



FCC RF TEST REPORT

REPORT NO.: SEFC1703322

MODEL NO.: FSP-301B, FSP-311B, FSP-321B

RECEIVED: Apr. 01, 2017

ISSUED: Apr.07, 2017

APPLICANT: The Watt Stopper, Inc.

ADDRESS: 2700 Zanker Road Suite 168 San Jose California
United States 95134

MANUFACTURER: Shanghai Legrand Electrical co.,Ltd

ADDRESS: 5/F, Building 2, No.508 Chundong Road, Minghang
District, Shanghai, China

ISSUED BY: BUREAU VERITAS ADT (Shanghai) Corporation

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FCC ID: Q4B-FSP-3X1

History of this Test Report

Report No.	Version	Issue Date	Description
SEFC1703322	Rev 01	Apr.07, 2017	Original.



1.CERTIFICATION

PRODUCT: PIR fixture integrated sensor
MODEL NO.: FSP-301B, FSP-311B, FSP-321B
APPLICANT: The Watt Stopper, Inc.
MANUFACTURER: Shanghai Legrand Electrical co.,Ltd
TESTED: Apr. 01, 2017~ Apr. 06, 2017
STANDARDS: FCC Part 15: 2015, Subpart C

PREPARED BY : Bing Ye, **DATE:** Apr.07, 2017

Bing YE
Testing Engineer

**TECHNICAL
ACCEPTANCE :** Joy zhu, **DATE:** Apr.07, 2017

Joy ZHU
Testing Manager

APPROVED BY : Yzhu, **DATE:** Apr.07, 2017

Zhaoqian YU
Lab Manager

2. Report of Measurements and Examinations

Reference STD		Description of Test	Compliance results
1	FCC Rules §15.207(a);	AC Conducted Emission	PASS
2	FCC Rules §15.209(a)	Radiated Emission	PASS
3	FCC Rules §15.247(a)(2);	6dB Bandwidth	PASS
4	FCC Rules §15.247(b)(3);	Output Power	PASS
5	FCC Rules §15.247(e)	Power Spectral Density	PASS
6	FCC Rules §15.247(d)	Conducted Band Edge and Out-of-Band Emissions	PASS
7	FCC Rules §15.247(d);	Radiated Emission Band Edges	PASS

3. General Inf

3.1 Description of wireless module

BT Module	BlueNRG-MS
BT Specification	Version 4.1
Spreading	V4.1: GFSK
Frequency Range	2402~2480MHz
Number of Channels	V4.1: 40
Data Rate	V4.1: 1Mbps(GFSK)
BT Channel Separation	V4.1: 2MHz
Antenna Type	See antenna requirement

Note: For more details, please refer to the EUT User manual.

3.2 Description of Antenna

Antenna	Peak Gain
SMD Chip Antenna	2dBi for 2.40~2.50GHz band

3.3 Carrier Frequency of Channels

Bluetooth Working Frequency of Each Channel: (For V4.1)							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
00	2402 MHz	01	2404 MHz	02	2406 MHz	03	2408 MHz
04	2410 MHz	05	2412 MHz	06	2414 MHz	07	2416 MHz
08	2418 MHz	09	2420 MHz	10	2422 MHz	11	2424 MHz
12	2426 MHz	13	2428 MHz	14	2430 MHz	15	2432 MHz
16	2434 MHz	17	2436 MHz	18	2438 MHz	19	2440 MHz
20	2442 MHz	21	2444 MHz	22	2446 MHz	23	2448 MHz
24	2450 MHz	25	2452 MHz	26	2454 MHz	27	2456 MHz
28	2458 MHz	29	2460 MHz	30	2462 MHz	31	2464 MHz
32	2466 MHz	33	2468 MHz	34	2470 MHz	35	2472 MHz
36	2474 MHz	37	2476 MHz	38	2478 MHz	39	2480 MHz

3.4 EUT Exercise Software

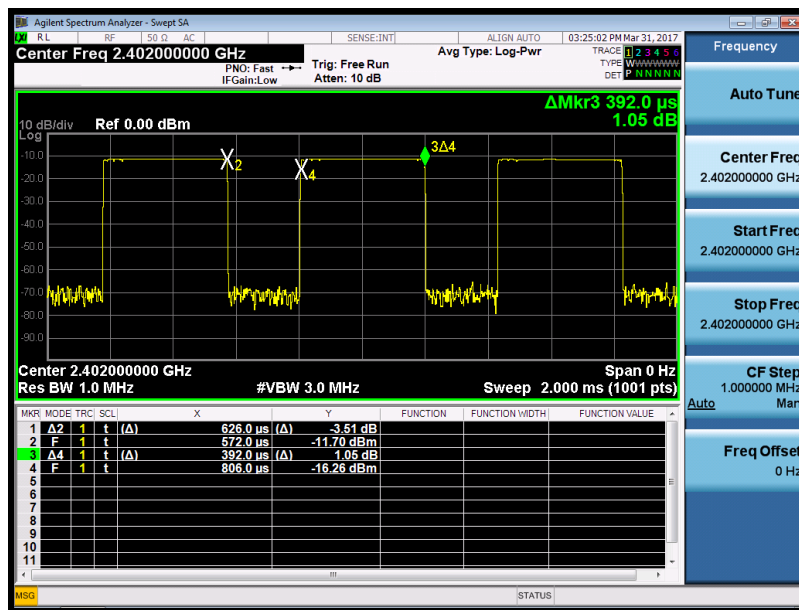
1	Turn on the power of equipment.
2	Set the test mode and channel, then press OK to start continue transmit.

3.5 Duty cycle

Test Item	Duty cycle
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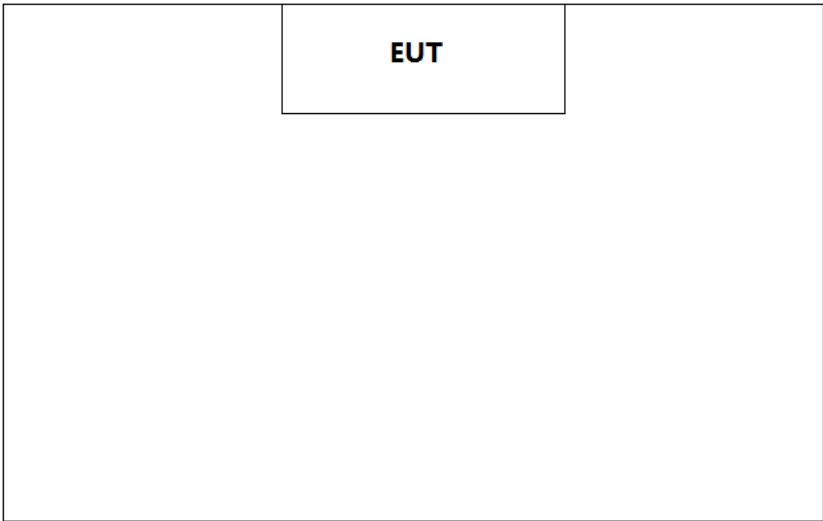
Mode	Frequency (MHz)	Measurement (%)
BLE	2440	62.6

BLE (2440MHz)



3.6 Support equipment

No	Device	Manufacturer	Model No.	Description
1	N/A	N/A	N/A	N/A

Connection Diagram	
	
Signal Cable Type	Signal cable Description
A	N/A
B	
C	

4. General Information of Test Site

4.1 Information of Test Site

Test Site	Cerpass Technology(Suzhou) Co., Ltd.
Test Site Location	No.66,Tangzhuang Road, Suzhou Industrial Park, Jiangsu 215006, China
NVLAP LAB Code	200814-0
FCC Registration Number	916572, 331395
IC Registration Number	7290A-1, 7290A-2
VCCI Registration Number	T-1945 for Telecommunication Test C-2919 for Conducted emission test R-2670 for Radiated emission test below 1GHz G-227 for Radiated emission test above 1GHz

4.2 Measuring Equipment

RF Conducted Measuring Equipment-AC104					
Instrument/Ancillary	Manufacturer	Model No.	Serial No.	Calibration Date	Valid Date.
Peak Power Sensor	Boonton	55006	9778	2016.06.08	2017.06.07
Series Power Meter	ANRITSU	ML2495A	1224005	2017.03.27	2018.03.26
Spectrum Analyzer	N9010A	Agilent	MY53400169	2016.11.11	2017.11.11
Spectrum Analyzer	E4407B	Agilent	MY44211883	2016.10.15	2017.10.14
Temperature/Humidity Meter	Zhicheng	ZC1-11	CEP-TH-003	2017.03.31	2018.03.30

AC Conducted Emission Measuring Equipment-SR101					
Instrument/Ancillary	Manufacturer	Model No.	Serial No.	Calibration Date	Valid Date.
EZ-EMC	Fala	Ver CT3A1	N/A	N/A	N/A
EMI Test Receiver	R&S	ESCI	100565	2017.03.26	2018.03.25
Artificial-Mains-Network	R&S	ESH2-Z5	100182	2016.08.31	2017.08.30
Line Impedance Stabilization Network	FCC	FCC-LISN-50-200-2-02	112087	2016.08.31	2017.08.30
Temperature/Humidity Meter	Zhicheng	ZC1-11	CEP-TH-004	2017.03.29	2018.03.28

Radiated Measuring Equipment-AC102					
Instrument/Ancillary	Manufacturer	Model No.	Serial No.	Calibration Date	Valid Date.
Loop Antenna	R&S	HFH2-Z2	100150	2016.08.31	2017.08.30
Bilog Antenna	Sunol Science	JB1	A072414-1	2016.04.16	2017.04.15
Broad-Band Horn Antenna	Schwarzbeck	BBHA9120D	9120D-619	2016.07.16	2017.07.15
Broad-Band Horn Antenna	Schwarzbeck	BBHA9170	9170-348	2016.05.07	2017.05.06
Preamplifier	HP	8447F	3113A05582	2017.03.26	2018.03.25
Preamplifier	EMCI	EMC-051835	980085	2016.09.06	2017.09.05
Preamplifier	COM-POWER	PA-840	711885	2017.03.26	2018.03.25
EMI Test Receiver	R&S	ESCI-3	101183	2016.06.29	2017.06.28
Spectrum Analyzer	N9010A	Agilent	MY53400169	2016.11.11	2017.11.11
Spectrum Analyzer	R&S	FS040	100324	2017.03.26	2018.03.25
Temperature/ Humidity Meter	Zhicheng	ZC1-11	CEP-TH-002	2017.03.31	2018.03.30

4.3 Measurement Uncertainty

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor (k=2)).

RF Conducted Measurement

Test Item		Uncertainty	Limit
Radio Frequency		$\pm 8.7 \times 10^{-7}$	$\pm 1 \times 10^{-5}$
RF output power, conducted		$\pm 0.63\text{dB}$	$\pm 1.5\text{dB}$
Power density, conducted		$\pm 1.21\text{dB}$	$\pm 3\text{dB}$
Unwanted emissions, conducted	30-1000MHz	$\pm 0.51\text{dB}$	$\pm 3\text{dB}$
	1-12.75GHz	$\pm 0.67\text{dB}$	$\pm 3\text{dB}$
All emissions, radiated	30-1000MHz	$\pm 2.28\text{dB}$	$\pm 6\text{dB}$
	1-12.75GHz	$\pm 2.59\text{dB}$	$\pm 6\text{dB}$
Temperature		$\pm 0.8^\circ\text{C}$	$\pm 1^\circ\text{C}$
Humidity		$\pm 3\%$	$\pm 5\%$
DC and low frequency voltages		$\pm 3\%$	$\pm 3\%$

AC Conducted Measurement

Measurement	Frequency	Uncertainty
Conducted emissions(LINE)	9KHz-30MHz	+/- 0.7738 dB
Conducted emissions(NEUTRAL)	9KHz-30MHz	+/- 0.7886 dB
Conducted emissions(10Mbps)	150KHz-30MHz	+/- 1.3013dB
Conducted emissions(100Mbps)	150KHz-30MHz	+/- 1.3197 dB
Conducted emissions(1000Mbps)	150KHz-30MHz	+/- 1.2987 dB

Radiated Measurement

Measurement	Polarity	Frequency	Uncertainty
Radiated emissions	Horizontal	below 1GHz	+/- 3.8936 dB
	Vertical	below 1GHz	+/- 3.8928 dB
	Horizontal	above 1GHz	+/- 5.18858dB
	Vertical	above 1GHz	+/- 5.18928 dB

5. AC Conducted Emission Measurement

5.1 Test Limit

Conducted Emissions were measured from 150 kHz to 30 MHz with a bandwidth of 9 KHz on the 120 VAC power and return leads of the EUT according to the methods defined in ANSI C63.10-2013 Section 6.2. The EUT was placed on a nonmetallic stand in a shielded room 0.8 meters above the ground plane as shown in section 6.2.2. The interface cables and equipment positioning were varied within limits of reasonable applications to determine the position produced maximum conducted emissions.

Frequency (MHz)	Quasi Peak (dB μ V)	Average (dB μ V)
0.15 – 0.5	66-56*	56-46*
0.5 – 5.0	56	46
5.0 – 30.0	60	50

*Decreases with the logarithm of the frequency.

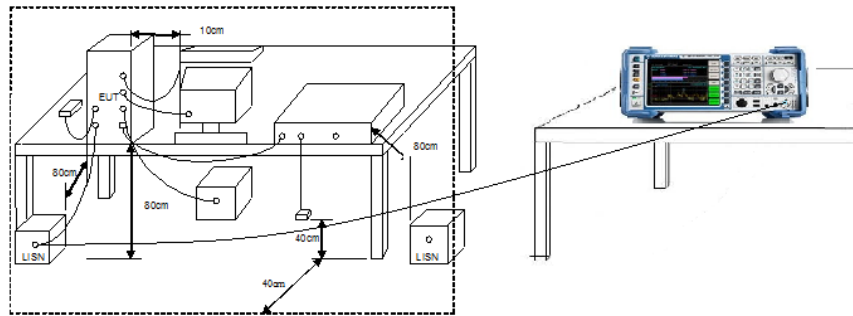
5.2 Test Standard

ANSI C63.10-2013 Section 6.2.

