



TEST REPORT

Reference No...... : WTX23X12264041W001
Manufacturer..... : Descartes System Group Inc
Address..... : 105 Trafalgar Street, Floor 2 Floor 2, Nelson, 7010 New Zealand
Product Name..... : COREInsight BLE Beacon Tag
Model No...... : STD004

Standards..... : ETSI EN 300 328 V2.2.2 (2019-07)
Date of Receipt sample.... : 2023-12-12
Date of Test..... : 2023-12-12 to 2023-12-23
Date of Issue..... : 2023-12-23
Test Report Form No...... : WTX_ ETSI EN 300 328_2019W
Test Result..... : Pass

Remarks:

The results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of approver.

Prepared By:

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Report version

Version No.	Date of issue	Description
Rev.00	2023-12-23	Original
/	/	/

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1. GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

General Description of EUT	
Product Name:	COREInsight BLE Beacon Tag
Trade Name:	/
Model No.:	STD004
Adding Model(s):	/
Rated Voltage:	Battery:DC3.6V
Battery Capacity:	2700mAh
Adapter Model:	/
Software Version:	STD004 V63
Hardware Version:	1.0
Radio Technology:	Bluetooth V5.0 (BLE Mode)
Operation Frequency:	2402MHz-2480MHz
Modulation:	GFSK
Antenna Type:	/
Antenna Gain:	2dBi
<i>Note: The Antenna Gain is provided by the customer and can affect the validity of results.</i> <i>The test data is gathered from a production sample, provided by the manufacturer.</i>	

E.1 Product Information (Bluetooth V5.0)	
a) Type of modulation:	☐ FHSS ☒ other forms of modulation
b) Adaptive / non-adaptive:	Adaptive equipment without a non-adaptive mode
c) In case of adaptive equipment:	The equipment has implemented an LBT based DAA mechanism
d) In case of non-adaptive equipment:	No
e) The worst case operational mode for each of the following tests	
RF output power:	BLE
Power spectrum density:	BLE
Occupied channel bandwidth:	BLE
Transmitter unwanted emissions in the OOB domain:	BLE
Transmitter unwanted emissions in the spurious domain:	BLE
Receiver spurious emissions:	BLE
f) Operating mode(antenna):	Single Antenna Equipment



g) In case of smart antenna Systems:	No
h) Operating frequency range(s) of the equipment:	2402MHz-2480MHz
i) Occupied channel bandwidth(s):	/
j) Type of equipment:	☒ Stand-alone ☐ Combined equipment ☐ Plug-in device
k) The extreme operating conditions	
Extreme voltage range:	Please refer to Section 1.5
Extreme temperature range:	Please refer to Section 1.5
l) The intended combination(s) of the radio equipment power settings and one or more antenna assemblies and their corresponding e.i.r.p levels	
Antenna type:	☐ PCB Antenna ☐ Dedicated Antennas
Antenna gain:	2dBi
m) Nominal voltage:	Please refer to Section 1.5
n) Describe the test modes available which can facilitate testing:	Please refer to Section 1.5
o) The equipment type	Bluetooth
E.2 Power Level Setting	
Highest EIRP value:	/
Conducted power:	/
Listed as power setting:	Default
E.3 Additional Information	
Modulation:	GFSK
Unmodulated modes:	No
Duty cycle:	Continuous operation possible for testing purposes
Type of the UUT:	Production models
Supporting equipment:	Combined equipment



1.2 Test Standards

The tests were performed according to following standards:

ETSI EN 300 328 V2.2.2 (2019-07): Wideband transmission systems; Data transmission equipment operating in the 2.4 GHz band; Harmonised Standard for access to radio spectrum.

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

1.3 Test Methodology

All measurements contained in this report were conducted with ETSI EN 300328, the equipment under test (EUT) was configured to measure its highest possible emission level. For more detail refer to the Operating Instructions.

1.4 Test Facility

Address of the test laboratory

Laboratory: Waltek Testing Group (Shenzhen) Co., Ltd.

Address: 1/F., Room 101, Building 1, Hongwei Industrial Park, Liuxian 2nd Road, Block 70 Bao'an District, Shenzhen, Guangdong, China

FCC – Registration No.: 125990

Waltek Testing Group (Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files. The Designation Number is CN5010, and Test Firm Registration Number is 125990.

Industry Canada (IC) Registration No.: 11464A

The 3m Semi-anechoic chamber of Waltek Testing Group (Shenzhen) Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 11464A.



