FCC TEST REPORT

Client Name	:	ROYCHE Co.,Ltd
Address	:	F11 ParkLand B/D 601 Eunjuro Gangnam Gu, Seoul, South Korea
Product Name	:	Dongle
Date	:	Jul. 12, 2021

Shenzhen Anbotek Compliance Laboratory Limited

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TEST REPORT

Applicant	:	ROYCHE Co.,Ltd
Manufacturer	:	Dongguan Lingjie Electronics Technology Co.,Ltd
Product Name	:	Dongle
Model No.	:	ZM7.0, RKBR-BT21
Trade Mark	:	N.A
Rating(s)	:	Input: DC 5V, 25mA

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	May 29, 2021
Date of Test	May 29 ~ Jul. 12, 2021
Prepared by	(Ella Liang)
Approved & Authorized Signer	(Kingkong Jin)

Address: 1/F., Building D, Sogood Science and Technology Park, Sanwei Community, Hangcheng Street, Bao'an District, Shenzhen, Guangdong, China.
Tel:(86) 755-26066440 Fax: (86) 755-26014772 Email: service@anbotek.com
Hotline 400-003-0500
www.anbotek.com

1. General Information

1.1. Client Information

Applicant	:	ROYCHE Co.,Ltd
Address	:	F11 ParkLand B/D 601 Eunjuro Gangnam Gu, Seoul, South Korea
Manufacturer	:	Dongguan Lingjie Electronics Technology Co.,Ltd
Address	:	Building A 1-4floors and Building B 1-5floors, No.16 Zhenxing North Road, Xiegang Town, Dongguan City, Guangdong Province, China
Factory	:	ROYCHE Co.,Ltd
Address	:	F11 ParkLand B/D 601 Eunjuro Gangnam Gu, Seoul, South Korea

1.2. Description of Device (EUT)

Product Name	:	Dongle	
Model No.	:	ZM7.0, RKBR-BT21 (Note: All samples are the same except the model number & colour, so we prepare "ZM7.0" for test only.)	
Trade Mark	:	N.A	
Test Power Supply	:	DC 5V USB port	
Test Sample No.	:	1-2-1(Normal Sample), 1-2-2(Engineering Sample)	
Product Description	:	Operation Frequency:	2403.85~2479.85MHz
		Number of Channel:	16 Channels
		Modulation Type:	GFSK
		Antenna Type:	PCB Antenna
		Antenna Gain(Peak):	-1 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

N/A		

1.4. Description of Test Modes

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Pretest Mode	Description	
Mode 1	CH01	TX Only
Mode 2	CH03	
Mode 3	CH16	

Note:

(1) The measurements are performed at the highest, middle, lowest available channels.

(2)The data rate was set in 1Mbps for radiated emission due to the highest RF output power.

1.5. List of channels

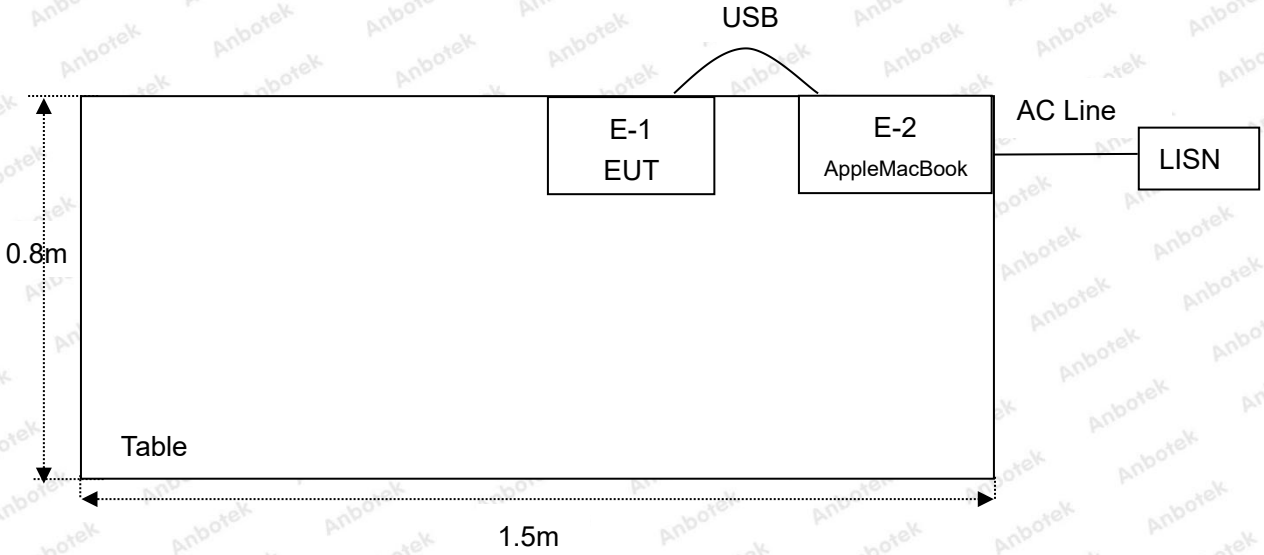
Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)
1	2403.85	5	2470.85	9	2414.85	13	2419.85
2	2426.85	6	2422.85	10	2436.85	14	2439.85
3	2441.85	7	2445.85	11	2459.85	15	2453.85
4	2463.85	8	2466.85	12	2473.85	16	2479.85

Note:

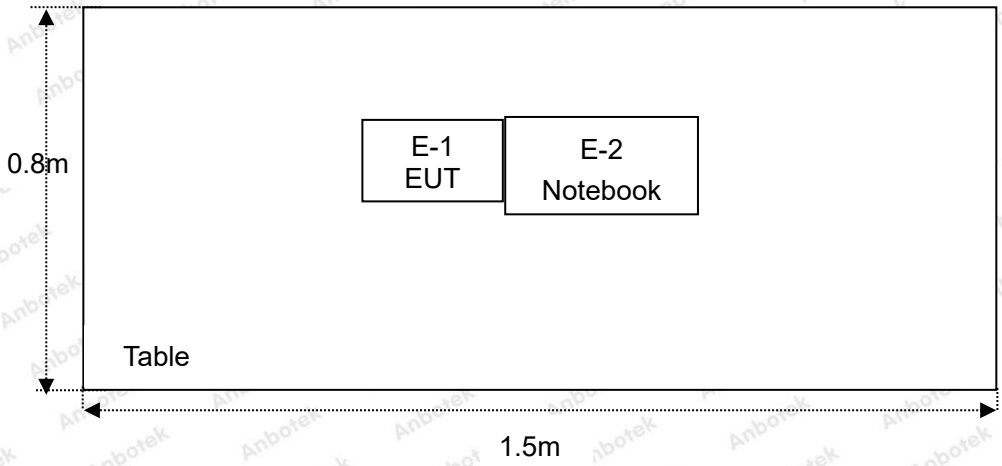
1. The engineering test program was provided and the EUT was programmed to be in continuously transmitting mode.

1.6. Description Of Test Setup

CE



RE



1.7. Test Equipment List

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	L.I.S.N. Artificial Mains Network	Rohde & Schwarz	ENV216	100055	Oct. 26, 2020	1 Year
2.	EMI Test Receiver	Rohde & Schwarz	ESCI	100627	Oct. 26, 2020	1 Year
3.	EMI Test Receiver	Rohde & Schwarz	ESR26	101481	Oct. 26, 2020	1 Year
4.	RF Switching Unit	Compliance Direction	RSU-M2	38303	Oct. 26, 2020	1 Year
5.	MAX Spectrum Analysis	Agilent	N9020A	MY51170037	Oct. 26, 2020	1 Year
6.	Preamplifier	SKET Electronic	BK1G18G30D	KD17503	Oct. 26, 2020	1 Year
7.	Double Ridged Horn Antenna	Instruments corporation	GTH-0118	351600	Nov. 02, 2020	2 Year
8.	Bilog Broadband Antenna	Schwarzbeck	VULB9163	VULB 9163-289	Nov. 02, 2020	2 Year
9.	Loop Antenna	Schwarzbeck	FMZB1519B	00053	Nov. 02, 2020	2 Year
10.	Horn Antenna	A-INFO	LB-180400-KF	J211060628	Nov. 02, 2020	2 Year
11.	Pre-amplifier	SONOMA	310N	186860	Oct. 26, 2020	1 Year
12.	EMI Test Software EZ-EMC	SHURPLE	N/A	N/A	N/A	N/A
13.	RF Test Control System	YIHENG	YH3000	2017430	Oct. 26, 2020	1 Year
14.	Power Sensor	DAER	RPR3006W	15I00041SN045	Oct. 26, 2020	1 Year
15.	Power Sensor	DAER	RPR3006W	15I00041SN046	Oct. 26, 2020	1 Year
16.	MXA Spectrum Analysis	Agilent	N9020A	MY51170037	Oct. 26, 2020	1 Year
17.	MXG RF Vector Signal Generator	Agilent	N5182A	MY48180656	Oct. 26, 2020	1 Year
18.	Signal Generator	Agilent	E4421B	MY41000743	Oct. 26, 2020	1 Year
19.	DC Power Supply	IVYTECH	IV3605	1804D360510	Oct. 26, 2020	1 Year

1.8. Measurement Uncertainty

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

1.9. 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, September 30, 2020.

