FCC RADIO TEST REPORT

FCC ID	:	**UZ7TC520L**
Equipment	:	**Touch Computer**
Brand Name	:	**Zebra**
Model Name	:	**TC520L**
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 Feb. 19, 2021 and testing was started from Mar. 26, 2021 and completed on May 08, 2021. We, Sporton International Inc. Wensan 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. Wensan Laboratory, the test report shall not be reproduced except in full.

Louis Wu

Approved by: Louis Wu

Sporton International Inc. Wensan Laboratory
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History of this test report

Report No.	Version	Description	Issued Date
FR122002C	01	Initial issue of report	May 26, 2021

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 1.15 dB at 2483.600 MHz
3.6	15.207	AC Conducted Emission	Pass	Under limit 14.97 dB at 0.501 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: Amy Chen

1 General Description

1.1 Product Feature of Equipment Under Test

Product Feature	
Equipment	Touch Computer
Brand Name	Zebra
Model Name	TC520L
FCC ID	UZ7TC520L
EUT supports Radios application	NFC WLAN 11b/g/n HT20 WLAN 11a/n HT20/HT40 WLAN 11ac VHT20/VHT40/VHT80 WLAN 11ax HE20/HE40/HE80 Bluetooth BR/EDR/LE
HW Version	DV
SW Version	11-09-22.00-RG-U00-PRD-HEL-04
FW Version	FUSION_SA_2_1.1.0.012_R
MFD	07APR21
EUT Stage	Identical Prototype

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

Specification of Accessories				
Adapter	**Brand Name**	Zebra	**Part Number**	PWR-WUA5V12W0US
Battery 1	**Brand Name**	Zebra	**Part Number**	BT-000314-01
Battery 2	**Brand Name**	Zebra	**Part Number**	BT-000314-50
Rugged Charge/USB cable	**Brand Name**	Zebra	**Part Number**	CBL-TC51-USB1-01
Headset Jumper 1	**Brand Name**	Zebra	**Part Number**	CBL-TC51-HDST25-01
Headset Jumper 2	**Brand Name**	Zebra	**Part Number**	CBL-TC51-HDST35-01
2.5mm Earphone	**Brand Name**	Zebra	**Part Number**	HDST-25MM-PTVP-01
3.5mm Earphone	**Brand Name**	Zebra	**Part Number**	HDST-35MM-PTVP-01
Exoskeleton	**Brand Name**	Zebra	**Part Number**	SG-TC51-EX01-01
Trigger Handle 1	**Brand Name**	Zebra	**Part Number**	TRG-TC51-SNP1-01
Soft Holster	**Brand Name**	Zebra	**Part Number**	SG-TC51-HLSTR1-01
Hand strap	**Brand Name**	Zebra	**Part Number**	SG-TC51-BHDSTP1-03
USB-C Adaptor	**Brand Name**	Zebra	**Part Number**	ADPTR-TC56-USBC-01
USB Type C cable	**Brand Name**	Zebra	**Part Number**	N/A

1.2 Product Specification of Equipment Under Test

<table>
<tr><th colspan="2">Product Specification subjective to this standard</th></tr>
<tr><td>Tx/Rx Channel Frequency Range</td><td>2412 MHz ~ 2462 MHz</td></tr>
<tr><td>Maximum Output Power to Antenna
<CDD Modes></td><td>MIMO <Ant. 1+2>
802.11b : 21.86 dBm / 0.1535 W
802.11g : 22.61 dBm / 0.1824 W
802.11n HT20 : 21.86 dBm / 0.1535 W
802.11ac VHT20: 21.96 dBm / 0.1570 W
802.11ax HE20: 21.86 dBm / 0.1535 W</td></tr>
<tr><td>Maximum Output Power
<TXBF Modes></td><td>MIMO <Ant. 1+2>
802.11ac VHT20: 21.01 dBm / 0.1262 W</td></tr>
<tr><td>99% Occupied Bandwidth
<CDD Mode></td><td>MIMO <Ant. 1>
802.11b : 11.39 MHz
802.11g : 17.88 MHz
802.11ac VHT20: 18.33 MHz
MIMO <Ant. 2>
802.11b : 12.04 MHz
802.11g : 17.53 MHz
802.11ac VHT20: 18.03 MHz</td></tr>
<tr><td>99% Occupied Bandwidth
<TXBF Mode></td><td>MIMO <Ant. 1>
802.11ac VHT20 : 18.33 MHz
MIMO <Ant. 2>
802.11ac VHT20 : 17.93 MHz</td></tr>
<tr><td>Antenna Type / Gain</td><td>Ant. 1: PIFA Antenna with gain 2.10 dBi
Ant. 2: PIFA Antenna with gain 1.90 dBi</td></tr>
<tr><td>Type of Modulation</td><td>802.11b : DSSS (DBPSK / DQPSK / CCK)
802.11g/n : OFDM (BPSK / QPSK / 16QAM / 64QAM)
802.11ac : OFDM (BPSK / QPSK / 16QAM / 64QAM / 256QAM)
802.11ax: OFDM (BPSK / QPSK / 16QAM / 64QAM / 256QAM / 1024QAM)</td></tr>
<tr><td>Antenna Function Description</td><td>
<table>
<tr><th></th><th>Ant. 1</th><th>Ant. 2</th></tr>
<tr><td>802.11
b/g/n/ac/ax
MIMO</td><td>V</td><td>V</td></tr>
<tr><td>802.11ac
TXBF</td><td>V</td><td>V</td></tr>
</table>
</td></tr>
</table>

Note:

1. MIMO Ant. 1+2 is a calculated result from sum of the power MIMO Ant. 1 and MIMO Ant. 2.
2. The above EUT's information was declared by manufacturer. Please refer to Comments and Explanations in report summary.

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 333, Taiwan (R.O.C.) TEL: +886-3-327-3456 FAX: +886-3-328-4978
Test Site No.	**Sporton Site No.**
	CO05-HY (TAF Code: 1190)
Remark	The AC Conducted Emission test item subcontracted to Sporton International Inc. EMC & Wireless Communications Laboratory.

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

Test Site	Sporton International Inc. Wensan Laboratory
Test Site Location	No.58, Aly. 75, Ln. 564, Wenhua 3rd, Rd., Guishan Dist., Taoyuan City 333010, Taiwan (R.O.C.) TEL: +886-3-327-0868 FAX: +886-3-327-0855
Test Site No.	**Sporton Site No.**
	TH05-HY, 03CH11-HY

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

FCC designation No.: TW1190 and TW3786

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.
- FCC KDB 662911 D01 Multiple Transmitter Output v02r01.
- 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 (CDD Mode: Z plane with 3.5mm Earphone; TXBF Mode: Z plane with 2.5mm Earphone) 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.

CDD Mode

Modulation	Data Rate
802.11b	1 Mbps
802.11g	6 Mbps
802.11n HT20 (Covered by VHT20)	MCS0
802.11ac VHT20	MCS0
802.11ax HE20 (Covered by VHT20)	MCS0

TXBF Mode

Modulation	Data Rate
802.11ac VHT20	MCS0

Test Cases	
AC Conducted Emission	Mode 1 : WLAN (2.4GHz) Link + Bluetooth Link + Scanner + Battery 1 + Rugged Charge/USB cable + Adapter + Headset Jumper 1 + 2.5mm Earphone
Remark: For Radiated Test Cases, the tests were performed with Battery 1, Headset Jumper 2 and 3.5mm Earphone.	

<CDD Mode>

Ch. #	2400-2483.5 MHz			
	802.11b	802.11g	802.11ac VHT20	802.11ax HE20
Low	01	01	01	01
Middle	06	06	06	-
High	11	11	11	11

<TXBF Mode>

Ch. #	2400-2483.5 MHz
	802.11ac VHT20
Low	01
Middle	06
High	11

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

<CDD Mode>
MIMO <Ant. 1+2>

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	**21.86**	CH 01	21.14	21.10	21.35
CH 06	2437	21.57				
CH 11	2462	18.71				

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		9M	12M	18M	24M	36M	48M	54M
CH 01	2412	19.76	CH 06	21.91	21.82	21.88	21.84	21.97	21.85	21.81
CH 06	2437	**22.61**								
CH 11	2462	17.11								

802.11n HT20 RF Avg Output Power (dBm)									
Power vs. Channel			Power vs Data Rate						
Channel	Frequency (MHz)	MCS Index	Channel	MCS Index					
		MCS0		MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
CH 01	2412	18.81	CH 06	21.76	21.76	21.76	21.76	21.76	21.76	21.76
CH 06	2437	**21.86**								
CH 11	2462	16.96								

802.11ac VHT20 RF Avg Output Power (dBm)										
Power vs. Channel			Power vs Data Rate							
Channel	Frequency (MHz)	MCS Index	Channel	MCS Index						
		MCS0		MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8
CH 01	2412	18.91	CH 06	21.58	21.70	21.72	21.72	21.88	21.88	21.87	21.88
CH 06	2437	**21.96**									
CH 11	2462	17.06									

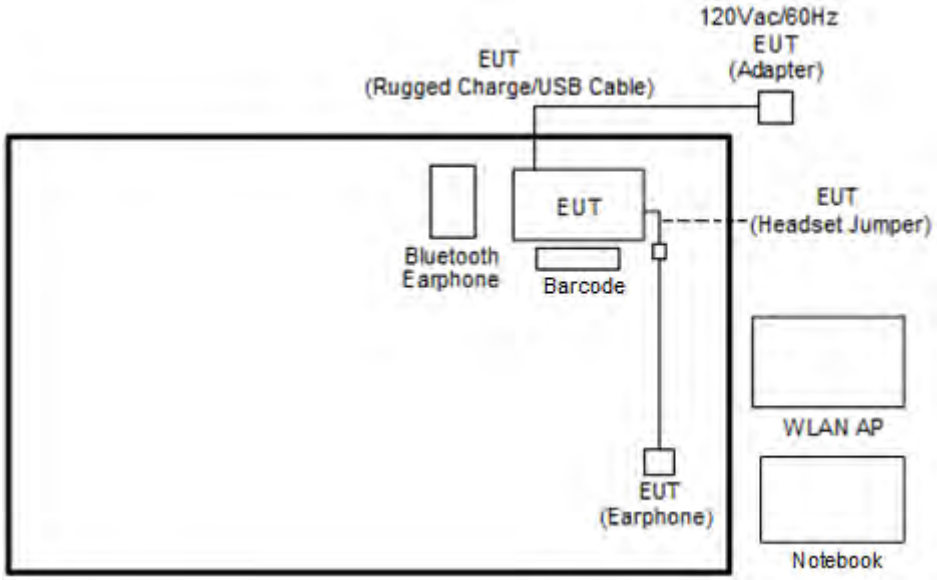
802.11ax HE20 RF Output Power (dBm)														
Power vs. Channel				Power vs Data Rate										
Channel	Frequency (MHz)	RU Config.	MCS Index	Channel	MCS Index									
			MCS0		MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8	MCS9	MCS 10	MCS 11
CH 01	2412	Full	18.41	CH 06	21.56	21.56	21.41	21.82	21.74	21.12	21.12	21.01	21.08	21.08	21.17
CH 01	2412	26/0	10.62												
CH 01	2412	52/37	12.24												
CH 01	2412	106/53	14.91												
CH 06	2437	Full	**21.86**												
CH 06	2437	26/4	16.81												
CH 06	2437	52/39	17.91												
CH 06	2437	106/53	21.06												
CH 11	2462	Full	16.96												
CH 11	2462	26/8	8.77												
CH 11	2462	52/40	10.61												
CH 11	2462	106/54	14.16												

<TXBF Mode>
MIMO <Ant. 1+2>

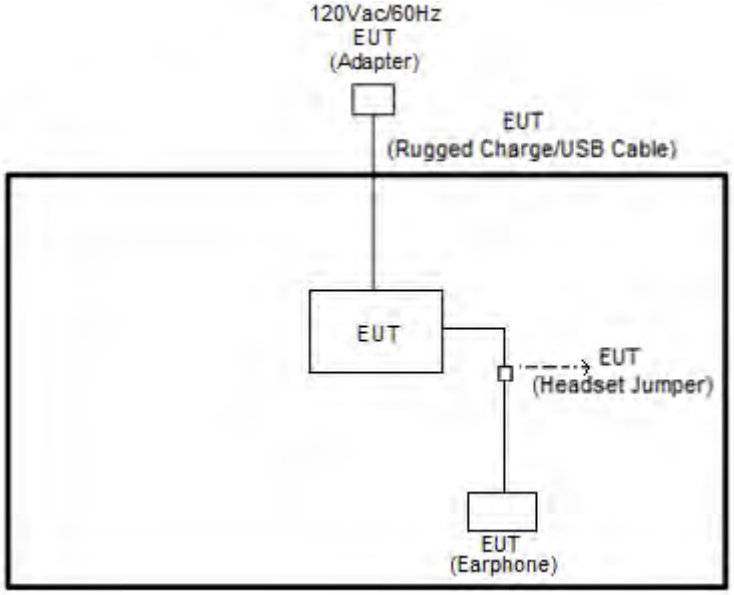
802.11ac VHT20 RF Output Power (dBm)										
Power vs. Channel			Power vs Data Rate							
Channel	Frequency (MHz)	MCS Index	Channel	MCS Index						
		MCS0		MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8
CH 01	2412	20.11	CH 06	20.91	20.91	20.91	20.91	20.91	20.91	20.91	20.91
CH 06	2437	**21.01**									
CH 11	2462	14.91									

2.3 Connection Diagram of Test System

<AC Conducted Emission Mode>



<CDD Mode>



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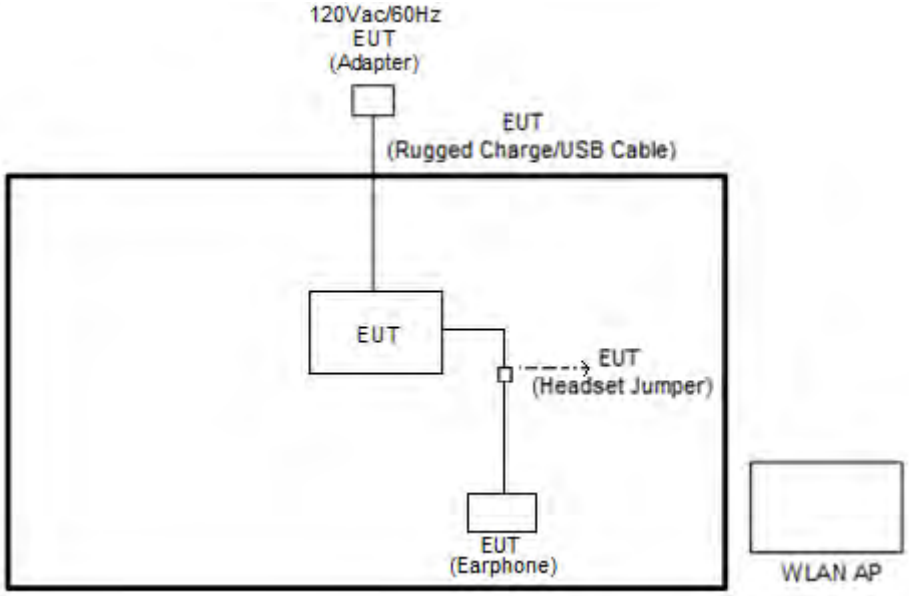


2.4 Support Unit used in test configuration and system

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 E6320	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
4.	Notebook	DELL	Latitude 3400	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
5.	Notebook	DELL	PP42L	FCC DoC	N/A	AC I/P: Unshielded, 0.8 m DC O/P: Shielded, 1.77 m
6.	SD Card	SanDisk	MicroSD HC	FCC DoC	N/A	N/A
7.	Barcode	N/A	N/A	N/A	N/A	N/A

2.5 EUT Operation Test Setup

The RF test items, utility “Cmd” 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.

For TXBF mode, the modulation modes and data rates manipulated by the command lines in the engineering program made the EUT link to AP by power under the normal operation. The “Command & Magic iPerf” software tool was used to enable the EUT to transmit signals continuously.

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 10 dB 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.

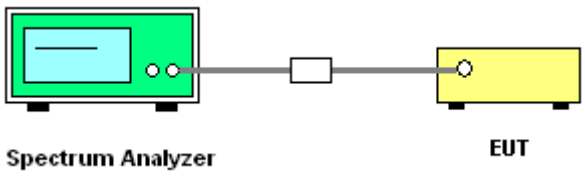
3.1.2 Measuring Instruments

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 the maximum power setting and enable the EUT to 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 :	Derek Hsu	Temperature :	23.1~24.7℃
		Relative Humidity :	55.9~58.8%

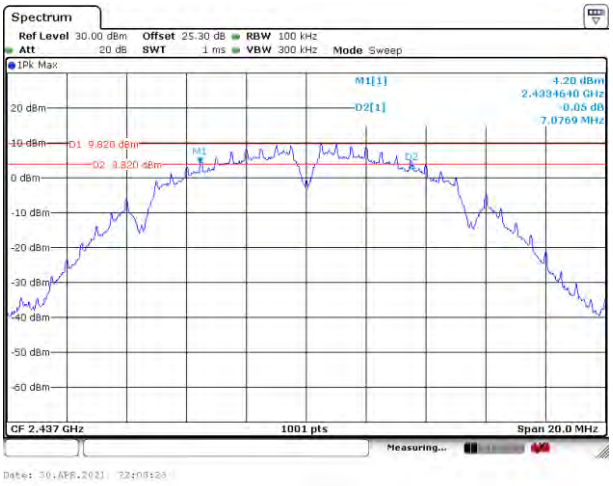
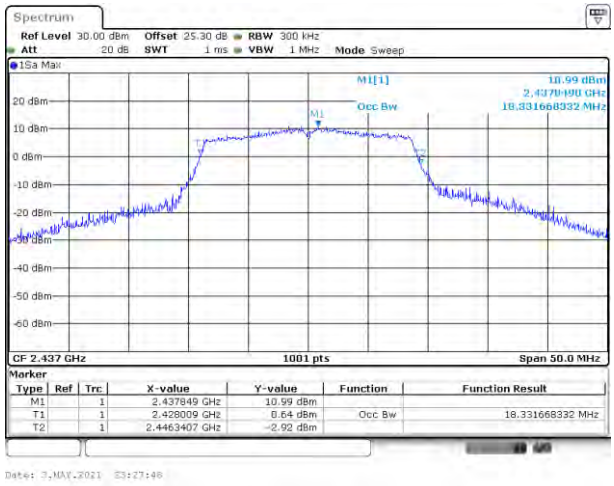
<CDD Mode>

2.4GHz Band MIMO										
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	2	1	2412	11.19	11.59	7.56	7.56	0.50	Pass
11b	1Mbps	2	6	2437	10.99	12.04	7.08	8.06	0.50	Pass
11b	1Mbps	2	11	2462	11.39	11.99	7.54	7.56	0.50	Pass
11g	6Mbps	2	1	2412	17.23	17.03	16.08	15.91	0.50	Pass
11g	6Mbps	2	6	2437	17.88	17.53	16.31	16.33	0.50	Pass
11g	6Mbps	2	11	2462	16.98	16.83	16.07	16.33	0.50	Pass
VHT20	MCS0	2	1	2412	18.13	17.83	16.91	16.36	0.50	Pass
VHT20	MCS0	2	6	2437	18.33	18.03	16.93	17.51	0.50	Pass
VHT20	MCS0	2	11	2462	18.13	17.83	16.93	17.56	0.50	Pass

<TXBF Mode>

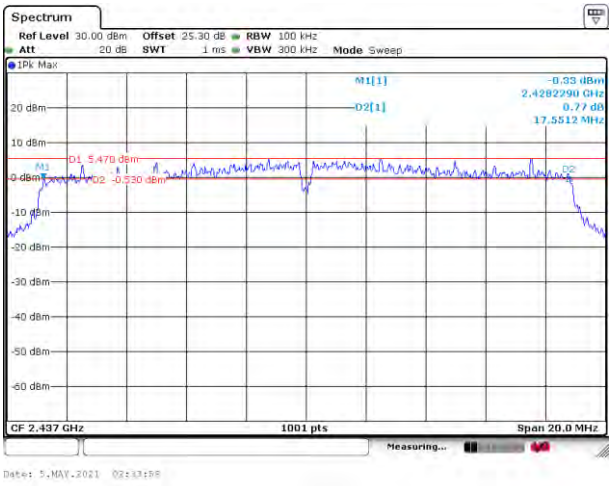
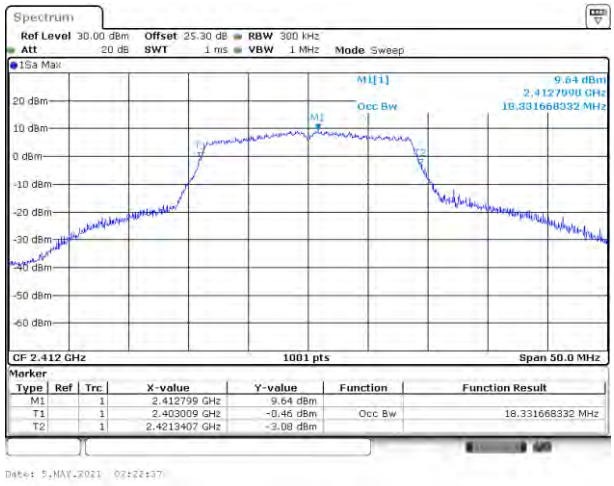
2.4GHz Band MIMO										
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	99% Occupied BW (MHz)		6dB BW (MHz)		6dB BW Limit (MHz)	Pass/Fail
					Ant1	Ant2	Ant1	Ant2		
VHT20	MCS0	2	1	2412	18.33	17.83	17.57	17.58	0.50	Pass
VHT20	MCS0	2	6	2437	18.08	17.93	17.55	17.57	0.50	Pass
VHT20	MCS0	2	11	2462	18.18	17.88	17.59	17.60	0.50	Pass

<CDD Mode>

Minimum 6dB Bandwidth	Maximum 99% Occupied Bandwidth
	

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

<TXBF Modes>

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 2400-2483.5 MHz, the limit for output power is 30 dBm. If transmitting antenna with directional gain greater than 6 dBi is used, the 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 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

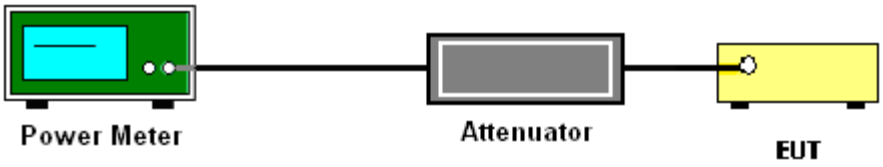
3.2.2 Measuring Instruments

See list of measuring equipment of this test report.

3.2.3 Test Procedures

1. For Average Power, the testing follows ANSI C63.10 Section 11.9.2.3.2 Method AVGPM-G
2. The RF output of EUT was connected to the power meter by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set the maximum power setting and enable the EUT to transmit continuously.
4. Measure the conducted output power and record the results in the test report.
5. For MIMO mode, calculation method follows FCC KDB 662911 D01 Multiple Transmitter Output v02r01.

3.2.4 Test Setup



3.2.5 Test Result of Average Output Power

Test Engineer :	Derek Hsu	Temperature :	23.1~24.7℃
		Relative Humidity :	55.9~58.8%

<CDD Mode>

2.4GHz Band MIMO															
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Average Conducted Power (dBm)			Conducted Power Limit (dBm)		DG (dBi)		EIRP Power (dBm)		EIRP Power Limit (dBm)		Pass /Fail
					Ant1	Ant2	SUM	Ant1	Ant2	Ant1	Ant2	Ant1	Ant2	Ant1	Ant2	
11b	1Mbps	2	1	2412	18.90	18.80	21.86	30.00		2.10		23.96		36.00		Pass
11b	1Mbps	2	6	2437	18.30	18.80	21.57	30.00		2.10		23.67		36.00		Pass
11b	1Mbps	2	11	2462	15.90	15.50	18.71	30.00		2.10		20.81		36.00		Pass
11g	6Mbps	2	1	2412	16.60	16.90	19.76	30.00		2.10		21.86		36.00		Pass
11g	6Mbps	2	6	2437	19.40	19.80	22.61	30.00		2.10		24.71		36.00		Pass
11g	6Mbps	2	11	2462	14.00	14.20	17.11	30.00		2.10		19.21		36.00		Pass
HT20	MCS0	2	1	2412	15.90	15.70	18.81	30.00		2.10		20.91		36.00		Pass
HT20	MCS0	2	6	2437	18.70	19.00	21.86	30.00		2.10		23.96		36.00		Pass
HT20	MCS0	2	11	2462	14.00	13.90	16.96	30.00		2.10		19.06		36.00		Pass
VHT20	MCS0	2	1	2412	16.00	15.80	18.91	30.00		2.10		21.01		36.00		Pass
VHT20	MCS0	2	6	2437	18.90	19.00	21.96	30.00		2.10		24.06		36.00		Pass
VHT20	MCS0	2	11	2462	14.10	14.00	17.06	30.00		2.10		19.16		36.00		Pass

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

2.4GHz Band MIMO																	
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	RU Config.	Average Conducted Power (dBm)			Conducted Power Limit (dBm)		DG (dBi)		EIRP Power (dBm)		EIRP Power Limit (dBm)		Pass /Fail
						Ant1	Ant2	SUM	Ant1	Ant2	Ant1	Ant2	Ant1	Ant2	Ant1	Ant2	
HE20	MCS0	2	1	2412	Full	15.40	15.40	18.41	30.00		2.10		20.51		36.00		Pass
HE20	MCS0	2	1	2412	26/0	7.90	7.30	10.62	30.00		2.10		12.72		36.00		Pass
HE20	MCS0	2	1	2412	52/37	9.70	8.70	12.24	30.00		2.10		14.34		36.00		Pass
HE20	MCS0	2	1	2412	106/53	12.10	11.70	14.91	30.00		2.10		17.01		36.00		Pass
HE20	MCS0	2	6	2437	Full	18.80	18.90	21.86	30.00		2.10		23.96		36.00		Pass
HE20	MCS0	2	6	2437	26/4	13.70	13.90	16.81	30.00		2.10		18.91		36.00		Pass
HE20	MCS0	2	6	2437	52/39	14.90	14.90	17.91	30.00		2.10		20.01		36.00		Pass
HE20	MCS0	2	6	2437	106/53	18.10	18.00	21.06	30.00		2.10		23.16		36.00		Pass
HE20	MCS0	2	11	2462	Full	14.00	13.90	16.96	30.00		2.10		19.06		36.00		Pass
HE20	MCS0	2	11	2462	26/8	6.10	5.40	8.77	30.00		2.10		10.87		36.00		Pass
HE20	MCS0	2	11	2462	52/40	7.60	7.60	10.61	30.00		2.10		12.71		36.00		Pass
HE20	MCS0	2	11	2462	106/54	11.10	11.20	14.16	30.00		2.10		16.26		36.00		Pass

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

<TXBF Mode>

2.4GHz Band MIMO																
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Average Conducted Power (dBm)			Conducted Power Limit (dBm)		DG (dBi)		EIRP Power (dBm)		EIRP Power Limit (dBm)		Pass /Fail
					Ant1	Ant2	SUM	Ant1	Ant2	Ant1	Ant2	Ant1	Ant2	Ant1	Ant2	
VHT20	MCS0	2	1	2412	17.10	17.10	20.11	30.00		5.01		25.12		36.00		Pass
VHT20	MCS0	2	6	2437	18.00	18.00	21.01	30.00		5.01		26.02		36.00		Pass
VHT20	MCS0	2	11	2462	12.00	11.80	14.91	30.00		5.01		19.92		36.00		Pass

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

3.3 Power Spectral Density Measurement

3.3.1 Limit of Power Spectral Density

The peak power spectral density shall not be greater than 8 dBm in any 3 kHz 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 the maximum power setting and enable the EUT to 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.
7. For MIMO mode, calculation method follows FCC KDB 662911 D01 Multiple Transmitter Output v02r01.

