Report No.: AGC06426160901FE08

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FCC Test Report

Report No.: AGC08116161202FE08

FCC ID : 2AF9F-1337R

APPLICATION PURPOSE: Original Equipment

PRODUCT DESIGNATION: CHIP Pro

BRAND NAME : CHIP Pro

MODEL NAME : CHIP-PRO

CLIENT : Next Thing Co

DATE OF ISSUE : Mar. 22, 2017

STANDARD(S) FCC Part 15.247

TEST PROCEDURE(S) KDB 558074 v03r05

REPORT VERSION: V1.0

Attestation of Global Compliance (Shenzhen) Co., Ltd

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Report Revise Record

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	Mar. 22, 2017	Valid	Original Report

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1. VERIFICATION OF COMPLIANCE

Next Thing Co
1940 Union St#32, Oakland CA
Next Thing Co
1940 Union St#32, Oakland CA
CHIP Pro
CHIP Pro
CHIP-PRO
Feb. 20, 2017~Mar. 16, 2017
None
Normal
AGCRT-US-BLE/RF

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 requirement of FCC Part 15 Rules requirement.

Tested By	demone itnong	
	Donjon Huang(Huang Dongyang)	Mar. 16, 2017
Reviewed By	Bore xie	
	Bart Xie(Xie Xiaobin)	Mar. 22, 2017
Approved By	Solya Zhong	
	Solger Zhang(Zhang Hongyi) Authorized Officer	Mar. 22, 2017

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2.GENERAL INFORMATION 2.1PRODUCT DESCRIPTION

The EUT is designed as "CHIP Pro". It is designed by way of utilizing the FHSS technology to achieve the system operation.

A major technical description of EUT is described as following

Operation Frequency	2.402 GHz to 2.480GHz
Bluetooth Version	V4.2
Modulation	GFSK
Number of channels	40 Channel(37 Hopping Channel,3 advertising Channel)
Antenna Designation	AA107:PCB Antenna HCX-P321:PCB Antenna FXP73: PCB Antenna AA055: Ceramic Antenna
Antenna Gain	AA107:3.3dBi; HCX-P321:2dBi; FXP73:2.5dBi; AA055:2.5dBi
Hardware Version	V1.0
Software Version	Fcc-20170109-b6281346
Power Supply	DC5V by PC

2.2 RELATED SUBMITTAL(S)/GRANT(S)

This submittal(s) (test report) is intended for **FCC ID: 2AF9F-1337R** filing to comply with Section 15.247of the FCC Part 15, Subpart C Rules.

2.3TEST METHODOLOGY

All measurements contained in this report were conducted with KDB 558074 D01 DTS Meas Guidance v03r05, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

The equipment under test (EUT) was configured to measure its highest possible emission level. The test modes were adapted accordingly in reference to the Operating Instructions. The EUT was tested in all three orthogonal planes and the worse case was showed.

2.4 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 C63.10:2013.	

2.5 SPECIAL ACCESSORIES

Refer to section 2.2.

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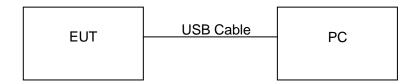
2.6 EQUIPMENT MODIFICATIONS

Not available for this EUT intended for grant.

3. SYSTEM TEST CONFIGURATION

3.1 CONFIGURATION OF TESTED SYSTEM

Configuration:



3.2 EQUIPMENT USED IN TESTED SYSTEM

Item	Equipment	Model No.	ID or Specification	Note
1	CHIP Pro	CHIP-PRO	2AF9F-1337R	EUT
2	Lenovo	B460	WB03928113	PC
3	USB Cable	N/A	N/A	Accessory

ALL TEST EQUIPMENT LIST

FOR RADIATED EMISSION TEST (BELOW 1GHZ)

Radiated Emission Test Site						
Name of Equipment	Name of Equipment Manufacturer		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 5, 2016	June 4, 2017	
MULTI-DEVICE Positioning Controller	Max-Full	MF-7802	MF780208339	N/A	N/A	
Active loop antenna (9K-30MHz)	Schwarzbeck	FMZB1519	1519-038	June 5, 2016	June 4, 2017	
Spectrum analyzer	Agilent	E4407B	MY46185649	June 5, 2016	June 4, 2017	
Power Probe	R&S	NRP-Z23	100323	July 24,2016	July 23,2017	
RF attenuator	N/A	RFA20db	68	N/A	N/A	

