FCC TEST REPORT

For

Viaan Electronics

VEBLE103

Model No.: VEBLE103

Prepared For	:	Viaan Electronics
Address	:	125 N Market St. Suite 1725, Wichita, Kansas 67202, United States
Prepared By	:	Shenzhen Anbotek Compliance Laboratory Limited
Address	:	1/F., Building 1, SEC Industrial Park, No.0409 Qianhai Road, Nanshan District, Shenzhen, Guangdong, China Tel: (86) 755-26066544 Fax: (86) 755-26014772
Report Number	:	R0117020641W
Date of Test	:	Feb. 23~ Mar. 30, 2017
Date of Report	:	Mar. 30, 2017

Contents

TEST REPORT

Applicant	:	Viaan Electronics
Manufacturer	:	Viaan Electronics
Product Name	:	VEBLE103
Model No.	:	VEBLE103
Trade Mark	:	Wireless
Rating(s)	:	DC 3.3V

Test Standard(s)	**:**	**FCC Part15 Subpart C 2016, Section 15.247**
Test Method(s)	**:**	**ANSI C63.10: 2013, KDB558074 D01 DTS Meas Guidance v03r05**

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 : : Feb. 23~ Mar. 30, 2017

Prepared by : : Winkey Wang

(Tested Engineer / Winkey Wang)

Reviewer : : Brown Lu

(Project Manager / Brown Lu)

Approved & Authorized Signer : : Tom Chen

(Manager / Tom Chen)

1. General Information

1.1. Client Information

Applicant	:	Viaan Electronics
Address	:	125 N Market St. Suite 1725, Wichita, Kansas 67202, United States
Manufacturer	:	Viaan Electronics
Address	:	125 N Market St. Suite 1725, Wichita, Kansas 67202, United States

1.2. Description of Device (EUT)

Product Name	:	VEBLE103	
Model No.	:	VEBLE103	
Trade Mark	:	Wireless	
Test Power Supply	:	AC 120V, 60Hz for adapter/AC 240V, 60Hz for adapter/ DC 5V by development Board	
Product Description	:	Operation Frequency:	2402MHz~2480MHz
		Transfer Rate:	1 Mbits/s
		Number of Channel:	40 Channels
		Modulation Type:	GFSK
		Antenna Type:	Ceramic Antenna
		Antenna Gain(Peak):	2 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
USB Cable	:	Length: 9cm Shielded Type: No Shielded Ferrite Core: None (Provided by customer)

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	CH00
Mode 2	CH20
Mode 3	CH39
Mode 4	Keeping TX mode

For Conducted Emission	
Final Test Mode	Description
Mode 4	Keeping TX mode

For Radiated Emission	
Final Test Mode	Description
Mode 1	CH00
Mode 2	CH20
Mode 3	CH39

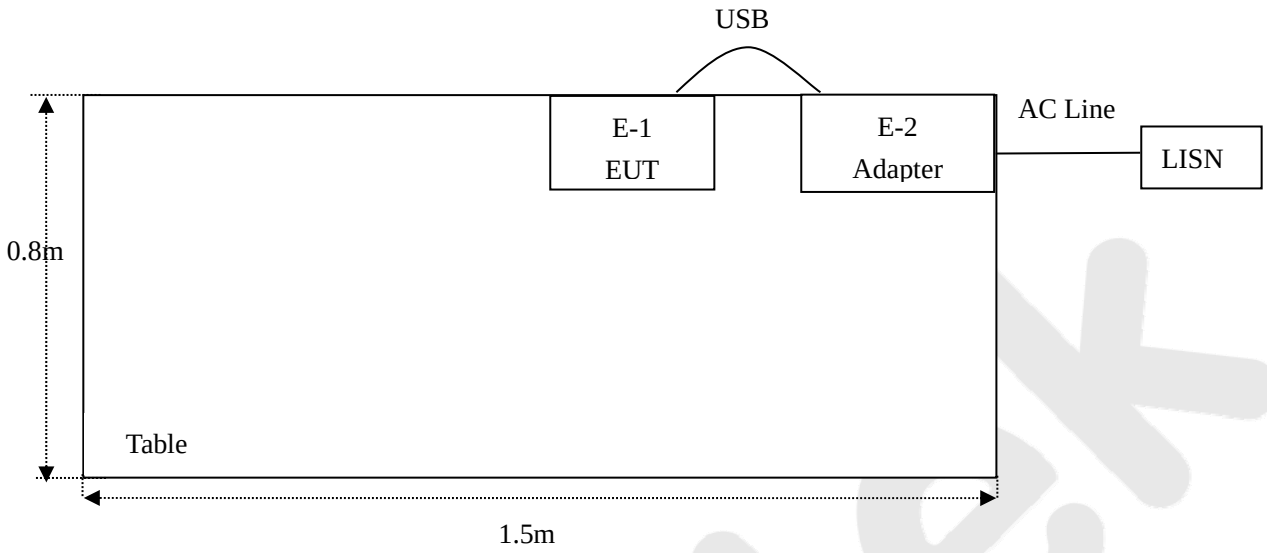
Note:
(1) The measurements are performed at the highest, middle, lowest available channels.
(2)The data rate was set in 1Mbps for radiated emission due to the highest RF output power.

1.5. List of channels

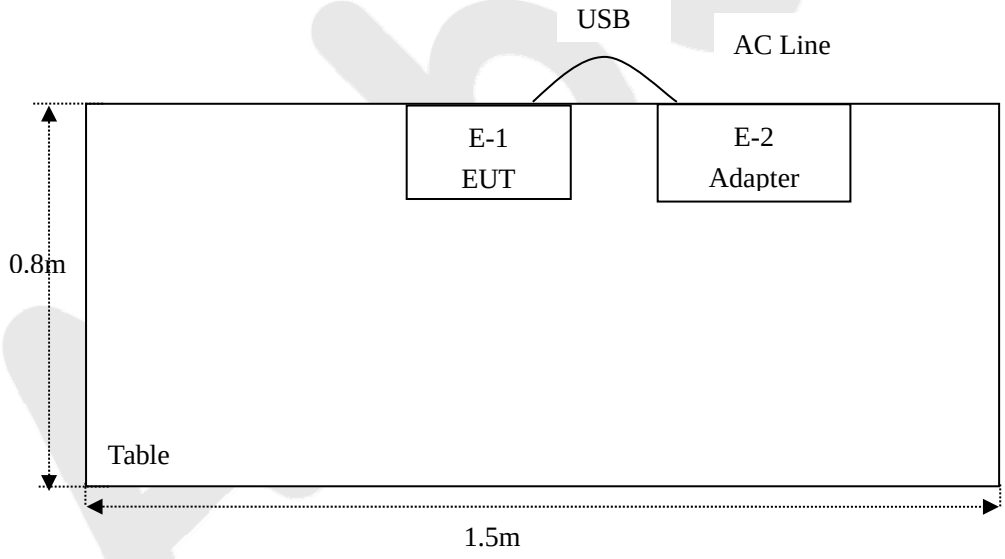
Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)
00	2402	09	2420	18	2438	27	2456	36	2474
01	2404	10	2422	19	2440	28	2458	37	2476
02	2406	11	2424	20	2442	29	2460	38	2478
03	2408	12	2426	21	2444	30	2462	39	2480
04	2410	13	2428	22	2446	31	2464		
05	2412	14	2430	23	2448	32	2466		
05	2414	15	2432	24	2450	33	2468		
07	2416	16	2434	25	2452	34	2470		
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.	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, 2016	1 Year
8.	Bilog Broadband Antenna	Schwarzbeck	VULB9163	VULB 9163-289	May 06, 2016	1 Year
9.	Loop Antenna	Schwarzbeck	FMZB1519	012	May 11, 2016	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 registed 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

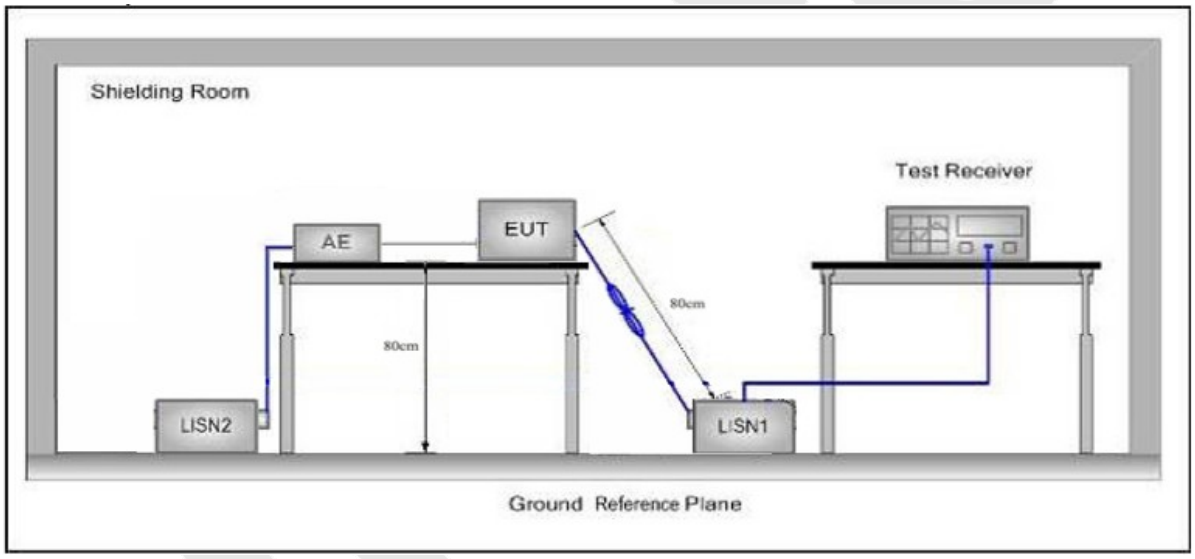
Standard Section	Test Item	Result
15.203/15.247(c)	Antenna Requirement	PASS
15.207	Conducted Emission	PASS
15.205/15.209	Spurious Emission	PASS
15.247(b)(3)	Conducted Peak Output Power	PASS
15.247(a)(2)	6dB Occupied Bandwidth	PASS
15.247(e)	Power Spectral Density	PASS
15.247(d)	Band Edge	PASS
Remark: "N/A" is an abbreviation for Not Applicable.		

3. Conducted Emission Test

3.1. Test Standard and Limit

Test Standard	FCC Part15 Section 15.207		
Test Limit	Frequency	Maximum RF Line Voltage (dBuV)	
		Quasi-peak Level	Average Level
	150kHz~500kHz	66 ~ 56 *	56 ~ 46 *
	500kHz~5MHz	56	46
	5MHz~30MHz	60	50
Remark: (1) *Decreasing linearly with logarithm of the frequency. (2) The lower limit shall apply at the transition frequency.			

