FCC Test Report

Report No.: AGC08715161202FE03

FCC ID : WBQAQRFDM6B

APPLICATION PURPOSE: Class II Equipment

PRODUCT DESIGNATION: Multimedia Locker

BRAND NAME : AQUATIC AV

MODEL NAME : AQ-BC-6BT

CLIENT : AQUATIC AV

DATE OF ISSUE : Jan. 06, 2017

STANDARD(S) : FCC Part 15 Rules

REPORT VERSION: V1.0

Attestation of Global Compliance (Shenzhen) Co., Ltd

CAUTION:

This report shall not be reproduced except in full without the written permission of the test laboratory and shall not be quoted out of context.



Report No.: AGC08715161202FE03 Page 2 of 23

Report Revise Record

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	Jan. 06, 2017	Valid	Original Report

Note: All the test items are refer to the report No. AGC08715161203FE05 except the Radiated Emission.

TABLE OF CONTENTS

1. VERIFICATION OF CONFORMITY	4
2. GENERAL INFORMATION	5
2.1. PRODUCT DESCRIPTION	5
2.2. TABLE OF CARRIER FREQUENCYS	5
3. MEASUREMENT UNCERTAINTY	6
4. DESCRIPTION OF TEST MODES	6
5. SYSTEM TEST CONFIGURATION	7
5.1. CONFIGURATION OF EUT SYSTEM	
5.2. EQUIPMENT USED IN EUT SYSTEM	7
5.3. SUMMARY OF TEST RESULTS	7
6. TEST FACILITY	8
7. RADIATED EMISSION	9
7.1TEST LIMIT	
7.2. MEASUREMENT PROCEDURE	
7.3. TEST SETUP	
7.4. TEST RESULT	13
APPENDIX A: PHOTOGRAPHS OF TEST SETUP	18
APPENDIX B: PHOTOGRAPHS OF EUT	19

Page 4 of 23

1. VERIFICATION OF CONFORMITY

Applicant	AQUATIC AV	
Address	282 Kinney Drive, San Jose, CA 95112, USA	
Manufacturer	YING LI DA ELECTRONIC CO., LTD	
Address XIE WU INDUSTRIAL ZONE, LUAN GANG, SHI WAN, BULUO, H		
Product Designation	Multimedia Locker	
Brand Name	AQUATIC AV	
Test Model AQ-BC-6BT		
Date of test	Jan. 04, 2017 to Jan. 05, 2017	
Deviation	None	
Condition of Test Sample Normal		
Test Result Pass		
Report Template AGCRT-US-BR/RF (2013-03-01)		

We hereby certify that:

The above equipment was tested by Dongguan Precise Testing Service Co., Ltd. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10 (2013) and the energy emitted by the sample EUT tested as described in this report is in compliance with radiated emission limits of FCC Rules Part 15.249.

Tested by

Max Zhang(Zhang Yi) Jan. 06, 2017

Reviewed by

Bart Xie(Xie Xiaobin) Jan. 06, 2017

Approved by

Solger Zhang(Zhang Hongyi) Jan. 06, 2017

Authorized Officer

Report No.: AGC08715161202FE03 Page 5 of 23

2. GENERAL INFORMATION

2.1. PRODUCT DESCRIPTION

A major technical description of EUT is described as following

Operation Frequency	2.402 GHz to 2.480GHz		
Maximum field strength	89.52dBuV/m(AV)@3m		
Bluetooth Version	Only BR/EDR for BT3.0		
Modulation GFSK, π /4-DQPSK, 8DPSK for BR/EDR			
Number of channels	79		
Antenna Gain	0dBi		
Antenna Designation	External Antenna provided by AGC lab (Met 15.203 Antenna requirement)		
Hardware Version	V2.3		
Software Version	N/A		
Power Supply	DC 12V		

2.2. TABLE OF CARRIER FREQUENCYS

BR/EDR channel List

Frequency Band	Channel Number	Frequency
	0	2402MHZ
	1	2403MHZ
	:	:
	38	2440 MHZ
2400~2483.5MHZ	39	2441 MHZ
	40	2442 MHZ
	÷	:
	77	2479 MHZ
	78	2480 MHZ

Report No.: AGC08715161202FE03 Page 6 of 23

3. MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement y $\pm U$, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95 % \circ

No.	Item	Uncertainty
1	Conducted Emission Test	±3.18dB
2	All emissions,radiated	±3.91dB
3	Temperature	±0.5°C
4	Humidity	±2%

4. DESCRIPTION OF TEST MODES

TEST MODE DESCRIPTION
Low channel GFSK
Middle channel GFSK
High channel GFSK
Low channel π /4-DQPSK
Middle channel π /4-DQPSK
High channel π /4-DQPSK
Low channel 8DPSK
Middle channel 8DPSK
High channel 8DPSK
BT Link with charging

Note:

- 1. All the test modes can be supply by battery, only the result of the worst case was recorded in the report, if no other cases.
- 2. For Radiated Emission, 3axis were chosen for testing for each applicable mode.

