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Report Template Version: V03 Report Template Revision Date: Mar.1st, 2017

Test Report

Report No. :	CQASZ20210500027EX-03			
Applicant:	Dongguan Lingjie Electronics & Technology Co., Ltd			
Address of Applicant:	Building A(Floor 1-4) and B(Floor 1-5), No. 16 Zhenxing North Road, Taiyuan Community, Xiegang Town, Dongguan City, Guangdong Province, 523590, P.R.C			
Manufacturer:	Dongguan Lingjie Electronics & Technology Co., Ltd			
Address of Manufacturer:	Building A(Floor 1-4) and B(Floor 1-5), No. 16 Zhenxing North Road, Taiyuan Community, Xiegang Town, Dongguan City, Guangdong Province, 523590, P.R.C			
Equipment Under Test (El	UT):			
Product: All Model:	Wireless Keyboard K911T, K922T, K901T, K933T, K913T, K902T, K903T, K921T, K923T, K912T			
Test Model No.:	K911T			
Brand Name:	N/A			
FCC ID:	2ANBU-K911T			
Standards:	47 CFR Part 15, Subpart C Section 15.247			
Date of Test:	Apr. 23, 2021 to May 10, 2021			
Date of Issue:	May 10, 2021			
Test Result :	PASS*			
Tested By:	lewis zhou			
	(Lewis Zhou)			
Reviewed By:				
	(Timo Lei)			
Approved By:	UNUN I LINU			

(Sheek Luo)

* In the configuration tested, the EUT complied with the standards specified above.

The test report is effective only with both signature and specialized stamp, The result(s) shown in this report refer only to the sample(s) tested. Without written approval of CQA, this report can't be reproduced except in full.



1 Version

Revision History Of Report

Report No.	Version	Description	Issue Date
CQASZ20210500027EX-03	Rev.01	Initial report	2020-05-10



2 Test Summary

Test Item	Test Requirement	Test method	Result
Antenna Requirement	47 CFR Part 15, Subpart C Section 15.203/15.247 (c)	ANSI C63.10 2013	PASS
AC Power Line Conducted Emission	47 CFR Part 15, Subpart C Section 15.207	ANSI C63.10 2013	N/A
Conducted Peak Output Power	47 CFR Part 15, Subpart C Section 15.247 (b)(3)	ANSI C63.10 2013	PASS
6dB Occupied Bandwidth	47 CFR Part 15, Subpart C Section 15.247 (a)(2)	ANSI C63.10 2013	PASS
Power Spectral Density	47 CFR Part 15, Subpart C Section 15.247 (e)	ANSI C63.10 2013	PASS
Band-edge for RF Conducted Emissions	47 CFR Part 15, Subpart C Section 15.247(d)	ANSI C63.10 2013	PASS
RF Conducted Spurious Emissions	47 CFR Part 15, Subpart C Section 15.247(d)	ANSI C63.10 2013	PASS
Radiated Spurious Emissions	47 CFR Part 15, Subpart C Section 15.205/15.209	ANSI C63.10 2013	PASS
Restricted bands around fundamental frequency (Radiated Emission)	47 CFR Part 15, Subpart C Section 15.205/15.209	ANSI C63.10 2013	PASS



3 Contents

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4 General Information

4.1 Client Information

Applicant:	Dongguan Lingjie Electronics & Technology Co., Ltd
Address of Applicant:	Building A(Floor 1-4) and B(Floor 1-5), No. 16 Zhenxing North Road, Taiyuan Community, Xiegang Town, Dongguan City, Guangdong Province, 523590, P.R.C
Manufacturer:	Dongguan Lingjie Electronics & Technology Co., Ltd
Address of Manufacturer:	Building A(Floor 1-4) and B(Floor 1-5), No. 16 Zhenxing North Road, Taiyuan Community, Xiegang Town, Dongguan City, Guangdong Province, 523590, P.R.C

4.2 General Description of EUT

Product Name:	Wireless Keyboard
Test Model No.:	K911T
Trade Mark:	N/A
Hardware Version:	V1.0
Software Version:	V1.8
Operation Frequency:	2402-2480MHz
Modulation Type:	GFSK
Transfer Rate:	1Mbps(Test software see page 6)
Number of Channel:	40
Product Type:	□ Mobile
Antenna Type:	PCB antenna
Antenna Gain:	0dBi
EUT Power Supply:	battery: 3.0V(2*1.5V)



Operation Frequency each of channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
0	2402MHz	10	2422MHz	20	2442MHz	30	2462MHz
1	2404MHz	11	2424MHz	21	2444MHz	31	2464MHz
2	2406MHz	12	2426MHz	22	2446MHz	32	2466MHz
3	2408MHz	13	2428MHz	23	2448MHz	33	2468MHz
4	2410MHz	14	2430MHz	24	2450MHz	34	2470MHz
5	2412MHz	15	2432MHz	25	2452MHz	35	2472MHz
6	2414MHz	16	2434MHz	26	2454MHz	36	2474MHz
7	2416MHz	17	2436MHz	27	2456MHz	37	2476MHz
8	2418MHz	18	2438MHz	28	2458MHz	38	2478MHz
9	2420MHz	19	2440MHz	29	2460MHz	39	2480MHz

