

# TEST REPORT



## CTK Co., Ltd.

(Ho-dong), 113, Yejik-ro, Cheoin-gu,  
Yongin-si, Gyeonggi-do, Korea  
Tel: +82-31-339-9970  
Fax: +82-31-624-9501

Report No.:  
CTK-2019-04565  
Page (1) / (48) Pages

### 1. Client

- Name : BIXOLON Co.,Ltd.
- Address : 7th~8th FL, Miraeasset Venture Tower, 20, Pangyoyeok-ro241beon-gil,  
Bundang-gu Seongnam-si, Gyeonggi-do, Korea
- Date of Receipt : 2019-07-16

### 2. Manufacturer

- Name : BIXOLON Co.,Ltd.
- Address : 7th~8th FL, Miraeasset Venture Tower, 20, Pangyoyeok-ro241beon-gil,  
Bundang-gu Seongnam-si, Gyeonggi-do, Korea

### 3. Use of Report : For FCC & ISED Certification

### 4. Test Sample / Model: Thermal Label Printer / FCC : XQ-84\*x ISED : XQ-840

### 5. Date of Test : 2019-07-26 to 2019-11-19

### 6. Test Standard(method) used : FCC 47 CFR part 15 subpart C 15.247 ANSI C63.10-2013, RSS-247

### 7. Testing Environment: Temp.: (23 ± 1) °C, Humidity: (48 ± 5) % R.H.

### 8. Test Results : Compliance

The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This Test Report cannot be reproduced, except in full.

Affirmation	Tested by	Technical Manager
	Gwanyong Kim: (Signature)	Young-taek Lee: (Signature)

2019-11-20

Republic of KOREA **CTK Co., Ltd.**



**CTK Co., Ltd.**  
(Ho-dong), 113, Yejik-ro, Cheoin-gu,  
Yongin-si, Gyeonggi-do, Korea  
Tel: +82-31-339-9970  
Fax: +82-31-624-9501

Report No.:  
CTK-2019-04565  
Page (2) / (48)Pages

## REPORT REVISION HISTORY

Date	Revision	Page No
2019-11-20	Issued (CTK-2019-04565)	all

*This report shall not be reproduced except in full, without the written approval of CTK Co., Ltd. This document may be altered or revised by CTK Co., Ltd. personnel only, and shall be noted in the revision section of the document. Any alteration of this document not carried out by CTK Co., Ltd. will constitute fraud and shall nullify the document.*

## **CONTENTS**

1. General Product Description .....	4
1.1 Client Information .....	4
1.2 Product Information.....	4
1.3 Peripheral Devices .....	4
2.0 Facility and Accreditations.....	5
2.1 Test Facility .....	5
2.2 Laboratory Accreditations and Listings.....	5
2.3 Calibration Details of Equipment Used for Measurement.....	5
3.0 Test Specifications .....	6
3.1 Standards .....	6
3.2 Mode of operation during the test .....	7
3.3 Maximum Measurement Uncertainty .....	7
4.0 Technical Characteristic Test .....	8
4.1 6dB Bandwidth and 99 % Bandwidth.....	8
4.2 Maximum peak Conducted Output Power .....	13
4.3 Power Spectral Density .....	17
4.4 Band Edge & Conducted Spurious emission .....	21
4.5 Radiated Emissions.....	25
4.6 AC Conducted Emissions .....	45
APPENDIX A – Test Equipment Used For Tests .....	48

## 1. General Product Description

### 1.1 Client Information

<b>Company</b>	BIXOLON Co.,Ltd.
<b>Contact Point</b>	7th~8th FL, Miraeasset Venture Tower, 20, Pangyoyeok-ro241beon-gil, Bundang-gu Seongnam-si, Gyeonggi-do, Korea
<b>Contact Person</b>	Name : Ji-Sung Shin E-mail : jsshin@bixolon.com Tel : +82-31-218-5582

### 1.2 Product Information

<b>FCC ID</b>	U5MXQ840
<b>Certification Number ISED</b>	7962A-XQ840
<b>Product Description</b>	THERMAL LABEL PRINTER
<b>Basic model (HVIN)</b>	FCC : XQ-84*x (*: Alphanumeric, x: blank or Alphanumeric) ISED : XQ-840
<b>Variant Model name</b>	XQ-843 differs from the basic model in printing resolution ▶ XQ-840 : 200 dpi ▶ XQ-843 : 300 dpi
<b>Operating Frequency</b>	2 412 MHz – 2 462 MHz
<b>RF Output Power</b>	802.11b : 11.50 dBm (14.13 mW) 802.11g : 11.49 dBm (14.09 mW) 802.11n_HT20 : 11.15 dBm (13.03 mW)
<b>Antenna type</b>	FPC Antenna
<b>Antenna gain</b>	1.59 dBi
<b>Number of channels</b>	11
<b>Type of Modulation</b>	802.11b : DSSS 802.11g/n : OFDM
<b>Power Source</b>	DC 24 V (AC/DC Adapter)
<b>FVIN</b>	V01_00
<b>Test Software(Version)</b>	Ampak RFTesTool, VER: 6.1
<b>RF Power setting in Test SW</b>	default
<b>S/N</b>	STD000KS19050015

### 1.3 Peripheral Devices

Device	Manufacturer	Model No.	Serial No.
Notebook Computer	HP	HP Probook 650	-
AC Adapter	HP	Series PPP019L-S	PA-1650-32HY

## 2.0 Facility and Accreditations

### 2.1 Test Facility

The measurement facility is located at (Ho-dong), 113, Yejik-ro, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea.

### 2.2 Laboratory Accreditations and Listings

Country	Agency	Registration Number
USA	FCC	805871
CANADA	ISED	8737A-2
KOREA	NRRA	KR0025

### 2.3 Calibration Details of Equipment Used for Measurement

Test equipment and test accessories are calibrated on regular basis. The maximum time between calibrations is one year or what is recommended by the manufacturer, whichever is less. All test equipment calibrations are traceable to the Korea Research Institute of Standards and Science (KRISS), therefore, all test data recorded in this report is traceable to KRISS.

## 3.0 Test Specifications

### 3.1 Standards

Section in FCC	Section in RSS	Requirement(s)	Status (Note 1)	Test Condition
15.247(a)	RSS-247 5.2(a)	6 dB Bandwidth	C	Conducted
15.247(e)	RSS-247 5.2(b)	Transmitter power spectral density	C	
15.247(b)	RSS-247 5.4(d)	Maximum peak conducted output power	C	
15.247(d)	RSS-247 5.5	Unwanted emission	C	
15.209	RSS-Gen 6.13	Transmitter emission	C	Radiated
15.207(a)	RSS-Gen 8.8	AC Conducted Emission	C	Line Conducted
<u>Note 1:</u> C=Complies NC=Not Complies NT=Not Tested NA=Not Applicable				
<u>Note 2:</u> The data in this test report are traceable to the national or international standards.				
<u>Note 3:</u> The sample was tested according to the following specification: FCC Part 15.247, ANSI C63.10-2013, RSS-247 Issue 2, RSS-GEN Issue 4				
<u>Note 4:</u> The tests were performed according to the method of measurements prescribed in KDB No.558074.				

### 3.2 Mode of operation during the test

The UUT is operated in a manner representative of the typical of the equipments.  
During at testing, system components were manipulated within the confines of typical usage to maximize each emission. The results are only attached worst cases.

#### Test mode & Worst case

Mode	Worst case(Data rate)
802.11b	1 Mbps
802.11g	6 Mbps
802.11n(HT20)	MCS 0

#### Test Frequency & Bandwidth

Bandwidth	Lowest channel	Middle channel	Highest channel
20 MHz	2 412 MHz	2 437 MHz	2 462 MHz

#### Duty cycle

Mode	Duty cycle (%)
802.11b	99.5
802.11g	97.1
802.11n(HT20)	96.9

### 3.3 Maximum Measurement Uncertainty

The value of the measurement uncertainty for the measurement of each parameter.  
Coverage factor  $k = 2$ , Confidence levels of 95 %

Description	Uncertainty
Conducted RF Output Power	$\pm 0.19$ dB
Power Spectral Density	$\pm 1.5$ dB
Occupied Bandwidth	$\pm 0.02$ KHz
Unwanted Emission(conducted)	$\pm 3.0$ dB
Radiated Emissions ( $f \leq 1$ GHz)	$\pm 4.38$ dB
Radiated Emissions ( $f > 1$ GHz)	$\pm 5.12$ dB
AC Conducted Emission	$\pm 3.64$ dB

## 4.0 Technical Characteristic Test

### 4.1 6dB Bandwidth and 99 % Bandwidth

#### Test Procedures (ANSI C63.10-2013 6.9.2)

Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

#### Test Procedures (ANSI C63.10-2013 6.9.3)

The occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5% of the total mean power of the given emission.

Use the 99% power bandwidth function of the instrument and report the measured bandwidth.

#### Test Settings :

Center frequency = the highest, middle and the lowest channels

- |  |  |
|--|--|
| a) RBW = 100 kHz (6dB Bandwidth)   | b) RBW = 1% to 5% of the OBW<br>(99 % Bandwidth) |
| c) VBW $\geq 3 \times$ RBW   | d) Detector = peak                               |
| e) Trace mode = Max hold   | f) Sweep = auto couple                           |
| g) Allow trace to fully stabilize  |  |
| h) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission. |  |

#### Limit : 6dB Bandwidth

---

6 dB Bandwidth > 500kHz

---

#### Limit : 99 % Bandwidth

---

N/A

---



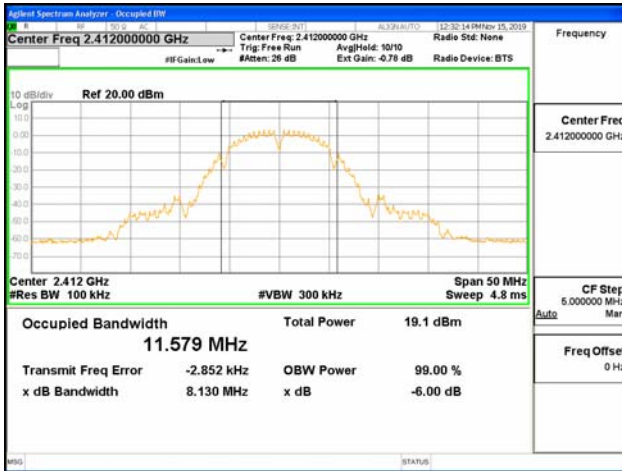
**Test Data:**

Mode	Channel	Frequency [MHz]	6 dB Bandwidth [MHz]	99% Bandwidth [MHz]	Result
802.11b	Low	2 412	8.13	12.006	Complies
	Middle	2 437	8.58	12.047	
	High	2 462	8.60	12.130	
802.11g	Low	2 412	15.86	16.520	
	Middle	2 437	16.08	16.518	
	High	2 462	15.54	16.395	
802.11n (HT20)	Low	2 412	15.42	17.643	
	Middle	2 437	16.14	17.669	
	High	2 462	15.49	17.613	

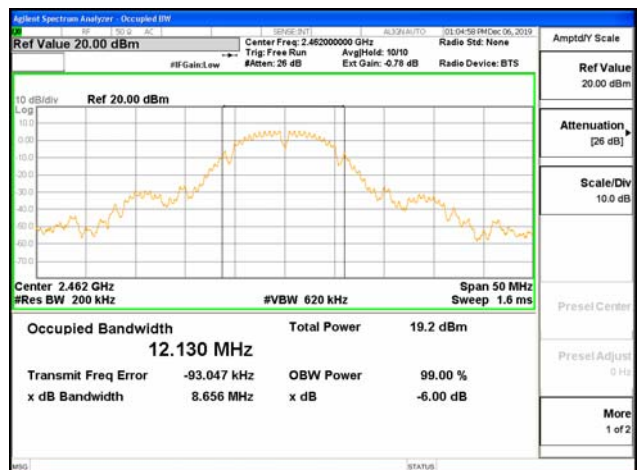
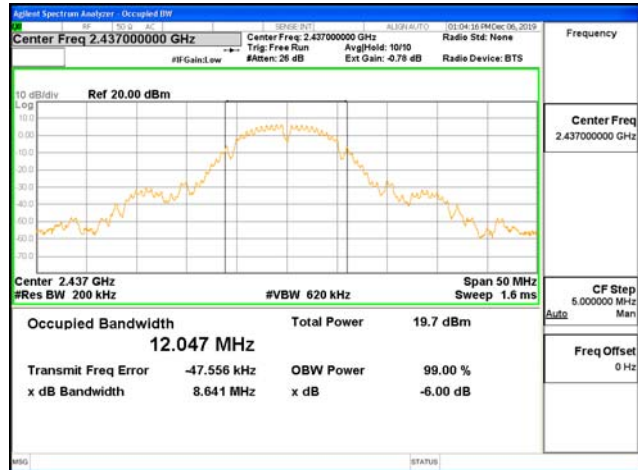
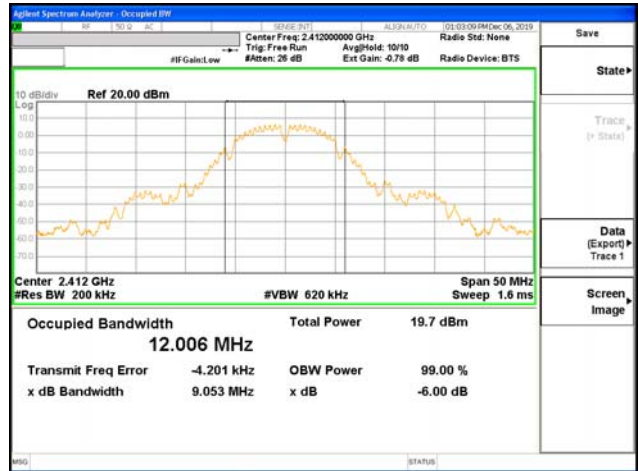
See next pages for actual measured spectrum plots.

