

FCC PART 15C TEST REPORT FOR CERTIFICATION

On Behalf of

Dongguan Yongjian Electronic Co., Ltd.

Bluetooth Keyboard

Model No. : FB00011KBK; FB00012KBK; FB00013KBK;
FB00014KBK; FB00015KBK; FB00016KBK;
FB00017KBK; FB00018KBK; FB00019KBK

FCC ID: 2AWUR-FB00011KBK

Prepared for : Dongguan Yongjian Electronic Co., Ltd.
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Date of Test : Jun.18~21,2020

Date of Report : Jul.21,2020

TABLE OF CONTENTS

Description	Page
1. SUMMARY OF STANDARDS AND RESULTS.....	5
1.1. Description of Standards and Results.....	5
2. GENERAL INFORMATION.....	6
2.1. Description of Equipment Under Test	6
2.2. Feature of Equipment Under Test	7
2.3. Tested Supporting System Details	8
2.4. Block Diagram of connection between EUT and simulators	8
2.5. Test information	8
2.6. Test Facility.....	9
2.7. Measurement Uncertainty (95% confidence levels, k=2)	9
3. POWER LINE CONDUCTED EMISSION TEST	10
3.1. Test Equipments.....	10
3.2. Block Diagram of Test Setup	10
3.3. Power Line Conducted Emission Test Limits	10
3.4. Configuration of EUT on Test	11
3.5. Operating Condition of EUT.....	11
3.6. Test Procedure.....	11
3.7. Power Line Conducted Emission Test Results.....	11
4. RADIATED EMISSION MEASUREMENT	13
4.1. Test Equipment	13
4.2. Block Diagram of Test Setup	14
4.3. Radiated Emission Limit Standard:.....	15
4.4. EUT Configuration on Test.....	15
4.5. Operating Condition of EUT.....	15
4.6. Test Procedure.....	15
4.7. Radiated Emission Test Results	16
5. CONDUCTED SPURIOUS EMISSIONS	22
5.1. Test Equipment	22
5.2. Block Diagram of Test Setup	22
5.3. Limit.....	22
5.4. Test Procedure.....	22
5.5. Test result	22
6. 20 DB & 99% BANDWIDTH TEST.....	26
6.1. Test Equipment	26
6.2. Limit.....	26
6.3. Test Procedure.....	26
6.4. Test Results	27
7. CARRIER FREQUENCY SEPARATION TEST	29
7.1. Test Equipment	29
7.2. Limit.....	29
7.3. Test Procedure.....	29
7.4. Test Results	30
8. NUMBER OF HOPPING FREQUENCY TEST.....	31
8.1. Test Equipment	31
8.2. Limit.....	31
8.3. Test Procedure.....	31
8.4. Test Results	31

9.	DWELL TIME.....	33
9.1.	Test Equipment	33
9.2.	Limit.....	33
9.3.	Test Procedure.....	33
9.4.	Test Results	33
10.	MAXIMUM PEAK OUTPUT POWER TEST	35
10.1.	Test Equipment	35
10.2.	Limit.....	35
10.3.	Test Procedure.....	35
10.4.	Test Results	35
11.	BAND EDGE COMPLIANCE TEST.....	36
11.1.	Test Equipment	36
11.2.	Limit.....	36
11.3.	Test Produce	36
11.4.	Test Results	36
12.	ANTENNA REQUIREMENT.....	38
12.1.	Standard Applicable	38
12.2.	Antenna Connected Construction.....	38
13.	DEVIATION TO TEST SPECIFICATIONS	39

Appendix A. Photograph of Test

Appendix B. Photo of the EUT

TEST REPORT CERTIFICATION

Applicant : Dongguan Yongjian Electronic Co., Ltd.
Manufacturer : Dongguan Yongjian Electronic Co., Ltd.
Product : Bluetooth Keyboard
FCC ID : 2AWUR-FB00011KBK
(A) Model No. : FB00011KBK; FB00012KBK; FB00013KBK;
FB00014KBK; FB00015KBK; FB00016KBK;
FB00017KBK; FB00018KBK; FB00019KBK
(B) Test Voltage : DC 3.7V

Tested for comply with:
FCC CFR47 Part 15 Subpart C

Test procedure used:
ANSI C63.10: 2013

The device described above is tested by AUDIX TECHNOLOGY (SHENZHEN) CO., LTD. to confirm comply with all the FCC Part 15 Subpart C requirements. The test results are contained in this test report and AUDIX TECHNOLOGY (SHENZHEN) CO., LTD. is assumed full responsibility for the accuracy and completeness of these tests. Also, this report shows that the Equipment Under Test (EUT) is to be technically compliant with the FCC requirements. This report contains data that are not covered by the NVLAP accreditation.

This Report is made under FCC Part 2.1074. No modifications were required during testing to bring this product into compliance.

This report applies to above tested sample only. This report shall not be reproduced in part without written approval of AUDIX TECHNOLOGY (SHENZHEN) CO., LTD.

The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government.

Date of Test : Jun.18~21,2020 Report of date: Jul.21,2020

Prepared by : Monica Liu Reviewed by : Sunny Lu
Monica Liu / Assistant Sunny Lu / Deputy Manager



信華科技(深圳)有限公司

Audix Technology (Shenzhen) Co., Ltd.

EMC 部門報告專用章

Stamp only for EMC Dept. Report

Signature: David Jin

Approved & Authorized Signer :

David Jin / Deputy General Manager

1. SUMMARY OF STANDARDS AND RESULTS

1.1. Description of Standards and Results

The EUT has been tested according to the applicable standards as referenced below.

EMISSION		
Description of Test Item	Standard	Results
Power Line Conducted Emission Test	FCC Part 15: 15.207 ANSI C63.10 2013	PASS
Radiated Emission Test	FCC Part 15 15.209 FCC Part 15 15.205 FCC Part 15 15.247(d) ANSI C63.10 2013	PASS
Conducted Spurious Emissions	FCC Part 15: 15.247(d) ANSI C63.10 2013	PASS
Carrier Frequency Separation Test	FCC Part 15: 15.247(a)(1) ANSI C63.10 2013	PASS
20dB & 99% Bandwidth Test	FCC Part 15: 15.215 ANSI C63.10 2013	PASS
Number Of Hopping Frequency Test	FCC Part 15: 15.247(a)(1)(iii) ANSI C63.10 2013	PASS
Dwell Time Test	FCC Part 15: 15.247(a)(1)(iii) ANSI C63.10 2013	PASS
Maximum Peak Output Power Test	FCC Part 15 15.247(b)(1) ANSI C63.10 2013	PASS
Band Edge Compliance Test	FCC Part 15 15.247(d) ANSI C63.10 2013	PASS
Antenna requirement	FCC Part 15: 15.203	PASS

2. GENERAL INFORMATION

2.1. Description of Equipment Under Test

Applicant	Dongguan Yongjian Electronic Co., Ltd.
Applicant Address	#301, 10 TianXin-Road, LongTou-Ridge, LinCun-community, TangXia-Town, DongGuan-City, GuangDong Province,China
Manufacturer	Dongguan Yongjian Electronic Co., Ltd.
Manufacturer Address	#301, 10 TianXin-Road, LongTou-Ridge, LinCun-community, TangXia-Town, DongGuan-City, GuangDong Province,China
Factory	Dongguan Yongjian Electronic Co., Ltd.
Factory Address	#301, 10 TianXin-Road, LongTou-Ridge, LinCun-community, TangXia-Town, DongGuan-City, GuangDong Province,China
Product	Bluetooth Keyboard
Model No.	FB00011KBK; FB00012KBK; FB00013KBK;FB00014KBK; FB00015KBK; FB00016KBK; FB00017KBK;FB00018KBK; FB00019KBK
	Different color and sales area.
Test Model	FB00011KBK
FCC ID	2AWUR-FB00011KBK
Sample Type	Prototype production
Date of Receipt	Jan.18,2020
Date of Test	Jun.18~21,2020
Remark: This report only for Bluetooth V3.0	

2.2. Feature of Equipment Under Test

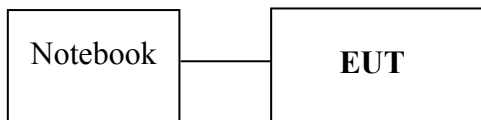
Product Feature & Specification		
Product	Bluetooth Keyboard	
Model No.	FB00011KBK; FB00012KBK; FB00013KBK; FB00014KBK; FB00015KBK; FB00016KBK; FB00017KBK; FB00018KBK; FB00019KBK	
Radio	Bluetooth V3.0	
Power Source	☐ Commercial Power	AC V
	☐ External Power Source	DC V
	☒ Li-ion Battery	DC 3.7V
	☐ UM battery	DC V
Bluetooth		
Bluetooth Version	V3.0	
Frequency Range	2402-2480MHz	
Type of Modulation	GFSK	
Data Rate	1Mbps	
Quantity of Channels	79	
Channel Separation	1MHz	

Antenna System	
Type of Antenna	PCB Antenna
Antenna Peak Gain	Bluetooth Peak Gain: 1.87dBi

2.3. Tested Supporting System Details

No.	Description	ACS No.	Manufacturer	Model	Serial Number
1.	Notebook	N/A	acer	ZOW	NVX7C
	USB Cable: Shielded, Detachable, 1.0m				

2.4. Block Diagram of connection between EUT and simulators



(EUT: Bluetooth Keyboard)

2.5. Test information

A special software was used to control EUT work in continuous TX mode

Tested mode, Packet Type, peak output power information			
Mode	Packet Type	Output power(dBm) P max	Output Power(dBm) P low
GFSK	DH1	-6.222	-7.186
	DH3		
	DH5		

Item		Modulation	Data Rate	Test Channel
Radiated Test Case	Radiated Band Edge	GFSK	1Mbps	00/78
	Radiated Spurious Emission	GFSK	1Mbps	00/39/78
Conducted Test Case	20dB Bandwidth	GFSK	1Mbps	00/39/78
	Carrier Frequency Separation	GFSK	1Mbps	39
	Time of Occupancy	GFSK	1Mbps	39
	Number of Hopping Channels	GFSK	1Mbps	39
	Maximum Peak Output Power	GFSK	1Mbps	00/39/78
	Band Edges	GFSK	1Mbps	00/78
	Spurious Emission	GFSK	1Mbps	00/39/78

2.6. Test Facility

Site Description

Name of Firm	: Audix Technology (Shenzhen) Co., Ltd. No. 6, Kefeng Road, Science & Technology Park, Nanshan District, Shenzhen, Guangdong, China
EMC Lab.	: Certificated by Industry Canada Registration Number: IC 5183A-1 Valid Date: Mar.31, 2021 Certificated by DAkkS, Germany Registration No: D-PL-12151-01-00 Valid Date: Dec.07, 2021 Accredited by NVLAP, USA : NVLAP Code: 200372-0 Valid Date: Mar.31, 2021 Certificated by FCC USA. : Designation No.: CN5022 Valid Date: Mar.31, 2021

2.7. Measurement Uncertainty (95% confidence levels, k=2)

Test Item	Uncertainty
Uncertainty for Conduction emission test in No. 1 Conduction	2.6dB(150KHz to 30MHz)
Uncertainty for Radiation Emission test in 3m chamber	3.6dB(30~200MHz, Polarization: H)
	4.0dB(30~200MHz, Polarization: V)
	3.6dB(200M~1GHz, Polarization: H)
	3.8dB(200M~1GHz, Polarization: V)
Uncertainty for Radiation Emission test in 3m chamber(1GHz-25GHz)	4.6dB(1~6GHz, Distance: 3m)
	4.6dB(6~25GHz, Distance: 3m)
Uncertainty for Radiated Spurious Emission test in RF chamber	3.7dB(30MHz~1000MHz)
	3.3dB(1~26.5GHz)
Uncertainty for Conduction Spurious emission test	2.0dB
Uncertainty for Output power test	0.8dB
Uncertainty for Bandwidth test	83kHz
Uncertainty for DC power test	0.1%
Uncertainty for test site temperature and humidity	0.6℃
	3%

Note: EMI uncertainty is evaluated by CISPR16-4-2.