Note:

In section 15.31(m), regards to the operating frequency range over 10 MHz, the lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

Channel	Frequency
The lowest channel (CH0)	2402MHz
The middle channel (CH19)	2440MHz
The highest channel (CH39)	2480MHz

(E) Help(H)		
TEST		
	COMM COM1 COM1	
	Comm Comm	
RF	S# TEST	
HW TEST	Freq 2 TX EX G C DateType SINWAVE V Enter Test mode	
Enter DUT		
	Power 0 Hopping PacketType WIL V Config	
	AFH 0 JPN (TELEC) BLE	
I	Send	



4.3 Test Environment

Operating Environment	Operating Environment:			
Conducted Emission				
Temperature:	23 °C			
Humidity:	51 % RH			
Atmospheric Pressure:	992 mbar			
Radiated Emission				
Temperature:	25.5 °C			
Humidity:	53 % RH			
Atmospheric Pressure:	992 mbar			
RF item test (RF test ro	oom)			
Temperature:	27.3 °C			
Humidity:	55 % RH			
Atmospheric Pressure:	992 mbar			
Test Mode:	Use test software to set the lowest frequency, the middle frequency and the highest frequency keep transmitting of the EUT.			

4.4 Description of Support Units

The EUT has been tested with associated equipment below.

Description	Manufacturer	Model No.	Remark	FCC certification
PC	Lenovo	ThinkPad E450C	Provide by lab	FCCID
AC/DC Adapter	Lenovo	ADLX65NLC3A	Provide by lab	FCC SDOC



4.5 Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate.

The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities.

The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 "Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements" and is documented in the **Shenzhen Huaxia Testing Technology Co., Ltd.** quality system acc. to DIN EN ISO/IEC 17025.

Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

No.	Item	Uncertainty	Notes
1	Radiated Emission (Below 1GHz)	5.12dB	(1)
2	Radiated Emission (Above 1GHz)	4.60dB	(1)
3	Conducted Disturbance (0.15~30MHz)	3.34dB	(1)
4	Radio Frequency	3×10 ⁻⁸	(1)
5	Duty cycle	0.6 %.	(1)
6	Occupied Bandwidth	1.1%	(1)
7	RF conducted power	0.86dB	(1)
8	RF power density	0.74	(1)
9	Conducted Spurious emissions	0.86dB	(1)
10	Temperature test	0.8°C	(1)
11	Humidity test	2.0%	(1)
12	Supply voltages	0.5 %.	(1)
13	Frequency Error	5.5 Hz	(1)

Hereafter the best measurement capability for CQA laboratory is reported:

(1)This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.



4.6 Test Location

Shenzhen Huaxia Testing Technology Co., Ltd,

1F., Block A of Tongsheng Technology Building, Huahui Road, Dalang Street, Longhua District, Shenzhen, China

4.7 Test Facility

The test facility is recognized, certified, or accredited by the following organizations: **IC Registration No.: 22984-1**

The 3m Semi-anechoic chamber of Shenzhen Huaxia Testing Technology Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing

• A2LA (Certificate No. 4742.01)

Shenzhen Huaxia Testing Technology Co., Ltd., Shenzhen EMC Laboratory is accredited by the

American Association for Laboratory Accreditation(A2LA). Certificate No. 4742.01.

• FCC Registration No.: 522263

Shenzhen Huaxia Testing Technology Co., Ltd., Shenzhen EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration No.:522263

4.8 Deviation from Standards

None.

4.9 Other Information Requested by the Customer

None.



4.10 Equipment List

			Instrument	Calibration	Calibration
Test Equipment	Manufacturer	Model No.	No.	Date	Due Date
EMI Test Receiver	R&S	ESR7	CQA-005	2020/09/22	2021/09/21
Spectrum analyzer	R&S	FSU26	CQA-038	2020/10/24	2021/10/23
Spectrum analyzer	keysight	N9020A	CQA-105	2020/10/24	2021/10/23
Preamplifier	MITEQ	AFS4-00010300-18-10P- 4	CQA-035	2020/09/22	2021/09/21
Preamplifier	MITEQ	AMF-6D-02001800-29- 20P	CQA-036	2020/10/29	2020/10/28
Loop antenna	Schwarzbeck	FMZB1516	CQA-087	2020/10/24	2021/10/23
Bilog Antenna	R&S	HL562	CQA-011	2020/09/22	2021/09/21
Horn Antenna	R&S	HF906	CQA-012	2020/09/22	2021/09/21
Horn Antenna	Schwarzbeck	BBHA 9170	CQA-088	2020/09/22	2021/09/21
Coaxial Cable (Above 1GHz)	CQA	N/A	C019	2020/09/22	2021/09/21
Coaxial Cable (Below 1GHz)	CQA	N/A	C020	2020/09/22	2021/09/21
Antenna Connector	CQA	RFC-01	CQA-080	2020/09/22	2021/09/21
RF cable(9KHz~40GHz)	CQA	RF-01	CQA-079	2020/09/22	2021/09/21
Power divider	MIDWEST	PWD-2533-02-SMA-79	CQA-067	2020/09/22	2021/09/21
EMI Test Receiver	R&S	ESPI3	CQA-013	2020/09/22	2021/09/21
LISN	R&S	ENV216	CQA-003	2020/11/01	2021/10/30
Coaxial cable	CQA	N/A	CQA-C009	2020/09/22	2021/09/21

