FCC RADIO TEST REPORT

FCC ID	**:**	**UZ7MC220K**
Equipment	**:**	**Mobile computer**
Brand Name	**:**	**Zebra**
Model Name	**:**	**MC220K**
Applicant	**:**	**Zebra Technologies Corporation 1 Zebra Plaza, Holtsville, NY 11742**
Manufacturer	**:**	**Zebra Technologies Corporation 1 Zebra Plaza, Holtsville, NY 11742**
Standard	**:**	**FCC Part 15 Subpart C §15.247**

The product was received on Apr. 07, 2020 and testing was started from Apr. 17, 2020 and completed on Aug. 15, 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 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
FR040803-02C	01	Initial issue of report	Aug. 28, 2020
FR040803-02C	02	Revise the typo of 802.11b maximum (average) output power in section 1.2	Sep. 09, 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 1.09 dB at 2389.940 MHz
3.6	15.207	AC Conducted Emission	Pass	Under limit 12.95 dB at 13.560 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

Product Feature	
Equipment	Mobile computer
Brand Name	Zebra
Model Name	MC220K
FCC ID	UZ7MC220K
EUT supports Radios application	NFC WLAN 11a/b/g/n HT20/HT40 WLAN 11ac VHT20/VHT40/VHT80 Bluetooth BR/EDR/LE
HW Version	EV1
SW Version	10-11-31.00-QG-U00-PRD-HEL-04
OS Version	Android 10
MFD	02JUN20
EUT Stage	Engineering Sample

Remark: The above EUT's information was declared by manufacturer.

Specification of Accessories				
AC Adapter	**Brand Name**	Zebra	**Part Number**	PWR-WUA5V12W0US
Battery	**Brand Name**	Zebra	**Part Number**	BT-000418-10
USB Cable (TypeA plug to TypeC plug)	**Brand Name**	Zebra	**Part Number**	CBL-TC2X-USBC-01
Trigger Handle	**Brand Name**	Zebra	**Part Number**	TRG-MC2X-SNP1-01
Holster 1	**Brand Name**	Zebra	**Part Number**	SG-MC2X-HLSTR-01
Holster 2	**Brand Name**	Zebra	**Part Number**	SG-MC3021212-01R

1.2 Product Specification of Equipment Under Test

Product Specification subjective to this standard	
Tx/Rx Channel Frequency Range	2412 MHz ~ 2462 MHz
Maximum (Peak) Output Power to antenna	802.11b : 22.34 dBm (0.1714 W) 802.11g : 23.52 dBm (0.2249 W) 802.11n HT20 : 22.80 dBm (0.1905 W) 802.11n HT40 : 22.85 dBm (0.1928 W) 802.11ac VHT20 : 22.83 dBm (0.1919 W) 802.11ac VHT40 : 22.86 dBm (0.1932 W)
Maximum (Average) Output Power to antenna	802.11b : 20.70 dBm (0.1175 W) 802.11g : 20.10 dBm (0.1023 W) 802.11n HT20 : 20.20 dBm (0.1047 W) 802.11n HT40 : 17.20 dBm (0.0525 W) 802.11ac VHT20 : 20.30 dBm (0.1072 W) 802.11ac VHT40 : 17.30 dBm (0.0537 W)
99% Occupied Bandwidth	802.11b : 14.19 MHz 802.11g : 17.68 MHz 802.11ac VHT20 : 18.43 MHz 802.11ac VHT40 : 36.66 MHz
Antenna Type / Gain	Monopole Antenna with gain 1.96 dBi
Type of Modulation	802.11b : DSSS (DBPSK / DQPSK / CCK) 802.11g/n : OFDM (BPSK / QPSK / 16QAM / 64QAM) 802.11ac: OFDM (BPSK / QPSK / 16QAM / 64QAM / 256QAM)

1.3 Modification of EUT

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

1.4 Testing Location

Test Site	SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory		
Test Site Location	No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.) TEL: +886-3-327-3456 FAX: +886-3-328-4978		
Test Site No.	**Sporton Site No.**		
	TH05-HY	CO05-HY	03CH07-HY

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

FCC designation No.: TW1190

1.5 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. The TAF code is not including all the FCC KDB listed without accreditation.
3. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.

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). For radiated measurement, pre-scanned in three orthogonal panels, X, Y, Z. The worst cases (Y plane) were recorded in this report.

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 (Covered by VHT20)	**MCS0**
802.11n HT40 (Covered by VHT40)	**MCS0**
802.11ac VHT20	**MCS0**
802.11ac VHT40	**MCS0**

Test Cases	
AC Conducted Emission	Mode 1 : WLAN (2.4GHz) Link + Bluetooth Link + NFC On + USB Cable (CBL-TC2X-USBC-01) (Charging from AC Adapter (PWR-WUA5V12W0US)) + Battery (BT-000418-10)

Ch. #	2400-2483.5 MHz			
	802.11b	802.11g	802.11ac VHT20	802.11ac VHT40
Low	01	01	01	03
Middle	06	06	06	06
High	11	11	11	09

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

802.11b RF Peak Output Power (dBm)						
Power vs. Channel			Power vs Data Rate			
Channel	Frequency (MHz)	Data Rate (bps) 1M	Channel	Data Rate (bps) 2M	5.5M	11M
CH 01	2412	**22.34**	CH 11	22.31	22.30	22.28
CH 06	2437	21.93				
CH 11	2462	22.15				

802.11g RF Peak Output Power (dBm)									
Power vs. Channel			Power vs Data Rate						
Channel	Frequency (MHz)	Data Rate (bps) 6M	Channel	Data Rate (bps) 9Mbps	12Mbps	18Mbps	24Mbps	36Mbps	48Mbps	54Mbps
CH 01	2412	22.64	CH 06	23.38	23.25	23.45	23.42	23.33	23.45	23.46
CH 06	2437	**23.52**								
CH 11	2462	22.43								

802.11n HT20 RF Peak Output Power (dBm)										
Power vs. Channel			Power vs Data Rate							
Channel	Frequency (MHz)	MCS Index MCS 0	Channel	MCS Index MCS 1	MCS 2	MCS 3	MCS 4	MCS 5	MCS 6	MCS 7
CH 01	2412	21.72	CH 06	22.74	22.74	22.76	22.72	22.72	22.71	22.67
CH 06	2437	**22.80**								
CH 11	2462	20.76								

802.11n HT40 RF Peak Output Power (dBm)										
Power vs. Channel			Power vs Data Rate							
Channel	Frequency (MHz)	MCS Index MCS 0	Channel	MCS Index MCS 1	MCS 2	MCS 3	MCS 4	MCS 5	MCS 6	MCS 7
CH 03	2422	19.81	CH 06	21.88	22.46	22.39	22.68	22.60	22.66	22.69
CH 06	2437	**22.85**								
CH 09	2452	20.22								

802.11ac VHT20 RF Peak Output Power (dBm)										
Power vs. Channel			Power vs Data Rate							
Channel	Frequency (MHz)	MCS Index MCS 0	Channel	MCS Index MCS 1	MCS 2	MCS 3	MCS 4	MCS 5	MCS 6	MCS 7	MCS 8
CH 01	2412	**21.74**	CH 06	22.76	22.77	22.77	22.75	22.75	22.73	22.72	22.70
CH 06	2437	**22.83**									
CH 11	2462	**20.77**									

802.11ac VHT40 RF Peak Output Power (dBm)											
Power vs. Channel			Power vs Data Rate								
Channel	Frequency (MHz)	MCS Index MCS 0	Channel	MCS Index MCS 1	MCS 2	MCS 3	MCS 4	MCS 5	MCS 6	MCS 7	MCS 8	MCS 9
CH 03	2422	**19.83**	CH 06	22.32	22.80	22.65	22.72	22.68	22.72	22.75	22.77	22.78
CH 06	2437	**22.86**										
CH 09	2452	**20.24**										

802.11b RF Avg Output Power (dBm)						
Power vs. Channel			Power vs Data Rate			
Channel	Frequency (MHz)	Data Rate (bps)	Channel	Data Rate (bps)		
		1M		2M	5.5M	11M
CH 01	2412	**20.70**	CH 06	20.40	20.20	20.20
CH 06	2437	20.30				
CH 11	2462	20.30				

802.11g RF Avg Output Power (dBm)									
Power vs. Channel			Power vs Data Rate						
Channel	Frequency (MHz)	Data Rate (bps)	Channel	Data Rate (bps)					
		6M		9Mbps	12Mbps	18Mbps	24Mbps	36Mbps	48Mbps	54Mbps
CH 01	2412	18.60	CH 06	19.70	19.70	18.70	18.60	15.30	16.20	15.70
CH 06	2437	**20.10**								
CH 11	2462	18.00								

802.11n HT20 RF Avg Output Power (dBm)									
Power vs. Channel			Power vs Data Rate						
Channel	Frequency (MHz)	MCS Index	Channel	MCS Index					
		MCS 0		MCS 1	MCS 2	MCS 3	MCS 4	MCS 5	MCS 6	MCS 7
CH 01	2412	17.60	CH 06	20.00	18.30	18.00	14.70	14.70	13.70	15.20
CH 06	2437	**20.20**								
CH 11	2462	17.00								

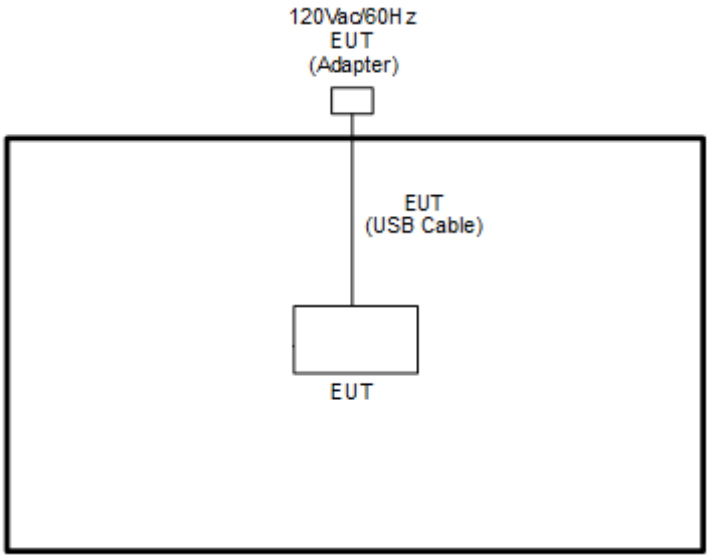
802.11n HT40 RF Avg Output Power (dBm)									
Power vs. Channel			Power vs Data Rate						
Channel	Frequency (MHz)	MCS Index	Channel	MCS Index					
		MCS 0		MCS 1	MCS 2	MCS 3	MCS 4	MCS 5	MCS 6	MCS 7
CH 03	2422	14.10	CH 06	16.70	16.80	17.00	14.30	14.10	14.70	14.80
CH 06	2437	**17.20**								
CH 09	2452	14.10								

802.11ac VHT20 RF Avg Output Power (dBm)										
Power vs. Channel			Power vs Data Rate							
Channel	Frequency (MHz)	MCS Index MCS 0	Channel	MCS Index MCS 1	MCS 2	MCS 3	MCS 4	MCS 5	MCS 6	MCS 7	MCS 8
CH 01	2412	17.70	CH 06	18.80	17.60	17.60	14.70	14.70	13.70	14.60	14.20
CH 06	2437	**20.30**									
CH 11	2462	17.10									

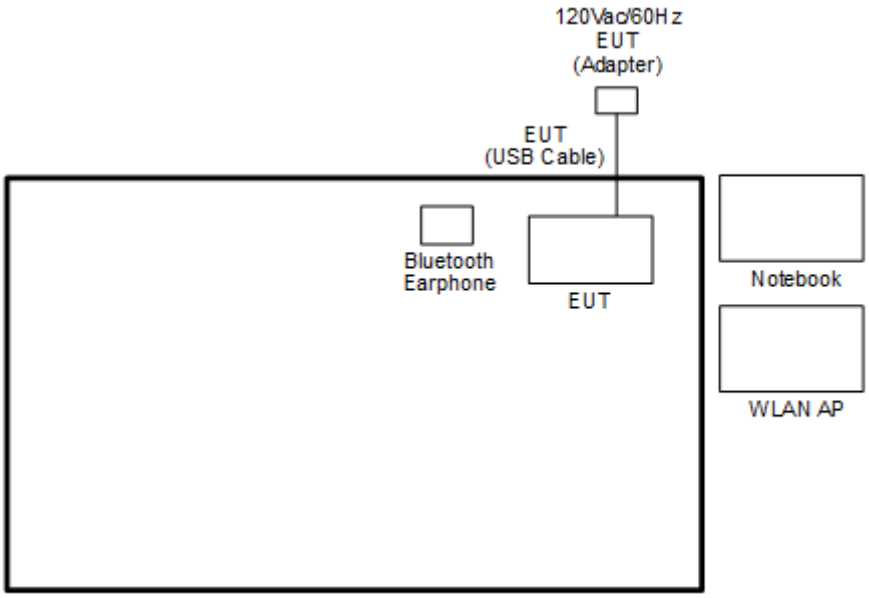
802.11ac VHT40 RF Avg Output Power (dBm)										
Power vs. Channel			Power vs Data Rate							
Channel	Frequency (MHz)	MCS Index MCS 0	Channel	MCS Index MCS 1	MCS 2	MCS 3	MCS 4	MCS 5	MCS 6	MCS 7	MCS 8	MCS 9
CH 03	2422	14.20	CH 06	17.10	17.20	17.20	14.30	14.80	14.80	15.10	14.80	14.10
CH 06	2437	**17.30**										
CH 09	2452	14.20										

2.3 Connection Diagram of Test System

<WLAN Tx Mode>



<AC Conducted Emission Mode>



2.4 Support Unit used in test configuration and system

Item	Equipment	Brand Name	Model Name	FCC ID	Data Cable	Power Cord
1.	Bluetooth Earphone	Sony Ericsson	MW600	PY7DDA-2029	N/A	N/A
2.	WLAN AP	ASUS	RT-AC66U	MSQ-RTAC66U	N/A	Unshielded, 1.8 m
3.	Notebook	DELL	Latitude 3400	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
4.	SD Card	SanDisk	MicroSD HC	FCC DoC	N/A	N/A

2.5 EUT Operation Test Setup

The RF test items, utility “QRCT V_4.0.00156.0” was installed in Notebook 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.

Offset(dB) = RF cable loss(dB) + attenuator factor(dB).
= 4.2 + 10 = 14.2 (dB)

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.

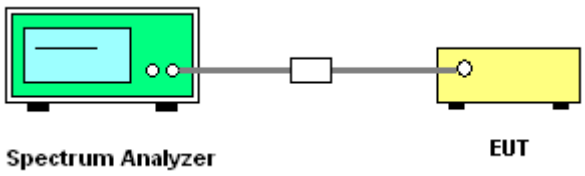
3.1.2 Measuring Instruments

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) ≥ 3 * RBW.
6. Measure and record the results in the test report.

3.1.4 Test Setup



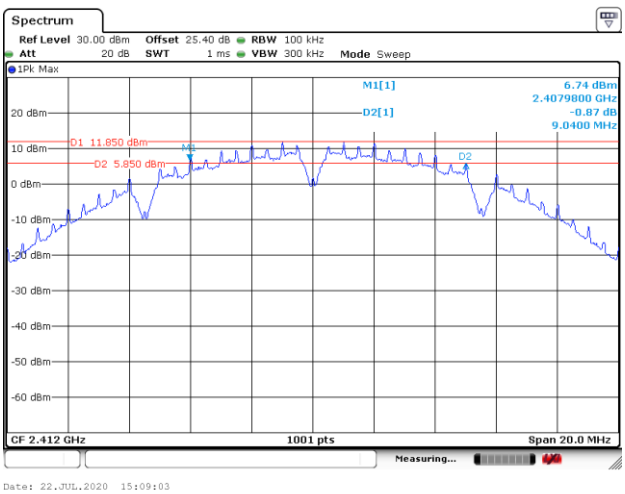
3.1.5 Test Result of 6dB and 99% Occupied Bandwidth

Test Engineer :	Owen Yang, Hank Hsu and Ryan Lin	Temperature :	21.2~24.1℃
		Relative Humidity :	47.2~57.8%

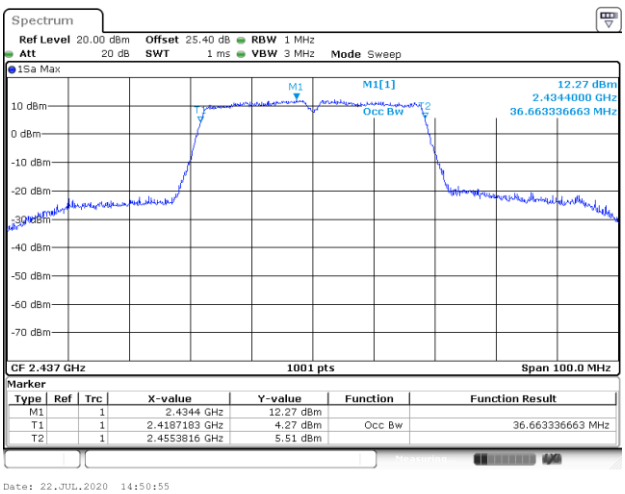
2.4GHz Band Single Antenna

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	14.19	-	**9.04**	-	0.50	Pass
11b	1Mbps	1	6	2437	14.04	-	9.06	-	0.50	Pass
11b	1Mbps	1	11	2462	14.09	-	9.52	-	0.50	Pass
11g	6Mbps	1	1	2412	17.58	-	16.06	-	0.50	Pass
11g	6Mbps	1	6	2437	17.68	-	15.68	-	0.50	Pass
11g	6Mbps	1	11	2462	16.78	-	15.50	-	0.50	Pass
VHT20	MCS0	1	1	2412	18.08	-	16.68	-	0.50	Pass
VHT20	MCS0	1	6	2437	18.43	-	17.52	-	0.50	Pass
VHT20	MCS0	1	11	2462	17.83	-	16.08	-	0.50	Pass
VHT40	MCS0	1	3	2422	36.46	-	35.12	-	0.50	Pass
VHT40	MCS0	1	6	2437	**36.66**	-	35.96	-	0.50	Pass
VHT40	MCS0	1	9	2452	36.46	-	35.36	-	0.50	Pass

Minimum 6dB Bandwidth



Maximum 99% Occupied Bandwidth



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.

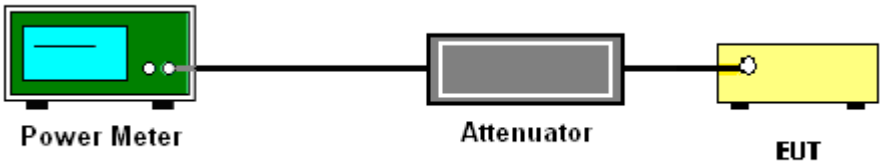
3.2.2 Measuring Instruments

See list of measuring equipment of this test report.

3.2.3 Test Procedures

1. For Peak Power, the testing follows ANSI C63.10 Section 11.9.1.3 PKPM1
2. For Average Power, the testing follows ANSI C63.10 Section 11.9.2.3.2 Method AVGPM-G
3. 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.
4. Set to the maximum power setting and enable the EUT transmit continuously.
5. Measure the conducted output power and record the results in the test report.

3.2.4 Test Setup



3.2.5 Test Result of Peak Output Power

Test Engineer :	Owen Yang, Hank Hsu and Ryan Lin	Temperature :	21.2~24.1℃
		Relative Humidity :	47.2~57.8%

2.4GHz Band Single Antenna																
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Peak 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	22.34	-	-	30.00	-	1.96	-	24.30	-	36.00	-	Pass
11b	1Mbps	1	6	2437	21.93	-		30.00	-	1.96	-	23.89	-	36.00	-	Pass
11b	1Mbps	1	11	2462	22.15	-		30.00	-	1.96	-	24.11	-	36.00	-	Pass
11g	6Mbps	1	1	2412	22.64	-		30.00	-	1.96	-	24.60	-	36.00	-	Pass
11g	6Mbps	1	6	2437	**23.52**	-		30.00	-	1.96	-	25.48	-	36.00	-	Pass
11g	6Mbps	1	11	2462	22.43	-		30.00	-	1.96	-	24.39	-	36.00	-	Pass
HT20	MCS0	1	1	2412	21.72	-		30.00	-	1.96	-	23.68	-	36.00	-	Pass
HT20	MCS0	1	6	2437	22.80	-		30.00	-	1.96	-	24.76	-	36.00	-	Pass
HT20	MCS0	1	11	2462	20.76	-		30.00	-	1.96	-	22.72	-	36.00	-	Pass
HT40	MCS0	1	3	2422	19.81	-		30.00	-	1.96	-	21.77	-	36.00	-	Pass
HT40	MCS0	1	6	2437	22.85	-		30.00	-	1.96	-	24.81	-	36.00	-	Pass
HT40	MCS0	1	9	2452	20.22	-		30.00	-	1.96	-	22.18	-	36.00	-	Pass
VHT20	MCS0	1	1	2412	21.74	-		30.00	-	1.96	-	23.70	-	36.00	-	Pass
VHT20	MCS0	1	6	2437	22.83	-		30.00	-	1.96	-	24.79	-	36.00	-	Pass
VHT20	MCS0	1	11	2462	20.77	-		30.00	-	1.96	-	22.73	-	36.00	-	Pass
VHT40	MCS0	1	3	2422	19.83	-		30.00	-	1.96	-	21.79	-	36.00	-	Pass
VHT40	MCS0	1	6	2437	22.86	-		30.00	-	1.96	-	24.82	-	36.00	-	Pass
VHT40	MCS0	1	9	2452	20.24	-		30.00	-	1.96	-	22.20	-	36.00	-	Pass

3.2.6 Test Result of Average Output Power (Reporting Only)

Test Engineer :	Owen Yang, Hank Hsu and Ryan Lin	Temperature :	21.2~24.1℃
		Relative Humidity :	47.2~57.8%

2.4GHz Band Single Antenna											
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Average Conducted Power (dBm)			DG (dBi)		EIRP Power (dBm)	
					Ant1	Ant2	SUM	Ant1	Ant2	Ant1	Ant2
11b	1Mbps	1	1	2412	**20.70**	-	-	1.96	-	22.66	-
11b	1Mbps	1	6	2437	20.30	-		1.96	-	22.26	-
11b	1Mbps	1	11	2462	20.30	-		1.96	-	22.26	-
11g	6Mbps	1	1	2412	18.60	-		1.96	-	20.56	-
11g	6Mbps	1	6	2437	20.10	-		1.96	-	22.06	-
11g	6Mbps	1	11	2462	18.00	-		1.96	-	19.96	-
HT20	MCS0	1	1	2412	17.60	-		1.96	-	19.56	-
HT20	MCS0	1	6	2437	20.20	-		1.96	-	22.16	-
HT20	MCS0	1	11	2462	17.00	-		1.96	-	18.96	-
HT40	MCS0	1	3	2422	14.10	-		1.96	-	16.06	-
HT40	MCS0	1	6	2437	17.20	-		1.96	-	19.16	-
HT40	MCS0	1	9	2452	14.10	-		1.96	-	16.06	-
VHT20	MCS0	1	1	2412	17.70	-		1.96	-	19.66	-
VHT20	MCS0	1	6	2437	20.30	-		1.96	-	22.26	-
VHT20	MCS0	1	11	2462	17.10	-		1.96	-	19.06	-
VHT40	MCS0	1	3	2422	14.20	-		1.96	-	16.16	-
VHT40	MCS0	1	6	2437	17.30	-		1.96	-	19.26	-
VHT40	MCS0	1	9	2452	14.20	-		1.96	-	16.16	-

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.

