edges (High CH: 2480MHz)

Peak & Average; Horizontal Polarity;



8. CHANNEL SEPARATION TEST

8.1. Test Standard and Limit

8.1.1. Test Standard

FCC Part 15.247 (a) (1)

8.1.2. Limits

Frequency hopping systems shall have hoping channel carrier frequencies separated by a minimum of 25 kHz or the 20dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20dB bandwidth of the hopping channel, whichever is greater provided the systems operate with an output power no greater than 125 mW.

8.2. Test Procedure

Set the EUT in transmitting mode, spectrum Bandwidth was set at 100 kHz, max-hold the channel.

8.3. Test Data

Result: Pass

Environmental Conditions

Temperature	24 °C
Relative Humidity	50 %
ATM Pressure	100.9 kPa

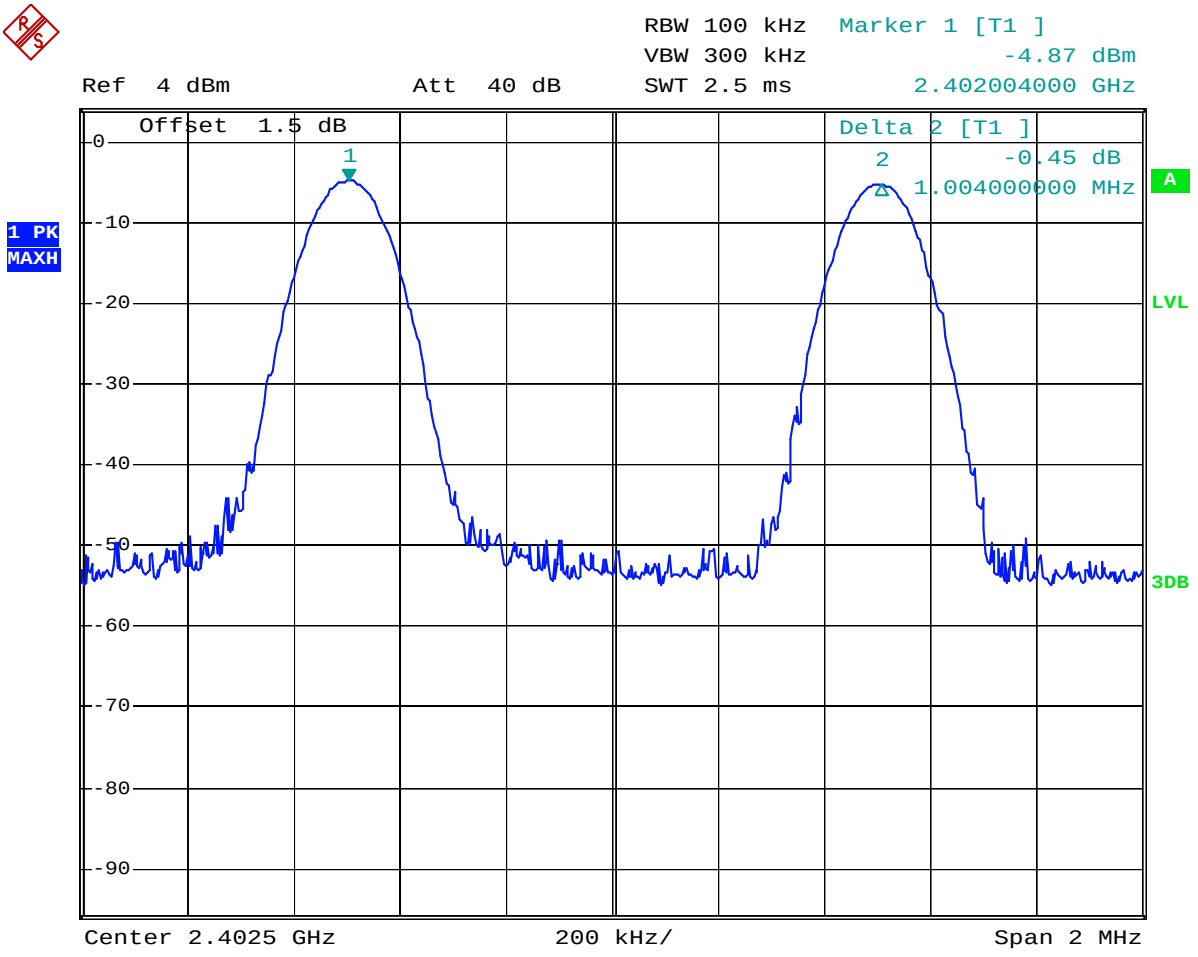
Test Mode: Transmitting

Table 10 Channel Separation Test Data

Channel	Channel Frequency (MHz)	Channel Separation (MHz)	Limit (MHz)	Result
Low Channel	2402	1.004	0.568	Pass
Adjacent Channel	2403			
Mid Channel	2441	1.008	0.565	Pass
Adjacent Channel	2442			
High Channel	2480	1.008	0.568	Pass
Adjacent Channel	2479			

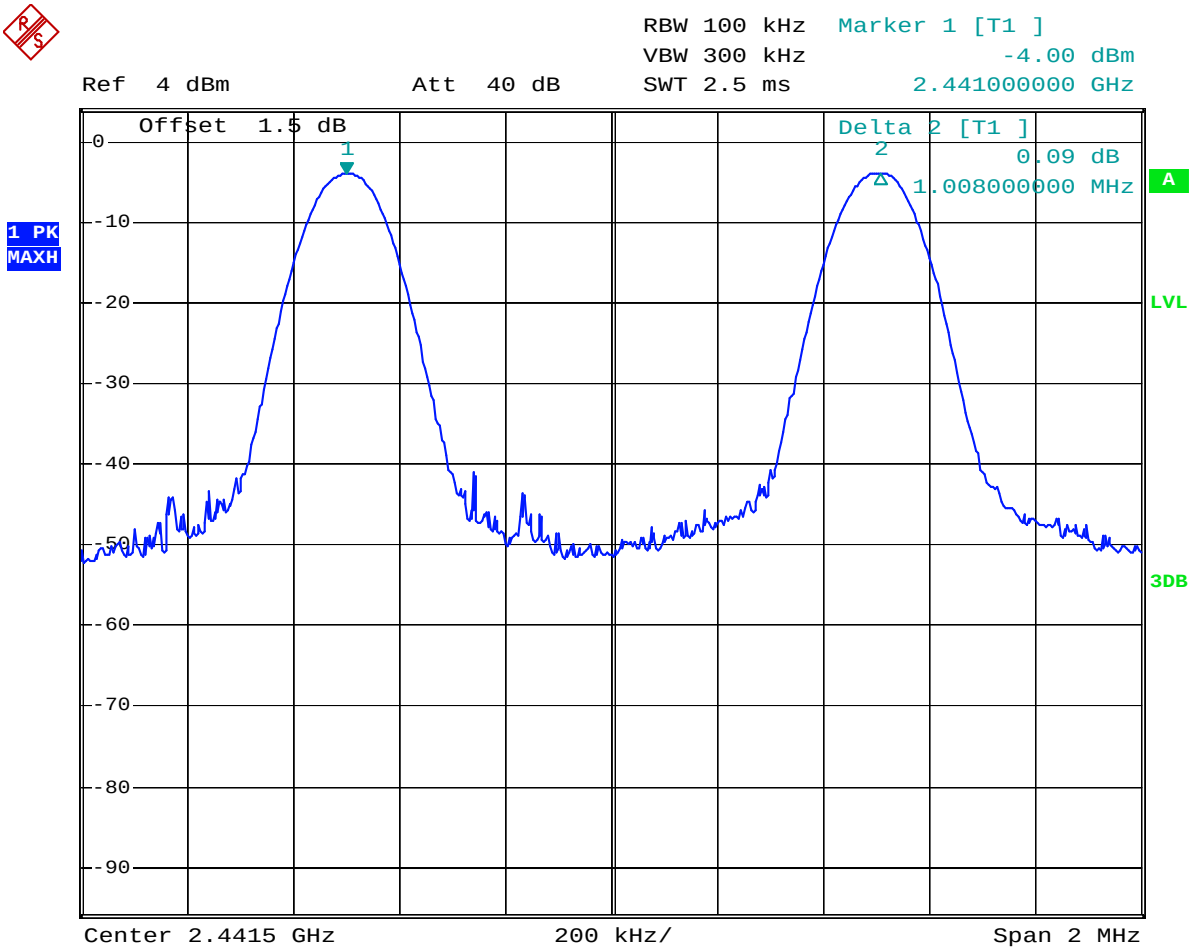
Please refer to the following plots.