3.2. Test Setup



3.3. Test Procedure

The EUT system is connected to the power mains through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm coupling impedance for the EUT system. Please refer the block diagram of the test setup and photographs. Both sides of AC line are checked to find out the maximum conducted emission. In order to find the maximum emission levels, the relative positions of equipment and all of the interface cables shall be changed according to FCC ANSI C63.10-2013 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

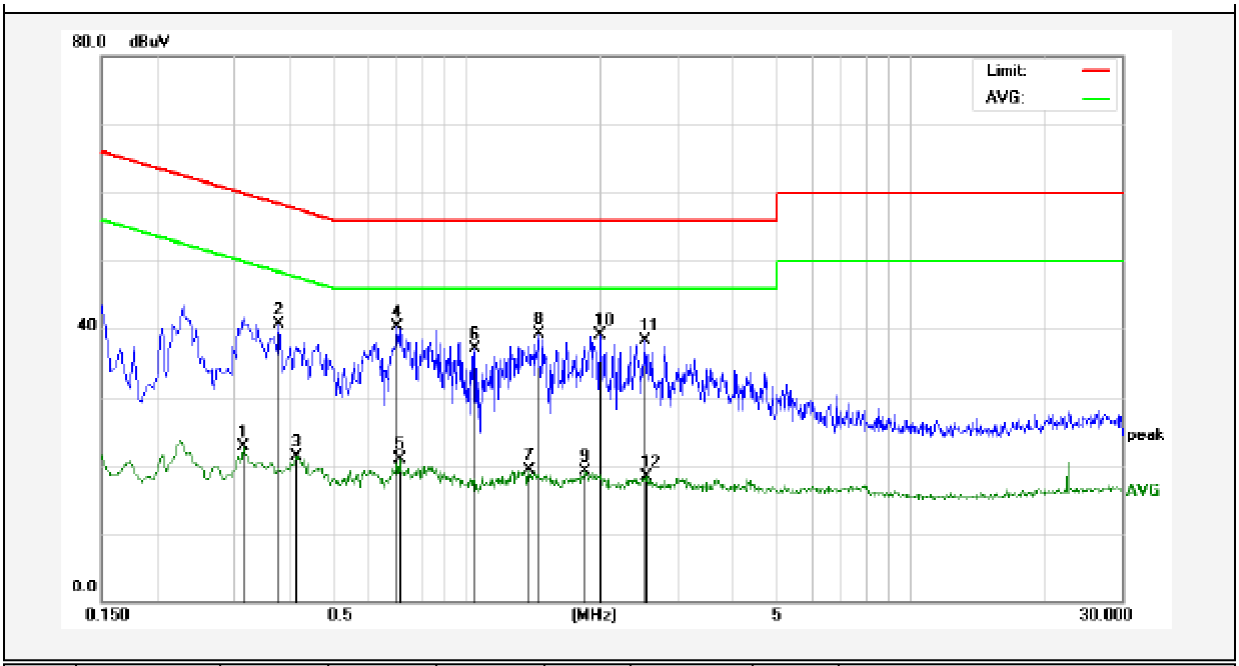
Test Site: 1# Shielded Room

Operating Condition: Keeping TX mode

Test Specification: AC 120V, 60Hz for adapter

Comment: Live Line

Tem.:25℃ Hum.:50%



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Over Limit (dB)	Detector	Remark
1	0.3140	2.85	19.90	22.75	49.86	-27.11	AVG	
2	0.3780	20.86	19.93	40.79	58.32	-17.53	QP	
3	0.4140	1.41	19.94	21.35	47.57	-26.22	AVG	
4	0.6980	20.25	20.04	40.29	56.00	-15.71	QP	
5	0.7060	0.83	20.04	20.87	46.00	-25.13	AVG	
6	1.0460	17.06	20.12	37.18	56.00	-18.82	QP	
7	1.3820	-0.75	20.13	19.38	46.00	-26.62	AVG	
8	1.4540	19.26	20.13	39.39	56.00	-16.61	QP	
9	1.8580	-0.94	20.14	19.20	46.00	-26.80	AVG	
10	1.9980	18.89	20.14	39.03	56.00	-16.97	QP	
11	2.5380	18.14	20.15	38.29	56.00	-17.71	QP	
12	2.5420	-1.91	20.15	18.24	46.00	-27.76	AVG	

Conducted Emission Test Data

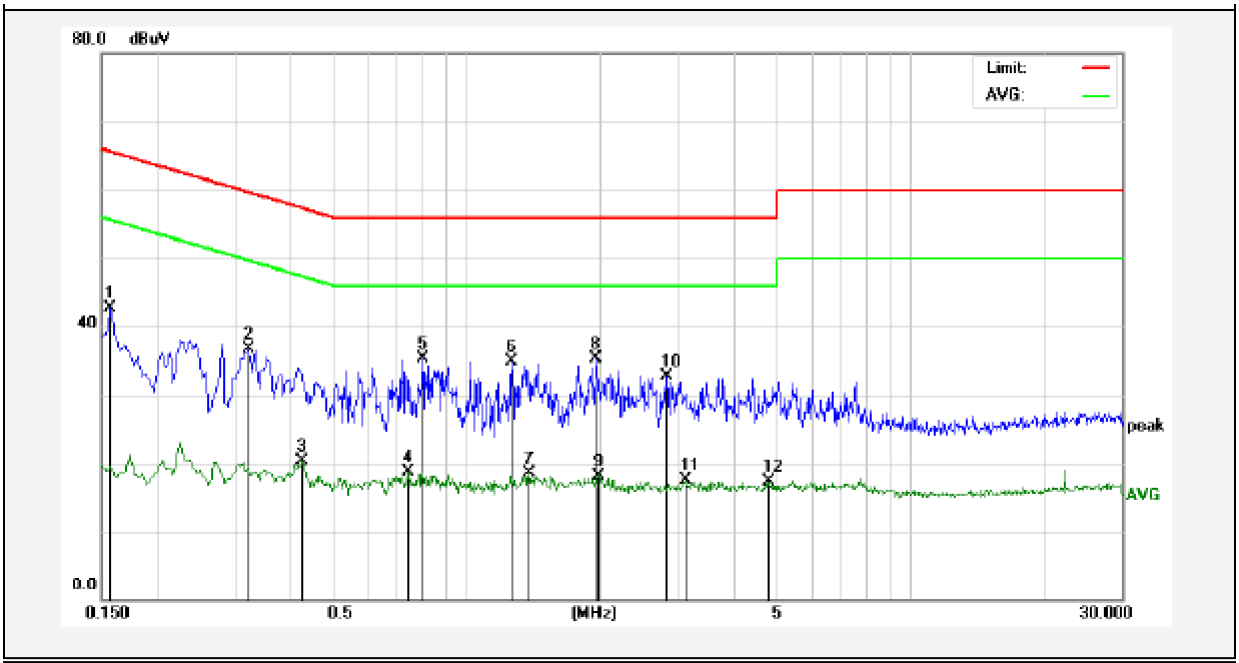
Test Site: 1# Shielded Room

Operating Condition: Keeping TX mode

Test Specification: AC 120V, 60Hz for adapter

Comment: Neutral Line

Tem.:25℃ Hum.:50%



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Over Limit (dB)	Detector	Remark
1	0.1580	22.89	19.90	42.79	65.56	-22.77	QP	
2	0.3220	16.89	19.90	36.79	59.65	-22.86	QP	
3	0.4260	0.26	19.95	20.21	47.33	-27.12	AVG	
4	0.7380	-1.41	20.05	18.64	46.00	-27.36	AVG	
5	0.7980	15.32	20.07	35.39	56.00	-20.61	QP	
6	1.2660	14.84	20.13	34.97	56.00	-21.03	QP	
7	1.3860	-1.66	20.13	18.47	46.00	-27.53	AVG	
8	1.9620	15.07	20.14	35.21	56.00	-20.79	QP	
9	1.9820	-1.94	20.14	18.20	46.00	-27.80	AVG	
10	2.8340	12.55	20.16	32.71	56.00	-23.29	QP	
11	3.1099	-2.71	20.16	17.45	46.00	-28.55	AVG	
12	4.8060	-2.90	20.20	17.30	46.00	-28.70	AVG	

Conducted Emission Test Data

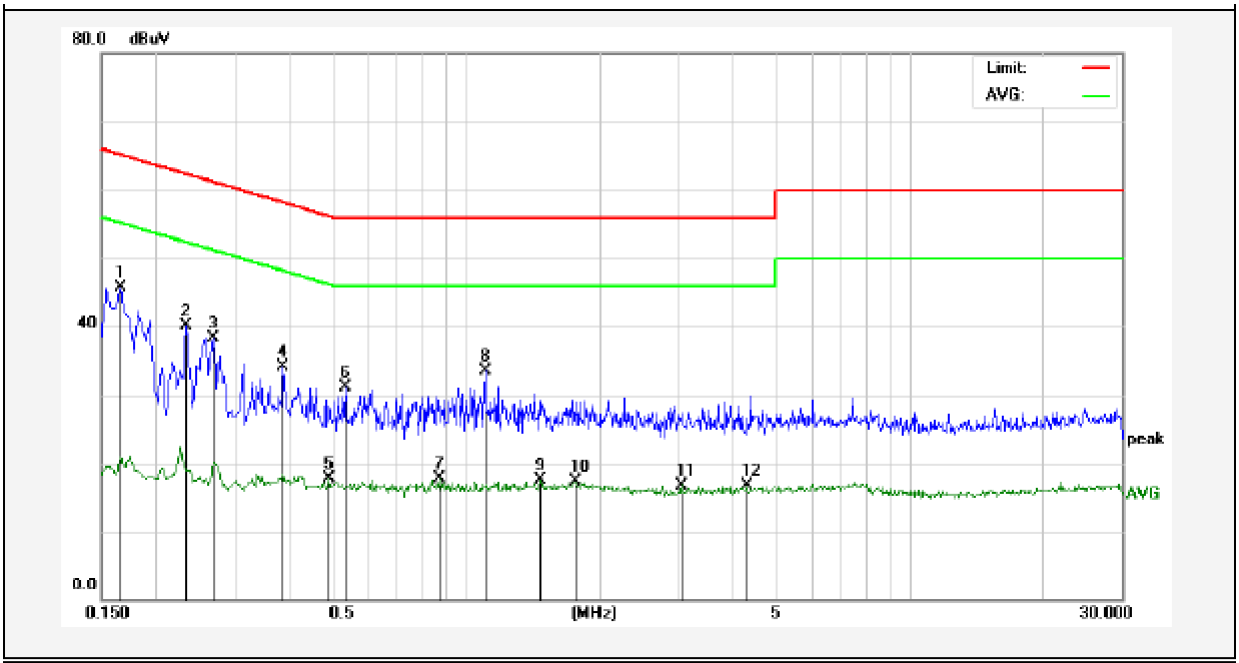
Test Site: 1# Shielded Room

Operating Condition: Keeping TX mode

Test Specification: AC 240V, 60Hz for adapter

Comment: Live Line

Tem.:25℃ Hum.:50%



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Over Limit (dB)	Detector	Remark
1	0.1660	25.90	19.90	45.80	65.15	-19.35	QP	
2	0.2340	20.20	19.89	40.09	62.30	-22.21	QP	
3	0.2700	18.42	19.89	38.31	61.12	-22.81	QP	
4	0.3860	14.21	19.93	34.14	58.15	-24.01	QP	
5	0.4900	-2.36	19.98	17.62	46.17	-28.55	AVG	
6	0.5340	11.05	19.99	31.04	56.00	-24.96	QP	
7	0.8700	-2.36	20.09	17.73	46.00	-28.27	AVG	
8	1.1019	13.48	20.12	33.60	56.00	-22.40	QP	
9	1.4660	-2.57	20.13	17.56	46.00	-28.44	AVG	
10	1.7660	-2.78	20.14	17.36	46.00	-28.64	AVG	
11	3.0500	-3.36	20.16	16.80	46.00	-29.20	AVG	
12	4.2700	-3.46	20.19	16.73	46.00	-29.27	AVG	