1.5 EUT Setup and Test Mode

The equipment under test (EUT) was configured to measure its highest possible emission/immunity level. The test modes were adapted according to the operation manual for use, the EUT was operated in the engineering mode to fix the Tx/Rx frequency that was for the purpose of the measurements, more detailed description as follows:

Test Mode List		
Test Mode	Description	Remark
TM1	BLE	Radiated spurious emissions; BLE 2440MHz

	NTNV	LTNV	HTNV
Temperature (°C)	25	-10	+40
Voltage (V)	DC3.6V		
Relative Humidity:			45 %.
ATM Pressure:			1019 mbar

EUT Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite
/	/	/	/

Special Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite
/	/	/	/

Auxiliary Equipment List and Details			
Description	Manufacturer	Model	Serial Number
/	/	/	/



1.6 Measurement Uncertainty

Measurement uncertainty		
Parameter	Uncertainty	Note
Radio frequency	± 0.4 ppm	(1)
Conducted RF Output Power	± 0.42 dB	(1)
Occupied Bandwidth	$\pm 1 \times 10^{-7}$	(1)
Conducted Power Spectral Density	± 0.70 dB	(1)
Conducted Spurious Emission	± 2.17 dB	(1)
Radiated Spurious Emissions	30-200MHz ± 4.52 dB	(1)
	0.2-1GHz ± 5.56 dB	(1)
	1-6GHz ± 3.84 dB	(1)
	6-18GHz ± 3.92 dB	(1)

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=1.96$.

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1.7 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal Date	Due Date
Spectrum Analyzer	Agilent	N9020A	US47140102	2023-02-25	2024-02-24
Signal Generator	Agilent	83752A	3610A01453	2023-02-25	2024-02-24
Vector Signal Generator	Agilent	N5182A	MY47070202	2023-02-25	2024-02-24
Power Sensor	Agilent	U2021XA	MY54250019	2023-02-25	2024-02-24
Power Sensor	Agilent	U2021XA	MY54250021	2023-02-25	2024-02-24
Simultaneous Sampling	Agilent	U2531A	TW54243509	2023-02-25	2024-02-24
Communication Tester	HP	8921A	/	2023-02-25	2024-02-24
Temperature&Humidity Chamber	/	HTC-1	/	2023-02-25	2024-02-24
Universal Radio Communication Tester	Rohde & Schwarz	CMW500	148650	2023-02-25	2024-02-24
☐ Chamber A: Below 1GHz					
Spectrum Analyzer	Rohde & Schwarz	FSP30	836079/035	2023-02-25	2024-02-24
EMI Test Receiver	Rohde & Schwarz	ESVB	825471/005	2023-02-25	2024-02-24
Amplifier	HP	8447F	2805A03475	2023-02-25	2024-02-24
Loop Antenna	Schwarz beck	FMZB 1516	9773	2021-03-20	2024-03-19
Trilog Broadband Antenna	Schwarz beck	VULB9163	9163-333	2023-03-20	2026-03-19
☐ Chamber A: Above 1GHz					
Spectrum Analyzer	Rohde & Schwarz	FSP30	836079/035	2023-02-25	2024-02-24
Spectrum Analyzer	Rohde & Schwarz	FSP40	100612	2023-02-25	2024-02-24
EMI Test Receiver	Rohde & Schwarz	ESVB	825471/005	2023-02-25	2024-02-24
Amplifier	C&D	PAP-1G18	14918	2023-02-25	2024-02-24
Horn Antenna	ETS	3117	00086197	2021-03-19	2024-03-18
DRG Horn Antenna	A.H. SYSTEMS	SAS-574	571	2021-03-19	2024-03-18
Pre-amplifier	Schwarzbeck	BBV 9721	9721-031	2023-02-25	2024-02-24
☐ Chamber B:Below 1GHz					
Trilog Broadband Antenna	Schwarz beck	VULB9163(B)	9163-635	2021-04-09	2024-04-08
Amplifier	Agilent	8447D	2944A10457	2023-02-25	2024-02-24
EMI Test Receiver	Rohde & Schwarz	ESPI	101391	2023-02-25	2024-02-24
☒ Chamber C:Below 1GHz					
EMI Test Receiver	Rohde & Schwarz	ESIB 26	100401	2023-02-25	2024-02-24
Trilog Broadband Antenna	Schwarz beck	VULB 9168	1194	2021-05-28	2024-05-27



Loop Antenna	Schwarz beck	FMZB 1516	9773	2021-03-20	2024-03-19
Amplifier	HP	8447F	2944A03869	2023-02-25	2024-02-24
☒ Chamber C: Above 1GHz					
EMI Test Receiver	Rohde & Schwarz	ESIB 26	100401	2023-02-25	2024-02-24
Horn Antenna	POAM	RTF-118A	1820	2023-03-10	2026-03-09
Amplifier	Tonscend	TAP01018050	AP22E806235	2023-02-25	2024-02-24
DRG Horn Antenna	A.H. SYSTEMS	SAS-574	571	2021-03-19	2024-03-18
Pre-amplifier	Schwarzbeck	BBV 9721	9721-031	2023-02-25	2024-02-24

