



MEASUREMENT REPORT

FCC PART 15.231

FCC ID: 2AOQRTCRF-PTI4

APPLICANT: ENERGY MANAGEMENT SYSTEM CO., LTD

Application Type: Certification

Product: TAINET Transceiver Module

Model No.: TCRF-PTI4

Brand Name: 

FCC Classification: Part 15 Remote Control/Security Device Transmitter (DSR)

FCC Rule Part(s): Part 15.231

Test Procedure(s): ANSI C63.10-2013

Test Date: December 8 ~ 13, 2017

Tested By : *Peter Syu*
(Peter Syu)

Reviewed By : *Paddy Chen*
(Paddy Chen)

Approved By : *Chenz Ker*
(Chenz Ker)



The test results relate only to the samples tested.

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.10-2013. Test results reported herein relate only to the item(s) tested.

The test report shall not be reproduced except in full without the written approval of MRT Technology (Taiwan) Co., Ltd.

Revision History

Report No.	Version	Description	Issue Date	Note
1711TW0401-U1	1.0	Original Report	2017-12-20	

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§2.1033 General Information

Applicant	ENERGY MANAGEMENT SYSTEM CO., LTD
Applicant Address	No.8,Dali 3rd Rd.,Shanhua District, Southern Taiwan Science Park (STSP),Tainan City 741, Taiwan(R.O.C)
Manufacturer	ENERGY MANAGEMENT SYSTEM CO., LTD
Manufacturer Address	No.8,Dali 3rd Rd.,Shanhua District, Southern Taiwan Science Park (STSP),Tainan City 741, Taiwan(R.O.C)
Test Site	MRT Technology (Taiwan) Co., Ltd
Test Site Address	No. 38, Fuxing Second Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C)
Test Device Serial No.:	N/A ☐ Production ☒ Pre-Production ☐ Engineering

Test Facility / Accreditations

1. MRT facility is a FCC registered (Reg. No. 291082) test facility with the site description report on file and is designated by the FCC as an Accredited Test Film.
2. MRT facility is an IC registered (MRT Reg. No. 21723-1) test laboratory with the site description on file at Industry Canada.
3. MRT Lab is accredited to ISO 17025 by the Taiwan Accreditation Foundation (TAF Cert. No. 3261) in EMC, Telecommunications and Radio testing for FCC (Designation Number: TW3261), Industry Taiwan, EU and TELEC Rules.

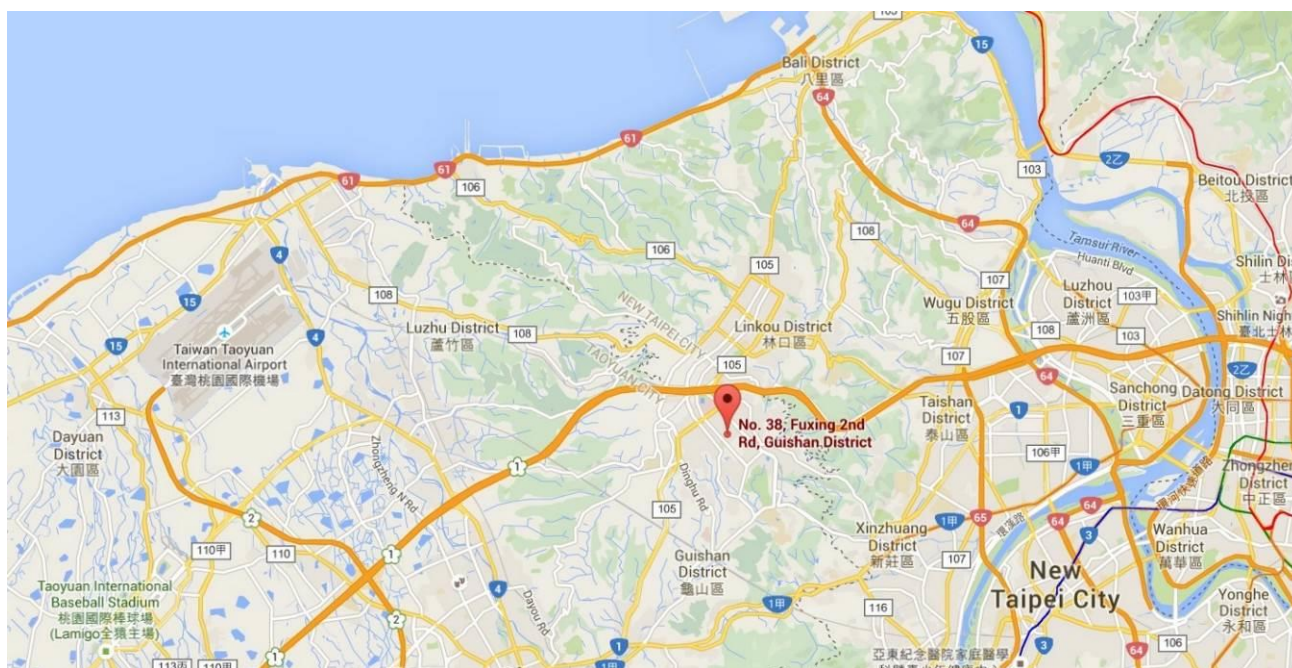
1. INTRODUCTION

1.1. Scope

Measurement and determination of electromagnetic emissions (EMC) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission and the Industry Canada Certification and Engineering Bureau.

1.2. MRT Test Location

The map below shows the location of the MRT LABORATORY, its proximity to the Taoyuan City. These measurement tests were conducted at the MRT Technology (Taiwan) Co., Ltd. Facility located at No.38, Fuxing 2nd Rd., Guishan Dist., Taoyuan City 33377, Taiwan (R.O.C).



2. PRODUCT INFORMATION

2.1. Equipment Description

Product Name	TAINET Transceiver Module
Model No.	TCRF-PTI4
Frequency Range	432.3 ~ 435.5MHz
Type of modulation	FSK
Antenna Type	Helical
Test Voltage	DC 3.6V by Battery (RFI/RFR), DC 5V by USB (RFD)
Max Power	79.23 dBuV/m

Note:

Since KDB 996369 D01, If the module is limited because it is not shielded, only the module grantee can make the test evaluation that the module is compliant in the host as below.

No.	Product Name	Model No.
1	RF USB Dongle	RFD
2	RF Transceiver Interface	RFI
3	RF Network Repeater	RFR

2.2. Test Standards

The following report is prepared on behalf of the **ENERGY MANAGEMENT SYSTEM CO., LTD** in accordance with FCC Part 15, Subpart C, and section 15.231, 15.203, 15.205 and 15.209 of the Federal Communication Commission rules.

The objective is to determine compliance with FCC Part 15, Subpart C, and section 15.231, 15.203, 15.205 and 15.209 of the Federal Communication Commission rules.

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product, which results in lowering the emission/immunity, should be checked to ensure compliance has been maintained.

2.3. Test Methodology

The measurement procedures described in the American National Standard for Testing Unlicensed Wireless Devices (ANSI C63.10-2013).

Deviation from measurement procedure.....None

2.4. EUT Setup and Test Mode

The EUT was operated at continuous transmitting mode that was for the purpose of the measurements. All testing shall be performed under maximum output power condition, and to measure its highest possible emissions level, more detailed description as follows:

Test Mode	
Mode 1	RFR Transmitting with FSK Modulation
Mode 2	RFI Transmitting with FSK Modulation
Mode 3	RFD Transmitting with FSK Modulation

Channel List	
Channel	Freq (MHz)
CH00	433.7
CH01	434.1
CH02	433.5
CH03	434.3
CH04	433.3
CH05	434.5
CH06	433.1
CH07	434.7
CH08	342.9
CH09	434.9
CH10	432.7
CH11	435.1
CH12	432.5
CH13	435.3
CH14 (Low Channel)	432.3
CH15 (Hight Channel)	435.5
CH16	433.9

3. ANTENNA REQUIREMENTS

Excerpt from §15.203 of the FCC Rules/Regulations:

“An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can 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 antenna of the **TAINET Transceiver Module** is permanently attached.
- There are no provisions for connection to an external antenna.

Conclusion:

The TAINET Transceiver Module unit complies with the requirement of §15.203.

4. TEST EQUIPMENT CALIBRATION DATA

Conducted Emissions – SR2

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
Two-Line V-Network	R&S	ENV216	MRTTWA00019	1 year	2018.03.15
Cable	Rosnol	N1C50-RG400-B 1C50-500CM	MRTTWE00013	1 year	2018.05.19
EMI Test Receiver	R&S	ESR3	MRTTWA00009	1 year	2018.03.16

Radiated Emissions – AC1

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
Broadband TRILOG Antenna	SCHWARZBECK	VULB 9162	MRTTWA00001	1 year	2018.05.14
EMI Test Receiver	R&S	ESR3	MRTTWA00009	1 year	2018.03.16
Active Loop Antenna	Schwarzbeck	FMZB 1519B	MRTTWA00002	1 year	2018.04.13
Broadband Horn antenna	SCHWARZBECK	BBHA 9120D	MRTTWA00003	1 year	2018.04.17
Breitband Hornantenna	Schwarzbeck	BBHA 9170	MRTTWA00004	1 year	2018.04.24
Broadband Amplifier	Schwarzbeck	BBV 9721	MRTTWA00006	1 year	2018.04.24
Broadband Preamplifier	SCHWARZBECK	BBV 9718	MRTTWA00005	1 year	2018.04.19
Cable	HUBERSUHNER	SF106	MRTTWA00010	1 year	2018.05.19
Cable	Rosnol	K1K50-UP0264- K1K50-4M	MRTTWA00012	1 year	2018.05.19

Conducted Test Equipment – SR2

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
Spectrum Analyzer	KEYSIGHT	N9010A	MRTTWA00012	1 year	2018.07.24
USB Wideband Power Sensor	KEYSIGHT	U2021XA	MRTTWA00015	1 year	2018.03.19

Test Software

Software	Version	Function
e3	9.160520a	EMI Test Software
EMI	V3	EMI Test Software

5. MEASUREMENT UNCERTAINTY

Where relevant, the following test uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k = 2$.

AC Conducted Emission Measurement – SR2
Measuring Uncertainty for a Level of Confidence of 95% ($U=2U_c(y)$): 150kHz–30MHz: 2.42dB
Conducted Measurement– SR1
Measuring Uncertainty for a Level of Confidence of 95% ($U=2U_c(y)$): 1.3dB
Radiated Emission Measurement – AC1
Measuring Uncertainty for a Level of Confidence of 95% ($U=2U_c(y)$): 4.22dB

6. TEST RESULT

6.1. Summary

Product Name: TAINET Transceiver Module

Applicant: TCRF-PTI4

FCC Part Section(s)	Test Description	Test Condition	Test Result
15.205 15.231(b)	Radiated Spurious Emissions	Radiated	Pass
15.231(c)	20dB Bandwidth		Pass
15.231(e)	Transmission Time		Pass
15.231(e)	Duty Cycle		Pass
15.207	AC Conducted Emissions 150kHz - 30MHz	Line Conducted	Pass

Notes:

- 1) All modes of operation and data rates were investigated. The test results shown in the following sections represent the worst case emissions.
- 2) The analyzer plots shown in this section were all taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables and attenuators used as part of the system to connect the EUT to the analyzer at all frequencies of interest.
- 3) The radiation measurements are performed in X, Y, Z axis positioning. Only the worst case is shown in the report.

6.2. Radiated Emissions

6.2.1. Standard Applicable

According to §15.231(b), the field strength of emissions from intentional radiators operated under this section shall not exceed the following:

Fundamental frequency (MHz)	Field strength of fundamental (microvolts/meter)	Field strength of spurious emissions (microvolts/meter)
40.66-40.70	2,250	225
70-130	1,250	125
130-174	1,250 to 3,750	125 to 375
174-260	3,750	375
260-470	13,750 to 12,500	1375 to 1,250
Above 470	12,500	1,250

The limits on the field strength of the spurious emissions in the above table are based on the fundamental frequency of the intentional radiator. Spurious emissions shall be attenuated to the average (or, alternatively, CISPR quasi-peak) limits shown in this table or to the general limits shown in §15.209, whichever limit permits a higher field strength.

The emission limit in this paragraph is based on measurement instrumentation employing an average detector. The provisions in §15.35 for limiting peak emissions apply. Spurious Radiated Emissions measurements start below or at the lowest crystal frequency.

Compliance with the provisions of §15.205 shall be demonstrated using the measurement instrumentation specified in that section.

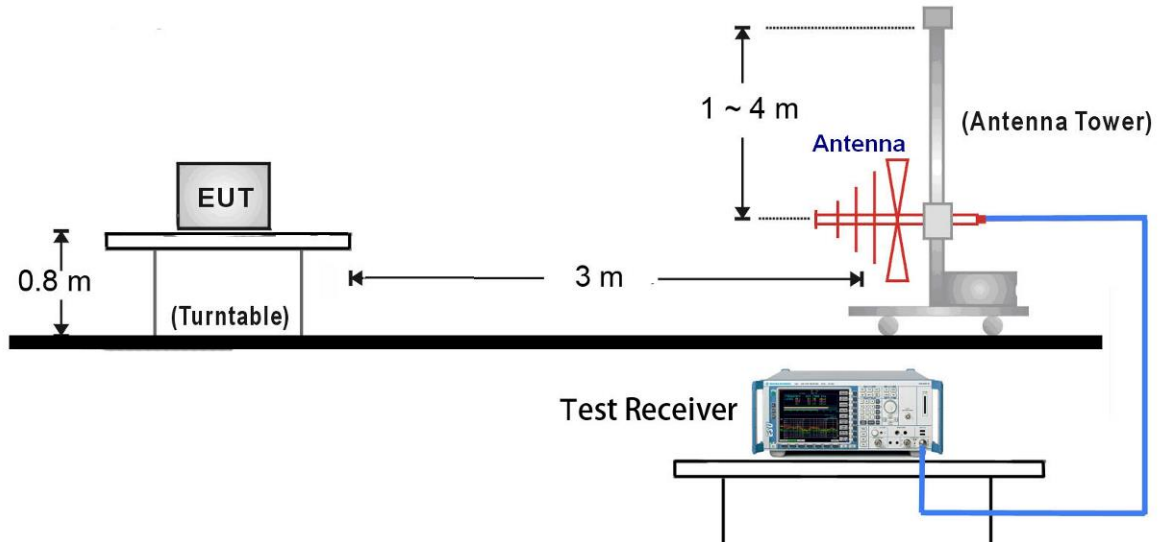
6.2.2. Test Procedure

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.231(b) and FCC Part 15.209 Limit.

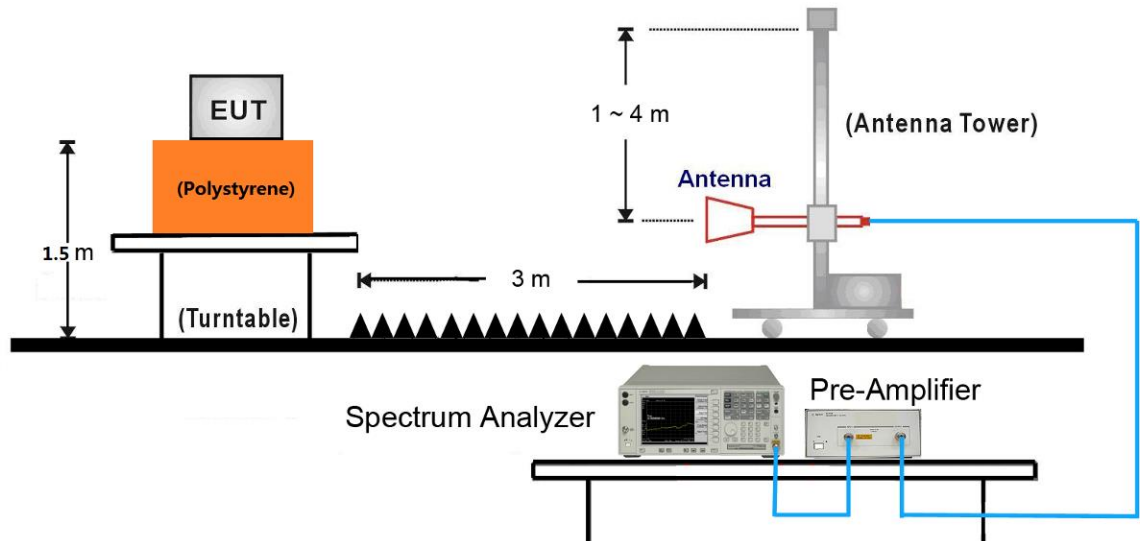
6.2.3. Test Setup

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.231(b) and FCC Part 15.209 Limit.

30MHz ~ 1GHz Test Setup:

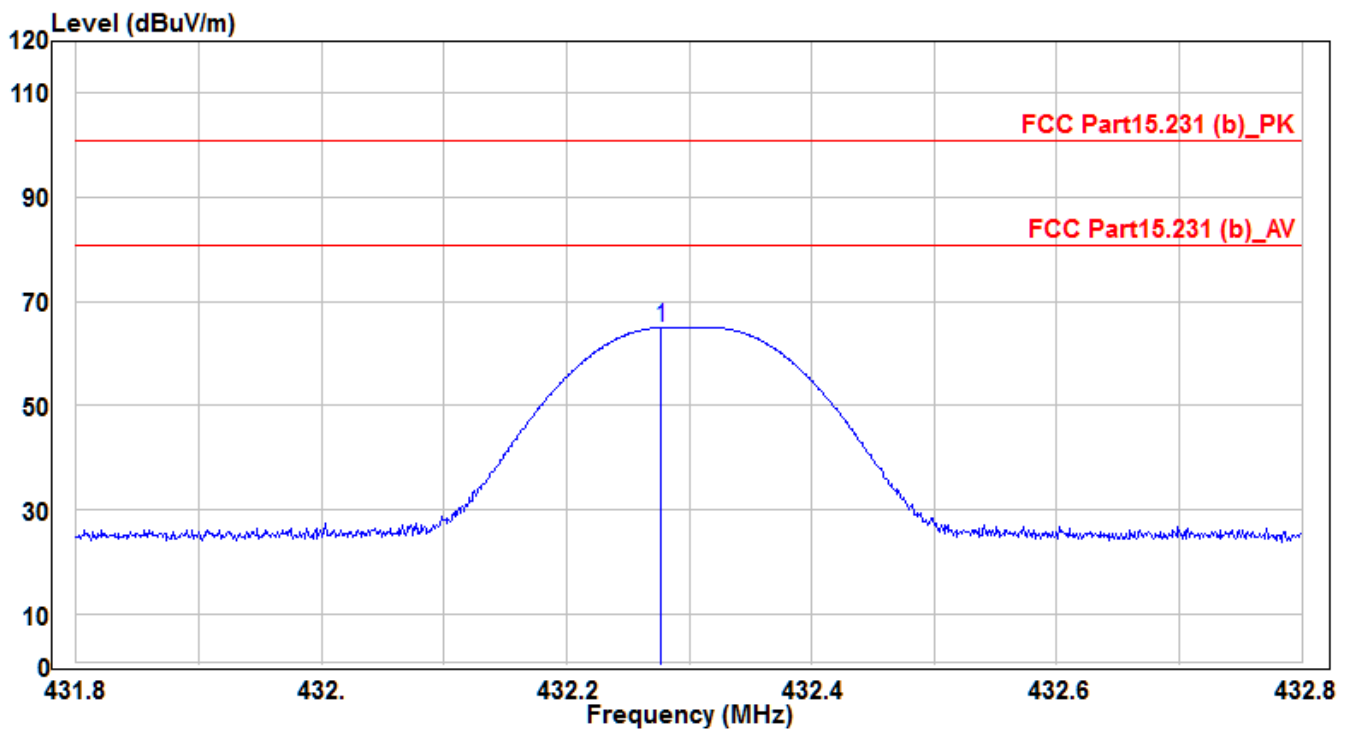


1GHz ~ 5GHz Test Setup:



6.2.4. Test Results

EUT	RF Network Repeater	Test Date	2017/12/14
Factor	VULB 9162 (30MHz~8GHz)	Temp. / Humidity	25°C / 60%
Polarity	Horizontal	Site / Engineer	AC1 / Peter
Test Mode	MODE1-CH14	Test Voltage	By Battery

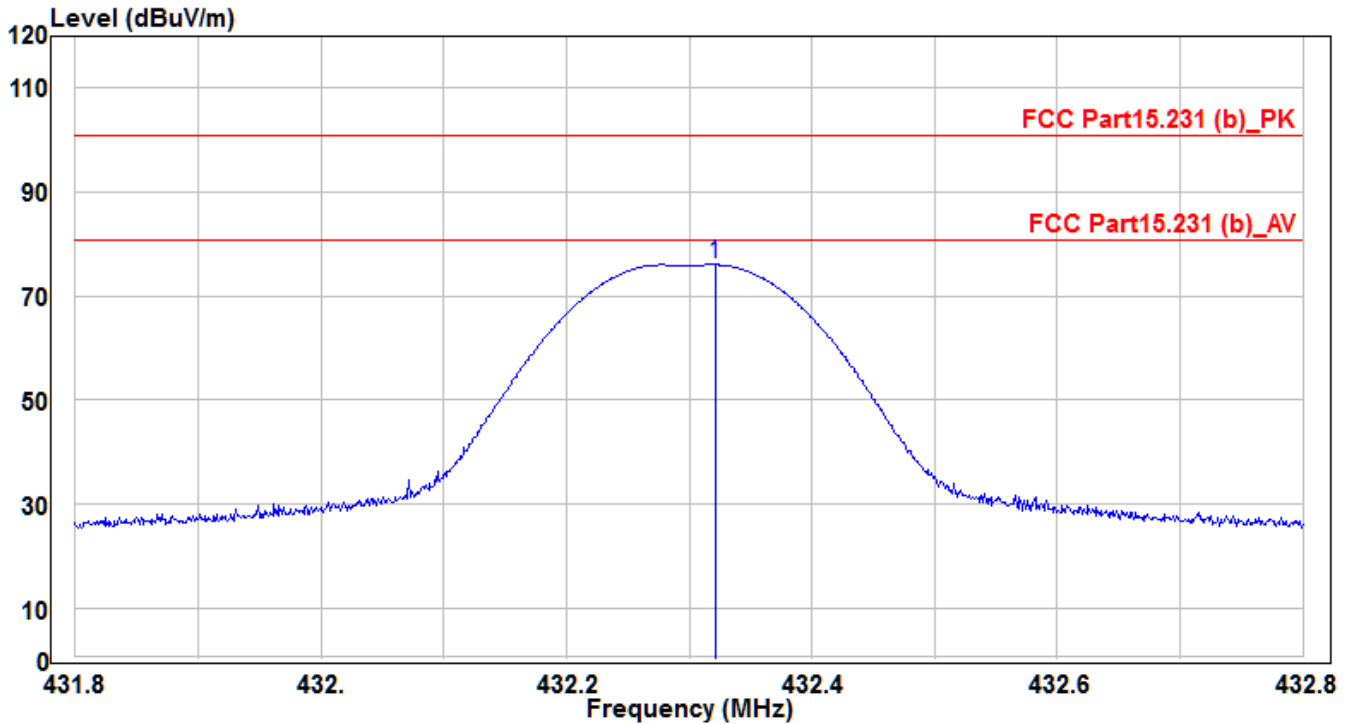


No		Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Height (cm)	Angle (deg)	Remark (QP/PK/AV)
1	*	432.277	40.2	24.76	64.96	-35.83	100.79	100	95	Peak

Note :

1. " * " means the worst value in this measurement data °
2. Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB) °
3. Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) °
4. The emission levels of other frequencies are very lower than the limit and not show in test report °
5. Other channel/mode was also verified. The test results shown represent the worst case emissions °
6. No emission found between lowest internal used/generated frequency to 30MHz °

EUT	RF Network Repeater	Test Date	2017/12/14
Factor	VULB 9162 (30MHz~8GHz)	Temp. / Humidity	25°C / 60%
Polarity	Vertical	Site / Engineer	AC1 / Peter
Test Mode	MODE1-CH14	Test Voltage	By Battery

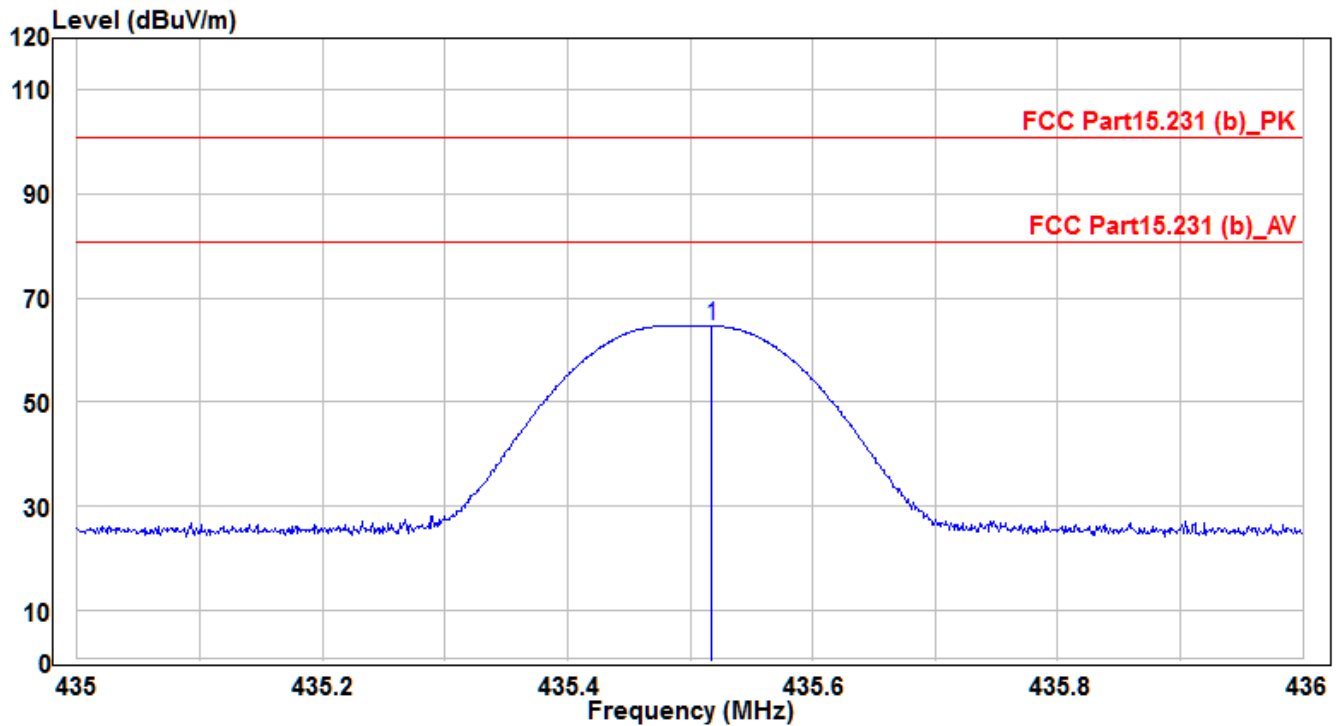


No		Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Height (cm)	Angle (deg)	Remark (QP/PK/AV)
1	*	432.321	51.29	24.76	76.05	-24.74	100.79	100	400	Peak

Note :

1. " * " means the worst value in this measurement data °
2. Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB) °
3. Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) °
4. The emission levels of other frequencies are very lower than the limit and not show in test report °
5. Other channel/mode was also verified. The test results shown represent the worst case emissions °
6. No emission found between lowest internal used/generated frequency to 30MHz °

EUT	RF Network Repeater	Test Date	2017/12/14
Factor	VULB 9162 (30MHz~8GHz)	Temp. / Humidity	25°C / 60%
Polarity	Horizontal	Site / Engineer	AC1 / Peter
Test Mode	MODE1-CH15	Test Voltage	By Battery

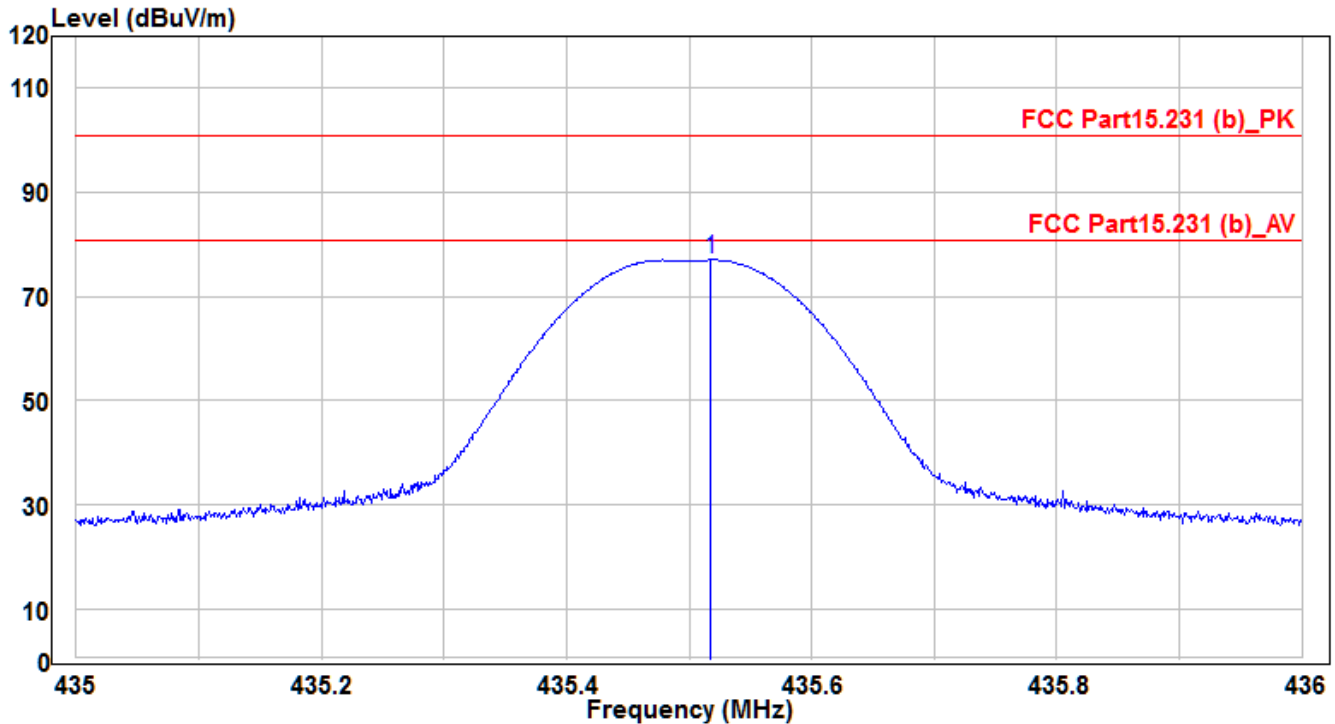


No		Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Height (cm)	Angle (deg)	Remark (QP/PK/AV)
1	*	435.518	39.79	24.82	64.61	-36.18	100.79	100	80	Peak

