ACCREDITED
CERTIFICATE #5473.01

Test Report No.:
FCC2023-0039-E

TEST REPORT

Applicant	:	Zhejiang Wanchao Electric Co., LTD.
Product Name	:	keyfob ECU
Mode No.	:	W0012244

CVC Testing Technology Co., Ltd.

Applicant	**Name :** Zhejiang Wanchao Electric Co., LTD. **Address :** 2898 Ouhai Avenue, Quxi Street, Ouhai District, Wenzhou City, Zhejiang Province
Manufacturer	**Name :** Zhejiang Wanchao Electric Co., LTD. **Address :** 2898 Ouhai Avenue, Quxi Street, Ouhai District, Wenzhou City, Zhejiang Province
Equipment under Test	**Product Name :** keyfob ECU **Model No. :** W0012244 **Trade mark :** — **Serial no. :** BP64365 **Sampling :** 1-1

Date of Receipt.	**2023.07.10**	Date of Testing	**2023.07.10-2023.08.25**

Test Specification	**Test Result**
FCC 47 CFR Part 15B	PASS

Evaluation of Test Result	The equipment under test was found to comply with the requirements of the standards applied. **Seal of CVC** **Issue Date: 2023.08.30**

Tested by:	Reviewed by:	Approved by:
Chen Zhengmao	Xu Zhenfei	Chen Huawen
Name Signature	Name Signature	Name Signature

Other Aspects: NONE.

Abbreviations:OK, Pass= passed Fail = failed N/A= not applicable EUT= equipment, sample(s) under tested

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1. General Product Information

1.1 General information

Product Name	keyfob ECU
Model No.	W0012244
Power Supply	DC 12V
Highest frequency of the internal sources	433.92MHz
FCC ID	2BBX5-W001244
Remark: --	

2. Test Sites

2.1 Test Facilities

The tests and measurements refer to this report were performed by EMC testing Lab. of CVC Testing Technology Co., Ltd.

Add.: No.3, Tiantaiyi Road, Kaitai Avenue, Science City, Guangzhou, 510663, P. R. China

Telephone : +86-20-32293888

Fax : +86-20-32293889

The EMC testing laboratory has been recognized by CNAS, and authorized by Nemko of Norway since 1997, and accredited by DAkkS of Germany since 2007, and assessed and found eligible to participated in the TDAP of VDE testing and certification Institute since 2004, and registered by FCC since 2001.

2.2 Description of Non-standard Method and Deviations

The testing and measurement methods used in this report are applied by all standard methods. Not any non-standard method or deviation from the used standards was used.

2.3 List of Test and Measurement Instruments

Refer to **Appendix**.

3. Test Configuration

3.1 Test Mode

The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application.

4. Summary of measurement results

Summary of measurements of results	Clause in FCC rules	Class / Severity	Verdict
Conducted Emissions	FCC 47 CFR Part 15 Section 15.107	Class B	N/A
Radiated Emissions	FCC 47 CFR Part 15 Section 15.109	Class B	PASS

5. Measurement procedure

5.1 Conducted Emission

Ambient condition:

Temperature	Relative humidity	Pressure
23°C ~25°C	50%~56%	101.5kPa

Method of Measurement:

