

FCC REPORT

Applicant: AZTECH TECHNOLOGIES PTE LTD
Address of Applicant: 31 Ubi Road 1, #01-05, Singapore 408694
Equipment Under Test (EUT)
Product Name: Zigbee Door and Window Sensor
Model No.: KSEN-220-ZB
Trade mark: KylaS
FCC ID: I38DOORSENSOR
Applicable standards: FCC CFR Title 47 Part 15 Subpart B
Date of sample receipt: 17 Jan., 2019
Date of Test: 17 Jan., to 13 Feb., 2019
Date of report issued: 19 Feb., 2019
Test Result: PASS *

* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:



Bruce Zhang
Laboratory Manager

This report details the results of the testing carried out on one sample. The results contained in this test report do not relate to other samples of the same product and does not permit the use of the CCIS product certification mark. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

This report may only be reproduced and distributed in full. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards.

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2 Version

Version No.	Date	Description
00	19 Feb., 2019	Original

Tested by:



Test Engineer

Date:

19 Feb., 2019

Reviewed by:



Project Engineer

Date:

19 Feb., 2019

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4 Test Summary

Test Item	Section in CFR 47	Result
Conducted Emission	Part 15.107	N/A
Radiated Emission	Part 15.109	Pass

Remark:
Pass: The EUT complies with the essential requirements in the standard.
N/A: The EUT not applicable of the test item.

5 General Information

5.1 Client Information

Applicant:	AZTECH TECHNOLOGIES PTE LTD
Address:	31 Ubi Road 1, #01-05, Singapore 408694
Manufacturer:	AZTECH TECHNOLOGIES PTE LTD
Address:	31 Ubi Road 1, #01-05, Singapore 408694
Factory:	Aztech Communication Device (DG) LTD
Address:	Jiu Jiang Shui Village, Chang Ping Town, Dong Guan City, Guang Dong Province, China.

5.2 General Description of E.U.T.

Product Name:	Zigbee Door and Window Sensor
Model No.:	KSEN-220-ZB
Power supply:	DC 3.0V (CR2032 battery)
Test Sample Condition:	The test samples were provided in good working order with no visible defects.

5.3 Test Mode

Operating mode	Detail description
On mode	Keep the EUT in On mode
<p>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.</p>	

5.4 Measurement Uncertainty

Parameters	Expanded Uncertainty
Conducted Emission (9kHz ~ 30MHz)	±2.22 dB (k=2)
Radiated Emission (9kHz ~ 30MHz)	±2.76 dB (k=2)
Radiated Emission (30MHz ~ 1000MHz)	±4.28 dB (k=2)
Radiated Emission (1GHz ~ 18GHz)	±5.72 dB (k=2)
Radiated Emission (18GHz ~ 40GHz)	±2.88 dB (k=2)

5.5 Related Submittal(s) / Grant (s)

This is an original grant, no related submittals and grants.

5.6 Laboratory Facility

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

- **FCC - Registration No.: 727551**

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

- **IC - Registration No.: 10106A-1**

The 3m Semi-anechoic chamber of Shenzhen Zhongjian Nanfang Testing 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 L6048**

Shenzhen Zhongjian Nanfang Testing Co., Ltd. is accredited to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration laboratories for the competence of testing. The Registration No. is CNAS L6048.

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

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005 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>

5.7 Laboratory Location

Shenzhen Zhongjian Nanfang Testing Co., Ltd.
 Address: No. B-C, 1/F., Building 2, Laodong No.2 Industrial Park, Xixiang Road,
 Bao'an District, Shenzhen, Guangdong, China
 Tel: +86-755-23118282, Fax: +86-755-23116366
 Email: info@ccis-cb.com, Website: http://www.ccis-cb.com

