

FCC TEST REPORT

FCC ID: 2ATOT-30004

Report Number..... : ZKT-220915L6886-05

Date of Test..... : Aug. 15, 2022 – Oct. 13, 2022

Date of issue..... : Oct. 13, 2022

Total number of pages : 33

Test Result..... : PASS

Testing Laboratory : **Shenzhen ZKT Technology Co., Ltd.**

Address : 1/F, No. 101, Building B, No. 6, Tangwei Community Industrial Avenue, Fuhai Street, Bao'an District, Shenzhen, China

Applicant's name : Lexi Device, Inc.

Address : 2342 Shattuck Ave, #260, Berkeley, CA 94704 US

Manufacturer's name : Jingrui Inspire Co.,Ltd.

Address : RM1306, Block 3 (C-1), Runhui Science Park, 18 Shenzhou Rd., Huangpu Dist., Guangzhou, Guangdong Prov., P.R. China, 510663

Test specification:

Standard : FCC CFR Title 47 Part 15 Subpart C Section 15.249
ANSI C63.10:2013

Test procedure..... : /

Non-standard test method : N/A

Test Report Form No. : TRF-EL-110_V0

Test Report Form(s) Originator : ZKT Testing

Master TRF : Dated: 2020-01-06

This device described above has been tested by ZKT, and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

This report shall not be reproduced except in full, without the written approval of ZKT, this document may be altered or revised by ZKT, personal only, and shall be noted in the revision of the document.

Product name..... : Multi-Protocol Gateway


Trademark : Lexi

Model/Type reference : 30004, 30003, 30017, 30018, 300019, 30020, 30021

Ratings : DC 5V 2A from adapter

Testing procedure and testing location:**Testing Laboratory** **Shenzhen ZKT Technology Co., Ltd.**Address 1/F, No. 101, Building B, No. 6, Tangwei Community
Industrial Avenue, Fuhai Street, Bao'an District,
Shenzhen, China

Tested by (name + signature) Alen He



Reviewer (name + signature) Joe Liu



Approved (name + signature) Lake Xie



Table of Contents

	Page
1. VERSION	5
2. SUMMARY OF TEST RESULTS	6
2.1 TEST FACILITY	7
2.2 MEASUREMENT UNCERTAINTY	7
3. GENERAL INFORMATION	8
3.1 GENERAL DESCRIPTION OF EUT	8
3.2 DESCRIPTION OF TEST MODES	8
3.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED	10
3.4 DESCRIPTION OF SUPPORT UNITS(CONDUCTED MODE)	10
3.5EQUIPMENTS LIST FOR ALL TEST ITEMS	11
4. EMC EMISSION TEST	12
4.1 CONDUCTED EMISSION MEASUREMENT	12
4.1.1 POWER LINE CONDUCTED EMISSION LIMITS	12
4.1.2 TEST PROCEDURE	12
4.1.3 DEVIATION FROM TEST STANDARD	12
4.1.4 TEST SETUP	13
4.1.5 EUT OPERATING CONDITIONS	13
4.1.6 TEST RESULT	14
4.1.6 TEST RESULT	14
4.2 RADIATED EMISSION MEASUREMENT	16
4.2.1 RADIATED EMISSION LIMITS	16
4.2.2 TEST PROCEDURE	17
4.2.3 DEVIATION FROM TEST STANDARD	17
4.2.4 TEST SETUP	17
4.2.5 EUT OPERATING CONDITIONS	18
4.2.6 TEST RESULTS	19
5. BANDWIDTH OF FREQUENCY BAND EDGE	24
5.1 TEST REQUIREMENT:	24
5.2 TEST PROCEDURE	24
5.3 DEVIATION FROM TEST STANDARD	25
5.4 TEST SETUP	25
5.5 EUT OPERATING CONDITIONS	25
5.6 TEST RESULT	26
6. CHANNEL BANDWIDTH	27
6.1 APPLIED PROCEDURES / LIMIT	27
6.2 TEST PROCEDURE	27
6.3 DEVIATION FROM STANDARD	27
6.4 TEST SETUP	27
6.5 EUT OPERATION CONDITIONS	27

6.6 TEST RESULT	28
7. ANTENNA REQUIREMENT	30
8. TEST SETUP PHOTO	31
9. EUT CONSTRUCTIONAL DETAILS	33

1. VERSION

Report No.	Version	Description	Approved
ZKT-220915L6886-05	Rev.01	Initial issue of report	Oct. 13, 2022

2. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

FCC Part15 (15.249) , Subpart C			
Standard Section	Test Item	Result	Remark
FCC part 15.203	Antenna requirement	PASS	
FCC part 15.207	AC Power Line Conducted Emission	PASS	
FCC part 15.249	Fundamental & Radiated Spurious Emission Measurement	PASS	
FCC 15.215 (c)	20dB Bandwidth	PASS	
FCC part 15.205	Band Edge	PASS	

NOTE:

(1)" N/A" denotes test is not applicable in this Test Report

2.1 TEST FACILITY

Shenzhen ZKT Technology Co., Ltd.

Add. : 1/F, No. 101, Building B, No. 6, Tangwei Community Industrial Avenue, Fuhai Street, Bao'an District, Shenzhen, China

FCC Test Firm Registration Number: 692225

Designation Number: CN1299

IC Registered No.: 27033

2.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement $y \pm U$, where expanded uncertainty U is based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95 %.

No.	Item	Uncertainty
1	Conducted Emission Test	$\pm 1.38\text{dB}$
2	RF power conducted	$\pm 0.16\text{dB}$
3	Spurious emissions conducted	$\pm 0.21\text{dB}$
4	All emissions radiated(<1G)	$\pm 4.68\text{dB}$
5	All emissions radiated(>1G)	$\pm 4.89\text{dB}$
6	Temperature	$\pm 0.5^{\circ}\text{C}$
7	Humidity	$\pm 2\%$

3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

Product Name:	Multi-Protocol Gateway
Model No.:	30004
Series Model No.	30003, 30017, 30018, 300019, 30020, 30021
Hardware Version:	V1.0
Software Version:	SecureCRT
Sample(s) Status:	Engineer sample
Frequency range:	902.3MHz~927.5MHz
Frequency separate:	200KHz
Channel numbers	127
Modulation technology:	FSK
Antenna Type:	Glue stick external antenna
Antenna gain:	1.44dBi
Power supply:	DC 5V 2A from adapter