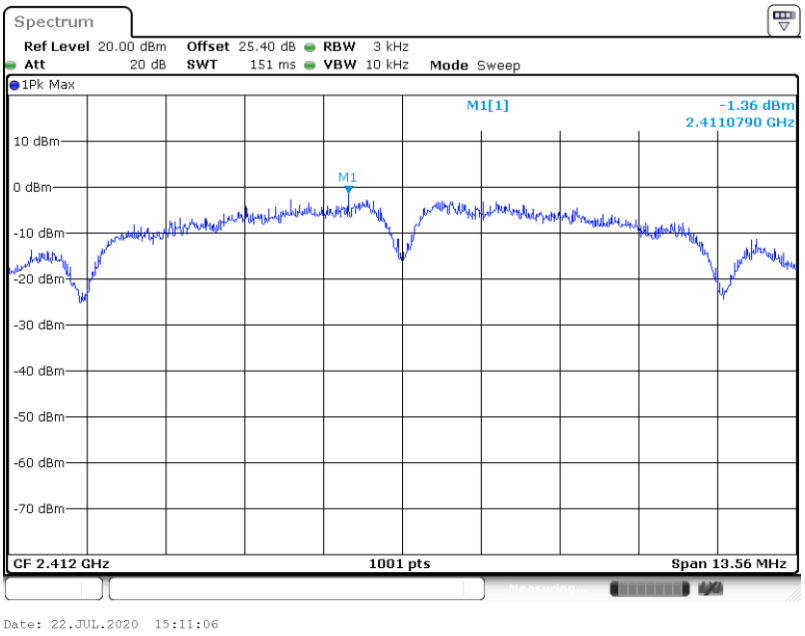
3.3.4 Test Setup

3.3.5 Test Result of Power Spectral Density

Test Engineer :	Owen Yang, Hank Hsu and Ryan Lin	Temperature :	21.2~24.1℃
		Relative Humidity :	47.2~57.8%

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	Ant1	Ant2	Ant1	Ant2	
11b	1Mbps	1	1	2412	-1.36	-	1.96	-	8.00	-	Pass
11b	1Mbps	1	6	2437	-1.41	-	1.96	-	8.00	-	Pass
11b	1Mbps	1	11	2462	-2.10	-	1.96	-	8.00	-	Pass
11g	6Mbps	1	1	2412	-6.29	-	1.96	-	8.00	-	Pass
11g	6Mbps	1	6	2437	-6.70	-	1.96	-	8.00	-	Pass
11g	6Mbps	1	11	2462	-7.67	-	1.96	-	8.00	-	Pass
VHT20	MCS0	1	1	2412	-7.56	-	1.96	-	8.00	-	Pass
VHT20	MCS0	1	6	2437	-5.34	-	1.96	-	8.00	-	Pass
VHT20	MCS0	1	11	2462	-7.29	-	1.96	-	8.00	-	Pass
VHT40	MCS0	1	3	2422	-10.84	-	1.96	-	8.00	-	Pass
VHT40	MCS0	1	6	2437	-7.84	-	1.96	-	8.00	-	Pass
VHT40	MCS0	1	9	2452	-10.04	-	1.96	-	8.00	-	Pass

Worst Case Power Density (dBm/3kHz)



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.

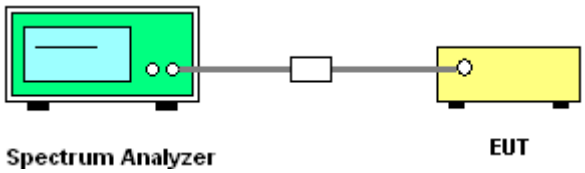
3.4.2 Measuring Instruments

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

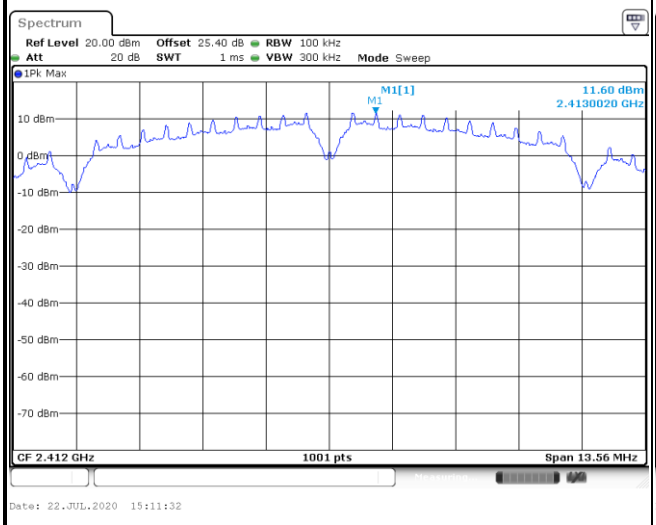
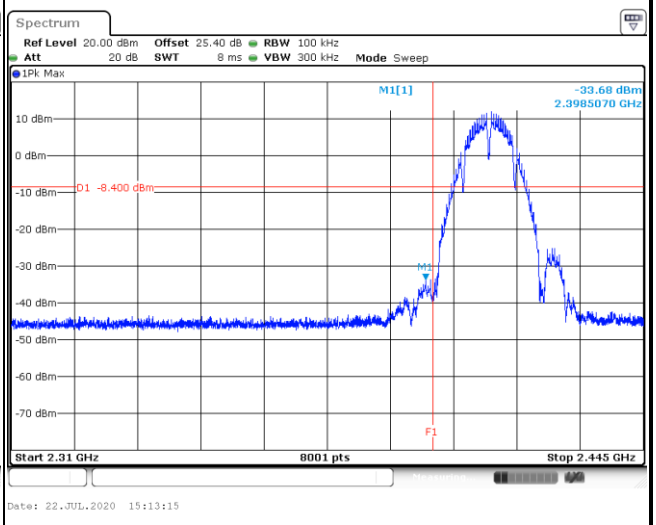
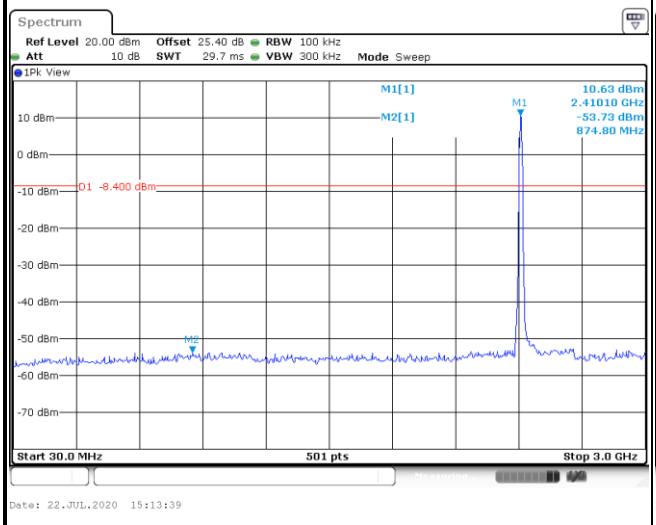
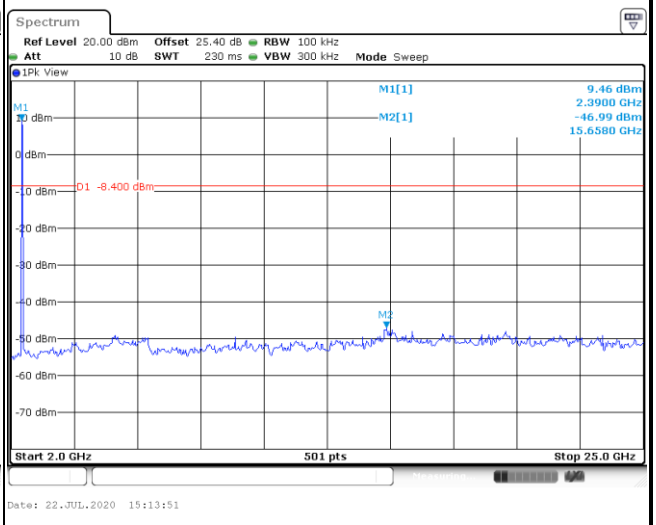


3.4.5 Test Result of Conducted Band Edges and Spurious Emission

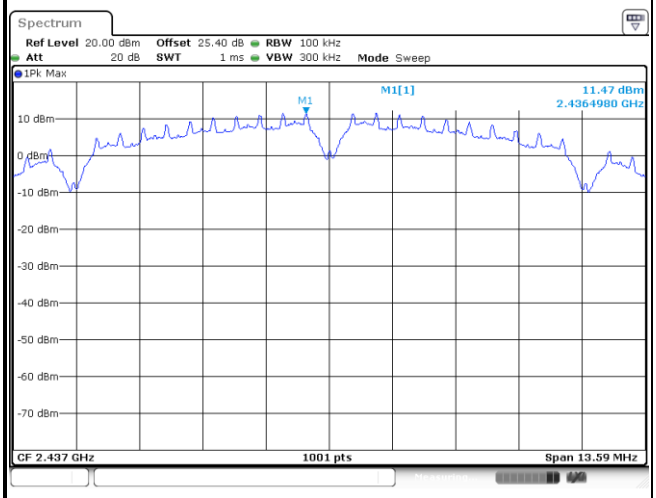
Test Engineer :	Owen Yang, Hank Hsu and Ryan Lin	Temperature :	21.2~24.1℃
		Relative Humidity :	47.2~57.8%

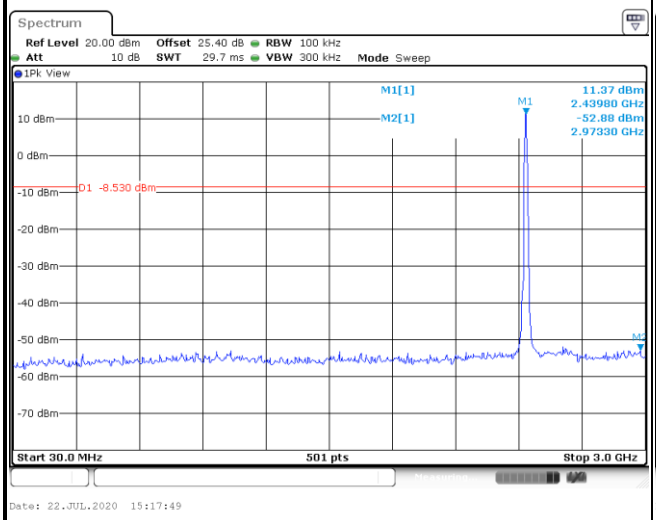
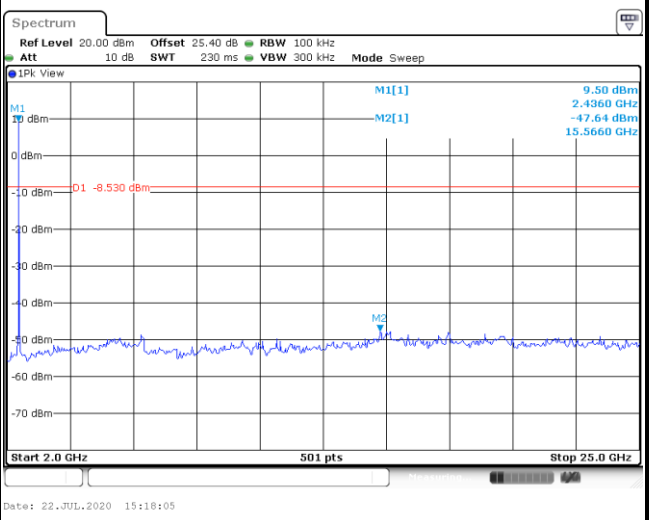
Number of TX = 1, Ant. 1 (Measured)

Test Mode :	802.11b	Test Channel :	01

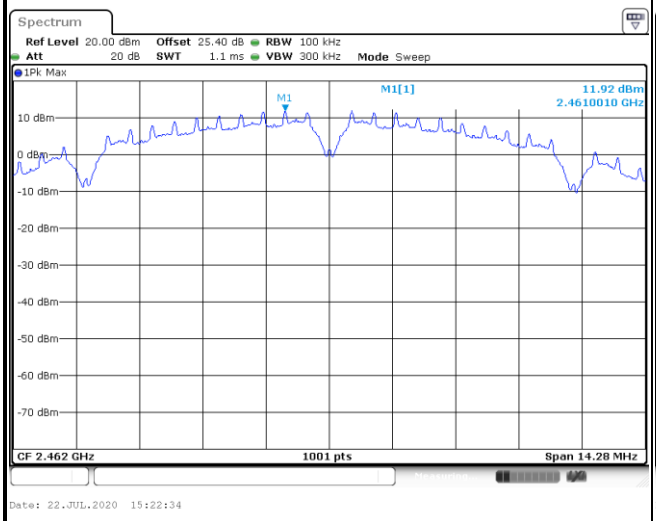
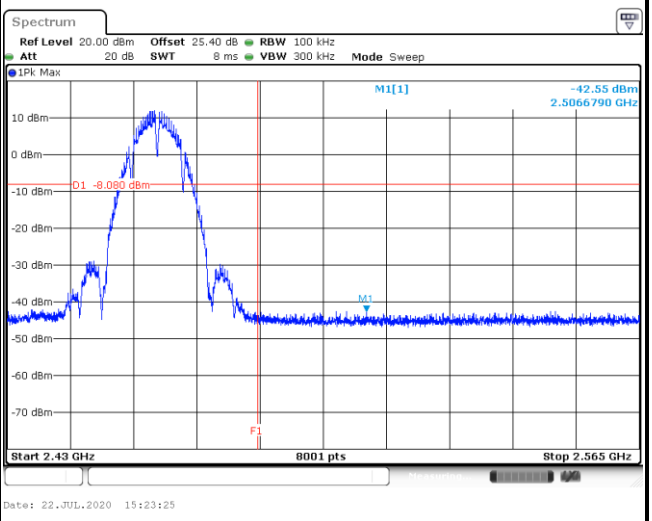
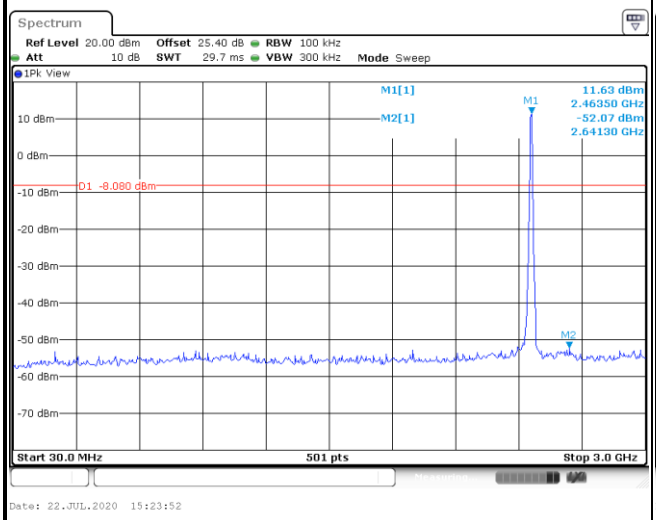
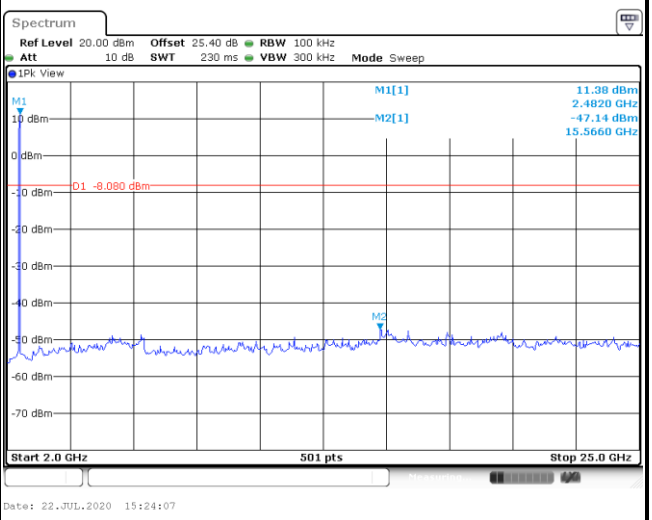
100kHz PSD reference Level	Low Channel Plot
	
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	

Test Mode :	802.11b	Test Channel :	06

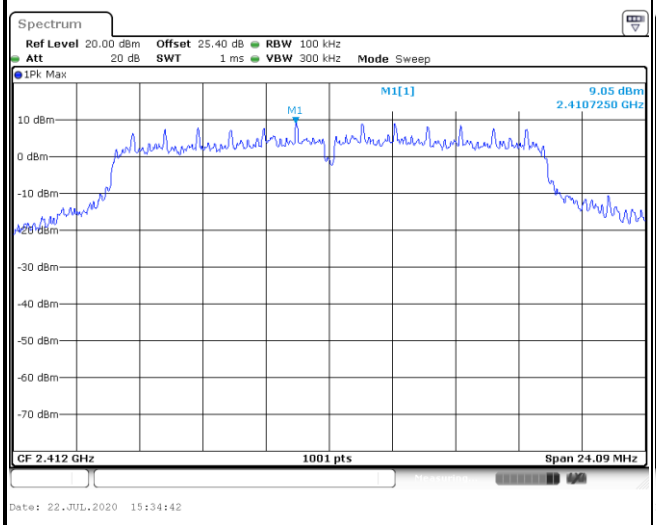
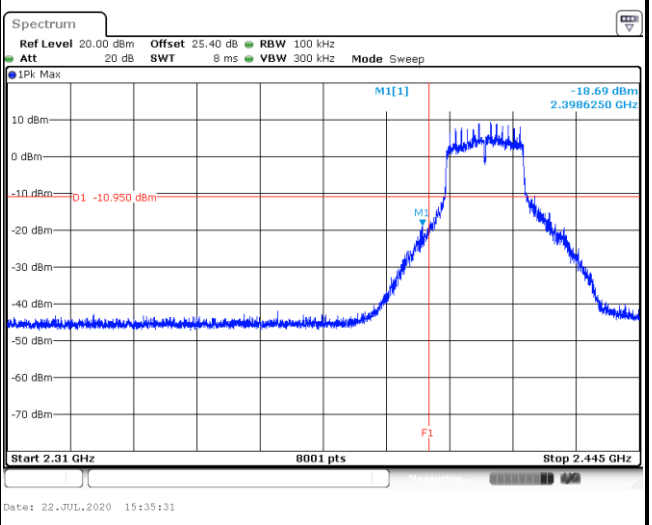
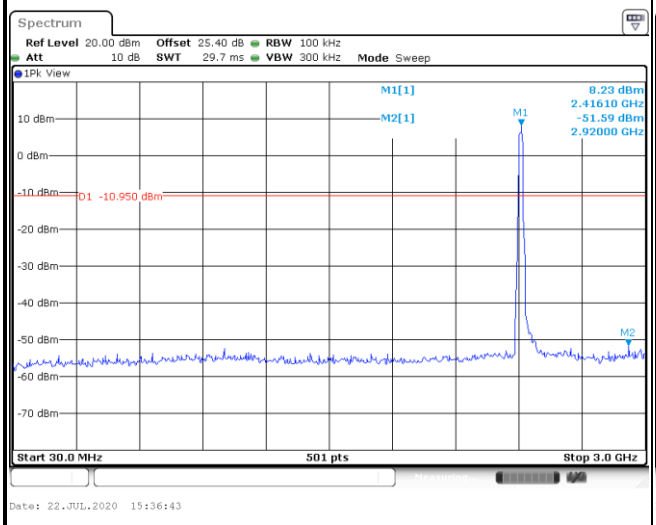
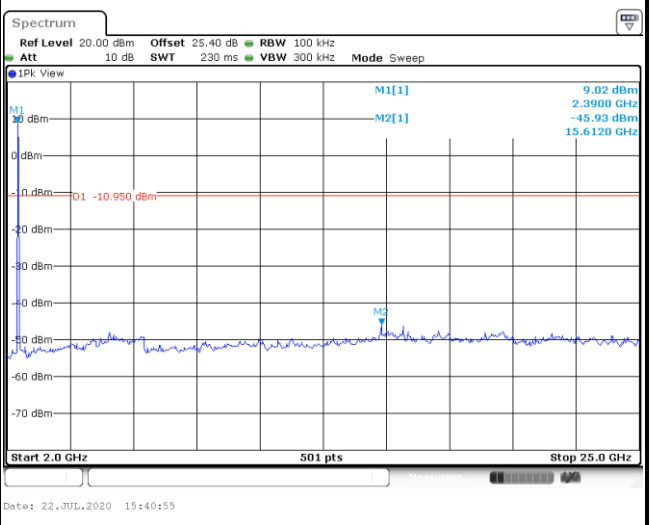
100kHz PSD reference Level	Mid Channel Plot
	

Spurious Emission 30MHz~3GHz	Spurious Emission 2GHz~25GHz
	

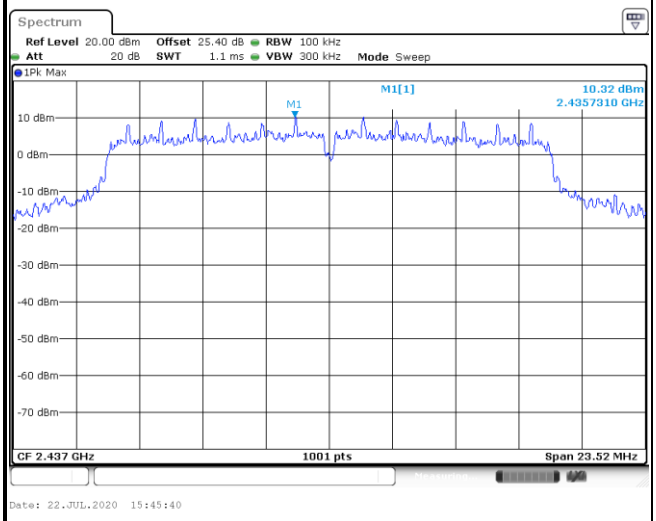
Test Mode :	802.11b	Test Channel :	11

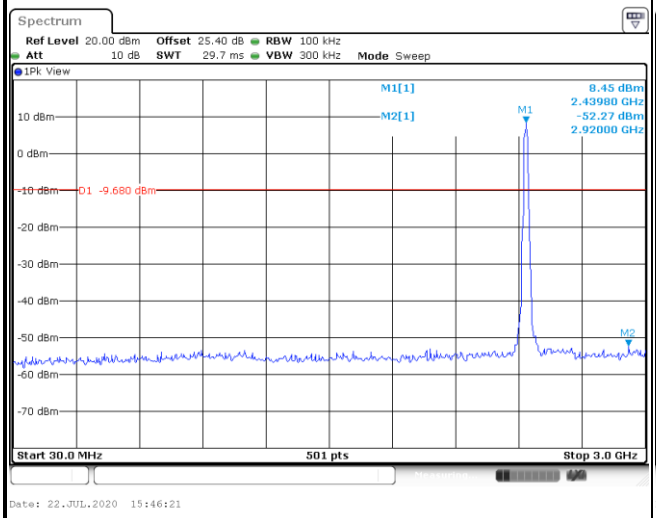
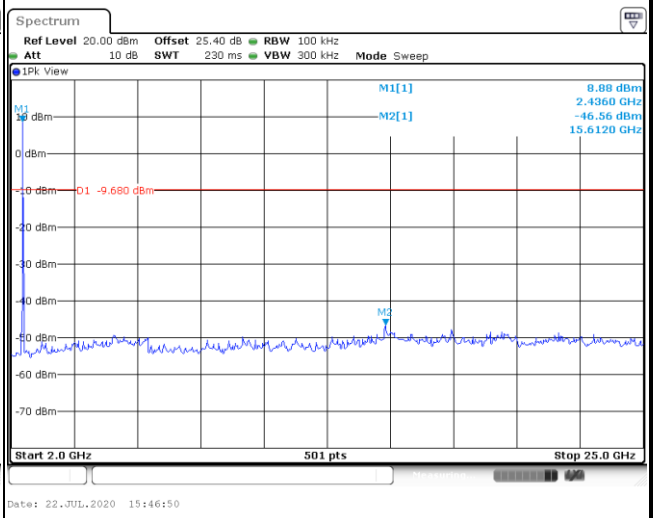
100kHz PSD reference Level	High Channel Plot
	