5.8 Test Instruments list

Radiated Emission:					
Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date (mm-dd-yy)	Cal. Due date (mm-dd-yy)
3m SAC	SAEMC	9m*6m*6m	966	07-22-2017	07-21-2020
Loop Antenna	SCHWARZBECK	FMZB1519B	00044	03-16-2018	03-15-2019
BiConiLog Antenna	SCHWARZBECK	VULB9163	497	03-16-2018	03-15-2019
Horn Antenna	SCHWARZBECK	BBHA9120D	916	03-16-2018	03-15-2019
Horn Antenna	SCHWARZBECK	BBHA9120D	1805	06-22-2017	06-21-2020
Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170582	11-21-2018	11-20-2019
EMI Test Software	AUDIX	E3	Version: 6.110919b		
Pre-amplifier	HP	8447D	2944A09358	03-07-2018	03-06-2019
Pre-amplifier	CD	PAP-1G18	11804	03-07-2018	03-06-2019
Spectrum analyzer	Rohde & Schwarz	FSP30	101454	03-07-2018	03-06-2019
Spectrum analyzer	Rohde & Schwarz	FSP40	100363	11-21-2018	11-20-2019
EMI Test Receiver	Rohde & Schwarz	ESRP7	101070	03-07-2018	03-06-2019
Cable	ZDECL	Z108-NJ-NJ-81	1608458	03-07-2018	03-06-2019
Cable	MICRO-COAX	MFR64639	K10742-5	03-07-2018	03-06-2019
Cable	SUHNER	SUCOFLEX100	58193/4PE	03-07-2018	03-06-2019

Conducted Emission:					
Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date (mm-dd-yy)	Cal. Due date (mm-dd-yy)
EMI Test Receiver	Rohde & Schwarz	ESCI	101189	03-07-2018	03-06-2019
Pulse Limiter	SCHWARZBECK	OSRAM 2306	9731	03-07-2018	03-06-2019
LISN	CHASE	MN2050D	1447	03-19-2018	03-18-2019
LISN	Rohde & Schwarz	ESH3-Z5	8438621/010	07-21-2018	07-20-2019
Cable	HP	10503A	N/A	03-07-2018	03-06-2019
EMI Test Software	AUDIX	E3	Version: 6.110919b		

6 Test results and Measurement Data

6.1 Radiated Emission

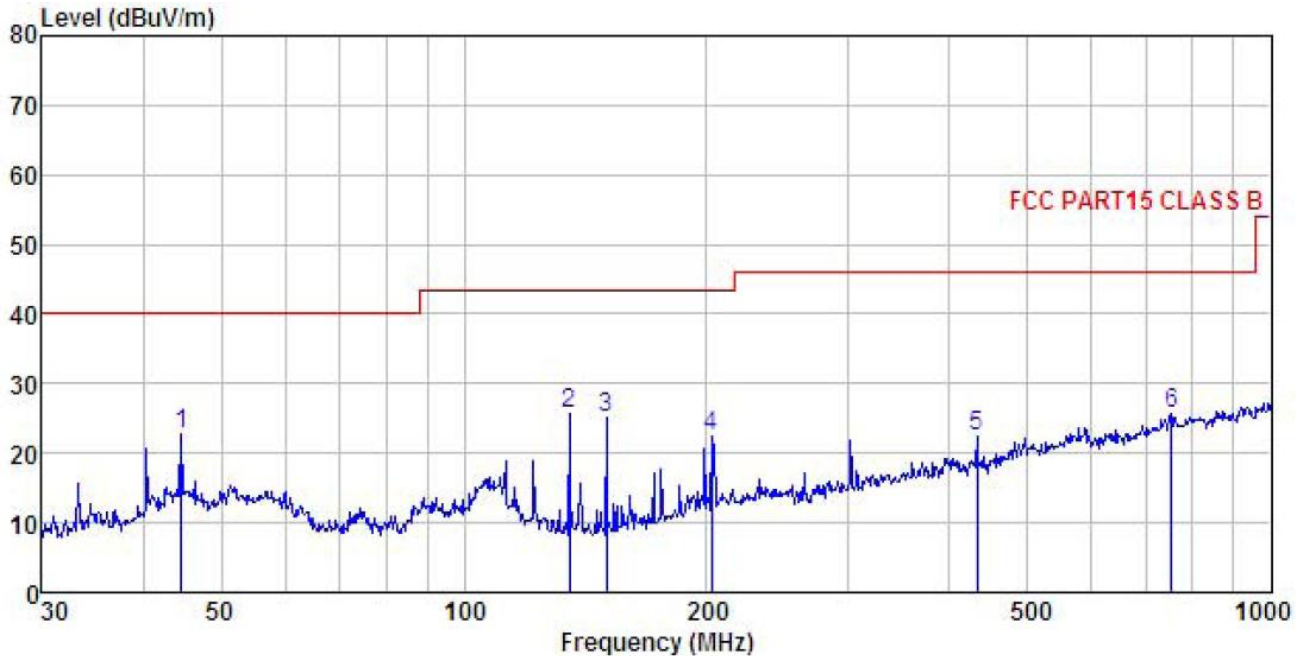
Test Requirement:	FCC Part 15 B Section 15.109				
Test Method:	ANSI C63.4:2014				
Test Frequency Range:	30MHz to 6000MHz				
Test site:	Measurement Distance: 3m (Semi-Anechoic Chamber)				
Receiver setup:	Frequency	Detector	RBW	VBW	Remark
	30MHz-1GHz	Quasi-peak	120kHz	300kHz	Quasi-peak Value
	Above 1GHz	Peak	1MHz	3MHz	Peak Value
RMS		1MHz	3MHz	Average Value	
Limit:	Frequency	Limit (dBuV/m @3m)			Remark
	30MHz-88MHz	40.0			Quasi-peak Value
	88MHz-216MHz	43.5			Quasi-peak Value
	216MHz-960MHz	46.0			Quasi-peak Value
	960MHz-1GHz	54.0			Quasi-peak Value
Above 1GHz	54.0			Average Value	
	74.0			Peak Value	
Test setup:	Below 1GHz				
Test setup:	Above 1GHz				

