FCC TEST REPORT

For

RF Code, Inc.

Mobile Asset Tag

Test Model: M184

Prepared for	:	RF Code, Inc.
Address	:	9229 Waterford Centre Blvd, Suite 500, Austin, TX 78758 USA
Prepared by	:	Shenzhen LCS Compliance Testing Laboratory Ltd.
Address	:	1/F., Xingyuan Industrial Park, Tongda Road, Bao'an Avenue, Bao'an District, Shenzhen, Guangdong, China
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Web	:	www.LCS-cert.com
Mail	:	webmaster@LCS-cert.com
Date of receipt of test sample	:	December 31, 2019
Number of tested samples	:	1
Serial number	:	N/A
Date of Test	:	December 31, 2019 ~ January 06, 2020
Date of Report	:	January 08, 2020

FCC/IC TEST REPORT FCC CFR 47 PART 15C(15.231)	
Report Reference No. ..... :	**LCS191227029AEA**
Date of Issue ..... :	January 08, 2020
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 ..... :	**RF Code, Inc.**
Address ..... :	9229 Waterford Centre Blvd, Suite 500, Austin, TX 78758 USA
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. ..... :	**Mobile Asset Tag**
Trade Mark ..... :	RF Code
Test Model..... :	M184
Ratings ..... :	DC 3.0V from CR2016 (x2)
Result ..... :	**Positive**

Compiled by:	**Supervised by:**	**Approved by:**
Jin Wang	Linda He	Gavin Liang
Jin Wang/ File administrators	Linda He/ Technique principal	Gavin Liang/ Manager

FCC/IC TEST REPORT

Test Report No. : LCS191227029AEA	January 08, 2020 Date of issue

Test Mode.....	:	M184
EUT.....	:	Mobile Asset Tag
Applicant.....	**:**	**RF Code, Inc.**
Address.....	:	9229 Waterford Centre Blvd, Suite 500, Austin, TX 78758 USA
Telephone.....	:	/
Fax.....	:	/
Manufacturer.....	**:**	**RF Code, Inc.**
Address.....	:	9229 Waterford Centre Blvd, Suite 500, Austin, TX 78758 USA
Telephone.....	:	/
Fax.....	:	/
Factory.....	**:**	**/**
Address.....	:	/
Telephone.....	:	/
Fax.....	:	/

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	January 08, 2020	Initial Issue	Gavin Liang

TABLE OF CONTENTS

1. GENERAL INFORMATION

1.1. Description of Device (EUT)

EUT	Mobile Asset Tag
Test Model	M184
Power Supply	DC 3.0V from CR2016 (x2)
Hardware Version	Rev 1
Software Version	Rev 1
Transmitter	
Frequency Range	433.92MHz
Channel Number	1
Modulation Type	ASK
Antenna Description	Internal Antenna, -5dBi

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 CanadaRSS-210 for Low Power, License-Exempt Radio Communication Devices. Certification ofthese 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
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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.
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
NVLAP Registration Code is 600167-0

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 Y axis was reported.
A new battery supplied DC 3.0V power to the EUT for testing.

The EUT transmits signal as soon as it is powered on, and recorded the result in this report.

***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 transmit 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	**Description of Test**	**Result**
§15.203	Antenna Requirement	Compliant
§15.205	Restricted Bands Of Operation	Compliant
§15.209	Radiated Emission Limits, General Requirements.	Compliant
§15.231 (e)	Field Strength Of Fundamental And Harmonics	Compliant
§15.231 (c)	20dB Bandwidth	Compliant
§15. 231(e)	Duration of each Transmission and the silent period	Compliant
§15.231	Duty cycle Factor	Compliant
§15.207	Conducted Emissions	N/A

5. TEST ITEMS AND RESULTS

5.1. Duration of each Transmission and the silent period

FCC 15.231 (e)

5.1.1. Limit

devices operated under the provisions of this paragraph shall be provided with a means for automatically limiting operation so that the duration of each transmission shall not be greater than one second and the silent period between transmissions shall be at least 30 times the duration of the transmission but in no case less than 10 seconds.

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.

