



FCC RADIO TEST REPORT

FCC ID: B4OEC86XFPX

Product : Wi-Fi + Bluetooth LE (WiBlue) module
Trade Name : GT-tronics
Serial Model : EC864FPA,EC865FPA,EC864FPB,EC865FPB,EC865FxA
Report No. : PTC801990160805E-FC02

Prepared for

GT-tronics HK Limited

B210, Tonic Industrial Center, 19 Lam Hing Street, Kowloon Bay, Hong Kong

Prepared by

DongGuan Precise Testing Service Co.,Ltd.

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TEST RESULT CERTIFICATION

Applicant's name : GT-tronics HK Limited
Address : B210, Tonic Industrial Center, 19 Lam Hing Street, Kowloon Bay, Hong Kong
Manufacture's Name : GT-tronics HK Limited
Address : B210, Tonic Industrial Center, 19 Lam Hing Street, Kowloon Bay, Hong Kong
Product name : Wi-Fi + Bluetooth LE (WiBlue) module
Serial Model : EC864FPA,EC865FPA,EC864FPB,EC865FPB,EC865FxA
Standards : FCC CFR47 Part 15 Section 15.247
Test procedure ANSI C63.10:2013

Date of Test.....

Date (s) of performance of tests.... Aug.29, 2016 ~ Sep.6, 2016

Date of Issue Sep.6, 2016

Test Result **Pass**

Testing Engineer

August Qiu

Authorized Signatory

Chris Du

August Qiu
Chris Du

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1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

FCC Part15 (15.247) , Subpart C KDB558074 D01 DTS Meas Guidance v03r02		
Standard Section	Test Item	Judgment
15.207	Conducted Emission	PASS
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

Dongguan Precise Testing Service Co., Ltd.

Building D, Baoding Technology Park, Guangming Road2, Dongcheng District, Dongguan,
Guangdong, China, Dongguan, 523129

China

FCC Registration Number: 371540

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	Wi-Fi + Bluetooth LE (WiBlue) module	
Trade Name	GT-tronics	
Model Numeber	EC864FPA,EC865FPA,EC864FPB,EC865FPB,EC865FxA	
Model Description	Only the model names and colors are different.	
Product Description	The EUT is a Wi-Fi + Bluetooth LE (WiBlue) module	
	Operation Frequency:	802.11b/g/n(20MHz):2412~2462 MHz 802.11n(40MHz):2422~2452
	Modulation Type:	CCK/OFDM/DBPSK/DAPSK
	Bit Rate of Transmitter	802.11b:11/5.5/2/1 Mbps 802.11g:54/48/36/24/18/12/9/6Mbps 802.11n(20/40MHz):150/144.44/130/117/115.56/104/86.67/78/52/6.5Mbps
	Number Of Channel	802.11b/g/n20MHz:11CH 802.11n40MHz:7CH
	Antenna Designation:	Please see Note 3.
	Output Power(Conducted, PK):	802.11b: 17.64 dBm (Max.) 802.11g: 14.77 dBm (Max.) 802.11n(20M) : 14.89dBm (Max.) 802.11n (40M): 13.79 dBm (Max.)
	Antenna Gain (dBi)	-0.30dBi for BLE; 2dBi for WIFI
	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.	
Ratings	DC3.3V	
Adapter	N/A	
Battery	N/A	
Hardware version	N/A	
Software version	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		

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

3.

Table for Filed Antenna

Ant	Brand	Model Name	Antenna Type	Connector	Gain (dBi)	NOTE
A	N/A	N/A	PCB antenna	N/A	2.0	

2.2 DESCRIPTION OF TEST MODES

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Pretest Mode	Description
Mode 1	802.11b CH1/ CH6/ CH11, 1Mbps
Mode 2	802.11g CH1/ CH6/ CH11, 6Mbps
Mode 3	802.11n(20) CH1/ CH6/ CH11, MSC0
Mode 4	802.11n(40) CH3/ CH6/ CH9, MSC0
Mode 5	WIFI Link Mode

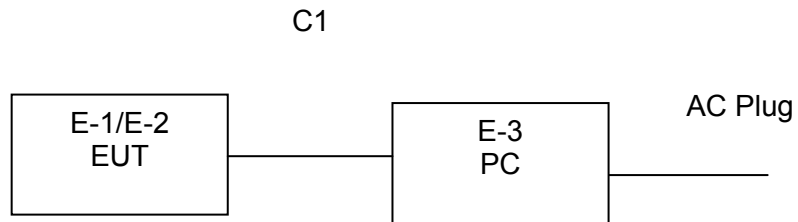
For Conducted Emission	
Final Test Mode	Description
Mode 5	WIFI Link Mode

For Radiated Emission	
Final Test Mode	Description
Mode 1	802.11b CH1/ CH6/ CH11, 1Mbps
Mode 2	802.11g CH1/ CH6/ CH11, 6Mbps
Mode 3	802.11n(20) CH1/ CH6/ CH11, MSC0
Mode 4	802.11n(40) CH3/ CH6/ CH9, MSC0

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
- (3) The EUT configured to transmit signals continuously. (duty cycle>98%)
- (4) The WIFI module control circuit board, is a auxiliary equipment, to test the WiFi module need to welding on the WIFI module control circuit board.

2.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED



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.
E-1	Show Box	N/A	EC864FPA	N/A
E-2	WIFI module control circuit board	N/A	LSD4WF	N/A
E-3	PC	4CV428DQXR	500-320cx	N/A

Item	Shielded Type	Ferrite Core	Length
C-1	NO	NO	1.0m

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****RF Conducted Test**

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	EMC Analyzer (9k~26.5GHz)	Agilent	E4407B	MY45109572	Aug.04, 2016	Aug.03, 2017	1 year
2	EXA Signal Analyzer	Agilent	N9010A	MY505202075 26B25MPBW7 X	Aug.04, 2016	Aug.03, 2017	1 year
3	EMI Test Receiver	R&S	ESCI	101155	July 15, 2016	July 14, 2017	1 year
4	Humidity Chamber	GF	GTH-225-40 -1P	IAA061225	July 15, 2016	July 14, 2017	1 year

Radiated Emissions

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	EMI Test Receiver	Rohde&Schwarz	ESCI	101417	July 15, 2016	July 14, 2017	1 year
2	Trilog Broadband Antenna	SCHWARZBECK	VULB9160	9160-3355	July 15, 2016	July 14, 2017	1 year
3	Amplifier	EM	EM-30180	060538	July 15, 2016	July 14, 2017	1 year
4	Horn Antenna	SCHWARZBECK	BBHA9120D	9120D-1246	July 15, 2016	July 14, 2017	1 year
5	Loop Antenna	SCHWARZBECK	FMZB1516	9130D-1243	July 15, 2016	July 14, 2017	1 year
6	3m Anechoic Chamber	CHENGYU	966	PTC-002	June 6, 2016	June 6, 2017	1 year

Conducted Emissions

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	EMI Test Receiver	R&S	ESCI	101155	July 15, 2016	July 14, 2017	1 year
2	LISN	SCHWARZBECK	NSLK 8128	8128-289	July 15, 2016	July 14, 2017	1 year
3	Cable	LARGE	RF300	-	July 15, 2016	July 14, 2017	1 year
4	Shielded room	CHENGYU	843	PTC-001	June 6, 2016	June 6, 2017	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 B (dBuV)		Standard
	Quasi-peak	Average	
0.15 -0.5	66 - 56 *	56 - 46 *	CISPR
0.50 -5.0	56.00	46.00	CISPR
5.0 -30.0	60.00	50.00	CISPR

0.15 -0.5	66 - 56 *	56 - 46 *	FCC
0.50 -5.0	56.00	46.00	FCC
5.0 -30.0	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

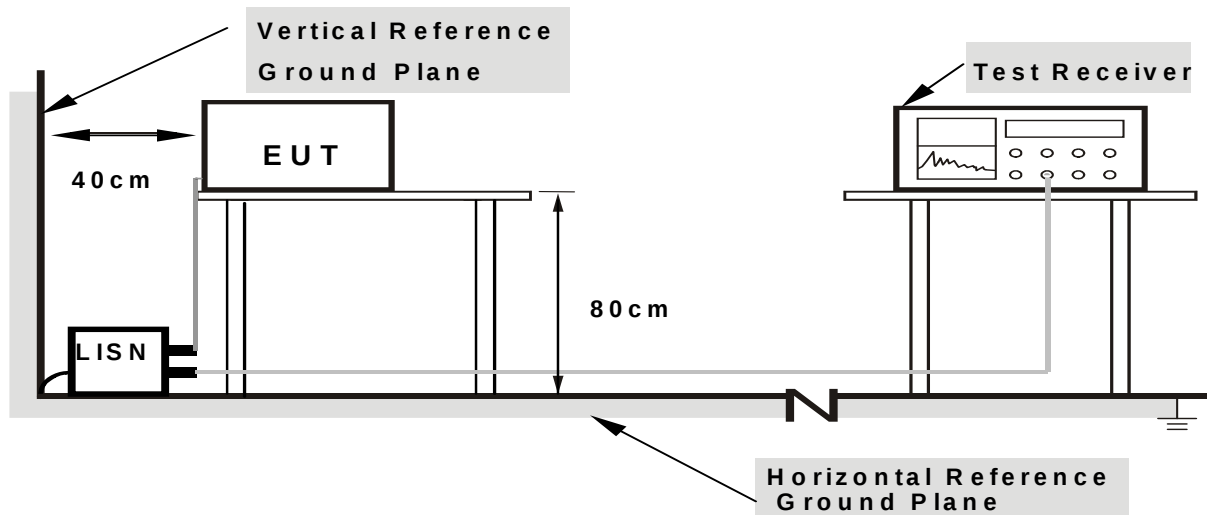
3.1.2 TEST PROCEDURE

- 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.
- 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.
- 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.
- LISN at least 80 cm from nearest part of EUT chassis.
- 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 cm 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.

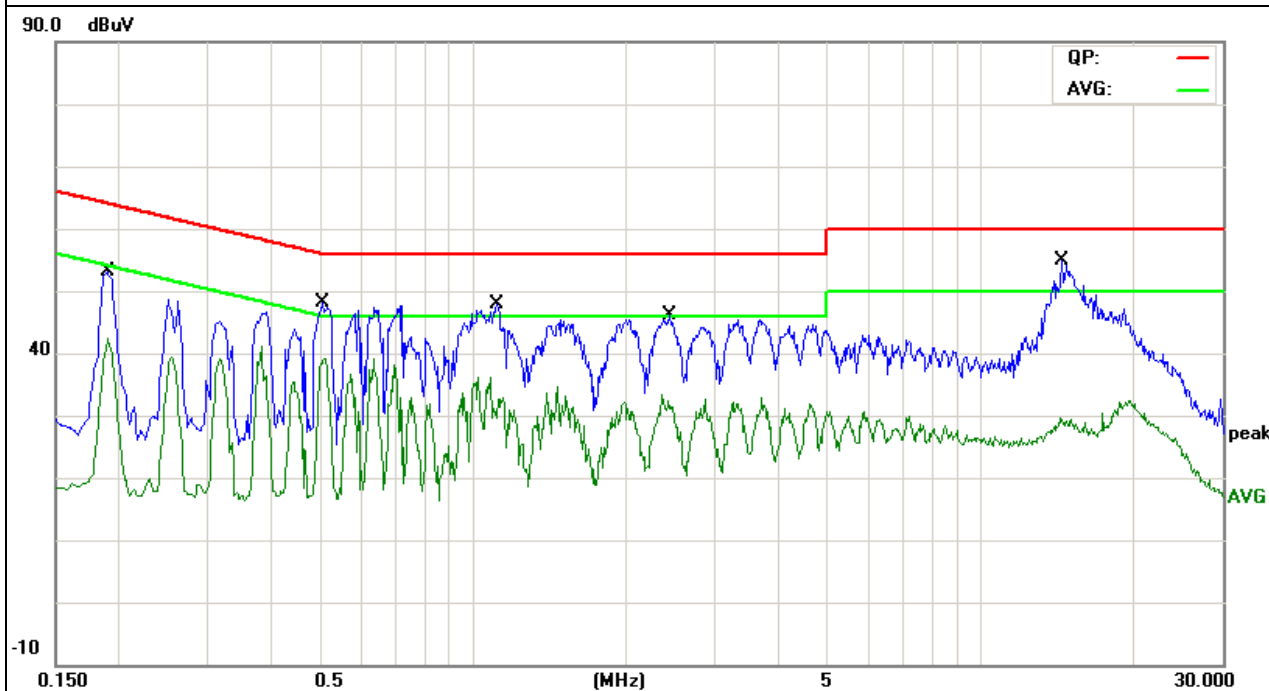
3.1.6 TEST RESULTS

EUT :	Wi-Fi + Bluetooth LE (WiBlue) module	Model:	EC864FPA
Temperature :	26 °C	Relative Humidity :	54%
Pressure :	1010hPa	Phase :	L
Test Voltage :	AC 120V	Test Mode :	Mode 5

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV)	Limits (dBμV)	Margin (dB)	Detector Type
0.1900	36.87	10.00	46.87	64.03	-17.16	QP
0.1900	31.16	10.00	41.16	54.03	-12.87	AVG
0.5060	34.63	10.02	44.65	56.00	-11.35	QP
0.5060	28.61	10.02	38.63	46.00	-7.37	AVG
1.1140	30.67	10.06	40.73	56.00	-15.27	QP
1.1140	19.17	10.06	29.23	46.00	-16.77	AVG
2.4380	28.88	10.05	38.93	56.00	-17.07	QP
2.4380	20.14	10.05	30.19	46.00	-15.81	AVG
14.4820	34.15	10.25	44.40	60.00	-15.60	QP
14.4820	16.25	10.25	26.50	50.00	-23.50	AVG

Remark:

1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.

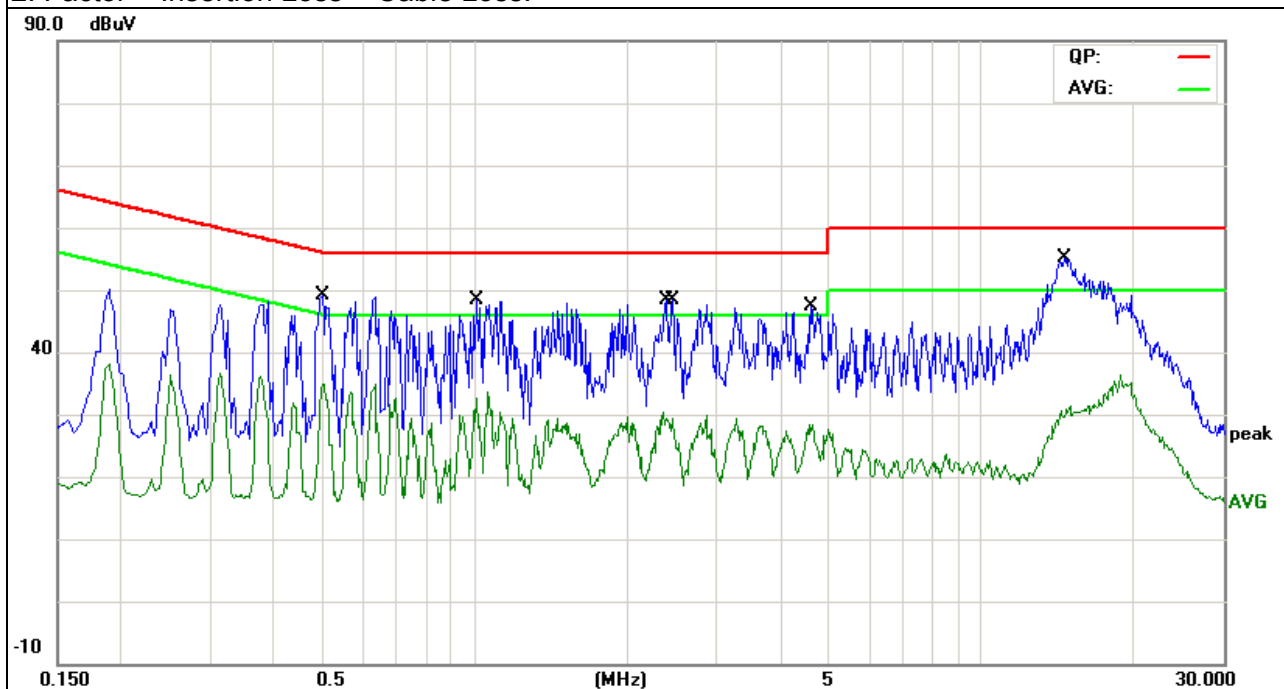


EUT :	Wi-Fi + Bluetooth LE (WiBlue) module	Model:	EC864FPA
Temperature :	26 °C	Relative Humidity :	54%
Pressure :	1010hPa	Phase :	N
Test Voltage :	AC 120V	Test Mode :	Mode 5

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV)	(dBμV)	(dB)	
0.5020	33.19	10.02	43.21	56.00	-12.79	QP
0.5020	24.57	10.02	34.59	46.00	-11.41	AVG
1.0100	30.88	10.06	40.94	56.00	-15.06	QP
1.0100	20.01	10.06	30.07	46.00	-15.93	AVG
2.3900	27.30	10.05	37.35	56.00	-18.65	QP
2.3900	16.10	10.05	26.15	46.00	-19.85	AVG
2.4539	27.03	10.04	37.07	56.00	-18.93	QP
2.4539	15.21	10.04	25.25	46.00	-20.75	AVG
4.6140	28.47	9.97	38.44	56.00	-17.56	QP
4.6140	16.89	9.97	26.86	46.00	-19.14	AVG

Remark:

1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.



