Shenzhen HTT Technology Co., Ltd.

FCC PART 15 SUBPART C TEST REPORT

FCC PART 15.231

Report Reference No......:	**HTT202210146F02**	
FCC ID..... **:**	**2A884-RMRF10TP**	
Compiled by (position+printed name+signature)..:	File administrators	Ervin Xu
Supervised by (position+printed name+signature)..:	Project Engineer	Bruce Zhu
Approved by (position+printed name+signature)..:	RF Manager	Kevin Yang
Date of issue.....:	Nov.03,2022	

Testing Laboratory Name .....:	**Shenzhen HTT Technology Co.,Ltd.**
Address.....**:**	1F, Building B, Huafeng International Robotics Industrial Park, Hangcheng Road,Nanchang Community, Xixiang Street, Bao'an District, Shenzhen, Guangdong, China
Applicant's name.....:	**Nanjing Ningyuan Intelligent Instrument Co., Ltd**
Address .....:	Building 6, Jima Industrial Park, No. 669 Jiangjun Avenue, Jiangning District, Nanjing
Test specification .....**:**	
Standard .....:	**FCC Part 15.231**

Test item description .....:	**LORA RF module**
Trade Mark .....:	N/A
Manufacturer .....:	Nanjing Ningyuan Intelligent Instrument Co., Ltd
Model/Type reference.....:	RM-RF10TP-1278(PI)
Listed Models .....:	RM-RF10TP-1278(N)，RM-RF10TP-1278(E)，RM-RF10TP-1278(C)
Ratings .....:	DC 5.0V
Modulation .....:	Hybrid system
Frequency.....	433.062866-509.937866MHz
Result.....:	**PASS**

T E S T R E P O R T

Equipment under Test	:	LORA RF module
Model /Type	:	RM-RF10TP-1278(PI)
Listed Models	:	RM-RF10TP-1278(N)，RM-RF10TP-1278(E)，RM-RF10TP-1278(C)
Model Declaration	:	PCB board, structure and internal of these model(s) are the same, So no additional models were tested.
Applicant	:	**Nanjing Ningyuan Intelligent Instrument Co., Ltd**
Address	:	Building 6, Jima Industrial Park, No. 669 Jiangjun Avenue, Jiangning District, Nanjing
Manufacturer	:	**Nanjing Ningyuan Intelligent Instrument Co., Ltd**
Address	:	Building 6, Jima Industrial Park, No. 669 Jiangjun Avenue, Jiangning District, Nanjing

Test Result:	**PASS**

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.

Contents

1 TEST STANDARDS

The tests were performed according to following standards:

FCC Rules Part 15.231:Periodic operation in the band 40.66-40.70 MHz and above 70 MHz.
ANSI C63.10:2013 : American National Standard for Testing Unlicensed Wireless Devices

2 SUMMARY

2.1 General Remarks

Date of receipt of test sample	:	Oct.28,2022
Testing commenced on	:	Oct.28,2022
Testing concluded on	:	Nov.03,2022

2.2 Product Description

Product Name:	LORA RF module
Model/Type reference:	RM-RF10TP-1278(PI)
Testing sample ID：	HTT202210146-1# (Engineer sample), HTT202210146-2#(Normal sample)
Power supply:	DC 5.0V
Modulation:	Hybrid system
Operation frequency:	433.062866-509.937866MHz
Channel number:	83
Antenna type:	External antenna
Antenna gain:	-0.74dBi

2.3 Equipment Under Test

Power supply system utilised

Power supply voltage	:	○	230V / 50 Hz	○	120V / 60Hz
		○	12 V DC	○	24 V DC
		●	Other (specified in blank below)		

DC 5.0V

2.4 Short description of the Equipment under Test (EUT)

This is a LORA RF module.

For more details, refer to the user's manual of the EUT.

Operation Frequency：

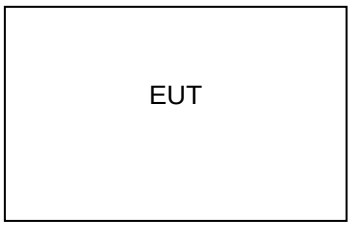
Channel	Frequency (MHz)	Channel	Frequency (MHz)
00	433.062866	42	472437866
01	434000366	43	473375366
02	434937866	44	474312866
03	435875366	45	475250366
04	436812866	46	476187866
05	437750366	47	477125366
06	438687866	48	478062866
07	439625366	49	479000366
08	440562866	50	479937866
09	441500366	51	480875366
10	442437866	52	481812866
11	443375366	53	482750366
12	444312866	54	483687866
13	445250366	55	484625366
14	446187866	56	485562866

15	447125366	57	486500366
16	448062866	58	487437866
17	449000366	59	488375366
18	449937866	60	489312866
19	450875366	61	490250366
20	451812866	62	491187866
21	452750366	63	492125366
22	453687866	64	493062866
23	454625366	65	494000366
24	455562866	66	494937866
25	456500366	67	495875366
26	457437866	68	496812866
27	458375366	69	497750366
28	459312866	70	498687866
29	460250366	71	499625366
30	461187866	72	500562866
31	462125366	73	501500366
32	463062866	74	502437866
33	464000366	75	503375366
34	464937866	76	504312866
35	465875366	77	505250366
36	466812866	78	506187866
37	467750366	79	507125366
38	468687866	80	508062866
39	469625366	81	509000366
40	470562866	**82**	509937866
41	471500366		

Test frequency：

Low channel	433.062866MHz
Mid channel	471.500366MHz
High channel	509.937866MHz

2.5 Block Diagram of Test Setup



2.6 Special Accessories

Follow auxiliary equipment(s) test with EUT that provided by the manufacturer or laboratory is listed as follow:

Description	Manufacturer	Model	Technical Parameters	Certificate	Provided by
/	/	/	/	/	/
/	/	/	/	/	/

2.7 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for the device filing to comply with Section 15.231 of the FCC Part 15, Subpart C Rules.

2.8 Modifications

No modifications were implemented to meet testing criteria.

3 TEST ENVIRONMENT

3.1 Address of the test laboratory

Shenzhen HTT Technology Co.,Ltd.
1F, Building B, Huafeng International Robotics Industrial Park, Hangcheng Road,Nanchang Community, Xixiang Street, Bao'an District, Shenzhen, Guangdong, China

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3.2 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

FCC-Registration No.: 779513 Designation Number: CN1319
Shenzhen HTT Technology Co.,Ltd. has been listed on the US Federal Communications Commission list of test facilities recognized to perform electromagnetic emissions measurements.

