



FCC RADIO TEST REPORT

FCC ID: 2AK7UFM2000

Product : 5.8GHz/2.4GH wireless local
area network equipment

Trade Name : **FEIMA**
ROBOTICS 

Model Name: FM2000

Serial Model : N/A

Report No. : POCE- 20170203217R1

Prepared for

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Prepared by

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TEST RESULT CERTIFICATION

Applicant's name : Shen Zhen Feima Robotics Co.,Ltd
Address : 1st floor,16 Buiding,Zhiheng Industrial Park Guankou 2nd Road,Nantou,Nanshan District,Shenzhen,China
Manufacture's Name : Shen Zhen Feima Robotics Co.,Ltd
Address : 1st floor,16 Buiding,Zhiheng Industrial Park Guankou 2nd Road,Nantou,Nanshan District,Shenzhen,China

Product description

Product name : 5.8GHz/2.4GH wireless local
area network equipment

Model and/or type reference : FM2000

Serial Model : N/A

Standards : FCC Part15.247, KDB558074 D01 DTS Meas Guidance v03r03

Test procedure ANSI C63.10-2013

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

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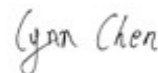
Date of Test :

Date (s) of performance of tests : 01 Feb. 2017 ~19 Feb. 2017

Date of Issue : 19 Feb. 2017

Test Result : **Pass**

Testing Engineer :



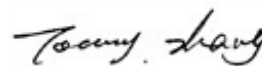
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1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

FCC Part15 (15.247) , Subpart C			
Standard Section	Test Item	Judgment	Remark
15.207	Conducted Emission	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 POCE Technology Co.,Ltd.

Add. : Room 502, Bldg. 1, Xinghua Garden, Baoan Road Xixiang, Baoan District, Shenzhen, China

FCC Registered No.: 222278

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	5.8GHz/2.4GH wireless local area network equipment	
Trade Name		
Model Name	FM2000	
Serial Model	N/A	
Model Difference	N/A	
Product Description	The EUT is a 5.8GHz/2.4GH wireless local area network equipment	
	Operation Frequency:	802.11b/g/n20MHz:2412~2462 MHz 802.11n40MHz:2422~2452 MHz
	Modulation Type:	WIFI: 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 150Mbps
	Number Of Channel	802.11b/g/n20MHz:11 CH 802.11n40MHz: 7 CH
	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.	
Power Source	DC 3.7V	
Adapter	N/A	
hardware version	N/A	
Software version	N/A	

Note:

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

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		

Channel List for 802.11n(40)							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
03	2422	05	2432	07	2442	09	2452
04	2427	06	2437	08	2447		

3. Table for Filed Antenna

Ant.	Brand	Model Name	Antenna Type	Gain (dBi)	NOTE
1	N/A	N/A	Integrated antenna	1.2dBi	

2.2 DESCRIPTION OF TEST MODES

Pretest Mode	Description
Mode 1	802.11b CH1/ CH6/ CH11
Mode 2	802.11g CH1/ CH6/ CH11
Mode 3	802.11n20 CH1/ CH6/ CH11
Mode 4	802.11n40 CH3/ CH6/ CH9
Mode 5	Link Mode

Conducted Emission	
Final Test Mode	Description
Mode 5	Link Mode

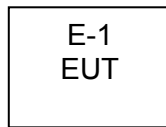
For Radiated Emission	
Final Test Mode	Description
Mode 1	802.11b CH1/ CH6/ CH11
Mode 2	802.11g CH1/ CH6/ CH11
Mode 3	802.11n20 CH1/ CH6/ CH11
Mode 4	802.11n40 CH3/ CH6/ CH9
Mode 5	Link Mode

Note:

(1) 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

Conducted/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	5.8GHz/2.4G H wireless local area network equipment		FM2000	N/A	EUT

Item	Shielded Type	Ferrite Core	Length	Note

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	MY45108040	2016.07.06	2017.07.05	1 year
2	Test Receiver	R&S	ESPI	101318	2016.06.07	2017.06.06	1 year
3	Bilog Antenna	TESEQ	CBL6111D	31216	2016.07.06	2017.07.05	1 year
4	50Ω Coaxial Switch	Anritsu	MP59B	6200264416	2016.06.07	2017.06.06	1 year
5	Spectrum Analyzer	ADVANTEST	R3132	150900201	2016.06.07	2017.06.06	1 year
6	Horn Antenna	EM	EM-AH-10180	2011071402	2016.07.06	2017.07.05	1 year
7	Horn Ant	Schwarzbeck	BBHA 9170	9170-181	2016.07.06	2017.07.05	1 year
8	Amplifier	EM	EM-30180	060538	2016.12.22	2017.12.21	1 year
9	Loop Antenna	ARA	PLA-1030/B	1029	2016.06.08	2017.06.07	1 year

Conduction Test equipment

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	Test Receiver	R&S	ESCI	101160	2016.06.06	2017.06.05	1 year
2	LISN	R&S	ENV216	101313	2016.08.24	2017.08.23	1 year
3	LISN	EMCO	3816/2	00042990	2016.08.24	2017.08.23	1 year
4	50Ω Coaxial Switch	Anritsu	MP59B	6200264417	2016.06.07	2017.06.06	1 year
5	Passive Voltage Probe	R&S	ESH2-Z3	100196	2016.06.07	2017.06.06	1 year
6	Absorbing clamp	R&S	MOS-21	100423	2016.06.08	2017.06.07	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 *	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

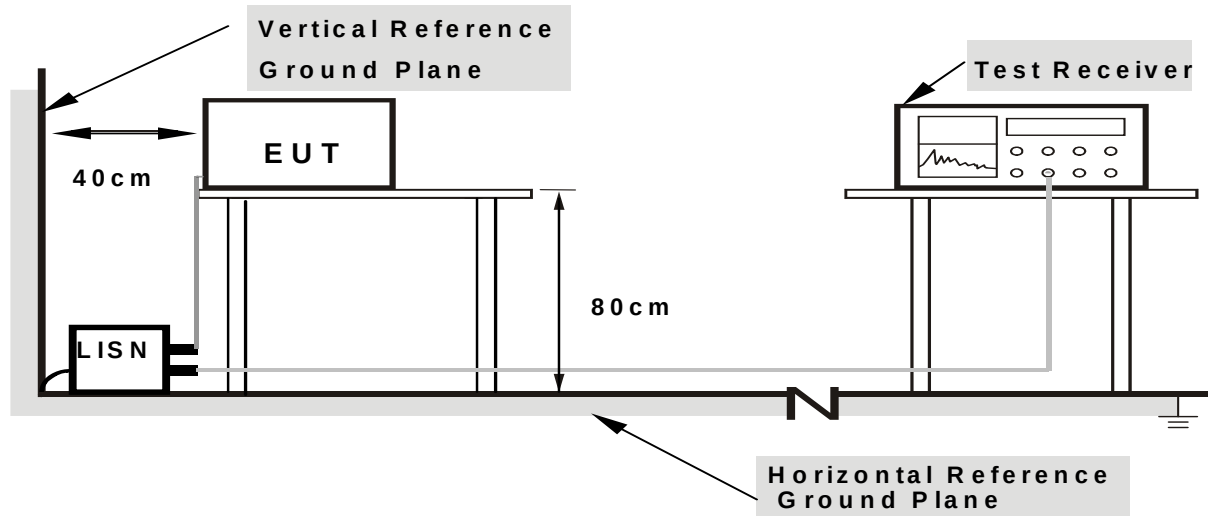
3.1.2 TEST PROCEDURE

- 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.

We pretest AC 120V and AC 240V, the worst voltage was AC 120V and the data recording in the report.

3.1.6 TEST RESULTS

N/A

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 B (dBuV/m) (at 3M)	
	PEAK	AVERAGE
Above 1000	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	25GHz
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

Below 1GHz test procedure as below:

- The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

Above 1GHz test procedure as below:

- Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber and change form table 0.8 metre to 1.5 metre(Above 18GHz the distance is 1 meter and table is 1.5 metre).
- Test the EUT in the lowest channel ,the middle channel ,the Highest channel

Note:

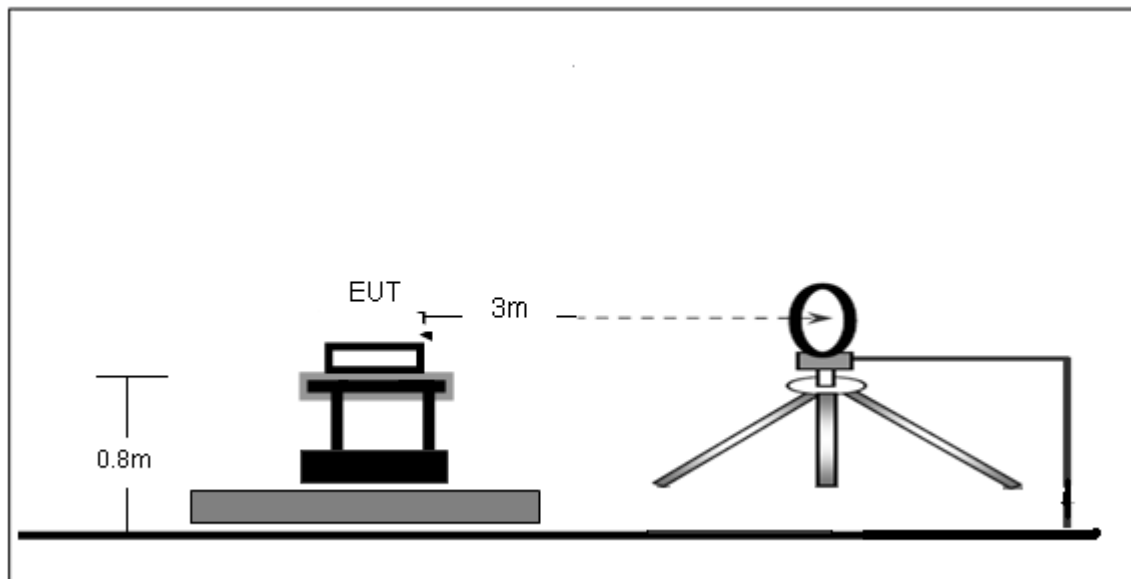
Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported

3.2.3 DEVIATION FROM TEST STANDARD

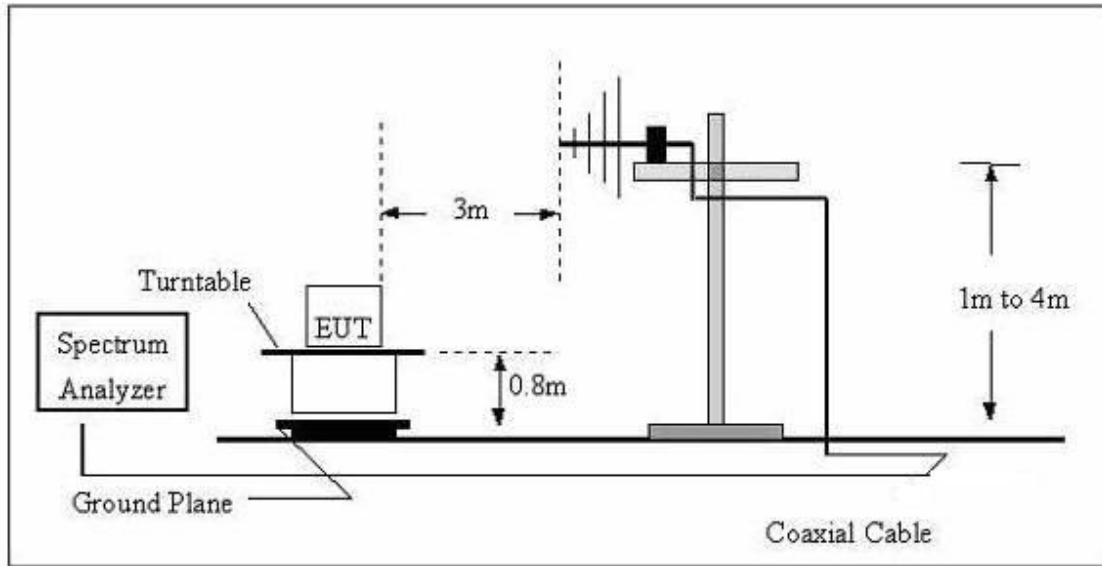
No deviation

3.2.4 TEST SETUP

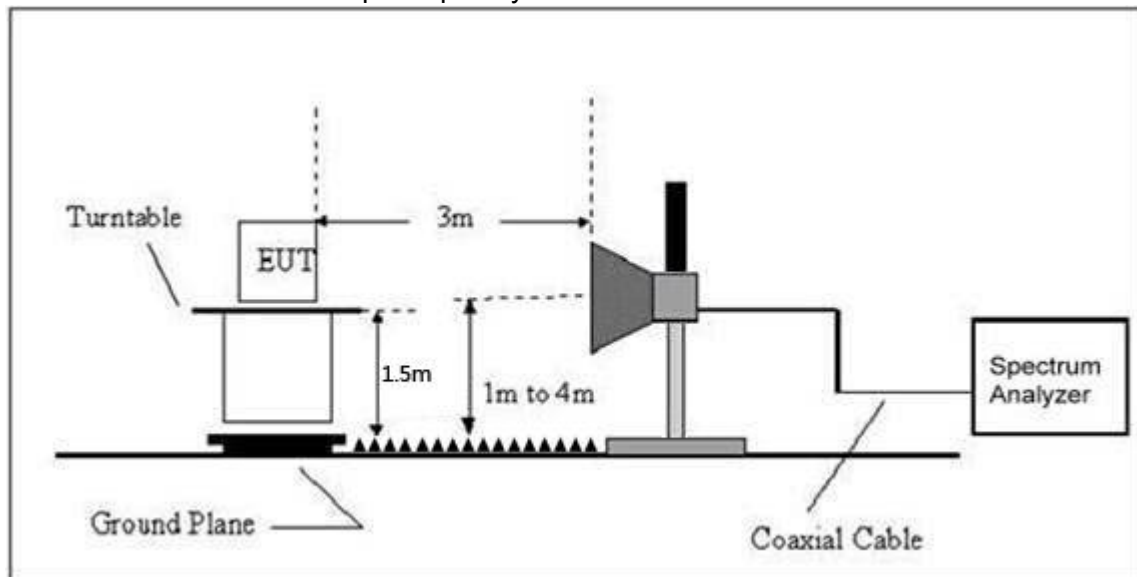
(A) Radiated Emission Test-Up Frequency Below 30MHz