Note:

The temporary antenna connector is soldered on the PCB board in order to perform conducted tests and this temporary antenna connector is listed in the equipment list.



5 Test results and Measurement Data

5.1 Antenna Requirement

Standard requirement:	47 CFR Part 15C Section 15.203 /247(c)
responsible party sh antenna that uses a so that a broken ant electrical connector 15.247(b) (4) require The conducted outp antennas with direct section, if transmittin power from the inter	or shall be designed to ensure that no antenna other than that furnished by the all be used with the device. The use of a permanently attached antenna or of an unique coupling to the intentional radiator, the manufacturer may design the unit enna can be replaced by the user, but the use of a standard antenna jack or is prohibited. ement: ut power limit specified in paragraph (b) of this section is based on the use of ional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this ag antennas of directional gain greater than 6 dBi are used, the conducted output ational radiator shall be reduced below the stated values in paragraphs (b)(1), this section, as appropriate, by the amount in dB that the directional gain of the
EUT Antenna:	PCB ANTENNA
The antenna is integ	ral antenna. The best case gain of the antenna is 0dBi.



5.2 Conducted Emissions

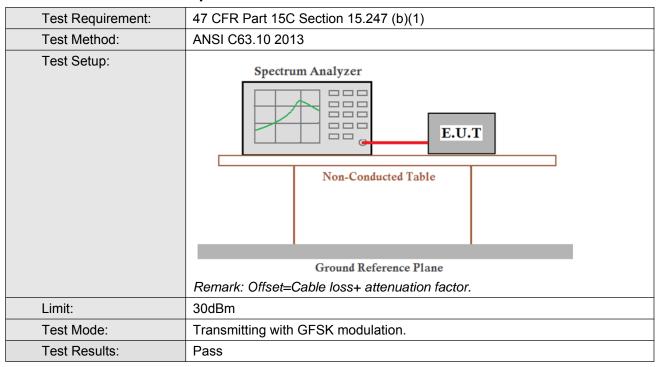
Test Requirement:	47 CFR Part 15C Section 15.2	207					
· ·							
Test Method:	ANSI C63.10: 2013						
Test Frequency Range	: 150kHz to 30MHz						
Limit:	Frequency range (MHz)	Limit (c	,	_			
		Quasi-peak	Average				
	0.15-0.5	66 to 56*	56 to 46*				
	0.5-5	56	46				
	5-30 60 50						
	* Decreases with the logarithm	n of the frequency.					
Test Procedure:	 The mains terminal disturt room. The EUT was connected Impedance Stabilization N impedance. The power connected to a second LIS plane in the same way a multiple socket outlet strip single LISN provided the ra 3) The tabletop EUT was pla ground reference plane. A placed on the horizontal gr The test was performed wi the EUT shall be 0.4 m vertical ground reference reference plane. The LISN unit under test and bon mounted on top of the gro the closest points of the L and associated equipment In order to find the maximu and all of the interface call ANSI C63.10: 2013 on cor 	to AC power source letwork) which provides cables of all other SN 2, which was bonded as the LISN 1 for the was used to connect n ating of the LISN was r aced upon a non-meta nd for floor-standing a round reference plane. th a vertical ground ref from the vertical ground from the vertical ground plane was bonded N 1 was placed 0.8 m ided to a ground ref und reference plane. T LISN 1 and the EUT. A was at least 0.8 m from um emission, the relation plane must be changed a	through a LISN 1 s a $50\Omega/50\mu$ H + 5Ω units of the EUT ed to the ground refe unit being measure multiple power cable not exceeded. Allic table 0.8m above rrangement, the EUT ference plane. The re- und reference plane to the horizontal gr from the boundary of ference plane for L his distance was bet All other units of the m the LISN 2.	(Line linear were rence ed. A s to a /e the T was ear of . The round of the LISNs tween e EUT			
Test Setup:	Shielding Room	_	est Receiver				
Test Mode:	When charging, the device ca	nnot transmitting					
Test Results:	/						