Conducted Emission Test Data

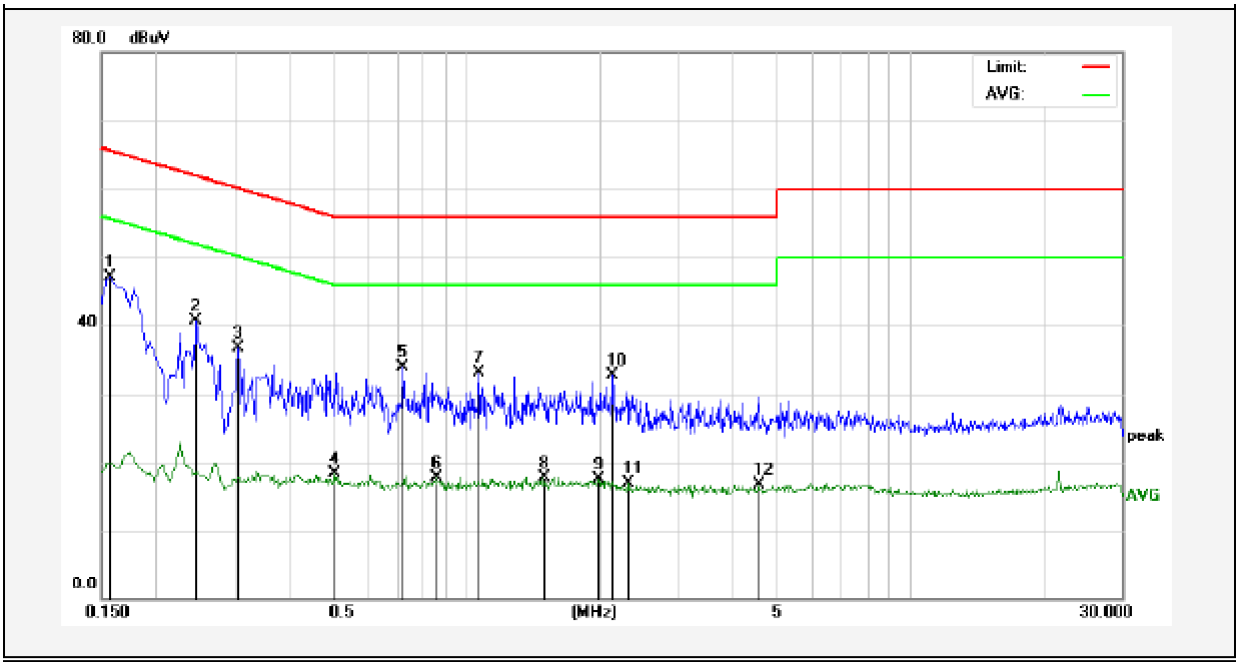
Test Site: 1# Shielded Room

Operating Condition: Keeping TX mode

Test Specification: AC 240V, 60Hz for adapter

Comment: Neutral Line

Tem.:25℃ Hum.:50%



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Over Limit (dB)	Detector	Remark
1	0.1580	27.23	19.90	47.13	65.56	-18.43	QP	
2	0.2460	20.76	19.89	40.65	61.89	-21.24	QP	
3	0.3060	16.73	19.89	36.62	60.08	-23.46	QP	
4	0.5020	-1.67	19.98	18.31	46.00	-27.69	AVG	
5	0.7180	13.78	20.04	33.82	56.00	-22.18	QP	
6	0.8500	-2.32	20.08	17.76	46.00	-28.24	AVG	
7	1.0700	13.06	20.12	33.18	56.00	-22.82	QP	
8	1.4940	-2.36	20.13	17.77	46.00	-28.23	AVG	
9	1.9820	-2.60	20.14	17.54	46.00	-28.46	AVG	
10	2.1420	12.58	20.14	32.72	56.00	-23.28	QP	
11	2.3300	-3.31	20.15	16.84	46.00	-29.16	AVG	
12	4.5579	-3.44	20.19	16.75	46.00	-29.25	AVG	

4. Radiation Spurious Emission and Band Edge

4.1. Test Standard and Limit

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

Remark:

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

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

4.2. Test Setup

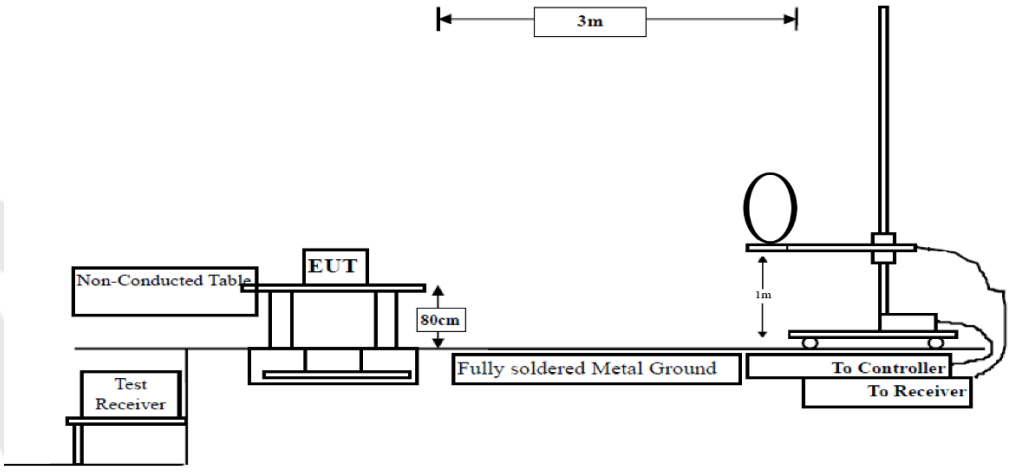


Figure 1. Below 30MHz

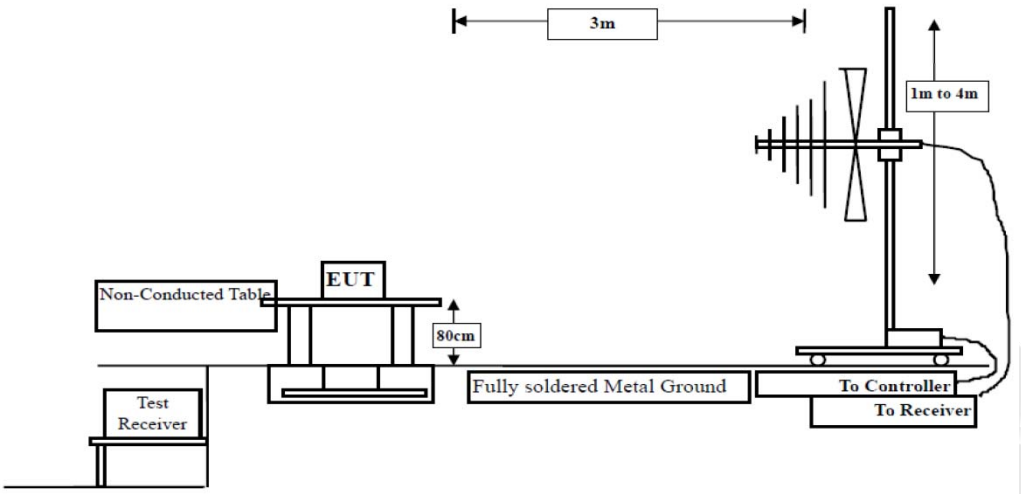


Figure 2. 30MHz to 1GHz

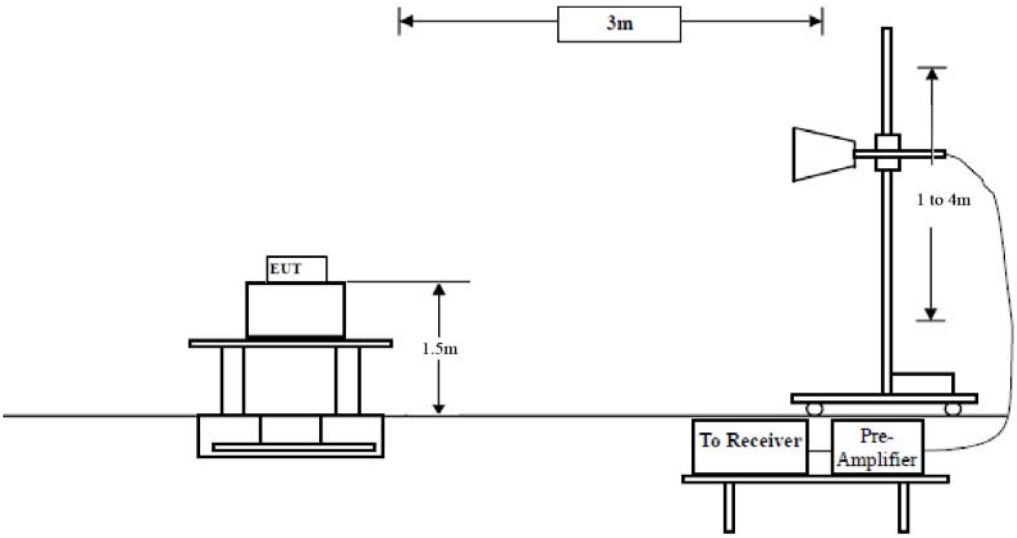


Figure 3. Above 1 GHz

4.3. Test Procedure

For below 1GHz: The EUT is placed on a turntable, which is 0.8m above the ground plane.
For above 1GHz: The EUT is placed on a turntable, which is 1.5m above the ground plane.
The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT is set 3 meters away from the receiving antenna which is mounted on a antenna tower. The antenna can be moved up and down from 1 to 4 meters to find out the maximum emission level. Rotated the EUT through three orthogonal axes to determine the maximum emissions, both horizontal and vertical polarization of the antenna are set on test. The EUT is tested in 9*6*6 Chamber. The device is evaluated in xyz orientation.

For 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 =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.

