FCC Test Report

Report No.: AGC07102201002FE03

FCC ID	:	2AAVD-KG9013C
APPLICATION PURPOSE	:	Original Equipment
PRODUCT DESIGNATION	:	Wireless Rechargeable Keyboard
BRAND NAME	:	N/A
MODEL NAME	:	KG9013C
APPLICANT	:	SHENZHEN LOYAL ELECTRONICS CO., LTD.
DATE OF ISSUE	:	Oct. 30, 2020
STANDARD(S) **TEST PROCEDURE(S)**	:	FCC Part 15 Rules
REPORT VERSION	:	V1.0

Attestation of Global Compliance (Shenzhen) Co., Ltd

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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	/	Oct. 30, 2020	Valid	Initial Release

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1. VERIFICATION OF CONFORMITY

Applicant	SHENZHEN LOYAL ELECTRONICS CO., LTD.
Address	No.5, First Industry Park, Shanmen, Songgang, Baoan, Shenzhen, Guangdong China.
Manufacturer	SHENZHEN LOYAL ELECTRONICS CO., LTD.
Address	No.5, First Industry Park, Shanmen, Songgang, Baoan, Shenzhen, Guangdong China.
Factory	SHENZHEN LOYAL ELECTRONICS CO., LTD.
Address	No.5, First Industry Park, Shanmen, Songgang, Baoan, Shenzhen, Guangdong China.
Product Designation	Wireless Rechargeable Keyboard
Brand Name	N/A
Test Model	KG9013C
Date of test	Oct. 22, 2020 to Oct. 30, 2020
Deviation	None
Condition of Test Sample	Normal
Test Result	Pass
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, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10 (2013) and the energy emitted by the sample EUT tested as described in this report is in compliance with radiated emission limits of FCC Rules Part 15.249.

Prepared By	Sky Dong (Project Engineer)	Oct. 30, 2020
Reviewed By	Max Zhang (Reviewer)	Oct. 30, 2020
Approved By	Forrest Lei (Authorized Officer)	Oct. 30, 2020

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2. GENERAL INFORMATION

2.1. PRODUCT DESCRIPTION

A major technical description of EUT is described as following

Operation Frequency	2.408GHz - 2.474GHz
Maximum field strength	82.19dBuV/m(Average)@3m
Modulation	GFSK
Number of channels	67
Antenna Gain	2.1dBi
Antenna Designation	Internal Antenna (Met 15.203 Antenna requirement)
Hardware Version	V3
Software Version	V3.1
Power Supply	DC 3.7V by battery or DC 5V by Adapter

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2.2. TABLE OF CARRIER FREQUENCY

Frequency Band	Channel Number	Frequency(MHZ)	Channel Number	Frequency(MHZ)	Channel Number	Frequency(MHZ)
2400~2483.5MHZ	01	2408	24	2431	47	2454
	02	2409	25	2432	48	2455
	03	2410	26	2433	49	2456
	04	2411	27	2434	50	2457
	05	2412	28	2435	51	2458
	06	2413	29	2436	52	2459
	07	2414	30	2437	53	2460
	08	2415	31	2438	54	2461
	09	2416	32	2439	55	2462
	10	2417	33	2440	56	2463
	11	2418	34	2441	57	2464
	12	2419	35	2442	58	2465
	13	2420	36	2443	59	2466
	14	2421	37	2444	60	2467
	15	2422	38	2445	61	2468
	16	2423	39	2446	62	2469
	17	2424	40	2447	63	2470
	18	2425	41	2448	64	2471
	19	2426	42	2449	65	3472
	20	2427	43	2450	66	2473
	21	2428	44	5421	67	2474
	22	2429	45	5452		
	23	2430	46	2453		

2.3. ANTENNA REQUIREMENT

This intentional radiator is designed with a permanently attached antenna of an antenna to ensure that no antenna other than that furnished by the responsible party shall be used with the device.
For more information of the antenna, please refer to the APPENDIX B: PHOTOGRAPHS OF EUT.

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3. MEASUREMENT UNCERTAINTY

The uncertainty is calculated using the methods suggested in the “Guide to the Expression of Uncertainty in measurement” (GUM) published by CISPR and ANSI.

- Uncertainty of Conducted Emission, Uc = ±3.1 dB
- Uncertainty of Radiated Emission below 1GHz, Uc = ±4.0 dB
- Uncertainty of Radiated Emission above 1GHz, Uc = ±4.8 dB

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4. DESCRIPTION OF TEST MODES

NO.	TEST MODE DESCRIPTION
1	Charging mode with adapter
2	TX mode at Low channel (2408MHz)
3	TX mode at Middle channel (2440MHz)
4	TX mode at High channel (2474MHz)

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 enters test modes by pressing keys of EUT.
4. For battery operated equipment, the battery is full charged during test.

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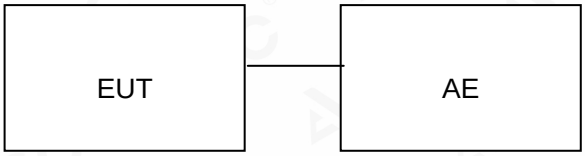
5. SYSTEM TEST CONFIGURATION

5.1. CONFIGURATION OF EUT SYSTEM

Radiated Emission Configure:

Conducted Emission Configure:



5.2 EQUIPMENT USED IN TESTED SYSTEM

Item	Equipment	Model No.	ID or Specification	Remark
1	Wireless Rechargeable Keyboard	KG9013C	2AAVD-KG9013C	EUT
2	ADAPTER	GQ15-050300-ZU	DC5V	AE

5.3. SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT
§15.249&15.209	Radiated Emission	Compliant
§15.249	Band Edges	Compliant
§15.215	20dB bandwidth	Compliant
§15.207	Conducted Emission	Compliant

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6. TEST FACILITY

Test Site	Attestation of Global Compliance (Shenzhen) Co., Ltd
Location	1-2/F, Building 19, Junfeng Industrial Park, Chongqing Road, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China
Designation Number	CN1259
FCC Test Firm Registration Number	975832
A2LA Cert. No.	5054.02
Description	Attestation of Global Compliance(Shenzhen) Co., Ltd is accredited by A2LA

TEST EQUIPMENT OF CONDUCTED EMISSION TEST

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
TEST RECEIVER	R&S	ESPI	101206	May 15, 2020	May 14, 2021
LISN	R&S	ESH2-Z5	100086	Jul. 03,2020	Jul. 02,2021
Test software	R&S	ES-K1(Ver.V1.71)	N/A	N/A	N/A

TEST EQUIPMENT OF RADIATED EMISSION TEST

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
TEST RECEIVER	R&S	ESCI	10096	May 15, 2020	May 14, 2021
EXA Signal Analyzer	Aglient	N9010A	MY53470504	Dec. 12, 2019	Dec. 11, 2020
2.4GHz Fliter	EM Electronics	2400-2500MHz	N/A	Mar. 23, 2020	Mar. 22, 2022
Attenuator	ZHINAN	E-002	N/A	Sep. 03, 2020	Sep. 02, 2022
Horn antenna	SCHWARZBECK	BBHA 9170	#768	Sep.21, 2019	Sep. 20, 2021
Active loop antenna (9K-30MHz)	ZHINAN	ZN30900C	18051	May 22, 2020	May 21, 2022
Double-Ridged Waveguide Horn	ETS LINDGREN	3117	00154520	Oct. 26, 2019	Oct. 25, 2021
Broadband Preamplifier	ETS LINDGREN	3117PA	00225134	Oct. 15, 2019	Oct. 16, 2021
ANTENNA	SCHWARZBECK	VULB9168	494	Jan. 09, 2019	Jan. 08, 2021
Test software	Tonscend	JS32-RE (Ver.2.5)	N/A	N/A	N/A

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7. RADIATED EMISSION

7.1TEST 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(μV)/m
0.009 ~ 0.490	300	2400/F(kHz)	---
0.490 ~ 1.705	30	24000/F(kHz)	---
1.705 ~ 30	30	30	---
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
960 ~ 1000	3	500	54.0
Above 1000	3	Other:74.0 dB(μV)/m (Peak) 54.0 dB(μV)/m (Average)	

Remark: (1) Emission level dB μ V = 20 log Emission level μ V/m

(2) The smaller limit shall apply at the cross point between two frequency bands.

(3) Distance is the distance in meters between the measuring instrument, antenna and the closest point of any part of the device or system.

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7.2. MEASUREMENT PROCEDURE

1. The EUT was placed on the top of the turntable 0.8 or 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emissions, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. For emissions above 1GHz, use minimum resolution bandwidth of 1 MHz. Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.
7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum values.
8. If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High - Low scan is not required in this case.