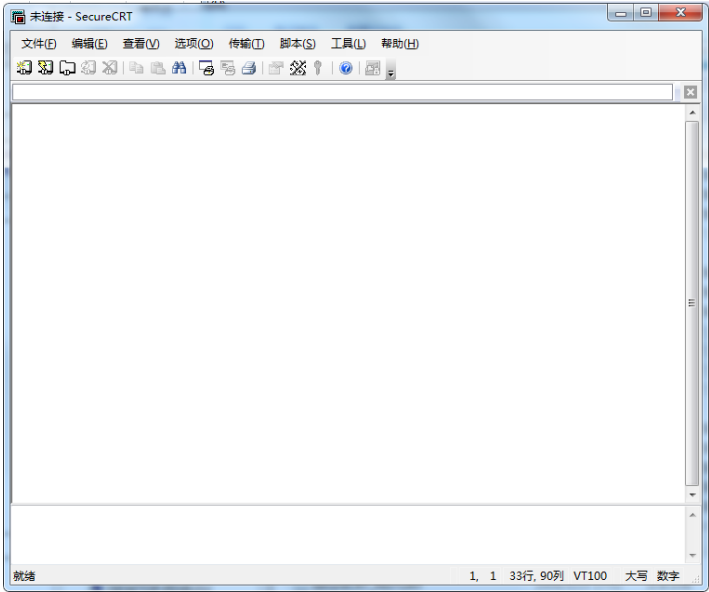
Note:

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:

Test channel	Frequency
The lowest channel	902.3MHz
The middle channel	915.0MHz
The Highest channel	927.5MHz

3.2 DESCRIPTION OF TEST MODES

Transmitting mode	Keep the EUT in continuously transmitting mode
Remark: During the test, the duty cycle >98%, the test voltage was tuned from 85% to 115% of the nominal rated supply voltage, and found that the worst case was under the nominal rated supply condition. So the report just shows that condition's data.	
We have verified the construction and function in typical operation. All the test modes were carried out with the EUT in transmitting operation, which was shown in this test report and defined as follows:	
Pre-scan all kind of data rate in lowest channel, and found the follow list which it was worst case.	

Test Software	Test Tool 
Power level setup	<10dBm

3.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

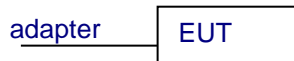
Conducted Emission



Radiated Emission



Conducted Spurious



3.4 DESCRIPTION OF SUPPORT UNITS(CONDUCTED MODE)

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Note
1	adapter	GUIZHOU VINMAN INDUSTRIAL CO.,LTD.	TAP12-050S200U1	/	SDOC
2					
3					
4					

Item	Shielded Type	Ferrite Core	Length	Note

Note:

- (1) The support equipment was authorized by Declaration of Confirmation.
- (2) For detachable type I/O cable should be specified the length in cm in 『Length』 column.

3.5EQUIPMENTS LIST FOR ALL TEST ITEMS

Radiation Test equipment

Item	Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
1	Spectrum Analyzer (9kHz-26.5GHz)	KEYSIGHT	9020A	MY55370835	Oct. 18, 2021	Oct. 17, 2022
2	Spectrum Analyzer (1GHz-40GHz)	R&S	FSQ	100363	Oct. 17, 2021	Oct. 16, 2022
3	EMI Test Receiver (9kHz-7GHz)	R&S	ESCI7	101169	Oct. 18, 2021	Oct. 17, 2022
4	Bilog Antenna (30MHz-1500MHz)	Schwarzbeck	VULB9168	N/A	Oct. 17, 2021	Oct. 16, 2022
5	Horn Antenna (1GHz-18GHz)	Agilent	AH-118	071145	Oct. 17, 2021	Oct. 16, 2022
6	Loop Antenna	TESEQ	HLA6121	58357	Oct. 17, 2021	Oct. 16, 2022
7	Amplifier (30-1000MHz)	EM Electronics	EM330 Amplifier	060747	Oct. 17, 2021	Oct. 16, 2022
8	Amplifier (1GHz-26.5GHz)	Agilent	8449B	3008A00315	Oct. 18, 2021	Oct. 17, 2022
9	RF cables1 (9kHz-30MHz)	N/A	9kHz-30MHz	N/A	Oct. 18, 2021	Oct. 17, 2022
10	RF cables2 (30MHz-1GHz)	N/A	30MHz-1GHz	N/A	Oct. 18, 2021	Oct. 17, 2022
11	RF cables3 (1GHz-40GHz)	N/A	1GHz-40GHz	N/A	Oct. 18, 2021	Oct. 17, 2022
12	ESG Signal Generator	Agilent	E4421B	N/A	Oct. 18, 2021	Oct. 17, 2022
13	Signal Generator	Agilent	N5182A	N/A	Oct. 22, 2021	Oct. 21, 2022
14	Magnetic Field Probe Tester	Narda	ELT-400	0-0344	Oct. 17, 2021	Oct. 16, 2022
15	MWRF Power Meter Test system	MW	MW100-RPC B	N/A	Oct. 22, 2021	Oct. 21, 2022
16	D.C. Power Supply	LongWei	TPR-6405D	N/A	\	\
17	EMC Software	Frad	EZ-EMC	Ver.EMC-CON 3A1.1	\	\
18	RF Software	MW	MTS8310	V2.0.0.0	\	\
19	Turntable	MF	MF-7802BS	N/A	\	\
20	Antenna tower	MF	MF-7802BS	N/A	\	\

Conduction Test equipment

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
1	LISN	R&S	ENV216	101471	Oct. 22, 2021	Oct. 21, 2022
2	LISN	CYBERTEK	EM5040A	E1850400149	Oct. 22, 2021	Oct. 21, 2022
3	Test Cable	N/A	C01	N/A	Oct. 18, 2021	Oct. 17, 2022
4	Test Cable	N/A	C02	N/A	Oct. 18, 2021	Oct. 17, 2022
5	EMI Test Receiver	R&S	ESCI3	101393	Oct. 17, 2021	Oct. 16, 2022
6	EMC Software	Frad	EZ-EMC	Ver.EMC-CON 3A1.1	\	\

4. EMC EMISSION TEST

4.1 CONDUCTED EMISSION MEASUREMENT

Test Requirement:	FCC Part15 C Section 15.207
Test Method:	ANSI C63.10:2013
Test Frequency Range:	150KHz to 30MHz
Receiver setup:	RBW=9KHz, VBW=30KHz, Sweep time=auto

4.1.1 POWER LINE CONDUCTED EMISSION Limits

FREQUENCY (MHz)	Limit (dBuV)		Standard
	Quasi-peak	Average	
0.15 -0.5	66 - 56 *	56 - 46 *	FCC
0.50 -5.0	56.00	46.00	FCC
5.0 -30.0	60.00	50.00	FCC

Note:

(1) *Decreases with the logarithm of the frequency.

