
FCC Test Report

Report No.: AGC02607150302FE03

FCC ID : 2ADPF-05224339

APPLICATION PURPOSE : Original Equipment

PRODUCT DESIGNATION : BOX

BRAND NAME : GHOST

MODEL NAME : GHOST Aerial
: GHOST Basic

CLIENT : Guangzhou EHang Intelligent Technologies Co., Ltd.

DATE OF ISSUE : May.06,2015

STANDARD(S) : FCC Part 15 Rules

TEST PROCEDURE(S)

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	/	May.06,2015	Valid	Original Report

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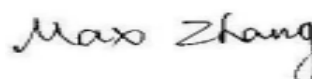
1. VERIFICATION OF CONFORMITY

Applicant	Guangzhou EHang Intelligent Technologies Co., Ltd.
Address	Floor 4, Vice-building, Grand View of the World, Aoti Road, Tianhe District, Guangzhou City, Guangdong Province
Manufacturer	Guangzhou EHang Intelligent Technologies Co., Ltd.
Address	Floor 4, Vice-building, Grand View of the World, Aoti Road, Tianhe District, Guangzhou City, Guangdong Province
Product Designation	BOX
Brand Name	GHOST
Test Model	GHOST Aerial
Series Model	GHOST Basic
Different Description	All the same except the model name and color.
Date of test	Apr.28,2015 to May.05,2015
Deviation	None
Condition of Test Sample	Normal
Report Template	AGCRT-US-BR/RF

We hereby certify that:

The above equipment was tested by Compliance Certification Services(Shenzhen) Inc. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.4 (2009) 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.

Prepared By



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May.06,2015

Checked By



Kidd Yang

May.06,2015

Authorized By



Solger Zhang

May.06,2015

2. GENERAL INFORMATION

2.1. PRODUCT DESCRIPTION

A major technical description of EUT is described as following

Operation Frequency(2.4G Module)	2405.5-2475MHz
Maximum field strength(2.4G Module)	89.50dBuV/m@3m(AV)
Modulation(2.4G Module)	FSK
Number of channels(2.4G Module)	160
Antenna Gain(2.4G Module)	2.41dBi
Antenna Designation(2.4G Module)	Component Antenna (Met 15.203 Antenna requirement)
Operation Frequency(BT Module)	2.402 GHz to 2.480GHz
Maximum field strength(BT Module)	86.73dBuV/m@3m(AV)
Bluetooth Version(BT Module)	V2.1+EDR
Modulation(BT Module)	GFSK, $\pi/4$ -DQPSK, 8DPSK
Number of channels(BT Module)	79
Antenna Gain(BT Module)	2.0dBi
Antenna Designation(BT Module)	PCB Antenna (Met 15.203 Antenna requirement)
Hardware Version	V2.4
Software Version	Android 1.0.3
Power Supply	DC3.7V by battery
Note: The USB port only used for charging and can't be used to transfer data with PC.	

2.2. TABLE OF CARRIER FREQUENCIES

For 2.4G Module

Group 1:

2410 MHz	2415 MHz	2420 MHz	2425 MHz	2427.5 MHz	2430 MHz	2432.5 MHz	2435 MHz
2440 MHz	2445 MHz	2450 MHz	2455 MHz	2460 MHz	2465 MHz	2470 MHz	2475 MHz

Group 2:

2409.5 MHz	2414.5 MHz	2419.5 MHz	2424.5 MHz	2427 MHz	2429.5 MHz	2432 MHz	2434.5 MHz
2439.5 MHz	2444.5 MHz	2449.5 MHz	2454.5 MHz	2459.5 MHz	2464.5 MHz	2469.5 MHz	2474.5 MHz

Group 3:

2409 MHz	2414 MHz	2419 MHz	2424 MHz	2426.5 MHz	2429 MHz	2431.5 MHz	2434 MHz
2439 MHz	2444 MHz	2449 MHz	2454 MHz	2459 MHz	2464 MHz	2469 MHz	2474 MHz

Group 4:

2408.5 MHz	2413.5 MHz	2418.5 MHz	2423.5 MHz	2426 MHz	2428.5 MHz	2431 MHz	2433.5 MHz
2438.5 MHz	2443.5 MHz	2448.5 MHz	2453.5 MHz	2458.5 MHz	2463.5 MHz	2468.5 MHz	2473.5 MHz

Group 5:

2408 MHz	2413 MHz	2418 MHz	2420.5 MHz	2423 MHz	2428 MHz	2430.5 MHz	2433 MHz
2438 MHz	2443 MHz	2448 MHz	2453 MHz	2458 MHz	2463 MHz	2468 MHz	2473 MHz

Group 6:

2407.5 MHz	2412.5 MHz	2417.5 MHz	2420 MHz	2422.5 MHz	2427.5 MHz	2430 MHz	2432.5 MHz
2437.5 MHz	2442.5 MHz	2447.5 MHz	2452.5 MHz	2457.5 MHz	2462.5 MHz	2467.5 MHz	2472.5 MHz

Group 7:

2407 MHz	2412 MHz	2417 MHz	2419.5 MHz	2422 MHz	2427 MHz	2429.5 MHz	2432 MHz
2437 MHz	2442 MHz	2447 MHz	2452 MHz	2457 MHz	2462 MHz	2467 MHz	2472 MHz

Group 8:

2406.5 MHz	2411.5 MHz	2416.5 MHz	2419 MHz	2421.5 MHz	2426.5 MHz	2429 MHz	2431.5 MHz
2436.5 MHz	2441.5 MHz	2446.5 MHz	2451.5 MHz	2456.5 MHz	2461.5 MHz	2466.5 MHz	2471.5 MHz

Group 9:

2406 MHz	2411 MHz	2416 MHz	2418.5 MHz	2421 MHz	2426 MHz	2428.5 MHz	2431 MHz
2436 MHz	2441 MHz	2446 MHz	2451 MHz	2456 MHz	2461 MHz	2466 MHz	2471 MHz

Group10:

2405.5 MHz	2410.5 MHz	2415.5 MHz	2417.5 MHz	2420.5 MHz	2425.5 MHz	2428 MHz	2430.5 MHz
2435.5 MHz	2440.5 MHz	2445.5 MHz	2450.5 MHz	2455.5 MHz	2460.5 MHz	2465.5 MHz	2470.5 MHz

Note: The EUT is actually a random switching in 10 groups when it starts.

For BT Module

Channel	Frequency (GHz)	Channel	Frequency (GHz)
01	2.402	42	2.443
02	2.403	43	2.444
03	2.404	44	2.445
04	2.405	45	2.446
05	2.406	46	2.447
06	2.407	47	2.448
07	2.408	48	2.449
08	2.409	49	2.450
09	2.410	50	2.451
10	2.411	51	2.452
11	2.412	52	2.453
12	2.413	53	2.454
13	2.414	54	2.455
14	2.415	55	2.456
15	2.416	56	2.457
16	2.417	57	2.458
17	2.418	58	2.459
18	2.419	59	2.460
19	2.420	60	2.461
20	2.421	61	2.462
21	2.422	62	2.463
22	2.423	63	2.464
23	2.424	64	2.465
24	2.425	65	2.466
25	2.426	66	2.467
26	2.427	67	2.468
27	2.428	68	2.469
28	2.429	69	2.470
29	2.430	70	2.471
30	2.431	71	2.472
31	2.432	72	2.473
32	2.433	73	2.474
33	2.434	74	2.475
34	2.435	75	2.476
35	2.436	76	2.477
36	2.437	77	2.478
37	2.438	78	2.479
38	2.439	79	2.480
39	2.440		
40	2.441		
41	2.442		

3. MEASUREMENT UNCERTAINTY

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

No.	Item	Uncertainty
1	Conducted Emission Test	$\pm 3.18\text{dB}$
2	All emissions, radiated	$\pm 3.91\text{dB}$
3	Temperature	$\pm 0.5^\circ\text{C}$
4	Humidity	$\pm 2\%$

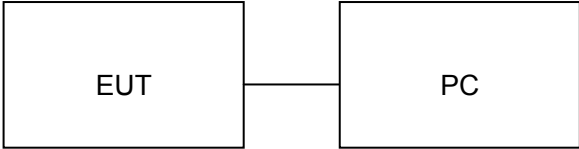
4. DESCRIPTION OF TEST MODES

NO.	TEST MODE DESCRIPTION
1	Low channel TX for 2.4G Module and BT Module in GFSK modulation simultaneously
2	Middle channel TX for 2.4G Module and BT Module in GFSK modulation simultaneously
3	High channel TX for 2.4G Module and BT Module in GFSK modulation simultaneously
4	Low channel TX for 2.4G Module and BT Module in $\pi/4$ -DQPSK modulation simultaneously
5	Middle channel TX for 2.4G Module and BT Module in $\pi/4$ -DQPSK modulation simultaneously
6	High channel TX for 2.4G Module and BT Module in $\pi/4$ -DQPSK modulation simultaneously
7	Low channel TX for 2.4G Module and BT Module in 8DPSK modulation simultaneously
8	Middle channel TX for 2.4G Module and BT Module in 8DPSK modulation simultaneously
9	High channel TX for 2.4G Module and BT Module in 8DPSK modulation simultaneously
10	Link mode for 2.4G Module and BT Module simultaneously
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.	

5. SYSTEM TEST CONFIGURATION

5.1. CONFIGURATION OF EUT SYSTEM

Configure :



5.2. EQUIPMENT USED IN EUT SYSTEM

Item	Equipment	Model No.	ID or Specification	Remark
1	BOX	GHOST Aerial	N/A	EUT
2	PC	ThinkpadL755	N/A	A.E

5.3. SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT
§15.249	Radiated Emission	Compliant
§15.249	Band Edges	Compliant
§15.207	Conduction Emission	Compliant

6. TEST FACILITY

Site	Compliance Certification Services(Shenzhen) Inc.
Location	Building 10-1, Mingkeda logistics park, huanguan South Road, guanlan town, Baoan District, Shenzhen, Guangdong, P.R.China
FCC Registration No.	441872
Description	The test site is constructed and calibrated to meet the FCC requirements in documents ANSI C63.4:2009.