   If measurements performed using method (2) plus 10 log (N) exceeds the emission limit, the test should choose method (1) before declaring that the device fails the emission limit.

   Method (1): Measure and sum the spectra across the outputs.

   The total final Power Spectral Density is from a device with 2 transmitter outputs. The spectrum measurements of the individual outputs are all performed with the same span and number of points, the spectrum value in the first spectral bin of output 1 is summed with that in the first spectral bin of output 2 to obtain the value for the first frequency bin of the summed spectrum.

   Method (2): Measure and add 10 log (N) dB, where N is the number of outputs. (N=2)

3.3.4 Test Setup

3.3.5 Test Result of Power Spectral Density

Test Engineer :	Derek Hsu	Temperature :	23.1~24.7℃
		Relative Humidity :	55.9~58.8%

<CDD Mode>

2.4GHz Band MIMO												
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Peak PSD (dBm/3kHz)			DG (dBi)		Peak PSD Limit (dBm/3kHz)		Pass/Fail
					Ant1	Ant2	Worse + 3.01	Ant1	Ant2	Ant1	Ant2	
11b	1Mbps	2	1	2412	-2.98	-2.60	0.41	5.01		8.00		Pass
11b	1Mbps	2	6	2437	-3.67	-3.93	-0.66	5.01		8.00		Pass
11b	1Mbps	2	11	2462	-7.10	-6.54	-3.53	5.01		8.00		Pass
11g	6Mbps	2	1	2412	-8.29	-7.24	-4.23	5.01		8.00		Pass
11g	6Mbps	2	6	2437	-5.51	-4.88	-1.87	5.01		8.00		Pass
11g	6Mbps	2	11	2462	-11.27	-11.05	-8.04	5.01		8.00		Pass
VHT20	MCS0	2	1	2412	-9.43	-9.40	-6.39	5.01		8.00		Pass
VHT20	MCS0	2	6	2437	-4.71	-4.23	-1.22	5.01		8.00		Pass
VHT20	MCS0	2	11	2462	-10.44	-10.75	-7.43	5.01		8.00		Pass

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

2.4GHz Band MIMO													
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	RU Config.	Peak PSD (dBm/3kHz)			DG (dBi)		Peak PSD Limit (dBm/3kHz)		Pass/Fail
						Ant1	Ant2	Worse + 3.01	Ant1	Ant2	Ant1	Ant2	
HE20	MCS0	2	1	2412	Full	-10.36	-9.95	-6.94	5.01		8.00		Pass
HE20	MCS0	2	1	2412	26/0	-10.17	-11.16	-7.16	5.01		8.00		Pass
HE20	MCS0	2	1	2412	52/37	-10.25	-11.20	-7.24	5.01		8.00		Pass
HE20	MCS0	2	1	2412	106/53	-10.83	-12.07	-7.82	5.01		8.00		Pass
HE20	MCS0	2	6	2437	Full	-4.49	-5.92	-1.48	5.01		8.00		Pass
HE20	MCS0	2	6	2437	26/4	-4.74	-4.82	-1.73	5.01		8.00		Pass
HE20	MCS0	2	6	2437	52/39	-4.71	-5.91	-1.70	5.01		8.00		Pass
HE20	MCS0	2	6	2437	106/53	-5.25	-4.87	-1.86	5.01		8.00		Pass
HE20	MCS0	2	11	2462	Full	-11.07	-11.57	-8.06	5.01		8.00		Pass
HE20	MCS0	2	11	2462	26/8	-11.60	-12.16	-8.59	5.01		8.00		Pass
HE20	MCS0	2	11	2462	52/40	-11.55	-11.28	-8.27	5.01		8.00		Pass
HE20	MCS0	2	11	2462	106/54	-11.49	-12.60	-8.48	5.01		8.00		Pass

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

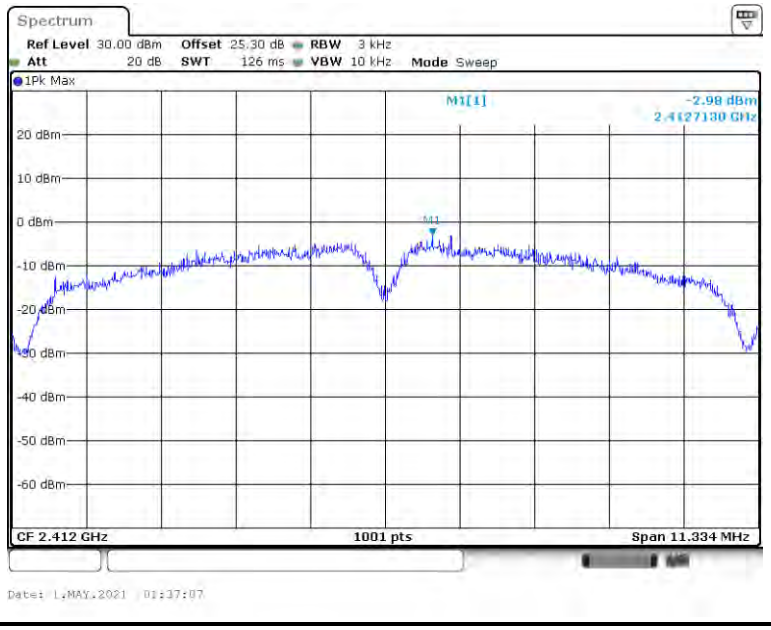
<TXBF Mode>

2.4GHz Band MIMO													
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Peak PSD (dBm/3kHz)			DG (dBi)		Peak PSD Limit (dBm/3kHz)		Pass/Fail	
					Ant1	Ant2	Worse + 3.01	Ant1	Ant2	Ant1	Ant2		
VHT20	MCS0	2	1	2412	-7.67	-6.43	-3.42	5.01		8.00		Pass	
VHT20	MCS0	2	6	2437	-5.70	-6.13	-2.69	5.01		8.00		Pass	
VHT20	MCS0	2	11	2462	-12.16	-12.27	-9.15	5.01		8.00		Pass	

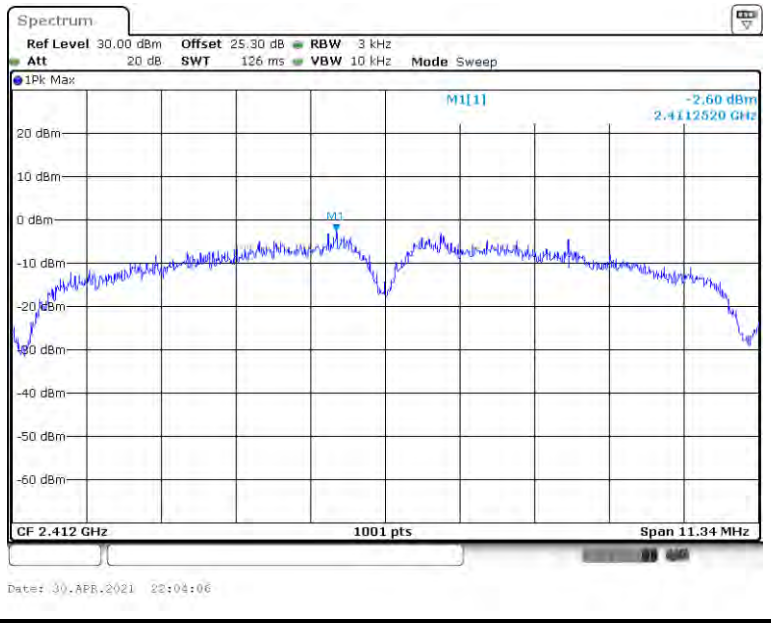
Measured power density (dBm) has offset with cable loss.

<CDD Modes>

Worst Case Power Density (dBm/3kHz) for MIMO Ant. 1

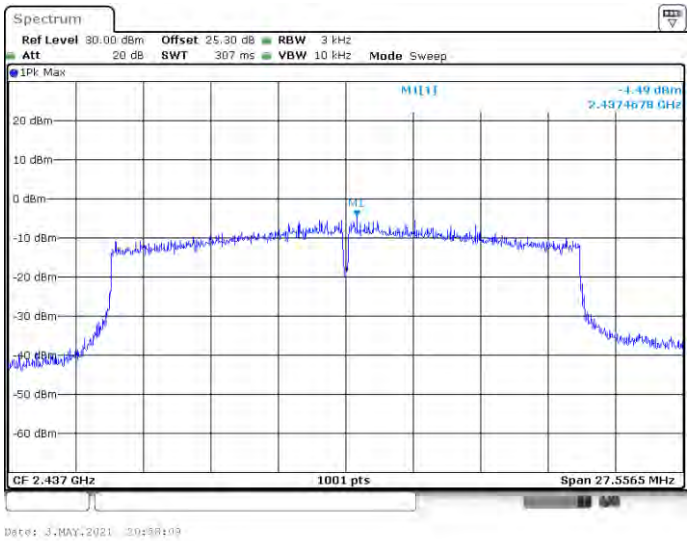


Worst Case Power Density (dBm/3kHz) for MIMO Ant. 2

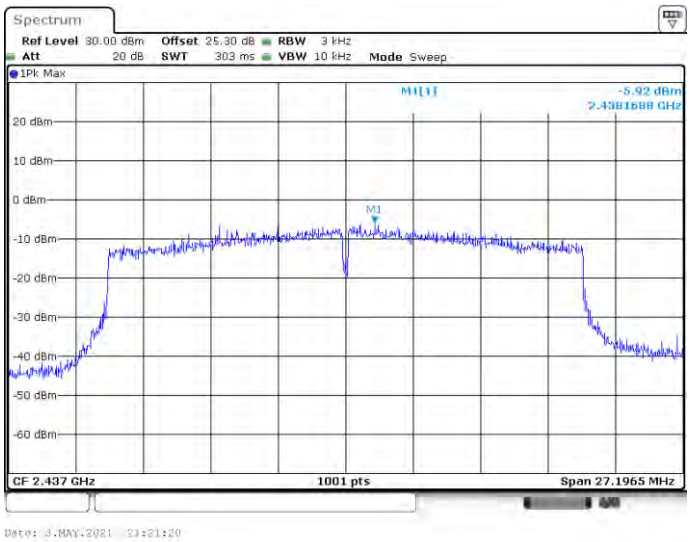


<For 802.11ax Mode>

Worst Case Power Density (dBm/3kHz) for MIMO Ant. 1

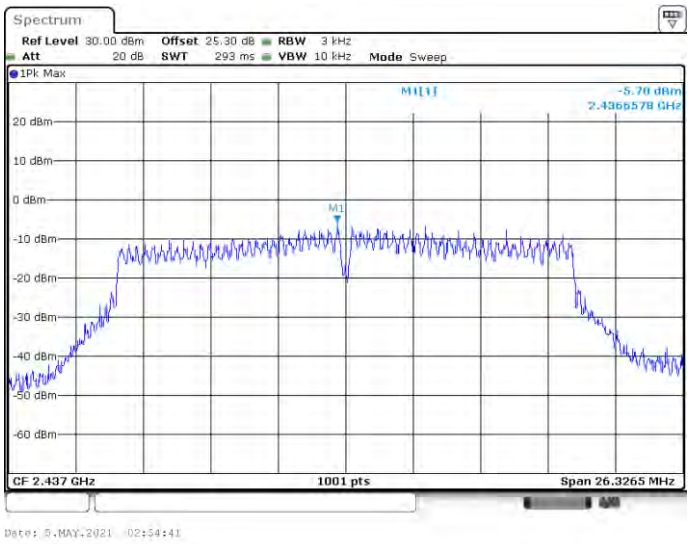


Worst Case Power Density (dBm/3kHz) for MIMO Ant. 2

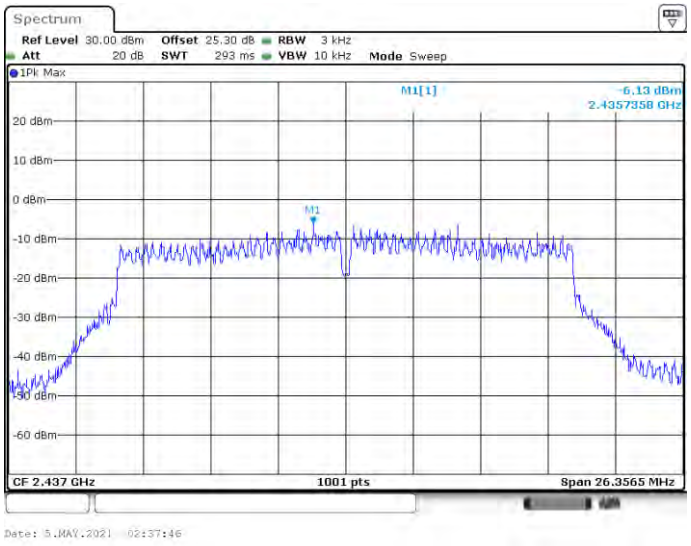


<TXBF Modes>

Worst Case Power Density (dBm/3kHz) for MIMO Ant. 1



Worst Case Power Density (dBm/3kHz) for MIMO Ant. 2



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 the maximum power setting and enable the EUT to 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

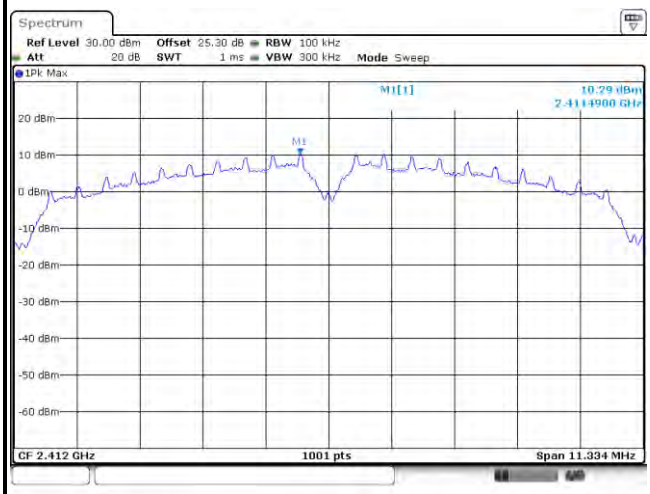
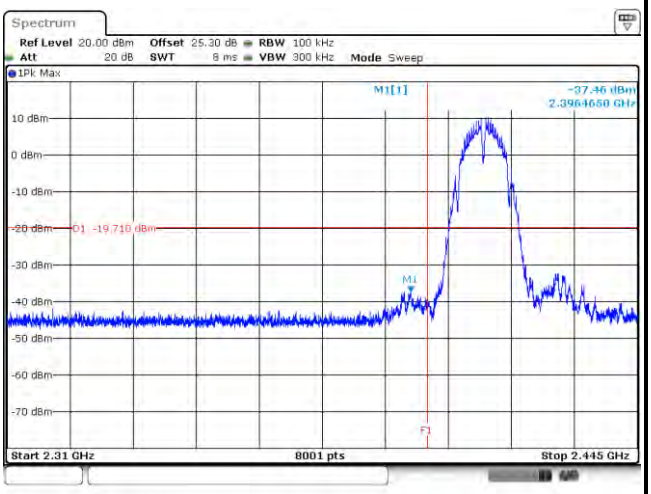
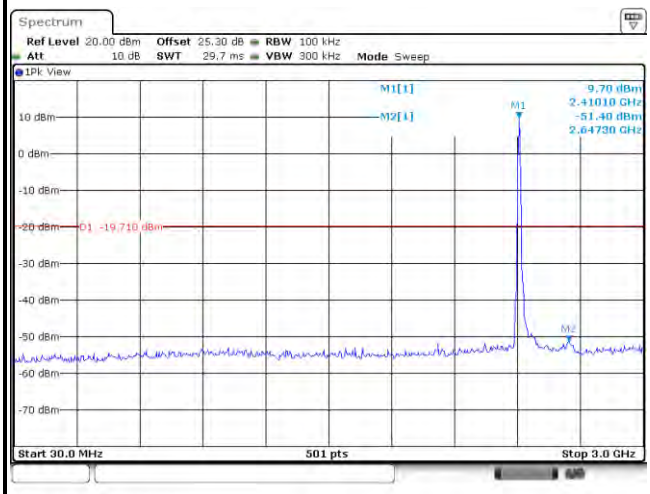
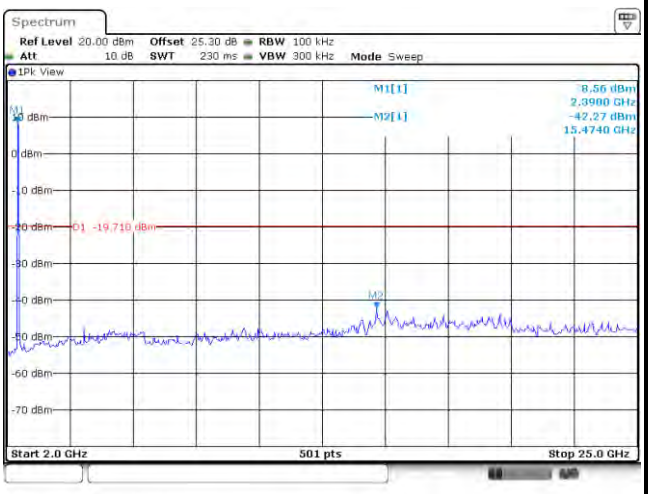
3.4.5 Test Result of Conducted Band Edges and Spurious Emission

Test Engineer :	Derek Hsu	Temperature :	23.1~24.7℃
		Relative Humidity :	55.9~58.8%

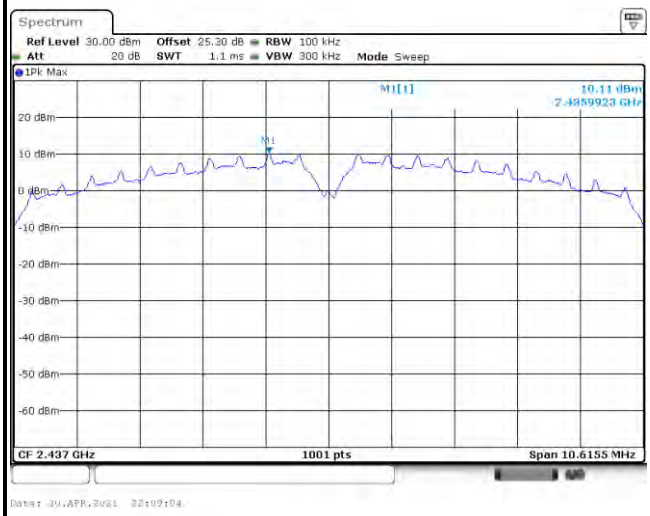
<CDD Modes>

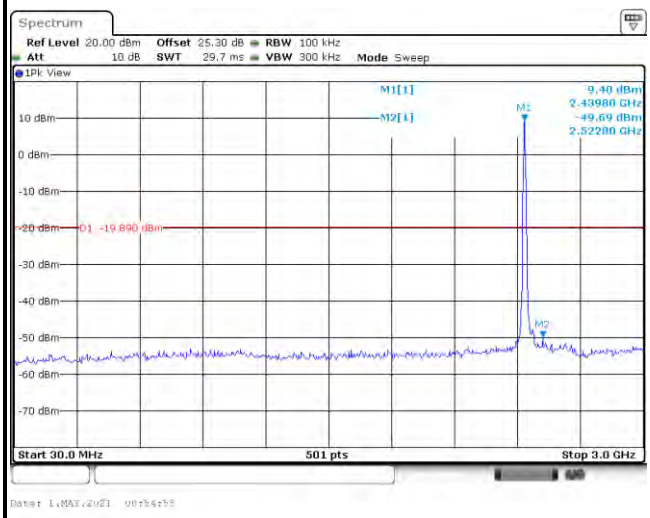
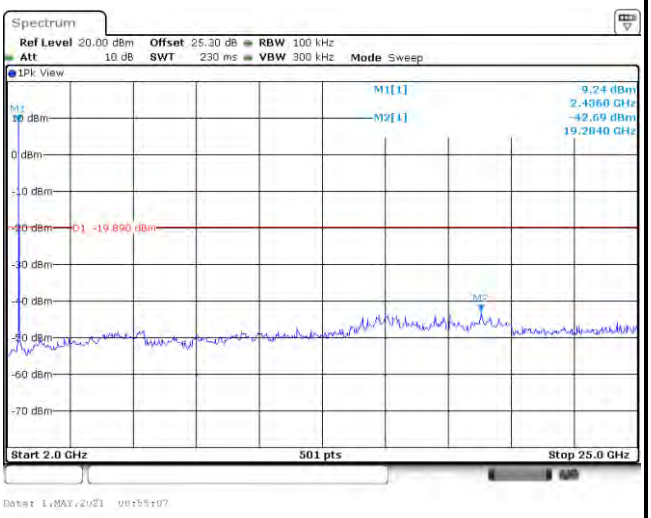
Number of TX = 2, Ant. 1 (Measured)

Test Mode :	802.11b	Test Channel :	01

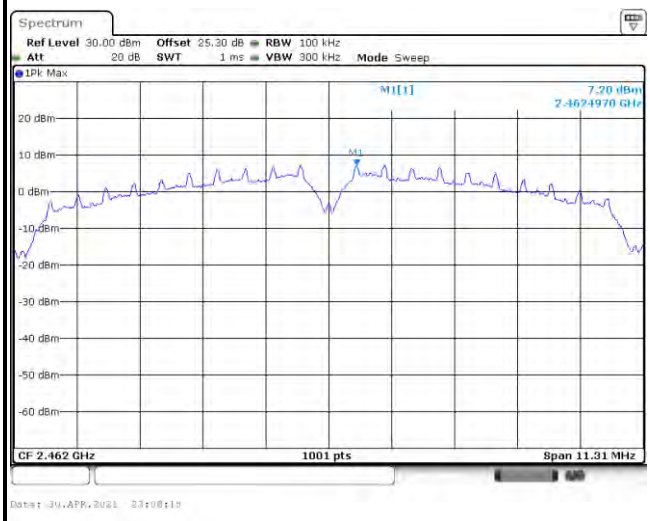
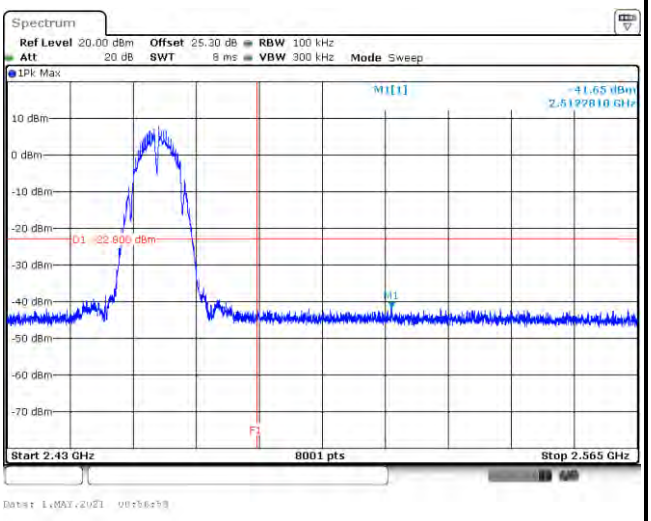
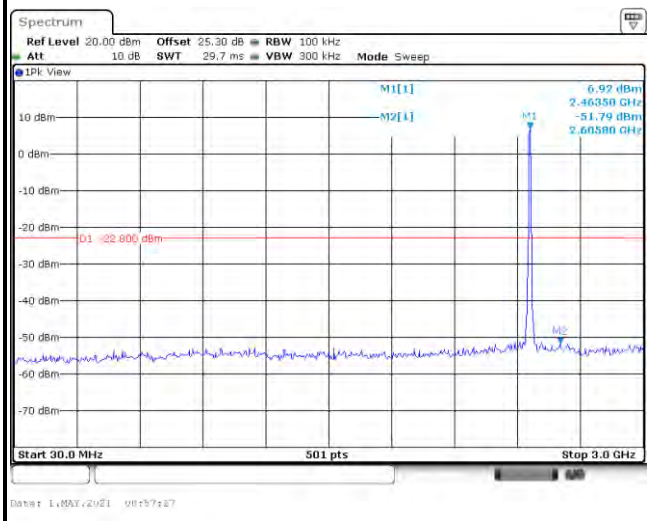
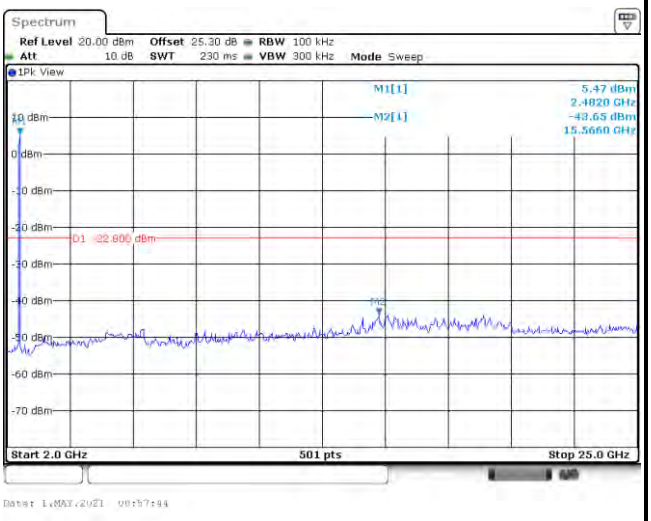
100kHz PSD reference Level	Low Channel Plot
	