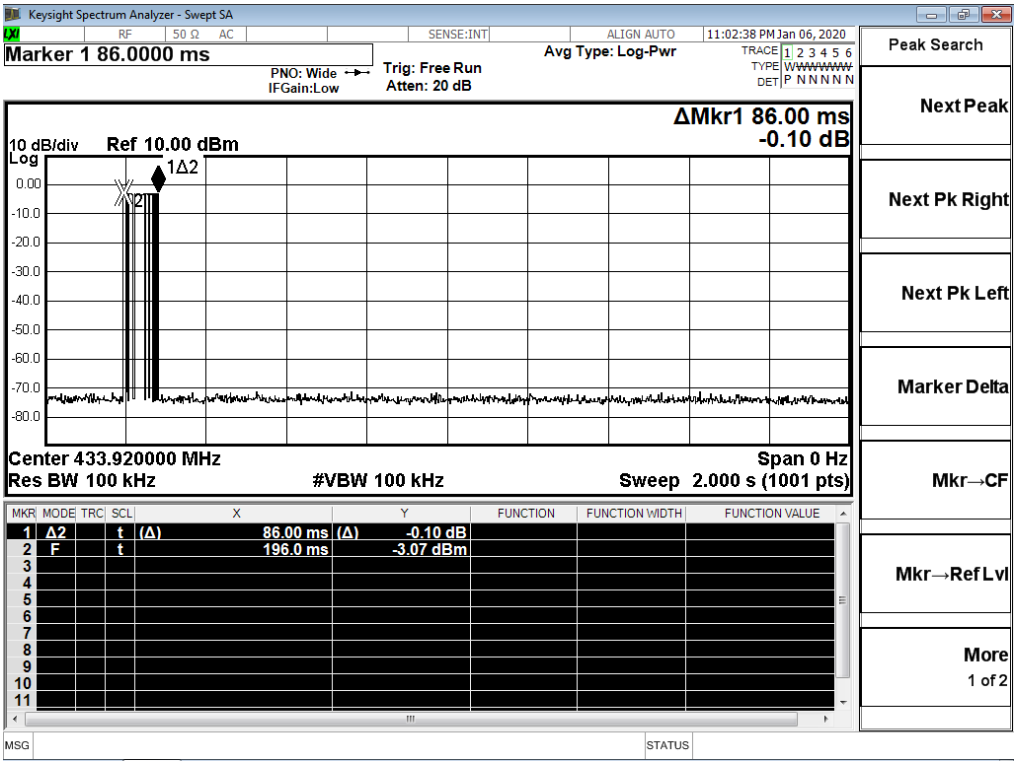
5.1.3. Test Results

Temperature	23.2℃	Humidity	53.2%
Test Engineer	David Luo		

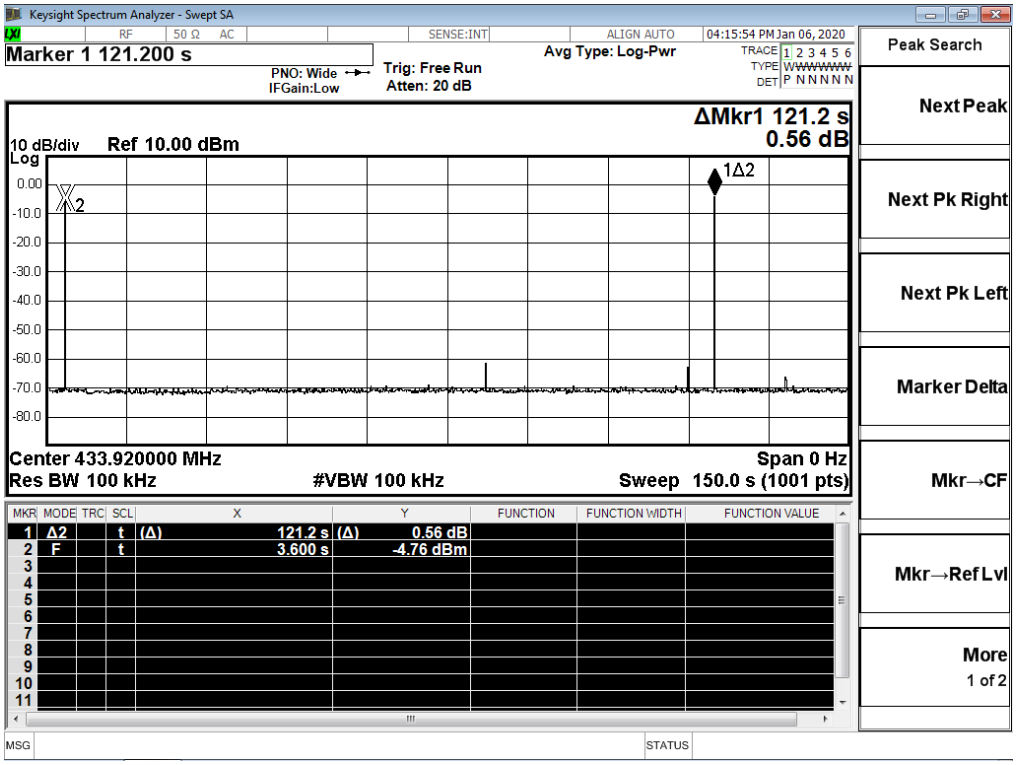
Frequency (MHz)	Duration of each Transmission Time (s)	Limit (s)	Conclusion
433.92	0.086	≤ 1	PASS

Frequency (MHz)	the silent period (s)	Limit 30 times the duration of the transmission(s)	Limit (s)	Conclusion
433.92	121.2	≥2.58	≥10	PASS

Each Transmission Time



Silent period



5.2. Transmitter Field Strength of Emissions

5.2.1. Limit

FCC §15.231 (e) /15.209

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	1,000	100
70-130	500	50
130-174	500 to 1,500	50 to 150
174-260	1,500	150
260-470	1,500 to 5,000	150 to 500
Above 470	5,000	500

[Where F is the frequency in MHz, the formulas for calculating the maximum permitted fundamental field strengths are as follows: for the band 260-470 MHz, μV/m at 3 meters = 16.66667(F) - 2833.333. 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) **Sequence of testing 9 kHz to 30 MHz**

Setup:

--- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.

