

Page 1 of 61

# FCC Test Report

## Report No.: AGC00116180302FE03

FCC ID	: 2AM5A-MA390W
APPLICATION PURPOSE	: Original Equipment
PRODUCT DESIGNATION	: Bluetooth headset
BRAND NAME	: RHA
MODEL NAME	: MA390 Wireless
CLIENT	: RHA Technologies Limited
DATE OF ISSUE	: May 24, 2018
STANDARD(S) TEST PROCEDURE(S)	: FCC Part 15 Subpart C Section 15.249
<b>REPORT VERSION</b>	: V1.0

# Attestation of Global Compliance (Shenzhen) Co., Ltd

AGC

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Report No.: AGC00116180302FE03 Page 2 of 61

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Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0		May 24, 2018	Valid	Initial release

#### **Report Revise Record**

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Report No.: AGC00116180302FE03 Page 3 of 61

## TABLE OF CONTENTS

1. VERIFICATION OF CONFORMITY	4
2. GENERAL INFORMATION	5
2.1. PRODUCT DESCRIPTION	5
3. MEASUREMENT UNCERTAINTY	6
4. DESCRIPTION OF TEST MODES	6
5. SYSTEM TEST CONFIGURATION	8
5.1. CONFIGURATION OF EUT SYSTEM 5.2. EQUIPMENT USED IN EUT SYSTEM 5.3. SUMMARY OF TEST RESULTS	
6. TEST FACILITY	
7. TEST METHOD	
8. TEST EQUIPMENT LIST	
9. RADIATED EMISSION	12
9.1. TEST LIMIT. 9.2. MEASUREMENT PROCEDURE. 9.3. TEST SETUP	
10. BAND EDGE EMISSION	
10.1. MEASUREMENT PROCEDURE 10.2 TEST SETUP 10.3 RADIATED TEST RESULT	
11. 20DB BANDWIDTH	43
11.1. MEASUREMENT PROCEDURE 11.2. TEST SET-UP 11.3. LIMITS AND MEASUREMENT RESULTS	43 43 43
12. FCC LINE CONDUCTED EMISSION TEST	
12.1. LIMITS OF LINE CONDUCTED EMISSION TEST 12.2. BLOCK DIAGRAM OF LINE CONDUCTED EMISSION TEST 12.3. PRELIMINARY PROCEDURE OF LINE CONDUCTED EMISSION TEST 12.4. FINAL PROCEDURE OF LINE CONDUCTED EMISSION TEST 12.5. TEST RESULT OF LINE CONDUCTED EMISSION TEST 12.5. TEST RESULT OF LINE CONDUCTED EMISSION TEST	51 51 51
APPENDIX A: PHOTOGRAPHS OF TEST SETUP	52
APPENDIX B: PHOTOGRAPHS OF EUT	54

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#### VERIFICATION OF CONFORMIT

Report No.: A	GC00116180302FE03
- C Allesu	Page 4 of 61

Applicant	RHA Technologies Limited
Address	RHA, Unit 3, 69 Haugh Road, Glasgow, G3 8TX, United Kingdom
Manufacturer	Shenzhen CANNICE Technology Co., Ltd.
Address	F-20, 7A, Baoneng Technology Park, Qingxiang Rd, Longhua, Shenzhen, China
Product Designation	Bluetooth headset
Brand Name	RHA
Test Model	MA390 Wireless
Date of test	May 11, 2018 to May 19, 2018
Deviation	None
Condition of Test Sample	Normal
Report Template	AGCRT-US-BR/RF

We hereby certify that:

The above equipment was tested by Attestation of Global Compliance (Shenzhen) Co., Ltd. The test data, the energy emitted by the sample tested as described in this report is in compliance with the requirements of FCC Rules Part 15.249. The test results of this report relate only to the tested sample identified in this report.

Tested By

Zhano Harry

Henry Zhang(Zhang Zhuorui) May 19, 2018

wed chang

**Reviewed By** 

Cool Cheng(Cheng Mengguo) May 24, 2018

Forverstoien

Approved By

Forrest Lei(Lei Yonggang) Authorized Officer

May 24, 2018

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#### 2. GENERAL INFORMATION 2.1. PRODUCT DESCRIPTION

#### A major technical description of EUT is described as following

<b>Operation Frequency</b>	2.402 GHz to 2.480GHz
RF Output Power	2.54dBm(Max EIRP Power=Max radiation field-95.2)
Bluetooth Version	V4.1 • • • • • • • • • • • • • • • • • • •
Modulation	BR ⊠GFSK, EDR ⊠π /4-DQPSK, ⊠8DPSK BLE □GFSK
Number of channels	79
Hardware Version	VOC
Software Version	VOB
Antenna Designation	Ceramic Antenna
Antenna Gain	1.7dBi
Power Supply	DC 3.7V by battery

The USB port only used for charging and can't be used to transfer data with PC.
The BT function of EUT isn't work when charging.

#### 2.2. TABLE OF CARRIER FREQUENCYS

#### **BR/EDR Channel List**

Frequency Band	Channel Number	Frequency
the the same	1 the man of the states of the	2402MHz
C The man of Galant Control	GO 1 GO	2403MHz
		AND THE STATE
	38	2440 MHz
2400~2483.5MHz	39	2441 MHz
	40	2442 MHz
		A Barrier C Barrier
	77	2479 MHz
E H a Const Contract	78	2480 MHz

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#### 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%.

- Uncertainty of Conducted Emission, Uc = ±3.2 dB
- Uncertainty of Radiated Emission below 1GHz, Uc = ±3.9 dB
- Uncertainty of Radiated Emission above 1GHz, Uc = ±4.8 dB

#### NO. **TEST MODE DESCRIPTION** 1 Low channel GFSK 2 Middle channel GFSK 3 High channel GFSK 4 Low channel π /4-DQPSK Middle channel π /4-DQPSK 5 6 High channel π /4-DQPSK 7 Low channel 8DPSK 8 Middle channel 8DPSK 9 High channel 8DPSK 10 **BT** Link

#### 4. DESCRIPTION OF TEST MODES

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.

3. The EUT used fully-charged battery when tested.

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	Software Settin	ng 💿 🔬 🕺 🖉	® The son of Global
BlueTest3			
-Test Mode	Test Arguments		
PAUSE RADIO STATUS RADIO STATUS FULL	LO Freq. (MHz)	2402	Close
TXSTART TXDATA1	Power (Ext, Int)	55 50	Execute
TXDATA2 TXDATA3 TXDATA4 			Cold Reset
RXSTART1 RXSTART2 RXDATA1			Warm Reset
. \logfile. txt			
Opening USB SPI (600732). Transport active. dal (Hardware ID 0x332) fir			
Radio Test CFG PKT success	arameters: 0017 0003 0011 0000 00 Ful arameters: 0004 0962 FF32 0000 00		
Radio Test TXDATA1 successi			
Radio Test TXDATA1 successi			
Radio Test TXDATA1 successi			
Radio Test TXDATA1 successi			
Sent Command Varid 5004 no			
Radio Test TXDATA1 successi			
Radio Test TXDATA1 successi	Ful Arameters: 0004 09B0 3728 0000 00 Ful Arameters: 0004 0962 3728 0000 00	00 0000	

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#### Report No.: AGC00116180302FE03 Page 8 of 61

#### 5. SYSTEM TEST CONFIGURATION 5.1. CONFIGURATION OF EUT SYSTEM

Configure 1: (Normal hopping)

EUT

Configure 2: (Control continuous TX)

				Kan		Jobal Co.
E	UT	Hation	Control box	0.54	PC	N

#### 5.2. EQUIPMENT USED IN EUT SYSTEM

ltem	Equipment	Mfr/Brand	Model/Type No.	Remark
1	Bluetooth headset	RHA	MA390 Wireless	EUT
2	Battery	SUPER POLYPOWER	SP72380	Accessory
3	PC	APPLE	A1465	A.E
4	Control box	CSR	USB_SPI_TOOLS	A.E
5	USB Cable	N/A	1m unshielded	A.E
6	IPOD	APPLE	A1367	A.E

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Report No.: AGC00116180302FE03 Page 9 of 61

#### **5.3. SUMMARY OF TEST RESULTS**

FCC RULES	DESCRIPTION OF TEST	RESULT
§15.249(a) §15.209	Radiated Emission	Compliant
§15.249(d)	Band Edges	Compliant
§15.207	Conduction Emission	N/A
§15.215	Bandwidth	Compliant

Note: N/A means it's not applicable to this item.

