

# FCC TEST REPORT

For

GUANGDONG PISEN ELECTRONICS CO., LTD.

Laser Pointer Dongle

Model No.: TS-D203

Prepared For : GUANGDONG PISEN ELECTRONICS CO., LTD.  
Address : 9 QINFU 1ST.STREET JINTANG INDUSTRY ZONE, LIUYUE,  
LONGGANG, SHENZHEN, CHINA

Prepared By : Shenzhen Anbotek Compliance Laboratory Limited  
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Report Number : R0217050033W  
Date of Test : Apr. 25~May 26, 2017  
Date of Report : May 26, 2017

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## TEST REPORT

Applicant : GUANGDONG PISEN ELECTRONICS CO., LTD.  
Manufacturer : GUANGDONG PISEN ELECTRONICS CO., LTD.  
Product Name : Laser Pointer Dongle  
Model No. : TS-D203  
Trade Mark : PISEN  
Rating(s) : Input DC 5V by USB Port

**Test Standard(s) : FCC Part15 Subpart C, Paragraph 15.249**

**Test Method(s) : ANSI C63.10: 2013**

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 Test : Apr. 25~May 26, 2017

Prepared by :



*Winkey Wang*

(Tested Engineer / Winkey Wang)

Reviewer :

*Amy Ding*

(Project Manager / Amy Ding)

Approved & Authorized Signer :

*Tom Chen*

(Manager / Tom Chen)

## 1. General Information

### 1.1. Client Information

Applicant	:	GUANGDONG PISEN ELECTRONICS CO., LTD.
Address	:	9 QINFU 1ST.STREET JINTANG INDUSTRY ZONE, LIUYUE, LONGGANG, SHENZHEN, CHINA
Manufacturer	:	GUANGDONG PISEN ELECTRONICS CO., LTD.
Address	:	9 QINFU 1ST.STREET JINTANG INDUSTRY ZONE, LIUYUE, LONGGANG, SHENZHEN, CHINA

### 1.2. Description of Device (EUT)

Product Name	:	Laser Pointer Dongle
Model No.	:	TS-D203
Trade Mark	:	PISEN
Test Power Supply	:	AC 120V, 60Hz for PC / AC 240V, 60Hz for PC
Product Description	Operation Frequency:	2406-2476MHz
	Number of Channel:	16 Channels
	Modulation Type:	FSK
	Antenna Type:	PCB Antenna
	Antenna Gain(Peak):	1.0 dBi
<b>Remark:</b> 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

Notebook	:	Manufacturer: LIFE BOOK Model: LH531 CE, FCC DOC
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#### 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
Mode 2	CH09
Mode 3	CH16

For Conducted Emission	
Final Test Mode	Description
Mode 1	TX mode

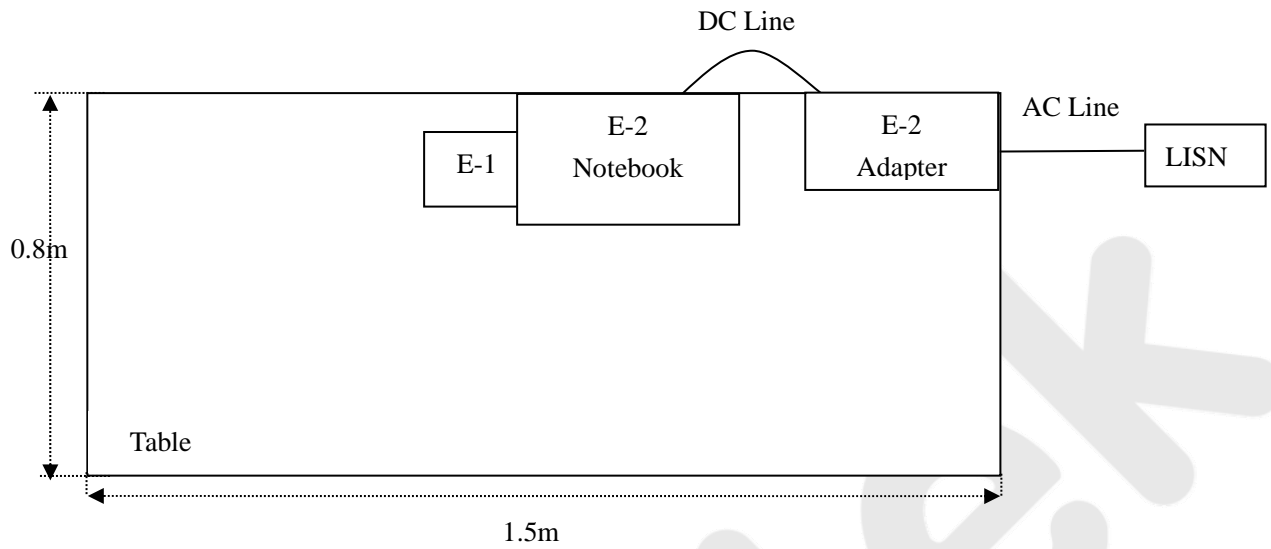
For Radiated Emission	
Final Test Mode	Description
Mode 1	CH01
Mode 2	CH09
Mode 3	CH16

### 1.5. List of Channels

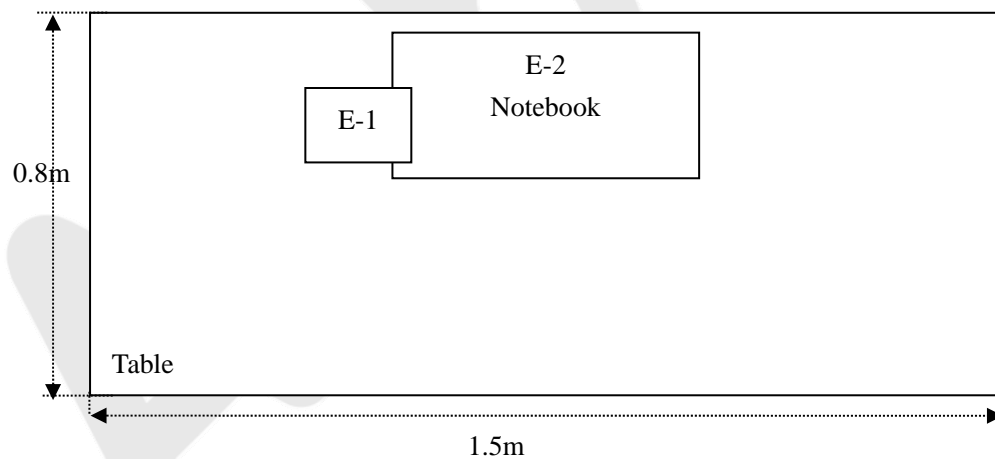
Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)
01	2406	05	2424	09	2447	13	2467
02	2411	06	2429	10	2451	14	2469
03	2414	07	2433	11	2455	15	2473
04	2417	08	2436	12	2459	16	2476

## 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.	Two-Line V-network	Rohde & Schwarz	ENV216	100055	Jul. 19, 2016	1 Year
2.	EMI Test Receiver	Rohde & Schwarz	ESCI	100627	Jun. 17, 2016	1 Year
3.	RF Switching Unit	Compliance Direction	RSU-M2	38303	Jun. 17, 2016	1 Year
4.	Spectrum Analysis	Agilent	E4407B	US39390582	Jul. 12, 2016	1 Year
5	Preamplifier	Instruments corporation	EMC011830	980100	Jun. 17, 2016	1 Year
6.	EMI Test Receiver	Rohde & Schwarz	ESPI	101604	Jun. 17, 2016	1 Year
7.	Double Ridged Horn Antenna	Instruments corporation	GTH-0118	351600	May 06, 2017	1 Year
8.	Bilog Broadband Antenna	Schwarzbeck	VULB9163	VULB 9163-289	May 06, 2017	1 Year
9.	Loop Antenna	Schwarzbeck	FMZB1519	012	May 11, 2017	1 Year
10.	Pre-amplifier	SONOMA	310N	186860	Jun. 17, 2016	1 Year
11	EMI Test Software EZ-EMC	SHURPLE	N/A	N/A	N/A	N/A
12.	Power Sensor	Agilent	KFSW150502	15I00041SN045	Jun. 17, 2016	1 Year
13.	MXA Spectrum Analysis	Agilent	N9020A	MY51170037	Jun. 17, 2016	1 Year
14.	MXG RF Vector Signal Generator	Agilent	N5182A	MY48180656	Jun. 17, 2016	1 Year
15	Signal Generator	Agilent	E4421B	MY41000743	Jun. 17, 2016	1 Year
16.	DC Power supply	IV	IV-8080	YQSB0096	Jun. 17, 2016	1 Year
17.	TEMP&HUMI PROGRAMMABLE CHAMBER	Bell Group	BE-THK-150 M8	SE-0137	Jun. 17, 2016	1 Year

## 1.8. Measurement Uncertainty

Radiation Uncertainty	:	Ur = 4.1 dB (Horizontal)
		Ur = 4.3 dB (Vertical)
Conduction Uncertainty	:	Uc = 3.4dB



## 1.9. Description of Test Facility

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

### **FCC-Registration No.: 752021**

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 752021, July 06, 2016.

### **IC-Registration No.: 8058A-1**

Shenzhen Anbotek Compliance Laboratory Limited., EMC Laboratory has been registered and fully described in a report filed with the (IC) Industry Canada. The acceptance letter from the IC is maintained in our files. Registration 8058A, June 13, 2016.

