

FCC Test Report

Client Name : Xiamen Milesight IoT Co., Ltd.

Client Address : Building C09, Software Park Phase III,
Xiamen 361024, Fujian, China

Product Name : 3D ToF People Counting Sensor

Report Date : Oct. 26, 2022

Shenzhen Anbotek Compliance Laboratory Limited



Shenzhen Anbotek Compliance Laboratory Limited

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TEST REPORT

Applicant : Xiamen Milesight IoT Co., Ltd.
Manufacturer : Xiamen Milesight IoT Co., Ltd.
Product Name : 3D ToF People Counting Sensor
Model No. : VS132-915M, VS132-9M, VS132-915M(AS923), VS132-915M[AS923],
NF132-915M
Trade Mark : Milesight
Rating(s) : Input: 12V $\overline{=}$ 2A

Test Standard(s) : FCC Part15 Subpart C, Section 15.247

Test Method(s) : ANSI C63.10: 2020

The device described above is tested by Shenzhen Anbotek Compliance Laboratory Limited to determine the maximum emission levels emanating from the device and the severe levels of the device can endure and its performance criterion. The measurement results are contained in this test report and Shenzhen Anbotek Compliance Laboratory Limited is assumed full of responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT (Equipment Under Test) is technically compliant with the FCC Part 15 Subpart C requirements.

This report applies to above tested sample only and shall not be reproduced in part without written approval of Shenzhen Anbotek Compliance Laboratory Limited.

Date of receipt

Sept. 19, 2022

Date of Test

Sept. 19~Oct. 26, 2022

Prepared by

Ella Liang

(Ella Liang)

Approved & Authorized Signer

Kingkong Jin

(Kingkong Jin)



Revision History

Report Version	Description	Issued Date
R00	Original Issue.	Oct. 26, 2022



1. General Information

1.1. Client Information

Applicant	:	Xiamen Milesight IoT Co., Ltd.
Address	:	Building C09, Software Park Phase III, Xiamen 361024, Fujian, China
Manufacturer	:	Xiamen Milesight IoT Co., Ltd.
Address	:	Building C09, Software Park Phase III, Xiamen 361024, Fujian, China
Factory	:	Xiamen Milesight IoT Co., Ltd.
Address	:	Factory 401 & 501, No. 890, Tong Long Er Road, Factory Area, Xiamen Torch Development Zone for High Tech Industries (Xiang'an)

1.2. Description of Device (EUT)

Product Name	:	3D ToF People Counting Sensor
Model No.	:	VS132-915M, VS132-9M, VS132-915M(AS923), VS132-915M[AS923], NF132-915M (Note: All samples are the same except the model number, so we prepare "VS132-915M" for test only.)
Trade Mark	:	Milesight
Test Power Supply	:	AC 120V, 60Hz for adapter
Test Sample No.	:	1-2-1(Normal Sample), 1-2-2(Engineering Sample)
Adapter	:	MODEL:FJ-SW126G1202000N INPUT:100-240V~50/60Hz 0.6A Max OUTPUT:12V= 2000mA

RF Specification

Support Technology	:	☒ LoRa
Operation Mode	:	☐ DSSS ☒ FHSS
Support Bandwidth	:	☒ 125KHz ☐ 250KHz ☐ 500KHz
Operation Frequency	:	902~928MHz
Number of Channel	:	118 Channels
Modulation Type	:	LoRa Chirp Spread Spectrum
Antenna Type	:	PCB antenna
Antenna Gain(Peak)	:	-15.65 dBi

Remark: 1) For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.



1.3. Auxiliary Equipment Used During Test

Description	Rating(s)
--	--

1.4. Description of Test Modes

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	902.3	45	911.1	89	920
2	902.5	46	911.3	90	920.2
3	902.7	47	911.5	91	920.4
4	902.9	48	911.7	92	920.6
5	903.1	49	911.9	93	920.8
6	903.3	50	912.1	94	921
7	903.5	51	912.3	95	921.2
8	903.7	52	912.5	96	921.4
9	903.9	53	912.7	97	921.6
10	904.1	54	912.9	98	921.8
11	904.3	55	913.1	99	922
12	904.5	56	913.3	100	922.2
13	904.7	57	913.5	101	922.4
14	904.9	58	913.7	102	922.6
15	905.1	59	913.9	103	922.8
16	905.3	60	914.1	104	923
17	905.5	61	914.3	105	923.2
18	905.7	62	914.5	106	923.4
19	905.9	63	914.7	107	923.6
20	906.1	64	914.9	108	923.8
21	906.3	65	915.2	-109	924
22	906.5	66	915.4	-110	924.2
23	906.7	67	915.6	111	924.4
24	906.9	68	915.8	112	924.6
25	907.1	69	916	113	924.8
26	907.3	70	916.2	114	925
27	907.5	71	916.4	115	925.2



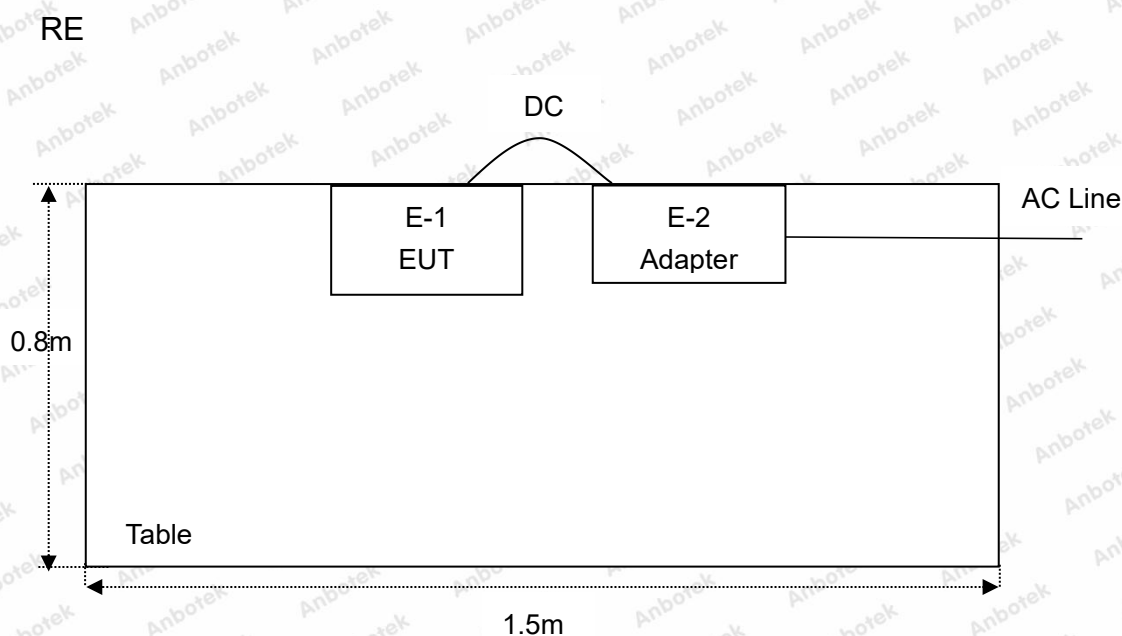
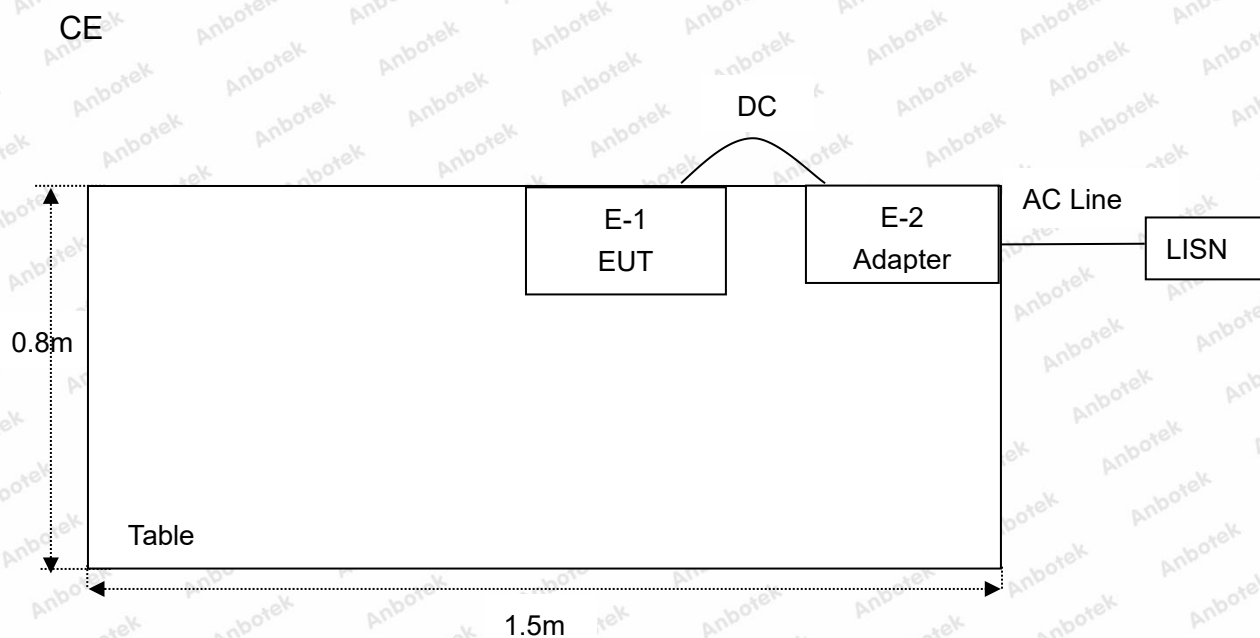
28	907.7	72	916.6	116	925.4
29	907.9	73	916.8	117	925.6
30	908.1	74	917	118	925.8
31	908.3	75	917.2		
32	908.5	76	917.4		
33	908.7	77	917.6		
34	908.9	78	917.8		
35	909.1	79	918		
36	909.3	80	918.2		
37	909.5	81	918.4		
38	909.7	82	918.6		
39	909.9	83	918.8		
40	910.1	84	919		
41	910.3	85	919.2		
42	910.5	86	919.4		
43	910.7	87	919.6		
44	910.9	88	919.8		

Note:

1. The engineering test program was provided and the EUT was programmed to be in continuously transmitting mode.
2. EUT was tested with Channel 1, 60 and 118.



