FCC TEST REPORT

FOR

Shenzhen SYSloT Co.,LTD

UHF RFID Module

Test Model: SR-MU921B

Additional Model No.: SR-MU921A, SR-MU922B, SR-MU922A

Prepared for	:	Shenzhen SYSloT Co.,LTD
Address	:	Room 717,Yiben E-Commerce Industrial Park,No.1063,Chaguang Road,Nanshan District,Shenzhen,China

Prepared by	:	Shenzhen LCS Compliance Testing Laboratory Ltd
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Date of receipt of test sample	:	July 20, 2020
Number of tested samples	:	1
Serial number	:	Prototype
Date of Test	:	July 20, 2020 ~ August 04, 2020
Date of Report	:	August 07, 2020

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FCC TEST REPORT

FCC CFR 47 PART 15 C(15.249)

Report Reference No.	**:**	**LCS200720047AEA**
Date of Issue	:	August 07, 2020
Testing Laboratory Name.....	**:**	**Shenzhen LCS Compliance Testing Laboratory Ltd.**
Address	:	101, 201 Bldg A & 301 Bldg C, Juji Industrial Park Shajing Street, Baoan District, Shenzhen, China
Testing Location/ Procedure.....	:	Full application of Harmonised standards ■ Partial application of Harmonised standards □ Other standard testing method □
Applicant's Name	**:**	**Shenzhen SYSloT Co.,LTD**
Address	:	Room 717,Yiben E-Commerce Industrial Park,No.1063,Chaguang Road,Nanshan District,Shenzhen,China
Test Specification		
Standard.....	:	FCC CFR 47 PART 15 C(15.249)
Test Report Form No.....	:	LCSEMC-1.0
TRF Originator	:	Shenzhen LCS Compliance Testing Laboratory Ltd.
Master TRF.....	:	Dated 2011-03

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Test Item Description.	**:**	**UHF RFID Module**
Trade Mark	:	, SYSIOT, 新思物联
Model/ Type reference.....	:	SR-MU921B
Ratings.....	:	DC 5V
Result	**:**	**Positive**

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

FCC -- TEST REPORT

Test Report No. : LCS200720047AEA	August 07, 2020 Date of issue

Type / Model.....	: SR-MU921B
EUT.....	: UHF RFID Module
Applicant.....	**: Shenzhen SYSloT Co.,LTD**
Address.....	: Room 717,Yiben E-Commerce Industrial Park,No.1063,Chaguang Road,Nanshan District,Shenzhen,China
Telephone.....	: /
Fax.....	: /
Manufacturer.....	**: Shenzhen SYSloT Co.,LTD**
Address.....	: Room 717,Yiben E-Commerce Industrial Park,No.1063,Chaguang Road,Nanshan District,Shenzhen,China
Telephone.....	: /
Fax.....	: /
Factory.....	**: Shenzhen SYSloT Co.,LTD**
Address.....	: Room 717,Yiben E-Commerce Industrial Park,No.1063,Chaguang Road,Nanshan District,Shenzhen,China
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	August 07, 2020	Initial Issue	Gavin Liang

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1. GENERAL INFORMATION

1.1. Description of Device (EUT)

EUT		UHF RFID Module
Test Model	:	SR-MU921B
Additional Model No.	:	SR-MU921A, SR-MU922B, SR-MU922A
Model Declaration	:	PCB board, structure and internal of these model(s) are the same, So no additional models were tested.
Power Supply	:	DC 5V
Hardware Version	:	M092x 30dBm A5.0
Software Version	:	VS5.01
SRD		
Frequency Range		902.25-927.75MHz
Channel Number		52
Modulation Technology		RFID
Antenna Description		External Antenna, 0dBi(Max.) Note: EUT has four antennas, but only a single antenna can transmit at a time and it does not supported simultaneous transmit.

1.2. Host System Configuration List and Details

Manufacturer	Description	Model	Serial Number	Certificate
SHENZHEN TIANYIN ELECTRONICS CO.,LTD	Adapter	TPA-46B05010 0UU	--	SDOC

Note: Adapter is supplied by lab and only used test.

1.3. External I/O

I/O Port Description	Quantity	Cable
---	---	---

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.

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	±4.00dB	(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.

1.7. Description of Test Modes

The EUT operates in the unlicensed ISM band at 902~928MHz. The following operating modes were applied for the related test items. And the new battery is used during the measurement.
The EUT received DC 5V.
All test modes were tested, only the result of the worst case was recorded in the report.

The EUT is considered a portable unit; it was pre-tested on the positioned of each 3 axis. The worst case was found positioned on X-plane. Therefore only the test data of this X-plane was used for radiated emission measurement test.

Mode of Operations	Transmitting Frequency (MHz)
RFID	902.25MHz, 914.75MHz, 927.75MHz
For Conducted Emission	
Test Mode	TX Mode
For Radiated Emission	
Test Mode	TX Mode

***Note: Using a temporary antenna connector for the EUT when the conducted measurements(Band Edges Measurement and 20 dB Bandwidth) are performed.

Channel List & Frequency

Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency(MHz)
0	**902.25**	18	911.25	36	920.25
1	902.75	19	911.75	37	920.75
2	903.25	20	912.25	38	921.25
3	903.75	21	912.75	39	921.75
4	904.25	22	913.25	40	922.25
5	904.75	23	913.75	41	922.75
6	905.25	24	914.25	42	923.25
7	905.75	25	**914.75**	43	923.75
8	906.25	26	915.25	44	924.25
9	906.75	27	915.75	45	924.75
10	907.25	28	916.25	46	925.25
11	907.75	29	916.75	47	925.75
12	908.25	30	917.25	48	926.25
13	908.75	31	917.75	49	926.75
14	909.25	32	918.25	50	927.25
15	909.75	33	918.75	51	**927.75**
16	910.25	34	919.25		
17	910.75	35	919.75		

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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 engineering mode to fix the TX frequency that 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 15.249 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 6.2.1 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. 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

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3. CONNECTION DIAGRAM OF TEST SYSTEM

3.1. Justification

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

3.2. EUT Exercise Software

The system was configured for testing in a continuous transmits condition and change test channels by software (ModuleReader5.4) provided by application.

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	Remark
§15.203	Antenna Requirement	Compliant	Note 1
§15.207(a)	Conduction Emissions	Compliant	Note 1
§15.205(a), §15.209(a), §15.249(a), §15.249(c)	Radiated Emissions Measurement	Compliant	Note 1
§15.249	Band Edges Measurement	Compliant	Note 1
§15.249, §2.1049	99% and 20dB Bandwidth	Compliant	Note 1

Remark:

Note 1 --- Test results inside test report.

Note 2 – N/A: Not Applicable!

5.TEST RESULTS

5.1. ANTENNA REQUIREMENT

5.1.1 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.

5.1.2 Antenna Connected Construction

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.

2) Antenna Connector Construction

The directional gains of antenna used for transmitting is 0 dBi, and the antenna is connect to external board and no consideration of replacement. Please see EUT photo for details.

3) Results: Compliance.

5.2. RADIATED EMISSION MEASUREMENT

5.2.1 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	M Hz	M Hz	G Hz
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 §15.249 (a): Except as provided in paragraph (b) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental frequency	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (microvolts/meter)
902-928 MHz	50	500
2400-2483.5 MHz	50	500
5725-5875 MHz	50	500
24.0-24.25 GHz	250	2500

* Field strength limits are specified at a distance of 3 meters.

* As shown in §15.35(b), for frequencies above 1000 MHz, the field strength limits in paragraphs (a) and (b) of this section are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For point-to-point operation under paragraph (b) of this section, the peak field strength shall not exceed 2500 millivolts/meter at 3 meters along the antenna azimuth.

* Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

5.2.2 Measuring Instruments and Setting

Please refer to 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/B kHz for Average
RB / VB (Emission in non-restricted band)	1MHz / 1MHz for Peak, 1 MHz / 1/B 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

5.2.3 Test Procedure

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 0.8 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.

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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.

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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 2.5 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 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.

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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 polarisations 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.

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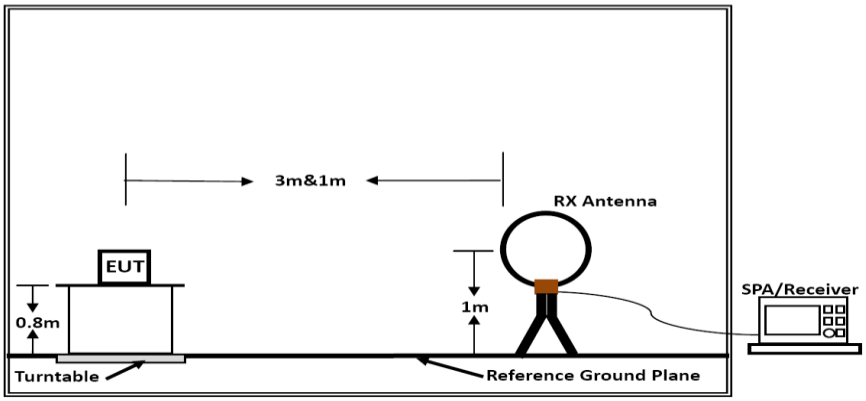
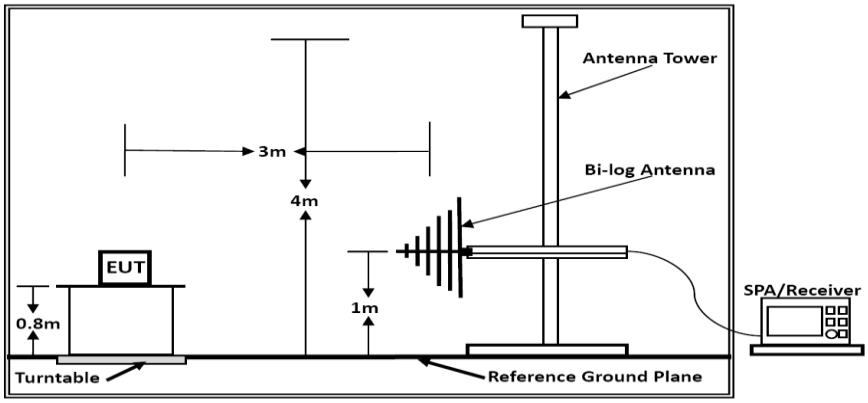
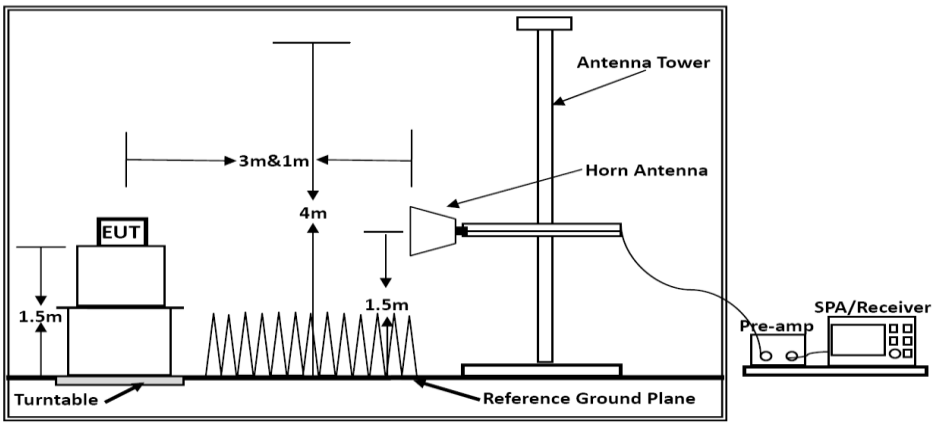
5.2.4 Block Diagram of Test Setup



Below 30MHz



Below 1GHz



Above 1GHz

Above 18 GHz shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade form 3m to 1m.

Distance extrapolation factor = 20 log (specific distanc [3m] / test distance [1m]) (dB);

Limit line = specific limits (dBuV) + distance extrapolation factor [6 dB].

5.2.5 EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

5.2.6 Test Results

Results of Radiated Emissions (9 KHz~30MHz)

Temperature	24.6℃	Humidity	54.1%
Test Engineer	Jay Li		

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

Note:

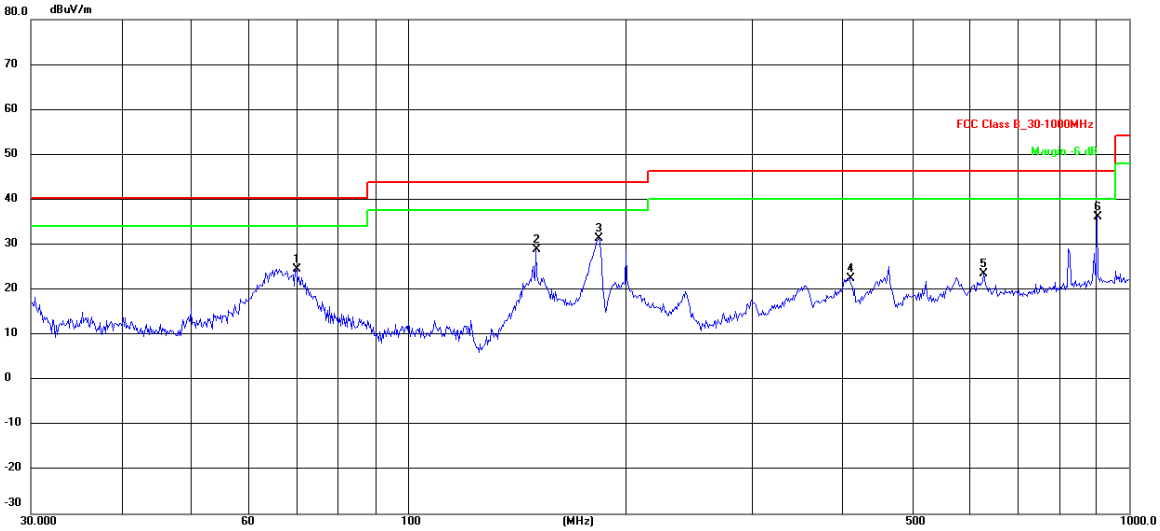
The amplitude of spurious emissions which are attenuated by more than 20 dB below the permissible value has no need to be reported.

