



FCC Part 15C Test Report

FCC ID: 2ADGHCON2005

Product Name:	Embedded WiFi module
Trademark:	N/A
Model Name :	TinyCon2005-LM-D
Prepared For :	Ralinwi Nanjing Electronic Technology Co., Ltd.
Address :	Room 404,Building 6,No.6 Su Yuan Road,Xuanwu District, Nanjing, China
Prepared By :	Shenzhen BCTC Technology Co., Ltd.
Address :	No.101,Yousong Road,Longhua New District, Shenzhen,China
Test Date:	Aug. 26- Aug. 30, 2015
Date of Report :	Aug. 31, 2015
Report No.:	BCTC-15080236



TEST RESULT CERTIFICATION

Applicant's name : Ralinwi Nanjing Electronic Technology Co., Ltd.
Address : Room 404,Building 6,No.6 Su Yuan Road,Xuanwu District,
Nanjing, China

Manufacture's Name : Ralinwi Nanjing Electronic Technology Co., Ltd.
Address : Room 404,Building 6,No.6 Su Yuan Road,Xuanwu District,
Nanjing, China

Product description

Product name : Embedded WiFi module
Model and/or type reference : TinyCon2005-LM-D
Serial Model : N/A

Standards : FCC Part15.247

Test procedure ANSI C63.10-2013

This device described above has been tested by BCTC, 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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**Table of Contents**

	Page
1 . SUMMARY OF TEST RESULTS	5
1.1 TEST FACILITY	6
1.2 MEASUREMENT UNCERTAINTY	6
2 . GENERAL INFORMATION	7
2.1 GENERAL DESCRIPTION OF EUT	7
2.2 DESCRIPTION OF TEST MODES	8
2.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED	9
2.4 DESCRIPTION OF SUPPORT UNITS(CONDUCTED MODE)	9
2.5 EQUIPMENTS LIST FOR ALL TEST ITEMS	10
3 . EMC EMISSION TEST	11
3.1 CONDUCTED EMISSION MEASUREMENT	11
3.1.1 POWER LINE CONDUCTED EMISSION LIMITS	11
3.1.2 TEST PROCEDURE	11
3.1.3 DEVIATION FROM TEST STANDARD	11
3.1.4 TEST SETUP	12
3.1.5 EUT OPERATING CONDITIONS	12
3.1.6 TEST RESULTS	12
3.2 RADIATED EMISSION MEASUREMENT	13
3.2.1 RADIATED EMISSION LIMITS	13
3.2.2 TEST PROCEDURE	14
3.2.3 DEVIATION FROM TEST STANDARD	14
3.2.4 TEST SETUP	15
3.2.5 EUT OPERATING CONDITIONS	16
3.2.6 TEST RESULTS (BETWEEN 9KHZ – 30 MHZ)	17
3.2.7 TEST RESULTS (BETWEEN 30MHZ – 1GHZ)	18
3.2.8 TEST RESULTS (ABOVE 1000 MHZ)	20
4 . POWER SPECTRAL DENSITY TEST	23
4.1 APPLIED PROCEDURES / LIMIT	23
4.1.1 TEST PROCEDURE	23
4.1.2 DEVIATION FROM STANDARD	23
4.1.3 TEST SETUP	23
4.1.4 EUT OPERATION CONDITIONS	23
4.1.5 TEST RESULTS	24



Table of Contents	Page
5 . BANDWIDTH TEST	30
5.1 APPLIED PROCEDURES / LIMIT	30
5.1.1 TEST PROCEDURE	30
5.1.2 DEVIATION FROM STANDARD	30
5.1.3 TEST SETUP	30
5.1.4 EUT OPERATION CONDITIONS	30
5.1.5 TEST RESULTS	31
6 . PEAK OUTPUT POWER TEST	37
6.1 APPLIED PROCEDURES / LIMIT	37
6.1.1 TEST PROCEDURE	37
6.1.2 DEVIATION FROM STANDARD	37
6.1.3 TEST SETUP	37
6.1.4 EUT OPERATION CONDITIONS	37
6.1.5 TEST RESULTS	38
7 . 100 KHZ BANDWIDTH OF FREQUENCY BAND EDGE	39
7.1 DEVIATION FROM STANDARD	40
7.2 TEST SETUP	40
7.3 EUT OPERATION CONDITIONS	40
7.4 TEST RESULTS	40
8 . DUTY CYCLE OF TEST SIGNAL	50
8.1 STANDARD REQUIREMENT	50
8.2 FORMULA:	50
9 . ANTENNA REQUIREMENT	51
9.1 STANDARD REQUIREMENT	51
9.2 EUT ANTENNA	51
10 . EUT TEST PHOTO	52
11 . PHOTO OF THE EUT	53



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	N/A	
15.247 (a)(2)	6dB Bandwidth	PASS	
15.247 (b)	Peak Output Power	PASS	
15.247 (c)	Radiated Spurious Emission	PASS	
15.247 (d)	Power Spectral Density	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

Shenzhen BCTC Technology Co., Ltd.

Add. : No.101,Yousong Road,Longhua New District, Shenzhen,China

FCC Registered No.: 187086

1.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement $y \pm U$, where expanded 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	$\pm 1.38\text{dB}$
2	RF power,conducted	$\pm 0.16\text{dB}$
3	Spurious emissions,conducted	$\pm 0.21\text{dB}$
4	All emissions,radiated(<1G)	$\pm 4.68\text{dB}$
5	All emissions,radiated(>1G)	$\pm 4.89\text{dB}$
6	Temperature	$\pm 0.5^{\circ}\text{C}$
7	Humidity	$\pm 2\%$



2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Equipment	Embedded WiFi module	
Trade Name	N/A	
Model Name	TinyCon2005-LM-D	
Serial Model	N/A	
Model Difference	All the model are the same circuit and RF module,except model names.	
Product Description	The EUT is a Embedded WiFi module	
	Operation Frequency:	802.11b/g/n20MHz:2412~2462 MHz
	Modulation Type:	OFDM/DSSS
	Bit Rate of Transmitter	802.11b:11/5.5/2/1 Mbps 802.11g:54/48/36/24/18/12/9/6Mbps 802.11n Up to 72Mbps
	Number Of Channel	11 CH, Please see Note 2.
	Antenna Designation:	Please see Note 3.
	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.	
Channel List	Please refer to the Note 2.	
Adapter	N/A	
Battery	N/A	
Connecting I/O Port(s)	Please refer to the User's Manual	

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.
- 2.

Channel List for 802.11b/g/n(20)							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
01	2412	04	2427	07	2442	10	2457
02	2417	05	2432	08	2447	11	2462
03	2422	06	2437	09	2452		

3.

Table for Filed Antenna

Ant.	Brand	Model Name	Antenna Type	Gain (dBi)	NOTE
1	N/A	N/A	Chip Antenna	1.5	.



2.2 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	802.11b CH1/ CH6/ CH11
Mode 2	802.11g CH1/ CH6/ CH11
Mode 3	802.11n CH1/ CH6/ CH11
Mode 4	Link Mode

For Conducted Emission	
Final Test Mode	Description
Mode 4	Link Mode

For Radiated Emission	
Final Test Mode	Description
Mode 1	802.11b CH1/ CH6/ CH11
Mode 2	802.11g CH1/ CH6/ CH11
Mode 3	802.11n CH1/ CH6/ CH11

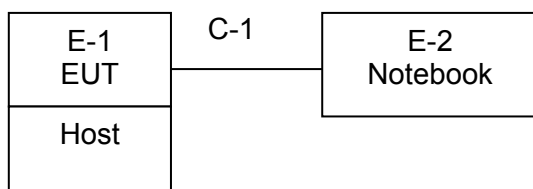
Note:

- (1) The measurements are performed at the highest, middle, lowest available channels.
- (2) The measurements are performed at all Bit Rate of Transmitter, the worst data was reported



2.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

Radiated Spurious Emission Test



2.4 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	Mfr/Brand	Model/Type No.	Series No.	Note
E-1	Embedded WiFi module	N/A	TinyCon2005-LM-D	N/A	EUT
E-2	Notebook	N/A	X550C	N/A	

Item	Shielded Type	Ferrite Core	Length	Note
C1	NO	NO	0.8M	

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.



2.5 EQUIPMENTS LIST FOR ALL TEST ITEMS

Radiation Test equipment

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	Spectrum Analyzer	Agilent	E4407B	MY45109572	2014.08.25	2015.08.24	1 year
2	Test Receiver	R&S	ESPI	101396	2014.08.25	2015.08.24	1 year
3	Bilog Antenna	SCHWARZBECK	VULB9160	VULB9160-3369	2014.08.25	2015.08.24	1 year
4	50Ω Coaxial Switch	Anritsu	MP59B	6200264416	2015.06.07	2016.06.06	1 year
5	Spectrum Analyzer	ADVANTEST	R3132	150900201	2015.06.07	2016.06.06	1 year
6	Horn Antenna	SCHWARZBECK	9120D	9120D-1275	2014.08.25	2015.08.24	1 year
7	Horn Ant	Schwarzbeck	BBHA 9170	9170-181	2014.07.06	2015.07.05	1 year
8	Amplifier	SCHWARZBECK	BBV9718	9718-270	2014.08.25	2015.08.24	1 year
9	Amplifier	SCHWARZBECK	BBV9743	9743-119	2014.08.25	2015.08.24	1 year
10	Loop Antenna	ARA	PLA-1030/B	1029	2015.06.08	2016.06.07	1 year
11	Power Meter	R&S	NRVS	100696	2014.07.06	2015.07.05	1 year
12	Power Sensor	R&S	URV5-Z4	0395.1619.05	2014.07.06	2015.07.05	1 year
13	RF cables	R&S	N/A	N/A	2014.07.06	2015.07.05	1 year



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

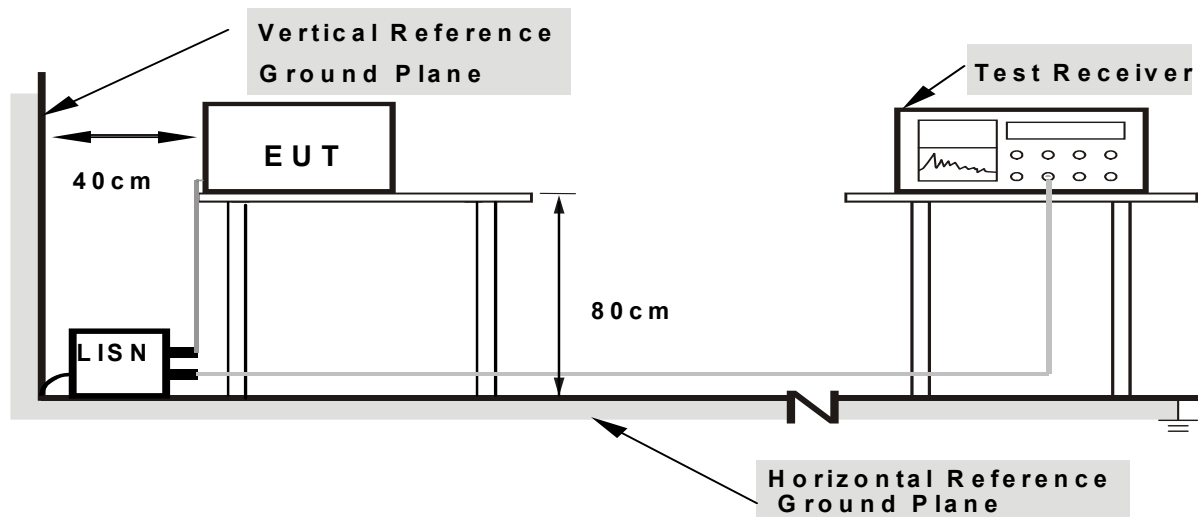
3.1.2 TEST PROCEDURE

- 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

EUT :	Embedded WiFi module	Model Name. :	TinyCon2005-LM-D
Temperature :	26°C	Relative Humidity :	54%
Pressure :	1010hPa	Phase :	/
Test Voltage :	DC 3.3V	Test Mode :	Mode 1

The product's power provide by host, no requirment for conduct test.



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

LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

FREQUENCY (MHz)	Class A (dBuV/m) (at 3M)		Class B (dBuV/m) (at 3M)	
	PEAK	AVERAGE	PEAK	AVERAGE
Above 1000	80	60	74	54

Notes:

- (1) The limit for radiated test was performed according to FCC PART 15C.
- (2) The tighter limit applies at the band edges.
- (3) Emission level (dBuV/m)=20log Emission level (uV/m).

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th 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

- a. The measuring distance of at 3 m shall be used for measurements at frequency up to 1GHz. For frequencies above 1GHz, any suitable measuring distance may be used.
- b. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter open area test site. The table was rotated 360 degrees to determine the position of the highest radiation.
- c. The height of the equipment or of the substitution antenna shall be 0.8 m; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- e. If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.
- f. For the actual test configuration, please refer to the related Item –EUT Test Photos.

Note:

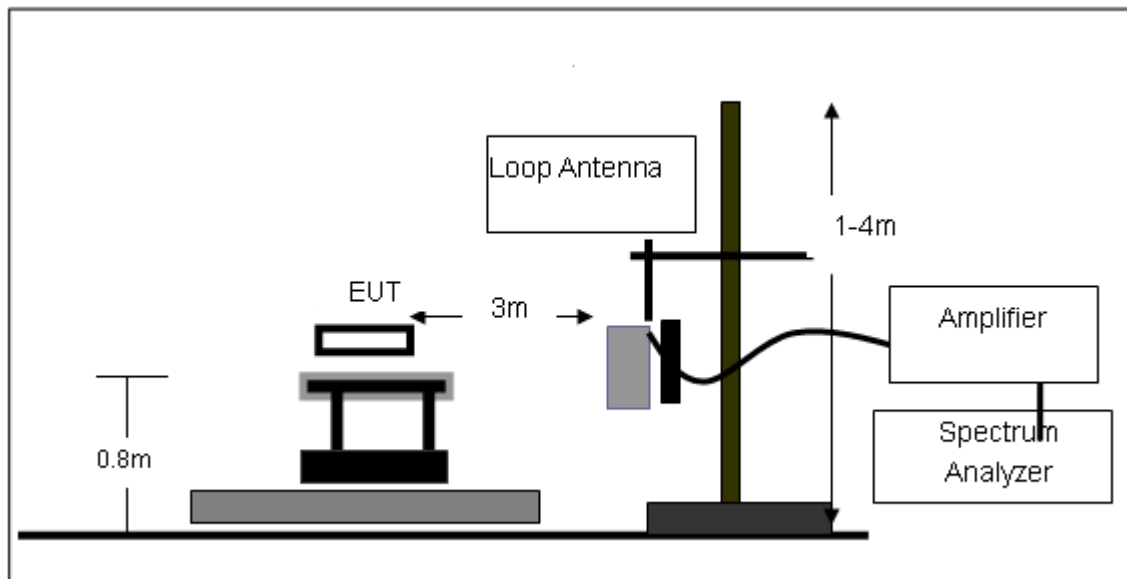
Both horizontal and vertical antenna polarities were tested
and performed pretest to three orthogonal axis. The worst case emissions were reported