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	

Test Mode :	802.11b	Test Channel :	06

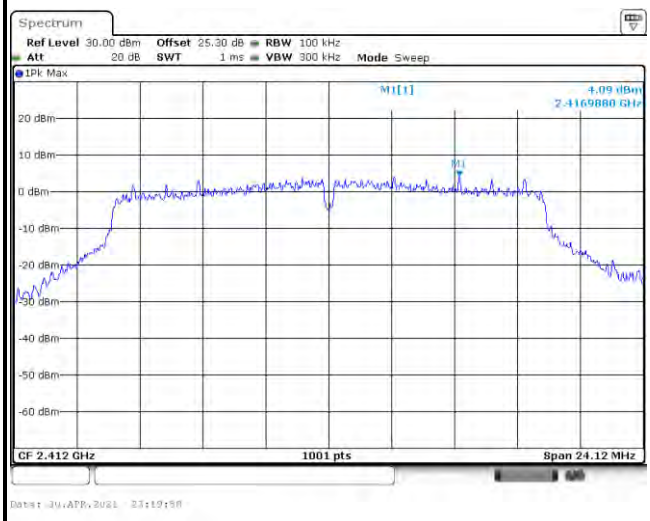
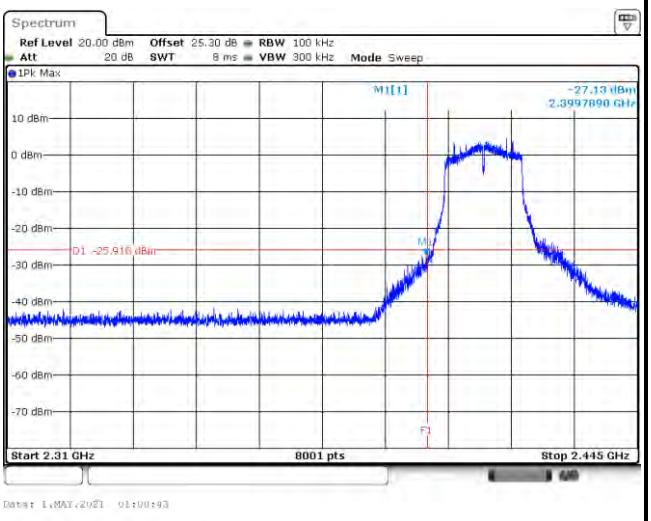
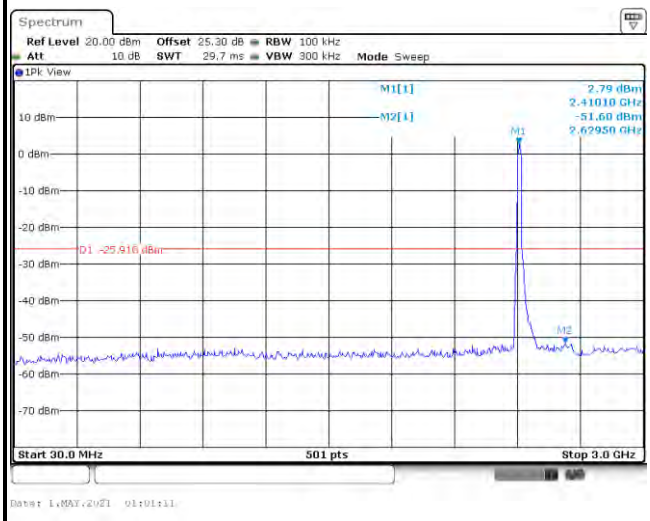
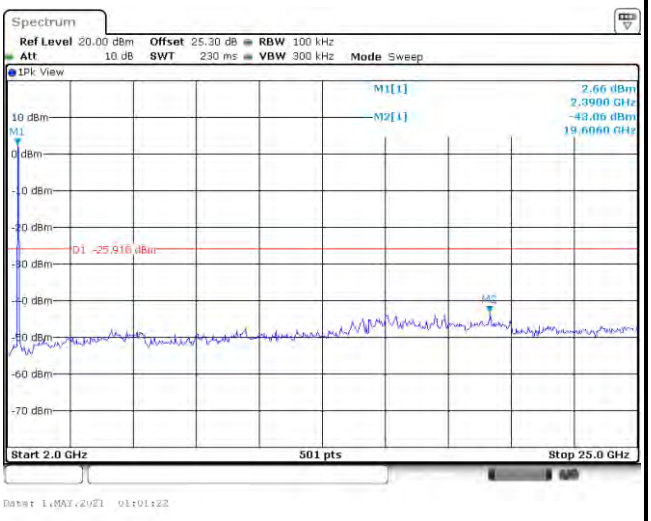
100kHz PSD reference Level	Mid Channel Plot
	

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

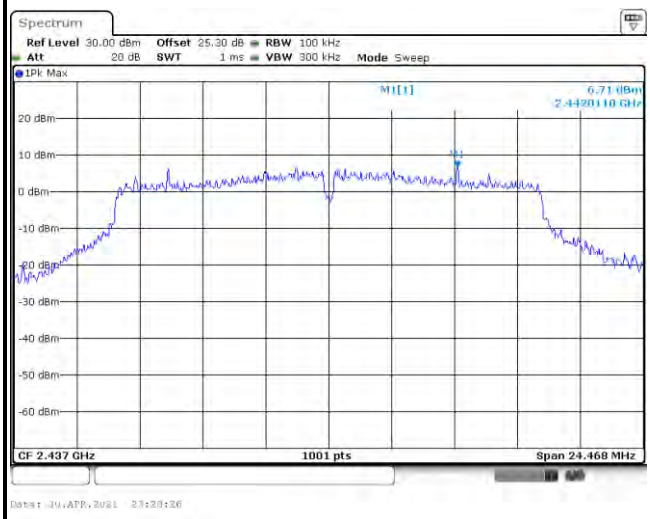
Test Mode :	802.11b	Test Channel :	11

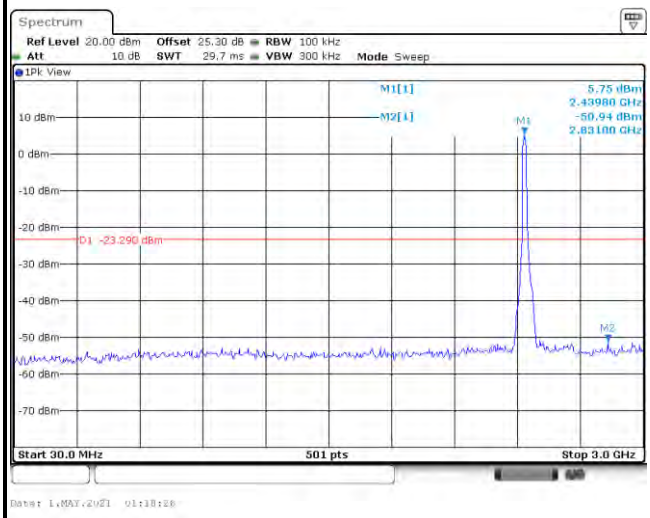
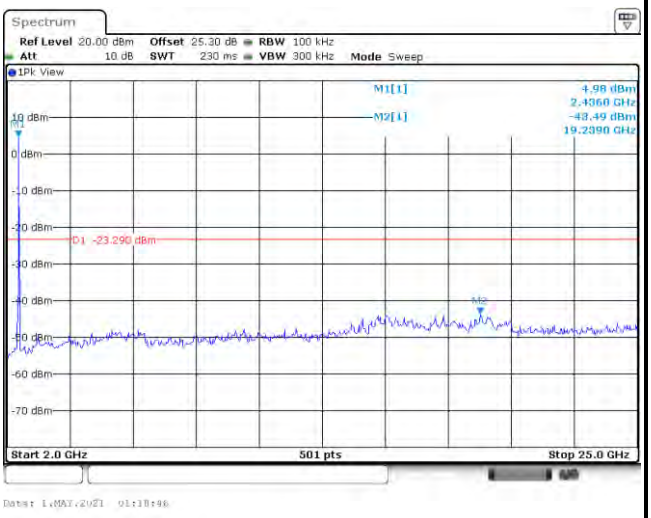
100kHz PSD reference Level	High Channel Plot
	
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	

Test Mode :	802.11g	Test Channel :	01

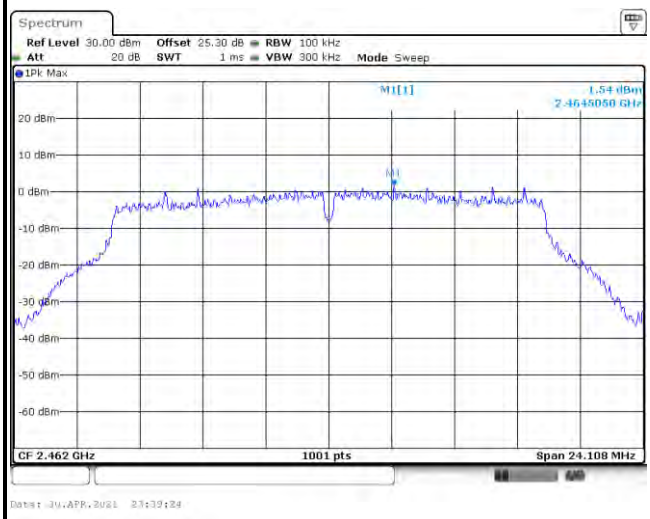
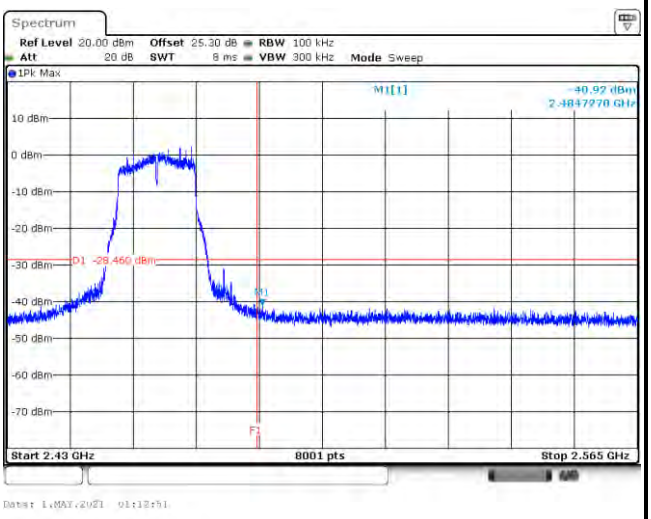
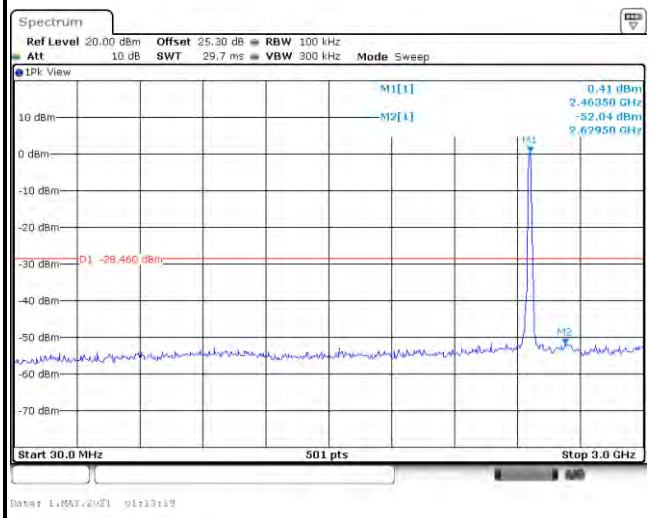
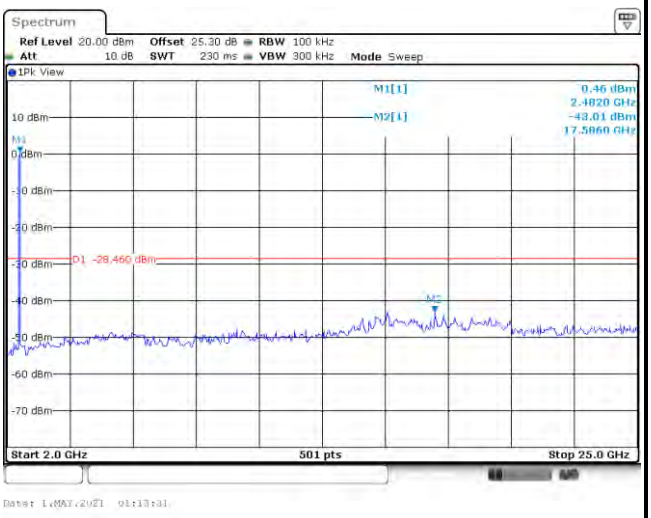
100kHz PSD reference Level	Low Channel Plot
	
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	

Test Mode :	802.11g	Test Channel :	06

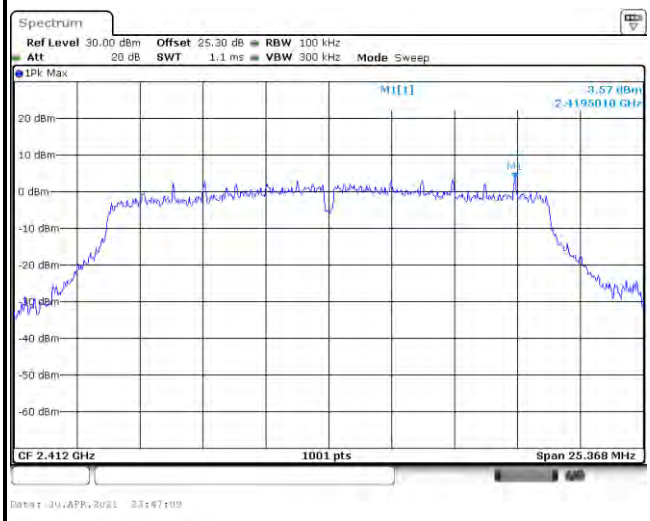
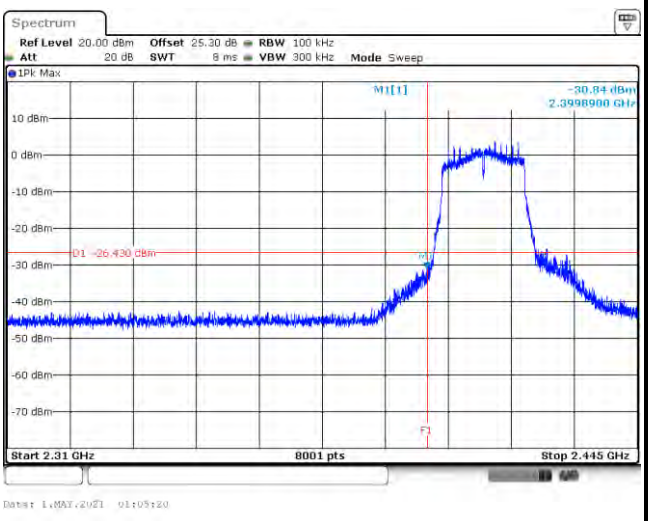
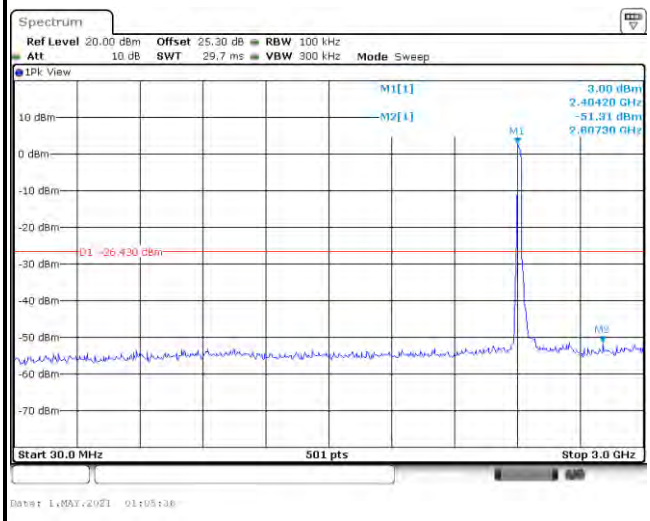
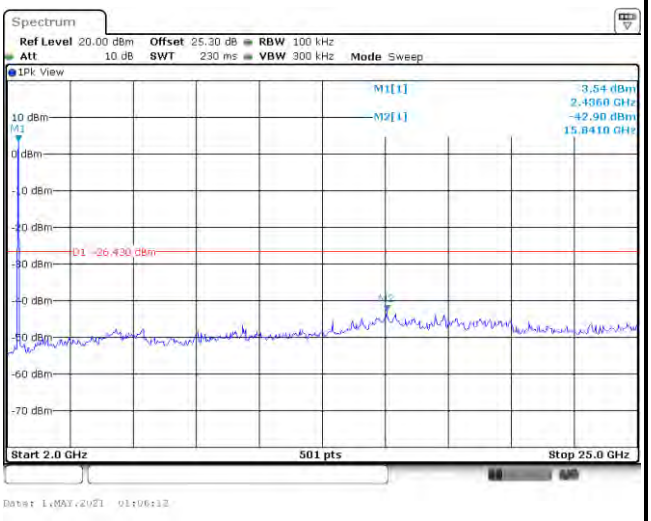
100kHz PSD reference Level	Mid Channel Plot
	

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

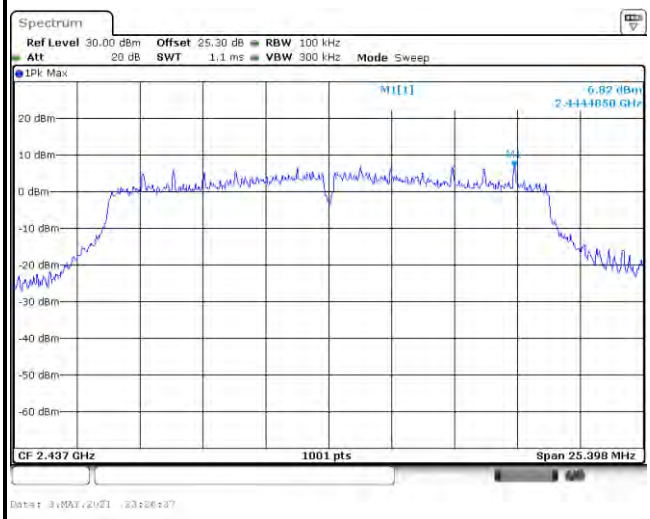
Test Mode :	802.11g	Test Channel :	11

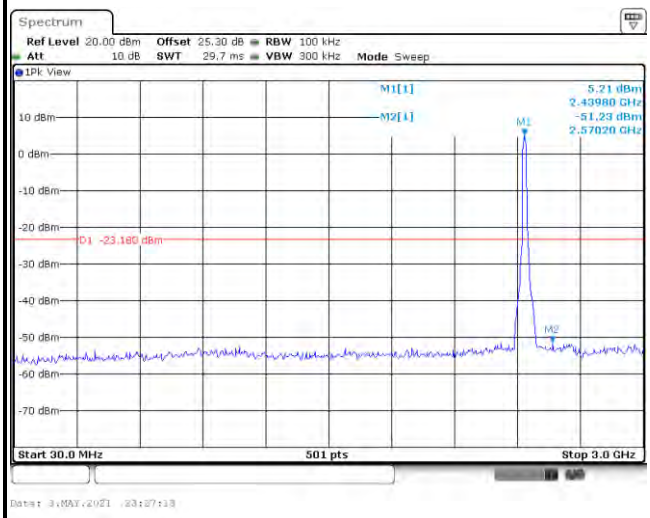
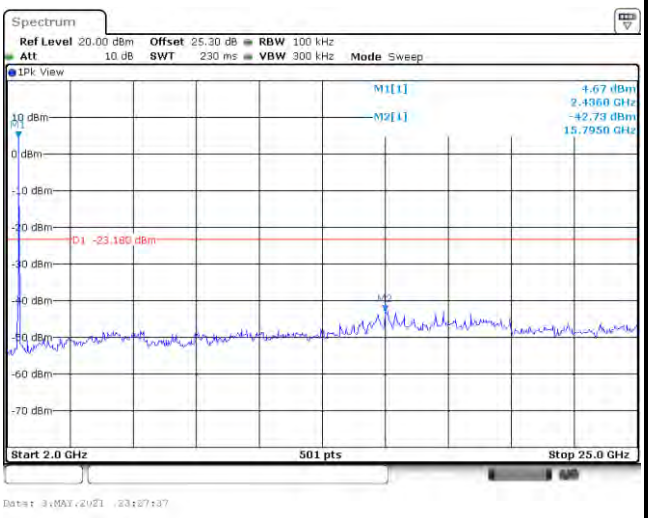
100kHz PSD reference Level	High Channel Plot
	
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	

Test Mode :	802.11ac VHT20	Test Channel :	01

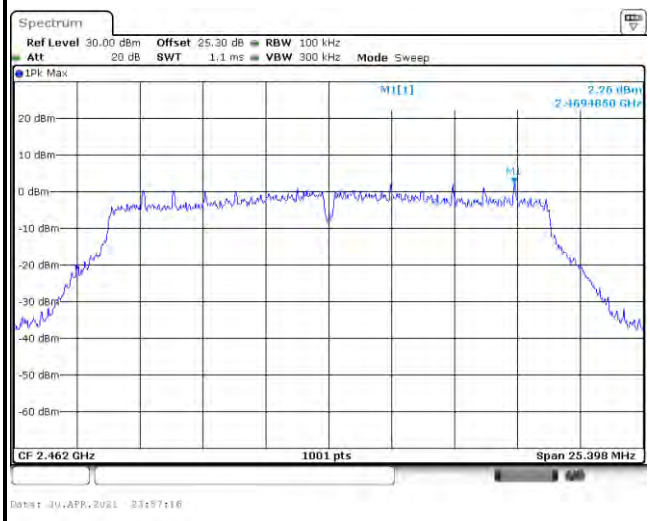
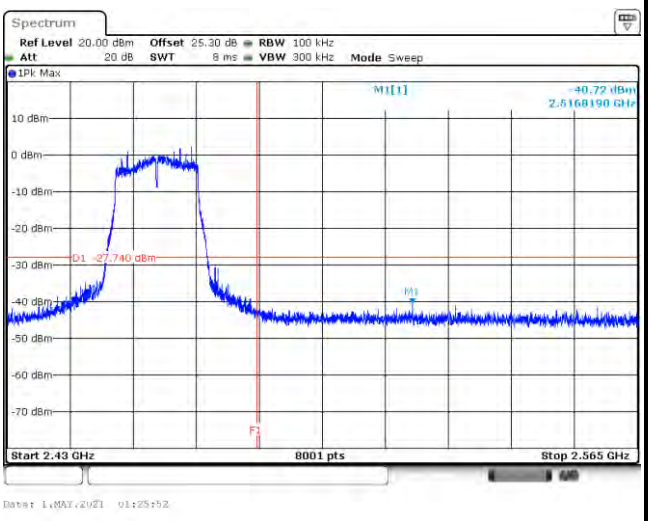
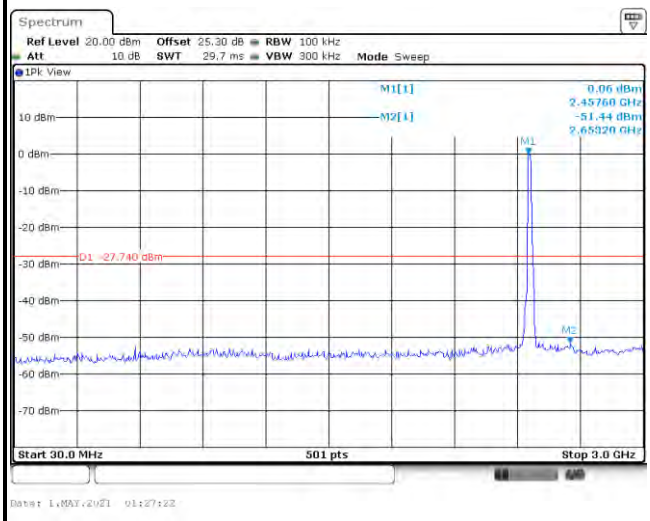
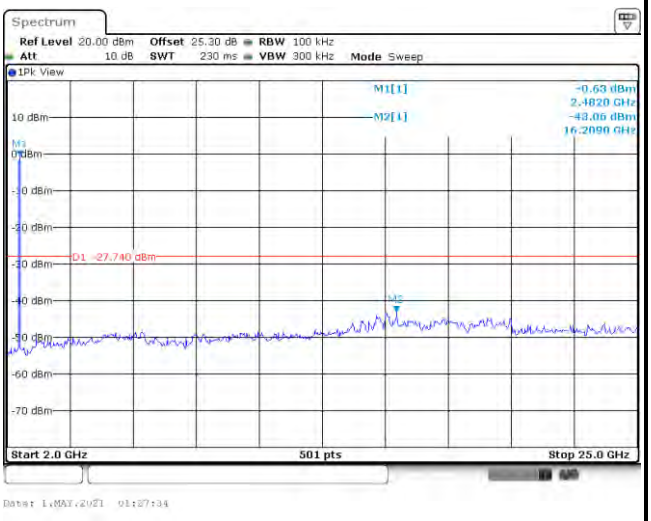
100kHz PSD reference Level	Low Channel Plot
	