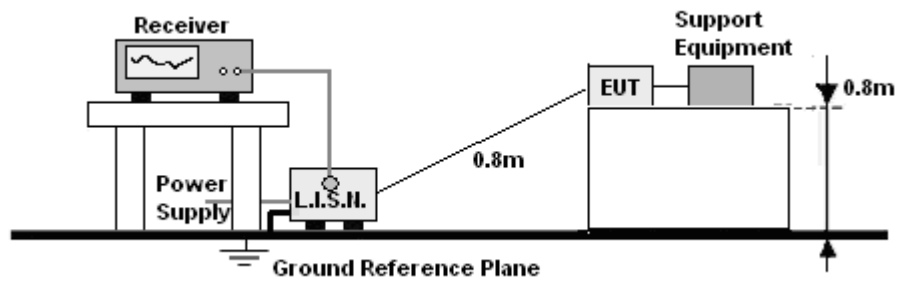
4.1.2 TEST PROCEDURE

- The EUT was placed 0.1 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
- I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
- LISN at least 80 cm from nearest part of EUT chassis.
- For the actual test configuration, please refer to the related Item –EUT Test Photos.

4.1.3 DEVIATION FROM TEST STANDARD

No deviation

4.1.4 TEST SETUP



4.1.5 EUT OPERATING CONDITIONS

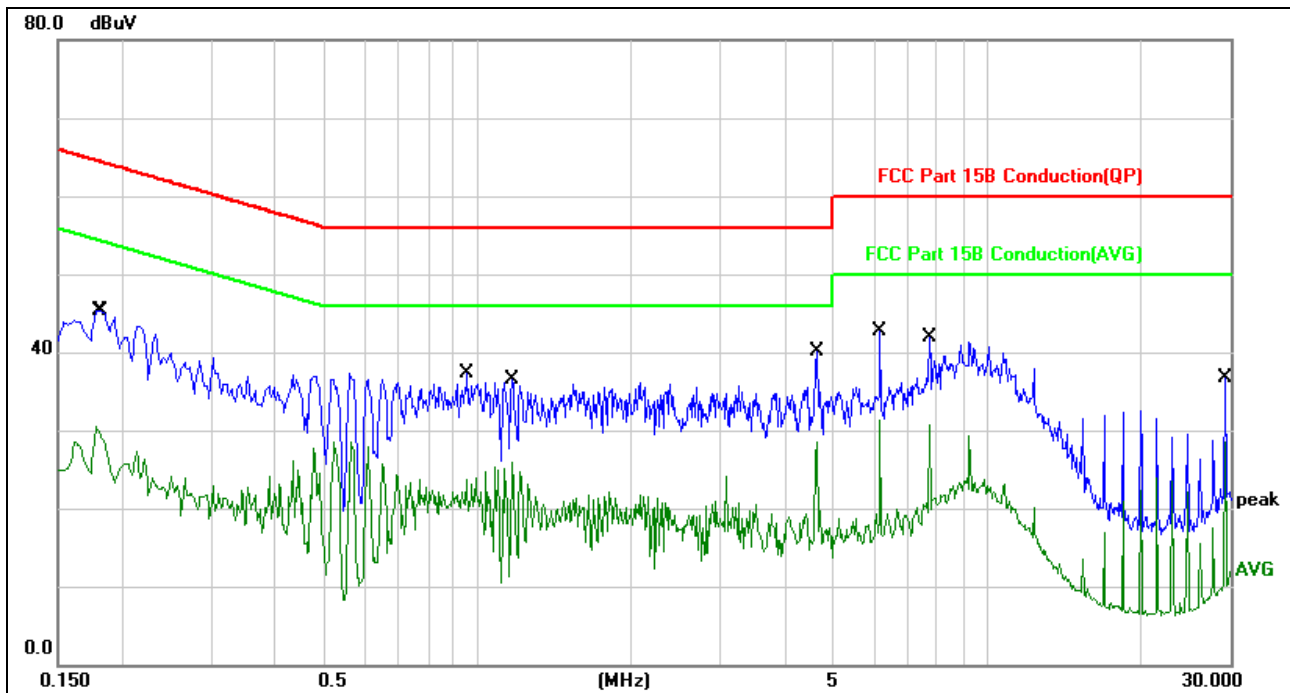
The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

We pretest AC 120V and AC 230V, the worst voltage was AC 120V and the data recording in the report.

4.1.6 TEST RESULT

4.1.6 Test Result

Temperature :	26°C	Relative Humidity :	54%
Pressure :	101kPa	Phase :	L
Test Voltage :	AC 120V/60Hz		