## 802.11b

### 6 dB Bandwidth

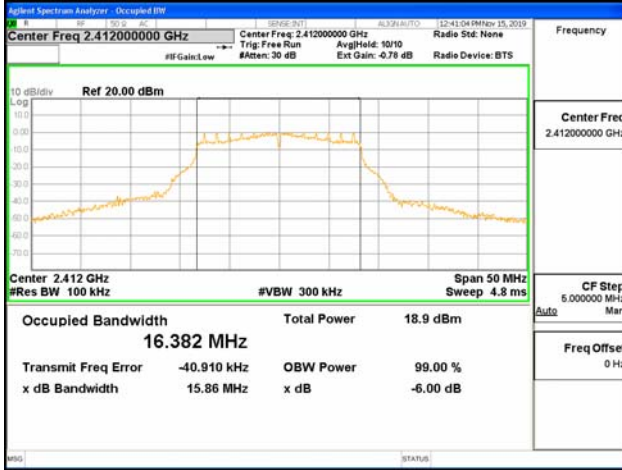


### 99% Bandwidth

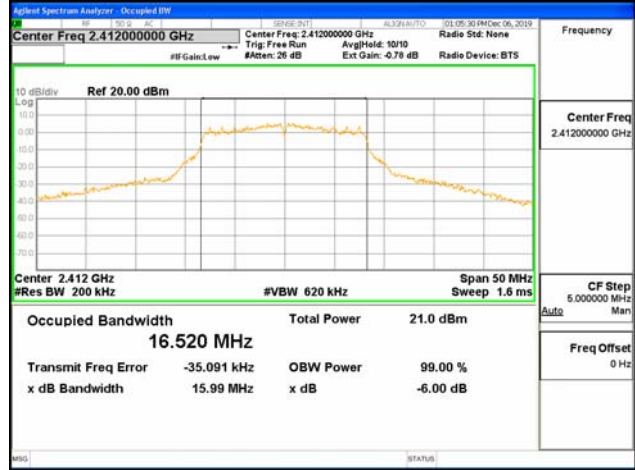


## 802.11g

### 6 dB Bandwidth

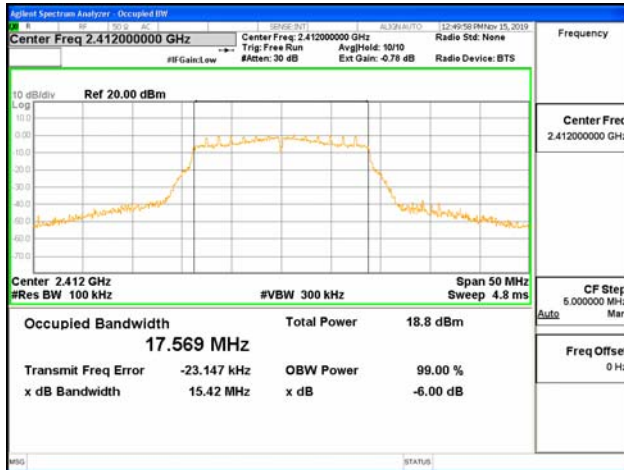


### 99% Bandwidth

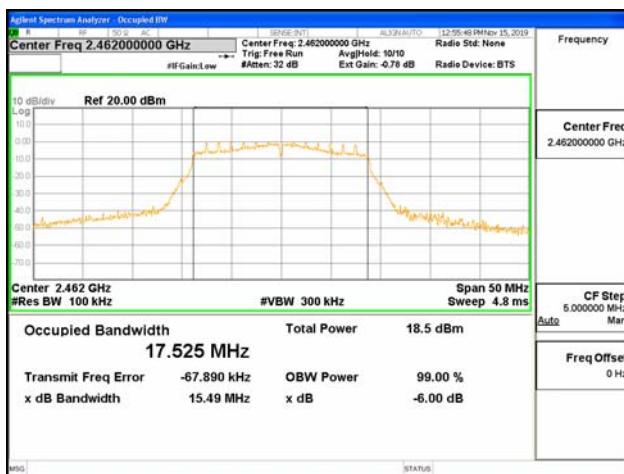
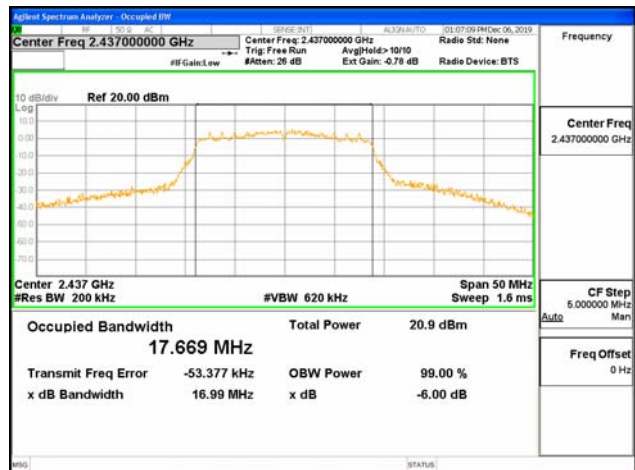
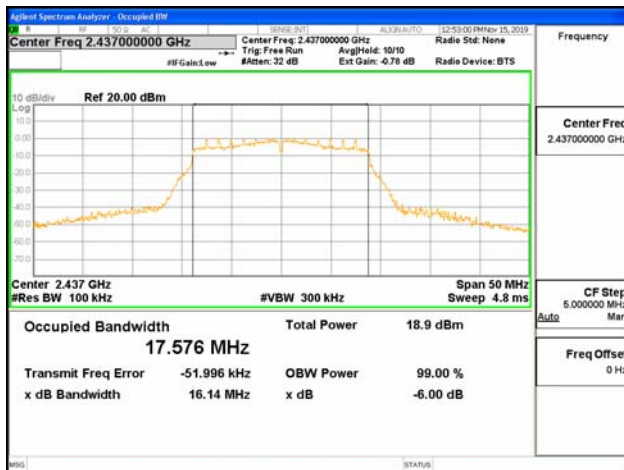
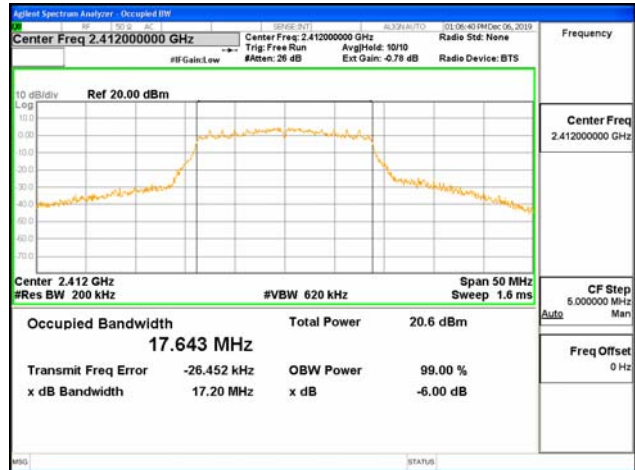


## 802.11n(HT20)

### 6 dB Bandwidth



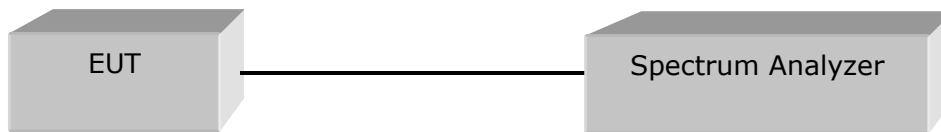
### 99% Bandwidth



## 4.2 Maximum peak Conducted Output Power

### Test Procedures(ANSI C63.10-2013 11.9.2.2.2)

The transmitter output is connected to a spectrum analyzer and the analyzer's internal channel power integration function is used to integrate the power over a bandwidth greater than or equal to the 99% bandwidth.



#### Test Settings:

Center frequency = the highest, middle and the lowest channels

- a) span  $\geq 1.5 \times \text{OBW}$
- b) RBW = 1% to 5% of the OBW, not to exceed 1 MHz
- c) VBW  $\geq 3 \times \text{RBW}$
- d) Sweep point  $\geq (2 \times \text{SPAN} / \text{RBW})$
- e) Detector = RMS
- f) Sweep time = auto
- g) Compute power by integrating the spectrum across the OBW of the signal using the instrument's band power measurement function, with band limits set equal to the OBW band edges.

#### Limit

---

Maximum Output Power < 1 W (30 dBm)

---

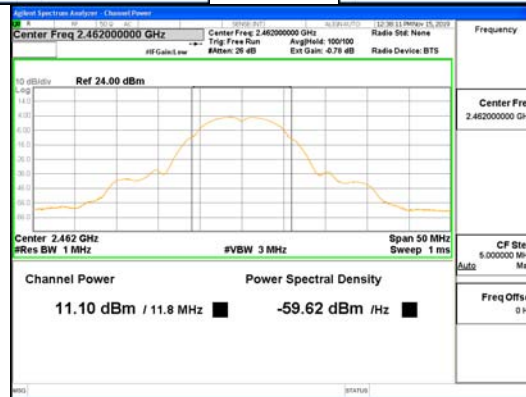
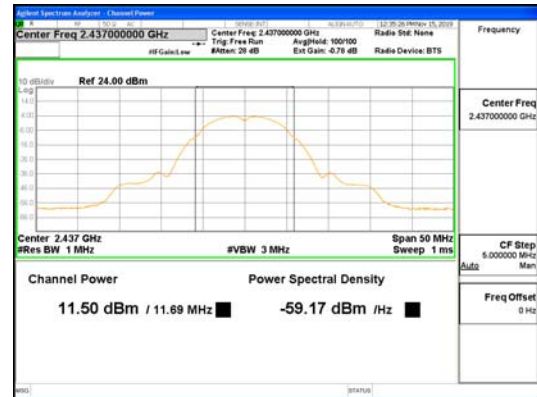
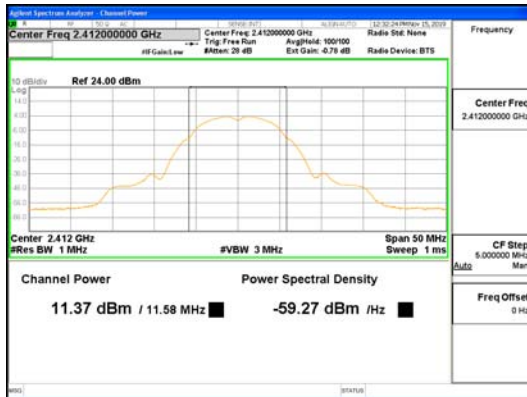


## Test Data

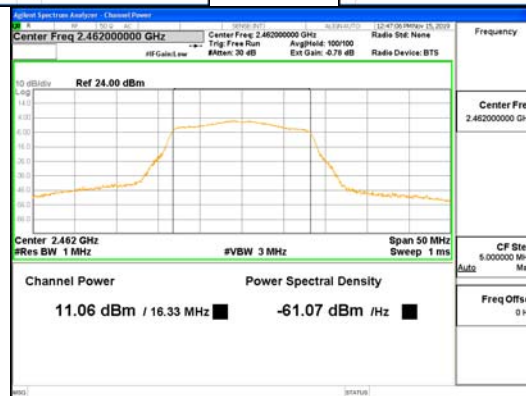
Mode	Channel	Frequency [MHz]	Measurement data [dBm]	Limit [dBm]	Result
802.11b	Low	2 412	11.37	30	Complies
	Middle	2 437	11.50		
	High	2 462	11.10		
802.11g	Low	2 412	11.49		
	Middle	2 437	11.43		
	High	2 462	11.06		
802.11n (HT20)	Low	2 412	11.03		
	Middle	2 437	11.15		
	High	2 462	10.78		

See next pages for actual measured spectrum plots.

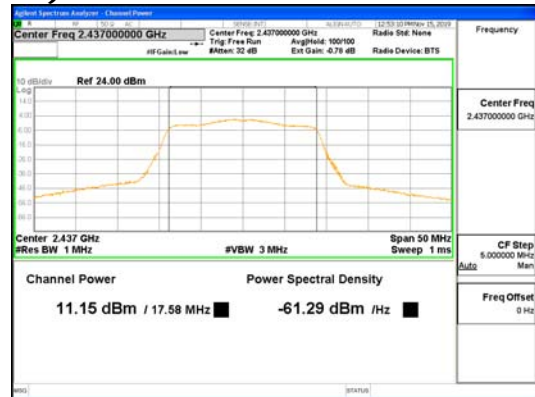
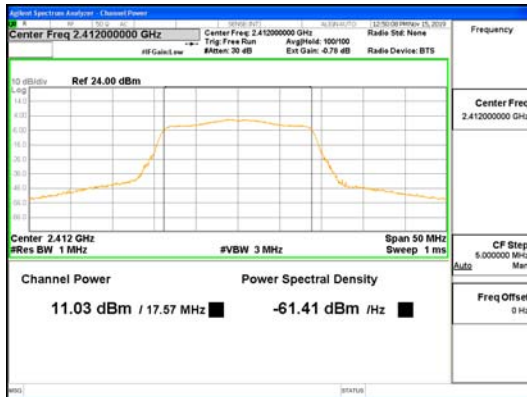
### 802.11b




### 802.11g



## 802.11n(HT20)





	<b>CTK Co., Ltd.</b> (Ho-dong), 113, Yejik-ro, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea Tel: +82-31-339-9970 Fax: +82-31-624-9501	Report No.: CTK-2019-04565 Page (17) / (48)Pages	
---	---	--	--

## 4.3 Power Spectral Density

### Test Procedures(ANSI C63.10-2013 11.10.2)

This procedure shall be used if maximum peak conducted output power was used to demonstrate compliance.

#### Test Settings:

Center frequency = the highest, middle and the lowest channels

- |  |                                   |
|--|-----------------------------------|
| a) RBW : $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$                            | b) VBW $\geq 3 \times \text{RBW}$ |
| c) span $\geq 1.5 \times \text{DTS bandwidth}$   | d) Sweep time = auto couple       |
| e) Detector = peak   | f) Trace mode= max hold           |
| g) Allow trace to fully stabilize  |                                   |
| h) Use the peak marker function to determine the maximum amplitude level within the RBW. |                                   |

#### **Limit :**

---

Power Spectral Density < 8 dBm @ 3 kHz BW

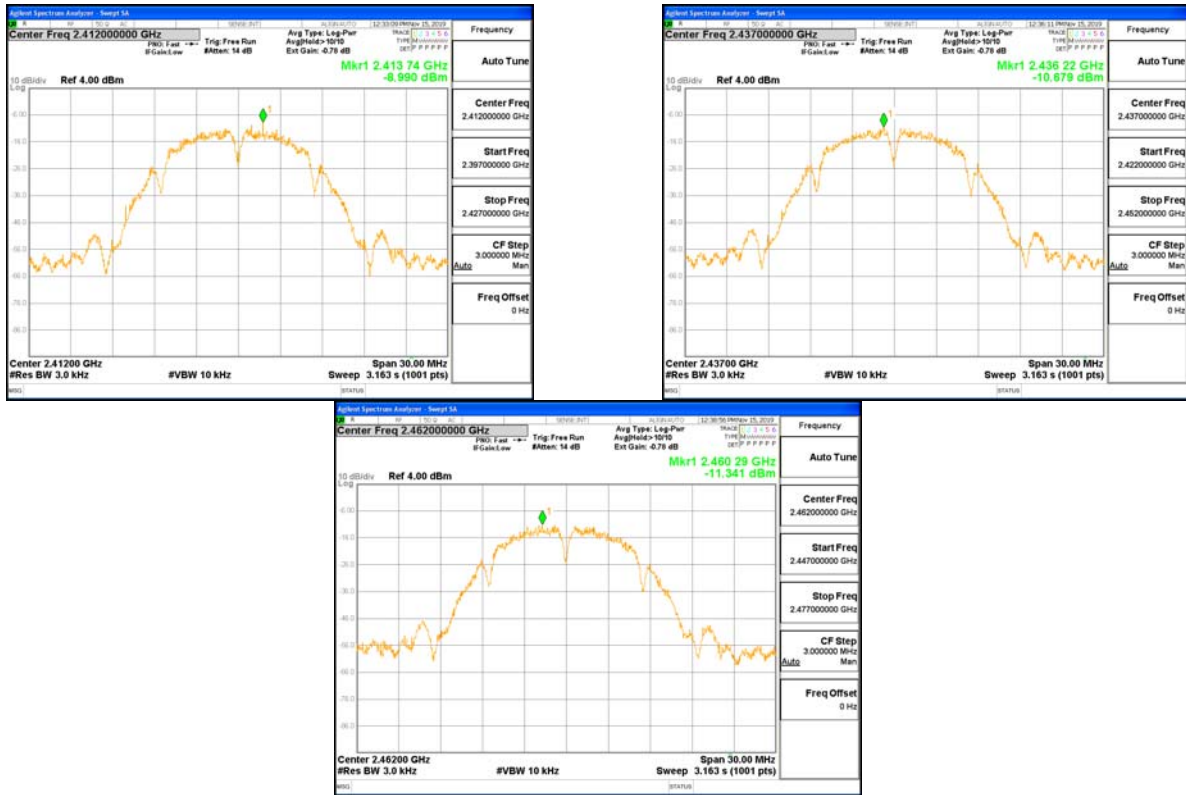
---

## Test Data

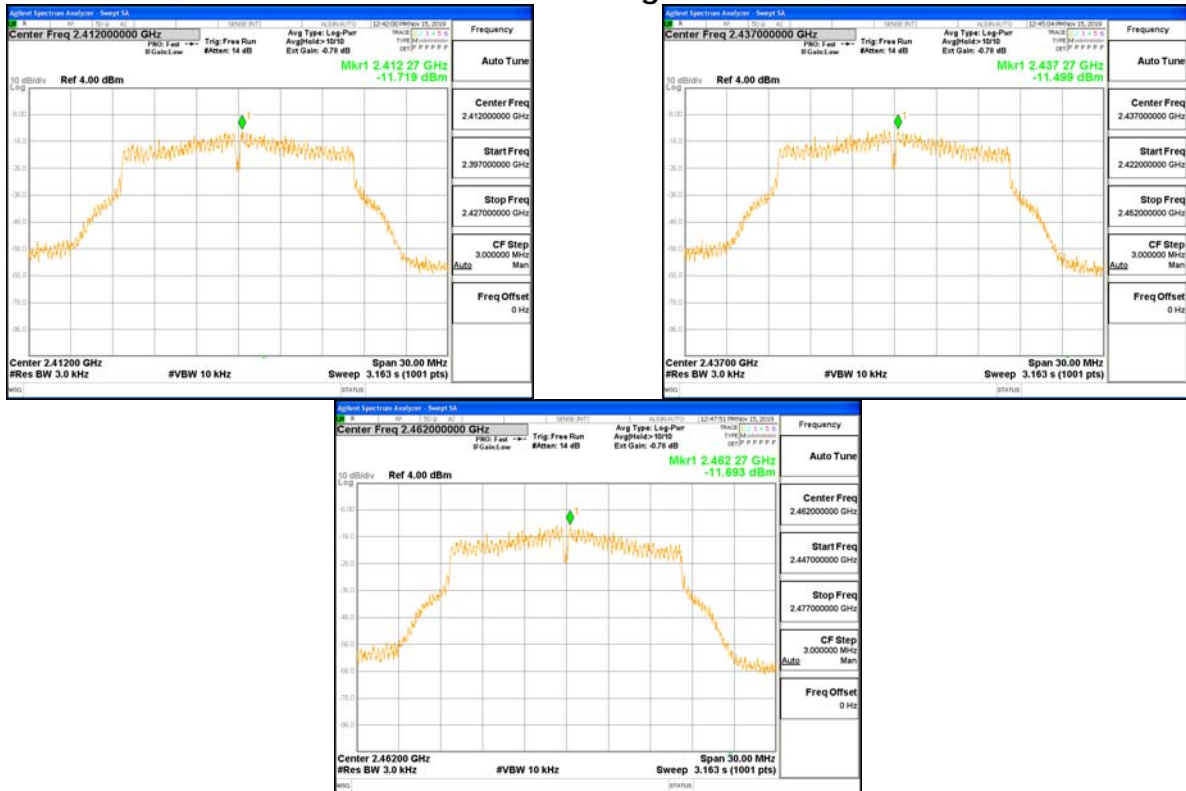
Mode	Channel	Frequency [MHz]	Measurement data [dBm]	Limit [dBm]	Result
802.11b	Low	2 412	-8.99	8	Complies
	Middle	2 437	-10.68		
	High	2 462	-11.34		
802.11g	Low	2 412	-11.72		
	Middle	2 437	-11.50		
	High	2 462	-11.69		
802.11n (HT20)	Low	2 412	-12.69		
	Middle	2 437	-11.21		
	High	2 462	-12.32		

See next pages for actual measured spectrum plots.