Software List			
Description	Manufacturer	Model	Version
EMI Test Software (Radiated Emission)*	Farad	EZ-EMC	RA-03A1
RF Test System	TST	TST-258	V2.0
RF Test System	Ascentest	AT890	V3.0

*Remark: indicates software version used in the compliance certification testing

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2. SUMMARY OF TEST RESULTS

Standards	Reference	Description of Test Item	Result
EN 300 328	4.3.1.2 / 4.3.2.2	RF Output Power	N/A
	4.3.2.3	Power Spectral Density	N/A
	4.3.1.3 / 4.3.2.4	Duty Cycle, Tx-sequence, Tx-gap	N/A
	4.3.1.4	Accumulated Transmit Time, Frequency Occupation and Hopping Sequence	N/A
	4.3.1.5	Hopping Frequency Separation	N/A
	4.3.1.6 / 4.3.2.5	Medium Utilisation (MU) Factor	N/A
	4.3.1.7 / 4.3.2.6	Adaptivity (Adaptive Frequency Hopping)	N/A
	4.3.1.8 / 4.3.2.7	Occupied Channel Bandwidth	N/A
	4.3.1.9 / 4.3.2.8	Transmitter Unwanted Emissions in the Out-of-band Domain	N/A
	4.3.1.10 / 4.3.2.9	Transmitter Unwanted Emissions in the Spurious Domain	Passed
	4.3.1.11 / 4.3.2.10	Receiver Spurious Emissions	Passed
	4.3.1.12 / 4.3.2.11	Receiver Blocking	N/A
	4.3.1.13 / 4.3.2.12	Geo-location capability	N/A
Passed: The EUT complies with the essential requirements in the standard. Failed: The EUT does not comply with the essential requirements in the standard. N/A: Not applicable.			



3. Transmitter Unwanted Emissions in the Spurious Domain

3.1 Standard Applicable

According to section 4.3.1.10.3& 4.3.2.9.3, the transmitter unwanted emissions in the spurious domain shall not exceed the values given in the following table.

Transmitter limit for spurious emissions

Frequency range	Maximum power	Bandwidth
30MHz to 47MHz	-36dBm	100kHz
47MHz to 74MHz	-54dBm	100kHz
74MHz to 87.5MHz	-36dBm	100kHz
87.5MHz to 118MHz	-54dBm	100kHz
118MHz to 174MHz	-36dBm	100kHz
174MHz to 230MHz	-54dBm	100kHz
230MHz to 470MHz	-36dBm	100kHz
470MHz to 694MHz	-54dBm	100kHz
694MHz to 1GHz	-36dBm	100kHz
1GHz to 12.75GHz	-30dBm	1MHz

3.2 Test Procedure

The device under test has an integral antenna and the radiated measurement shall apply to the device, using the method of measurement as described in the EN300328 section 5.4.9.2

