FCC TEST REPORT

For

GUANGZHOU TAIMA(TICODE) ELECTRONICS TECHNOLOGY LTD.

Wireless Barcode Scanner

Test Model No.: TI4145

Additional Model No.: TI4145AT, TI4145H, TI4145HAT, TI4146, TI4146AT, TI4146H, TI4146HAT, TS4115, TS4115AT, TS4115H, TS4115HAT, TS4116, TS4116AT, TS4116H, TS4116HAT

Prepared for	:	GUANGZHOU TAIMA(TICODE) ELECTRONICS TECHNOLOGY LTD.
Address	:	NO.768, Shenzhou Road, Science City, Luogang, Guangzhou, China
Prepared by	:	Shenzhen LCS Compliance Testing Laboratory Ltd.
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Date of receipt of test sample	:	Nov 02, 2017
Number of tested samples	:	1
Serial number	:	N/A
Date of Test	:	Nov 02, 2017~Dec 19, 2017
Date of Report	:	Dec 19, 2017

FCC TEST REPORT FCC CFR 47 PART 15C(15.231)	
Report Reference No.	**: LCS171102017AEA**
Date of Issue	: Dec 19, 2017
Testing Laboratory Name.....	**: Shenzhen LCS Compliance Testing Laboratory Ltd.**
Address	: 1/F., Xingyuan Industrial Park, Tongda Road, Bao'an Avenue, Bao'an District, Shenzhen, Guangdong, China
Testing Location/ Procedure.....	: Full application of Harmonised standards ■ Partial application of Harmonised standards □ Other standard testing method □
Applicant's Name.....	**: GUANGZHOU TAIMA(TICODE) ELECTRONICS TECHNOLOGY LTD.**
Address	: NO.768, Shenzhou Road, Science City, Luogang, Guangzhou, China
Test Specification	
Standard	: FCC CFR 47 PART 15 Subpart C
Test Report Form No.....	**:** LCSEMC-1.0
TRF Originator	: Shenzhen LCS Compliance Testing Laboratory Ltd.
Master TRF	: Dated 2011-03

Test Item Description.	**: Wireless Barcode Scanner**
Trade Mark	: TICODE
Test Model	: TI4145
Ratings	: DC 3.7V by Li-ion battery
Result	: **Positive**

Compiled by:	**Supervised by:**	**Approved by:**
Calvin Weng	Dick Su	Gavin Liang
Calvin Weng/ Administrator	Dick Su/ Technique principal	Gavin Liang/ Manager

FCC TEST REPORT

Test Report No. : LCS171102017AEA	Dec 19, 2017 Date of issue

Test Mode.....	:	TI4145
EUT.....	:	Wireless Barcode Scanner
Applicant.....	**:**	**GUANGZHOU TAIMA(TICODE) ELECTRONICS TECHNOLOGY LTD.**
Address.....	:	NO.768, Shenzhou Road, Science City, Luogang, Guangzhou, China
Telephone.....	:	(+86)20-38743936
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Manufacturer.....	**:**	**GUANGZHOU TAIMA(TICODE) ELECTRONICS TECHNOLOGY LTD.**
Address.....	:	NO.768, Shenzhou Road, Science City, Luogang, Guangzhou, China
Telephone.....	:	(+86)20-38743936
Fax.....	:	(+86)20-38743936
Factory.....	**:**	**GUANGZHOU TAIMA(TICODE) ELECTRONICS TECHNOLOGY LTD.**
Address.....	:	NO.768, Shenzhou Road, Science City, Luogang, Guangzhou, China
Telephone.....	:	(+86)20-38743936
Fax.....	:	(+86)20-38743936

Test Result	Positive

The test report merely corresponds to the test sample.

It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

Revision History

Revision	Issue Date	Revisions	Revised By
000	Dec 19, 2017	Initial Issue	Gavin Liang

TABLE OF CONTENTS

1. GENERAL INFORMATION

1.1. Description of Device (EUT)

EUT	:	Wireless Barcode Scanner
Test Model	:	TI4145
Hardware Version	:	V1.0
Software Version	:	V1.2
Power Supply	:	DC 3.7V by Li-ion battery
Transmit Frequency	:	433.20MHz~434.60MHz
Channel Spacing	:	0.1MHz
Number of Channels	:	15
Modulation Type	:	FSK
Antenna Description	:	Integral Antenna, 2.0dBi(Max.)

1.2. Objective

The primary objective of the manufacturer is compliance with Subpart C of Part 15 of FCC Rules for the radiated and conducted emissions of intentional radiators and Industry Canada RSS-210 for Low Power, License-Exempt Radio Communication Devices. Certification of these devices is required as a prerequisite to marketing as defined in Part 2 the FCC Rules and Industry Canada Radio Standards Procedure RSP-100.

Certification is a procedure where the manufacturer or a contracted laboratory makes measurements and submits the test data and technical information to the FCC. The FCC issues a grant of equipment authorization upon successful completion of their review of the submitted documents. Once the equipment authorization has been obtained, the label indicating compliance must be attached to all identical units, which are subsequently manufactured.

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product which may result in increased emissions should be checked to ensure compliance has been maintained (i.e., printed circuit board layout changes, different line filter, different power supply, harnessing or I/O cable changes, etc.).

1.3. Environmental Conditions

During the measurement the environmental conditions were within the listed ranges:
- Temperature: 15-35ºC
- Humidity: 30-60 %
- Atmospheric pressure: 86-106kPa

1.4. Host System Configuration List and Details

Manufacturer	Description	Model	Serial Number	Certificate
Lenovo	PC	Ideapad	A131101550	FCC DOC
Lenovo	Power adapter	CPA-A090	36200414	FCC DOC

1.5. External I/O Port

I/O Port Description	Quantity	Cable
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1.6. Description of Test Facility

FCC Registration Number. is 254912.

Industry Canada Registration Number. is 9642A-1.

VCCI Registration Number. is C-4260 and R-3804.

ESMD Registration Number. is ARCB0108.

UL Registration Number. is 100571-492.

TUV SUD Registration Number. is SCN1081.

TUV RH Registration Number. is UA 50296516-001

1.7. Statement of The Measurement Uncertainty

ISO Guide 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level and were calculated in accordance with NAMAS document NIS 81.

Test Item		Frequency Range	Uncertainty	Note
Radiation Uncertainty	:	9KHz~30MHz	3.10dB	(1)
		30MHz~200MHz	2.96dB	(1)
		200MHz~1000MHz	3.10dB	(1)
		1GHz~26.5GHz	3.80dB	(1)
Conduction Uncertainty	:	150kHz~30MHz	1.63dB	(1)
Power disturbance	:	30MHz~300MHz	1.60dB	(1)

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

2. TEST METHODOLOGY

All measurements contained in this report were conducted with ANSI C63.10: 2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

The radiated testing was performed at an antenna-to-EUT distance of 3 meters. All radiated and conducted emissions measurement was performed at Shenzhen LCS Compliance Testing Laboratory Ltd..

2.1. EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

2.2. EUT Exercise

The EUT was operated in the normal operating mode. The TX frequency that was fixed which was for the purpose of the measurements.

According to its specifications, the EUT must comply with the requirements of the Section 15.203, 15.205, 15.207, 15.209 and 15.231 under the FCC Rules Part 15 Subpart C and RSS-210.

2.3. General Test Procedures

2.3.1 Conducted Emissions(N/A)

According to the requirements in Section 6.2 of ANSI C63.10: 2013, AC power-line conducted emissions shall be measured in the frequency range between 0.15 MHz and 30MHz using Quasi-peak and average detector modes.

2.3.2 Radiated Emissions

The EUT is placed on a turn table and the turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna, which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the maximum emissions, exploratory radiated emission measurements were made according to the requirements in Section 6.3 of ANSI C63.10: 2013

2.4. Instrument Calibration

All test equipment is regularly checked to ensure that performance is maintained in accordance with the manufacturer's specifications. All antennas are calibrated at regular intervals with respect to tuned half-wave dipoles. An exhibit of this report contains the list of test equipment used and calibration information.

2.5. Test Mode

The EUT has been tested under engineering mode. The field strength of radiation emission was measured in the following position: EUT stand-up position (Y axis), lie-down position (X, Z axis).
The worst case of X axis was reported.
A full charged battery supplied DC power to the EUT for testing.

Only recorded the worst test case in this report.

The EUT just transmits signal one time when you press the button, when you release the button, it'll stop transmitting. If you want to transmit again, you must release the button and press the button again.

***Note: Using a temporary antenna connector for the EUT when conducted measurements are performed.

3. SYSTEM TEST CONFIGURATION

3.1. Justification

The system was configured for testing in a continuous transmitting condition.

3.2. EUT Exercise Software

N/A

3.3. Special Accessories

N/A

3.4. Block Diagram/Schematics

Please refer to the related document

3.5. Equipment Modifications

Shenzhen LCS Compliance Testing Laboratory Ltd. has not done any modification on the EUT.

3.6. Test Setup

Please refer to the test setup photo.