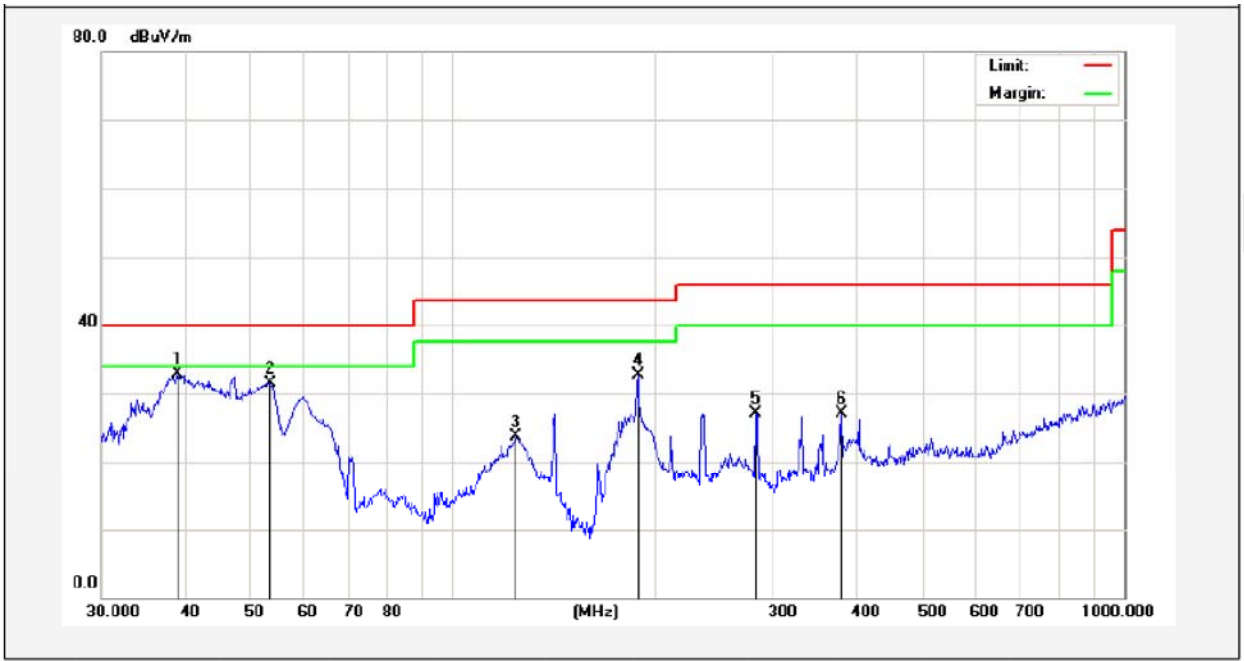
Test Results (30~1000MHz)

Job No.:	0117020641W	Temp.(℃)/Hum.(%RH):	24.3℃/55%RH
Standard:	FCC PART 15C	Power Source:	AC 120V/60HZ from adapter
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	33.2112	42.19	-15.24	26.95	40.00	-13.05	peak			
2	56.1974	40.45	-15.05	25.40	40.00	-14.60	peak			
3	114.9169	45.13	-20.97	24.16	43.50	-19.34	peak			
4	185.7882	53.86	-21.31	32.55	43.50	-10.95	peak			
5	207.1226	53.99	-20.60	33.39	43.50	-10.11	peak			
6	392.0951	45.17	-13.03	32.14	46.00	-13.86	peak			

Test Results (30~1000MHz)

Job No.:	0117020641W	Temp.(℃)/Hum.(%RH):	24.3℃/55%RH
Standard:	FCC PART 15C	Power Source:	AC 120V/60HZ from adapter
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	38.8878	44.08	-11.24	32.84	40.00	-7.16	peak			
2	53.5052	46.26	-14.82	31.44	40.00	-8.56	peak			
3	124.1330	40.56	-16.95	23.61	43.50	-19.89	peak			
4	188.4125	48.87	-16.07	32.80	43.50	-10.70	peak			
5	281.9946	42.24	-15.17	27.07	46.00	-18.93	peak			
6	378.5843	39.34	-12.30	27.04	46.00	-18.96	peak			

Test Results (Above 1000MHz)

Test Mode: TX 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.
4804.00	38.98	34.04	6.58	34.09	45.51	74.00	-28.49	V
7206.00	32.94	37.11	7.73	34.50	43.28	74.00	-30.72	V
9608.00	32.46	39.31	9.23	34.79	46.21	74.00	-27.79	V
12010.00	*					74.00		V
14412.00	*					74.00		V
4804.00	43.60	34.04	6.58	34.09	50.13	74.00	-23.87	H
7206.00	34.84	37.11	7.73	34.50	45.18	74.00	-28.82	H
9608.00	32.04	39.31	9.23	34.79	45.79	74.00	-28.21	H
12010.00	*					74.00		H
14412.00	*					74.00		H
Average Value								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Pol.
4804.00	27.48	34.04	6.58	34.09	34.01	54.00	-19.99	V
7206.00	21.44	37.11	7.73	34.50	31.78	54.00	-22.22	V
9608.00	20.41	39.31	9.23	34.79	34.16	54.00	-19.84	V
12010.00	*					54.00		V
14412.00	*					54.00		V
4804.00	31.89	34.04	6.58	34.09	38.42	54.00	-15.58	H
7206.00	23.72	37.11	7.73	34.50	34.06	54.00	-19.94	H
9608.00	20.28	39.31	9.23	34.79	34.03	54.00	-19.97	H
12010.00	*					54.00		H
14412.00	*					54.00		H

Test Results (Above 1000MHz)

Test Mode: TX Mode				Test channel: Middle				
Peak Value								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Pol.
4880.00	37.30	34.38	6.69	34.09	44.28	74.00	-29.72	V
7320.00	31.83	37.22	7.78	34.53	42.30	74.00	-31.70	V
9760.00	31.47	39.46	9.35	34.80	45.48	74.00	-28.52	V
12200.00	*					74.00		V
14640.00	*					74.00		V
4880.00	41.59	34.38	6.69	34.09	48.57	74.00	-25.43	H
7320.00	33.58	37.22	7.78	34.53	44.05	74.00	-29.95	H
9760.00	30.89	39.46	9.35	34.80	44.90	74.00	-29.10	H
12200.00	*					74.00		H
14640.00	*					74.00		H
Average Value								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Pol.
4880.00	26.13	34.38	6.69	34.09	33.11	54.00	-20.89	V
7320.00	20.52	37.22	7.78	34.53	30.99	54.00	-23.01	V
9760.00	19.60	39.46	9.35	34.80	33.61	54.00	-20.39	V
12200.00	*					54.00		V
14640.00	*					54.00		V
4880.00	30.36	34.38	6.69	34.09	37.34	54.00	-16.66	H
7320.00	22.70	37.22	7.78	34.53	33.17	54.00	-20.83	H
9760.00	19.33	39.46	9.35	34.80	33.34	54.00	-20.66	H
12200.00	*					54.00		H
14640.00	*					54.00		H

Test Results (Above 1000MHz)

Test Mode: TX 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.
4960.00	36.69	34.72	6.79	34.09	44.11	74.00	-29.89	V
7440.00	31.42	37.34	7.82	34.57	42.01	74.00	-31.99	V
9920.00	31.11	39.62	9.46	34.81	45.38	74.00	-28.62	V
12400.00	*					74.00		V
14880.00	*					74.00		V
4960.00	40.85	34.72	6.79	34.09	48.27	74.00	-25.73	H
7440.00	33.12	37.34	7.82	34.57	43.71	74.00	-30.29	H
9920.00	30.47	39.62	9.46	34.81	44.74	74.00	-29.26	H
12400.00	*					74.00		H
14880.00	*					74.00		H
Average Value								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Pol.
4960.00	25.69	34.72	6.79	34.09	33.11	54.00	-20.89	V
7440.00	20.22	37.34	7.82	34.57	30.81	54.00	-23.19	V
9920.00	19.34	39.62	9.46	34.81	33.61	54.00	-20.39	V
12400.00	*					54.00		V
14880.00	*					54.00		V
4960.00	29.86	34.72	6.79	34.09	37.28	54.00	-16.72	H
7440.00	22.36	37.34	7.82	34.57	32.95	54.00	-21.05	H
9920.00	19.02	39.62	9.46	34.81	33.29	54.00	-20.71	H
12400.00	*					54.00		H
14880.00	*					54.00		H

Remark:

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

2. “*”, means this data is the too weak instrument of signal is unable to test.

Radiated Band Edge:

Test Mode: GFSK				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	44.95	29.15	3.41	34.01	43.50	74.00	-30.50	H
2400.00	62.03	29.16	3.43	34.01	60.61	74.00	-13.39	H
2390.00	45.69	29.15	3.41	34.01	44.24	74.00	-29.76	V
2400.00	64.29	29.16	3.43	34.01	62.87	74.00	-11.13	V
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	35.03	29.15	3.41	34.01	33.58	54.00	-20.42	H
2400.00	46.39	29.16	3.43	34.01	44.97	54.00	-9.03	H
2390.00	35.12	29.15	3.41	34.01	33.67	54.00	-20.33	V
2400.00	43.24	29.16	3.43	34.01	41.82	54.00	-12.18	V

Test Mode: GFSK				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	47.30	29.28	3.53	34.03	46.08	74.00	-27.92	H
2500.00	46.08	29.30	3.56	34.03	44.91	74.00	-29.09	H
2483.50	48.49	29.28	3.53	34.03	47.27	74.00	-26.73	V
2500.00	47.27	29.30	3.56	34.03	46.10	74.00	-27.90	V
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	37.88	29.28	3.53	34.03	36.66	54.00	-17.34	H
2500.00	35.59	29.30	3.56	34.03	34.42	54.00	-19.58	H
2483.50	39.27	29.28	3.53	34.03	38.05	54.00	-15.95	V
2500.00	35.68	29.30	3.56	34.03	34.51	54.00	-19.49	V

Remark:

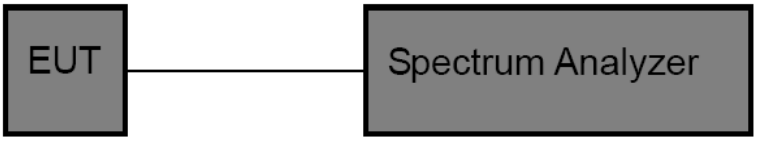
1. Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor

5. Maximum Peak Output Power Test

5.1. Test Standard and Limit

Test Standard	FCC Part15 C Section 15.247 (b)(3)
Test Limit	30dBm

5.2. Test Setup



5.3. Test Procedure

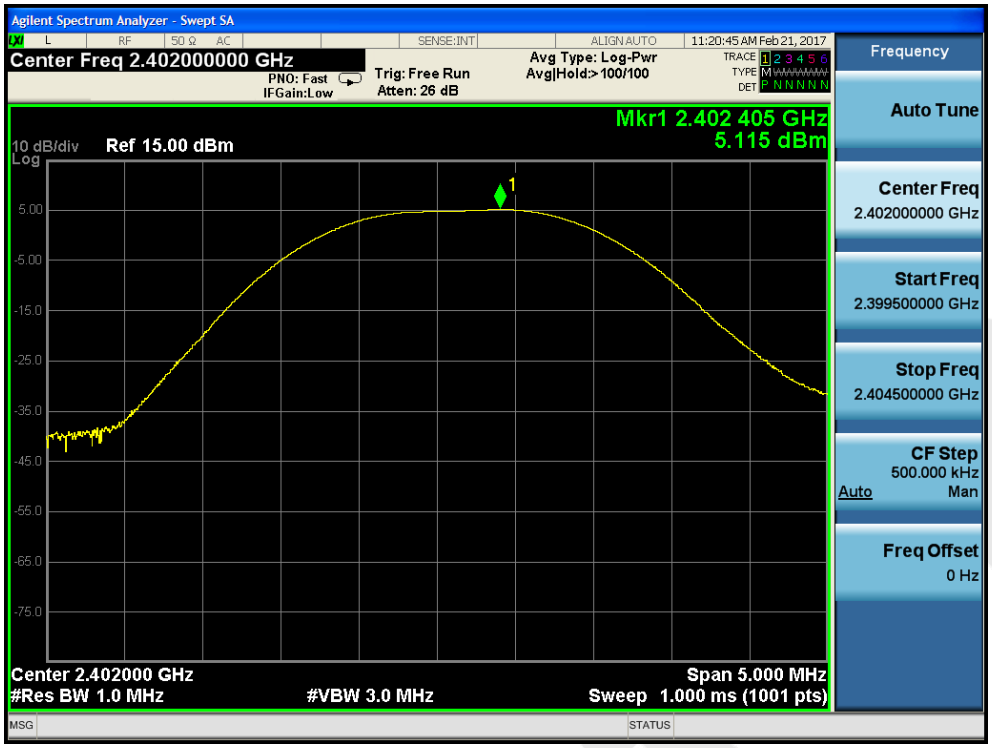
This procedure shall be used when the measurement instrument has available a resolution bandwidth that is greater than the DTS bandwidth.