Low Channel



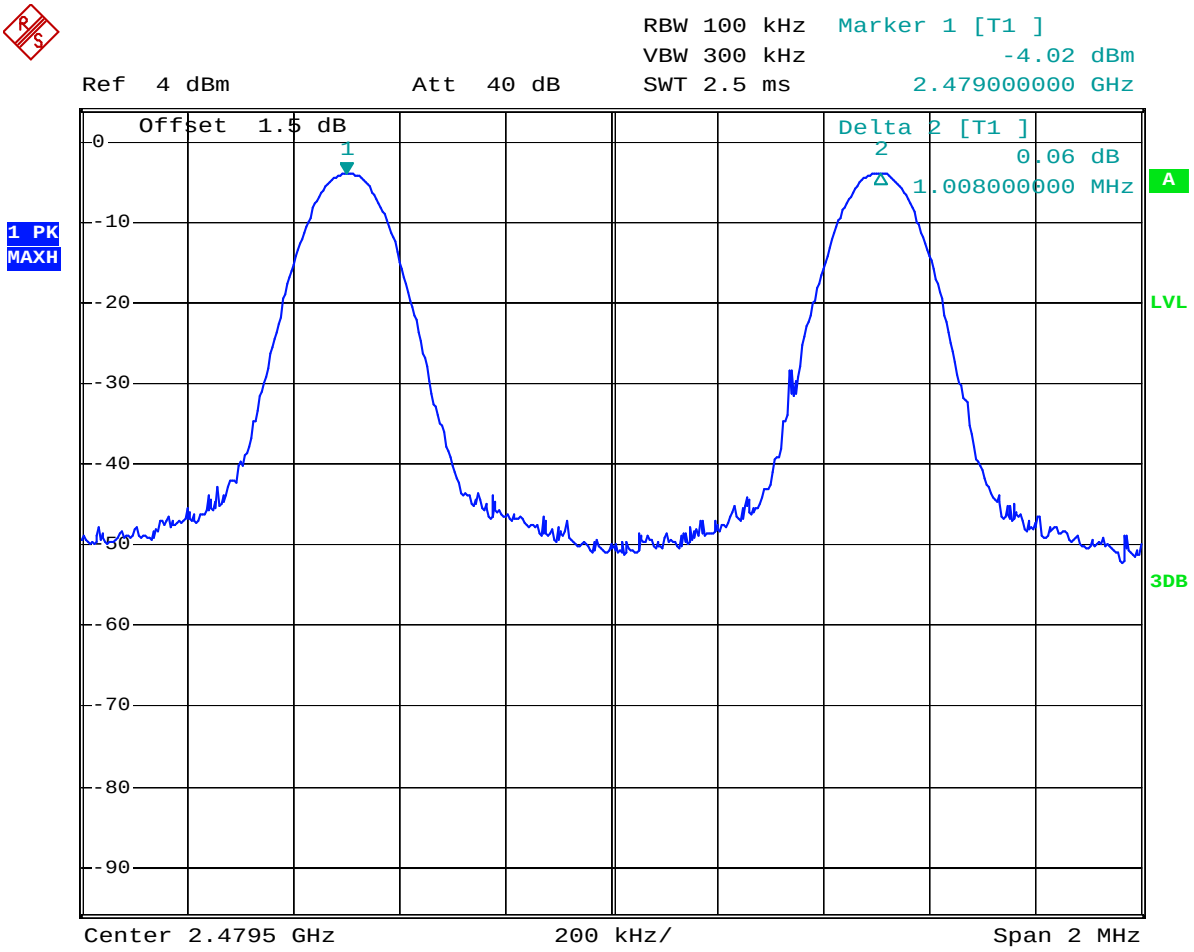
Date: 11.FEB.2010 02:51:05

Middle Channel



Date: 11.FEB.2010 03:08:21

High Channel



Date: 11.FEB.2010 03:11:16

9. 20DB BANDWIDTH TEST

9.1. Test Standard and Limit

9.1.1. Test Standard

FCC Part 15.247 (a) (1)

9.1.2. Limit

Alternatively, frequency hopping systems operating in the 2400– 2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125mW.

9.2. Test Procedure

Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.

Position the EUT without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.

Measure the frequency difference of two frequencies that were attenuated 20 dB from the reference level. Record the frequency difference as the emission bandwidth.

Repeat above procedures until all frequencies measured were complete.

9.3. Test Arrangement

The arrangement of the equipment is installed to meet the standards and operating in a manner, which tends to maximize its emission characteristics in a normal application. The detailed information refers to test plots.

9.4. Test data

Environmental Conditions

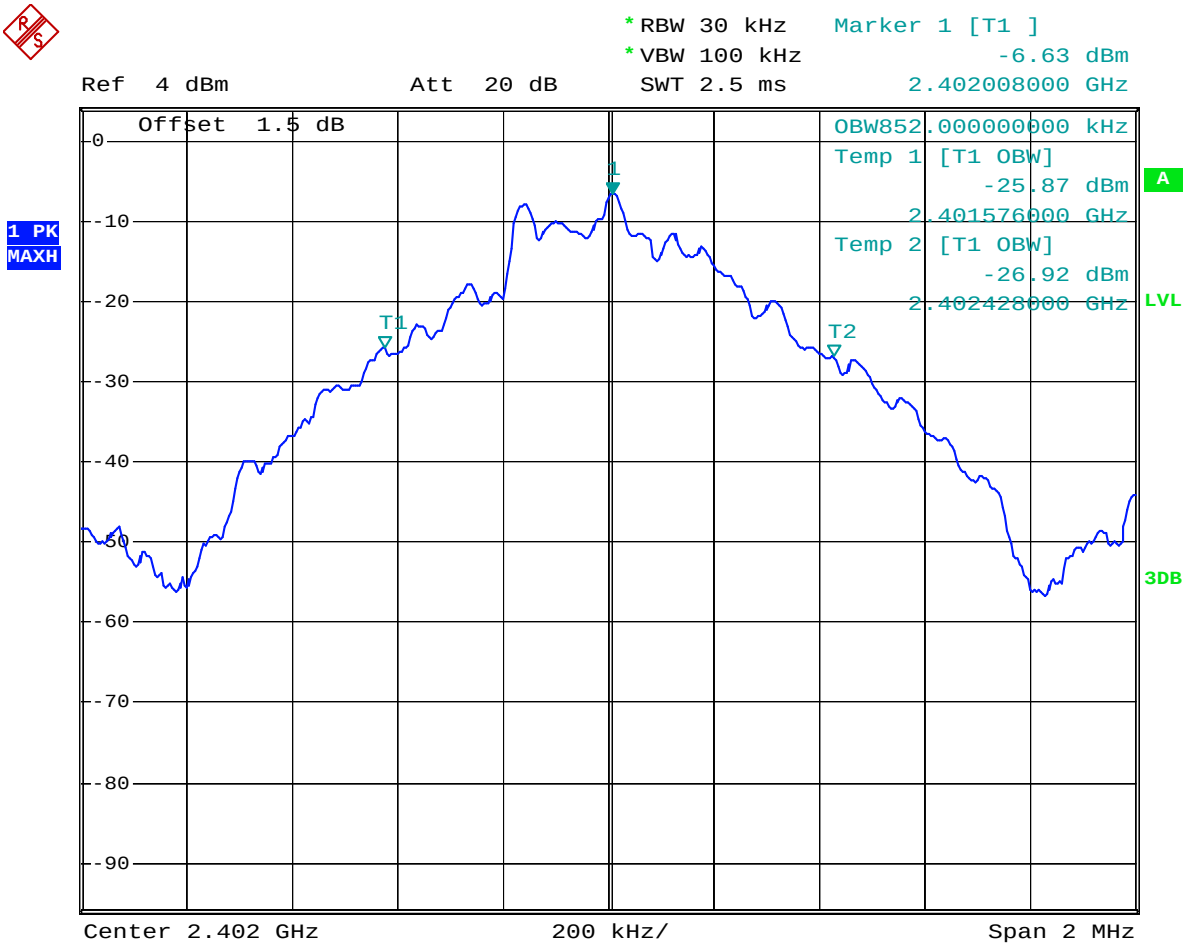
Temperature	24 °C
Relative Humidity	50 %
ATM Pressure	100.9 kPa