4. SUMMARY OF TEST RESULTS

Applied Standard: FCC Part 15 Subpart C			
FCC Rules	**IC Rules**	**Description of Test**	**Result**
§15.203	RSS-Gen	Antenna Requirement	Compliant
§15.205	RSS-Gen	Restricted Bands Of Operation	Compliant
§15.209	RSS-Gen	Radiated Emission Limits, General Requirements.	Compliant
§15.231 (b)	A1.1	Field Strength Of Fundamental And Harmonics	Compliant
§15.231 (c)	A1.1	20dB Bandwidth	Compliant
§15.231 (a)(1)	A1.1	Transmission Cease Time	Compliant
§15.207	RSS-Gen	Conducted Emissions	Compliant

5. TEST ITEMS AND RESULTS

5.1. Transmission Cease Time

FCC 15.231 (a) & RSS-210 A1.1.1(a)

5.1.1. Limit

A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

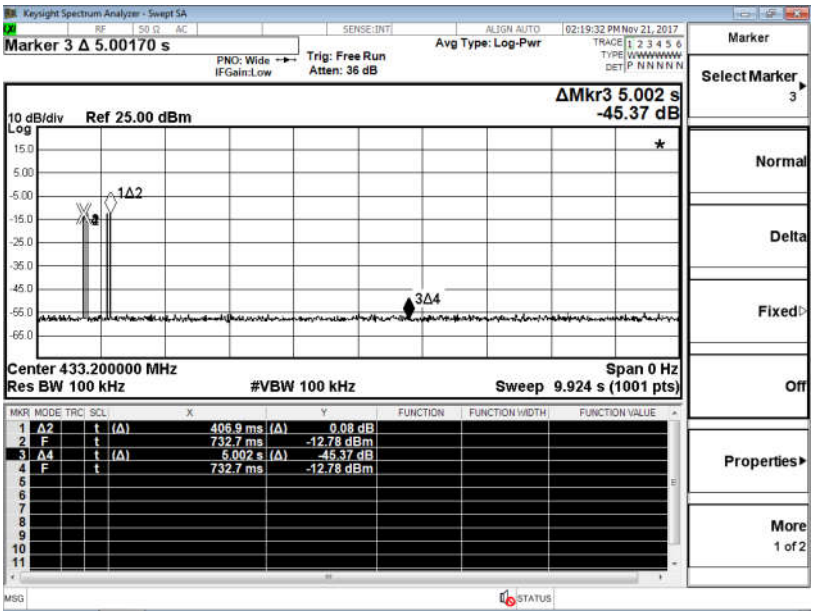
5.1.2. Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations. The antenna was all opened.

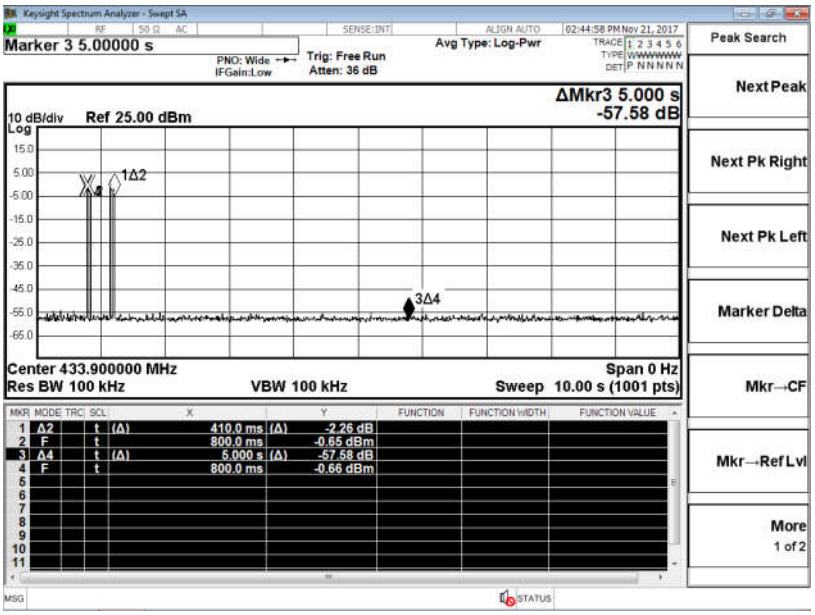
5.1.3. Test Results

Temperature	24.8℃	Humidity	57%
Test Engineer	Jayden Zhuo	Test Date	Nov 21, 2017

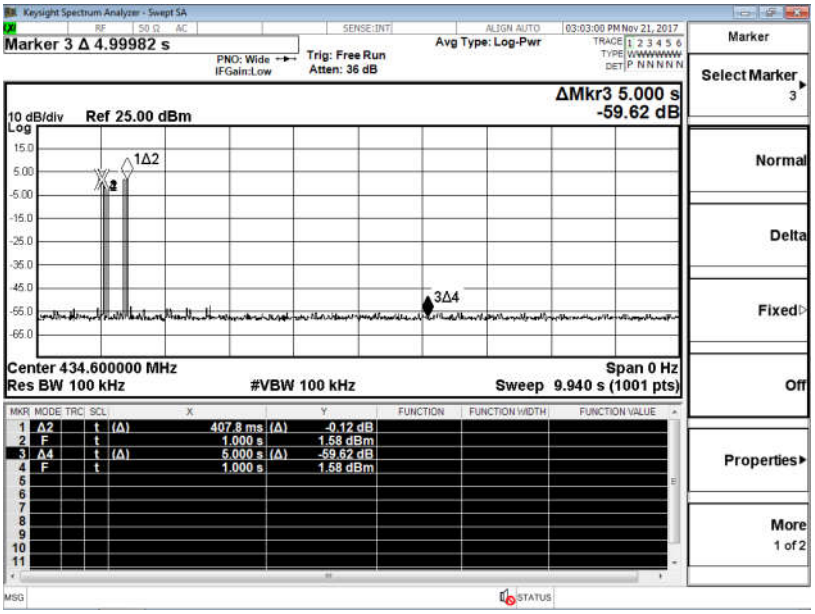
Frequency (MHz)	Transmission cease Time (s)	Limit	Conclusion
433.20	0.4069	not more than 5 seconds of being released(s)	PASS
433.90	0.4100	not more than 5 seconds of being released(s)	PASS
434.60	0.4078	not more than 5 seconds of being released(s)	PASS



Low channel



Mid channel



High Channel

Note: only recorded the low channel because all channels are the same.

5.2. Transmitter Field Strength of Emissions

5.2.1. Limit

FCC §15.231 (b) & RSS-210 A1.1.2(1)

In addition to the provisions of § 15.205, the field strength of emissions from Intentional radiators operated under this section shall not exceed the following:

Fundamental frequency (MHz)	Field Strength of Fundamental (microvolt/meter)	Field Strength of spurious emissions (microvolt/meter)
40.66-40.70	2,250	225
70-130	1,250	125
130-174	1,250 to 3,370	125 to375
174-260	3,750	375
260-470	3,750 to12, 500	375 to 1,250
Above 470	12,500	1,250

[Where F is the frequency in MHz, the formulas for calculating the maximum permitted fundamental field strengths are as follows: for the band 130-174 MHz, μV/m at 3 meters = 56.81818(F) - 6136.3636; for the band 260-470 MHz, μV/m at 3 meters = 41.6667(F) - 7083.3333. The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level.]

§15.205 (a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
[1]0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 -	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.52525	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	156.7 - 156.9	3260 - 3267	23.6 - 24.0
12.29 - 12.293	162.0125 - 167.17	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	167.72 - 173.2	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	240 - 285	3600 - 4400	([2])
13.36 – 13.41	322 - 335.4		

1 Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.
2 Above 38.6

§15.205 (b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

§15.209 (a) Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009–0.490	2400/F(kHz)	300
0.490–1.705	24000/F(kHz)	30
1.705–30.0	30	30
30–88	100**	3
88–216	150**	3
216–960	200**	3
Above 960	500	3

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54 72 MHz, 76 88 MHz, 174 216 MHz or 470 806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

§15.209 (b) In the emission table above, the tighter limit applies at the band edges.

5.2.2. Instruments Setting

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

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RB / VB (Emission in restricted band)	1MHz / 1MHz for Peak, 1 MHz / 10Hz for Average
RB / VB (Emission in non-restricted band)	1MHz / 1MHz for Peak, 1 MHz / 10Hz for Average

Spectrum Parameter	Setting
Attenuation	Auto
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

5.2.3. Test Procedures

1) Configure the EUT according to ANSI C63.10: 2013. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.

2) Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.

3) The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.

4) For each suspected emissions, the antenna tower was scan (from 1 m to 4 m) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading

5) Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.

6) For emissions above 1GHz, use 1MHz VBW and RBW for peak reading. Then 1MHz RBW and 10Hz VBW for average reading in spectrum analyzer.