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	

Test Mode :	802.11ac VHT20	Test Channel :	06

100kHz PSD reference Level	Mid Channel Plot
	

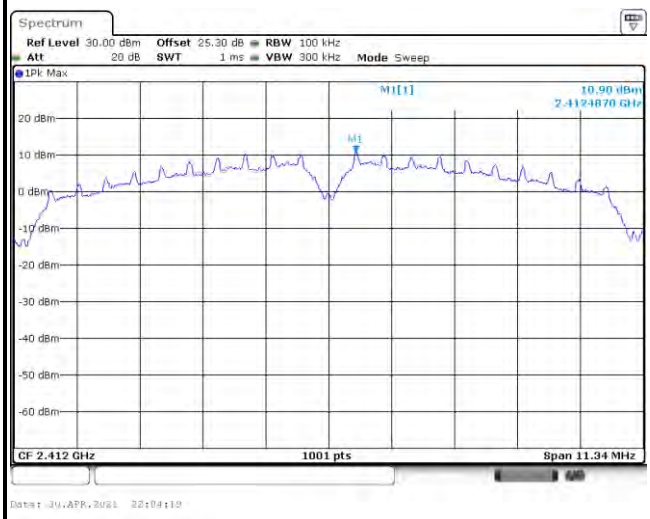
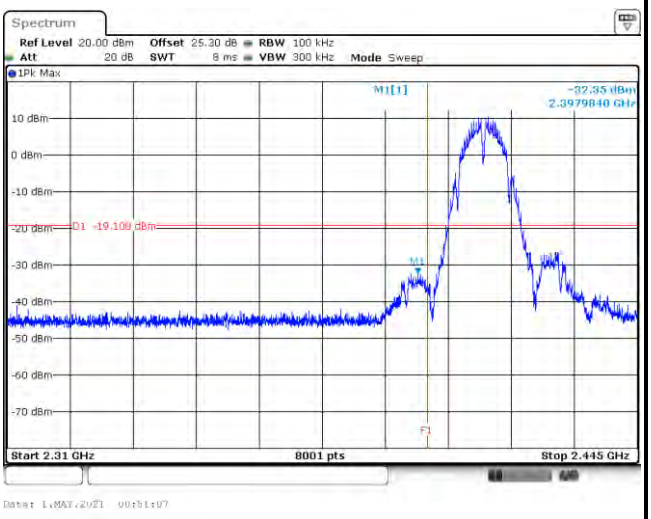
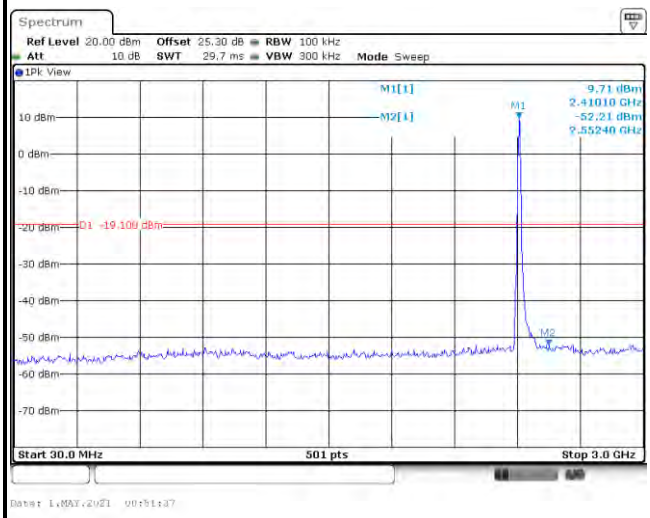
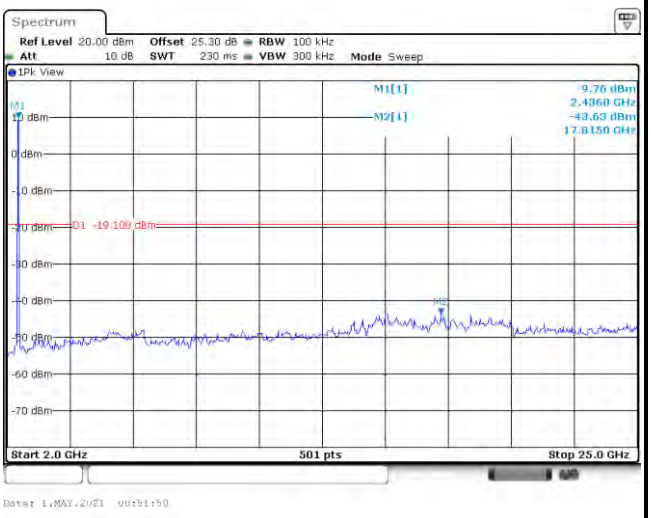
Spurious Emission 30MHz~3GHz	Spurious Emission 2GHz~25GHz
	

Test Mode :	802.11ac VHT20	Test Channel :	11

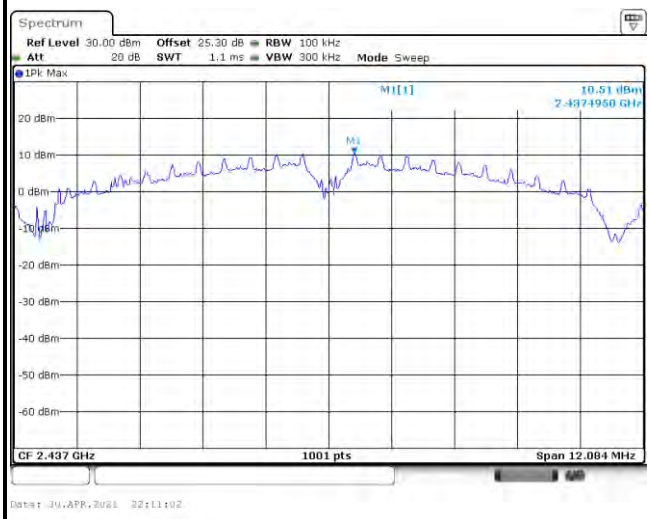
100kHz PSD reference Level	High Channel Plot
	
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	

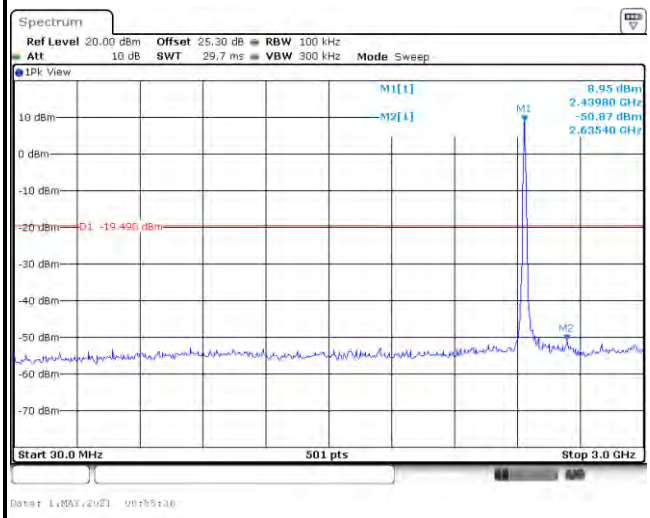
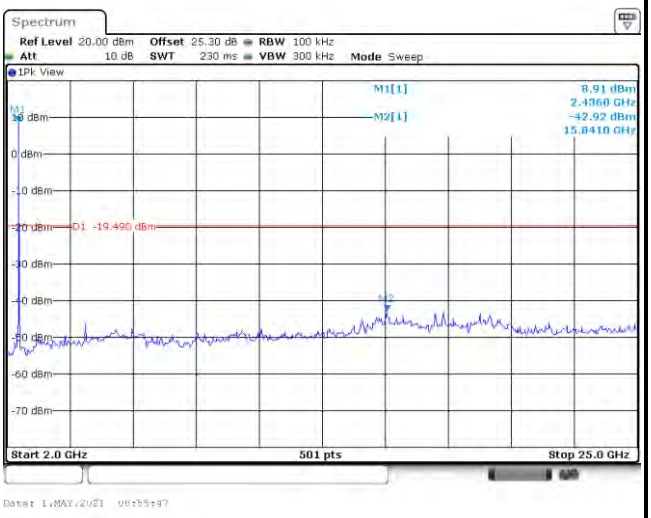
Number of TX = 2, Ant. 2 (Measured)

Test Mode :	802.11b	Test Channel :	01

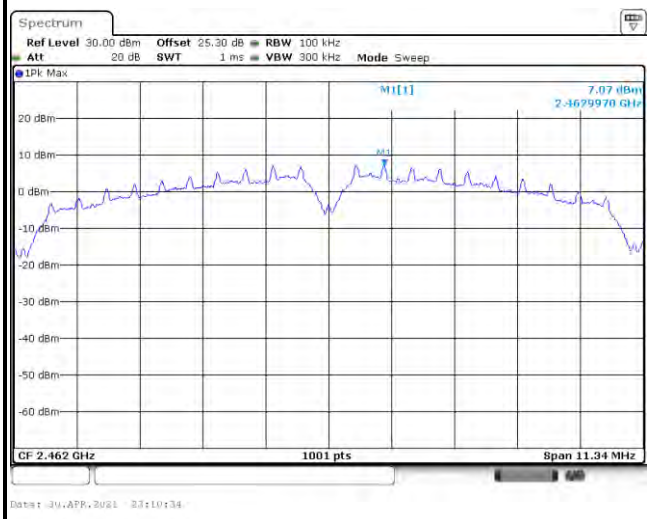
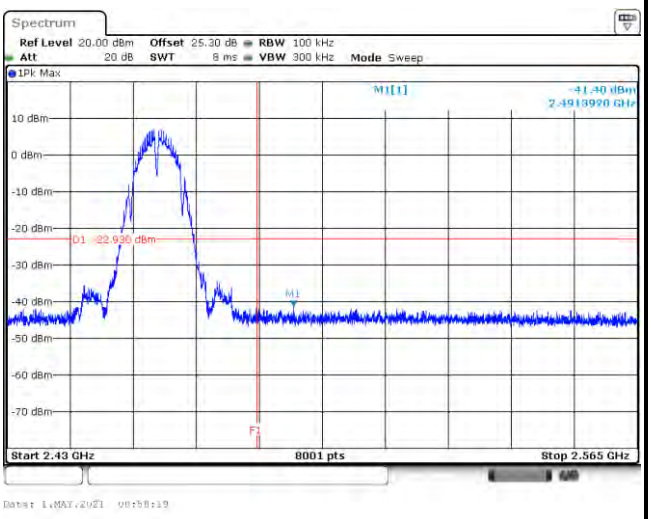
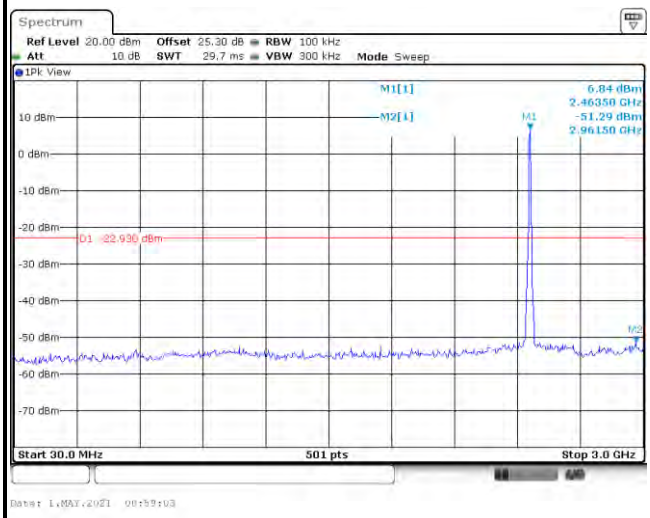
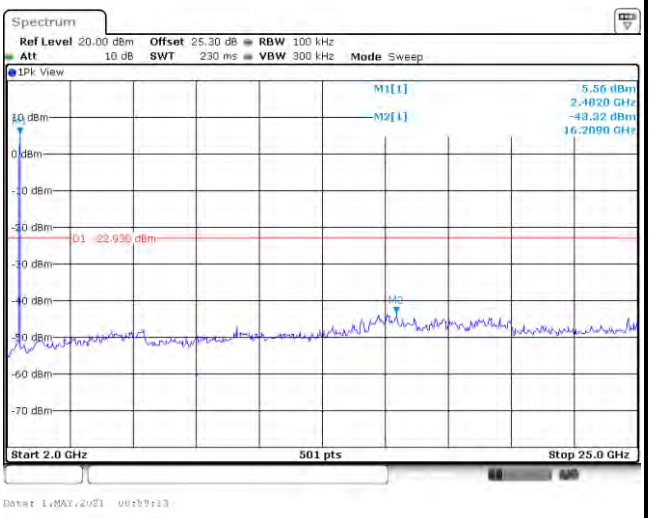
100kHz PSD reference Level	Low Channel Plot
	
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	

Test Mode :	802.11b	Test Channel :	06

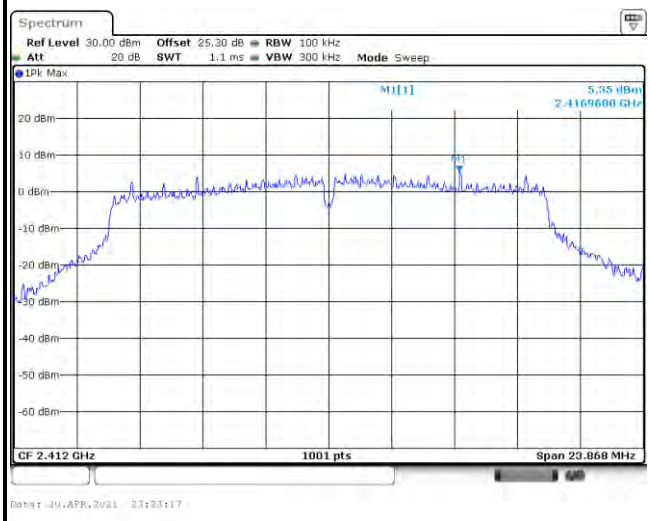
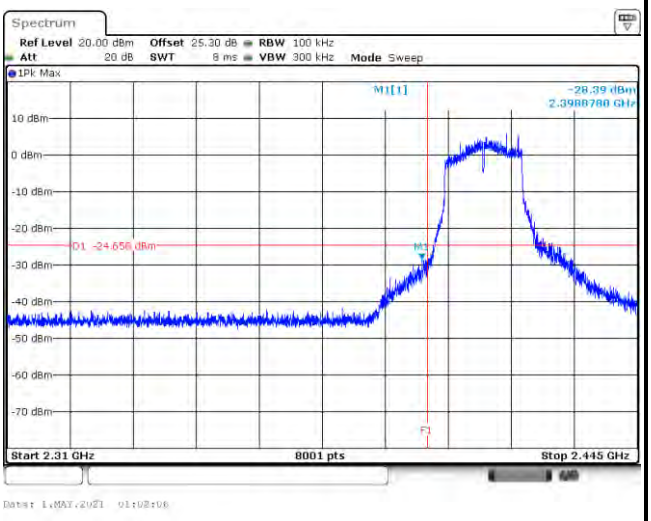
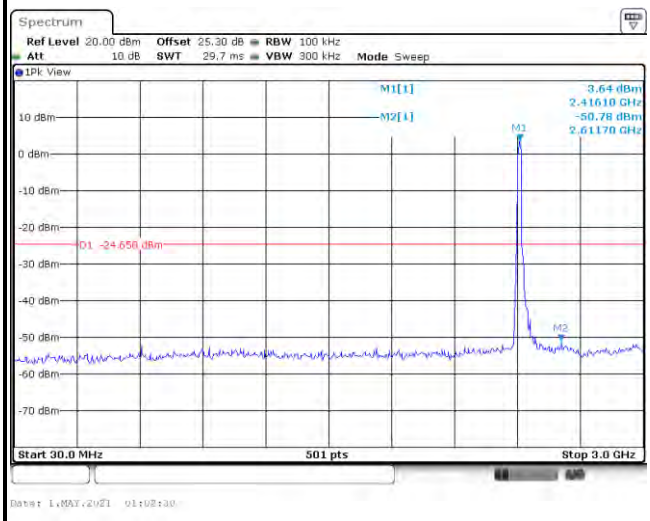
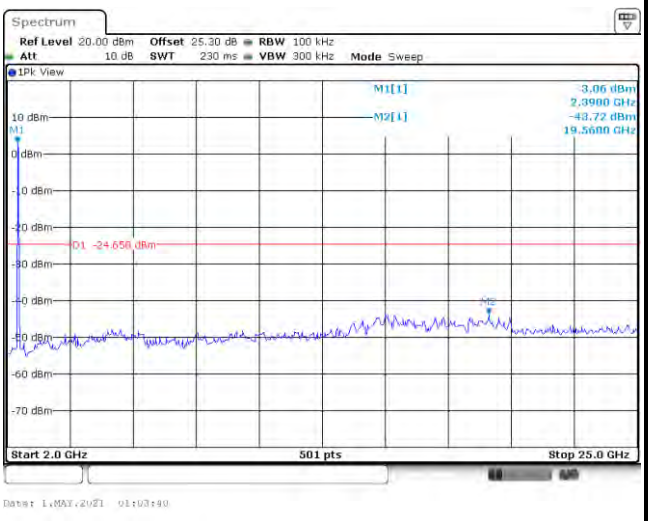
100kHz PSD reference Level	Mid Channel Plot
	

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

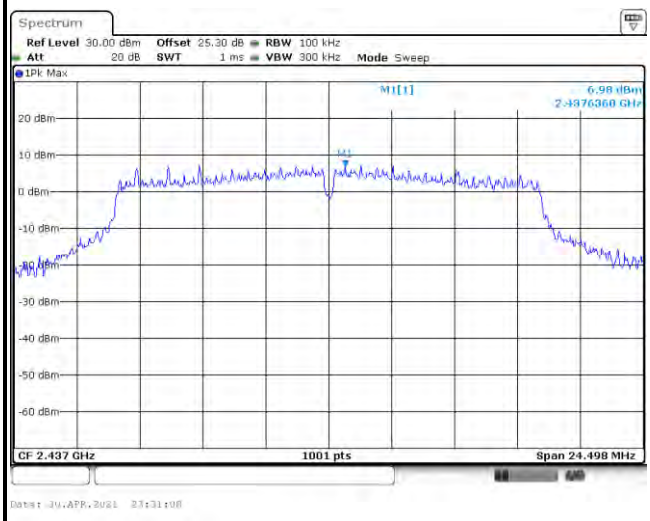
Test Mode :	802.11b	Test Channel :	11

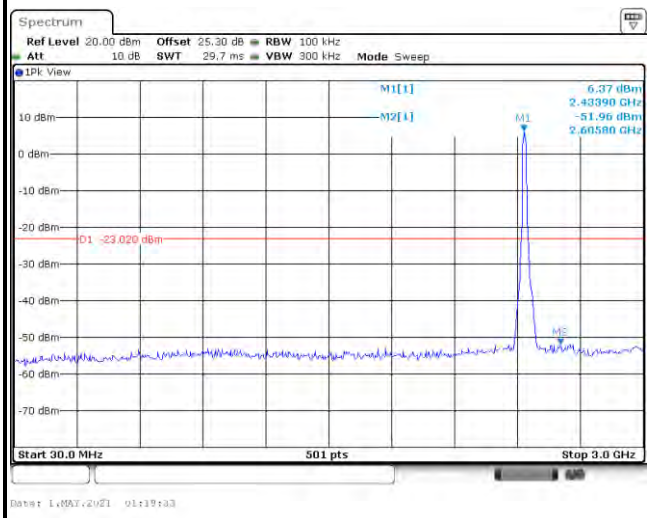
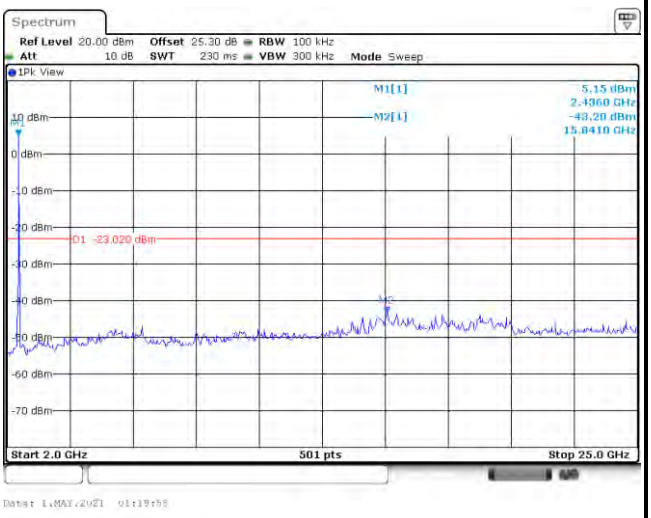
100kHz PSD reference Level	High Channel Plot
	
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	

Test Mode :	802.11g	Test Channel :	01

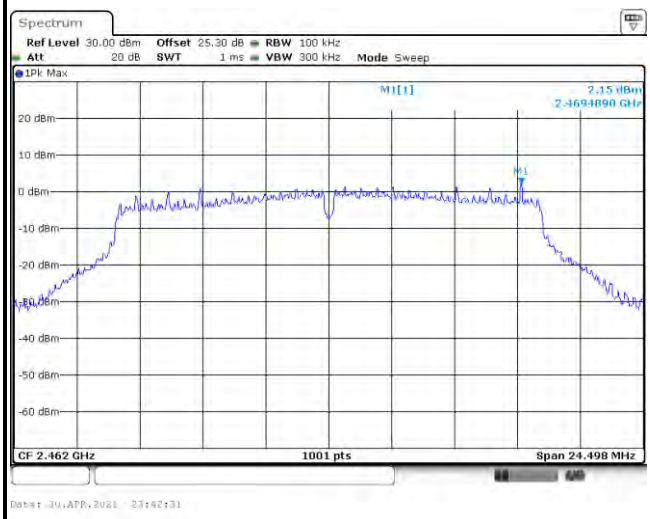
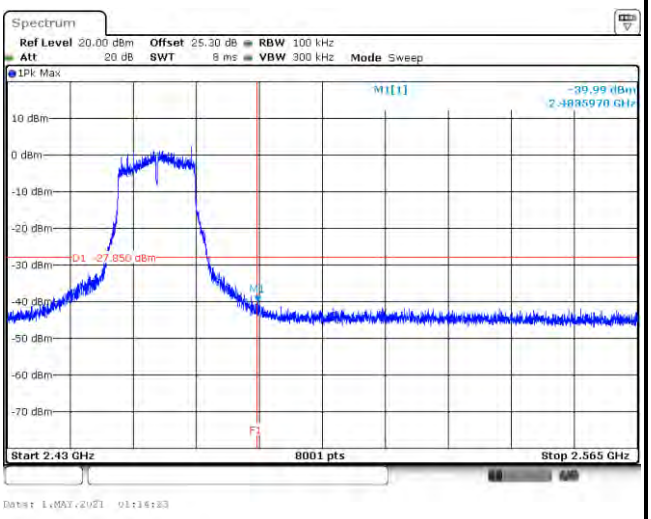
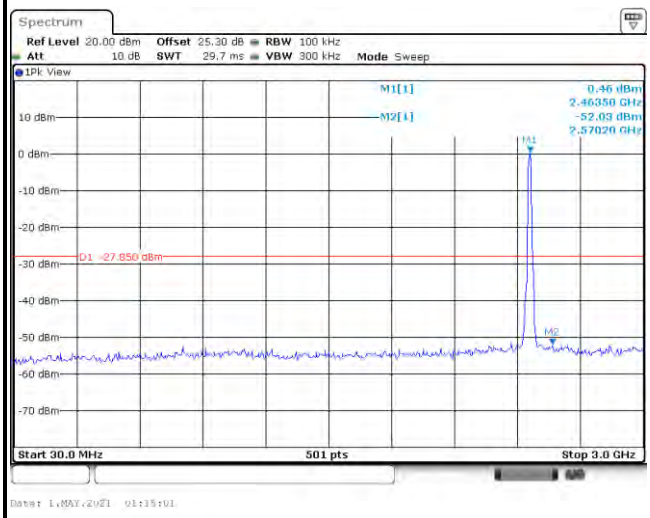
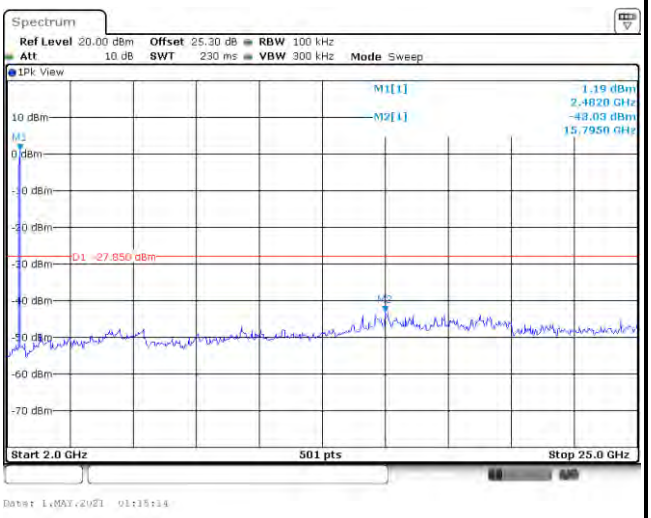
100kHz PSD reference Level	Low Channel Plot
	