Test Mode: Transmitting

Table 11: 20 dB bandwidth Test Data

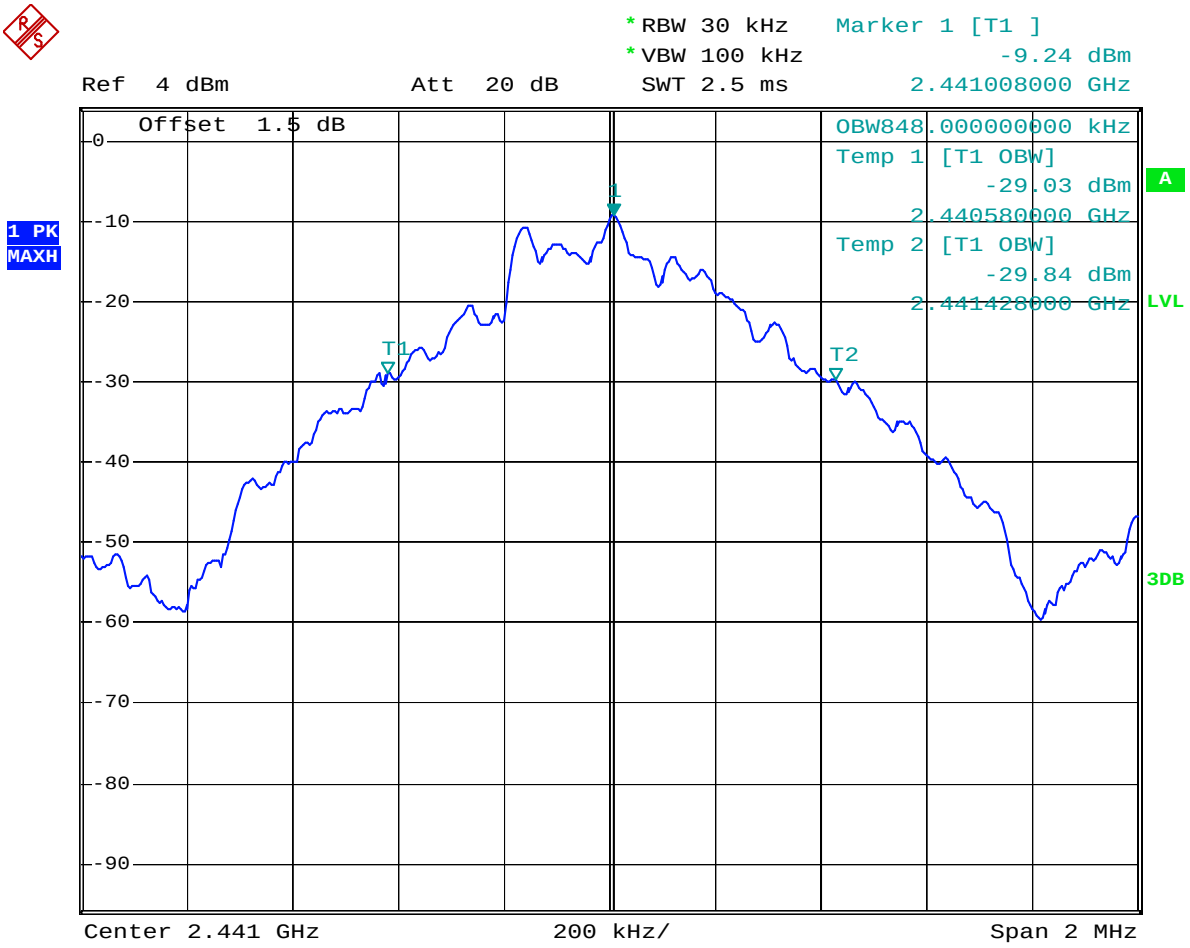
Channel	Frequency (MHz)	20dB Bandwidth (MHz)
Lower CH	2402	0.852
Middle CH	2441	0.848
Higher CH	2480	0.852

Lower Channel



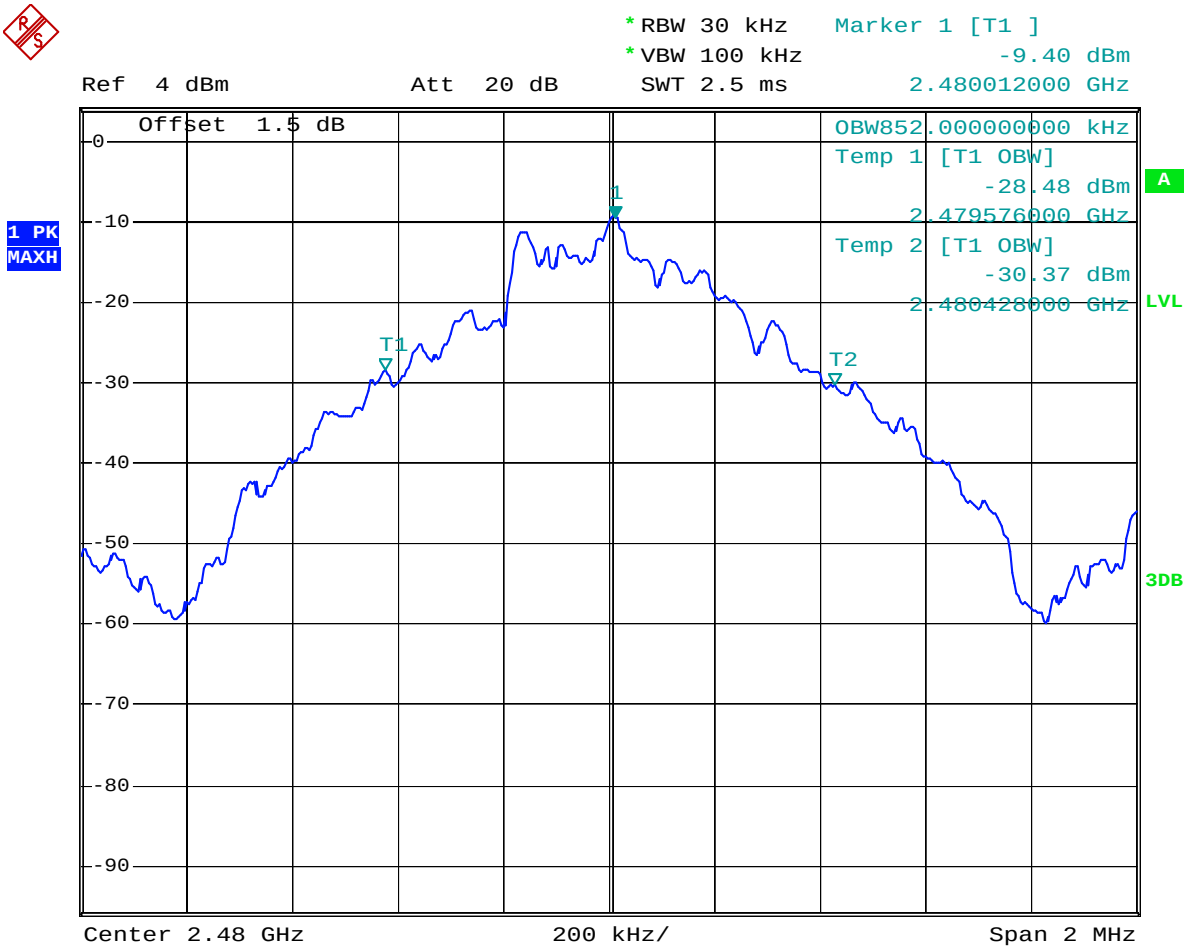
Date: 6.FEB.2010 02:18:16

Middle Channel



Date: 6.FEB.2010 02:14:40

High Channel



Date: 6.FEB.2010 02:20:00

10. QUANTITY OF HOPPING CHANNEL

10.1. Test Standard and Limit

10.1.1. Test Standard

FCC Part 15.247 (a) (1) (iii)

10.1.2. Limit

Frequency hopping systems in the 2400– 2483.5 MHz band shall use at least 15 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 may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

10.2. Test Procedure

Place the EUT on the table and set it in transmitting mode. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer. Set the EUT in transmitting mode from first channel to last.

Set spectrum analyzer Start=2400MHz, Stop = 2483.5MHz, Sweep = auto. By using the Max-Hold function record the Quantity of the channel.

10.3. Test Arrangement

The arrangement of the equipment is installed to meet the standards and operating in a manner, which tends to maximize its emission characteristics in a normal application. The detailed information refers to test plot.

10.4. Test Data

Result: Pass

Environmental Conditions

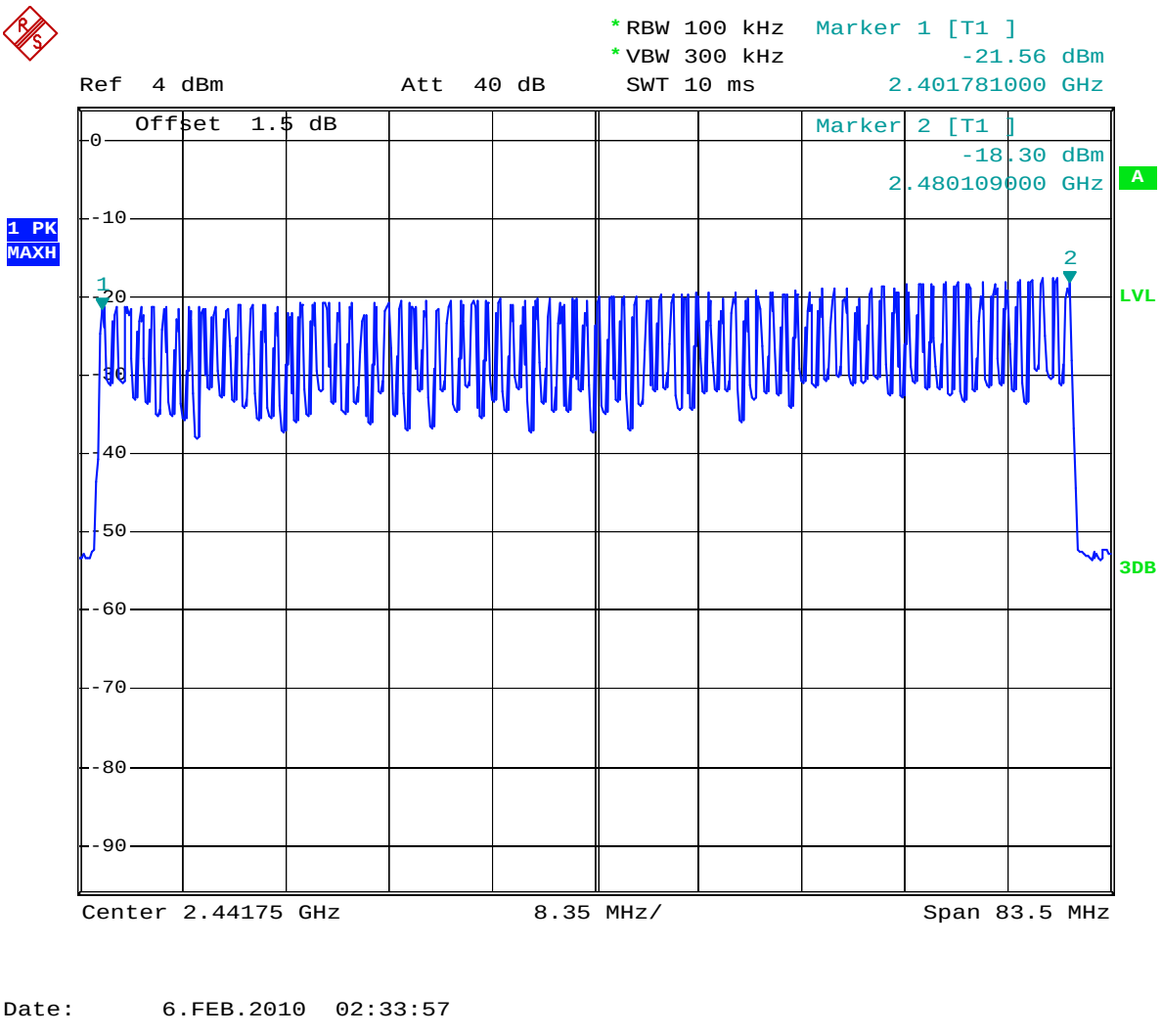
Temperature	24 °C
Relative Humidity	50 %
ATM Pressure	100.9 kPa

