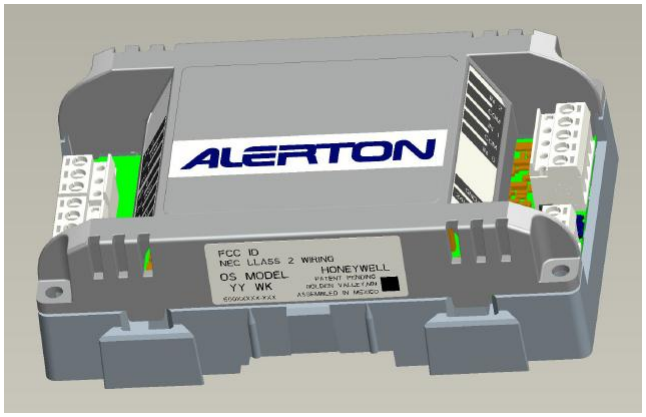
Prüfbericht-Nr.: *Test Report No.*:	**16803235 001**	**Auftrags-Nr.:** *Order No.*:	**1140012318**	Seite 1 von 59 *Page 1 of 59*
Kunden-Referenz-Nr.: *Client Reference No.*:	**403898**	**Auftragsdatum:** *Order date*:	**2014-03-25**	
Auftraggeber: *Client*:	**Honeywell International Inc.** *1985 Douglas Drive, Golden Valley, Minnesota 55422, United States*			
Prüfgegenstand: *Test item*:	**Geopoint Wireless I/O**			
Bezeichnung / Typ-Nr.: *Identification / Type No.*:	**GP-IO-332, GP-IO-332-E**			
Auftrags-Inhalt: *Order content*:	**FCC certificate**			
Prüfgrundlage: *Test specification*:	**FCC Part 15 Subpart C Section 15.207** **FCC Part 15 Subpart C Section 15.209** **FCC Part 15 Subpart C Section 15.247**			
Wareneingangsdatum: *Date of receipt*:	**2014-03-25**			
Prüfmuster-Nr.: *Test sample No.*:	**Engineering sample**			
Prüfzeitraum: *Testing period*:	**2014-03-25 to 2014-04-16**			
Ort der Prüfung: *Place of testing*:	**Refer to section 1.1**			
Prüflaboratorium: *Testing laboratory*:	**Refer to section 1.1**			
Prüfergebnis*: *Test result**:	Pass			



geprüft von / *tested by*:			**kontrolliert von /** *reviewed by*:		
2014-05-08	Yang, Kai/ PE	Yang Kai	2014-05-08	Sun, Lixun/Reviewer	Sun Lixun
Datum *Date*	**Name / Stellung** *Name / Position*	**Unterschrift** *Signature*	**Datum** *Date*	**Name / Stellung** *Name / Position*	**Unterschrift** *Signature*

Sonstiges / *Other*:

Zustand des Prüfgegenstandes bei Anlieferung:
Condition of the test item at delivery: Prüfmuster vollständig und unbeschädigt
Test item complete and undamaged

* Legende:	1 = sehr gut	2 = gut	3 = befriedigend	4 = ausreichend	5 = mangelhaft
	P(ass) = entspricht o.g. Prüfgrundlage(n)		F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	N/A = nicht anwendbar	N/T = nicht getestet
Legend:	*1 = very good*	*2 = good*	*3 = satisfactory*	*4 = sufficient*	*5 = poor*
	P(ass) = passed a.m. test specification(s)		*F(ail) = failed a.m. test specification(s)*	*N/A = not applicable*	*N/T = not tested*

Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens.
This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.

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TEST SUMMARY

4.1.1 ANTENNA REQUIREMENT
RESULT: Passed

4.1.2 PEAK OUTPUT POWER
RESULT: Passed

4.1.3 6DB BANDWIDTH AND 26DB BANDWIDTH
RESULT: Passed

4.1.4 CONDUCTED SPURIOUS EMISSIONS IN 100KHZ BANDWIDTH
RESULT: Passed

4.1.5 POWER SPECTRAL DENSITY
RESULT: Passed

4.1.6 RADIATED SPURIOUS EMISSION
RESULT: Passed

4.1.7 CONDUCTED EMISSIONS
RESULT: Passed

4.2.1 ELECTROMAGNETIC FIELDS
RESULT: Passed

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1. Test Sites

1.1 Test Facilities

Laboratory 1: TA Beijing Limited (FCC Registration No.: 413514)
Address: Building B-4, No.1, JingHai 3rd Road, BDA East ParK,Beijing, 100176 China
Laboratory 2: China Household Electrical Appliance Research Institute (FCC Registration Number: 161284)
Address: No.29 Xiaxie Str. XuanWu District, Beijing 100053, P.R. China

The used test equipment is in accordance with CISPR 16-1 for measurement of radio interference.

1.2 List of Test and Measurement Instruments

Table 1: List of Test and Measurement Equipment

Lab 1: (Peak Output Power, 6dB and 26dB Bandwidth, Conducted Spurious Emissions in 100kHz Bandwidth, Power Spectral Density, Radiated Spruious Emission)

Kind of Equipment	Type	S/N	Manufacturer	Calibrated until
Bi-log Antenna	HL562	100488	Rohde & Schwarz	2015-02-15
Double Ridge Guide Horn Antenna	EMCO 3117	00056662	ETS-Lindgren	2015-02-15
EMI Test Receiver	ESIB26	100301	Rohde & Schwarz	2015-02-21
Signal Analyzer	ESIB26	100301	Rohde & Schwarz	2015-01-29

Lab 2: (Conduted Emission)

Kind of Equipment	Type	S/N	Manufacturer	Calibrated until
EMI Test Receiver	ESCS30	0311031	R&S	2015-02-20
LISN	ESH2-Z5	0311031-03	R&S	2015-02-19

1.3 Traceability

All measurement equipment calibrations are traceable to NIM (National Institude of Metrology P.R. China) or where calibration is performed outside the United States, to equivalent nationally recognized standards organizations.

1.4 Calibration

Equipment requiring calibration is calibrated periodically by the lab or according to lab's specifications. Additionally all equipment is verified for proper performance on a regular basics using in house standards or comparisons.

1.5 Measurement Uncertainty

For a 95% confidence level, the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO/IEC 17025 are:

Table 2: Measurement Uncertainty

Items		Extended Uncertainty
RE (30-1000MHz)	Field strength (dBuV/m)	U=±4.94dB, k=2, σ=95%
RE (1-26GHz)	Field strength (dBuV/m)	U=±4.34dB, k=2, σ=95%

2. General Product Information

2.1 Product Function and Intended Use

The EUT (equipment under test) is Geopoint Wireless I/O which uses the Zigbee technology, For more information, please refer to the user manual.

2.2 Ratings and System Details

Table 3: Rating of EUT

Kind of Equipment:	Geopoint Wireless I/O
Type Designation:	GP-IO-332, GP-IO-332-E
FCC ID	HS9GPIO332
Rated Input Voltage	The product has 3 types of input power: 1. AC 20-30V, 60Hz 2. DC 20-30V 3. DC 5V via USB
Rated comsuption power	5VA

Identities and difference:
The above models have exactly same electric characteristics and construction, except the different RF output power setting controlled by the software, the model GP-IO-332 has the higher RF output power, therefore all tests were performed on the model GP-IO-332.

Table 4: Technical Specification

Item	**Description**
Operating Frequency band	2.405GHz—2.475GHz
Channel Number	15
Channel Center Frequency	2405MHz, 2410MHz, 2415MHz, 2420MHz, 2425MHz, 2430MHz, 2435MHz, 2440MHz, 2445MHz, 2450MHz, 2455MHz, 2460MHz, 2465MHz, 2470MHz, 2475MHz.
Modulation	DSSS
Antenna	Integrated Antenna
Antenna Gain (dBi)	2

2.3 Independent Operation Modes

The basic operation modes are:

A. On, transmitting
B. On, receiving
C. Off

2.4 Noise Generating and Noise Suppressing Parts

Refer to the Circuit Diagram.

2.5 Submitted Documents

- Bill of Material
- Circuit Diagram
- PCB Layout
- Instruction Manual
- Photo Document
- Rating Label

3. Test Set-up and Operation Modes

3.1 Principle of Configuration Selection

The equipment under test (EUT) was configured to measure its maximum power level. The test modes were adapted accordingly in reference to the instructions for use.

3.2 Test Operation and Test Software

Test operation refers to test setup in chapter 5. All testing were performed according to the procedures in ANSI C63.10: 2009.

3.3 Special Accessories and Auxiliary Equipment

Kind of accessories	Model	Manufacture
Resistor	5033CM470R0J15AFX (470ohm)	VISHAY AMERICAS INC
Computer	X220	Lenovo
AC power transformer	TGC80-24	STANCOR

3.4 Countermeasures to achieve EMC Compliance

The test sample which has been tested contained the noise suppression parts as described in the Constructional Data Form or the Technical Construction File. No additional measures were employed to achieve compliance.

3.5 Test Setup Diagram

Diagram of Measurement Configuration for Radiation Test

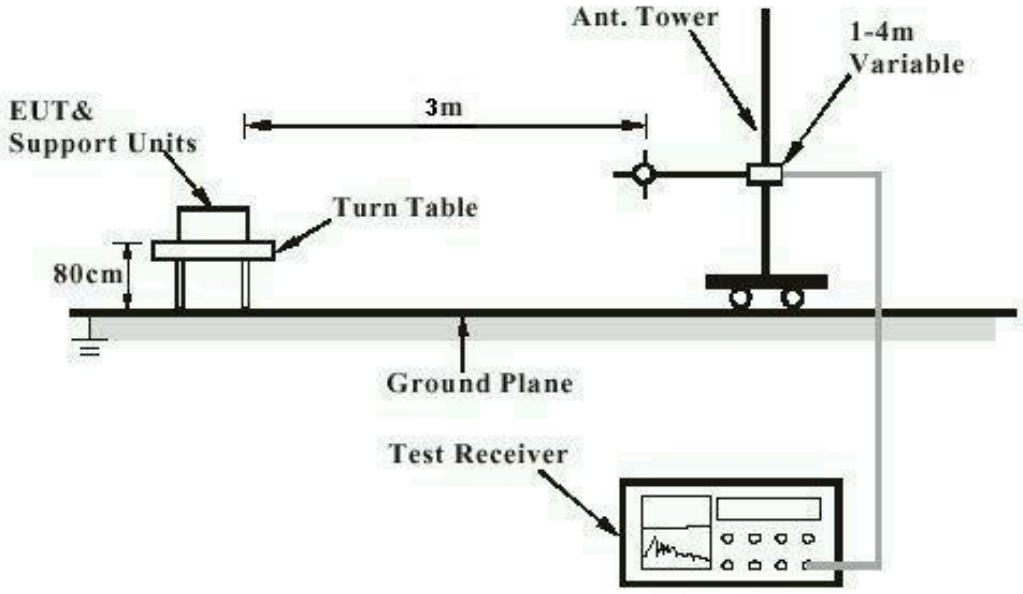


Diagram of Measurement Equipment Configuration for Conduction Measurement

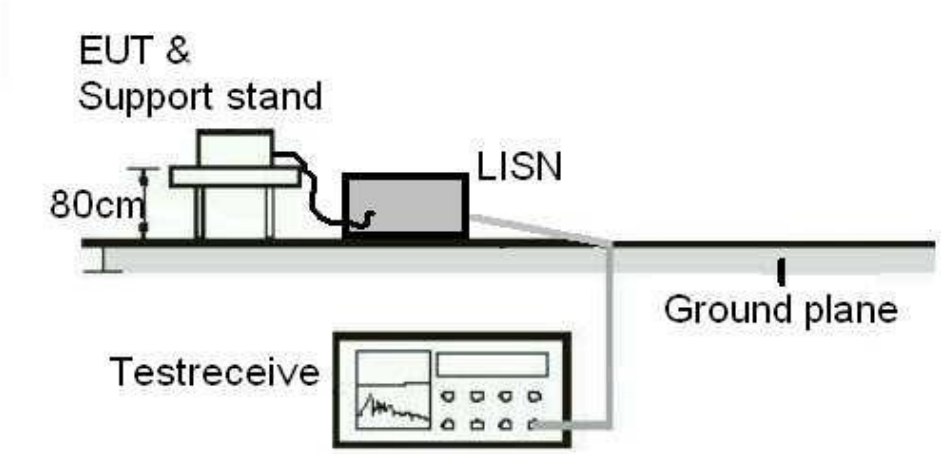
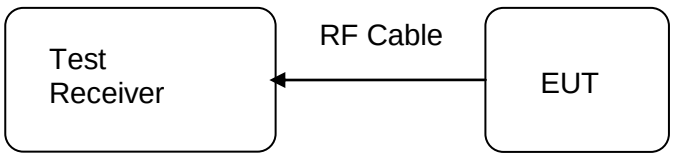


Diagram of Measurement Equipment Configuration for Transmitter Measurement



4. Test Results

4.1 Transmitter Requirement & Test Suites

4.1.1 Antenna Requirement

RESULT: **Passed**

Test date	:	2014-03-25
Test standard	:	FCC Part 15.247(b)(4) and Part 15.203
Limit	:	the use of antennas with directional gains that do not exceed 6 dBi

According to the manufacturer declared, the EUT has an internal antenna, the directional gain of antenna is 2dBi, and the antenna connector is designed with permanent attachment and no consideration of replacement. Therefore the EUT is considered sufficient to comply with the provision.

4.1.2 Peak Output Power

RESULT: **Passed**

Test date	:	2014-03-25
Test standard	:	FCC Part 15.247(b)(1)
Basic standard	:	ANSI C63.10: 2009
Limit	:	1 Watt
Kind of test site	:	Shielded room

Test setup

Test Channel	:	Low/ Middle/ High
Operation Mode	:	A
Ambient temperature	:	23℃
Relative humidity	:	49%
Atmospheric pressure	:	101 kPa

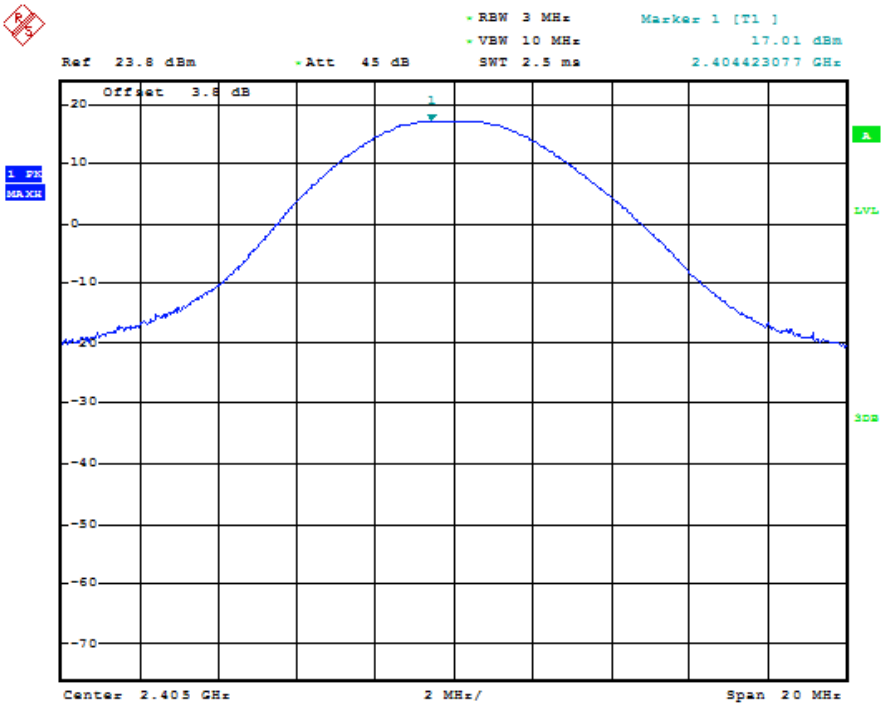
Table 5: Test result of Peak Output Power

Types of Power Supply	Channel Frequency (MHz)	Peak Output Power		Limit
		(dBm)	(mW)	(W)
AC	2405	17.01	50.23	1
	2440	14.63	29.04	1
	2475	12.11	16.26	1
DC	2405	16.43	43.95	1
	2440	14.47	27.99	1
	2475	11.43	13.90	1
USB	2405	16.31	42.76	1
	2440	14.44	27.80	1
	2475	11.86	15.35	1