7 ALL TEST EQUIPMENT LIST

Radiation Test equipment

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last Calibration	Calibrated Until
Universal Radio Communication Tester	R&S	CMU200	112012	2014.10.25	2015.10.24
Bilog Antenna	TESEQ	CBL6111D	34678	2014.10.25	2015.10.24
Low frequency cable	MURATA	R-03	130627	2014.10.25	2015.10.24
High frequency cable	HARBOUR	R-02	FL0000175	2014.10.25	2015.10.24
EMI Test Receiver	R&S	ESCI	101427	2014.10.25	2015.10.24
Antenna Mast	EM	SC100_1	N/A	N/A	N/A
Turn Table	EM	SC100	060531	N/A	N/A
50Ω Switch	Anritsu Corp	MP59B	6200983705	2014.07.06	2015.07.05
Spectrum Analyzer	Aglient	E4407B	MY50140340	2014.10.25	2015.10.24
Horn Antenna	Schwarbeck	BBHA 9120D	9120D-963	2014.10.25	2015.10.24
Pre-Amplifier	DASY 5	NO. WL-42W	9638	2014.10.25	2015.10.24

Conduction Test equipment

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last Calibration	Calibrated Until
EMI Test Receiver	R&S	ESPI	102086	2014.10.25	2015.10.24
LISN	R&S	ENV216	101242	2014.10.25	2015.10.24
LISN	EMCO	3810/2NM	000-23625	2014.10.25	2015.10.24
Absorbing clamp	R&S	MDS-21	100668	2014.10.27	2015.10.26
Temperature & Humidity Chamber	Mieo	HH660	N/A	2014.10.27	2015.10.26
Conduction Cable	EM	C01	N/A	2014.10.25	2015.10.24
Clamp Cable	EM	C02	N/A	2014.10.25	2015.10.24

8. RADIATED EMISSION

8.1 TEST LIMIT

Standard FCC15.249

Fundamental Frequency	Field Strength of Fundamental (millivolts/meter)	Field Strength of Harmonics (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 (MHz)	Distance Meters	Field Strengths Limit	
		μ V/m	dB(μ V)/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(μ V)/m (Peak) 54.0 dB(μ V)/m (Average)	

Remark: (1) Emission level $\text{dB } \mu \text{ V} = 20 \log \text{ Emission level } \mu \text{ V/m}$
 (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.

8.2. MEASUREMENT PROCEDURE

1. Configure the EUT according to ANSI C63.4. 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.
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.

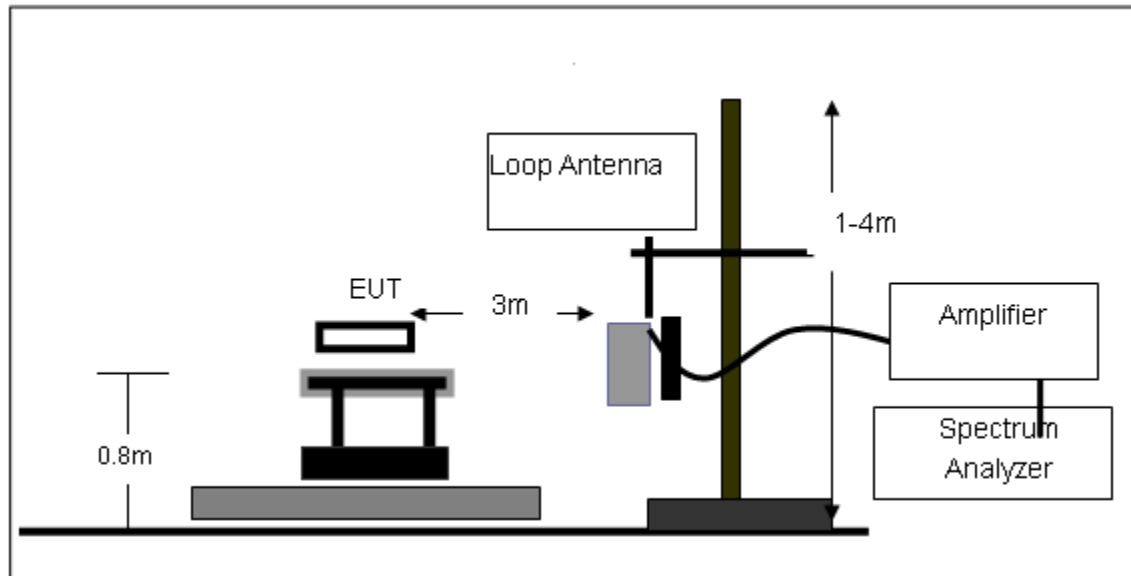
The following table is the setting of spectrum analyzer and receiver.

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

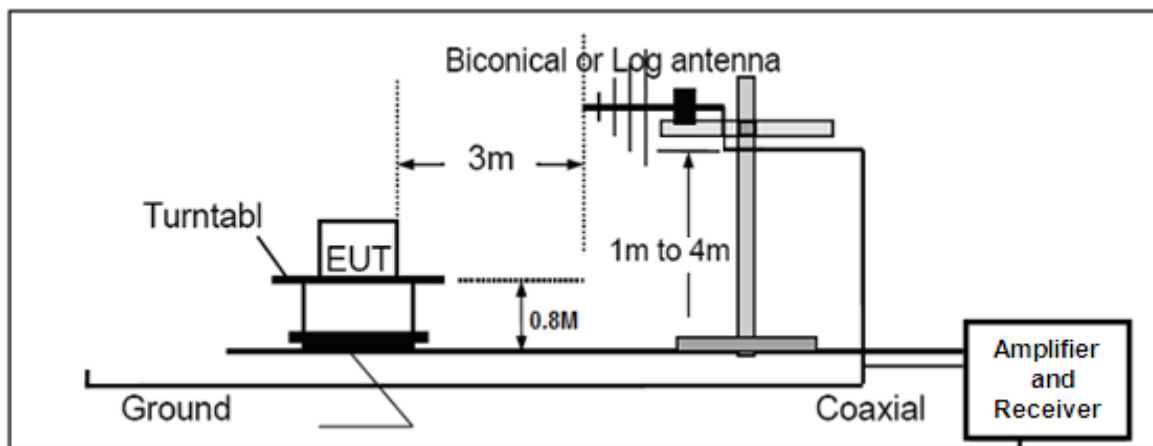
Receiver Parameter	Setting
Start ~Stop Frequency	9KHz~150KHz/RB 200Hz for QP
Start ~Stop Frequency	150KHz~30MHz/RB 9KHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RB 120KHz for QP

8.3. TEST SETUP

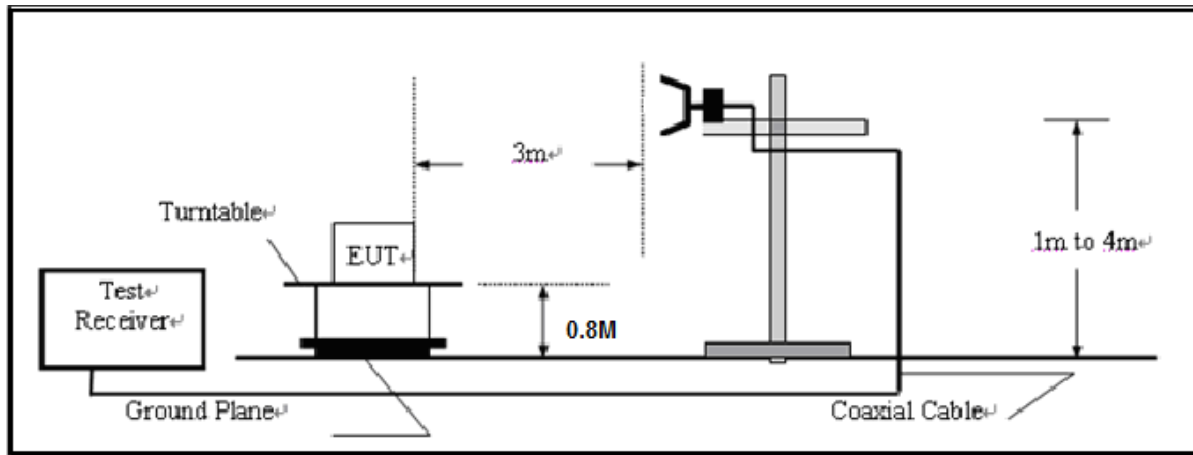
Radiated Emission Test-Setup Frequency Below 30MHz