A2LA-Lab Cert. No.: 6435.01
Shenzhen HTT Technology Co.,Ltd. has been listed by American Association for Laboratory Accreditation to perform electromagnetic emission measurement.

The 3m-Semi anechoic test site fulfils CISPR 16-1-4 according to ANSI C63.10 and CISPR 16-1-4:2010.

3.3 Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Radiated Emission:

Temperature:	25 ° C
Humidity:	45 %
Atmospheric pressure:	950-1050mbar

Conducted testing：

Temperature:	25 ° C
Humidity:	44 %
Atmospheric pressure:	950-1050mbar

3.4 Summary of measurement results

FCC and IC Requirements		
FCC Part 15.207	Conducted Emission	PASS
FCC Part 15.231(a)(2)	Automatically Deactivate	PASS
FCC Part 15.231(b)	Electric Field Strength of Fundamental Emission	PASS
FCC Part 15.205 &15.209& 15.231(b)	Electric Field Strength of Spurious Emission	PASS
FCC Part 15.231(c)	-20dB bandwidth	PASS

Remark: The measurement uncertainty is not included in the test result.

3.5 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 TR-100028-01" Electromagnetic compatibility and Radio spectrum Matters (ERM);Uncertainties in the measurement of mobile radio equipment characteristics; Part 1" and TR-100028-02 "Electromagnetic compatibility and Radio spectrum Matters (ERM);Uncertainties in the measurement of mobile radio equipment characteristics; Part 2 " and is documented in the Shenzhen HTT Technology Co.,Ltd. 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.
Hereafter the best measurement capability for Shenzhen HTT Technology Co.,Ltd. :

Test	Range	Measurement Uncertainty	Notes
Radiated Emission	30~1000MHz	4.10 dB	(1)
Radiated Emission	1~18GHz	4.32 dB	(1)
Radiated Emission	18-40GHz	5.54 dB	(1)
Conducted Disturbance	0.15~30MHz	3.12 dB	(1)

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

3.6 Equipments Used during the Test

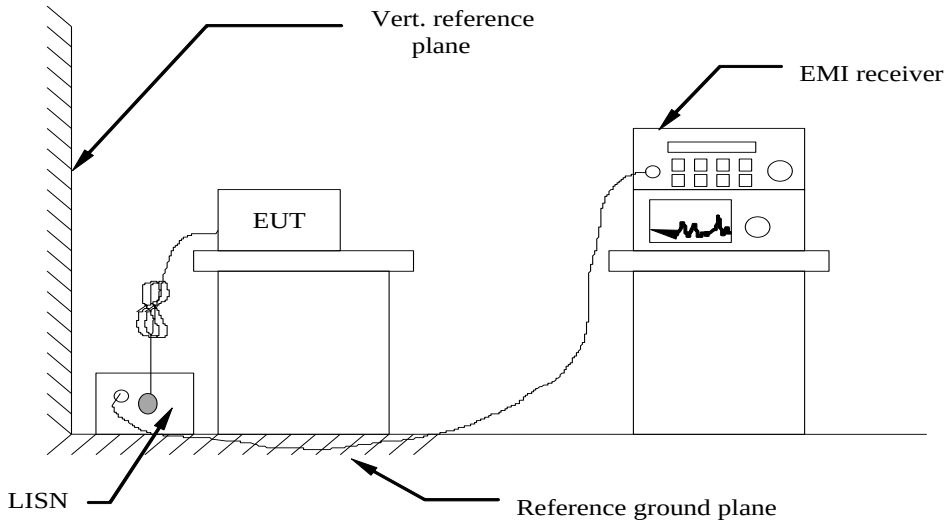
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	3m Semi- Anechoic Chamber	Shenzhen C.R.T technology co., LTD	9*6*6	HTT-E028	Aug. 10 2020	Aug. 09 2024
2	Control Room	Shenzhen C.R.T technology co., LTD	4.8*3.5*3.0	HTT-E030	Aug. 10 2020	Aug. 09 2024
3	EMI Test Receiver	Rohde&Schwar	ESCI7	HTT-E022	May 23 2022	May 22 2023
4	Spectrum Analyzer	Rohde&Schwar	FSP	HTT-E037	May 23 2022	May 22 2023
5	Coaxial Cable	ZDecl	ZT26-NJ-NJ-0.6M	HTT-E018	May 23 2022	May 22 2023
6	Coaxial Cable	ZDecl	ZT26-NJ-SMAJ-2M	HTT-E019	May 23 2022	May 22 2023
7	Coaxial Cable	ZDecl	ZT26-NJ-SMAJ-0.6M	HTT-E020	May 23 2022	May 22 2023
8	Coaxial Cable	ZDecl	ZT26-NJ-SMAJ-8.5M	HTT-E021	May 23 2022	May 22 2023
9	Composite logarithmic antenna	Schwarzbeck	VULB 9168	HTT-E017	May 23 2022	May 22 2023
10	Horn Antenna	Schwarzbeck	BBHA9120D	HTT-E016	May 23 2022	May 22 2023
11	Loop Antenna	Zhinan	ZN30900C	HTT-E039	May 23 2022	May 22 2023
12	Horn Antenna	Beijing Hangwei Dayang	OBH100400	HTT-E040	May 23 2022	May 22 2023
13	low frequency Amplifier	Sonoma Instrument	310	HTT-E015	May 23 2022	May 22 2023
14	high-frequency Amplifier	HP	8449B	HTT-E014	May 23 2022	May 22 2023
15	Variable frequency power supply	Shenzhen Anbiao Instrument Co., Ltd	ANB-10VA	HTT-082	May 23 2022	May 22 2023
16	EMI Test Receiver	Rohde & Schwarz	ESCS30	HTT-E004	May 23 2022	May 22 2023
17	Artificial Mains	Rohde & Schwarz	ESH3-Z5	HTT-E006	May 23 2022	May 22 2023
18	Artificial Mains	Rohde & Schwarz	ENV-216	HTT-E038	May 23 2022	May 22 2023
19	Cable Line	Robinson	Z302S-NJ-BNCJ-1.5M	HTT-E001	May 23 2022	May 22 2023
20	Attenuator	Robinson	6810.17A	HTT-E007	May 23 2022	May 22 2023
21	Variable frequency power supply	Shenzhen Yanghong Electric Co., Ltd	YF-650（5KVA）	HTT-E032	May 23 2022	May 22 2023
22	Control Room	Shenzhen C.R.T technology co., LTD	8*4*3.5	HTT-E029	May 23 2022	May 22 2023
23	DC power supply	Agilent	E3632A	HTT-E023	May 23 2022	May 22 2023
24	EMI Test Receiver	Agilent	N9020A	HTT-E024	May 23 2022	May 22 2023
25	Analog signal generator	Agilent	N5181A	HTT-E025	May 23 2022	May 22 2023
26	Vector signal generator	Agilent	N5182A	HTT-E026	May 23 2022	May 22 2023
27	Power sensor	Keysight	U2021XA	HTT-E027	May 23 2022	May 22 2023
28	Temperature and humidity meter	Shenzhen Anbiao Instrument Co., Ltd	TH10R	HTT-074	May 23 2022	May 22 2023
29	Radiated Emission Test Software	Farad	EZ-EMC	N/A	N/A	N/A
30	Conducted Emission Test Software	Farad	EZ-EMC	N/A	N/A	N/A
31	RF Test Software	panshanrf	TST	N/A	N/A	N/A