(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)

Temperature:	20°C	Relative Humidity:	48%
Pressure:	1010 hPa	Test Voltage :	DC 3.7V
Test Mode :	Mode 1/2/3/4	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)

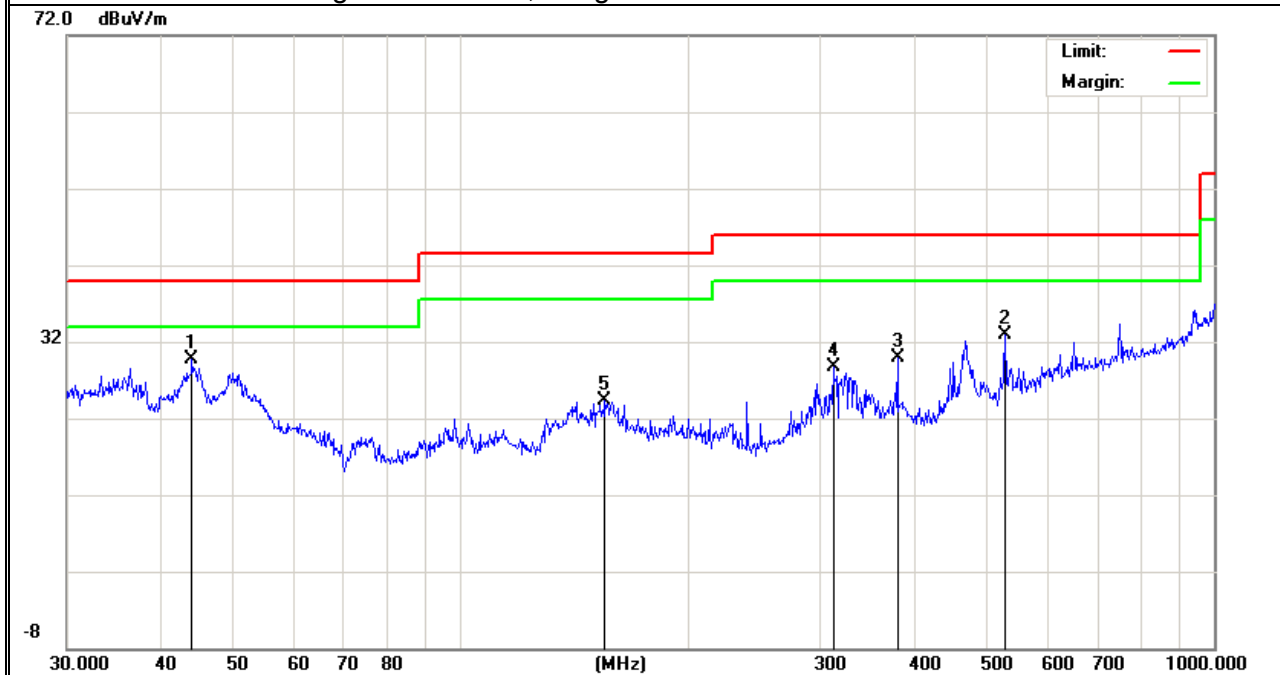
Temperature :	26°C	Relative Humidity :	54%
Pressure :	1010 hPa	Polarization :	Vertical
Test Voltage :	DC 3.7V		
Test Mode :	Mode 5		

All the modulation modes have been tested, and the worst result was report as below:

Polar (H/V)	Frequency (MHz)	Meter Reading (dBUV)	Factor (dB)	Emission Level (dBUV/m)	Limits (dBUV/m)	Margin (dB)	Remark
V	43.9658	16.33	13.38	29.71	40.00	-10.29	QP
V	528.2458	13.95	18.86	32.81	46.00	-13.19	QP
V	379.9141	13.64	16.28	29.92	46.00	-16.08	QP
V	312.1793	14.44	14.31	28.75	46.00	-17.25	QP
V	155.3642	11.40	12.92	24.32	43.50	-19.18	QP

Remark:

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

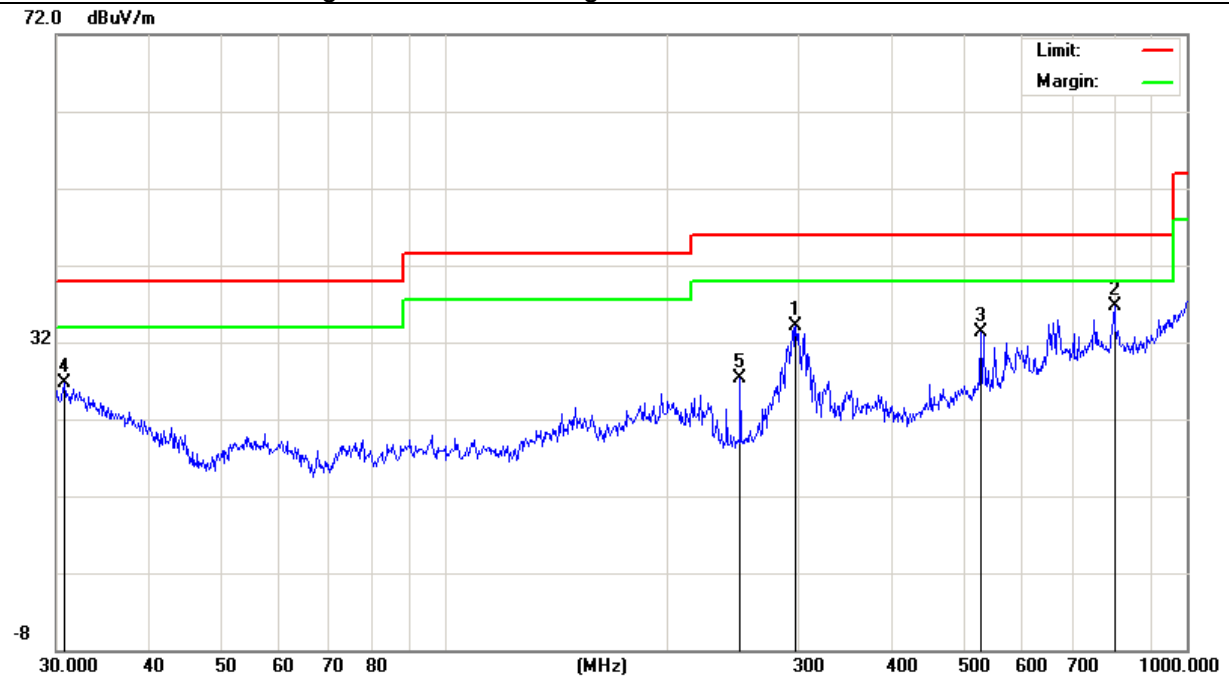


Temperature :	26°C	Relative Humidity :	54%
Pressure :	1010 hPa	Polarization :	Horizontal
Test Voltage :	DC 3.7V		
Test Mode :	Mode 5		

Polar (H/V)	Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Remark
	(MHz)	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
H	297.2241	20.42	13.76	34.18	46.00	-11.82	QP
H	798.9796	12.73	24.01	36.74	46.00	-9.26	QP
H	528.2458	14.40	18.86	33.26	46.00	-12.74	QP
H	30.7454	6.66	19.98	26.64	40.00	-13.36	QP
H	250.3010	15.13	12.12	27.25	46.00	-18.75	QP

Remark:

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



3.2.8 TEST RESULTS (1GHZ~25GHZ)

the worst result was report as below;

Low Channel (2412 MHz)

Frequency (MHz)	S.A. Reading (dBμV)	Detector (PK/AV)	Polarity (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Cord Amp. (dBμV/m)	Limit (dBμV/m)	Margin (dB)
4824	38.75	AV	V	34	6.86	31.72	47.89	54	-6.11
4824	38.39	AV	H	33.8	6.86	31.72	47.33	54	-6.67
4824	47.34	PK	V	34	6.86	31.72	56.48	74	-17.52
4824	47.18	PK	H	33.8	6.86	31.72	56.12	74	-17.88

Middle Channel (2437 MHz)

Frequency (MHz)	S.A. Reading (dBμV)	Detector (PK/AV)	Polarity (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Cord Amp. (dBμV/m)	Limit (dBμV/m)	Margin (dB)
4874	38.69	AV	V	33.6	6.82	31.82	47.29	54	-6.71
4874	38.41	AV	H	33.8	6.82	31.82	47.21	54	-6.79
4874	47.38	PK	V	33.6	6.82	31.82	55.98	74	-18.02
4874	47.22	PK	H	33.8	6.82	31.82	56.02	74	-17.98

High Channel (2462 MHz)

Frequency (MHz)	S.A. Reading (dBμV)	Detector (PK/AV)	Polarity (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Cord Amp. (dBμV/m)	Limit (dBμV/m)	Margin (dB)
4924	38.65	AV	V	34.6	6.76	31.92	48.09	54	-5.91
4924	38.37	AV	H	34.7	6.76	31.92	47.91	54	-6.09
4924	47.31	PK	V	34.6	6.76	31.92	56.75	74	-17.25
4924	47.16	PK	H	34.7	6.76	31.92	56.7	74	-17.30

Note:

- 1, The testing has been conformed to $10 \times 2462 \text{ MHz} = 24,620 \text{ MHz}$
- 2, All other emissions more than 30 dB below the limit

3.3 RADIATED BAND EMISSION MEASUREMENT

3.3.1 TEST REQUIREMENT:

RSS-247 5.5

LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

FREQUENCY (MHz)	Class B (dBuV/m) (at 3M)	
	PEAK	AVERAGE
Above 1000	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	2300MHz
Stop Frequency	2520
RB / VB (emission in restricted band)	1 MHz / 1 MHz for Peak, 1 MHz / 10Hz for Average

3.3.2 TEST PROCEDURE

Above 1GHz test procedure as below:

- a. 1. The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
- g. Test the EUT in the lowest channel,the Highest channel

Note:

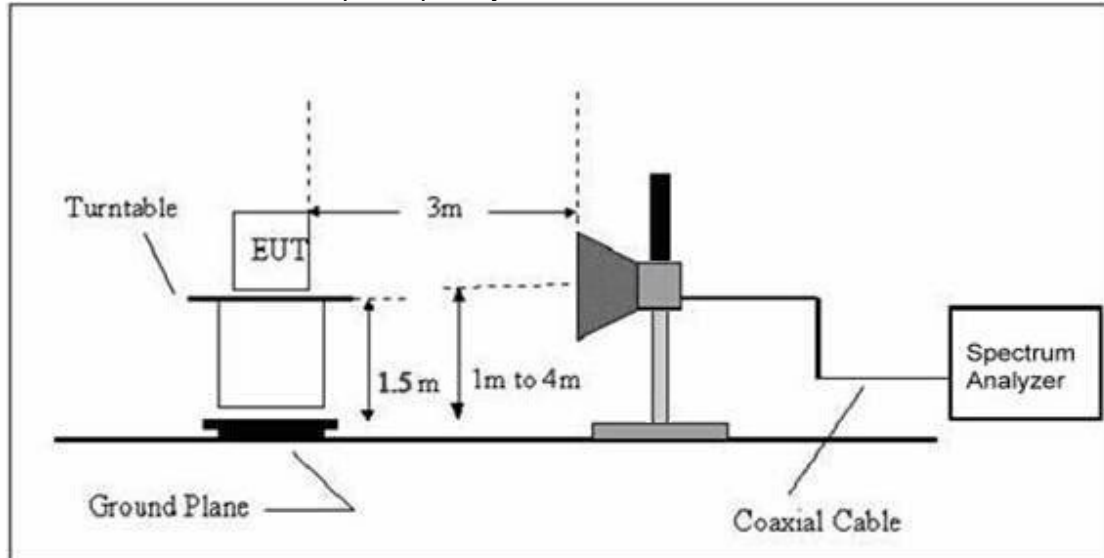
Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported

3.3.3 DEVIATION FROM TEST STANDARD

No deviation

3.3.4 TEST SETUP

Radiated Emission Test-Up Frequency Above 1GHz



3.3.5 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.