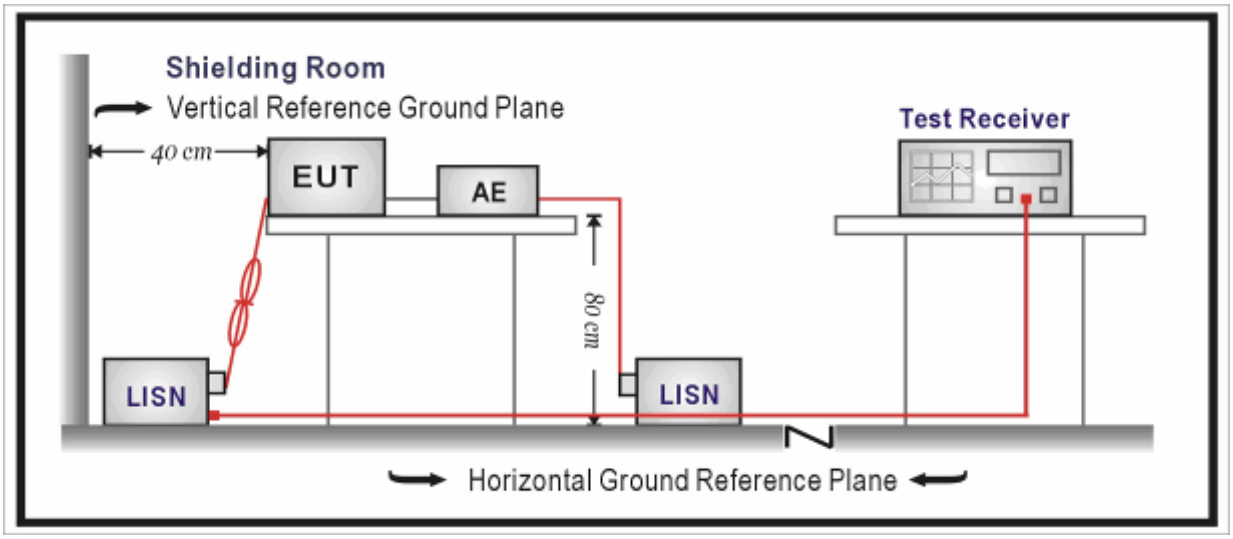
The EUT is placed on a non-metallic table of 80cm height above the horizontal metal reference ground plane. During the test, the EUT was operating in its typical mode. The test method is according to ANSI C63.4-2014. Connect the AC power line of the EUT to the L.I.S.N. Use EMI receiver to detect the average and Quasi-peak value. RBW is set to 9 kHz, VBW is set to 30kHz.The measurement result should include both L line and N line.

The test is in SOUP mode.

Limits:

Frequency (MHz)	Conducted Limits(dBμV)			
	Class B		Class A	
	Quasi-peak	Average	Quasi-peak	Average
0.15 - 0.5	66 to 56 *	56 to 46*	79	66
0.5 - 5	56	46	73	60
5 - 30	60	50	73	60
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 0.15 MHz to 0.5 MHz.				

Test Setup:



Note: AC Power source is used to change the voltage 120V/60Hz.

Measurement Uncertainty：

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor k = 1.96. U= 2.66 dB.

Test Results:

Power Line	L
Worst Case Operating Mode:	Typical working state

Conducted Emission					
Port: AC Power Line(Power line L)					
Freq. (MHz)	QP Limits (dBμV)	QP Level (dBμV)	Freq. (MHz)	AV Limits (dBμV)	AV Level (dBμV)
/	/	/	/	/	/
/	/	/	/	/	/
/	/	/	/	/	/

Power Line	N
Worst Case Operating Mode:	Typical working state

Conducted Emission					
Port: AC Power Line(Power line N)					
Freq. (MHz)	QP Limits (dBμV)	QP Level (dBμV)	Freq. (MHz)	AV Limits (dBμV)	AV Level (dBμV)
/	/	/	/	/	/
/	/	/	/	/	/
/	/	/	/	/	/

5.2 Radiated Emission

Ambient condition:

Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

Method of Measurement:

The test set-up was made in accordance to the general provisions of ANSI C63.4-2014.The Equipment Under Test (EUT) was set up on a non-conductive table in the semi-anechoic chamber. The test was performed at the distance of 3 m between the EUT and the receiving antenna. The radiated emissions measurements were made in a typical installation configuration.

Sweep the whole frequency band through the range from 9 kHz to the 10th harmonic of the carrier, and the emissions less than 20 dB below the permissible value are reported.