### **Test Location**

All Emissions tests were performed at

Shenzhen Anbotek Compliance Laboratory Limited. at 1/F., Building 1, SEC Industrial Park, No.0409 Qianhai Road, Nanshan District, Shenzhen, Guangdong, China

## 2. Summary of Test Results

Standard Section	Test Item	Result
15.203	Antenna Requirement	PASS
15.207	Conducted Emission	PASS
15.249	Radiated Emission	PASS
15.215(c)	20dB Bandwidth	PASS
15.249(c)	Band Edge	PASS
<b>Remark:</b> “N/A” is an abbreviation for Not Applicable.		

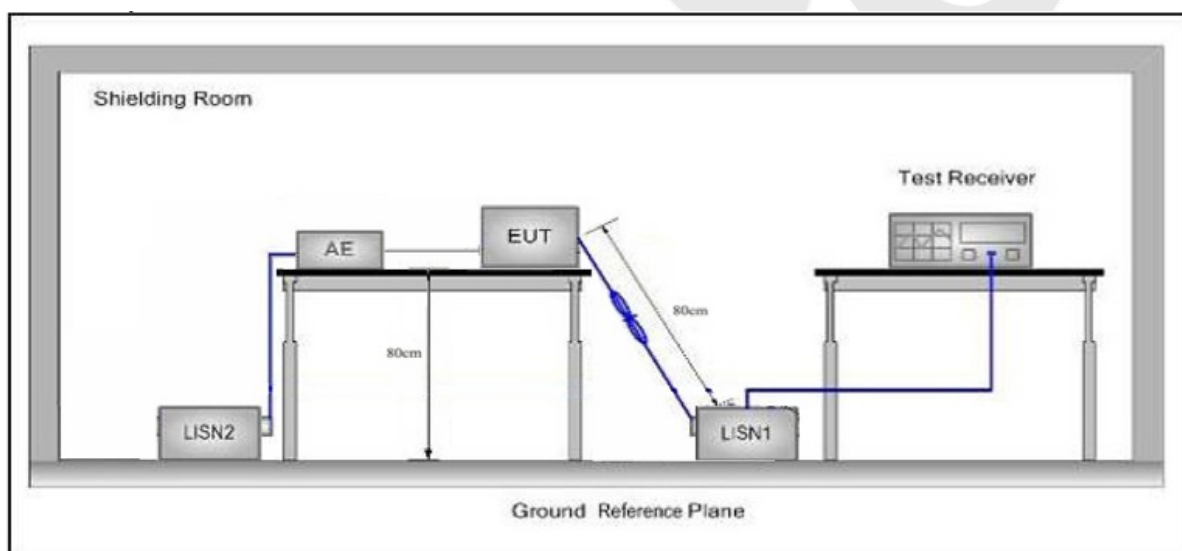
### 3. Conducted Emission Test

#### 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 C63.10-2013 on Conducted Emission Measurement.

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

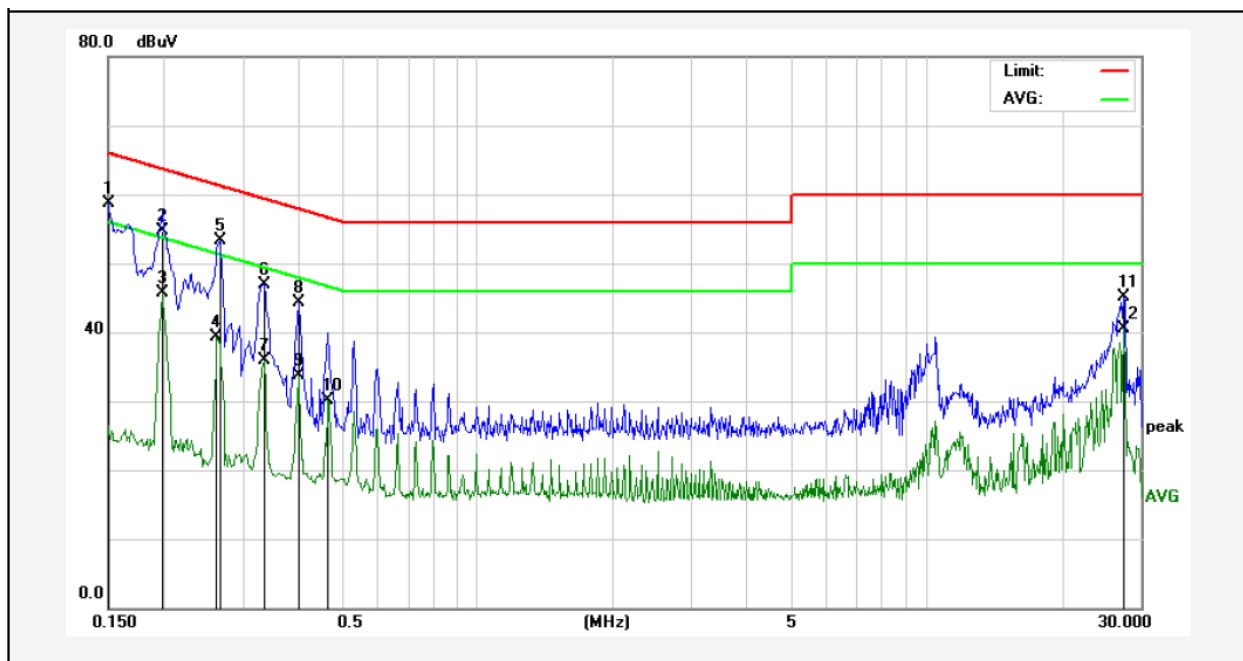
The frequency range from 150kHz to 30MHz is checked.

#### 3.4. Test Data

Please to see the following pages

## Conducted Emission Test Data

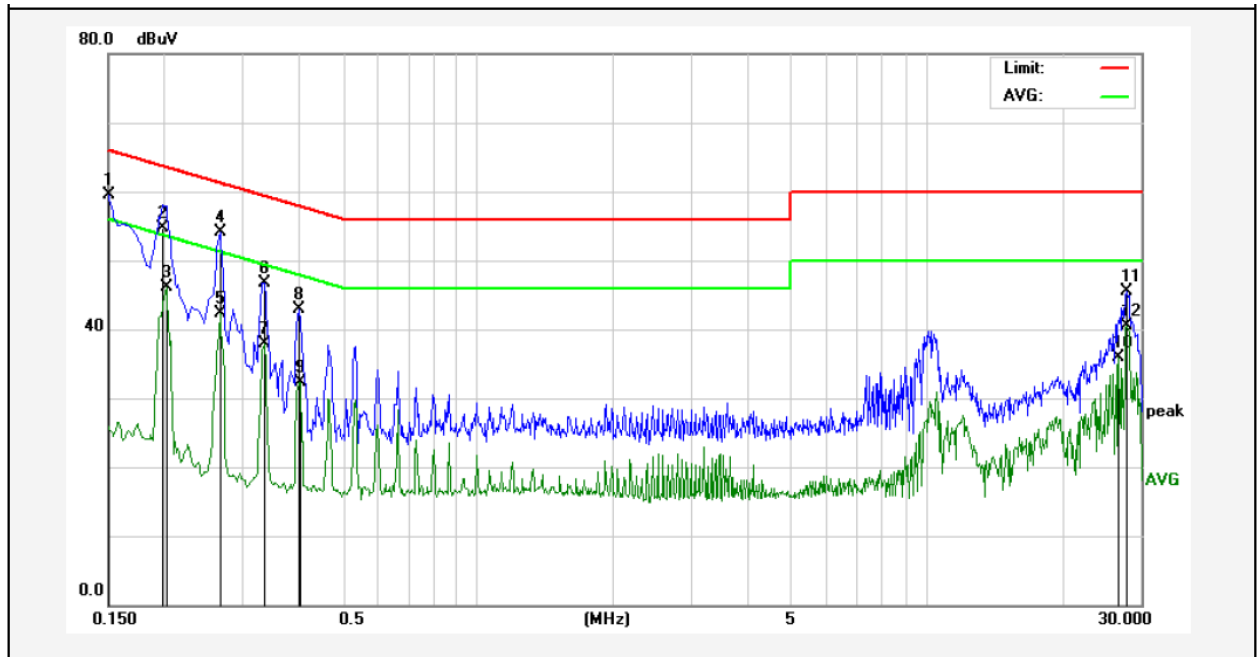
Test Site: 1# Shielded Room  
Operating Condition: TX mode  
Test Specification: AC 120V, 60Hz for PC  
Comment: Live Line  
Tem.:25℃ Hum.:50%



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Over Limit (dB)	Detector	Remark
1	0.1499	38.76	19.90	58.66	66.00	-7.34	QP	
2	0.1980	34.73	19.90	54.63	63.69	-9.06	QP	
3	0.1980	25.82	19.90	45.72	53.69	-7.97	AVG	
4	0.2620	19.39	19.89	39.28	51.36	-12.08	AVG	
5	0.2660	33.39	19.89	53.28	61.24	-7.96	QP	
6	0.3339	27.00	19.91	46.91	59.35	-12.44	QP	
7	0.3339	16.02	19.91	35.93	49.35	-13.42	AVG	
8	0.3980	24.47	19.93	44.40	57.89	-13.49	QP	
9	0.3980	13.82	19.93	33.75	47.89	-14.14	AVG	
10	0.4660	10.09	19.96	30.05	46.58	-16.53	AVG	
11	27.5140	24.79	20.27	45.06	60.00	-14.94	QP	
12	27.5140	20.14	20.27	40.41	50.00	-9.59	AVG	