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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 RBW 2.4MHz/ VBW 8MHz for Peak, RBW 2.4MHz/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

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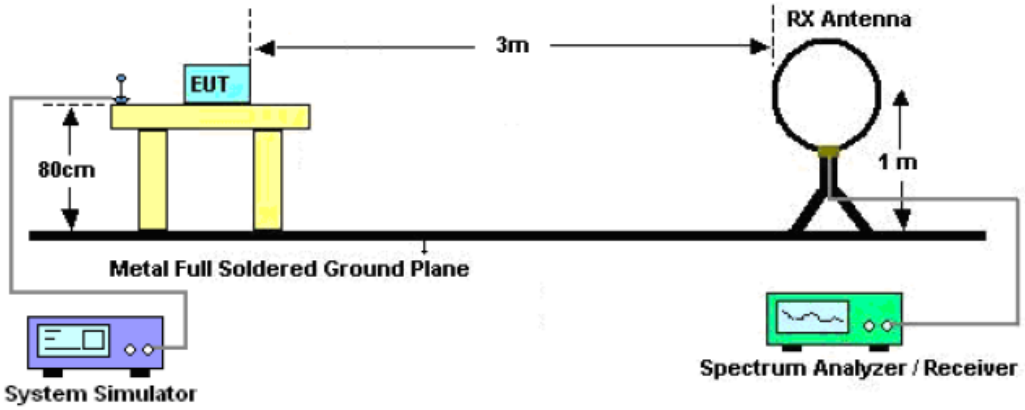
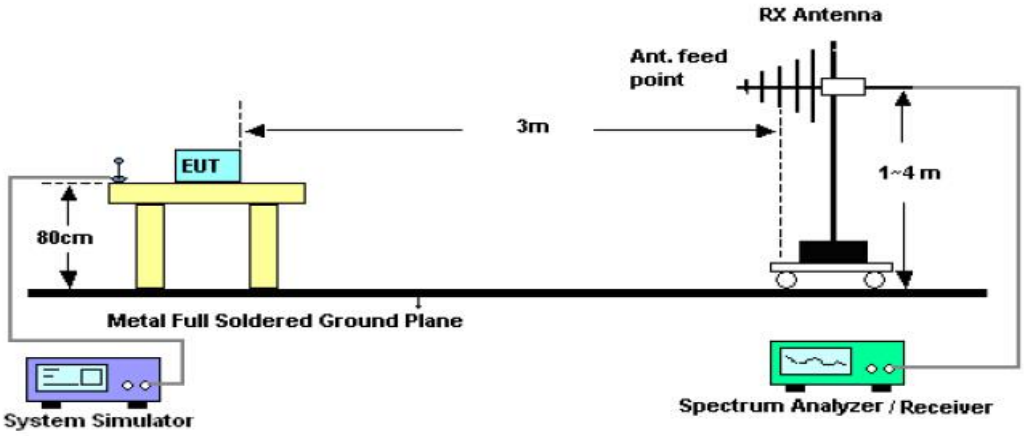
7.3. TEST SETUP

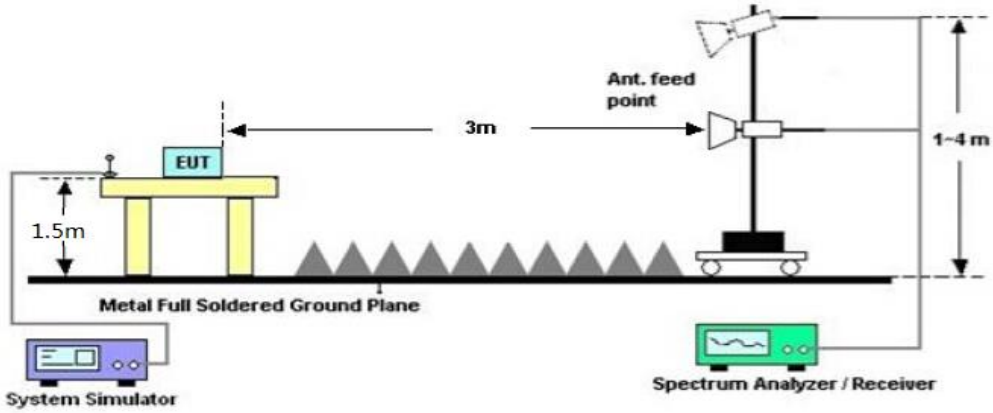
Radiated Emission Test-Setup Frequency Below 30MHz



RADIATED EMISSION TEST SETUP 30MHz-1000MHz



RADIATED EMISSION TEST SETUP ABOVE 1000MHz



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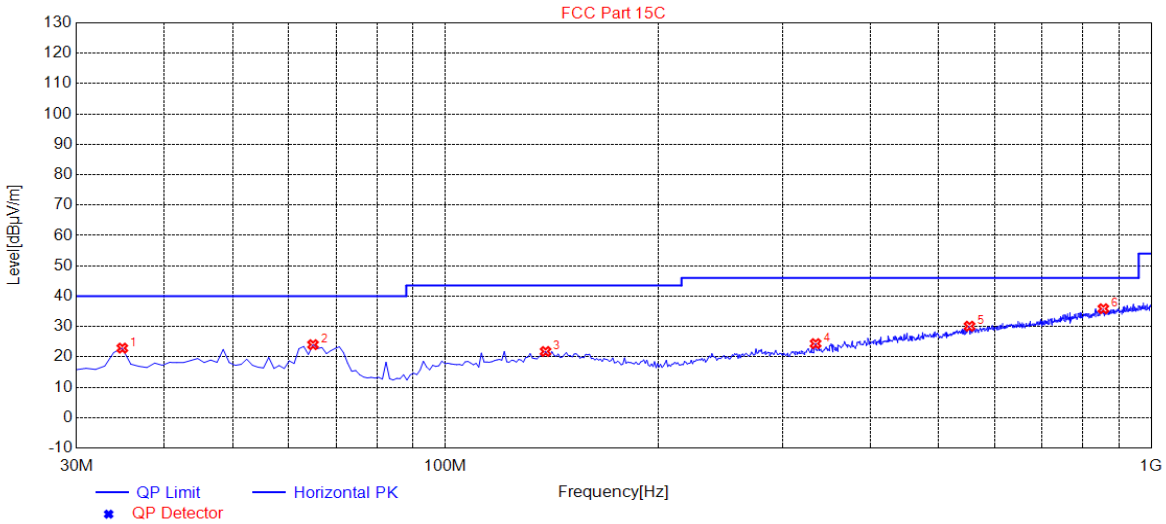
7.4. TEST RESULT

RADIATED EMISSION BELOW 30MHZ

The amplitude of spurious emissions from 9kHz to 30MHz which are attenuated more than 20 dB below the permissible value need not be reported.

RADIATED EMISSION 30MHz- 1GHZ

EUT	Wireless Rechargeable Keyboard	Model Name	KG9013C
Temperature	25℃	Relative Humidity	60%
Pressure	101kPa	Test Voltage	DC 3.7V
Test Mode	Mode 2	Polarization	Horizontal



NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	34.8500	22.89	10.70	40.00	17.11	100	67	Horizontal
2	64.9200	24.03	10.09	40.00	15.97	100	344	Horizontal
3	138.6400	21.79	14.78	43.50	21.71	100	352	Horizontal
4	334.5800	24.38	17.29	46.00	21.62	100	38	Horizontal
5	552.8300	30.11	23.31	46.00	15.89	100	358	Horizontal
6	855.4700	35.87	29.42	46.00	10.13	100	109	Horizontal

RESULT: PASS

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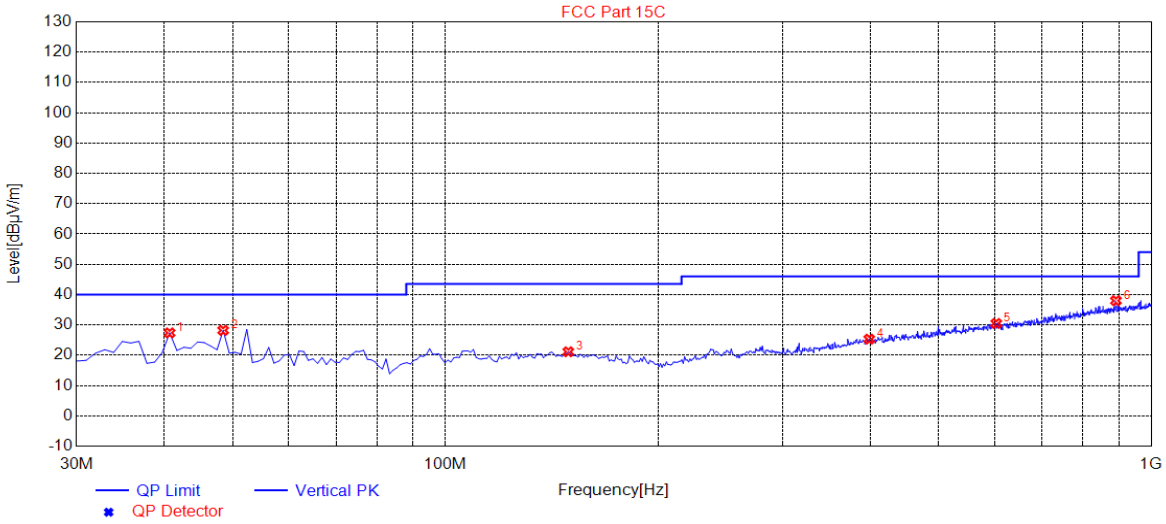
EUT	Wireless Rechargeable Keyboard	Model Name	KG9013C
Temperature	25℃	Relative Humidity	60%
Pressure	101kPa	Test Voltage	DC 3.7V
Test Mode	Mode 2	Polarization	Vertical



NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	40.6700	27.38	11.91	40.00	12.62	100	168	Vertical
2	48.4300	28.21	11.71	40.00	11.79	100	21	Vertical
3	149.3100	21.14	14.88	43.50	22.36	100	107	Vertical
4	398.6000	25.32	19.73	46.00	20.68	100	117	Vertical
5	603.2700	30.49	24.37	46.00	15.51	100	13	Vertical
6	891.3600	38.00	30.00	46.00	8.00	100	186	Vertical

RESULT: PASS

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

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

The mode 2 is the worst case, and only the data of the worst case recorded in this test report.