5.3 Test Procedures

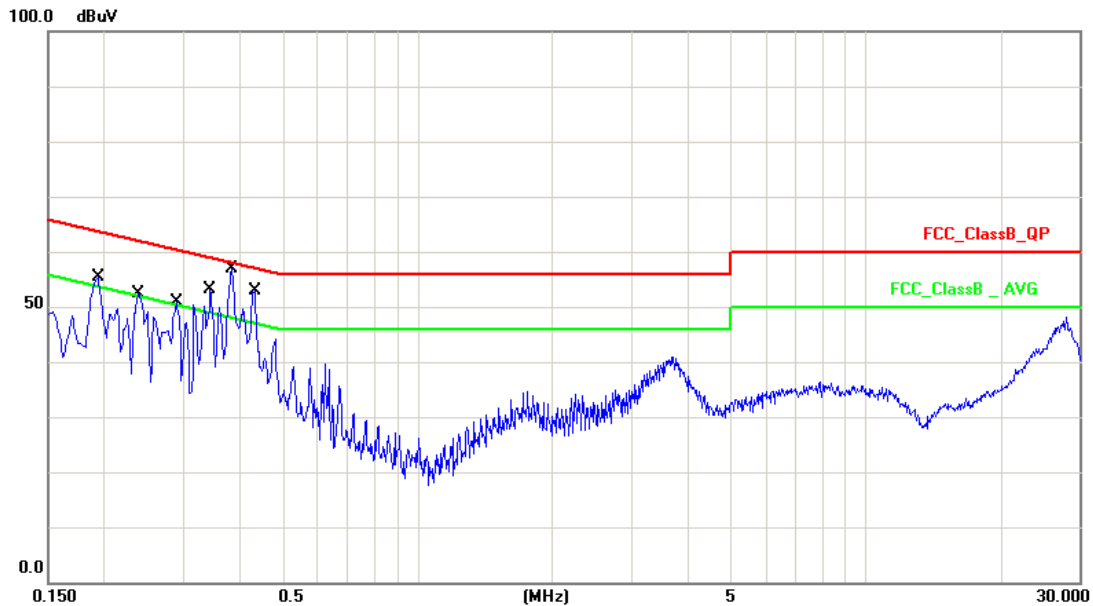
- The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
- Connect EUT to the power mains through a line impedance stabilization network (LISN).
- All the support units are connecting to the other LISN.
- The LISN provides 50 ohm coupling impedance for the measuring instrument.
- The FCC states that a 50 ohm, 50 micro-Henry LISN should be used.
- Both sides of AC line were checked for maximum conducted interference.
- The frequency range from 150 kHz to 30 MHz was searched.
- Set the test-receiver system to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

5.4 Test Setup Layout



5.5 Test Result

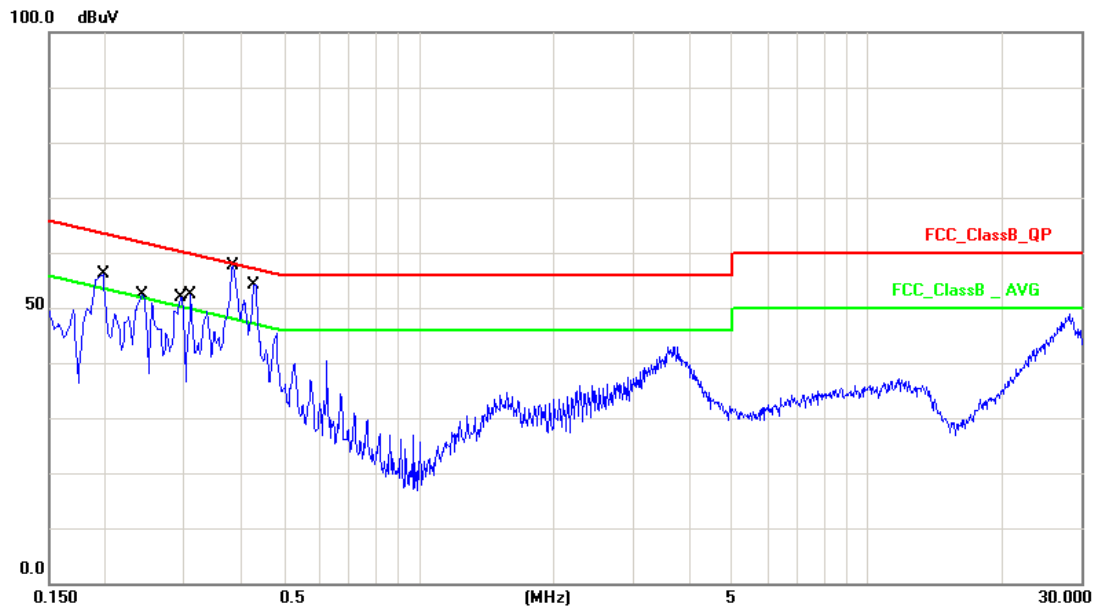
Test Mode :	Mode 1: Normal Operation with BLE on		
AC Power :	AC 120V/60Hz	Phase:	LINE
Temperature :	26°C	Humidity:	60%
Pressure(mbar) :	1002	Date:	2017/04/05



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.1940	10.12	42.57	52.69	63.86	-11.17	QP
2	0.1940	10.12	23.03	33.15	53.86	-20.71	AVG
3	0.2380	10.12	39.01	49.13	62.16	-13.03	QP
4	0.2380	10.12	23.32	33.44	52.16	-18.72	AVG
5	0.2900	10.14	36.24	46.38	60.52	-14.14	QP
6	0.2900	10.14	25.43	35.57	50.52	-14.95	AVG
7	0.3460	10.14	31.69	41.83	59.06	-17.23	QP
8	0.3460	10.14	13.79	23.93	49.06	-25.13	AVG
9	0.3860	10.15	45.16	55.31	58.15	-2.84	QP
10	0.3860	10.15	36.00	46.15	48.15	-2.00	AVG
11	0.4340	10.15	41.58	51.73	57.18	-5.45	QP
12	0.4340	10.15	32.92	43.07	47.18	-4.11	AVG

Note: Measurement Level = Reading Level + Correct Factor

Test Mode :	Mode 1: Normal Operation with BLE on		
AC Power :	AC 120V/60Hz	Phase :	NEUTRAL
Temperature :	26°C	Humidity :	60%
Pressure(mbar) :	1002	Date:	2017/04/05



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.1980	10.12	35.77	45.89	63.69	-17.80	QP
2	0.1980	10.12	16.50	26.62	53.69	-27.07	AVG
3	0.2420	10.12	40.42	50.54	62.02	-11.48	QP
4	0.2420	10.12	24.94	35.06	52.02	-16.96	AVG
5	0.2940	10.14	34.87	45.01	60.41	-15.40	QP
6	0.2940	10.14	19.31	29.45	50.41	-20.96	AVG
7	0.3100	10.14	29.25	39.39	59.97	-20.58	QP
8	0.3100	10.14	15.58	25.72	49.97	-24.25	AVG
9	0.3860	10.15	45.26	55.41	58.15	-2.74	QP
10	0.3860	10.15	35.03	45.18	48.15	-2.97	AVG
11	0.4300	10.15	42.52	52.67	57.25	-4.58	QP
12	0.4300	10.15	33.92	44.07	47.25	-3.18	AVG

Note: Measurement Level = Reading Level + Correct Factor

6. Radiated Emission Measurement

6.1 Test Limit

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. If the transmitter measurement is based on the maximum conducted output power, the attenuation required under this paragraph shall be 30dB instead of 20dB. In addition, radiated emissions which fall in section 15.205(a) the restricted bands must also comply with the radiated emission limit specified in section 15.209(a).

FREQUENCIES (MHz)	FIELD STRENGTH (micro volts/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

For unintentional device, according to CISPR PUB.22, for Class B digital devices, the general requirement of field strength of radiated emissions from intentional radiators at a distance of 10 meters shall not exceed the above table.

Frequency (MHz)	Distance Meters	Radiated (dB μ V/ M)
30-230	10	30
230-1000	10	37

6.2 Test Standard

ANSI C63.10-2013 Section 6.5 & Section 6.6

6.3 Test Procedures

Peak Field Strength Measurements:

Analyzer center frequency was set to the frequency of the radiated spurious emission of interest

1. RBW=As specified in Table 1
2. VBW=3×RBW
3. Detector=Peak
4. Trace mode=Max hold
5. Sweep time=Auto couple
6. Allow the trace to stabilize

Table 1-RBW as a function of frequency

Frequency	RBW
9 ~ 150kHz	200 ~ 300Hz
0.15 ~ 30MHz	9 ~ 10kHz
30 ~ 1000MHz	100 ~ 120kHz
> 1000MHz	1MHz

AVE Field Strength Measurements:

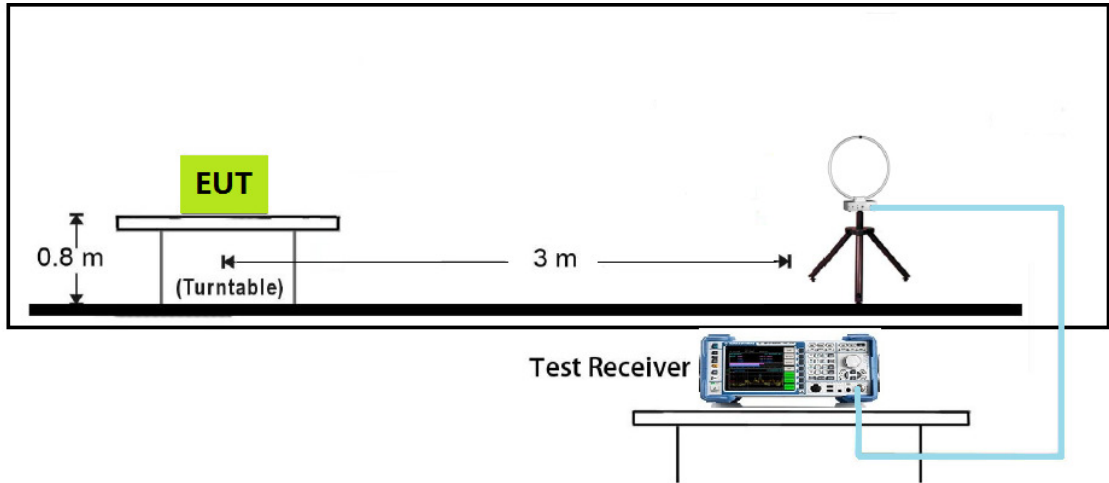
Analyzer center frequency was set to the frequency of the radiated spurious emission of interest

1. RBW= 1MHz
2. VBW≥1/T
3. Detector=Peak
4. Trace mode=Max hold
5. Sweep time=Auto couple
6. Allow max hold to run for at least 50 times(1/duty cycle) trace

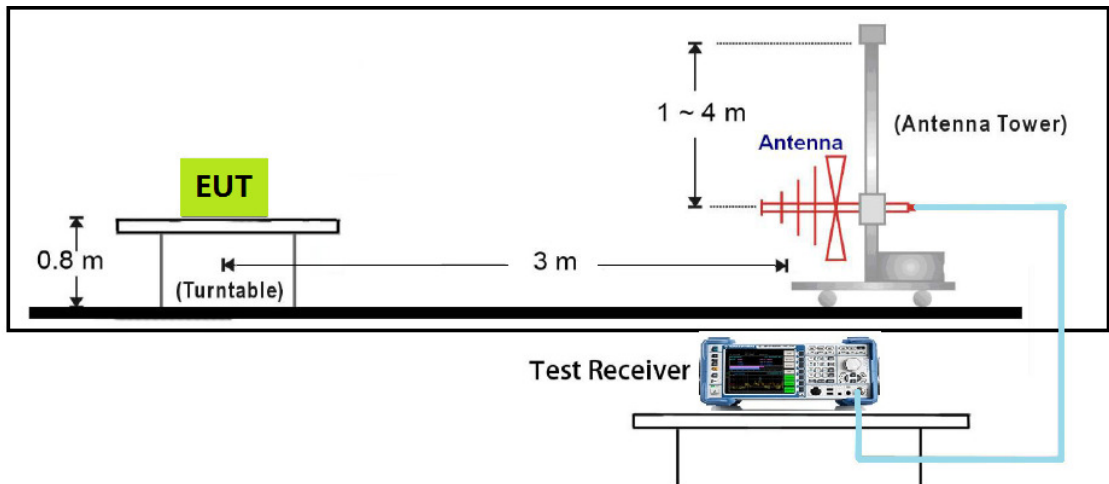
Do as an alternative, the instrument may be set to linear detector mode. Ensure that video filtering is applied in linear voltage domain (rather than in a log or dB domain). Some instruments require linear display mode in order to accomplish this. Others have a setting for Average-VBW Type, which can be set to "Voltage" regardless of the display mode

