FCC TEST REPORT

FOR

Metratec GmbH

PLRM

Test Model: PLRM

Prepared for	:	Metratec GmbH
Address	:	Niels-Bohr- Str. 5, 39106 Magdeburg, Germany
Prepared by	:	Shenzhen LCS Compliance Testing Laboratory Ltd. 101, 201 Bldg A & 301 Bldg C, Juji Industrial Park
Address	:	Yabianxueziwei, Shajing Street, Baoan District, Shenzhen, 518000, China
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Date of receipt of test sample	:	March 12, 2025
Number of tested samples	:	2
Sample No.	:	A250310163-1, A250310163-2
Serial number	:	Prototype
Date of Test	:	March 12, 2025 ~ June 04, 2025
Date of Report	:	June 05, 2025

FCC TEST REPORT

FCC CFR 47 PART 15 C (15.247)

Report Reference No.	**:**	**LCSA03125011EA**
Date of Issue.....	:	June 05, 2025
Testing Laboratory Name	**:**	**Shenzhen LCS Compliance Testing Laboratory Ltd.**
Address.....	:	101, 201 Bldg A & 301 Bldg C, Juji Industrial Park Yabianxueziwei, Shajing Street, Baoan District, Shenzhen, 518000, China
Testing Location/ Procedure	:	Full application of Harmonised standards ■ Partial application of Harmonised standards □ Other standard testing method □
Applicant's Name	**:**	**Metratec GmbH**
Address.....	:	Niels-Bohr- Str. 5, 39106 Magdeburg, Germany
Test Specification		
Standard	:	FCC CFR 47 PART 15 C (15.247)
Test Report Form No.....	:	TRF-4-E-208 A/0
TRF Originator.....	:	Shenzhen LCS Compliance Testing Laboratory Ltd.
Master TRF.....	:	Dated 2011-03

Test Item Description.	**:**	**PLRM**
Trade Mark	:	Metratec
Test Model.....	:	PLRM
Ratings.....	:	Input: 5.0V⎓3.0A For AC Adapter Input: 100-240V~, 50-60Hz, 1.0A MAX Adapter Output: 5.0V⎓3.0A, MAX 15.0W
**Result ..... **	**:**	**PASS**

Compiled by:	**Supervised by:**	**Approved by:**
Vera Deng/ Administrator	Jack Liu/ Technique principal	Gavin Liang/ Manager

FCC -- TEST REPORT

Test Report No. : LCSA03125011EA	June 05, 2025 Date of issue

Test Model.....	: PLRM
EUT.....	: PLRM
Applicant.....	**: Metratec GmbH**
Address.....	: Niels-Bohr- Str. 5, 39106 Magdeburg, Germany
Telephone.....	: /
Fax.....	: /
Manufacturer.....	**: Metratec GmbH**
Address.....	: Niels-Bohr- Str. 5, 39106 Magdeburg, Germany
Telephone.....	: /
Fax.....	: /
Factory.....	**: Metratec GmbH**
Address.....	: Niels-Bohr- Str. 5, 39106 Magdeburg, Germany
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

Report Version	Issue Date	Revision Content	Revised By
000	June 05, 2025	Initial Issue	---

TABLE OF CONTENTS

1. GENERAL INFORMATION

1.1 Description of Device (EUT)

EUT	:	PLRM
Test Model	:	PLRM
Ratings	:	Input: 5.0V⎓3.0A For AC Adapter Input: 100-240V~, 50-60Hz, 1.0A MAX Adapter Output: 5.0V⎓3.0A, MAX 15.0W
Hardware Version	:	PLRM_0106
Software Version	:	0106
Frequency Range	:	902MHz~928MHz
Channel Number	:	50 channels
Channel Spacing	:	500kHz
Modulation Type	:	ASK
Antenna Description	:	External Antenna, 3.5dBi(Max.)

Note: Default antenna port is ANT1. All antenna ports behave identically. Only one antenna port can be active at a time.

1.2 Support equipment List

Manufacturer	Description	Model	Serial Number	Certificate
---	SWITCHING ADAPTER	SYS1308N-1505-W2E	--	FCC

1.3 External I/O Cable

I/O Port Description	Quantity	Cable
Power Port	1	N/A

1.4 Description of Test Facility

NVLAP Accreditation Code is 600167-0.
FCC Designation Number is CN5024.
CAB identifier is CN0071.
CNAS Registration Number is L4595.
Test Firm Registration Number: 254912.

The 3m-Semi anechoic test site fulfils CISPR 16-1-4 according to ANSI C63.10:2013 and CISPR 16-1-4:2010 SVSWR requirement for radiated emission above 1GHz.

1.5 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 LCS 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.

1.6 Measurement Uncertainty

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)
		26.5GHz~40GHz	±3.90dB	(1)
Conduction Uncertainty	:	150kHz~30MHz	±1.63dB	(1)
Power disturbance	:	30MHz~300MHz	±1.60dB	(1)
Output power	:	1GHz-40GHz	±0.57dB	(1)
Occupied Channel Bandwidth	:	1GHz-40GHz	±5%	(1)
Conducted RF Spurious Emission	:	9kHz-40GHz	±1.80dB	(1)
Emissions in Restricted Bands	:	1GHz-40GHz	±2.47dB	(1)

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

1.7 Description of Test Modes

The EUT has been tested under operating condition.

This test was performed with EUT in X, Y, Z position and the worst case was found when EUT in X position.

All test modes were tested, only the result of the worst case was recorded in the report.

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

Operation Frequency each of channel							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	902.750	14	909.250	27	915.750	40	922.250
2	903.250	15	909.750	28	916.250	41	922.750
3	903.750	16	910.250	29	916.750	42	923.250
4	904.250	17	910.750	30	917.250	43	923.750
5	904.750	18	911.250	31	917.750	44	924.250
6	905.250	19	911.750	32	918.250	45	924.750
7	905.750	20	912.250	33	918.750	46	925.250
8	906.250	21	912.750	34	919.250	47	925.750
9	906.750	22	913.250	35	919.750	48	926.250
10	907.250	23	913.750	36	920.250	49	926.750
11	907.750	24	914.250	37	920.750	50	927.250
12	908.250	25	914.750	38	921.250	---	---
13	908.750	26	915.250	39	921.750	---	---
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:

Mode of Operations	Channel	Frequency Range (MHz)
ASK	1	902.750
	25	914.750
	50	927.250

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10-2013, FCC CFR PART 15C 15.207, 15.209 and 15.247.

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 for Hopping Numbers and Dwell Time test and a continuous transmits mode for other tests.

According to its specifications, the EUT must comply with the requirements of the Section 15.207, 15.209, 15.247 under the FCC Rules Part 15 Subpart C.

2.3 General Test Procedures

2.3.1 Conducted Emissions

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 6.1.1 of ANSI C63.10-2013 Conducted emissions from the EUT 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, which is 0.8 m above ground plane below 1GHz and 1.5 m above ground plane above 1GHz. 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 6.4 of ANSI C63.10-2013

2.4. Test Sample

The application provides 2 samples to meet requirement;

Sample Number	Description
Sample 1(A250310163-1)	Engineer sample – continuous transmit
Sample 2(A250310163-2)	Normal sample – Intermittent transmit

3. SYSTEM TEST CONFIGURATION

3.1 Justification

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

3.2 EUT Exercise Software

The system was configured for testing in a continuous transmits condition and change test channels by software provided by application. Power setting Default.