RADIATED EMISSION TEST SETUP 30MHz-1000MHz



RADIATED EMISSION TEST SETUP ABOVE 1000MHz



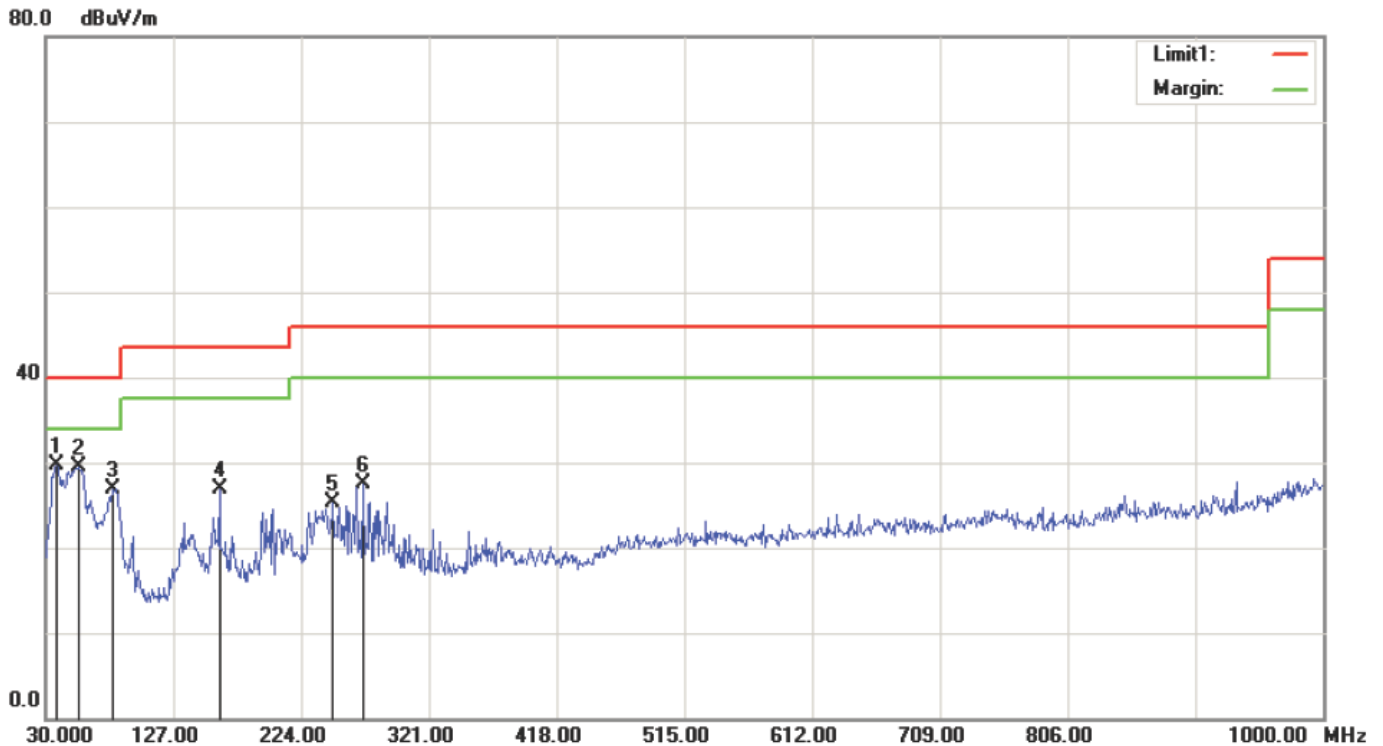
8.4. TEST RESULT(Worst modulation: GFSK)

RADIATED EMISSION BELOW 30MHZ

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

RADIATED EMISSION 30MHz- 1GHZ

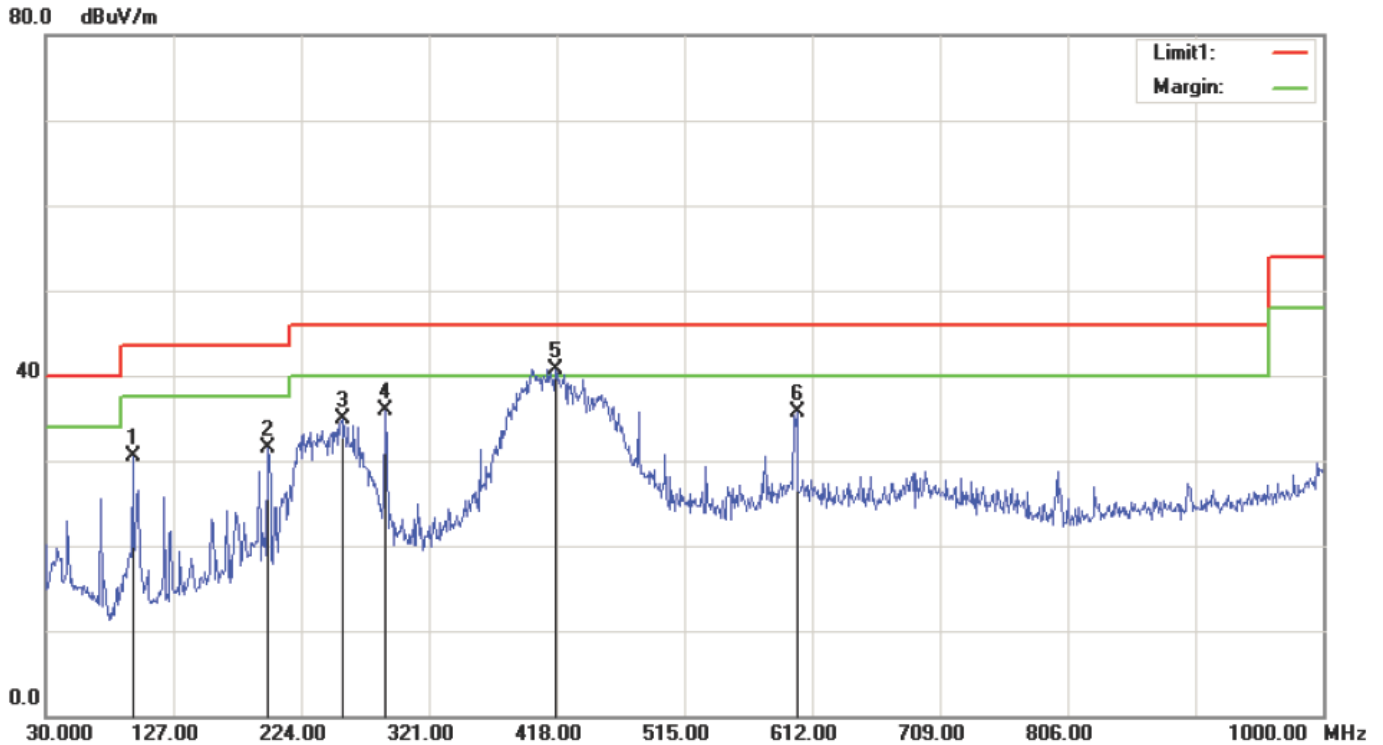
EUT :	BOX	Model Name. :	GHOST Aerial
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC3.7V
Test Mode :	Mode 10	Polarization :	Horizontal



No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (deg.)	Height (cm)	Remark
1*	38.7300	41.01	-11.27	29.74	40.00	-10.26			peak
2	55.2200	42.39	-12.80	29.59	40.00	-10.41			peak
3	81.4100	42.90	-15.95	26.95	40.00	-13.05			peak
4	161.9200	38.95	-11.95	27.00	43.50	-16.50			peak
5	248.2500	36.11	-10.81	25.30	46.00	-20.70			peak
6	270.5600	37.70	-10.16	27.54	46.00	-18.46			peak

RESULT: PASS

EUT :	BOX	Model Name. :	GHOST Aerial
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC3.7V
Test Mode :	Mode 10	Polarization :	Vertical



No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (deg.)	Height (cm)	Remark
1	95.9600	45.09	-14.52	30.57	43.50	-12.93			peak
2	198.7800	43.86	-12.27	31.59	43.50	-11.91			peak
3	255.0400	45.68	-10.75	34.93	46.00	-11.07			peak
4	288.0200	45.67	-9.82	35.85	46.00	-10.15			peak
5*	417.0300	49.35	-8.60	40.75	46.00	-5.25			peak
6	600.3600	41.47	-5.84	35.63	46.00	-10.37			peak

RESULT: PASS

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

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

RADIATED EMISSION ABOVE 1GHZ

EUT :	BOX	Model Name. :	GHOST Aerial
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC3.7V
Test Mode :	Mode 1	Polarization :	Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2405.513	108.54	-6.62	101.92	114	-12.08	peak
2405.513	96.12	-6.62	89.5	94	-4.5	AVG
4811.026	56.26	1.72	57.98	74	-16.02	peak
4811.026	46.38	1.72	48.1	54	-5.9	AVG
7216.539	48.57	8.11	56.68	74	-17.32	peak
7216.539	36.26	8.11	44.37	54	-9.63	AVG
2402.012	105.49	-6.63	98.86	114	-15.14	peak
2402.012	93.25	-6.63	86.62	94	-7.38	AVG
4804.024	54.26	1.69	55.95	74	-18.05	peak
4804.024	46.28	1.69	47.97	54	-6.03	AVG
7206.036	47.28	8.09	55.37	74	-18.63	peak
7206.036	38.56	8.09	46.65	54	-7.35	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

EUT :	BOX	Model Name. :	GHOST Aerial
Temperature :	20 ℃	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC3.7V
Test Mode :	Mode 1	Polarization :	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2405.513	107.51	-6.62	100.89	114	-13.11	peak
2405.513	94.26	-6.62	87.64	94	-6.36	AVG
4811.026	55.61	1.72	57.33	74	-16.67	peak
4811.026	44.57	1.72	46.29	54	-7.71	AVG
7216.539	47.91	8.11	56.02	74	-17.98	peak
7216.539	37.58	8.11	45.69	54	-8.31	AVG
2402.012	102.05	-6.63	95.42	114	-18.58	peak
2402.012	91.25	-6.63	84.62	94	-9.38	AVG
4804.024	55.18	1.69	56.87	74	-17.13	peak
4804.024	43.81	1.69	45.5	54	-8.5	AVG
7206.036	47.26	8.09	55.35	74	-18.65	peak
7206.036	38.61	8.09	46.7	54	-7.3	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