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	

Test Mode :	802.11g	Test Channel :	06

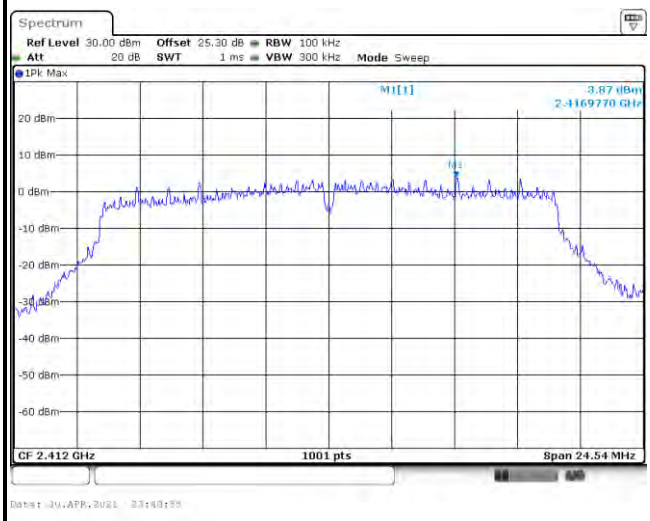
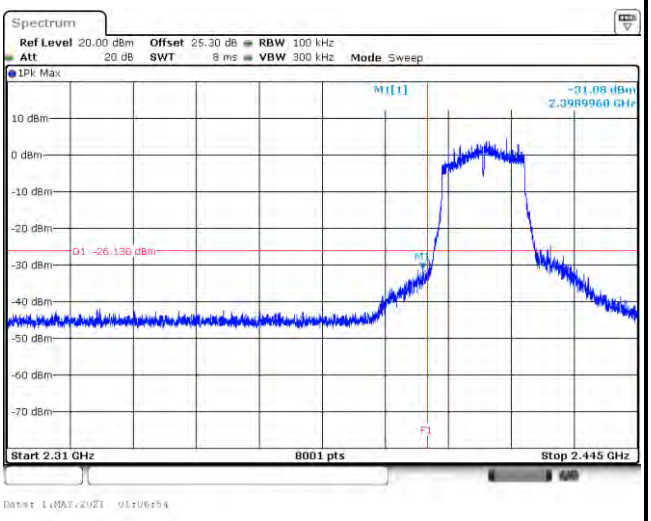
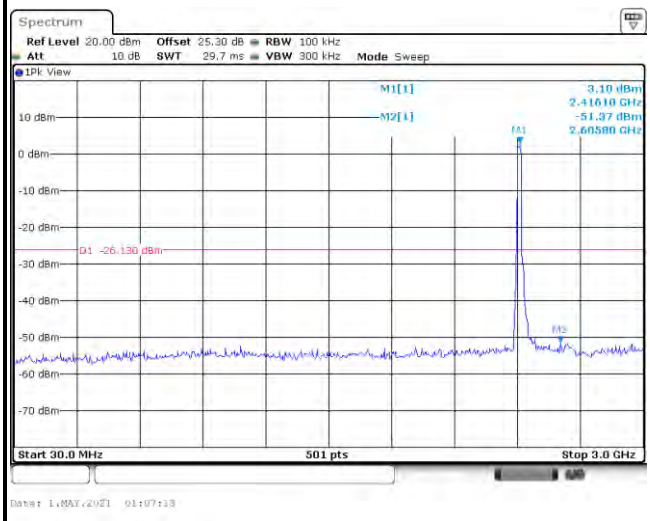
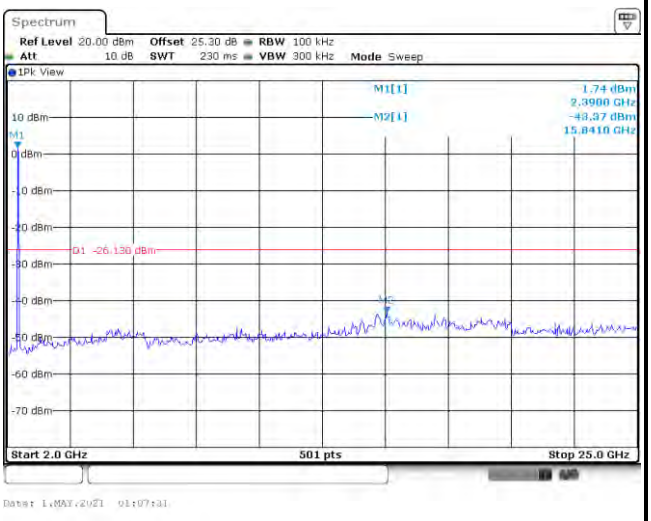
100kHz PSD reference Level	Mid Channel Plot
	

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

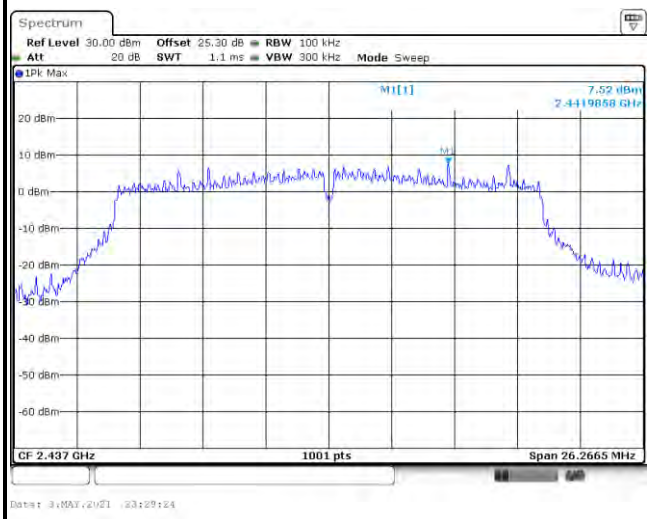
Test Mode :	802.11g	Test Channel :	11

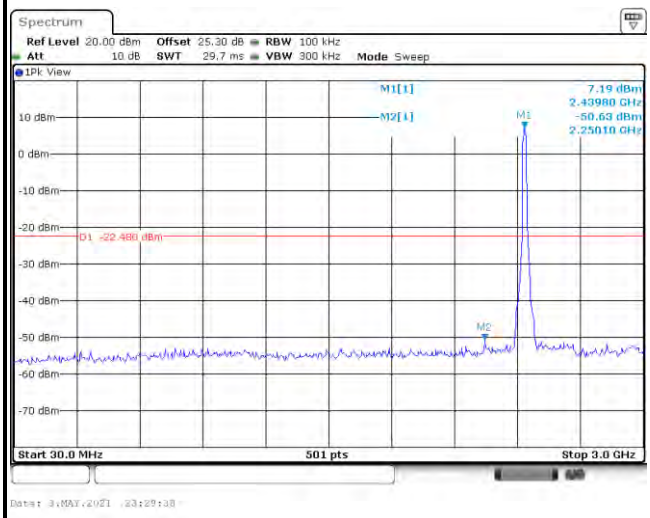
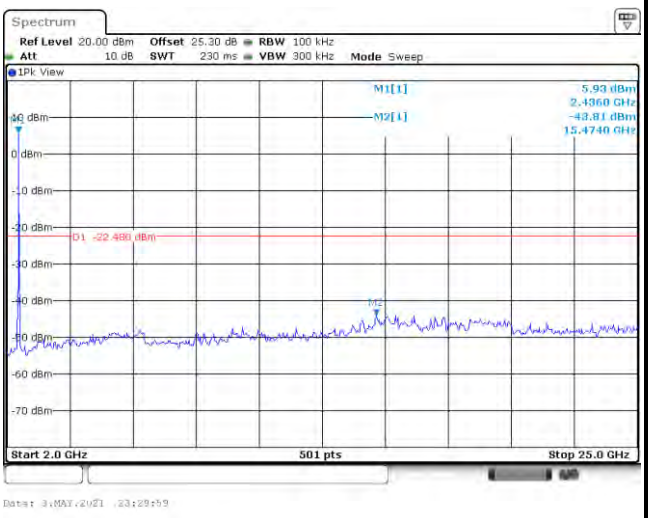
100kHz PSD reference Level	High Channel Plot
	
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	

Test Mode :	802.11ac VHT20	Test Channel :	01

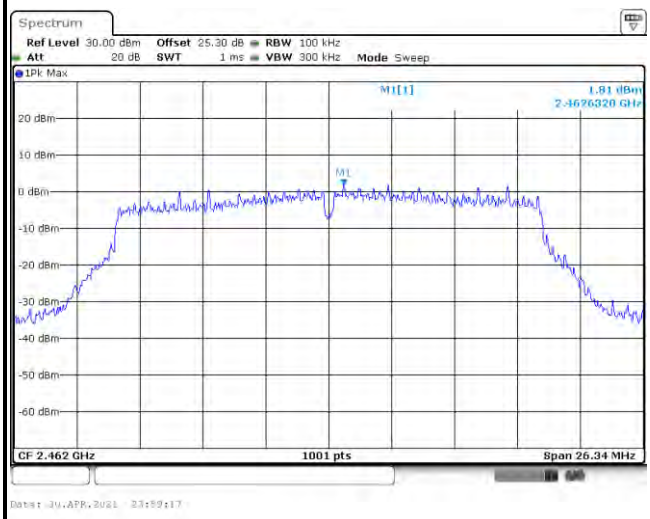
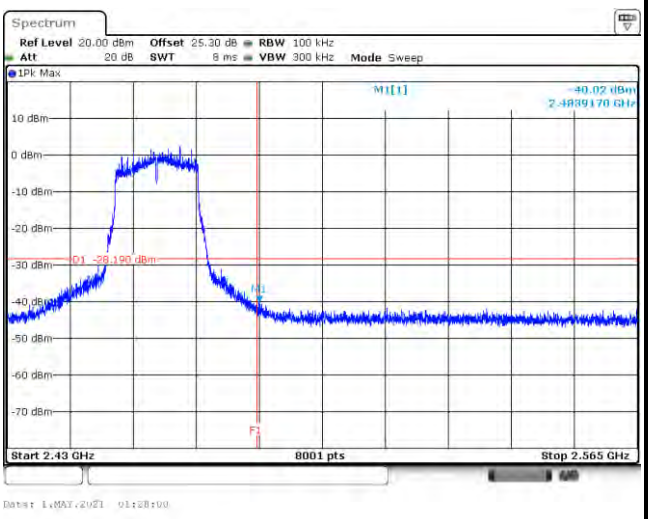
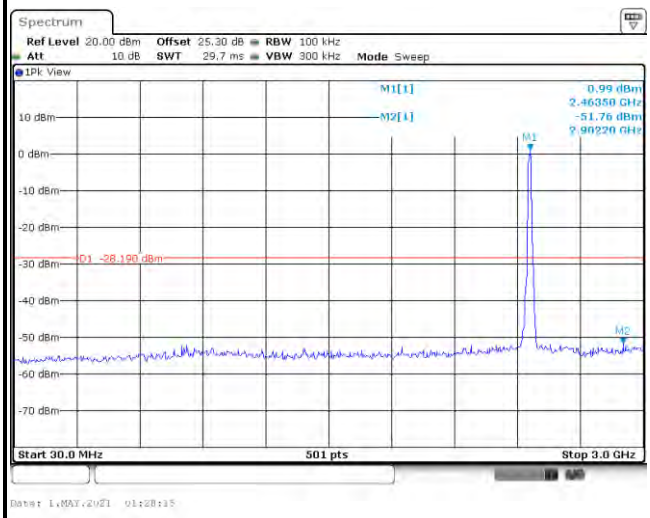
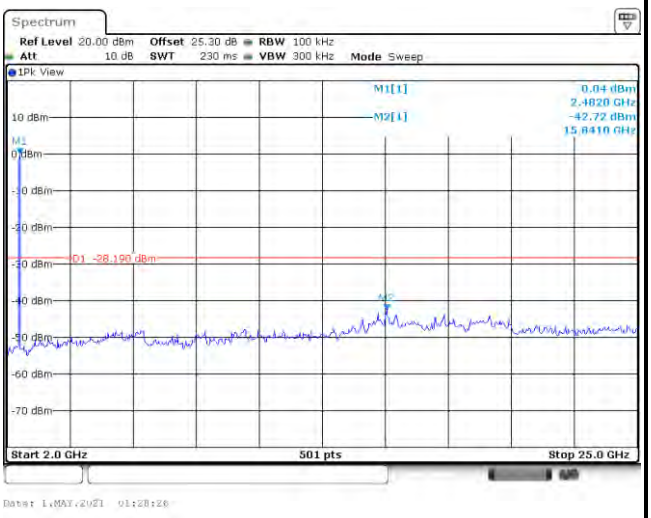
100kHz PSD reference Level	Low Channel Plot
	
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	

Test Mode :	802.11ac VHT20	Test Channel :	06

100kHz PSD reference Level	Mid Channel Plot
	

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

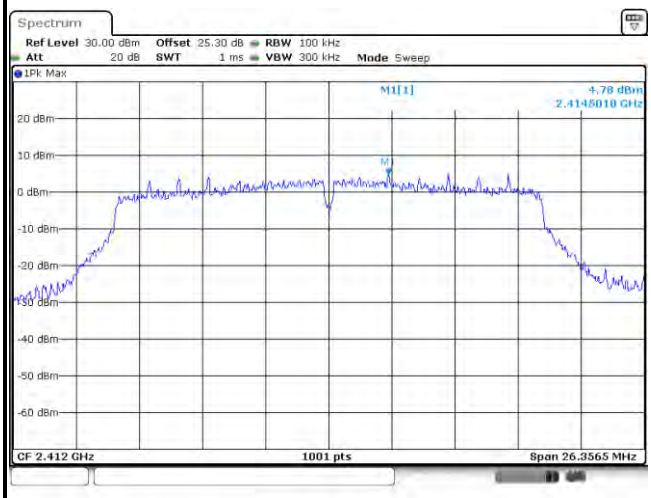
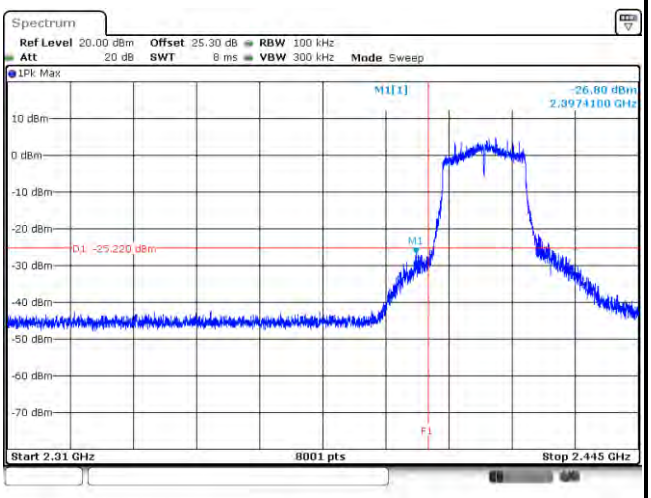
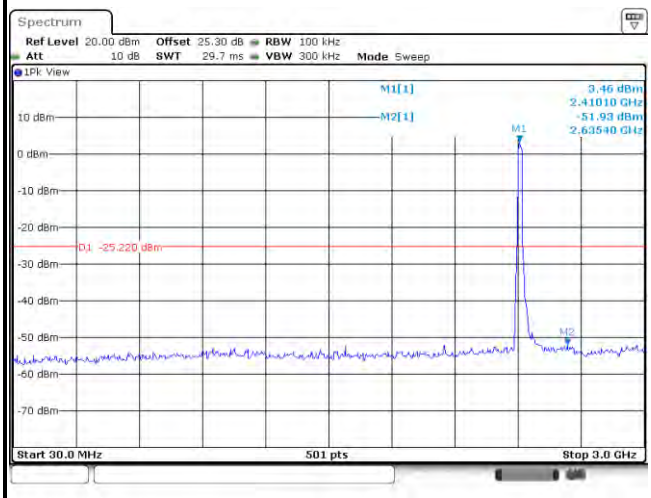
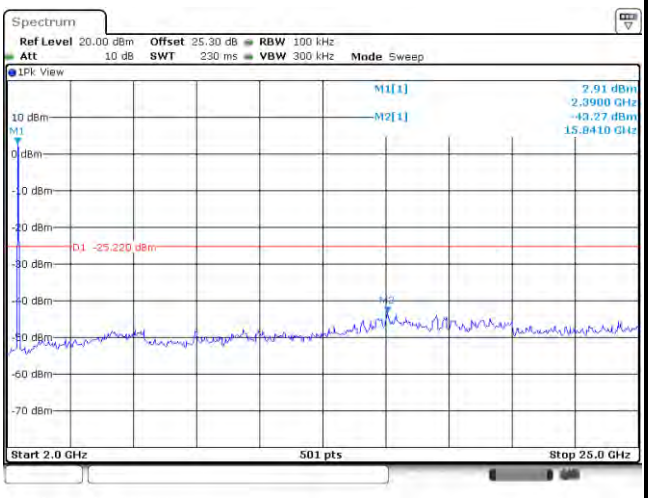
Test Mode :	802.11ac VHT20	Test Channel :	11

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

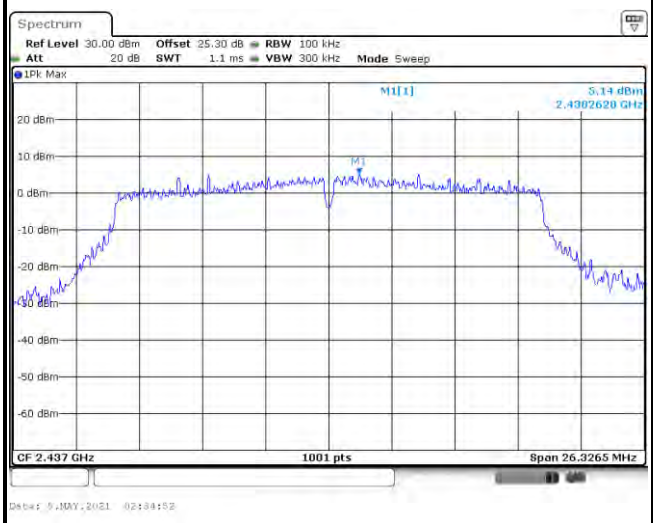
<TXBF Mode>

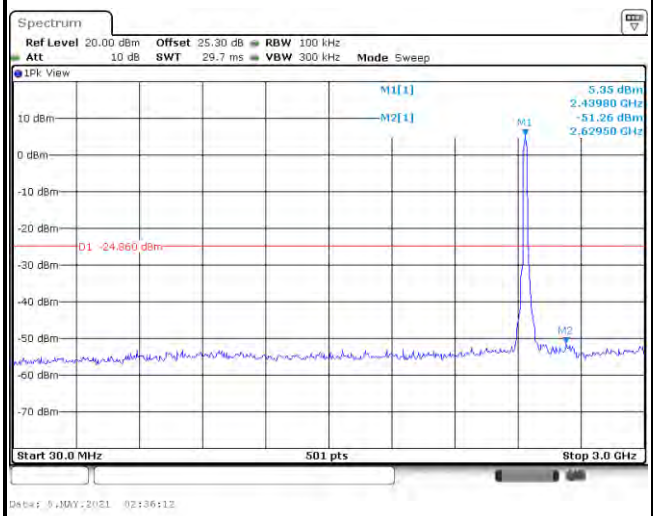
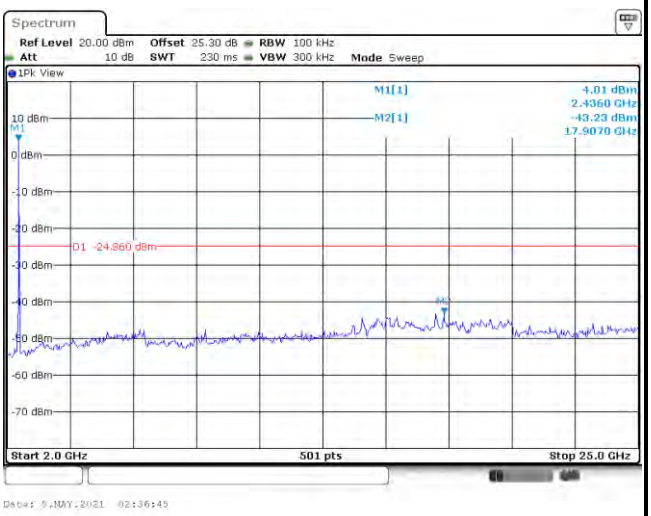
Number of TX = 2, Ant. 1 (Measured)

Test Mode :	802.11ac VHT20	Test Channel :	01

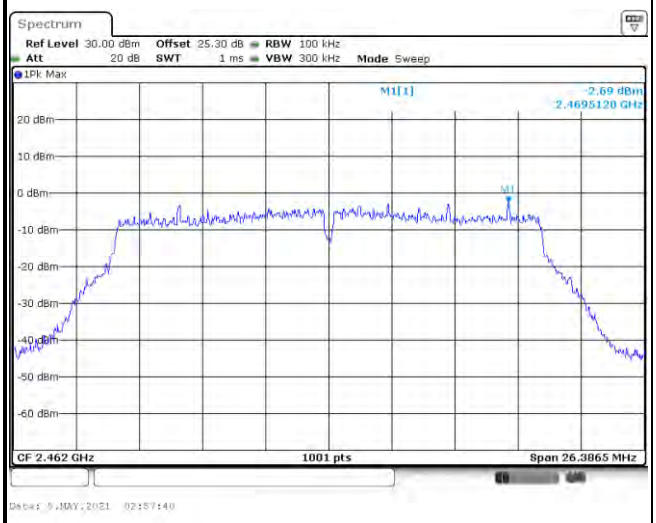
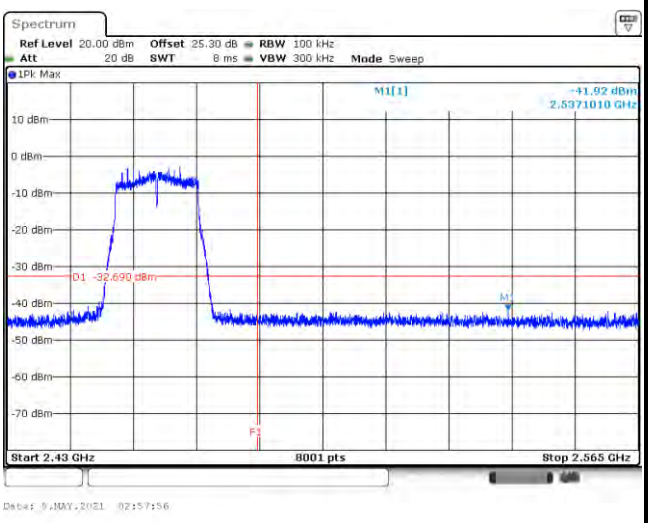
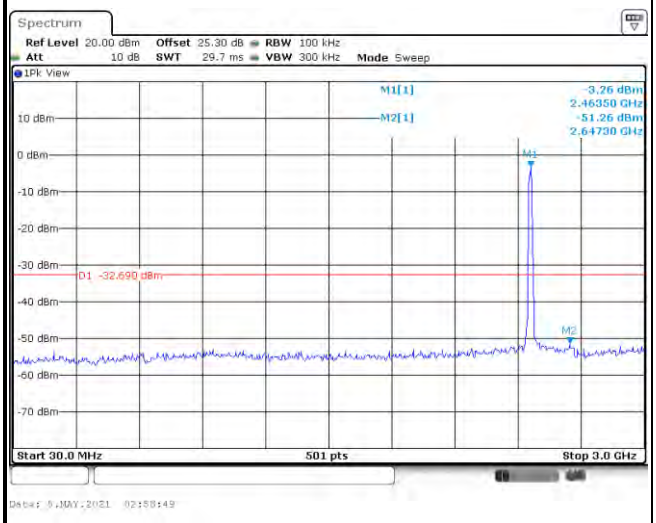
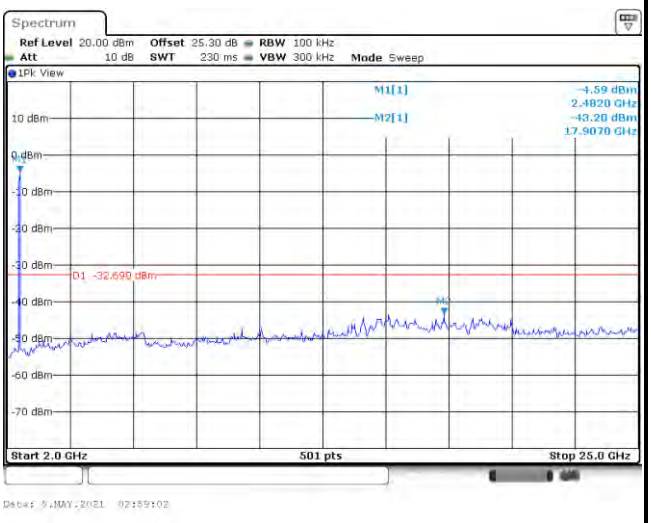
100kHz PSD reference Level	Low Channel Plot
	
