

FCC TEST REPORT

For

WIRELESS-TAG TECHNOLOGY CO., LIMITED

WT52832

Model No.: WT52832-S2-BK, WT52832-S2

Prepared For : WIRELESS-TAG TECHNOLOGY CO., LIMITED
Address : 4/F., BAK Sci & Tech Building, No. 9 Keyan Road, Science & Technology Park Central, Nanshan District, Shenzhen, China

Prepared By : Shenzhen Anbotek Compliance Laboratory Limited
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Report Number : SZAWW171220008-01
Date of Test : Dec. 12~19, 2017
Date of Report : Dec. 19, 2017

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TEST REPORT

Applicant : WIRELESS-TAG TECHNOLOGY CO., LIMITED
Manufacturer : WIRELESS-TAG TECHNOLOGY CO., LIMITED
Product Name : WT52832
Model No. : WT52832-S2-BK, WT52832-S2
Trade Mark : N/A
Rating(s) : Input: DC 3.3V

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 : Dec. 12~19, 2017

Prepared by :



Winkey Wang

(Tested Engineer / Winkey Wang)

Reviewer :

Tangcy. T.

(Project Manager / Tangcy. T)

Approved & Authorized Signer :

Tom Chen

(Manager / Tom Chen)

1. General Information

1.1. Client Information

Applicant	:	WIRELESS-TAG TECHNOLOGY CO., LIMITED
Address	:	4/F., BAK Sci & Tech Building, No. 9 Keyan Road, Science & Technology Park Central, Nanshan District, Shenzhen, China
Manufacturer	:	WIRELESS-TAG TECHNOLOGY CO., LIMITED
Address	:	4/F., BAK Sci & Tech Building, No. 9 Keyan Road, Science & Technology Park Central, Nanshan District, Shenzhen, China

1.2. Description of Device (EUT)

Product Name	:	WT52832	
Model No.	:	WT52832-S2-BK, WT52832-S2 (Note: All samples are the same except the model number and Color, so we prepare "WT52832-S2-BK" for test only.)	
Trade Mark	:	N/A	
Test Power Supply	:	DC 3.3V	
Product Description	:	Operation Frequency:	2402-2480MHz
		Number of Channel:	40 Channels
		Modulation Type:	GFSK
		Antenna Type:	PCB Antenna
		Antenna Gain(Peak):	0 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

Adapter	:	Manufacturer: ZTE M/N: STC-A2050I1000USBA-C S/N: 201202102100876 Input: 100-240V~50/60Hz 0.3A Output: DC 5V 1000mA
Test board	:	Manufacturer: WIRELESS-TAG TECHNOLOGY CO., LIMITED M/N: WT52832-V1.0 S/N: / Input: DC5V, 1A, Output:DC3.3V

Note.:

However when the device shall be approved as limited modular approval, then it must be tested inside a representative host, and that affects many test results.

1.4. Description of Test Modes

To investigate the maximum EMI emission characteristics generated from EUT, the test system was pre-scanning tested based on the consideration of following EUT operation mode or test configuration mode which possibly 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	Keeping TX mode
Mode 2	CH00
Mode 3	CH20
Mode 4	CH39

For Conducted Emission	
Final Test Mode	Description
Mode 1	Keeping TX mode

For Radiated Emission	
Final Test Mode	Description
Mode 2	CH00
Mode 3	CH20
Mode 4	CH39

Note:

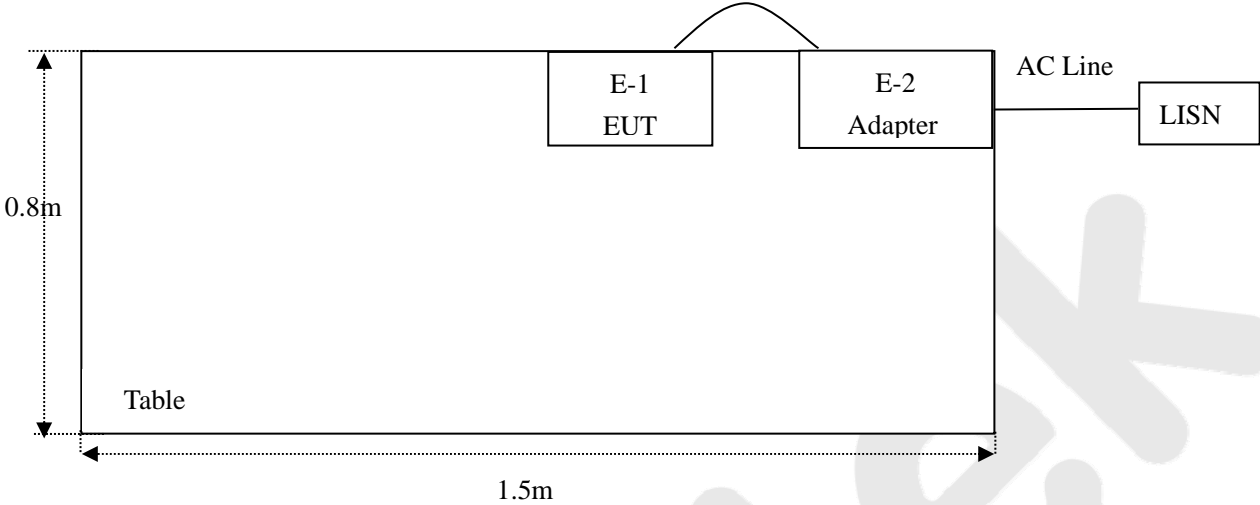
- The engineering test program was provided and the EUT was programmed to be in continuously transmitting mode.

1.5. List of Channels

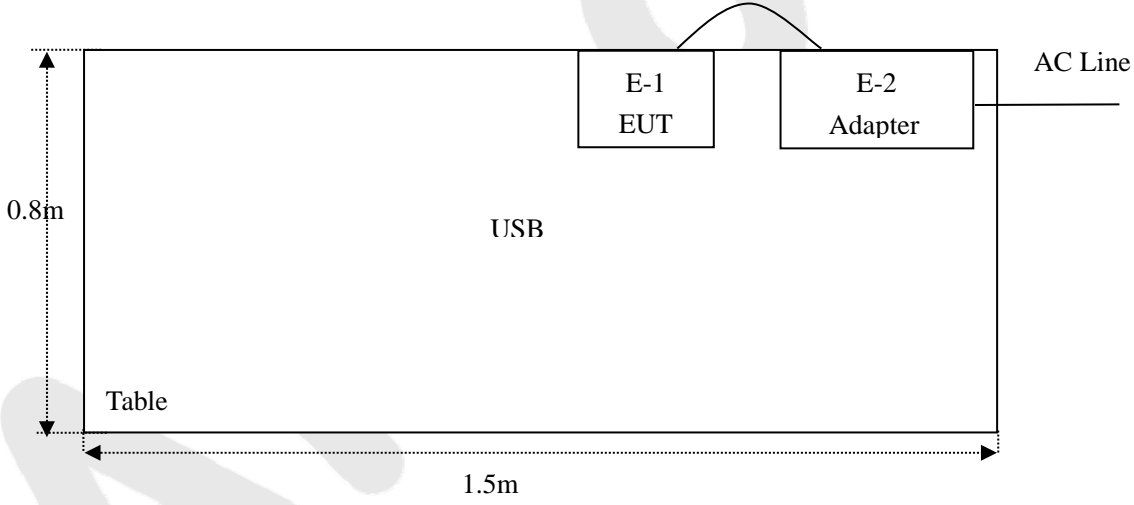
Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)
00	2402	09	2420	18	2438	27	2456	36	2474
01	2404	10	2422	19	2440	28	2458	37	2476
02	2406	11	2424	20	2442	29	2460	38	2478
03	2408	12	2426	21	2444	30	2462	39	2480
04	2410	13	2428	22	2446	31	2464		
05	2412	14	2442	23	2448	32	2466		
06	2414	15	2432	24	2450	33	2468		
07	2416	16	2434	25	2452	34	2480		
08	2418	17	2436	26	2454	35	2472		

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	May 27, 2017	1 Year
2.	EMI Test Receiver	Rohde & Schwarz	ESCI	100627	May 27, 2017	1 Year
3.	RF Switching Unit	Compliance Direction	RSU-M2	38303	May 27, 2017	1 Year
4.	Spectrum Analysis	Agilent	E4407B	US39390582	May 27, 2017	1 Year
5.	Spectrum Analysis	Agilent	N9038A	MY53227295	May 27, 2017	1 Year
6.	Preamplifier	SKET Electronic	BK1G18G30 D	KD17503	May 27, 2017	1 Year
7.	EMI Test Receiver	Rohde & Schwarz	ESPI	101604	May 27, 2017	1 Year
8.	Double Ridged Horn Antenna	Instruments corporation	GTH-0118	351600	May 31, 2017	1 Year
9.	Bilog Broadband Antenna	Schwarzbeck	VULB9163	VULB 9163-289	May 31, 2017	1 Year
10.	Loop Antenna	Schwarzbeck	HFH2-Z2	100047	Apr. 03, 2017	1 Year
11.	Horn Antenna	Schwarzbeck	BBHA9170	9170-375	May 27, 2017	1 Year
12.	Pre-amplifier	SONOMA	310N	186860	May 27, 2017	1 Year
13.	Pre-amplifier	SKET Electronic	BK1G40G50 A	KD25352	May 27, 2017	1 Year
14.	EMI Test Software EZ-EMC	SHURPLE	N/A	N/A	N/A	N/A
15.	Power Sensor	DAER	RPR3006W	15I00041SN045	May 27, 2017	1 Year
16.	Power Sensor	DAER	RPR3006W	15I00041SN046	May 27, 2017	1 Year
17.	MXA Spectrum Analysis	Agilent	N9020A	MY51170037	May 27, 2017	1 Year
18.	MXG RF Vector Signal Generator	Agilent	N5182A	MY48180656	May 27, 2017	1 Year
19.	Signal Generator	Agilent	E4421B	MY41000743	May 27, 2017	1 Year
20.	DC Power supply	IVYTECH	IV6003	1601D6030007	May 26, 2017	1 Year
21.	TEMP&HUMI PROGRAMMABLE CHAMBER	Sertep	ZJ-HWHS80 B	ZJ-17042804	Mar. 03, 2017	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.: 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, July 31, 2017.

ISED-Registration No.: 8058A-1

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-1, 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

Remark: "N/A" is an abbreviation for Not Applicable.

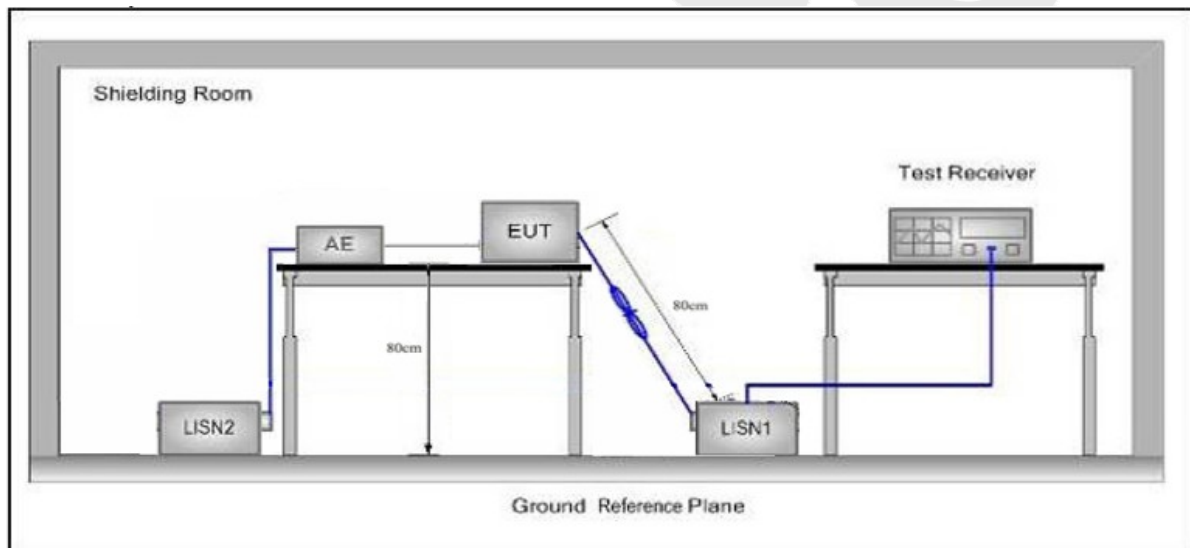
3. Conducted Emission Test

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 C63.10-2013 on Conducted Emission Measurement.