Note: The Cal.Interval was one year.

4 TEST CONDITIONS AND RESULTS

4.1 AC Power Conducted Emission

TEST CONFIGURATION



TEST PROCEDURE

1 The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. The EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10-2013.
2 Support equipment, if needed, was placed as per ANSI C63.10-2013
3 All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10-2013
4 The EUT received DC 12V power from adapter, the adapter received AC120V/60Hz and AC 240V/60Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
5 All support equipments received AC power from a second LISN, if any.
6 The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT.The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
7 Analyzer / Receiver scanned from 150 KHz to 30MHz for emissions in each of the test modes.
8 During the above scans, the emissions were maximized by cable manipulation.

AC Power Conducted Emission Limit

For intentional device, according to § 15.207(a) AC Power Conducted Emission Limits is as following：

Frequency range (MHz)	Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50
* Decreases with the logarithm of the frequency.		

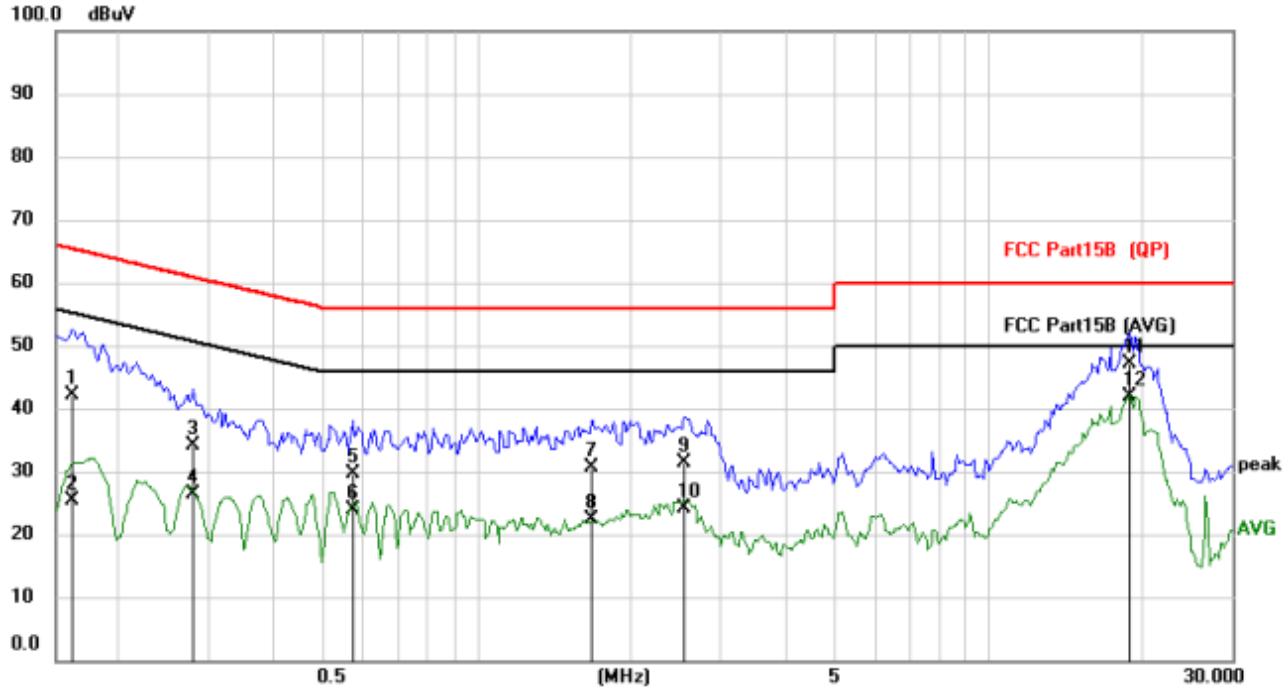
TEST RESULTS

Remark:

1. Lora was tested at Low, Middle, and High channel; only the worst result of Lora High channel was reported as below:

2. Both 120 VAC, 50/60 Hz and 240 VAC, 50/60 Hz power supply have been tested, only the worst result of 120 VAC, 60 Hz was reported as below:

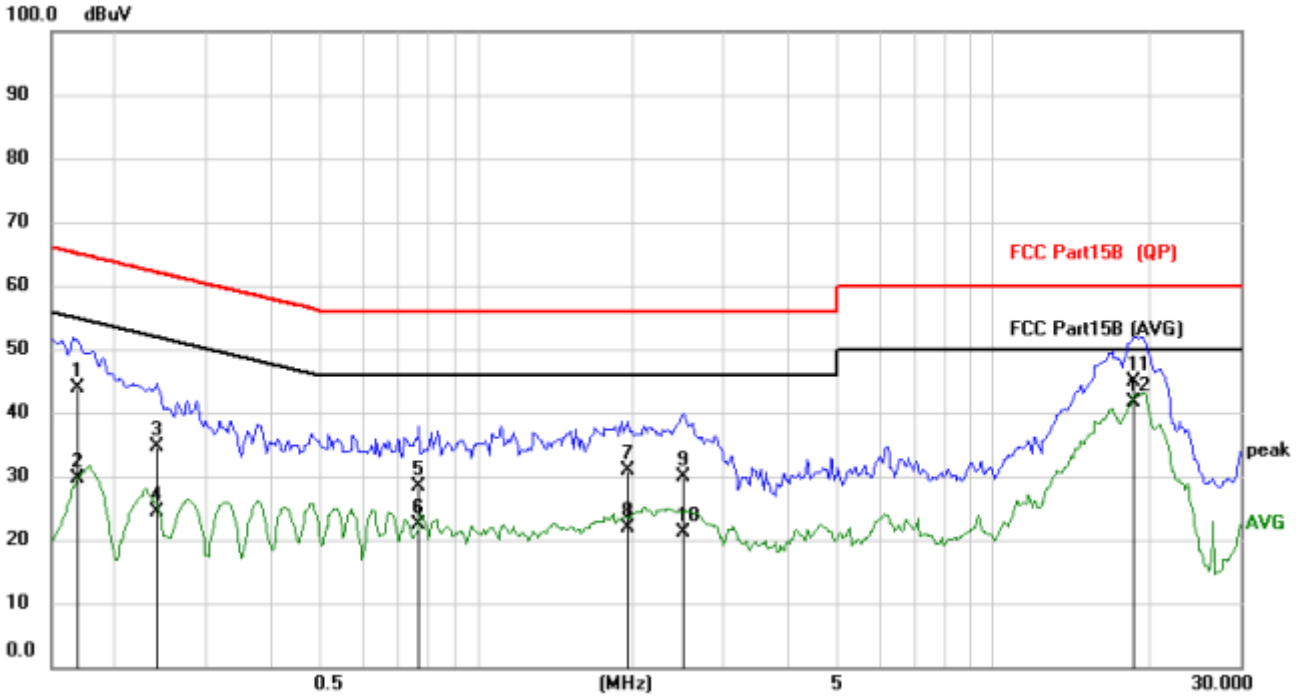
Power supply:	DC 5.0V from PC AC 120V/60Hz	Polarization	L



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector
1		0.1617	31.70	10.38	42.08	65.38	-23.30	QP
2		0.1617	15.09	10.38	25.47	55.38	-29.91	AVG
3		0.2787	23.68	10.41	34.09	60.85	-26.76	QP
4		0.2787	16.02	10.41	26.43	50.85	-24.42	AVG
5		0.5712	19.15	10.55	29.70	56.00	-26.30	QP
6		0.5712	13.44	10.55	23.99	46.00	-22.01	AVG
7		1.6788	19.90	10.85	30.75	56.00	-25.25	QP
8		1.6788	11.63	10.85	22.48	46.00	-23.52	AVG
9		2.5485	20.45	10.83	31.28	56.00	-24.72	QP
10		2.5485	13.33	10.83	24.16	46.00	-21.84	AVG
11		18.9080	34.88	12.34	47.22	60.00	-12.78	QP
12	*	18.9080	29.49	12.34	41.83	50.00	-8.17	AVG

Note:1).QP Value (dBμV)= QP Reading (dBμV)+ Factor (dB)
2). Factor (dB)=insertion loss of LISN (dB) + Cable loss (dB)
3). QPMargin(dB) = QP Limit (dBμV) - QP Value (dBμV)
4). AVMargin(dB) = AV Limit (dBμV) - AV Value (dBμV)

Power supply:	DC 5.0V from PC AC 120V/60Hz	Polarization	N



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector
1		0.1685	33.55	10.24	43.79	65.03	-21.24	QP
2		0.1685	19.39	10.24	29.63	55.03	-25.40	AVG
3		0.2397	24.52	10.22	34.74	62.11	-27.37	QP
4		0.2397	14.07	10.22	24.29	52.11	-27.82	AVG
5		0.7740	17.73	10.69	28.42	56.00	-27.58	QP
6		0.7740	11.71	10.69	22.40	46.00	-23.60	AVG
7		1.9557	20.17	10.82	30.99	56.00	-25.01	QP
8		1.9557	11.15	10.82	21.97	46.00	-24.03	AVG
9		2.5095	18.96	10.83	29.79	56.00	-26.21	QP
10		2.5095	10.21	10.83	21.04	46.00	-24.96	AVG
11		18.6468	32.46	12.42	44.88	60.00	-15.12	QP
12	*	18.6468	29.16	12.42	41.58	50.00	-8.42	AVG

Note:1).QP Value (dBμV)= QP Reading (dBμV)+ Factor (dB)
2). Factor (dB)=insertion loss of LISN (dB) + Cable loss (dB)
3). QPMargin(dB) = QP Limit (dBμV) - QP Value (dBμV)
4). AVMargin(dB) = AV Limit (dBμV) - AV Value (dBμV)

4.2 Radiated Emission

Limit

For intentional device, according to 15.209(a) the general requirement of field strength of radiated emission from intentional radiators at a distance of 3 meters shall not exceed the following table.

Frequency (MHz)	Distance (Meters)	Radiated (dBμV/m)	Radiated (μV/m)
0.009-0.49	3	20log(2400/F(KHz))+40log(300/3)	2400/F(KHz)
0.49-1.705	3	20log(24000/F(KHz))+ 40log(30/3)	24000/F(KHz)
1.705-30	3	20log(30)+ 40log(30/3)	30
30-88	3	40.0	100
88-216	3	43.5	150
216-960	3	46.0	200
Above 960	3	54.0	500

In addition to the provisions of 15.231(b), the field strength of emissions from intentional radiators operated under this section shall not exceed the following:

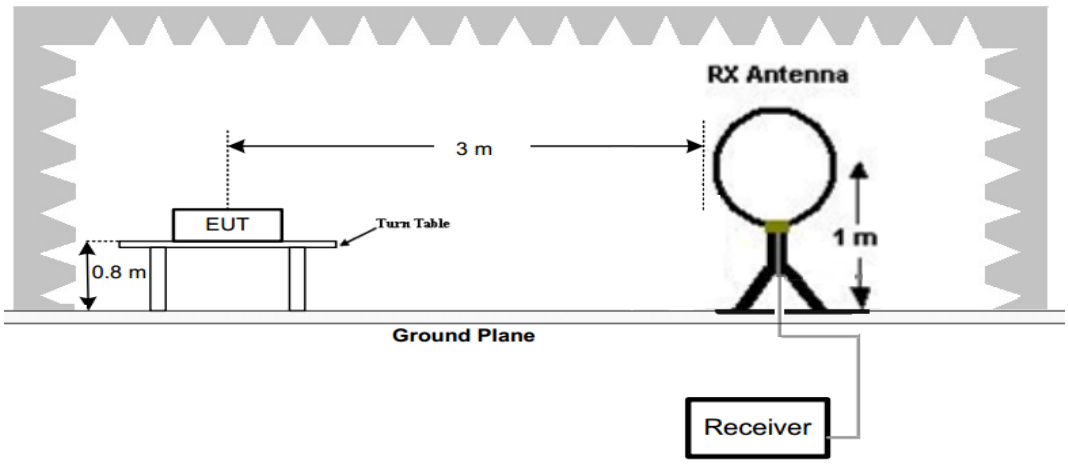
Fundamental frequency (MHz)	Field strength of fundamental (microvolts/meter)	Field strength of spurious emissions (microvolts/meter)
40.66–40.70.	2,250	225
70–130	1,250	125
130–174	[1] 1,250 to 3,750	[1] 125 to 375
174–260	3,750	375
260–470	[1] 3,750 to 12,500	[1] 375 to 1,250
Above 470	12,500	1,250

[1] Linear interpolations.

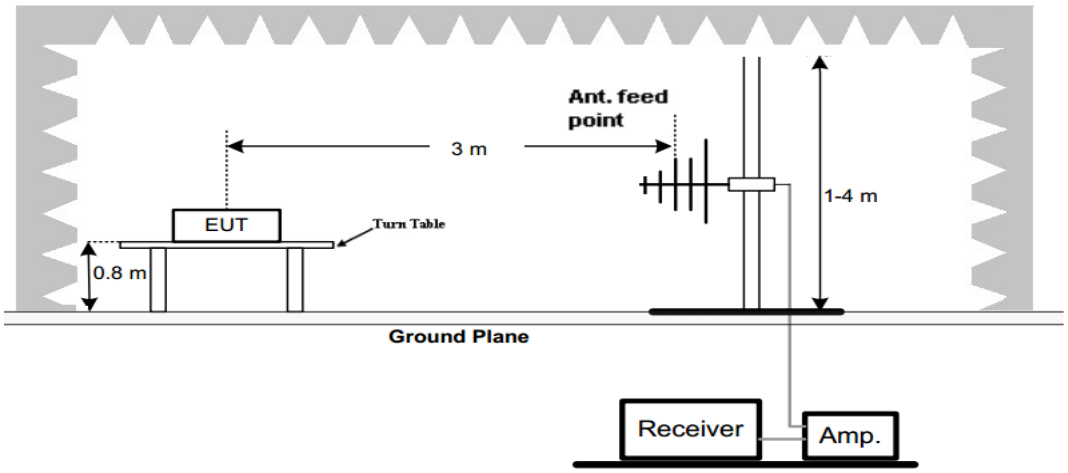
[Where F is the frequency in MHz, the formulas for calculating the maximum permitted fundamental field strengths are as follows: for the band 260-470 MHz, 20*log(41.6667*433.890-7083.3333)=80.82dBuV/m The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level.]

TEST CONFIGURATION

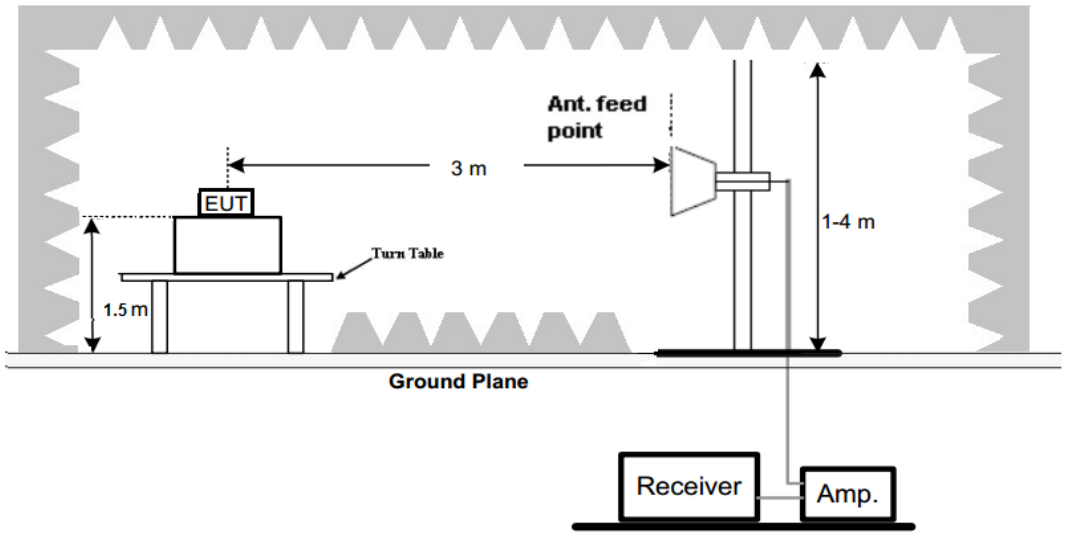
(A) Radiated Emission Test Set-Up, Frequency Below 30MHz



(B) Radiated Emission Test Set-Up, Frequency below 1000MHz



(C) Radiated Emission Test Set-Up, Frequency above 1000MHz



Test Procedure

1. Below 1GHz measurement the EUT is placed on a turntable which is 0.8m above ground plane, and above 1GHz measurement EUT was placed on a low permittivity and low loss tangent turn table which is 1.5m above ground plane.
2. Maximum procedure was performed by raising the receiving antenna from 1m to 4m and rotating the turn table from 0℃ to 360℃ to acquire the highest emissions from EUT
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measurements have been completed.

TEST RESULTS

The emissions from 30MHz to 5GHz are measured peak and average level, below 1 GHz measured QP level, detailed test data please see below. Besides, we tested 3 directions and recorded the worst data.