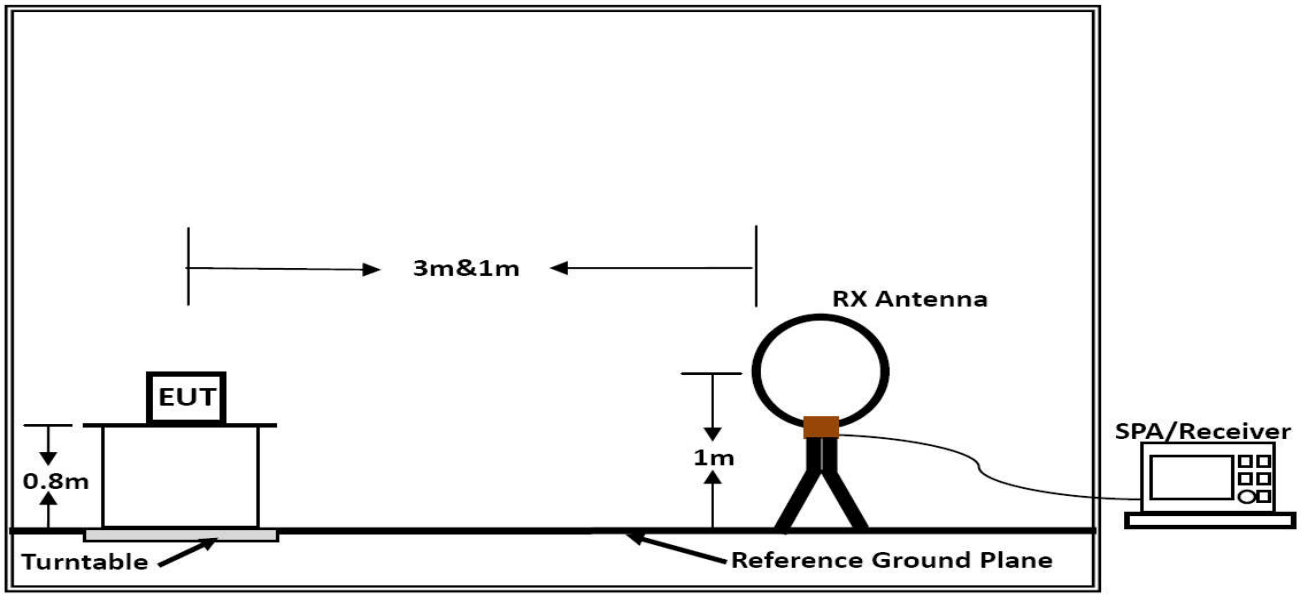
7) When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value.

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.

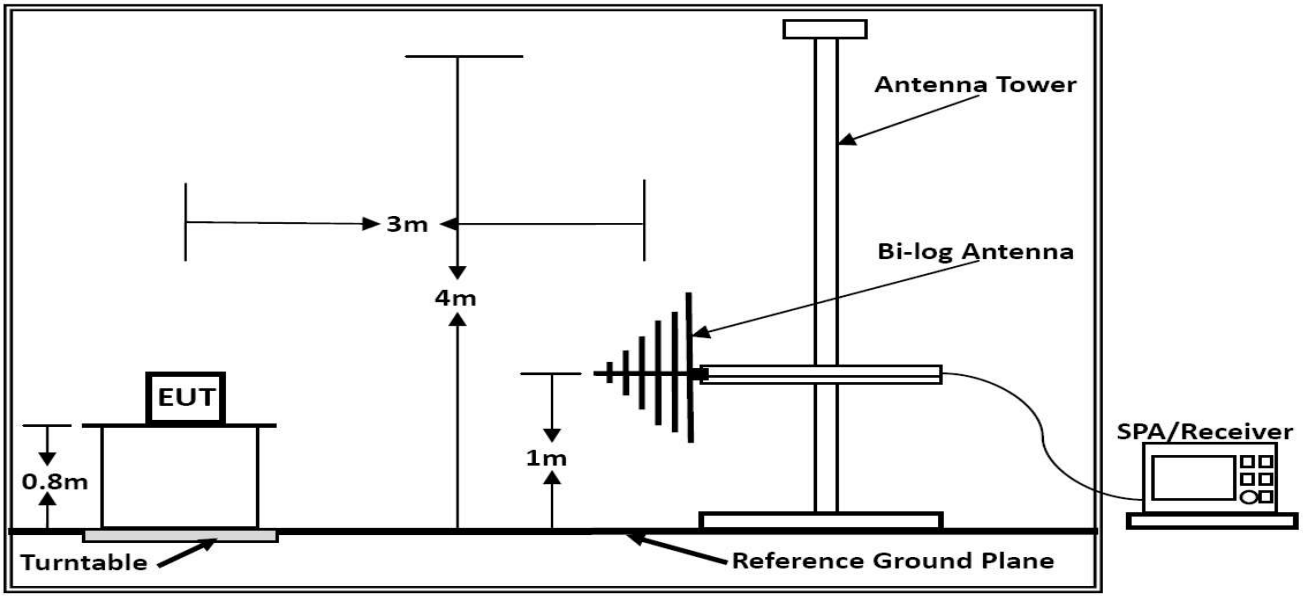
9) For the radiated emission test above 1GHz: Place the measurement antenna away from each area of the EUT determined to be a source of emission sat the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with 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. 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.

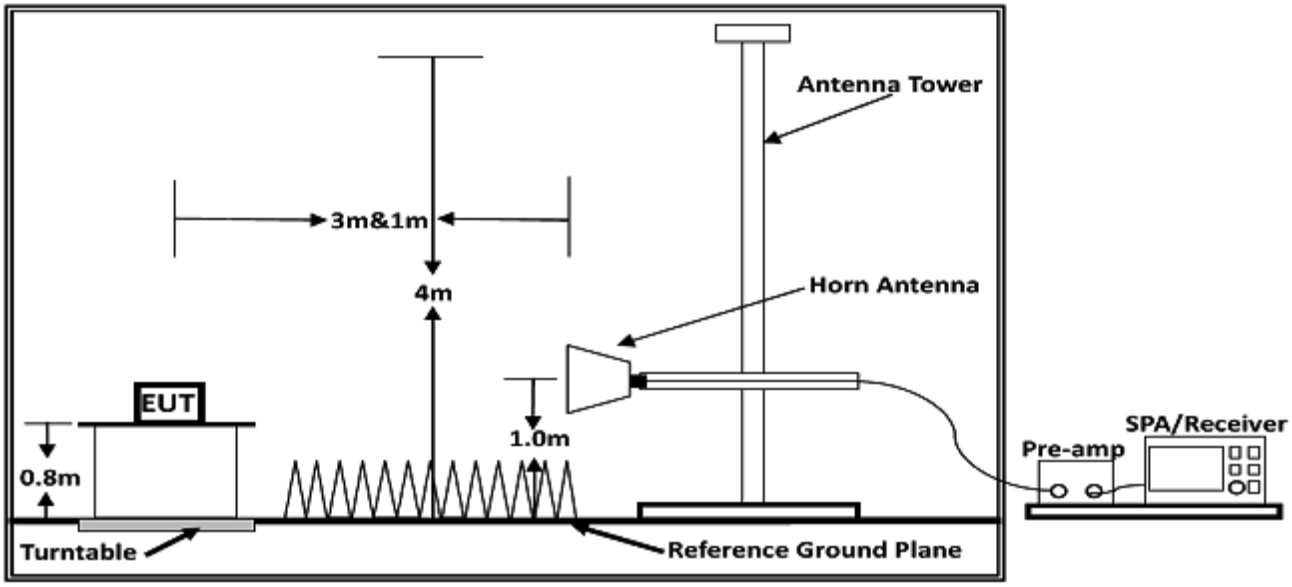
5.2.4. Test Setup Layout



Below 30MHz



Below 1GHz



Above 1GHz

5.2.5. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

5.2.6. Results of Radiated Emissions (9kHz~30MHz)

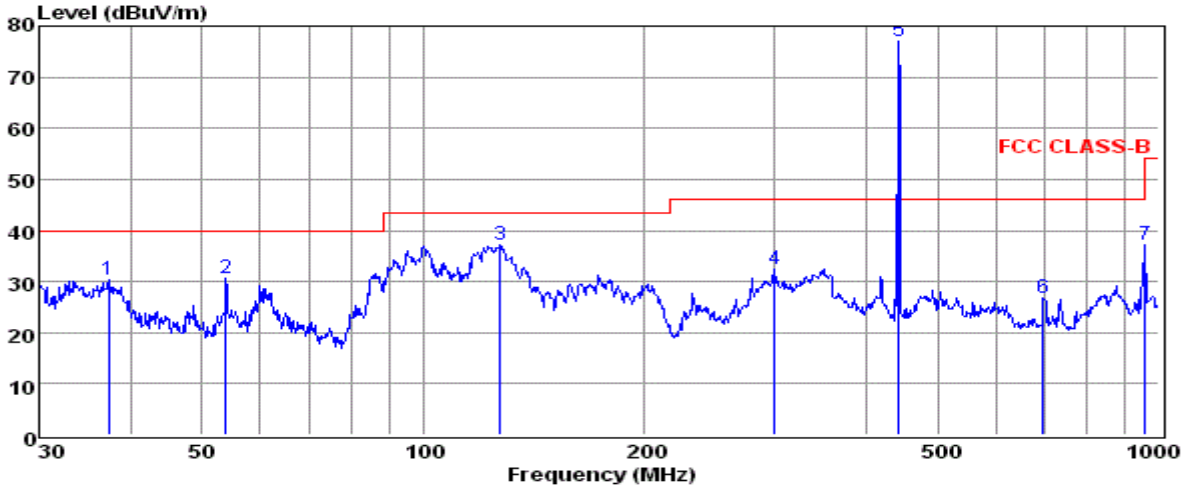
The low frequency, which started from 9KHz to 30MHz, was pre-scan and the result was 20dB lower than the limit line per 15.31(o) was not reported.