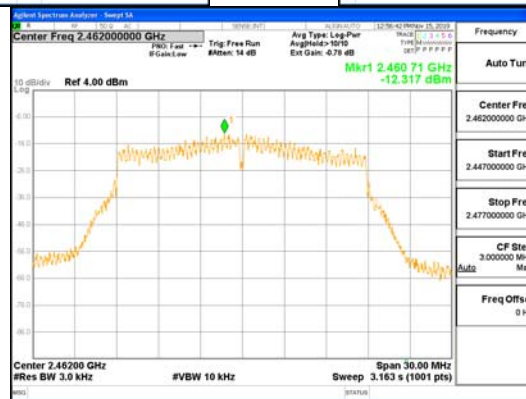
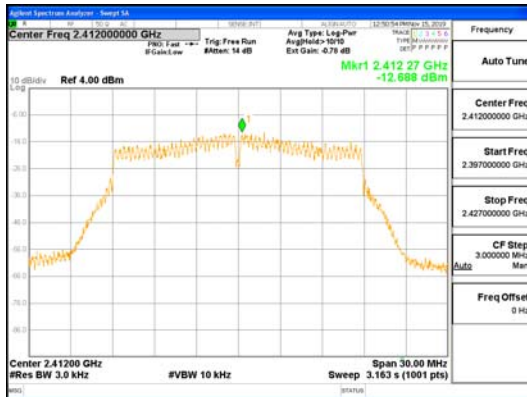
### 802.11b



### 802.11g



### 802.11n(HT20)



## 4.4 Band Edge & Conducted Spurious emission

### Test Procedures(ANSI C63.10-2013 11.11.3)

The Unwanted emission from the EUT were measured according to the dictates PKPSD measurement procedure in section 11.11 of ANSI C63.10-2013.

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced 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 that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under Section 5.4(4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

#### Test Settings:

Center frequency = the highest, middle and the lowest channels

- |   |                             |
|---|-----------------------------|
| a) RBW = 100 kHz  | b) VBW $\geq 3 \times$ RBW  |
| c) Detector = peak  | d) Sweep time = auto couple |
| e) Trace mode= max hold   |                             |
| f) Allow trace to fully stabilize   |                             |
| g) Use the peak marker function to determine the maximum amplitude level. |                             |

#### **Limit :**

---

Emission level < 30 dBc

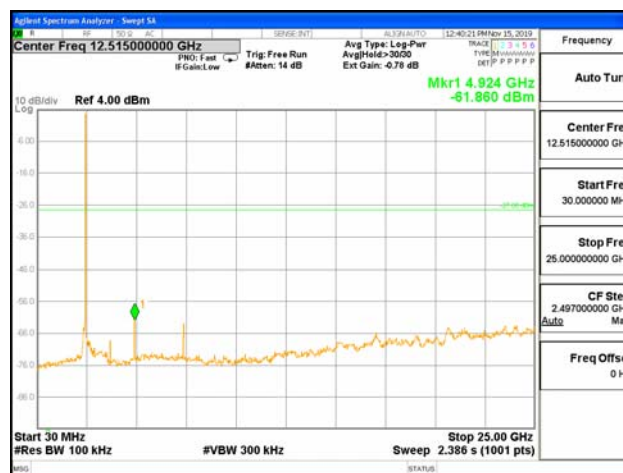
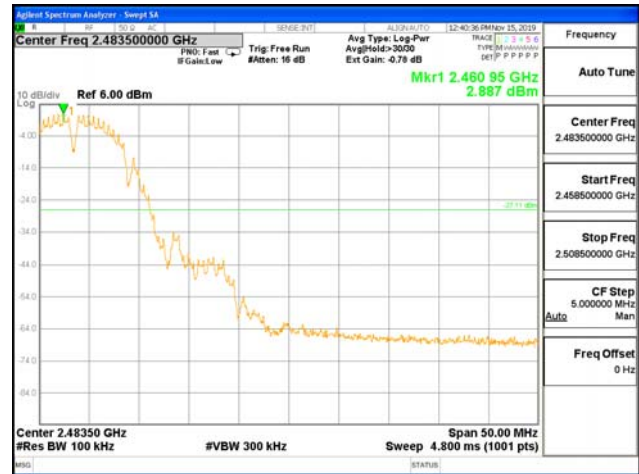
---

#### **Test Data: Complies**

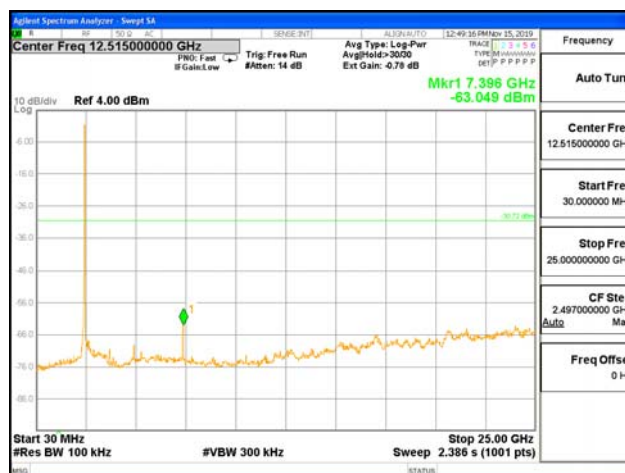
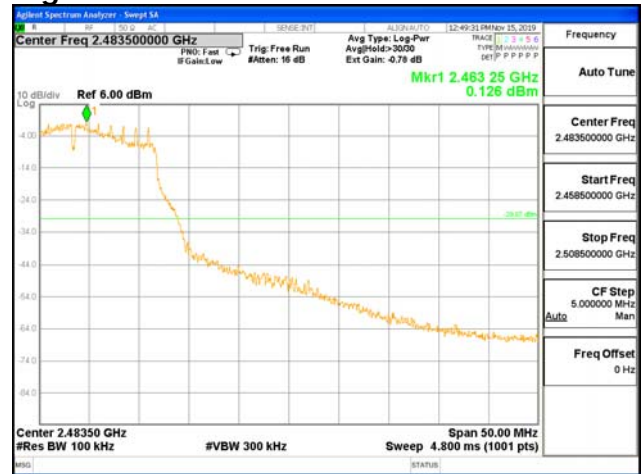
- All conducted emission in any 100 kHz bandwidth outside of the spread spectrum band was at least 30dB lower than the highest in-band spectral density. Therefore the applying equipment meets the requirement.

See next pages for actual measured spectrum plots.

### 802.11b

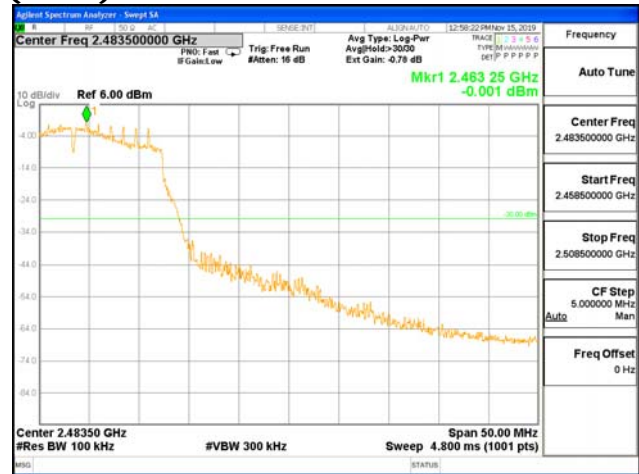
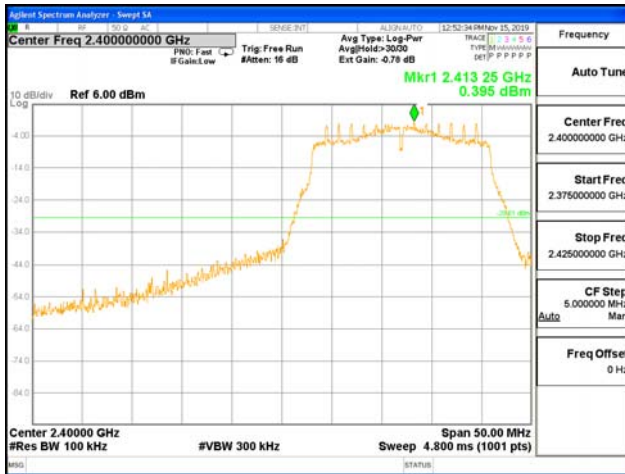


## 802.11g





### 802.11n(HT20)





## 4.5 Radiated Emissions

### Test Location

- ☒ 10 m SAC (test distance : ☐ 10 m, ☒ 3 m)  
☒ 3 m SAC (test distance : 3 m)

### Test Procedures

- 1) In the frequency range of 9 kHz to 30 MHz, magnetic field is measured with Loop Antenna. The center of the Loop Test Antenna is 1m above the ground. During the measurement the Loop Test Antenna rotates about its vertical axis for maximum response at each azimuth about the EUT.
- 2) In the frequency range above 30 MHz, Bi-Log Test Antenna(30 MHz to 1 GHz) and Horn Test Antenna(above 1 GHz) are used. Test Antenna is 3m away from the EUT. Test Antenna height is carried from 1m to 4m above the ground to determine the maximum value of the field strength. The emissions levels at both horizontal and vertical polarizations should be tested.

### Instrument Settings

Frequency Range = 9 kHz ~ 26.5 GHz (2.4 GHz 10<sup>th</sup> harmonic)

- a) RBW = 1 MHz for  $f \geq 1$  GHz, 100 kHz for  $f < 1$  GHz, 9 kHz for  $f < 30$  MHz
- b) VBW  $\geq$  RBW
- c) Sweep time = auto couple

## Limit :

FCC Part 15 § 15.205 (a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

**Table 1. Restricted Frequency Bands\***

MHz	MHz	MHz	MHz	MHz	GHz
0.09-0.11	8.37626-8.38675	73-74.6	399.9-410	2690-2900	10.6-12.7
<sup>1</sup> 0.495-0.505	8.41425-8.41475	74.8-75.2	608-614	3260-3267	13.25-13.4
2.1735-2.1905	12.29-12.293	108-121.94	960-1240	3332-3339	14.47-14.5
4.125-4.128	12.51975-12.52025	123-138	1300-1427	3345.8-3358	15.35-16.2
4.17725-4.17775	12.57675-12.57725	149.9-150.05	1435-1626.5	3600-4400	17.7-21.4
4.20725-4.20775	13.36-13.41	156.52475-156.52525	1645.5-1646.5	4500-5150	22.01-23.12
6.215-6.218	16.42-16.423	156.7-156.9	1660-1710	5350-5460	23.6-24
6.26775-6.26825	16.69475-16.69525	162.0125-167.17	1718.8-1722.2	7250-7750	31.2-31.8
6.31175-6.31225	16.80425-16.80475	167.72-173.2	2200-2300	8025-8500	36.43-36.5
8.291-8.294	25.5-25.67	240-285	2310-2390	9000-9200	<sup>2</sup> Above 38.6
8.362-8.366	37.5-38.25	322-335.4	2483.5-2500	9300-9500	

<sup>1</sup> Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

<sup>2</sup> Above 38.6

§ 15.205 (b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

\*Certain frequency bands listed in Table 6 and in band above 38.6 GHz are designated for licence-exempt applications. These frequency bands and the requirements that apply to the devices are set out in the 200- and 300-series of RSSs, such as RSS-210 and RSS-310, which contain the requirements that apply to licence-exempt radio apparatus.

FCC Part 15 § 15.209 (a) Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table :

Frequency(MHz)	Field Strength uV/m	Field Strength dBuV/m	Deasurement Distance (meters)
0.009-0.490	2400/F(kHz)	-	300
0.490-1.705	24000/F(kHz)	-	30
1.705-30	30	-	30
30-88	100**	40	3
88-216	150**	43.5	3
216-960	200**	46	3
Above 960	500	54	3

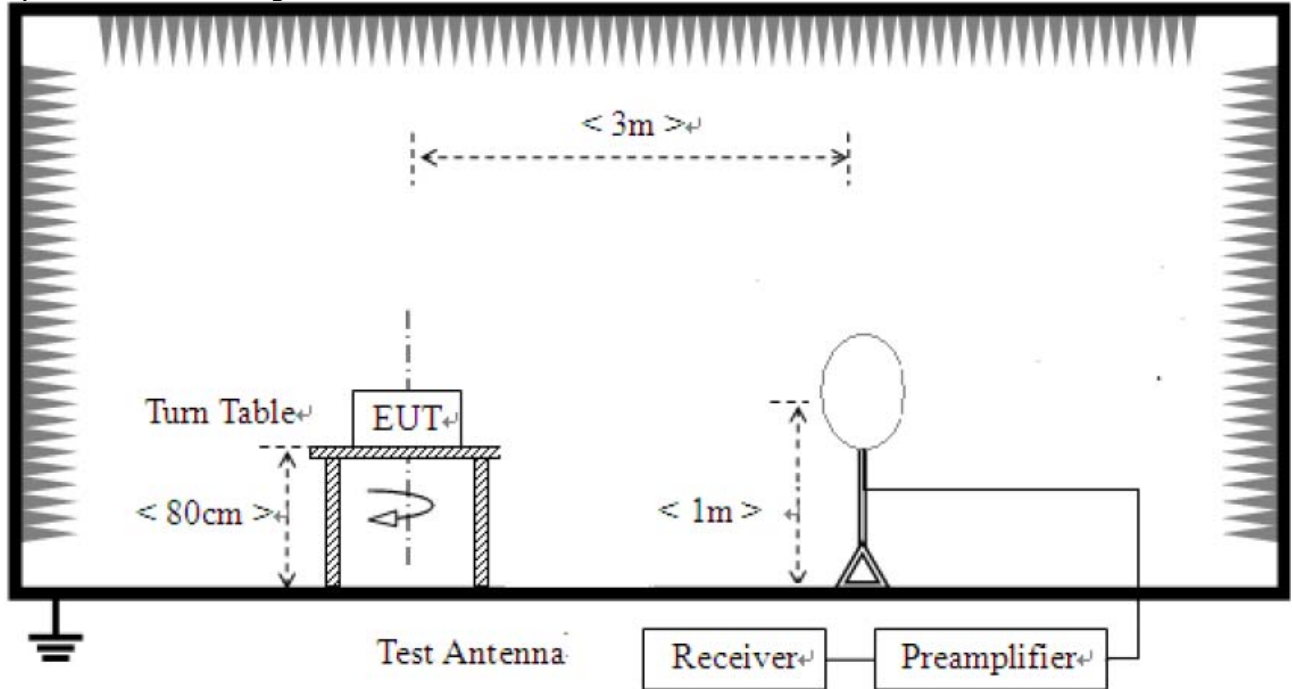
\*\* Except as provided in 15.209(g).fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72MHz, 76-88MHz, 174-216MHz, 470-806MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g.15.231 and 15.241.

Note :

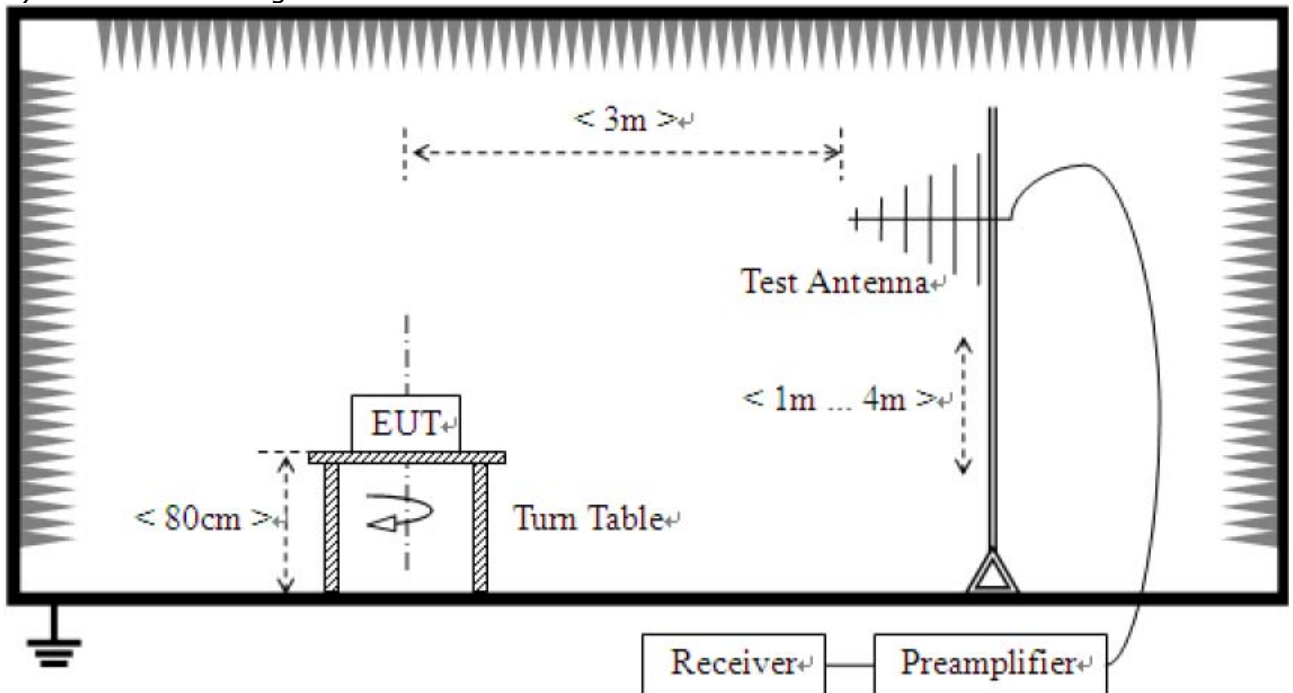
- 1) For above 1 GHz, the emission limit in this paragraph is based on measurement instrumentation employing an average detector, measurement using instrumentation with a peak detector function, corresponding to 20 dB above the maximum permitted average limit.
- 2) For above 1 GHz, limit field strength of harmonics : 54 dBuV/m@3m (AV) and 74 dBuV/m@3m (PK)
- 3) For measurement above 1GHz, the resolution bandwidth is set to 1 MHz and video bandwidth is set to 3 MHz for peak measurement.