<p>Test Procedure:</p>	<ol style="list-style-type: none"> 1. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. 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 rotatable 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. 						
<p>Test environment:</p>	<table border="1"> <tr> <td>Temp.:</td> <td>24 °C</td> <td>Humid.:</td> <td>57%</td> <td>Press.:</td> <td>1 01kPa</td> </tr> </table>	Temp.:	24 °C	Humid.:	57%	Press.:	1 01kPa
Temp.:	24 °C	Humid.:	57%	Press.:	1 01kPa		
<p>Test Instruments:</p>	<p>Refer to section 5.9 for details</p>						
<p>Test mode:</p>	<p>Refer to section 5.3 for details</p>						
<p>Test results:</p>	<p>Passed</p>						
<p>Remark:</p>	<p>All of the observed value above 6GHz were the noise floor , which were no recorded</p>						

Measurement Data:

Below 1GHz:

Product Name:	Zigbee Door and Window Sensor	Product Model:	KSEN-220-ZB
Test By:	Caffrey	Test mode:	On mode
Test Frequency:	30 MHz ~ 1 GHz	Polarization:	Vertical
Test Voltage:	DC 3.0V	Environment:	Temp: 24°C Humi: 57%

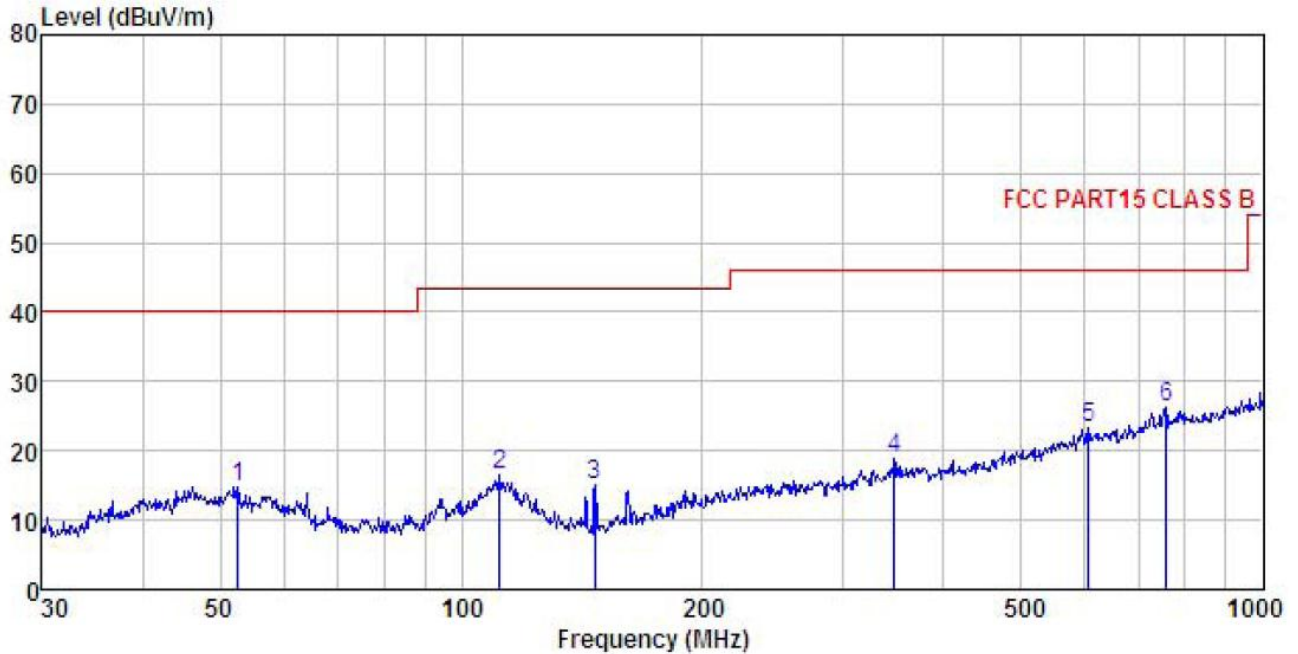


	ReadAntenna	Cable Preamp	Limit	Over					
Freq	Level	Factor	Loss	Factor	Level				
MHz	dBuV	dB/m	dB	dB	dBuV/m				
1	44.587	37.77	13.63	1.28	29.86	22.82	40.00	-17.18	QP
2	135.032	44.34	8.39	2.34	29.30	25.77	43.50	-17.73	QP
3	150.011	43.15	8.60	2.52	29.22	25.05	43.50	-18.45	QP
4	202.810	36.88	11.61	2.87	28.81	22.55	43.50	-20.95	QP
5	432.546	32.26	15.90	3.16	28.84	22.48	46.00	-23.52	QP
6	752.743	28.74	21.00	4.36	28.46	25.64	46.00	-20.36	QP

Remark:

- Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamp Factor.
- The emission levels of other frequencies are very lower than the limit and not show in test report.

Product Name:	Zigbee Door and Window Sensor	Product Model:	KSEN-220-ZB
Test By:	Caffrey	Test mode:	On mode
Test Frequency:	30 MHz ~ 1 GHz	Polarization:	Horizontal
Test Voltage:	DC 3.0V	Environment:	Temp: 24°C Huni: 57%