3.3 Special Accessories

Manufacturer	Description	Model	Serial Number	Certificate
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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	Test Sample	Result	Remark
§15.247(a)(1)	20dB Bandwidth	Sample 1	Compliant	Appendix A.1
§15.247(b)(2)	Maximum Peak Conducted Output Power	Sample 1	Compliant	Appendix A.2
§15.247(a)(1)	Frequency Separation	Sample 1	Compliant	Appendix A.3
§15.247(a)(1)	Time Of Occupancy (Dwell Time)	Sample 1	Compliant	Appendix A.4
§15.247(a)(1)	Number Of Hopping Frequency	Sample 1	Compliant	Appendix A.5
§15.209(a)	Radiated Spurious Emissions	Sample 1 Sample 2	Compliant	Note 1
§15.247(d)	Band Edges Measurements and Conducted Spurious Emissions	Sample 1	Compliant	Appendix A.6 Appendix A.7
/	On Time and Duty Cycle	Sample 1	/	Only reported; Appendix A.8
§15.205	Emissions at Restricted Band	Sample 2	Compliant	Note 1
§15.207(a)	AC Mains Conducted Emissions	Sample 2	Compliant	Note 1
§15.203	Antenna Requirements	Sample 1	Compliant	Note 1
§15.247(i)§1.1310 §15.247(i)§2.1091	RF Exposure	N/A	Compliant	Note 2

Remark:
1. Note 1 – Test results inside test report;
2. Note 2 – Test results in other test report (RF Exposure Evaluation);
3. N/A - Not Applicable!!!

5. SUMMARY OF TEST EQUIPMENT

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	MXA Signal Analyzer	Agilent	N9020A	MY49100060	2024-10-08	2025-10-07
2	DC Power Supply	Agilent	E3642A	N/A	2024-10-08	2025-10-07
3	Temperature & Humidity Chamber	Baro	/	/	2024-06-12	2025-06-11
4	EMI Test Software	AUDIX	E3	/	N/A	N/A
5	3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	2024-06-06	2025-06-05
6	Positioning Controller	Max-Full	MF7802BS	MF780208586	N/A	N/A
7	Active Loop Antenna	SCHWARZBECK	FMZB 1519B	00005	2024-07-13	2027-07-12
8	By-log Antenna	SCHWARZBECK	VULB9163	9163-470	2024-08-03	2027-08-02
9	Horn Antenna	SCHWARZBECK	BBHA 9120D	9120D-1925	2024-07-13	2027-07-12
10	EMI Test Receiver	R&S	ESR 7	101181	2024-06-06	2025-06-05
11	RS SPECTRUM ANALYZER	R&S	FSP40	100503	2024-06-06	2025-06-05
12	Low-frequency amplifier	SchwarzZBECK	BBV9745	00253	2024-10-08	2025-10-07
13	High-frequency amplifier	JS Denki Pte	PA0118-43	JSPA21009	2024-10-08	2025-10-07
14	EMI Test Receiver	R&S	ESPI	101940	2024-06-06	2025-06-05
15	Artificial Mains	R&S	ENV216	101288	2024-06-06	2025-06-05
16	10dB Attenuator	SCHWARZBECK	MTS-IMP-136	261115-001-0032	2024-06-06	2025-06-05
17	EMI Test Software	Farad	EZ	/	N/A	N/A
18	Antenna Mast	Max-Full	MFA-515BSN	1308572	N/A	N/A
19	Pulse Limiter	R&S	ESH3-Z2	102750-NB	2024-06-06	2025-06-05
20	Broadband Horn Antenna	SCHWARZBECK	BBHA 9170	791	2024-07-13	2027-07-12
21	Broadband Preamplifier	SCHWARZBECK	BBV9719	9719-025	2024-07-30	2025-07-29

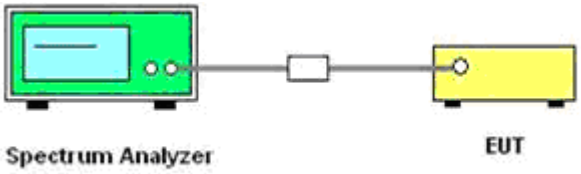
6. MEASUREMENT RESULTS

6.1. Frequency Separation and 20 dB Bandwidth

6.1.1 Limit

According to §15.247(a), Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

6.1.2 Block Diagram of Test Setu



6.1.3 Test Procedure

Frequency separation test procedure：

1). Place the EUT on the table and set it in transmitting mode.
2). Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the Spectrum Analyzer.
3). Set center frequency of Spectrum Analyzer = middle of hopping channel.
4). Set the Spectrum Analyzer as RBW = 100 kHz, VBW = 300 kHz, Span = wide enough to capture the peaks of two adjacent channels, Sweep = auto.
5). Max hold, mark 2 peaks of hopping channel and record the 2 peaks frequency.

20dB bandwidth test procedure：

1). Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hopping channel.
2). RBW ≥1% of the 20 dB bandwidth, VBW ≥RBW.
3). Detector function = peak.
4). Trace = max hold.

6.1.4 Test Results

6.1.4.1 20dB Bandwidth

PASS

Please refer to Appendix A.1

Remark:

1. *Test results including cable loss;*
2. *Measured 20dB Bandwidth at difference Packet Type for each mode and recorded worst case for each mode.*

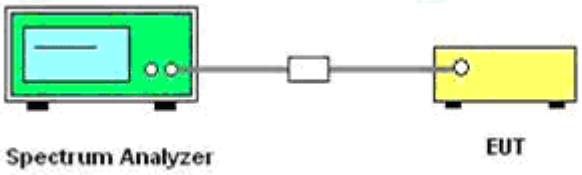
6.1.4.2 Frequency Separation

PASS

Please refer to Appendix A.3

6.2. Peak Power

6.2.1 Block Diagram of Test Setup



6.2.2 Limit

According to §15.247(b)(2), For frequency hopping systems operating in the 902-928 MHz band: 1 watt for systems employing at least 50 hopping channels; and, 0.25 watts for systems employing less than 50 hopping channels, but at least 25 hopping channels, as permitted under paragraph (a)(1)(i) of this section.

6.2.3 Test Procedure

The transmitter output is connected to the spectrum.

6.2.4. Test Procedures

1) Span: Approximately five times the 20 dB bandwidth, centered on a hopping channel.
2) RBW > 20 dB bandwidth of the emission being measured.
3) VBW ≥ RBW.
4) Sweep: Auto.
5) Detector function: Peak.
6) Trace: Max hold.

6.2.5 Test Results

PASS

Please refer to Appendix A.2

Remark:

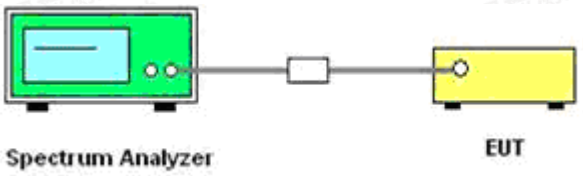
1. *Test results including cable loss;*
2. *Measured output power at difference Packet Type for each mode and recorded worst case for each mode.*

6.3. Time of Occupancy (Dwell Time)

6.3.1 Limit

According to §15.247(a)(1), For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period.

6.3.2 Block Diagram of Test Setup



6.3.3 Test Procedure

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

2). Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the Spectrum Analyzer.

3). Set center frequency of Spectrum Analyzer = operating frequency.

4). Set the Spectrum Analyzer as RBW=1MHz, VBW=3MHz, Span = 0Hz, Sweep = auto.

5). Repeat above procedures until all frequency measured was complete.