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FOR RADIATED EMISSION TEST (1GHZ ABOVE)

Radiated Emission Test (1GHZ ABOVE) Radiated Emission Test Site									
Name of Equipmen	Name of Equipment Manufacturer Model Number Serial Last Due Calibration Calibration								
EMI Test Receiver Rohde & Sch		warz	ESCI		101417		July 3, 20		July 2, 2017
Horn Antenna (1G-18GHz)		SCHWARZBECK		BBHA9120D		6	July 10, 2		July 9, 2017
Spectrum Analyzei	r Agilent		E4411B		MY451145	3	July 3, 20	016	July 2, 2017
Signal Amplifier	SCHWARZBI	ECK	BBV 9718		9718-269		July 6, 20	016	July 5, 2017
RF Cable	SCHWARZBI	ECK	AK9515H		96220		July 7, 20	016	July 6, 2017
3m Anechoic Chamb	oer CHENGYL	J	966		PTS-001		June 5, 2	016	June 4, 2017
MULTI-DEVICE Positioning Controlle	er Max-Full		MF-7802		MF78020833	39	N/A		N/A
Horn Ant (18G-40GF	lz) Schwarzbe	ck	BBHA 9170)	9170-181		June 5, 2	016	June 4, 2017
Power Probe	R&S		NRP-Z23		100323		July 24,2016		July 23,2017
RF attenuator	N/A	RFA20db			68		N/A		N/A
	C	ondu	cted Emission	Те	st Site				
Name of Equipment	Manufacturer	Мос	del Number	Se	rial Number	Ca	Last alibration	Due	e Calibration
EMI Test Receiver	Rohde & Schwarz		ESCI		101417	Ju	ly 3, 2016	J	uly 2, 2017
Artificial Mains Network	Narda		L2-16B	00	00WX31025	Ju	ly 7, 2016	J	uly 6, 2017
Artificial Mains Network (AUX)	Narda		L2-16B	00	00WX31026	Ju	ly 7, 2016	J	uly 6, 2017
RF Cable	SCHWARZBECK	P	AK9515E		96222 July 3, 2016		July 2, 2017		
Shielded Room	CHENGYU		843		PTS-002 June 5,2016		June 4,2017		
	C	Conducted Emission Test Site							
Name of Equipment	Manufacturer	Mod	del Number	Se	rial Number	Ca	Last alibration	Due	e Calibration
EMI Test Receiver	Rohde & Schwarz		ESCI		101417	Ju	ly 3, 2016	J	uly 2, 2017
Artificial Mains Network	Narda		L2-16B	00	00WX31025	Ju	ly 7, 2016	J	uly 6, 2017
Artificial Mains Network (AUX)	Narda		L2-16B	00	00WX31026	Ju	ly 7, 2016	J	uly 6, 2017
	001114/4 DZDE01/	AK9515E							
RF Cable	SCHWARZBECK	F	AK9515E		96222	Ju	ly 3, 2016	J	uly 2, 2017

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4. SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT
§ 15.203	Antenna Requirement	Compliant
§15.209 §15.247(d)	Radiated Emission	Compliant
§15.247(d)	Band Edges	Compliant
§15.247	6 dB Bandwidth	Compliant
§15.247(b)	Conducted Power	Compliant
§15.247(e)	Maximum Conducted Output Power SPECTRAL Density	Compliant
§15.207	Conduction Emission	Compliant

5. DESCRIPTION OF TEST MODES

The EUT has been operated in three modulations: GFSK independently.

NO.	TEST MODE DESCRIPTION
1	Low channel TX
2	Middle channel TX
3	High channel TX
4	Normal Operating (BT)

Note:

- 1. All the test modes can be supply by PC, only the result of the worst case was recorded in the report if no any records.
- 2. For Radiated Emission, 3axis were chosen for testing for each applicable mode.
- 3. Eut is operating at its maximum duty cycle>or equal 98%

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6. ANTENNA REQUIREMENT

6.1. STANDARD APPLICABLE

According to FCC 15.203, An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of Sections 15.211, 15.213, 15.217, 15.219, or 15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with Section 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this Part are not exceeded.