### Test Setup:

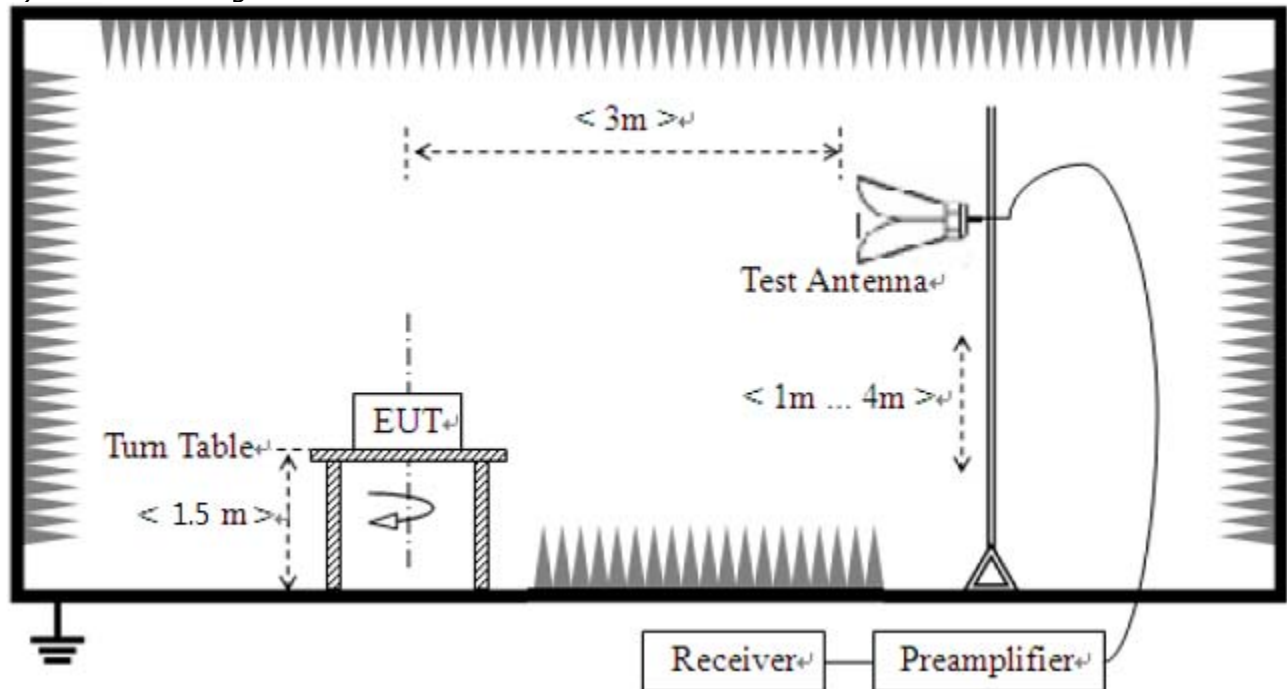
- 1) For field strength of emissions from 9 kHz to 30 MHz



- 2) For field strength of emissions from 30 MHz to 1 GHz



3) For field strength of emissions above 1 GHz



## Test results

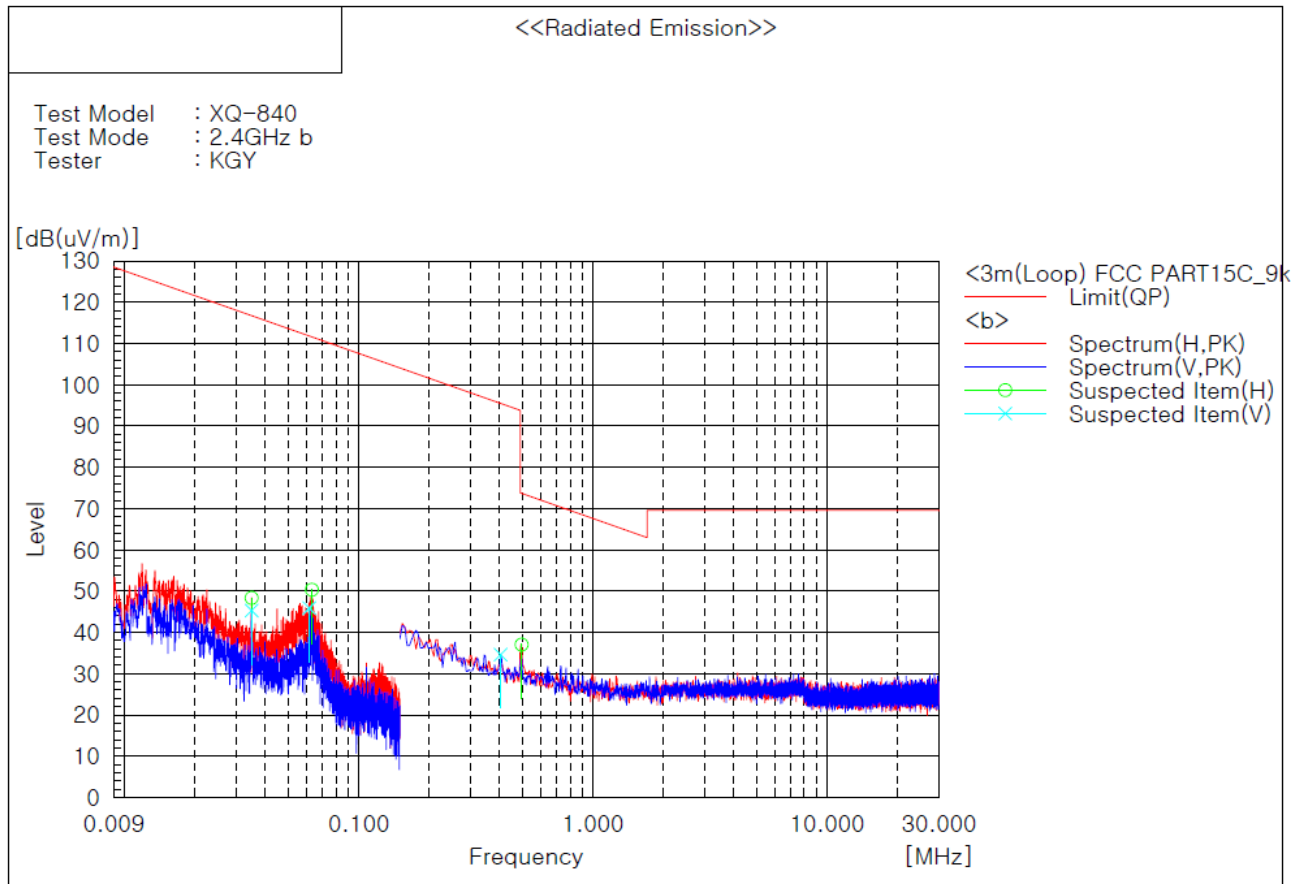
### 1) 9 kHz to 30 MHz

Test mode : 802.11b, middle channel (Worst case)

The requirements are:

☒ Complies

## Test Data



**Result :** There are more than 20 dB of margin compared to the reference value.

### Remark :

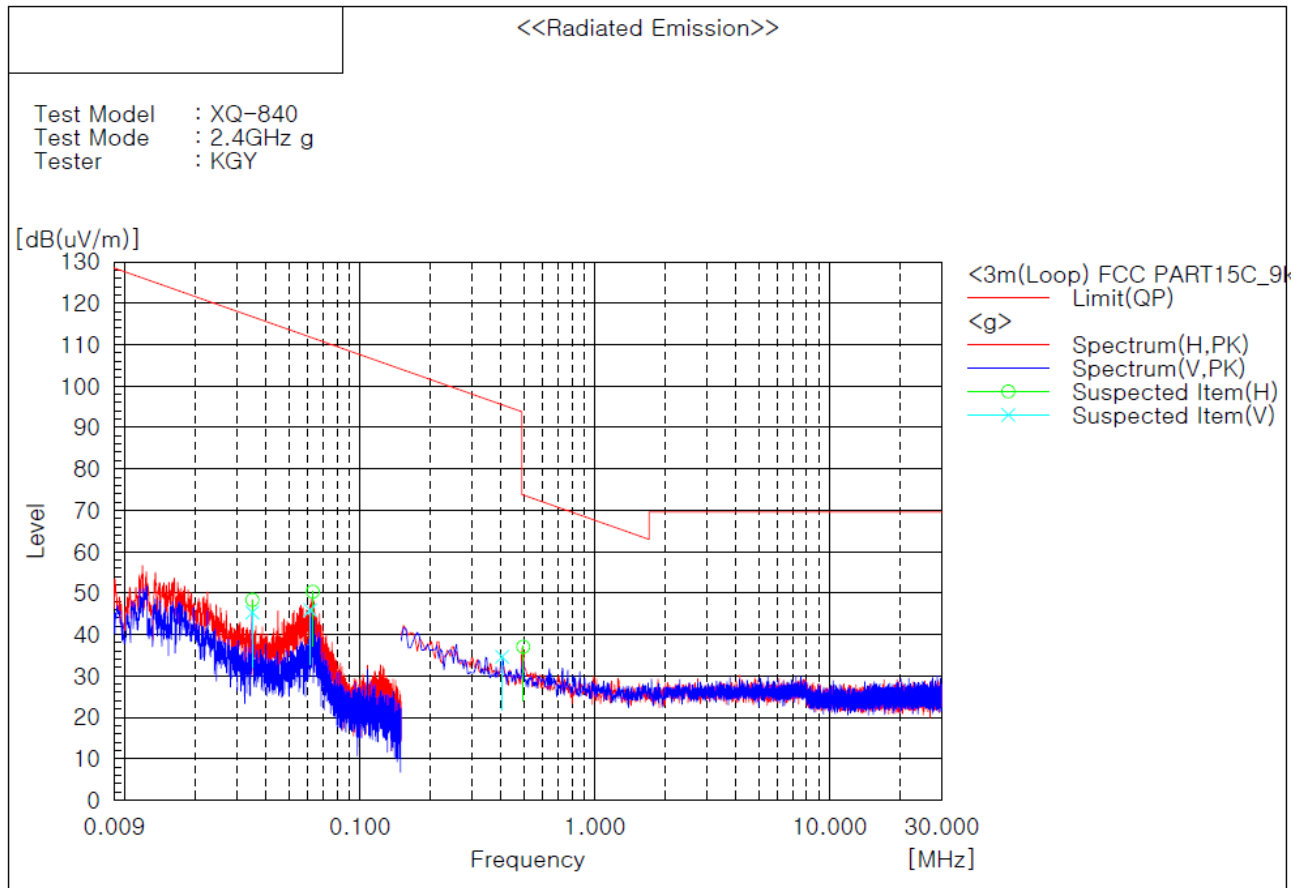
1. Measuring position : The Unwanted emission was measured in the following position: EUT stand-up position(Z axis), lie-down position(X,Y axis). The worst emission was found in stand-up position(Z axis) and the worst case was recorded.
2. Result = Reading + c.f(correction factor)
3. Correction factor = Antenna factor + Cable loss + 6 dB attenuator
4. Distance extrapolation factor =  $40 \log (\text{specific distance} / \text{test distance})$  (dB)
5. This data is the Peak(PK) value.

**Test mode : 802.11g, low channel (Worst case)**

The requirements are:

☒ Complies

**Test Data**



**Result :** There are more than 20 dB of margin compared to the reference value.

**Remark :**

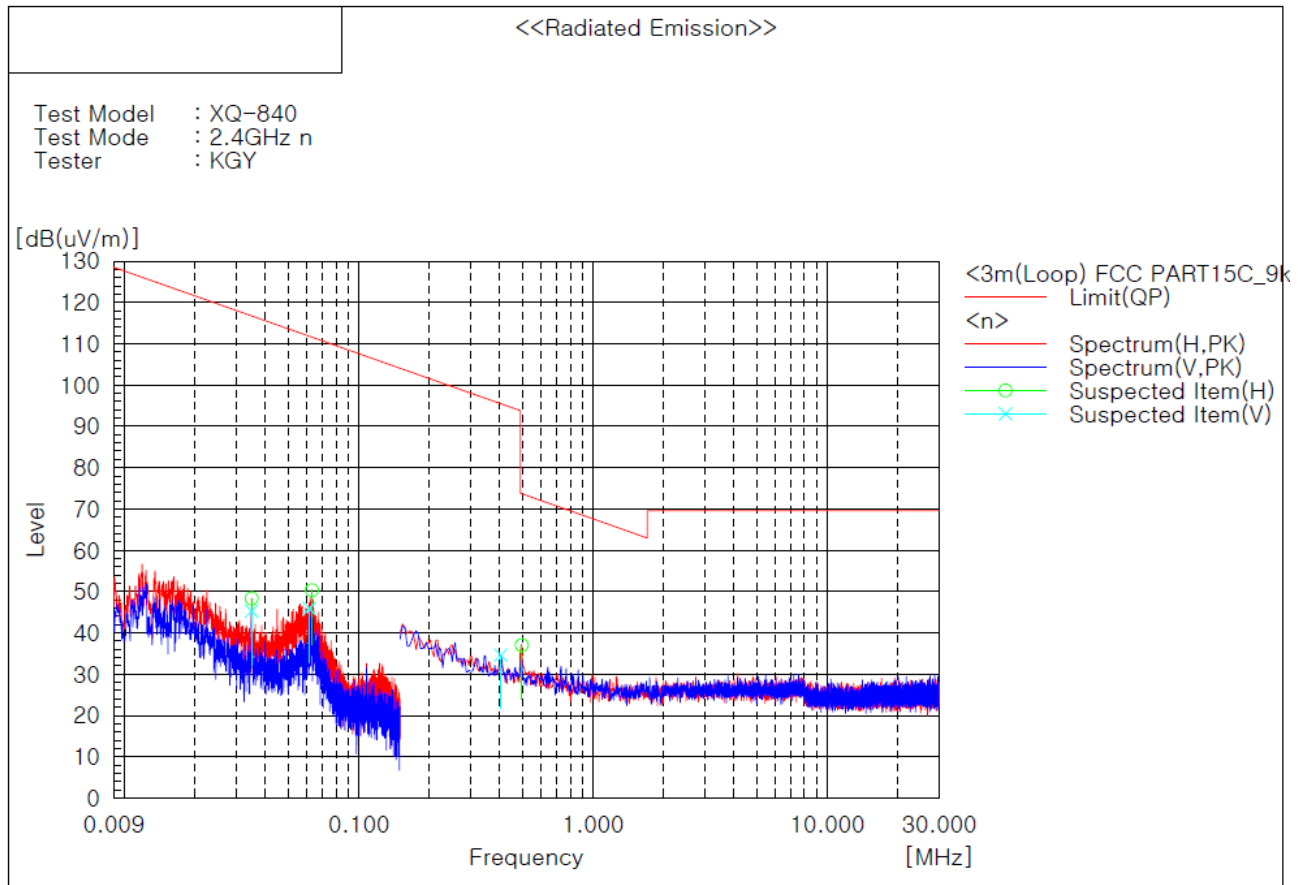
1. Measuring position : The Unwanted emission was measured in the following position: EUT stand-up position(Z axis), lie-down position(X,Y axis). The worst emission was found in stand-up position(Z axis) and the worst case was recorded.
2. Result = Reading + c.f(correction factor)
3. Correction factor = Antenna factor + Cable loss + 6 dB attenuator
4. Distance extrapolation factor =  $40 \log (\text{specific distance} / \text{test distance})$  (dB)
5. This data is the Peak(PK) value.