EUT :	BOX	Model Name. :	GHOST Aerial
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC3.7V
Test Mode :	Mode 2	Polarization :	Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2440.024	107.75	-6.45	101.3	114	-12.7	peak
2440.024	95.87	-6.45	89.42	94	-4.58	AVG
4880.048	54.31	1.95	56.26	74	-17.74	peak
4880.048	42.26	1.95	44.21	54	-9.79	AVG
7320.072	45.35	8.32	53.67	74	-20.33	peak
7320.072	34.47	8.32	42.79	54	-11.21	AVG
2441.021	104.98	-6.43	98.55	114	-15.45	peak
2441.021	92.56	-6.43	86.13	94	-7.87	AVG
4882.042	51.26	1.96	53.22	74	-20.78	peak
4882.042	40.85	1.96	42.81	54	-11.19	AVG
7323.063	44.63	8.33	52.96	74	-21.04	peak
7323.063	32.54	8.33	40.87	54	-13.13	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

EUT :	BOX	Model Name. :	GHOST Aerial
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC3.7V
Test Mode :	Mode 2	Polarization :	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
2440.024	106.35	-6.45	99.9	114	-14.1	peak
2440.024	93.19	-6.45	86.74	94	-7.26	AVG
4880.048	53.28	1.95	55.23	74	-18.77	peak
4880.048	41.57	1.95	43.52	54	-10.48	AVG
7320.072	44.31	8.32	52.63	74	-21.37	peak
7320.072	32.58	8.32	40.9	54	-13.1	AVG
2440.024	103.64	-6.43	97.21	114	-16.79	peak
2440.024	91.56	-6.43	85.13	94	-8.87	AVG
4880.048	50.28	1.96	52.24	74	-21.76	peak
4880.048	40.04	1.96	42	54	-12	AVG
7320.072	41.26	8.33	49.59	74	-24.41	peak
7320.072	32.64	8.33	40.97	54	-13.03	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

EUT :	BOX	Model Name. :	GHOST Aerial
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC3.7V
Test Mode :	Mode 3	Polarization :	Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
2475.023	108.56	-6.28	102.28	114	-11.72	peak
2475.023	95.62	-6.28	89.34	94	-4.66	AVG
4950.046	53.61	2.01	55.62	74	-18.38	peak
4950.046	42.86	2.01	44.87	54	-9.13	AVG
7425.069	45.61	8.41	54.02	74	-19.98	peak
7425.069	35.24	8.41	43.65	54	-10.35	AVG
2480.019	103.28	-6.25	97.03	114	-16.97	peak
2480.019	92.98	-6.25	86.73	94	-7.27	AVG
4960.038	51.26	2.03	53.29	74	-20.71	peak
4960.038	40.28	2.03	42.31	54	-11.69	AVG
7440.057	42.64	8.43	51.07	74	-22.93	peak
7440.057	31.28	8.43	39.71	54	-14.29	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

EUT :	BOX	Model Name. :	GHOST Aerial
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC3.7V
Test Mode :	Mode 3	Polarization :	Vertical

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
2475.023	105.26	-6.28	98.98	114	-15.02	peak
2475.023	92.59	-6.28	86.31	94	-7.69	AVG
4950.046	52.47	2.01	54.48	74	-19.52	peak
4950.046	41.29	2.01	43.3	54	-10.7	AVG
7425.069	45.37	8.41	53.78	74	-20.22	peak
7425.069	34.19	8.41	42.6	54	-11.4	AVG
2475.023	102.34	-6.25	96.09	114	-17.91	peak
2475.023	91.57	-6.25	85.32	94	-8.68	AVG
4950.046	53.26	2.03	55.29	74	-18.71	peak
4950.046	42.64	2.03	44.67	54	-9.33	AVG
7425.069	43.61	8.43	52.04	74	-21.96	peak
7425.069	33.97	8.43	42.4	54	-11.6	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

Note: 8~25GHz 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.

9. BAND EDGE EMISSION

9.1. MEASUREMENT PROCEDURE

1The 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.

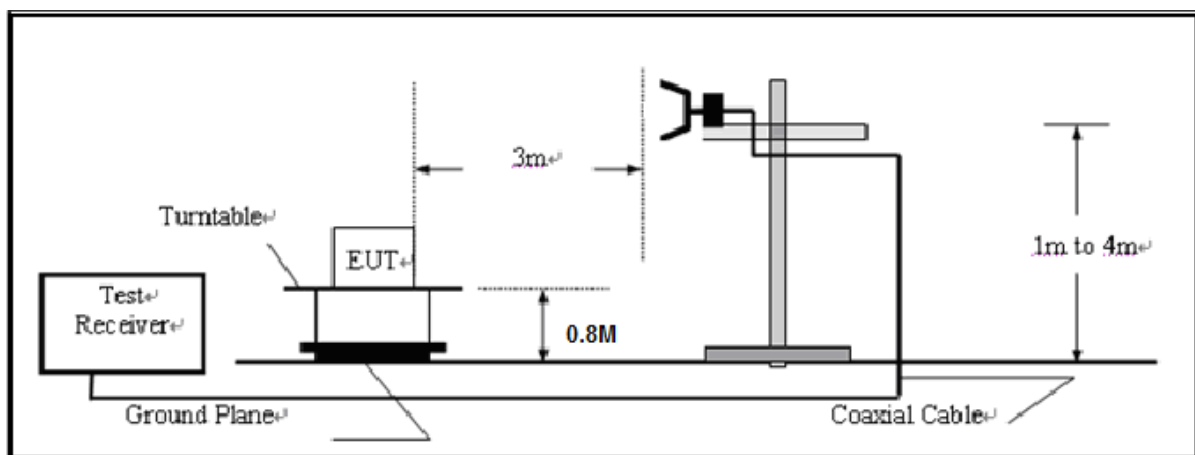
2Max hold the trace of the setp 1,and the EUT operates at hopping-on test mode to verify the largest spurious emissions power.

3Set the spectrum analyzer in the following setting in order to capture the lower and upper band-edges of the emission: (a) PEAK: RBW=VBW=1MHz / Sweep=AUTO

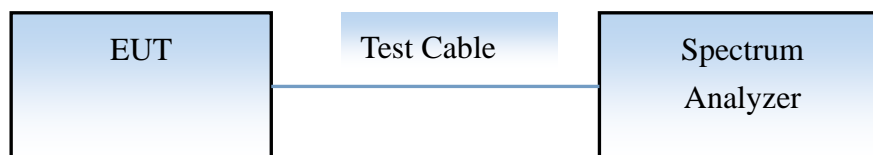
(b) AVERAGE: RBW=1MHz ; VBW=1/on time(1KHz) / Sweep=AUTO

9.2 TEST SETUP

RADIATED EMISSION TEST SETUP



CONDUCTED TEST SETUP



9.3 RADIATED TEST RESULT(Worst modulation: GFSK)

EUT :	BOX	Model Name. :	GHOST Aerial
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC3.7V
Test Mode :	Mode 1	Polarization :	Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
2399.900	62.57	-6.64	55.93	74	-18.07	peak
2399.900	48.94	-6.64	42.3	54	-11.7	AVG
2400.000	62.63	-6.63	56	74	-18	peak
2400.000	49.27	-6.63	42.64	54	-11.36	AVG

Remark:

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

EUT :	BOX	Model Name. :	GHOST Aerial
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC3.7V
Test Mode :	Mode 1	Polarization :	Vertical

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
2399.900	62.38	-6.64	55.74	74	-18.26	peak
2399.900	51.69	-6.64	45.05	54	-8.95	AVG
2400.000	62.41	-6.63	55.78	74	-18.22	peak
2400.000	52.07	-6.63	45.44	54	-8.56	AVG

Remark:

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

EUT :	BOX	Model Name. :	GHOST Aerial
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC3.7V
Test Mode :	Mode 3	Polarization :	Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
2483.500	63.28	-6.28	57	74	-17	peak
2483.500	52.69	-6.28	46.41	54	-7.59	AVG
2483.600	63.31	-6.29	57.02	74	-16.98	peak
2483.600	52.74	-6.29	46.45	54	-7.55	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

EUT :	BOX	Model Name. :	GHOST Aerial
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC3.7V
Test Mode :	Mode 3	Polarization :	Vertical

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
2483.500	62.98	-6.28	56.7	74	-17.3	peak
2483.500	52.87	-6.28	46.59	54	-7.41	AVG
2483.600	63.05	-6.29	56.76	74	-17.24	peak
2483.600	54.39	-6.29	48.1	54	-5.9	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

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

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

10. FCC LINE CONDUCTED EMISSION TEST

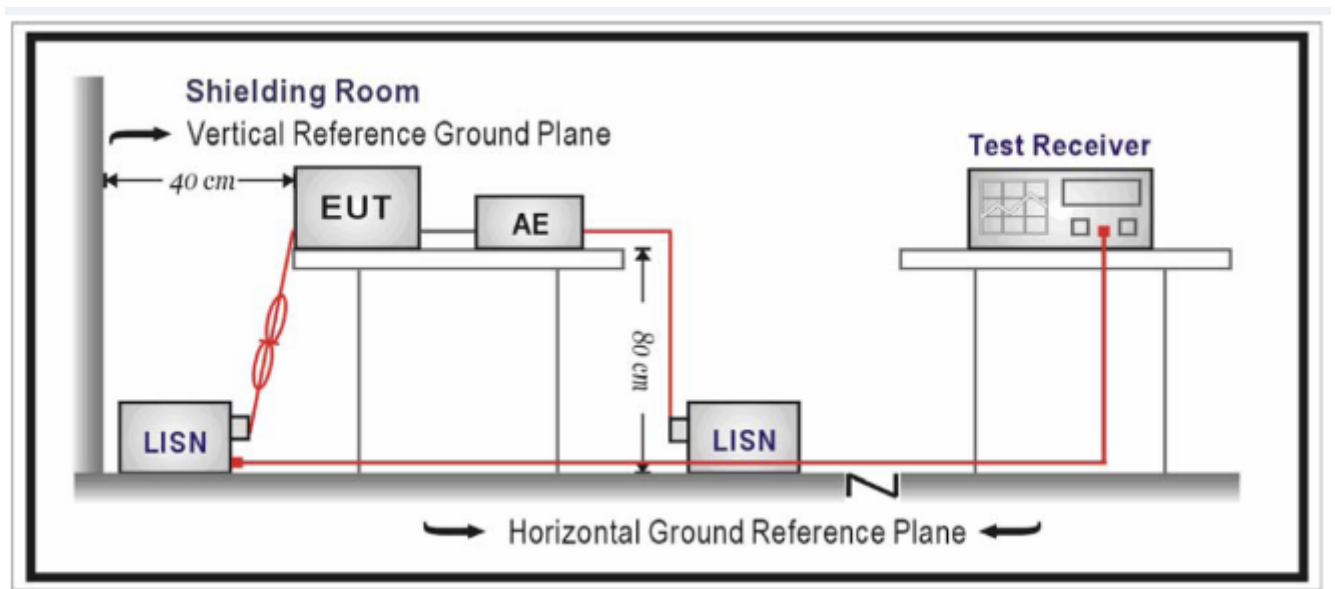
10.1. LIMITS OF LINE CONDUCTED EMISSION TEST

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

10.2. BLOCK DIAGRAM OF LINE CONDUCTED EMISSION TEST



10.3. PRELIMINARY PROCEDURE OF LINE CONDUCTED EMISSION TEST

1. 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 C63.4 (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 C63.4.
3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.4.
4. All support equipments received AC120V/60Hz power from a LISN, if any.
5. The EUT received DC charging voltage by PC which received 120V/60Hz power 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.