6.4 Test Setup Layout

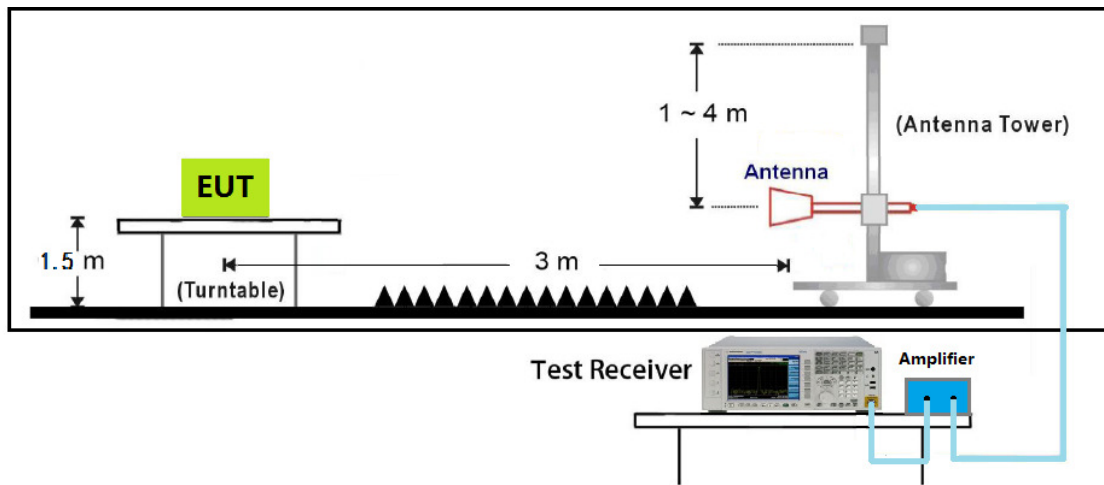
9kHz~30MHz Test Setup



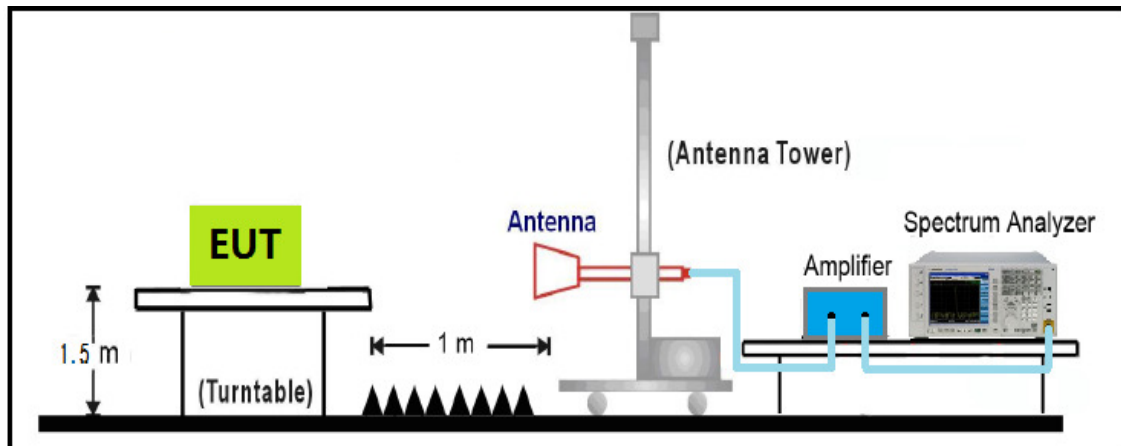
30MHz~1GHz Test Setup



1GHz~18GHz Test Setup



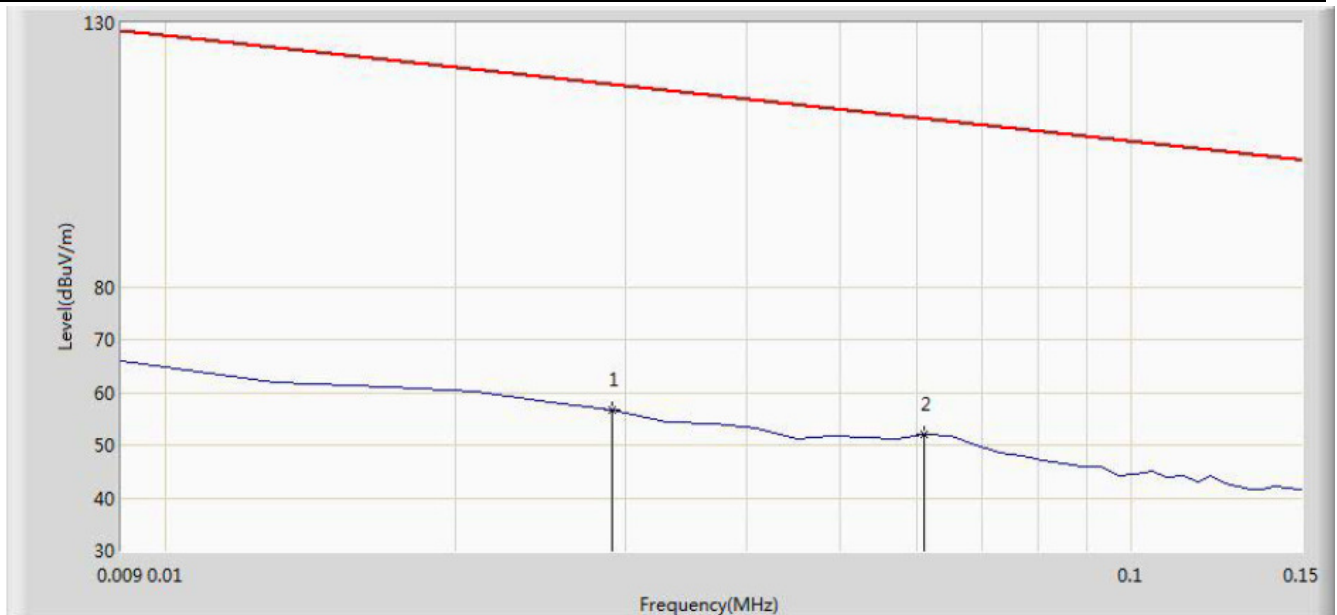
18GHz~40GHz Test Setup



6.5 Test Result

The worst case of Radiated Emission below 1GHz:

Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: HFH2-Z2 (9KHz-30MHz)	Polarity: Face on
EUT: FSP-321B	Power: AC 120V/60Hz
Note: There is the ambient noise within frequency range 9KHz-30MHz	

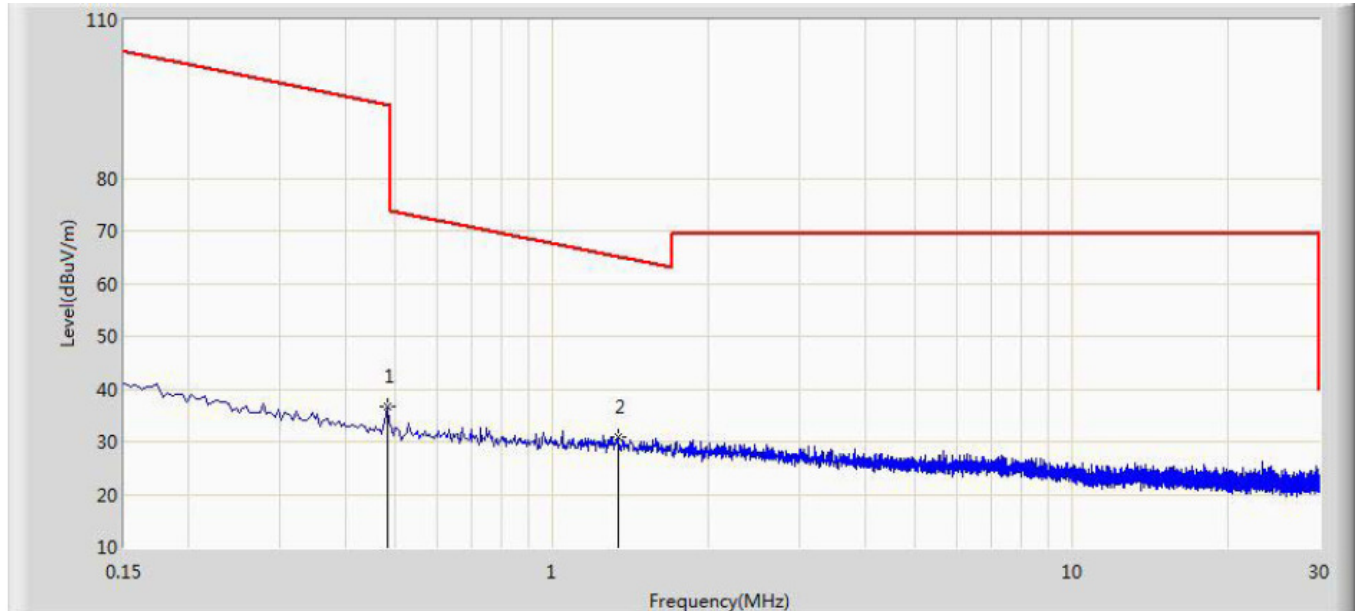


No.	Frequency (MHz)	Level (dBuV/m)	Reading (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB/m)	Det.
1	0.029	58.574	37.548	-59.768	118.342	21.026	QP
2	0.061	53.064	32.527	-58.823	111.887	20.537	QP

Note: Measure Level (dBuV/m) = Reading Level (dBuV) + Factor(dB).

Factor (dB)=Cable Loss(dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain(dB)

Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: HFH2-Z2 (9KHz-30MHz)	Polarity: Face on
EUT: FSP-321B	Power: AC 120V/60Hz
Note: There is the ambient noise within frequency range 9KHz-30MHz	

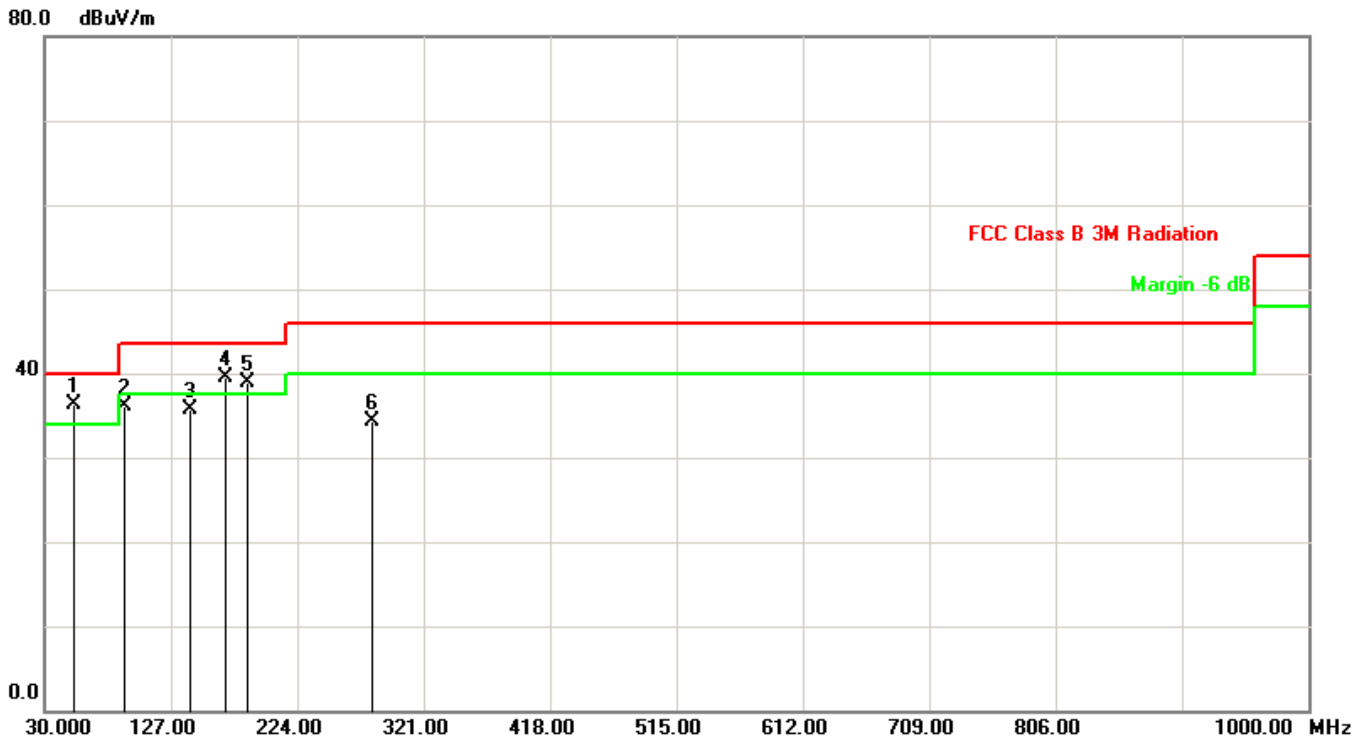


No.	Frequency (MHz)	Level (dBuV/m)	Reading (dBuV)	Margin (dB)	Limit (dBuV/m)	Factor (dB/m)	Det.
1	0.482	37.942	17.537	-56.001	93.943	20.405	QP
2	1.338	33.136	12.683	-31.963	65.099	20.453	QP

Note: Measure Level (dBuV/m) = Reading Level (dBuV) + Factor(dB).

Factor (dB)=Cable Loss(dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain(dB)

Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: CBL6112D (30-1000MHz)	Polarity: Horizontal
EUT: FSP-321B	Power: AC 120V/60Hz
Note: Mode1: Transmit at channel 2402MHz by DH5	

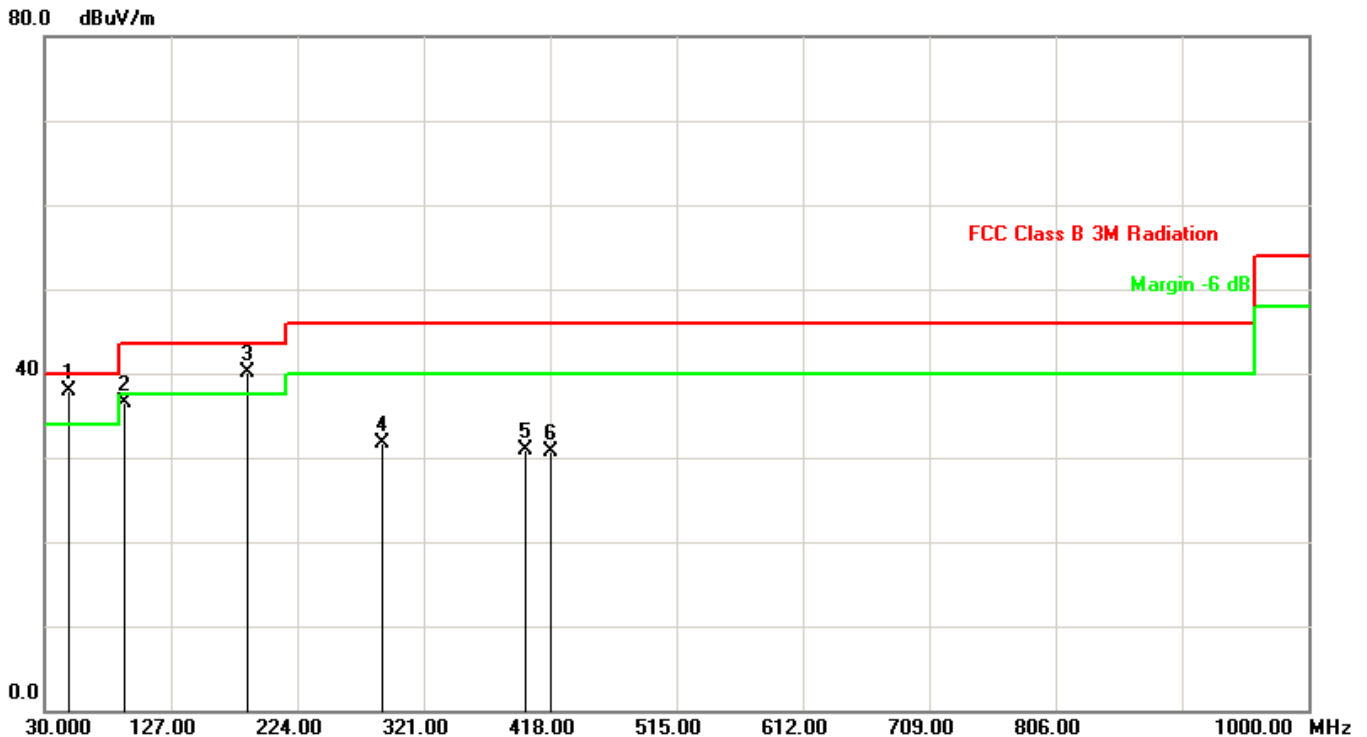


No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	52.3100	-11.37	47.73	36.36	40.00	-3.64	QP
2	91.1099	-14.95	50.98	36.03	43.50	-7.47	QP
3	141.5500	-7.80	43.51	35.71	43.50	-7.79	QP
4	169.6799	-7.57	47.15	39.58	43.50	-3.92	QP
5	186.1699	-9.13	48.08	38.95	43.50	-4.55	QP
6	282.1999	-8.90	43.24	34.34	46.00	-11.66	QP

Note: Measure Level (dBuV/m) = Reading Level (dBuV) + Factor(dB).