**Test mode : 802.11n(HT20), middle channel (Worst case)**

The requirements are:

☒ Complies

## Test Data



**Result :** There are more than 20 dB of margin compared to the reference value.

### Remark :

1. Measuring position : The Unwanted emission was measured in the following position: EUT stand-up position(Z axis), lie-down position(X,Y axis). The worst emission was found in stand-up position(Z axis) and the worst case was recorded.
2. Result = Reading + c.f(correction factor)
3. Correction factor = Antenna factor + Cable loss + 6 dB attenuator
4. Distance extrapolation factor =  $40 \log (\text{specific distance} / \text{test distance})$  (dB)
5. This data is the Peak(PK) value.



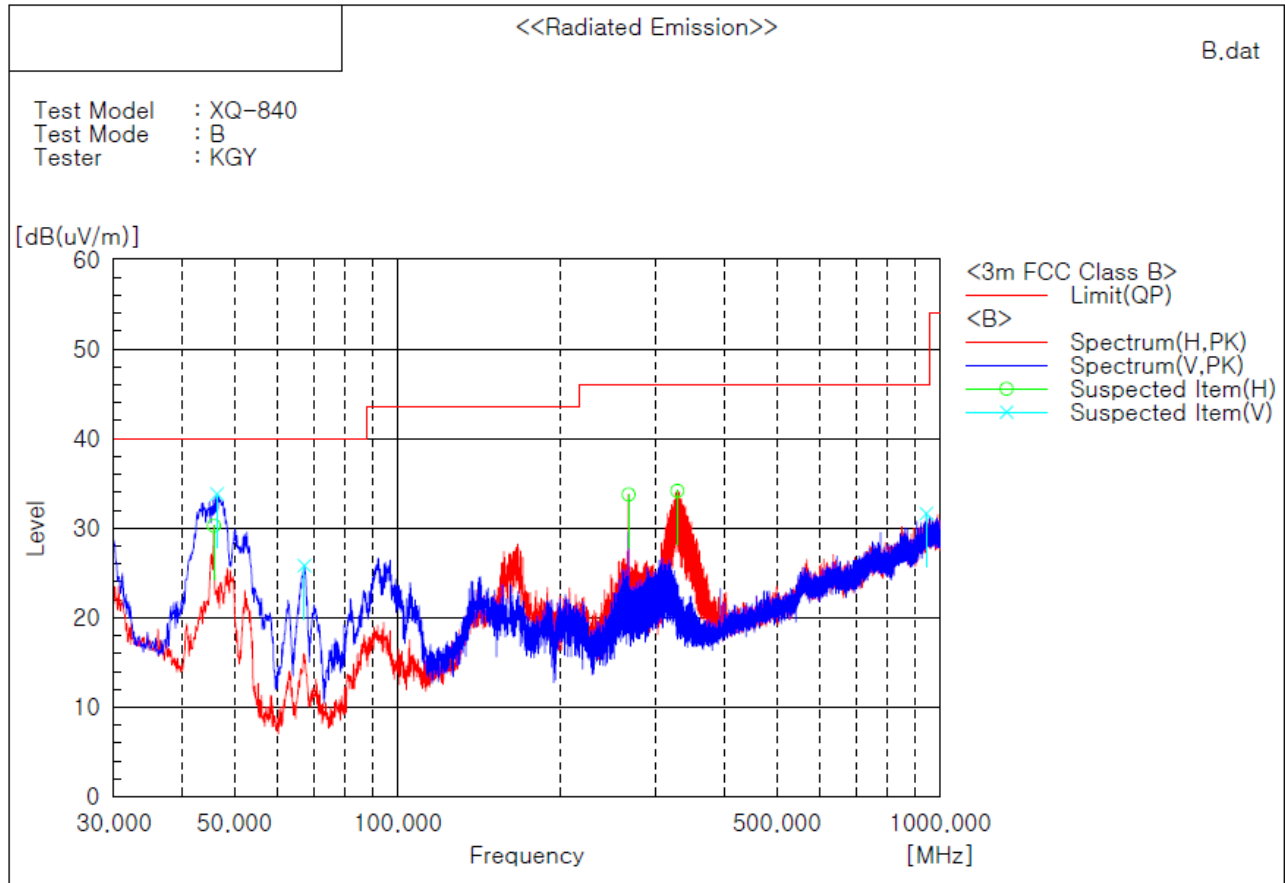
## 2) 30 MHz to 1 GHz

Test mode : 802.11b, middle channel (Worst case)

The requirements are:

☒ Complies

### Test Data



### Spectrum Selection

No.	Frequency [MHz]	(P)	Reading [dB(uV)]	c.f [dB(1/m)]	Result PK [dB(uV/m)]	Limit QP [dB(uV/m)]	Margin QP [dB]	Height [cm]	Angle [deg]
1	45.884	H	44.1	-13.8	30.3	40.0	9.7	101.0	91.0
2	46.490	V	47.8	-14.0	33.8	40.0	6.2	101.0	292.0
3	67.345	V	43.5	-17.7	25.8	40.0	14.2	194.0	220.0
4	266.680	H	42.5	-8.7	33.8	46.0	12.2	101.0	290.0
5	328.154	H	41.8	-7.6	34.2	46.0	11.8	101.0	51.0
6	943.983	V	24.7	6.9	31.6	46.0	14.4	101.0	40.0

### Remark :

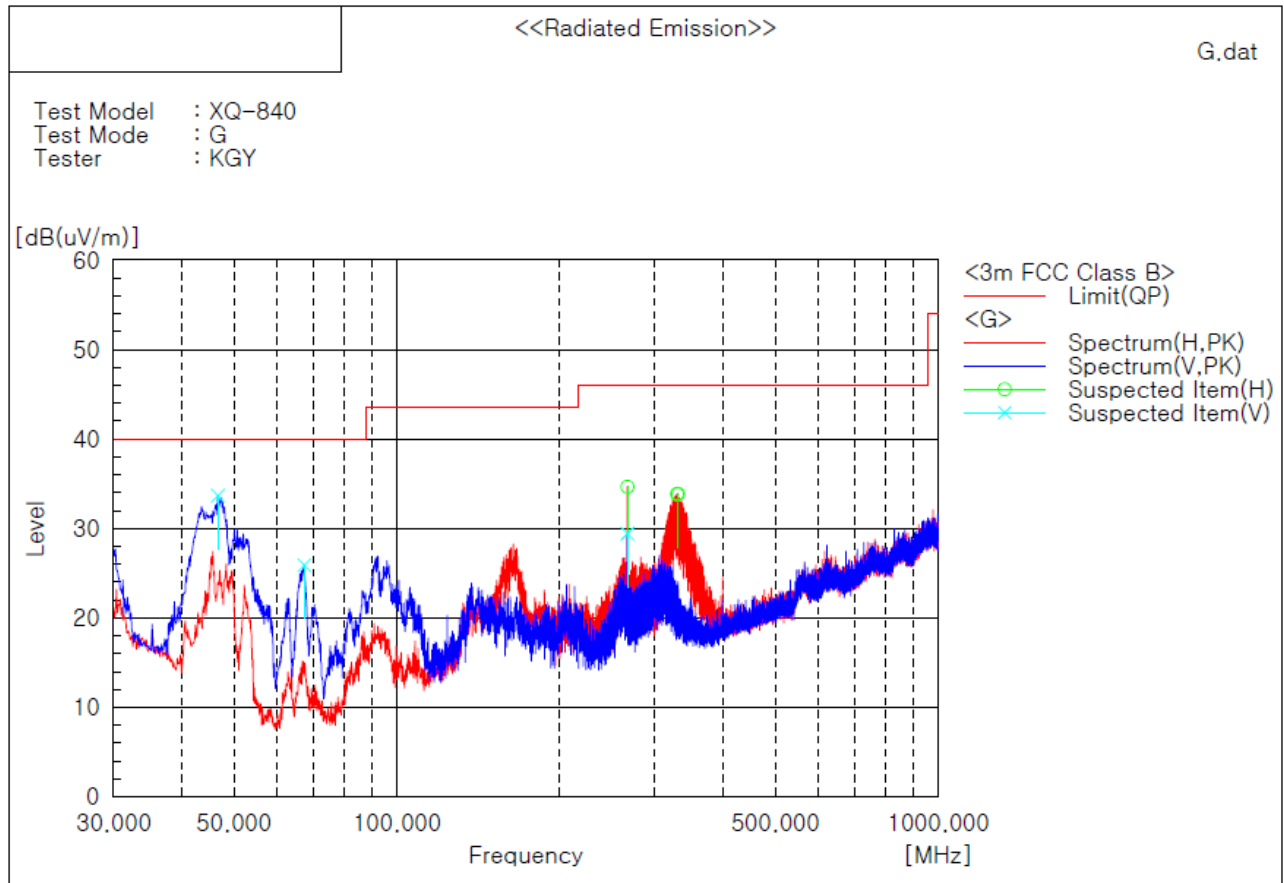
1. The Unwanted emission was measured in the following position: EUT stand-up position(Z axis), lie-down position(X,Y axis). The worst emission was found in lie-down position(X axis) and the worst case was recorded.
2. Result = Reading + c.f(Correction factor)
3. Correction factor = Antenna factor + Cable loss + 6 dB attenuator - Amp Gain
4. This data is the Peak(PK) value.

**Test mode : 802.11g, low channel (Worst case)**

The requirements are:

☒ Complies

**Test Data**



**Spectrum Selection**

No.	Frequency [MHz]	(P)	Reading [dB(uV)]	c.f [dB(1/m)]	Result PK [dB(uV/m)]	Limit QP [dB(uV/m)]	Margin QP [dB]	Height [cm]	Angle [deg]
1	46.733	V	47.8	-14.1	33.7	40.0	6.3	101.0	288.0
2	67.466	V	43.6	-17.7	25.9	40.0	14.1	195.0	230.0
3	266.680	H	43.4	-8.7	34.7	46.0	11.3	101.0	290.0
4	266.680	V	38.1	-8.7	29.4	46.0	16.6	101.0	36.0
5	329.366	H	41.4	-7.6	33.8	46.0	12.2	101.0	64.0
6	331.064	H	41.3	-7.5	33.8	46.0	12.2	101.0	81.0

**Remark :**

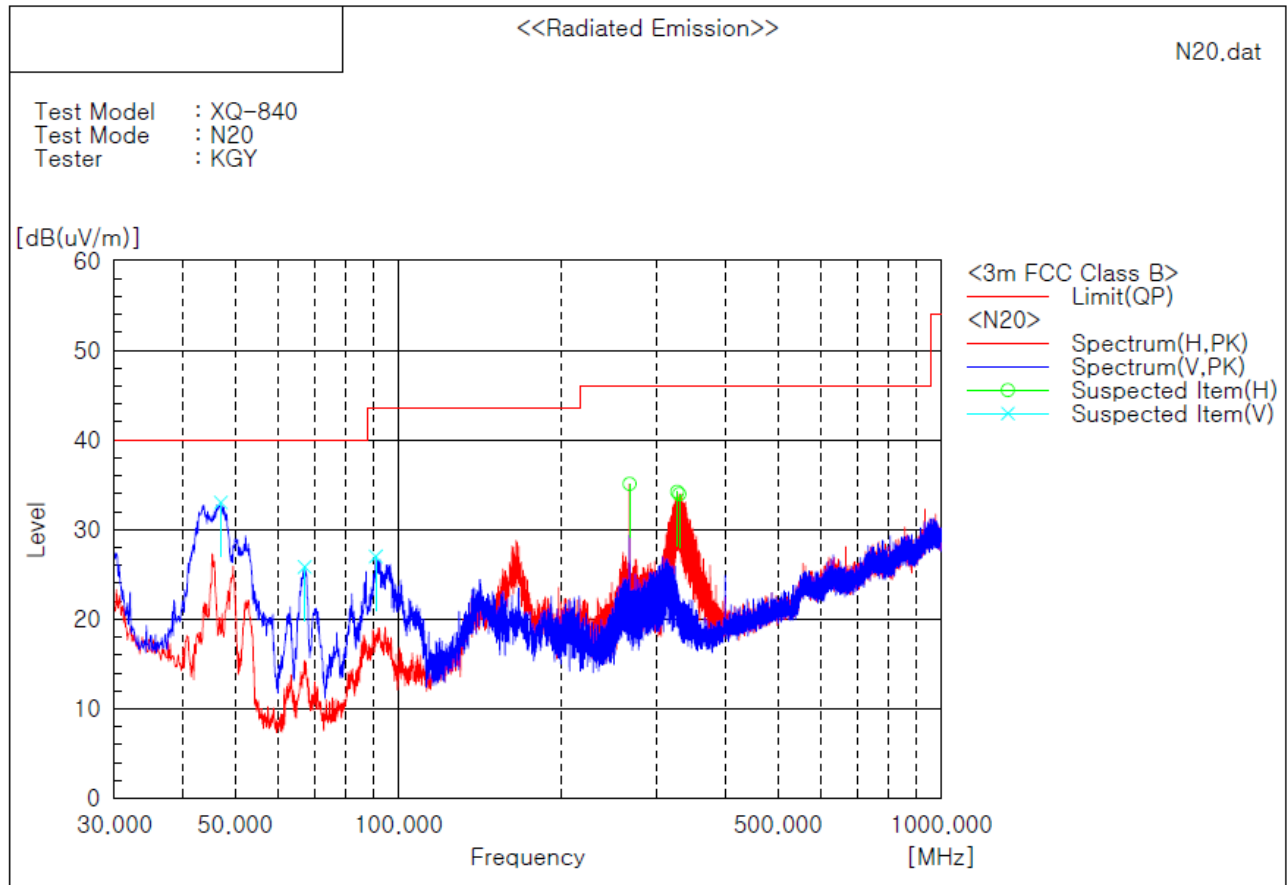
1. The Unwanted emission was measured in the following position: EUT stand-up position(Z axis), lie-down position(X,Y axis). The worst emission was found in lie-down position(X axis) and the worst case was recorded.
2. Result = Reading + c.f(Correction factor)
3. Correction factor = Antenna factor + Cable loss + 6 dB attenuator - Amp Gain
4. This data is the Peak(PK) value.

**Test mode : 802.11n(HT20), middle channel (Worst case)**

The requirements are:

☒ Complies

**Test Data**



**Spectrum Selection**

No.	Frequency [MHz]	(P)	Reading [dB(uV)]	c.f [dB(1/m)]	Result PK [dB(uV/m)]	Limit QP [dB(uV/m)]	Margin QP [dB]	Height [cm]	Angle [deg]
1	47.096	V	47.3	-14.3	33.0	40.0	7.0	101.0	318.0
2	67.224	V	43.5	-17.7	25.8	40.0	14.2	192.0	217.0
3	90.868	V	41.6	-14.6	27.0	43.5	16.5	101.0	37.0
4	266.680	H	43.8	-8.7	35.1	46.0	10.9	101.0	290.0
5	326.335	H	41.9	-7.7	34.2	46.0	11.8	101.0	75.0
6	329.366	H	41.6	-7.6	34.0	46.0	12.0	101.0	68.0

**Remark :**

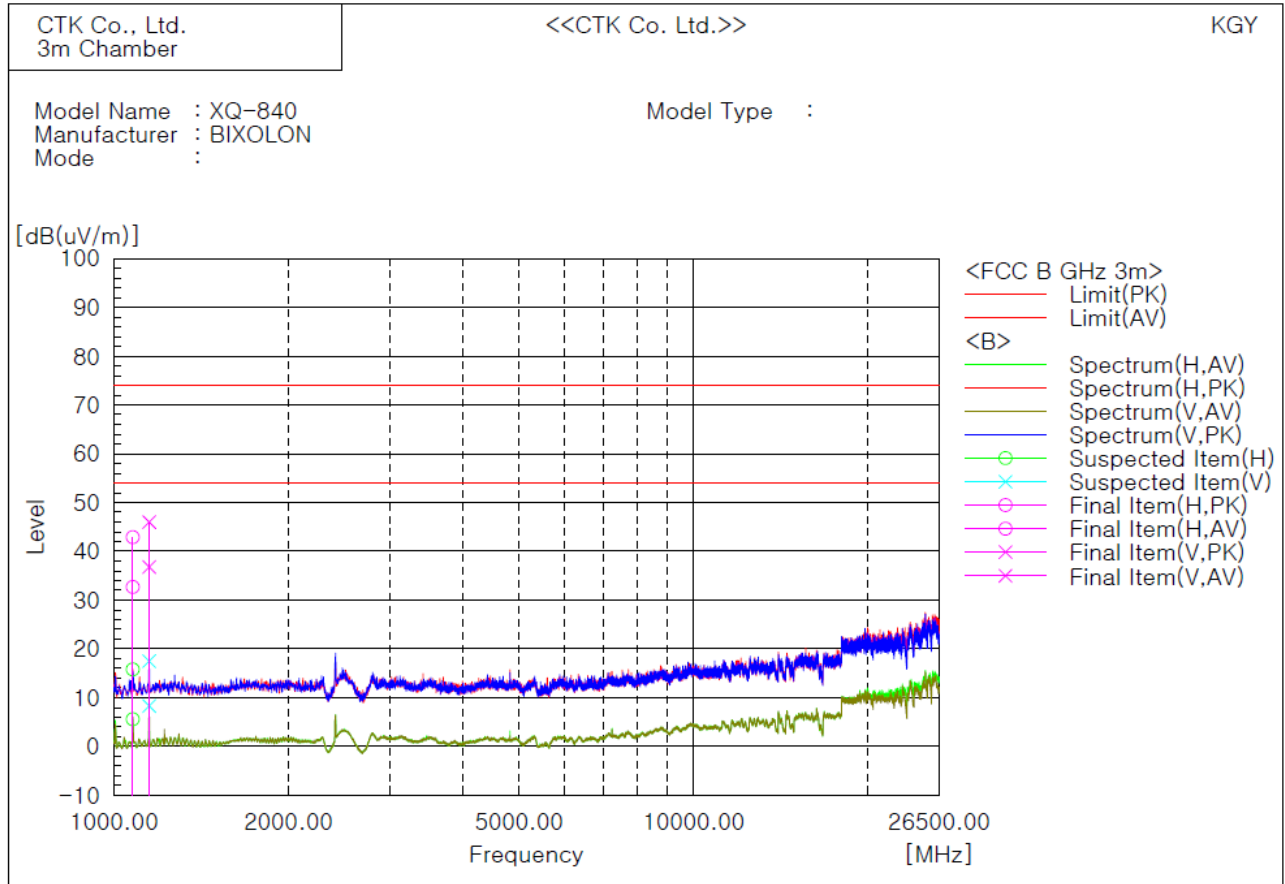
1. The Unwanted emission was measured in the following position: EUT stand-up position(Z axis), lie-down position(X,Y axis). The worst emission was found in lie-down position(X axis) and the worst case was recorded.
2. Result = Reading + c.f(Correction factor)
3. Correction factor = Antenna factor + Cable loss + 6 dB attenuator - Amp Gain
4. This data is the Peak(PK) value.

