

FCC EMC Test Report

Report No.: JYTSZ-R01-2500102

Applicant: CoreHW Semiconductor Oy

Address of Applicant: Visiokatu 1, 33720 Tampere, Finland

Equipment Under Test (EUT)

Product Name: CoreTag (Bluetooth LE AoA Tag)

Model No.: CHW-TAG4001, CHW-TAG4000, CHW-TAG4002

Trade Mark: CoreHW

FCC ID: 2BPQS-TAG4000

Applicable Standards: FCC CFR Title 47 Part 15B

Date of Sample Receipt: 03 Mar., 2025

Date of Test: 04 Mar., to 24 Mar., 2025

Date of report Issued: 25 Mar., 2025

Test Result: PASS

Project by:	<u> </u> Project Engineer	Date:	<u> </u> 25 Mar., 2025
Reviewed by:	<u> </u> Senior Engineer	Date:	<u> </u> 25 Mar., 2025
Approved by:	<u> </u> Manager	Date:	<u> </u> 25 Mar., 2025

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 above the application standard version. Test results reported herein relate only to the item(s) tested.

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1 Version

Version No.	Date	Description
00	25 Mar., 2025	Original

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3 General Information

3.1 Client Information

Applicant:	CoreHW Semiconductor Oy
Address:	Visiokatu 1, 33720 Tampere, Finland
Manufacturer/ Factory:	CoreHW Semiconductor Oy
Address:	Visiokatu 1, 33720 Tampere, Finland

3.2 General Description of E.U.T.

Product Name:	CoreTag (Bluetooth LE AoA Tag)
Model No.:	CHW-TAG4001, CHW-TAG4000, CHW-TAG4002
Power Supply:	DC 3.0V (CR 2450)
Remark:	CHW-TAG4001, CHW-TAG4000, CHW-TAG4002, the differences between them are as follows: Their were identical inside, the electrical circuit design, layout, components used and internal wiring, with only difference being model name and cover for products.
Test Sample Condition:	The test samples were provided in good working order with no visible defects.

3.3 Test Mode

Operating Mode	Detail Description
Working mode	Keep the EUT in Working mode
The sample was placed 0.8m above the ground plane of 3m chamber. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating the turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case are shown in Test Results of the following pages.	

3.4 Description of Test Auxiliary Equipment

Manufacturer	Description	Model	S/N	FCC ID/DoC
N/A	N/A	N/A	N/A	N/A

3.5 Description of Cable Used

Cable Type	Description	Length	From	To
N/A	N/A	N/A	N/A	N/A

3.6 Measurement Uncertainty

Parameter	Expanded Uncertainty (Confidence of 95%(U = 2Uc(y)))
Radiated Emission (30MHz ~ 200MHz) (3m SAC)	±4.6 dB
Radiated Emission (200MHz ~ 1000MHz) (3m SAC)	±5.8 dB
Radiated Emission (1GHz ~ 6GHz) (3m SAC)	±4.5 dB
Radiated Emission (6GHz ~ 18GHz) (3m SAC)	4.7 dB
Note: All the measurement uncertainty value were shown with a coverage k=2 to indicate 95% level of confidence. The measurement data show herein meets or exceeds the CISPR measurement uncertainty values specified in CISPR 16-4-2 and can be compared directly to specified limit to determine compliance.	

3.7 Additions to, Deviations, or Exclusions from the Method

No

3.8 Laboratory Facility

The test facility is recognized, certified, or accredited by the following organizations:

● **FCC - Designation No.: CN1211**

JianYan Testing Group Shenzhen Co., Ltd. has been accredited as a testing laboratory by FCC(Federal Communications Commission). The test firm Registration No. is 727551.

● **ISED – CAB identifier.: CN0021**

The 3m Semi-anechoic chamber and 10m Semi-anechoic chamber of JianYan Testing Group Shenzhen Co., Ltd. has been Registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 10106A-1.