3.3.6 TEST RESULT

the worst result was report as below:

802.11b

Polar (H/V)	Frequency (MHz)	Meter Reading (dBUV)	Factor (dB)	Emission Level (dBUV/m)	Limits (dBUV/m)	Margin (dB)	Detec or Type
operation frequency:2412							
V	2390.00	37.42	13.83	51.25	74.00	-22.75	PK
V	2390.00	26.00	13.83	39.83	54.00	-14.17	AV
V	2400.00	37.63	13.85	51.48	74.00	-22.52	PK
V	2400.00	25.58	13.85	39.43	54.00	-14.57	AV
H	2390.00	37.72	13.83	51.55	74.00	-22.45	PK
H	2390.00	26.03	13.83	39.86	54.00	-14.14	AV
H	2400.00	37.58	13.85	51.43	74.00	-22.57	PK
H	2400.00	25.97	13.85	39.82	54.00	-14.18	AV

Polar (H/V)	Frequency (MHz)	Meter Reading (dBUV)	Factor (dB)	Emission Level (dBUV/m)	Limits (dBUV/m)	Margin (dB)	Detector Type
operation frequency:2462							
V	2483.50	37.63	14.02	51.65	74.00	-22.35	PK
V	2483.50	26.24	14.02	40.26	54.00	-13.74	AV
V	2500.00	37.57	14.06	51.63	74.00	-22.37	PK
V	2500.00	25.69	14.06	39.75	54.00	-14.25	AV
H	2483.50	37.76	14.02	51.78	74.00	-22.22	PK
H	2483.50	26.28	14.02	40.30	54.00	-13.70	AV
H	2500.00	37.37	14.06	51.43	74.00	-22.57	PK
H	2500.00	26.53	14.06	40.59	54.00	-13.41	AV

Remark:

1. Emission Level = Meter Reading + Factor, Margin= Emission Level - Limit
2. If peak below the average limit, the average emission was no test.
3. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

802.11g

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
operation frequency:2412							
V	2390.00	37.12	13.83	50.95	74.00	-23.05	PK
V	2390.00	25.79	13.83	39.62	54.00	-14.38	AV
V	2400.00	37.32	13.85	51.17	74.00	-22.83	PK
V	2400.00	25.37	13.85	39.22	54.00	-14.78	AV
H	2390.00	37.41	13.83	51.24	74.00	-22.76	PK
H	2390.00	25.82	13.83	39.65	54.00	-14.35	AV
H	2400.00	37.27	13.85	51.12	74.00	-22.88	PK
H	2400.00	25.76	13.85	39.61	54.00	-14.39	AV

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
operation frequency:2462							
V	2483.50	37.32	14.02	51.34	74.00	-22.66	PK
V	2483.50	26.03	14.02	40.05	54.00	-13.95	AV
V	2500.00	37.26	14.06	51.32	74.00	-22.68	PK
V	2500.00	25.48	14.06	39.54	54.00	-14.46	AV
H	2483.50	37.45	14.02	51.47	74.00	-22.53	PK
H	2483.50	26.07	14.02	40.09	54.00	-13.91	AV
H	2500.00	37.07	14.06	51.13	74.00	-22.87	PK
H	2500.00	26.32	14.06	40.38	54.00	-13.62	AV

Remark:

1. Emission Level = Meter Reading + Factor, Margin= Emission Level - Limit
2. If peak below the average limit, the average emission was no test.
3. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

802.11n(20MHz)

Polar (H/V)	Frequency (MHz)	Meter Reading (dBUV)	Factor (dB)	Emission Level (dBUV/m)	Limits (dBUV/m)	Margin (dB)	Detector Type
operation frequency:2412							
V	2390.00	37.22	13.83	51.05	74.00	-22.95	PK
V	2390.00	25.87	13.83	39.70	54.00	-14.30	AV
V	2400.00	37.43	13.85	51.28	74.00	-22.72	PK
V	2400.00	25.44	13.85	39.29	54.00	-14.71	AV
H	2390.00	37.52	13.83	51.35	74.00	-22.65	PK
H	2390.00	25.90	13.83	39.73	54.00	-14.27	AV
H	2400.00	37.38	13.85	51.23	74.00	-22.77	PK
H	2400.00	25.84	13.85	39.69	54.00	-14.31	AV

Polar (H/V)	Frequency (MHz)	Meter Reading (dBUV)	Factor (dB)	Emission Level (dBUV/m)	Limits (dBUV/m)	Margin (dB)	Detector Type
operation frequency:2462							
V	2483.50	37.43	14.02	51.45	74.00	-22.55	PK
V	2483.50	26.10	14.02	40.12	54.00	-13.88	AV
V	2500.00	37.37	14.06	51.43	74.00	-22.57	PK
V	2500.00	25.55	14.06	39.61	54.00	-14.39	AV
H	2483.50	37.56	14.02	51.58	74.00	-22.42	PK
H	2483.50	26.14	14.02	40.16	54.00	-13.84	AV
H	2500.00	37.17	14.06	51.23	74.00	-22.77	PK
H	2500.00	26.39	14.06	40.45	54.00	-13.55	AV

Remark:

1. Emission Level = Meter Reading + Factor, Margin= Emission Level - Limit
2. If peak below the average limit, the average emission was no test.
3. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

802.11n(40MHz)

Polar (H/V)	Frequency (MHz)	Meter Reading (dBUV)	Factor (dB)	Emission Level (dBUV/m)	Limits (dBUV/m)	Margin (dB)	Detector Type
operation frequency:2422							
V	2390.00	37.54	13.83	51.37	74.00	-22.63	PK
V	2390.00	26.08	13.83	39.91	54.00	-14.09	AV
V	2400.00	37.75	13.85	51.60	74.00	-22.40	PK
V	2400.00	25.66	13.85	39.51	54.00	-14.49	AV
H	2390.00	37.84	13.83	51.67	74.00	-22.33	PK
H	2390.00	26.10	13.83	39.93	54.00	-14.07	AV
H	2400.00	37.70	13.85	51.55	74.00	-22.45	PK
H	2400.00	26.05	13.85	39.90	54.00	-14.10	AV

Polar (H/V)	Frequency (MHz)	Meter Reading (dBUV)	Factor (dB)	Emission Level (dBUV/m)	Limits (dBUV/m)	Margin (dB)	Detector Type
operation frequency:2452							
V	2483.50	37.75	14.02	51.77	74.00	-22.23	PK
V	2483.50	26.32	14.02	40.34	54.00	-13.66	AV
V	2500.00	37.69	14.06	51.75	74.00	-22.25	PK
V	2500.00	25.76	14.06	39.82	54.00	-14.18	AV
H	2483.50	37.88	14.02	51.90	74.00	-22.10	PK
H	2483.50	26.36	14.02	40.38	54.00	-13.62	AV
H	2500.00	37.49	14.06	51.55	74.00	-22.45	PK
H	2500.00	26.61	14.06	40.67	54.00	-13.33	AV

Remark:

1. Emission Level = Meter Reading + Factor, Margin= Emission Level - Limit
2. If peak below the average limit, the average emission was no test.
3. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

4. 6DB BANDWIDTH

4.1 APPLICABLE STANDARD

According to FCC Part 15.247(a)(2) and KDB 558074 DTS 01 Meas. Guidance v03r04

4.2 CONFORMANCE LIMIT

The minimum permissible 6dB bandwidth is 500 kHz.

4.3 MEASURING INSTRUMENTS

The Measuring equipment is listed in the section 6.3 of this test report.

4.4 TEST SETUP

Please refer to Section 6.1 of this test report.

4.5 TEST PROCEDURE

The testing follows KDB 558074 DTS 01 Meas. Guidance v03r04

The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator.

The path loss was compensated to the results for each measurement.

Set to the maximum power setting and enable the EUT transmit continuously.

The EUT was operating in controlled its channel.

Use the following spectrum analyzer settings:

Span = the frequency band of operation

RBW = 100KHz

VBW $\geq$ 3*RBW

Sweep = auto

Detector function = peak

Trace = max hold

4. 6TEST RESULTS

802.11b Mode

Channel	Frequency (MHz)	6dB bandwidth (MHz)	Limit (kHz)	Result
Low	2412	10.10	500	Pass
Middle	2437	10.10	500	Pass
High	2462	10.10	500	Pass

802.11g Mode

Channel	Frequency (MHz)	6dB bandwidth (MHz)	Limit (kHz)	Result
Low	2412	16.57	500	Pass
Middle	2437	16.57	500	Pass
High	2462	16.57	500	Pass

802.11n20 Mode

Channel	Frequency (MHz)	6dB bandwidth (MHz)	Limit (kHz)	Result
Low	2412	17.77	500	Pass
Middle	2437	17.77	500	Pass
High	2462	17.78	500	Pass

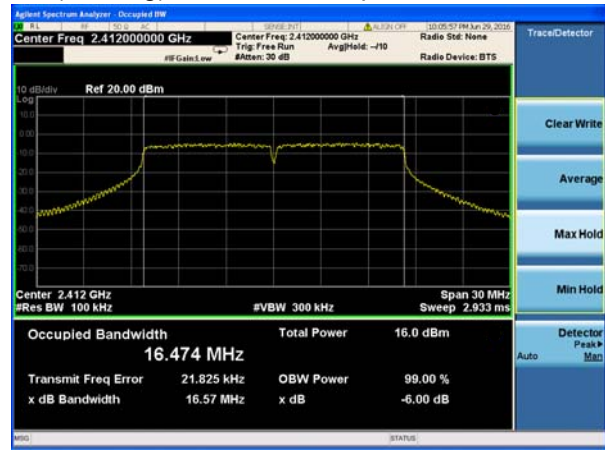
802.11n40 Mode

Channel	Frequency (MHz)	6dB bandwidth (MHz)	Limit (kHz)	Result
Low	2422	36.45	500	Pass
Middle	2437	36.45	500	Pass
High	2452	36.46	500	Pass

(802.11b) 6dB Bandwidth plot on channel 1



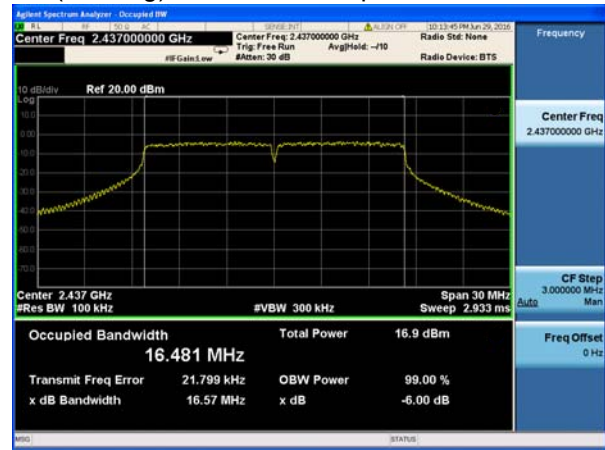
(802.11g) 6dB Bandwidth plot on channel 1



(802.11b) 6dB Bandwidth plot on channel 6



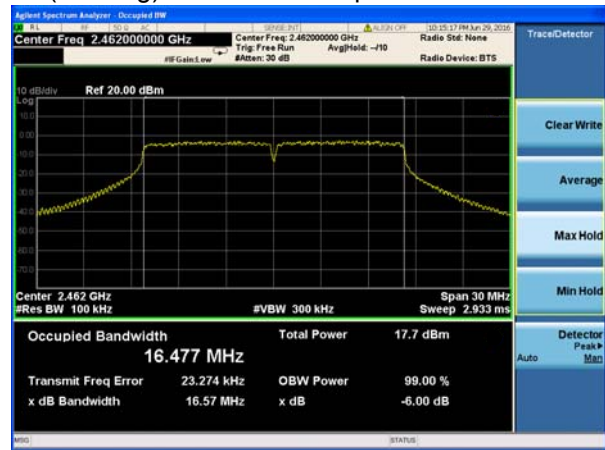
(802.11g) 6dB Bandwidth plot on channel 6



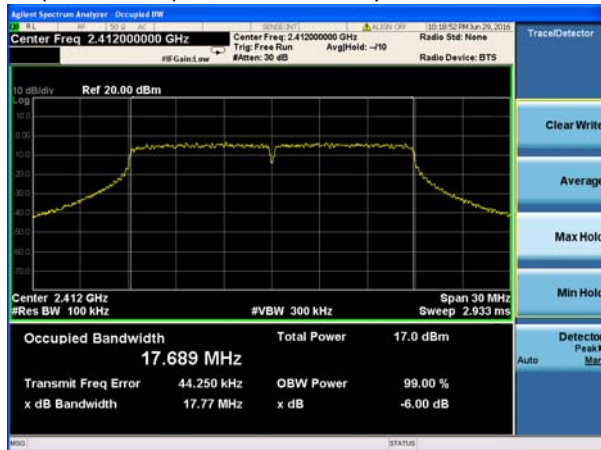
(802.11b) 6dB Bandwidth plot on channel 11



(802.11g) 6dB Bandwidth plot on channel 11



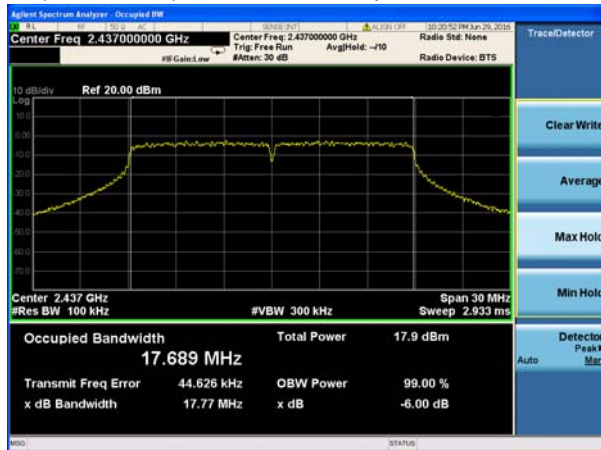
(802.11n20) 6dB Bandwidth plot on channel 1



(802.11n40) 6dB Bandwidth plot on channel 3



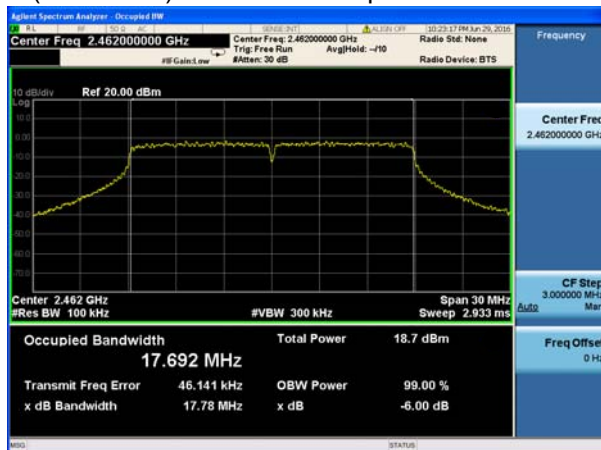
(802.11n20) 6dB Bandwidth plot on channel 6



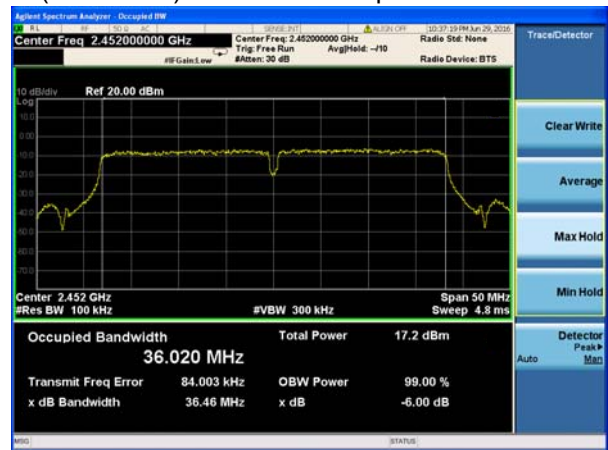
(802.11n40) 6dB Bandwidth plot on channel 6



(802.11n20) 6dB Bandwidth plot on channel 11



(802.11n40) 6dB Bandwidth plot on channel 9



5. 20DB BANDWIDTH**5.1 APPLICABLE STANDARD**

According to FCC Part 15.247(a)(2) and KDB 558074 DTS 01 Meas. Guidance v03r05

5.2 CONFORMANCE LIMIT

The minimum permissible 6dB bandwidth is 500 kHz.

