



# FCC RADIO TEST REPORT

**FCC ID** : N7NYLW  
**Equipment** : Open-Source Hardware Development Platform  
**Brand Name** : mangOH  
**Model Name** : Yellow  
**Applicant** : Sierra Wireless Inc.  
13811 Wireless Way Richmond, BC Canada V6V 3A4  
**Manufacturer** : Sierra Wireless Inc.  
13811 Wireless Way Richmond, BC Canada V6V 3A4  
**Standard** : FCC Part 15 Subpart C §15.247

The product was received on Feb. 07, 2020 and testing was started from Feb. 28, 2020 and completed on Apr. 23, 2020. We, SPORTON INTERNATIONAL INC., EMC & Wireless Communications Laboratory, would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

The report must not be used by the client to claim product certification, approval, or endorsement by TAF or any agency of government.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.

*Louis Wu*

Approved by: Louis Wu

**SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory**

No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)



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### History of this test report

Report No.	Version	Description	Issued Date
FR020433B	01	Initial issue of report	Jun. 10, 2020
FR020433B	02	Adding conduction data in appendix B	Jun. 30, 2020
FR020433B	03	Removing WWAN information	Jul. 08, 2020
FR020433B	04	Adding near photo	Jul. 10, 2020



### Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
3.1	15.247(a)(2)	6dB Bandwidth	Pass	-
3.1	2.1049	99% Occupied Bandwidth	Reporting only	-
3.2	15.247(b)	Power Output Measurement	Pass	-
3.3	15.247(e)	Power Spectral Density	Pass	-
3.4	15.247(d)	Conducted Band Edges	Pass	-
		Conducted Spurious Emission	Pass	-
3.5	15.247(d)	Radiated Band Edges and Radiated Spurious Emission	Pass	Under limit 1.12 dB at 2483.520 MHz
3.6	15.207	AC Conducted Emission	Pass	Under limit 5.73 dB at 0.166 MHz
3.7	15.203 & 15.247(b)	Antenna Requirement	Pass	-

**Declaration of Conformity:**

The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.

**Comments and Explanations:**

The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

Reviewed by: **Wii Chang**

Report Producer: **Vivian Hsu**



# 1 General Description

## 1.1 Product Feature of Equipment Under Test

Bluetooth, and Wi-Fi 2.4GHz 802.11b/g/n.

Product Specification subjective to this standard	
Antenna Type	WLAN: Loop Antenna Bluetooth: Loop Antenna

## 1.2 Modification of EUT

No modifications are made to the EUT during all test items.



### 1.3 Testing Location

<b>Test Site</b>	SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory	
<b>Test Site Location</b>	No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.) TEL: +886-3-327-3456 FAX: +886-3-328-4978	
<b>Test Site No.</b>	<b>Sporton Site No.</b>	
	TH05-HY	CO05-HY

**Note:** The test site complies with ANSI C63.4 2014 requirement.

<b>Test Site</b>	SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory	
<b>Test Site Location</b>	No.58, Aly. 75, Ln. 564, Wenhua 3rd, Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.) TEL: +886-3-327-0868 FAX: +886-3-327-0855	
<b>Test Site No.</b>	<b>Sporton Site No.</b>	
	03CH13-HY	

**Note:** The test site complies with ANSI C63.4 2014 requirement.

FCC designation No.: TW1190

### 1.4 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- ♦ FCC Part 15 Subpart C §15.247
- ♦ FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v05r02
- ♦ FCC KDB 414788 D01 Radiated Test Site v01r01.
- ♦ ANSI C63.10-2013

**Remark:**

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.
3. The TAF code is not including all the FCC KDB listed without accreditation.



## 2 Test Configuration of Equipment Under Test

- a. The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: conduction emission (150 kHz to 30 MHz), radiation emission (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower).
  
- b. AC power line Conducted Emission was tested under maximum output power.

### 2.1 Carrier Frequency and Channel

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)
2400-2483.5 MHz	1	2412	7	2442
	2	2417	8	2447
	3	2422	9	2452
	4	2427	10	2457
	5	2432	11	2462
	6	2437		



## 2.2 Test Mode

Final test modes are considering the modulation and worse data rates as below table.

Modulation	Data Rate
802.11b	1 Mbps
802.11g	6 Mbps
802.11n HT20	MCS0

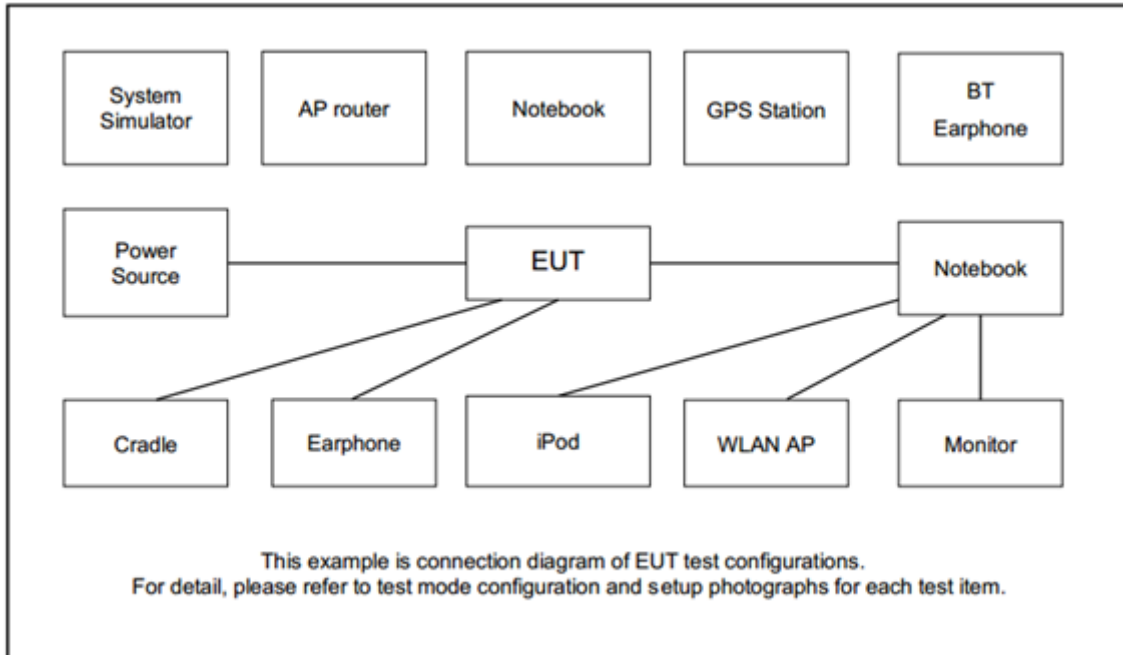
Test Cases	
AC Conducted Emission	Mode 1: WLAN (2.4GHz) Link + Bluetooth Link with BT Sensor + IOT Expansion Card (Load) + USB Cable (Charging from Notebook)

Ch. #	2400-2483.5 MHz		
	802.11b	802.11g	802.11n HT20
Low	01	01	01
Middle	06	06	06
High	11	11	11

**Remark:** For radiation spurious emission, the final modulation and the worst data rate was reference the max RF conducted power.



### 2.3 Connection Diagram of Test System



### 2.4 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	Personal Computer	HP	ProDesk 400 G4	N/A	N/A	Unshielded, 1.8m
2.	IOT breakout boards	Sierra	N/A	N/A	N/A	N/A
3.	Bluetooth Sensor	TEXAS INSTRUMENTS	CC1350STK	N/A	N/A	N/A
4.	WLAN AP	ASUS	RT-AC66U	MSQ-RTAC66U	N/A	Unshielded, 1.8 m
5.	iPod	Apple	A1285	FCC DoC	Shielded, 1.0 m	N/A
6.	Notebook	Dell	Latitude 3400	FCC DOC	N/A	AC I/P : Unshielded, 1.2m DC O/P : Shielded, 1.8m



## 2.5 EUT Operation Test Setup

The RF test items, utility “teraterm V4.104” was installed in Personal Computer which was programmed in order to make the EUT get into the engineering modes to provide channel selection, power level, data rate and the application type and for continuous transmitting signals.

## 2.6 Measurement Results Explanation Example

**For all conducted test items:**

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator factor between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

Example:

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

*Offset = RF cable loss + attenuator factor.*

Following shows an offset computation example with cable loss 4.2 dB and 10dB attenuator.

$$\begin{aligned} \text{Offset}(dB) &= \text{RF cable loss}(dB) + \text{attenuator factor}(dB). \\ &= 4.2 + 10 = 14.2 \text{ (dB)} \end{aligned}$$

### 3 Test Result

#### 3.1 6dB and 99% Bandwidth Measurement

##### 3.1.1 Limit of 6dB and 99% Bandwidth

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

##### 3.1.2 Measuring Instruments

See list of measuring equipment of this test report.

##### 3.1.3 Test Procedures

1. The testing follows the ANSI C63.10 Section 6.9.3 (OBW) and 11.8.1 (6dB BW).
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. Set the Video bandwidth (VBW) = 300 kHz. In order to make an accurate measurement. The 6 dB bandwidth must be greater than 500 kHz.
5. For 99% Bandwidth Measurement, the spectrum analyzer's resolution bandwidth (RBW) is set 1-5% of the emission bandwidth and set the Video bandwidth (VBW)  $\geq 3 * RBW$ .
6. Measure and record the results in the test report.

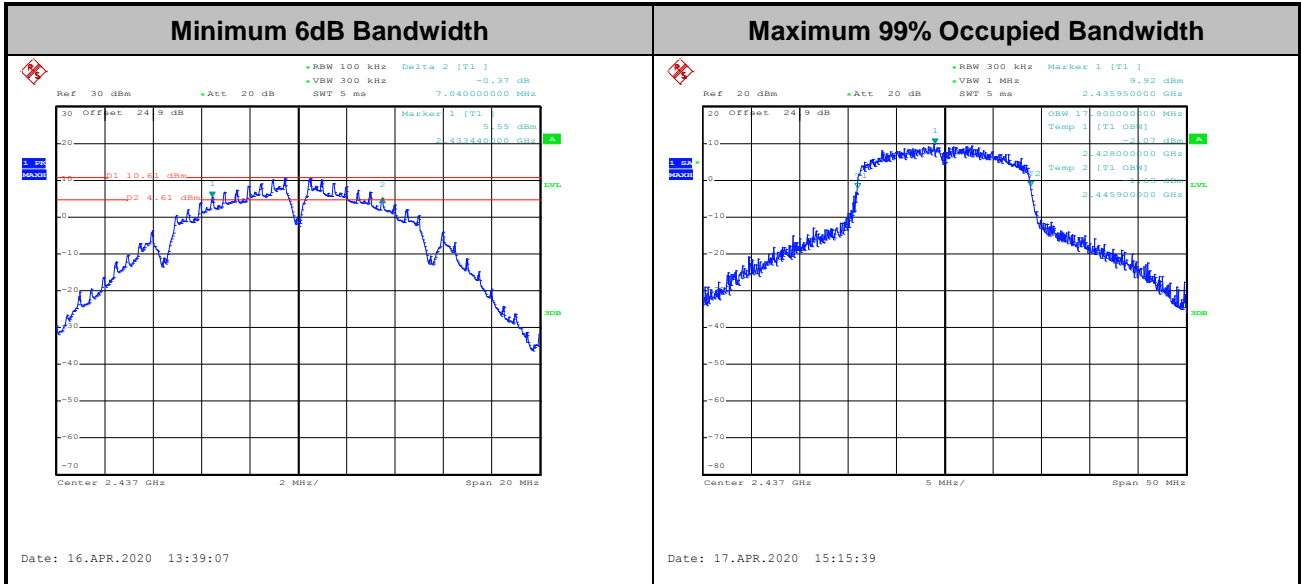
##### 3.1.4 Test Setup





### 3.1.5 Test Result of 6dB and 99% Occupied Bandwidth

Please refer to Appendix A.



**Note:** The occupied channel bandwidth is maintained within the band of operation for all of the modulations.

## 3.2 Output Power Measurement

### 3.2.1 Limit of Output Power

For systems using digital modulation in the 2400-2483.5MHz, the limit for output power is 30dBm. If transmitting antenna with directional gain greater than 6dBi is used, the peak output power from the intentional radiator shall be reduced below the above stated value by the amount in dB that the directional gain of the antenna exceeds 6 dBi. In case of point-to-point operation, the limit has to be reduced by 1dB for every 3dB that the directional gain of the antenna exceeds 6dBi.

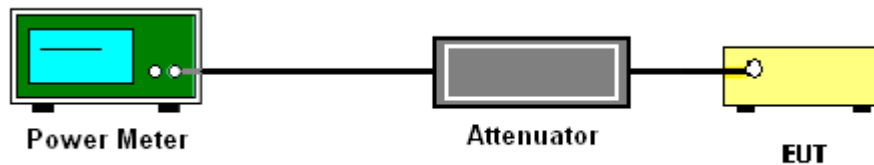
### 3.2.2 Measuring Instruments

See list of measuring equipment of this test report.

### 3.2.3 Test Procedures

1. For Average Power, the testing follows ANSI C63.10 Section 11.9.2.3.2 Method AVGPM-G
2. The RF output of EUT was connected to the power meter by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Measure the conducted output power and record the results in the test report.

### 3.2.4 Test Setup



### 3.2.5 Test Result of Average Output Power

Please refer to Appendix A.

### 3.3 Power Spectral Density Measurement

#### 3.3.1 Limit of Power Spectral Density

The peak power spectral density shall not be greater than 8dBm in any 3kHz band at any time interval of continuous transmission.

#### 3.3.2 Measuring Instruments

See list of measuring equipment of this test report.

#### 3.3.3 Test Procedures

1. The testing follows the ANSI C63.10 Section 11.10.2 Method PKPSD.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 3 kHz. Video bandwidth VBW = 10 kHz In order to make an accurate measurement, set the span to 1.5 times DTS Channel Bandwidth. (6dB BW)
5. Detector = peak, Sweep time = auto couple, Trace mode = max hold, Allow trace to fully stabilize. Use the peak marker function to determine the maximum power level.
6. Measure and record the results in the test report.

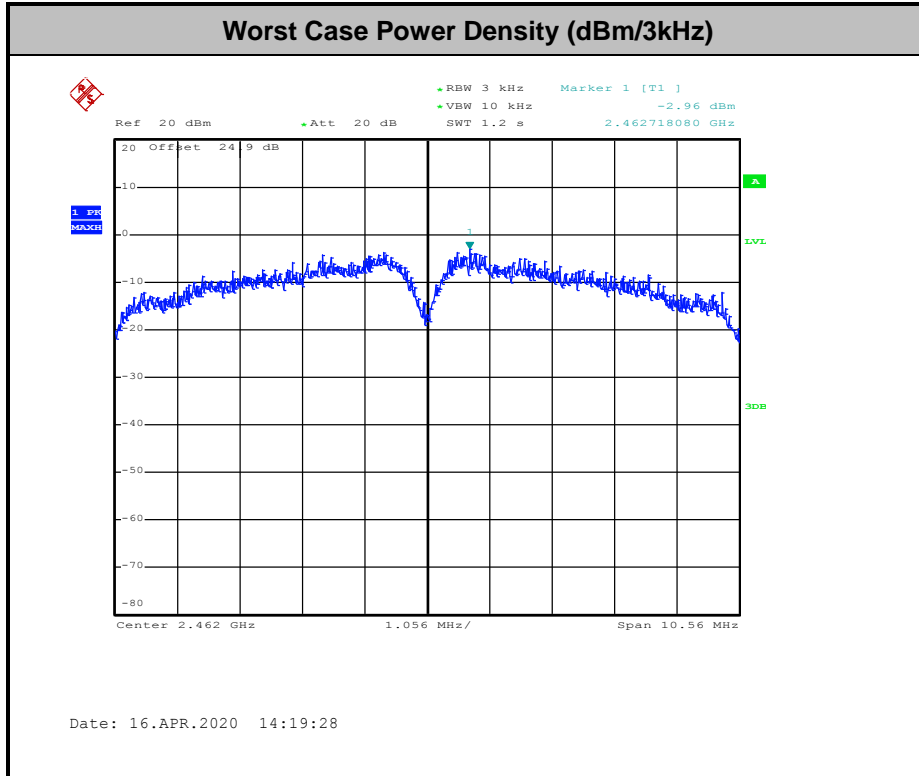
#### 3.3.4 Test Setup





### 3.3.5 Test Result of Power Spectral Density

Please refer to Appendix A.



## 3.4 Conducted Band Edges and Spurious Emission Measurement

### 3.4.1 Limit of Conducted Band Edges and Spurious Emission Measurement

In any 100 kHz bandwidth outside of the authorized frequency band, the emissions which fall in the non-restricted bands shall be attenuated at least 20 dB / 30dB relative to the maximum PSD level in 100 kHz by RF conducted measurement.

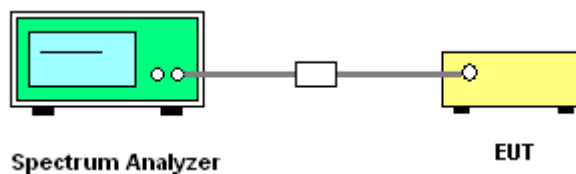
### 3.4.2 Measuring Instruments

See list of measuring equipment of this test report.