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#### 6. TEST FACILITY

Test Site	Attestation of Global Compliance (Shenzhen) Co., Ltd		
Location	1-2F., Bldg.2, No.1-4, Chaxi Sanwei Technical Industrial Park, Gushu, Xixiang, Bao'an District B112-B113, Bldg.12, Baoan Bldg Materials Center, No.1 of Xixiang Inner Ring Road, Baoan District, Shenzhen 518012		
NVLAP Lab Code	600153-0		
Designation Number	CN5028		
Test Firm Registration Number	682566		
Description	Attestation of Global Compliance(Shenzhen) Co., Ltd is accredited by National Voluntary Laboratory Accreditation program, NVLAP Code 600153-0		

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### 7. TEST METHOD

All measurements contained in this report were conducted with ANSI C63.10-2013

#### 8. TEST EQUIPMENT LIST

#### TEST EQUIPMENT OF RADIATED EMISSION TEST

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
TEST RECEIVER	R&S	ESCI	10096	Jun.20, 2017	Jun.19, 2018
EXA Signal Analyzer	Aglient	N9010A	MY53470504	Dec.08, 2017	Dec.07, 2018
Horn antenna	SCHWARZBECK	BBHA 9170	#768	Sep.20, 2017	Sep.19, 2018
preamplifier	ChengYi	EMC184045SE	980508	Sep.15, 2017	Sep.14, 2018
Double-Ridged Waveguide Horn	ETS LINDGREN	3117	00034609	May 18, 2017	May 17, 2019
Broadband Preamplifier	SCHWARZBECK	BBV 9718	9718-205	Jun.20, 2017	Jun.19, 2018
ANTENNA	SCHWARZBECK	VULB9168	D69250	Sep.28, 2017	Sep.27, 2018
Radiation Cable 1	MXT	RS1	R005	June 6, 2017	June 5, 2018
Radiation Cable 2	МХТ	RS1	R006	June 6, 2017	June 5, 2018
Loop Antenna	A.H.Systems,Inc	SAS-562B	station of Give	Mar. 01, 2018	Feb. 28, 2019
Filter (2.4-2.483GHz)	Micro-tronics	087		Jun.20, 2017	Jun.19, 2018

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### 9. RADIATED EMISSION

#### 9.1. TEST LIMIT

Standard FCC15.249

Fundamental	Field Strength of Fundamental	Field Strength of Harmonics
Frequency	(millivolts/meter)	(microvolts/meter)
900-928MHz	50	500
2400-2483.5MHz	50 6 6	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	E The constant of the second court				
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 Januar Co	Other:74.0 dB(µV)/m (Average)	(Peak) 54.0 dB(µV)/m				

Remark: (1) Emission level dB $\mu$  V = 20 log Emission level  $\mu$  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.

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Report No.: AGC00116180302FE03 Page 13 of 61

#### 9.2. MEASUREMENT PROCEDURE

- The measuring distance of 3m shall be used for measurements. The EUT was placed on the top of a rotating table 0.8 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation(Below 1GHz)
- The measuring distance of 3m shall used for measurements. The EUT was placed on the top of a rotating table 1.5 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation(Above 1GHz)
- 3. The height of the test antenna shall vary between 1m to 4m.Both horizontal and vertical polarization Of the antenna are set to make the measurement.
- 4. The initial step in collecting radiated emission data is a receive peak detector mode. Pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- 5. All readings are peak unless otherwise stated QP in column of Note. Peak denoted that the Peak reading compliance with the QP limits and then QP Mode measurement didn't perform(Below 1GHz)
- 6. All readings are Peak mode value unless otherwise stated AVG in column of Note. If the Peak mode measured value compliance with the Peak limits and lower than AVG Limits, the EUT shall be deemed to meet Peak & AVG limits and then only Peak mode was measured, but AVG mode didn't perform.(Above 1GHz)

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Report No.: AGC00116180302FE03 Page 14 of 61

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	Fundamental: 2.4~2.483GHz RBW 2MHz/ VBW 6MHz for Peak, RBW 2MHz/ VBW 10Hz for Average Harmonics: 1GHz~25GHz RBW 1MHz/ VBW 3MHz for Peak, RBW 1MHz/ VBW 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

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

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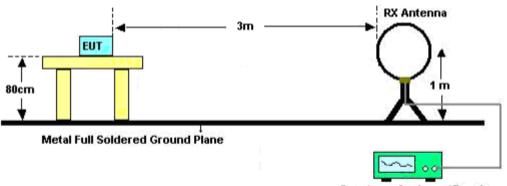


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Report No.: AGC00116180302FE03 Page 15 of 61

#### 9.3. TEST SETUP

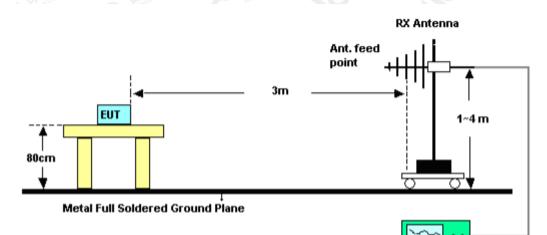
RADIATED EMISSION TEST-SETUP FREQUENCY BELOW 30MHz



Spectrum Analyzer / Receiver

Spectrum Analyzer / Receiver

#### RADIATED EMISSION TEST SETUP 30MHz-1000MHz

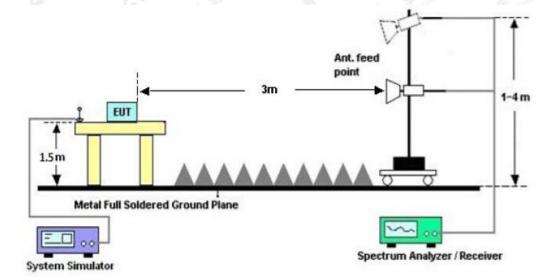


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Report No.: AGC00116180302FE03 Page 16 of 61



RADIATED EMISSION TEST SETUP ABOVE 1000MHz

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Report No.: AGC00116180302FE03 Page 17 of 61

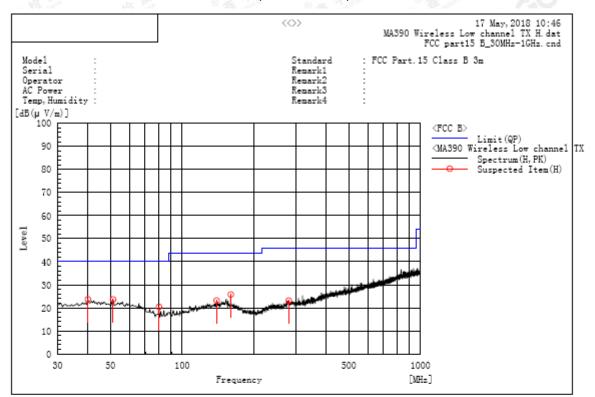
#### 9.4. TEST RESULT

(Worst modulation: GFSK)

#### **RADIATED EMISSION BELOW 30MHz**

No emission found between lowest internal used/generated frequencies to 30MHz. **RADIATED EMISSION BELOW 1GHz** 

#### RADIATED EMISSION TEST- (30MHz-1GHz)-LOW CHANNEL-HORIZONTAL



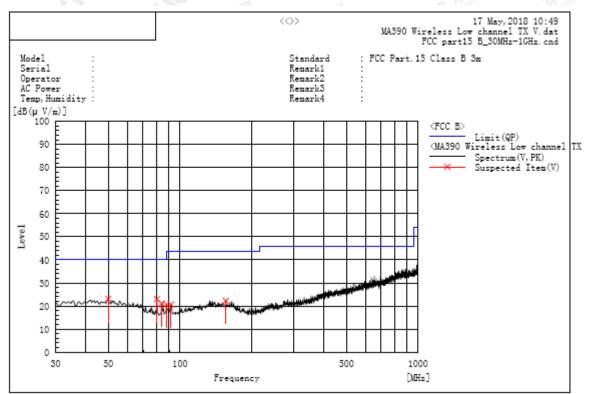
#### A. Suspected List:

KGY	Frequency MHz	Polarization	Reading dB(uV)	Factor dB (1/m)	Level dB(uV/m) PK	Limit dB(u∨/m) QP	Margin dB	Pass/Fail	Height cm	Angle deg
	40.185	Н	6.3	17.4	23.7	40.0	16.3	Pass	100.0	198.8
	51.340	Н	6.7	17.0	23.7	40.0	16.3	Pass	100.0	275.8
2	79.955	Н	8.1	12.3	20.4	40.0	19.6	Pass	150.0	115.4
	139.610	Н	6.6	16.6	23.2	43.5	20.3	Pass	200.0	142.8
	159.980	Н	9.2	16.6	25.8	43.5	17.7	Pass	100.0	301.7
4	280.260	Н	5.5	17.7	23.2	46.0	22.8	Pass	100.0	327.8