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, September 30, 2020.

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.518128

2. Summary of Test Results

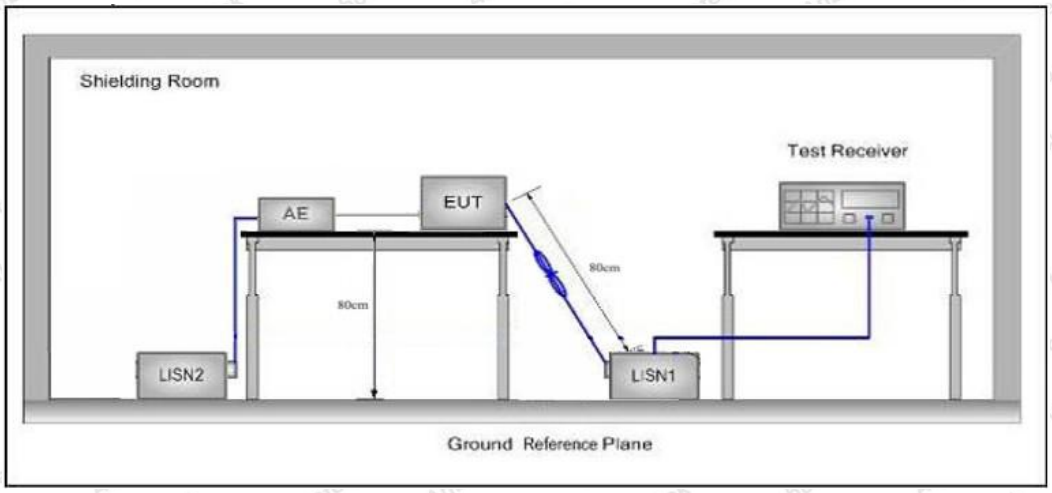
Standard Section	Test Item	Result
15.203/15.247(c)	Antenna Requirement	PASS
15.207	Conducted Emission	PASS
15.205/15.209	Spurious Emission	PASS
15.247(b)(1)	Conducted Peak Output Power	PASS
15.247(a)(1)	20dB Occupied Bandwidth	PASS
15.247(a)(1)	Carrier Frequencies Separation	PASS
15.247(a)(1)	Hopping Channel Number	PASS
15.247(a)(1)	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.

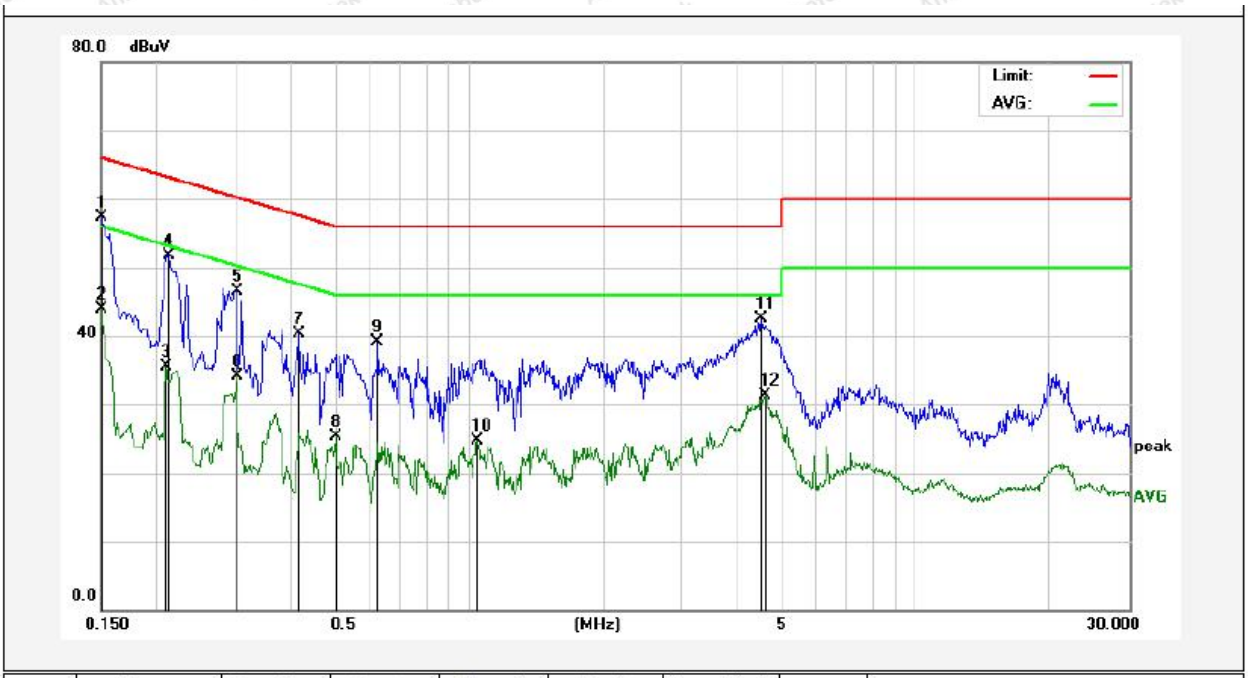
3.4. Test Data

PASS

During the test, pre-scan all the modes, and found the Low channel which is the worst case, only the worst case is recorded in the report.

Conducted Emission Test Data

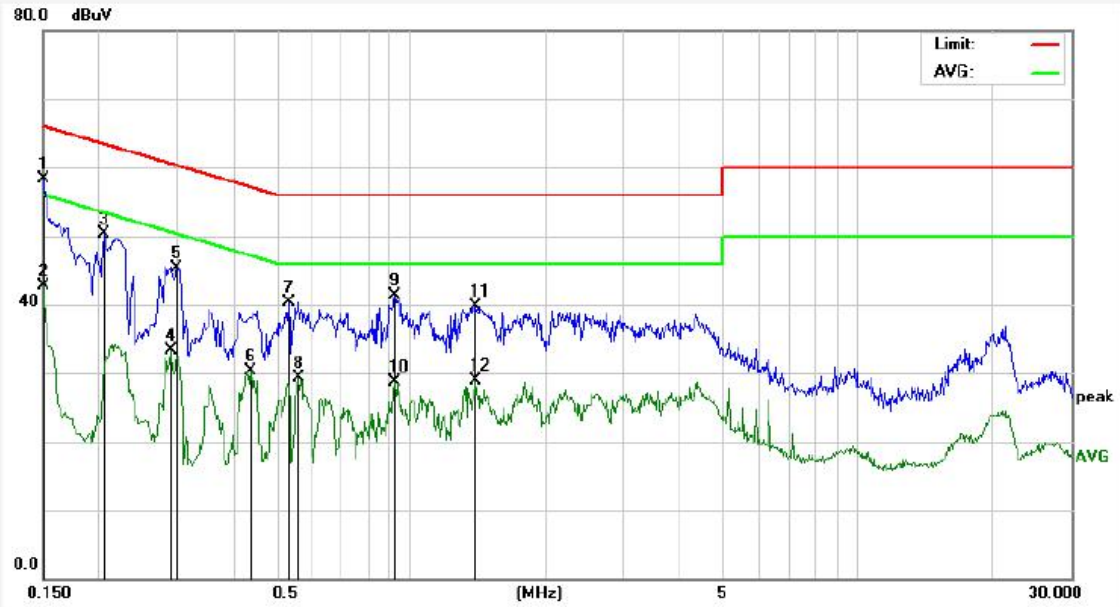
Test Site: 1# Shielded Room
Operating Condition: Mode 1
Test Specification: DC 5V USB port
Comment: Live Line
Tem.: 24.1℃ Hum.: 48%



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV)	Over Limit (dB)	Detector	Remark
1	0.1500	37.37	19.90	57.27	65.99	-8.72	QP	
2	0.1500	23.91	19.90	43.81	55.99	-12.18	AVG	
3	0.2100	15.60	19.90	35.50	53.20	-17.70	AVG	
4	0.2128	31.80	19.90	51.70	63.09	-11.39	QP	
5	0.3020	26.59	19.89	46.48	60.19	-13.71	QP	
6	0.3020	14.12	19.89	34.01	50.19	-16.18	AVG	
7	0.4180	20.42	19.94	40.36	57.49	-17.13	QP	
8	0.5020	5.24	19.98	25.22	46.00	-20.78	AVG	
9	0.6260	19.02	20.02	39.04	56.00	-16.96	QP	
10	1.0460	4.53	20.12	24.65	46.00	-21.35	AVG	
11	4.5060	22.36	20.19	42.55	56.00	-13.45	QP	
12	4.6100	11.05	20.20	31.25	46.00	-14.75	AVG	

Conducted Emission Test Data

Test Site: 1# Shielded Room
Operating Condition: Mode 1
Test Specification: DC 5V USB port
Comment: Neutral Line
Tem.: 24.1℃ Hum.: 48%