5.3 MEASURING INSTRUMENTS

The Measuring equipment is listed in the section 6.3 of this test report.

5.4 TEST SETUP

Please refer to Section 6.1 of this test report.

5.5 TEST PROCEDURE

The testing follows KDB 558074 DTS 01 Meas. Guidance v03r05

The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator.

The path loss was compensated to the results for each measurement.

Set to the maximum power setting and enable the EUT transmit continuously.

The EUT was operating in controlled its channel.

Use the following spectrum analyzer settings:

Span = the frequency band of operation

RBW = 100KHz

VBW $\geq$ 3*RBW

Sweep = auto

Detector function = peak

Trace = max hold

5.6 TEST RESULTS

802.11b Mode

Channel	Frequency (MHz)	-20dB bandwidth (MHz)	Limit (kHz)	Result
Low	2412	17.12	500	Pass
Middle	2437	17.12	500	Pass
High	2462	17.12	500	Pass

802.11g Mode

Channel	Frequency (MHz)	-20dB bandwidth (MHz)	Limit (kHz)	Result
Low	2412	18.60	500	Pass
Middle	2437	18.58	500	Pass
High	2462	18.60	500	Pass

802.11n20 Mode

Channel	Frequency (MHz)	-20dB bandwidth (MHz)	Limit (kHz)	Result
Low	2412	19.41	500	Pass
Middle	2437	19.41	500	Pass
High	2462	19.60	500	Pass

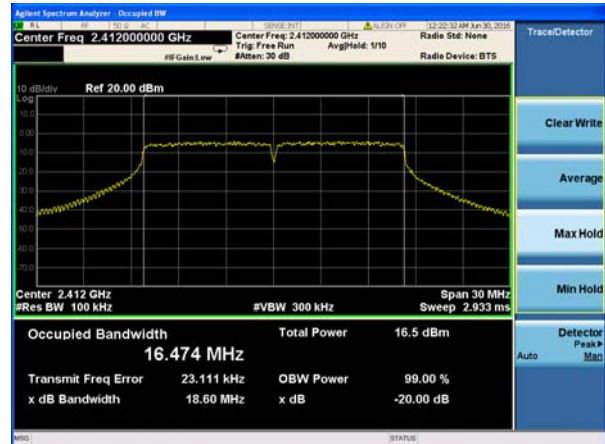
802.11n40 Mode

Channel	Frequency (MHz)	-20dB bandwidth (MHz)	Limit (kHz)	Result
Low	2422	37.80	500	Pass
Middle	2437	37.77	500	Pass
High	2452	37.75	500	Pass

(802.11b) -20dB Bandwidth plot on channel 1



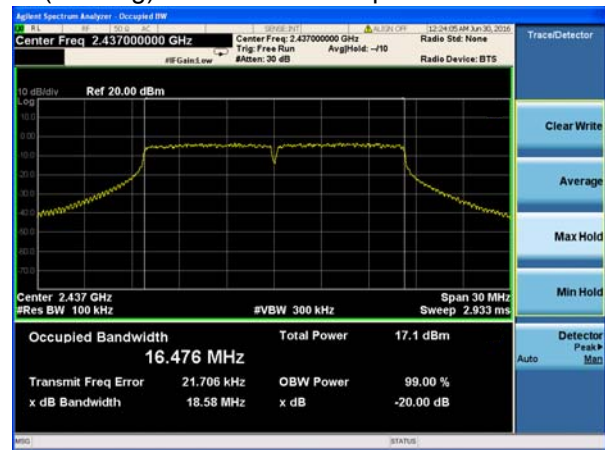
(802.11g) -20dB Bandwidth plot on channel 1



(802.11b) -20dB Bandwidth plot on channel 6



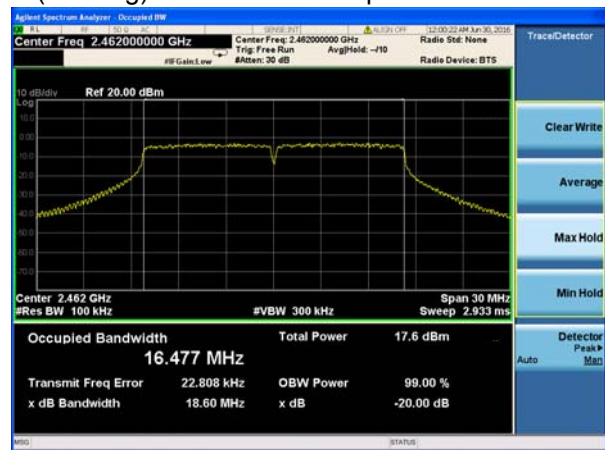
(802.11g) -20dB Bandwidth plot on channel 6



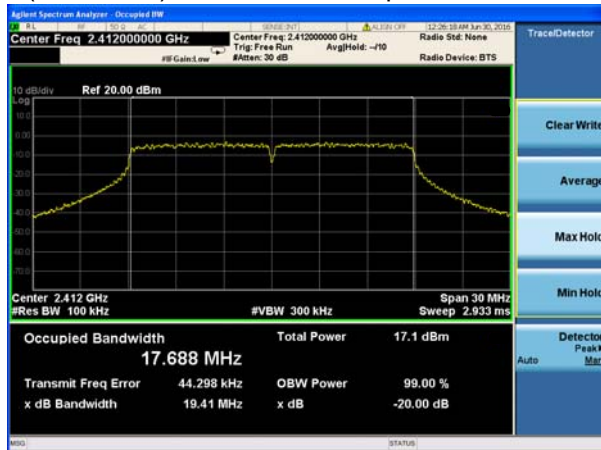
(802.11b) -20dB Bandwidth plot on channel 11



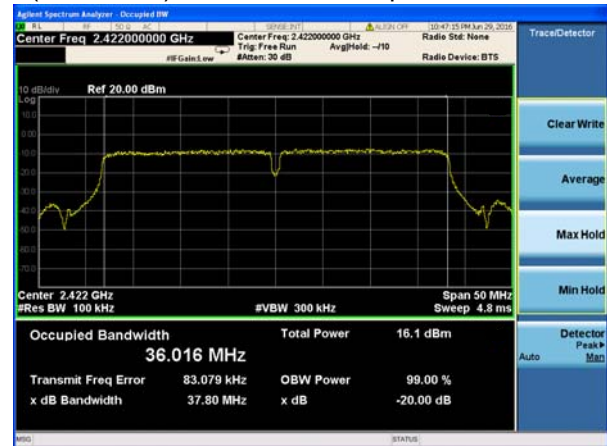
(802.11g) -20dB Bandwidth plot on channel 11



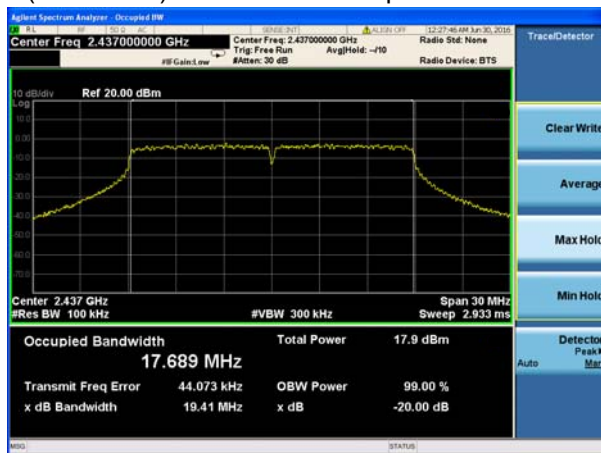
(802.11n20) -20dB Bandwidth plot on channel 1



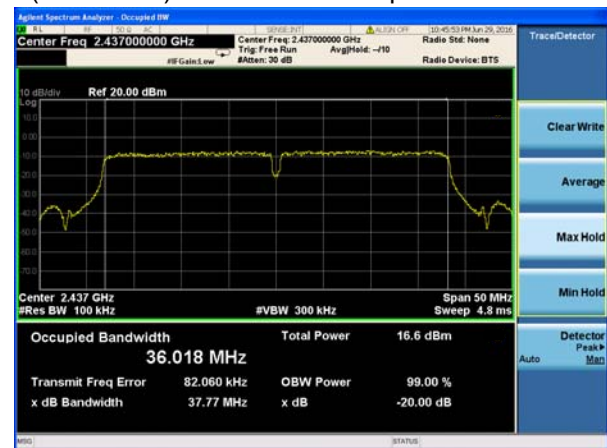
(802.11n40) -20dB Bandwidth plot on channel 3



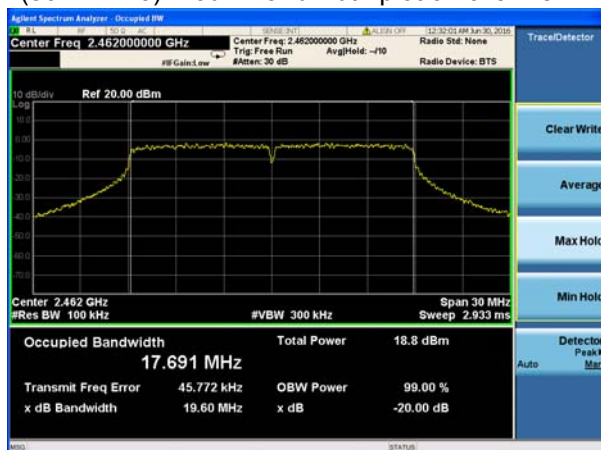
(802.11n20) -20dB Bandwidth plot on channel 6



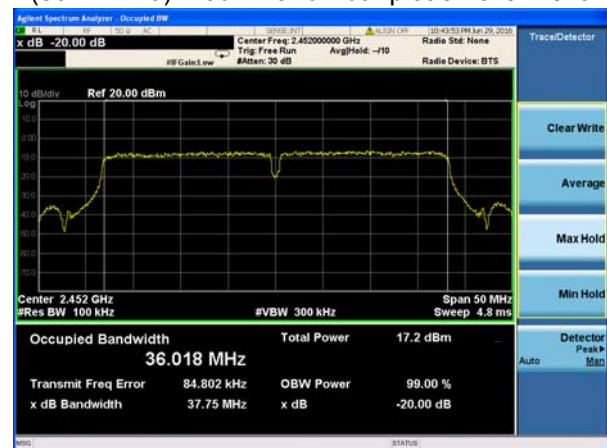
(802.11n40) -20dB Bandwidth plot on channel 6



(802.11n20) -20dB Bandwidth plot on channel 11



(802.11n40) -20dB Bandwidth plot on channel 9



6. DUTY CYCLE

6.1 APPLICABLE STANDARD

According to KDB 558074)6)b), issued 06/09/2015

6.2 CONFORMANCE LIMIT

No limit requirement.

6.3 MEASURING INSTRUMENTS

The Measuring equipment is listed in the section 6.3 of this test report.

6.4 TEST SETUP

Please refer to Section 6.1 of this test report.

6.5 TEST PROCEDURE

The zero-span mode on a spectrum analyzer or EMI receiver if the response time and spacing between bins on the sweep are sufficient to permit accurate measurements of the on and off times of the transmitted signal. Set the center frequency of the instrument to the center frequency of the transmission. Set $RBW \geq OBW$ if possible; otherwise, set RBW to the largest available value. Set $VBW \geq RBW$. Set detector = peak or average. The zero-span measurement method shall not be used unless both RBW and VBW are $> 50/T$ and the number of sweep points across duration T exceeds 100. (For example, if VBW and/or RBW are limited to 3 MHz, then the zero-span method of measuring duty cycle shall not be used if $T \leq 16.7$ microseconds.)

The transmitter output is connected to the Spectrum Analyzer. We tested according to the zero-span measurement method, 6.0)b) in KDB 558074(issued 06/09/2015)

The largest available value of RBW is 8 MHz and VBW is 50 MHz. The zero-span method of measuring duty cycle shall not be used if $T \leq 6.25$ microseconds. ($50/6.25 = 8$)

The zero-span method was used because all measured T data are > 6.25 microseconds and both RBW and VBW are $> 50/T$.

The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator.

The path loss was compensated to the results for each measurement.

Set to the maximum power setting and enable the EUT transmit continuously.

The EUT was operating in controlled its channel.

