Shenzhen Asia Test Technology Co., Ltd.

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FCC RADIO TEST REPORT
FCC ID: BOOKP-Y4073823

Product： USB Dongle

Trade Name： iPazzPort

Model Name： Y4073823

Serial Model： N/A

Prepared for

Unisen Limited

Room 907, Fook Hong Industrial Bldg., 19 Sheung Yuet Road, Kowloon Bay, Kowloon, Hong Kong

Prepared by

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TEST RESULT CERTIFICATION

Manufacture's Name..... Unisen Limited

Address ..... Wuwu Rd. Banshi Wuwu Village, Changping Town, Dongguan City Guangdong Prov. China

Product description

Product name ..... USB Dongle

Model and/or type reference Y4073823

Additional Model ..... N/A

Standards ..... FCC Part15.247

Test procedure ..... ANSI C63.10-2013

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

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Date of Test.....

Date (s) of performance of tests ..... Nov. 19 2016 ~Dec. 01 2016

Date of Issue..... Dec. 01 2016

Test Result..... **Pass**

Testing Engineer	:	Jack Yu
		(Jack Yu)
Technical Manager	:	Jerry You
		(Jerry You)
Authorized Signatory	:	Can Liu
		(Can Liu)

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1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

FCC Part15 (15.247) , Subpart C			
Standard Section	Test Item	Judgment	Remark
15.207	Conducted Emission	PASS	
15.247(a)(1)	Hopping Channel Separation	PASS	
15.247(b)(1)	Peak Output Power	PASS	
15.247(c)	Radiated Spurious Emission	PASS	
15.247(a)(iii)	Number of Hopping Frequency	PASS	
15.247(a)(iii)	Dwell Time	PASS	
15.247(a)(1)	Bandwidth	PASS	
15.205	Band Edge Emission	PASS	
15.203	Antenna Requirement	PASS	

NOTE:

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

1.1 TEST FACILITY

Dongguan Yaxu(AiT) Technology Limited
No. 22,JinQianLing Street 3, JiTiGang Village, Huang-Jiang Town, DongGuan, Guangdong, 523757 China
FCC Registration No.: 248337

1.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement **y** ± **U**，where expended uncertainty **U** is based on a standard uncertainty multiplied by a coverage factor of **k=2**，providing a level of confidence of approximately **95** %。

No.	Item	Uncertainty
1	Conducted Emission Test	±1.38dB
2	RF power,conducted	±0.16dB
3	Spurious emissions,conducted	±0.21dB
4	All emissions,radiated(<1G)	±4.68dB
5	All emissions,radiated(>1G)	±4.89dB
6	Temperature	±0.5°C
7	Humidity	±2%

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

<table>
<tr><td>Equipment</td><td>USB Dongle</td></tr>
<tr><td>Model Name</td><td>Y4073823</td></tr>
<tr><td>Serial number</td><td>N/A</td></tr>
<tr><td>Serial Model</td><td>N/A</td></tr>
<tr><td>Model Difference</td><td>N/A</td></tr>
<tr><td>Product Description</td><td>The EUT is a USB Dongle
<table>
<tr><td>Operation Frequency:</td><td>2402~2480 MHz</td></tr>
<tr><td>Modulation Type:</td><td>GFSK</td></tr>
<tr><td>Bit Rate of Transmitter</td><td>500Kbps</td></tr>
<tr><td>Number Of Channel</td><td>79 CH</td></tr>
<tr><td>Antenna Designation:</td><td>Please see Note 3.</td></tr>
<tr><td>Output Power(Conducted):</td><td>-0.42dBm PK</td></tr>
</table>
Based on the application, features, or specification exhibited in User's Manual, the EUT is considered as an ITE/Computing Device. More details of EUT technical specification, please refer to the User's Manual.</td></tr>
<tr><td>Channel List</td><td>Please refer to the Note 2.</td></tr>
<tr><td>Ratings</td><td>DC 5V</td></tr>
<tr><td>Adapter</td><td>N/A</td></tr>
<tr><td>Battery</td><td>N/A</td></tr>
<tr><td>hardware version</td><td>UT_MX1223</td></tr>
<tr><td>Software version</td><td>V1.0</td></tr>
</table>

Note:

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

2.

Channel List					
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
00	2402	27	2429	54	2456
01	2403	28	2430	55	2457
02	2404	29	2431	56	2458
03	2405	30	2432	57	2459
04	2406	31	2433	58	2460
05	2407	32	2434	59	2461
06	2408	33	2435	60	2462
07	2409	34	2436	61	2463
08	2410	35	2437	62	2464
09	2411	36	2438	63	2465
10	2412	37	2439	64	2466
11	2413	38	2440	65	2467
12	2414	39	2441	66	2468
13	2415	40	2442	67	2469
14	2416	41	2443	68	2470
15	2417	42	2444	69	2471
16	2418	43	2445	70	2472
17	2419	44	2446	71	2473
18	2420	45	2447	72	2474
19	2421	46	2448	73	2475
20	2422	47	2449	74	2476
21	2423	48	2450	75	2477
22	2424	49	2451	76	2478
23	2425	50	2452	77	2479
24	2426	51	2453	78	2480
25	2427	52	2454		
26	2428	53	2455		

3.

Table for Filed Antenna

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)	NOTE
1	N/A	N/A	PCB Antenna	N/A	0.15	

2.2 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	CH00
Mode 2	CH39
Mode 3	CH78
Mode 4	TX Link

For Conducted Emission	
Final Test Mode	Description
Mode 4	TX Link

For Radiated Emission	
Final Test Mode	Description
Mode 1	CH00
Mode 2	CH39
Mode 3	CH78

Note:

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

(2) Measurements are performed according to C63.10.

(3) The relevant RF Conducted Measurement is performed by a temporary antenna connector, please refer to the Equipment List for the detail

(4) Test perform on all mode, only records worse cases in the test report.

(5) The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudorandomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitter signals.
Example:
Frequency used:2402 - 2480 MHz
79 Channels (Ch 0 - Ch 78)
Hopping Sequence in Data Mode

55,48,26,33,52,35,50,65,54,67,15,08,64,49,66,53,22,25,63,04,41,05,24,43,73,07,75,28,56,37,60,39,58,69,16,40,21,44
23,42,13,17,46,02,51,03,11,29,77,47,62,27,71,10,68,32,57 12,59,72,30,76,31,18,74,61,14,70,36,06,09,45,19,20,34,38
78,00,01

From the hopping sequence, each frequency has be used equally on the average by each transmitter.
RX bandwidth=1MHz

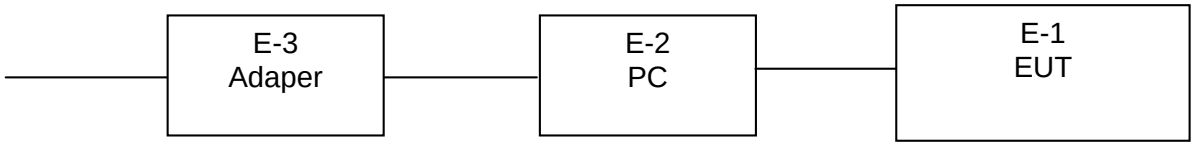
2.3 TABLE OF PARAMETERS OF TEXT SOFTWARE SETTING

During testing channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product power parameters of FHSS

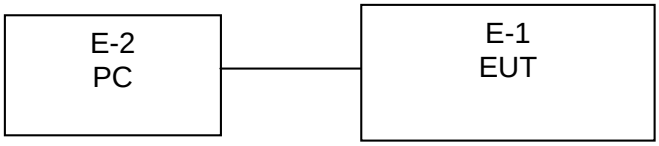
Test software Version	Test program: CC2500_V3.0		
Frequency	2402 MHz	2441 MHz	2480 MHz
Parameters	DEF	DEF	DEF

2.4 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

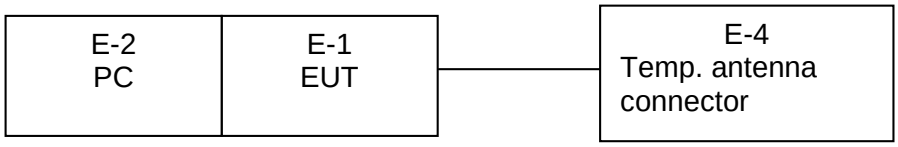
CE



RE



RF conducted measurement



2.5 DESCRIPTION OF SUPPORT UNITS(CONDUCTED MODE)

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

Item	Equipment	Brand	Model/Type No.	Series No.	Note
E-1	USB Dongle	iPazzPort	Y4073823	N/A	EUT
E-2	Lap top	ASUS	X401A	X16-96072	
E-3	Adapter (laptop)	ASUS	EXA0703YH	N/A	
E-4	Temp. antenna connector	DOKMA	KYS-0944	22550510	Impedance=50ohm cable loss=0.9db

Item	Shielded Type	Ferrite Core	Length	Note
C-1	No	Yes	100	
C-2	No	Yes	80	

Note:

(1) The support equipment was authorized by Declaration of Confirmation.
(2) For detachable type I/O cable should be specified the length in cm in『Length』column.
(3) “YES” is means “shielded” “with core”; “NO” is means “unshielded” “without core”.

2.6 EQUIPMENTS LIST FOR ALL TEST ITEMS

For Radiation Test and other conducted test (bandwidth,output power, power spectral density)

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1	Spectrum Analyzer	ADVANTEST	R3182	150900201	2016.06.26	1Y
2	EMI Measuring Receiver	R&S	ESR	101160	2016.06.26	1Y
3	Preamplifier	Tsj	MLA-10K01-B01-27	1205323	2016.06.26	1Y
4	Preamplifier	Tsj	MLA-0120-A02-34	2648A04738	2015.12.02	1Y
5	Bilog Antenna	SCHWARZBECK	VULB9160	3206	2015.12.03	1Y
6	Horn Antenna	SCHWARZBECK	BBHA 9120D	452	2015.12.03	1Y
7	Horn Ant	Schwarzbeck	BBHA 9170	9170-181	2016.05.29	1 Y
8	Loop Antenna	TESEQ	HLA6120	35779	2016.05.29	1 Y
9	Coaxial Switch	Anritsu	MP59B	6200264416	2016.09.25	6M
10	Power Mete	Anritsu	ML2487B	110553	2016.07.10	1Y
11	Power Sensor	Anritsu	MA2411B	100345	2016.07.10	1Y
12	Cable below 30MHz	N/A	AIT005	R005	2016.07.10	1Y
13	RF Cabl 30-1000MHz	N/A	AIT001	R001	2016.07.10	1Y
14	RF Cabl 1-25GHz	N/A	AIT001	R001	2016.07.10	1Y
15	Temp. antenna connector	DOKMA	KYS-0944	22550510	2016.07.10	1Y

Conduction Test equipment						
No	Test Equipment	Manufacturer	Model No	Serial No	Last Cal.	Cal. Interval
1	EMI Test Receiver	R&S	ESCI	100124	2016.06.29	1Y
2	LISN	Kyoritsu	KNW-242	8-837-4	2016.06.29	1 Y
3	LISN	Kyoritsu	KNW-407	8-1789-3	2016.06.29	1 Y
4	50Ω Coaxial Switch	Anritsu	MP59B	6200264417	2016.06.29	1Y

Note: The temporary antenna connector is soldered on the PCB board in order to perform conducted tests and this temporary antenna connector is listed in the equipment list.

3. EMC EMISSION TEST

3.1 CONDUCTED EMISSION MEASUREMENT

3.1.1 POWER LINE CONDUCTED EMISSION Limits (Frequency Range 150KHz-30MHz)

FREQUENCY (MHz)	Class A (dBuV)		Class B (dBuV)		Standard
	Quasi-peak	Average	Quasi-peak	Average	
0.15 -0.5	79.00	66.00	66 - 56 *	56 - 46 *	CISPR
0.50 -5.0	73.00	60.00	56.00	46.00	CISPR
5.0 -30.0	73.00	60.00	60.00	50.00	CISPR

0.15 -0.5	79.00	66.00	66 - 56 *	56 - 46 *	FCC
0.50 -5.0	73.00	60.00	56.00	46.00	FCC
5.0 -30.0	73.00	60.00	60.00	50.00	FCC

Note:

(1) The tighter limit applies at the band edges.

(2) The limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

The following table is the setting of the receiver

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

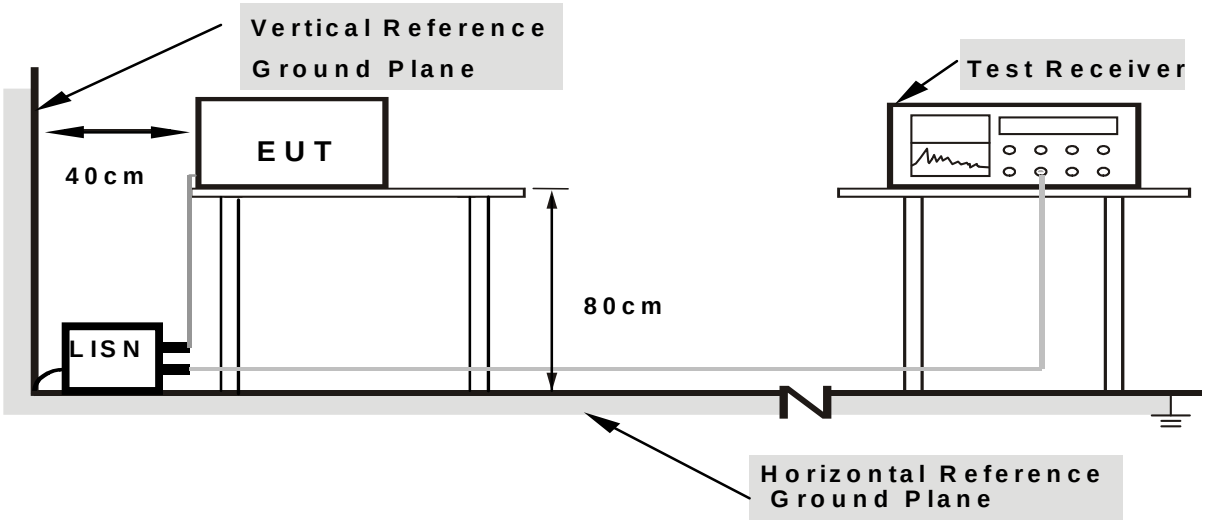
3.1.2 TEST PROCEDURE

a. The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
b. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
c. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
d. LISN at least 80 cm from nearest part of EUT chassis.
e. For the actual test configuration, please refer to the related Item –EUT Test Photos.