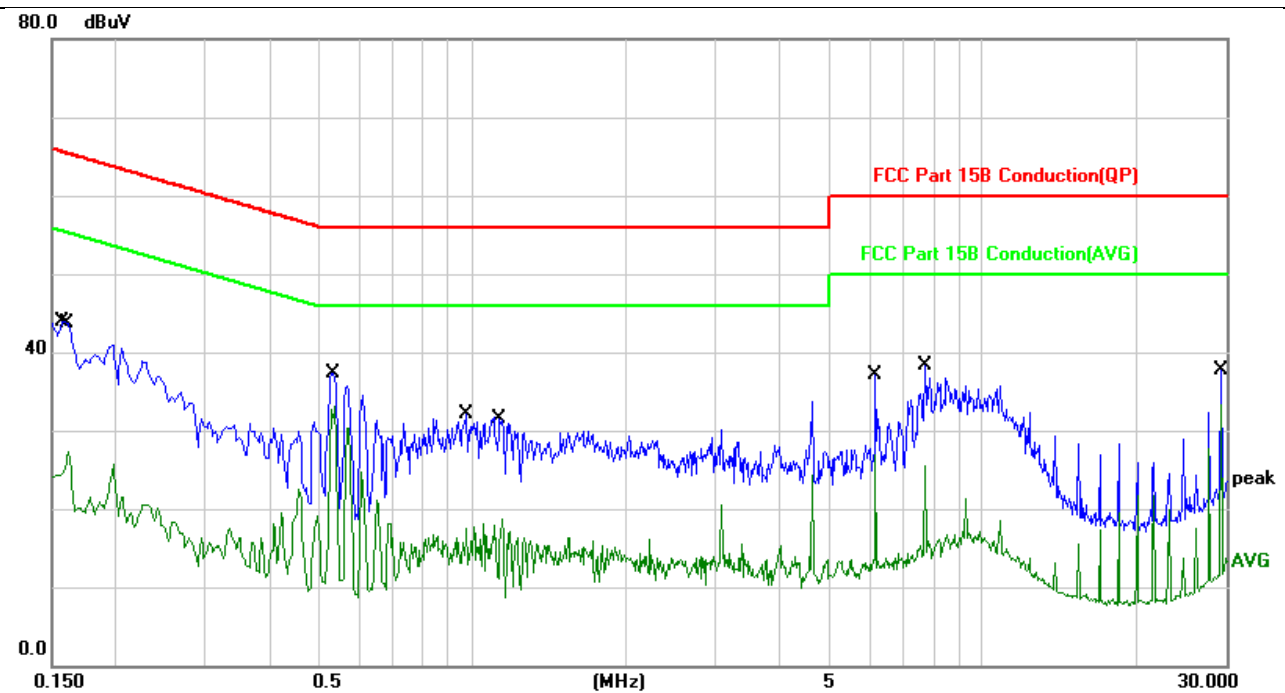


No. Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1	0.1780	20.83	9.75	30.58	54.57	-23.99	AVG	
2	0.1819	35.58	9.75	45.33	64.39	-19.06	QP	
3	0.9540	27.63	9.77	37.40	56.00	-18.60	QP	
4	1.1700	16.12	9.73	25.85	46.00	-20.15	AVG	
5 *	4.6260	30.45	9.67	40.12	56.00	-15.88	QP	
6	4.6260	18.89	9.67	28.56	46.00	-17.44	AVG	
7	6.1660	33.04	9.64	42.68	60.00	-17.32	QP	
8	6.1660	21.64	9.64	31.28	50.00	-18.72	AVG	
9	7.7060	32.21	9.61	41.82	60.00	-18.18	QP	
10	7.7060	21.02	9.61	30.63	50.00	-19.37	AVG	
11	29.2980	27.22	9.50	36.72	60.00	-23.28	QP	
12	29.2980	19.06	9.50	28.56	50.00	-21.44	AVG	

Notes:

1. An initial pre-scan was performed on the line and neutral lines with peak detector.
2. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
3. Measurement Level = Reading level + Correct Factor

Temperature :	26°C	Relative Humidity :	54%
Pressure :	101kPa	Phase :	N
Test Voltage :	AC 120V/60Hz		



No. Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1	0.1580	34.10	9.75	43.85	65.56	-21.71	QP	
2	0.1620	17.59	9.75	27.34	55.36	-28.02	AVG	
3	0.5340	27.53	9.85	37.38	56.00	-18.62	QP	
4 *	0.5380	23.21	9.85	33.06	46.00	-12.94	AVG	
5	0.9780	22.37	9.76	32.13	56.00	-23.87	QP	
6	1.1420	8.94	9.74	18.68	46.00	-27.32	AVG	
7	6.1740	27.49	9.63	37.12	60.00	-22.88	QP	
8	6.1740	17.30	9.63	26.93	50.00	-23.07	AVG	
9	7.7180	28.76	9.62	38.38	60.00	-21.62	QP	
10	7.7180	15.92	9.62	25.54	50.00	-24.46	AVG	
11	29.3220	28.20	9.50	37.70	60.00	-22.30	QP	
12	29.3220	23.79	9.50	33.29	50.00	-16.71	AVG	

Notes:

1. An initial pre-scan was performed on the line and neutral lines with peak detector.
2. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
3. Measurement Level = Reading level + Correct Factor

4.2 RADIATED EMISSION MEASUREMENT

Test Requirement:	FCC Part15 C Section 15.209				
Test Method:	ANSI C63.10:2013				
Test Frequency Range:	9kHz to 25GHz				
Test site:	Measurement Distance: 3m				
Receiver setup:	Frequency	Detector	RBW	VBW	Value
	9KHz-150KHz	Quasi-peak	200Hz	600Hz	Quasi-peak
	150KHz-30MHz	Quasi-peak	9KHz	30KHz	Quasi-peak
	30MHz-1GHz	Quasi-peak	120KHz	300KHz	Quasi-peak
	Above 1GHz	Peak	1MHz	3MHz	Peak
		Peak	1MHz	10Hz	Average

4.2.1 RADIATED EMISSION LIMITS

Frequencies (MHz)	Field Strength (micorvolts/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

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

LIMITS OF RADIATED EMISSION MEASUREMENT

FREQUENCY (MHz)	Limit (dBuV/m) (at 3M)	
	PEAK	AVERAGE
Above 1000	74	54

Notes:

- (1) The limit for radiated test was performed according to FCC PART 15C.

- (2) The tighter limit applies at the band edges.
- (3) Emission level (dBuV/m)=20log Emission level (uV/m).

4.2.2 TEST PROCEDURE

- a. The measuring distance of at 3 m shall be used for measurements at frequency up to 25GHz. For frequencies above 1GHz, any suitable measuring distance may be used.
- b. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-chamber test. The table was rotated 360 degrees to determine the position of the highest radiation.
- c. The height of the equipment or of the substitution antenna shall be 0.8m; above 1GHz, the height was 1.5m, the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- e. If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.
- f. For the actual test configuration, please refer to the related Item –EUT Test Photos.
- g. For the radiated emission test above 1GHz:
Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response.

The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.

Note:

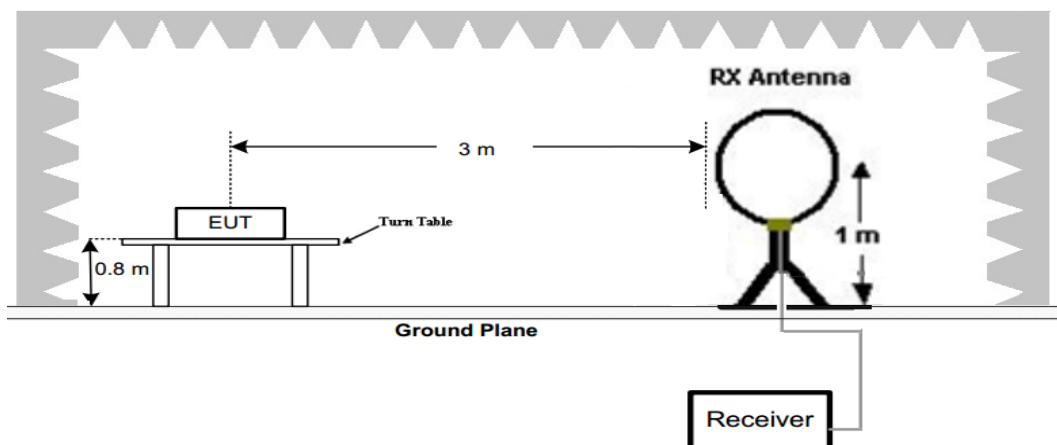
Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported

4.2.3 DEVIATION FROM TEST STANDARD

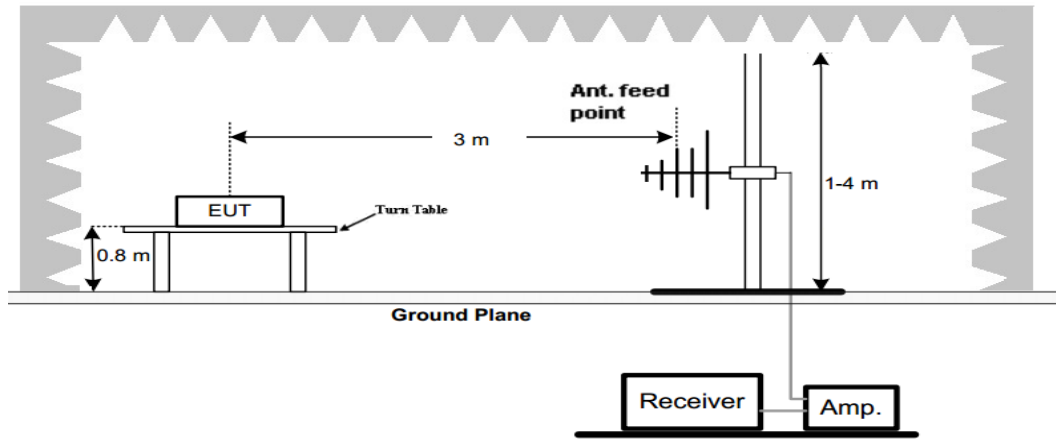
No deviation

4.2.4 TEST SETUP

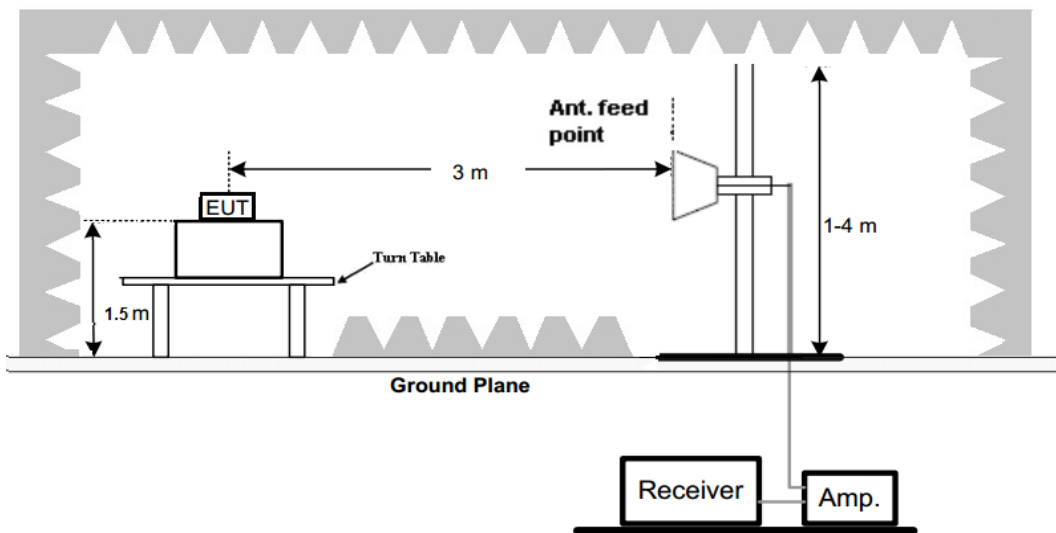
(A) Radiated Emission Test-Up Frequency Below 30MHz



(B) Radiated Emission Test-Up Frequency 30MHz~1GHz



(C) Radiated Emission Test-Up Frequency Above 1GHz



4.2.5 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

4.2.6 TEST RESULTS

Between 9KHz – 30MHz

The emission from 9 kHz to 30MHz was pre-tested and found the result was 20dB lower than the limit, and according to 15.31(o) & RSS-Gen 6.13, the test result no need to reported.

Field Strength of Fundamental:

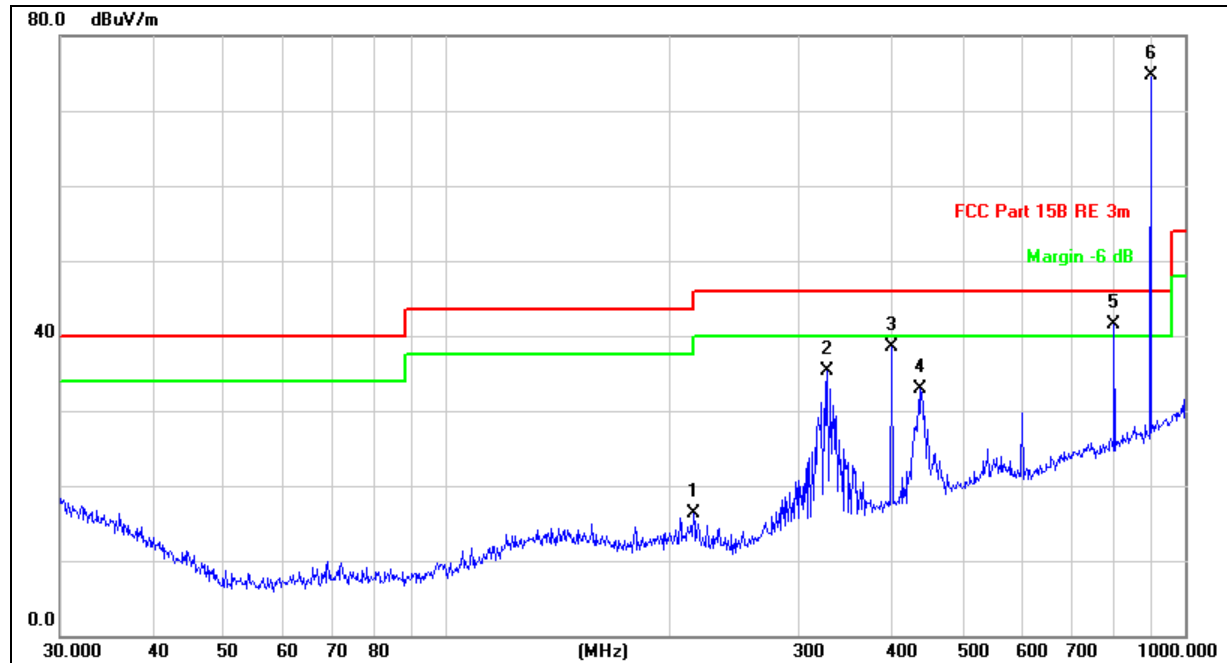
Frequency (MHz)	Emission (dBuV/m)	PK/AV	Ant. Pol.	Limits PK/AV (dBuV/m)	Margin (dB)
902.3	85.55	PK	H	114	-28.45
902.3	64.53	AV	H	94	-29.47
902.3	82.59	PK	V	114	-31.41
902.3	61.73	AV	V	94	-32.27

Frequency (MHz)	Emission (dBuV/m)	PK/AV	Ant. Pol.	Limits PK/AV (dBuV/m)	Margin (dB)
915.0	81.17	PK	H	114	-32.83
915.0	65.08	AV	H	94	-28.92
915.0	82.16	PK	V	114	-31.84
915.0	61.04	AV	V	94	-32.96