### Conducted Emission Test Data

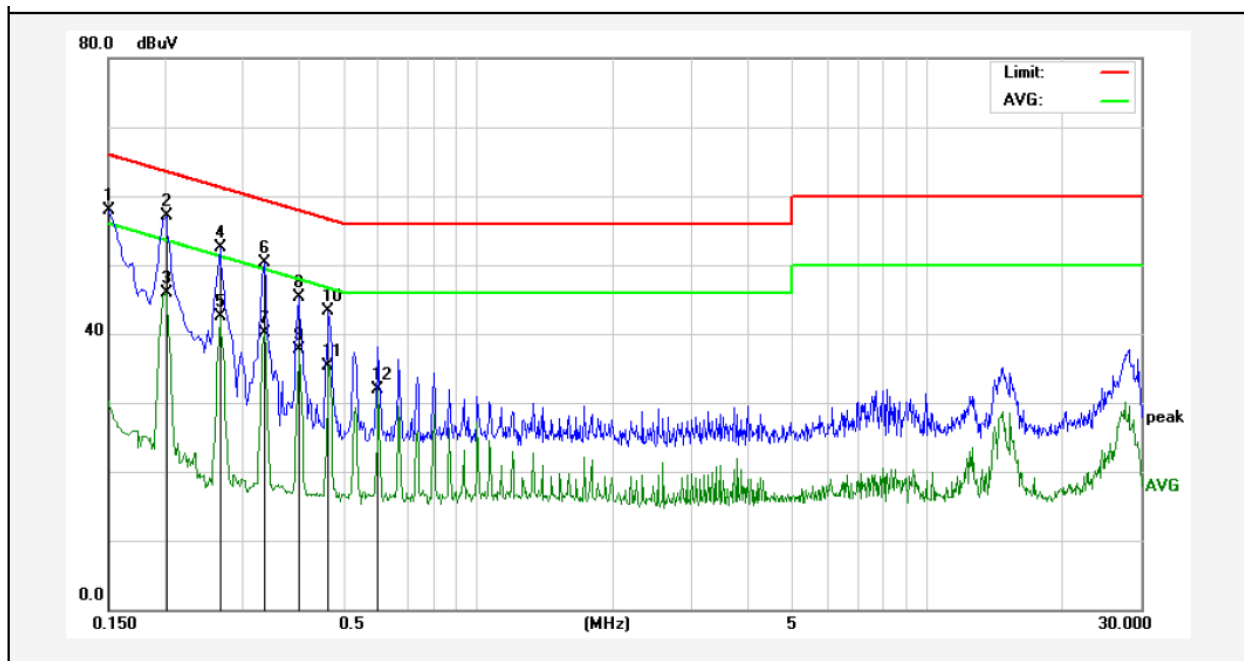
Test Site: 1# Shielded Room  
Operating Condition: TX mode  
Test Specification: AC 120V, 60Hz for PC  
Comment: Neutral Line  
Tem.:25℃ Hum.:50%



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Over Limit (dB)	Detector	Remark
1	0.1499	39.67	19.90	59.57	66.00	-6.43	QP	
2	0.1980	34.86	19.90	54.76	63.69	-8.93	QP	
3	0.2020	26.24	19.90	46.14	53.52	-7.38	AVG	
4	0.2660	34.14	19.89	54.03	61.24	-7.21	QP	
5	0.2660	22.48	19.89	42.37	51.24	-8.87	AVG	
6	0.3339	26.82	19.91	46.73	59.35	-12.62	QP	
7	0.3339	17.90	19.91	37.81	49.35	-11.54	AVG	
8	0.3980	23.06	19.93	42.99	57.89	-14.90	QP	
9	0.4020	12.45	19.94	32.39	47.81	-15.42	AVG	
10	26.7020	15.65	20.28	35.93	50.00	-14.07	AVG	
11	27.8580	25.31	20.27	45.58	60.00	-14.42	QP	
12	27.8580	20.25	20.27	40.52	50.00	-9.48	AVG	

## Conducted Emission Test Data

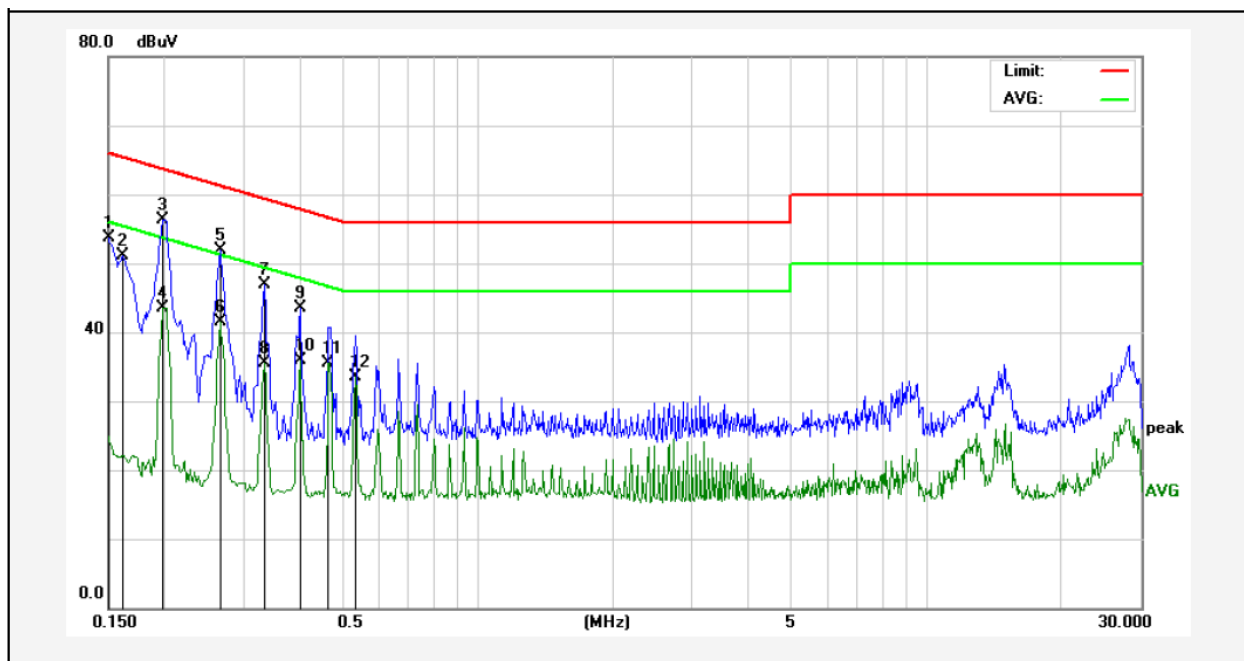
Test Site: 1# Shielded Room  
Operating Condition: TX mode  
Test Specification: AC 240V, 60Hz for PC  
Comment: Live Line  
Tem.:25℃ Hum.:50%



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Over Limit (dB)	Detector	Remark
1	0.1499	38.00	19.90	57.90	66.00	-8.10	QP	
2	0.2020	37.13	19.90	57.03	63.52	-6.49	QP	
3	0.2020	26.09	19.90	45.99	53.52	-7.53	AVG	
4	0.2660	32.57	19.89	52.46	61.24	-8.78	QP	
5	0.2660	22.59	19.89	42.48	51.24	-8.76	AVG	
6	0.3339	30.34	19.91	50.25	59.35	-9.10	QP	
7	0.3339	20.25	19.91	40.16	49.35	-9.19	AVG	
8	0.3980	25.33	19.93	45.26	57.89	-12.63	QP	
9	0.3980	17.71	19.93	37.64	47.89	-10.25	AVG	
10	0.4660	23.30	19.96	43.26	56.58	-13.32	QP	
11	0.4660	15.40	19.96	35.36	46.58	-11.22	AVG	
12	0.5978	11.94	20.01	31.95	46.00	-14.05	AVG	

## Conducted Emission Test Data

Test Site: 1# Shielded Room  
Operating Condition: TX mode  
Test Specification: AC 240V, 60Hz for PC  
Comment: Neutral Line  
Tem.:25℃ Hum.:50%



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Over Limit (dB)	Detector	Remark
1	0.1499	33.78	19.90	53.68	66.00	-12.32	QP	
2	0.1620	31.29	19.90	51.19	65.36	-14.17	QP	
3	0.1980	36.33	19.90	56.23	63.69	-7.46	QP	
4	0.1980	23.55	19.90	43.45	53.69	-10.24	AVG	
5	0.2660	32.11	19.89	52.00	61.24	-9.24	QP	
6	0.2660	21.64	19.89	41.53	51.24	-9.71	AVG	
7	0.3339	27.05	19.91	46.96	59.35	-12.39	QP	
8	0.3339	15.66	19.91	35.57	49.35	-13.78	AVG	
9	0.4020	23.56	19.94	43.50	57.81	-14.31	QP	
10	0.4020	16.00	19.94	35.94	47.81	-11.87	AVG	
11	0.4660	15.52	19.96	35.48	46.58	-11.10	AVG	
12	0.5340	13.59	19.99	33.58	46.00	-12.42	AVG	

## 4. Radiated 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.

Test Standard	FCC Part15 C Section 15.249					
Test Limit	Frequency (MHz)	Field Strength of fundamental ((millivolts /meter)	Field Strength of Harmonics (microvolts/meter)	Limit (dBuV/m)	Remark	Measurement distance (m)
	2400~2483.5	50	-	114.0	Peak	3
	2400~2483.5	50	-	94.0	Average	3
	2400~2483.5	-	500	74.0	Peak	3
	2400~2483.5	-	500	54.0	Average	3