### 3.4.3 Test Procedures

1. The testing follows the ANSI C63.10 Section 11.11.3 Emission level measurement.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Set RBW = 100 kHz, VBW=300 kHz, Peak Detector. Unwanted Emissions measured in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz when maximum peak conducted output power procedure is used. 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 per 15.247(d).
5. Measure and record the results in the test report.
6. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

### 3.4.4 Test Setup





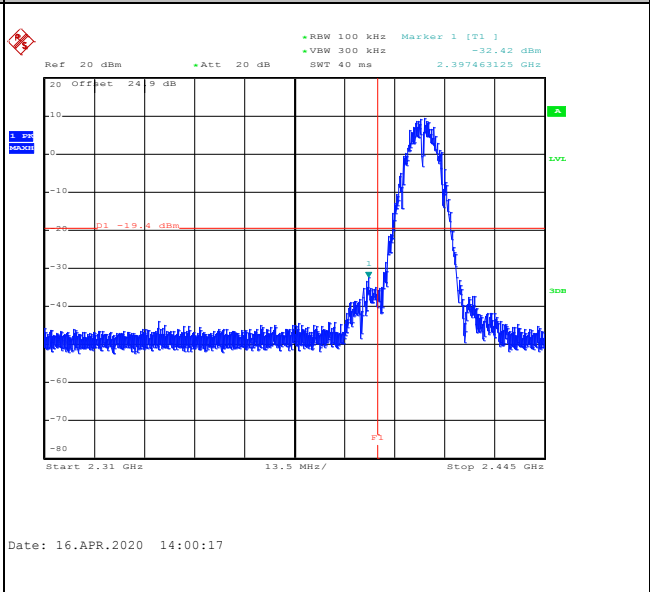
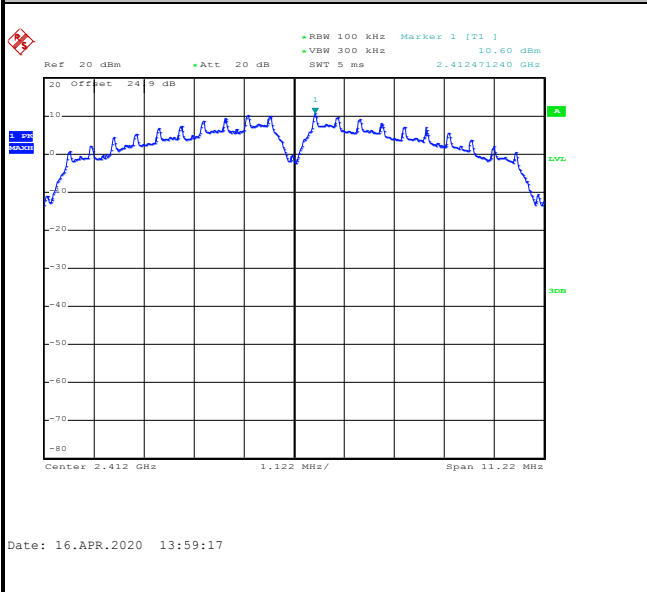


### 3.4.5 Test Result of Conducted Band Edges and Spurious Emission

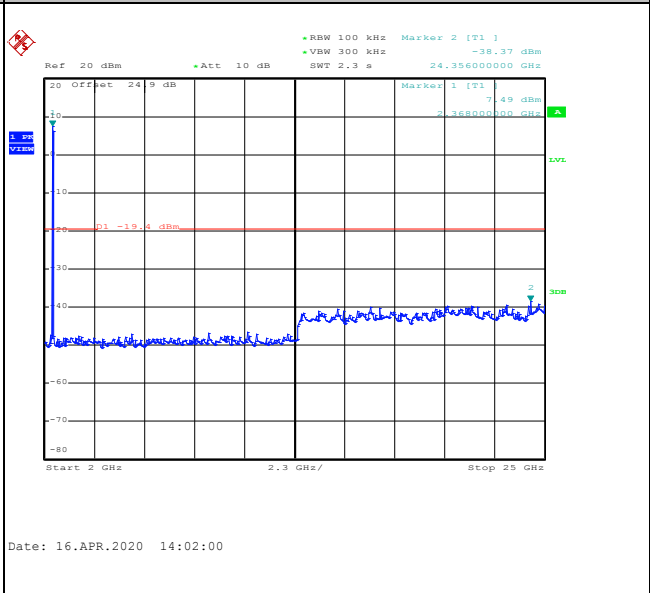
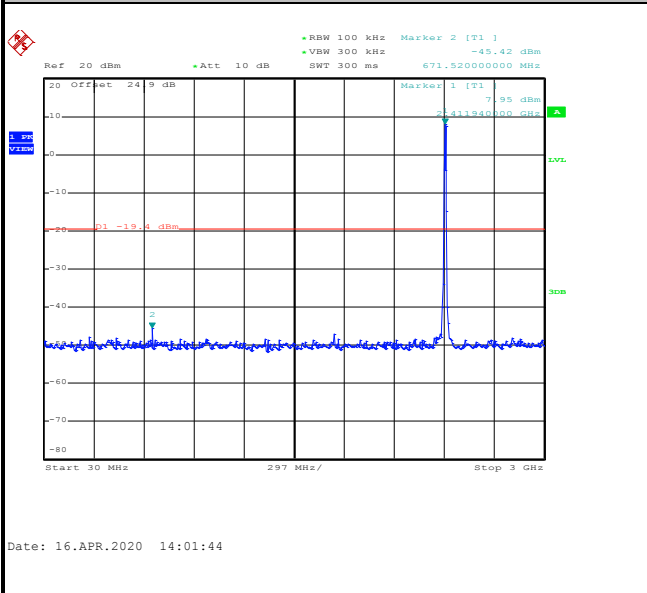
Test Engineer :	Owen Yang and Kathy Chen	Temperature :	21~25°C
		Relative Humidity :	51~54%

Test Mode :	802.11b	Test Channel :	01
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<b>100kHz PSD reference Level</b>	<b>Low Channel Plot</b>
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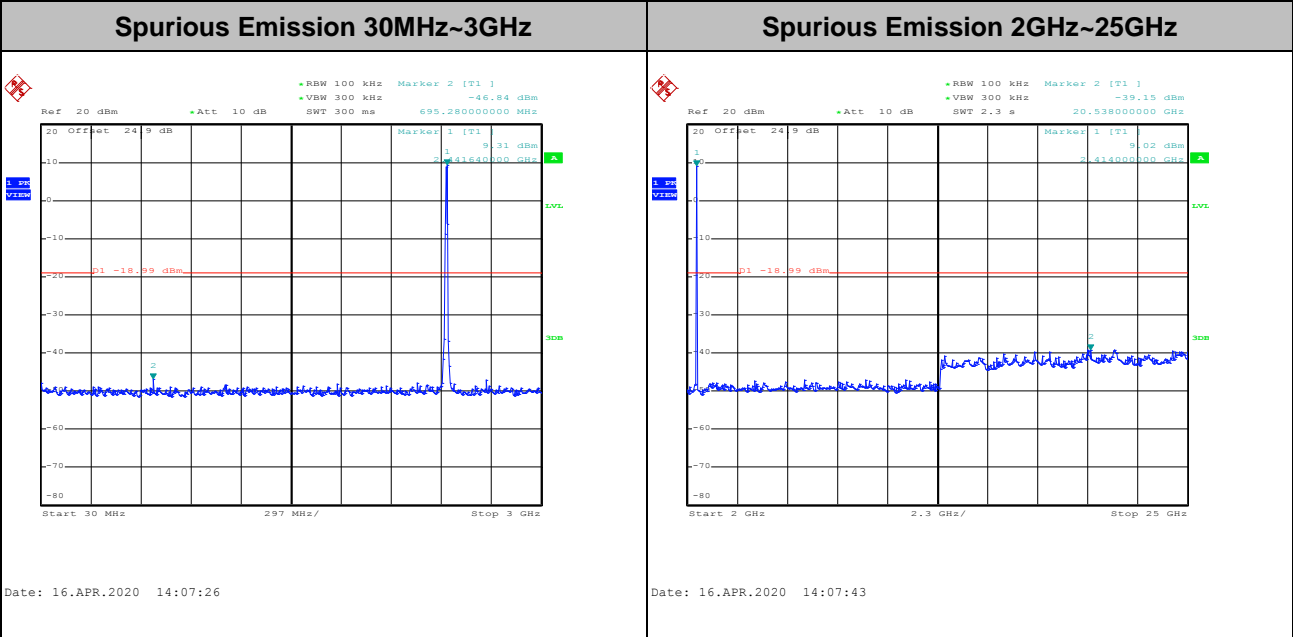
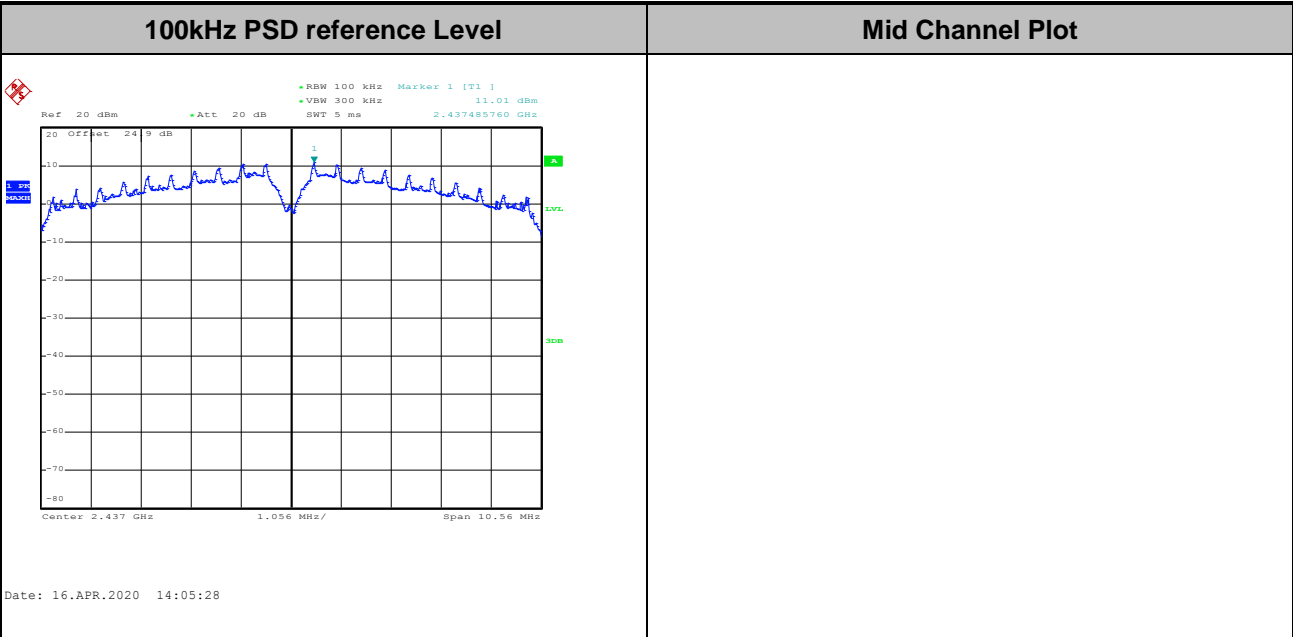


<b>Spurious Emission 30MHz~3GHz</b>	<b>Spurious Emission 2GHz~25GHz</b>
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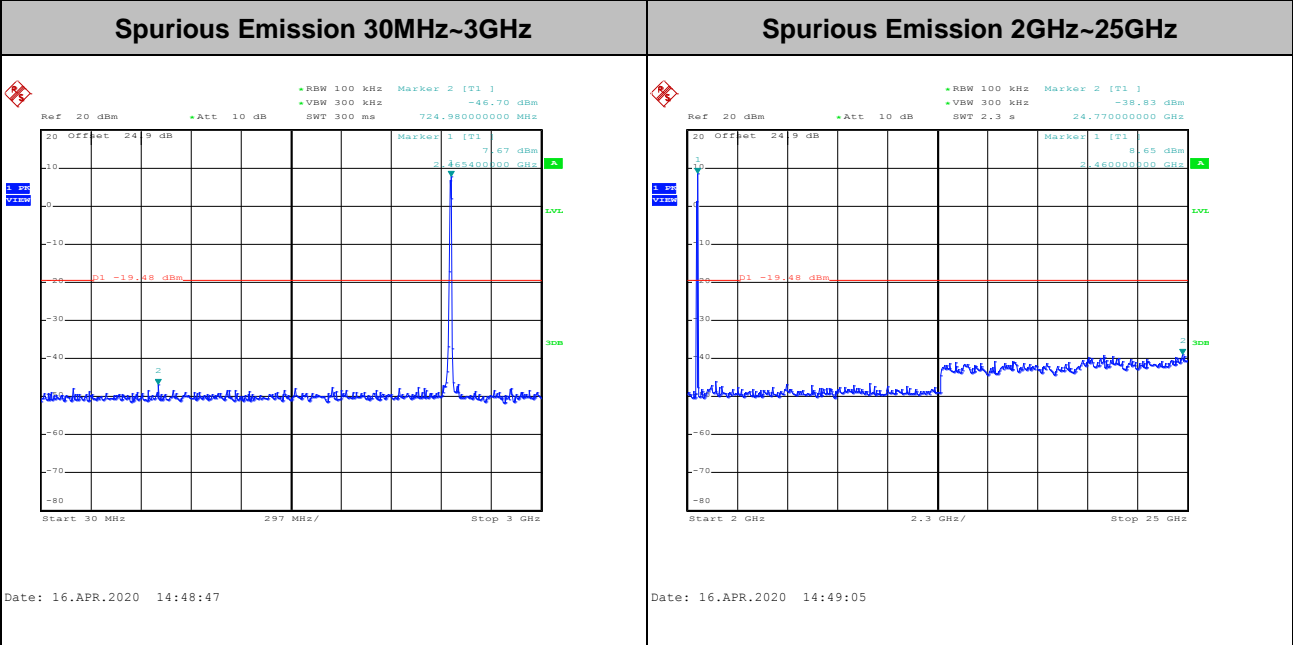
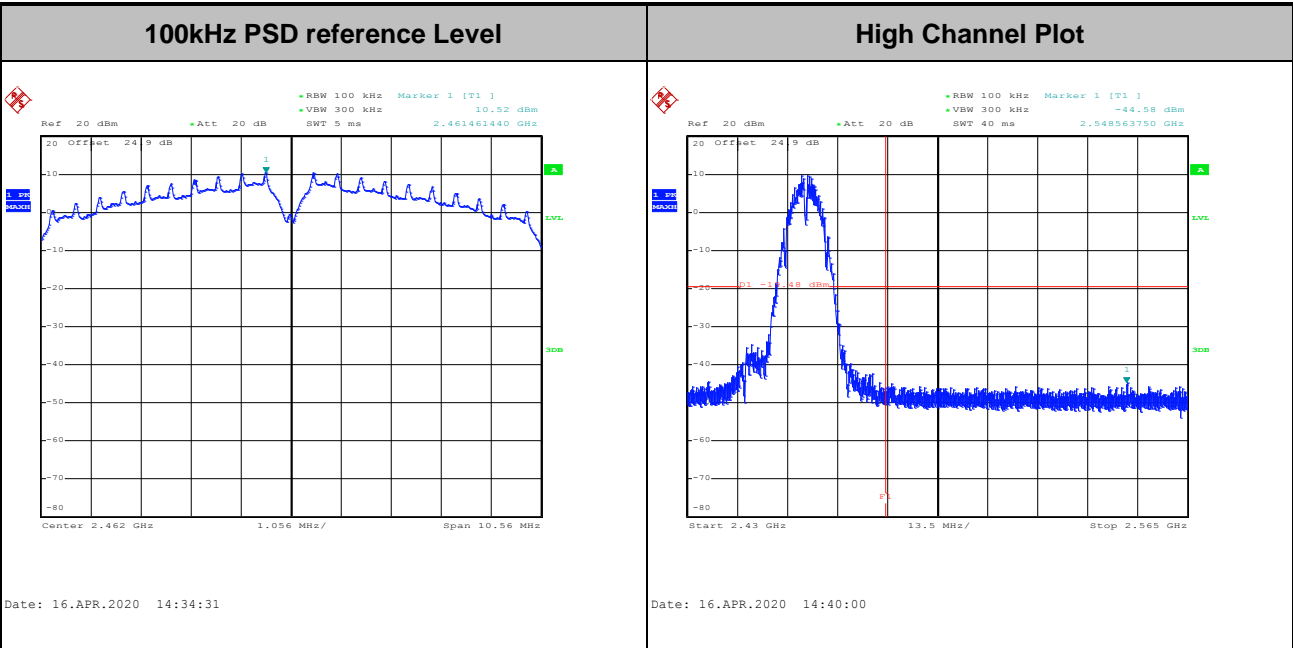


Test Mode :	802.11b	Test Channel :	06
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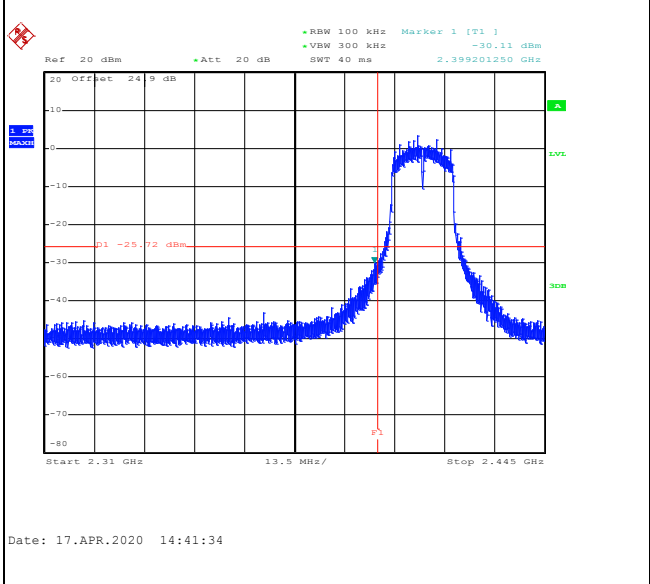
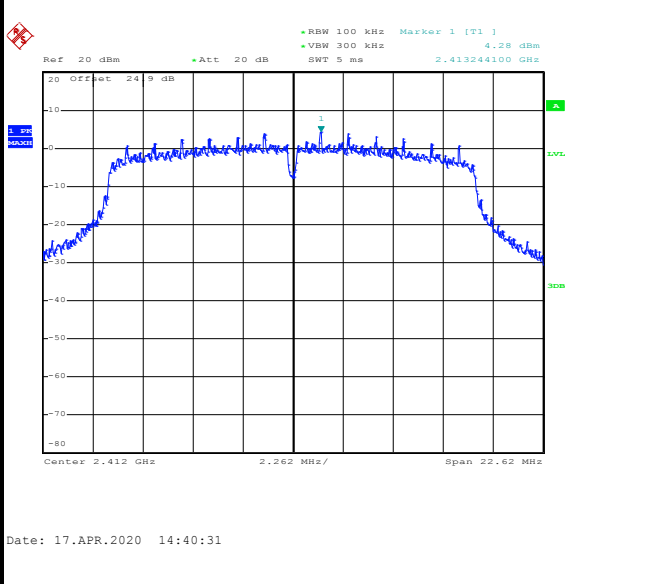
Test Mode :	802.11b	Test Channel :	11
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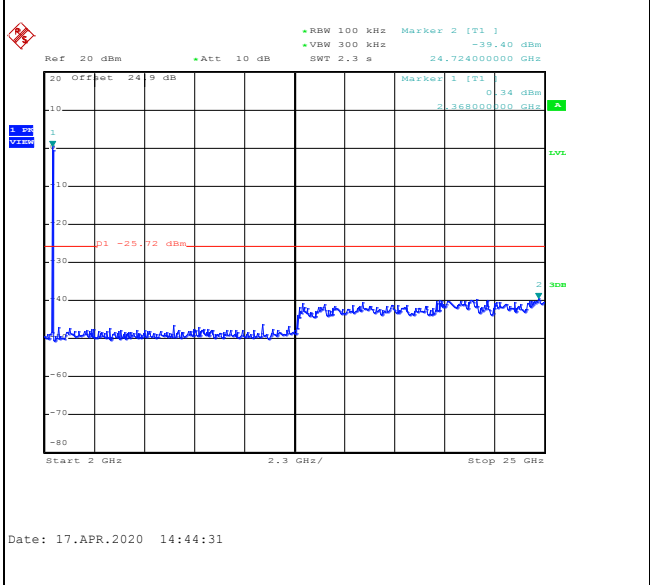
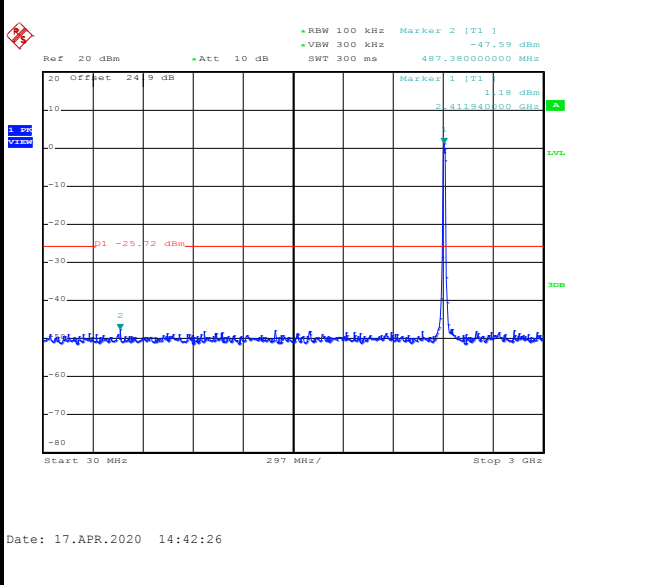