1. Set the RBW ≥DTS bandwidth.
2. Set the VBW≥3*RBW.
3. Set the span≥ 3*RBW.
4. Detector = peak.
5. Sweep time = auto couple.
6. Trace mode = max hold.
7. Allow trace to fully stabilize.
8. Use peak marker function to determine the peak amplitude level.

5.4. Test Data

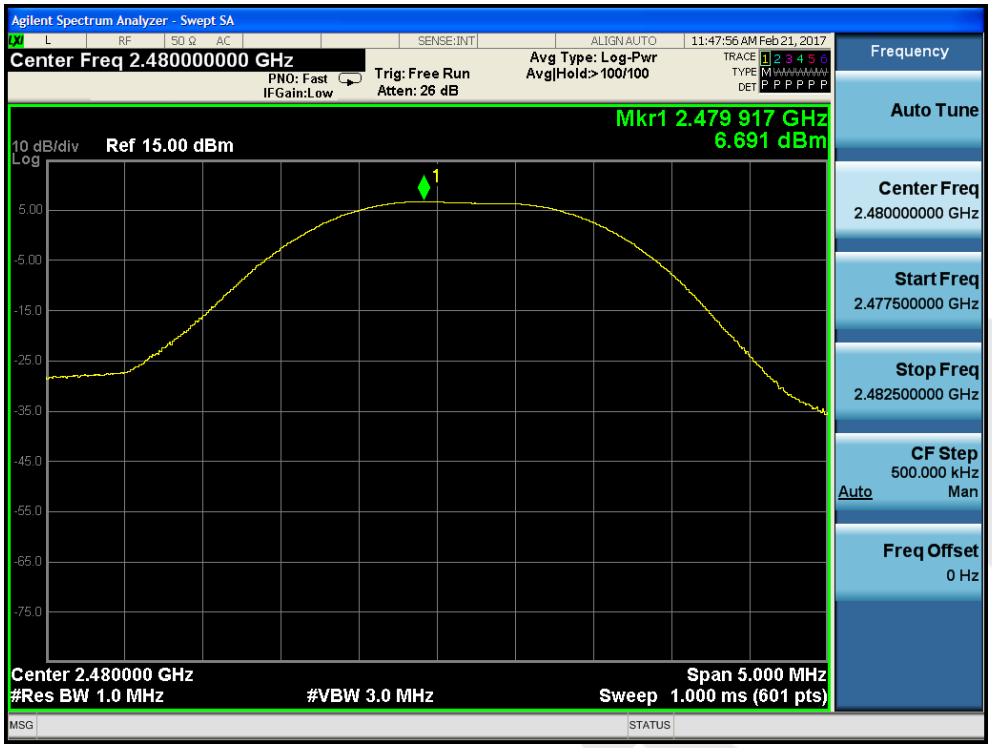
Test Item	:	Max. peak output power	Test Mode	:	CH Low ~ CH High
Test Voltage	:	AC120V, 60Hz for adapter	Temperature	:	24℃
Test Result	:	PASS	Humidity	:	55%RH

Channel Frequency (MHz)	Peak Power output (dBm)	Limit (dBm)	Results
2402	5.115	30	PASS
2442	6.041	30	PASS
2480	**6.691**	30	PASS



CH: Low

CH: Middle


Agilent Spectrum Analyzer - Swept SA
Center Freq 2.480000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 26 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
11:47:56 AM Feb 21, 2017
Mkr1 2.479 917 GHz
6.691 dBm
10 dB/div
Log
Ref 15.00 dBm
5.00
-5.00
-15.0
-25.0
-35.0
-45.0
-55.0
-65.0
-75.0
Center 2.480000 GHz
#Res BW 1.0 MHz
#VBW 3.0 MHz
Span 5.000 MHz
Sweep 1.000 ms (601 pts)
Frequency
Auto Tune
Center Freq
2.480000000 GHz
Start Freq
2.477500000 GHz
Stop Freq
2.482500000 GHz
CF Step
500.000 kHz
Auto
Man
Freq Offset
0 Hz
MSG
STATUS

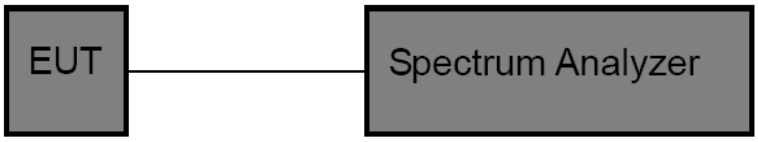
CH: High

6. 6DB Occupy Bandwidth Test

6.1. Test Standard and Limit

Test Standard	FCC Part15 C Section 15.247 (a)(2)
Test Limit	>500kHz

6.2. Test Setup



6.3. 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 = 100kHz, VBW≥3*RBW =300kHz,

Detector= Peak

Trace mode= Max hold.

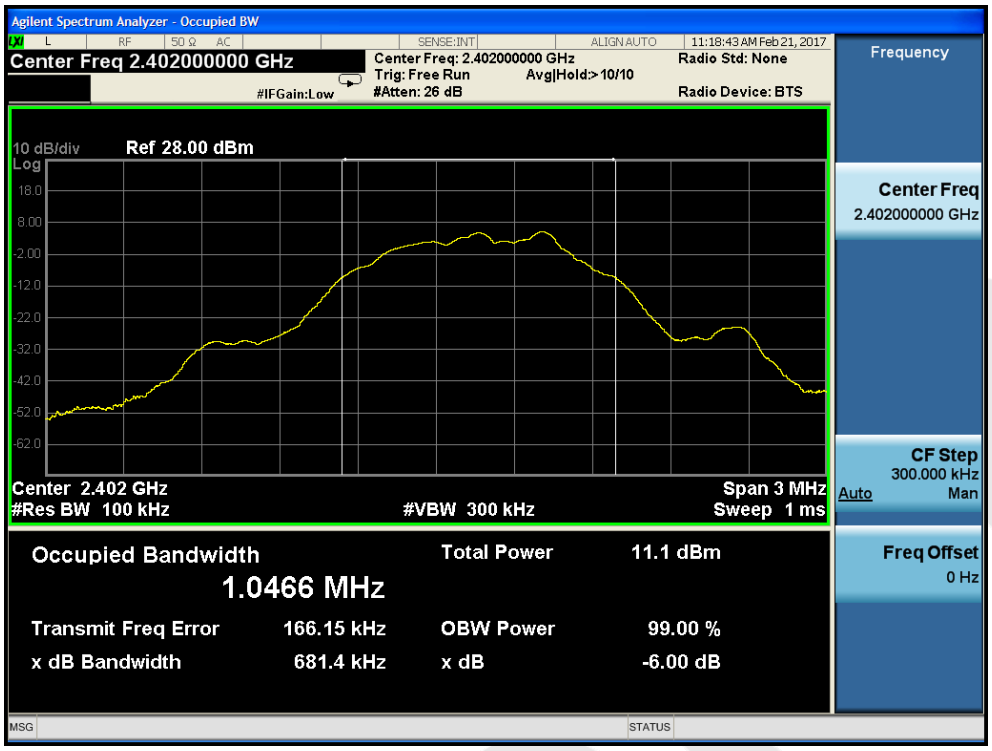
Sweep- auto couple.

4. Mark the peak frequency and –6dB (upper and lower) frequency.
5. Repeat until all the rest channels are investigated.

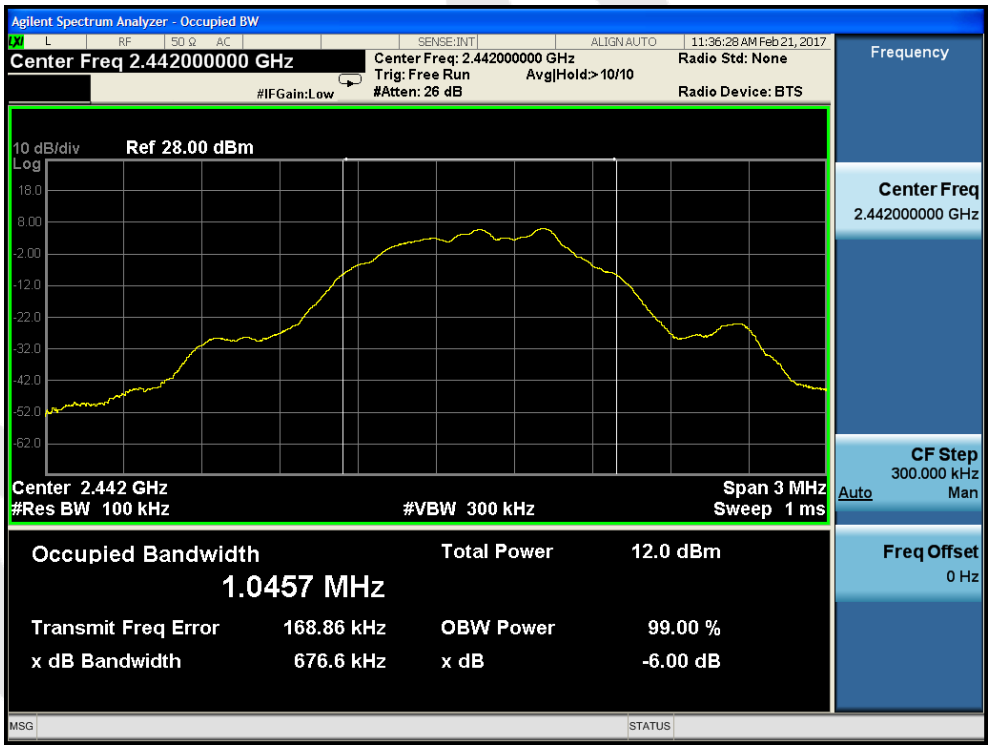
6.4. Test Data

Test Item	:	6dB Bandwidth	Test Mode	:	CH Low ~ CH High
Test Voltage	:	AC120V, 60Hz for adapter	Temperature	:	24℃
Test Result	:	PASS	Humidity	:	55%RH