The value of measurement uncertainty of EMI is less than U_{CISPR} .

The value is not calculated in the test results.

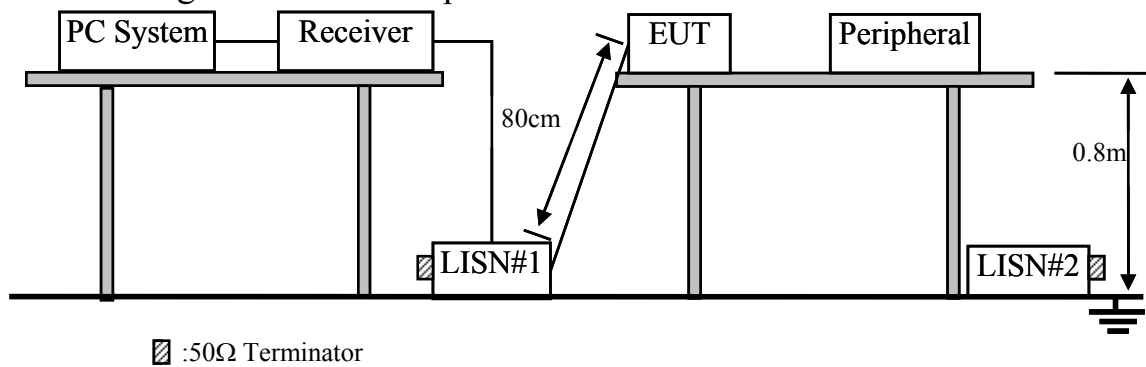
3. POWER LINE CONDUCTED EMISSION TEST

3.1. Test Equipments

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	1# Shielding Room	AUDIX	N/A	N/A	May.17,18	3 Year
2.	EMI Test Receiver	Rohde & Schwarz	ESCI	100842	Apr.12,20	1 Year
3.	L.I.S.N.#1	Rohde & Schwarz	ENV216	102160	Oct.13,19	1 Year
4.	L.I.S.N.#2	Kyoritsu	KNW-407	8-1636-1	Apr.12,20	1 Year
5.	Terminator	Hubersuhner	50Ω	No.1	Apr.12,20	1 Year
6.	Terminator	Hubersuhner	50Ω	No.2	Apr.12,20	1 Year
7.	RF Cable	EMCI	EMCCFD300-BM-NM-2000	190422	Apr.12,20	1 Year
8.	Coaxial Switch	Anritsu	MP59B	6201397223	Apr.11,20	1 Year
9.	Test Software	AUDIX	e3	6.100913a	N/A	N/A

Note: N/A means Not applicable.

3.2. Block Diagram of Test Setup



3.3. Power Line Conducted Emission Test Limits

Frequency	Maximum RF Line Voltage	
	Quasi-Peak Level dB(μV)	Average Level dB(μV)
150kHz ~ 500kHz	66 ~ 56*	56 ~ 46*
500kHz ~ 5MHz	56	46
5MHz ~ 30MHz	60	50

Notes: 1. * Decreasing linearly with logarithm of frequency.

2. The lower limit shall apply at the transition frequencies.

3.4.Configuration of EUT on Test

The following equipment are installed on Power Line Conducted Emission Test to meet the commission requirement and operating regulations in a manner which tends to maximize its emission characteristics in a normal application.

3.4.1. Bluetooth Keyboard (EUT)

Model Number : FB00011KBK

3.4.2. Support Equipment: As Tested Supporting System Details, in Section 2.2.

3.5.Operating Condition of EUT

3.5.1. Setup the EUT and simulator as shown as Section 3.2.

3.5.2. Turn on the power of all equipments.

3.5.3. PC run test software to control EUT work in Tx mode.

3.6.Test Procedure

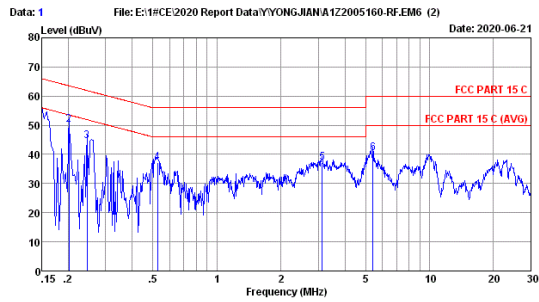
The EUT was placed on a non-metallic table, 80cm above the ground plane. The EUT Power Via AC unit connected to the power mains through a line impedance stabilization network (L.I.S.N. 1#). This provides a 50 ohm coupling impedance for the EUT (Please refer the block diagram of the test setup and photographs). The AC line are checked to find out the maximum conducted emission. In order to find the maximum emission levels, the relative positions of equipment and all of the interface cables shall be changed according to ANSI C63.10: 2013 on Conducted Emission Test.

The bandwidth of test receiver (R & S ESCI) is set at 9kHz.

The frequency range from 150kHz to 30MHz is checked.

3.7.Power Line Conducted Emission Test Results

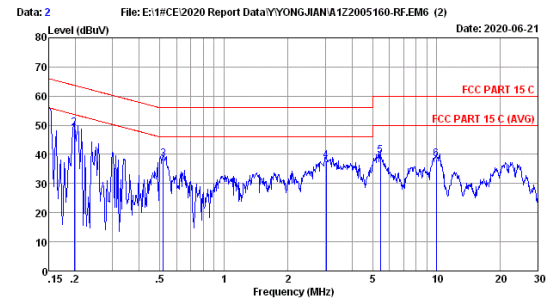
PASS. (All emissions not reported below are too low against the prescribed limits.)



Site no :1# Conduction Data No :1
 Dis./Lism :2019 ENV216 L LISM phase:
 Limit :FCC PART 15 C
 Env./Ins. :21.2°C/55% Engineer :Garry
 EUT :M/N:FB00011KBK
 Power Rating :DC 3.7V
 Test Mode :BT3.0 TX

No	Freq (MHz)	LISM Factor (dB)	Cable loss (dB)	Reading (dBuV)	Emission Level (dBuV)	Limits (dBuV)	Margin (dB)	Remark
1	0.150	9.60	0.01	44.45	54.06	66.00	11.94	QP
2	0.202	9.60	0.01	40.56	50.17	63.54	13.37	QP
3	0.246	9.60	0.01	35.00	44.61	61.91	17.30	QP
4	0.527	9.60	0.01	27.73	37.34	56.00	18.66	QP
5	3.123	9.60	0.04	27.61	37.25	56.00	18.75	QP
6	5.419	9.65	0.04	30.83	40.52	60.00	19.48	QP

Remarks: 1.Emission Level=LISM Factor+Cable Loss+Reading.
 2.If the average limit is met when using a quasi-peak detector, the EUT shall be deemed to meet both limits and measurement with average detector is unnecessary.



Site no :1# Conduction Data No :2
 Dis./Lism :2019 ENV216 N LISM phase:
 Limit :FCC PART 15 C
 Env./Ins. :21.2°C/55% Engineer :Garry
 Power Rating :DC 3.7V
 Test Mode :BT3.0 TX

No	Freq (MHz)	LISM Factor (dB)	Cable loss (dB)	Reading (dBuV)	Emission Level (dBuV)	Limits (dBuV)	Margin (dB)	Remark
1	0.150	9.60	0.01	44.82	54.43	66.00	11.57	QP
2	0.198	9.60	0.01	39.52	49.13	63.71	14.58	QP
3	0.518	9.60	0.01	28.71	38.32	56.00	17.68	QP
4	3.025	9.60	0.04	28.05	37.69	56.00	18.31	QP
5	5.447	9.60	0.04	29.77	39.41	60.00	20.59	QP
6	9.966	9.60	0.06	28.59	38.25	60.00	21.75	QP

Remarks: 1.Emission Level=LISM Factor+Cable Loss+Reading.
 2.If the average limit is met when using a quasi-peak detector, the EUT shall be deemed to meet both limits and measurement with average detector is unnecessary.

4. RADIATED EMISSION MEASUREMENT

4.1. Test Equipment

Frequency range: 30~1000MHz

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	3#Chamber(NSA)	AUDIX	N/A	N/A	May.03,20	1 Year
2.	3#Chamber(SE)	AUDIX	N/A	N/A	May.17,18	3 Year
3.	Signal Analyzer	Rohde & Schwarz	FSV30	104050	Apr.11,20	1 Year
4.	EMI Test Receiver	Rohde & Schwarz	ESR7	101547	Apr.12,20	1 Year
5.	Amplifier	HP	8447D	2648A04738	Apr.11,20	1 Year
6.	Loop Antenna	Chase	HLA6120	1062	Apr.29,20	1 Year
7.	Bi log Antenna	TESEQ	CBL6112D	35375	Nov.26,19	1 Year
8.	NSA Cable	HUBER+SUHNER	CFD400NL-LW	No.3	Oct.13,19	1 Year
9.	Coaxial Switch	Anritsu	MP59B	6201397222	Apr.11,20	1 Year
10.	Test Software	AUDIX	e3	6.2009-5-21a(n)	N/A	N/A

Note: N/A means Not applicable.