Frequency (MHz)	Emission (dBuV/m)	PK/AV	Ant. Pol.	Limits PK/AV (dBuV/m)	Margin (dB)
927.5	84.41	PK	H	114	-29.59
927.5	64.72	AV	H	94	-29.28
927.5	84.00	PK	V	114	-30.00
927.5	62.69	AV	V	94	-31.31

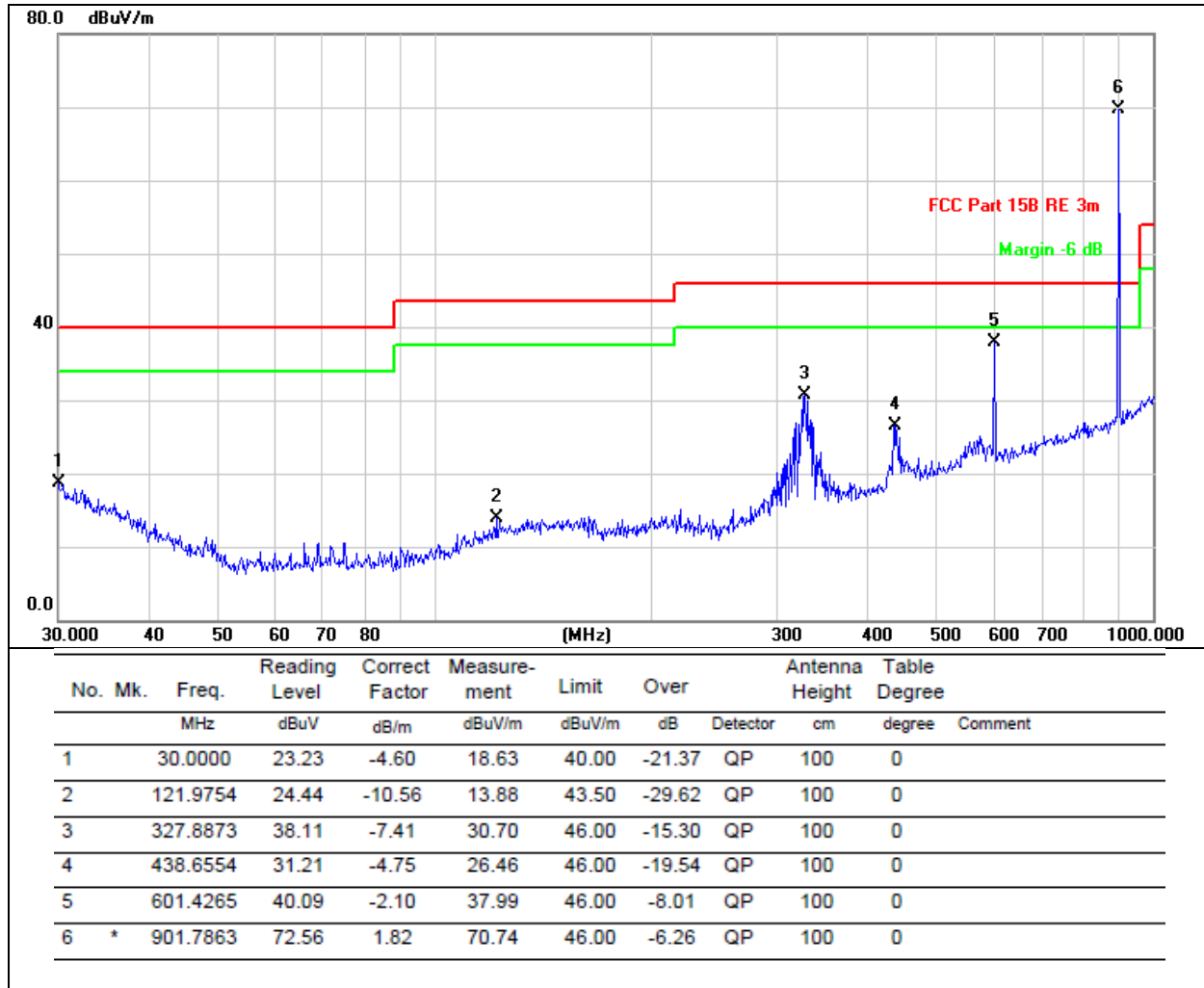
Between 30MHz – 1GHz

Temperature:	26°C	Relative Humidity:	54%
Pressure:	101 kPa	Polarization:	Horizontal
Test Voltage:	AC120V		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector	cm	degree
1		216.0240	26.59	-10.24	16.35	46.00	-29.65	QP	100	360
2		327.8873	42.75	-7.41	35.34	46.00	-10.66	QP	100	360
3		400.4319	44.18	-5.73	38.45	46.00	-7.55	QP	100	360
4		438.6554	37.70	-4.75	32.95	46.00	-13.05	QP	100	360
5	*	801.7863	39.77	1.82	41.59	46.00	-4.41	QP	100	360
6		902.0000	82.68	6.26	76.42	54.00	22.42	QP	100	360

Temperature:	26°C	Relative Humidity:	54%
Pressure:	101kPa	Polarization:	Vertical
Test Voltage:	AC120V		



Remarks:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2. The emission levels of other frequencies are very lower than the limit and not show in test report.

1GHz~25GHz

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre-ampl ifier (dB)	Cable Loss (dB)	Antenna Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/ m)	Margin (dB)	Detect or Type
Low Channel: 902.3MHz									
V	1804.60	54.37	30.26	4.18	24.97	53.26	74.00	-20.74	PK
V	1804.60	40.36	30.26	4.18	24.97	39.25	54.00	-14.75	AV
V	2706.90	53.92	30.31	4.7	24.82	53.13	74.00	-20.87	PK
V	2706.90	40.05	30.31	4.7	24.82	39.26	54.00	-14.74	AV
V	3609.20	50.16	30.43	5.13	24.7	49.56	74.00	-24.44	PK
V	3609.20	36.32	30.43	5.13	24.7	35.72	54.00	-18.28	AV
H	1804.60	54.78	30.26	4.18	24.97	53.67	74.00	-20.33	PK
H	1804.60	41.28	30.26	4.18	24.97	40.17	54.00	-13.83	AV
H	2706.90	53.70	30.31	4.7	24.82	52.91	74.00	-21.09	PK
H	2706.90	40.96	30.31	4.7	24.82	40.17	54.00	-13.83	AV
H	3609.20	52.06	30.43	5.13	24.7	51.46	74.00	-22.54	PK
H	3609.20	39.04	30.43	5.13	24.7	38.44	54.00	-15.56	AV