6.2. TEST RESULT

In addition to permanent antenna, the product could be connected with some detachable antennas. Note: The U.FL / IPEX antenna connector is not considered as a type of unique antenna coupling. However, as the installation of this module would be done by OEM integrator, it could be considered as a professional installation.

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7. RADIATED EMISSION

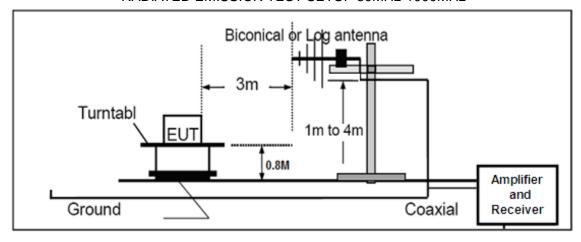
7.1 MEASUREMENT PROCEDURE

- 1. Configure the EUT according to ANSI C63.10. The EUT was placed on the top of the turntable 0.8 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. The EUT was placed on the top of the turntable 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.
- 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.

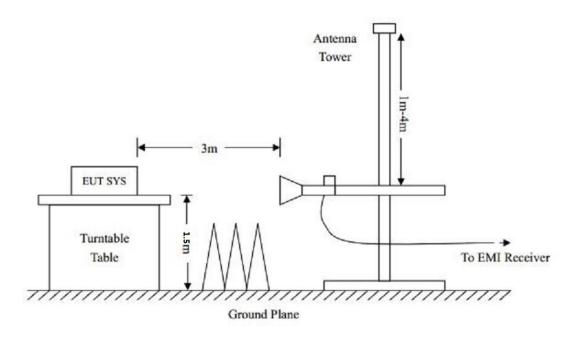
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7.2 TEST SETUP

RADIATED EMISSION TEST SETUP 30MHz-1000MHz



RADIATED EMISSION TEST SETUP ABOVE 1000MHz



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7.3 LIMITS AND MEASUREMENT RESULT

15.209 Limit in the below table has to be followed

Frequencies (MHz)	Field Strength (micorvolts/meter)	Measurement Distance (meters)
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

Note: All modes were tested For restricted band radiated emission,

the test records reported below are the worst result compared to other modes.

7.4 TEST RESULT

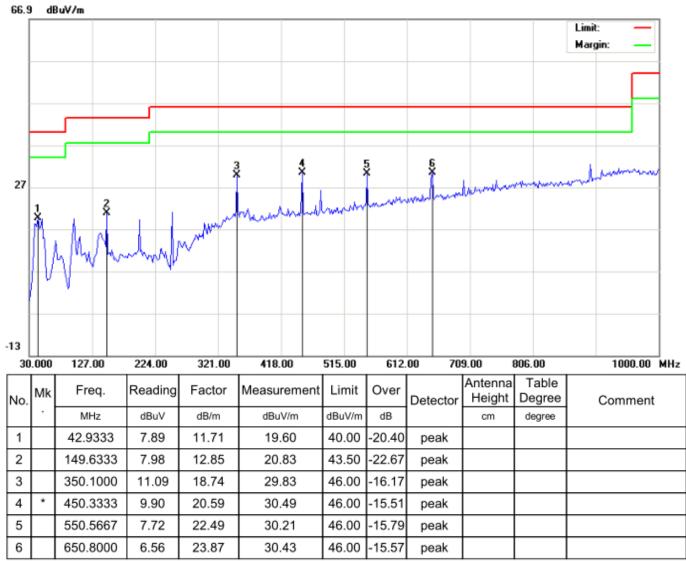
RADIATED EMISSION BELOW 30MHZ

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

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RADIATED EMISSION BELOW 1GHZ