Low Channel:

Emission Styles	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Direction (H/V)
Fundamental	433.062866	96.83	-11.32	85.51	100.8	15.29	PK	H
Spurious	457.321	44.27	-12.39	31.88	46	14.12	PK	H
Harmonics	866.125732	71.43	-17.65	53.78	80.8	27.02	PK	H
Harmonics	1299.188598	46.80	5.38	52.18	74	21.82	PK	H
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Fundamental	433.062866	93.33	-11.32	82.01	100.8	18.79	PK	V
Spurious	457.321	42.96	-12.39	30.57	46	15.43	PK	V
Harmonics	866.125732	70.35	-17.65	52.7	80.8	28.10	PK	V
Harmonics	1299.188598	46.13	5.38	51.51	74	22.49	PK	V
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Emission Styles	Frequency (MHz)	PK Level (dBuV/m)	AV Factor (dB/m)	AV Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Direction (H/V)
Fundamental	433.062866	85.51	-8.83	76.68	80.8	4.12	H
Harmonics	866.125732	53.78	-8.83	44.95	60.8	15.85	H
Harmonics	1299.188598	52.18	-8.83	43.35	54	10.65	H
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Fundamental	433.062866	82.01	-8.83	73.18	80.8	7.62	V
Harmonics	866.125732	52.70	-8.83	43.87	60.8	16.93	V
Harmonics	1299.188598	51.51	-8.83	42.68	54	11.32	V
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Mid Channel:

Emission Styles	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Direction (H/V)
Fundamental	471.500366	97.20	-11.39	85.81	101.94	16.13	PK	H
Spurious	457.321	44.44	-12.39	32.05	46	13.95	PK	H
Harmonics	943.000732	71.65	-17.71	53.94	81.93	27.99	PK	H
Harmonics	1414.501098	46.28	5.41	51.69	74	22.31	PK	H
--	--	--	--	--	--	--	--	--
Fundamental	471.500366	97.20	-11.39	85.81	101.94	16.13	PK	V
Spurious	457.321	43.76	-12.39	31.37	46	14.63	PK	V
Harmonics	943.000732	70.83	-17.71	53.12	81.93	28.81	PK	V
Harmonics	1414.501098	46.93	5.41	52.34	74	21.66	PK	V
--	--	--	--	--	--	--	--	--

Emission Styles	Frequency (MHz)	PK Level (dBuV/m)	AV Factor (dB/m)	AV Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Direction (H/V)
Fundamental	471.500366	85.81	-8.83	76.98	81.93	4.95	H
Harmonics	943.000732	53.94	-8.83	45.11	61.93	16.82	H
Harmonics	1414.501098	51.69	-8.83	42.86	54	11.14	H
--	--	--	--	--	--	--	--
Fundamental	471.500366	82.39	-8.83	73.56	81.93	8.37	V
Harmonics	943.000732	53.12	-8.83	44.29	61.93	17.64	V
Harmonics	1414.501098	52.34	-8.83	43.51	54	10.49	V
--	--	--	--	--	--	--	--

High Channel:

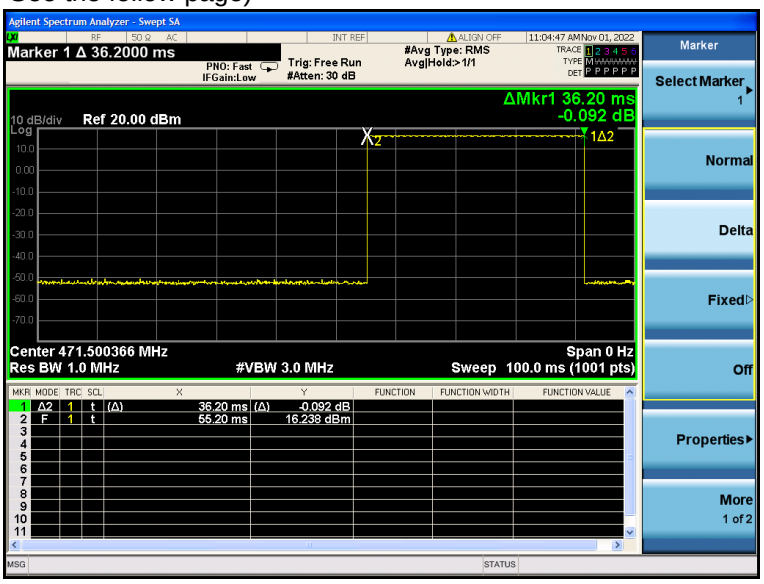
Emission Styles	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Direction (H/V)
Fundamental	509.937866	98.34	-11.87	86.47	101.94	15.47	PK	H
Spurious	457.321	44.07	-12.39	31.68	46	14.32	PK	H
Harmonics	1019.875732	72.55	-18.01	54.54	74	19.46	PK	H
Harmonics	1529.813598	46.82	5.91	52.73	74	21.27	PK	H
--	--	--	--	--	--	--	--	--
Fundamental	509.937866	93.34	-11.87	81.47	101.94	20.47	PK	V
Spurious	457.321	43.11	-12.39	30.72	46	15.28	PK	V
Harmonics	1019.875732	70.96	-18.01	52.95	74	21.05	PK	V
Harmonics	1529.813598	46.60	5.91	52.51	74	21.49	PK	V
--	--	--	--	--	--	--	--	--

Emission Styles	Frequency (MHz)	PK Level (dBuV/m)	AV Factor (dB/m)	AV Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Direction (H/V)
Fundamental	509.937866	86.47	-8.83	77.64	81.93	4.29	H
Harmonics	1019.875732	54.54	-8.83	45.71	54	8.29	H
Harmonics	1529.813598	52.73	-8.83	43.90	54	10.1	H
--	--	--	--	--	--	--	--
Fundamental	509.937866	81.47	-8.83	72.64	81.93	9.29	V
Harmonics	1019.875732	52.95	-8.83	44.12	54	9.88	V
Harmonics	1529.813598	52.51	-8.83	43.68	54	10.32	V
--	--	--	--	--	--	--	--

Note:

1. Level (dBuV/m)= Reading (dBuV)+Factor(dB/m)
2. AV Level (dBuV/m)= PK Level (dBuV/m)+ AV Factor(dB)
3. In a transmit cycle 100ms period found burst 1pcs, the Duty Cycle can calculate as below:
4. Duty Cycle= (36.20)/ 100==0.3620
5. AV Factor=20*log(Duty Cycle)=20*log(0.3620)=-8.83

(The plot of Duty Cycle See the follow page)



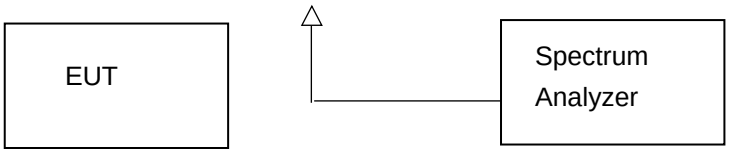
(Transmit cycle 100ms)

4.3 20dB Bandwidth

Limit

According to 47 CFR 15.231(c) The bandwidth of the emission shall be no wider than 0.25% of the centre frequency for devices operating above 70MHz and below 900MHz. Bandwidth is determined at the points 20dB down from the modulated carrier.