--- If the EUT is a tabletop system, a rotatable table with 0.8 m height is used.

--- If the EUT is a floor standing device, it is placed on the ground.

--- Auxiliary equipment and cables were positioned to simulate normal operation conditions.

--- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.

--- The measurement distance is 3 meter.

--- The EUT was set into operation.

Premeasurement:

--- The turntable rotates from 0° to 315° using 45° steps.

--- The antenna height is 1.5 meter.

--- At each turntable position the analyzer sweeps with peak detection to find the maximum of all emissions

Final measurement:

--- Identified emissions during the premeasurement the software maximizes by rotating the turntable position (0° to 360°) and by rotating the elevation axes (0° to 360°).

--- The final measurement will be done in the position (turntable and elevation) causing the highest emissions with QPK detector.

--- The final levels, frequency, measuring time, bandwidth, turntable position, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement and the limit will be stored.

2) **Sequence of testing 30 MHz to 1 GHz**

Setup:

--- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.

--- If the EUT is a tabletop system, a table with 0.8 m height is used, which is placed on the ground plane.

--- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.

--- Auxiliary equipment and cables were positioned to simulate normal operation conditions

--- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.

--- The measurement distance is 3 meter.

--- The EUT was set into operation.

Premeasurement:

--- The turntable rotates from 0° to 315° using 45° steps.

--- The antenna is polarized vertical and horizontal.

--- The antenna height changes from 1 to 3 meter.

--- At each turntable position, antenna polarization and height the analyzer sweeps three times in peak to find the maximum of all emissions.

Final measurement:

--- The final measurement will be performed with minimum the six highest peaks.

--- According to the maximum antenna and turntable positions of premeasurement the software maximize the peaks by changing turntable position (± 45°) and antenna movement between 1 and 4 meter.

--- The final measurement will be done with QP detector with an EMI receiver.

--- The final levels, frequency, measuring time, bandwidth, antenna height, antenna polarization, turntable angle, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement with marked maximum final measurements and the limit will be stored.

3) **Sequence of testing 1 GHz to 12.75 GHz**

Setup:

--- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.

--- If the EUT is a tabletop system, a rotatable table with 1.5 m height is used.

--- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.

--- Auxiliary equipment and cables were positioned to simulate normal operation conditions

--- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.

--- The measurement distance is 3 meter.

--- The EUT was set into operation.

Premeasurement:

--- The turntable rotates from 0° to 315° using 45° steps.

--- The antenna is polarized vertical and horizontal.

--- The antenna height is 1.5 meter.

--- At each turntable position and antenna polarization the analyzer sweeps with peak detection to find the maximum of all emissions.

Final measurement:

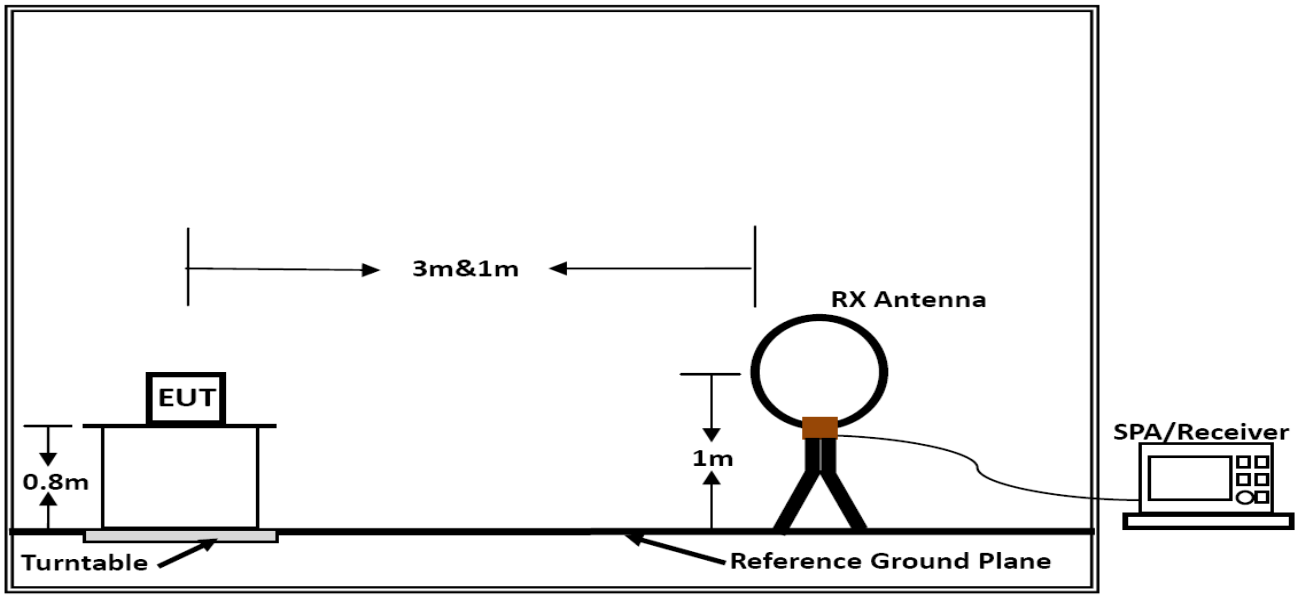
--- The final measurement will be performed with minimum the six highest peaks.