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	

Test Mode :	802.11g	Test Channel :	01

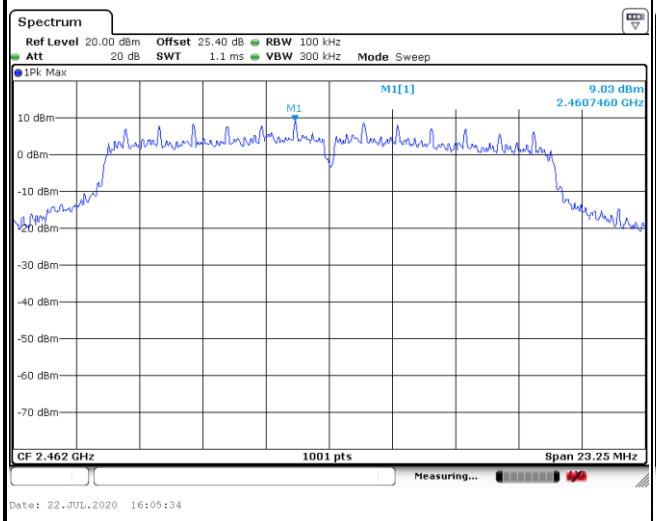
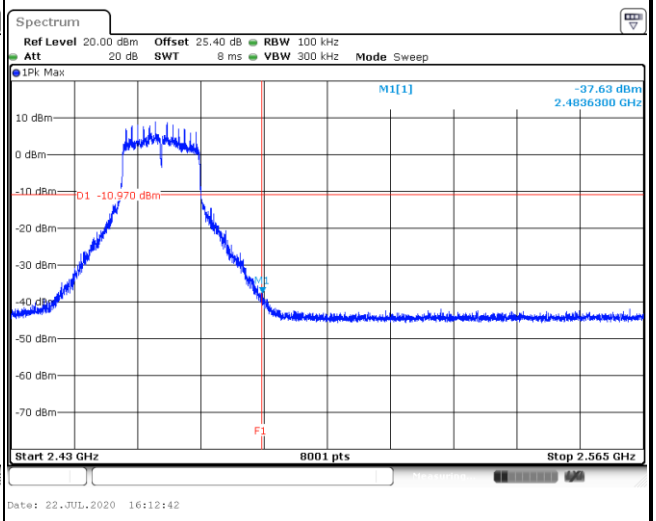
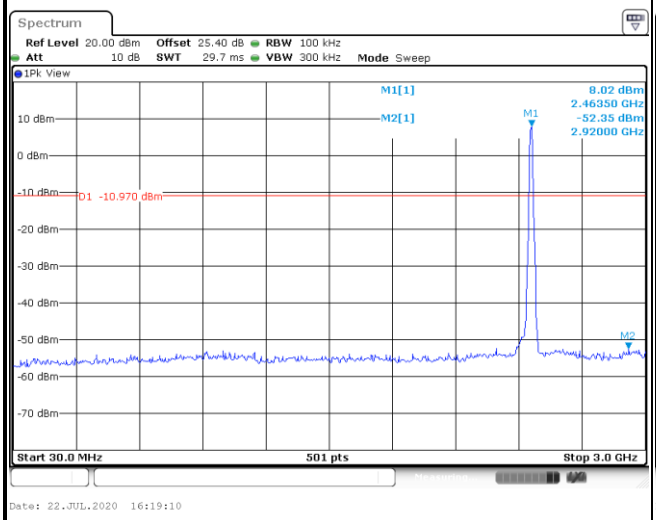
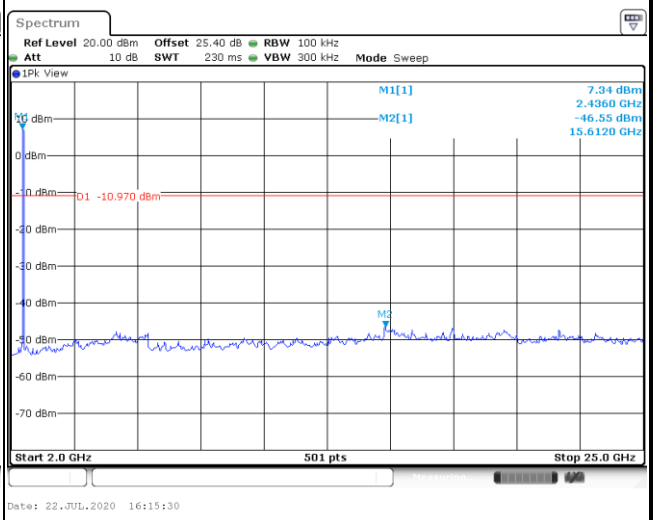
100kHz PSD reference Level	Low Channel Plot
	
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	

Test Mode :	802.11g	Test Channel :	06

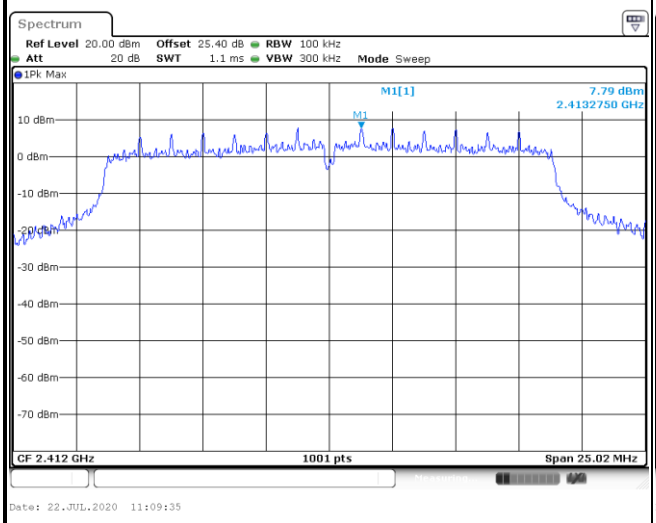
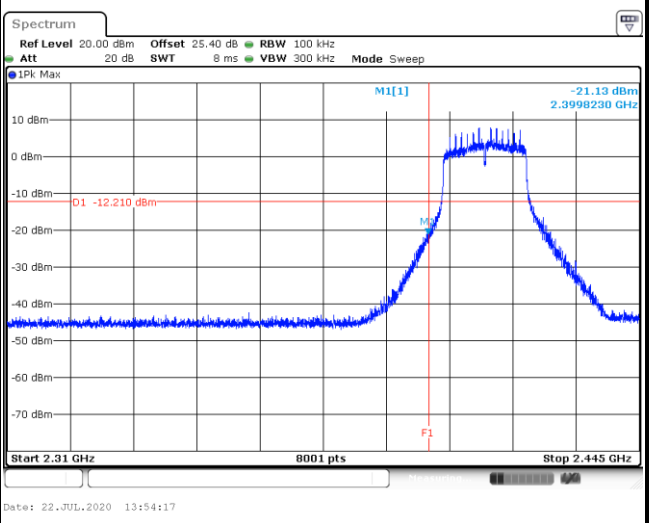
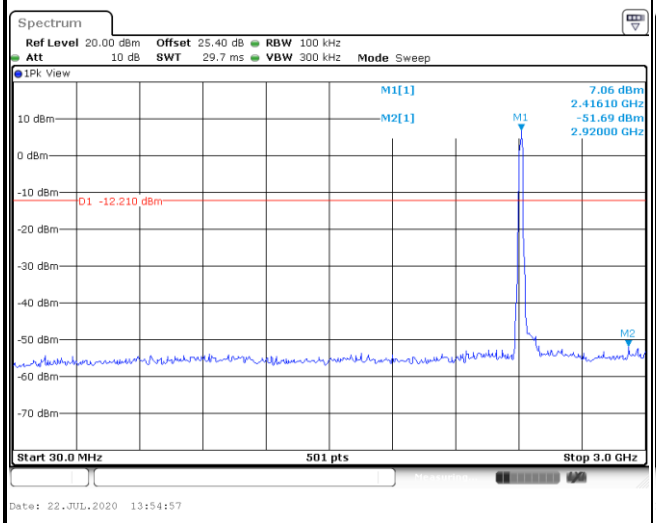
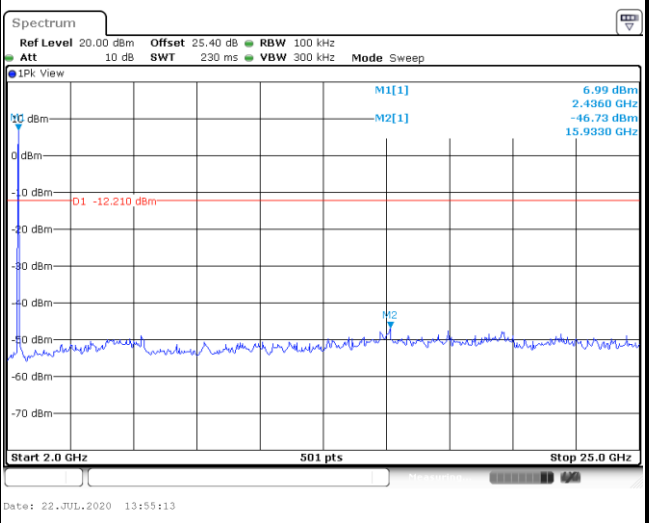
100kHz PSD reference Level	Mid Channel Plot
	

Spurious Emission 30MHz~3GHz	Spurious Emission 2GHz~25GHz
	

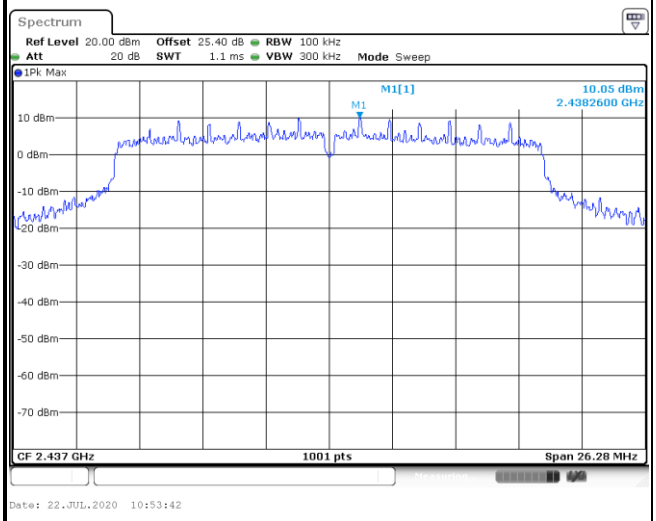
Test Mode :	802.11g	Test Channel :	11

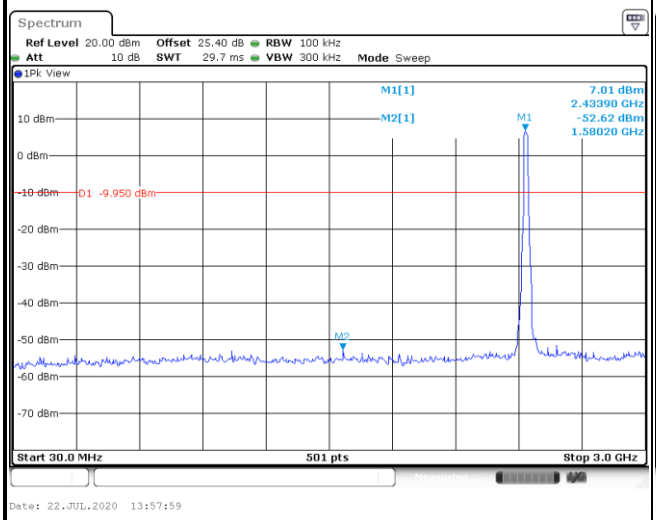
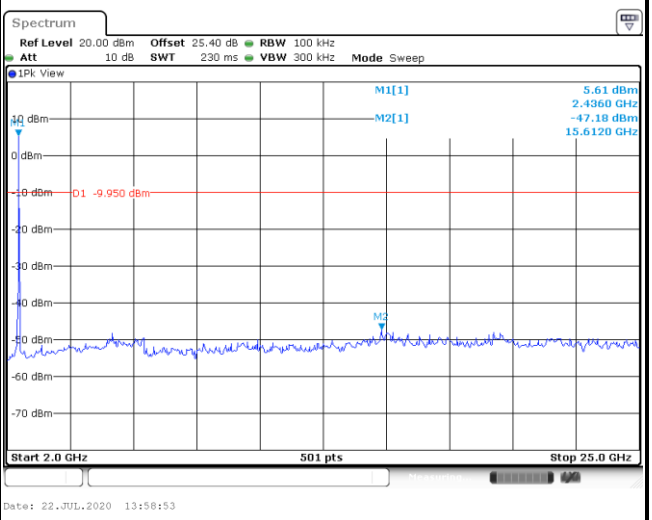
100kHz PSD reference Level	High Channel Plot
	
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	

Test Mode :	802.11ac VHT20	Test Channel :	01

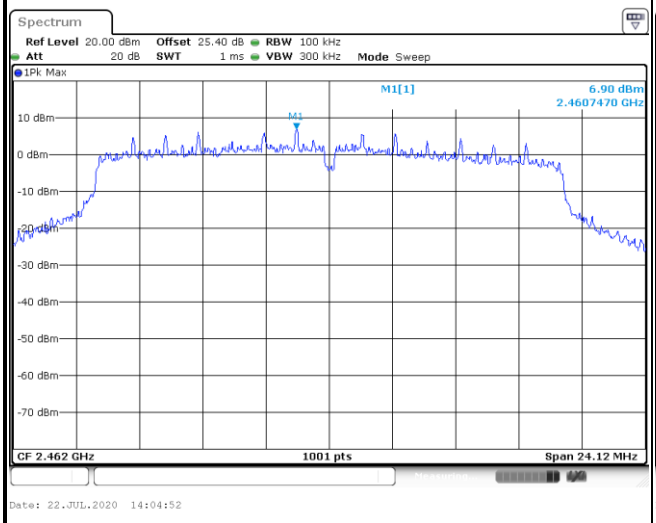
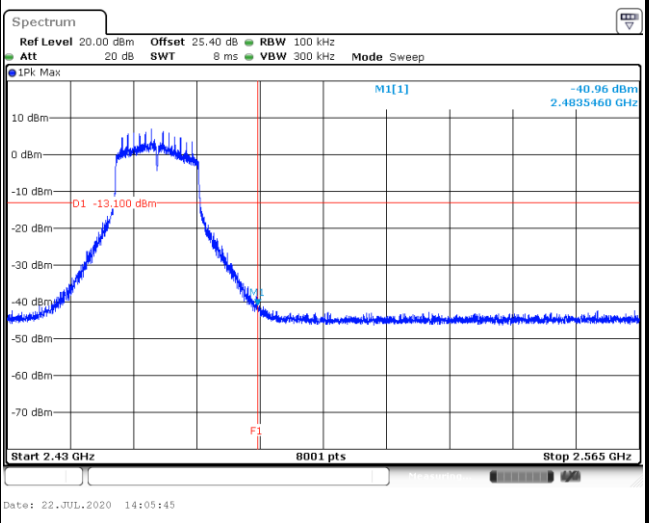
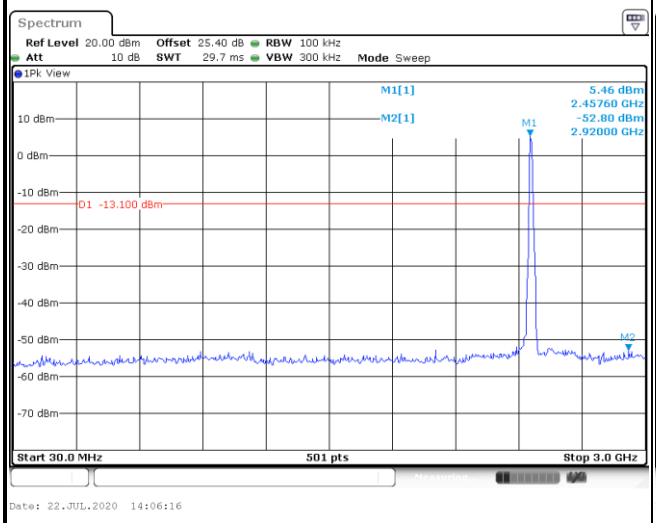
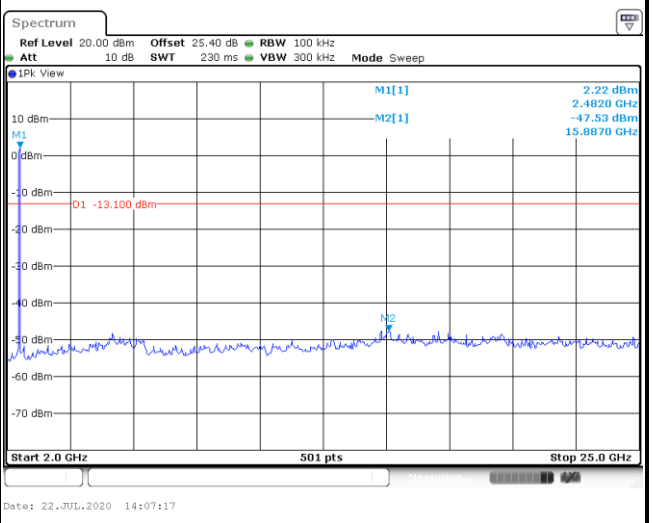
100kHz PSD reference Level	Low Channel Plot
	
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	

Test Mode :	802.11ac VHT20	Test Channel :	06

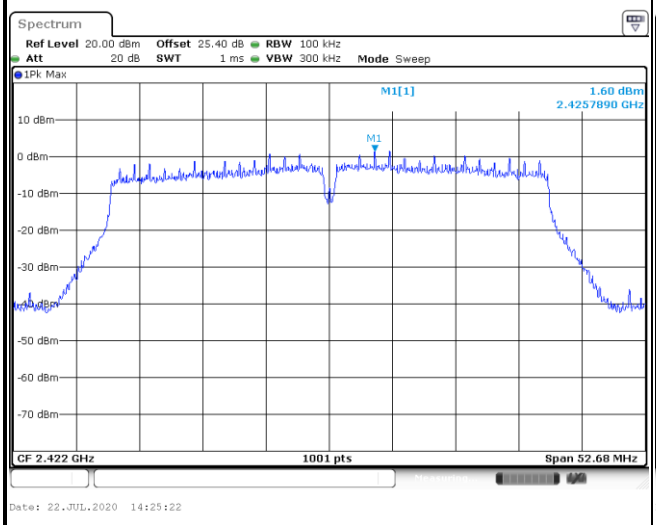
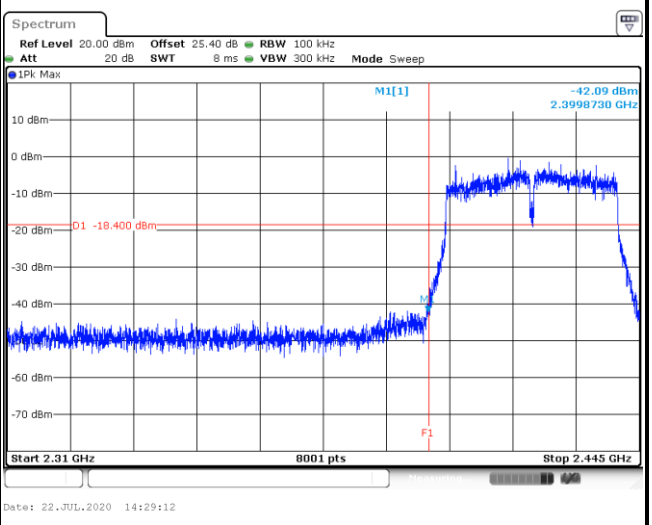
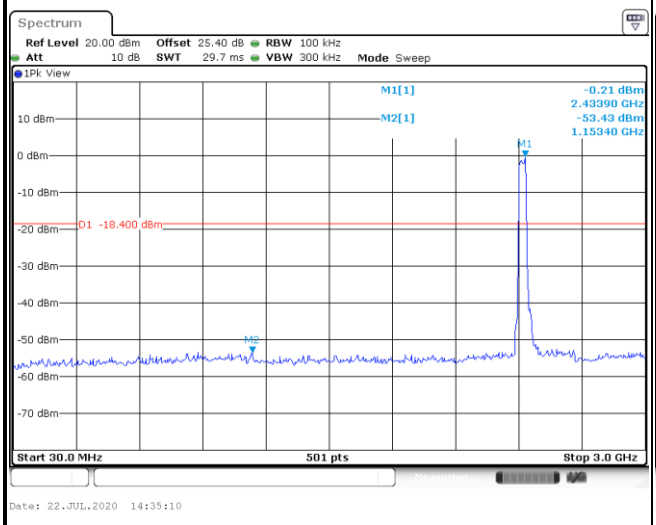
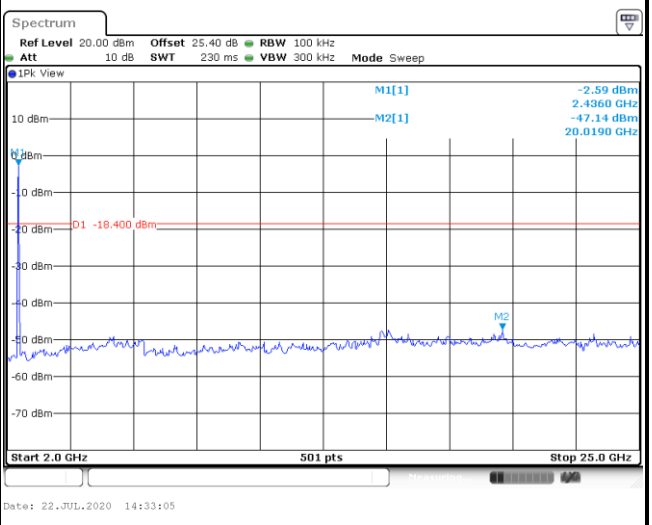
100kHz PSD reference Level	Mid Channel Plot
	

