FCC TEST REPORT

According to

CFR47 §15.247

Applicant	:	**Elo Touch Solutions, Inc**
Address	:	**670 N. McCarthy Blvd., Suite 100, Milpitas, CA95035**
Manufacturer	:	**Elo Touch Solutions, Inc.**
Address	:	**670 N. McCarthy Blvd., Suite 100, Milpitas, CA95035**
Equipment	:	**Touch All in one Computer**
Model No.	:	**ESY15I1B, ESY15I1C**
FCC ID	:	**RBWESY15I1B**
IC ID	:	**10757B-ESY15I1B**
Test Period	:	**Sept.03,2017~ Sept.18, 2017**

■ The test result refers exclusively to the test presented test model / sample.

■ Without written approval of ***Cerpass Technology Corporation Test Laboratory.*** the test report shall not be reproduced exc- ept in full.

■ The test report must not be used by the clients to claim product certification approval by any agency of the Government.

I HEREBY CERTIFY THAT :
The measurements shown in this test report were made in accordance with the procedures given in **ANSI C63.10 – 2013&RSS-247,Issue 2&RSS-Gen&FCC Part15.247**and the energy emitted by this equipment was ***passed.***

Approved by:

Mark Liao / Assistant Manager

Laboratory Accreditation:

☒ Cerpass Technology Corporation Test Laboratory

TAF LAB Code:	**1439**

Contents

History of this Test Report

Report No.	Version	Issue Date	Description
TEFN1707267-B	Rev 01	Sept. 21, 2017	Original.

1. Report of Measurements and Examinations

Performed Test Item	Normative References	Test Performed	Deviation	Result
Conducted Emission	FCC CFR Title 47 Part 15 Subpart C: 2016 Section 15.207	Yes	N/A	Pass
Radiated Emission	FCC CFR Title 47 Part 15 Subpart C: 2016 Section 15.209 RSS-Gen Issue 4 November 2014 Section 6.13	Yes	No	Pass
RF Antenna Conducted Spurious	FCC CFR Title 47 Part 15 Subpart C: 2016 Section 15.247(d) RSS-247 Issue 2 February 2017 Section 5.5	Yes	No	Pass
Radiated Emission Band Edge	FCC CFR Title 47 Part 15 Subpart C: 2016 15.247(d) RSS-247 Issue 2 February 2017 Section 5.5	Yes	No	Pass
Operation Frequency Range of 20dB Bandwidth	FCC CFR Title 47 Part 15 Subpart C: 2016 15.215(c)	Yes	No	Pass
Occupied Bandwidth	FCC CFR Title 47 Part 15 Subpart C: 2016 Section 15.247(a)(2) RSS-247 Issue 2 February 2017 Section 5.2(a)	Yes	No	Pass
Output Power	FCC CFR Title 47 Part 15 Subpart C: 2016 Section 15.247(b)(3) RSS-247 Issue 2 February 2017 Section 5.4(d)	Yes	No	Pass
Power Spectral Density	FCC CFR Title 47 Part 15 Subpart C: 2016 Section 15.247(e) RSS-247 Issue 2 February 2017 Section 5.2(b)	Yes	No	Pass

2. General Info

2.1 Description of EUT

Product name	Touch All in one Computer	
Model No.	ESY15I1B, ESY15I1C (two models were identical except for marketing purpose)	
Operational Climate	Tnomal:	25℃
	Tmin:	0℃
	Tmax:	35℃
Power supply	Model:	ADP-65JH HB
	Input:	100-240V~ 50/60Hz 1.5A
	Output:	19V⎓3.42A

2.2 Description of wireless module

Module Name	80-WL024-12
Bluetooth Specification	BT4.0
Modulation Type	GFSK
Frequency Range	2402 - 2480 MHz
BT Channel Number	40
Data Rate	1Mbps(GFSK)
Channel Separation	2MHz

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

2.3 Description of Antenna

Model	Antenna	Peak Gain
ESY10I1B, ESY10I1C	PCB Antenna	2.92dBi for 2.4~2.4835GHz band 2.67dBi for 5.15~5.25GHz band 2.64dBi for 5.725~5.85GHz band
ESY15I1B, ESY15I1C	PCB Antenna	2.68dBi for 2.4~2.4835GHz band 2.50dBi for 5.15~5.25GHz band 2.54dBi for 5.725~5.85GHz band
ESY22I1B	PCB Antenna	2.68dBi for 2.4~2.4835GHz band 2.50dBi for 5.15~5.25GHz band 2.54dBi for 5.725~5.85GHz band

Note: We choose the maximum peak gain (ESY10I1B) for final test of each channel shown as the table.

2.4 Carrier Frequency of Channels

Bluetooth Working Frequency of Each Channel: (For V4.0)							
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

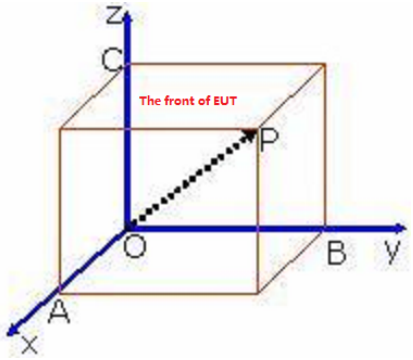
2.5 The Worst Case Configuration

Data rate Configuration:

Modulation Mode	Worst Data Rate
BLE	1Mbps

Note: 1. Power output test was verified over all data rates of each mode, and then choose the maximum power output for final test of each channel shown as the table.

2. EUT is put X,Y,Z three axial assessment test,and Y axial is the worst case,so the EUT is put Y axial for all RF items tested.



2.6 EUT Exercise Software

1	Turn on the power of equipment.
2	Run 'QRCT', input RF test command and set the test mode and channel, then press Transmit to start continue transmit.

2.7 Power Parameter Value of the test software

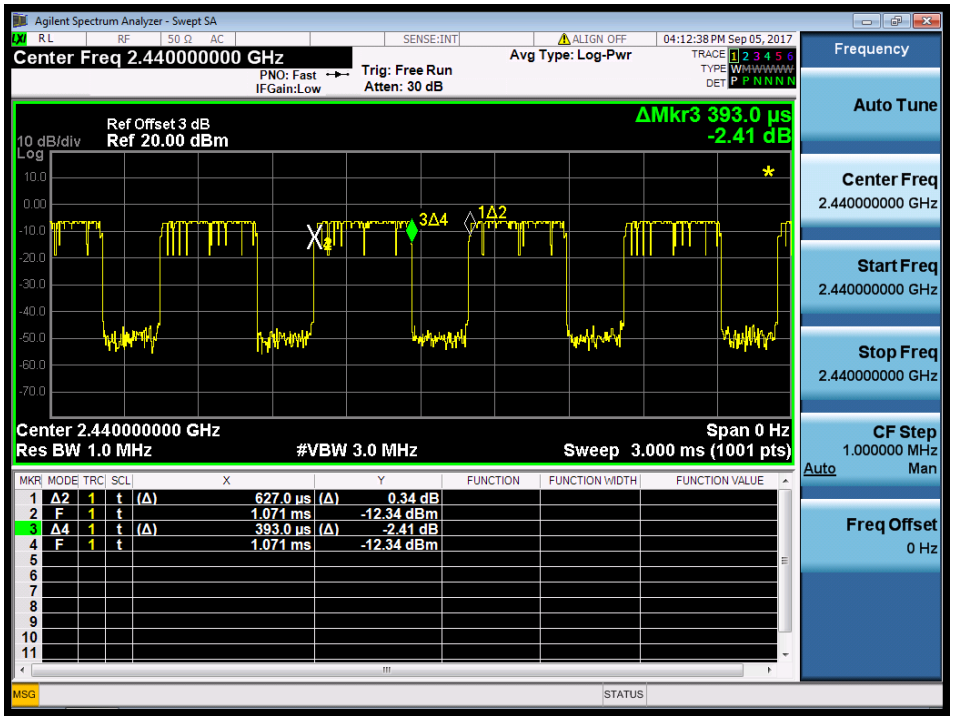
Mode	Frequency (MHz)	Power Setting
BLE	2402	9
	2440	9
	2480	9

2.8 Duty cycle

Test Item	Duty cycle

Mode	Frequency (MHz)	Measurement (%)
BLE	2440	62.68

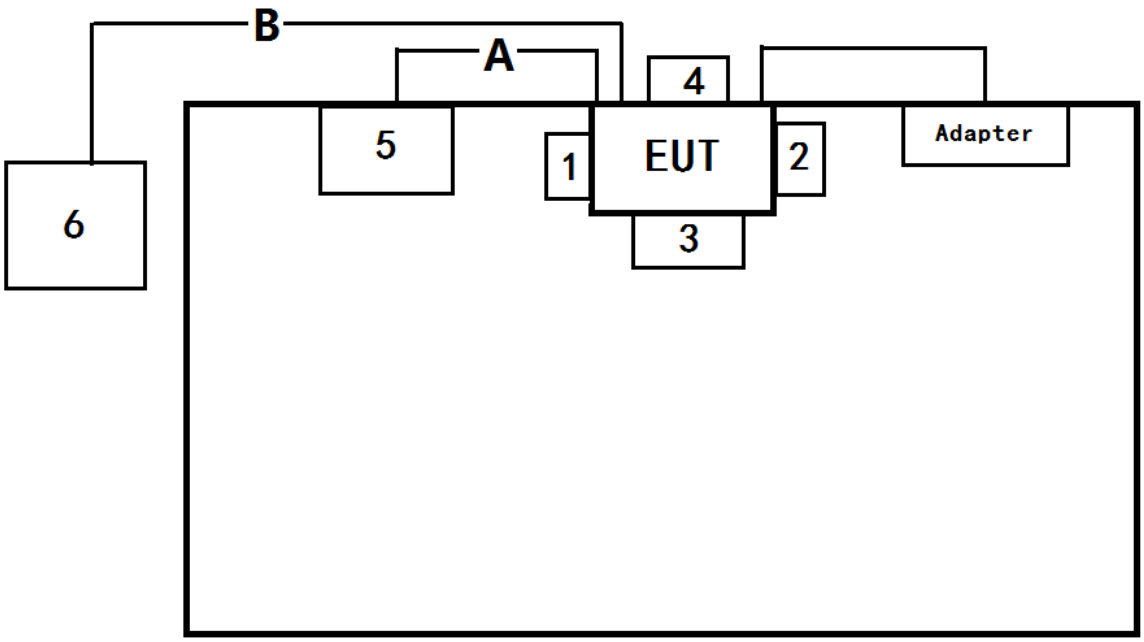
BLE (2440MHz)