**Remark:**

(1) 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

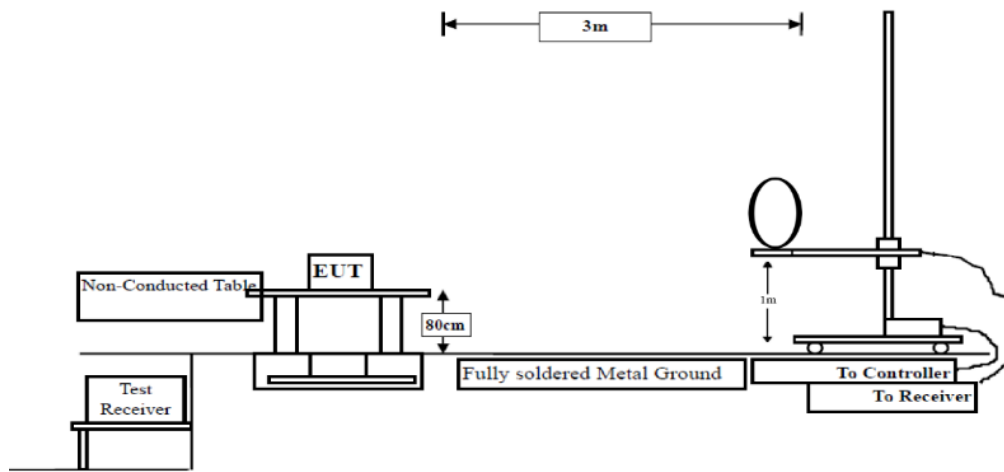


Figure 1. Below 30MHz

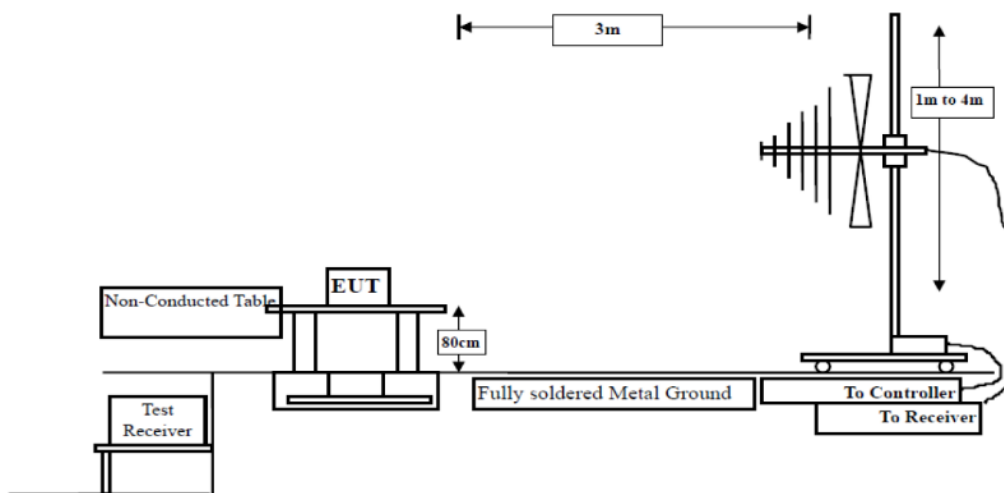


Figure 2. 30MHz to 1GHz

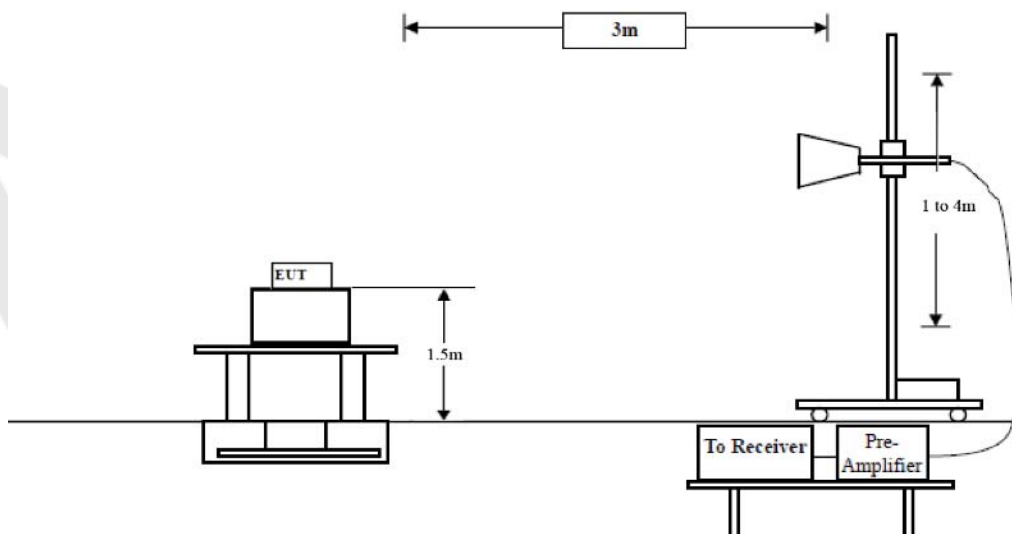


Figure 3. Above 1 GHz

### 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 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

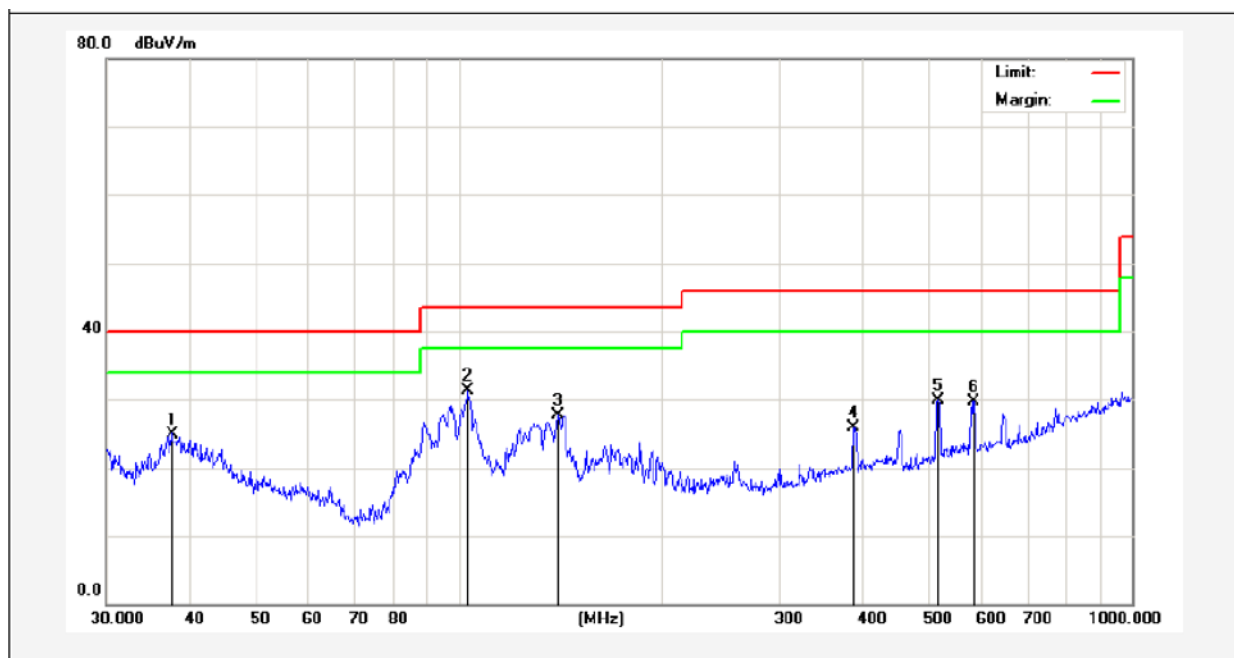
#### PASS

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 and above 18000MHz are attenuated more than 20dB below the permissible limits, so the results don't record in the report.

**Test Results (30~1000MHz)**

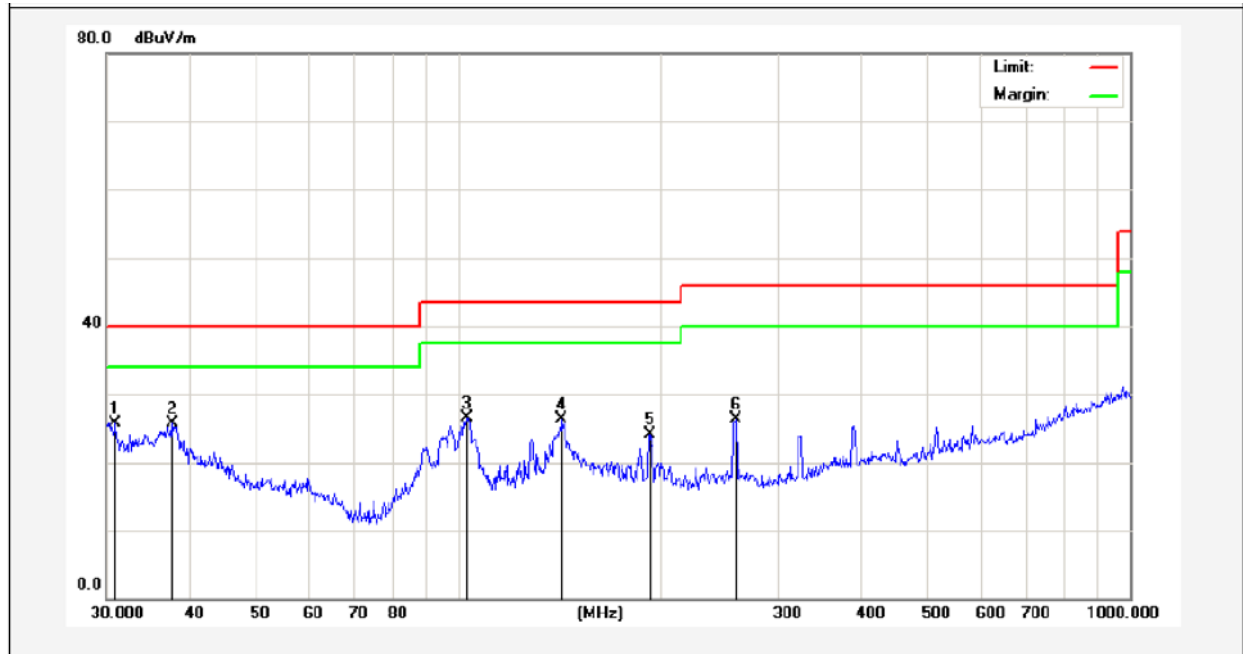
Job No.: 0217050033W Temp.(°C)/Hum.(%RH): 24.3°C/55%RH  
Standard: FCC PART 15C Power Source: AC 120V, 60Hz for PC  
Test Mode: TX Mode Polarization: Horizontal