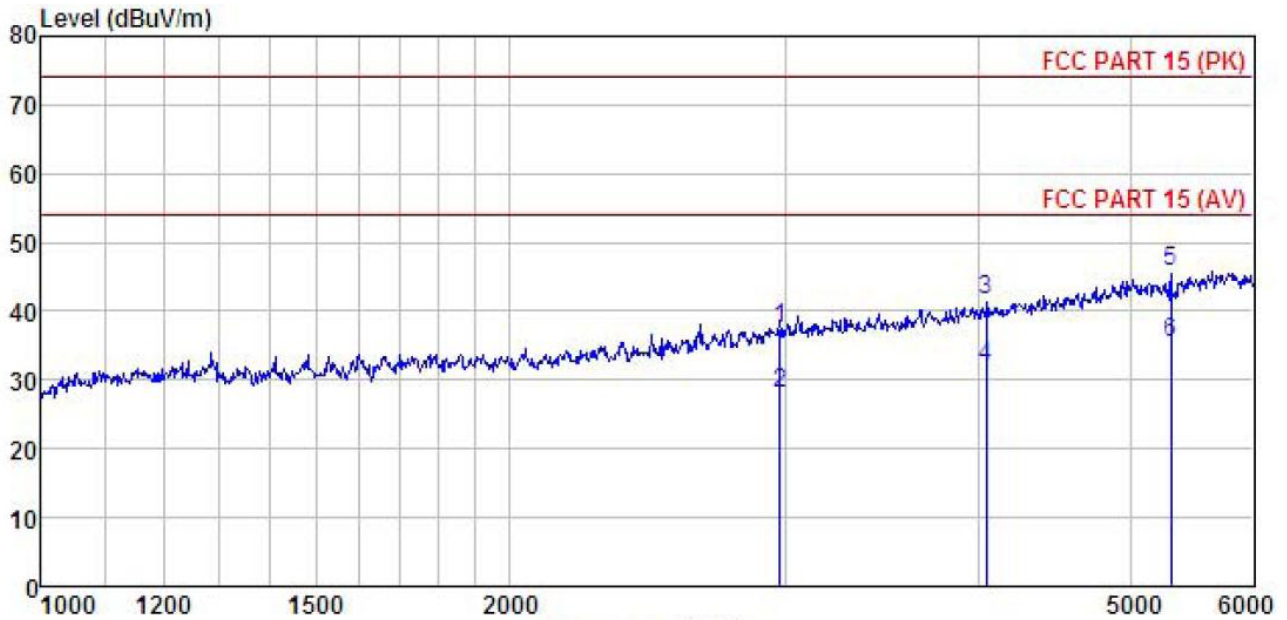
	ReadAntenna	Cable Preamp	Limit	Over				
Freq	Level	Loss	Line	Limit	Remark			
MHz	dBuV	dB/m	dB	dB				
1	29.78	13.63	1.29	29.81	14.89	40.00	-25.11	QP
2	31.92	11.92	2.08	29.44	16.48	43.50	-27.02	QP
3	33.32	8.45	2.47	29.24	15.00	43.50	-28.50	QP
4	29.81	14.54	3.09	28.55	18.89	46.00	-27.11	QP
5	29.01	19.27	3.93	28.92	23.29	46.00	-22.71	QP
6	29.20	21.00	4.36	28.43	26.13	46.00	-19.87	QP

Remark:

- Final Level = Receiver Read level + Antenna Factor + Cable Loss – Pre-amplifier Factor.
- The emission levels of other frequencies are very lower than the limit and not show in test report.

Above 1GHz:

Product Name:	Zigbee Door and Window Sensor	Product Model:	KSEN-220-ZB
Test By:	Caffrey	Test mode:	On mode
Test Frequency:	1 GHz ~ 6 GHz	Polarization:	Vertical
Test Voltage:	DC 3.0V	Environment:	Temp: 24°C Humi: 57%