Test Configuration



Test Procedure

The 20dB bandwidth and 99% bandwidth is measured with a spectrum analyzer connected via a receive antenna placed near the EUT while the EUT is operating in transmission mode.

The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20dB.

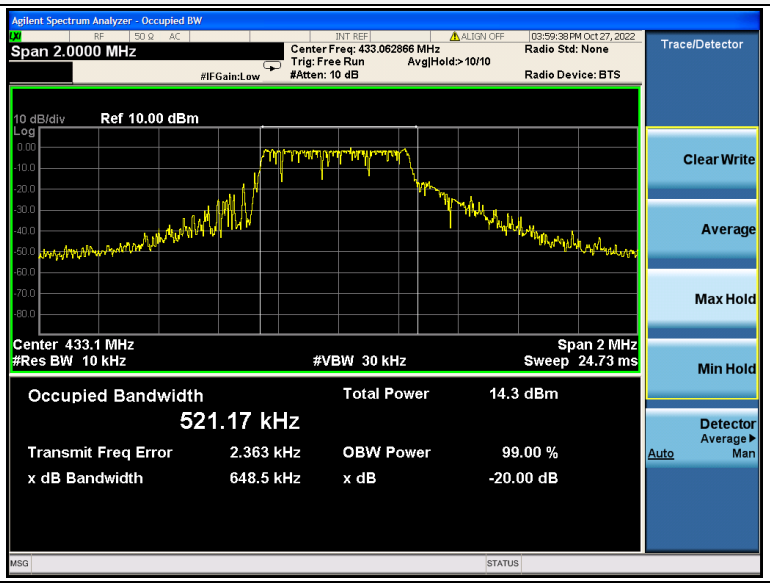
The occupied bandwidth (OBW), that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission.

Test Results

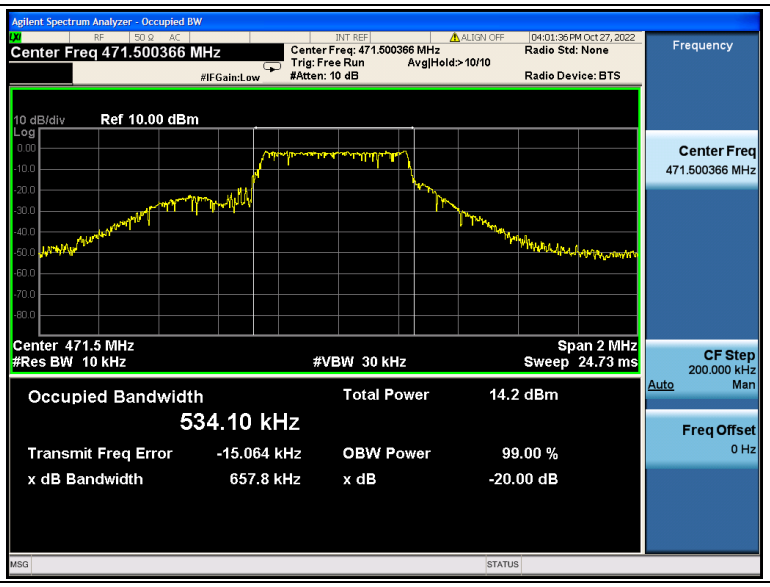
Modulation	Channel Frequency (MHz)	99% OBW (KHz)	20dB bandwidth (KHz)	Limit (MHz)	Result
Hybrid system	433.062866	521.17	648.50	0.25%*433.062866=1.0826	Pass
	471.500366	534.10	657.80	0.25%*471.500366=1.1788	Pass
	509.937866	508.28	603.00	0.25%*509.937866=1.2748	Pass

Test plot as follows:

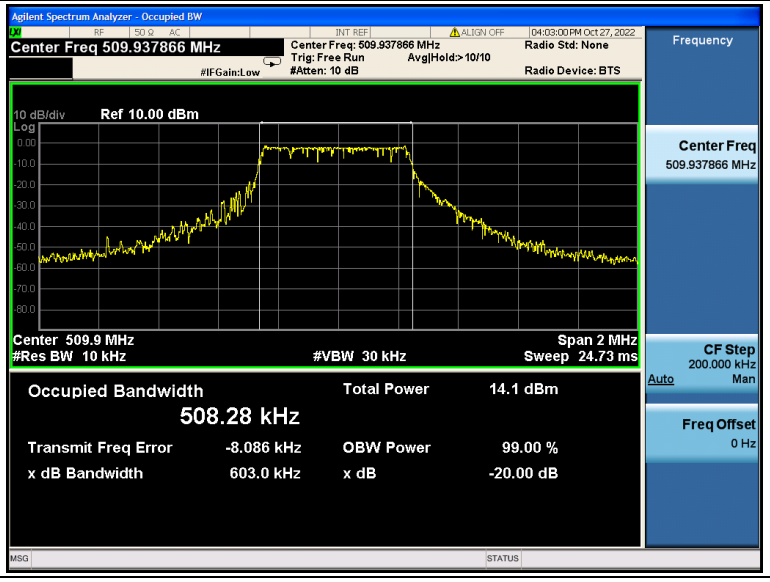
Hybrid system Modulation



Low Channel



Mid Channel



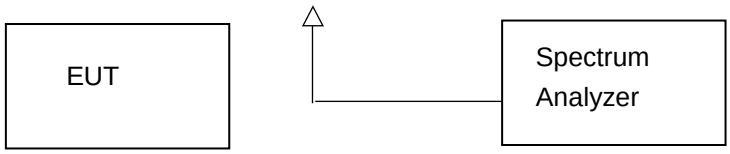
High Channel

4.4 Deactivation Time

Limit

According to FCC §15.231(a)(2), A transmitter activated automatically shall cease transmission within 5 seconds after activation.

