



FCC 47 CFR PART 15 SUBPART C

RF Test Report

Applicant : Nuheara Limited

Product Type : IQbuds

Trade Name : NUHEARA

Model Number : NU317

Test Specification : FCC 47 CFR PART 15 SUBPART C
ANSI C63.10:2013

Receive Date : Dec. 05, 2016

Test Period : Feb. 06 ~ Feb. 07, 2017

Issue Date : Mar. 02, 2017

Issue by

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Taiwan Accreditation Foundation accreditation number: 1330

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Revision History

Rev.	Issue Date	Revisions	Revised By
00	Feb. 15, 2017	Initial Issue	Snow Wang
01	Mar. 02, 2017	Revised report information.	Joyce Liao



Verification of Compliance

Issued Date: Mar. 02, 2017

Applicant : Nuheara Limited
Product Type : IQbuds
Trade Name : NUHEARA
Model Number : NU317
FCC ID : 2AKMG00000NU317
EUT Rated Voltage : DC 4.2V, 100mA
Test Voltage : DC 3.7V
Applicable Standard : FCC 47 CFR PART 15 SUBPART C
ANSI C63.10:2013
Test Result : Complied

Performing Lab. : A Test Lab Techno Corp.
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<http://www.atl-lab.com.tw/e-index.htm>



A Test Lab Techno Corp. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by A Test Lab Techno Corp. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Approved By :

(Manager)

Fly Lu

(Fly Lu)

Reviewed By :

(Testing Engineer)

Eric Ou Yang

(Eric Ou Yang)



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1 General Information

1.1 Summary of Test Result

Reference	Test	Results	Remark
47 CFR Part 15.209			
15.207(a)	Conducted Emissions Voltage	NA	Note
15.209 (a)	Radiated Emission Limits	PASS	---

The test results of this report relate only to the tested sample(s) identified in this report. Manufacturer or whom it may concern should recognize the pass or fail of the test result.

Note: The EUT will not generate a 10.6MHz signal during recharging.

1.2 Measurement Uncertainty

Test Item	Frequency Range	Uncertainty
Conducted Emission	9kHz ~ 150KHz	2.7
	150kHz ~ 30MHz	2.7
Radiated Emission	9kHz ~ 30MHz	1.7
	30MHz ~ 1000MHz	5.7
	1000MHz ~ 18000MHz	5.5
	18000MHz ~ 26500MHz	4.8
	26500MHz ~ 40000MHz	4.8
RF Bandwidth		4.96%
Frequency Stability		+ 2.212 x 10 ⁻⁷ % / - 2.170 x 10 ⁻⁷

2 EUT Description

Applicant	Nuheara Limited Unit 5, 28 John St, Northbridge, WA 6003, Australia
Manufacturer	Flextronics, Zhuhai Xin Qing Science & Technology Industrial Park, Jing An, Doumen, Zhuhai, P.R. China
Product	IQbuds
Trade Name	NUHEARA
Model Number	NU317
FCC ID	2AKMG00000NU317
Frequency Range	10.6 MHz
Modulation Type	8-DPSK
Number of Channels	1 Channel
Antenna Type	Coil Antenna

3 Test Methodology

3.1. Mode of Operation

The following test mode(s) were scanned during the preliminary test :

Pre-Test Mode
Mode 1: Transmit Mode

ATL has verified the construction and function in typical operation. All the test modes were carried out with the EUT in normal operation.

