



FCC RADIO TEST REPORT

FCC ID: 2AH2BHF-SP25

Product : Wi-Fi Smart Plug

Trade Name : N/A

Model Name: HF-SP25

Serial Model : N/A

Report No. : POCE-160912651F

Prepared for

Xi'an HuaFan Instrument Co., Ltd.

Room No.1,3rd Floor, Xi'an Railway Engineering Building ,No.205
Jinhua North Road, Xincheng District,Xi'an City,
Shaanxi Province, China

Prepared by

Shenzhen POCE Technology Co.,Ltd.

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Baoan District, Shenzhen, China

TEST RESULT CERTIFICATION

Applicant's name : Xi'an HuaFan Instrument Co., Ltd.

Address : Room No.1,3rd Floor, Xi'an Railway Engineering Building ,
No.205 Jinhua North Road, Xincheng District,Xi'an City,
Shaanxi Province, China

Manufacture's Name : Xi'an HuaFan Instrument Co., Ltd.

Address : Room No.1,3rd Floor, Xi'an Railway Engineering Building ,
No.205 Jinhua North Road, Xincheng District,Xi'an City,
Shaanxi Province, China

Product description

Product name : Wi-Fi Smart Plug

Model and/or type reference : HF-SP25

Trade Name N/A

Standards : FCC Part15.247

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 : 7 Sep. 2016 ~15 Sep. 2016

Date of Issue : 15 Sep. 2016

Test Result : **Pass**

Testing Engineer : 

(Ken Li)

Technical Manager : 

(Jimmy Yao)

Authorized Signatory : 

(Terry Yang)

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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	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

Shenzhen POCE Technology Co.,Ltd.

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

FCC-Registration No.: 222278

1.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement $y \pm U$, where expended 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 Smart Plug															
Trade Name	N/A															
Model Name	HF-SP25															
Serial Model	N/A															
Model Difference	N/A															
Product Description	The EUT is a Wi-Fi Smart Plug <table border="1"> <tr> <td>Operation Frequency:</td> <td>802.11b/g/n:2412~2462 MHz</td> </tr> <tr> <td>Modulation Type:</td> <td>CCK/OFDM/DBPSK/DAPSK</td> </tr> <tr> <td>Bit Rate of Transmitter</td> <td>802.11b:11/5.5/2/1 Mbps 802.11g:54/48/36/24/18/12/9/6Mbps 802.11n:78/52/6.5Mbps</td> </tr> <tr> <td>Number Of Channel</td> <td>802.11b/g/n:11CH</td> </tr> <tr> <td>Antenna Designation:</td> <td>Please see Note 3.</td> </tr> <tr> <td>Output Power(Conducted):</td> <td>12.67 dBm (Max.)</td> </tr> <tr> <td>Antenna Gain (dBi)</td> <td>1.2dbi</td> </tr> </table>		Operation Frequency:	802.11b/g/n:2412~2462 MHz	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:78/52/6.5Mbps	Number Of Channel	802.11b/g/n:11CH	Antenna Designation:	Please see Note 3.	Output Power(Conducted):	12.67 dBm (Max.)	Antenna Gain (dBi)	1.2dbi
Operation Frequency:	802.11b/g/n:2412~2462 MHz															
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:78/52/6.5Mbps															
Number Of Channel	802.11b/g/n:11CH															
Antenna Designation:	Please see Note 3.															
Output Power(Conducted):	12.67 dBm (Max.)															
Antenna Gain (dBi)	1.2dbi															
	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.															
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	Connector	Gain (dBi)	NOTE
A	N/A	N/A	PCB Antenna	N/A	1.2	Wifi Antenna

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

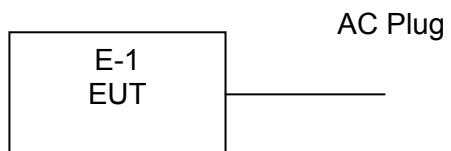
For Conducted Emission	
Final Test Mode	Description
Mode 4	Link Mode

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



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	Brand	Model/Type No.	Series No.	Note
E-1	Wi-Fi Smart Plug	N/A	HF-SP25	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	MY4510840	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
10	Power Meter	R&S	NRVS	100696	2016.07.06	2017.07.05	1 year
11	Power Sensor	R&S	URV5-Z4	0395.1619.05	2016.07.06	2017.07.05	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 *	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

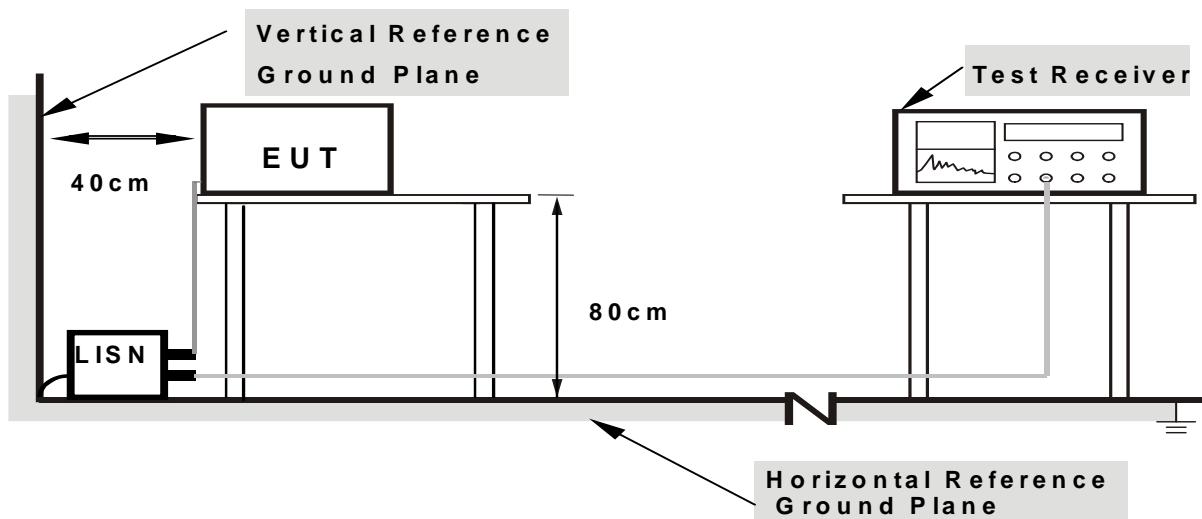
3.1.2 TEST PROCEDURE

- 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



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.

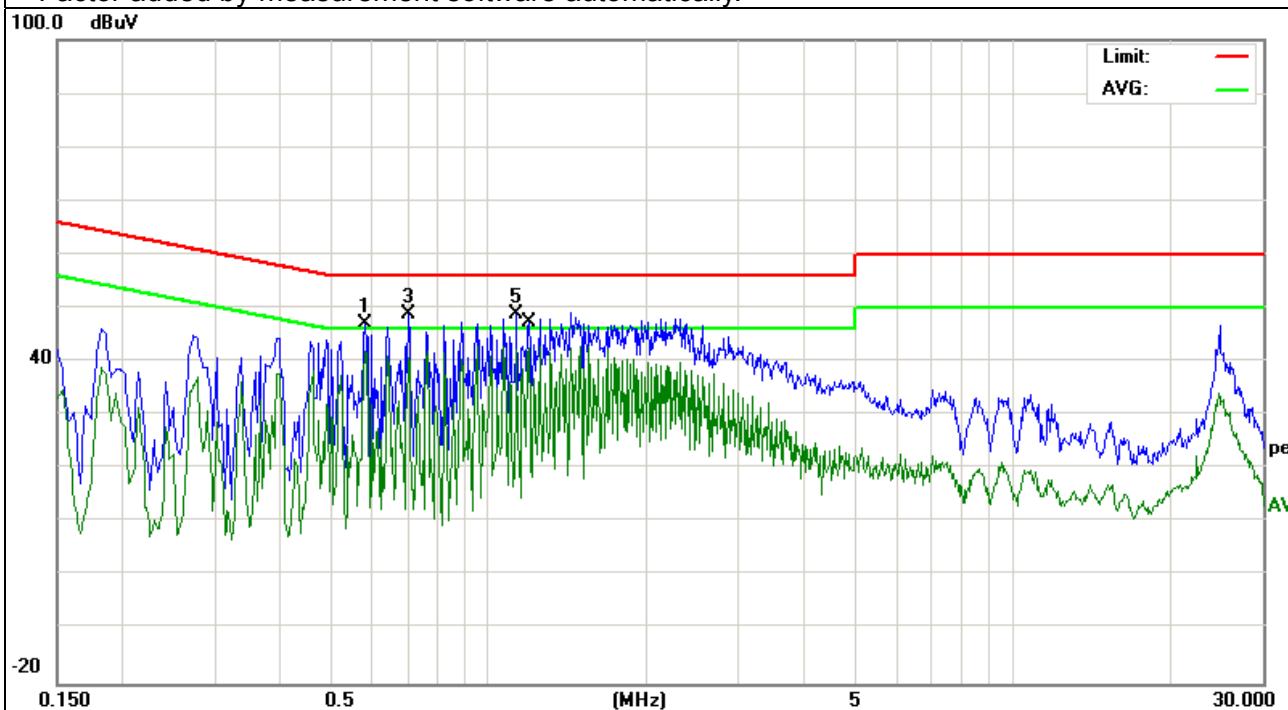
3.1.6 TEST RESULTS

EUT :	Wi-Fi Smart Plug	Model Name. :	HF-SP25
Temperature :	26 °C	Relative Humidity :	54%
Pressure :	1010hPa	Phase :	L
Test Voltage :	AC 120V/60Hz	Test Mode :	Mode 1

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dB μ V)	(dB)	(dB μ V)	(dB μ V)	(dB)	
0.582	36.51	10.4	46.91	56	-9.09	peak
0.582	31.68	10.4	42.08	46	-3.92	AVG
0.7019	38.52	10.41	48.93	56	-7.07	peak
0.7019	30.45	10.41	40.86	46	-5.14	AVG
1.134	38.45	10.41	48.86	56	-7.14	peak
1.194	32.09	10.41	42.5	46	-3.5	AVG

Remark:

1. All readings are Quasi-Peak and Average values.
2. lever = Read lever + factor (LISN Factor +cable loss)
Factor added by measurement software automatically.



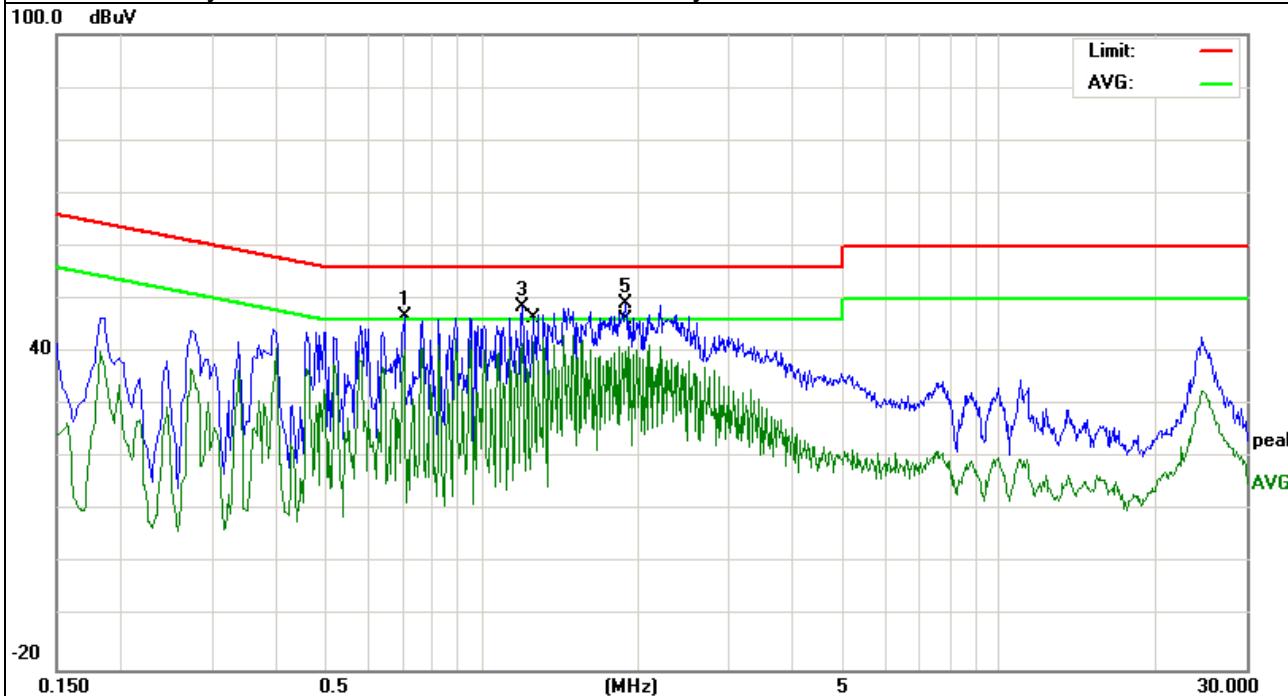
EUT :	Wi-Fi Smart Plug	Model Name. :	HF-SP25
Temperature :	26 °C	Relative Humidity :	54%
Pressure :	1010hPa	Phase :	N
Test Voltage :	AC 120V/60Hz	Test Mode :	Mode 1

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dB μ V)	(dB)	(dB μ V)	(dB μ V)	(dB)	
0.706	36.27	10.41	46.68	56	-9.32	peak
0.706	29.9	10.41	40.31	46	-5.69	AVG
1.194	38.06	10.41	48.47	56	-7.53	peak
1.254	31.52	10.41	41.93	46	-4.07	AVG
1.894	38.75	10.42	49.17	56	-6.83	peak
1.926	30.64	10.42	41.06	46	-4.94	AVG

Remark:

1. All readings are Quasi-Peak and Average values.
2. lever = Read lever + factor (LISN Factor +cable loss)

Factor added by measurement software automatically.