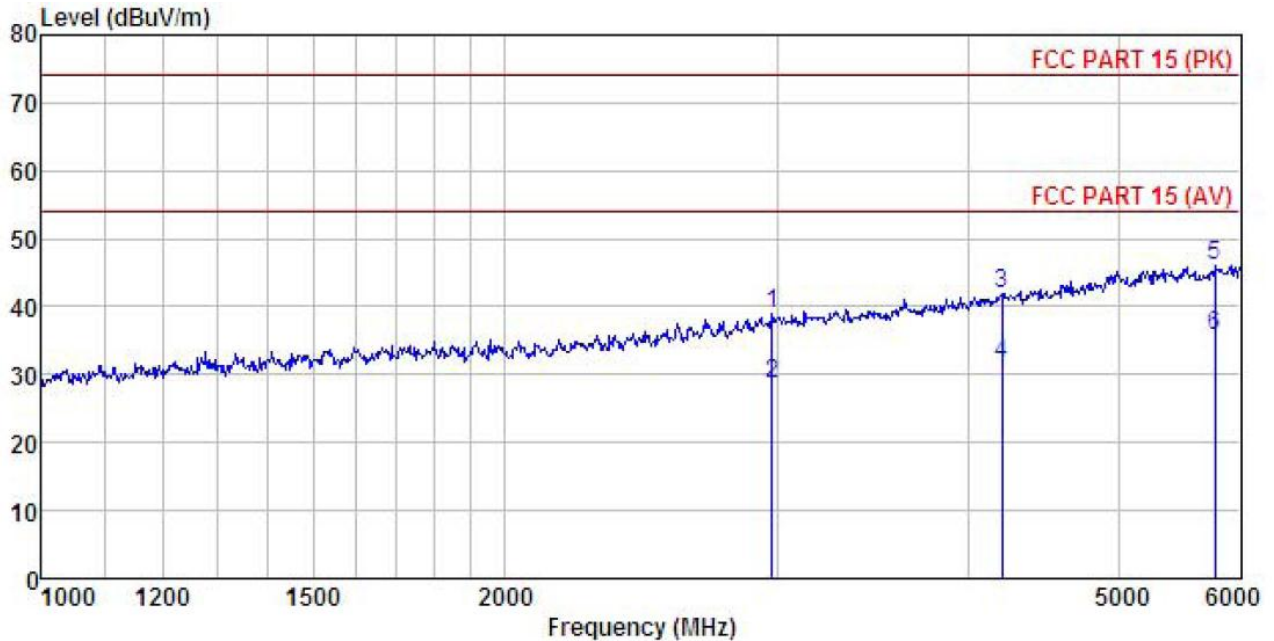


	Freq	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2977.790	45.27	28.56	5.33	41.52	37.64	74.00	-36.36	Peak
2	2977.790	35.78	28.56	5.33	41.52	28.15	54.00	-25.85	Average
3	4038.126	47.09	30.27	6.16	41.81	41.71	74.00	-32.29	Peak
4	4038.126	37.31	30.27	6.16	41.81	31.93	54.00	-22.07	Average
5	5311.742	48.38	32.22	7.10	41.90	45.80	74.00	-28.20	Peak
6	5311.742	38.13	32.22	7.10	41.90	35.55	54.00	-18.45	Average

Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Pre-amplifier Factor.
2. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product Name:	Zigbee Door and Window Sensor	Product Model:	KSEN-220-ZB