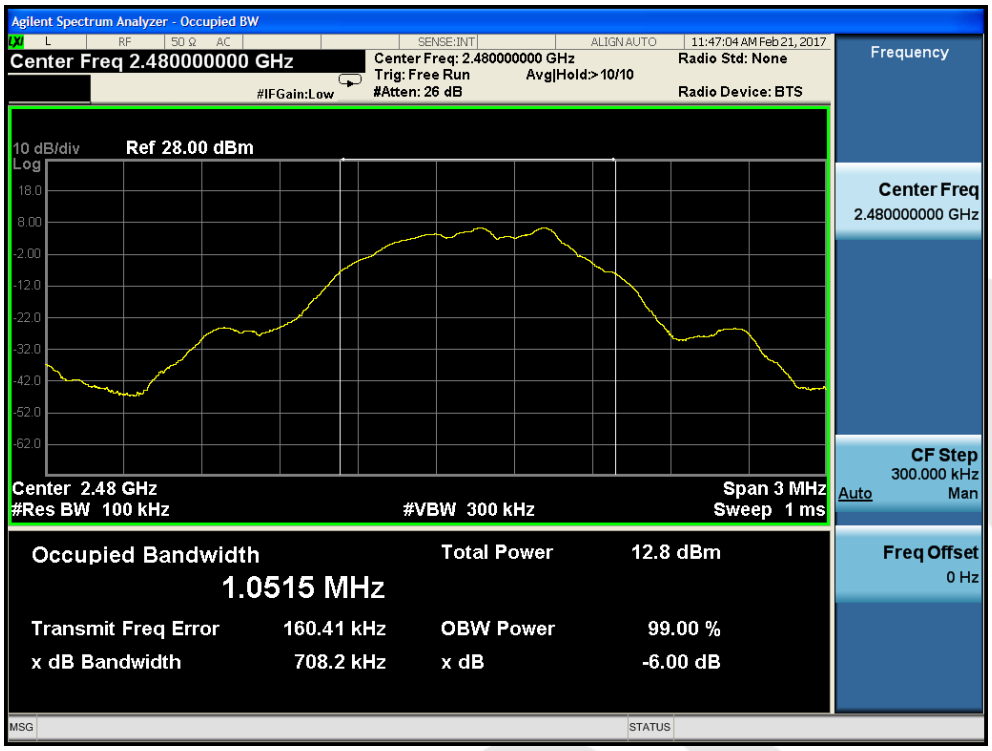
Channel	Frequency(MHz)	Bandwidth (kHz)	Limit (kHz)	Results
Low	2402	681.4	>500	PASS
Middle	2442	676.6		PASS
High	2480	708.2		PASS



CH: Low



CH: Middle


Agilent Spectrum Analyzer - Occupied BW
Center Freq 2.480000000 GHz
Center Freq: 2.480000000 GHz
Trig: Free Run
Avg|Hold:>10/10
#Atten: 26 dB
#IFGain:Low
Radio Std: None
Radio Device: BTS
11:47:04 AM Feb 21, 2017
Frequency
10 dB/div
Log
Ref 28.00 dBm
18.0
8.00
-2.00
-12.0
-22.0
-32.0
-42.0
-52.0
-62.0
Center Freq
2.480000000 GHz
CF Step
300.000 kHz
Auto
Man
Center 2.48 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 3 MHz
Sweep 1 ms
Occupied Bandwidth
1.0515 MHz
Total Power
12.8 dBm
Transmit Freq Error
160.41 kHz
OBW Power
99.00 %
x dB Bandwidth
708.2 kHz
x dB
-6.00 dB
Freq Offset
0 Hz
MSG
STATUS

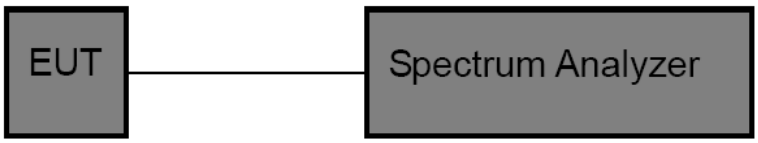
CH: High

7. Power Spectral Density Test

7.1. Test Standard and Limit

Test Standard	FCC Part15 C Section 15.247 (e)
Test Limit	8dBm

7.2. Test Setup



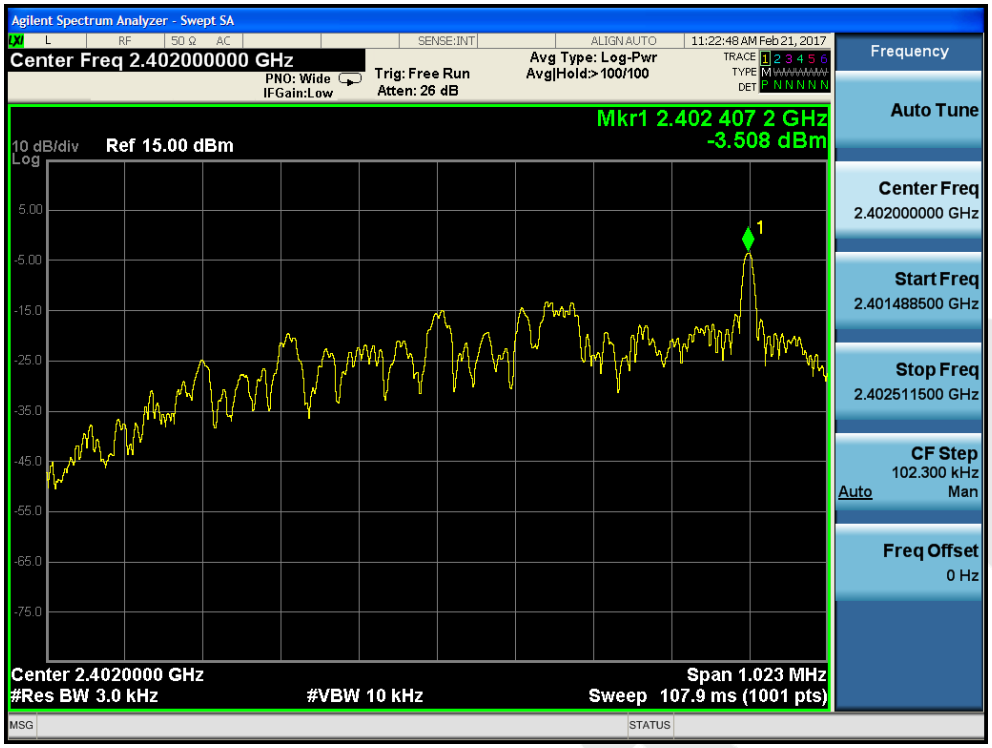
7.3. Test Procedure

1. Place the EUT on the table and set it in transmitting mode. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
2. Set the spectrum analyzer as RBW = 3kHz, VBW = 10kHz, Span = 1.5xDTS BW
3. Record the max. reading.
4. Repeat the above procedure until the measurements for all frequencies are completed.

7.4. Test Data

Test Item	:	Power Spectral Density	Test Mode	:	CH Low ~ CH High
Test Voltage	:	AC120V, 60Hz for adapter	Temperature	:	24℃
Test Result	:	PASS	Humidity	:	55%RH

Channel	Frequency (MHz)	PPSD (dBm/3KHz)	Limit (dBm/3KHz)	Results
Low	2402	-3.508	8.00	PASS
Middle	2442	-2.615	8.00	PASS
High	2480	-2.310	8.00	PASS



CH: Low

CH: Middle


Agilent Spectrum Analyzer - Swept SA
Center Freq 2.480000000 GHz
PNO: Wide
IFGain:Low
Trig: Free Run
Atten: 26 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
11:49:12 AM Feb 21, 2017
Mkr1 2.480 412 8 GHz
-2.310 dBm
10 dB/div
Log
Ref 15.00 dBm
5.00
-5.00
-15.0
-25.0
-35.0
-45.0
-55.0
-65.0
-75.0
Center 2.4800000 GHz
#Res BW 3.0 kHz
#VBW 10 kHz
Span 1.063 MHz
Sweep 112.1 ms (601 pts)
Frequency
Auto Tune
Center Freq
2.480000000 GHz
Start Freq
2.479468500 GHz
Stop Freq
2.480531500 GHz
CF Step
106.300 kHz
Auto
Man
Freq Offset
0 Hz

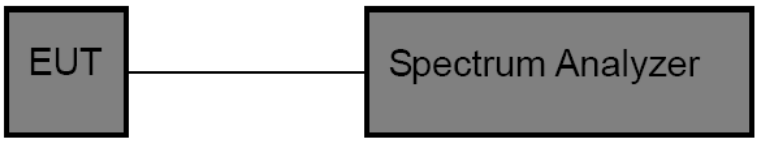
CH: High

8. 100kHz Bandwidth of Frequency Band Edge Requirement

8.1. Test Standard and Limit

Test Standard	FCC Part15 C Section 15.247 (d)
Test Limit	in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator in operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in15.209(a).

8.2. Test Setup



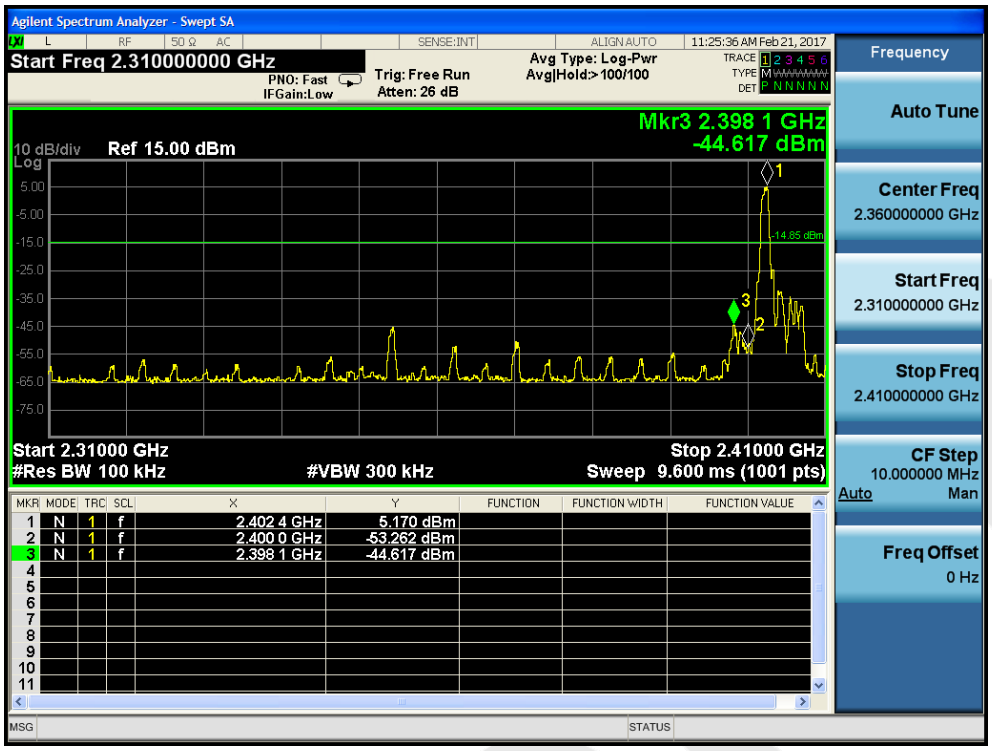
8.3. Test Procedure

Using the following spectrum analyzer setting:
1. Set the RBW = 100KHz.
2. Set the VBW = 300KHz.
3. Sweep time = auto couple.
4. Detector function = peak.
5. Trace mode = max hold.
6. Allow trace to fully stabilize.