3.1.3 DEVIATION FROM TEST STANDARD

No deviation

3.1.4 TEST SETUP



Note: 1.Support units were connected to second LISN.
2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

3.1.5 EUT OPERATING CONDITIONS

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

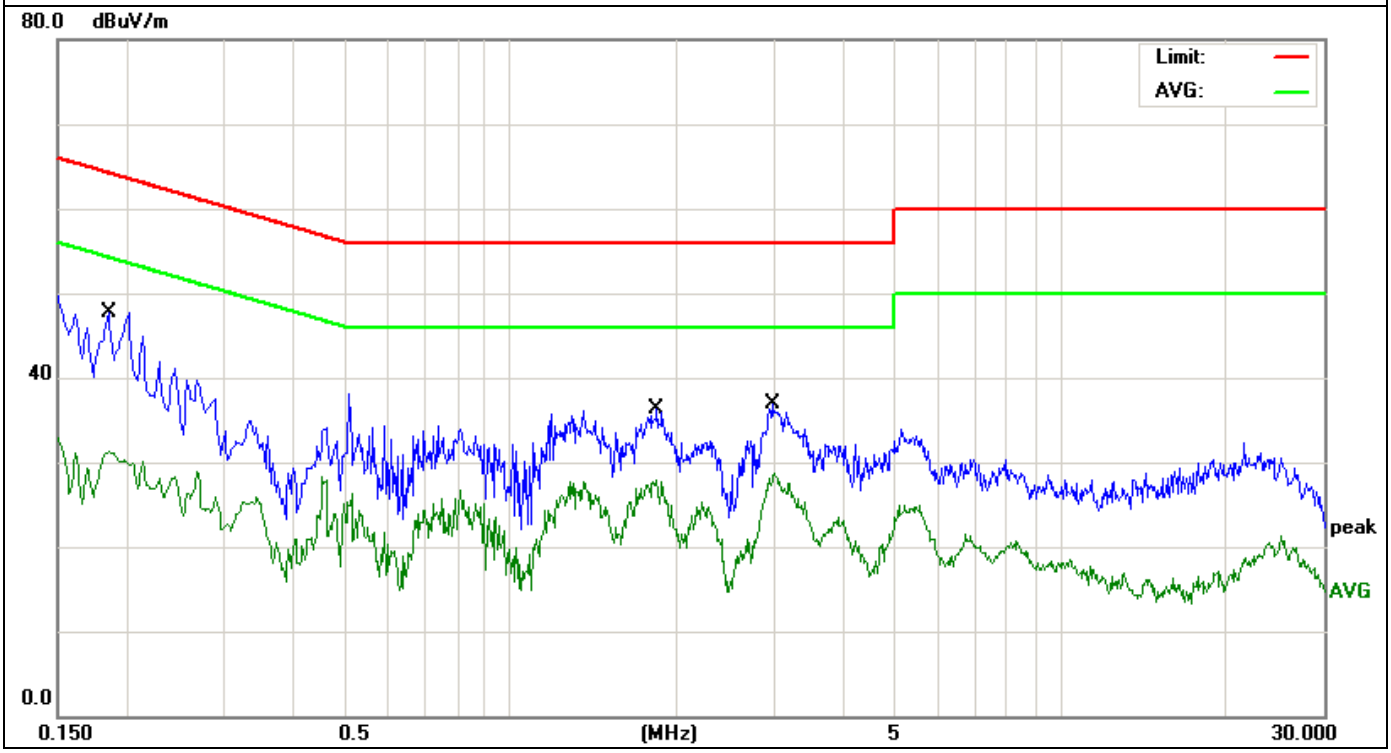
3.1.6 TEST RESULTS

.

Model name:	Y4073823	Test Date :	2016-11-28
Test Mode:	4	Phase :	Line
Test Voltage:	DC 5V from Laptop, AC 120V/60Hz for Laptop		

Frequency (MHz)	Meter Reading (dBµV)	Factor(dB)	Emission Level (dBµV)	Limits (dBµV)	Margin (dB)	Detector
0.186	36.49	11.31	47.8	64.21	-16.41	QP
0.186	19.94	11.31	31.25	54.21	-22.96	AVG
1.834	18.01	9.95	27.96	46	-18.04	AVG
1.842	26.36	9.95	36.31	56	-19.69	QP
2.978	26.88	9.98	36.86	56	-19.14	QP
3.018	18.77	9.98	28.75	46	-17.25	AVG

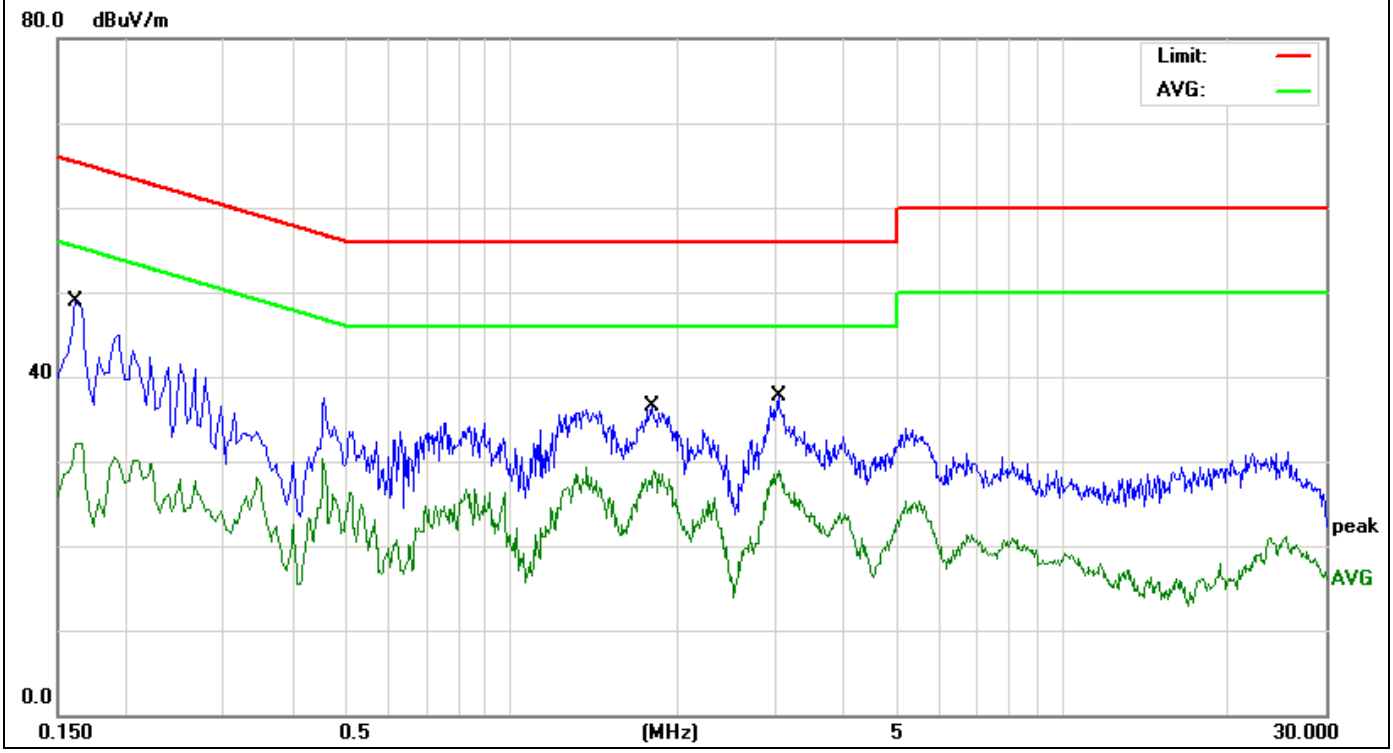
Remark: Factor = LISN factor + Cable Loss + Pulse limiter factor.



Model name:	Y4073823	Test Date :	2016-11-28
Test Mode:	4	Phase :	Neutral
Test Voltage:	DC 5V from Laptop, AC 120V/60Hz for Laptop		

Frequency (MHz)	Meter Reading (dBµV)	Factor(dB)	Emission Level (dBµV)	Limits (dBµV)	Margin (dB)	Detector
0.162	37.16	11.68	48.84	65.36	-16.52	QP
0.162	20.49	11.68	32.17	55.36	-23.19	AVG
1.794	26.49	9.95	36.44	56	-19.56	QP
1.818	18.91	9.95	28.86	46	-17.14	AVG
3.042	27.78	9.98	37.76	56	-18.24	QP
3.062	18.84	9.98	28.82	46	-17.18	AVG

Remark: Factor = LISN factor + Cable Loss + Pulse limiter factor.



3.2 RADIATED EMISSION MEASUREMENT

3.2.1 RADIATED EMISSION LIMITS (Frequency Range 9kHz-1000MHz)

20dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

Frequencies (MHz)	Field Strength (micorvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

Notes:

(1) The tighter limit applies at the band edges.

(2) Emission level (dBuV/m)=20log Emission level (uV/m).

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10^{th} carrier harmonic
RB / VB (emission in restricted band)	1 MHz / 1 MHz for Peak, 1 MHz / 10Hz for Average

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

3.2.2 TEST PROCEDURE

1)9 kHz to 30 MHz emissions:
For testing performed with the loop antenna, testing was performed in accordance to ANSI C63.10. The centre of the loop was positioned 1 m above the ground and positioned with its plane vertical at the specified distance from the EUT, During testing the loop was rotated about its vertical axis for maximum response at each azimuth and also investigated with the loop positioned in the horizontal plane.
2)30 MHz to 1 GHz emissions:
For testing performed with the bi-log type antenna, testing was performed in accordance to ANSI C63.10. The measurement is performed with the EUT rotated 360º, the antenna height scanned between 1m and 4m, and the antenna rotated to repeat the measurement for both the horizontal and vertical antenna polarizations.
3)1 GHz to 25 GHz emissions:
Test site with RF absorbing material covering the ground plane that met the site validation criterion called out in CISPR 16-1-4:2010 was used to perform radiated emission test above 1 GHz.
For testing performed with the horn antenna, testing was performed in accordance to ANSI C63.10. The measurement is performed with the EUT rotated 360º, the antenna height scan between 1m and 4m, and the antenna rotated to repeat the measurement for both the horizontal and vertical antenna polarizations.

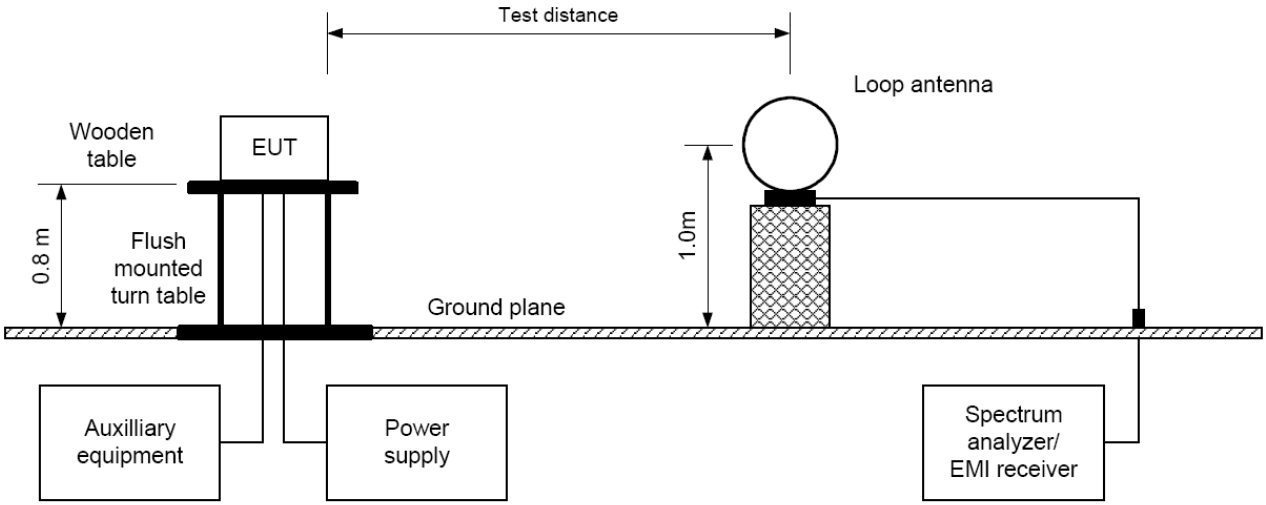
For the radiated emission test above 1GHz:
Both horizontal and vertical antenna polarities were testedand performed pretest to three orthogonal axis. The worst case emissions were reported.
Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified 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.