Note :

1. " * " means the worst value in this measurement data °
2. Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB) °
3. Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) °
4. The emission levels of other frequencies are very lower than the limit and not show in test report °
5. Other channel/mode was also verified. The test results shown represent the worst case emissions °
6. No emission found between lowest internal used/generated frequency to 30MHz °

EUT	RF Network Repeater	Test Date	2017/12/14
Factor	VULB 9162 (30MHz~8GHz)	Temp. / Humidity	25°C / 60%
Polarity	Vertical	Site / Engineer	AC1 / Peter
Test Mode	MODE1-CH15	Test Voltage	By Battery

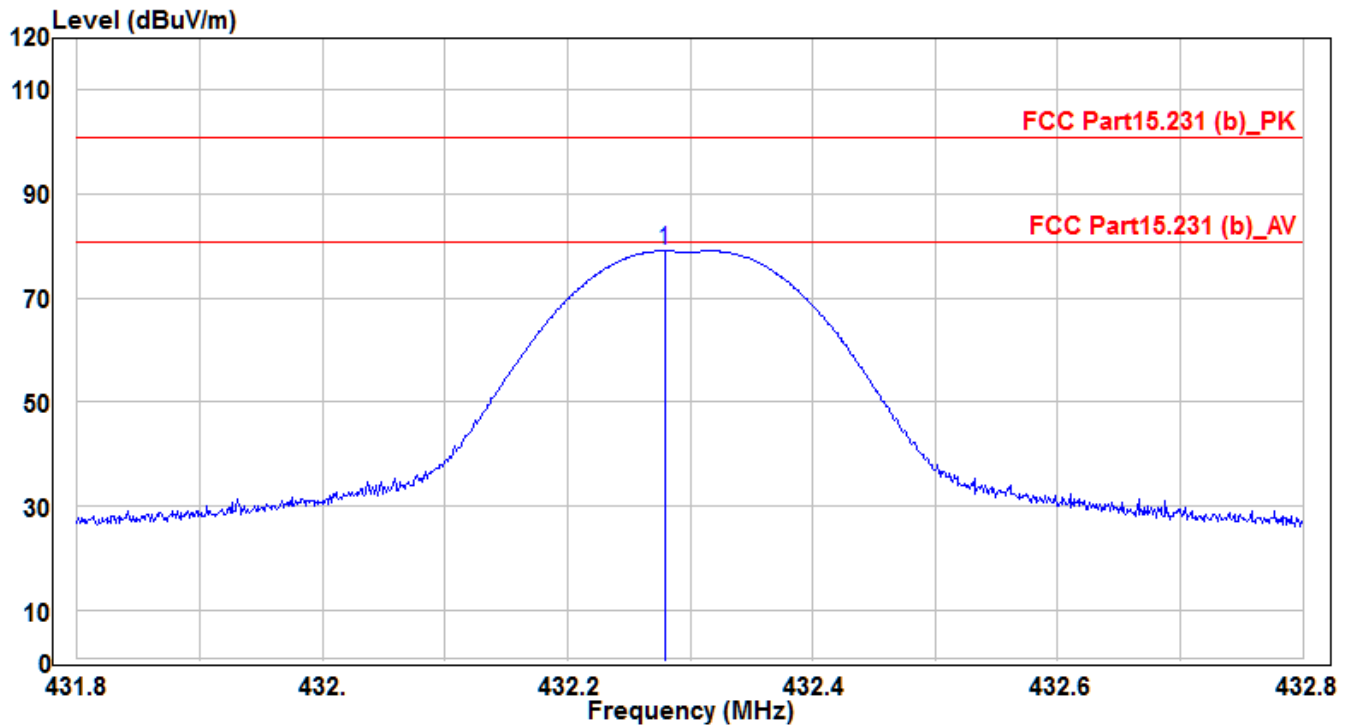


No		Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Height (cm)	Angle (deg)	Remark (QP/PK/AV)
1	*	435.518	52.19	24.82	77.01	-23.78	100.79	100	400	Peak

Note :

- "*" means the worst value in this measurement data °
- Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB) °
- Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) °
- The emission levels of other frequencies are very lower than the limit and not show in test report °
- Other channel/mode was also verified. The test results shown represent the worst case emissions °
- No emission found between lowest internal used/generated frequency to 30MHz °

EUT	RF Transceiver Interface	Test Date	2017/12/14
Factor	VULB 9162 (30MHz~8GHz)	Temp. / Humidity	25°C / 60%
Polarity	Horizontal	Site / Engineer	AC1 / Peter
Test Mode	MODE2-CH14	Test Voltage	By Battery

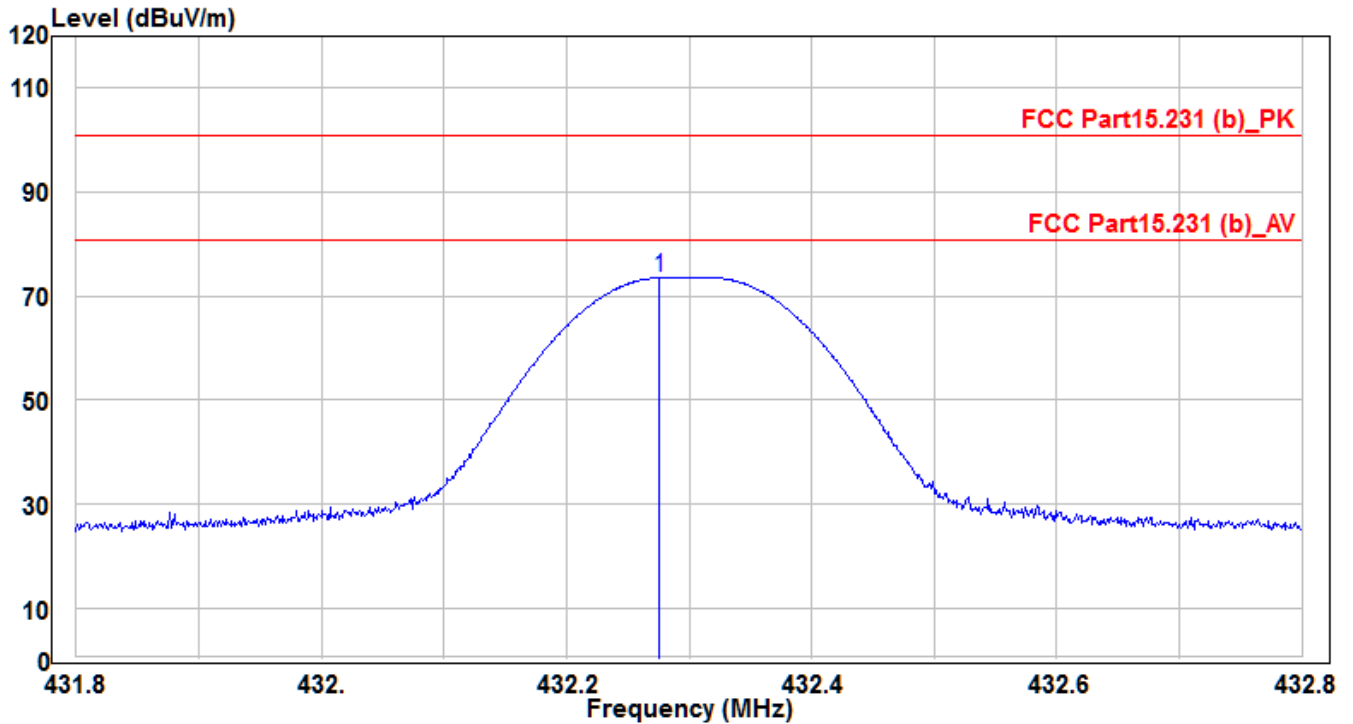


No		Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Height (cm)	Angle (deg)	Remark (QP/PK/AV)
1	*	432.279	54.28	24.76	79.04	-21.75	100.79	100	330	Peak

Note :

1. " * " means the worst value in this measurement data °
2. Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB) °
3. Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) °
4. The emission levels of other frequencies are very lower than the limit and not show in test report °
5. Other channel/mode was also verified. The test results shown represent the worst case emissions °
6. No emission found between lowest internal used/generated frequency to 30MHz °

EUT	RF Transceiver Interface	Test Date	2017/12/14
Factor	VULB 9162 (30MHz~8GHz)	Temp. / Humidity	25°C / 60%
Polarity	Vertical	Site / Engineer	AC1 / Peter
Test Mode	MODE2-CH14	Test Voltage	By Battery

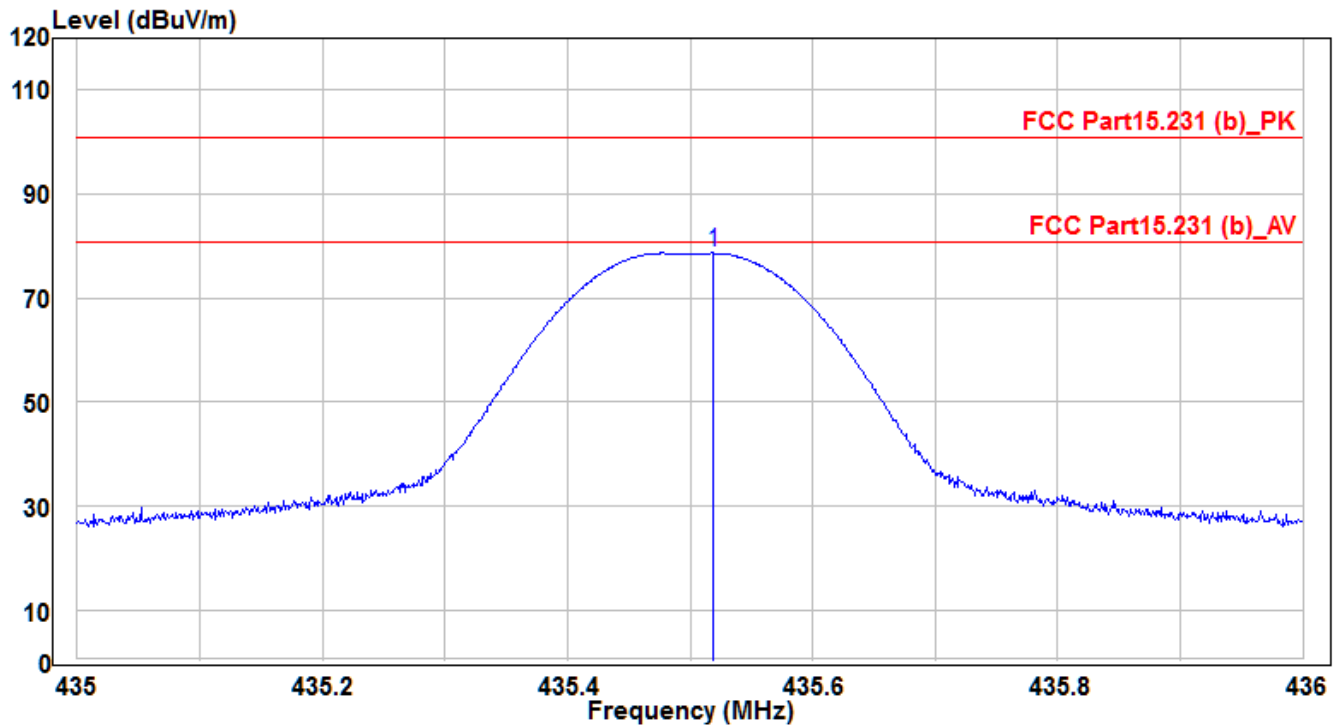


No		Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Height (cm)	Angle (deg)	Remark (QP/PK/AV)
1	*	432.276	48.73	24.76	73.49	-27.3	100.79	120	275	Peak

Note :

1. " * " means the worst value in this measurement data °
2. Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB) °
3. Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) °
4. The emission levels of other frequencies are very lower than the limit and not show in test report °
5. Other channel/mode was also verified. The test results shown represent the worst case emissions °
6. No emission found between lowest internal used/generated frequency to 30MHz °

EUT	RF Transceiver Interface	Test Date	2017/12/14
Factor	VULB 9162 (30MHz~8GHz)	Temp. / Humidity	25°C / 60%
Polarity	Horizontal	Site / Engineer	AC1 / Peter
Test Mode	MODE2-CH15	Test Voltage	By Battery

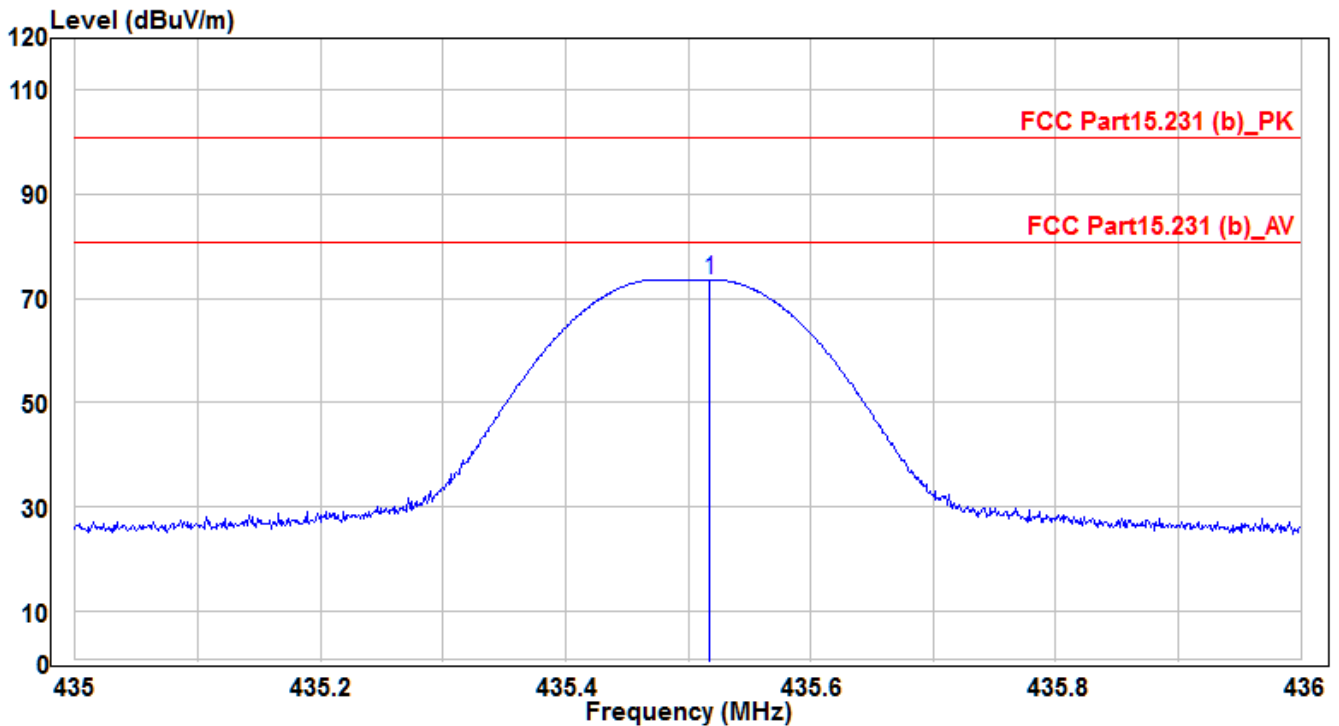


No		Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Height (cm)	Angle (deg)	Remark (QP/PK/AV)
1	*	435.519	53.83	24.82	78.65	-22.14	100.79	100	5	Peak

Note :

1. " * " means the worst value in this measurement data °
2. Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB) °
3. Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) °
4. The emission levels of other frequencies are very lower than the limit and not show in test report °
5. Other channel/mode was also verified. The test results shown represent the worst case emissions °
6. No emission found between lowest internal used/generated frequency to 30MHz °

EUT	RF Transceiver Interface	Test Date	2017/12/14
Factor	VULB 9162 (30MHz~8GHz)	Temp. / Humidity	25°C / 60%
Polarity	Vertical	Site / Engineer	AC1 / Peter
Test Mode	MODE2-CH15	Test Voltage	By Battery

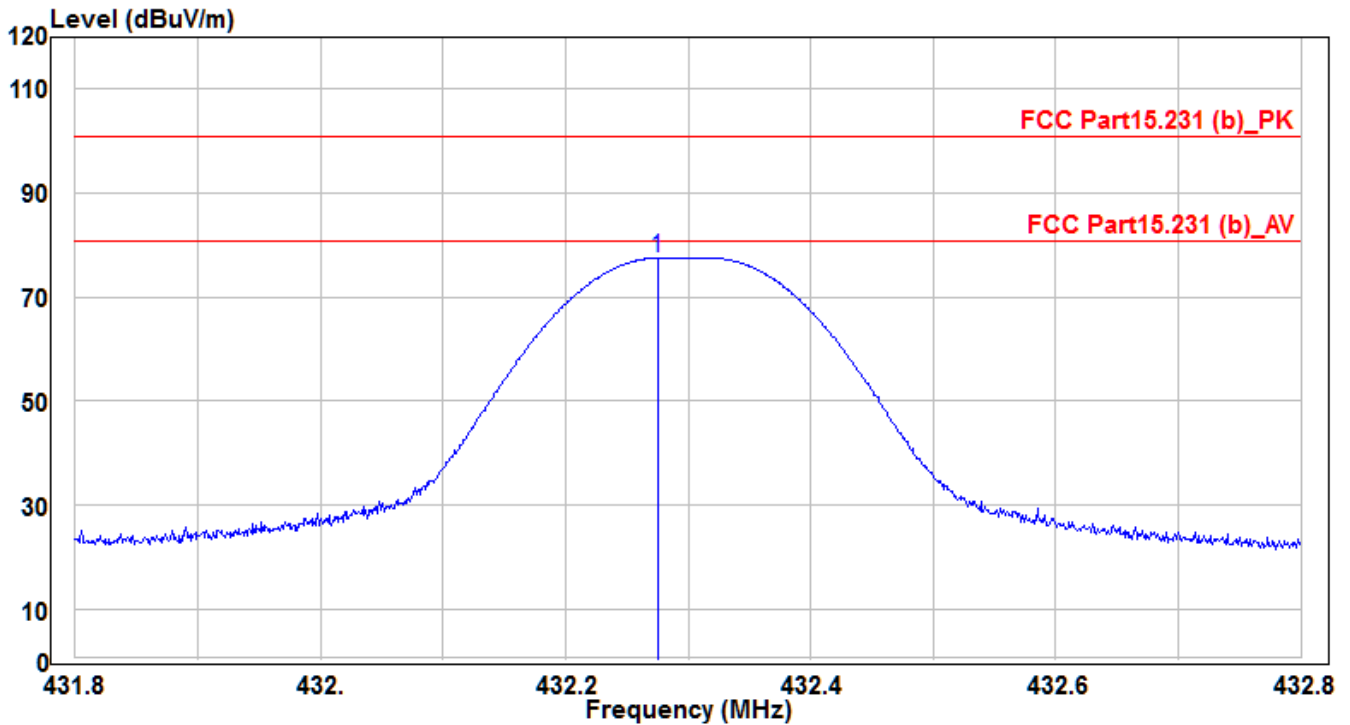


No		Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Height (cm)	Angle (deg)	Remark (QP/PK/AV)
1	*	435.518	48.86	24.82	73.68	-27.11	100.79	120	295	Peak

Note :

- " * " means the worst value in this measurement data °
- Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB) °
- Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) °
- The emission levels of other frequencies are very lower than the limit and not show in test report °
- Other channel/mode was also verified. The test results shown represent the worst case emissions °
- No emission found between lowest internal used/generated frequency to 30MHz °

EUT	RF USB Dongle	Test Date	2017/12/14
Factor	VULB 9162 (30MHz~8GHz)	Temp. / Humidity	25°C / 60%
Polarity	Horizontal	Site / Engineer	AC1 / Peter
Test Mode	MODE3-CH14	Test Voltage	By Notebook PC

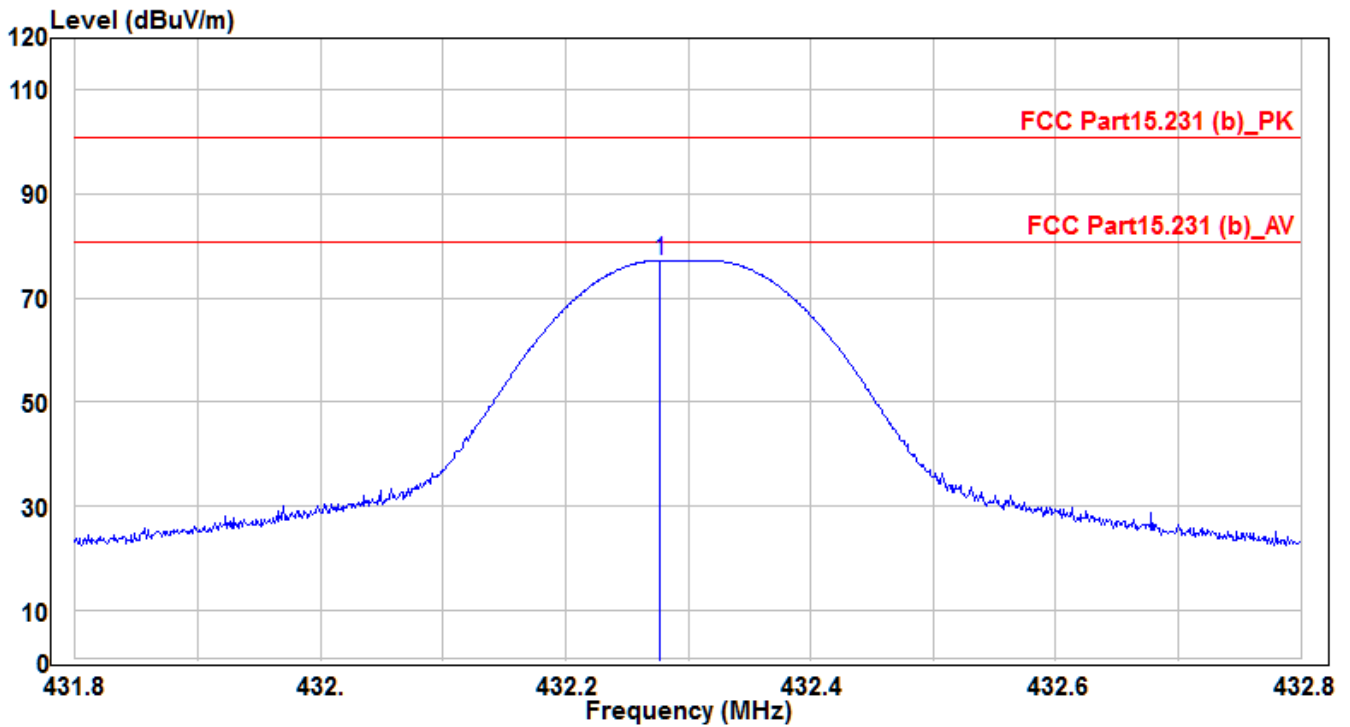


No		Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Height (cm)	Angle (deg)	Remark (QP/PK/AV)
1	*	432.275	52.73	24.76	77.49	-23.3	100.79	100	-40	Peak

Note :

- "*" means the worst value in this measurement data °
- Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB) °
- Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) °
- The emission levels of other frequencies are very lower than the limit and not show in test report °
- Other channel/mode was also verified. The test results shown represent the worst case emissions °
- No emission found between lowest internal used/generated frequency to 30MHz °

EUT	RF USB Dongle	Test Date	2017/12/14
Factor	VULB 9162 (30MHz~8GHz)	Temp. / Humidity	25°C / 60%
Polarity	Vertical	Site / Engineer	AC1 / Peter
Test Mode	MODE3-CH14	Test Voltage	By Notebook PC

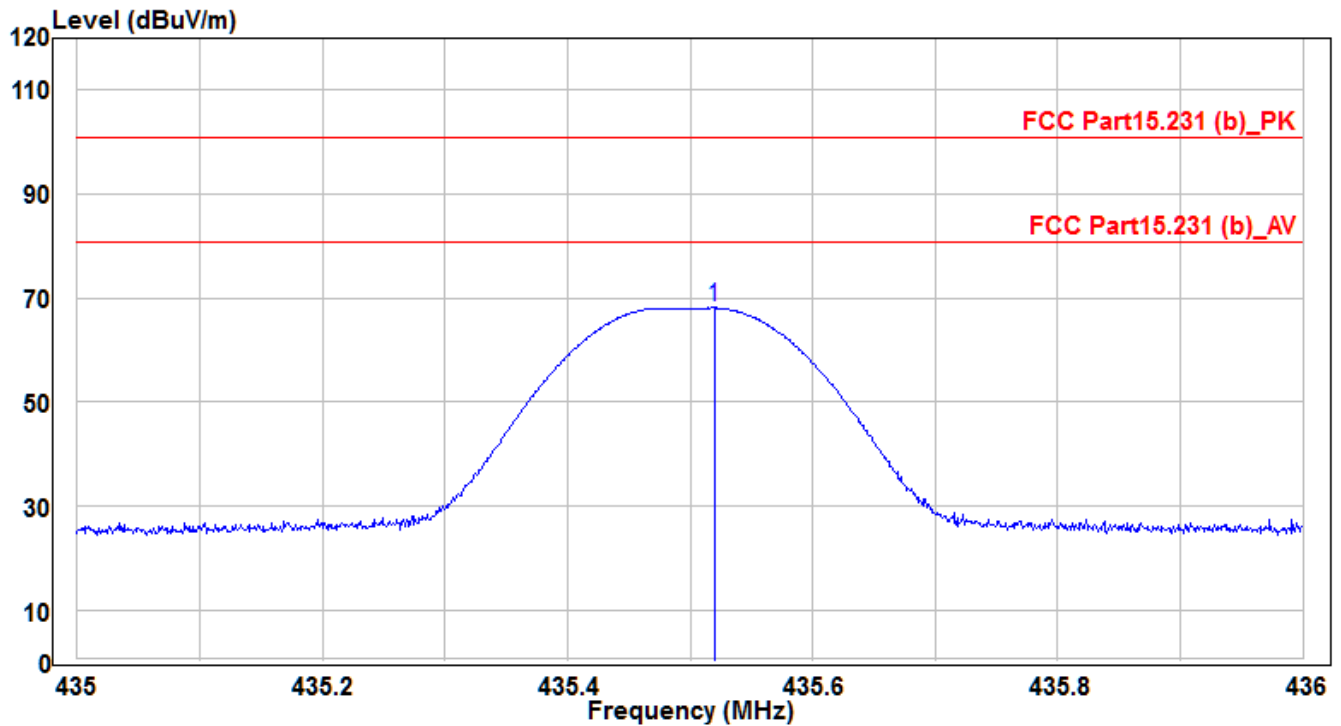


No		Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Height (cm)	Angle (deg)	Remark (QP/PK/AV)
1	*	432.277	52.45	24.76	77.21	-23.58	100.79	130	65	Peak

Note :

1. " * " means the worst value in this measurement data °
2. Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB) °
3. Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) °
4. The emission levels of other frequencies are very lower than the limit and not show in test report °
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EUT	RF USB Dongle	Test Date	2017/12/14
Factor	VULB 9162 (30MHz~8GHz)	Temp. / Humidity	25°C / 60%
Polarity	Horizontal	Site / Engineer	AC1 / Peter
Test Mode	MODE3-CH15	Test Voltage	By Notebook PC

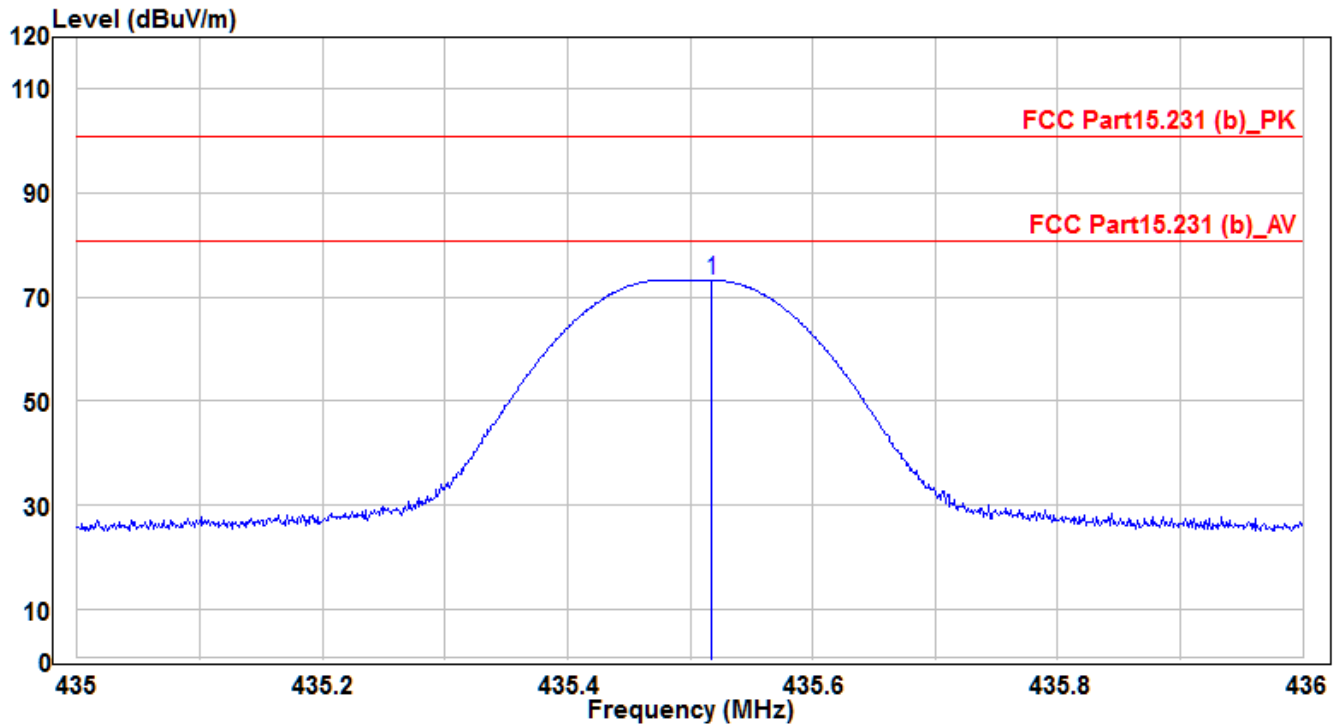


No		Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Height (cm)	Angle (deg)	Remark (QP/PK/AV)
1	*	435.52	43.28	24.82	68.1	-32.69	100.79	100	210	Peak

