FCC REPORT

Applicant:	Bitwave Pte Ltd
Address of Applicant:	11 Serangoon North Ave 5, #05-03, Singapore 554809

Equipment Under Test (EUT)

Product Name:	Bluetooth Helmet Communicator
Model No.:	EXO-COM
Trade mark:	UClear Digital
FCC ID:	NMC-XCOM
Applicable standards:	FCC CFR Title 47 Part 15 Subpart B
Date of sample receipt:	19 Aug., 2020
Date of Test:	20 Aug., to 17 Sep., 2020
Date of report issued:	18 Sep., 2020
Test Result:	PASS *

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

Authorized Signature:

Bruce Zhang
Laboratory Manager

2 Version

Version No.	Date	Description
00	*18 Sep., 2020*	*Original*

Tested by: Yaro Wu ***Date:*** *18 Sep., 2020*

Test Engineer

Reviewed by: Winner Zhang ***Date:*** *18 Sep., 2020*

Project Engineer

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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:

1. Pass: The EUT complies with the essential requirements in the standard.

2. N/A: The EUT not applicable of the test item.

Test Method:	*ANSI C63.4:2014*

5 General Information

5.1 Client Information

Applicant:	Bitwave Pte Ltd
Address:	11 Serangoon North Ave 5, #05-03, Singapore 554809
Manufacturer/ Factory:	Bitwave Pte Ltd
Address:	11 Serangoon North Ave 5, #05-03, Singapore 554809

5.2 General Description of E.U.T.

Product Name:	Bluetooth Helmet Communicator
Model No.:	EXO-COM
Power supply:	Rechargeable Li-ion Battery DC3.7V, 700mAh
Test Sample Condition:	The test samples were provided in good working order with no visible defects.

5.3 Test Mode and test samples plans

Operating mode	Detail description
On mode	Keep the EUT in On 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.	

5.4 Measurement Uncertainty

Parameters	Expanded Uncertainty
Conducted Emission (9kHz ~ 30MHz)	±1.60 dB (k=2)
Radiated Emission (9kHz ~ 30MHz)	±3.12 dB (k=2)
Radiated Emission (30MHz ~ 1000MHz)	±4.32 dB (k=2)
Radiated Emission (1GHz ~ 18GHz)	±5.16 dB (k=2)
Radiated Emission (18GHz ~ 40GHz)	±3.20 dB (k=2)

5.5 Description of Support Units

N/A

5.6 Related Submittal(s) / Grant (s)

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

5.7 Description of Cable Used

N/A

5.8 Additions to, deviations, or exclusions from the method

No

5.9 Laboratory Facility

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

- **FCC - Designation No.: CN1211**

Shenzhen Zhongjian Nanfang Testing 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 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.

- **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

5.10 Laboratory Location

Shenzhen Zhongjian Nanfang Testing Co., Ltd.
Address: No.110~116, Building B, Jinyuan Business Building, 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