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

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

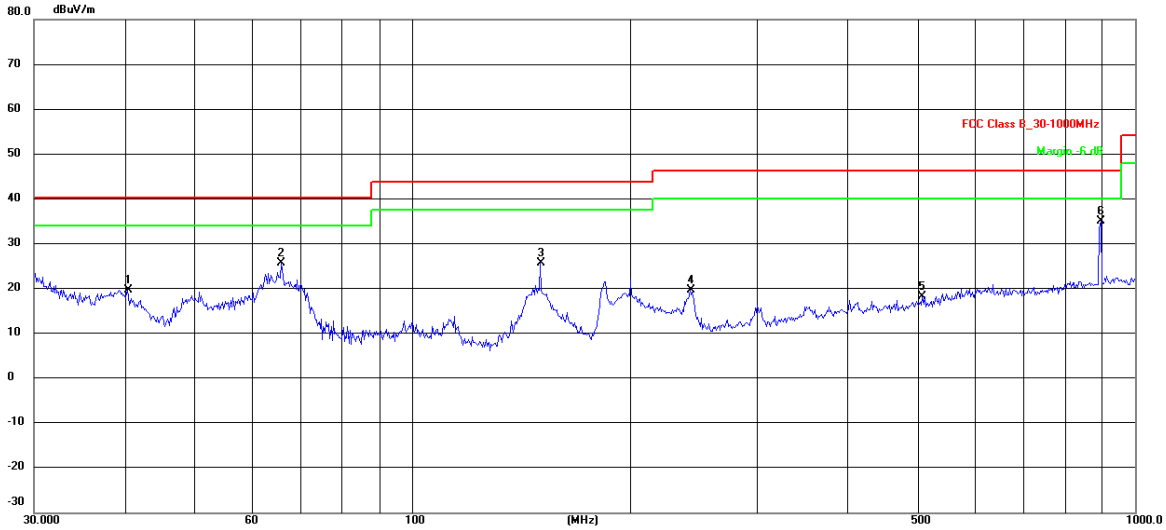
Results of Radiated Emissions (30MHz~1000MHz)

Horizontal



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	69.8450	44.48	-19.95	24.53	40.00	-15.47	QP
2	150.5378	49.93	-21.17	28.76	43.50	-14.74	QP
3	183.8440	50.48	-19.16	31.32	43.50	-12.18	QP
4	410.3825	34.56	-12.07	22.49	46.00	-23.51	QP
5	629.4772	31.71	-8.35	23.36	46.00	-22.64	QP
6 *	903.3094	41.90	-5.87	36.03	46.00	-9.97	QP

Vertical



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	40.4172	36.14	-16.33	19.81	40.00	-20.19	QP
2	66.0342	44.44	-18.73	25.71	40.00	-14.29	QP
3	150.5378	46.97	-21.17	25.80	43.50	-17.70	QP
4	242.5253	35.48	-15.83	19.65	46.00	-26.35	QP
5	508.2582	29.06	-10.77	18.29	46.00	-27.71	QP
6 *	902.7532	42.08	-5.96	36.12	46.00	-9.88	QP

Note:

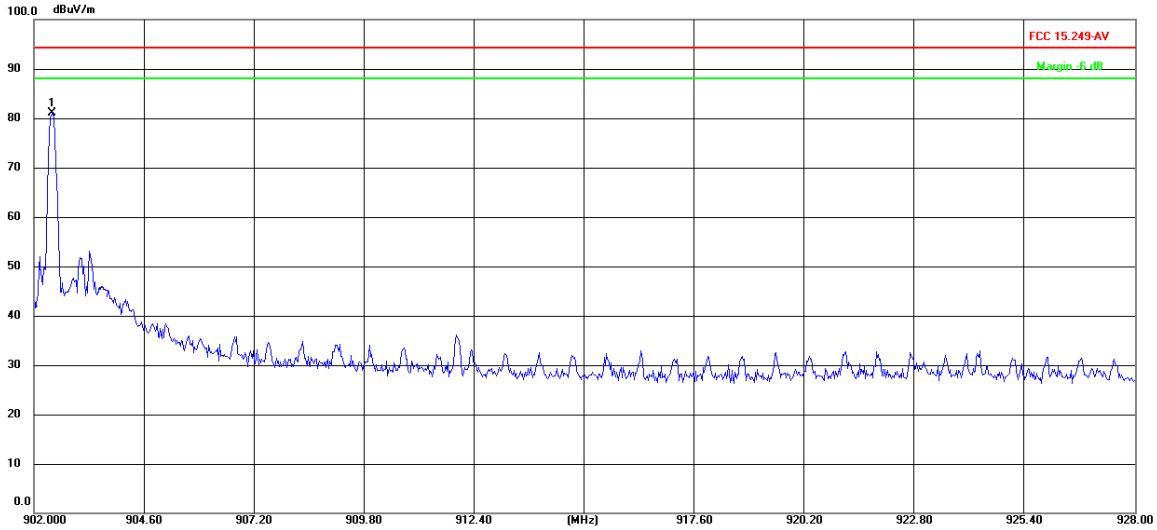
Pre-scan all antennas and recorded the worst case results in this report (antenna 0(low channel)).

Emission level (dBuV/m) = 20 log Emission level (uV/m).
Margin=Reading level + Factor- Limit

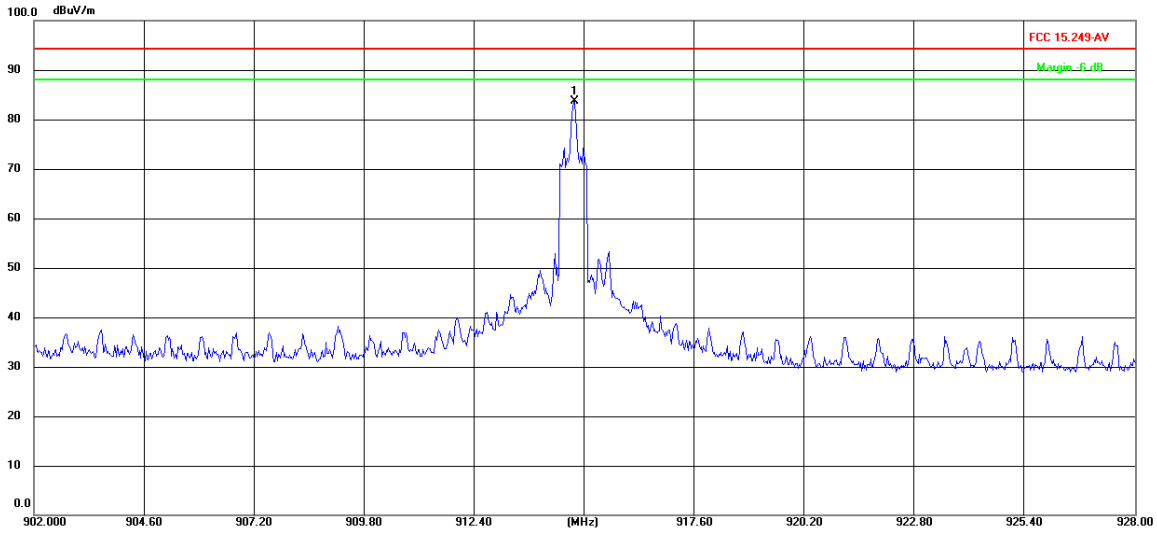
Field strength of fundamental:

Frequency (MHz)	Pol.	Measure Result (QP, dBuV/m)	Limit (dBuV/m)	Result
902.25	H	80.98	94	Pass
902.25	V	83.19	94	Pass
914.75	H	83.62	94	Pass
914.75	V	83.64	94	Pass
927.75	H	83.67	94	Pass
927.75	V	83.83	94	Pass