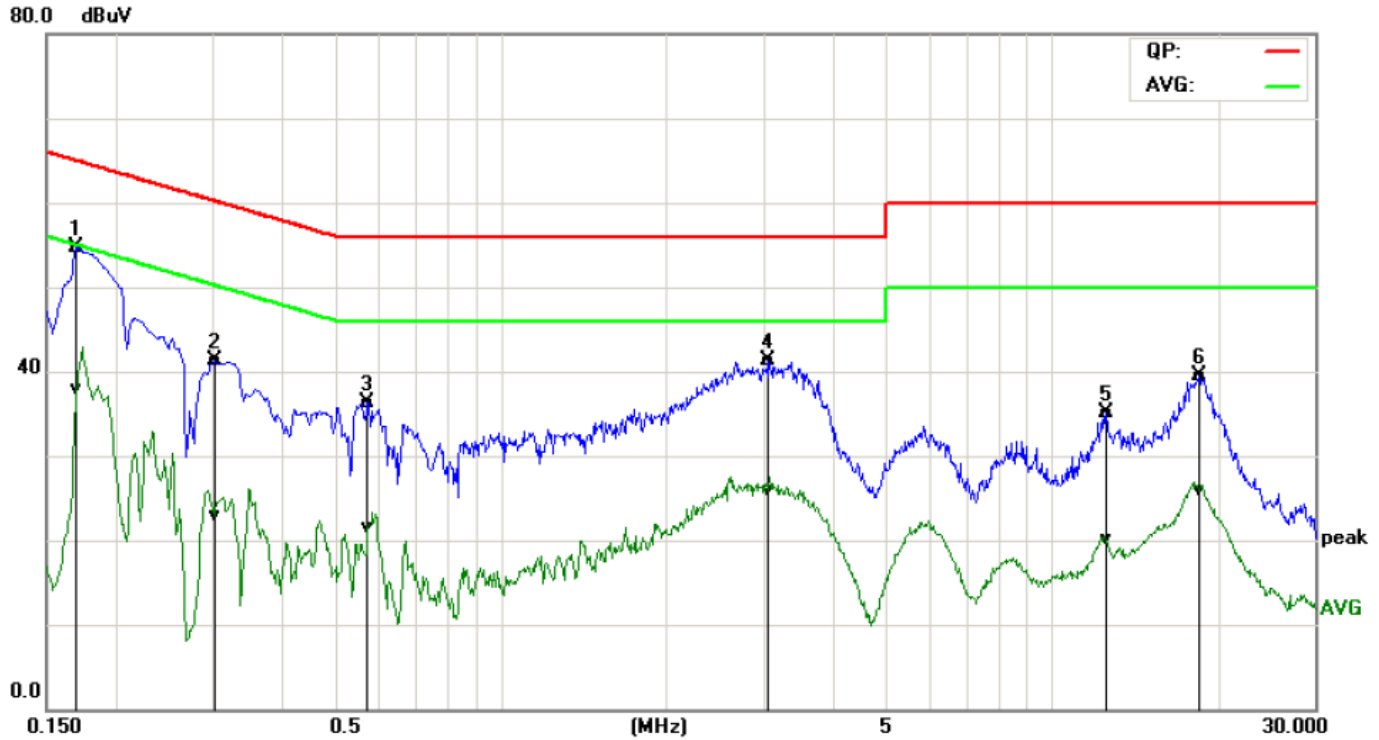
Then, the EUT configuration and cable configuration of the above highest emission level were recorded for reference of final testing.

10.4. FINAL PROCEDURE OF LINE CONDUCTED EMISSION TEST

- EUT and support equipment was set up on the test bench as per step 2 of the preliminary test.
2. 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.

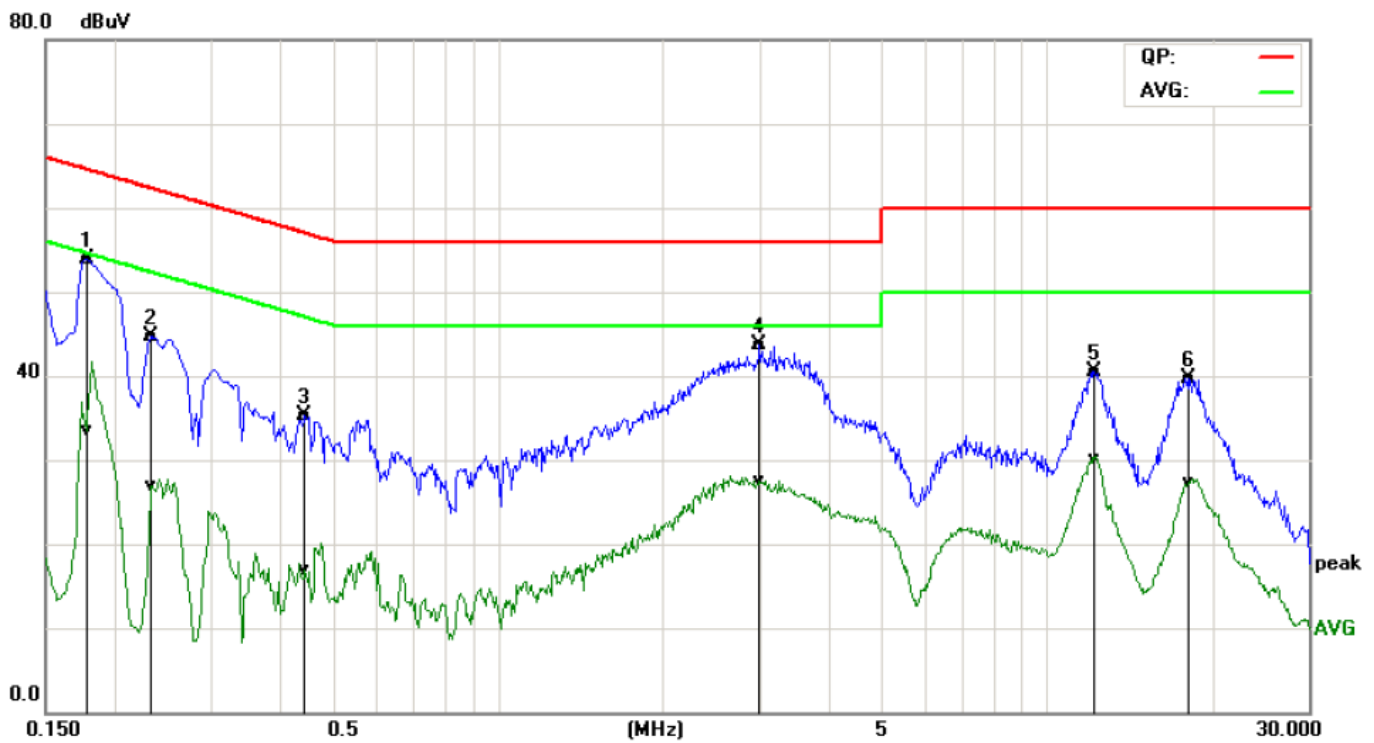
10.5. TEST RESULT OF LINE CONDUCTED EMISSION TEST

EUT :	BOX	Model Name. :	GHOST Aerial
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	AC120V/50Hz
Test Mode :	Mode 10	Polarization :	L



No.	Frequency (MHz)	QuasiPeak reading (dBuV)	Average reading (dBuV)	Correction factor (dB)	QuasiPeak result (dBuV)	Average result (dBuV)	QuasiPeak limit (dBuV)	Average limit (dBuV)	QuasiPeak margin (dB)	Average margin (dB)	Remark
1*	0.1700	44.95	28.21	9.78	54.73	37.99	64.96	54.96	-10.23	-16.97	Pass
2P	0.3020	31.45	13.22	9.76	41.21	22.98	60.19	50.19	-18.98	-27.21	Pass
3P	0.5740	26.69	11.91	9.68	36.37	21.59	56.00	46.00	-19.63	-24.41	Pass
4P	3.0700	31.48	16.20	9.75	41.23	25.95	56.00	46.00	-14.77	-20.05	Pass
5P	12.5300	25.28	10.39	9.79	35.07	20.18	60.00	50.00	-24.93	-29.82	Pass
6P	18.5900	29.69	16.17	9.72	39.41	25.89	60.00	50.00	-20.59	-24.11	Pass

EUT :	BOX	Model Name. :	GHOST Aerial
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	AC120V/50Hz
Test Mode :	Mode 10	Polarization :	N