2.9 Support equipment

Product	Manufacturer	Model No.	Serial No.
1 Barcode Scanner	Elo Touch Solutions, Inc.	KIT,BCR,USB, AAiO/02 Series	E093433
2 Barcode Scanner	Elo Touch Solutions, Inc.	KIT,FPR,USB,ESY X-Series	E001001
3 NFC	Elo Touch Solutions, Inc.	KIT,NFC,USB, ESY X Series/AAiO/02 Series	E001004
4 Barcode Scanner	Elo Touch Solutions, Inc.	ELOKIT, 2DBCR, USB, ESYELO-RGEN	E926356
5 HDD	HGST	HTS721010A9E630	N/A
6 Router	Zyxel	P-660HNU-T1	R33011

Connection Diagram



Signal Cable Type		Signal cable Description
A	USB Cable	0.3m
B	Lan Cable	＞10m

3. General Information of Test Site

3.1 Information of Test Site

Test Site :	**Cerpass Technology Corporation Test Laboratory** Location: No.10 Lane2 Lianfu Street Luzhu District, Taoyuan City Taiwan ROC Tel:+886-3-3226-888 Fax:+886-3-3226-881
FCC Registration Number :	TW1439
IC Registration Number :	4934B-1
VCCI	T-2205 for Telecommunication Test C-4663 for Conducted emission test R-4399, R-4218 for Radiated emission test G-812, G-813 for radiated disturbance above 1GHz

3.2 Measuring Equipment

Instrument/Ancillary	Manufacturer	Model No.	Serial No.	Calibration Date	Valid Date.
Test Receiver	R&S	ESCI	100565	2017.03.26	2018.03.25
AMN	R&S	ESH2-Z5	100182	2017.09.06	2018.09.05
Two-Line V-Network	R&S	ENV216	100325	/	/
Pulse Limiter	R&S	ESH3-Z2	100529	2017.03.26	2018.03.25
Temperature/ Humidity Meter	Zhicheng	ZC1-11	CEP-TH-004	2017.03.29	2018.03.28
EZ-EMC	Fala	Ver CT3A1	N/A	N/A	N/A

Instrument/Ancillary	Manufacturer	Model No.	Serial No.	Calibration Date	Valid Date.
EMI Test Receiver	R&S	ESCI	101183	2017.03.26	2018.03.25
Preamplifier	songyi	EM330	60618	2017.03.26	2018.03.25
Preamplifier	Agilent	8449B	3008A02342	2017.03.26	2018.03.25
Bilog Antenna	Sunol Science	JB1	A072414-1	2017.04.16	2018.04.15
Broad-Band Horn Antenna	Schwarzbeck	BBHA9120D	9120D-618	2017.04.16	2018.04.15
Broad-Band Horn Antenna	Schwarzbeck	BBHA9170	9170-347	2017.04.16	2018.04.15
Preamplifier	COM-POWER	PA-840	711885	2017.03.26	2018.03.25
Spectrum Analyzer	R&S	FSP40	100324	2017.03.26	2018.03.25
Spectrum Analyzer	KEYSIGHT	N9010A	MY54200207	2017.03.17	2018.03.16
Temperature/ Humidity Meter	Zhicheng	ZC1-11	CEP-TH-002	2017.03.29	2018.03.28
EZ-EMC	Fala	Ver CT3A1	N/A	N/A	N/A

3.3 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		±8.7X10^{-7}	±1X10^{-5}
RF output power, conducted		±0.63dB	±1.5dB
Power density, conducted		±1.21dB	±3dB
Unwanted emissions, conducted	30-1000MHz	±0.51dB	±3dB
	1-25GHz	±0.67dB	±3dB
All emissions, radiated	30-1000MHz	±2.28dB	±6dB
	1-25GHz	±2.59dB	±6dB
Temperature		±0.8℃	±1℃
Humidity		±3%	±5%
DC and low frequency voltages		±3%	±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

4. AC Conducted Emission Measurement

4.1 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.

FCC Part 15 Subpart C Paragraph 15.207 Limits		
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.

4.2 Test Standard

Tested according to ANSI C63.10: 2013 Section 6.2 for compliance to FCC 47CFR 15.247 Part15.207 (a) requirements.

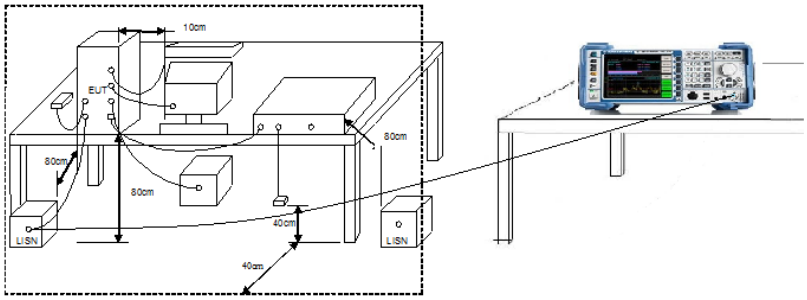
4.3 Test Procedures

The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm from any other grounded conducting surface. The EUT and simulators are connected to the main power through a line impedance stabilization network (LISN). The LISN provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN. (Please refer to the block diagram of the test setup and photographs) Each current-carrying conductor of the EUT power cord, except the ground (safety) conductor, was individually connected through a LISN to the input power source.

The excess length of the power cord between the EUT and the LISN receptacle were folded back and forth at the center of the lead to form a bundle not exceeding 40 cm in length.

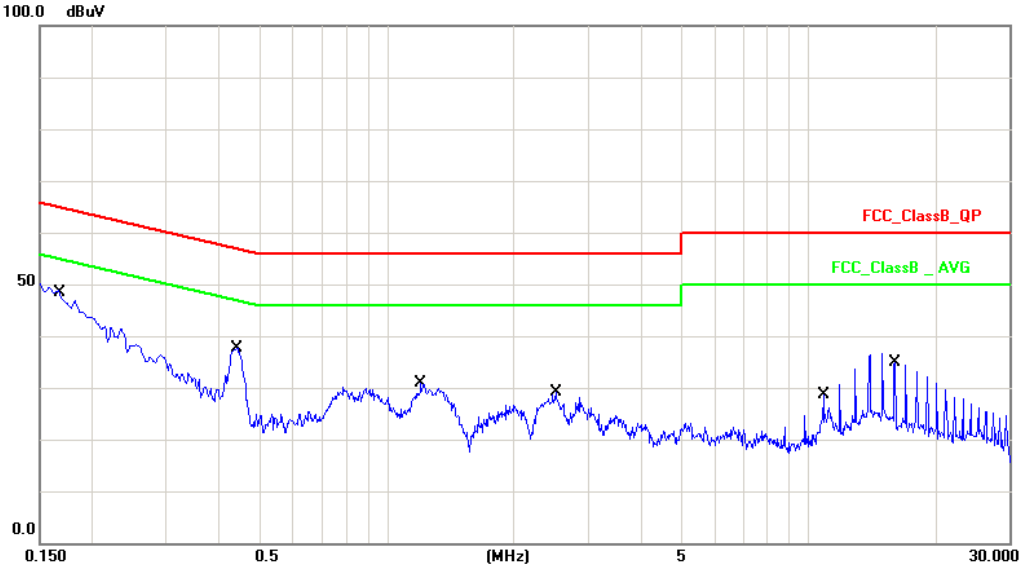
Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9 kHz.

4.4 Test Setup Layout



4.5 Test Result

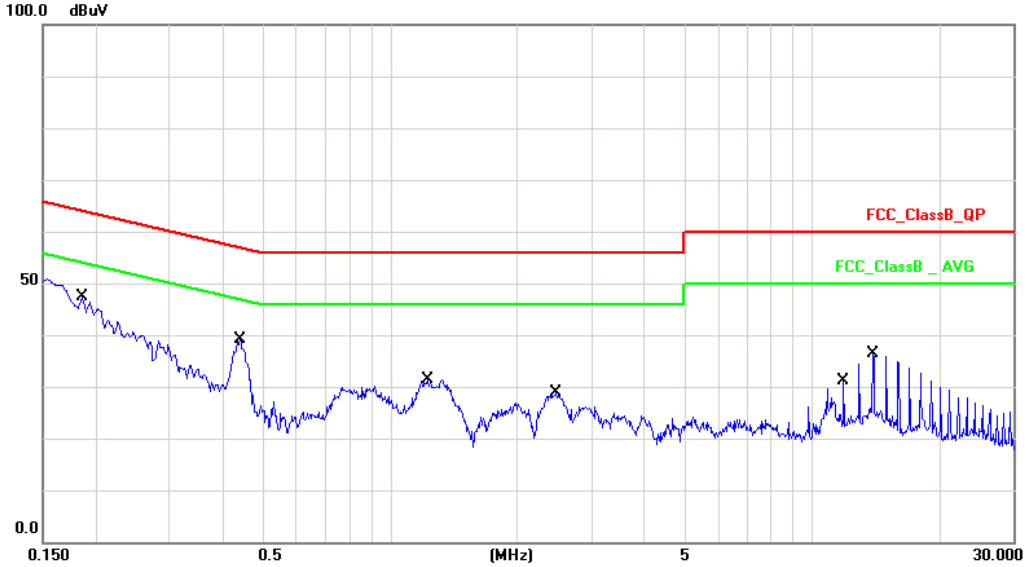
Test Mode :	Mode 1: Normal Operation with BT on		
AC Power :	AC 120V/60Hz	Phase:	LINE
Temperature :	26°C	Humidity:	60%
Pressure(mbar) :	1002	Date:	2017/09/11



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.1677	10.13	31.20	41.33	65.07	-23.74	QP
2	0.1677	10.13	10.44	20.57	55.07	-34.50	AVG
3	0.4420	10.15	25.31	35.46	57.02	-21.56	QP
4	0.4420	10.15	19.41	29.56	47.02	-17.46	AVG
5	1.2059	10.16	16.04	26.20	56.00	-29.80	QP
6	1.2059	10.16	10.93	21.09	46.00	-24.91	AVG
7	2.5260	10.18	13.93	24.11	56.00	-31.89	QP
8	2.5260	10.18	8.09	18.27	46.00	-27.73	AVG
9	10.8740	10.30	14.65	24.95	60.00	-35.05	QP
10	10.8740	10.30	11.11	21.41	50.00	-28.59	AVG
11	16.0620	10.49	22.89	33.38	60.00	-26.62	QP
12	16.0620	10.49	19.31	29.80	50.00	-20.20	AVG

Note: Measurement Level = Reading Level + Correct Factor

Test Mode :	Mode 1: Normal Operation with BT on		
AC Power :	AC 120V/60Hz	Phase :	NEUTRAL
Temperature :	26°C	Humidity :	60%
Pressure(mbar) :	1002	Date:	2017/09/11



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.1860	10.13	28.12	38.25	64.21	-25.96	QP
2	0.1860	10.13	8.44	18.57	54.21	-35.64	AVG
3	0.4420	10.15	25.53	35.68	57.02	-21.34	QP
4	0.4420	10.15	19.58	29.73	47.02	-17.29	AVG
5	1.2260	10.18	16.21	26.39	56.00	-29.61	QP
6	1.2260	10.18	11.01	21.19	46.00	-24.81	AVG
7	2.4860	10.19	14.49	24.68	56.00	-31.32	QP
8	2.4860	10.19	8.98	19.17	46.00	-26.83	AVG
9	11.9100	10.36	18.23	28.59	60.00	-31.41	QP
10	11.9100	10.36	14.62	24.98	50.00	-25.02	AVG
11	13.9820	10.48	24.13	34.61	60.00	-25.39	QP
12	13.9820	10.48	21.66	32.14	50.00	-17.86	AVG

Note: Measurement Level = Reading Level + Correct Factor

5. Radiated Emission Measurement

5.1 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).