#### **RESULT: PASS**

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#### RADIATED EMISSION TEST- (30MHz-1GHz)-LOW CHANNEL -VERTICAL

#### A. Suspected List:

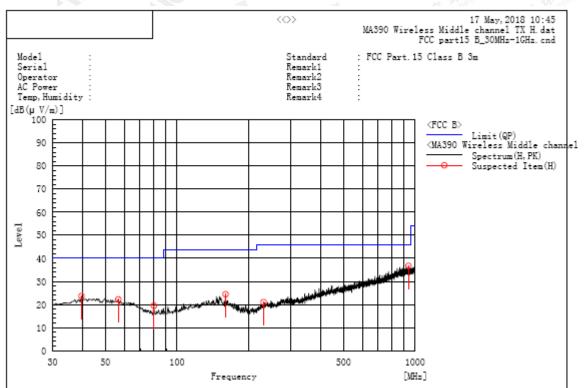
Frequency MHz	Polarization	Reading dB(uV)	Factor dB (1/m)	Level dB(uV/m) PK	Limit dB(u∨/m) QP	Margin dB	Pass/Fail	Height cm	Angle deg
49.885	v	6.0	17.1	23.1	40.0	16.9	Pass	100.0	44.3
79.955	v	10.7	12.3	23.0	40.0	17.0	Pass	100.0	299.3
83.835	v	8.9	12.3	21.2	40.0	18.8	Pass	150.0	38.3
87.715	v	8.3	12.3	20.6	40.0	19.4	Pass	100.0	80.7
91.595	v	8.3	12.4	20.7	43.5	22.8	Pass	200.0	19.1
155.615	v	5.7	16.6	22.3	43.5	21.2	Pass	150.0	252.9

#### **RESULT: PASS**

Note: 1. Factor=Antenna Factor + Cable loss, Margin=Measurement-Limit.

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

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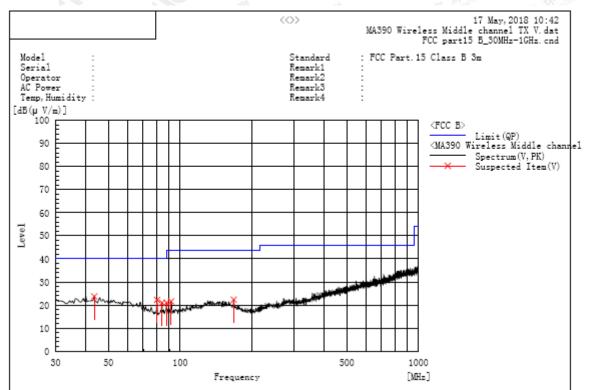
#### RADIATED EMISSION TEST- (30MHz-1GHz)-MIDDLE CHANNEL-HORIZONTAL

#### A. Suspected List:

Frequency MHz	Polarization	Reading dB(uV)	Factor dB (1/m)	Level dB(uV/m) PK	Limit dB(uV/m) QP	Marqin dB	Pass/Fail	Height cm	Angle deg
39.700	Н	6.3	17.4	23.7	40.0	16.3	Pass	100.0	69.6
56.675	Н	5.6	16.6	22.2	40.0	17.8	Pass	200.0	358.5
79.955	н	7.2	12.3	19.5	40.0	20.5	Pass	200.0	34.9
159.980	Н	7.9	16.6	24.5	43.5	19.0	Pass	100.0	69.6
231.275	Н	5.2	15.8	21.0	46.0	25.0	Pass	150.0	143.7
937.920	Н	6.3	30.5	36.8	46.0	9.2	Pass	150.0	71.5

**RESULT: PASS** 

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#### RADIATED EMISSION TEST- (30MHz-1GHz)-MIDDLE CHANNEL -VERTICAL

#### A. Suspected List:

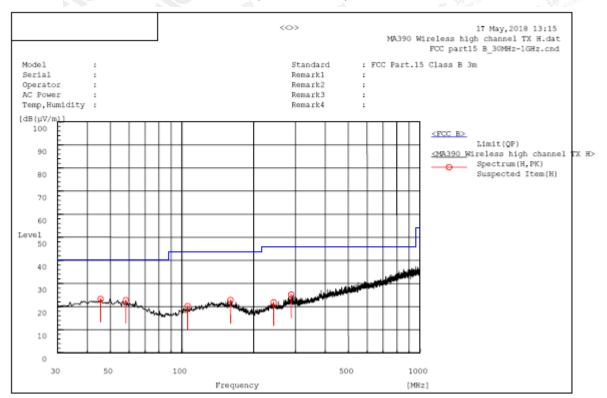
Frequency MHz	Polarization	Reading dB(uV)	Factor dB (1/m)	Level dB(u∨/m) PK	Limit dB(u∨/m) QP	Margin dB	Pass/Fail	Height cm	Angle deg
43.580	v	6.4	17.4	23.8	40.0	16.2	Pass	100.0	306.9
79.955	v	10.0	12.3	22.3	40.0	17.7	Pass	100.0	342.5
83.835	v	8.7	12.3	21.0	40.0	19.0	Pass	150.0	179.4
87.715	v	8.8	12.3	21.1	40.0	18.9	Pass	150.0	108.0
91.595	v	9.2	12.4	21.6	43.5	21.9	Pass	200.0	305.9
167.740	v	6.3	16.1	22.4	43.5	21.1	Pass	100.0	52.7

#### **RESULT: PASS**

Note: 1. Factor=Antenna Factor + Cable loss, Margin=Measurement-Limit.

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

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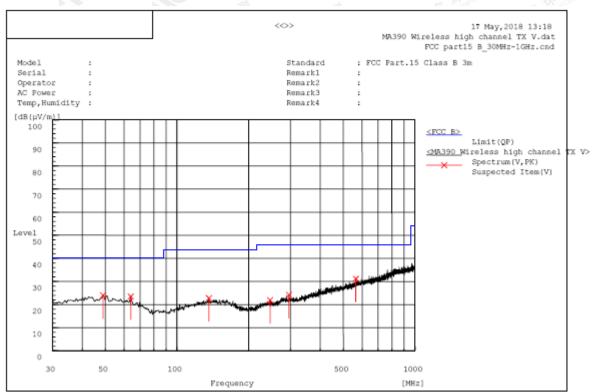
#### RADIATED EMISSION TEST- (30MHz-1GHz)-HIGH CHANNEL-HORIZONTAL

#### A. Suspected List:

Frequency MHz	Polarization	Reading dB(uV)	Factor dB (1/m)	Level dB(uV/m) PK	Limit dB(uV/m) QP	Marqin dB	Pass/Fail	Height cm	Angle deg
45.520	Н	6.0	17.3	23.3	40.0	16.7	Pass	100.0	53.8
58.130	Н	6.4	16.4	22.8	40.0	17.2	Pass	100.0	198.6
105.660	н	6.1	14.1	20.2	43.5	23.3	Pass	150.0	147.9
159.980	Н	6.2	16.6	22.8	43.5	20.7	Pass	100.0	217.6
242.915	Н	5.6	16.2	21.8	46.0	24.2	Pass	200.0	255.4
288.020	Н	7.6	17.6	25.2	46.0	20.8	Pass	100.0	280.0

#### **RESULT: PASS**

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#### RADIATED EMISSION TEST- (30MHz-1GHz)-HIGH CHANNEL -VERTICAL

#### A. Suspected List:

	Frequency MHz	Polarization	Reading dB(uV)	Factor dB (1/m)	Level dB(uV/m) PK	Limit dB(uV/m) QP	Marqin dB	Pass/Fail	Height cm	Angle deg
	48.915	v	6.9	17.1	24.0	40.0	16.0	Pass	100.0	1.2
ſ	63.950	v	7.8	15.7	23.5	40.0	16.5	Pass	100.0	1.2
	136.215	v	6.2	16.6	22.8	43.5	20.7	Pass	200.0	122.2
	246.310	v	5.8	16.1	21.9	46.0	24.1	Pass	150.0	1.2
	295.780	v	6.8	17.4	24.2	46.0	21.8	Pass	100.0	1.2
	564.470	v	7.0	24.2	31.2	46.0	14.8	Pass	150.0	199.6

#### **RESULT: PASS**

Note: 1. Factor=Antenna Factor + Cable loss, Margin=Measurement-Limit.