3.2.3 DEVIATION FROM TEST STANDARD

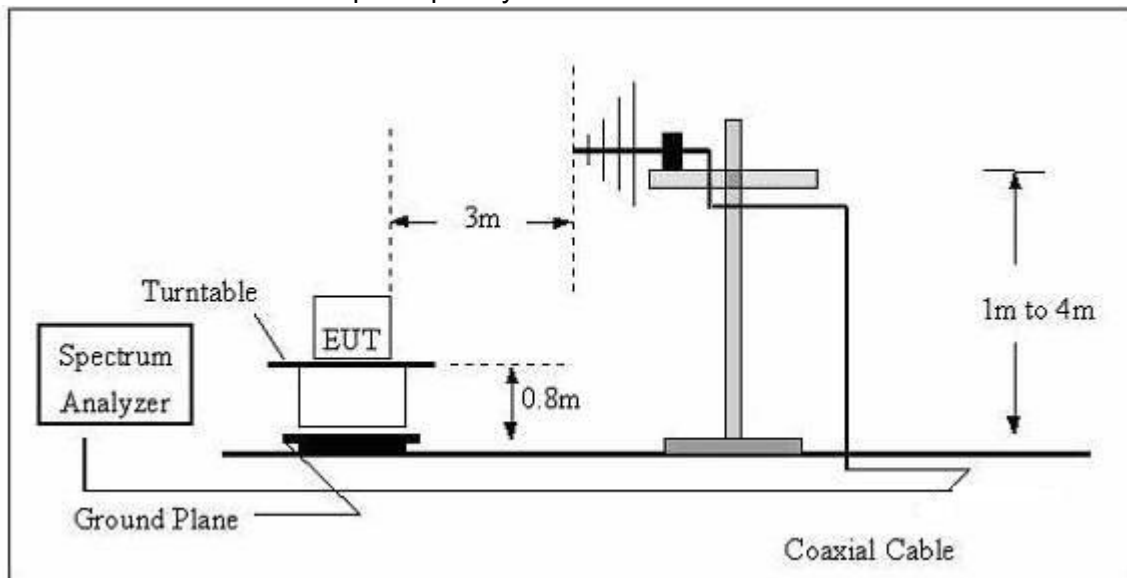
No deviation

3.2.4 TEST SETUP

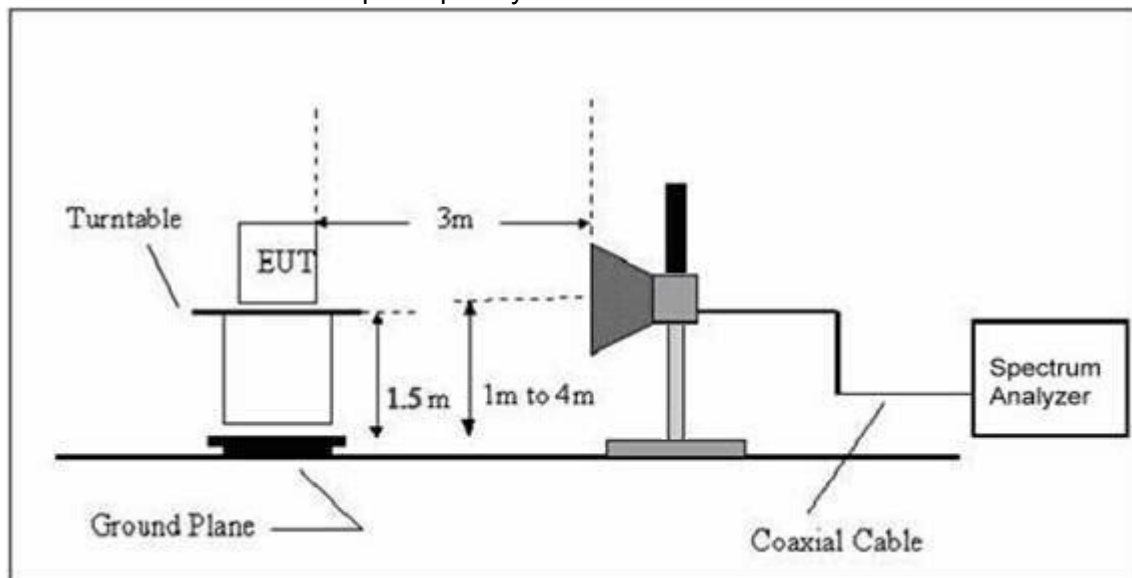
(A) Radiated Emission Test-Up Frequency Below 30MHz



(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 (BETWEEN 9KHZ – 30 MHZ)**

EUT:	Embedded WiFi module	Model Name. :	TinyCon2005-LM-D
Temperature:	20℃	Relative Humidity:	48%
Pressure:	1010 hPa	Test Voltage :	AC120V/60Hz
Test Mode :	TX	Polarization :	--

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

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 = $40 \log (\text{specific distance/test distance})$ (dB);

Limit line = specific limits(dBuV) + distance extrapolation factor.

**3.2.7 TEST RESULTS (BETWEEN 30MHZ – 1GHZ)**

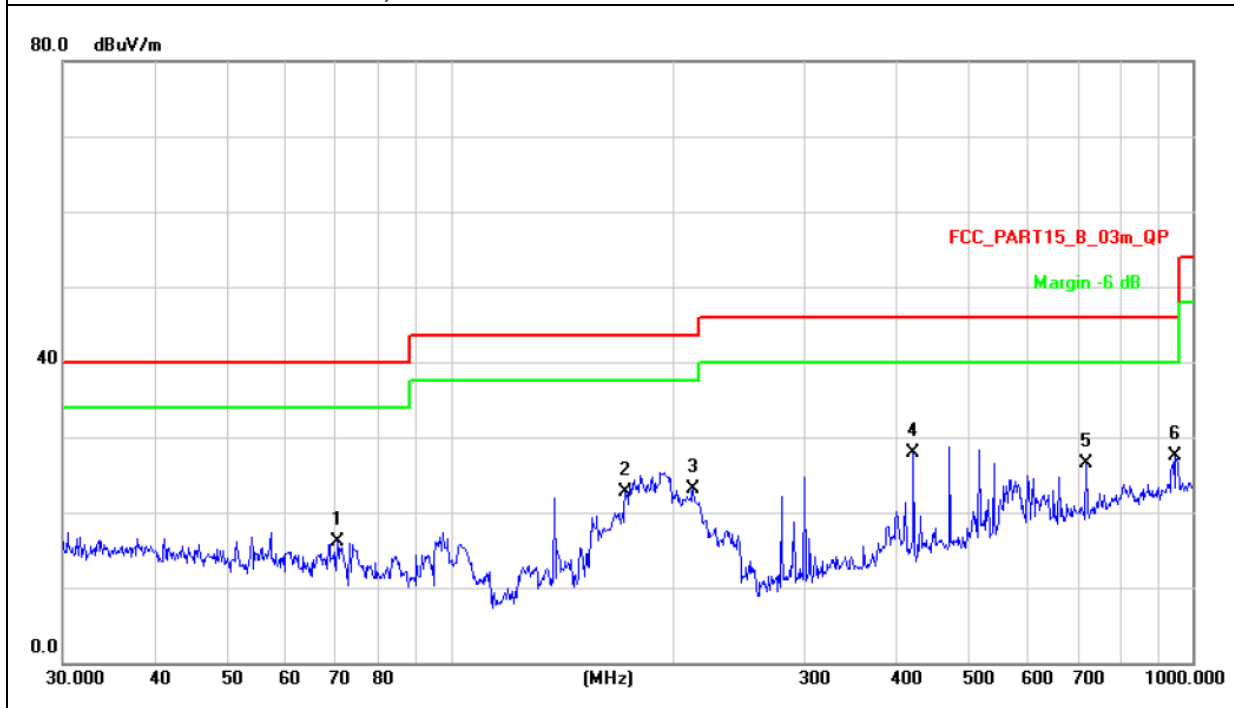
EUT :	Embedded WiFi module	Model Name :	TinyCon2005-LM-D
Temperature :	26°C	Relative Humidity :	54%
Pressure :	1010 hPa	Polarization :	Horizontal
Test Voltage :	DC5V from laptop		
Test Mode :	TX		

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector	cm	degree
1		70.3365	30.76	-14.65	16.11	40.00	-23.89	QP		
2		171.9945	36.37	-13.64	22.73	43.50	-20.77	QP		
3		212.2694	38.89	-15.85	23.04	43.50	-20.46	QP		
4	*	420.5803	37.66	-9.73	27.93	46.00	-18.07	QP		
5		719.1994	30.58	-3.98	26.60	46.00	-19.40	QP		
6		948.7609	27.90	-0.48	27.42	46.00	-18.58	QP		

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

All interfaces was connected, and TX mode was link.





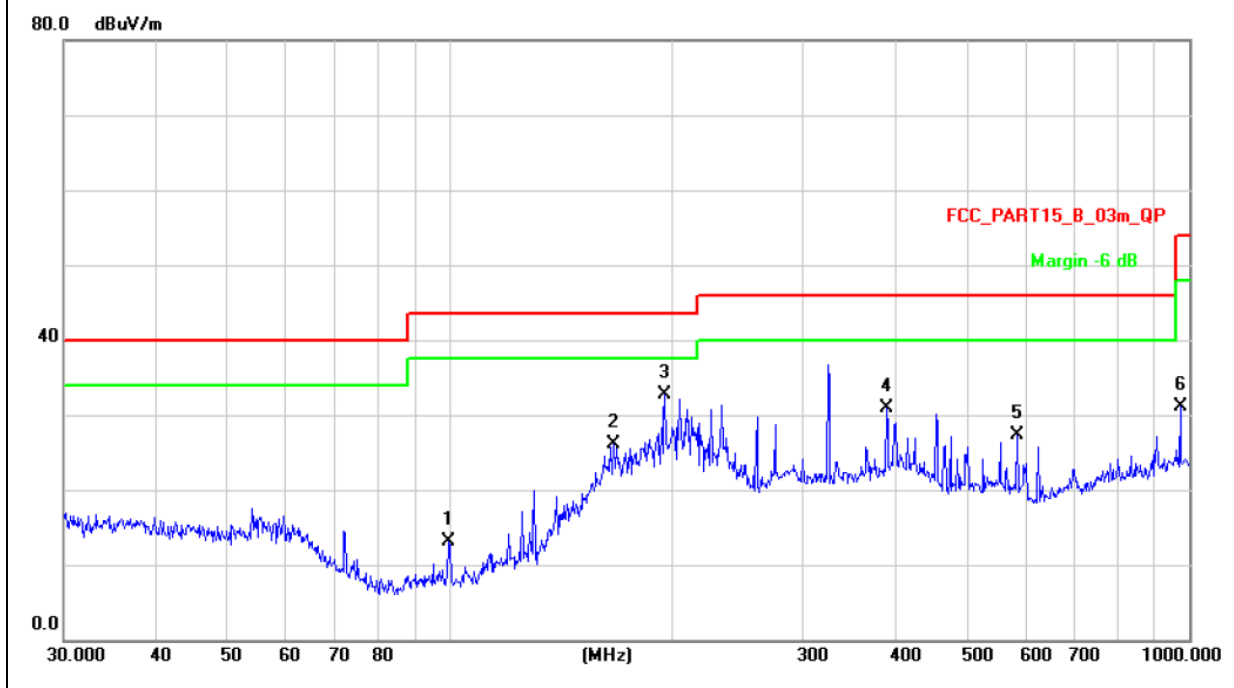
EUT :	Embedded WiFi module	Model Name :	TinyCon2005-LM-D
Temperature :	26℃	Relative Humidity :	54%
Pressure :	1010 hPa	Polarization :	Vertical
Test Voltage :	DC5V from laptop		
Test Mode :	TX		

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector	cm	degree
1		99.5279	29.66	-16.52	13.14	43.50	-30.36	peak		
2		166.0680	39.35	-13.23	26.12	43.50	-17.38	peak		
3	*	195.1365	48.63	-15.90	32.73	43.50	-10.77	peak		
4		389.3548	41.40	-10.44	30.96	46.00	-15.04	peak		
5		584.7894	33.51	-6.15	27.36	46.00	-18.64	peak		
6		972.3374	31.52	-0.39	31.13	54.00	-22.87	peak		

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

All interfaces was connected, and TX mode was link.



**3.2.8 TEST RESULTS (ABOVE 1000 MHZ)****802.11b**

Normal Voltage

Normal Voltage							
Polar (H/V)	Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
	(MHz)	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
operation frequency:2412							
V	4824.165	64.53	-3.6	60.93	74	-13.07	Pk
V	4824.165	45.74	-3.6	42.14	54	-11.86	AV
H	4824.316	64.65	-3.58	61.07	74	-12.93	Pk
H	4824.316	43.86	-3.58	40.28	54	-13.72	AV
Remark:							
Absolute Level= ReadingLevel+ Factor, Margin= Limit- Absolute Level							

802.11b

Normal Voltage

Normal Voltage							
Polar (H/V)	Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
	(MHz)	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
operation frequency:2437							
V	4875.148	62.29	-3.64	58.65	74	-15.35	Pk
V	4875.148	43.93	-3.64	40.29	54	-13.71	AV
H	4874.359	63.39	-3.64	59.75	74	-14.25	Pk
H	4874.359	41.21	-3.64	37.57	54	-16.43	AV
Remark:							
Absolute Level= ReadingLevel+ Factor, Margin= Limit- Absolute Level							

802.11b

Normal Voltage

Polar (H/V)	Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
	(MHz)	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
operation frequency:2462							
V	4924.367	62.27	-3.64	58.63	74	-15.37	pk
H	4924.367	61.12	-3.66	57.46	74	-16.54	pk
Remark: Absolute Level= ReadingLevel+ Factor, Margin= Limit- Absolute Level							

**802.11g**

Normal Voltage

Polar (H/V)	Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
	(MHz)	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
operation frequency:2412							
V	4824.362	63.49	-3.6	59.89	74	-14.11	Pk
V	4824.362	42.96	-3.6	39.36	54	-14.64	AV
H	4824.518	62.85	-3.6	59.25	74	-14.75	Pk
H	4824.518	42.89	-3.6	39.29	54	-14.71	AV
Remark: Absolute Level= ReadingLevel+ Factor, Margin= Limit- Absolute Level							

802.11g

Normal Voltage

Polar (H/V)	Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
	(MHz)	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
operation frequency:2437							
V	4873.538	63.24	-3.63	59.61	74	-14.39	Pk
V	4873.538	45.44	-3.63	41.81	54	-12.19	AV
H	4874.127	64.37	-3.64	60.73	74	-13.27	Pk
H	4874.127	44.96	-3.64	41.32	54	-12.68	AV
Remark: Absolute Level= ReadingLevel+ Factor, Margin= Limit- Absolute Level							

802.11g

Normal Voltage

Polar (H/V)	Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
	(MHz)	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
operation frequency:2462							
V	4924.218	60.08	-3.66	56.42	74	-17.58	pk
H	4924.183	58.49	-3.66	54.83	74	-19.17	pk
Remark: Absolute Level= ReadingLevel+ Factor, Margin= Limit- Absolute Level							

**802.11n(20MHz)**

Normal Voltage

Normal Voltage							
Polar (H/V)	Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
	(MHz)	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
operation frequency:2412							
V	4825.162	63.30	-3.58	59.72	74	-14.28	Pk
V	4825.162	46.16	-3.58	42.58	54	-11.42	AV
H	4824.341	64.14	-3.6	60.54	74	-13.46	Pk
H	4824.341	44.71	-3.6	41.11	54	-12.89	AV
Remark:							
Absolute Level= ReadingLevel+ Factor, Margin= Limit- Absolute Level							

802.11n(20MHz)

Normal Voltage

Normal Voltage							
Polar (H/V)	Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
	(MHz)	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
operation frequency:2437							
V	4874.284	65.38	-3.63	61.75	74	-12.25	Pk
V	4874.284	43.49	-3.63	39.86	54	-14.14	AV
H	4873.729	63.39	-3.64	59.75	74	-14.25	Pk
H	4873.729	42.12	-3.64	38.48	54	-15.52	AV
Remark:							
Absolute Level= ReadingLevel+ Factor, Margin= Limit- Absolute Level							

802.11n(20MHz)

Normal Voltage

Polar (H/V)	Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
	(MHz)	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
operation frequency:2462							
V	4924.287	60.61	-3.64	56.97	74	-17.03	pk
V	4924.287	38.55	-3.64	34.91	54	-19.09	AV
H	4925.196	55.87	-3.66	52.21	74	-21.79	pk
Remark:							
Absolute Level= ReadingLevel+ Factor, Margin= Limit- Absolute Level							



4. POWER SPECTRAL DENSITY TEST

4.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247	Power Spectral Density	8 dBm (in any 3KHz)	2400-2483.5	PASS

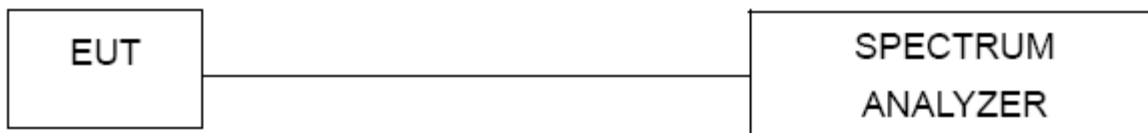
4.1.1 TEST PROCEDURE

1. Set analyzer center frequency to DTS channel center frequency.
2. Set the span to 1.5 times the DTS channel bandwidth.
3. Set the RBW ≥ 3 kHz.
4. Set the VBW $\geq 3 \times$ RBW.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

4.1.2 DEVIATION FROM STANDARD

No deviation.