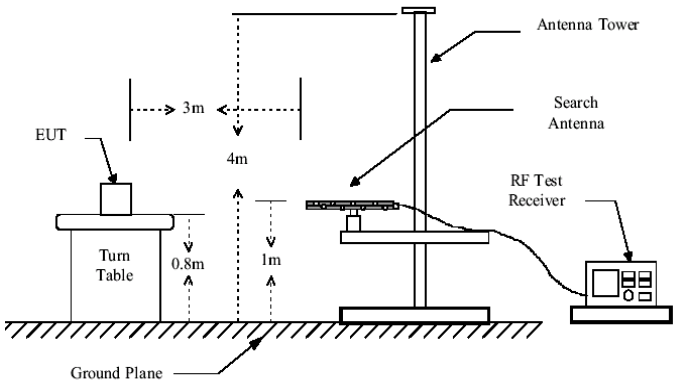
5.11 Test Instruments list

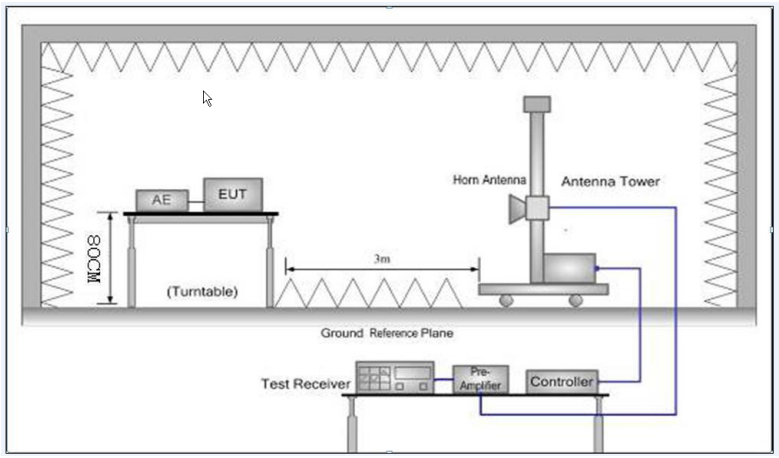
Radiated Emission:					
Test Equipment	**Manufacturer**	**Model No.**	**Serial No.**	**Cal. Date (mm-dd-yy)**	**Cal. Due date (mm-dd-yy)**
3m SAC	SAEMC	9m*6m*6m	966	07-22-2017	07-21-2020
				07-22-2020	07-21-2021
Loop Antenna	SCHWARZBECK	FMZB1519B	00044	03-07-2020	03-06-2021
BiConiLog Antenna	SCHWARZBECK	VULB9163	497	03-07-2020	03-06-2021
Horn Antenna	SCHWARZBECK	BBHA9120D	916	03-07-2020	03-06-2021
Horn Antenna	SCHWARZBECK	BBHA9120D	1805	06-22-2017	06-21-2020
				06-22-2020	06-21-2021
Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170582	11-18-2019	11-17-2020
EMI Test Software	AUDIX	E3	Version: 6.110919b		
Pre-amplifier	HP	8447D	2944A09358	03-07-2020	03-06-2021
Pre-amplifier	CD	PAP-1G18	11804	03-07-2020	03-06-2021
Spectrum analyzer	Rohde & Schwarz	FSP30	101454	03-05-2020	03-04-2021
Spectrum analyzer	Rohde & Schwarz	FSP40	100363	11-18-2019	11-17-2020
EMI Test Receiver	Rohde & Schwarz	ESRP7	101070	03-05-2020	03-04-2021
Cable	ZDECL	Z108-NJ-NJ-81	1608458	03-07-2020	03-06-2021
Cable	MICRO-COAX	MFR64639	K10742-5	03-07-2020	03-06-2021
Cable	SUHNER	SUCOFLEX100	58193/4PE	03-07-2020	03-06-2021

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	03-05-2020	03-04-2021
Pulse Limiter	SCHWARZBECK	OSRAM 2306	9731	03-05-2020	03-04-2021
LISN	CHASE	MN2050D	1447	03-05-2020	03-04-2021
LISN	Rohde & Schwarz	ESH3-Z5	8438621/010	07-21-2017	07-20-2020
				07-21-2020	07-20-2021
Cable	HP	10503A	N/A	03-05-2020	03-04-2021
EMI Test Software	AUDIX	E3	Version: 6.110919b		