● **CNAS - Registration No.: CNAS L15527**

JianYan Testing Group Shenzhen Co., Ltd. is accredited to ISO/IEC 17025:2017 General Requirements for the Competence of Testing and Calibration laboratories for the competence of testing. The Registration No. is CNAS L15527.

● **A2LA - Registration No.: 4346.01**

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 General requirements for the competence of testing and calibration laboratories. The test scope can be found as below link: <https://portal.a2la.org/scopepdf/4346-01.pdf>

3.9 Laboratory Location

JianYan Testing Group Shenzhen Co., Ltd.

Address: No.101, Building 8, Innovation Wisdom Port, No.155 Hongtian Road, Huangpu Community, Xinqiao Street, Bao'an District, Shenzhen, Guangdong, People's Republic of China.

Tel: +86-755-23118282, Fax: +86-755-23116366

Email: info-JYTee@lets.com, Website: <http://jyt.lets.com>

3.10 Test Instruments List

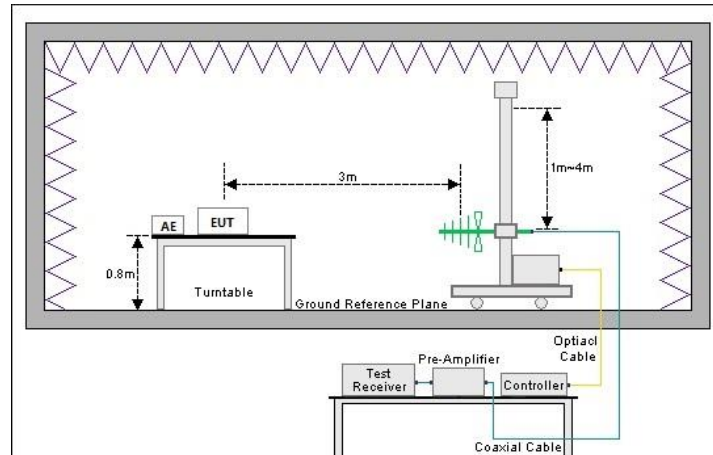
Radiated Emission(3m SAC):					
Test Equipment	Manufacturer	Model No.	Manage No.	Cal. Date (mm-dd-yy)	Cal. Due date (mm-dd-yy)
3m SAC	ETS	9m*6m*6m	WXJ001-1	04-14-2021	04-13-2026
BiConiLog Antenna	Schwarzbeck	VULB9163	WXJ002	01-03-2025	01-02-2026
Horn Antenna	Schwarzbeck	BBHA9120D	WXJ002-2	01-03-2025	01-02-2026
Pre-amplifier (30MHz ~ 1GHz)	Schwarzbeck	BBV9743B	WXJ001-2	12-16-2024	12-15-2025
Pre-amplifier (1GHz ~ 18GHz)	SKET	LNPA_0118G-50	WXJ001-3	12-16-2024	12-15-2025
EMI Test Receiver	Rohde & Schwarz	ESRP7	WXJ003-1	12-16-2024	12-15-2025
Spectrum Analyzer	Rohde & Schwarz	FSP 30	WXJ004	12-16-2024	12-15-2025
Coaxial Cable (30MHz ~ 1GHz)	JYTSZ	JYT3M-1G-NN-8M	WXG001-4	01-15-2025	01-14-2026
Coaxial Cable (1GHz ~ 18GHz)	JYTSZ	JYT3M-18G-NN-8M	WXG001-5	01-15-2025	01-14-2026
Band Reject Filter Group	Tonscend	JS0806-F	WXJ089	N/A	
Test Software	Tonscend	TS+	Version: 3.0.0.1		