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 (microvolt/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)

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 1GHz, the high was 1.5m) 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(above 1GHz, the high was 1.5m); 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:

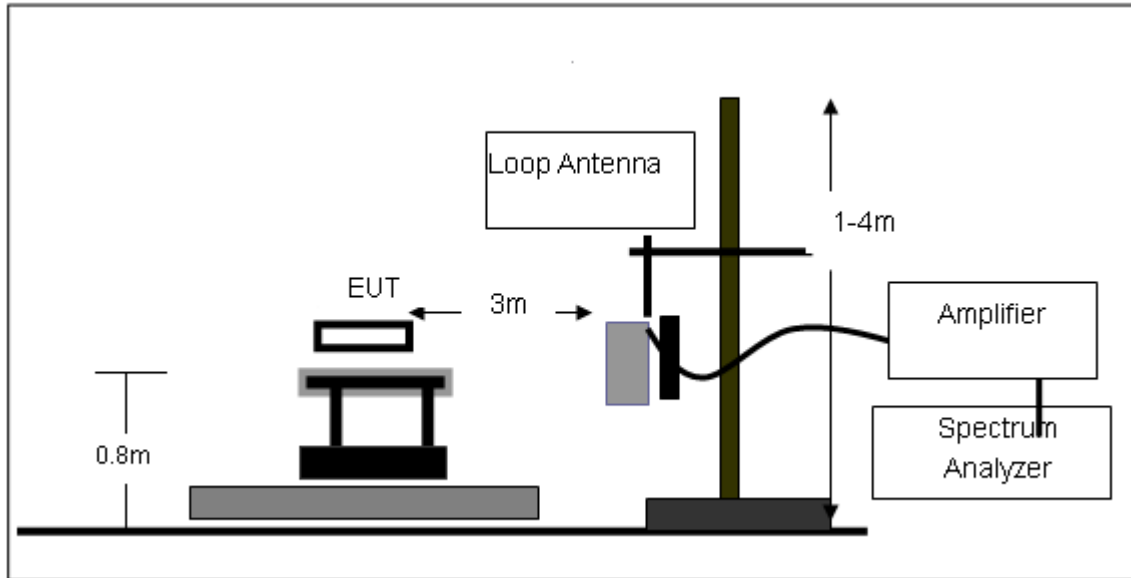
Both horizontal and vertical antenna polarities were tested. The worst case emissions were reported

3.2.3 DEVIATION FROM TEST STANDARD

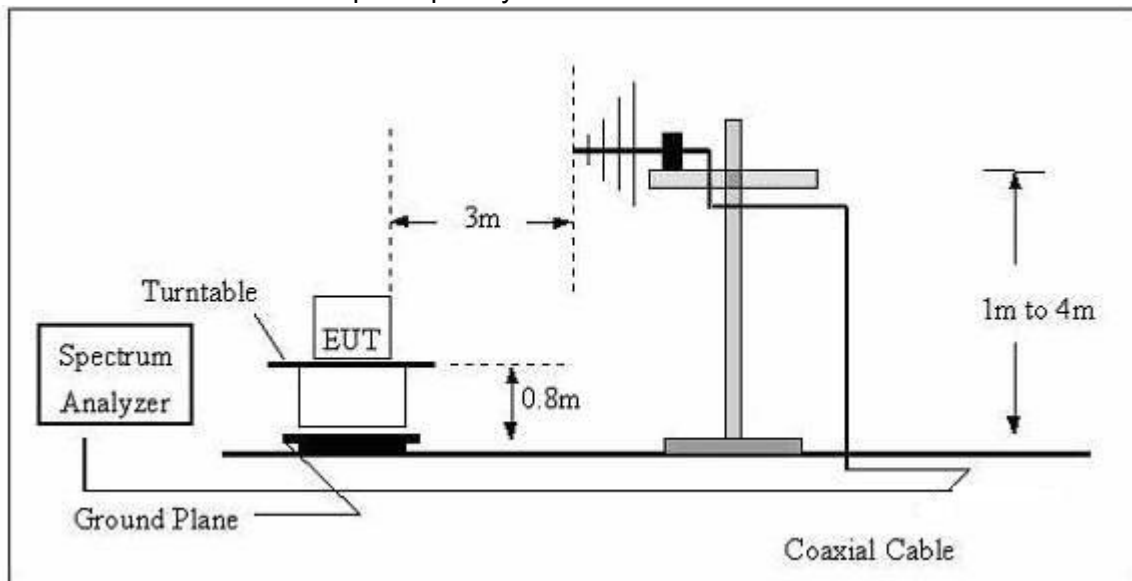
No deviation

3.2.4 TEST SETUP

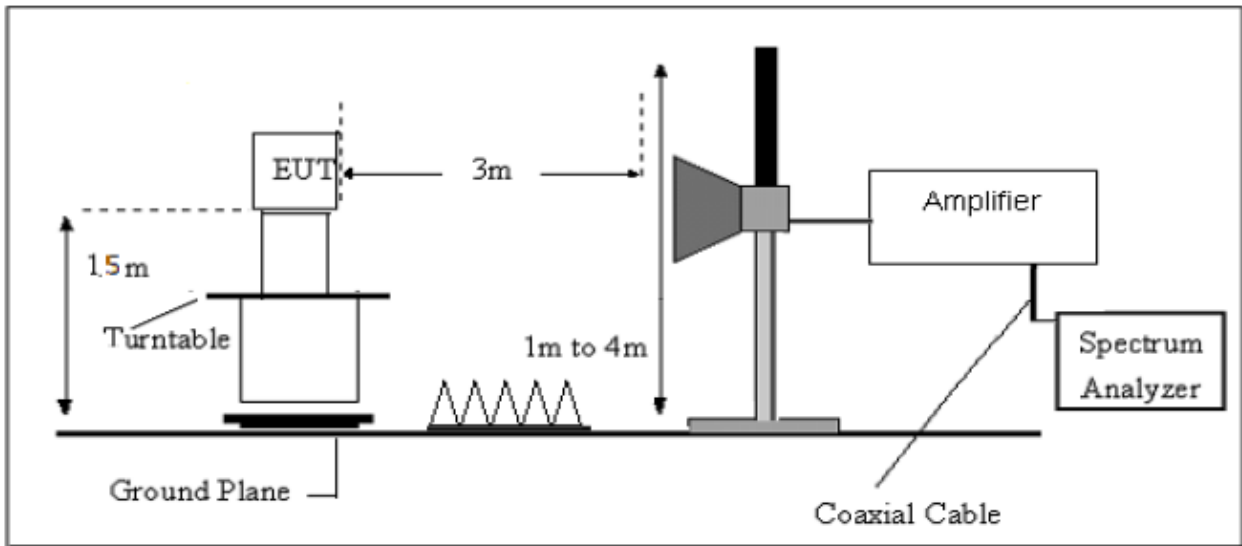
(A) Radiated Emission Test-Up Frequency Below 30MHz



(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:	Wi-Fi + Bluetooth LE (WiBlue) module	Model:	EC864FPA
Temperature:	20 °C	Relative Humidity:	48%
Pressure:	1010 hPa	Test Voltage :	AC 120V
Test Mode :	TX/Mode 5	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)

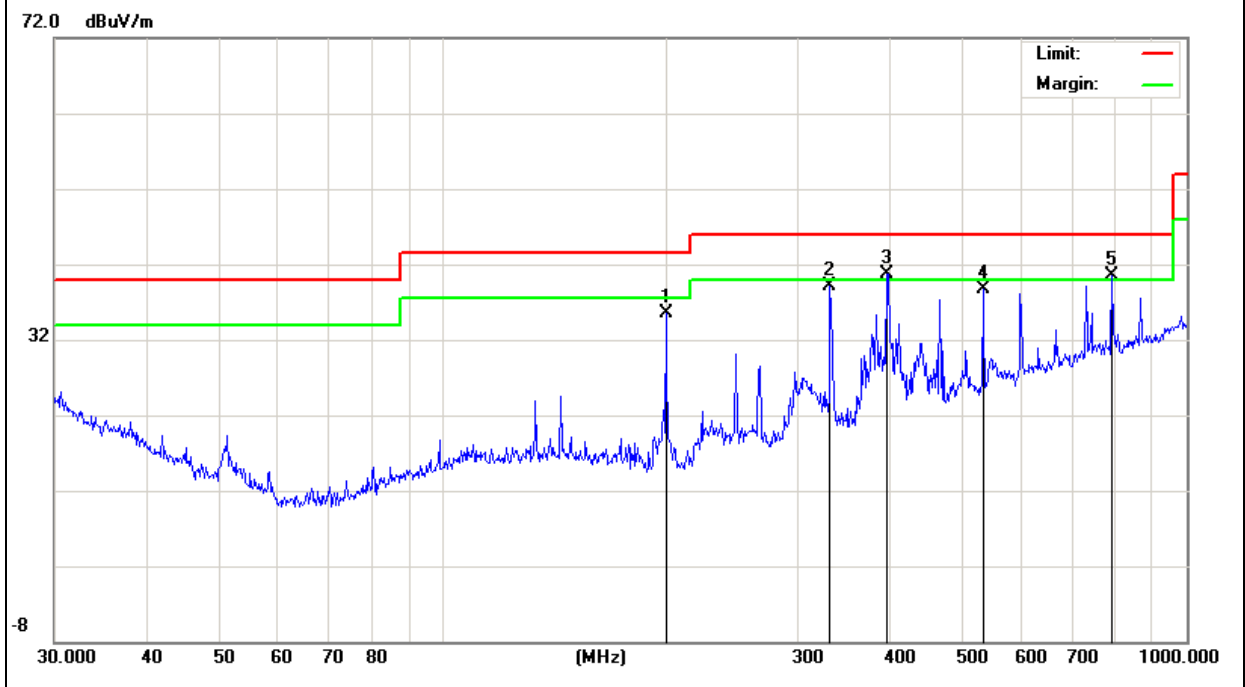
EUT :	Wi-Fi + Bluetooth LE (WiBlue) module	Model Name :	EC864FPA
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Polarization :	Horizontal
Test Voltage :	AC 120V		
Test Mode :	TX/802.11b,1Mbps Low CH(Worst case)		

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
199.2855	26.88	8.71	35.59	43.5	-7.91	QP
331.3546	24.23	14.97	39.2	46	-6.8	QP
394.8543	23.77	17.03	40.8	46	-5.2	QP
531.9633	18.85	19.76	38.61	46	-7.39	QP
793.3958	16.51	23.91	40.42	46	-5.58	QP

Remark:

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

Factor added by measurement software automatically.



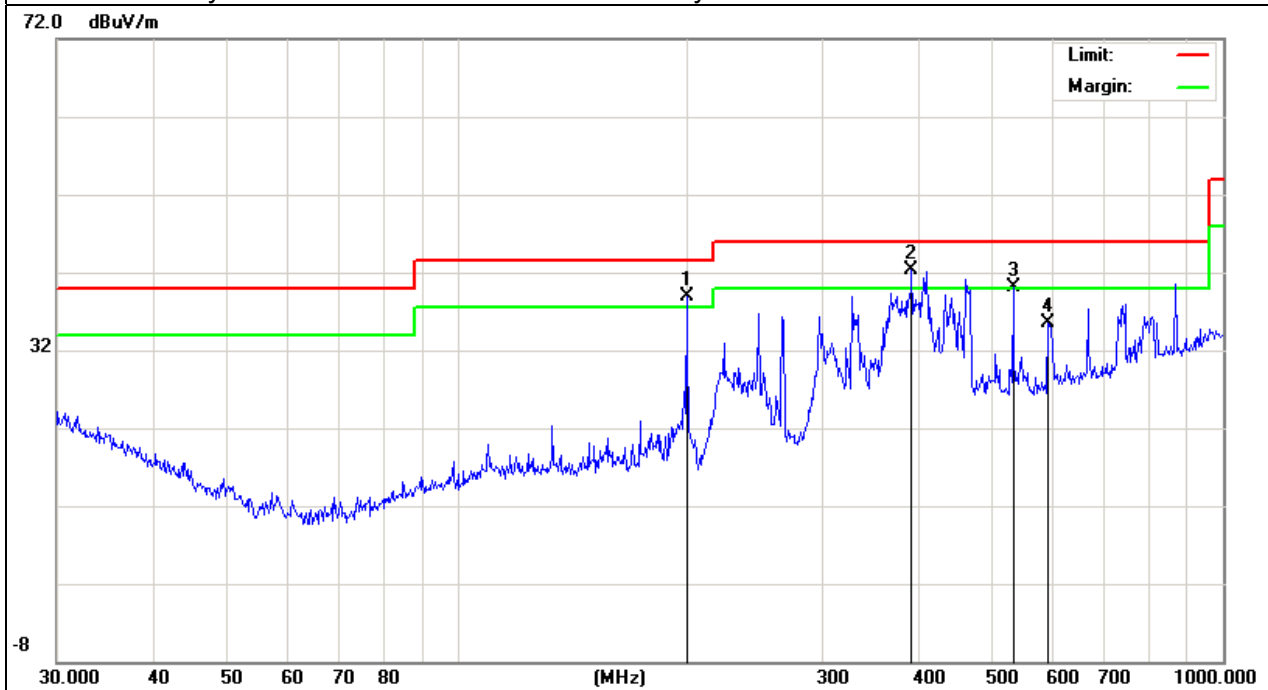
EUT :	Wi-Fi + Bluetooth LE (WiBlue) module	Model Name :	EC864FPA
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Polarization :	Vertical
Test Voltage :	AC 120V		
Test Mode :	TX/802.11b,1Mbps Low CH(Worst case)		

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
199.2855	30.12	8.71	38.83	43.5	-4.67	QP
392.0951	25.41	16.93	42.34	46	-3.66	QP
531.9633	20.35	19.76	40.11	46	-5.89	QP
590.9737	14.71	20.79	35.5	46	-10.5	QP

Remark:

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

Factor added by measurement software automatically.



3.2.8 TEST RESULTS (1000 MHz-10thharmonics)

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:2412							
V	4824.243	47.76	10.44	58.2	74	-15.8	peak
V	4824.243	29.68	10.44	40.12	54	-13.88	AVG
H	4824.243	46.95	10.44	57.35	74	-16.65	peak
H	4824.243	28.82	10.44	39.22	54	-14.78	AVG
operation frequency:2437							
V	4874.142	46.17	10.4	56.57	74	-17.43	peak
V	4874.142	30.56	10.4	40.96	54	-13.04	AVG
H	4874.142	48.24	10.4	58.63	74	-15.37	peak
H	4874.142	30.08	10.4	40.52	54	-13.48	AVG
operation frequency:2462							
V	4924.216	49.02	10.39	59.41	74	-14.59	peak
V	4924.216	32.9	10.39	43.29	54	-10.71	AVG
H	4924.216	48.96	10.39	59.35	74	-14.65	peak
H	4924.216	31.08	10.39	41.47	54	-12.53	AVG

Remark:

Absolute Level= Reading Level+ Factor, Margin= Absolute Level – Limit

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

Factor added by measurement software automatically

Emission Level is less(PK) than AV Limits,No need AV level

"802.11b,1Mbps" mode is the worst mode, and is recorded in the test report

3.3 BAND EDGE EMISSION (RADIATED):

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type	Comment
802.11b,1Mbps							
2400	82.19	-12.99	69.2	74	-4.8	peak	Vertical
2400	84.39	-12.99	71.4	74	-2.6	peak	Horizontal
2400	59.82	-12.99	46.83	54	-7.17	AVG	Vertical
2400	59.62	-12.99	46.63	54	-7.37	AVG	Horizontal
2483.5	59.20	-12.78	46.42	74	-27.58	peak	Vertical
2483.5	52.74	-12.78	39.96	74	-34.04	peak	Horizontal
802.11g,6Mbps							
2400	79.32	-12.99	66.33	74	-7.67	peak	Horizontal
2400	57.27	-12.99	44.28	54	-9.72	AVG	Horizontal
2400	83.59	-12.99	70.6	74	-3.4	peak	Vertical
2400	60.37	-12.99	47.38	54	-6.62	AVG	Vertical
2483.5	60.51	-12.78	47.73	74	-26.27	peak	Vertical
2483.5	61.19	-12.78	48.41	74	-25.59	peak	Horizontal
802.11n(20),MSC0							
2400	84.29	-12.99	71.3	74	-2.7	peak	Horizontal
2400	60.84	-12.99	47.85	54	-6.15	AVG	Horizontal
2400	83.79	-12.99	70.8	74	-3.2	peak	Vertical
2400	60.33	-12.99	47.34	54	-6.66	AVG	Vertical
2483.5	58.21	-12.78	45.46	74	-28.54	peak	Vertical
2483.5	55.51	-12.78	42.73	74	-31.27	peak	Horizontal
802.11n(40),MSC0							
2400.000	76.22	-12.99	63.23	74.00	-10.77	peak	Horizontal
2400.000	59.49	-12.99	46.50	54.00	-7.50	AVG	Horizontal
2400.000	65.73	-12.99	52.74	74.00	-21.26	peak	Vertical
2483.500	64.58	-12.78	51.80	74.00	-22.20	peak	Horizontal
2483.500	62.67	-12.78	49.89	74.00	-24.11	peak	Vertical