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre-ampl ifier (dB)	Cable Loss (dB)	Antenna Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/ m)	Margin (dB)	Detect or Type
Middle Channel: 915.0MHz									
V	1830.00	54.89	30.26	4.18	24.97	53.78	74.00	-20.22	PK
V	1830.00	39.35	30.26	4.18	24.97	38.24	54.00	-15.76	AV
V	2745.00	54.14	30.31	4.7	24.82	53.35	74.00	-20.65	PK
V	2745.00	40.74	30.31	4.7	24.82	39.95	54.00	-14.05	AV
V	3660.00	51.96	30.43	5.13	24.7	51.36	74.00	-22.64	PK
V	3660.00	36.94	30.43	5.13	24.7	36.34	54.00	-17.66	AV
H	1830.00	54.06	30.26	4.18	24.97	52.95	74.00	-21.05	PK
H	1830.00	41.79	30.26	4.18	24.97	40.68	54.00	-13.32	AV
H	2745.00	53.15	30.31	4.7	24.82	52.36	74.00	-21.64	PK
H	2745.00	41.23	30.31	4.7	24.82	40.44	54.00	-13.56	AV
H	3660.00	52.18	30.43	5.13	24.7	51.58	74.00	-22.42	PK
H	3660.00	36.30	30.43	5.13	24.7	35.70	54.00	-18.30	AV

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre-ampli fier (dB)	Cable Loss (dB)	Antenna Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/ m)	Margin (dB)	Detect or Type
High Channel: 927.5MHz									
V	1855.00	55.14	30.26	4.18	24.97	54.03	74.00	-19.97	PK
V	1855.00	41.75	30.26	4.18	24.97	40.64	54.00	-13.36	AV
V	2782.50	52.93	30.31	4.7	24.82	52.14	74.00	-21.86	PK
V	2782.50	39.25	30.31	4.7	24.82	38.46	54.00	-15.54	AV
V	3710.00	50.56	30.43	5.13	24.7	49.96	74.00	-24.04	PK
V	3710.00	36.99	30.43	5.13	24.7	36.39	54.00	-17.61	AV
H	1855.00	56.20	30.26	4.18	24.97	55.09	74.00	-18.91	PK
H	1855.00	39.31	30.26	4.18	24.97	38.20	54.00	-15.80	AV
H	2782.50	54.32	30.31	4.7	24.82	53.53	74.00	-20.47	PK
H	2782.50	39.15	30.31	4.7	24.82	38.36	54.00	-15.64	AV
H	3710.00	51.31	30.43	5.13	24.7	50.71	74.00	-23.29	PK
H	3710.00	38.80	30.43	5.13	24.7	38.20	54.00	-15.80	AV

Remark:

1. Emission Level = Meter Reading + Antenna Factor + Cable Loss – Pre-amplifier,
Margin= Emission Level - Limit
2. If peak below the average limit, the average emission was no test.
3. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

5. BANDWIDTH OF FREQUENCY BAND EDGE

5.1 TEST REQUIREMENT:

Test Requirement:	FCC Part15 C Section 15.209 and 15.205				
Test Method:	ANSI C63.10: 2013				
Test Frequency Range:	All of the restrict bands were tested, only the worst band's (2310MHz to 2500MHz) data was showed.				
Test site:	Measurement Distance: 3m				
Receiver setup:	Frequency	Detector	RBW	VBW	Value
	Above 1GHz	Peak	1MHz	3MHz	Peak
		Average	1MHz	3MHz	Average

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 TEST PROCEDURE

Above 1GHz test procedure as below:

- a. 1. The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
- g. Test the EUT in the lowest channel,the Highest channel

Note:

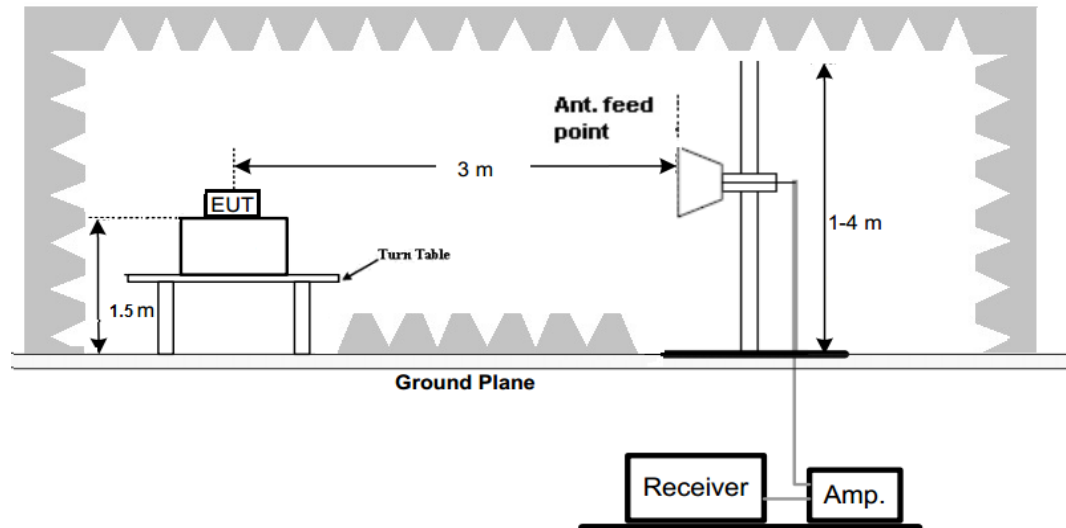
Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported

5.3 DEVIATION FROM TEST STANDARD

No deviation

5.4 TEST SETUP

Radiated Emission Test-Up Frequency Above 1GHz



5.5 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.

5.6 TEST RESULT

[illegible]

6. CHANNEL BANDWIDTH

Test Requirement:	FCC Part15 C Section 15.215(c)
Test Method:	ANSI C63.10: 2013

6.1 APPLIED PROCEDURES / LIMIT

Section	Test Item	Frequency Range (MHz)	Result
15.215(c)	Bandwidth	2400-2483.5	PASS

6.2 TEST PROCEDURE

1. Set resolution bandwidth (RBW) =1% to 5% of the OBW ,
2. Set the video bandwidth (VBW) $\geq 3 \times$ RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

6.3 DEVIATION FROM STANDARD

No deviation.