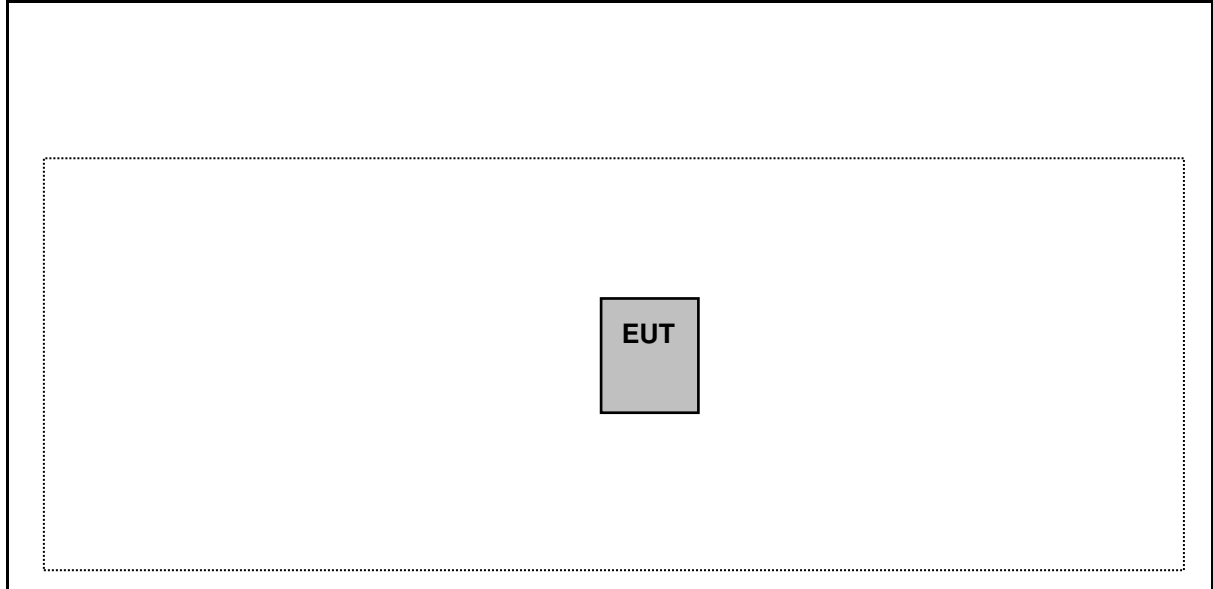
3.2. EUT Exercise Software

1.	Setup the EUT as shown on 3.3.
2.	Turn on the power of all equipment.
3.	The EUT will start to operate function.

Measurement Software
1 EZ-EMC Ver. ATL-03A1-1

3.3. Configuration of Test System Details

Radiated Emission



3.4. Test Site Environment

Items	Required (IEC 60068-1)	Actual
Temperature (°C)	15-35	26
Humidity (%RH)	25-75	60
Barometric pressure (mbar)	860-1060	950



4 Test Results

4.1. Radiated Emissions Measurement

■ Limit

- (a) Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:
- (b) In the emission table above, the tighter limit applies at the band edges.
- (c) The level of any unwanted emissions from an intentional radiator operating under these general provisions shall not exceed the level of the fundamental emission. For intentional radiators which operate under the provisions of other sections within this part and which are required to reduce their unwanted emissions to the limits specified in this table, the limits in this table are based on the frequency of the unwanted emission and not the fundamental frequency. However, the level of any unwanted emissions shall not exceed the level of the fundamental frequency.
- (d) The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.
- (e) The provisions in §§15.31, 15.33, and 15.35 for measuring emissions at distances other than the distances specified in the above table, determining the frequency range over which radiated emissions are to be measured, and limiting peak emissions apply to all devices operated under this part.
- (f) In accordance with §15.33(a), in some cases the emissions from an intentional radiator must be measured to beyond the tenth harmonic of the highest fundamental frequency designed to be emitted by the intentional radiator because of the incorporation of a digital device. If measurements above the tenth harmonic are so required, the radiated emissions above the tenth harmonic shall comply with the general radiated emission limits applicable to the incorporated digital device, as shown in §15.109 and as based on the frequency of the emission being measured, or, except for emissions contained in the restricted frequency bands shown in §15.205, the limit on spurious emissions specified for the intentional radiator, whichever is the higher limit. Emissions which must be measured above the tenth harmonic of the highest fundamental frequency designed to be emitted by the intentional radiator and which fall within the restricted bands shall comply with the general radiated emission limits in §15.109 that are applicable to the incorporated digital device.
- (g) Perimeter protection systems may operate in the 54-72 MHz and 76-88 MHz bands under the provisions of this section. The use of such perimeter protection systems is limited to industrial, business and commercial applications.