Use the following spectrum analyzer settings:

Span = Zero Span

RBW = 8MHz(the largest available value)

VBW = 8MHz ($\geq$ RBW)

Number of points in Sweep > 100

Detector function = peak

Trace = Clear write

Measure T_{total} and T_{on}

Calculate Duty Cycle = T_{on} / T_{total} and Duty Cycle Factor = $10 \cdot \log(1/\text{Duty Cycle})$

6.6 TEST RESULTS

Mode	Data rate	Channel	T _{on}	T _{total}	Duty Cycle %	Duty Cycle Factor (dB)	1/T Minimum VBW (kHz)
802.11b	1Mbps	6	10	10	100	0.00	0.01
802.11g	6Mbps	6	10	10	100	0.00	0.01
802.11n HT20	MCS0	6	10	10	100	0.00	0.01
802.11n HT40	MCS0	6	10	10	100	0.00	0.01

7. POWER SPECTRAL DENSITY TEST

7.1 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

7.2 TEST PROCEDURE

1. Set analyzer center frequency to DTS channel center frequency.
2. Set the span to 1.5 times the DTS bandwidth.
3. Set the RBW to: $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$.
4. Set the VBW $\geq 3 \times \text{RBW}$.
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 within the RBW.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

7.3 DEVIATION FROM STANDARD

No deviation.

7.4 TEST SETUP



7.5 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.

7.6 TEST RESULTS

Temperature :	25°C	Relative Humidity :	60%
Pressure :	1015 hPa	Test Voltage :	DC 3.7V
Test Mode :	TX b Mode		

NOTE:

EUT has two antennas, and different modes support different transmit mode what describe as Following form:

ANT1,ANT2 Represent the value of antenna 1 and 2,The worst data is Antenna 1 ,only shown Antenna 1 Plot.

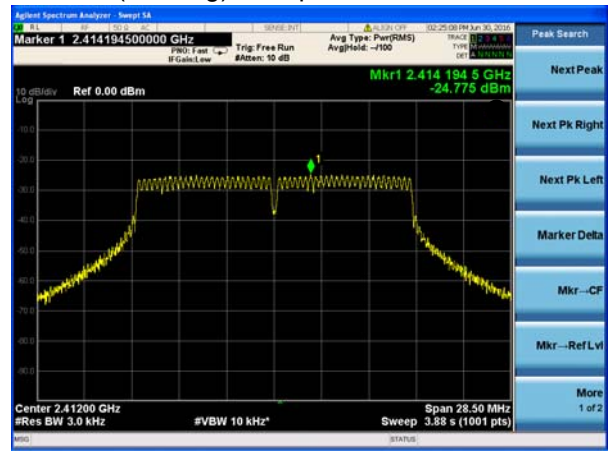
Mode	Tx/Rx
11b, 11g, 11n(HT20, HT40)	1Tx, 1Rx
11n(HT20, HT40)	2Tx, 2Rx

Test Channel	Frequenc y	Power Density	LIMIT	Verdict
	(MHz)	(dBm/3K Hz)	(dBm/3KHz)	
802.11b				
1	2412	-17.264	8	PASS
6	2437	-16.649	8	PASS
11	2462	-15.751	8	PASS
802.11g				
1	2412	-24.775	8	PASS
6	2437	-24.128	8	PASS
11	2462	-22.963	8	PASS
802.11n HT20				
1	2412	-24.114	8	PASS
6	2437	-22.95	8	PASS
11	2462	-22.464	8	PASS
802.11n HT40				
3	2422	-28.429	8	PASS
6	2437	-27.643	8	PASS
9	2452	-26.240	8	PASS

(802.11b) PSD plot on channel 1



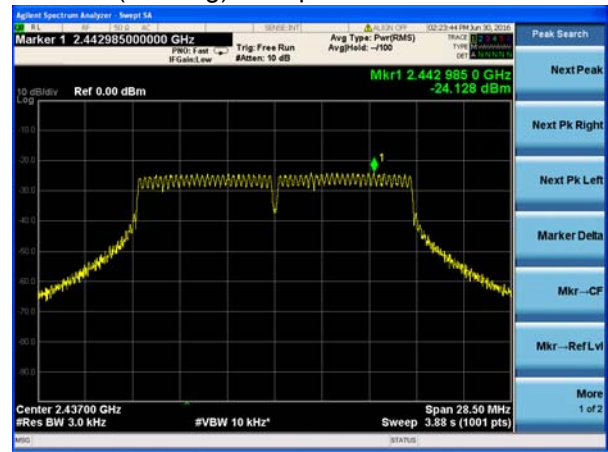
(802.11g) PSD plot on channel 1



(802.11b) PSD plot on channel 6



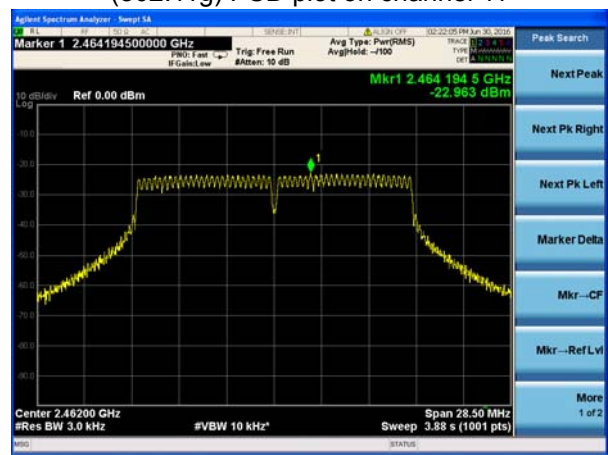
(802.11g) PSD plot on channel 6



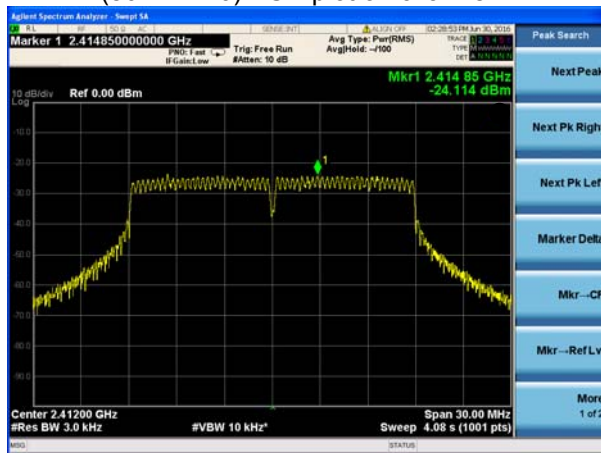
(802.11b) PSD plot on channel 11



(802.11g) PSD plot on channel 11



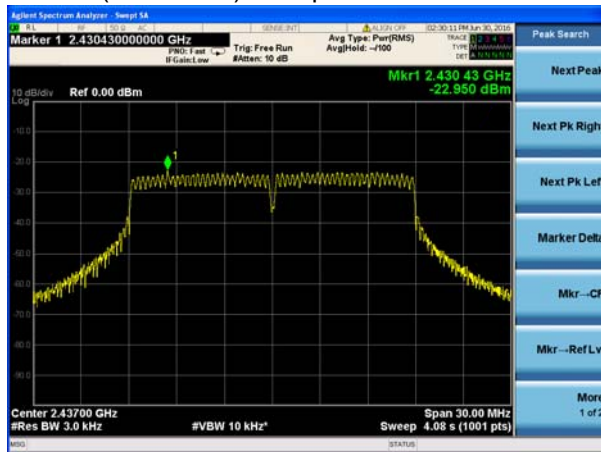
(802.11n20) PSD plot on channel 1



(802.11n40) PSD plot on channel 3



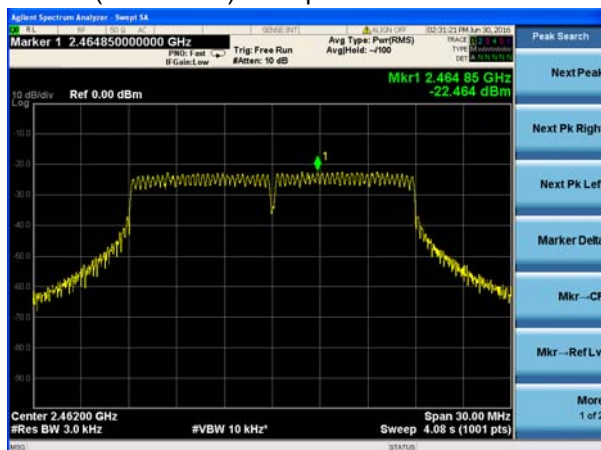
(802.11n20) PSD plot on channel 6



(802.11n40) PSD plot on channel 6



(802.11n20) PSD plot on channel 11



(802.11n40) PSD plot on channel 9



8. PEAK OUTPUT POWER TEST

8.1 APPLIED PROCEDURES / LIMIT

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

8.2 TEST PROCEDURE

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

8.3 DEVIATION FROM STANDARD

No deviation.

8.4 TEST SETUP



8.5 EUT OPERATION CONDITIONS

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

8.6 TEST RESULT

TX 802.11b Mode			
Test Channel	Frequency (MHz)	Maximum Conducted Output Power (dBm)	LIMIT dBm
CH01	2412	17.24	30
CH06	2437	17.16	30
CH11	2462	17.21	30
TX 802.11g Mode			
CH01	2412	17.29	30
CH06	2437	17.15	30
CH11	2462	17.22	30
TX 802.11n-HT20 Mode			
CH01	2412	17.16	30
CH06	2437	17.23	30
CH11	2462	17.18	30
TX 802.11n-HT40 Mode			
CH03	2422	17.36	30
CH06	2437	17.29	30
CH09	2452	17.58	30

9. EMISSION NOT IN RESTRICTED BAND

9.1 APPLICABLE STANDARD

According to FCC Part 15.247(d) and KDB 558074 DTS 01 Meas. Guidance v03r05

The DTS rules specify that in any 100 kHz bandwidth outside of the authorized frequency band, the power shall be attenuated according to the following conditions:

- a) If the maximum peak conducted output power procedure was used to demonstrate compliance as described in 9.1, then the peak output power measured in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz (i.e., 20 dBc).
- b) If maximum conducted (average) output power was used to demonstrate compliance as described in 9.2, then the peak power in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 30 dB relative to the maximum in-band peak PSD level in 100 kHz (i.e., 30 dBc).
- c) In either case, attenuation to levels below the 15.209 general radiated emissions limits is not required.

The following procedures shall be used to demonstrate compliance to these limits. Note that these procedures can be used in either an antenna-port conducted or radiated test set-up. Radiated tests must conform to the test site requirements and utilize maximization procedures defined herein.

9.2 MEASURING INSTRUMENTS

The Measuring equipment is listed in the section 6.3 of this test report.

9.3 TEST SETUP

Reference level measurement

Establish a reference level by using the following procedure:

- a) Set instrument center frequency to DTS channel center frequency.
- b) Set the span to ≥ 1.5 times the DTS bandwidth.
- c) Set the RBW = 100 kHz.
- d) Set the VBW $\geq 3 \times$ RBW.
- e) Detector = peak.
- f) Sweep time = auto couple.
- g) Trace mode = max hold.
- h) Allow trace to fully stabilize.
- i) Use the peak marker function to determine the maximum PSD level.

Note that the channel found to contain the maximum PSD level can be used to establish the reference level.

Emission level measurement

- a) Set the center frequency and span to encompass frequency range to be measured.
- b) Set the RBW = 100 kHz.
- c) Set the VBW $\geq 3 \times$ RBW.
- d) Detector = peak.
- e) Sweep time = auto couple.

- f) Trace mode = max hold.
- g) Allow trace to fully stabilize.
- h) Use the peak marker function to determine the maximum amplitude level.

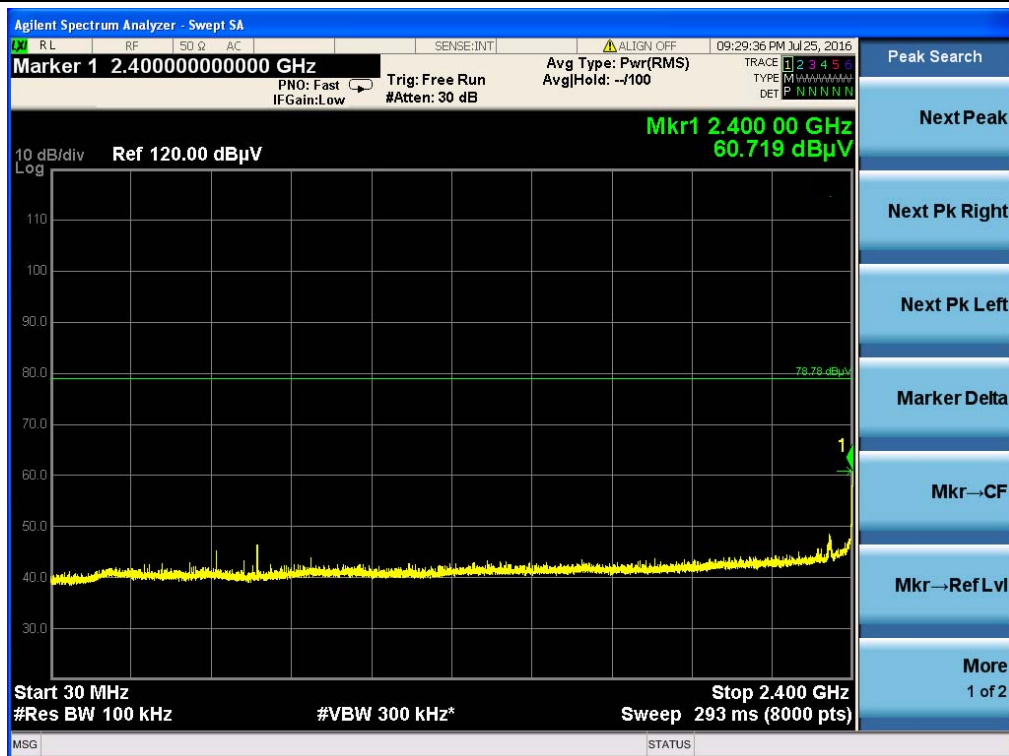
Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) are attenuated by at least the minimum requirements specified in 11.1 a) or 11.1 b).