--- According to the maximum found antenna polarisation and turntable position of the premeasurement the software maximizes the peaks by rotating the turntable position (0° to 360°). This measurement is repeated for different EUT-table positions (0° to 150° in 30°-steps). This procedure is repeated for both antenna polarisations.

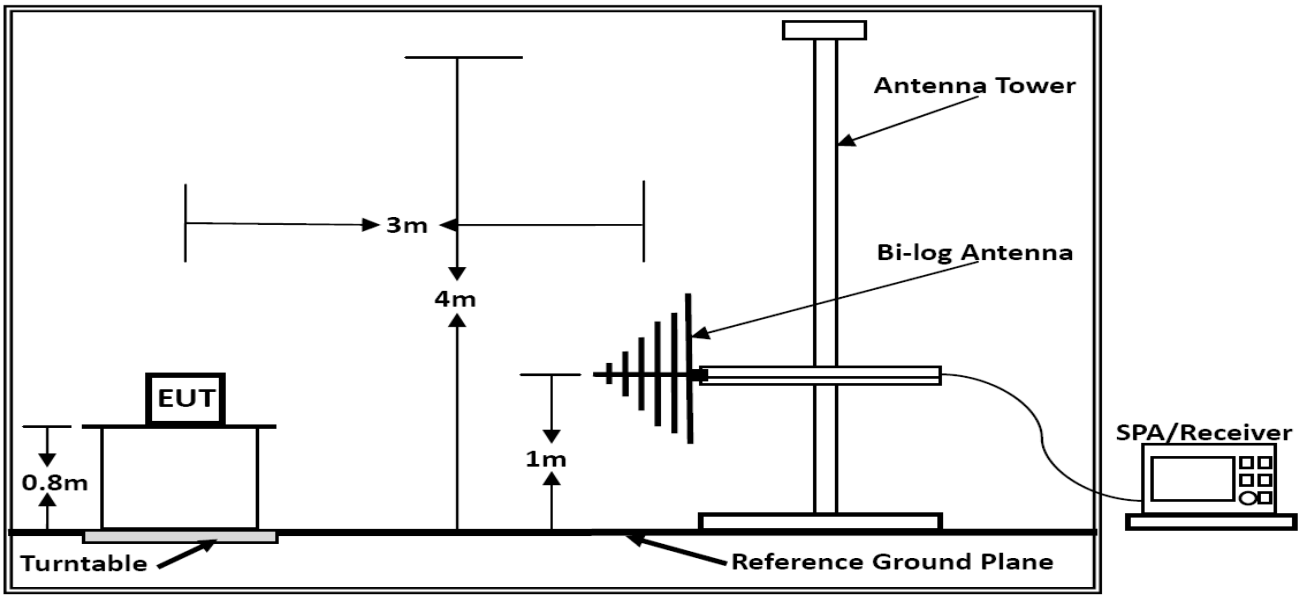
--- The final measurement will be done in the position (turntable, EUT-table and antenna polarization) causing the highest emissions with Peak and RMS detector.

--- The final levels, frequency, measuring time, bandwidth, turntable position, EUT-table position, antenna polarization, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement with marked maximum final measurements and the limit will be stored.

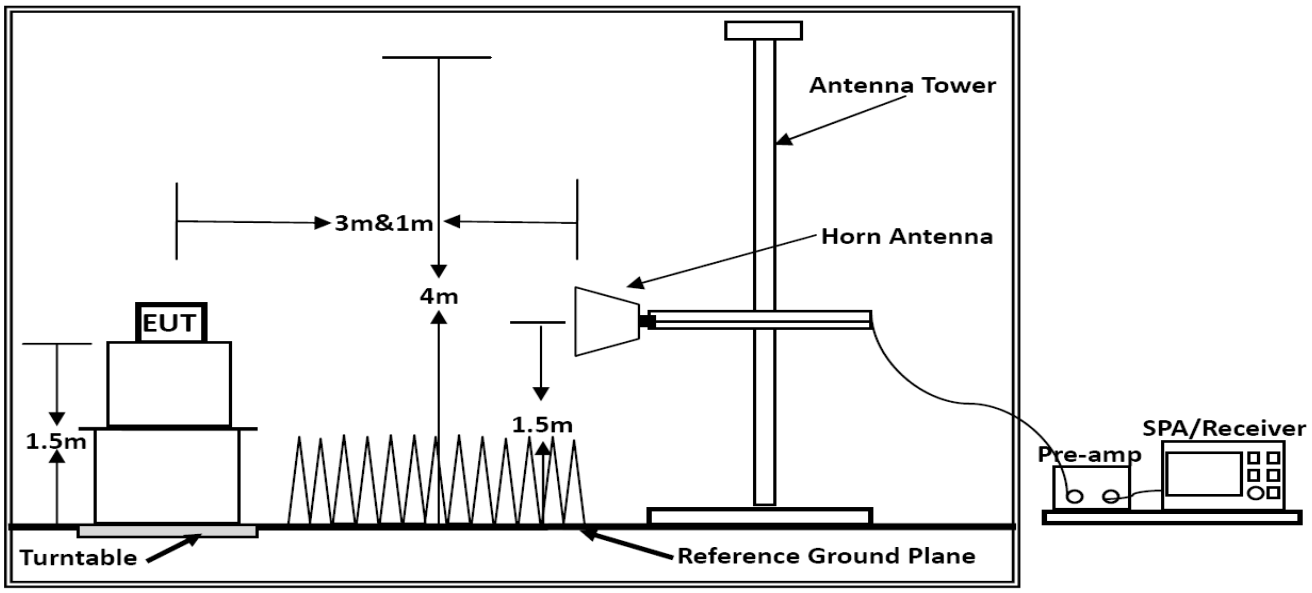
5.2.4. Test Setup Layout



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)