Frequency (MHz)	Field Strength ($\mu\text{V/m}$ at meter)	Measurement Distance (meter)
0.009 – 0.490	2400 / F (kHz)	300
0.490 – 1.705	24000 / F (kHz)	30
1.705 – 30.0	30	30
30 - 88	100**	3
88-216	150**	3
216-960	200**	3
Above 960	500	3

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

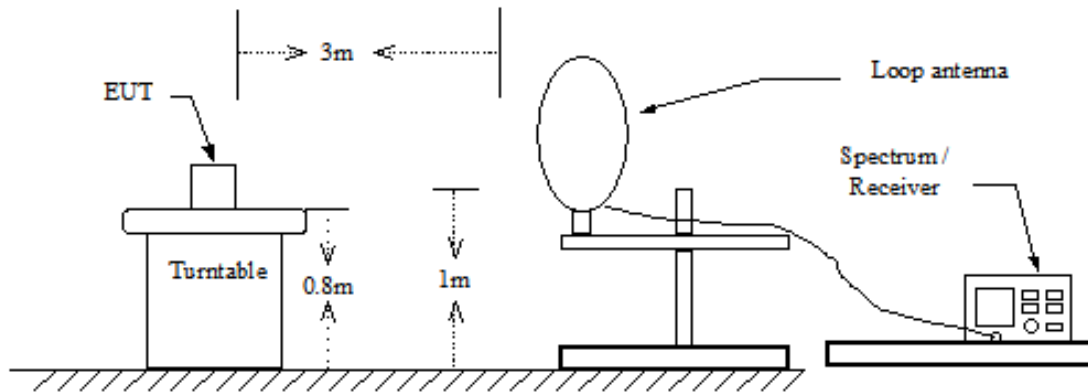
■ Test Instruments

3 Meter Chamber					
Equipment	Manufacturer	Model Number	Serial Number	Cal. Date	Remark
RF Pre-selector	Agilent	N9039A	MY46520256	03/22/2016	1 year
Spectrum Analyzer	Agilent	E4446A	MY46180578	03/22/2016	1 year
Pre Amplifier	Agilent	8449B	3008A02237	10/11/2016	1 year
Pre Amplifier	Agilent	8447D	2944A11119	01/12/2017	1 year
Broadband Antenna	Schwarzbeck	VULB9168	416	10/13/2016	1 year
Horn Antenna (1~18GHz)	SCHWARZBECK MESS-ELEKTRONIK	BBHA9120D	9120D-550	06/06/2016	1 year
Horn Antenna (18~40GHz)	ETS	3116	86467	09/05/2016	1 year
Loop Antenna	COM-POWER CORPORATION	AL-130	121014	01/27/2017	1 year
Microwave Cable	EMCI	EMC102-KM-KM-14000	151001	02/23/2016	1 year
Microwave Cable	EMCI	EMC-104-SM-SM-14000	140202	02/23/2016	1 year
Microwave Cable	EMCI	EMC104-SM-SM-600	140301	02/23/2016	1 year
Test Site	ATL	TE01	888001	08/29/2016	1 year