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV)	Over Limit (dB)	Detector	Remark
1	0.1500	38.48	19.90	58.38	65.99	-7.61	QP	
2	0.1500	22.88	19.90	42.78	55.99	-13.21	AVG	
3	0.2060	30.50	19.90	50.40	63.36	-12.96	QP	
4	0.2900	13.42	19.89	33.31	50.52	-17.21	AVG	
5	0.2987	25.38	19.89	45.27	60.28	-15.01	QP	
6	0.4380	10.31	19.95	30.26	47.10	-16.84	AVG	
7	0.5340	20.40	19.99	40.39	56.00	-15.61	QP	
8	0.5620	9.22	20.00	29.22	46.00	-16.78	AVG	
9	0.9220	21.19	20.10	41.29	56.00	-14.71	QP	
10	0.9220	8.54	20.10	28.64	46.00	-17.36	AVG	
11	1.4020	19.62	20.13	39.75	56.00	-16.25	QP	
12	1.4020	8.69	20.13	28.82	46.00	-17.18	AVG	

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

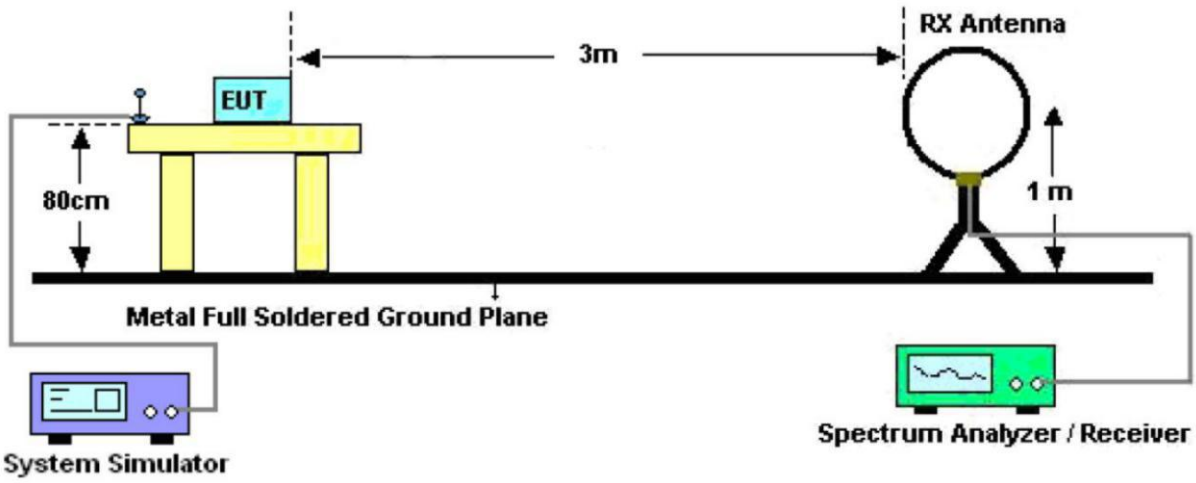


Figure 1. Below 30MHz

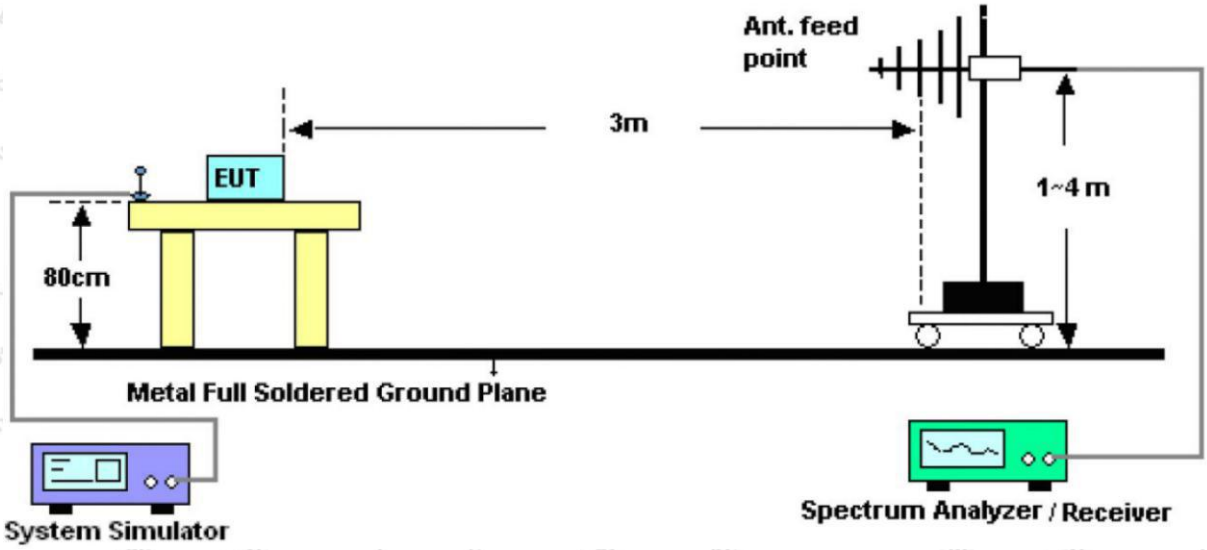


Figure 2. 30MHz to 1GHz

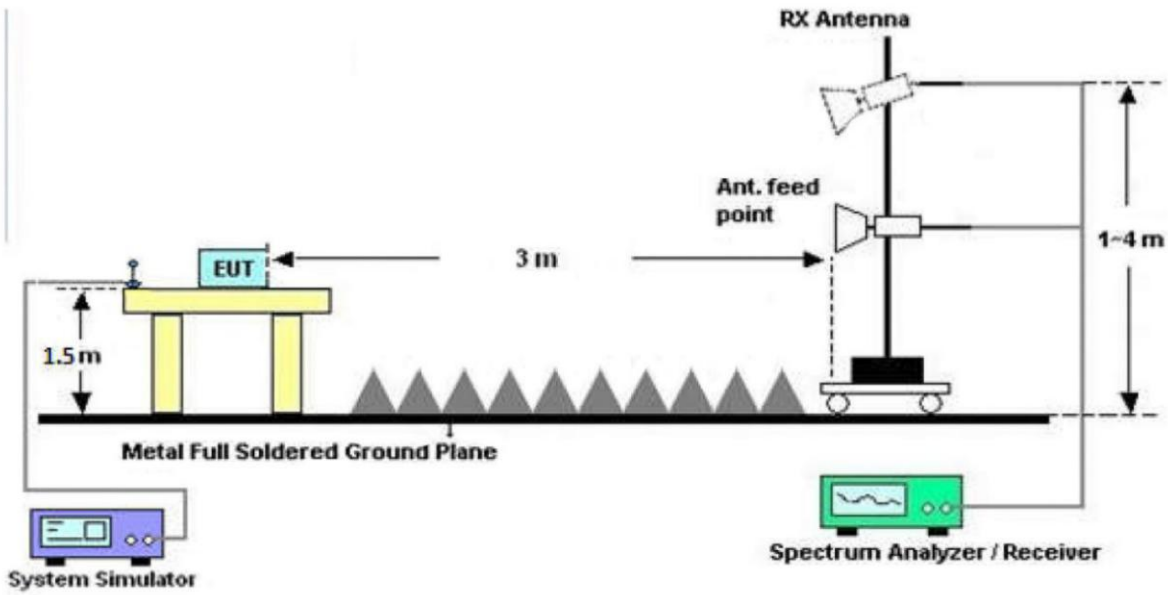


Figure 3. Above 1 GHz

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 = 120kHz, 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.
For average measurement: use duty cycle correction factor method (DCCF)
Average level = Peak level + DCCF

4.4. Test Data

PASS

During the test, pre-scan all the modes, and found the Low channel (TX) which is the worst case, only the worst case is recorded in the report.

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

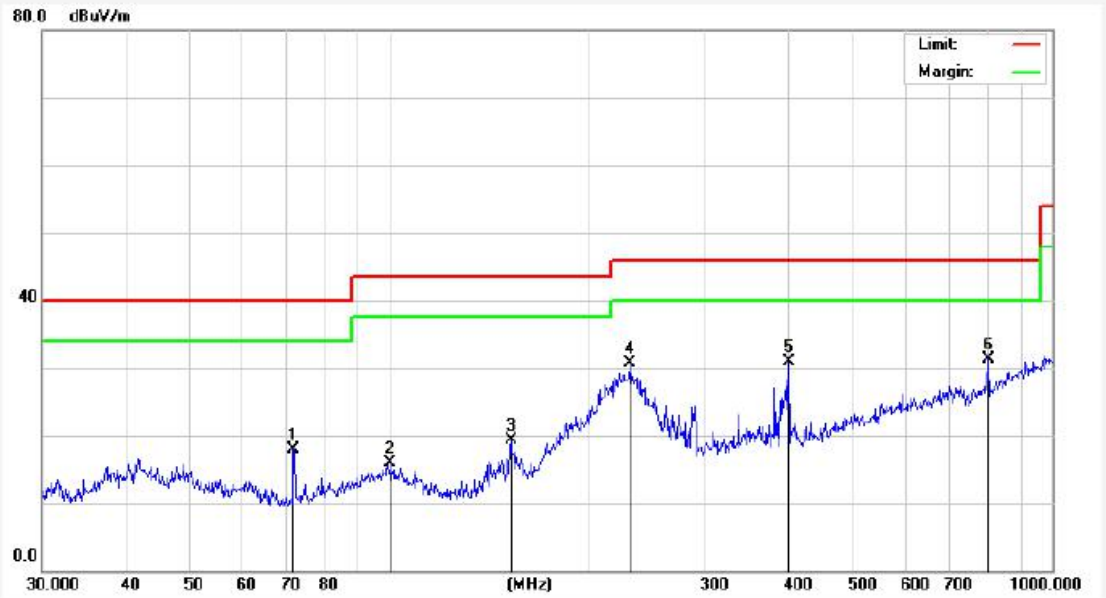
Test Results (30~1000MHz)