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

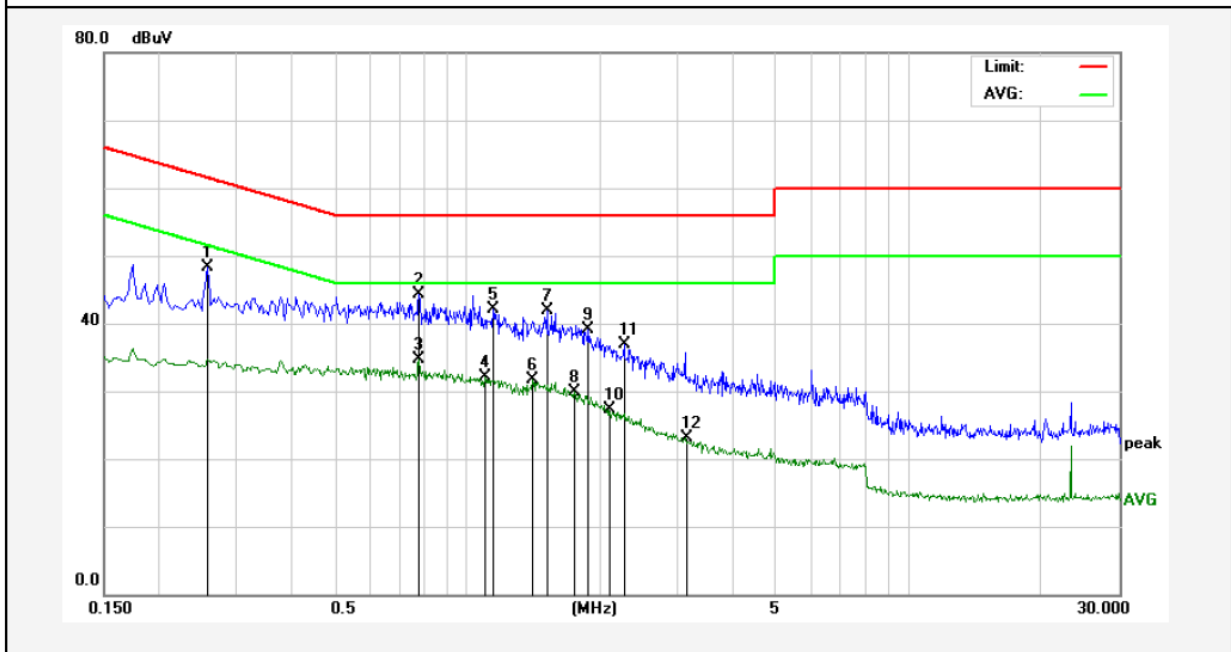
The frequency range from 150kHz to 30MHz is checked.

3.4. Test Data

Please to see the following pages

Conducted Emission Test Data

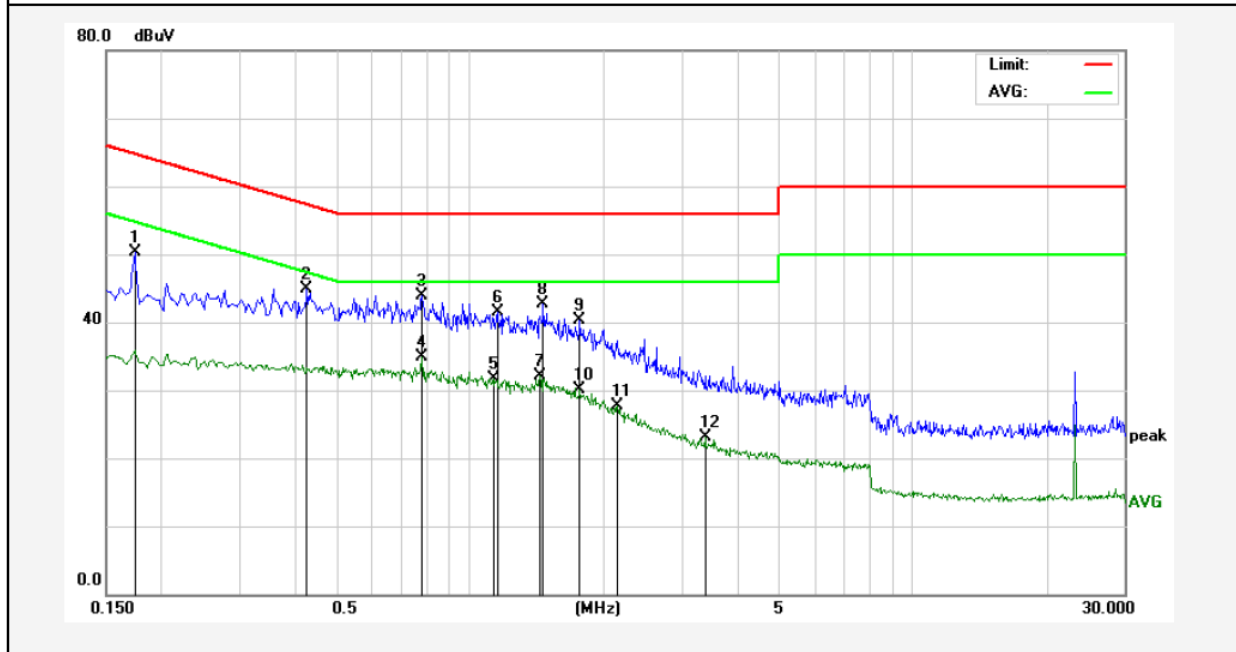
Test Site: 1# Shielded Room
 Operating Condition: Keeping TX mode
 Test Specification: DC 3.3V
 Comment: Live Line
 Tem.:25°C Hum.:50%



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Over Limit (dB)	Detector	Remark
1	0.2580	30.34	17.89	48.23	61.49	-13.26	QP	
2	0.7780	26.26	18.06	44.32	56.00	-11.68	QP	
3	0.7780	16.59	18.06	34.65	46.00	-11.35	AVG	
4	1.0980	13.89	18.12	32.01	46.00	-13.99	AVG	
5	1.1420	23.96	18.12	42.08	56.00	-13.92	QP	
6	1.4100	13.59	18.13	31.72	46.00	-14.28	AVG	
7	1.5140	23.69	18.13	41.82	56.00	-14.18	QP	
8	1.7460	11.82	18.13	29.95	46.00	-16.05	AVG	
9	1.8820	20.92	18.14	39.06	56.00	-16.94	QP	
10	2.0940	9.10	18.14	27.24	46.00	-18.76	AVG	
11	2.2659	18.70	18.15	36.85	56.00	-19.15	QP	
12	3.1340	4.91	18.16	23.07	46.00	-22.93	AVG	

Conducted Emission Test Data

Test Site: 1# Shielded Room
 Operating Condition: Keeping TX mode
 Test Specification: DC 3.3V
 Comment: Neutral Line
 Tem.:25°C Hum.:50%



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Over Limit (dB)	Detector	Remark
1	0.1740	32.46	17.90	50.36	64.76	-14.40	QP	
2	0.4260	26.96	17.95	44.91	57.33	-12.42	QP	
3	0.7780	25.85	18.06	43.91	56.00	-12.09	QP	
4	0.7780	16.81	18.06	34.87	46.00	-11.13	AVG	
5	1.1300	13.65	18.12	31.77	46.00	-14.23	AVG	
6	1.1500	23.29	18.12	41.41	56.00	-14.59	QP	
7	1.4340	13.91	18.13	32.04	46.00	-13.96	AVG	
8	1.4620	24.53	18.13	42.66	56.00	-13.34	QP	
9	1.7660	22.09	18.14	40.23	56.00	-15.77	QP	
10	1.7660	11.89	18.14	30.03	46.00	-15.97	AVG	
11	2.1500	9.59	18.14	27.73	46.00	-18.27	AVG	
12	3.3940	4.91	18.17	23.08	46.00	-22.92	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