During the test, below 30MHz, the center of the loop shall be 1 meters; above 30MHz, the height of receive antenna shall be moved from 1 to 4 meters, and the antenna shall be performed under horizontal and vertical polarization. The turntable shall be rotated from 0 to 360 degrees for detecting the maximum of radiated spurious signal level. The measurements shall be repeated with orthogonal polarization of the test antenna. The data of cable loss and antenna factor has been calibrated in full testing frequency range before the testing.

Set the spectrum analyzer in the following:

Below 1GHz (detector: Peak and Quasi-Peak)

RBW=100kHz / VBW=300kHz / Sweep=AUTO

Above 1GHz(detector: Peak):

(a)PEAK: RBW=1MHz VBW=3MHz/ Sweep=AUTO

(b)AVERAGE: RBW=1MHz / VBW=3MHz / Sweep=AUTO

The test is in SOUP mode.

Limits for class B:

Limit in restricted band(Part 15.109)

Frequency (MHz)	Measurement Distance (m)	Field strength(uV/m)	Level (dBuV/m)
30 - 88	3	100	40
88 - 216	3	150	43.5
216 - 960	3	200	46
Above 960-1000	3	500	54
Note 1: The lower limit shall apply at the transition frequency. Note 2: Distance refers to the distance in meters between the measuring instrument Antenna and the closed point of any part of the device or system. Note 3: E field strength (dBuV/m) = 20 log E field strength (uV/m)			

Limit in radiated emission measurement (Part 15.109)

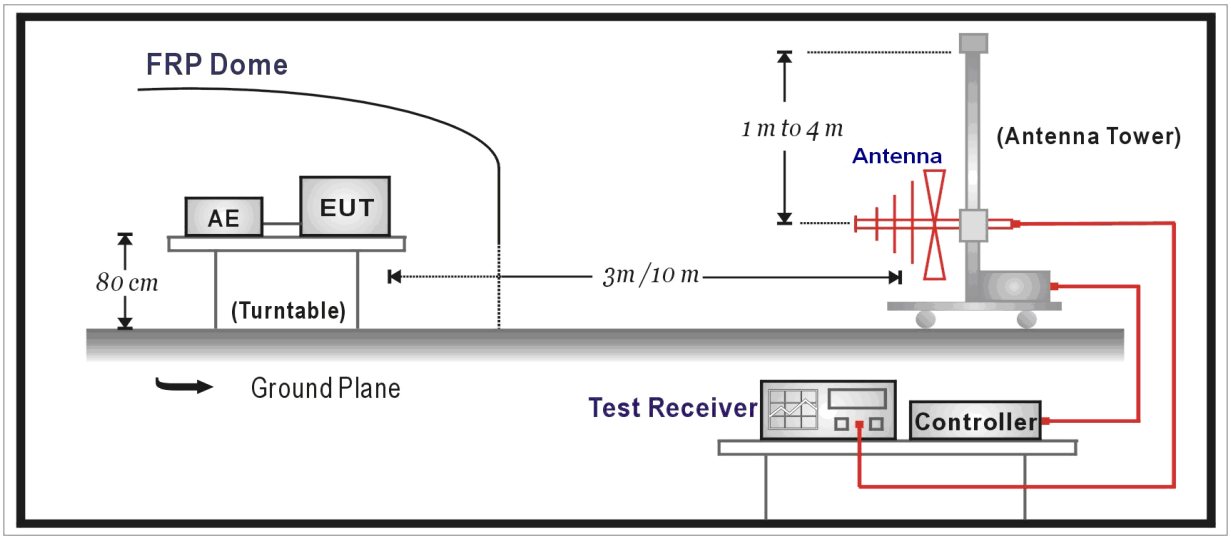
Frequency(MHz)	Field strength(dBuV/m) @3m	
Above 1000	74(peak)	54(average)

According to FCC Part 15.33(b),for an unintentional radiator, including a digital device, the spectrum shall be investigated from the lowest radio frequency signal generated or used in the device, without going below the lowest frequency for which a radiated emission limit is specified, up to the frequency shown in the following table:

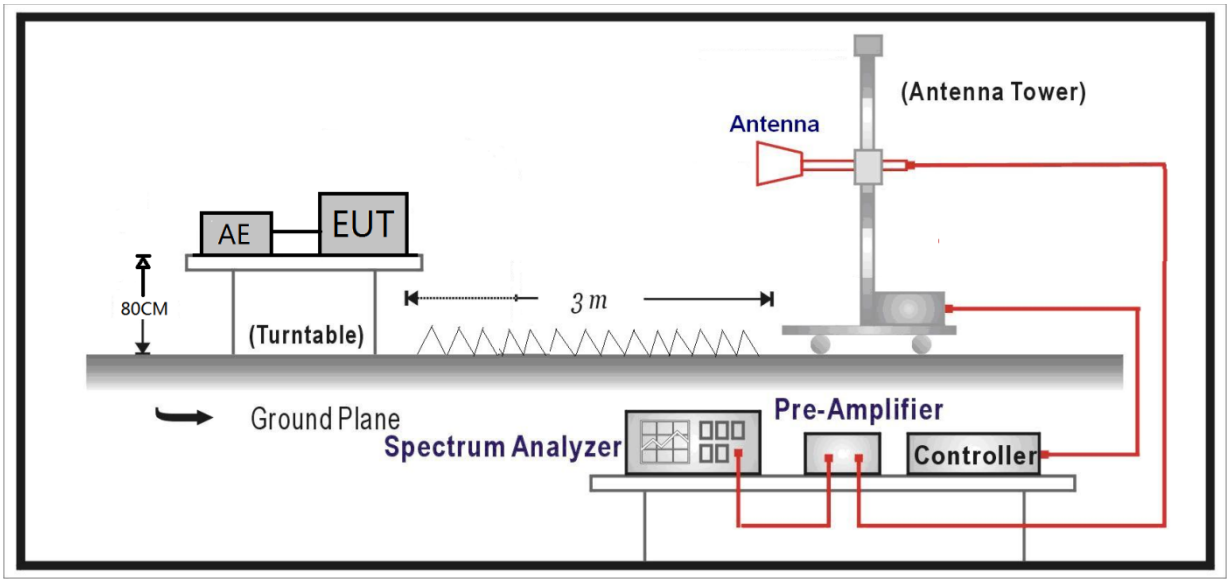
Highest frequency generated or used in the device or on which the device operates or tunes (MHz)	Upper frequency of measurement range (MHz)
Above 1.705	30
1.705 - 108	1000
108 - 500	2000
500 - 1000	5000
Above 1000	5th harmonic of the highest frequency or 40 GHz, whichever is lower.

Test Setup:

Below 1GHz Test Setup:



Above 1GHz Test Setup:



Measurement Uncertainty：

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor k = 1.96.