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 1GHz is 1.5 m) 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 is 1.5 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:

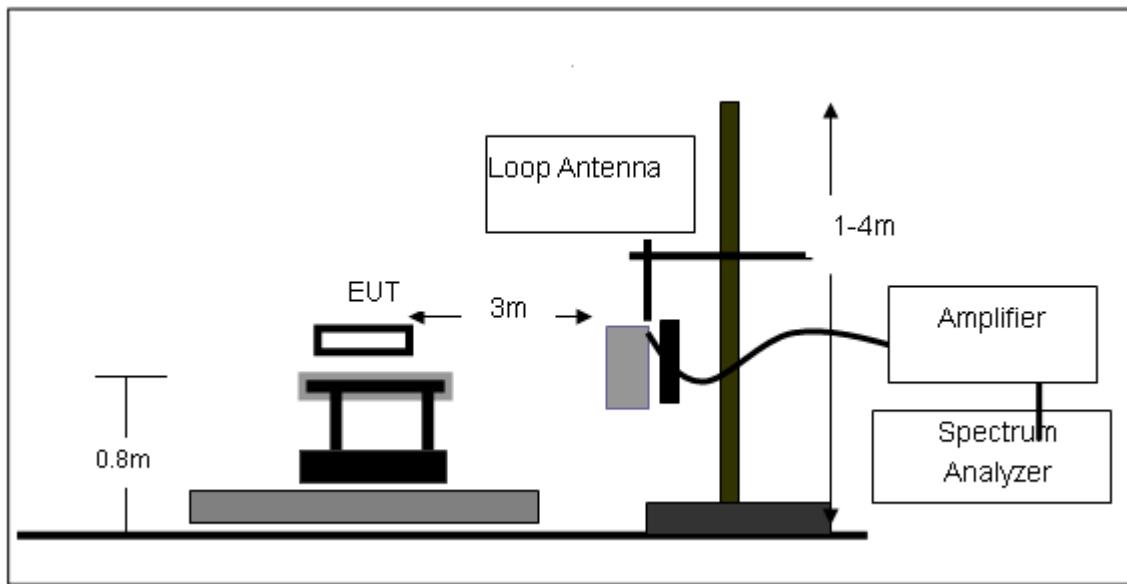
Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported

3.2.3 DEVIATION FROM TEST STANDARD

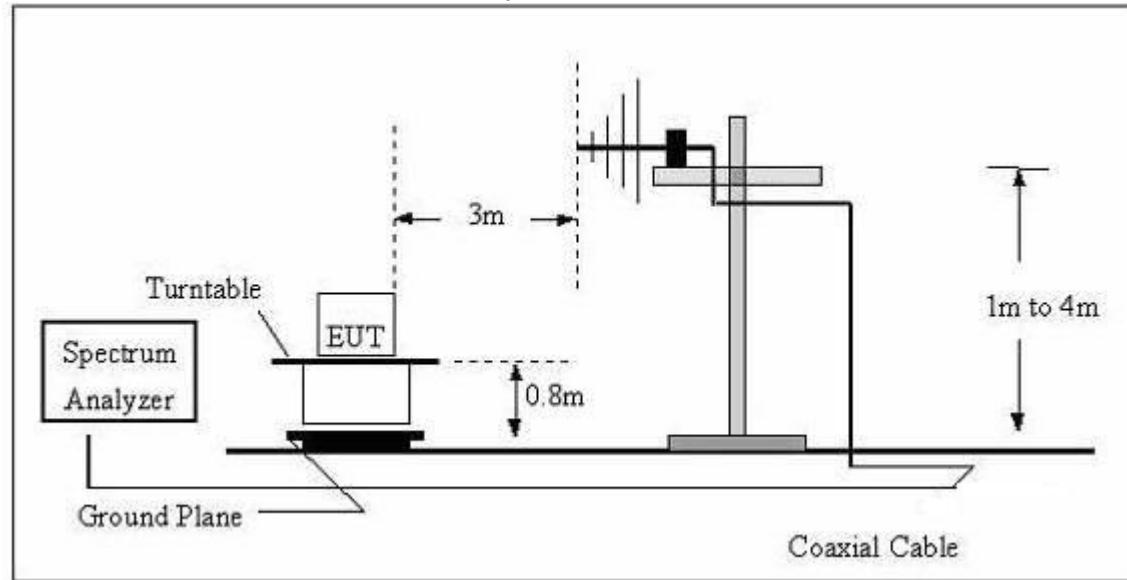
No deviation

3.2.4 TEST SETUP

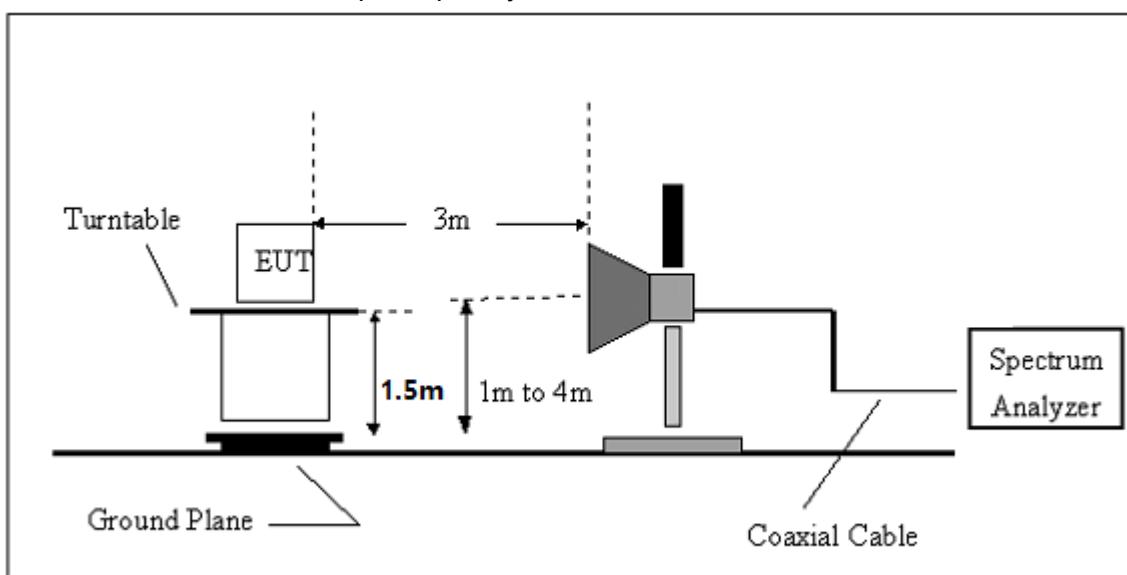
(A) Radiated Emission Test-Up Frequency Below 30MHz



(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:	Wi-Fi Smart Plug	Model Name. :	HF-SP25
Temperature:	20 °C	Relative Humidity:	48%
Pressure:	1010 hPa	Test Voltage :	AC 120V/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 = $40 \log (\text{specific distance}/\text{test distance})$ (dB);
 Limit line = specific limits(dBuV) + distance extrapolation factor.

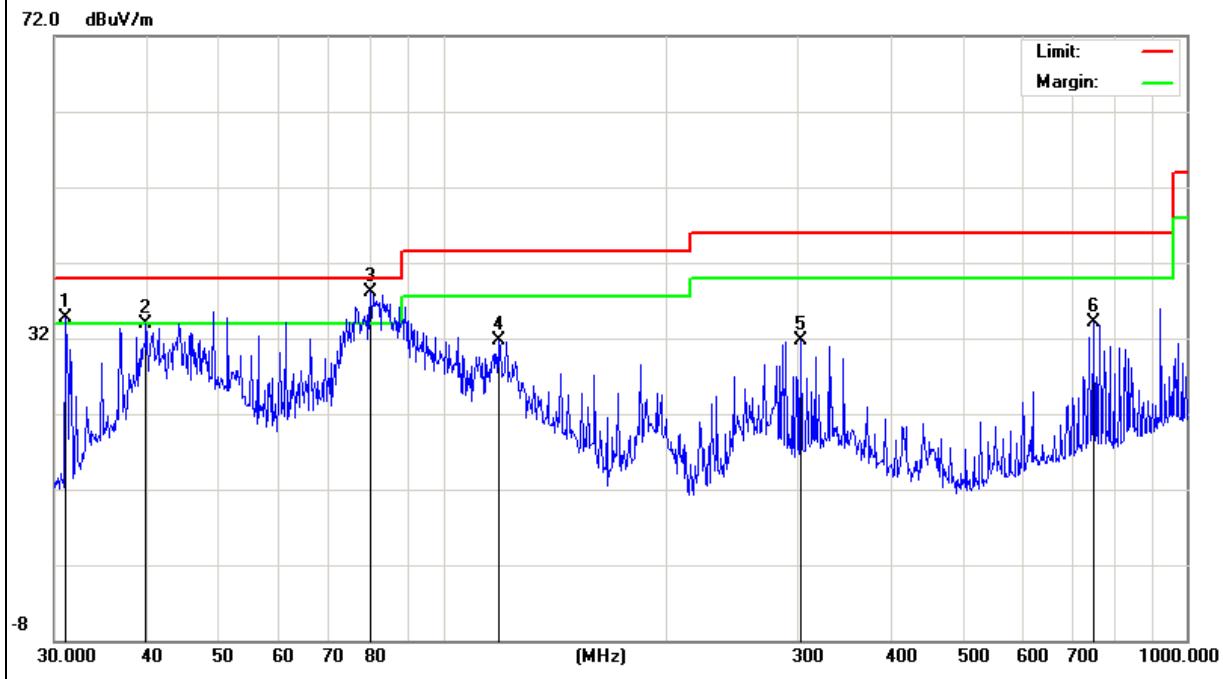
3.2.7 TEST RESULTS (BETWEEN 30MHZ – 1GHZ)

EUT :	Wi-Fi Smart Plug	Model Name :	HF-SP25
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Polarization :	Horizontal
Test Voltage :	AC 120V/60Hz		

Frequency (MHz)	Meter Reading (dB μ V)	Factor (dB)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector Type
31.0705	16.76	17.86	34.62	40	-5.38	QP
39.8541	20.45	13.46	33.91	40	-6.09	QP
79.8002	29.34	7.76	37.1	40	-2.9	QP
118.6013	19.65	12.05	31.7	43.5	-11.8	QP
302.4812	16.99	14.81	31.8	46	-14.2	QP
750.1082	7.71	26.39	34.1	46	-11.9	QP

Remark:

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



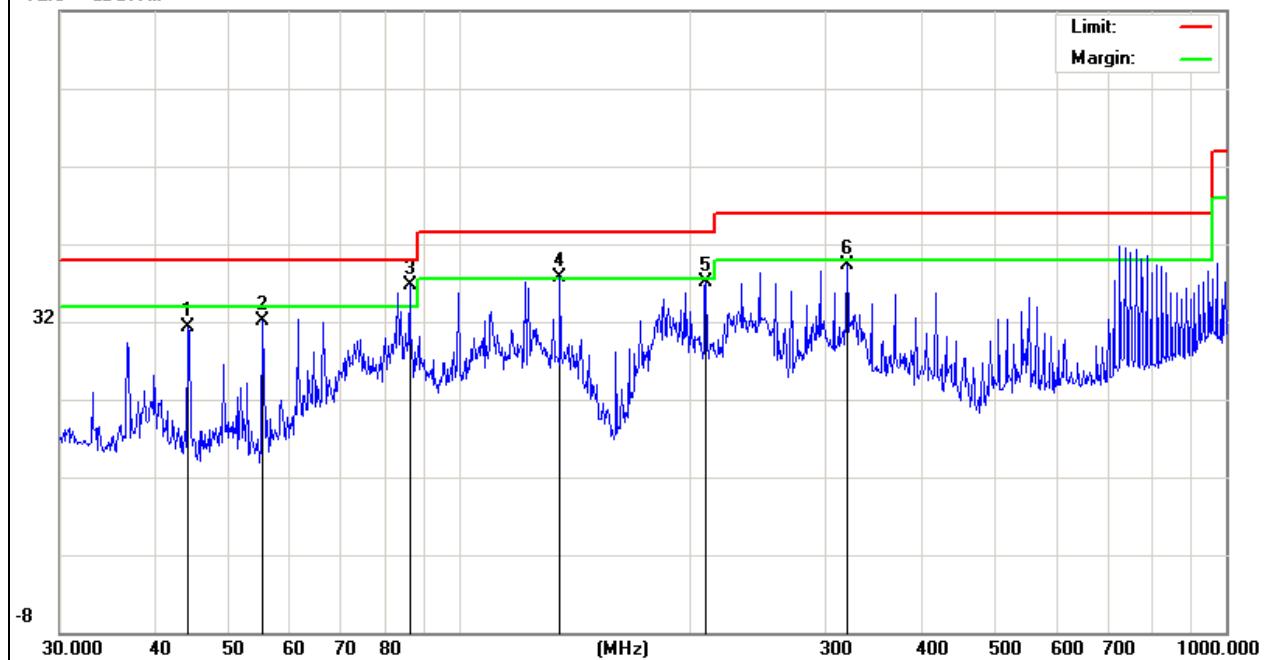
EUT :	Wi-Fi Smart Plug	Model Name :	HF-SP25
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Polarization :	Vertical
Test Voltage :	AC 120V/60Hz		

Frequency (MHz)	Meter Reading (dB μ V)	Factor (dB)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector Type
44.12	20.13	11.09	31.22	40	-8.78	QP
55.2207	25.86	6.21	32.07	40	-7.93	QP
85.8983	27.83	8.9	36.73	40	-3.27	QP
135.0319	25.46	12.25	37.71	43.5	-5.79	QP
209.3129	27.43	9.65	37.08	43.5	-6.42	QP
319.937	23.82	15.44	39.26	46	-6.74	QP

Remark:

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

72.0 dB μ V/m



3.2.8 TEST RESULTS (1G-26GHZ)

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

Frequency (MHz)	Read Level (dB μ V)	Cable loss (dB)	Antenna Factor dB/m	Preamplifier Factor (dB)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Remark
Low Channel (2412 MHz)-Above 1G								
4824.458	55.15	4.68	35.59	44.30	51.12	74.00	-22.88	Pk
4824.458	49.61	4.68	35.59	44.30	45.58	54.00	-8.42	AV
7236.206	48.29	7.10	36.22	44.60	47.01	74.00	-26.99	Pk
7236.206	42.19	7.10	36.22	44.60	40.91	54.00	-13.09	AV
4824.339	56.21	4.65	35.55	44.30	52.11	74.00	-21.89	Pk
4824.339	48.34	4.65	35.55	44.30	44.24	54.00	-9.76	AV
7236.102	47.33	7.11	36.24	44.52	46.16	74.00	-27.84	Pk
7236.102	41.19	7.11	36.24	44.52	40.02	54.00	-13.98	AV
Mid Channel (2437 MHz)-Above 1G								
4874.107	58.26	5.21	35.66	44.20	54.93	74.00	-19.07	Pk
4874.107	45.18	5.21	35.66	44.20	41.85	54.00	-12.15	AV
7311.089	48.36	7.10	36.50	44.43	47.53	74.00	-26.47	Pk
7311.089	42.06	7.10	36.50	44.43	41.23	54.00	-12.77	AV
4874.136	57.33	5.21	35.66	44.20	54.00	74.00	-20.00	Pk
4874.136	46.26	5.21	35.66	44.20	42.93	54.00	-11.07	AV
7311.335	47.29	7.10	36.50	44.43	46.46	74.00	-27.54	Pk
7311.335	41.38	7.10	36.50	44.43	40.55	54.00	-13.45	AV
High Channel (2462 MHz)- Above 1G								
4924.683	58.67	5.21	35.52	44.21	55.19	74.00	-18.81	Pk
4924.683	46.26	5.21	35.52	44.21	42.78	54.00	-11.22	AV
7386.248	47.18	7.10	36.53	44.60	46.21	74.00	-27.79	Pk
7386.248	41.07	7.10	36.53	44.60	40.10	54.00	-13.90	AV
4924.032	57.33	5.21	35.52	44.21	53.85	74.00	-20.15	Pk
4924.032	45.34	5.21	35.52	44.21	41.86	54.00	-12.14	AV
7386.169	48.16	7.10	36.53	44.60	47.19	74.00	-26.81	Pk
7386.169	43.07	7.10	36.53	44.60	42.10	54.00	-11.9	AV

Note: "802.11b" mode is the worst mode.

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

Factor added by measurement software automatically.

3.2.9 BAND EDGE EMISSION(RADIATED MEASUREMENT):

Frequency (MHz)	Reading Level (dB μ V)	Cable Loss (dB)	Antenna Factor dB/m	Preamp Factor (dB)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector Type	Comment
802.11b									
2390	69.61	3.14	27.21	43.80	56.16	74	-17.84	Pk	Vertical
2390	60.62	3.14	27.21	43.80	47.17	54	-6.83	AV	Vertical
2483.5	71.34	3.58	27.70	44.00	58.62	74	-15.38	Pk	Horizontal
2483.5	61.26	3.58	27.70	44.00	48.54	54	-5.46	AV	Horizontal
802.11g									
2390	68.29	3.14	27.21	43.80	54.84	74	-19.16	Pk	Vertical
2390	59.34	3.14	27.21	43.80	45.89	54	-8.11	AV	Vertical
2483.5	70.12	3.58	27.70	44.00	57.4	74	-16.6	Pk	Horizontal
2483.5	60.22	3.58	27.70	44.00	47.5	54	-6.5	AV	Horizontal
802.11n(20)									
2390	68.69	3.14	27.21	43.80	55.24	74	-18.76	Pk	Vertical
2390	58.38	3.14	27.21	43.80	44.93	54	-9.07	AV	Vertical
2483.5	70.36	3.58	27.70	44.00	57.64	74	-16.36	Pk	Horizontal
2483.5	60.05	3.58	27.70	44.00	47.33	54	-6.67	AV	Horizontal

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 lever

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

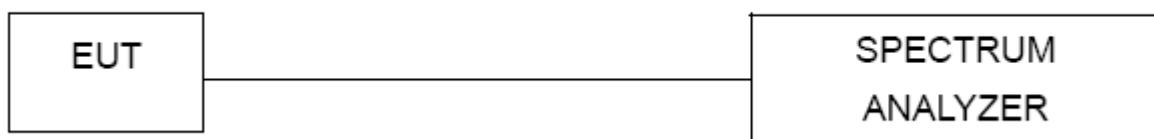
4.1.1 TEST PROCEDURE

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 \geq 3 kHz.
4. Set the VBW \geq 3 x 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