Note :

1. " * " means the worst value in this measurement data °
2. Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB) °
3. Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) °
4. The emission levels of other frequencies are very lower than the limit and not show in test report °
5. Other channel/mode was also verified. The test results shown represent the worst case emissions °
6. No emission found between lowest internal used/generated frequency to 30MHz °

EUT	RF USB Dongle	Test Date	2017/12/14
Factor	VULB 9162 (30MHz~8GHz)	Temp. / Humidity	25°C / 60%
Polarity	Vertical	Site / Engineer	AC1 / Peter
Test Mode	MODE3-CH15	Test Voltage	By Notebook PC

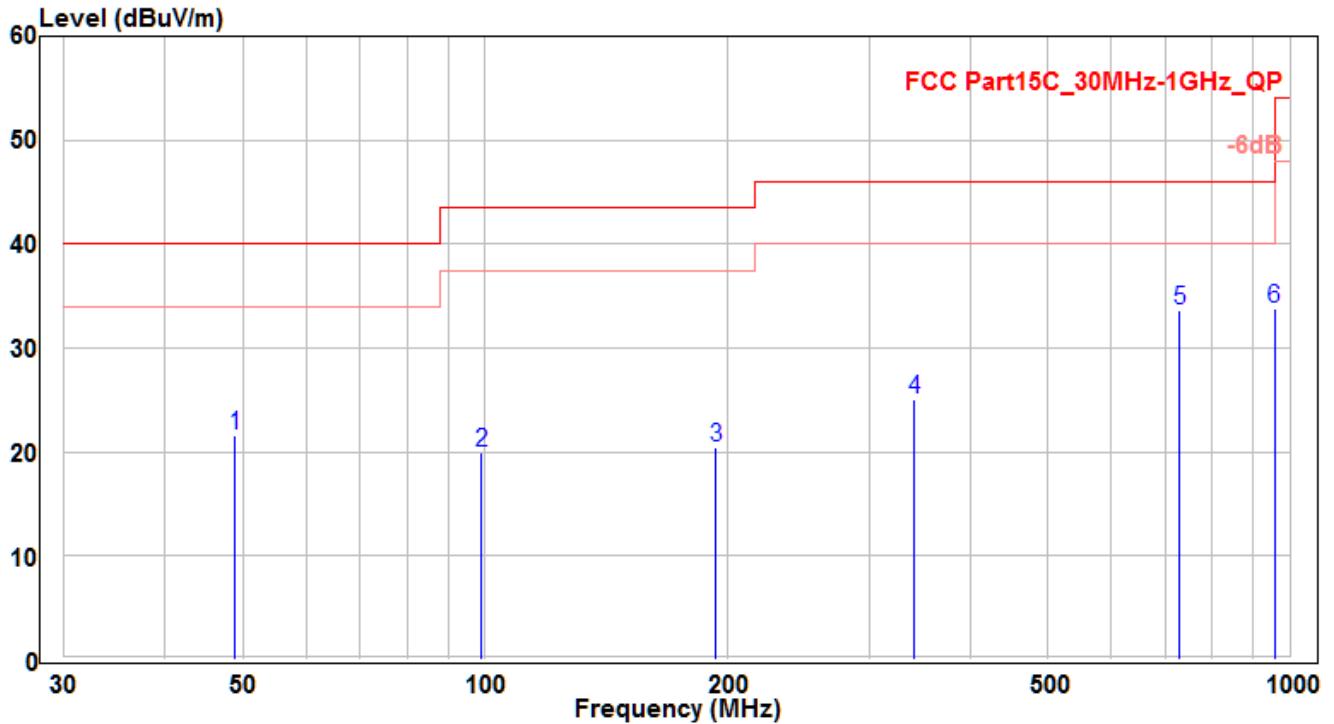


No		Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Height (cm)	Angle (deg)	Remark (QP/PK/AV)
1	*	435.518	48.43	24.82	73.25	-27.54	100.79	120	150	Peak

Note :

- " * " means the worst value in this measurement data °
- Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB) °
- Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) °
- The emission levels of other frequencies are very lower than the limit and not show in test report °
- Other channel/mode was also verified. The test results shown represent the worst case emissions °
- No emission found between lowest internal used/generated frequency to 30MHz °

EUT	RF Network Repeater	Test Date	2017/12/14
Factor	VULB 9162 (30MHz~8GHz)	Temp. / Humidity	25°C / 60%
Polarity	Horizontal	Site / Engineer	AC1 / Peter
Test Mode	MODE1-CH14	Test Voltage	By Battery

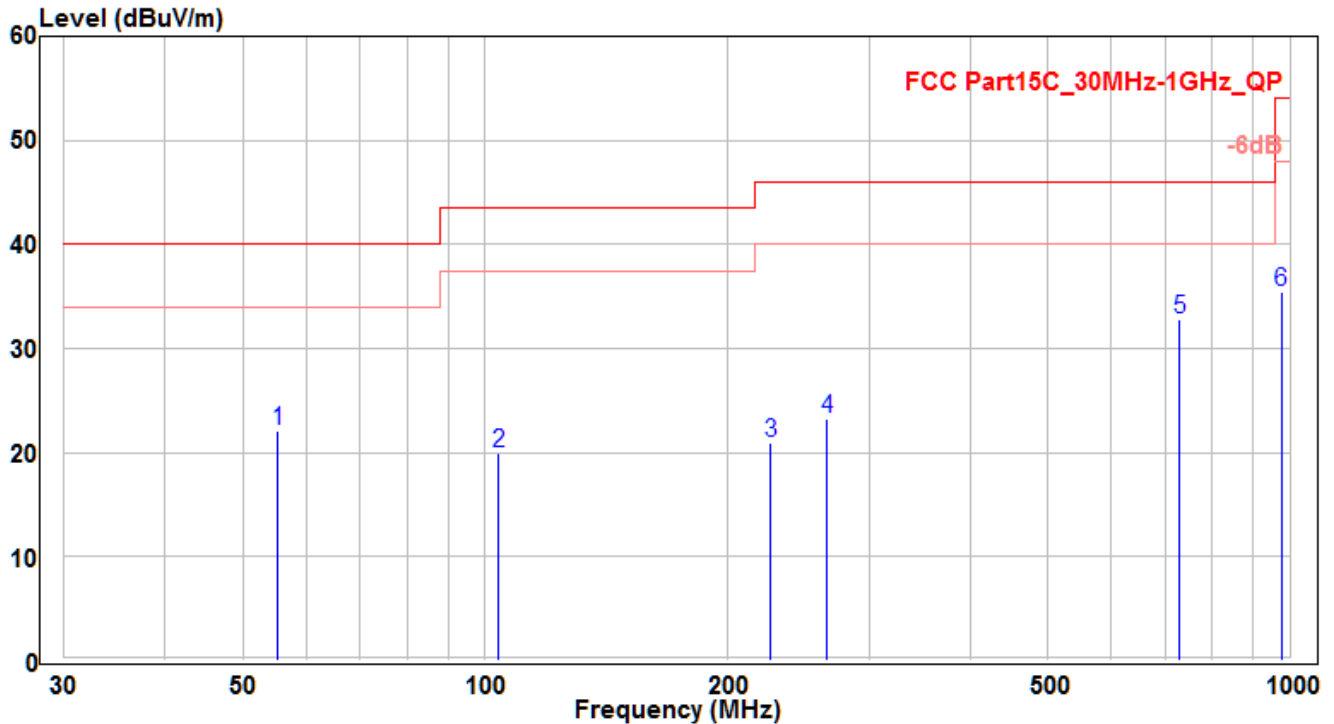


No		Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Height (cm)	Angle (deg)	Remark (QP/PK/AV)
1		48.976	0.09	21.52	21.61	-18.39	40	100	400	QP
2		98.931	0.74	19.15	19.89	-23.61	43.5	100	400	QP
3		193.627	1.59	18.94	20.53	-22.97	43.5	100	400	QP
4		341.552	1.94	23.17	25.11	-20.89	46	100	400	QP
5		729.764	3.69	29.95	33.64	-12.36	46	100	400	QP
6	*	957.532	1.62	32.26	33.88	-12.12	46	100	400	QP

Note :

- " * " means the worst value in this measurement data °
- Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB) °
- Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) °
- The emission levels of other frequencies are very lower than the limit and not show in test report °
- Other channel/mode was also verified. The test results shown represent the worst case emissions °
- No emission found between lowest internal used/generated frequency to 30MHz °

EUT	RF Network Repeater	Test Date	2017/12/14
Factor	VULB 9162 (30MHz~8GHz)	Temp. / Humidity	25°C / 60%
Polarity	Vertical	Site / Engineer	AC1 / Peter
Test Mode	MODE1-CH14	Test Voltage	By Battery

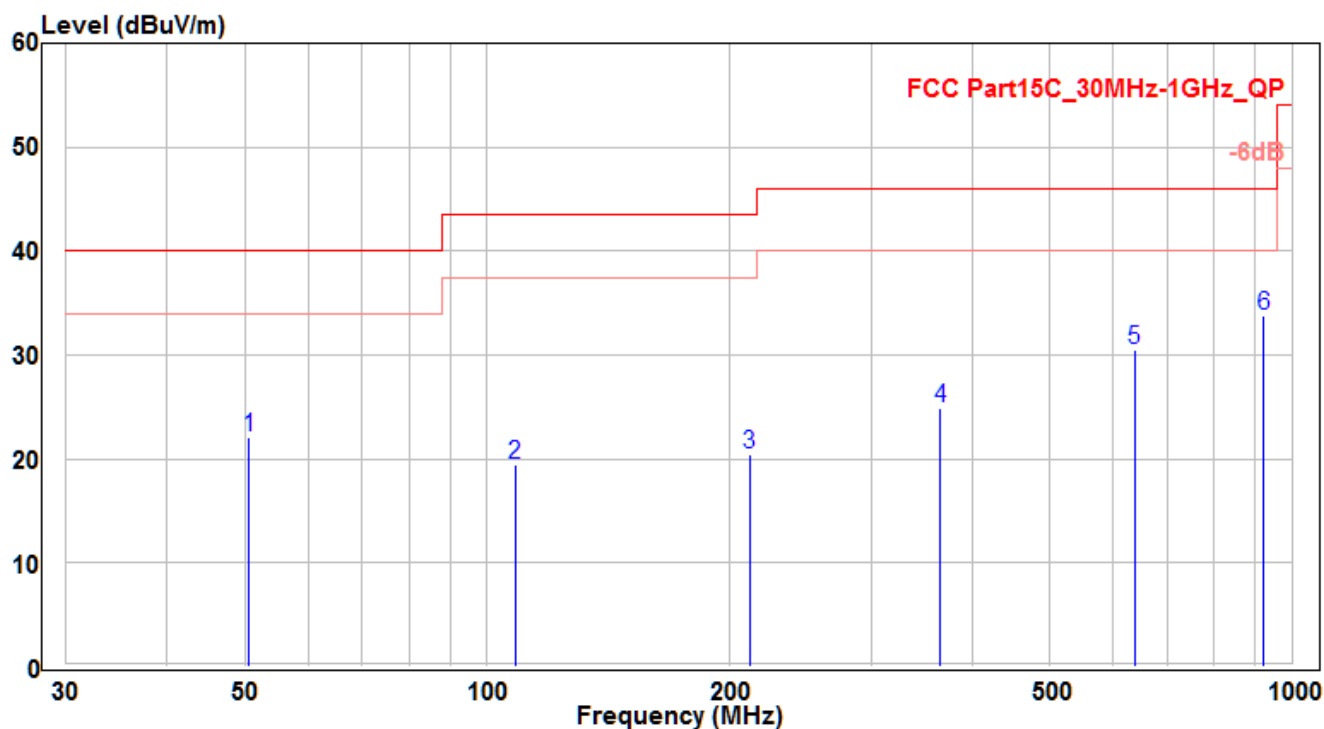


No		Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Height (cm)	Angle (deg)	Remark (QP/PK/AV)
1		55.311	1.45	20.62	22.07	-17.93	40	100	400	QP
2		103.932	0.84	19.15	19.99	-23.51	43.5	100	400	QP
3		226.455	1.48	19.47	20.95	-25.05	46	100	400	QP
4		266.286	2.57	20.65	23.22	-22.78	46	100	400	QP
5	*	729.794	2.87	29.95	32.82	-13.18	46	100	400	QP
6		976.174	2.91	32.52	35.43	-18.57	54	100	400	QP

Note :

- " * " means the worst value in this measurement data °
- Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB) °
- Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) °
- The emission levels of other frequencies are very lower than the limit and not show in test report °
- Other channel/mode was also verified. The test results shown represent the worst case emissions °
- No emission found between lowest internal used/generated frequency to 30MHz °

EUT	RF Network Repeater	Test Date	2017/12/14
Factor	VULB 9162 (30MHz~8GHz)	Temp. / Humidity	25°C / 60%
Polarity	Horizontal	Site / Engineer	AC1 / Peter
Test Mode	MODE1-CH15	Test Voltage	By Battery

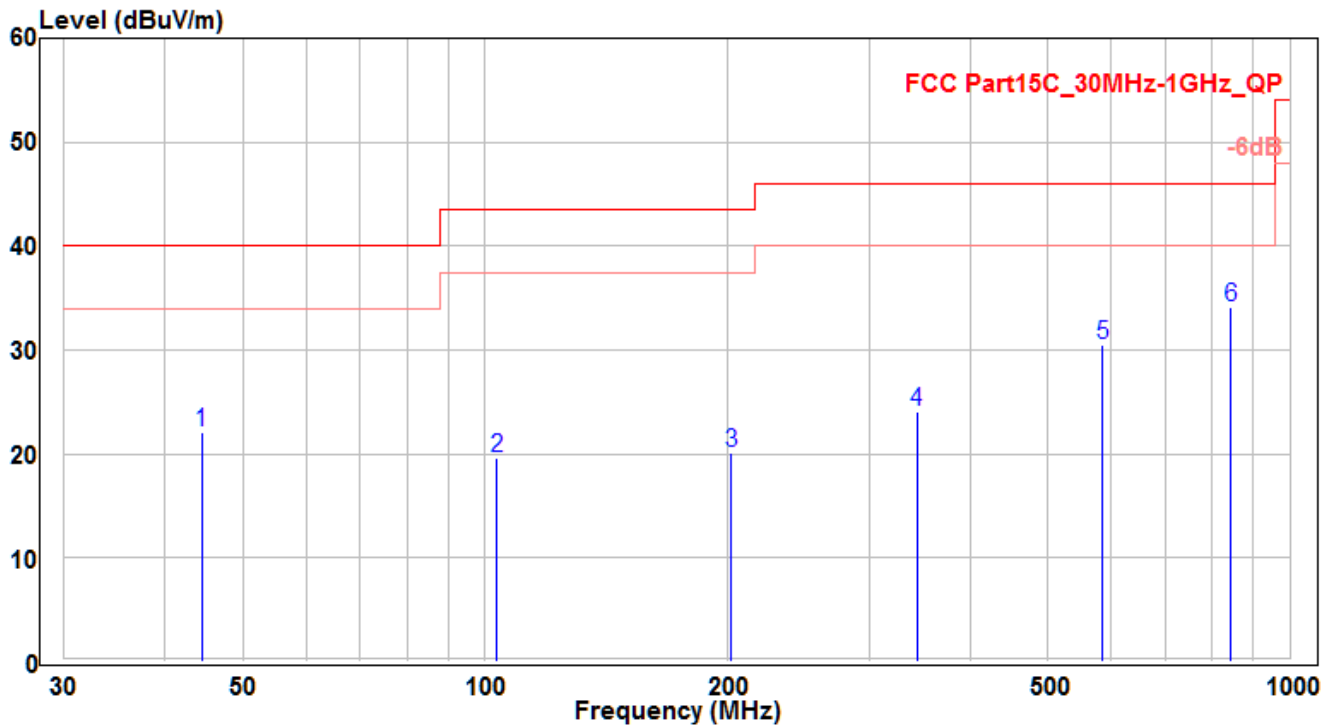


No		Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Height (cm)	Angle (deg)	Remark (QP/PK/AV)
1		50.582	0.59	21.45	22.04	-17.96	40	100	400	QP
2		108.328	0.59	18.9	19.49	-24.01	43.5	100	400	QP
3		212.087	1.63	18.78	20.41	-23.09	43.5	100	400	QP
4		365.62	1.13	23.73	24.86	-21.14	46	100	400	QP
5		637.644	2.02	28.46	30.48	-15.52	46	100	400	QP
6	*	923.067	1.66	32.06	33.72	-12.28	46	100	400	QP

Note :

1. " * " means the worst value in this measurement data °
2. Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB) °
3. Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) °
4. The emission levels of other frequencies are very lower than the limit and not show in test report °
5. Other channel/mode was also verified. The test results shown represent the worst case emissions °
6. No emission found between lowest internal used/generated frequency to 30MHz °

EUT	RF Network Repeater	Test Date	2017/12/14
Factor	VULB 9162 (30MHz~8GHz)	Temp. / Humidity	25°C / 60%
Polarity	Vertical	Site / Engineer	AC1 / Peter
Test Mode	MODE1-CH15	Test Voltage	By Battery

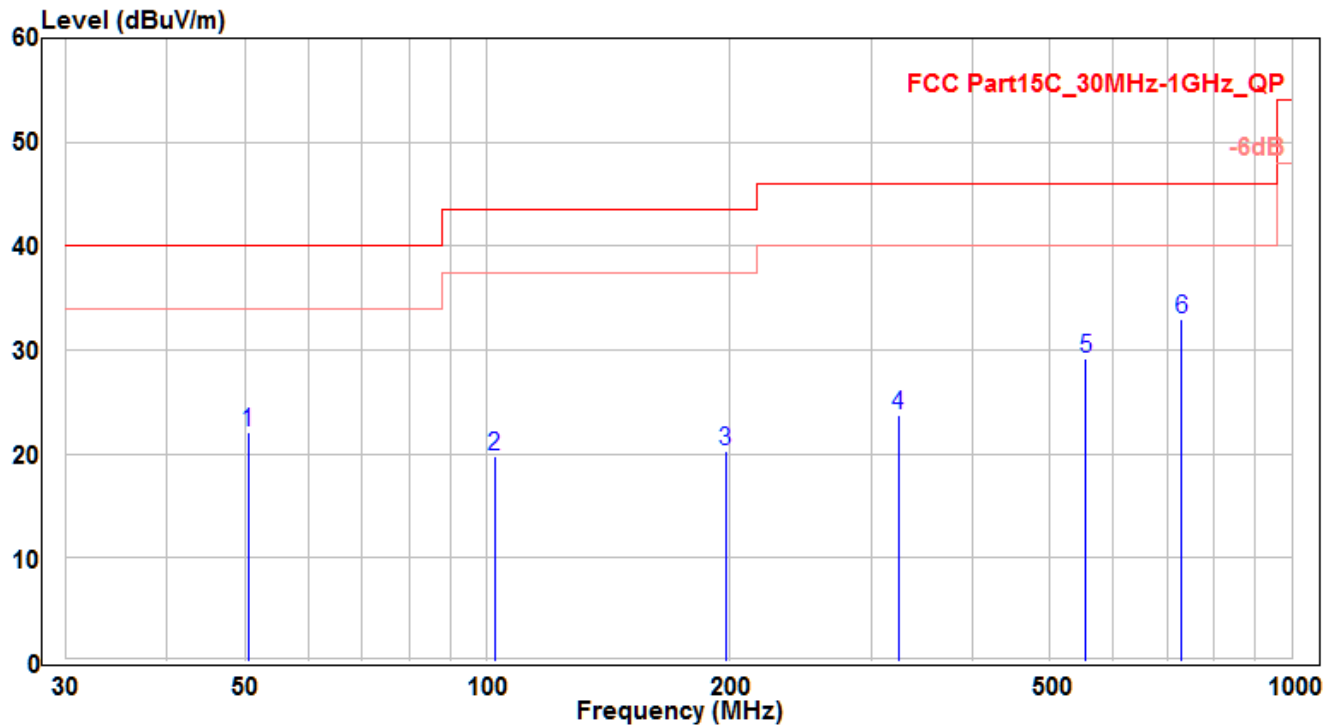


No		Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Height (cm)	Angle (deg)	Remark (QP/PK/AV)
1		44.459	0.79	21.31	22.1	-17.9	40	100	400	QP
2		103.326	0.45	19.19	19.64	-23.86	43.5	100	400	QP
3		202.357	1.05	19.04	20.09	-23.41	43.5	100	400	QP
4		344.189	0.74	23.28	24.02	-21.98	46	100	400	QP
5		584.658	3.01	27.46	30.47	-15.53	46	100	400	QP
6	*	843.891	2.6	31.55	34.15	-11.85	46	100	400	QP

Note :

- " * " means the worst value in this measurement data °
 - Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB) °
 - Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) °
 - The emission levels of other frequencies are very lower than the limit and not show in test report °
 - Other channel/mode was also verified. The test results shown represent the worst case emissions °
- No emission found between lowest internal used/generated frequency to 30MHz °

EUT	RF Transceiver Interface	Test Date	2017/12/14
Factor	VULB 9162 (30MHz~8GHz)	Temp. / Humidity	25°C / 60%
Polarity	Horizontal	Site / Engineer	AC1 / Peter
Test Mode	MODE2-CH14	Test Voltage	By Battery

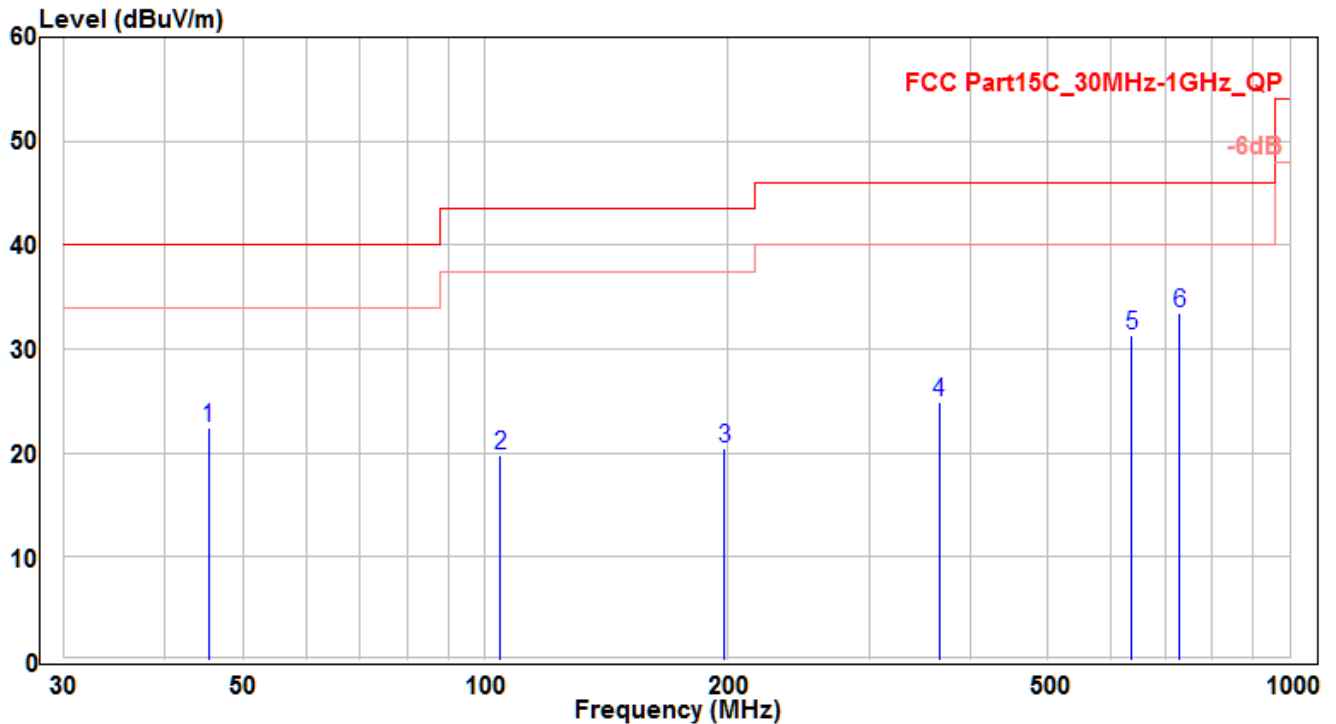


No	Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Height (cm)	Angle (deg)	Remark (QP/PK/AV)
1	50.522	0.64	21.46	22.1	-17.9	40	100	400	QP
2	102.174	0.47	19.26	19.73	-23.77	43.5	100	400	QP
3	197.84	1.24	19.08	20.32	-23.18	43.5	100	400	QP
4	324.183	1.33	22.43	23.76	-22.24	46	100	400	QP
5	554.073	2.22	26.98	29.2	-16.8	46	100	400	QP
6	* 728.946	3.07	29.93	33	-13	46	100	400	QP

Note :

- " * " means the worst value in this measurement data °
- Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB) °
- Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) °
- The emission levels of other frequencies are very lower than the limit and not show in test report °
- Other channel/mode was also verified. The test results shown represent the worst case emissions °
- No emission found between lowest internal used/generated frequency to 30MHz °

EUT	RF Transceiver Interface	Test Date	2017/12/14
Factor	VULB 9162 (30MHz~8GHz)	Temp. / Humidity	25°C / 60%
Polarity	Vertical	Site / Engineer	AC1 / Peter
Test Mode	MODE2-CH14	Test Voltage	By Battery

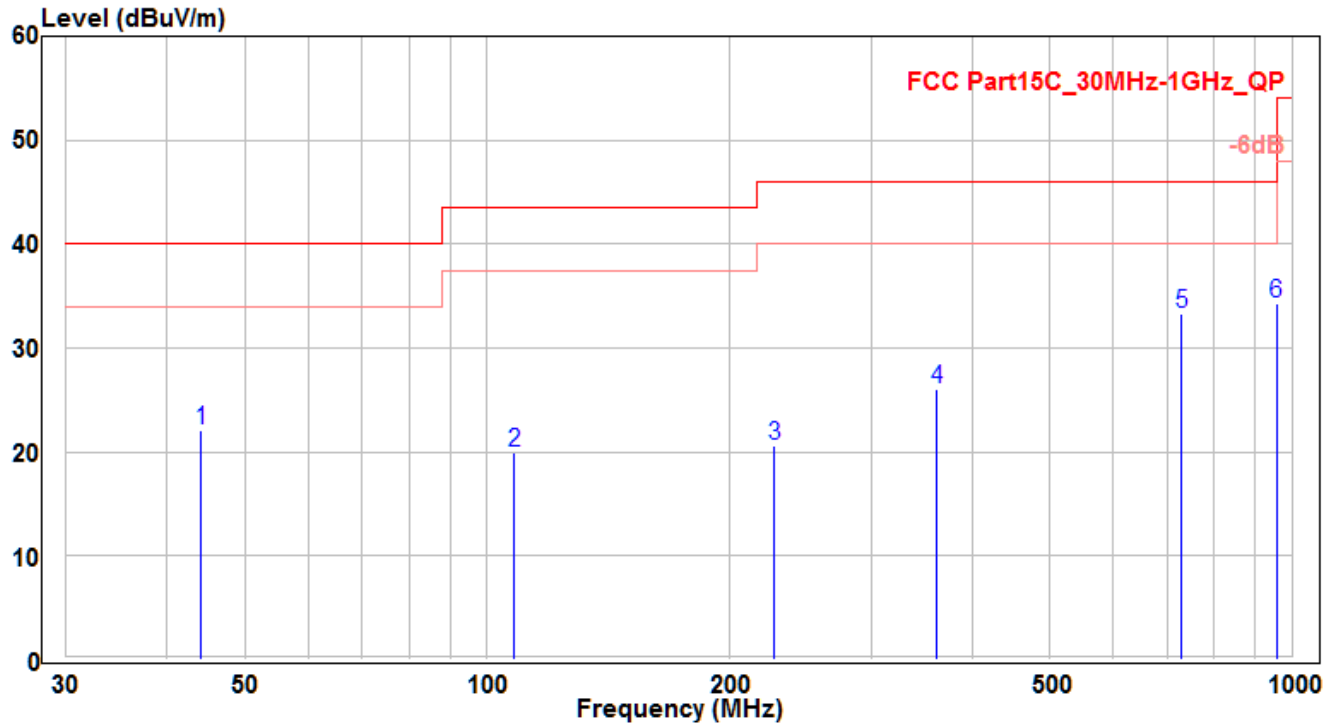


No		Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Height (cm)	Angle (deg)	Remark (QP/PK/AV)
1		45.308	1.02	21.42	22.44	-17.56	40	100	400	QP
2		104.508	0.66	19.12	19.78	-23.72	43.5	100	400	QP
3		198.447	1.37	19.09	20.46	-23.04	43.5	100	400	QP
4		366.711	1.21	23.74	24.95	-21.05	46	100	400	QP
5		635.401	2.86	28.42	31.28	-14.72	46	100	400	QP
6	*	728.824	3.6	29.93	33.53	-12.47	46	100	400	QP

Note :

- "*" means the worst value in this measurement data °
- Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB) °
- Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) °
- The emission levels of other frequencies are very lower than the limit and not show in test report °
- Other channel/mode was also verified. The test results shown represent the worst case emissions °
- No emission found between lowest internal used/generated frequency to 30MHz °

EUT	RF Transceiver Interface	Test Date	2017/12/14
Factor	VULB 9162 (30MHz~8GHz)	Temp. / Humidity	25°C / 60%
Polarity	Horizontal	Site / Engineer	AC1 / Peter
Test Mode	MODE2-CH15	Test Voltage	By Battery