1.5. Description Of Test Setup



1.6. Test Equipment List

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	L.I.S.N. Artificial Mains Network	Schwarzbeck	NSLK 8127	8127386	Sept. 7, 2022	1 Year
2.	EMI Test Receiver	Rohde & Schwarz	ESPI	101604	Sept. 7, 2022	1 Year
3.	Spectrum Analysis	Keysight	N9020A	MY53100616	Nov.11 , 2021	1 Year
4.	Preamplifier	SKET Electronic	BK1G18G30 D	KD17503	Oct. 25, 2022	1 Year
5.	Pre-amplifier	EMtrace	RP01A	50017	Sept. 7, 2022	1 Year
6.	Double Ridged Horn Antenna	Instruments corporation	GTH-0118	351600	Nov. 02, 2020	2 Year
7.	Bilog Broadband Antenna	Schwarzbeck	VULB9163	01417	Nov. 02, 2020	2 Year
8.	Loop Antenna	Schwarzbeck	FMZB1519B	00053	Nov. 02, 2020	2 Year
9.	Test Software	Ferrari Technology	EZ-EMC	N/A	N/A	N/A
10.	Switch box	Meike	/	/	Nov. 10, 2021	1 Year
11.	Power Sensor box	Meike	/	/	Oct. 23, 2022	1 Year
12.	MXG RF Vector Signal Generator	Agilent	N5182A	MY47420822	Feb. 28, 2022	1 Year
13.	Signal Generator	Agilent	E4425B	GB39340038	Oct. 23, 2022	1 Year
14.	DC Power Supply	Longwei	TPR-6420D	020215240	N/A	N/A



1.7. Measurement Uncertainty

Radiation Uncertainty	:	Ur = 3.9 dB (Horizontal)
		Ur = 3.8 dB (Vertical)
Conduction Uncertainty	:	Uc = 3.4 dB

1.8. Description of Test Facility

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

FCC-Registration No.: 184111

Shenzhen Anbotek Compliance Laboratory Limited, EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration No. 184111.

ISED-Registration No.: 8058A

Shenzhen Anbotek Compliance Laboratory Limited, EMC Laboratory has been registered and fully described in a report filed with the (ISED) Innovation, Science and Economic Development Canada. The acceptance letter from the ISED is maintained in our files. Registration 8058A.

Test Location

Shenzhen Anbotek Compliance Laboratory Limited.

1/F, Building D, Sogood Science and Technology Park, Sanwei community, Hangcheng Street, Bao'an District, Shenzhen, Guangdong, China.518102



2. Summary of Test Results

Standard Section	Test Item	Result
15.203/15.247(c)	Antenna Requirement	PASS
15.207	Conducted Emission	PASS
15.205/15.209	Spurious Emission	PASS
15.247(b)(2)	Conducted Peak Output Power	PASS
15.247(a)(1)(i)	20dB Occupied Bandwidth	PASS
15.247(a)(1)	Carrier Frequencies Separation	PASS
15.247(a)(1)(i)	Hopping Channel Number	PASS
15.247(a)(1)(i), 15.247(f)	Dwell Time	PASS
15.247(d)	Band Edge	PASS
Remark: "N/A" is an abbreviation for Not Applicable.		



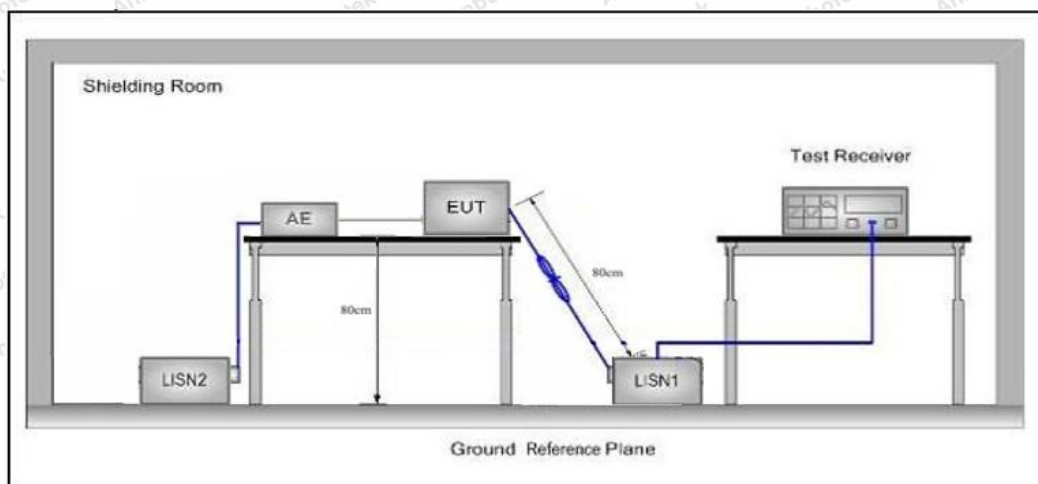
3. Conducted Emission Test

3.1. Test Standard and Limit

Test Standard	FCC Part15 Section 15.207		
Test Limit	Frequency	Maximum RF Line Voltage (dBuV)	
		Quasi-peak Level	Average Level
	150kHz~500kHz	66 ~ 56 *	56 ~ 46 *
	500kHz~5MHz	56	46
	5MHz~30MHz	60	50

Remark: (1) *Decreasing linearly with logarithm of the frequency.
(2) The lower limit shall apply at the transition frequency.

3.2. Test Setup



3.3. Test Procedure

The EUT system is connected to the power mains through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm coupling impedance for the EUT system. Please refer the block diagram of the test setup and photographs. Both sides of AC line are checked to find out the maximum conducted emission. In order to find the maximum emission levels, the relative positions of equipment and all of the interface cables shall be changed according to FCC ANSI C63.10: 2020 on Conducted Emission Measurement.

The bandwidth of test receiver (ESCI) set at 9kHz.

The frequency range from 150kHz to 30MHz is checked.

3.4. Test Data

During the test, pre-scan all modes, only the worst case is recorded in the report.

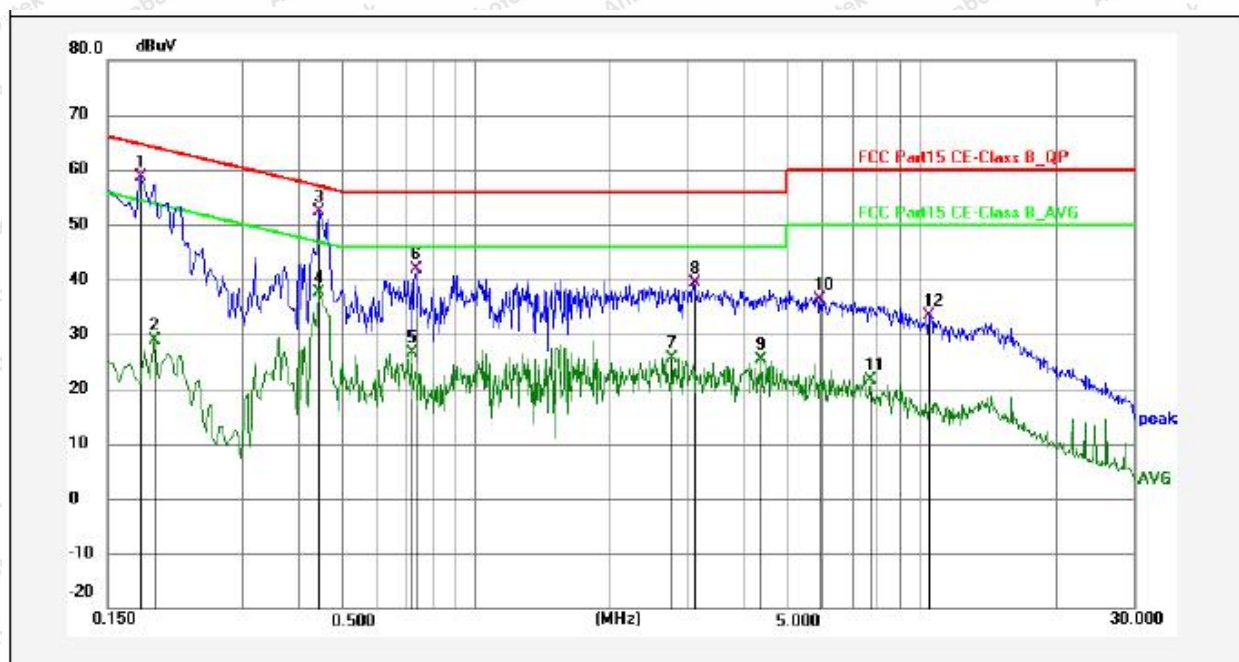
AC conducted emission pre-test at both at AC 120V/60Hz and AC 240V/60Hz modes, recorded worst case AC 120V/60Hz.

Please to see the following pages.