Spurious Emission 30MHz~3GHz	Spurious Emission 2GHz~25GHz
	

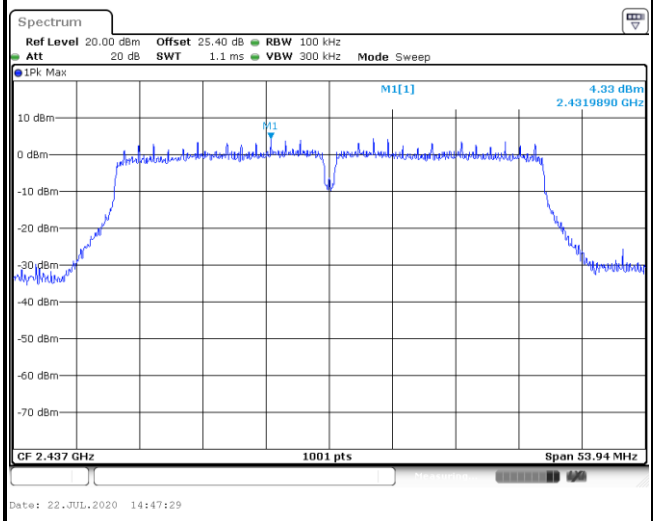
Test Mode :	802.11ac VHT20	Test Channel :	11

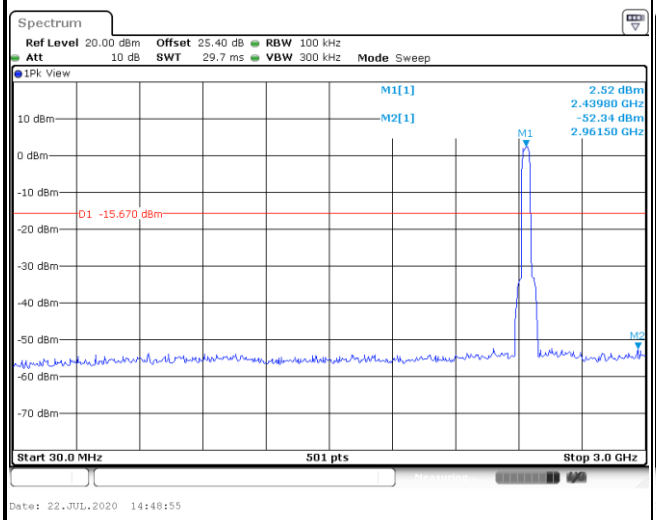
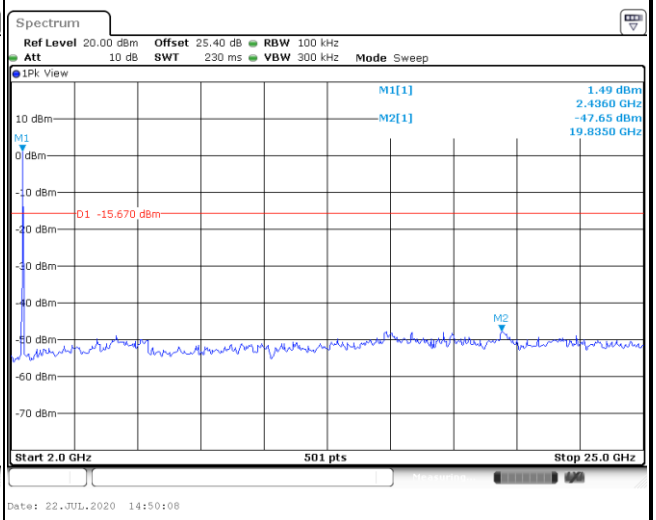
100kHz PSD reference Level	High Channel Plot
	
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	

Test Mode :	802.11ac VHT40	Test Channel :	03

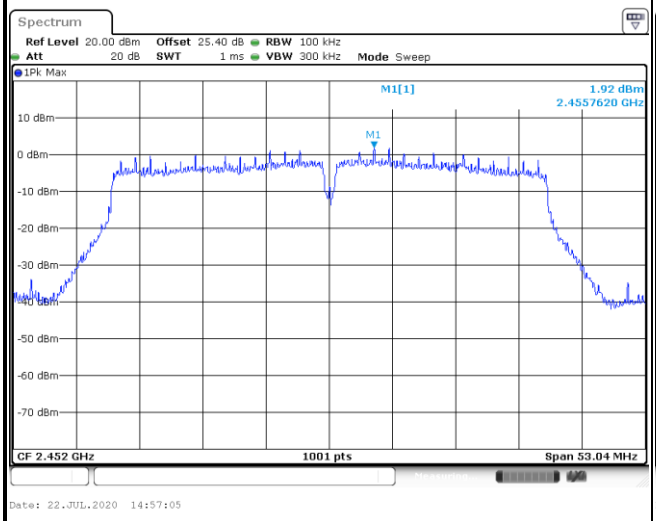
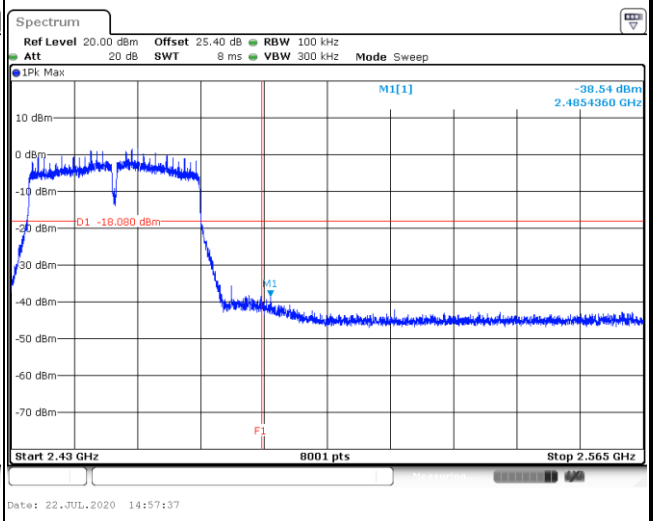
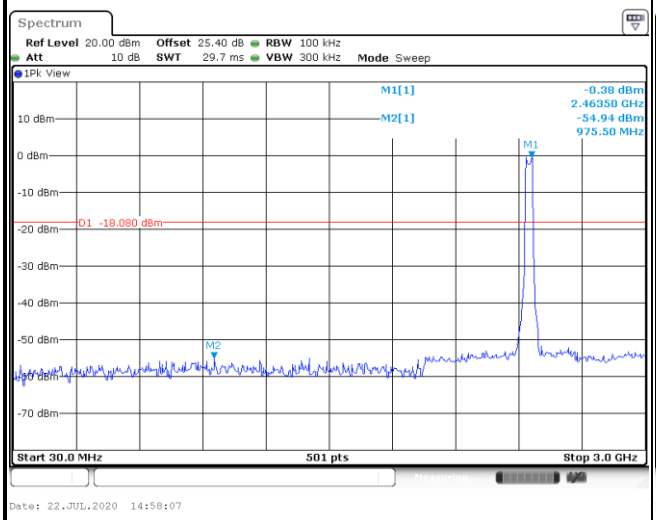
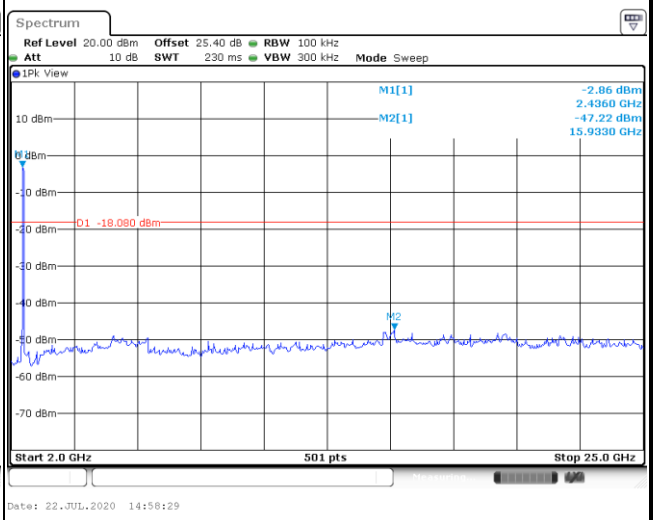
100kHz PSD reference Level	Low Channel Plot
	
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	

Test Mode :	802.11ac VHT40	Test Channel :	06

100kHz PSD reference Level	Mid Channel Plot
	

Spurious Emission 30MHz~3GHz	Spurious Emission 2GHz~25GHz
	

Test Mode :	802.11ac VHT40	Test Channel :	09

100kHz PSD reference Level	High Channel Plot
	
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	

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

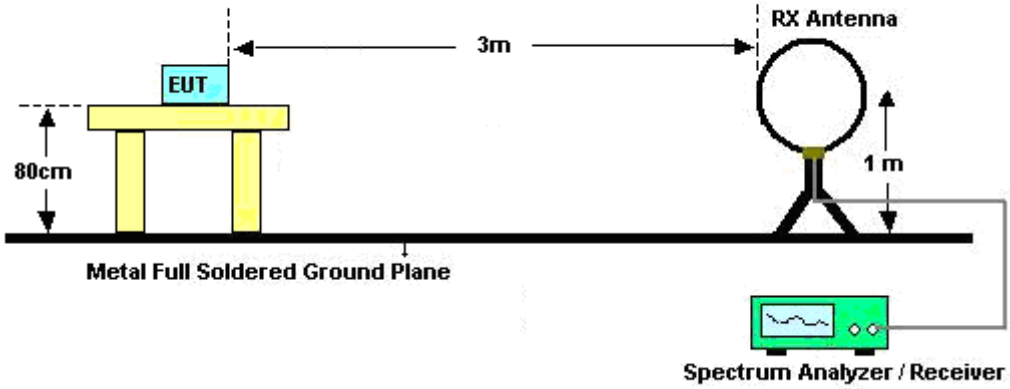
See list of measuring equipment of this test report.

3.5.3 Test Procedures

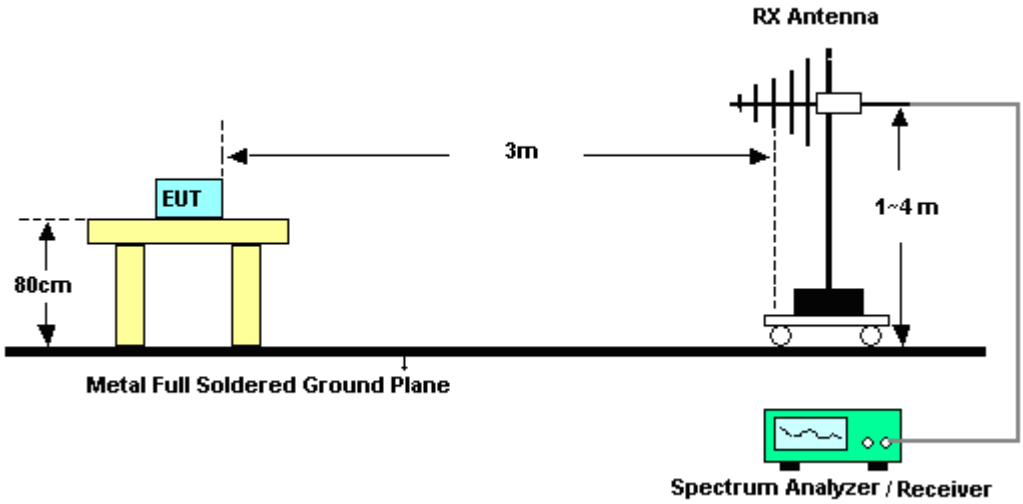
1. The testing follows the ANSI C63.10 Section 11.12.1 Radiated emission measurements.
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the 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 ≥ RBW; Sweep = auto; Detector function = peak; Trace = max hold;
   (3) Set RBW = 1 MHz, VBW= 3MHz for f ≥ 1 GHz for peak measurement.
   For average measurement:
   - VBW = 10 Hz, when duty cycle is no less than 98 percent.
   - VBW ≥ 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

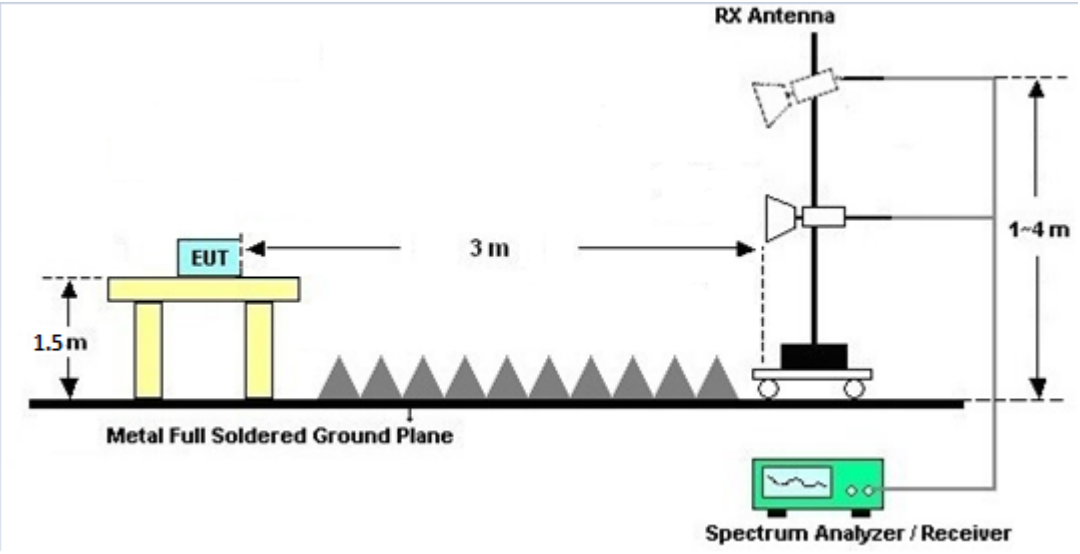
For radiated emissions below 30MHz



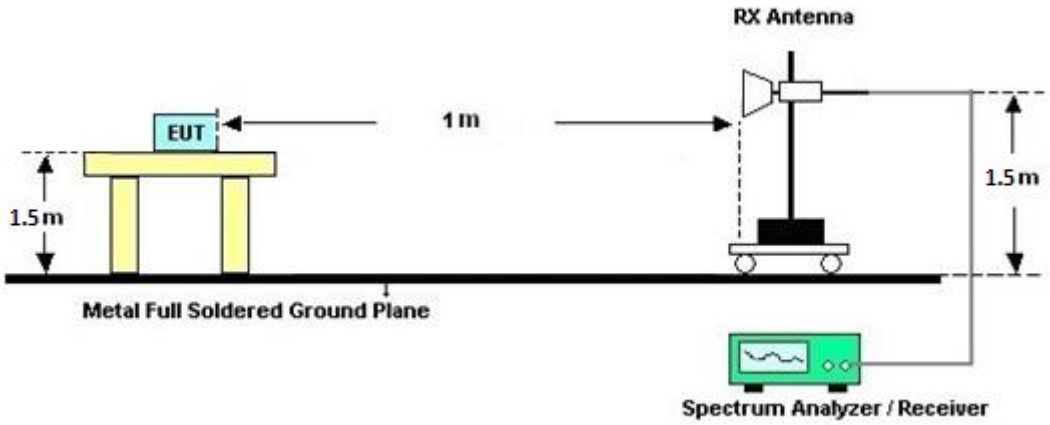
For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



For radiated emissions above 18GHz



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 B and C.

3.5.7 Duty Cycle

Please refer to Appendix D.

3.5.8 Test Result of Radiated Spurious Emission (30MHz ~ 10th Harmonic)

Please refer to Appendix A and B.

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 (dBμV)	
	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.

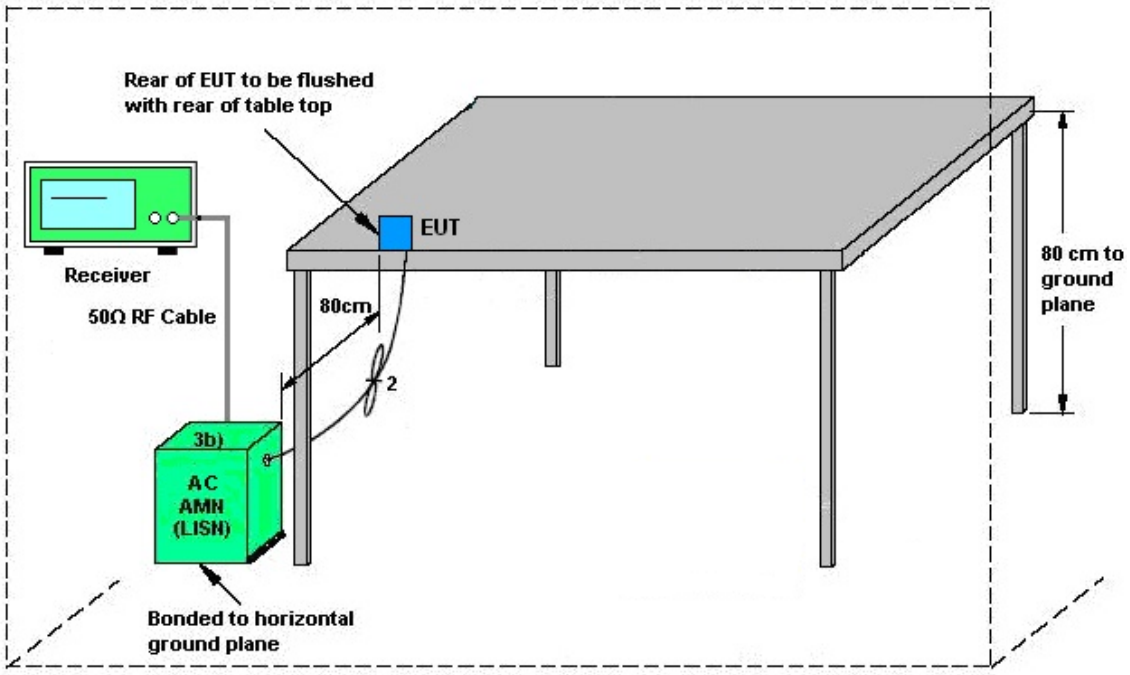
3.6.2 Measuring Instruments

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



AMN = Artificial mains network (LISN)
AE = Associated equipment
EUT = Equipment under test
ISN = Impedance stabilization network

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	Brand Name	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Bilog Antenna	TESEQ	CBL 6111D & 00800N1D01N-06	35419 & 03	30MHz~1GHz	Apr. 30, 2019	Apr. 17, 2020 ~ Apr. 28, 2020	Apr. 29, 2020	Radiation (03CH07-HY)
Bilog Antenna	TESEQ	CBL 6111D & 00800N1D01N-06	35419 & 03	30MHz~1GHz	Apr. 29, 2020	Apr. 29, 2020~ Aug. 15, 2020	Apr. 28, 2021	Radiation (03CH07-HY)
Double Ridge Horn Antenna	ESCO	3117	00075962	1GHz ~ 18GHz	Dec. 06, 2019	Apr. 17, 2020~ Aug. 15, 2020	Dec. 05, 2020	Radiation (03CH07-HY)
EMI Test Receiver	Agilent	N9038A(MXE)	MY53290053	20Hz~26.5GHz	Jan. 18, 2020	Apr. 17, 2020~ Aug. 15, 2020	Jan. 17, 2021	Radiation (03CH07-HY)
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100315	9 kHz~30 MHz	Dec. 26, 2019	Apr. 17, 2020~ Aug. 15, 2020	Dec. 25, 2020	Radiation (03CH07-HY)
Preamplifier	MITEQ	AMF-7D-00101800-30-10P	1590075	1GHz~18GHz	Apr. 24, 2019	Apr. 17, 2020 ~ Apr. 22, 2020	Apr. 23, 2020	Radiation (03CH07-HY)
Preamplifier	MITEQ	AMF-7D-00101800-30-10P	1590075	1GHz~18GHz	Apr. 23, 2020	Apr. 23, 2020 ~ Aug. 15, 2020	Apr. 22, 2021	Radiation (03CH07-HY)
Preamplifier	COM-POWER	PA-103A	161241	10MHz~1GHz	May 20, 2019	Apr. 17, 2020 ~ May 18, 2020	May 19, 2020	Radiation (03CH07-HY)
Preamplifier	COM-POWER	PA-103A	161241	10MHz~1GHz	May 19, 2020	May 19, 2020~ Aug. 15, 2020	May 18, 2021	Radiation (03CH07-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	MY2858/2,801606/2	18GHz~40GHz	Feb. 25, 2020	Apr. 17, 2020~ Aug. 15, 2020	Feb. 24, 2021	Radiation (03CH07-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 126	532078/126E	30MHz~18GHz	N/A	Apr. 17, 2020~ Aug. 15, 2020	N/A	Radiation (03CH07-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY24971/4, MY28655/4	9kHz~30MHz	Feb. 25, 2020	Apr. 17, 2020~ Aug. 15, 2020	Feb. 24, 2021	Radiation (03CH07-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY28655/4, MY24971/4, MY15682/4	30MHz~1GHz	Feb. 25, 2020	Apr. 17, 2020~ Aug. 15, 2020	Feb. 24, 2021	Radiation (03CH07-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY28655/4, MY24971/4, MY15682/4	1GHz~18GHz	Feb. 25, 2020	Apr. 17, 2020~ Aug. 15, 2020	Feb. 24, 2021	Radiation (03CH07-HY)
Controller	ChainTek	Chaintek 3000	N/A	Control Turn table	N/A	Apr. 17, 2020~ Aug. 15, 2020	N/A	Radiation (03CH07-HY)
Controller	Max-Full	MF7802	MF780208368	Control Ant Mast	N/A	Apr. 17, 2020~ Aug. 15, 2020	N/A	Radiation (03CH07-HY)