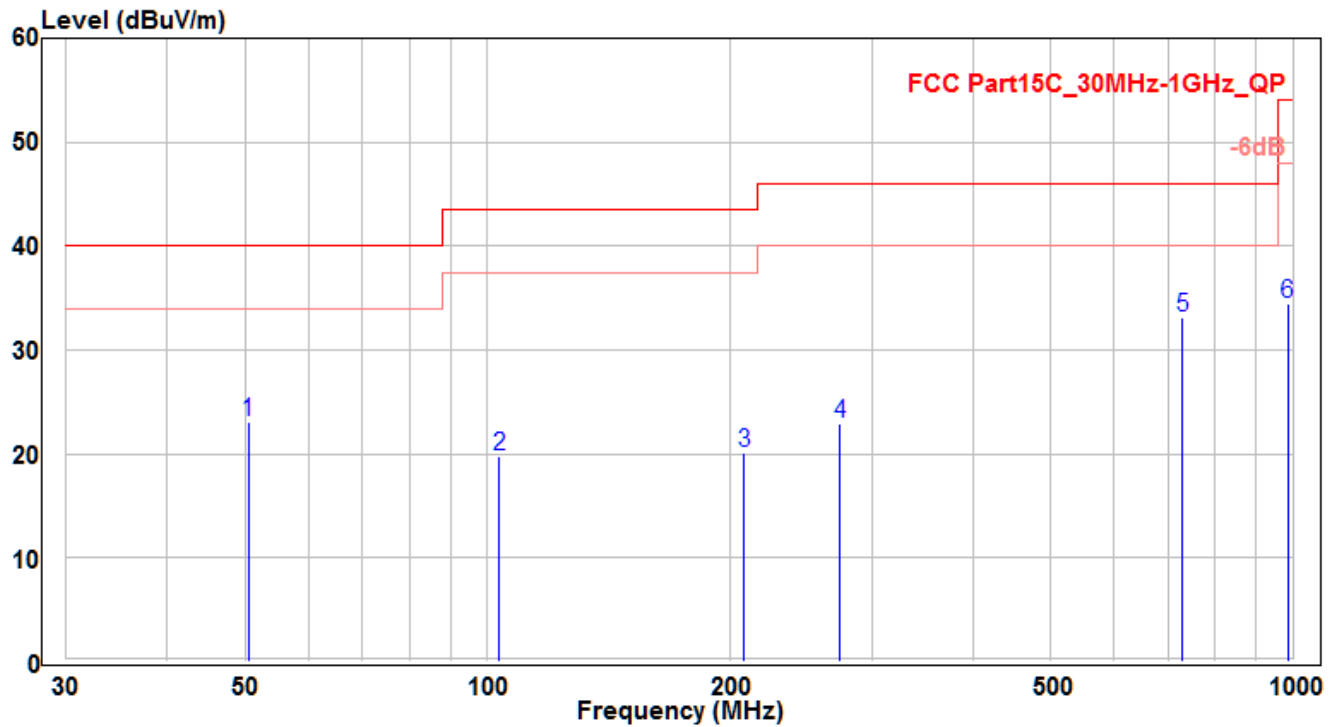


No	Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Height (cm)	Angle (deg)	Remark (QP/PK/AV)
1	44.156	0.78	21.26	22.04	-17.96	40	100	400	QP
2	108.146	0.96	18.91	19.87	-23.63	43.5	100	400	QP
3	227.425	1.1	19.52	20.62	-25.38	46	100	400	QP
4	362.073	2.3	23.68	25.98	-20.02	46	100	400	QP
5	730.007	3.37	29.95	33.32	-12.68	46	100	400	QP
6	* 957.805	2.11	32.26	34.37	-11.63	46	100	400	QP

Note :

- " * " means the worst value in this measurement data °
- Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB) °
- Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) °
- The emission levels of other frequencies are very lower than the limit and not show in test report °
- Other channel/mode was also verified. The test results shown represent the worst case emissions °
- No emission found between lowest internal used/generated frequency to 30MHz °

EUT	RF Transceiver Interface	Test Date	2017/12/14
Factor	VULB 9162 (30MHz~8GHz)	Temp. / Humidity	25°C / 60%
Polarity	Vertical	Site / Engineer	AC1 / Peter
Test Mode	MODE2-CH15	Test Voltage	By Battery

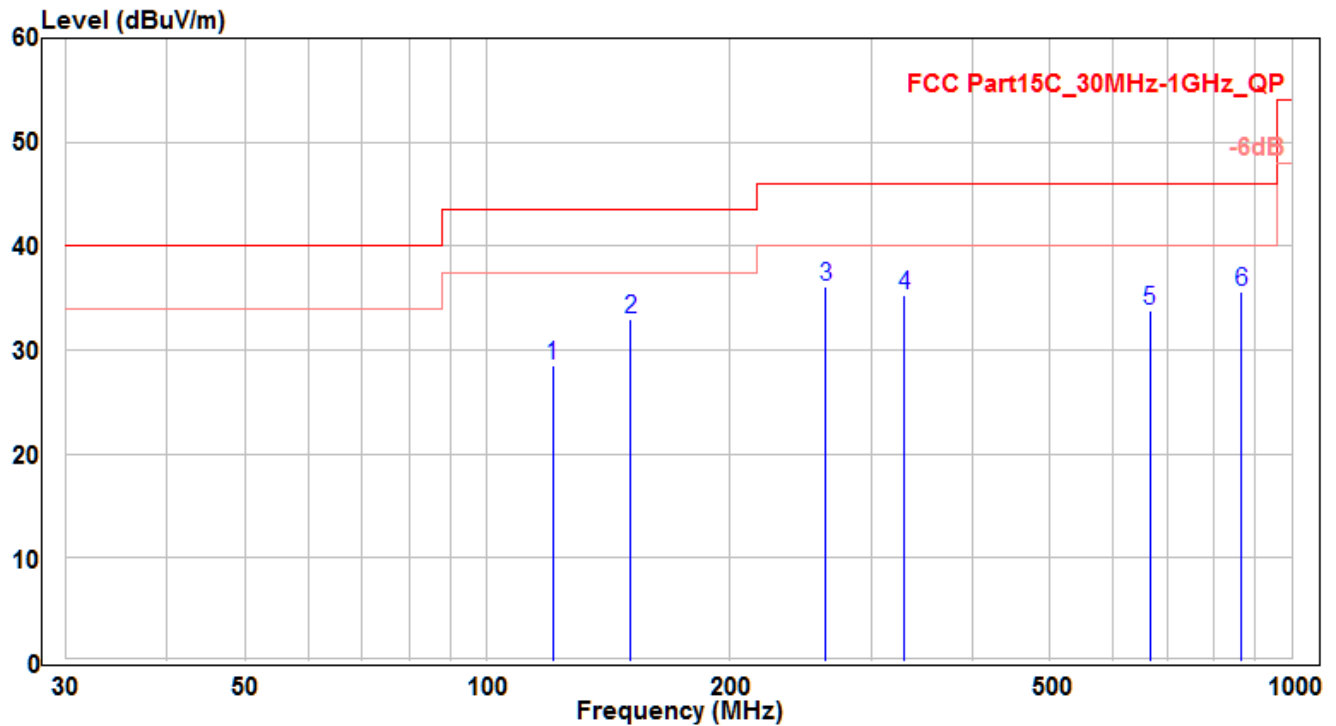


No		Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Height (cm)	Angle (deg)	Remark (QP/PK/AV)
1		50.461	1.62	21.47	23.09	-16.91	40	100	400	QP
2		103.326	0.66	19.19	19.85	-23.65	43.5	100	400	QP
3		208.328	1.33	18.76	20.09	-23.41	43.5	100	400	QP
4		274.289	2.05	20.85	22.9	-23.1	46	100	400	QP
5	*	729.825	3.15	29.95	33.1	-12.9	46	100	400	QP
6		985.42	1.74	32.65	34.39	-19.61	54	100	400	QP

Note :

- " * " means the worst value in this measurement data °
- Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB) °
- Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) °
- The emission levels of other frequencies are very lower than the limit and not show in test report °
- Other channel/mode was also verified. The test results shown represent the worst case emissions °
- No emission found between lowest internal used/generated frequency to 30MHz °

EUT	RF USB Dongle	Test Date	2017/12/14
Factor	VULB 9162 (30MHz~8GHz)	Temp. / Humidity	25°C / 60%
Polarity	Horizontal	Site / Engineer	AC1 / Peter
Test Mode	MODE3-CH14	Test Voltage	By Notebook PC

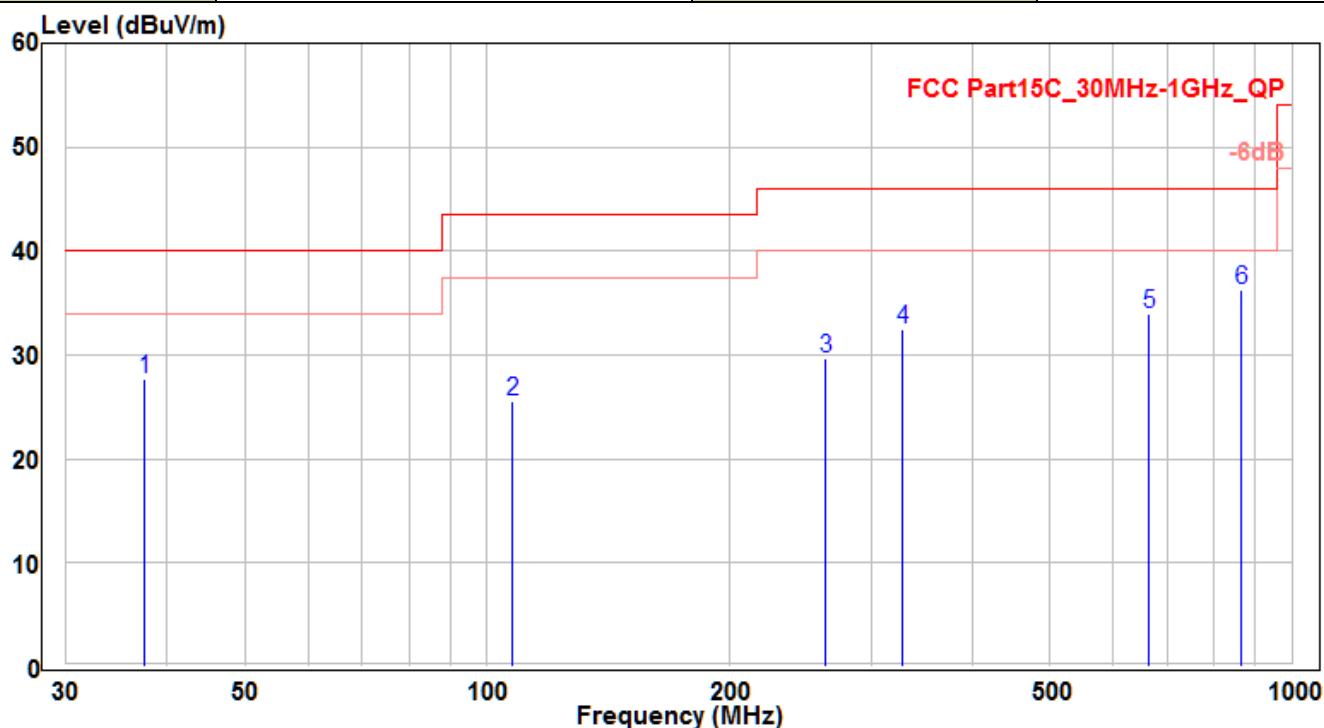


No		Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Height (cm)	Angle (deg)	Remark (QP/PK/AV)
1		120.725	11.43	17.07	28.5	-15	43.5	100	250	QP
2		150.735	17.07	15.9	32.97	-10.53	43.5	100	330	QP
3		263.8	15.53	20.62	36.15	-9.85	46	100	400	QP
4		329.669	12.65	22.67	35.32	-10.68	46	100	110	QP
5		666.169	4.93	28.94	33.87	-12.13	46	100	250	QP
6	*	864.624	3.76	31.77	35.53	-10.47	46	100	-30	QP

Note :

- " * " means the worst value in this measurement data °
- Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB) °
- Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) °
- The emission levels of other frequencies are very lower than the limit and not show in test report °
- Other channel/mode was also verified. The test results shown represent the worst case emissions °
- No emission found between lowest internal used/generated frequency to 30MHz °

EUT	RF USB Dongle	Test Date	2017/12/14
Factor	VULB 9162 (30MHz~8GHz)	Temp. / Humidity	25°C / 60%
Polarity	Vertical	Site / Engineer	AC1 / Peter
Test Mode	MODE3-CH14	Test Voltage	By Notebook PC

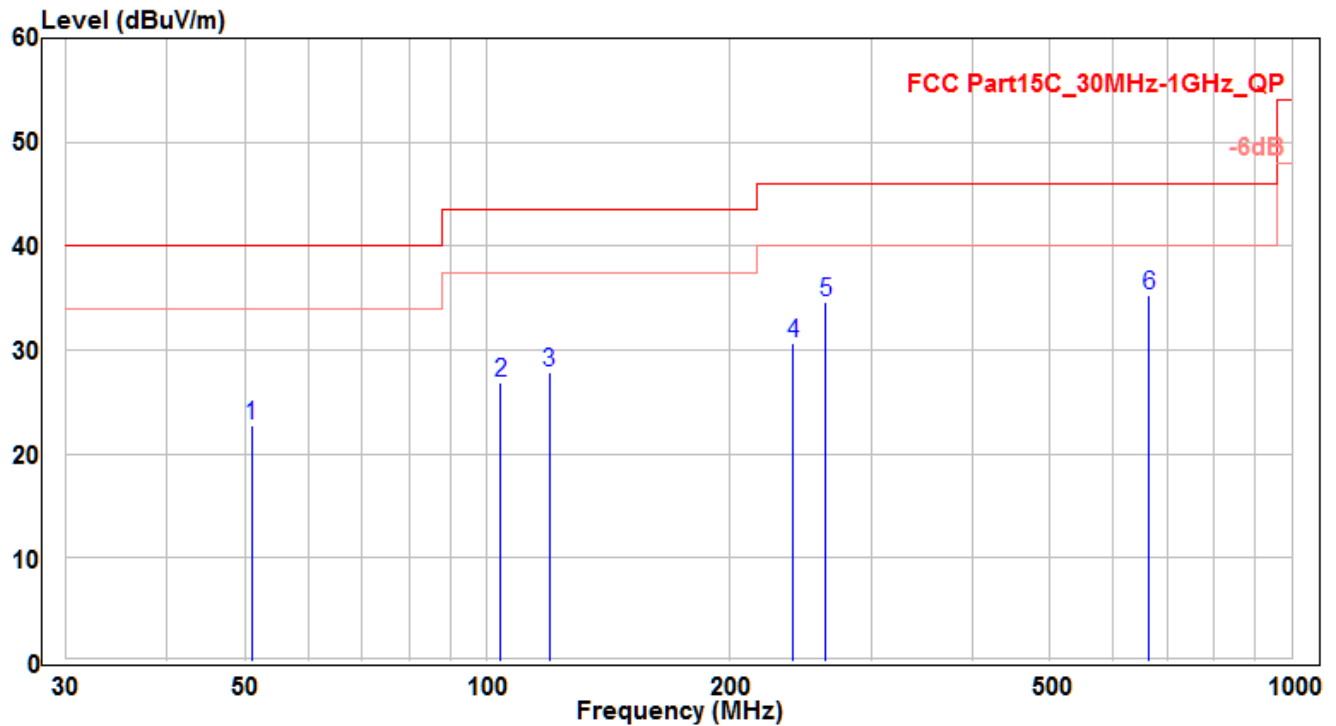


No		Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Height (cm)	Angle (deg)	Remark (QP/PK/AV)
1		37.548	7.91	19.76	27.67	-12.33	40	100	400	QP
2		107.63	6.54	18.94	25.48	-18.02	43.5	100	210	QP
3		263.8	9.09	20.62	29.71	-16.29	46	100	30	QP
4		328.336	9.82	22.6	32.42	-13.58	46	100	-40	QP
5		663.895	5.07	28.91	33.98	-12.02	46	100	150	QP
6	*	864.655	4.58	31.77	36.35	-9.65	46	100	240	QP

Note :

- " * " means the worst value in this measurement data °
- Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB) °
- Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) °
- The emission levels of other frequencies are very lower than the limit and not show in test report °
- Other channel/mode was also verified. The test results shown represent the worst case emissions °
- No emission found between lowest internal used/generated frequency to 30MHz °

EUT	RF USB Dongle	Test Date	2017/12/14
Factor	VULB 9162 (30MHz~8GHz)	Temp. / Humidity	25°C / 60%
Polarity	Horizontal	Site / Engineer	AC1 / Peter
Test Mode	MODE3-CH15	Test Voltage	By Notebook PC

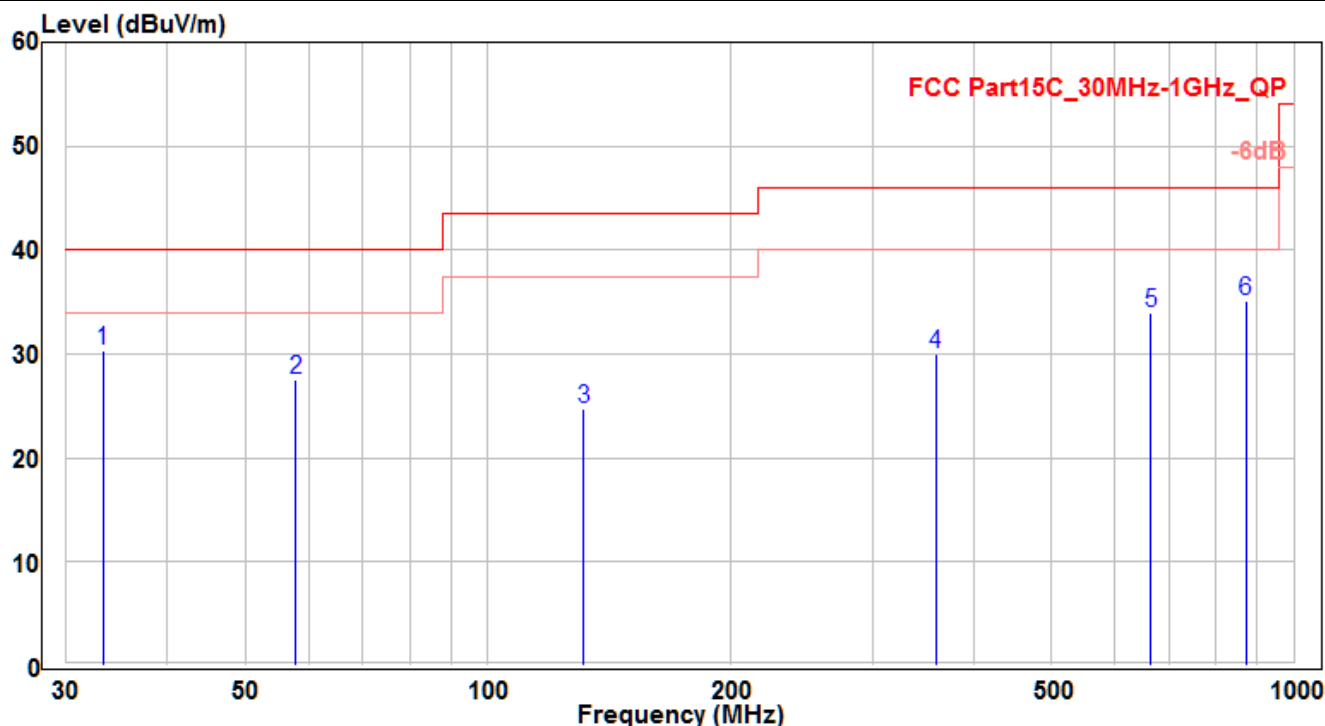


No		Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Height (cm)	Angle (deg)	Remark (QP/PK/AV)
1		50.976	1.43	21.38	22.81	-17.19	40	100	400	QP
2		104.023	7.8	19.15	26.95	-16.55	43.5	100	400	QP
3		119.634	10.63	17.2	27.83	-15.67	43.5	100	230	QP
4		239.823	10.55	20.19	30.74	-15.26	46	100	220	QP
5		263.8	14.08	20.62	34.7	-11.3	46	100	150	QP
6	*	663.925	6.36	28.91	35.27	-10.73	46	100	310	QP

Note :

- " * " means the worst value in this measurement data °
- Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB) °
- Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) °
- The emission levels of other frequencies are very lower than the limit and not show in test report °
- Other channel/mode was also verified. The test results shown represent the worst case emissions °
- No emission found between lowest internal used/generated frequency to 30MHz °

EUT	RF USB Dongle	Test Date	2017/12/14
Factor	VULB 9162 (30MHz~8GHz)	Temp. / Humidity	25°C / 60%
Polarity	Vertical	Site / Engineer	AC1 / Peter
Test Mode	MODE3-CH15	Test Voltage	By Notebook PC

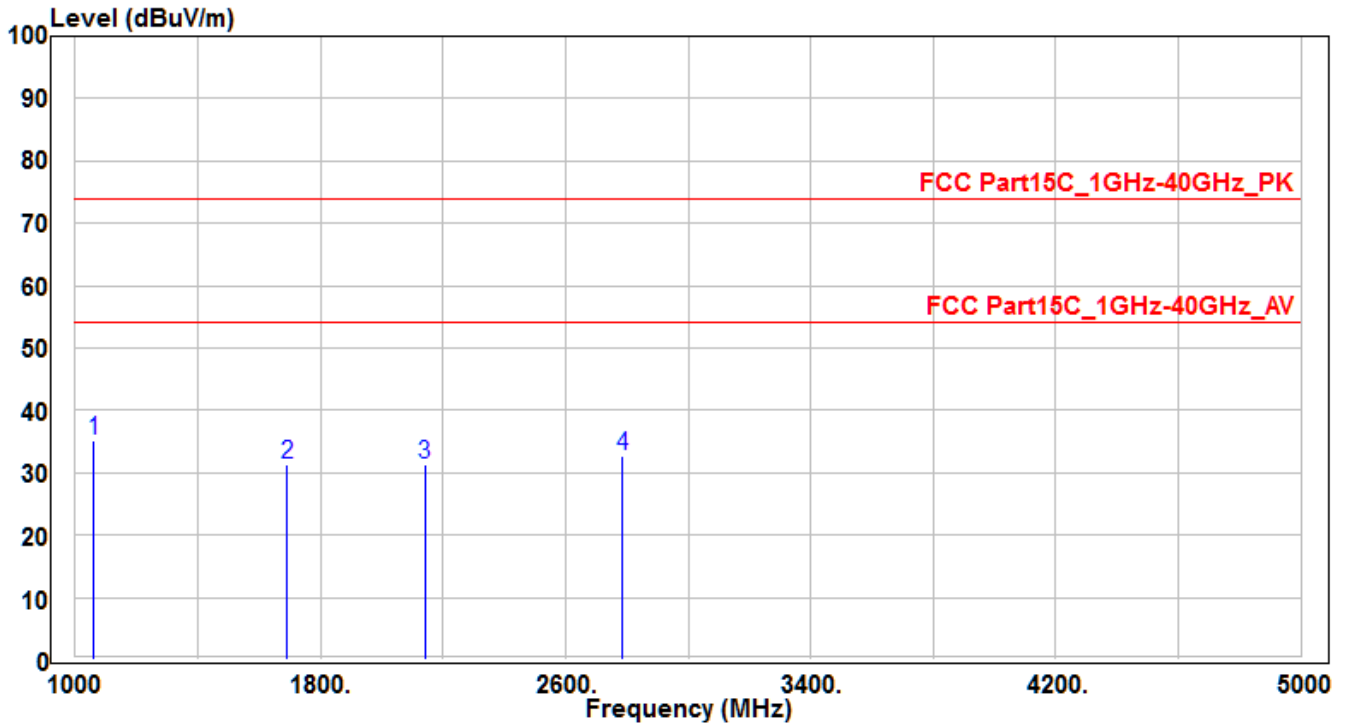


No		Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Height (cm)	Angle (deg)	Remark (QP/PK/AV)
1	*	33.304	11.81	18.57	30.38	-9.62	40	100	230	QP
2		57.736	7.3	20.21	27.51	-12.49	40	100	105	QP
3		131.638	8.45	16.24	24.69	-18.81	43.5	100	400	QP
4		359.77	6.28	23.66	29.94	-16.06	46	100	220	QP
5		663.895	4.98	28.91	33.89	-12.11	46	100	260	QP
6		871.051	3.37	31.8	35.17	-10.83	46	100	350	QP

Note :

1. " * " means the worst value in this measurement data °
2. Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB) °
3. Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) °
4. The emission levels of other frequencies are very lower than the limit and not show in test report °
5. Other channel/mode was also verified. The test results shown represent the worst case emissions °
6. No emission found between lowest internal used/generated frequency to 30MHz °

EUT	RF Network Repeater	Test Date	2017/12/12
Factor	BBHA 9120D (1GHz~18GHz)	Temp. / Humidity	25°C / 60%
Polarity	Horizontal	Site / Engineer	AC1 / Peter
Test Mode	MODE1-CH14	Test Voltage	By Battery

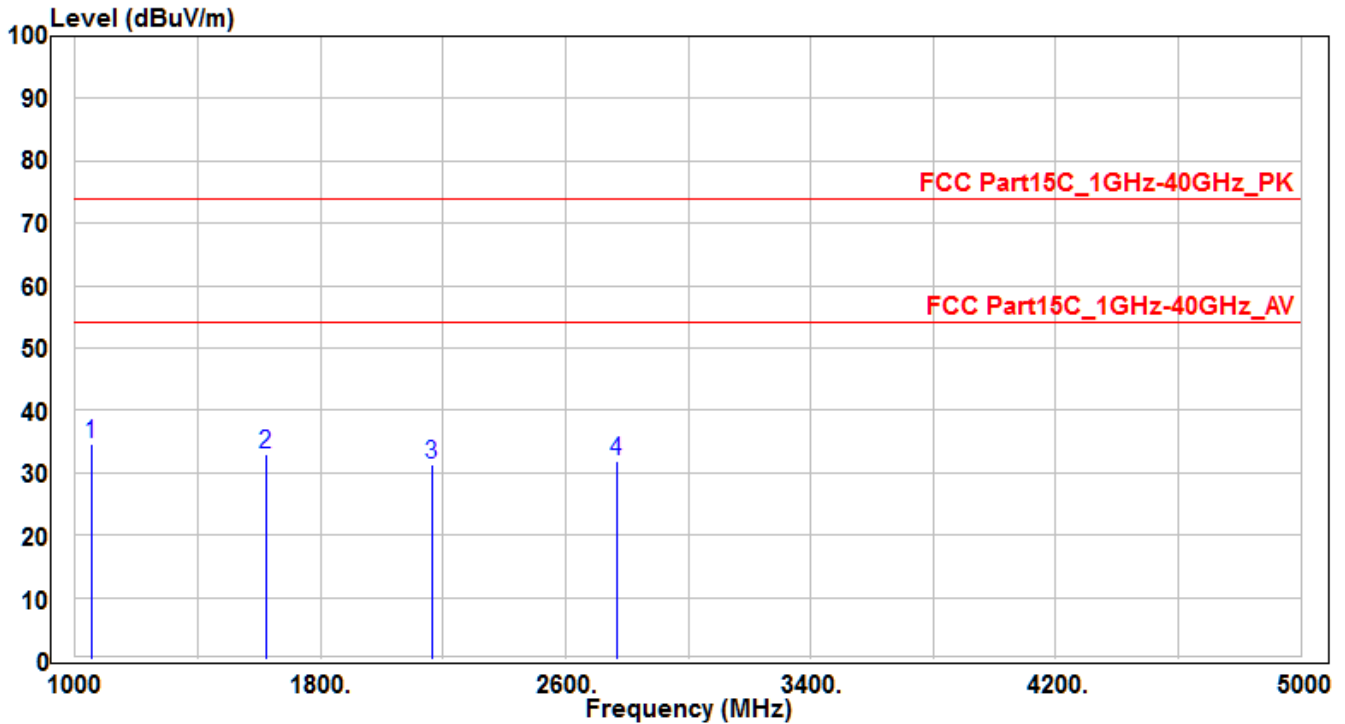


No		Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Height (cm)	Angle (deg)	Remark (QP/PK/AV)
1	*	1061.19	42.7	-7.4	35.3	-38.7	74	150	400	Peak
2		1690.92	37.07	-5.68	31.39	-42.61	74	150	400	Peak
3		2140.15	35.12	-3.89	31.23	-42.77	74	150	400	Peak
4		2787.01	35.19	-2.54	32.65	-41.35	74	150	400	Peak

Note :

- " * " means the worst value in this measurement data °
- Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB) °
- Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) °
- The emission levels of other frequencies are very lower than the limit and not show in test report °

EUT	RF Network Repeater	Test Date	2017/12/12
Factor	BBHA 9120D (1GHz~18GHz)	Temp. / Humidity	25°C / 60%
Polarity	Vertical	Site / Engineer	AC1 / Peter
Test Mode	MODE1-CH14	Test Voltage	By Battery

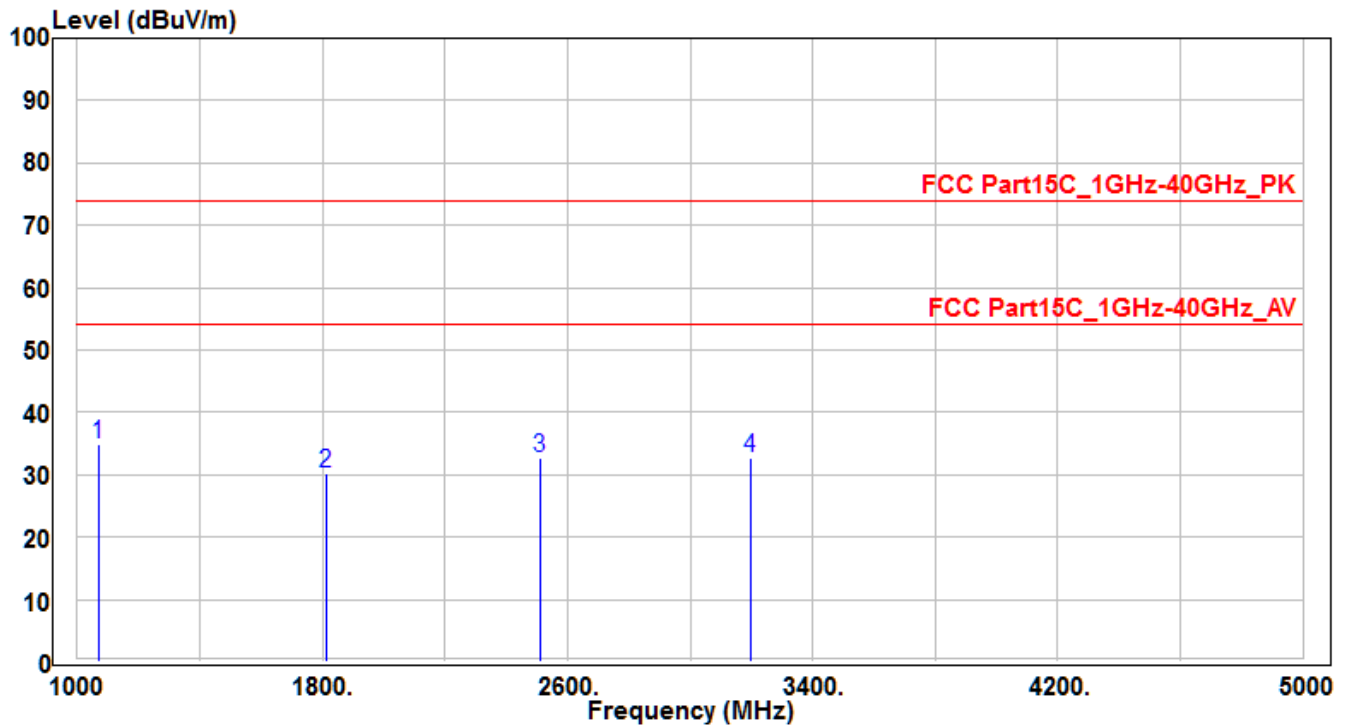


No		Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Height (cm)	Angle (deg)	Remark (QP/PK/AV)
1	*	1051.31	42.1	-7.43	34.67	-39.33	74	150	400	Peak
2		1622.17	38.85	-5.91	32.94	-41.06	74	150	400	Peak
3		2164.65	35.11	-3.76	31.35	-42.65	74	150	400	Peak
4		2765.76	34.38	-2.51	31.87	-42.13	74	150	400	Peak