3.2.3 DEVIATION FROM TEST STANDARD

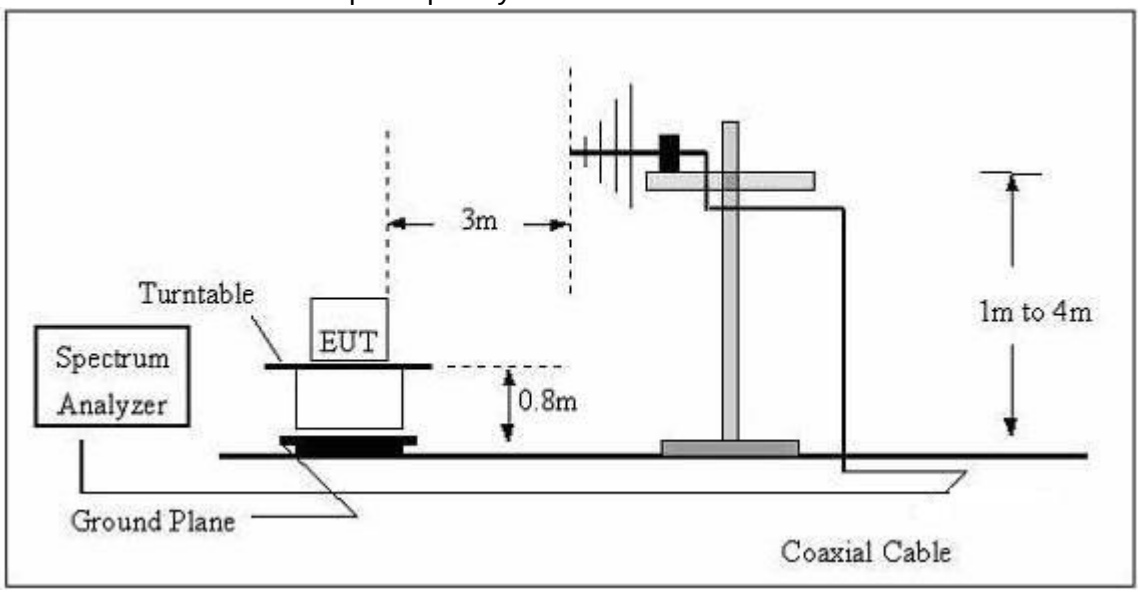
No deviation

3.2.4 TEST SETUP

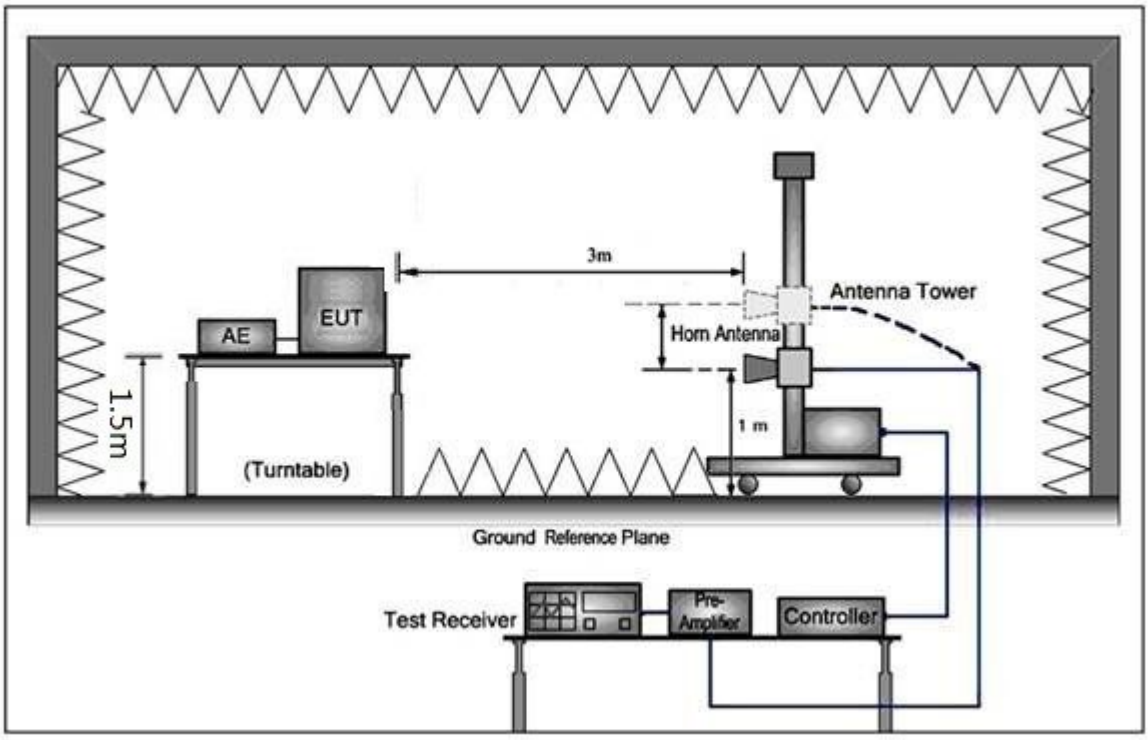
（A）Radiated Emission Test-Up Frequency Below 30MHz



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



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



3.2.5 EUT OPERATING CONDITIONS

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

3.2.6 TEST RESULTS (BELOW 30 MHZ)

EUT：	USB Dongle	Model Name ：	Y4073823
Temperature：	20 ℃	Relative Humidity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC 5V
Test Mode ：	TX	Polarization :	---

Freq.	Reading	Limit	Margin	State
(MHz)	(dBuV/m)	(dBuV/m)	(dB)	P/F
--	--	--	--	P
--	--	--	--	P

NOTE:
The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.
Distance extrapolation factor =20 log (specific distance/test distance)(dB);
Limit line = specific limits(dBuv) + distance extrapolation factor.

3.2.7 TEST RESULTS (BETWEEN 30M – 1000 MHZ)

EUT：	USB Dongle	Model Name ：	Y4073823
Temperature：	24 ℃	Relative Humidity：	54%
Pressure：	1010hPa	Test Mode：	TX 2402
Test Voltage ：	DC 5V		

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
V	33.68	45.72	-16.35	29.37	40	-10.63	QP
V	104.72	48.67	-15.47	33.2	43.5	-10.3	QP
V	255.72	41.23	-13.26	27.97	46	-18.03	QP
V	406.72	46.22	-8.65	37.57	46	-8.43	QP
V	516.27	43.29	-4.33	38.96	46	-7.04	QP
V	669.77	31.67	-2.64	29.03	46	-16.97	QP
H	78.52	39.27	-14.65	24.62	40	-15.38	QP
H	219.35	40.15	-13.17	26.98	46	-19.02	QP
H	259.64	44.72	-11.64	33.08	46	-12.92	QP
H	335.34	42.38	-8.67	33.71	46	-12.29	QP
H	448.72	40.58	-5.16	35.42	46	-10.58	QP
H	678.35	39.27	-2.14	37.13	46	-8.87	QP

Remark:
Absolute Level= ReadingLevel+ Factor, Margin= Absolute Level - Limit

Note:test perform on all TX mode,"TX 2402” mode is the worst mode and has been reported.

3.2.8 TEST RESULTS (Above 1GHz~ 10th harmonic)

EUT：	USB Dongle	Model Name ：	Y4073823
Temperature：	24 ℃	Relative Humidity：	48%
Pressure：	1010hPa	Test Mode：	TX
Test Voltage：	DC 5V		

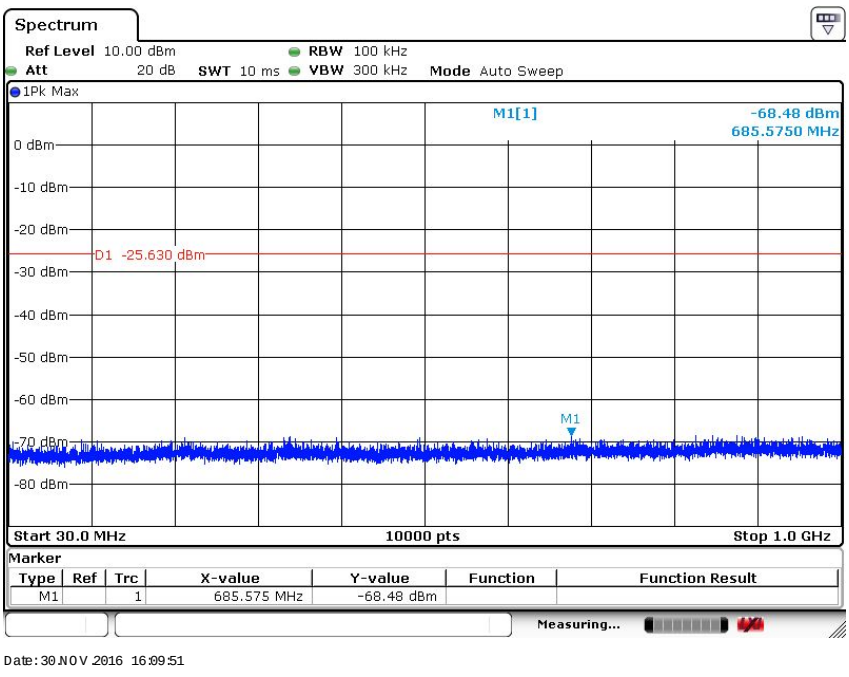
Low Channel (2402 MHz)-Above 1G							
Frequency (MHz)	Meter Reading (dBuV)	Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type	Polar (H/V)
4804	64.58	-8.65	55.93	74	-18.07	Pk	Vertical
4804	53.66	-8.65	45.01	54	-8.99	Av	Vertical
7206	63.58	-7.47	56.11	74	-17.89	Pk	Vertical
7206	52.16	-7.47	44.69	54	-9.31	Av	Vertical
4804	65.71	-8.34	57.37	74	-16.63	Pk	Horizontal
4804	53.26	-8.34	44.92	54	-9.08	Av	Horizontal
7206	64.72	-6.58	58.14	74	-15.86	Pk	Horizontal
7206	55.26	-6.58	48.68	54	-5.32	Av	Horizontal
Mid Channel (2441 MHz)-Above 1G							
4882	66.74	-8.27	58.47	74	-15.53	Pk	Vertical
4882	51.57	-8.27	43.3	54	-10.7	Av	Vertical
7323	63.25	-7.33	55.92	74	-18.08	Pk	Vertical
7323	53.48	-7.33	46.15	54	-7.85	Av	Vertical
4882	66.35	-8.12	58.23	74	-15.77	Pk	Horizontal
4882	54.17	-8.12	46.05	54	-7.95	Av	Horizontal
7323	59.38	-6.45	52.93	74	-21.07	Pk	Horizontal
7323	48.72	-6.45	42.27	54	-11.73	Av	Horizontal
High Channel (2480MHz)- Above 1G							
4960	60.22	-8.05	52.17	74	-21.83	Pk	Vertical
4960	54.72	-8.05	46.67	54	-7.33	Av	Vertical
7440	61.25	-7.14	54.11	74	-19.89	Pk	Vertical
7440	53.58	-7.14	46.44	54	-7.56	Av	Vertical
4960	60.66	-7.89	52.77	74	-21.23	Pk	Horizontal
4960	58.84	-7.89	50.95	54	-3.05	Av	Horizontal
7440	64.25	-6.2	58.05	74	-15.95	Pk	Horizontal
7440	50.58	-6.2	44.38	54	-9.62	Av	Horizontal

Conducted Spurious Emissions at Antenna Port

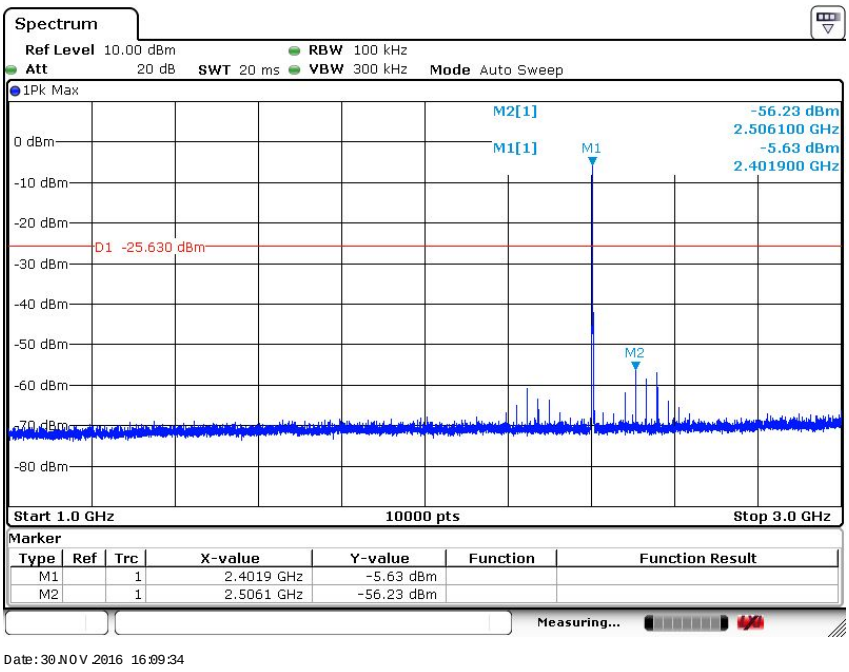
Channel	Frequency (MHz)	Frequency Range	Sweep Points	Refer to Plot	Limit (dBc)	Verdict
00	2402	30MHz-1GHz	9700	Plot 4.9.1 A1	-20	PASS
		1MHz-3GHz	20000	Plot 4.9.1 A2	-20	PASS
		3GHz-13GHz	100000	Plot 4.9.1 A3	-20	PASS
		13GHz-25GHz	120000	Plot 4.9.1 A4	-20	PASS
39	2441	30MHz-1GHz	9700	Plot 4.9.1 B1	-20	PASS
		1MHz-3GHz	20000	Plot 4.9.1 B2	-20	PASS
		3GHz-13GHz	100000	Plot 4.9.1 B3	-20	PASS
		13GHz-25GHz	120000	Plot 4.9.1 B4	-20	PASS
78	2480	30MHz-1GHz	9700	Plot 4.9.1 C1	-20	PASS
		1MHz-3GHz	20000	Plot 4.9.1 C2	-20	PASS
		3GHz-13GHz	100000	Plot 4.9.1 C3	-20	PASS
		13GHz-25GHz	120000	Plot 4.9.1 C4	-20	PASS

Note:
1. The test results including the cable lose.