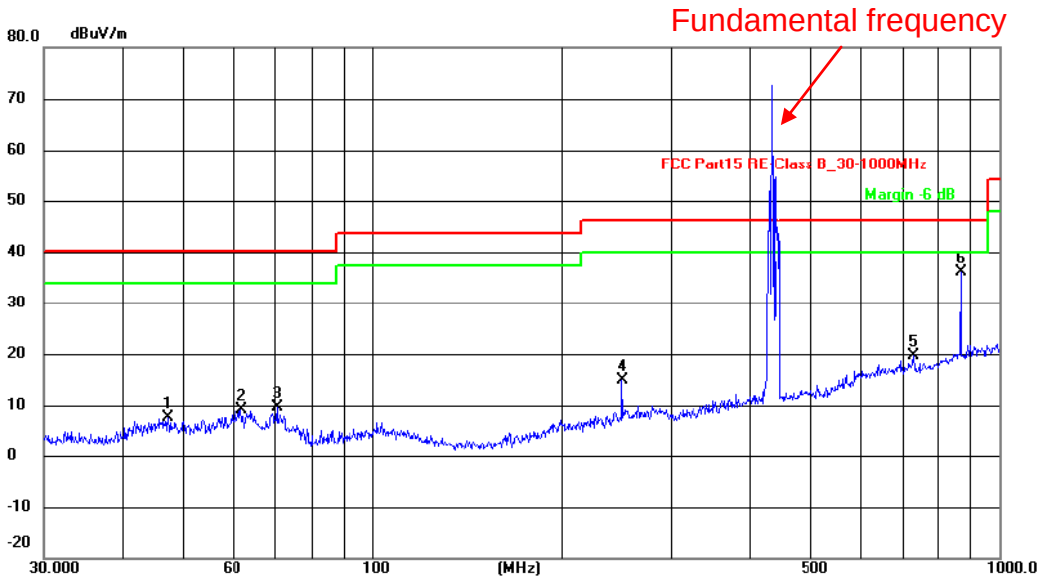
The low frequency, which started from 9KHz to 30MHz, was pre-scan and the result was 20dB lower than the limit line per 15.31(o) was not reported.

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)

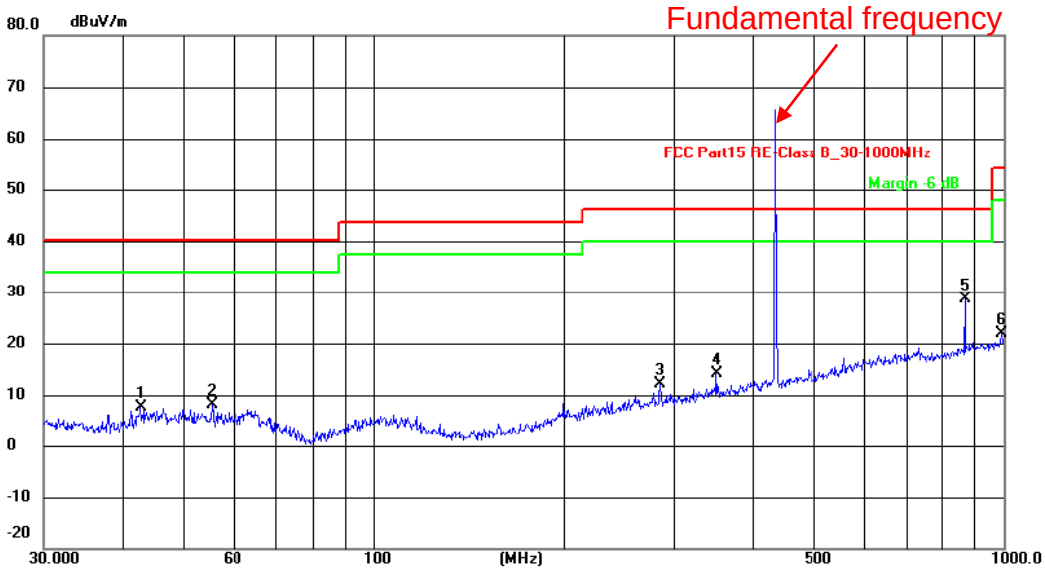
Temperature	24.3℃	Humidity	53.1%
Test Engineer	David Luo	Pol	Horizontal
Test Mode	Tx		



Site 966 chamber #1 Polarization: *Horizontal* Temperature: 24.3 (C)
Limit: FCC Part15 RE-Class B_30-1000MHz Power: DC 3.0V Humidity: 53.1 %RH