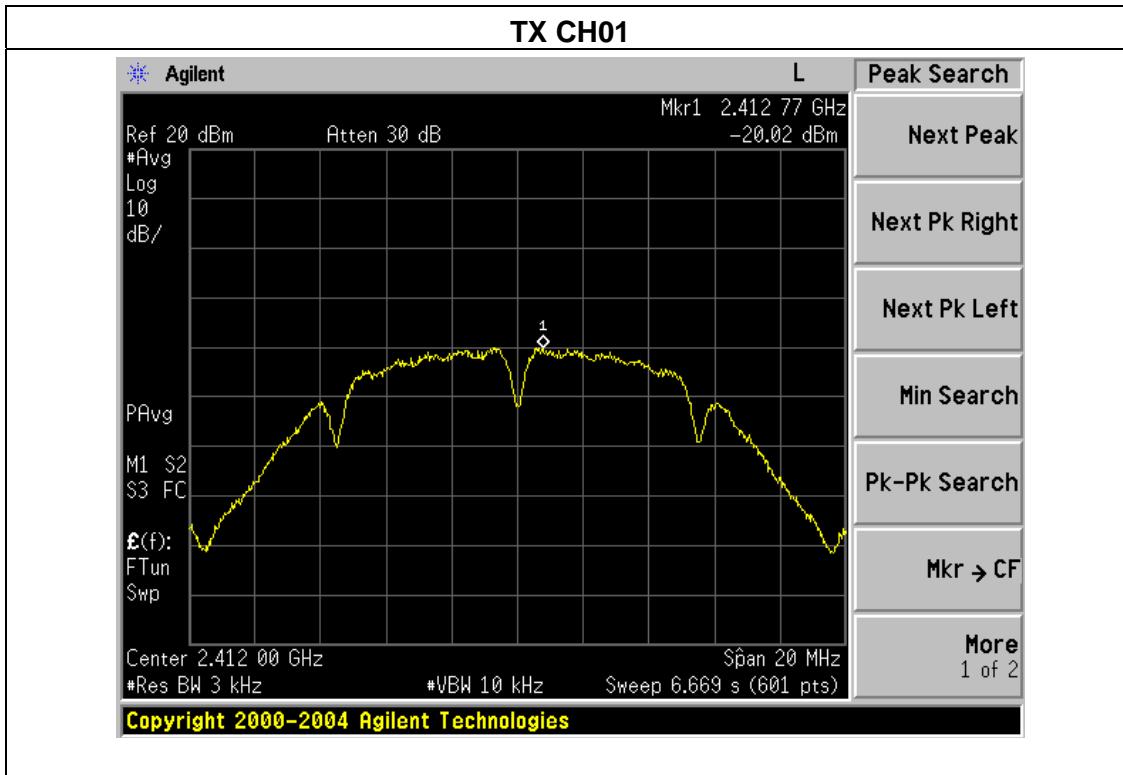
4.1.4 EUT OPERATION CONDITIONS

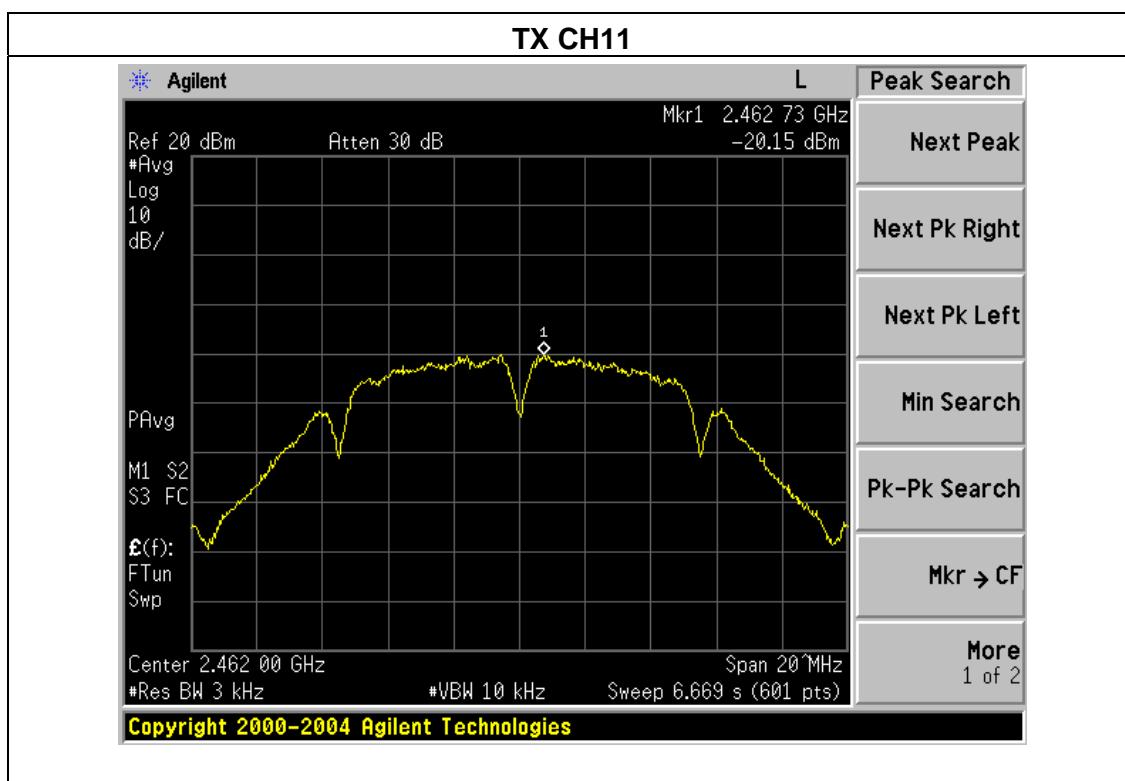
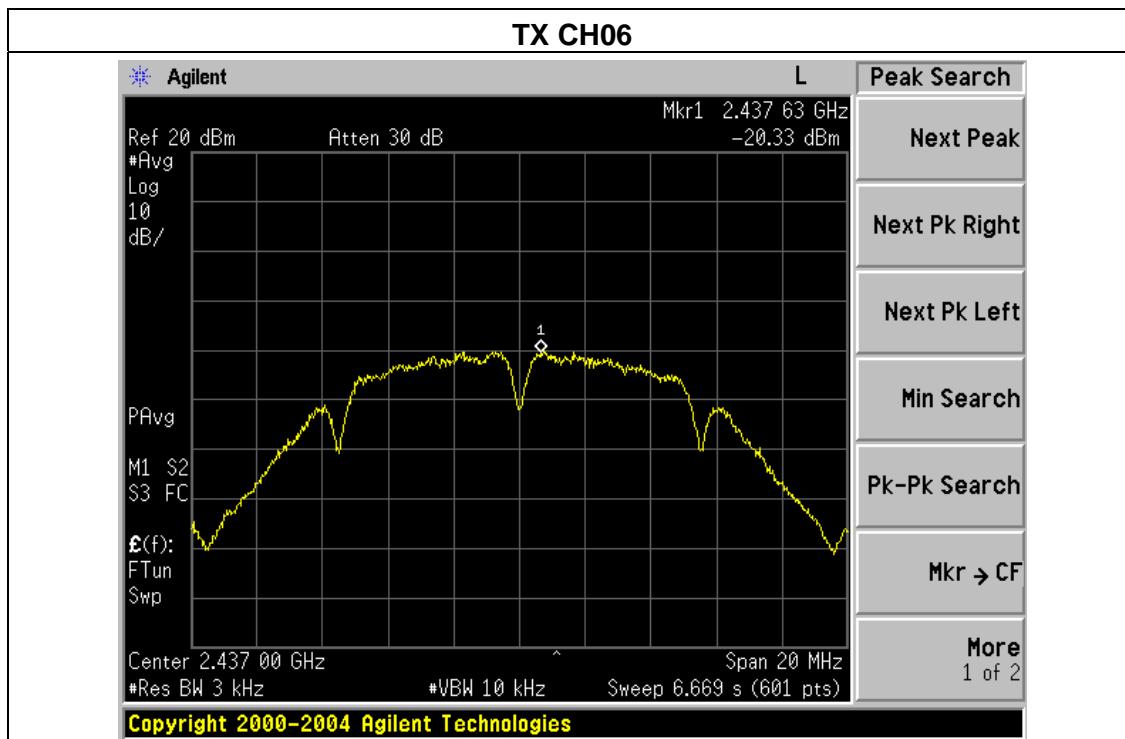
The EUT tested system was configured as the statements of 2.1 Unless otherwise a special operating condition is specified in the follows during the testing.

4.1.5 TEST RESULTS

EUT :	Wi-Fi Smart Plug	Model Name :	HF-SP25
Temperature :	25 °C	Relative Humidity :	60%
Pressure :	1015 hPa	Test Voltage :	AC 120V
Test Mode :	TX b Mode /CH01, CH06, CH11		

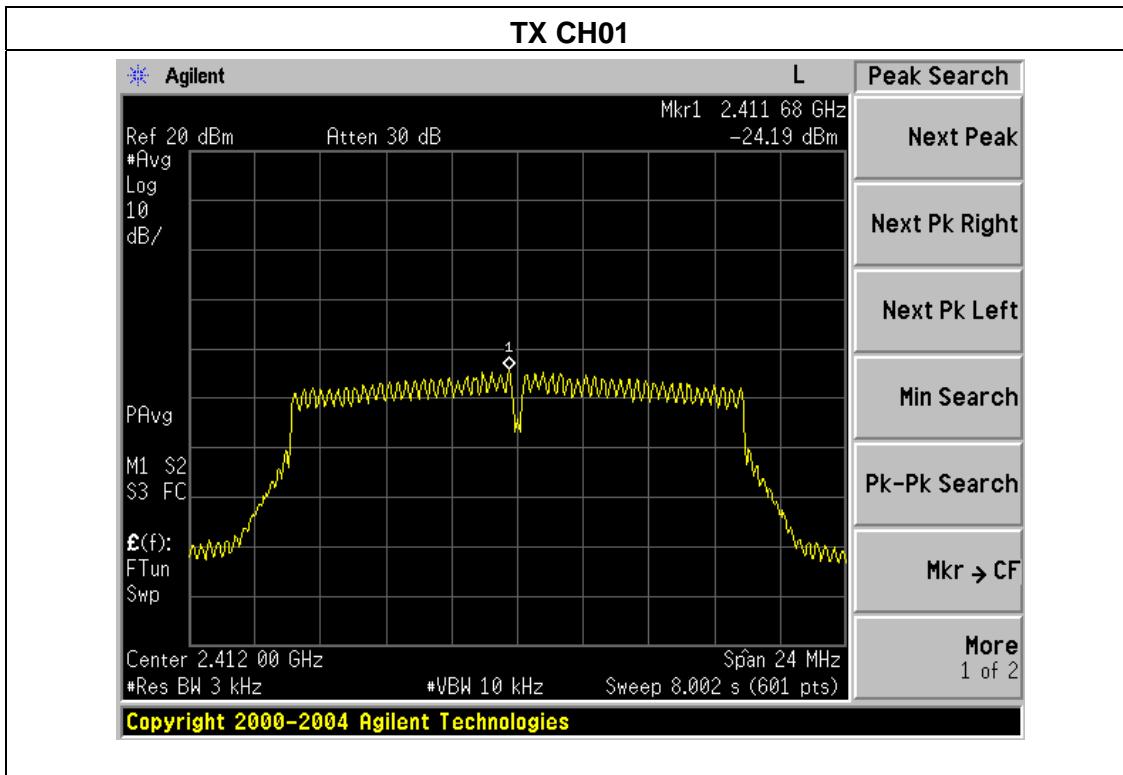
Frequency	Power Density (dBm)	Limit (dBm)	Result
2412 MHz	-20.02	8	PASS
2437 MHz	-20.33	8	PASS
2462 MHz	-20.15	8	PASS

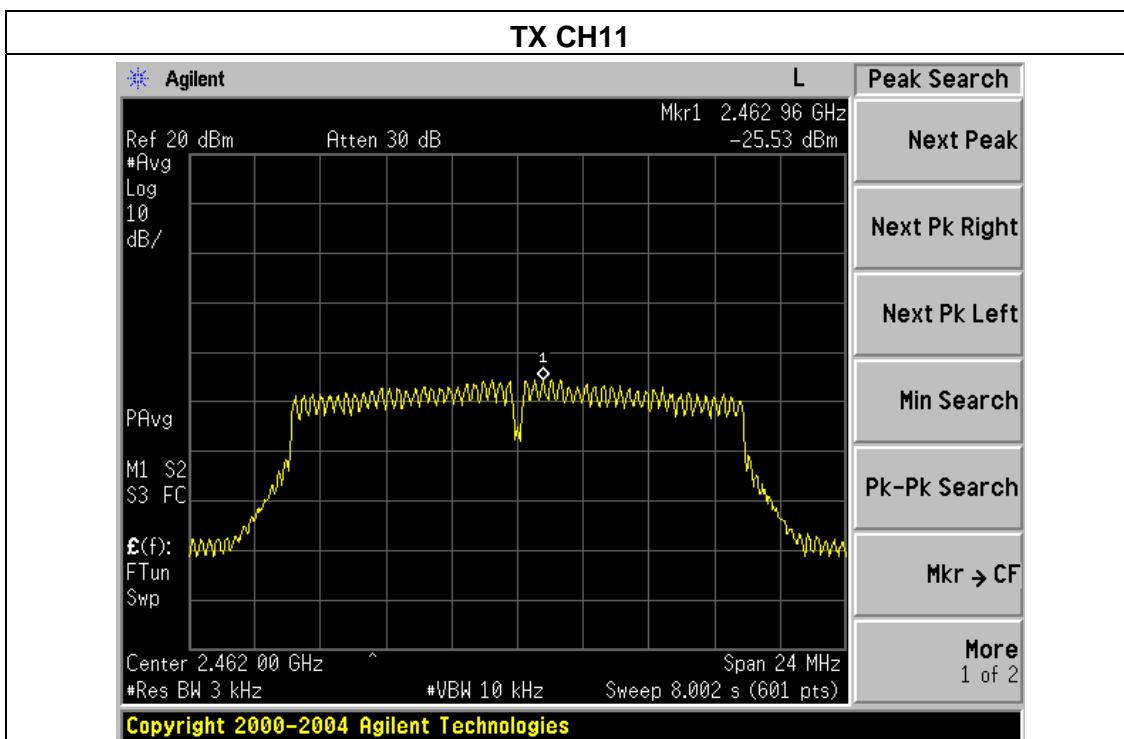
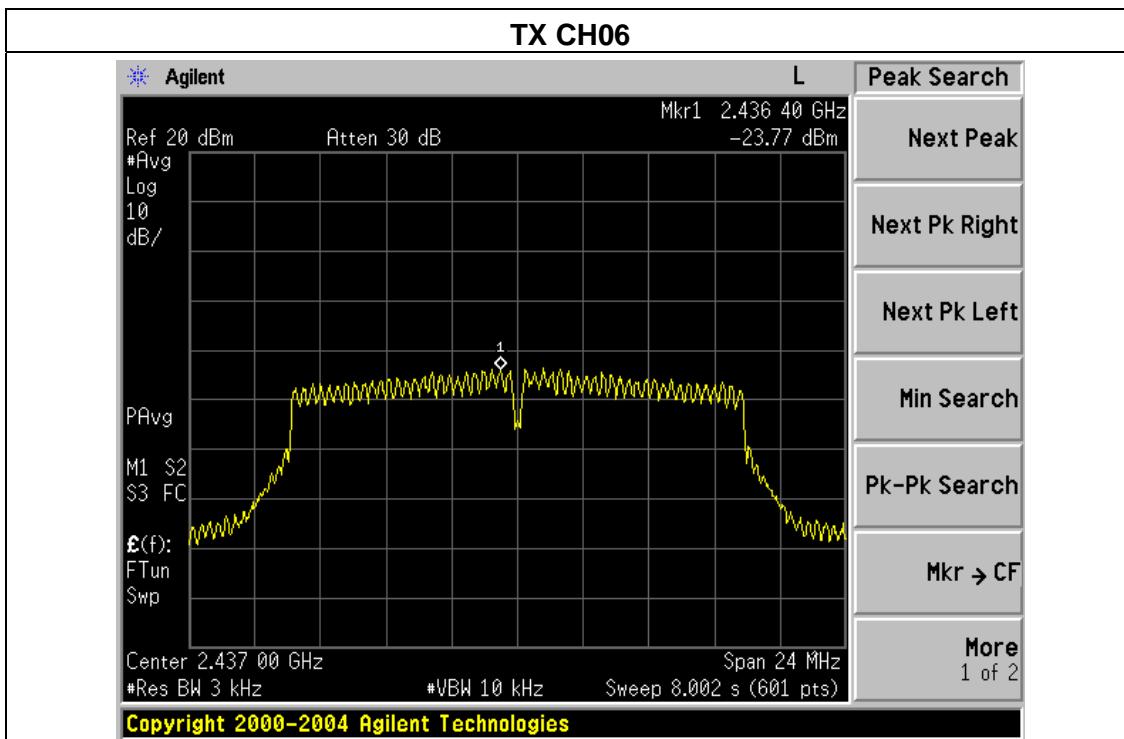