Conducted Emission Test Data

Test Site: 1# Shielded Room
Operating Condition: Low CH (902.3MHz)
Test Specification: AC 120V, 60Hz for adapter
Comment: Live Line
Temp.(°C)/Hum.(%RH): 25.6°C/54%RH

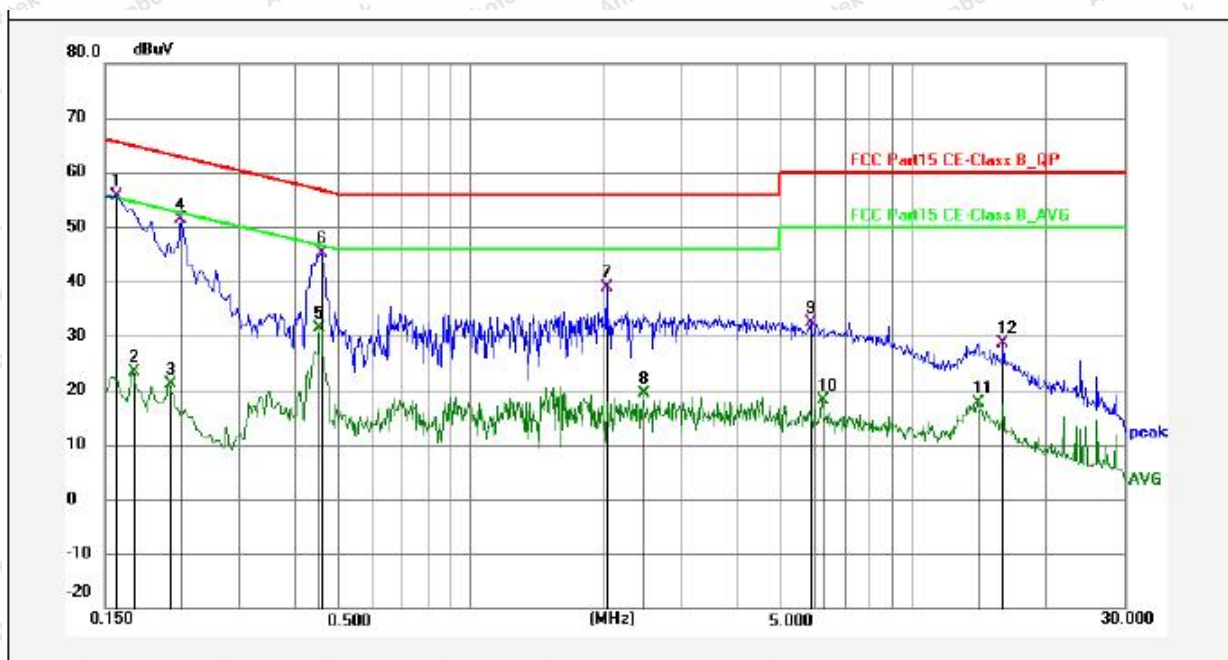


No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV)	Over Limit (dB)	Detector	Remark
1	0.1770	57.86	0.76	58.62	64.63	-6.01	QP	
2	0.1905	28.10	0.75	28.85	54.01	-25.16	AVG	
3	0.4470	51.70	0.78	52.48	56.93	-4.45	QP	
4	0.4470	36.78	0.78	37.56	46.93	-9.37	AVG	
5	0.7215	25.91	0.78	26.69	46.00	-19.31	AVG	
6	0.7350	41.03	0.78	41.81	56.00	-14.19	QP	
7	2.7510	24.85	0.82	25.67	46.00	-20.33	AVG	
8	3.1020	38.46	0.83	39.29	56.00	-16.71	QP	
9	4.3935	24.62	0.84	25.46	46.00	-20.54	AVG	
10	5.9550	35.56	0.86	36.42	60.00	-23.58	QP	
11	7.7100	20.85	0.86	21.71	50.00	-28.29	AVG	
12	10.4415	32.55	0.88	33.43	60.00	-26.57	QP	



Conducted Emission Test Data

Test Site: 1# Shielded Room
Operating Condition: Low CH (902.3MHz)
Test Specification: AC 120V, 60Hz for adapter
Comment: Neutral Line
Temp.(°C)/Hum.(%RH): 25.6°C/54%RH



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV)	Over Limit (dB)	Detector	Remark
1	0.1590	54.88	0.77	55.65	65.52	-9.87	QP	
2	0.1725	22.61	0.76	23.37	54.84	-31.47	AVG	
3	0.2085	20.44	0.75	21.19	53.26	-32.07	AVG	
4	0.2220	50.70	0.76	51.46	62.74	-11.28	QP	
5	0.4560	30.64	0.79	31.43	46.77	-15.34	AVG	
6	0.4605	44.22	0.79	45.01	56.68	-11.67	QP	
7	2.0355	38.15	0.81	38.96	56.00	-17.04	QP	
8	2.4675	18.66	0.82	19.48	46.00	-26.52	AVG	
9	5.8875	31.59	0.86	32.45	60.00	-27.55	QP	
10	6.2340	17.17	0.85	18.02	50.00	-31.98	AVG	
11	13.9515	16.62	0.89	17.51	50.00	-32.49	AVG	
12	15.9990	27.74	0.89	28.63	60.00	-31.37	QP	



4. Radiation Spurious Emission and Band Edge

4.1. Test Standard and Limit

Test Standard	FCC Part15 C Section 15.209 and 15.205				
Test Limit	Frequency (MHz)	Field strength (microvolt/meter)	Limit (dBuV/m)	Remark	Measurement distance (m)
	0.009MHz~0.490MHz	2400/F(kHz)	-	-	300
	0.490MHz~1.705MHz	24000/F(kHz)	-	-	30
	1.705MHz~30MHz	30	-	-	30
	30MHz~88MHz	100	40.0	Quasi-peak	3
	88MHz~216MHz	150	43.5	Quasi-peak	3
	216MHz~960MHz	200	46.0	Quasi-peak	3
	960MHz~1000MHz	500	54.0	Quasi-peak	3
	Above 1000MHz	500	54.0	Average	3
		-	74.0	Peak	3

Remark:

(1)The lower limit shall apply at the transition frequency.

(2) 15.35(b), Unless otherwise specified, the limit on peak radio frequency emissions is 20dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device.