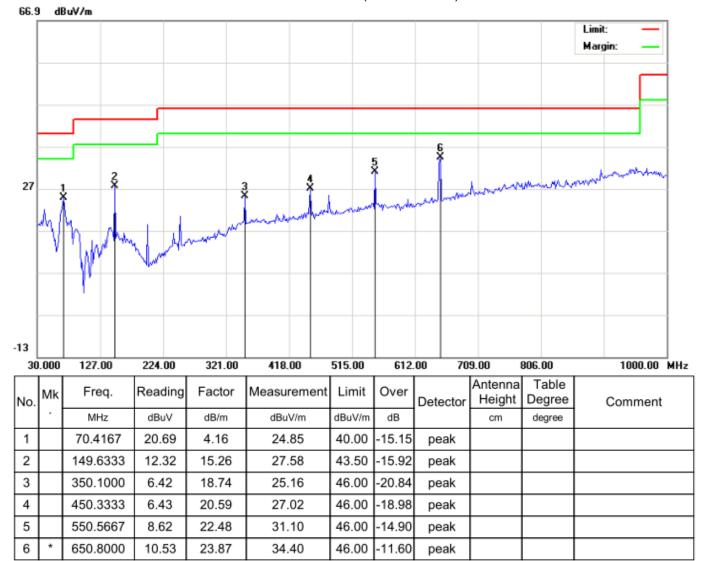
RADIATED EMISSION TEST- (30MHZ-1GHZ) -HORIZONTAL



RESULT: PASS

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RADIATED EMISSION TEST- (30MHZ-1GHZ) -VERTICAL



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.
- 3. All modes were tested (matched worst case antenna), only the worst case record in the report

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RADIATED EMISSION ABOVE 1GHZ

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector	Comment
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Туре	Comment
Low Channel (2402 MHz)							
4804	40.22	10.44	50.66	74	-23.34	Pk	Horizontal
4804	29.17	10.44	39.61	54	-14.39	AV	Horizontal
7206	42.06	12.39	54.45	74	-19.55	pk	Horizontal
7206	29.08	12.39	41.47	54	-12.53	AV	Horizontal
4804	43.10	10.4	53.50	74	-20.50	Pk	Vertical
4804	28.54	10.4	38.94	54	-15.06	AV	Vertical
7206	32.70	12.75	45.45	74	-28.55	Pk	Vertical
7206	27.95	12.75	40.70	54	-13.30	AV	Vertical
			Mid Channel (2440	MHz)			
4880	38.59	10.4	48.99	74	-25.01	Pk	Horizontal
4880	29.75	10.4	40.15	54	-13.85	AV	Horizontal
7320	40.26	12.75	53.01	74	-20.99	Pk	Horizontal
7320	30.80	12.75	43.55	54	-10.45	AV	Horizontal
4880	43.31	10.39	53.70	74	-20.30	Pk	Vertical
4880	27.98	10.44	38.42	54	-15.58	AV	Vertical
7320	39.87	12.68	52.55	74	-21.45	Pk	Vertical
7320	30.90	12.68	43.58	54	-10.42	AV	Vertical
			High Channel (2480	MHz)			
4960	43.23	10.39	53.62	74	-20.38	pk	Horizontal
4960	26.04	10.39	36.43	54	-17.57	AV	Horizontal
7440	39.36	12.68	52.04	74	-21.96	pk	Horizontal
7440	30.71	12.68	43.39	54	-10.61	AV	Horizontal
4960	37.05	10.39	47.44	74	-26.56	pk	Vertical
4960	27.13	10.39	37.52	54	-16.48	AV	Vertical
7440	39.85	12.68	52.53	74	-21.47	pk	Vertical
7440	30.97	12.68	43.65	54	-10.35	AV	Vertical

RESULT: PASS

Note: 1~25GHz scan with GFSK. No recording in the test report at least have 20dB margin.

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Emission Level = Meter Reading + Factor

Margin = Emission - Leve Limit

All modes were tested(matched worst case antenna), only the worst case record in the report

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8. BAND EDGE EMISSION

8.1. MEASUREMENT PROCEDURE

1)Radiated restricted band edge measurements

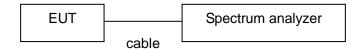
The radiated restricted band edge measurements are measured with an EMI test receiver connected to the receive antenna while the EUT is transmitting

- 2)Conducted Emissions at the bang edge
 - a)The transmitter output was connected to the spectrum analyzer
 - b)Set RBW=100kHz,VBW=300kHz
 - c)Suitable frequency span including 100kHz bandwidth from band edge