Not application to this device



5.3 Conducted Peak Output Power



Measurement Data

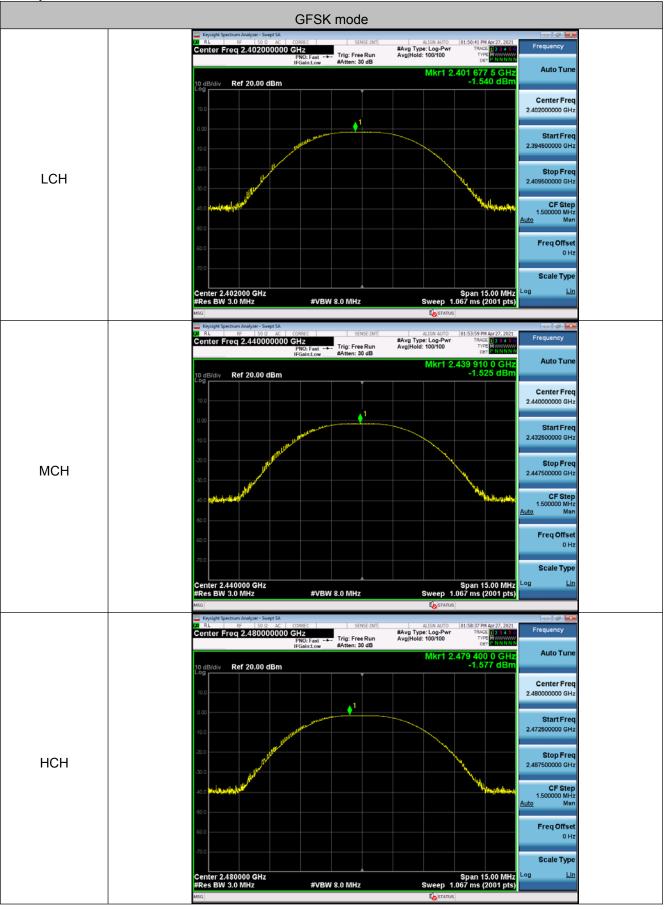
	GFSK mode (1Mbps)						
Test channel	Peak Output Power (dBm)	Limit (dBm)	Result				
Lowest	-1.540	30.00	Pass				
Middle	-1.525	30.00	Pass				
Highest	-1.577	30.00	Pass				



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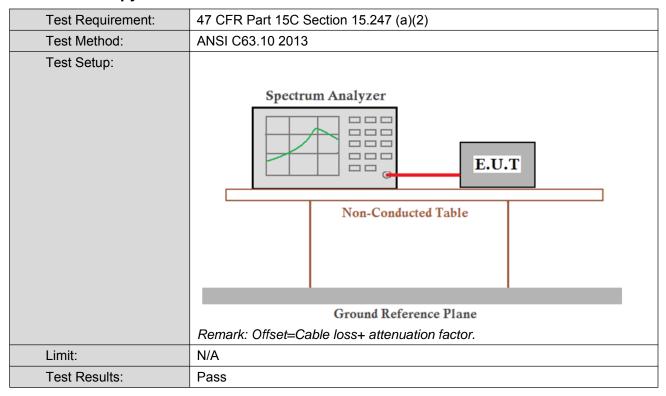
Report No.: CQASZ20210500027EX-03

Test plot as follows:





5.4 6dB Occupy Bandwidth

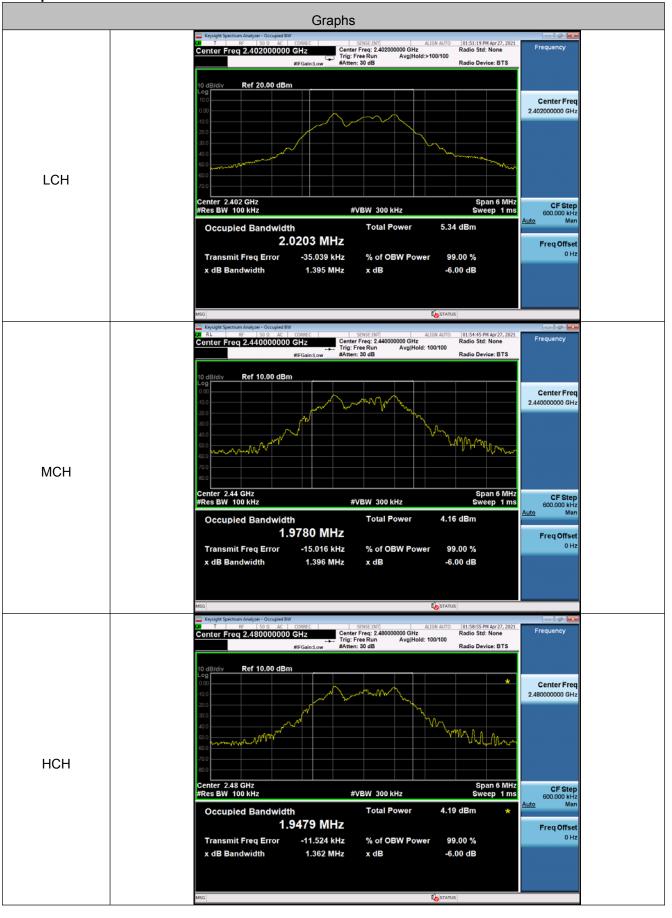


Measurement Data

	GFSK mode						
Test channel	6dB Occupy Bandwidth (MHz)	Limit (kHz)	Result				
Lowest	1.395	N/A	Pass				
Middle	1.396	N/A	Pass				
Highest	1.362	N/A	Pass				