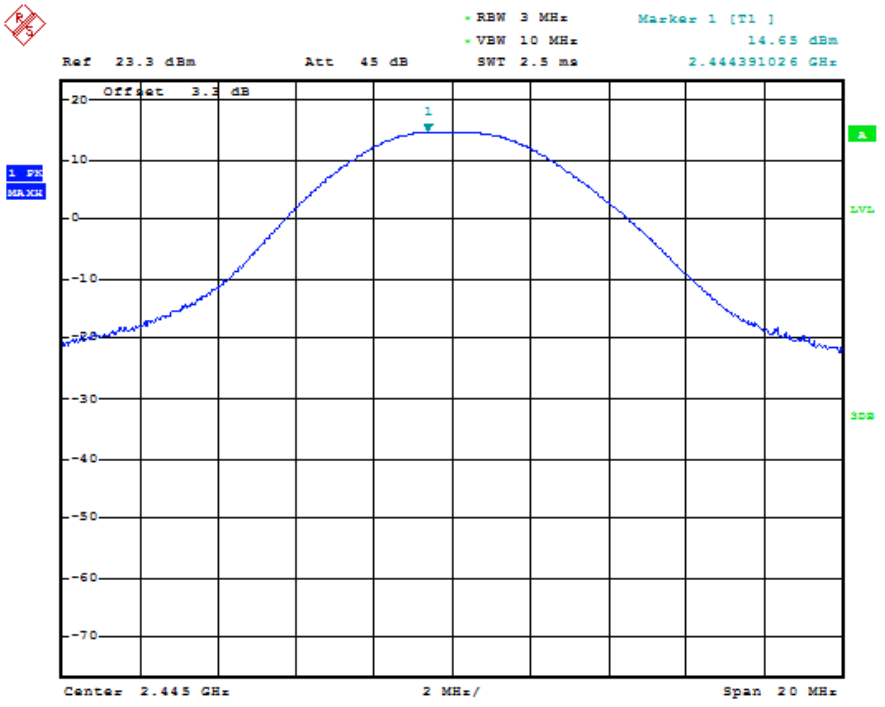
Test Graph of Peak Output Power

For AC power supply

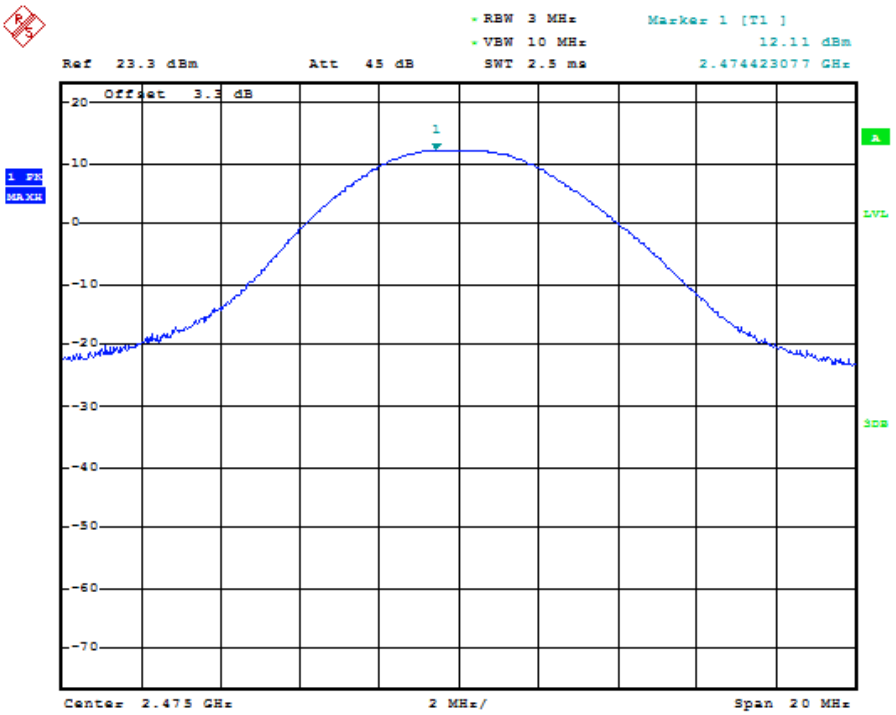
Low Channel



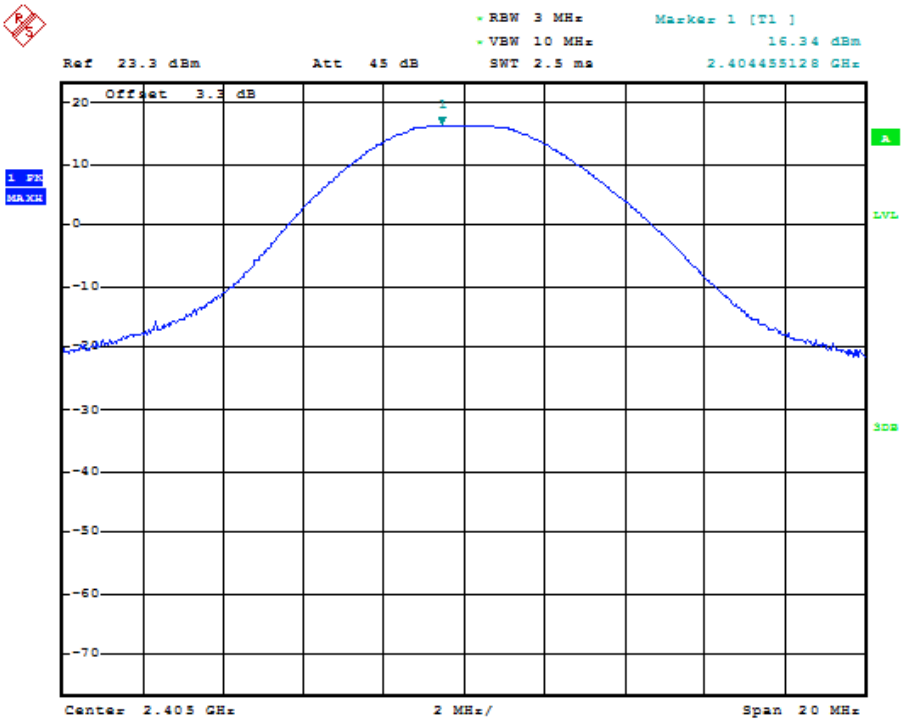
Middle Channel



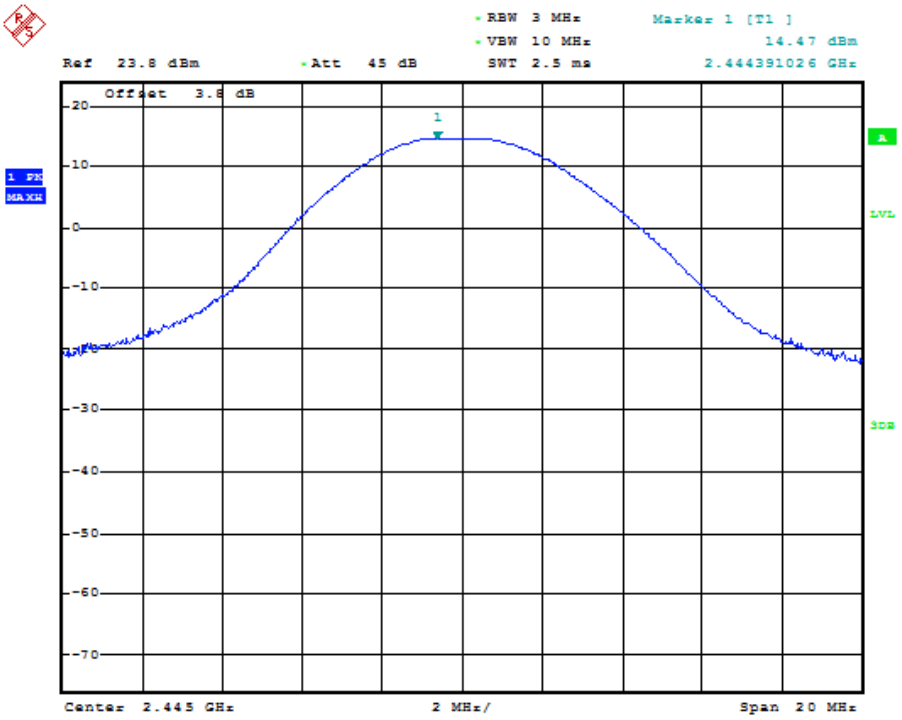
High Channel



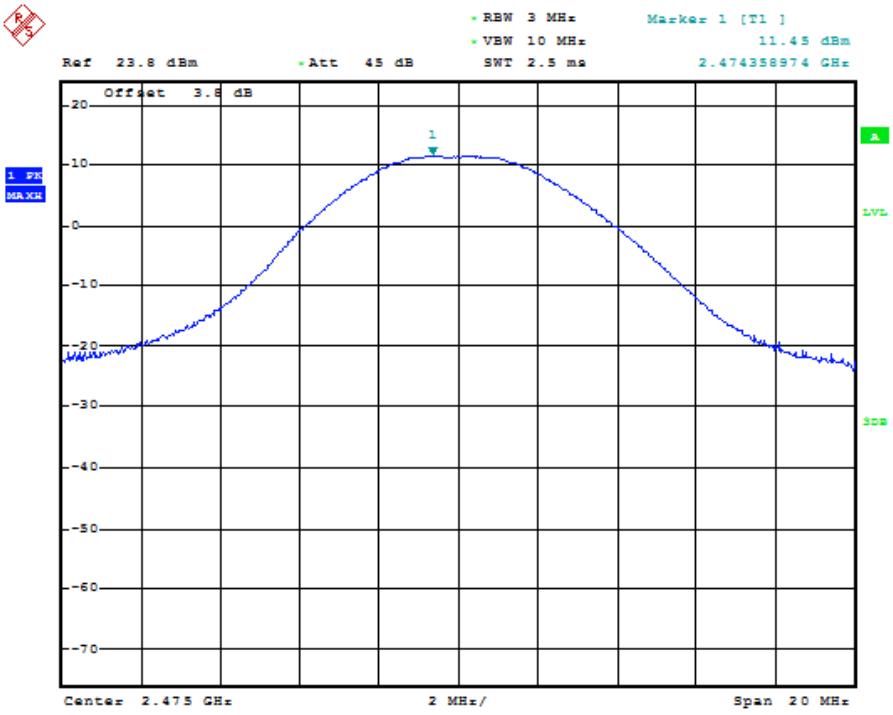
For DC power supply
Low Channel



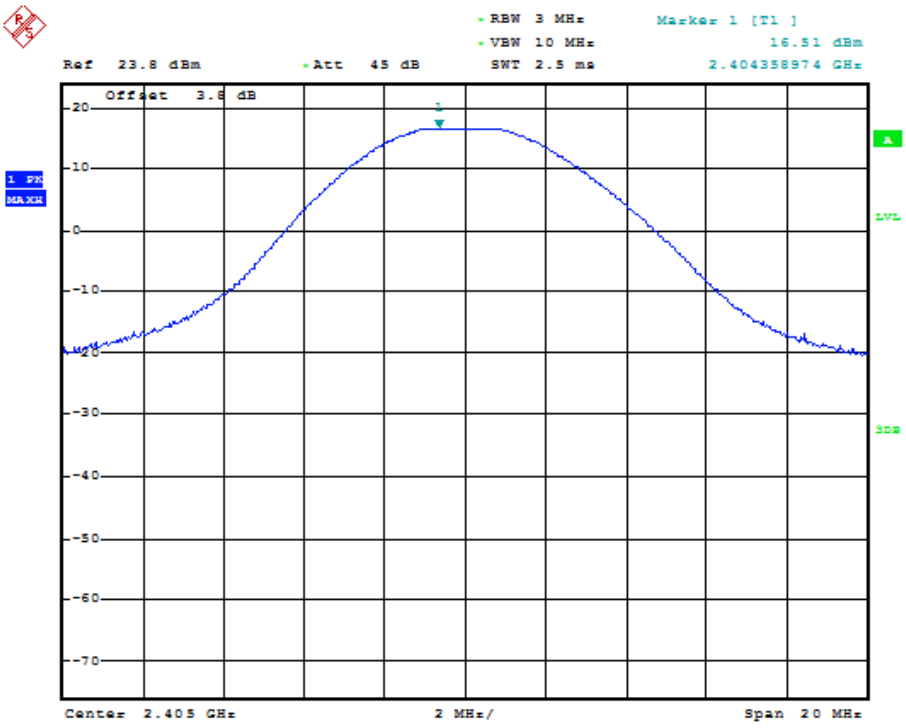
Middle Channel



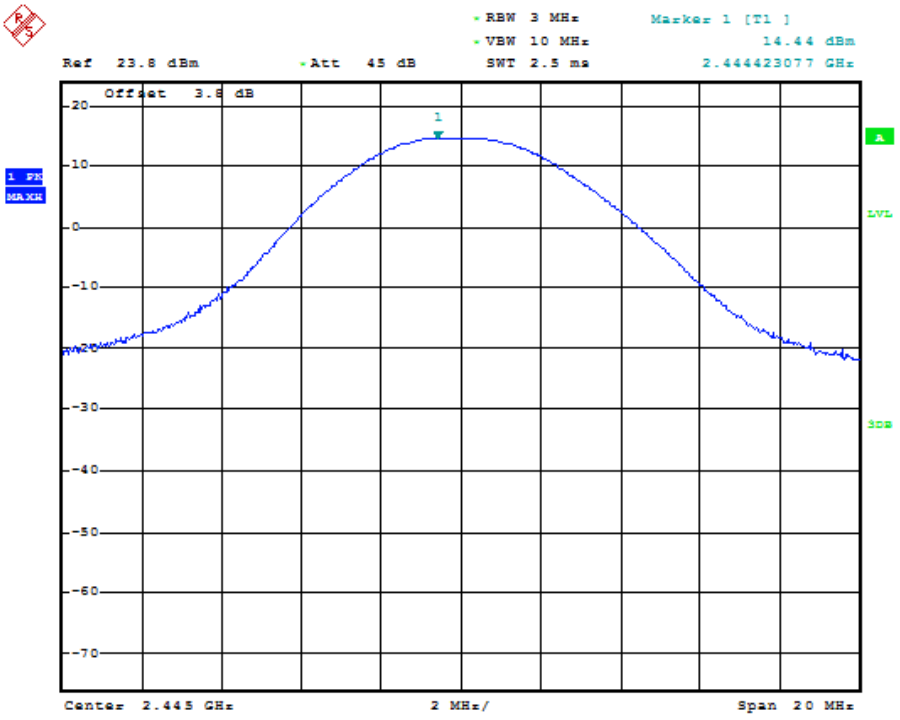
High Channel



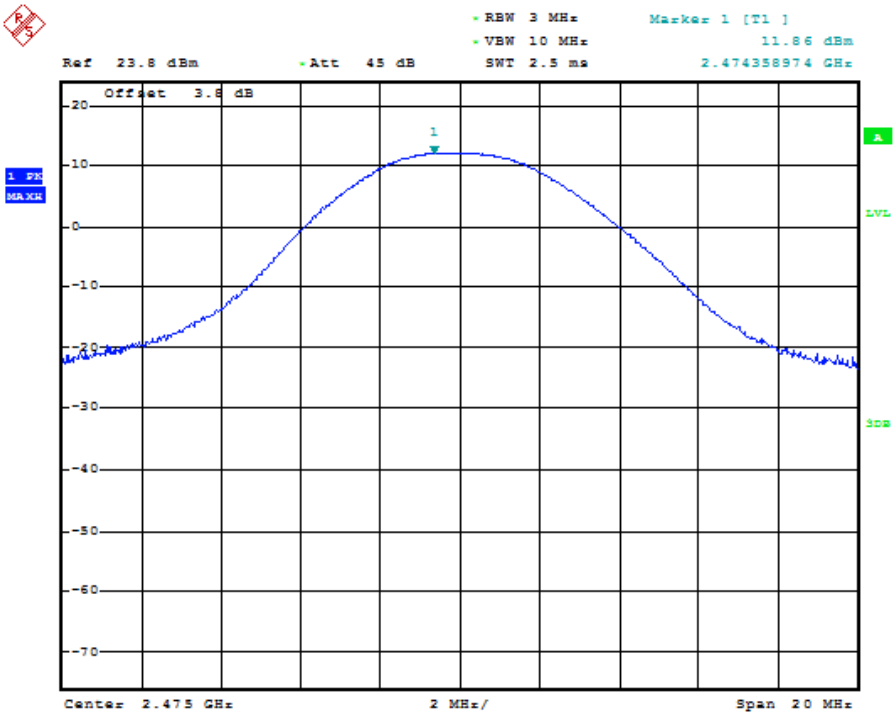
For USB power supply
Low Channel



Middle Channel



High Channel



4.1.3 6dB Bandwidth and 26dB Bandwidth

RESULT: **Passed**

Date of testing	:	2014-03-25
Test standard	:	FCC Part 15.247(a)(2)
Basic standard	:	ANSI C63.10: 2009
Kind of test site	:	Shielded room

Test setup

Test Channel	:	Low/ Middle/ High
Operation Mode	:	A
Ambient temperature	:	23℃
Relative humidity	:	49%
Atmospheric pressure	:	101 kPa

According to the peak output power's result, the type of AC power supply has the highest output power, therefore this test is only performed on the product with AC power suuply.

Table 6: Test result of 6dB Bandwidth

Channel	Channel Frequency (MHz)	6dB Bandwidth (kHz)	Limit(kHz)
Low Channel	2405	1538.4	>500
Mid Channel	2440	1602.6	>500
High Channel	2480	1586.5	>500

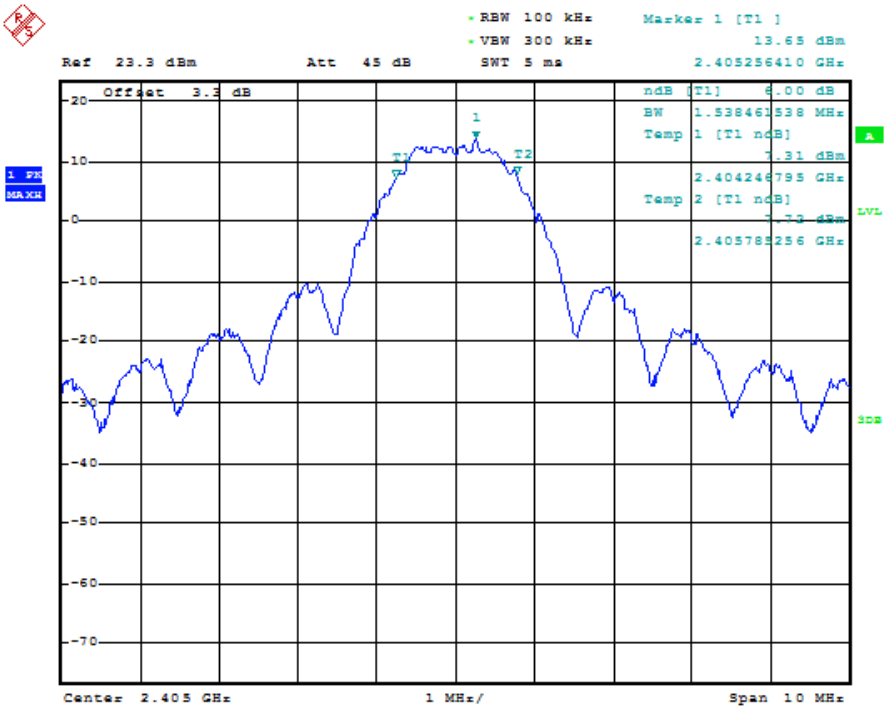
Table 7: Test result of 26dB Bandwidth

Channel	Channel Frequency (MHz)	26dB Bandwidth (kHz)
Low Channel	2405	3990.4
Mid Channel	2440	4268.8
High Channel	2480	4022.4

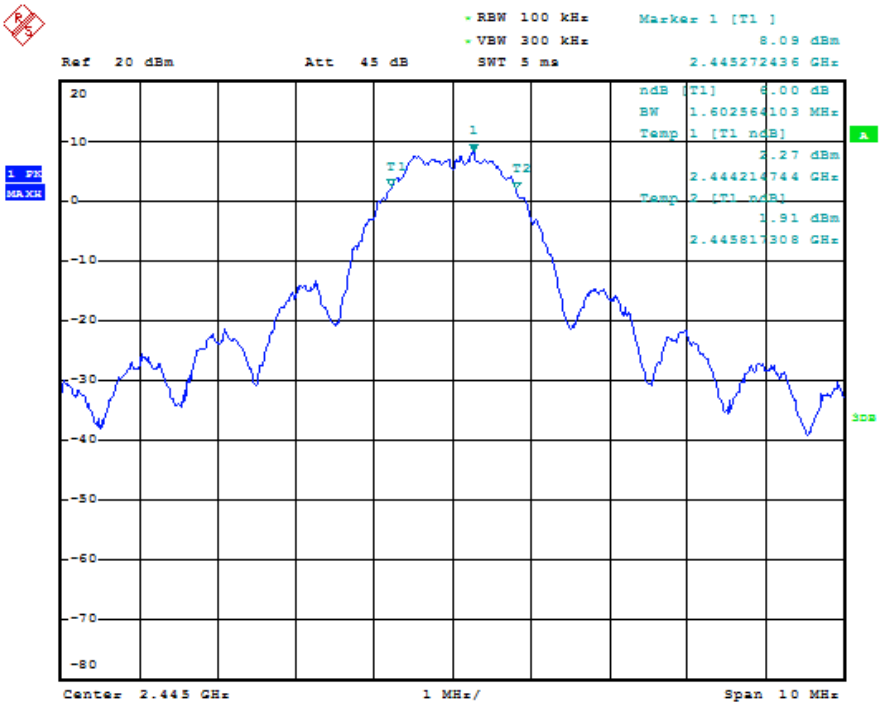
Notes: No specific 26dB bandwitdth requirement in part 15.247(a) (1).