Test Mode :	802.11g	Test Channel :	01
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<b>100kHz PSD reference Level</b>	<b>Low Channel Plot</b>
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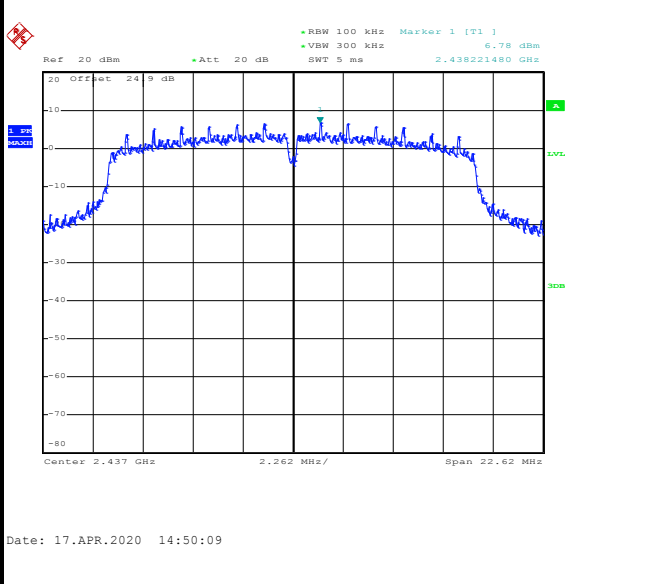
<b>Spurious Emission 30MHz~3GHz</b>	<b>Spurious Emission 2GHz~25GHz</b>
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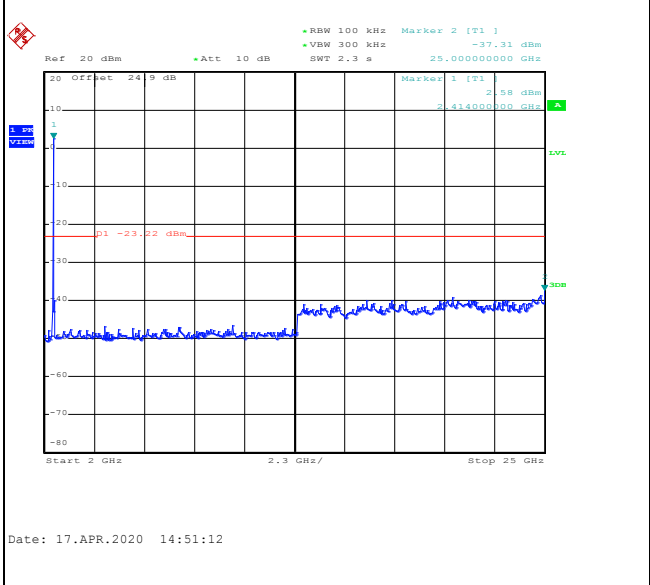
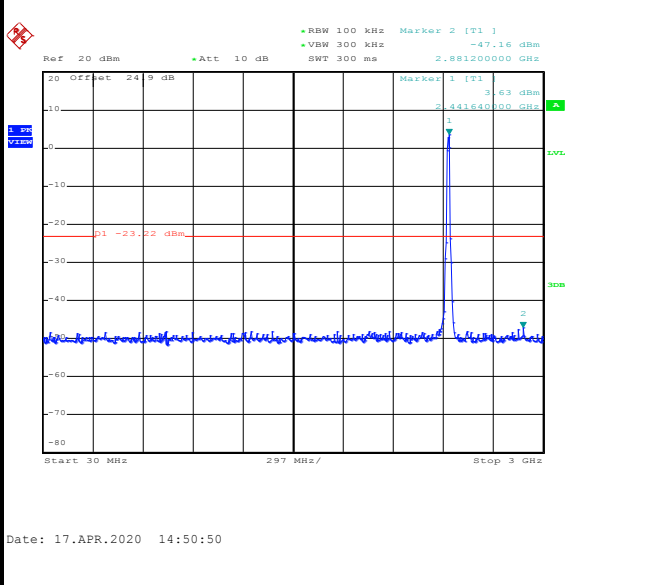


Test Mode :	802.11g	Test Channel :	06
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<b>100kHz PSD reference Level</b>	<b>Mid Channel Plot</b>
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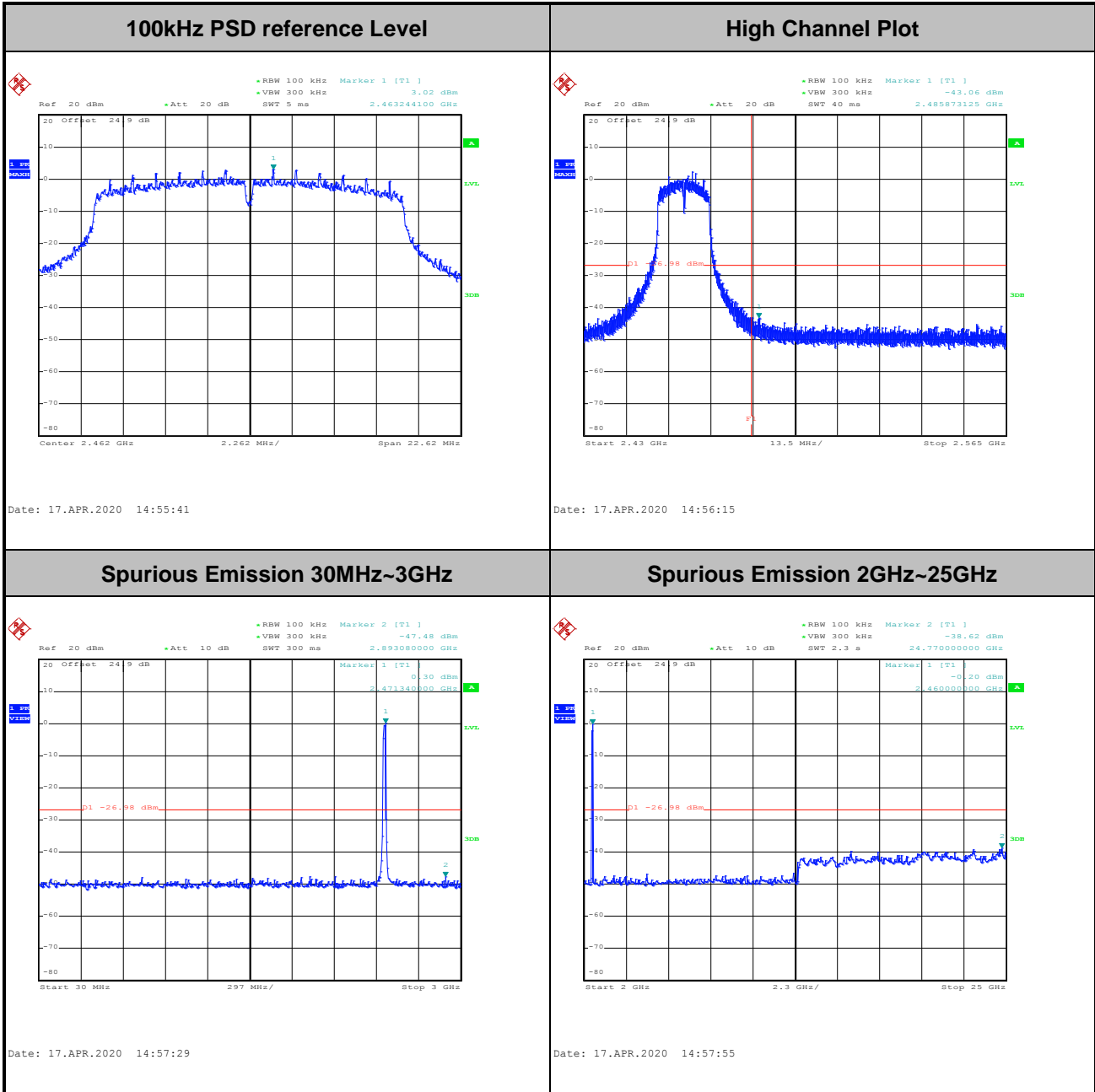


<b>Spurious Emission 30MHz~3GHz</b>	<b>Spurious Emission 2GHz~25GHz</b>
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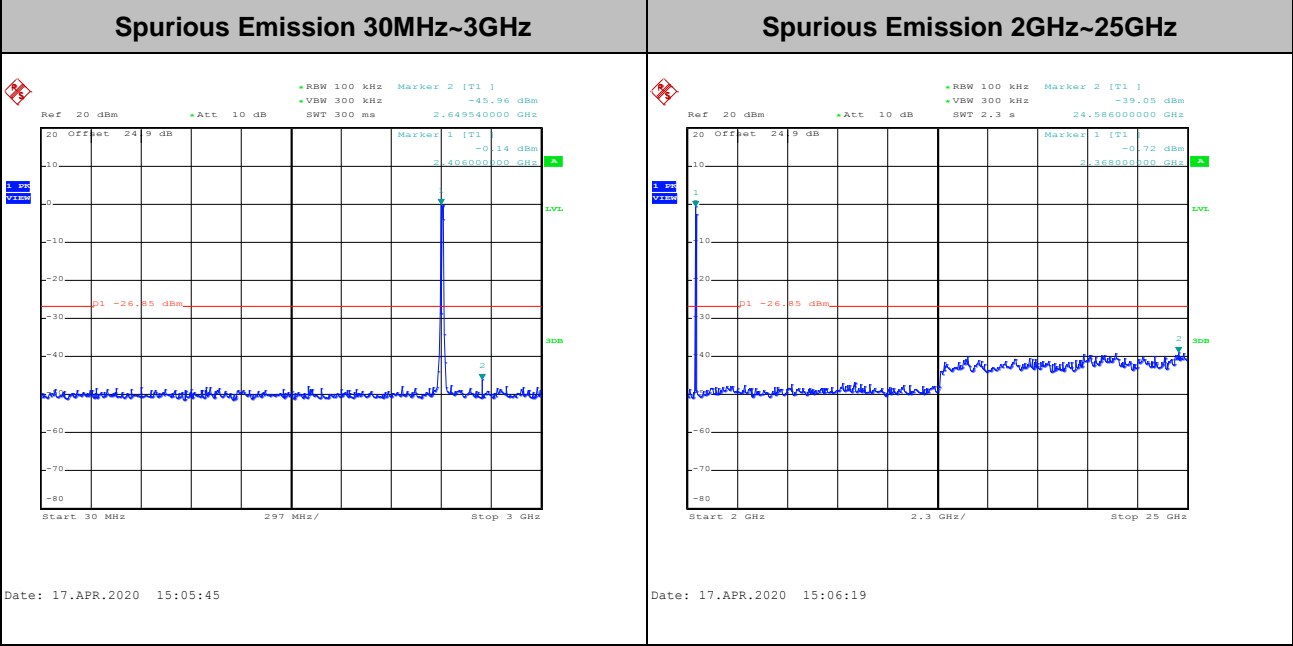
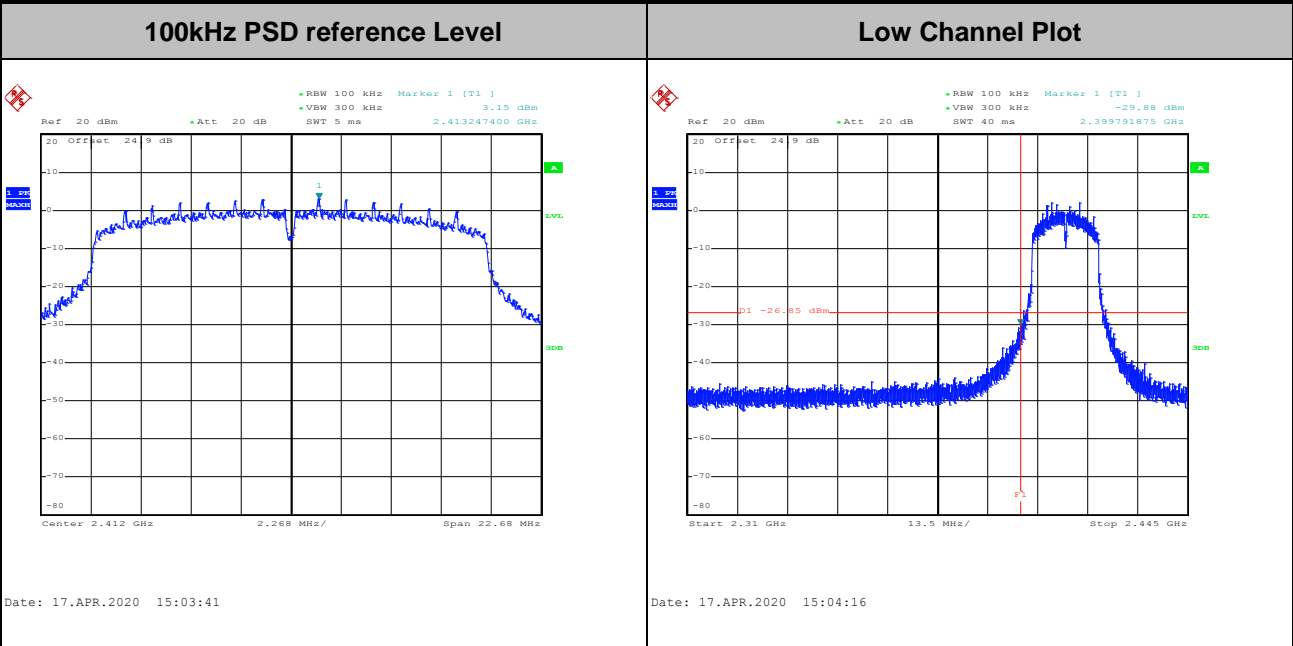


Test Mode :	802.11g	Test Channel :	11
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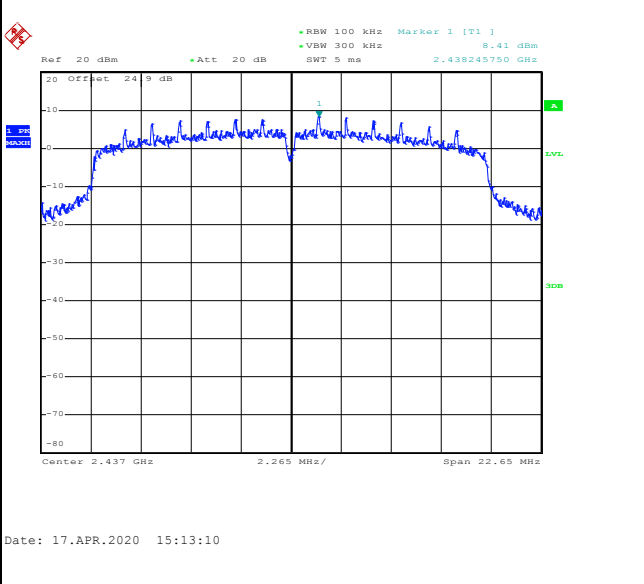
Test Mode :	802.11n HT20	Test Channel :	01
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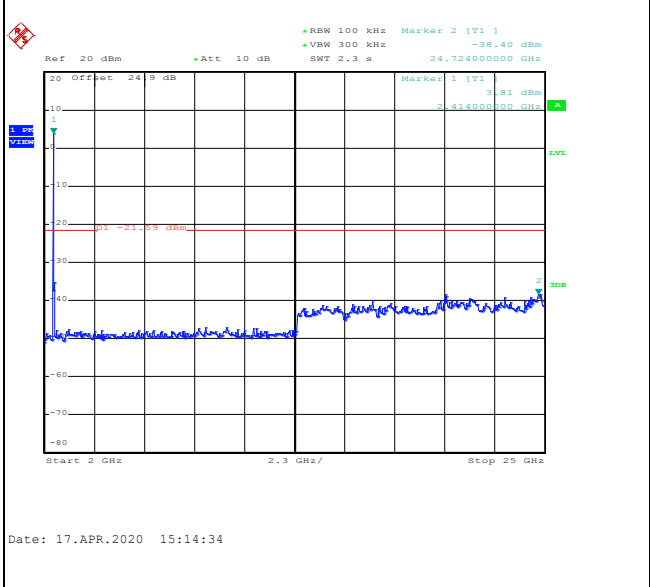
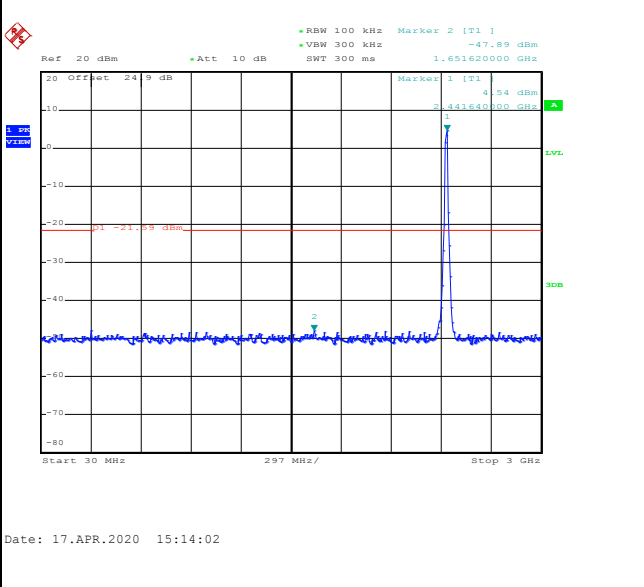


Test Mode :	802.11n HT20	Test Channel :	06
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<b>100kHz PSD reference Level</b>	<b>Mid Channel Plot</b>
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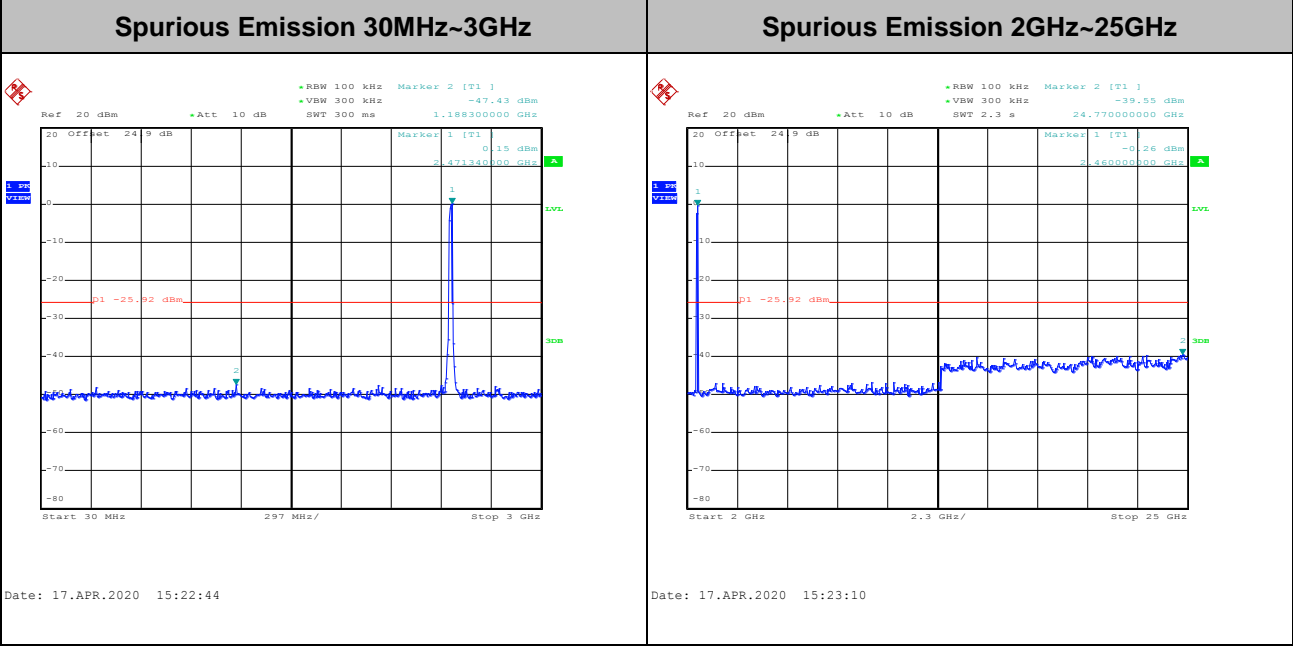
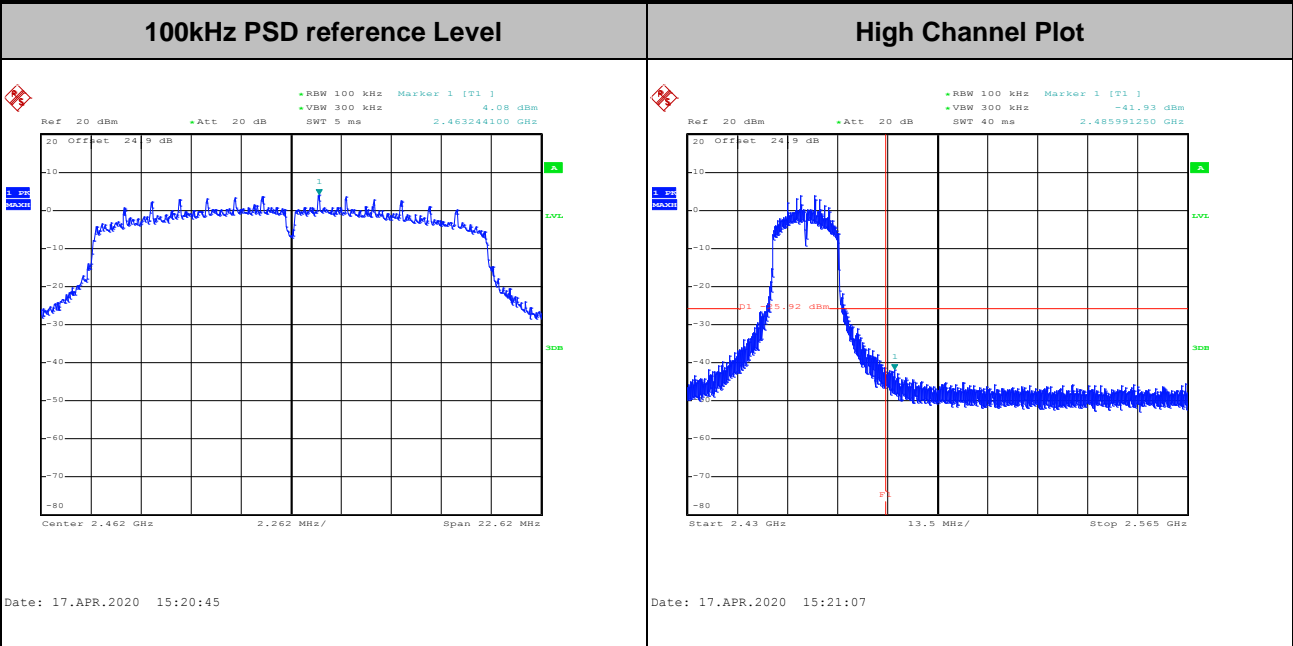
<b>Spurious Emission 30MHz~3GHz</b>	<b>Spurious Emission 2GHz~25GHz</b>
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Test Mode :	802.11n HT20	Test Channel :	11
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### 3.5 Radiated Band Edges and Spurious Emission Measurement

#### 3.5.1 Limit of Radiated band edge and Spurious Emission Measurement

In any 100 kHz bandwidth outside the intentional radiator frequency band, all harmonics/spurious must be at least 20 dB below the highest emission level within the authorized band. If the output power of this device was measured by spectrum analyzer, the attenuation under this paragraph shall be 30 dB instead of 20 dB. In addition, radiated emissions which fall in the restricted bands must also comply with the limits as below.