Note :

- " * " means the worst value in this measurement data °
- Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB) °
- Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) °
- The emission levels of other frequencies are very lower than the limit and not show in test report °

EUT	RF Network Repeater	Test Date	2017/12/12
Factor	BBHA 9120D (1GHz~18GHz)	Temp. / Humidity	25°C / 60%
Polarity	Horizontal	Site / Engineer	AC1 / Peter
Test Mode	MODE1-CH15	Test Voltage	By Battery

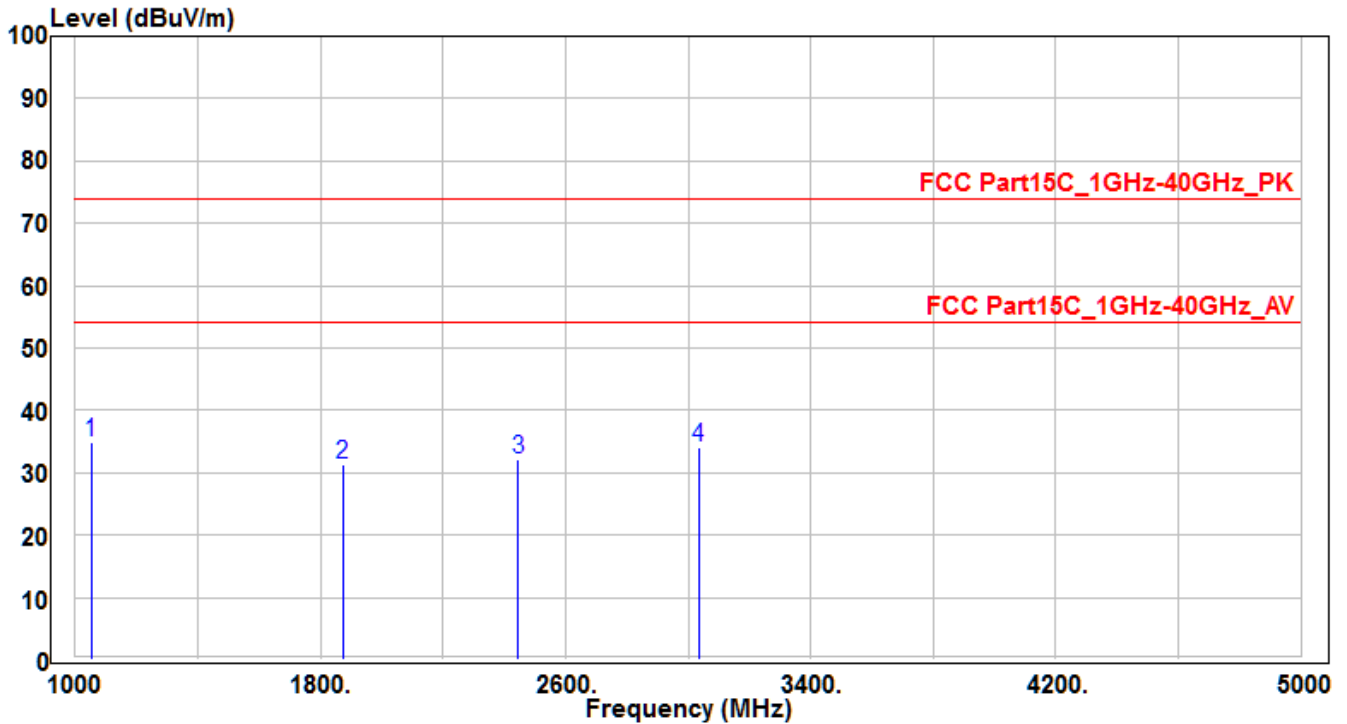


No		Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Height (cm)	Angle (deg)	Remark (QP/PK/AV)
1	*	1068.44	42.28	-7.38	34.9	-39.1	74	150	400	Peak
2		1810.66	35.57	-5.27	30.3	-43.7	74	150	400	Peak
3		2508.77	34.82	-2.04	32.78	-41.22	74	150	400	Peak
4		3195.62	35.27	-2.47	32.8	-41.2	74	150	400	Peak

Note :

- " * " means the worst value in this measurement data °
- Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB) °
- Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) °
- The emission levels of other frequencies are very lower than the limit and not show in test report °

EUT	RF Network Repeater	Test Date	2017/12/12
Factor	BBHA 9120D (1GHz~18GHz)	Temp. / Humidity	25°C / 60%
Polarity	Vertical	Site / Engineer	AC1 / Peter
Test Mode	MODE1-CH15	Test Voltage	By Battery

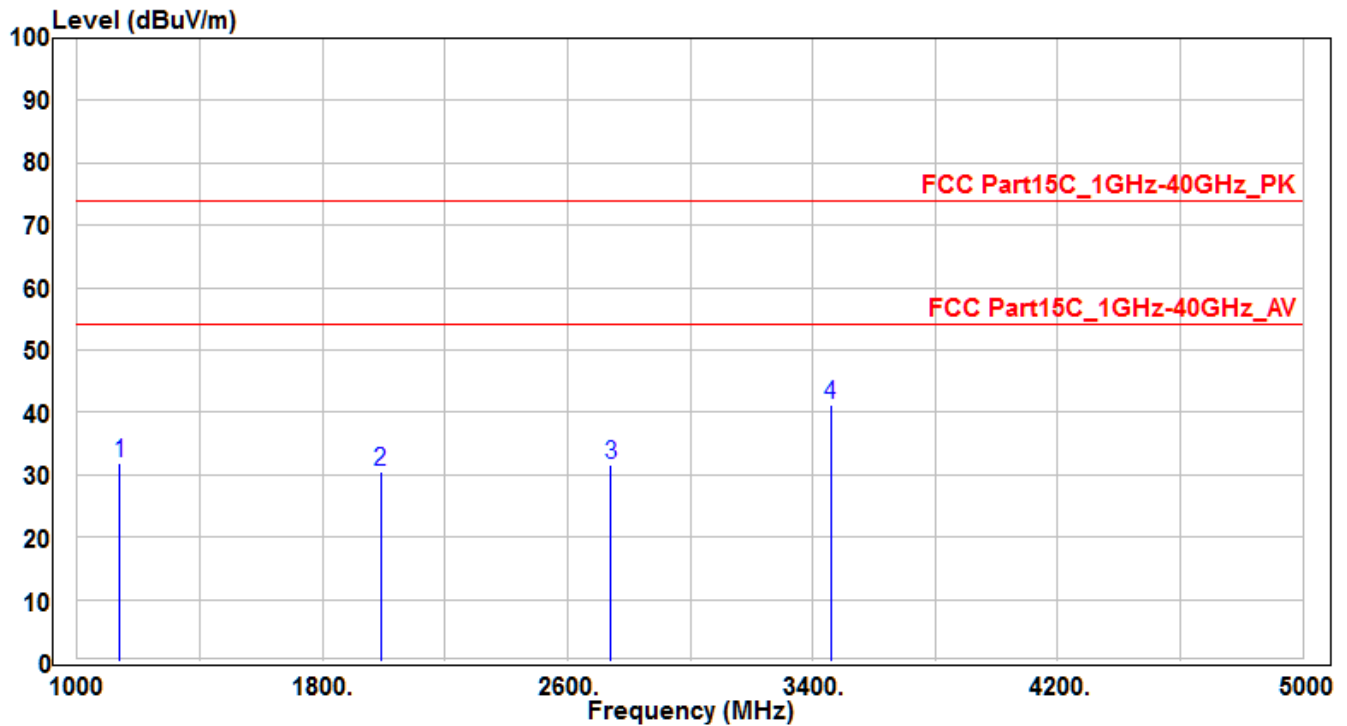


No		Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Height (cm)	Angle (deg)	Remark (QP/PK/AV)
1	*	1051.56	42.36	-7.43	34.93	-39.07	74	150	400	Peak
2		1872.79	36.32	-5.06	31.26	-42.74	74	150	400	Peak
3		2445.52	34.41	-2.31	32.1	-41.9	74	150	400	Peak
4		3033.75	36.94	-2.85	34.09	-39.91	74	150	400	Peak

Note :

1. " * " means the worst value in this measurement data °
2. Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB) °
3. Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) °
4. The emission levels of other frequencies are very lower than the limit and not show in test report °

EUT	RF Transceiver Interface	Test Date	2017/12/12
Factor	BBHA 9120D (1GHz~18GHz)	Temp. / Humidity	25°C / 60%
Polarity	Horizontal	Site / Engineer	AC1 / Peter
Test Mode	MODE2-CH14	Test Voltage	By Battery

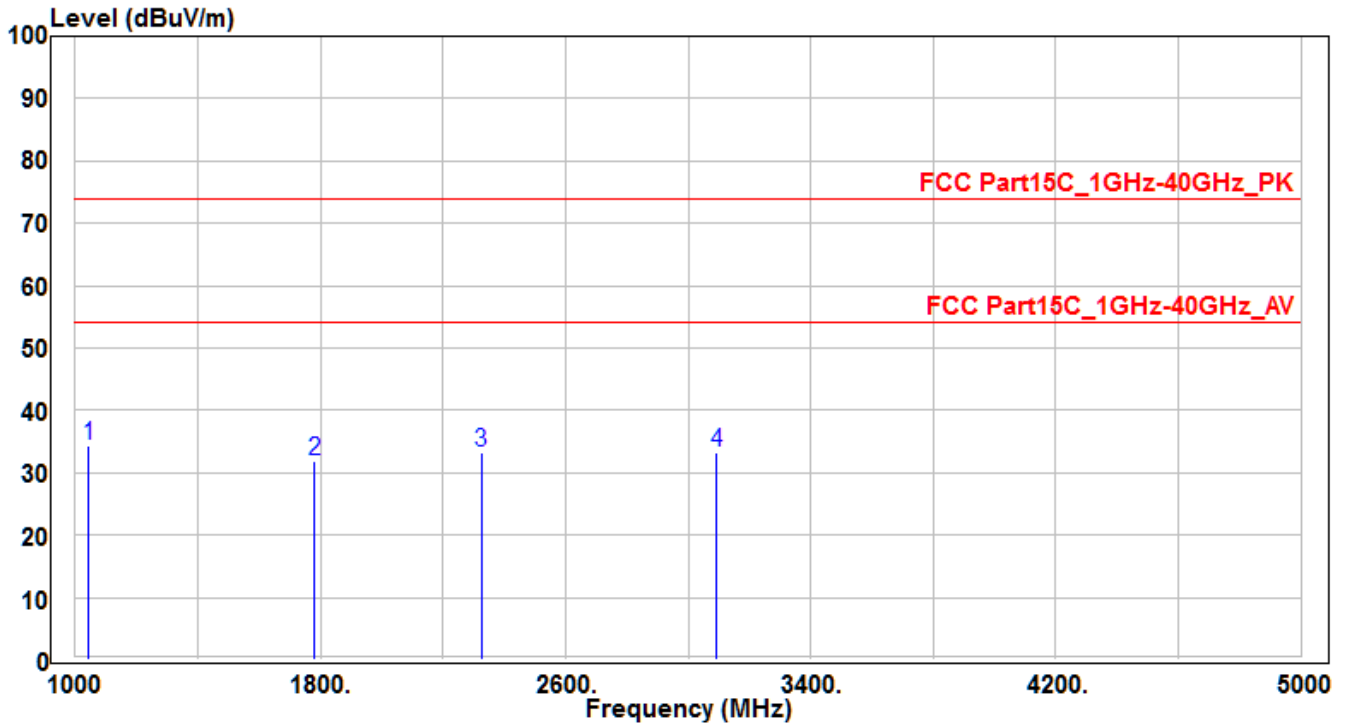


No		Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Height (cm)	Angle (deg)	Remark (QP/PK/AV)
1		1140.18	39.19	-7.21	31.98	-42.02	74	150	400	Peak
2		1989.41	35.13	-4.65	30.48	-43.52	74	150	400	Peak
3		2741.13	34.14	-2.46	31.68	-42.32	74	150	400	Peak
4	*	3458.24	43.1	-1.83	41.27	-32.73	74	150	400	Peak

Note :

- " * " means the worst value in this measurement data °
- Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB) °
- Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) °
- The emission levels of other frequencies are very lower than the limit and not show in test report °

EUT	RF Transceiver Interface	Test Date	2017/12/12
Factor	BBHA 9120D (1GHz~18GHz)	Temp. / Humidity	25°C / 60%
Polarity	Vertical	Site / Engineer	AC1 / Peter
Test Mode	MODE2-CH14	Test Voltage	By Battery

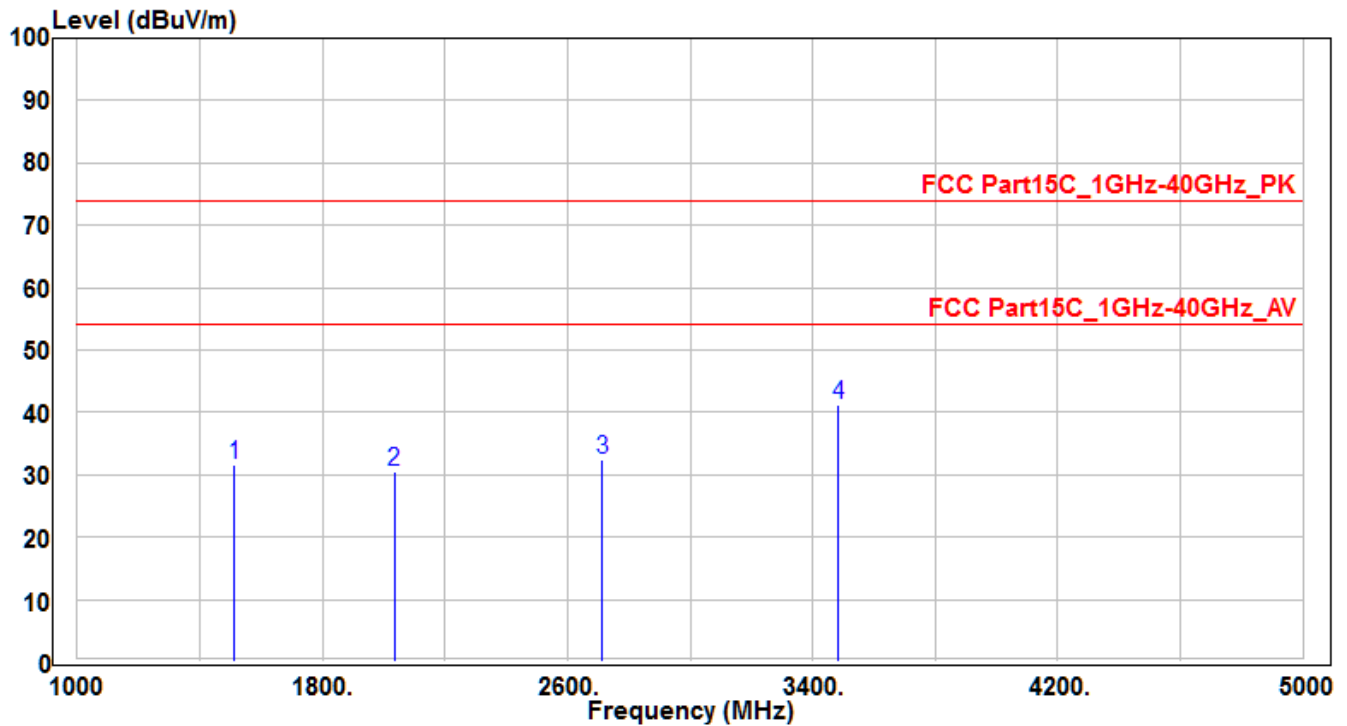


No		Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Height (cm)	Angle (deg)	Remark (QP/PK/AV)
1	*	1045.06	41.74	-7.44	34.3	-39.7	74	150	400	Peak
2		1780.04	37.36	-5.37	31.99	-42.01	74	150	400	Peak
3		2325.9	36.26	-2.93	33.33	-40.67	74	150	400	Peak
4		3094.5	35.92	-2.71	33.21	-40.79	74	150	400	Peak

Note :

1. " * " means the worst value in this measurement data °
2. Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB) °
3. Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) °
4. The emission levels of other frequencies are very lower than the limit and not show in test report °

EUT	RF Transceiver Interface	Test Date	2017/12/12
Factor	BBHA 9120D (1GHz~18GHz)	Temp. / Humidity	25°C / 60%
Polarity	Horizontal	Site / Engineer	AC1 / Peter
Test Mode	MODE2-CH15	Test Voltage	By Battery

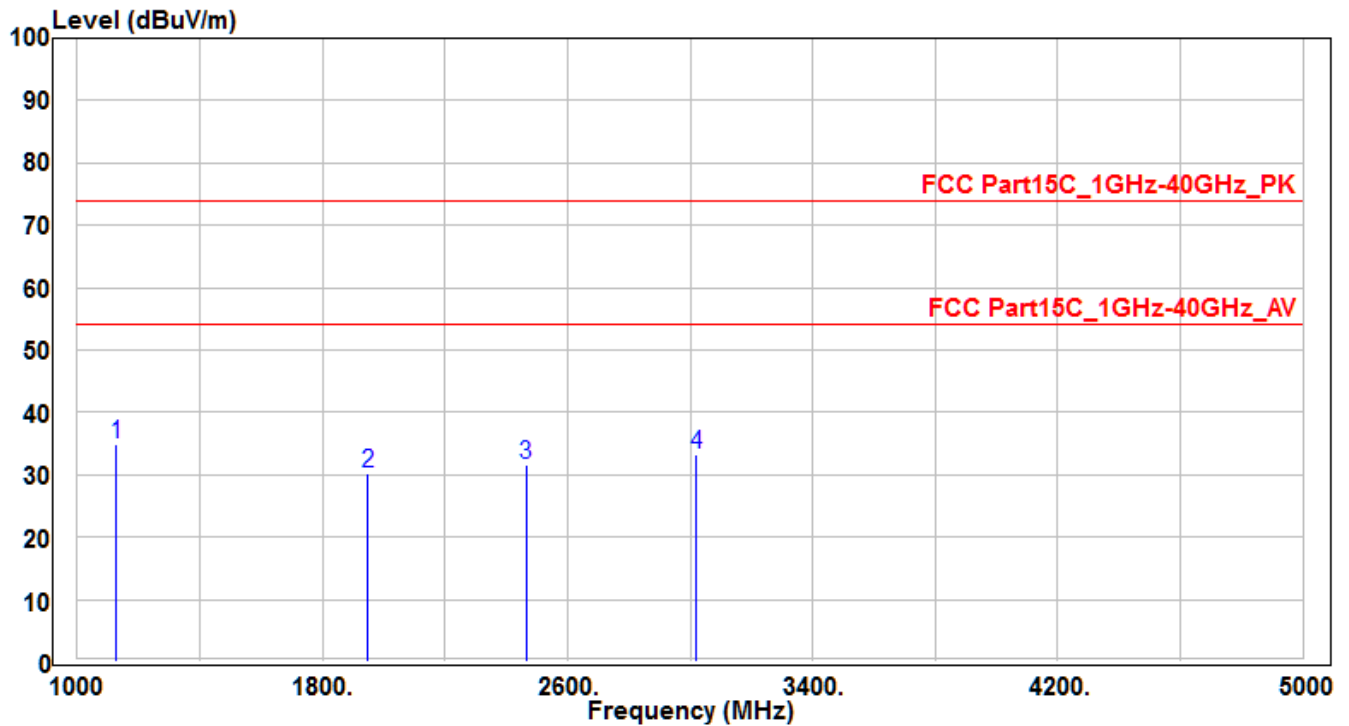


No		Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Height (cm)	Angle (deg)	Remark (QP/PK/AV)
1		1513.92	37.95	-6.28	31.67	-42.33	74	150	400	Peak
2		2035.91	34.9	-4.44	30.46	-43.54	74	150	400	Peak
3		2712.88	34.96	-2.41	32.55	-41.45	74	150	400	Peak
4	*	3483.86	42.88	-1.78	41.1	-32.9	74	150	400	Peak

Note :

- " * " means the worst value in this measurement data °
- Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB) °
- Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) °
- The emission levels of other frequencies are very lower than the limit and not show in test report °

EUT	RF Transceiver Interface	Test Date	2017/12/12
Factor	BBHA 9120D (1GHz~18GHz)	Temp. / Humidity	25°C / 60%
Polarity	Vertical	Site / Engineer	AC1 / Peter
Test Mode	MODE2-CH15	Test Voltage	By Battery

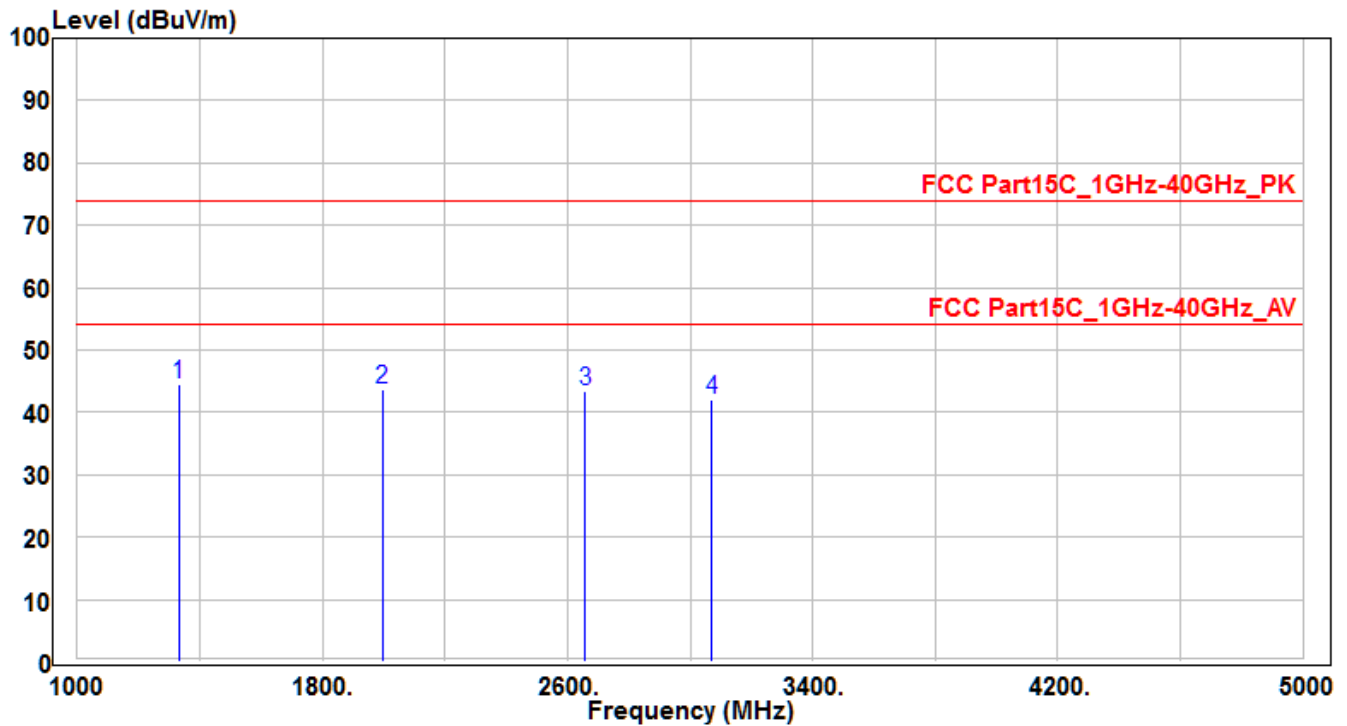


No		Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Height (cm)	Angle (deg)	Remark (QP/PK/AV)
1	*	1128.68	42.11	-7.23	34.88	-39.12	74	150	400	Peak
2		1948.66	34.95	-4.79	30.16	-43.84	74	150	400	Peak
3		2466.02	33.75	-2.2	31.55	-42.45	74	150	400	Peak
4		3019.25	36.17	-2.88	33.29	-40.71	74	150	400	Peak

Note :

- " * " means the worst value in this measurement data °
- Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB) °
- Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) °
- The emission levels of other frequencies are very lower than the limit and not show in test report °

EUT	RF USB Dongle	Test Date	2017/12/12
Factor	BBHA 9120D (1GHz~18GHz)	Temp. / Humidity	25°C / 60%
Polarity	Horizontal	Site / Engineer	AC1 / Peter
Test Mode	MODE3-CH14	Test Voltage	By Notebook PC

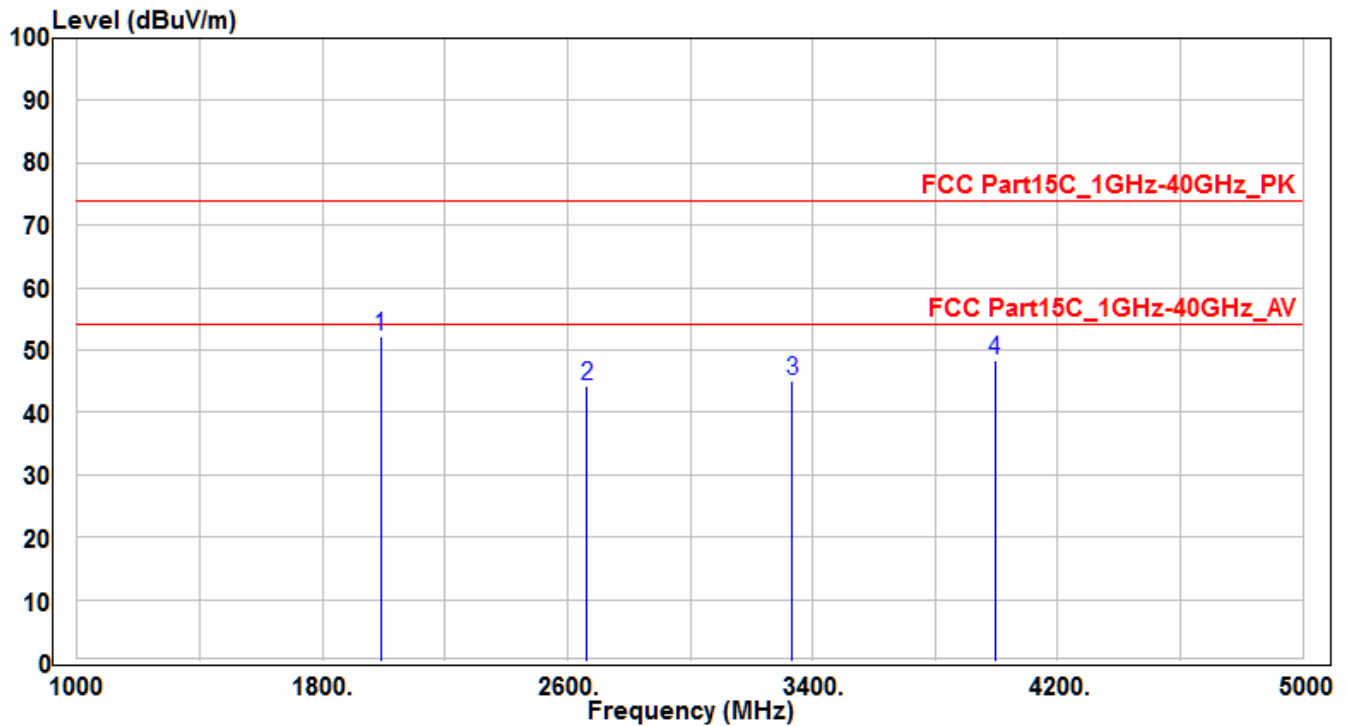


No		Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV)	Height (cm)	Angle (deg)	Remark (QP/PK/AV)
1	*	1330.55	51.26	-6.74	44.52	-29.48	74	150	400	Peak
2		1995.03	48.28	-4.64	43.64	-30.36	74	150	400	Peak
3		2657.39	45.67	-2.3	43.37	-30.63	74	150	400	Peak
4		3069.62	44.7	-2.76	41.94	-32.06	74	150	400	Peak

Note :

- " * " means the worst value in this measurement data °
- Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB) °
- Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) °
- The emission levels of other frequencies are very lower than the limit and not show in test report °

EUT	RF USB Dongle	Test Date	2017/12/12
Factor	BBHA 9120D (1GHz~18GHz)	Temp. / Humidity	25°C / 60%
Polarity	Vertical	Site / Engineer	AC1 / Peter
Test Mode	MODE3-CH14	Test Voltage	By Notebook PC