Note: Distance extrapolation factor = 40 log (specific distance / test distance) (dB);

Limit line = specific limits (dBuV) + distance extrapolation factor.

5.2.7. Results of Radiated Emissions (30MHz~1GHz)

Temperature	24℃	Humidity	56%
Test Engineer	Jayden Zhuo	Test Date	Dec 18, 2017
Test Mode	Tx-Low channel	Pol	Horizontal

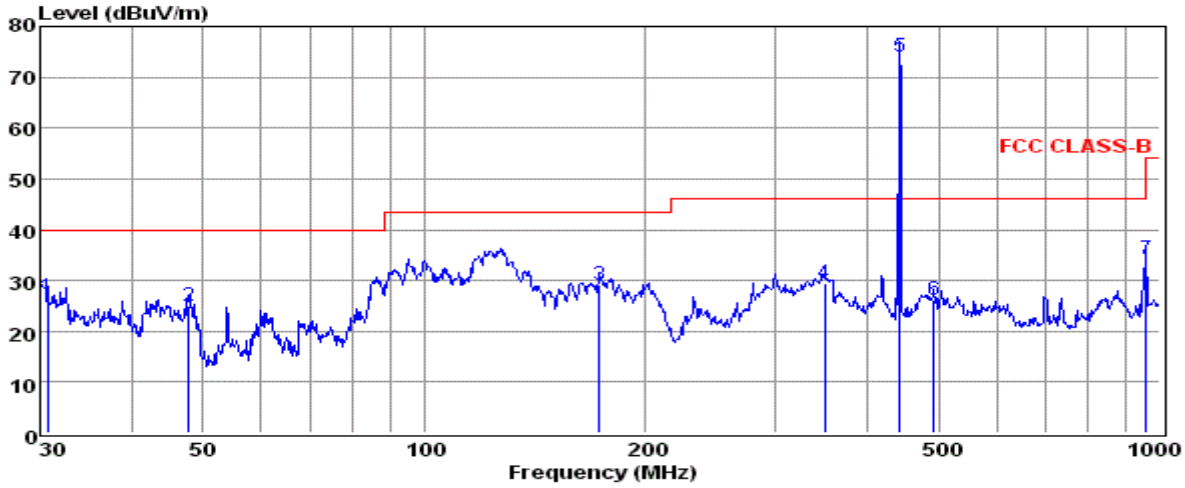


	Freq	Reading	CabLos	Antfac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	37.29	16.94	0.41	12.89	30.24	40.00	-9.76	QP
2	53.88	17.12	0.46	13.07	30.65	40.00	-9.35	QP
3	127.22	27.27	0.67	9.36	37.30	43.50	-6.20	QP
4	300.37	18.09	1.13	13.06	32.28	46.00	-13.72	QP
5	433.20	60.15	1.25	15.56	76.96	46.00	30.96	Peak
6	696.86	6.47	1.59	18.80	26.86	46.00	-19.14	QP
7	958.79	13.71	1.90	21.47	37.08	46.00	-8.92	QP

Note: 1. All readings are Quasi-peak values.
2. Measured= Reading + Antenna Factor + Cable Loss
3. The emission that ate 20db blow the offficial limit are not reported

Fundamental and Harmonics Average Result						
Frequency (MHz)	Peak Level (dBμV/m)	AV Factor(dBμV/m) (see Section 5.4)	Average Level (dBμV/m)	Limit(dBμV/m) (average)	Margin(dB μV/m)	Conclusion
433.20	76.96	-16.03	60.93	80.82	-19.89	PASS
866.40	28.34	-16.03	12.31	60.82	-48.51	PASS

Temperature	24℃	Humidity	56%
Test Engineer	Jayden Zhuo	Test Date	Dec 18, 2017
Test Mode	Tx-Low channel	Pol	Vertical

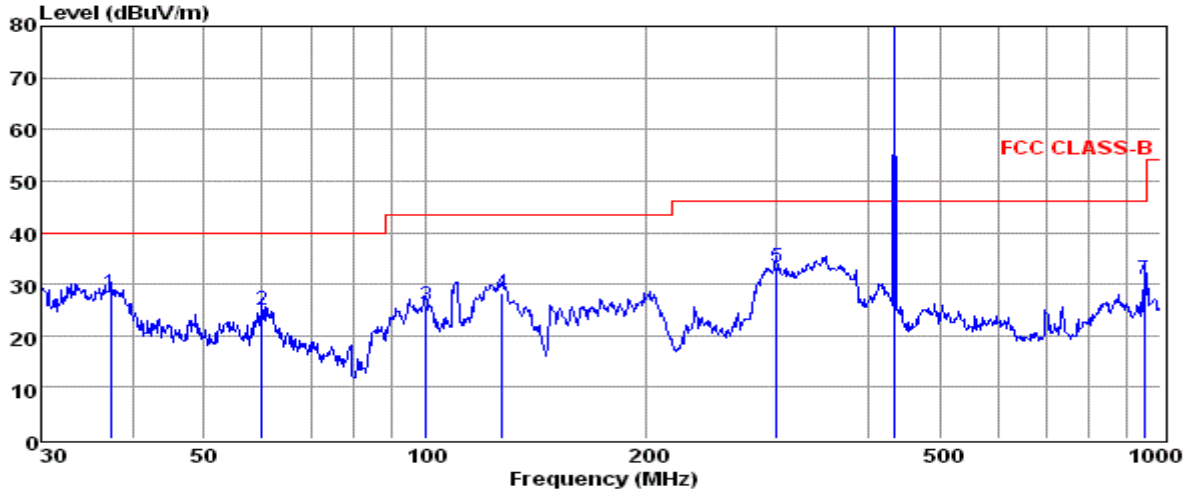


	Freq	Reading	CabLos	Antfac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	30.75	14.00	0.39	12.33	26.72	40.00	-13.28	QP
2	47.83	11.31	0.35	13.38	25.04	40.00	-14.96	QP
3	173.21	19.04	0.91	9.20	29.15	43.50	-14.35	QP
4	350.48	13.96	1.15	14.28	29.39	46.00	-16.61	QP
5	433.20	57.15	1.25	15.56	73.96	46.00	27.96	Peak
6	492.47	8.37	1.50	16.39	26.26	46.00	-19.74	QP
7	958.79	10.71	1.90	21.47	34.08	46.00	-11.92	QP

Note: 1. All readings are Quasi-peak values.
2. Measured= Reading + Antenna Factor + Cable Loss
3. The emission that ate 20db blow the offficial limit are not reported

Fundamental and Harmonics Average Result						
Frequency (MHz)	Peak Level (dBμV/m)	AV Factor(dBμV/m) (see Section 5.4)	Average Level (dBμV/m)	Limit(dBμV/m) (average)	Margin(dBμV/m)	Conclusion
433.20	73.96	-16.03	57.93	80.82	-22.89	PASS
866.40	27.59	-16.03	11.56	60.82	-49.26	PASS

Temperature	24℃	Humidity	56%
Test Engineer	Jayden Zhuo	Test Date	Dec 18, 2017
Test Mode	Tx-Mid channel	Pol	Horizontall