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

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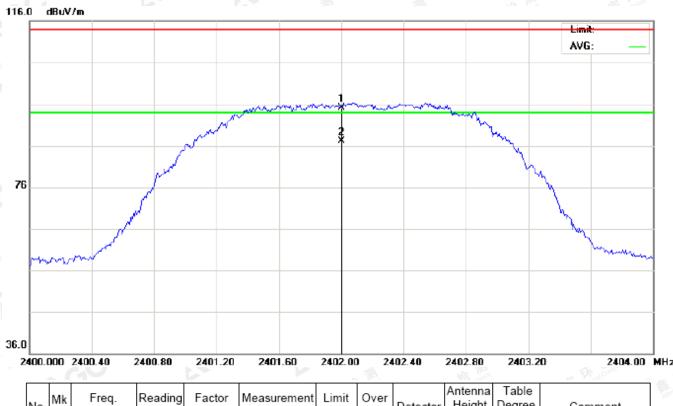
Report No.: AGC00116180302FE03 Page 23 of 61

#### **RADIATED EMISSION ABOVE 1GHz**

(Worst modulation: GFSK)

#### For Fundamental

RADIATED EMISSION TEST- (ABOVE 1GHz)-LOW CHANNEL-HORIZONTAL



No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Height	Degree	Comment
	-	MHz	dBu∀	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		2402.000	84.70	10.32	95.02	114.00	-18.98	peak			
2	*	2402.000	76.72	10.32	87.04	94.00	-6.96	AVG	100	245	

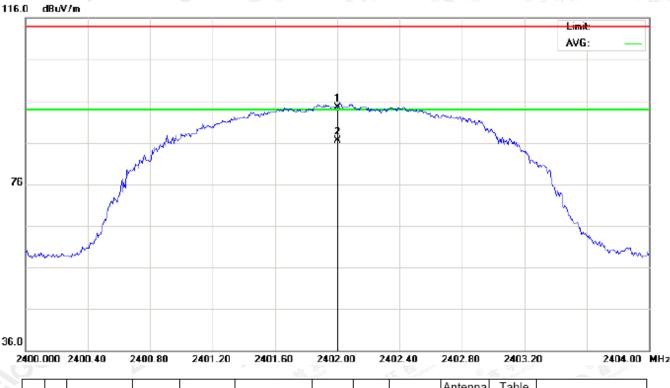
**RESULT: PASS** 

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Report No.: AGC00116180302FE03 Page 24 of 61



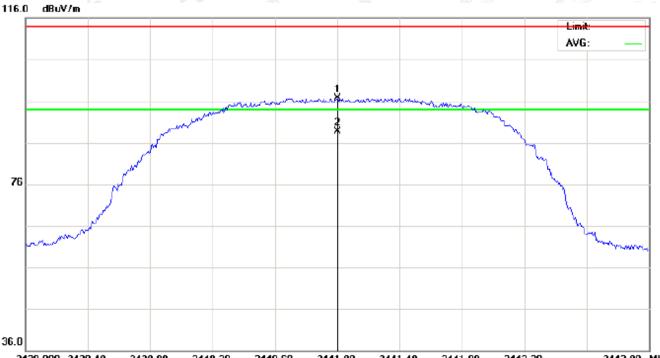
RADIATED EMISSION TEST- (ABOVE 1GHz)-LOW CHANNEL- VERTICAL

No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
	-	MHz	dBu∨	dB/m	dBu∀/m	dBu∨/m	dB		cm	degree	
1		2402.000	84.22	10.32	94.54	114.00	-19.46	peak			
2	*	2402.000	76.21	10.32	86.53	94.00	-7.47	AVG	100	314	

RESULT: PASS

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RADIATED EMISSION TEST- (ABOVE 1GHz)-MIDDLE CHANNEL-HORIZONTAL

2439.000 2439.40 2439.80 2440.20 2440.60 2441.00 2441.40 2441.80 2442.20 2443.00 MHz

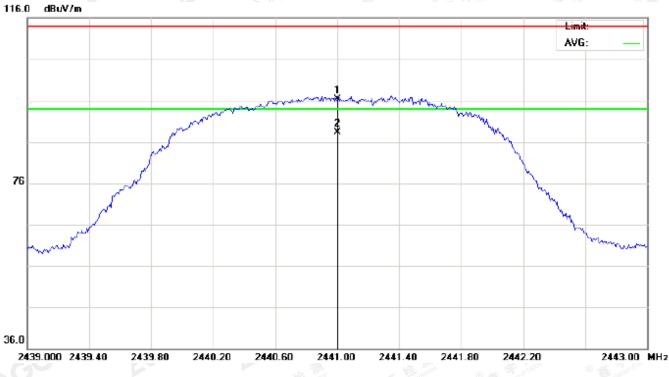
	No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
2		-	MHz	dBu∨	dB/m	dBu\//m	dBuV/m	dB		cm	degree	
121	1		2441.000	86.32	10.36	96.68	114.00	-17.32	peak			
	2	*	2441.000	78.39	10.36	88.75	94.00	-5.25	AVG	100	245	

**RESULT: PASS** 

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Report No.: AGC00116180302FE03 Page 26 of 61



RADIATED EMISSION TEST- (ABOVE 1GHz)-MIDDLE CHANNEL- VERTICAL

No	. Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
8		MHz	dBu∀	dB/m	dBuV/m	dBu∨/m	dB		cm	degree	
1		2441.000	85.89	10.36	96.25	114.00	-17.75	peak			
2	*	2441.000	77.85	10.36	88.21	94.00	-5.79	AVG	100	121	

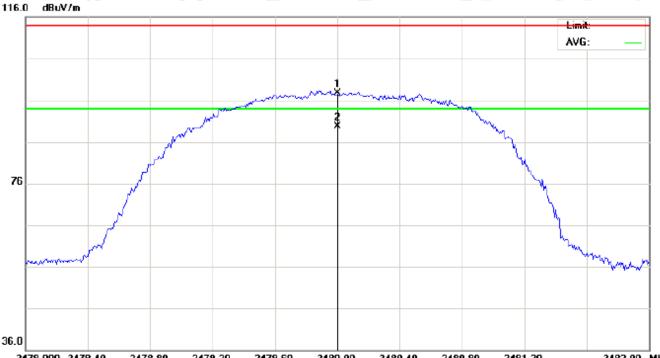
RESULT: PASS

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#### RADIATED EMISSION TEST- (ABOVE 1GHz)-HIGH CHANNEL-HORIZONTAL

2478.000 2478.40 2478.80 2479.20 2479.60 2480.00 2480.40 2480.80 2481.20 2482.00 MHz

	No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		•	MHz	dBu∨	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
5121	1		2480.000	87.33	10.41	97.74	114.00	-16.26	peak			
	2	*	2480.000	79.38	10.41	89.79	94.00	-4.21	AVG	100	358	

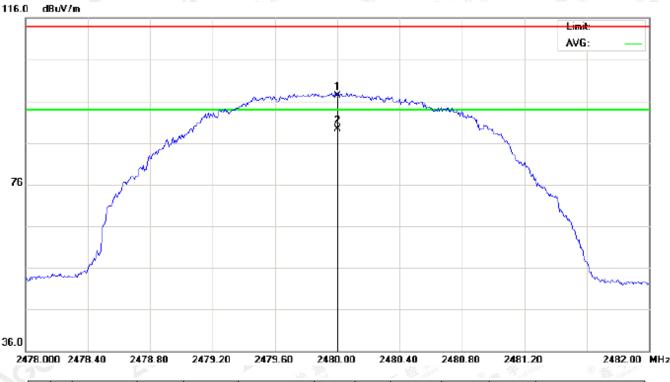
#### RESULT: PASS

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Report No.: AGC00116180302FE03 Page 28 of 61



#### RADIATED EMISSION TEST- (ABOVE 1GHz)-HIGH CHANNEL- VERTICAL

- 2									201 - AL II	5 · 5 · - 1		-581.P
	No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
8		-	MHz	dBu∨	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
8	1		2480.000	86.87	10.41	97.28	114.00	-16.72	peak			
	2	*	2480.000	78.92	10.41	89.33	94.00	-4.67	AVG	100		

#### **RESULT: PASS**

Note: Factor=Antenna Factor + Cable loss - Amplifier gain, Margin=Measurement-Limit.