Frequency (MHz)	Field Strength (microvolts/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

#### 3.5.2 Measuring Instruments

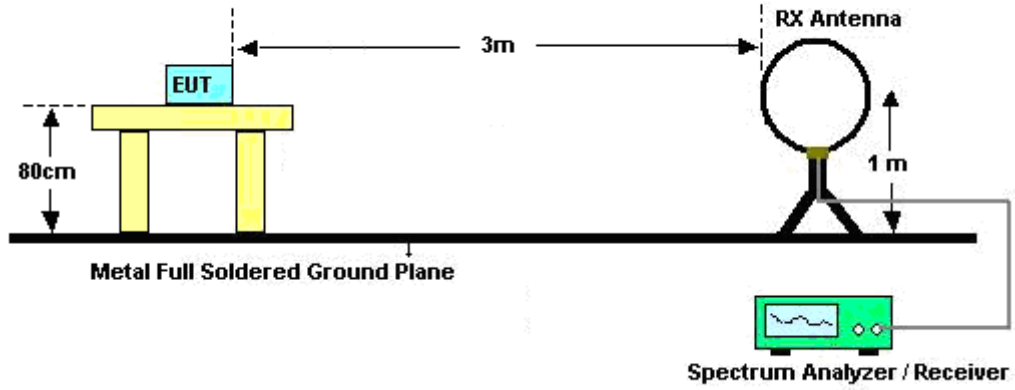
See list of measuring equipment of this test report.

**3.5.3 Test Procedures**

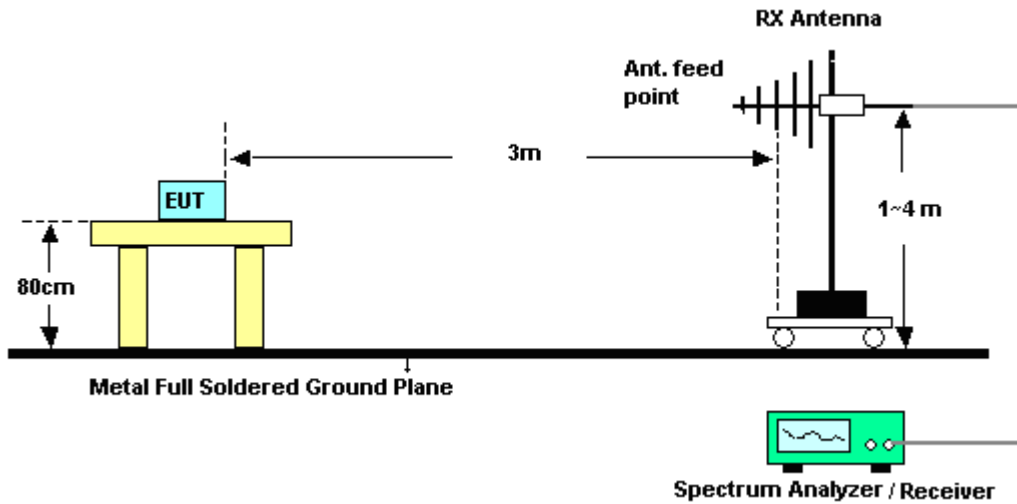
1. The testing follows the ANSI C63.10 Section 11.12.1 Radiated emission measurements.
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level.
3. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
5. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level
6. For testing below 1GHz, if the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then peak values of EUT will be reported, otherwise, the emissions will be repeated one by one using the CISPR quasi-peak method and reported.
7. For testing above 1GHz, the emission level of the EUT in peak mode was 20dB lower than average limit (that means the emission level in average mode also complies with the limit in average mode), then peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
8. Use the following spectrum analyzer settings:
  - (1) Span shall wide enough to fully capture the emission being measured;
  - (2) Set RBW=100 kHz for  $f < 1$  GHz;  $VBW \geq RBW$ ; Sweep = auto; Detector function = peak; Trace = max hold;
  - (3) Set RBW = 1 MHz, VBW= 3MHz for  $f \geq 1$  GHz for peak measurement.  
For average measurement:
    - $VBW = 10$  Hz, when duty cycle is no less than 98 percent.
    - $VBW \geq 1/T$ , when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

### 3.5.4 Test Setup

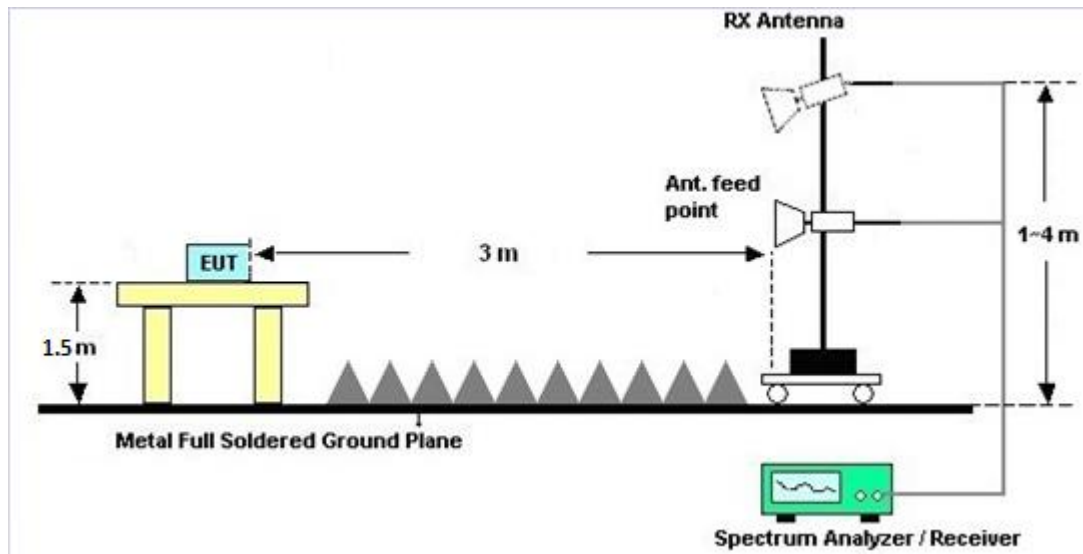
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



### 3.5.5 Test Results of Radiated Spurious Emissions (9kHz ~ 30MHz)

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line was not reported.

There is a comparison data of both open-field test site and alternative test site - semi-Anechoic chamber according to 414788 D01 Radiated Test Site v01r01, and the result came out very similar.

### 3.5.6 Test Result of Radiated Spurious at Band Edges

Please refer to Appendix C and D.

### 3.5.7 Duty Cycle

Please refer to Appendix E.

### 3.5.8 Test Result of Radiated Spurious Emission (30MHz ~ 10<sup>th</sup> Harmonic)

Please refer to Appendix C and D.



### 3.6 AC Conducted Emission Measurement

#### 3.6.1 Limit of AC Conducted Emission

For equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table.

Frequency of Emission (MHz)	Conducted Limit (dB $\mu$ V)	
	Quasi-Peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

\*Decreases with the logarithm of the frequency.

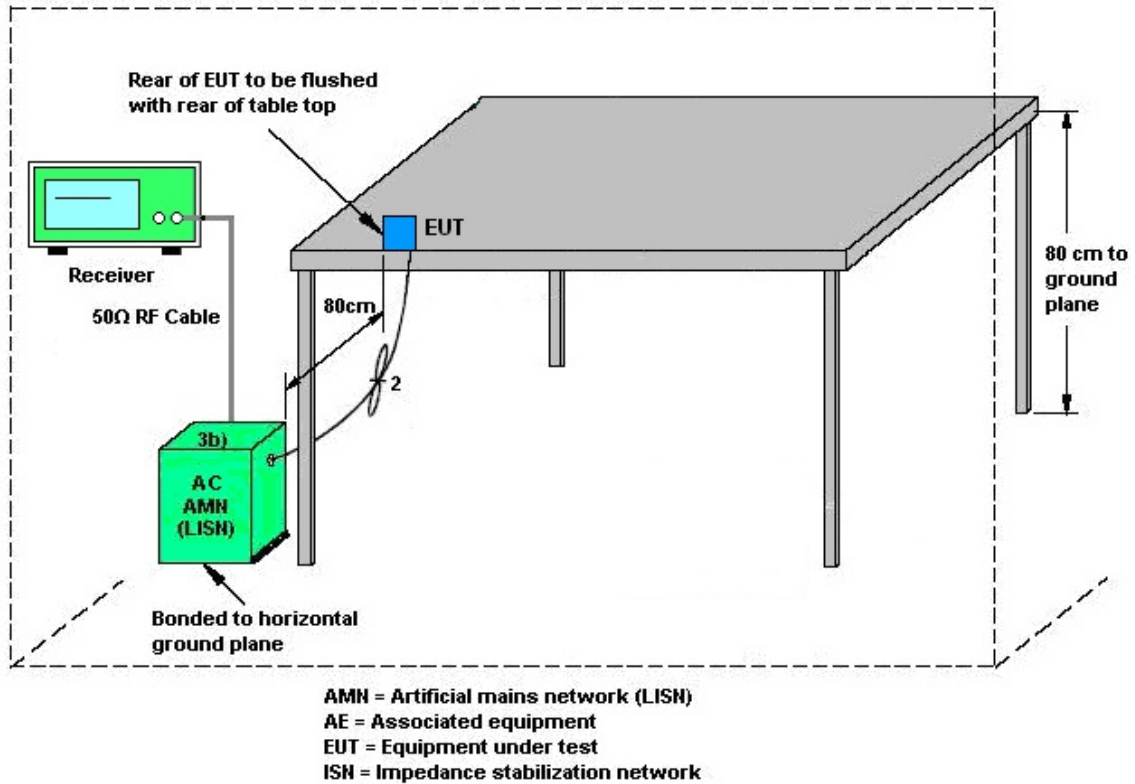
#### 3.6.2 Measuring Instruments

See list of measuring equipment of this test report.

#### 3.6.3 Test Procedures

1. The EUT was placed 0.4 meter from the conducting wall of the shielding room, and it was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.
4. The LISN provides 50 ohm coupling impedance for the measuring instrument.
5. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
6. Both sides of AC line were checked for maximum conducted interference.
7. The frequency range from 150 kHz to 30 MHz was searched.
8. Set the test-receiver system to Peak Detect Function and specified bandwidth (IF bandwidth = 9kHz) with Maximum Hold Mode.

### 3.6.4 Test Setup



### 3.6.5 Test Result of AC Conducted Emission

Please refer to Appendix B.



## **3.7 Antenna Requirements**

### **3.7.1 Standard Applicable**

If directional gain of transmitting Antennas is greater than 6dBi, the power shall be reduced by the same level in dB comparing to gain minus 6dBi. The use of a permanently attached Antenna or of an Antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the rule.

### **3.7.2 Antenna Anti-Replacement Construction**

An embedded-in antenna design is used.

### **3.7.3 Antenna Gain**

The antenna peak gain of EUT is less than 6 dBi. Therefore, it is not necessary to reduce maximum peak output power limit.





## 4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Hygrometer	Testo	608-H2	41410069	N/A	Jun. 17, 2019	Feb. 28, 2020~ Apr. 17, 2020	Jun. 16, 2020	Conducted (TH05-HY)
Power Sensor	DARE	RPR3006W	16I00054S NO10	10MHz~6GHz	Dec. 23, 2019	Feb. 28, 2020~ Apr. 17, 2020	Dec. 22, 2020	Conducted (TH05-HY)
Spectrum Analyzer	Rohde & Schwarz	FSP40	100055	9kHz-40GHz	Aug. 14, 2019	Feb. 28, 2020~ Apr. 17, 2020	Aug. 13, 2020	Conducted (TH05-HY)
Switch Box & RF Cable	Burgeon	ETF-058	EC130048 4	N/A	Aug. 22, 2019	Feb. 28, 2020~ Apr. 17, 2020	Aug. 21, 2020	Conducted (TH05-HY)
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100488	9 kHz~30 MHz	Jan. 09, 2020	Mar. 09, 2020~ Apr. 10, 2020	Jan. 08, 2021	Radiation (03CH13-HY)
Horn Antenna	SCHWARZBE CK	BBHA 9120 D	9120D-124 1	1GHz ~ 18GHz	Jul. 02, 2019	Mar. 09, 2020~ Apr. 10, 2020	Jul. 01, 2020	Radiation (03CH13-HY)
Bilog Antenna	TESEQ	CBL 6111D&00800 N1D01N-06	40103 & 07	30MHz~1GHz	Apr. 30, 2019	Mar. 09, 2020~ Apr. 10, 2020	Apr. 29, 2020	Radiation (03CH13-HY)
SHF-EHF Horn Antenna	SCHWARZBE CK	BBHA 9170	BBHA9170 576	18GHz- 40GHz	May 14, 2019	Mar. 09, 2020~ Apr. 10, 2020	May 13, 2020	Radiation (03CH13-HY)
Preamplifier	Keysight	83017A	MY532701 47	1GHz~26.5GHz	Oct. 28, 2019	Mar. 09, 2020~ Apr. 10, 2020	Oct. 27, 2020	Radiation (03CH13-HY)
Preamplifier	MITEQ	AMF-7D-0010 1800-30-10P	1590074	1GHz~18GHz	May 20, 2019	Mar. 09, 2020~ Apr. 10, 2020	May 19, 2020	Radiation (03CH13-HY)
Amplifier	Sonoma-Instru ment	310 N	187282	9KHz~1GHz	Dec. 17, 2019	Mar. 09, 2020~ Apr. 10, 2020	Dec. 16, 2020	Radiation (03CH13-HY)
Preamplifier	EMEC	EM18G40G	060715	18GHz ~ 40GHz	Dec. 13, 2019	Mar. 09, 2020~ Apr. 10, 2020	Dec. 12, 2020	Radiation (03CH13-HY)
Hygrometer	TECEPEL	DTM-303B	TP150115	N/A	Nov. 08, 2019	Mar. 09, 2020~ Apr. 10, 2020	Nov. 07, 2020	Radiation (03CH13-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 126E	0030/126E	30M-18G	Feb. 12, 2020	Mar. 09, 2020~ Apr. 10, 2020	Feb. 11, 2021	Radiation (03CH13-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	804793/4	30M-18G	Feb. 12, 2020	Mar. 09, 2020~ Apr. 10, 2020	Feb. 11, 2021	Radiation (03CH13-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY24961/ 4	30M-18G	Feb. 12, 2020	Mar. 09, 2020~ Apr. 10, 2020	Feb. 11, 2021	Radiation (03CH13-HY)
Spectrum Analyzer	Keysight	N9010A	MY553705 26	10Hz~44GHz	Mar. 19, 2019	Mar. 09, 2020~ Mar. 17, 2020	Mar. 18, 2020	Radiation (03CH13-HY)
Spectrum Analyzer	Keysight	N9010A	MY553705 26	10Hz~44GHz	Mar. 20, 2020	Mar. 20, 2020~ Apr. 10, 2020	Mar. 19, 2021	Radiation (03CH13-HY)
Controller	EMEC	EM1000	N/A	Control Turn table & Ant Mast	N/A	Mar. 09, 2020~ Apr. 10, 2020	N/A	Radiation (03CH13-HY)



Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Antenna Mast	EMEC	AM-BS-4500-B	N/A	1m~4m	N/A	Mar. 09, 2020~ Apr. 10, 2020	N/A	Radiation (03CH13-HY)
Turn Table	EMEC	TT2000	N/A	0~360 Degree	N/A	Mar. 09, 2020~ Apr. 10, 2020	N/A	Radiation (03CH13-HY)
Software	AUDIX	E3 6.2009-8-24c	RK-001124	N/A	N/A	Mar. 09, 2020~ Apr. 10, 2020	N/A	Radiation (03CH13-HY)
EMI Test Receiver	Keysight	N9038A(MXE )	MY541300 85	20Hz ~ 8.4GHz	Nov. 01, 2019	Mar. 09, 2020~ Apr. 10, 2020	Oct. 31, 2020	Radiation (03CH13-HY)
Filter	Wainwright	WHKX12-270 0-3000-18000 -60SS	SN2	3GHz High Pass Filter	Jul. 14, 2019	Mar. 09, 2020~ Apr. 10, 2020	Jul. 13, 2020	Radiation (03CH13-HY)
Filter	Wainwright	WLK4-1000-1 530-8000-40S S	SN12	1.53GHz Low Pass Filter	Sep. 16, 2019	Mar. 09, 2020~ Apr. 10, 2020	Sep. 15, 2020	Radiation (03CH13-HY)
AC Power Source	ChainTek	APC-1000W	N/A	N/A	N/A	Apr. 23, 2020	N/A	Conduction (CO05-HY)
EMI Test Receiver	Rohde & Schwarz	ESR3	102388	9kHz~3.6GHz	Nov. 15, 2019	Apr. 23, 2020	Nov. 14, 2020	Conduction (CO05-HY)
Hygrometer	Testo	608-H1	34913912	N/A	Nov. 07, 2019	Apr. 23, 2020	Nov. 06, 2020	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100080	9kHz~30MHz	Nov. 20, 2019	Apr. 23, 2020	Nov. 19, 2020	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100081	9kHz~30MHz	Nov. 15, 2019	Apr. 23, 2020	Nov. 14, 2020	Conduction (CO05-HY)
Software	Rohde & Schwarz	EMC32 V10.30	N/A	N/A	N/A	Apr. 23, 2020	N/A	Conduction (CO05-HY)
LF Cable	HUBER + SUHNER	RG-214/U	LF01	N/A	Jan. 02, 2020	Apr. 23, 2020	Jan. 01, 2021	Conduction (CO05-HY)
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100851	N/A	Jan. 02, 2020	Apr. 23, 2020	Jan. 01, 2021	Conduction (CO05-HY)



## 5 Uncertainty of Evaluation

### Uncertainty of Conducted Emission Measurement (150kHz ~ 30MHz)

Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ )	2.3
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### Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ )	4.4
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### Uncertainty of Radiated Emission Measurement (1000 MHz ~ 18000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ )	5.5
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### Uncertainty of Radiated Emission Measurement (18000 MHz ~ 40000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ )	4.8
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**Appendix A. Test Result of Conducted Test Items**

Test Engineer:	Owen Yang/Kathy Chen	Temperature:	21~25	°C
Test Date:	2020/2/28~2020/04/17	Relative Humidity:	51~54	%

**TEST RESULTS DATA**  
**6dB and 99% Occupied Bandwidth**

2.4GHz Band Single Antenna										
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	99% Occupied BW (MHz)		6dB BW (MHz)		6dB BW Limit (MHz)	Pass/Fail
					Ant1	Ant2	Ant1	Ant2		
11b	1Mbps	1	1	2412	12.50	-	7.48	-	0.50	Pass
11b	1Mbps	1	6	2437	12.30	-	7.04	-	0.50	Pass
11b	1Mbps	1	11	2462	12.00	-	7.04	-	0.50	Pass
11g	6Mbps	1	1	2412	16.50	-	15.08	-	0.50	Pass
11g	6Mbps	1	6	2437	16.70	-	15.08	-	0.50	Pass
11g	6Mbps	1	11	2462	16.45	-	15.08	-	0.50	Pass
HT20	MCS0	1	1	2412	17.60	-	15.12	-	0.50	Pass
HT20	MCS0	1	6	2437	17.90	-	15.10	-	0.50	Pass
HT20	MCS0	1	11	2462	17.60	-	15.08	-	0.50	Pass

**TEST RESULTS DATA**  
**Average Output Power**

2.4GHz Band Single Antenna																
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Average Conducted Power (dBm)			Conducted Power Limit (dBm)		DG (dBi)		EIRP Power (dBm)		EIRP Power Limit (dBm)		Pass /Fail
					Ant1	Ant2	SUM	Ant1	Ant2	Ant1	Ant2	Ant1	Ant2	Ant1	Ant2	
11b	1Mbps	1	1	2412	17.60	-		30.00	-	1.43	-	19.03	-	36.00	-	Pass
11b	1Mbps	1	6	2437	17.90	-		30.00	-	1.43	-	19.33	-	36.00	-	Pass
11b	1Mbps	1	11	2462	17.90	-		30.00	-	1.43	-	19.33	-	36.00	-	Pass
11g	6Mbps	1	1	2412	14.70	-		30.00	-	1.43	-	16.13	-	36.00	-	Pass
11g	6Mbps	1	6	2437	17.50	-		30.00	-	1.43	-	18.93	-	36.00	-	Pass
11g	6Mbps	1	11	2462	13.80	-		30.00	-	1.43	-	15.23	-	36.00	-	Pass
HT20	MCS0	1	1	2412	14.00	-		30.00	-	1.43	-	15.43	-	36.00	-	Pass
HT20	MCS0	1	6	2437	17.90	-		30.00	-	1.43	-	19.33	-	36.00	-	Pass
HT20	MCS0	1	11	2462	14.40	-		30.00	-	1.43	-	15.83	-	36.00	-	Pass

Note: Measured power (dBm) has offset with cable loss.