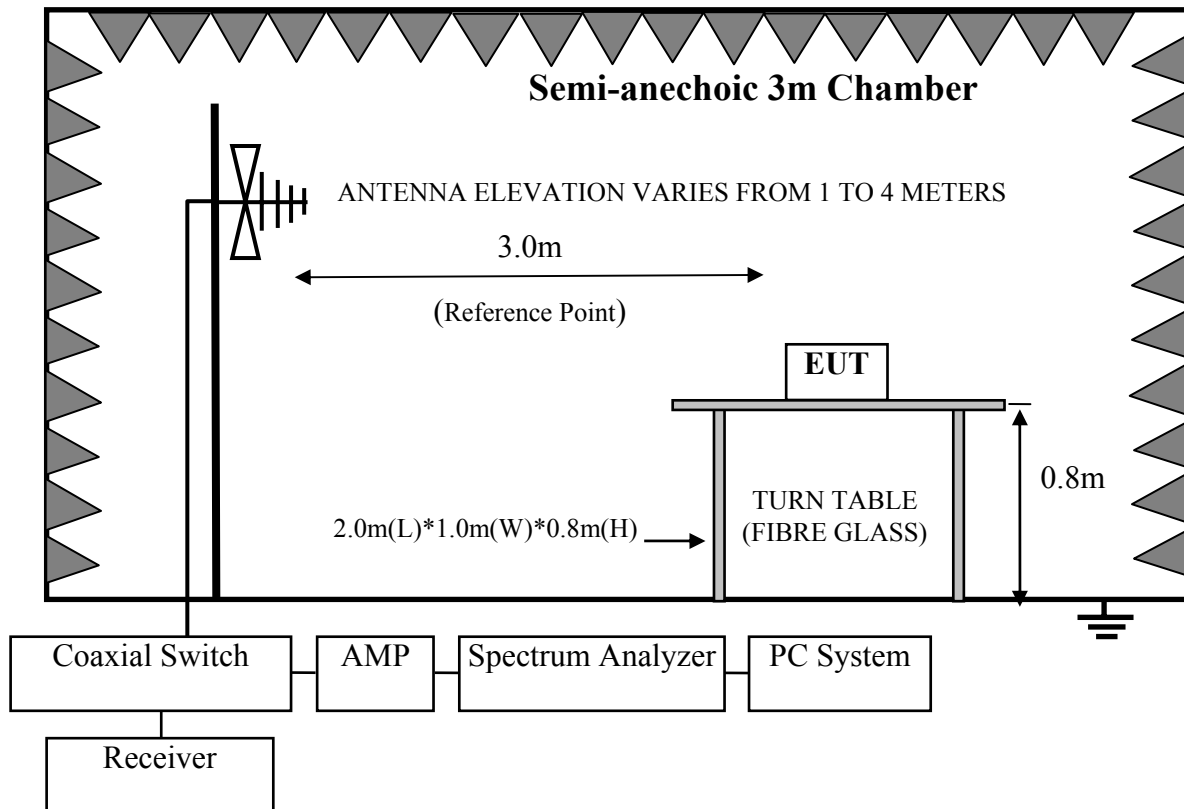
Frequency range: above 1000MHz

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	RF Chamber(Svswr)	AUDIX	N/A	N/A	Apr.16,20	1 Year
2.	RF Chamber(SE)	AUDIX	N/A	N/A	Apr.16,19	3 Year
3.	Signal Analyzer	Rohde & Schwarz	FSV30	104051	Apr.12,20	1 Year
4.	PXA Signal Analyzer	Agilent	N9030A	MY51380221	Apr.12,20	1 Year
5.	Horn Antenna	ETS	3117	00218552	Dec.02,19	1 Year
6.	Horn Antenna	ETS	3116	00060089	Dec.02,19	1 Year
7.	Amplifier	HP	8449B	3008A00863	Apr.23,19	1 Year
8.	Amplifier	EMCI	EMC184040SE	980507	Apr.12,20	1 Year
9.	RF Cable	EMCI	EMC102-KM-KM-3500	170702	Apr.12,20	1 Year
10.	Test Software	AUDIX	e3	6.100913a	N/A	N/A

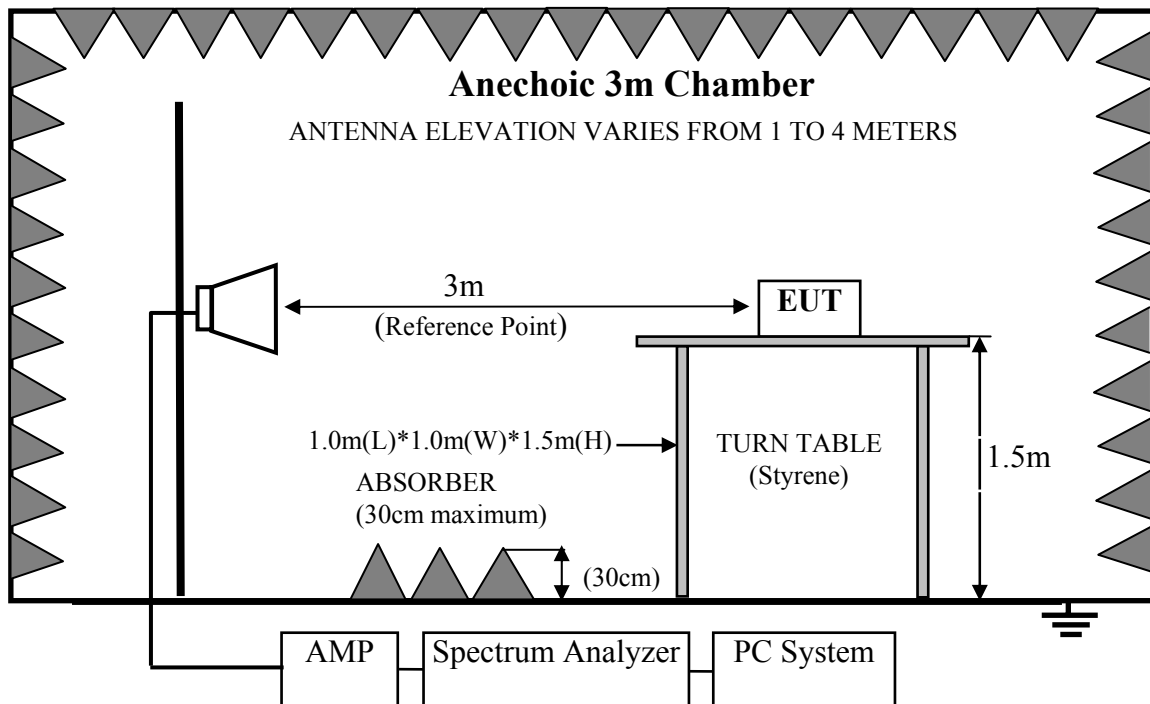
Note: N/A means Not applicable.

4.2. Block Diagram of Test Setup

For frequency range 30MHz-1000MHz



For frequency range above 1GHz



4.3. Radiated Emission Limit Standard:

FREQUENCY MHz	DISTANCE Meters	FIELD STRENGTHS LIMIT	
		$\mu\text{V/m}$	$\text{dB}(\mu\text{V})/\text{m}$
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 1000MHz	3	74.0 $\text{dB}(\mu\text{V})/\text{m}$ (Peak) 54.0 $\text{dB}(\mu\text{V})/\text{m}$ (Average)	

- Remark :
- (1) Emission level $\text{dB}\mu\text{V} = 20 \log$ 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.
 - (4) The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

4.4. EUT Configuration on Test

The following equipment are installed on Radiated Emission Test to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

4.4.1. Bluetooth Keyboard (EUT)

Model Number : FB00011KBK

4.5. Operating Condition of EUT

- 4.5.1. Setup the EUT and simulator as shown as Section 4.2.
- 4.5.2. Turn on the power of all equipments.
- 4.5.3. Let EUT work in Tx mode.

4.6. Test Procedure

Frequency below 30MHz:

The EUT setup on the turn table which has 0.8 m height to the ground. The turn table rotated 360 degrees and antenna fixed to 1 m to find the maximum emission level. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10-2013 regulation.

EUT and its simulators are placed on a turn table, which is 0.8 meter high above ground for frequency 30MHz~1000MHz, 1.5 meter high above ground for frequency above 1GHz and put the absorbing with 2.4m(L)*2.4m(W)*0.3m(H) on the ground . The turn table can rotate 360 degrees to determine the position of the maximum emission level. Power on the EUT and let it working in test mode, then test it. EUT is set 3 meters away from the receiving antenna, which is mounted on a antenna tower. The antenna can be moved up and down between 1 meter and 4 meters to find out the maximum emission level. Broadband antenna (calibrated bilog antenna) is used as receiving antenna for frequency 30MHz~1000MHz, and the Horn antenna is used as receiving antenna for frequency above 1GHz. Both horizontal and vertical polarization of the antenna is set on Test. In order to find the maximum emission levels, all of the interface cables must be manipulated according to ANSI C63.10-2013 on radiated emission Test.

This test was performed with EUT in X, Y, Z position, and the worse case was found when EUT in X position as the test photo indicated.

The bandwidth of the EMI test receiver (R&S ESR7) is set at 120kHz for frequency range from 30MHz to 1000 MHz.

The bandwidth of the Spectrum's RBW is set at 1MHz and VBW is set at 3MHz for peak emissions measurement above 1GHz

This device is pulse Modulated, a duty cycle factor was used to calculated average level based measured peak level.

The frequency range from 30MHz to 10th harmonic (25GHz) are checked. and no any emissions were found from 18GHz to 25 GHz, So the radiated emissions from 18GHz to 25GHz were not record.

4.7.Radiated Emission Test Results

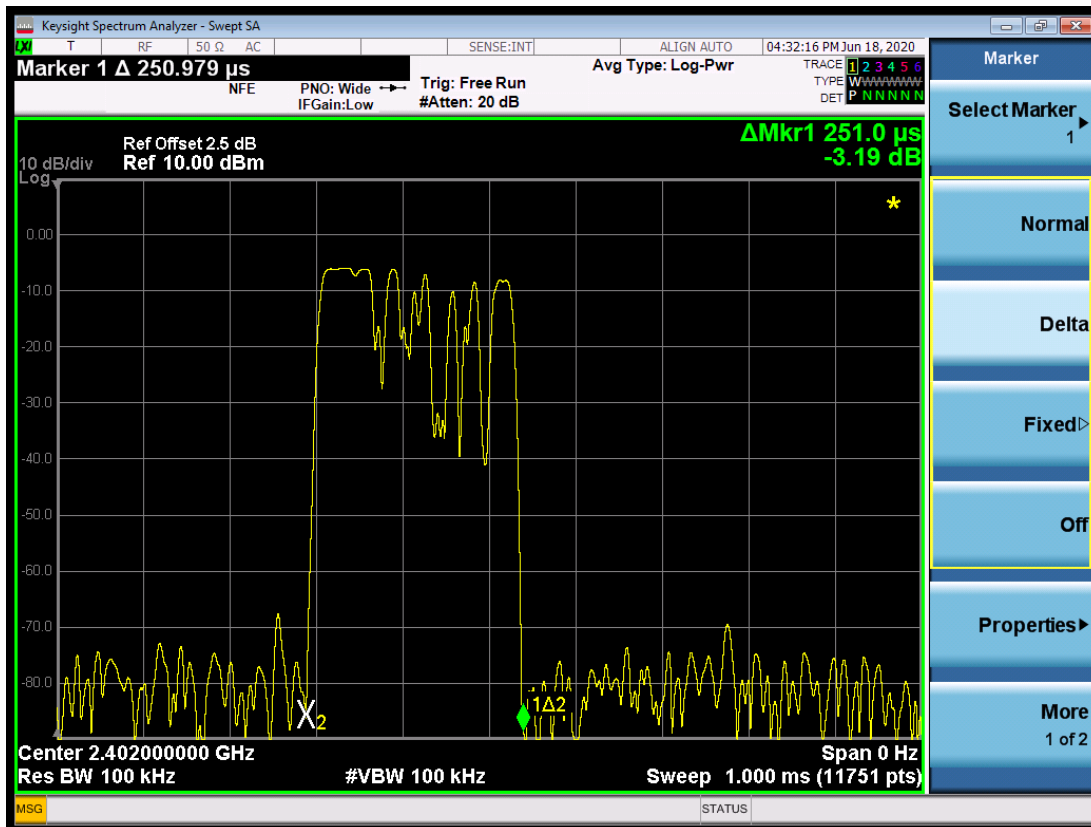
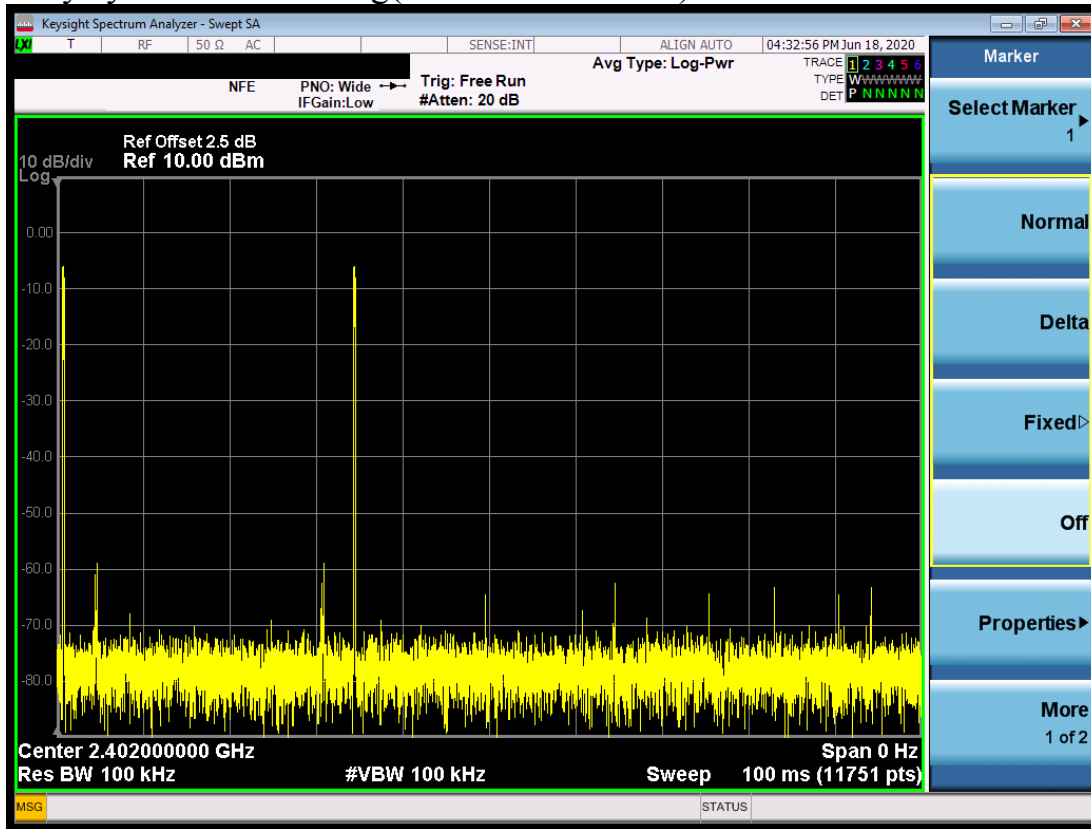
PASS.