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	47.3255	24.08	-16.42	7.66	40.00	-32.34	QP
2	61.7781	27.54	-18.42	9.12	40.00	-30.88	QP
3	70.5836	30.14	-20.58	9.56	40.00	-30.44	QP
4	250.3012	31.58	-16.69	14.89	46.00	-31.11	QP
5	729.3582	27.48	-7.95	19.53	46.00	-26.47	QP
6	869.1300	42.20	-6.18	36.02	46.00	-9.98	QP

Temperature	24.3℃	Humidity	53.1%
Test Engineer	David Luo	Pol	Vertical
Test Mode	Tx		



Site 966 chamber #1
Limit: FCC Part15 RE-Class B_30-1000MHz
Polarization: *Vertical*
Power: DC 3.0V
Temperature: 24.3 (C)
Humidity: 53.1 %RH

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	42.7496	24.42	-16.89	7.53	40.00	-32.47	QP
2	55.4147	25.28	-17.25	8.03	40.00	-31.97	QP
3	284.9767	28.21	-15.98	12.23	46.00	-33.77	QP
4	350.4768	28.46	-14.40	14.06	46.00	-31.94	QP
5	869.1302	34.76	-6.18	28.58	46.00	-17.42	QP
6	993.0113	26.97	-5.21	21.76	54.00	-32.24	QP

Fundamental Peak Result							
Polarization	Frequency (MHz)	Reading Level (dBμV/m)	Factor (dB /m)	Peak Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	result
H	433.92	86.52	-12.67	73.85	92.85	-19.0	PASS
V	433.92	78.22	-12.67	65.55	92.85	-27.3	PASS

Fundamental Average Result							
Polarization	Frequency (MHz)	Peak Level (dBμV/m)	AV Factor (dB /m)	Average Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	result
H	433.92	73.85	-45.68	28.17	72.85	-44.68	PASS
V	433.92	65.55	-45.68	19.87	72.85	-16.83	PASS

Harmonics Result							
Polarization	Frequency (MHz)	QP Reading level (dBμV/m)	Factor (dB /m)	QP Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	result
H	867.84	42.20	-6.18	36.02	52.85	-16.83	PASS
V	867.84	34.76	-6.18	28.58	52.85	-24.27	PASS

Note: AV Factor is based on section 5.4.

5.2.8. Results of Radiated Emissions (1-5GHz)

Temperature	23.2℃	Humidity	53.2%
Test Engineer	David Luo	Test Mode	Tx

Peak Value:

Frequency (MHz)	Reading Level (dBuV/m)	Factor (dB/m)	Peak value (dBuV/m)	Limit (dBuV/m)	Margin (dBuV/m)	Polarization
1301.76	40.27	5.30	45.57	74	-28.43	Horizontal
1735.68	33.16	4.68	37.84	74	-36.16	Horizontal
2169.60	38.80	2.48	41.28	74	-32.72	Horizontal
1301.76	39.59	5.30	44.89	74	-29.11	Vertical
1735.68	31.25	4.68	35.93	74	-38.07	Vertical
2169.60	38.43	2.48	40.91	74	-33.09	Vertical

Average Value:

Frequency (MHz)	Reading Level (dBuV/m)	Duty cycle factor	Average value (dBuV/m)	Limit (dBuV/m)	Margin (dBuV/m)	Polarization
1301.76	45.57	-45.68	-0.11	54	-54.11	Horizontal
1735.68	37.84	-45.68	-7.84	54	-61.84	Horizontal
2169.60	41.28	-45.68	-4.40	54	-58.40	Horizontal
1301.76	44.89	-45.68	-0.79	54	-54.79	Vertical
1735.68	35.93	-45.68	-9.75	54	-63.75	Vertical
2169.60	40.91	-45.68	-4.77	54	-58.77	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)

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.

