

TEST REPORT

Product Name : UWB sensor
Brand Mark : YF
Model No. : CB-CAN18
FCC ID : 2A6YK-UWBSENSOR
Report Number : BLA-EMC-202304-A3801
Date of Sample Receipt : 2023/4/12
Date of Test : 2023/4/17-2023/6/12
Date of Issue : 2023/6/12
Test Standard : FCC Part 15, Subpart F
ANSI C63.10:2013-2013
KDB 393764 D01 v02r01
KDB 178919 D01 v06
Test Result : Pass

Prepared for:

Yuanfeng Technology Co., Ltd

No. 18 Industrial East Road, Songshan Lake Development Zone, Dongguan, Guangdong, China

Prepared by:

BlueAsia of Technical Services(Shenzhen) Co.,Ltd.

Building C, No. 107, Shihuan Road, Shiyuan Sub-District, Baoan District, Shenzhen, Guangdong Province, China

TEL: +86-755-23059481

Compiled by:

Jozu

Review by:

Sue

Approved by:

Blue Zheng

Date:

2023/6/12



Report Revise Record

Version No.	Date	Description
01	2023/6/12	Original

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1 General information

1.1 General information

Applicant	Yuanfeng Technology Co. , Ltd
Address	No. 18 Industrial East Road, Songshan Lake Development Zone, Dongguan, Guangdong, China
Manufacturer	Yuanfeng Technology Co. , Ltd
Address	No. 18 Industrial East Road, Songshan Lake Development Zone, Dongguan, Guangdong, China
Factory	YuanFeng Technology Co. , Ltd
Address	No.18,Gongye East Road,Songshanhu Park,Dongguan,Guangdong
Product Name	UWB sensor
Test Model No.	CB-CAN18

1.2 Description of EUT

Operation Frequency:	3100 MHz to 10600 MHz
Channel numbers:	Channel 5: 6489.6 MHz; Channel 9: 7987.2 MHz
Modulation technology:	BPM-BPSK
Data rate:	6.8 Mbit/s
Antenna Type:	Ceramic Antenna
Antenna gain:	4.5 dBi
Hardware Version	B1
Software Version	X02

1.3 Test environment and laboratory location

1.3.1 Test environment

Environment	Temperature℃	Voltage(V)
Normal	25	DC 12V

1.3.2 Laboratory location

All tests were performed at:
BlueAsia of Technical Services(Shenzhen) Co.,Ltd.
Building C, No. 107, Shihuan Road, Shiyuan Sub-District, Baoan District, Shenzhen, Guangdong Province, China
Telephone: TEL: +86-755-28682673 FAX: +86-755-28682673

1.4 Measurement uncertainty

Parameter	Expanded Uncertainty (Confidence of 95%)
Occupied Channel Bandwidth	±5%
RF output power, conducted	±1.5 dB
Power Spectral Density, conducted	±3.0 dB
Unwanted Emissions, conducted	±3.0 dB
Temperature	±3 °C
Supply voltages	±3 %
Time	±5%
Radiated Emission(9kHz-30MHz)	±4.34dB
Radiated Emission (30MHz ~ 1000MHz)	±4.35 dB
Radiated Emission (1GHz ~ 40GHz)	±4.44 dB

1.5 Test mode

TEST MODE	TEST MODE DESCRIPTION
TX mode	Keep the EUT in continuously transmitting mode with modulation.
Normal mode	Keep the EUT in normal work mode

1.6 Description of support unit

Device Type	Manufacturer	Model Name	Serial No.	Remark
--	--	--	--	The EUT has been tested as an independent unit.

For UWB Test channel:

Channel number	Center frequency (MHz)
5	6489.6
9	7987.2

2 Test summary

No.	Test item	Test Requirement	Test Method	Result
1	AC Power Line Conducted Emissions	15.207	ANSI C63.10:2013,6.2	N/A
2	UWB Bandwidth	15.519 (c) & (e) and 15.503(a)(b)(c)(d)	ANSI C63.10:2013,10.1	Pass
3	Peak Power	15.519 (a)(1)	ANSI C63.10:2013,10.3	Pass
4	Radiated emissions below 1GHz	15.519 (c) & (d)	ANSI C63.10:2013,10.2	Pass
5	Radiated emissions above 1GHz	15.207 (a) & 15.521	ANSI C63.10:2013,10.3	Pass
6	Cessation Time	15.519 (c) & 15.209 (a) & 15.505	--	Pass

Remark:

N/A: Not Applicable

3 Test instruments list

Equipment	Manufacturer	Model	S/N	Cal.Date	Cal.Due
Spectrum	R&S	FSP40	100817	2022/09/15	2023/09/14
Receiver	R&S	ESR7	101199	2022/09/15	2023/09/14
Receiver	R&S	ESPI7	101477	2022/07/16	2023/07/15
Spectrum	Agilent	N9020A	MY49100060	2022/09/07	2023/09/06
Spectrum	KEYSIGHT	N9010A	MY54330814	2022/07/01	2023/06/30
Signal Generator	Agilent	N5181A	MY46240904	2022/08/02	2023/08/01
Signal Generator	R&S	CMW500	132429	2022/09/07	2023/09/06
Loop antenna	Schwarz beck	FMZB1519B	00102	2022/9/14	2025/9/13
broadband Antenna	Schwarz beck	VULB9168	00836 P:00227	2022/09/15	2023/09/14
Horn Antenna	Schwarz beck	BBHA9120D	01892 P:00331	2022/09/13	2025/09/12
Horn Antenna	Schwarz beck	BBHA 9170	1106	2022/04/24	2024/04/23
Amplifier	SKET	LNPA_30M01G-30	SK2021060801	2022/07/16	2023/07/15
Amplifier	SKET	PA-000318G-45	N/A	2022/09/13	2023/09/12
Amplifier	SKET	LNPA_18G40G-50	SK2022071301	2022/07/14	2023/07/13
Receiver	R&S	ESPI3	101082	2022/09/14	2023/09/13
LISN	R&S	ENV216	3560.6550.15	2022/09/14	2023/09/13
LISN	AT	AT166-2	AKK1806000003	2022/09/14	2023/09/13
EMI software	EZ	EZ-EMC	EEMC-3A1	N/A	N/A
EMI software	EZ	EZ-EMC	EEMC-3A2	N/A	N/A
RF software	MW	MTS 8310	2.0.0.0	N/A	N/A

4 Test item

4.1 UWB Bandwidth

4.1.1 Description

§ 15.503

The UWB bandwidth is the frequency band bounded by the points that are 10 dB below the highest radiated emission, as based on the complete transmission system including the antenna.

4.1.2 Limit

≥500MHz

4.1.3 Test procedure

15.503:

- (a) The upper boundary is designated f_H and the lower boundary is designated f_L . The frequency at which the highest radiated emission occurs is designated f_M .
- (b) Center frequency. The center frequency, f_C , equals $(f_H + f_L)/2$.
- (c) Fractional bandwidth. The fractional bandwidth equals $2(f_H - f_L)/(f_H + f_L)$.

15.519:

The UWB bandwidth of a device operating under the provisions of this section must be contained between 3100MHz and 10600MHz.

Use the following spectrum analyzer settings:

RBW = 1 MHz

VBW ≥ 3 MHz

Sweep = auto

Detector function = RMS

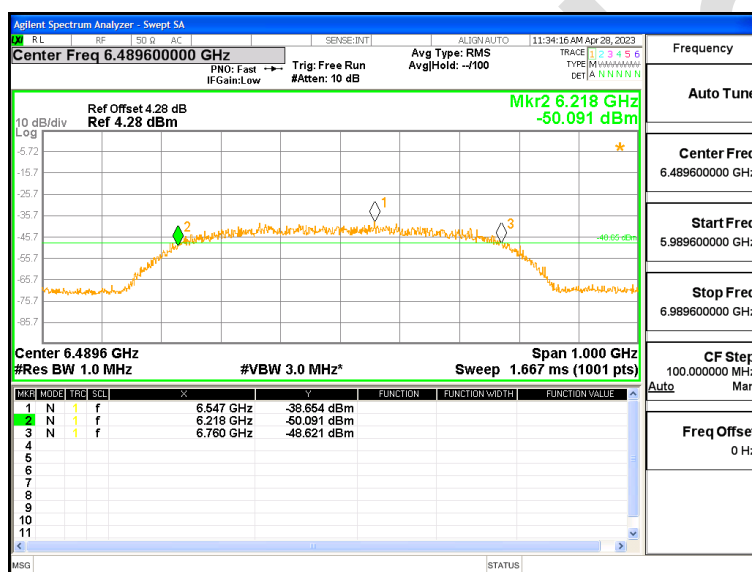
Trace = max hold



4.1.4 Results

Channel	F _L (MHz)	F _M (MHz)	F _H (MHz)	UWB Bandwidth (MHz)	Limit (MHz)	Verdict
CH05	6218	6547	6760	542	≥ 500 MHz	Pass
CH09	7673	7908	8239	566	≥ 500 MHz	Pass

CH05:



CH09:



4.2 Peak Power

4.2.1 Description

There is a limit on the peak level of the emissions contained within a 50 MHz bandwidth centered on the frequency at which the highest radiated emission occurs, f_M .

4.2.2 Limit

That limit is 0 dBm EIRP. It is acceptable to employ a different resolution bandwidth, and a correspondingly different peak emission limit, following the procedures described in FCC15.521.

4.2.3 Test procedure

Bandwidth conversion of peak power measurements:

It is acceptable to employ an RBW of less than 50 MHz (but no less than 1 MHz) when performing the required peak power measurements. When this approach is employed, the peak emissions EIRP limit (0 dBm / 50 MHz) is converted to a limit commensurate with the RBW by employing a $[20 \log (RBW/50 \text{ MHz})]$ relationship. For example, the peak power limit could be expressed in a 1 MHz bandwidth as follows in Equation

$$EIRP_{1\text{MHz}} = EIRP_{50\text{MHz}} + 20 \log (1 \text{ MHz} / 50 \text{ MHz}) = 0 \text{ dBm} + (-34 \text{ dB}) = -34 \text{ dBm}$$

When a resolution bandwidth of less than 50 MHz is used, this measurement shall be performed over a 50 MHz span centered on the frequency associated with the highest detected average emission level.

Use the following spectrum analyzer settings:

RBW = 1 MHz

VBW $\geq$ 3 MHz

Sweep = auto

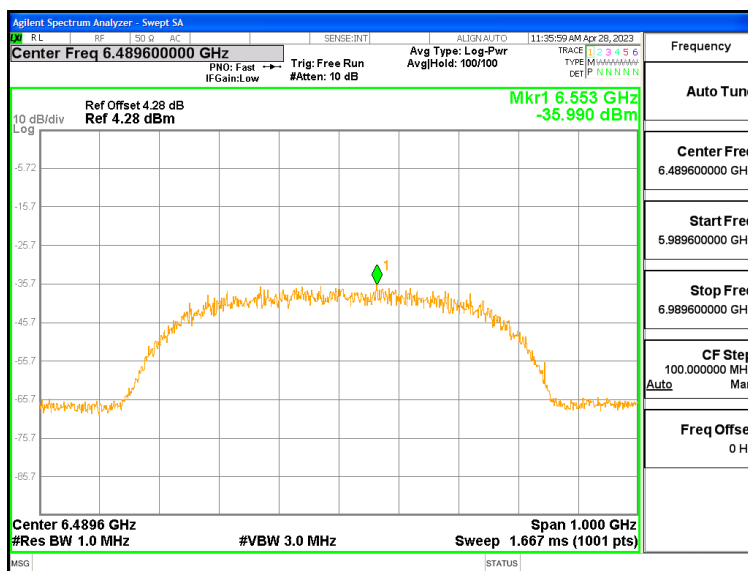
Detector function = Peak

Trace = max hold

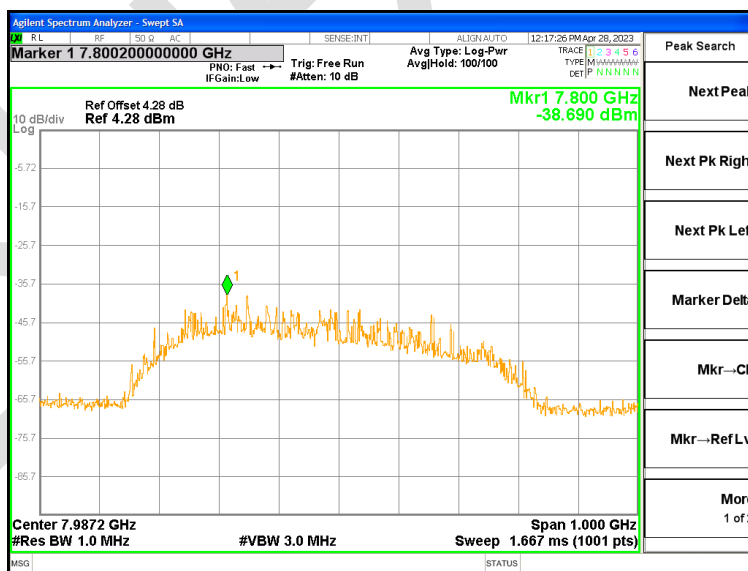
4.2.4 Results

Channel	Power (dBm)	Limit (dBm)	Verdict
CH05	-35.990	-34	Pass
CH09	-38.690	-34	Pass

CH05:



CH09:



4.3 Radiated emissions below 1GHz

4.3.1 Description

FCC 15.519 (c) The radiated emissions at or below 960 MHz from a device operating under the provisions of this section shall not exceed the emission levels in FCC 15.209.