6 Test results and Measurement Data

6.1 Radiated Emission

<table>
<tr><td>Test Requirement:</td><td colspan="5">FCC Part 15 B Section 15.109</td></tr>
<tr><td>Test Frequency Range:</td><td colspan="5">30MHz to 6000MHz</td></tr>
<tr><td>Test site:</td><td colspan="5">Measurement Distance: 3m (Semi-Anechoic Chamber)</td></tr>
<tr><td rowspan="4">Receiver setup:</td><td>Frequency</td><td>Detector</td><td>RBW</td><td>VBW</td><td>Remark</td></tr>
<tr><td>30MHz-1GHz</td><td>Quasi-peak</td><td>120kHz</td><td>300kHz</td><td>Quasi-peak Value</td></tr>
<tr><td rowspan="2">Above 1GHz</td><td>Peak</td><td>1MHz</td><td>3MHz</td><td>Peak Value</td></tr>
<tr><td>RMS</td><td>1MHz</td><td>3MHz</td><td>Average Value</td></tr>
<tr><td rowspan="7">Limit:</td><td colspan="2">Frequency</td><td colspan="2">Limit (dBuV/m @3m)</td><td>Remark</td></tr>
<tr><td colspan="2">30MHz-88MHz</td><td colspan="2">40.0</td><td>Quasi-peak Value</td></tr>
<tr><td colspan="2">88MHz-216MHz</td><td colspan="2">43.5</td><td>Quasi-peak Value</td></tr>
<tr><td colspan="2">216MHz-960MHz</td><td colspan="2">46.0</td><td>Quasi-peak Value</td></tr>
<tr><td colspan="2">960MHz-1GHz</td><td colspan="2">54.0</td><td>Quasi-peak Value</td></tr>
<tr><td colspan="2" rowspan="2">Above 1GHz</td><td colspan="2">54.0</td><td>Average Value</td></tr>
<tr><td colspan="2">74.0</td><td>Peak Value</td></tr>
<tr><td>Test setup:</td><td colspan="5">Below 1GHz
 

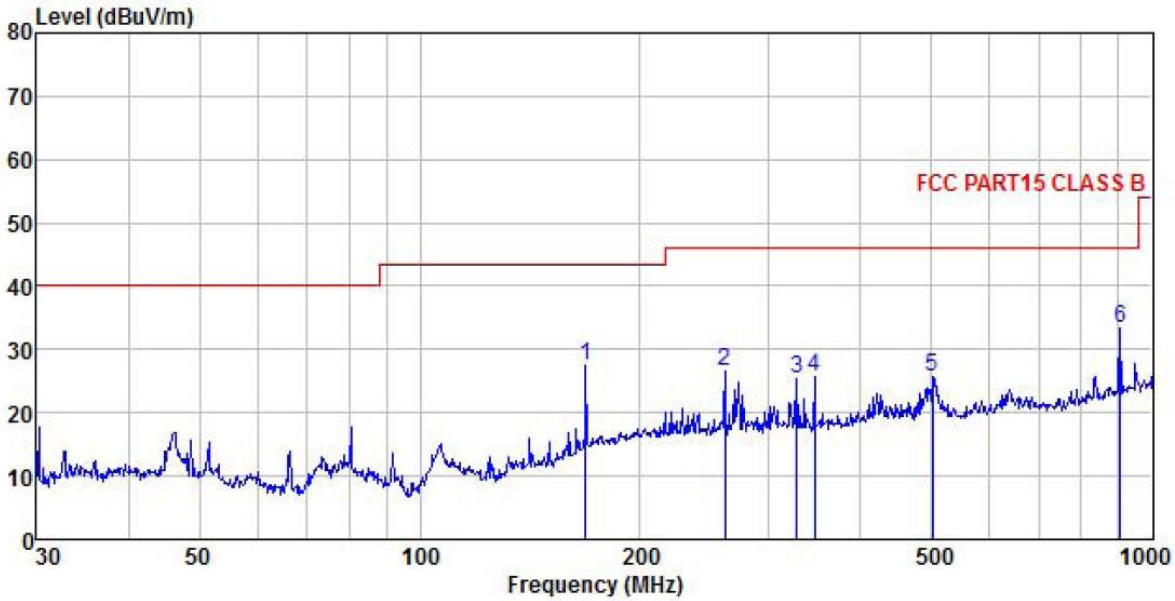
Above 1GHz
 
</td></tr>
<tr><td>Test Procedure:</td><td colspan="5">1. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation.
2. The EUT was set 3 meters away 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</td></tr>
</table>

	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.
Test Instruments:	Refer to section 5.11 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed
Remark:	All of the observed value above 6GHz ware the niose floor , which were no recorded

Measurement Data:

Below 1GHz:

Product Name:	Bluetooth Helmet Communicator	**Product Model:**	EXO-COM
Test By:	Yaro	**Test mode:**	On mode
Test Frequency:	30 MHz ~ 1 GHz	**Polarization:**	Vertical
Test Voltage:	AC 120/60Hz	**Environment:**	Temp: 24℃ Huni: 57%

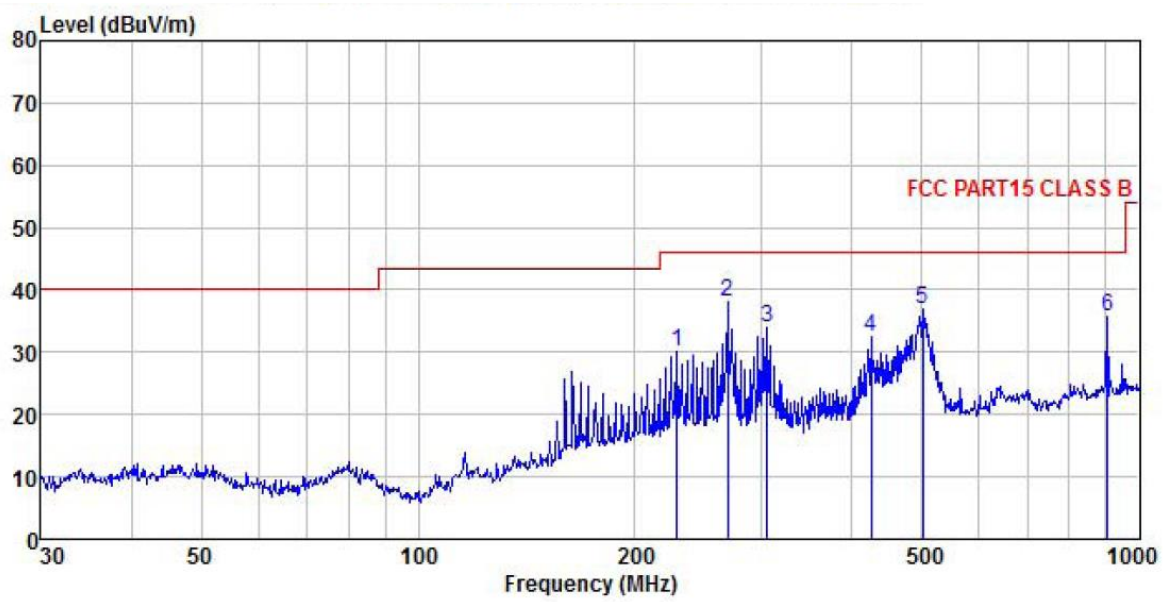


	Freq	Read Level	Antenna Factor	Cable Loss	Aux Factor	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dB	dBuV/m	dBuV/m	dB	
1	168.414	39.77	16.20	0.65	0.00	29.06	27.56	43.50	-15.94	QP
2	261.058	35.67	18.55	0.80	0.00	28.52	26.50	46.00	-19.50	QP
3	326.740	34.29	18.75	0.90	0.00	28.51	25.43	46.00	-20.57	QP
4	345.595	34.58	18.79	0.92	0.00	28.55	25.74	46.00	-20.26	QP
5	501.179	34.05	19.41	1.10	0.00	28.96	25.60	46.00	-20.40	QP
6	903.309	37.12	22.61	1.49	0.00	27.87	33.35	46.00	-12.65	QP

Remark:

1. *Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor.*
2. *The emission levels of other frequencies are very lower than the limit and not show in test report.*
3. *The Aux Factor is a notch filter switch box loss, this item is not used.*

Product Name:	Bluetooth Helmet Communicator	Product Model:	EXO-COM
Test By:	Yaro	Test mode:	On mode
Test Frequency:	30 MHz ~ 1 GHz	Polarization:	Horizontal
Test Voltage:	AC 120/60Hz	Environment:	Temp: 24℃ Huni: 57%