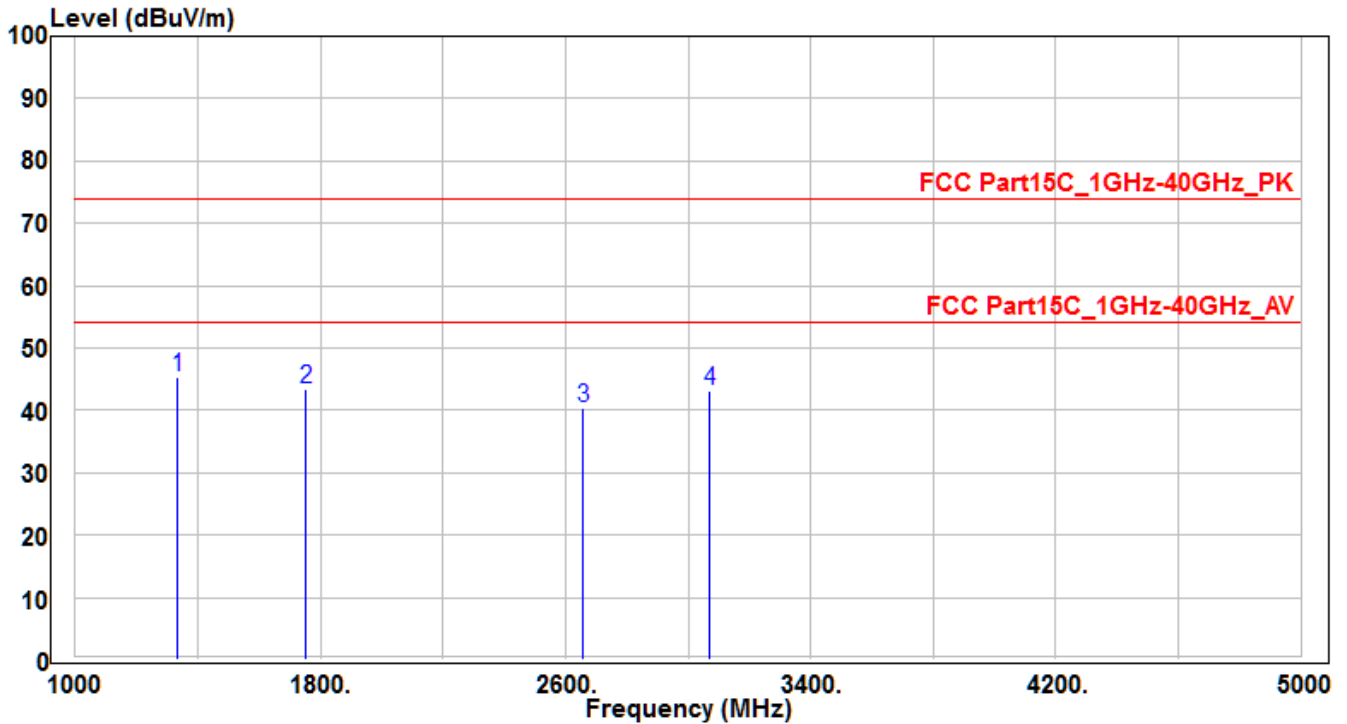


No		Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Height (cm)	Angle (deg)	Remark (QP/PK/AV)
1	*	1991.03	56.9	-4.65	52.25	-21.75	74	150	400	Peak
2		2664.64	46.7	-2.33	44.37	-29.63	74	150	400	Peak
3		3333.31	47.08	-2.13	44.95	-29.05	74	150	400	Peak
4		3996.34	48.31	0.17	48.48	-25.52	74	150	400	Peak

Note :

1. " * " means the worst value in this measurement data °
2. Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB) °
3. Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) °
4. The emission levels of other frequencies are very lower than the limit and not show in test report °

EUT	RF USB Dongle	Test Date	2017/12/12
Factor	BBHA 9120D (1GHz~18GHz)	Temp. / Humidity	25°C / 60%
Polarity	Horizontal	Site / Engineer	AC1 / Peter
Test Mode	MODE3-CH15	Test Voltage	By Notebook PC

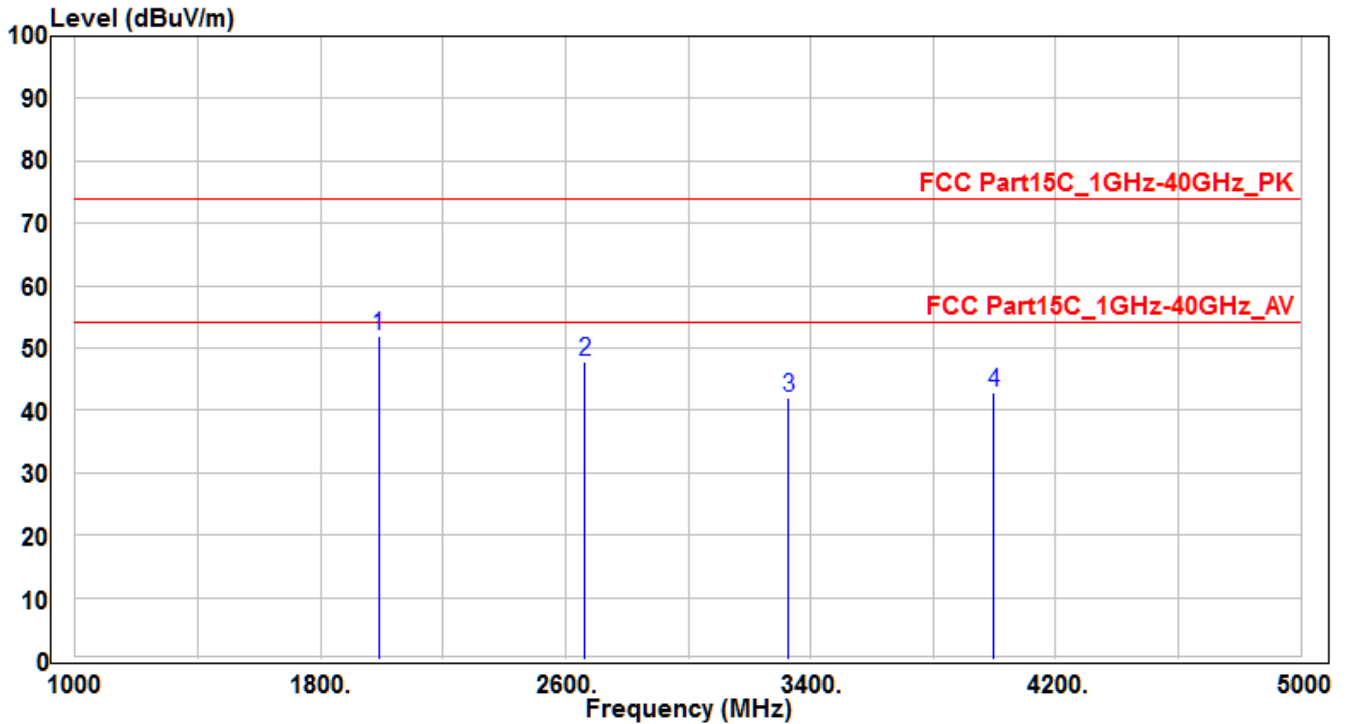


No		Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Height (cm)	Angle (deg)	Remark (QP/PK/AV)
1	*	1332.93	52.08	-6.74	45.34	-28.66	74	150	400	Peak
2		1753.41	48.94	-5.46	43.48	-30.52	74	150	400	Peak
3		2657.89	42.76	-2.3	40.46	-33.54	74	150	400	Peak
4		3070.62	45.92	-2.76	43.16	-30.84	74	150	400	Peak

Note :

1. " * " means the worst value in this measurement data °
2. Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB) °
3. Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) °
4. The emission levels of other frequencies are very lower than the limit and not show in test report °

EUT	RF USB Dongle	Test Date	2017/12/12
Factor	BBHA 9120D (1GHz~18GHz)	Temp. / Humidity	25°C / 60%
Polarity	Vertical	Site / Engineer	AC1 / Peter
Test Mode	MODE3-CH15	Test Voltage	By Notebook PC



No		Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Height (cm)	Angle (deg)	Remark (QP/PK/AV)
1	*	1991.66	56.71	-4.65	52.06	-21.94	74	150	400	Peak
2		2662.76	50.02	-2.32	47.7	-26.3	74	150	400	Peak
3		3326.49	44.31	-2.16	42.15	-31.85	74	150	400	Peak
4		3996.59	42.7	0.17	42.87	-31.13	74	150	400	Peak

Note :

- " * " means the worst value in this measurement data °
- Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB) °
- Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) °
- The emission levels of other frequencies are very lower than the limit and not show in test report °

6.3. 20dB Bandwidth

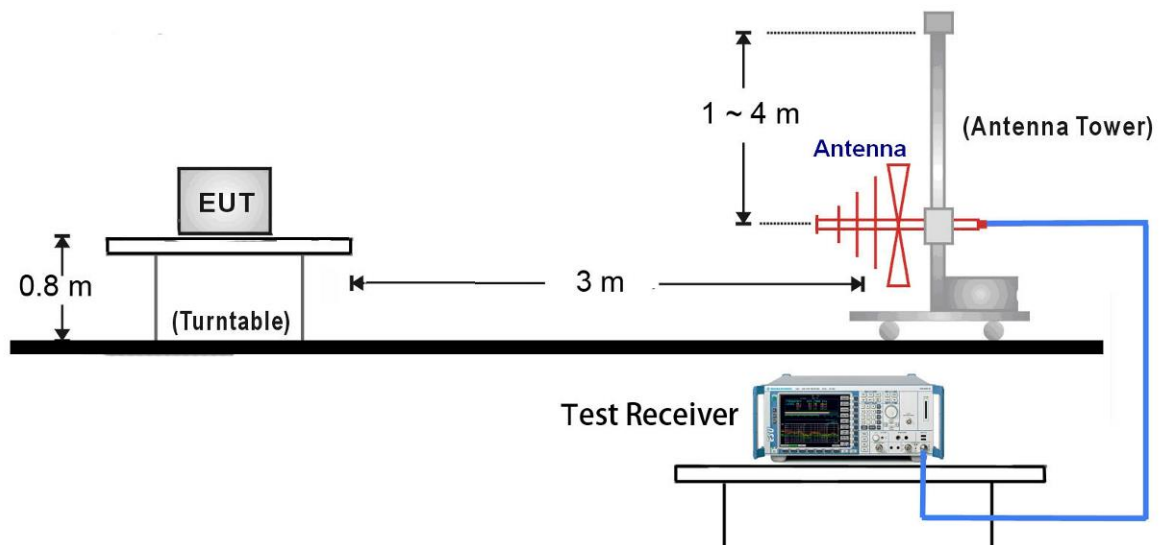
6.3.1. Standard Applicable

According to FCC Part 15.231(c), the bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70MHz and below 900MHz. Bandwidth is determined at the points 20 dB down from the modulated carrier.

6.3.2. Test Procedure

With the EUT's antenna attached, the EUT's 20dB Bandwidth power was received by the test antenna, which was connected to the spectrum analyzer with the START, and STOP frequencies set to the EUT's operation band.

6.3.3. Test Setup



6.3.4. Test Result

7. Modulation Type	Frequency (MHz)	20dB Bandwidth (MHz)	Limit (MHz)	Result
FSK	432.3	0.1088	≤ 1.085	Pass
FSK	435.5	0.1088	≤ 1.085	Pass
Limit: $434\text{MHz} \times 0.0025 = 1.085\text{MHz}$				

432.3MHz



Date: 8 DEC 2017 00:31:42

435.5MHz



Date: 7 DEC 2017 23:08:15

7.1. Transmission Time

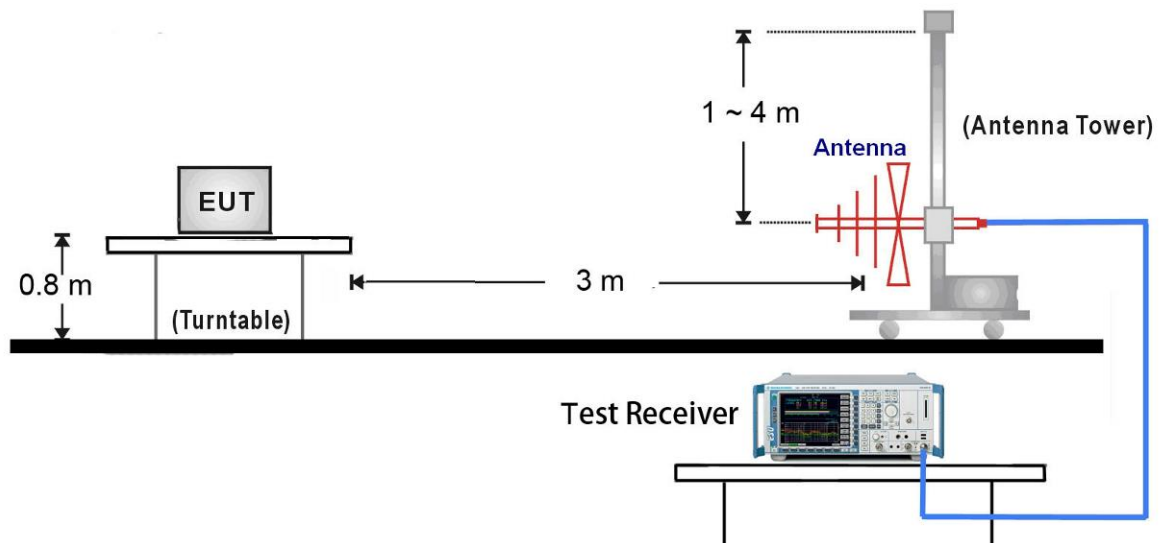
7.1.1. Standard Applicable

According to FCC 15.231(e), devices operated under the provisions of this paragraph shall be provided with a means for automatically limiting operation so that the duration of each transmission shall not be greater than one second and the silent period between transmissions shall be at least 30 times the duration of the transmission but in no case less than 10 seconds.

7.1.2. Test Procedure

With the EUT's antenna attached, the EUT's output signal was received by the test antenna, which was connected to the spectrum analyzer. Set the center frequency to 434MHz, then set the spectrum analyzer to Zero Span for the release time reading. During the testing, the switch was released then the EUT automatically deactivated.

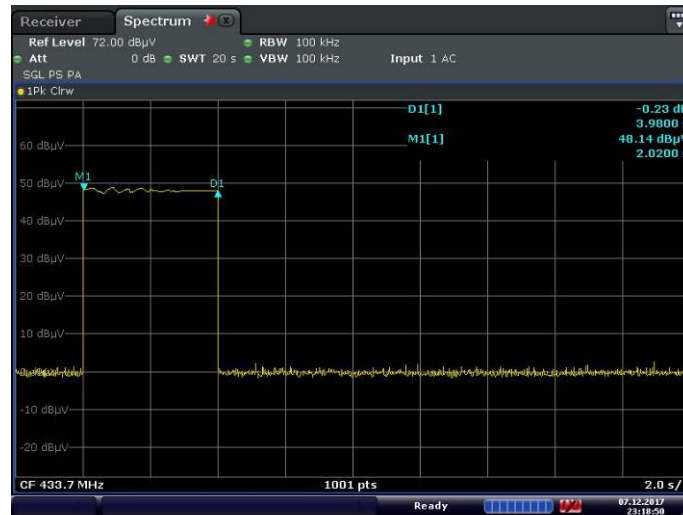
7.1.3. Test Setup



7.1.4. Test Result

Test Item	Frequency (MHz)	Measurement (s)	Limit (s)	Result
Transmission Time(T_{on})	434	3.98	< 5	Pass

434MHz-Transmission Time(T_{on})



Date: 7.DEC.2017 23:18:50

7.2. Duty Cycle

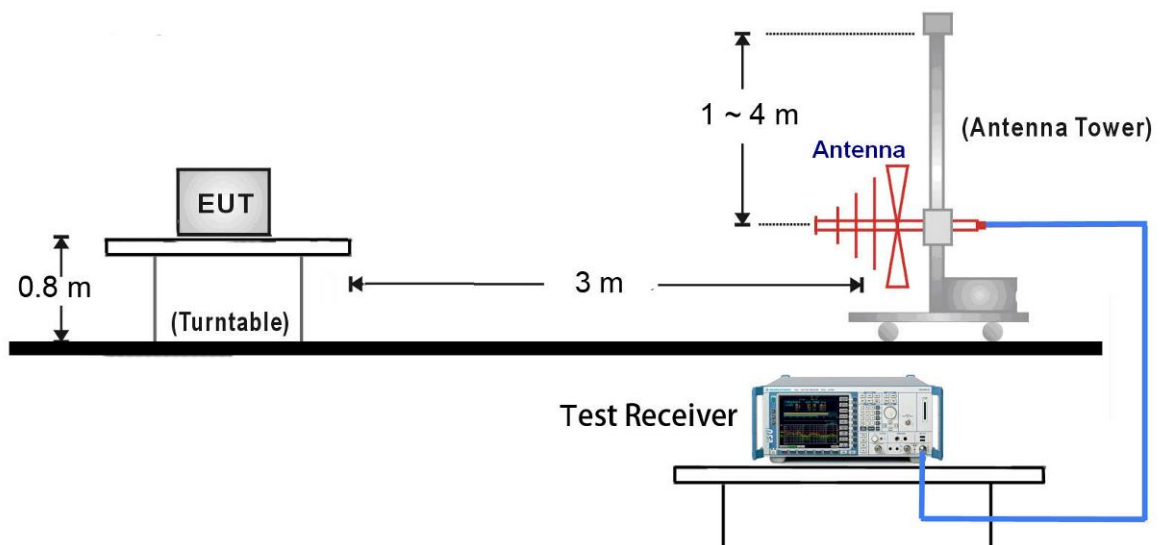
7.2.1. Standard Applicable

According to FCC Part 15.231(b) and 15.35(c), for pulse operation transmitter, the averaging pulsed emissions are calculated by peak value of measured emission plus duty cycle factor.

7.2.2. Test Procedure

With the EUT's antenna attached, the EUT's output signal was received by the test antenna, which was connected to the spectrum analyzer. Set the center frequency to 434MHz, then set the spectrum analyzer to Zero Span for the release time reading. During the testing, the switch was released then the EUT automatically deactivated.

7.2.3. Test Setup



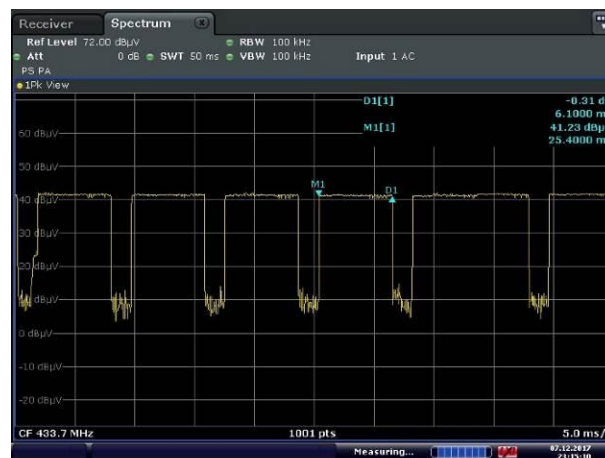
7.2.4. Test Result

Modulation Type	Total Time (T_{on}) (ms)	The duration of one cycle (ms)	Duty Cycle (ms)	Duty Cycle Factor (dB)
FSK	6.1	100	0.06	24.29

Note 1: Duty Cycle = Total Time (T_{on}) / 100ms.

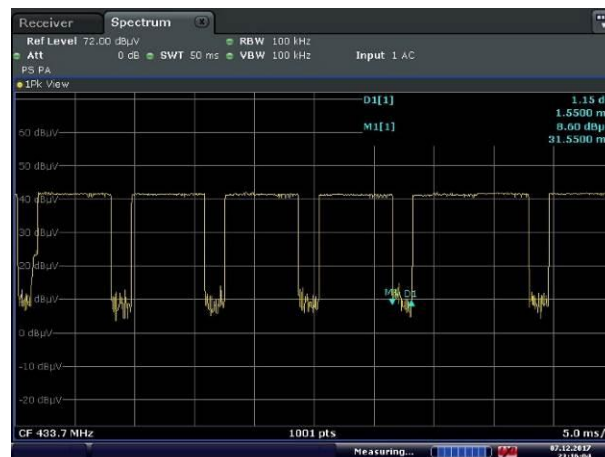
Note 2: Duty Cycle Factor = $20 \cdot \log(1/\text{Duty Cycle})$.

434MHz (T_{on})



Date: 7.DEC.2017 23:15:10

434MHz (T_{off})



Date: 7.DEC.2017 23:16:04

7.3. AC Conducted Emissions Measurement

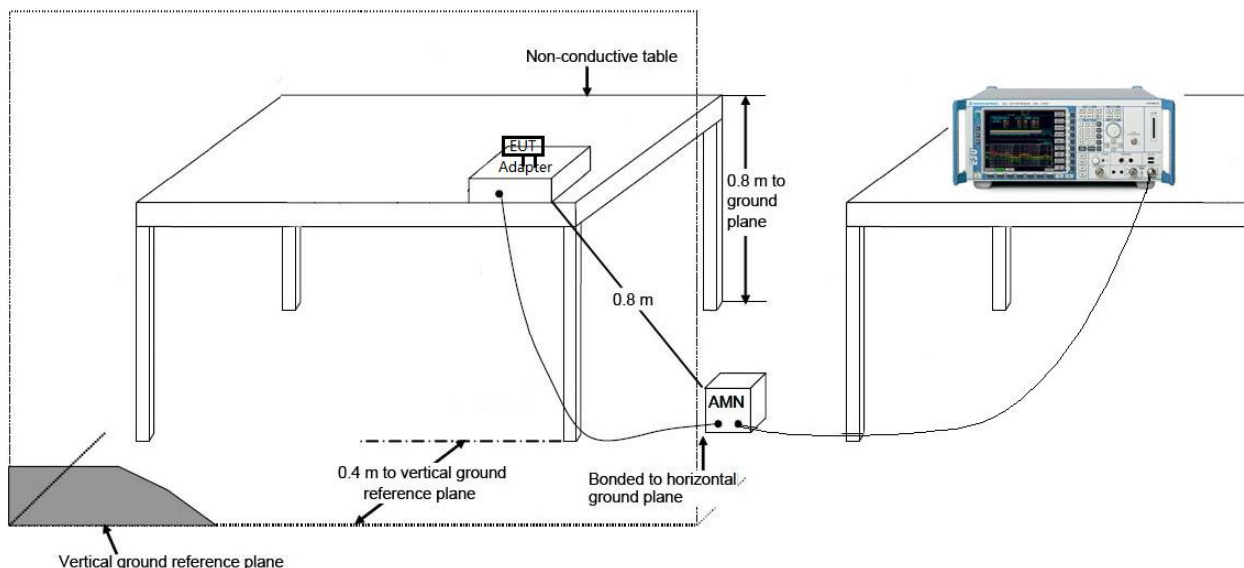
7.3.1. Test Limit

FCC Part 15 Subpart C Paragraph 15.207 / RSS-Gen Limits		
Frequency (MHz)	QP (dBμV)	Average (dBμV)
0.15 - 0.50	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30	60	50

Note 1: The lower limit shall apply at the transition frequencies.

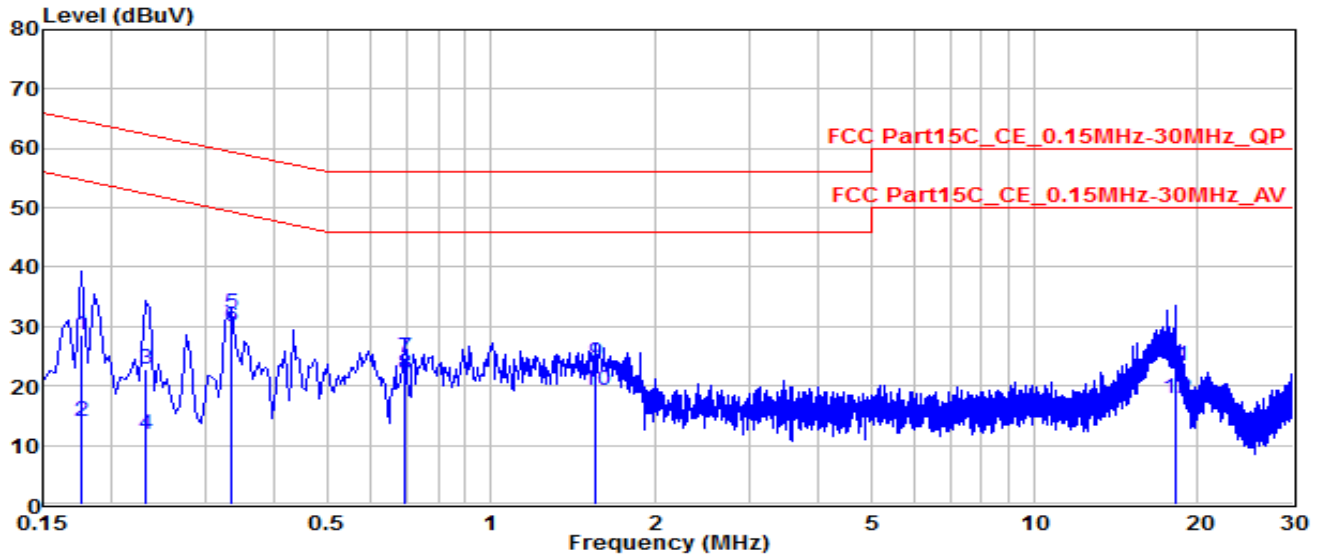
Note 2: The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.5MHz.

7.3.2. Test Setup



7.3.3. Test Result

EUT	TAINET Transceiver Module	Test Date	2017/12/13
Factor	CE_ENV216-L1 (Filter ON)	Temp. / Humidity	24°C / 55%
Polarity	Line1	Site / Engineer	SR2 / Peter
Test Mode	MODE3-CH14	Test Voltage	AC120V/60Hz

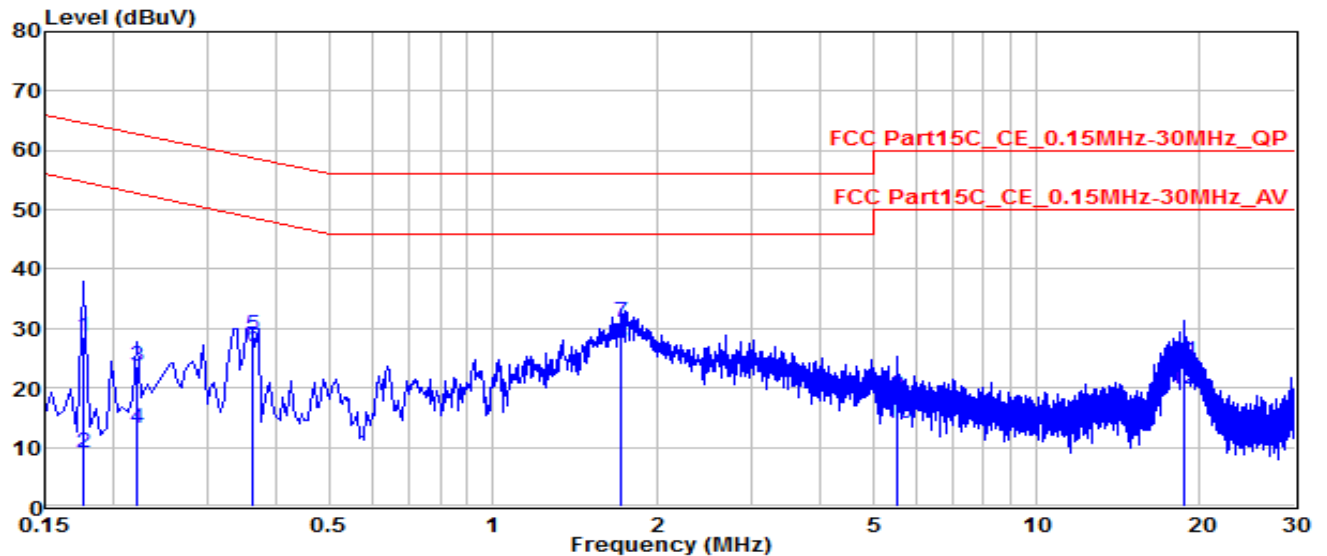


No		Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV)	Margin (dB)	Limit (dBuV/m)	Remark (QP/PK/AV)
1		0.177	18.31	10.15	28.46	-36.17	64.63	QP
2		0.177	3.94	10.15	14.09	-40.54	54.63	Average
3		0.23099	12.92	9.95	22.87	-39.54	62.41	QP
4		0.23099	1.88	9.95	11.83	-40.58	52.41	Average
5	*	0.33448	22.11	10.01	32.12	-27.22	59.34	QP
6	*	0.33448	19.84	10.01	29.85	-19.49	49.34	Average
7		0.69445	14.81	10.01	24.82	-31.18	56	QP
8		0.69445	11.93	10.01	21.94	-24.06	46	Average
9		1.554	13.91	9.87	23.78	-32.22	56	QP
10		1.554	9.28	9.87	19.15	-26.85	46	Average
11		18.211	13.33	9.99	23.32	-36.68	60	QP
12		18.211	8.01	9.99	18	-32	50	Average

Note : The EUT Power by Notebook PC

- "*" means the worst value in this measurement data .
- C.F (Correction Factor) = Factor (dB)+ Cable Loss (dB) .
- Measurement (dBuV) = Reading(dBuV)+ C.F (Correction Factor) .
- Other mode was also verified. The test results shown represent the worst case emissions .

EUT	TAINET Transceiver Module	Test Date	2017/12/13
Factor	CE_ENV216-N (Filter ON)	Temp. / Humidity	24°C / 55%
Polarity	Neutral	Site / Engineer	SR2 / Peter
Test Mode	MODE3-CH14	Test Voltage	AC120V/60Hz



No	Frequency (MHz)	Reading (dBUV)	C.F (dB)	Measurement (dBUV)	Margin (dB)	Limit (dBUV/m)	Remark (QP/PK/AV)
1	0.177	18.53	10.11	28.64	-35.99	64.63	QP
2	0.177	-0.91	10.11	9.2	-45.43	54.63	Average
3	0.22199	13.57	9.94	23.51	-39.23	62.74	QP
4	0.22199	3.25	9.94	13.19	-39.55	52.74	Average
5	0.36148	18.91	10.03	28.94	-29.75	58.69	QP
6	0.36148	17.03	10.03	27.06	-21.63	48.69	Average
7	* 1.725	21.09	9.86	30.95	-25.05	56	QP
8	* 1.725	17.56	9.86	27.42	-18.58	46	Average
9	5.554	8.92	9.78	18.7	-41.3	60	QP
10	5.554	4.25	9.78	14.03	-35.97	50	Average
11	18.643	14.31	10.06	24.37	-35.63	60	QP
12	18.643	9.72	10.06	19.78	-30.22	50	Average

Note : The EUT Power by Notebook PC

- " * " means the worst value in this measurement data .
- C.F (Correction Factor) = Factor (dB)+ Cable Loss (dB) .
- Measurement (dBUV) = Reading(dBUV)+ C.F (Correction Factor) .
- Other channel was also verified. The test results shown represent the worst case emissions .