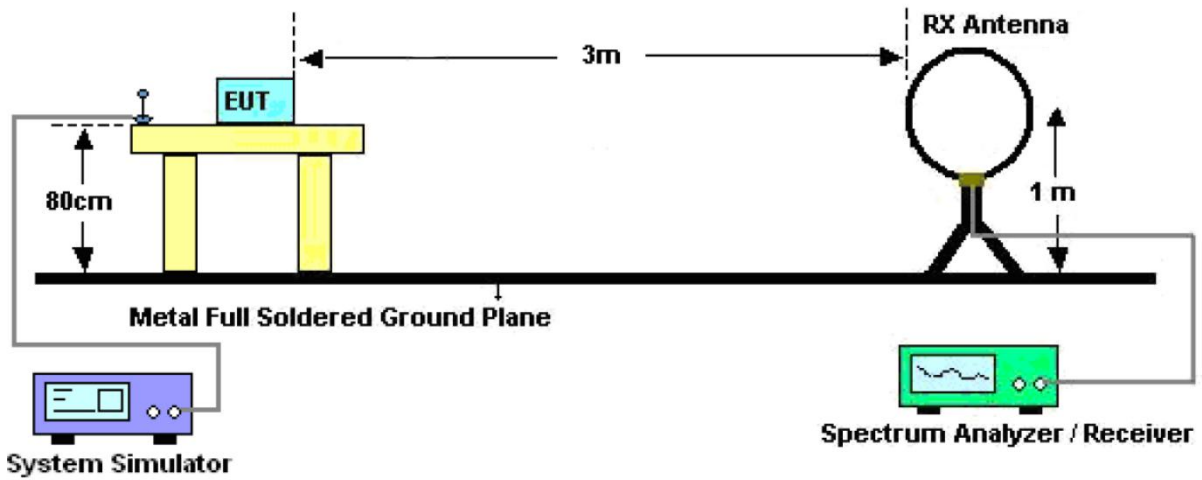


Figure 2. 30MHz to 1GHz

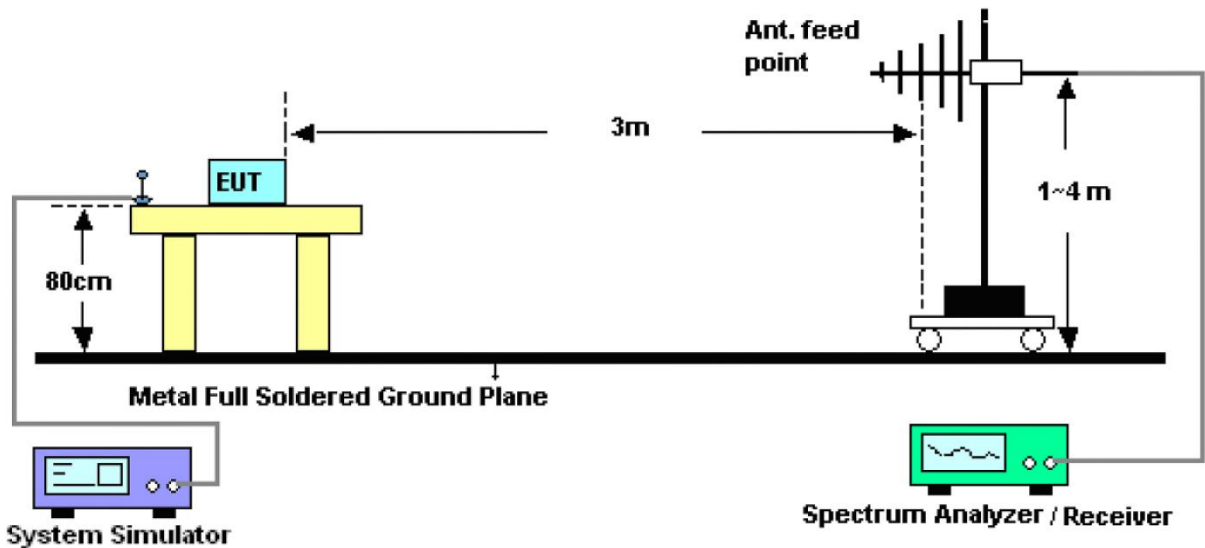
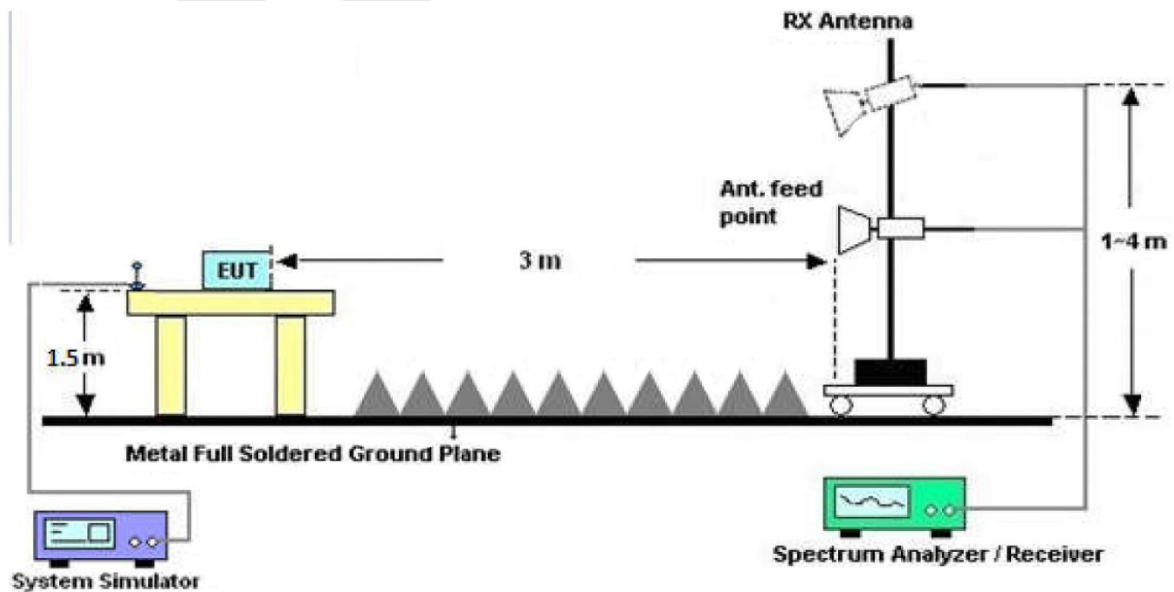


Figure 3. Above 1 GHz



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 the radiated emission test above 1GHz:

Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.

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

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

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

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

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

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

For above 1GHz,Set the spectrum analyzer as:

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

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

4.4. Test Data

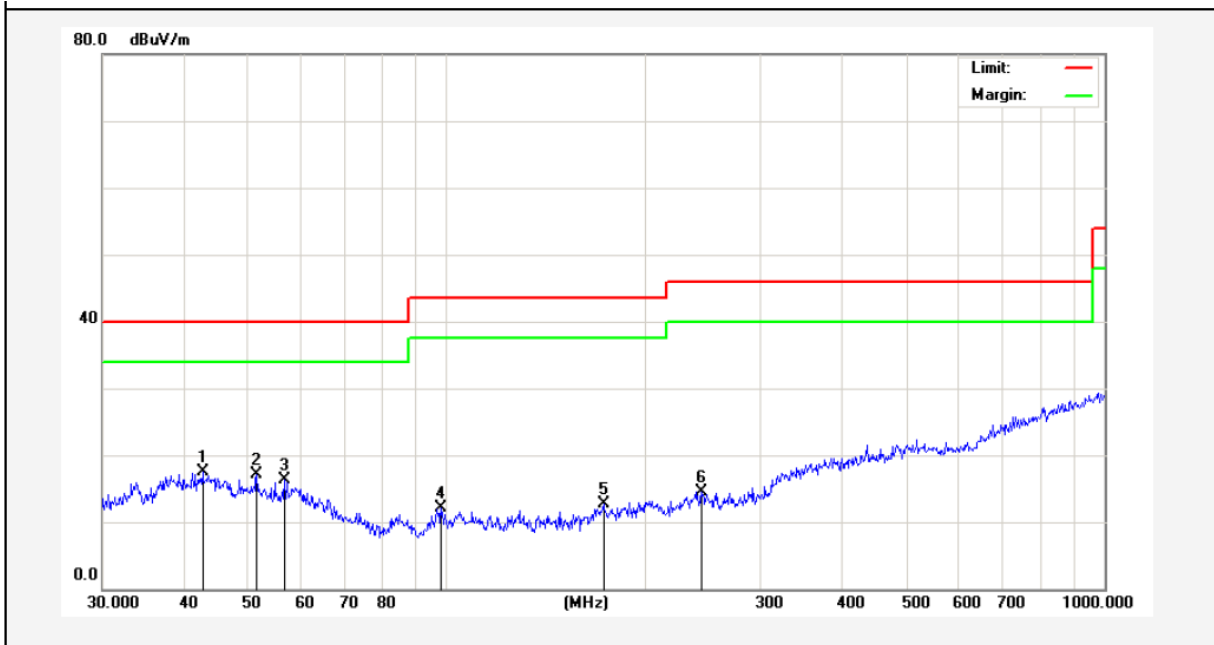
PASS

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

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

Test Results (30~1000MHz)

Job No.: SZAWW171220008-01 Temp.(°C)/Hum.(%RH): 24.3°C/55%RH
 Standard: FCC PART 15C Power Source: DC 3.3V
 Test Mode: TX Mode Polarization: Horizontal

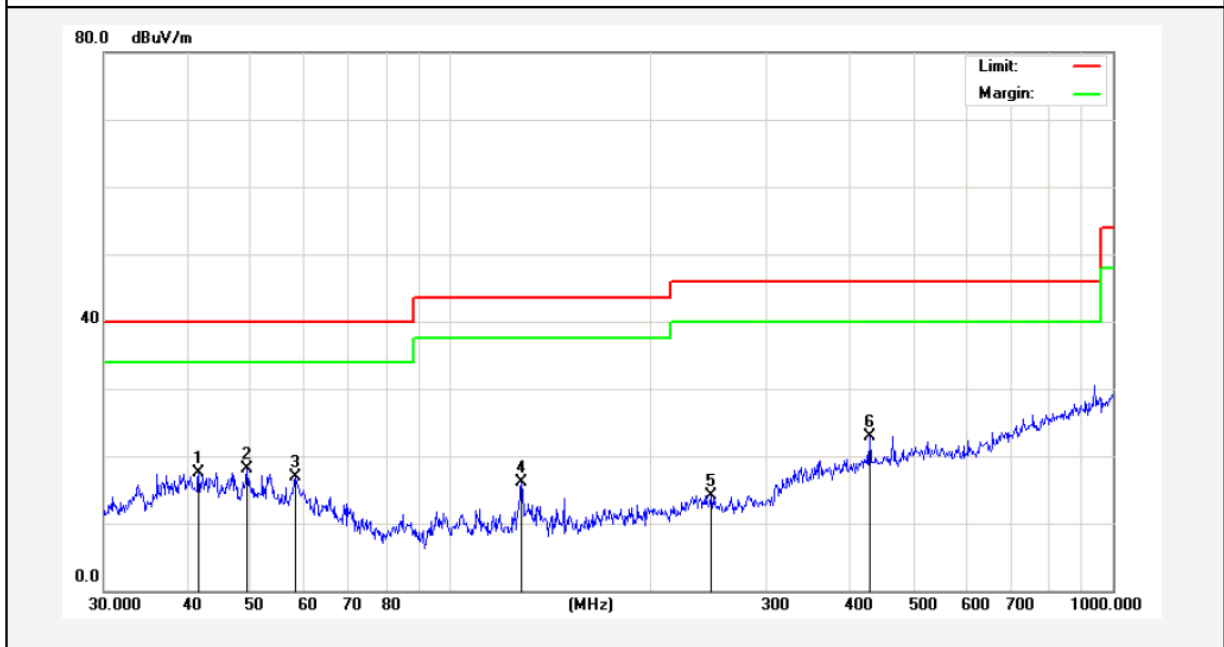


No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	42.6000	32.44	-14.87	17.57	40.00	-22.43	QP	300	16	
2	51.4807	33.68	-16.62	17.06	40.00	-22.94	QP	300	77	
3	56.7917	33.07	-16.82	16.25	40.00	-23.75	QP	300	124	
4	98.1419	32.97	-20.94	12.03	43.50	-31.47	QP	300	154	
5	173.2051	32.44	-19.65	12.79	43.50	-30.71	QP	300	212	
6	244.2321	32.27	-17.73	14.54	46.00	-31.46	QP	300	263	



Test Results (30~1000MHz)

Job No.: SZAWW171220008-01 Temp.(°C)/Hum.(%RH): 24.3°C/55%RH
 Standard: FCC PART 15C Power Source: DC 3.3V
 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	41.7129	31.12	-13.70	17.42	40.00	-22.58	QP	300	16	
2	49.3594	33.43	-15.41	18.02	40.00	-21.98	QP	300	44	
3	58.4074	32.81	-15.92	16.89	40.00	-23.11	QP	300	152	
4	128.1130	32.69	-16.54	16.15	43.50	-27.35	QP	300	176	
5	247.6819	27.73	-13.54	14.19	46.00	-31.81	QP	300	210	
6	429.5228	34.20	-11.24	22.96	46.00	-23.04	QP	300	236	



Test Results (1GHz-25GHz)

LE 4.0

Test Mode: CH01 (Low 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
2402.0000	93.31	31.09	2.10	35.23	91.27	114.00	-22.73	V	Peak
2402.0000	84.41	31.09	2.10	35.23	82.37	94.00	-11.63	V	AVG
4804.0000	47.42	33.98	2.49	34.54	49.35	74.00	-24.65	V	Peak
4804.0000	41.10	33.98	2.49	34.54	43.03	54.00	-10.97	V	AVG
7206.0000	40.48	36.01	2.78	34.89	44.38	74.00	-29.62	V	Peak
7206.0000	34.86	36.01	2.78	34.89	38.76	54.00	-15.24	V	AVG
9608.0000	*								
12010.0000	*								
14412.0000	*								
16814.0000	*								
2402.0000	90.39	31.09	2.10	35.23	88.35	114.00	-25.65	H	Peak
2402.0000	82.47	31.09	2.10	35.23	80.43	94.00	-13.57	H	AVG
4804.0000	44.65	33.98	2.49	34.54	46.58	74.00	-27.42	H	Peak
4804.0000	37.78	33.98	2.49	34.54	39.71	54.00	-14.29	H	AVG
7206.0000	40.12	36.01	2.78	34.89	44.02	74.00	-29.98	H	Peak
7206.0000	33.24	36.01	2.78	34.89	37.14	54.00	-16.86	H	AVG
9608.0000	*								
12010.0000	*								
14412.0000	*								
16814.0000	*								

Note:

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.