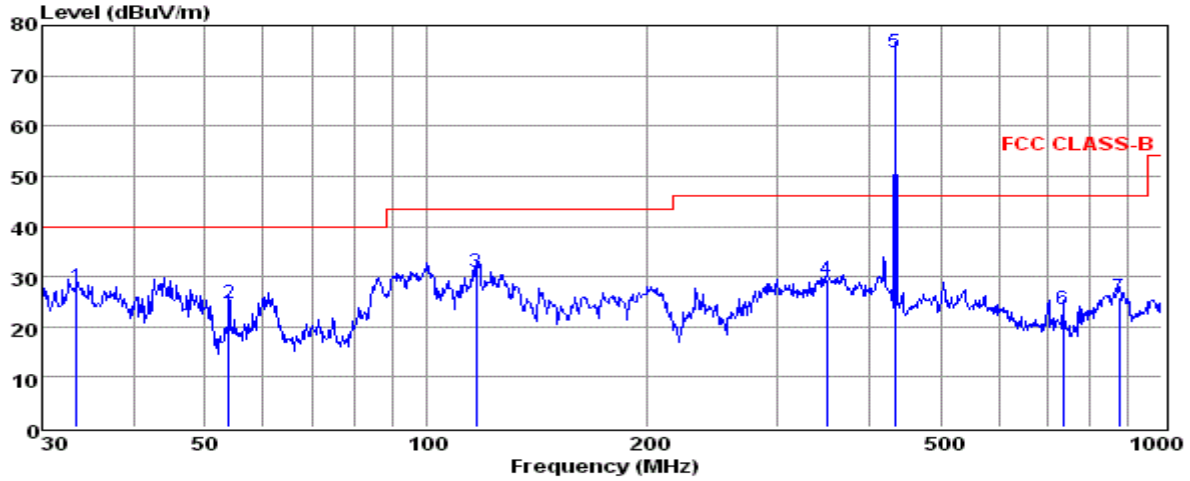


	Freq	Reading	CabLos	Antfac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	37.29	14.94	0.41	12.89	28.24	40.00	-11.76	QP
2	59.86	11.88	0.49	12.70	25.07	40.00	-14.93	QP
3	100.23	12.04	0.60	13.14	25.78	43.50	-17.72	QP
4	127.22	18.27	0.67	9.36	28.30	43.50	-15.20	QP
5	300.37	19.09	1.13	13.06	33.28	46.00	-12.72	QP
6	433.90	63.80	1.18	15.53	80.51	46.00	34.51	Peak
7	948.76	7.74	1.91	21.41	31.06	46.00	-14.94	QP

Note: 1. All readings are Quasi-peak values.
2. Measured= Reading + Antenna Factor + Cable Loss
3. The emission that ate 20db blow the offficial limit are not reported

Fundamental and Harmonics Average Result						
Frequency (MHz)	Peak Level (dBμV/m)	AV Factor(dBμV/m) (see Section 5.4)	Average Level (dBμV/m)	Limit(dBμV/m) (average)	Margin(dBμV/m)	Conclusion
433.90	80.51	-16.03	64.48	80.82	-16.34	PASS
867.80	27.29	-16.03	11.26	60.82	-49.56	PASS

Temperature	24℃	Humidity	56%
Test Engineer	Jayden Zhuo	Test Date	Dec 18, 2017
Test Mode	Tx-Mid channel	Pol	Vertical

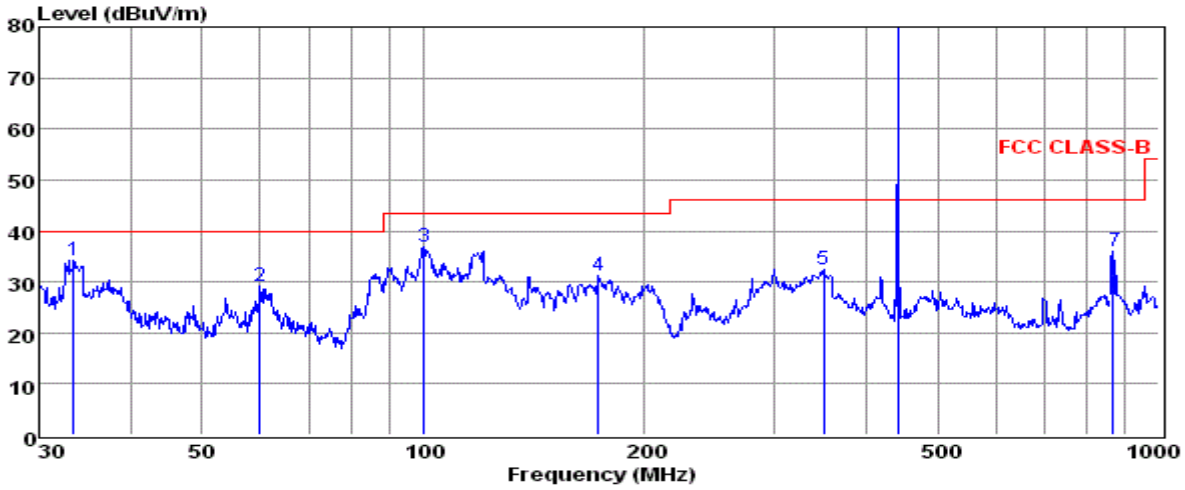


	Freq	Reading	CabLos	Antfac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	33.44	15.40	0.37	12.31	28.08	40.00	-11.92	QP
2	53.88	11.01	0.46	13.07	24.54	40.00	-15.46	QP
3	116.95	19.22	0.68	11.02	30.92	43.50	-12.58	QP
4	350.48	13.96	1.15	14.28	29.39	46.00	-16.61	QP
5	433.90	58.00	1.18	15.53	74.71	46.00	28.71	Peak
6	734.49	2.43	1.74	19.24	23.41	46.00	-22.59	QP
7	875.25	3.24	1.87	20.84	25.95	46.00	-20.05	QP

Note: 1. All readings are Quasi-peak values.
2. Measured= Reading + Antenna Factor + Cable Loss
3. The emission that ate 20db blow the offficial limit are not reported

Fundamental and Harmonics Average Result						
Frequency (MHz)	Peak Level (dBμV/m)	AV Factor(dBμV/m) (see Section 5.4)	Average Level (dBμV/m)	Limit(dBμV/m) (average)	Margin(dBμV/m)	Conclusion
433.90	74.71	-16.03	58.68	80.82	-22.14	PASS
867.80	26.87	-16.03	10.84	60.82	-49.98	PASS

Temperature	24℃	Humidity	56%
Test Engineer	Jayden Zhuo	Test Date	Dec 18, 2017
Test Mode	Tx-High channel	Pol	Horizontall

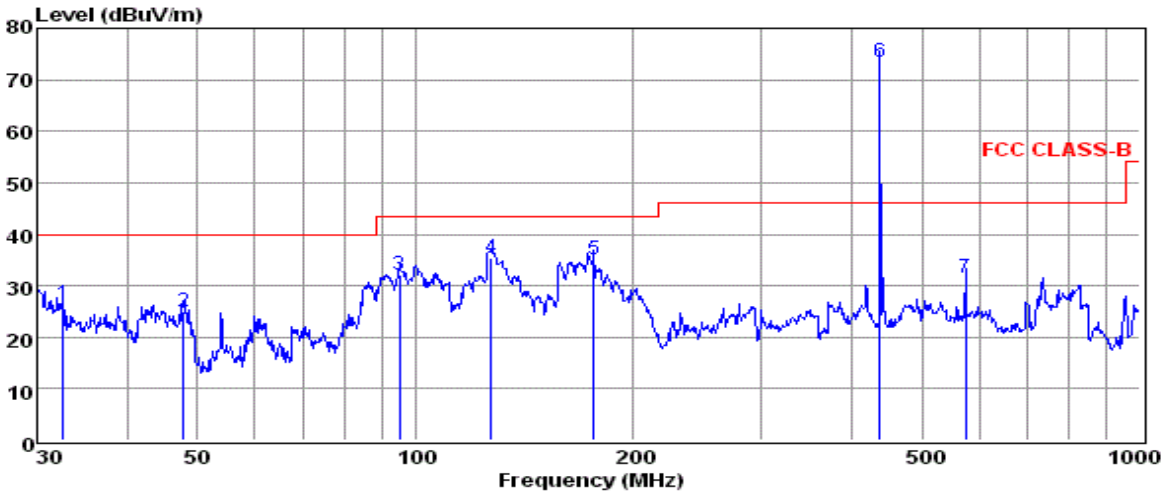


	Freq	Reading	CabLos	Antfac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	33.44	21.40	0.37	12.31	34.08	40.00	-5.92	QP
2	59.86	15.88	0.49	12.70	29.07	40.00	-10.93	QP
3	100.23	23.04	0.60	13.14	36.78	43.50	-6.72	QP
4	173.21	21.04	0.91	9.20	31.15	43.50	-12.35	QP
5	350.48	16.96	1.15	14.28	32.39	46.00	-13.61	QP
6	434.60	63.78	1.25	15.56	80.59	46.00	34.59	Peak
7	869.20	13.30	1.87	20.84	36.01	46.00	-9.99	QP

Note: 1. All readings are Quasi-peak values.
2. Measured= Reading + Antenna Factor + Cable Loss
3. The emission that ate 20db blow the offficial limit are not reported

Fundamental and Harmonics Average Result						
Frequency (MHz)	Peak Level (dBμV/m)	AV Factor(dBμV/m) (see Section 5.4)	Average Level (dBμV/m)	Limit(dBμV/m) (average)	Margin(dBμV/m)	Conclusion
434.60	80.59	-16.03	64.56	80.82	-16.26	PASS
869.20	36.01	-16.03	19.98	60.82	-40.84	PASS

Temperature	24℃	Humidity	56%
Test Engineer	Jayden Zhuo	Test Date	Dec 18, 2017
Test Mode	Tx-High channel	Pol	Vertical