Note: Factor = Antenna Factor + Cable Loss – Pre-amplifier.
Factor added by measurement software automatically.
Emission Level is less(PK) than AV Limits, No need AV 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 $100 \text{ kHz} \geq \text{RBW} \geq 3 \text{ kHz}$.
4. Set the $\text{VBW} \geq 3 \times \text{RBW}$.
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. \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



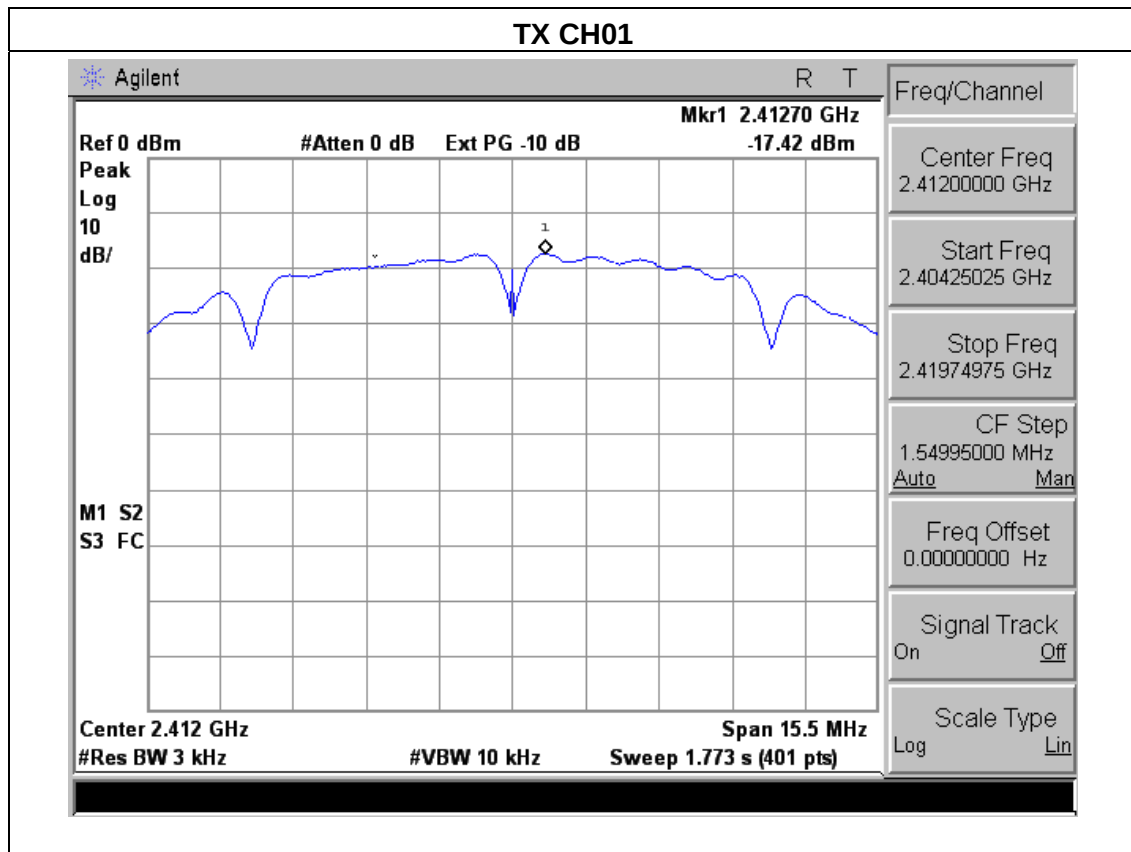
4.1.4 EUT OPERATION CONDITIONS

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.

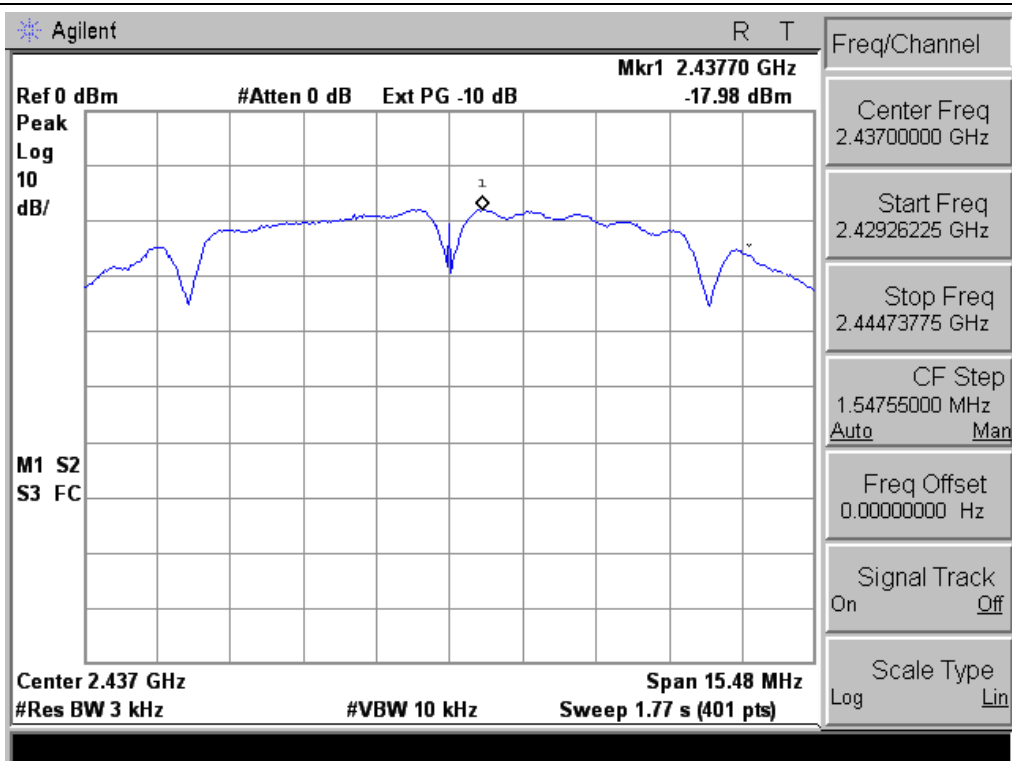
4.1.5 TEST RESULTS

EUT :	Wi-Fi + Bluetooth LE (WiBlue) module	Model:	EC864FPA
Temperature :	25 °C	Relative Humidity :	60%
Pressure :	1015 hPa	Test Voltage :	AC120V
Test Mode :	TX b Mode /CH01, CH06, CH11		

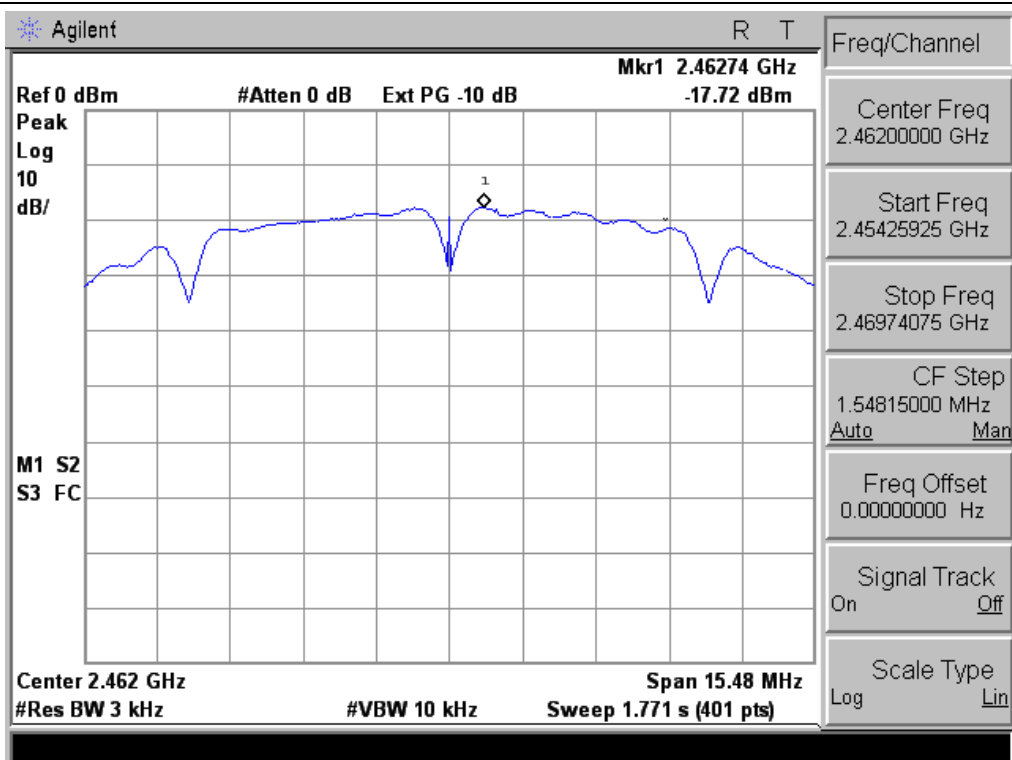
Frequency	Power Density (dBm/3KHz)	Limit (dBm/3KHz)	Result
2412 MHz	-17.42	8	PASS
2437 MHz	-17.98	8	PASS
2462 MHz	-17.72	8	PASS



TX CH06



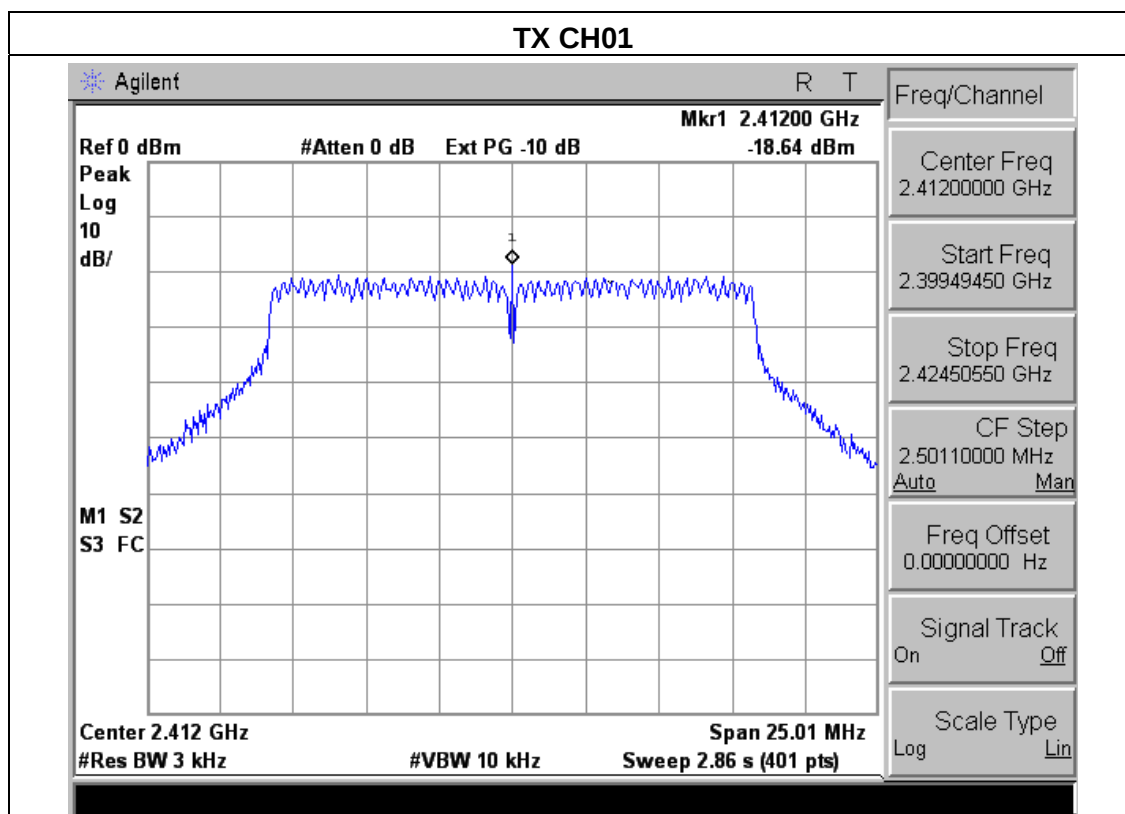
TX CH11

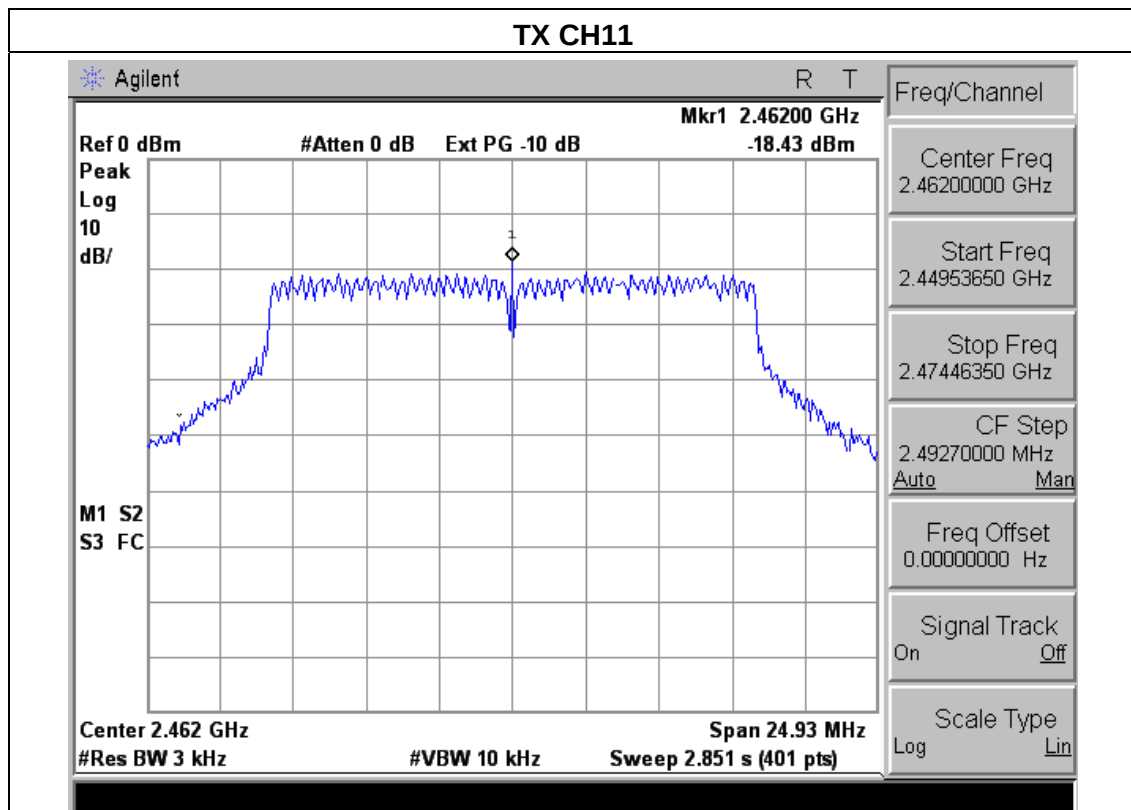
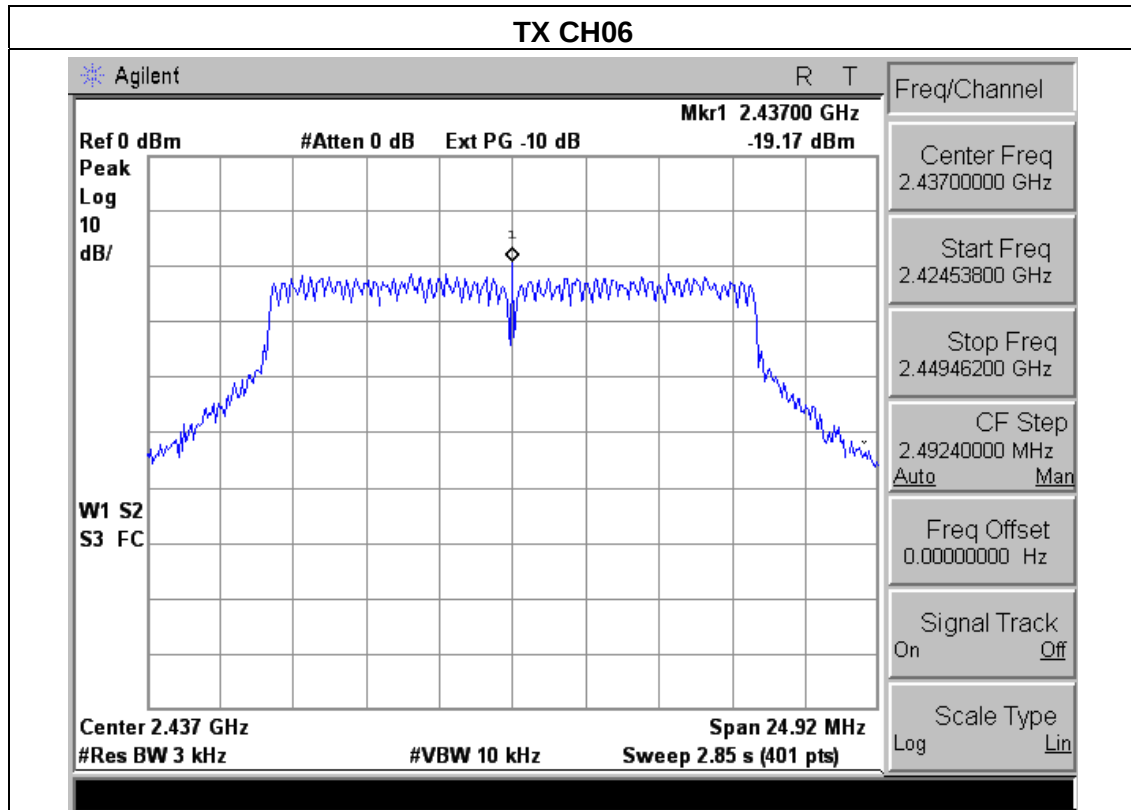