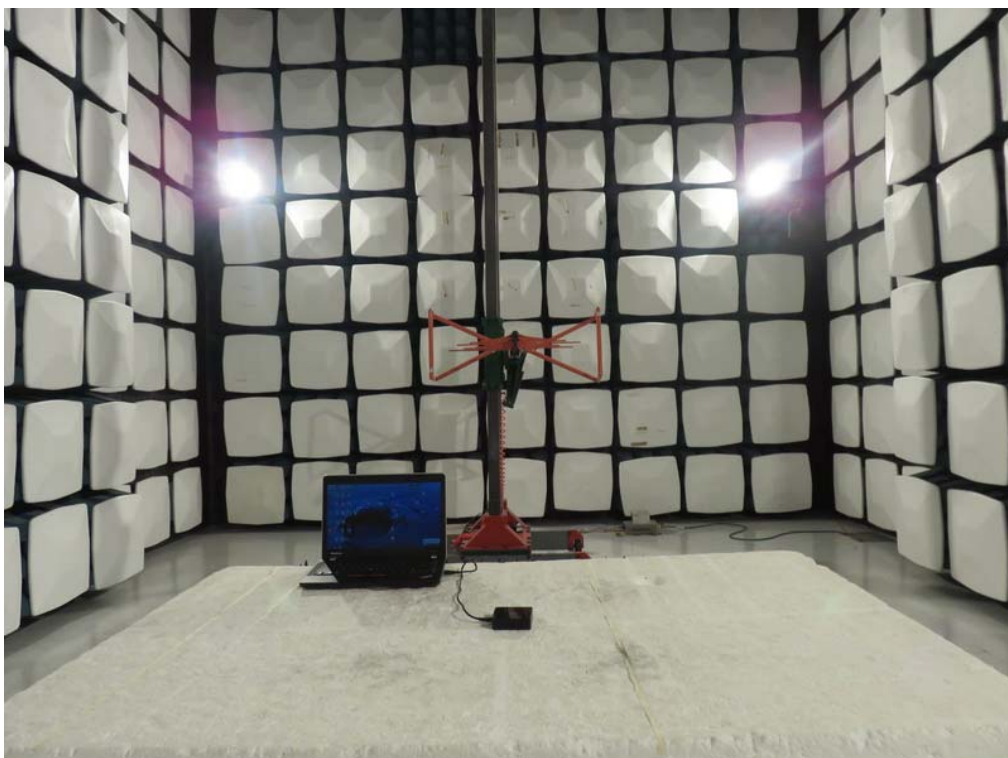
No.	Frequency (MHz)	QuasiPeak reading (dBuV)	Average reading (dBuV)	Correction factor (dB)	QuasiPeak result (dBuV)	Average result (dBuV)	QuasiPeak limit (dBuV)	Average limit (dBuV)	QuasiPeak margin (dB)	Average margin (dB)	Remark
1*	0.1780	44.35	23.84	9.65	54.00	33.49	64.57	54.58	-10.57	-21.09	Pass
2P	0.2340	35.01	17.15	9.69	44.70	26.84	62.30	52.31	-17.60	-25.47	Pass
3P	0.4460	25.62	7.19	9.68	35.30	16.87	56.95	46.95	-21.65	-30.08	Pass
4P	3.0020	33.89	17.80	9.72	43.61	27.52	56.00	46.00	-12.39	-18.48	Pass
5P	12.2020	30.65	20.13	9.89	40.54	30.02	60.00	50.00	-19.46	-19.98	Pass
6P	18.1420	29.87	17.49	9.86	39.73	27.35	60.00	50.00	-20.27	-22.65	Pass