RBW=100kHz VBW=300kHz 30MHz-1GHz
 RBW=1MHz VBW=3MHz 1GHz-12.75GHz

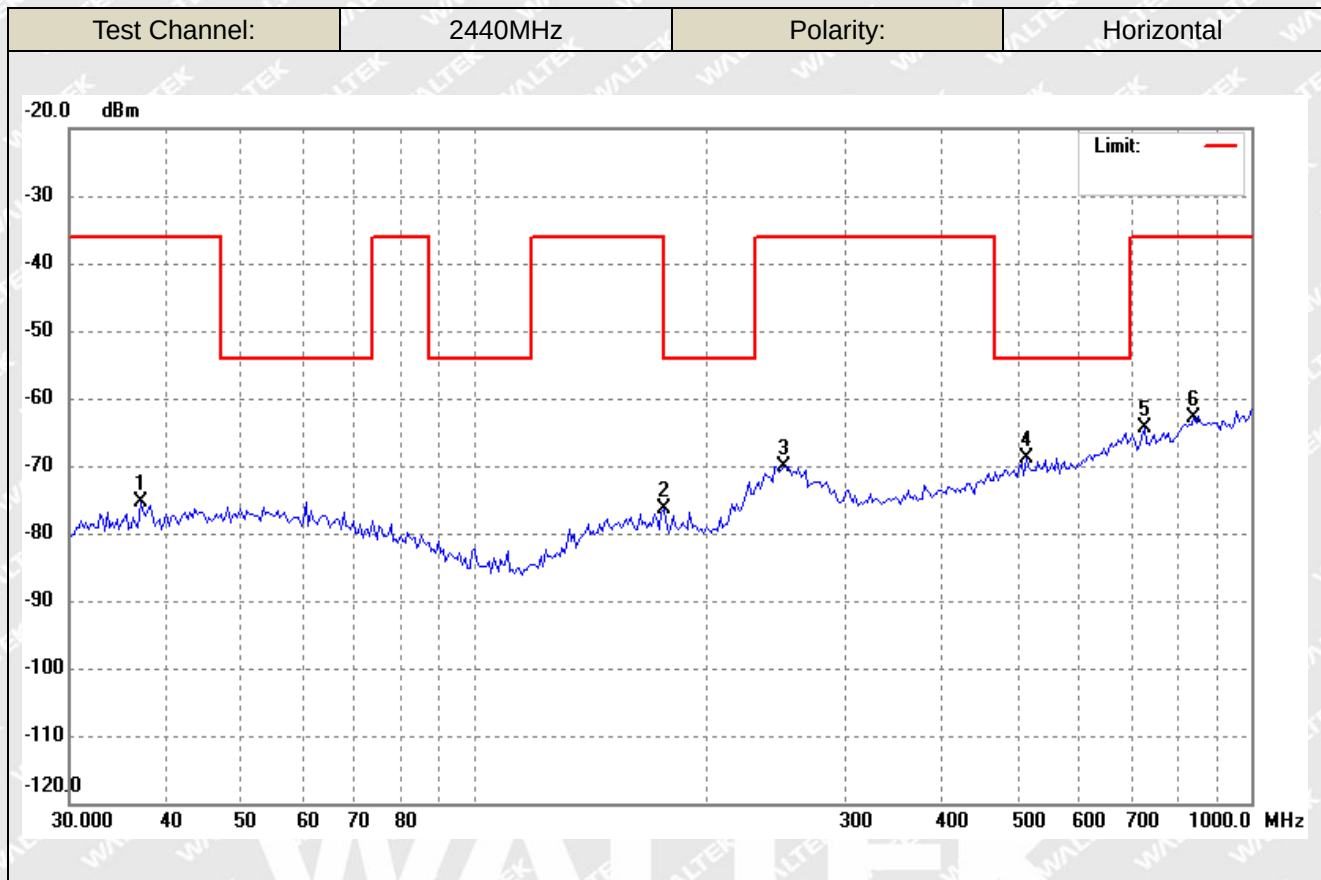
3.3 Summary of Test Results/Plots

According to the data, the EUT complied with the EN 300328 standards, and had the worst cases:

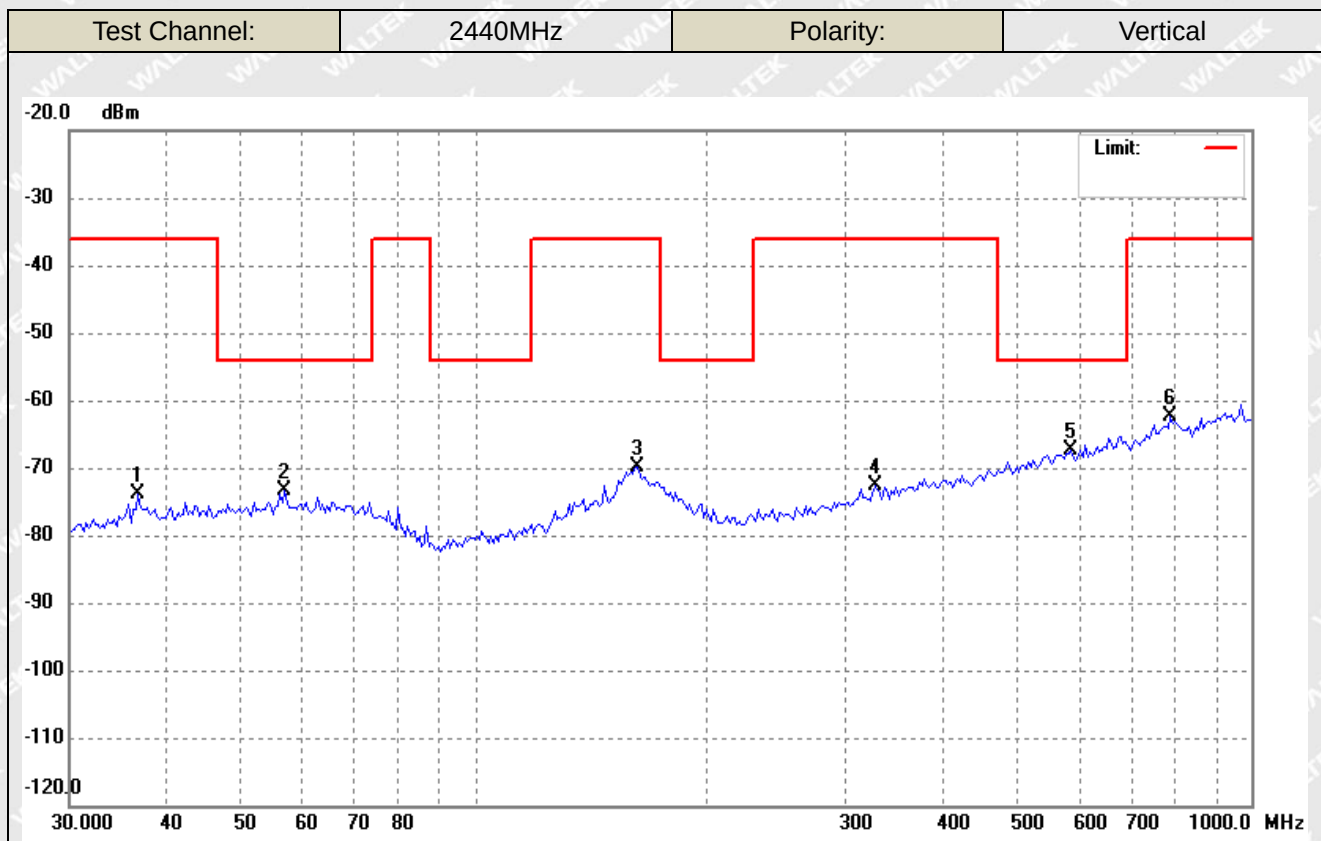
Reference No.: WTX23X12264041W001



➤ Spurious Emission From 30MHz To 1GHz
For BLE



No.	Frequency (MHz)	Reading (dBm)	Correct Factor(dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	37.0405	-77.63	2.27	-75.36	-36.00	-39.36	ERP
2	175.0404	-77.41	0.98	-76.43	-54.00	-22.43	ERP
3	250.4859	-78.53	8.51	-70.02	-36.00	-34.02	ERP
4	512.9478	-76.27	7.41	-68.86	-54.00	-14.86	ERP
5	728.8971	-75.50	11.10	-64.40	-36.00	-28.40	ERP
6	844.8028	-76.53	13.63	-62.90	-36.00	-26.90	ERP



No.	Frequency (MHz)	Reading (dBm)	Correct Factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	36.7811	-76.21	2.24	-73.97	-36.00	-37.97	ERP
2	56.8644	-76.79	3.36	-73.43	-54.00	-19.43	ERP
3	162.0197	-77.37	7.57	-69.80	-36.00	-33.80	ERP
4	327.1554	-76.43	3.87	-72.56	-36.00	-36.56	ERP
5	586.2172	-76.05	8.60	-67.45	-54.00	-13.45	ERP
6	787.4749	-74.77	12.34	-62.43	-36.00	-26.43	ERP



➤ Spurious Emission Above 1GHz

For BLE

Frequency	Reading	Correct	Result	Limit	Margin	Polar
(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	H/V
2440MHz						
2011.485	-57.54	-5.62	-63.16	-30.00	-33.16	H
5466.952	-55.23	2.74	-52.49	-30.00	-22.49	H
12240.145	-56.78	12.12	-44.66	-30.00	-14.66	H
1921.223	-56.76	-4.17	-60.93	-30.00	-30.93	V
4236.163	-56.28	-0.74	-57.02	-30.00	-27.02	V
8652.386	-55.02	7.48	-47.54	-30.00	-17.54	V

Note 1: Testing is carried out with frequency rang 30MHz to 12.75GHz, which above 4th Harmonics are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

Note 2: this EUT was tested in 3 orthogonal positions and the worst case position data was reported.

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4. Receiver Spurious Emissions

4.1 Standard Applicable

According to section 4.3.1.11.3&4.3.2.10.3, the spurious emissions of the receiver shall not exceed the values given in table below:

NOTE: In case of equipment with antenna connectors, these limits apply to emissions at the antenna port (conducted) and to the emissions radiated by the cabinet. In case of integral antenna equipment (without temporary antenna connectors), these limits apply to emissions radiated by the equipment. Spurious emission limits for receivers

Frequency range	Maximum power	Bandwidth
30MHz to 1GHz	-57dBm	100kHz
1GHz to 12.75GHz	-47dBm	1MHz

4.2 Test Procedure

The device under test has an integral antenna and the radiated measurement shall apply to the device, using the method of measurement as described in the EN300328 section 5.4.10.2.