	Freq	Reading	CabLos	Antfac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	32.63	13.85	0.37	12.31	26.53	40.00	-13.47	QP
2	47.83	11.31	0.35	13.38	25.04	40.00	-14.96	QP
3	95.09	18.68	0.58	12.85	32.11	43.50	-11.39	QP
4	127.22	25.27	0.67	9.36	35.30	43.50	-8.20	QP
5	176.27	24.82	0.73	9.42	34.97	43.50	-8.53	QP
6	434.60	56.49	1.41	15.55	73.45	46.00	27.45	Peak
7	574.63	11.93	1.49	17.98	31.40	46.00	-14.60	QP

Note: 1. All readings are Quasi-peak values.
2. Measured= Reading + Antenna Factor + Cable Loss
3. The emission that ate 20db blow the offficial limit are not reported

	Fundamental and Harmonics Average Result					
Frequency (MHz)	Peak Level (dBμV/m)	AV Factor(dBμV/m) (see Section 5.4)	Average Level (dBμV/m)	Limit(dBμV/m) (average)	Margin(dBμV/m)	Conclusion
434.60	73.45	-16.03	57.42	80.82	-23.40	PASS
869.20	21.36	-16.03	5.33	60.82	-55.49	PASS

5.2.8. Results of Radiated Emissions (Above1GHz)

Temperature	24℃	Humidity	56%
Test Engineer	Jayden Zhuo	Test Date	Dec 18, 2017
Test Mode	Tx-Low channel		

Peak Value:

Frequency (MHz)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin (dBuV/m)	Polarization
1299.60	46.64	74.00	-27.36	Horizontal
1732.80	38.13	74.00	-35.87	Horizontal
2166.00	40.82	74.00	-33.18	Horizontal
1299.60	44.28	74.00	-29.72	Vertical
1732.80	37.55	74.00	-36.45	Vertical
2166.00	39.43	74.00	-34.57	Vertical

Average Value:

Frequency (MHz)	Level (dBuV/m)	Duty cycle factor	Average value (dBuV/m)	Limit Line (dBuV/m)	Margin (dBuV/m)	Polarization
1299.60	46.64	-16.03	30.61	54.00	-23.39	Horizontal
1732.80	38.13	-16.03	22.10	54.00	-31.90	Horizontal
2166.00	40.82	-16.03	24.80	54.00	-29.20	Horizontal
1299.60	44.28	-16.03	28.25	54.00	-25.75	Vertical
1732.80	37.55	-16.03	21.52	54.00	-32.48	Vertical
2166.00	39.43	-16.03	23.41	54.00	-30.59	Vertical

Temperature	24℃	Humidity	56%
Test Engineer	Jayden Zhuo	Test Date	Dec 18, 2017
Test Mode	Tx-Mid channel		

Peak Value:

Frequency (MHz)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin (dBuV/m)	Polarization
1301.70	46.68	74.00	-27.32	Horizontal
1735.60	38.20	74.00	-35.80	Horizontal
2169.50	40.86	74.00	-33.14	Horizontal
1301.70	44.53	74.00	-29.47	Vertical
1735.60	37.94	74.00	-36.06	Vertical
2169.50	39.35	74.00	-34.65	Vertical

Average Value:						
Frequency (MHz)	Level (dBuV/m)	Duty cycle factor	Average value (dBuV/m)	Limit Line (dBuV/m)	Margin (dBuV/m)	Polarization
1301.70	46.68	-16.03	30.65	54.00	-23.35	Horizontal
1735.60	38.20	-16.03	22.17	54.00	-31.83	Horizontal
2169.50	40.86	-16.03	24.83	54.00	-29.17	Horizontal
1301.70	44.53	-16.03	28.51	54.00	-25.49	Vertical
1735.60	37.94	-16.03	21.91	54.00	-32.09	Vertical
2169.50	39.35	-16.03	23.33	54.00	-30.67	Vertical

Temperature	24℃	Humidity	56%
Test Engineer	Jayden Zhuo	Test Date	Dec 18, 2017
Test Mode	Tx-High channel		

Peak Value:				
Frequency (MHz)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin (dBuV/m)	Polarization
1303.80	46.70	74.00	-27.30	Horizontal
1738.40	38.29	74.00	-35.71	Horizontal
2173.00	40.84	74.00	-33.16	Horizontal
1303.80	44.73	74.00	-29.27	Vertical
1738.40	37.57	74.00	-36.43	Vertical
2173.00	39.73	74.00	-34.27	Vertical

Average Value:						
Frequency (MHz)	Level (dBuV/m)	Duty cycle factor	Average value (dBuV/m)	Limit Line (dBuV/m)	Margin (dBuV/m)	Polarization
1301.70	46.70	-16.03	30.67	54.00	-23.33	Horizontal
1735.60	38.29	-16.03	22.26	54.00	-31.74	Horizontal
2169.50	40.84	-16.03	24.81	54.00	-29.19	Horizontal
1301.70	44.73	-16.03	28.70	54.00	-25.30	Vertical
1735.60	37.57	-16.03	21.55	54.00	-32.45	Vertical
2169.50	39.73	-16.03	23.70	54.00	-30.30	Vertical

1. Measuring frequencies from 9k~10th harmonic (ex. 5GHz), No emission found between lowest internal used/generated frequency to 30MHz.

2. Radiated emissions measured in frequency range from 9k~10th harmonic (ex. 5GHz) were made with an instrument using Peak detector mode.

3. Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

5.3. 20dB Bandwidth Emissions

FCC 15.231 (c) & RSS-210 A1.1.3

5.3.1. Limit

The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. Bandwidth is determined at the points 20 dB down from the modulated carrier.

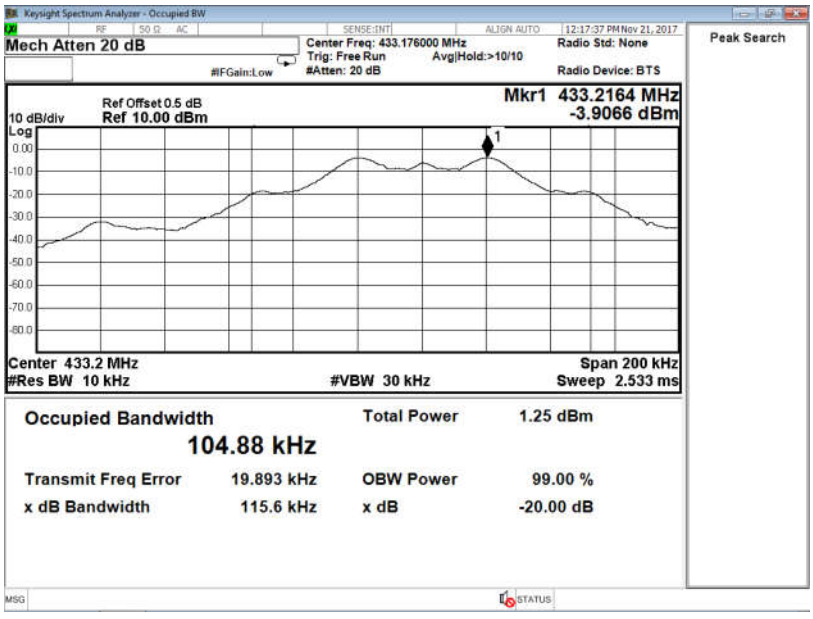
5.3.2. Test Procedure

With the EUT's antenna attached, the EUT's 20dB Bandwidth power was received by the test antenna which was connected to the spectrum analyzer with the START and STOP frequencies set to the EUT's operation band.

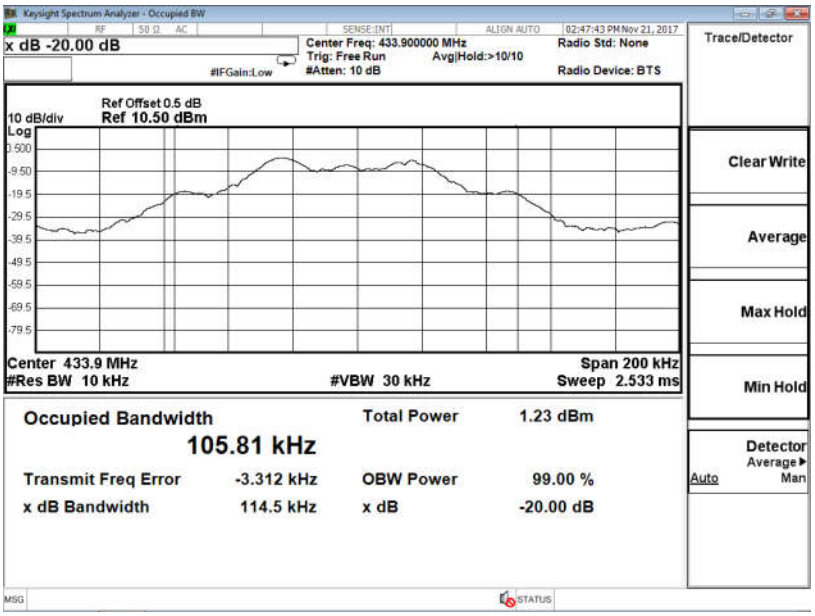
5.3.3. Test Data

Temperature	24.3℃	Humidity	55%
Test Engineer	Jayden Zhuo	Test Date	Nov 21, 2017
Test Mode	Tx		