Test Mode: Transmitting

Table 12 Quantity of Hopping Frequency Test Data

Frequency Range (MHz)	Number of Hopping Channel	Limit
2400-2483.5	79	＞15

Test plot



11. TIME OF OCCUPANCY (DWELL TIME)

11.1. Test Standard and Limit

11.1.1. Test Standard

FCC Part 15.247 (a) (1) (iii)

11.1.2. Limit

Frequency hopping systems in the 2400– 2483.5 MHz band shall use at least 15 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 may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

11.2. Test Procedure

The EUT was worked in channel hopping; Spectrum SPAN was set as 0. Sweep was set as 0.4 * channel no. (s), the quantity of pulse was get from single sweep. In addition, the time of single pulses was tested.

11.3. Test Arrangement

The arrangement of the equipment is installed to meet the standards and operating in a manner, which tends to maximize its emission characteristics in a normal application. The detailed information refers to test plots.

11.4. Test Data

Result: Pass

Environmental Conditions

Temperature	27 °C
Relative Humidity	56 %
ATM Pressure	100.9 kPa

Test Mode: Transmitting

Middle CH

Table 13: Time of Occupancy Test Data

Test Mode	Pulse Width (ms)	Dwell Time (s)	Limit (s)
DH1	0.430	0.138	0.4
DH3	1.680	0.269	0.4
DH5	2.952	0.315	0.4

Note:

DH1: Dwell time=Pulse width (ms) * (1600/2/79) *31.6 s
DH3: Dwell time=Pulse width (ms) * (1600/4/79) *31.6 s
DH5: Dwell time=Pulse width (ms) * (1600/6/79) *31.6 s

Hop rate=1600/s

12. PEAK OUTPUT POWER

12.1. Test Standard and Limit

12.1.1. Test Standard

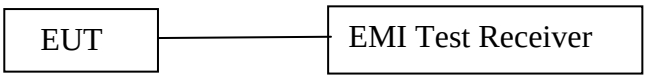
FCC Part 15.247 (b) (1)

12.1.2. Limit

According to §15.247(b) (1), for frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt; for all other frequency hopping systems in the 2400– 2483.5 MHz band: 0.125 watts.

12.2. Test Procedure

Place the EUT on a bench and set it in transmitting mode.
Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to an EMI Test Receiver.
Set the EUT transmitting continuously to each of low, middle, and high frequency.
Add a correction factor to the display.



12.3. Test Arrangement

The arrangement of the equipment is installed to meet the standards and operating in a manner, which tends to maximize its emission characteristics in a normal application. The detailed information refers to test plots.