CONCLUSION

The data collected relate only the item(s) tested and show that the **TAINET Transceiver Module** is in compliance with FCC Part 15.231(b) of the FCC Rules.

Appendix A - Test Photograph

Test Mode: Mode 3

Description: Front View of Conducted Emission Test Setup



Test Mode: Mode 3

Description: Back View of Conducted Emission Test Setup



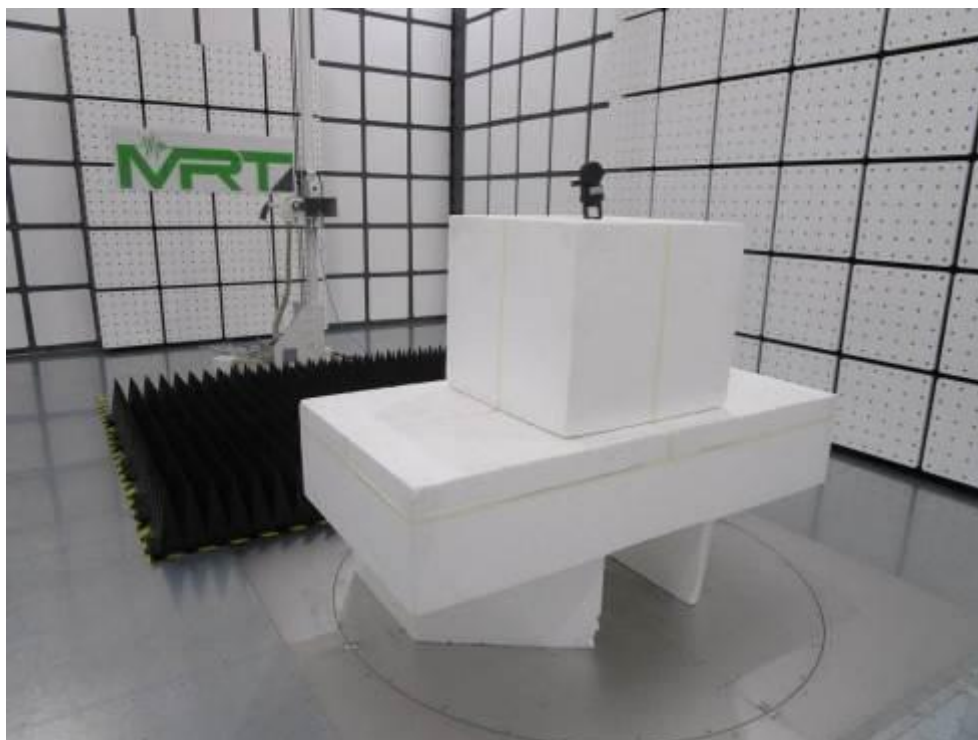
Test Mode: Mode 1

Description: Radiated Emission Test Setup for below 1GHz



Test Mode: Mode 1

Description: Radiated Emission Test Setup for above 1GHz



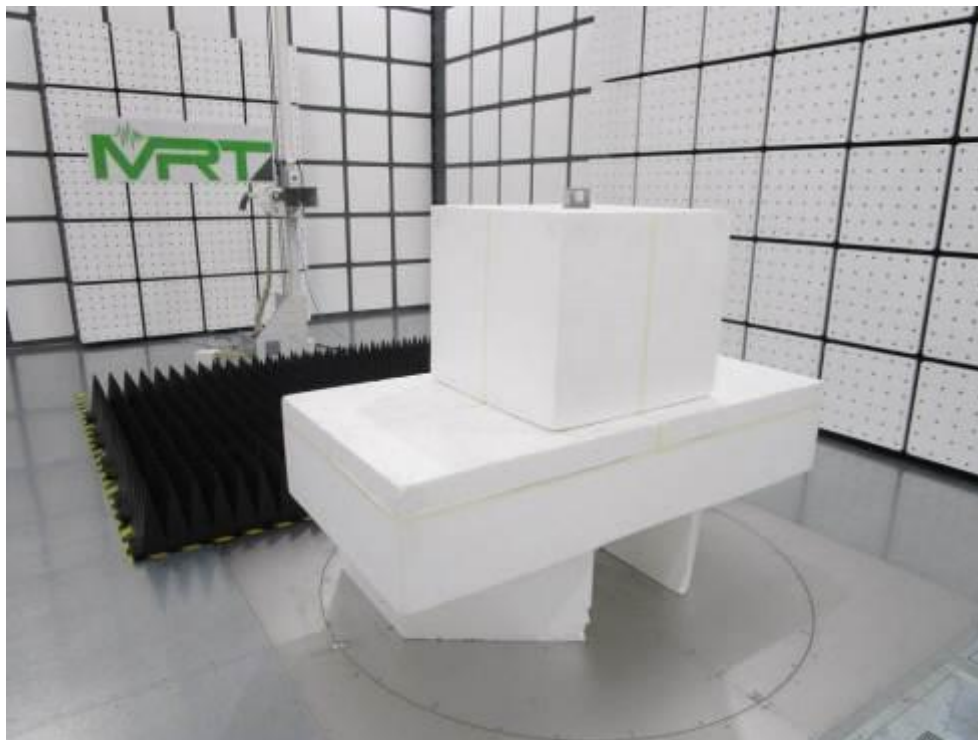
Test Mode: Mode 2

Description: Radiated Emission Test Setup for below 1GHz



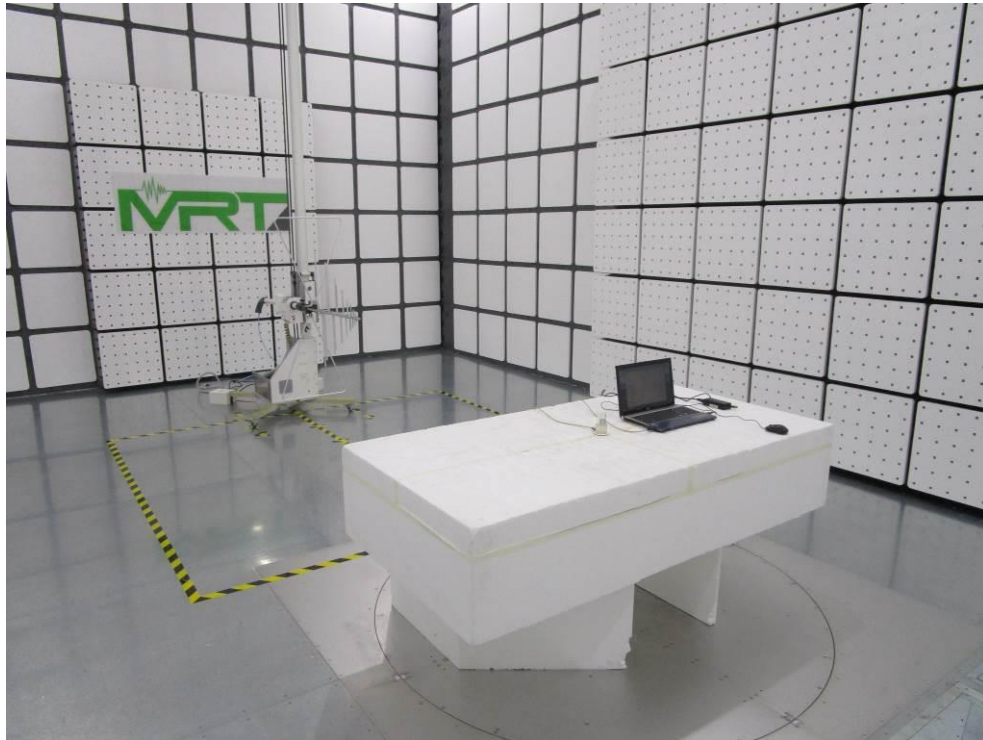
Test Mode: Mode 2

Description: Radiated Emission Test Setup for above 1GHz



Test Mode: Mode 3

Description: Radiated Emission Test Setup for below 1GHz



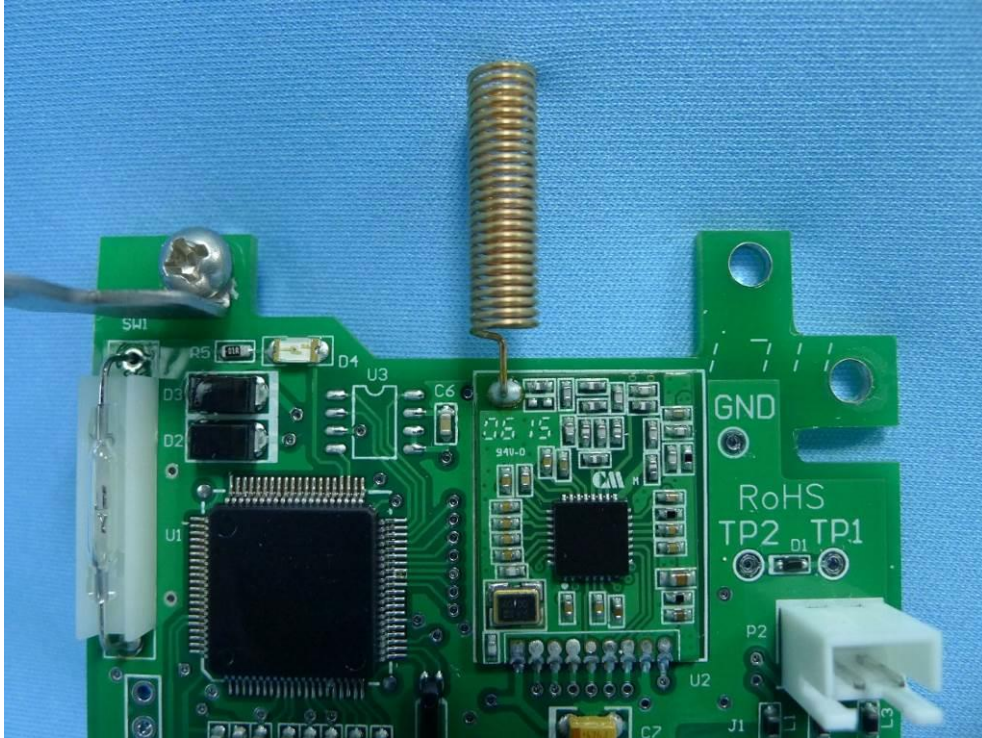
Test Mode: Mode 3

Description: Radiated Emission Test Setup for above 1GHz



Appendix B - External Photograph

(1) EUT Photo (434MHz RF Module)



(2) Host Photo (RFR)



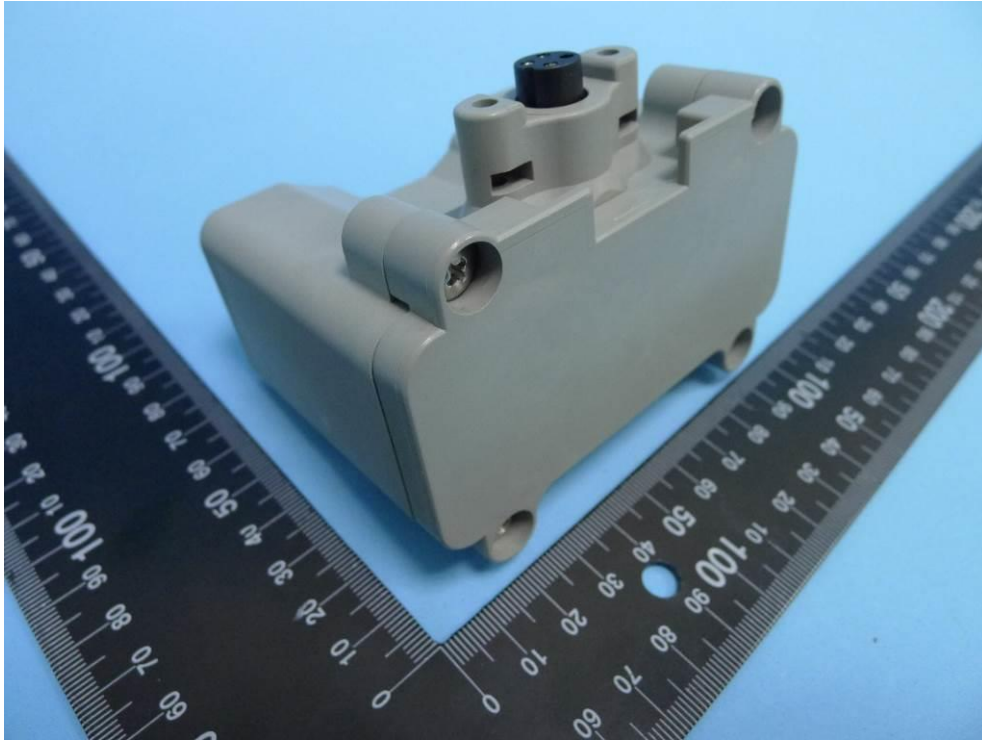
(3) Host Photo (RFR)



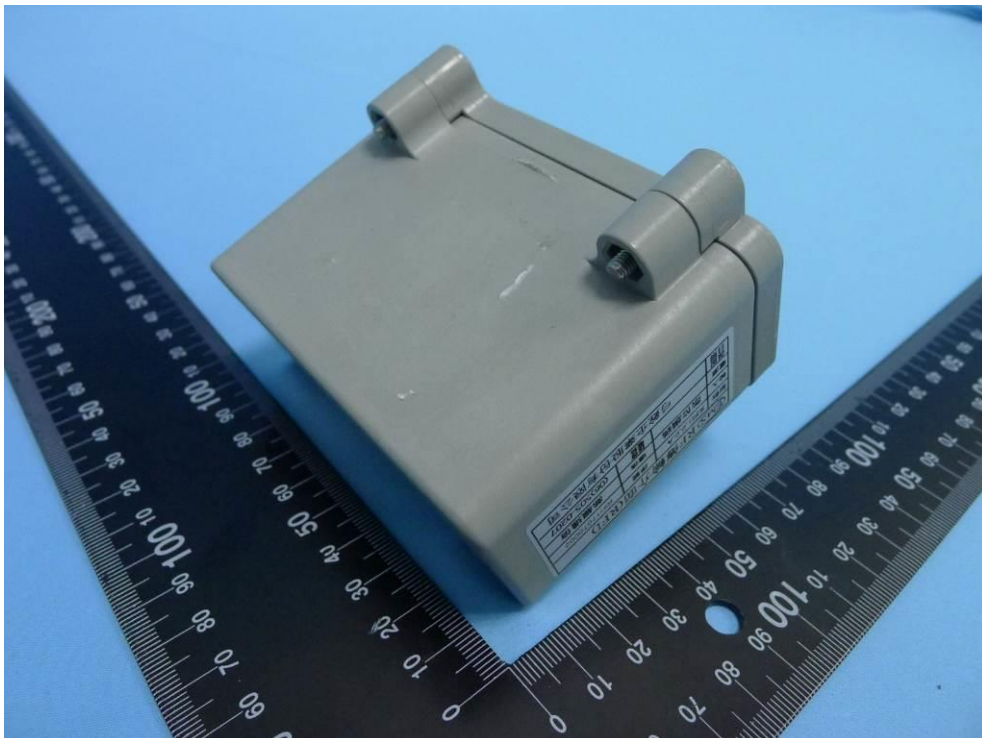
(4) Host Photo (RFR)



(5) Host Photo (RFI)



(6) Host Photo (RFI)



(7) Host Photo (RFI)



(8) Host Photo (RFD)



(9) Host Photo (RFD)



(10) Host Photo (RFD)

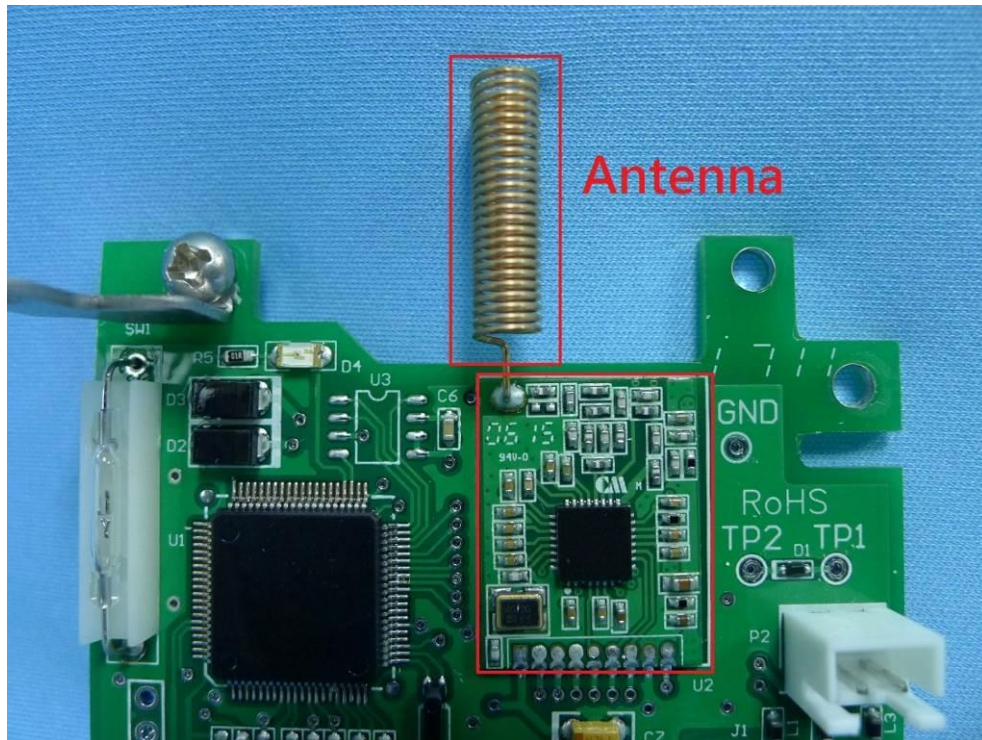


(11) Host Photo (RFD)



Appendix C - Internal Photograph

(1) EUT Photo (434MHz RF Module)



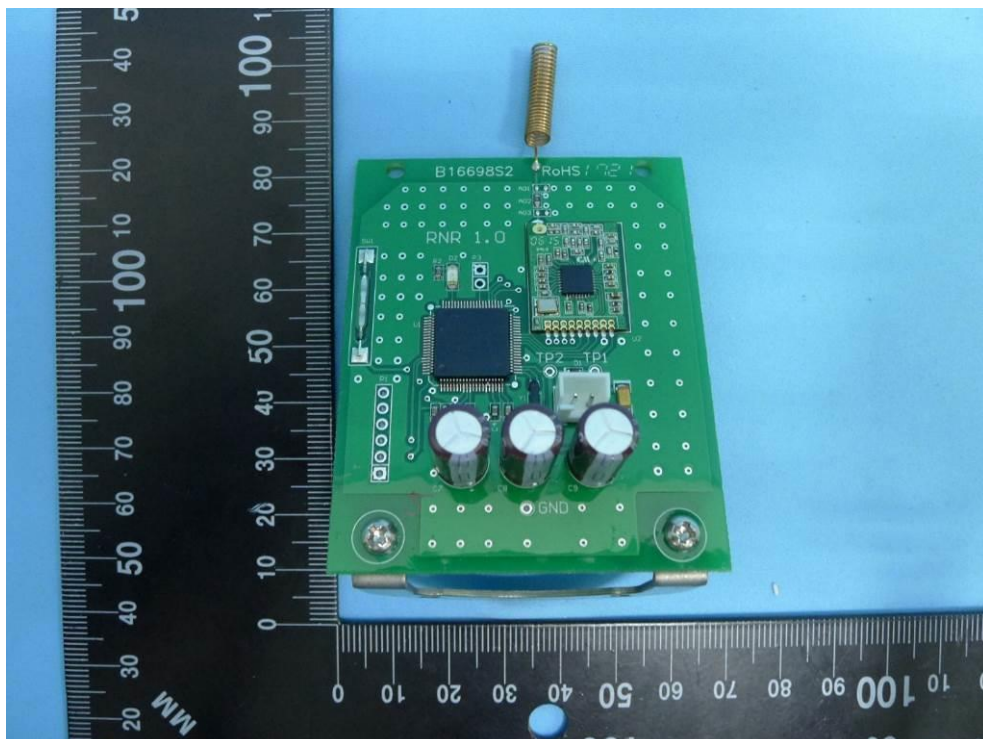
(2) Host Photo (RFR)



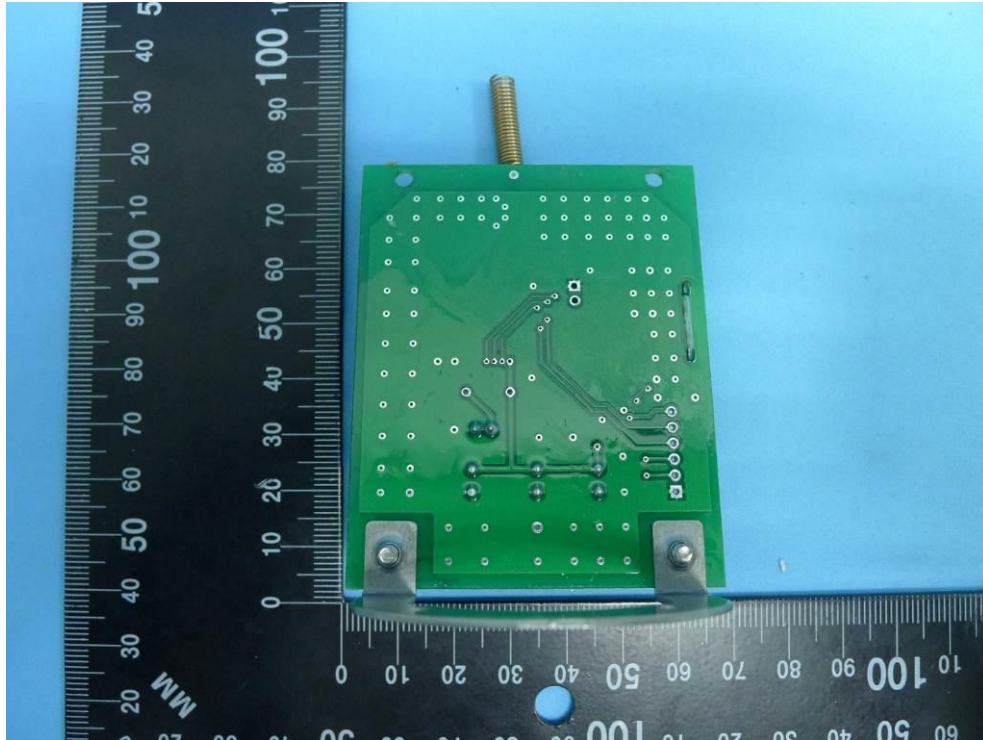
(3) Host Photo (RFR)



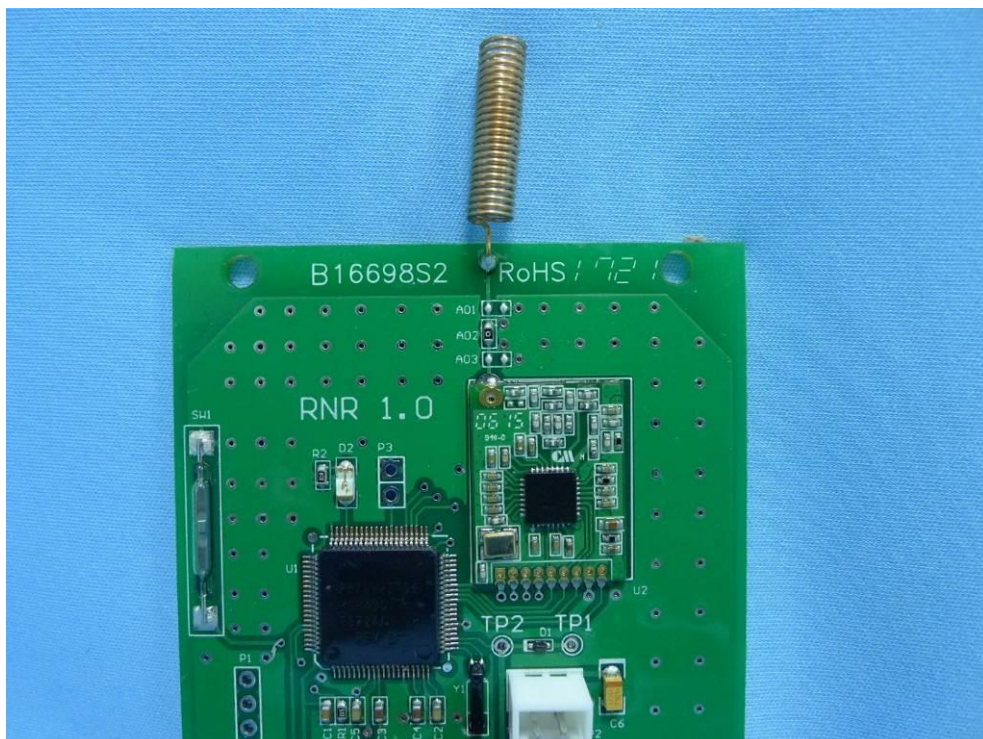
(4) Host Photo (RFR)



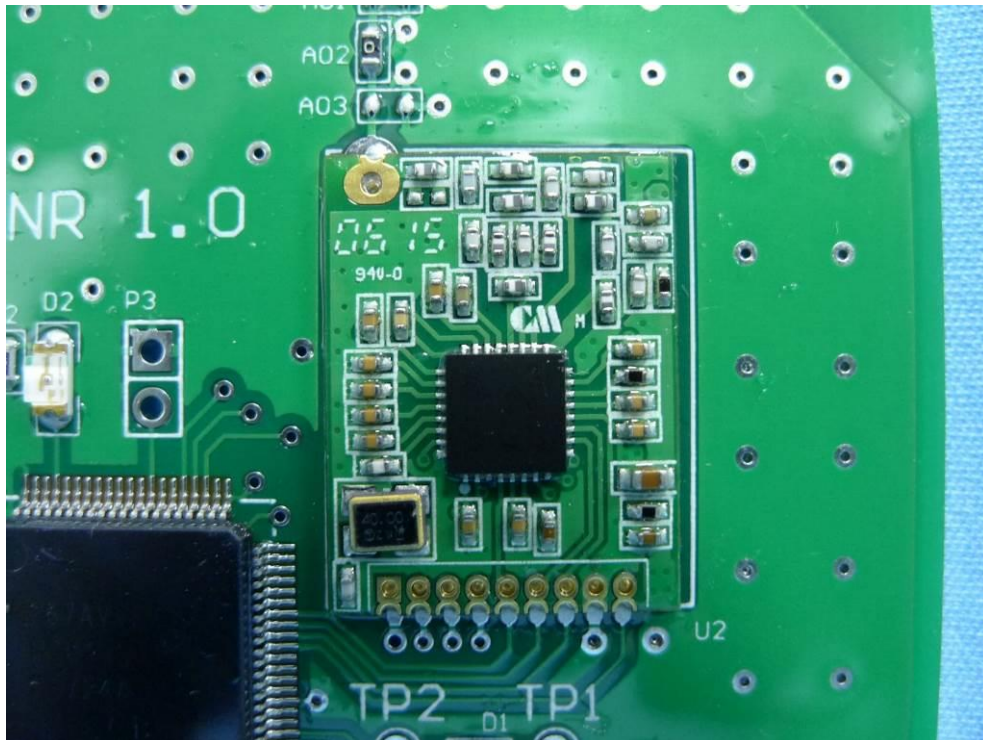
(5) Host Photo (RFR)



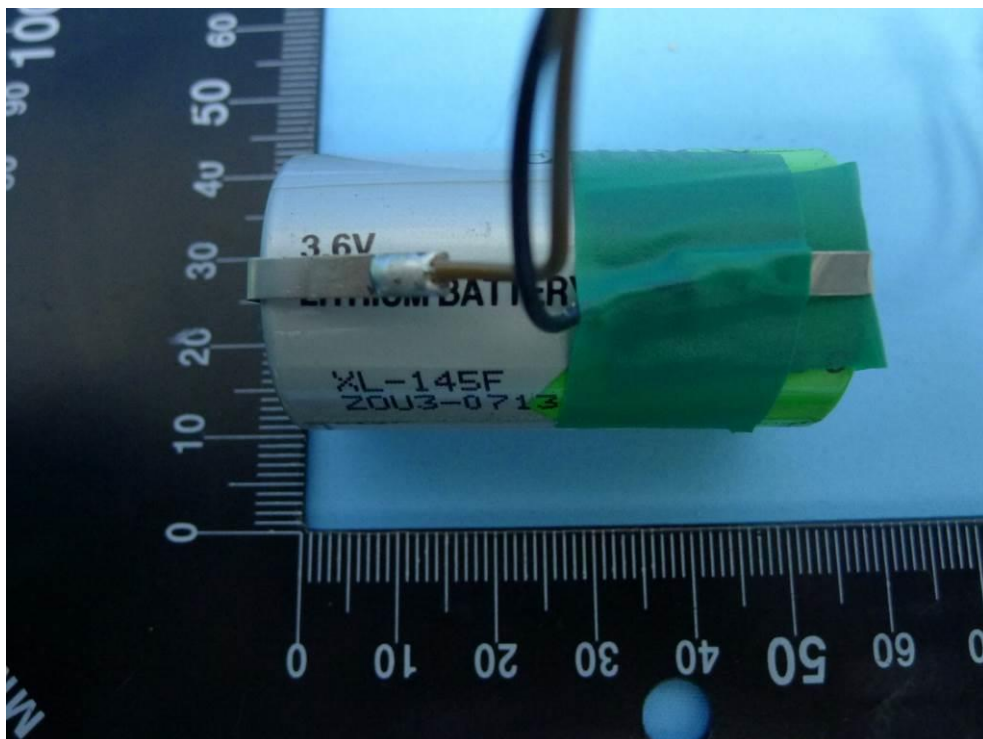
(6) Host Photo (RFR)