Instrument	Brand Name	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Antenna Mast	Max-Full	MFA520BS	N/A	1m~4m	N/A	Apr. 17, 2020~ Aug. 15, 2020	N/A	Radiation (03CH07-HY)
Turn Table	ChainTek	Chaintek 3000	N/A	0~360 Degree	N/A	Apr. 17, 2020~ Aug. 15, 2020	N/A	Radiation (03CH07-HY)
USB Data Logger	TECPEL	TR-32	HE17XB2495	N/A	N/A	Apr. 17, 2020~ Aug. 15, 2020	N/A	Radiation (03CH07-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170251	18GHz~40GHz	Nov. 26, 2019	Apr. 17, 2020~ Aug. 15, 2020	Nov. 25, 2020	Radiation (03CH07-HY)
Spectrum Analyzer	Keysight	N9010A	MY54200485	10Hz~44GHz	Feb. 10, 2020	Apr. 17, 2020~ Aug. 15, 2020	Feb. 09, 2021	Radiation (03CH07-HY)
Preamplifier	EMEC	EM18G40G	060801	18GHz~40GHz	N/A	Apr. 17, 2020~ Aug. 15, 2020	N/A	Radiation (03CH07-HY)
Software	Audix	E3 6.2009-8-24	80504004656H	N/A	N/A	Apr. 17, 2020~ Aug. 15, 2020	N/A	Radiation (03CH07-HY)
AC Power Source	ChainTek	APC-1000W	N/A	N/A	N/A	Jun. 25, 2020	N/A	Conduction (CO05-HY)
EMI Test Receiver	Rohde & Schwarz	ESR3	102388	9kHz~3.6GHz	Nov. 15, 2019	Jun. 25, 2020	Nov. 14, 2020	Conduction (CO05-HY)
Hygrometer	Testo	608-H1	34913912	N/A	Nov. 07, 2019	Jun. 25, 2020	Nov. 06, 2020	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100081	9kHz~30MHz	Nov. 15, 2019	Jun. 25, 2020	Nov. 14, 2020	Conduction (CO05-HY)
Software	Rohde & Schwarz	EMC32 V10.30	N/A	N/A	N/A	Jun. 25, 2020	N/A	Conduction (CO05-HY)
LF Cable	HUBER + SUHNER	RG-214/U	LF01	N/A	Jan. 02, 2020	Jun. 25, 2020	Jan. 01, 2021	Conduction (CO05-HY)
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100851	N/A	Jan. 02, 2020	Jun. 25, 2020	Jan. 01, 2021	Conduction (CO05-HY)
Hygrometer	Testo	HTC-1	2	N/A	Mar. 02, 2020	May 04, 2020~ Aug. 04, 2020	Mar. 01, 2021	Conducted (TH05-HY)
Power Sensor	DARE	RPR3006W	16I00054SNO10	10MHz~6GHz	Dec. 23, 2019	May 04, 2020~ Aug. 04, 2020	Dec. 22, 2020	Conducted (TH05-HY)
Signal Analyzer	Rohde & Schwarz	FSV40	101397	10Hz~40GHz	Nov. 15, 2019	May 04, 2020~ Aug. 04, 2020	Nov. 14, 2020	Conducted (TH05-HY)
Switch Control Manframe	Burgeon	ETF-058	EC1300484	N/A	Aug. 22, 2019	May 04, 2020~ Aug. 04, 2020	Aug. 21, 2020	Conducted (TH05-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**

Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**4.7**

Uncertainty of Radiated Emission Measurement (1000 MHz ~ 18000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**5.3**

Uncertainty of Radiated Emission Measurement (18000 MHz ~ 40000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**5.0**

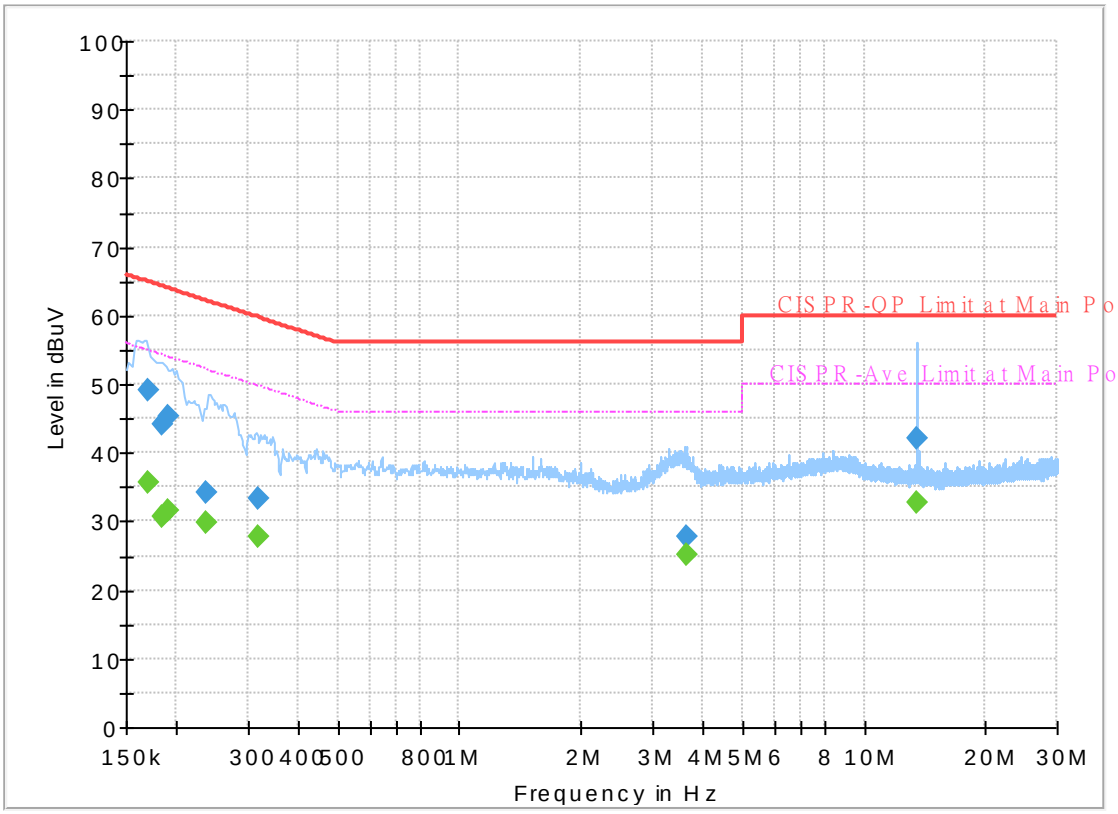
Appendix A. AC Conducted Emission Test Results

Test Engineer :	Tom Lee	**Temperature :**	23~25℃
		Relative Humidity :	42~50%

EUT Information

Report NO :	040803-02
Test Mode :	Mode 1
Test Voltage :	120Vac/60Hz
Phase :	Line

Full Spectrum



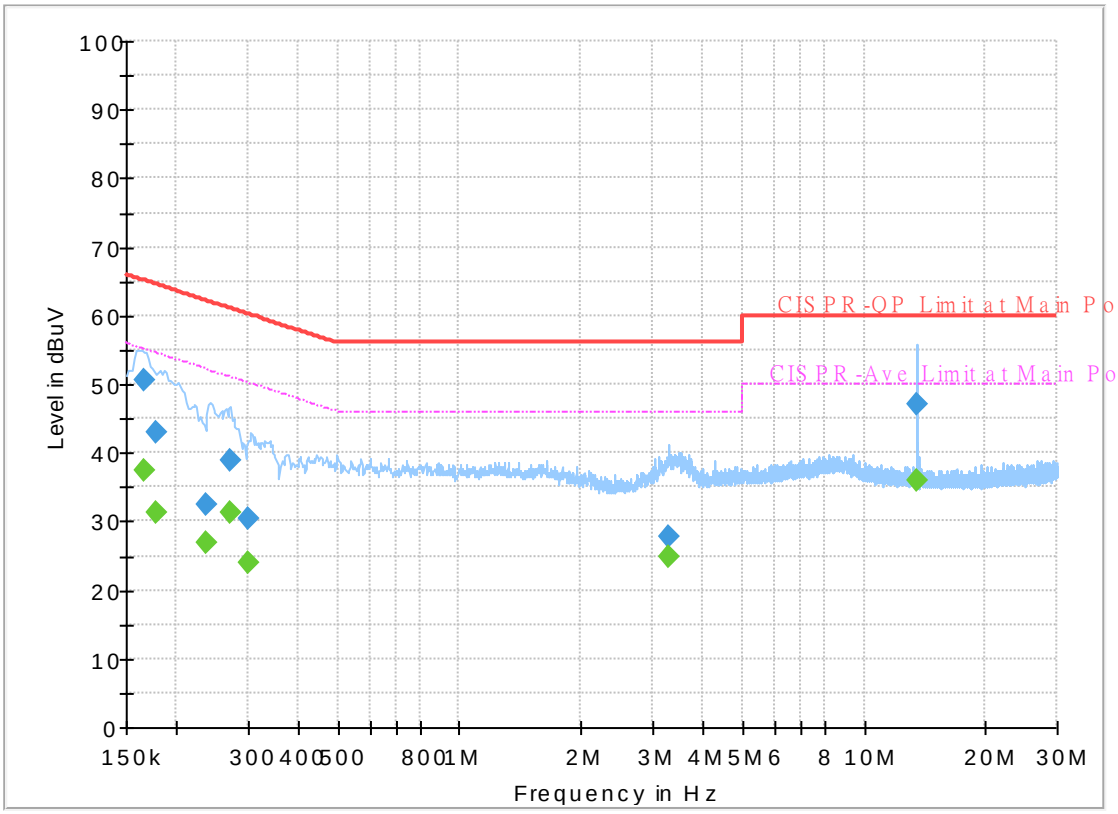
Final_Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.170250	---	35.74	54.95	19.21	L1	OFF	19.6
0.170250	49.04	---	64.95	15.91	L1	OFF	19.6
0.183750	---	30.84	54.31	23.47	L1	OFF	19.6
0.183750	44.26	---	64.31	20.05	L1	OFF	19.6
0.190500	---	31.63	54.02	22.39	L1	OFF	19.6
0.190500	45.24	---	64.02	18.78	L1	OFF	19.6
0.235500	---	29.86	52.25	22.39	L1	OFF	19.6
0.235500	34.30	---	62.25	27.95	L1	OFF	19.6
0.318750	---	27.64	49.74	22.10	L1	OFF	19.6
0.318750	33.34	---	59.74	26.40	L1	OFF	19.6
3.625080	---	25.25	46.00	20.75	L1	OFF	19.7
3.625080	27.78	---	56.00	28.22	L1	OFF	19.7
13.560000	---	32.68	50.00	17.32	L1	OFF	20.2
13.560000	42.07	---	60.00	17.93	L1	OFF	20.2

EUT Information

Report NO :	040803-02
Test Mode :	Mode 1
Test Voltage :	120Vac/60Hz
Phase :	Neutral

Full Spectrum



Final_Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.165750	---	37.47	55.17	17.70	N	OFF	19.5
0.165750	50.69	---	65.17	14.48	N	OFF	19.5
0.177000	---	31.25	54.63	23.38	N	OFF	19.5
0.177000	43.06	---	64.63	21.57	N	OFF	19.5
0.237750	---	26.79	52.17	25.38	N	OFF	19.5
0.237750	32.60	---	62.17	29.57	N	OFF	19.5
0.270420	---	31.20	51.11	19.91	N	OFF	19.5
0.270420	38.94	---	61.11	22.17	N	OFF	19.5
0.302190	---	24.01	50.18	26.17	N	OFF	19.5
0.302190	30.54	---	60.18	29.64	N	OFF	19.5
3.273000	---	24.98	46.00	21.02	N	OFF	19.6
3.273000	27.76	---	56.00	28.24	N	OFF	19.6
13.560000	---	36.05	50.00	13.95	N	OFF	19.9
13.560000	47.05	---	60.00	12.95	N	OFF	19.9

Appendix B. Radiated Spurious Emission

Test Engineer :	Jesse Wang, Stan Hsieh and Ken Wu	Temperature :	21~25°C
		Relative Humidity :	48~53%

2.4GHz 2400~2483.5MHz

WIFI 802.11b (Band Edge @ 3m)

WIFI Ant.	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Path Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11b CH 01 2412MHz		2363.55	54.08	-19.92	74	39.49	31.87	17.94	35.22	102	354	P	H
		2390	44.74	-9.26	54	30.19	31.8	17.98	35.23	102	354	A	H
	*	2412	105.86	-	-	91.22	31.87	18.02	35.25	102	354	P	H
	*	2412	102.47	-	-	87.83	31.87	18.02	35.25	102	354	A	H
													H
													H
		2387.7	56.2	-17.8	74	41.65	31.8	17.98	35.23	219	21	P	V
		2390	50.76	-3.24	54	36.21	31.8	17.98	35.23	219	21	A	V
	*	2412	113.7	-	-	99.06	31.87	18.02	35.25	219	21	P	V
	*	2412	110.28	-	-	95.64	31.87	18.02	35.25	219	21	A	V
													V
													V
802.11b CH 06 2437MHz		2349.06	53.58	-20.42	74	38.99	31.9	17.9	35.21	124	21	P	H
		2389.1	43.03	-10.97	54	28.48	31.8	17.98	35.23	124	21	A	H
	*	2437	107.17	-	-	92.38	32	18.05	35.26	124	21	P	H
	*	2437	103.86	-	-	89.07	32	18.05	35.26	124	21	A	H
		2492.72	54.28	-19.72	74	39.35	32.1	18.13	35.3	124	21	P	H
		2483.69	43.92	-10.08	54	29.02	32.07	18.12	35.29	124	21	A	H
		2313.92	53.48	-20.52	74	39	31.83	17.84	35.19	243	7	P	V
		2389.38	44.11	-9.89	54	29.56	31.8	17.98	35.23	243	7	A	V
	*	2437	114.93	-	-	100.14	32	18.05	35.26	243	7	P	V
	*	2437	111.7	-	-	96.91	32	18.05	35.26	243	7	A	V
		2492.65	54.62	-19.38	74	39.69	32.1	18.13	35.3	243	7	P	V
		2485.79	44.7	-9.3	54	29.8	32.07	18.12	35.29	243	7	A	V

802.11b CH 11 2462MHz	*	2462	109.14	-	-	94.3	32.03	18.09	35.28	143	24	P	H
	*	2462	105.97	-	-	91.13	32.03	18.09	35.28	143	24	A	H
		2484.08	57.26	-16.74	74	42.36	32.07	18.12	35.29	143	24	P	H
		2484	50.5	-3.5	54	35.6	32.07	18.12	35.29	143	24	A	H
													H
													H
	*	2462	114.8	-	-	99.96	32.03	18.09	35.28	324	360	P	V
	*	2462	111.62	-	-	96.78	32.03	18.09	35.28	324	360	A	V
		2483.88	58.12	-15.88	74	43.22	32.07	18.12	35.29	324	360	P	V
		2483.92	51.98	-2.02	54	37.08	32.07	18.12	35.29	324	360	A	V
													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 802.11b (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	42.4	-31.6	74	55.39	34.05	11.99	59.03	100	0	P	H
													H
													H
													H
		4824	40.97	-33.03	74	53.96	34.05	11.99	59.03	100	0	P	V
													V
													V
													V
802.11b CH 06 2437MHz		4874	44.78	-29.22	74	57.54	34.1	12.06	58.92	100	0	P	H
		7311	40.38	-33.62	74	48.5	35.6	14.58	58.3	100	0	P	H
													H
													H
		4874	40.96	-33.04	74	53.72	34.1	12.06	58.92	100	0	P	V
		7311	40.45	-33.55	74	48.57	35.6	14.58	58.3	100	0	P	V
													V
													V
802.11b CH 11 2462MHz		4924	44.74	-29.26	74	57.19	34.23	12.13	58.81	100	0	P	H
		7386	39.73	-34.27	74	47.84	35.6	14.64	58.35	100	0	P	H
													H
													H
		4924	40.32	-33.68	74	52.77	34.23	12.13	58.81	100	0	P	V
		7386	39.45	-34.55	74	47.56	35.6	14.64	58.35	100	0	P	V
													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		2390	60.47	-13.53	74	45.92	31.8	17.98	35.23	148	336	P	H
		2390	50.71	-3.29	54	36.16	31.8	17.98	35.23	148	336	A	H
	*	2412	107.06	-	-	92.42	31.87	18.02	35.25	148	336	P	H
	*	2412	99.48	-	-	84.84	31.87	18.02	35.25	148	336	A	H
													H
													H
		2390	62.58	-11.42	74	48.03	31.8	17.98	35.23	343	1	P	V
		2390	52.34	-1.66	54	37.79	31.8	17.98	35.23	343	1	A	V
	*	2412	112.46	-	-	97.82	31.87	18.02	35.25	343	1	P	V
	*	2412	105	-	-	90.36	31.87	18.02	35.25	343	1	A	V
													V
													V
802.11g CH 06 2437MHz		2389.66	54.74	-19.26	74	40.19	31.8	17.98	35.23	123	8	P	H
		2389.94	44.6	-9.4	54	30.05	31.8	17.98	35.23	123	8	A	H
	*	2437	109.8	-	-	95.01	32	18.05	35.26	123	8	P	H
	*	2437	102.5	-	-	87.71	32	18.05	35.26	123	8	A	H
		2483.55	57.68	-16.32	74	42.78	32.07	18.12	35.29	123	8	P	H
		2483.5	47.39	-6.61	54	32.49	32.07	18.12	35.29	123	8	A	H
		2389.52	56.87	-17.13	74	42.32	31.8	17.98	35.23	301	3	P	V
		2389.94	47	-7	54	32.45	31.8	17.98	35.23	301	3	A	V
	*	2437	117.01	-	-	102.22	32	18.05	35.26	301	3	P	V
	*	2437	109.66	-	-	94.87	32	18.05	35.26	301	3	A	V
		2483.62	57.73	-16.27	74	42.83	32.07	18.12	35.29	301	3	P	V
		2483.62	47.34	-6.66	54	32.44	32.07	18.12	35.29	301	3	A	V

802.11g CH 11 2462MHz	*	2462	106.53	-	-	91.69	32.03	18.09	35.28	145	10	P	H
	*	2462	98.94	-	-	84.1	32.03	18.09	35.28	145	10	A	H
		2483.6	59.51	-14.49	74	44.61	32.07	18.12	35.29	145	10	P	H
		2483.52	49.06	-4.94	54	34.16	32.07	18.12	35.29	145	10	A	H
													H
													H
	*	2462	112.57	-	-	97.73	32.03	18.09	35.28	323	5	P	V
	*	2462	105.02	-	-	90.18	32.03	18.09	35.28	323	5	A	V
		2483.52	63.79	-10.21	74	48.89	32.07	18.12	35.29	323	5	P	V
		2483.56	52.75	-1.25	54	37.85	32.07	18.12	35.29	323	5	A	V
													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 (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	41.17	-32.83	74	54.02	34.05	11.99	58.89	100	0	P	H
													H
													H
													H
		4824	41.09	-32.91	74	53.94	34.05	11.99	58.89	100	0	P	V
													V
													V
													V
802.11g CH 06 2437MHz		4874	42.44	-31.56	74	55.04	34.1	12.06	58.76	100	0	P	H
		7311	42.98	-31.02	74	50.27	35.6	14.58	57.47	100	0	P	H
													H
													H
		4874	40.71	-33.29	74	53.31	34.1	12.06	58.76	100	0	P	V
		7311	41.85	-32.15	74	49.14	35.6	14.58	57.47	100	0	P	V
													V
													V
802.11g CH 11 2462MHz		4924	40.92	-33.08	74	53.2	34.23	12.13	58.64	100	0	P	H
		7386	41.08	-32.92	74	48.38	35.6	14.64	57.54	100	0	P	H
													H
													H
		4924	41.04	-32.96	74	53.32	34.23	12.13	58.64	100	0	P	V
		7386	40.87	-33.13	74	48.17	35.6	14.64	57.54	100	0	P	V
													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 802.11ac VHT20 (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)
		2389.485	58.51	-15.49	74	43.96	31.8	17.98	35.23	148	336	P	H
		2390	49.33	-4.67	54	34.78	31.8	17.98	35.23	148	336	A	H
	*	2412	105.5	-	-	90.86	31.87	18.02	35.25	148	336	P	H
	*	2412	98.18	-	-	83.54	31.87	18.02	35.25	148	336	A	H
802.11ac													H
VHT20													H
CH 01		2390	62.6	-11.4	74	48.05	31.8	17.98	35.23	343	1	P	V
2412MHz		2390	52.37	-1.63	54	37.82	31.8	17.98	35.23	343	1	A	V
	*	2412	112.21	-	-	97.57	31.87	18.02	35.25	343	1	P	V
	*	2412	104.22	-	-	89.58	31.87	18.02	35.25	343	1	A	V
													V
													V
		2332.54	54.77	-19.23	74	40.23	31.87	17.87	35.2	123	8	P	H
		2389.94	44.73	-9.27	54	30.18	31.8	17.98	35.23	123	8	A	H
	*	2437	110.12	-	-	95.33	32	18.05	35.26	123	8	P	H
	*	2437	101.97	-	-	87.18	32	18.05	35.26	123	8	A	H
802.11ac		2483.69	58.42	-15.58	74	43.52	32.07	18.12	35.29	123	8	P	H
VHT20		2483.5	47.81	-6.19	54	32.91	32.07	18.12	35.29	123	8	A	H
CH 06		2388.26	57.58	-16.42	74	43.03	31.8	17.98	35.23	301	3	P	V
2437MHz		2389.94	47.16	-6.84	54	32.61	31.8	17.98	35.23	301	3	A	V
	*	2437	117.07	-	-	102.28	32	18.05	35.26	301	3	P	V
	*	2437	109.39	-	-	94.6	32	18.05	35.26	301	3	A	V
		2484.53	58.15	-15.85	74	43.25	32.07	18.12	35.29	301	3	P	V
		2483.5	48.1	-5.9	54	33.2	32.07	18.12	35.29	301	3	A	V

	*	2462	105.84	-	-	91	32.03	18.09	35.28	145	10	P	H
	*	2462	98.03	-	-	83.19	32.03	18.09	35.28	145	10	A	H
		2483.92	59.59	-14.41	74	44.69	32.07	18.12	35.29	145	10	P	H
		2483.52	48.92	-5.08	54	34.02	32.07	18.12	35.29	145	10	A	H
802.11ac													H
VHT20													H
CH 11	*	2462	111.79	-	-	96.95	32.03	18.09	35.28	326	5	P	V
2462MHz	*	2462	104.22	-	-	89.38	32.03	18.09	35.28	326	5	A	V
		2483.72	64.5	-9.5	74	49.6	32.07	18.12	35.29	326	5	P	V
		2483.52	52.6	-1.4	54	37.7	32.07	18.12	35.29	326	5	A	V
													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 802.11ac VHT20 (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)
		4824	40.8	-33.2	74	53.65	34.05	11.99	58.89	100	0	P	H
													H
802.11ac													H
VHT20													H
CH 01		4824	41.2	-32.8	74	54.05	34.05	11.99	58.89	100	0	P	V
2412MHz													V
													V
													V
		4874	42.35	-31.65	74	54.95	34.1	12.06	58.76	100	0	P	H
		7311	42.45	-31.55	74	49.74	35.6	14.58	57.47	100	0	P	H
802.11ac													H
VHT20													H
CH 06		4874	41.32	-32.68	74	53.92	34.1	12.06	58.76	100	0	P	V
2437MHz		7311	42.19	-31.81	74	49.48	35.6	14.58	57.47	100	0	P	V
													V
													V
		4924	41.39	-32.61	74	53.67	34.23	12.13	58.64	100	0	P	H
		7386	41.67	-32.33	74	48.97	35.6	14.64	57.54	100	0	P	H
802.11ac													H
VHT20													H
CH 11		4924	41.73	-32.27	74	54.01	34.23	12.13	58.64	100	0	P	V
2462MHz		7386	41.65	-32.35	74	48.95	35.6	14.64	57.54	100	0	P	V
													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 802.11ac VHT40 (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)
		2389.94	56.86	-17.14	74	42.31	31.8	17.98	35.23	133	351	P	H
		2389.38	49.59	-4.41	54	35.04	31.8	17.98	35.23	133	351	A	H
	*	2422	99.12	-	-	84.41	31.93	18.03	35.25	133	351	P	H
	*	2422	92.23	-	-	77.52	31.93	18.03	35.25	133	351	A	H
802.11ac		2499.23	54.22	-19.78	74	39.28	32.1	18.14	35.3	133	351	P	H
VHT40		2486.28	45.25	-8.75	54	30.34	32.07	18.13	35.29	133	351	A	H
CH 03		2389.38	60.18	-13.82	74	45.63	31.8	17.98	35.23	341	357	P	V
2422MHz		2389.94	52.91	-1.09	54	38.36	31.8	17.98	35.23	341	357	A	V
	*	2422	105.93	-	-	91.22	31.93	18.03	35.25	341	357	P	V
	*	2422	98.54	-	-	83.83	31.93	18.03	35.25	341	357	A	V
		2484.32	54.61	-19.39	74	39.71	32.07	18.12	35.29	341	357	P	V
		2485.58	45.9	-8.1	54	31	32.07	18.12	35.29	341	357	A	V
		2389.8	58.01	-15.99	74	43.46	31.8	17.98	35.23	122	350	P	H
		2389.8	48.79	-5.21	54	34.24	31.8	17.98	35.23	122	350	A	H
	*	2437	101.28	-	-	86.49	32	18.05	35.26	122	350	P	H
	*	2437	93.92	-	-	79.13	32	18.05	35.26	122	350	A	H
802.11ac		2483.69	61.59	-12.41	74	46.69	32.07	18.12	35.29	122	350	P	H
VHT40		2483.55	52.54	-1.46	54	37.64	32.07	18.12	35.29	122	350	A	H
CH 06		2389.52	60.89	-13.11	74	46.34	31.8	17.98	35.23	301	4	P	V
2437MHz		2389.94	52.37	-1.63	54	37.82	31.8	17.98	35.23	301	4	A	V
	*	2437	108.15	-	-	93.36	32	18.05	35.26	301	4	P	V
	*	2437	101.02	-	-	86.23	32	18.05	35.26	301	4	A	V
		2483.62	63.77	-10.23	74	48.87	32.07	18.12	35.29	301	4	P	V
		2483.5	52.78	-1.22	54	37.88	32.07	18.12	35.29	301	4	A	V

		2310.84	54.58	-19.42	74	40.11	31.83	17.83	35.19	142	7	P	H
		2332.54	44.82	-9.18	54	30.28	31.87	17.87	35.2	142	7	A	H
	*	2452	99.01	-	-	84.2	32	18.08	35.27	142	7	P	H
	*	2452	91.72	-	-	76.91	32	18.08	35.27	142	7	A	H
802.11ac		2484.11	57.06	-16.94	74	42.16	32.07	18.12	35.29	142	7	P	H
VHT40		2483.62	49.08	-4.92	54	34.18	32.07	18.12	35.29	142	7	A	H
CH 09		2388.96	53.81	-20.19	74	39.26	31.8	17.98	35.23	324	5	P	V
2452MHz		2387.84	44.75	-9.25	54	30.2	31.8	17.98	35.23	324	5	A	V
	*	2452	105.14	-	-	90.33	32	18.08	35.27	324	5	P	V
	*	2452	98.08	-	-	83.27	32	18.08	35.27	324	5	A	V
		2483.69	59.66	-14.34	74	44.76	32.07	18.12	35.29	324	5	P	V
		2483.55	52.32	-1.68	54	37.42	32.07	18.12	35.29	324	5	A	V

Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.