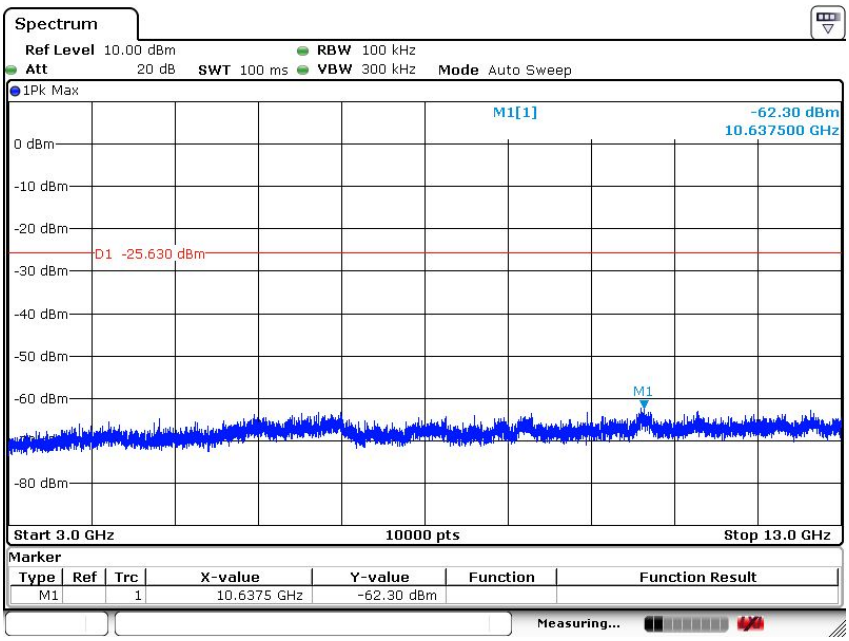
A. Test Plots



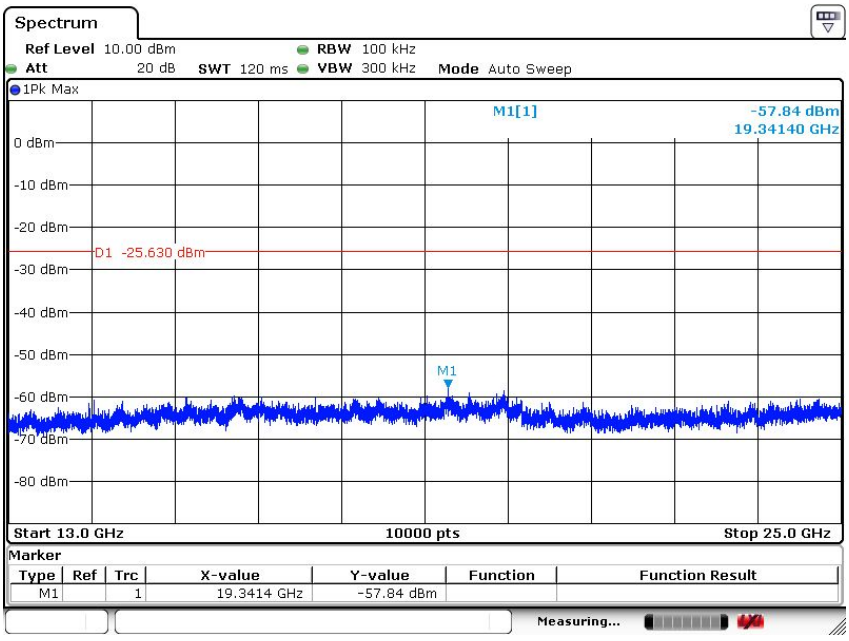
(Plot 4.9.1 A1: Channel 00: 2402MHz @ GFSK)



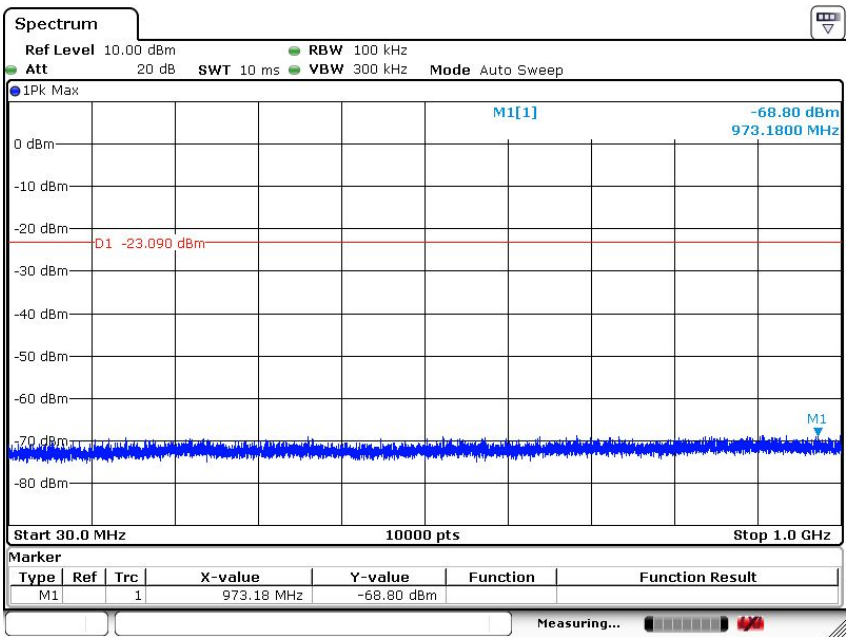
(Plot 4.9.1 A2: Channel 00: 2402MHz @ GFSK)



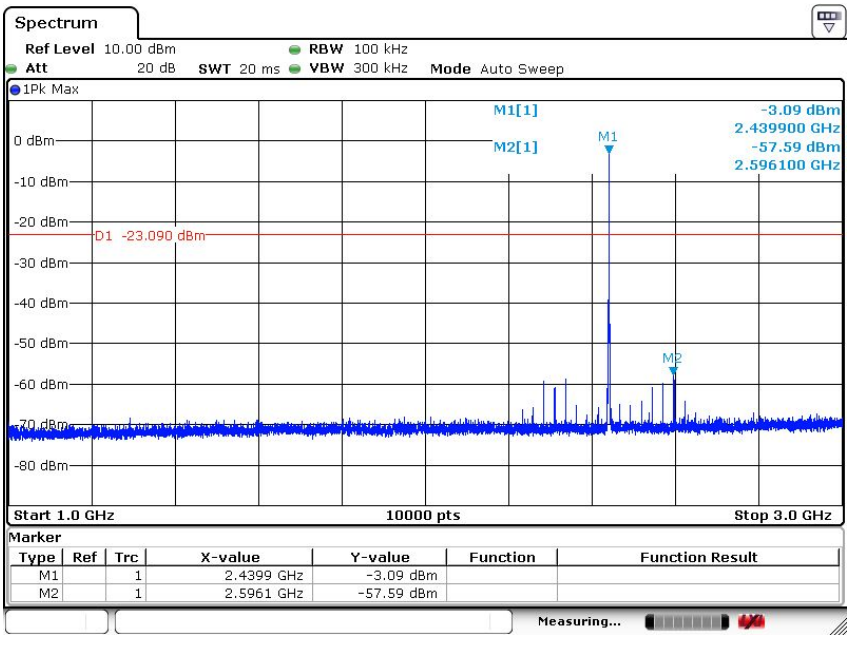
(Plot 4.9.1 A3: Channel 00: 2402MHz @ GFSK)



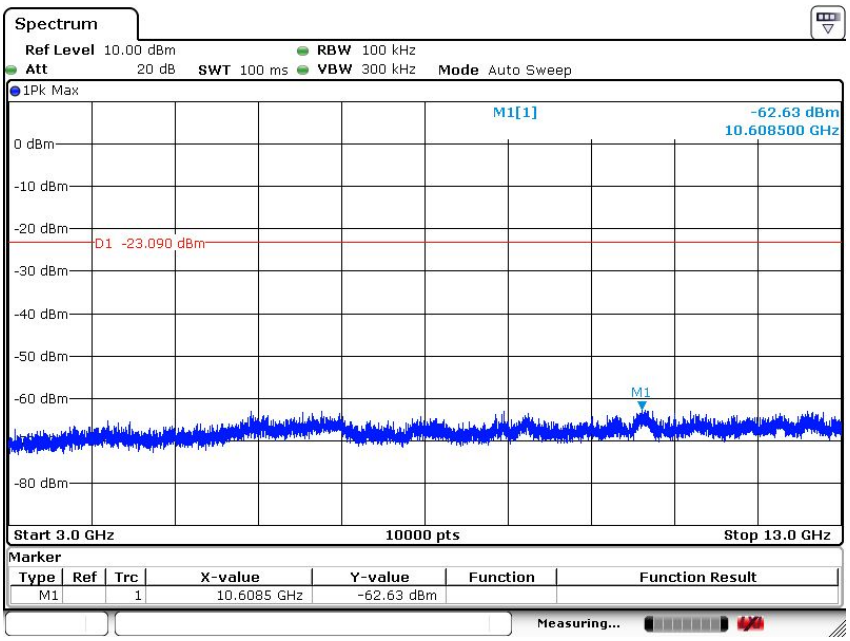
(Plot 4.9.1 A4: Channel 00: 2402MHz @ GFSK)



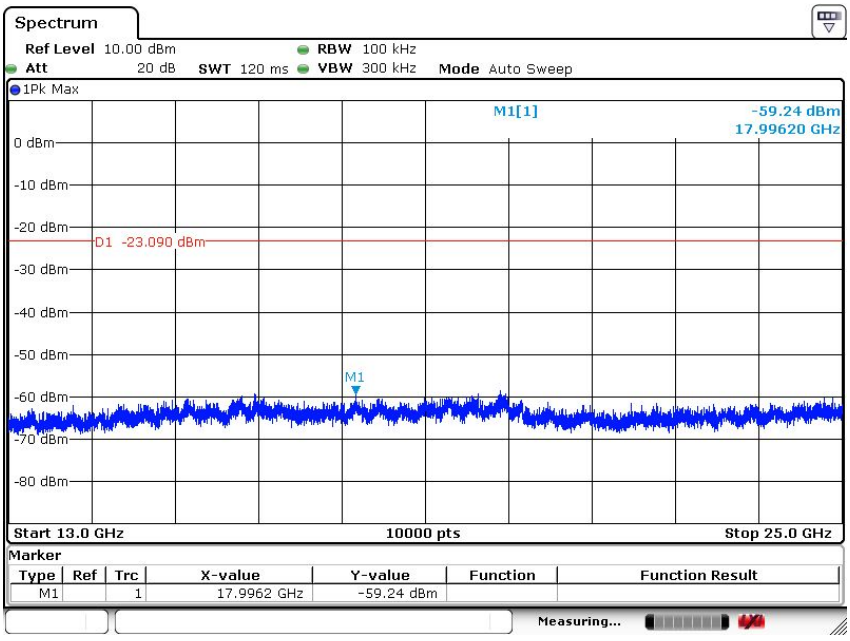
(Plot 4.9.1 B1: Channel 39: 2441MHz @ GFSK)



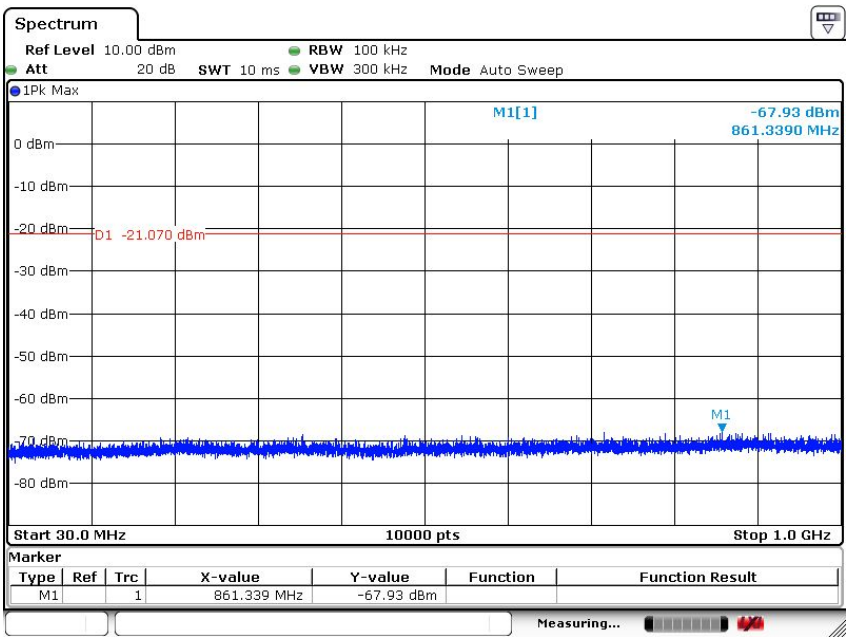
(Plot 4.9.1 B2: Channel 39: 2441MHz @ GFSK)



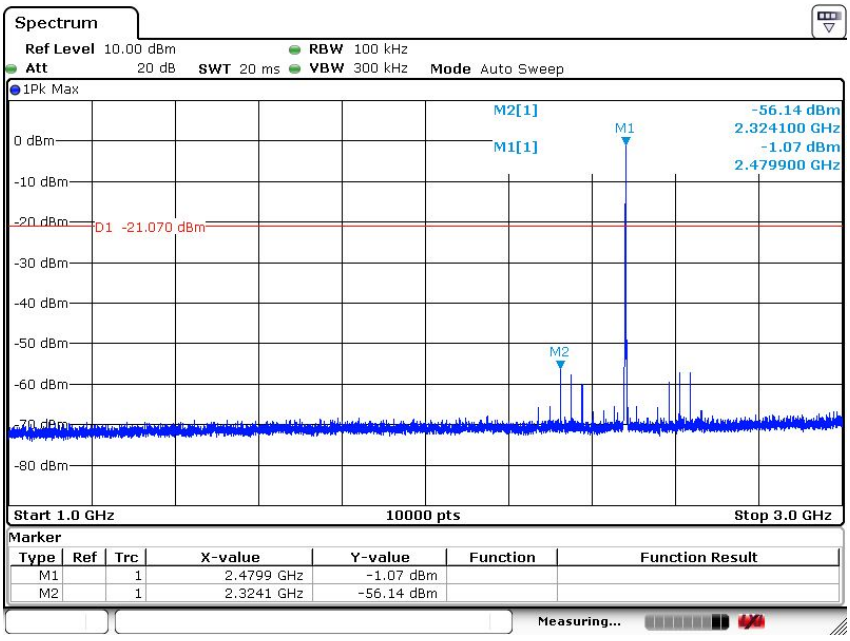
(Plot 4.9.1 B3: Channel 39: 2441MHz @ GFSK)



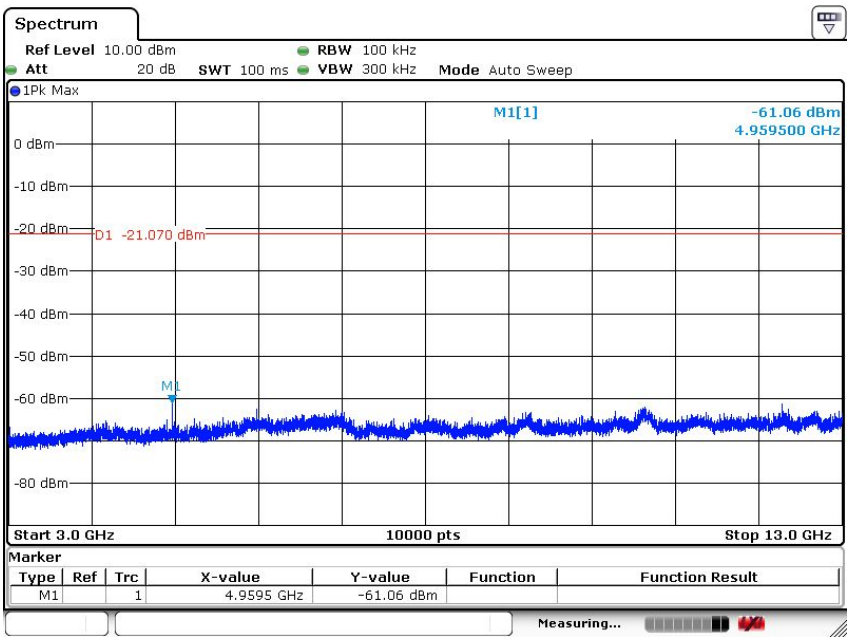
(Plot 4.9.1 B4: Channel 39: 2441MHz @ GFSK)