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

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Field strength of the fundamental signal

#### 1Mbps Result:

Peak value

Frequency	Reading Level	Factor	Measurement	Limit	Over	Antenna
(MHz)	(dBuv)	(dB/m)	(dBuv/m)	(dBuv/m)	(dB)	Polarization
2402	84.70	10.32	95.02	114	-18.98	Horizontal
2402	84.22	10.32	94.54	114	-19.46	Vertical
2441	86.32	10.36	96.68	114 📣	-17.32	Horizontal
2441	85.89	10.36	96.25	114	-17.75	Vertical
2480	87.33	10.41	97.74	114	-16.26	Horizontal
2480	86.87	10.41	97.28	114	-16.72	Vertical
Alles	The star	A LAND				dis.

#### Average value

Frequency	Reading Level	Factor	Measurement	Limit	Over	Antenna
(MHz)	(dBuv)	(dB/m)	(dBuv/m)	(dBuv/m)	(dB)	Polarization
2402	76.72	10.32	87.04	94	-6.96	Horizontal
2402	76.21	10.32	86.53	94	-7.47	Vertical
2441	78.39	10.36	88.75	94	-5.25	Horizontal
2441	77.85	10.36	88.21	94	-5.79	Vertical
2480	79.38	10.41	89.79	94	-4.21	Horizontal
2480	78.92	10.41	89.33	94	-4.67	Vertical

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#### Report No.: AGC00116180302FE03 Page 30 of 61

#### 2Mbps Result:

#### Peak value

Frequency	Reading Level	Factor	Measurement	Limit	Over	Antenna	
(MHz)	(dBuv)	(dB/m)	(dBuv/m)	(dBuv/m)	(dB)	Polarization	
2402	84.28	10.32	94.60	114	-19.40	Horizontal	
2402	83.85	10.32	94.17	114	-19.83	Vertical	
2441	85.90	10.36	96.26	114	-17.74	Horizontal	
2441	85.42	10.36	95.78	114	-18.22	Vertical	
2480	86.86	10.41	97.27	114	-16.73	Horizontal	
2480	86.42	10.41	96.83	114	-17.17	Vertical	

#### Average value

Frequency	Reading Level	Factor	Measurement	Limit	Over	Antenna
(MHz)	(dBuv)	(dB/m)	(dBuv/m)	(dBuv/m)	(dB)	Polarization
2402	76.25	10.32	86.57	94	-7.43	Horizontal
2402	75.74	10.32	86.06	94	-7.94	Vertical
2441	77.86	10.36	88.22	94	-5.78	Horizontal
2441	77.40	10.36	87.76	94	-6.24	Vertical
2480	79.02	10.41	89.43	94	-4.57	Horizontal
2480	78.43	10.41	88.84	94	-5.16	Vertical

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#### Report No.: AGC00116180302FE03 Page 31 of 61

#### 3Mbps Result:

#### Peak value

Frequency	Reading Level	Factor	Factor Measurement		Over	Antenna	
(MHz)	(dBuv)	(dB/m)	(dBuv/m)	(dBuv/m)	(dB)	Polarization	
2402	83.85	10.32	94.17	114	-19.83	Horizontal	
2402	83.38	10.32	93.70	114	-20.30	Vertical	
2441	85.46	10.36	95.82	114	-18.18	Horizontal	
2441	84.95	10.36	95.31	114	-18.69	Vertical	
2480	86.38	10.41	96.79	114	-17.21	Horizontal	
2480	85.95	10.41	96.36	114	-17.64	Vertical	

#### Average value

Frequency	Reading Level	Factor	Measurement	Limit	Over	Antenna
(MHz)	(dBuv)	(dB/m)	(dBuv/m)	(dBuv/m)	(dB)	Polarization
2402	75.83	10.32	86.15	94	-7.85	Horizontal
2402	75.32	10.32	85.64	94	-8.36	Vertical
2441	77.45	10.36	87.81	94	-6.19	Horizontal
2441	76.97	10.36	87.33	94	-6.67	Vertical
2480	78.56	10.41	88.97	94	-5.03	Horizontal
2480	78.02	10.41	88.43	94	-5.57	Vertical

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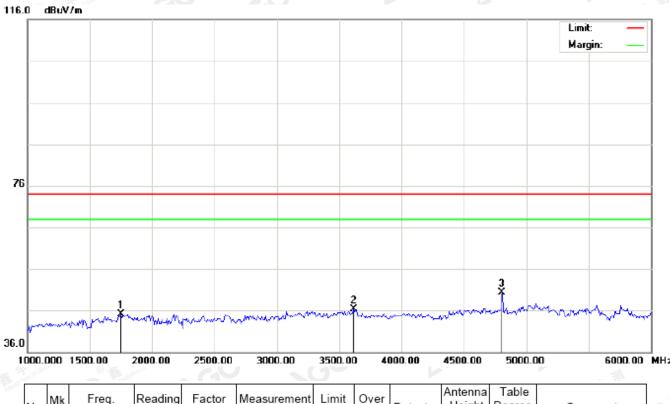




#### (Worst modulation: GFSK)

#### For Harmonics

#### RADIATED EMISSION TEST- (ABOVE 1GHz)-LOW CHANNEL-HORIZONTAL



No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Height	Degree	Comment
	-	MHz	dBu∀	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		1750.000	37.85	7.25	45.10	74.00	-28.90	peak			
2		3616.667	33.55	12.83	46.38	74.00	-27.62	peak			
3	*	4804.000	42.71	7.69	50.40	74.00	-23.60	peak			

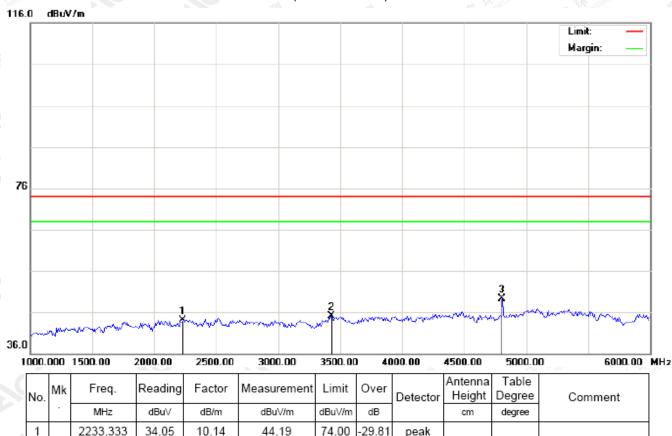
#### **RESULT: PASS**

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Report No.: AGC00116180302FE03 Page 33 of 61



74.00

74.00

28.91

24.76

peak

peak

### RADIATED EMISSION TEST- (ABOVE 1GHz)-LOW CHANNEL- VERTICAL

**RESULT: PASS** 

2

3

3433.333

4804.000

33.04

41.55

12.05

7.69

45.09

49.24

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# 116.0 dBuV/m Limit: Margin: 76 3×

RADIATED EMISSION TEST- (ABOVE 1GHz)-MIDDLE CHANNEL-HORIZONTAL

36.0

· · ·	·												8
1	000	.000	1500.00	2000.00	2500.00	3000.00	3500.00	) 40	00.00	4500.00	5000.00	6000.00	MHz
	No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment	Con
1		-	MHz	dBu∀	dB/m	dBuV/m	dBu∨/m	dB		cm	degree		9
	1		2616.667	34.33	10.71	45.04	74.00	-28.96	peak				]
1.0	2		3941.667	30.60	14.83	45.43	74.00	-28.57	peak				1
2	3	*	4882.000	42.66	7.89	50.55	74.00	-23.45	peak				. 27

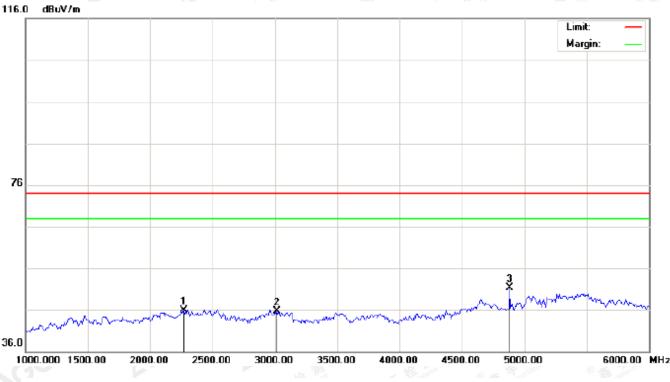
**RESULT: PASS** 

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Report No.: AGC00116180302FE03 Page 35 of 61