**TEST RESULTS DATA**  
**Peak Power Spectral Density**

2.4GHz Band Single Antenna												
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Peak PSD (dBm/3kHz)			DG (dBi)		Peak PSD Limit (dBm/3kHz)		Pass/Fail
					Ant1	Ant2	Worse + 3.01	Ant1	Ant2	Ant1	Ant2	
11b	1Mbps	1	1	2412	-3.36	-		1.43	-	8.00	-	Pass
11b	1Mbps	1	6	2437	-2.97	-		1.43	-	8.00	-	Pass
11b	1Mbps	1	11	2462	-2.96	-		1.43	-	8.00	-	Pass
11g	6Mbps	1	1	2412	-9.81	-		1.43	-	8.00	-	Pass
11g	6Mbps	1	6	2437	-7.57	-		1.43	-	8.00	-	Pass
11g	6Mbps	1	11	2462	-11.33	-		1.43	-	8.00	-	Pass
HT20	MCS0	1	1	2412	-10.60	-		1.43	-	8.00	-	Pass
HT20	MCS0	1	6	2437	-6.14	-		1.43	-	8.00	-	Pass
HT20	MCS0	1	11	2462	-9.97	-		1.43	-	8.00	-	Pass

Measured power density (dBm) has offset with cable loss.



## Appendix B. AC Conducted Emission Test Results

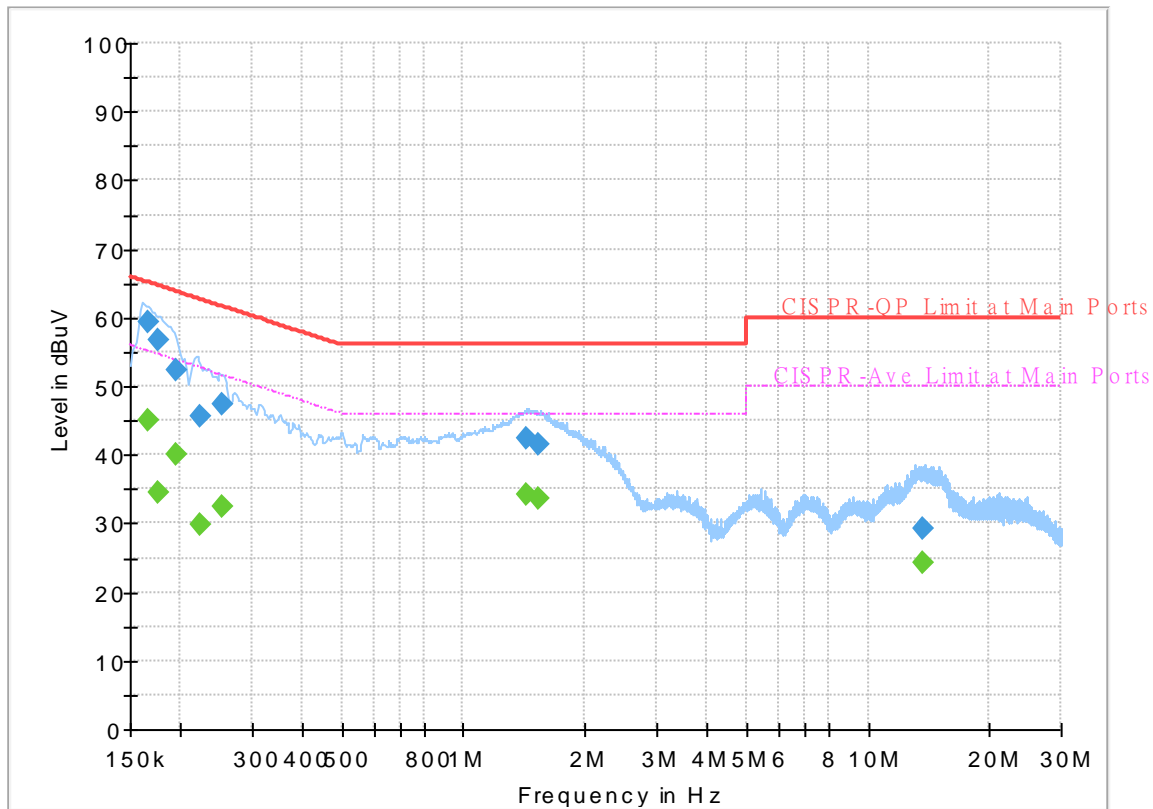
Test Engineer :	Tom Lee	Temperature :	21~25°C
		Relative Humidity :	42~50%



# EUT Information

Report NO : 020433  
 Test Mode : Mode 1  
 Test Voltage : Power From System  
 Phase : Line

Full Spectrum



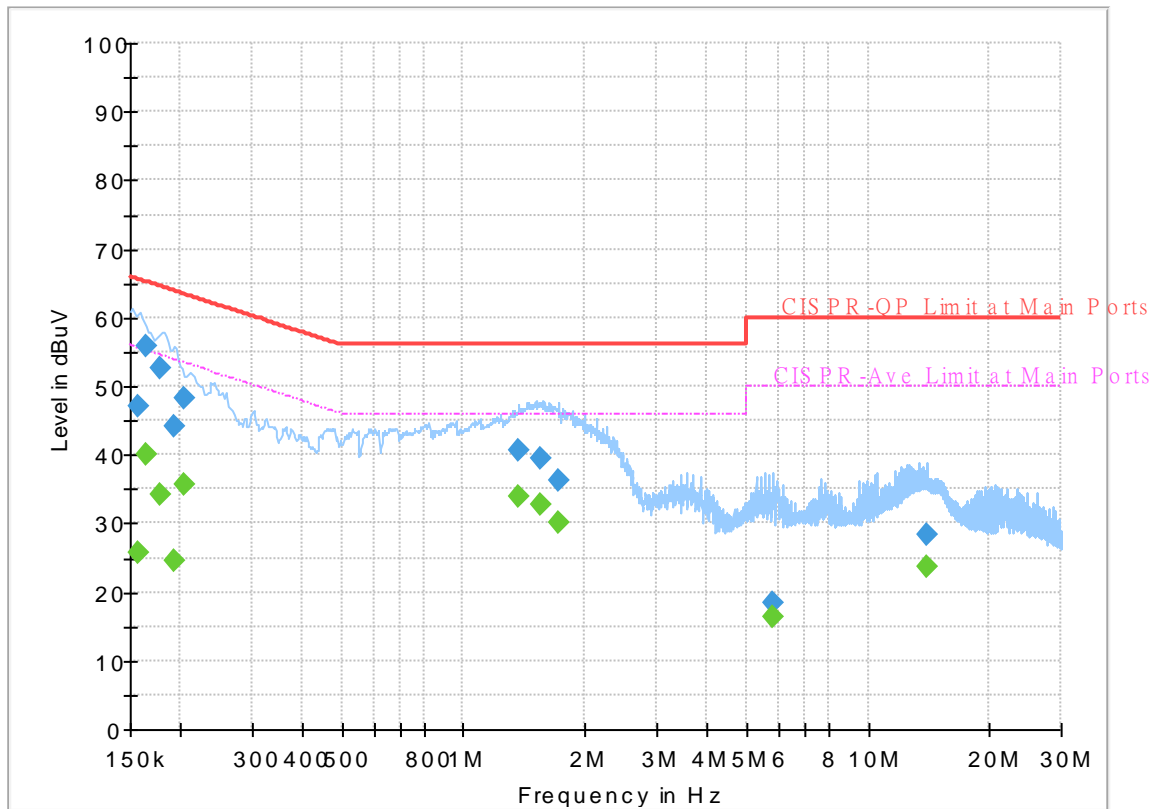
## Final Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.165750	---	44.90	55.17	10.27	L1	OFF	19.5
0.165750	59.44	---	65.17	5.73	L1	OFF	19.5
0.175290	---	34.56	54.71	20.15	L1	OFF	19.5
0.175290	56.72	---	64.71	7.99	L1	OFF	19.5
0.195540	---	40.10	53.80	13.70	L1	OFF	19.5
0.195540	52.33	---	63.80	11.47	L1	OFF	19.5
0.224250	---	29.71	52.66	22.95	L1	OFF	19.5
0.224250	45.63	---	62.66	17.03	L1	OFF	19.5
0.253500	---	32.46	51.64	19.18	L1	OFF	19.5
0.253500	47.46	---	61.64	14.18	L1	OFF	19.5
1.435920	---	34.27	46.00	11.73	L1	OFF	19.6
1.435920	42.51	---	56.00	13.49	L1	OFF	19.6
1.534830	---	33.56	46.00	12.44	L1	OFF	19.6
1.534830	41.62	---	56.00	14.38	L1	OFF	19.6
13.611930	---	24.38	50.00	25.62	L1	OFF	19.8
13.611930	29.26	---	60.00	30.74	L1	OFF	19.8

# EUT Information

Report NO : 020433  
 Test Mode : Mode 1  
 Test Voltage : Power From System  
 Phase : Neutral

Full Spectrum



## Final Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.156615	---	25.70	55.64	29.94	N	OFF	19.5
0.156615	47.18	---	65.64	18.46	N	OFF	19.5
0.163500	---	39.92	55.28	15.36	N	OFF	19.5
0.163500	55.84	---	65.28	9.44	N	OFF	19.5
0.177000	---	34.13	54.63	20.50	N	OFF	19.5
0.177000	52.60	---	64.63	12.03	N	OFF	19.5
0.193470	---	24.50	53.89	29.39	N	OFF	19.5
0.193470	44.17	---	63.89	19.72	N	OFF	19.5
0.204000	---	35.54	53.45	17.91	N	OFF	19.5
0.204000	48.32	---	63.45	15.13	N	OFF	19.5
1.367250	---	33.89	46.00	12.11	N	OFF	19.6
1.367250	40.78	---	56.00	15.22	N	OFF	19.6
1.548060	---	32.77	46.00	13.23	N	OFF	19.6
1.548060	39.51	---	56.00	16.49	N	OFF	19.6
1.718250	---	30.10	46.00	15.90	N	OFF	19.6
1.718250	36.35	---	56.00	19.65	N	OFF	19.6
5.824500	---	16.27	50.00	33.73	N	OFF	19.7
5.824500	18.39	---	60.00	41.61	N	OFF	19.7
13.994250	---	23.61	50.00	26.39	N	OFF	19.9
13.994250	28.34	---	60.00	31.66	N	OFF	19.9



## Appendix C. Radiated Spurious Emission

Test Engineer :	Daniel Lee, Jacky Hung and Wilson Wu	Temperature :	20~25°C
		Relative Humidity :	50~60%

### 2.4GHz 2400~2483.5MHz

#### WIFI 802.11b (Band Edge @ 3m)

WIFI Ant.	Note	Frequency ( MHz )	Level ( dBμV/m )	Over Limit ( dB )	Limit Line ( dBμV/m )	Read Level ( dBμV )	Antenna Factor ( dB/m )	Path Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Peak Avg. ( P/A )	Pol. ( H/V )	
802.11b CH 01 2412MHz		2388.96	57.04	-16.96	74	42.7	27.64	13.99	27.29	150	139	P	H	
		2388.96	47.82	-6.18	54	33.48	27.64	13.99	27.29	150	139	A	H	
	*	2412	111.17	-	-	96.86	27.58	14.01	27.28	150	139	P	H	
	*	2412	107.84	-	-	93.53	27.58	14.01	27.28	150	139	A	H	
													H	
			2389.8	56.86	-17.14	74	42.52	27.64	13.99	27.29	310	96	P	V
			2388.96	47.47	-6.53	54	33.13	27.64	13.99	27.29	310	96	A	V
	*		2412	110	-	-	95.69	27.58	14.01	27.28	310	96	P	V
	*		2412	106.61	-	-	92.3	27.58	14.01	27.28	310	96	A	V
														V
802.11b CH 06 2437MHz		2340.66	55.52	-18.48	74	41.06	27.82	13.94	27.3	154	137	P	H	
		2389.66	45.55	-8.45	54	31.21	27.64	13.99	27.29	154	137	A	H	
	*	2437	111	-	-	96.72	27.53	14.03	27.28	154	137	P	H	
	*	2437	107.59	-	-	93.31	27.53	14.03	27.28	154	137	A	H	
			2492.16	55.85	-18.15	74	41.54	27.5	14.08	27.27	154	137	P	H
			2485.02	45.06	-8.94	54	30.75	27.5	14.08	27.27	154	137	A	H
			2319.38	55.57	-18.43	74	41.09	27.86	13.92	27.3	306	95	P	V
			2389.66	45.3	-8.7	54	30.96	27.64	13.99	27.29	306	95	A	V
	*		2437	110.47	-	-	96.19	27.53	14.03	27.28	306	95	P	V
	*		2437	107.15	-	-	92.87	27.53	14.03	27.28	306	95	A	V
			2494.33	55.22	-18.78	74	40.91	27.5	14.08	27.27	306	95	P	V
			2485.23	44.68	-9.32	54	30.37	27.5	14.08	27.27	306	95	A	V



<b>802.11b CH 11 2462MHz</b>	*	2462	111.16	-	-	96.88	27.5	14.06	27.28	150	138	P	H
	*	2462	107.78	-	-	93.5	27.5	14.06	27.28	150	138	A	H
		2484.64	57.61	-16.39	74	43.3	27.5	14.08	27.27	150	138	P	H
		2484.72	48.4	-5.6	54	34.09	27.5	14.08	27.27	150	138	A	H
													H
													H
	*	2462	110.69	-	-	96.41	27.5	14.06	27.28	296	97	P	V
	*	2462	107.5	-	-	93.22	27.5	14.06	27.28	296	97	A	V
		2496.68	56.9	-17.1	74	42.58	27.5	14.09	27.27	296	97	P	V
		2484.64	47.99	-6.01	54	33.68	27.5	14.08	27.27	296	97	A	V
													V
													V
<b>Remark</b>	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



**2.4GHz 2400~2483.5MHz  
WIFI 802.11b (Harmonic @ 3m)**

WIFI Ant. 1	Note	Frequency ( MHz )	Level ( dBμV/m )	Over Limit ( dB )	Limit Line ( dBμV/m )	Read Level ( dBμV )	Antenna Factor ( dB/m )	Path Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Peak Avg. ( P/A )	Pol. ( H/V )	
802.11b CH 01 2412MHz		4824	39.17	-34.83	74	58.6	31.15	6.97	57.55	100	0	P	H	
													H	
													H	
													H	
			4824	38.31	-35.69	74	57.74	31.15	6.97	57.55	100	0	P	V
														V
														V
802.11b CH 06 2437MHz		4874	39.05	-34.95	74	58.33	31.2	6.97	57.45	100	0	P	H	
		7311	46.31	-27.69	74	58.52	36.78	8.28	57.27	100	0	P	H	
													H	
													H	
			4874	38.39	-35.61	74	57.67	31.2	6.97	57.45	100	0	P	V
			7311	46.46	-27.54	74	58.67	36.78	8.28	57.27	100	0	P	V
														V
802.11b CH 11 2462MHz		4924	38.49	-35.51	74	57.62	31.25	6.97	57.35	100	0	P	H	
		7386	44.85	-29.15	74	57.37	36.63	8.21	57.36	100	0	P	H	
													H	
													H	
			4924	38.63	-35.37	74	57.76	31.25	6.97	57.35	100	0	P	V
			7386	46.26	-27.74	74	58.78	36.63	8.21	57.36	100	0	P	V
														V
Remark	1. No other spurious found.													
	2. All results are PASS against Peak and Average limit line.													