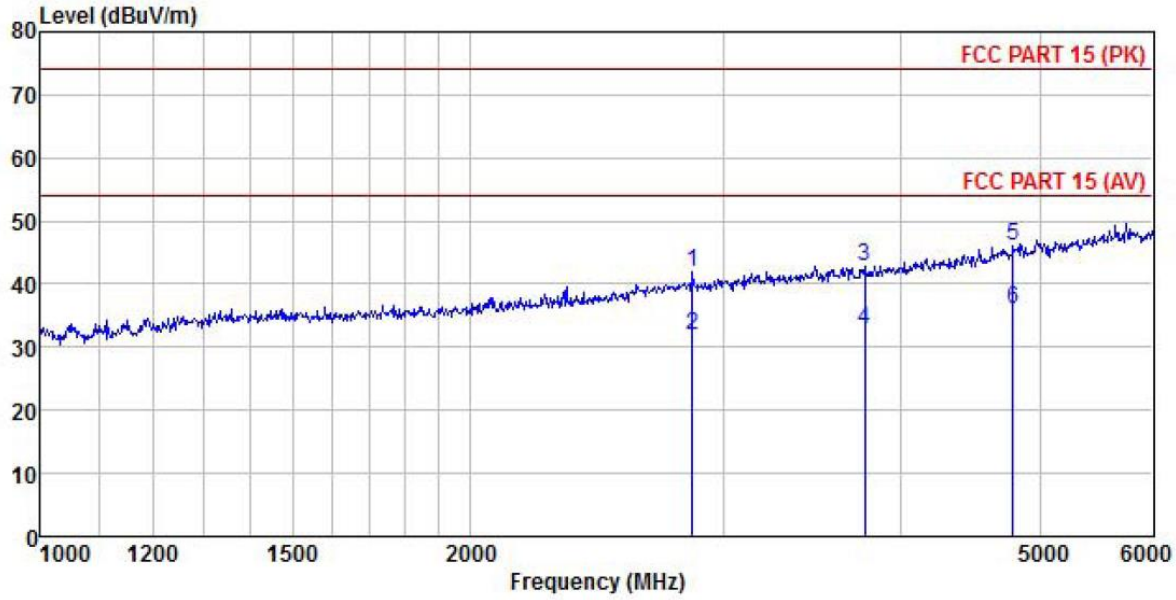
	Freq	Read Level	Antenna Factor	Cable Loss	Aux Factor	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dB	dBuV/m	dBuV/m	dB	
1	228.490	39.60	18.42	0.75	0.00	28.66	30.11	46.00	-15.89	QP
2	268.485	47.15	18.58	0.82	0.00	28.51	38.04	46.00	-7.96	QP
3	304.610	42.78	18.71	0.87	0.00	28.46	33.90	46.00	-12.10	QP
4	425.028	41.14	19.15	1.02	0.00	28.83	32.48	46.00	-13.52	QP
5	501.179	45.23	19.41	1.10	0.00	28.96	36.78	46.00	-9.22	QP
6	903.309	39.42	22.61	1.49	0.00	27.87	35.65	46.00	-10.35	QP

Remark:

1. *Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor.*
2. *The emission levels of other frequencies are very lower than the limit and not show in test report.*
3. *The Aux Factor is a notch filter switch box loss, this item is not used.*

Above 1GHz:

Product Name:	Bluetooth Helmet Communicator	Product Model:	EXO-COM
Test By:	Yaro	Test mode:	On mode
Test Frequency:	1 GHz ~ 6 GHz	Polarization:	Vertical
Test Voltage:	AC 120/60Hz	Environment:	Temp: 24℃ Huni: 57%