4.2. Test Setup

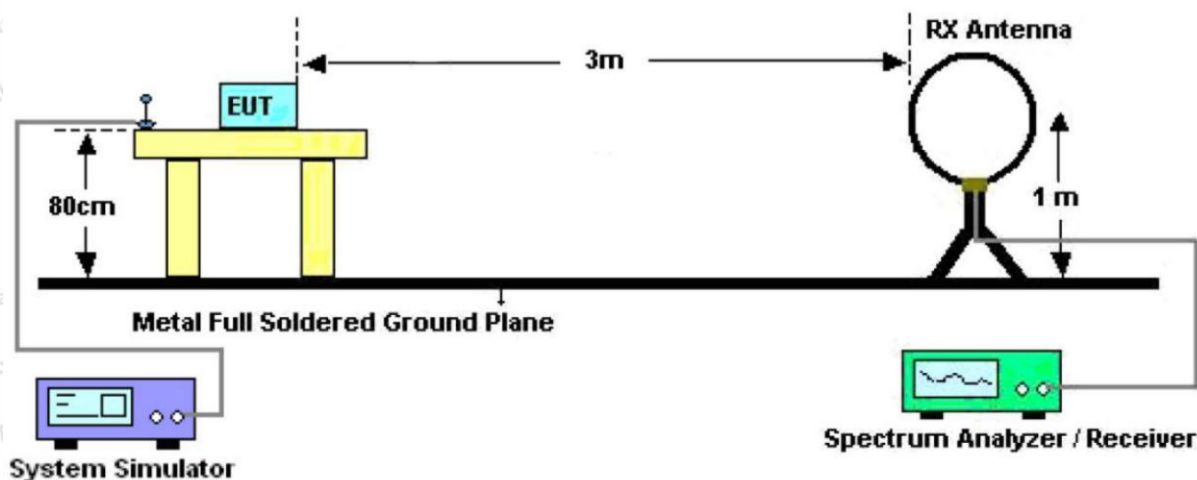


Figure 1. Below 30MHz



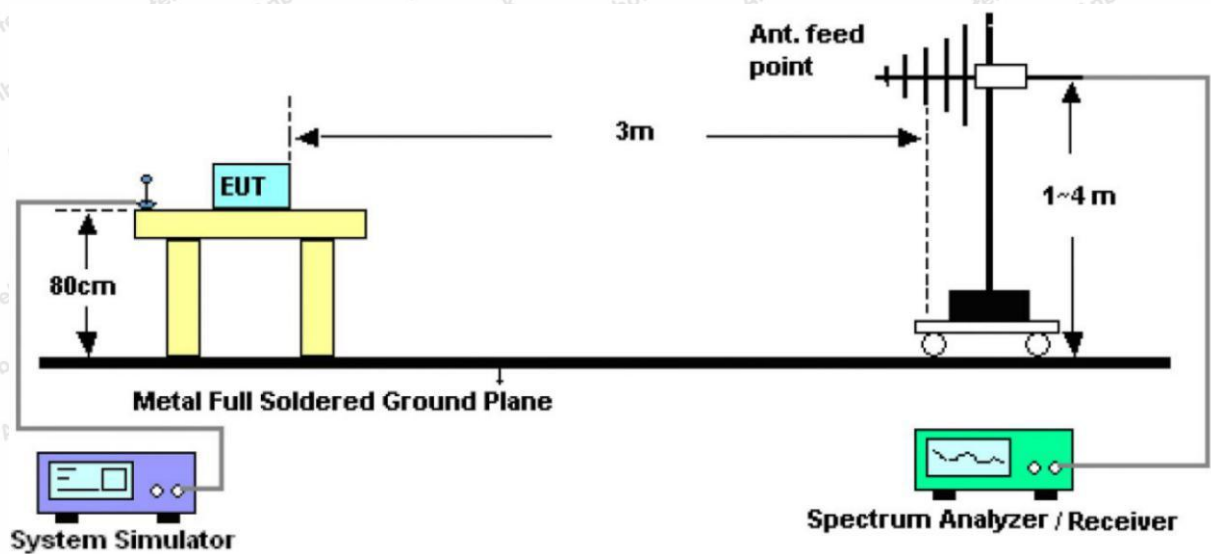


Figure 2. 30MHz to 1GHz

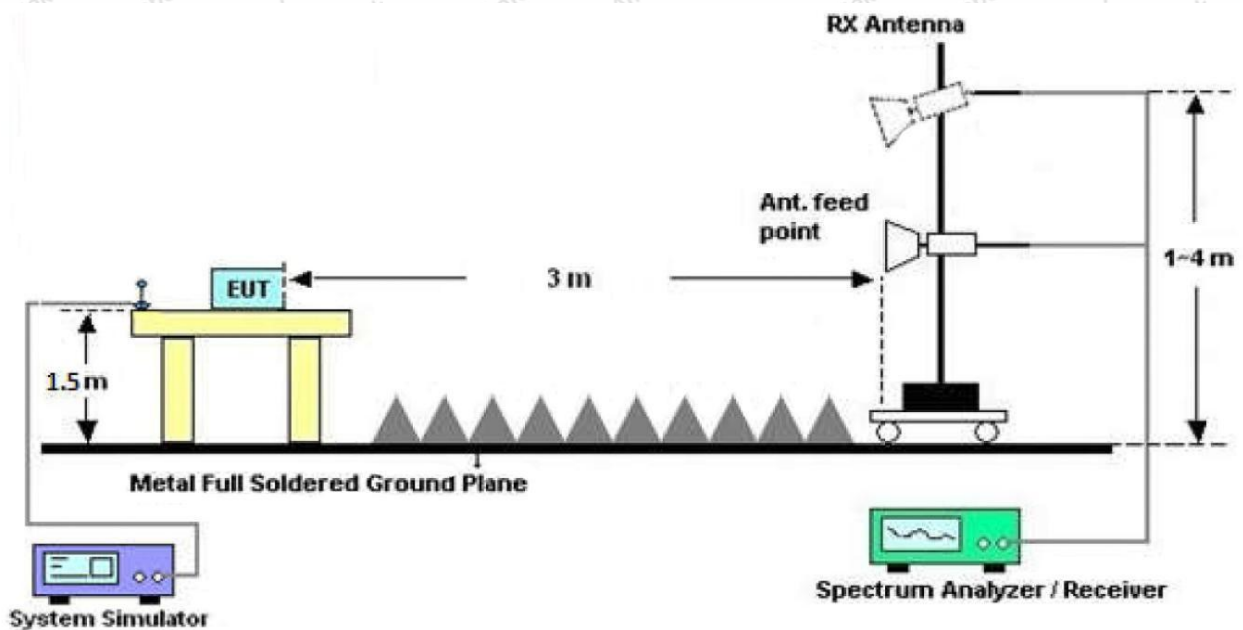


Figure 3. Above 1 GHz

4.3. Test Procedure

For below 1GHz: The EUT is placed on a turntable, which is 0.8m above the ground plane.

For above 1GHz: The EUT is placed on a turntable, which is 1.5m above the ground plane.

The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT is set 3 meters away from the receiving antenna which is mounted on a antenna tower. The antenna can be moved up and down from 1 to 4 meters to find out the maximum emission level. Rotated the EUT through three orthogonal axes to determine the maximum emissions, both horizontal and vertical polarization of the antenna are set on test. The EUT is tested in 9*6*6 Chamber. The



device is evaluated in xyz orientation.

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.

For 9kHz to 150kHz, Set the spectrum analyzer as:

RBW = 200Hz, VBW =1kHz, Detector= Quasi-Peak, Trace mode= Max hold, Sweep- auto couple.

For 150kHz to 30MHz, Set the spectrum analyzer as:

RBW = 9KHz, VBW =30kHz, Detector= Quasi-Peak, Trace mode= Max hold, Sweep- auto couple.

For 30MHz to 1000MHz, Set the spectrum analyzer as:

RBW = 100kHz, VBW =300kHz, Detector= Quasi-Peak, Trace mode= Max hold, Sweep- auto couple.

For above 1GHz, Set the spectrum analyzer as:

RBW =1MHz, VBW =1MHz, Detector= Peak, Trace mode= Max hold, Sweep- auto couple.

RBW =1MHz, VBW =10Hz, Detector= Average, Trace mode= Max hold, Sweep- auto couple.

4.4. Test Data

PASS

During the test, Pre-scan all kind of the place mode (X-axis, Y-axis, Z-axis), and found the X-axis is the worst case.

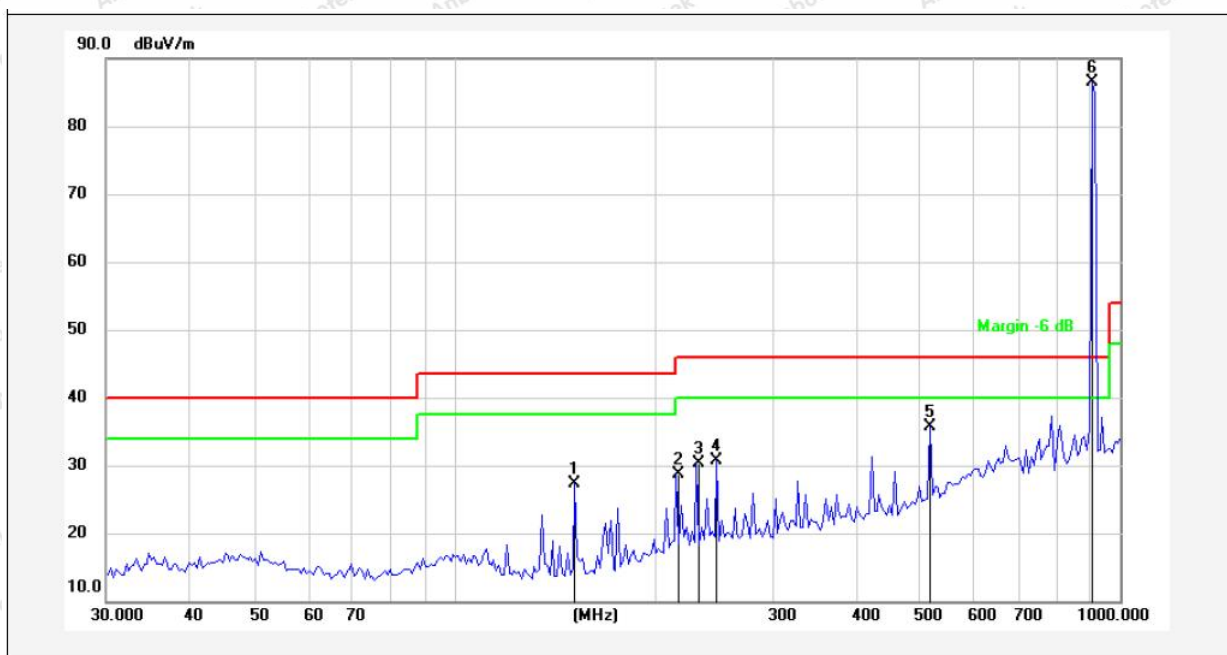
The test results of 9kHz-30MHz was attenuated more than 20dB below the permissible limits, so the results don't record in the report.

During the test, pre-scan all modes, only the worst case is recorded in the report.



Test Results (30~1000MHz)

Test Mode: Low CH (902.3MHz)
Power Source: AC 120V, 60Hz for adapter
Polarization: Horizontal
Temp.(°C)/Hum.(%RH): 25.2°C/55%RH

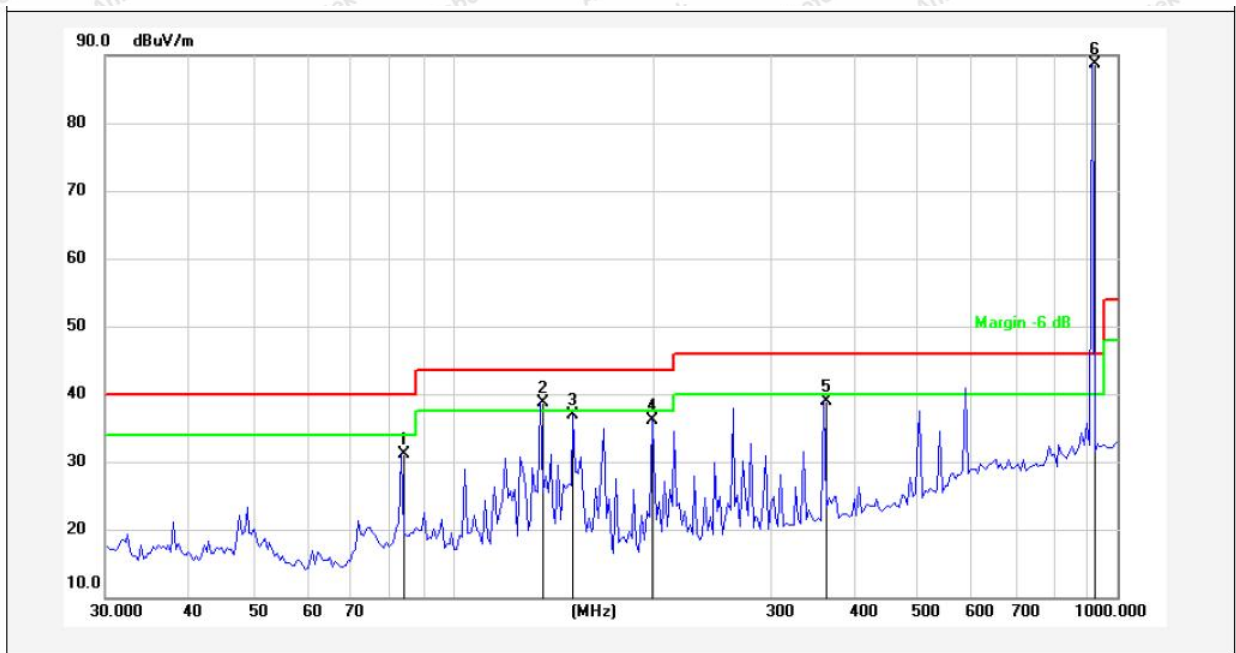


No.	Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	151.8632	43.38	-16.05	27.33	43.50	-16.17	QP			
2	215.6456	41.20	-12.55	28.65	43.50	-14.85	QP			
3	231.3120	42.27	-11.97	30.30	46.00	-15.70	QP			
4	248.1165	41.82	-11.15	30.67	46.00	-15.33	QP			
5	518.1556	40.43	-4.68	35.75	46.00	-10.25	QP			
6	902.3000	82.21	4.35	86.56	N/A	N/A	QP			



Test Results (30~1000MHz)

Test Mode: Low CH (902.3MHz)
Power Source: AC 120V, 60Hz for adapter
Polarization: Vertical
Temp.(°C)/Hum.(%RH): 25.2°C/55%RH