Factor (dB)=Cable Loss(dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain(dB)

Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: CBL6112D (30-1000MHz)	Polarity: Vertical
EUT: FSP-321B	Power: AC 120V/60Hz
Note: Mode1: Transmit at channel 2402MHz by DH5	



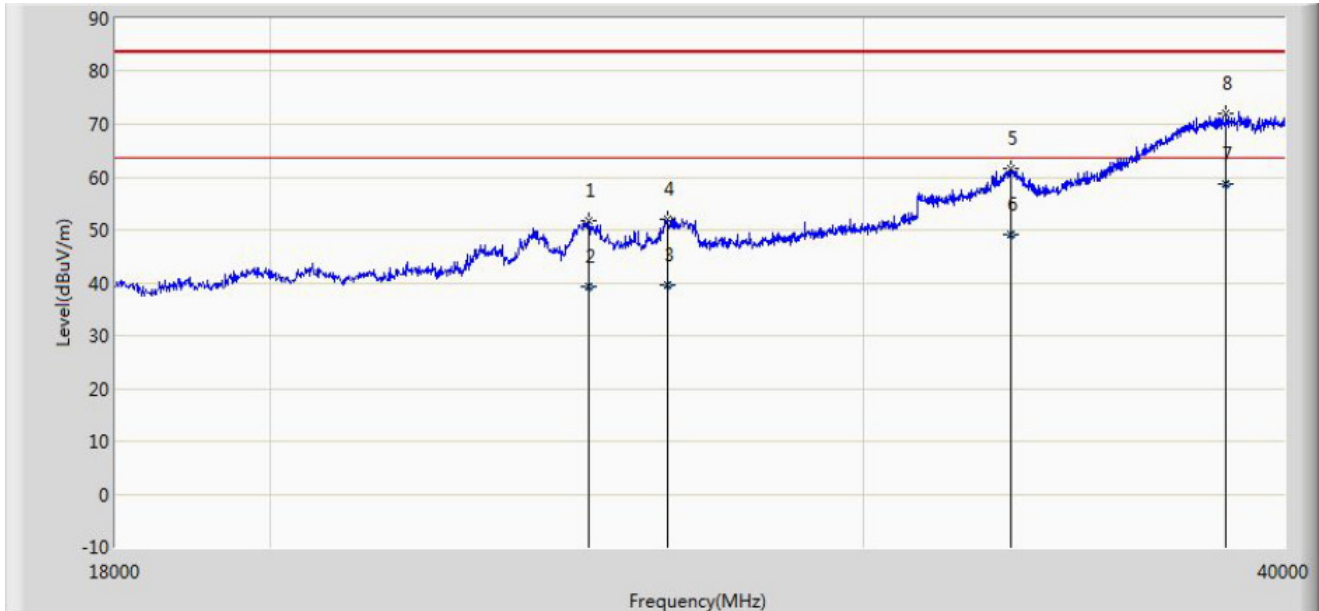
No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	48.4299	-10.24	48.12	37.88	40.00	-2.12	QP
2	92.0799	-14.71	51.31	36.60	43.50	-6.90	QP
3	186.1699	-9.13	49.27	40.14	43.50	-3.36	QP
4	289.9599	-8.63	40.42	31.79	46.00	-14.21	QP
5	398.6000	-5.83	36.80	30.97	46.00	-15.03	QP
6	418.0000	-3.53	34.29	30.76	46.00	-15.24	QP

Note: Measure Level (dBuV/m) = Reading Level (dBuV) + Factor(dB).

Factor (dB)=Cable Loss(dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain(dB)

Radiated Emission above 1GHz:

Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: BBHA9170 (18GHz-40GHz)	Polarity: Horizontal
EUT: FSP-321B	Power: AC 120V/60Hz
Note: There is the ambient noise within frequency range 18GHz-40GHz	



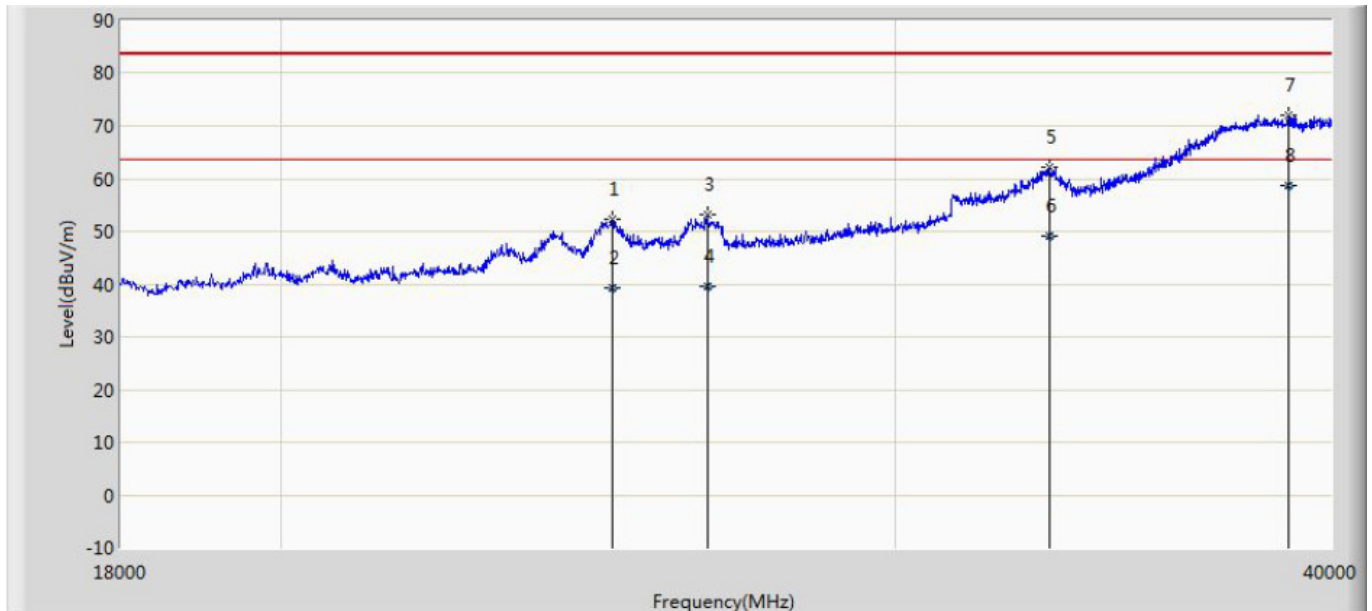
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		24864.000	51.876	37.101	-31.624	83.500	14.775	PK
2		24864.088	39.255	24.480	-24.245	63.500	14.775	AV
3		26260.988	39.509	24.090	-23.991	63.500	15.419	AV
4		26261.000	51.996	36.577	-31.504	83.500	15.419	PK
5		33180.000	61.501	39.980	-21.999	83.500	21.521	PK
6		33180.363	49.081	27.560	-14.419	63.500	21.521	AV
7	*	38437.980	58.563	31.230	-4.937	63.500	27.333	AV
8		38438.000	72.071	44.738	-11.429	83.500	27.333	PK

Note: Measure Level (dBuV/m) = Reading Level (dBuV) + Factor(dB).

Factor (dB)=Cable Loss(dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain(dB)

Limit@1m = 20*Log(500uV/m) + 20*Log(3m/1m) = 63.5dBμv/m (Average detector), and 83.5dBμv/m (Peak detector).

Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: BBHA9170 (18GHz-40GHz)	Polarity: Vertical
EUT: FSP-321B	Power: AC 120V/60Hz
Note: There is the ambient noise within frequency range 18GHz-40GHz	



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		24886.000	52.363	37.578	-31.137	83.500	14.785	PK
2		24886.970	39.274	24.489	-24.226	63.500	14.785	AV
3		26503.000	53.267	37.247	-30.233	83.500	16.020	PK
4		26503.877	39.632	23.610	-23.868	63.500	16.022	AV
5		33213.000	62.169	40.632	-21.331	83.500	21.538	PK
6		33213.989	49.128	27.590	-14.372	63.500	21.538	AV
7		38900.000	72.136	44.251	-11.364	83.500	27.885	PK
8	*	38900.756	58.755	30.870	-4.745	63.500	27.885	AV

Note: Measure Level (dBuV/m) = Reading Level (dBuV) + Factor(dB).

Factor (dB)=Cable Loss(dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain(dB)

Limit@1m = $20 \cdot \log(500 \mu\text{V/m}) + 20 \cdot \log(3\text{m}/1\text{m}) = 63.5 \text{ dB}\mu\text{V/m}$ (Average detector), and $83.5 \text{ dB}\mu\text{V/m}$ (Peak detector).

Mode	CH	Antenna	Frequency (MHz)	Factor (dB)	Reading Level (dBuV/m)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
BLE	00	H	4808.00	3.29	49.30	52.59	54(note3)	-1.41	PK
		H	7205.00	8.19	43.58	51.77	54(note3)	-2.23	PK
		V	4808.00	3.29	45.20	48.49	54(note3)	-5.51	PK
		V	7206.00	8.19	41.88	50.07	54(note3)	-3.93	PK
	19	H	4876.00	3.42	47.37	50.79	54(note3)	-3.21	PK
		H	7324.00	8.28	44.45	52.73	54(note3)	-1.27	PK
		V	4876.00	3.42	45.69	49.11	54(note3)	-4.89	PK
		V	7324.00	8.28	43.52	51.80	54(note3)	-2.20	PK
	39	H	4961.00	3.59	47.91	51.50	54(note3)	-2.50	PK
		H	7443.00	8.36	44.07	52.43	54(note3)	-1.57	PK
		V	4961.00	3.59	47.91	51.50	54(note3)	-2.50	PK
		V	7440.00	8.36	44.07	52.43	54(note3)	-1.57	PK

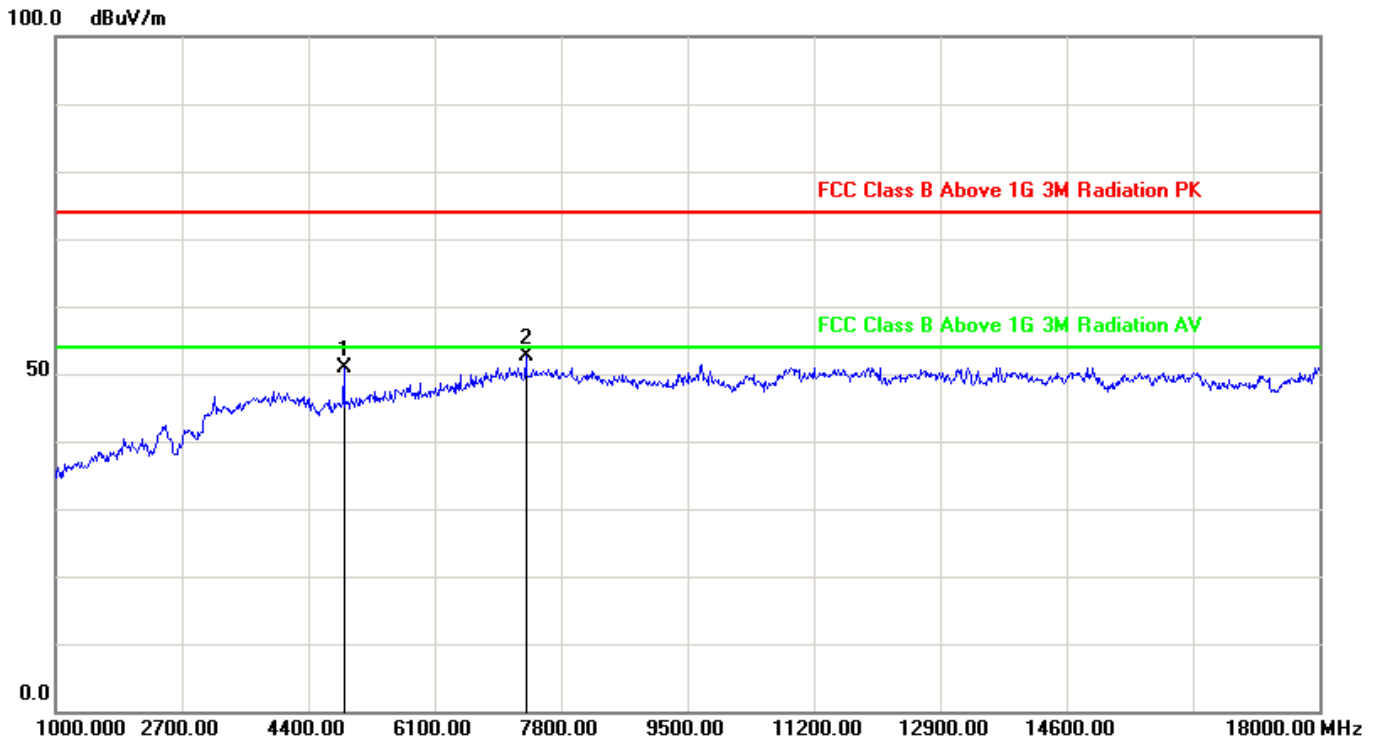
Note: 1. Measure Level = Reading Level + Factor.