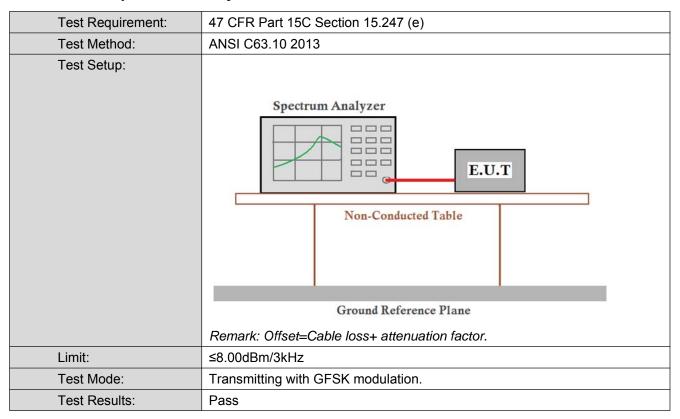


Test plot as follows:





5.5 Power Spectral Density



Measurement Data

	GFSK mode					
Test channel	Power Spectral Density (dBm/3kHz)	Limit (dBm/3kHz)	Result			
Lowest	-14.645	≤8.00	Pass			
Middle	-14.730	≤8.00	Pass			
Highest	-14.837	≤8.00	Pass			

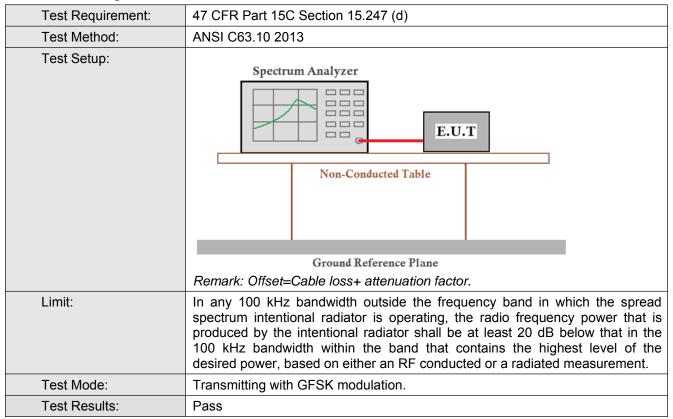


Test plot as follows:



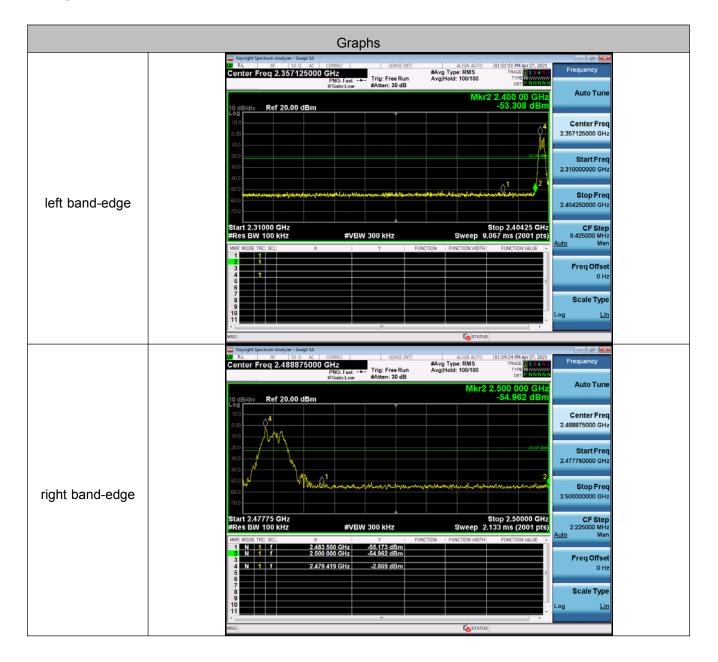


5.6 Band-edge for RF Conducted Emissions



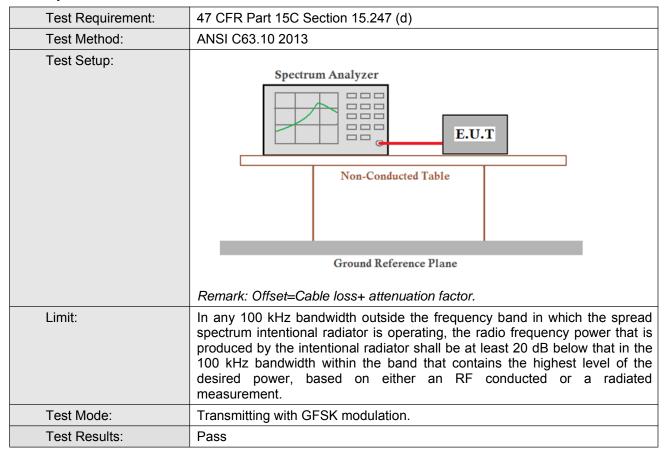


Test plot as follows:



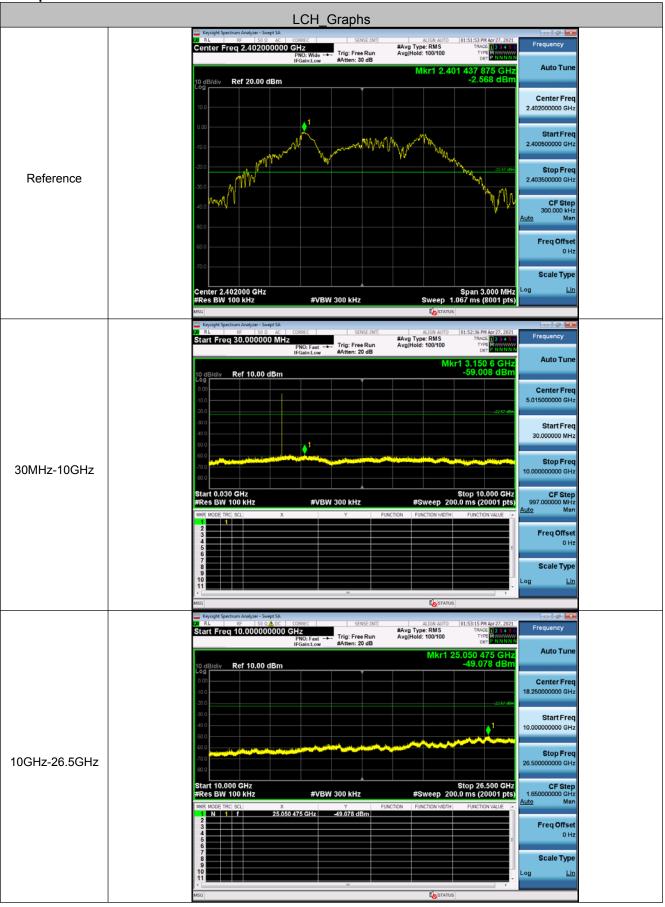


5.7 Spurious RF Conducted Emissions

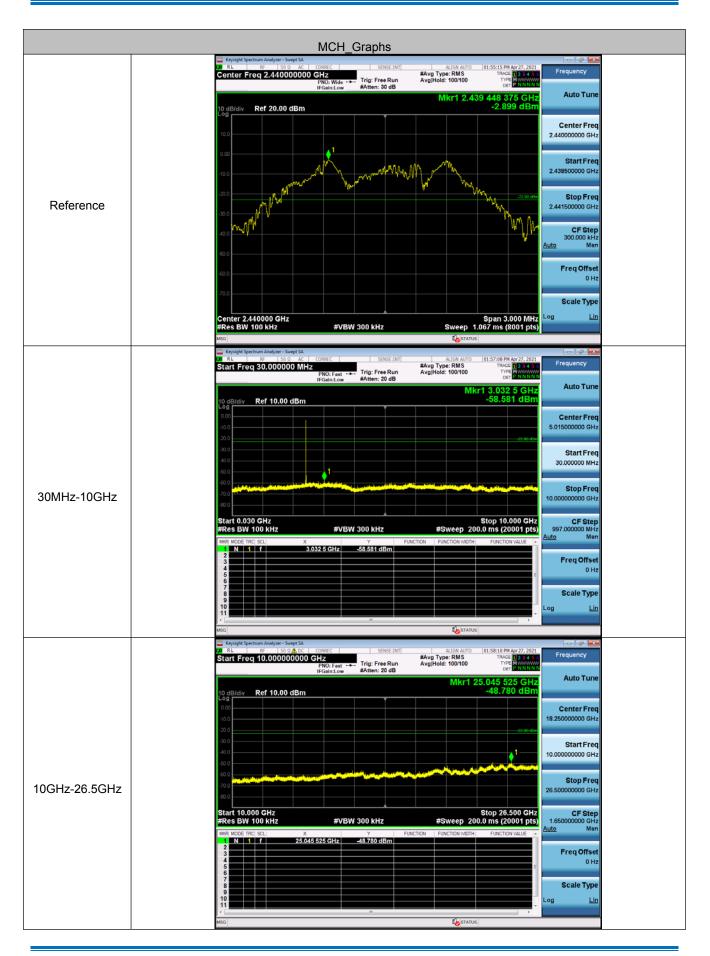




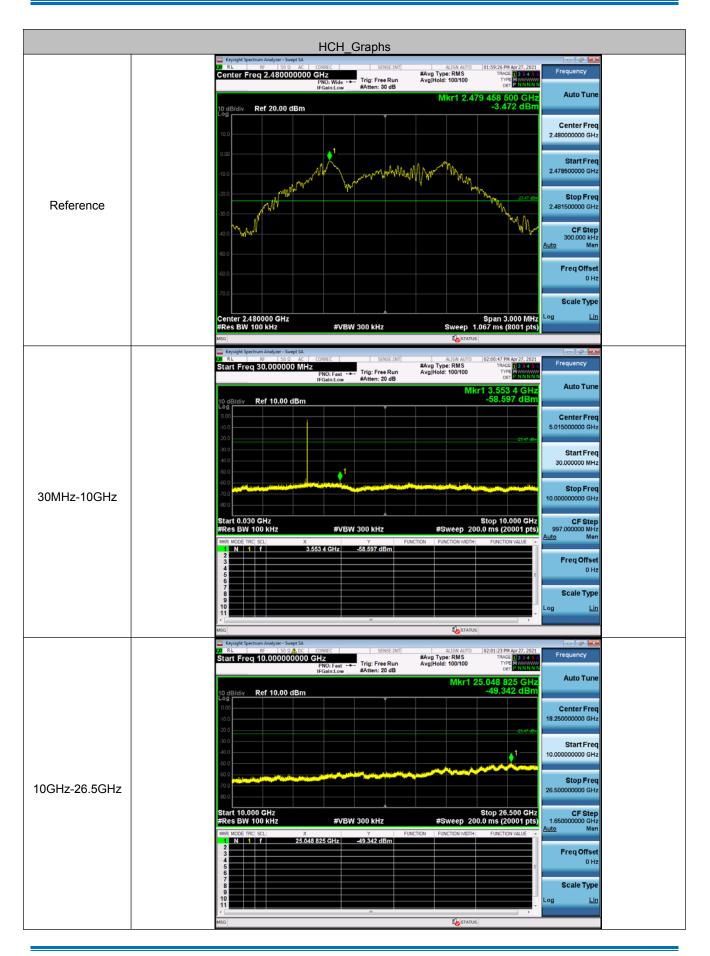
Test plot as follows:













Remark:

Pretest 9kHz to 25GHz, find the highest point when testing, so only the worst data were shown in the test report. Per FCC Part 15.33 (a) and 15.31 (o) ,The amplitude of spurious emissions from intentional radiators which are attenuated more than 20 dB below the permissible value need not be reported unless specifically required elsewhere in this part.