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	83.6688	47.21	-16.15	31.06	40.00	-8.94	QP			
2	135.5062	55.43	-16.74	38.69	43.50	-4.81	QP			
3	151.8632	52.99	-16.05	36.94	43.50	-6.56	QP			
4	199.2855	49.19	-13.09	36.10	43.50	-7.40	QP			
5	361.7139	47.94	-9.09	38.85	46.00	-7.15	QP			
6	902.3000	84.18	4.55	88.73	N/A	N/A	QP			



Test Results (1GHz-25GHz)

Test channel: Lowest

Peak value:

Frequency (MHz)	Antenna Pol.	Reading (dBuV/m)	Cable Loss (dB)	Ant Factor (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Det. Mode
1804.60	H	44.17	7.39	28.73	26.31	53.98	74.00	-20.02	PK
1804.60	H	36.26	7.39	28.73	26.31	46.07	54.00	-7.93	AV
2706.90	H	43.16	8.10	29.71	27.01	53.96	74.00	-20.04	PK
2706.90	H	34.12	8.10	29.71	27.01	44.92	54.00	-9.08	AV
3609.20	H	*	--	--	--	--	--	--	PK
3609.20	H	*	--	--	--	--	--	--	AV
1804.60	V	44.23	7.39	28.73	26.31	54.04	74.00	-19.96	PK
1804.60	V	35.39	7.39	28.73	26.31	45.20	54.00	-8.80	AV
2706.90	V	43.29	8.10	29.71	27.01	54.09	74.00	-19.91	PK
2706.90	V	35.58	8.10	29.71	27.01	46.38	54.00	-7.62	AV
3609.20	V	*	--	--	--	--	--	--	PK
3609.20	V	*	--	--	--	--	--	--	AV



Test Results (1GHz-25GHz)

Test channel: Middle

Peak value:

Frequency (MHz)	Antenna Pol.	Reading (dBuV/m)	Cable Loss (dB)	Ant Factor (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Det. Mode
1828.20	H	47.22	7.39	28.73	26.31	57.03	74.00	-16.97	PK
1828.20	H	37.18	7.39	28.73	26.31	46.99	54.00	-7.01	AV
2742.30	H	46.34	8.10	29.71	27.01	57.14	74.00	-16.86	PK
2742.30	H	35.05	8.10	29.71	27.01	45.85	54.00	-8.15	AV
3656.40	H	*	--	--	--	--	--	--	PK
3656.40	H	*	--	--	--	--	--	--	AV
1828.20	V	47.64	7.39	28.73	26.31	57.45	74.00	-16.55	PK
1828.20	V	37.57	7.39	28.73	26.31	47.38	54.00	-6.62	AV
2742.30	V	46.32	8.10	29.71	27.01	57.12	74.00	-16.88	PK
2742.30	V	35.42	8.10	29.71	27.01	46.22	54.00	-7.78	AV
3656.40	V	*	--	--	--	--	--	--	PK
3656.40	V	*	--	--	--	--	--	--	AV



Test Results (1GHz-25GHz)

Test channel: Highest

Peak value:

Frequency (MHz)	Antenna Pol.	Reading (dBuV/m)	Cable Loss (dB)	Ant Factor (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Det. Mode
1851.60	H	47.57	7.39	28.73	26.31	57.38	74.00	-16.62	PK
1851.60	H	37.04	7.39	28.73	26.31	46.85	54.00	-7.15	AV
2777.40	H	46.72	8.10	29.71	27.01	57.52	74.00	-16.48	PK
2777.40	H	36.26	8.10	29.71	27.01	47.06	54.00	-6.94	AV
3703.20	H	*	--	--	--	--	--	--	PK
3703.20	H	*	--	--	--	--	--	--	AV
1851.60	V	48.58	7.39	28.73	26.31	58.39	74.00	-15.61	PK
1851.60	V	36.49	7.39	28.73	26.31	46.30	54.00	-7.70	AV
2777.40	V	45.97	8.10	29.71	27.01	56.77	74.00	-17.23	PK
2777.40	V	36.19	8.10	29.71	27.01	46.99	54.00	-7.01	AV
3703.20	V	*	--	--	--	--	--	--	PK
3703.20	V	*	--	--	--	--	--	--	AV

Remark:

- 1.Result =Reading + Factor
2. "*" means the test results were attenuated more than 20dB below the permissible limits, so the results don't record in the report.

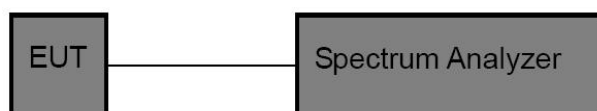


5. Maximum Peak Output Power Test

5.1. Test Standard and Limit

Test Standard	FCC Part15 C Section 15.247 (b)(2)
Test Limit	For frequency hopping systems operating in the 902-928 MHz band: 1 watt for systems employing at least 50 hopping channels; and, 0.25 watts for systems employing less than 50 hopping channels, but at least 25 hopping channels, as permitted under paragraph (a)(1)(i) of this section.

5.2. Test Setup



5.3. Test Procedure

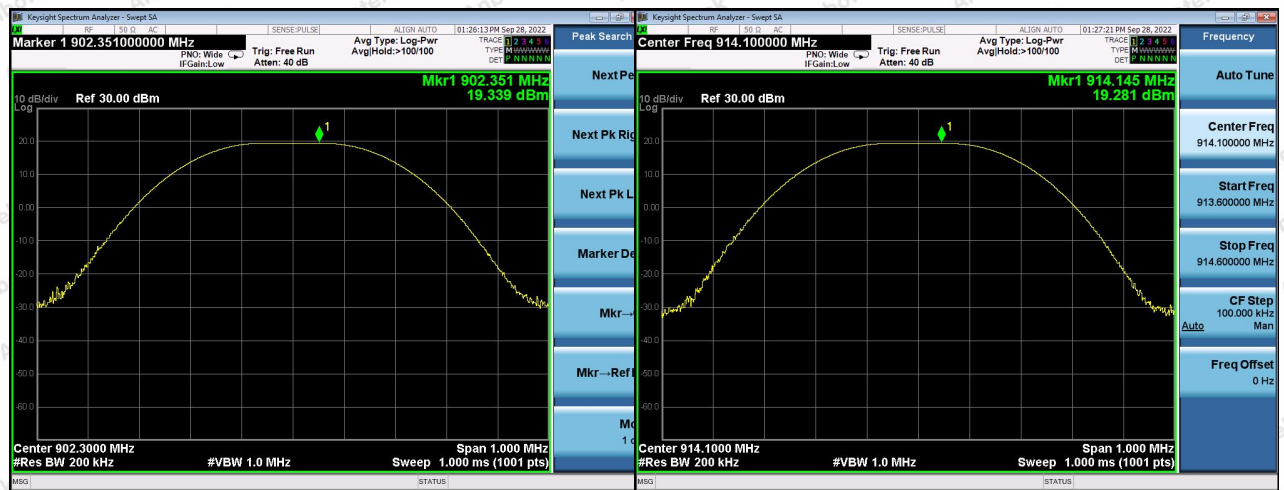
1. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above,
2. Spectrum Setting:
 - RBW > the 20 dB bandwidth of the emission being measured
 - Span = approximately 5 times the 20 dB bandwidth, centered on a hopping channel
 - VBW $\geq$ RBW
 - Sweep = auto
 - Detector function = peak
 - Trace = max hold

5.4. Test Data

Test Item	:	Max. peak output power	Test Mode	:	CH Low ~ CH High
Test Voltage	:	AC 120V, 60Hz for adapter	Temperature	:	23.6° C
Test Result	:	PASS	Humidity	:	49 %

Test Channel	Peak Power output (dBm)	Limit (dBm)	Results
Low	19.339	30.00	PASS
Middle	19.281	30.00	PASS
High	19.279	30.00	PASS





Low Channel

Mid Channel



High Channel

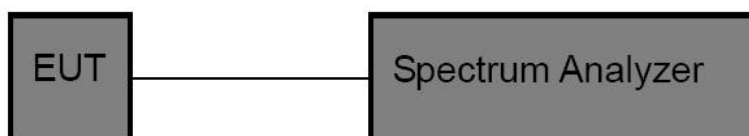


6. 20DB Occupy Bandwidth Test

6.1. Test Standard

Test Standard	FCC Part15 C Section 15.247 (a)(1)(i)
Limit	Less than 250KHz

6.2. Test Setup



6.3. Test Procedure

Using the following spectrum analyzer settings:

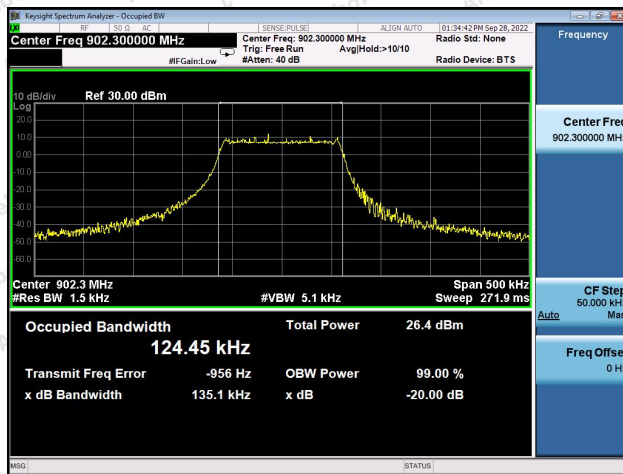
1. Span= approximately 2 to 3 times the 20dB bandwidth, centered on a hopping channel.
2. Set the RBW $\geq 1\%$ of the 20 dB bandwidth.
3. Set the VBW $\geq$ RBW.
4. Sweep time = auto couple.
5. Detector function = peak.
6. Trace mode = max hold.
7. Allow trace to fully stabilize.