Test Mode: Mode 1

Power Source: DC 5V USB port

Polarization: Horizontal

Temp.(℃)/Hum.(%RH): 24.3℃/46%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	71.8320	38.71	-20.71	18.00	40.00	-22.00	peak			
2	100.5806	35.42	-19.47	15.95	43.50	-27.55	peak			
3	152.6641	40.22	-20.97	19.25	43.50	-24.25	peak			
4	230.9068	49.85	-19.23	30.62	46.00	-15.38	peak			
5	400.4319	43.86	-12.98	30.88	46.00	-15.12	peak			
6	798.9797	35.56	-4.17	31.39	46.00	-14.61	peak			

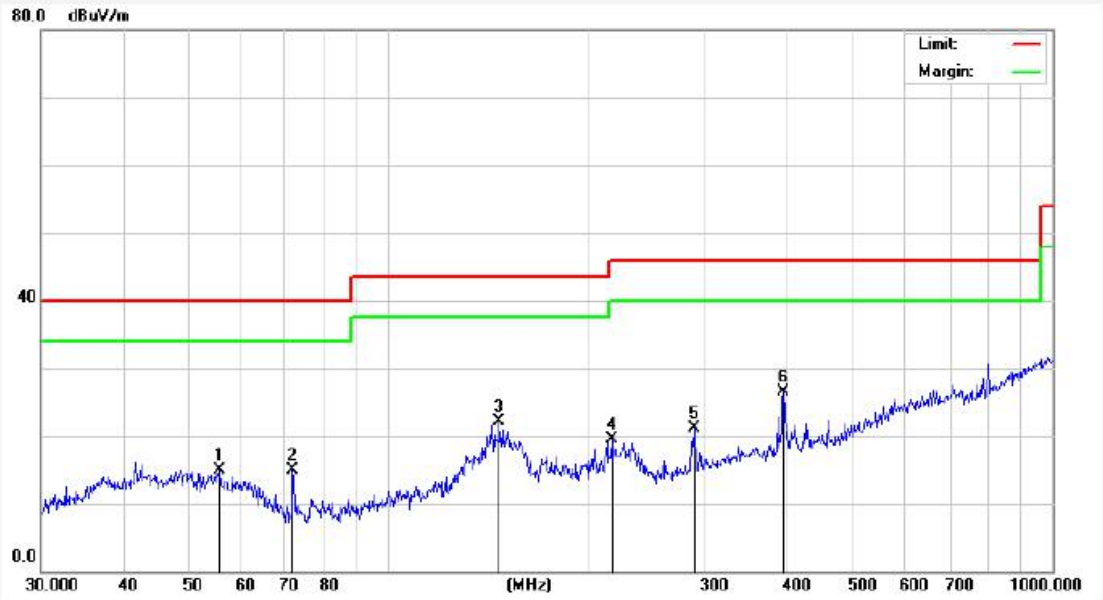
Test Results (30~1000MHz)

Test Mode: Mode 1

Power Source: DC 5V USB port

Polarization: Vertical

Temp.(℃)/Hum.(%RH): 24.3℃/46%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	55.8047	31.36	-16.47	14.89	40.00	-25.11	peak			
2	71.8320	33.35	-18.49	14.86	40.00	-25.14	peak			
3	146.8877	42.00	-19.95	22.05	43.50	-21.45	peak			
4	216.7828	36.09	-16.55	19.54	46.00	-26.46	peak			
5	289.0021	34.91	-13.82	21.09	46.00	-24.91	peak			
6	393.4723	37.78	-11.37	26.41	46.00	-19.59	peak			

Test Results (1GHz-25GHz)

Test Mode: CH01					Test channel: Lowest			
Peak Value								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Pol.
4807.70	37.49	34.04	6.58	34.09	44.02	74.00	-29.98	V
7211.55	31.95	37.11	7.73	34.50	42.29	74.00	-31.71	V
9615.40	31.58	39.31	9.23	34.79	45.33	74.00	-28.67	V
12019.25	*					74.00		V
14423.10	*					74.00		V
4807.70	41.81	34.04	6.58	34.09	48.34	74.00	-25.66	H
7211.55	33.72	37.11	7.73	34.50	44.06	74.00	-29.94	H
9615.40	31.01	39.31	9.23	34.79	44.76	74.00	-29.24	H
12019.25	*					74.00		H
14423.10	*					74.00		H
Average Value								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Pol.
4807.70	26.27	34.04	6.58	34.09	32.80	54.00	-21.20	V
7211.55	20.62	37.11	7.73	34.50	30.96	54.00	-23.04	V
9615.40	19.68	39.31	9.23	34.79	33.43	54.00	-20.57	V
12019.25	*					54.00		V
14423.10	*					54.00		V
4807.70	30.51	34.04	6.58	34.09	37.04	54.00	-16.96	H
7211.55	22.80	37.11	7.73	34.50	33.14	54.00	-20.86	H
9615.40	19.43	39.31	9.23	34.79	33.18	54.00	-20.82	H
12019.25	*					54.00		H
14423.10	*					54.00		H

Test Results (1GHz-25GHz)

Test Mode: CH03					Test channel: Middle			
Peak Value								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Pol.
4883.70	37.89	34.38	6.69	34.09	44.87	74.00	-29.13	V
7325.55	32.22	37.22	7.78	34.53	42.69	74.00	-31.31	V
9767.40	31.81	39.46	9.35	34.80	45.82	74.00	-28.18	V
12209.25	*					74.00		V
14651.10	*					74.00		V
4883.70	42.29	34.38	6.69	34.09	49.27	74.00	-24.73	H
7325.55	34.02	37.22	7.78	34.53	44.49	74.00	-29.51	H
9767.40	31.29	39.46	9.35	34.80	45.30	74.00	-28.70	H
12209.25	*					74.00		H
14651.10	*					74.00		H
Average Value								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Pol.
4883.70	26.61	34.38	6.69	34.09	33.59	54.00	-20.41	V
7325.55	20.85	37.22	7.78	34.53	31.32	54.00	-22.68	V
9767.40	19.89	39.46	9.35	34.80	33.90	54.00	-20.10	V
12209.25	*					54.00		V
14651.10	*					54.00		V
4883.70	30.90	34.38	6.69	34.09	37.88	54.00	-16.12	H
7325.55	23.06	37.22	7.78	34.53	33.53	54.00	-20.47	H
9767.40	19.67	39.46	9.35	34.80	33.68	54.00	-20.32	H
12209.25	*					54.00		H
14651.10	*					54.00		H

Test Results (1GHz-25GHz)