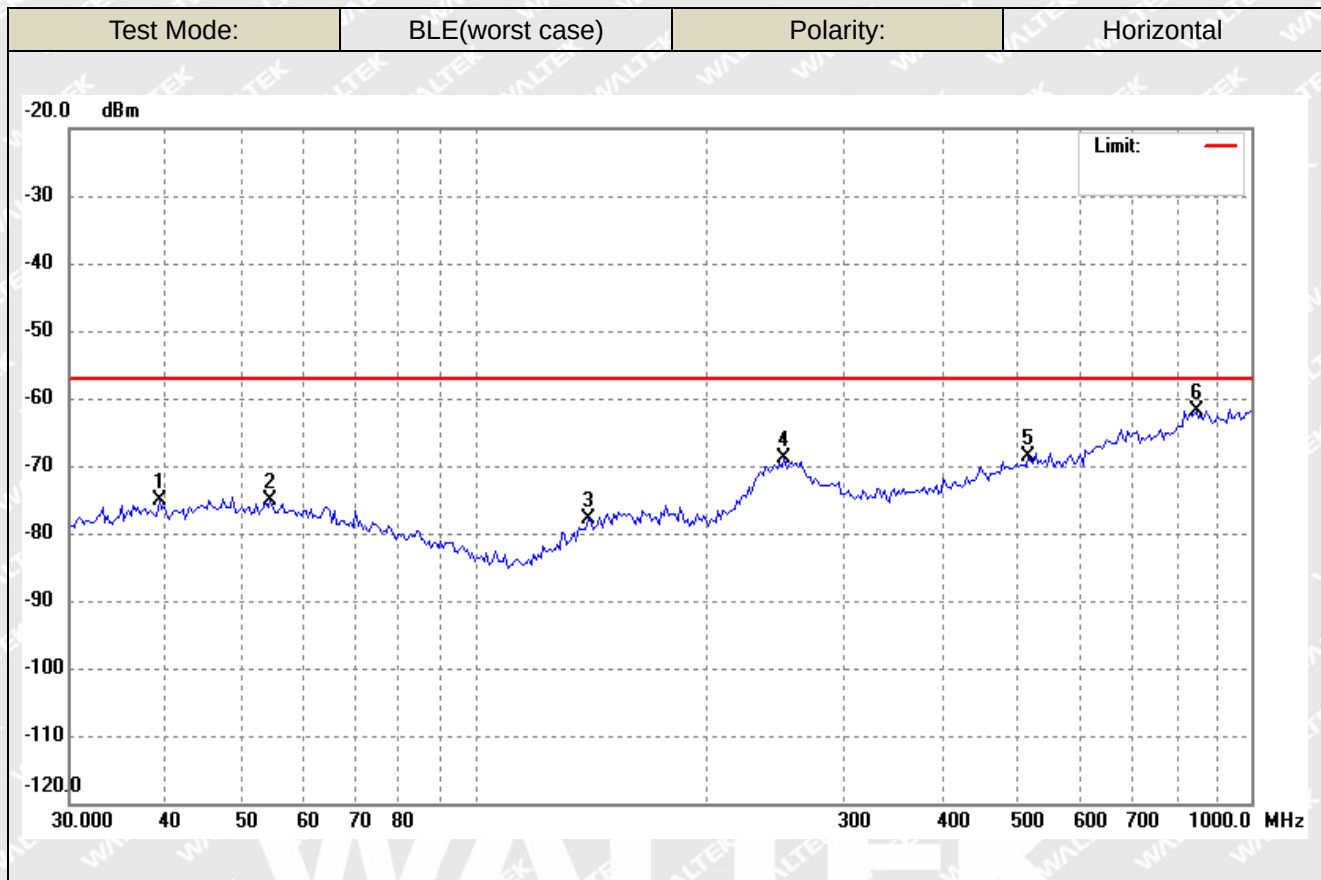
RBW=100kHz VBW=300kHz 30MHz-1GHz
RBW=1MHz VBW=3MHz 1GHz-12.75GHz