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	37.5478	37.30	-12.30	25.00	40.00	-15.00	peak			
2	103.4419	46.94	-15.71	31.23	43.50	-12.27	peak			
3	140.8351	46.09	-18.46	27.63	43.50	-15.87	peak			
4	385.2805	38.16	-12.16	26.00	46.00	-20.00	peak			
5	515.4374	40.55	-10.68	29.87	46.00	-16.13	peak			
6	582.7424	39.20	-9.53	29.67	46.00	-16.33	peak			

**Test Results (30~1000MHz)**

Job No.: 0217050033W Temp.(°C)/Hum.(%RH): 24.3°C/55%RH  
Standard: FCC PART 15C Power Source: AC 120V, 60Hz for PC  
Test Mode: TX Mode Polarization: Vertical



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	30.9618	42.21	-16.44	25.77	40.00	-14.23	peak			
2	37.5478	38.06	-12.30	25.76	40.00	-14.24	peak			
3	103.4419	47.25	-20.71	26.54	43.50	-16.96	peak			
4	142.8243	49.67	-23.45	26.22	43.50	-17.28	peak			
5	193.0945	45.07	-20.91	24.16	43.50	-19.34	peak			
6	259.2337	45.26	-18.96	26.30	46.00	-19.70	peak			

**Test Results (Above 1000MHz)**

Test Mode: CH01 (Low channel)									
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Pol.	Detector
2406.0000	85.38	31.22	2.18	35.33	83.45	114.00	-30.55	V	Peak
2406.0000	81.63	31.22	2.18	35.33	79.70	94.00	-14.30	V	AVG
4812.0000	47.29	34.03	2.58	34.65	49.25	74.00	-24.75	V	Peak
4812.0000	43.21	34.03	2.58	34.65	45.17	54.00	-8.83	V	AVG
7218.0000	41.27	36.17	2.97	35.07	45.34	74.00	-28.66	V	Peak
7218.0000	36.44	36.17	2.97	35.07	40.51	54.00	-13.49	V	AVG
9624.0000	*								
12030.0000	*								
14436.0000	*								
16842.0000	*								
2406.0000	83.21	31.22	2.18	35.33	81.28	114.00	-32.72	H	Peak
2406.0000	78.44	31.22	2.18	35.33	76.51	94.00	-17.49	H	AVG
4812.0000	43.45	34.03	2.58	34.65	45.41	74.00	-28.59	H	Peak
4812.0000	38.61	34.03	2.58	34.65	40.57	54.00	-13.43	H	AVG
7218.0000	38.65	36.17	2.97	35.07	42.72	74.00	-31.28	H	Peak
7218.0000	34.31	36.17	2.97	35.07	38.38	54.00	-15.62	H	AVG
9624.0000	*								
12030.0000	*								
14436.0000	*								
16842.0000	*								

Test Mode: CH09 (Middle channel)									
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.	Detector
2447.0000	87.22	32.35	2.24	34.81	87.00	114.00	-27.00	V	Peak
2447.0000	83.48	32.35	2.24	34.81	83.26	94.00	-10.74	V	AVG
4894.0000	46.25	35.16	2.58	34.62	49.37	74.00	-24.63	V	Peak
4894.0000	42.25	35.16	2.58	34.62	45.37	54.00	-8.63	V	AVG
7341.0000	40.27	36.48	3.05	35.13	44.67	74.00	-29.33	V	Peak
7341.0000	37.53	36.48	3.05	35.13	41.93	54.00	-12.07	V	AVG
9788.0000	*								
12235.0000	*								
14682.0000	*								
17129.0000	*								
2447.0000	84.29	32.35	2.24	34.81	84.07	114.00	-29.93	H	Peak
2447.0000	78.58	32.35	2.24	34.81	78.36	94.00	-15.64	H	AVG
4894.0000	45.21	35.16	2.58	34.62	48.33	74.00	-25.67	H	Peak
4894.0000	42.59	35.16	2.58	34.62	45.71	54.00	-8.29	H	AVG
7341.0000	39.71	36.48	3.05	35.13	44.11	74.00	-29.89	H	Peak
7341.0000	36.64	36.48	3.05	35.13	41.04	54.00	-12.96	H	AVG
9788.0000	*								
12235.0000	*								
14682.0000	*								
17129.0000	*								

Test Mode: CH16 (High channel)									
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.	Detector
2476.0000	84.65	31.67	2.23	36.07	82.48	114.00	-31.52	V	Peak
2476.0000	81.23	31.67	2.23	36.07	79.06	94.00	-14.94	V	AVG
4952.0000	43.31	35.42	2.60	34.93	46.40	74.00	-27.60	V	Peak
4952.0000	40.15	35.42	2.60	34.93	43.24	54.00	-10.76	V	AVG
7428.0000	38.41	36.52	3.12	35.11	42.94	74.00	-31.06	V	Peak
7428.0000	35.22	36.52	3.12	35.11	39.75	54.00	-14.25	V	AVG
9904.0000	*								
12380.0000	*								
14856.0000	*								
17332.0000	*								
2476.0000	82.54	31.67	2.23	36.07	80.37	114.00	-33.63	H	Peak
2476.0000	78.34	31.67	2.23	36.07	76.17	94.00	-17.83	H	AVG
4952.0000	45.49	35.42	2.60	34.93	48.58	74.00	-25.42	H	Peak
4952.0000	41.25	35.42	2.60	34.93	44.34	54.00	-9.66	H	AVG
7428.0000	40.36	36.52	3.12	35.11	44.89	74.00	-29.11	H	Peak
7428.0000	37.26	36.52	3.12	35.11	41.79	54.00	-12.21	H	AVG
9904.0000	*								
12380.0000	*								
14856.0000	*								
17332.0000	*								

**Radiated Band Edge:**

Test Mode:					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.
2390.00	52.48	29.15	3.41	34.01	51.03	74.00	-22.97	V
2400.00	54.29	29.16	3.43	34.01	52.87	74.00	-21.13	V
2390.00	52.57	29.15	3.41	34.01	51.12	74.00	-22.88	H
2400.00	54.33	29.16	3.43	34.01	52.91	74.00	-21.09	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.
2390.00	43.16	29.15	3.41	34.01	41.71	54.00	-12.29	V
2400.00	44.73	29.16	3.43	34.01	43.31	54.00	-10.69	V
2390.00	42.76	29.15	3.41	34.01	41.31	54.00	-12.69	H
2400.00	44.59	29.16	3.43	34.01	43.17	54.00	-10.83	H

Test Mode:					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.
2483.50	57.21	29.28	3.53	34.03	55.99	74.00	-18.01	V
2500.00	55.48	29.30	3.56	34.03	54.31	74.00	-19.69	V
2483.50	56.31	29.28	3.53	34.03	55.09	74.00	-18.91	H
2500.00	54.47	29.30	3.56	34.03	53.30	74.00	-20.70	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.
2483.50	45.78	29.28	3.53	34.03	44.56	54.00	-9.44	V
2500.00	43.29	29.30	3.56	34.03	42.12	54.00	-11.88	V
2483.50	44.81	29.28	3.53	34.03	43.59	54.00	-10.41	H
2500.00	43.16	29.30	3.56	34.03	41.99	54.00	-12.01	H

Remark:

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

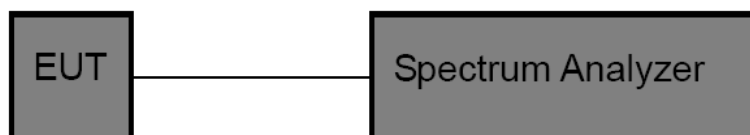


## 5. 20dB Bandwidth Test

### 5.1. Test Standard and Limit

Test Standard	FCC Part15 C Section 15.249
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### 5.2. Test Setup