**2.4GHz 2400~2483.5MHz  
WIFI 802.11g (Band Edge @ 3m)**

WIFI Ant. 1	Note	Frequency ( MHz )	Level ( dBμV/m )	Over Limit ( dB )	Limit Line ( dBμV/m )	Read Level ( dBμV )	Antenna Factor ( dB/m )	Path Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Peak Avg. ( P/A )	Pol. ( H/V )	
802.11g CH 01 2412MHz		2389.905	64.34	-9.66	74	50	27.64	13.99	27.29	154	140	P	H	
		2389.59	52.47	-1.53	54	38.13	27.64	13.99	27.29	154	140	A	H	
	*	2412	109.76	-	-	95.45	27.58	14.01	27.28	154	140	P	H	
	*	2412	101.66	-	-	87.35	27.58	14.01	27.28	154	140	A	H	
													H	
														H
			2389.17	61.75	-12.25	74	47.41	27.64	13.99	27.29	307	95	P	V
			2390	51.46	-2.54	54	37.12	27.64	13.99	27.29	307	95	A	V
	*		2412	108.54	-	-	94.23	27.58	14.01	27.28	307	95	P	V
	*		2412	100.63	-	-	86.32	27.58	14.01	27.28	307	95	A	V
														V
														V
802.11g CH 06 2437MHz		2385.04	56.04	-17.96	74	41.68	27.66	13.99	27.29	154	136	P	H	
		2386.02	46.55	-7.45	54	32.19	27.66	13.99	27.29	154	136	A	H	
	*	2437	111.33	-	-	97.05	27.53	14.03	27.28	154	136	P	H	
	*	2437	103.73	-	-	89.45	27.53	14.03	27.28	154	136	A	H	
			2485.51	55.87	-18.13	74	41.56	27.5	14.08	27.27	154	136	P	H
			2485.51	46.42	-7.58	54	32.11	27.5	14.08	27.27	154	136	A	H
			2388.54	55.89	-18.11	74	41.54	27.65	13.99	27.29	301	96	P	V
			2389.66	46.35	-7.65	54	32.01	27.64	13.99	27.29	301	96	A	V
	*		2437	111.42	-	-	97.14	27.53	14.03	27.28	301	96	P	V
	*		2437	103.53	-	-	89.25	27.53	14.03	27.28	301	96	A	V
			2486.14	55.85	-18.15	74	41.54	27.5	14.08	27.27	301	96	P	V
			2483.76	46.13	-7.87	54	31.82	27.5	14.08	27.27	301	96	A	V



<b>802.11g</b>  <b>CH 11</b>  <b>2462MHz</b>	*	2462	108.27	-	-	93.99	27.5	14.06	27.28	128	137	P	H
	*	2462	100.55	-	-	86.27	27.5	14.06	27.28	128	137	A	H
		2483.64	61.84	-12.16	74	47.53	27.5	14.08	27.27	128	137	P	H
		2483.64	50.91	-3.09	54	36.6	27.5	14.08	27.27	128	137	A	H
													H
													H
	*	2462	108.03	-	-	93.75	27.5	14.06	27.28	296	97	P	V
	*	2462	100.15	-	-	85.87	27.5	14.06	27.28	296	97	A	V
		2483.88	63.71	-10.29	74	49.4	27.5	14.08	27.27	296	97	P	V
		2483.52	50.28	-3.72	54	35.97	27.5	14.08	27.27	296	97	A	V
													V
													V
<b>Remark</b>	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



**2.4GHz 2400~2483.5MHz  
WIFI 802.11g (Harmonic @ 3m)**

WIFI Ant. 1	Note	Frequency ( MHz )	Level ( dBμV/m )	Over Limit ( dB )	Limit Line ( dBμV/m )	Read Level ( dBμV )	Antenna Factor ( dB/m )	Path Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Peak Avg. ( P/A )	Pol. ( H/V )	
802.11g CH 01 2412MHz		4824	38.48	-35.52	74	57.91	31.15	6.97	57.55	100	0	P	H	
													H	
													H	
													H	
			4824	38.76	-35.24	74	58.19	31.15	6.97	57.55	100	0	P	V
														V
														V
802.11g CH 06 2437MHz		4874	38.93	-35.07	74	58.21	31.2	6.97	57.45	100	0	P	H	
		7311	44.55	-29.45	74	56.76	36.78	8.28	57.27	100	0	P	H	
													H	
													H	
			4874	39.31	-34.69	74	58.59	31.2	6.97	57.45	100	0	P	V
			7311	45.26	-28.74	74	57.47	36.78	8.28	57.27	100	0	P	V
														V
802.11g CH 11 2462MHz		4924	38.65	-35.35	74	57.78	31.25	6.97	57.35	100	0	P	H	
		7386	44.94	-29.06	74	57.46	36.63	8.21	57.36	100	0	P	H	
													H	
													H	
			4924	39.19	-34.81	74	58.32	31.25	6.97	57.35	100	0	P	V
			7386	44.12	-29.88	74	56.64	36.63	8.21	57.36	100	0	P	V
														V
Remark	1. No other spurious found.													
	2. All results are PASS against Peak and Average limit line.													





**2.4GHz 2400~2483.5MHz  
WIFI 802.11n HT20 (Band Edge @ 3m)**

WIFI Ant. 1	Note	Frequency ( MHz )	Level ( dBμV/m )	Over Limit ( dB )	Limit Line ( dBμV/m )	Read Level ( dBμV )	Antenna Factor ( dB/m )	Path Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Peak Avg. ( P/A )	Pol. ( H/V )	
802.11n HT20 CH 01 2412MHz		2389.485	61.42	-12.58	74	47.08	27.64	13.99	27.29	157	138	P	H	
		2389.905	51.14	-2.86	54	36.8	27.64	13.99	27.29	157	138	A	H	
	*	2412	108.52	-	-	94.21	27.58	14.01	27.28	157	138	P	H	
	*	2412	100.47	-	-	86.16	27.58	14.01	27.28	157	138	A	H	
													H	
														H
			2389.485	60.09	-13.91	74	45.75	27.64	13.99	27.29	313	97	P	V
			2390	50.56	-3.44	54	36.22	27.64	13.99	27.29	313	97	A	V
		*	2412	107.04	-	-	92.73	27.58	14.01	27.28	313	97	P	V
		*	2412	99.4	-	-	85.09	27.58	14.01	27.28	313	97	A	V
													V	
													V	
802.11n HT20 CH 06 2437MHz		2386.44	57.19	-16.81	74	42.84	27.65	13.99	27.29	152	138	P	H	
		2389.66	47.58	-6.42	54	33.24	27.64	13.99	27.29	152	138	A	H	
	*	2437	112.39	-	-	98.11	27.53	14.03	27.28	152	138	P	H	
	*	2437	104.48	-	-	90.2	27.53	14.03	27.28	152	138	A	H	
			2484.11	56.73	-17.27	74	42.42	27.5	14.08	27.27	152	138	P	H
			2483.5	46.71	-7.29	54	32.4	27.5	14.08	27.27	152	138	A	H
			2387.56	56.14	-17.86	74	41.79	27.65	13.99	27.29	305	95	P	V
			2389.24	46.86	-7.14	54	32.52	27.64	13.99	27.29	305	95	A	V
		*	2437	112.19	-	-	97.91	27.53	14.03	27.28	305	95	P	V
		*	2437	104.43	-	-	90.15	27.53	14.03	27.28	305	95	A	V
		2484.25	56.27	-17.73	74	41.96	27.5	14.08	27.27	305	95	P	V	
		2483.69	46.42	-7.58	54	32.11	27.5	14.08	27.27	305	95	A	V	



<b>802.11n</b> <b>HT20</b> <b>CH 11</b> <b>2462MHz</b>	*	2462	108.63	-	-	94.35	27.5	14.06	27.28	147	138	P	H
	*	2462	101.08	-	-	86.8	27.5	14.06	27.28	147	138	A	H
		2483.72	67.23	-6.77	74	52.92	27.5	14.08	27.27	147	138	P	H
		2483.52	52.88	-1.12	54	38.57	27.5	14.08	27.27	147	138	A	H
													H
													H
	*	2462	108.29	-	-	94.01	27.5	14.06	27.28	298	95	P	V
	*	2462	100.41	-	-	86.13	27.5	14.06	27.28	298	95	A	V
		2483.92	65.96	-8.04	74	51.65	27.5	14.08	27.27	298	95	P	V
		2483.52	51.46	-2.54	54	37.15	27.5	14.08	27.27	298	95	A	V
													V
													V
<b>Remark</b>	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



**2.4GHz 2400~2483.5MHz  
WIFI 802.11n HT20 (Harmonic @ 3m)**

WIFI Ant. 1	Note	Frequency ( MHz )	Level ( dBμV/m )	Over Limit ( dB )	Limit Line ( dBμV/m )	Read Level ( dBμV )	Antenna Factor ( dB/m )	Path Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Peak Avg. ( P/A )	Pol. ( H/V )	
802.11n HT20 CH 01 2412MHz		4824	38.5	-35.5	74	57.93	31.15	6.97	57.55	100	0	P	H	
													H	
													H	
													H	
			4824	39.19	-34.81	74	58.62	31.15	6.97	57.55	100	0	P	V
														V
														V
802.11n HT20 CH 06 2437MHz		4874	38.54	-35.46	74	57.82	31.2	6.97	57.45	100	0	P	H	
		7311	44.44	-29.56	74	56.65	36.78	8.28	57.27	100	0	P	H	
													H	
													H	
			4874	39.46	-34.54	74	58.74	31.2	6.97	57.45	100	0	P	V
			7311	43.59	-30.41	74	55.8	36.78	8.28	57.27	100	0	P	V
														V
802.11n HT20 CH 11 2462MHz		4924	39.04	-34.96	74	58.17	31.25	6.97	57.35	100	0	P	H	
		7386	43.76	-30.24	74	56.28	36.63	8.21	57.36	100	0	P	H	
													H	
													H	
			4924	38.23	-35.77	74	57.36	31.25	6.97	57.35	100	0	P	V
			7386	43.68	-30.32	74	56.2	36.63	8.21	57.36	100	0	P	V
														V
Remark	1. No other spurious found.													
	2. All results are PASS against Peak and Average limit line.													



**Emission Above 18GHz  
2.4GHz WIFI 802.11n HT20 (SHF)**

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.	
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.		
1		( MHz )	( dBμV/m )	( dB )	( dBμV/m )	( dBμV )	( dB/m )	( dB )	( dB )	( cm )	( deg )	( P/A )	( H/V )	
<b>2.4GHz 802.11n HT20 SHF</b>		20366	39.53	-34.47	74	43.52	37.95	11.64	53.58	150	0	P	H	
													H	
													H	
													H	
			20954	40.38	-33.62	74	43.38	38.36	12.05	53.41	150	0	P	V
														V
														V
<b>Remark</b>	1. No other spurious found. 2. All results are PASS against limit line.													



Emission below 1GHz  
2.4GHz WIFI 802.11n HT20 (LF)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.	
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.		
1		( MHz )	( dBμV/m )	( dB )	( dBμV/m )	( dBμV )	( dB/m )	( dB )	( dB )	( cm )	( deg )	( P/A )	( H/V )	
2.4GHz 802.11n HT20 LF		244.37	32.45	-13.55	46	45.84	17.42	1.36	32.17	-	-	P	H	
		350.1	32.56	-13.44	46	42.65	20.1	1.62	31.81	-	-	P	H	
		372.41	30.9	-15.1	46	40.42	20.55	1.67	31.74	-	-	P	H	
		427.7	36.75	-9.25	46	44.56	22.3	1.77	31.88	-	-	P	H	
		716.76	38.72	-7.28	46	41.4	26.67	2.33	31.68	100	0	P	H	
		894.27	37.76	-8.24	46	38.06	28.69	2.66	31.65	-	-	P	H	
														H
														H
														H
														H
														H
														H
			193.93	27.15	-16.35	43.5	43.71	14.49	1.25	32.3	-	-	P	V
			239.52	27.62	-18.38	46	41.61	16.85	1.34	32.18	-	-	P	V
			434.49	38.4	-7.6	46	46.16	22.39	1.79	31.94	-	-	P	V
			549.92	30.16	-15.84	46	35.59	24.99	1.99	32.41	-	-	P	V
			721.61	33.64	-12.36	46	36.11	26.9	2.33	31.7	-	-	P	V
			893.3	40.58	-5.42	46	40.91	28.67	2.65	31.65	100	0	P	V
													V	
													V	
													V	
													V	
													V	
													V	
Remark	1. No other spurious found. 2. All results are PASS against limit line.													



**Note symbol**

*	<b>Fundamental Frequency</b> which can be ignored. However, the level of any unwanted emissions shall not exceed the level of the fundamental frequency.
!	Test result is <b>over limit</b> line.
P/A	<b>Peak</b> or <b>Average</b>
H/V	<b>Horizontal</b> or <b>Vertical</b>



A calculation example for radiated spurious emission is shown as below:

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1		( MHz )	( dBμV/m )	( dB )	( dBμV/m )	( dBμV )	( dB/m )	( dB )	( dB )	( cm )	( deg )	( P/A )	( H/V )
802.11b		2390	55.45	-18.55	74	54.51	32.22	4.58	35.86	103	308	P	H
CH 01													
2412MHz		2390	43.54	-10.46	54	42.6	32.22	4.58	35.86	103	308	A	H

1. Path Loss(dB) = Cable loss(dB) + Filter loss(dB) + Attenuator loss(dB)
2. Level(dBμV/m) =  
Antenna Factor(dB/m) + Path Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)
3. Over Limit(dB) = Level(dBμV/m) – Limit Line(dBμV/m)

**For Peak Limit @ 2390MHz:**

1. Level(dBμV/m)  
= Antenna Factor(dB/m) + Path Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)  
= 32.22(dB/m) + 4.58(dB) + 54.51(dBμV) – 35.86 (dB)  
= 55.45 (dBμV/m)
2. Over Limit(dB)  
= Level(dBμV/m) – Limit Line(dBμV/m)  
= 55.45(dBμV/m) – 74(dBμV/m)  
= -18.55(dB)

**For Average Limit @ 2390MHz:**

1. Level(dBμV/m)  
= Antenna Factor(dB/m) + Path Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)  
= 32.22(dB/m) + 4.58(dB) + 42.6(dBμV) – 35.86 (dB)  
= 43.54 (dBμV/m)
2. Over Limit(dB)  
= Level(dBμV/m) – Limit Line(dBμV/m)  
= 43.54(dBμV/m) – 54(dBμV/m)  
= -10.46(dB)

Both peak and average measured complies with the limit line, so test result is “PASS”.



## Appendix D. Radiated Spurious Emission Plots

Test Engineer :	Daniel Lee, Jacky Hung and Wilson Wu	Temperature :	20~25°C
		Relative Humidity :	50~60%

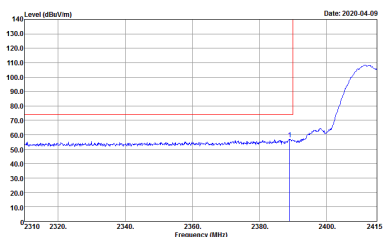
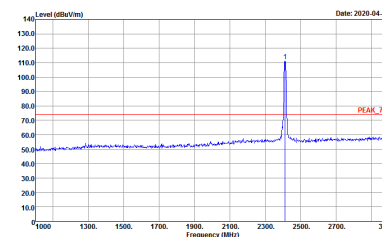
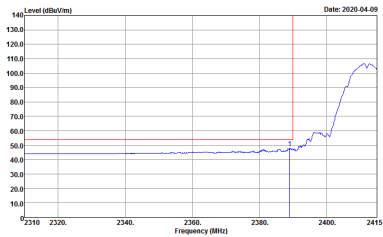
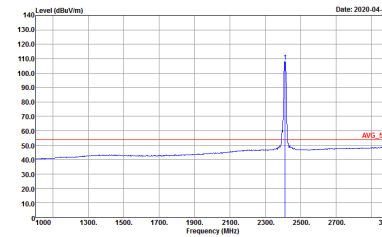
### Note symbol

-L	Low channel location
-R	High channel location

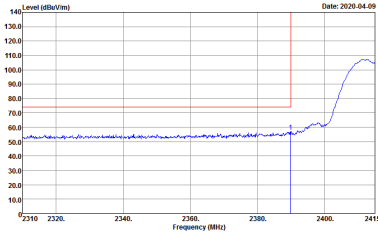
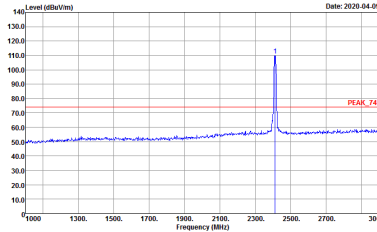
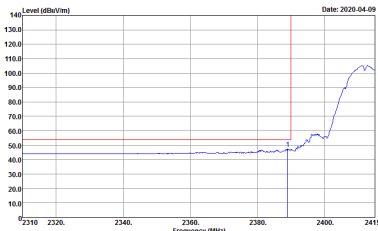
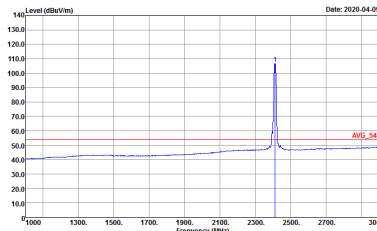




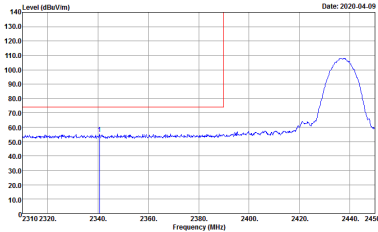
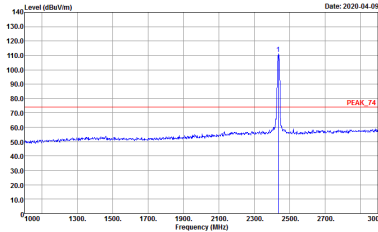
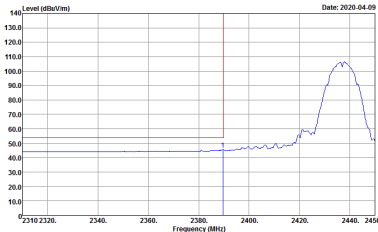
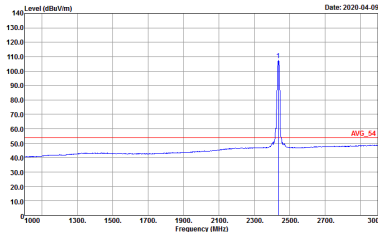
2.4GHz 2400~2483.5MHz  
 WIFI 802.11b (Band Edge @ 3m)

WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11b CH01 2412MHz	
1	Horizontal	Fundamental
<b>Peak</b>	 <p>Site : 03CH13-HY            Condition : PEAK_BE_74 3m HORN_91200_1241 HORIZONTAL            : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	 <p>Site : 03CH13-HY            Condition : PEAK_74 3m HORN_91200_1241 HORIZONTAL            : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>
<b>Avg.</b>	 <p>Site : 03CH13-HY            Condition : AVG_BE_54 3m HORN_91200_1241 HORIZONTAL            : RBW:1000.000KHz VBW:0.010KHz SWT:Auto</p>	 <p>Site : 03CH13-HY            Condition : AVG_54 3m HORN_91200_1241 HORIZONTAL            : RBW:1000.000KHz VBW:0.010KHz SWT:Auto</p>

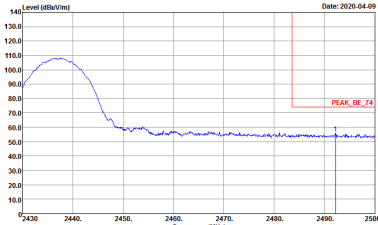
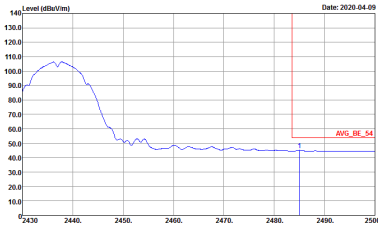


WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11b CH01 2412MHz	
1	Vertical	Fundamental
<p><b>Peak</b></p>	 <p>Site : 03CH13-HY Condition : PEAK_BE_74 3m HORN_91200_1241 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	 <p>Site : 03CH13-HY Condition : PEAK_74 3m HORN_91200_1241 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>
<p><b>Avg.</b></p>	 <p>Site : 03CH13-HY Condition : AVG_BE_54 3m HORN_91200_1241 VERTICAL : RBW:1000.000KHz VBW:0.010KHz SWT:Auto</p>	 <p>Site : 03CH13-HY Condition : AVG_54 3m HORN_91200_1241 VERTICAL : RBW:1000.000KHz VBW:0.010KHz SWT:Auto</p>

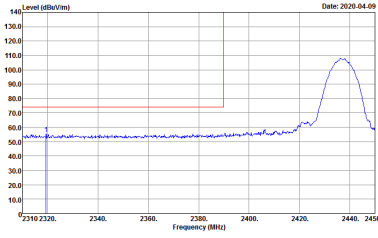
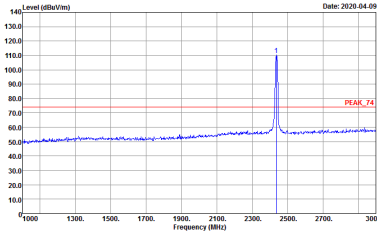
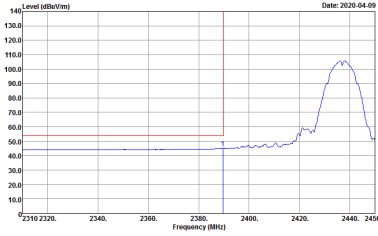
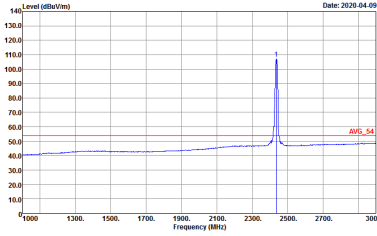


WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11b CH06 2437MHz - L	
1	Horizontal	Fundamental
Peak	 <p>Site : 03CH13-HY Condition : PEAK_BE_74 3m HORN_91200_1241 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	 <p>Site : 03CH13-HY Condition : PEAK_74 3m HORN_91200_1241 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>
Avg.	 <p>Site : 03CH13-HY Condition : AVG_BE_54 3m HORN_91200_1241 HORIZONTAL : RBW:1000.000KHz VBW:0.010KHz SWT:Auto</p>	 <p>Site : 03CH13-HY Condition : AVG_54 3m HORN_91200_1241 HORIZONTAL : RBW:1000.000KHz VBW:0.010KHz SWT:Auto</p>



WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11b CH06 2437MHz - R	
1	Horizontal	Fundamental
<p><b>Peak</b></p>	 <p>Site : 03CH13-HY Condition : PEAK_BE_74 3m HORN_91200_1241 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	<p>Left blank</p>
<p><b>Avg.</b></p>	 <p>Site : 03CH13-HY Condition : AVG_BE_54 3m HORN_91200_1241 HORIZONTAL : RBW:1000.000KHz VBW:0.010KHz SWT:Auto</p>	<p>Left blank</p>

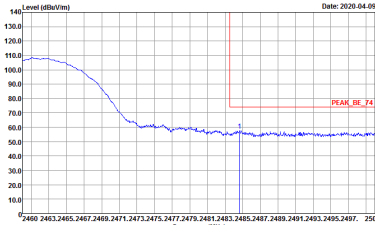
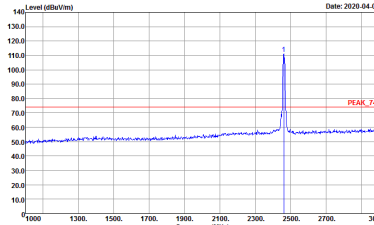
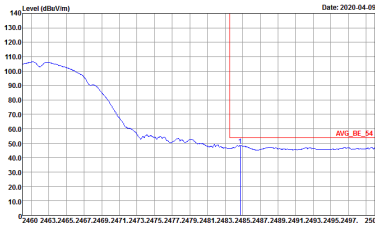
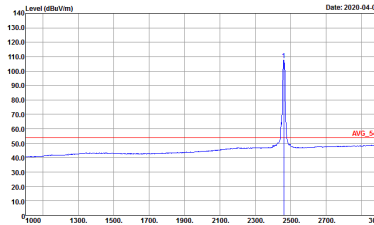


WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11b CH06 2437MHz - L	
1	Vertical	Fundamental
Peak	 <p>Site : 03CH13-HY Condition : PEAK_BE_74 3m HORN_91200_1241 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	 <p>Site : 03CH13-HY Condition : PEAK_74 3m HORN_91200_1241 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>
Avg.	 <p>Site : 03CH13-HY Condition : AVG_BE_54 3m HORN_91200_1241 VERTICAL : RBW:1000.000KHz VBW:0.010KHz SWT:Auto</p>	 <p>Site : 03CH13-HY Condition : AVG_54 3m HORN_91200_1241 VERTICAL : RBW:1000.000KHz VBW:0.010KHz SWT:Auto</p>

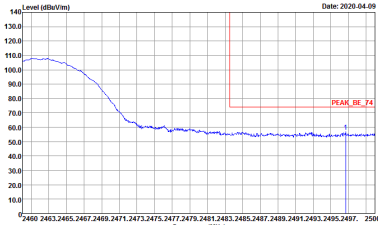
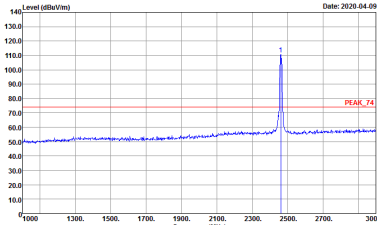
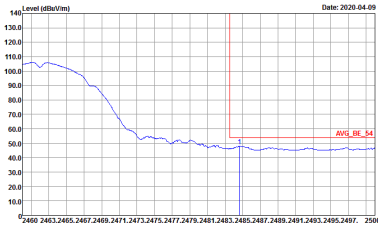
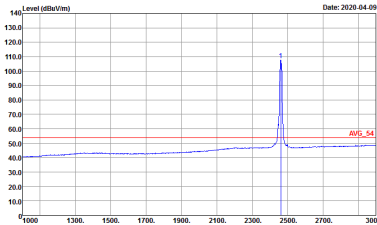


WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11b CH06 2437MHz - R	
1	Vertical	Fundamental
Peak	<p>Site : 03CH13-HY Condition : PEAK_BE_74 3m HORN_91200_1241 VERTICAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	Left blank
Avg.	<p>Site : 03CH13-HY Condition : AVG_BE_54 3m HORN_91200_1241 VERTICAL RBW:1000.000KHz VBW:0.010KHz SWT:Auto</p>	Left blank



WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11b CH11 2462MHz	
1	Horizontal	Fundamental
Peak	 <p>Site : 03CH13-HY Condition : PEAK_BE_74 3m HORN_91200_1241 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	 <p>Site : 03CH13-HY Condition : PEAK_74 3m HORN_91200_1241 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>
Avg.	 <p>Site : 03CH13-HY Condition : AV6_BE_54 3m HORN_91200_1241 HORIZONTAL : RBW:1000.000KHz VBW:0.010KHz SWT:Auto</p>	 <p>Site : 03CH13-HY Condition : AV6_54 3m HORN_91200_1241 HORIZONTAL : RBW:1000.000KHz VBW:0.010KHz SWT:Auto</p>



WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11b CH11 2462MHz	
1	Vertical	Fundamental
Peak	 <p>Site : 03CH13-HY Condition : PEAK_BE_74 3m HORN_91200_1241 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	 <p>Site : 03CH13-HY Condition : PEAK_74 3m HORN_91200_1241 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>
Avg.	 <p>Site : 03CH13-HY Condition : AVG_BE_54 3m HORN_91200_1241 VERTICAL : RBW:1000.000KHz VBW:0.010KHz SWT:Auto</p>	 <p>Site : 03CH13-HY Condition : AVG_54 3m HORN_91200_1241 VERTICAL : RBW:1000.000KHz VBW:0.010KHz SWT:Auto</p>

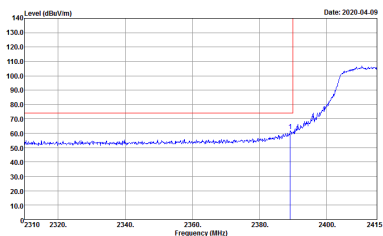
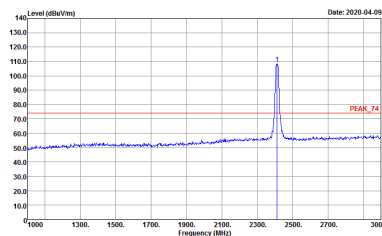
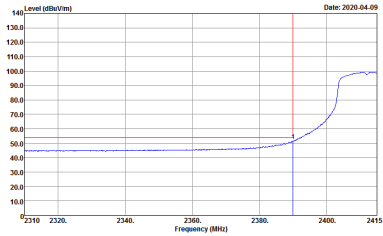
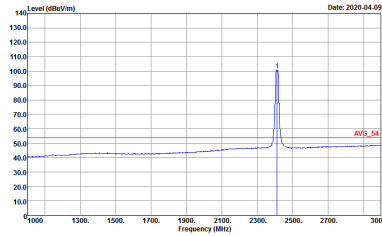




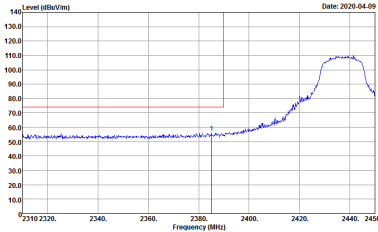
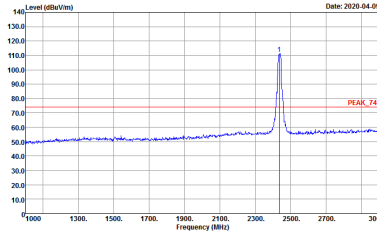
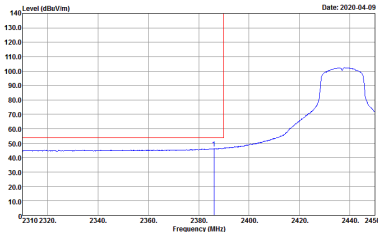
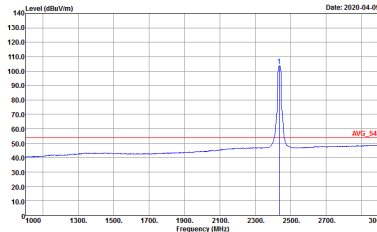
2.4GHz 2400~2483.5MHz  
 WIFI 802.11g (Band Edge @ 3m)

WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11g CH01 2412MHz	
1	Horizontal	Fundamental
Peak	<p>Site : 03CH13-HY            Condition : PEAK_BE_74 3m HORN_91200_1241 HORIZONTAL            : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	<p>Site : 03CH13-HY            Condition : PEAK_74 3m HORN_91200_1241 HORIZONTAL            : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>
Avg.	<p>Site : 03CH13-HY            Condition : AVG_BE_54 3m HORN_91200_1241 HORIZONTAL            : RBW:1000.000KHz VBW:1.000KHz SWT:Auto</p>	<p>Site : 03CH13-HY            Condition : AVG_54 3m HORN_91200_1241 HORIZONTAL            : RBW:1000.000KHz VBW:1.000KHz SWT:Auto</p>



WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11g CH01 2412MHz	
1	Vertical	Fundamental
Peak	 <p>Site : 03CH13-HY Condition : PEAK_BE_74 3m HORN_91200_1241 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	 <p>Site : 03CH13-HY Condition : PEAK_74 3m HORN_91200_1241 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>
Avg.	 <p>Site : 03CH13-HY Condition : AVG_BE_54 3m HORN_91200_1241 VERTICAL : RBW:1000.000KHz VBW:1.000KHz SWT:Auto</p>	 <p>Site : 03CH13-HY Condition : AVG_54 3m HORN_91200_1241 VERTICAL : RBW:1000.000KHz VBW:1.000KHz SWT:Auto</p>

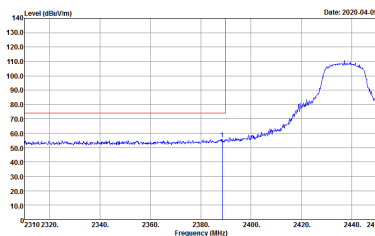
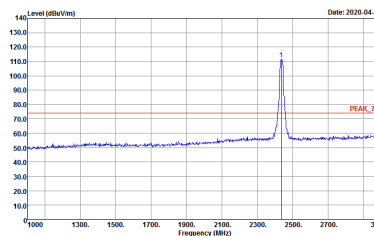
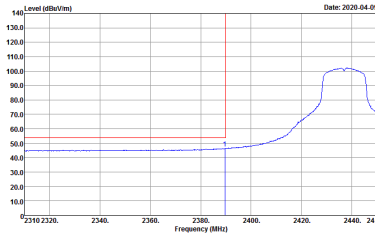
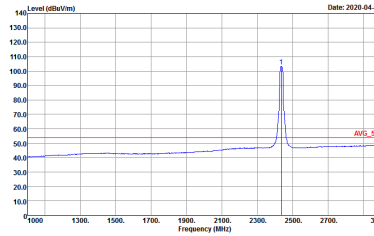


<b>WIFI</b>	<b>2.4GHz 2400~2483.5MHz Band Edge @ 3m</b>	
<b>ANT</b>	<b>802.11g CH06 2437MHz - L</b>	
<b>1</b>	<b>Horizontal</b>	<b>Fundamental</b>
<b>Peak</b>	 <p>Site : 03CH13-HY Condition : PEAK_BE_74 3m HORN_91200_1241 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	 <p>Site : 03CH13-HY Condition : PEAK_74 3m HORN_91200_1241 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>
<b>Avg.</b>	 <p>Site : 03CH13-HY Condition : AVG_BE_54 3m HORN_91200_1241 HORIZONTAL : RBW:1000.000KHz VBW:1.000KHz SWT:Auto</p>	 <p>Site : 03CH13-HY Condition : AVG_54 3m HORN_91200_1241 HORIZONTAL : RBW:1000.000KHz VBW:1.000KHz SWT:Auto</p>



WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11g CH06 2437MHz - R	
1	Horizontal	Fundamental
Peak	<p>Site : 03CH13-HY Condition : PEAK_BE_74 3m HORN_91200_1241 HORIZONTAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	Left blank
Avg.	<p>Site : 03CH13-HY Condition : AVG_BE_54 3m HORN_91200_1241 HORIZONTAL RBW:1000.000KHz VBW:1.000KHz SWT:Auto</p>	Left blank

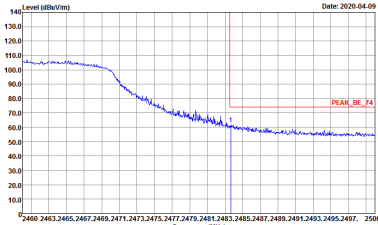
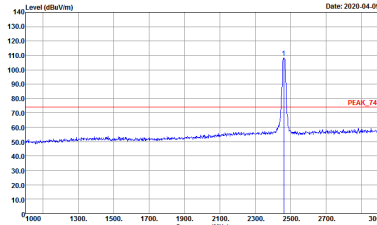
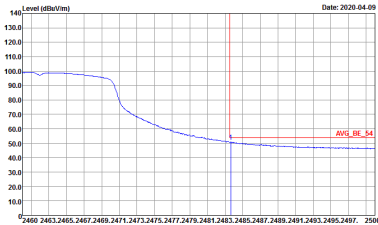
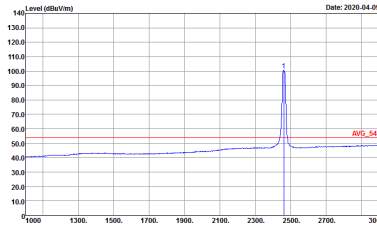


WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11g CH06 2437MHz - L	
1	Vertical	Fundamental
Peak	 <p>Site : 03CH13-HY Condition : PEAK_BE_74 3m HORN_91200_1241 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	 <p>Site : 03CH13-HY Condition : PEAK_74 3m HORN_91200_1241 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>
Avg.	 <p>Site : 03CH13-HY Condition : AVG_BE_54 3m HORN_91200_1241 VERTICAL : RBW:1000.000KHz VBW:1.000KHz SWT:Auto</p>	 <p>Site : 03CH13-HY Condition : AVG_54 3m HORN_91200_1241 VERTICAL : RBW:1000.000KHz VBW:1.000KHz SWT:Auto</p>

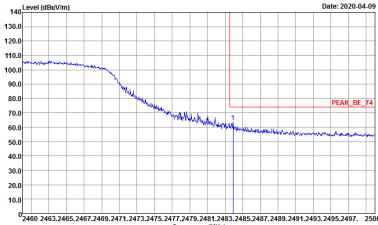
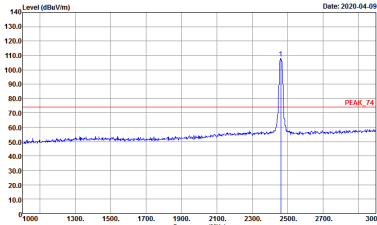
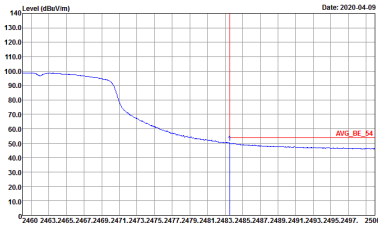
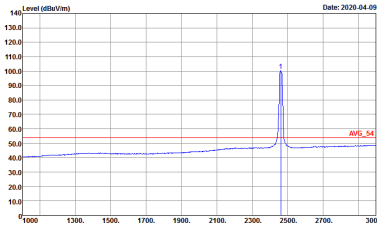


WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11g CH06 2437MHz - R	
1	Vertical	Fundamental
Peak	<p>Site : 03CH13-HY Condition : PEAK_BE_74 3m HORN_91200_1241 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	Left Blank
Avg.	<p>Site : 03CH13-HY Condition : AVG_BE_54 3m HORN_91200_1241 VERTICAL : RBW:1000.000KHz VBW:1.000KHz SWT:Auto</p>	Left Blank



WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11g CH11 2462MHz	
1	Horizontal	Fundamental
Peak	 <p>Site : 03CH13-HY Condition : PEAK_BE_74 3m HORN_91200_1241 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	 <p>Site : 03CH13-HY Condition : PEAK_74 3m HORN_91200_1241 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>
Avg.	 <p>Site : 03CH13-HY Condition : AVG_BE_54 3m HORN_91200_1241 HORIZONTAL : RBW:1000.000KHz VBW:1.000KHz SWT:Auto</p>	 <p>Site : 03CH13-HY Condition : AVG_54 3m HORN_91200_1241 HORIZONTAL : RBW:1000.000KHz VBW:1.000KHz SWT:Auto</p>



WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11g CH11 2462MHz	
1	Vertical	Fundamental
Peak	 <p>Site : 03CH13-HY Condition : PEAK_BE_74 3m HORN_91200_1241 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	 <p>Site : 03CH13-HY Condition : PEAK_74 3m HORN_91200_1241 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>
Avg.	 <p>Site : 03CH13-HY Condition : AVG_BE_54 3m HORN_91200_1241 VERTICAL : RBW:1000.000KHz VBW:1.000KHz SWT:Auto</p>	 <p>Site : 03CH13-HY Condition : AVG_54 3m HORN_91200_1241 VERTICAL : RBW:1000.000KHz VBW:1.000KHz SWT:Auto</p>



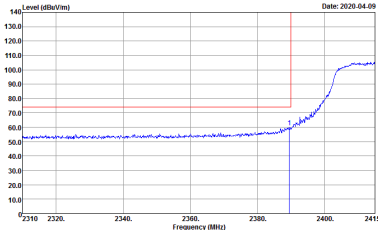
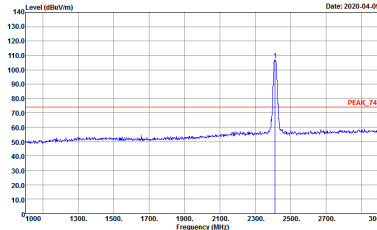
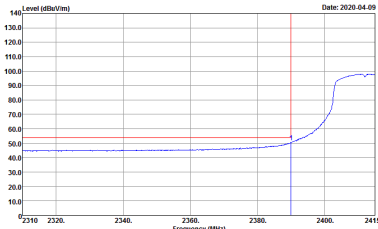
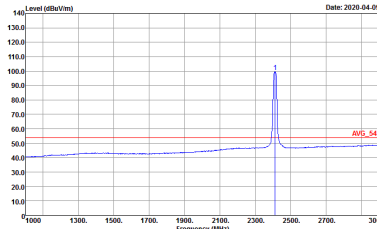


2.4GHz 2400~2483.5MHz

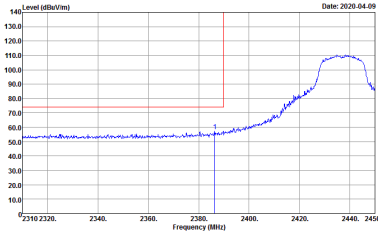
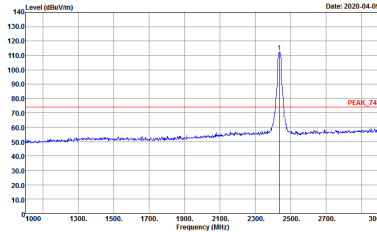
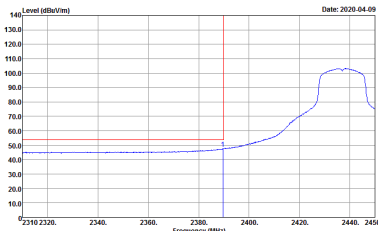
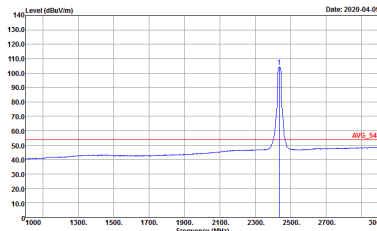
WIFI 802.11n HT20 (Band Edge @ 3m)

WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT20 CH01 2412MHz	
1	Horizontal	Fundamental
Peak	<p>Site : 03CH13-HY Condition : PEAK_BE_74 3m HORN_91200_1241 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	<p>Site : 03CH13-HY Condition : PEAK_74 3m HORN_91200_1241 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>
Avg.	<p>Site : 03CH13-HY Condition : AVG_BE_54 3m HORN_91200_1241 HORIZONTAL : RBW:1000.000KHz VBW:1.000KHz SWT:Auto</p>	<p>Site : 03CH13-HY Condition : AVG_54 3m HORN_91200_1241 HORIZONTAL : RBW:1000.000KHz VBW:1.000KHz SWT:Auto</p>



WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT20 CH01 2412MHz	
1	Vertical	Fundamental
Peak	 <p>Site : 03CH13-HY Condition : PEAK_BE_74 3m HORN_91200_1241 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	 <p>Site : 03CH13-HY Condition : PEAK_74 3m HORN_91200_1241 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>
Avg.	 <p>Site : 03CH13-HY Condition : AVG_BE_54 3m HORN_91200_1241 VERTICAL : RBW:1000.000KHz VBW:1.000KHz SWT:Auto</p>	 <p>Site : 03CH13-HY Condition : AVG_54 3m HORN_91200_1241 VERTICAL : RBW:1000.000KHz VBW:1.000KHz SWT:Auto</p>

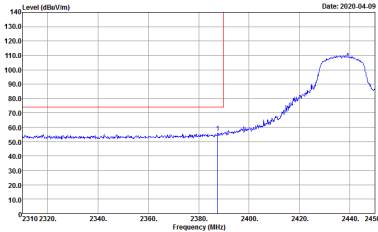
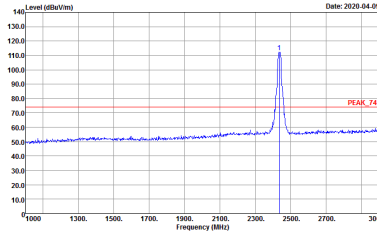
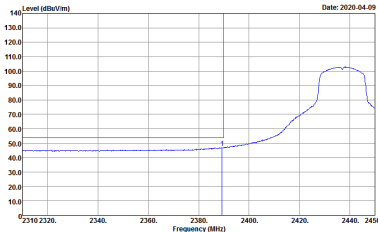
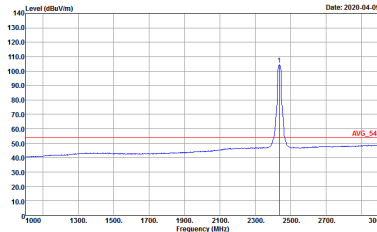


WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT20 CH06 2437MHz - L	
1	Horizontal	Fundamental
Peak	 <p>Site : 03CH13-HY Condition : PEAK_BE_74 3m HORN_91200_1241 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	 <p>Site : 03CH13-HY Condition : PEAK_74 3m HORN_91200_1241 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>
Avg.	 <p>Site : 03CH13-HY Condition : AVG_BE_54 3m HORN_91200_1241 HORIZONTAL : RBW:1000.000KHz VBW:1.000KHz SWT:Auto</p>	 <p>Site : 03CH13-HY Condition : AVG_54 3m HORN_91200_1241 HORIZONTAL : RBW:1000.000KHz VBW:1.000KHz SWT:Auto</p>

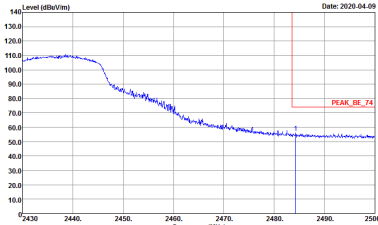
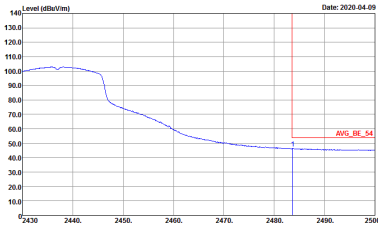


WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT20 CH06 2437MHz - R	
1	Horizontal	Fundamental
<p><b>Peak</b></p>		<p>Left blank</p>
<p><b>Avg.</b></p>		<p>Left blank</p>

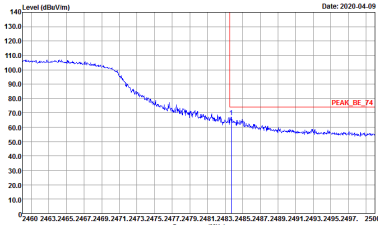
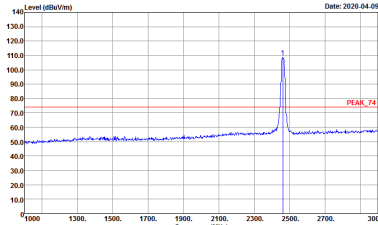
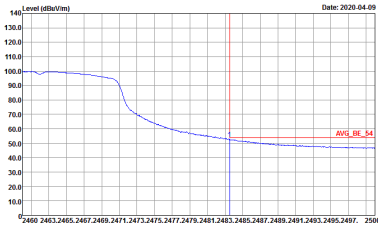
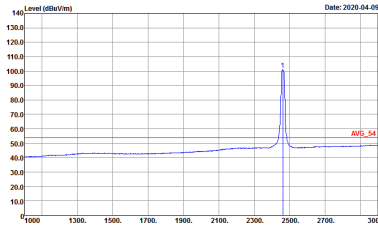


WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT20 CH06 2437MHz - L	
1	Vertical	Fundamental
Peak	 <p>Site : 03CH13-HY Condition : PEAK_BE_74 3m HORN_91200_1241 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	 <p>Site : 03CH13-HY Condition : PEAK_74 3m HORN_91200_1241 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>
Avg.	 <p>Site : 03CH13-HY Condition : AVG_BE_54 3m HORN_91200_1241 VERTICAL : RBW:1000.000KHz VBW:1.000KHz SWT:Auto</p>	 <p>Site : 03CH13-HY Condition : AVG_54 3m HORN_91200_1241 VERTICAL : RBW:1000.000KHz VBW:1.000KHz SWT:Auto</p>

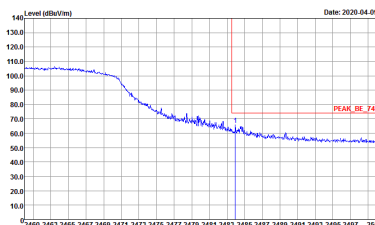
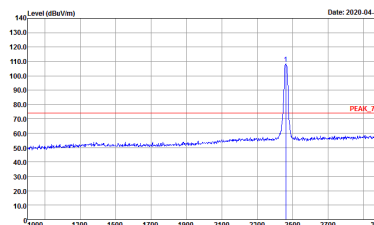
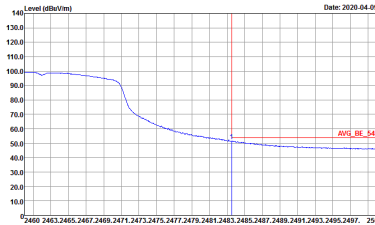
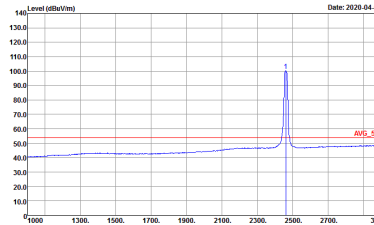


WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT20 CH06 2437MHz - R	
1	Vertical	Fundamental
Peak	 <p>Site : 03CH13-HY Condition : PEAK_BE_74 3m HORN_91200_1241 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	Left Blank
Avg.	 <p>Site : 03CH13-HY Condition : AVG_BE_54 3m HORN_91200_1241 VERTICAL : RBW:1000.000KHz VBW:1.000KHz SWT:Auto</p>	Left Blank



WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT20 CH11 2462MHz	
1	Horizontal	Fundamental
Peak	 <p>Site : 03CH13-HY Condition : PEAK_BE_74 3m HORN_91200_1241 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	 <p>Site : 03CH13-HY Condition : PEAK_74 3m HORN_91200_1241 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>
Avg.	 <p>Site : 03CH13-HY Condition : AVG_BE_54 3m HORN_91200_1241 HORIZONTAL : RBW:1000.000KHz VBW:1.000KHz SWT:Auto</p>	 <p>Site : 03CH13-HY Condition : AVG_54 3m HORN_91200_1241 HORIZONTAL : RBW:1000.000KHz VBW:1.000KHz SWT:Auto</p>



WIFI	2.4GHz 2400~2483.5MHz Fundamental @ 3m	
ANT	802.11n HT20 CH11 2462MHz	
1	Vertical	Fundamental
Peak	 <p>Site : 03CH13-HY Condition : PEAK_BE_74 3m HORN_91200_1241 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>	 <p>Site : 03CH13-HY Condition : PEAK_74 3m HORN_91200_1241 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto</p>
Avg.	 <p>Site : 03CH13-HY Condition : AVG_BE_54 3m HORN_91200_1241 VERTICAL : RBW:1000.000KHz VBW:1.000KHz SWT:Auto</p>	 <p>Site : 03CH13-HY Condition : AVG_54 3m HORN_91200_1241 VERTICAL : RBW:1000.000KHz VBW:1.000KHz SWT:Auto</p>





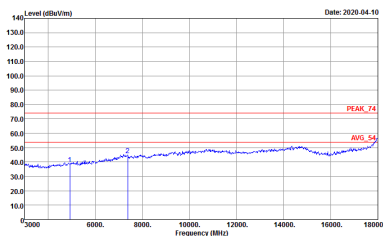
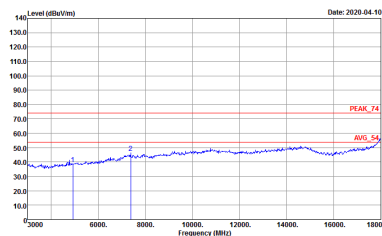
2.4GHz 2400~2483.5MHz  
 WIFI 802.11b (Harmonic @ 3m)

WIFI	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	802.11b CH01 2412MHz	
1	Horizontal	Vertical
Peak Avg.	<p>Site : 03CH13-HY            Condition : PEAK_74 3m HORN_91200_1241 HORIZONTAL            Detector : Peak</p>	<p>Site : 03CH13-HY            Condition : PEAK_74 3m HORN_91200_1241 VERTICAL            Detector : Peak</p>



<b>WIFI</b>	<b>2.4GHz 2400~2483.5MHz Harmonic @ 3m</b>	
<b>ANT</b>	<b>802.11b CH06 2437MHz</b>	
<b>1</b>	<b>Horizontal</b>	<b>Vertical</b>
<b>Peak Avg.</b>	<p>Site : 03CH13-HY Condition : PEAK_74 3m HORN_91200_1241 HORIZONTAL Detector : Peak</p>	<p>Site : 03CH13-HY Condition : PEAK_74 3m HORN_91200_1241 VERTICAL Detector : Peak</p>



WIFI	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	802.11b CH11 2462MHz	
1	Horizontal	Vertical
Peak Avg.	 <p>Site : 03CH13-HY Condition : PEAK_74 3m HORN_91200_1241 HORIZONTAL Detector : Peak</p>	 <p>Site : 03CH13-HY Condition : PEAK_74 3m HORN_91200_1241 VERTICAL Detector : Peak</p>



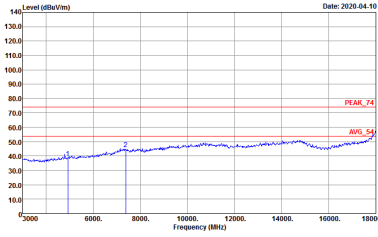
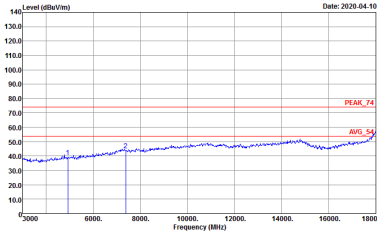
2.4GHz 2400~2483.5MHz  
 WIFI 802.11g (Harmonic @ 3m)

WIFI	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	802.11g CH01 2412MHz	
1	Horizontal	Vertical
Peak Avg.	<p>Site : 03CH13-HY            Condition : PEAK_74 3m HORN_91200_1241 HORIZONTAL            Detector : Peak</p>	<p>Site : 03CH13-HY            Condition : PEAK_74 3m HORN_91200_1241 VERTICAL            Detector : Peak</p>



<b>WIFI</b>	<b>2.4GHz 2400~2483.5MHz Harmonic @ 3m</b>	
<b>ANT</b>	<b>802.11g CH06 2437MHz</b>	
<b>1</b>	<b>Horizontal</b>	<b>Vertical</b>
<b>Peak Avg.</b>	<p>Site : 03CH13-HY Condition : PEAK_74 3m HORN_91200_1241 HORIZONTAL Detector : Peak</p>	<p>Site : 03CH13-HY Condition : PEAK_74 3m HORN_91200_1241 VERTICAL Detector : Peak</p>



<b>WIFI</b>	<b>2.4GHz 2400~2483.5MHz Harmonic @ 3m</b>	
<b>ANT</b>	<b>802.11g CH11 2462MHz</b>	
<b>1</b>	<b>Horizontal</b>	<b>Vertical</b>
<p><b>Peak</b></p> <p><b>Avg.</b></p>	 <p>Site : 03CH13-HY Condition : PEAK_74 3m HORN_91200_1241 HORIZONTAL Detector : Peak</p>	 <p>Site : 03CH13-HY Condition : PEAK_74 3m HORN_91200_1241 VERTICAL Detector : Peak</p>



2.4GHz 2400~2483.5MHz  
WIFI 802.11n HT20 (Harmonic @ 3m)

WIFI	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	802.11n HT20 CH01 2412MHz	
1	Horizontal	Vertical
Peak Avg.	<p>Site : 03CH13-HY Condition : PEAK_74 3m HORN_91200_1241 HORIZONTAL Detector : Peak</p>	<p>Site : 03CH13-HY Condition : PEAK_74 3m HORN_91200_1241 VERTICAL Detector : Peak</p>



<b>WIFI</b>	<b>2.4GHz 2400~2483.5MHz Harmonic @ 3m</b>	
<b>ANT</b>	<b>802.11n HT20 CH06 2437MHz</b>	
<b>1</b>	<b>Horizontal</b>	<b>Vertical</b>
<b>Peak Avg.</b>	<p>Site : 03CH13-HY Condition : PEAK_74 3m HORN_91200_1241 HORIZONTAL Detector : Peak</p>	<p>Site : 03CH13-HY Condition : PEAK_74 3m HORN_91200_1241 VERTICAL Detector : Peak</p>





<b>WIFI</b>	<b>2.4GHz 2400~2483.5MHz Harmonic @ 3m</b>	
<b>ANT</b>	<b>802.11n HT20 CH11 2462MHz</b>	
<b>1</b>	<b>Horizontal</b>	<b>Vertical</b>
<b>Peak Avg.</b>	<p>Site : 03CH13-HY Condition : PEAK_74 3m HORN_91200_1241 HORIZONTAL Detector : Peak</p>	<p>Site : 03CH13-HY Condition : PEAK_74 3m HORN_91200_1241 VERTICAL Detector : Peak</p>



Emission above 18GHz  
2.4GHz WIFI 802.11n HT20 (SHF)

WIFI	2.4GHz 2400~2483.5MHz	
ANT	802.11n HT20 SHF	
1	Horizontal	Vertical
QP / Peak	<p>Site : 03CH13-14Y Condition : PEAK_74 In SHF HORN 88H-A9170584 HORIZONTAL Detector : Peak Project : 020433</p>	<p>Site : 03CH13-14Y Condition : PEAK_74 In SHF HORN 88H-A9170584 VERTICAL Detector : Peak Project : 020433</p>



Emission below 1GHz
2.4GHz WIFI 802.11n HT20 (LF)

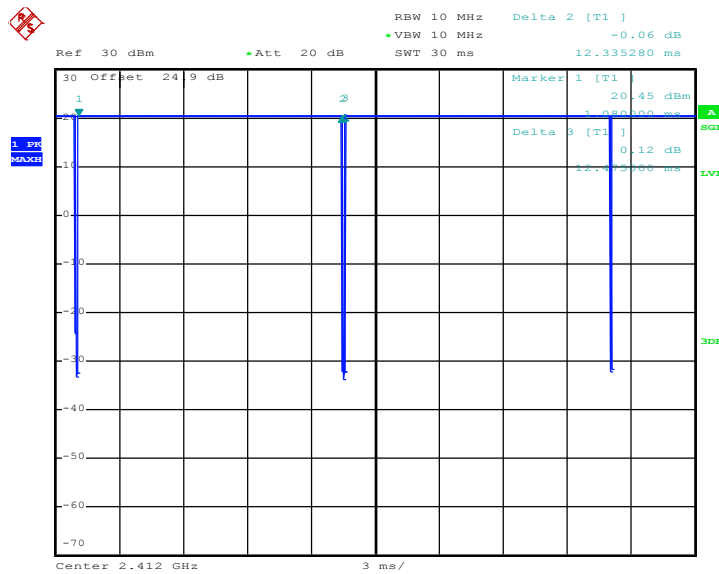
Table with 2 columns: Horizontal and Vertical. Contains two spectral plots showing Level (dBuV/m) vs Frequency (MHz) for 2.4GHz WIFI 802.11n HT20 (LF). Includes metadata like Site, Condition, Detector, Project, and Mode.



### Appendix E. Duty Cycle Plots

Band	Duty Cycle(%)	T(us)	1/T(kHz)	VBW Setting	Duty Factor(dB)
802.11b	98.88	-	-	10Hz	0.05
802.11g	95.41	2080	0.48	1kHz	0.20
2.4GHz 802.11n HT20	94.83	1925	0.52	1kHz	0.23

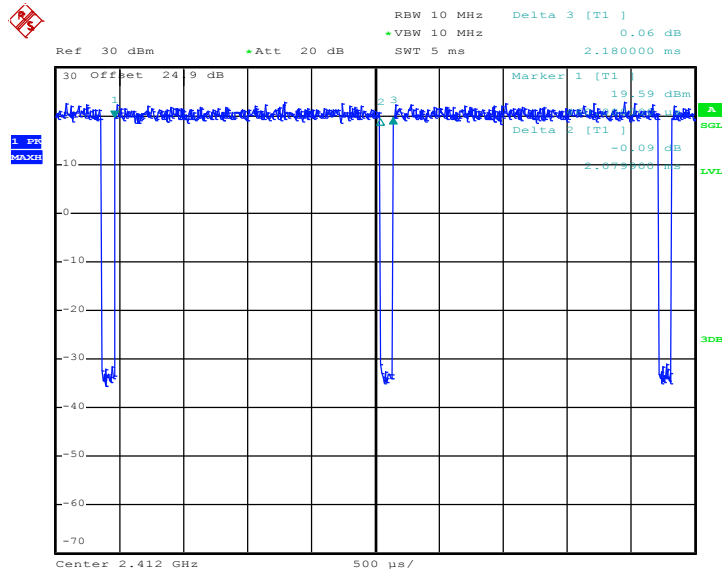
#### 802.11b



Date: 16.APR.2020 10:26:23

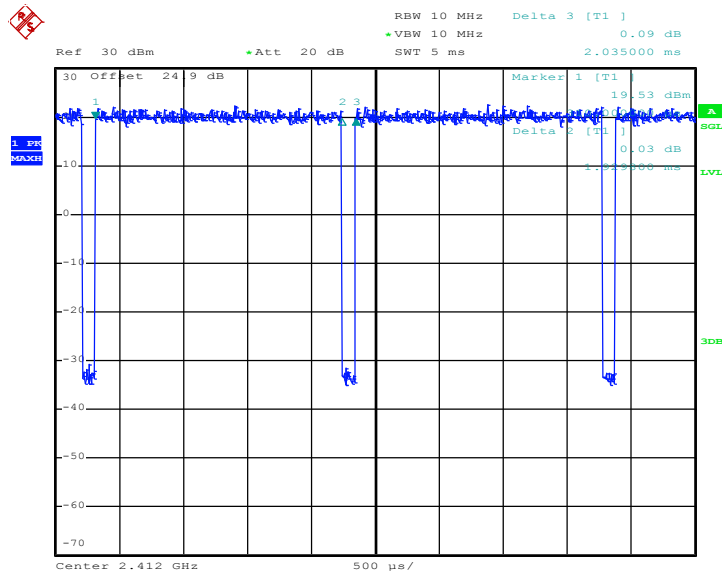


802.11g



Date: 16.APR.2020 10:42:27

802.11n HT20



Date: 16.APR.2020 11:04:45