FCC Part 15 Subpart C Paragraph 15.209		
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

Note 1: The lower limit shall apply at the transition frequency.
Note 2: Distance refers to the distance in meters between the measuring instrument Antenna and the closed point of any part of the device or system.
Note 3: E field strength (dBuV/m) = 20 log E field strength (uV/m)
Note 4: **Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permItted under other sections of this part, e.g., §§15.231 and 15.241.

5.2 Test Standard

KDB 558074 D01v04 - Section 12.2.3 (quasi-peak measurements)
KDB 558074 D01v04 - Section 12.2.4 (peak power measurements)
KDB 558074 D01v04- Section 12.2.5 (average power measurements)

5.3 Test Procedures

Quasi-Peak Field Strength Measurements:

The specifications for measurements using the CISPR quasi-peak detector can be found in Publication 16 of the International Special Committee on Radio Frequency Interference (CISPR) of the International Electrotechnical Commission.

As an alternative to CISPR quasi-peak measurement, compliance can be demonstrated to the applicable emission limits using a peak detector.

Peak Field Strength Measurements:

Analyzer center frequen 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:

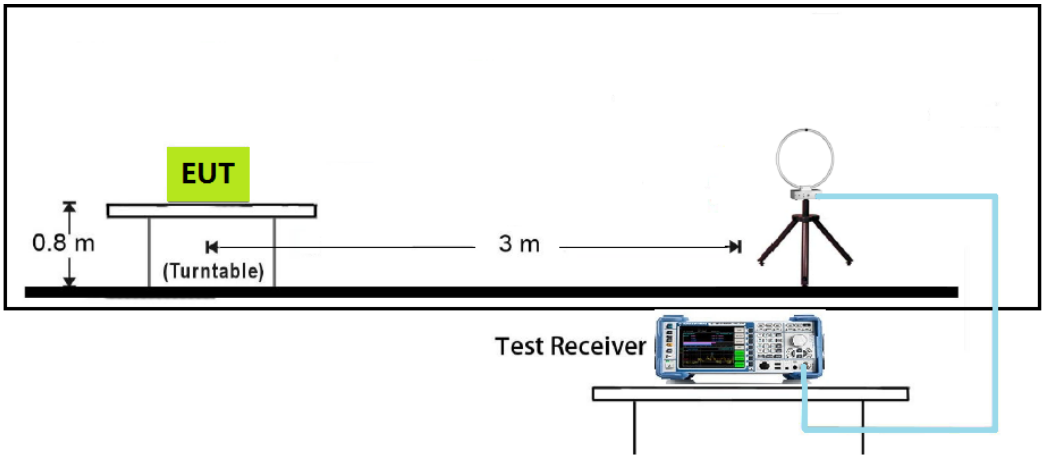
Analyzer center frequen was set to the frequency of the radiated spurious emission of interest

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

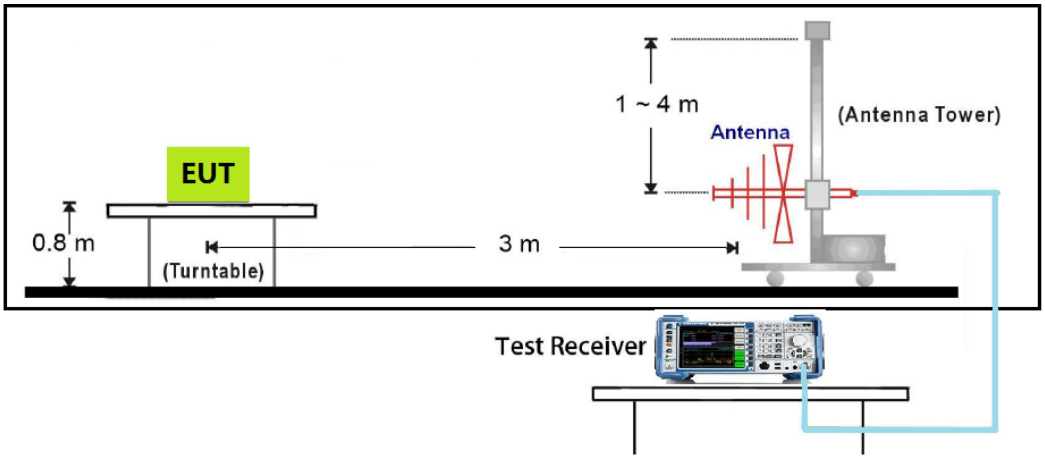
Do as an alternative, the instrument may be set to linear detector mode. Ensure that video filtering is applied in linear voltage domain (rather than in a log or dB domain). Some instruments require linear display mode in order to accomplish this. Others have a setting for Average-VBW Type, which can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

5.4 Test Setup Layout

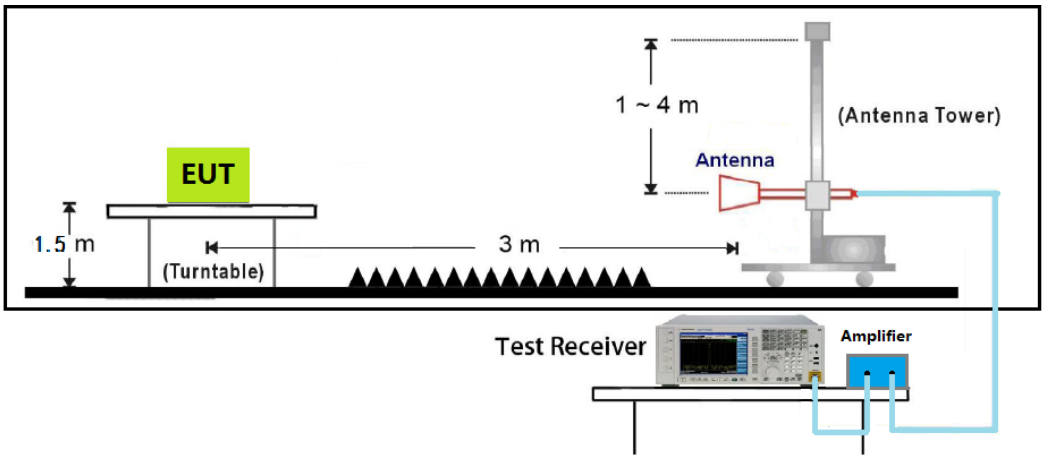
9kHz~30MHz Test Setup



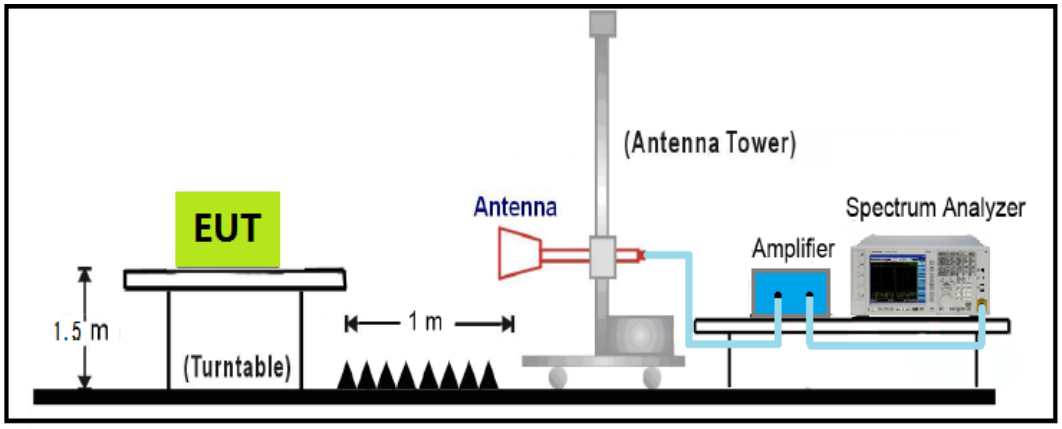
30MHz~1GHz Test Setup



1GHz~18GHz Test Setup

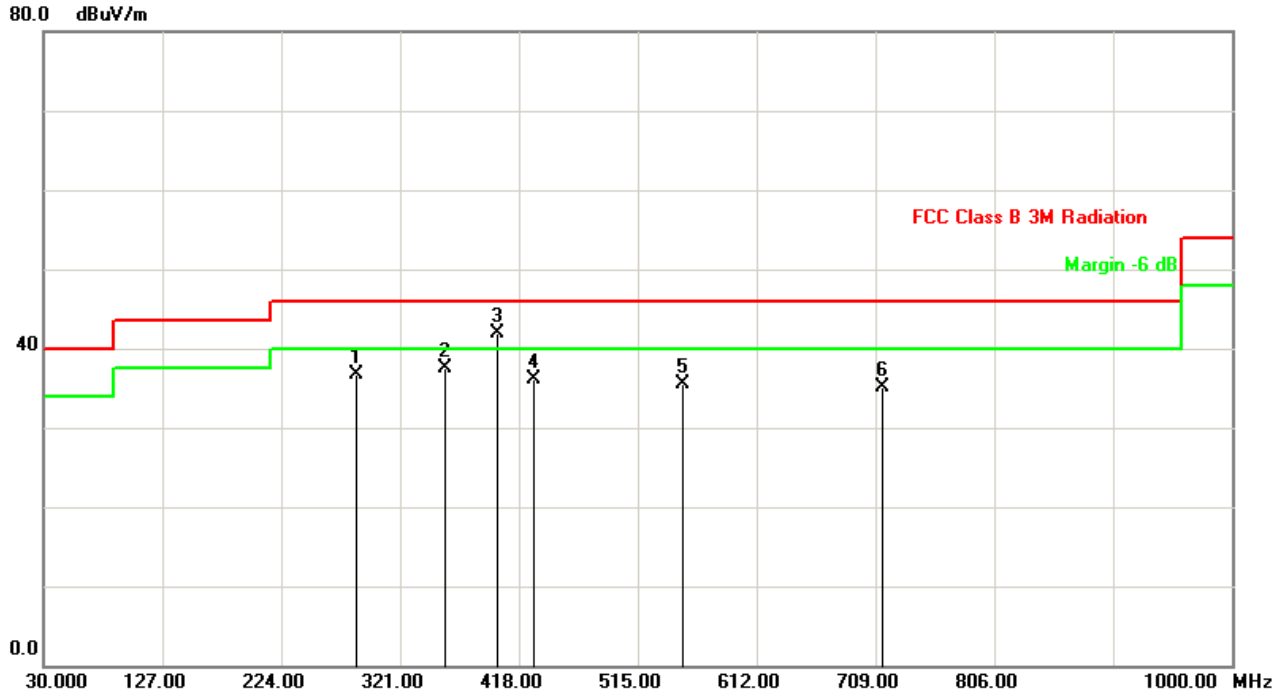


18GHz~40GHz Test Setup



5.5 Test Result

Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: CBL6112D (30-1000MHz)	Polarity: Horizontal
EUT: Touch All in one Computer	Power: AC 120V/60Hz
Note: Mode1: Transmit at channel 2437MHz by 802.11b	