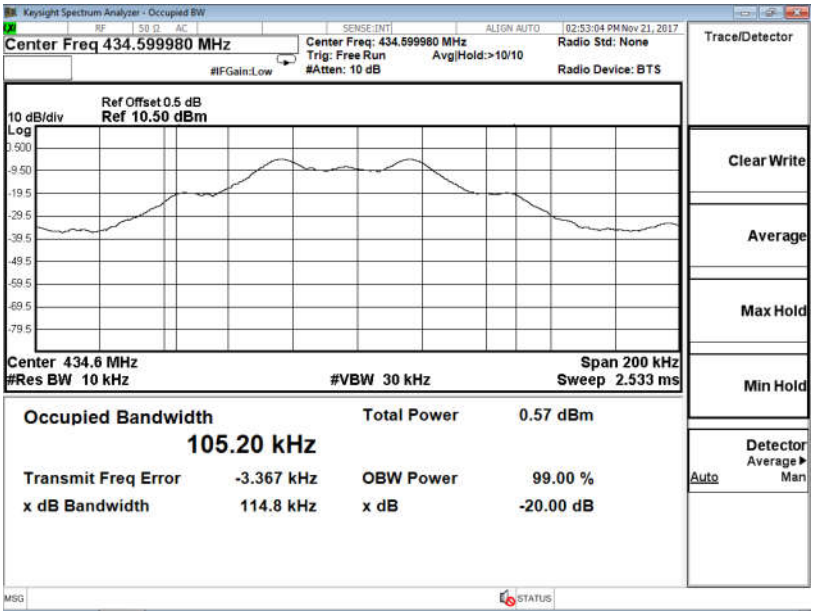
Transmit Frequency (MHz)	Limit (kHz)	20dB Bandwidth (kHz)	Result
433.20	1084.8	115.6	PASS
433.90	1084.8	114.5	PASS
434.60	1084.8	114.8	PASS
Maximum allowed bandwidth:	☒0.25% of the centre operating frequency ☐0.5% of the centre operating frequency		
RBW: **VBW:**	☒10kHz ☐100kHz ☐other kHz ☒30kHz ☐300kHz ☐other kHz		



Low channel



Mid channel



High channel

5.4. Duty cycle

5.4.1. Limit

No dedicated limit specified in the Rules.

5.4.2. Test Procedure

5.4.2.1. Place the EUT on the table and set it in transmitting mode.

5.4.2.2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.

5.4.2.3. Set centre frequency of spectrum analyzer=operating frequency.

5.4.2.4. Set the spectrum analyzer as RBW=100kHz, VBW=100KHz, Span=0Hz, Adjust Sweep=100ms to obtain the "worst-case" pulse on time

5.4.2.5. Repeat above procedures until all frequency measured was complete.

5.4.3. Test Data

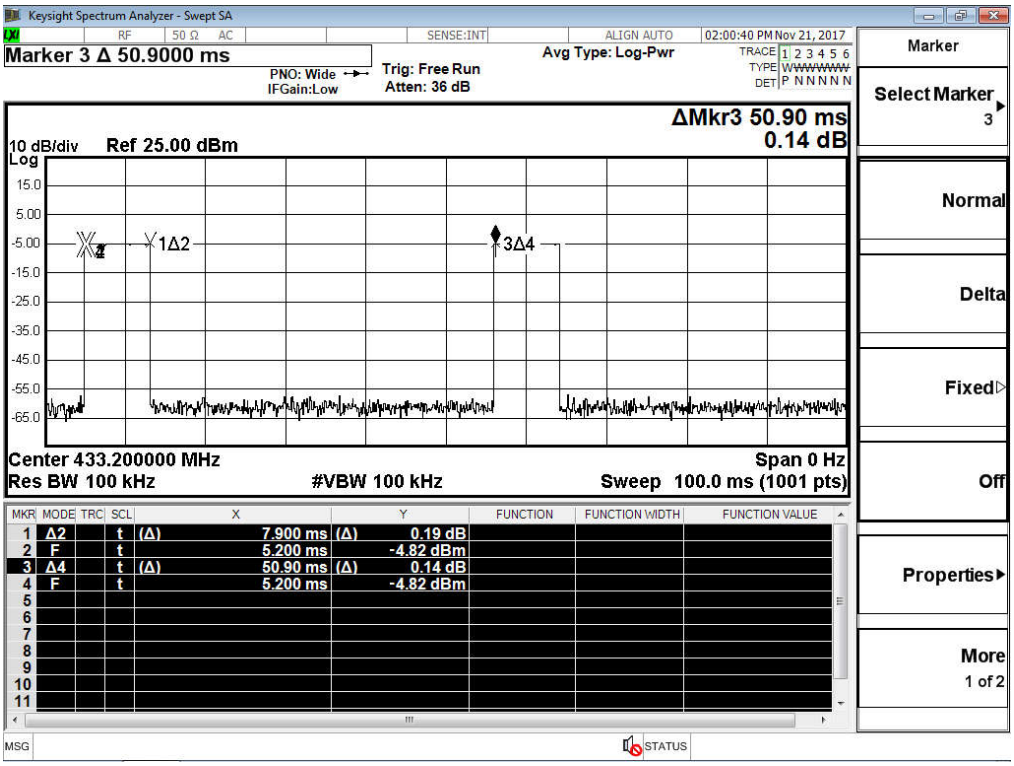
Ton = 7.9*2(ms)=15.8(ms)

Tp = 100(ms)

The duty cycle= 15.8/100= 15.8%

Average Correction Factory = 20log (Ton/Tp) =20log (15.8/100) = -16.03dB

Note: The signal bandwidth was measured and less then 100kHz RBW so PDCF factor is not required to correct the fundamental signal peak result.



Note: Duty cycle for all channels are the same, only recorded one channel for calculation.

5.5. Power line conducted emissions

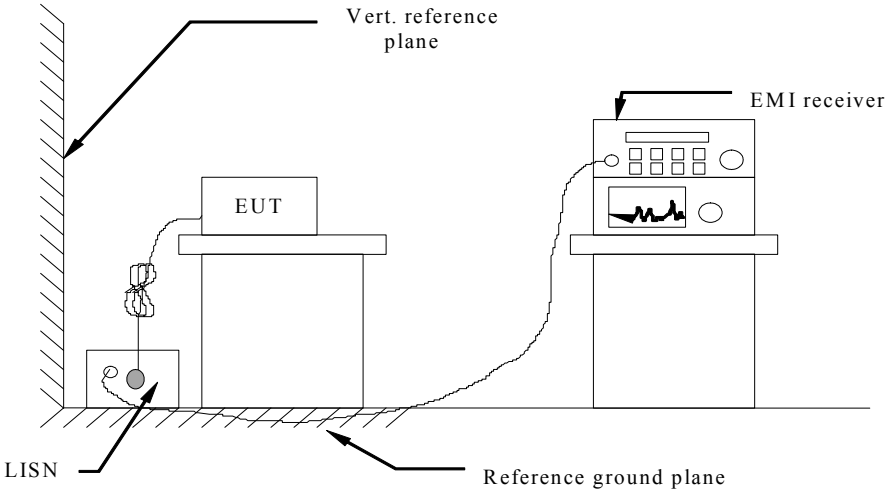
5.5.1 Standard Applicable

According to §15.207 (a): For an intentional radiator which is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed 250 microvolts (The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz). The limits at specific frequency range are listed as follows:

Frequency Range (MHz)	Limits (dBμV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50

* Decreasing linearly with the logarithm of the frequency

5.5.2 Block Diagram of Test Setup



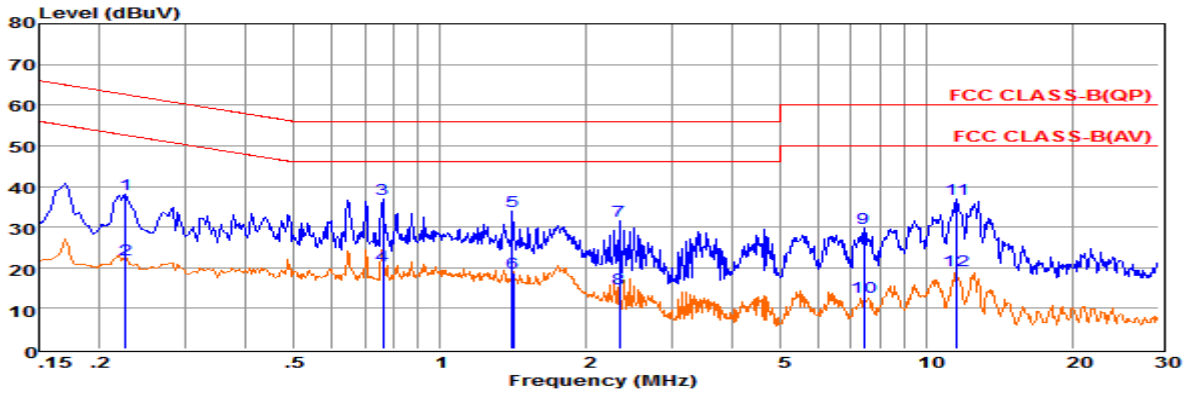
5.5.3 Test Results

PASS.