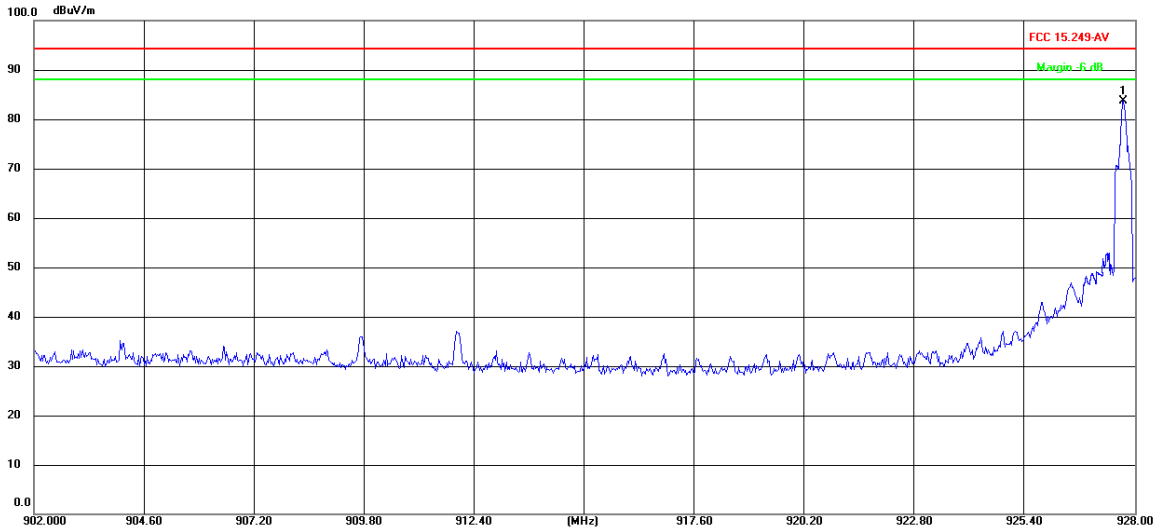
Horizontal



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1 *	902.2778	84.28	-3.30	80.98	94.00	-13.02	QP

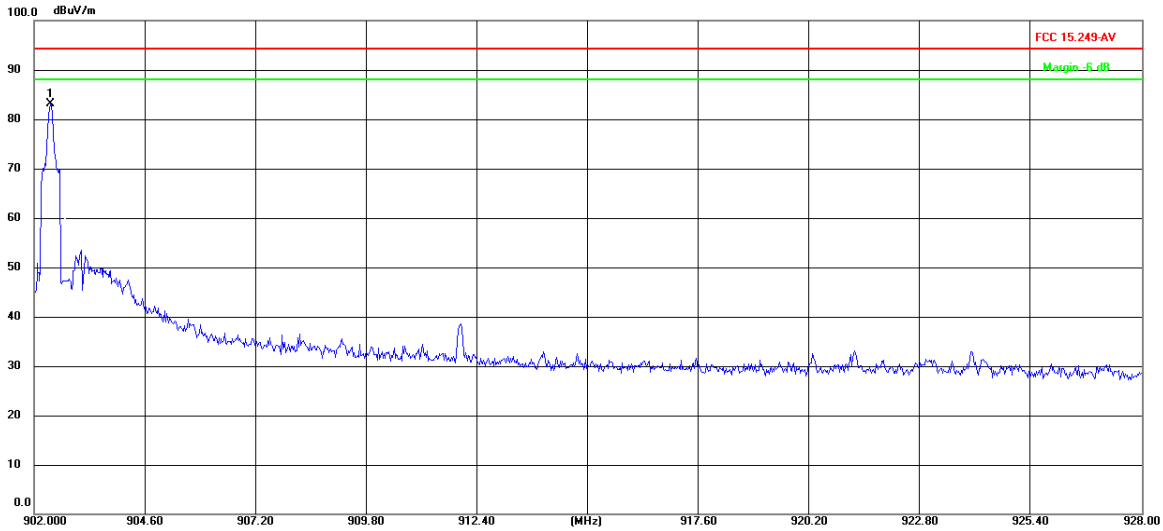


No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1 *	914.7658	86.80	-3.18	83.62	94.00	-10.38	QP

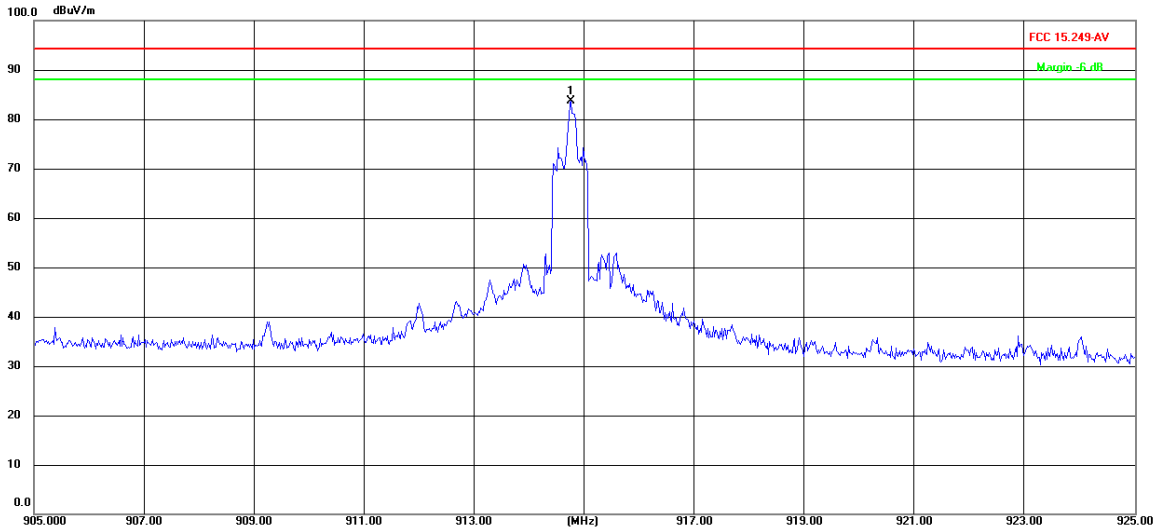


No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1 *	927.7520	86.72	-3.05	83.67	94.00	-10.33	QP

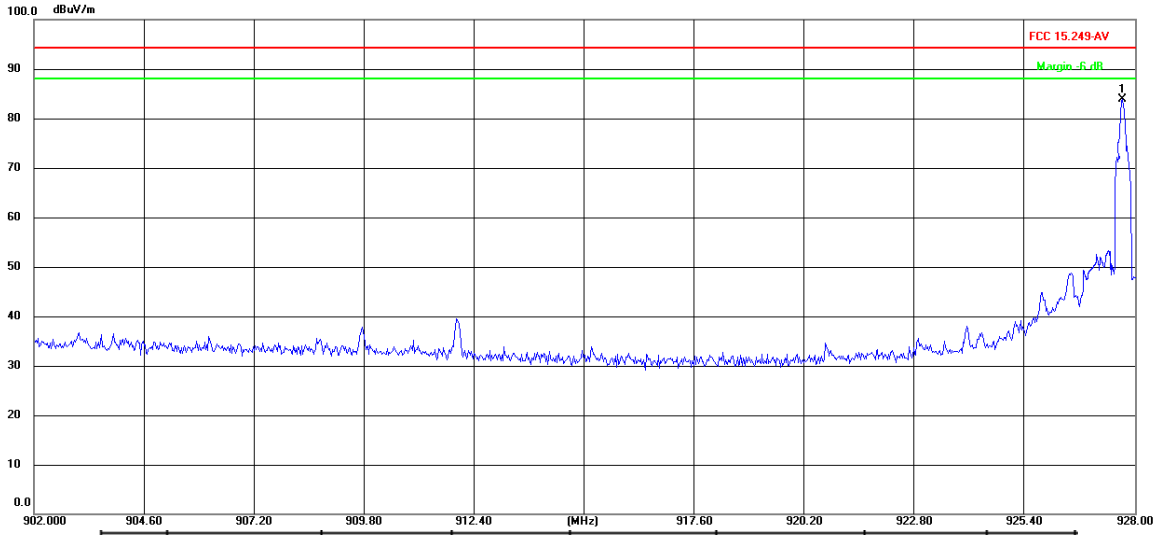
Vertical



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1 *	902.2778	86.49	-3.30	83.19	94.00	-10.81	QP