Report No.: AGC08715161202FE03 Page 7 of 23

5. SYSTEM TEST CONFIGURATION

5.1. CONFIGURATION OF EUT SYSTEM

Configure:

EUT

5.2. EQUIPMENT USED IN EUT SYSTEM

Item	Equipment	Model No.	ID or Specification	Remark
1	Multimedia Locker	AQ-BC-6BT	WBQAQRFDM6B	EUT

5.3. SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT	
§15.249&15.209	Radiated Emission	Compliant	

Report No.: AGC08715161202FE03 Page 8 of 23

6. TEST FACILITY

Site	Dongguan Precise Testing Service Co., Ltd.
Location Building D, Baoding Technology Park, Guangming Road2, Dongcheng District Dongguan, Guangdong, China.	
FCC Registration No.	371540
Description	The test site is constructed and calibrated to meet the FCC requirements in documents ANSI C63.4:2014.

ALL TEST EQUIPMENT LIST

	Radiated Emission Test Site				
Name of Equipment	Manufacturer	Model Number	Serial Number	Last Calibration	Due Calibration
EMI Test Receiver	Rohde & Schwarz	ESCI	101417	July 3, 2016	July 2, 2017
Trilog Broadband Antenna (25M-1GHz)	SCHWARZBECK	VULB9160	9160-3355	July 3, 2016	July 2, 2017
Signal Amplifier	SCHWARZBECK	BBV 9475	9745-0013	July 3, 2016	July 2, 2017
RF Cable	SCHWARZBECK	AK9515E	96221	July 3, 2016	July 2, 2017
3m Anechoic Chamber	CHENGYU	966	PTS-001	June 3, 2016	June 2, 2017
MULTI-DEVICE Positioning Controller	Max-Full	MF-7802	MF780208339	N/A	N/A
Active loop antenna (9K-30MHz)	Schwarzbeck	FMZB1519	1519-038	June 3, 2016	June 2, 2017
Spectrum analyzer	Agilent	E4407B	MY46185649	June 3, 2016	June 2, 2017
Power Sensor	Agilent	U2021XA	MY55050474	June 3, 2016	June 2, 2017
Horn Antenna (1G-18GHz)	SCHWARZBECK	BBHA9120D	9120D-1246	June 3, 2016	June 2, 2017
Horn Ant (18G-40GHz)	Schwarzbeck	BBHA 9170	9170-181	June 3, 2016	June 2, 2017

Page 9 of 23

7. RADIATED EMISSION

7.1TEST LIMIT

Standard FCC15.249

Fundamental Frequency	Field Strength of Fundamental	Field Strength of Harmonics	
	(millivolts/meter)	(microvolts/meter)	
900-928MHz	50	500	
2400-2483.5MHz	50	500	
5725-5875MHz	50	500	
24.0-24.25GHz	250	2500	

Standard FCC 15.209

Frequency	Distance	Field Strengths Limit			
(MHz)	Meters	μ V/m	dB(μV)/m		
0.009 ~ 0.490	300	2400/F(kHz)			
0.490 ~ 1.705	30	24000/F(kHz)			
1.705 ~ 30	30	30			
30 ~ 88	3	100	40.0		
88 ~ 216	3	150	43.5		
216 ~ 960	3	200	46.0		
960 ~ 1000	3	500	54.0		
Above 1000	3	Other:74.0 dB(μV)/m (Peak) 54.0 dB(μV)/m (Average)			

Remark:

- (1) Emission level dB μ V = 20 log Emission level μ V/m
- (2) The smaller limit shall apply at the cross point between two frequency bands.
- (3) Distance is the distance in meters between the measuring instrument, antenna and the closest point of any part of the device or system.

Report No.: AGC08715161202FE03 Page 10 of 23

7.2. MEASUREMENT PROCEDURE

1. The EUT was placed on the top of the turntable 0.8 or 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.

- 2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
- 3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
- 4. For each suspected emissions, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
- 5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
- 6. For emissions above 1GHz, use 1MHz VBW and RBW for peak reading. Then 1MHz RBW and 10Hz VBW for average reading in spectrum analyzer. Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.
- 7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum values.
- 8.If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
- 9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions 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.
- 10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High Low scan is not required in this case.