2. Factor (dB)=Cable Loss(dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain(dB)

3. This limit applies for using average detector, if the test result on peak is lower than average limit, then average measurement needn't be performed.

The worst case of Radiated Emission above 1GHz:

Site: AC102	Time: 2017/03/31
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: N/A	Polarity: Horizontal
EUT: FSP-321B	Power: AC 120V/60Hz
Note: Mode:Transmit BLE at 2437MHz	



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	4876.000	3.42	47.37	50.79	74.00	-23.21	peak
2	7324.000	8.28	44.45	52.73	74.00	-21.27	peak

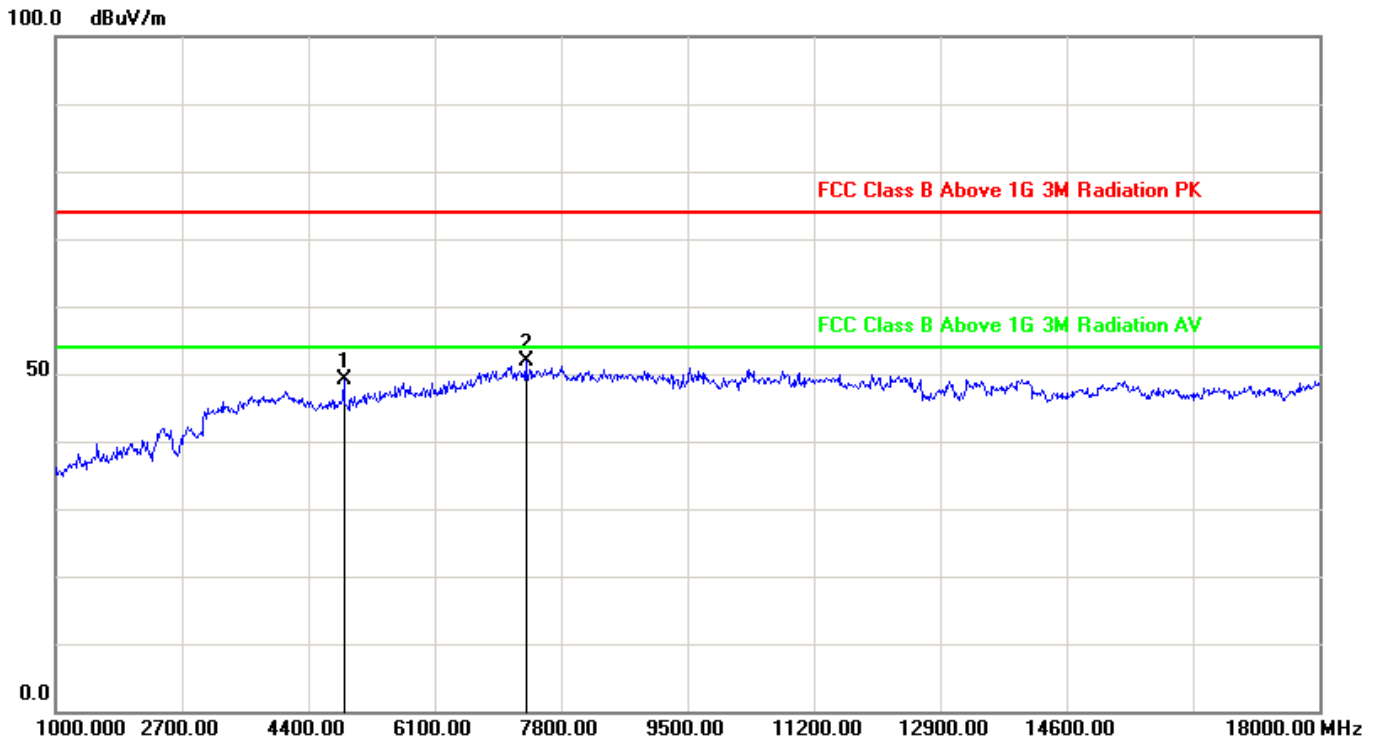
Note: 1. Measure Level = Reading Level + Factor.

2. Factor (dB)=Cable Loss(dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain(dB)

3. This limit applies for using average detector, if the test result on peak is lower than average limit, then average measurement needn't be performed.

FCC ID: Q4B-FSP-3X1

Site: AC102	Time: 2017/03/31
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: N/A	Polarity: Vertical
EUT: FSP-321B	Power: AC 120V/60Hz
Note: Mode:Transmit BLE at 2437MHz	



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	4876.000	3.42	45.69	49.11	74.00	-24.89	peak
2	7324.000	8.28	43.52	51.80	74.00	-22.20	peak

Note: 1. Measure Level = Reading Level + Factor.

2. Factor (dB)=Cable Loss(dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain(dB)

3. This limit applies for using average detector, if the test result on peak is lower than average limit, then average measurement needn't be performed.

7. 6dB Bandwidth Measurement

7.1 Test Limit

The minimum 6dB bandwidth shall be at least 500 kHz..

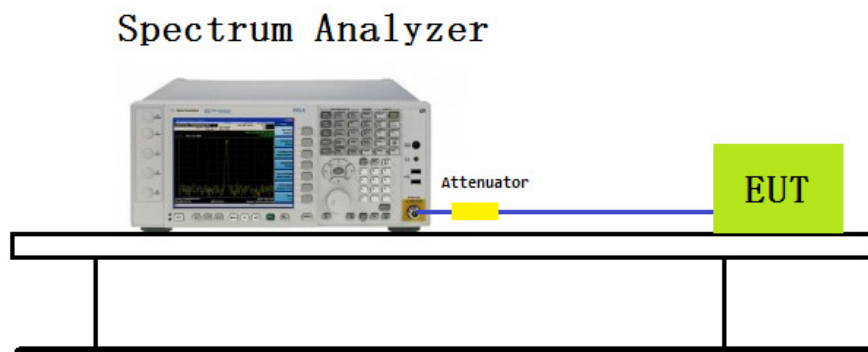
7.2 Test Standard

KDB 558074 D01v03r05 – Section 8.2 Option 2

7.3 Test Procedures

1. Set RBW=100KHz
2. VBW $\geq$ 3 $\times$ RBW
3. Detector=Peak
4. Trace mode=Max hold
5. Sweep time=Auto couple
6. Allow the trace to stabilize
7. The Spectrum's automatic bandwidth measurement capability was used to perform the 6dB bandwidth measurement. The "X" dB bandwidth parameter was set to X = 6. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.

7.4 Test Setup Layout



7.5 Test Result

Test Item	Occupied Bandwidth
Test Mode	Mode 1: Transmit by BLE

Channel No.	Frequency(MHz)	6dB Bandwidth(kHz)	99% Bandwidth(MHz)
00	2402	666.9	1.0730
19	2440	705.9	1.0859
39	2480	741.7	1.1353



8. Output Power Measurement

8.1 Test Limit

The Maximum Output Power Measurement is 1W (30dBm).

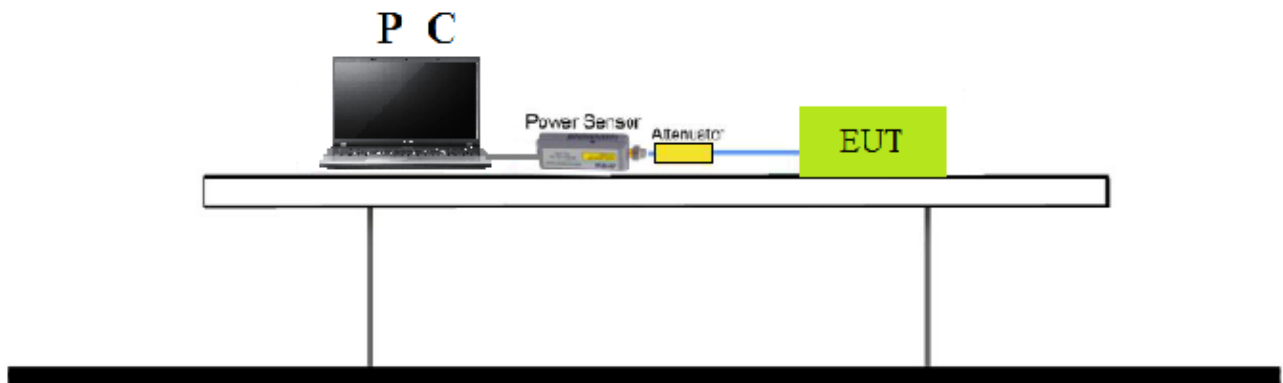
8.2 Test Standard

KDB 558074 D01v03r05 - Section 9.1.2 PKPM1 Peak Power Method (for signals with BW $\leq$ 50MHz)

8.3 Test Procedures

Out power measurements were performed only when the EUT was transmitting at its maximum power control level using a broadband power meter with a pulse sensor. The pulse sensor employs a VBW = 50MHz so this method was only used for signals whose DTS bandwidth was less than or equal to 50MHz.

8.4 Test Setup Layout



8.5 Test Result

For Peak Power :

Test Mode	Channel No.	Frequency (MHz)	Peak Output Power (dBm)	Limit (dBm)	Result
BLE	00	2402	5.71	30	Pass
	19	2440	6.11	30	Pass
	39	2480	6.53	30	Pass

For Average Power :

Test Mode	Channel No.	Frequency (MHz)	Average Output Power (dBm)	Limit (dBm)	Result
BLE	00	2402	3.45	30	Pass
	19	2440	3.85	30	Pass
	39	2480	4.26	30	Pass

9. Power Spectral Density Measurement

9.1 Test Limit

The maximum permissible power spectral density is 8dBm in any 3 kHz band.

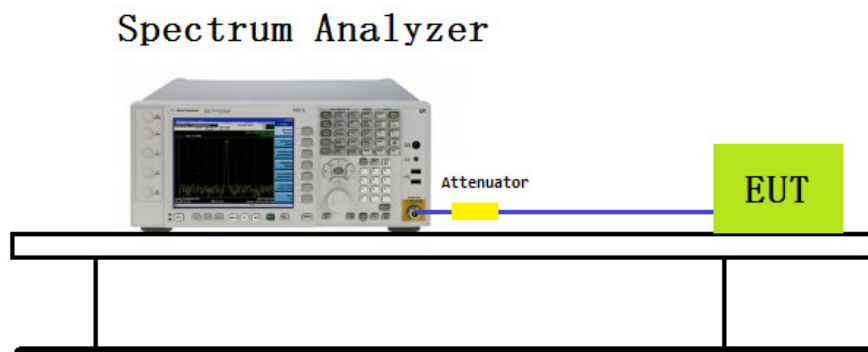
9.2 Test Standard

KDB 558074 D01v03r05 - Section 10.2 Method PKPSD

9.3 Test Procedures

1. Set RBW=3kHz
2. Set RBW=10kHz
3. Span = 1.5 times the DTS channel bandwidth
4. Detector=Peak
5. Trace mode=Max hold
6. Sweep time=Auto couple
7. Allow the trace to stabilize
8. Analyzer was set to the center frequency of the DTS channel under investigation.

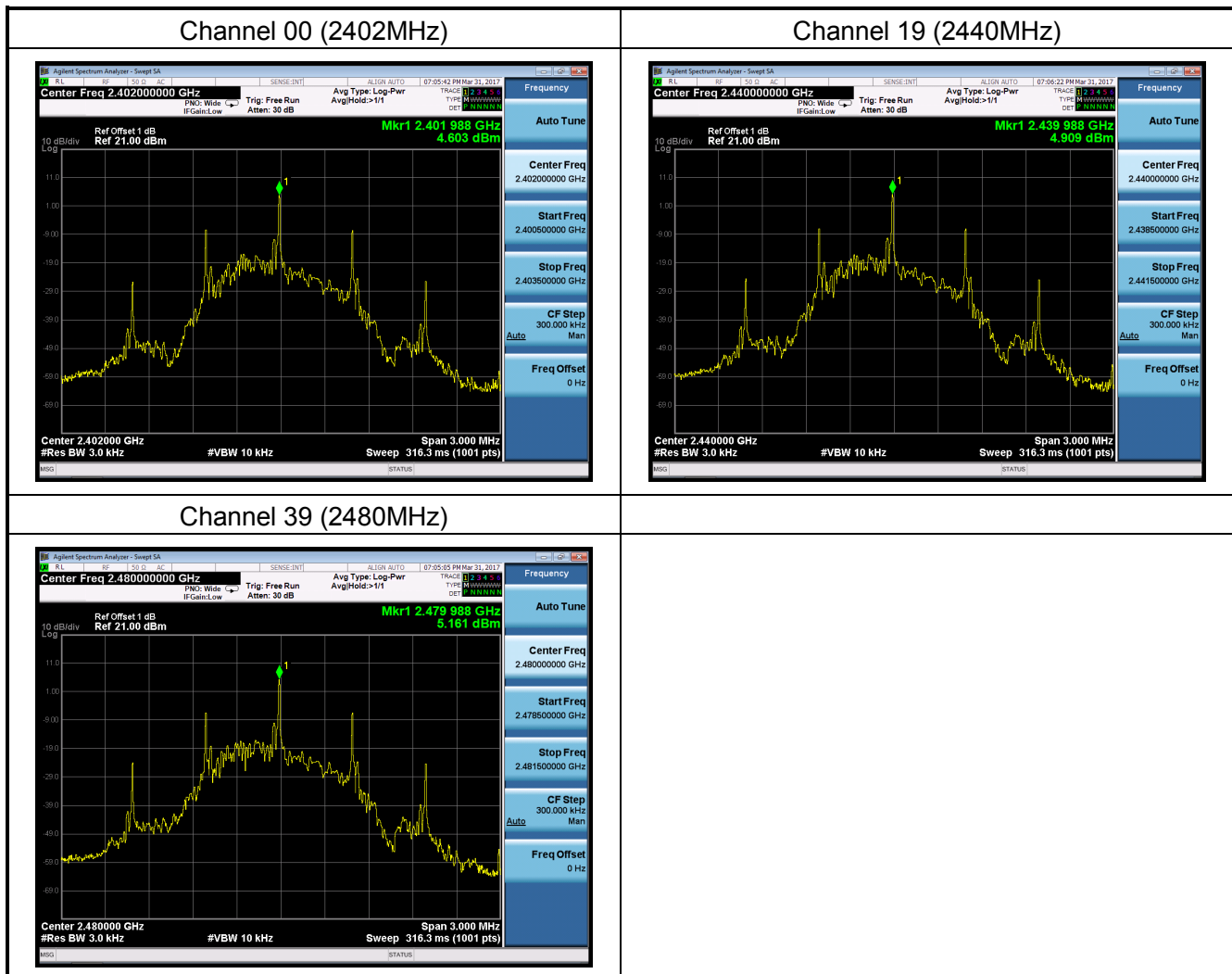
9.4 Test Setup Layout



9.5 Test Result

Test Item	Power Spectral Density
Test Mode	Mode 1: Transmit by BLE

Channel No.	Frequency(MHz)	Power Spectral Density (dBm/3kHz)	Limit (dBm/3kHz)	Result
00	2402	4.603	8	Pass
19	2440	4.909	8	Pass
39	2480	5.161	8	Pass