Test By:	Caffrey	Test mode:	On mode
Test Frequency:	1 GHz ~ 6 GHz	Polarization:	Horizontal
Test Voltage:	DC 3.0V	Environment:	Temp: 24°C Huni: 57%



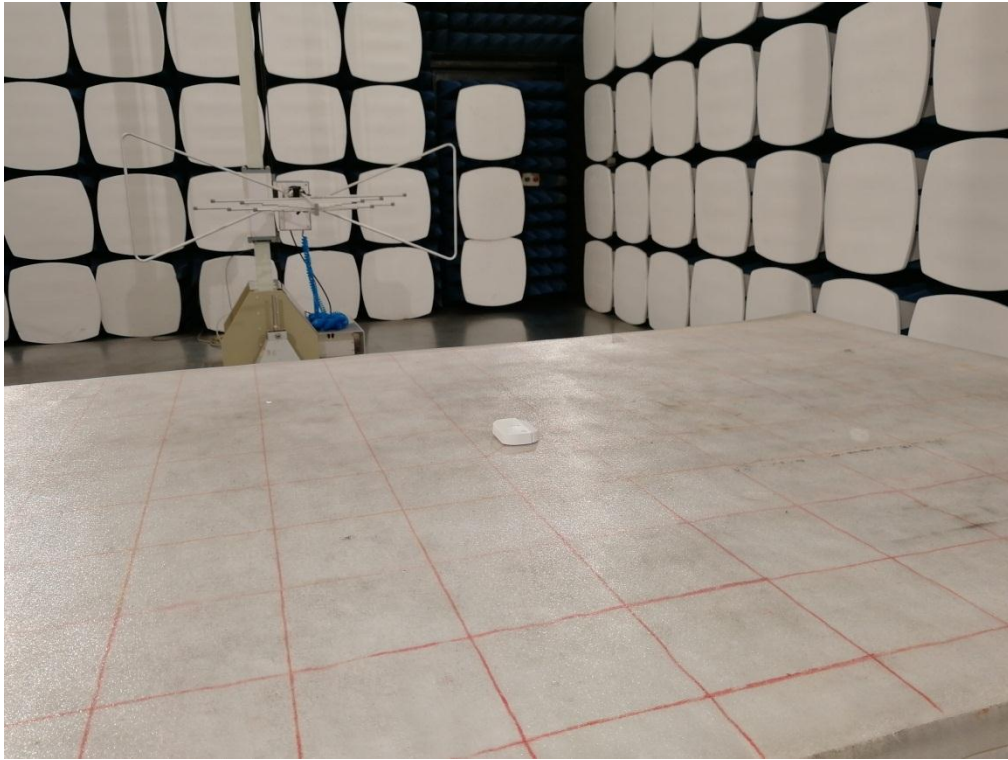
	Read Freq	Antenna Level	Cable Factor	Preamp Loss	Preamp Factor	Limit Level	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB
1	2977.790	46.51	28.56	5.33	41.52	38.88	74.00	-35.12 Peak
2	2977.790	36.12	28.56	5.33	41.52	28.49	54.00	-25.51 Average
3	4200.482	46.85	30.57	6.41	41.81	42.02	74.00	-31.98 Peak
4	4200.482	36.50	30.57	6.41	41.81	31.67	54.00	-22.33 Average
5	5778.433	47.18	32.91	7.84	42.00	45.93	74.00	-28.07 Peak
6	5778.433	37.07	32.91	7.84	42.00	35.82	54.00	-18.18 Average