8.2. TEST SET-UP

Radiated same as 6.2

Conducted set up



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8.3. Radiated Test Result

oioi radiated rest result								
Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector	Comment	
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Туре		
	Low Channel (2402 MHz)							
2399.9	69.44	-13	56.44	74	-17.56	peak	Horizontal	
2399.9	55.13	-13	42.13	54	-11.87	AVG	Horizontal	
2400	65.17	-12.99	52.18	74	-21.82	peak	Horizontal	
2400	51.62	-12.99	38.63	54	-15.37	AVG	Horizontal	
2399.9	64.24	-12.97	51.27	74	-22.73	peak	Vertical	
2399.9	52.13	-12.97	39.16	54	-14.84	AVG	Vertical	
2400	66.18	-12.94	53.24	74	-20.76	peak	Vertical	
2400	54.18	-12.94	41.24	54	-12.76	AVG	Vertical	
			High Channe	l (2480 MHz)				
2483.5	68.40	-12.78	55.62	74	-18.38	peak	Horizontal	
2483.5	56.92	-12.78	44.14	54	-9.86	AVG	Horizontal	
2483.6	67.31	-12.77	54.54	74	-19.46	peak	Horizontal	
2483.6	54.25	-12.77	41.48	54	-12.52	AVG	Horizontal	
2483.5	70.36	-12.76	57.60	74	-16.40	peak	Vertical	
2483.5	53.45	-12.76	40.69	54	-13.31	AVG	Vertical	
2483.6	65.98	-12.72	53.26	74	-20.74	peak	Vertical	
2483.6	53.43	-12.72	40.71	54	-13.29	AVG	Vertical	

RESULT: PASS

Note: Factor=Antenna Factor + Cable loss - Amplifier gain,

Emission Level = Meter Reading + Factor

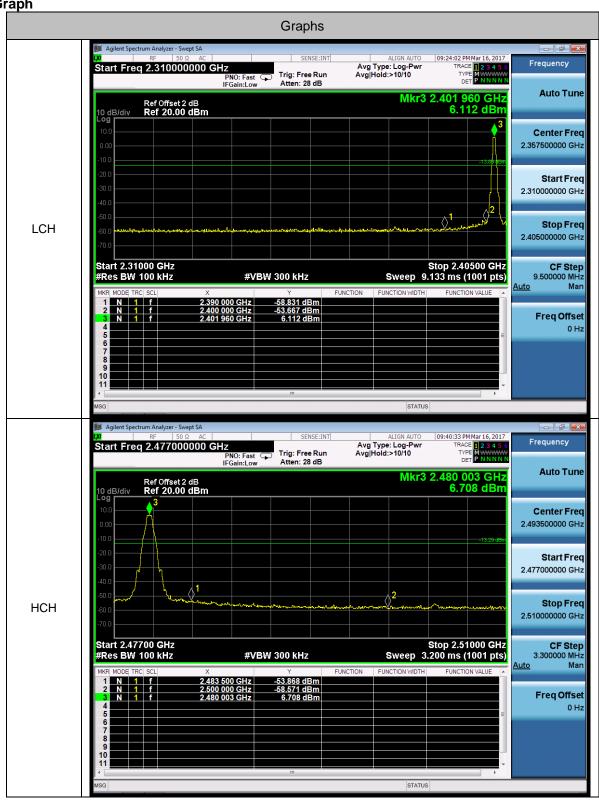
Margin= Emission Level -Limit.

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

All modes were tested (matched worst case antenna), only the worst case record in the report

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8.4. Conducted Test Result Test Graph



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9. 6DB BANDWIDTH

9.1. TEST PROCEDURE

- 1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
- 2. Set the EUT Work on the top, the middle and the bottom operation frequency individually.
- 3. Set SPA Centre Frequency = Operation Frequency, RBW= 100 KHz, VBW≥RBW.
- 4. Set SPA Trace 1 Max hold, then View.

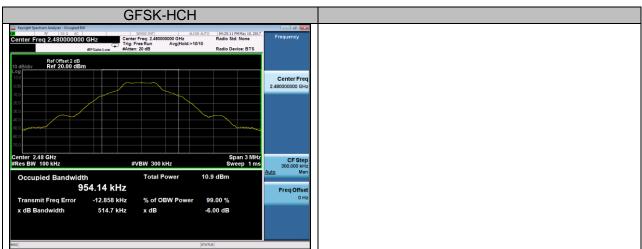
9.2. SUMMARY OF TEST RESULTS/PLOTS

Mode	Channel	6dB Bandwidth [KHz]	Verdict
BLE	LCH	513.4	PASS
BLE	MCH	512.2	PASS
BLE	HCH	514.7	PASS

Note: Two transmit antennas had been tested, the antenna 1 was the worst case and record in the test report.