6.3.4 Test Results

PASS

Please refer to Appendix A.4

Remark:

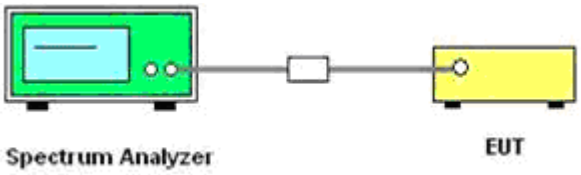
1. Test results including cable loss;
2. Measured at difference Packet Type for each mode and recorded worst case for each mode.

6.4. Number of Hopping Frequency

6.4.1 Limit

According to §15.247(a)(1), For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies.

6.4.2 Block Diagram of Test Setup



6.4.3 Test Procedure

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

2). Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the Spectrum Analyzer.

3). Set Spectrum Analyzer Start=900MHz, Stop = 930MHz, Sweep = auto.

4). Set the Spectrum Analyzer as RBW=100KHz, VBW=300KHz.

5). Max hold, view and count how many channel in the band.

6.4.4 Test Results

PASS

Please refer to Appendix A.5

Remark:

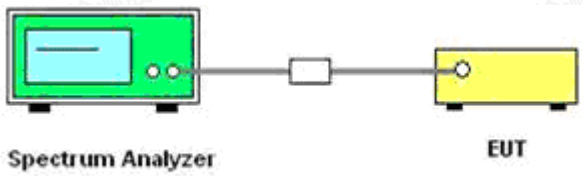
1. Test results including cable loss;
2. Measured number of hopping channels at difference Packet Type for each mode and recorded worst case for each mode.

6.5. Band Edges Measurements and Conducted Spurious Emissions Test

6.5.1 Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required.

6.5.2 Block Diagram of Test Setup



6.5.3 Test Procedure

Conducted RF measurements of the transmitter output were made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 100 KHz. The video bandwidth is set to 300 KHz.

Measurements are made over the 30 MHz to 25GHz range with the transmitter set to the lowest, middle, and highest channels

6.5.4 Test Results of Conducted Spurious Emissions

No non-compliance noted. Only record the worst test result in this report. The test data refer to the following page.

PASS

Please refer to Appendix A.6 for Band Edges Measurements.

Please refer to Appendix A.7 for Conducted Spurious Emission.

Remark:

1. Test results including cable loss;
2. Measured at difference Packet Type for each mode and recorded worst case for each mode.

6.6. Restricted Band Emission Limit

6.6.1. Standard Applicable

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	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293.	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	(\2\)
13.36-13.41			

\1\ Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

\2\ Above 38.6

According to §15.247 (d): 20dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

Frequencies (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

6.6.2. Measuring Instruments and Setting

Please refer to of equipment list in this report. 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 / 1/T kHz for Average
RB / VB (Emission in non-restricted band)	1MHz / 1MHz for Peak, 1 MHz / 1/T kHz for Average

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB/VB 200Hz/1KHz for QP/AVG
Start ~ Stop Frequency	150kHz~30MHz / RB/VB 9kHz/30KHz for QP/AVG
Start ~ Stop Frequency	30MHz~1000MHz / RB/VB 120kHz/1MHz for QP

6.6.3. 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 1.0 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 4 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 18 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 scan range is 1 meter to 4 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 antenna and turntable positions of premeasurement the software maximize the peaks by changing turntable position (± 45°) and antenna movement between 1 and 4 meter. This procedure is repeated for both antenna polarizations.

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

4) Sequence of testing above 18 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 1 meter.

--- The EUT was set into operation.

Premeasurement:

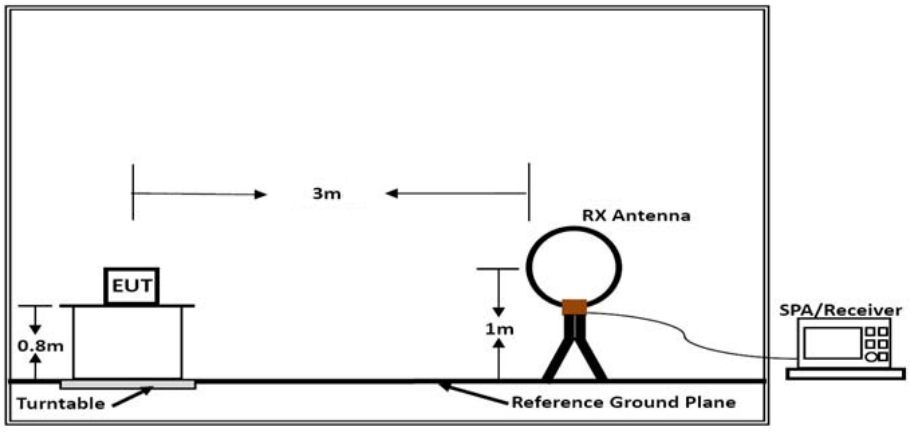
--- The antenna is moved spherical over the EUT in different polarizations of the antenna.

Final measurement:

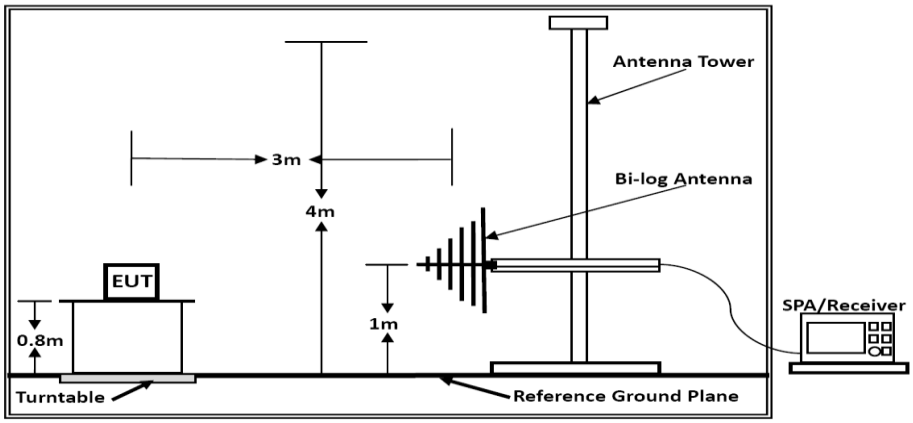
--- The final measurement will be performed at the position and antenna orientation for all detected emissions that were found during the premeasurements with Peak and Average detector.

--- The final levels, frequency, measuring time, bandwidth, 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.

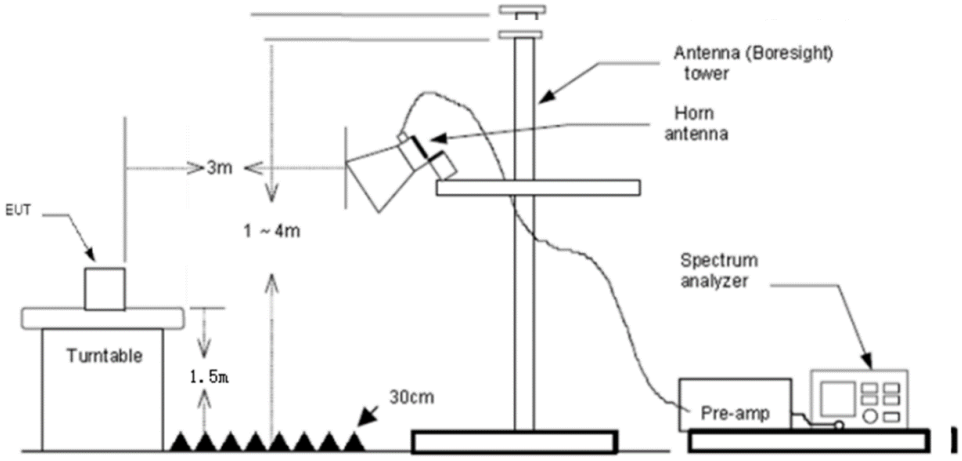
6.6.4. Test Setup Layout



Below 30MHz



Below 1GHz



Above 10 GHz shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade form 3m to 1.5m.