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1 *	914.7600	86.82	-3.18	83.64	94.00	-10.36	QP



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1 *	927.7520	86.88	-3.05	83.83	94.00	-10.17	QP

Note: 1) Pre-scan all antennas and recorded the worst case results in this report (antenna 0)
2) Margin=Reading level + Factor- Limit

Above 1G（The worst test result for Tx）:

902.25MHz

Freq. MHz	Reading dBuv	Ant. Fac dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuv/m	Limit dBuv/m	Margin dB	Remark	Pol.
1804.50	48.36	33.01	35	3.86	50.23	74.00	-23.77	Peak	Horizontal
1804.50	33.48	33.01	35	3.86	35.35	54.00	-18.65	Average	Horizontal
2706.75	49.16	33.03	35.02	3.91	51.08	74.00	-22.92	Peak	Horizontal
2706.75	35.56	33.03	35.02	3.91	37.48	54.00	-16.52	Average	Horizontal
1804.50	50.69	33.01	35	3.86	52.56	74.00	-21.44	Peak	Vertical
1804.50	31.76	33.01	35	3.86	33.63	54.00	-20.37	Average	Vertical
2706.75	50.26	33.03	35.02	3.91	52.18	74.00	-21.82	Peak	Vertical
2706.75	33.28	33.03	35.02	3.91	35.20	54.00	-18.80	Average	Vertical

914.75MHz

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	49.17	33.01	35	3.86	51.04	74.00	-22.96	Peak	Horizontal
1829.50	30.94	33.01	35	3.86	32.81	54.00	-21.19	Average	Horizontal
2744.25	49.38	33.03	35.02	3.91	51.30	74.00	-22.70	Peak	Horizontal
2744.25	35.10	33.03	35.02	3.91	37.02	54.00	-16.98	Average	Horizontal
1829.50	48.35	33.01	35	3.86	50.22	74.00	-23.78	Peak	Vertical
1829.50	34.80	33.01	35	3.86	36.67	54.00	-17.33	Average	Vertical
2744.25	51.95	33.03	35.02	3.91	53.87	74.00	-20.13	Peak	Vertical
2744.25	33.45	33.03	35.02	3.91	35.37	54.00	-18.63	Average	Vertical

927.75MHz

Freq. MHz	Reading dBuv	Ant. Fac dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuv/m	Limit dBuv/m	Margin dB	Remark	Pol.
1855.50	50.90	33.01	35	3.86	52.77	74.00	-21.23	Peak	Horizontal
1855.50	30.72	33.01	35	3.86	32.59	54.00	-21.41	Average	Horizontal
2783.25	48.33	33.03	35.02	3.91	50.25	74.00	-23.75	Peak	Horizontal
2783.25	34.08	33.03	35.02	3.91	36.00	54.00	-18.00	Average	Horizontal
1855.50	48.20	33.01	35	3.86	50.07	74.00	-23.93	Peak	Vertical
1855.50	31.69	33.01	35	3.86	33.56	54.00	-20.44	Average	Vertical
2783.25	48.42	33.03	35.02	3.91	50.34	74.00	-23.66	Peak	Vertical
2783.25	32.67	33.03	35.02	3.91	34.59	54.00	-19.41	Average	Vertical

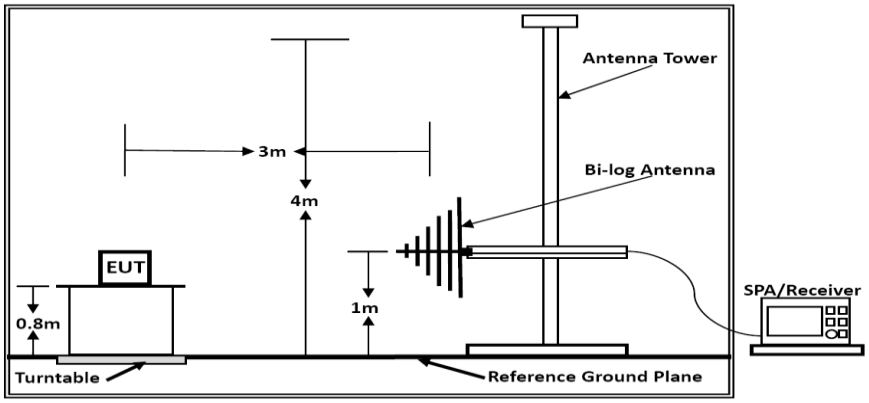
Notes:
1. Measuring frequencies from 9k~10th harmonic (ex. 10GHz), No emission found between lowest internal used/generated frequency to 30 MHz.
2. Radiated emissions measured in frequency range from 9k~10th harmonic (ex. 10GHz) were made with an instrument using Peak detector mode.
3. Measured radiated emission below 1 GHz adopt 915 MHz band-reject filter in order avoid test receiver overload.
4. Pre-scan all antennas and recorded the worst case results in this report (antenna 0)
5. Margin=Reading level+Ant Fac+Cab Loss-Pre Fac-Limit

5.3. Band Edges Measurement

5.3.1 Standard Applicable

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.

5.3.2 Block Diagram of Test Setup



Below 1GHz

5.3.3 Test Procedure

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.

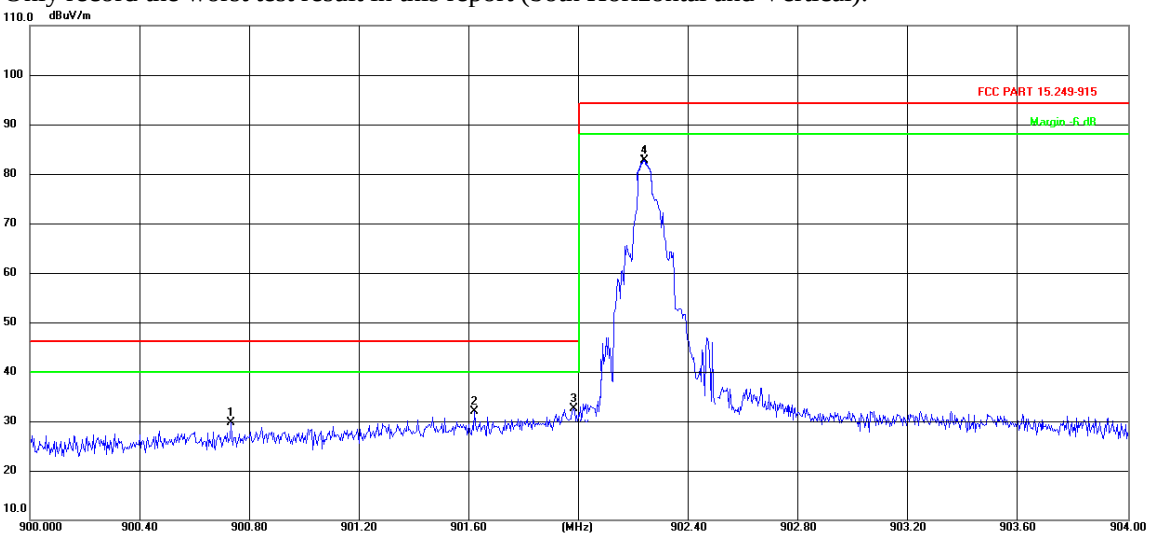
--- The final levels, frequency, measuring time, bandwidth, antenna height, antenna polarization, turntable

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.