12.4. Test Data

Result: Pass

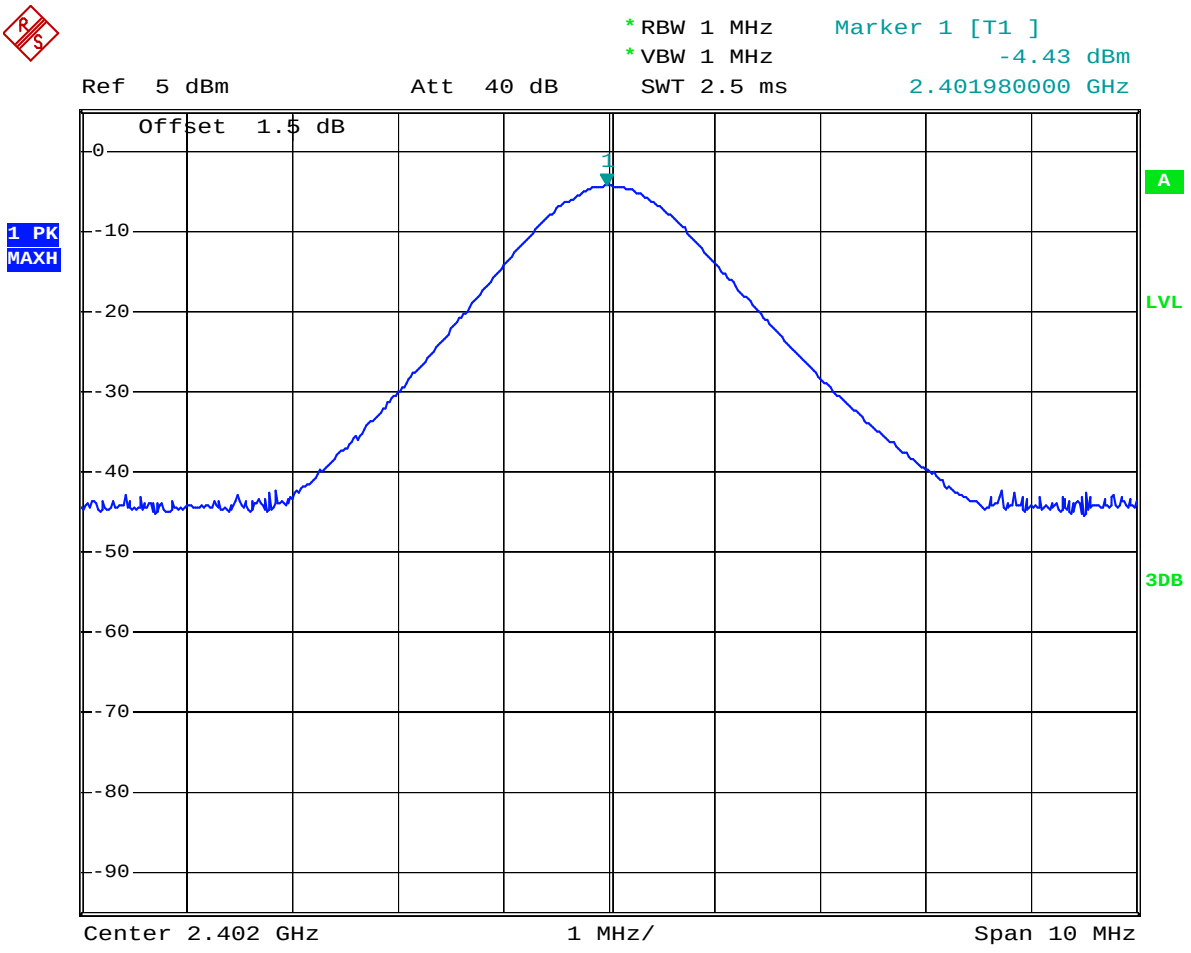
Environmental Conditions

Temperature	27 °C
Relative Humidity	56 %
ATM Pressure	100.9 kPa

Table 14: Peak Output Power Test Data

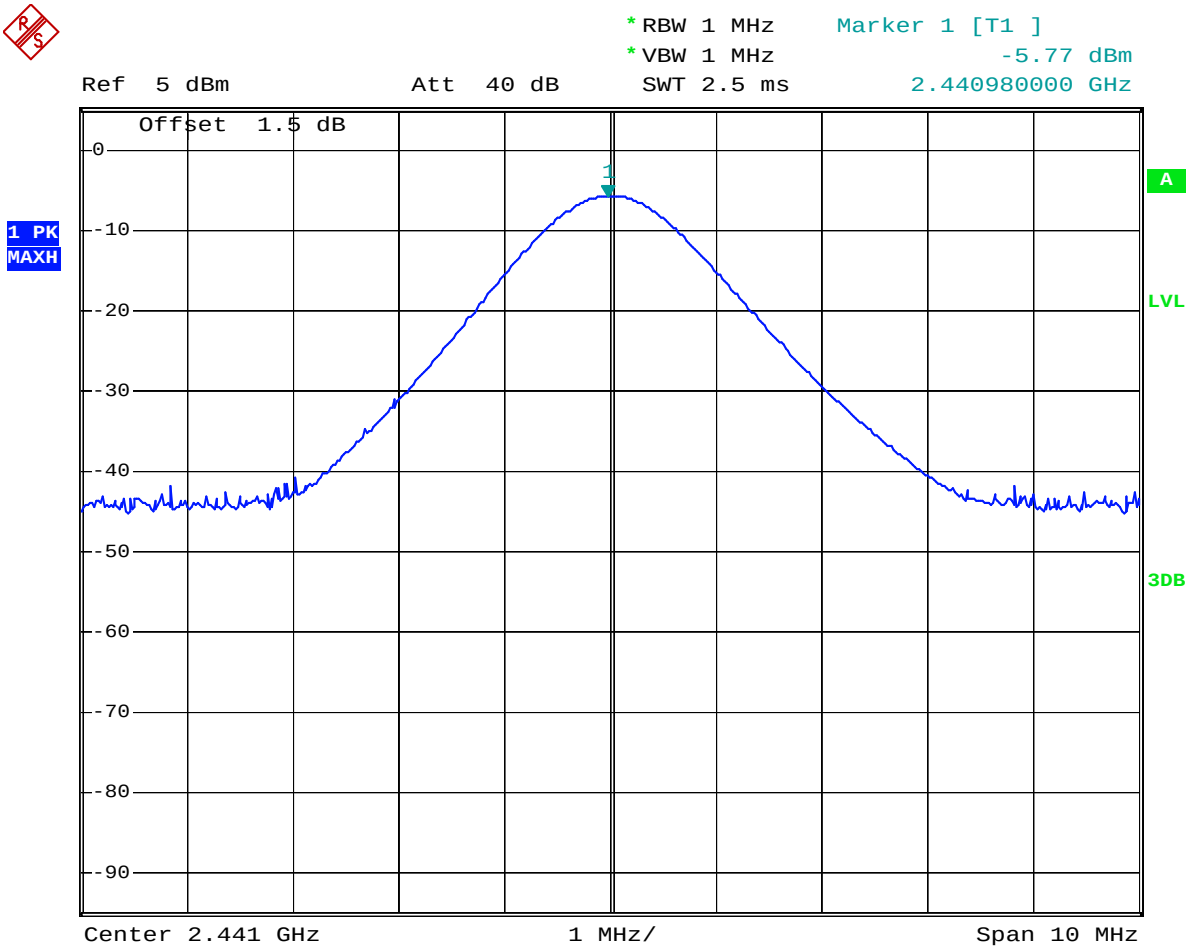
Channel	Frequency (MHz)	Peak Output Power		Limit (mW)	Results
		(dBm)	(mW)		
Lower Channel	2402	-4.43	0.36	125	Pass
Middle Channel	2441	-5.77	0.26	125	Pass
Higher Channel	2480	-5.35	0.29	125	Pass

Low CH



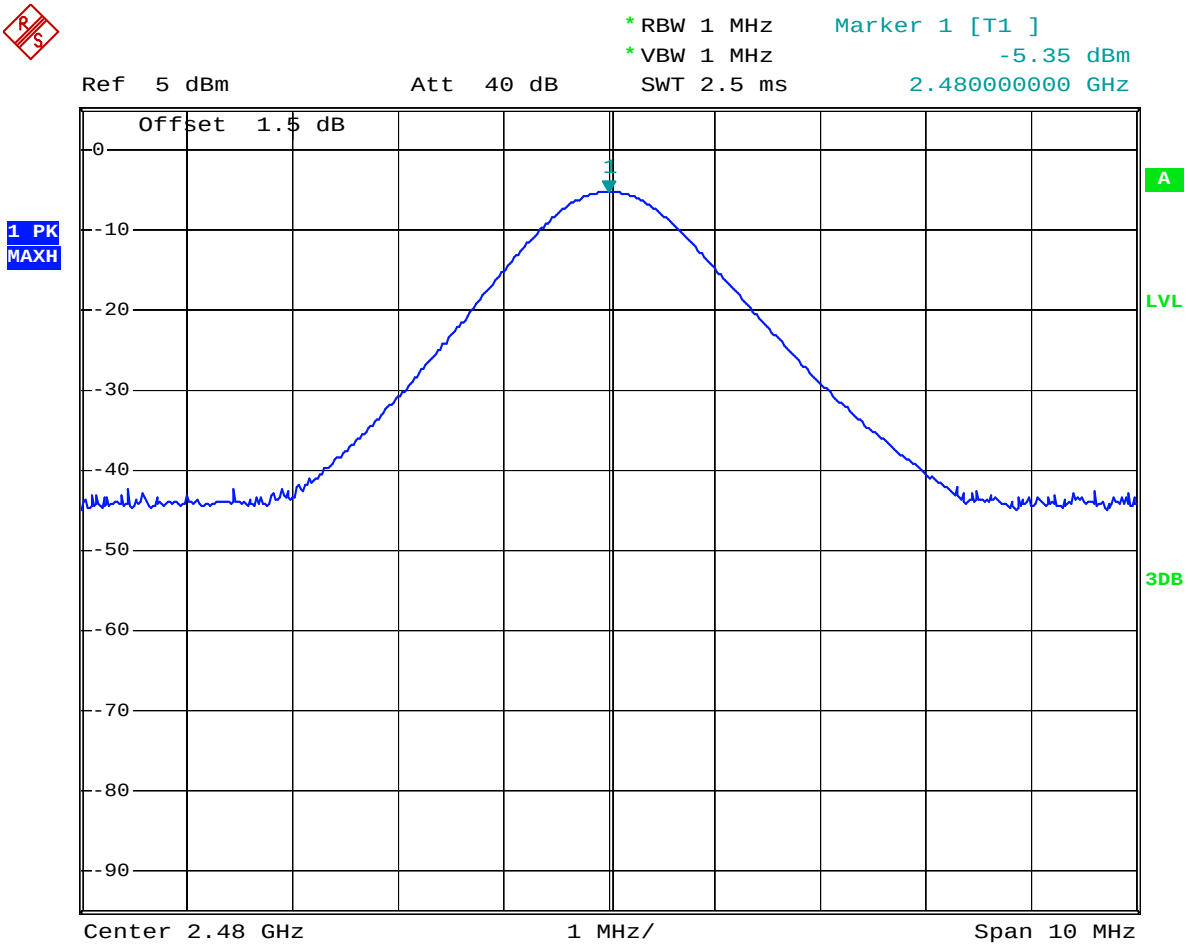
Date: 5.FEB.2010 07:42:28

Middle CH



Date: 5.FEB.2010 07:40:58

High CH



Date: 5.FEB.2010 07:39:59

13. 100KHZ BANDWIDTH OF BAND EDGES

13.1.Test Standard and Limit

13.1.1.Test Standard

FCC Part 15.247 (d)

13.1.2.Limit

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, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a).

13.2.Test Procedure

Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.

Put EUT on the non-metal table and make it operate in transmitting mode. Then set it to Low Channel and High Channel within its operating range, and make sure the instrument is operated in its linear range.

Set both RBW and VBW of spectrum analyzer to 100 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.

Measure the highest amplitude appearing on spectral display. Plot the graph with marking the highest point and edge frequency.

13.3.Test Arrangement

The arrangement of the equipment is installed to meet the standards and operating in a manner, which tends to maximize its emission characteristics in a normal application. The detailed information refers to test plots.