6.6.5. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

6.6.6. Results of Radiated Emissions (9 KHz~30MHz)

Temperature	23.8℃	Humidity	52.1%
Test Engineer	Jay Luo	Configurations	

Freq. (MHz)	Level (dBuV)	Over Limit (dB)	Over Limit (dBuV)	Remark
-	-	-	-	See Note

Note:

The amplitude of spurious emissions which are attenuated by more than 20 dB below the permissible value has no need to be reported.

Distance extrapolation factor = 40 log (specific distance / test distance) (dB);
Limit line = specific limits (dBuV) + distance extrapolation factor.

6.6.7. EUT Operation during Test

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:

FS (dBuV/m) = RA (dBuV) + AF (dB/m) + CL (dB) – AG (dB)

Where FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
RA = Reading Amplitude	AG = Amplifier Gain
AF = Antenna Factor	

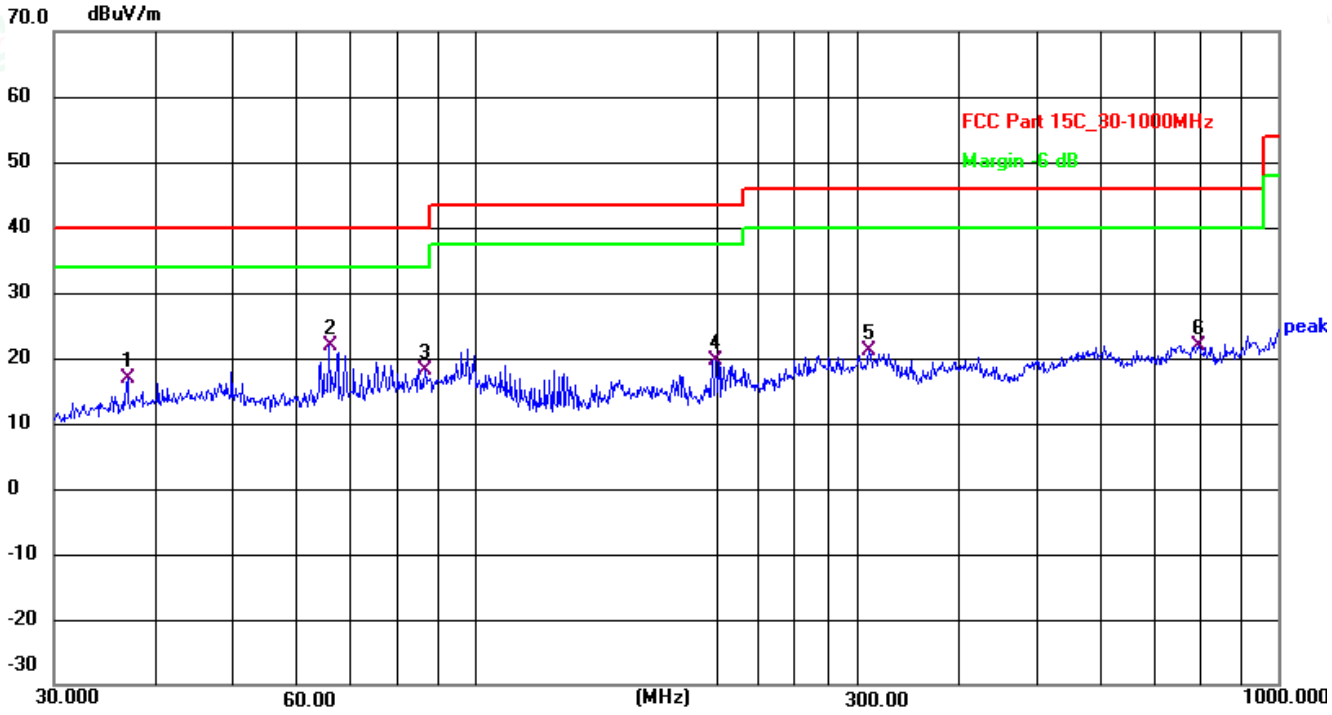
6.6.8. Results of Radiated Emissions (30 MHz~1000 MHz)

Temperature	23.8℃	Humidity	52.1%
Test Engineer	Jay Luo		

PASS.

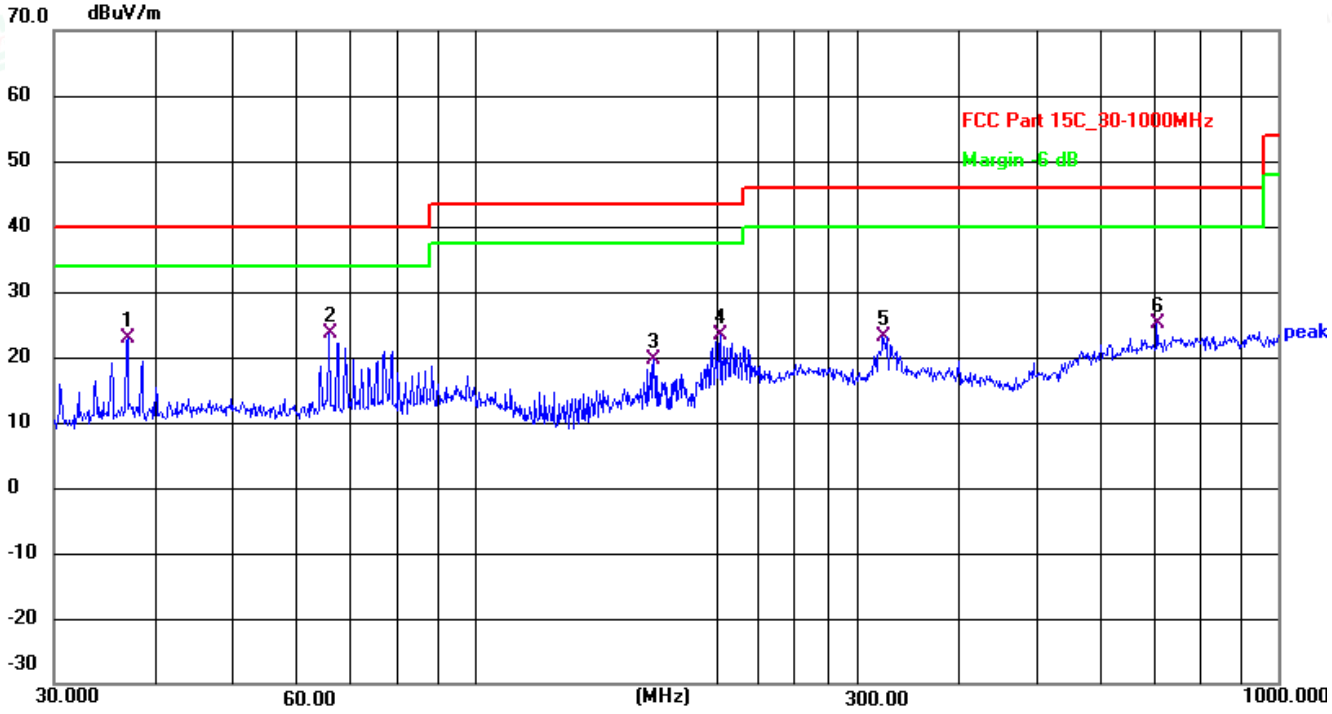
The test data please refer to following page.