Test Graph of 6dB Bandwidth

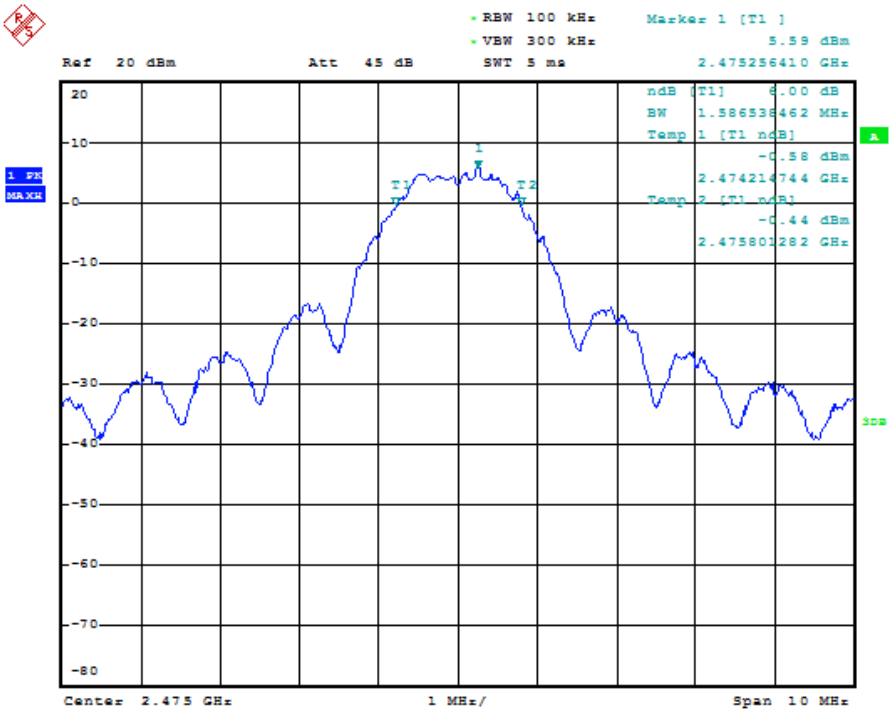
Low Channel



Middle Channel

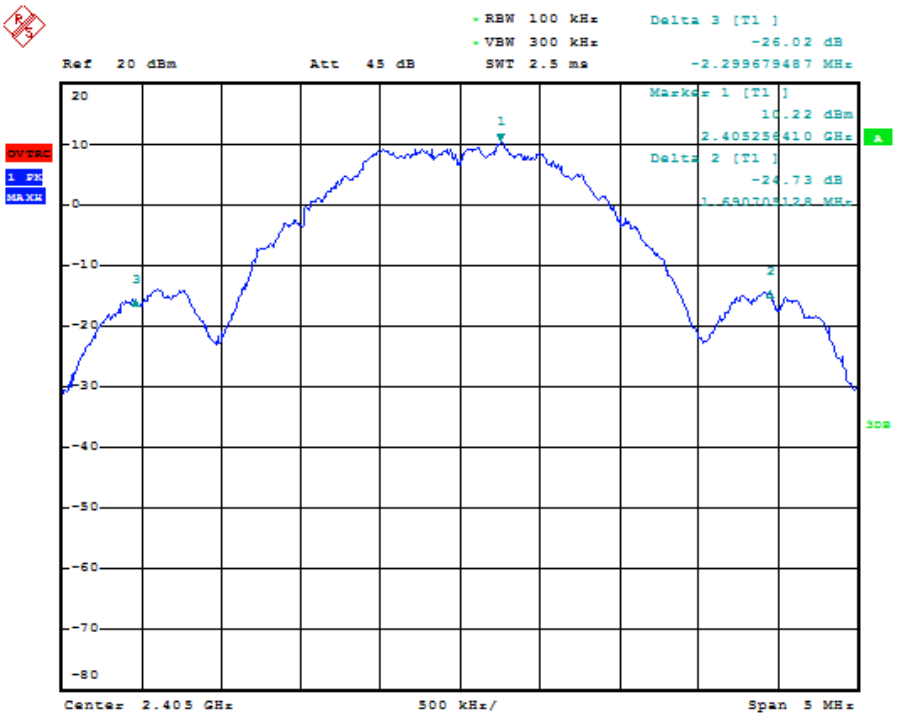


High Channel

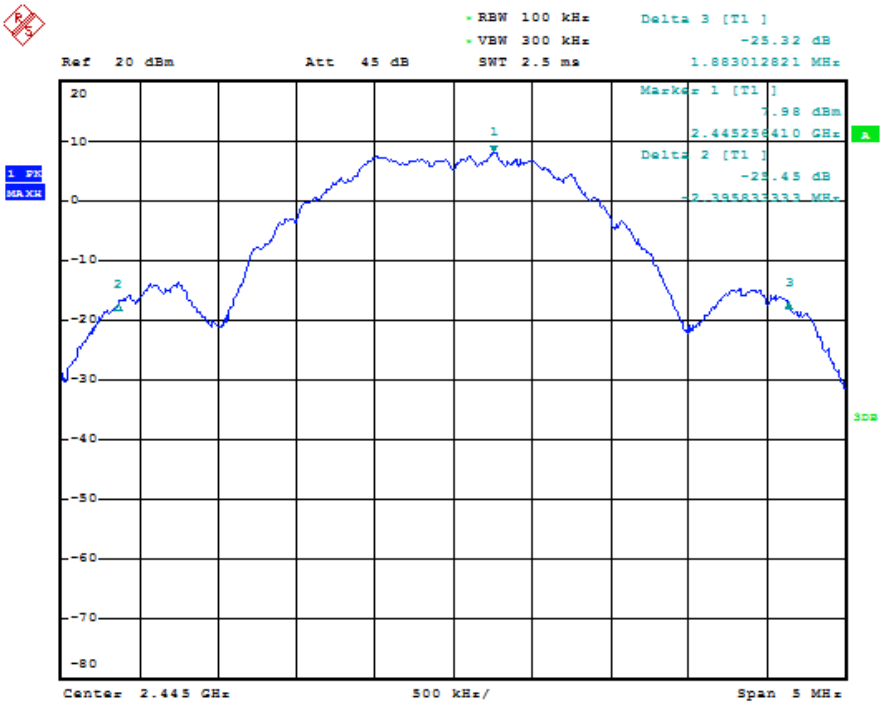


Test Graph of 26dB Bandwidth

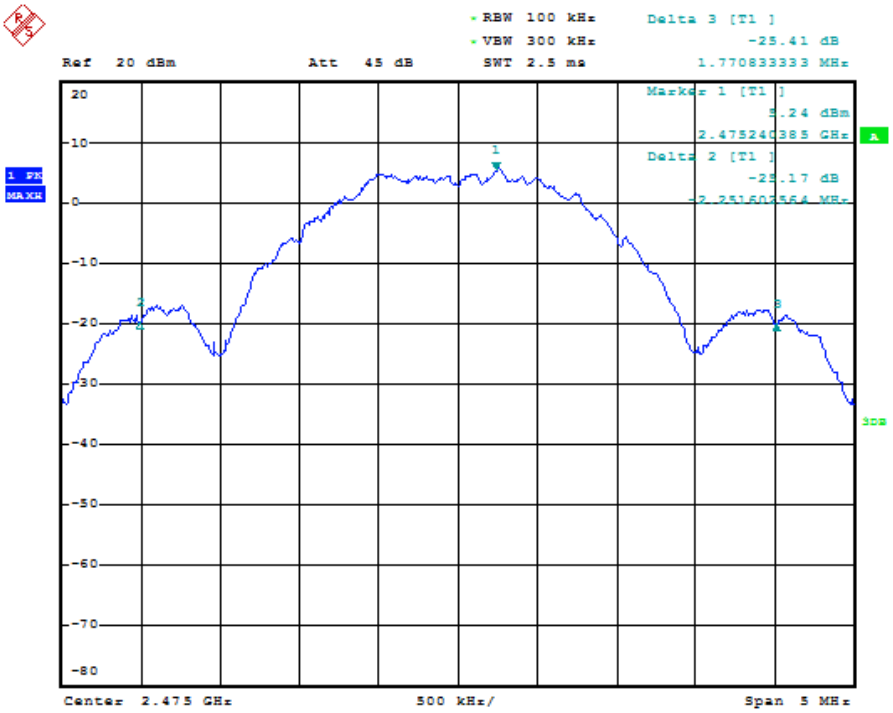
Low Channel



Middle Channel



High Channel



4.1.4 Conducted Spurious Emissions in 100kHz Bandwidth

RESULT: **Passed**

Date of testing	:	2014-03-25
Test standard	:	FCC part 15.247(d)
Basic standard	:	ANSI C63.10: 2009
Limit	:	20dB (below that in the 100kHz bandwidth within the band that contains the highest level of the desired power); In addition, radiated emissions which fall in the restricted bands, must also comply with the radiated emission limits specified in 15.209(a)
Kind of test site	:	Shield room

Test setup

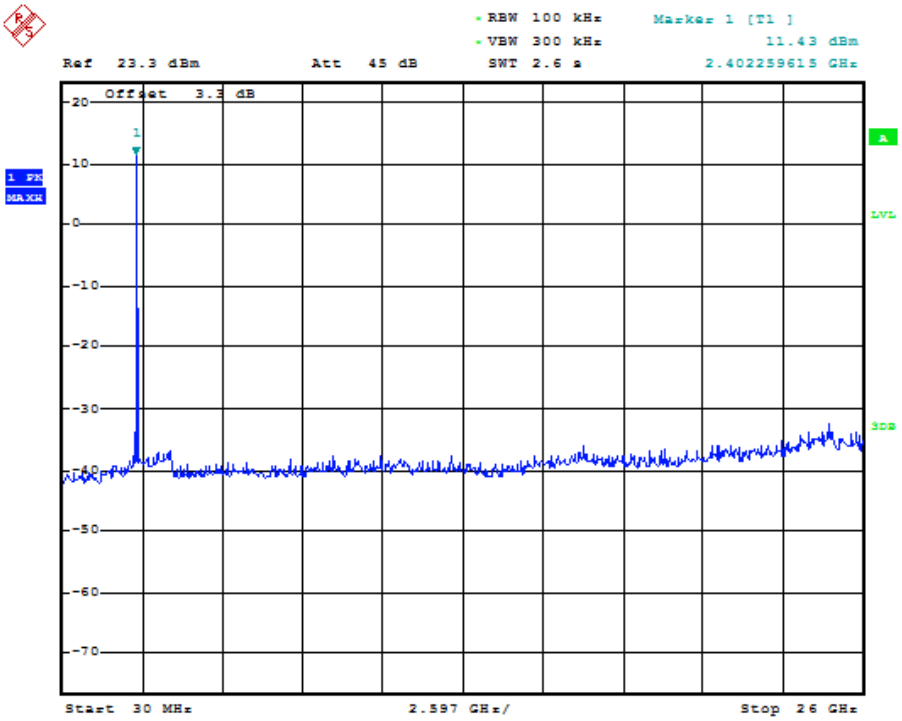
Test Channel	:	Low/ Mid/High
Operation mode	:	A
Ambient temperature	:	23℃
Relative humidity	:	49%
Atmospheric pressure	:	101 kPa

According to the peak output power's result, the type of AC power supply has the highest output power, therefore this test is only performed on the product with AC power suuply.

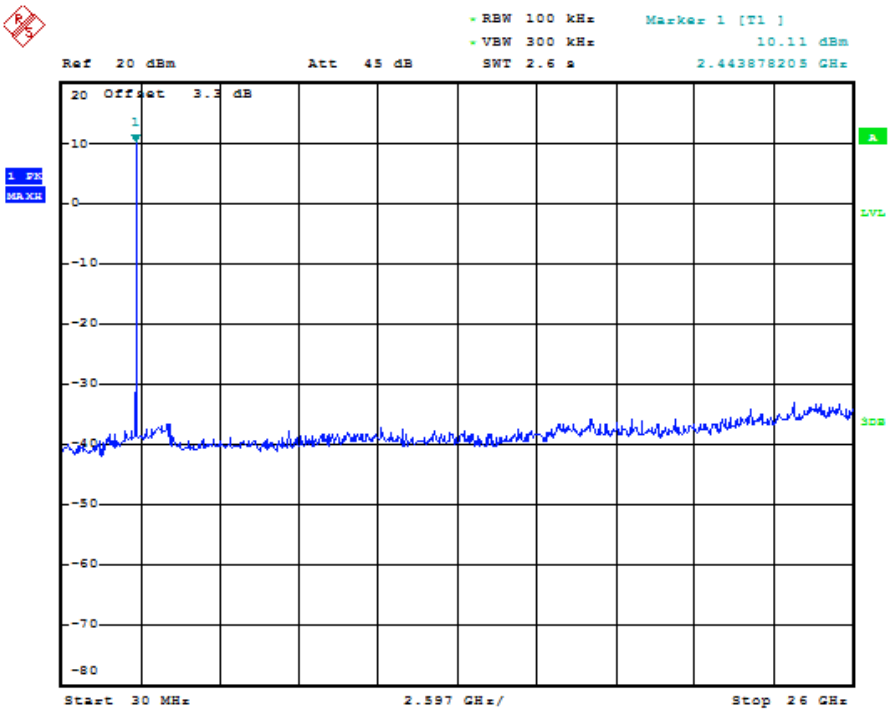
All emissions are more than 20dB below fundamental, details refer to following test Graph, and compliance is achived as well.

Test Graph of Conducted Spurious Emissions measured in 100kHz Bandwidth

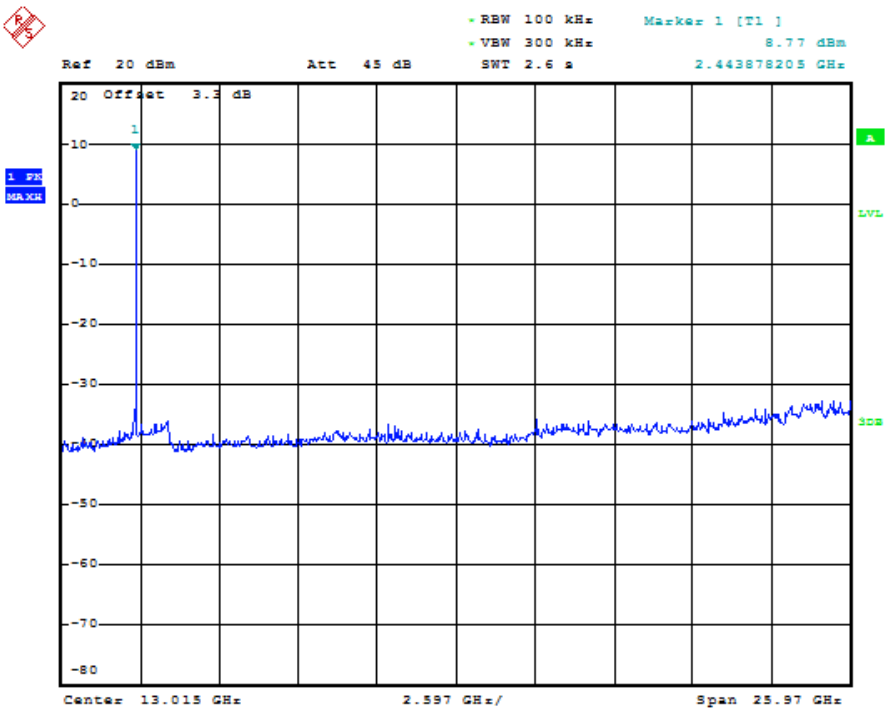
Low Channel



Middle Channel

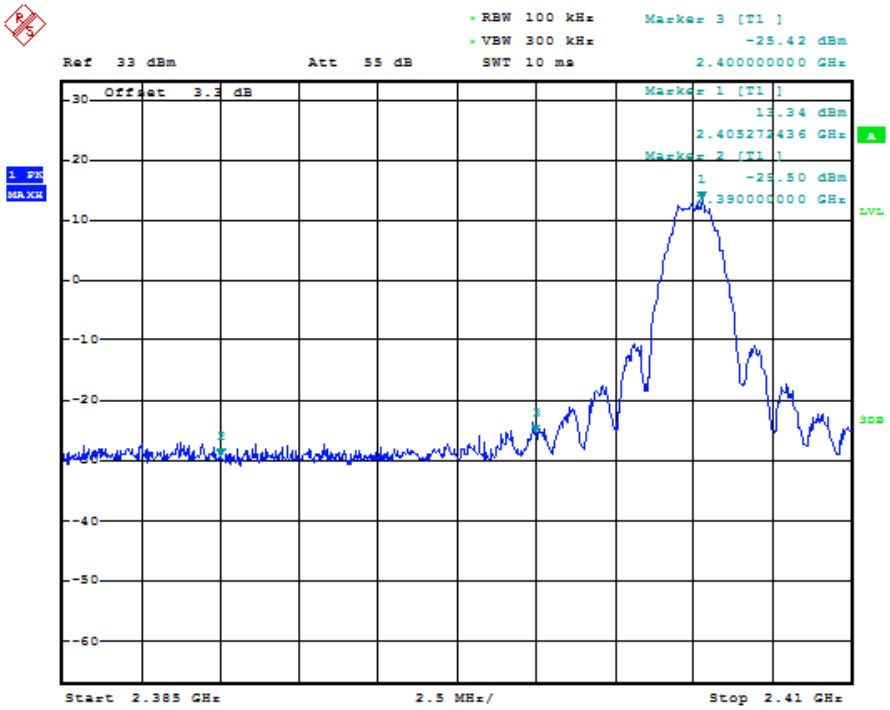


High Channel

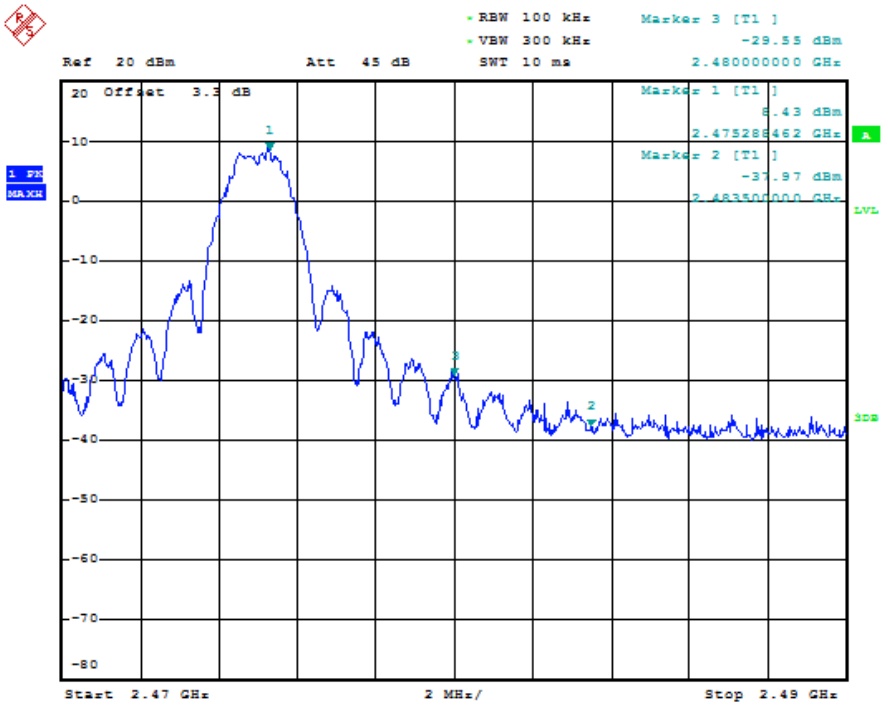


Test Graph of Band Edge measured in 100kHz Bandwidth

Low Channel



High Channel



4.1.5 Power Spectral Density

RESULT: **Passed**

Date of testing	:	2014-03-25
Test standard	:	FCC part 15.247(e)
Basic standard	:	ANSI C63.10: 2009
Limits	:	8.0 dBm (in any 3kHz band)
Kind of test site		Shield room

Test Setup

Test Channel	:	Low/ Middle/ High
Operation mode	:	A
Ambient temperature	:	23℃
Relative humidity	:	49%
Atmospheric pressure	:	101 kPa

According to the peak output power's result, the type of AC power supply has the highest output power, therefore this test is only performed on the product with AC power suuply.