6.4. Test Data

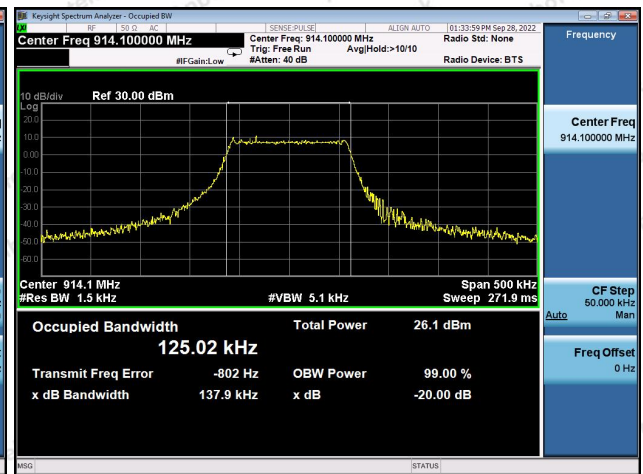
Test Item	: 20dB BW	Test Mode	: CH Low ~ CH High
Test Voltage	: AC 120V, 60Hz for adapter	Temperature	: 23.6℃
Test Result	: PASS	Humidity	: 53 %

Test Channel	Bandwidth (kHz)	Limit (kHz)	Results
Low	135.1	≤ 250	PASS
Middle	137.9	≤ 250	PASS
High	137.1	≤ 250	PASS

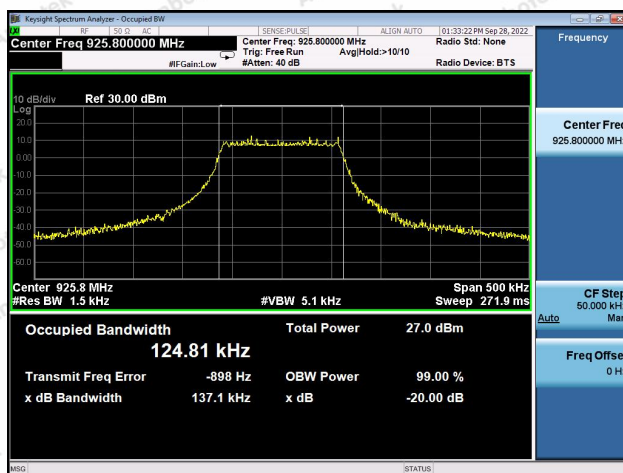




Low Channel



Mid Channel



High Channel

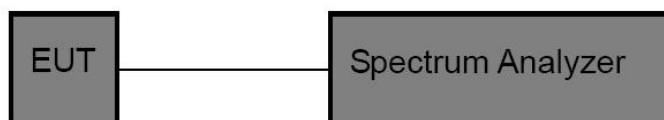


7. Carrier Frequency Separation Test

7.1. Test Standard and Limit

Test Standard	FCC Part15 C Section 15.247 (a)(1)
Test Limit	> 25 kHz or the 20 dB bandwidth whichever is greater.

7.2. Test Setup



7.3. Test Procedure

The EUT must have its hopping function enabled. Using the following spectrum analyzer settings:

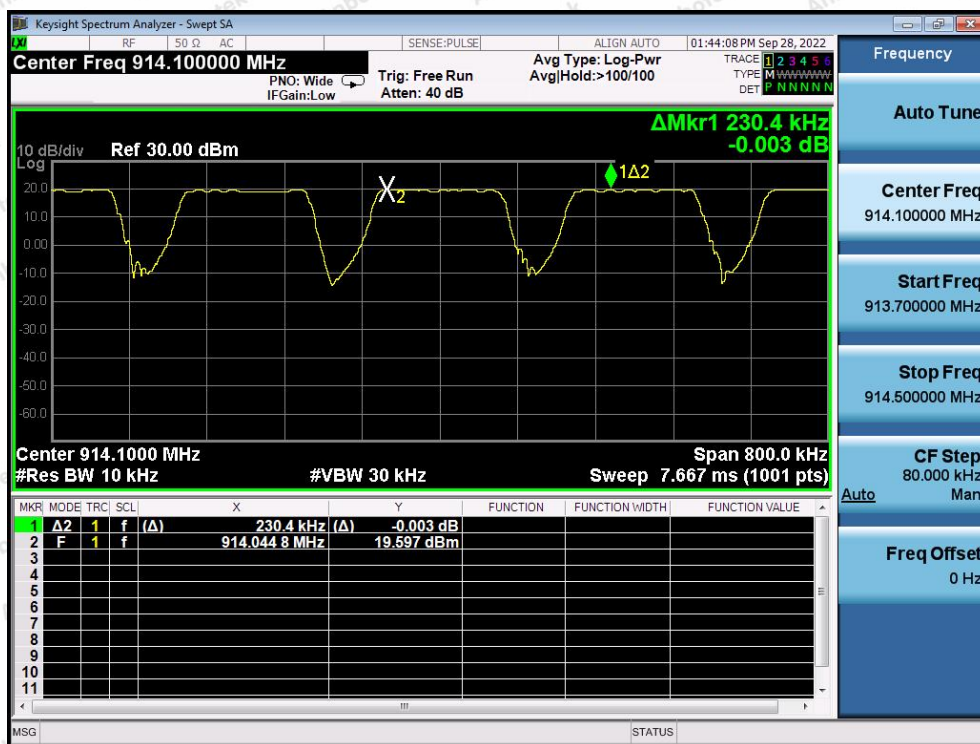
1. Span= Wide enough to capture the peaks of two adjacent channels
2. Set the RBW =approximately 30% of the channel spacing.
3. Set the VBW $\geq$ RBW.
4. Sweep time = auto couple.
5. Detector function = peak.
6. Trace mode = max hold.
7. Allow trace to fully stabilize.

7.4. Test Data

Test Item	:	Frequency Separation	Test Mode	:	Hopping
Test Voltage	:	AC 120V, 60Hz for adapter	Temperature	:	23.6° C
Test Result	:	PASS	Humidity	:	49 %

Mode	Frequency (MHz)	Separation Read Value (kHz)	Limit (kHz)	Result
Hopping	914.1	230.4	137.9	PASS





Hopping

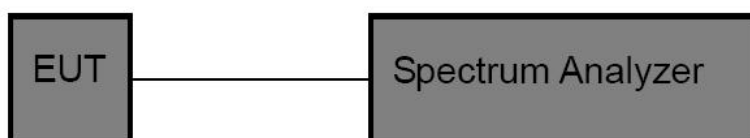


8. Number of Hopping Channel Test

8.1. Test Standard and Limit

Test Standard	FCC Part15 C Section 15.247(a)(1)(i)
Test Limit	≥ 50 channels for 20 dB bandwidth less than 250KHz ≥ 25 channels for 20 dB bandwidth greater than 250KHz

8.2. Test Setup



8.3. Test Procedure

The EUT must have its hopping function enabled. Using the following spectrum analyzer setting:

1. Span= the frequency band of operation
2. Set the RBW = less than 30% of the channel spacing or the 20 dB bandwidth, whichever is smaller.
3. Set the VBW ≥ RBW.
4. Sweep time = auto couple.
5. Detector function = peak.
6. Trace mode = max hold.
7. Allow trace to fully stabilize.

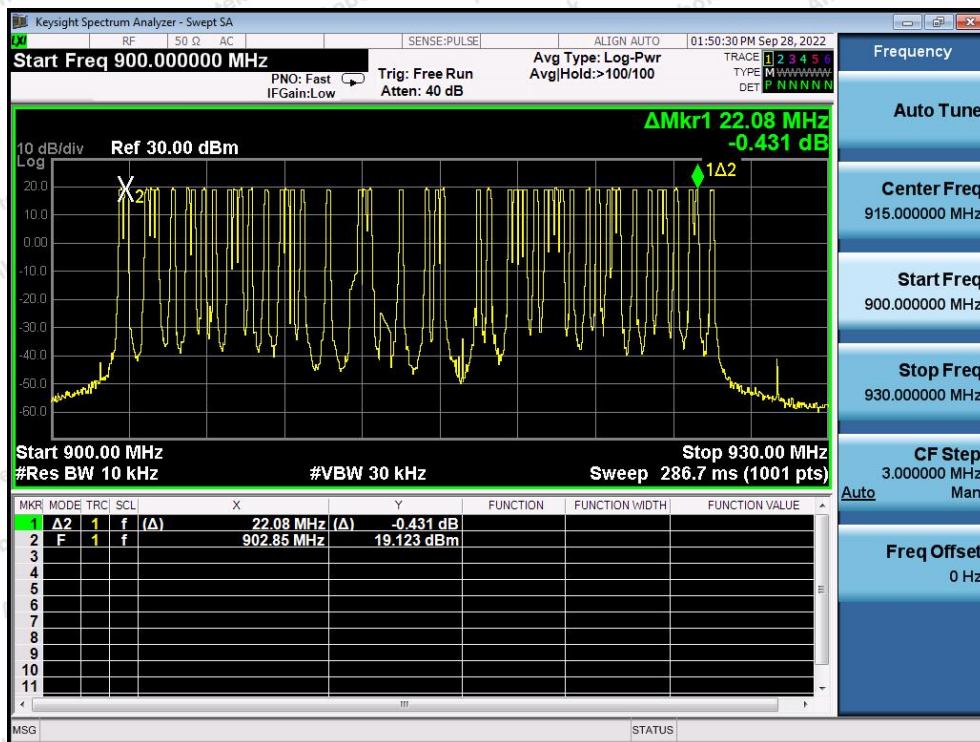
8.4. Test Data

Test Item	:	Number of Hopping Frequency	Test Mode	:	Hopping
Test Voltage	:	AC 120V, 60Hz for adapter	Temperature	:	23.6° C
Test Result	:	PASS	Humidity	:	49 %

Hopping Channel Frequency Range	Quantity of Hopping Channel	Quantity of Hopping Channel
902-928MHz	52	≥ 50

Note: There are actually 118 channels in the EUT. because it takes too long for all channels to hop, the test only selects more than 50 quantity of Hopping Channel