4 Measurement Setup and Procedure

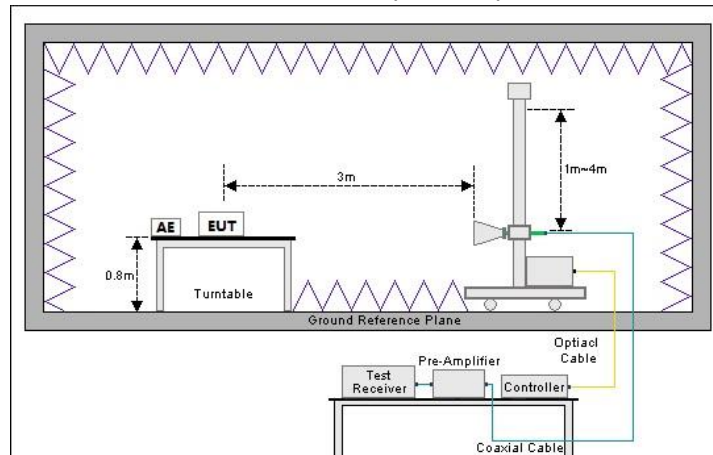
4.1 Test Setup

1) Radiated emission measurement:

Below 1GHz (3m SAC)



Above 1GHz (3m SAC)



4.2 Test Procedure

Test method	Test step
Radiated emission	For below 1GHz: 1. The EUT was placed on the tabletop of a rotating table 0.8 m the ground at a 3 m semi anechoic chamber. The measurement distance from the EUT to the receiving antenna is 3 m. 2. EUT works in each mode of operation that needs to be tested, and having the EUT continuously working, respectively on 3 axis (X, Y & Z) and considered typical configuration to obtain worst position. The highest signal levels relative to the limit shall be determined by rotating the EUT from 0° to 360° and with varying the measurement antenna height between 1 m and 4 m in vertical and horizontal polarizations. 3. Open the test software to control the test antenna and test turntable. Perform the test, save the test results, and export the test data. For above 1GHz: 1. The EUT was placed on the tabletop of a rotating table 0.8 m the ground at a 3 m fully anechoic room. The measurement distance from the EUT to the receiving antenna is 3 m. 2. EUT works in each mode of operation that needs to be tested, and having the EUT continuously working, respectively on 3 axis (X, Y & Z) and considered typical configuration to obtain worst position. The highest signal levels relative to the limit shall be determined by rotating the EUT from 0° to 360° and with varying the measurement antenna height between 1 m and 4 m in vertical and horizontal polarizations. 3. Open the test software to control the test antenna and test turntable. Perform the test, save the test results, and export the test data.

5 Test Results

5.1 Summary

5.1.1 Clause and data summary

Test items	Standard clause	Test data	Result
Conducted Emission	Part 15.107	N/A	N/A
Radiated Emission	Part 15.109	See Section 5.2	Pass
Remark: 1. The EUT is a Class B digital device. 2. Pass: The EUT complies with the essential requirements in the standard. 3. N/A: Not Applicable.			
Test Method:	ANSI C63.4:2014		