5.8 Radiated Spurious Emission & Restricted bands

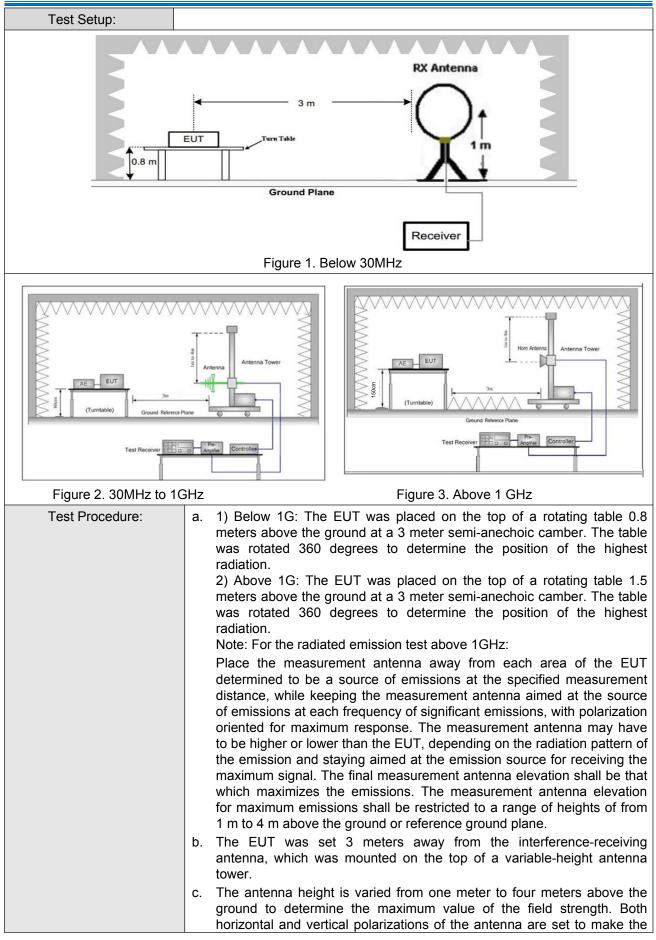
5.8.1 Spurious Emissions

5.0.1 Spundus Emiss	10113								
Test Requirement:	47 CFR Part 15C Section	47 CFR Part 15C Section 15.209 and 15.205							
Test Method:	ANSI C63.10 2013								
Test Site:	Measurement Distance: 3m (Semi-Anechoic Chamber)								
Receiver Setup:	Frequency	Detector	RBW	'	VBW	Remark			
	0.009MHz-0.090MH	0.009MHz-0.090MHz F		10kHz	z	30kHz	Peak		
	0.009MHz-0.090MH	0.009MHz-0.090MHz Average		10kHz	z	30kHz	Average		
	0.090MHz-0.110MH	0.090MHz-0.110MHz Quasi-peak		10kHz	z	30kHz	Quasi-peak		
	0.110MHz-0.490MH	z	Peak	10kHz	z	30kHz	Peak		
	0.110MHz-0.490MH	z	Average	10kHz	z	30kHz	Average		
	0.490MHz -30MHz	0.490MHz -30MHz Quasi-peak			z	30kHz	Quasi-peak		
	30MHz-1GHz Qu		Quasi-peak	100 k⊢	łz	300kHz	Quasi-peak		
			Peak	1MHz	z	3MHz	Peak		
	Above 1GHz		Peak	1MHz	2	10Hz	Average		
Limit:	Frequency		eld strength crovolt/meter)	Limit (dBuV/m)	F	Remark	Measuremer distance (m)		
	0.009MHz-0.490MHz	2	400/F(kHz)	-		-	300		
	0.490MHz-1.705MHz	24	1000/F(kHz)	-	-		30		
	1.705MHz-30MHz		30	-		-	30		
	30MHz-88MHz		100	40.0	Qı	uasi-peak	3		
	88MHz-216MHz		150	43.5	Quasi-peak		3		
	216MHz-960MHz		200	46.0	Qı	uasi-peak	3		
	960MHz-1GHz500Above 1GHz500		500	54.0) Quasi-peak		3		
			54.0	4	Average	3			
	Note: 15.35(b), frequency emissions is limit applicable to the e peak emission level rad	20c quip	B above the ment under t	maximum est. This p	per	mitted ave	erage emission		

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	measurement.
	d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
	e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
	 f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet. g. Test the EUT in the lowest channel (2402MHz),the middle channel (2440MHz),the Highest channel (2480MHz) h. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case. i. Repeat above procedures until all frequencies measured was complete.
	i. Repeat above procedures until all frequencies measured was complete.
Exploratory Test Mode:	Transmitting with BLE5.0 & BT3.0 mode.
Final Test Mode:	Transmitting with BLE-GFSK and BT3.0-GFSK modulation.