Hopping

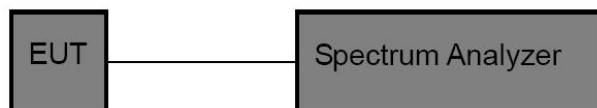


9. Dwell Time Test

9.1. Test Standard and Limit

Test Standard	FCC Part15 C Section 15.247(a)(1)(i), 15.247(f)
Test Limit	15.247(a)(1)(i): if the 20 dB bandwidth of the hopping channel is less than 250 KHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 KHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. 15.247(f): For the purposes of this section, hybrid systems are those that employ a combination of both frequency hopping and digital modulation techniques. The frequency hopping operation of the hybrid system, with the direct sequence or digital modulation operation turned-off, shall have an average time of occupancy on any frequency not to exceed 0.4 seconds within a time period in seconds equal to the number of hopping frequencies employed multiplied by 0.4

9.2. Test Setup



9.3. Test Procedure

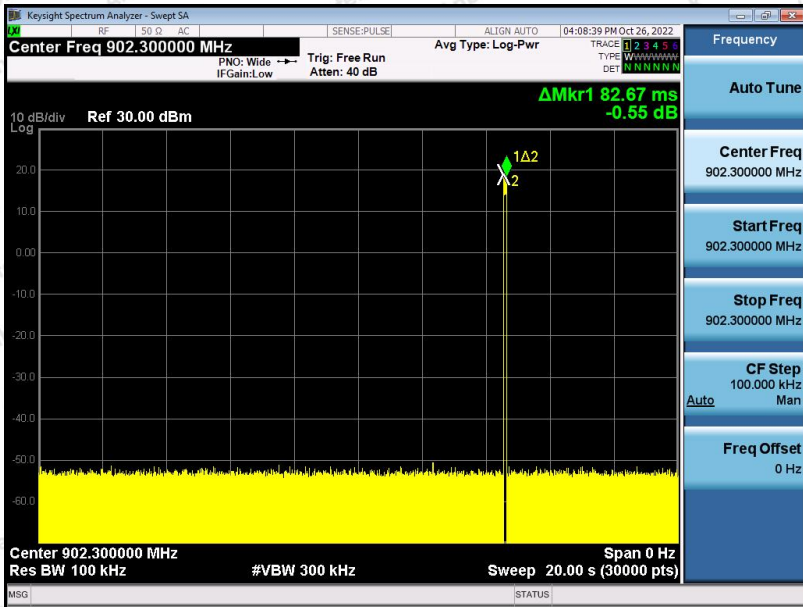
The EUT must have its hopping function enabled. Use the following spectrum analyzer settings:

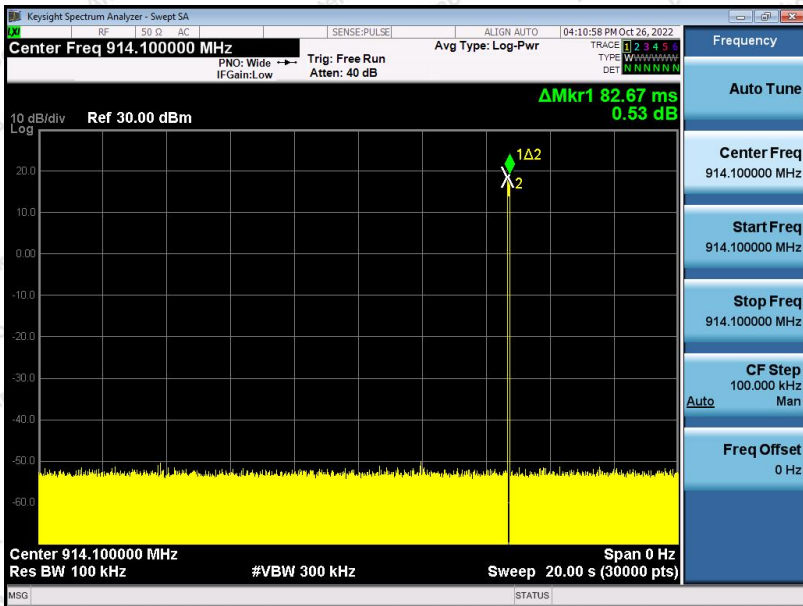
1. Span= zero span, centered on a channel
2. Set the RBW = 100 KHz.
3. Set the VBW = 300 KHz.
4. Sweep time = as necessary to capture the entire dwell time per hopping channel.
5. Detector function = peak.
6. Trace mode = max hold.
7. Allow trace to fully stabilize.

9.4. Test Data

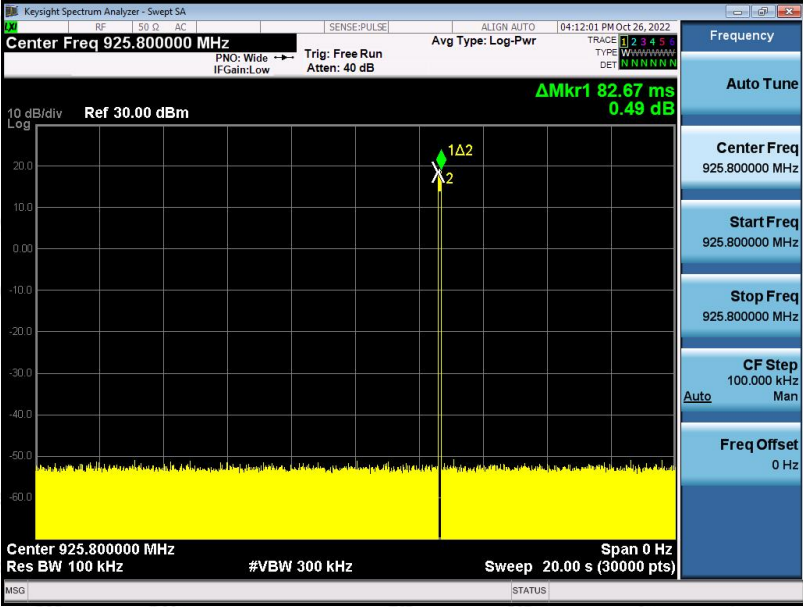
Test Item	:	Time of Occupancy	Test Mode	:	CH Low ~ CH High
Test Voltage	:	AC 120V, 60Hz for adapter	Temperature	:	23.6° C
Test Result	:	PASS	Humidity	:	49 %



Requirement	Pulse width (ms)	Observe Period(s)	Dwell time (ms)	Limit (s)	Result
15.247(a)(1)(i)	82.67	20.00	82.67	0.40	PASS
 Center Freq 902.300000 MHz Ref 30.00 dBm Pulse width 82.67 ms Level -0.55 dB Span 0 Hz Sweep 20.00 s (30000 pts) Res BW 100 kHz #VBW 300 kHz					
Low Channel					

Requirement	Pulse width (ms)	Observe Period(s)	Dwell time (ms)	Limit (s)	Result
15.247(a)(1)(i)	82.67	20.00	82.67	0.40	PASS
 Center Freq 914.100000 MHz Ref 30.00 dBm Pulse width 82.67 ms Level 0.53 dB Span 0 Hz Sweep 20.00 s (30000 pts) Res BW 100 kHz #VBW 300 kHz					
Middle Channel					



Requirement	Pulse width (ms)	Observe Period(s)	Dwell time (ms)	Limit (s)	Result
15.247(a)(1)(i)	82.67	20.00	82.67	0.40	PASS
 High Channel					

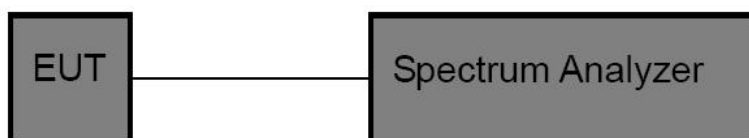


10. 100kHz Bandwidth of Frequency Band Edge Requirement

10.1. Test Standard and Limit

Test Standard	FCC Part15 C Section 15.247 (d)
Test Limit	in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in 15.209(a).

10.2. Test Setup



10.3. Test Procedure

The EUT must have its hopping/Non-hopping function enabled. Using the following spectrum analyzer setting:

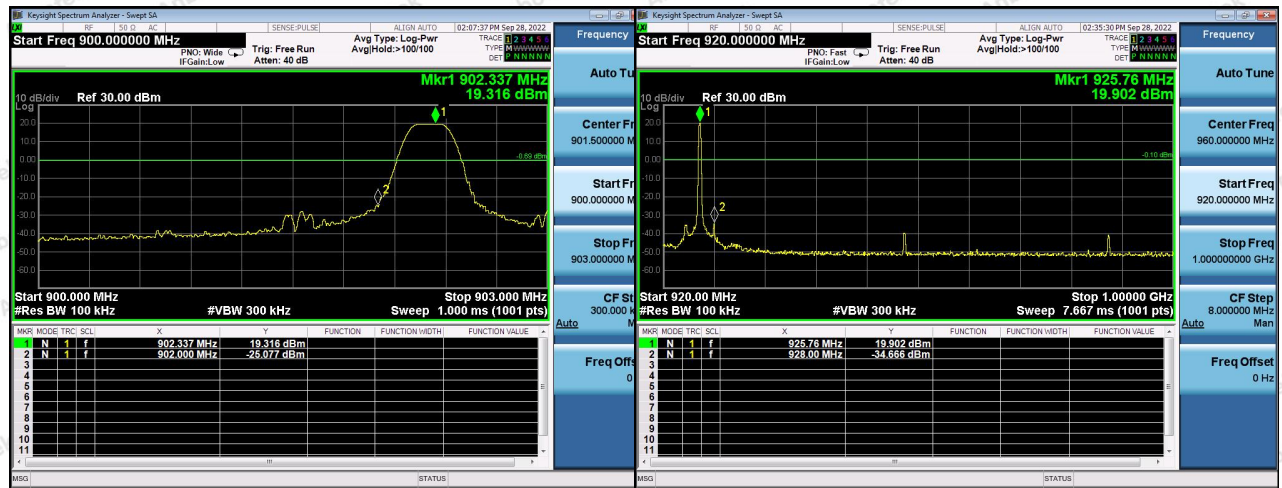
1. Set the RBW = 100kHz.
2. Set the VBW = 300kHz.
3. Sweep time = auto couple.
4. Detector function = peak.
5. Trace mode = max hold.
6. Allow trace to fully stabilize.