#### RADIATED EMISSION TEST- (ABOVE 1GHz)-MIDDLE CHANNEL- VERTICAL

No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBu∨	dB/m	dBu\//m	dBuV/m	dB		cm	degree	
ं 1		2266.667	35.83	10.17	46.00	74.00	-28.00	peak			
2		3016.667	34.06	11.66	45.72	74.00	-28.28	peak			
3	*	4882.000	43.39	7.89	51.28	74.00	-22.72	peak			

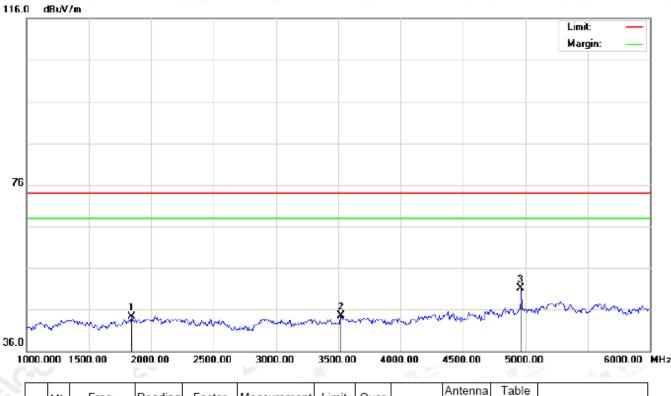
**RESULT: PASS** 

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Report No.: AGC00116180302FE03 Page 36 of 61



#### RADIATED EMISSION TEST- (ABOVE 1GHz)-HIGH CHANNEL-HORIZONTAL

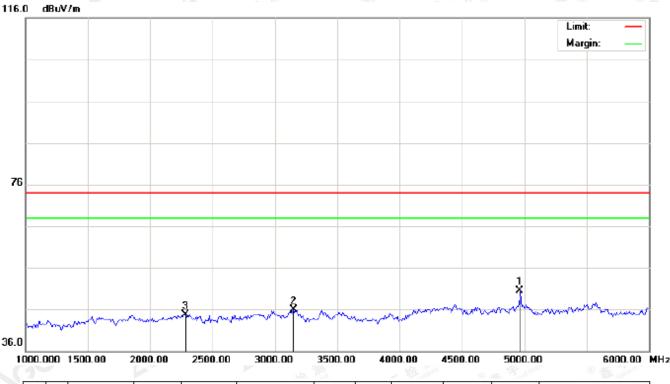
No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height		Comment
		MHz	dBu∨	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		1841.667	36.07	8.21	44.28	74.00	-29.72	peak			
2		3525.000	32.29	12.26	44.55	74.00	-29.45	peak			
3	*	4960.000	43.10	8.09	51.19	74.00	-22.81	peak			

**RESULT: PASS** 

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#### RADIATED EMISSION TEST- (ABOVE 1GHz)-HIGH CHANNEL- VERTICAL

No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
	-	MHz	dBu∨	dB/m	dBuV/m	dBu∨/m	dB		cm	degree	
1	*	4960.000	42.41	8.09	50.50	74.00	-23.50	peak			
2		3150.000	34.14	11.78	45.92	74.00	-28.08	peak			
3		2283.333	34.55	10.19	44.74	74.00	-29.26	peak			

#### **RESULT: PASS**

Note: 6~25GHz at least have 20dB margin. 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.

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Report No.: AGC00116180302FE03 Page 38 of 61

#### **10. BAND EDGE EMISSION**

#### 10.1. MEASUREMENT PROCEDURE

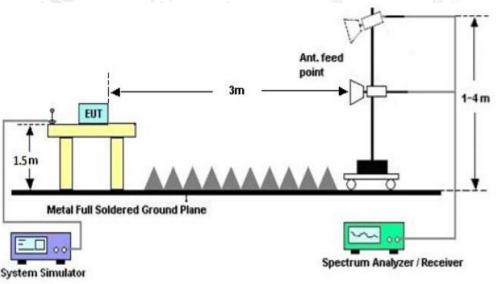
1. The EUT operates at hopping-off test mode. The lowest or highest channels are tested to verify the largest transmission and spurious emissions power at the continuous transmission mode.

2. Max hold the trace of the setup 1, and the EUT operates at hopping-on test mode to verify the largest spurious emissions power.

3. Set the spectrum analyzer in the following setting in order to capture the lower and upper band-edges of the emission.

Start	frequency(MH	z)	Stop frequency(MHz)			
The second	2200	South Contraction	not C The station	2405	SCC -	
C Treasulton of Circles	2478	C Allestation of Gird	GO	2500		

#### 10.2 TEST SETUP



RADIATED EMISSION TEST SETUP

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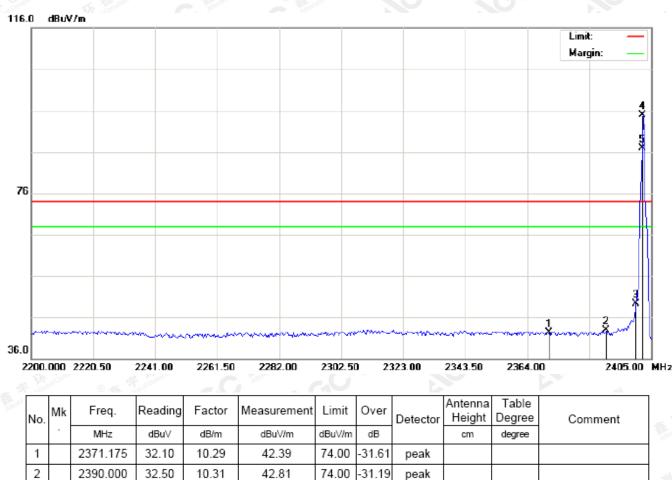


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#### **10.3 RADIATED TEST RESULT**

#### (Worst modulation: GFSK)

#### TEST PLOT OF BAND EDGE FOR LOW CHANNEL-Horizontal



74.00

74.00

74.00

-24.76

20.92

12.94

peak

peak

AVG

100

247

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3

4

5 | X

2400.000

2402.000

2402.000

38.92

84.60

76.62

10.32

10.32

10.32

49.24

94.92

86.94



Report No.: AGC00116180302FE03 Page 40 of 61



74.00

74.00

74.00

74.00

-32.48

-30.12

12.41

20.42

peak

peak

AVG

peak

100

157

TEST PLOT OF BAND EDGE FOR LOW CHANNEL -Vertical

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2

3

4

5

Х

2390.000

2400.000

2402.000

2402.267

31.21

33.56

76.09

84.10

10.31

10.32

10.32

10.32

41.52

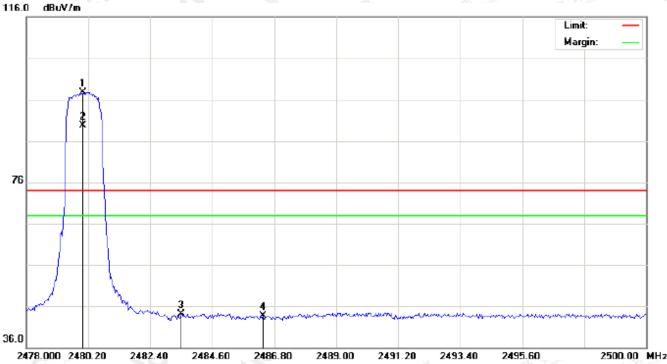
43.88

86.41

94.42

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Report No.: AGC00116180302FE03 Page 41 of 61



#### TEST PLOT OF BAND EDGE FOR HIGH CHANNEL -Horizontal

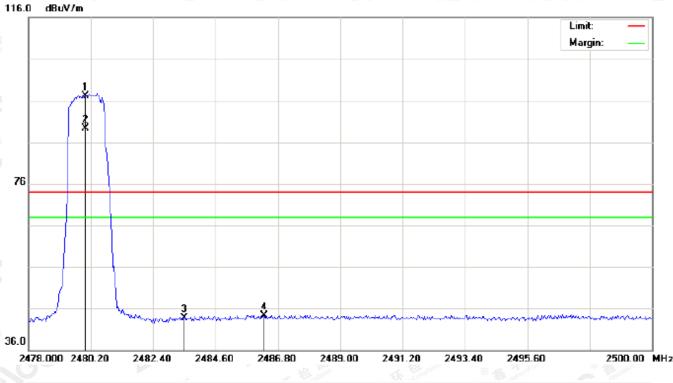
	No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height		Comment
		•	MHz	dBu∀	dB/m	dBuV/m	dBu∨/m	dB		cm	degree	
25	1	*	2480.000	87.21	10.41	97.62	74.00	23.62	peak			
stat	2	Х	2480.000	79.23	10.41	89.64	74.00	15.64	AVG	100	261	
	3		2483.500	33.69	10.41	44.10	74.00	-29.90	peak			
	4		2486.396	33.36	10.41	43.77	74.00	-30.23	peak			

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Report No.: AGC00116180302FE03 Page 42 of 61



#### TEST PLOT OF BAND EDGE FOR HIGH CHANNEL-Vertical

N	. I	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
1		-	MHz	dBu∀	dB/m	dBu∀/m	dBuV/m	dB		cm	degree	
1		*	2480.000	86.75	10.41	97.16	74.00	23.16	peak			
2	2	Х	2480.000	78.80	10.41	89.21	74.00	15.21	AVG	100	134	
3	1		2483.500	33.26	10.41	43.67	74.00	-30.33	peak			
4			2486.323	33.94	10.41	44.35	74.00	-29.65	peak			

#### **RESULT: PASS**

Note: Factor=Antenna Factor + Cable loss - Amplifier gain, Over=Measure-Limit.