Test Graph





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10. CONDUCTED OUTPUT POWER

10.1. MEASUREMENT PROCEDURE

- 1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
- 2. Set the EUT Work on the top, middle and the bottom operation frequency individually.
- 3. Use the following spectrum analyzer settings:

Set the RBW ≥ DTS bandwidth

Set the VBW \geq 3 x RBW Set the span \geq 3 x RBW

Detector = peak

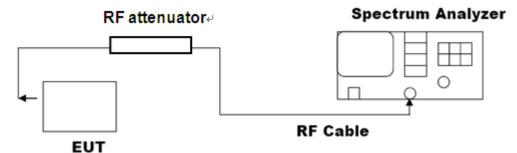
Sweep time = auto couple

Trace mode = max hold

- 4. Allow the trace to stabilize. Use peak marker function to determine the peak amplitude level
- 5. Record the result form the Spectrum Analyzer.

Note: The EUT was tested according to KDB 558074 for compliance to FCC 47CFR 15.247 requirements.

10.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)



10.3. LIMITS AND MEASUREMENT RESULT

Channel	Peak Power (dBm)		Applicable Limits	Pass/Fail	
	Ant1	Ant2	(dBm)		
Low Channel	5.175	-10.670	30	Pass	
Middle Channel	5.252	-10.666	30	Pass	
High Channel	6.277	-10.115	30	Pass	

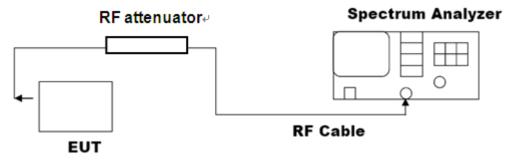
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11. MAXIMUM CONDUCTED OUTPUT POWER SPECTRAL DENSITY 11.1 MEASUREMENT PROCEDURE

- (1). Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
- (2). Set the EUT Work on the top, the middle and the bottom operation frequency individually.
- (3). Set SPA Trace 1 Max hold, then View.

Note: The EUT was tested according to KDB 558074 for compliance to FCC 47CFR 15.247 requirements.

11.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)



11.3 LIMITS AND MEASUREMENT RESULT

Mode	Channel	PSD [dB	m/3kHz]	Limit[dDm/2];U=1	Verdict	
Wiode	Onamer	Ant1	Ant2	Limit[dBm/3kHz]	verdict	
BLE	LCH	-2.656	-19.804	8	PASS	
BLE	MCH	-2.515	-19.811	8	PASS	
BLE	НСН	-2.984	-19.554	8	PASS	

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12. CONDUCTED SPURIOUS EMISSION

12.1. MEASUREMENT PROCEDURE

- 1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
- 2. Set the EUT Work on the top, the Middle and the bottom operation frequency individually.
- 3. Set the Span = wide enough to capture the peak level of the in-band emission and all spurious emissions from the lowest frequency generated in the EUT up through the 10th harmonic.
 - RBW = 100 kHz; VBW ≥ RBW; Sweep = auto; Detector function = peak.
- 4. Set SPA Trace 1 Max hold, then View.

Note: The EUT was tested according to DA000705 for compliance to FCC 47CFR 15.247 requirements. Owing to satisfy the requirements of the number of measurement points, we set the RBW=1MHz, VBW>RBW, scan up through 10th harmonic, and consider the tested results as the worst case, if the tested results conform to the requirement, we can deem that the real tested results(set the RBW=100KHz, VBW>RBW) are conform to the requirement.