10. Conducted Band Edge and Out-of-Band Emissions Measurement

10.1 Test Limit

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 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, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) of FCC part 15 is not required.

10.2 Test Standard

KDB 558074 D01v03r05 - Section 11.2 & Section 11.3

10.3 Test Procedures

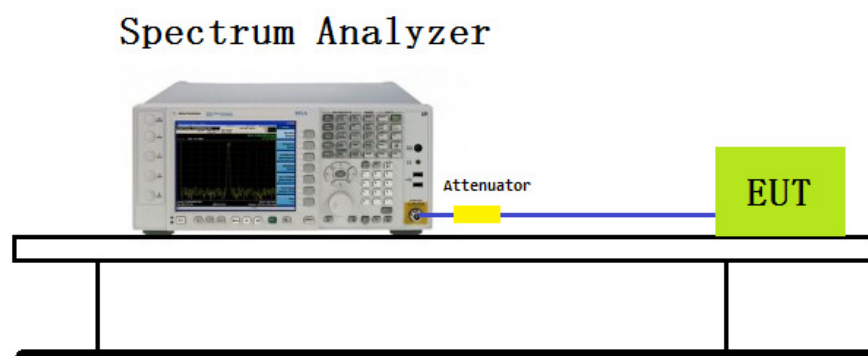
Reference level measurement:

1. Set the RBW = 100 kHz
2. Set the VBW $\geq 3 \times$ RBW
3. Set the span to ≥ 1.5 times the DTS bandwidth
4. Detector = peak
5. Trace mode = max hold
6. Sweep time = auto couple
7. Allow trace to fully stabilize
8. Set instrument center frequency to DTS channel center frequency

Emission level measurement:

1. RBW = 100kHz
2. VBW = 300kHz
3. Detector = Peak
4. Trace mode = max hold
5. Sweep time = auto couple
6. The trace was allowed to stabilize
7. Set the center frequency and span to encompass frequency range to be measured

10.4 Test Setup Layout





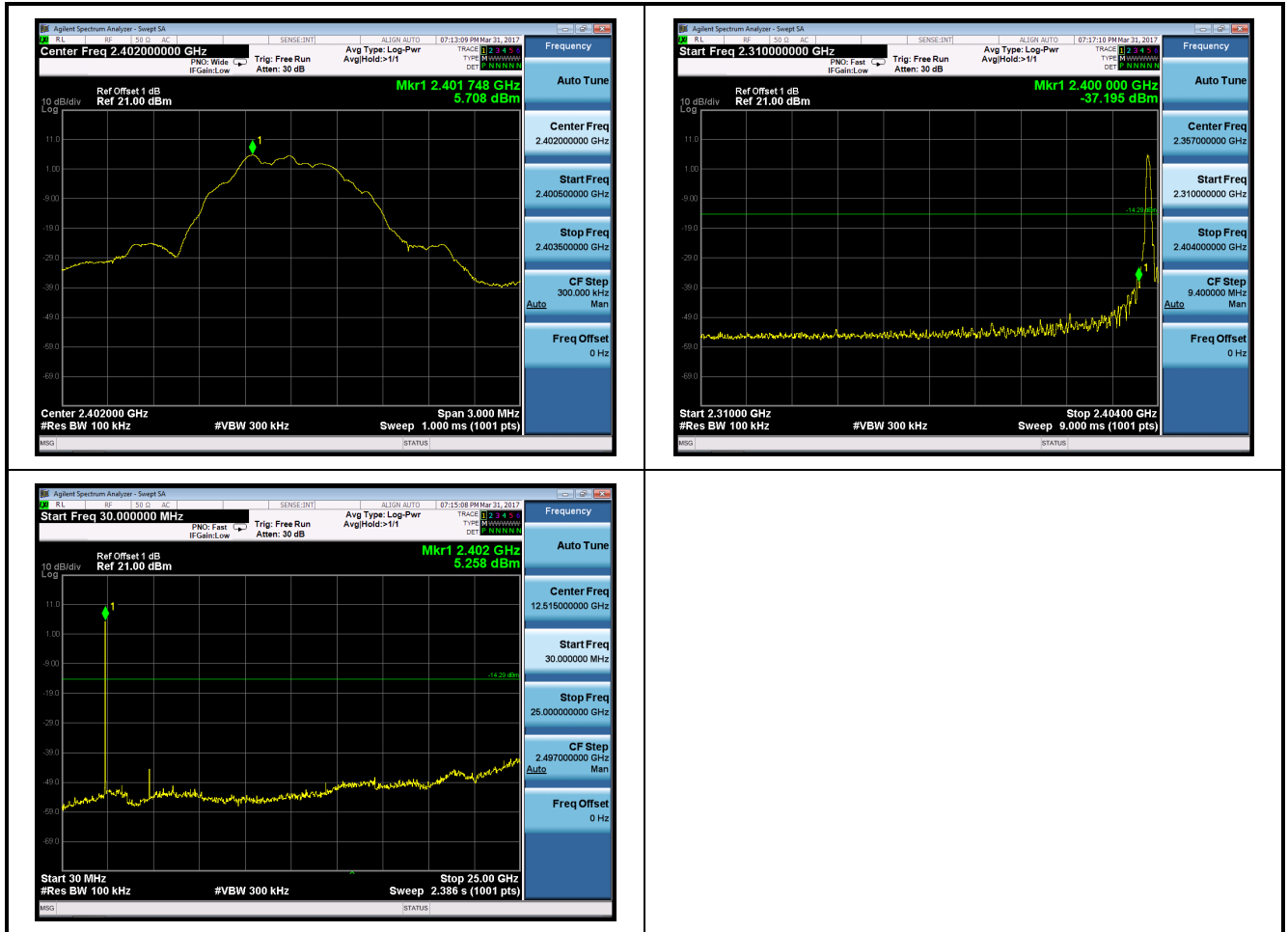
FCC ID: Q4B-FSP-3X1

10.5 Test Result

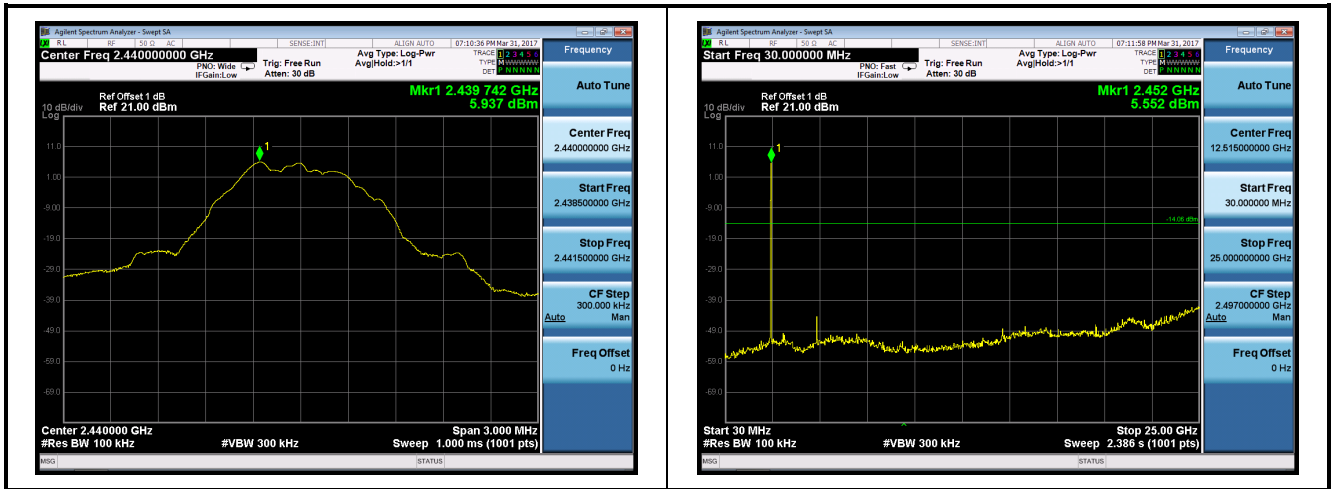
Test Mode	Channel No.	Frequency (MHz)	Limit	Result
BLE	00	2402	20dBc	Pass
	19	2440	20dBc	Pass
	39	2480	20dBc	Pass

Test Item	:	Conducted Band Edge and Out-of-Band Emissions
Test Mode	:	Mode 1: Transmit by BLE

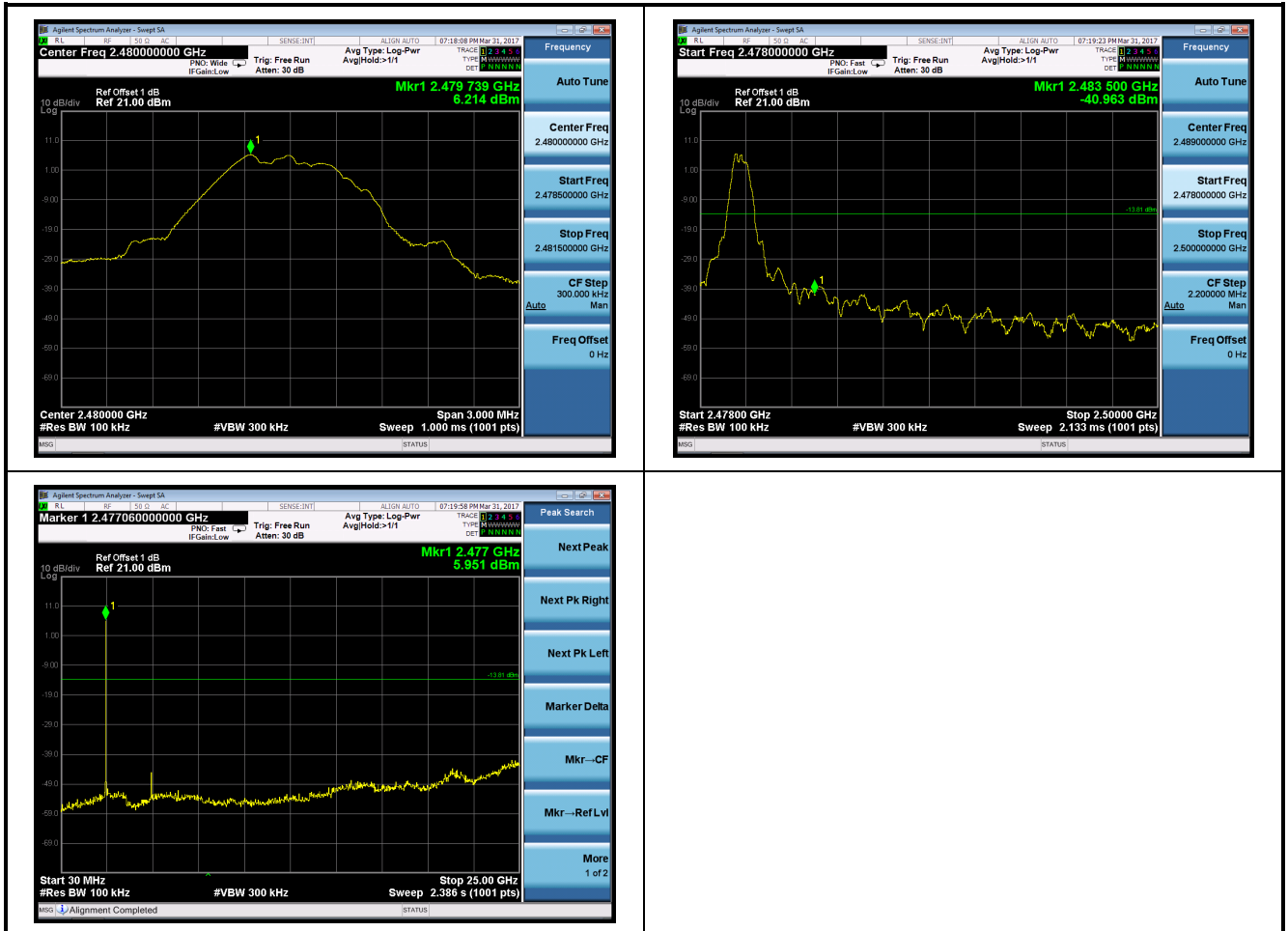
Mode 1: Transmit by BLE (2402MHz)



Mode 1: Transmit by BLE (2440MHz)



Mode 1: Transmit by BLE (2480MHz)



11. Radiated Emission Band Edge Measurement

11.1 Test Limit

Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a) of FCC part 15, must also comply with the radiated emission limits specified in Section 15.209(a) of FCC part 15.