Report No.: AGC08715161202FE03 Page 11 of 23

The following table is the setting of spectrum analyzer and receiver.

Spectrum Parameter	Setting				
Start ~Stop Frequency	9KHz~150KHz/RB 200Hz for QP				
Start ~Stop Frequency	150KHz~30MHz/RB 9KHz for QP				
Start ~Stop Frequency	30MHz~1000MHz/RB 120KHz for QP				
Start ~Stop Frequency	1GHz~26.5GHz 1MHz/1MHz for Peak, 1MHz/10Hz for Average				

Receiver Parameter	Setting
Start ~Stop Frequency	9KHz~150KHz/RB 200Hz for QP
Start ~Stop Frequency	150KHz~30MHz/RB 9KHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RB 120KHz for QP

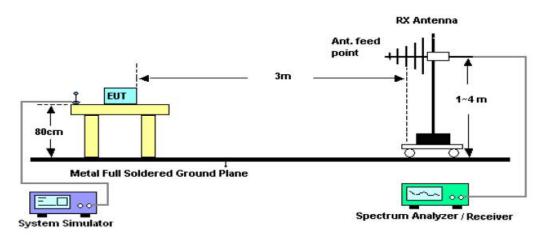
Page 12 of 23

7.3. TEST SETUP

Radiated Emission Test-Setup Frequency Below 30MHz



RADIATED EMISSION TEST SETUP 30MHz-1000MHz



RADIATED EMISSION TEST SETUP ABOVE 1000MHz



Page 13 of 23

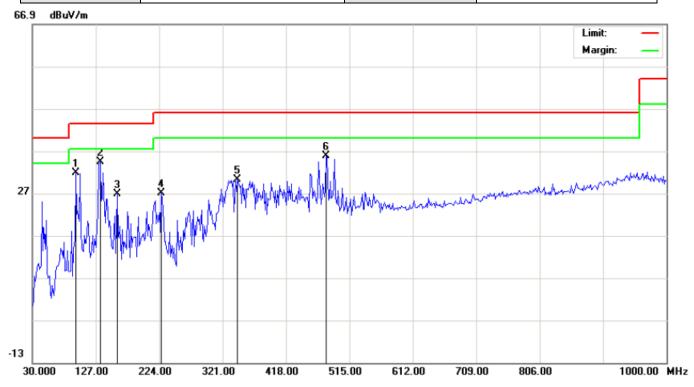
7.4. TEST RESULT

RADIATED EMISSION BELOW 30MHZ

No emission found between lowest internal used/generated frequencies to 30MHz.

RADIATED EMISSION 30MHz-1GHZ

EUT:	Multimedia Locker	Model Name. :	AQ-BC-6BT
Temperature:	20 ℃	Relative Humidtity:	48%
Pressure:	1010 hPa	Test Voltage :	DC12V
Test Mode :	Mode 1	Polarization :	Horizontal

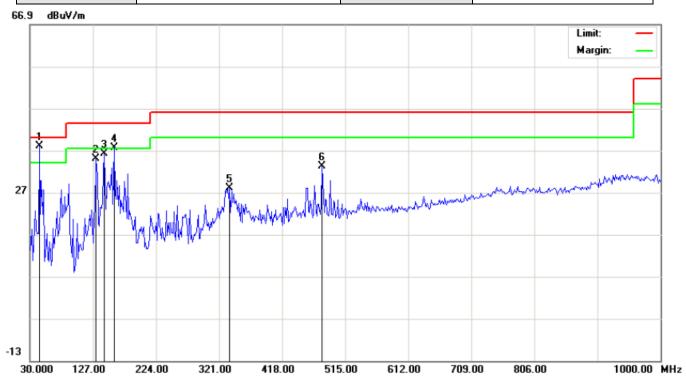


No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		96.2833	25.09	6.77	31.86	43.50	-11.64	peak			
2	*	133.4667	22.20	12.15	34.35	43.50	-9.15	peak			
3		159.3333	16.26	10.49	26.75	43.50	-16.75	peak			
4		227.2333	17.85	9.22	27.07	46.00	-18.93	peak			
5		343.6333	11.87	18.32	30.19	46.00	-15.81	peak			
6		479.4333	14.91	20.91	35.82	46.00	-10.18	peak			