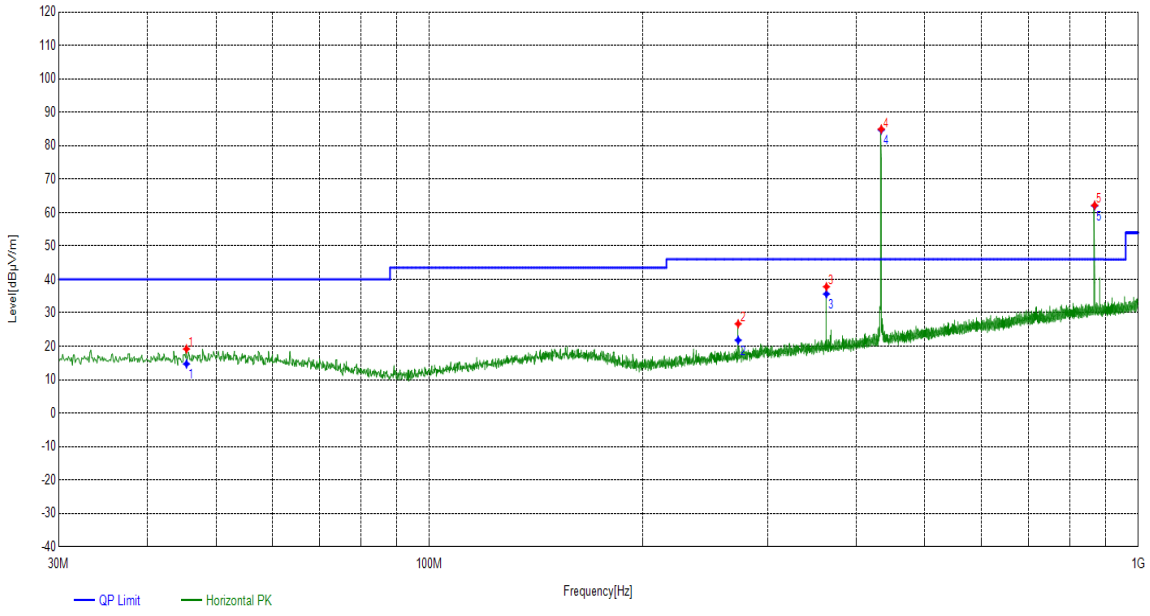
Frequency	Uncertainty
above 1G	4.84 dB
below 1G	4.10 dB

Test Results:

SPURIOUS EMISSIONS 30MHz~1GHz：

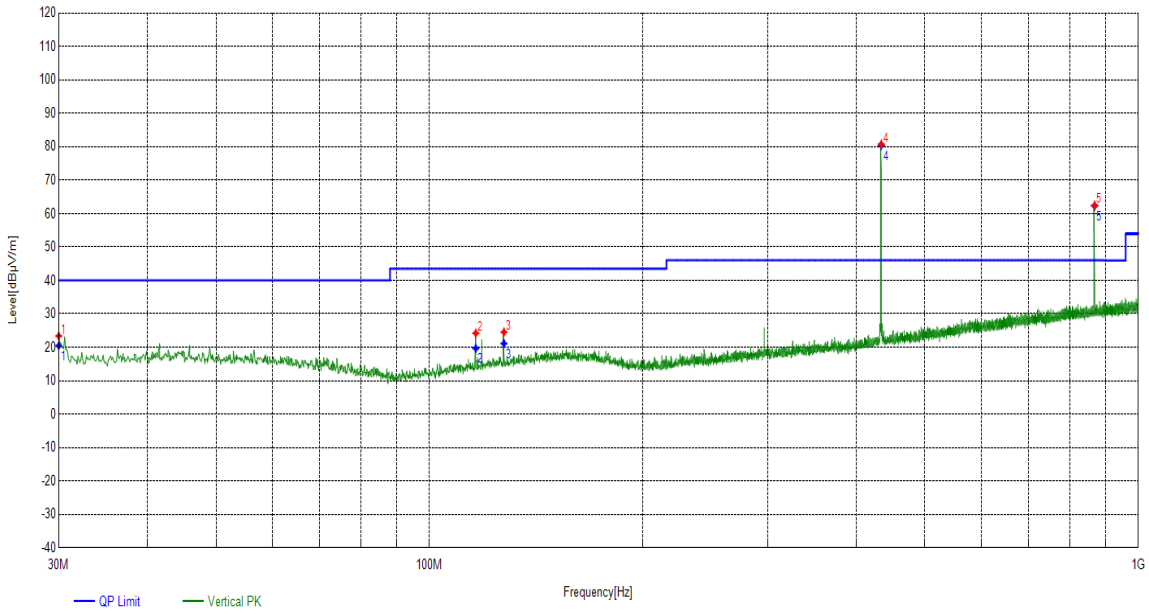
Radiated Emission	30MHz-1GHz
Polarity	Horizontal
Worst Case Operating Mode:	wireless receiving mode