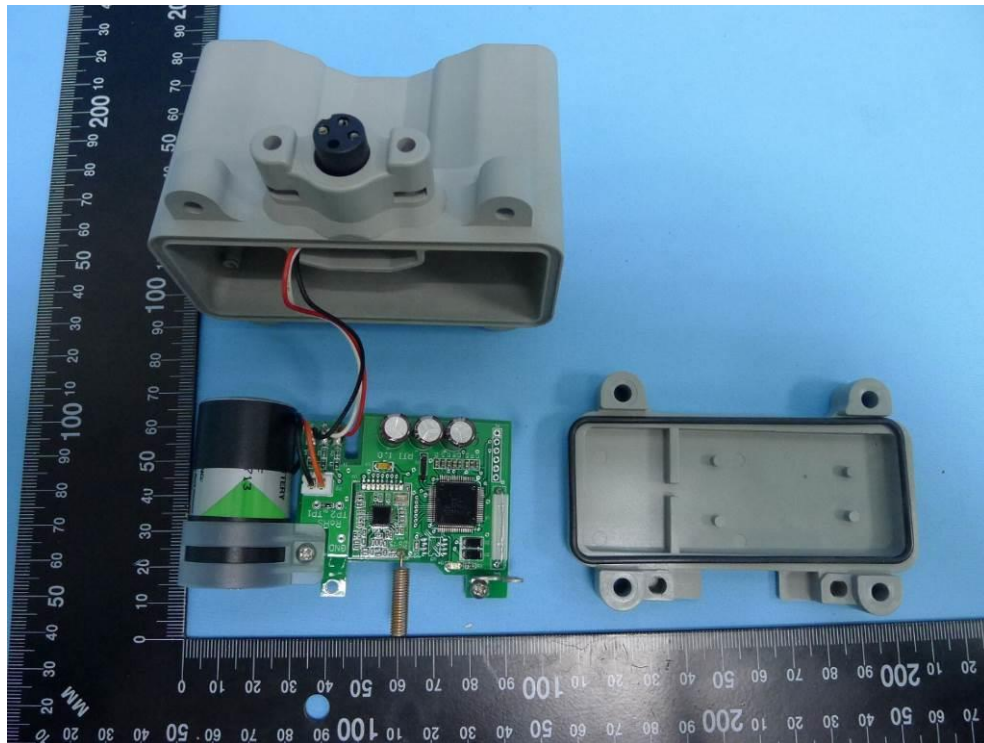
(7) Host Photo (RFR)



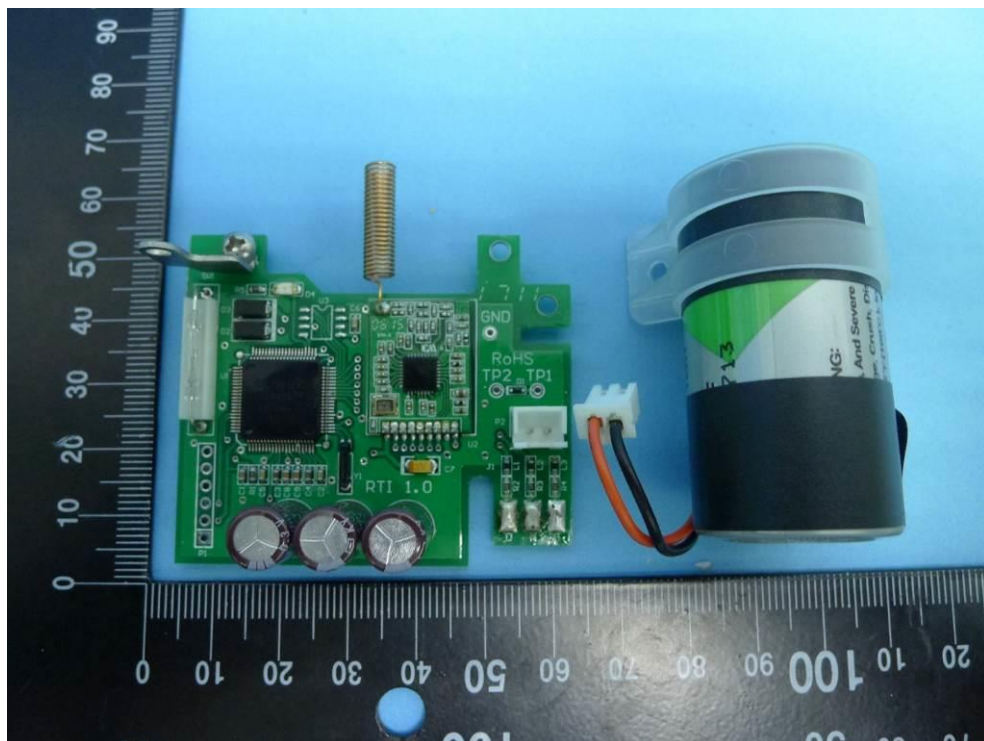
(8) Host Photo (RFR)



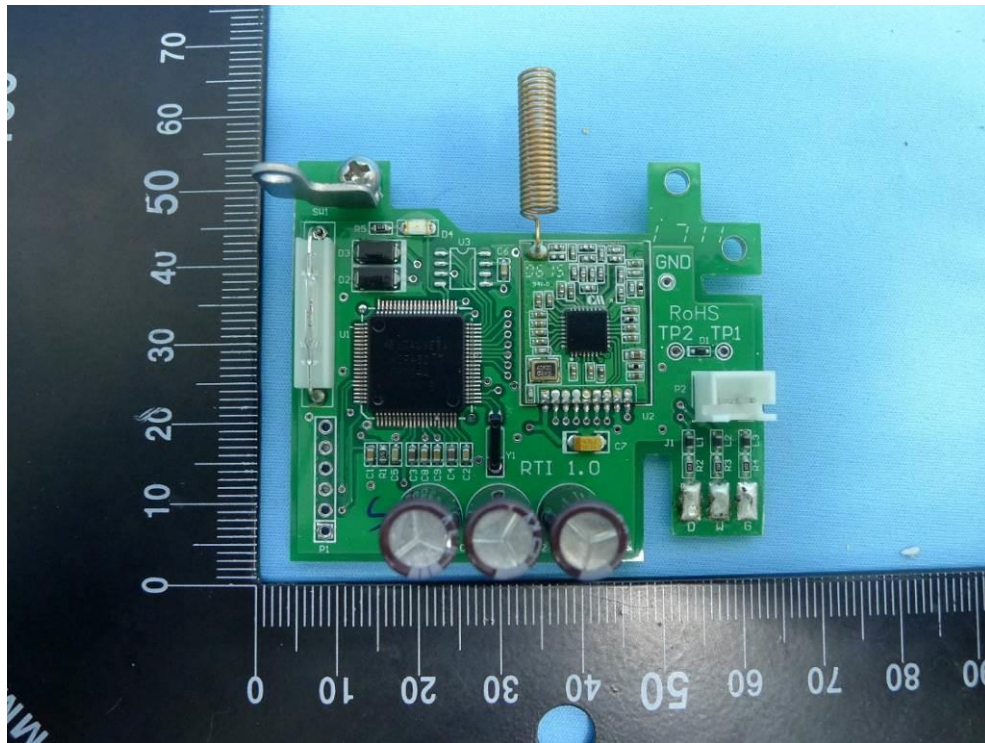
(9) Host Photo (RFI)



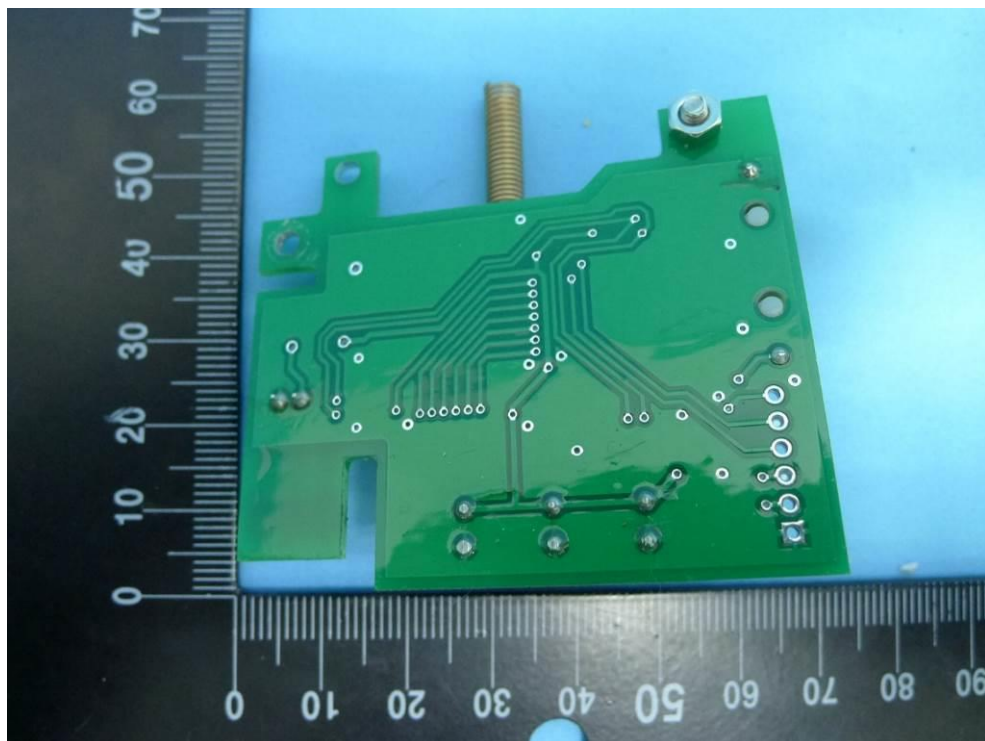
(10) Host Photo (RFI)



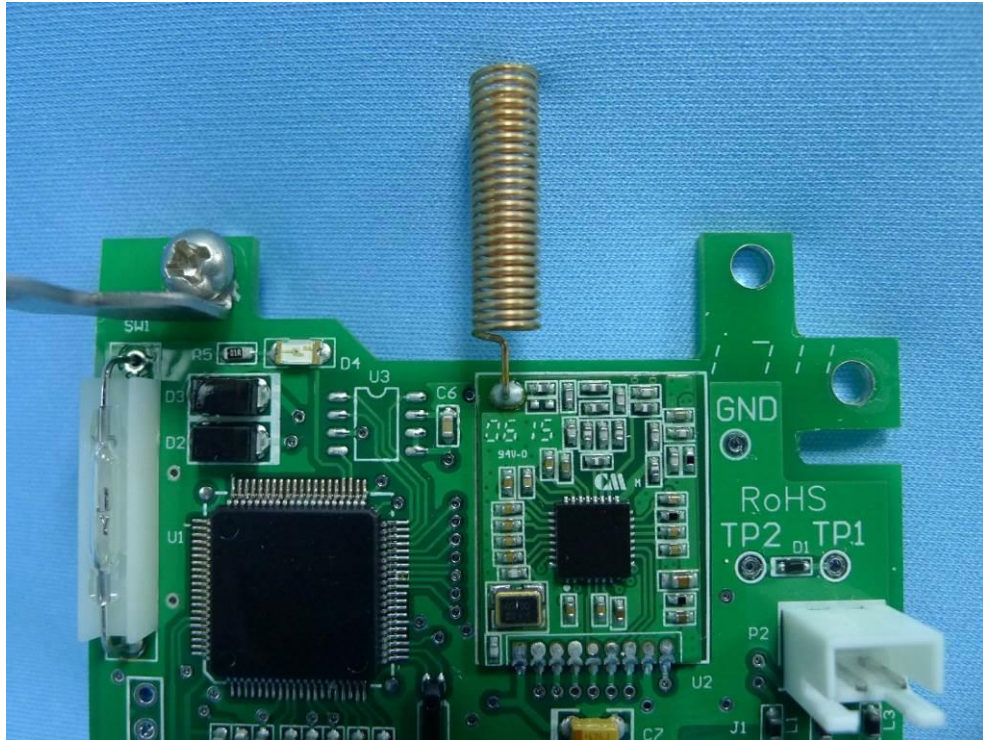
(11) Host Photo (RFI)



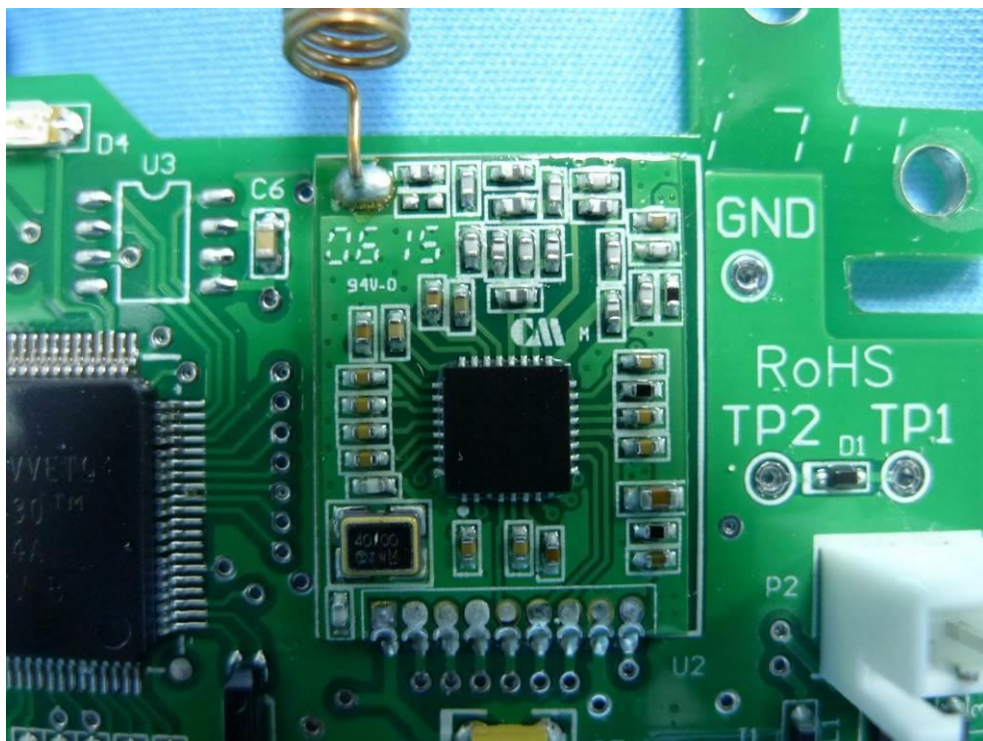
(12) Host Photo (RFI)



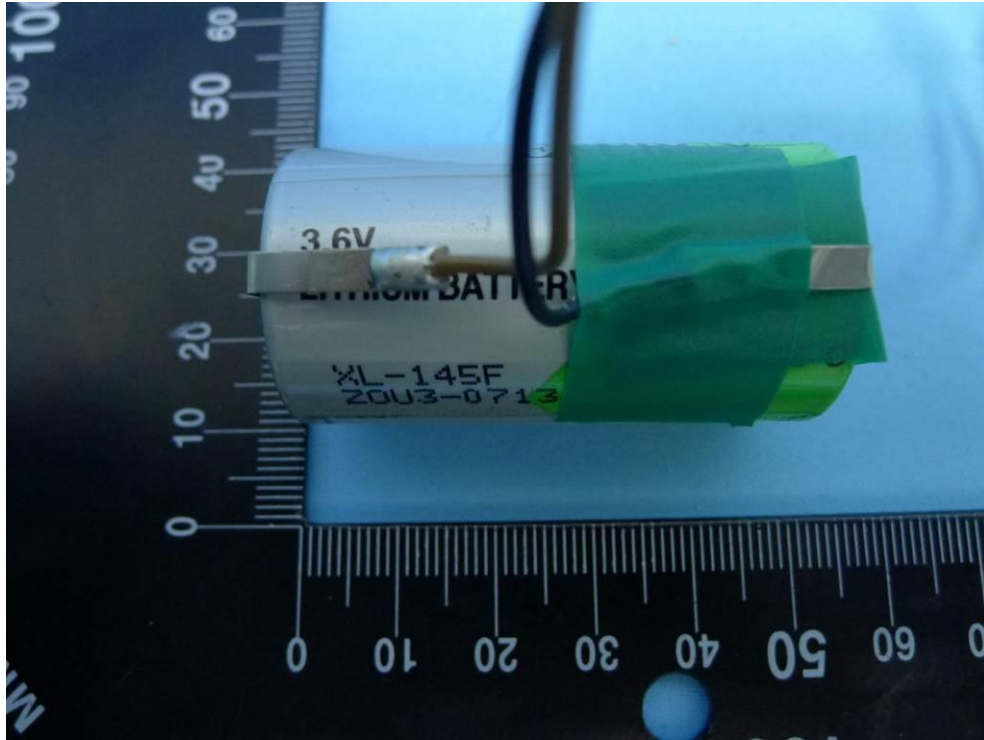
(13) Host Photo (RFI)



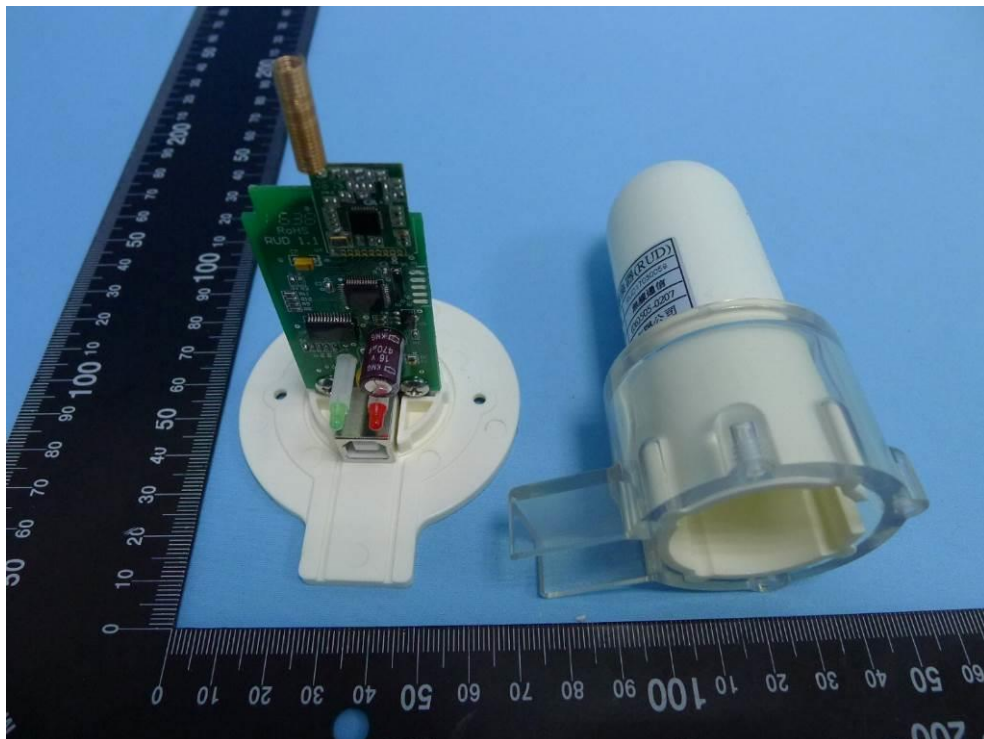
(14) Host Photo (RFI)



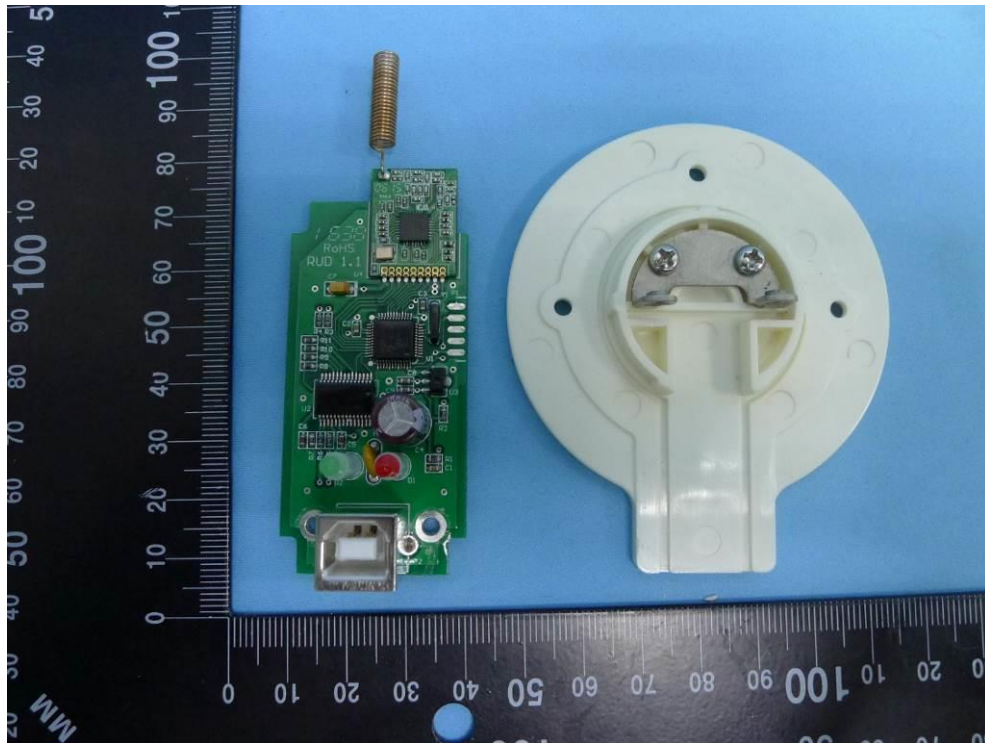
(15) Host Photo (RFI)



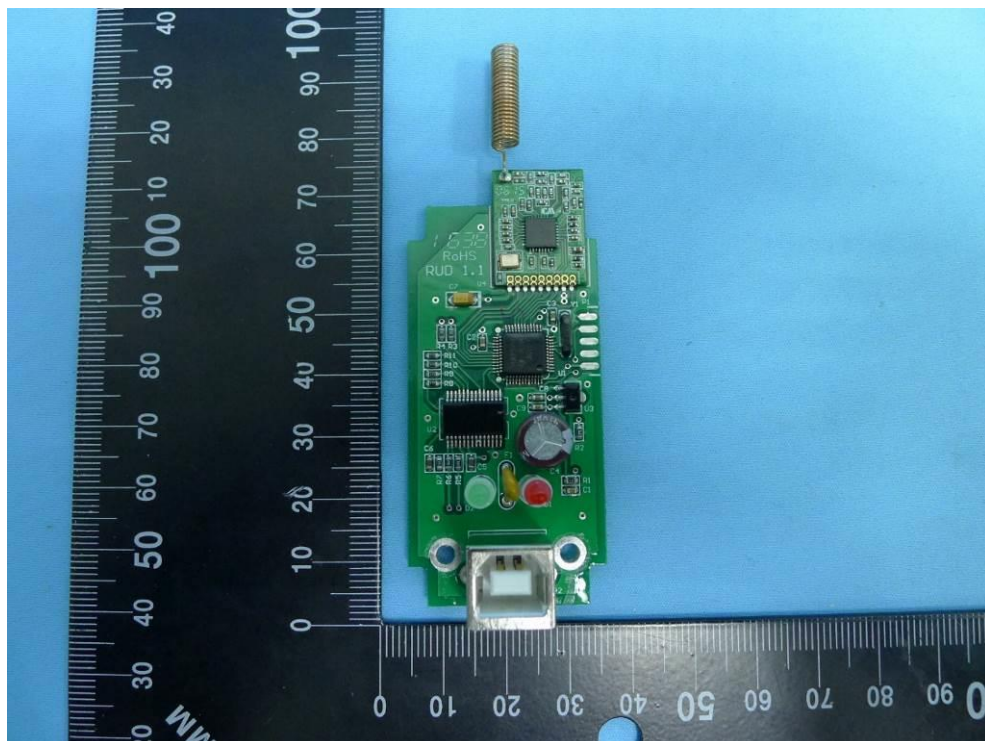
(16) Host Photo (RFD)



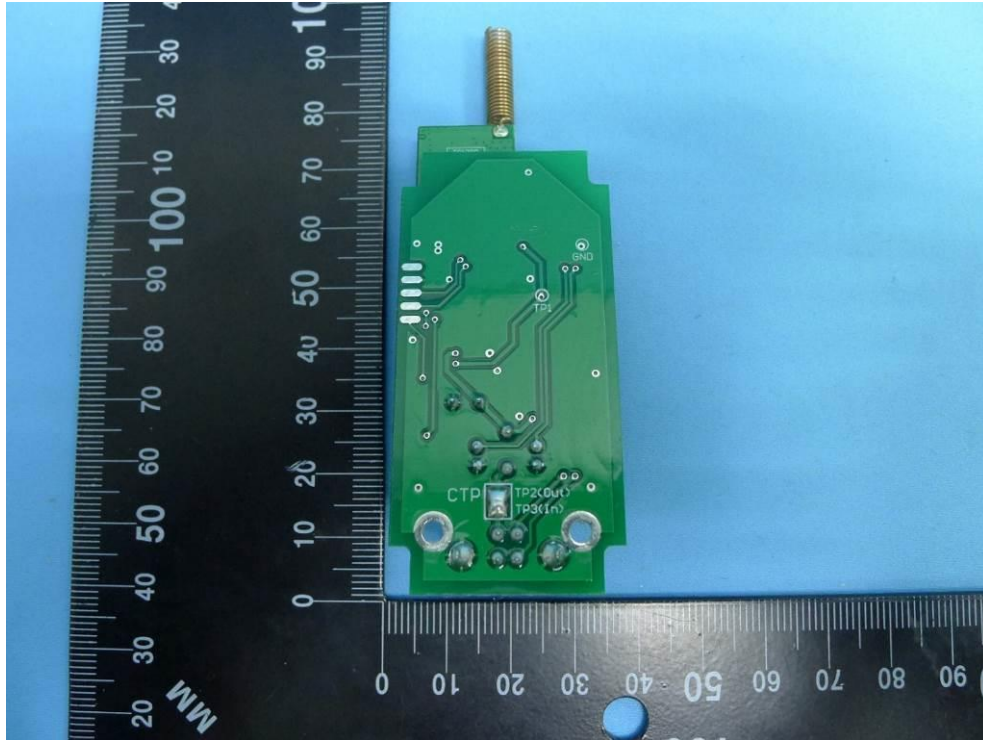
(17) Host Photo (RFD)



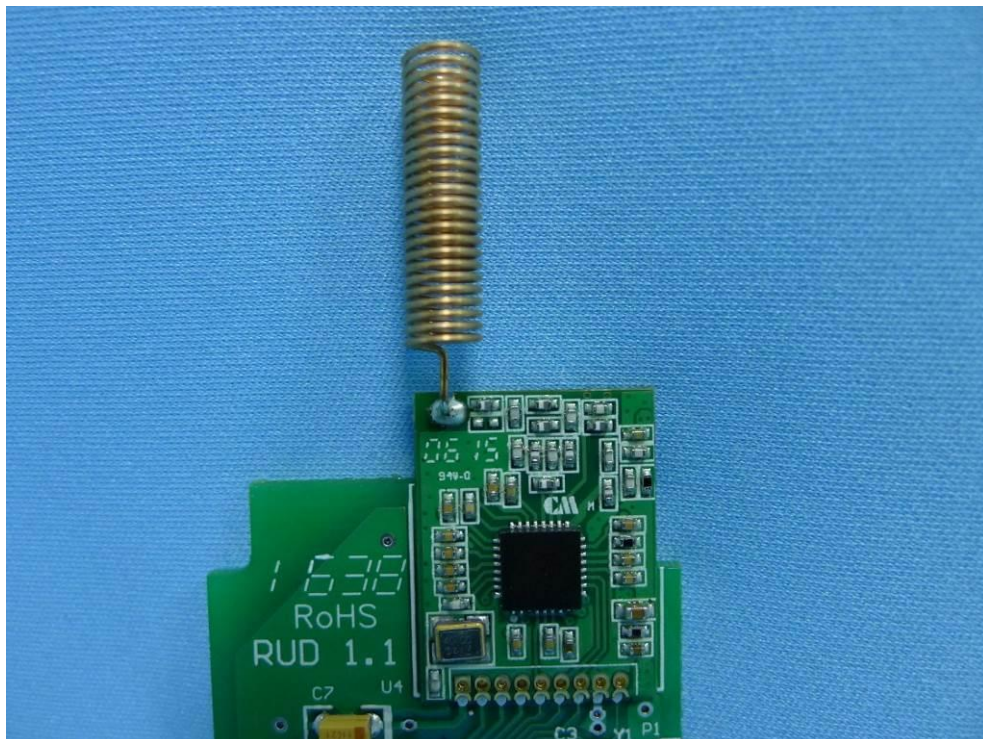
(18) Host Photo (RFD)



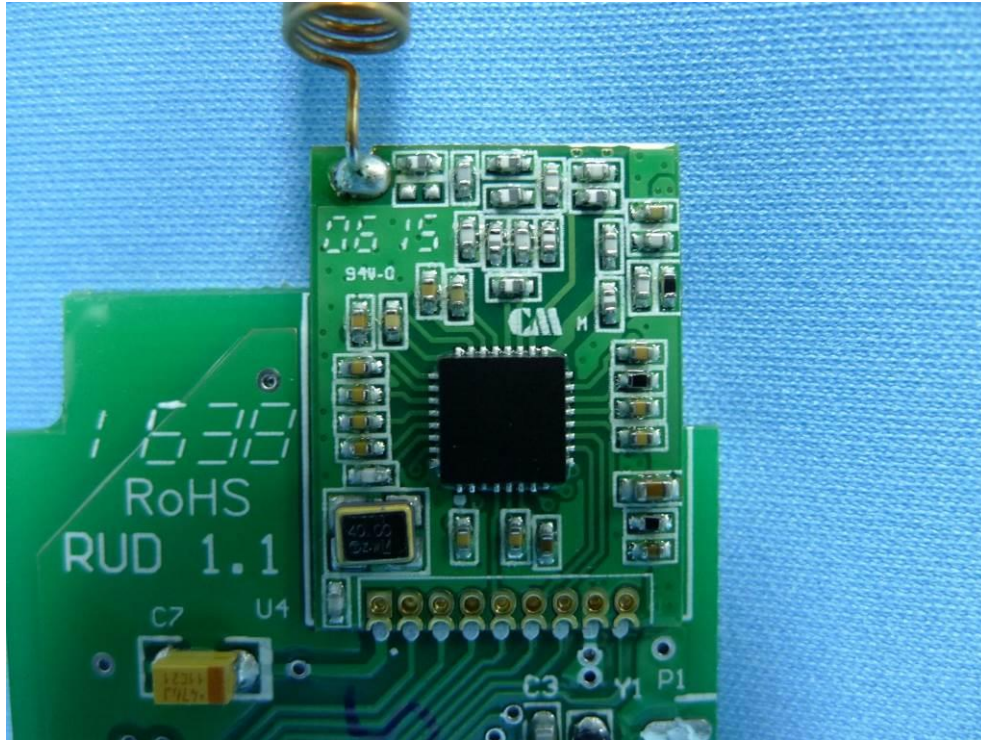
(19) Host Photo (RFD)



(20) Host Photo (RFD)



(21) Host Photo (RFD)



The End