Report the three highest emissions relative to the limit.

(802.11b) Emission not in Restricted Band plot on channel 1
Reference Level



Configuration IEEE 802.11b / CH 1 / 30MHz~2400MHz (down 30dBc)

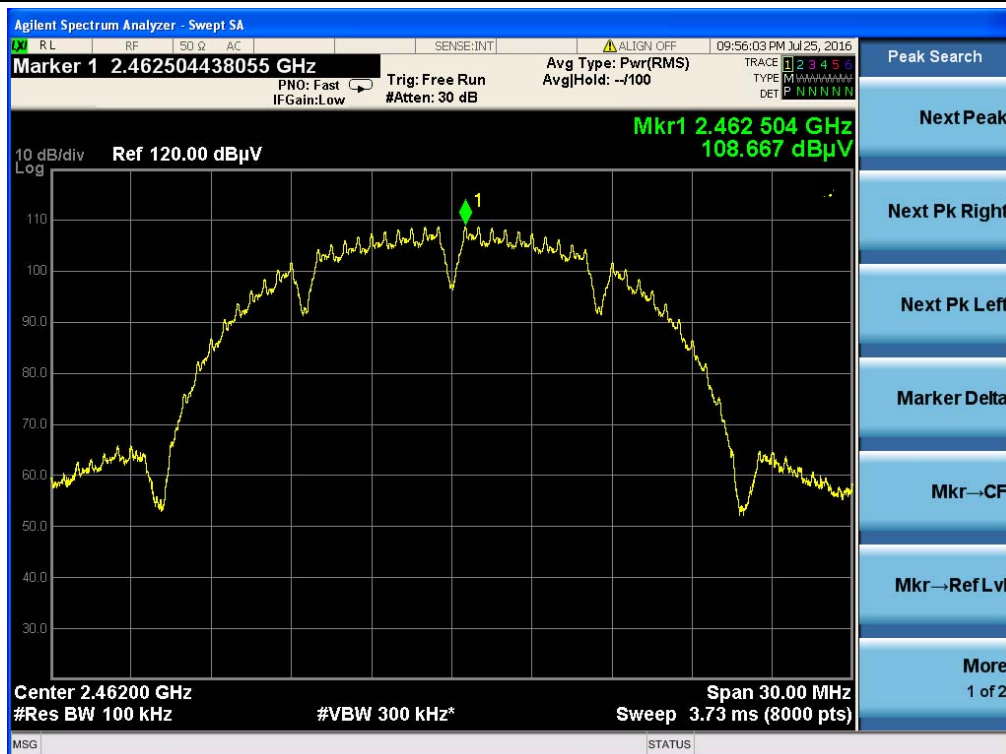


Configuration IEEE 802.11b / CH 1 / 2500MHz~26500MHz (down 30dBc)

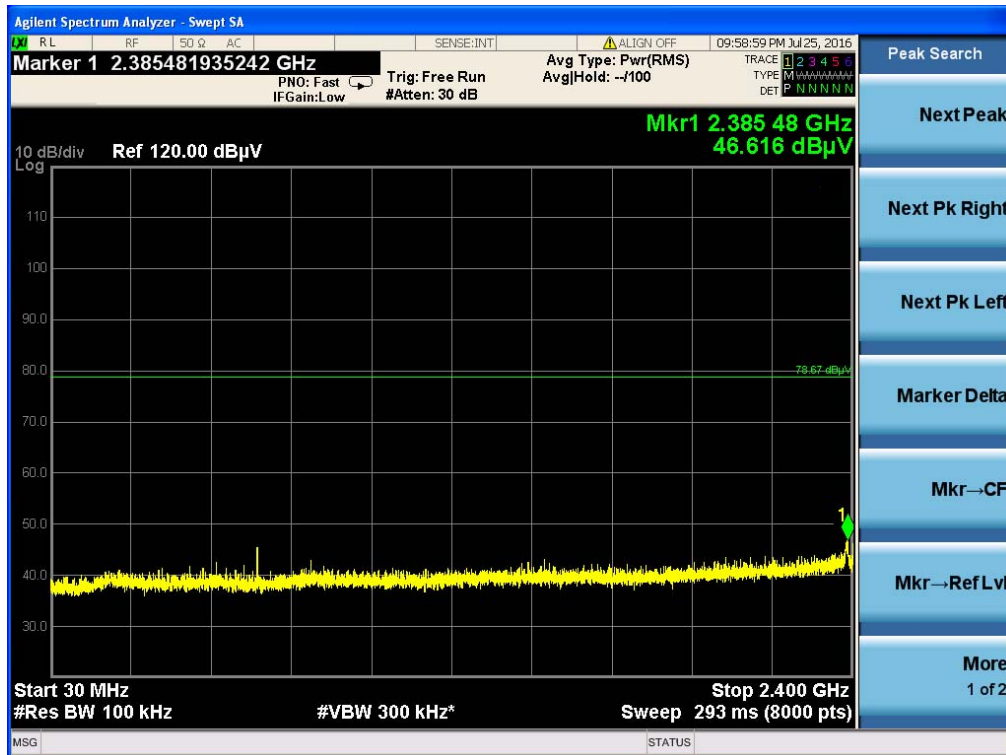


(802.11b) Emission not in Restricted Band plot on channel 11

Reference Level



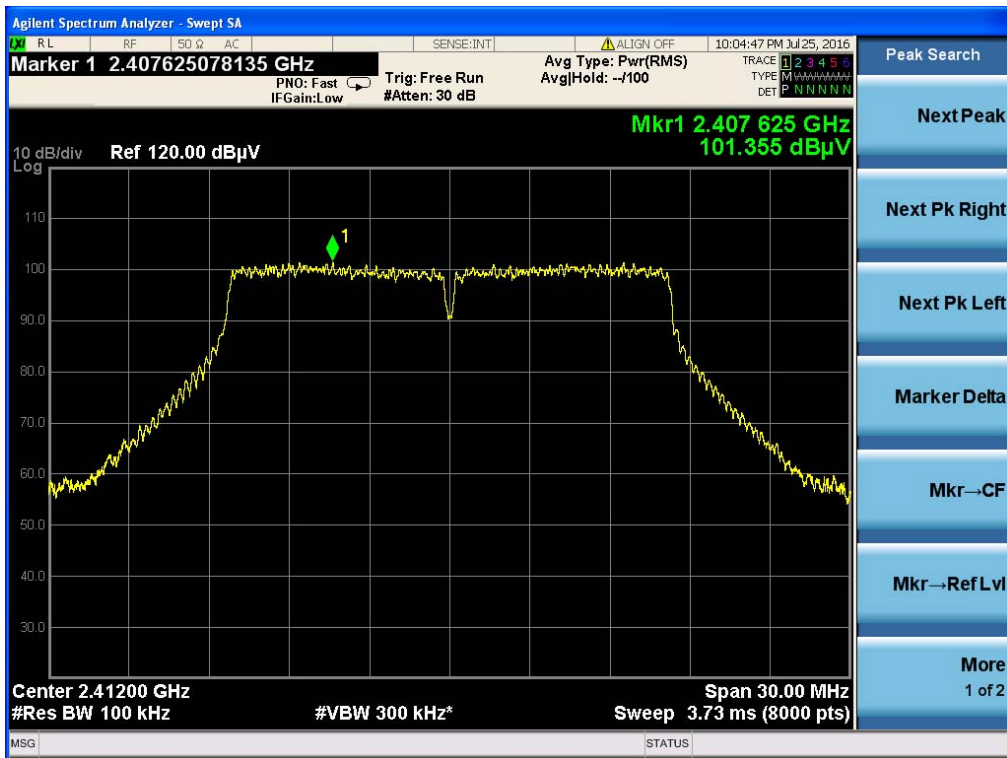
Configuration IEEE 802.11b / CH 11 / 30MHz~2400MHz (down 30dBc)



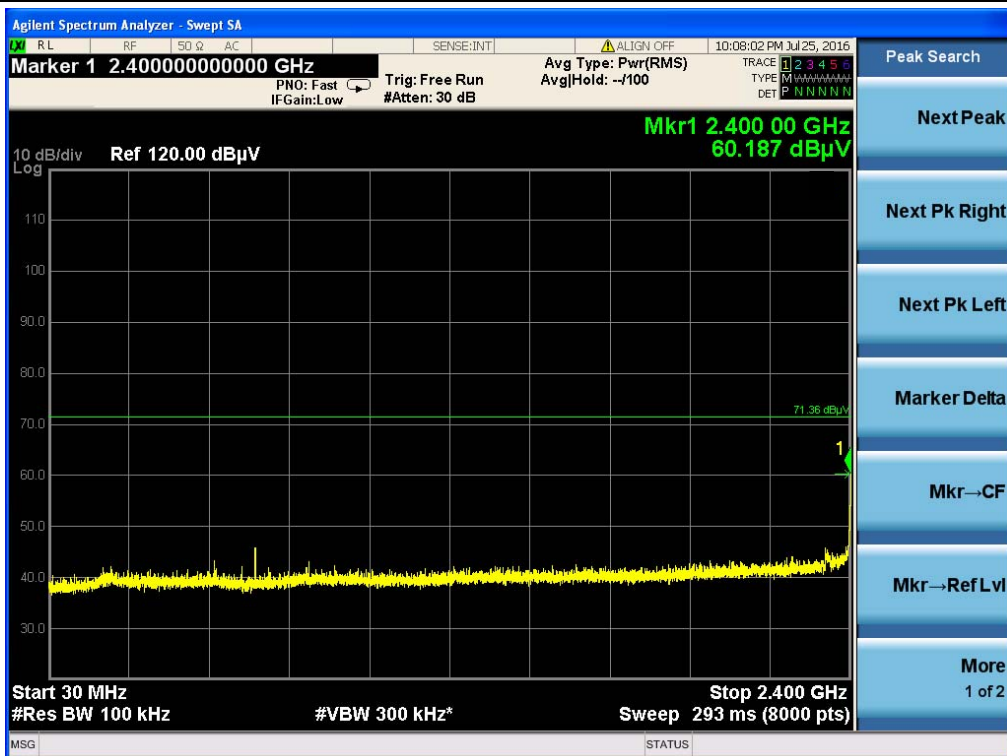
Configuration IEEE 802.11b / CH 11 / 2500MHz~26500MHz (down 30dBc)



Configuration IEEE 802.11g Emission not in Restricted Band plot on channel 1 Reference Level



Configuration IEEE 802.11g / CH 1 / 30MHz~2400MHz (down 30dBc)

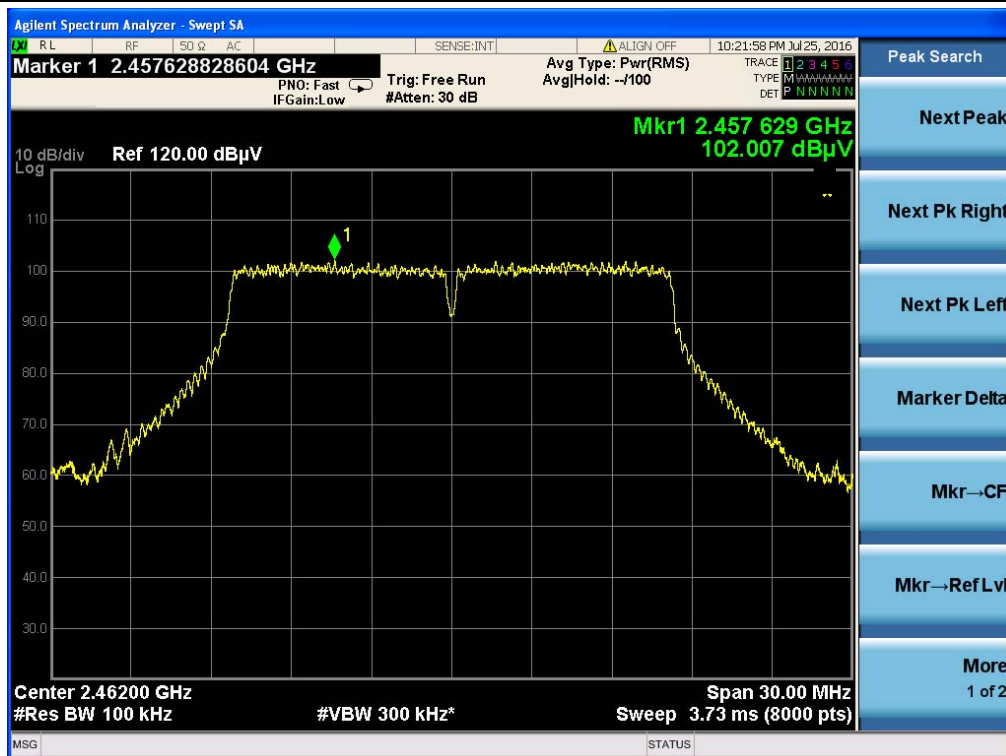


Configuration IEEE 802.11g / CH 1 / 2500MHz~26500MHz (down 30dBc)