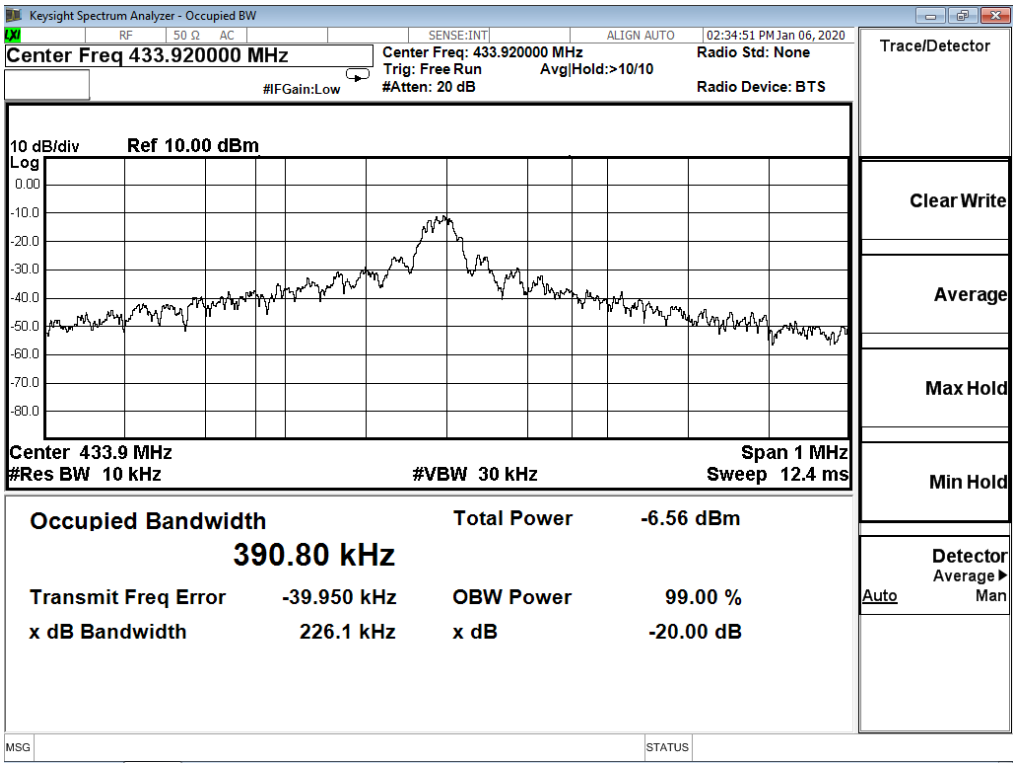
5.3.2. Test Procedure

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	23.2℃	Humidity	53.2%
Test Engineer	David Luo	Test Mode	Tx

Transmit Frequency (MHz)	Limit (kHz)	20dB Bandwidth (kHz)	Result
433.92	1084.8	226.1	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		



5.4. Duty cycle

5.4.1. Limit

No dedicated limit specified in the Rules.

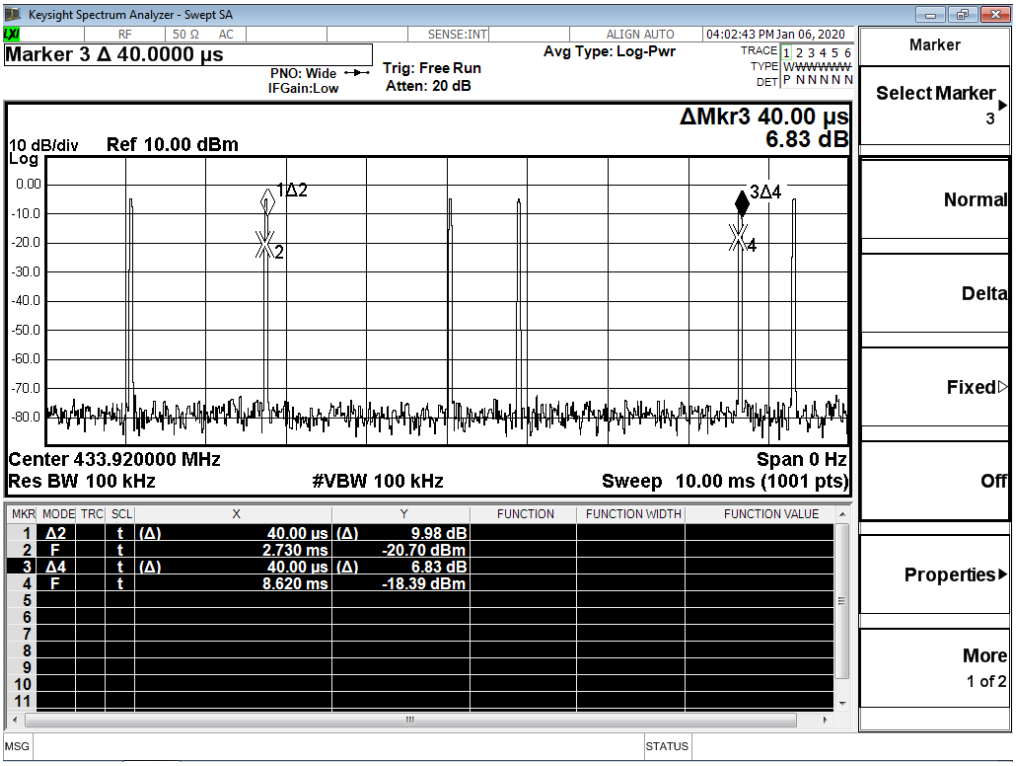
5.4.2. Test Procedure

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.