Test Mode: CH20 (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
2442.0000	92.42	31.12	2.20	34.51	91.23	114.00	-22.77	V	Peak
2442.0000	87.70	31.22	2.20	34.51	86.61	94.00	-7.39	V	AVG
4884.0000	47.40	34.98	2.49	34.14	50.73	74.00	-23.27	V	Peak
4884.0000	41.23	34.98	2.49	34.14	44.56	54.00	-9.44	V	AVG
7326.0000	38.54	36.01	3.01	34.56	43.00	74.00	-31.00	V	Peak
7326.0000	33.75	36.01	3.01	34.56	38.21	54.00	-15.79	V	AVG
9768.0000	*								
12210.0000	*								
14652.0000	*								
17094.0000	*								
2442.0000	89.87	31.12	2.20	34.51	88.68	114.00	-25.32	H	Peak
2442.0000	78.88	31.12	2.20	34.51	77.69	94.00	-16.31	H	AVG
4884.0000	42.54	34.98	2.49	34.14	45.87	74.00	-28.13	H	Peak
4884.0000	36.22	34.98	2.49	34.14	39.55	54.00	-14.45	H	AVG
7326.0000	35.65	36.01	3.01	34.56	40.11	74.00	-33.89	H	Peak
7326.0000	32.11	36.01	3.01	34.56	36.57	54.00	-17.43	H	AVG
9768.0000	*								
12210.0000	*								
14652.0000	*								
17094.0000	*								

Note:

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.

Test Mode: CH39 (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
2480.0000	93.01	31.66	2.23	36.08	90.82	114.00	-23.18	V	Peak
2480.0000	85.45	31.66	2.23	36.08	83.26	94.00	-10.74	V	AVG
4960.0000	48.21	35.06	2.61	34.94	50.94	74.00	-23.06	V	Peak
4960.0000	43.62	35.06	2.61	34.94	46.35	54.00	-7.65	V	AVG
7440.0000	37.93	36.20	3.12	35.12	42.13	74.00	-31.87	V	Peak
7440.0000	33.51	36.20	3.12	35.12	37.71	54.00	-16.29	V	AVG
9920.0000	*								
12400.0000	*								
14880.0000	*								
17360.0000	*								
2480.0000	90.67	31.66	2.23	36.08	88.48	114.00	-25.52	H	Peak
2480.0000	79.24	31.66	2.23	36.08	77.05	94.00	-16.95	H	AVG
4960.0000	44.55	35.06	2.61	34.94	47.28	74.00	-26.72	H	Peak
4960.0000	42.23	35.06	2.61	34.94	44.96	54.00	-9.04	H	AVG
7440.0000	38.65	36.20	3.12	35.12	42.85	74.00	-31.15	H	Peak
7440.0000	34.21	36.20	3.12	35.12	38.41	54.00	-15.59	H	AVG
9920.0000	*								
12400.0000	*								
14880.0000	*								
17360.0000	*								

Note:

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:					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	50.20	29.15	3.41	34.01	48.75	74.00	-25.25	V
2400.00	54.03	29.16	3.43	34.01	52.61	74.00	-21.39	V
2390.00	50.50	29.15	3.41	34.01	49.05	74.00	-24.95	H
2400.00	53.42	29.16	3.43	34.01	52.00	74.00	-22.00	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.
2390.00	40.48	29.15	3.41	34.01	39.03	54.00	-14.97	V
2400.00	43.78	29.16	3.43	34.01	42.36	54.00	-11.64	V
2390.00	40.12	29.15	3.41	34.01	38.67	54.00	-15.33	H
2400.00	42.85	29.16	3.43	34.01	41.43	54.00	-12.57	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	55.32	29.28	3.53	34.03	54.10	74.00	-19.90	V
2500.00	51.41	29.30	3.56	34.03	50.24	74.00	-23.76	V
2483.50	56.24	29.28	3.53	34.03	55.02	74.00	-18.98	H
2500.00	54.63	29.30	3.56	34.03	53.46	74.00	-20.54	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	43.50	29.28	3.53	34.03	42.28	54.00	-11.72	V
2500.00	40.21	29.30	3.56	34.03	39.04	54.00	-14.96	V
2483.50	40.77	29.28	3.53	34.03	39.55	54.00	-14.45	H
2500.00	37.14	29.30	3.56	34.03	35.97	54.00	-18.03	H

Remark:

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

LE 5.0

Test Mode: CH01 (Low 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
2402.0000	94.21	31.09	2.10	35.23	92.17	114.00	-21.83	V	Peak
2402.0000	84.52	31.09	2.10	35.23	82.48	94.00	-11.52	V	AVG
4804.0000	48.02	33.98	2.49	34.54	49.95	74.00	-24.05	V	Peak
4804.0000	42.02	33.98	2.49	34.54	43.95	54.00	-10.05	V	AVG
7206.0000	40.30	36.01	2.78	34.89	44.20	74.00	-29.80	V	Peak
7206.0000	33.24	36.01	2.78	34.89	37.14	54.00	-16.86	V	AVG
9608.0000	*								
12010.0000	*								
14412.0000	*								
16814.0000	*								
2402.0000	90.21	31.09	2.10	35.23	88.17	114.00	-25.83	H	Peak
2402.0000	80.21	31.09	2.10	35.23	78.17	94.00	-15.83	H	AVG
4804.0000	44.01	33.98	2.49	34.54	45.94	74.00	-28.06	H	Peak
4804.0000	37.78	33.98	2.49	34.54	39.71	54.00	-14.29	H	AVG
7206.0000	35.32	36.01	2.78	34.89	39.22	74.00	-34.78	H	Peak
7206.0000	33.01	36.01	2.78	34.89	36.91	54.00	-17.09	H	AVG
9608.0000	*								
12010.0000	*								
14412.0000	*								
16814.0000	*								

Note:

1. Level = Receiver Read level + Antenna Factor + Cable Loss – Pre-amplifier Factor
2. “*” means the test results were attenuated more than 20dB below the permissible limits, so the results don't record in the report.

Test Mode: CH20 (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
2442.0000	91.21	31.12	2.20	34.51	90.02	114.00	-23.98	V	Peak
2442.0000	87.01	31.22	2.20	34.51	85.92	94.00	-8.08	V	AVG
4884.0000	47.22	34.98	2.49	34.14	50.55	74.00	-23.45	V	Peak
4884.0000	40.96	34.98	2.49	34.14	44.29	54.00	-9.71	V	AVG
7326.0000	38.21	36.01	3.01	34.56	42.67	74.00	-31.33	V	Peak
7326.0000	34.21	36.01	3.01	34.56	38.67	54.00	-15.33	V	AVG
9768.0000	*								
12210.0000	*								
14652.0000	*								
17094.0000	*								
2442.0000	88.93	31.12	2.20	34.51	87.74	114.00	-26.26	H	Peak
2442.0000	79.22	31.12	2.20	34.51	78.03	94.00	-15.97	H	AVG
4884.0000	42.01	34.98	2.49	34.14	45.34	74.00	-28.66	H	Peak
4884.0000	36.21	34.98	2.49	34.14	39.54	54.00	-14.46	H	AVG
7326.0000	36.12	36.01	3.01	34.56	40.58	74.00	-33.42	H	Peak
7326.0000	33.21	36.01	3.01	34.56	37.67	54.00	-16.33	H	AVG
9768.0000	*								
12210.0000	*								
14652.0000	*								
17094.0000	*								

Note:

1. Level = Receiver Read level + Antenna Factor + Cable Loss – Pre-amplifier Factor
2. “*” means the test results were attenuated more than 20dB below the permissible limits, so the results don't record in the report.

Test Mode: CH39 (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
2480.0000	92.10	31.66	2.23	36.08	89.91	114.00	-24.09	V	Peak
2480.0000	85.21	31.66	2.23	36.08	83.02	94.00	-10.98	V	AVG
4960.0000	48.11	35.06	2.61	34.94	50.84	74.00	-23.16	V	Peak
4960.0000	42.10	35.06	2.61	34.94	44.83	54.00	-9.17	V	AVG
7440.0000	37.93	36.20	3.12	35.12	42.13	74.00	-31.87	V	Peak
7440.0000	36.21	36.20	3.12	35.12	40.41	54.00	-13.59	V	AVG
9920.0000	*								
12400.0000	*								
14880.0000	*								
17360.0000	*								
2480.0000	92.02	31.66	2.23	36.08	89.83	114.00	-24.17	H	Peak
2480.0000	77.27	31.66	2.23	36.08	75.08	94.00	-18.93	H	AVG
4960.0000	45.32	35.06	2.61	34.94	48.05	74.00	-25.95	H	Peak
4960.0000	41.22	35.06	2.61	34.94	43.95	54.00	-10.05	H	AVG
7440.0000	33.62	36.20	3.12	35.12	37.82	74.00	-36.18	H	Peak
7440.0000	34.02	36.20	3.12	35.12	38.22	54.00	-15.78	H	AVG
9920.0000	*								
12400.0000	*								
14880.0000	*								
17360.0000	*								

Note:

1. Level = Receiver Read level + Antenna Factor + Cable Loss – Pre-amplifier 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:					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	51.22	29.15	3.41	34.01	49.77	74.00	-24.23	V
2400.00	53.21	29.16	3.43	34.01	51.79	74.00	-22.21	V
2390.00	50.00	29.15	3.41	34.01	48.55	74.00	-25.45	H
2400.00	53.12	29.16	3.43	34.01	51.70	74.00	-22.30	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	41.25	29.15	3.41	34.01	39.80	54.00	-14.20	V
2400.00	44.21	29.16	3.43	34.01	42.79	54.00	-11.21	V
2390.00	40.21	29.15	3.41	34.01	38.76	54.00	-15.24	H
2400.00	42.20	29.16	3.43	34.01	40.78	54.00	-13.22	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	55.31	29.28	3.53	34.03	54.09	74.00	-19.91	V
2500.00	52.01	29.30	3.56	34.03	50.84	74.00	-23.16	V
2483.50	56.02	29.28	3.53	34.03	54.80	74.00	-19.20	H
2500.00	53.96	29.30	3.56	34.03	52.79	74.00	-21.21	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	41.23	29.28	3.53	34.03	40.01	54.00	-13.99	V
2500.00	40.25	29.30	3.56	34.03	39.08	54.00	-14.92	V
2483.50	41.36	29.28	3.53	34.03	40.14	54.00	-13.86	H
2500.00	36.95	29.30	3.56	34.03	35.78	54.00	-18.22	H

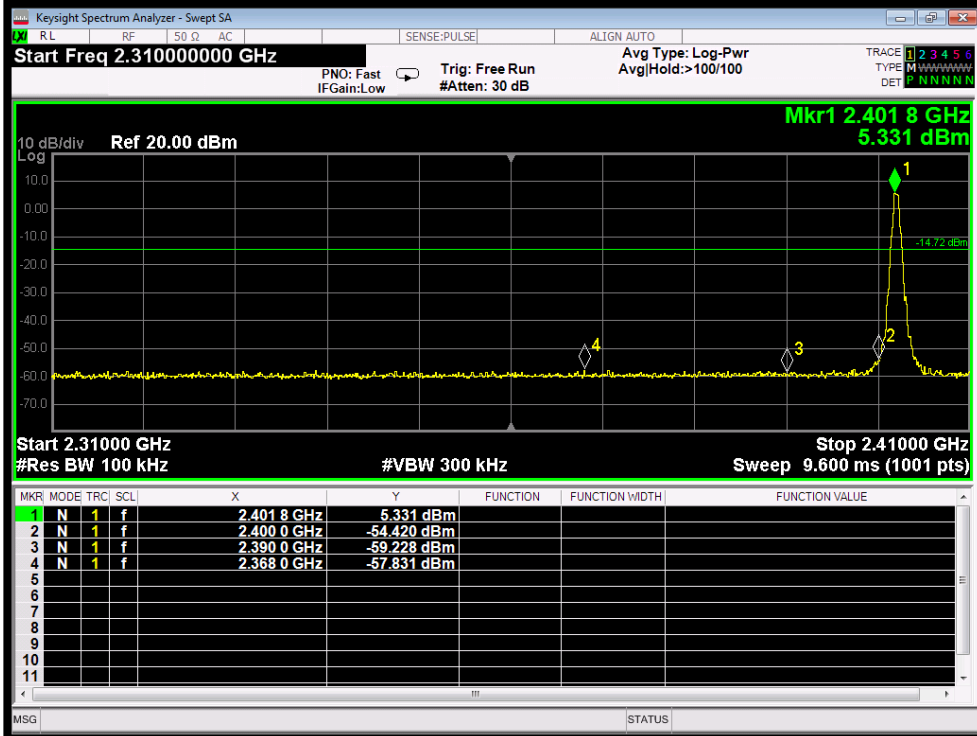
Remark:

- Level = Receiver Read level + Antenna Factor + Cable Loss – Pre-amplifier Factor

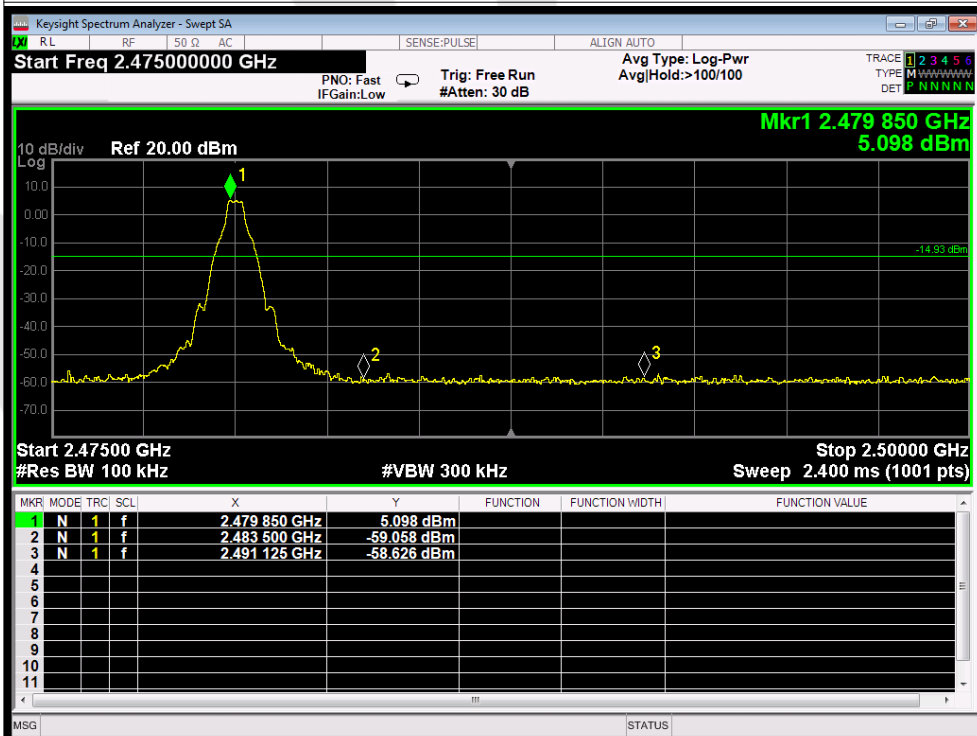
LE 4.0

Conducted band edge

Frequency Band (MHz)	Delta Peak toBand Emission (dBc)	Limit (dBc)	Results
2402	59.751	>50	PASS
2480	64.156	>50	PASS



Lowest

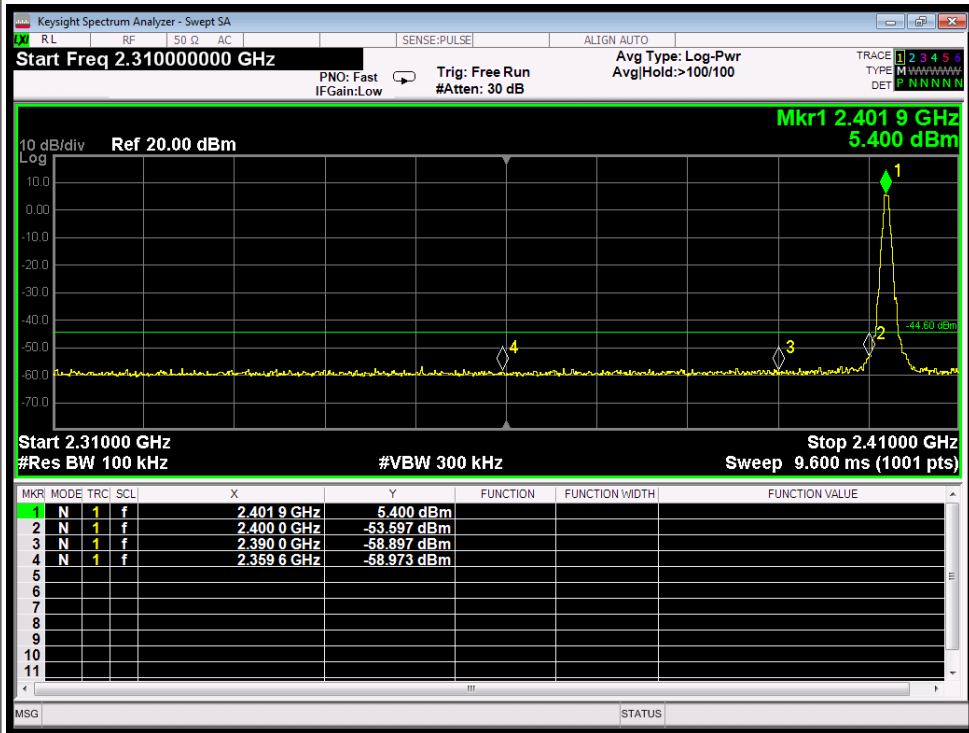


Highest

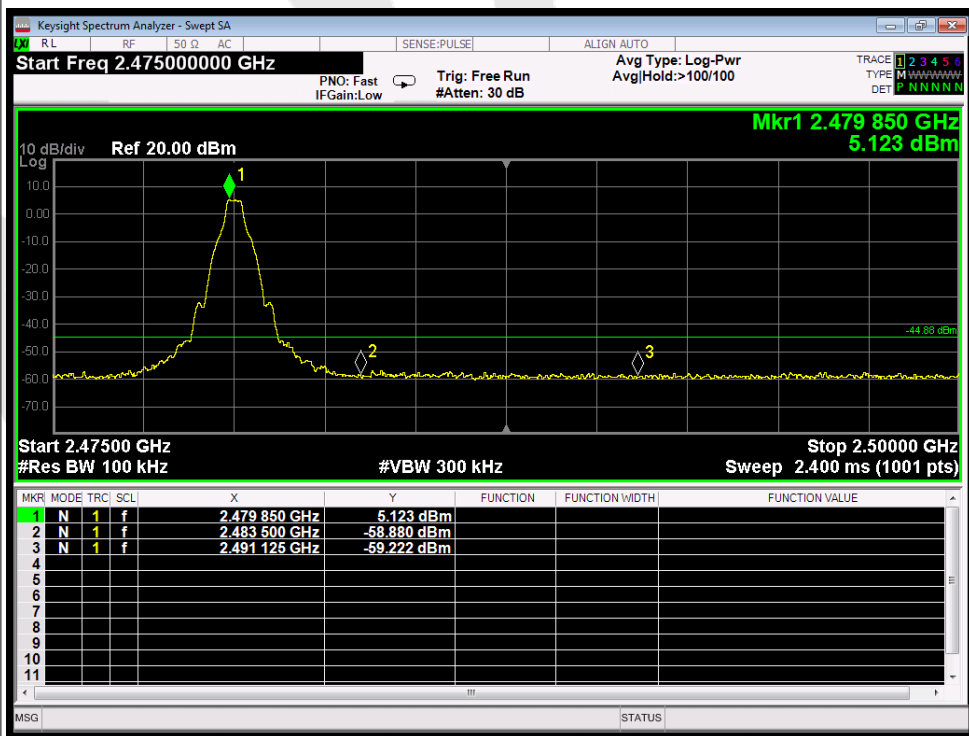
LE 5.0

Conducted band edge

Frequency Band (MHz)	Delta Peak toBand Emission (dBc)	Limit (dBc)	Results
2402	58.997	>50	PASS
2480	64.003	>50	PASS