13.4.Test Data

Result: Pass

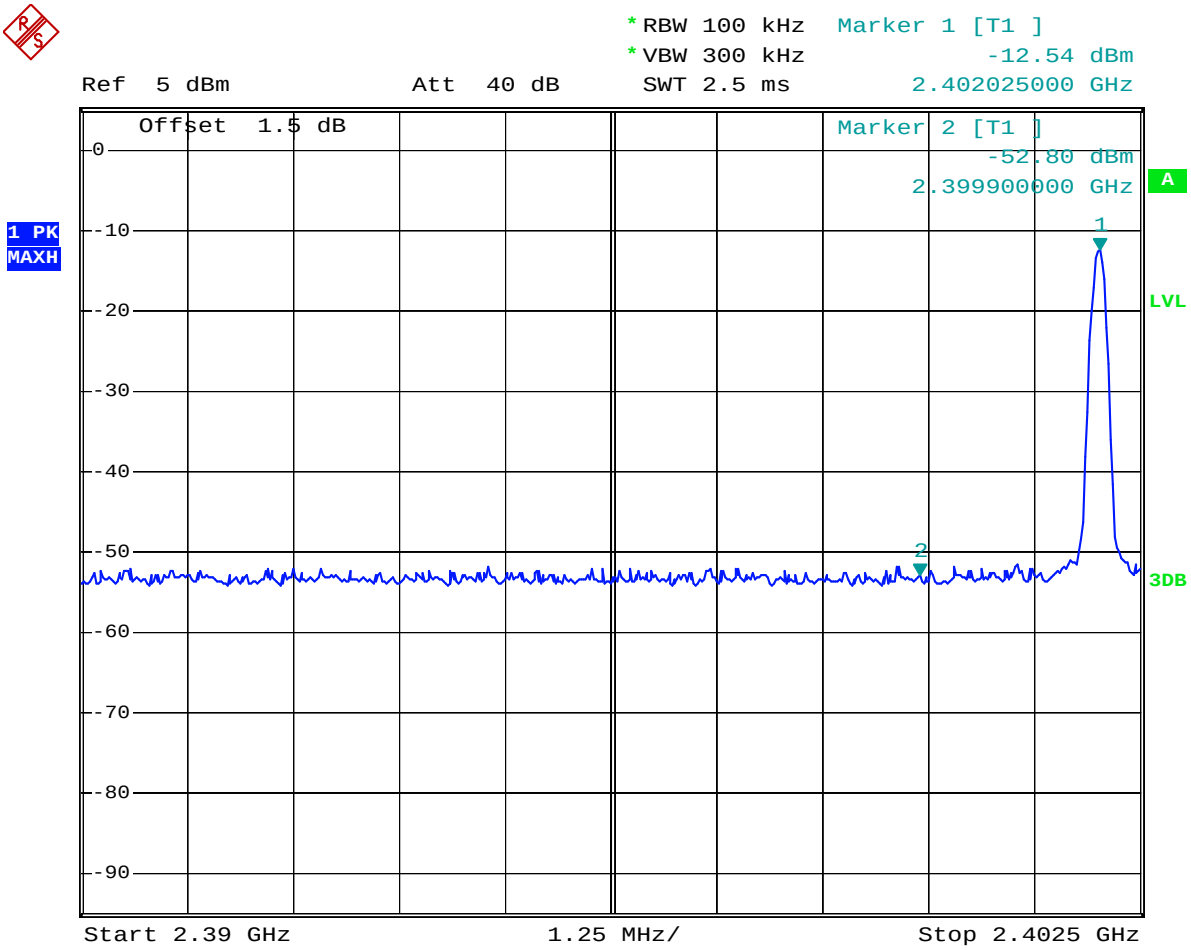
Please refer to the test plots.

Environmental Conditions

Temperature	27 °C
Relative Humidity	56 %
ATM Pressure	100.9 kPa

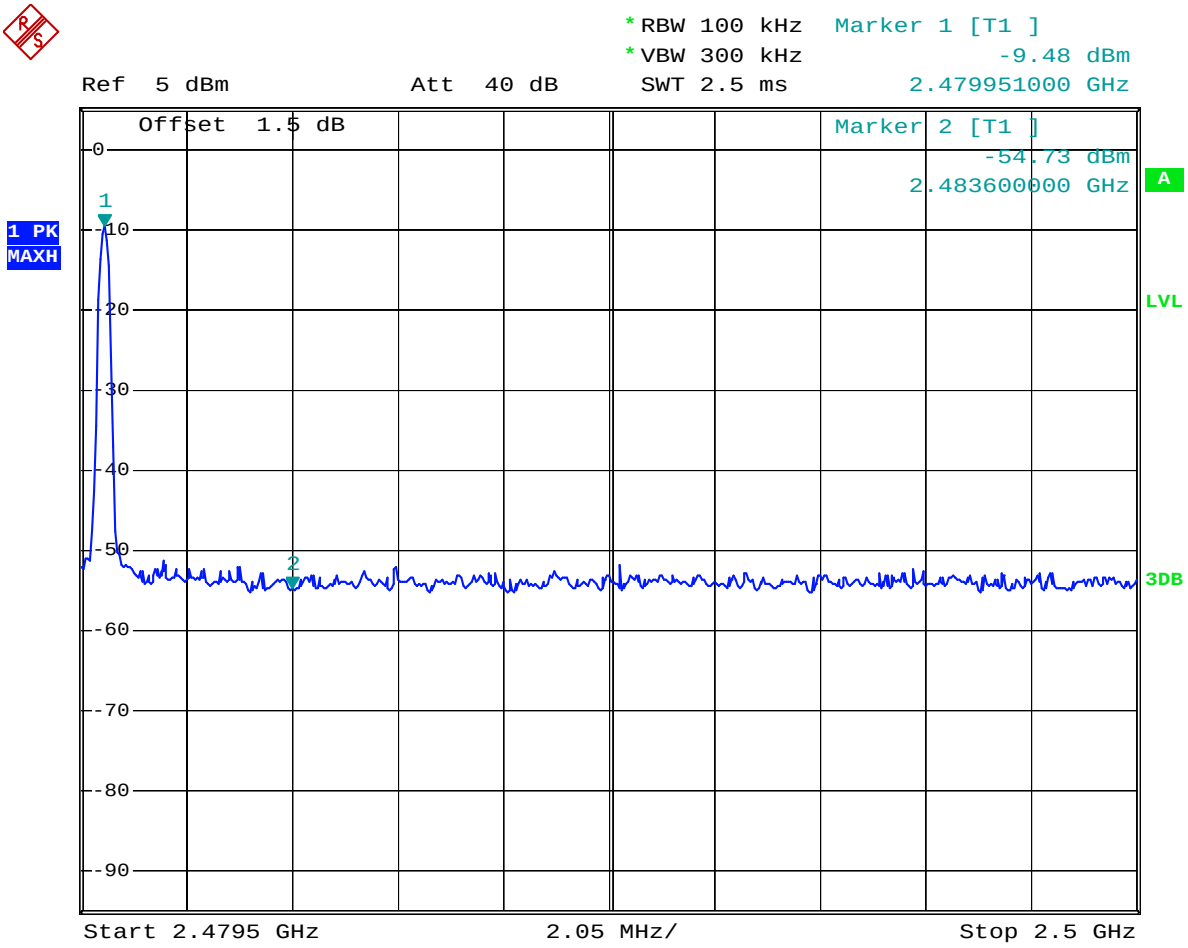
Test Mode: Transmitting

Band Edge: Left Side



Date: 5.FEB.2010 07:55:33

Band Edge: Right Side



Date: 5.FEB.2010 08:00:30

APPENDIX I TEST PHOTOS

Photo 1 Front of Radiated Disturbance Test (Below 1GHz)

Photo 2 Rear of Radiated Disturbance Test (Below 1GHz)

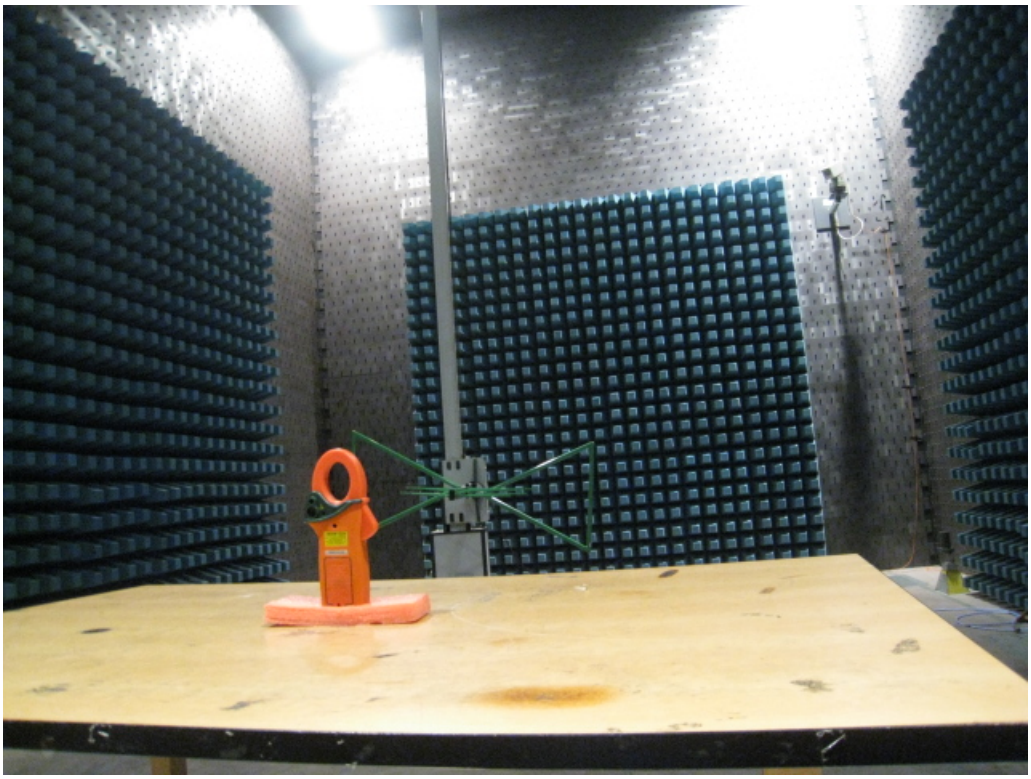


Photo 3 Front of Radiated Disturbance Test (Above 1GHz)