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FIELD STRENGTH OF FUNDAMENTAL

EUT	Wireless Rechargeable Keyboard	Model Name	KG9013C
Temperature	25℃	Relative Humidity	60%
Pressure	101kPa	Test Voltage	DC 3.7V
Test Modulation	GFSK	Polarization	Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
2408	47.63	49.05	87.85	114.00	-26.15	peak
2408	32.33	49.05	79.07	94.00	-14.93	AVG
2440	47.14	49.12	86.05	114.00	-27.95	peak
2440	28.66	49.12	78.68	94.00	-15.32	AVG
2474	46.22	49.25	87.73	114.00	-26.27	peak
2474	28.60	49.25	82.19	94.00	-11.81	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

EUT	Wireless Rechargeable Keyboard	Model Name	KG9013C
Temperature	25℃	Relative Humidity	60%
Pressure	101kPa	Test Voltage	DC 3.7V
Test Modulation	GFSK	Polarization	Vertical

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
2408	45.65	49.05	86.05	114.00	-27.95	peak
2408	29.51	49.05	80.49	94.00	-13.51	AVG
2440	45.31	49.12	82.16	114.00	-31.84	peak
2440	30.11	49.12	80.28	94.00	-13.72	AVG
2474	40.78	49.25	85.65	114.00	-28.35	peak
2474	30.48	49.25	81.20	94.00	-12.80	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

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RADIATED EMISSION ABOVE 1GHZ

EUT	Wireless Rechargeable Keyboard	Model Name	KG9013C
Temperature	25℃	Relative Humidity	60%
Pressure	101kPa	Test Voltage	DC 3.7V
Test Modulation	Mode 2	Polarization	Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
4816.056	55.18	0.08	55.26	74.00	-18.74	peak
4816.056	42.91	0.08	42.99	54.00	-11.01	AVG
7224.382	50.12	2.21	52.33	74.00	-21.67	peak
7224.382	38.12	2.21	40.33	54.00	-13.67	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

EUT	Wireless Rechargeable Keyboard	Model Name	KG9013C
Temperature	25℃	Relative Humidity	60%
Pressure	101kPa	Test Voltage	DC 3.7V
Test Modulation	Mode 2	Polarization	Vertical

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
4816.056	54.12	0.08	54.20	74.00	-19.80	peak
4816.056	43.16	0.08	43.24	54.00	-10.76	AVG
7224.382	49.33	2.21	51.54	74.00	-22.46	peak
7224.382	37.52	2.21	39.73	54.00	-14.27	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

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EUT	Wireless Rechargeable Keyboard	Model Name	KG9013C
Temperature	25℃	Relative Humidity	60%
Pressure	101kPa	Test Voltage	DC 3.7V
Test Modulation	Mode 3	Polarization	Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
4880.781	50.26	0.14	50.40	74.00	-23.60	peak
4880.781	44.12	0.14	44.26	54.00	-9.74	AVG
7320.543	46.27	2.36	48.63	74.00	-25.37	peak
7320.543	35.97	2.36	38.33	54.00	-15.67	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

EUT	Wireless Rechargeable Keyboard	Model Name	KG9013C
Temperature	25℃	Relative Humidity	60%
Pressure	101kPa	Test Voltage	DC 3.7V
Test Modulation	Mode 3	Polarization	Vertical

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
4880.781	50.28	0.14	50.42	74.00	-23.58	peak
4880.781	40.17	0.14	40.31	54.00	-13.69	AVG
7320.543	45.37	2.36	47.73	74.00	-26.27	peak
7320.543	38.16	2.36	40.52	54.00	-13.48	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

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EUT	Wireless Rechargeable Keyboard	Model Name	KG9013C
Temperature	25℃	Relative Humidity	60%
Pressure	101kPa	Test Voltage	DC 3.7V
Test Modulation	Mode 4	Polarization	Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
4948.068	54.14	0.22	54.36	74.00	-19.64	peak
4948.068	47.15	0.22	47.37	54.00	-6.63	AVG
7422.362	51.03	2.64	53.67	74.00	-20.33	peak
7422.362	40.84	2.64	43.48	54.00	-10.52	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

EUT	Wireless Rechargeable Keyboard	Model Name	KG9013C
Temperature	25℃	Relative Humidity	60%
Pressure	101kPa	Test Voltage	DC 3.7V
Test Modulation	Mode 4	Polarization	Vertical

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
4948.068	55.39	0.22	55.61	74.00	-18.39	peak
4948.068	44.35	0.22	44.57	54.00	-9.43	AVG
7422.362	50.28	2.64	52.92	74.00	-21.08	peak
7422.362	39.96	2.64	42.60	54.00	-11.40	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

Note: The amplitude of other spurious emissions from 1G to 25 GHz which are attenuated more than 20 dB below the permissible value need not be reported.

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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8. BAND EDGE EMISSION

8.1. MEASUREMENT PROCEDURE

1. The EUT operates at transmitting mode. The operate channel is tested to verify the largest transmission and spurious emissions power at the continuous transmission mode.

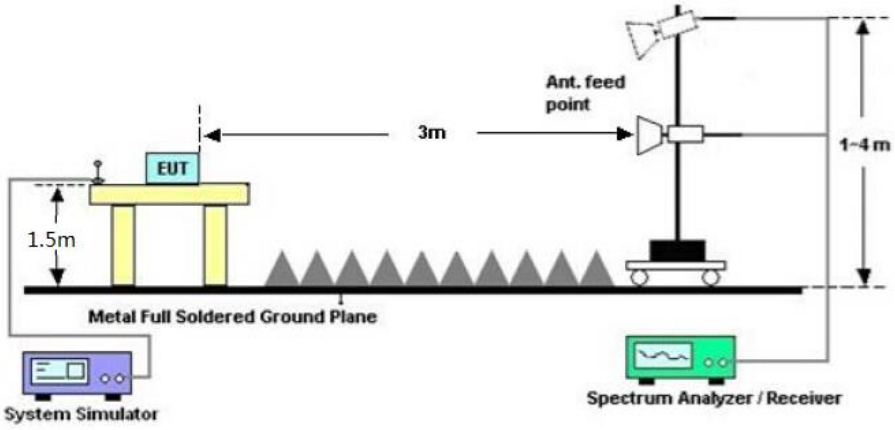
2. Set the spectrum analyzer in the following setting in order to capture the lower and upper band-edges of the emission: (a) PEAK: RBW=1MHz, VBW=3MHz / Sweep=AUTO

(b) AVERAGE: RBW=1MHz ; VBW=10Hz / Sweep=AUTO

3. Other procedures refer to clause 7.2.

8.2 TEST SETUP

RADIATED EMISSION TEST SETUP



8.3 RADIATED TEST RESULT

Note:

1. Factor=Antenna Factor + Cable loss - Amplifier gain. Field Strength=Factor + Reading level
2. The factor had been edited in the “Input Correction” of the Spectrum Analyzer. So the Amplitude of test plots is equal to Reading level plus the Factor in dB. Use the A dB(μV) to represent the Amplitude. Use the F dB(μV/m) to represent the Field Strength. So A=F.