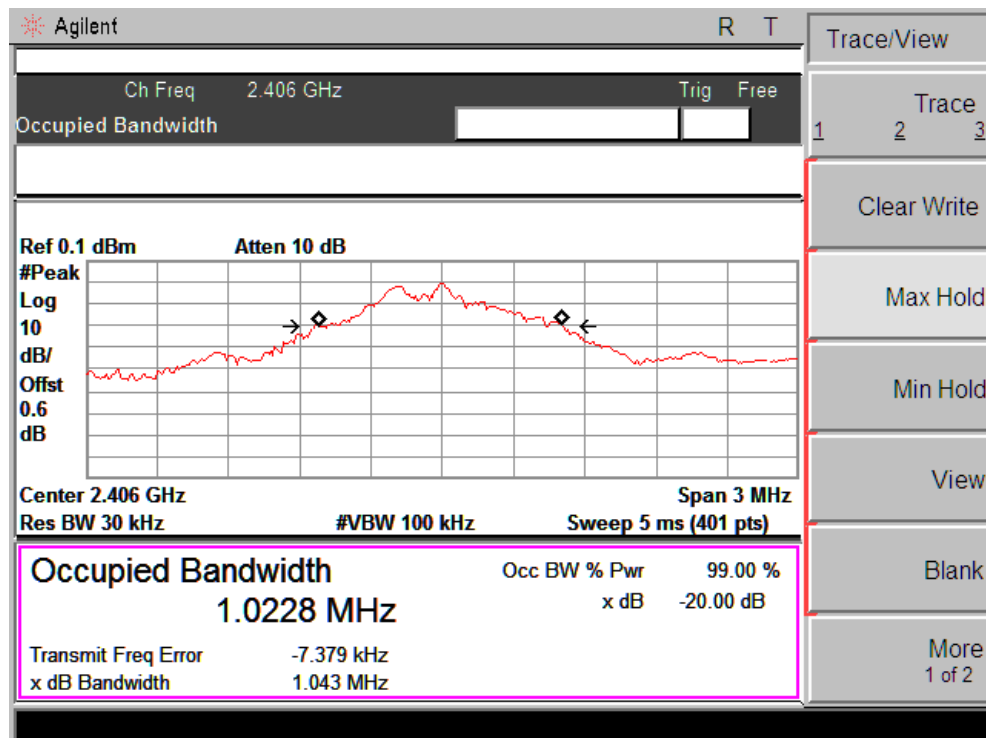
### 5.3. Test Procedure

1. Place the EUT on the table and set it in the transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as:  
 $RBW = 30\text{kHz}$ ,  $VBW \geq 3 \times RBW = 100\text{kHz}$ ,  
 Detector= Average  
 Trace mode= Max hold.  
 Sweep- auto couple.
4. Mark the peak frequency and  $-20\text{dB}$  (upper and lower) frequency.
5. Repeat until all the rest channels are investigated.

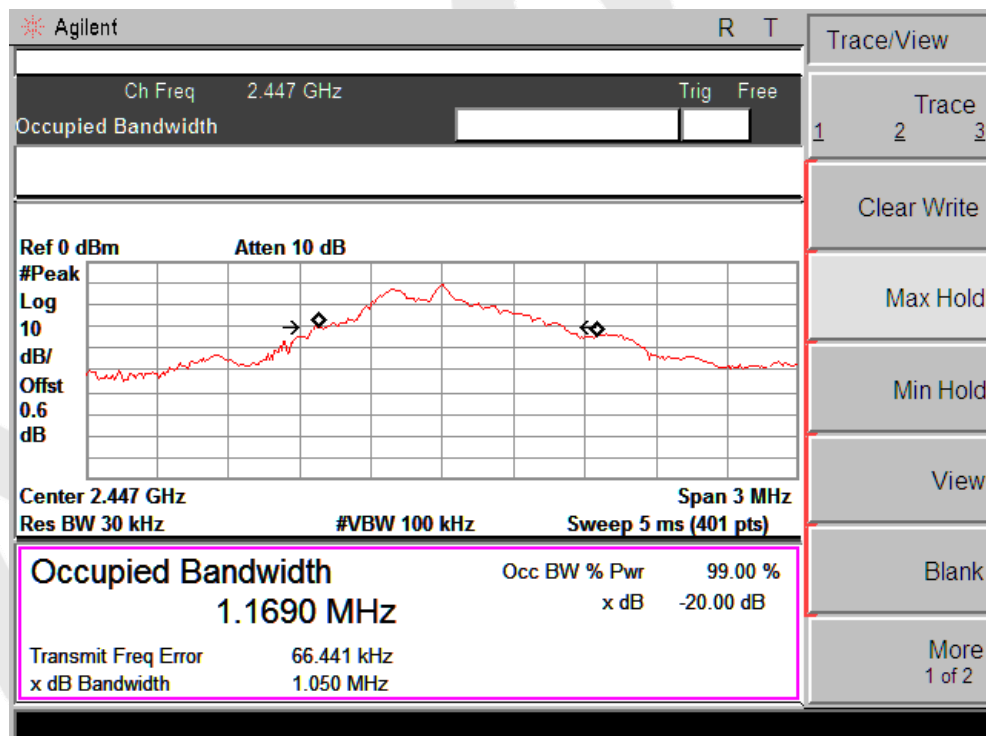
### 5.4. Test Data

Test Item	: 20dB Bandwidth	Test Mode	: TX Mode
Test Voltage	: DC 5V	Temperature	: 24°C
Test Result	: PASS	Humidity	: 55%RH

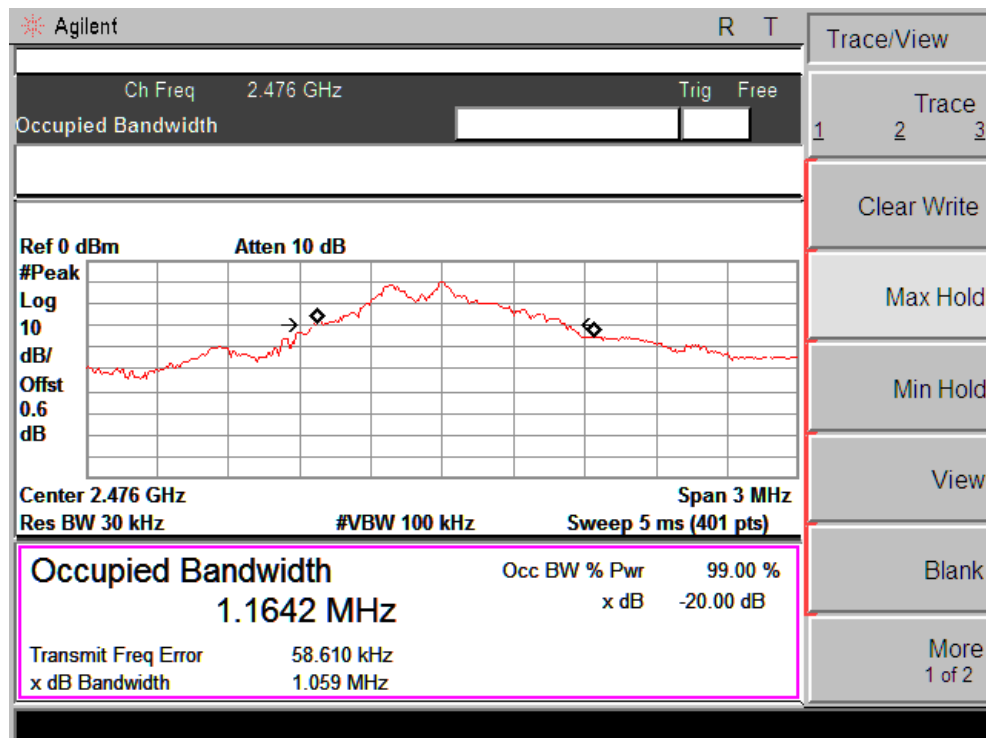
Frequency (MHz)	Bandwidth (kHz)	Result
2406MHZ	1043	PASS
2447MHZ	1050	PASS
2476MHZ	1059	PASS



Test Mode: Low



Test Mode: Middle



Test Mode: High

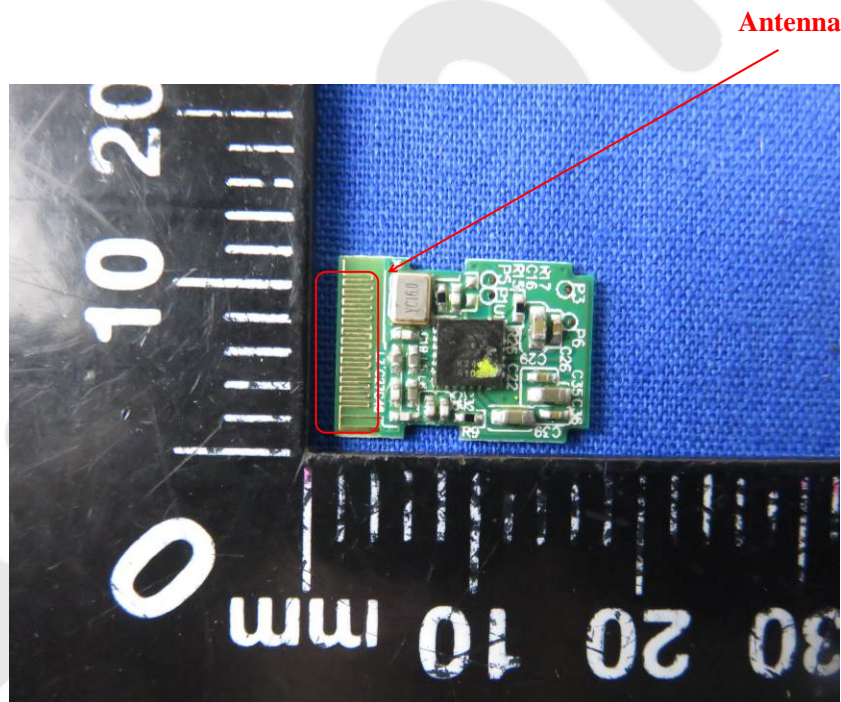
## 6. Antenna Requirement

### 6.1. Test Standard and Requirement

Test Standard	FCC Part15 Section 15.203
Requirement	<p>1) 15.203 requirement:</p> <p>An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.</p>

### 6.2. Antenna Connected Construction

The antenna is a PCB Antenna which permanently attached, and the best case gain of the antenna is 1.0dBi. It complies with the standard requirement.