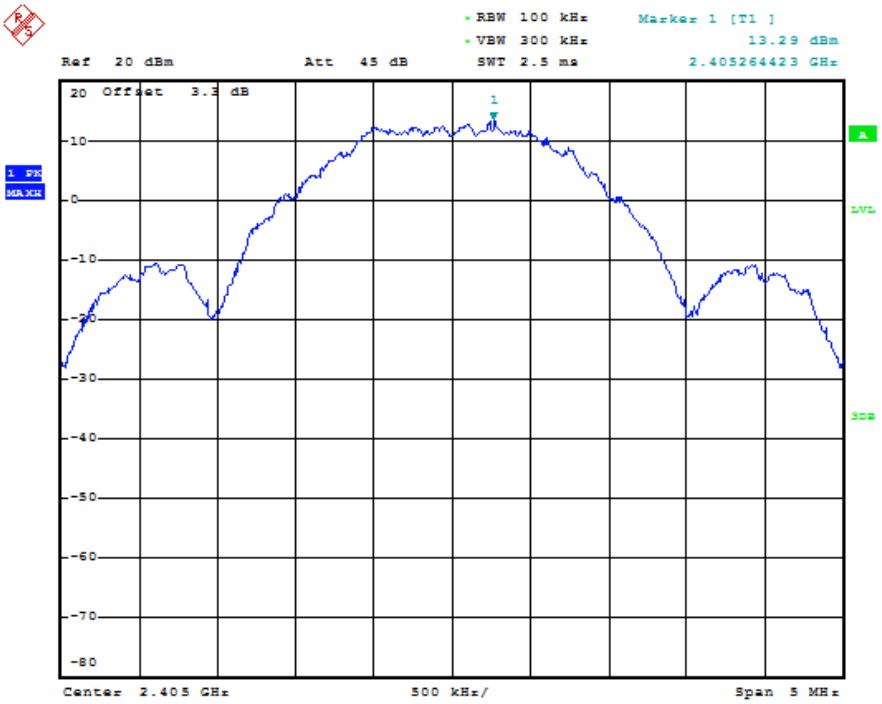
Table 8: Test result of power spectral density(PSD)

Channel	Maximum power spectral density (dBm/100kHz)	Maximum power spectral density (dBm/3kHz)	Limit (dBm/3kHz)
Low Channel	13.29	-1.91	8
Mid Channel	11.26	-3.94	8
High Channel	8.77	-6.43	8

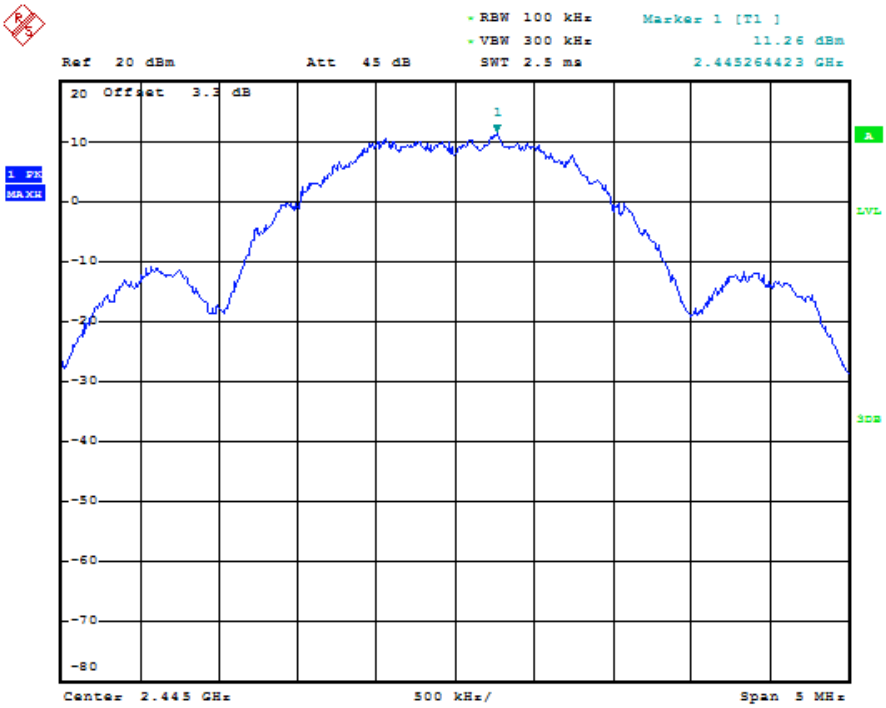
Note: According to the KDB558074, PSD_{3kHz}= PSD_{100kHz} ×10log(3kHz/100kHz)= PSD_{100kHz} -15.2dB

Test Graph of Power Spectral Density

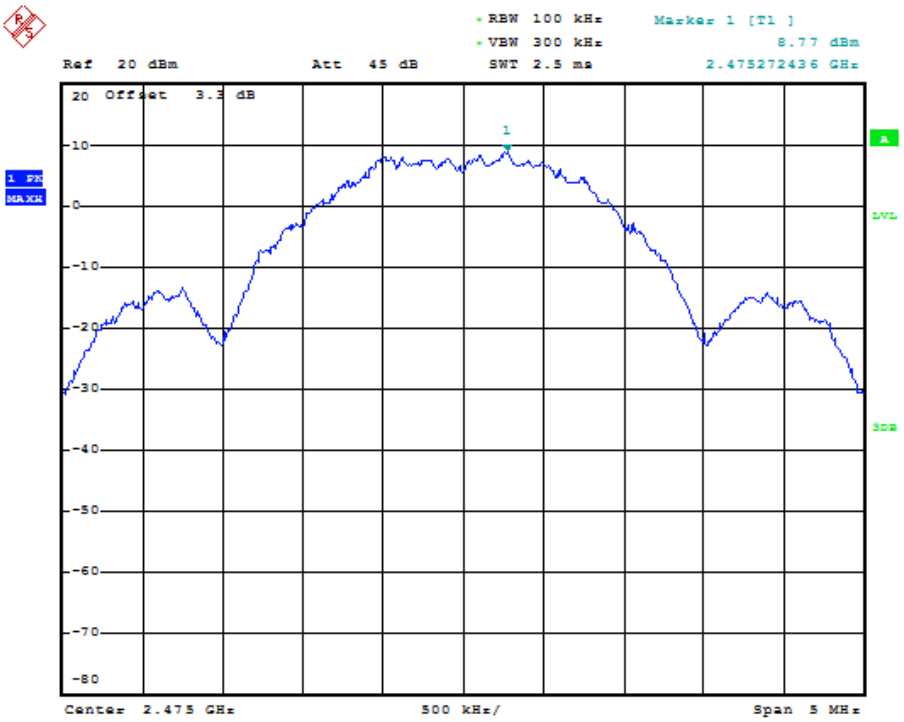
Low Channel



Middle Channel



High Channel



4.1.6 Radiated Spurious Emission

RESULT: **Passed**

Date of testing	:	2013-03-26
Test standard	:	FCC part 15.247(d)
Basic standard	:	ANSI C63.10: 2009
Limits	:	Refer to 15.209(a)
Kind of test site	:	3m Semi-Anechoic Chamber

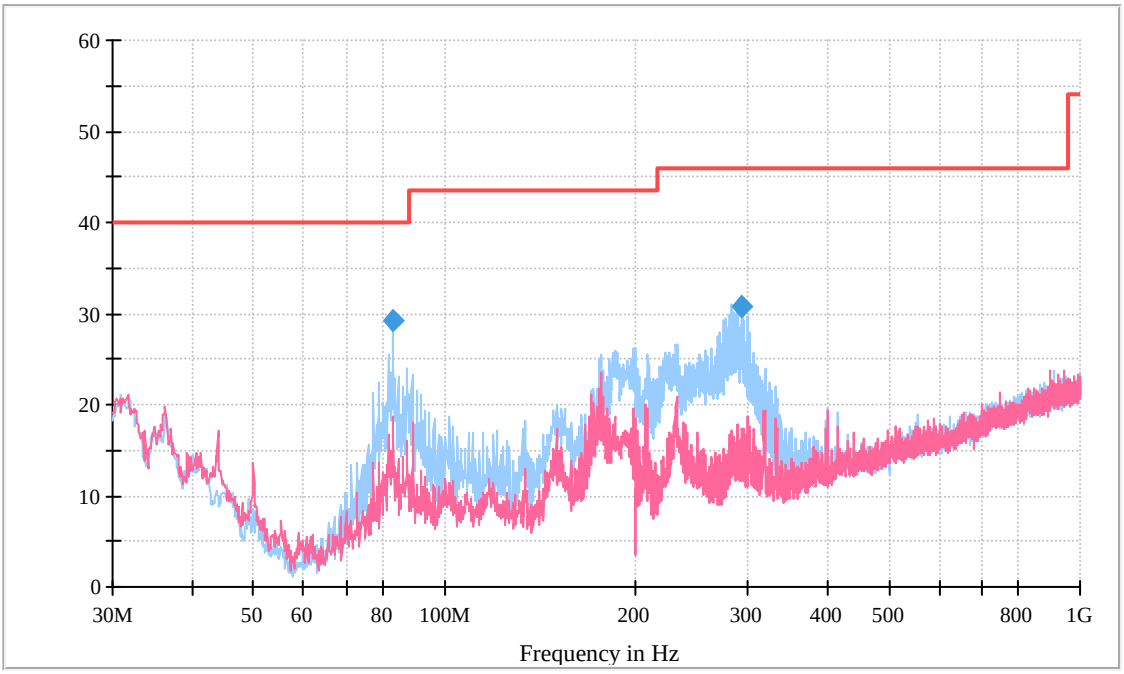
Test setup

Test Channel	:	Low/ Middle/ High
Operation mode	:	A
Ambient temperature	:	23℃
Relative humidity	:	49%
Atmospheric pressure	:	100 kPa

During the test, the wooden table was rotated 360° around and the antenna was varied from 1m to 4m to find the maximum disturbance. The test was performed with the antenna both in its horizontal and vertical polarizations.
The following figures and tables were those measured by an automatic measurement system. The vertical results are marked with red, and the horizontal ones are marked with blue.
Plots of the band edge are also shown.

Figure 1: Spurious emission measurement results, AC power supply, low channel, 30-1000MHz, vertical and horizontal polarization

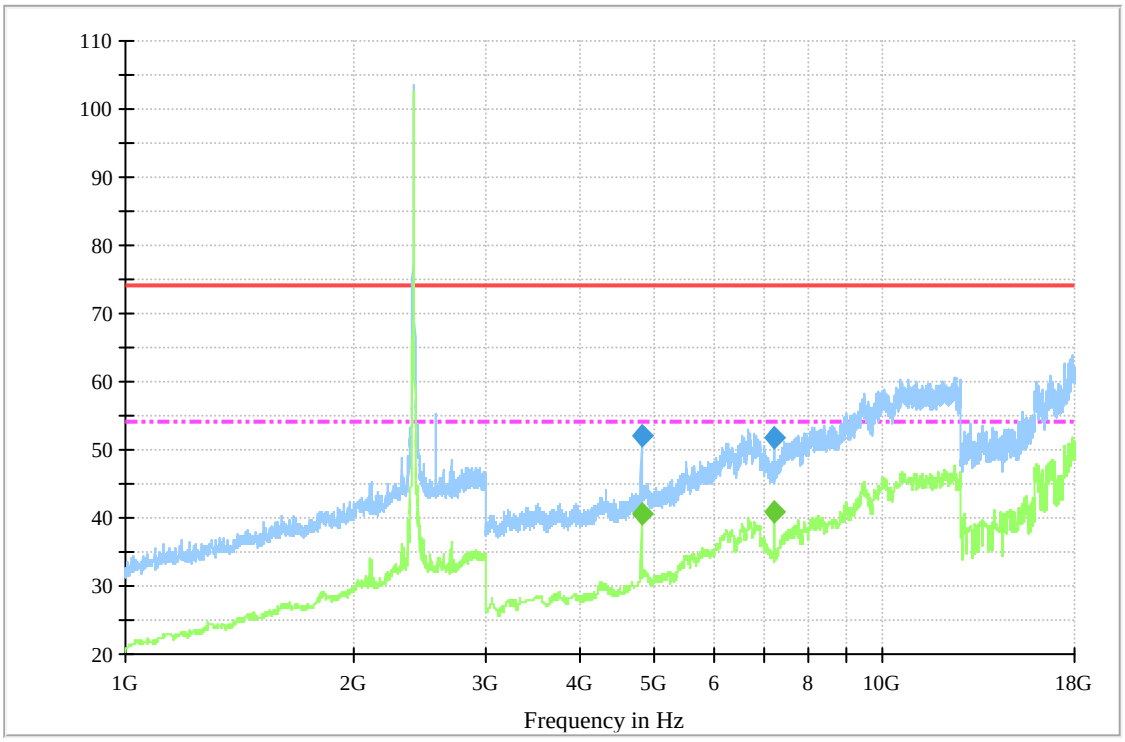
Level in dBµV/m



Final quasi-peak measurement result:

Frequency (MHz)	QuasiPeak (dBµV/m)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Margin (dB)	Limit (dBµV/m)
83.006052	29.3	120.000	250.0	H	17.0	10.70	40.00
294.138377	30.7	120.000	100.0	H	10.0	15.30	46.00

Figure 2: Spurious emission measurement results, AC power supply, low channel, 1-18GHz, vertical and horizontal polarization



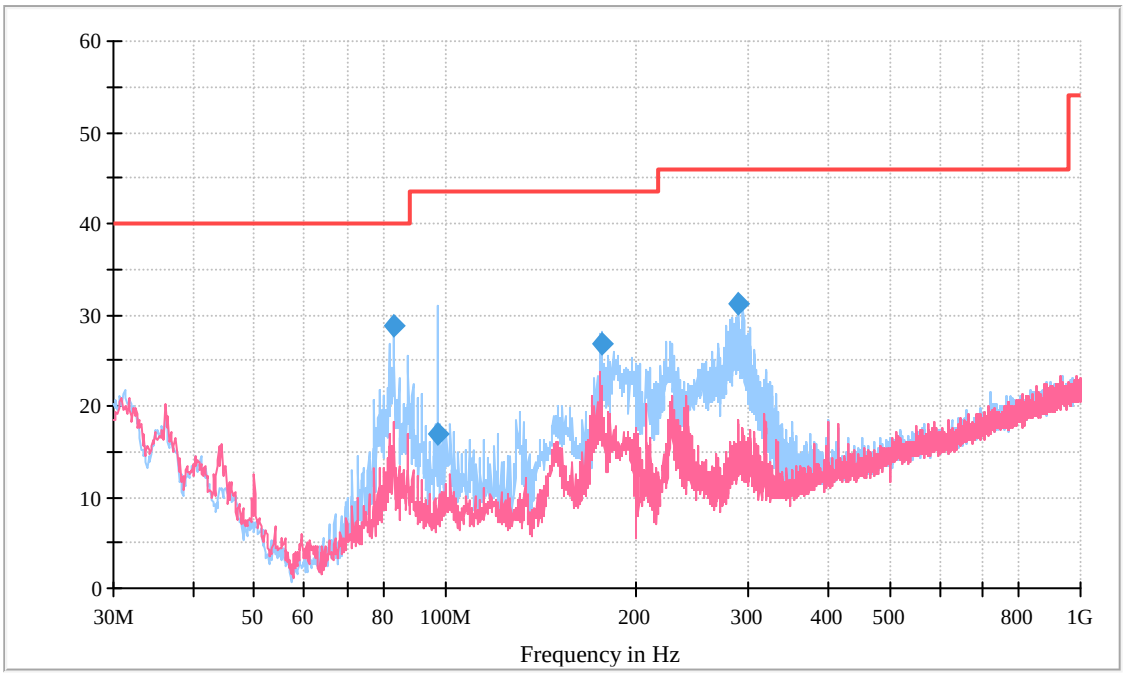
Final measurement result:

Frequency (MHz)	MaxPeak (dBµV/m)	Height (cm)	Polarization	Azimuth (deg)	Margin (dB)	Limit (dBµV/m)
4809.116233	52.1	100.0	H	8.0	21.90	74.00
7213.527655	51.7	100.0	H	2.0	22.30	74.00

Frequency (MHz)	Average (dBµV/m)	Height (cm)	Polarization	Azimuth (deg)	Margin (dB)	Limit (dBµV/m)
4810.821643	40.7	100.0	H	0.0	13.30	54.00
7216.533066	40.8	100.0	H	2.0	13.20	54.00

Note: At the frequency from 18GHz-26GHz, no emission was found above the background noise.