RESULT: PASS

Report No.: AGC08715161202FE03 Page 14 of 23

EUT:	Multimedia Locker	Model Name. :	AQ-BC-6BT
Temperature:	20 ℃	Relative Humidtity:	48%
Pressure :	1010 hPa	Test Voltage :	DC12V
Test Mode :	Mode 1	Polarization :	Vertical



No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height		Comment
	-	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1	*	44.5500	29.36	8.60	37.96	40.00	-2.04	peak			
2		131.8500	23.15	11.80	34.95	43.50	-8.55	peak			
3		144.7833	20.91	15.23	36.14	43.50	-7.36	peak			
4	İ	159.3333	22.22	15.33	37.55	43.50	-5.95	peak			
5		337.1666	10.06	17.89	27.95	46.00	-18.05	peak			
6		479.4333	12.23	20.91	33.14	46.00	-12.86	peak			

RESULT: PASS

Note:

Factor=Antenna Factor + Cable loss, Margin=Result-Limit.

The "Factor" value can be calculated automatically by software of measurement system.

The mode 1 is the worst case, and only the data of the worst case recorded in this test report.

Report No.: AGC08715161202FE03 Page 15 of 23

RADIATED EMISSION ABOVE 1GHZ

EUT:	Multimedia Locker	Model Name. :	AQ-BC-6BT
Temperature : 20 °C Re		Relative Humidtity:	48%
Pressure :	1010 hPa	Test Voltage :	DC12V
Test Mode :	est Mode : Mode 1		Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type		
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	value Type		
4804.026	47.42	3.74	51.16	74	-22.84	peak		
4804.026	42.15	3.74	45.89	54	-8.11	AVG		
7206.039	40.14	8.14	48.28	74	-25.72	peak		
7206.039	7206.039 35.96 8.14 44.1 54 -9.9 AVG							
Remark:								
Factor = Ante	-actor = Antenna Factor + Cable Loss – Pre-amplifier.							

EUT:	Multimedia Locker	Model Name. :	AQ-BC-6BT
Temperature:	20 ℃	Relative Humidtity:	48%
Pressure :	1010 hPa	Test Voltage :	DC12V
Test Mode :	Mode 1	Polarization :	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type		
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	value Type		
4804.026	46.72	3.74	50.46	74	-23.54	peak		
4804.026	41.58	3.74	45.32	54	-8.68	AVG		
7206.039	40.41	8.14	48.55	74	-25.45	peak		
7206.039	7206.039 35.97 8.14 44.11 54 -9.89 AVG							
Remark:								
Factor = Ante	Factor = Antenna Factor + Cable Loss – Pre-amplifier.							

Report No.: AGC08715161202FE03 Page 16 of 23

EUT:	Multimedia Locker	Model Name. :	AQ-BC-6BT
Temperature:	20 ℃	Relative Humidtity:	48%
Pressure :	1010 hPa	Test Voltage :	DC12V
Test Mode :	Mode 2	Polarization:	Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type	
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	value Type	
4882.032	48.42	3.76	52.18	74	-21.82	peak	
4882.032	42.51	3.76	46.27	54	-7.73	AVG	
7323.048	39.18	8.17	47.35	74	-26.65	peak	
7323.048	34.74	8.17	42.91	54	-11.09	AVG	
Remark:							
Factor = Antenna Factor + Cable Loss – Pre-amplifier.							

EUT: Multimedia Locker		Model Name. :	AQ-BC-6BT
Temperature:	20 ℃	Relative Humidtity:	48%
Pressure :	1010 hPa	Test Voltage :	DC12V
Test Mode :	Mode 2	Polarization:	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type	
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	value Type	
4882.032	46.47	3.76	50.23	74	-23.77	peak	
4882.032	40.28	3.76	44.04	54	-9.96	AVG	
7323.048	38.54	8.17	46.71	74	-27.29	peak	
7323.048	34.05	8.17	42.22	54	-11.78	AVG	
Remark:							
Factor = Antenna Factor + Cable Loss – Pre-amplifier.							

Report No.: AGC08715161202FE03 Page 17 of 23

EUT:	Multimedia Locker	Model Name. :	AQ-BC-6BT
Temperature:	20 ℃	Relative Humidtity:	48%
Pressure :	1010 hPa	Test Voltage :	DC12V
Test Mode :	Mode 3	Polarization:	Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type	
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	value Type	
4960.042	46.51	3.83	50.34	74	-23.66	peak	
4960.042	40.38	3.83	44.21	54	-9.79	AVG	
7440.063	39.75	8.21	47.96	74	-26.04	peak	
7440.063	35.16	8.21	43.37	54	-10.63	AVG	
Remark:							
Factor = Antenna Factor + Cable Loss – Pre-amplifier.							