4.3.2 Limit

15.209 (a)

The radiated emissions above 960 MHz from a device operating under the provisions of this section shall not exceed the following average limits when measured using a resolution bandwidth of 1 MHz:

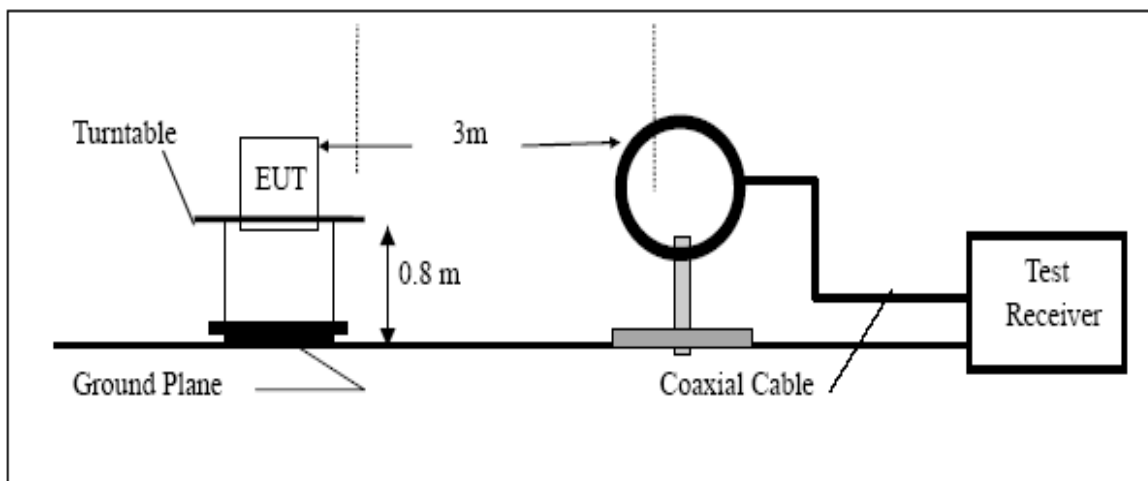
Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100**	3
88-216	150**	3
216-960	200**	3

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., 15.231 and 15.241.

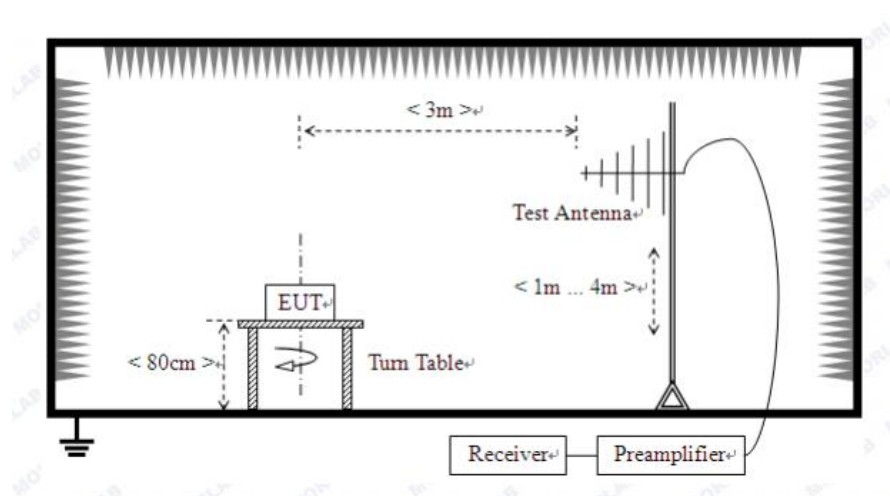
4.3.3 Test procedure

Measurements are made with the antenna feeding a spectrum analyzer via a preamplifier and cables, at a maximum distance of 3m from the EUT.

Below 30MHz



Below 1GHz



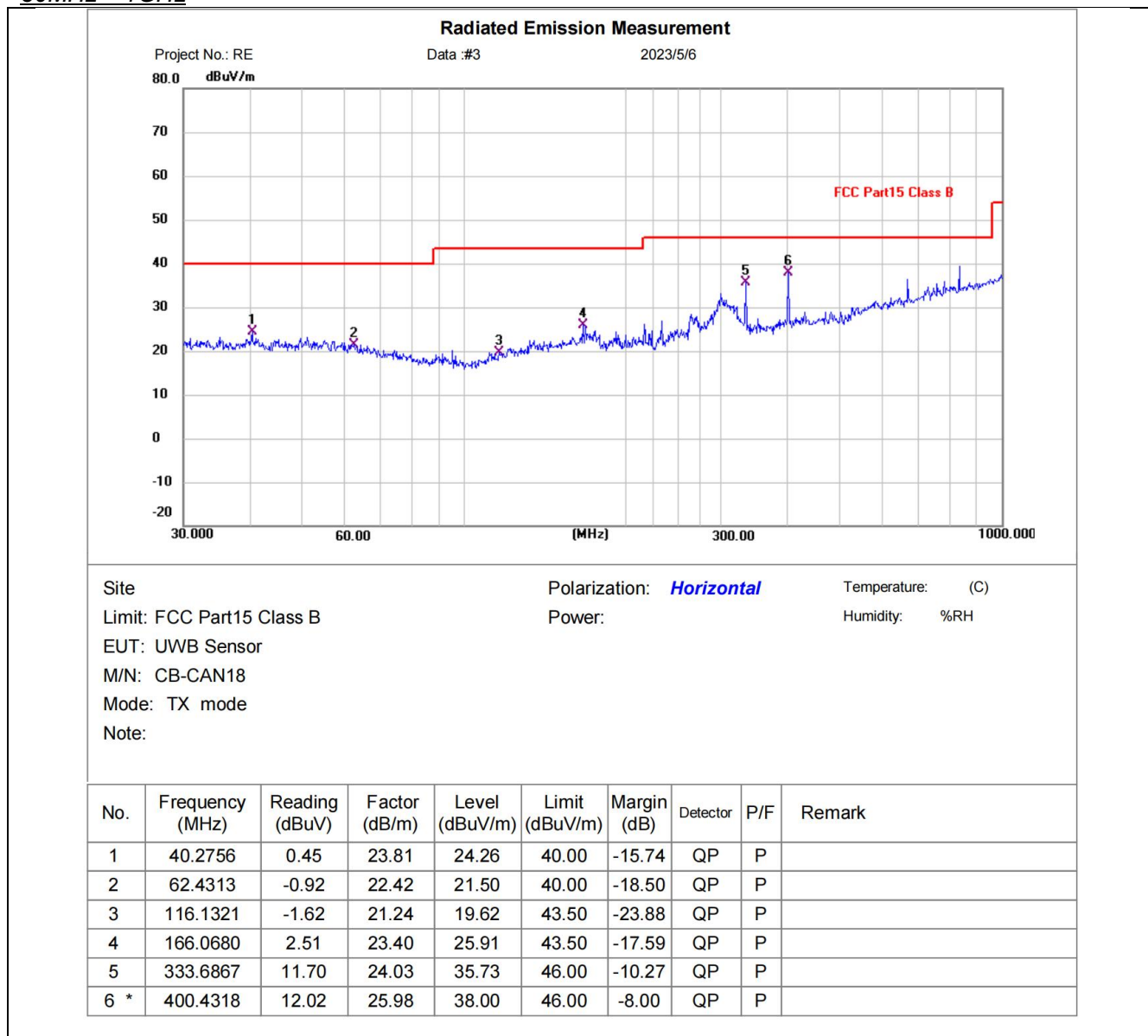
1. The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.
2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading.
5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
7. The radiation measurements are performed in X, Y, Z axis positioning. And found the X axis positioning which it is worse case, only the test worst case mode is recorded in the report.

Note: For below 30 MHz and 18-40GHz testing, when the EUT was pre-scanned and the result which was 20 dB lower than the limit line, so that the test result was not showed in this reported.

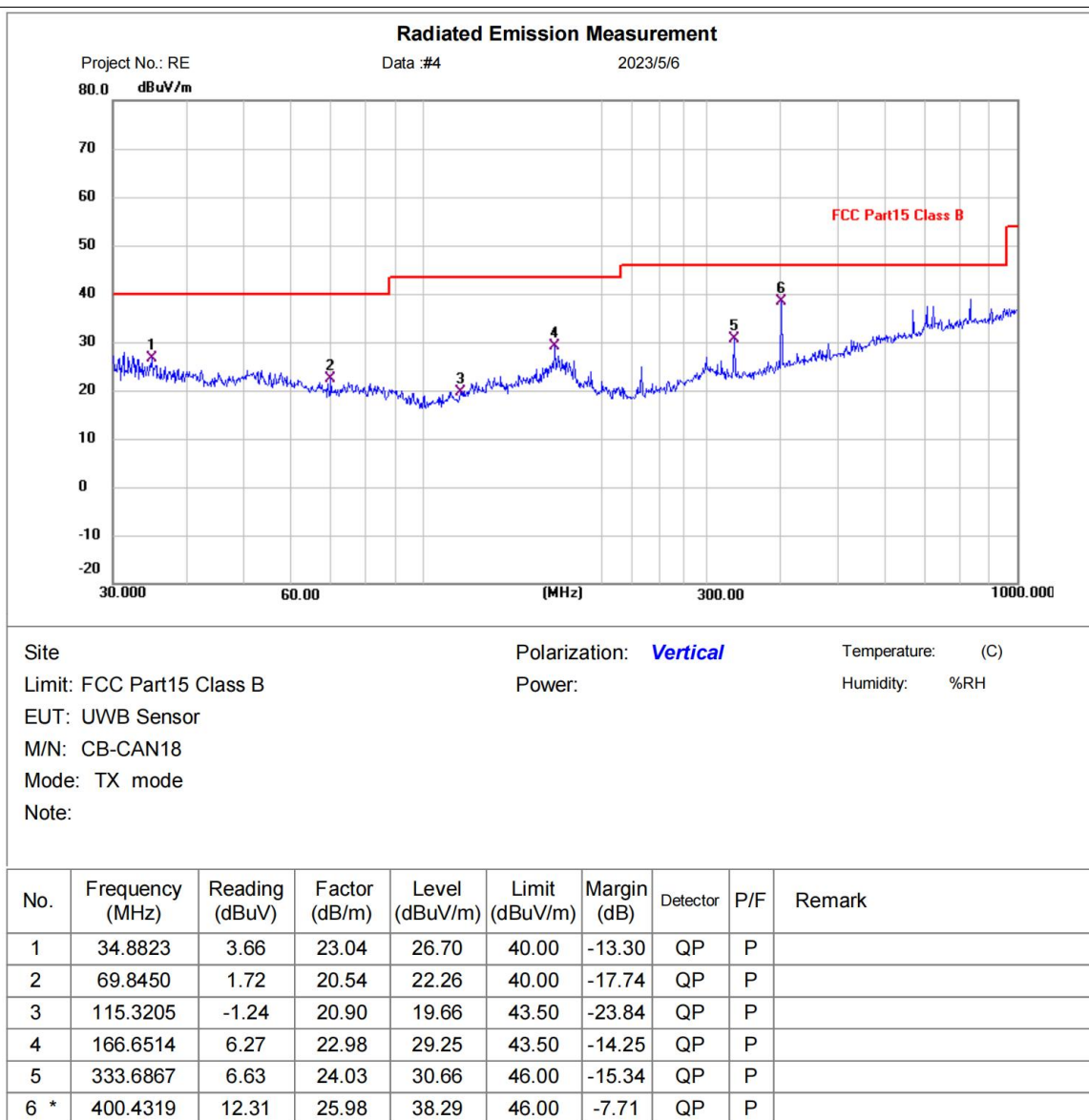
4.3.4 Results

Test data:

30MHz – 1GHz



Note: Final Level = Reading level + Factor, Factor = Antenna Factor + Cable Loss – Preamplifier Factor



Note: Final Level = Reading level + Factor, Factor = Antenna Factor + Cable Loss – Preamplifier Factor

4.4 Radiated emissions above 1GHz

4.4.1 Limit

15.519 (c)

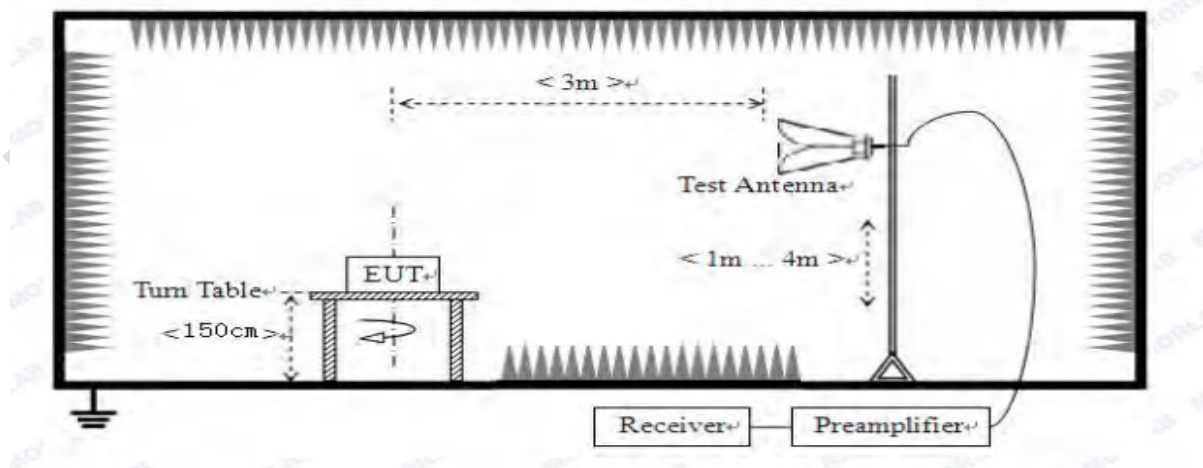
Frequency in MHz	EIRP in dBm
960-1610	-75.3
1610-1990	-63.3
1990-3100	-61.3
3100-10600	-41.3
Above 10600	-61.3

FCC 15.519 (d) In addition to the radiated emission limits specified in the table in paragraph (c) of this section, UWB transmitters operating under the provisions of this section shall not exceed the following average limits when measured using a resolution bandwidth of no less than 1 kHz:

Frequency in MHz	EIRP in dBm
1164-1240	-85.3
1559-1610	-85.3

4.4.2 Test procedure

Measurements are made with the antenna feeding a spectrum analyzer via a preamplifier and cables, at a maximum distance of 3m from the EUT.



1. The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.
2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading.
5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
7. The radiation measurements are performed in X, Y, Z axis positioning. And found the X axis positioning which it is worse case, only the test worst case mode is recorded in the report.

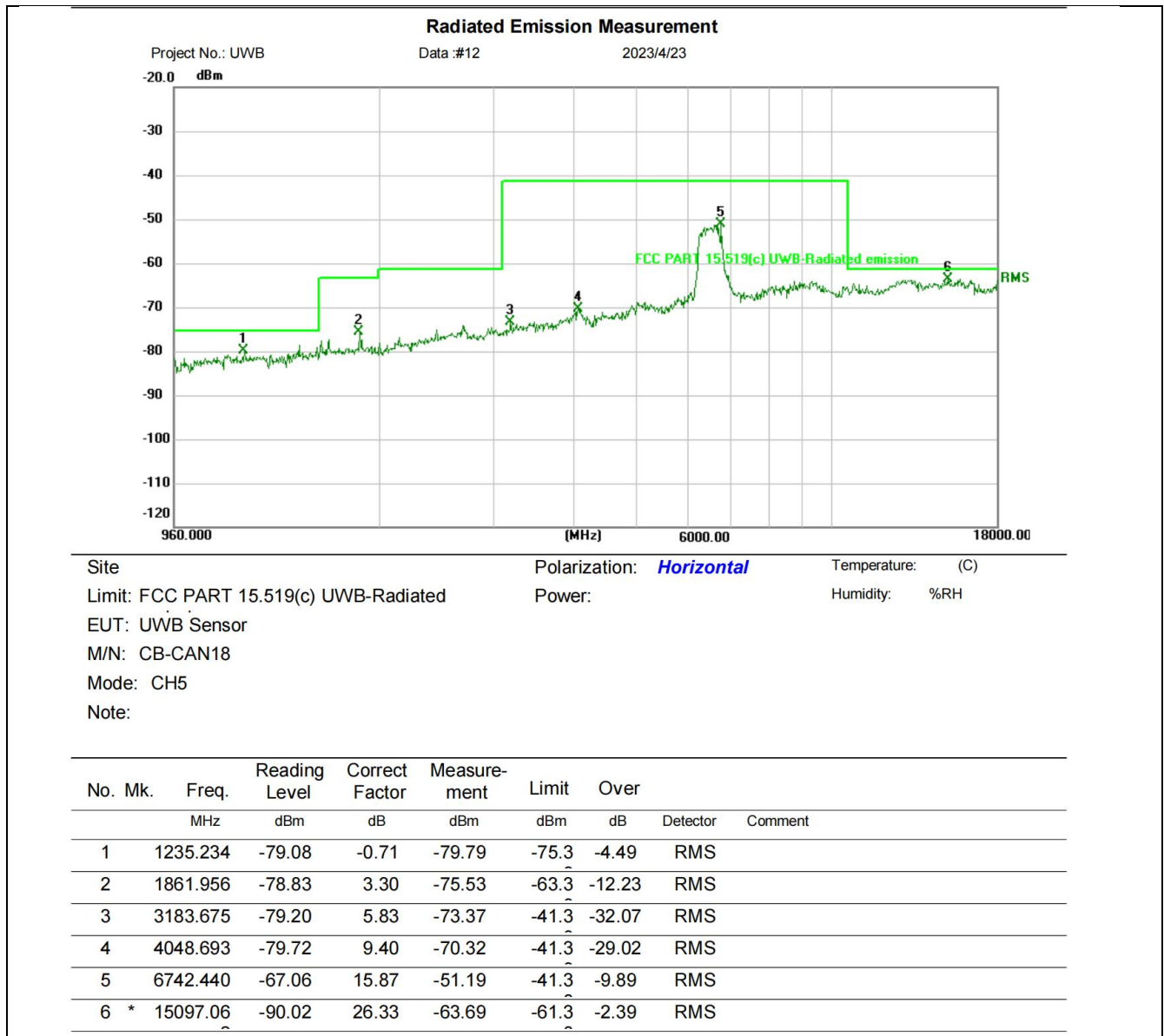
Note: Exploratory measurements for all frequency ranges are performed with the measurement antenna at close distances to the EUT as described in ANSI C63.10 6.6.4.2. Where emissions are observed the measurement antenna is then positioned at a height of 1.5m and a distance of 0.5m from the EUT and final measurements are made at the frequencies observed in the exploratory scans using the alternative measurement procedures detailed in ANSI C63.10 section 6.6.5. If no emissions are observed, a plot is made at a test distance of 0.5m from the EUT to show the measurement system noise floor.

4.4.3 Results

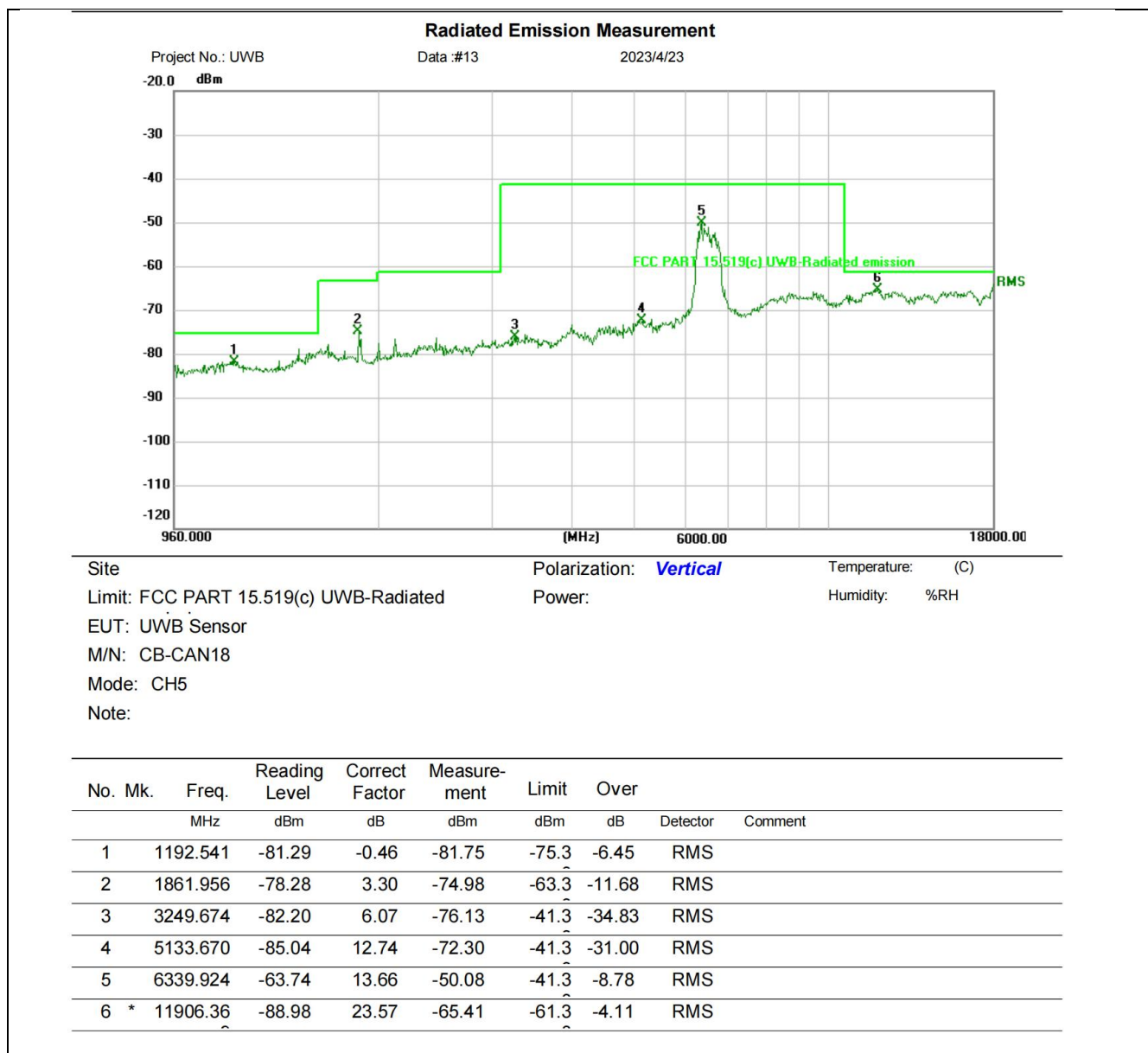
4.4.3.1 Emission (1GHz – 18GHz)