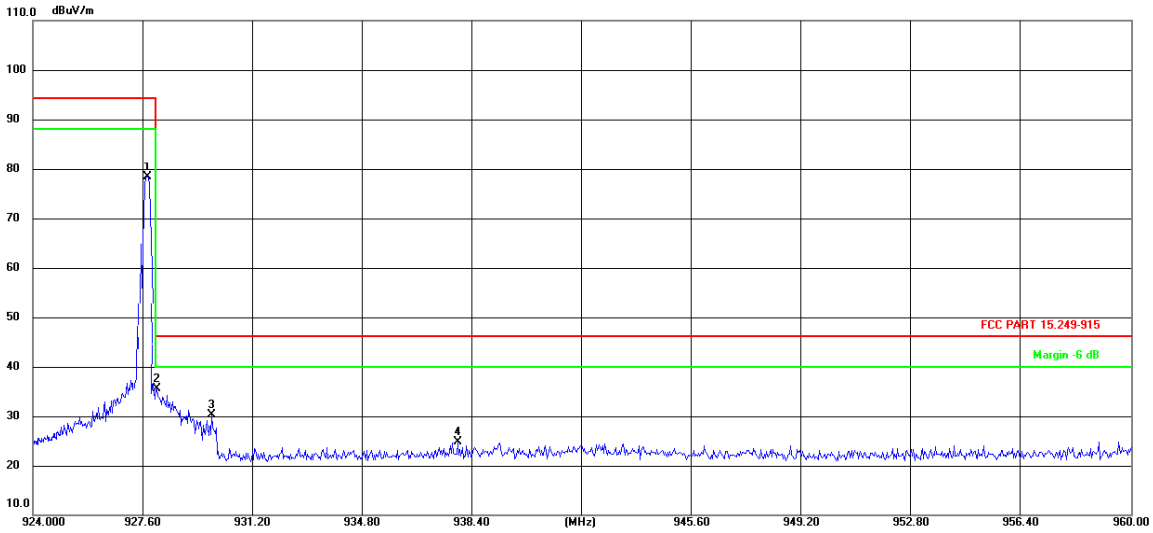
5.3.4 Test Results

PASS

Only record the worst test result in this report (both Horizontal and Vertical).



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	900.7319	35.41	-5.77	29.64	46.00	-16.36	AVG
2	901.6200	37.65	-5.76	31.89	46.00	-14.11	AVG
3	901.9800	38.24	-5.76	32.48	46.00	-13.52	AVG
4 *	902.2539	88.41	-5.75	82.66	94.00	-11.34	AVG



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	927.7880	84.03	-5.64	78.39	94.00	-15.61	AVG
2 *	928.0680	41.13	-5.63	35.50	46.00	-10.50	AVG
3	929.8680	35.93	-5.62	30.31	46.00	-15.69	AVG
4	937.9320	30.34	-5.58	24.76	46.00	-21.24	AVG

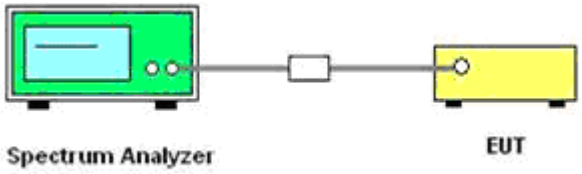
Note: 1) Pre-scan all antennas and recorded the worst case results in this report (antenna 0)
2) Margin=Reading level + Factor- Limit

5.4. 20 DB BANDWIDTH MEASUREMENT

5.4.1 Standard Applicable

According to §2.1049: The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured under the following conditions as applicable.

5.4.2 Block Diagram of Test Setup



5.4.3 Test Procedure

Use the following spectrum analyzer settings:

Span = approximately 2 to 5 times the 20 dB bandwidth, centered on a hopping channel

RBW = 1% to 5% of the 20 dB bandwidth

VBW =3 RBW

Sweep = auto

Detector function = peak

Trace = max hold

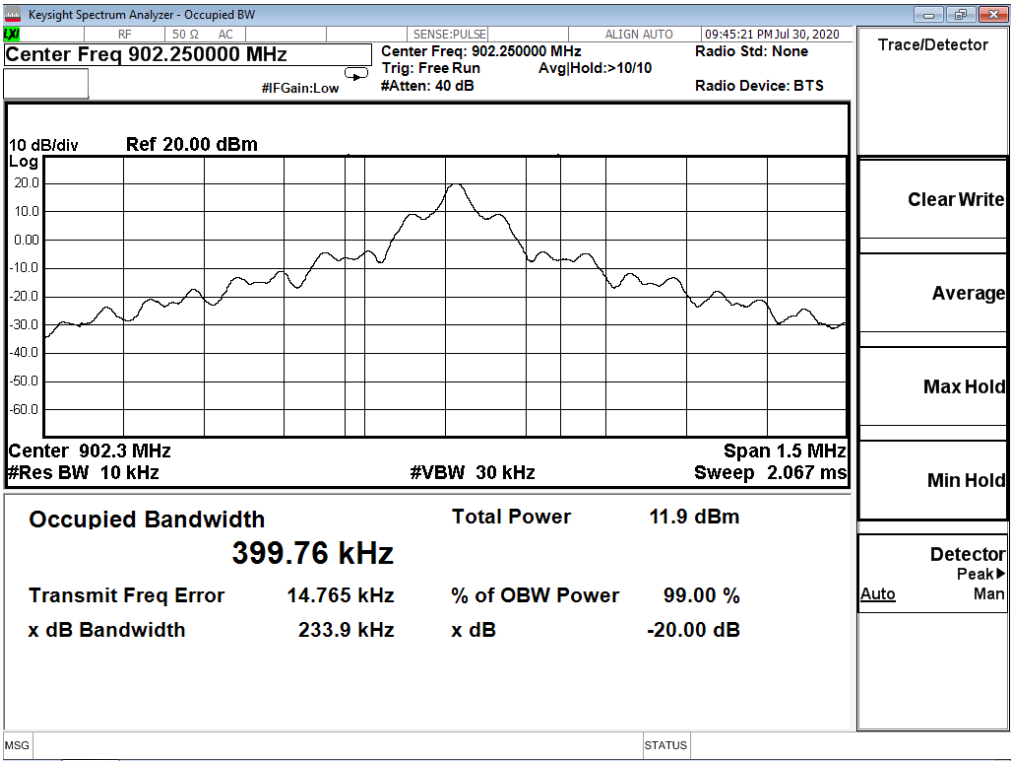
The EUT should be transmitting at its maximum data rate. Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. Use the marker-delta function to measure 20 dB down one side of the emission. Reset the marker-delta function, and move the marker to the other side of the emission, until it is (as close as possible to) even with the reference marker level. The marker-delta reading at this point is the 20 dB bandwidth of the emission. If this value varies with different modes of operation (e.g., data rate, modulation format, etc.), repeat this test for each variation. The limit is specified in one of the subparagraphs of this Section. Submit this plot(s).