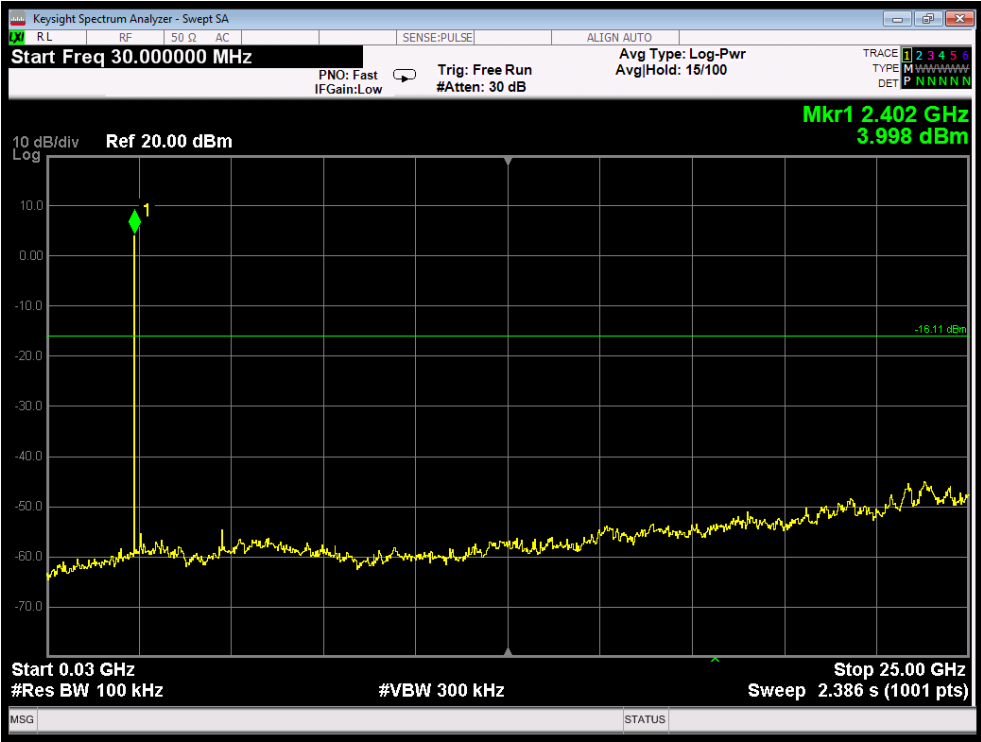


Lowest

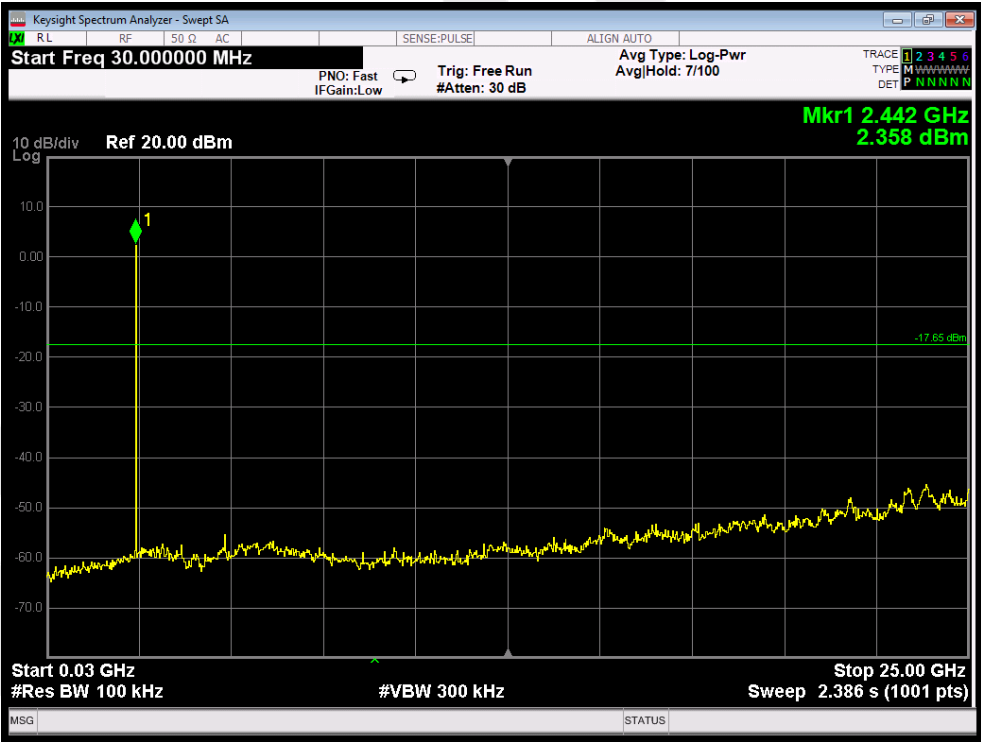


Highest

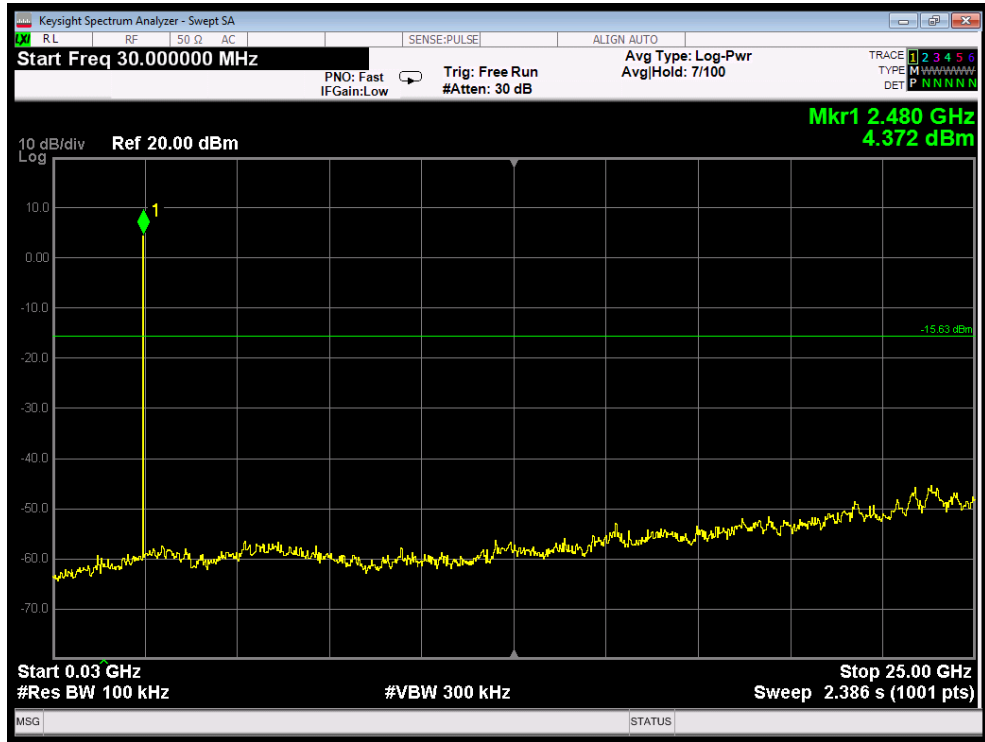
Conducted Emission Method



CH: Low



CH: Middle



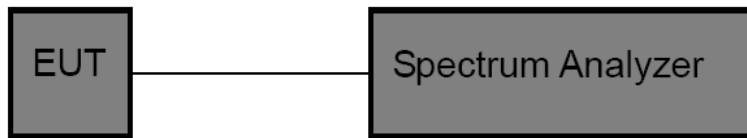
CH: High

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

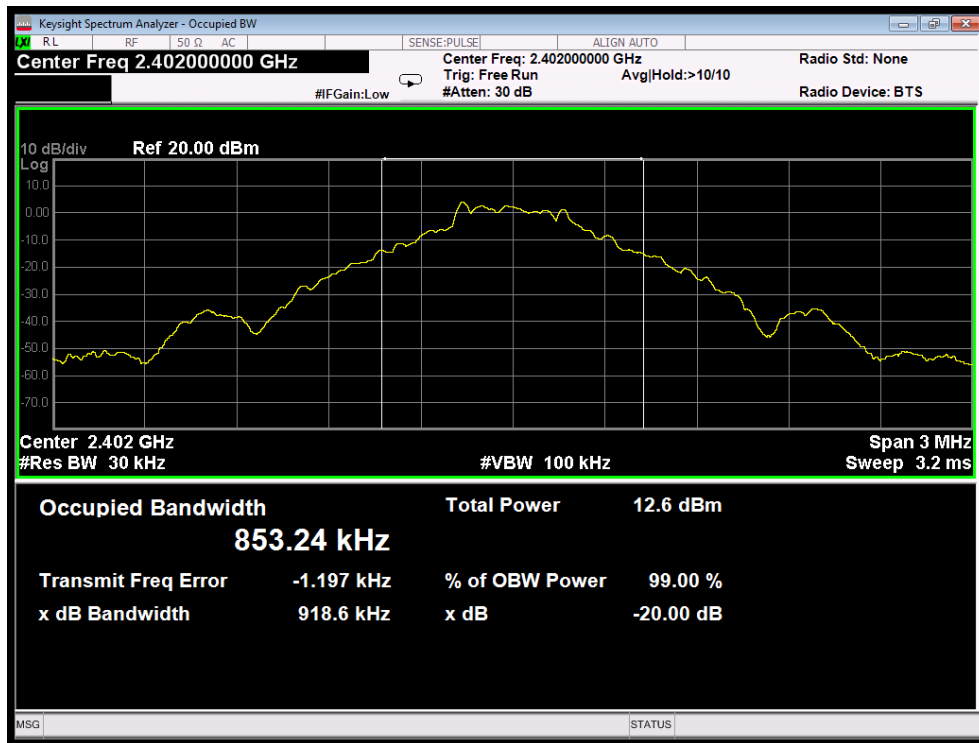
1. Place the EUT on the table and set it in the transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as:
 RBW = 30kHz, VBW ≥ 3*RBW = 100kHz,
 Detector= Average
 Trace mode= Max hold.
 Sweep-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

5.4. Test Data

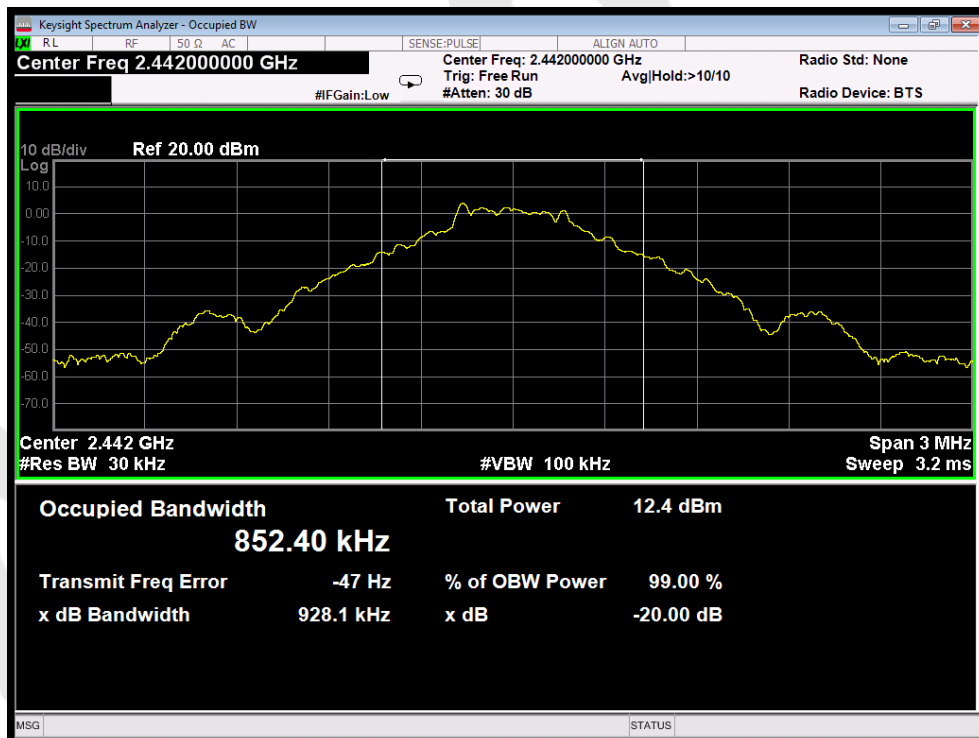
Test Item	: 20dB Bandwidth	Test Mode	: TX Mode
Test Voltage	: DC 3.3V	Temperature	: 24°C
Test Result	: PASS	Humidity	: 55%RH

LE 4.0

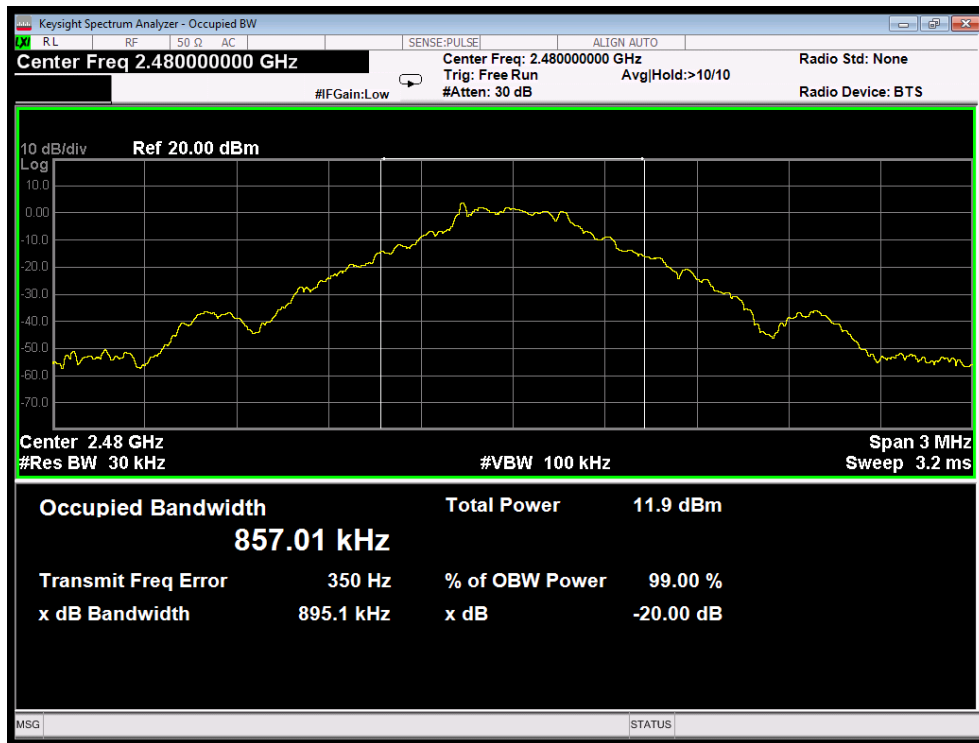
Frequency (MHz)	Bandwidth (kHz)	Result
2402MHZ	918.6	PASS
2442MHZ	928.1	PASS
2480MHZ	895.1	PASS