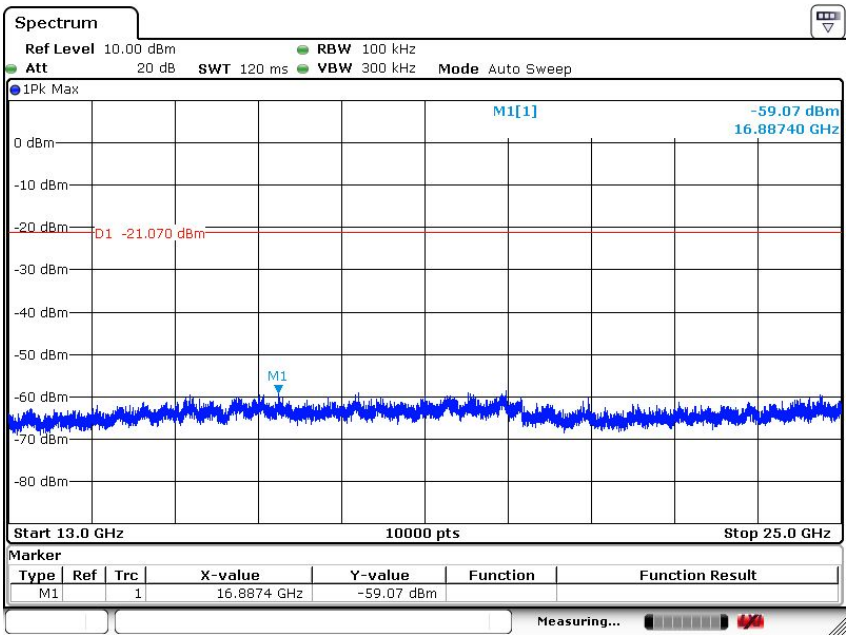
(Plot 4.9.1 C1: Channel 78: 2480MHz @ GFSK)



(Plot 4.9.1 C2: Channel 78: 2480MHz @ GFSK)



(Plot 4.9.1 C3: Channel 78: 2480MHz @ GFSK)



(Plot 4.9.1 C4: Channel 78: 2480MHz @ GFSK)

4. NUMBER OF HOPPING CHANNEL

4.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247 (a)(1)(iii)	Number of Hopping Channel	≥15	2400-2483.5	PASS

Spectrum Parameters	Setting
Attenuation	Auto
Span Frequency	= the frequency band of operation
RB	≥ 1% of the span
VB	VBW ≥ RBW
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

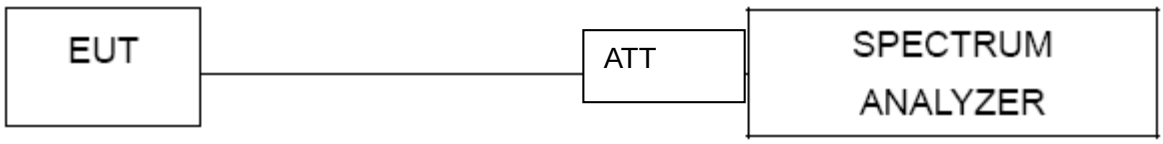
4.1.1 TEST PROCEDURE

a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
b. Spectrum Setting : RBW= 100kHz, VBW=300kHz, Sweep time = Auto.

4.1.2 DEVIATION FROM STANDARD

No deviation.

4.1.3 TEST SETUP



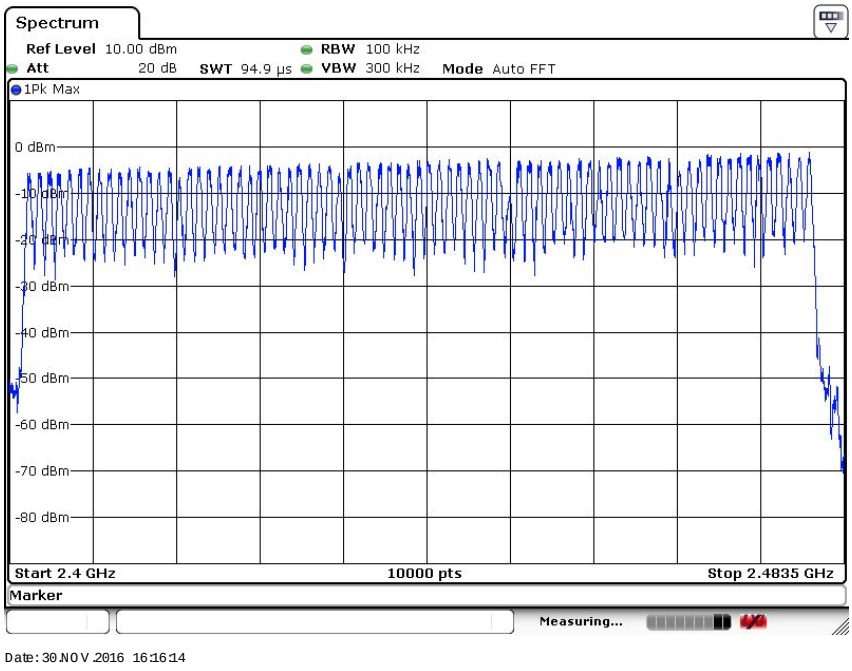
4.1.4 EUT OPERATION CONDITIONS

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

4.1.5 TEST RESULTS

EUT：	USB Dongle	Model Name ：	Y4073823
Temperature：	25 ℃	Relative Humidity：	60%
Pressure：	1015 hPa	Test Voltage ：	DC 5V
Test Mode ：	Hopping Mode		

Number of Hopping Channel	79



5. AVERAGE TIME OF OCCUPANCY

5.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247 (a)(1)(iii)	Average Time of Occupancy	0.4sec	2400-2483.5	PASS

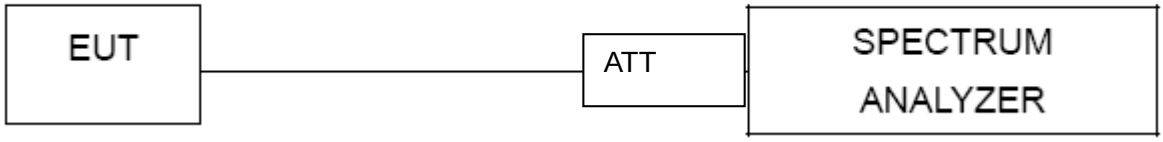
5.1.1 TEST PROCEDURE

a. The transmitter output (antenna port) was connected to the spectrum analyzer
b. Set RBW of spectrum analyzer to 1MHz and VBW to 1MHz.
c. Use a video trigger with the trigger level set to enable triggering only on full pulses.
d. Sweep Time is more than once pulse time.
e. Set the center frequency on any frequency would be measure and set the frequency span to zero span.
f. Measure the maximum time duration of one single pulse.

5.1.2 DEVIATION FROM STANDARD

No deviation.

5.1.3 TEST SETUP



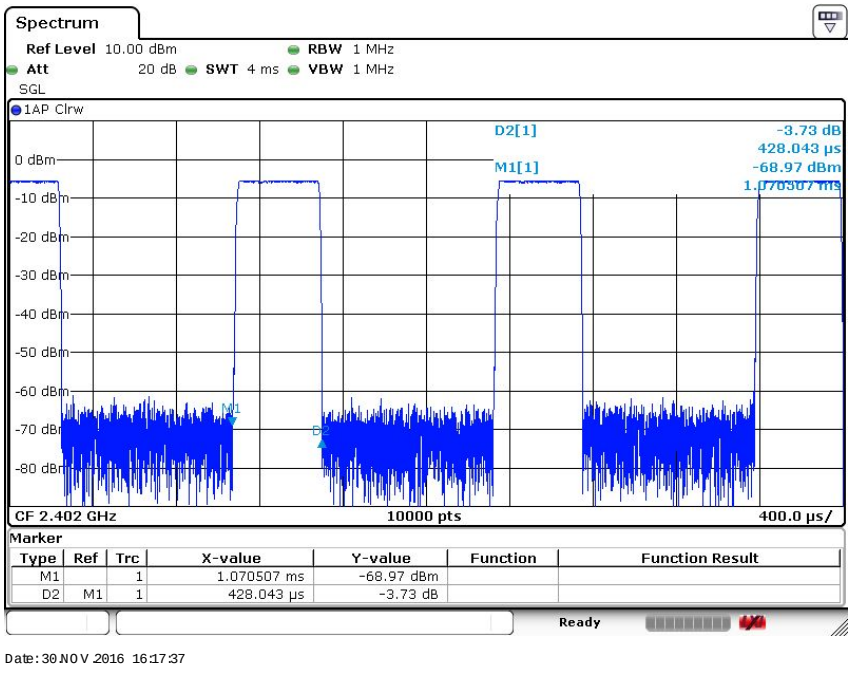
5.1.4 EUT OPERATION CONDITIONS

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

5.1.5 TEST RESULTS

EUT：	USB Dongle	Model Name ：	Y4073823
Temperature：	25 ℃	Relative Humidity：	60%
Pressure：	1012 hPa	Test Voltage ：	DC 5V
Test Mode ：	TX		

Frequency	Plus Duration（ms）	Dwell Time（s）	Limits（s）
2402MHz	0.428	0.137	0.4



6. HOPPING CHANNEL SEPARATION MEASUREMENT

6.1 APPLIED PROCEDURES / LIMIT

Frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	> Measurement Bandwidth or Channel Separation
RB	100 kHz
VB	300 kHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

6.1.1 TEST PROCEDURE

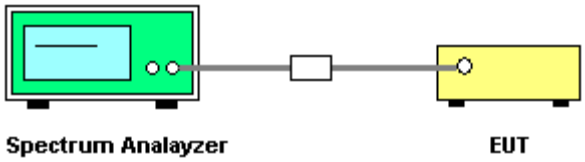
a. The transmitter output (antenna port) was connected to the spectrum analyser in peak hold mode.

b. The resolution bandwidth of 100 kHz and the video bandwidth of 300 kHz were utilised for channel separation measurement.

6.1.2 DEVIATION FROM STANDARD

No deviation.

6.1.3 TEST SETUP



6.1.4 EUT OPERATION CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

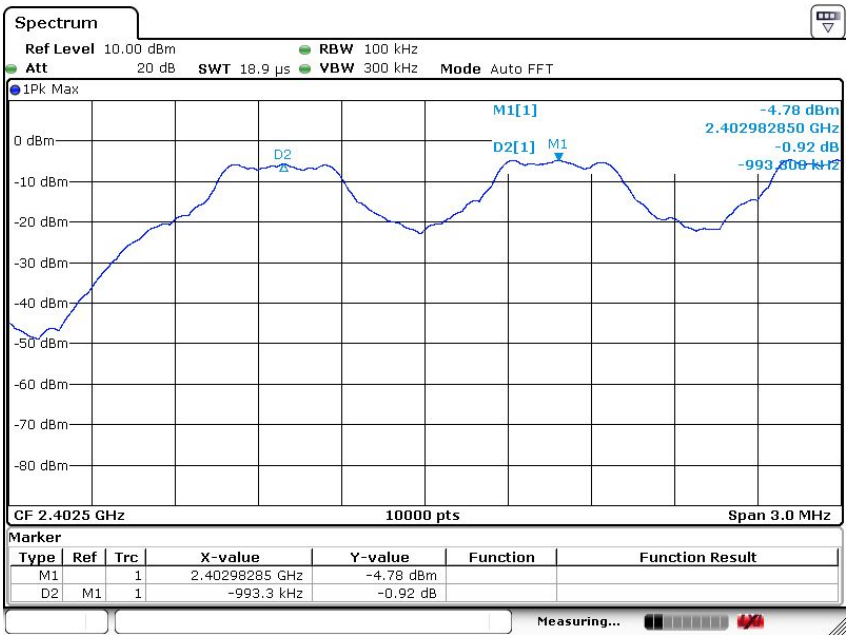
6.1.5 TEST RESULTS

EUT：	USB Dongle	Model Name ：	Y4073823
Temperature：	24 ℃	Relative Humidity：	60%
Pressure：	1012 hPa	Test Voltage ：	DC 5V
Test Mode ：	CH00 / CH39 /CH78		

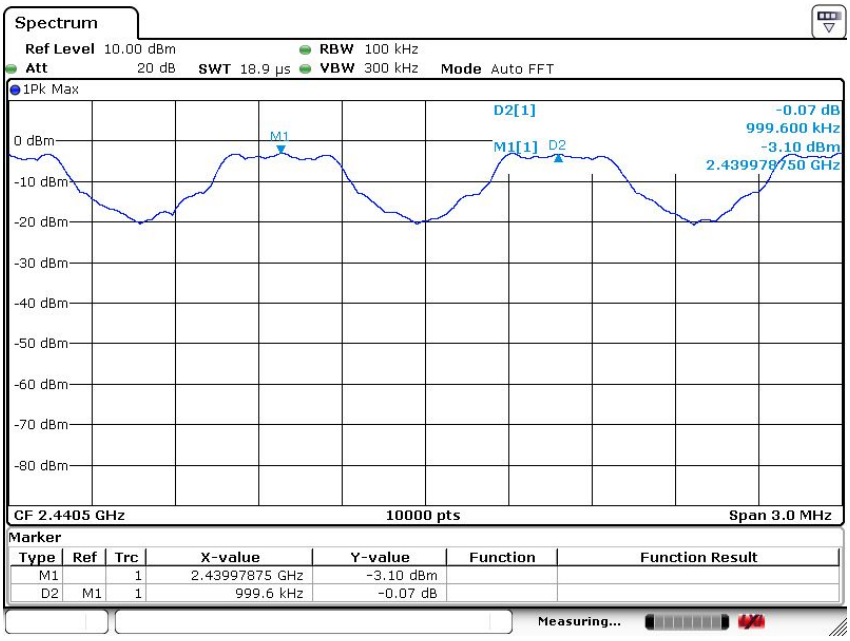
Frequency	Ch. Separation (KHz)	Result
2402 MHz	993.8	**Complies**
2441 MHz	999.6	**Complies**
2480 MHz	999.0	**Complies**