EUT :	Wi-Fi Smart Plug	Model Name :	HF-SP25
Temperature :	25 °C	Relative Humidity :	60%
Pressure :	1015 hPa	Test Voltage :	AC 120V
Test Mode :	TX g Mode /CH01, CH06, CH11		

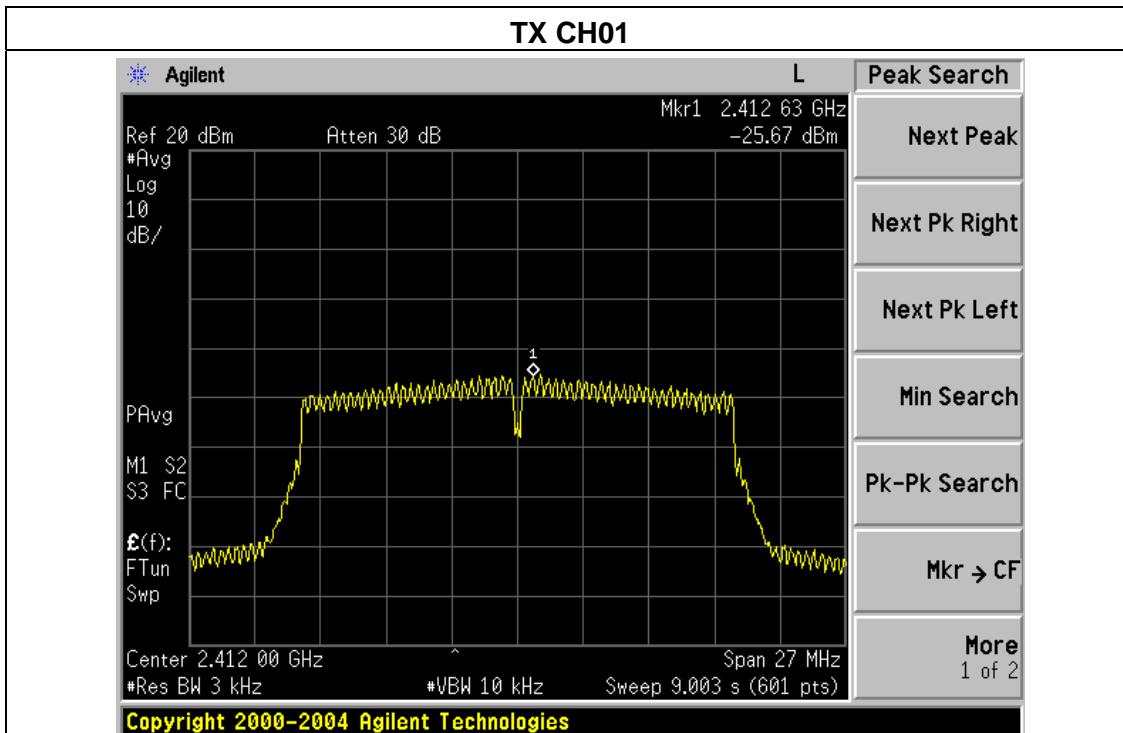
Frequency	Power Density (dBm)	Limit (dBm)	Result
2412 MHz	-24.19	8	PASS
2437 MHz	-23.77	8	PASS
2462 MHz	-25.53	8	PASS

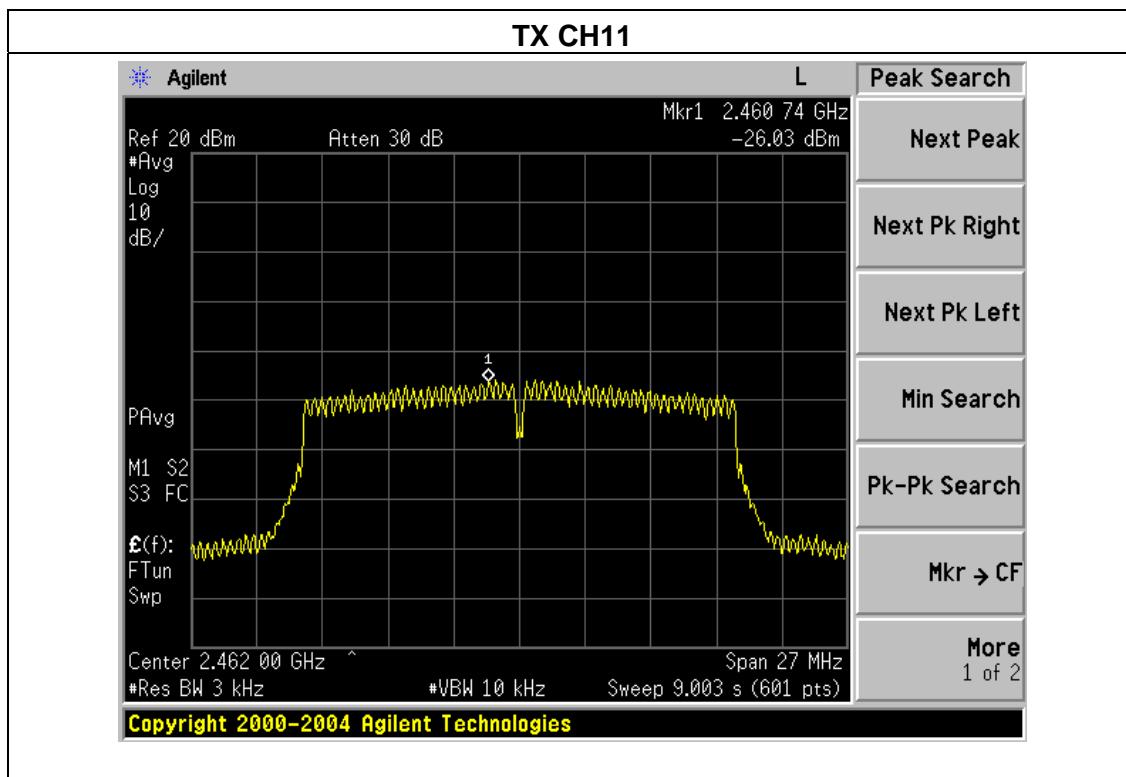
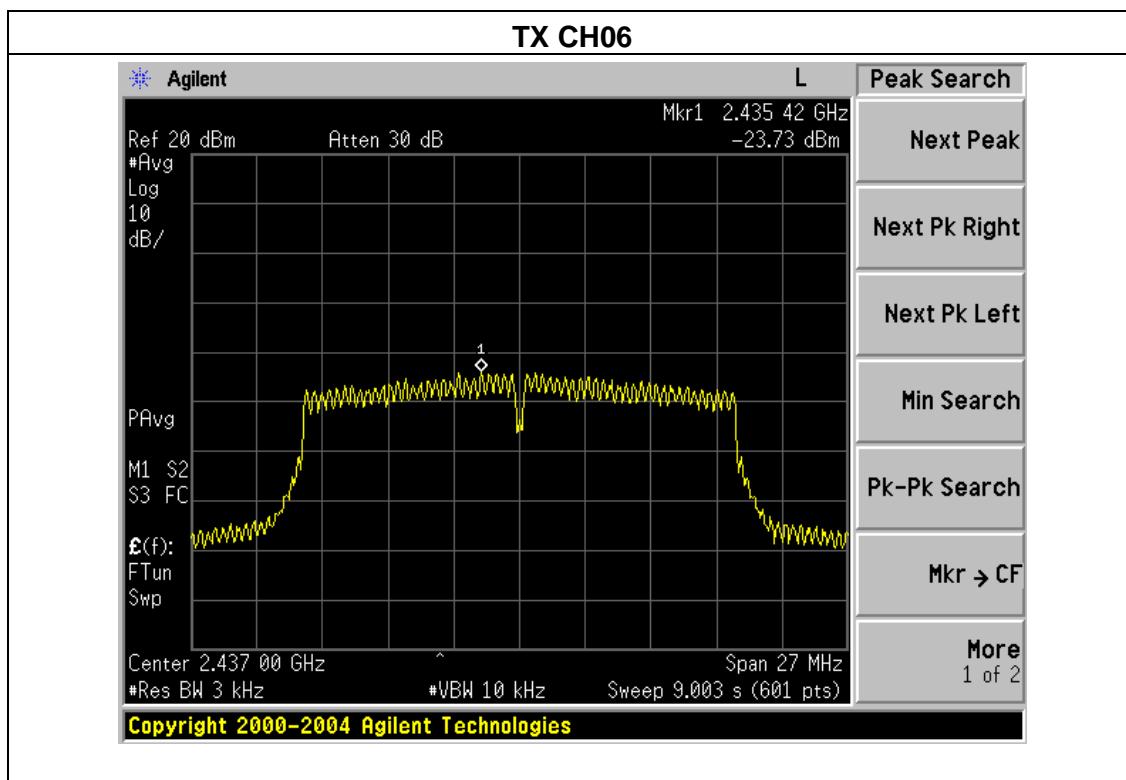




EUT :	Wi-Fi Smart Plug	Model Name :	HF-SP25
Temperature :	25 °C	Relative Humidity :	60%
Pressure :	1015 hPa	Test Voltage :	AC 120V
Test Mode :	TX n(20) Mode /CH01, CH06, CH11		

Frequency	Power Density (dBm)	Limit (dBm)	Result
2412 MHz	-25.67	8	PASS
2437 MHz	-23.73	8	PASS
2462 MHz	-26.03	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	>= 500KHz (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