### 3) above 1 GHz

Test mode : 802.11b, middle channel (Worst case)

The requirements are:

☒ Complies



#### Final Result

No.	Frequency [MHz]	(P)	Reading PK [dB(uV)]	Reading AV [dB(uV)]	c.f [dB(1/m)]	Result PK [dB(uV/m)]	Result AV [dB(uV/m)]	Limit PK [dB(uV/m)]	Limit AV [dB(uV/m)]	Margin PK [dB]	Margin AV [dB]	Height [cm]	Angle [deg]	Remark
1	1150.875	V	54.7	45.5	-8.7	46.0	36.8	74.0	54.0	28.0	17.2	276.4	185.9	
2	1150.875	V	53.3	43.1	-10.4	42.9	32.7	74.0	54.0	31.1	21.3	286.2	350.1	
3	1078.625	H											0.0	
4	1078.625	H											186.9	

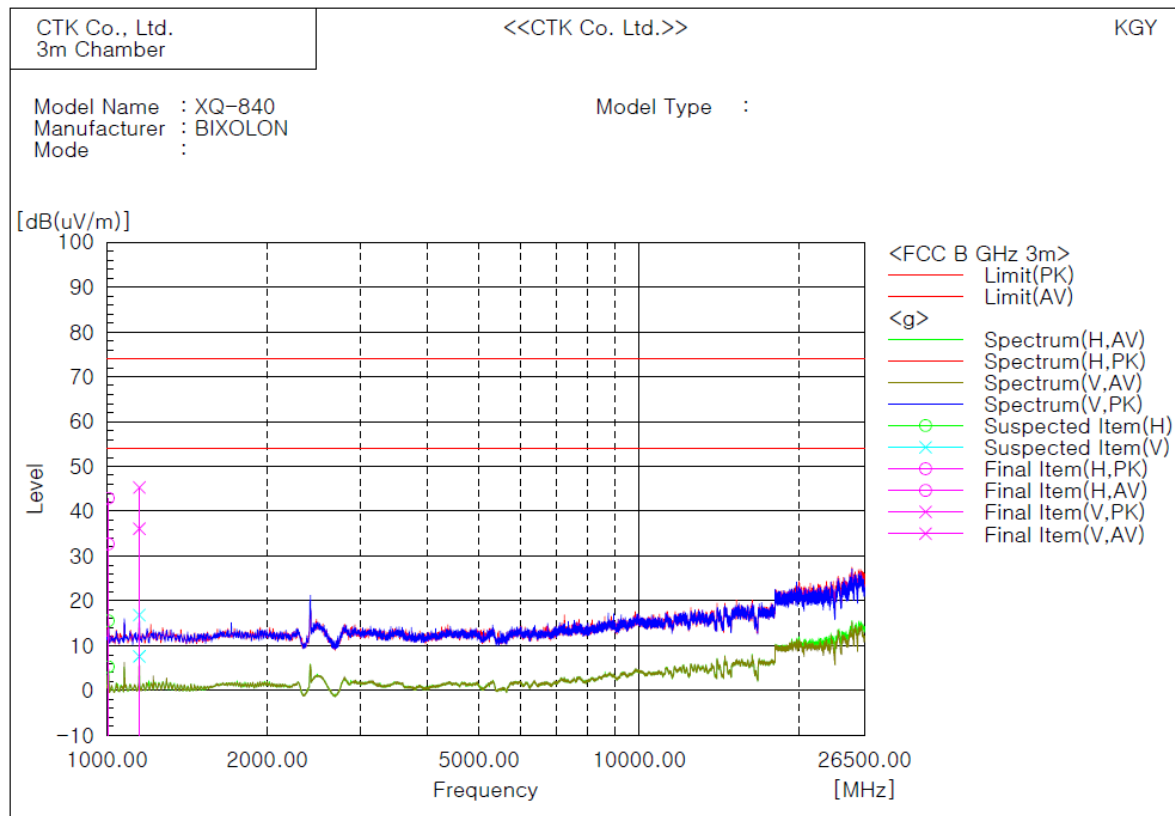
#### Remarks

1. The Unwanted emission was measured in the following position: EUT stand-up position(Z axis), lie-down position(X,Y axis). The worst emission was found in stand-up position(Z axis) and the worst case was recorded.
2. Result = Reading + c.f(correction factor)
3. Correction factor = Antenna factor + Cable loss - Amp Gain

**Test mode : 802.11g, low channel (Worst case)**

The requirements are:

☒ Complies



**Final Result**

No.	Frequency [MHz]	(P)	Reading PK [dB(uV)]	Reading AV [dB(uV)]	c.f [dB(1/m)]	Result PK [dB(uV/m)]	Result AV [dB(uV/m)]	Limit PK [dB(uV/m)]	Limit AV [dB(uV/m)]	Margin PK [dB]	Margin AV [dB]	Height [cm]	Angle [deg]	Remark
1	1006.375	H	53.3	43.1	-10.4	42.9	32.7	74.0	54.0	31.1	21.3	285.4	186.3	
2	1006.375	H	53.3	43.1	-10.4	42.9	32.7	74.0	54.0	31.1	21.3	285.4	294.8	
3	1150.875	V	54.0	44.8	-8.7	45.3	36.1	74.0	54.0	28.7	17.9	273.1	0.0	
4	1150.875	V	54.0	44.8	-8.7	45.3	36.1	74.0	54.0	28.7	17.9	273.1	345.4	

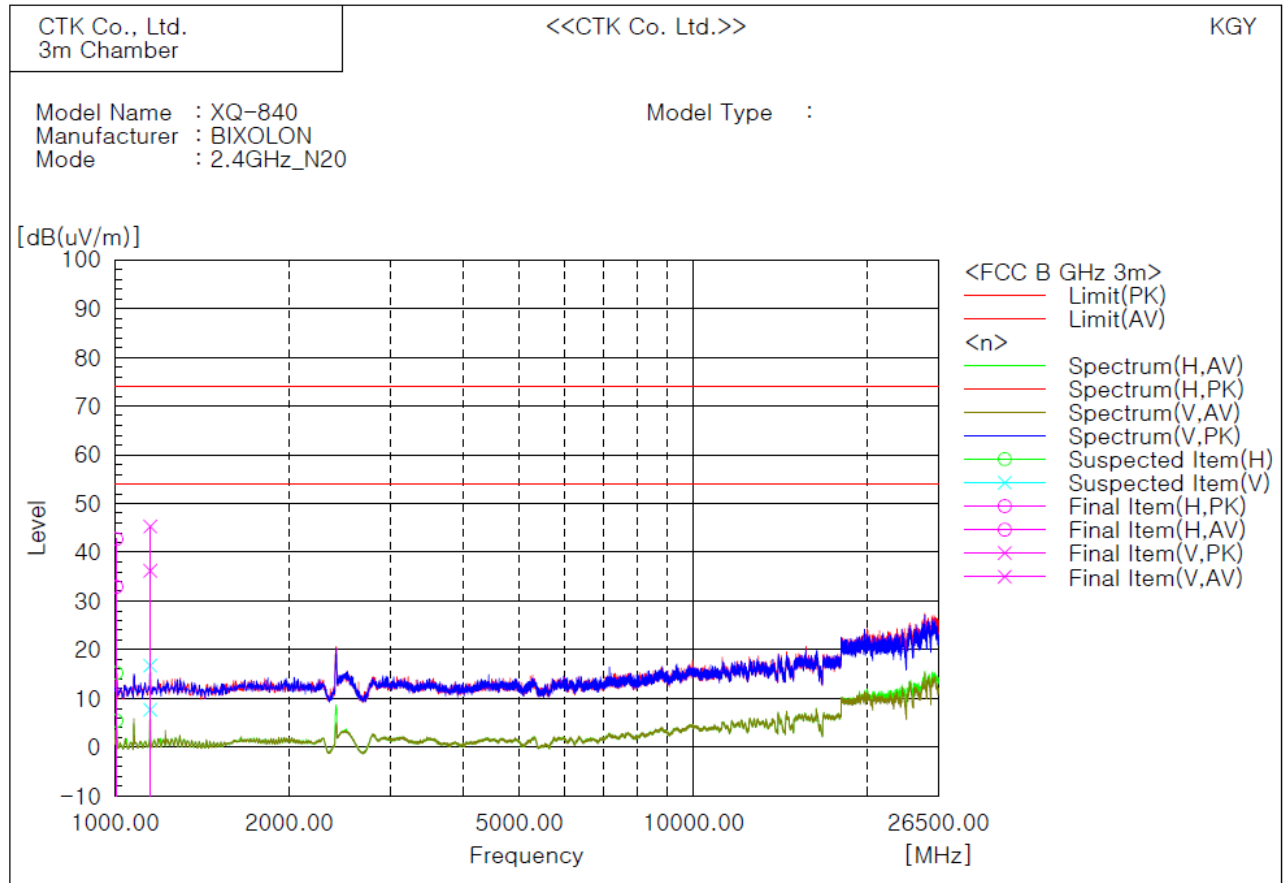
**Remarks**

1. The Unwanted emission was measured in the following position: EUT stand-up position(Z axis), lie-down position(X,Y axis). The worst emission was found in stand-up position(Z axis) and the worst case was recorded.
2. Result = Reading + c.f(correction factor)
3. Correction factor = Antenna factor + Cable loss - Amp Gain

**Test mode : 802.11n(HT20), middle channel (Worst case)**

The requirements are:

☒ Complies



#### Final Result

No.	Frequency [MHz]	(P)	Reading PK [dB(μV)]	Reading AV [dB(μV)]	c.f [dB(1/m)]	Result PK [dB(μV/m)]	Result AV [dB(μV/m)]	Limit PK [dB(μV/m)]	Limit AV [dB(μV/m)]	Margin PK [dB]	Margin AV [dB]	Height [cm]	Angle [deg]	Remark
1	1006.375	H	53.1	43.3	-10.4	42.7	32.9	74.0	54.0	31.3	21.1	285.6	75.1	
2	1006.375	H	54.0	44.9	-10.4	43.6	33.2	74.0	54.0	28.7	17.8	285.6	99.3	
3	1150.875	V	54.0	44.9	-8.7	45.3	36.2	74.0	54.0	28.7	17.8	273.6	116.8	
4	1150.875	V	54.0	44.9	-8.7	45.3	36.2	74.0	54.0	28.7	17.8	273.6	0.0	

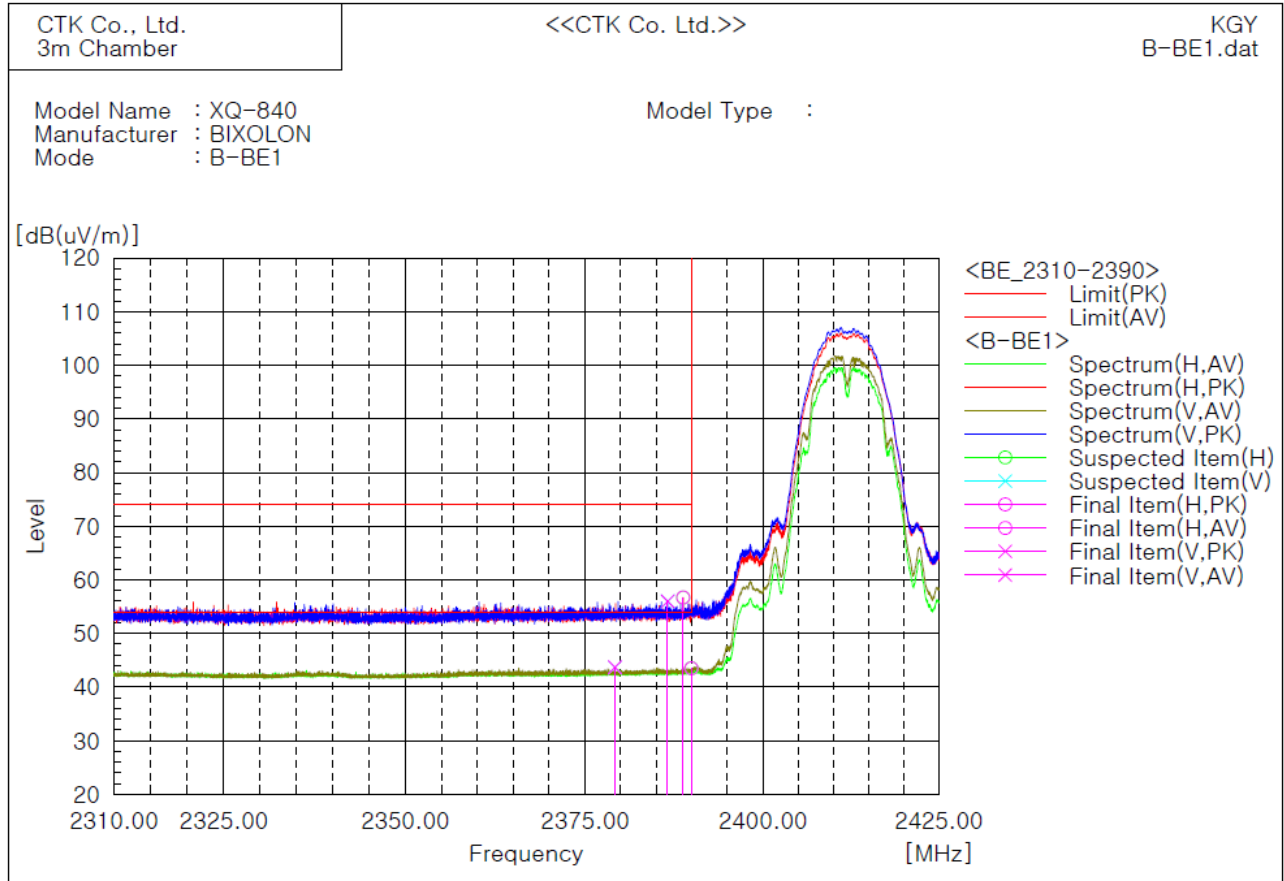
#### Remarks

1. The Unwanted emission was measured in the following position: EUT stand-up position(Z axis), lie-down position(X,Y axis). The worst emission was found in stand-up position(Z axis) and the worst case was recorded.
2. Result = Reading + c.f(correction factor)
3. Correction factor = Antenna factor + Cable loss - Amp Gain