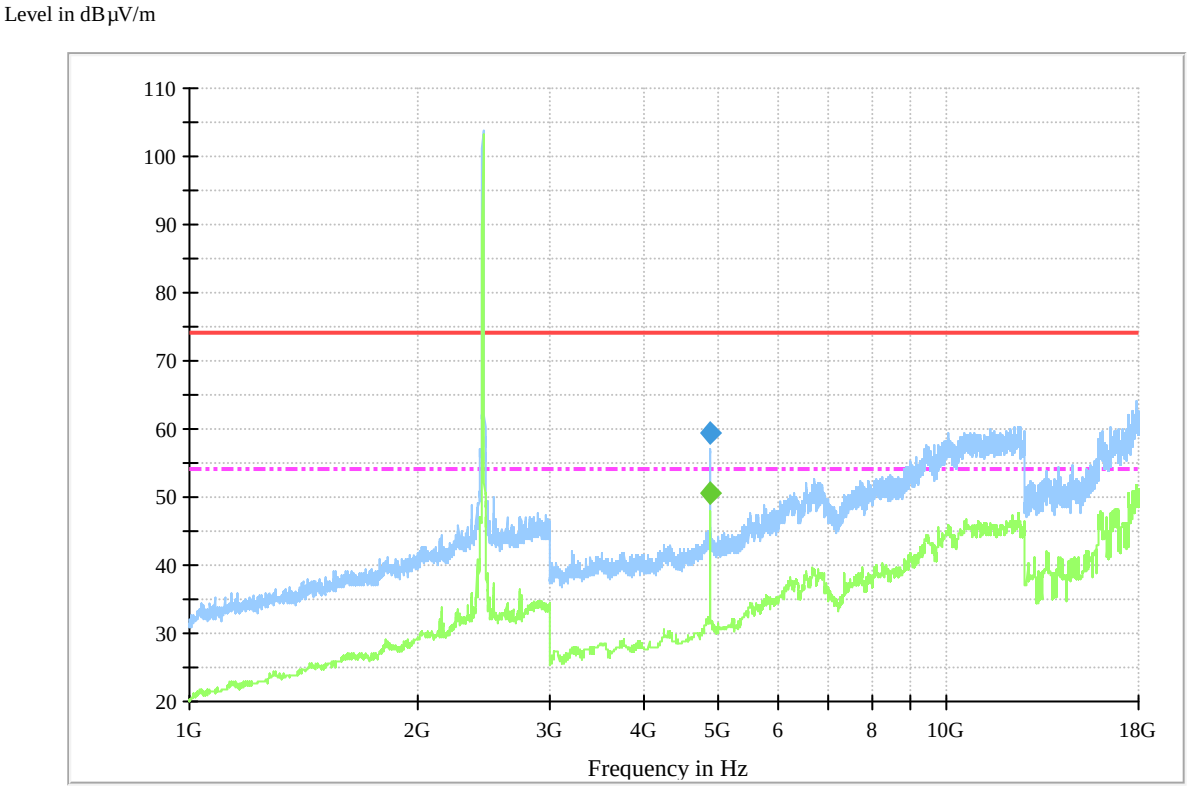
Figure 3: Spurious emission measurement results, AC power supply, mid channel, 30-1000MHz, vertical and horizontal polarization



Final quasi-peak measurement result:

Frequency (MHz)	QuasiPeak (dBµV/m)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Margin (dB)	Limit (dBµV/m)
83.006052	28.8	120.000	248.0	H	213.0	11.20	40.00
97.524669	16.9	120.000	231.0	H	207.0	26.60	43.50
176.192305	26.9	120.000	237.0	H	206.0	16.60	43.50
288.296754	31.1	120.000	100.0	H	10.0	14.90	46.00

Figure 4: Spurious emission measurement results, AC power supply, mid channel, 1-18GHz, vertical and horizontal polarization



Final measurement result:

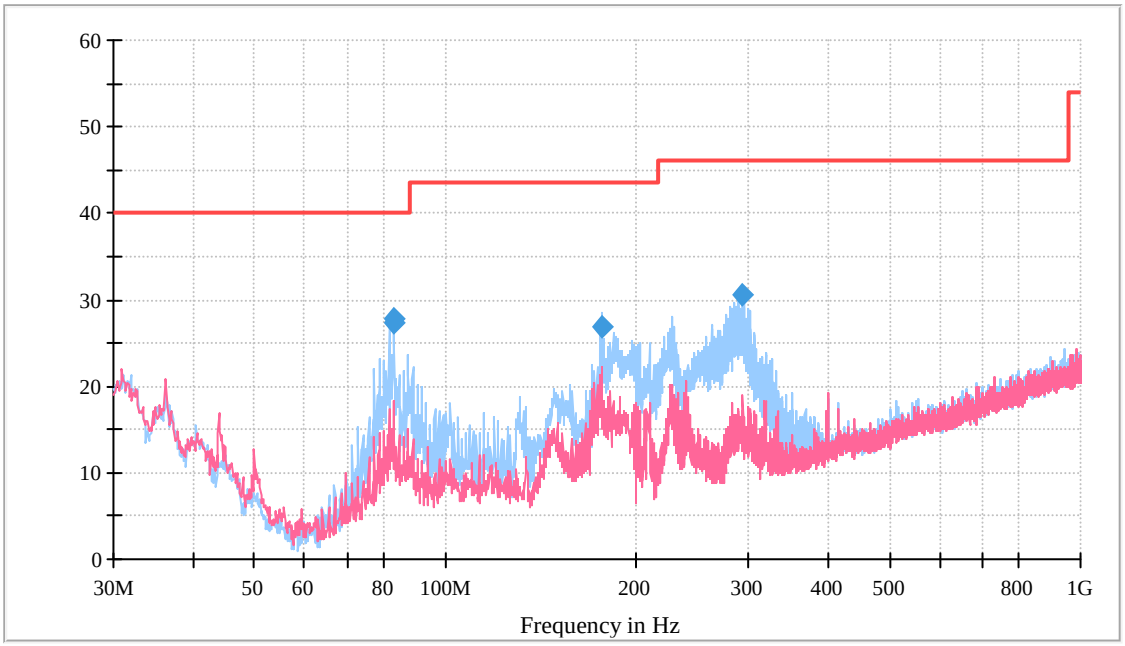
Frequency (MHz)	MaxPeak (dBµV/m)	Height (cm)	Polarization	Azimuth (deg)	Margin (dB)	Limit (dBµV/m)
4889.076754	59.4	100.0	H	24.0	14.60	74.00

Frequency (MHz)	Average (dBµV/m)	Height (cm)	Polarization	Azimuth (deg)	Margin (dB)	Limit (dBµV/m)
4891.082164	50.7	100.0	H	0.0	3.30	54.00

Note: At the frequency from 18GHz-26GHz, no emission was found above the background noise.

Figure 5: Spurious emission measurement results, AC power supply, high channel, 30MHz-1GHz, vertical and horizontal polarization

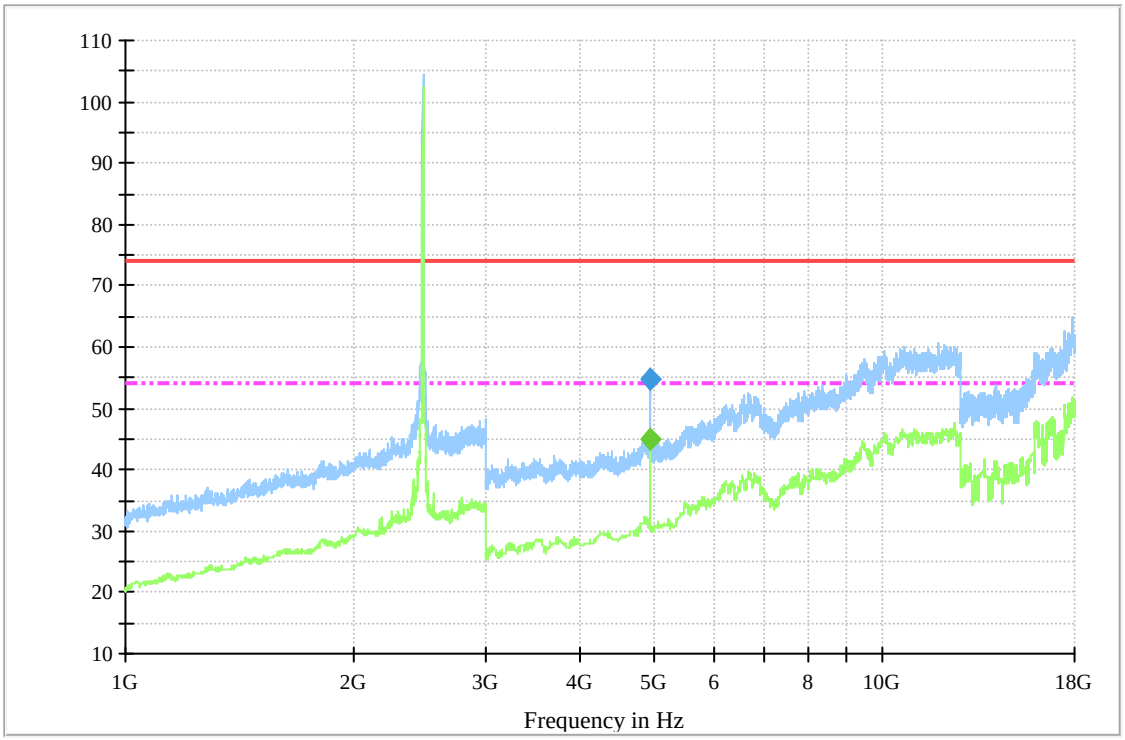
Level in dBµV/m



Final quasi-peak measurement result:

Frequency (MHz)	QuasiPeak (dBµV/m)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Margin (dB)	Limit (dBµV/m)
82.983246	27.4	120.000	216.0	H	206.0	12.60	40.00
83.006052	27.8	120.000	205.0	H	210.0	12.20	40.00
176.162305	26.8	120.000	176.0	H	225.0	16.70	43.50
294.138377	30.5	120.000	100.0	H	3.0	15.50	46.00

Figure 6: Spurious emission measurement results, AC power supply, high channel, 1-18GHz, vertical and horizontal polarization



Final measurement result:

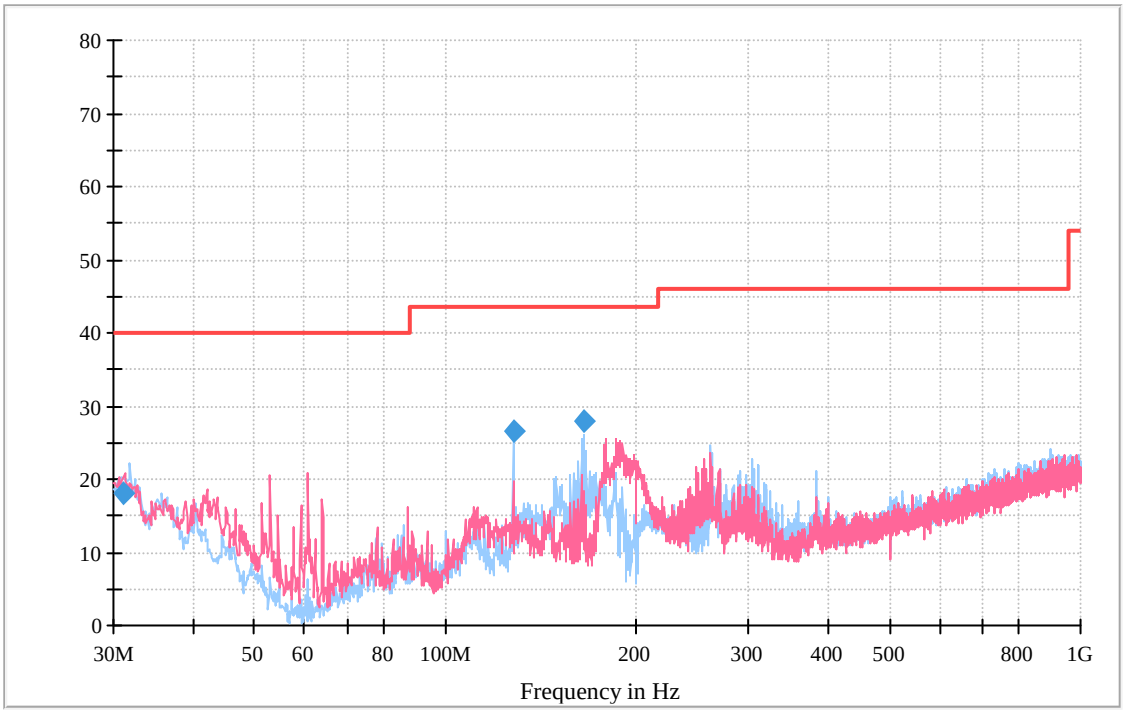
Frequency (MHz)	MaxPeak (dBµV/m)	Height (cm)	Polarization	Azimuth (deg)	Margin (dB)	Limit (dBµV/m)
4949.097595	54.8	100.0	H	0.0	19.20	74.00

Frequency (MHz)	Average (dBµV/m)	Height (cm)	Polarization	Azimuth (deg)	Margin (dB)	Limit (dBµV/m)
4950.601202	44.8	100.0	H	0.0	9.20	54.00

Note: At the frequency from 18GHz-26GHz, no emission was found above the background noise.

Figure 7: Spurious emission measurement results, DC power supply, low channel, 30-1000MHz, vertical and horizontal polarization

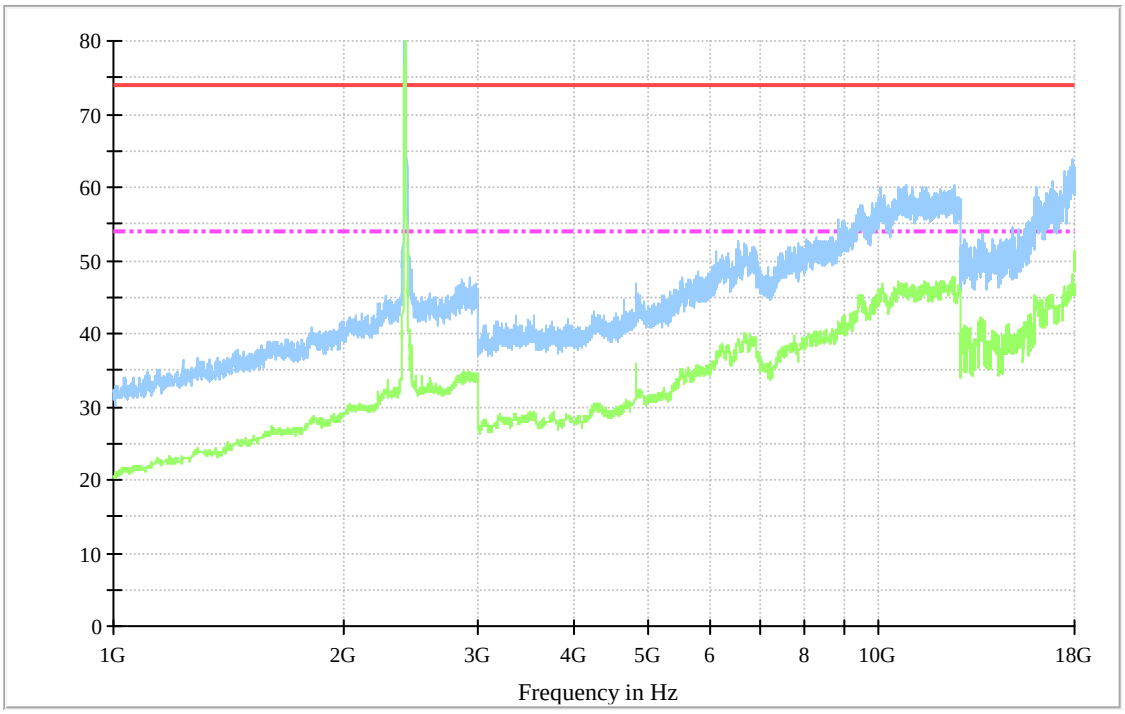
Level in dBµV/m



Final quasi-peak measurement result:

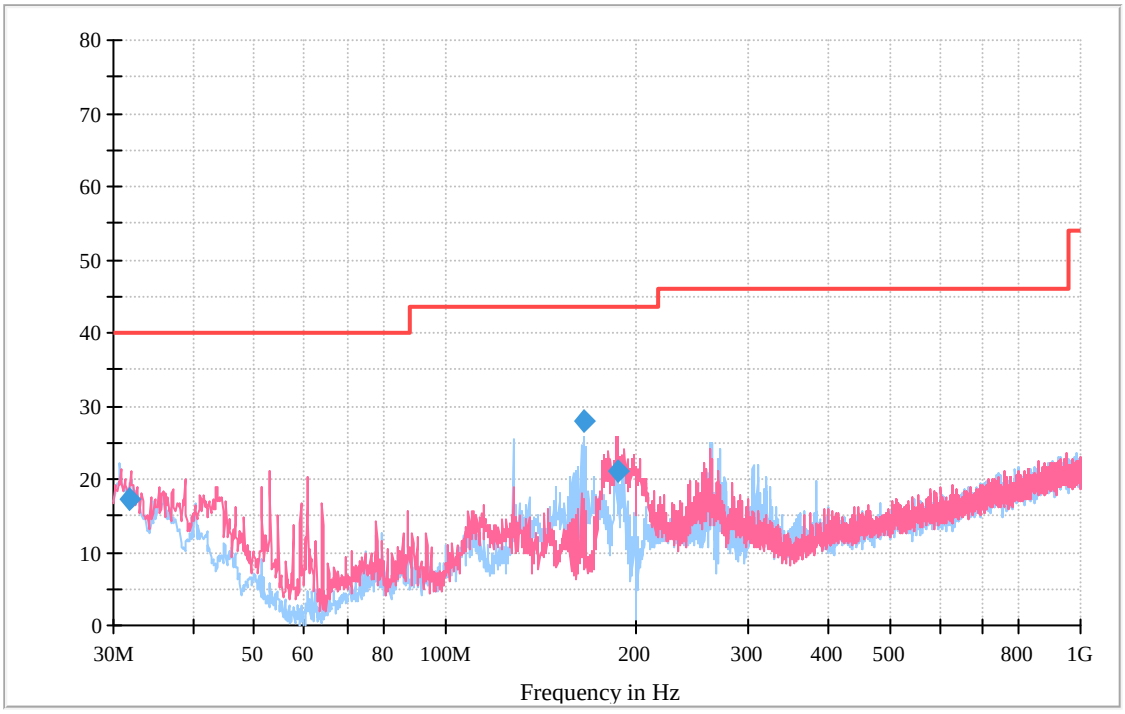
Frequency (MHz)	QuasiPeak (dBµV/m)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Margin (dB)	Limit (dBµV/m)
31.080000	18.2	120.000	119.0	H	12.0	21.80	40.00
127.985711	26.7	120.000	142.0	H	18.0	16.80	43.50
165.080261	28.0	120.000	150.0	H	44.0	15.50	43.50

Figure 8: Spurious emission measurement results, DC power supply, low channel, 1-18GHz, vertical and horizontal polarization



Final measurement result:
The margin is more than 6dB.
Note: At the frequency from 18GHz-26GHz, no emission was found above the background noise.