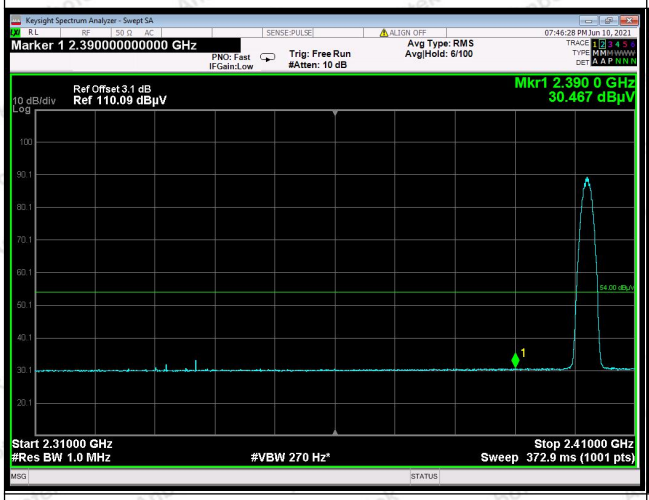
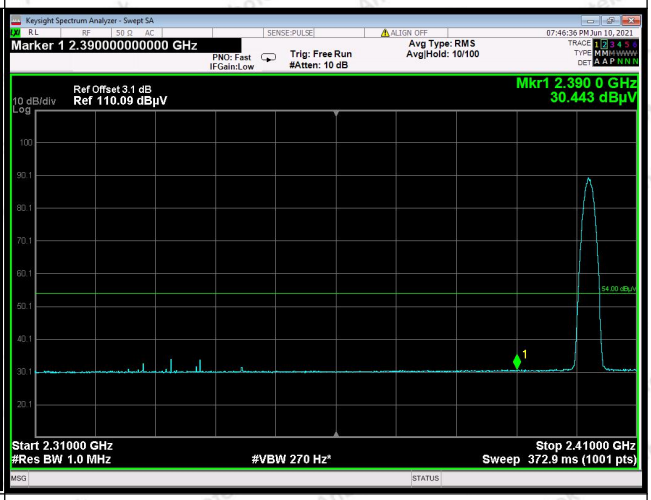
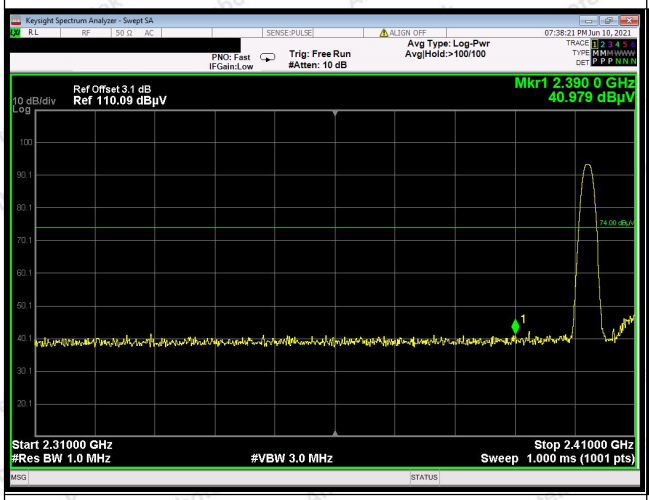
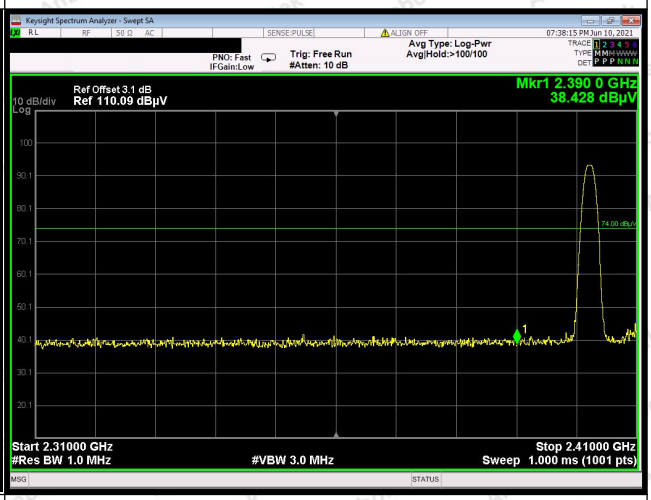
Test Mode: CH16					Test channel: Highest			
Peak Value								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Pol.
4959.70	38.07	34.72	6.79	34.09	45.49	74.00	-28.51	V
7439.55	32.34	37.34	7.82	34.57	42.93	74.00	-31.07	V
9919.40	31.92	39.62	9.46	34.81	46.19	74.00	-27.81	V
12399.25	*					74.00		V
14879.10	*					74.00		V
4959.70	42.51	34.72	6.79	34.09	49.93	74.00	-24.07	H
7439.55	34.16	37.34	7.82	34.57	44.75	74.00	-29.25	H
9919.40	31.42	39.62	9.46	34.81	45.69	74.00	-28.31	H
12399.25	*					74.00		H
14879.10	*					74.00		H
Average Value								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Pol.
4959.70	26.85	34.72	6.79	34.09	34.27	54.00	-19.73	V
7439.55	21.01	37.34	7.82	34.57	31.60	54.00	-22.40	V
9919.40	20.03	39.62	9.46	34.81	34.30	54.00	-19.70	V
12399.25	*					54.00		V
14879.10	*					54.00		V
4959.70	31.18	34.72	6.79	34.09	38.60	54.00	-15.40	H
7439.55	23.25	37.34	7.82	34.57	33.84	54.00	-20.16	H
9919.40	19.84	39.62	9.46	34.81	34.11	54.00	-19.89	H
12399.25	*					54.00		H
14879.10	*					54.00		H

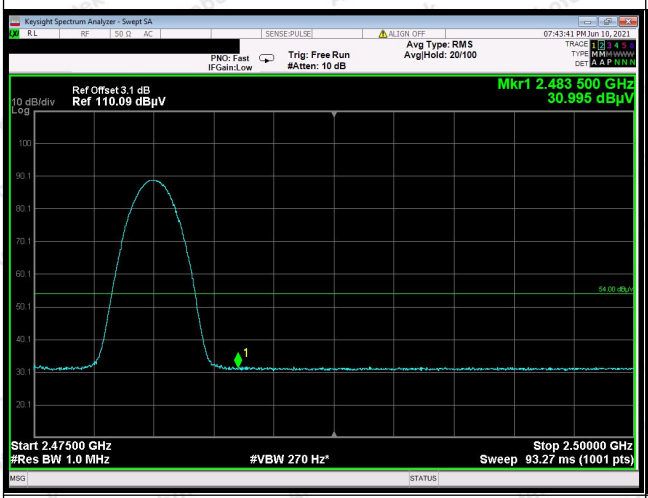
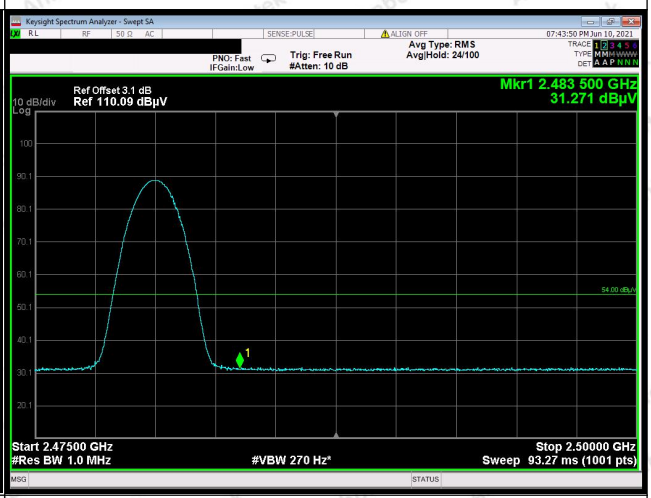
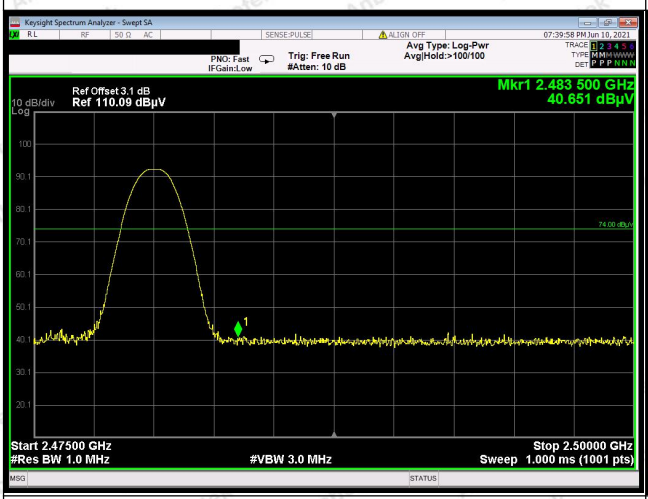
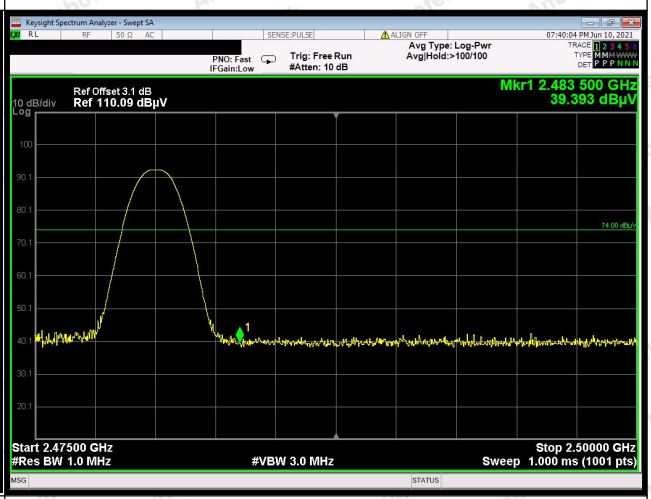
Remark:

1. Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor

2. "*" means the test results were attenuated more than 20dB below the permissible limits, so the results don't record in the report.

Radiated Band Edge:

Test Mode: CH01	Test channel: Lowest
	
Peak Value(Vertical)	Peak Value(Horizontal)
	
Average Value(Vertical)	Average Value(Horizontal)

Test Mode: CH16	Test channel: Highest
	
Peak Value(Vertical)	Peak Value(Horizontal)
	
Average Value(Vertical)	Average Value(Horizontal)

Remark:

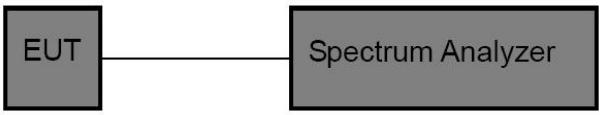
1. Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor

5. Maximum Peak Output Power Test

5.1. Test Standard and Limit

Test Standard	FCC Part15 C Section 15.247 (b)(1)
Test Limit	30dBm

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 ≥ RBW

   Sweep = auto

   Detector function = peak

   Trace = max hold

5.4. Test Data

Pass

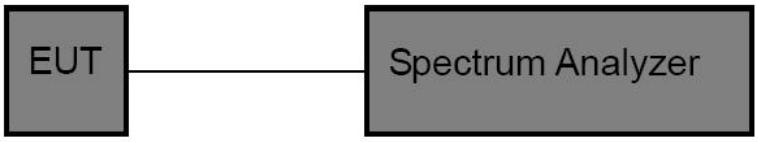
Please refer to clause 2 of the Appendix Test Data.