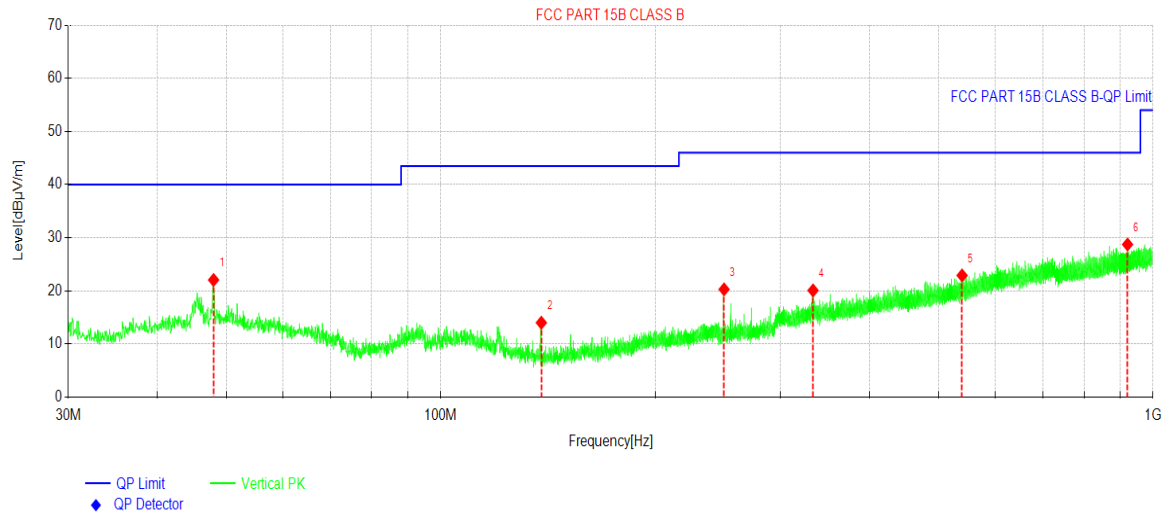
5.1.2 Test Limit

Test items	Limit				
Radiated Emission	Frequency (MHz)	Class A Limit (dBµV/m)		Class B Limit (dBµV/m)	
		Quasi-Peak @ 3m	Quasi-Peak @ 10m	Quasi-Peak @ 3m	Quasi-Peak @ 10m
	30 – 88	49.0	39.0	40.0	30.0
	88 – 216	53.5	43.5	43.5	33.5
	216 – 960	56.0	46.0	46.0	36.0
	960 – 1000	60.0	50.0	54.0	44.0
	Note: The more stringent limit applies at transition frequencies.				
	Frequency	Class A Limit (dBµV/m) @ 3m		Class B Limit (dBµV/m) @ 3m	
		Average	Peake	Average	Peake
	Above 1 GHz	60.0	80.0	54.0	74.0
	Note: The measurement bandwidth shall be 1 MHz or greater.				

5.2 Radiated Emission

Below 1GHz:

Product Name:	CoreTag (Bluetooth LE AoA Tag)	Product Model:	CHW-TAG4001
Test By:	Kiran Zeng	Test mode:	Working mode
Test Frequency:	30 MHz ~ 1 GHz	Polarization:	Vertical
Test Voltage:	DC 3.0V		