#### 4) Restricted Frequency Bands

Test mode : 802.11b

Test frequency range : 2 310 MHz – 2 390 MHz



#### Final Result

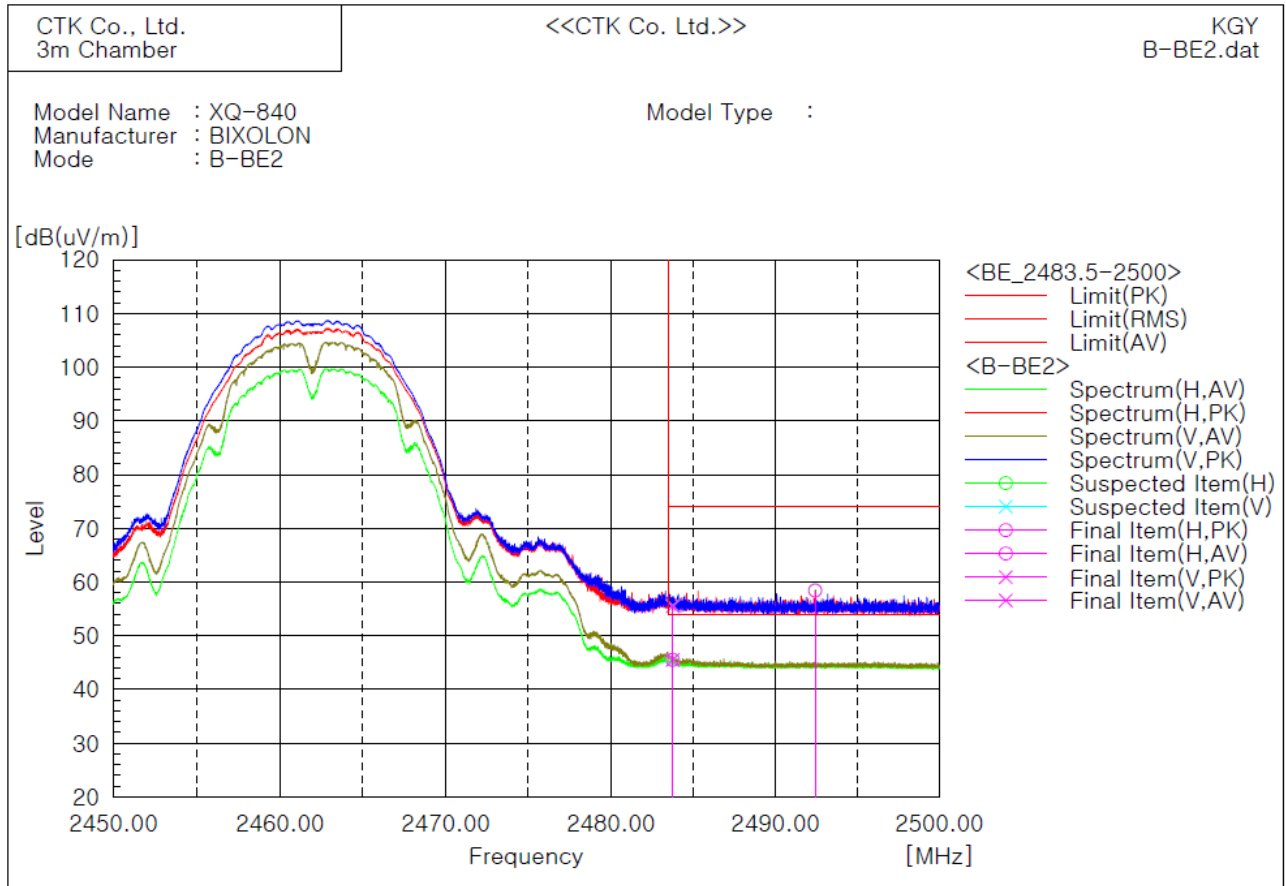
No.	Frequency [MHz]	(P)	Reading PK [dB(μV)]	Reading AV [dB(μV)]	c.f [dB(1/m)]	Result PK [dB(μV/m)]	Result AV [dB(μV/m)]	Limit PK [dB(μV/m)]	Limit AV [dB(μV/m)]	Margin PK [dB]	Margin AV [dB]	Height [cm]	Angle [deg]	Remark
1	2388.790	H	51.8		4.9	56.7		74.0	54.0	17.3		464.1	93.6	
2	2389.939	H		38.5	5.0		43.5	74.0	54.0		10.5	354.9	0.0	
3	2386.604	V	51.1		4.9	56.0		74.0	54.0	18.0		346.2	355.2	
4	2379.201	V		38.9	4.8		43.7	74.0	54.0		10.3	464.1	0.0	

#### Remarks

1. The Unwanted emission was measured in the following position: EUT stand-up position(Z axis), lie-down position(X,Y axis). The worst emission was found in stand-up position(Z axis) and the worst case was recorded.
2. Result = Reading + c.f(correction factor)
3. Correction factor = Antenna factor + Cable loss - Amp Gain



**Test frequency range : 2 483.5 MHz – 2 500 MHz**



**Final Result**

No.	Frequency [MHz]	(P)	Reading PK [dB(μV)]	Reading AV [dB(μV)]	c.f [dB(1/m)]	Result PK [dB(μV/m)]	Result AV [dB(μV/m)]	Limit PK [dB(μV/m)]	Limit AV [dB(μV/m)]	Margin PK [dB]	Margin AV [dB]	Height [cm]	Angle [deg]	Remark
1	2492.425	H	51.8	38.8	6.6	58.4	45.5	74.0	54.0	15.6	8.5	235.9	191.9	
2	2483.762	H	48.8	38.8	6.7	55.5	45.5	74.0	54.0	18.5	8.5	344.5	351.4	
3	2483.762	V	48.8	38.8	6.7	55.5	45.5	74.0	54.0	18.5	8.5	344.5	351.4	
4	2483.762	V	48.8	38.8	6.7	55.5	45.5	74.0	54.0	18.5	8.5	344.5	351.4	

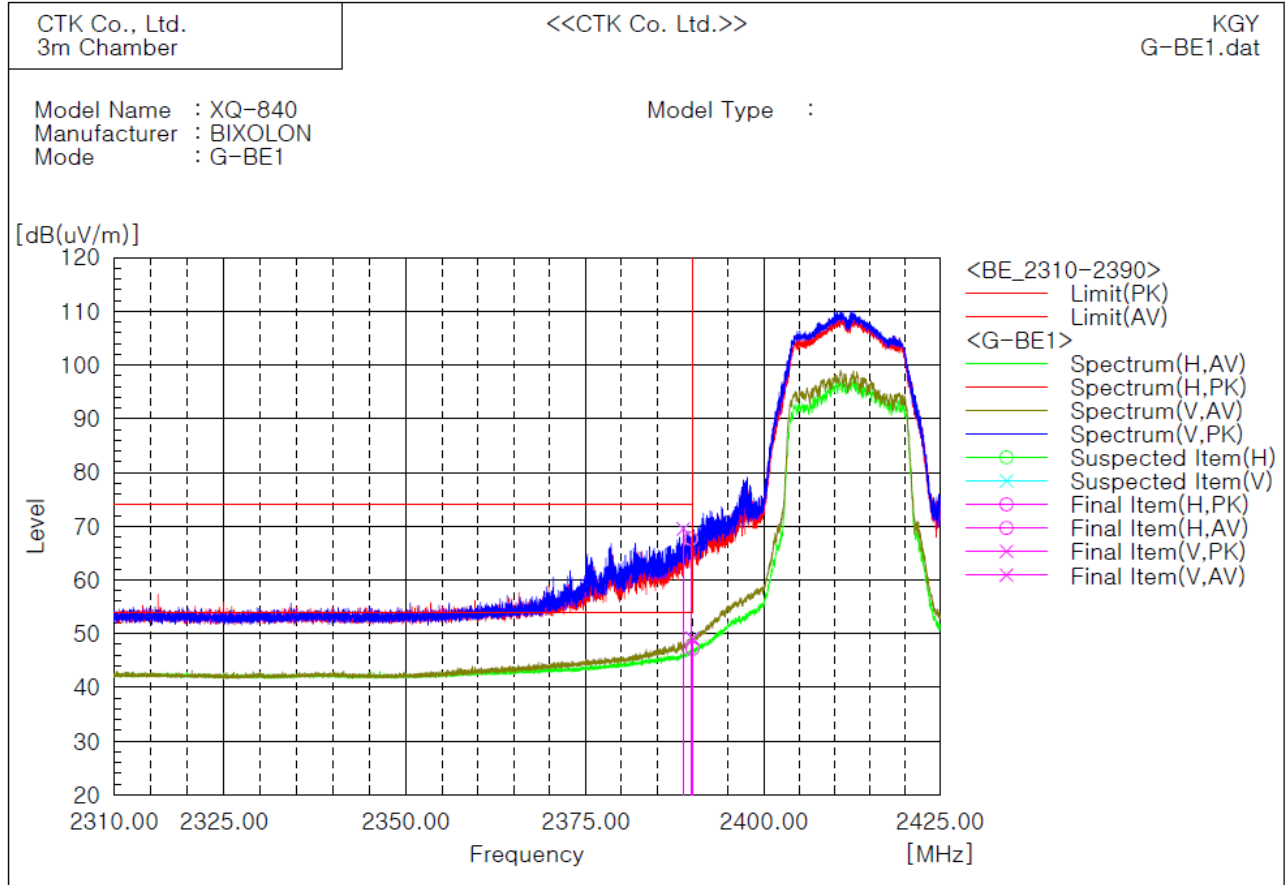
**Remarks**

1. The Unwanted emission was measured in the following position: EUT stand-up position(Z axis), lie-down position(X,Y axis). The worst emission was found in stand-up position(Z axis) and the worst case was recorded.
2. Result = Reading + c.f(correction factor)
3. Correction factor = Antenna factor + Cable loss - Amp Gain



Test mode : 802.11g

Test frequency range : 2 310 MHz – 2 390 MHz



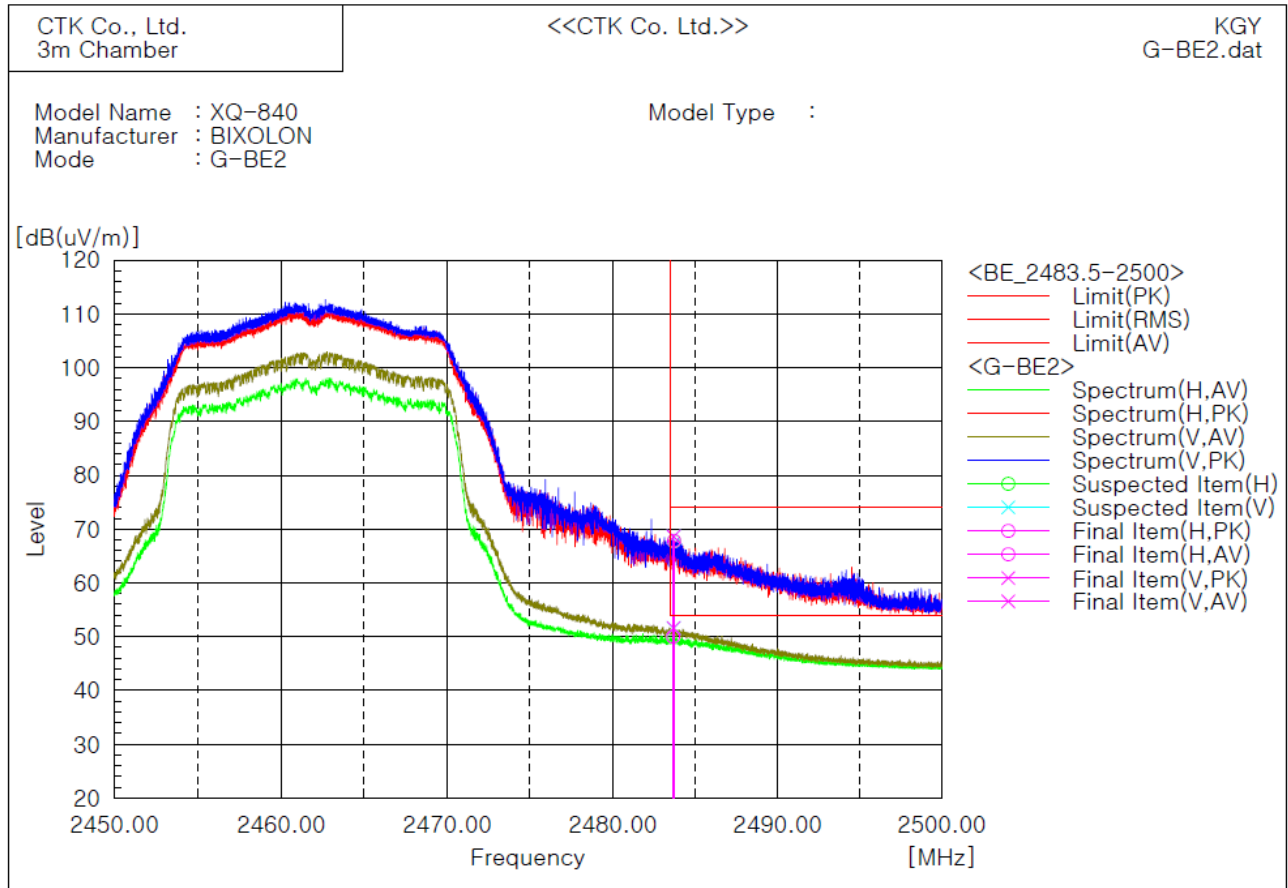
#### Final Result

No.	Frequency [MHz]	(P)	Reading PK [dB(uV)]	Reading AV [dB(uV)]	c.f [dB(1/m)]	Result PK [dB(uV/m)]	Result AV [dB(uV/m)]	Limit PK [dB(uV/m)]	Limit AV [dB(uV/m)]	Margin PK [dB]	Margin AV [dB]	Height [cm]	Angle [deg]	Remark
1	2389.752	H	62.7	42.2	5.0	67.7	47.2	74.0	54.0	6.3	6.8	234.7	174.3	
2	2389.968	H	64.6	44.1	4.9	69.5	49.1	74.0	54.0	4.5	4.9	355.7	23.4	
3	2388.689	V						74.0	54.0			344.3	25.9	
4	2389.968	V						74.0	54.0			344.3	0.0	

#### Remarks

1. The Unwanted emission was measured in the following position: EUT stand-up position(Z axis), lie-down position(X,Y axis). The worst emission was found in stand-up position(Z axis) and the worst case was recorded.
2. Result = Reading + c.f(correction factor)
3. Correction factor = Antenna factor + Cable loss - Amp Gain

**Test frequency range : 2 483.5 MHz – 2 500 MHz**



**Final Result**

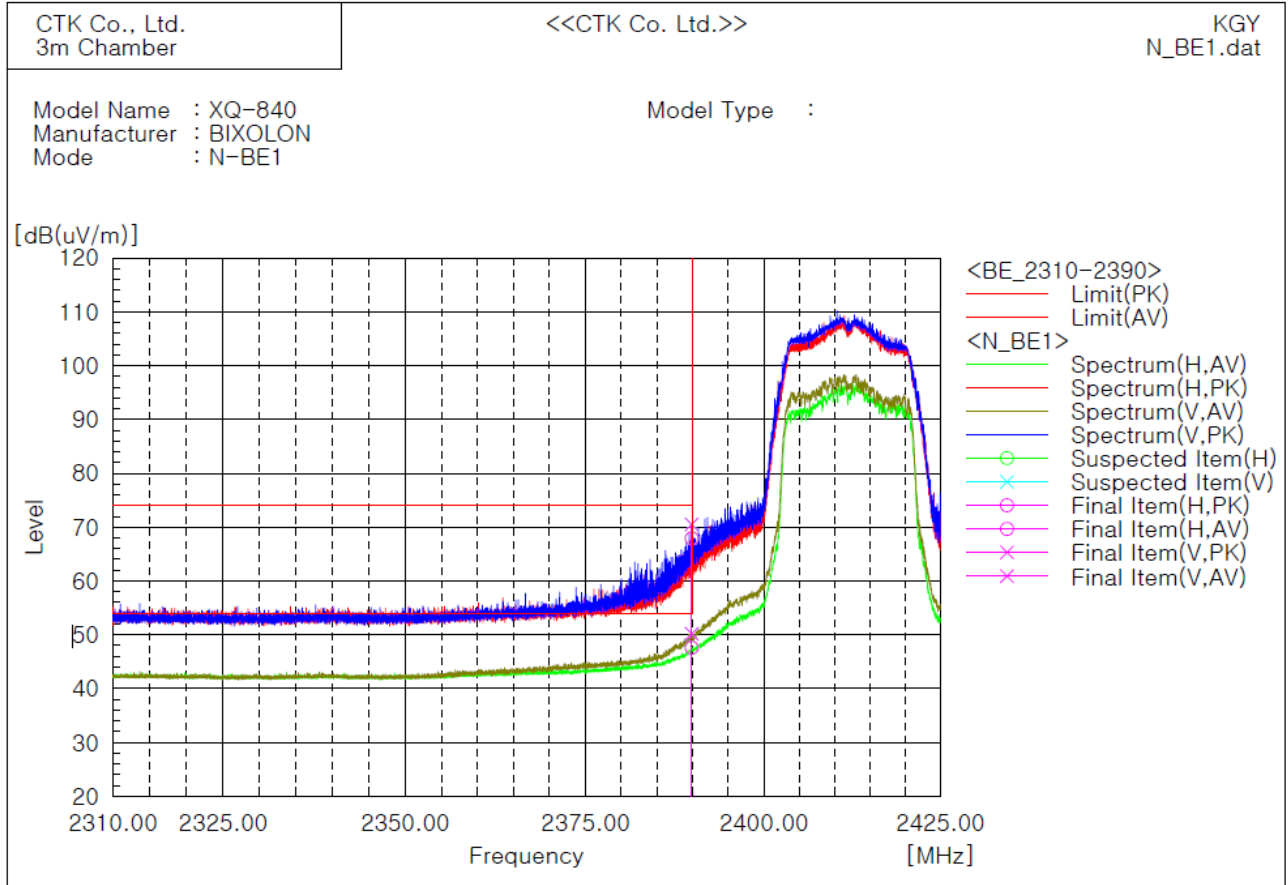
No.	Frequency [MHz]	(P)	Reading PK [dB(uV)]	Reading AV [dB(uV)]	c.f [dB(1/m)]	Result PK [dB(uV/m)]	Result AV [dB(uV/m)]	Limit PK [dB(uV/m)]	Limit AV [dB(uV/m)]	Margin PK [dB]	Margin AV [dB]	Height [cm]	Angle [deg]	Remark
1	2483.731	H	61.1	43.3	6.7	67.8	50.0	74.0	54.0	6.2	4.0	356.3	291.3	
2	2483.669	H	61.9	44.9	6.7	68.6	51.6	74.0	54.0	5.4	2.4	464.2	0.0	
3	2483.700	V												
4	2483.700	V												