Horizontal



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	37.0248	34.26	-17.41	16.85	40.00	-23.15	QP
2	66.0342	39.97	-18.03	21.94	40.00	-18.06	QP
3	86.8067	37.87	-19.71	18.16	40.00	-21.84	QP
4	199.9855	38.18	-18.49	19.69	43.50	-23.81	QP
5	309.9977	36.54	-15.48	21.06	46.00	-24.94	QP
6	796.1829	31.08	-9.11	21.97	46.00	-24.03	QP

Vertical



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	37.0248	40.66	-17.69	22.97	40.00	-17.03	QP
2	66.0342	42.79	-19.22	23.57	40.00	-16.43	QP
3	167.2366	39.12	-19.57	19.55	43.50	-23.95	QP
4	202.8103	40.61	-17.31	23.30	43.50	-20.20	QP
5	322.1885	37.48	-14.35	23.13	46.00	-22.87	QP
6	706.6998	35.97	-10.81	25.16	46.00	-20.84	QP

Note:

1). Pre-scan all modes and recorded the worst case results in this report (1Mbps-High Channel).

2). Emission level (dBuV/m) = 20 log Emission level (uV/m).

3). Level = Reading + Factor, Margin = Level–Limit, Factor = Antenna Factor + Cable Loss - Preamp Factor.

6.6.9. Results of Radiated Emissions (1 GHz~26 GHz)

Note: All the modes have been tested and recorded worst mode in the report.

Channel 1 / 902.750MHz

Freq. MHz	Reading dBuv	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuv/m	Limit dBuv/m	Margin dB	Remark	Pol.
1805.50	53.17	33.06	35.04	3.94	55.13	74.00	-18.87	Peak	Horizontal
1805.50	40.60	33.06	35.04	3.94	42.56	54.00	-11.44	Average	Horizontal
1805.50	54.20	33.06	35.04	3.94	56.16	74.00	-17.84	Peak	Vertical
1805.50	41.69	33.06	35.04	3.94	43.65	54.00	-10.35	Average	Vertical

Channel 25 / 914.750MHz

Freq. MHz	Reading dBuv	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuv/m	Limit dBuv/m	Margin dB	Remark	Pol.
1829.50	57.04	33.16	35.15	3.96	59.01	74.00	-14.99	Peak	Horizontal
1829.50	42.86	33.16	35.15	3.96	44.83	54.00	-9.17	Average	Horizontal
1829.50	57.46	33.16	35.15	3.96	59.43	74.00	-14.57	Peak	Vertical
1829.50	44.52	33.16	35.15	3.96	46.49	54.00	-7.51	Average	Vertical

Channel 50 / 927.250MHz

Freq. MHz	Reading dBuv	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuv/m	Limit dBuv/m	Margin dB	Remark	Pol.
1854.50	56.62	33.26	35.14	3.98	58.72	74.00	-15.28	Peak	Horizontal
1854.50	41.01	33.26	35.14	3.98	43.11	54.00	-10.89	Average	Horizontal
1854.50	57.59	33.26	35.14	3.98	59.69	74.00	-14.31	Peak	Vertical
1854.50	44.79	33.26	35.14	3.98	46.89	54.00	-7.11	Average	Vertical

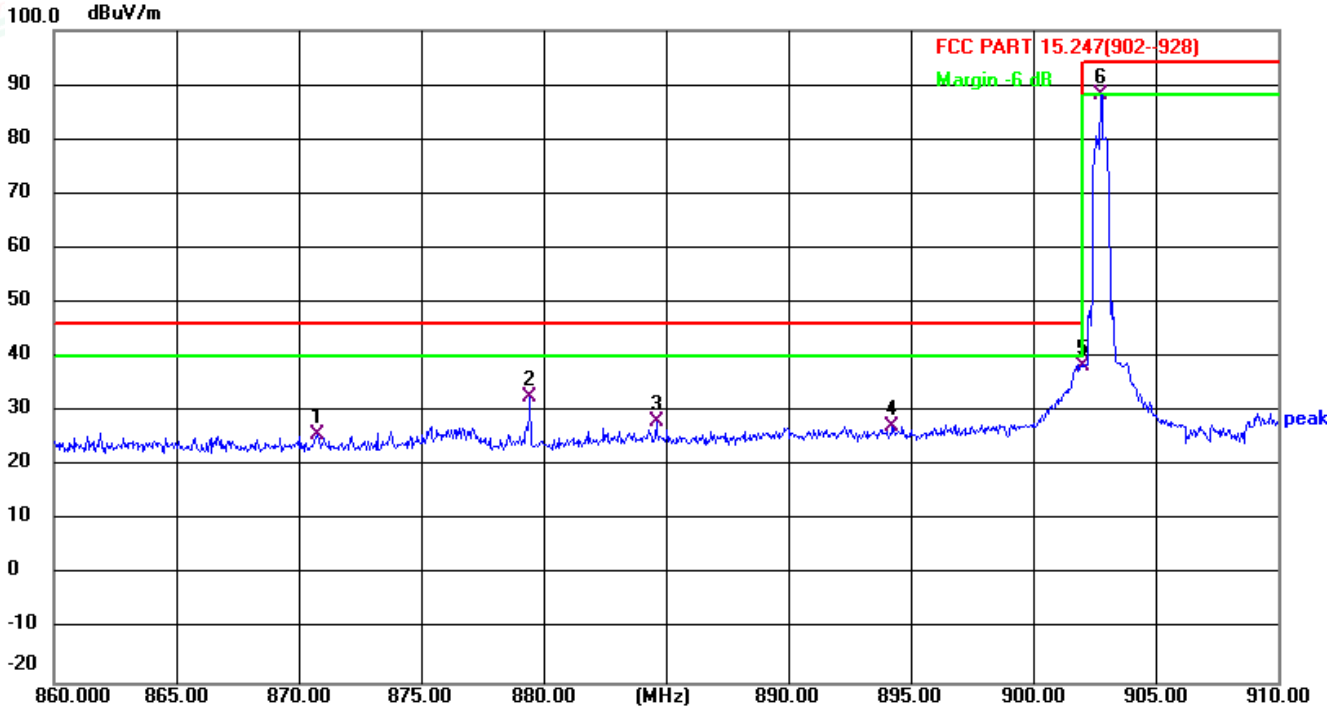
Notes:

1). Measuring frequencies from 9 KHz~10th harmonic or 26.5GHz (which is less), at least have 20dB margin found between lowest internal used/generated frequency to 30MHz.
2). Radiated emissions measured in frequency range from 9 KHz~10th harmonic or 26.5GHz (which is less) 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.
4). Measured Level = Reading Level + Factor, Margin = Measured Level – Limit,
Factor = Antenna Factor + Cable Loss - Preamp Factor

Restricted bands:

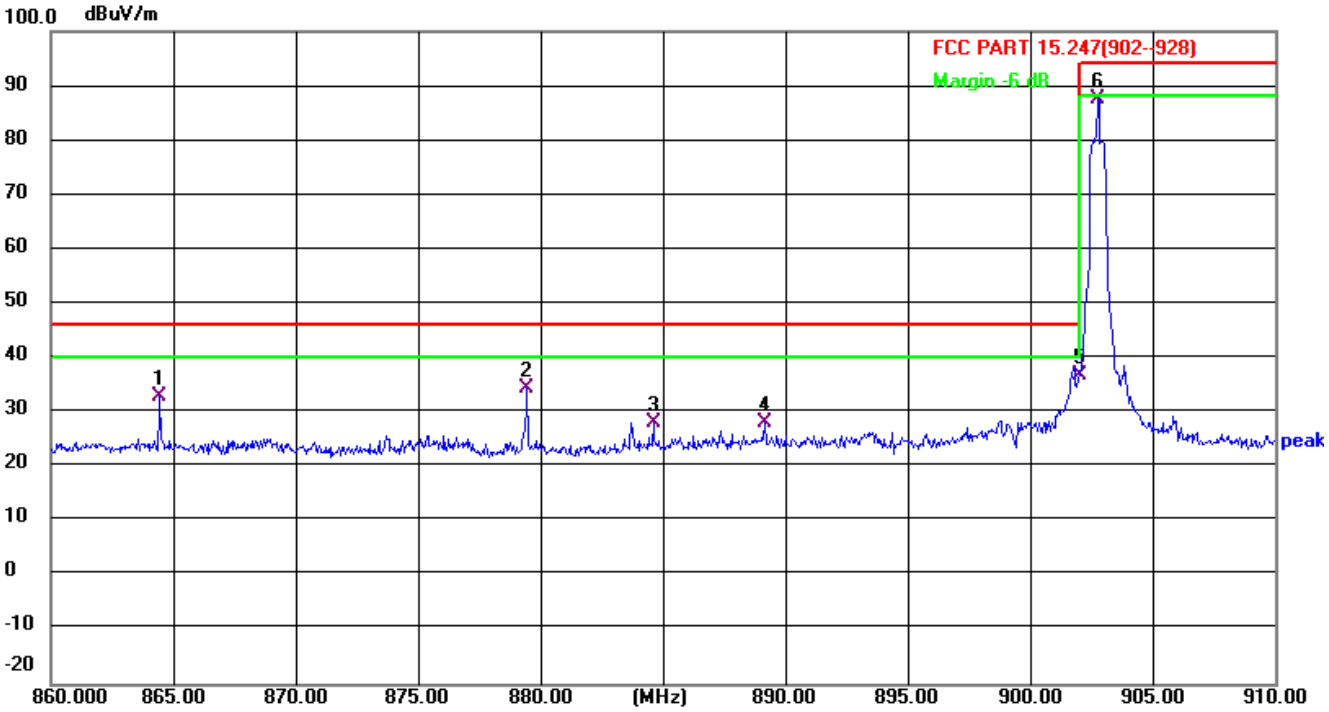
902.750MHz

Horizontal



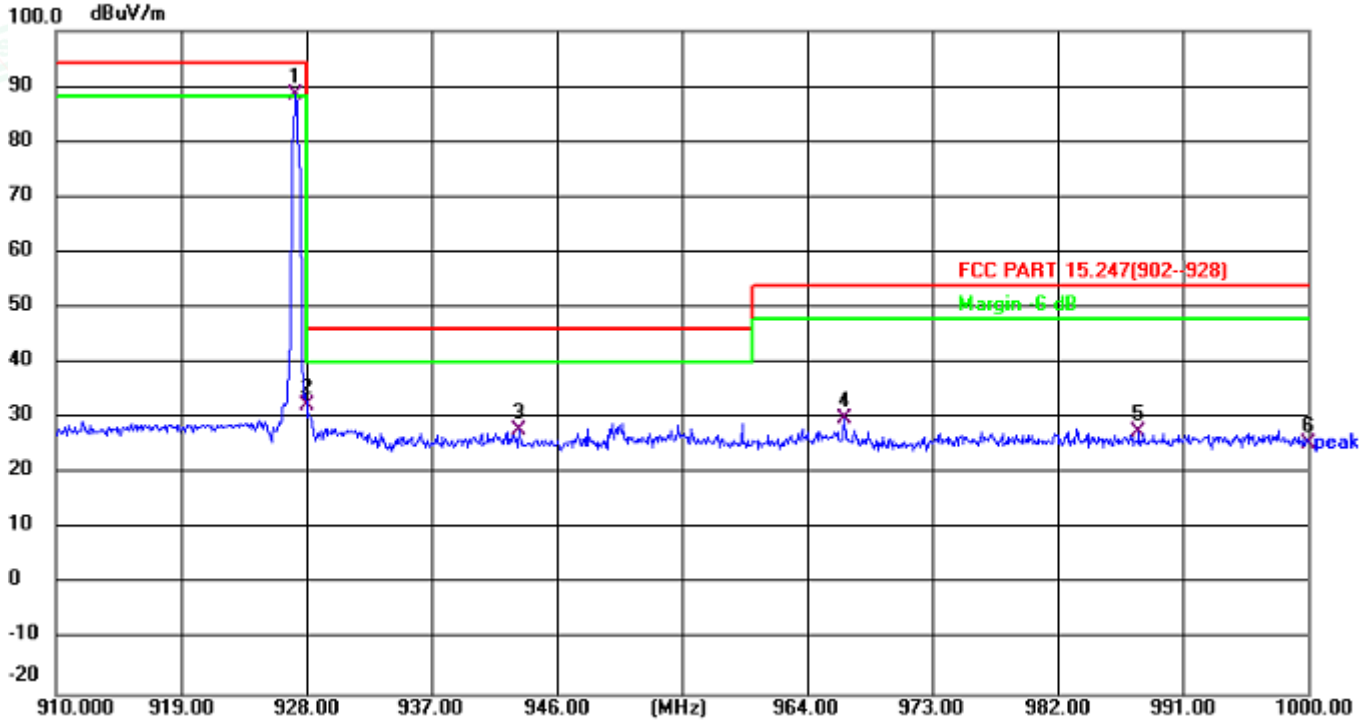
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	870.7500	34.50	-8.74	25.76	46.00	-20.24	QP
2	879.4500	41.34	-8.62	32.72	46.00	-13.28	QP
3	884.6000	36.79	-8.54	28.25	46.00	-17.75	QP
4	894.2500	35.77	-8.39	27.38	46.00	-18.62	QP
5	902.0000	46.54	-8.27	38.27	46.00	-7.73	QP
6	902.7500	96.28	-8.26	88.02	94.00	-5.98	QP