EUT :	Wi-Fi + Bluetooth LE (WiBlue) module	Model:	EC864FPA
Temperature :	25 °C	Relative Humidity :	60%
Pressure :	1015 hPa	Test Voltage :	AC120V
Test Mode :	TX g Mode /CH01, CH06, CH11		

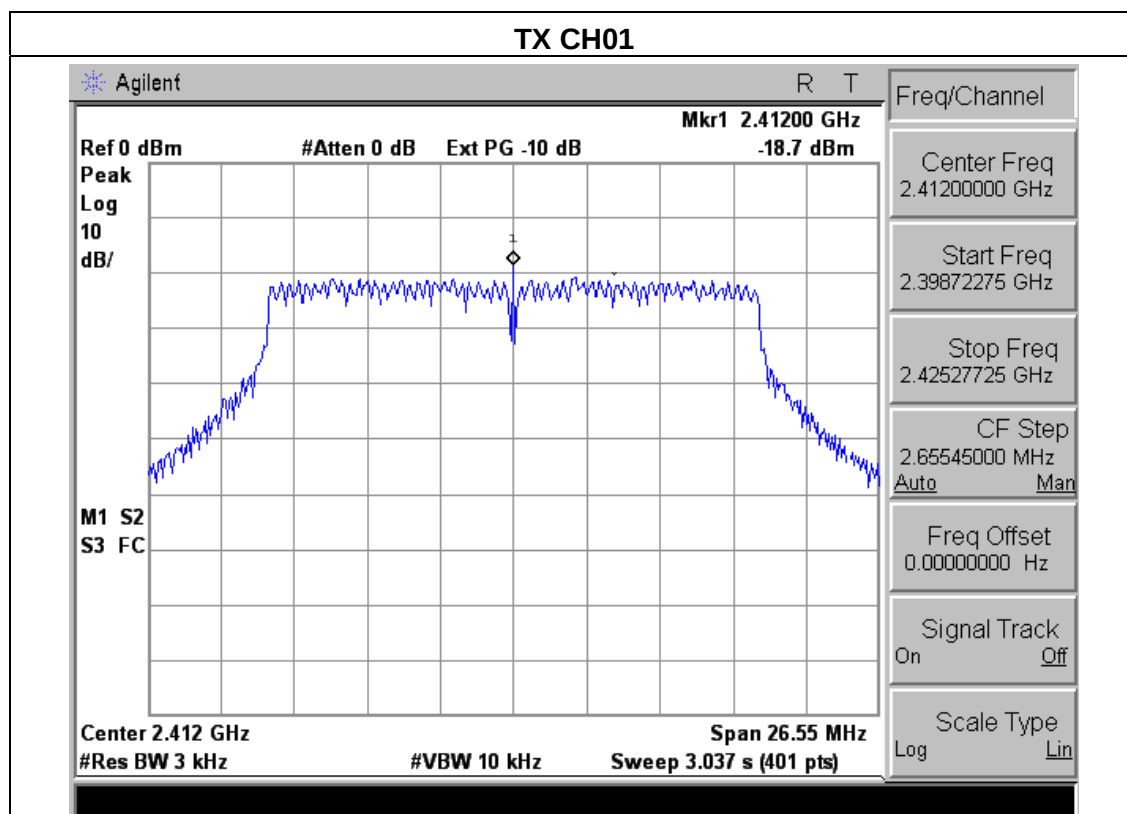
Frequency	Power Density (dBm/3KHz)	Limit (dBm/3KHz)	Result
2412 MHz	-18.64	8	PASS
2437 MHz	-19.17	8	PASS
2462 MHz	-18.43	8	PASS



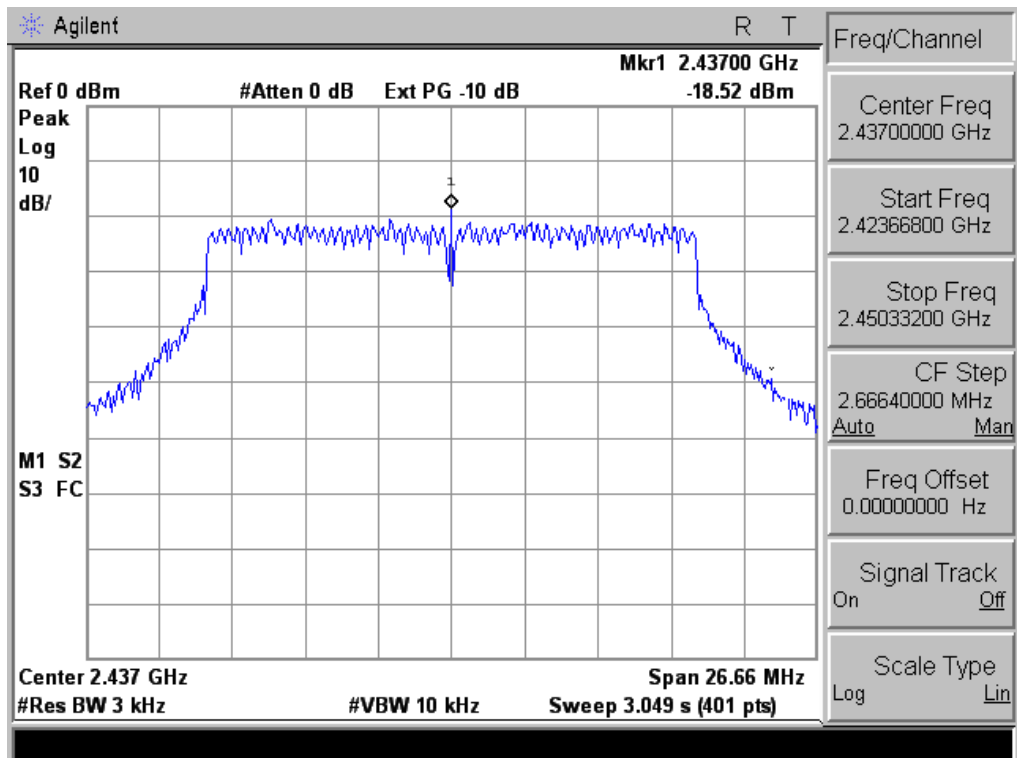


EUT :	Wi-Fi + Bluetooth LE (WiBlue) module	Model:	EC864FPA
Temperature :	25 °C	Relative Humidity :	60%
Pressure :	1015 hPa	Test Voltage :	AC120V
Test Mode :	TX n Mode(20M) /CH01, CH06, CH11		

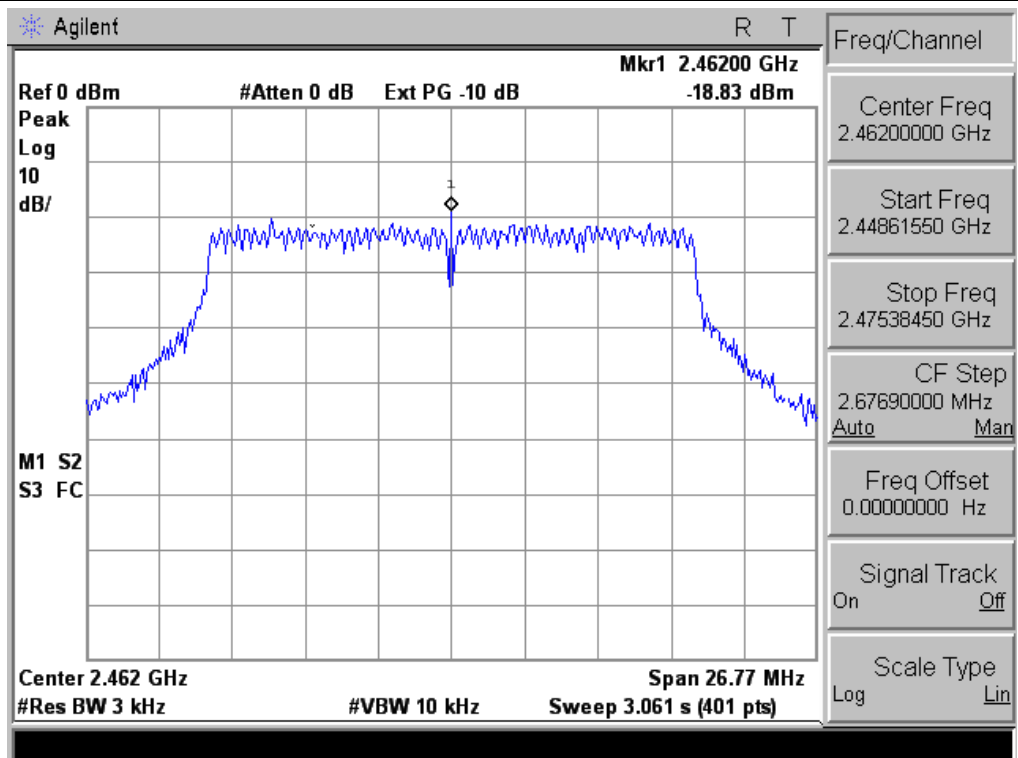
Frequency	Power Density (dBm/3KHz)	Limit (dBm/3KHz)	Result
2412 MHz	-18.70	8	PASS
2437 MHz	-18.52	8	PASS
2462 MHz	-18.83	8	PASS



TX CH06



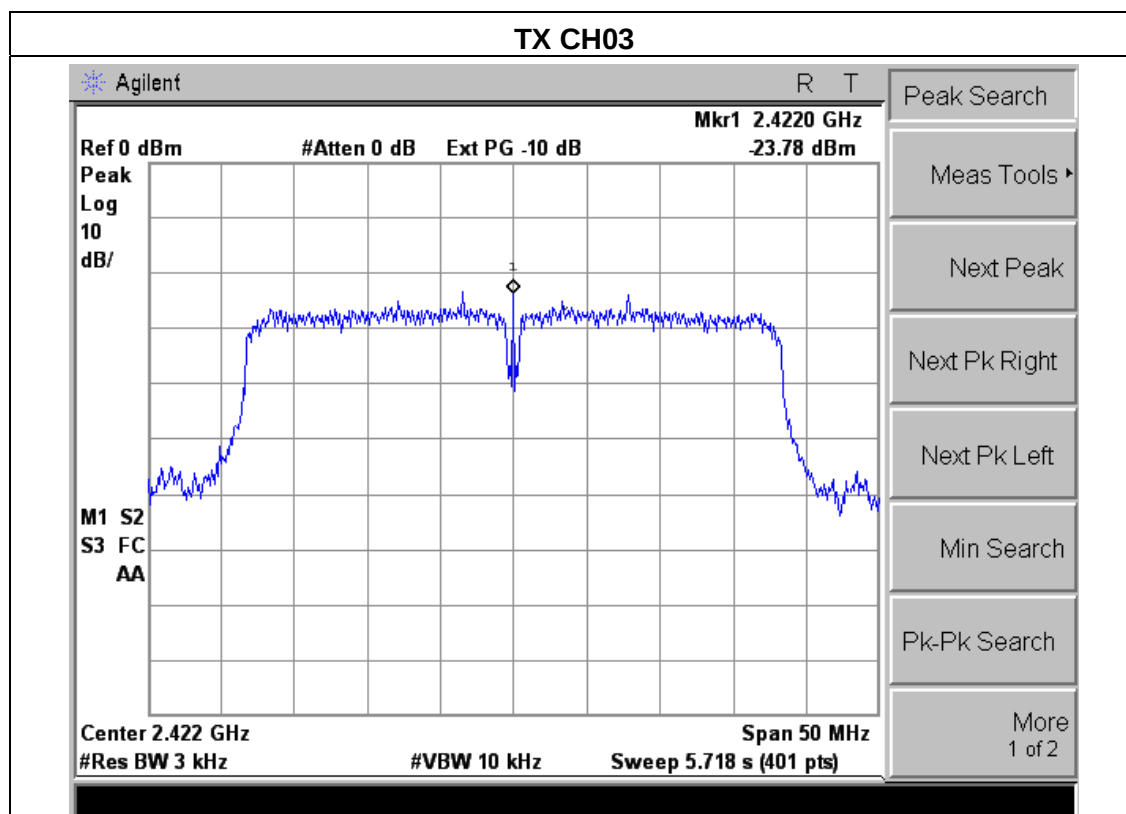
TX CH11

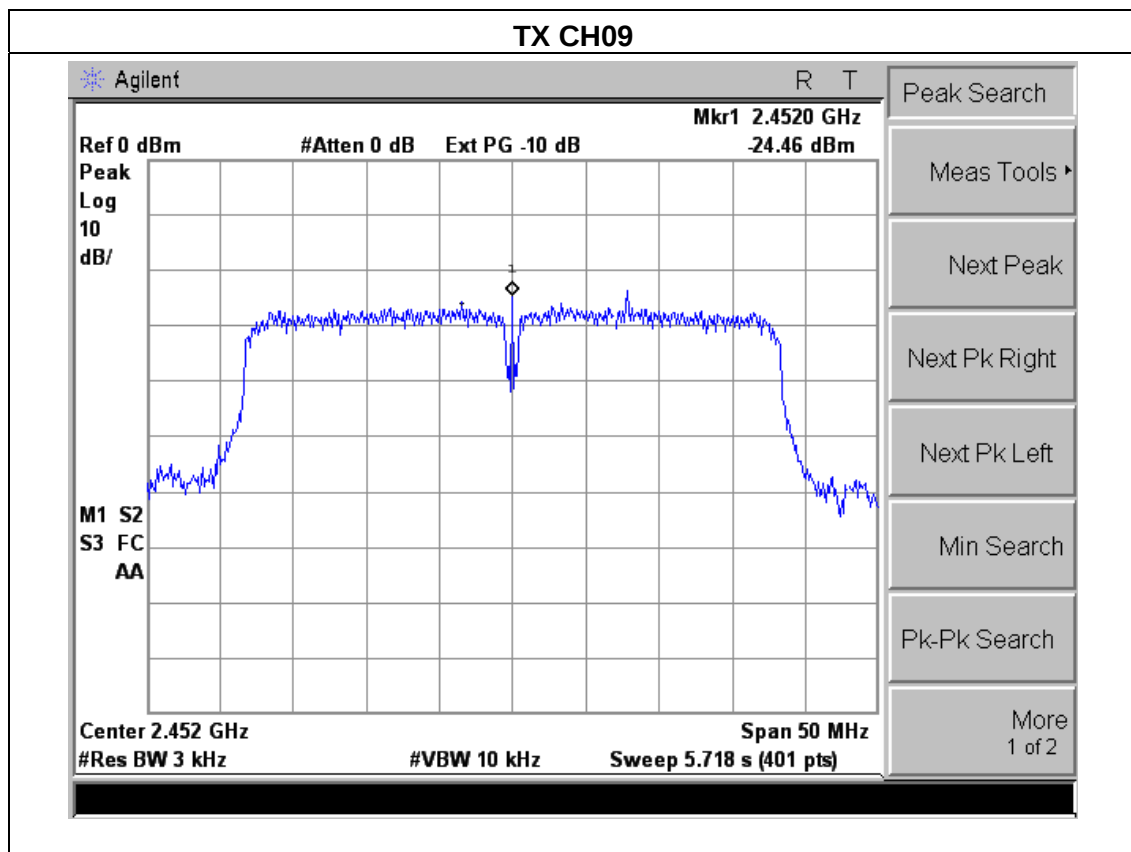
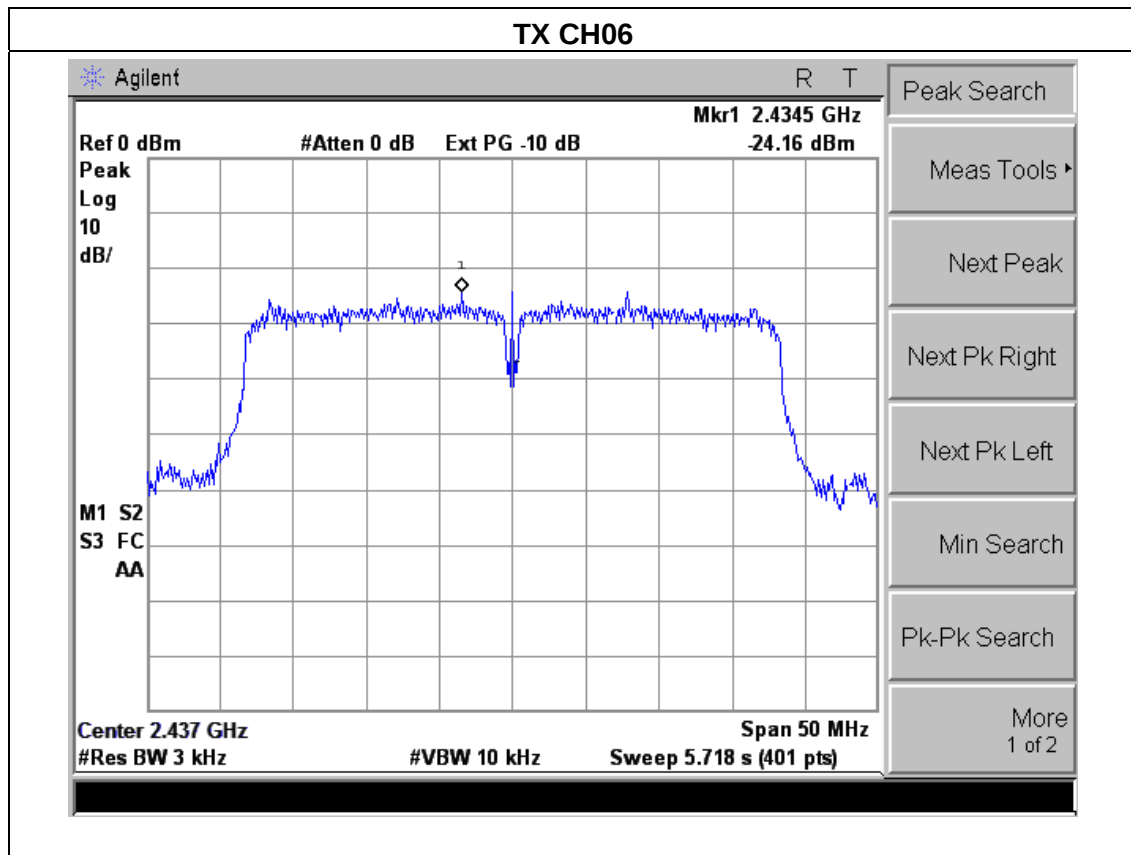