EUT:	Multimedia Locker	Model Name. :	AQ-BC-6BT
Temperature:	20 ℃	Relative Humidtity:	48%
Pressure :	1010 hPa	Test Voltage :	DC12V
Test Mode :	Mode 3	Polarization:	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type	
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	value Type	
4960.042	45.71	3.83	49.54	74	-24.46	peak	
4960.042	39.31	3.83	43.14	54	-10.86	AVG	
7440.063	38.44	8.21	46.65	74	-27.35	peak	
7440.063 34.18 8.21 42.39 54 -11.61 AVG							
Remark:							
Factor = Antenna Factor + Cable Loss – Pre-amplifier.							

Note: Other emissions from 8G to 25 GHz are considered as ambient noise. No recording in the test report. Factor=Antenna Factor + Cable loss - Amplifier gain, Margin=Measurement-Limit.

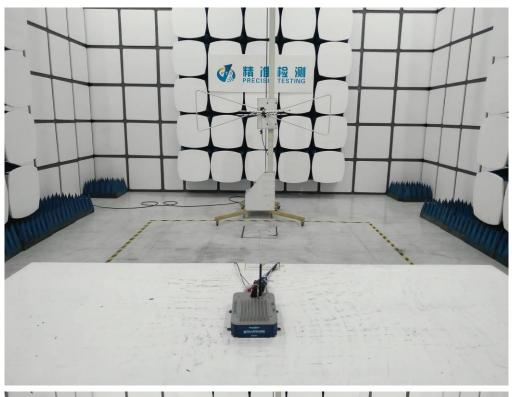
The "Factor" value can be calculated automatically by software of measurement system.

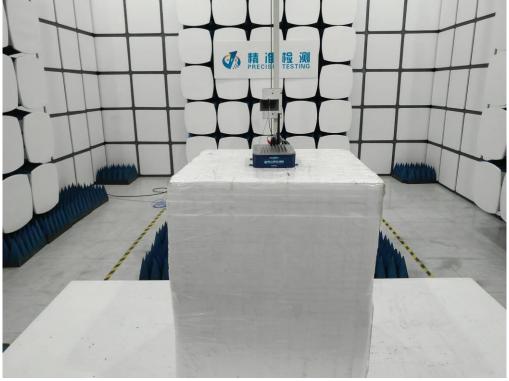
The GFSK modulation was the worst case and only the data of worst recorded in this report.

Report No.: AGC08715161202FE03 Page 18 of 23

APPENDIX A: PHOTOGRAPHS OF TEST SETUP

FCC RADIATED EMISSION TEST SETUP





Page 19 of 23

APPENDIX B: PHOTOGRAPHS OF EUT

TOP VIEW OF EUT



BOTTOM VIEW OF EUT



Page 20 of 23





BACK VIEW OF EUT



Page 21 of 23

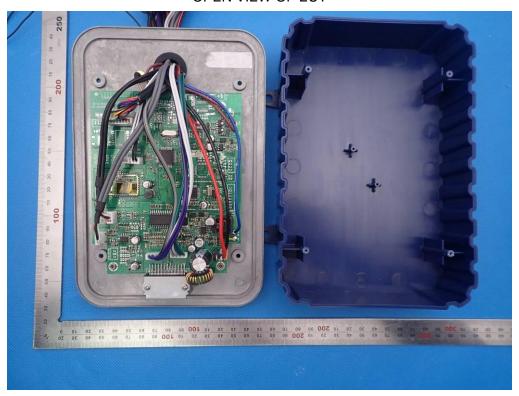
LEFT VIEW OF EUT



RIGHT VIEW OF EUT



OPEN VIEW OF EUT

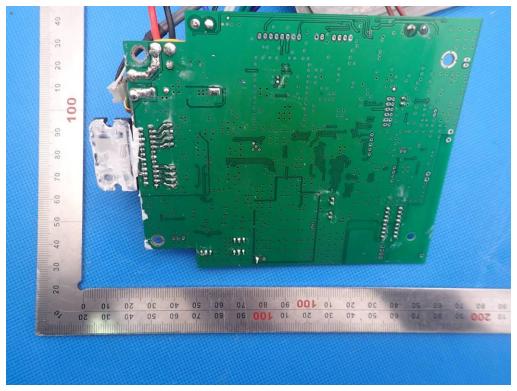


INTERNAL VIEW OF EUT-1



Report No.: AGC08715161202FE03 Page 23 of 23

INTERNAL VIEW OF EUT-2



----END OF REPORT----