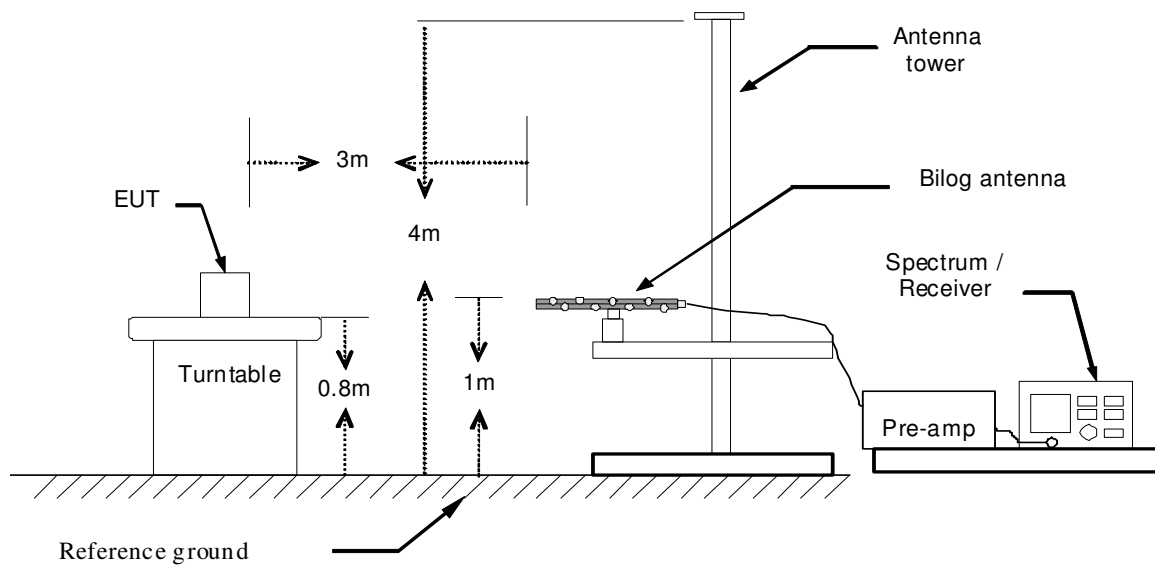
NOTE: N.C.R. = No Calibration Request.

■ Setup

9kHz ~ 30MHz



30MHz ~ 1 GHz





■ Test Procedure

Final radiation measurements were made on a three-meter Semi Anechoic Chamber. The EUT system was placed on a nonconductive turntable which is 0.8 meters height, top surface 1.0 x 1.5 meter. The spectrum was examined from 3 Hz to 44 GHz in order to cover the whole spectrum below 10th harmonic which could generate from the EUT. During the test, EUT was set to transmit continuously.

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, and then the video bandwidth is set to 1 MHz for peak measurements and 10 Hz for average measurements.

A nonconductive material surrounded the EUT to supporting the EUT for standing on three orthogonal planes. At each condition, the EUT was rotated 360 degrees, and the antenna was raised and lowered from one to four meters to find the maximum emission levels. Measurements were taken using both horizontal and vertical antenna polarization.

Broadband/Horn Antenna were used in frequency 30MHz to 18 GHz at a distance of 3 meter. Loop/Horn Antenna was used in frequency 9kHz to 30MHz and 18 to 26.5 GHz at a distance of 1 meter. All test results were extrapolated to equivalent signal at 3 meters utilizing an inverse linear distance extrapolation Factor (20dB/decade).

For testing above 1GHz, the emission level of the EUT in peak mode was 20dB lower than average limit (that means the emission level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.

Appropriate preamplifiers were used for improving sensitivity and precautions were taken to avoid overloading or desensitizing the spectrum analyzer. No post – detector video filters were used in the test.

The spectrum analyzer's 6 dB bandwidth was set to 1 MHz, and the analyzer was operated in the peak detection mode, for frequencies both below and up 1 GHz. The average levels were obtained by subtracting the duty cycle correction factor from the peak readings.

The following procedures were used to convert the emission levels measured in decibels referenced to 1 microvolt (dBuV) into field intensity in microvolt pre-meter (uV/m).

The actual field intensity in decibels referenced to 1 microvolt in to field intensity in microvolt per-meter (dBuV/m).

The actual field intensity in referenced to 1 microvolt per meter (dBuV/m) is determined by algebraically adding the measured reading in dBuV, the antenna factor (dB), and cable loss (dB) and Subtracting the gain of preamplifier (dB) is auto calculate in spectrum analyzer.

$$(1) \text{ Amplitude (dBuV/m) = FI (dBuV) + AF (dBuV) + CL (dBuV) - Gain (dB)}$$

FI= Reading of the field intensity.

AF= Antenna factor.

CL= Cable loss.