8.4. Test Data

Test Item	:	Band edge	Test Mode	:	CH Low ~ CH High
Test Voltage	:	AC120V, 60Hz for adapter	Temperature	:	24℃
Test Result	:	PASS	Humidity	:	55%RH

Frequency Band (MHz)	Delta Peak toBand Emission (dBc)	Limit (dBc)	Results
2400	48.092	>20	PASS
2483.5	41.979	>20	PASS



CH: Low

CH: High

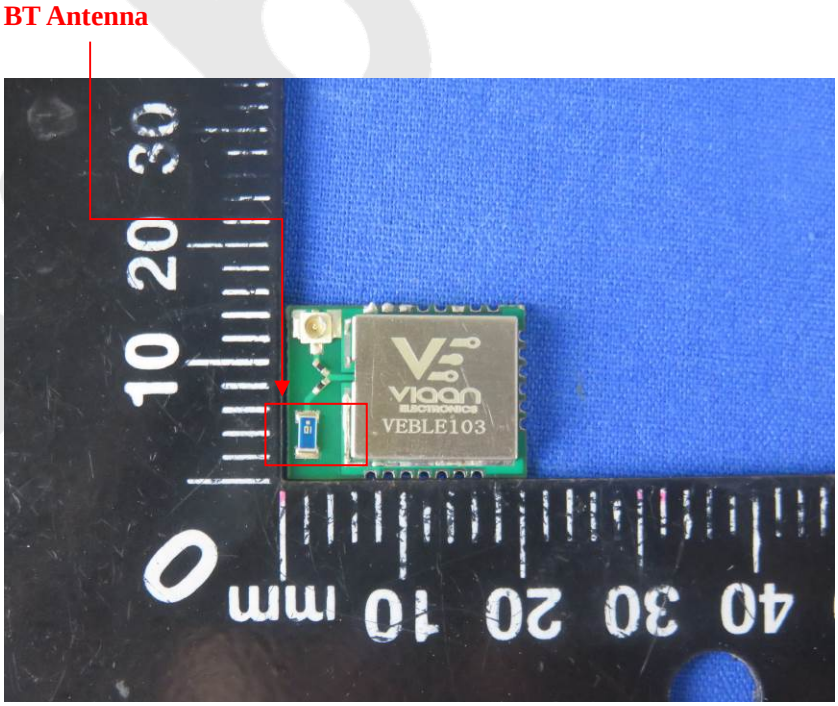
9. Antenna Requirement

9.1. Test Standard and Requirement

Test Standard	FCC Part15 Section 15.203 /247(c)
Requirement	1) 15.203 requirement: An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. 2) 15.247(c) (1)(i) requirement: Systems operating in the 2400-2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

9.2. Antenna Connected Construction

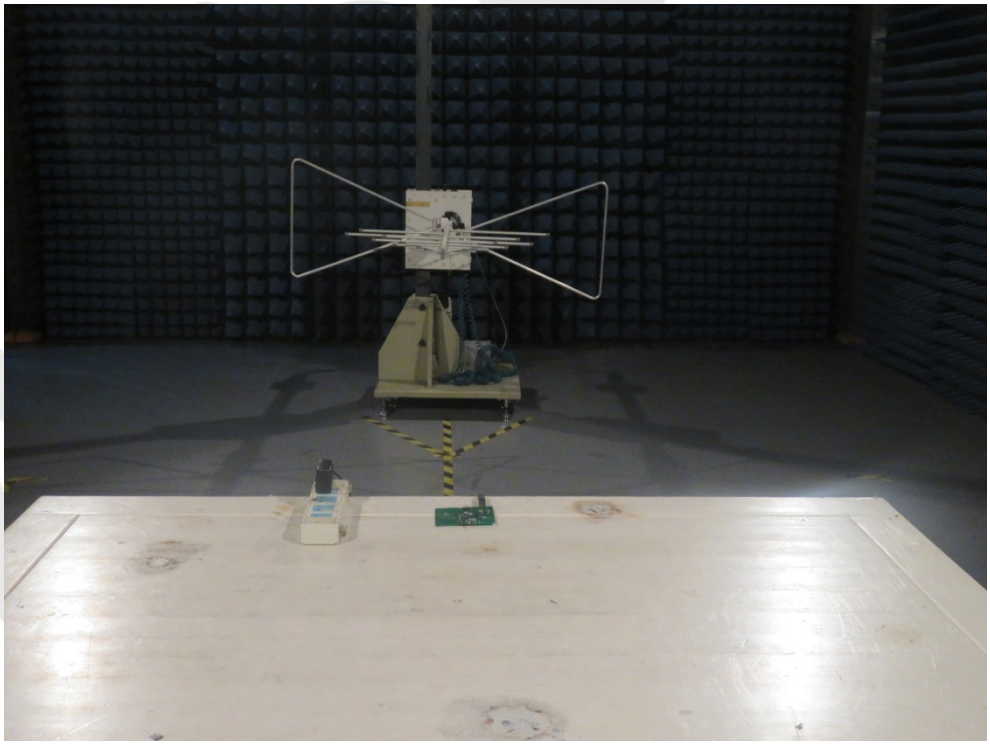
The bluetooth antenna is a ceramic antenna which permanently attached, and the best case gain of the antenna is 2dBi. It complies with the standard requirement.