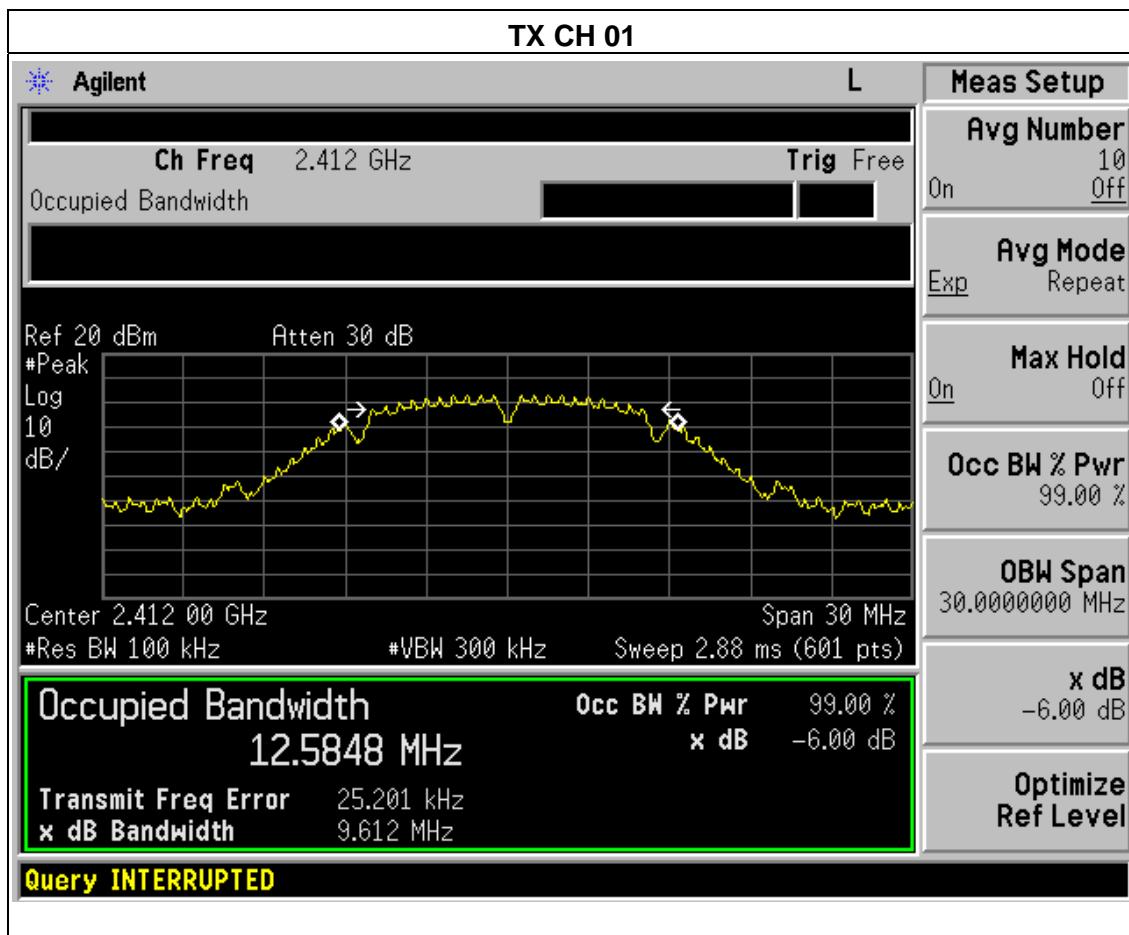
5.1.4 EUT OPERATION CONDITIONS

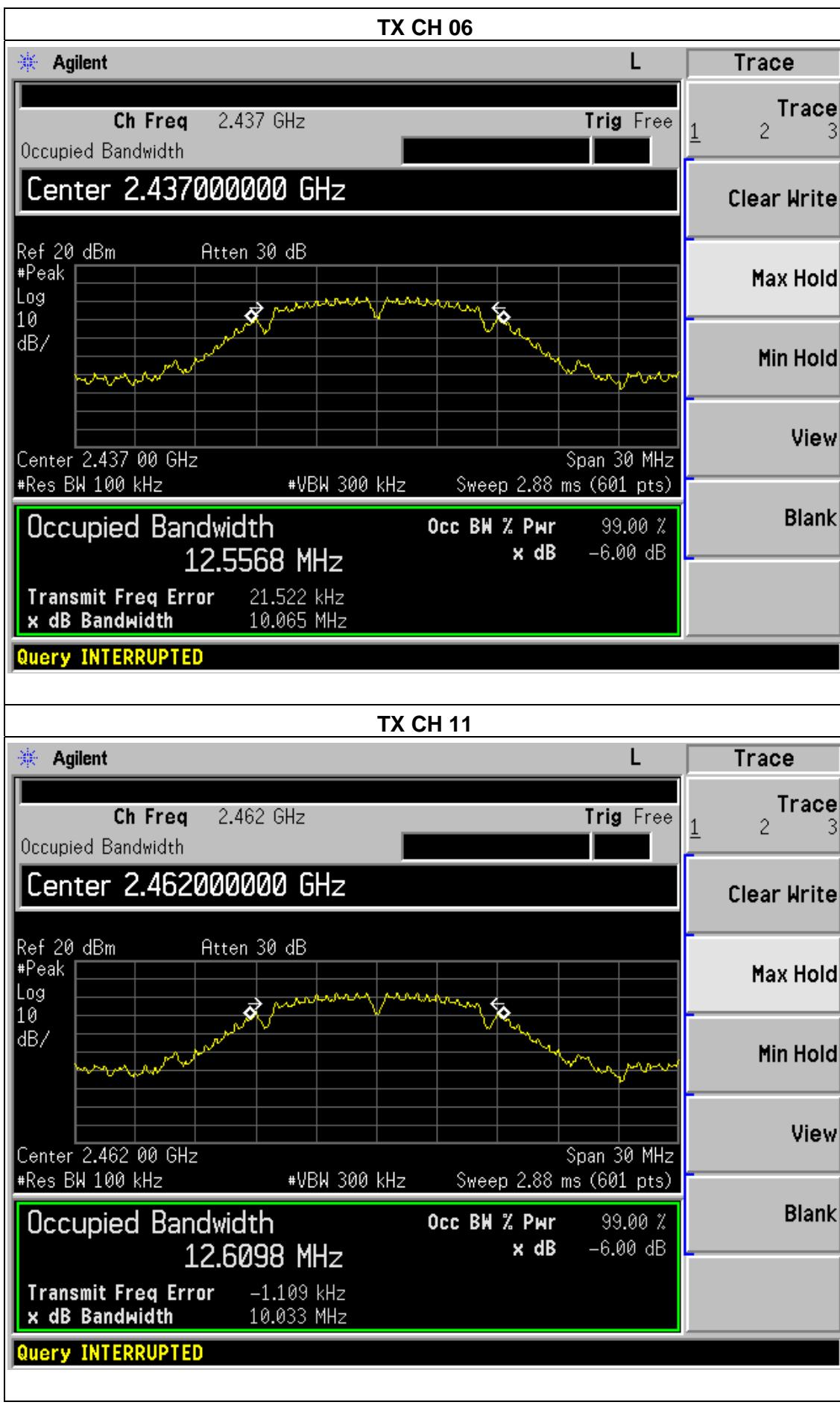
The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

5.1.5 TEST RESULTS

EUT :	Wi-Fi Smart Plug	Model Name :	HF-SP25
Temperature :	25 °C	Relative Humidity :	60%
Pressure :	1012 hPa	Test Voltage :	AC 120V
Test Mode :	TX b Mode /CH01, CH06, CH11		

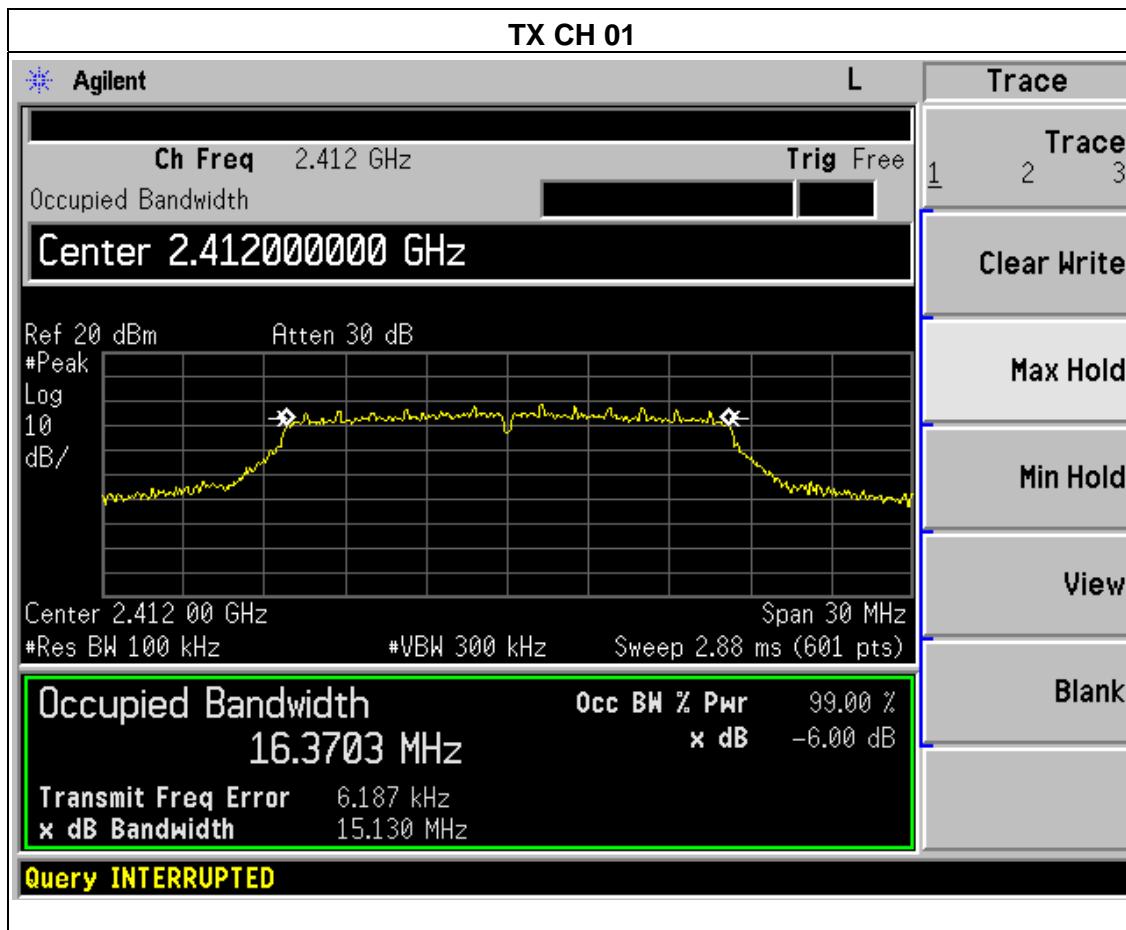
Channel	Frequency (MHz)	6dB bandwidth (MHz)	Limit (kHz)	Result
Low	2412	9.612	500	Pass
Middle	2437	10.065	500	Pass
High	2462	10.033	500	Pass

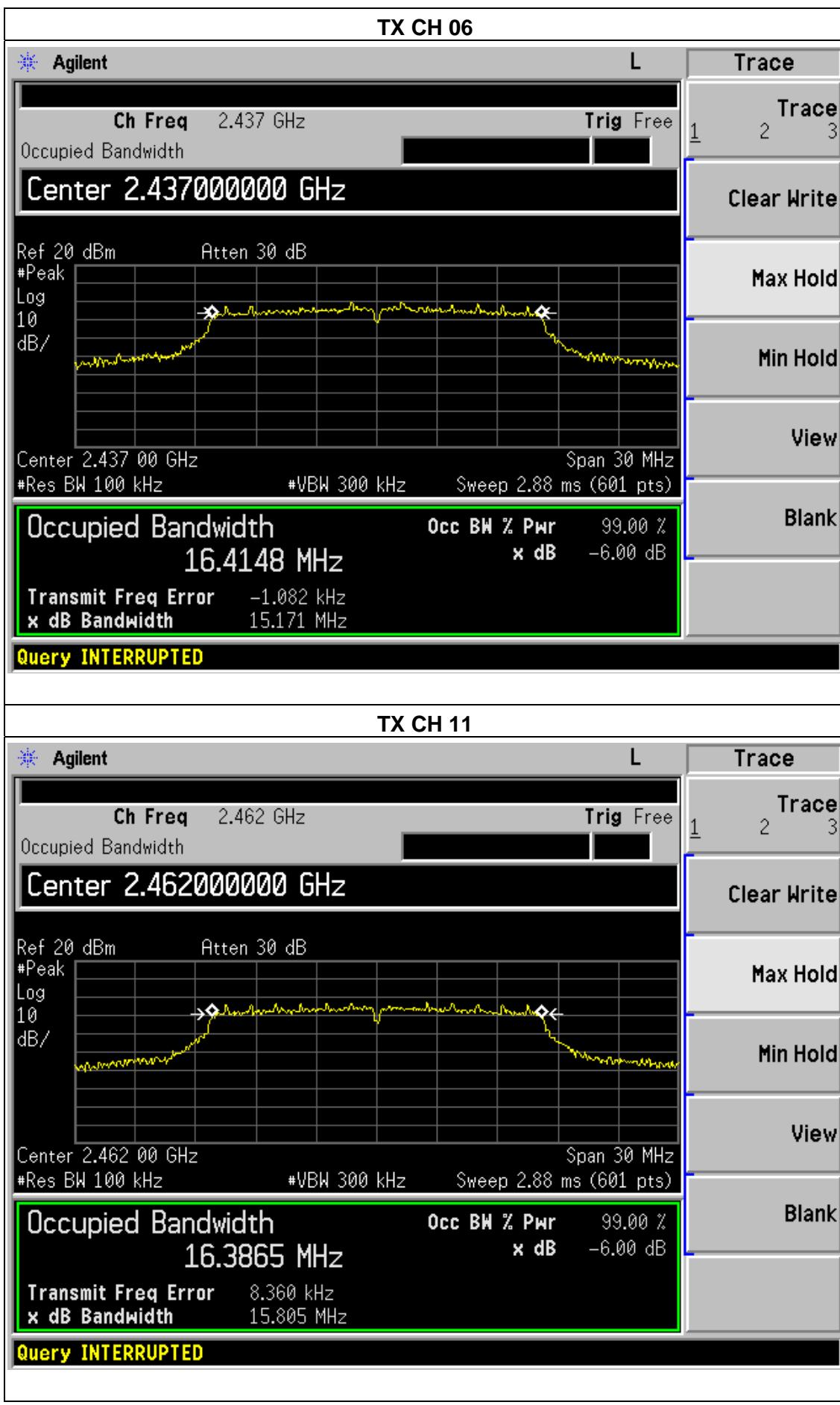




EUT :	Wi-Fi Smart Plug	Model Name :	HF-SP25
Temperature :	25 °C	Relative Humidity :	60%
Pressure :	1012 hPa	Test Voltage :	AC 120V
Test Mode :	TX g Mode /CH01, CH06, CH11		