10.4. Test Data

Test Item	:	Band edge	Test Mode	:	CH Low, CH High
Test Voltage	:	AC 120V, 60Hz for adapter	Temperature	:	23.6° C
Test Result	:	PASS	Humidity	:	49 %



Band edge measurements



For Low channel Non-Hopping Mode

For High channel Non-Hopping Mode

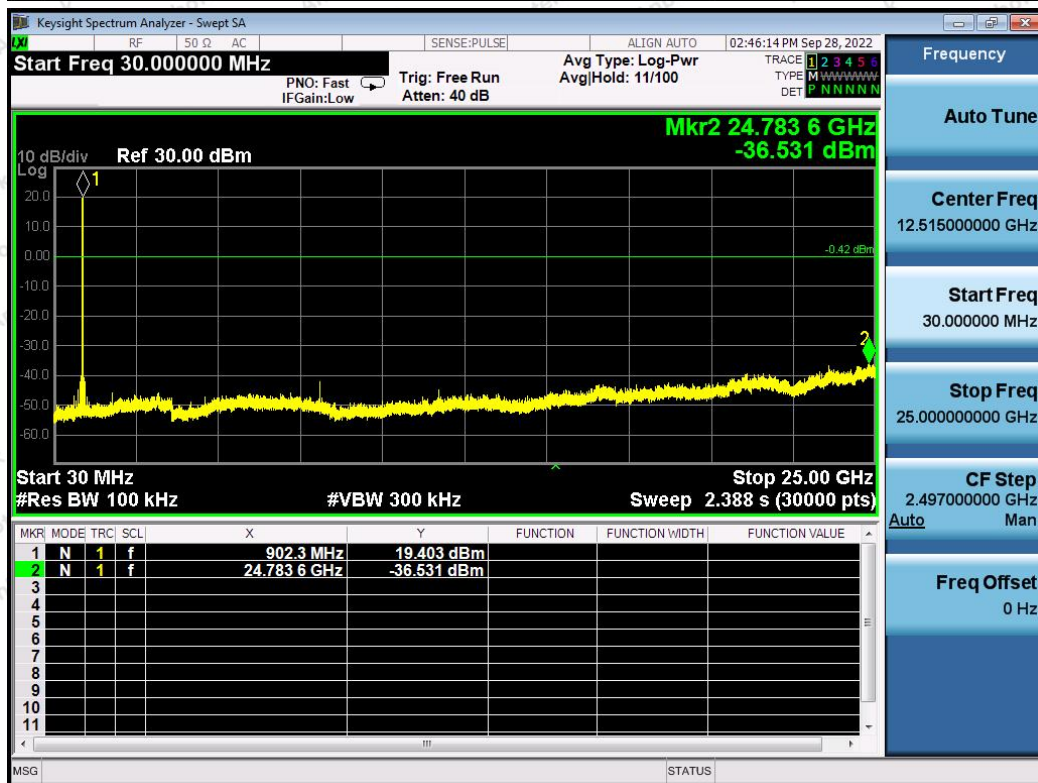


For Low channel Hopping Mode

For High channel Hopping Mode

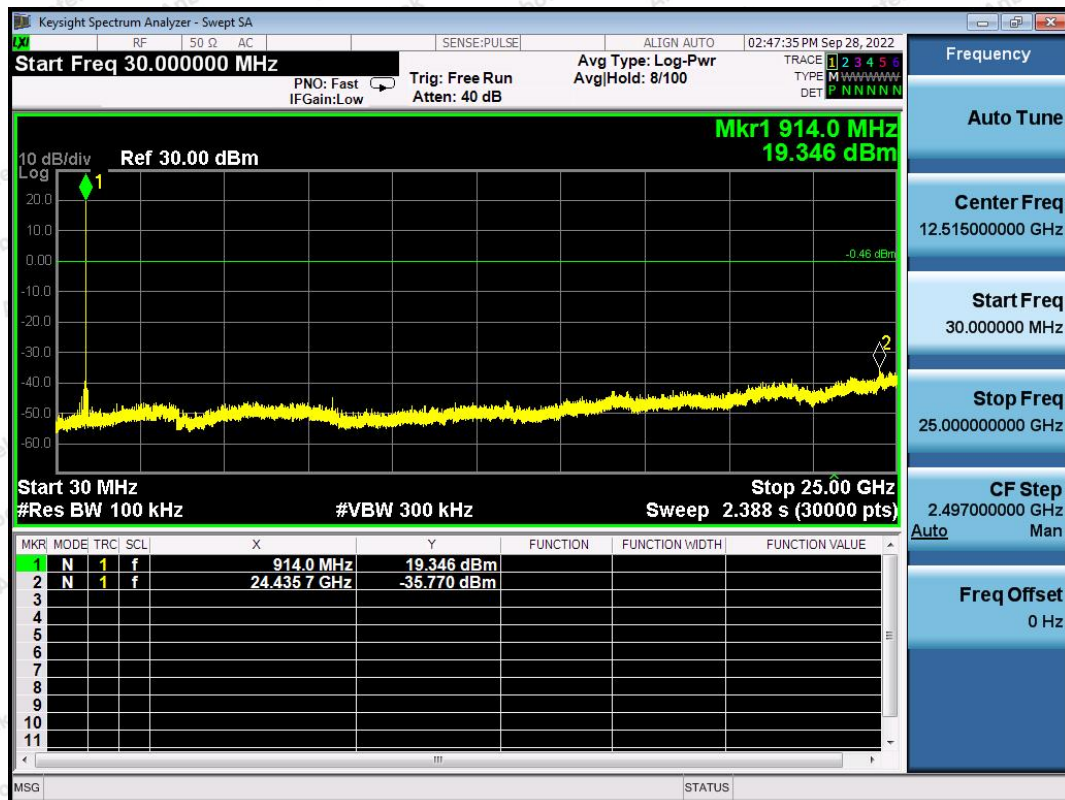


Conducted Emission Method



Low Channel





Mid Channel

Shenzhen Anbotek Compliance Laboratory Limited

Address: 1/F., Building D, Sogood Science and Technology Park, Sanwei Community, Hangcheng Street, Bao'an District, Shenzhen, Guangdong, China.
Tel: (86) 0755-26066440 Fax: (86) 0755-26014772 Email: service@anbotek.com

Code: AB-RF-05-b

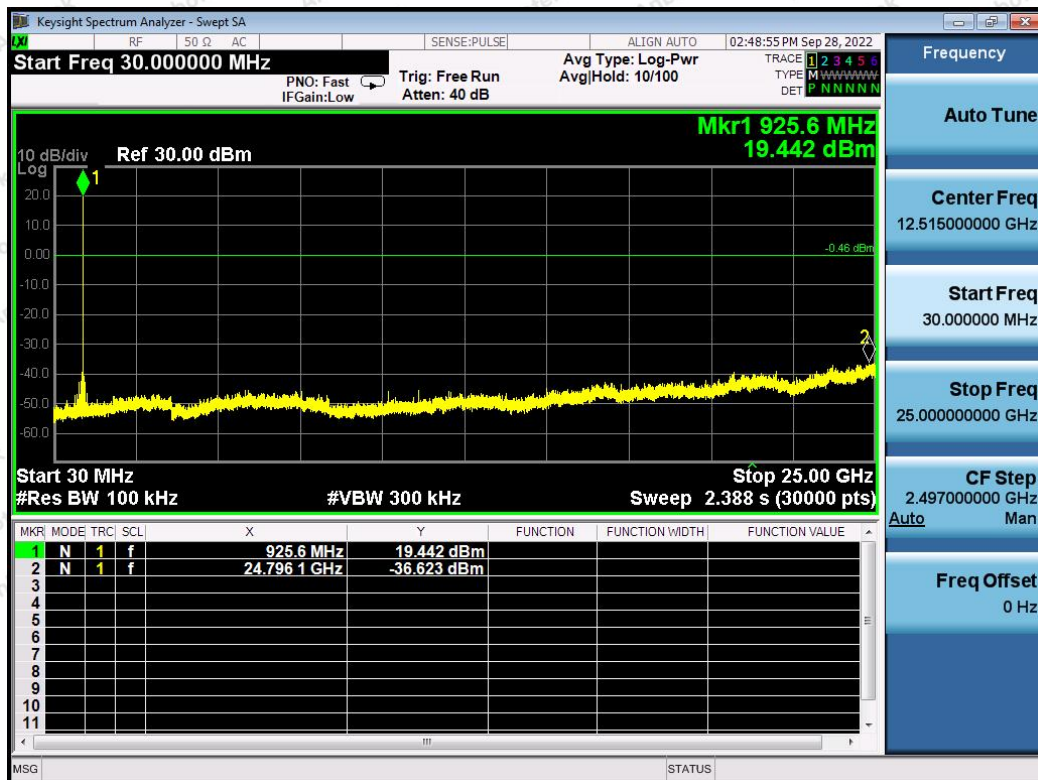


Hotline

400-003-0500

www.anbotek.com.cn





High Channel

Shenzhen Anbotek Compliance Laboratory Limited

Address: 1/F., Building D, Sogood Science and Technology Park, Sanwei Community, Hangcheng Street, Bao'an District, Shenzhen, Guangdong, China.
Tel: (86) 0755-26066440 Fax: (86) 0755-26014772 Email: service@anbotek.com

Code: AB-RF-05-b



Hotline

400-003-0500

www.anbotek.com.cn



11. Antenna Requirement

11.1. Test Standard and Requirement

Test Standard	FCC Part15 Section 15.203 /247(c)
Requirement	1) 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. 2) 15.247(c) (1)(i) requirement: 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 6 dBi.

11.2. Antenna Connected Construction

The antenna is PCB antenna which permanently attached, and the best case gain of the antenna is -15.65dBi. It complies with the standard requirement.



APPENDIX I -- TEST SETUP PHOTOGRAPH

Please refer to separated files Appendix I -- Test Setup Photograph

APPENDIX II -- EXTERNAL PHOTOGRAPH

Please refer to separated files Appendix II -- External Photograph

APPENDIX III -- INTERNAL PHOTOGRAPH

Please refer to separated files Appendix III -- Internal Photograph

----- End of Report -----