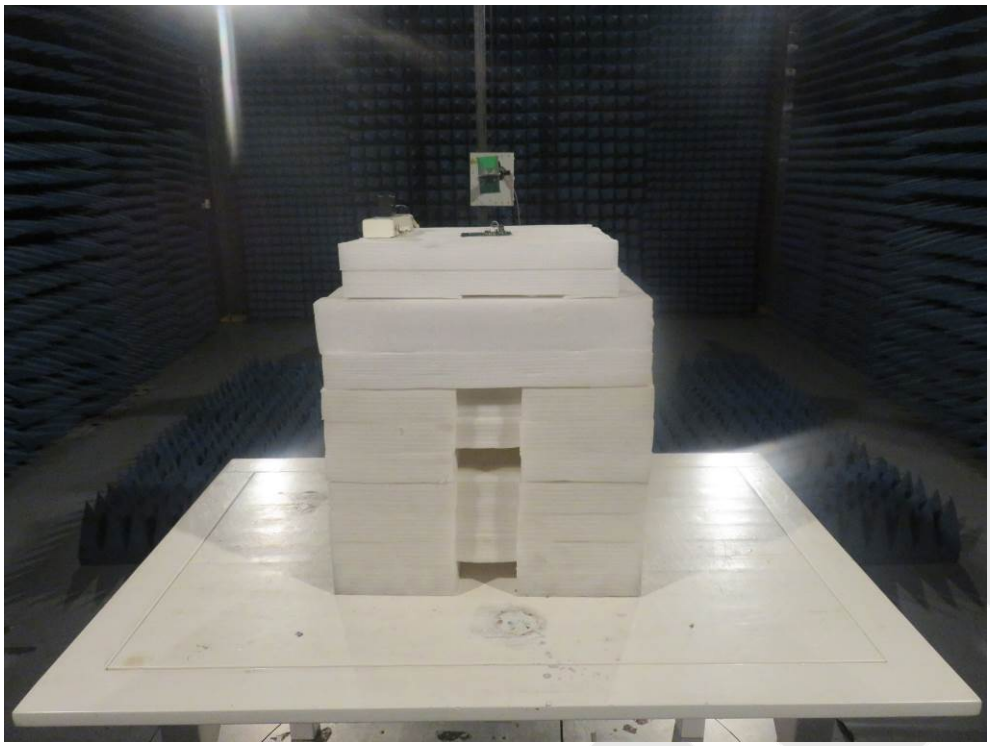


APPENDIX I -- TEST SETUP PHOTOGRAPH

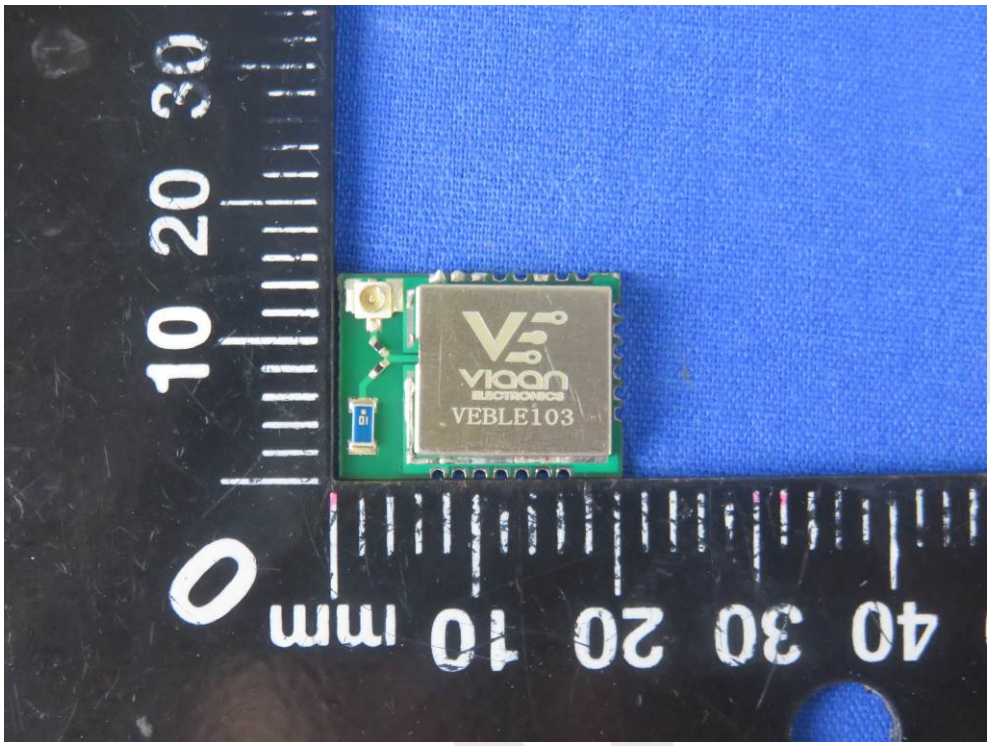
Photo of Conducted Emission Measurement

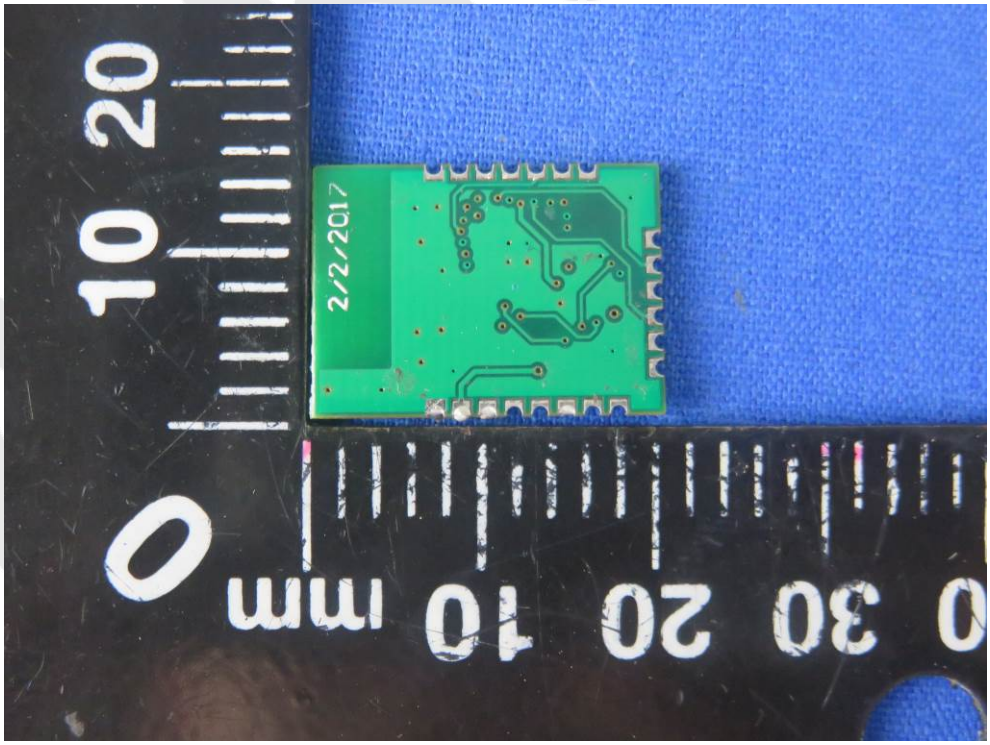
Photo of Radiation Emission Test



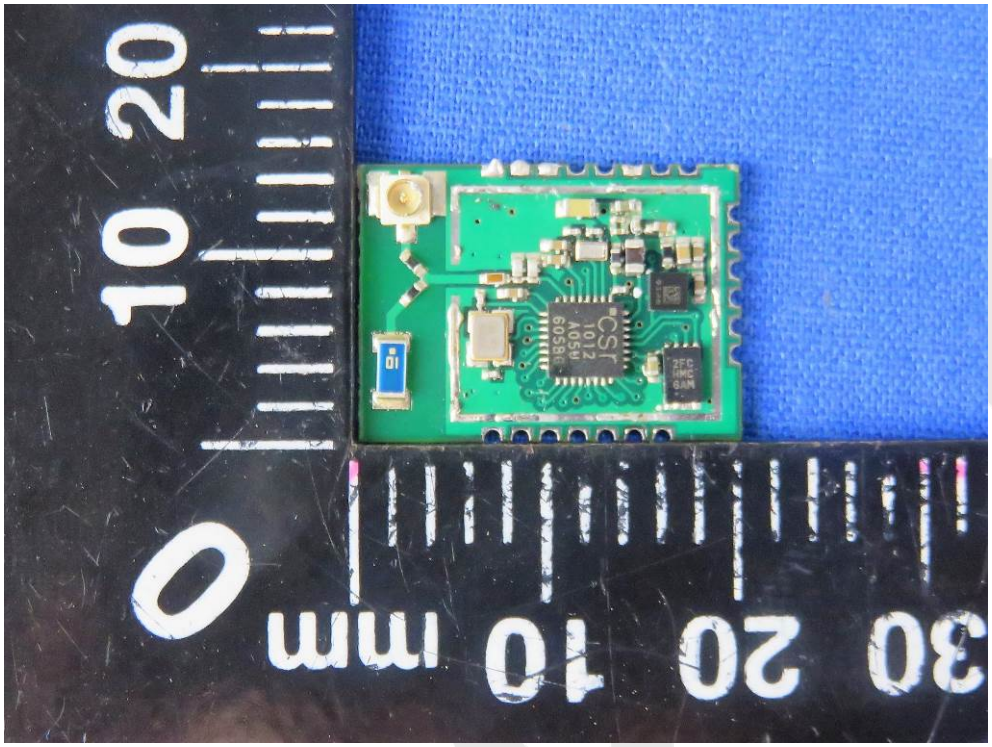


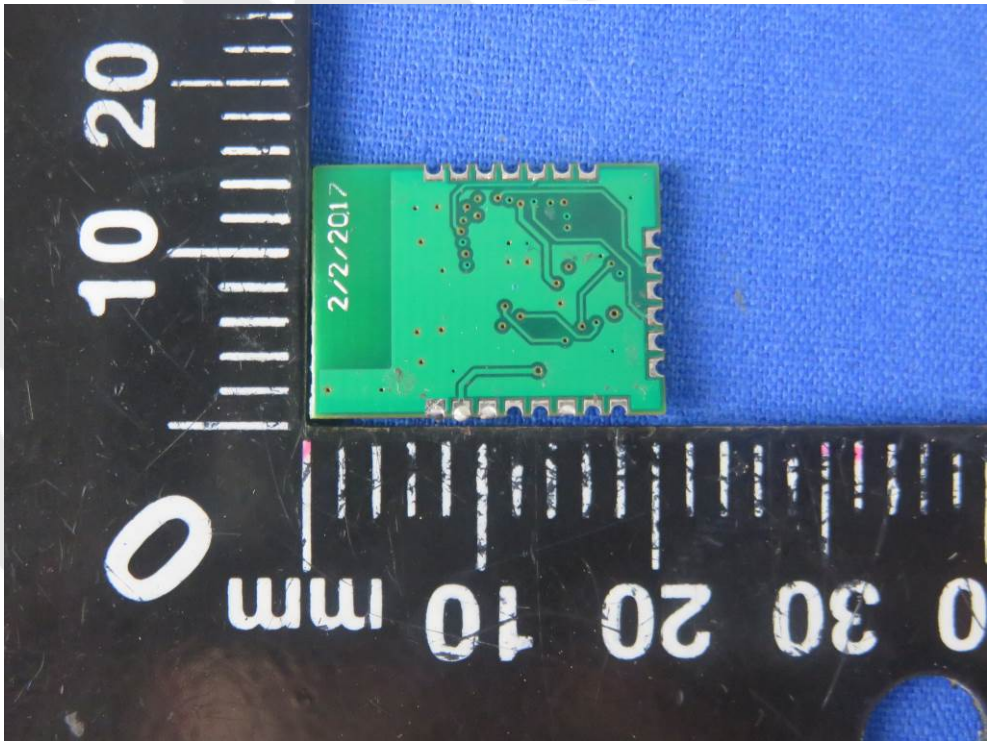
APPENDIX II -- EXTERNAL PHOTOGRAPH

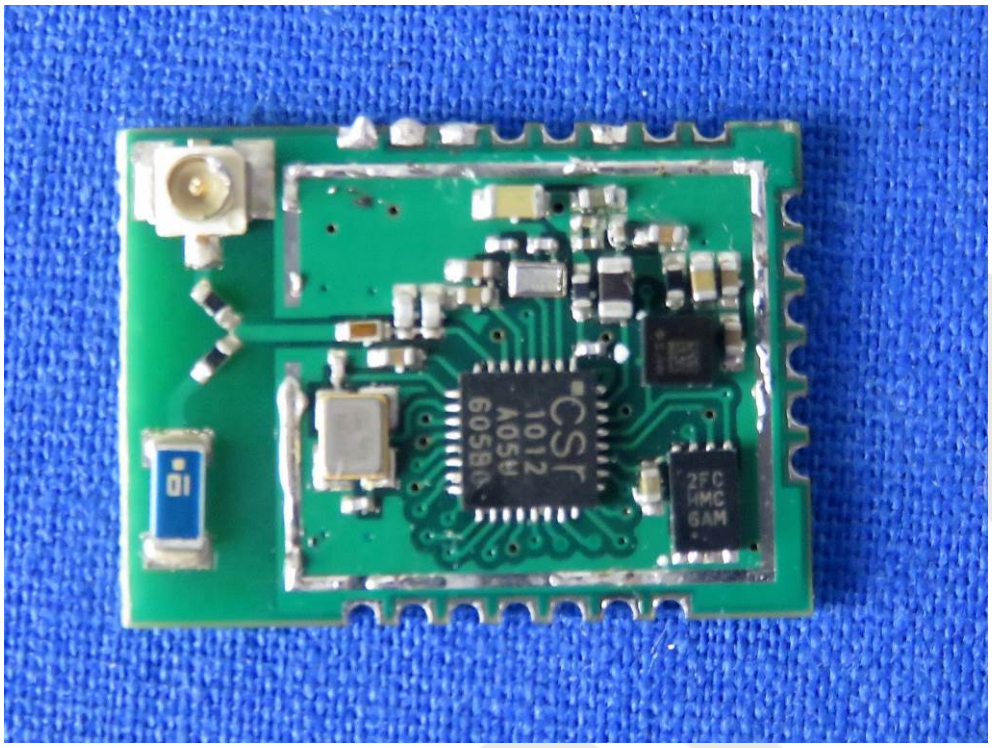


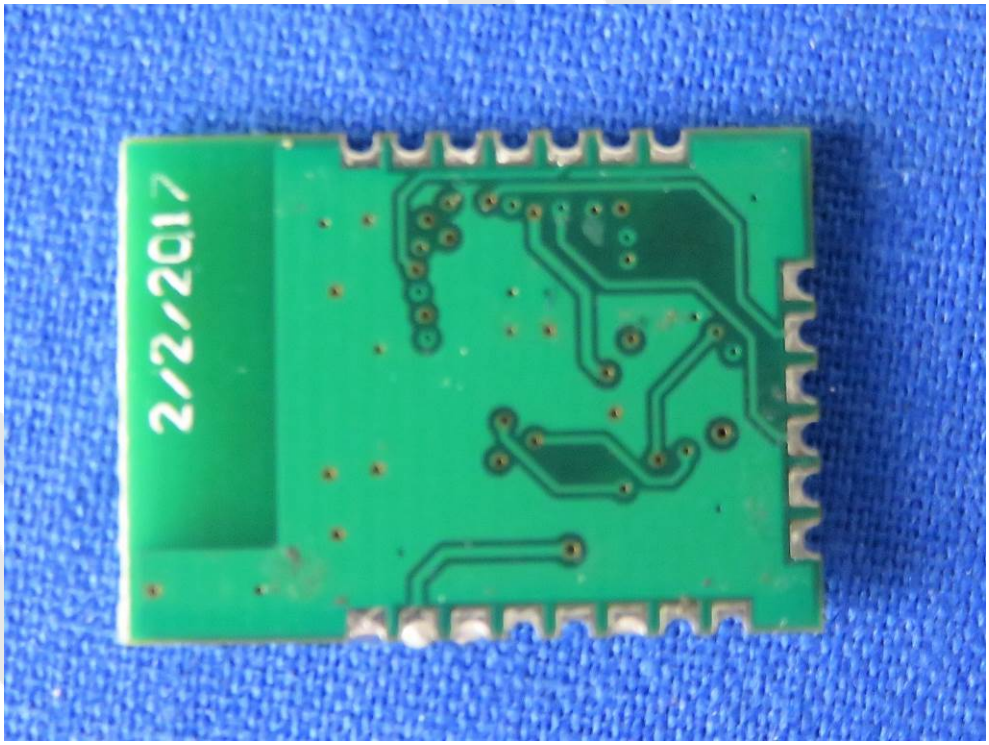


APPENDIX III -- INTERNAL PHOTOGRAPH






csr
1012
A05W
6058


2/2/2017