All the emissions from 30MHz to 25GHz were comply with the 15.209 Limit.

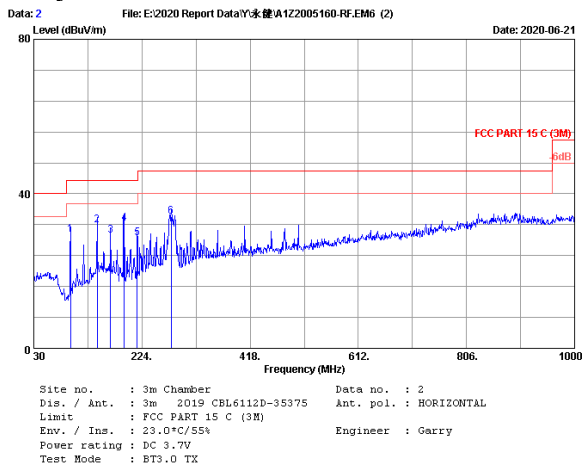
Note 1: The duty cycle factor for calculate average level is -45.986dB, and average limit is 20dB below peak limit, so if peak measured level comply with average limit, the average level was deemed to comply with average limit.

Note 2: The emissions (9kHz~30MHz) not reported for there is no emission be found.

Duty cycle factor = $20\log(\text{Dwell time}/100\text{ms}) = -45.986\text{dB}$

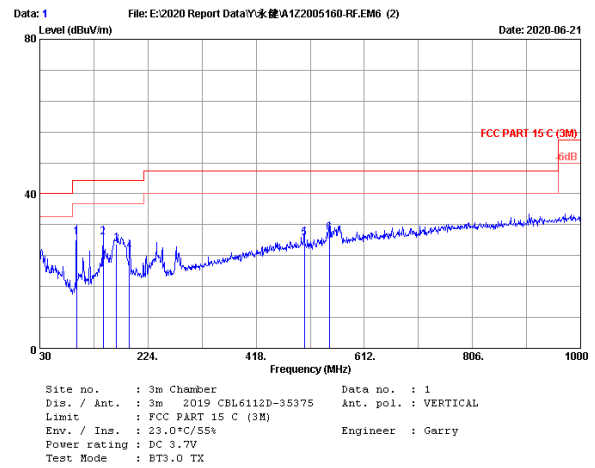


Frequency: 30MHz~1GHz



No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	95.960	16.60	0.98	11.74	29.32	43.50	14.18	QP
2	143.490	17.23	1.20	13.36	31.79	43.50	11.71	QP
3	167.740	16.16	1.30	11.77	29.23	43.50	14.27	QP
4	191.990	15.54	1.41	15.47	32.42	43.50	11.08	QP
5	215.270	15.50	1.50	11.55	28.55	43.50	14.95	QP
6	276.380	19.31	1.72	13.01	34.04	46.00	11.96	QP

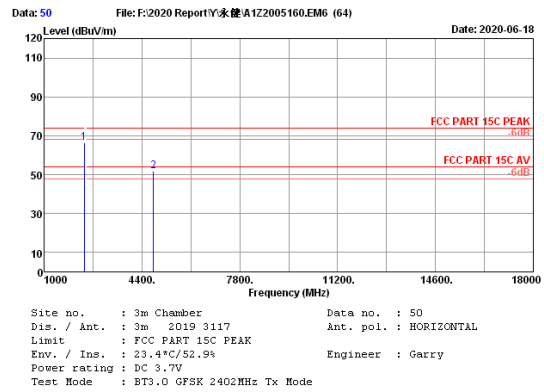
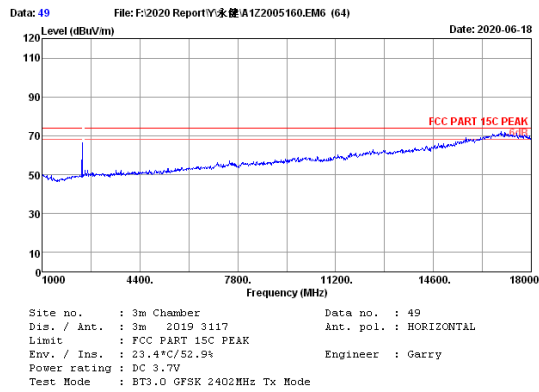
Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
 2. The emission levels that are 20dB below the official limit are not reported.



No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	95.960	16.60	0.98	11.22	28.80	43.50	14.70	QP
2	143.490	17.23	1.20	10.25	28.68	43.50	14.82	QP
3	167.740	16.16	1.30	9.42	26.98	43.50	16.62	QP
4	191.020	15.55	1.40	8.24	25.19	43.50	18.31	QP
5	504.330	23.64	2.35	2.50	28.49	46.00	17.51	QP
6	548.950	24.13	2.50	3.16	29.79	46.00	16.21	QP

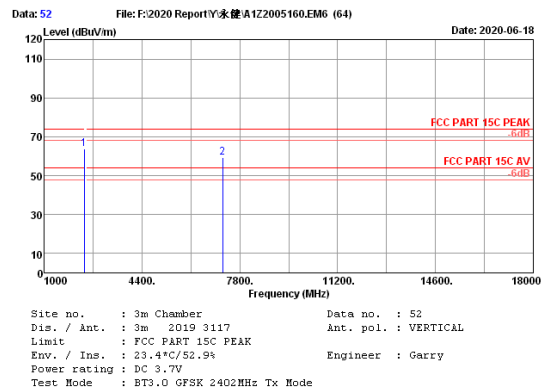
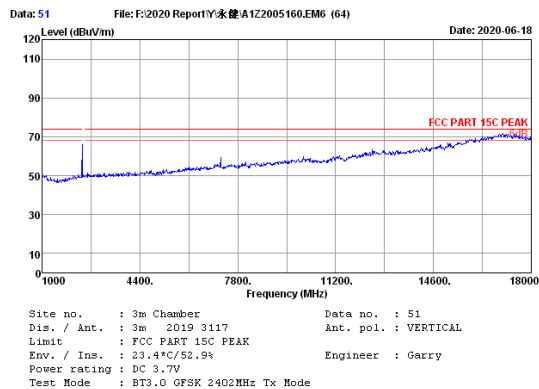
Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.
 2. The emission levels that are 20dB below the official limit are not reported.

Frequency: 1GHz~18GHz



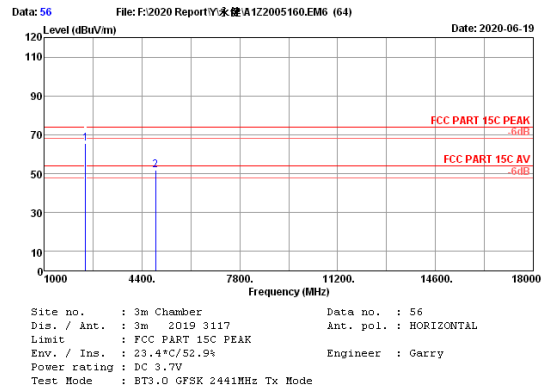
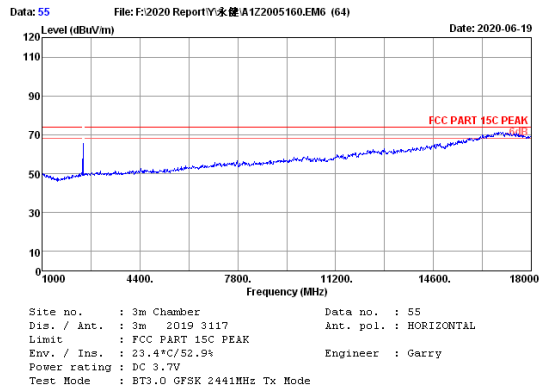
No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Amp factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2402.000	32.37	5.98	61.39	33.48	66.26	74.00	22.25	Peak
2	4804.000	34.36	7.40	43.17	33.18	51.75	74.00	22.25	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading
 -Amp factor.
 2. The emission levels that are 20dB below the official limit are not reported.



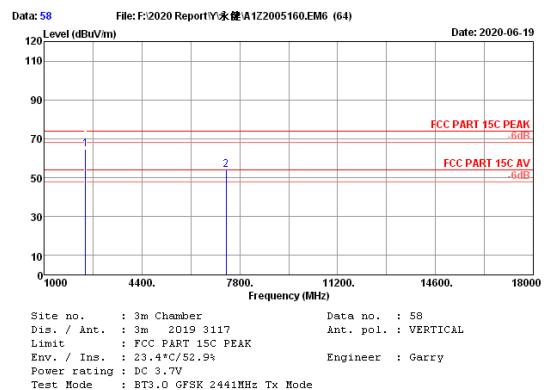
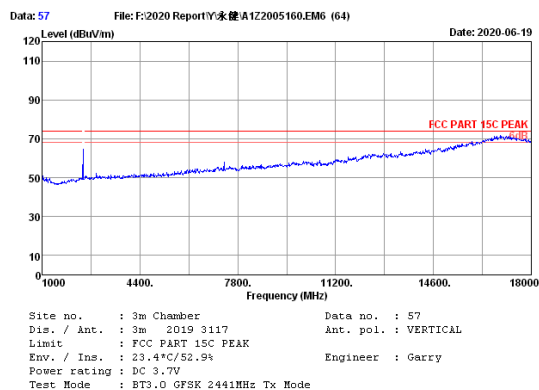
No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Amp factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2402.000	32.37	5.98	59.09	33.48	63.96	74.00	14.79	Peak
2	7206.000	35.90	8.79	47.54	33.02	59.21	74.00	14.79	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading
 -Amp factor.
 2. The emission levels that are 20dB below the official limit are not reported.