6.4 TEST SETUP



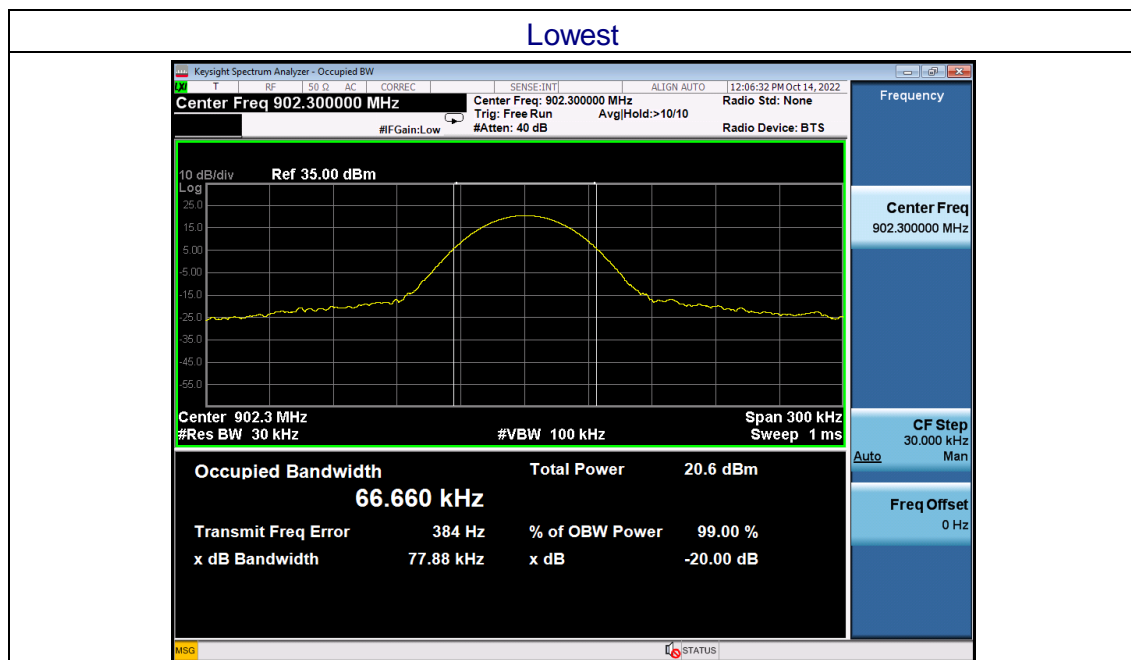
6.5 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

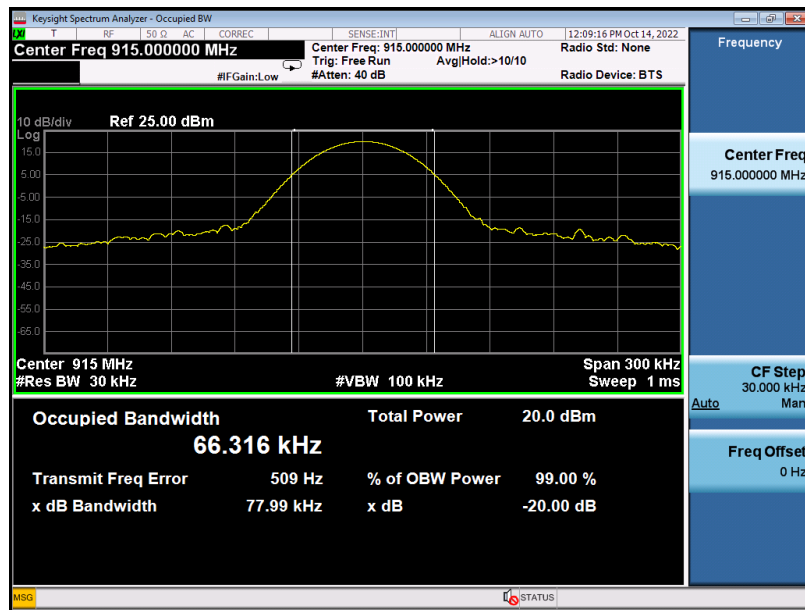
6.6 TEST RESULT

Temperature :	26°C	Relative Humidity :	54%
Pressure :	101kPa	Test Voltage :	DC5.0V
Test Mode :	FSK		

Test channel	99% Channel Bandwidth (KHz)	20dB Channel Bandwidth (KHz)	Result
Lowest	66.660	77.88	Pass
Middle	66.316	77.99	
Highest	67.049	77.97	



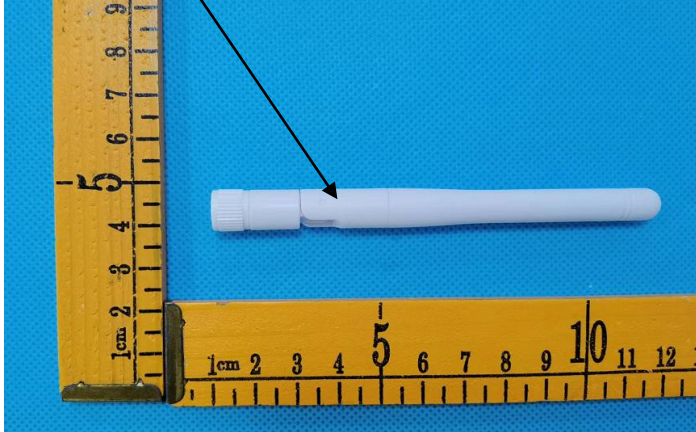
Middle



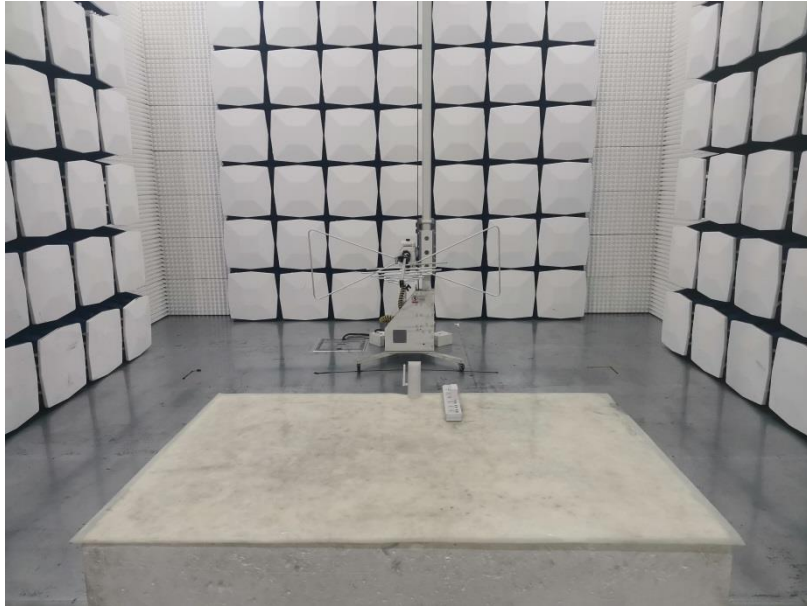
Highest



7. ANTENNA REQUIREMENT

Standard requirement:	FCC Part15 C Section 15.203 /247(c)
<p>15.203 requirement: 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, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.</p> <p>15.247(c) (1)(i) requirement: (i) Systems operating in the 2400-2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.</p>	
EUT Antenna:	
<p>The antenna is Glue stick external antenna, the best case gain of the antennas are 1.44dBi, reference to the below photo for details</p> <p>ANT for Lora</p> 	

8. TEST SETUP PHOTO





9. EUT CONSTRUCTIONAL DETAILS

Please refer to external photos file and internal photos file

***** END OF REPORT *****