Vertical



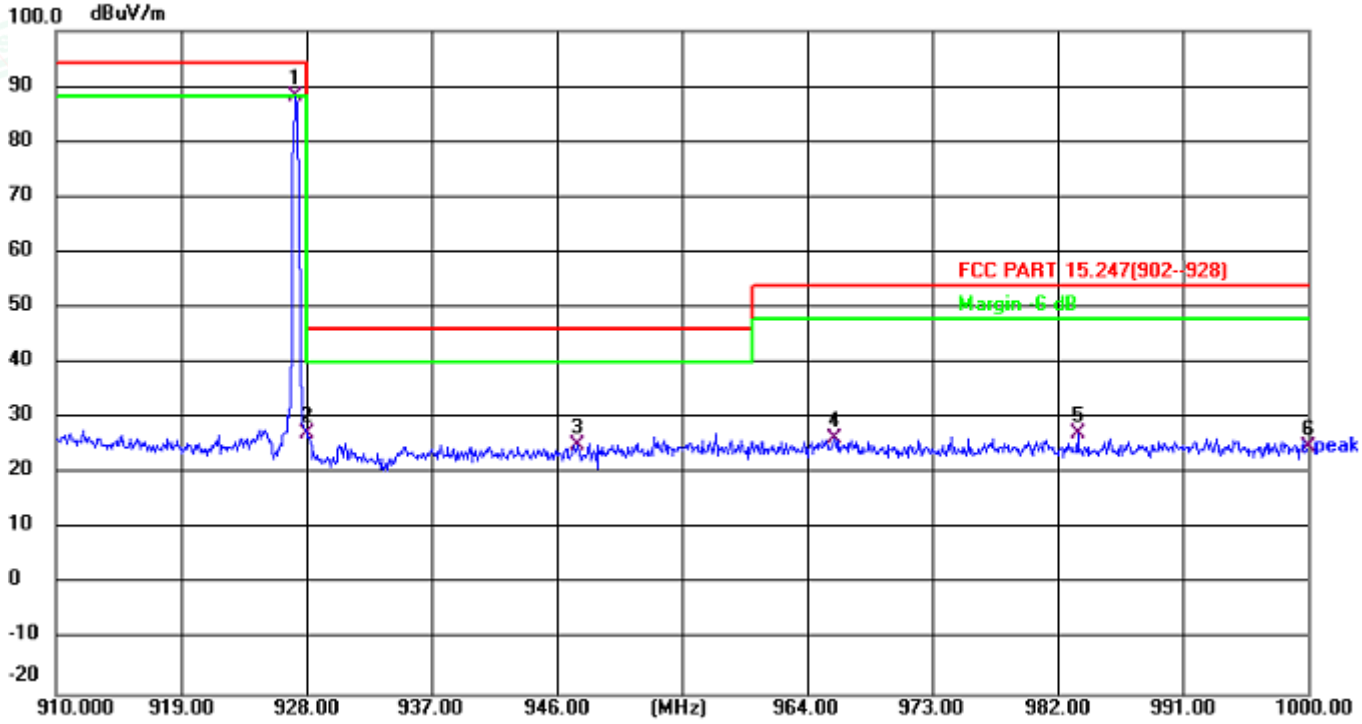
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	864.4500	41.86	-8.81	33.05	46.00	-12.95	QP
2	879.4500	42.94	-8.62	34.32	46.00	-11.68	QP
3	884.6000	36.69	-8.54	28.15	46.00	-17.85	QP
4	889.1500	36.55	-8.46	28.09	46.00	-17.91	QP
5	902.0000	45.12	-8.27	36.85	46.00	-9.15	QP
6	902.7500	95.69	-8.26	87.43	94.00	-6.57	QP

925.250MHz
Horizontal



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	927.1900	95.79	-7.37	88.42	94.00	-5.58	QP
2	928.0000	39.78	-7.35	32.43	46.00	-13.57	QP
3	943.3000	34.74	-6.94	27.80	46.00	-18.20	QP
4	966.7000	36.65	-6.74	29.91	54.00	-24.09	QP
5	987.8500	34.21	-6.73	27.48	54.00	-26.52	QP
6	1000.0000	32.26	-6.72	25.54	54.00	-28.46	QP

Vertical



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	927.1900	96.18	-7.95	88.23	94.00	-5.77	QP
2	928.0000	35.20	-7.96	27.24	46.00	-18.76	QP
3	947.4400	33.42	-8.13	25.29	46.00	-20.71	QP
4	965.9800	34.15	-7.92	26.23	54.00	-27.77	QP
5	983.4400	34.84	-7.59	27.25	54.00	-26.75	QP
6	1000.0000	32.14	-7.22	24.92	54.00	-29.08	QP

Notes:

1）Level（dBuv/m）=Reading+Factor;

2）Margin(dB)=Level-Limit;

3）Factor=Ant Fac-Pre Fac+Cab Loss.

6.7. AC Power Line Conducted Emissions

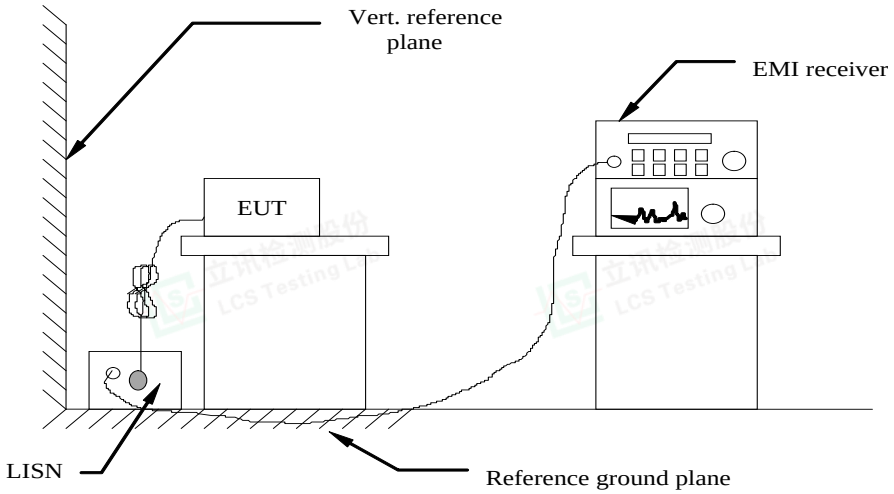
6.7.1 Standard Applicable

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 is 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

6.7.2 Block Diagram of Test Setup



6.7.3 Disturbance Calculation

The AC mains conducted disturbance is calculated by adding the 10dB Pulse Limiter and Cable Factor and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:

CD (dBuV) = RA (dBuV) + PL (dB) + CL (dB)

Where CD = Conducted Disturbance	CL = Cable Attenuation Factor (Cable Loss)
RA = Reading Amplitude	PL = 10 dB Pulse Limiter Factor

6.7.4 Test Results

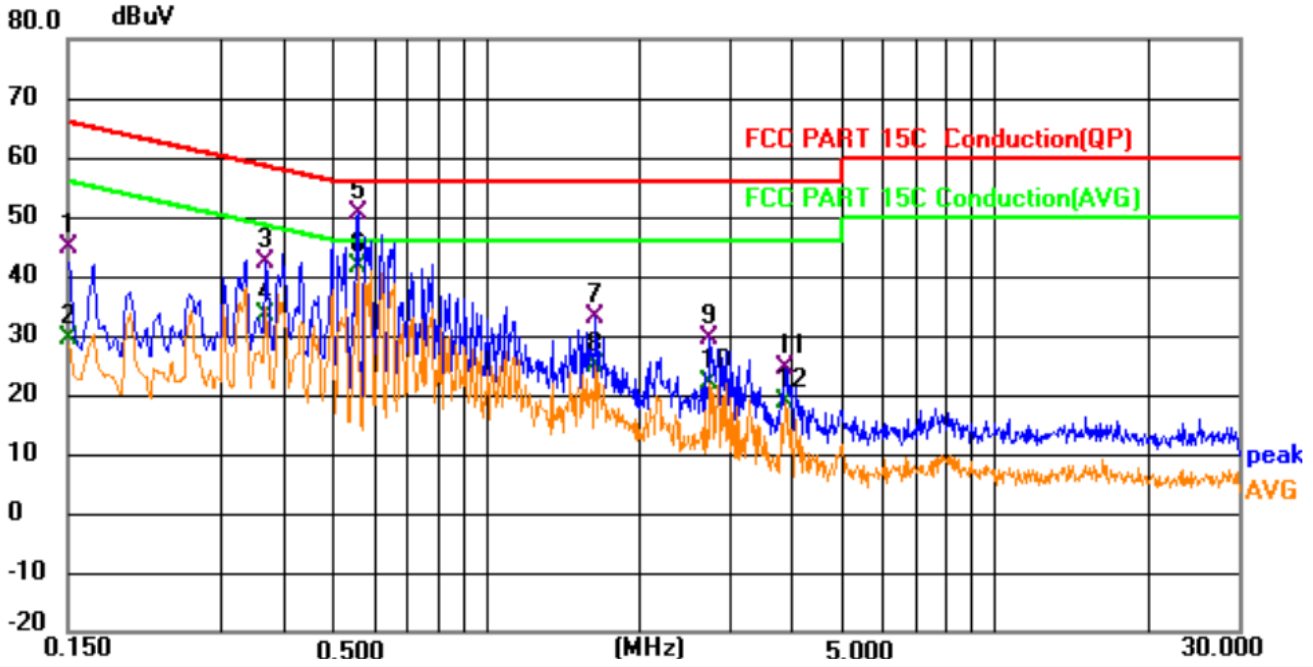
Temperature	22.5℃	Humidity	53.7%
Test Engineer	Jay Luo	Configurations	TX Mode

PASS.