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

Hopping on mode and Hopping off mode have been tested, but only worst case reported.

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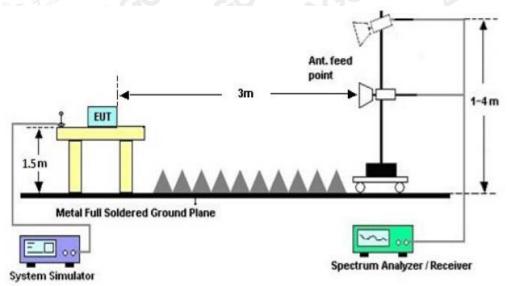
#### Report No.: AGC00116180302FE03 Page 43 of 61

#### 11. 20DB BANDWIDTH

#### **11.1. MEASUREMENT PROCEDURE**

- 1. Set the EUT Work on the top, the middle and the bottom operation frequency individually.
- 2. Set Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hoping channel
- RBW  $\geq$  1% of the 20 dB bandwidth, VBW  $\geq$  3RBW; Sweep = auto; Detector function = peak
- 3. Set SPA Trace 1 Max hold, then View.

#### 11.2. TEST SET-UP



#### 11.3. LIMITS AND MEASUREMENT RESULTS

BLUETOOTH 1MBPS LIMITS AND MEASUREMENT RESULT							
	Measurement Result						
Applicable Limits		Desult					
		99%OBW (MHz)	-20dB BW(MHz)	Result			
Hard Constant	Low Channel	0.933	1.085	PASS			
N/A	Middle Channel	0.925	1.098	PASS			
	High Channel	0.925	1.112	PASS			

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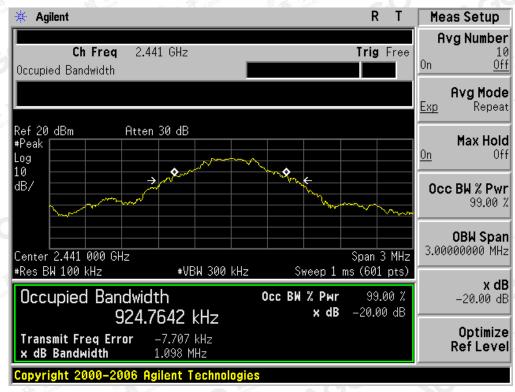


#### TEST PLOT OF BANDWIDTH FOR LOW CHANNEL

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#### TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL



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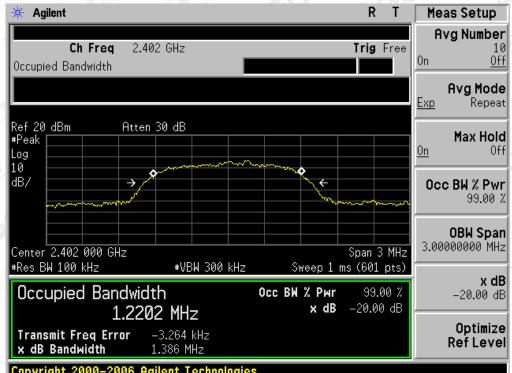
#### TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL

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BLUETOOTH 2MBPS LIMITS AND MEASUREMENT RESULT							
	Measurement Result						
Applicable Limits		Dec. II					
		99%OBW (MHz)	-20dB BW(MHz)	Result			
The fill and the fille	Low Channel	1.220	1.386	PASS			
N/A	Middle Channel	1.205	1.369	PASS			
	High Channel	1.210	1.363	PASS			
	10-	-2000	Mr. Con	Vope. Mon			

TEST PLOT OF BANDWIDTH FOR LOW CHANNEL



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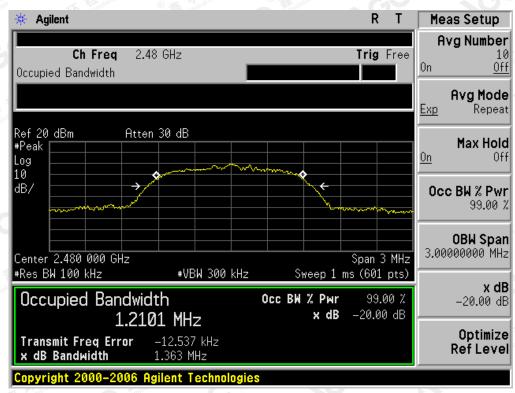
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#### TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL

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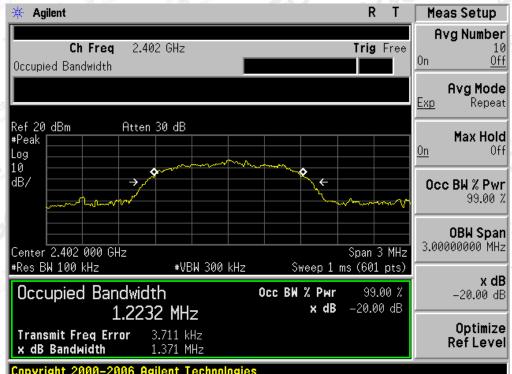
#### TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL



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BLUETOOTH 3MBPS LIMITS AND MEASUREMENT RESULT							
	Measurement Result						
Applicable Limits		Dec. K					
		99%OBW (MHz)	-20dB BW(MHz)	Result			
The fill and the f	Low Channel	1.223	1.371	PASS			
N/A	Middle Channel	1.208	1.345	PASS			
	High Channel	1.226	1.359	PASS			
		-1100	M. N.Co.	obu Alu			

TEST PLOT OF BANDWIDTH FOR LOW CHANNEL



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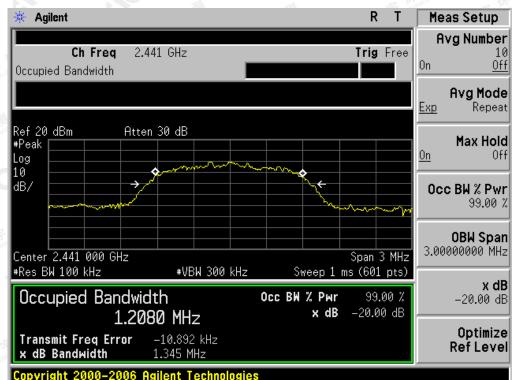
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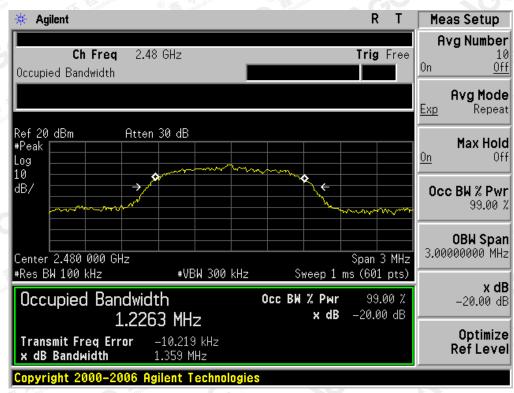
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#### TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL

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#### TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL



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## **12. FCC LINE CONDUCTED EMISSION TEST**

#### 12.1. LIMITS OF LINE CONDUCTED EMISSION TEST

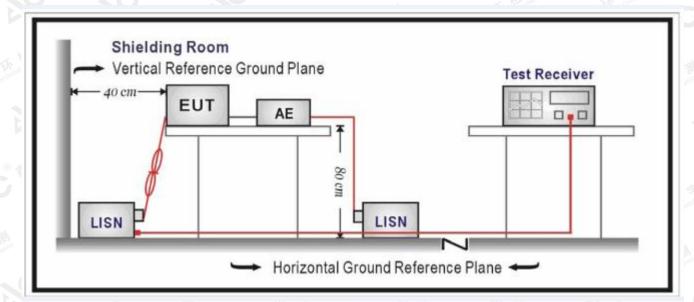
Francisco	Maximum RF Line Voltage					
Frequency	Q.P.( dBuV)	Average( dBuV)				
150kHz~500kHz	66-56	56-46				
500kHz~5MHz	© 56 56	46				
5MHz~30MHz	60	50				

Note:

1. The lower limit shall apply at the transition frequency.

2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.