Test Mode: Low



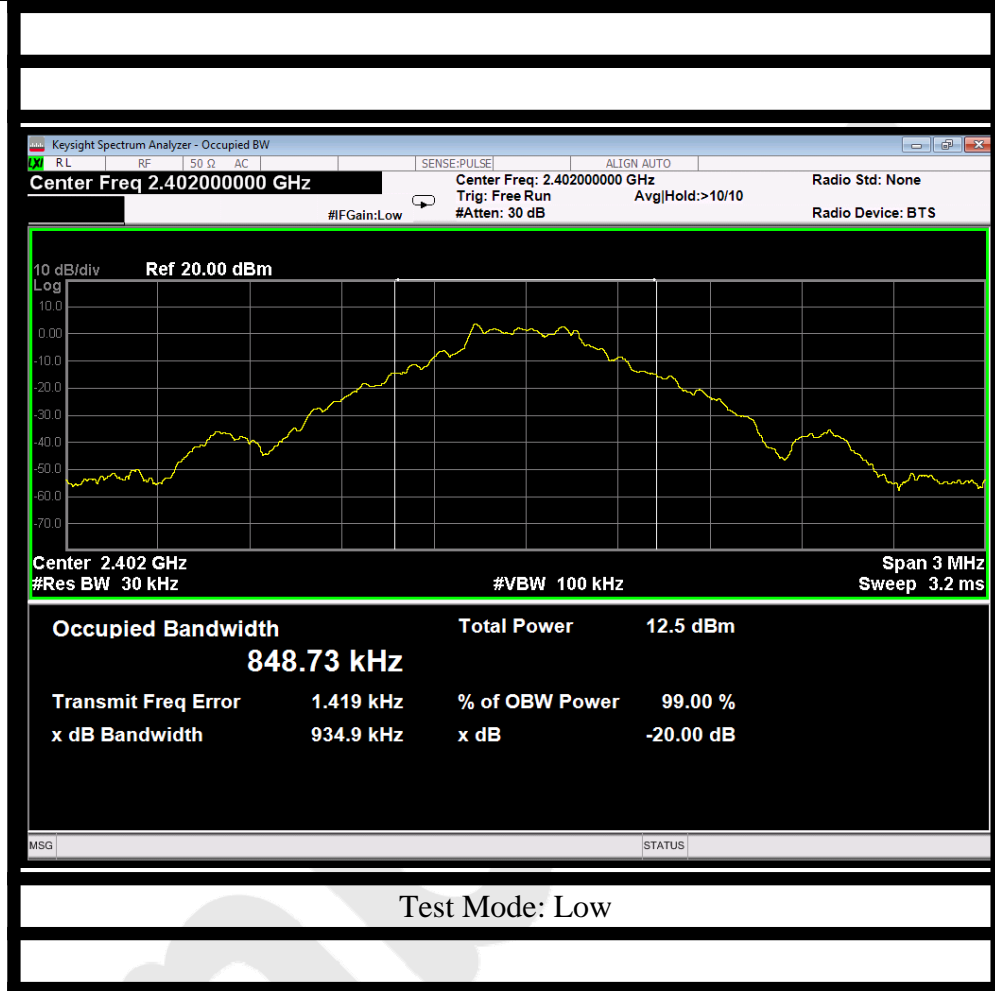
Test Mode: Middle

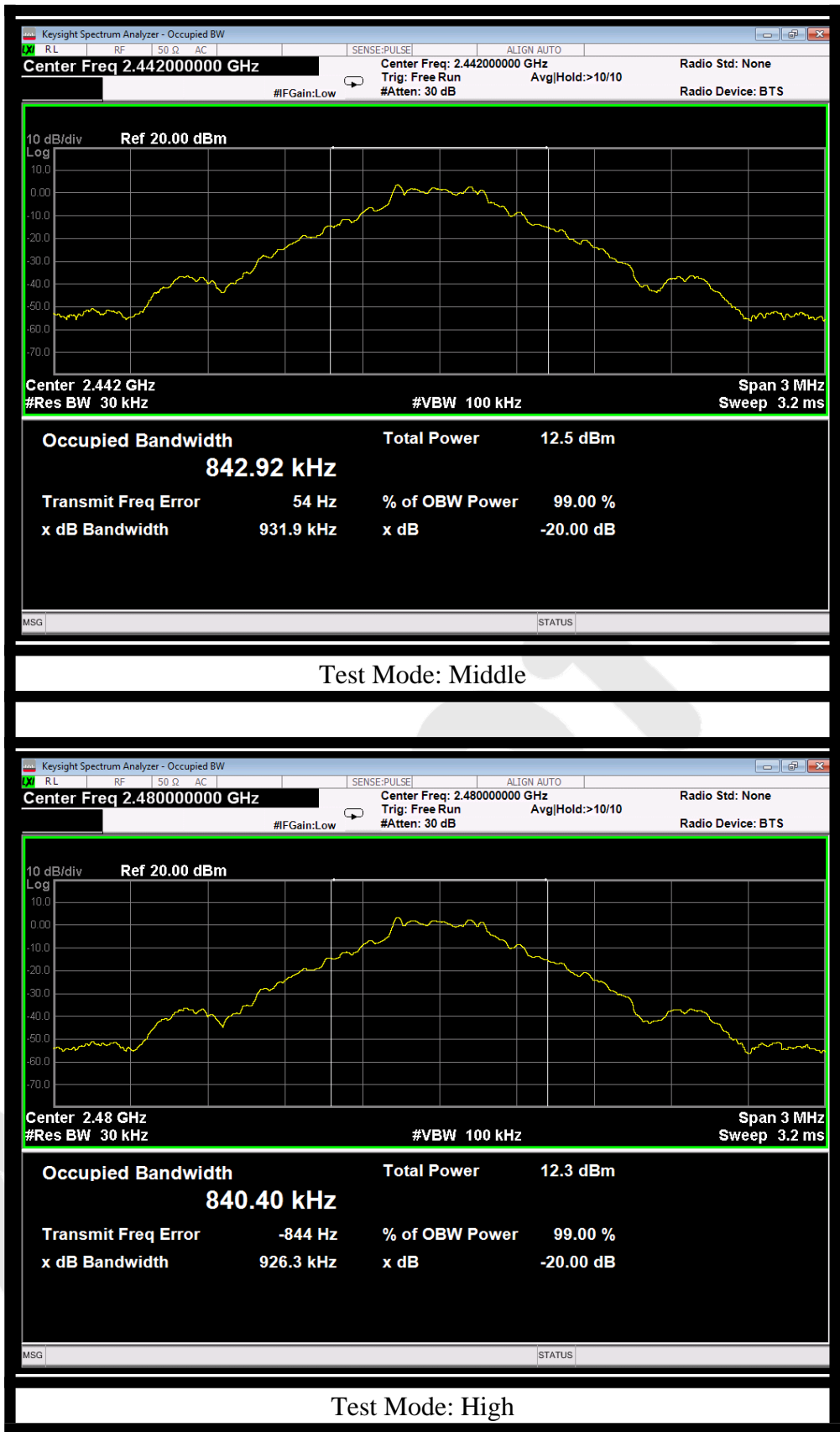


Test Mode: High

LE 5.0

Frequency (MHz)	Bandwidth (kHz)	Result
2402MHZ	934.9	PASS
2442MHZ	931.9	PASS
2480MHZ	926.3	PASS





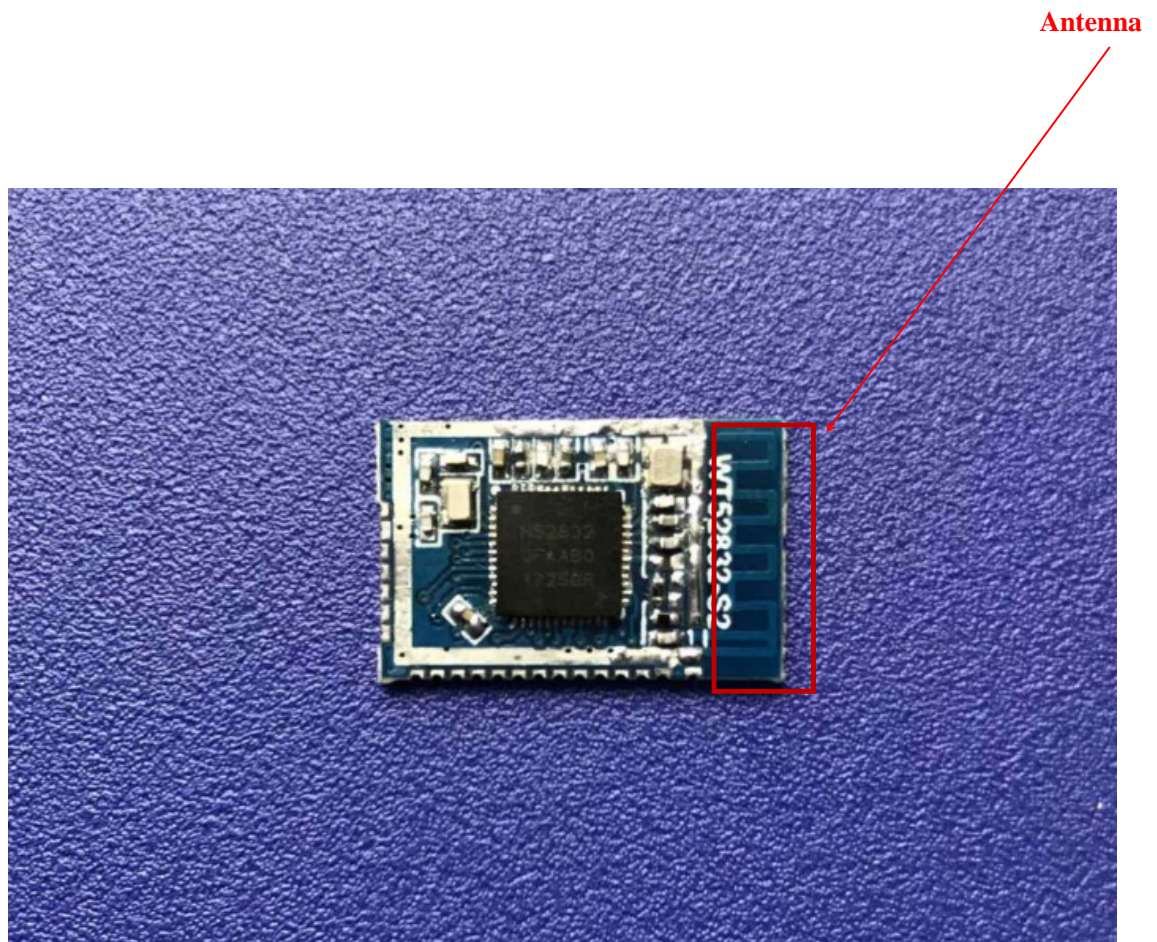
6. Antenna Requirement

6.1. Test Standard and Requirement

Test Standard	FCC Part15 Section 15.203
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.

6.2. Antenna Connected Construction

The antenna is a PCB Antenna which permanently attached, and the best case gain of the antenna is 0 dBi. It complies with the standard requirement.