12.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

The same as described in section 8.2

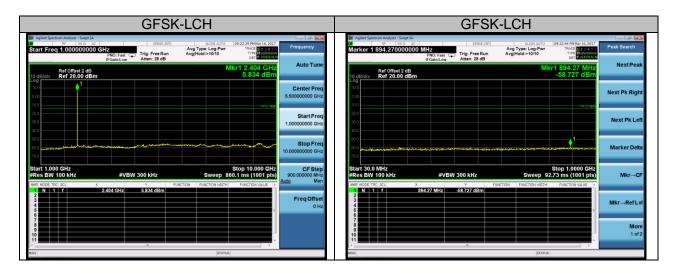
12.3. MEASUREMENT EQUIPMENT USED

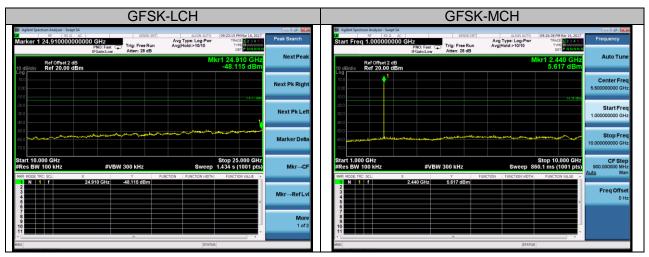
The same as described in section 6

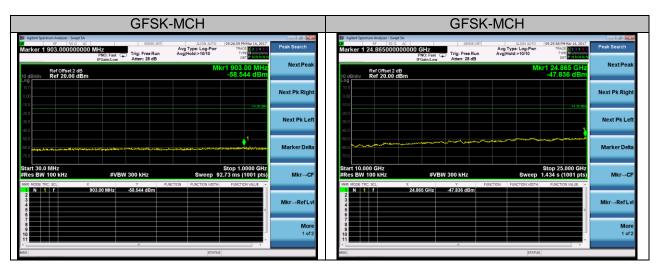
12.4. LIMITS AND MEASUREMENT RESULT

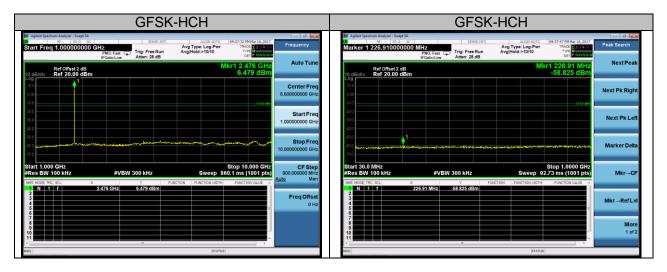
LIMITS AND MEASUREMENT RESULT						
Applicable Limite	Measurement Result					
Applicable Limits	Test Data	Criteria				
In any 100 KHz Bandwidth Outside the frequency band in which the spread spectrum	At least -20dBc than the limit Specified on the BOTTOM Channel	PASS				
intentional radiator is operating, the radio frequency power that is produce by the intentional radiator shall be at least 20 dB below that in 100KHz bandwidth within the band that contains the highest level of the desired power. In addition, radiation emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in§15.209(a))	At least -20dBc than the limit Specified on the TOP Channel	PASS				

Test Graph









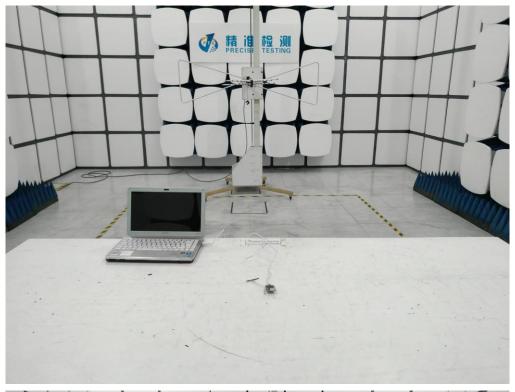


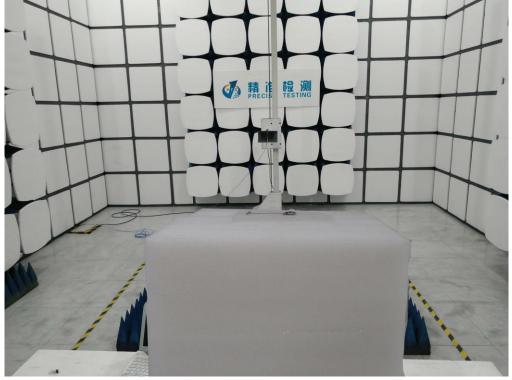
Note: All modes were tested, only the worst case record in the report.

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APPENDIX A: PHOTOGRAPHS OF TEST SETUP

FCC RADIATED EMISSION TEST SETUP





----END OF REPORT----