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	

Test Mode :	802.11ac VHT20	Test Channel :	06

100kHz PSD reference Level	Mid Channel Plot
	

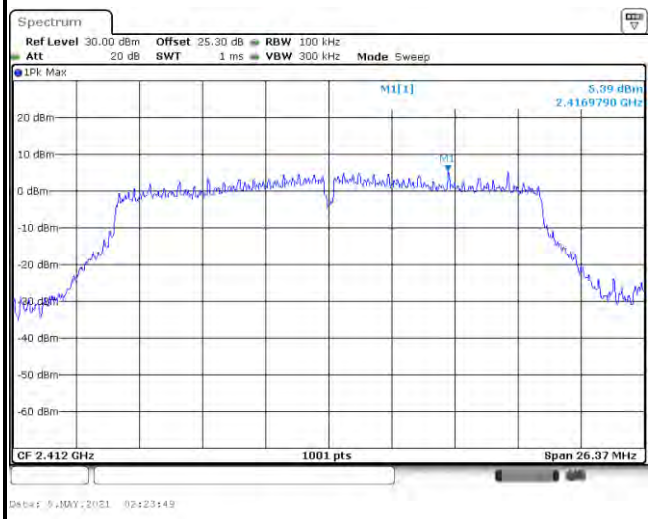
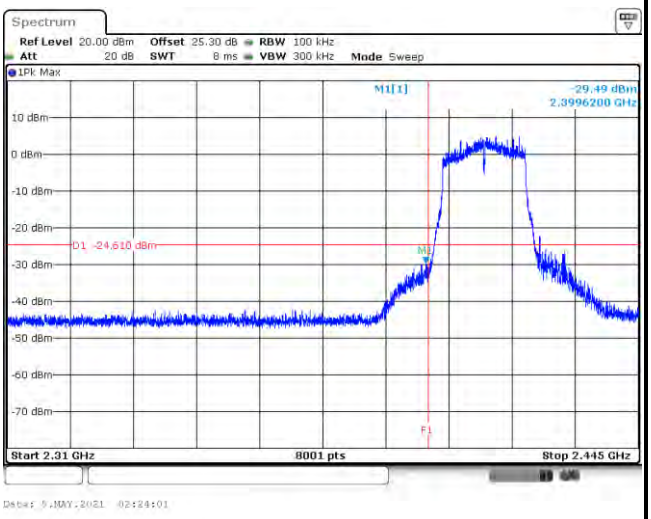
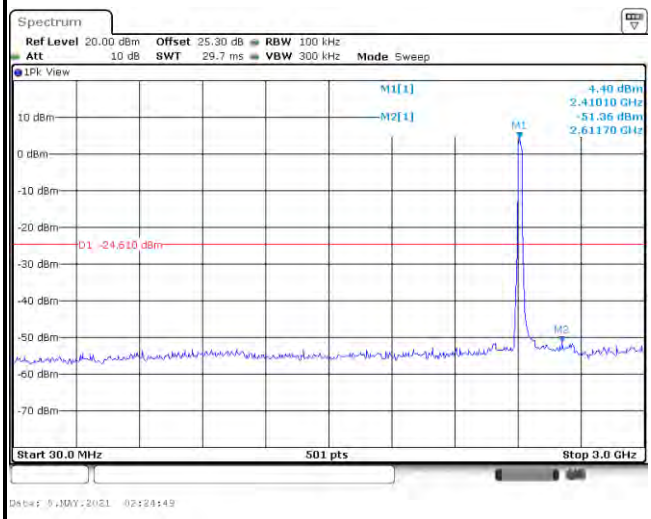
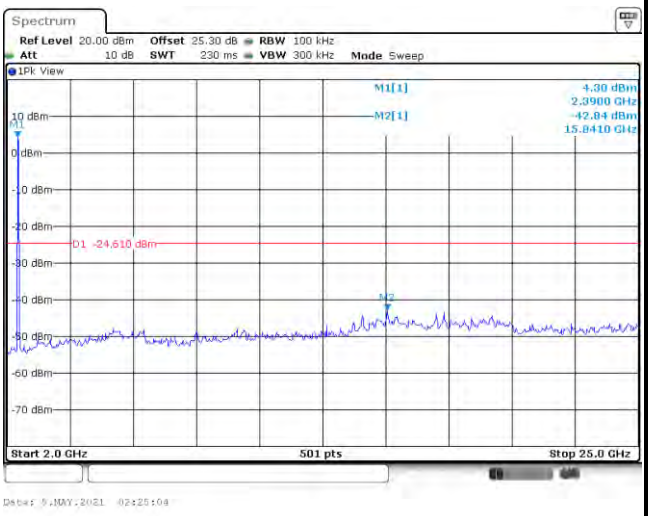
Spurious Emission 30MHz~3GHz	Spurious Emission 2GHz~25GHz
	

Test Mode :	802.11ac VHT20	Test Channel :	11

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

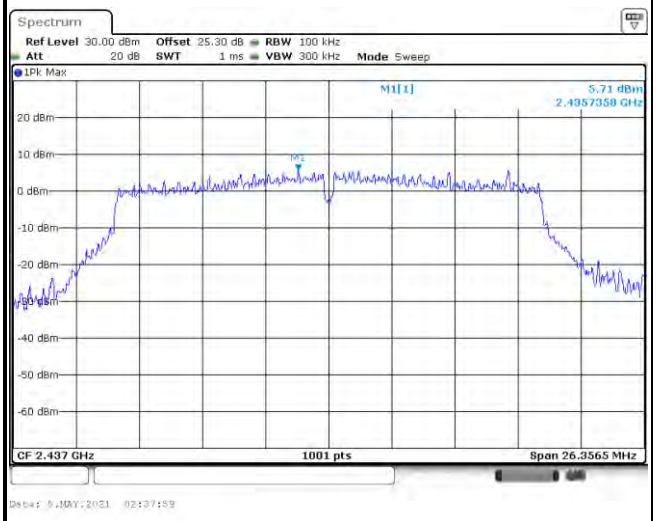
Number of TX = 2, Ant. 2 (Measured)

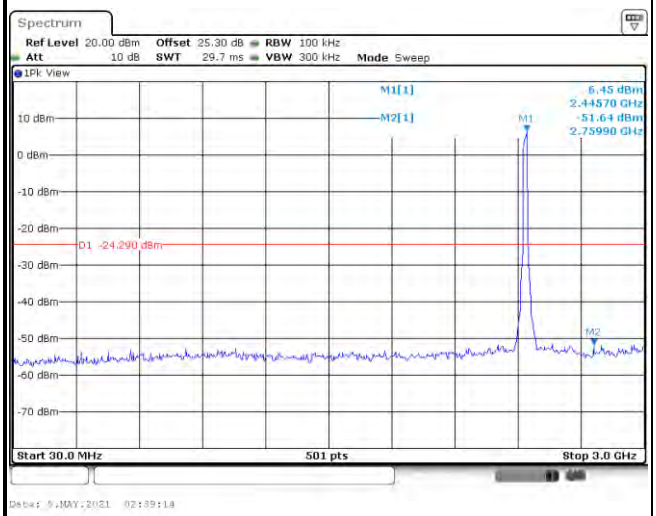
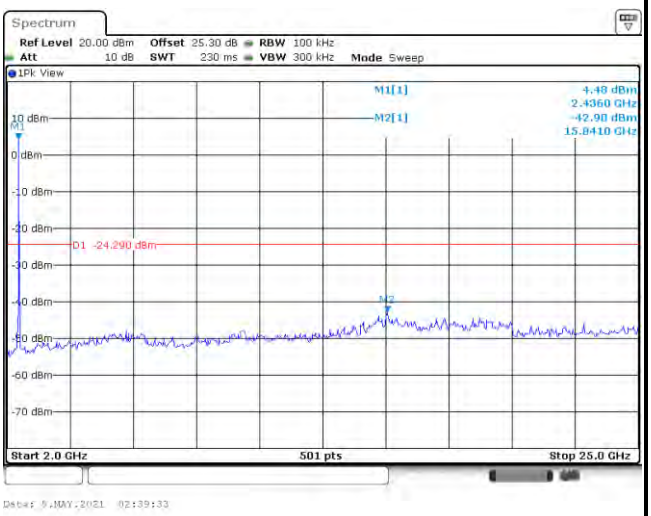
Test Mode :	802.11ac VHT20	Test Channel :	01

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

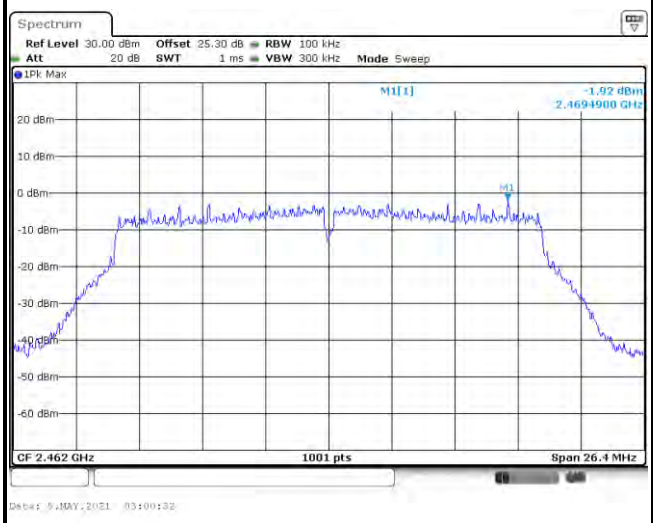
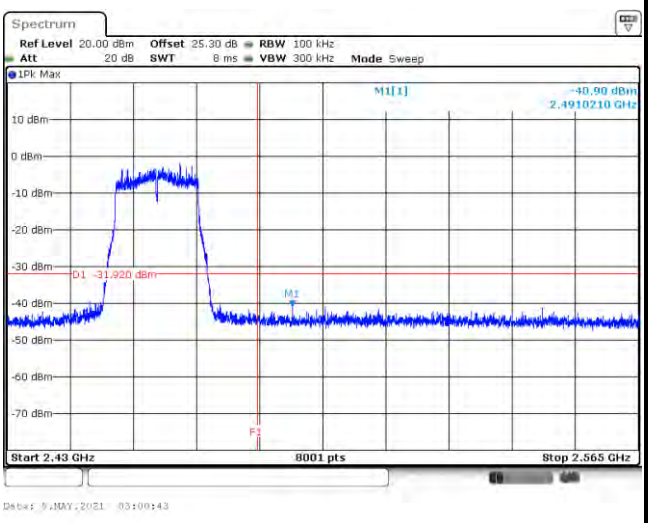
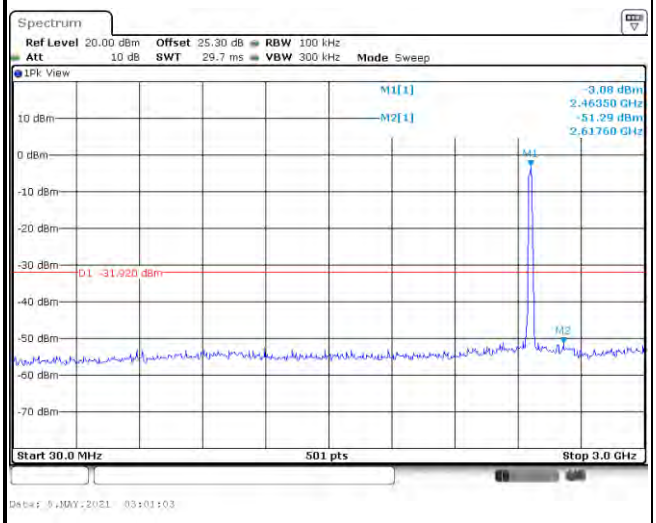
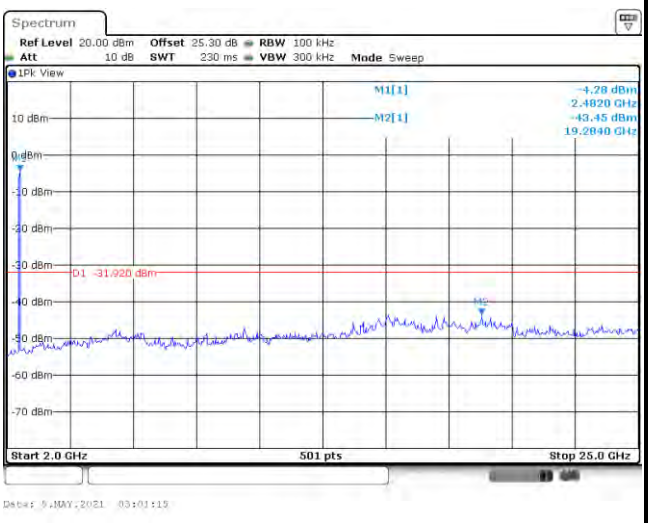
2

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**
	

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

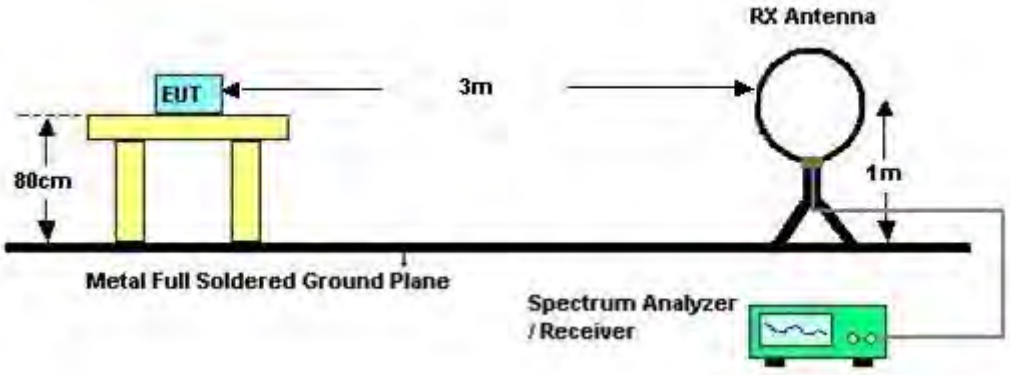
See list of measuring equipment of this test report.

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 1 GHz and 1.5 meter for frequency above 1 GHz 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 1 GHz, 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 be reported.
7. For testing above 1 GHz, the emission level of the EUT in peak mode was 20 dB 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 = 3 MHz 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.

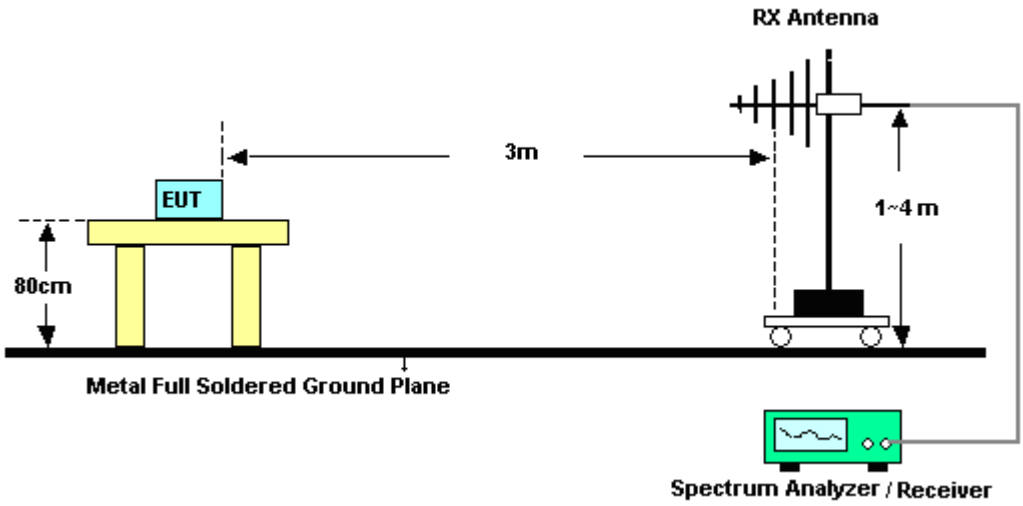
3.5.4 Test Setup

For radiated emissions below 30MHz

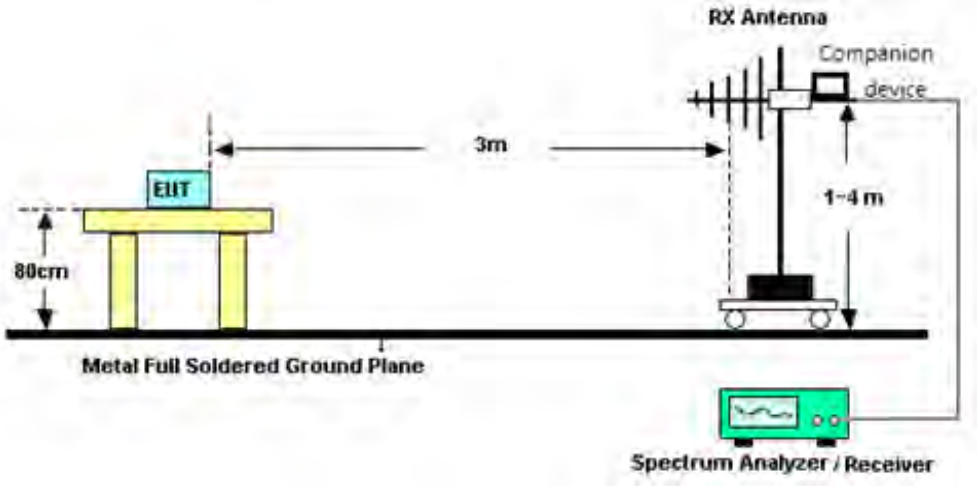


For radiated emissions from 30MHz to 1GHz

<CDD Mode>

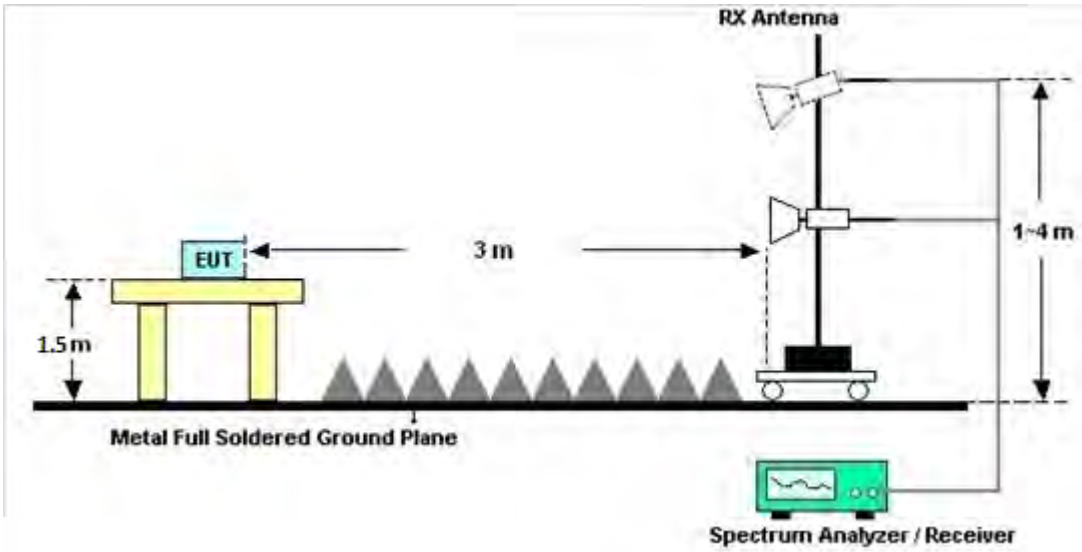


<TXBF Modes>

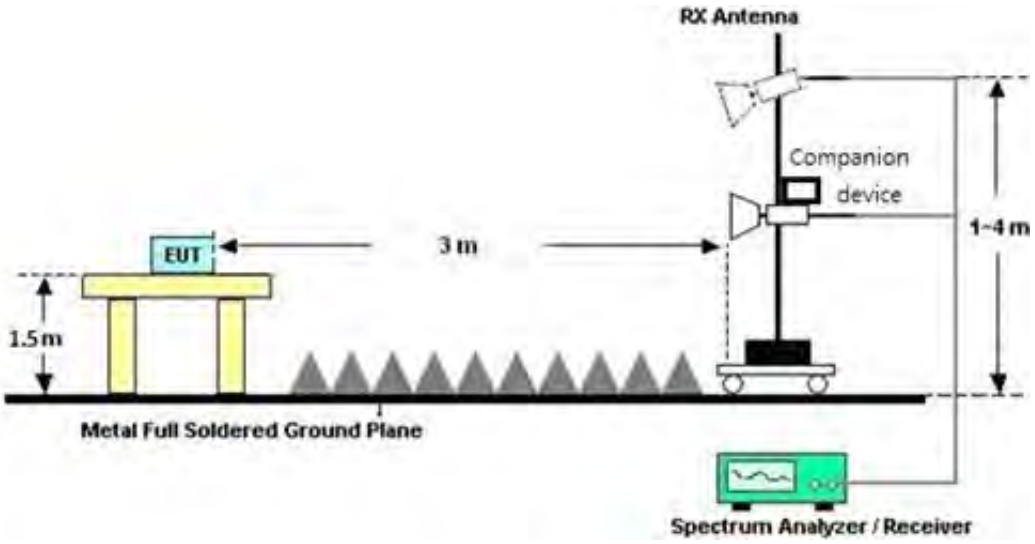


For radiated test above 1GHz

<CDD Mode>



<TXBF Modes>



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

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 (30 MHz ~ 10th Harmonic)

Please refer to Appendix B and C.

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.

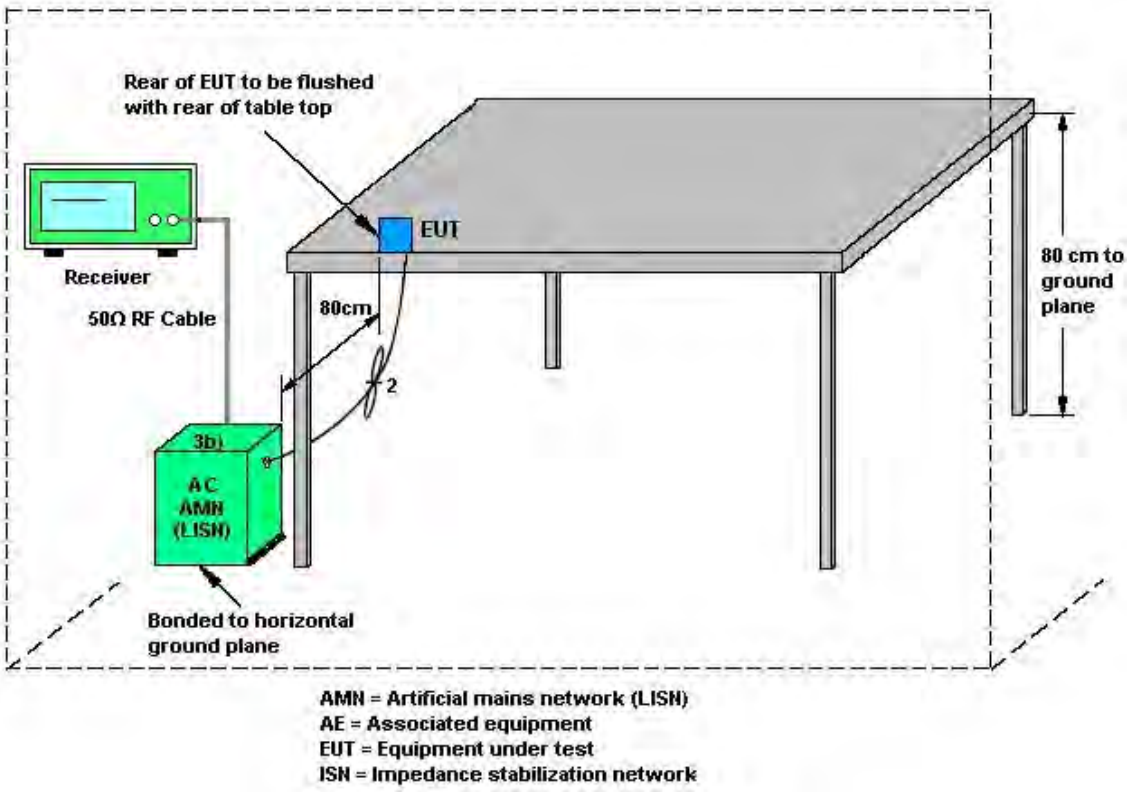
3.6.2 Measuring Instruments

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 shall be used.
6. Both sides of AC line were checked for maximum conducted interference.
7. The frequency range from 150 kHz to 30 MHz was searched.
8. Set the test-receiver system to Peak Detect Function and specified bandwidth (IF bandwidth = 9kHz) with Maximum Hold Mode.

3.6.4 Test Setup



3.6.5 Test Result of AC Conducted Emission

Please refer to Appendix A.

3.7 Antenna Requirements

3.7.1 Standard Applicable

If directional gain of transmitting antennas is greater than 6 dBi, the power shall be reduced by the same level in dB comparing to gain minus 6 dBi. 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

<CDD Modes >

FCC KDB 662911 D01 Multiple Transmitter Output v02r01

For CDD transmissions, directional gain is calculated as

Directional gain = G_{ANT} + Array Gain, where Array Gain is as follows.

For power spectral density (PSD) measurements on all devices,

Array Gain = 10 log(N_{ANT}/N_{SS}=1) dB.

For power measurements on IEEE 802.11 devices,

Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leq 4$.

Directional gain may be calculated by using the formulas applicable to equal gain antennas with G_{ANT} set equal to the gain of the antenna having the highest gain;

The EUT supports CDD mode.

For power, the directional gain G_{ANT} is set equal to the antenna having the highest gain, i.e., F)2)f)i).

For PSD, the directional gain calculation is following F)2)f)ii) of KDB 662911 D01 v02r01.

The power and PSD limit should be modified if the directional gain of EUT is over 6 dBi,

The directional gain “DG” is calculated as following table.

<CDD Modes>

			DG for Power	DG for PSD	Power Limit Reduction	PSD Limit Reduction
	Ant. 1 (dBi)	Ant. 2 (dBi)	(dBi)	(dBi)	(dB)	(dB)
2.4 GHz	2.10	1.90	2.10	5.01	0.00	0.00

Power Limit Reduction = DG(Power) – 6dBi, (min = 0)

PSD Limit Reduction = DG(PSD) – 6dBi, (min = 0)

TXBF modes

FCC KDB 662911 D01 Multiple Transmitter Output v02r01

For CDD transmissions, directional gain is calculated as

$$DirectionalGain = 10 \cdot \log\left[\frac{\sum_{j=1}^{N_{SS}}\left\{\sum_{k=1}^{N_{ANT}} g_{j,k}\right\}^2}{N_{ANT}}\right]$$

where

Each antenna is driven by no more than one spatial stream;

N_{SS} = the number of independent spatial streams of data;

N_{ANT} = the total number of antennas

$g_{j,k} = 10^{G_k/20}$ if the kth antenna is being fed by spatial stream j, or zero if it is not;

G_k is the gain in dBi of the kth antenna.

The EUT supports beamforming for 802.11ac modes.

The directional gain calculation is following F)2)e)ii) of KDB 662911 D01 v02r01.

The power and PSD limit should be modified if the directional gain of EUT is over 6 dBi,

The directional gain “DG” is calculated as following table.