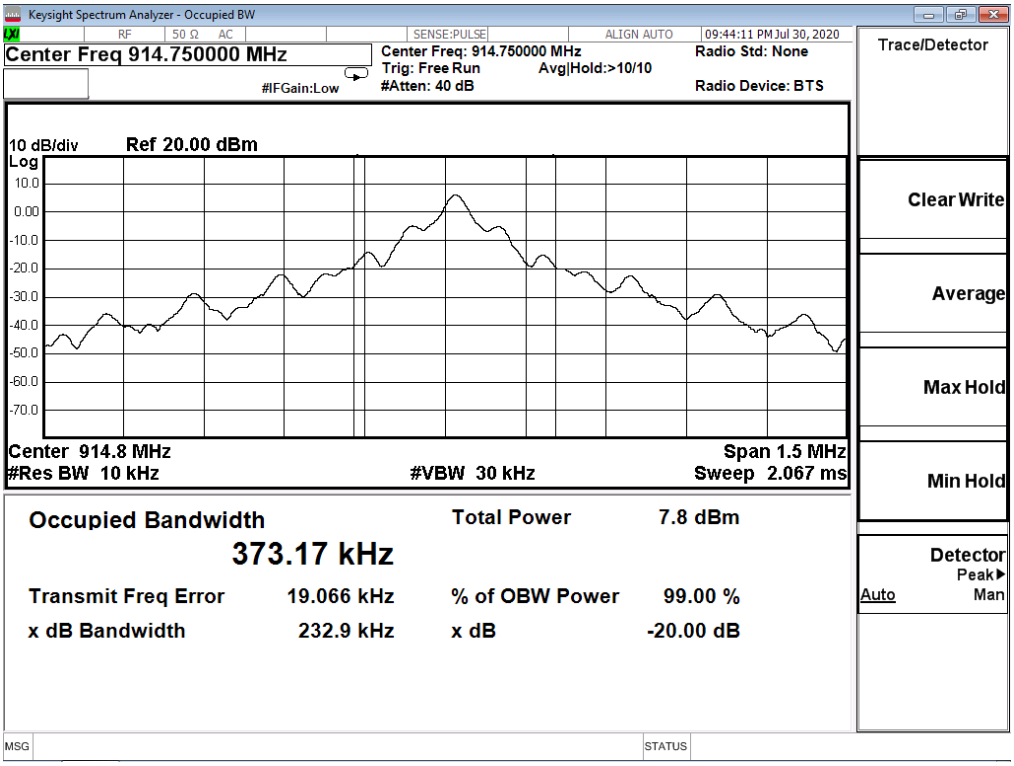
5.4.4 Test Results

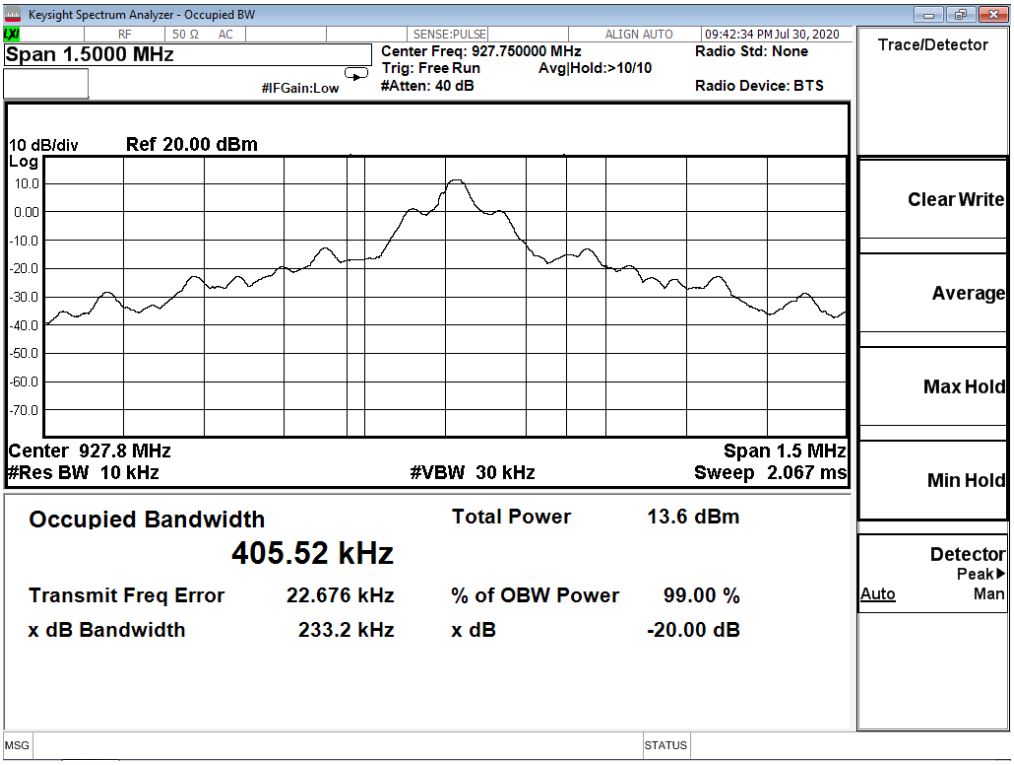
Please refer to the following page.

Result: Pass

Test Result Of 20dB Bandwidth Measurement		
Test Frequency (MHz)	20dB Bandwidth (kHz)	Limit (MHz)
902.25	233.9	Non-Specified
914.75	232.9	Non-Specified
927.75	233.2	Non-Specified







Note: Pre-scan all antennas and recorded the worst case results in this report (antenna 0)

5.5.AC Power line conducted emissions

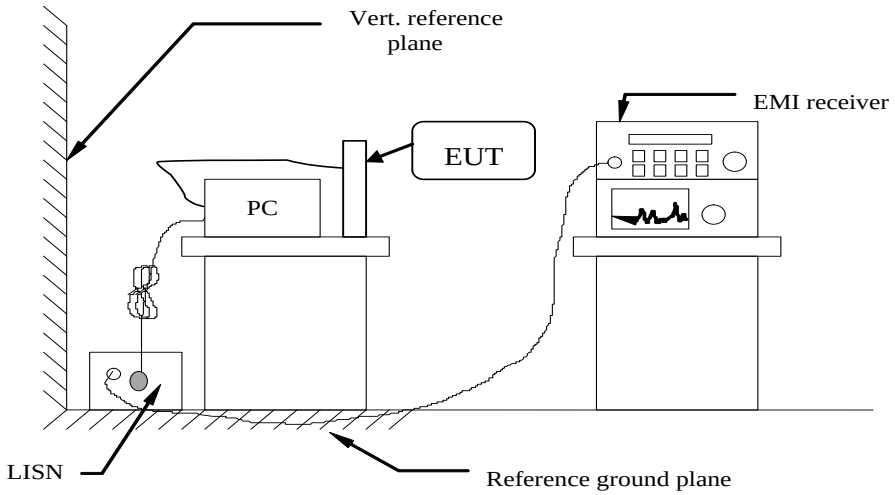
5.5.1 Standard Applicable

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 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