EUT :	Wi-Fi + Bluetooth LE (WiBlue) module	Model:	EC864FPA
Temperature :	25 °C	Relative Humidity :	60%
Pressure :	1015 hPa	Test Voltage :	AC120V
Test Mode :	TX n Mode(40M) /CH03, CH06, CH09		

Frequency	Power Density (dBm/3KHz)	Limit (dBm/3KHz)	Result
2422 MHz	-23.78	8	PASS
2437 MHz	-24.16	8	PASS
2452 MHz	-24.46	8	PASS





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 RBW= 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



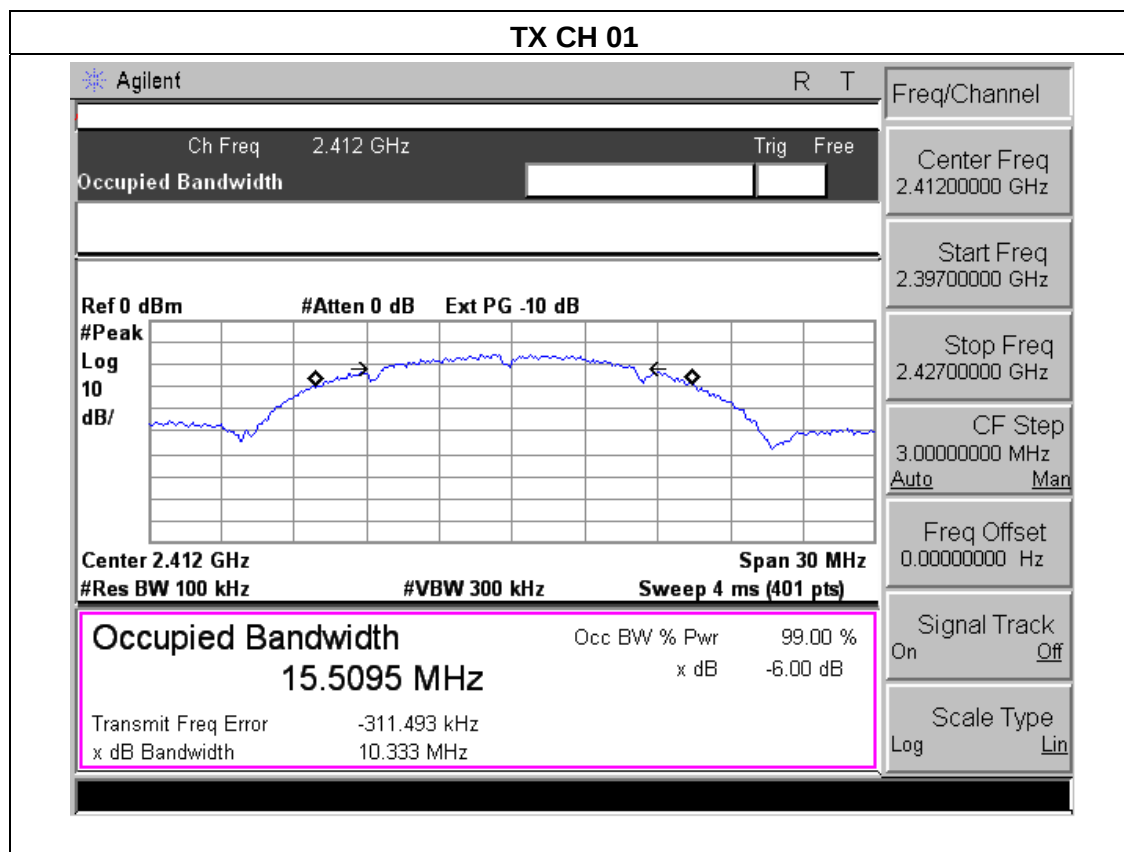
5.1.4 EUT OPERATION CONDITIONS

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.

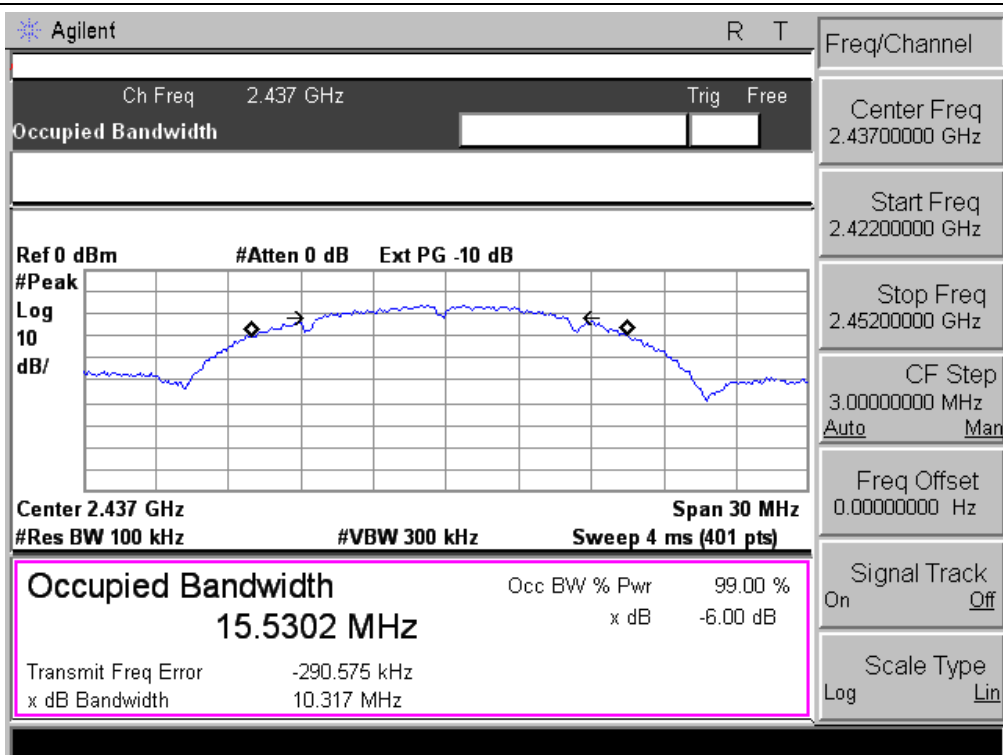
5.1.5 TEST RESULTS

EUT :	Wi-Fi + Bluetooth LE (WiBlue) module	Model:	EC864FPA
Temperature :	25 °C	Relative Humidity :	60%
Pressure :	1012 hPa	Test Voltage :	AC120V
Test Mode :	TX b Mode /CH01, CH06, CH11		

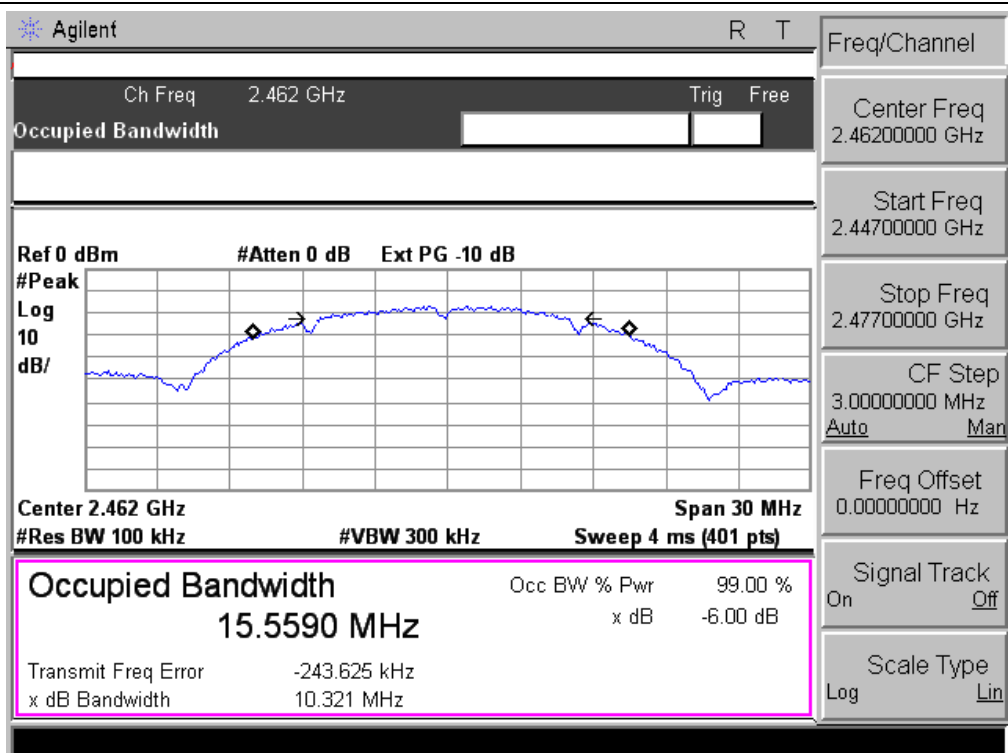
Channel	Frequency (MHz)	6dB bandwidth (MHz)	Limit (kHz)	Result
Low	2412	10.33	500	Pass
Middle	2437	10.31	500	Pass
High	2462	10.32	500	Pass



TX CH 06

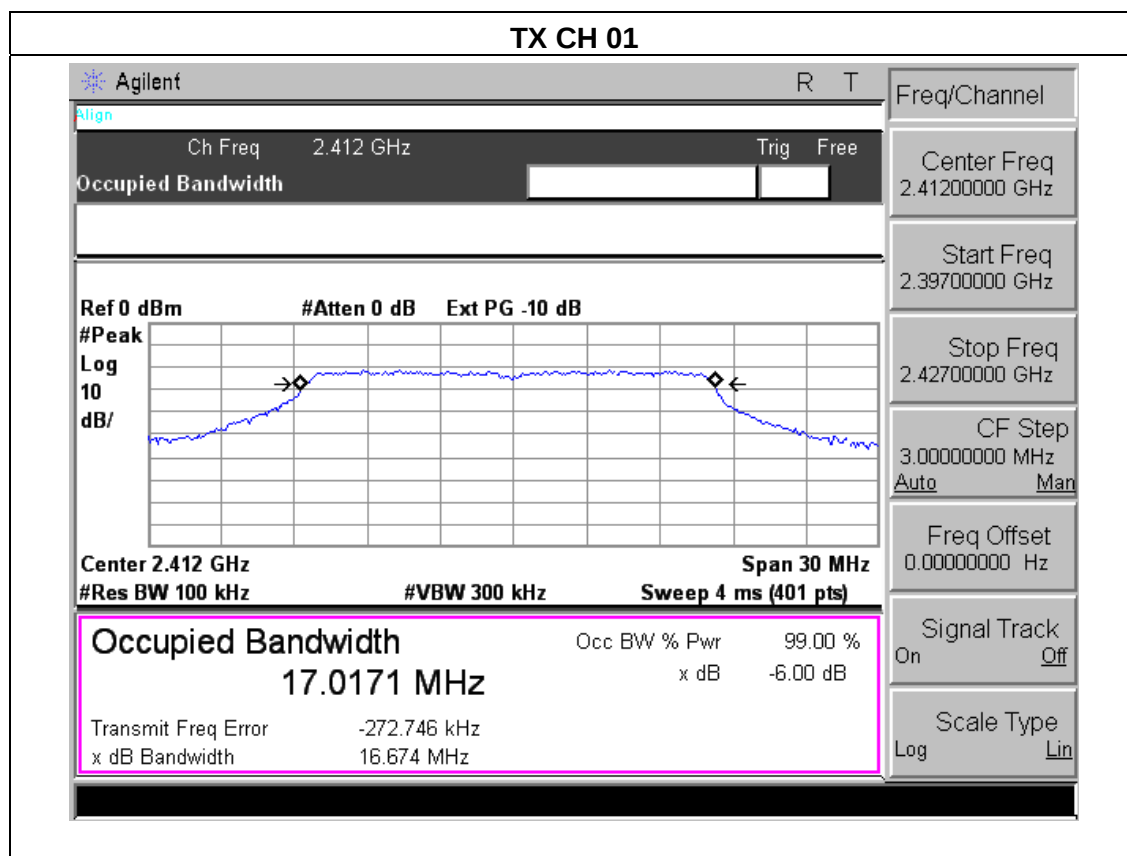


TX CH 11

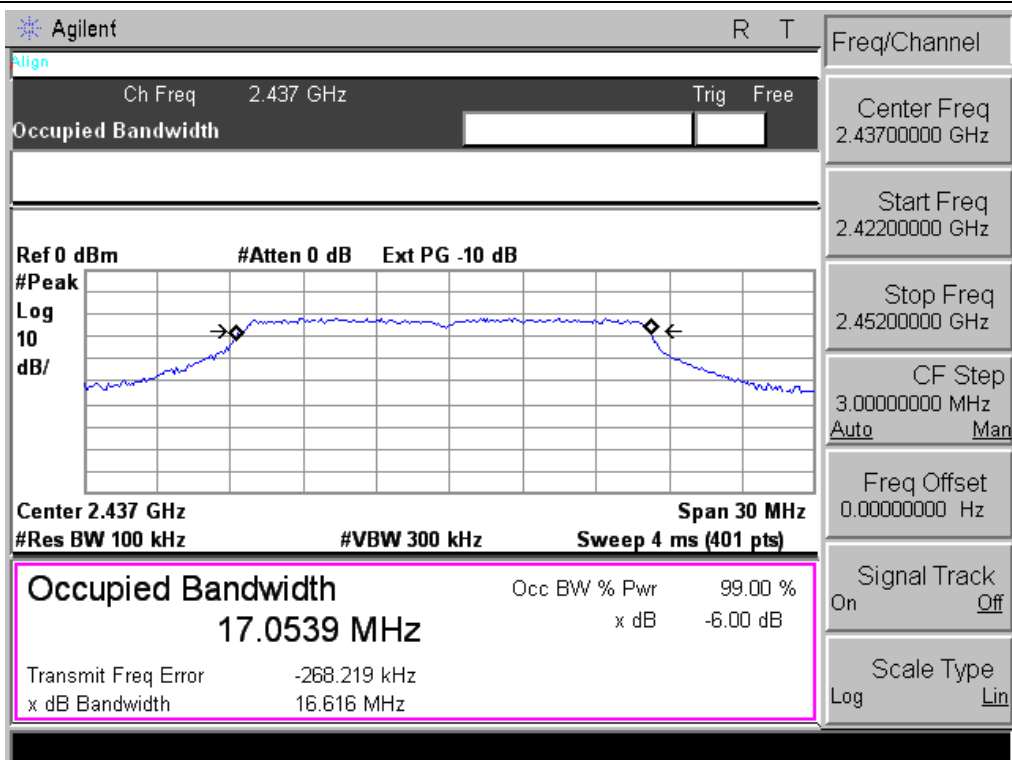


EUT :	Wi-Fi + Bluetooth LE (WiBlue) module	Model:	EC864FPA
Temperature :	25 °C	Relative Humidity :	60%
Pressure :	1012 hPa	Test Voltage :	AC120V
Test Mode :	TX g Mode /CH01, CH06, CH11		