4.1.3 TEST SETUP



4.1.4 EUT OPERATION CONDITIONS

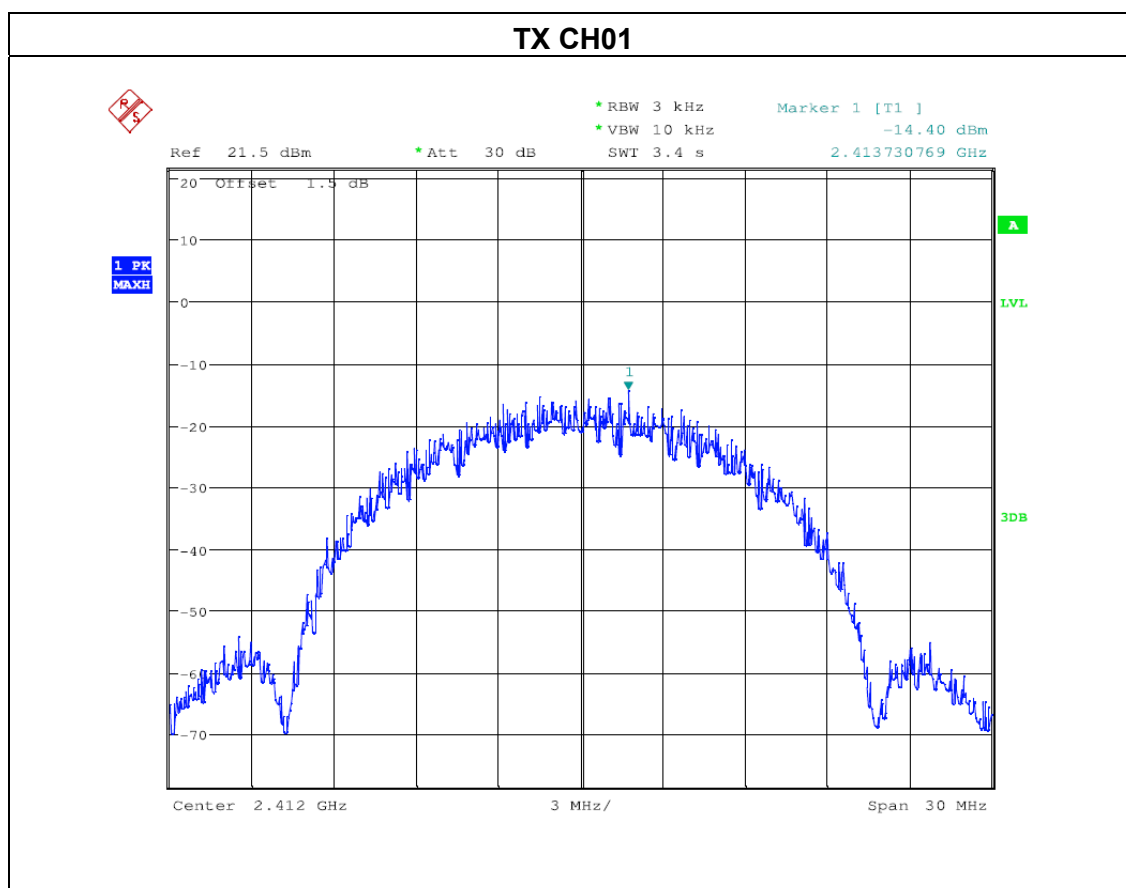
The EUT tested system was configured as the statements of 2.1 Unless otherwise a special operating condition is specified in the follows during the testing.

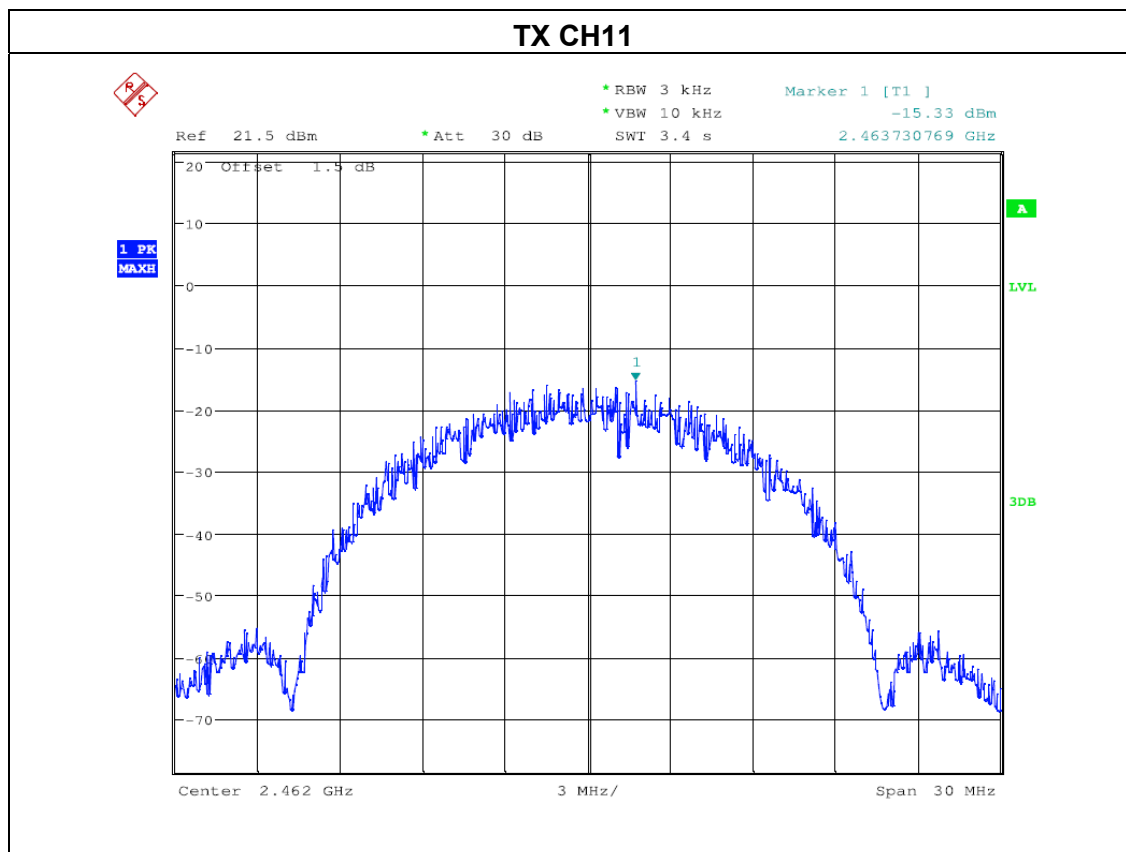
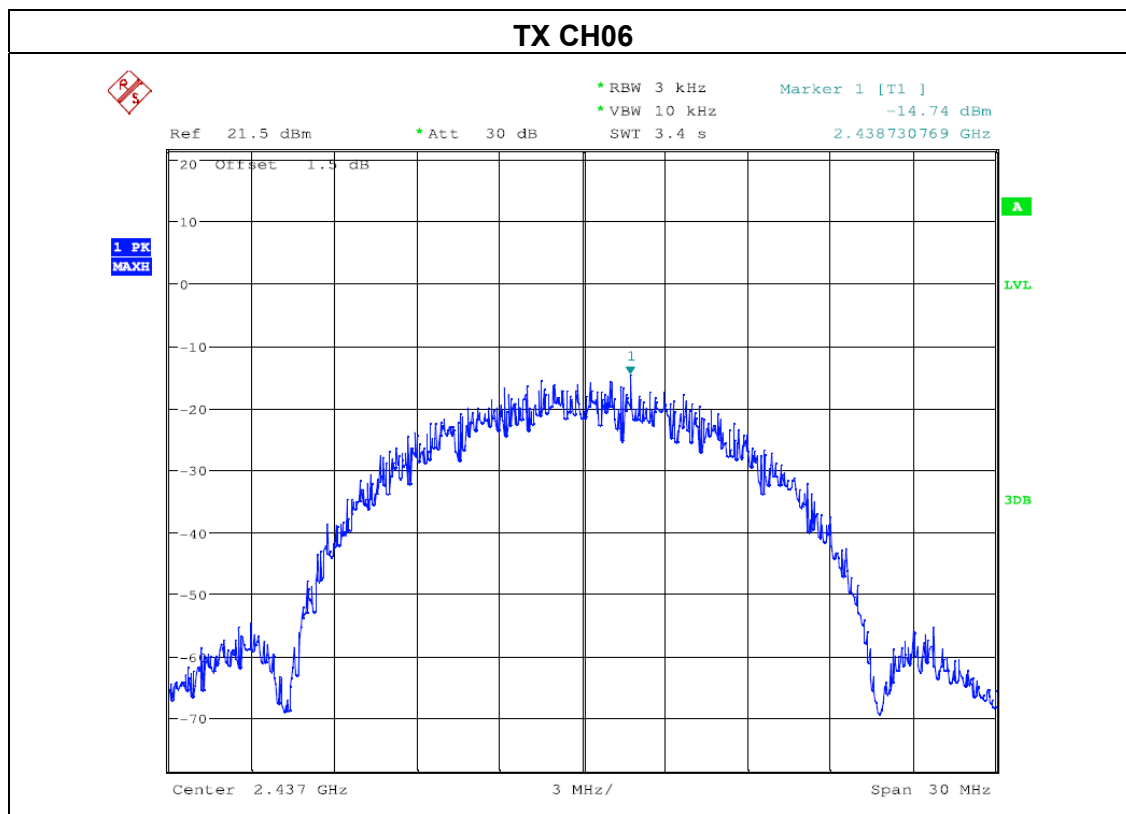


4.1.5 TEST RESULTS

EUT :	Embedded WiFi module	Model Name :	TinyCon2005-LM-D
Temperature :	25°C	Relative Humidity :	60%
Pressure :	1015 hPa	Test Voltage :	DC5V from laptop
Test Mode :	TX b Mode /CH01, CH06, CH11		

Frequency	Power Density (dBm)	Limit (dBm)	Result
2412 MHz	-14.40	8	PASS
2437 MHz	-14.74	8	PASS
2462 MHz	-15.33	8	PASS

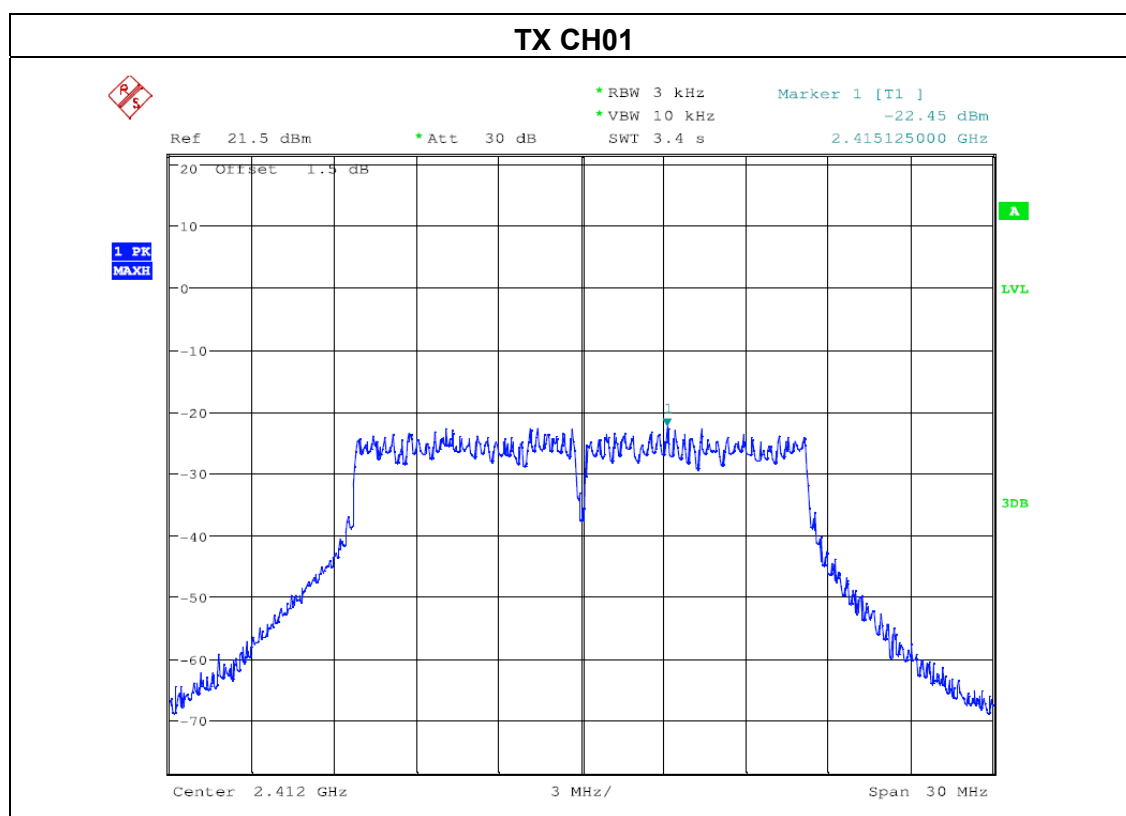






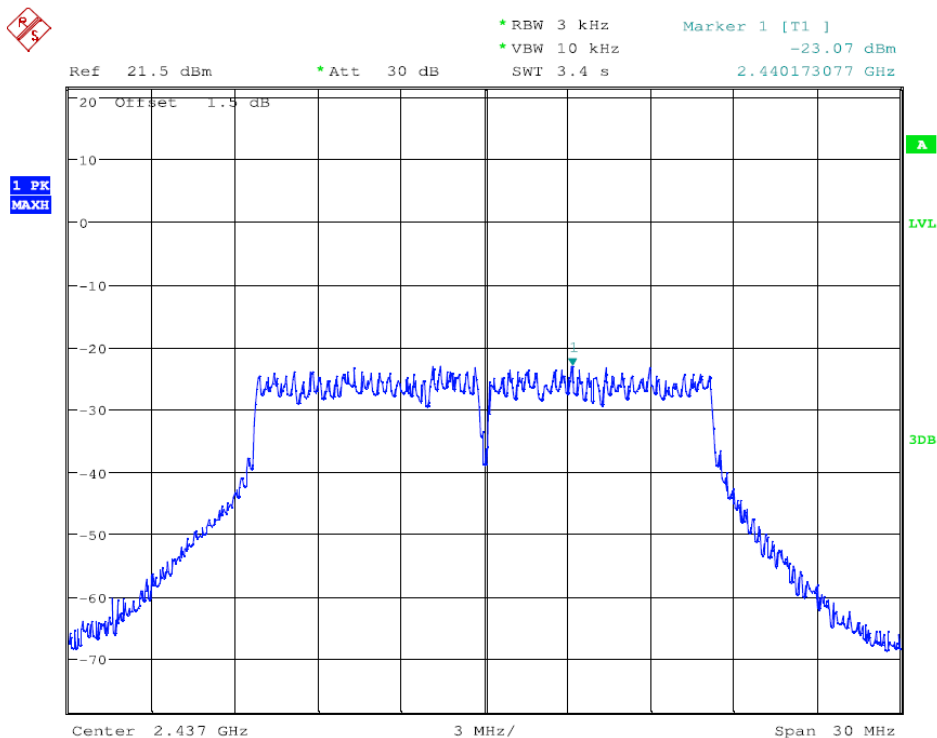
EUT :	Embedded WiFi module	Model Name :	TinyCon2005-LM-D
Temperature :	25°C	Relative Humidity :	60%
Pressure :	1015 hPa	Test Voltage :	DC5V from laptop
Test Mode :	TX g Mode /CH01, CH06, CH11		