#### 12.2. BLOCK DIAGRAM OF LINE CONDUCTED EMISSION TEST



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Report No.: AGC00116180302FE03 Page 51 of 61

#### 12.3. PRELIMINARY PROCEDURE OF LINE CONDUCTED EMISSION TEST

- The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. When the EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10 (see Test Facility for the dimensions of the ground plane used). When the EUT is a floor-standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.
- 2. Support equipment, if needed, was placed as per ANSI C63.10.
- 3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10.
- 4. All support equipments received AC120V/60Hz power from a LISN, if any.
- 5. The EUT received DC charging voltage by adapter or PC which received 120V/60Hzpower by a LISN.
- 6. The test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
- 7. Analyzer / Receiver scanned from 150 kHz to 30MHz for emissions in each of the test modes.
- 8. During the above scans, the emissions were maximized by cable manipulation.
- 9. The test mode(s) were scanned during the preliminary test.

Then, the EUT configuration and cable configuration of the above highest emission level were recorded for reference of final testing.

#### 12.4. FINAL PROCEDURE OF LINE CONDUCTED EMISSION TEST

- 1. EUT and support equipment was set up on the test bench as per step 2 of the preliminary test.
- A scan was taken on both power lines, Line 1 and Line 2, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit. If EUT emission level was less –2dB to the A.V. limit in Peak mode, then the emission signal was re-checked using Q.P and Average detector.
- 3. The test data of the worst case condition(s) was reported on the Summary Data page.

#### 12.5. TEST RESULT OF LINE CONDUCTED EMISSION TEST

N/A

Note: The BT function of EUT isn't work when charging.

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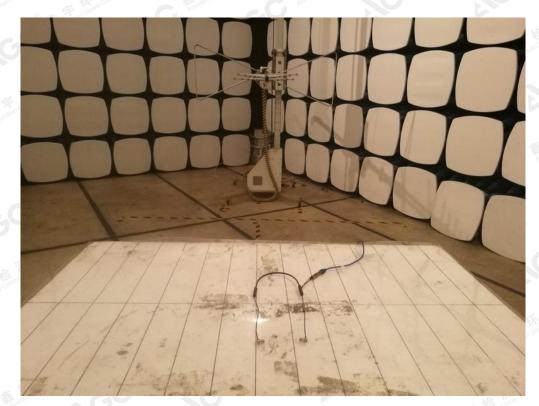




Report No.: AGC00116180302FE03 Page 52 of 61

APPENDIX A: PHOTOGRAPHS OF TEST SETUP FCC RADIATED EMISSION TEST SETUP



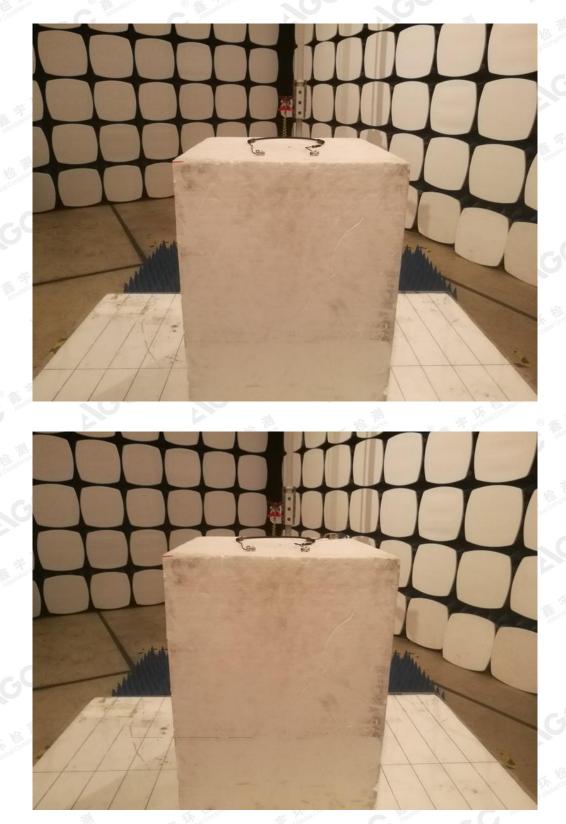


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Report No.: AGC00116180302FE03 Page 53 of 61



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Report No.: AGC00116180302FE03 Page 54 of 61

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#### APPENDIX B: PHOTOGRAPHS OF EUT ALL VIEW OF EUT

TOP VIEW OF EUT



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Report No.: AGC00116180302FE03 Page 55 of 61

#### BOTTOM VIEW OF EUT



FRONT VIEW OF EUT



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Report No.: AGC00116180302FE03 Page 56 of 61

#### BACK VIEW OF EUT



LEFT VIEW OF EUT



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Report No.: AGC00116180302FE03 Page 57 of 61

#### **RIGHT VIEW OF EUT**



#### VIEW OF EUT (PORT)



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Report No.: AGC00116180302FE03 Page 58 of 61

#### OPEN VIEW OF EUT



#### **VIEW OF BATTERY**



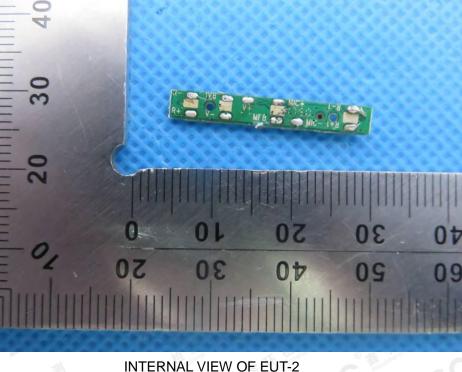
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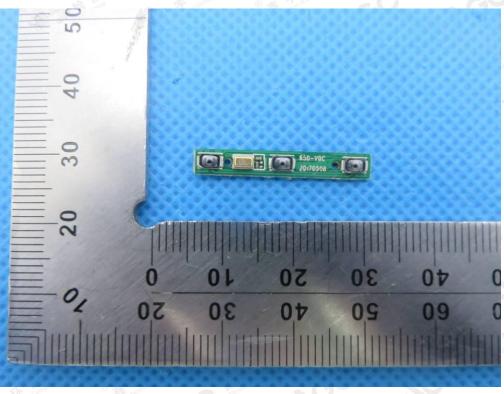


Report No.: AGC00116180302FE03 Page 59 of 61

#### **INTERNAL VIEW OF EUT-1**



#### **INTERNAL VIEW OF EUT-2**



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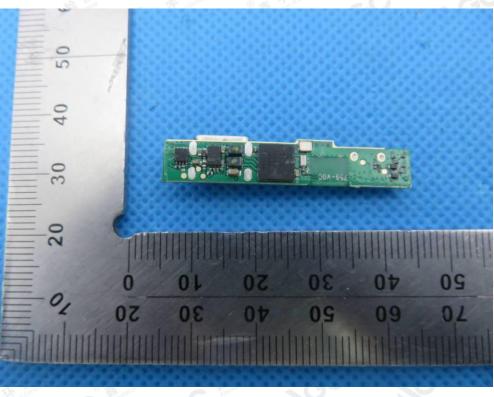


Report No.: AGC00116180302FE03 Page 60 of 61

## 0 5 0 Antenna 0 30 20 20 08 0 7 01 01 20 30 07 09 09

#### INTERNAL VIEW OF EUT-3

**INTERNAL VIEW OF EUT-4** 

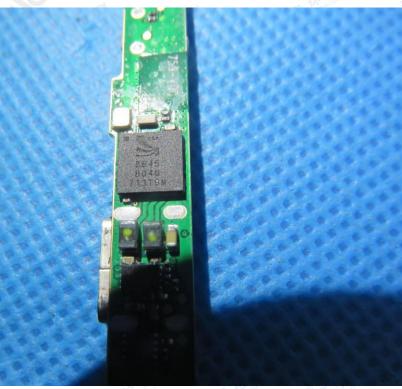


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Report No.: AGC00116180302FE03 Page 61 of 61

#### **INTERNAL VIEW OF EUT-5**



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