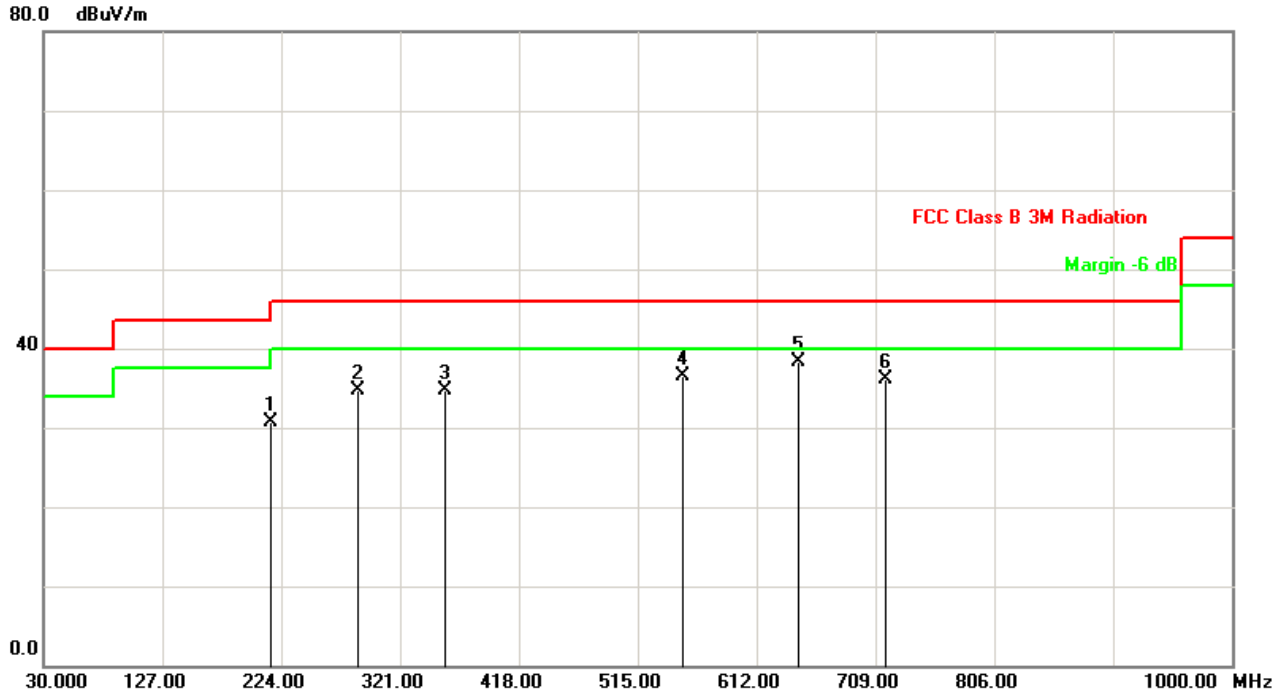


No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	286.0799	-8.77	45.38	36.61	46.00	-9.39	QP
2	357.8599	-6.82	44.30	37.48	46.00	-8.52	QP
3	400.5400	-5.67	47.53	41.86	46.00	-4.14	QP
4	430.6100	-4.41	40.47	36.06	46.00	-9.94	QP
5	551.8600	-3.60	39.01	35.41	46.00	-10.59	QP
6	714.8200	1.32	33.78	35.10	46.00	-10.90	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: Touch All in one Computer	Power: AC 120V/60Hz
Note: Mode1: Transmit at channel 2437MHz by 802.11b	



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	215.2700	-12.25	43.04	30.79	43.50	-12.71	QP
2	287.0500	-8.73	43.53	34.80	46.00	-11.20	QP
3	357.8599	-6.82	41.62	34.80	46.00	-11.20	QP
4	551.8600	-3.60	40.19	36.59	46.00	-9.41	QP
5	645.9500	-2.17	40.51	38.34	46.00	-7.66	QP
6	717.7300	1.36	34.68	36.04	46.00	-9.96	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:

Radiated Emission above 1GHz:

Mode1: Transmit by BLE

CH	Antenna	Frequency (MHz)	Reading Level (dBuV/m)	Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
0	H	4804.0	54.1	-8.4	45.7	54(note3)	-8.3	PK
	H	7206.0	51.7	-3.5	48.2	54(note3)	-5.8	PK
	V	4804.0	53.5	-8.4	45.1	54(note3)	-8.9	PK
	V	7206.0	52.0	-3.5	48.5	54(note3)	-5.5	PK
19	H	4880.0	53.8	-8.1	45.7	54(note3)	-8.3	PK
	H	7320.0	52.2	-3.1	49.1	54(note3)	-4.9	PK
	V	4880.0	53.9	-8.1	45.8	54(note3)	-8.2	PK
	V	7320.0	51.1	-3.1	48	54(note3)	-6	PK
39	H	4960.0	53.2	-8.3	44.9	54(note3)	-9.1	PK
	H	7440.0	51.0	-2.9	48.1	54(note3)	-5.9	PK
	V	4960.0	52.4	-8.3	44.1	54(note3)	-9.9	PK
	V	7440.0	51.7	-2.9	48.8	54(note3)	-5.2	PK

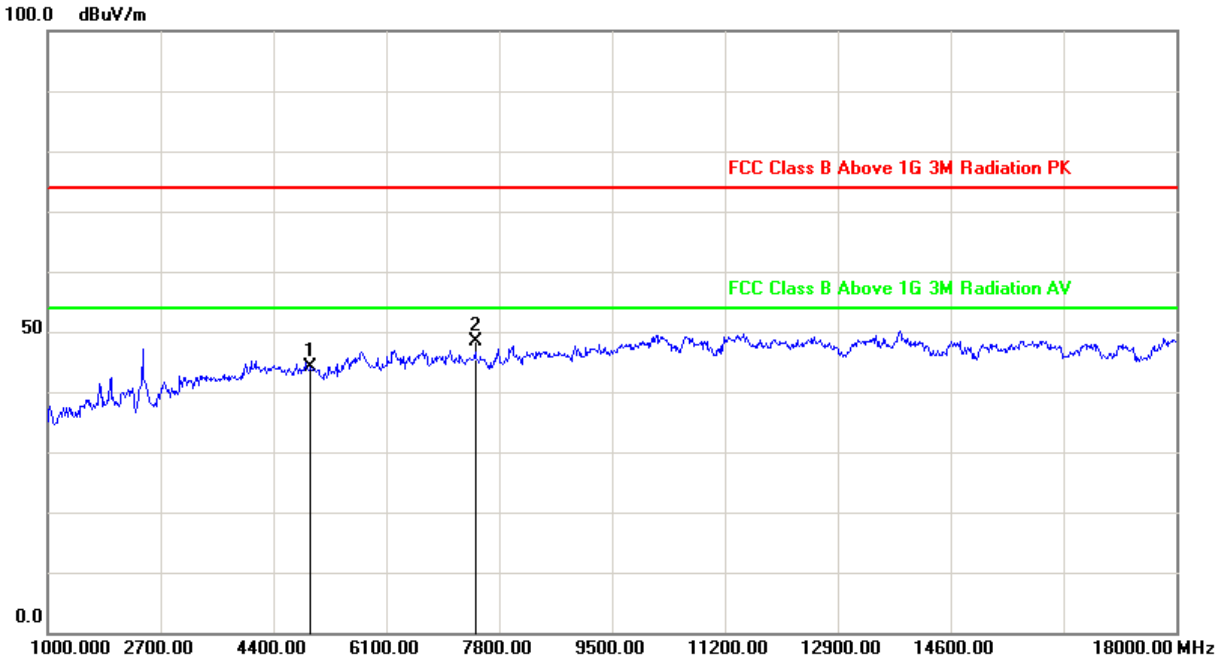
Note: 1. Measure Level = Reading Level + Factor.

2. The test trace is same as the ambient noise (the test frequency range: 9kHz~30MHz, 18GHz~25GHz), therefore no data appear in the report.

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 1~18GHz:

Site: AC102	Time: 2017/09/13
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: N/A	Polarity: Horizontal
EUT: Touch All in one Computer	Power: AC 120V/60Hz
Note: Mode: Transmit 802.11b at 2437MHz	

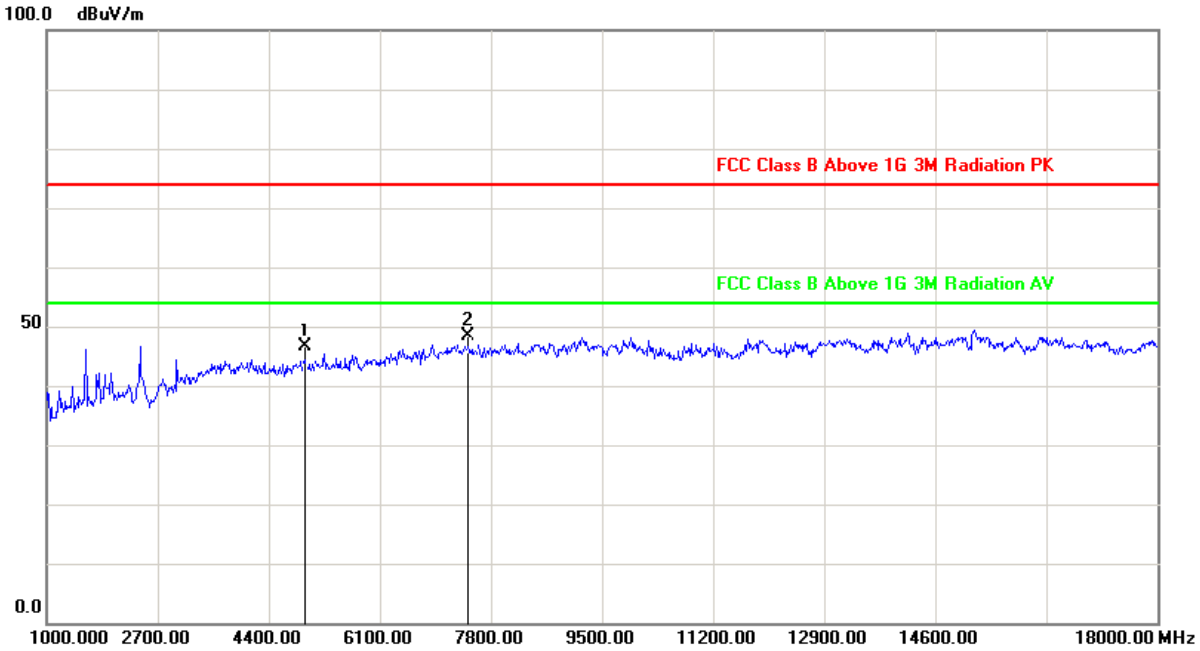


No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	4960.000	-8.1	53.8	45.7	54(note3)	-8.3	peak
2	7440.000	-3.1	52.2	49.1	54(note3)	-4.9	peak

Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or AVG measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor
3. The test trace is same as the ambient noise (the test frequency range: 9kHz~30MHz, 18GHz~40GHz), therefore no data appear in the report.