Frequency	Power Density (dBm)	Limit (dBm)	Result
2412 MHz	-22.45	8	PASS
2437 MHz	-23.07	8	PASS
2462 MHz	-23.47	8	PASS

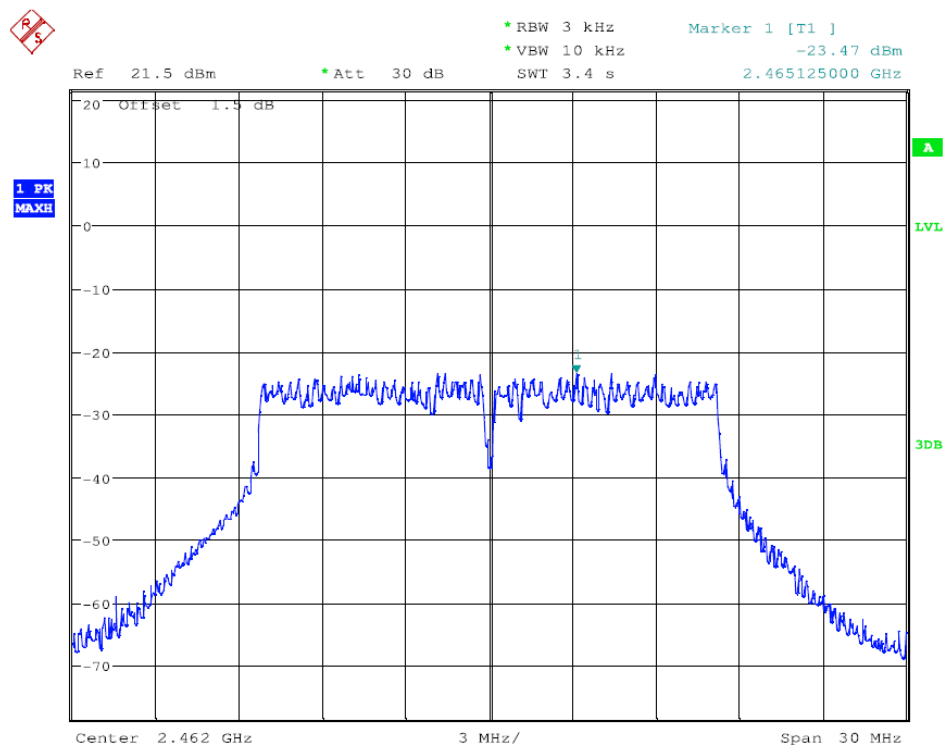




TX CH06



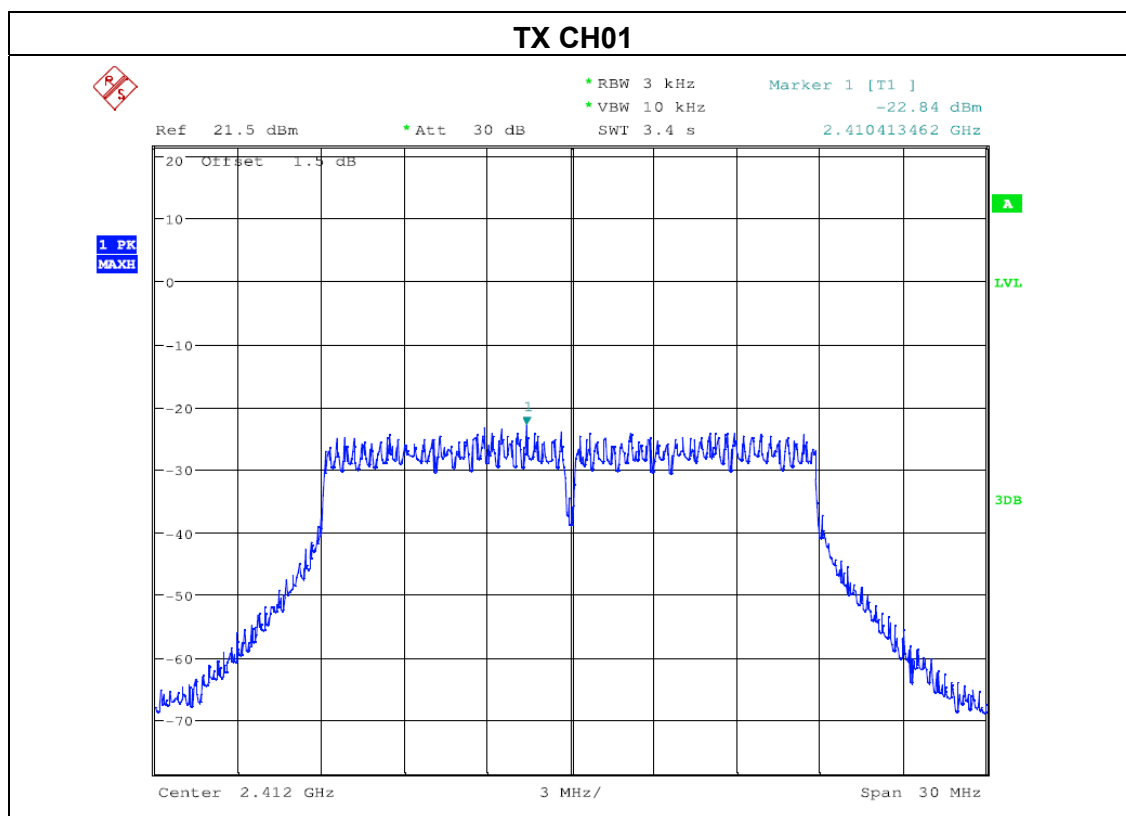
TX CH11





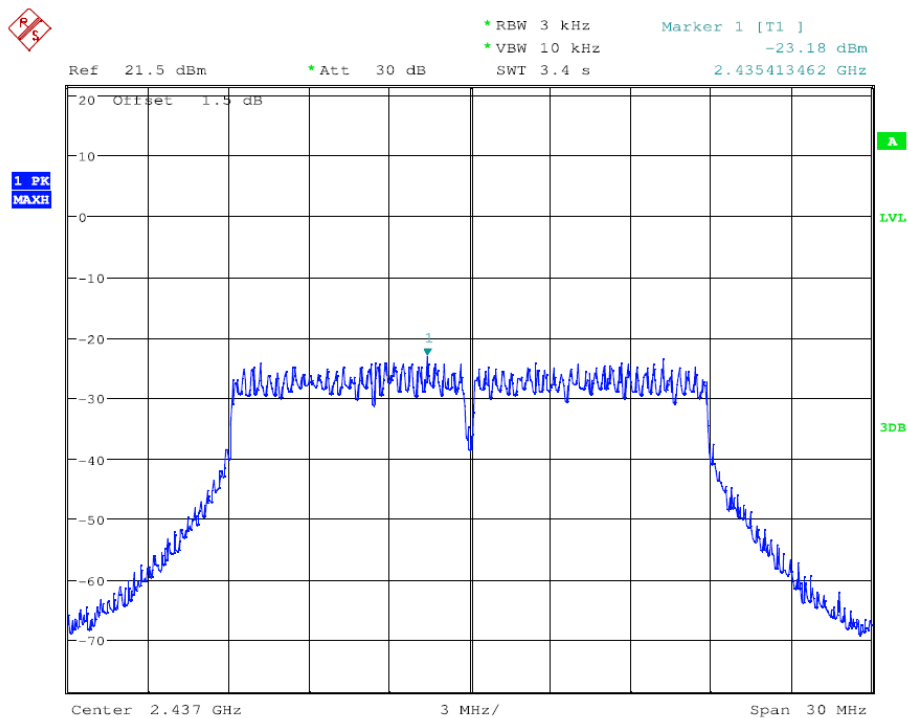
EUT :	Embedded WiFi module	Model Name :	TinyCon2005-LM-D
Temperature :	25°C	Relative Humidity :	60%
Pressure :	1015 hPa	Test Voltage :	DC5V from laptop
Test Mode :	TX n Mode(20M) /CH01, CH06, CH11		

Frequency	Power Density (dBm)	Limit (dBm)	Result
2412 MHz	-22.84	8	PASS
2437 MHz	-23.18	8	PASS
2462 MHz	-23.67	8	PASS

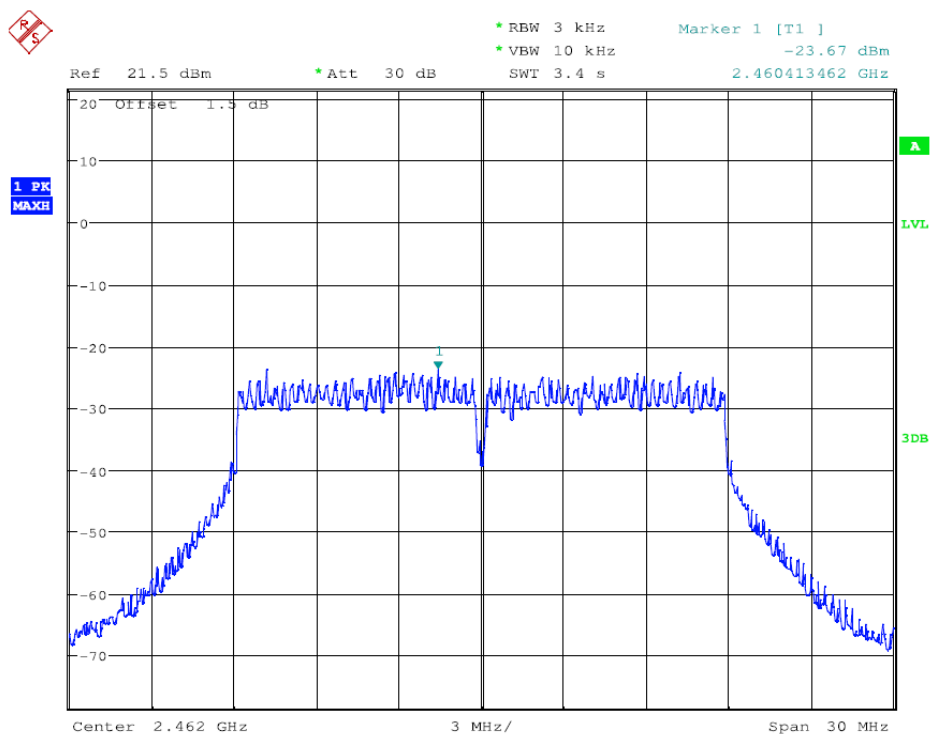




TX CH06



TX CH11





5. BANDWIDTH TEST

5.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(a)(2)	Bandwidth	$\geq 500\text{KHz}$ (6dB bandwidth)	2400-2483.5	PASS

5.1.1 TEST PROCEDURE

1. Set resolution bandwidth (RBW) = 1-5% or DTS BW, not to exceed 100 kHz.
2. Set the video bandwidth (VBW) $\geq 3 \times$ RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

5.1.2 DEVIATION FROM STANDARD

No deviation.

5.1.3 TEST SETUP



5.1.4 EUT OPERATION CONDITIONS

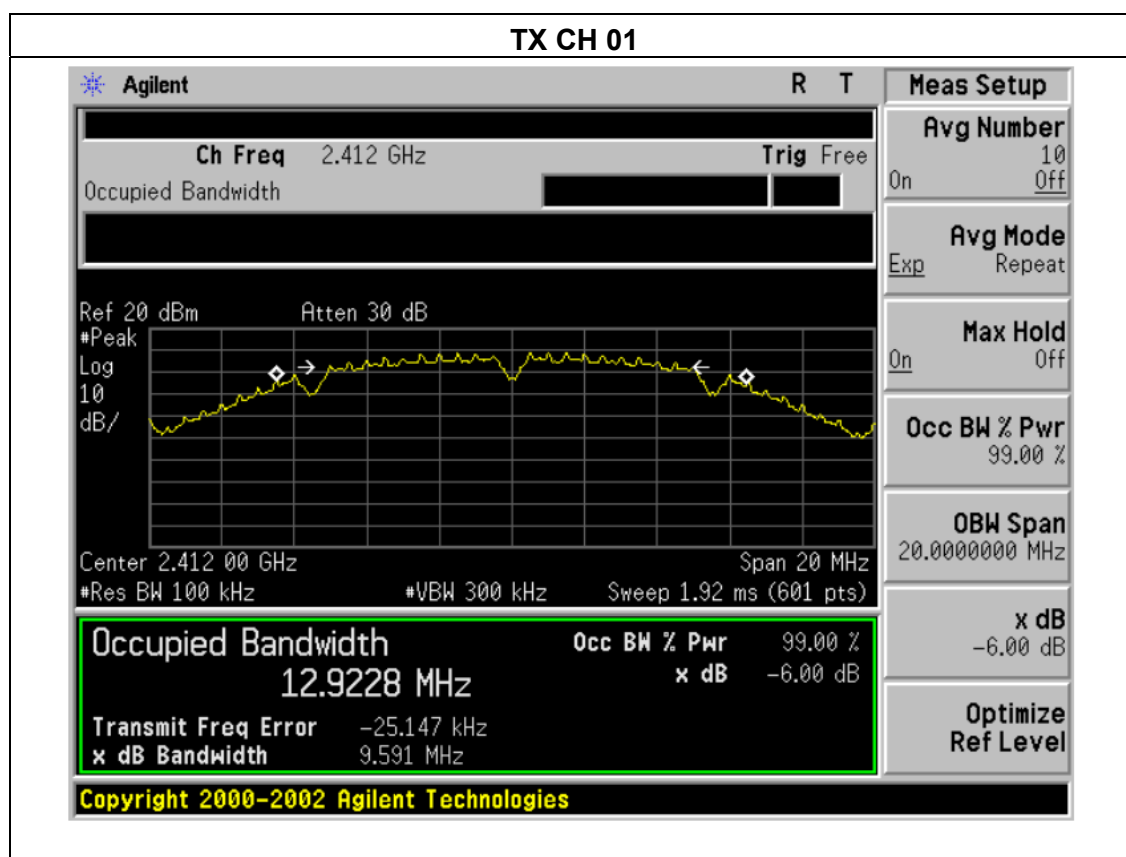
The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.