2.4GHz 2400~2483.5MHz

WIFI 802.11ac VHT40 (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)
		4844	41.71	-32.29	74	54.43	34.1	12.02	58.84	100	0	P	H
		7266	42.34	-31.66	74	49.62	35.6	14.55	57.43	100	0	P	H
802.11ac													H
VHT40													H
CH 03		4844	41.55	-32.45	74	54.27	34.1	12.02	58.84	100	0	P	V
2422MHz		7266	41.92	-32.08	74	49.2	35.6	14.55	57.43	100	0	P	V
													V
													V
		4874	40.68	-33.32	74	53.28	34.1	12.06	58.76	100	0	P	H
		7311	42.05	-31.95	74	49.34	35.6	14.58	57.47	100	0	P	H
802.11ac													H
VHT40													H
CH 06		4874	41.24	-32.76	74	53.84	34.1	12.06	58.76	100	0	P	V
2437MHz		7311	42.58	-31.42	74	49.87	35.6	14.58	57.47	100	0	P	V
													V
													V
		4904	40.87	-33.13	74	53.28	34.17	12.11	58.69	100	0	P	H
		7356	41.35	-32.65	74	48.75	35.5	14.61	57.51	100	0	P	H
802.11ac													H
VHT40													H
CH 09		4904	41.14	-32.86	74	53.55	34.17	12.11	58.69	100	0	P	V
2452MHz		7356	41.24	-32.76	74	48.64	35.5	14.61	57.51	100	0	P	V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Emission below 1GHz

2.4GHz WIFI 802.11ac VHT40 (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)
		30.27	22.56	-17.44	40	27.32	24.32	0.93	30.01	-	-		H
		119.64	20.26	-23.24	43.5	30.9	17.48	1.84	29.96	-	-		H
		126.39	20.63	-22.87	43.5	31.17	17.54	1.88	29.96	-	-		H
		878.2	31.73	-14.27	46	26.9	28.87	5.05	29.09	-	-		H
		902	31.94	-14.06	46	26.95	28.84	5.13	28.98	-	-		H
		939.8	33.2	-12.8	46	27	29.73	5.23	28.76	100	0		H
													H
													H
													H
													H
2.4GHz													H
802.11ac													H
VHT40		30.27	28.9	-11.1	40	33.66	24.32	0.93	30.01	100	0		V
LF		40.53	26.09	-13.91	40	36.01	19	1.08	30	-	-		V
		60.24	22.41	-17.59	40	39.19	11.91	1.3	29.99	-	-		V
		903.4	31.74	-14.26	46	26.73	28.85	5.13	28.97	-	-		V
		935.6	32.35	-13.65	46	26.47	29.44	5.22	28.78	-	-		V
		956.6	32.57	-13.43	46	25.45	30.5	5.28	28.66	-	-		V
													V
													V
													V
													V
													V
													V

Remark

3. No other spurious found.
4. All results are PASS against limit line.

Note symbol

*	**Fundamental Frequency** which can be ignored. However, the level of any unwanted emissions shall not exceed the level of the fundamental frequency.
!	Test result is **over limit** line.
P/A	**P**eak or **A**verage
H/V	**H**orizontal or **V**ertical

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 CH 01 2412MHz		2390	55.45	-18.55	74	54.51	32.22	4.58	35.86	103	308	P	H
		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 C. Radiated Spurious Emission Plots

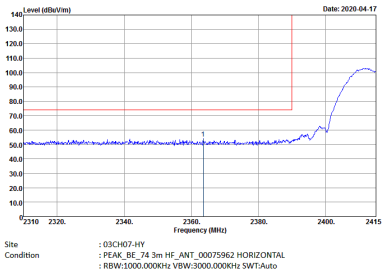
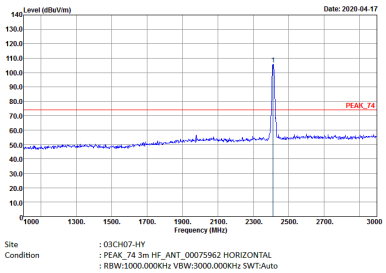
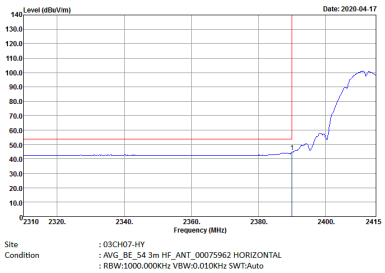
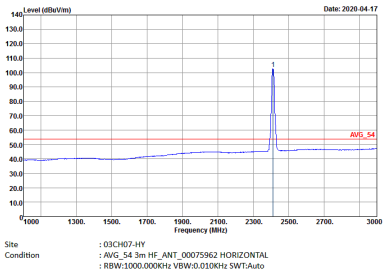
Test Engineer :	Jesse Wang, Stan Hsieh and Ken Wu	**Temperature :**	21~25°C
		Relative Humidity :	48~53%

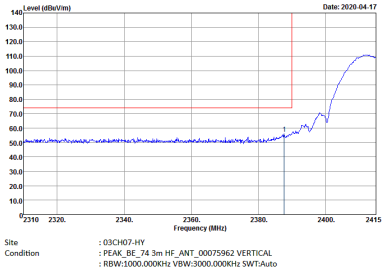
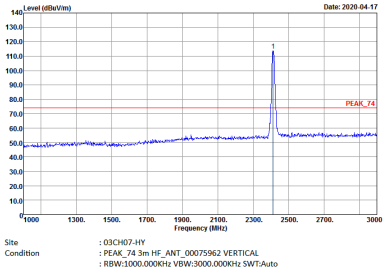
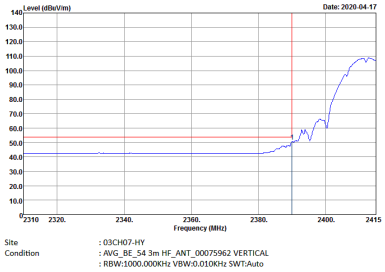
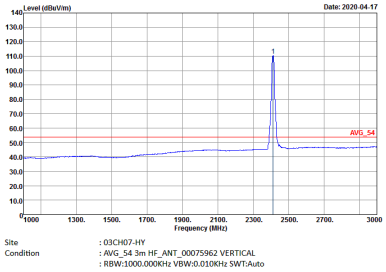
Note symbol

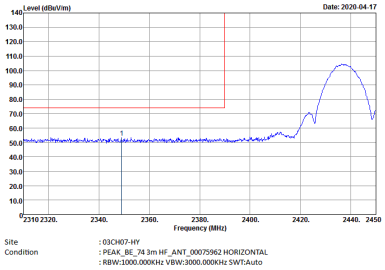
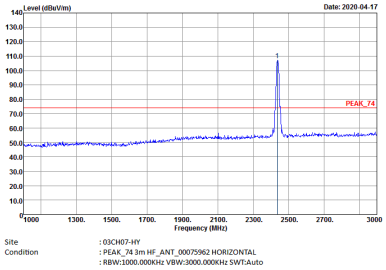
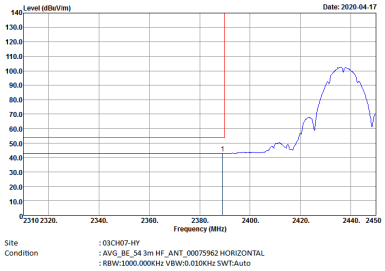
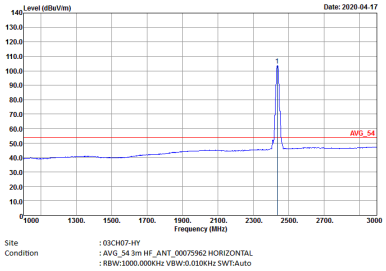
-L	**Low channel location**
-R	**High channel location**

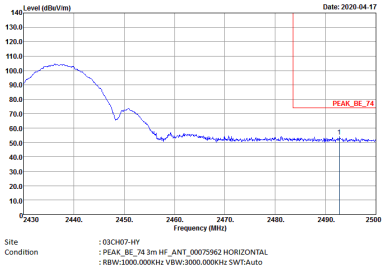
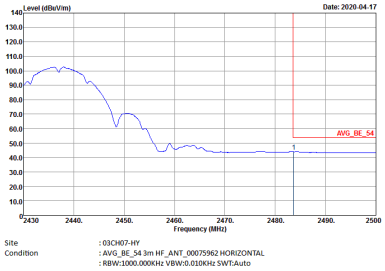
2.4GHz 2400~2483.5MHz

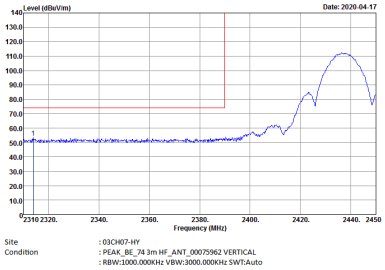
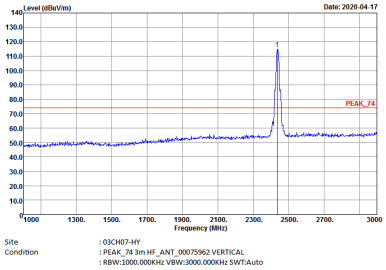
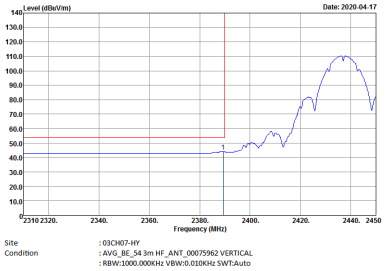
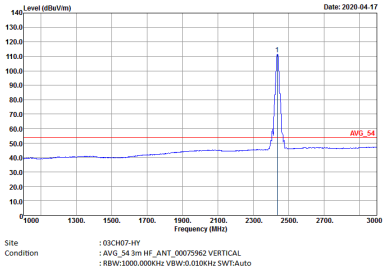
WIFI 802.11b (Band Edge @ 3m)

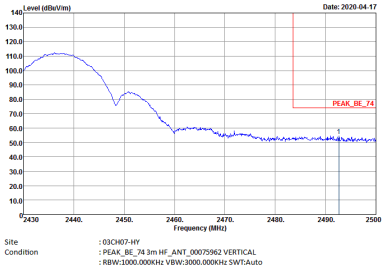
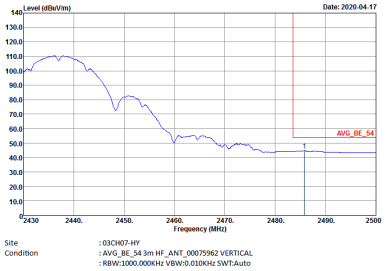
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11b CH01 2412MHz	
1	Horizontal	Fundamental
Peak		
Avg.		

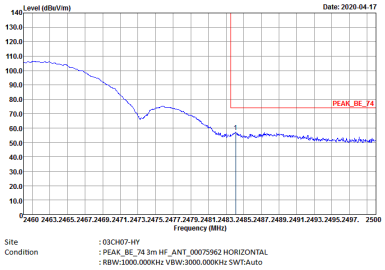
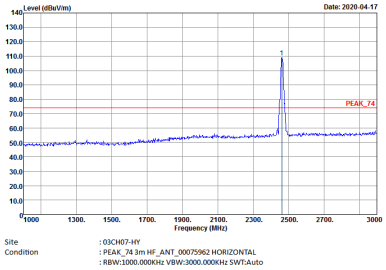
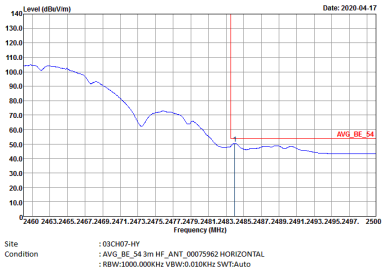
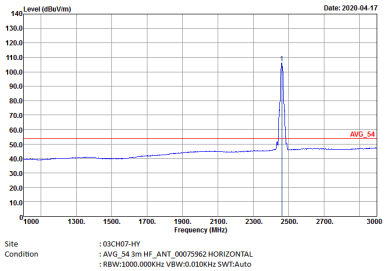
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11b CH01 2412MHz	
1	Vertical	Fundamental
Peak		
Avg.		

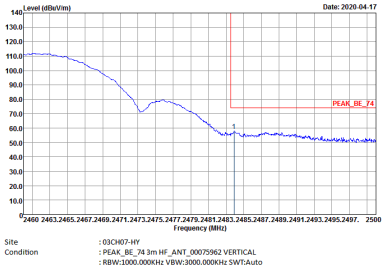
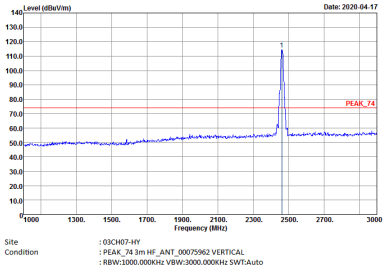
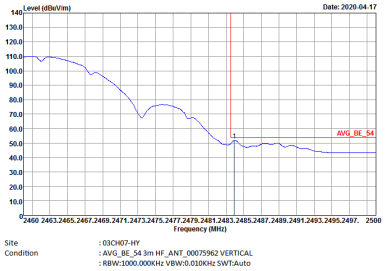
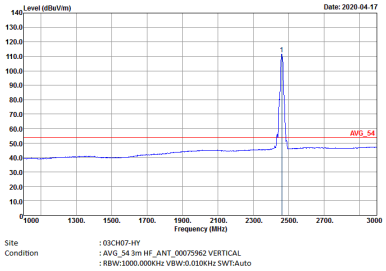
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11b CH06 2437MHz - L	
1	Horizontal	Fundamental
Peak		
Avg.		

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

WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11b CH06 2437MHz - L	
1	Vertical	Fundamental
Peak		
Avg.		

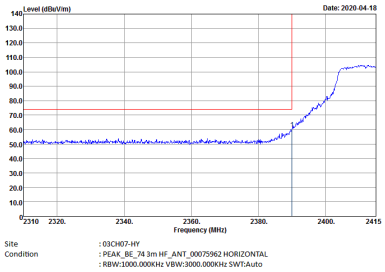
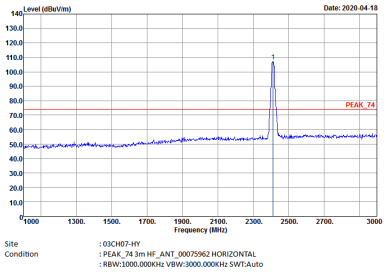
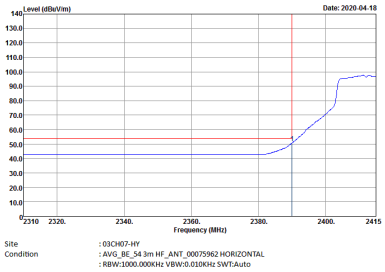
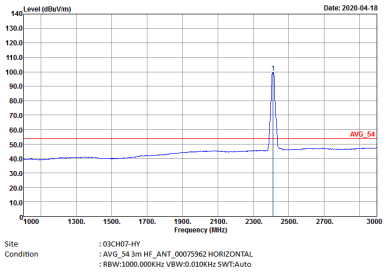
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11b CH06 2437MHz - R	
1	Vertical	Fundamental
Peak		Left blank
Avg.		Left blank

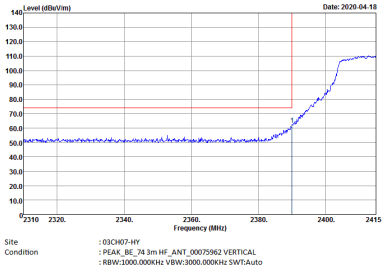
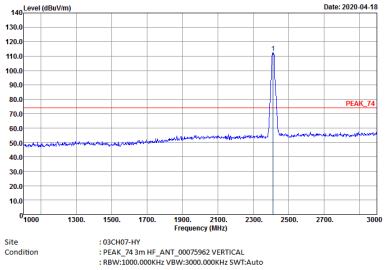
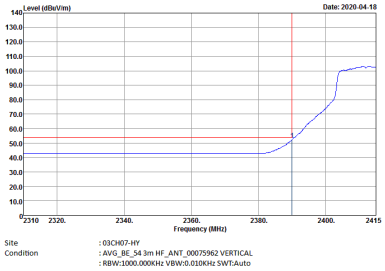
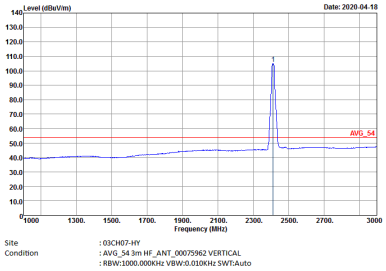
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11b CH11 2462MHz	
1	Horizontal	Fundamental
Peak		
Avg.		

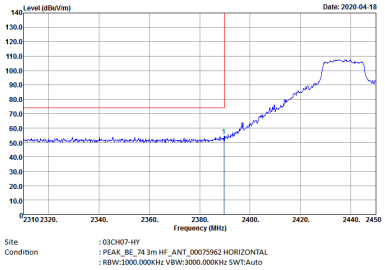
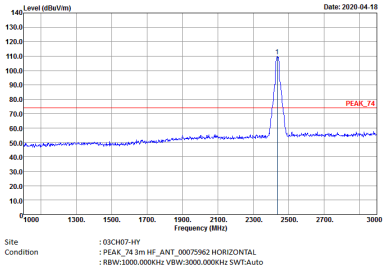
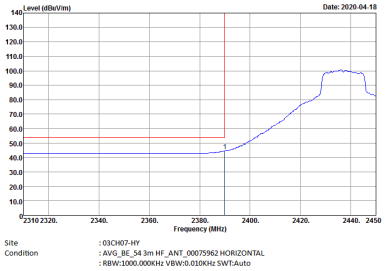
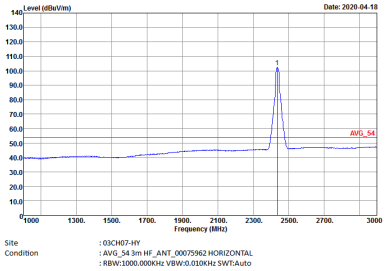
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11b CH11 2462MHz	
1	Vertical	Fundamental
Peak		
Avg.		

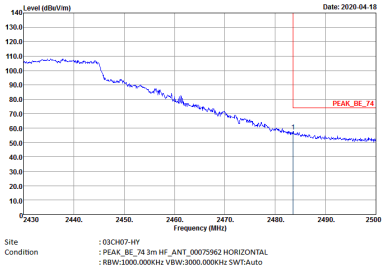
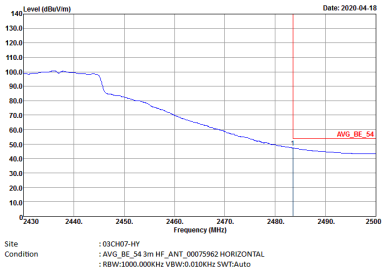
2.4GHz 2400~2483.5MHz

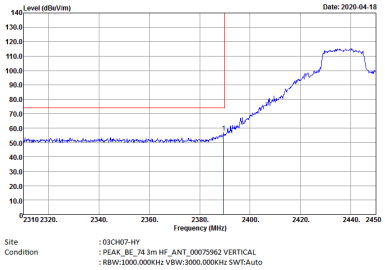
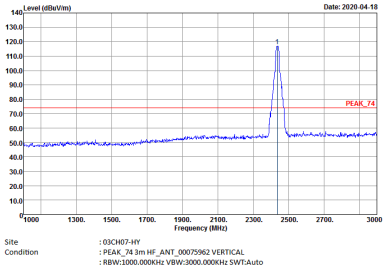
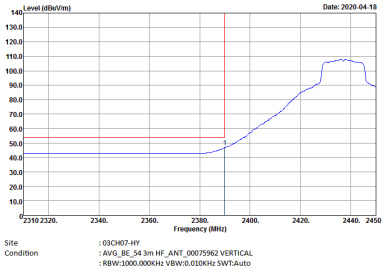
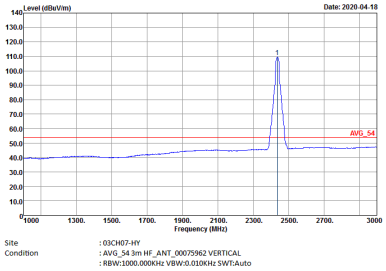
WIFI 802.11g (Band Edge @ 3m)

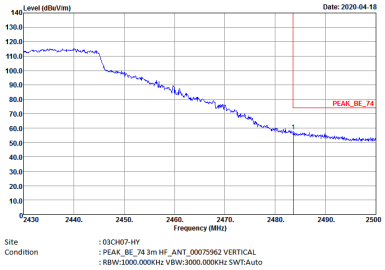
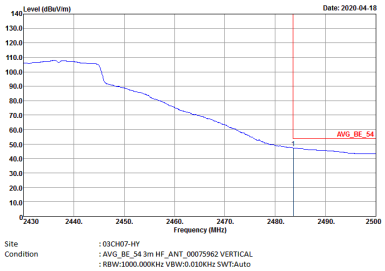
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11g CH01 2412MHz	
1	Horizontal	Fundamental
Peak		
Avg.		