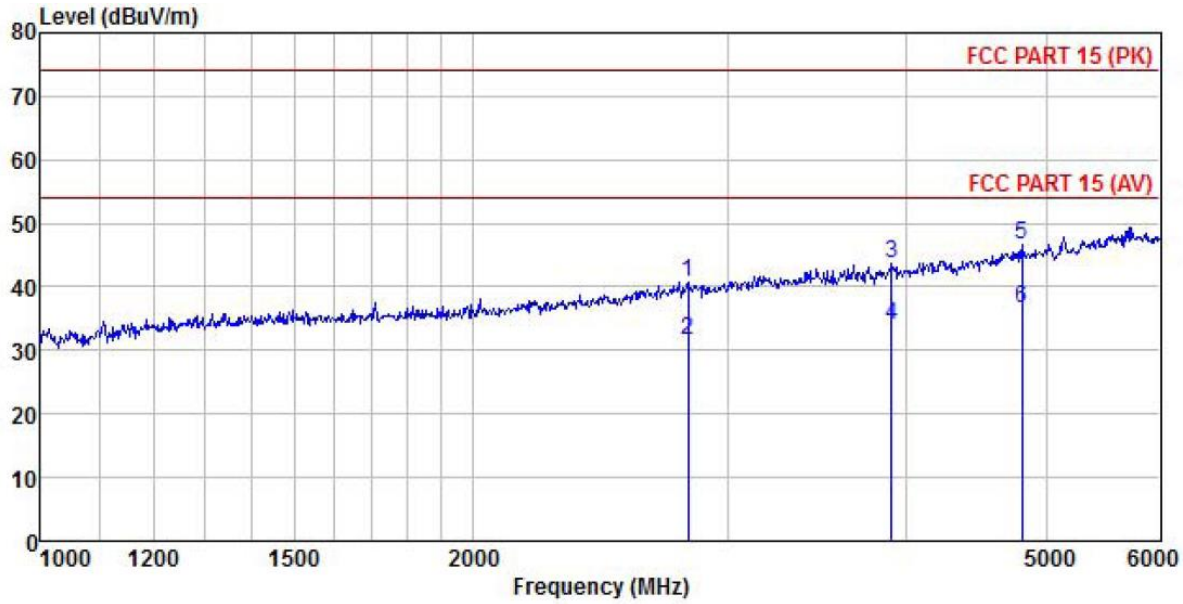


	Freq	Read Level	Antenna Factor	Cable Loss	Aux Factor	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dB	dBuV/m	dBuV/m	dB	
1	2857.568	48.94	28.10	4.72	1.85	41.62	41.99	74.00	-32.01	Peak
2	2857.568	38.69	28.10	4.72	1.85	41.62	31.74	54.00	-22.26	Average
3	3772.333	47.76	29.03	5.56	2.20	41.75	42.80	74.00	-31.20	Peak
4	3772.333	37.61	29.03	5.56	2.20	41.75	32.65	54.00	-21.35	Average
5	4787.449	48.18	30.75	6.39	2.44	41.83	45.93	74.00	-28.07	Peak
6	4787.449	38.41	30.75	6.39	2.44	41.83	36.16	54.00	-17.84	Average

Remark:

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

Product Name:	Bluetooth Helmet Communicator	Product Model:	EXO-COM
Test By:	Yaro	Test mode:	On mode
Test Frequency:	1 GHz ~ 6 GHz	Polarization:	Horizontal
Test Voltage:	AC 120/60Hz	Environment:	Temp: 24℃ Huni: 57%



	Freq	Read Level	Antenna Factor	Cable Loss	Aux Factor	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dB	dBuV/m	dBuV/m	dB	
1	2816.900	47.90	28.02	4.67	1.83	41.65	40.77	74.00	-33.23	Peak
2	2816.900	38.65	28.02	4.67	1.83	41.65	31.52	54.00	-22.48	Average
3	3902.968	48.34	29.19	5.68	2.20	41.80	43.61	74.00	-30.39	Peak
4	3902.968	38.62	29.19	5.68	2.20	41.80	33.89	54.00	-20.11	Average
5	4813.252	48.74	30.81	6.41	2.44	41.82	46.58	74.00	-27.42	Peak
6	4813.252	38.70	30.81	6.41	2.44	41.82	36.54	54.00	-17.46	Average

Remark:

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

8 EUT Constructional Details

Reference to the test report No.: CCISE200805601.

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