11.2 Test Standard

ANSI C63.10-2013 Section 6.10.5

11.3 Test Procedure

Peak Field Strength Measurements:

Analyzer center frequency was set to the frequency of the radiated spurious emission of interest

7. RBW=As specified in Table 1
8. VBW=3×RBW
9. Detector=Peak
10. Trace mode=Max hold
11. Sweep time=Auto couple
12. Allow the trace to stabilize

Table 1-RBW as a function of frequency

Frequency	RBW
9 ~ 150kHz	200 ~ 300Hz
0.15 ~ 30MHz	9 ~ 10kHz
30 ~ 1000MHz	100 ~ 120kHz
> 1000MHz	1MHz

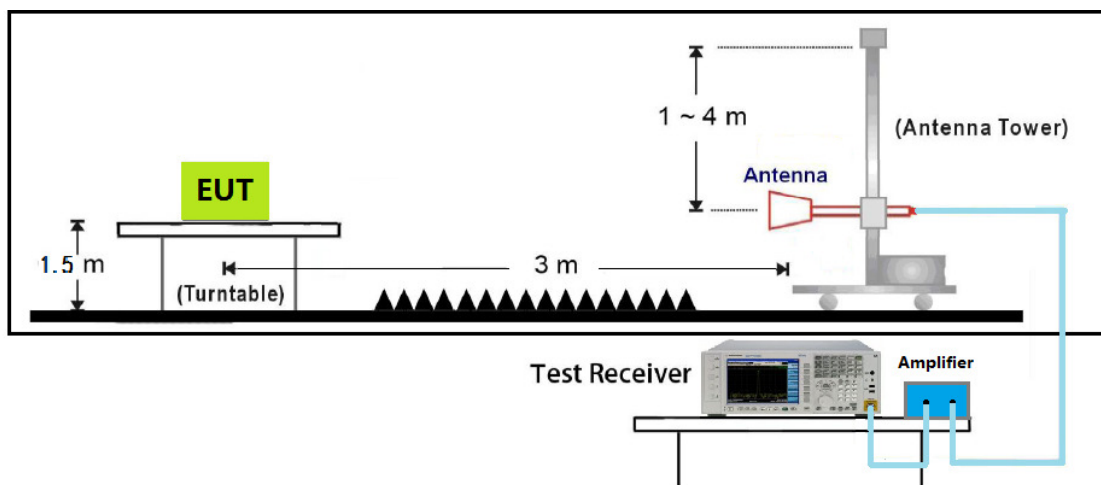
AVE Field Strength Measurements:

Analyzer center frequency was set to the frequency of the radiated spurious emission of interest

7. RBW= 1MHz
8. VBW $\geq$ 1/T
9. Detector=Peak
10. Trace mode=Max hold
11. Sweep time=Auto couple
12. Allow max hold to run for at least 50 times(1/duty cycle) trace

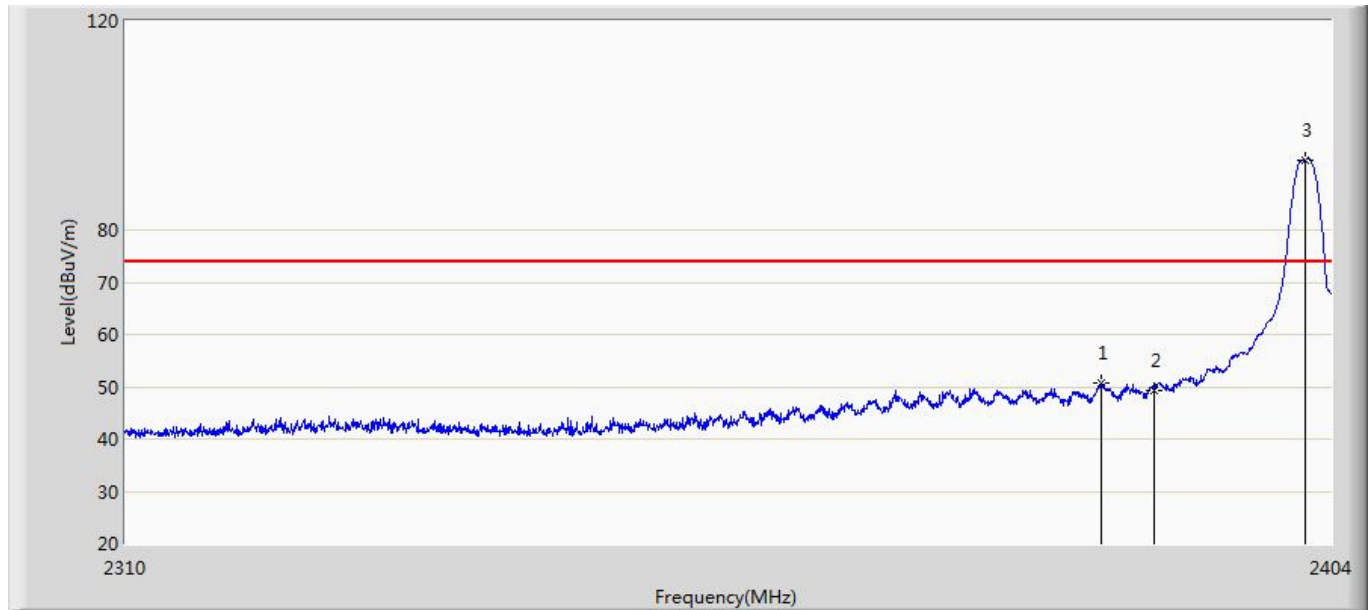
Do as an alternative, the instrument may be set to linear detector mode. Ensure that video filtering is applied in linear voltage domain (rather than in a log or dB domain). Some instruments require linear display mode in order to accomplish this. Others have a setting for Average-VBW Type, which can be set to "Voltage" regardless of the display mode

11.4 Test Setup Layout



11.5 Test Result

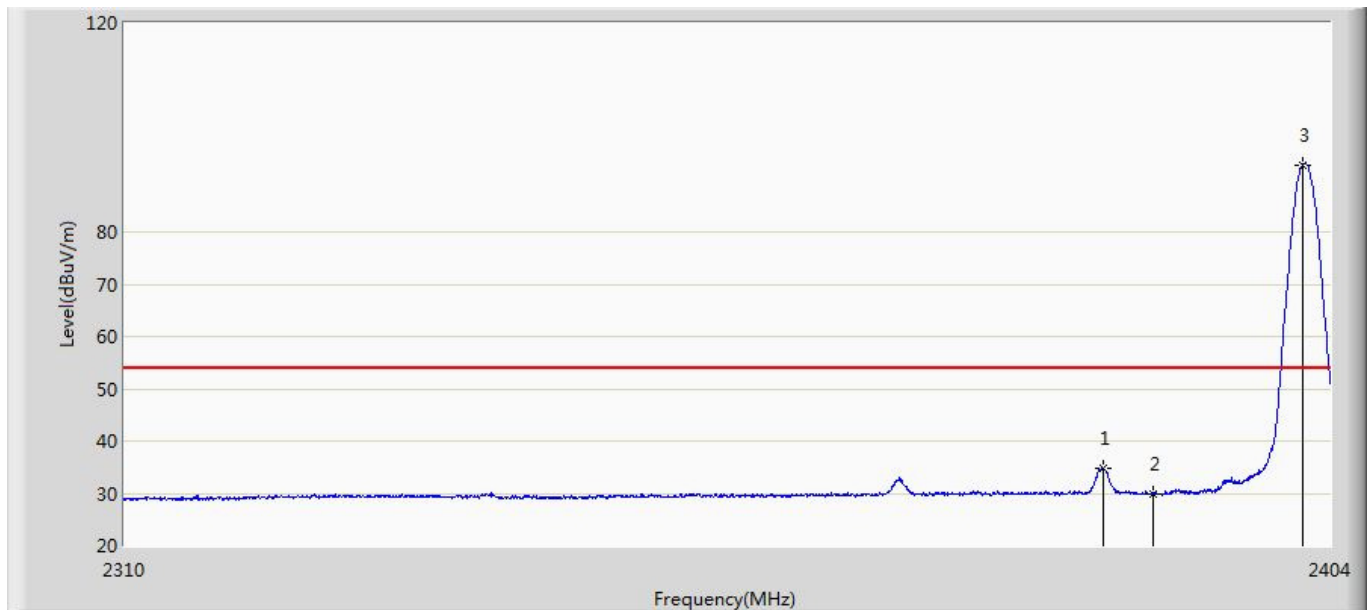
Site: AC102	Time: 2017/03/31 - 15:15
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: N/A	Polarity: Horizontal
EUT: FSP-321B	Power: AC 120V/60Hz
Note: Mode:Transmit BLE at 2402MHz	



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2385.811	50.645	52.902	-23.355	74.000	-2.257	PK
2		2390.000	49.374	51.615	-24.626	74.000	-2.241	PK
3	*	2401.979	93.452	95.648	N/A	N/A	-2.196	PK

FCC ID: Q4B-FSP-3X1

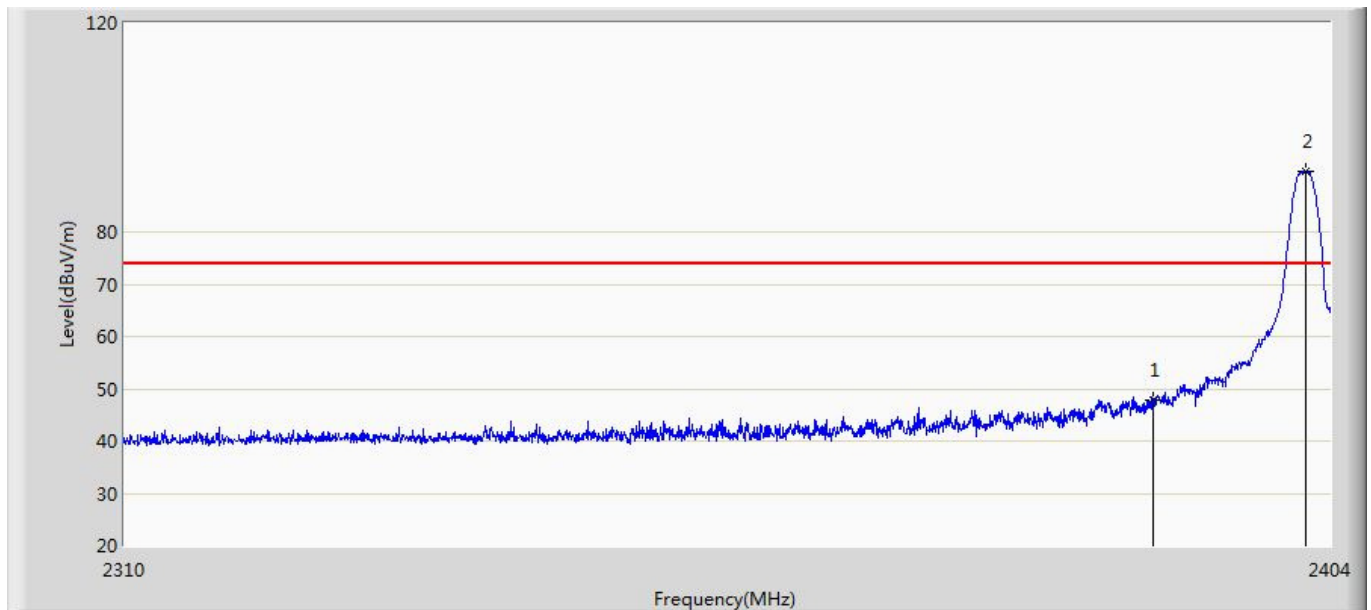
Site: AC102	Time: 2017/03/31 - 15:33
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: N/A	Polarity: Horizontal
EUT: FSP-321B	Power: AC 120V/60Hz
Note: Mode:Transmit BLE at 2402MHz	



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2386.046	34.866	37.122	-19.134	54.000	-2.256	AV
2		2390.000	29.913	32.154	-24.087	54.000	-2.241	AV
3	*	2401.838	92.884	95.081	N/A	N/A	-2.197	AV

FCC ID: Q4B-FSP-3X1

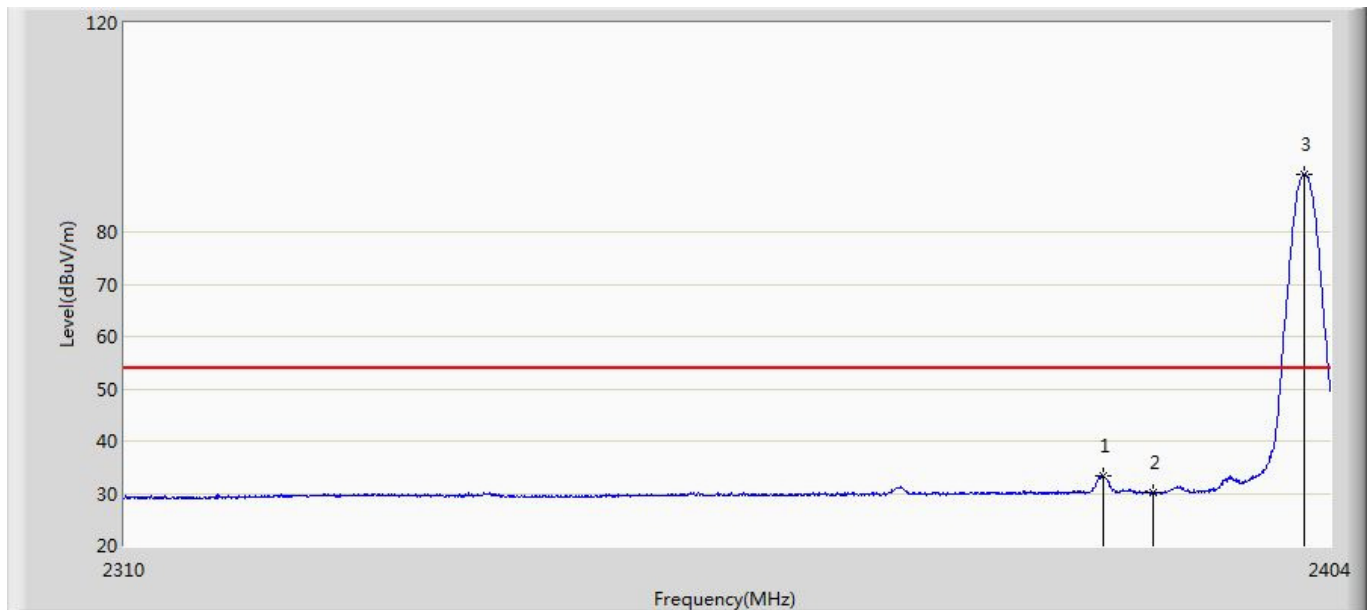
Site: AC102	Time: 2017/03/31 - 15:35
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: N/A	Polarity: Vertical
EUT: FSP-321B	Power: AC 120V/60Hz
Note: Mode:Transmit BLE at 2402MHz	