	Ant. 1 (dBi)	Ant. 2 (dBi)	DG for Power (dBi)	DG for PSD (dBi)	Power Limit Reduction (dB)	PSD Limit Reduction (dB)
2.4 GHz	2.10	1.90	5.01	5.01	0.00	0.00

Power Limit Reduction = DG(Power) – 6dBi, (min = 0)

PSD Limit Reduction = DG(PSD) – 6dBi, (min = 0)

4 List of Measuring Equipment

Instrument	Brand Name	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100315	9 kHz~30 MHz	Jan. 04, 2021	Apr. 01, 2021~ Apr. 30, 2021	Jan. 03, 2022	Radiation (03CH11-HY)
Bilog Antenna	TESEQ	CBL 6111D & N-6-06	35414 & AT-N0602	30MHz~1GHz	Oct. 11, 2020	Apr. 01, 2021~ Apr. 30, 2021	Oct. 10, 2021	Radiation (03CH11-HY)
Horn Antenna	SCHWARZBECK	BBHA 9120 D	9120D-1326	1GHz ~ 18GHz	Nov. 03, 2020	Apr. 01, 2021~ Apr. 30, 2021	Nov. 02, 2021	Radiation (03CH11-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA9170	00994	18GHz~40GHz	Nov. 19, 2020	Apr. 01, 2021~ Apr. 30, 2021	Nov. 18, 2021	Radiation (03CH11-HY)
Amplifier	SONOMA	310N	187312	9kHz~1GHz	Dec. 02, 2020	Apr. 01, 2021~ Apr. 30, 2021	Dec. 01, 2021	Radiation (03CH11-HY)
Preamplifier	EMEC	EM1G18G	060812	1GHz~18GHz	Oct. 27, 2020	Apr. 01, 2021~ Apr. 30, 2021	Oct. 26, 2021	Radiation (03CH11-HY)
Preamplifier	Keysight	83017A	MY53270080	1GHz~26.5GHz	Nov. 12, 2020	Apr. 01, 2021~ Apr. 30, 2021	Nov. 11, 2021	Radiation (03CH11-HY)
Preamplifier	EMEC	EM18G40G	060801	18GHz~40GHz	Jun. 15, 2020	Apr. 01, 2021~ Apr. 30, 2021	Jun. 14, 2021	Radiation (03CH11-HY)
Spectrum Analyzer	Keysight	N9010A	MY54200486	10Hz~44GHz	Oct. 23, 2020	Apr. 01, 2021~ Apr. 30, 2021	Oct. 22, 2021	Radiation (03CH11-HY)
EMI Test Receiver	Keysight	N9038A(MXE)	MY55420170	20MHz~8.4GHz	May 21, 2020	Apr. 01, 2021~ Apr. 30, 2021	May 20, 2021	Radiation (03CH11-HY)
Antenna Mast	EMEC	AM-BS-4500-B	N/A	1~4m	N/A	Apr. 01, 2021~ Apr. 30, 2021	N/A	Radiation (03CH11-HY)
Turn Table	EMEC	TT 2000	N/A	0~360 Degree	N/A	Apr. 01, 2021~ Apr. 30, 2021	N/A	Radiation (03CH11-HY)
Software	Audix	E3 6.2009-8-24	RK-001053	N/A	N/A	Apr. 01, 2021~ Apr. 30, 2021	N/A	Radiation (03CH11-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY9837/4PE	9kHz-30MHz	Mar. 11, 2021	Apr. 01, 2021~ Apr. 30, 2021	Mar. 10, 2022	Radiation (03CH11-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	MY2859/2	30MHz-40GHz	Mar. 11, 2021	Apr. 01, 2021~ Apr. 30, 2021	Mar. 10, 2022	Radiation (03CH11-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY9837/4PE	30M-18G	Mar. 11, 2021	Apr. 01, 2021~ Apr. 30, 2021	Mar. 10, 2022	Radiation (03CH11-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	MY4274/2	30MHz-40GHz	Mar. 11, 2021	Apr. 01, 2021~ Apr. 30, 2021	Mar. 10, 2022	Radiation (03CH11-HY)
Filter	Wainwright	WLK4-1000-1530-8000-40SS	SN11	1.53G Low Pass	Sep. 14, 2020	Apr. 01, 2021~ Apr. 30, 2021	Sep. 13, 2021	Radiation (03CH11-HY)
Filter	Wainwright	WHKX12-2700-3000-18000-60SS	SN3	3GHz High Pass Filter	Sep. 14, 2020	Apr. 01, 2021~ Apr. 30, 2021	Sep. 13, 2021	Radiation (03CH11-HY)
Hygrometer	TECPEL	DTM-303B	TP140325	N/A	Nov. 18, 2020	Apr. 01, 2021~ Apr. 30, 2021	Nov. 17, 2021	Radiation (03CH11-HY)
Hygrometer	TECPEL	DTM-303B	TP200880	QA-3-031	Oct. 22, 2020	Apr. 01, 2021~ Apr. 30, 2021	Oct. 21, 2021	Radiation (03CH11-HY)

Instrument	Brand Name	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
AC Power Source	ChainTek	APC-1000W	N/A	N/A	N/A	Mar. 26, 2021	N/A	Conduction (CO05-HY)
EMI Test Receiver	Rohde & Schwarz	ESR3	102388	9kHz~3.6GHz	Nov. 30, 2020	Mar. 26, 2021	Nov. 29, 2021	Conduction (CO05-HY)
Hygrometer	Testo	608-H1	34913912	N/A	Nov. 18, 2020	Mar. 26, 2021	Nov. 17, 2021	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100081	9kHz~30MHz	Nov. 16, 2020	Mar. 26, 2021	Nov. 15, 2021	Conduction (CO05-HY)
Software	Rohde & Schwarz	EMC32 V10.30	N/A	N/A	N/A	Mar. 26, 2021	N/A	Conduction (CO05-HY)
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100851	N/A	Feb. 25, 2021	Mar. 26, 2021	Feb. 24, 2022	Conduction (CO05-HY)
LISN Cable	MVE	RG-400	260260	N/A	Dec. 31, 2020	Mar. 26, 2021	Dec. 30, 2021	Conduction (CO05-HY)
Hygrometer	Testo	608-H1	34893241	N/A	Mar. 03, 2021	Mar. 29, 2021~ May 08, 2021	Mar. 02, 2022	Conducted (TH05-HY)
Power Sensor	DARE	RPR3006W	16I00054SNO10	10MHz~6GHz	Dec. 16, 2020	Mar. 29, 2021~ May 08, 2021	Dec. 15, 2021	Conducted (TH05-HY)
Signal Analyzer	Rohde & Schwarz	FSV40	101566	10Hz ~ 40GHz	Jul. 22, 2020	Mar. 29, 2021~ May 08, 2021	Jul. 21, 2021	Conducted (TH05-HY)
Spectrum Analyzer	Rohde & Schwarz	FSP40	100055	9kHz-40GHz	Jan. 21, 2021	Mar. 29, 2021~ May 03, 2021	Jan. 20, 2022	Conducted (TH05-HY)
Switch Box & RF Cable	EM Electronics	EMSW18SE	SW200302	N/A	Mar. 17, 2021	Mar. 29, 2021~ May 08, 2021	Mar. 16, 2022	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))	4.4

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	5.2

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	5.1

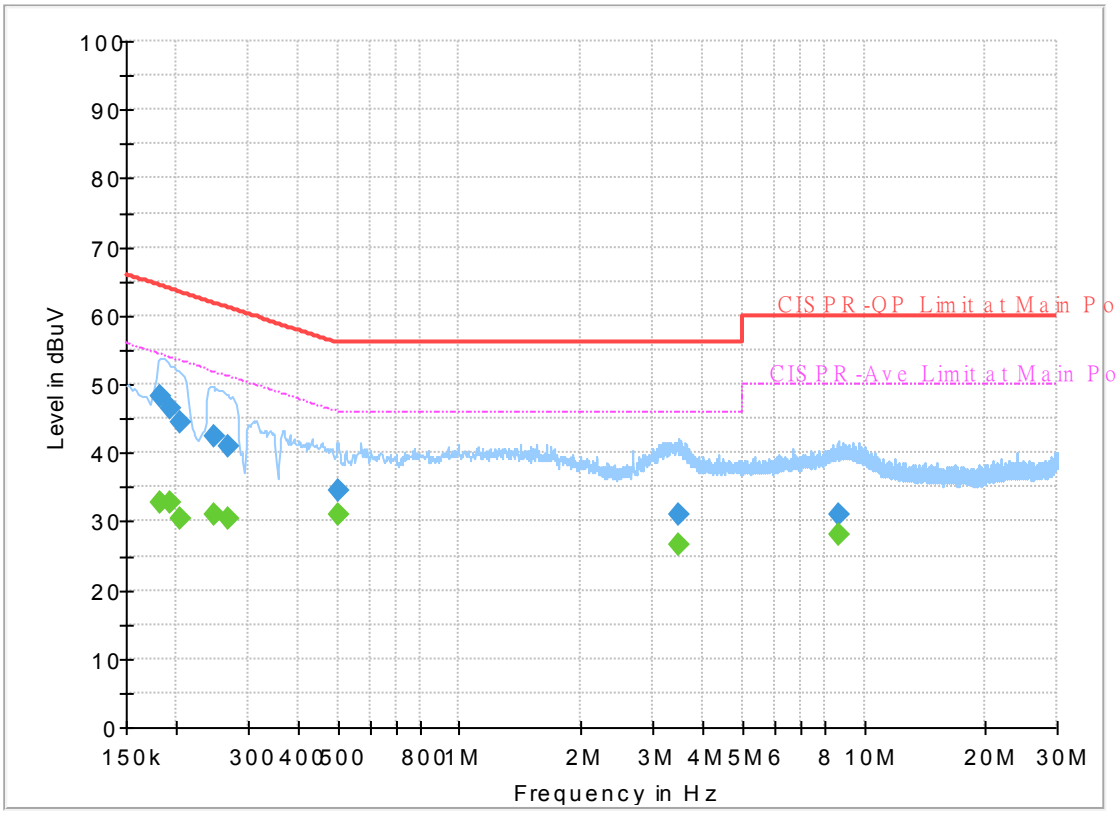
Appendix A. AC Conducted Emission Test Results

Test Engineer :	Tom Lee	**Temperature :**	23~26℃
		Relative Humidity :	40~50%

EUT Information

Report NO :	122002
Test Mode :	Mode 1
Test Voltage :	120Vac/60Hz
Phase :	Line

Full Spectrum



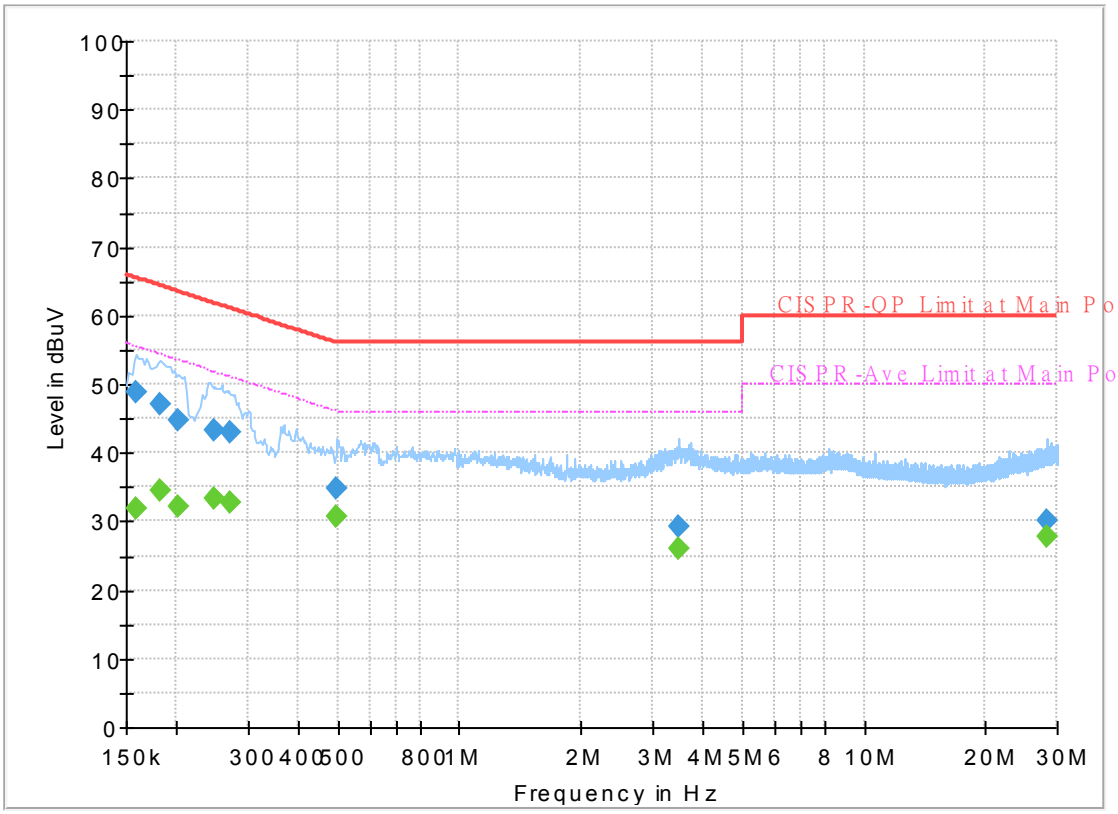
Final_Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.181500	---	32.68	54.42	21.74	L1	OFF	19.7
0.181500	48.22	---	64.42	16.20	L1	OFF	19.7
0.192750	---	32.88	53.92	21.04	L1	OFF	19.7
0.192750	46.53	---	63.92	17.39	L1	OFF	19.7
0.204000	---	30.28	53.45	23.17	L1	OFF	19.7
0.204000	44.31	---	63.45	19.14	L1	OFF	19.7
0.246750	---	30.97	51.87	20.90	L1	OFF	19.7
0.246750	42.45	---	61.87	19.42	L1	OFF	19.7
0.269250	---	30.54	51.14	20.60	L1	OFF	19.7
0.269250	40.94	---	61.14	20.20	L1	OFF	19.7
0.501000	---	31.03	46.00	14.97	L1	OFF	19.9
0.501000	34.58	---	56.00	21.42	L1	OFF	19.9
3.486750	---	26.49	46.00	19.51	L1	OFF	20.1
3.486750	30.98	---	56.00	25.02	L1	OFF	20.1
8.616750	---	28.17	50.00	21.83	L1	OFF	20.2
8.616750	31.04	---	60.00	28.96	L1	OFF	20.2

EUT Information

Report NO :	122002
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)
0.159000	---	31.96	55.52	23.56	N	OFF	19.7
0.159000	48.70	---	65.52	16.82	N	OFF	19.7
0.181500	---	34.50	54.42	19.92	N	OFF	19.7
0.181500	46.99	---	64.42	17.43	N	OFF	19.7
0.201750	---	32.23	53.54	21.31	N	OFF	19.7
0.201750	44.77	---	63.54	18.77	N	OFF	19.7
0.249000	---	33.42	51.79	18.37	N	OFF	19.8
0.249000	43.22	---	61.79	18.57	N	OFF	19.8
0.271500	---	32.88	51.07	18.19	N	OFF	19.8
0.271500	43.01	---	61.07	18.06	N	OFF	19.8
0.498750	---	30.77	46.02	15.25	N	OFF	19.9
0.498750	34.91	---	56.02	21.11	N	OFF	19.9
3.498000	---	26.01	46.00	19.99	N	OFF	20.1
3.498000	29.29	---	56.00	26.71	N	OFF	20.1
28.232250	---	27.75	50.00	22.25	N	OFF	20.9
28.232250	30.07	---	60.00	29.93	N	OFF	20.9

Appendix B. Radiated Spurious Emission

Test Engineer :	Bill Chang, Fu Chen, and Troye Hsieh	Temperature :	18.2~24.2℃
		Relative Humidity :	43.2~70.1%

<CDD Mode>

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+2		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11b CH 01 2412MHz		2389.905	54.14	-19.86	74	43.02	27.52	17.06	33.46	100	322	P	H
		2390	47.34	-6.66	54	36.22	27.52	17.06	33.46	100	322	A	H
	*	2412	113.12	-	-	101.97	27.5	17.09	33.44	100	322	P	H
	*	2412	110.01	-	-	98.86	27.5	17.09	33.44	100	322	A	H
													H
													H
		2389.485	55.34	-18.66	74	44.22	27.52	17.06	33.46	145	243	P	V
		2390	47.38	-6.62	54	36.26	27.52	17.06	33.46	145	243	A	V
	*	2412	116.04	-	-	104.89	27.5	17.09	33.44	145	243	P	V
	*	2412	112.96	-	-	101.81	27.5	17.09	33.44	145	243	A	V
													V
													V
802.11b CH 06 2437MHz		2376.72	53	-21	74	41.86	27.55	17.05	33.46	178	327	P	H
		2389.36	42.69	-11.31	54	31.57	27.52	17.06	33.46	178	327	A	H
	*	2437	111.89	-	-	100.69	27.5	17.13	33.43	178	327	P	H
	*	2437	108.89	-	-	97.69	27.5	17.13	33.43	178	327	A	H
		2484.4	56.27	-17.73	74	45.05	27.43	17.2	33.41	178	327	P	H
		2484.64	46.78	-7.22	54	35.56	27.43	17.2	33.41	178	327	A	H
		2372.88	52.57	-21.43	74	41.43	27.55	17.05	33.46	112	91	P	V
		2389.2	42.78	-11.22	54	31.66	27.52	17.06	33.46	112	91	A	V
	*	2437	113.27	-	-	102.07	27.5	17.13	33.43	112	91	P	V
	*	2437	110.14	-	-	98.94	27.5	17.13	33.43	112	91	A	V
		2485.44	56.05	-17.95	74	44.83	27.43	17.2	33.41	112	91	P	V
		2485.12	46.4	-7.6	54	35.18	27.43	17.2	33.41	112	91	A	V

802.11b CH 11 2462MHz	*	2462	109.14	-	-	97.91	27.48	17.17	33.42	100	318	P	H
	*	2462	105.86	-	-	94.63	27.48	17.17	33.42	100	318	A	H
		2487.12	55.41	-18.59	74	44.18	27.43	17.21	33.41	100	318	P	H
		2485.4	51.27	-2.73	54	40.05	27.43	17.2	33.41	100	318	A	H
													H
													H
	*	2462	112.25	-	-	101.02	27.48	17.17	33.42	219	306	P	V
	*	2462	109.05	-	-	97.82	27.48	17.17	33.42	219	306	A	V
		2486.52	55.73	-18.27	74	44.51	27.43	17.2	33.41	219	306	P	V
		2486.36	49.85	-4.15	54	38.63	27.43	17.2	33.41	219	306	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+2	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	52.23	-21.77	74	76.17	31	11.22	66.16	343	33	P	H
		4824	50.49	-3.51	54	74.43	31	11.22	66.16	343	33	A	H
													H
													H
		4824	48.99	-25.01	74	72.93	31	11.22	66.16	100	0	P	V
		4824	48.99	-25.01	74	72.93	31	11.22	66.16	100	0	P	V
													V
													V
802.11b CH 06 2437MHz		4874	50.46	-23.54	74	73.82	31.43	11.33	66.12	287	159	P	H
		4874	48.46	-5.54	54	71.82	31.43	11.33	66.12	287	159	A	H
		7311	53	-21	74	68.88	36.4	13.44	65.72	228	38	P	H
		7311	49.05	-4.95	54	64.93	36.4	13.44	65.72	228	38	A	H
		4874	49.34	-24.66	74	72.7	31.43	11.33	66.12	100	0	P	V
		7311	48.09	-25.91	74	63.97	36.4	13.44	65.72	100	0	P	V
		4874	49.34	-24.66	74	72.7	31.43	11.33	66.12	100	0	P	V
		7311	48.09	-25.91	74	63.97	36.4	13.44	65.72	100	0	P	V
802.11b CH 11 2462MHz		4924	49.93	-24.07	74	73.11	31.47	11.43	66.08	100	0	P	H
		7386	52.64	-21.36	74	68.46	36.4	13.54	65.76	225	55	P	H
		7386	48.95	-5.05	54	64.77	36.4	13.54	65.76	225	55	A	H
													H
		4924	47.54	-26.46	74	70.72	31.47	11.43	66.08	100	0	P	V
		7386	46.39	-27.61	74	62.21	36.4	13.54	65.76	100	0	P	V
		4924	47.54	-26.46	74	70.72	31.47	11.43	66.08	100	0	P	V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

2.4GHz 2400~2483.5MHz

WIFI 802.11g (Band Edge @ 3m)

WIFI Ant. 1+2	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	65.85	-8.15	74	54.73	27.52	17.06	33.46	118	319	P	H
		2390	51.48	-2.52	54	40.36	27.52	17.06	33.46	118	319	A	H
	*	2412	113.35	-	-	102.2	27.5	17.09	33.44	118	319	P	H
	*	2412	105.74	-	-	94.59	27.5	17.09	33.44	118	319	A	H
													H
													H
		2390	62.7	-11.3	74	51.58	27.52	17.06	33.46	109	284	P	V
		2390	48.39	-5.61	54	37.27	27.52	17.06	33.46	109	284	A	V
	*	2412	113.83	-	-	102.68	27.5	17.09	33.44	109	284	P	V
	*	2412	106.49	-	-	95.34	27.5	17.09	33.44	109	284	A	V
													V
													V
802.11g CH 06 2437MHz		2389.36	56.12	-17.88	74	45	27.52	17.06	33.46	114	319	P	H
		2390	43.85	-10.15	54	32.73	27.52	17.06	33.46	114	319	A	H
	*	2437	115.12	-	-	103.92	27.5	17.13	33.43	114	319	P	H
	*	2438	107.64	-	-	96.44	27.5	17.13	33.43	114	319	A	H
		2484	64.29	-9.71	74	53.07	27.43	17.2	33.41	114	319	P	H
		2483.92	47.74	-6.26	54	36.52	27.43	17.2	33.41	114	319	A	H
		2390	58.55	-15.45	74	47.43	27.52	17.06	33.46	111	108	P	V
		2390	44.83	-9.17	54	33.71	27.52	17.06	33.46	111	108	A	V
	*	2437	117.02	-	-	105.82	27.5	17.13	33.43	111	108	P	V
	*	2437	109.21	-	-	98.01	27.5	17.13	33.43	111	108	A	V
		2484.88	64.31	-9.69	74	53.09	27.43	17.2	33.41	111	108	P	V
		2485.2	47.09	-6.91	54	35.87	27.43	17.2	33.41	111	108	A	V

802.11g CH 11 2462MHz	*	2464	110.1	-	-	98.88	27.47	17.17	33.42	107	316	P	H
	*	2462	102.97	-	-	91.74	27.48	17.17	33.42	107	316	A	H
		2484	69.49	-4.51	74	58.27	27.43	17.2	33.41	107	316	P	H
		2483.52	49.42	-4.58	54	38.2	27.43	17.2	33.41	107	316	A	H
													H
													H
	*	2462	110.77	-	-	99.54	27.48	17.17	33.42	355	250	P	V
	*	2462	103.23	-	-	92	27.48	17.17	33.42	355	250	A	V
		2483.76	70.23	-3.77	74	59.01	27.43	17.2	33.41	355	250	P	V
		2483.56	49.55	-4.45	54	38.33	27.43	17.2	33.41	355	250	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+2	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	52.89	-21.11	74	76.83	31	11.22	66.16	100	114	P	H
		4824	42.21	-11.79	54	66.15	31	11.22	66.16	100	114	A	H
													H
													H
		4824	55.81	-18.19	74	79.75	31	11.22	66.16	100	318	P	V
		4824	43.2	-10.8	54	67.14	31	11.22	66.16	100	318	A	V
													V
													V
802.11g CH 06 2437MHz		4874	46.3	-27.7	74	69.66	31.43	11.33	66.12	100	0	P	H
		7311	56.76	-17.24	74	72.64	36.4	13.44	65.72	100	51	P	H
		7311	45.22	-8.78	54	61.1	36.4	13.44	65.72	100	51	A	H
													H
		4874	45.98	-28.02	74	69.34	31.43	11.33	66.12	100	0	P	V
		7311	55.45	-18.55	74	71.33	36.4	13.44	65.72	236	256	P	V
		7311	44.2	-9.8	54	60.08	36.4	13.44	65.72	236	256	A	V
													V
802.11g CH 11 2462MHz		4924	46.72	-27.28	74	69.9	31.47	11.43	66.08	100	0	P	H
		7386	45.86	-28.14	74	61.68	36.4	13.54	65.76	100	0	P	H
													H
													H
		4924	47.4	-26.6	74	70.58	31.47	11.43	66.08	100	0	P	V
		7386	44.73	-29.27	74	60.55	36.4	13.54	65.76	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+2	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)
		2389.905	63.16	-10.84	74	52.04	27.52	17.06	33.46	119	325	P	H
		2390	48.29	-5.71	54	37.17	27.52	17.06	33.46	119	325	A	H
	*	2412	108.91	-	-	97.76	27.5	17.09	33.44	119	325	P	H
	*	2412	101.72	-	-	90.57	27.5	17.09	33.44	119	325	A	H
802.11ac													H
VHT20													H
CH 01		2389.275	63.09	-10.91	74	51.97	27.52	17.06	33.46	188	278	P	V
2412MHz		2390	50.93	-3.07	54	39.81	27.52	17.06	33.46	188	278	A	V
	*	2412	112.73	-	-	101.58	27.5	17.09	33.44	188	278	P	V
	*	2412	104.75	-	-	93.6	27.5	17.09	33.44	188	278	A	V
													V
													V
		2390	55.49	-18.51	74	44.37	27.52	17.06	33.46	100	326	P	H
		2390	44.18	-9.82	54	33.06	27.52	17.06	33.46	100	326	A	H
	*	2437	112.14	-	-	100.94	27.5	17.13	33.43	100	326	P	H
	*	2437	104.73	-	-	93.53	27.5	17.13	33.43	100	326	A	H
802.11ac		2486	60.88	-13.12	74	49.66	27.43	17.2	33.41	100	326	P	H
VHT20		2483.52	47.72	-6.28	54	36.5	27.43	17.2	33.41	100	326	A	H
CH 06		2389.84	57.81	-16.19	74	46.69	27.52	17.06	33.46	208	275	P	V
2437MHz		2390	44.85	-9.15	54	33.73	27.52	17.06	33.46	208	275	A	V
	*	2437	115.67	-	-	104.47	27.5	17.13	33.43	208	275	P	V
	*	2437	107.16	-	-	95.96	27.5	17.13	33.43	208	275	A	V
		2483.76	63.4	-10.6	74	52.18	27.43	17.2	33.41	208	275	P	V
		2483.52	48.82	-5.18	54	37.6	27.43	17.2	33.41	208	275	A	V