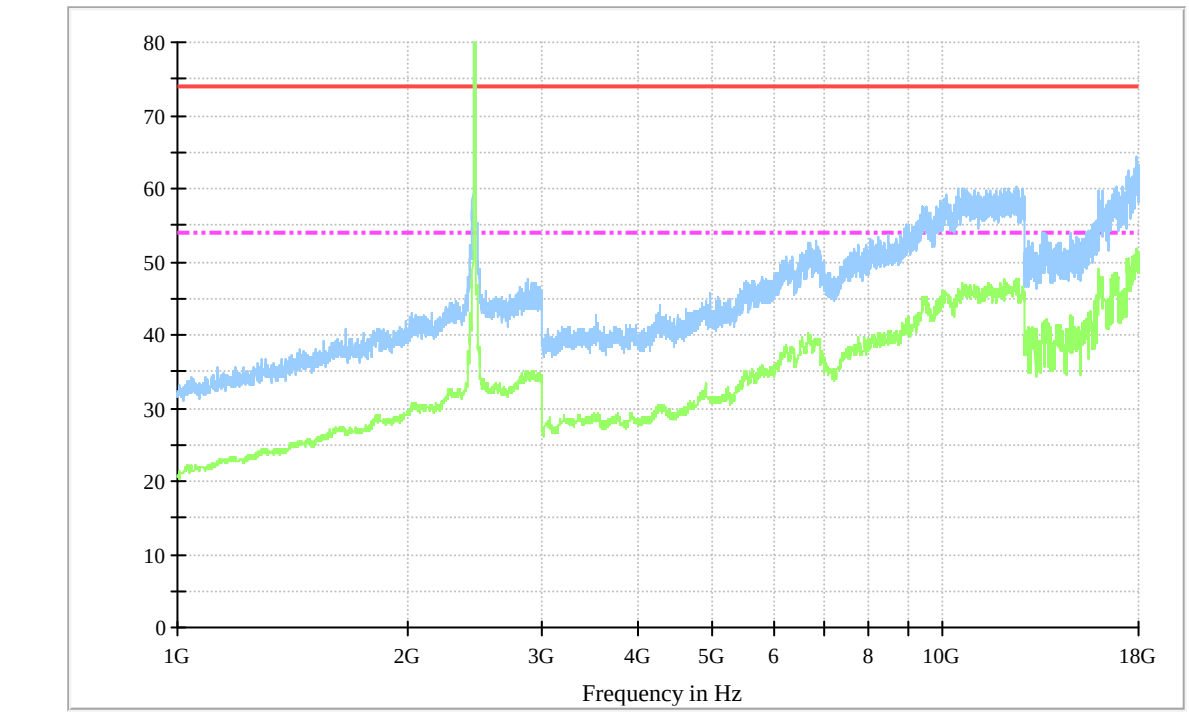
Figure 9: Spurious emission measurement results, DC power supply, mid channel, 30-1000MHz, vertical and horizontal polarization



Final quasi-peak measurement result:

Frequency (MHz)	QuasiPeak (dBµV/m)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Margin (dB)	Limit (dBµV/m)
31.740000	17.4	120.000	100.0	H	22.0	22.60	40.00
165.020261	27.9	120.000	150.0	H	45.0	15.60	43.50
186.790741	21.1	120.000	100.0	V	41.0	22.40	43.50

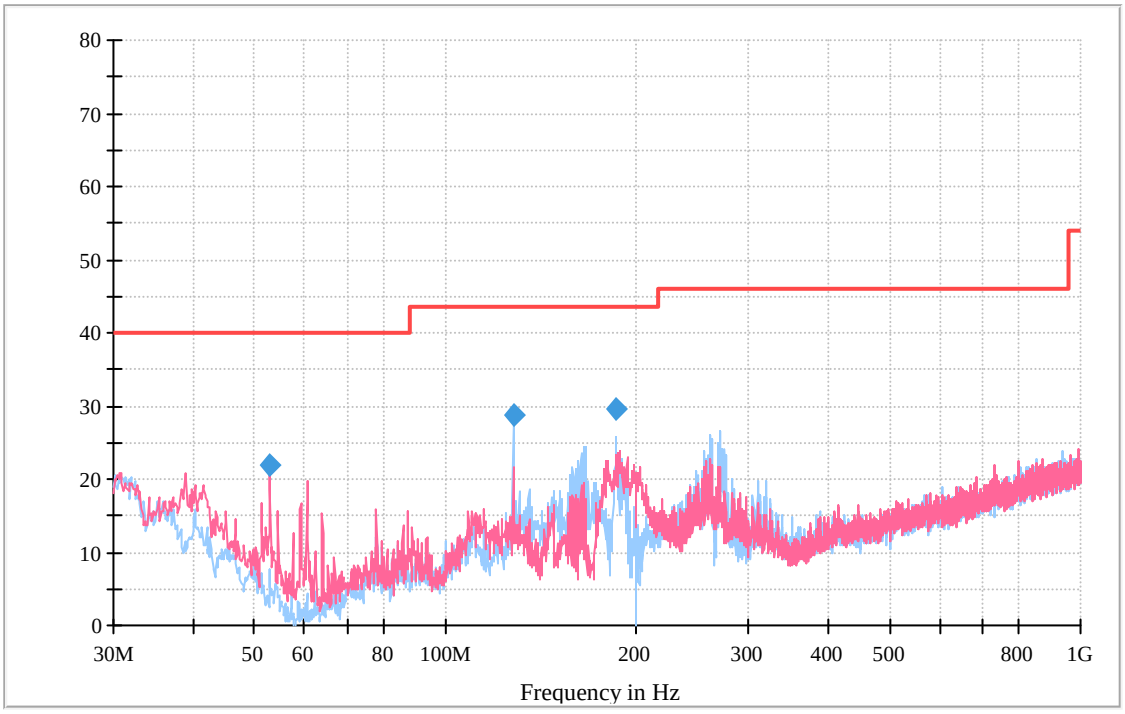
Figure 10: Spurious emission measurement results, DC power supply, mid channel, 1-18GHz, vertical and horizontal polarization



Final measurement result:
The margin is more than 6dB.
Note: At the frequency from 18GHz-26GHz, no emission was found above the background noise.

Figure 11: Spurious emission measurement results, DC power supply, high channel, 30MHz-1GHz, vertical and horizontal polarization

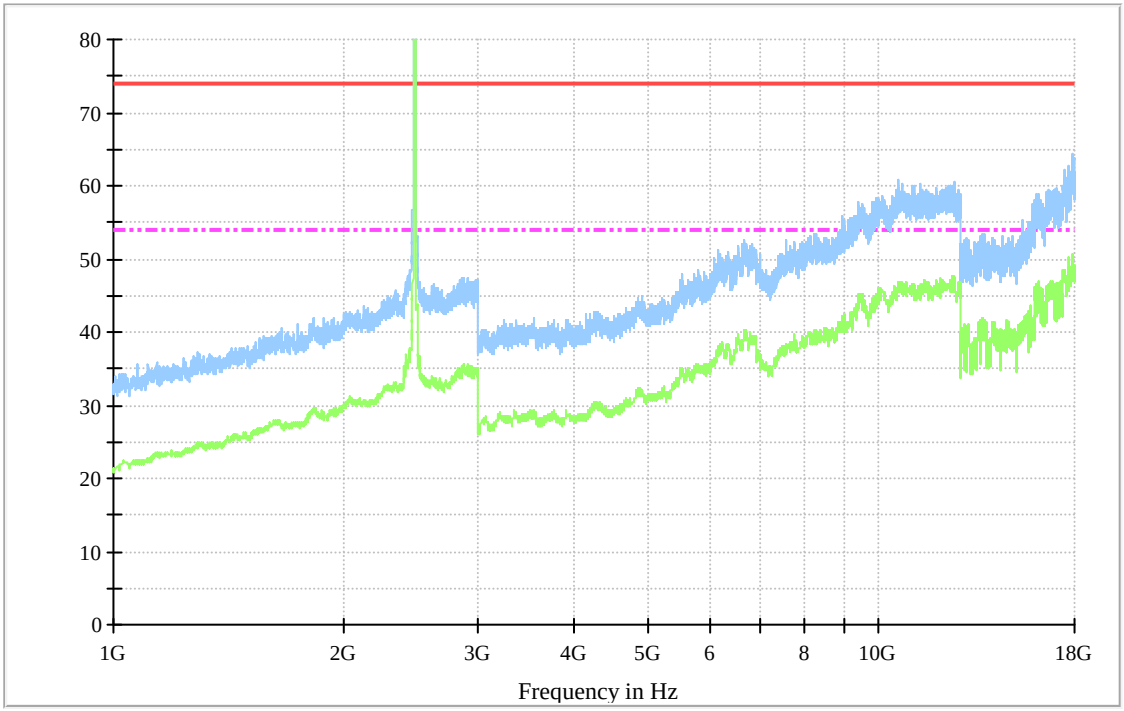
Level in dBµV/m



Final quasi-peak measurement result:

Frequency (MHz)	QuasiPeak (dBµV/m)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Margin (dB)	Limit (dBµV/m)
52.905731	21.8	120.000	100.0	V	22.0	18.20	40.00
127.985711	28.7	120.000	150.0	H	2.0	14.80	43.50
185.230741	29.7	120.000	126.0	H	45.0	13.80	43.50

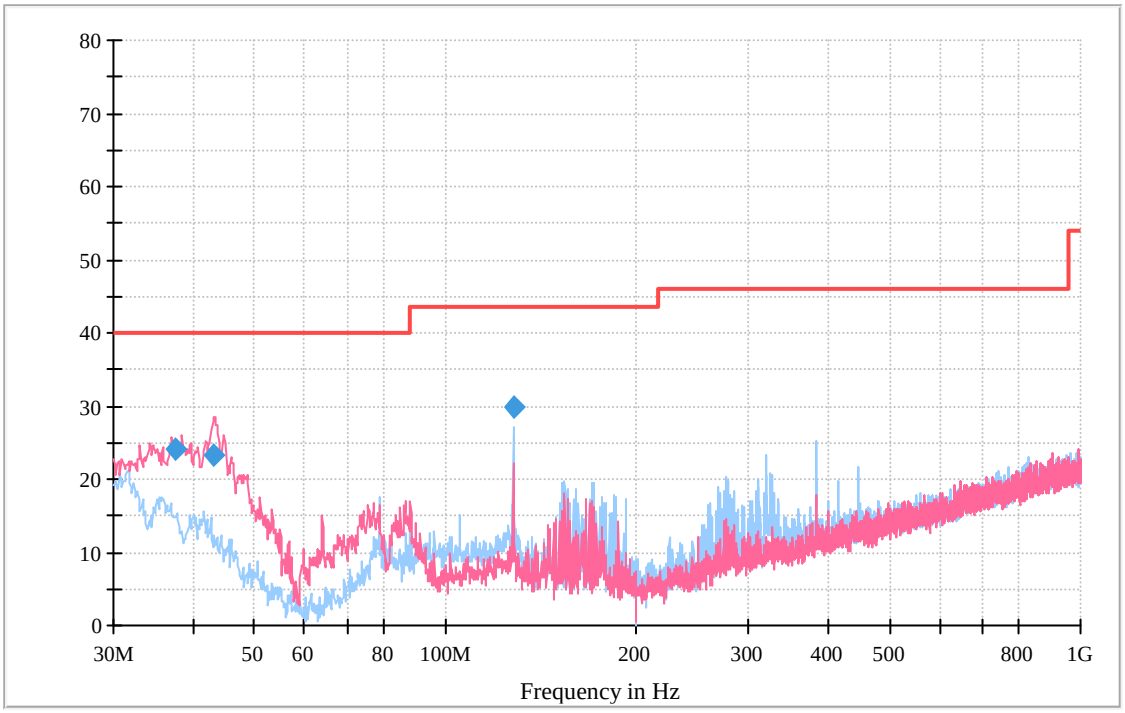
Figure 12: Spurious emission measurement results, DC power supply, high channel, 1-18GHz, vertical and horizontal polarization



Final measurement result:
The margin is more than 6dB.
Note: At the frequency from 18GHz-26GHz, no emission was found above the background noise.

Figure 13: Spurious emission measurement results, USB power supply, low channel, 30-1000MHz, vertical and horizontal polarization

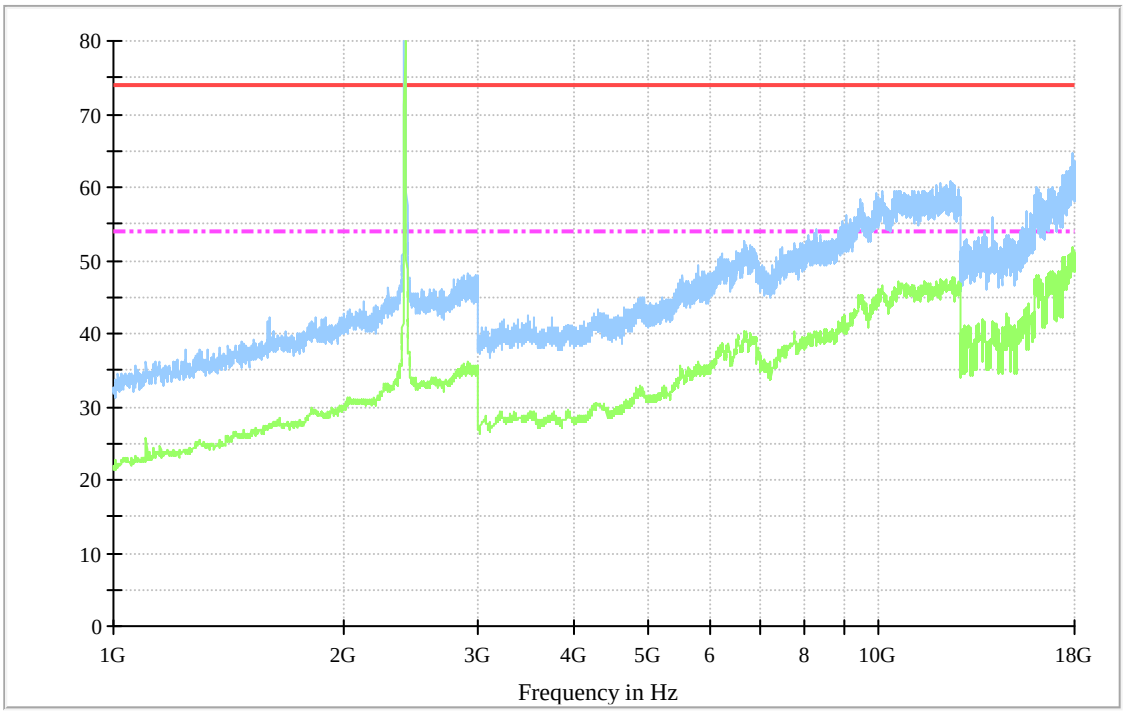
Level in dBµV/m



Final quasi-peak measurement result:

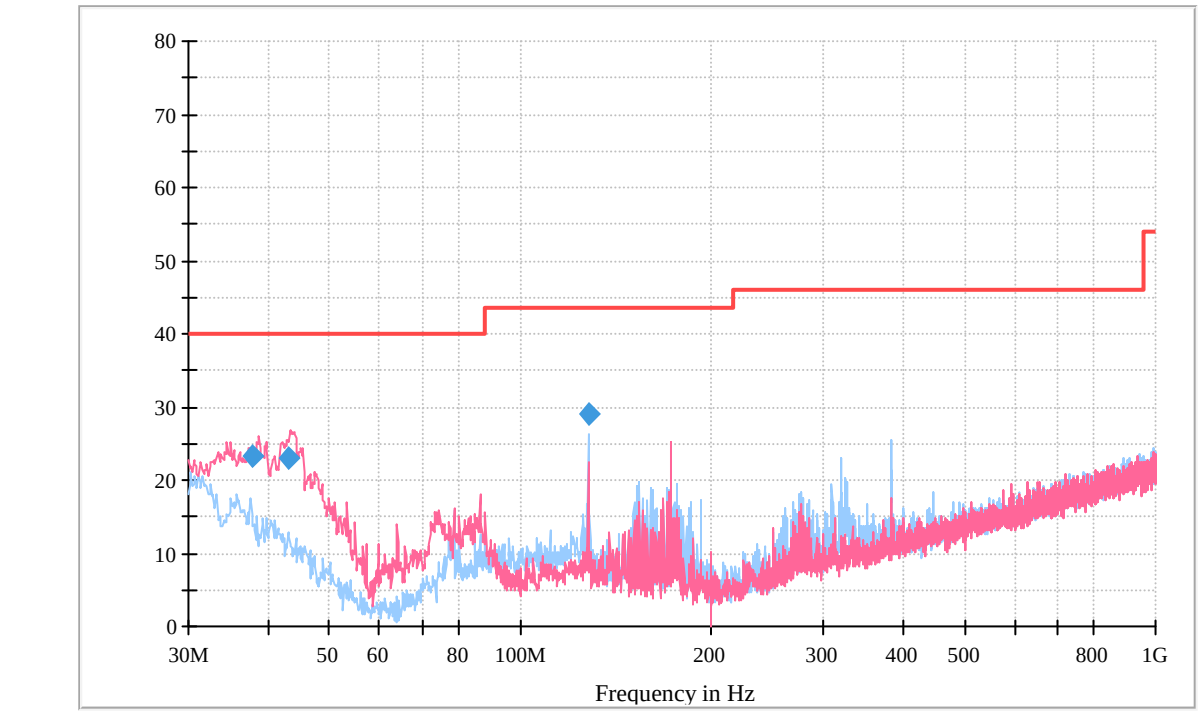
Frequency (MHz)	QuasiPeak (dBµV/m)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Margin (dB)	Limit (dBµV/m)
37.706834	24.2	120.000	100.0	V	2.0	15.80	40.00
43.126653	23.3	120.000	100.0	V	29.0	16.70	40.00
127.985711	29.8	120.000	150.0	H	15.0	13.70	43.50

Figure 14: Spurious emission measurement results, USB power supply, low channel, 1-18GHz, vertical and horizontal polarization



Final measurement result:
The margin is more than 6dB.
Note: At the frequency from 18GHz-26GHz, no emission was found above the background noise.