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EUT	Wireless Rechargeable Keyboard	Model Name	KG9013C
Temperature	25℃	Relative Humidity	60%
Pressure	101kPa	Test Voltage	DC 3.7V
Test Mode	Mode 2	Polarization	Horizontal

Peak Value

Average Value

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EUT	Wireless Rechargeable Keyboard	Model Name	KG9013C
Temperature	25℃	Relative Humidity	60%
Pressure	101kPa	Test Voltage	DC 3.7V
Test Mode	Mode 2	Polarization	Vertical

Peak Value

Average Value

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EUT	Wireless Rechargeable Keyboard	Model Name	KG9013C
Temperature	25℃	Relative Humidity	60%
Pressure	101kPa	Test Voltage	DC 3.7V
Test Mode	Mode 4	Polarization	Horizontal

Peak Value

Average Value

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EUT	Wireless Rechargeable Keyboard	Model Name	KG9013C
Temperature	25℃	Relative Humidity	60%
Pressure	101kPa	Test Voltage	DC 3.7V
Test Mode	Mode 4	Polarization	Vertical

Peak Value

Average Value

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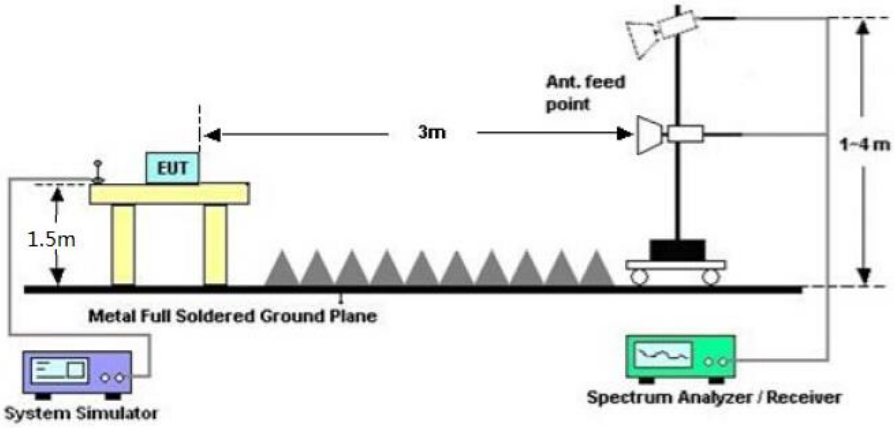
9. 20DB BANDWIDTH

9.1. MEASUREMENT PROCEDURE

1. Set the EUT Work on the top, the middle and the bottom operation frequency individually.
2. Set SPA Centre Frequency = Operation Frequency, RBW= 30 KHz, VBW≥3×RBW.
3. Set SPA Trace 1 Max hold, then View.

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



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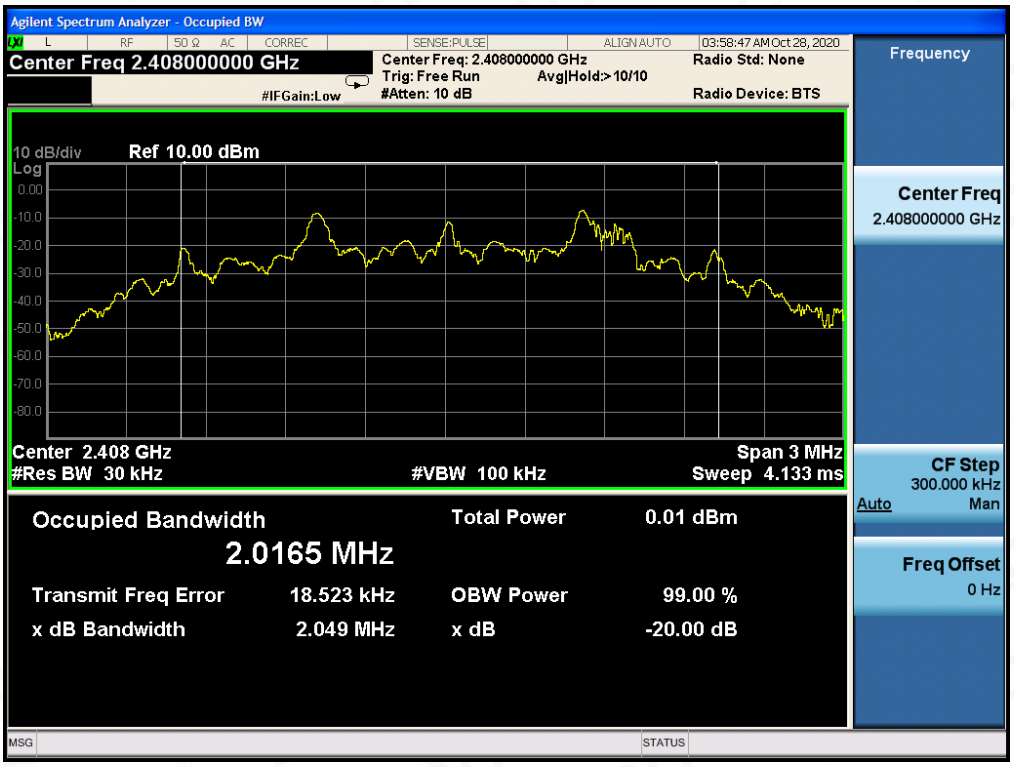
9.3. MEASUREMENT RESULTS

TEST ITEM	20DB BANDWIDTH
TEST MODULATION	GFSK

Test Data (MHz)		Criteria
Low Channel	2.049	PASS
Middle Channel	2.036	PASS
High Channel	2.049	PASS

TEST PLOT OF BANDWIDTH FOR LOW CHANNEL



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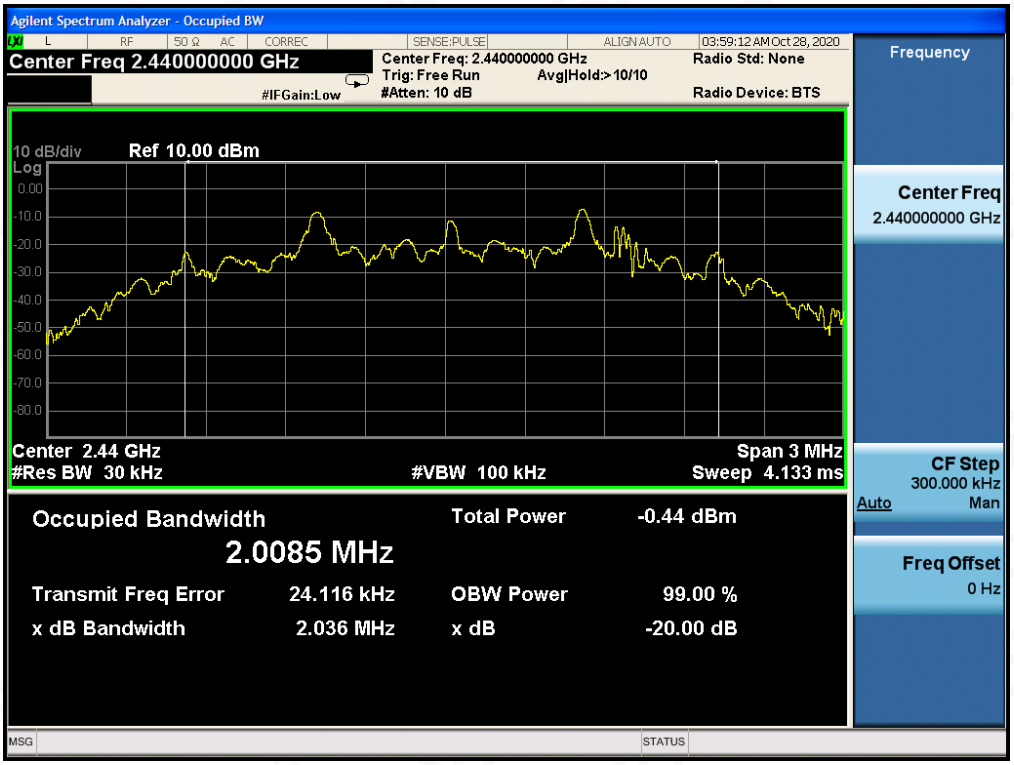
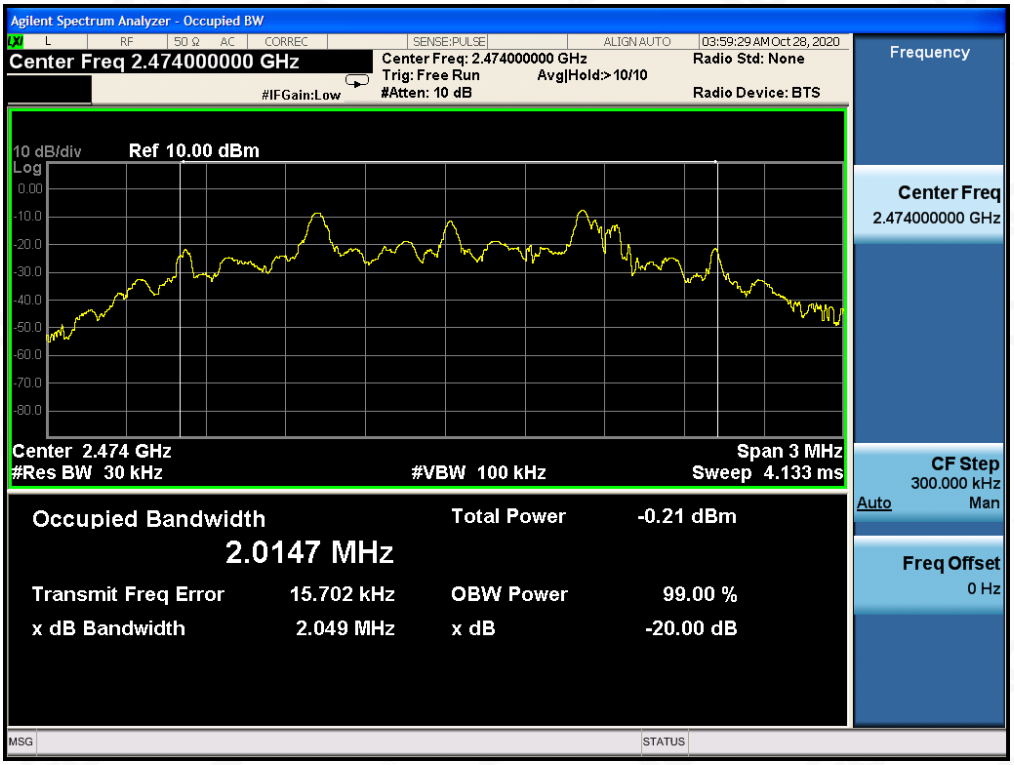
TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL



TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL



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10. FCC LINE CONDUCTED EMISSION TEST

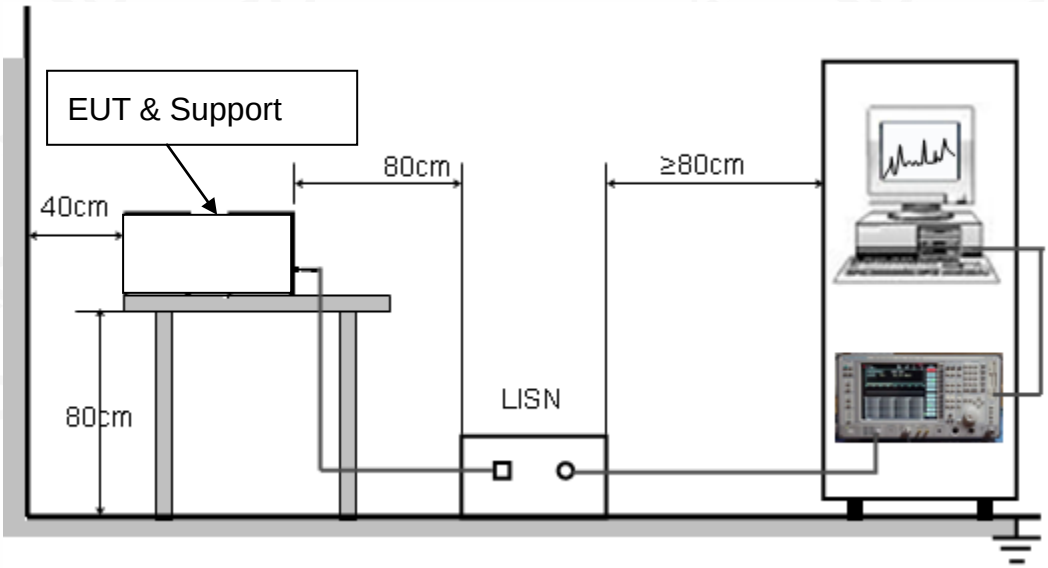
10.1. LIMITS OF LINE CONDUCTED EMISSION TEST

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



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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 C63.10 (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 equipment received AC120V/60Hz power from a LISN, if any.
5. The EUT received DC 5V power from control board which received AC120V/60Hz power from 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.
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.

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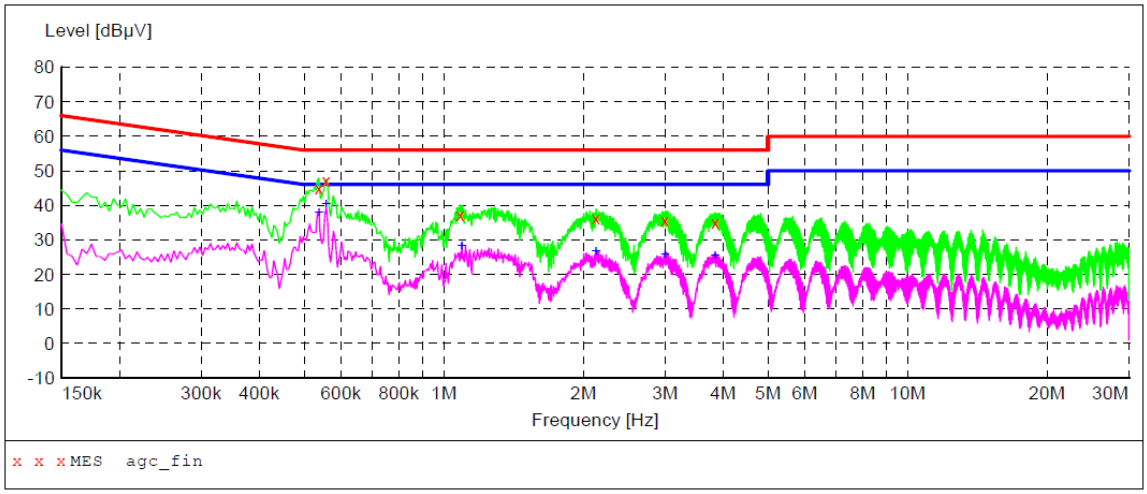
12.5. TEST RESULT OF LINE CONDUCTED EMISSION TEST

Line Conducted Emission Test Line 1-L



MEASUREMENT RESULT: "agc_fin"

2020/10/27 13:43

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line
0.538000	45.10	11.3	56	10.9	QP	L1
0.558000	47.20	11.3	56	8.8	QP	L1
1.086000	37.10	11.3	56	18.9	QP	L1
2.130000	36.40	11.3	56	19.6	QP	L1
2.998000	35.60	11.4	56	20.4	QP	L1
3.850000	35.00	11.4	56	21.0	QP	L1

MEASUREMENT RESULT: "agc_fin2"

2020/10/27 13:43

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line
0.538000	37.80	11.3	46	8.2	AV	L1
0.558000	40.40	11.3	46	5.6	AV	L1
1.094000	28.20	11.3	46	17.8	AV	L1
2.130000	26.60	11.3	46	19.4	AV	L1
2.998000	25.80	11.4	46	20.2	AV	L1
3.850000	25.50	11.4	46	20.5	AV	L1

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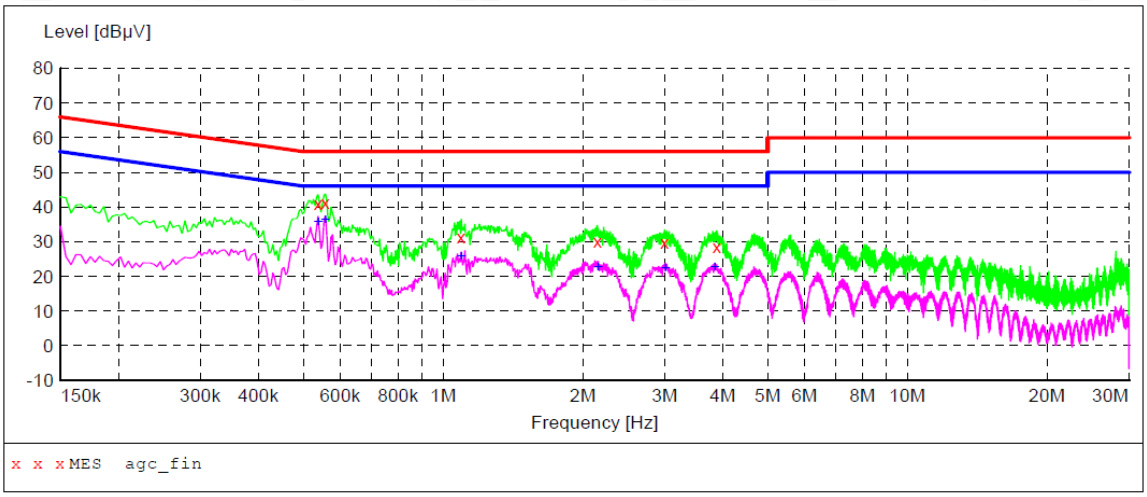
Line Conducted Emission Test Line 2-N



MEASUREMENT RESULT: "agc_fin"

2020/10/27 13:47

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line
0.538000	41.10	11.3	56	14.9	QP	N
0.558000	41.40	11.3	56	14.6	QP	N
1.094000	31.30	11.3	56	24.7	QP	N
2.150000	30.20	11.3	56	25.8	QP	N
2.998000	29.90	11.4	56	26.1	QP	N
3.882000	28.60	11.4	56	27.4	QP	N

MEASUREMENT RESULT: "agc_fin2"

2020/10/27 13:47

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line
0.538000	35.60	11.3	46	10.4	AV	N
0.558000	36.40	11.3	46	9.6	AV	N
1.094000	25.70	11.3	46	20.3	AV	N
2.158000	22.60	11.3	46	23.4	AV	N
3.014000	22.40	11.4	46	23.6	AV	N
3.846000	22.50	11.4	46	23.5	AV	N

RESULT: PASS

Note: All the test modes had been tested, the mode 1 was the worst case. Only the data of the worst case would be record in this test report.

Any report having not been signed by authorized approver, or having been altered without authorization, or having not been stamped by the "Dedicated Testing/Inspection Stamp" is deemed to be invalid. Copying or excerpting portion of, or altering the content of the report is not permitted without the written authorization of AGC. The test results presented in the report apply only to the tested sample. Any objections to report issued by AGC should be submitted to AGC within 15days after the issuance of the test report. Further enquiry of validity or verification of the test report should be addressed to AGC by agc@agc-cert.com.