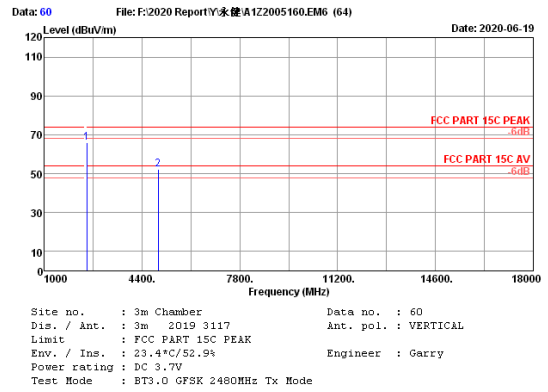
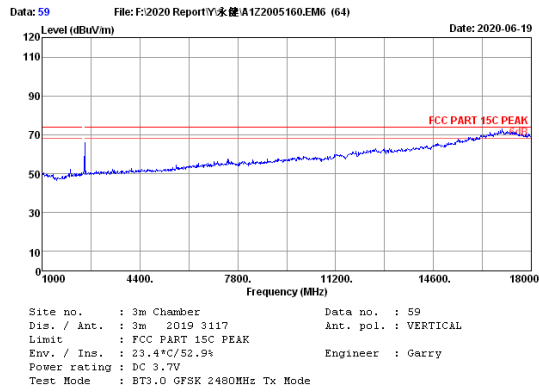
No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Amp factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2441.000	32.49	6.01	60.29	33.47	65.32	74.00	22.01	Peak
2	4882.000	34.38	7.44	43.36	33.19	51.99	74.00	22.01	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading -Amp factor.
 2. The emission levels that are 20dB below the official limit are not reported.



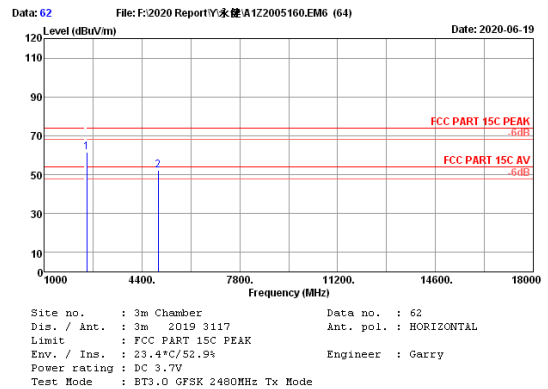
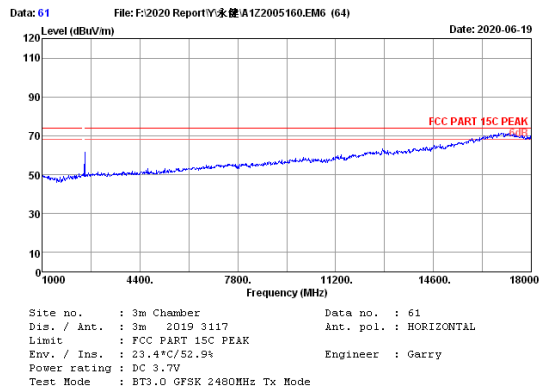
No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Amp factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2441.000	32.49	6.01	59.58	33.47	64.61	74.00	20.04	Peak
2	7323.000	35.90	8.86	42.23	33.03	53.96	74.00	20.04	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading -Amp factor.
 2. The emission levels that are 20dB below the official limit are not reported.



No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Amp factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2480.000	32.56	6.03	60.84	33.46	65.97	74.00	21.73	Peak
2	4960.000	34.39	7.49	43.59	33.20	52.27	74.00	21.73	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading - Amp factor.
 2. The emission levels that are 20dB below the official limit are not reported.



No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Amp factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2480.000	32.56	6.03	56.24	33.46	61.37	74.00	21.76	Peak
2	4960.000	34.39	7.49	43.56	33.20	52.24	74.00	21.76	Peak

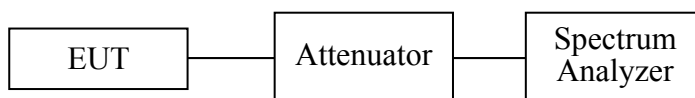
Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading - Amp factor.
 2. The emission levels that are 20dB below the official limit are not reported.

5. CONDUCTED SPURIOUS EMISSIONS

5.1. Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	PXA Signal Analyzer	Agilent	N9030A	MY51380221	Jun.30,19	1 Year
2.	Attenuator	Agilent	8491B	MY39269201	Oct.13,19	1 Year
3.	RF Cable	EMCI	EMC102-KM-KM-3500	170702	Apr.12,20	1 Year

5.2. Block Diagram of Test Setup



5.3. Limit

In any 100kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power.

5.4. Test Procedure

Use the test method described in ANSI C63.10 clause 7.8.8:

The transmitter output was connected to a spectrum analyzer, The resolution bandwidth is set to 100 kHz, The video bandwidth is set to 300 kHz and measure all the emissions With peak detector.

Note: The cable loss and attenuator loss were offset into spectrum analyzer as an amplitude offset.

5.5. Test result

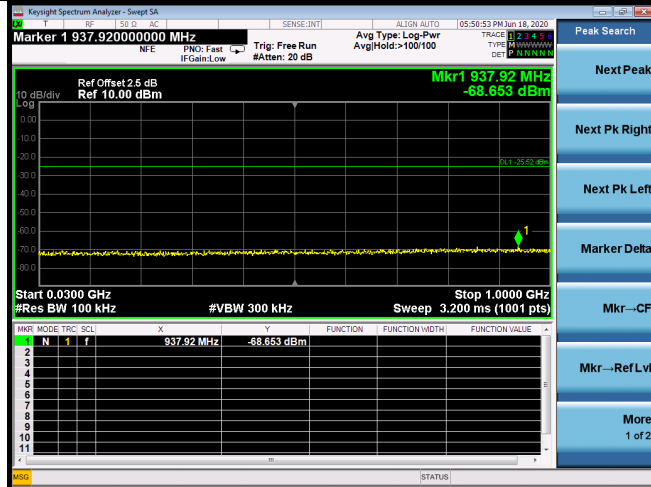
PASS (The testing data was attached in the next pages.)

EUT: Bluetooth Keyboard		
M/N: FB00011KBK		
Test date: 2020-06-18	Pressure: 102.1±1.0 kpa	Humidity: 51.1±3.0%
Tested by: Garry	Test site: RF site	Temperature: 22.8±0.6 °C

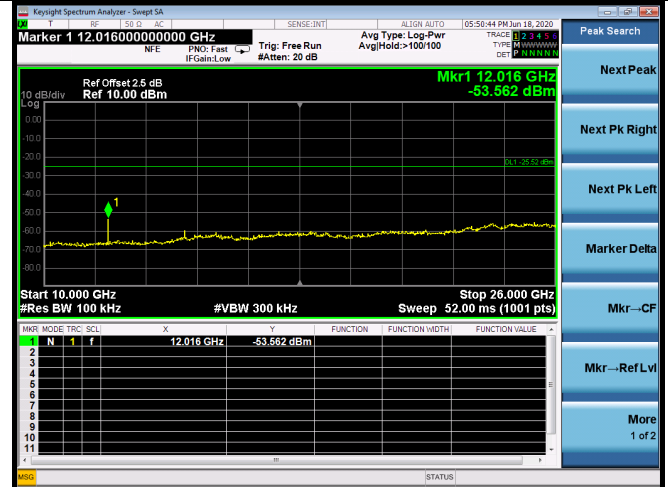
Hopping off

FSK

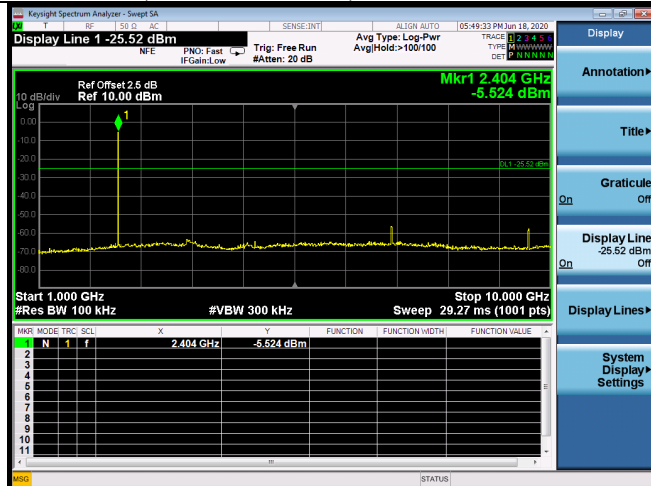
2402MHz(30MHz – 1GHz)



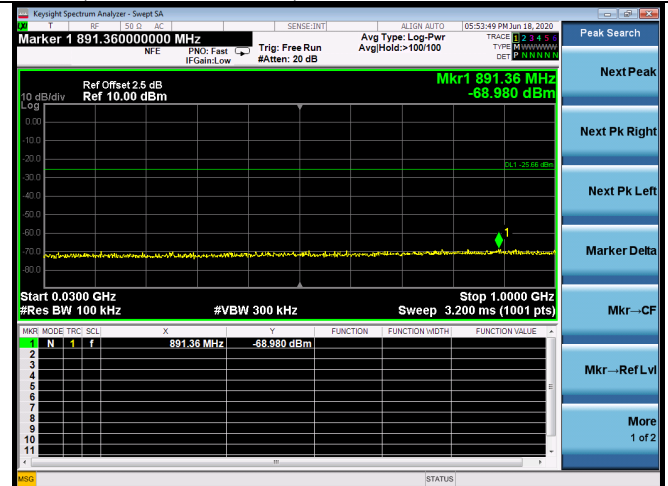
2402MHz(10GHz – 26GHz)



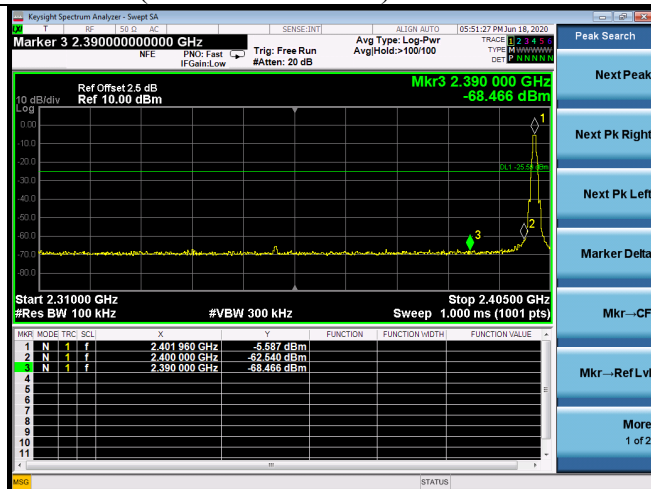
2402MHz(1GHz – 10GHz)