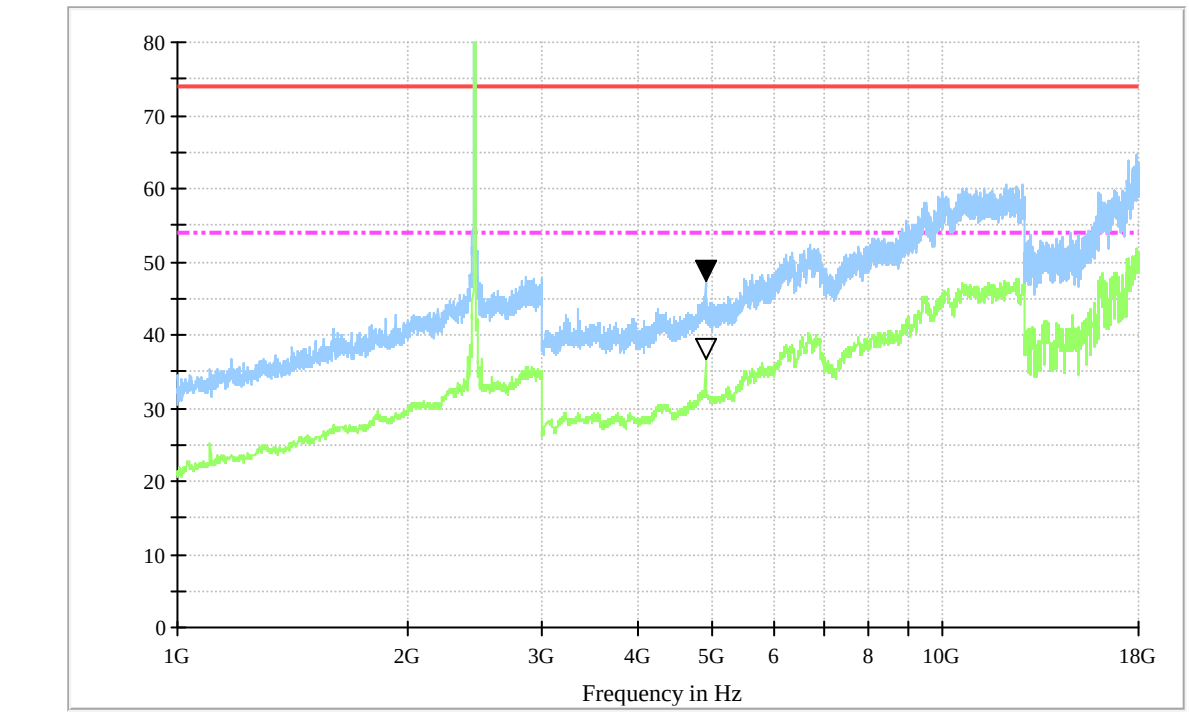
Figure 15: Spurious emission measurement results, USB power supply, mid channel, 30-1000MHz, vertical and horizontal polarization



Final quasi-peak measurement result:

Frequency (MHz)	QuasiPeak (dBµV/m)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Margin (dB)	Limit (dBµV/m)
37.717395	23.3	120.000	100.0	V	1.0	16.70	40.00
43.066653	23.0	120.000	100.0	V	20.0	17.00	40.00
127.985711	29.0	120.000	150.0	H	17.0	14.50	43.50

Figure 16: Spurious emission measurement results, USB power supply, mid channel, 1-18GHz, vertical and horizontal polarization



Final measurement result:

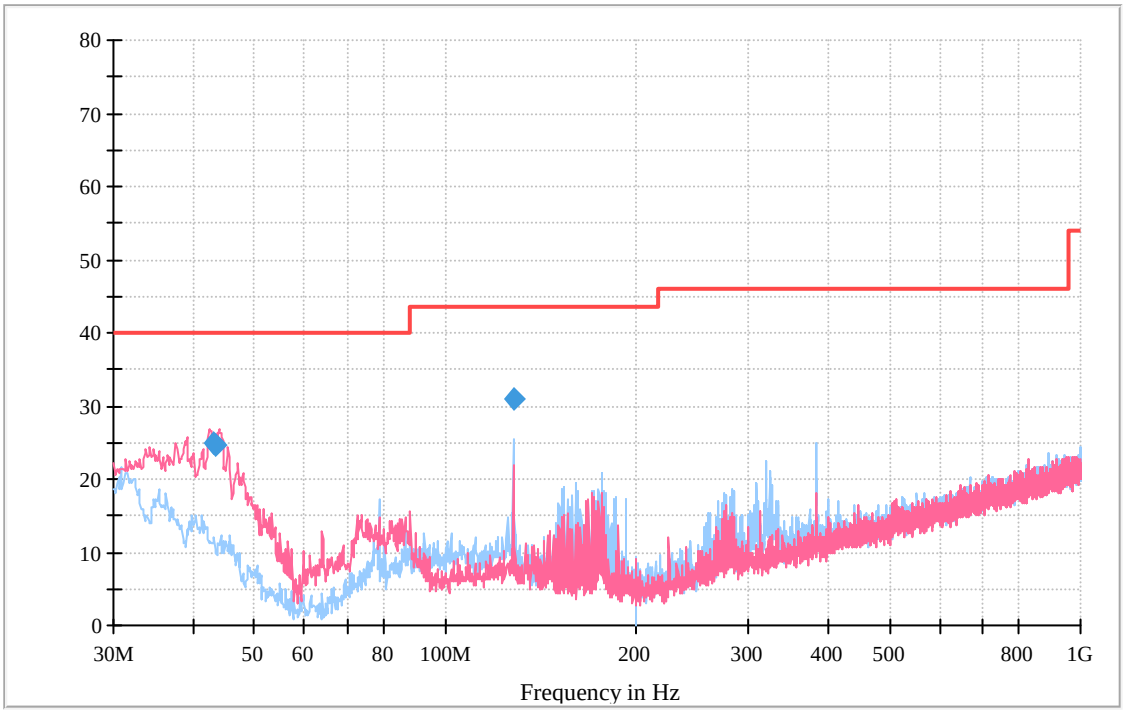
Frequency (MHz)	MaxPeak (dBµV/m)	Height (cm)	Polarization	Azimuth (deg)	Margin (dB)	Limit (dBµV/m)
4891.082164	47.688	100.0	H	90.0	26.312	74.00

Frequency (MHz)	Average (dBµV/m)	Height (cm)	Polarization	Azimuth (deg)	Margin (dB)	Limit (dBµV/m)
4891.082164	36.866	100.0	H	90.0	17.134	54.00

Note: At the frequency from 18GHz-26GHz, no emission was found above the background noise.

Figure 17: Spurious emission measurement results, USB power supply, high channel, 30MHz-1GHz, vertical and horizontal polarization

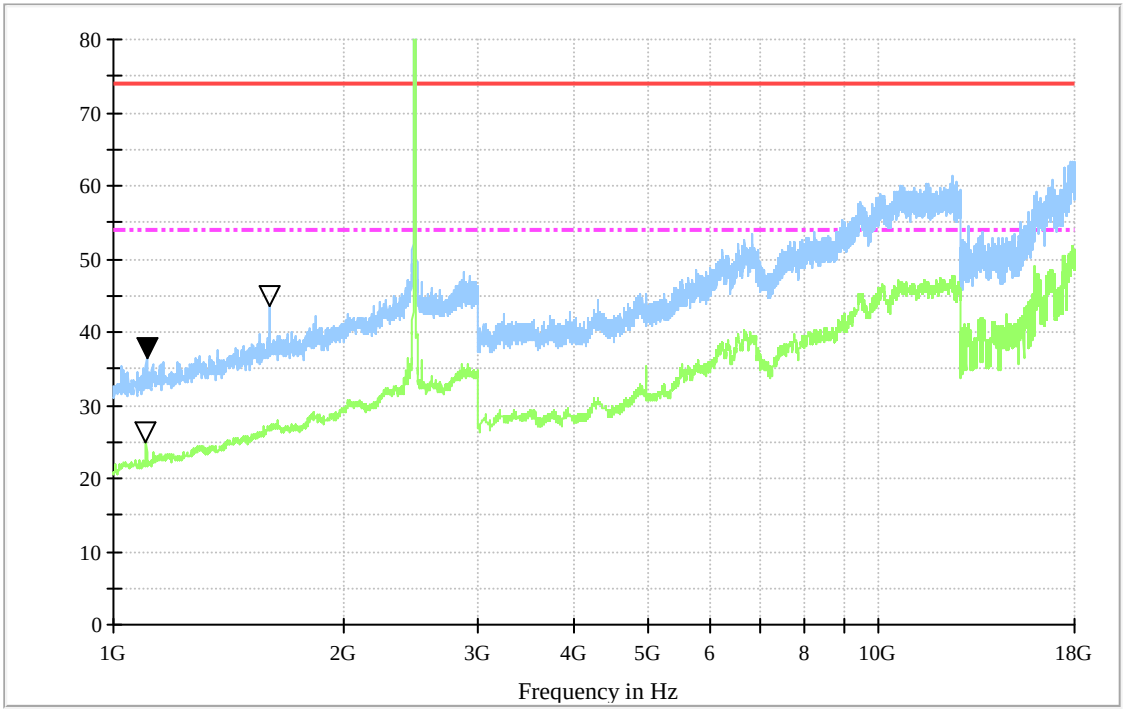
Level in dBµV/m



Final quasi-peak measurement result:

Frequency (MHz)	QuasiPeak (dBµV/m)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Margin (dB)	Limit (dBµV/m)
43.244970	24.9	120.000	100.0	V	24.0	15.10	40.00
43.468056	24.6	120.000	100.0	V	44.0	15.40	40.00
127.985711	30.9	120.000	150.0	H	14.0	12.60	43.50

Figure 18: Spurious emission measurement results, USB power supply, high channel, 1-18GHz, vertical and horizontal polarization



Final measurement result:

Frequency (MHz)	MaxPeak (dBµV/m)	Height (cm)	Polarization	Azimuth (deg)	Margin (dB)	Limit (dBµV/m)
1104.609219	36.705	100.0	H	90.0	37.295	74.00
1596.993988	43.927	100.0	V	180	30.073	74.00

Frequency (MHz)	Average (dBµV/m)	Height (cm)	Polarization	Azimuth (deg)	Margin (dB)	Limit (dBµV/m)
1103.707415	25.192	100.0	H	90.0	28.808	54.00

Note: At the frequency from 18GHz-26GHz, no emission was found above the background noise.

Band Edge measurement results

No significant harmonic emissions was detected at the lower (2390MHz) and upper (2483.5MHz) restricted band.

4.1.7 Conducted emissions

RESULT: **Passed**

Date of testing	:	2013-03-26
Test standard	:	FCC Part 15.207(a)
Basic standard	:	ANSI C63.10: 2009
Frequency range	:	0.15 – 30MHz
Limits	:	FCC Part 15.207(a)
Kind of test site	:	Shield room

Test setup

Input Voltage	:	AC 20V-30V (via transformer) and DC 5V (via USB)
Operation Mode	:	A
Earthing	:	Not Connected
Ambient temperature	:	23℃
Relative humidity	:	49%
Atmospheric pressure	:	100 kPa

The measurement setup was made in a shielded room.

The measurement equipment like test receivers, quasi-peak detector, average detector and LISN are in compliance with CISPR 16-1 series standards and ANSI C63.10-2009. The tested object was operated under its rated voltage and its rated frequency. Prior to the measurements the test object operated about 5 minutes (warm-up) in order to stabilize its operating conditions and to ensure reliable measurement values.

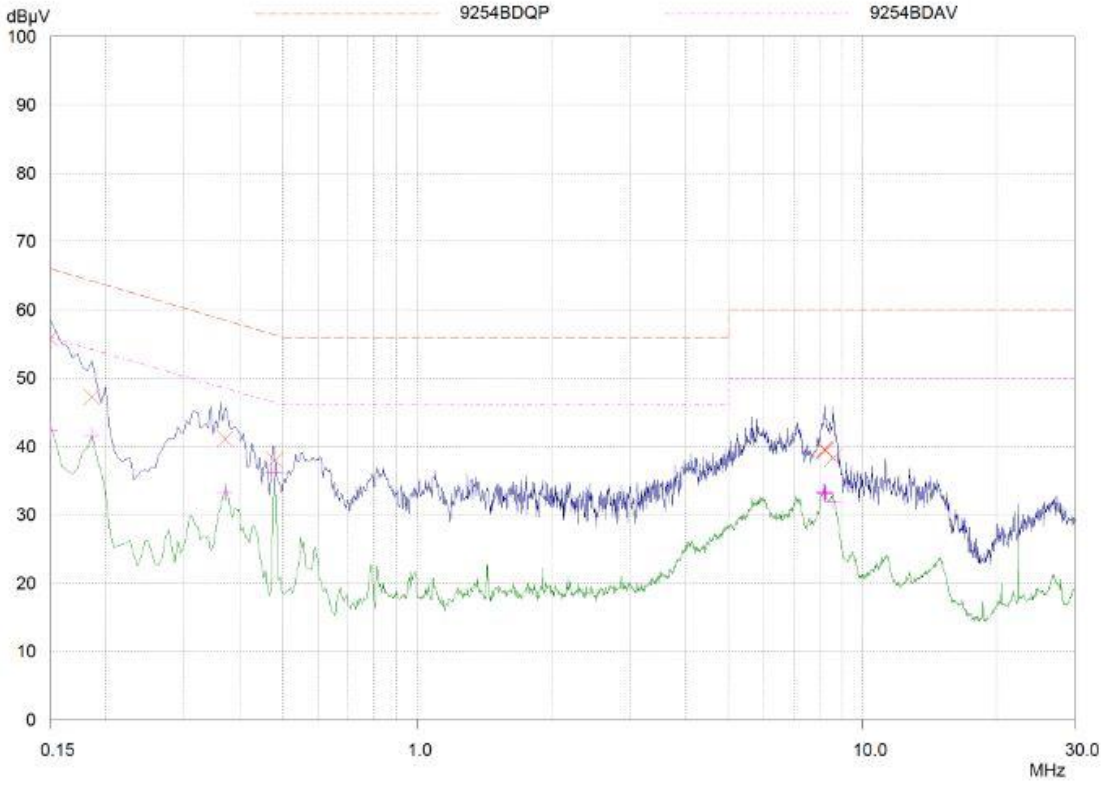
Furthermore an internal calibration with the test receiver was conducted prior to each measurement.

The EUT was set 0.8m away from the LISN. The cord longer than necessary to be connected to the LISN was folded forth and back parallel so as to form a bundle with a length between 0.3m and 0.4m.

The interference voltage was determined while measuring the line conductor by turns.

The following figures and tables were those measured by an automatic measuring system. A preview test was first made with peak detector. Final test with quasi-peak detector and average detector was only performed at these critical frequencies found via preview test.

Figure 19: Conducted emission measurement results, AC power line, Line L

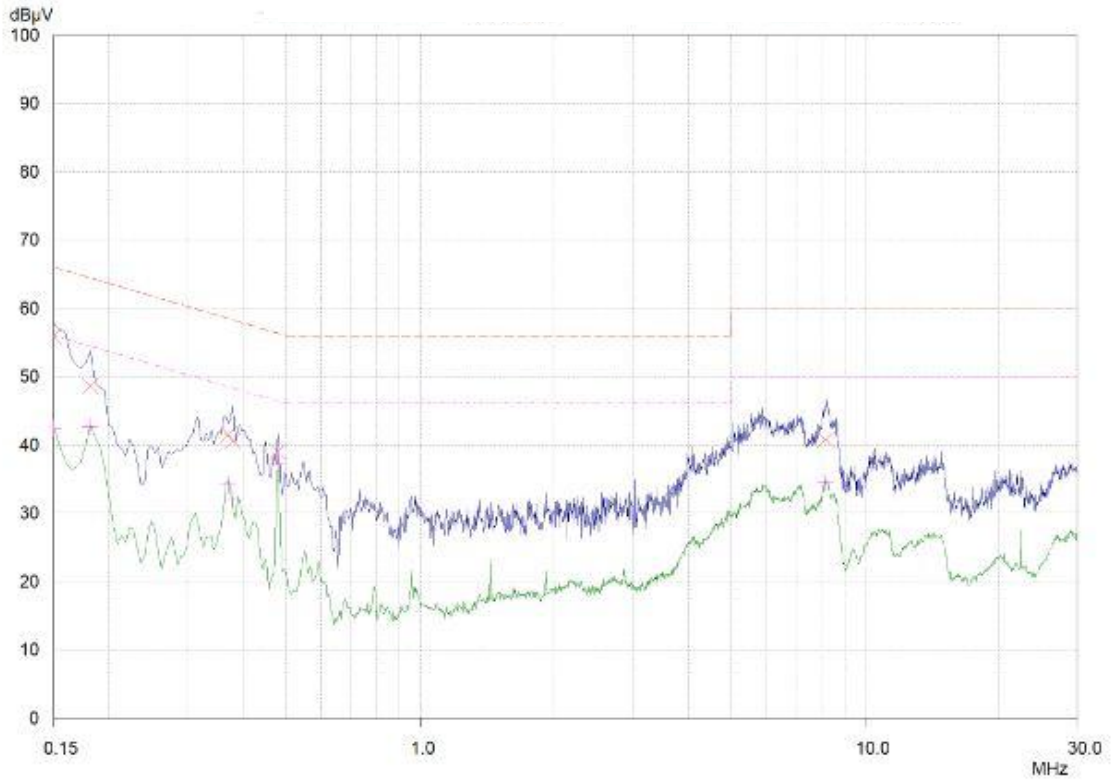


Final Measurement Results

Frequency MHz	QP Level dBµV	QP Limit dBµV	QP Delta dB	Phase -	PE -
0.15	55.78	66.00	10.22	L1	gnd
0.186	47.23	64.21	16.98	L1	gnd
0.3705	41.07	58.49	17.42	L1	gnd
0.4785	37.96	56.37	18.41	L1	gnd
8.1915	39.59	60.00	20.41	L1	gnd
8.214	39.47	60.00	20.53	L1	gnd
8.241	39.34	60.00	20.66	L1	gnd
8.5695	38.29	60.00	21.71	L1	gnd

Frequency MHz	AV Level dBµV	AV Limit dBµV	AV Delta dB	Phase -	PE -
0.15	42.23	56.00	13.77	L1	gnd
0.186	41.54	54.21	12.67	L1	gnd
0.3705	33.22	48.49	15.27	L1	gnd
0.4785	36.21	46.37	10.16	L1	gnd
8.1915	33.32	50.00	16.68	L1	gnd
8.214	33.24	50.00	16.76	L1	gnd
8.241	33.00	50.00	17.00	L1	gnd
8.5695	31.95	50.00	18.05	L1	gnd