**Remarks**

1. The Unwanted emission was measured in the following position: EUT stand-up position(Z axis), lie-down position(X,Y axis). The worst emission was found in stand-up position(Z axis) and the worst case was recorded.
2. Result = Reading + c.f(correction factor)
3. Correction factor = Antenna factor + Cable loss - Amp Gain

Test mode : 802.11n(HT20)

Test frequency range : 2 310 MHz – 2 390 MHz



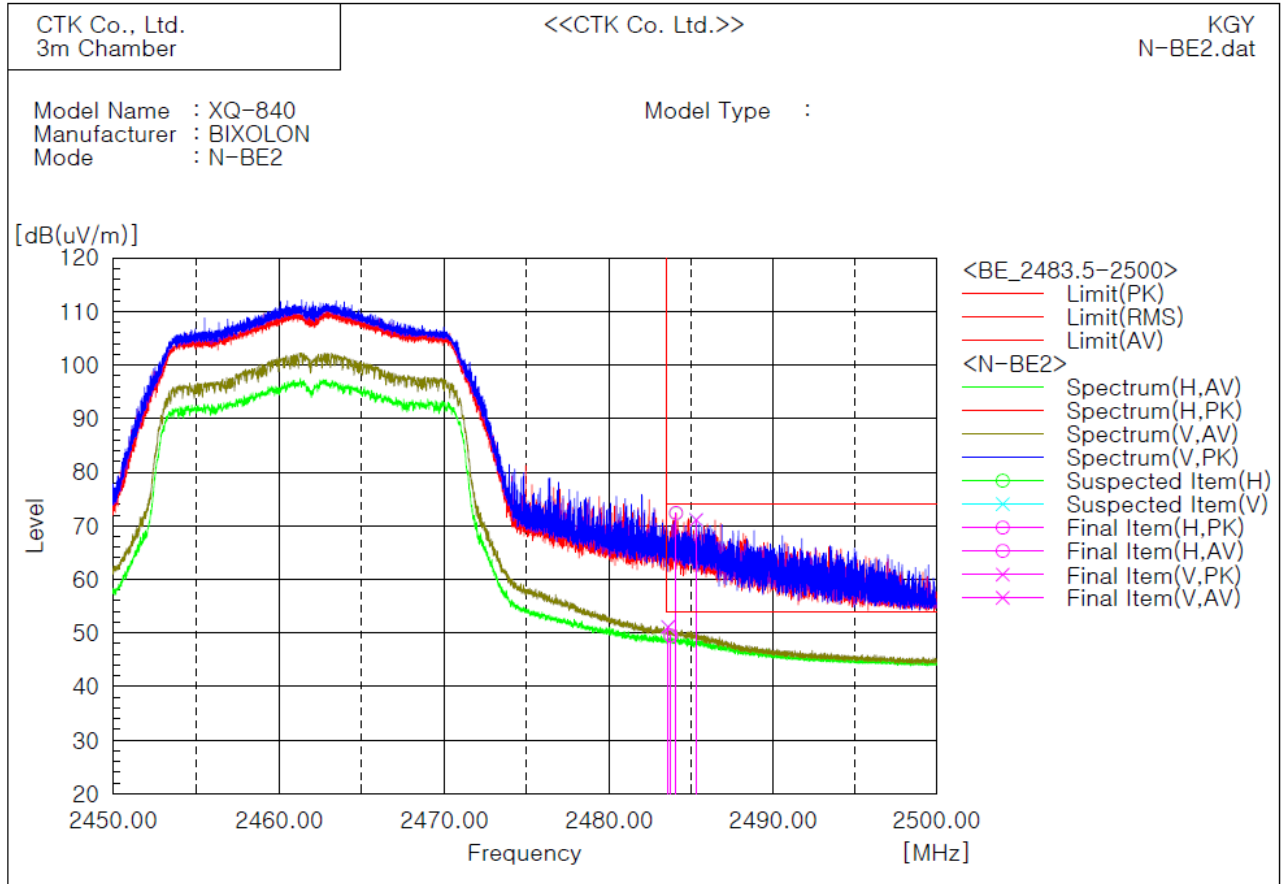
Final Result

No.	Frequency [MHz]	(P)	Reading PK [dB(uV)]	Reading AV [dB(uV)]	c.f [dB(1/m)]	Result PK [dB(uV/m)]	Result AV [dB(uV/m)]	Limit PK [dB(uV/m)]	Limit AV [dB(uV/m)]	Margin PK [dB]	Margin AV [dB]	Height [cm]	Angle [deg]	Remark
1	2389.882	H	62.9		5.0	67.9		74.0	54.0	6.1		355.3	139.7	
2	2389.882	H		42.6	5.0		47.6	74.0	54.0		6.4	355.3	45.8	
3	2389.867	V	65.5		5.0	70.5		74.0	54.0	3.5		345.1	34.0	
4	2389.853	V		45.2	5.0		50.2	74.0	54.0		3.8	345.1	359.9	

Remarks

1. The Unwanted emission was measured in the following position: EUT stand-up position(Z axis), lie-down position(X,Y axis). The worst emission was found in stand-up position(Z axis) and the worst case was recorded.
2. Result = Reading + c.f(correction factor)
3. Correction factor = Antenna factor + Cable loss - Amp Gain

**Test frequency range : 2 483.5 MHz – 2 500 MHz**



**Final Result**

No.	Frequency [MHz]	(P)	Reading PK [dB(μV)]	Reading AV [dB(μV)]	c.f [dB(1/m)]	Result PK [dB(μV/m)]	Result AV [dB(μV/m)]	Limit PK [dB(μV/m)]	Limit AV [dB(μV/m)]	Margin PK [dB]	Margin AV [dB]	Height [cm]	Angle [deg]	Remark
1	2484.087	H	65.7	42.8	6.7	72.4	49.5	74.0	54.0	1.6	4.5	355.9	290.7	
2	2483.762	H	64.4	42.8	6.7	71.1	49.5	74.0	54.0	2.9	4.5	464.2	0.1	
3	2485.313	V	64.4	44.4	6.7	71.1	51.1	74.0	54.0	2.9	2.9	224.1	0.0	
4	2483.600	V	64.4	44.4	6.7	71.1	51.1	74.0	54.0	2.9	2.9	464.2	0.0	

**Remarks**

1. The Unwanted emission was measured in the following position: EUT stand-up position(Z axis), lie-down position(X,Y axis). The worst emission was found in stand-up position(Z axis) and the worst case was recorded.
2. Result = Reading + c.f(correction factor)
3. Correction factor = Antenna factor + Cable loss - Amp Gain

## 4.6 AC Conducted Emissions

A radio apparatus that is designed to be connected to the public utility (AC) power line shall ensure that the radio frequency voltage, which is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz-30 MHz, shall not exceed the limits.

### Instrument Settings

IF Band Width: 9 kHz

### Test Procedures

The EUT was placed on a non-metallic table 0.8m above the metallic, grounded floor and 0.4m from the reference ground plane wall. The distance to other metallic surfaces was at least 0.8m.

Amplitude measurements were performed with a quasi-peak detector and an average detector.

### Limit

Frequency (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average**
0.15 ~ 0.5	66 to 56*	56 to 46*
0.5 ~ 5	56	46
5 ~ 30	60	50

\* The level decreases linearly with the logarithm of the frequency.

\*\* A linear average detector is required.

### Test Results

The requirements are:

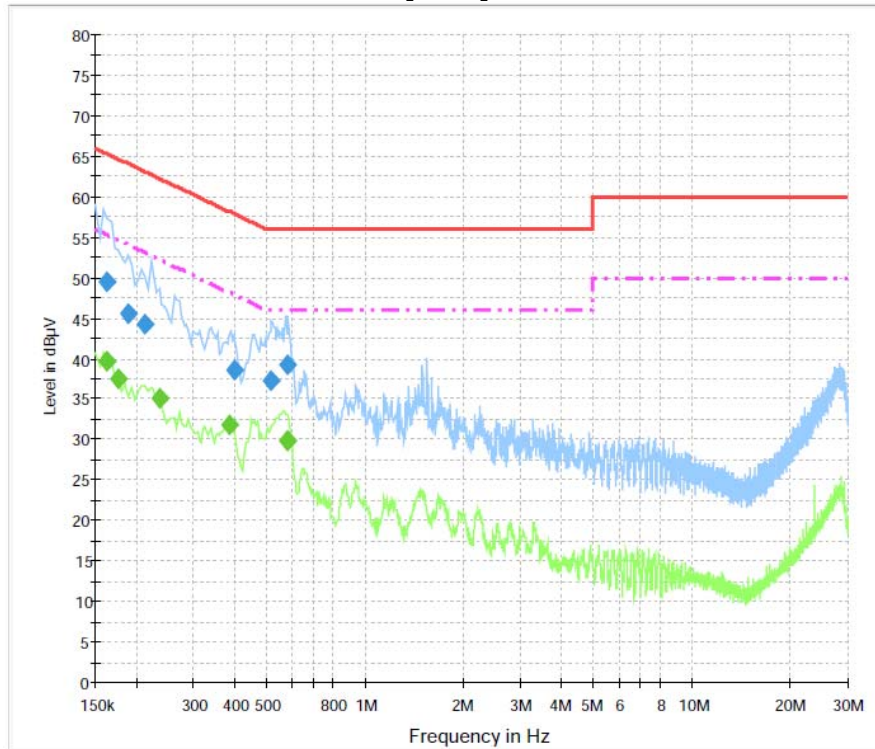
☒ Complies

#### Test mode : 802.11b, low channel(Worst case)

Frequency [MHz]	Measured Data [dBuV]	Margin [dB]	Remark
0.159	50.0	15.5	Quasi-peak
0.163	39.8	15.5	Average

## Test Data

[LINE]



## Final Result 1

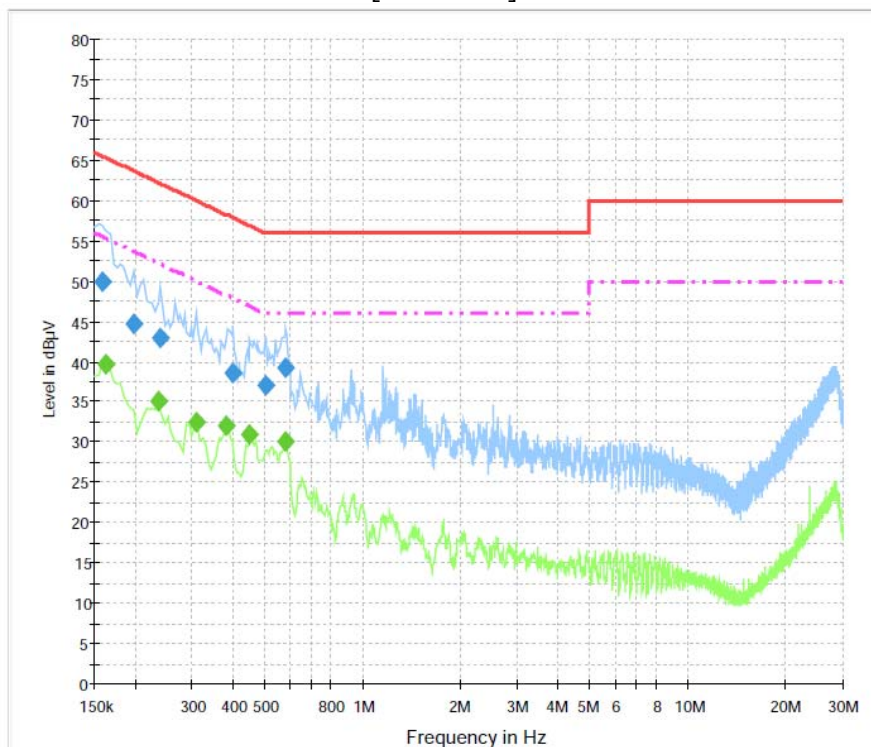
Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.163500	49.5	1000.0	9.000	On	L1	10.2	15.8	65.3
0.190500	45.5	1000.0	9.000	On	L1	10.2	18.5	64.0
0.213000	44.3	1000.0	9.000	On	L1	10.1	18.8	63.1
0.402000	38.5	1000.0	9.000	On	L1	10.1	19.3	57.8
0.519000	37.2	1000.0	9.000	On	L1	10.2	18.8	56.0
0.577500	39.3	1000.0	9.000	On	L1	10.2	16.7	56.0

## Final Result 2

Frequency (MHz)	CAverage (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.163500	39.7	1000.0	9.000	On	L1	10.2	15.6	55.3
0.177000	37.4	1000.0	9.000	On	L1	10.3	17.2	54.6
0.235500	35.0	1000.0	9.000	On	L1	10.0	17.2	52.3
0.384000	31.9	1000.0	9.000	On	L1	10.1	16.3	48.2
0.577500	29.9	1000.0	9.000	On	L1	10.2	16.1	46.0
0.577500	29.9	1000.0	9.000	On	L1	10.2	16.1	46.0



[NEUTRAL]



### Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.159000	50.0	1000.0	9.000	On	N	10.5	15.5	65.5
0.199500	44.7	1000.0	9.000	On	N	10.4	18.9	63.6
0.240000	42.9	1000.0	9.000	On	N	10.3	19.2	62.1
0.402000	38.7	1000.0	9.000	On	N	10.5	19.1	57.8
0.505500	37.0	1000.0	9.000	On	N	10.6	19.0	56.0
0.582000	39.2	1000.0	9.000	On	N	10.6	16.8	56.0

### Final Result 2

Frequency (MHz)	CAverage (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.163500	39.8	1000.0	9.000	On	N	10.5	15.5	55.3
0.235500	35.0	1000.0	9.000	On	N	10.3	17.2	52.3
0.307500	32.4	1000.0	9.000	On	N	10.4	17.6	50.0
0.379500	32.1	1000.0	9.000	On	N	10.5	16.2	48.3
0.451500	30.9	1000.0	9.000	On	N	10.5	15.9	46.8
0.577500	30.1	1000.0	9.000	On	N	10.6	15.9	46.0

## APPENDIX A – Test Equipment Used For Tests

	Name of Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	MXA Signal Analyzer	Agilent	N9020A	MY50200512	2019-04-23	2020-04-23
2	Signal Generator	Rohde & Schwarz	SMBV100A	258008	2019-01-28	2020-01-28
3	EMI Test Receiver	Rohde & Schwarz	ESCI7	100814	2019-10-22	2020-10-22
4	Bilog Antenna	SCHAFFNER	CBL6111C	2551	2019-04-17	2021-04-17
5	Active Loop Antenna	SCHWARZBECK	FMZB 1513	1513-125	2018-05-02	2020-05-02
6	6dB Attenuator	Rohde & Schwarz	DNF	272.4110.50-2	2019-10-25	2020-10-25
7	AMPLIFIER	SONOMA	310	291721	2019-01-28	2020-01-28
8	EMI Test Receiver	Rohde & Schwarz	ESU40	100336	2019-01-29	2020-01-29
9	Preamplifier	Agilent	8449B	3008A02011	2018-11-30	2019-12-03
10	Double Ridged Guide Antenna	ETS-Lindgren	3117	00154525	2019-02-22	2021-02-22
11	Double Ridged Guide Antenna	ETS-Lindgren	3116	00062916	2019-04-22	2021-04-22
12	Band Reject Filter	Micro Tronics	BRM50702	G233	2019-01-28	2020-01-28

	Cable	Manufacturer	Model No.	Serial No.	Check Date
1	RF Cable (Radiated)	HUBER+SUHNER	SUCOFLEX 104	MY27558/4	2018-12-19
2	RF Cable (Radiated)	HUBER+SUHNER	SUCOFLEX 104	N/A (below 1GHz)	2018-12-19
3	RF Cable (Radiated)	HUBER+SUHNER	SUCOFLEX 104	MY27573/4	2018-12-19
4	RF Cable (Radiated)	HUBER+SUHNER	SUCOFLEX 106	N/A (above 1GHz)	2018-12-19
5	RF Cable (Radiated)	HUBER+SUHNER	SUCOFLEX 102	MY2374/2	2018-12-19
6	RF Cable (Radiated)	HUBER+SUHNER	SUCOFLEX 102	MY4728/2	2018-12-19
7	RF Cable (Conducted Emissions)	Canare Corporation	L-5D2W	N/A	2018-12-19
8	RF Cable (Conducted)	Junkosha Inc.	MWX221	1510S087	2019-10-22

### Remark

- Equipment No. 3 and 6 were used for radiation measurements after the calibration date.