Ch. Separation Limits: >20dB bandwidth

CH00

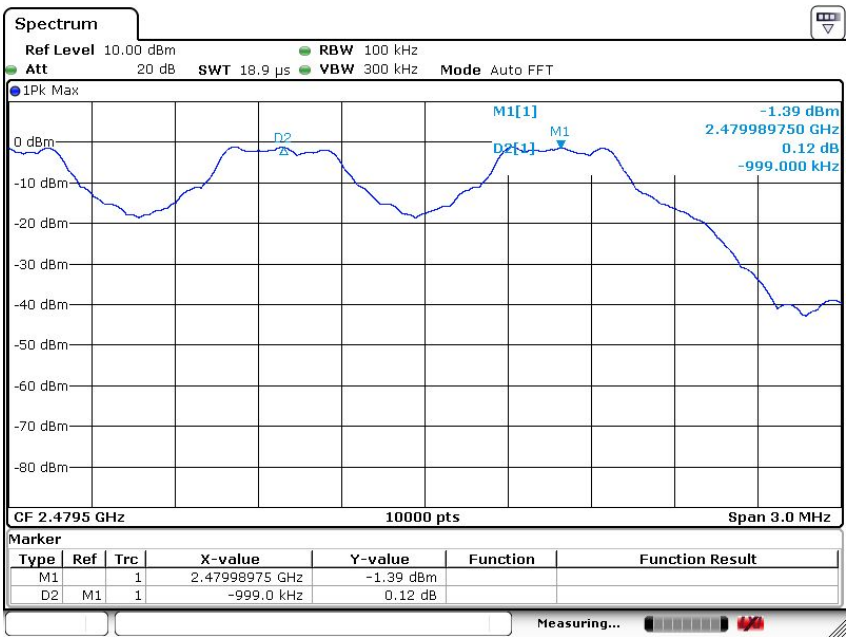


CH39



Date: 30.NOV.2016 16:14:30

CH78



Date: 30.NOV.2016 16:15:24

7. BANDWIDTH TEST

7.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247 (a)(1)	Bandwidth	(20dB bandwidth)	2400-2483.5	PASS

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	> Measurement Bandwidth or Channel Separation
RB	100 kHz
VB	300 kHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

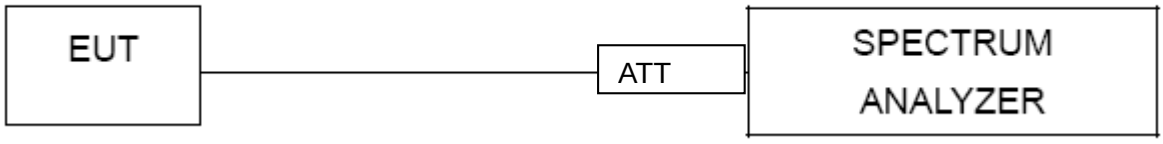
7.1.1 TEST PROCEDURE

a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
b. Spectrum Setting : RBW= 100KHz, VBW=300KHz, Sweep time = Auto.

7.1.2 DEVIATION FROM STANDARD

No deviation.

7.1.3 TEST SETUP



7.1.4 EUT OPERATION CONDITIONS

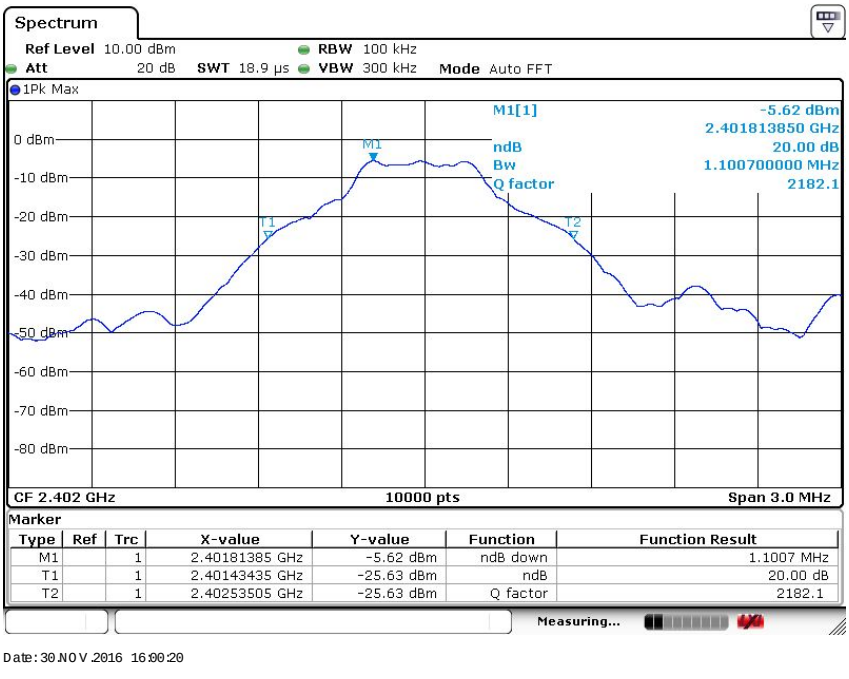
The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

7.1.5 TEST RESULTS

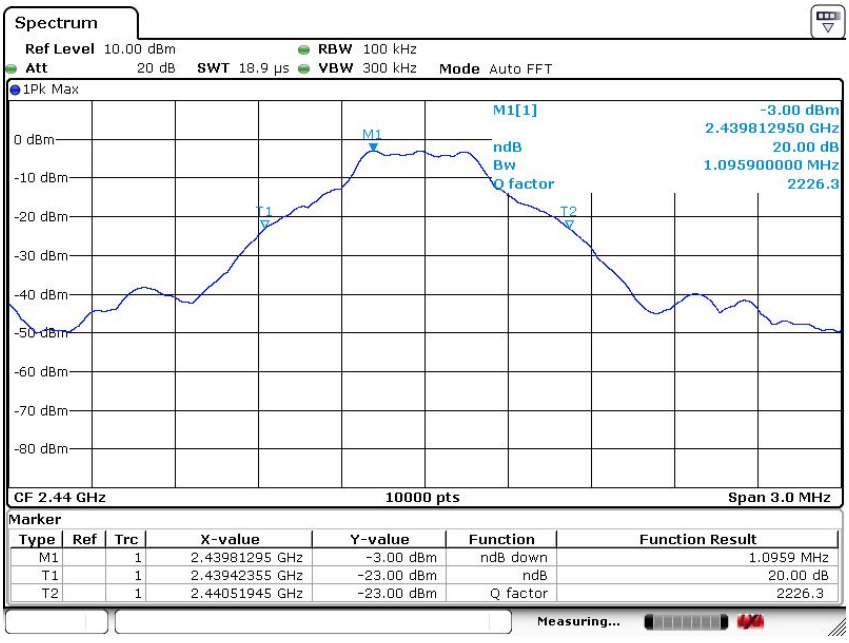
EUT：	USB Dongle	Model Name ：	Y4073823
Temperature：	25 ℃	Relative Humidity：	60%
Pressure：	1012 hPa	Test Voltage ：	DC 5V
Test Mode ：	CH00 / CH39 /C78		

Frequency	20dB Bandwidth (MHz)	Result
2402 MHz	1.1007	**PASS**
2441 MHz	1.0959	**PASS**
2480 MHz	1.0977	**PASS**

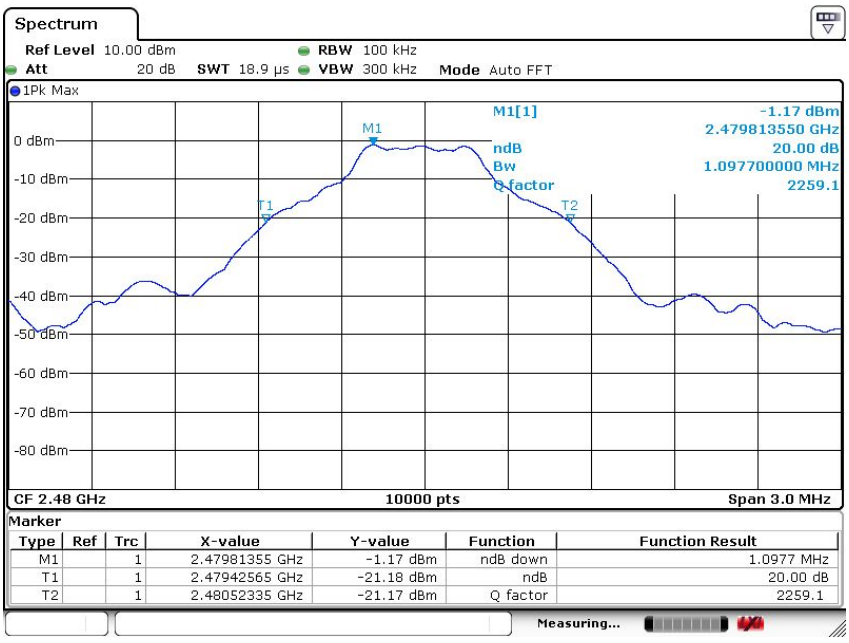
CH00



CH39


Spectrum
Ref Level 10.00 dBm
RBW 100 kHz
Att 20 dB
SWT 18.9 µs
VBW 300 kHz
Mode Auto FFT
1Pk Max
M1[1]
-3.00 dBm
2.439812950 GHz
ndB 20.00 dB
Bw 1.095900000 MHz
Q factor 2226.3
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 2.44 GHz
10000 pts
Span 3.0 MHz
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 2.43981295 GHz -3.00 dBm ndB down 1.0959 MHz
T1 1 2.43942355 GHz -23.00 dBm ndB 20.00 dB
T2 1 2.44051945 GHz -23.00 dBm Q factor 2226.3
Measuring...
Date: 30.NOV.2016 16:00:00

CH78


Spectrum
Ref Level 10.00 dBm
RBW 100 kHz
Att 20 dB
SWT 18.9 µs
VBW 300 kHz
Mode Auto FFT
1Pk Max
M1[1]
-1.17 dBm
2.479813550 GHz
ndB 20.00 dB
Bw 1.097700000 MHz
Q factor 2259.1
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 2.48 GHz
10000 pts
Span 3.0 MHz
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 2.47981355 GHz -1.17 dBm ndB down 1.0977 MHz
T1 1 2.47942565 GHz -21.18 dBm ndB 20.00 dB
T2 1 2.48052335 GHz -21.17 dBm Q factor 2259.1
Measuring...
Date: 30.NOV.2016 15:59:45

8. PEAK OUTPUT POWER TEST

8.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247 (b)(i)	Peak Output Power	0.125 w or 1w	2400-2483.5	PASS

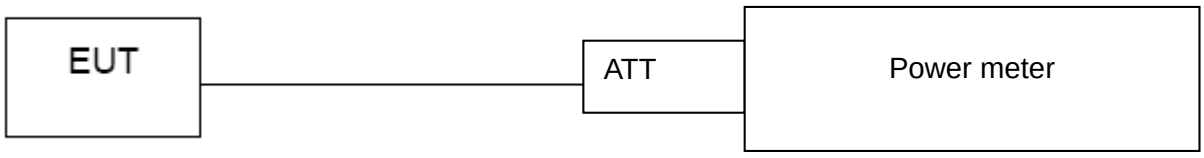
8.1.1 TEST PROCEDURE

a. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the Power Meter.

8.1.2 DEVIATION FROM STANDARD

No deviation.

8.1.3 TEST SETUP



8.1.4 EUT OPERATION CONDITIONS

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

8.1.5 TEST RESULTS

EUT：	USB Dongle	Model Name ：	Y4073823
Temperature：	25 ℃	Relative Humidity：	60%
Pressure：	1012 hPa	Test Voltage ：	DC 5V
Test Mode ：	CH00/ CH39 /CH78		

Note: The relevant measured result has the offset with cable loss already.

Test Channel	Frequency (MHz)	Peak Output Power (dBm)	LIMIT (dBm)
CH00	2402	-0.43	30
CH39	2441	-0.48	30
CH78	2480	-0.42	30

9. 100 KHZ BANDWIDTH OF FREQUENCY BAND EDGE

APPLICABLE STANDARD

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. 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).

TEST PROCEDURE

a) Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.

b) Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.

c) For restricted band: Set RBW to 100 kHz and VBW of spectrum analyzer to 300 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
For non-restricted band: RBW = 1 MHz for f ≥ 1 GHz, 100 kHz for f < 1 GHz, VBW ≥ RBW

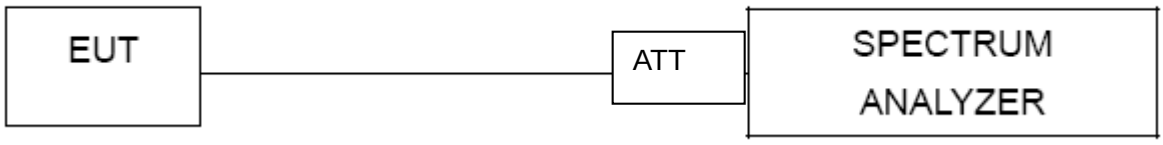
d) Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.

e) Repeat above procedures until all measured frequencies were complete.

9.1 DEVIATION FROM STANDARD

No deviation.