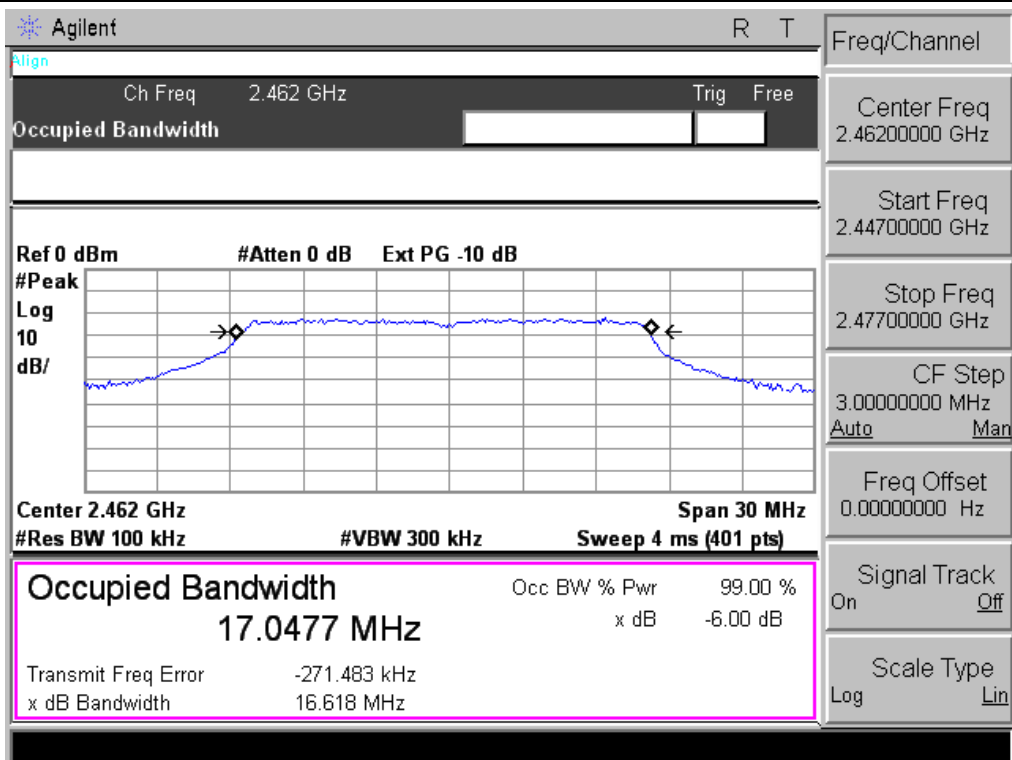
Channel	Frequency (MHz)	6dB bandwidth (MHz)	Limit (kHz)	Result
Low	2412	16.67	500	Pass
Middle	2437	16.62	500	Pass
High	2462	16.62	500	Pass



TX CH 06

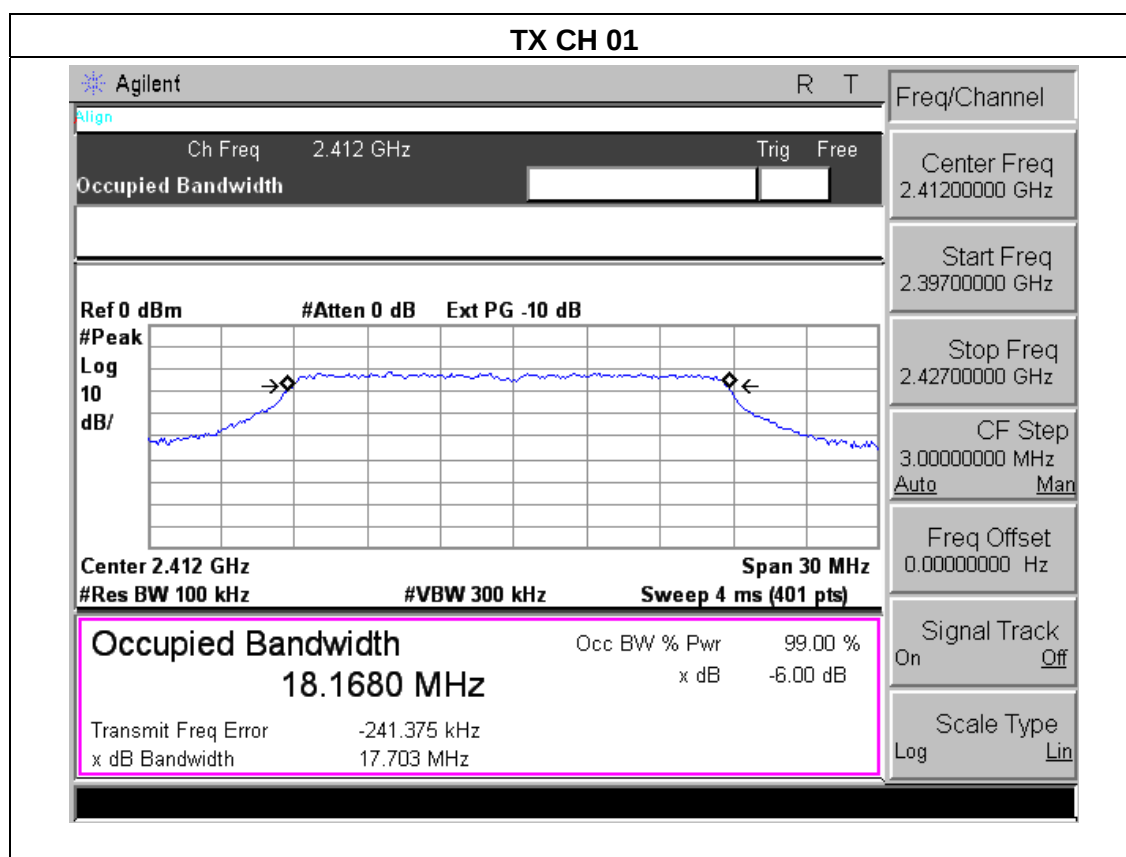


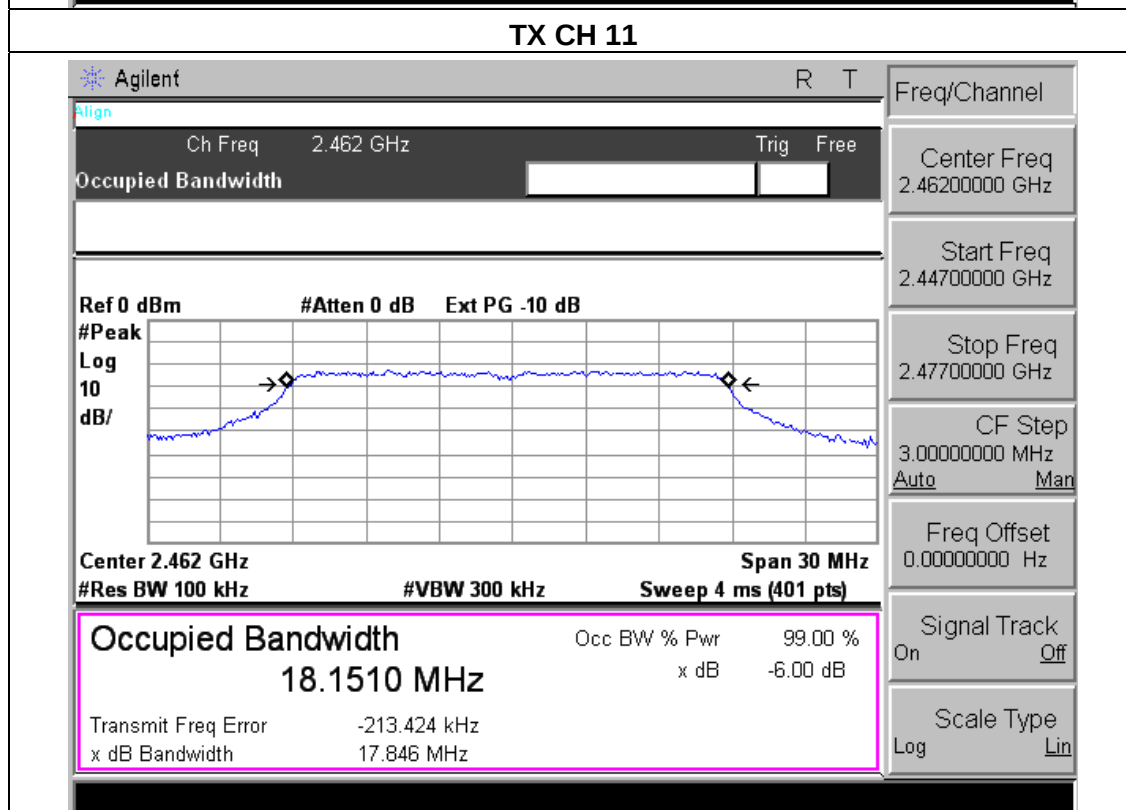
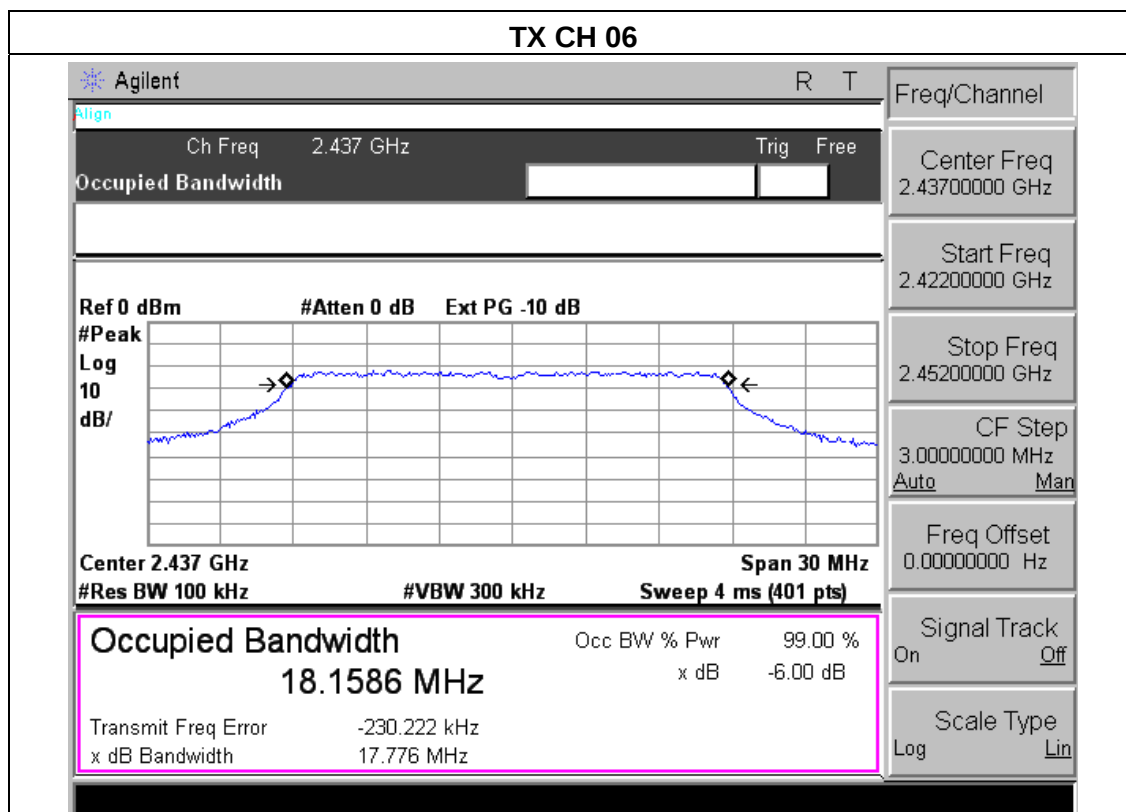
TX CH 11



EUT :	Wi-Fi + Bluetooth LE (WiBlue) module	Model:	EC864FPA
Temperature :	25 °C	Relative Humidity :	60%
Pressure :	1012 hPa	Test Voltage :	AC120V
Test Mode :	TX n Mode(20M) /CH01, CH06, CH11		

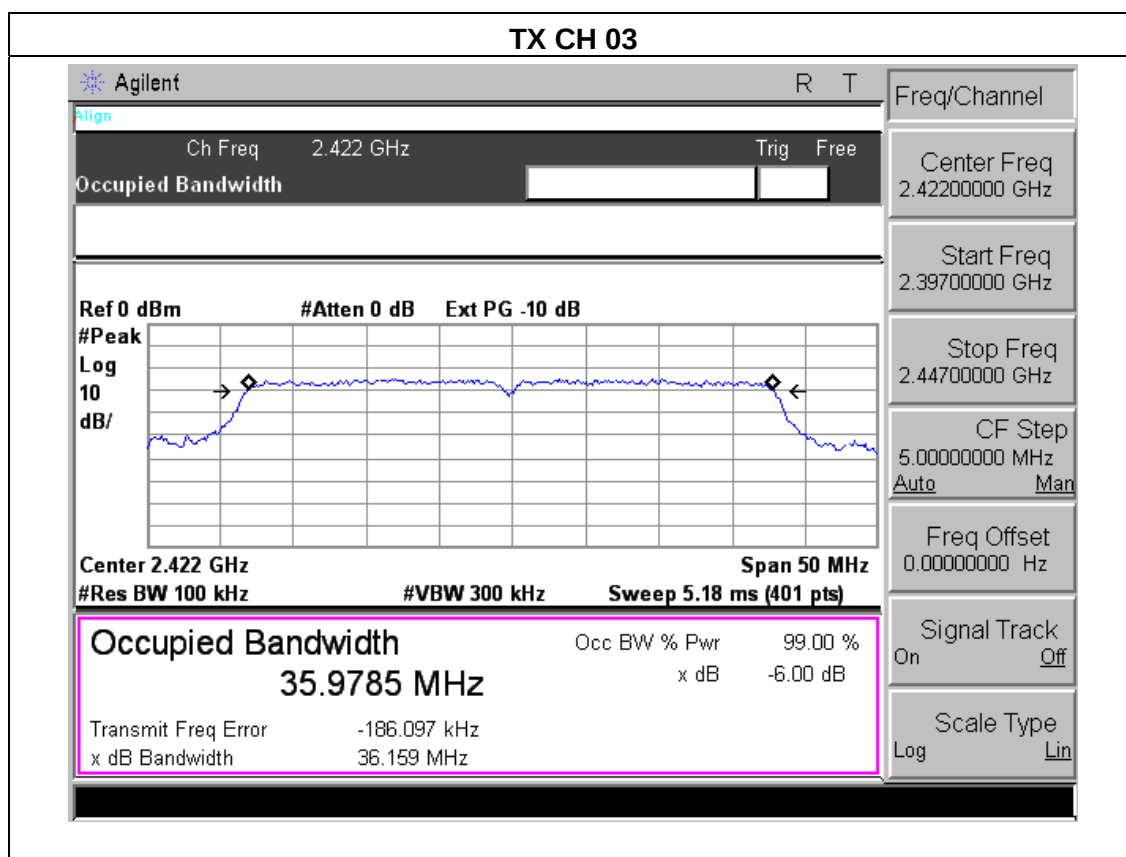
Channel	Frequency (MHz)	6dB bandwidth (MHz)	Limit (kHz)	Result
Low	2412	17.70	500	Pass
Middle	2437	17.78	500	Pass
High	2462	17.85	500	Pass