Test data:

CH5:

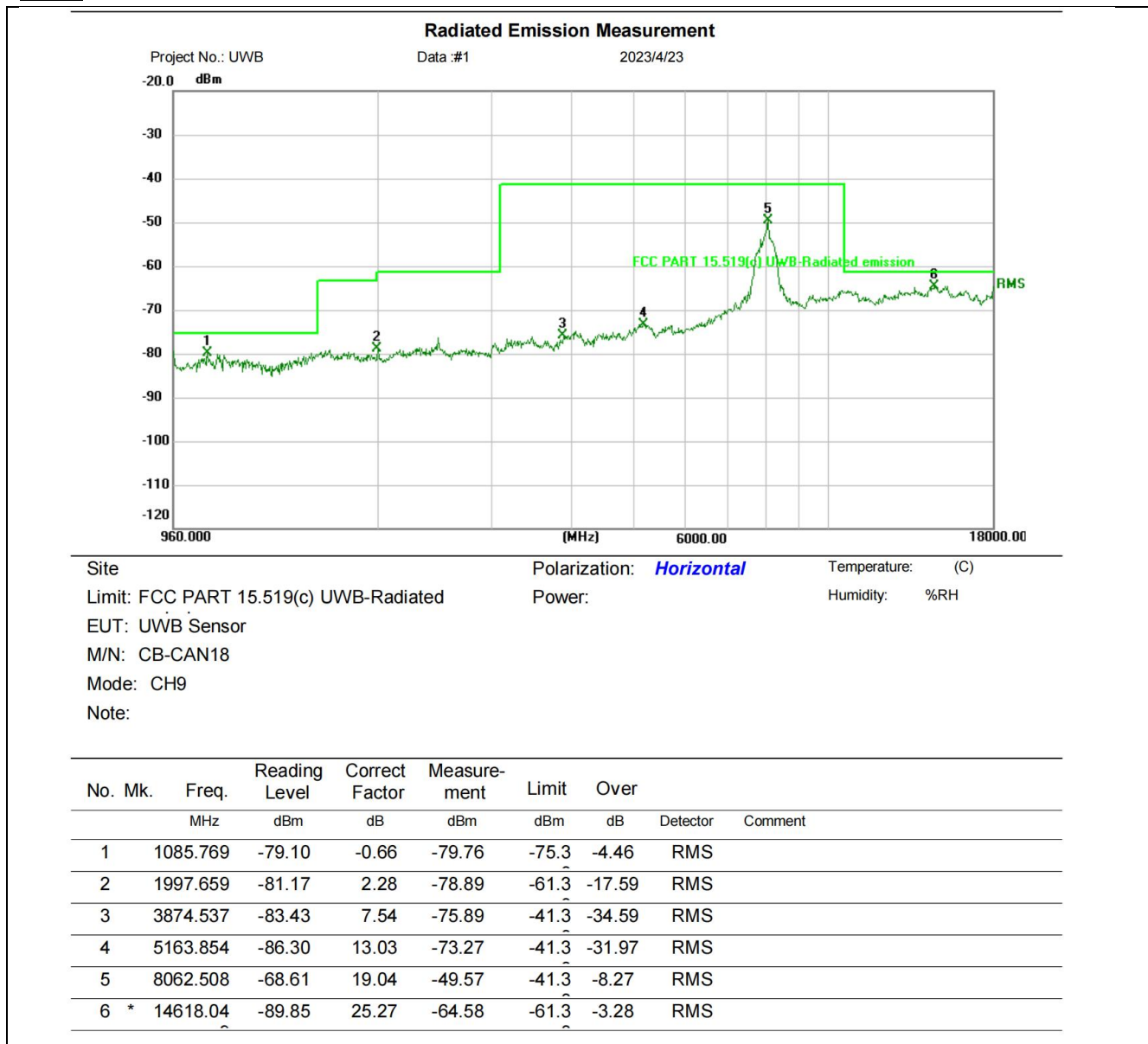


Note: Final Level = Reading level + Correct Factor, Correct Factor = Antenna Factor + Cable Loss – Preamplifier Factor

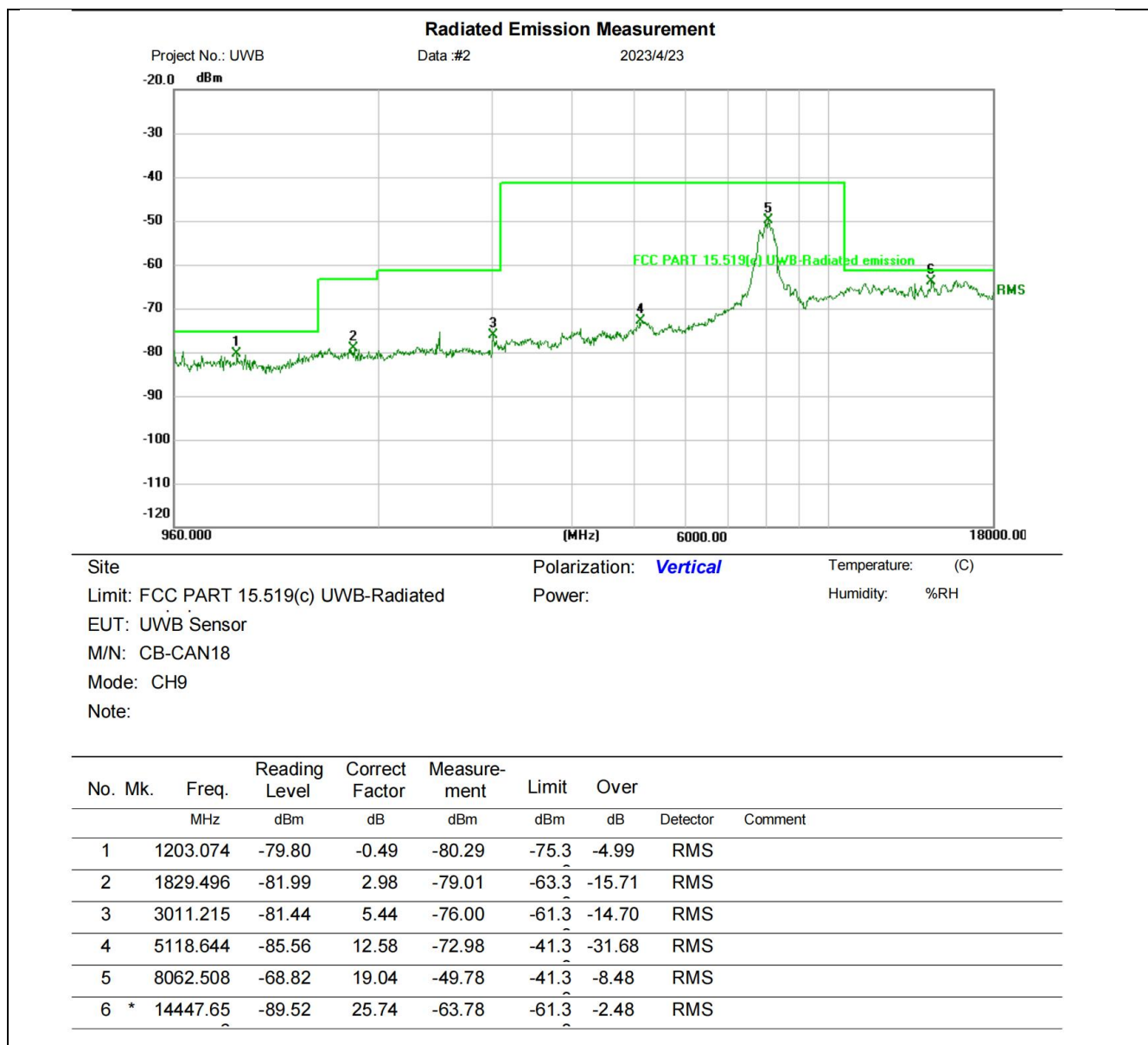


Note: Final Level = Reading level + Correct Factor, Correct Factor = Antenna Factor + Cable Loss – Preamplifier Factor

CH9:



Note: Final Level = Reading level + Correct Factor, Correct Factor = Antenna Factor + Cable Loss – Preamplifier Factor

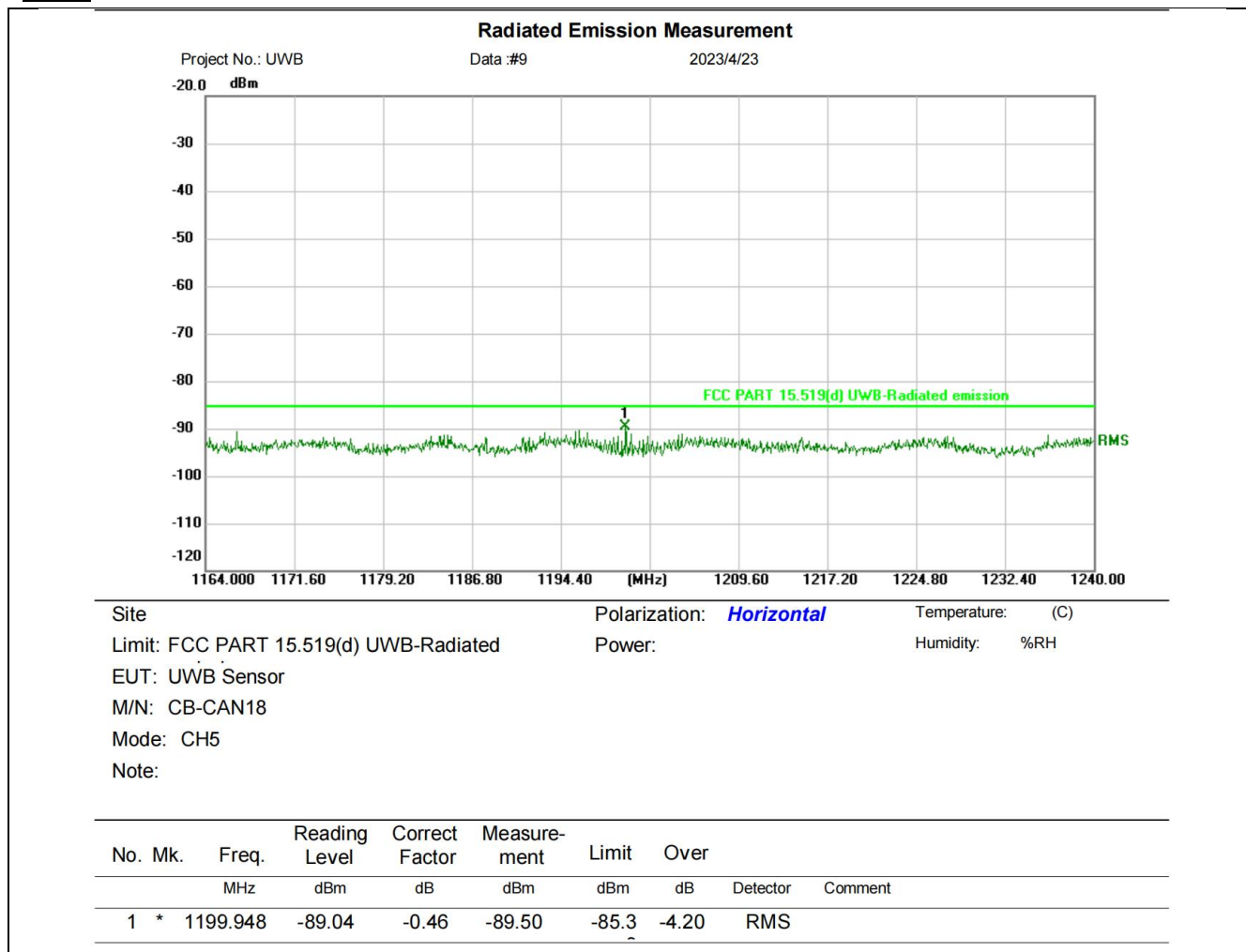


Note: Final Level = Reading level + Correct Factor, Correct Factor = Antenna Factor + Cable Loss – Preamplifier Factor