4.3 Summary of Test Results/Plots

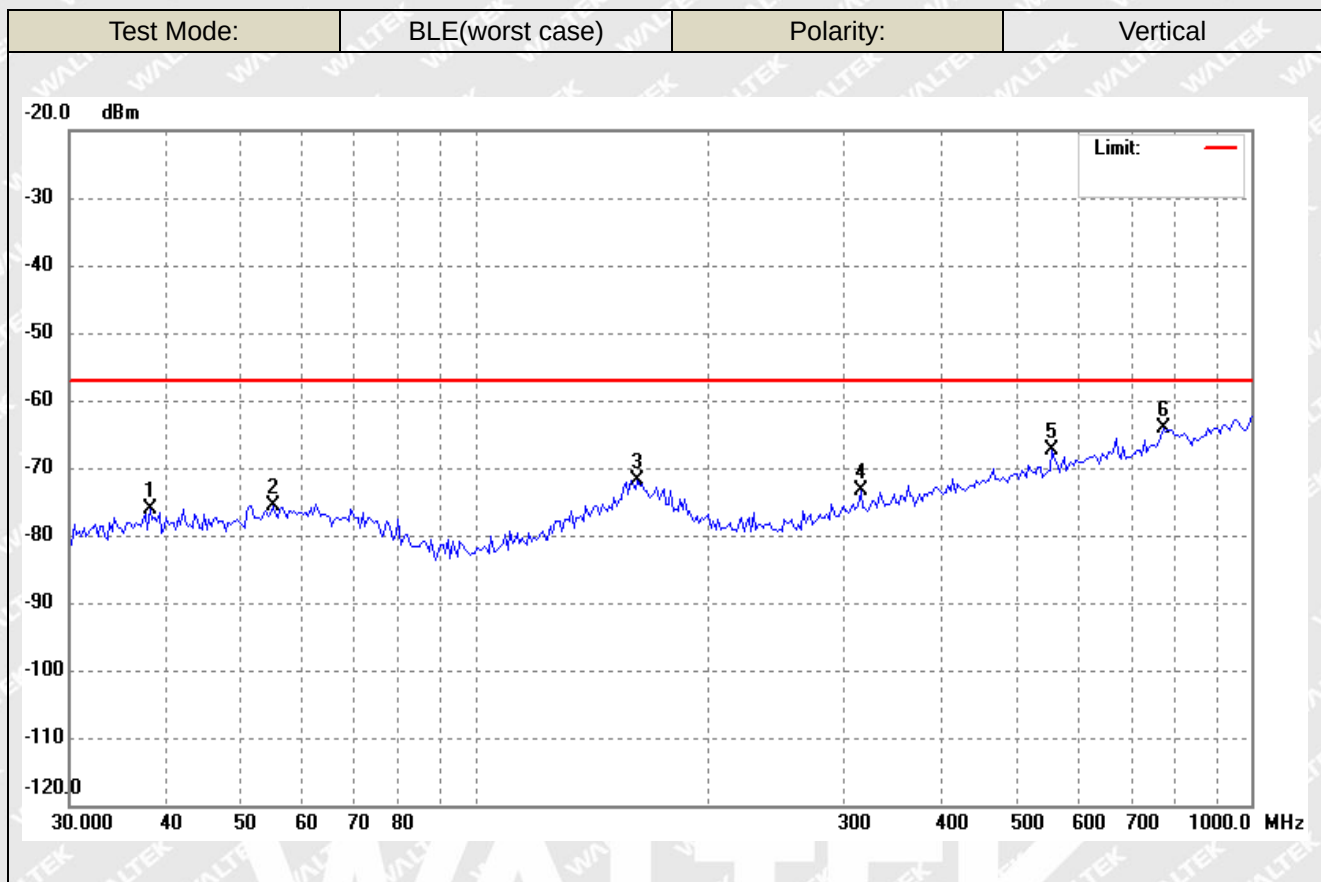
According to the data, the EUT complied with the EN 300328 standards, and had the worst case:



➤ Receiver Spurious Emission From 30MHz To 1GHz



No.	Frequency (MHz)	Reading (dBm)	Correct Factor(dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	39.1825	-77.66	2.47	-75.19	-57.00	-18.19	ERP
2	54.5167	-78.12	2.95	-75.17	-57.00	-18.17	ERP
3	176.2748	-76.91	0.98	-75.93	-57.00	-18.93	ERP
4	243.5431	-76.06	7.44	-68.62	-57.00	-11.62	ERP
5	502.2473	-75.29	7.31	-67.98	-57.00	-10.98	ERP
6	850.7603	-75.42	13.61	-61.81	-57.00	-4.81	ERP



No.	Frequency (MHz)	Reading (dBm)	Correct Factor(dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	38.0965	-78.44	2.37	-76.07	-57.00	-19.07	ERP
2	54.9011	-78.95	3.40	-75.55	-57.00	-18.55	ERP
3	162.0197	-79.35	7.57	-71.78	-57.00	-14.78	ERP
4	313.6483	-76.96	3.59	-73.37	-57.00	-16.37	ERP
5	554.1708	-75.54	8.07	-67.47	-57.00	-10.47	ERP
6	771.0475	-76.03	11.92	-64.11	-57.00	-7.11	ERP



➤ Receiver Spurious Emission Above 1GHz

BLE Mode

Frequency (MHz)	Result (dBm)	Limit (dBm)	Margin (dB)	Polar H/V
1980.936	-68.07	-47.00	-21.07	H
6023.360	-58.87	-47.00	-11.87	H
9245.635	-55.13	-47.00	-8.13	H
1980.936	-63.43	-47.00	-16.43	V
4715.168	-60.40	-47.00	-13.40	V
7694.502	-55.96	-47.00	-8.96	V