6. 20DB Occupy Bandwidth Test

6.1. Test Standard

Test Standard	FCC Part15 C Section 15.247 (a)(1)

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 ≥1% of the 20 dB bandwidth.
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.

6.4. Test Data

Pass

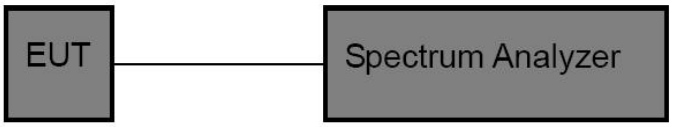
Please refer to clause 1 of the Appendix Test Data.

7. Carrier Frequency Separation Test

7.1. Test Standard and Limit

Test Standard	FCC Part15 C Section 15.247 (a)(1)
Test Limit	>25KHz or >two-thirds of the 20 dB bandwidth

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 ≥ 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

Pass

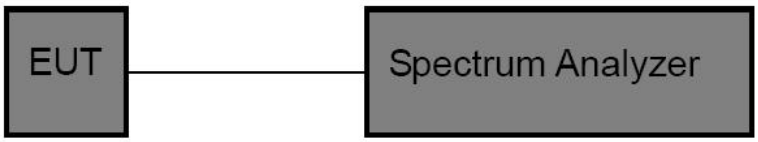
Please refer to clause 3 of the Appendix Test Data.

8. Number of Hopping Channel Test

8.1. Test Standard and Limit

Test Standard	FCC Part15 C Section 15.247 (a)(1)
Test Limit	>15 channels

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

Pass

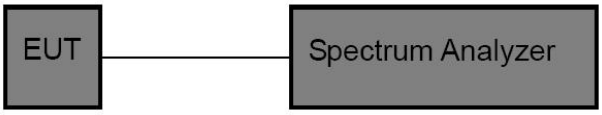
Please refer to clause 4 of the Appendix Test Data.

9. Dwell Time Test

9.1. Test Standard and Limit

Test Standard	FCC Part15 C Section 15.247 (a)(1)
Test Limit	0.4 sec

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 hopping channel
2. Set the RBW = 1 MHz.
3. Set the VBW = 1 MHz.
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

Pass

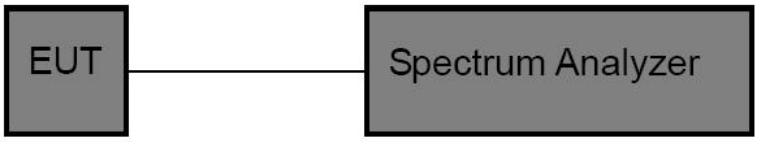
Please refer to clause 5 of the Appendix Test Data.

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 in 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

Pass

Please refer to clause 6 of the Appendix Test Data.

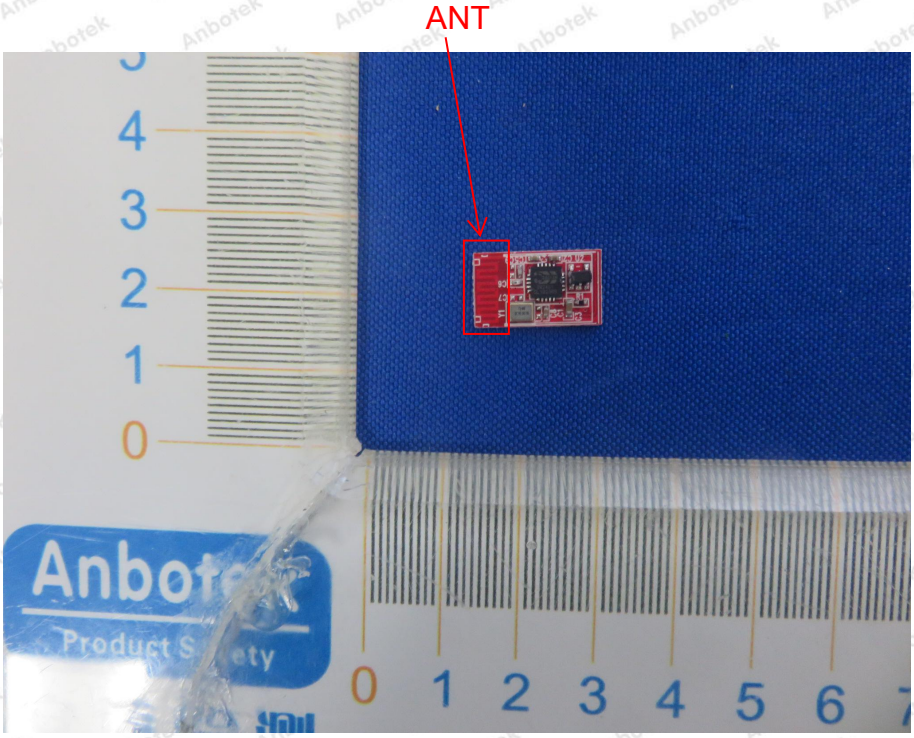
11. Antenna Requirement

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 -1 dBi. It complies with the standard requirement.



APPENDIX I -- TEST SETUP PHOTOGRAPH

Photo of Conducted Emission Measurement

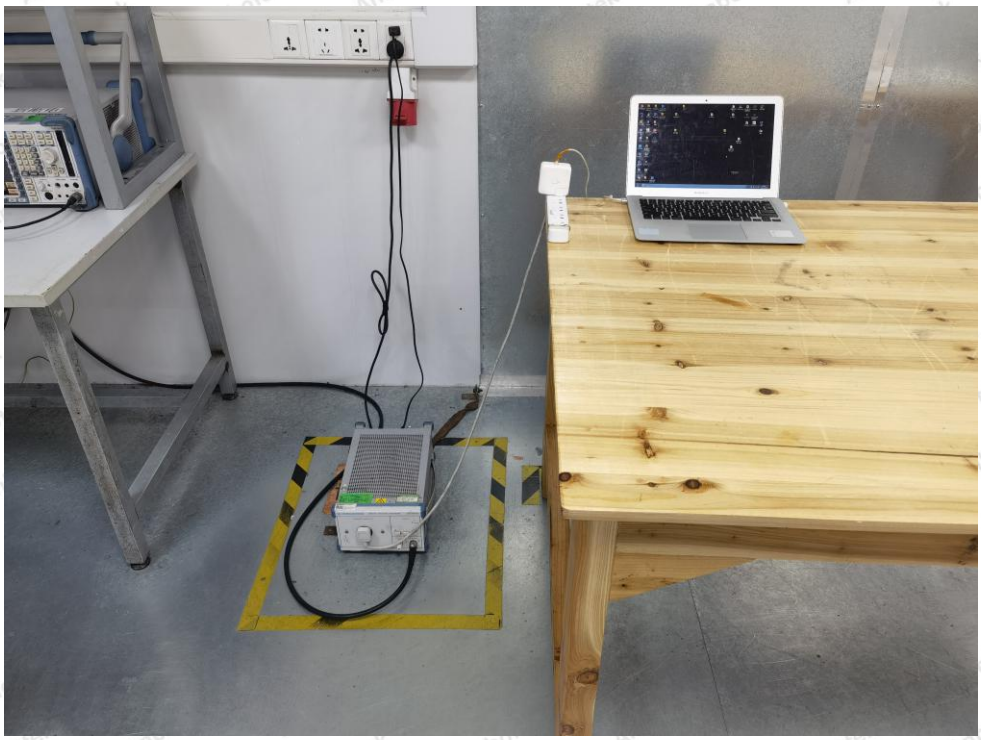
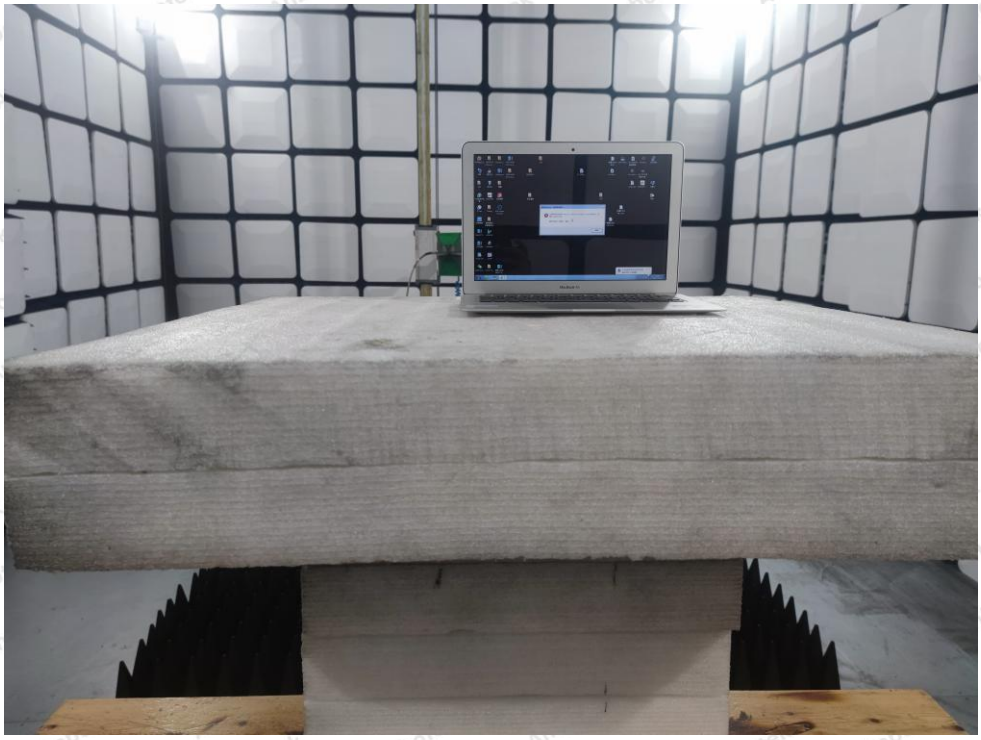
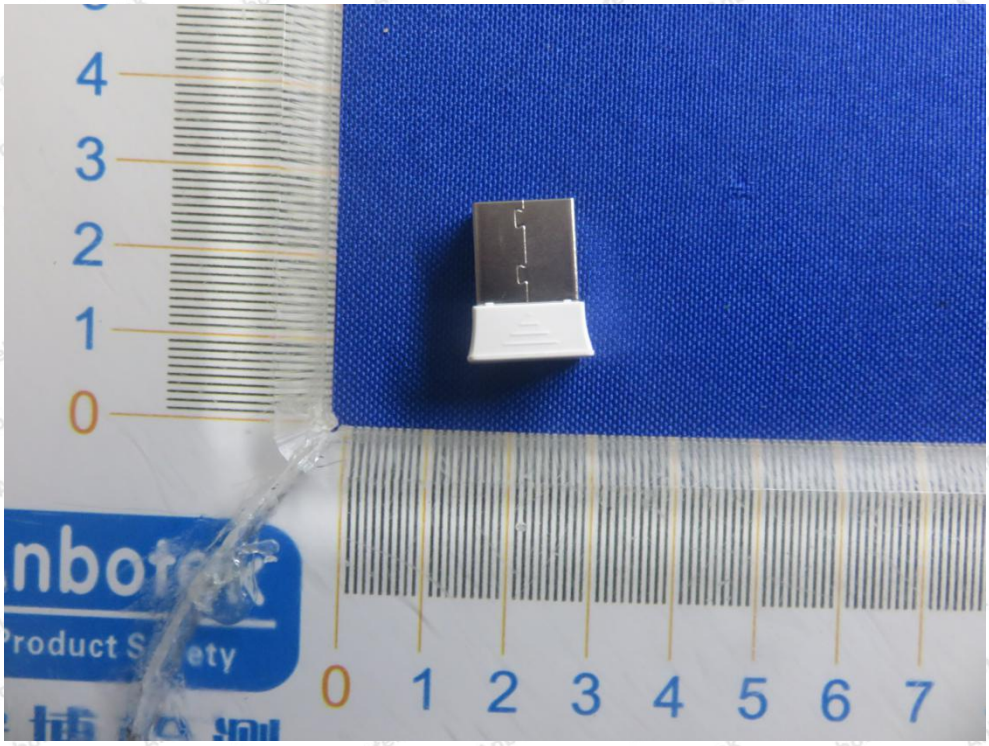