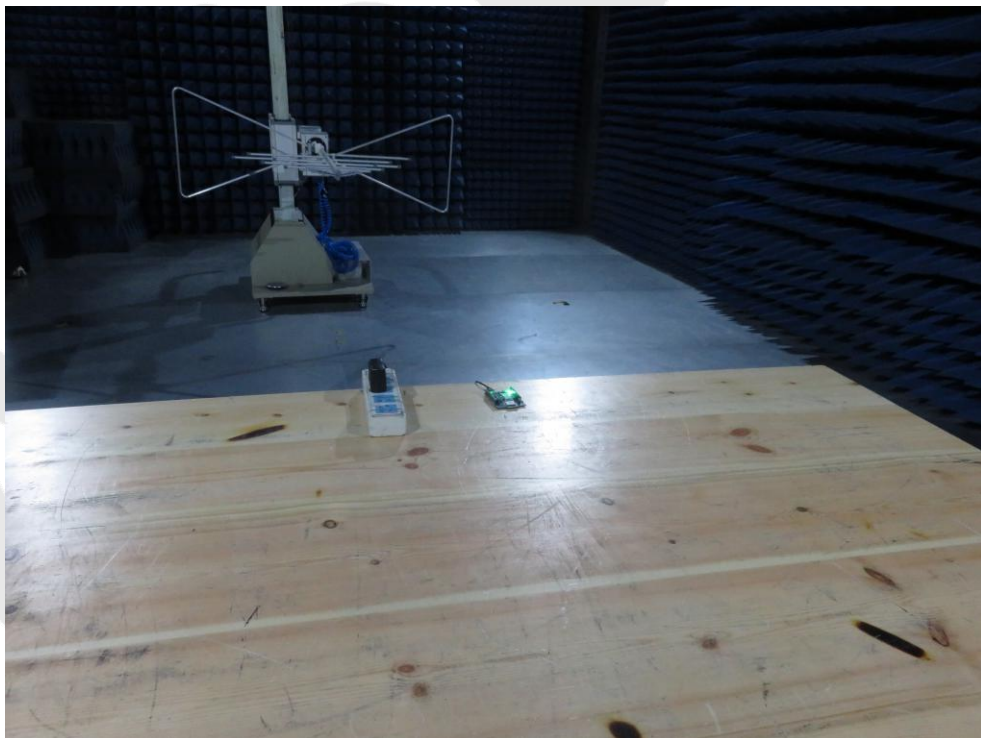


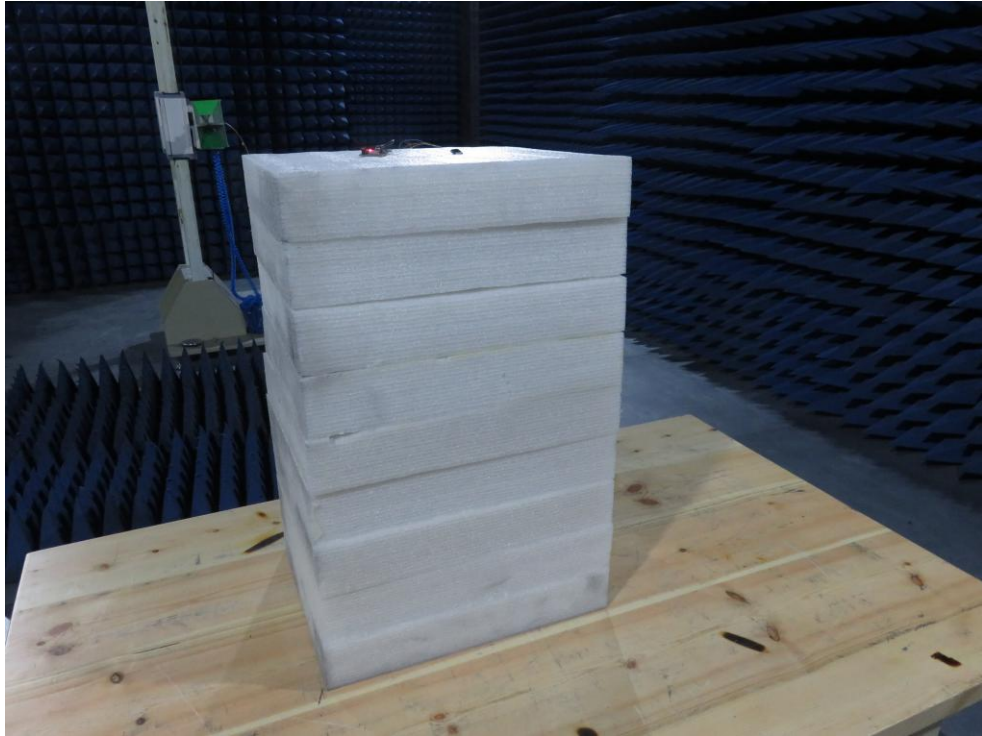
APPENDIX I -- TEST SETUP PHOTOGRAPH

Photo of Conducted Emission Test



Photo of Radiation Emission Test

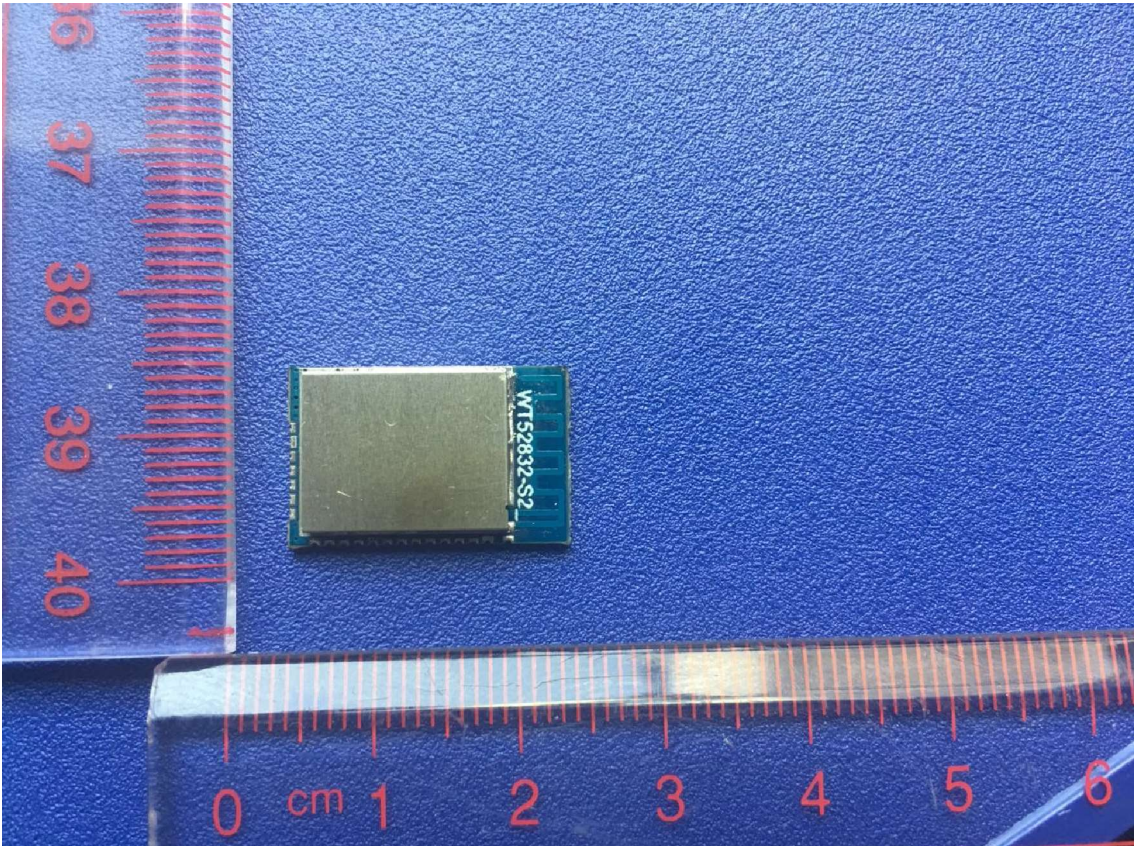




Anbotek

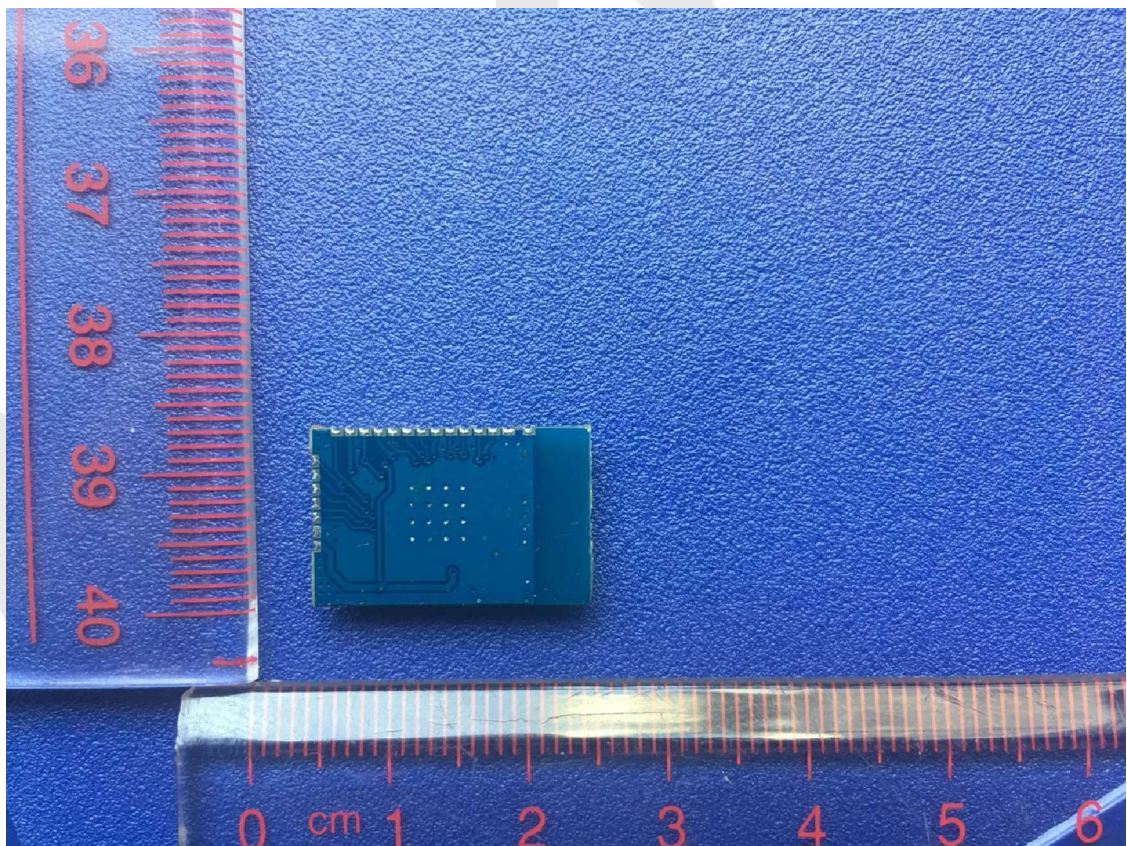
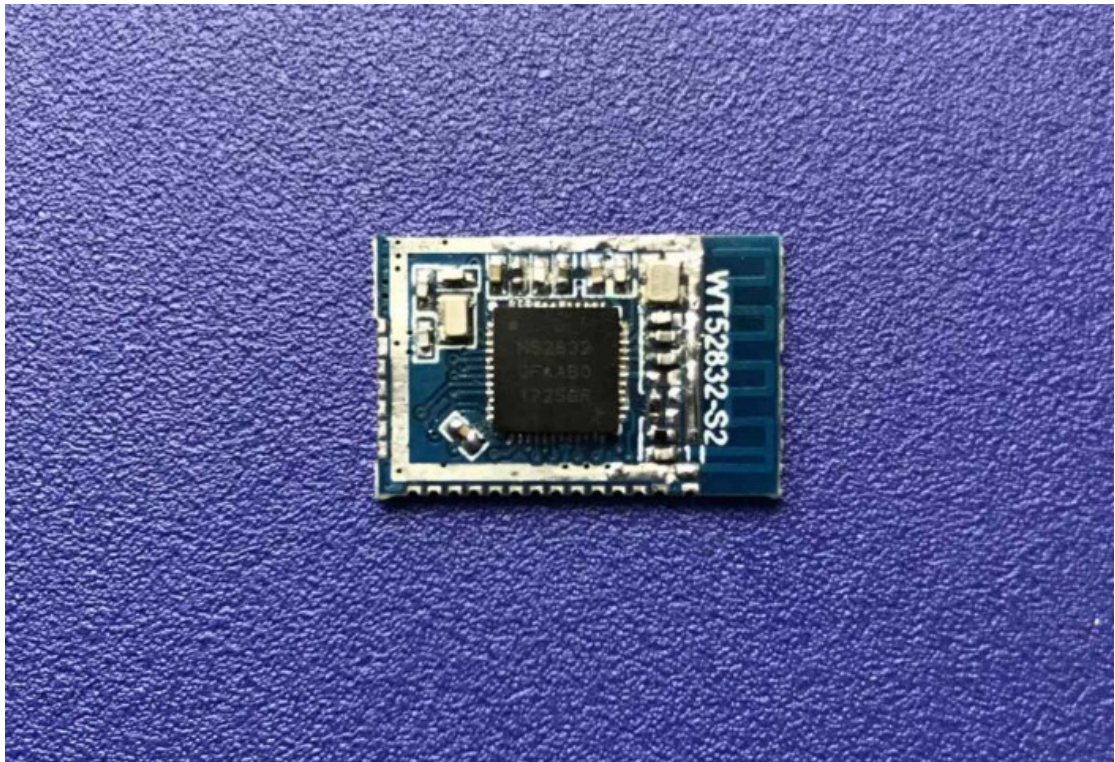
APPENDIX II

EXTERNAL PHOTOGRAPH



Anbotek

INTERNAL PHOTOGRAPH



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