APPENDIX A: PHOTOGRAPHS OF TEST SETUP

FCC LINE CONDUCTED EMISSION TEST SETUP



FCC RADIATED EMISSION TEST SETUP



APPENDIX B: PHOTOGRAPHS OF EUT

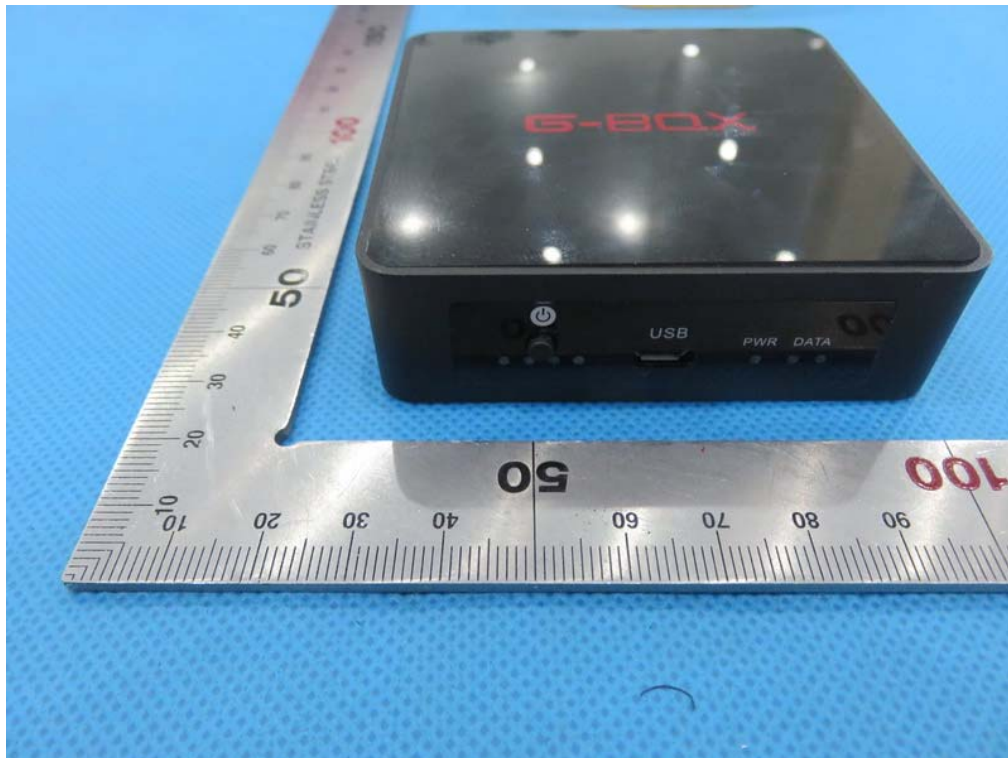
TOP VIEW



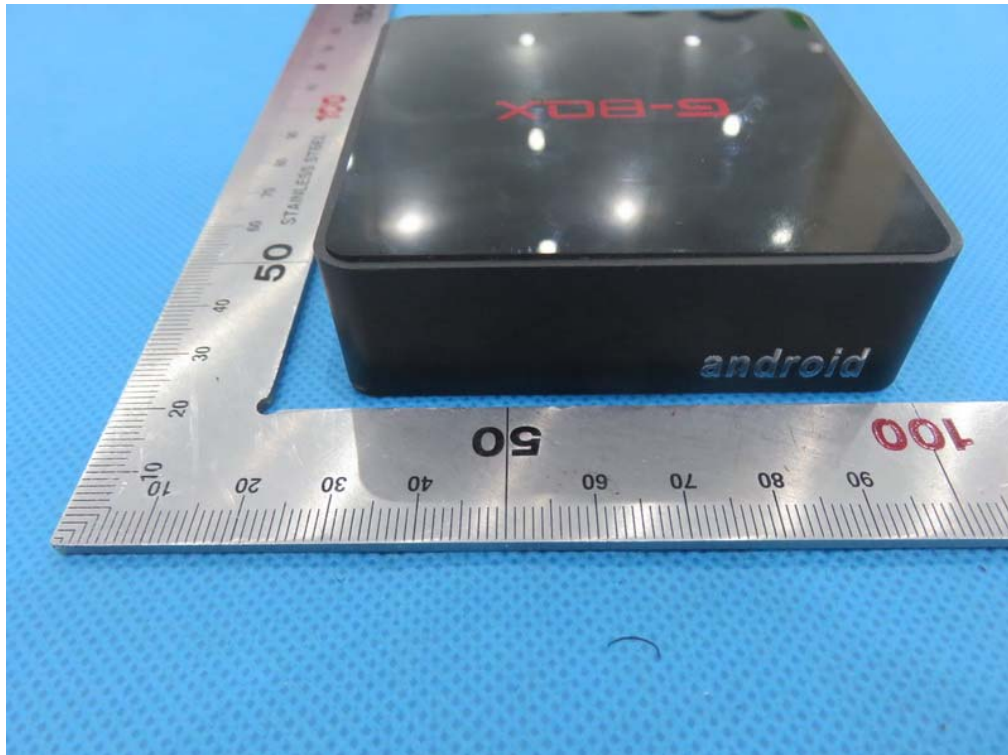
BOTTOM VIEW



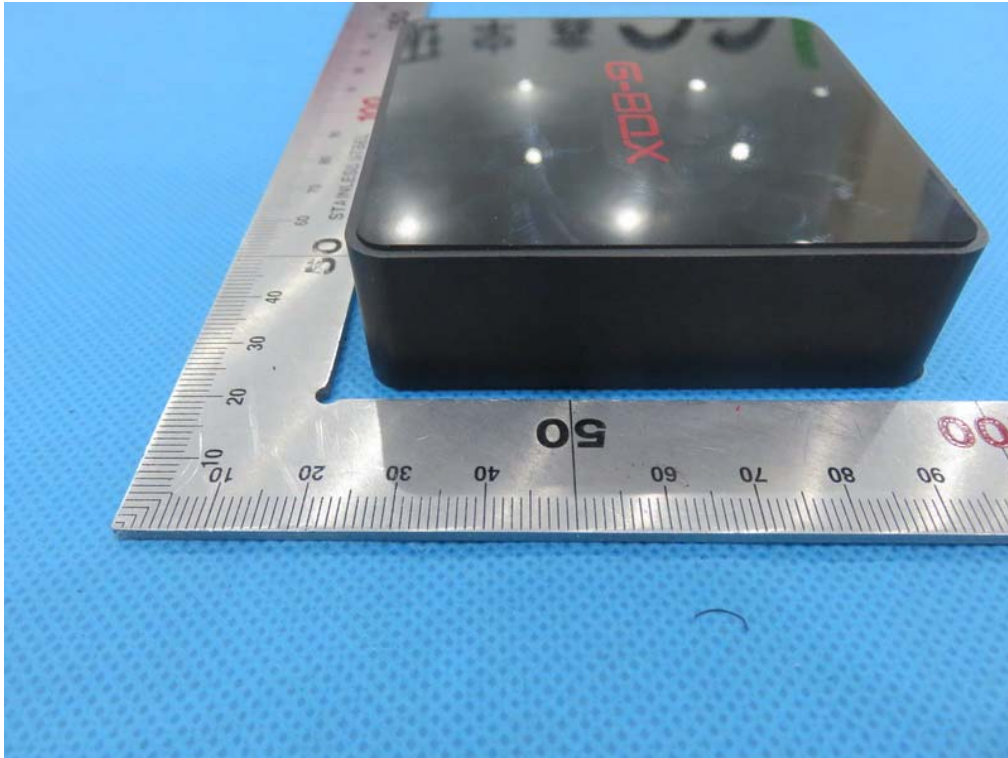
LEFT VIEW



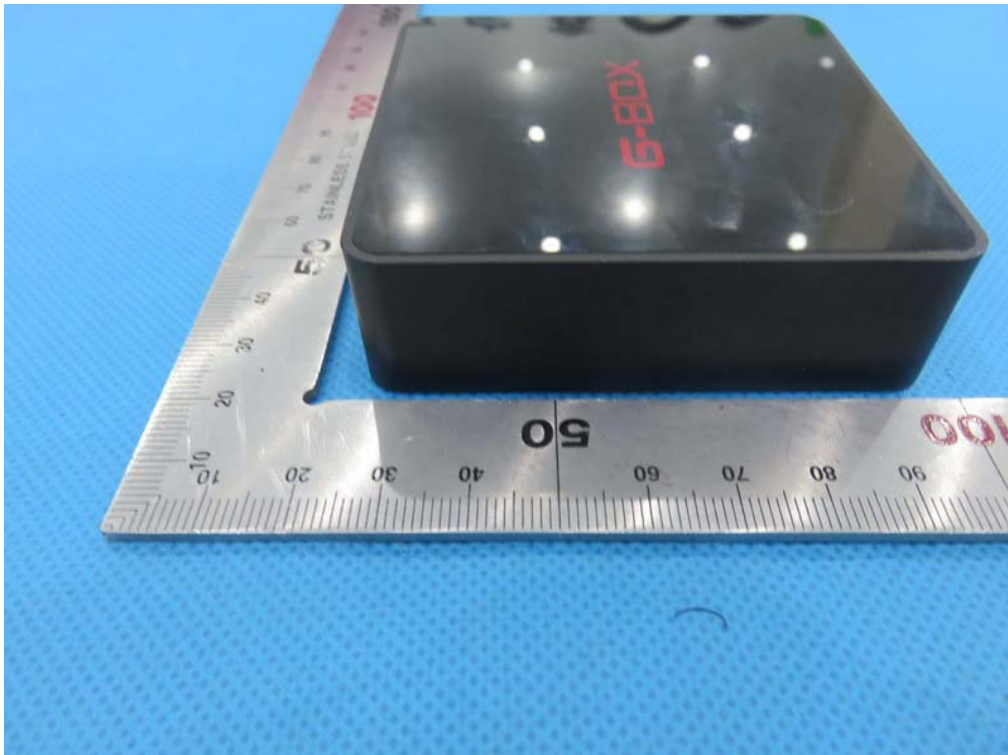
RIGHT VIEW OF SAMPLE



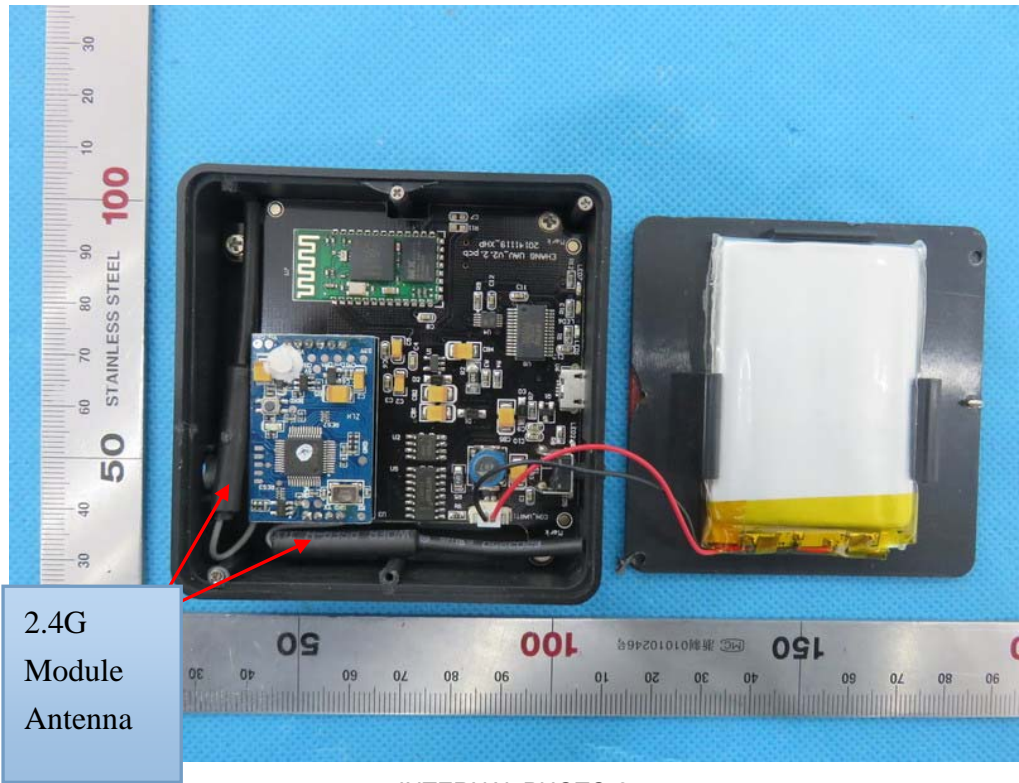