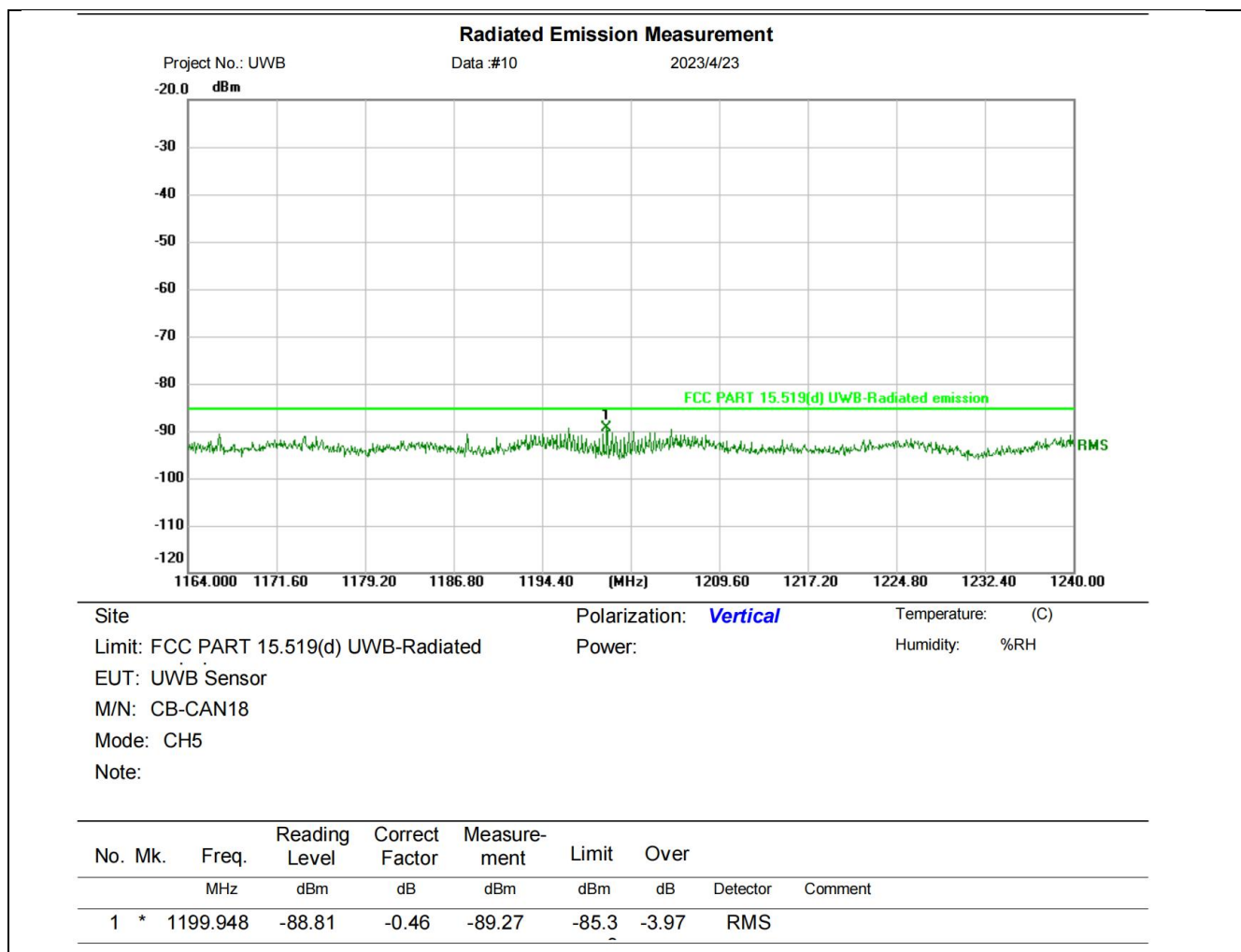
4.4.3.2 Emission (1164-1240 MHz and 1559-1610 MHz)

Test data:

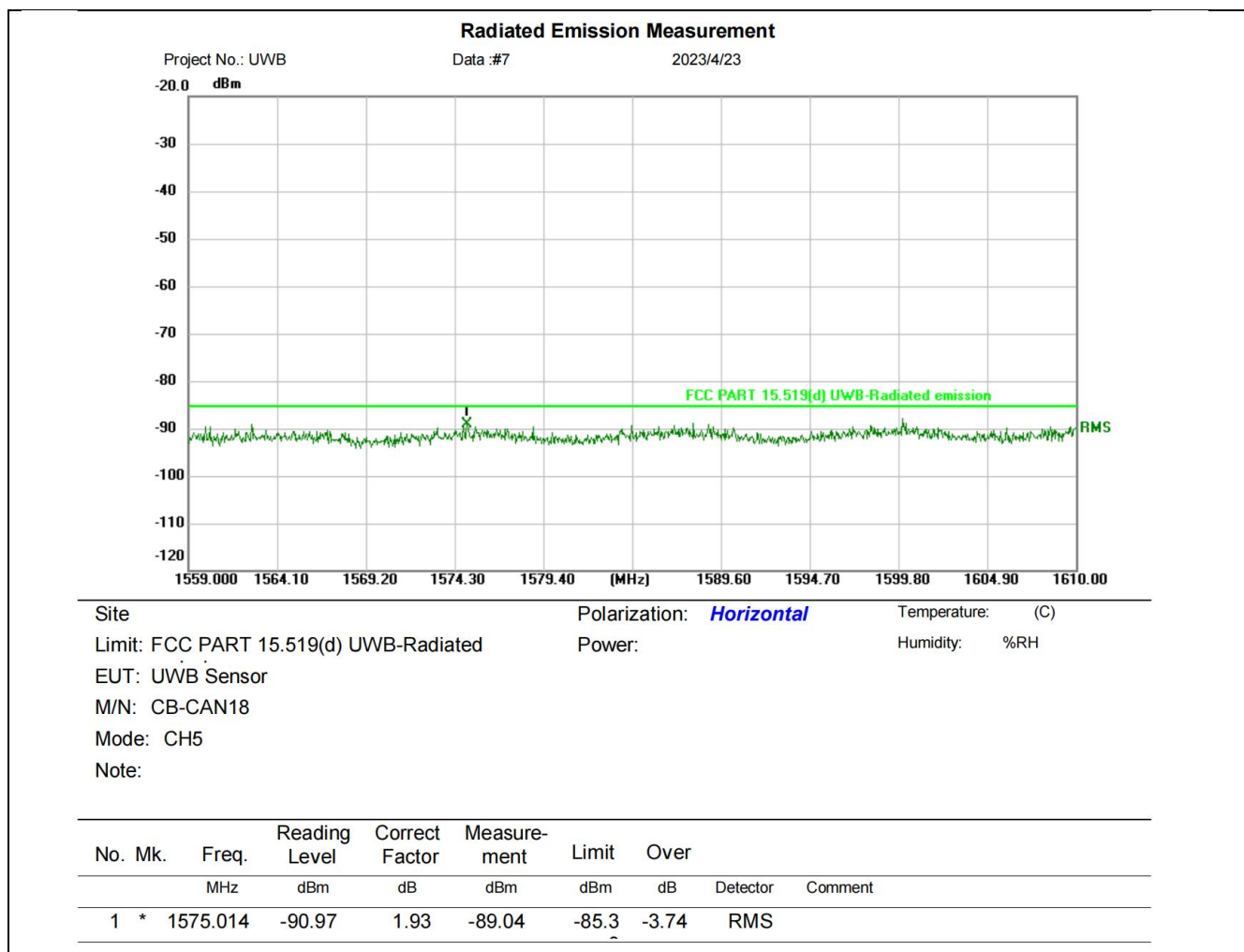
CH5:



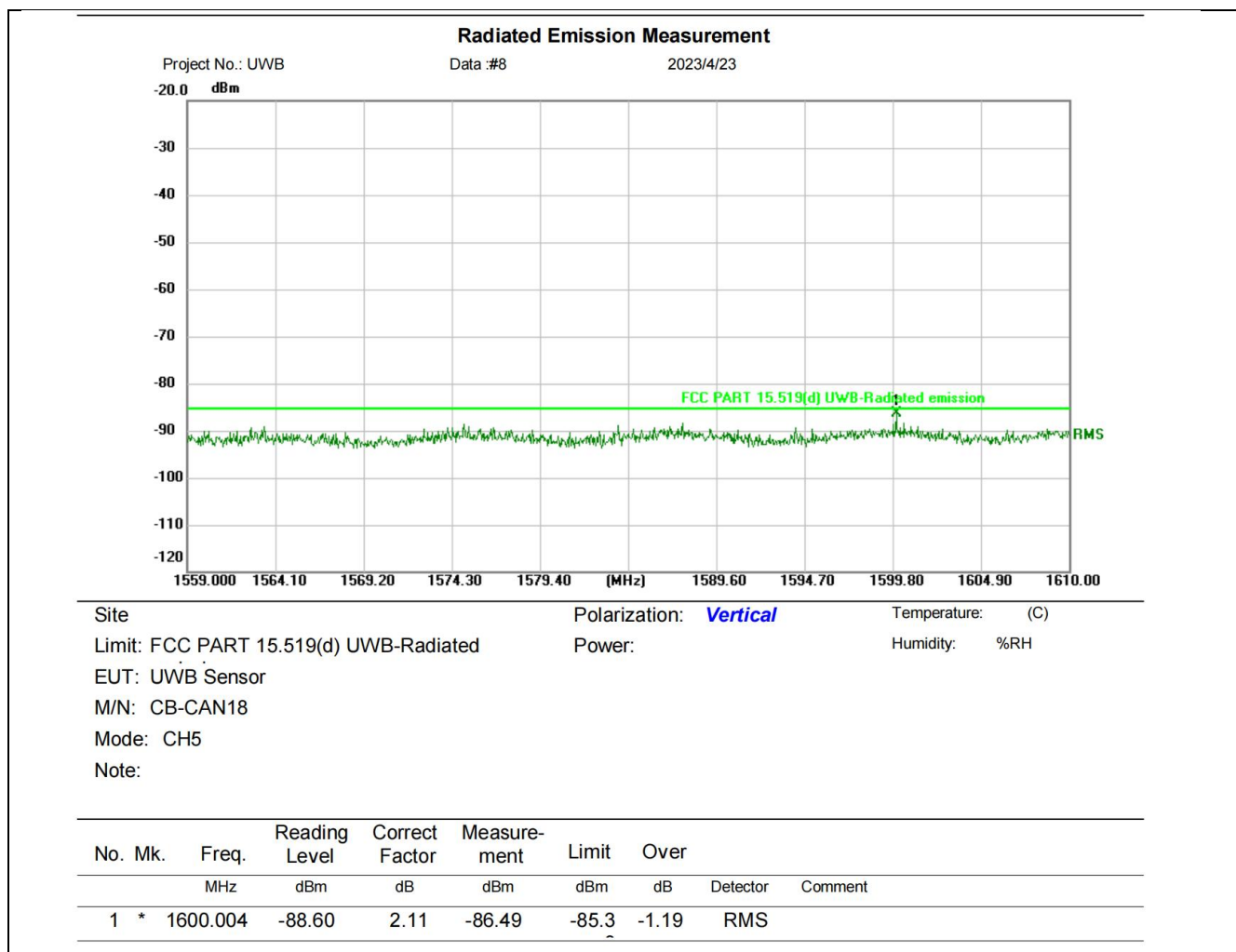
Note: Final Level = Reading level + Correct Factor, Correct Factor = Antenna Factor + Cable Loss – Preamplifier Factor



Note: Final Level = Reading level + Correct Factor, Correct Factor = Antenna Factor + Cable Loss – Preamplifier Factor