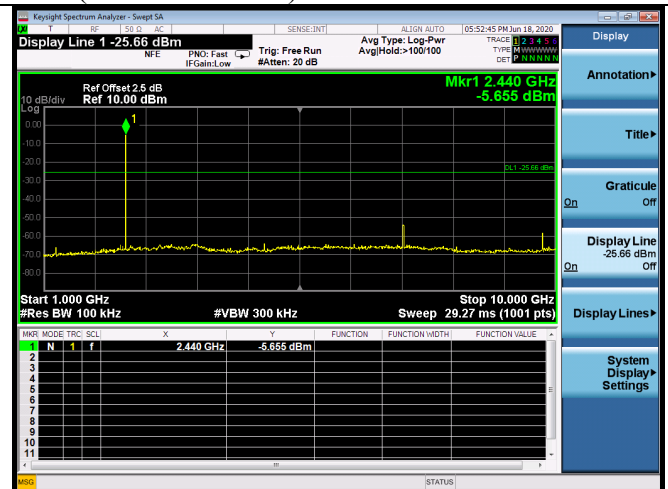
2441(30MHz – 1GHz)



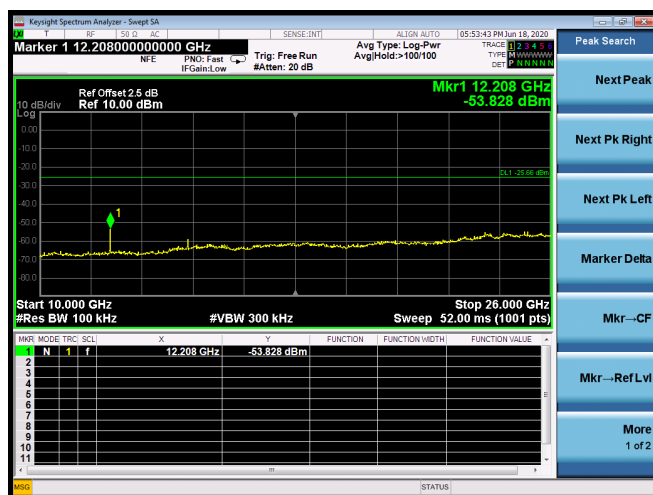
2402MHz(2.3GHz – 2.4GHz)



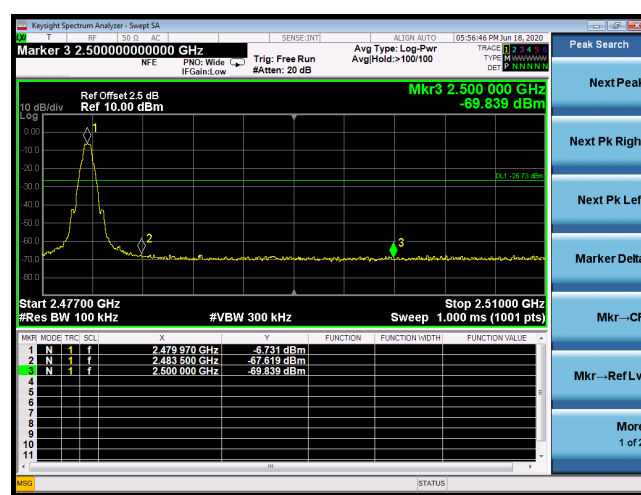
2441(1GHz – 10GHz)



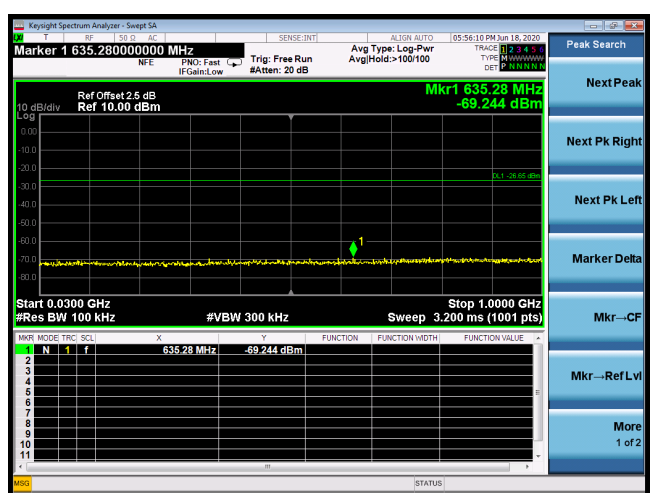
2441(10GHz – 26GHz)



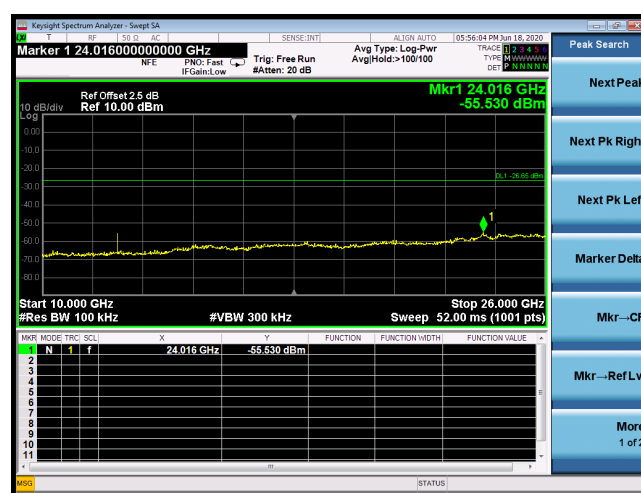
2480MHz(2.4GHz – 2.5GHz)



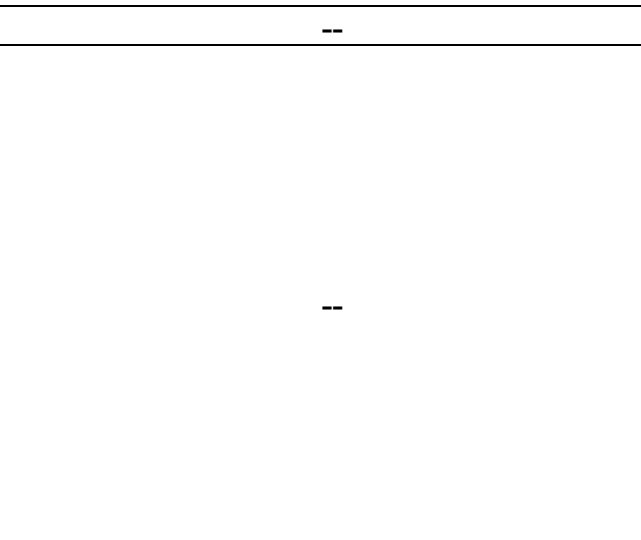
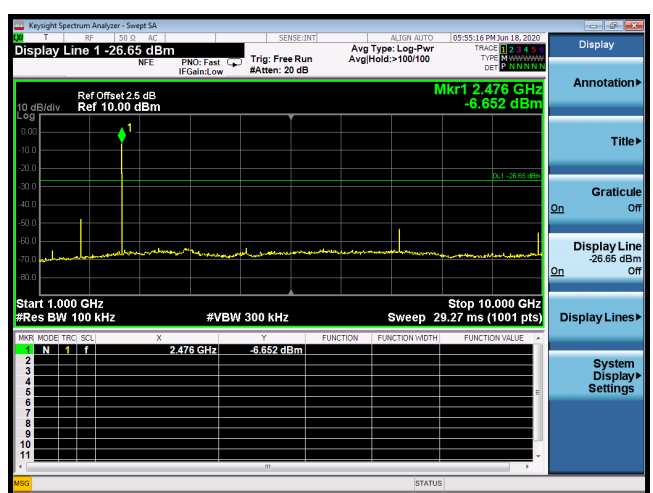
2480MHz(30MHz – 1GHz)



2480MHz(10GHz – 26GHz)

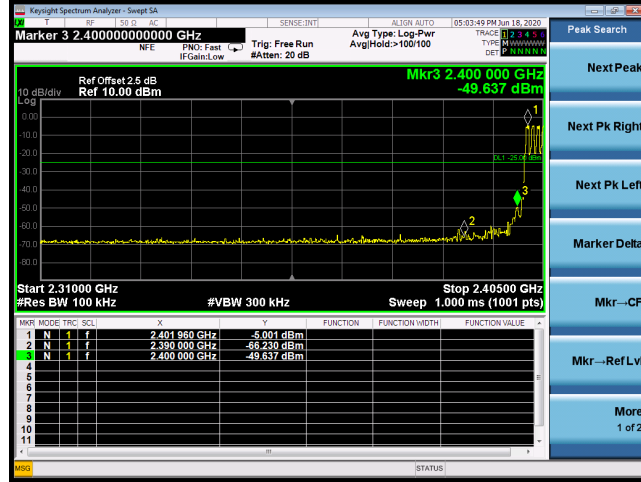


2480MHz(1GHz – 10GHz)

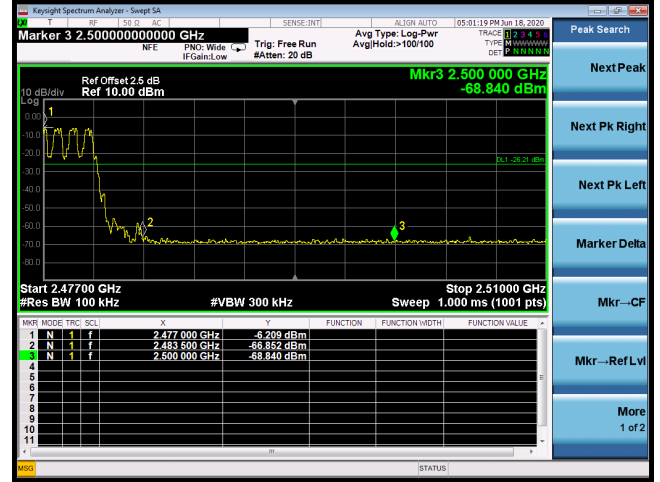


Hopping on

GFSK(2.3GHz – 2.4GHz)



(2.4GHz – 2.5GHz)



6. 20 DB & 99% BANDWIDTH TEST

6.1. Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	PXA Signal Analyzer	Agilent	N9030A	MY51380221	Jun.30,19	1 Year
2.	Attenuator	Agilent	8491B	MY39269201	Oct.13,19	1 Year
3.	RF Cable	EMCI	EMC102-KM-KM-3500	170702	Apr.12,20	1 Year

6.2. Limit

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

6.3. Test Procedure

Use the test method described in ANSI C63.10 clause 7.8.7:

1. Connect the antenna port of the EUT to the spectrum analyzer.
2. Let the EUT transmit at Low/ Mid/ High channel with test software.
3. Setting of SA is following as: RBW: 30kHz / VBW: 100kHz
Sweep Mode: Continuous sweep
Detect mode: Positive peak
Trace mode: Max hold.
4. Use the occupied bandwidth function of the SA measure the 20dB bandwidth directly.