FRONT VIEW OF SAMPLE



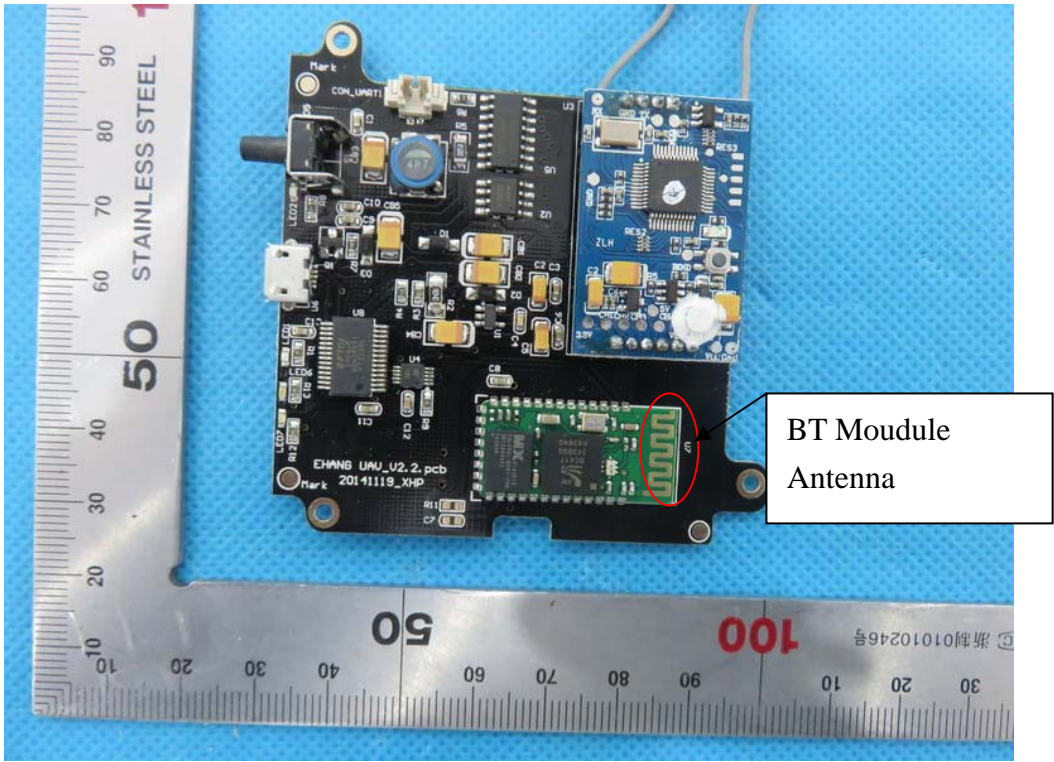
BACK VIEW OF SAMPLE



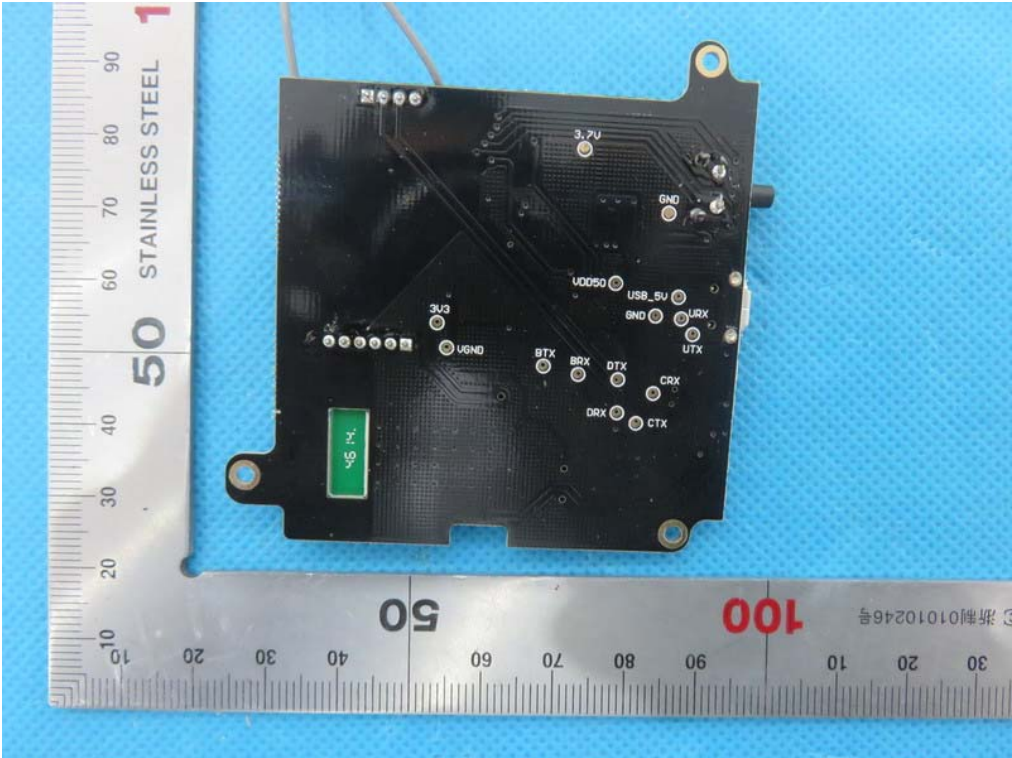
INTERNAL PHOTO-1



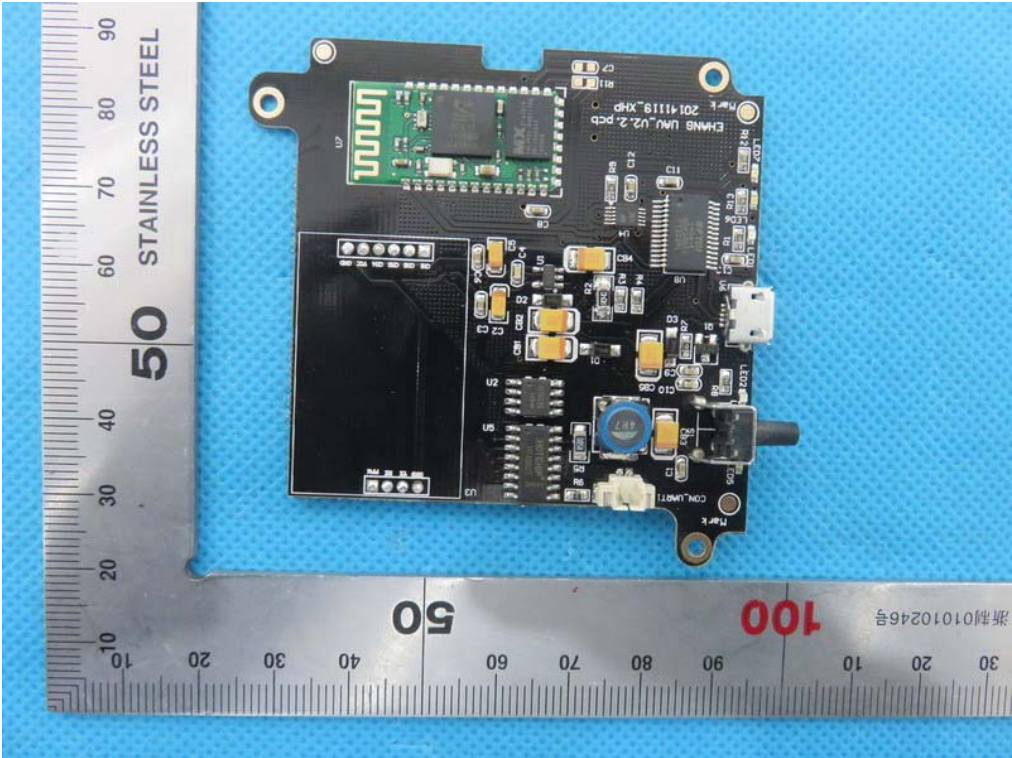
INTERNAL PHOTO-2



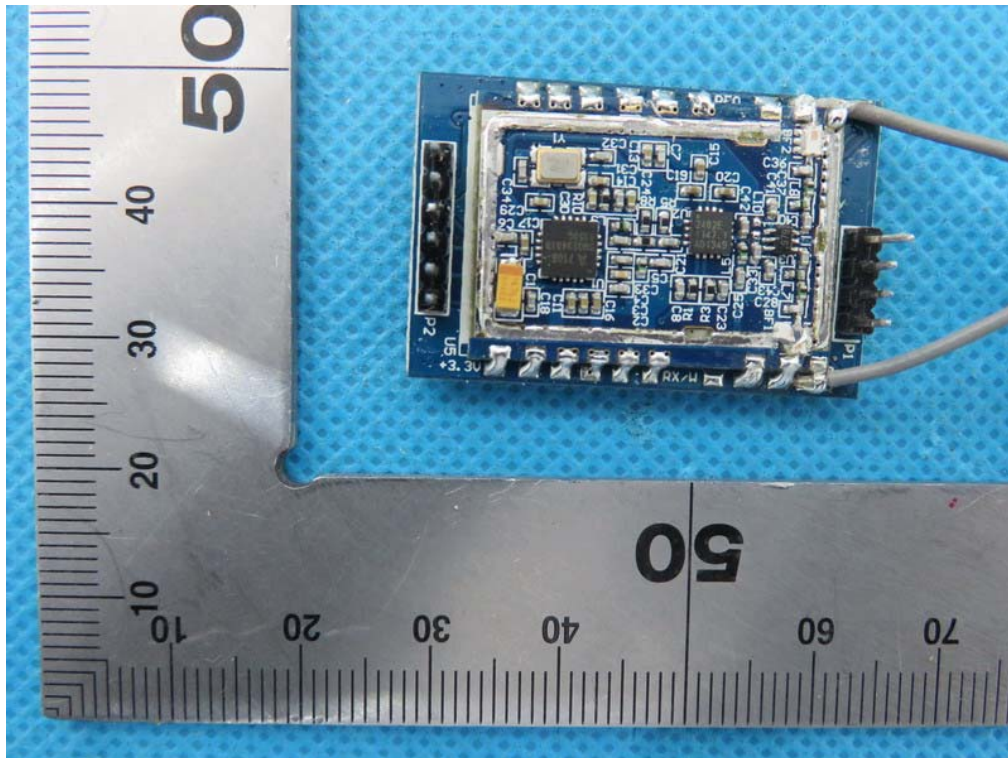
INTERNAL PHOTO-3



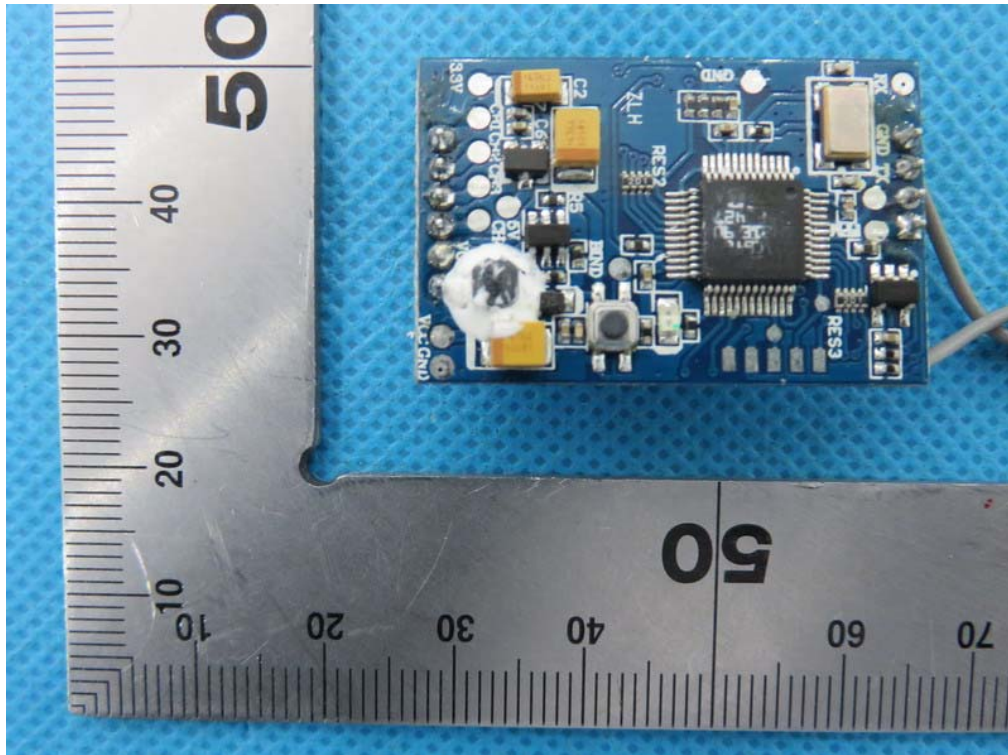
INTERNAL PHOTO-4



INTERNAL PHOTO-5



INTERNAL PHOTO-6



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