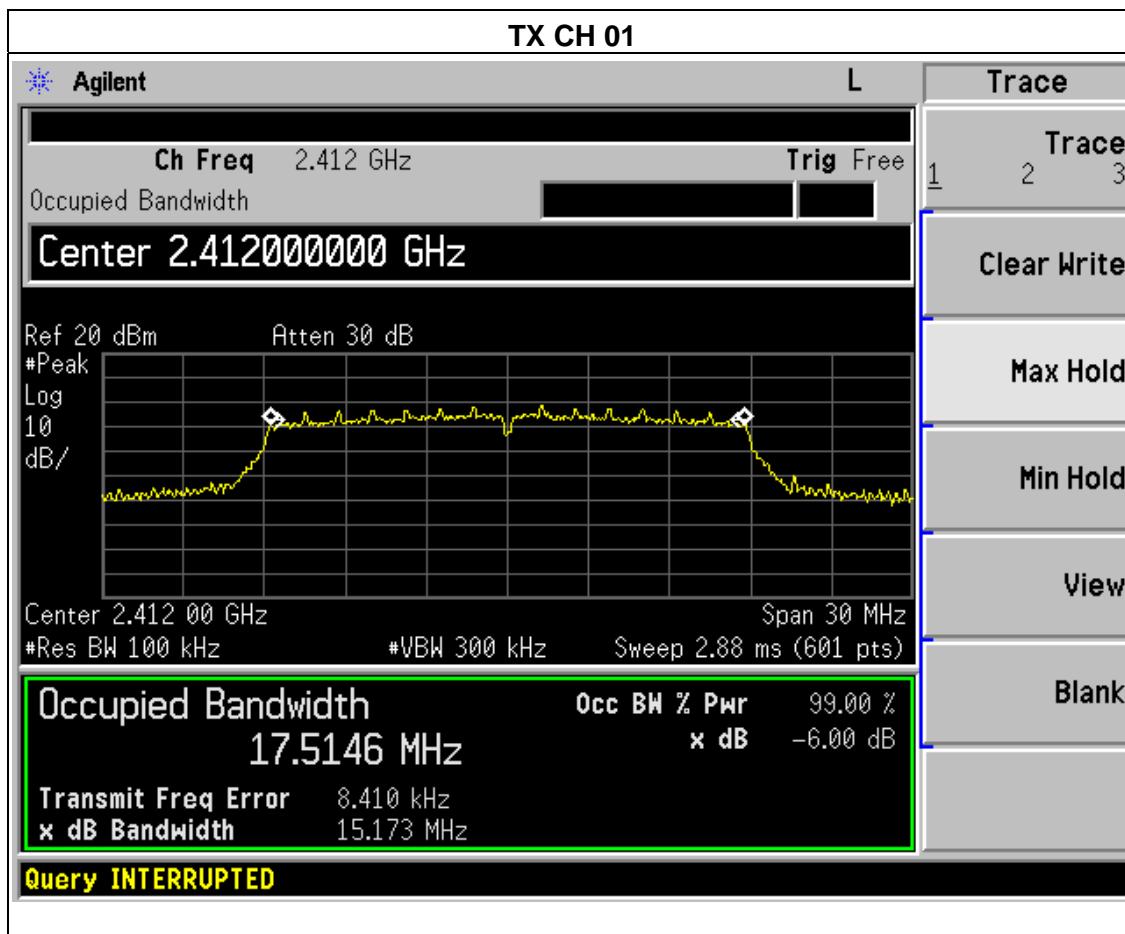
Channel	Frequency (MHz)	6dB bandwidth (MHz)	Limit (kHz)	Result
Low	2412	15.130	500	Pass
Middle	2437	15.171	500	Pass
High	2462	15.805	500	Pass

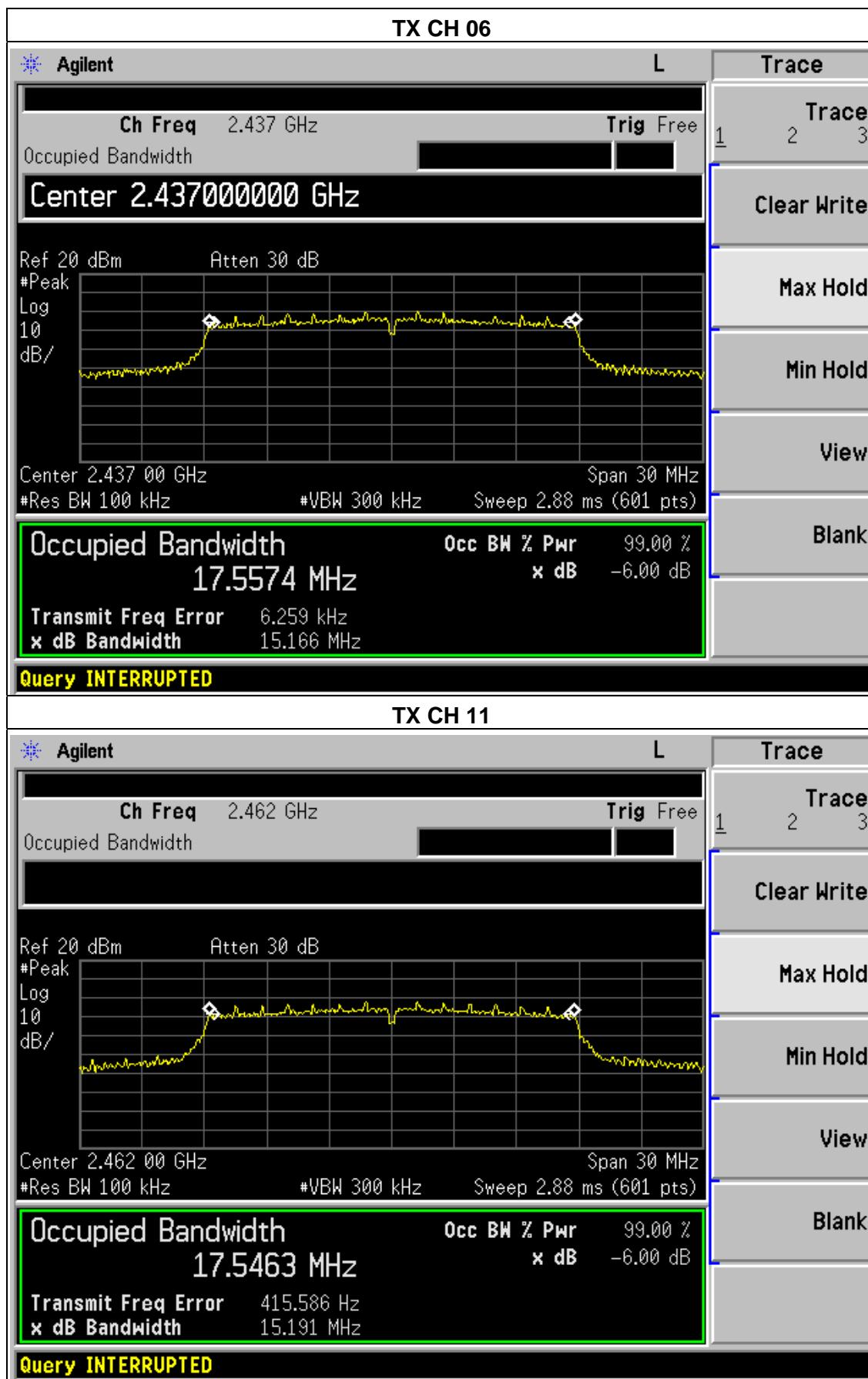




EUT :	Wi-Fi Smart Plug	Model Name :	HF-SP25
Temperature :	25 °C	Relative Humidity :	60%
Pressure :	1012 hPa	Test Voltage :	AC 120V
Test Mode :	TX n(20) Mode /CH01, CH06, CH11		

Channel	Frequency (MHz)	6dB bandwidth (MHz)	Limit (kHz)	Result
Low	2412	15.173	500	Pass
Middle	2437	15.166	500	Pass
High	2462	15.191	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

- 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 Smart Plug	Model Name :	HF-SP25
Temperature :	25 °C	Relative Humidity :	60%
Pressure :	1012 hPa	Test Voltage :	AC 120V
Test Mode :	TX b/g/n Mode /CH01, CH06, CH11		

TX 802.11b Mode			
Test Channel	Frequency	Maximum Conducted Output Power(PK)	LIMIT
	(MHz)	(dBm)	dBm
CH01	2412	12.21	30
CH06	2437	12.41	30
CH11	2462	12.67	30

TX 802.11g Mode			
CH01	2412	10.31	30
CH06	2437	10.13	30
CH11	2462	10.09	30

TX 802.11n Mode			
CH01	2412	9.22	30
CH06	2437	9.18	30
CH11	2462	9.11	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

- a) Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- b) 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.
- c) 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.
- d) 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.
- e) 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.

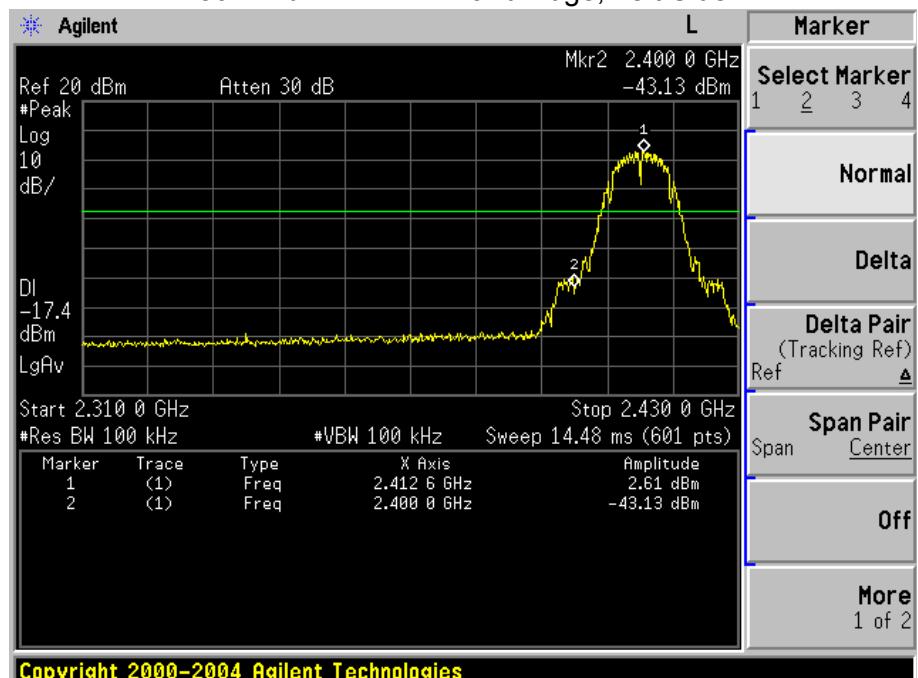
7.4 TEST RESULTS

EUT :	Wi-Fi Smart Plug	Model Name :	HF-SP25
Temperature :	25 °C	Relative Humidity :	60%
Pressure :	1012 hPa	Test Voltage :	AC 120V