Final Data List								
Frequency [MHz]	Polarity	Factor [dB]	QP Value [dBμV/m]	QP Limit [dBμV/m]	QP Margin [dB]	Height [cm]	Angle [°]	Pass/Fail
363.1313	Horizontal	23.02	35.65	46.02	10.37	140	153	PASS
45.4245	Horizontal	20.20	14.72	40.00	25.28	210	106	PASS
272.6213	Horizontal	20.31	21.82	46.02	24.20	330	337	PASS



Radiated Emission	30MHz-1GHz
Polarity	Vertical
Worst Case Operating Mode:	wireless receiving mode

Final Data List								
Frequency [MHz]	Polarity	Factor [dB]	QP Value [dBμV/m]	QP Limit [dBμV/m]	QP Margin [dB]	Height [cm]	Angle [°]	Pass/Fail
127.3977	Vertical	18.98	21.13	43.51	22.38	110	228	PASS
30. 0000	Vertical	19.08	20.43	40.00	19.57	160	69	PASS
116.2416	Vertical	18.00	19.66	43.51	23.85	390	96	PASS



Note: 1. Quasi-Peak = Reading value + Correction factor

2. Correction Factor = Antenna factor+ Insertion loss(cable loss+amplifier gain)

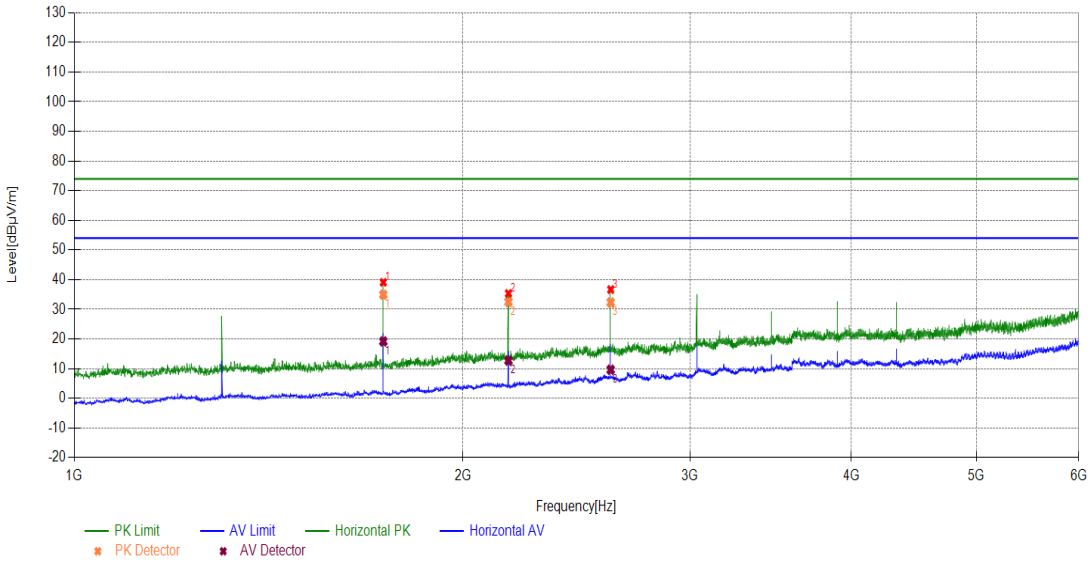
3. In the test results, the overlimit frequency (433.95MHz, 867.87MHz) is Wireless signal transmitter (AE) intentional emission frequency and spurious emission.