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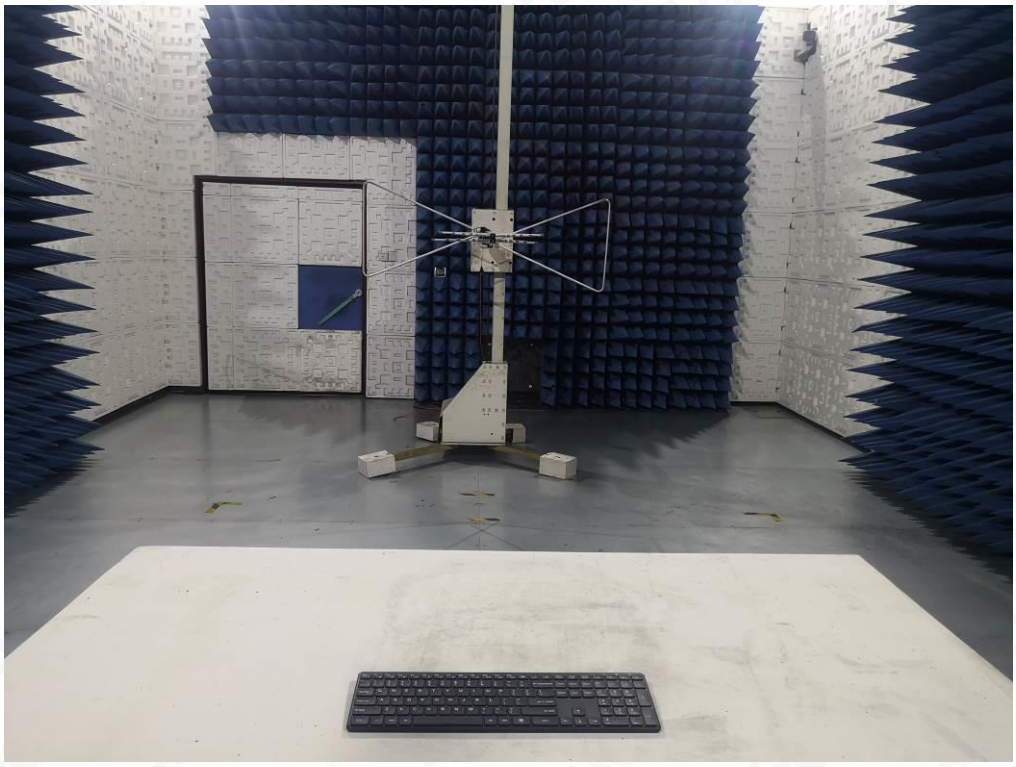
APPENDIX A: PHOTOGRAPHS OF TEST SETUP

FCC RADIATED EMISSION TEST SETUP BELOW 1GHZ



FCC RADIATED EMISSION TEST SETUP ABOVE 1GHZ

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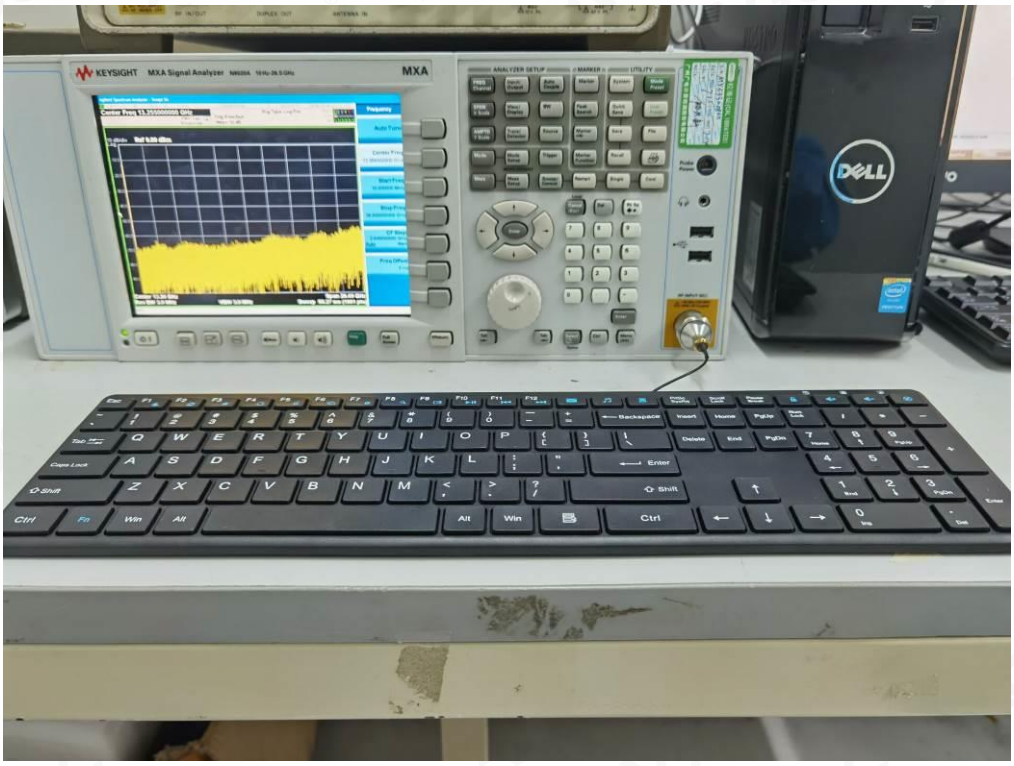
CONDUCTED EMISSION TEST SETUP

CONDUCTED TEST SETUP



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APPENDIX B: PHOTOGRAPHS OF THE EUT

TOP VIEW OF EUT

BOTTOM VIEW OF EUT

Any report having not been signed by authorized approver, or having been altered without authorization, or having not been stamped by the "Dedicated Testing/Inspection Stamp" is deemed to be invalid. Copying or excerpting portion of, or altering the content of the report is not permitted without the written authorization of AGC. The test results presented in the report apply only to the tested sample. Any objections to report issued by AGC should be submitted to AGC within 15days after the issuance of the test report. Further enquiry of validity or verification of the test report should be addressed to AGC by agc@agc-cert.com.

FRONT VIEW OF EUT

BACK VIEW OF EUT

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LEFT VIEW OF EUT

RIGHT VIEW OF EUT

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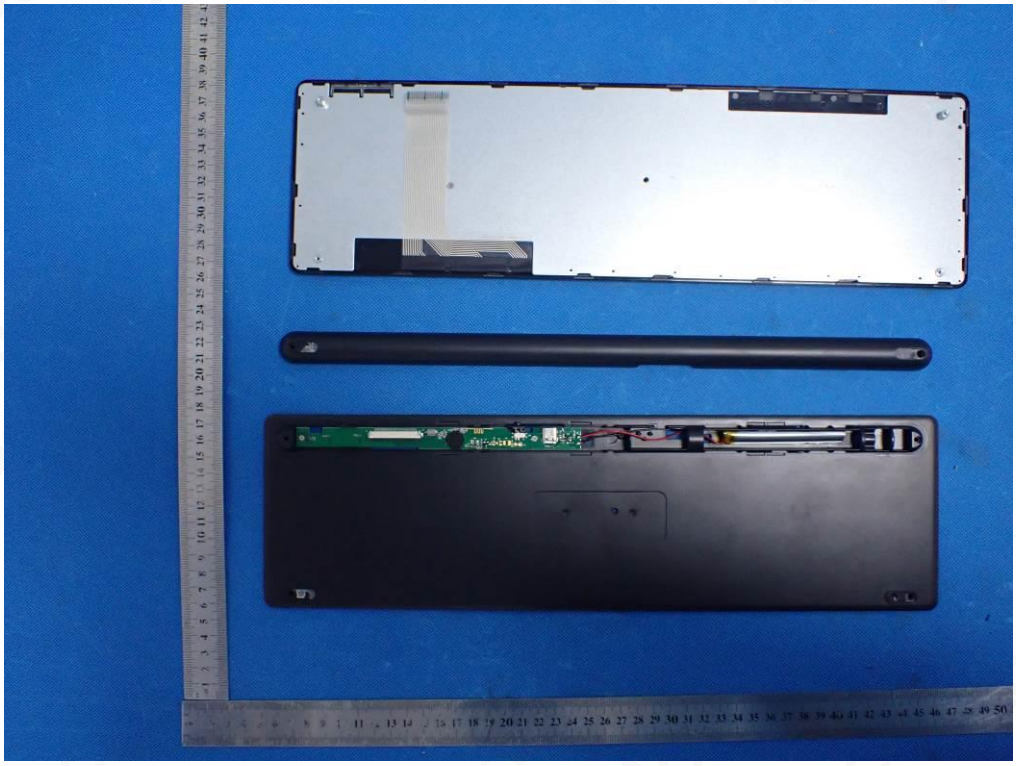
PORTS VIEW OF EUT