Remark:

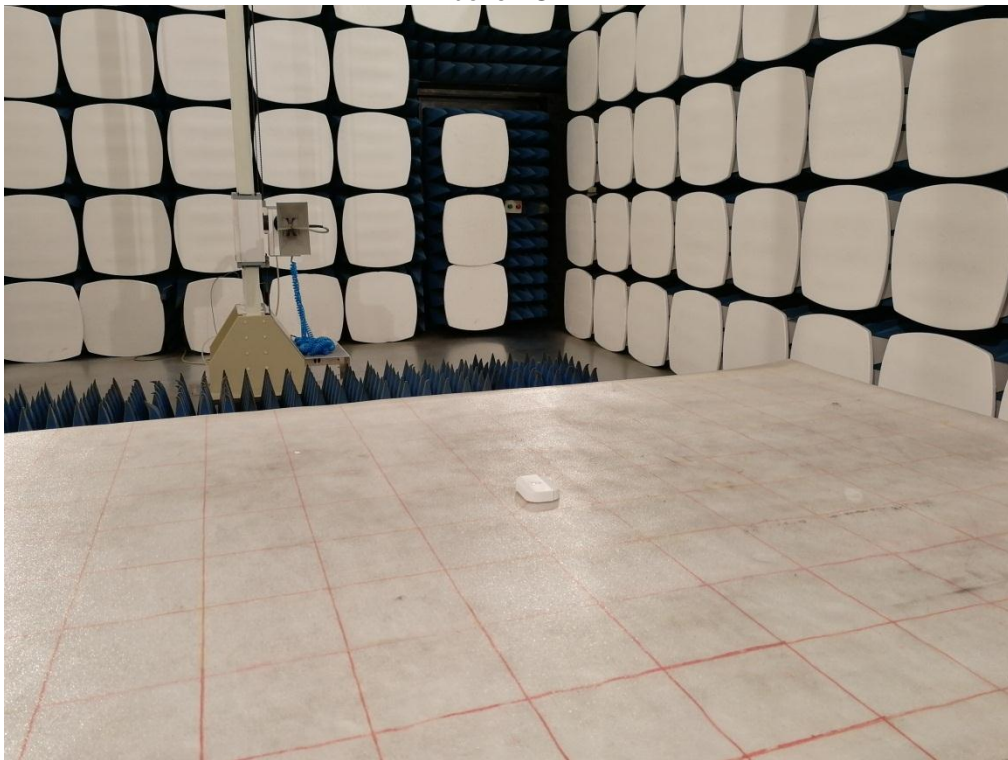
1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Pre-amplifier Factor.
2. The emission levels of other frequencies are very lower than the limit and not show in test report.

7 Test Setup Photo

Radiated Emission
Below 1GHz



Above 1GHz



8 EUT Constructional Details

Reference to the test report No.: CCISE190105201

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