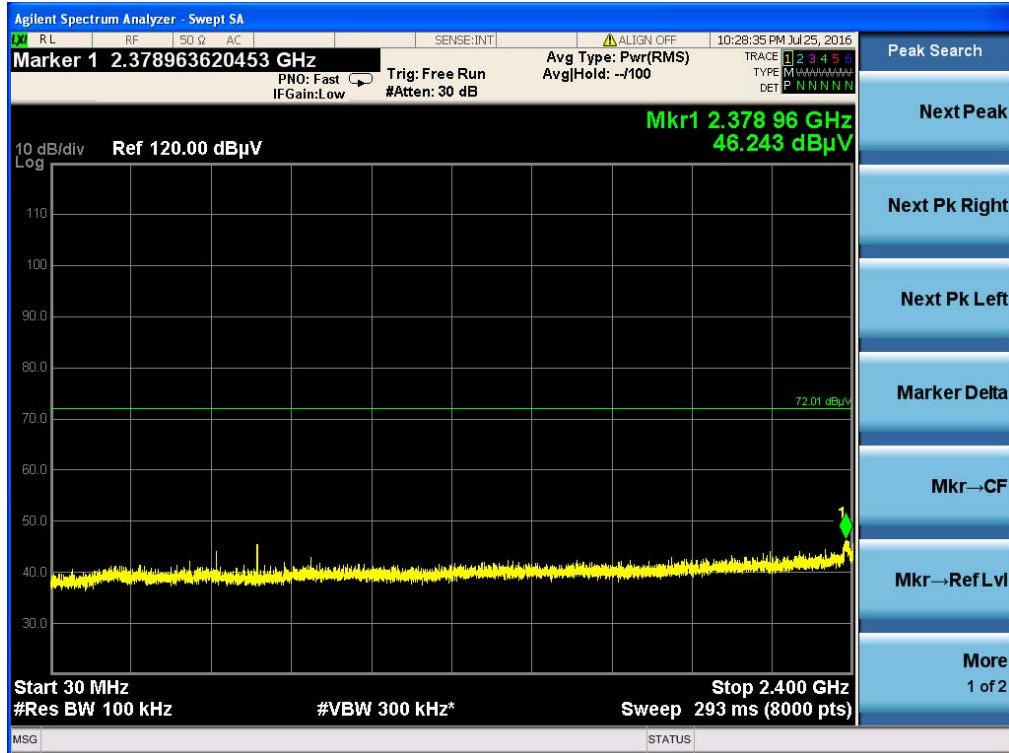


Configuration IEEE 802.11g Emission not in Restricted Band plot on channel 11

Reference Level



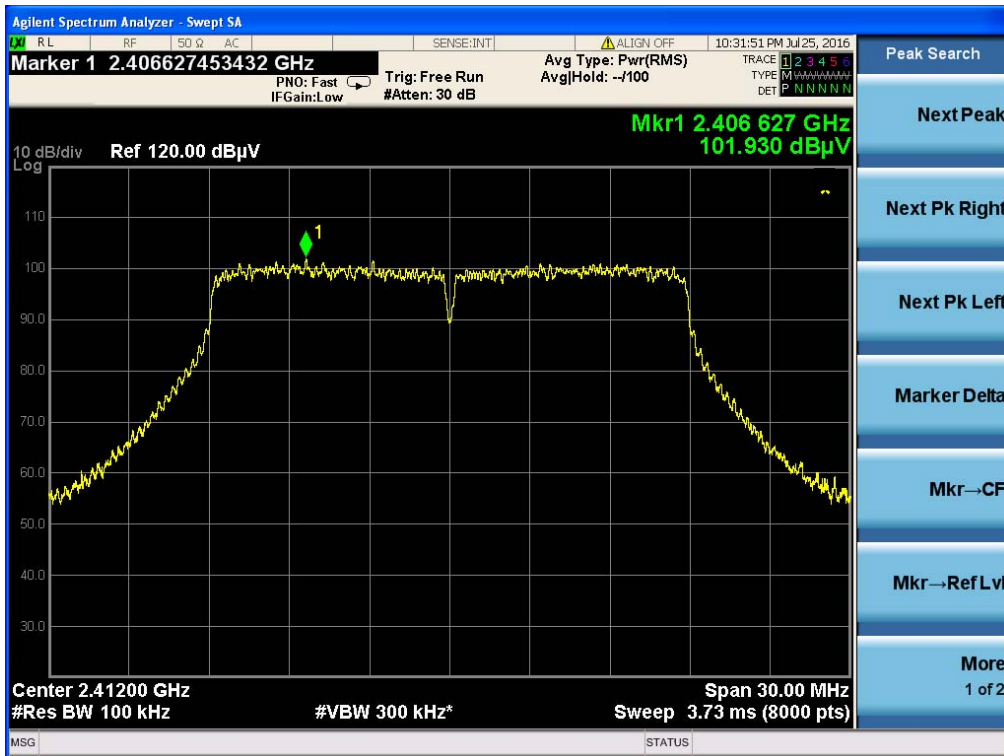
Configuration IEEE 802.11g / CH 11 / 30MHz~2400MHz (down 30dBc)



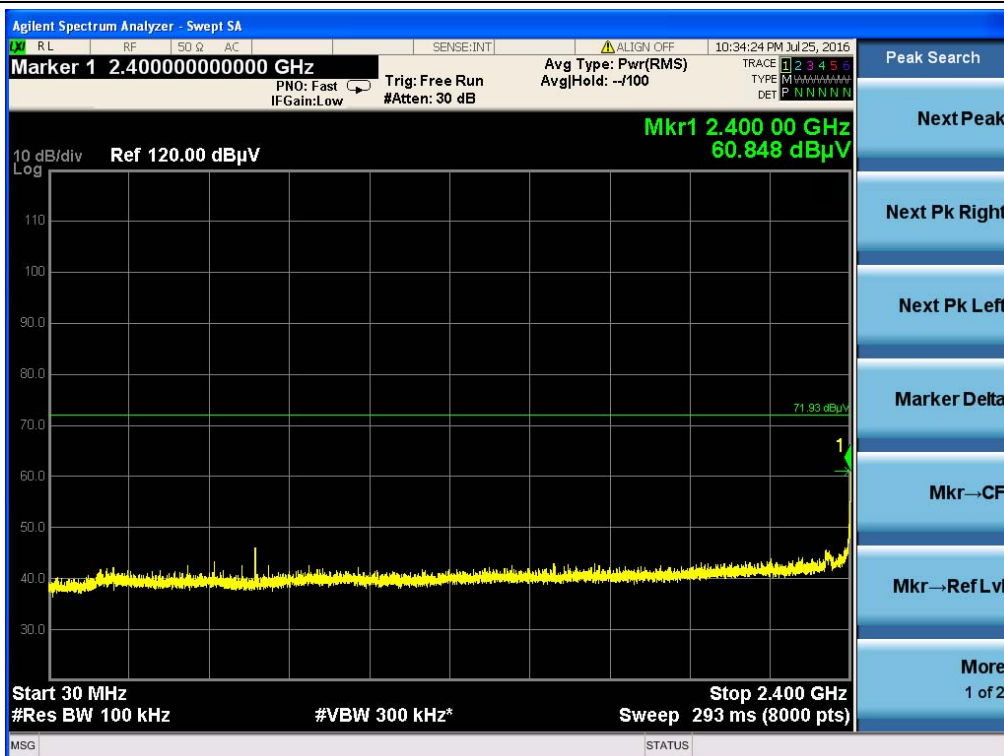
Configuration IEEE 802.11g / CH 11 / 2500MHz~26500MHz (down 30dBc)



Configuration IEEE 802.11n20 Emission not in Restricted Band plot on channel 1 Reference Level



Configuration IEEE 802.11n20 / CH 1 / 30MHz~2400MHz (down 30dBc)

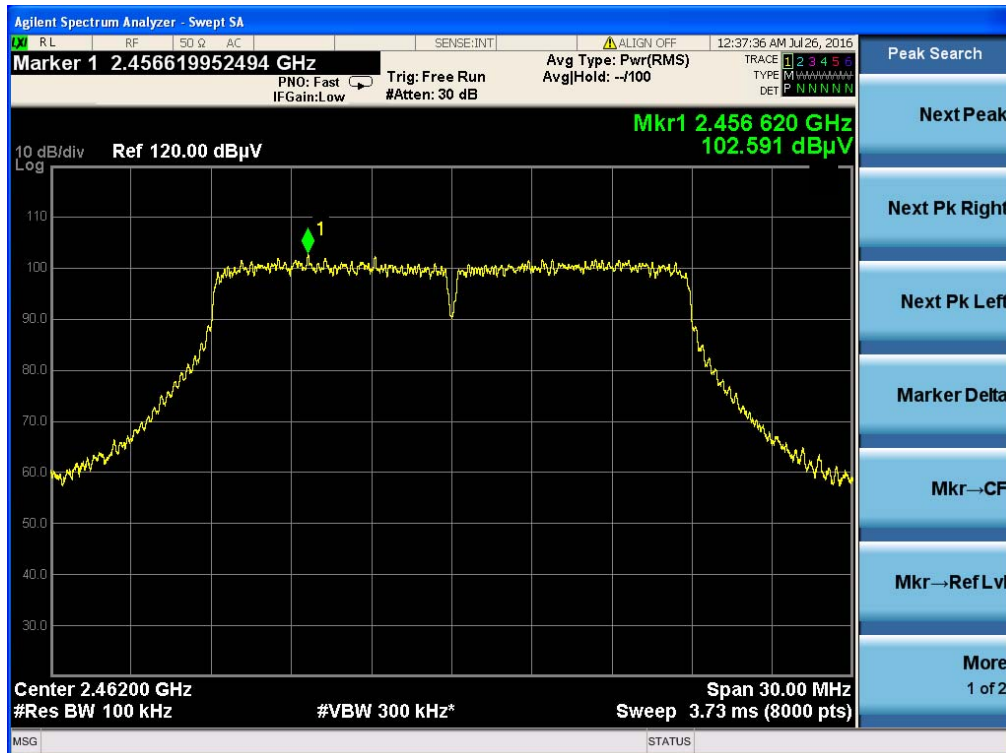


Configuration IEEE 802.11n20 / CH 1 / 2500MHz~26500MHz (down 30dBc)

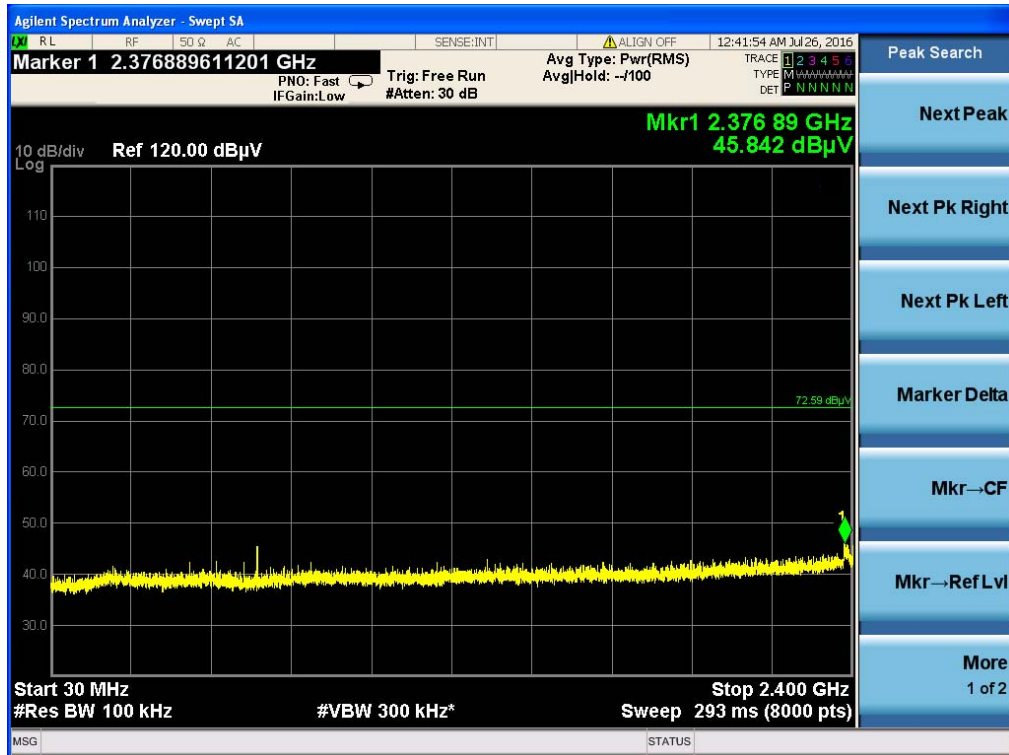


Configuration IEEE 802.11n20 Emission not in Restricted Band plot on channel 11

Reference Level



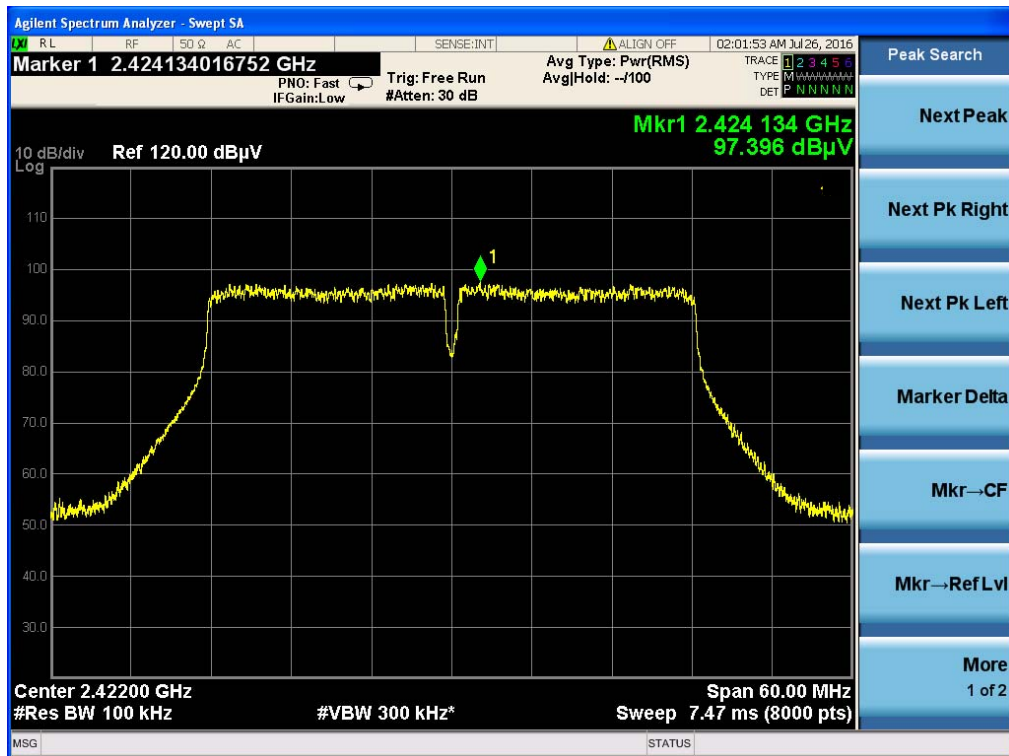
Configuration IEEE 802.11n20 / CH 11 / 30MHz~2400MHz (down 30dBc)