The test data please refer to following page.

AC Conducted Emission of power adapter @ AC 120V/60Hz @ GFSK (worst case)

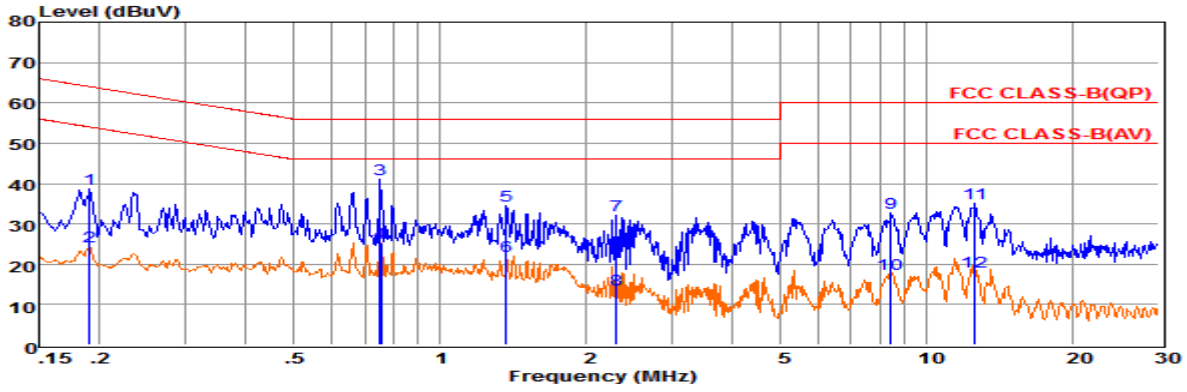
Line



	Freq	Reading	LISNFac	CabLos	Aux2Fac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB	dB	dB	dBuV	dBuV	dB
1	0.23	18.41	9.63	0.03	10.00	38.07	62.61	-24.54	QP
2	0.23	2.31	9.63	0.03	10.00	21.97	52.61	-30.64	Average
3	0.76	17.25	9.64	0.04	10.00	36.93	56.00	-19.07	QP
4	0.76	0.79	9.64	0.04	10.00	20.47	46.00	-25.53	Average
5	1.41	14.36	9.63	0.05	10.00	34.04	56.00	-21.96	QP
6	1.41	-1.05	9.63	0.05	10.00	18.63	46.00	-27.37	Average
7	2.33	11.86	9.64	0.05	10.00	31.55	56.00	-24.45	QP
8	2.33	-4.68	9.64	0.05	10.00	15.01	46.00	-30.99	Average
9	7.45	9.85	9.68	0.07	10.00	29.60	60.00	-30.40	QP
10	7.45	-7.00	9.68	0.07	10.00	12.75	50.00	-37.25	Average
11	11.56	17.16	9.70	0.09	10.00	36.95	60.00	-23.05	QP
12	11.56	-0.52	9.70	0.09	10.00	19.27	50.00	-30.73	Average

Remarks: 1. Measured = Reading + LISNFac + Cable Loss + Aux2 Fac.
2. The emission levels that are 20dB below the official limit are not reported.

Neutral



	Freq	Reading	LISNFac	CabLos	Aux2Fac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB	dB	dB	dBuV	dBuV	dB
1	0.19	19.07	9.61	0.02	10.00	38.70	64.02	-25.32	QP
2	0.19	4.65	9.61	0.02	10.00	24.28	54.02	-29.74	Average
3	0.75	21.43	9.63	0.04	10.00	41.10	56.00	-14.90	QP
4	0.76	5.61	9.63	0.04	10.00	25.28	46.00	-20.72	Average
5	1.37	14.69	9.63	0.05	10.00	34.37	56.00	-21.63	QP
6	1.37	2.25	9.63	0.05	10.00	21.93	46.00	-24.07	Average
7	2.31	12.36	9.63	0.05	10.00	32.04	56.00	-23.96	QP
8	2.31	-5.89	9.63	0.05	10.00	13.79	46.00	-32.21	Average
9	8.46	12.86	9.71	0.08	10.00	32.65	60.00	-27.35	QP
10	8.46	-2.20	9.71	0.08	10.00	17.59	50.00	-32.41	Average
11	12.58	15.31	9.73	0.09	10.00	35.13	60.00	-24.87	QP
12	12.58	-1.62	9.73	0.09	10.00	18.20	50.00	-31.80	Average

Remarks: 1. Measured = Reading + LISNFac + Cable Loss + Aux2 Fac.
2. The emission levels that are 20dB below the official limit are not reported.

****Note: Pre-scan all modes and recorded the worst case results in this report;*

5.6. Antenna Requirement

FCC 15.203 & RSS-Gen

5.6.1. Standard Applicable

According to § 15.203 & RSS-Gen, An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

5.6.2. Result

Compliant.

The antenna used for transmitting is permanently attached and no consideration of replacement. Please see EUT photo for details.

6. LIST OF MEASURING EQUIPMENTS

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1	Power Meter	R&S	NRVS	100444	2017-06-17	2018-06-16
2	Power Sensor	R&S	NRV-Z81	100458	2017-06-17	2018-06-16
3	Power Sensor	R&S	NRV-Z32	10057	2017-06-17	2018-06-16
4	EPM Series Power Meter	Agilent	E4419B	MY45104493	2017-06-17	2018-06-16
5	E-SERIES AVG POWER SENSOR	Agilent	E9301H	MY41495234	2017-06-17	2018-06-16
6	ESA-E SERIES SPECTRUM ANALYZER	Agilent	E4407B	MY41440754	2017-11-18	2018-11-17
7	MXA Signal Analyzer	Agilent	N9020A	MY49100040	2017-06-17	2018-06-16
8	SPECTRUM ANALYZER	R&S	FSP	100503	2017-06-17	2018-06-16
9	3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	2017-06-17	2018-06-16
10	Positioning Controller	MF	MF-7082	/	2017-06-17	2018-06-16
11	EMI Test Software	AUDIX	E3	N/A	2017-06-17	2018-06-16
12	EMI Test Receiver	ROHDE & SCHWARZ	ESR 7	101181	2017-06-17	2018-06-16
13	AMPLIFIER	QuieTek	QTK-A2525G	CHM10809065	2017-11-18	2018-11-17
14	Active Loop Antenna	SCHWARZBECK	FMZB 1519B	00005	2017-06-23	2018-06-22
15	By-log Antenna	SCHWARZBECK	VULB9163	9163-470	2017-05-02	2018-05-01
16	Horn Antenna	EMCO	3115	6741	2017-06-23	2018-06-22
17	RF Cable-R03m	Jye Bao	RG142	CB021	2017-06-17	2018-06-16
18	RF Cable-HIGH	SUHNER	SUCOFLEX 106	03CH03-HY	2017-06-17	2018-06-16
19	TEST RECEIVER	R&S	ESCI	101142	2017-06-17	2018-06-16
20	RF Cable-CON	UTIFLEX	3102-26886-4	CB049	2017-06-17	2018-06-16
21	10dB Attenuator	SCHWARZBECK	MTS-IMP136	261115-001-0032	2017-06-17	2018-06-16
22	Artificial Mains	R&S	ENV216	101288	2017-06-17	2018-06-16
23	X-series USB Peak and Average Power Sensor Aglient	Agilent	U2021XA	MY54080022	2017-10-27	2018-10-26
24	4 CH. Simultaneous Sampling 14 Bits 2MS/s	Agilent	U2531A	MY54080016	2017-10-27	2018-10-26
25	Test Software	Ascentest	AT890-SW	20160630	N/A	N/A

26	RF Control Unit	Ascentest	AT890-RFB	N/A	2017-06-17	2018-06-16
27	Universal Radio Communication Tester	R&S	CMU 200	105788	2017-06-17	2018-06-16
28	WIDEBAND RADIO COMMUNICATION TESTER	R&S	CMW 500	103818	2017-06-17	2018-06-16
29	RF Control Unit	Tonscend	JS0806-1	N/A	2017-06-17	2018-06-16
30	DC Power Supply	Agilent	E3642A	N/A	2017-11-18	2018-11-17
31	LTE Test Software	Tonscend	JS1120-1	N/A	N/A	N/A

7. PHOTOGRAPHS OF TEST SETUP

Please refer to separated file for Test setup photos.

8. EXTERNAL PHOTOGRAPHS OF EUT

Please refer to separated file for external photos.

8. INTERNAL PHOTOGRAPHS OF EUT

Please refer to separated file for internal photos.

----------THE END OF REPORT----------