Note: Testing is carried out with frequency rang 30MHz to 12.75GHz, which above 1GHz are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

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EXHIBIT 1 - EUT PHOTOGRAPHS

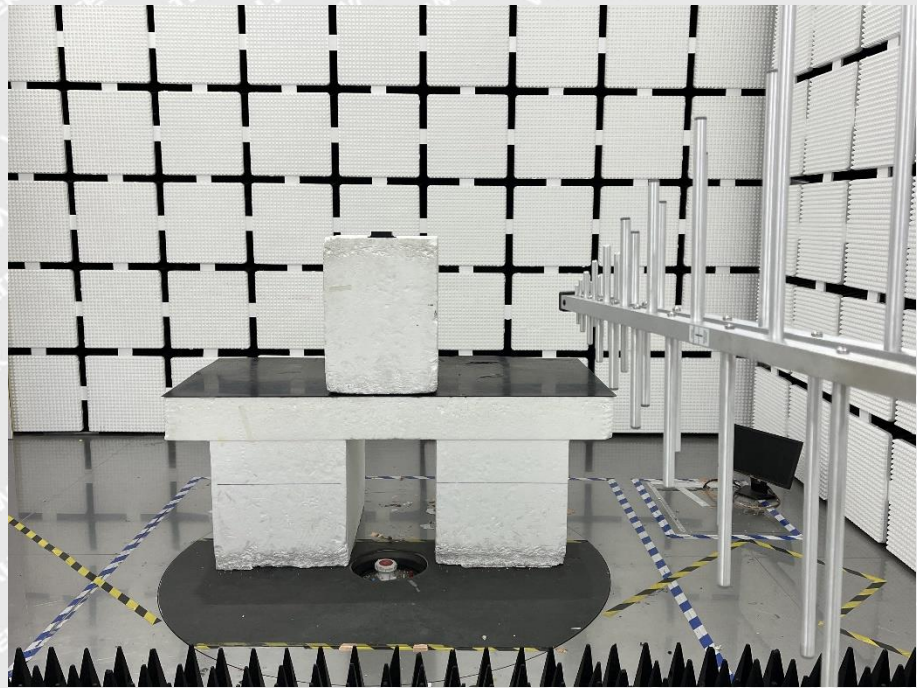
Please refer to “ANNEX”.

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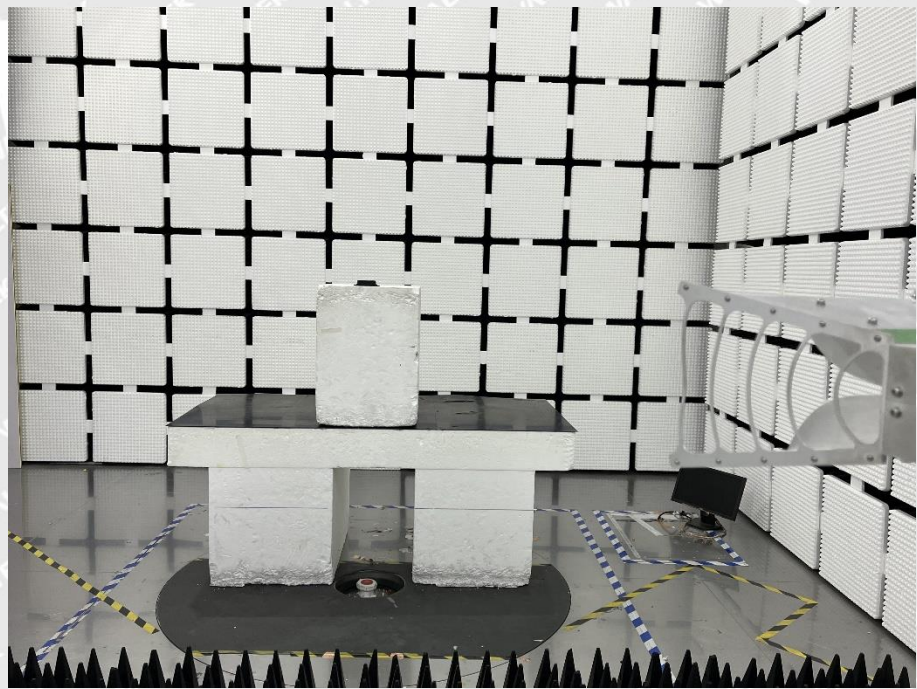


EXHIBIT 2 - Test setup photo

**Spurious Emission
Test Setup
(Below 1GHz)**



**Spurious Emission
Test Setup (Above
1GHz)**



***** END OF REPORT *****