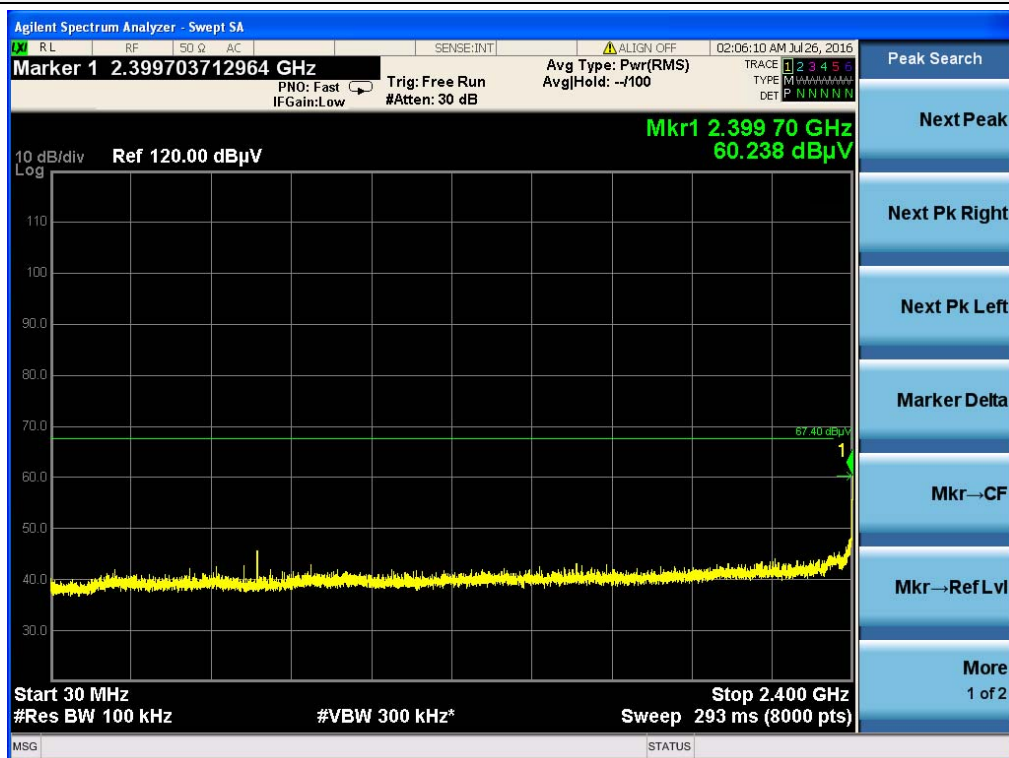
Configuration IEEE 802.11n20 / CH 11 / 2500MHz~26500MHz (down 30dBc)



Configuration IEEE 802.11n40 Emission not in Restricted Band plot on channel 3 Reference Level



Configuration IEEE 802.11n40 / CH 3 / 30MHz~2400MHz (down 30dBc)

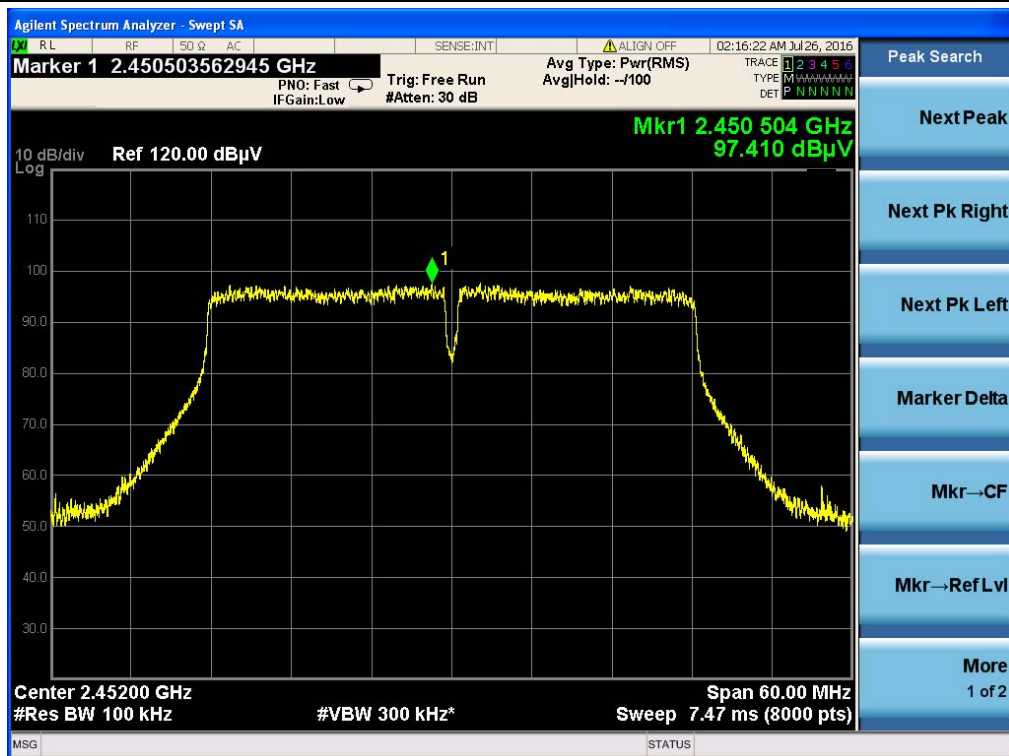


Configuration IEEE 802.11n40 / CH 3 / 2500MHz~26500MHz (down 30dBc)

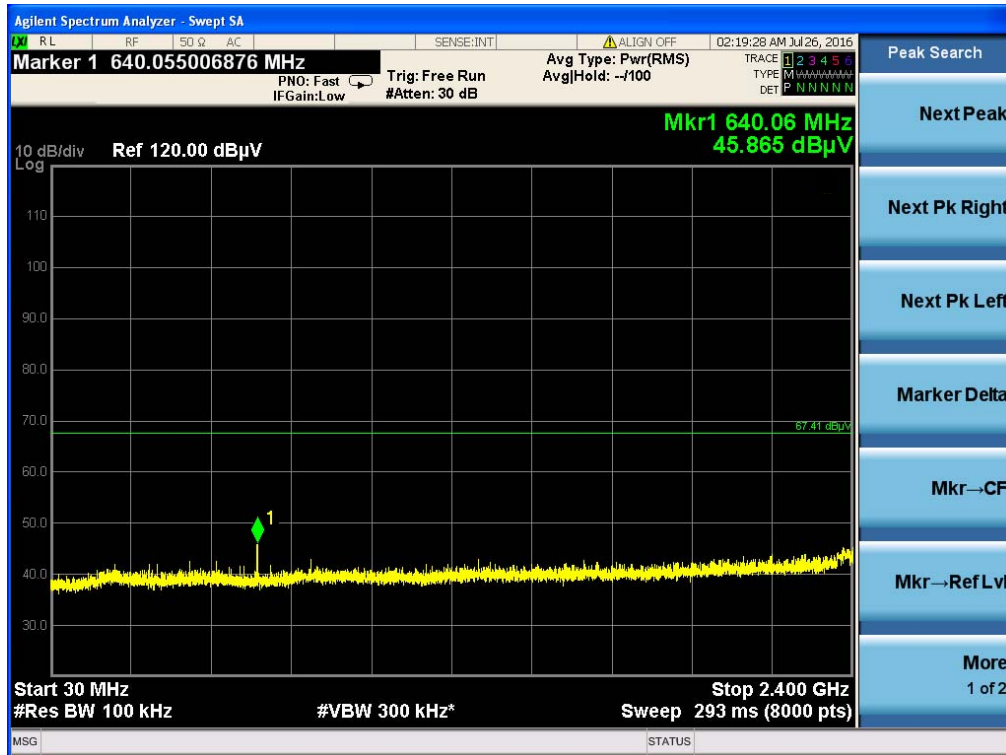


Configuration IEEE 802.11n40 Emission not in Restricted Band plot on channel 9

Reference Level



Configuration IEEE 802.11n40 / CH 9 / 30MHz~2400MHz (down 30dBc)



Configuration IEEE 802.11n40 / CH 9 / 2500MHz~26500MHz (down 30dBc)



10. ANTENNA REQUIREMENT

10.1 STANDARD REQUIREMENT

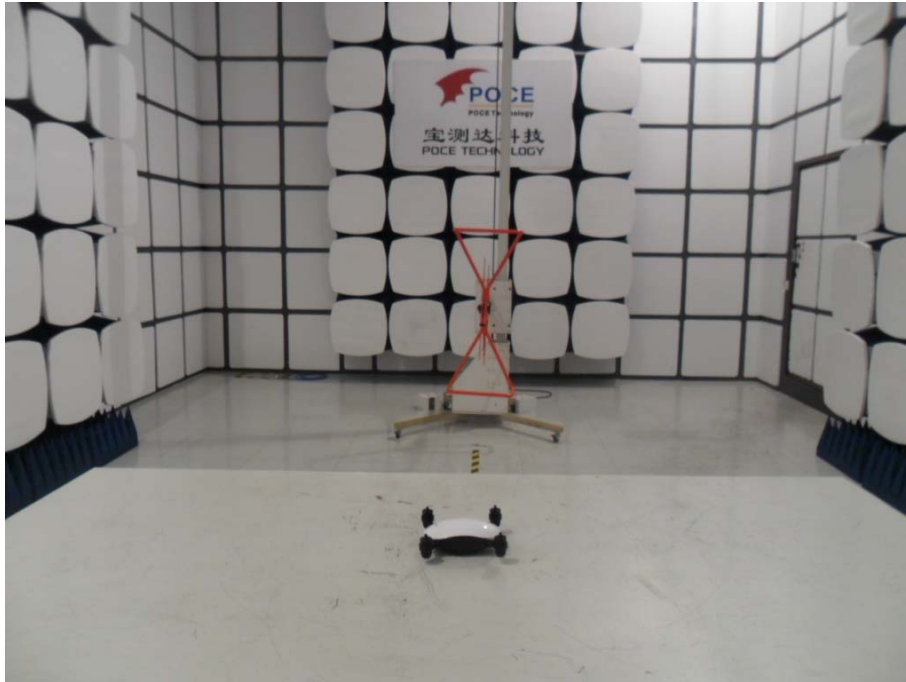
15.203 requirement: For intentional device, according to 15.203: an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

10.2 EUT ANTENNA

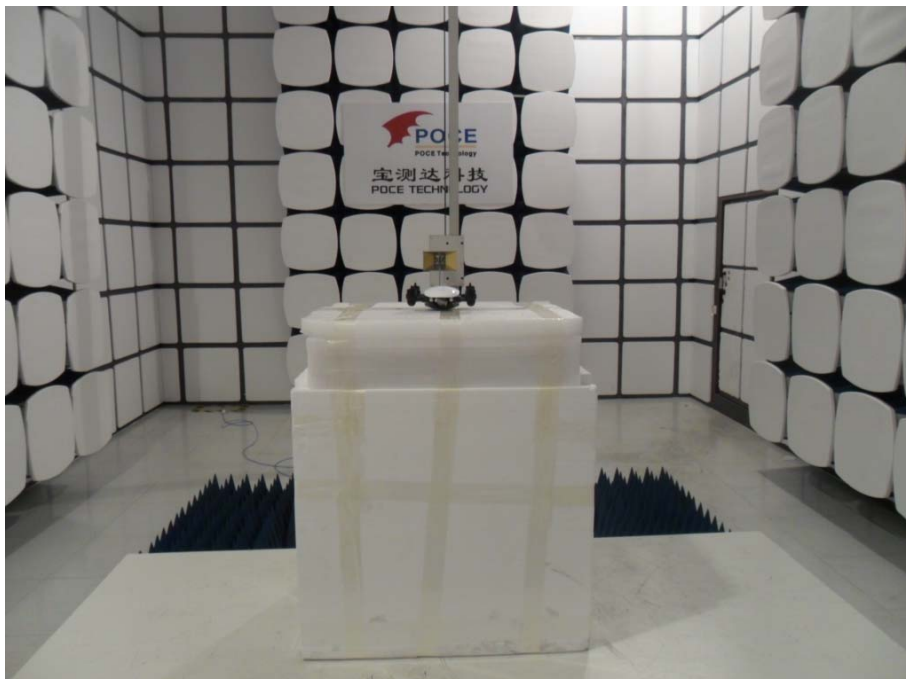
The EUT antenna is Integrated antenna, It comply with the standard requirement.

4. EUT TEST PHOTO

Radiated Measurement Photos



Radiated Measurement Photos



***** END OF REPORT *****