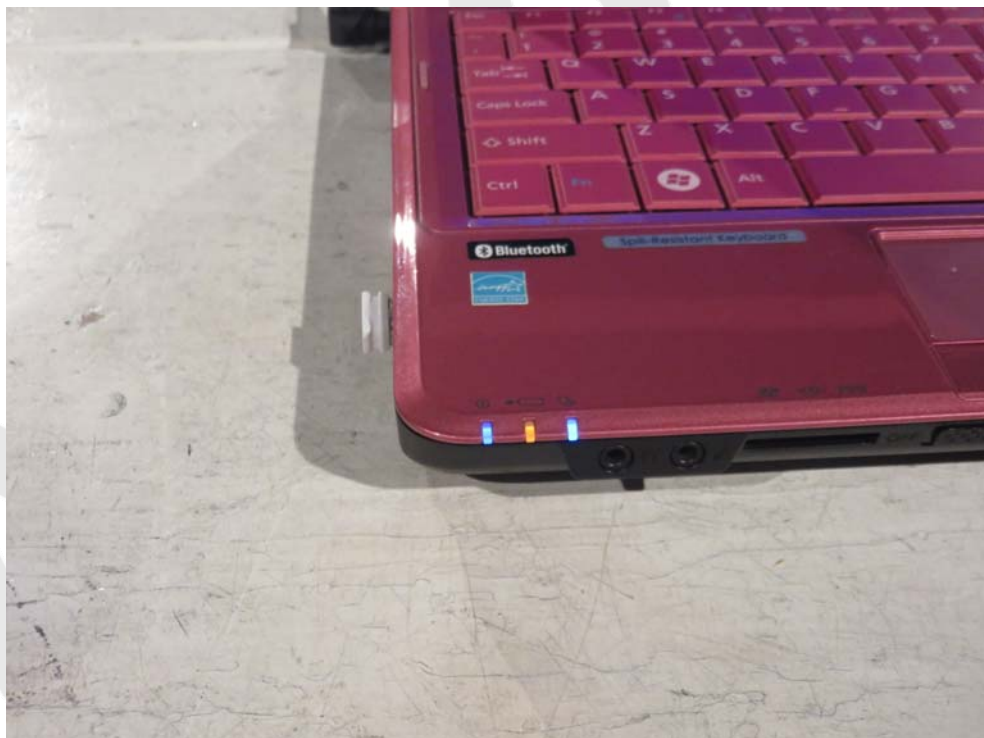
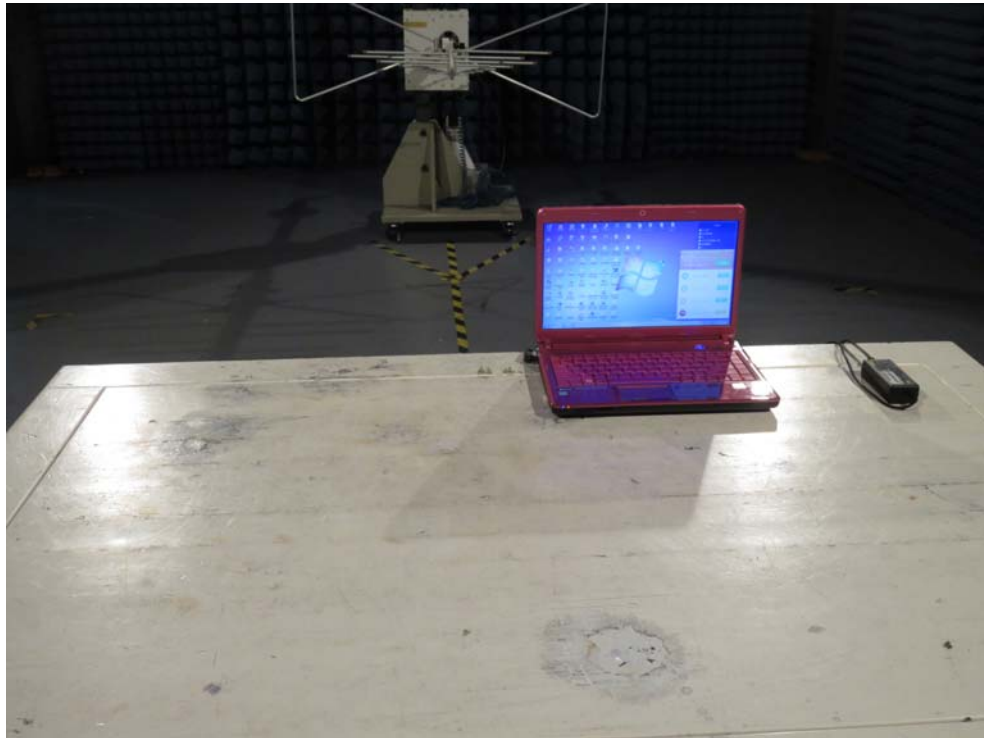
## APPENDIX I -- TEST SETUP PHOTOGRAPH

Photo of Conducted Emission Measurement





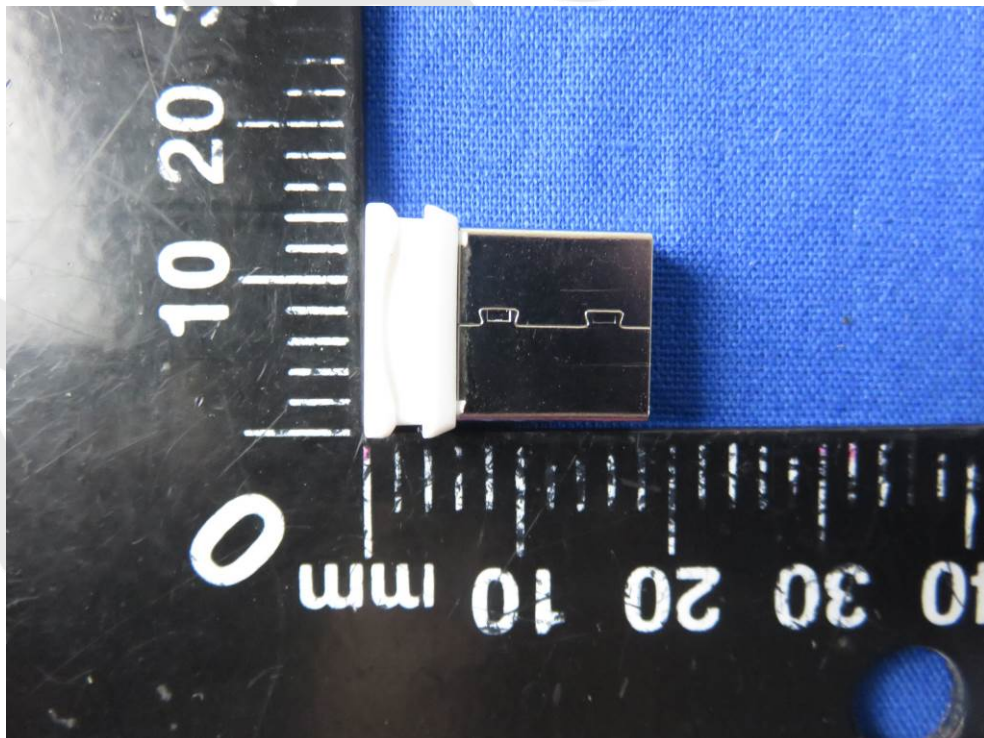
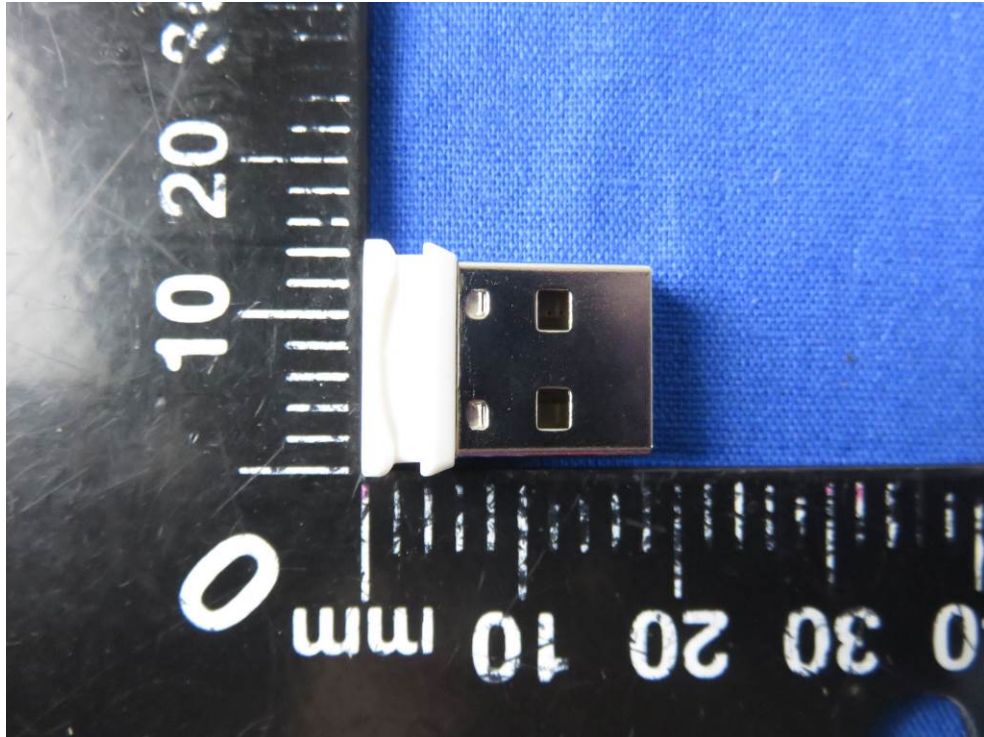
Photo of Radiation Emission Test