	For below 1GHz part, through pre-scan, the worst case is the BT3.0-GFSK- high channel
	Only the worst case is recorded in the report.
Test Results:	Pass

The worst result of the test is recorded in report number : CQASZ20210510011EX-02



Transmitter Emission above 1GHz

Worse case m	ode:	GFSK Test channel:		el:	Lowest		
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector	Ant. Pol.
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Туре	H/V
2390	58.33	-9.2	49.13	74	-24.87	Peak	н
2400	62.57	-9.39	53.18	74	-20.82	Peak	Н
4804	55.59	-4.33	51.26	74	-22.74	Peak	Н
7206	55.55	1.01	56.56	74	-17.44	Peak	Н
2390	59.85	-9.2	50.65	74	-23.35	Peak	v
2400	61.30	-9.39	51.91	74	-22.09	Peak	V
4804	54.23	-4.33	49.90	74	-24.10	Peak	V
7206	54.27	1.01	55.28	74	-18.72	Peak	V

Worse case m	Worse case mode:		GFSK Test channel:		el:	Middle	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector	Ant. Pol.
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Туре	H/V
4880	56.28	-4.11	52.17	74	-21.83	Peak	Н
7320	53.73	1.51	55.24	74	-18.76	Peak	н
4880	55.84	-4.11	51.73	74	-22.27	Peak	V
7320	54.23	1.51	55.74	74	-18.26	Peak	V

Worse case m	ode:	GFSK		Test channel:		Highest	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector	Ant. Pol.
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Туре	H/V
2483.5	58.11	-9.29	48.82	74	-25.18	Peak	н
4960	60.55	-4.04	56.51	74	-17.49	Peak	н
7440	52.23	1.57	53.80	74	-20.20	Peak	н
2483.5	58.20	-9.29	48.91	74	-25.09	Peak	v
4960	59.17	-4.04	55.13	74	-18.87	Peak	V
7440	53.31	1.57	54.88	74	-19.12	Peak	V

Remark:

1) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

Final Test Level =Receiver Reading + Antenna Factor + Cable Factor – Preamplifier Factor

2) Scan from 9kHz to 25GHz, the disturbance above 10GHz and below 30MHz was very low. As shown in this section, for frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. So, only the peak measurements were shown in the report.



6 Photographs - EUT Test Setup

Please refer to the report No.: CQASZ20210500027EX-01



7 Photographs - EUT Constructional Details

Please refer to the report No.: CQASZ20210500027EX-01

The End