Test Configuration



Test Procedure

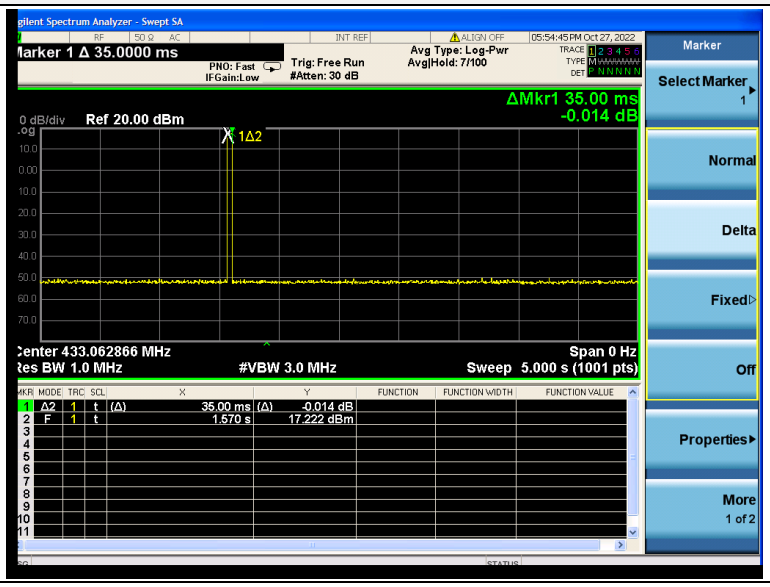
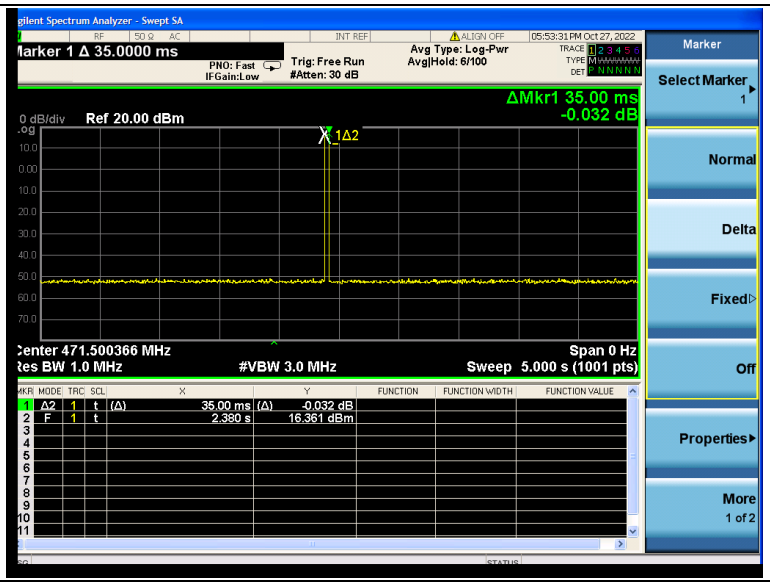
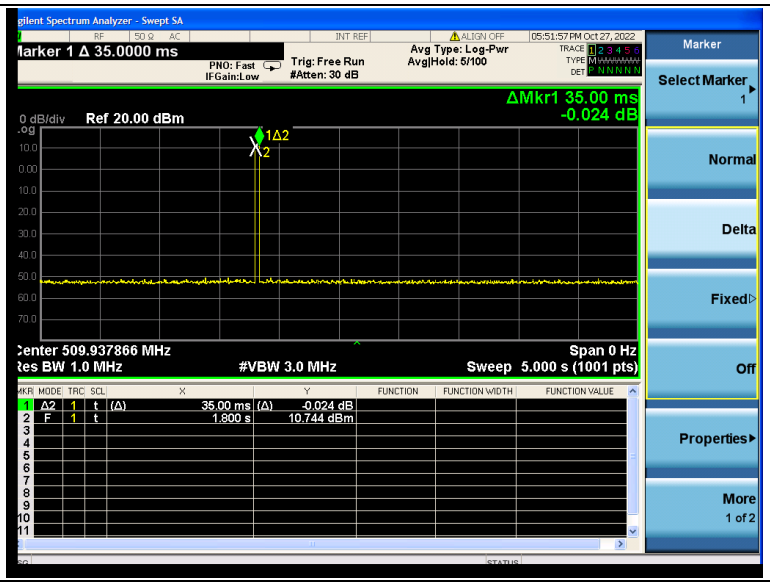
1. The EUT was placed on a wooded table which is 0.8m height and close to receiver antenna of spectrum analyzer.
2. The spectrum analyzer resolution bandwidth was set to 1 MHz and video bandwidth was set to 1 MHz to encompass all significant spectral components during the test. The spectrum analyzer was operated in linear scale and zero span mode after tuning to the transmitter carrier frequency.

TEST RESULTS

Note: The transmitter was automatically activated

Frequency (MHz)	One transmission time (S)	Limit(S)	Result
433.062866	0.0350	5	Pass
471.500366	0.0350	5	Pass
509.937866	0.0350	5	Pass

Test plot as follows:

Hybrid system Modulation

Low Channel

Mid Channel

High Channel

4.5 Antenna Requirement

Standard Applicable

According to FCC Part 15C 15.203

a) An intentional radiator shall be de-signed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

b) 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.

Refer to statement below for compliance.

The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited. Further, this requirement does not apply to intentional radiators that must be professionally installed.

Antenna Connected Construction

The antenna used in this product is an Internal Antenna, The directional gains of antenna used for transmitting is -0.74dBi.
Remark:The antenna gain is provided by the customer , if the data provided by the customer is not accurate, Shenzhen HTT Technology Co.,Ltd. does not assume any responsibility.

5 Test Setup Photos of the EUT

Reference to the **appendix I** for details

6 Photos of the EUT

Reference to the **appendix II** for details.

********** End of Report **********