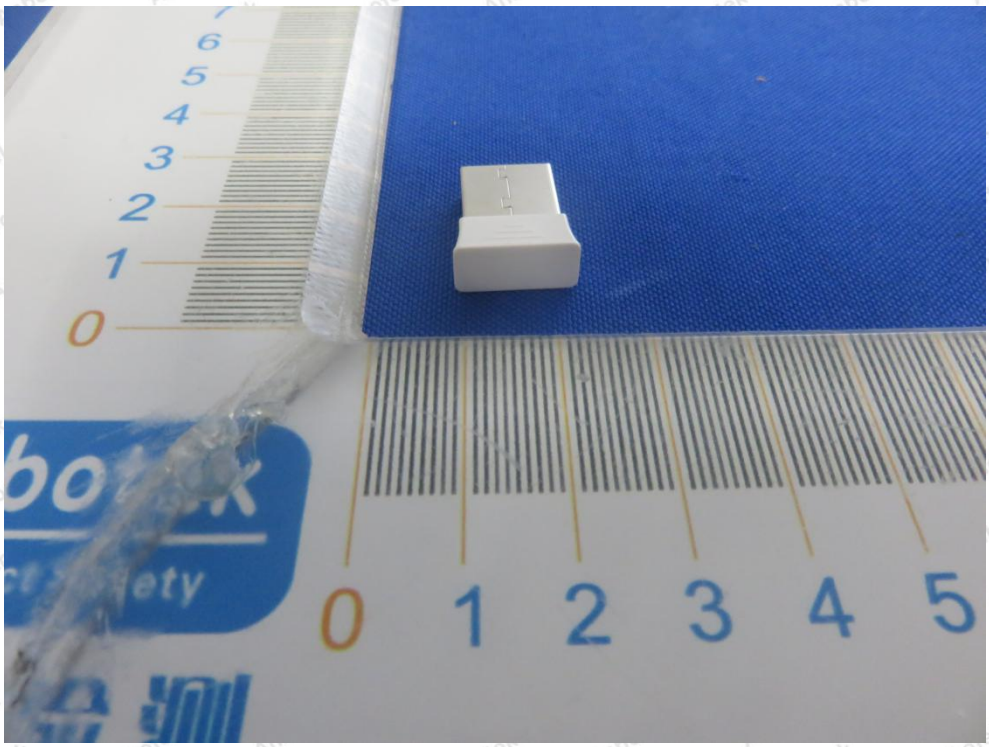
Photo of Radiation Emission Test

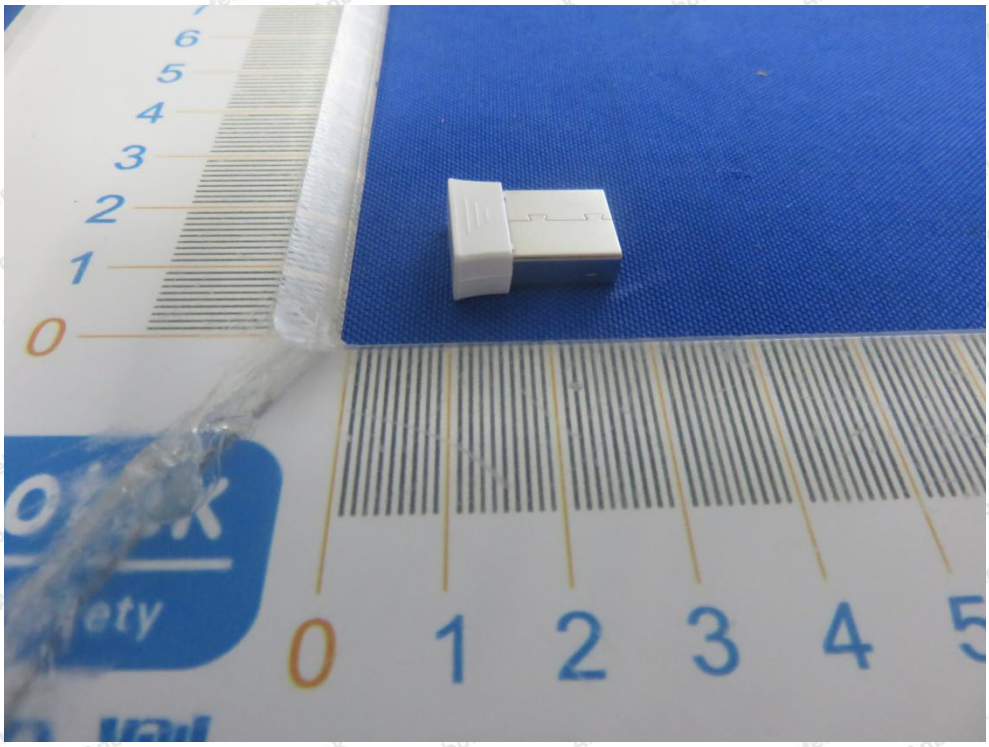
Photo of Radiation Emission Test

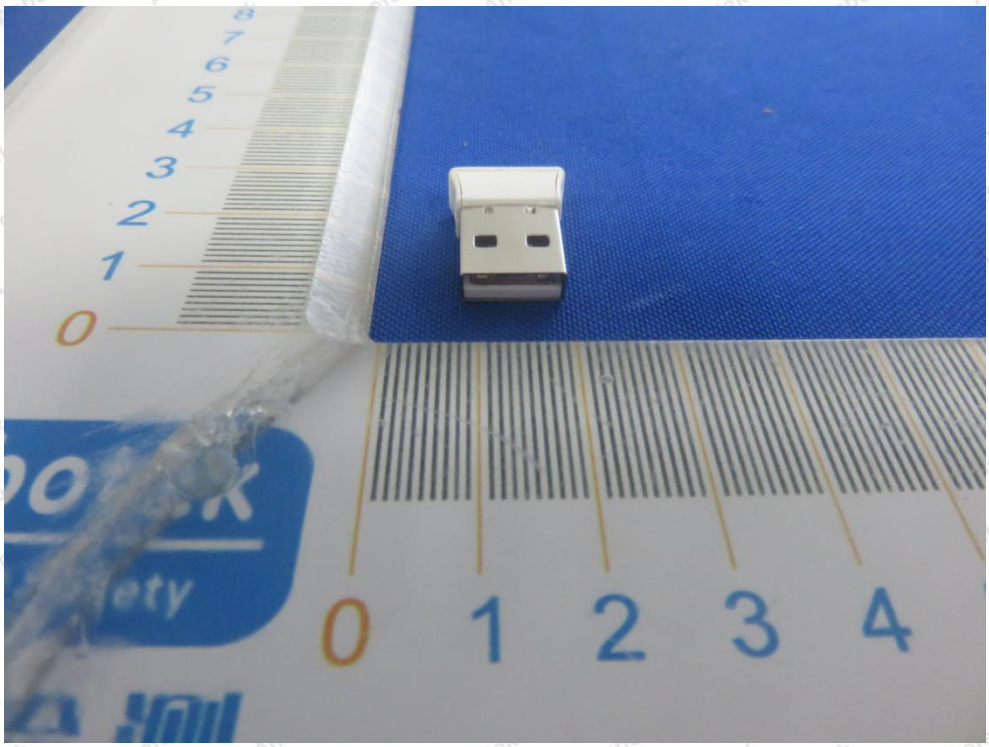


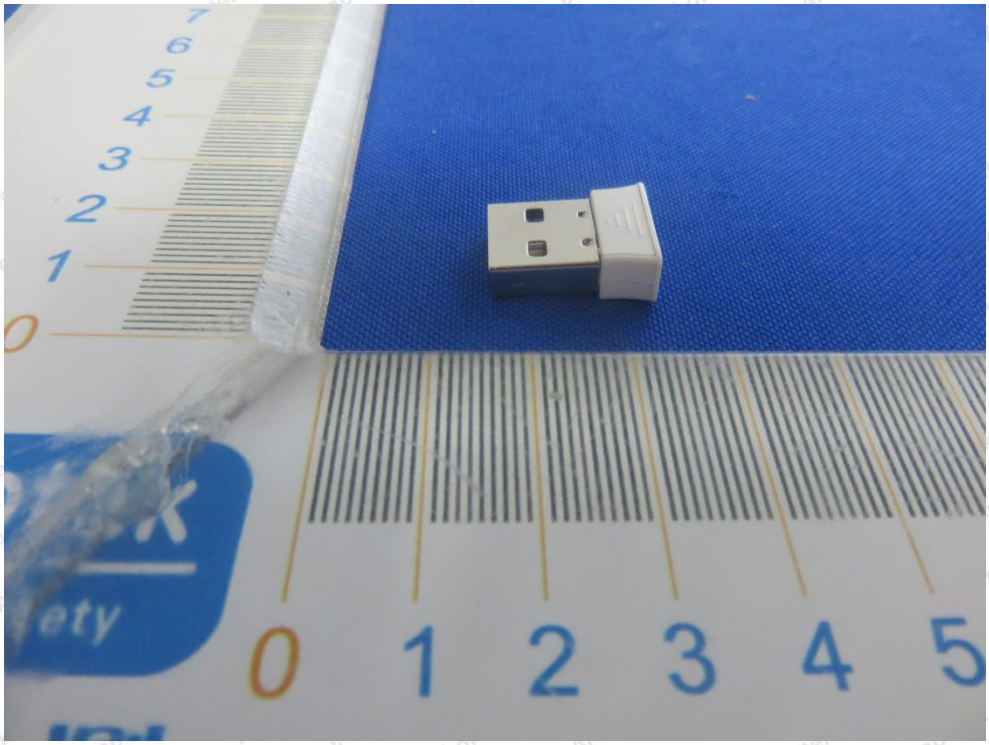