Site: AC102	Time: 2017/09/13
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: N/A	Polarity: Vertical
EUT: Touch All in one Computer	Power: AC 120V/60Hz
Note: Mode: Transmit 802.11b at 2437MHz	



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	4960.000	-8.1	53.9	45.8	54(note3)	-8.2	peak
2	7440.000	-3.1	51.1	48	54(note3)	-6	peak

Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or AVG measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor
3. The test trace is same as the ambient noise (the test frequency range: 9kHz~30MHz, 18GHz~40GHz), therefore no data appear in the report.

6. 6dB Bandwidth Measurement

6.1 Test Limit

According to FCC part15.247 - Section (a)(2), the minimum 6dB bandwidth shall be at least 500 kHz.

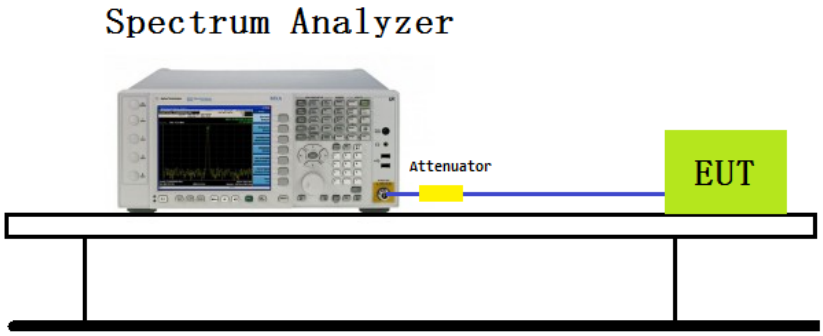
6.2 Test Standard

KDB 558074 D01v04– Section 8.2 Option 2

6.3 Test Procedures

1. Set RBW=100KHz
2. VBW≥3×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.

6.4 Test Setup Layout

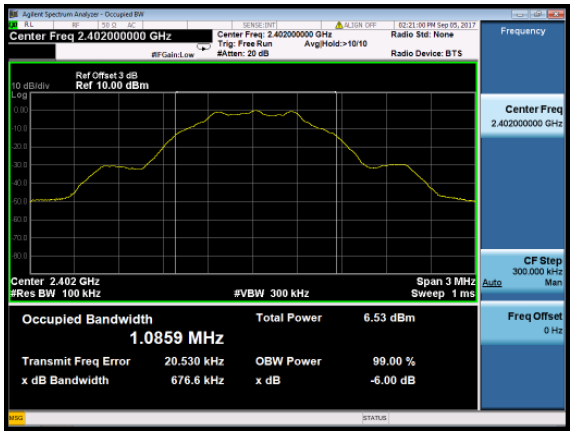


6.5 Test Result

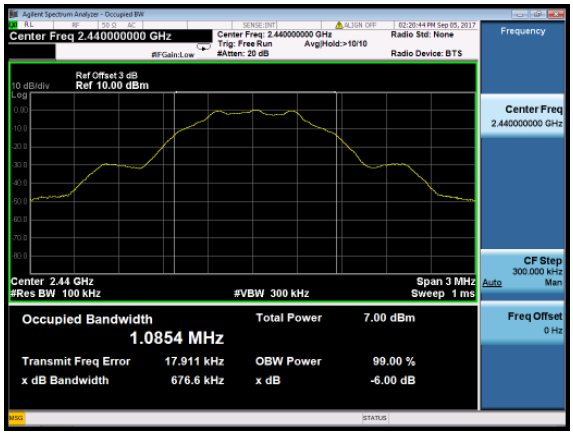
Test Item	Occupied Bandwidth
Test Mode	Mode 1: Transmit by BLE

Channel No.	Frequency(MHz)	6dB Bandwidth(KHz)	99% Bandwidth(MHz)
0	2402	676.6	1.0859
19	2440	676.6	1.0854
39	2480	678.9	1.0857

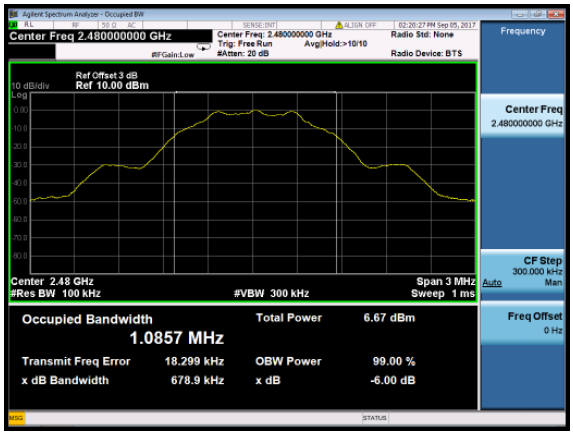
Channel 0 (2402MHz)



Channel 19 (2440MHz)



Channel 39 (2480MHz)



7. Output Power Measurement

7.1 Test Limit

According to FCC part15.247 (b) (3), for systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.
Per RSS247 Issue 2 Section 5.4(d), for DTSs employing digital modulation techniques operating in the bands 902-928 MHz and 2400-2483.5 MHz, the maximum peak conducted output power shall not exceed 1W.

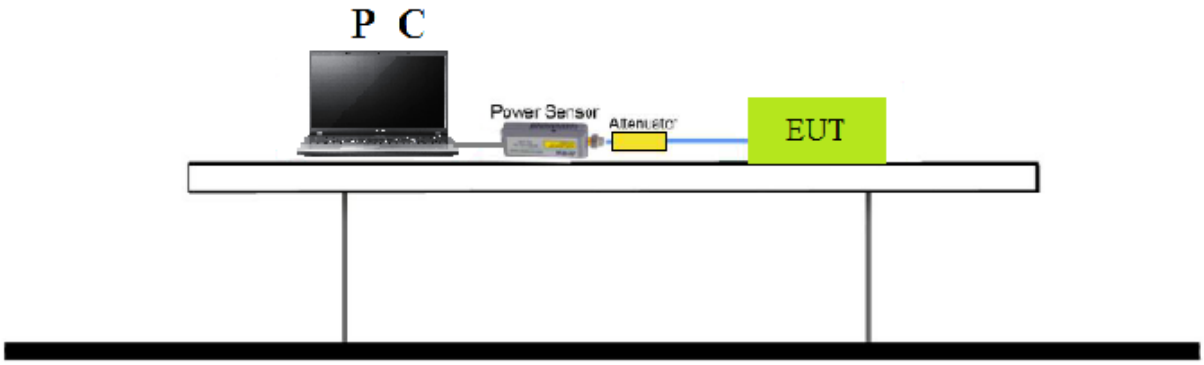
7.2 Test Standard

KDB 558074 D01v04 - Section 9.1.2 PKPM1 Peak Power Method (for signals with BW ≤50MHz)

7.3 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.

7.4 Test Setup Layout



7.5 Test Result

For Peak Power :

Test Mode	Channel No.	Frequency (MHz)	Peak Output Power (dBm)	Limit (dBm)	Result
BLE	0	2402	6.51	30	Pass
	19	2440	6.23	30	Pass
	39	2480	5.78	30.	Pass

For Average Power :

Test Mode	Channel No.	Frequency (MHz)	Average Output Power (dBm)	Limit (dBm)	Result
BLE	0	2402	-0.83	30.	Pass
	19	2440	-1.01	30	Pass
	39	2480	-1.51	30.	Pass

8. Power Spectral Density Measurement

8.1 Test Limit

According to FCC part15.247 - Section (e), for digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

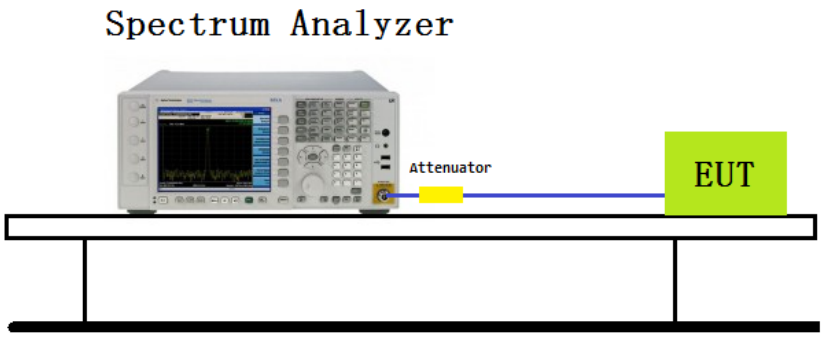
8.2 Test Standard

KDB 558074 D01v04- Section 10.2 Method PKPSD

8.3 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.