9.2 TEST SETUP



9.3 EUT OPERATION CONDITIONS

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

9.4 TEST RESULTS

EUT：	USB Dongle	Model Name ：	Y4073823
Temperature：	24 ℃	Relative Humidity：	60%
Pressure：	1012 hPa	Test Voltage ：	DC 5V

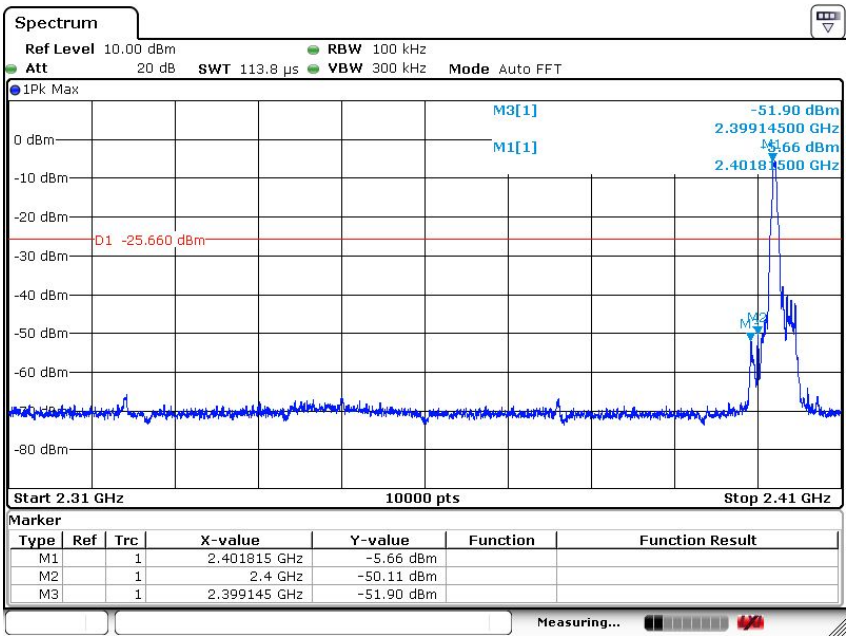
Frequency Band	Delta Peak to band emission (dBc)	＞Limit (dBc)	Result
Non-hopping			
2390.00MHz	46.24	20	Pass
2483.50 MHz	63.37	20	Pass
hopping			
2390.00MHz	52.87	20	Pass
2483.50 MHz	66.37	20	Pass

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type	Comment
Non-hopping							
2390	63.75	-13.06	50.69	74	-23.31	peak	Vertical
2390	64.18	-13.06	51.12	74	-22.88	peak	Horizontal
2483.5	62.55	-12.78	49.77	74	-24.23	peak	Vertical
2483.5	60.72	-12.78	47.94	74	-26.06	peak	Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type	Comment
hopping							
2390	62.57	-13.06	49.51	74	-24.49	peak	Vertical
2390	63.71	-13.06	50.65	74	-23.35	peak	Horizontal
2483.5	63.55	-12.78	50.77	74	-23.23	peak	Vertical
2483.5	61.15	-12.78	48.37	74	-25.63	peak	Horizontal

Note: Test method to see chapter 3.2 . When PK value is lower than the Average value limit, average didn't record.

Band Edge, Left Side



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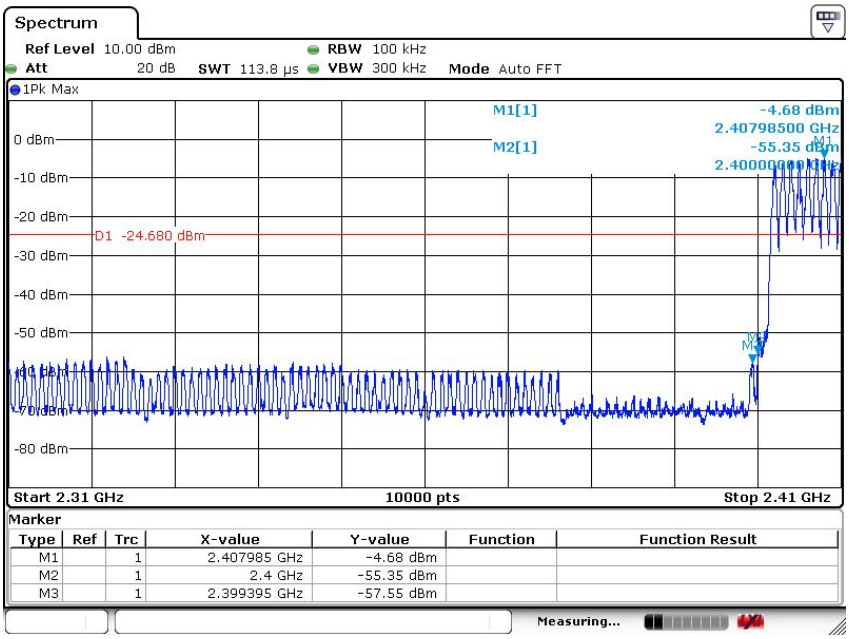
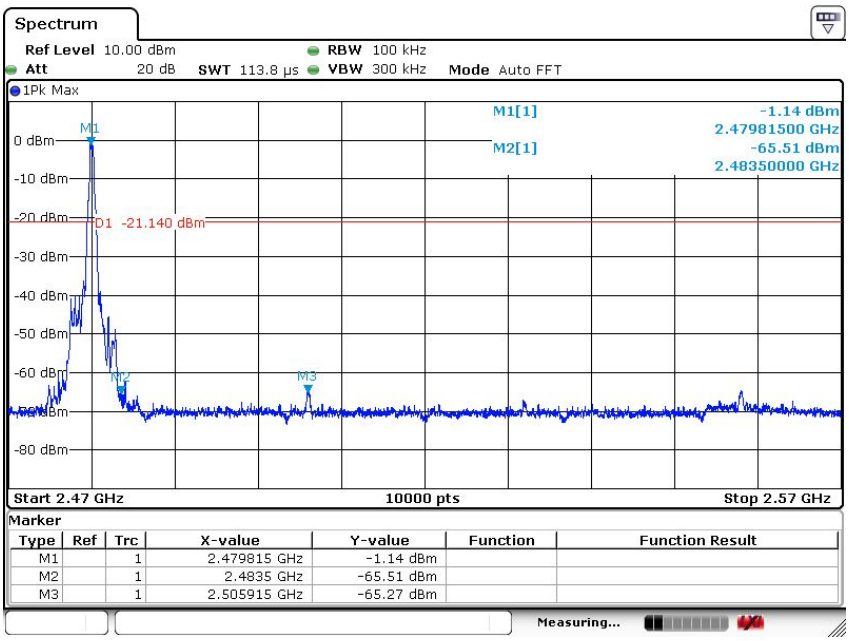


Date: 30.NOV.2016 16:11:16

Band Edge, Right Side



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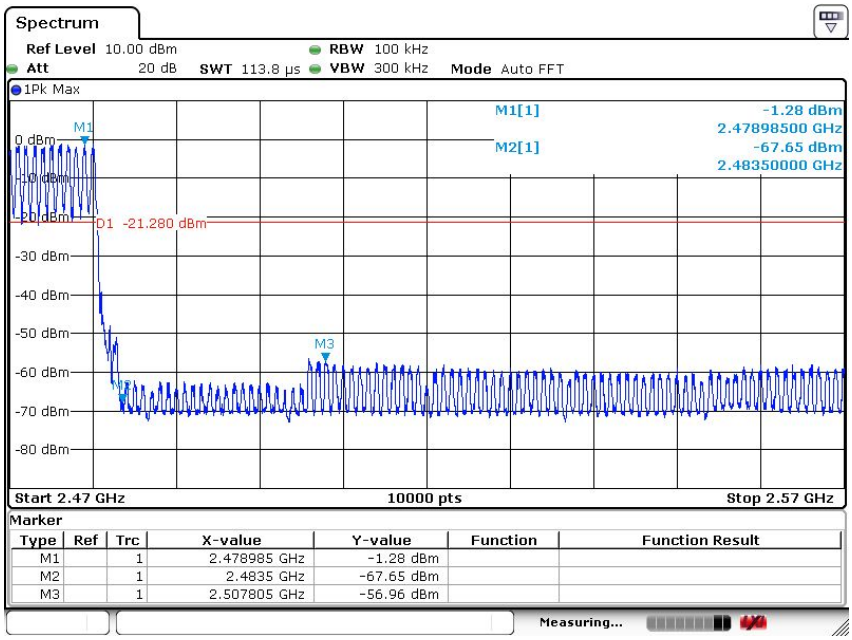


Date: 30.NOV.2016 16:12:28

10. ANTENNA REQUIREMENT

Standard Applicable

For intentional device, according to FCC 47 CFR Section 15.203, 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.

And according to FCC 47 CFR Section 15.247 (c), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

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

Measurement
The antenna gain of the complete system is calculated by the difference of radiated power in EIRP and the conducted power of the module.For normal devices, the GFSK mode is used.

Measurement parameters

Measurement parameter	
Detector:	Peak
Sweep time:	Auto
Resolution bandwidth:	1MHz
Video bandwidth:	3MHz
Trace-Mode:	Max hold

Limits

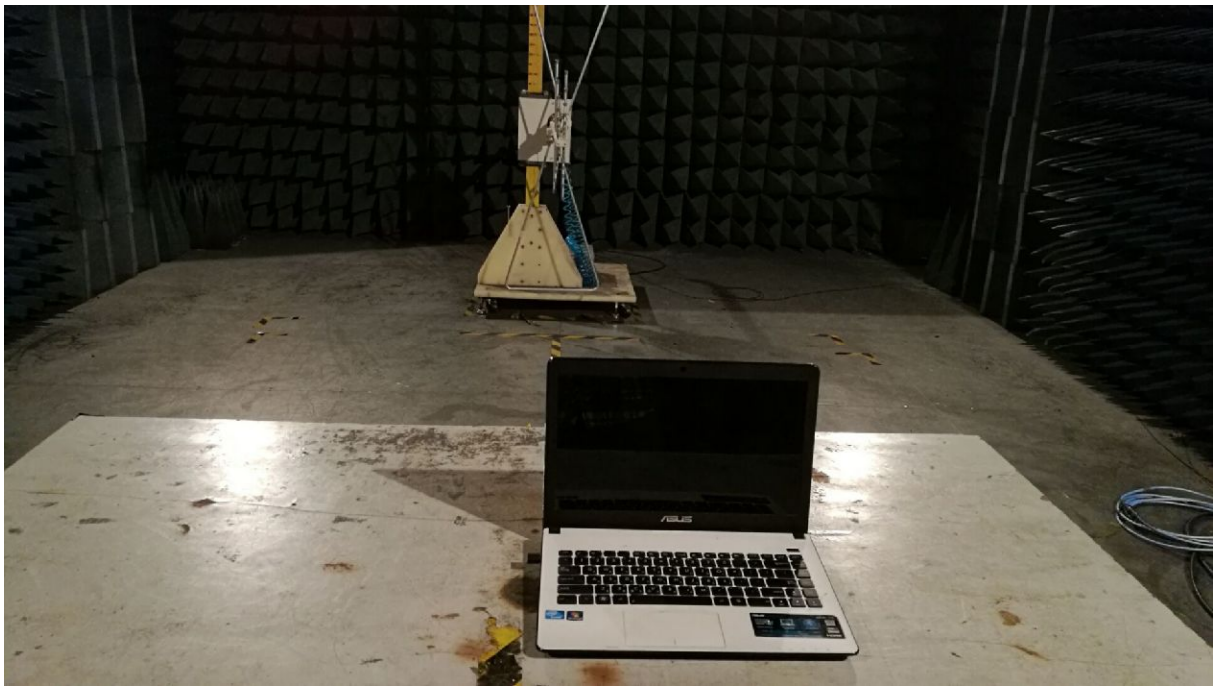
FCC	IC
Antenna Gain	
6 dBi	

Results
antenna type:PCB antenna

T_{nom}	V_{nom}	Lowest Channel 2402 MHz	Middle Channel 2441 MHz	Highest Channel 2480 MHz
Conducted power [dBm] Measured with GFSK modulation		-0.43	-0.48	-0.42
Radiated power [dBm] Measured with GFSK modulation		-0.28	-0.37	-0.27
Gain [dBi] Calculated		0.15	0.11	0.15
Measurement uncertainty		± 0.6 dB (cond.) / ± 2.56 dB (rad.)		