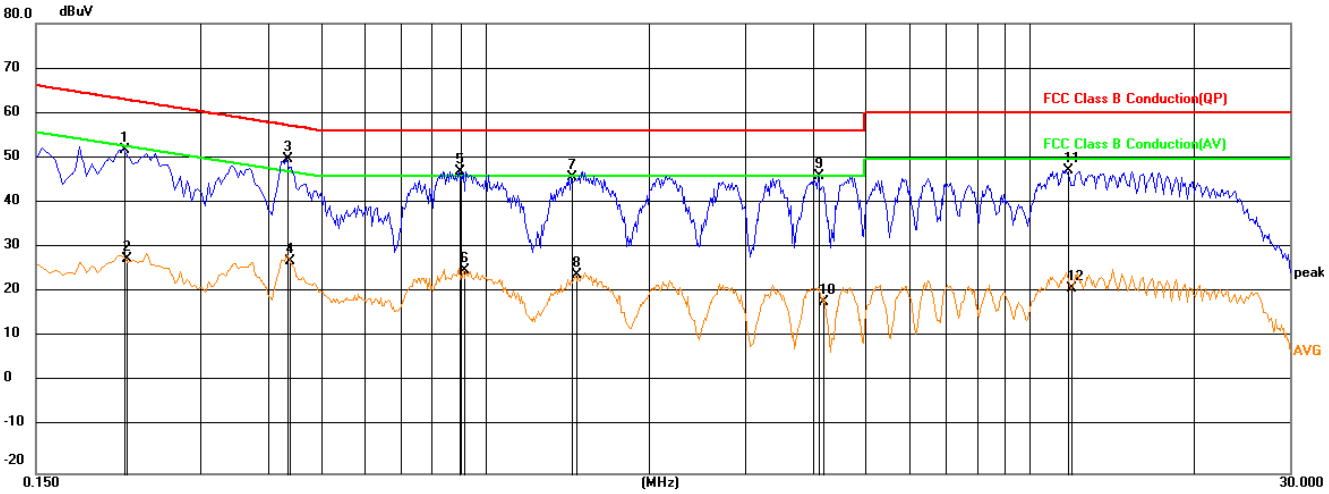
5.5.2 Block Diagram of Test Setup



5.5.3 Test Results

Temperature	23.0℃	Humidity	53.2%
Test Engineer	Jay Li		

Neutral:



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.2175	36.68	15.20	51.88	62.91	-11.03	QP
2	0.2197	12.43	15.20	27.63	52.83	-25.20	AVG
3	0.4335	34.61	15.32	49.93	57.19	-7.26	QP
4	0.4397	12.01	15.32	27.33	47.07	-19.74	AVG
5	0.8970	31.95	15.29	47.24	56.00	-8.76	QP
6	0.9150	10.06	15.28	25.34	46.00	-20.66	AVG
7	1.4415	30.45	15.32	45.77	56.00	-10.23	QP
8	1.4640	8.98	15.32	24.30	46.00	-21.70	AVG
9	4.1055	30.63	15.46	46.09	56.00	-9.91	QP
10	4.1730	2.81	15.46	18.27	46.00	-27.73	AVG
11	11.7375	31.62	15.84	47.46	60.00	-12.54	QP
12	11.8725	5.31	15.85	21.16	50.00	-28.84	AVG

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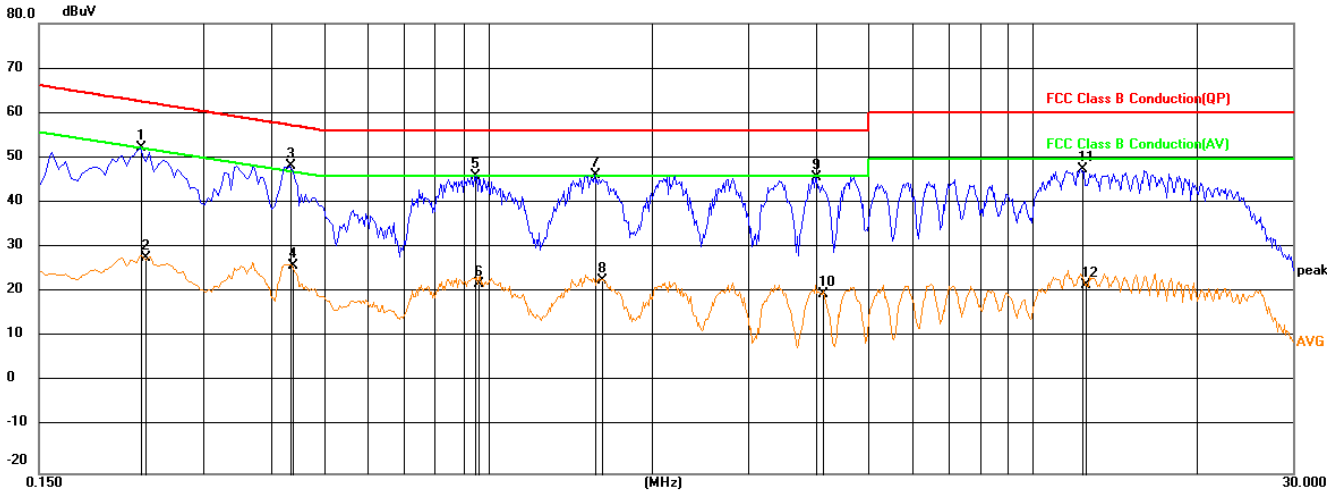
Line:



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB)	(dBuV)	(dBuV)	(dB)	
1	0.2310	37.20	15.21	52.41	62.41	-10.00	QP
2	0.2341	12.66	15.21	27.87	52.30	-24.43	AVG
3	0.4335	32.97	15.32	48.29	57.19	-8.90	QP
4	0.4380	10.94	15.32	26.26	47.10	-20.84	AVG
5	0.9465	30.90	15.29	46.19	56.00	-9.81	QP
6	0.9600	6.92	15.28	22.20	46.00	-23.80	AVG
7	1.5765	30.95	15.35	46.30	56.00	-9.70	QP
8	1.6170	7.59	15.36	22.95	46.00	-23.05	AVG
9	4.0020	30.37	15.47	45.84	56.00	-10.16	QP
10	4.1190	4.55	15.47	20.02	46.00	-25.98	AVG
11	12.2685	31.63	15.89	47.52	60.00	-12.48	QP
12	12.4530	6.09	15.91	22.00	50.00	-28.00	AVG

****Note: 1). Pre-scan all antennas and recorded the worst case results in this report (antenna 0).*
2). Margin=Reading level + Correct - Limit

6. SUMMARY OF TEST EQUIPMENT

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	MXA Signal Analyzer	Agilent	N9020A	MY49100060	2019-11-22	2020-11-21
2	DC Power Supply	Agilent	E3642A	N/A	2019-11-14	2020-11-13
3	Temperature & Humidity Chamber	GUANGZHOU GOGNWEN	GDS-100	70932	2019-10-09	2020-10-08
4	EMI Test Software	EZ	EZ-EMC	/	N/A	N/A
5	3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	2020-06-22	2021-06-21
6	Positioning Controller	MF	MF7082	MF78020803	2020-06-22	2021-06-21
7	Active Loop Antenna	SCHWARZBECK	FMZB 1519B	00005	2018-07-26	2021-07-25
8	By-log Antenna	SCHWARZBECK	VULB9163	9163-470	2018-07-26	2021-07-25
9	Horn Antenna	SCHWARZBECK	BBHA 9120D	9120D-1925	2018-07-02	2021-07-01
10	EMI Test Receiver	R&S	ESR 7	101181	2020-06-22	2021-06-21
11	RS SPECTRUM ANALYZER	R&S	FSP40	100503	2019-11-14	2020-11-13
12	Broadband Preamplifier	/	BP-01M18G	P190501	2020-06-22	2021-06-21
13	RF Cable-R03m	Jye Bao	RG142	CB021	2020-06-22	2021-06-21
14	RF Cable-HIGH	SUHNER	SUCOFLEX 106	03CH03-HY	2020-06-22	2021-06-21
15	EMI Test Receiver	R&S	ESPI	101840	2020-06-22	2021-06-21
16	Artificial Mains	R&S	ENV216	101288	2020-06-22	2021-06-21
17	10dB Attenuator	SCHWARZBECK	MTS-IMP-136	261115-001-0032	2020-06-22	2021-06-21
18	RF Filter	Micro-Tronics	BRC50718	S/N-017	2019-11-22	2020-11-21
Note: All equipment is calibrated through CHINA CEPREI LABORATORY and GUANGZHOU LISAI CALIBRATION AND TEST CO., LTD.						

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 REPORT----------