5.1.5 TEST RESULTS

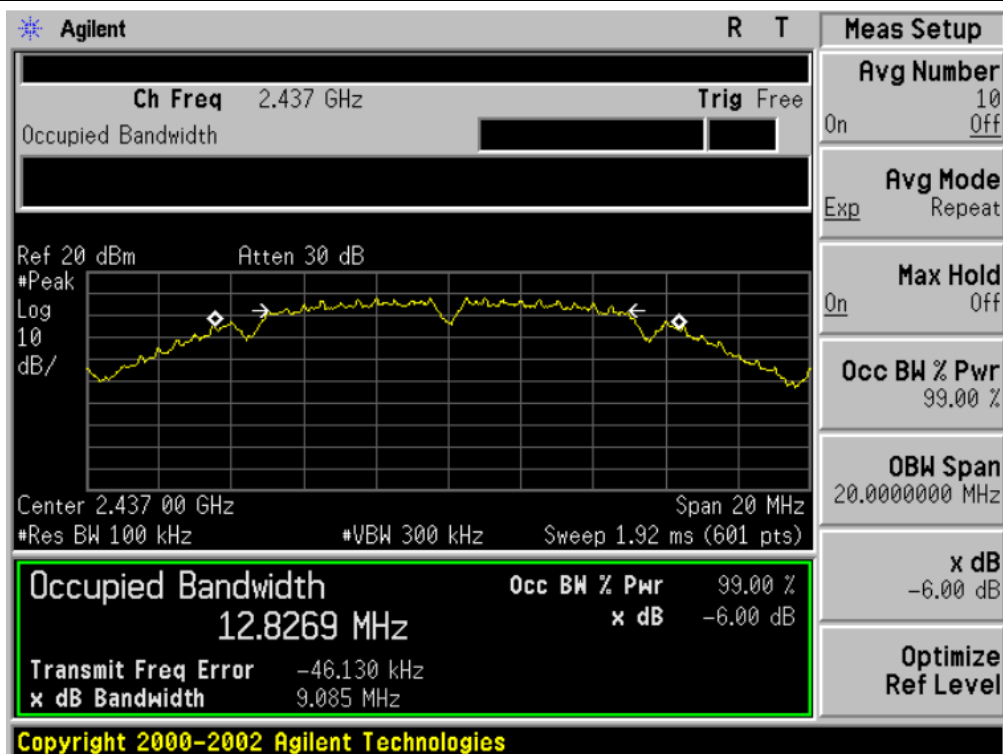
EUT :	Embedded WiFi module	Model Name :	TinyCon2005-LM-D
Temperature :	25°C	Relative Humidity :	60%
Pressure :	1012 hPa	Test Voltage :	DC5V from laptop
Test Mode :	TX b Mode /CH01, CH06, CH11		

Channel	Frequency (MHz)	6dB bandwidth (MHz)	Limit (kHz)	Result
Low	2412	9.59	500	Pass
Middle	2437	9.09	500	Pass
High	2462	8.62	500	Pass

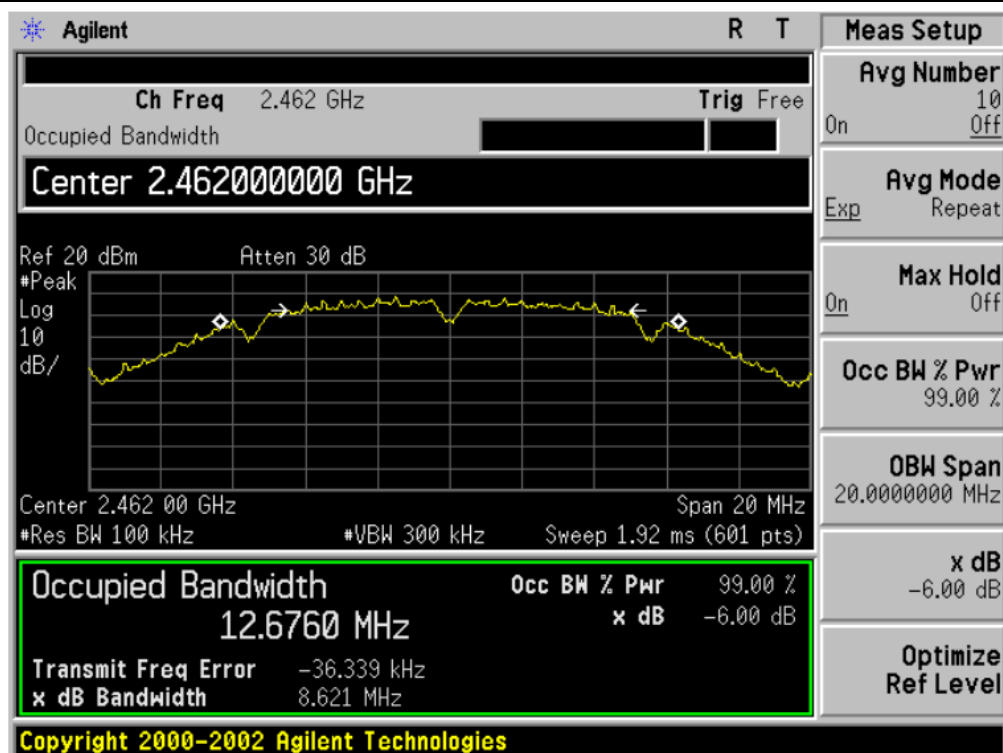




TX CH 06



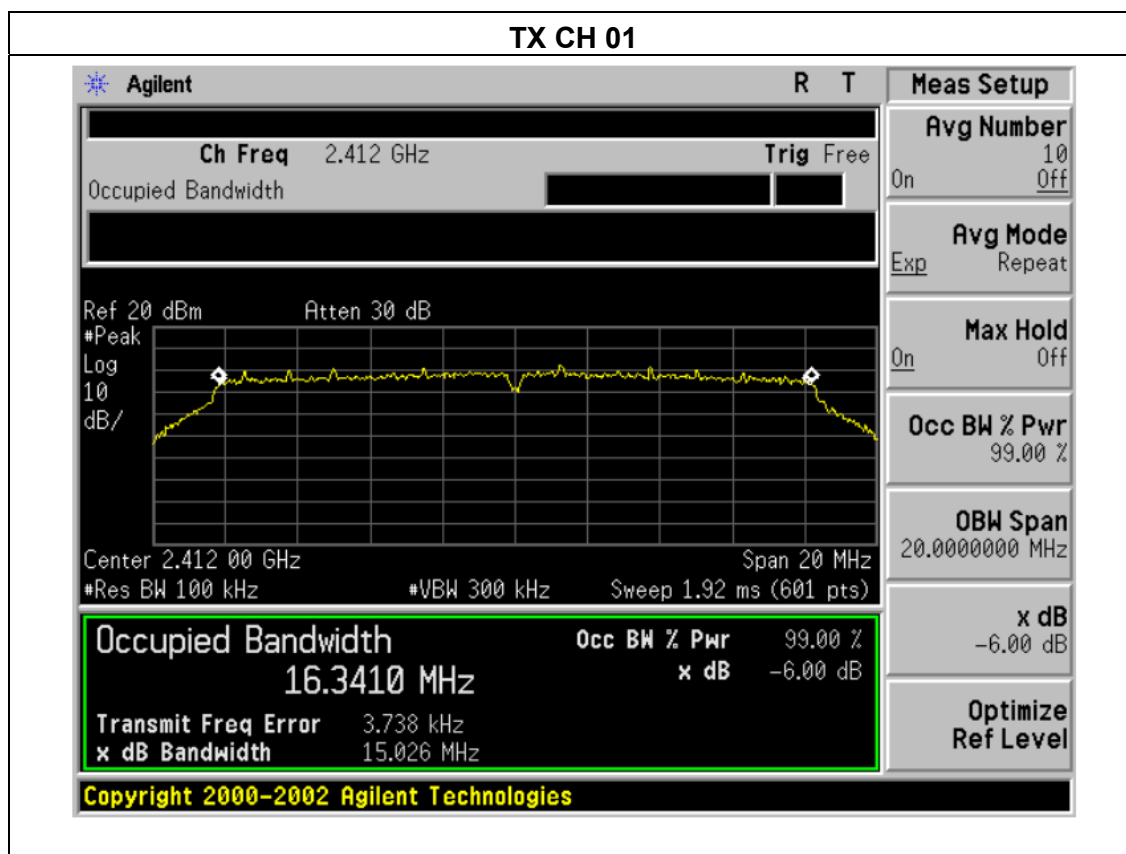
TX CH 11





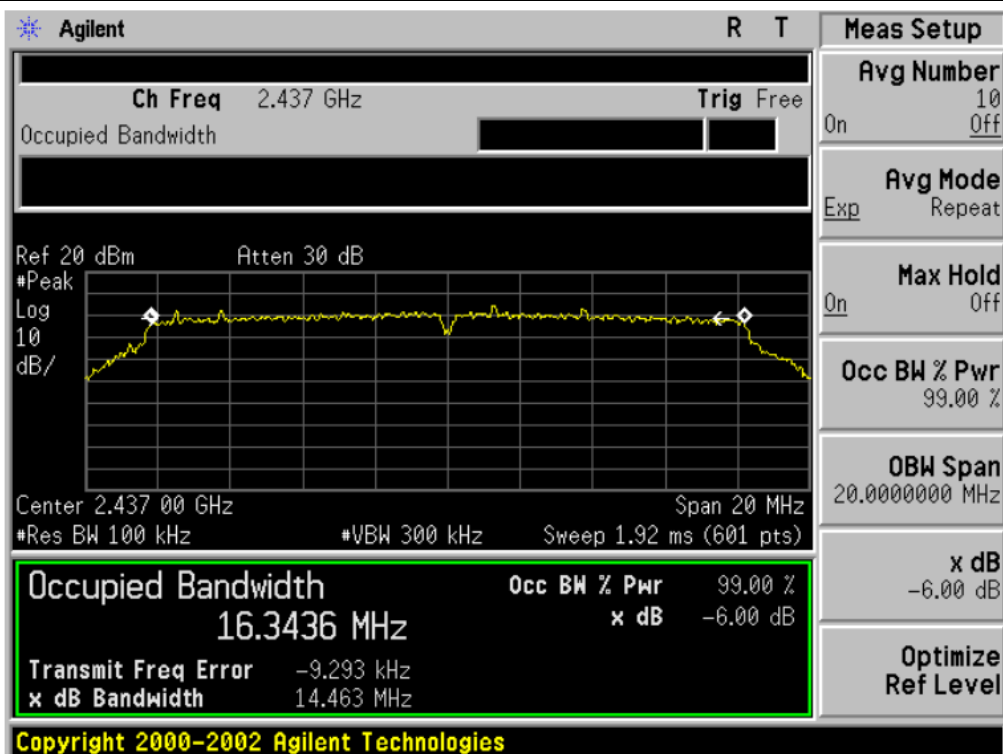
EUT :	Embedded WiFi module	Model Name :	TinyCon2005-LM-D
Temperature :	25°C	Relative Humidity :	60%
Pressure :	1012 hPa	Test Voltage :	DC5V from laptop
Test Mode :	TX g Mode /CH01, CH06, CH11		

Channel	Frequency (MHz)	6dB bandwidth (MHz)	Limit (kHz)	Result
Low	2412	15.03	500	Pass
Middle	2437	14.46	500	Pass
High	2462	15.69	500	Pass