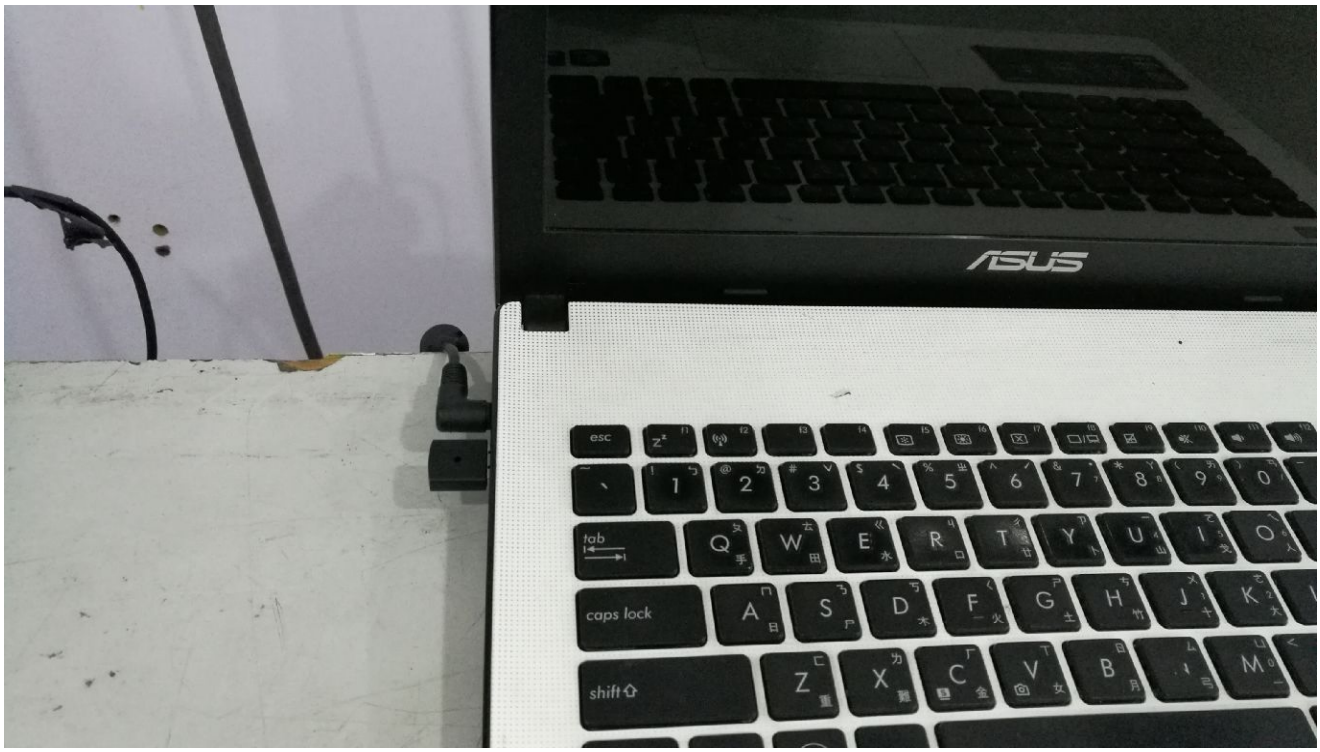
11. EUT TEST PHOTO

Radiated Measurement Photos
Between 30MHz-1GHz



Above 1GHz

Conducted Measurement Photos



12. EXTERNAL AND INTERNAL PHOTOS OF THE EUT

Photo 1

Photo 2

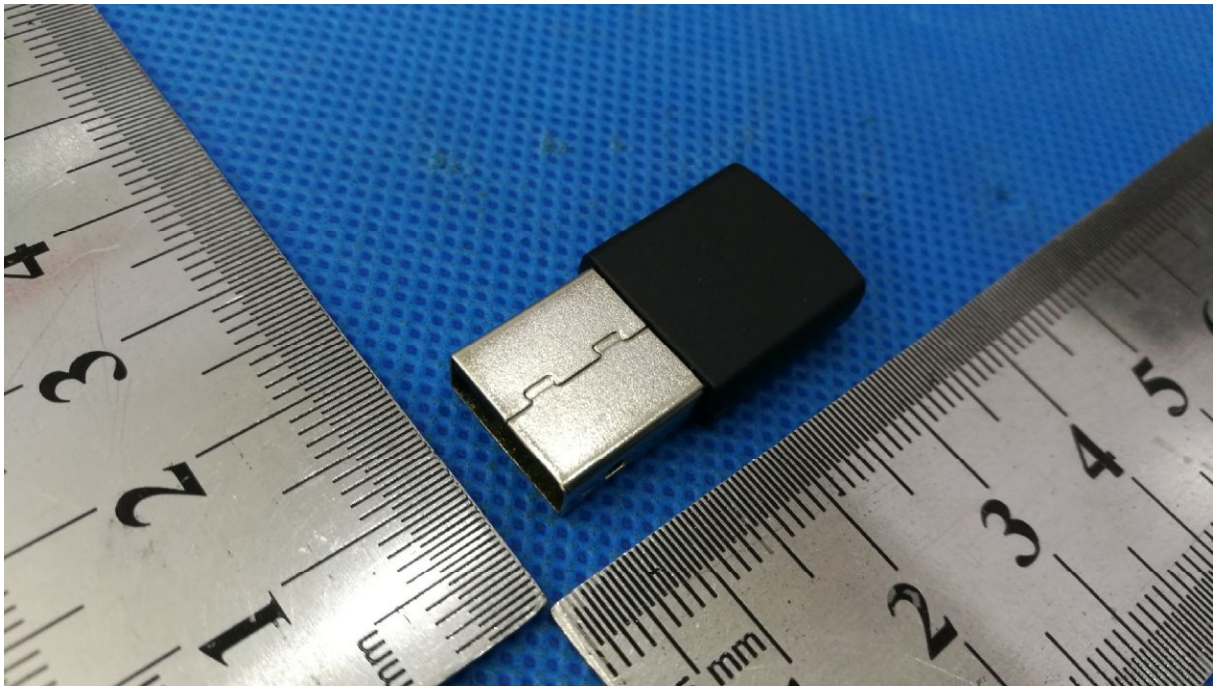


Photo 3

Photo 4

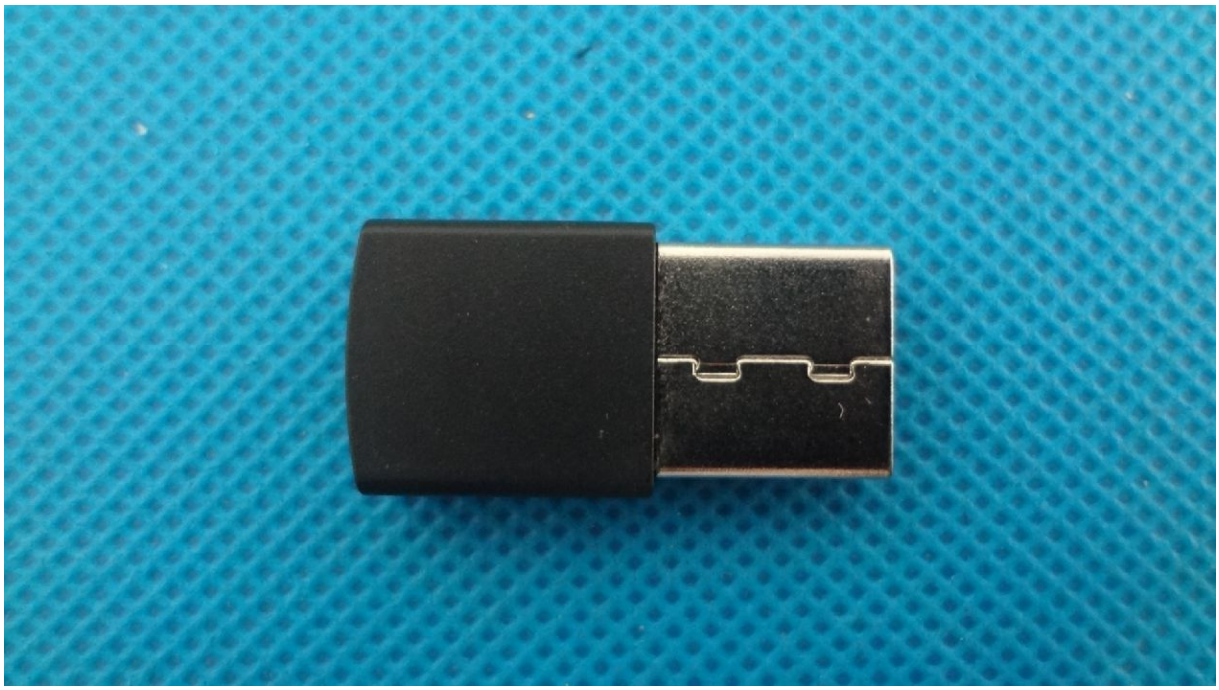


Photo 5

Photo 6

Photo 7

Photo 8

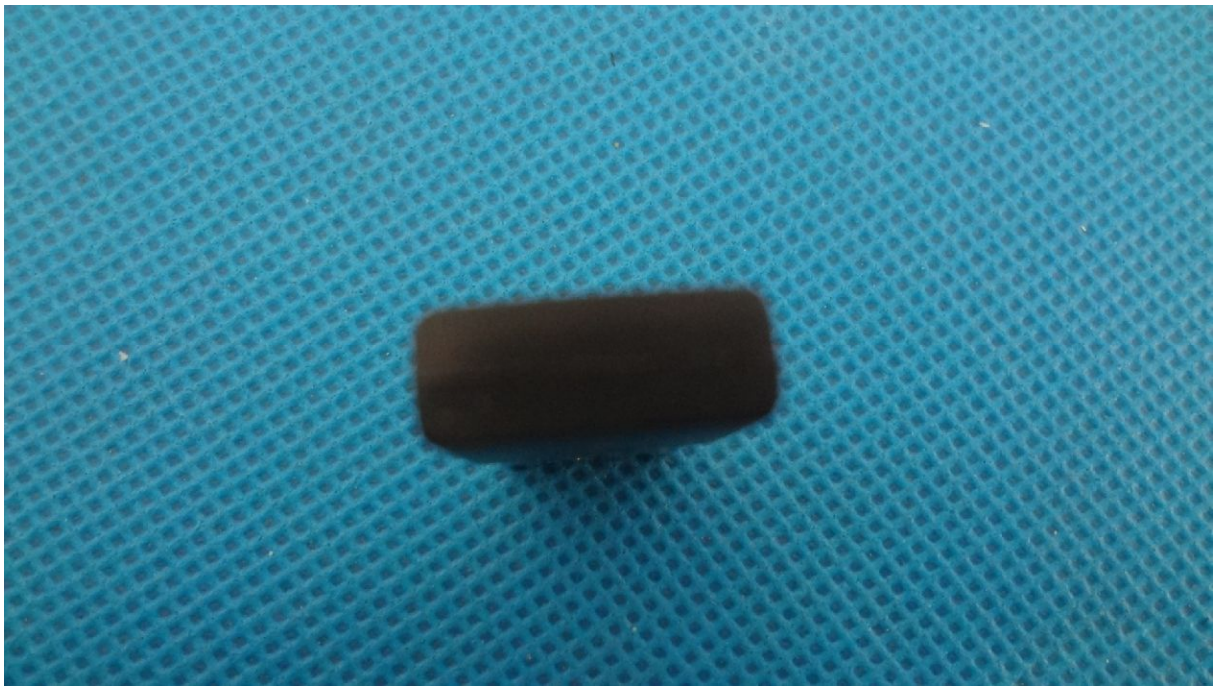


Photo 9

Photo 10

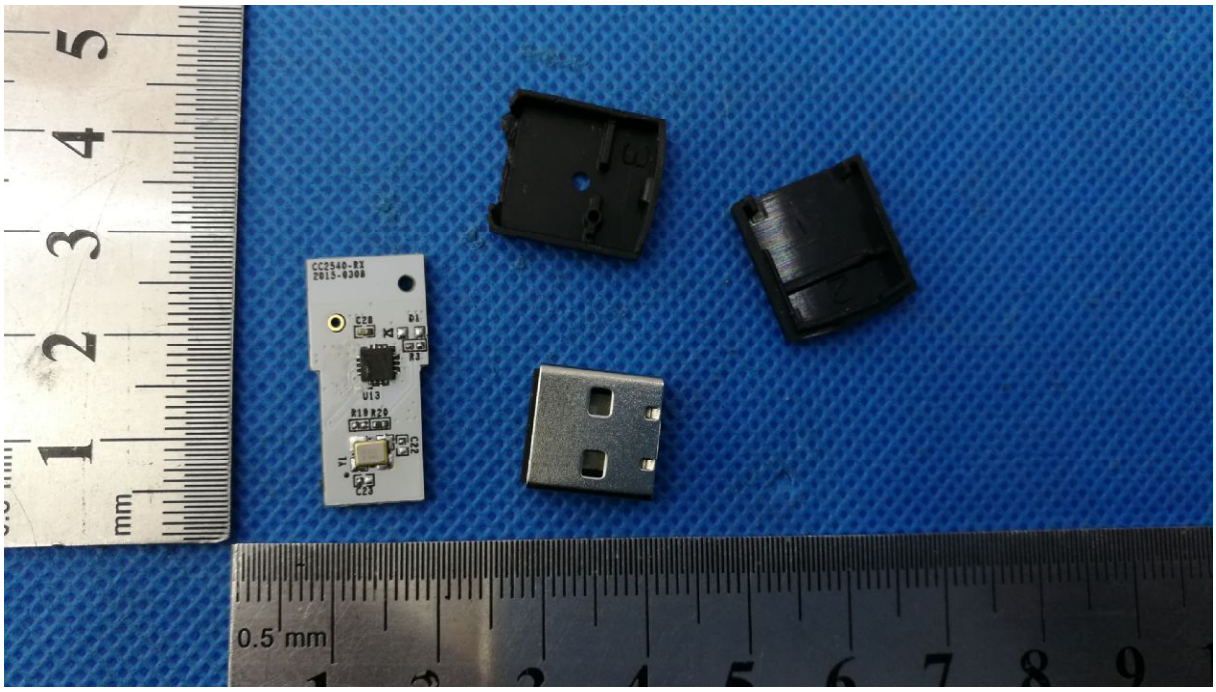


Photo 11

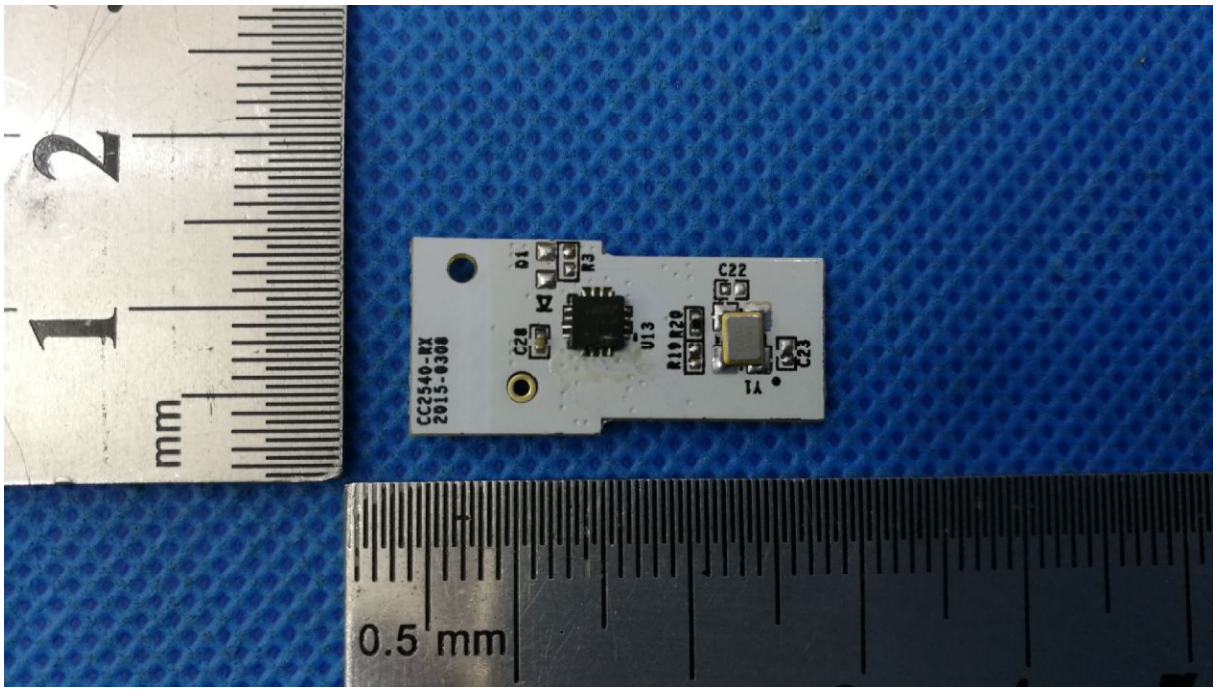


Photo 12