P.S Amplitude is auto calculate in spectrum analyzer.

$$(2) \text{ Actual Amplitude (dBuV/m) = Amplitude (dBuV) - Dis(dB)}$$

The FCC specified emission limits were calculated according the EUT operating frequency and by following linear interpolation equations:

(a) For fundamental frequency : Transmitter Output < +30dBm

(b) For spurious frequency : Spurious emission limits = fundamental emission limit /10

Data of measurement within this frequency range without mark in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

■ Test Result

9kHz ~ 30MHz:

Standard:	FCC Part 15C	Test Distance:	1m
Test item:	Radiated Emission	Power:	DC 3.7V
Mode:	Mode 1	Temp.(°C)/Hum. (%RH):	26(°C)/60%RH
Ant.Polar.:	Horizontal	Date:	02/07/2017

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Near-Field Result (dBuV/m)	Derived Value (dBuV)	Limit (dBuV/m)	Margin (dB)	Remark
1	1.2684	52.96	14.62	67.58	6.52	25.54	-19.01	QP
2	5.1974	27.50	15.27	42.77	-6.04	29.54	-35.58	QP
3	9.0961	23.24	15.68	38.92	-5.03	29.54	-34.57	QP
4	10.6000	38.00	15.76	53.76	11.15	29.54	-18.39	QP
5	15.9940	19.47	15.75	35.22	-3.84	29.54	-33.38	QP
6	19.2632	19.90	15.74	35.64	-1.79	29.54	-31.33	QP

Note: The level is measured at 1 meter and is converted into result at 300 or 30 meter.

The converted formula listed below:

Measure result (1 meter distance): a

Compute result (30 meter distance): A

$d_{\text{near field}} = \lambda/2\pi$, $d_{\text{measure}} = 1$ meter distance

$A = a - 40 \cdot \log(d_{\text{near field}} / d_{\text{measure}}) - 20 \cdot \log(d_{\text{limit}} / d_{\text{near field}})$

ex. $a = 67.58$ dBuV, $A = 67.58 - 40 \cdot \log(37.64 / 1) - 20 \cdot \log(30 / 37.64)$ dBuV = 6.52 dBuV



Standard:	FCC Part 15C	Test Distance:	1m
Test item:	Radiated Emission	Power:	DC 3.7V
Mode:	Mode 1	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Ant.Polar.:	Vertical	Date:	02/07/2017

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Near-Field Result (dBuV/m)	Derived Value (dBuV)	Limit (dBuV/m)	Margin (dB)	Remark
1	1.3886	46.39	14.62	61.01	0.74	24.75	-24.01	QP
2	5.4973	27.19	15.29	42.48	-5.84	29.54	-35.39	QP
3	9.3361	26.77	15.70	42.47	-1.24	29.54	-30.78	QP
4	10.6000	40.76	15.76	56.52	13.91	29.54	-15.63	QP
5	17.9134	22.72	15.76	38.48	0.41	29.54	-29.14	QP
6	23.5518	22.73	14.94	37.67	1.98	29.54	-27.56	QP

Note: The level is measured at 1 meter and is converted into result at 300 or 30 meter.

**30MHz ~ 1GHz:**

Standard:	FCC Part 15C	Test Distance:	3m
Test item:	Radiated Emission	Power:	DC 3.7V
Mode:	Mode 1	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Ant.Polar.:	Horizontal	Date:	02/07/2017

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	165.5000	22.69	-5.30	17.39	43.50	-26.11	QP
2	295.5000	21.98	-3.52	18.46	46.00	-27.54	QP
3	449.0000	24.20	-0.19	24.01	46.00	-21.99	QP
4	568.0000	22.10	1.99	24.09	46.00	-21.91	QP
5	707.5000	23.90	4.86	28.76	46.00	-17.24	QP
6	840.5000	24.69	7.39	32.08	46.00	-13.92	QP

Standard:	FCC Part 15C	Test Distance:	3m
Test item:	Radiated Emission	Power:	DC 3.7V
Mode:	Mode 1	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Ant.Polar.:	Vertical	Date:	02/07/2017

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	144.5000	22.76	-5.58	17.18	43.50	-26.32	QP
2	282.0000	22.19	-3.88	18.31	46.00	-27.69	QP
3	463.0000	24.41	0.07	24.48	46.00	-21.52	QP
4	626.0000	24.25	3.43	27.68	46.00	-18.32	QP
5	769.0000	24.65	6.28	30.93	46.00	-15.07	QP
6	918.0000	22.46	8.98	31.44	46.00	-14.56	QP