OPEN VIEW OF EUT



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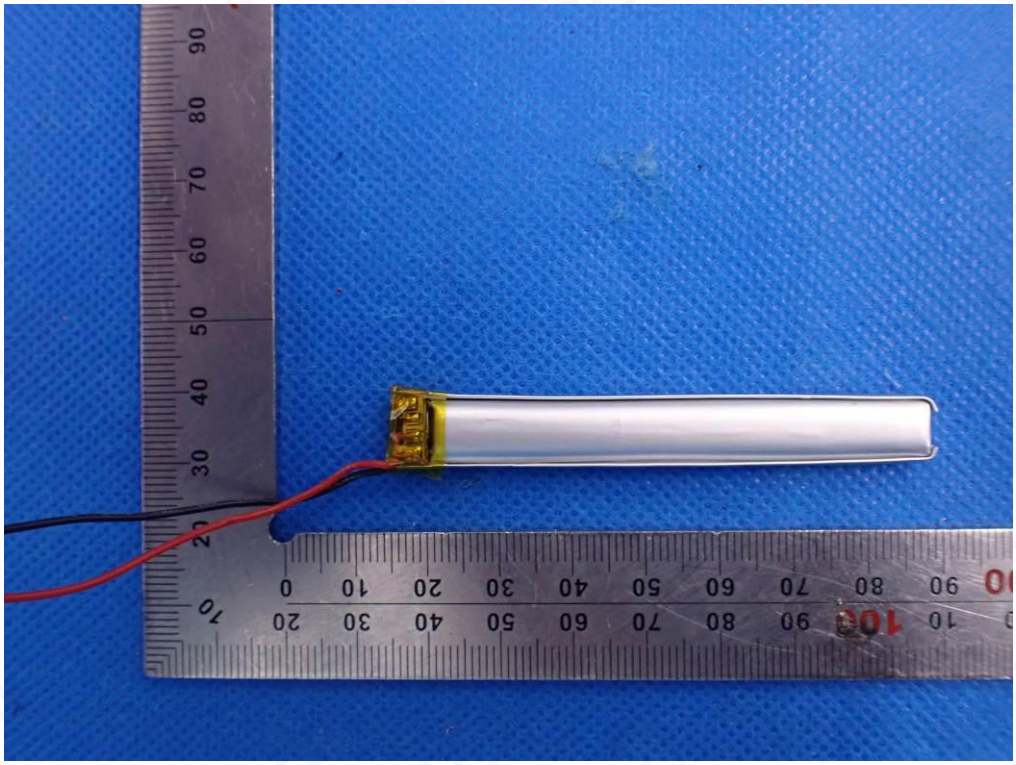
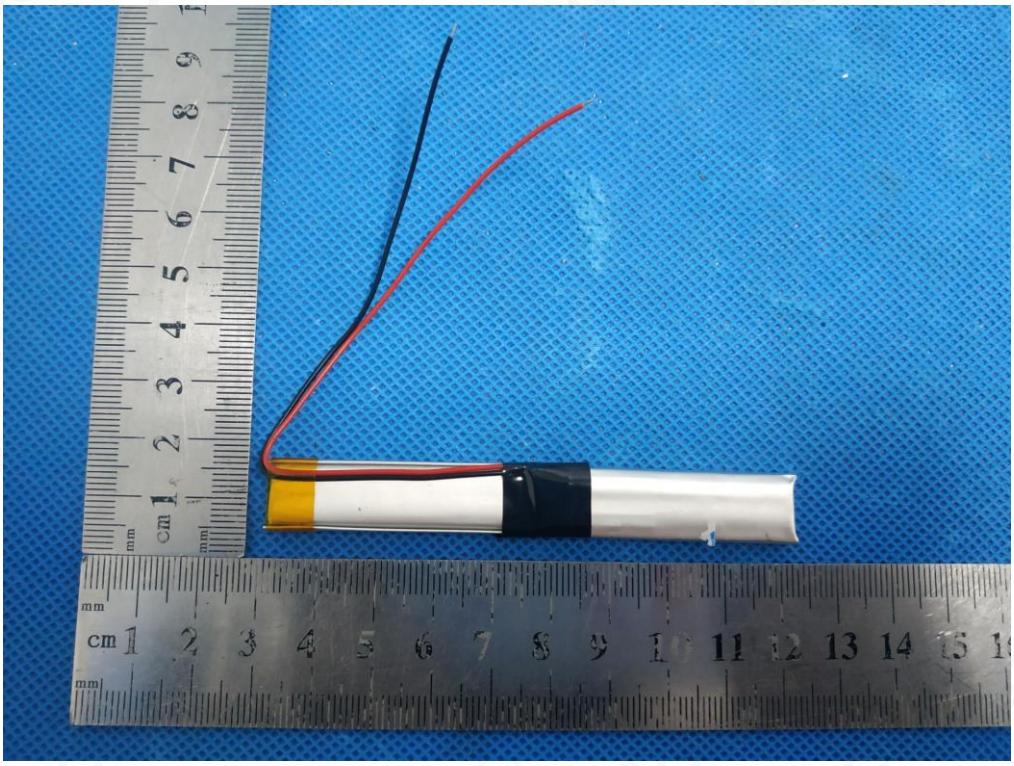
VIEW OF BATTERY-1



VIEW OF BATTERY-2



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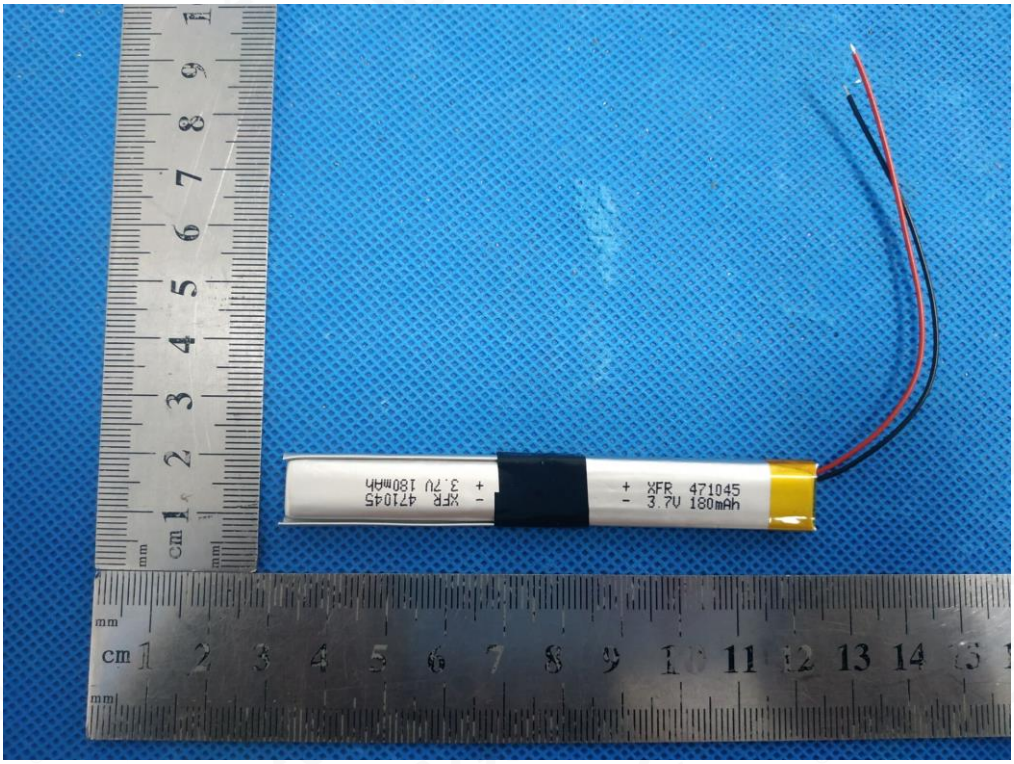
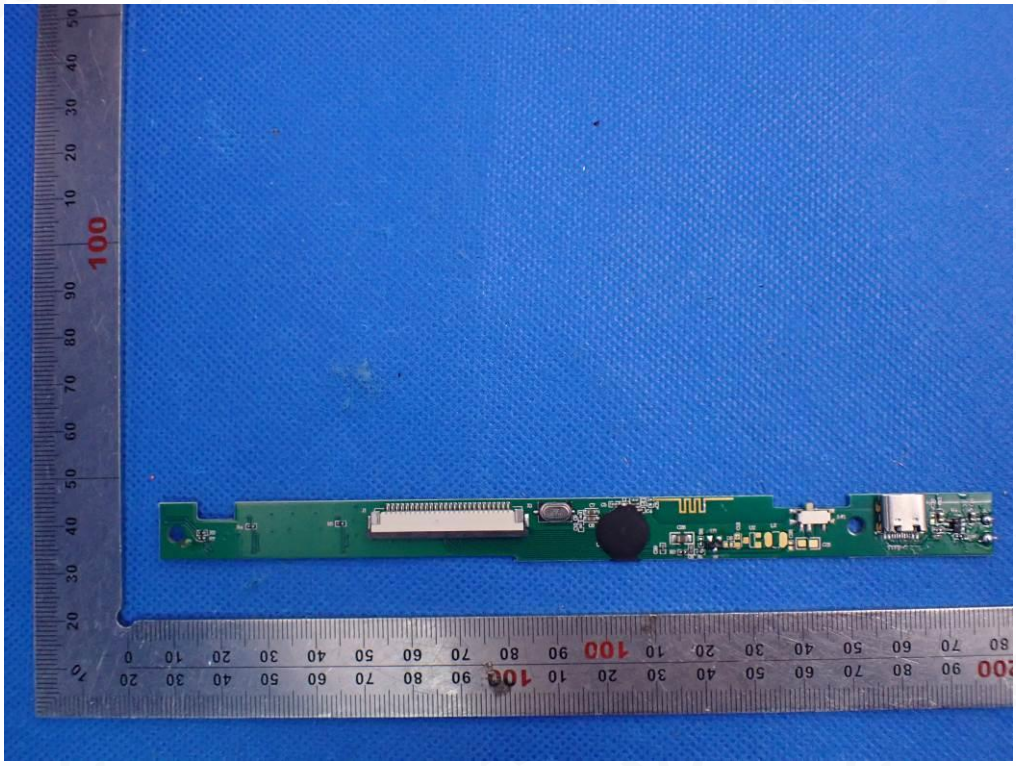
VIEW OF BATTERY-3