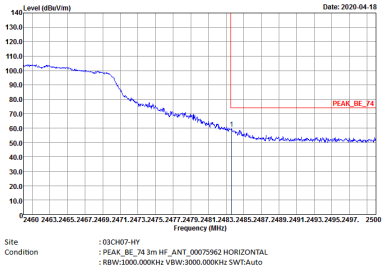
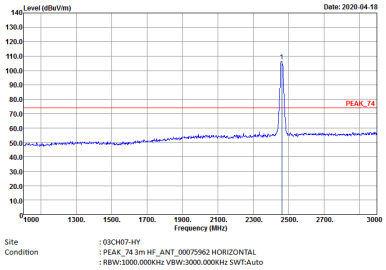
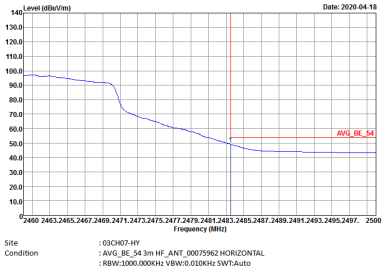
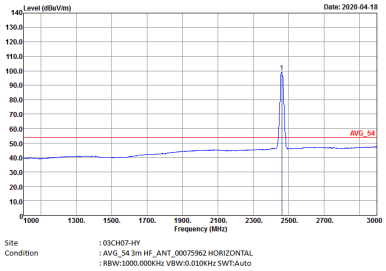
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11g CH01 2412MHz	
1	Vertical	Fundamental
Peak		
Avg.		

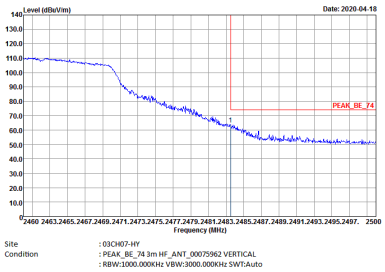
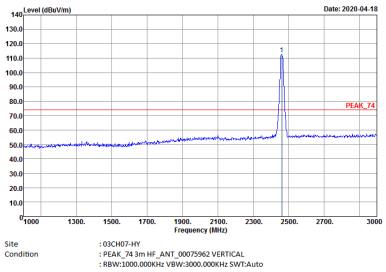
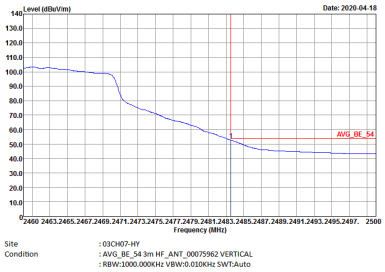
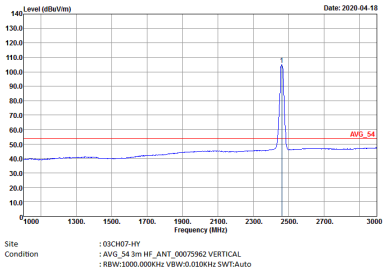
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11g CH06 2437MHz - L	
1	Horizontal	Fundamental
Peak		
Avg.		

WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11g CH06 2437MHz - R	
1	Horizontal	Fundamental
Peak		Left blank
Avg.		Left blank

WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11g CH06 2437MHz - L	
1	Vertical	Fundamental
Peak		
Avg.		

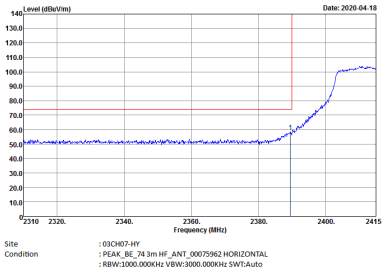
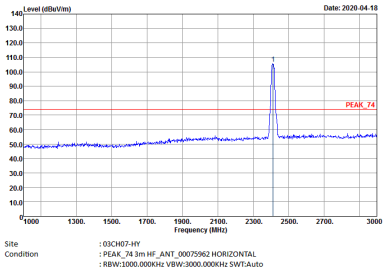
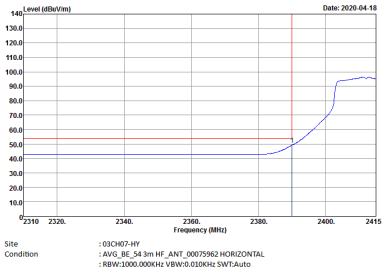
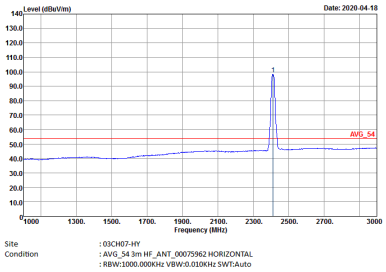
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11g CH06 2437MHz - R	
1	Vertical	Fundamental
Peak		Left Blank
Avg.		Left Blank

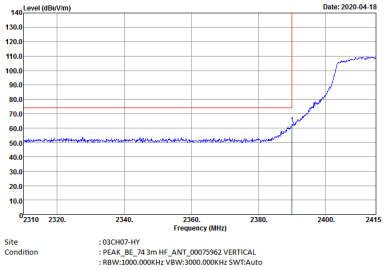
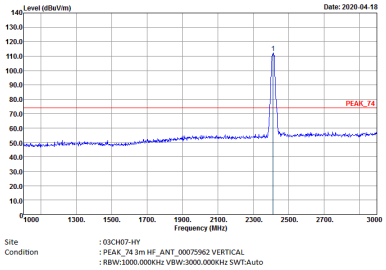
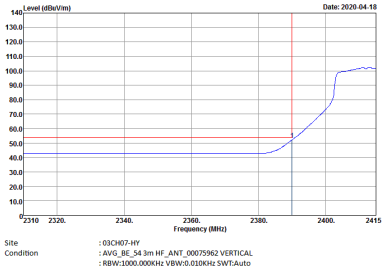
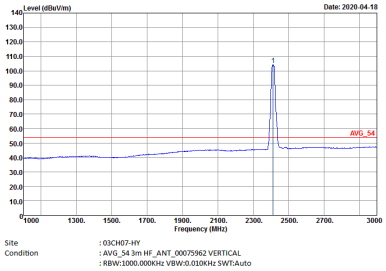
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11g CH11 2462MHz	
1	Horizontal	Fundamental
Peak		
Avg.		

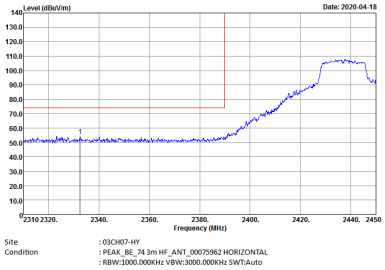
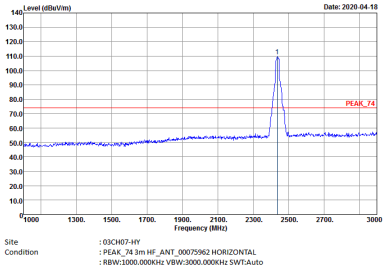
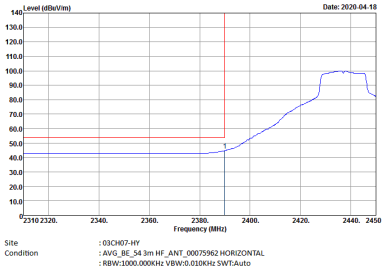
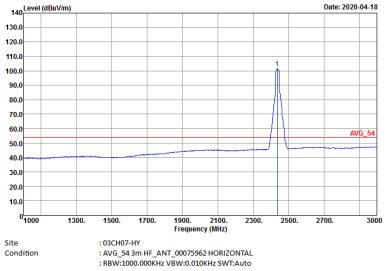
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11g CH11 2462MHz	
1	Vertical	Fundamental
Peak		
Avg.		

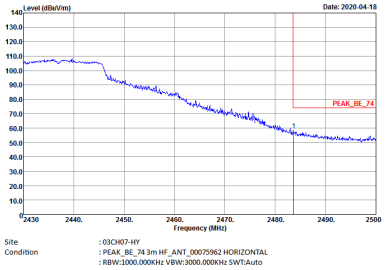
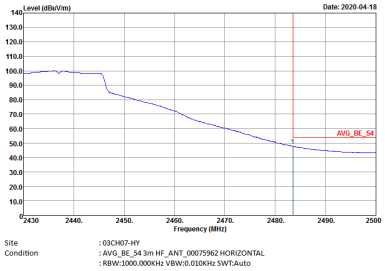
2.4GHz 2400~2483.5MHz

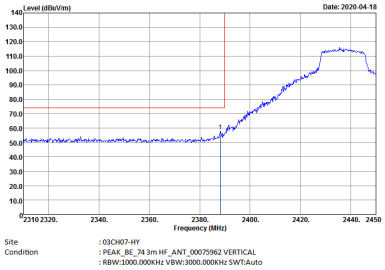
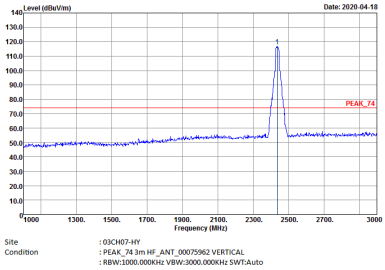
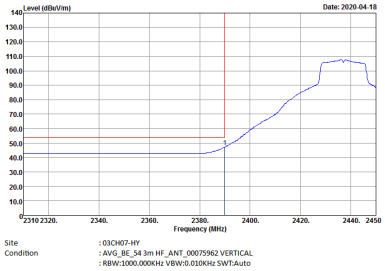
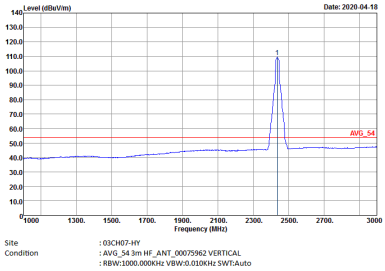
WIFI 802.11ac VHT20 (Band Edge @ 3m)

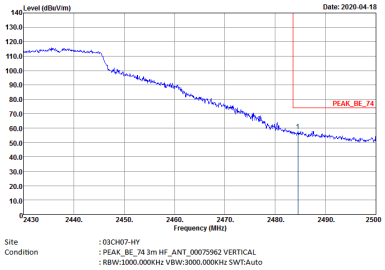
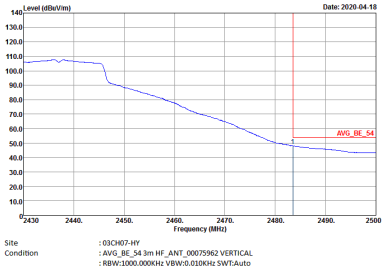
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11ac VHT20 CH01 2412MHz	
1	Horizontal	Fundamental
Peak		
Avg.		

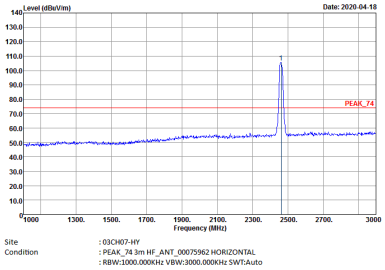
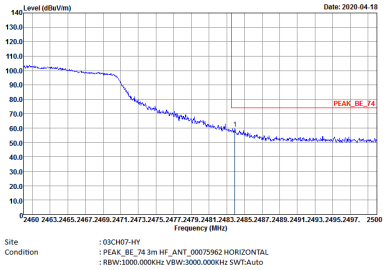
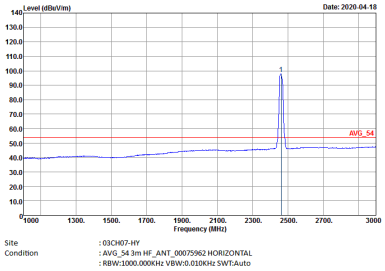
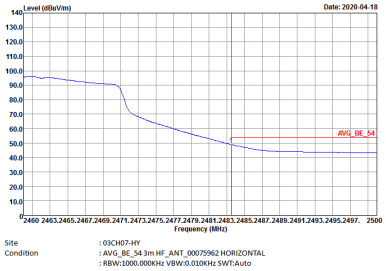
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11ac VHT20 CH01 2412MHz	
1	Vertical	Fundamental
Peak		
Avg.		

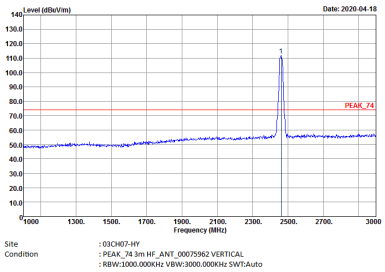
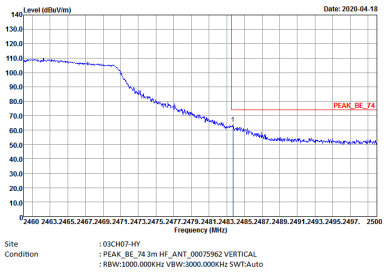
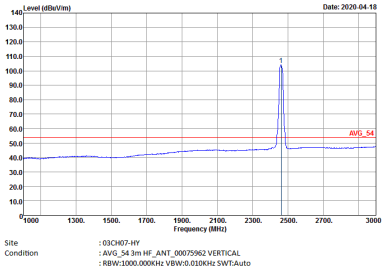
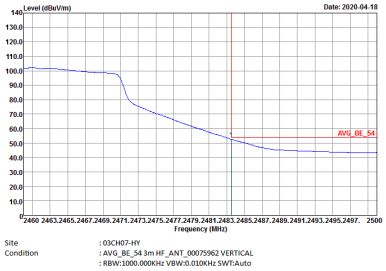
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11ac VHT20 CH06 2437MHz - L	
1	Horizontal	Fundamental
Peak		
Avg.		

WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11ac VH20 CH06 2437MHz - R	
1	Horizontal	Fundamental
Peak		Left blank
Avg.		Left blank

WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11ac VH20 CH06 2437MHz - L	
1	Vertical	Fundamental
Peak		
Avg.		

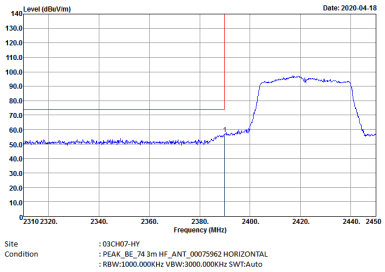
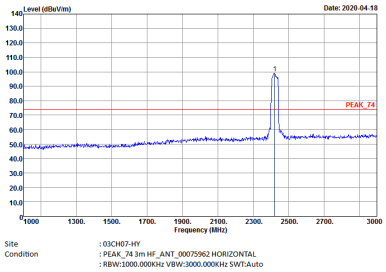
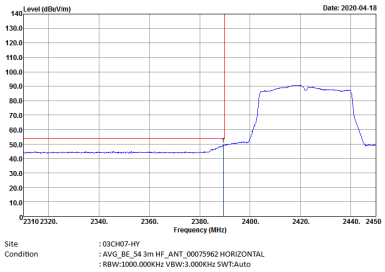
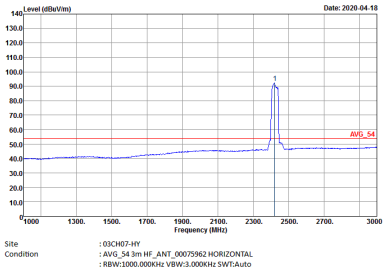
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11ac VH20 CH06 2437MHz - R	
1	Vertical	Fundamental
Peak		Left blank
Avg.		Left blank

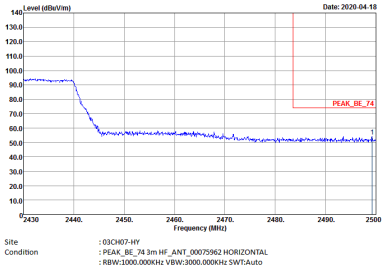
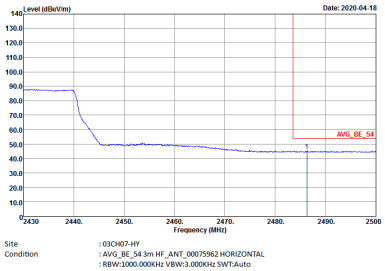
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11ac VH20 CH11 2462MHz	
1	Horizontal	Fundamental
Peak		
Avg.		

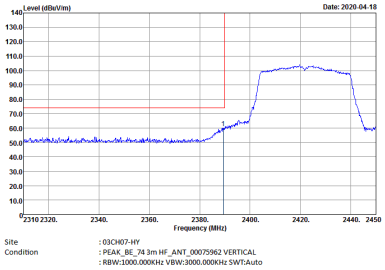
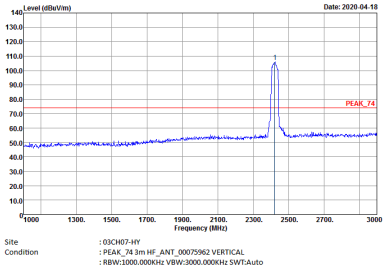
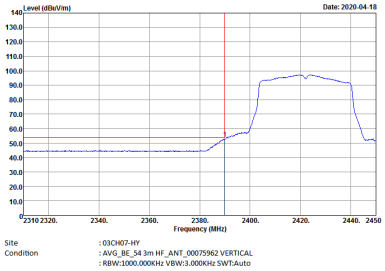
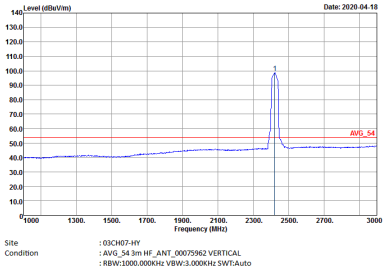
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11ac VH20 CH11 2462MHz	
1	Vertical	Fundamental
Peak		
Avg.		

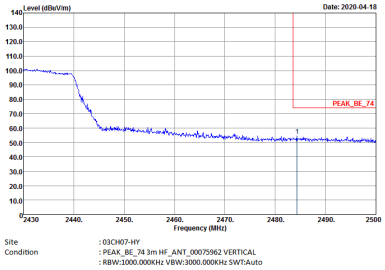
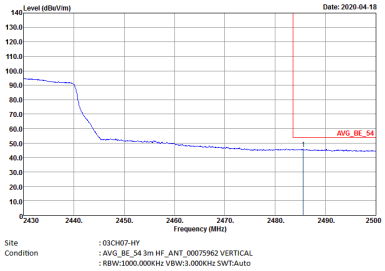
2.4GHz 2400~2483.5MHz

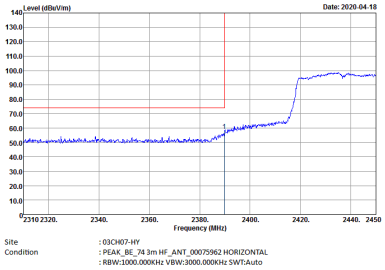
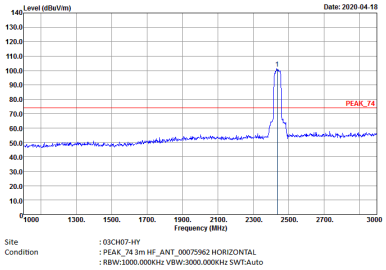
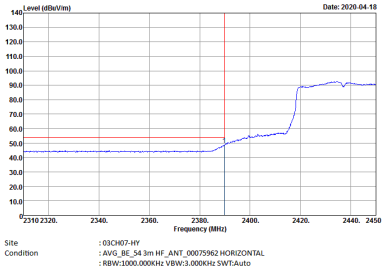
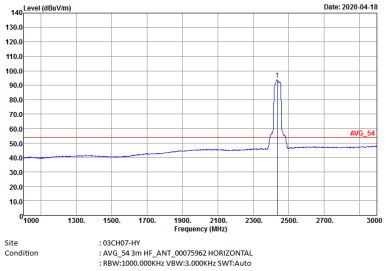
WIFI 802.11ac VHT40 (Band Edge @ 3m)

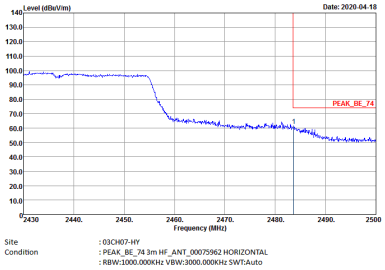
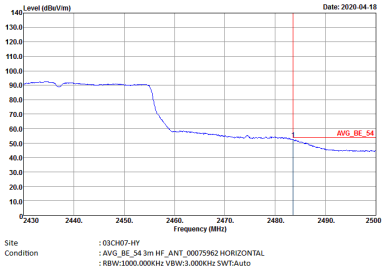
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11ac VH40 CH03 2422MHz - L	
1	Horizontal	Fundamental
Peak		
Avg.		

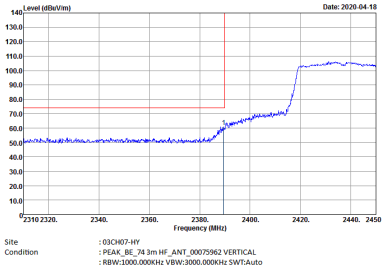
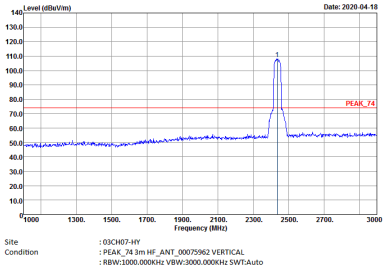
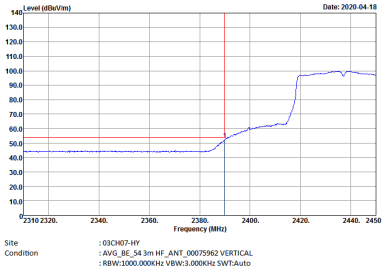
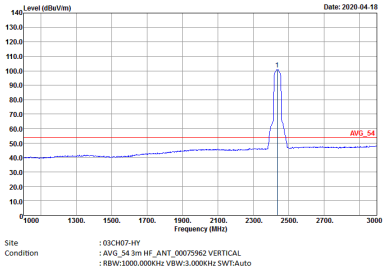
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11ac VH40 CH03 2422MHz - R	
1	Horizontal	Fundamental
Peak		Left blank
Avg.		Left blank

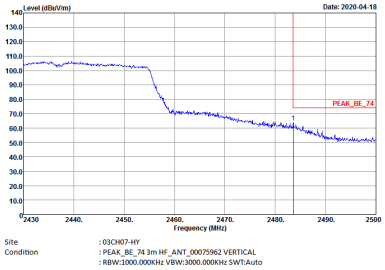
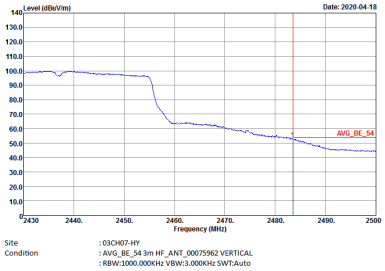
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11ac VH40 CH03 2422MHz - L	
1	Vertical	Fundamental
Peak		
Avg.		