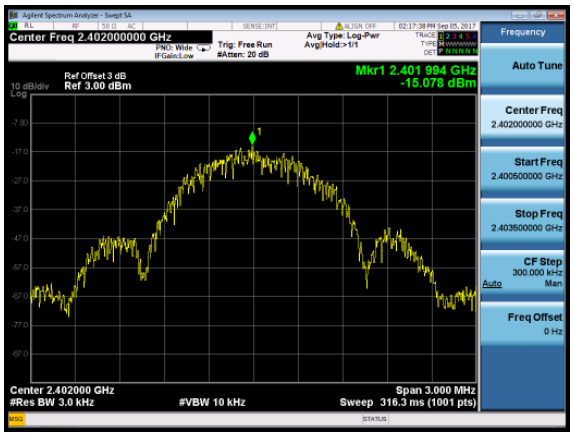
8.4 Test Setup Layout



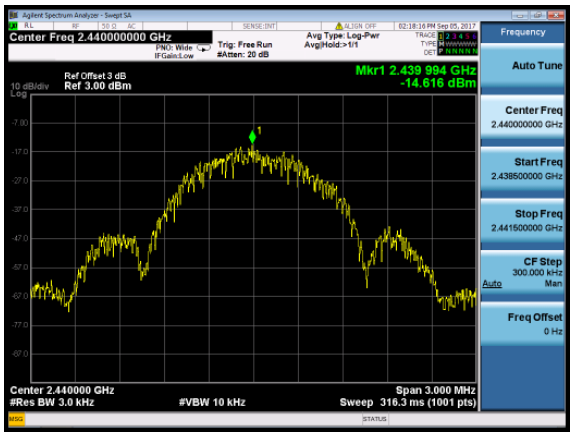
8.5 Test Result

Test Mode	Channel No.	Frequency(MHz)	Power Spectral Density (dBm/3kHz)	Limit (dBm/3kHz)	Result
BLE	0	2402	-15.078	8	Pass
	19	2440	-14.616	8	Pass
	39	2480	-14.975	8	Pass

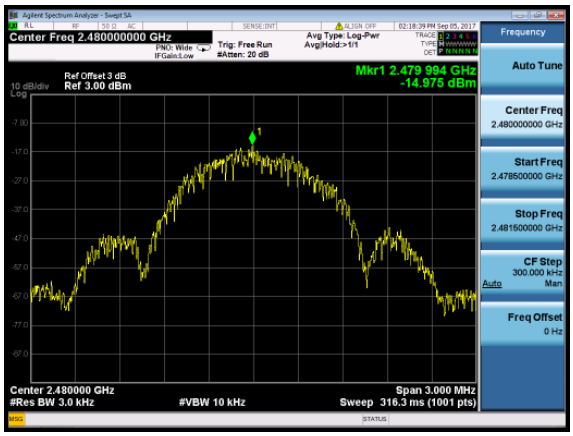
Channel 0 (2402MHz)



Channel 19 (2440MHz)



Channel 39 (2480MHz)



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

9.1 Test Limit

According to FCC part 15.247(d) , 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.

9.2 Test Standard

KDB 558074 D01v04 - Section 11.2 & Section 11.3

9.3 Test Procedures

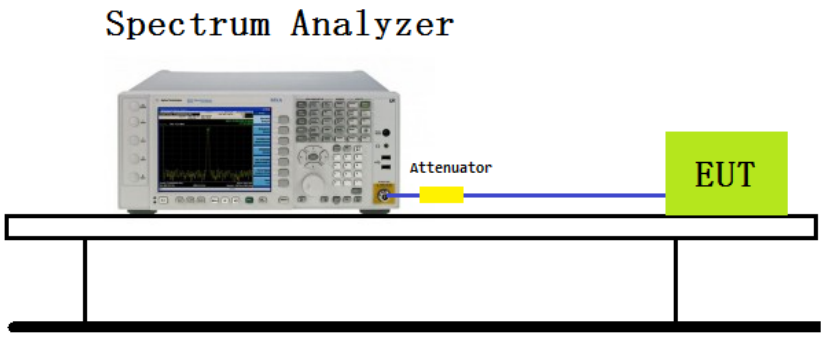
Reference level measurement:

1. Set the RBW = 100 kHz
2. Set the VBW ≥ 3 x 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

9.4 Test Setup Layout

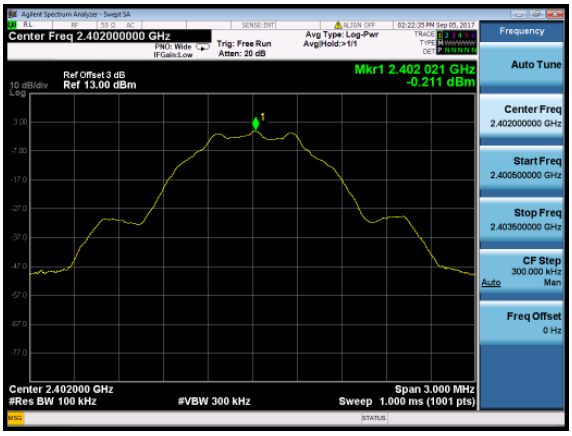


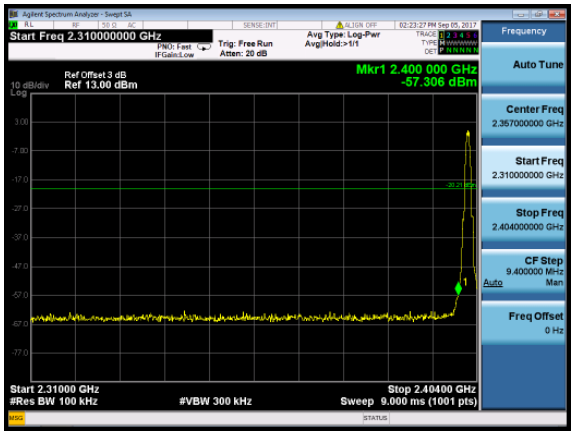
9.5 Test Result

Test Mode	Channel No.	Frequency (MHz)	Limit	Result
BLE	0	2402	20dBc	Pass
	19	2440	20dBc	Pass
	39	2480	20dBc	Pass

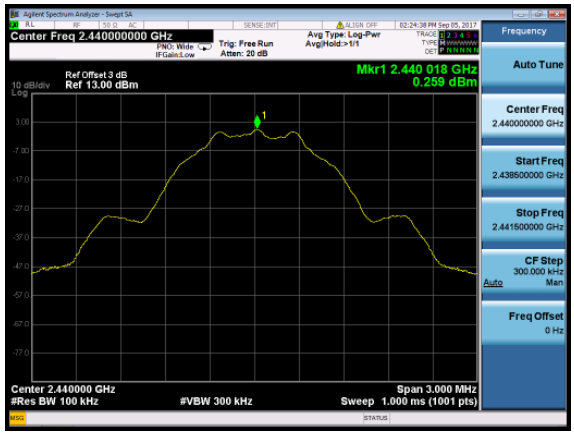
Test Item	:	Conducted Band Edge and Out-of-Band Emissions
Test Mode	:	Mode 1: Transmit by BLE

Mode 1: Transmit by BLE (2402MHz)

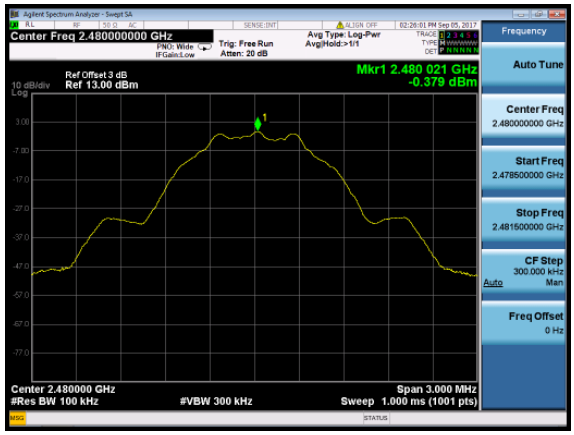


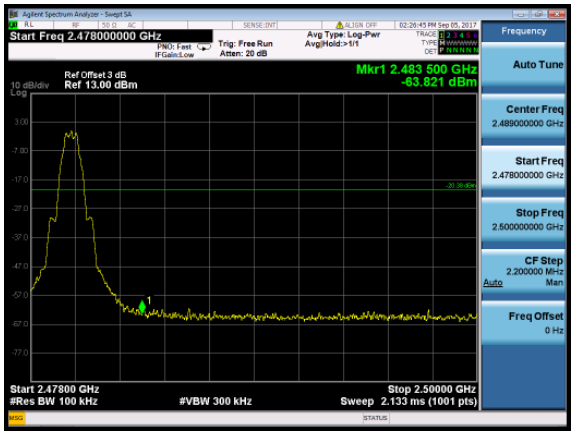


Mode 1: Transmit by BLE (2440MHz)



Mode 1: Transmit by BLE (2480MHz)





10. Radiated Emission Band Edge Measurement

10.1 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.

10.2Test Standard

ANSI C63.10-2013 Section 6.10.5

10.3 Test Procedure

Peak Field Strength Measurements:

Analyzer center frequen 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

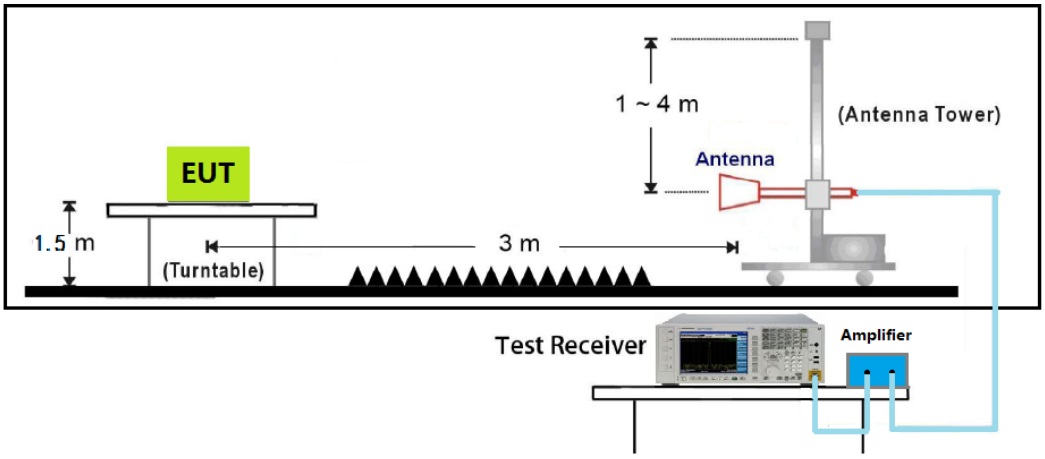
AVE Field Strength Measurements:

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

7. RBW= 1MHz
8. VBW≥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

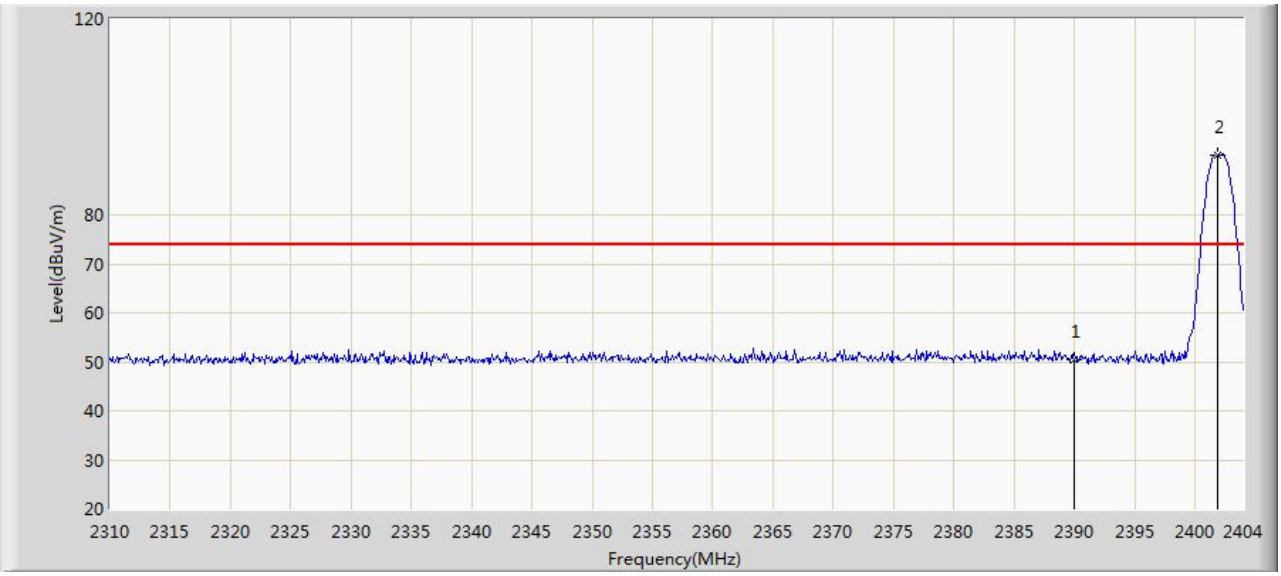
Do as an alternative, the instrument may be set to linear detector mode. Ensure that video filtering is applied in linear voltage domain (rather than in a log or dB domain). Some instruments require linear display mode in order to accomplish this. Others have a setting for Average-VBW Type, which can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

10.4 Test Setup Layout



10.5 Test Result

Site: AC102	Time: 2017/09/09 - 14:24
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: N/A	Polarity: Horizontal
EUT: Touch All in one Computer	Power: AC 120V/60Hz
Note: Mode:Transmit BLE at 2402MHz	

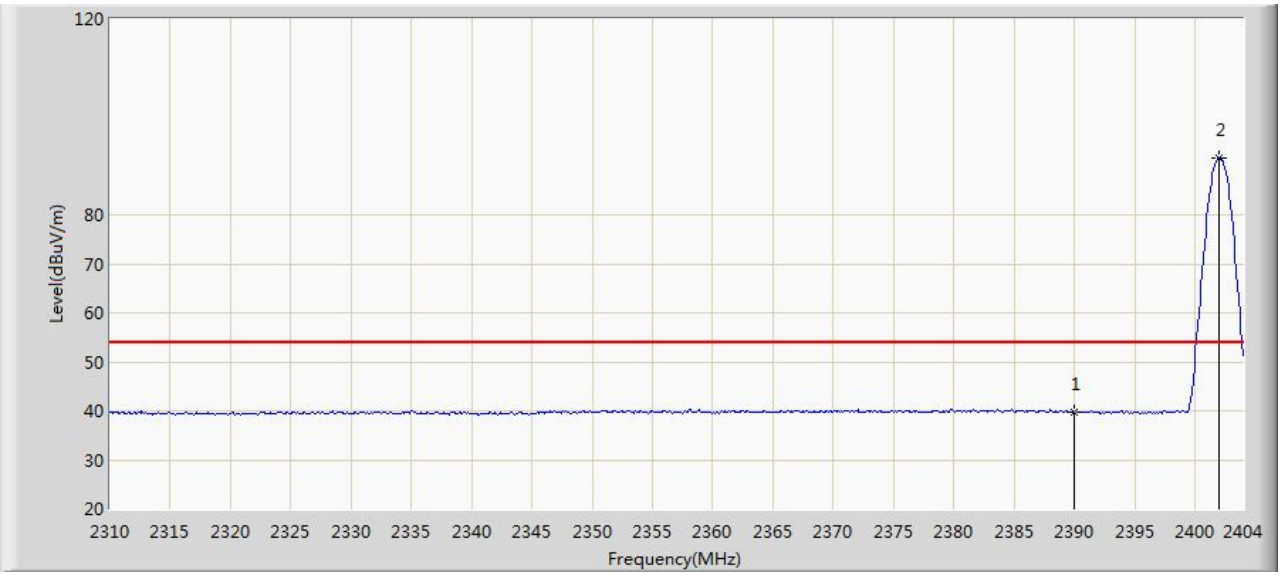


No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2390.000	50.323	52.564	-23.677	74.000	-2.241	PK
2	*	2401.932	92.277	94.474	N/A	N/A	-2.197	PK

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

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m).

Site: AC102	Time: 2017/09/09 - 14:35
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: N/A	Polarity: Horizontal
EUT: Touch All in one Computer	Power: AC 120V/60Hz
Note: Mode:Transmit BLE at 2402MHz	

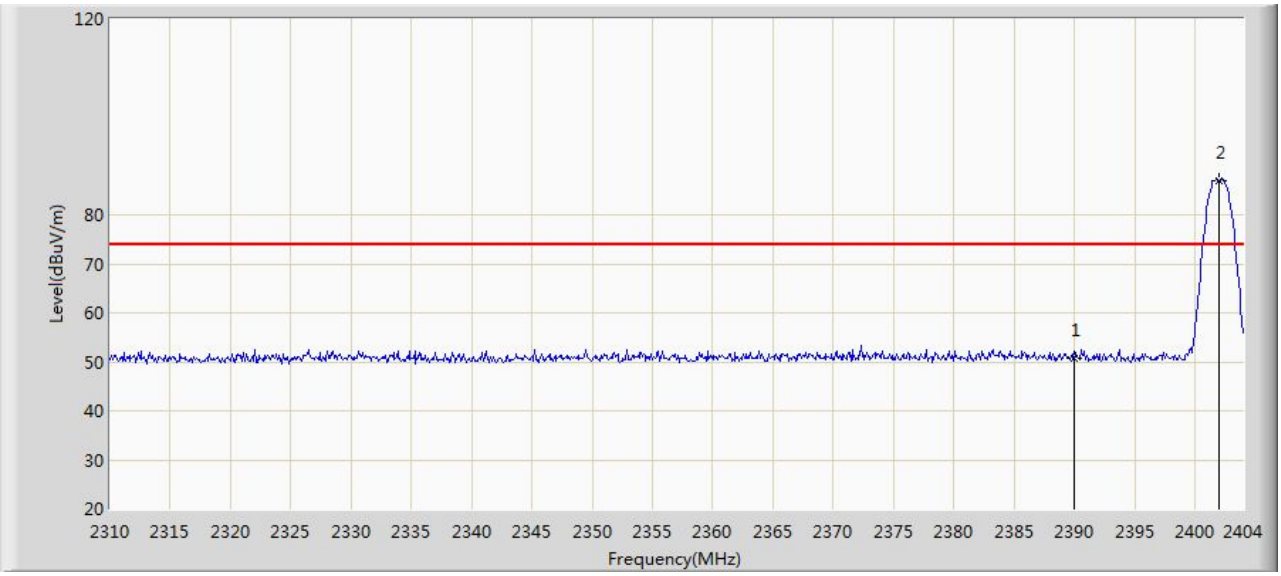


No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2390.000	39.814	42.055	-14.186	54.000	-2.241	AV
2	*	2402.026	91.628	93.824	N/A	N/A	-2.196	AV

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

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m).

Site: AC102	Time: 2017/09/09 - 14:36
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: N/A	Polarity: Vertical
EUT: Touch All in one Computer	Power: AC 120V/60Hz
Note: Mode:Transmit BLE at 2402MHz	

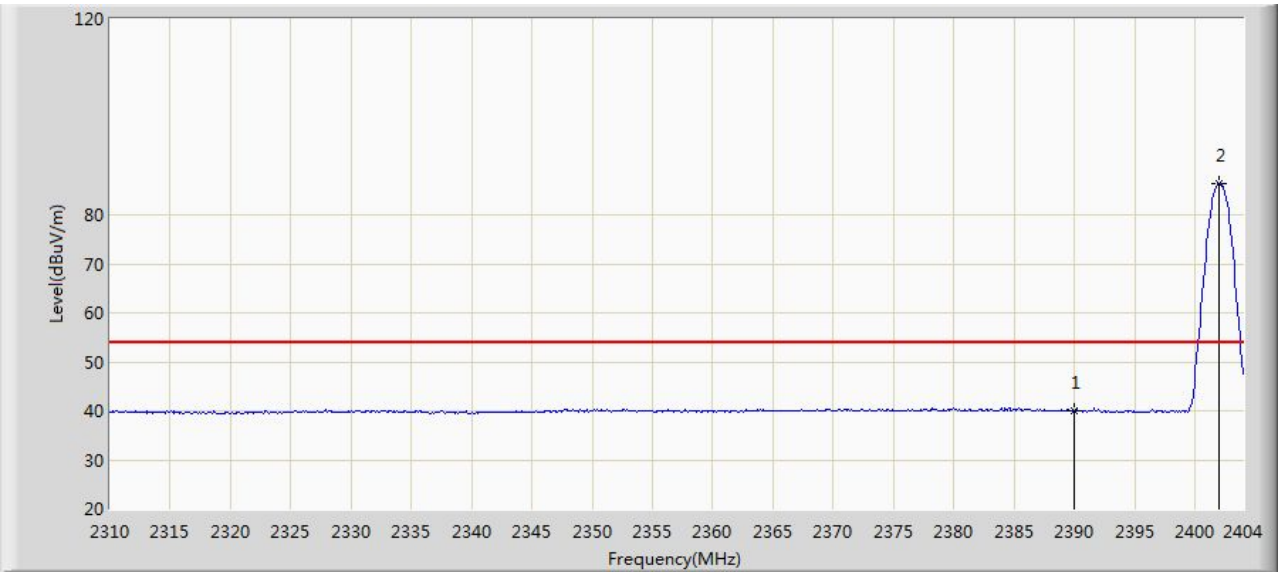


No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2390.000	50.622	52.863	-23.378	74.000	-2.241	PK
2	*	2402.026	87.086	89.282	N/A	N/A	-2.196	PK

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

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m).