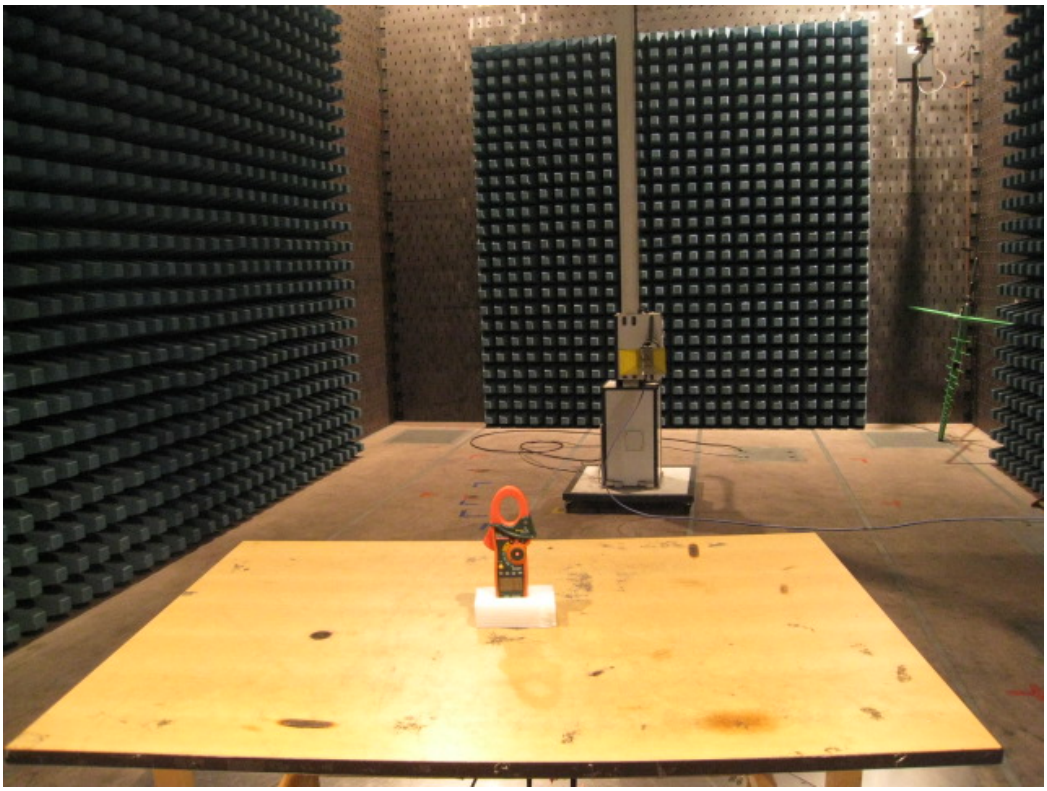
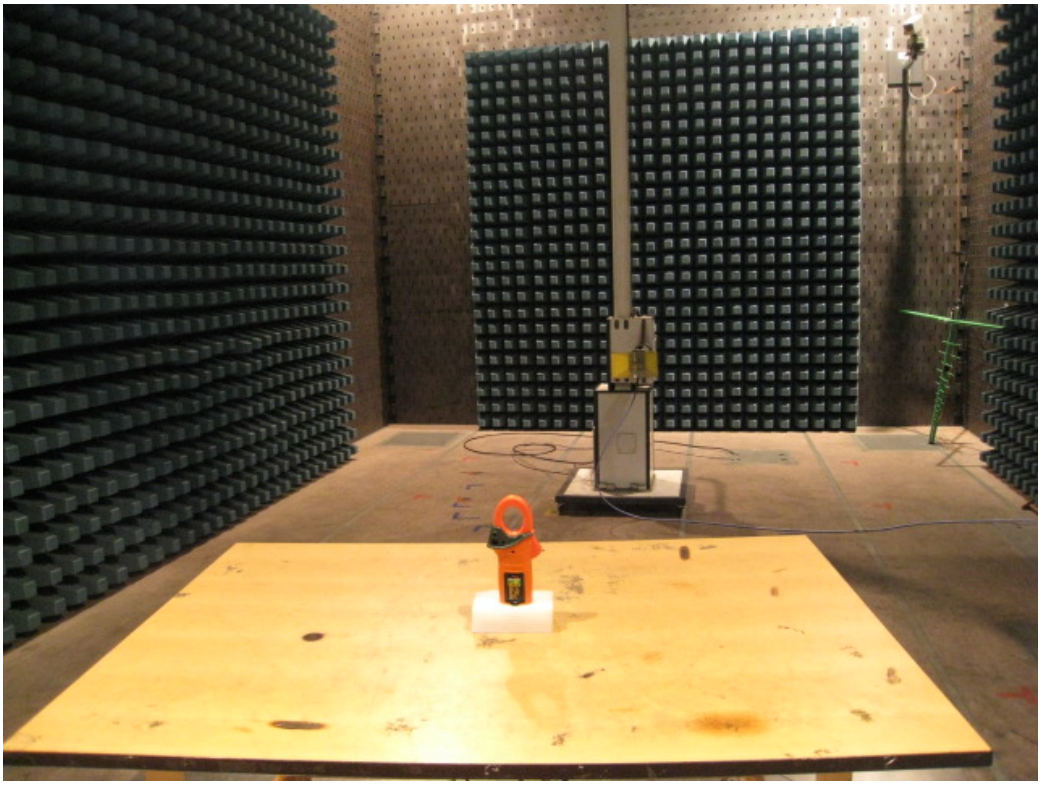


Photo 4 Rear of Radiated Disturbance Test (Above 1GHz)



APPENDIX II EUT Photo (EXTERNAL)

Photo 1 Appearance of EUT

Photo 2 Appearance of EUT

APPENDIX III EUT Photo (Internal)

Photo 1 Inside of EUT (with RF module and antenna)

Photo 2 Bluetooth Module (top)

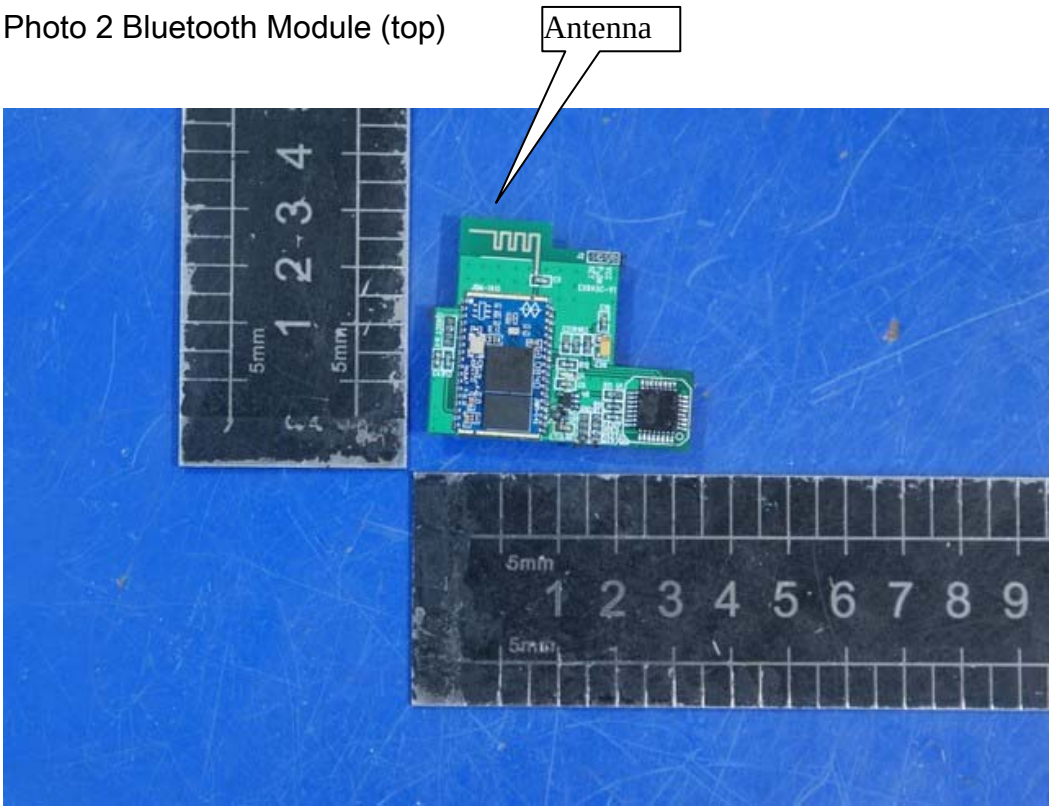


Photo 3 Bluetooth Module (bottom)