APPENDIX II -- EXTERNAL PHOTOGRAPH



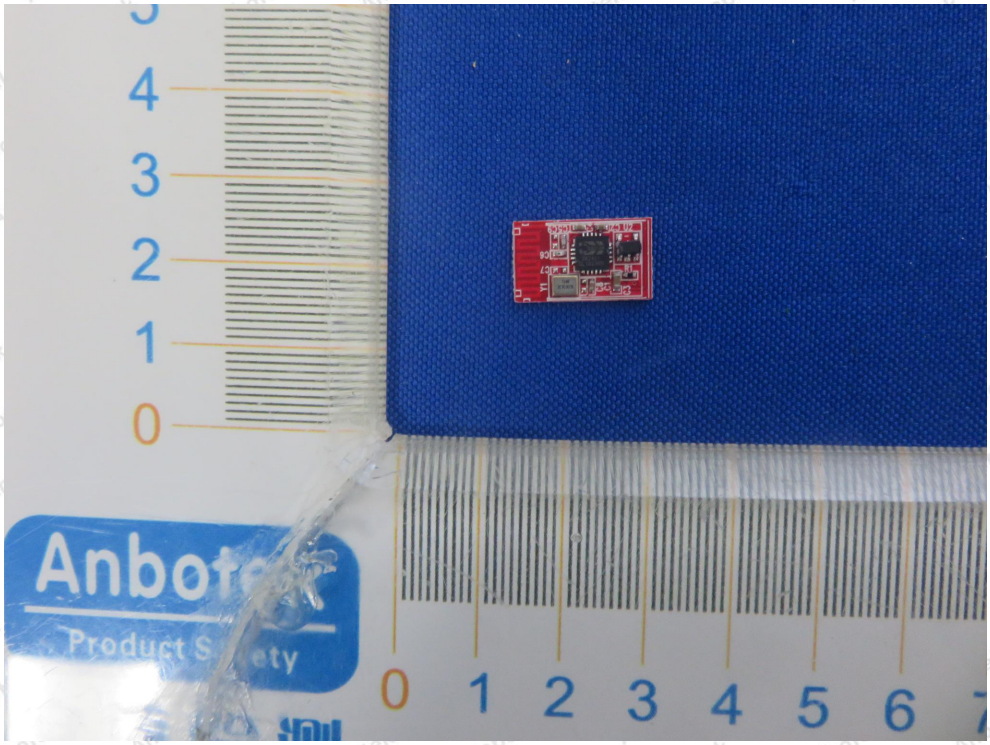


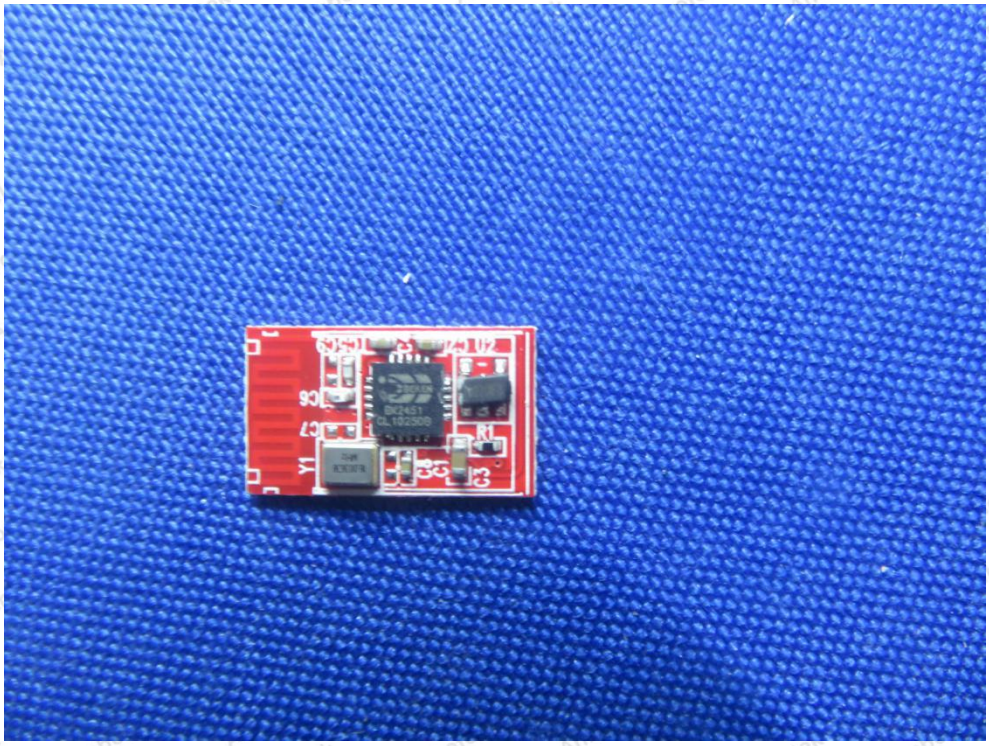






APPENDIX III -- INTERNAL PHOTOGRAPH




C6
C7
Y1
C8
C3
R1

APPENDIX IV – Appendix Test Data