INTERNAL VIEW OF EUT-3



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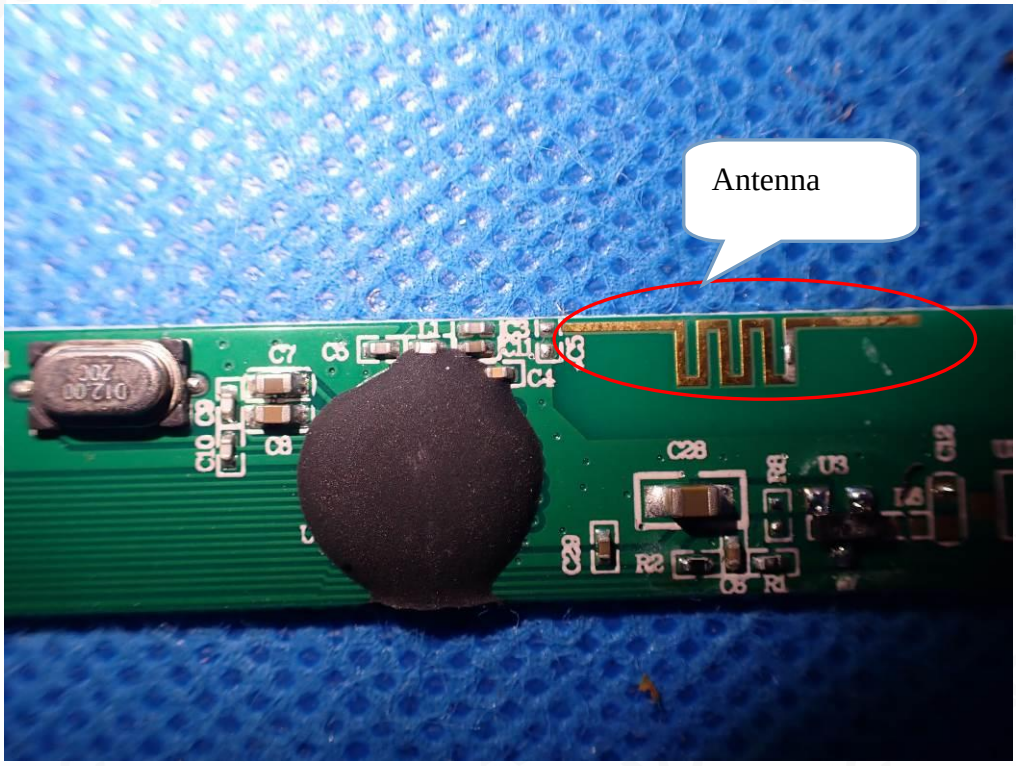
INTERNAL VIEW OF EUT-4

INTERNAL VIEW OF EUT-5



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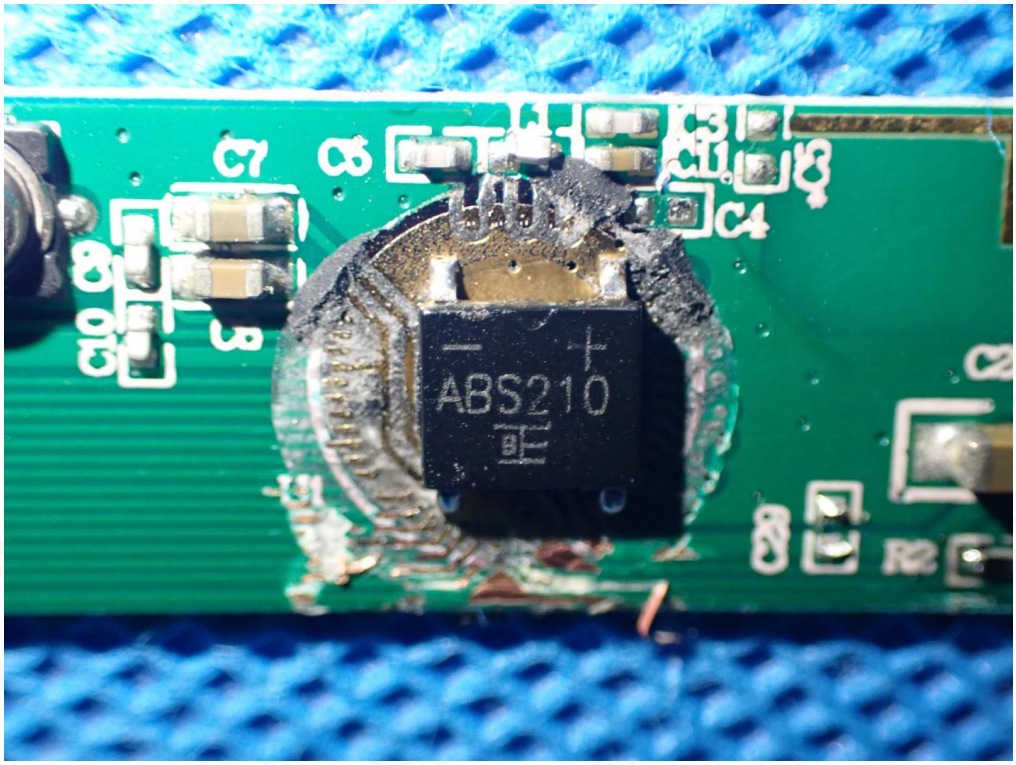

----END OF REPORT----

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Conditions of Issuance of Test Reports

1. All samples and goods are accepted by the Attestation of Global Compliance (Shenzhen) Co., Ltd (the "Company") solely for testing and reporting in accordance with the following terms and conditions. The company provides its services on the basis that such terms and conditions constitute express agreement between the company and any person, firm or company requesting its services (the "Clients").

2. Any report issued by Company as a result of this application for testing services (the "Report") shall be issued in confidence to the Clients and the Report will be strictly treated as such by the Company. It may not be reproduced either in its entirety or in part and it may not be used for advertising or other unauthorized purposes without the written consent of the Company. The Clients to whom the Report is issued may, however, show or send it, or a certified copy thereof prepared by the Company to its customer, supplier or other persons directly concerned. The Company will not, without the consent of the Clients, enter into any discussion or correspondence with any third party concerning the contents of the Report, unless required by the relevant governmental authorities, laws or court orders.

3.The Company shall not be called or be liable to be called to give evidence or testimony on the Report in a court of law without its prior written consent, unless required by the relevant governmental authorities, laws or court orders.

4. The non-CMA report issued by AGC is only permitted to be used by the client as internal reference use and shall not be used for public demonstration purpose.

5. In the event of the improper use of the report as determined by the Company, the Company reserves the right to withdraw it, and to adopt any other additional remedies which may be appropriate.

6. Samples submitted for testing are accepted on the understanding that the Report issued cannot form the basis of, or be the instrument for, any legal action against the Company.

7. The Company will not be liable for or accept responsibility for any loss or damage however arising from the use of information contained in any of its Reports or in any communication whatsoever about its said tests or investigations.

8.Clients wishing to use the Report in court proceedings or arbitration shall inform the Company to that effect prior to submitting the sample for testing.

9. The Company is not responsible for recalling the electronic version of the original report when any revision is made to them. The Client assumes the responsibility to providing the revised version to any interested party who uses them.

10. Subject to the variable length of retention time for test data and report stored hereinto as otherwise specifically required by individual accreditation authorities, the Company will only keep the supporting test data and information of the test report for a period of six years. The data and information will be disposed of after the aforementioned retention period has elapsed. Under no circumstances shall we provide any data and information which has been disposed of after retention period. Under no circumstances shall we be liable for damage of any kind, including (but not limited to) compensatory damages, lost profits, lost data, or any form of special, incidental, indirect, consequential or punitive damages of any kind, whether based on breach of contract of warranty, tort (including negligence), product liability or otherwise, even if we are informed in advance of the possibility of such damages.

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