Site: AC102	Time: 2017/09/09 - 14:38
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: N/A	Polarity: Vertical
EUT: Touch All in one Computer	Power: AC 120V/60Hz
Note: Mode:Transmit BLE at 2402MHz	

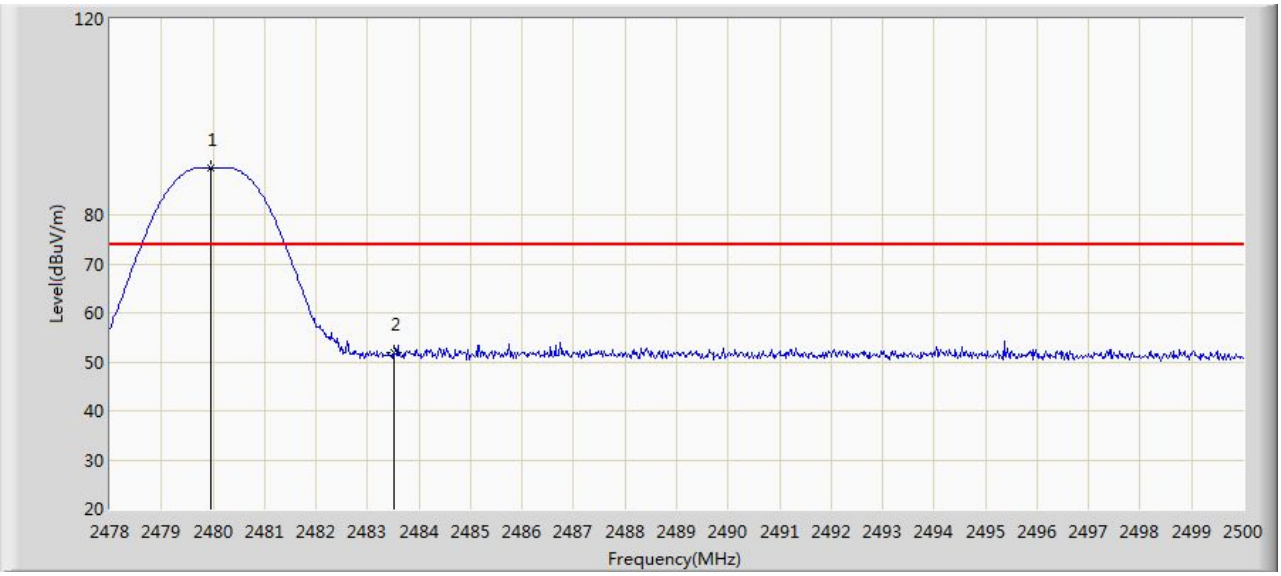


No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2390.000	39.993	42.234	-14.007	54.000	-2.241	AV
2	*	2402.026	86.418	88.614	N/A	N/A	-2.196	AV

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

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m).

Site: AC102	Time: 2017/09/09 - 14:38
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: N/A	Polarity: Vertical
EUT: Touch All in one Computer	Power: AC 120V/60Hz
Note: Mode:Transmit BLE at 2480MHz	

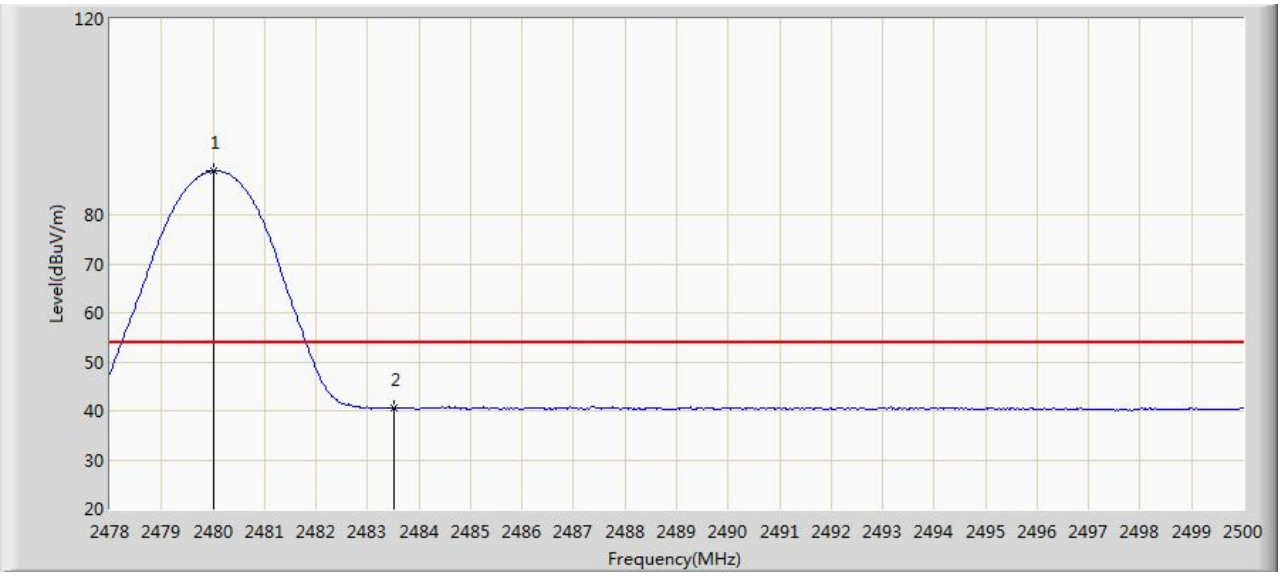


No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2479.958	89.609	91.514	N/A	N/A	-1.905	PK
2		2483.500	51.842	53.734	-22.158	74.000	-1.892	PK

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

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m).

Site: AC102	Time: 2017/09/09 - 14:40
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: N/A	Polarity: Vertical
EUT: Touch All in one Computer	Power: AC 120V/60Hz
Note: Mode:Transmit BLE at 2480MHz	

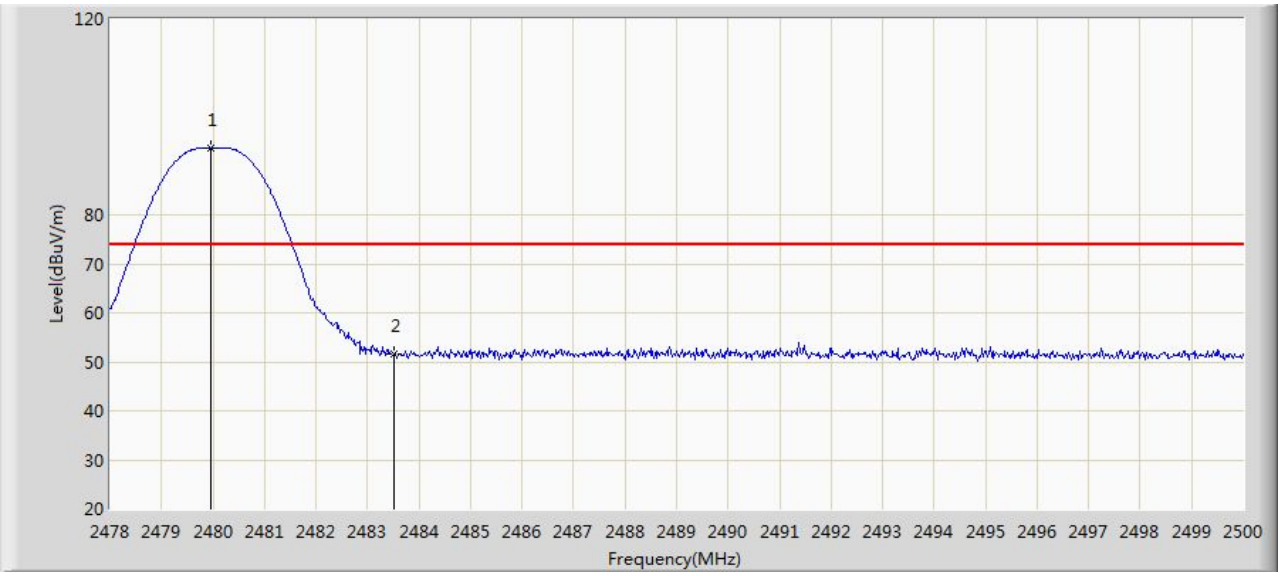


No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2480.024	88.936	90.841	N/A	N/A	-1.905	AV
2		2483.500	40.511	42.403	-13.489	54.000	-1.892	AV

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

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m).

Site: AC102	Time: 2017/09/09 - 14:41
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: N/A	Polarity: Horizontal
EUT: Touch All in one Computer	Power: AC 120V/60Hz
Note: Mode:Transmit BLE at 2480MHz	

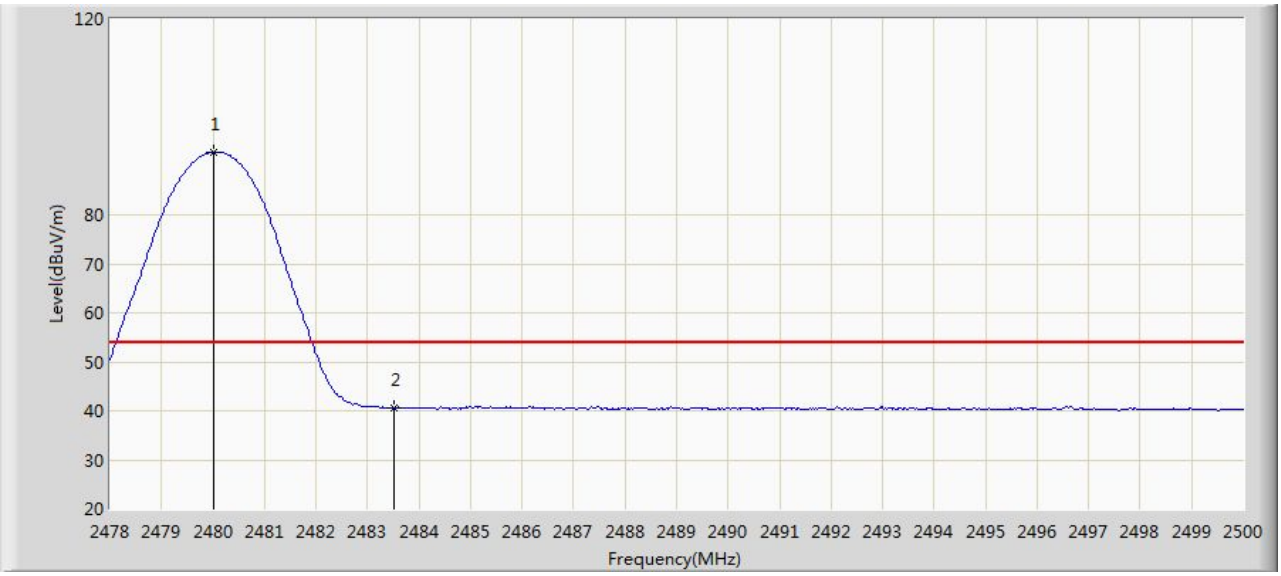


No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2479.958	93.519	95.424	N/A	N/A	-1.905	PK
2		2483.500	51.500	53.392	-22.500	74.000	-1.892	PK

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

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m).

Site: AC102	Time: 2017/09/09 - 14:42
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: N/A	Polarity: Horizontal
EUT: Touch All in one Computer	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	92.849	94.754	N/A	N/A	-1.905	AV
2		2483.500	40.705	42.597	-13.295	54.000	-1.892	AV

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

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m).

The End