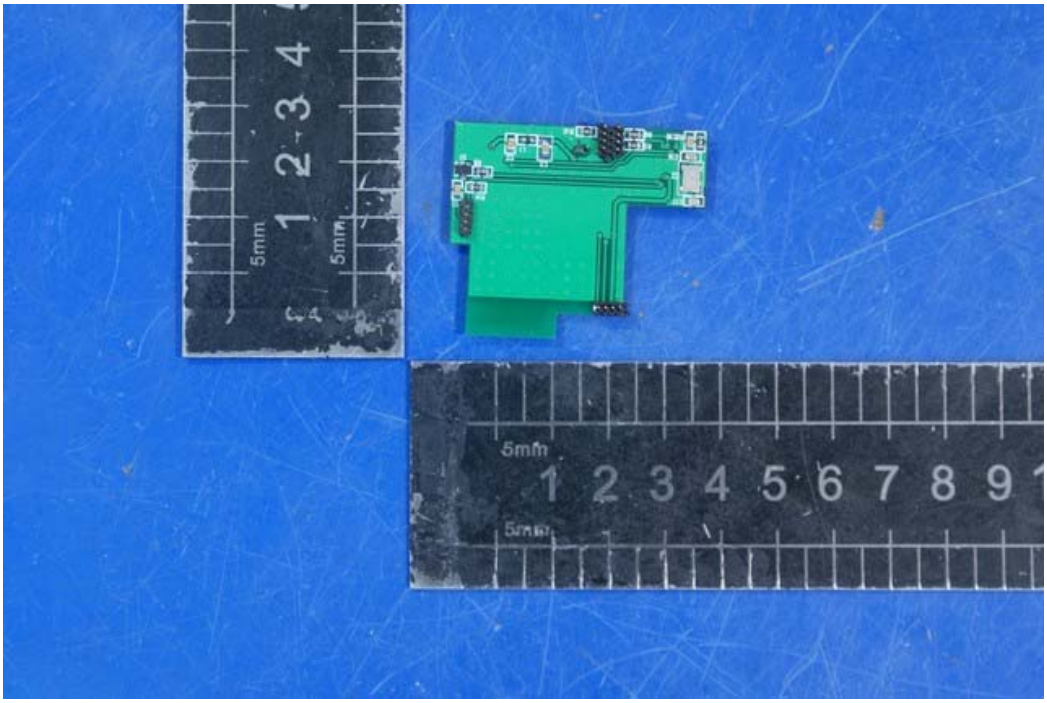


Photo 4 Inside of EUT

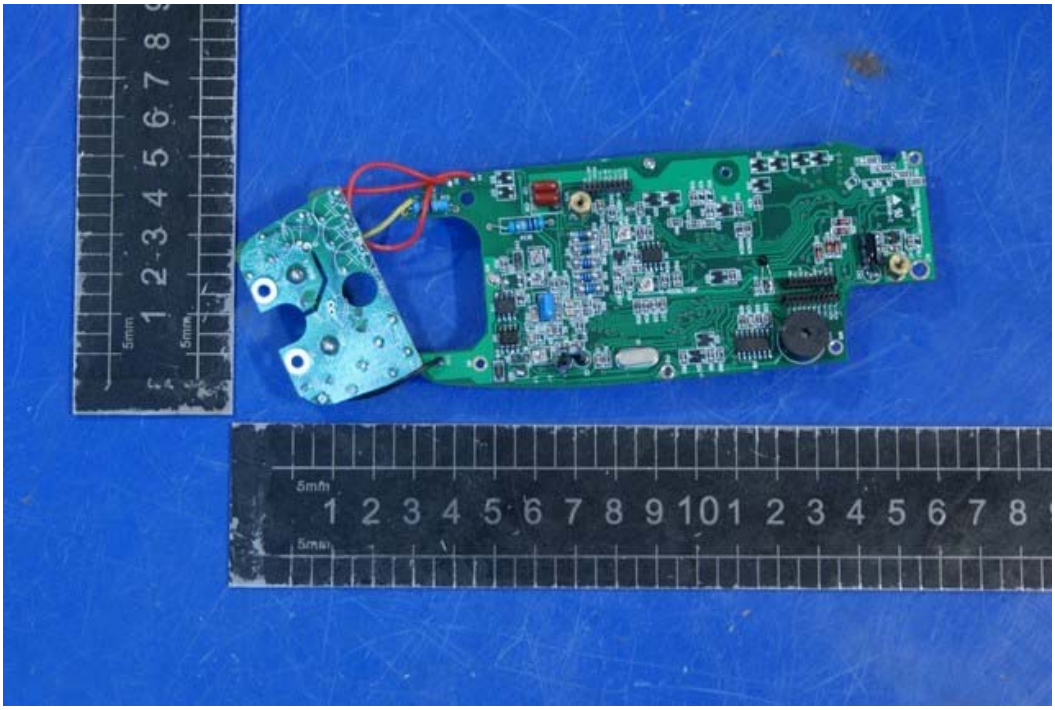


Photo 5 Inside of EUT

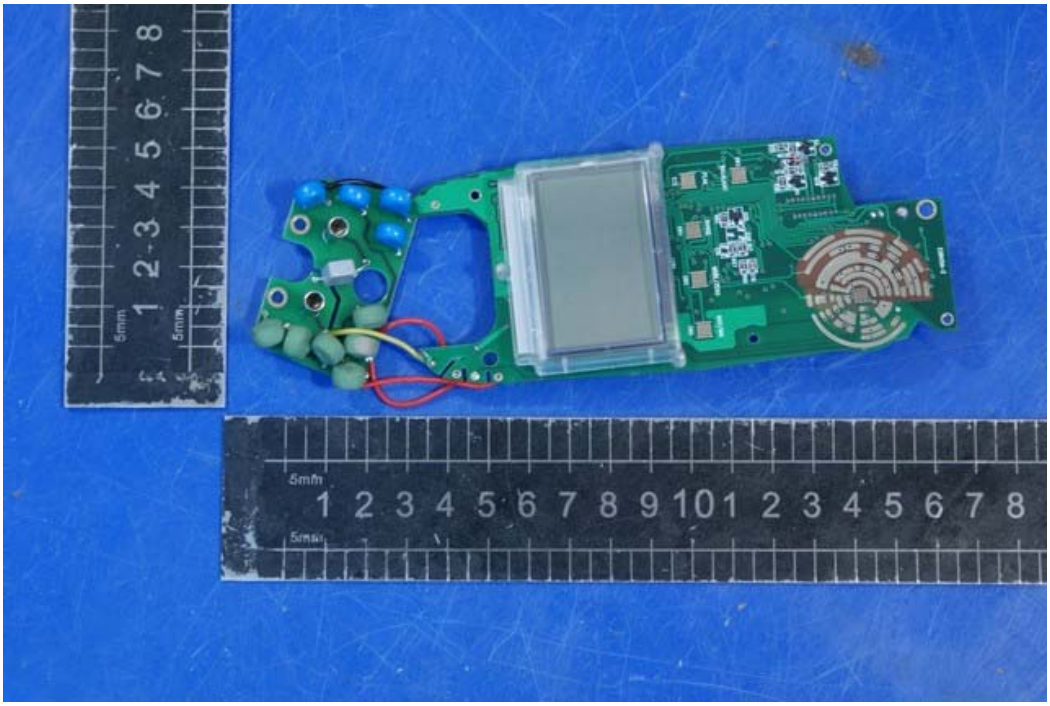


Photo 6 Inside of EUT

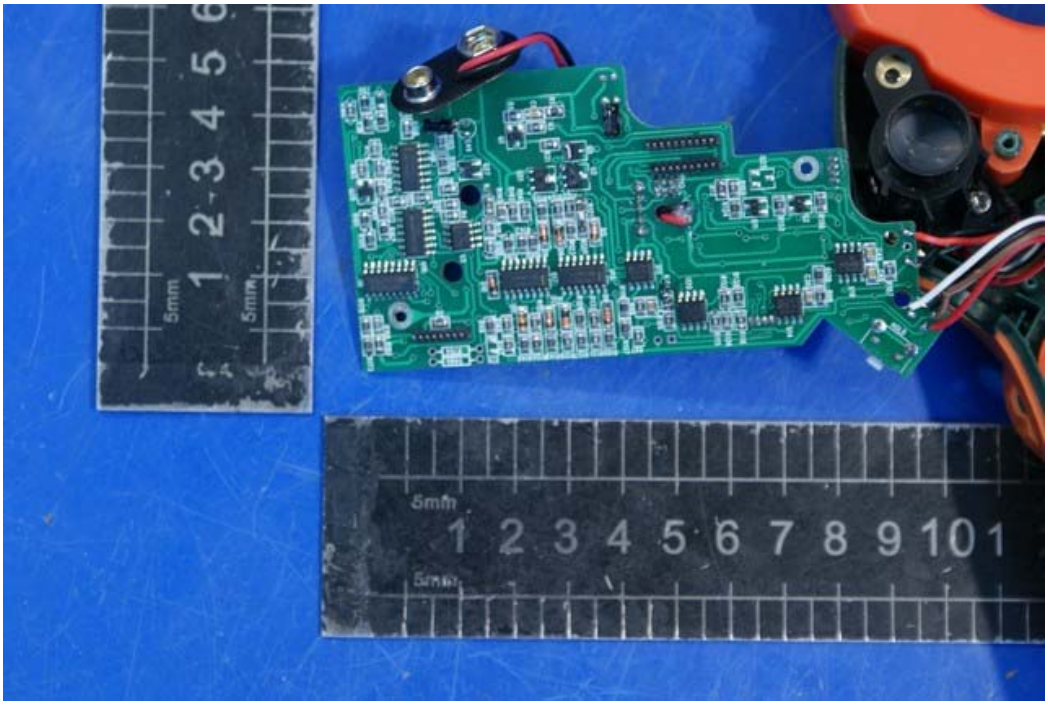


Photo 7 Inside of EUT