Figure 20: Conducted emission measurement results, AC power line, Line N

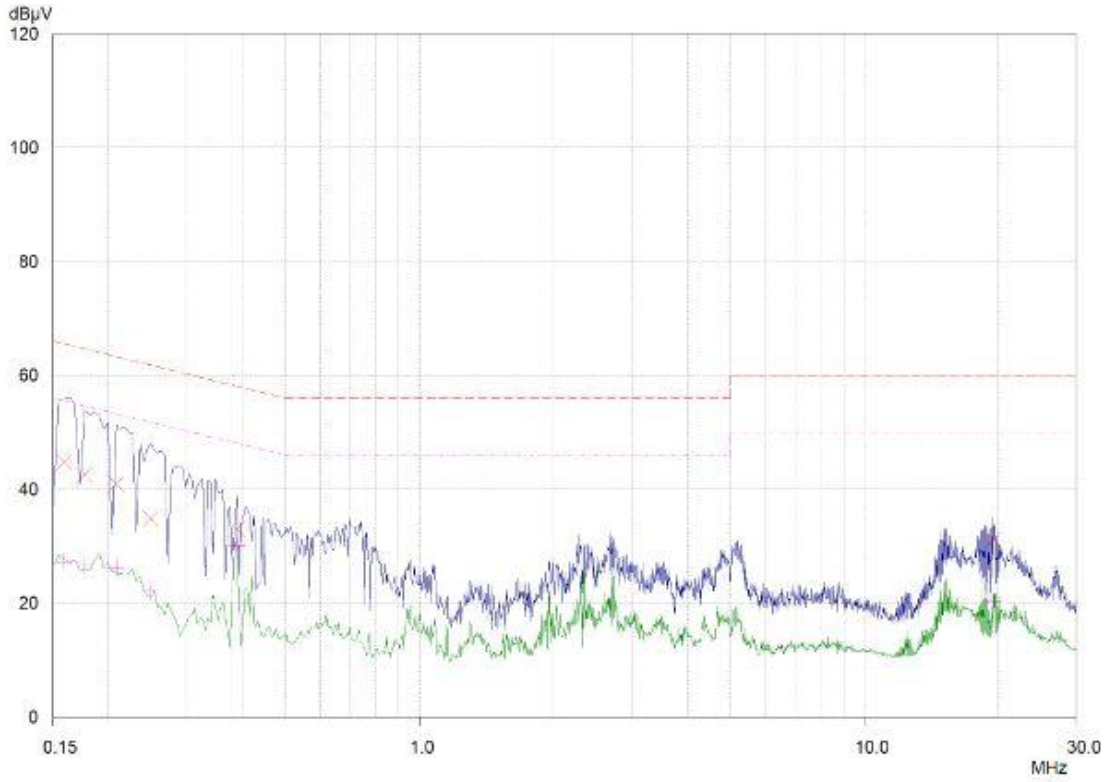


Final Measurement Results

Frequency MHz	QP Level dBµV	QP Limit dBµV	QP Delta dB	Phase -	PE -
0.15	55.90	66.00	10.10	N	gnd
0.1815	48.55	64.42	15.87	N	gnd
0.3705	41.45	58.49	17.04	N	gnd
0.3795	40.55	58.29	17.74	N	gnd
0.4785	39.00	56.37	17.37	N	gnd
8.151	40.71	60.00	19.29	N	gnd

Frequency MHz	AV Level dBµV	AV Limit dBµV	AV Delta dB	Phase -	PE -
0.15	42.33	56.00	13.67	N	gnd
0.1815	42.61	54.42	11.81	N	gnd
0.3705	34.05	48.49	14.44	N	gnd
0.3795	31.97	48.29	16.32	N	gnd
0.4785	37.10	46.37	9.27	N	gnd
8.151	34.38	50.00	15.62	N	gnd

Figure 21: Conducted emission measurement results, USB power supply



Final Measurement Results

Frequency MHz	QP Level dBµV	QP Limit dBµV	QP Delta dB	Phase -	PE -
0.159	44.75	65.52	20.77	L1	gnd
0.177	42.46	64.63	22.17	L1	gnd
0.2085	40.85	63.26	22.41	L1	gnd
0.249	34.79	61.79	27.00	L1	gnd
0.3885	32.93	58.10	25.17	L1	gnd
19.3695	31.14	60.00	28.86	L1	gnd

Frequency MHz	AV Level dBµV	AV Limit dBµV	AV Delta dB	Phase -	PE -
0.159	27.29	55.52	28.23	L1	gnd
0.177	26.54	54.63	28.09	L1	gnd
0.2085	26.06	53.26	27.20	L1	gnd
0.249	22.08	51.79	29.71	L1	gnd
0.3885	30.08	48.10	18.02	L1	gnd
19.3695	20.19	50.00	29.81	L1	gnd

4.2 Radio Frequency Exprosure Compliance

4.2.1 Electromagnetic Fields

RESULT: **Passed**

Date of testing	:	2014-03-25
Test standard	:	FCC KDB publication 447498

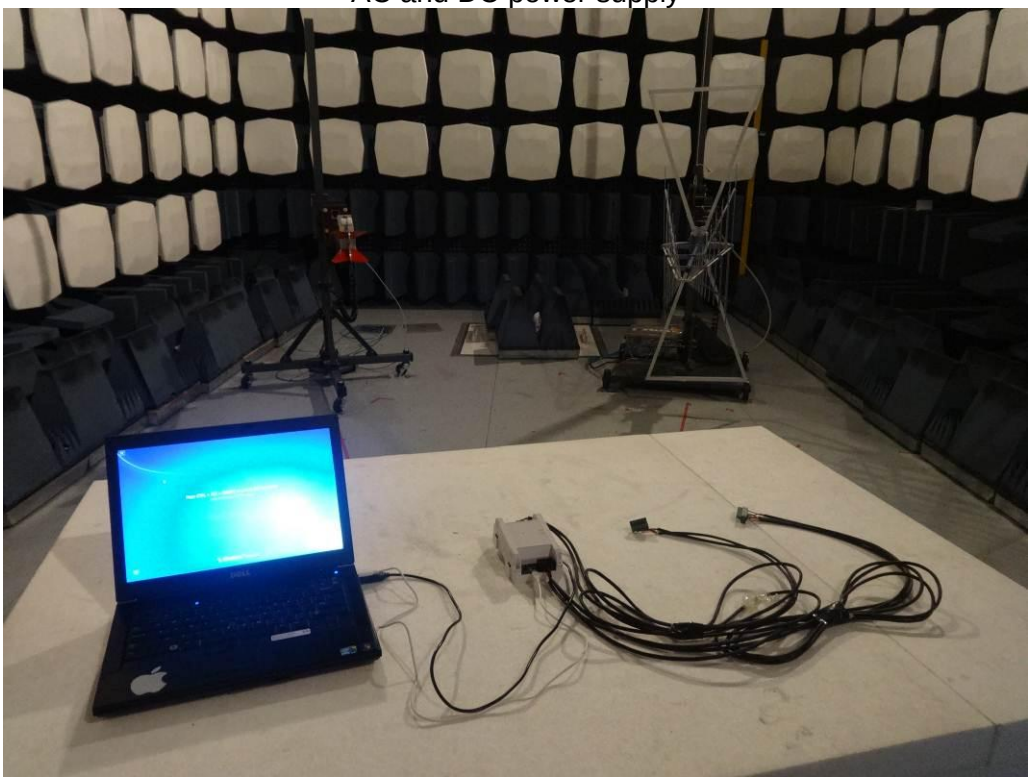
Test setup

As for normally used, the product is mounted in the wall or other similar place where the smallest operational separation distance is larger than 50mm, according to the test result of clause 4.1.2 of this report (the max. output power is 50.23 mW, which the SAR Test Exclusion Threshold for device operating at frequency 2.405GHz-2.475GHz is 96mW), and the FCC KDB publication 447498 D01 General RF Exposure Guidance v05r02, the EUT is exempted from routine SAR evaluation.

5. Photographs of the Test Set-Up

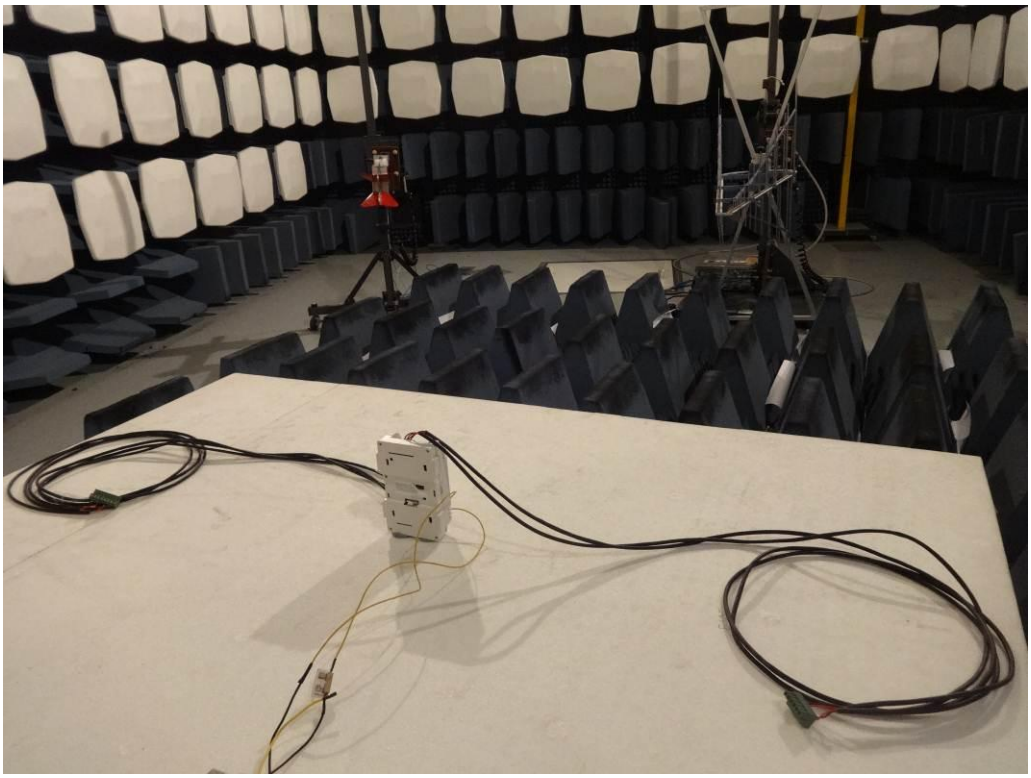
Photograph 1: Set-up for Radiated Spurious Emissions, below 1GHz

AC and DC power supply

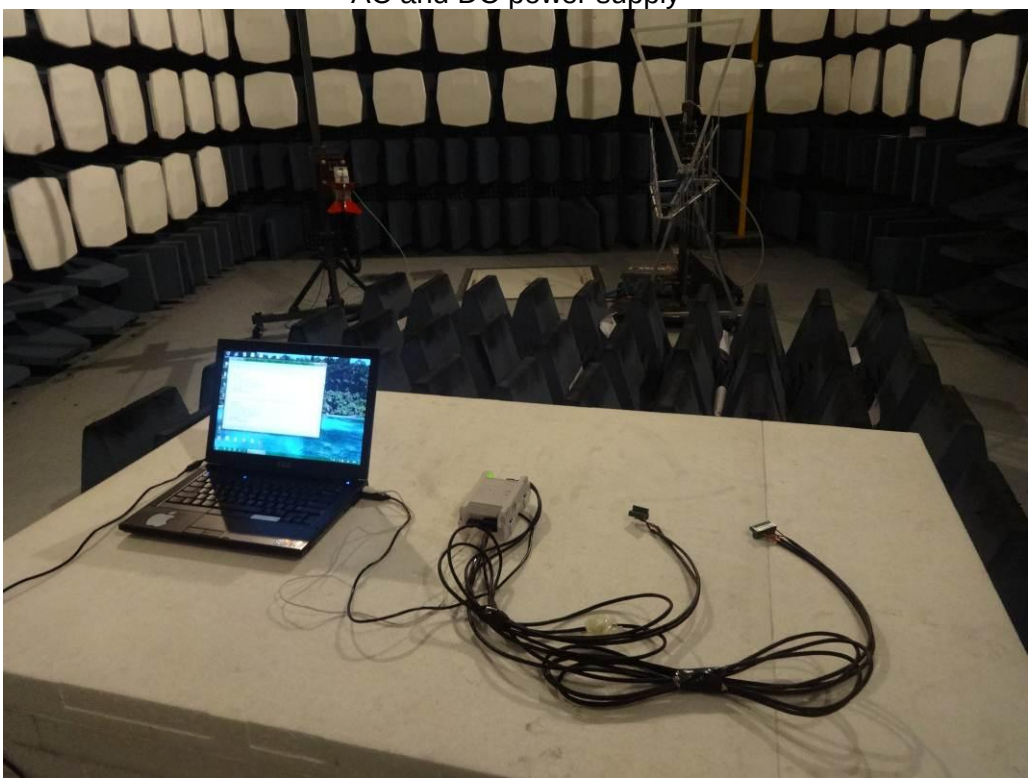


USB power supply

Photograph 2: Set-up for Spurious Emissions, above 1GHz

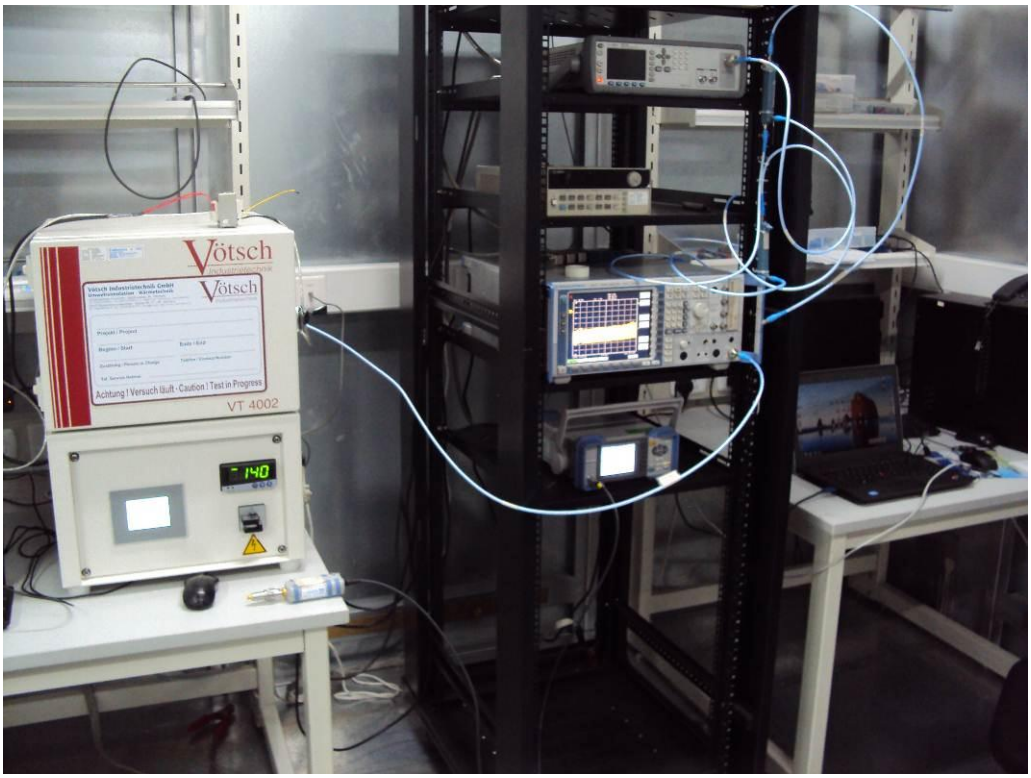


AC and DC power supply

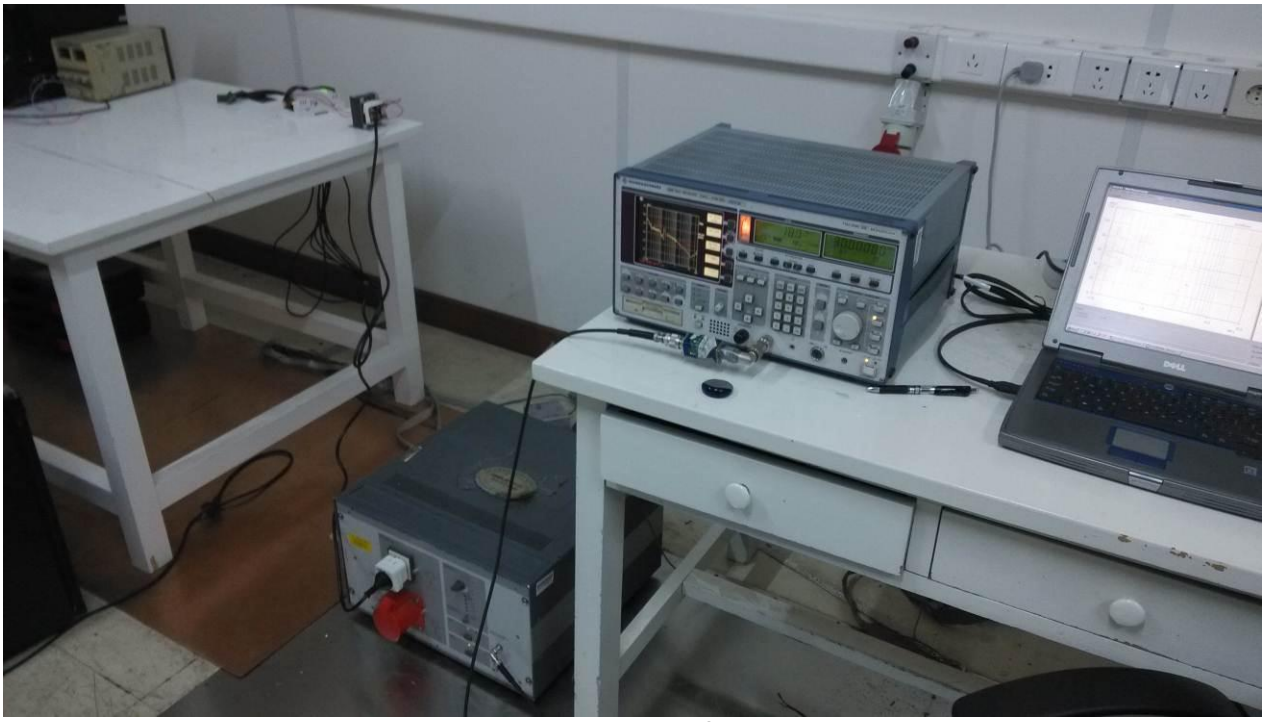


USB power supply

Photograph 3: Set-up for RF test



Photograph 4: Set-up for Condutied emission



AC power supply

USB power supply

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