6.4. Test Results

EUT: Bluetooth Keyboard		
M/N: FB00011KBK		
Test date: 2020-06-18	Pressure: 102.1±1.0 kpa	Humidity: 51.1±3.0%
Tested by: Garry	Test site: RF site	Temperature: 22.8±0.6 °C

Test Mode	Frequency (MHz)	20dB bandwidth (KHz)	Limit (KHz)
GFSK	2402	1092	N/A
	2441	1034	N/A
	2480	1032	N/A
Conclusion : PASS			

Test Mode	Frequency (MHz)	99% Bandwidth (KHz)	Limit (KHz)
GFSK	2402	938.80	N/A
	2441	933.21	N/A
	2480	931.79	N/A
Conclusion : PASS			

GFSK

2402MHz



2441MHz



2480MHz



7. CARRIER FREQUENCY SEPARATION TEST

7.1. Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	PXA Signal Analyzer	Agilent	N9030A	MY51380221	Jun.30,19	1 Year
2.	RF Cable	EMCI	EMC102-KM-KM-3500	170702	Apr.12,20	1 Year

7.2. Limit

Frequency hopping systems shall have hopping channel carrier frequency separated by a minimum of 25kHz or the 20dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

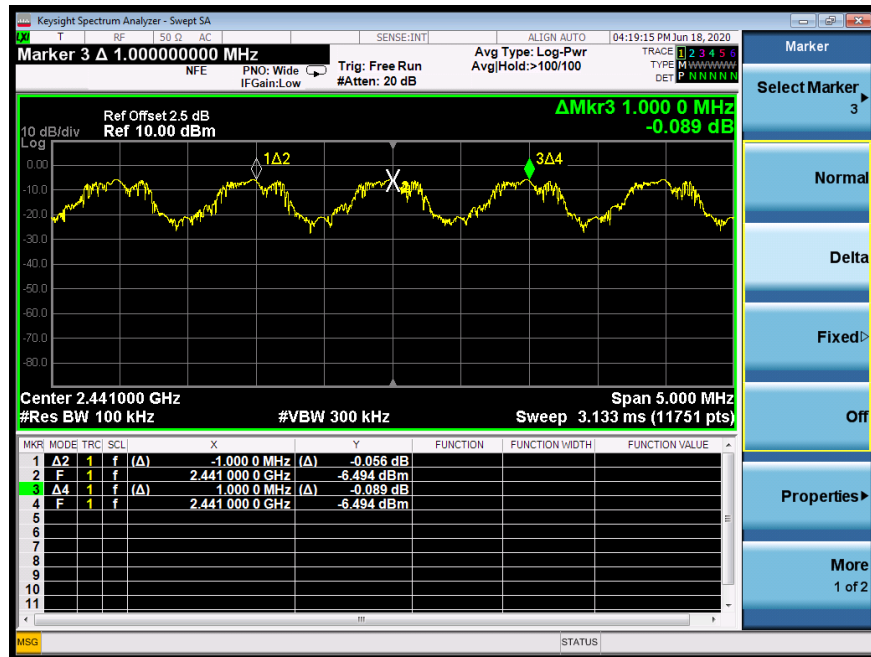
7.3. Test Procedure

Use the test method described in ANSI C63.10 clause 7.8.2:

1. Connect the antenna port of the EUT to the Spectrum analyzer.
2. Let the EUT transmit at Low/ Mid/ High channel.
3. Setting of SA is following as: RBW: 100kHz / VBW: 300kHz.Span: 3MHz
4. Use the mark Delta function of the SA measure out the channel separation.

7.4. Test Results.

EUT: Bluetooth Keyboard			
M/N: FB00011KKBK			
Test date: 2020-06-18		Pressure: 102.1±1.0 kpa	Humidity: 51.1±3.0%
Tested by: Garry		Test site: RF site	Temperature: 22.8±0.6 °C
Test Mode	Channel separation	Limit(KHz)	Conclusion
GFSK	1.0MHz	728	PASS



8. NUMBER OF HOPPING FREQUENCY TEST

8.1. Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	PXA Signal Analyzer	Agilent	N9030A	MY51380221	Jun.30,19	1 Year
2.	RF Cable	EMCI	EMC102-KM-KM-3500	170702	Apr.12,20	1 Year

8.2. Limit

Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels

8.3. Test Procedure

Use the test method descried in ANSI C63.10 clause 7.8.3:

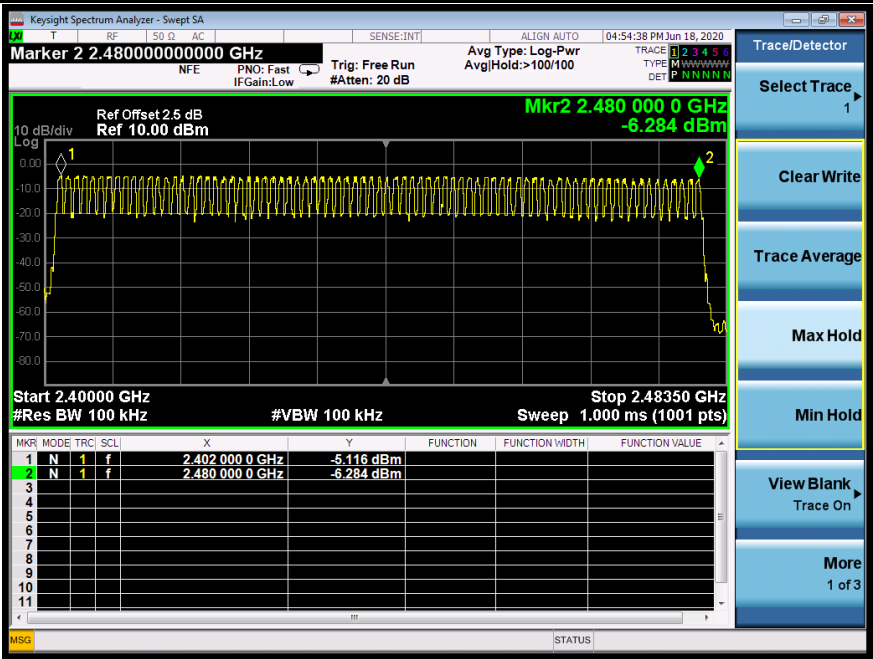
1. Connect the antenna of the EUT to Spectrum analyzer and let the EUT working at hopping mode.
2. Setting of SA is following as: RBW: 100kHz / VBW: 300kHz ,
Start frequency: 2390MHz
Stop frequency: 2483.5MHz

And waiting for the hopping trace until stability, count out the number of the hopping.

8.4. Test Results

EUT: Bluetooth Keyboard		
M/N: FB00011KBK		
Test date: 2020-06-18	Pressure: 102.1±1.0 kpa	Humidity: 51.1±3.0%
Tested by: Garry	Test site: RF site	Temperature:22.8±0.6 °C

Test Mode	Number of channel	Limit	Conclusion
GFSK	79	>=15	PASS



9. DWELL TIME

9.1. Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	PXA Signal Analyzer	Agilent	N9030A	MY51380221	Jun.30,19	1 Year
2.	RF Cable	EMCI	EMC102-KM-KM-3500	170702	Apr.12,20	1 Year

9.2. Limit

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

9.3. Test Procedure

Use the test method described in ANSI C63.10 clause 7.8.4:

1. Connect the antenna of the EUT to Spectrum analyzer and let the EUT working at hopping mode.
2. Setting of SA is following as:
RBW: 100kHz / VBW: 100kHz
Sweep Mode: Single
Detect mode: Positive peak
Trace mode: Auto
Span: 0Hz
Sweep time: 5s and big enough to measure one hopping signal
3. Use below formula calculate the Dwell time
Dwell time=Hopping number per second*0.4*channel number*Pulse bandwidth per hopping.

9.4. Test Results

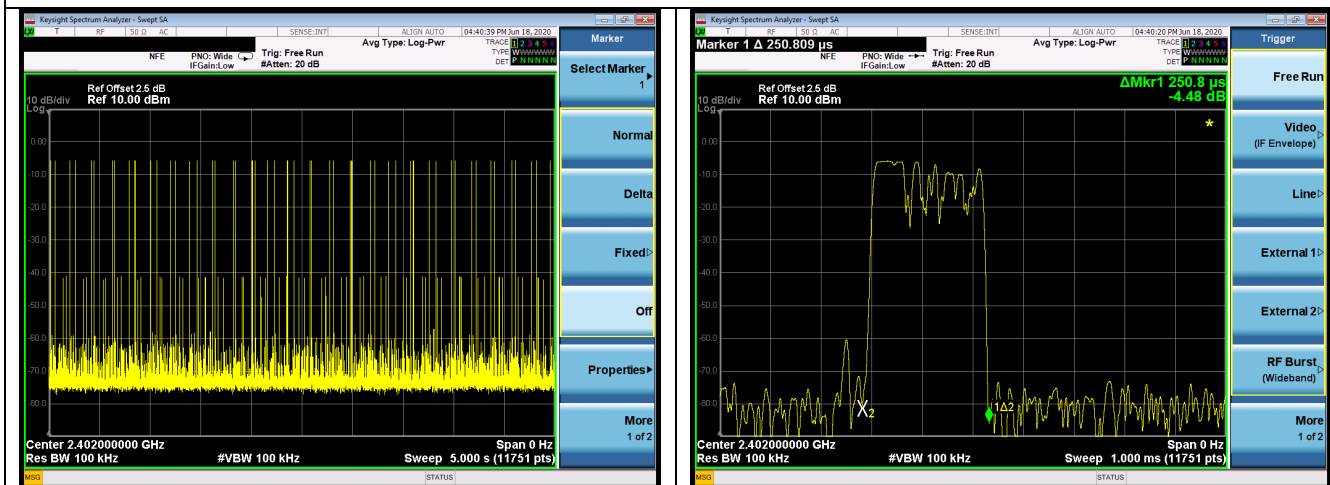
EUT: Bluetooth Keyboard		
M/N: FB00011KBK		
Test date: 2020-06-18	Pressure: 102.1±1.0 kpa	Humidity: 51.1±3.0%
Tested by: Garry	Test site: RF site	Temperature: 22.8±0.6 °C

Mode		dwell time	Limit	Conclusion
GFSK	DH1	51 hops/5s*0.4*79channels* 0.2508 ms =80.838ms	≤400ms	PASS
	DH3	20 hops/5s*0.4*79channels* 0.2523 ms =31.891ms	≤400ms	PASS
	DH5	20 hops/5s*0.4*79channels* 0.2800 ms =35.392ms	≤400ms	PASS

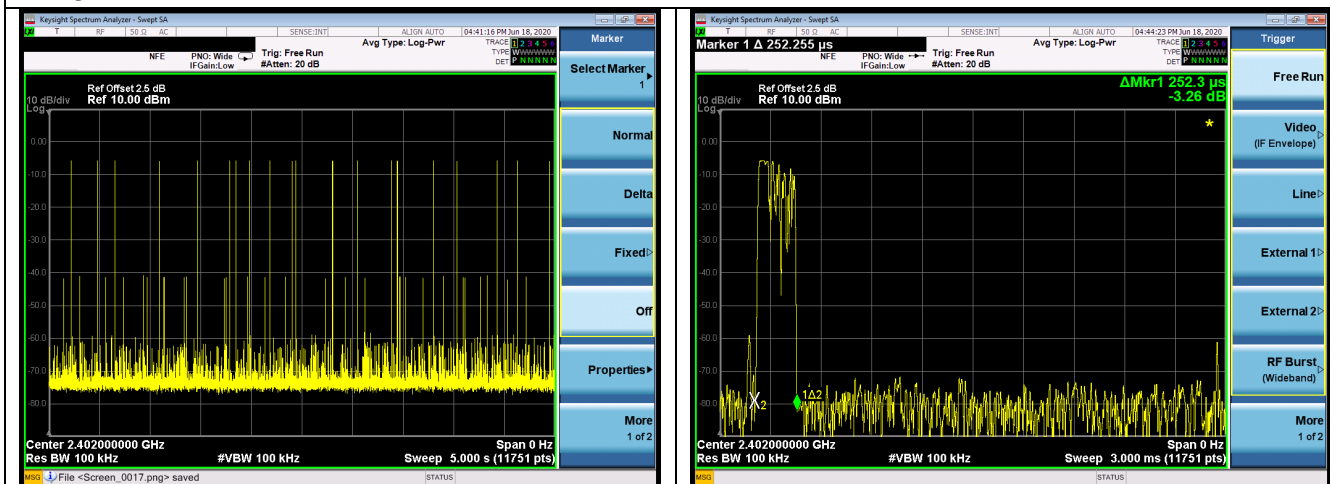
Note: All the lower levels were signaled from receiver and should not be considered in here.