Test Results:

SPURIOUS EMISSIONS 1GHz~6GHz：

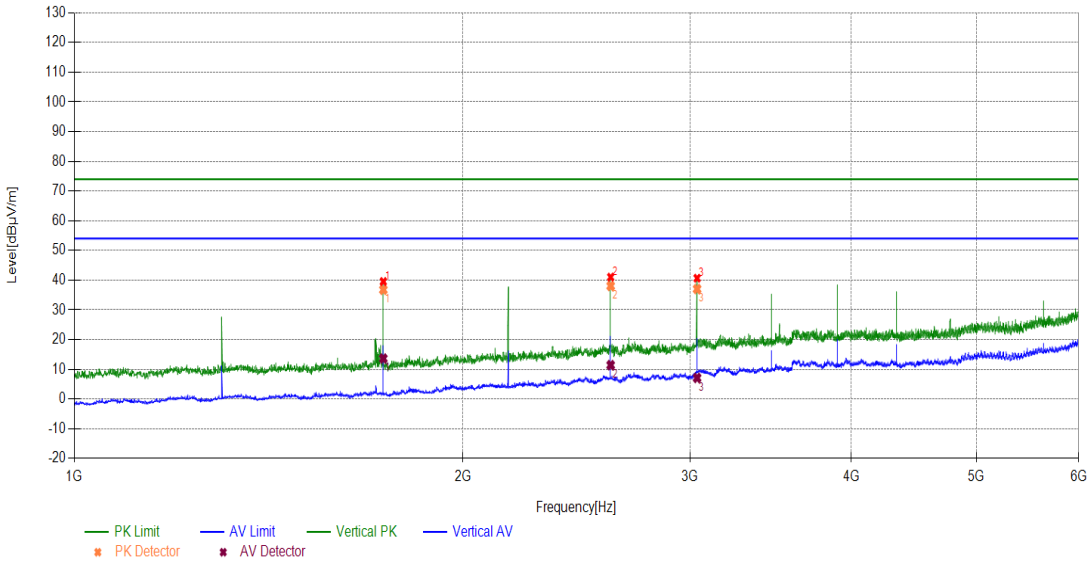
Radiated Emission	1GHz-18GHz
Polarity	Horizontal
Worst Case Operating Mode:	wireless receiving mode

Frequency [MHz]	Polarity	Factor [dB]	PK Value [dBμV/m]	PK Limit [dBμV/m]	AV Value [dBμV/m]	AV Limit [dBμV/m]	Height [cm]	Angle [°]	Pass/Fail
1735.5736	Horizontal	-7.29	34.94	74.00	19.21	54.00	100	263	PASS
2169.6170	Horizontal	-5.91	32.55	74.00	12.73	54.00	100	263	PASS
2603.6604	Horizontal	-4.56	32.34	74.00	9.66	54.00	100	157	PASS



Radiated Emission	1GHz-18GHz
Polarity	Vertical
Worst Case Operating Mode:	wireless receiving mode

Frequency [MHz]	Polarity	Factor [dB]	PK Value [dBμV/m]	PK Limit [dBμV/m]	AV Value [dBμV/m]	AV Limit [dBμV/m]	Height [cm]	Angle [°]	Pass/Fail
1735.5736	Vertical	-7.29	36.79	74.00	13.64	54.00	100	340	PASS
2603.6604	Vertical	-4.56	38.06	74.00	11.41	54.00	100	102	PASS
3037.7038	Vertical	-2.96	37.05	74.00	7.11	54.00	100	198	PASS



6. Measurement Equipment

Test Equipment	Type/Mode	Equipment No.	Manufacturer	Cal. Due
EMI Test Receiver	N9038A-508	EM-000397	Agilent	2024-02-22
EMI Test Receiver	ESR7	VGDY-0956	R&S	2024-02-22
Broadband Antenna(5m)	VULB 9168	EM-000736-1	SCHWARZBECK	2024-04-24
Waveguide Horn Antenna	HF906	WKNA-0024-8	R&S	2024-02-24
Semi-Anechoic Chamber(3m)	FACT-4	WKNA-0024	ETS	2024-12-11
Semi-Anechoic Chamber(5m)	SAC-5	EM-000557	COMTEST	2024-11-01

Description Of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Description	Brand	Model No.	FCC ID	Serial Number	Supplied by
keyfob	/	W0012203	2BBX5-W0012203	BP64365	Applicant

The End