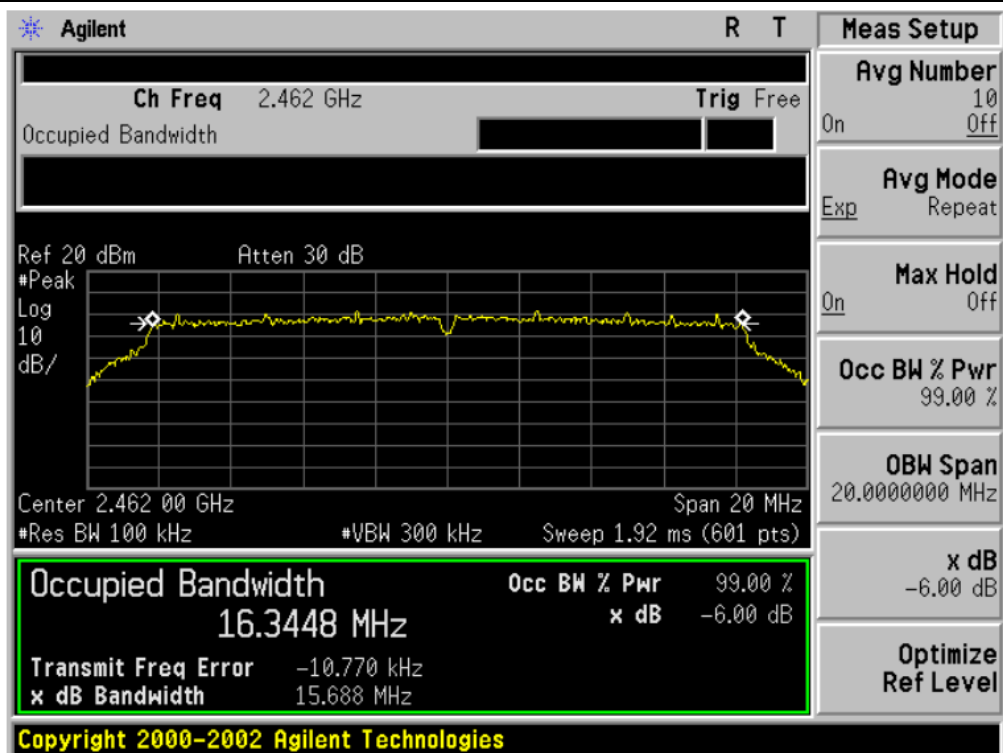




TX CH 06



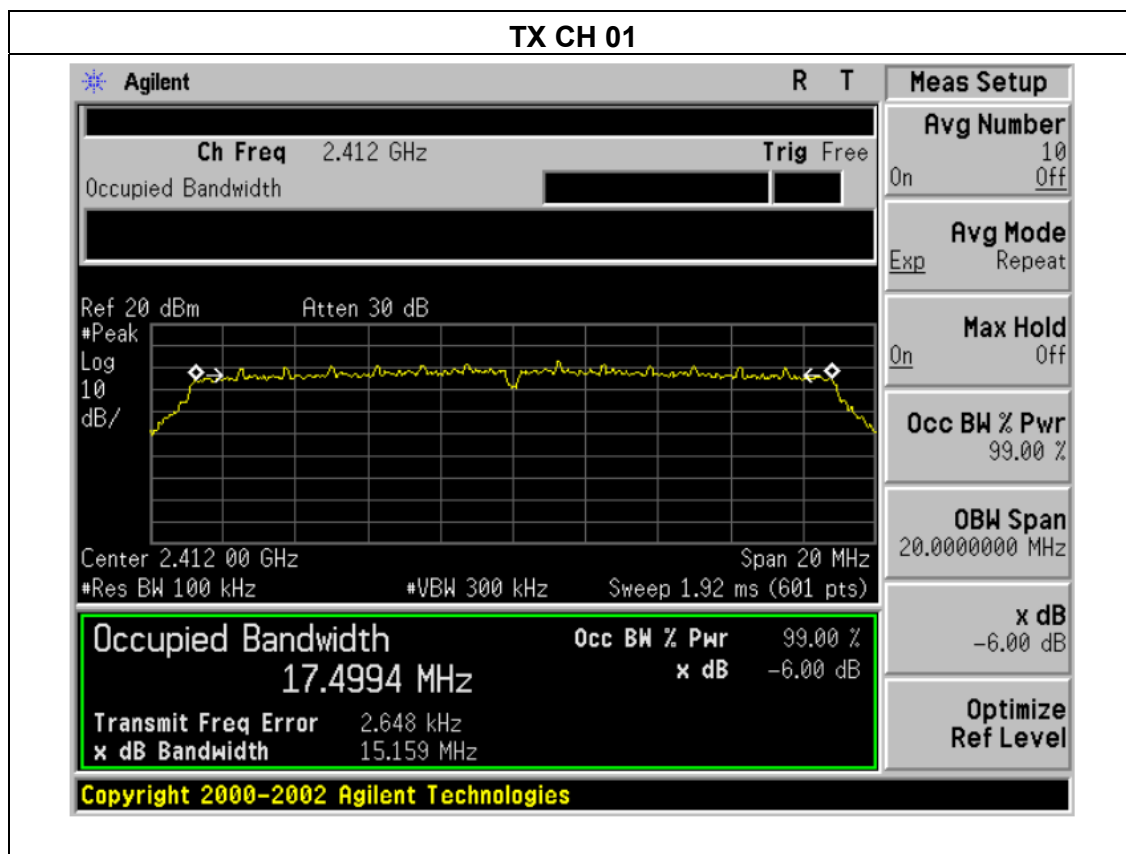
TX CH 11

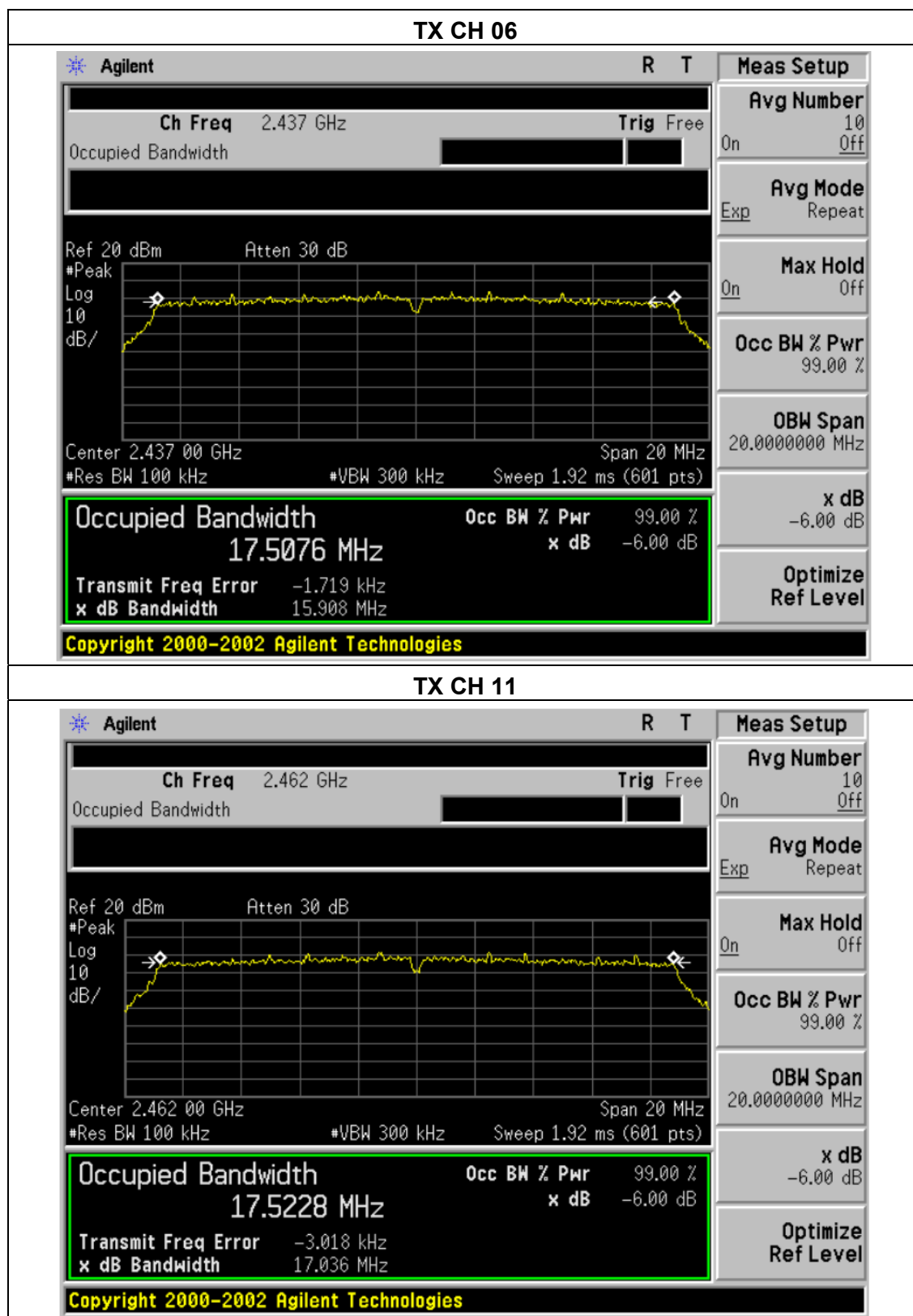




EUT :	Embedded WiFi module	Model Name :	TinyCon2005-LM-D
Temperature :	25°C	Relative Humidity :	60%
Pressure :	1012 hPa	Test Voltage :	DC5V from laptop
Test Mode :	TX n Mode(20M) /CH01, CH06, CH11		

Channel	Frequency (MHz)	6dB bandwidth (MHz)	Limit (kHz)	Result
Low	2412	15.16	500	Pass
Middle	2437	15.91	500	Pass
High	2462	17.04	500	Pass







6. PEAK OUTPUT POWER TEST

6.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(b)(3)	Peak Output Power	1 watt or 30dBm	2400-2483.5	PASS

6.1.1 TEST PROCEDURE

- a. The EUT was directly connected to the Power meter

6.1.2 DEVIATION FROM STANDARD

No deviation.

6.1.3 TEST SETUP



6.1.4 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.

**6.1.5 TEST RESULTS**

EUT :	Embedded WiFi module	Model Name :	TinyCon2005-LM-D
Temperature :	25°C	Relative Humidity :	60%
Pressure :	1012 hPa	Test Voltage :	DC5V from laptop
Test Mode :	TX b/g/n(20M)		

TX 802.11b Mode				
Test Channe	Frequency	Maximum Conducted Output Power(PK)	Maximum Conducted Output Power(AV)	LIMIT
	(MHz)	(dBm)	(dBm)	dBm
CH01	2412	17.36	15.12	30
CH06	2437	17.24	15.08	30
CH11	2462	17.29	15.11	30
TX 802.11g Mode				
CH01	2412	14.87	12.26	30
CH06	2437	14.91	12.18	30
CH11	2462	14.89	12.24	30
TX 802.11n-HT20 Mode				
CH01	2412	13.38	11.21	30
CH06	2437	13.39	11.28	30
CH11	2462	13.34	11.26	30



7. 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) (see §15.205(c)).

TEST PROCEDURE

According to the KDB 558074D01 v03r03, the band-edge radiated test method as follows:

Set span = wide enough to capture the peak level of the emission operating on the channel closest to the bandedge, as well as any modulation products which fall outside of the authorized band of operation (2310MHz to 2420MHz for low bandedge, 2460MHz to 2500MHz for the high bandedge)

RBW = 1MHz, VBW = 1MHz for peak value measured

RBW = 1MHz, VBW = 10Hz for average value measured

Sweep = auto; Detector function = peak/average; Trace = max hold

All the trace to stabilize, set the marker on the emission at the bandedge, or on the highest modulation product outside of the band, if this level is greater than that at the bandedge. Enable the marker-delta function, then use the marker-to-peak function to move the marker to the peak of the in-band emission. Those emission must comply with the 15.209 limit for fall in the restricted bands listed in section 15.205.



According to the KDB 558074 D01 V03r03, the conducted spurious emissions test method as follows:

1. Set start frequency to DTS channel edge frequency.
2. Set stop frequency so as to encompass the spectrum to be examined.
3. Set RBW = 100 kHz.
4. Set VBW $\geq$ 300 kHz.
5. Detector = peak.
6. Trace Mode = max hold.
7. Sweep = auto couple.
8. Allow the trace to stabilize (this may take some time, depending on the extent of the span).
9. Use peak marker function to determine maximum amplitude of all unwanted emissions within any 100 kHz bandwidth.

Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) are attenuated by at least the minimum requirements specified in section 3.2. Report the three highest emissions relative to the limit.

7.1 DEVIATION FROM STANDARD

No deviation.

7.2 TEST SETUP



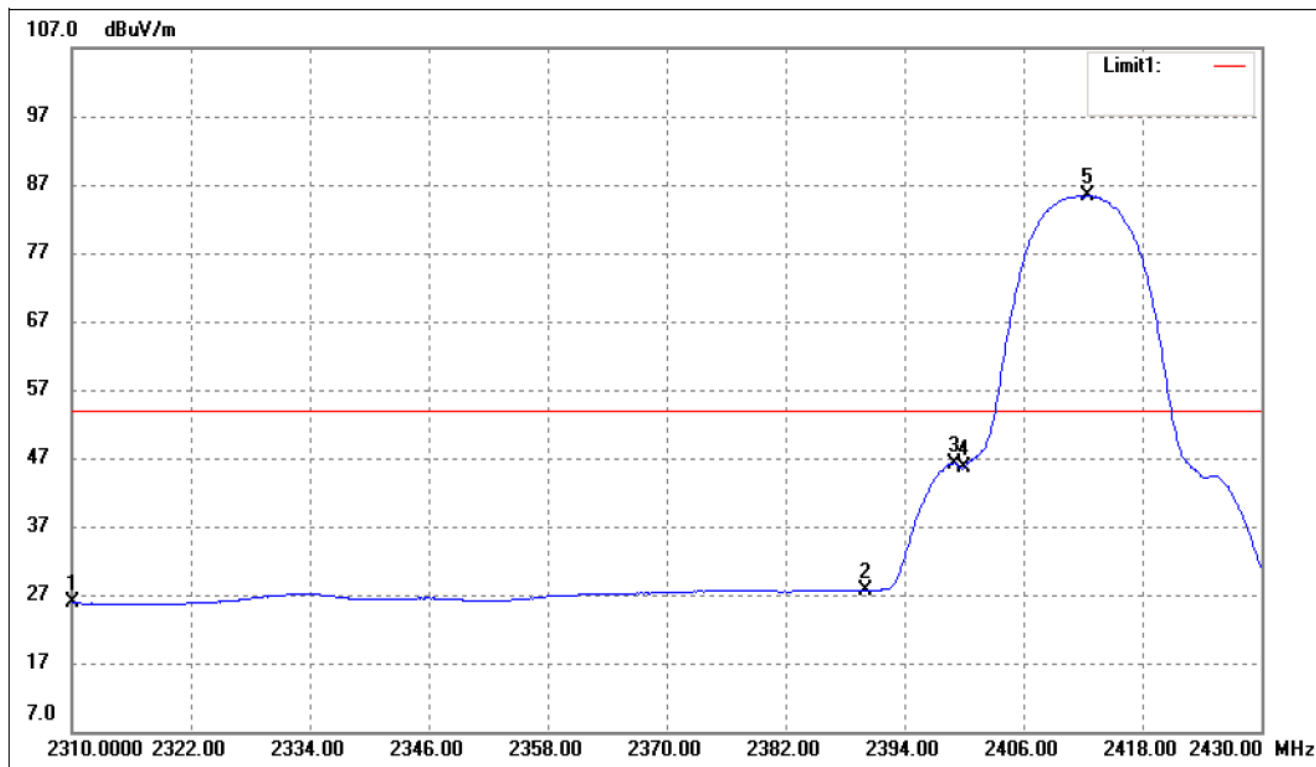
7.3 EUT OPERATION CONDITIONS

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.

7.4 TEST RESULTS



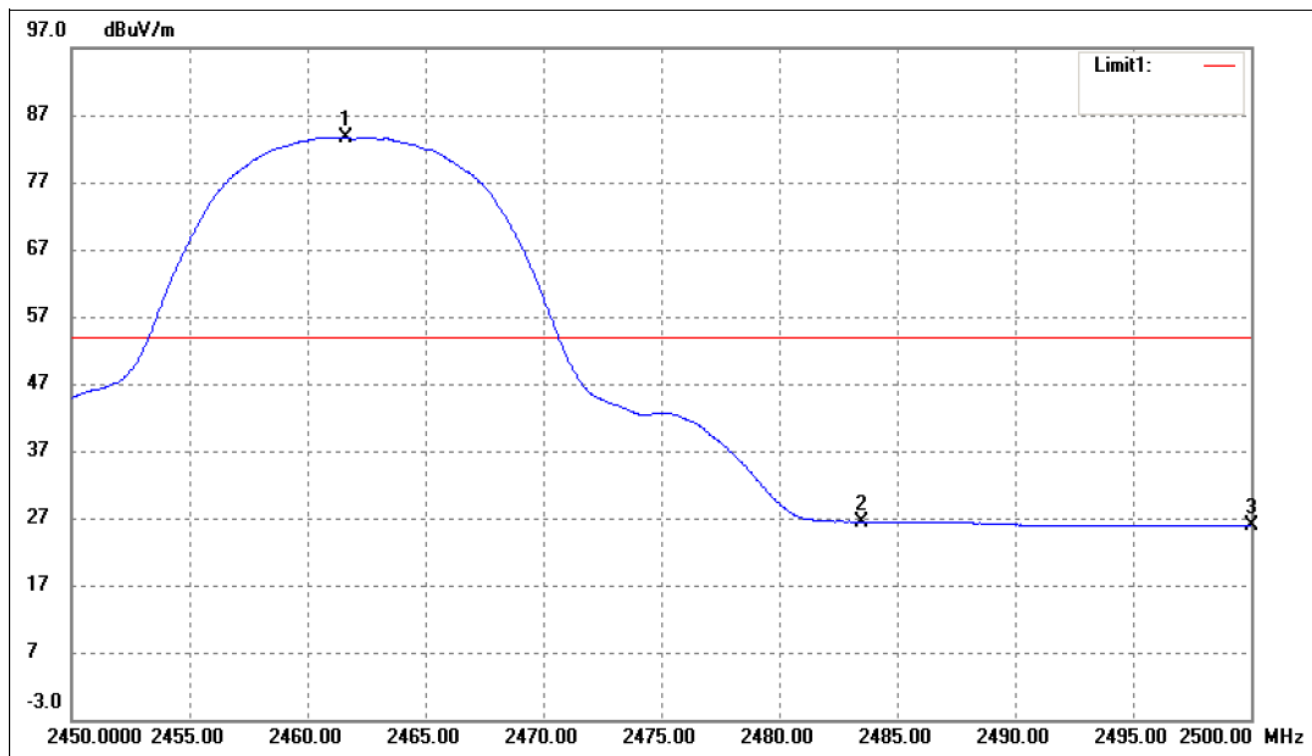
For Radiated:
802.11b low channel
Vertical (Worst case)



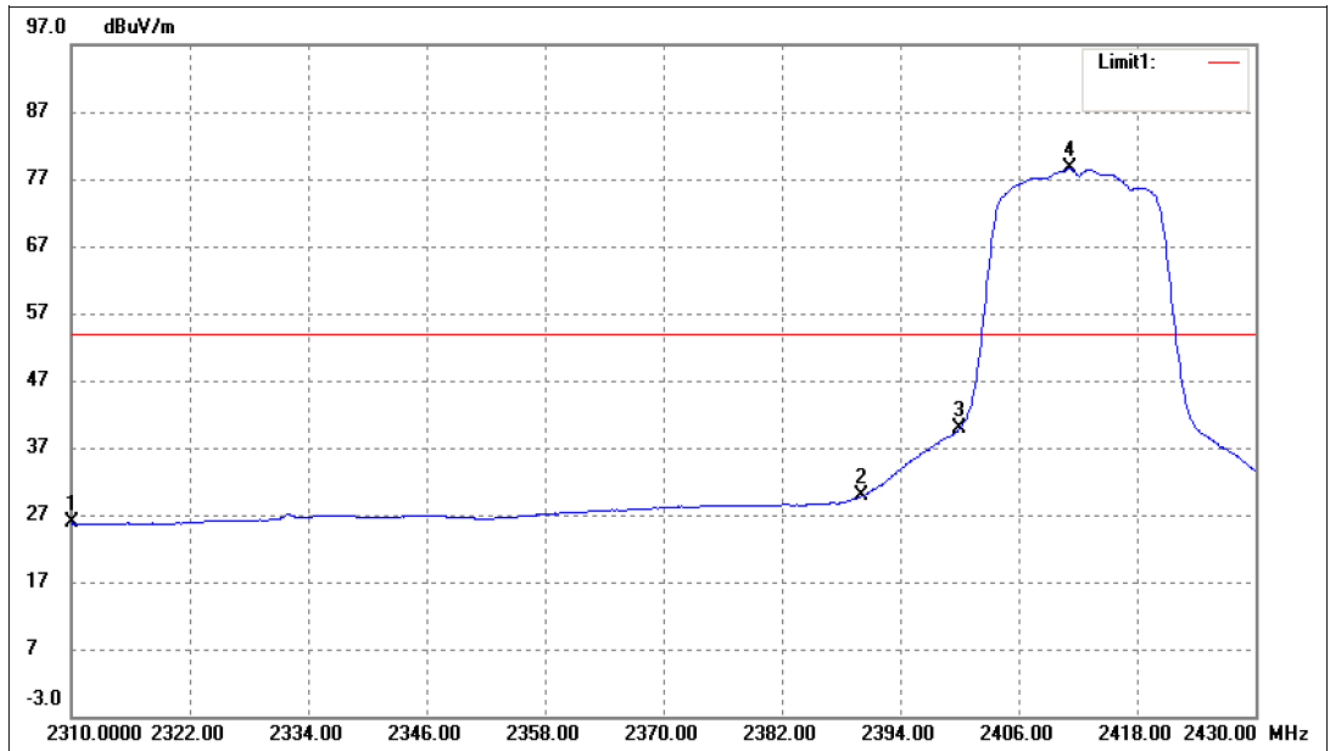
No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2310.000	29.50	-3.71	25.79	54.00	-28.21	Average Detector
	2310.000	42.81	-3.71	39.10	74.00	-34.90	Peak Detector
2	2390.000	31.27	-3.54	27.73	54.00	-26.27	Average Detector
	2390.000	44.12	-3.54	40.58	74.00	-33.42	Peak Detector
3	2399.040	49.76	-3.51	46.25	54.00	-7.75	Average Detector
4	2400.000	49.20	-3.51	45.69	Delta =39.65dBc		Average Detector
5	2412.480	88.82	-3.48	85.34			Average Detector