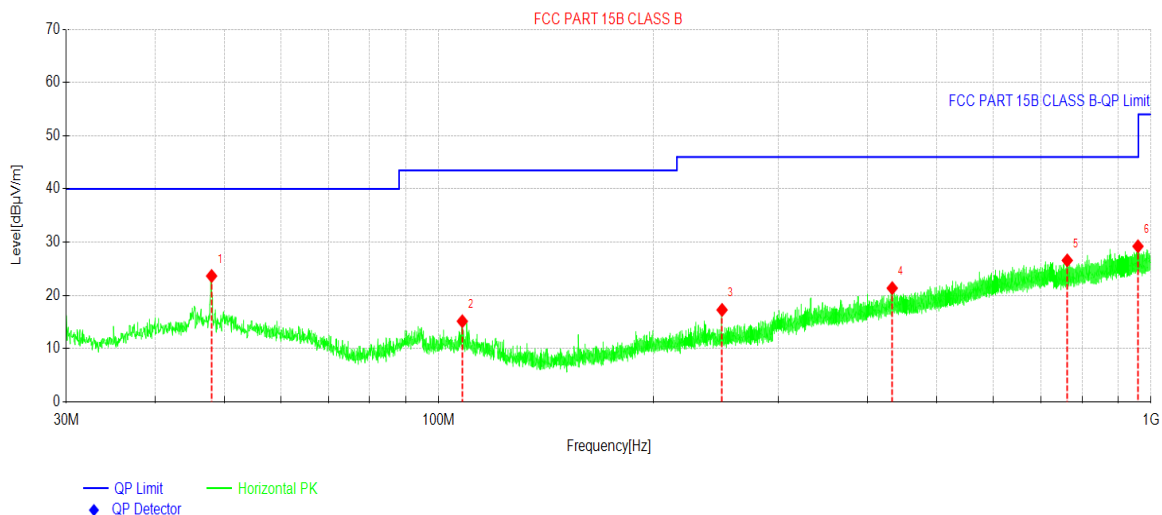
Suspected Data List

NO.	Freq. [MHz]	Reading [dBμV/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Trace	Polarity
1	47.9944	34.47	-12.42	22.05	40.00	17.95	PK	Vertical
2	138.4514	31.95	-17.95	14.00	43.50	29.50	PK	Vertical
3	249.9585	33.88	-13.59	20.29	46.00	25.71	PK	Vertical
4	333.2372	31.81	-11.73	20.08	46.00	25.92	PK	Vertical
5	539.5180	30.82	-7.92	22.90	46.00	23.10	PK	Vertical
6	921.0381	30.81	-2.08	28.73	46.00	17.27	PK	Vertical

Remark:

1. Level = Reading + Factor(Antenna Factor + Cable Loss – Preamplifier Factor).

Product Name:	CoreTag (Bluetooth LE AoA Tag)	Product Model:	CHW-TAG4001
Test By:	Kiran Zeng	Test mode:	Working mode
Test Frequency:	30 MHz ~ 1 GHz	Polarization:	Horizontal
Test Voltage:	DC 3.0V		



Suspected Data List

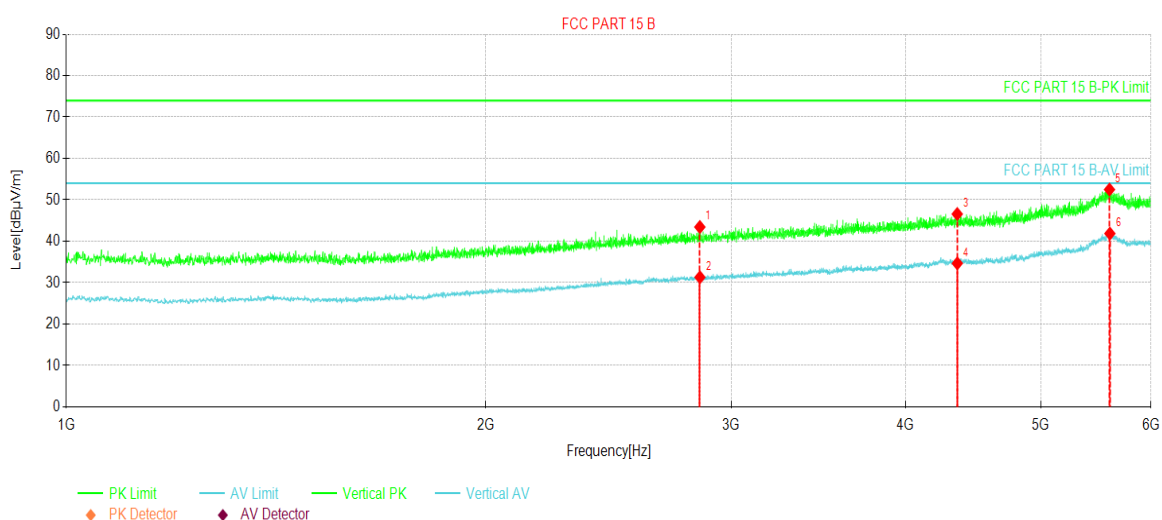
NO.	Freq. [MHz]	Reading [dBμV/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Trace	Polarity
1	47.9944	36.07	-12.42	23.65	40.00	16.35	PK	Horizontal
2	107.9434	29.36	-14.22	15.14	43.50	28.36	PK	Horizontal
3	249.9585	30.87	-13.59	17.28	46.00	28.72	PK	Horizontal
4	433.2977	31.19	-9.83	21.36	46.00	24.64	PK	Horizontal
5	762.8716	30.59	-4.01	26.58	46.00	19.42	PK	Horizontal
6	958.9184	30.96	-1.74	29.22	46.00	16.78	PK	Horizontal

Remark:

1. Level = Reading + Factor(Antenna Factor + Cable Loss – Preamplifier Factor).

Above 1GHz:

Product Name:	CoreTag (Bluetooth LE AoA Tag)	Product Model:	CHW-TAG4001
Test By:	Kiran Zeng	Test mode:	Working mode
Test Frequency:	1000 MHz ~ 6000 MHz	Polarization:	Vertical
Test Voltage:	DC 3.0V		



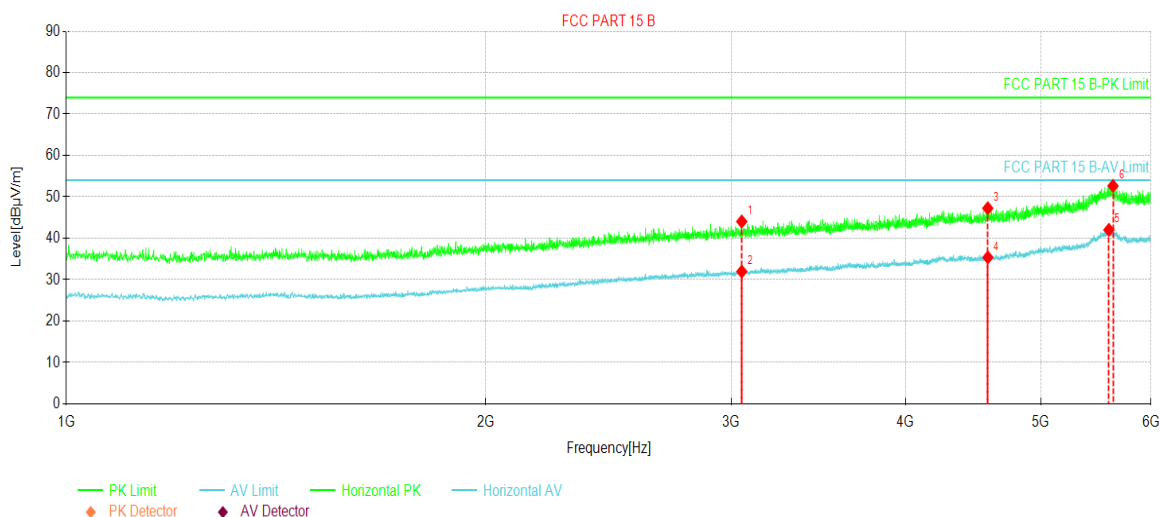
Suspected Data List

NO.	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Trace	Polarity
1	2847.7310	60.83	43.44	-17.39	74.00	30.56	PK	Vertical
2	2848.3560	48.69	31.30	-17.39	54.00	22.70	AV	Vertical
3	4356.6696	58.68	46.57	-12.11	74.00	27.43	PK	Vertical
4	4357.2947	46.77	34.66	-12.11	54.00	19.34	AV	Vertical
5	5602.4503	57.07	52.48	-4.59	74.00	21.52	PK	Vertical
6	5606.2008	46.50	41.87	-4.63	54.00	12.13	AV	Vertical

Remark:

1. Level = Reading + Factor(Antenna Factor + Cable Loss – Preamplifier Factor).

Product Name:	CoreTag (Bluetooth LE AoA Tag)	Product Model:	CHW-TAG4001
Test By:	Kiran Zeng	Test mode:	Working mode
Test Frequency:	1000 MHz ~ 6000 MHz	Polarization:	Horizontal
Test Voltage:	DC 3.0V		



Suspected Data List								
NO.	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Trace	Polarity
1	3052.1315	60.81	44.04	-16.77	74.00	29.96	PK	Horizontal
2	3052.1315	48.74	31.97	-16.77	54.00	22.03	AV	Horizontal
3	4582.3228	58.36	47.25	-11.11	74.00	26.75	PK	Horizontal
4	4582.9479	46.49	35.38	-11.11	54.00	18.62	AV	Horizontal
5	5596.8246	46.64	42.02	-4.62	54.00	11.98	AV	Horizontal
6	5634.9544	57.55	52.65	-4.90	74.00	21.35	PK	Horizontal

Remark:

1. Level = Reading + Factor(Antenna Factor + Cable Loss – Preamplifier Factor).

-----End of report-----