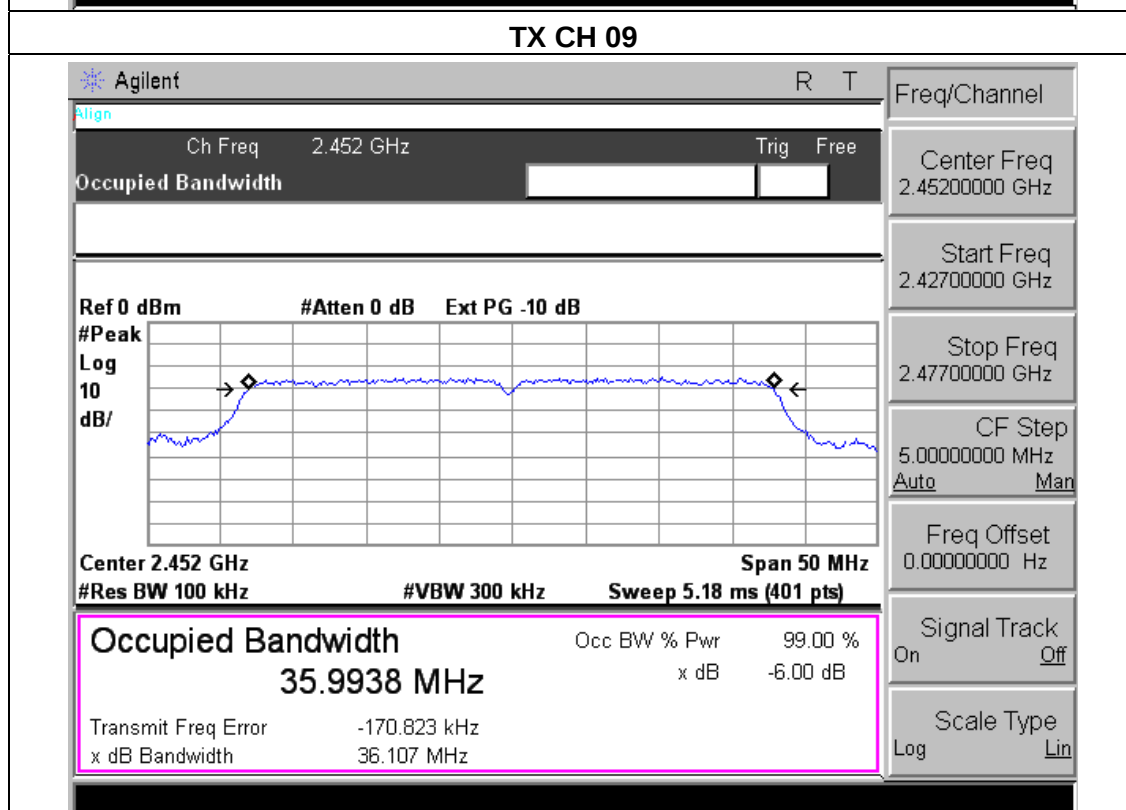
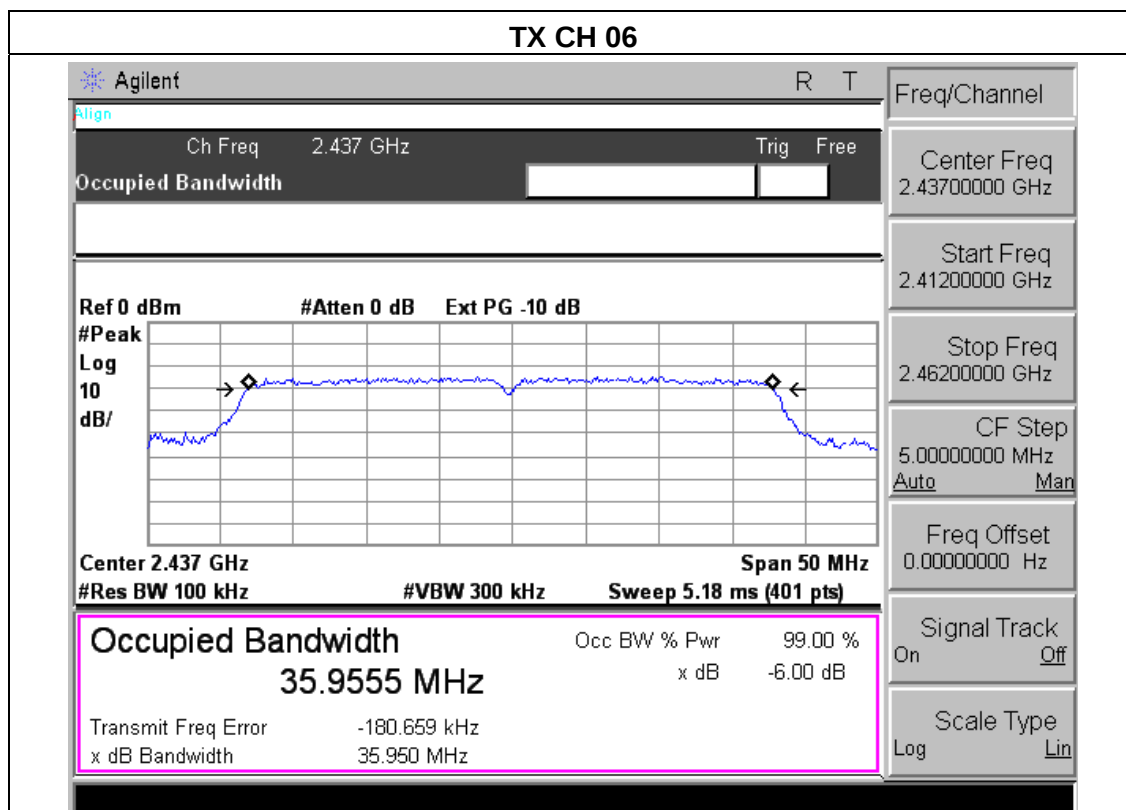




EUT :	Wi-Fi + Bluetooth LE (WiBlue) module	Model:	EC864FPA
Temperature :	25 °C	Relative Humidity :	60%
Pressure :	1012 hPa	Test Voltage :	AC120V
Test Mode :	TX n Mode(40M) /CH03, CH06, CH09		

Channel	Frequency (MHz)	6dB bandwidth (MHz)	Limit (kHz)	Result
Low	2422	36.16	500	Pass
Middle	2437	35.95	500	Pass
High	2452	36.11	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 :	Wi-Fi + Bluetooth LE (WiBlue) module	Model:	EC864FPA
Temperature :	25 °C	Relative Humidity :	60%
Pressure :	1012 hPa	Test Voltage :	AC120V
Test Mode :	TX b/g/n(20M, 40M) Mode		

TX 802.11b Mode				
Test Channel	Frequency	Maximum Conducted Output Power(PK)	Maximum Conducted Output Power(AV)	LIMIT
	(MHz)	(dBm)	(dBm)	dBm
CH01	2412	17.64	14.32	30
CH06	2437	17.45	14.21	30
CH11	2462	17.34	14.11	30
TX 802.11g Mode				
CH01	2412	14.04	11.03	30
CH06	2437	14.77	11.21	30
CH11	2462	14.11	11.33	30
TX 802.11n-HT20 Mode				
CH01	2412	14.44	11.09	30
CH06	2437	14.89	11.23	30
CH11	2462	14.42	10.98	30
TX 802.11n-HT40 Mode				
CH03	2422	13.08	10.11	30
CH06	2437	13.79	10.08	30
CH09	2452	13.61	10.01	30

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

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)).

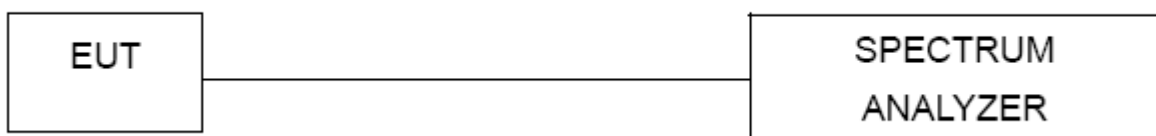
TEST PROCEDURE

- Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
- Set RBW to 100 kHz and VBW of spectrum analyzer to 300 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
- Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
- Repeat above procedures until all measured frequencies were complete.

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.

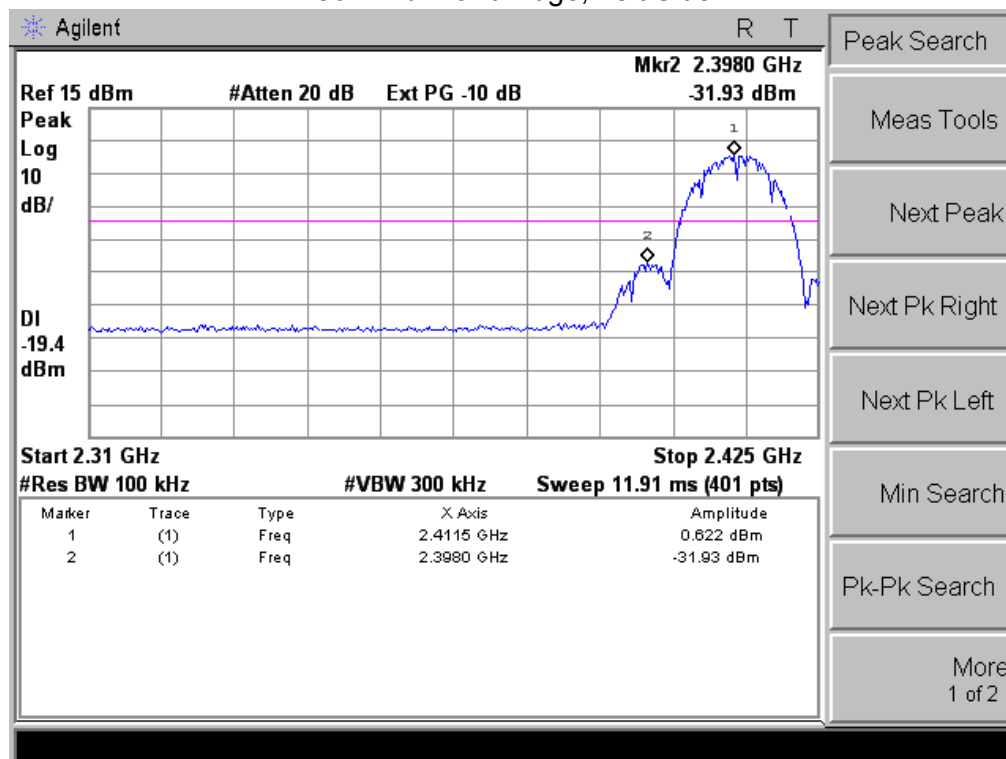
7.4 TEST RESULTS

EUT :	Wi-Fi + Bluetooth LE (WiBlue) module	Model:	EC864FPA
Temperature :	25 °C	Relative Humidity :	60%
Pressure :	1012 hPa	Test Voltage :	AC120V

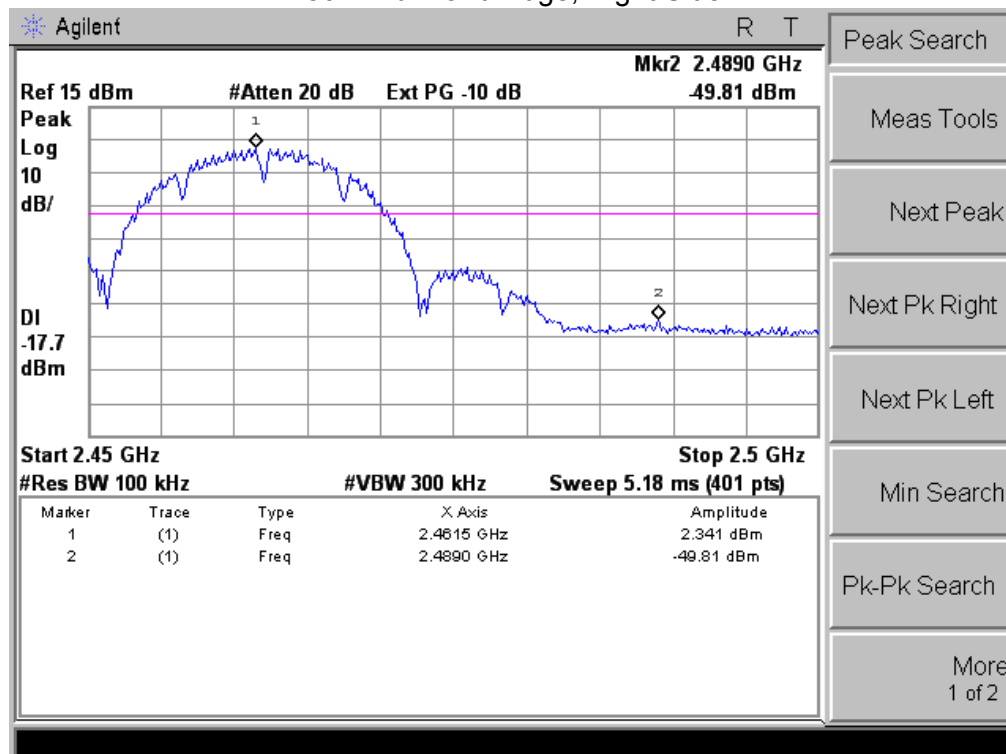
Frequency Band	Delta Peak to band emission (dBc)	> Limit (dBc)	Result
802.11b mode			
Left-band	32.55	20	Pass
Right-band	52.15	20	Pass
802.11g mode			
Left-band	29.45	20	Pass
Right-band	42.88	20	Pass
802.11n-HT20 mode			
Left-band	30.89	20	Pass
Right-band	41.97	20	Pass
802.11n-HT40 mode			
Left-band	28.30	20	Pass
Right-band	37.20	20	Pass

BAND EDGE EMISSION (CONDUCTED):