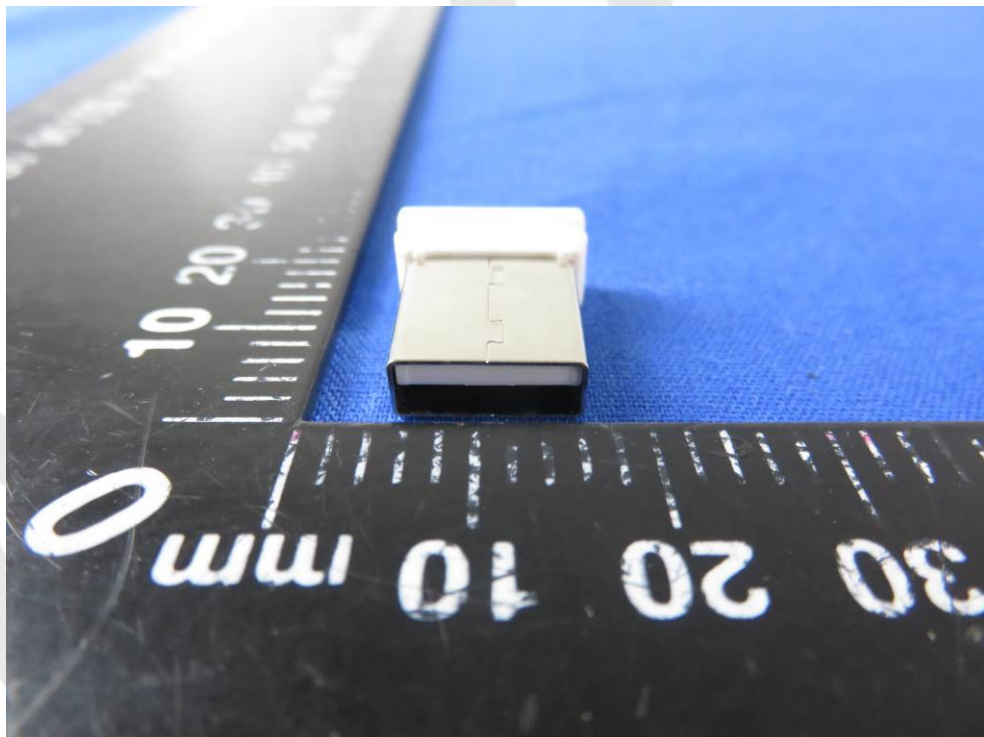
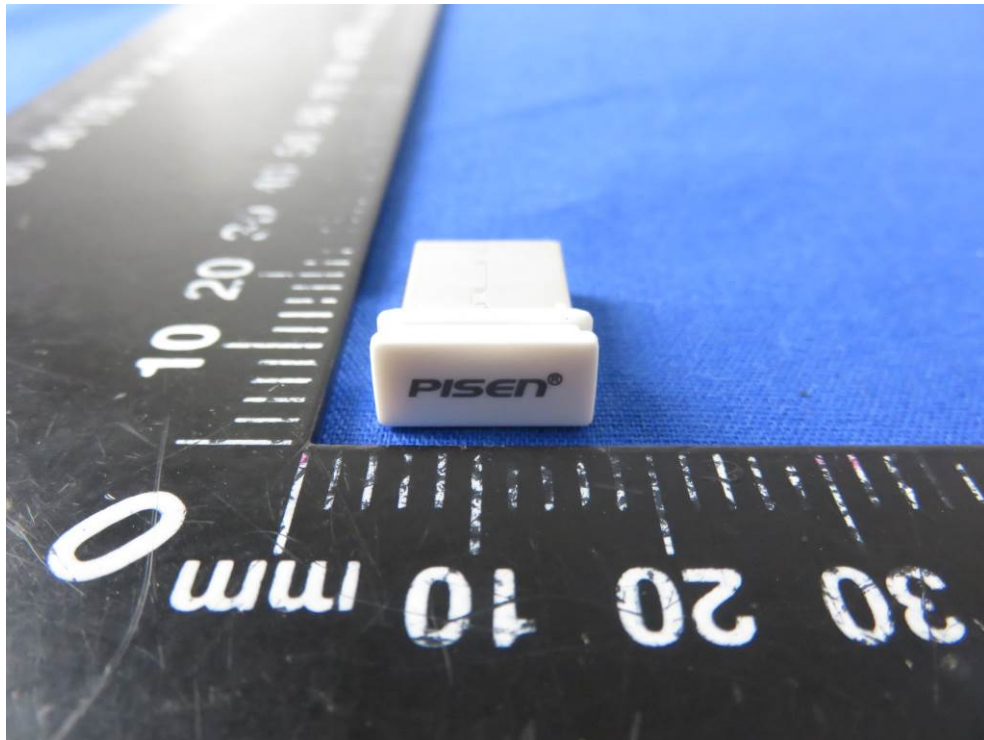


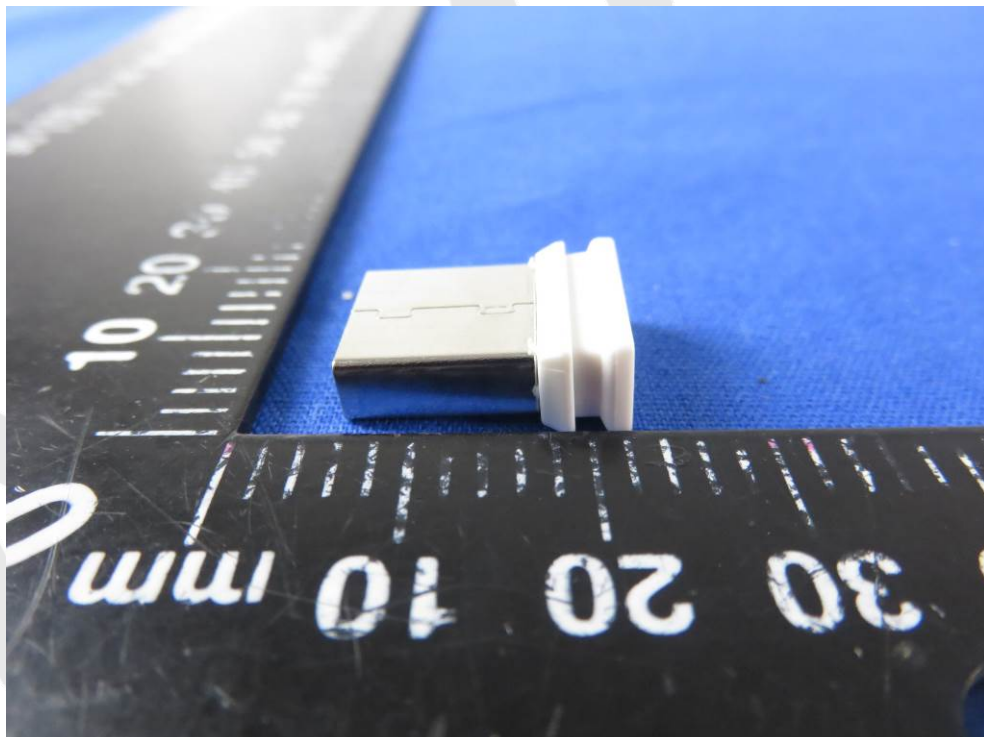
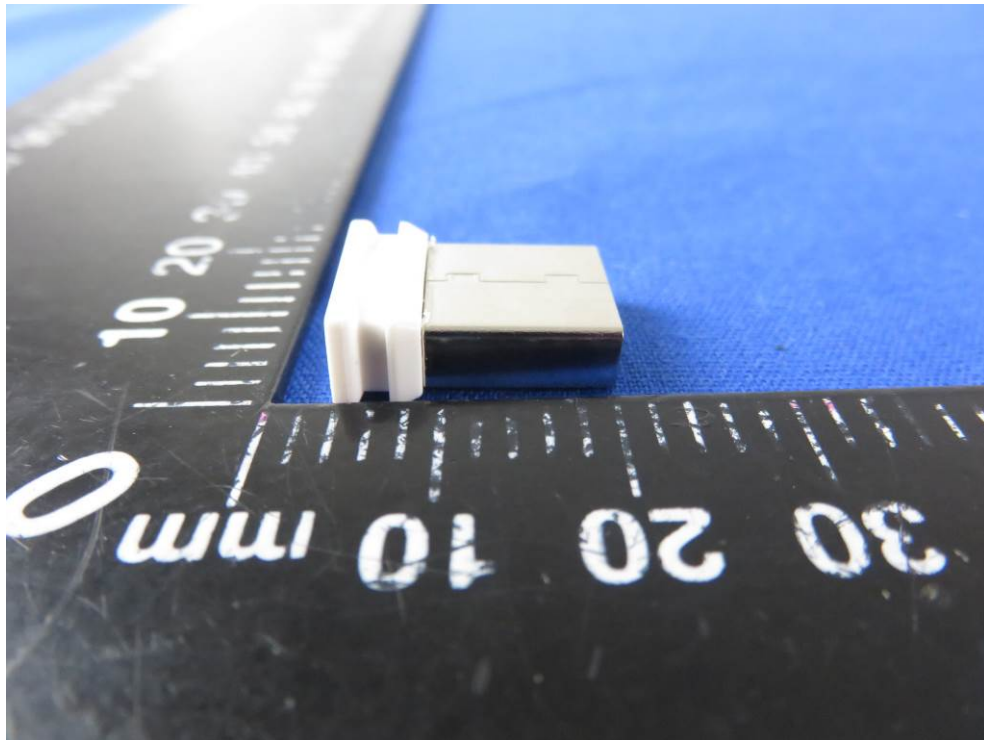


## APPENDIX II -- EXTERNAL PHOTOGRAPH











### APPENDIX III -- INTERNAL PHOTOGRAPH