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2390.000	47.913	50.154	-26.087	74.000	-2.241	PK
2	*	2402.073	91.659	93.855	N/A	N/A	-2.196	PK

FCC ID: Q4B-FSP-3X1

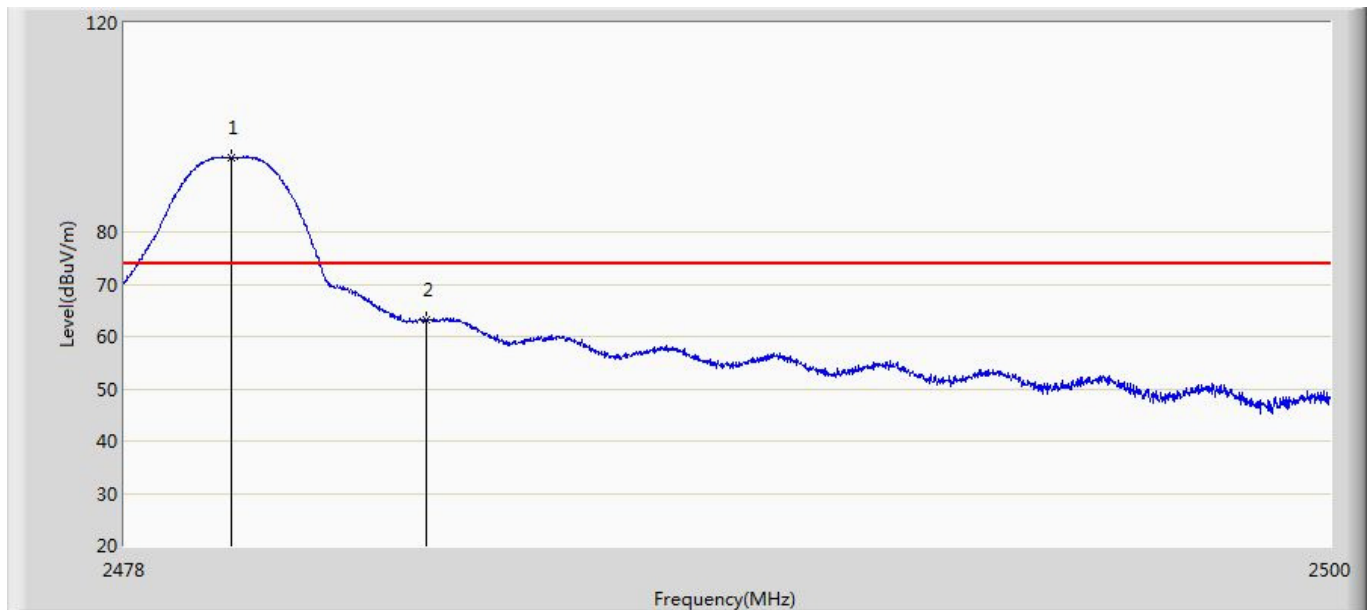
Site: AC102	Time: 2017/03/31 - 15:40
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: N/A	Polarity: Vertical
EUT: FSP-321B	Power: AC 120V/60Hz
Note: Mode:Transmit BLE at 2402MHz	



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2385.999	33.368	35.624	-20.632	54.000	-2.256	AV
2		2390.000	30.083	32.324	-23.917	54.000	-2.241	AV
3	*	2401.932	91.035	93.232	N/A	N/A	-2.197	AV

FCC ID: Q4B-FSP-3X1

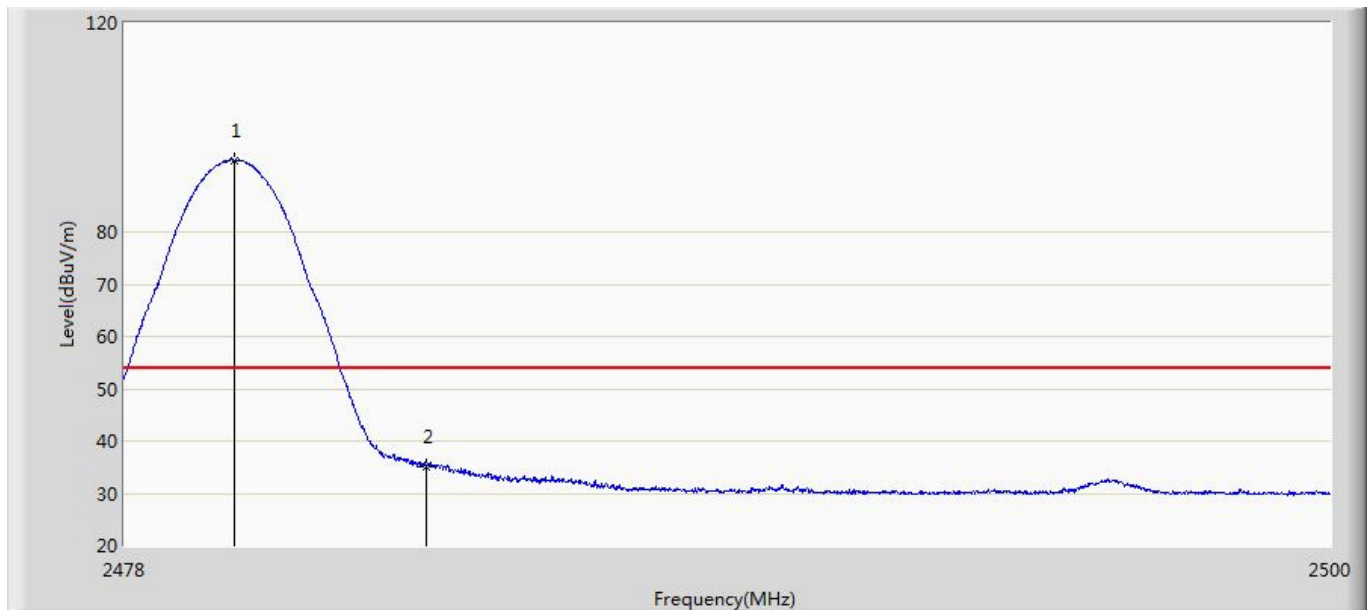
Site: AC102	Time: 2017/03/31 - 15:45
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: N/A	Polarity: Horizontal
EUT: FSP-321B	Power: AC 120V/60Hz
Note: Mode:Transmit BLE at 2480MHz	



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2479.947	94.251	96.156	N/A	N/A	-1.905	PK
2		2483.500	63.064	64.956	-10.936	74.000	-1.892	PK

FCC ID: Q4B-FSP-3X1

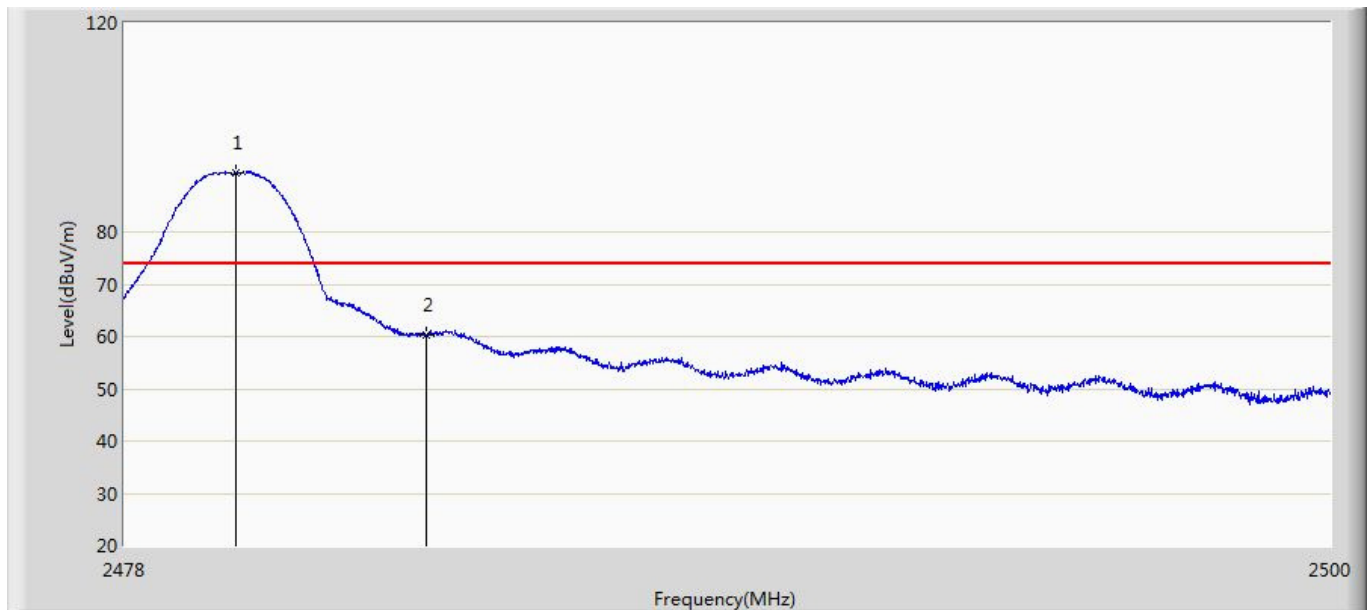
Site: AC102	Time: 2017/03/31 - 15:50
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: N/A	Polarity: Horizontal
EUT: FSP-321B	Power: AC 120V/60Hz
Note: Mode:Transmit BLE at 2480MHz	



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2480.013	93.736	95.641	N/A	N/A	-1.905	AV
2		2483.500	35.005	36.897	-18.995	54.000	-1.892	AV

FCC ID: Q4B-FSP-3X1

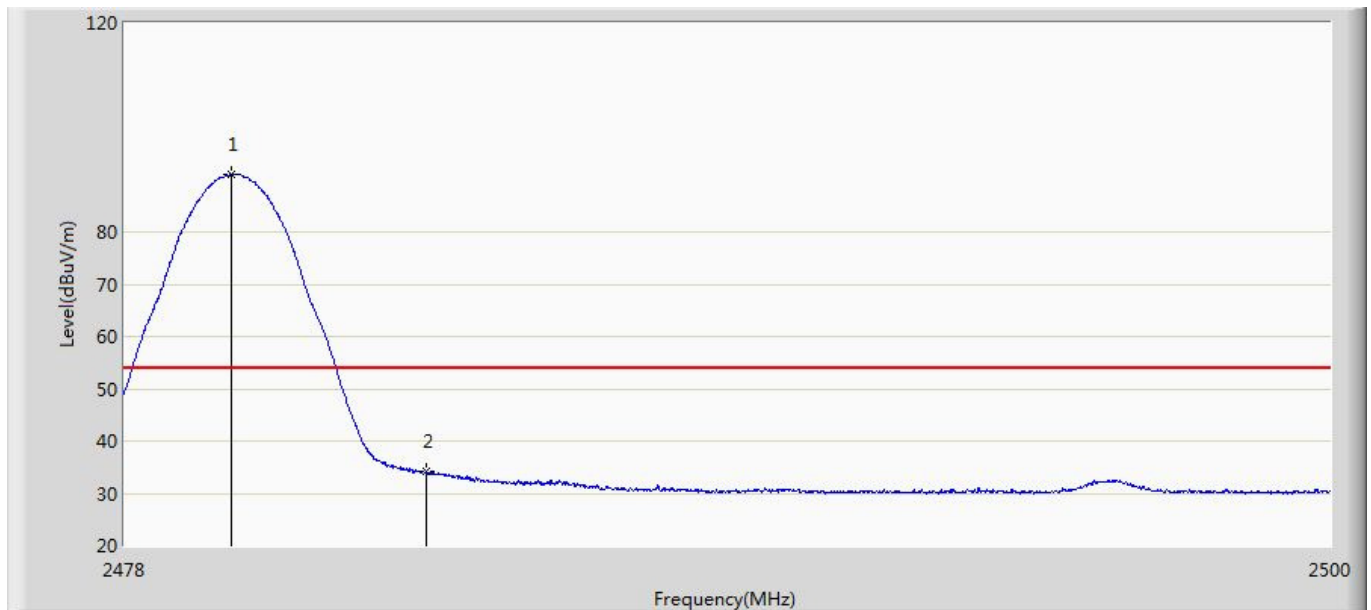
Site: AC102	Time: 2017/03/31 - 15:52
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: N/A	Polarity: Vertical
EUT: FSP-321B	Power: AC 120V/60Hz
Note: Mode:Transmit BLE at 2480MHz	



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2480.024	91.398	93.303	N/A	N/A	-1.905	PK
2		2483.500	60.425	62.317	-13.575	74.000	-1.892	PK

FCC ID: Q4B-FSP-3X1

Site: AC102	Time: 2017/03/31 - 15:59
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: N/A	Polarity: Vertical
EUT: FSP-321B	Power: AC 120V/60Hz
Note: Mode:Transmit BLE at 2480MHz	



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2479.936	90.974	92.879	N/A	N/A	-1.905	AV
2		2483.500	34.106	35.998	-19.894	54.000	-1.892	AV

_____ The End _____