GFSK

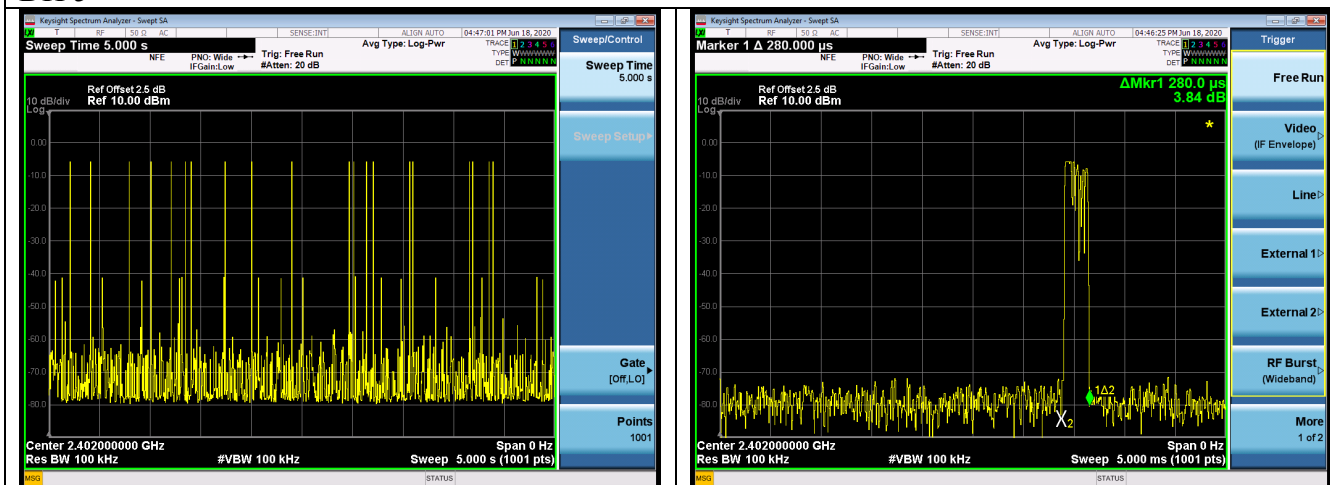
DH 1



DH 3



DH 5



10. MAXIMUM PEAK OUTPUT POWER TEST

10.1. Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	PXA Signal Analyzer	Agilent	N9030A	MY51380221	Jun.30,19	1 Year
2.	Power meter	HP	436A	2016A07891	Oct.13,19	1 Year
3.	Power sensor	Agilent	8482B	MY41090514	Oct.13,19	1 Year
4.	Attenuator	Agilent	8491B	MY39269201	Oct.13,19	1 Year
5.	RF Cable	EMCI	EMC102-KM-KM-350 0	170702	Apr.12,20	1 Year

10.2. Limit

For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt.

10.3. Test Procedure

Use the test method described in ANSI C63.10 clause 7.8.5:

Connected the EUT's antenna port to Power Sensor, and use power meter to test peak output power directly.

10.4. Test Results

EUT: Bluetooth Keyboard		
M/N: FB00011KBK		
Test date: 2020-06-18	Pressure: 102.3±1.0 kpa	Humidity: 53.6±3.0%
Tested by: Garry	Test site: RF site	Temperature: 25.5±0.6°C

Test Mode	Frequency	Peak output Power (dBm)	Limit (dBm)
GFSK	2402	-6.287	21
	2441	-6.222	21
	2480	-7.186	21
Conclusion: PASS			

11.BAND EDGE COMPLIANCE TEST

11.1.Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	PXA Signal Analyzer	Agilent	N9030A	MY51380221	Jun.30,19	1 Year
2.	Amplifier	Agilent	8449B	3008A02495	Apr.23,20	1 Year
3.	Horn Antenna	ETS	3117	00218552	Dec.02,19	1 Year
4.	RF Cable	EMCI	EMC102-KM-KM-3500	170702	Apr.12,20	1 Year

11.2.Limit

All the lower and upper band-edges emissions appearing within 2310MHz to 2390MHz and 2483.5MHz to 2500MHz restricted frequency bands shall not exceed the limits shown in 15.209, all the other emissions outside operation frequency band 2400MHz to 2483.5MHz shall be at least 20dB below the fundamental emissions, or comply with 15.209 limits.

11.3.Test Produce

Use the test method descried in ANSI C63.10 clause 7.8.6:

For upper band emissions that are up to two bandwidths(2MHz) away (2483.5MHz to 2485.5MHz) from the band-edge use below produce:

1. Choose a spectrum analyzer span that encompasses both the peak of the fundamental emission and the band-edge emission under investigation. Set the analyzer RBW to 100KHz and with a video bandwidth 300KHz. Record the peak levels of the fundamental emission and the relevant band-edge emission, Observe the stored trace and measure the amplitude delta between the peak of the fundamental and the peak of the band-edge emission. This is not a field strength measurement, it is only a relative measurement to determine the amount by which the emission drops at the band edge relative to the highest fundamental emission level.
2. Subtract the delta measured in step (1) from the maximum field strengths measured in clause 4 .The resultant field strengths are then used to determine band-edge compliance as required by Section 15.205

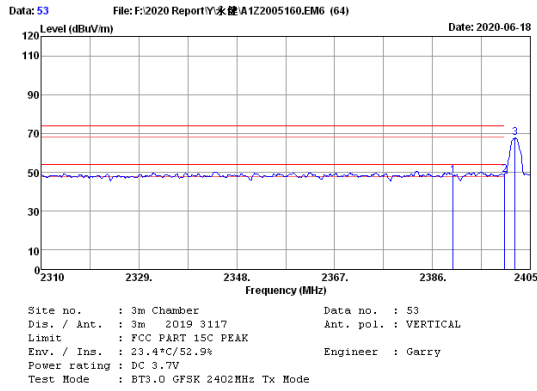
For emissions above two bandwidths away from the band-edge use below produce:

1. The EUT is placed on a insulating material (up to 12mm thick) worked at highest radiated power.
2. The turntable was rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission.
4. Set the spectrum analyzer in the following setting in order to capture the lower and upperband-edges of the emission:
 - (a) PEAK: RBW=1MHz ;VBW=3MHz, PK detector, Sweep=AUTO
 - (b) This is pulse Modulation device a duty cycle factor was used to calculate average level based measured peak level.

11.4.Test Results

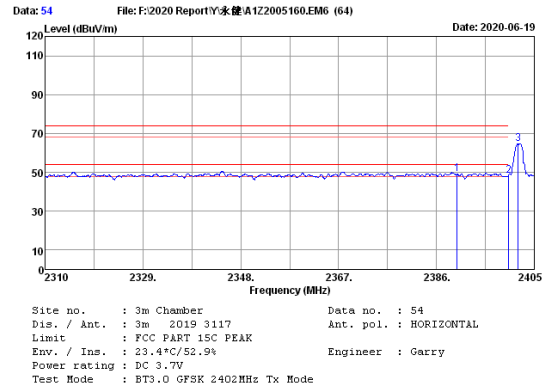
Pass (The testing data was attached in the next pages.)

Note: If the PK measured levels comply with average limit, then the average level were deemed to comply with average limit.



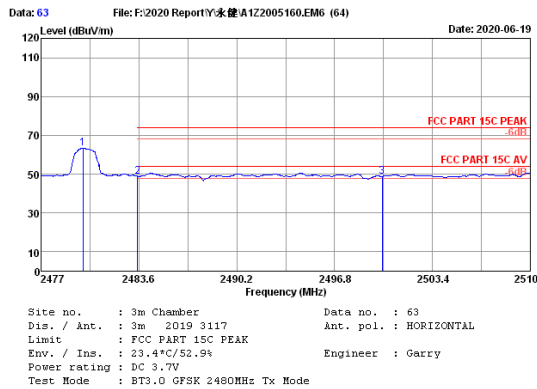
No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Amp factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2390.000	32.37	5.98	43.42	33.48	48.29	74.00	25.71	Peak
2	2400.000	32.37	5.98	43.72	33.48	48.59	74.00	25.41	Peak
3	2402.055	32.37	5.98	62.82	33.48	67.69	74.00	6.31	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading -Amp factor.
 2. The emission levels that are 20dB below the official limit are not reported.



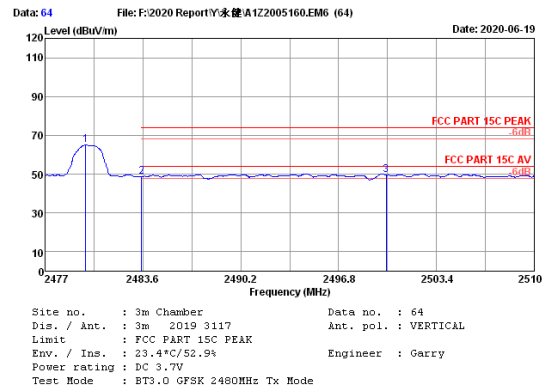
No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Amp factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2390.000	32.37	5.98	44.22	33.48	49.09	74.00	24.91	Peak
2	2400.000	32.37	5.98	43.34	33.48	48.21	74.00	25.79	Peak
3	2401.865	32.37	5.98	59.90	33.48	64.77	74.00	9.23	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading -Amp factor.
 2. The emission levels that are 20dB below the official limit are not reported.



No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Amp factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2479.838	32.56	6.03	58.37	33.46	63.50	74.00	10.50	Peak
2	2483.500	32.56	6.03	43.79	33.46	48.92	74.00	25.08	Peak
3	2500.000	32.60	6.04	43.55	33.45	48.74	74.00	25.26	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading -Amp factor.
 2. The emission levels that are 20dB below the official limit are not reported.



No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Amp factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2479.739	32.56	6.03	59.91	33.46	65.04	74.00	8.96	Peak
2	2483.500	32.56	6.03	43.62	33.46	48.75	74.00	25.25	Peak
3	2500.000	32.60	6.04	44.26	33.45	49.45	74.00	24.55	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading -Amp factor.
 2. The emission levels that are 20dB below the official limit are not reported.

12. ANTENNA REQUIREMENT

12.1. Standard Applicable

For intentional device, according to FCC 47 CFR Section 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. And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

12.2. Antenna Connected Construction

The antennas used for this product are PCB antenna that no antenna other than that furnished by the responsible party shall be used with the device, the maximum peak gain of the transmit antenna is 1.87dBi.

13.DEVIATION TO TEST SPECIFICATIONS

[NONE]