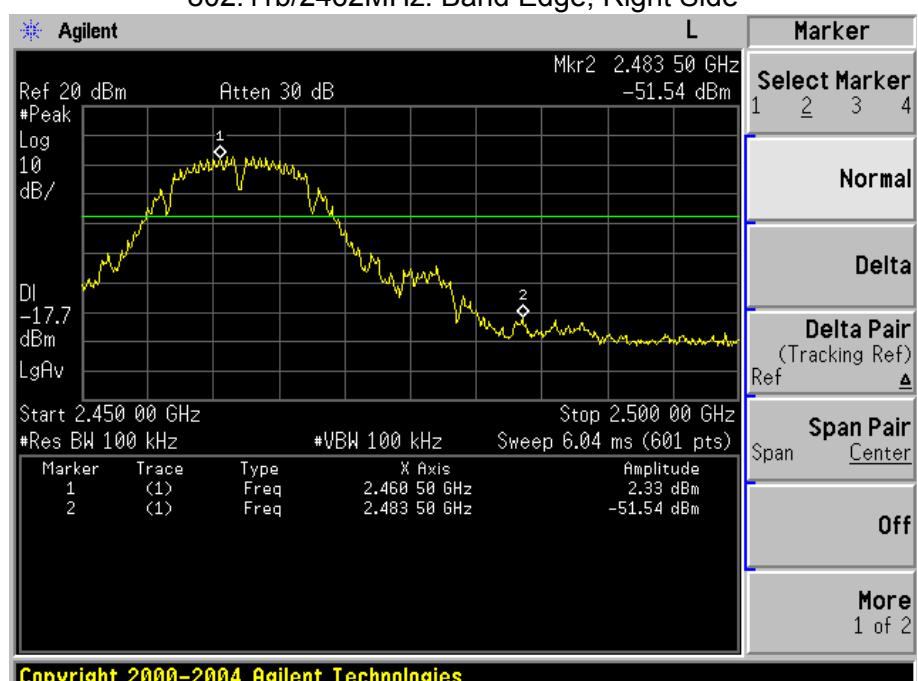
Frequency Band	Delta Peak to band emission (dBc)	>Limit (dBc)	Result
802.11b mode			
Left-band	45.74	20	Pass
Right-band	53.87	20	Pass
802.11g mode			
Left-band	33.31	20	Pass
Right-band	45.06	20	Pass
802.11n mode			
Left-band	33.11	20	Pass
Right-band	42.82	20	Pass

BAND EDGE (CONDUCTED)

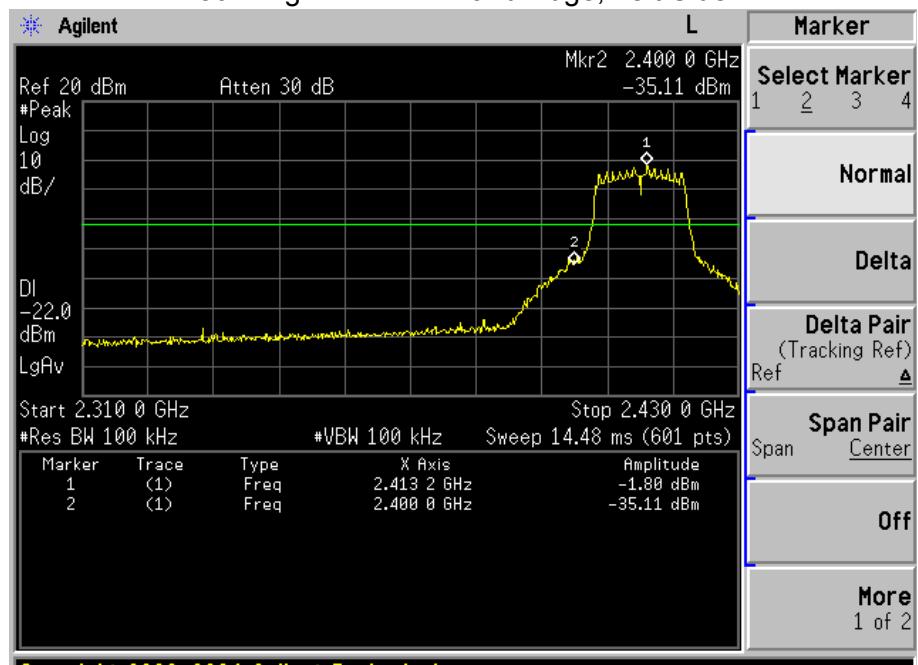
802.11b/2412MHz: Band Edge, Left Side



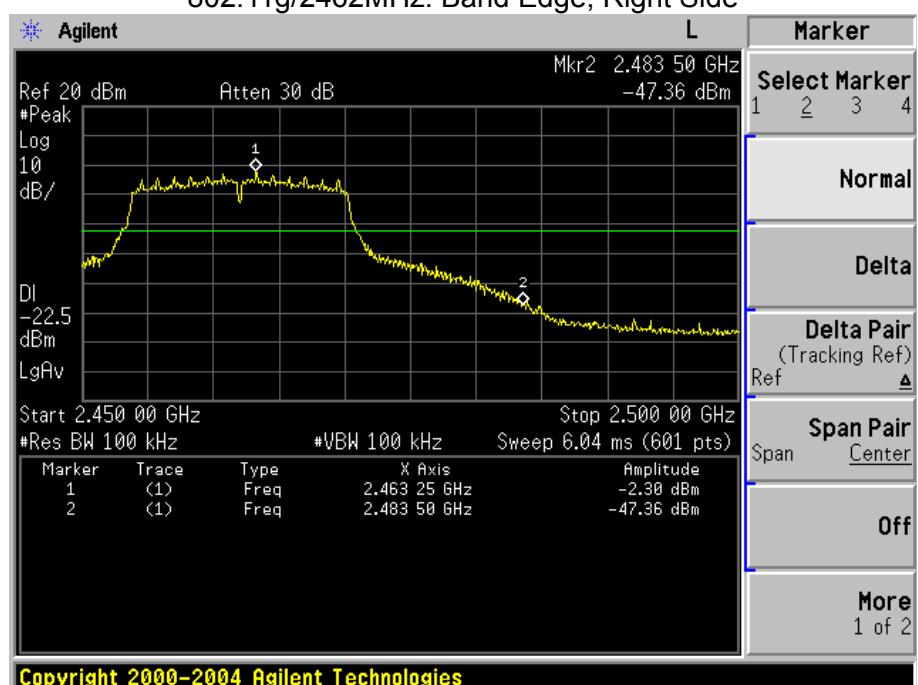
802.11b/2462MHz: Band Edge, Right Side



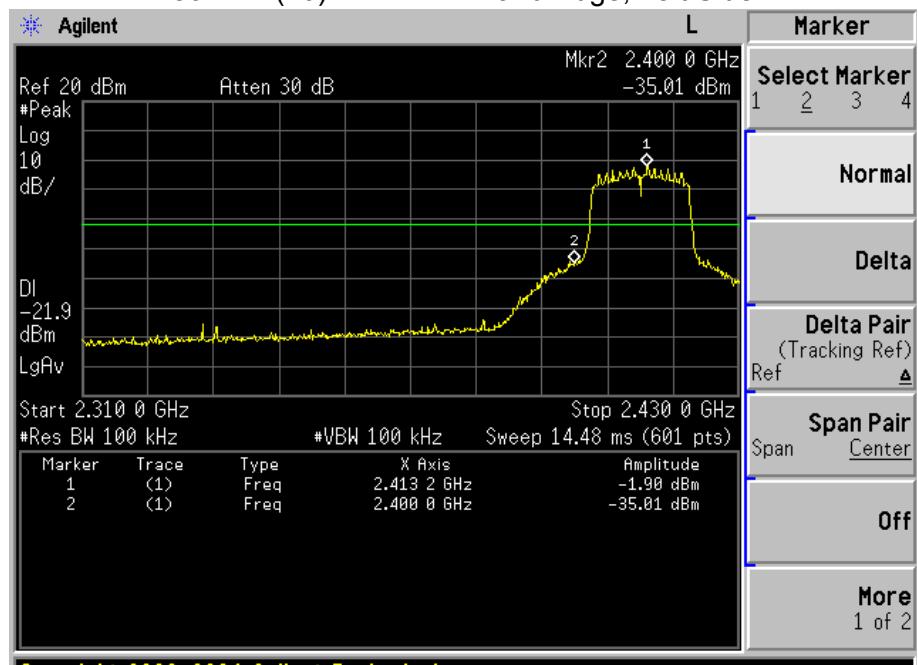
802.11g/2412MHz: Band Edge, Left Side



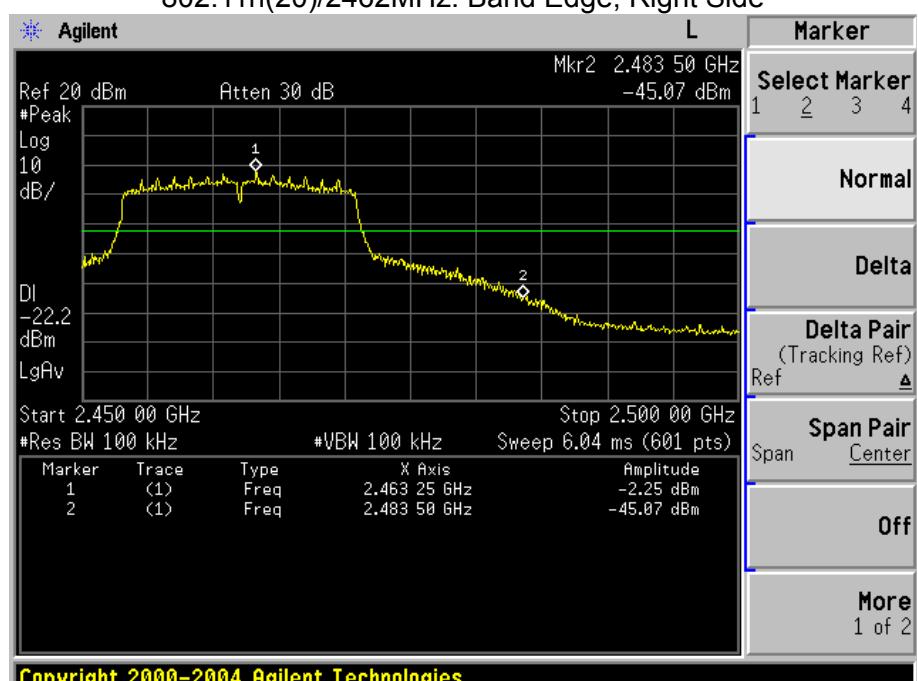
802.11g/2462MHz: Band Edge, Right Side



802.11n(20)/2412MHz: Band Edge, Left Side



802.11n(20)/2462MHz: Band Edge, Right Side



8. ANTENNA REQUIREMENT

8.1 STANDARD REQUIREMENT

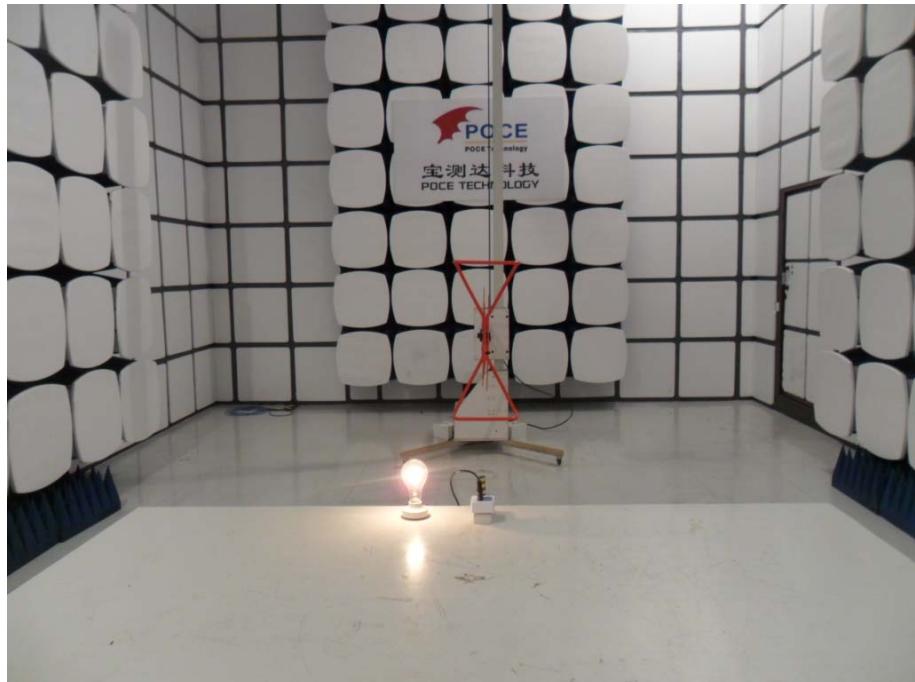
15.203 requirement: For intentional device, according to 15.203: an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

8.2 EUT ANTENNA

The EUT antenna is PCB antenna. It comply with the standard requirement.

9. EUT TEST PHOTO

Radiated Measurement Photos



Conducted Measurement Photos