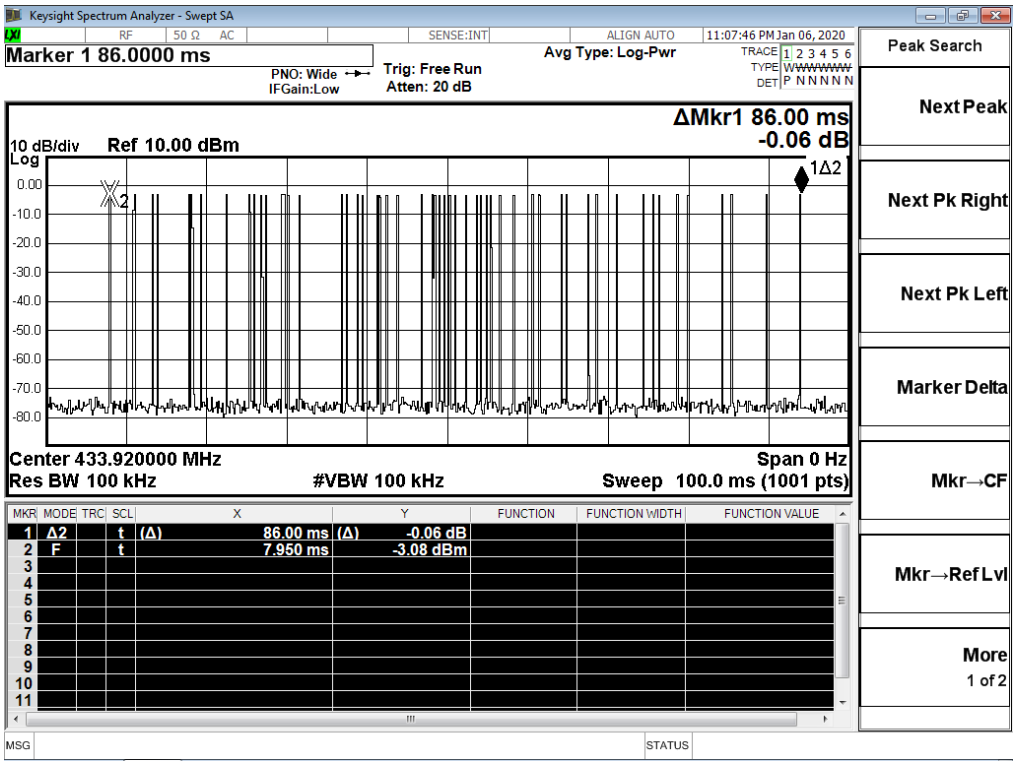
5.4.3. Test Data

Ton = 0.04*13 (ms)=0.52(ms)
Tp = 100(ms)
The duty cycle=0.52/100=0.0052
Average Correction Factory = 20log (duty cycle) =20*log 0.0052 = -45.68dB

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



Pulse width (0.04ms)



Numbers of pulse during 100ms(13)

5.5. Antenna Requirement

FCC 15.203

5.5.1. Standard Applicable

According to § 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. 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.

5.5.2. Result

Compliant.

The antenna is internal antenna which is permanently attached to the PCB and no consideration of replacement. Please see EUT photo for details.

6. LIST OF MEASURING EQUIPMENTS

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	Power Meter	R&S	NRVS	100444	2019-06-11	2020-06-10
2	Power Sensor	R&S	NRV-Z81	100458	2019-06-11	2020-06-10
3	Power Sensor	R&S	NRV-Z32	10057	2019-06-11	2020-06-10
4	ESG Vector Signal Generator	Agilent	E4438C	MY49072627	2019-06-11	2020-06-10
5	MXA Signal Analyzer	Agilent	N9020A	MY50510140	2019-11-22	2020-11-21
6	DC Power Supply	Agilent	E3642A	N/A	2019-11-14	2020-11-13
7	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
8	3m Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	2019-06-12	2020-06-11
9	Positioning Controller	MF	MF-7082	N/A	2019-06-12	2020-06-11
10	Active Loop Antenna	SCHWARZBECK	FMZB 1519B	00005	2018-07-26	2021-07-25
11	By-log Antenna	SCHWARZBECK	VULB9163	9163-470	2018-07-26	2021-07-25
12	Horn Antenna	SCHWARZBECK	BBHA 9120D	9120D-1925	2018-07-02	2021-07-01
13	Broadband Horn Antenna	SCHWARZBECK	BBHA 9170	791	2017-09-21	2020-09-20
14	Broadband Preamplifier	SCHWARZBECK	BBV 9719	9719-025	2019-09-19	2020-09-20
15	EMI Test Receiver	R&S	ESR 7	101181	2019-06-12	2020-06-11
16	RS SPECTRUM ANALYZER	R&S	FSP40	100503	2019-11-14	2020-11-13
17	Broadband Preamplifier	/	BP-01M18G	P190501	2019-07-01	2020-06-30
18	RF Cable-R03m	Jye Bao	RG142	CB021	2019-06-12	2020-06-11
19	RF Cable-HIGH	SUHNER	SUCOFLEX 106	03CH03-HY	2019-06-12	2020-06-11
20	6dB Attenuator	/	100W/6dB	1172040	2019-06-11	2020-06-10
21	3dB Attenuator	/	2N-3dB	/	2019-06-11	2020-06-10
22	EMI Test Receiver	R&S	ESPI	101840	2019-06-11	2020-06-10
23	Artificial Mains	R&S	ENV216	101288	2019-06-12	2020-06-11
24	10dB Attenuator	SCHWARZBECK	MTS-IMP-136	261115-001-0032	2019-06-11	2020-06-10
25	Combiner	eastsheep	SHWLPD2-52 500S	/	2019-11-22	2020-11-21
26	Audio Analyzer	R&S	UPV	1146.2003K02-10 1721-UW	2019-11-26	2020-11-25
Note: All equipment is calibrated through GUANGZHOU LISAI CALIBRATION AND TEST CO.,LTD.						

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