The test data please refer to following page.

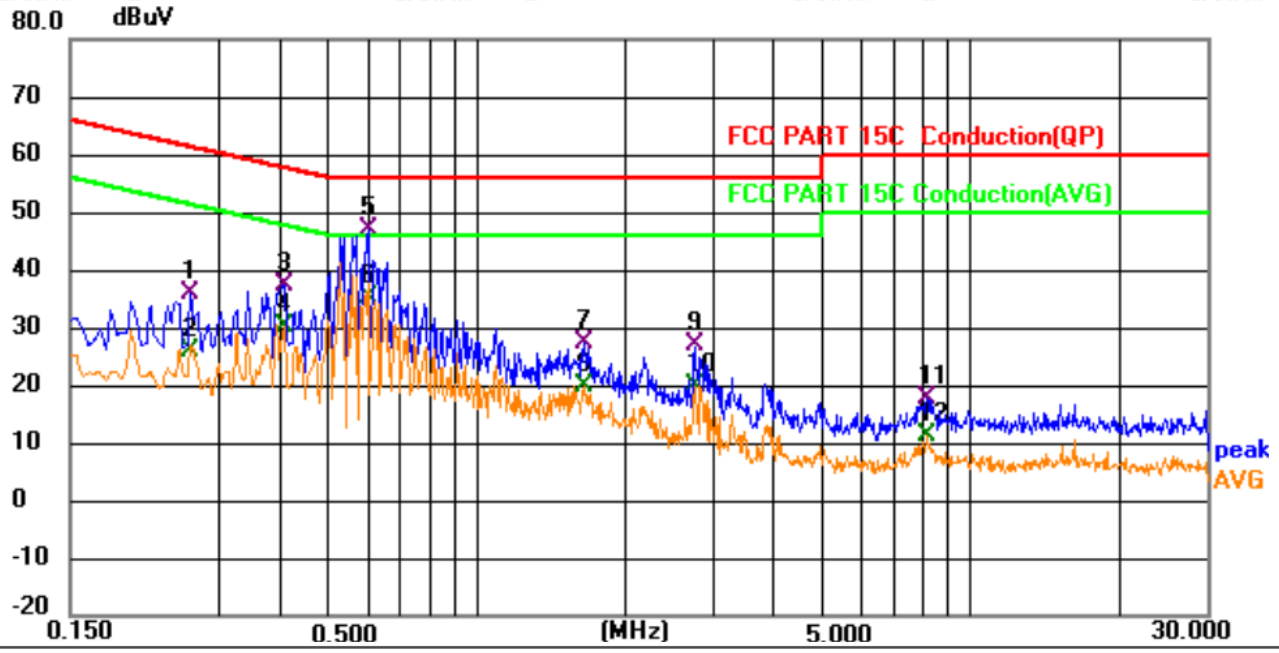
AC Conducted Emission @ AC 120V/60Hz (worst case)

Line



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.150	24.94	19.89	44.83	66.00	-21.17	QP	
2		0.150	9.60	19.89	29.49	56.00	-26.51	AVG	
3		0.366	22.39	19.94	42.33	58.59	-16.26	QP	
4		0.366	13.47	19.94	33.41	48.59	-15.18	AVG	
5		0.559	30.98	19.65	50.63	56.00	-5.37	QP	
6	*	0.559	22.09	19.65	41.74	46.00	-4.26	AVG	
7		1.644	13.87	19.01	32.88	56.00	-23.12	QP	
8		1.644	5.83	19.01	24.84	46.00	-21.16	AVG	
9		2.747	10.33	19.17	29.50	56.00	-26.50	QP	
10		2.747	2.74	19.17	21.91	46.00	-24.09	AVG	
11		3.849	5.20	19.17	24.37	56.00	-31.63	QP	
12		3.849	-0.44	19.17	18.73	46.00	-27.27	AVG	

Neutral



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.263	16.21	19.75	35.96	61.34	-25.38	QP	
2		0.263	6.20	19.75	25.95	51.34	-25.39	AVG	
3		0.406	17.15	20.01	37.16	57.73	-20.57	QP	
4		0.406	10.03	20.01	30.04	47.73	-17.69	AVG	
5	*	0.600	27.37	19.53	46.90	56.00	-9.10	QP	
6		0.600	15.72	19.53	35.25	46.00	-10.75	AVG	
7		1.662	8.43	19.01	27.44	56.00	-28.56	QP	
8		1.662	0.67	19.01	19.68	46.00	-26.32	AVG	
9		2.751	7.62	19.17	26.79	56.00	-29.21	QP	
10		2.751	0.60	19.17	19.77	46.00	-26.23	AVG	
11		8.178	-1.85	19.70	17.85	60.00	-42.15	QP	
12		8.178	-8.46	19.70	11.24	50.00	-38.76	AVG	

****Note: 1). Pre-scan all modes and recorded the worst case results in this report ASK mode (Low Channel).*
2). Measurement = Reading + Correct, Margin = Measurement – Limit.
Correct Factor=Lisn Factor+Cable Factor+Insertion loss of Pulse Limiter

6.8. On Time and Duty Cycle

6.8.1. Standard Applicable

None: for reporting purpose only.

6.8.2. Measuring Instruments and Setting

Please refer to equipment list in this report. The following table is the setting of the spectrum analyzer.

6.8.3. Test Procedures

1. Set the center frequency of the spectrum analyzer to the transmitting frequency;
2. Set the span=0MHz, RBW=1.0MHz, VBW=3.0MHz, Sweep time=Auto
3. Detector = peak;
4. Trace mode = Single hold.

6.8.4. Test Setup Layout

6.8.5. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

6.8.6. Test result

For reporting purpose only.

Please refer to Appendix A.8

6.9. Pseudorandom Frequency Hopping Sequence

6.9.1 Standard Applicable

For 47 CFR Part 15C sections 15.247 (a) (1) requirement:

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hop-ping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400–2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW. The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudo randomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hop-ping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

6.9.2 EUT Pseudorandom Frequency Hopping Sequence Requirement

The device meets Pseudorandom Frequency Hopping Sequence Requirement, please refer to Operation description on FCC_Pseudorandom_ Hopping_Declaration.

6.10. Antenna Requirement

6.10.1 Standard Applicable

According to antenna requirement of §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. The manufacturer may design the unit so that a broken antenna can be re-placed by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of Sections 15.211, 15.213, 15.217, 15.219, or 15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with Section 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this Part are not exceeded.

6.10.2 Antenna Connected Construction

6.10.2.1. 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.

6.10.2.2. Antenna Connector Construction

The directional gains of antenna used for transmitting is 3.5dBi(Max), and the antenna is an External Antenna connect to PCB board and no consideration of replacement. Please see EUT photo for details.

6.10.2.3. Results: Compliance.

7. TEST SETUP PHOTOGRAPHS OF EUT

Please refer to separated files for Test Setup Photos of the EUT.

8. EXTERIOR PHOTOGRAPHS OF THE EUT

Please refer to separated files for External Photos of the EUT.

9. INTERIOR PHOTOGRAPHS OF THE EUT

Please refer to separated files for Internal Photos of the EUT.

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