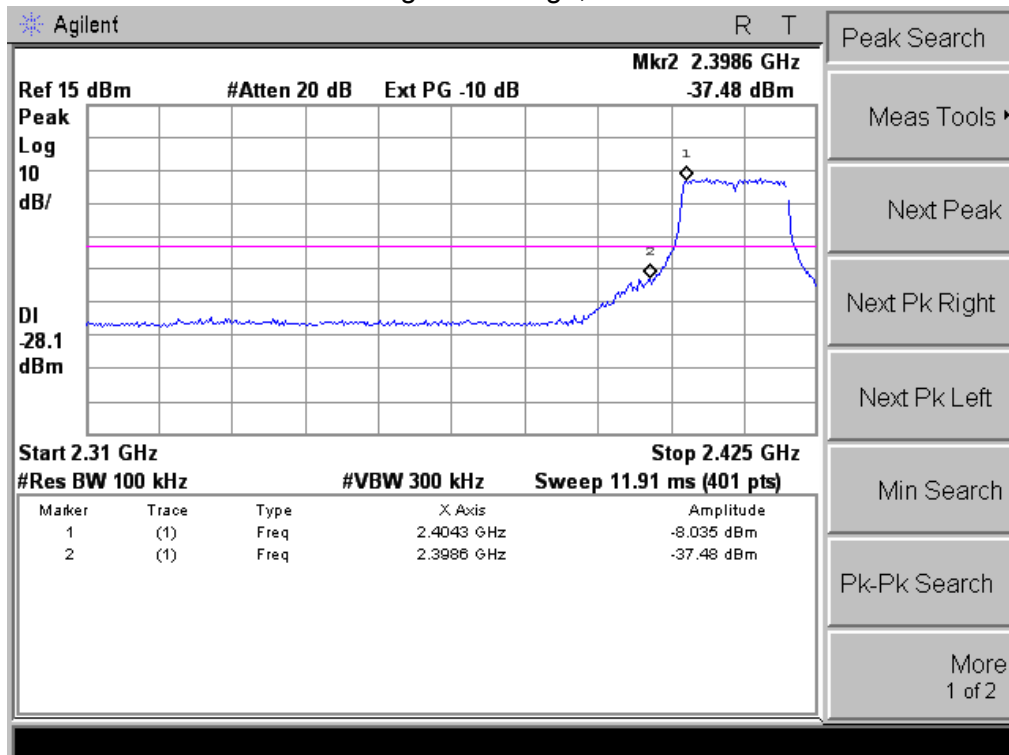
802.11b: Band Edge, Left Side



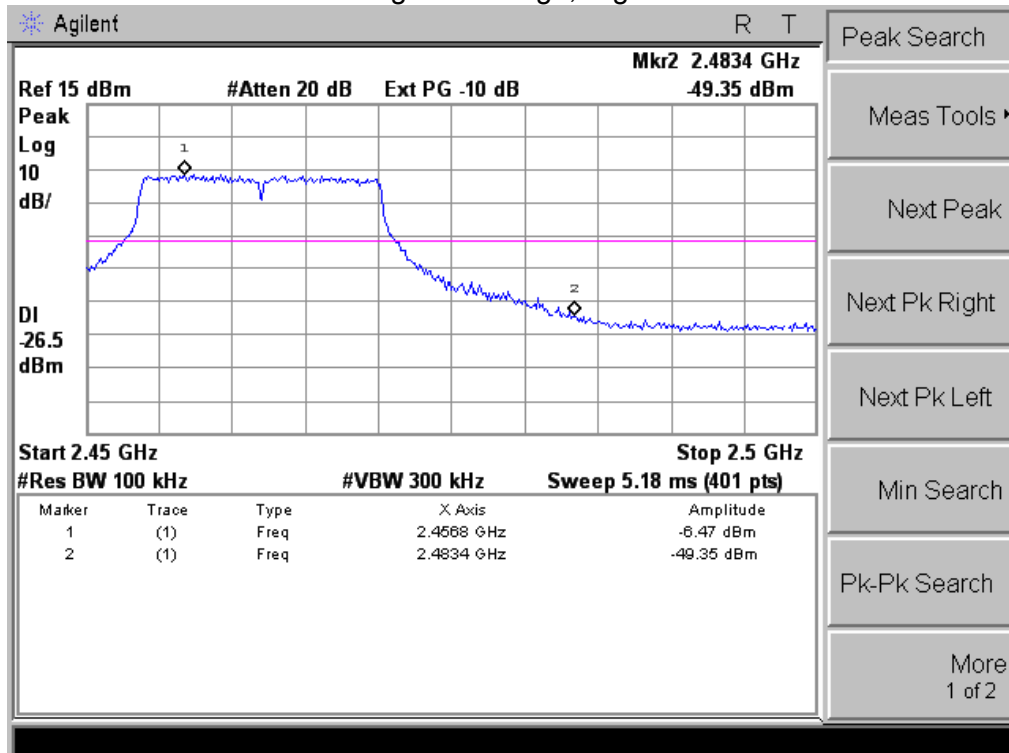
802.11b: Band Edge, Right Side



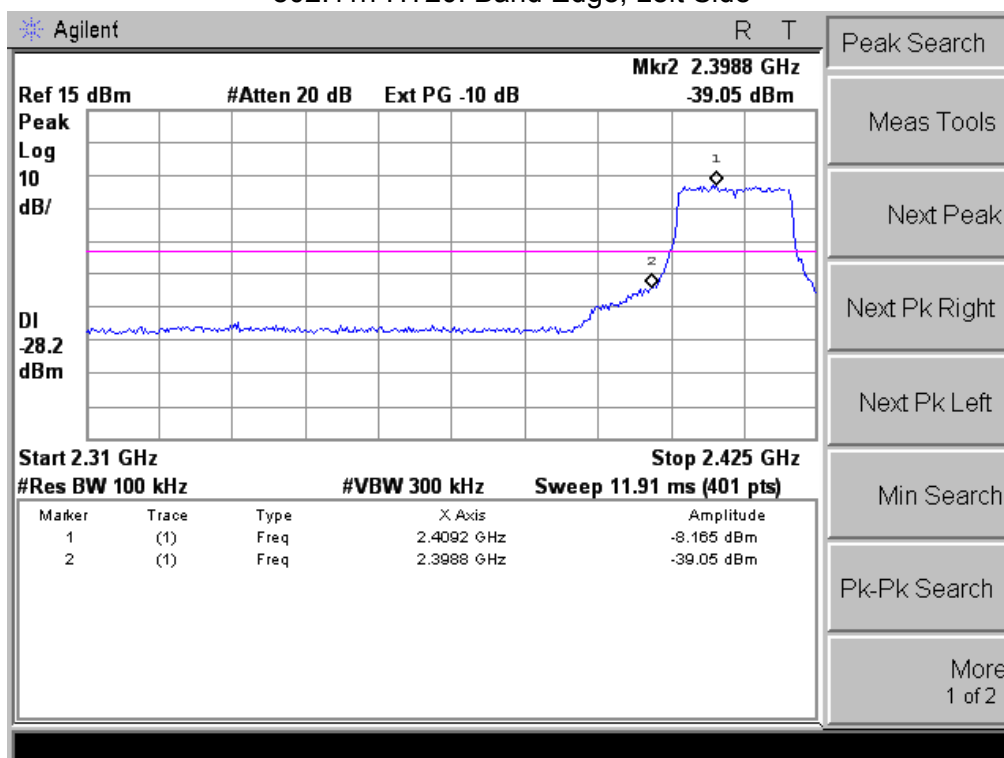
802.11g: Band Edge, Left Side



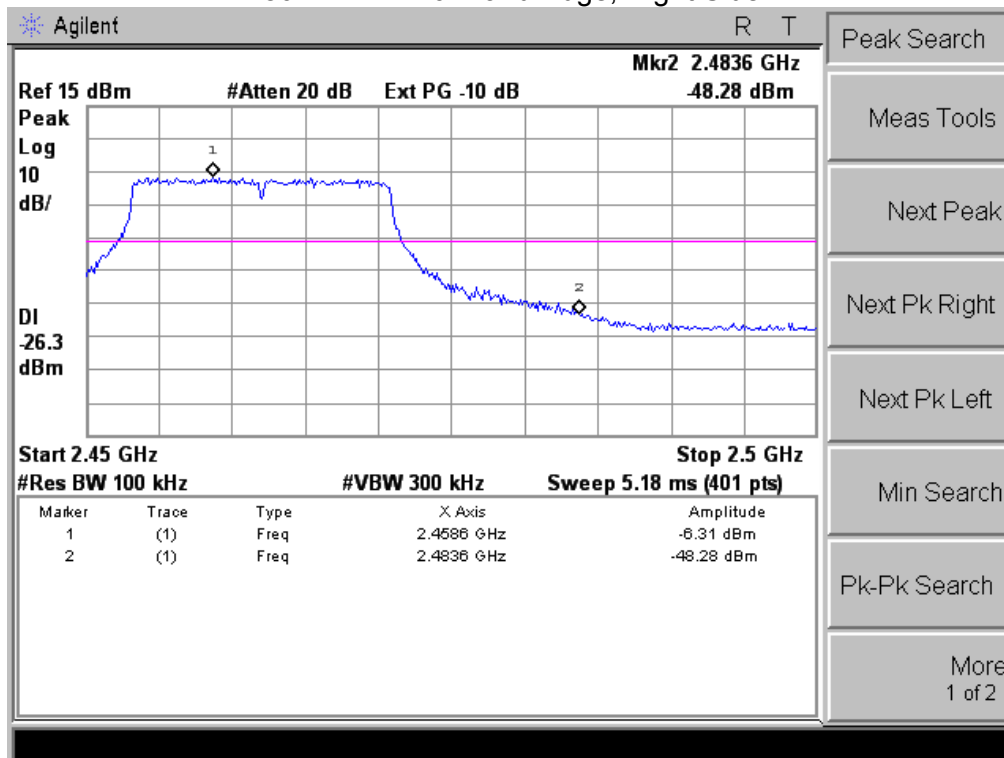
802.11g: Band Edge, Right Side



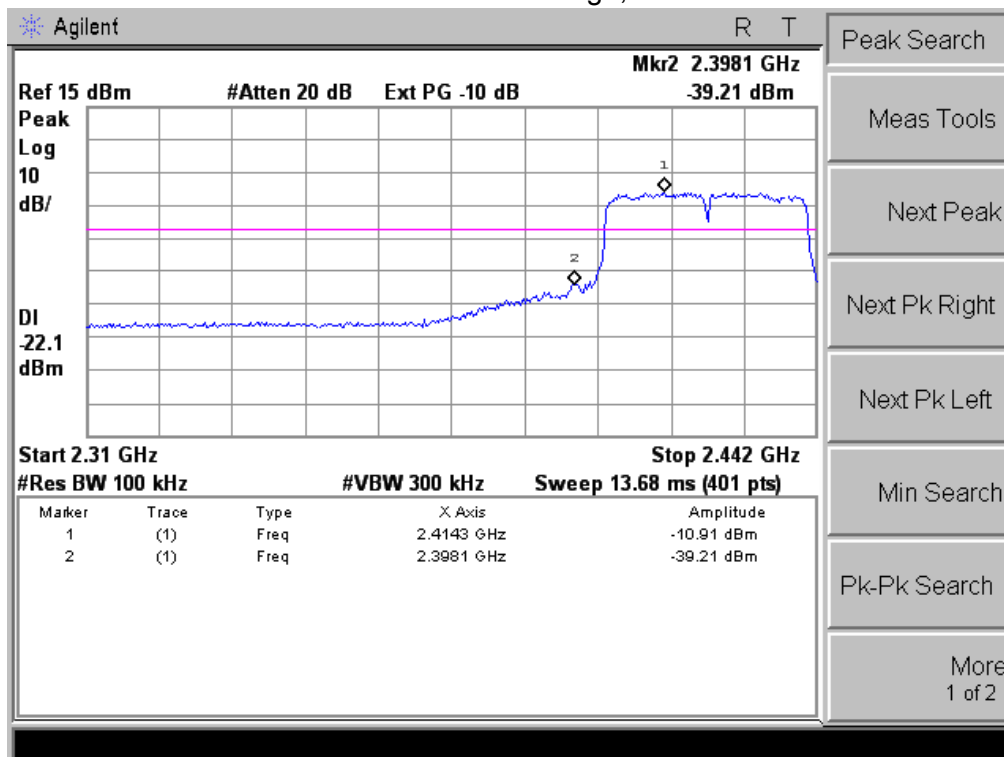
802.11n-HT20: Band Edge, Left Side



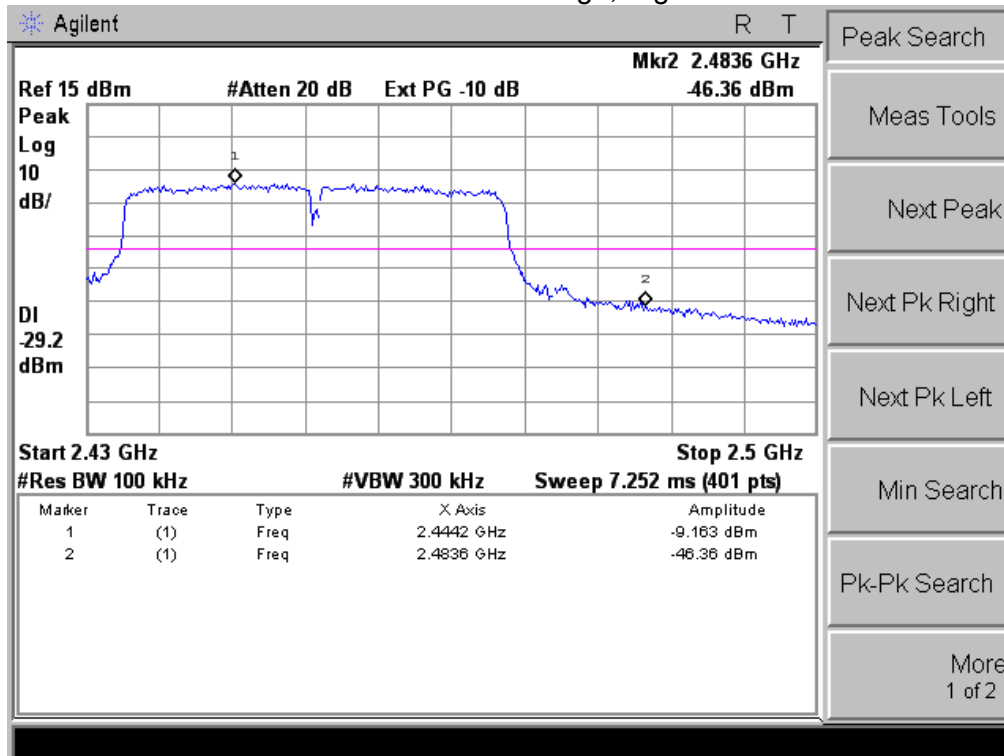
802.11n-HT20: Band Edge, Right Side



802.11n-HT40: Band Edge, Left Side



802.11n-HT40: Band Edge, Right Side

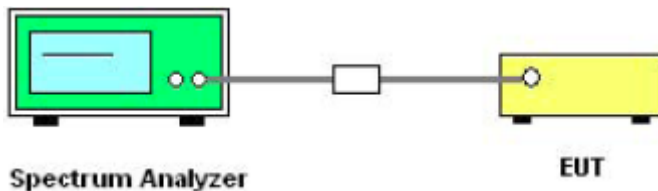


8. CONDUCTED SPURIOUS

8.1 REQUIREMENT

According to FCC section 15.247(d), in any 100kHz 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 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

8.2 TEST SETUP

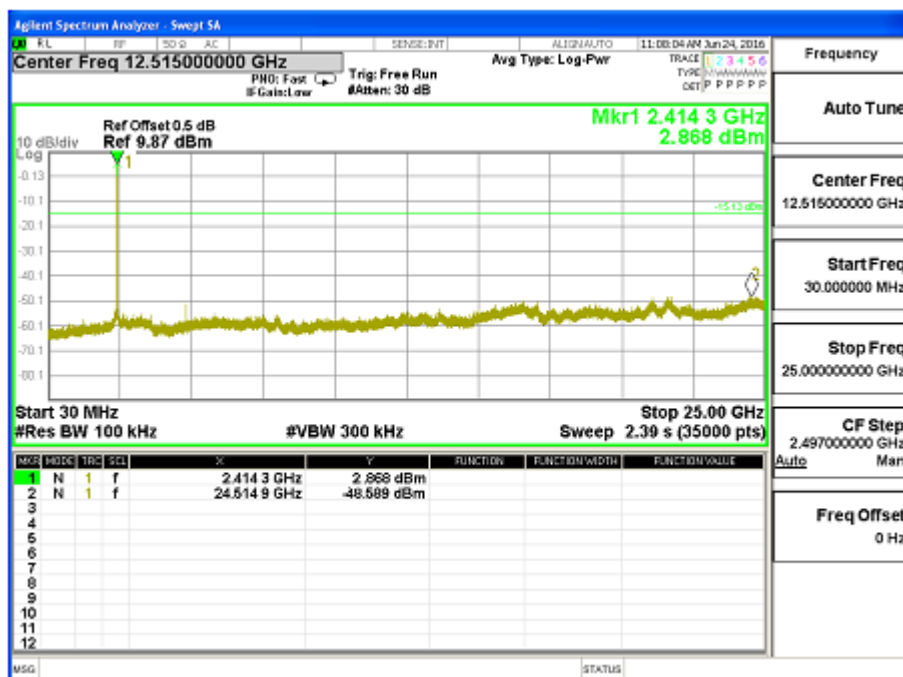


8.3 EUT OPERATION CONDITIONS

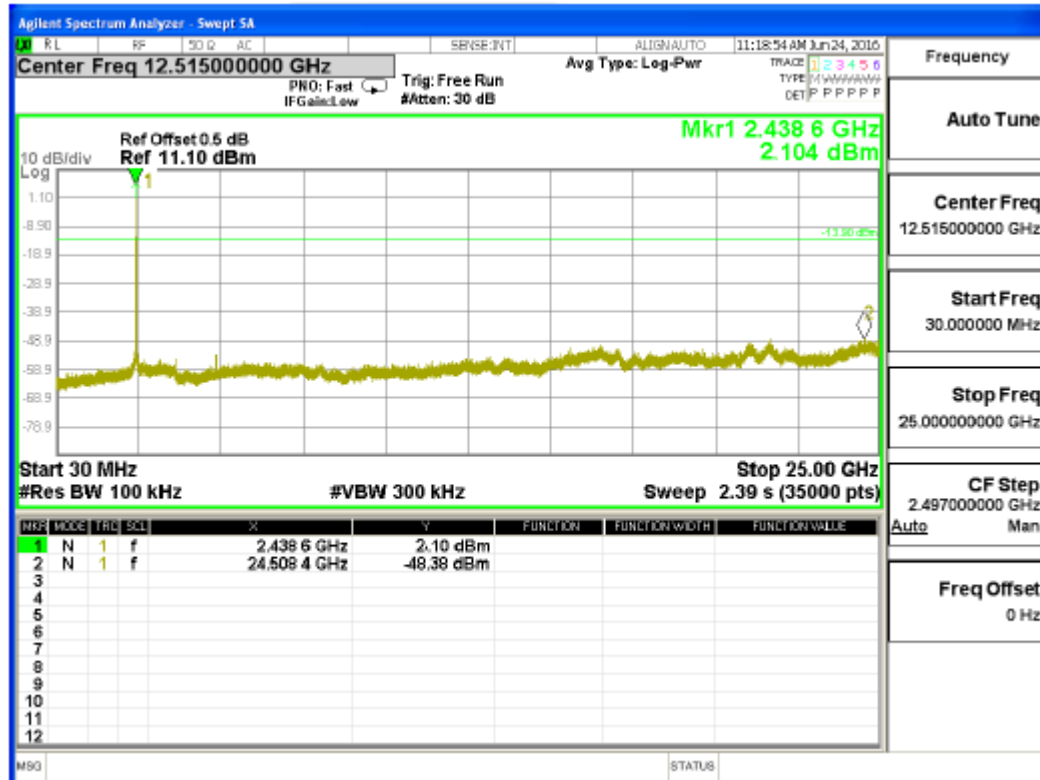
The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.

8.4 TEST RESULTS

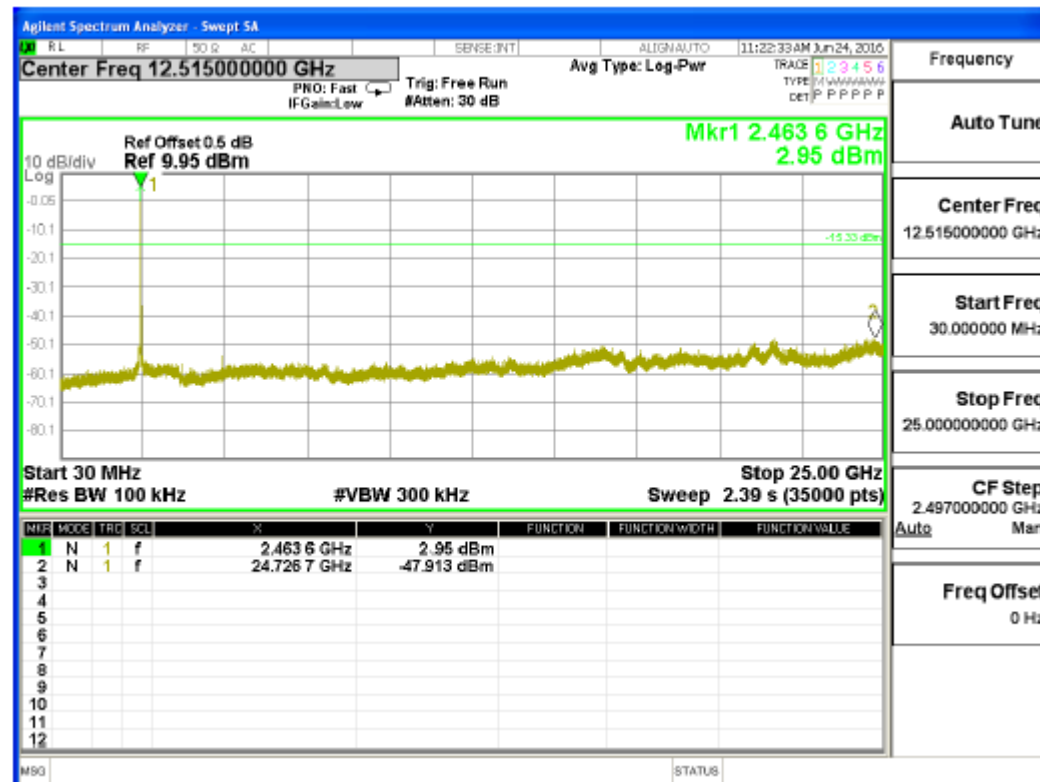
CH01



CH06



CH11



NOTE: "802.11b,1Mbps" mode is the worst mode, and is recorded in the test report

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 PCB antenna .
It comply with the standard requirement.