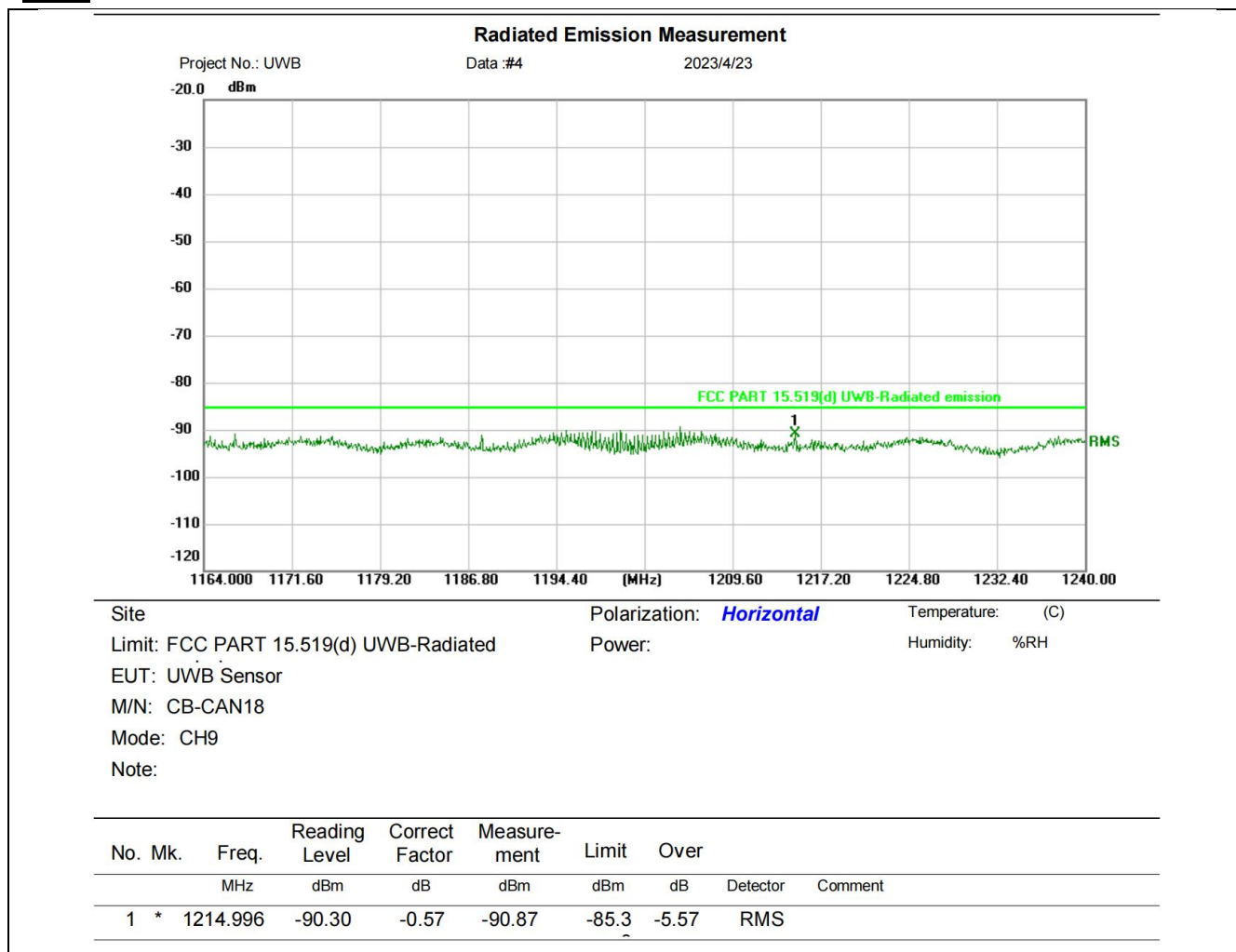


Note: Final Level = Reading level + Correct Factor, Correct Factor = Antenna Factor + Cable Loss – Preamplifier Factor

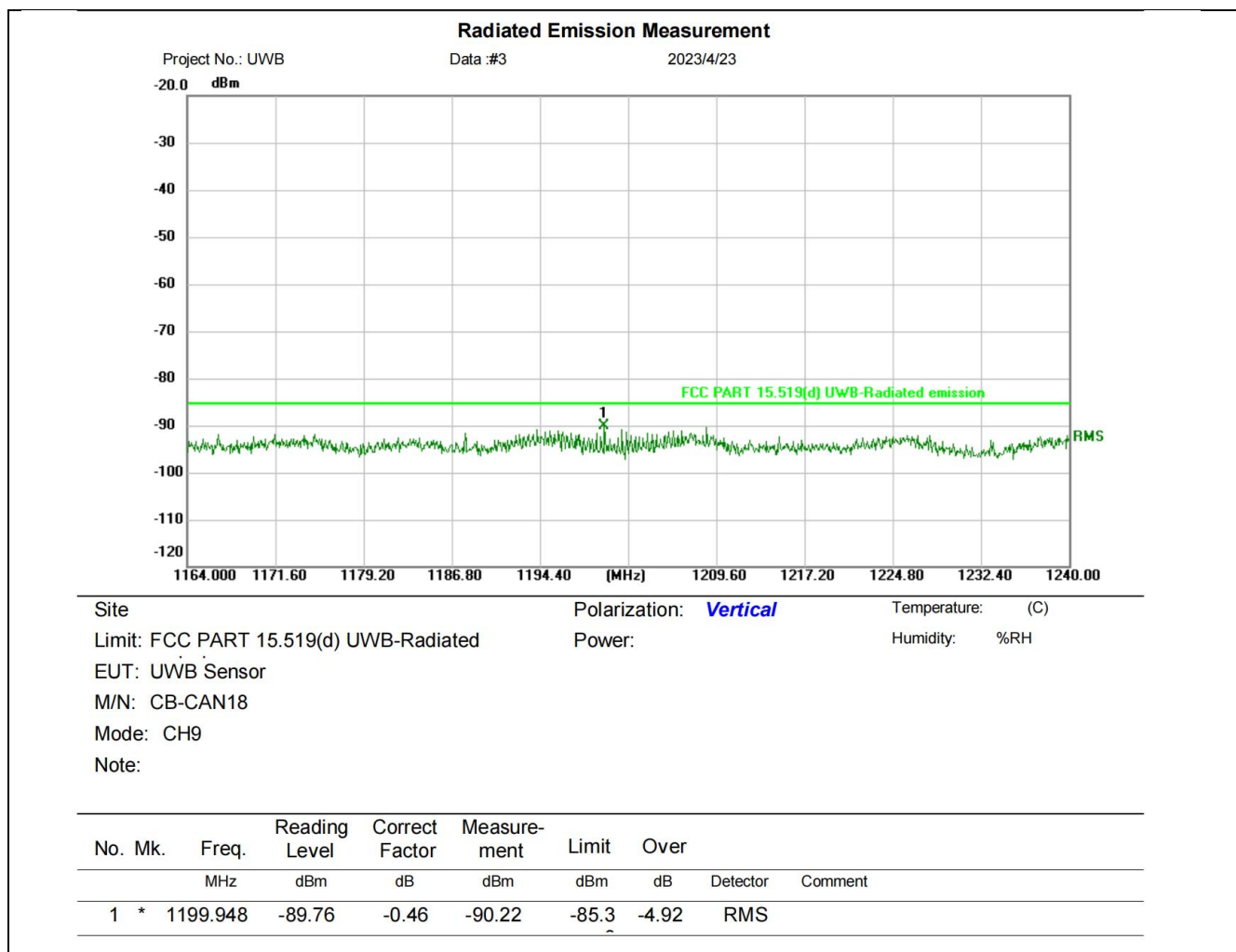


Note: Final Level = Reading level + Correct Factor, Correct Factor = Antenna Factor + Cable Loss – Preamplifier Factor

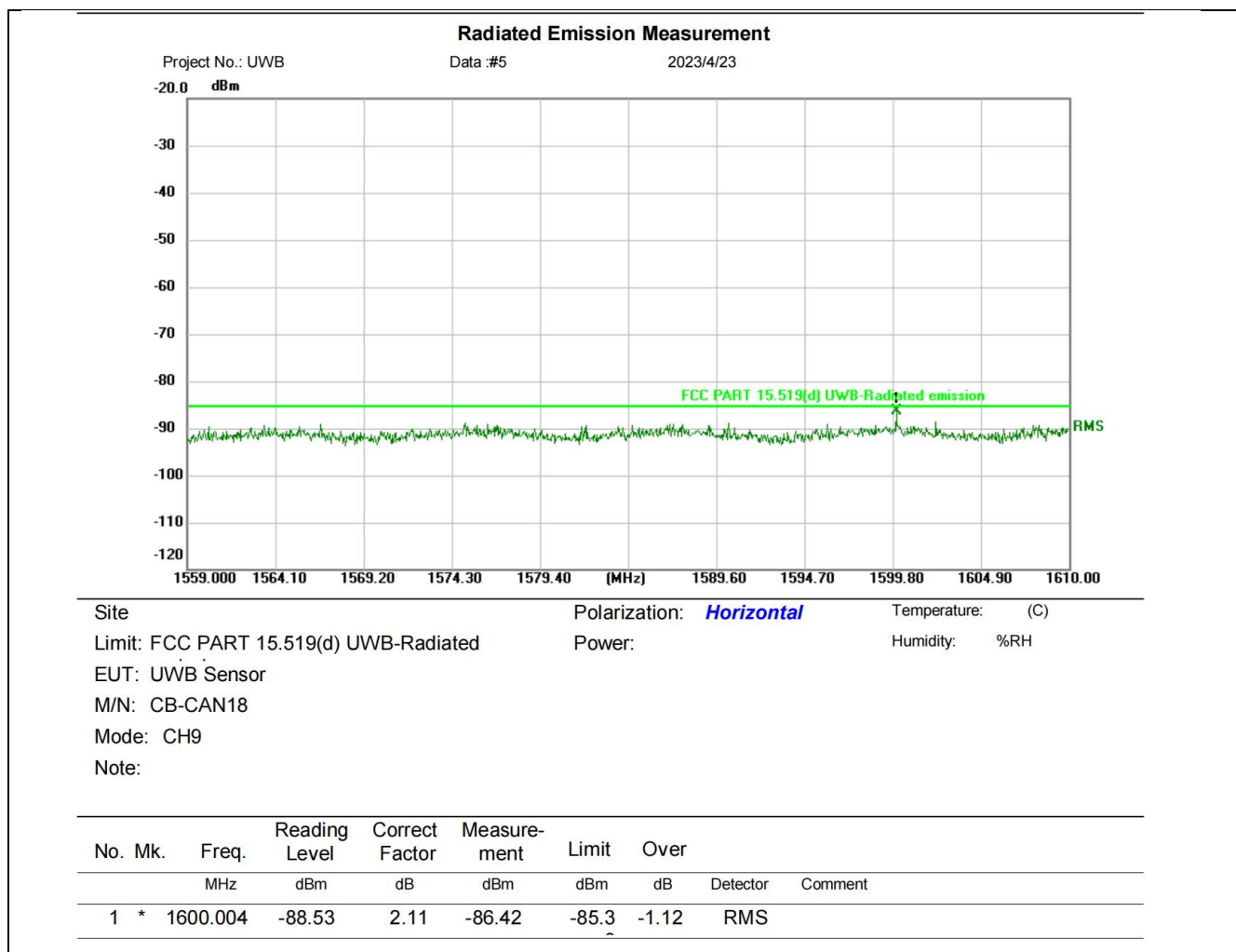
CH9:



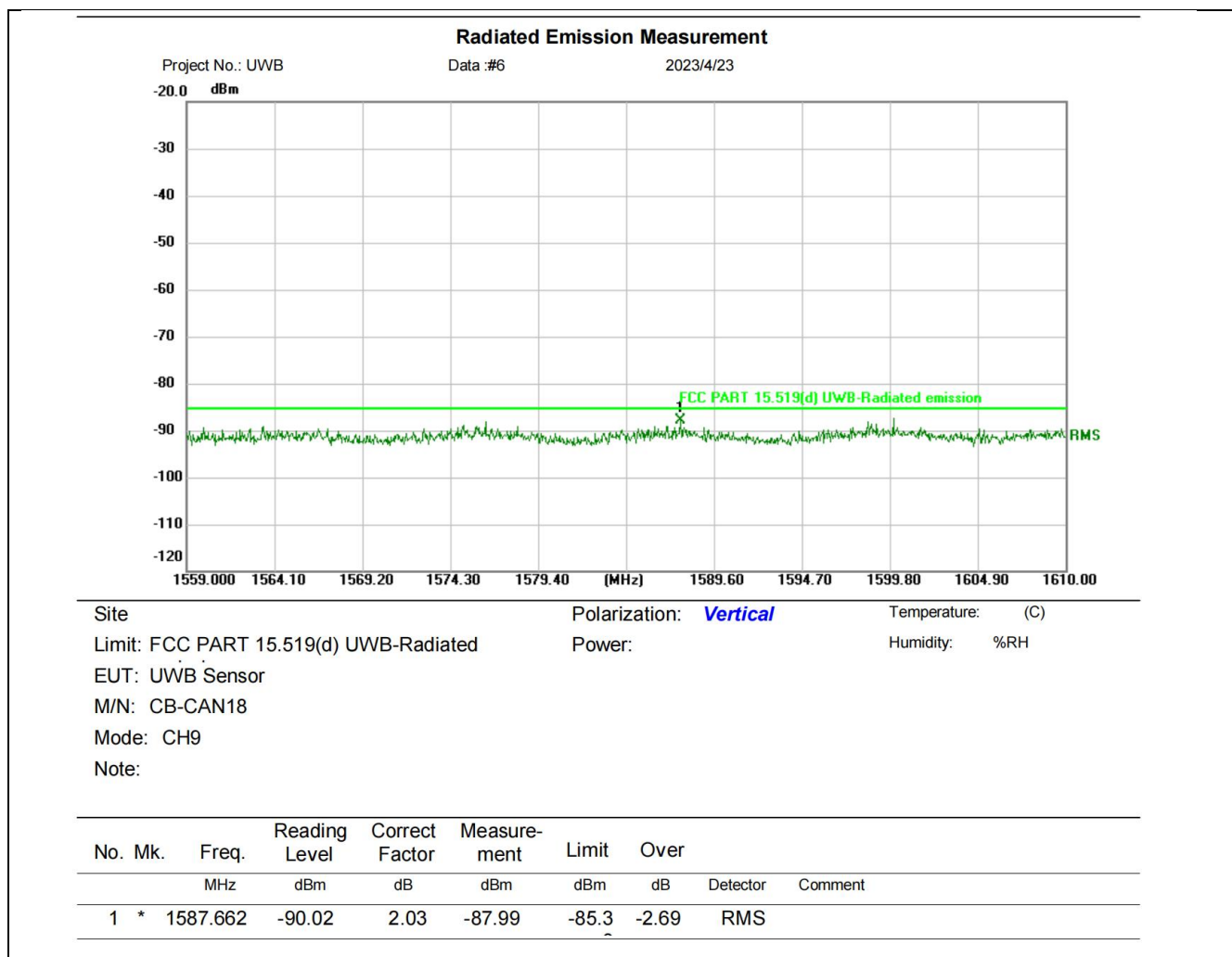
Note: Final Level = Reading level + Correct Factor, Correct Factor = Antenna Factor + Cable Loss – Preamplifier Factor



Note: Final Level = Reading level + Correct Factor, Correct Factor = Antenna Factor + Cable Loss – Preamplifier Factor



Note: Final Level = Reading level + Correct Factor, Correct Factor = Antenna Factor + Cable Loss – Preamplifier Factor



Note: Final Level = Reading level + Correct Factor, Correct Factor = Antenna Factor + Cable Loss – Preamplifier Factor

4.5 Coordination requirements.

4.5.1 Limit

For FCC 15.519 Technical requirements for hand held UWB systems:

A UWB device operating under the provisions of this section shall transmit only when it is sending information to an associated receiver. The UWB intentional radiator shall cease transmission within 10 seconds unless it receives an acknowledgement from the associated receiver that its transmission is being received. An acknowledgment of reception must continue to be received by the UWB intentional radiator at least every 10 seconds or the UWB device must cease transmitting.

According to KDB 393764 D01 UWB FAQ v02 section 4:

An acknowledgement of reception must continue to be received by the UWB device at least once every 10 seconds, or else the device shall cease transmission of any information other than periodic signals for use in the establishment or re-establishment of a communications link with an associated receiver.

4.5.2 Test procedure

Keep EUT working mode.

1. The transmitter ends the UWB link.
2. The receiver ends the UWB link.

RBW: 3 MHz,

VBW: 3 MHz

Detector: average

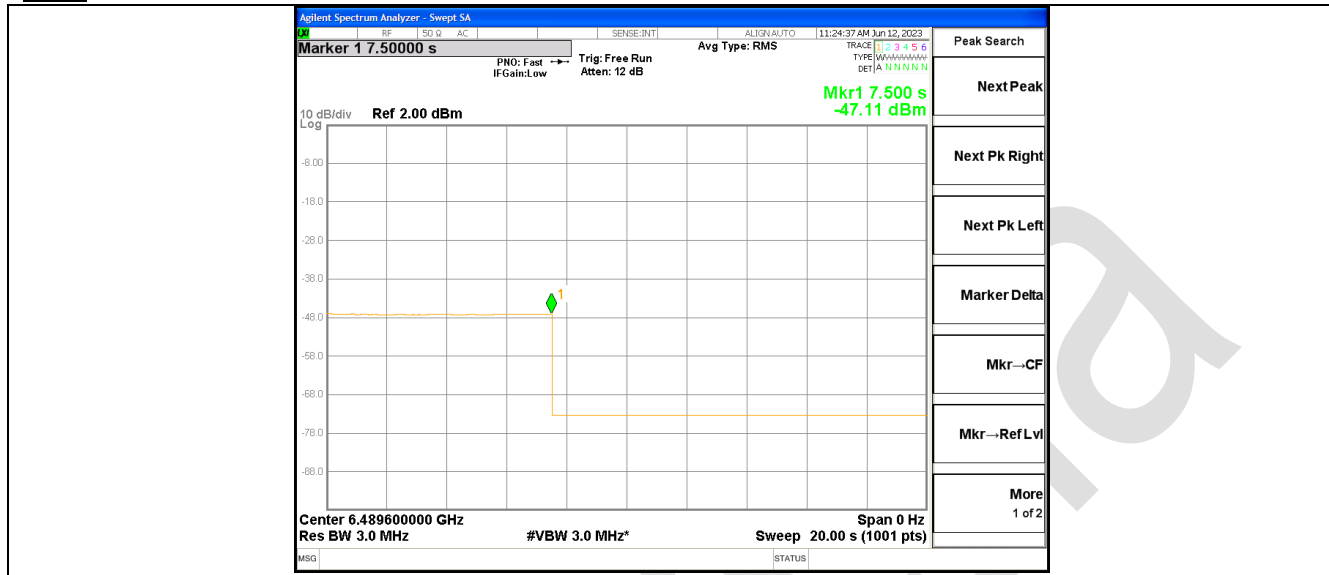
Span: zero span

Sweep time: 20s

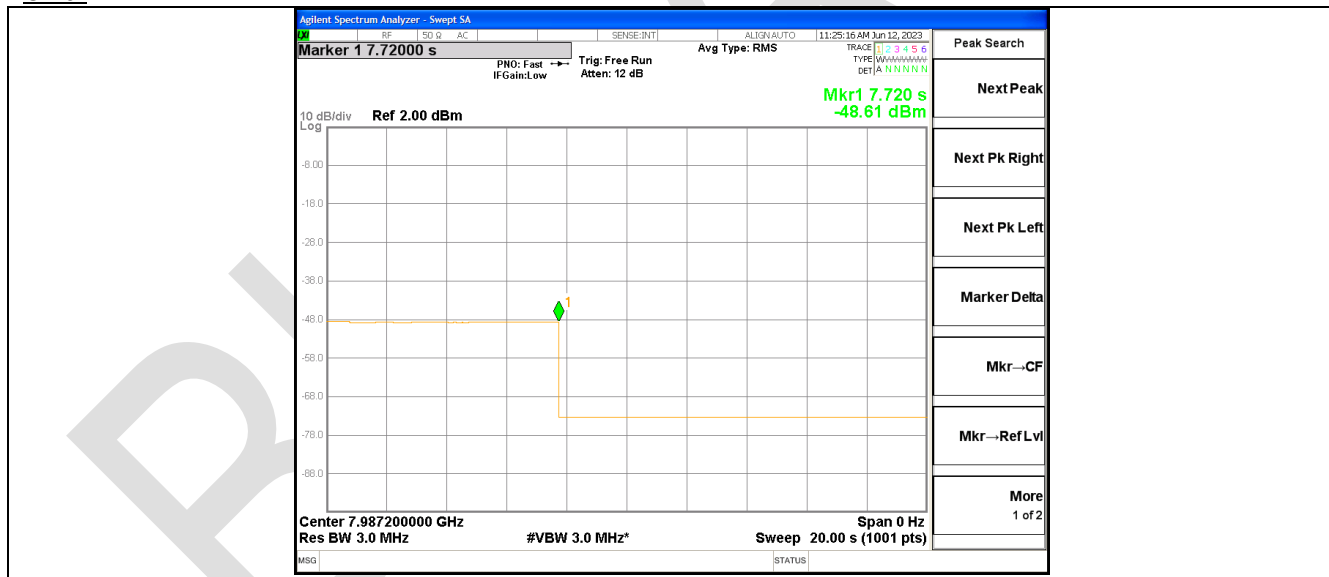
4.5.3 Results

Test Plot:

CH5:

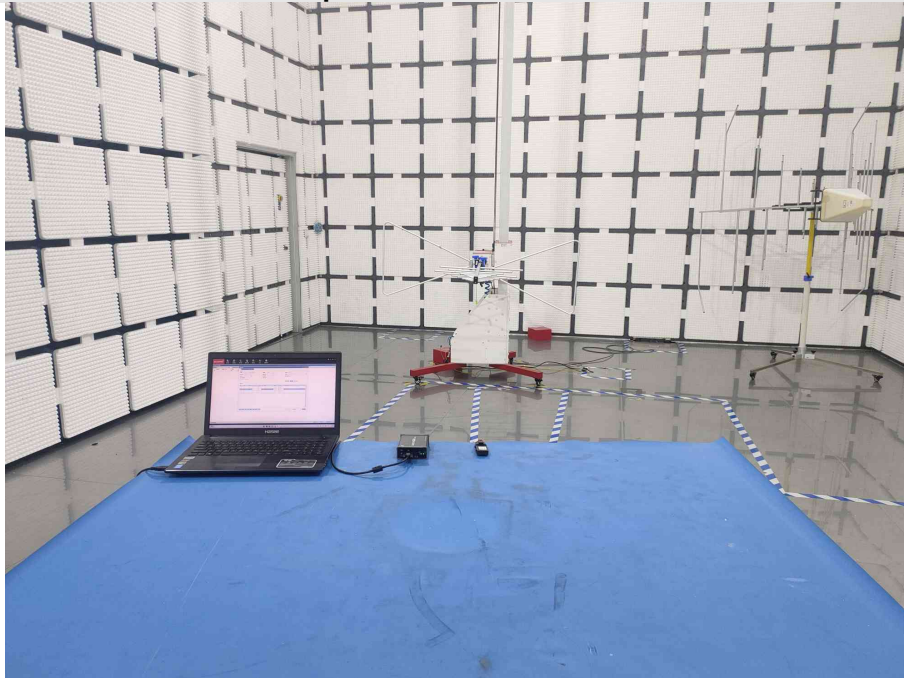


CH9:



5 Photographs of test setup

Radiated Spurious Emissions Below 1GHz

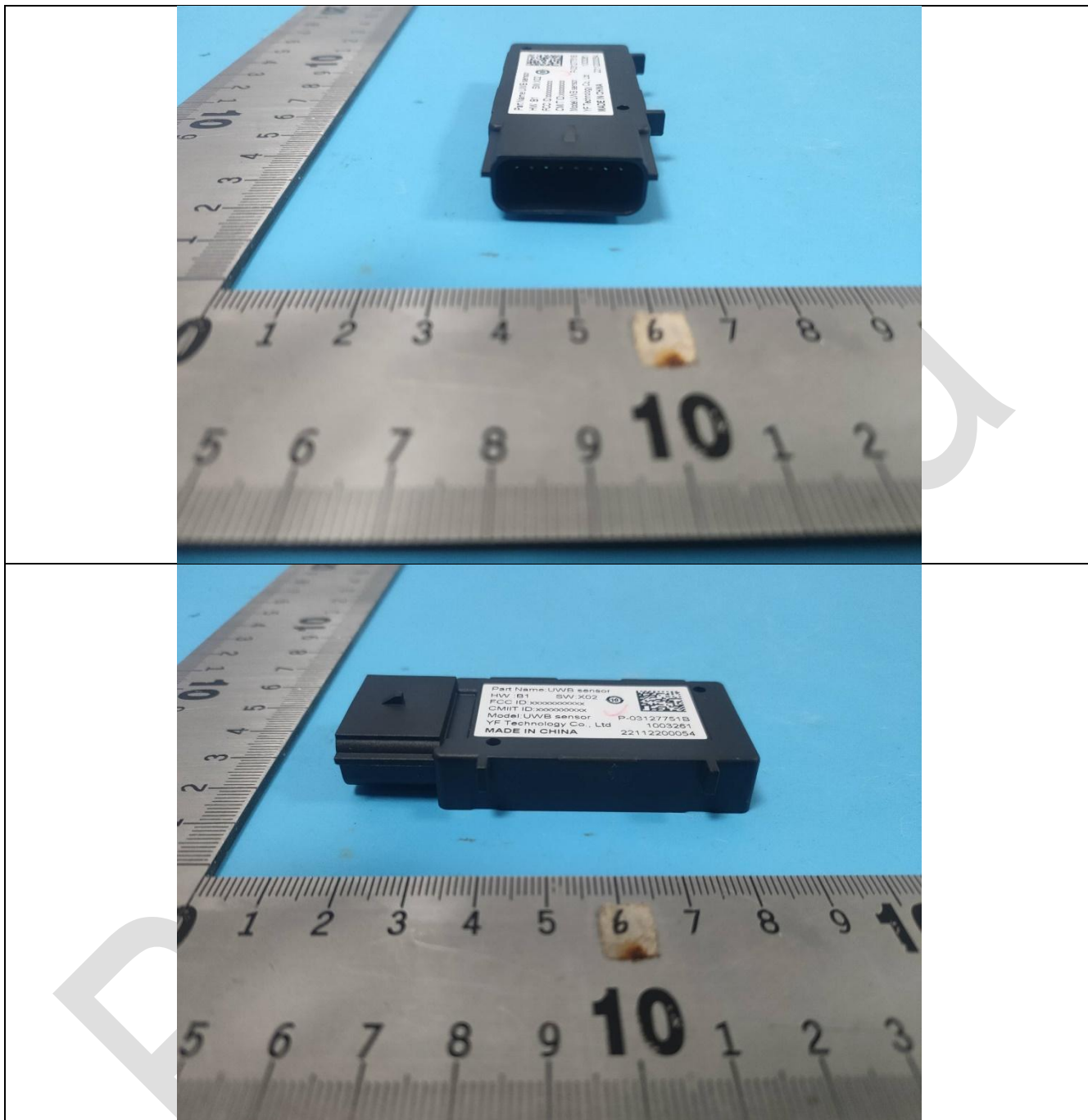


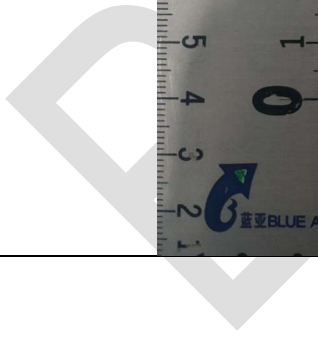
Radiated Spurious Emissions Above 1GHz

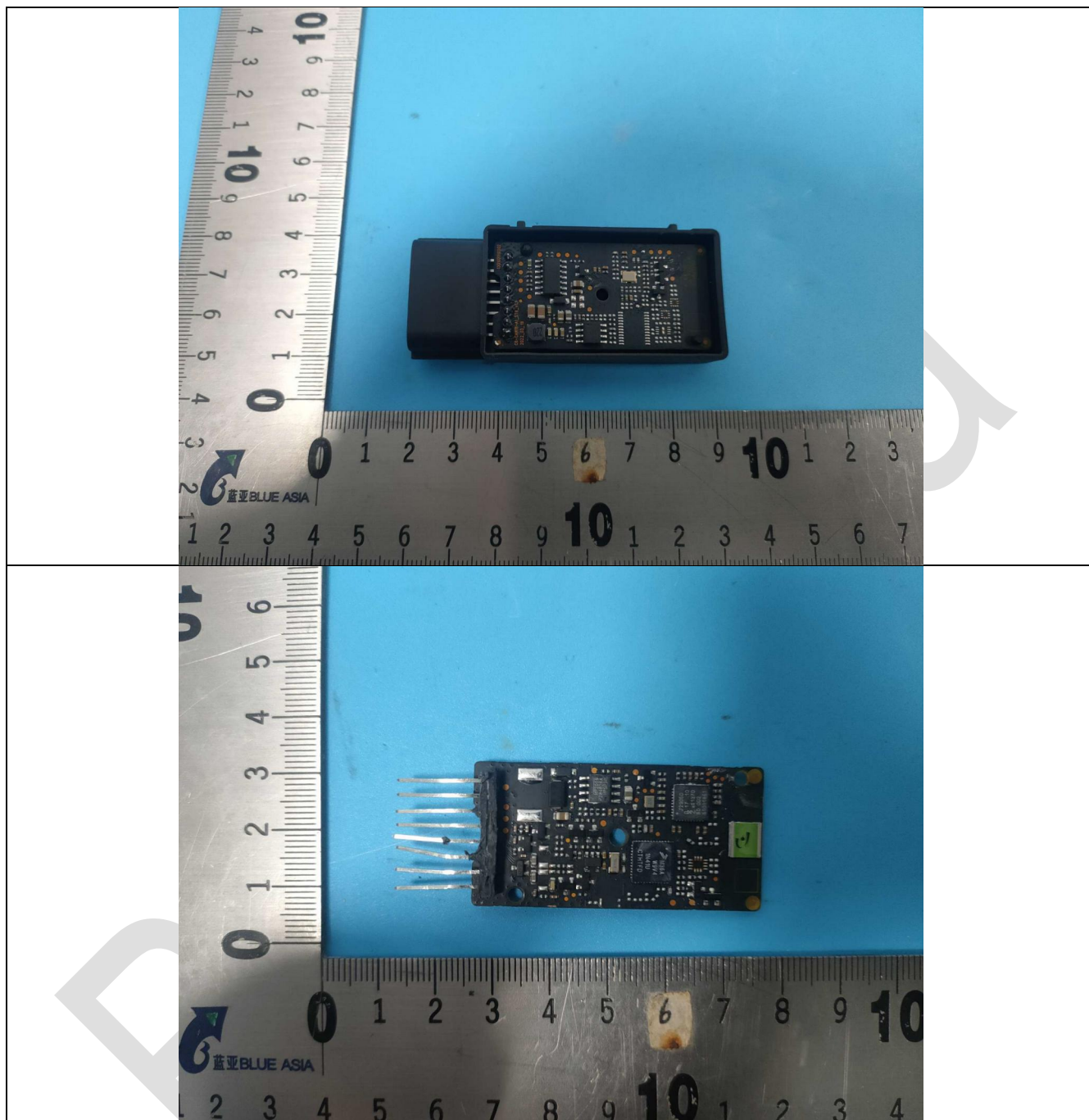


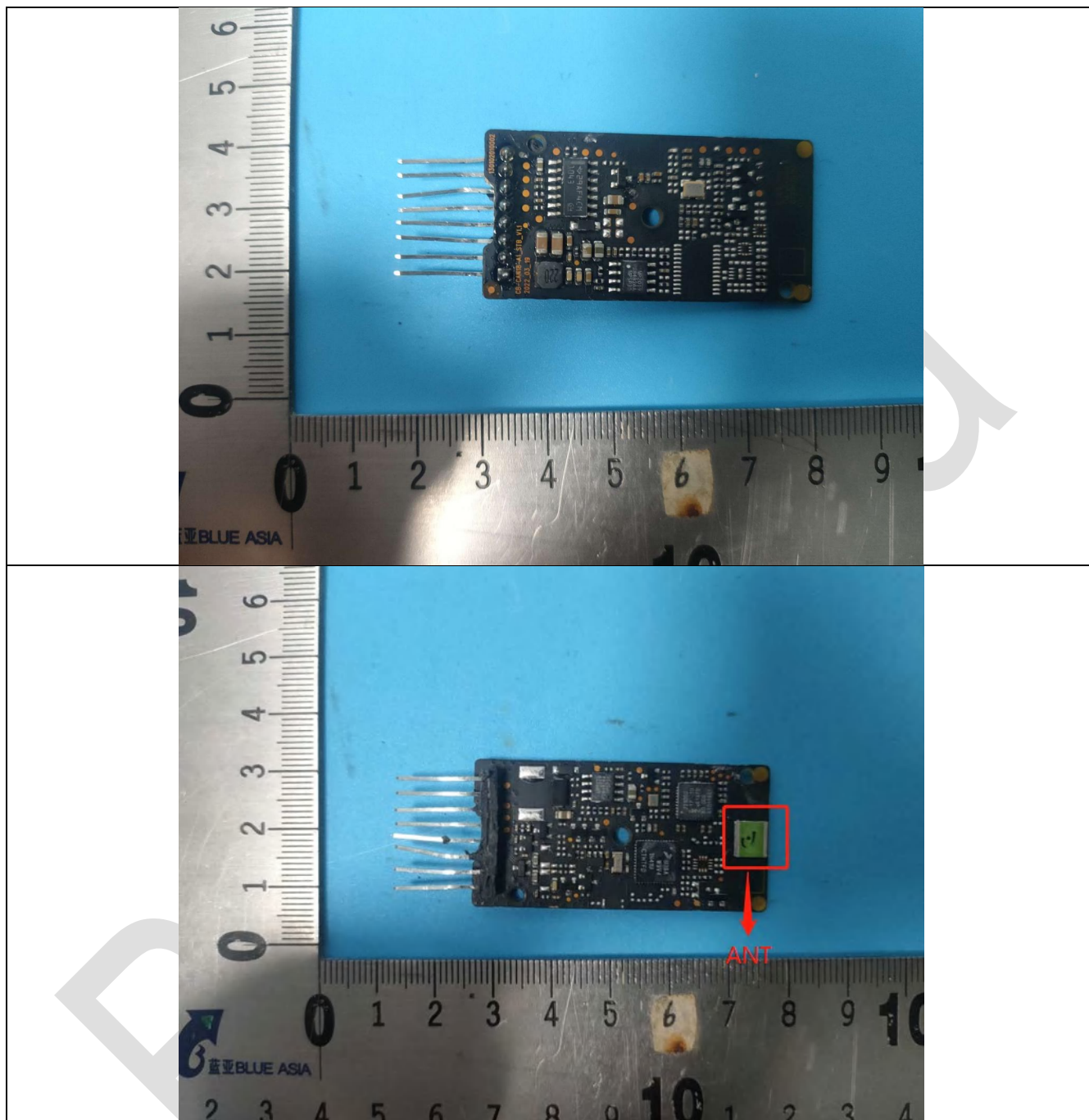
6 Photographs of EUT











----END OF REPORT----

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