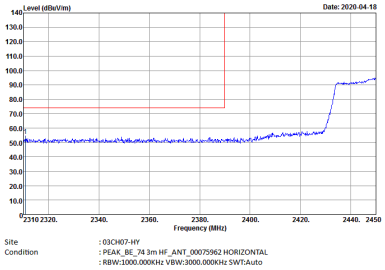
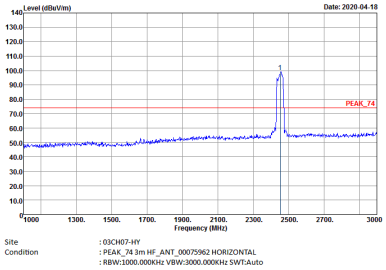
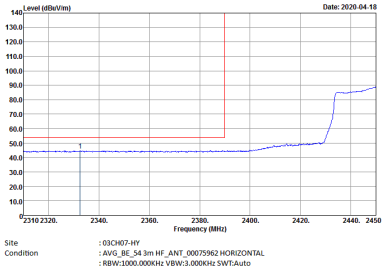
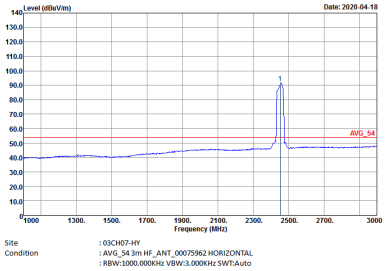
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11ac VH40 CH03 2422MHz - R	
1	Vertical	Fundamental
Peak		Left blank
Avg.		Left blank

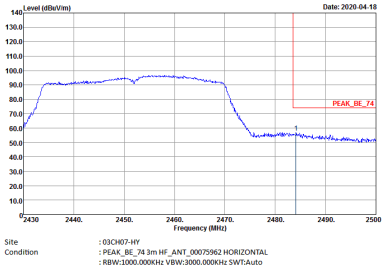
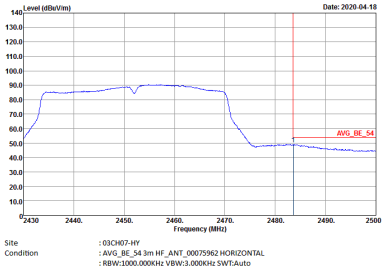
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11ac VH40 CH06 2437MHz - L	
1	Horizontal	Fundamental
Peak		
Avg.		

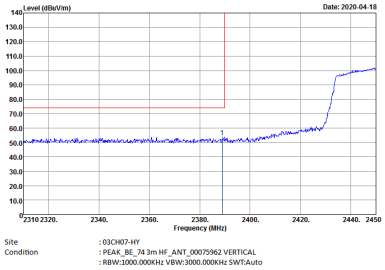
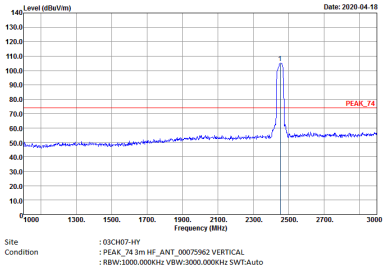
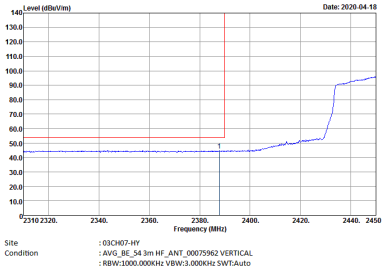
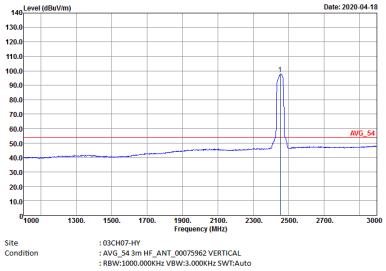
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11ac VH40 CH06 2437MHz - R	
1	Horizontal	Fundamental
Peak		Left blank
Avg.		Left blank

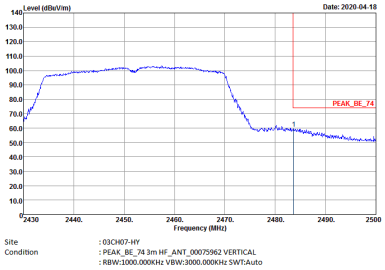
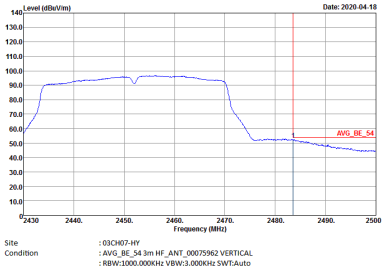
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11ac VH40 CH06 2437MHz - L	
1	Vertical	Fundamental
Peak		
Avg.		

WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11ac VH40 CH06 2437MHz - R	
1	Vertical	Fundamental
Peak		Left blank
Avg.		Left blank

WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11ac VH40 CH09 2452MHz - L	
1	Horizontal	Fundamental
Peak		
Avg.		

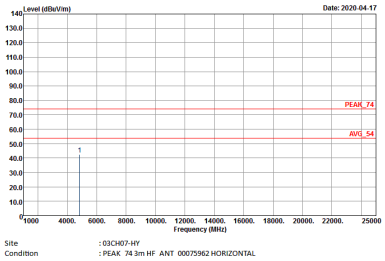
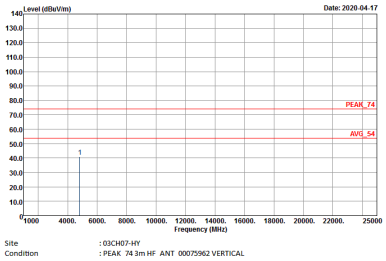
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11ac VH40 CH09 2452MHz - R	
1	Horizontal	Fundamental
Peak		Left blank
Avg.		Left blank

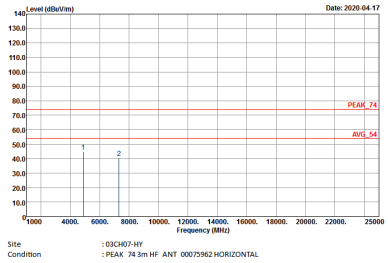
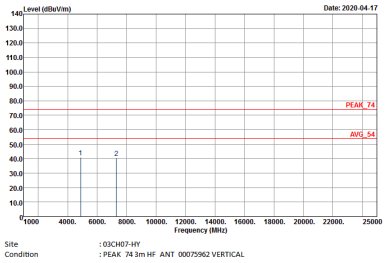
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11ac VH40 CH09 2452MHz - L	
1	Vertical	Fundamental
Peak		
Avg.		

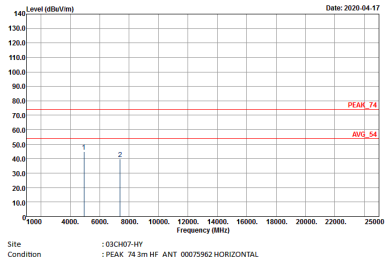
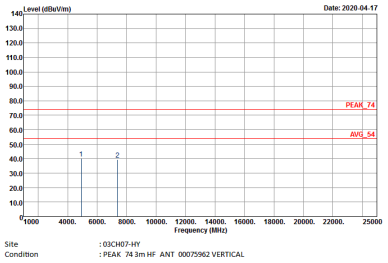
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11ac VH40 CH09 2452MHz - R	
1	Vertical	Fundamental
Peak		Left blank
Avg.		Left blank

2.4GHz 2400~2483.5MHz

WIFI 802.11b (Harmonic @ 3m)

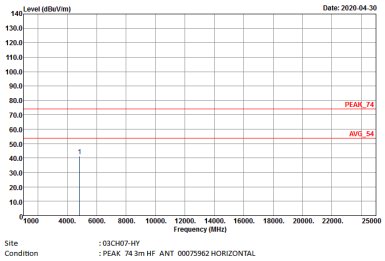
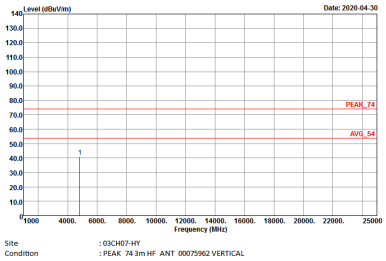
WIFI	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	802.11b CH01 2412MHz	
1	Horizontal	Vertical
Peak Avg.		

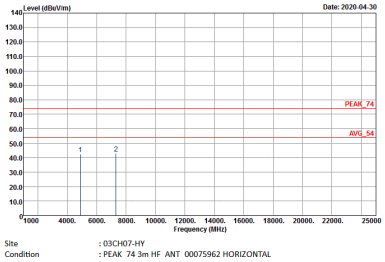
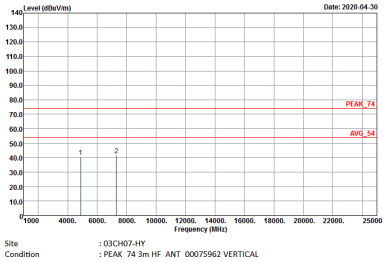
WIFI	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	802.11b CH06 2437MHz	
1	Horizontal	Vertical
Peak Avg.		

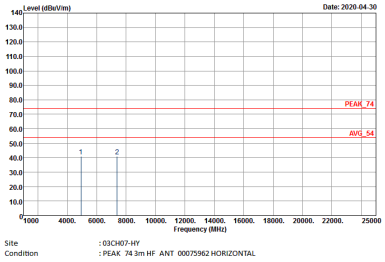
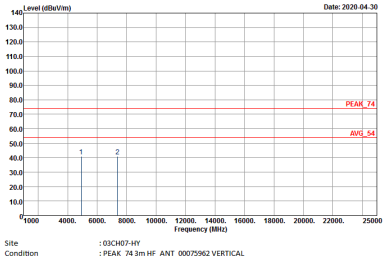
WIFI	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	802.11b CH11 2462MHz	
1	Horizontal	Vertical
Peak Avg.		

2.4GHz 2400~2483.5MHz

WIFI 802.11g (Harmonic @ 3m)

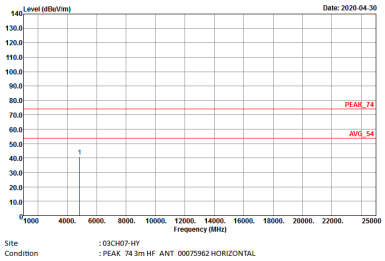
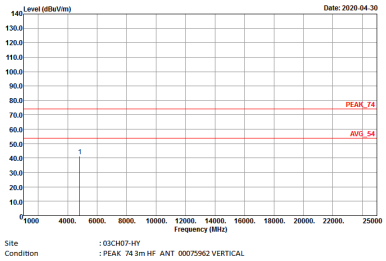
WIFI	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	802.11g CH01 2412MHz	
1	Horizontal	Vertical
Peak Avg.		

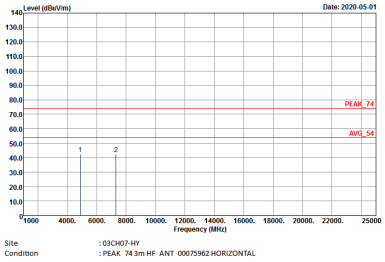
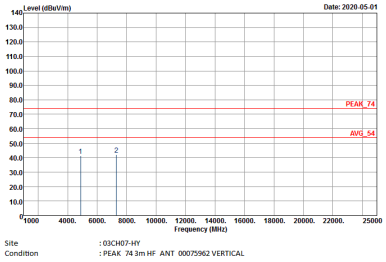
WIFI	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	802.11g CH06 2437MHz	
1	Horizontal	Vertical
Peak Avg.		

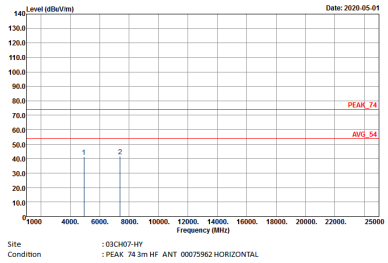
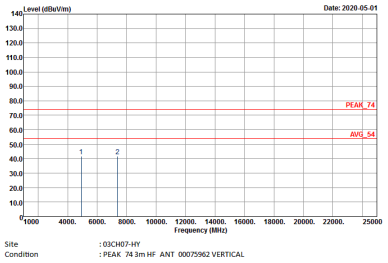
WIFI	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	802.11g CH11 2462MHz	
1	Horizontal	Vertical
Peak Avg.		

2.4GHz 2400~2483.5MHz

WIFI 802.11ac VHT20 (Harmonic @ 3m)

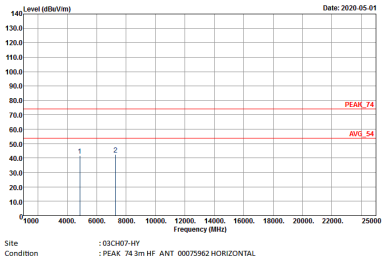
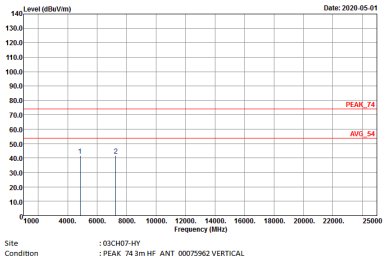
WIFI	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	802.11ac VHT20 CH01 2412MHz	
1	Horizontal	Vertical
Peak Avg.		

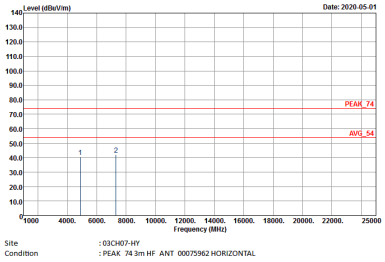
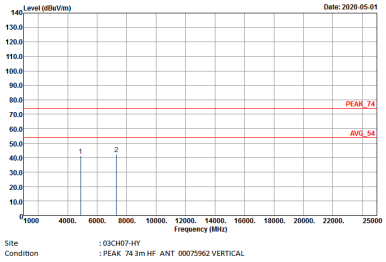
WIFI	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	802.11ac VHT20 CH06 2437MHz	
1	Horizontal	Vertical
Peak Avg.		

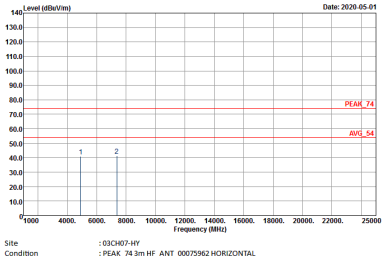
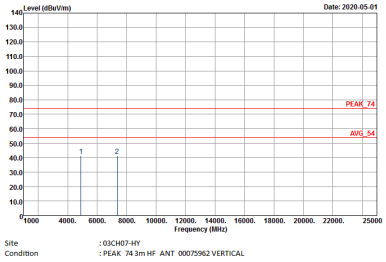
WIFI	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	802.11ac VHT20 CH11 2462MHz	
1	Horizontal	Vertical
Peak Avg.		

2.4GHz 2400~2483.5MHz

WIFI 802.11ac VHT40 (Harmonic @ 3m)

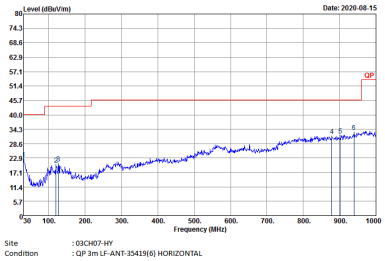
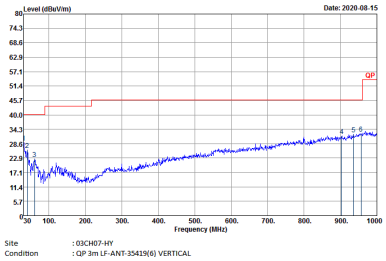
WIFI	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	802.11ac VHT40 CH03 2422MHz	
1	Horizontal	Vertical
Peak Avg.		

WIFI	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	802.11ac VHT40 CH06 2437MHz	
1	Horizontal	Vertical
Peak Avg.		

WIFI	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	802.11ac VHT40 CH09 2452MHz	
1	Horizontal	Vertical
Peak Avg.		

Emission below 1GHz

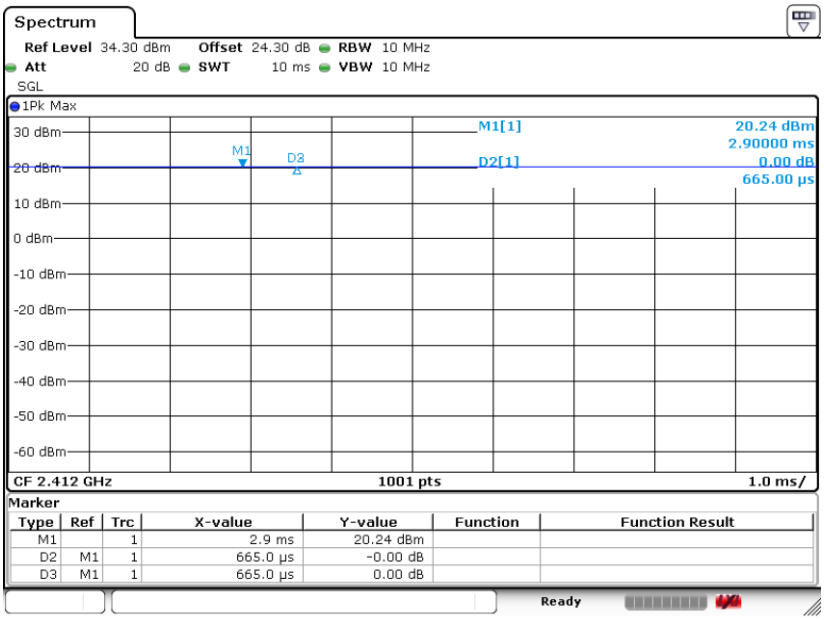
2.4GHz WIFI 802.11ac VHT40 (LF)

WIFI	2.4GHz 2400~2483.5MHz	
ANT	802.11ac VHT40 LF	
1	Horizontal	Vertical
QP / Peak		

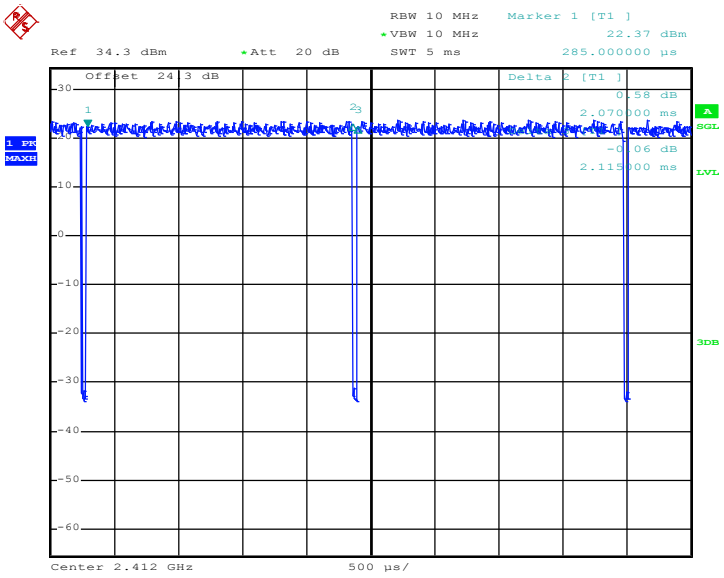
Appendix D. Duty Cycle Plots

Band	Duty Cycle(%)	T(us)	1/T(kHz)	VBW Setting	Duty Factor(dB)
802.11b	99.04	-	-	10Hz	0.04
802.11g	98.10	-	-	10Hz	0.08
2.4GHz 802.11ac20	97.97	1930	0.52	1kHz	0.09
2.4GHz 802.11ac40	95.00	950	1.05	3kHz	0.22

802.11b

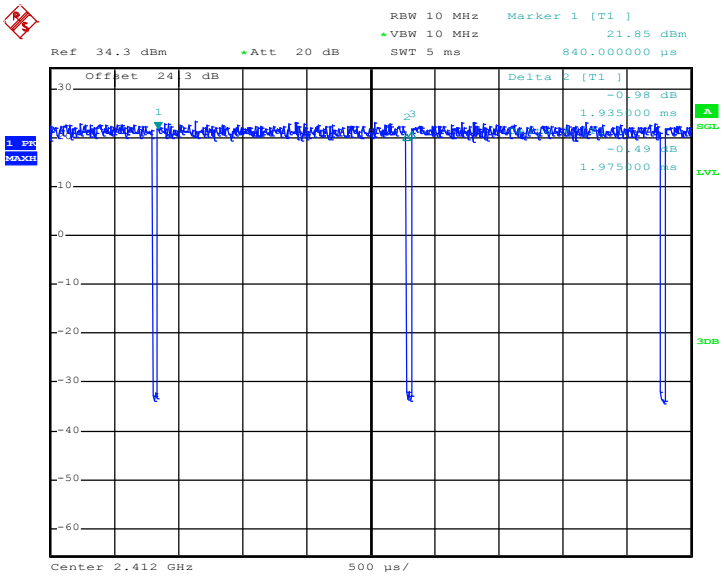


802.11g



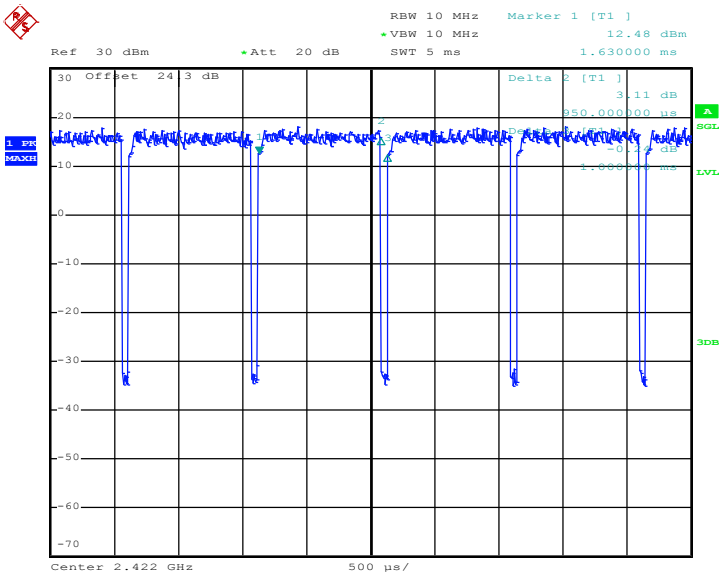
Date: 6.MAY.2020 18:36:44

802.11ac VHT20



Date: 6.MAY.2020 18:43:13

802.11ac VHT40



Date: 6.MAY.2020 18:47:22