802.11b-Highest Bandedge
Vertical (Worst case)



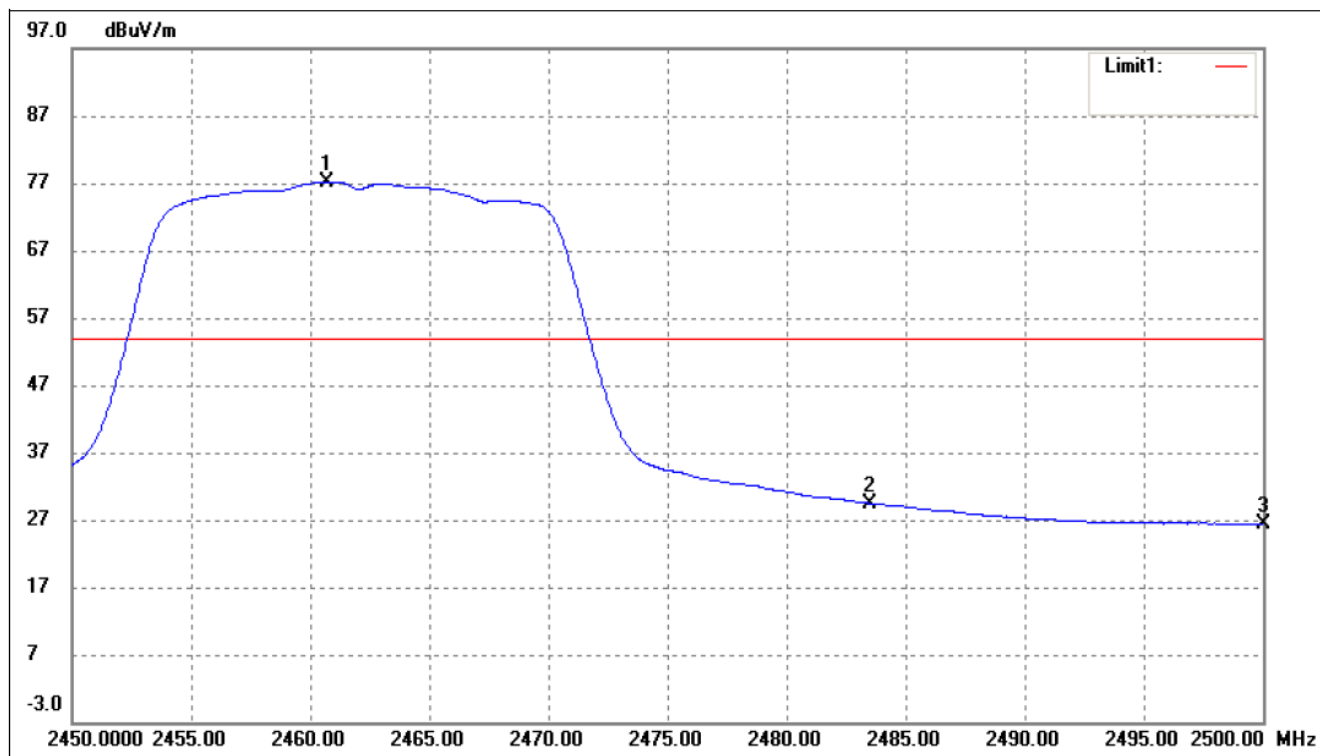
No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2461.600	87.03	-3.37	83.66	/	/	Average Detector
	2463.300	96.02	-3.36	92.66	/	/	Peak Detector
2	2483.500	Delta = 58.99dBc		24.67	54.00	-29.33	Average Detector
	2483.500			33.67	74.00	-40.33	Peak Detector
3	2500.000	29.17	-3.28	25.89	54.00	-28.11	Average Detector
	2500.000	41.43	-3.28	38.15	74.00	-35.85	Peak Detector

802.11g-Lowest Bandedge
Vertical (Worst case)

No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2310.000	29.51	-3.71	25.80	54.00	-28.20	Average Detector
	2310.000	41.73	-3.71	38.02	74.00	-35.98	Peak Detector
2	2390.000	33.32	-3.54	29.78	54.00	-24.22	Average Detector
	2390.000	47.51	-3.54	43.97	74.00	-30.03	Peak Detector
3	2400.000	43.36	-3.51	39.85	Delta =38.69dBc		Average Detector
4	2411.160	82.02	-3.48	78.54			Average Detector



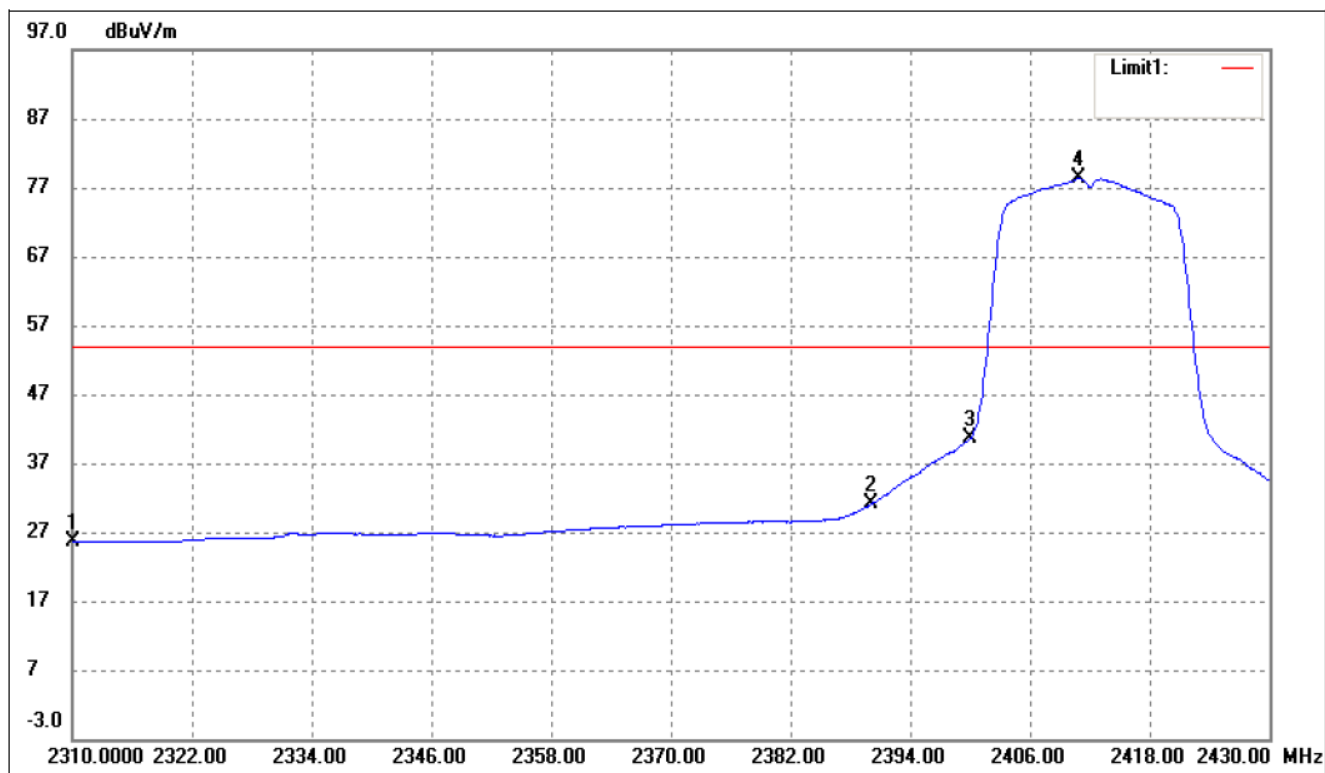
802.11g-Highest Bandedge
Vertical (Worst case)



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2460.700	80.60	-3.37	77.23	/	/	Average Detector
	2463.450	91.85	-3.36	88.49	/	/	Peak Detector
2	2483.500	Delta = 46.90dBc		30.33	54.00	-23.67	Average Detector
	2483.500			41.59	74.00	-32.41	Peak Detector
3	2500.000	29.60	-3.28	26.32	54.00	-27.68	Average Detector
	2500.000	42.55	-3.28	39.27	74.00	-34.73	Peak Detector



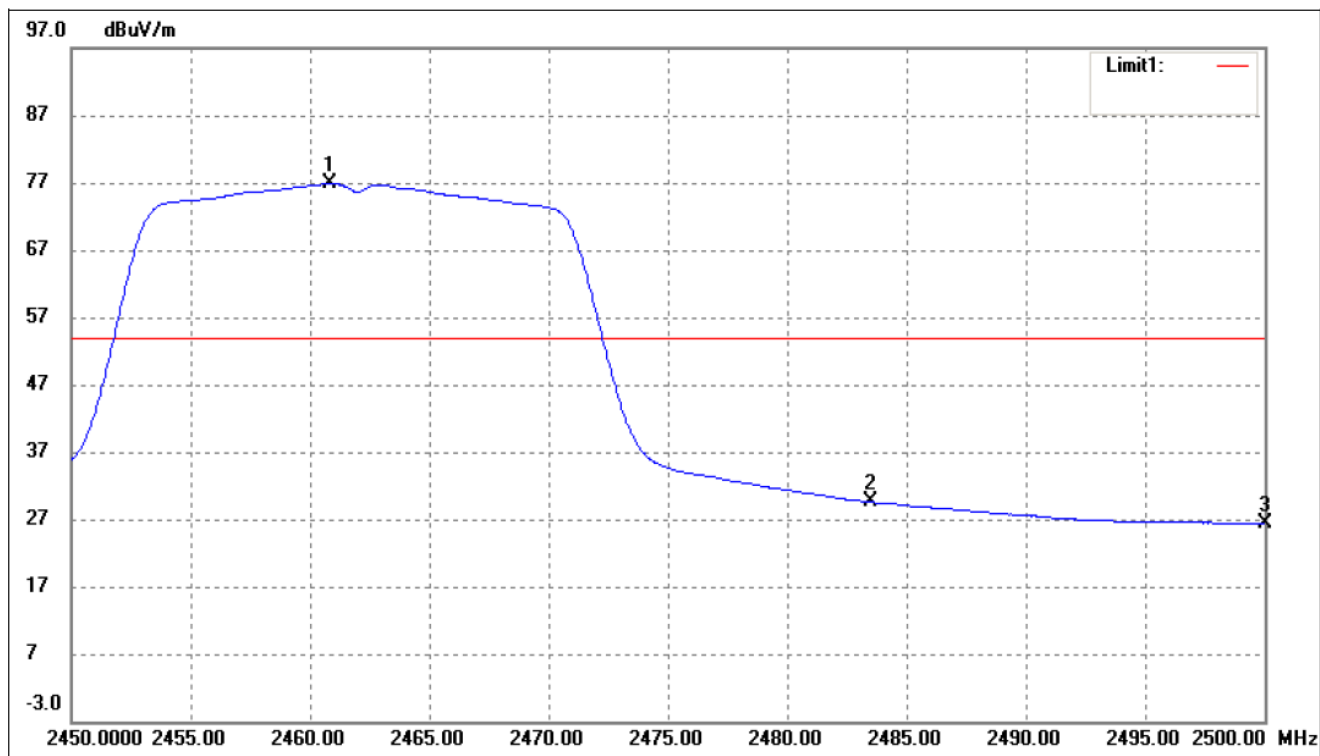
802.11n-HT20-Lowest Bandedge
Vertical (Worst case)



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	2310.000	29.43	-3.71	25.72	54.00	-28.28	Average Detector
	2310.000	42.34	-3.71	38.63	74.00	-35.37	Peak Detector
2	2390.000	34.55	-3.54	31.01	54.00	-22.99	Average Detector
	2390.000	51.10	-3.54	47.56	74.00	-26.44	Peak Detector
3	2400.000	44.09	-3.51	40.58	Delta =37.75dBc		Average Detector
4	2410.920	81.81	-3.48	78.33			Average Detector



802.11n-HT20-Highest Bandedge
Vertical (Worst case)

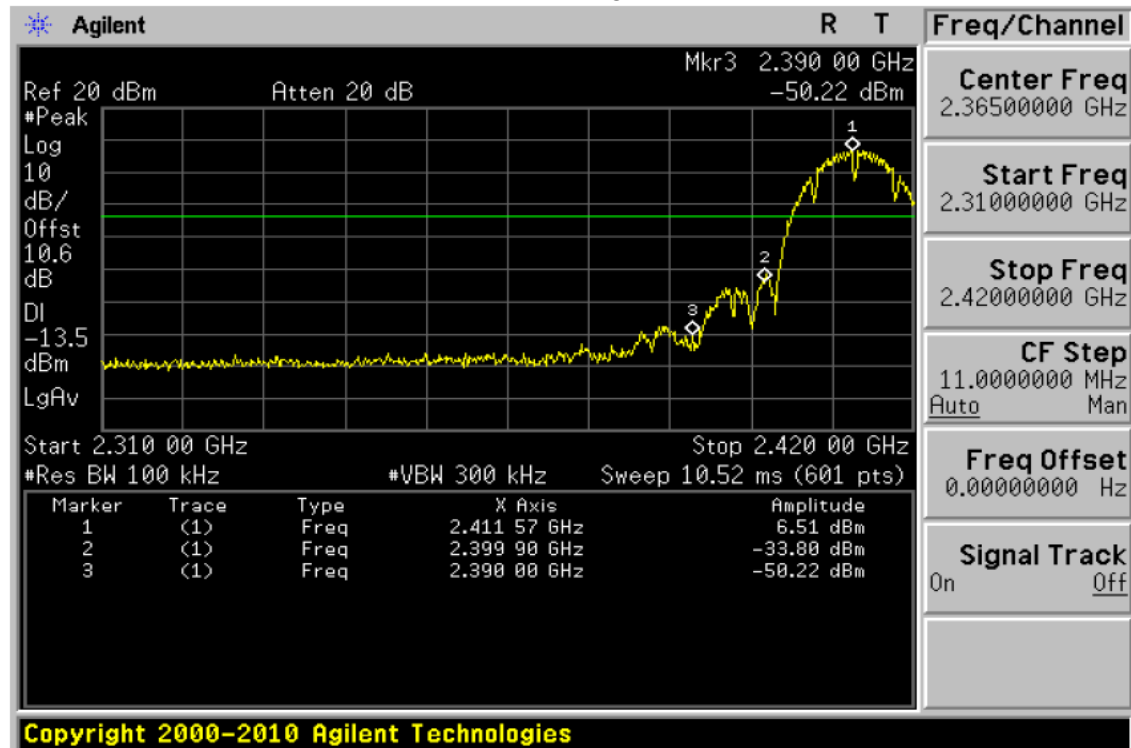


No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2460.850	80.29	-3.37	76.92	/	/	Average Detector
	2461.400	91.78	-3.37	88.41	/	/	Peak Detector
2	2483.500	Delta =48.25dBc		28.67	54.00	-25.33	Average Detector
	2483.500			40.16	74.00	-33.84	Peak Detector
3	2500.000	29.63	-3.28	26.35	54.00	-27.65	Average Detector
	2500.000	41.59	-3.28	38.31	74.00	-35.69	Peak Detector



For conducted:

802.11b: Band Edge, Left Side

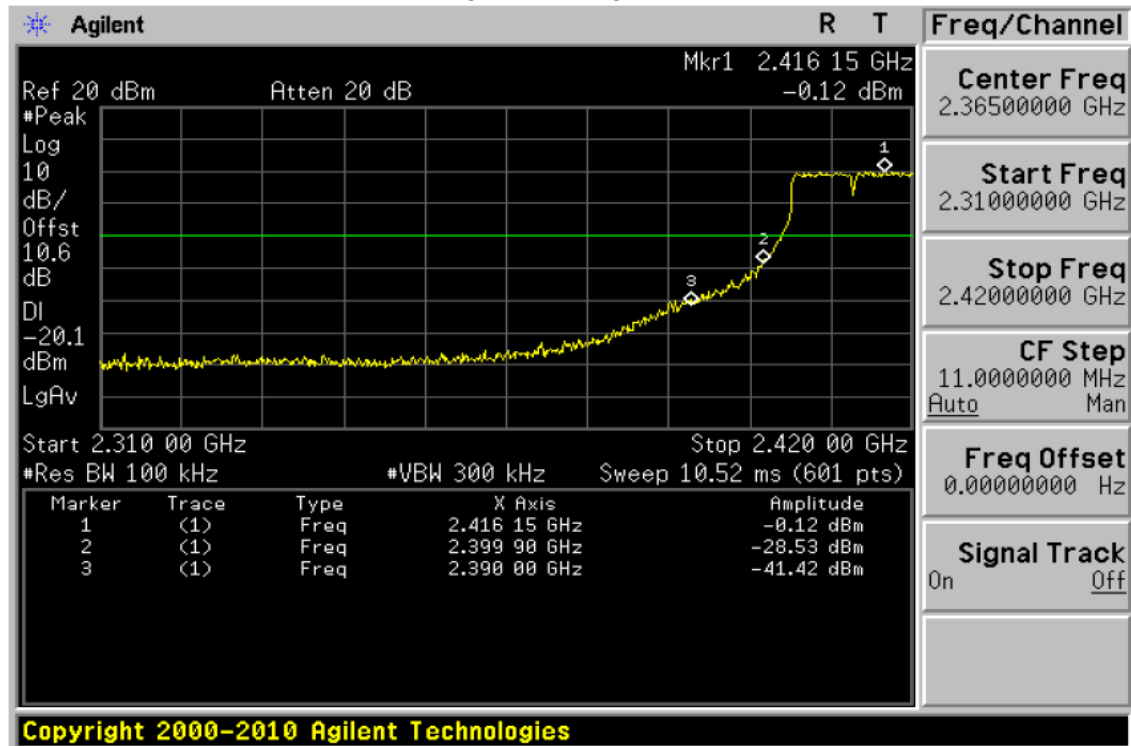


802.11b: Band Edge, Right Side

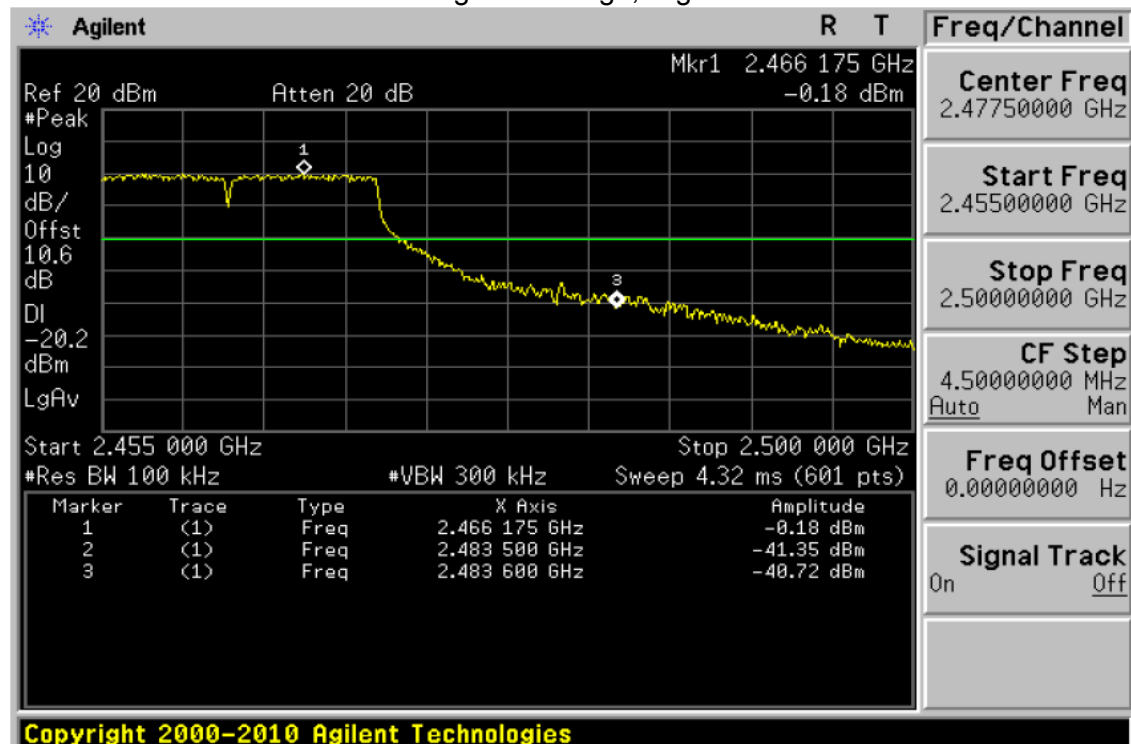




802.11g: Band Edge, Left Side

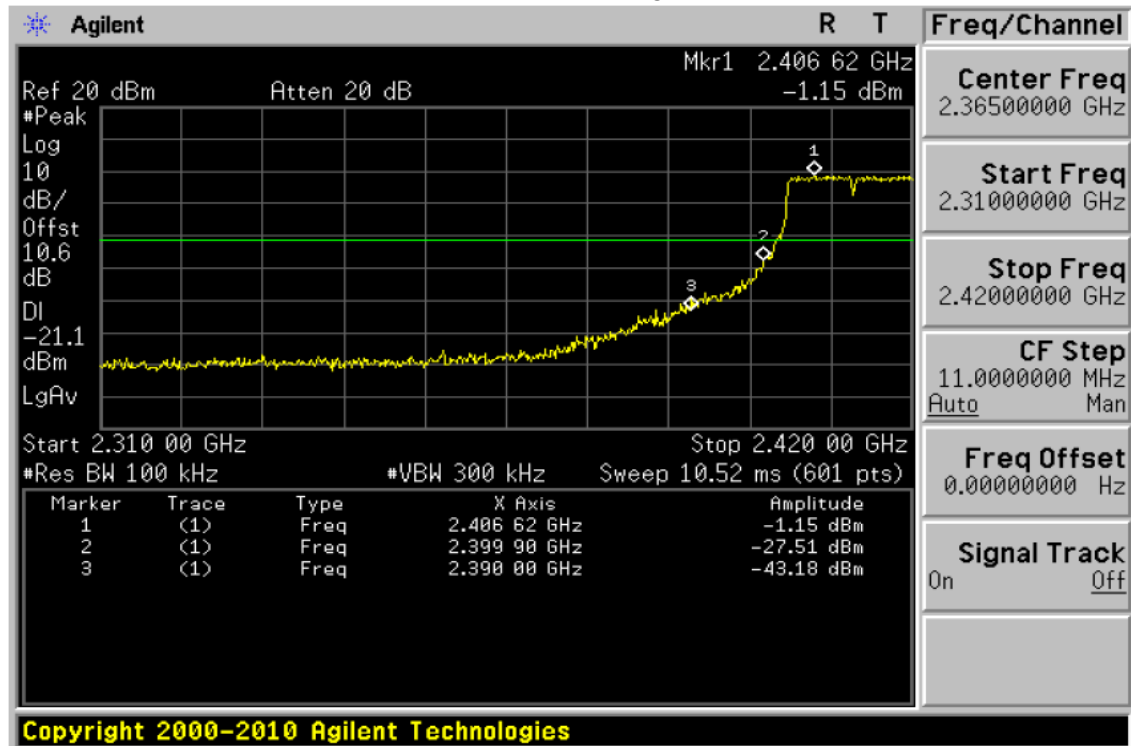


802.11g: Band Edge, Right Side

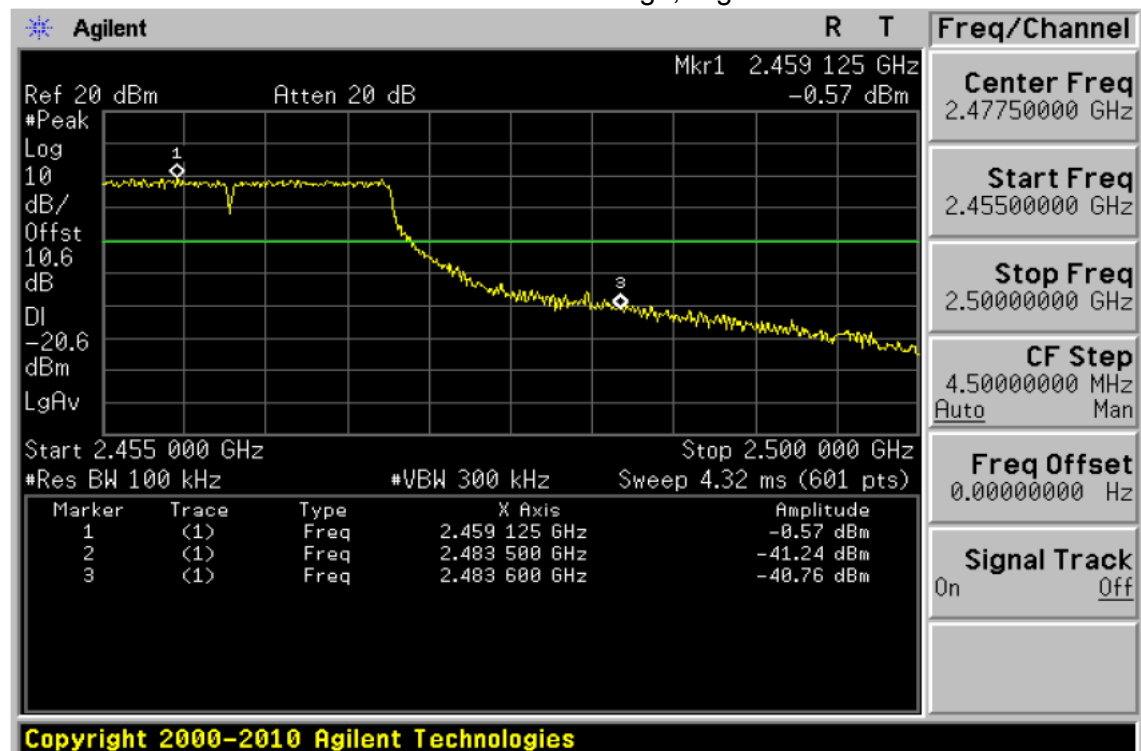




802.11n-HT20: Band Edge, Left Side



802.11n-HT20: Band Edge, Right Side





8. DUTY CYCLE OF TEST SIGNAL

8.1 STANDARD REQUIREMENT

Pre-analysis Check: While conducting average power measurement, duty cycle of each mode shall be checked to ensure its duty cycle in order to compensate for the loss due to insufficient ratio of duty cycle.

All duty cycle is pre-scanned, and result as obtained below shows only the most representative ones where duty cycle is conducted as the given transmission with given virtual operation that expresses the percentage.

8.2 FORMULA:

Duty Cycle = $T_{on} / (T_{on} + T_{off})$

Measurement Procedure:

1. Set span = Zero
2. RBW = 8MHz
3. VBW = 8MHz,
4. Detector = Peak

Duty Cycle:

	Duty Cycle	Duty Fator (dB)
802.11b	1	0
802.11g	1	0
802.11n(HT20)	1	0



9. ANTENNA REQUIREMENT

9.1 STANDARD REQUIREMENT

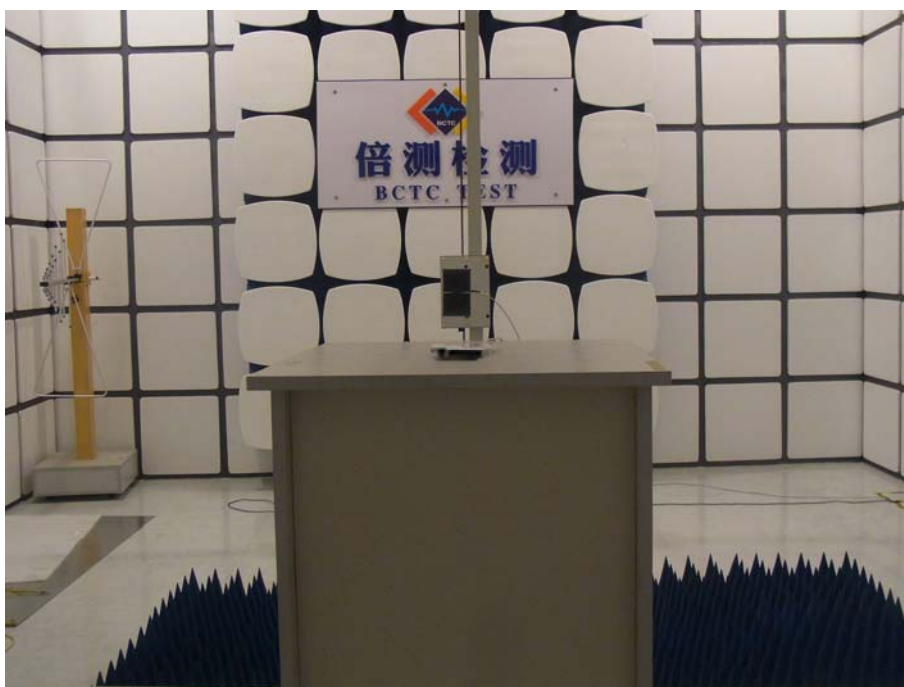
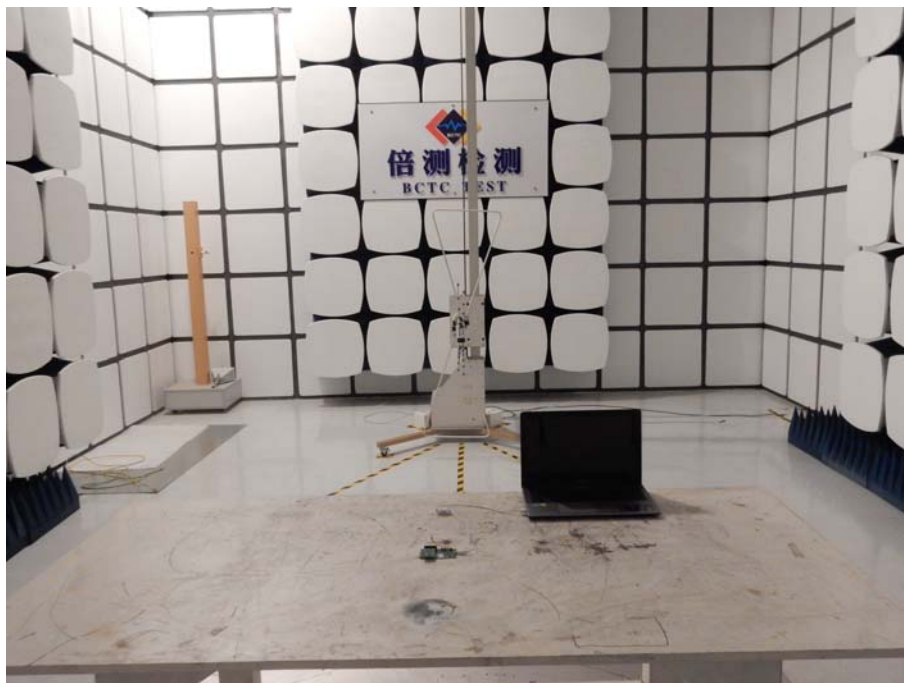
15.203 requirement: For intentional device, according to 15.203: an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

9.2 EUT ANTENNA

The EUT antenna is used chip antenna. It comply with the standard requirement.

10. EUT TEST PHOTO

Radiated Measurement Photos



11. PHOTO OF THE EUT