	*	2462	107.12	-	-	95.89	27.48	17.17	33.42	117	326	P	H
	*	2462	98.67	-	-	87.44	27.48	17.17	33.42	117	326	A	H
		2483.68	66.26	-7.74	74	55.04	27.43	17.2	33.41	117	326	P	H
		2483.52	47.89	-6.11	54	36.67	27.43	17.2	33.41	117	326	A	H
802.11ac													H
VHT20													H
CH 11	*	2462	109.51	-	-	98.28	27.48	17.17	33.42	192	274	P	V
2462MHz	*	2462	100.89	-	-	89.66	27.48	17.17	33.42	192	274	A	V
		2483.52	67.41	-6.59	74	56.19	27.43	17.2	33.41	192	274	P	V
		2483.52	50.26	-3.74	54	39.04	27.43	17.2	33.41	192	274	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+2	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	47.27	-26.73	74	71.21	31	11.22	66.16	100	0	P	H
													H
802.11ac													H
VHT20													H
CH 01		4824	47.53	-26.47	74	71.47	31	11.22	66.16	100	0	P	V
2412MHz													V
													V
													V
		4874	48.49	-25.51	74	71.85	31.43	11.33	66.12	100	0	P	H
		7311	52.66	-21.34	74	68.54	36.4	13.44	65.72	250	64	P	H
802.11ac		7311	44.46	-9.54	54	60.34	36.4	13.44	65.72	250	64	A	H
VHT20													H
CH 06		4874	53.8	-20.2	74	77.16	31.43	11.33	66.12	300	112	P	V
2437MHz		4874	42.94	-11.06	54	66.3	31.43	11.33	66.12	300	112	A	V
		7311	55.69	-18.31	74	71.57	36.4	13.44	65.72	250	276	P	V
													V
		4924	45.48	-28.52	74	68.66	31.47	11.43	66.08	100	0	P	H
		7386	45.45	-28.55	74	61.27	36.4	13.54	65.76	100	0	P	H
802.11ac													H
VHT20													H
CH 11		4924	44.35	-29.65	74	67.53	31.47	11.43	66.08	100	0	P	V
2462MHz		7386	46.95	-27.05	74	62.77	36.4	13.54	65.76	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 802.11ax HE20 Partial 106 (Band Edge @ 3m)

WIFI Ant. 1+2	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)
		2390	65.21	-8.79	74	54.09	27.52	17.06	33.46	100	326	P	H
		2390	48.92	-5.08	54	37.8	27.52	17.06	33.46	100	326	A	H
		2412	114	-	-	102.85	27.5	17.09	33.44	100	326	P	H
802.11ax		2412	105.22	-	-	94.07	27.5	17.09	33.44	100	326	A	H
HE20													H
Partial													H
106/53		2389.59	63.65	-10.35	74	52.53	27.52	17.06	33.46	192	279	P	V
CH 01		2390	49.68	-4.32	54	38.56	27.52	17.06	33.46	192	279	A	V
2412MHz		2412	116.55	-	-	105.4	27.5	17.09	33.44	192	279	P	V
		2412	107.92	-	-	96.77	27.5	17.09	33.44	192	279	A	V
													V
													V
		2462	113.03	-	-	101.8	27.48	17.17	33.42	112	327	P	H
		2462	103.65	-	-	92.42	27.48	17.17	33.42	112	327	A	H
		2483.8	66.14	-7.86	74	54.92	27.43	17.2	33.41	112	327	P	H
802.11ax		2483.52	48.68	-5.32	54	37.46	27.43	17.2	33.41	112	327	A	H
HE20													H
Partial													H
106/54		2462	115.4	-	-	104.17	27.48	17.17	33.42	178	275	P	V
CH 11		2462	105.81	-	-	94.58	27.48	17.17	33.42	178	275	A	V
2462MHz		2483.6	72.85	-1.15	74	61.63	27.43	17.2	33.41	178	275	P	V
		2483.52	49.78	-4.22	54	38.56	27.43	17.2	33.41	178	275	A	V
													V
													V

2.4GHz 2400~2483.5MHz

WIFI 802.11ax HE20 Partial 106 (Harmonic @ 3m)

WIFI Ant. 1+2	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	52.27	-21.73	74	76.21	31	11.22	66.16	250	117	P	H
802.11ax		4824	39.67	-14.33	54	63.61	31	11.22	66.16	250	117	A	H
HE20													H
Partial													H
106/53		4824	55.17	-18.83	74	79.11	31	11.22	66.16	100	285	P	V
CH 01		4824	42.05	-11.95	54	65.99	31	11.22	66.16	100	285	A	V
2412MHz													V
													V
		4924	48.09	-25.91	74	71.27	31.47	11.43	66.08	100	0	P	H
802.11ax		7386	55.18	-18.82	74	71	36.4	13.54	65.76	113	75	P	H
HE20		7386	42.67	-11.33	54	58.49	36.4	13.54	65.76	113	75	A	H
Partial													H
106/54		4924	46.98	-27.02	74	70.16	31.47	11.43	66.08	100	0	P	V
CH 11		7386	49.86	-24.14	74	65.68	36.4	13.54	65.76	100	0	A	V
2462MHz													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 802.11ax HE20 Partial RU 106 (LF)

WIFI Ant. 1+2	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)
		68.8	30.8	-9.2	40	49.93	12.12	1.28	32.53	-	-	P	H
		132.82	34.85	-8.65	43.5	48.22	17.39	1.75	32.51	100	0	P	H
		384.05	31.94	-14.06	46	39.62	21.19	2.96	31.83	-	-	P	H
		445.16	27.49	-18.51	46	33.3	23.01	3.14	31.96	-	-	P	H
		730.34	30.12	-15.88	46	30.67	27.55	4.05	32.15	-	-	P	H
		960.23	33.17	-20.83	54	28.12	31.14	4.72	30.81	-	-	P	H
													H
													H
													H
2.4GHz													H
802.11ax													H
HE20													H
Partial RU		35.82	36.08	-3.92	40	46.4	21.25	0.91	32.48	100	142	Q	V
106		69.77	30.53	-9.47	40	49.58	12.19	1.29	32.53	-	-	P	V
LF		132.82	27.13	-16.37	43.5	40.5	17.39	1.75	32.51	-	-	P	V
		384.05	29.06	-16.94	46	36.74	21.19	2.96	31.83	-	-	P	V
		853.53	30.35	-15.65	46	28.14	29.2	4.4	31.39	-	-	P	V
		957.32	31.46	-14.54	46	26.55	31.02	4.72	30.83	-	-	P	V
													V
													V
													V
													V
													V
													V

Remark

1. No other spurious found.
2. All results are PASS against limit line.

<TXBF Mode>

2.4GHz 2400~2483.5MHz

WIFI 802.11ac VHT20 (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+2		(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
		2389.905	59.62	-14.38	74	48.5	27.52	17.06	33.46	115	320	P	H
		2389.905	45.78	-8.22	54	34.66	27.52	17.06	33.46	115	320	A	H
	*	2412	105.21	-	-	94.06	27.5	17.09	33.44	115	320	P	H
	*	2412	97.58	-	-	86.43	27.5	17.09	33.44	115	320	A	H
802.11ac													H
VHT20													H
CH 01		2389.695	64.92	-9.08	74	53.8	27.52	17.06	33.46	175	236	P	V
2412MHz		2390	49.65	-4.35	54	38.53	27.52	17.06	33.46	175	236	A	V
	*	2412	107.57	-	-	96.42	27.5	17.09	33.44	175	236	P	V
	*	2412	99.18	-	-	88.03	27.5	17.09	33.44	175	236	A	V
													V
													V
		2366.96	53.18	-20.82	74	42.04	27.57	17.04	33.47	111	314	P	H
		2389.84	43.96	-10.04	54	32.84	27.52	17.06	33.46	111	314	A	H
	*	2437	113.18	-	-	101.98	27.5	17.13	33.43	111	314	P	H
	*	2437	104.29	-	-	93.09	27.5	17.13	33.43	111	314	A	H
802.11ac		2484.24	59.05	-14.95	74	47.83	27.43	17.2	33.41	111	314	P	H
VHT20		2484.24	47.45	-6.55	54	36.23	27.43	17.2	33.41	111	314	A	H
CH 06		2389.36	55.83	-18.17	74	44.71	27.52	17.06	33.46	248	256	P	V
2437MHz		2390	45.62	-8.38	54	34.5	27.52	17.06	33.46	248	256	A	V
	*	2437	114.22	-	-	103.02	27.5	17.13	33.43	248	256	P	V
	*	2437	106.27	-	-	95.07	27.5	17.13	33.43	248	256	A	V
		2484.56	60.25	-13.75	74	49.03	27.43	17.2	33.41	248	256	P	V
		2483.52	50.27	-3.73	54	39.05	27.43	17.2	33.41	248	256	A	V

	*	2462	101.21	-	-	89.98	27.48	17.17	33.42	100	306	P	H
	*	2462	92.69	-	-	81.46	27.48	17.17	33.42	100	306	A	H
		2484.48	60.12	-13.88	74	48.9	27.43	17.2	33.41	100	306	P	H
		2483.68	47.64	-6.36	54	36.42	27.43	17.2	33.41	100	306	A	H
802.11ac													H
VHT20													H
CH 11	*	2462	104.33	-	-	93.1	27.48	17.17	33.42	359	275	P	V
2462MHz	*	2462	96.22	-	-	84.99	27.48	17.17	33.42	359	275	A	V
		2484.24	66.34	-7.66	74	55.12	27.43	17.2	33.41	359	275	P	V
		2483.56	52.05	-1.95	54	40.83	27.43	17.2	33.41	359	275	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+2	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)
		2524	67.95	-17.26	85.21	56.73	27.35	17.26	33.39	246	54	P	H
		4824	49.78	-24.22	74	73.72	31	11.22	66.16	100	0	P	H
802.11ac													H
VHT20													H
CH 01		2524	69.38	-18.19	87.57	58.16	27.35	17.26	33.39	300	252	P	V
2412MHz		4824	45.19	-28.81	74	69.13	31	11.22	66.16	100	0	P	V
													V
													V
		2528	68.83	-24.35	93.18	57.61	27.34	17.27	33.39	100	48	P	H
		4874	46.37	-27.63	74	69.73	31.43	11.33	66.12	100	0	P	H
802.11ac		7311	59.7	-14.3	74	75.58	36.4	13.44	65.72	300	113	P	H
VHT20		7311	49.7	-4.3	54	65.58	36.4	13.44	65.72	300	113	A	H
CH 06		2526	70.64	-23.58	94.22	59.41	27.35	17.27	33.39	303	269	P	V
2437MHz		4874	46.93	-27.07	74	70.29	31.43	11.33	66.12	100	0	P	V
		7311	52.07	-21.93	74	67.95	36.4	13.44	65.72	350	174	P	V
		7311	40.07	-13.93	54	55.95	36.4	13.44	65.72	350	174	A	V
		2402	71.86	-10.99	82.85	60.74	27.5	17.07	33.45	100	299	P	H
		2530	70.74	-12.11	82.85	59.52	27.34	17.27	33.39	100	48	P	H
802.11ac		4924	47.22	-26.78	74	70.4	31.47	11.43	66.08	100	0	P	H
VHT20		7386	39.95	-34.05	74	55.77	36.4	13.54	65.76	100	0	P	H
CH 11		2402	72.79	-10.5	83.29	61.67	27.5	17.07	33.45	250	263	P	V
2462MHz		2530	71.65	-11.64	83.29	60.43	27.34	17.27	33.39	284	245	P	V
		4924	39.5	-34.5	74	62.68	31.47	11.43	66.08	100	0	P	V
		7386	40.68	-33.32	74	56.5	36.4	13.54	65.76	100	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Emission below 1GHz

2.4GHz WIFI 802.11 ac VHT20 (LF)

WIFI Ant. 1+2	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)
		67.83	27.76	-12.24	40	46.98	12.04	1.27	32.53	100	0	P	H
		109.54	30.78	-12.72	43.5	44.99	16.7	1.59	32.5	-	-	P	H
		147.37	24.81	-18.69	43.5	38.45	17.03	1.85	32.52	-	-	P	H
		384.05	32.77	-13.23	46	40.45	21.19	2.96	31.83	-	-	P	H
		853.53	33.6	-12.4	46	31.39	29.2	4.4	31.39	-	-	P	H
		960.23	32.83	-21.17	54	27.78	31.14	4.72	30.81	-	-	P	H
													H
													H
													H
													H
2.4GHz													H
802.11ac													H
VHT20		38.73	31.57	-8.43	40	43.15	19.94	0.97	32.49	100	172	QP	V
LF		67.83	32	-8	40	51.22	12.04	1.27	32.53	100	357	QP	V
		108.57	30.49	-13.01	43.5	44.75	16.65	1.59	32.5	-	-	P	V
		384.05	26.09	-19.91	46	33.77	21.19	2.96	31.83	-	-	P	V
		735.19	32.42	-13.58	46	32.77	27.7	4.06	32.11	-	-	P	V
		952.47	31.53	-14.47	46	26.89	30.79	4.71	30.86	-	-	P	V
													V
													V
													V
													V
													V
													V

Remark

1. No other spurious found.
2. 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+2		(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 :	Bill Chang, Fu Chen, and Troye Hsieh	**Temperature :**	18.2~24.2℃
		Relative Humidity :	43.2~70.1%

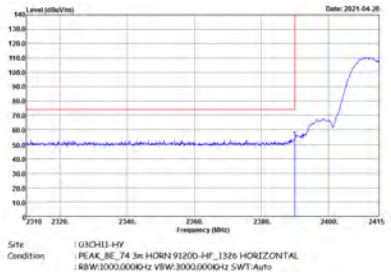
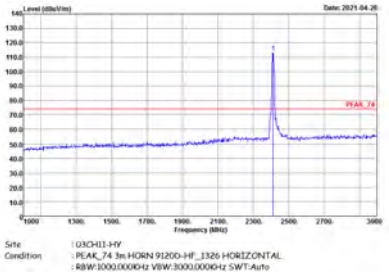
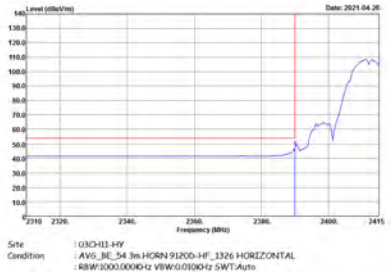
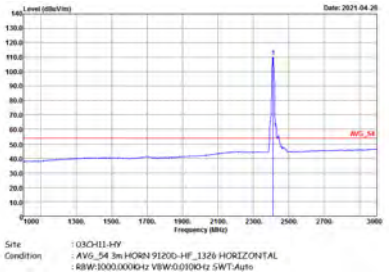
Note symbol

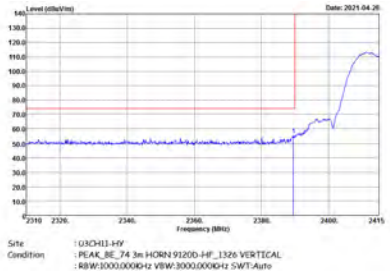
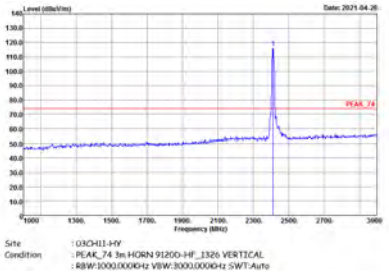
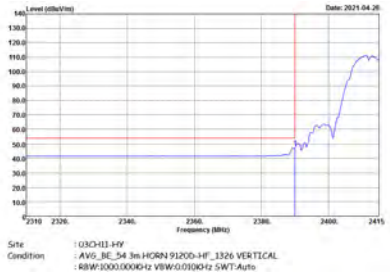
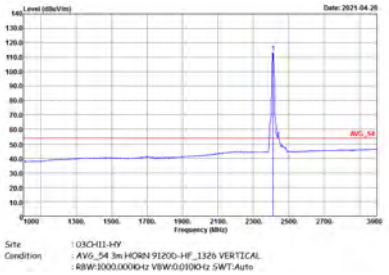
-L	**Low channel location**
-R	**High channel location**

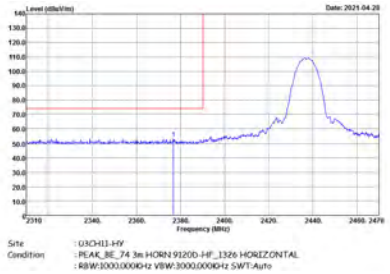
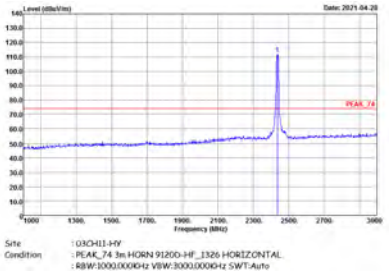
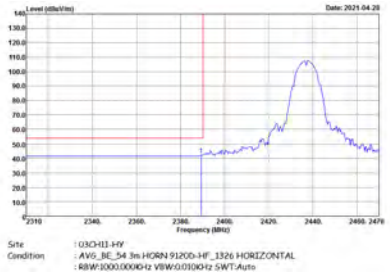
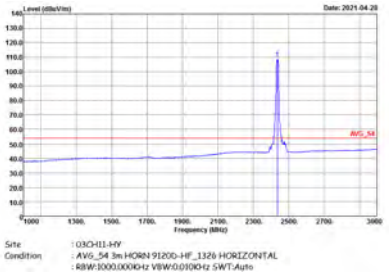
<CDD Mode>

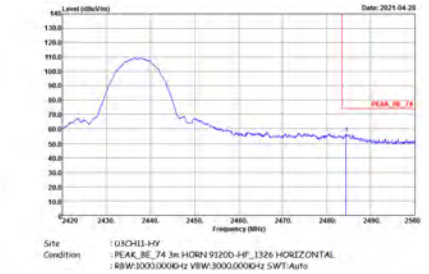
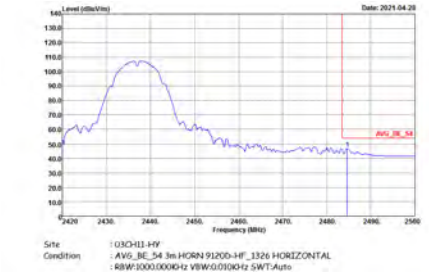
2.4GHz 2400~2483.5MHz

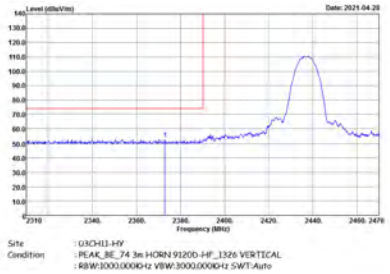
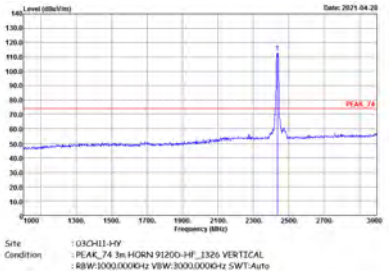
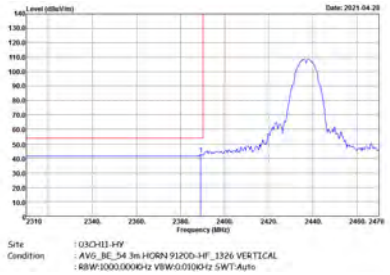
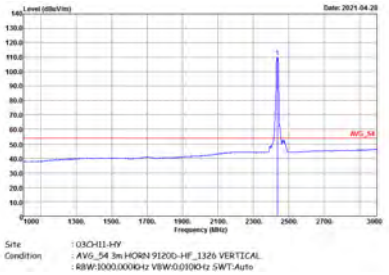
WIFI 802.11b (Band Edge @ 3m)

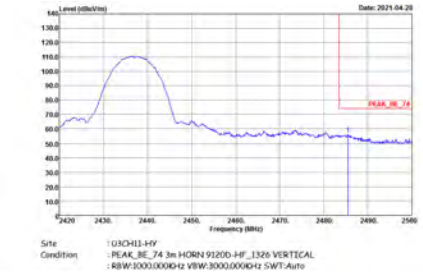
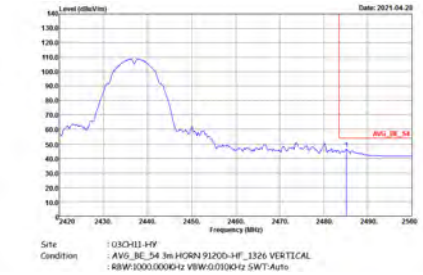
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11b CH01 2412MHz	
1+2	Horizontal	Fundamental
Peak		
Avg.		

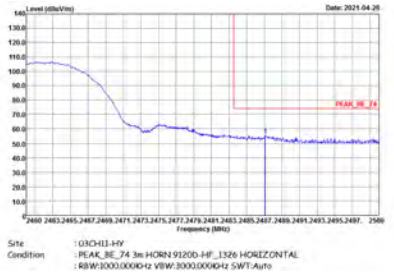
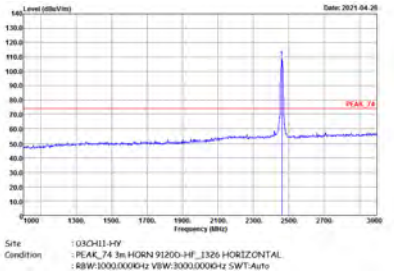
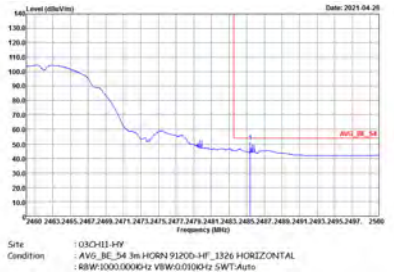
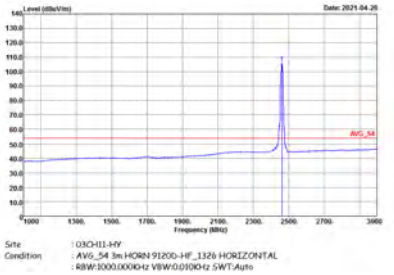
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11b CH01 2412MHz	
1+2	Vertical	Fundamental
Peak		
Avg.		

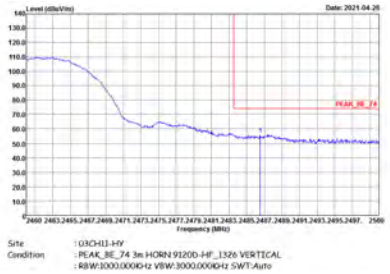
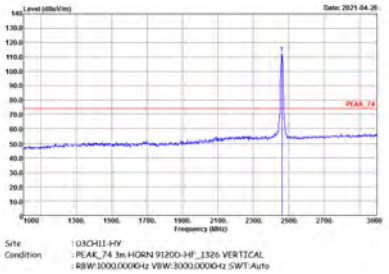
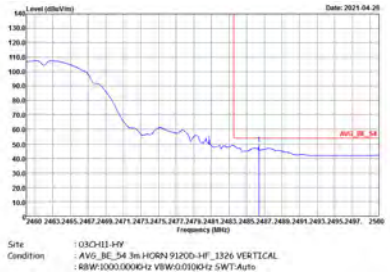
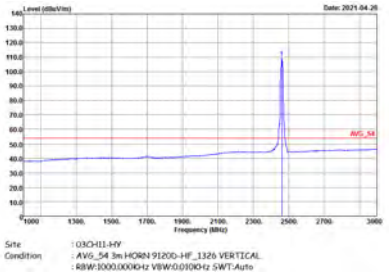
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11b CH06 2437MHz - L	
1+2	Horizontal	Fundamental
Peak		
Avg.		

WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11b CH06 2437MHz - R	
1+2	Horizontal	Fundamental
Peak		Left blank
Avg.		Left blank

WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11b CH06 2437MHz - L	
1+2	Vertical	Fundamental
Peak		
Avg.		

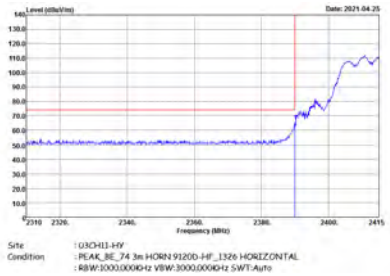
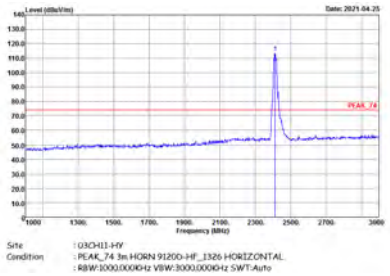
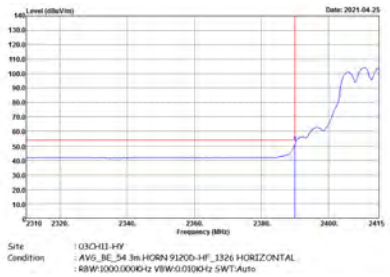
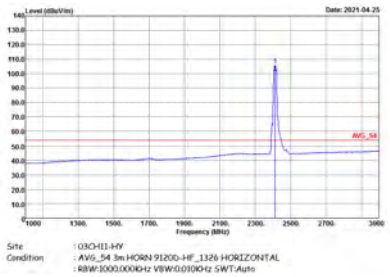
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11b CH06 2437MHz - R	
1+2	Vertical	Fundamental
Peak		Left blank
Avg.		Left blank

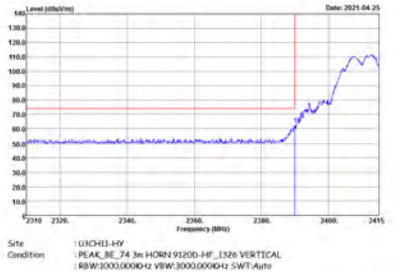
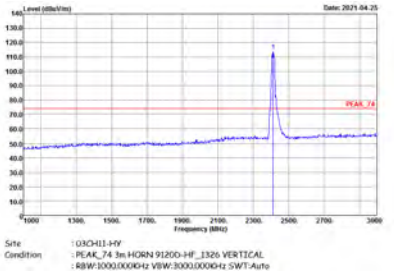
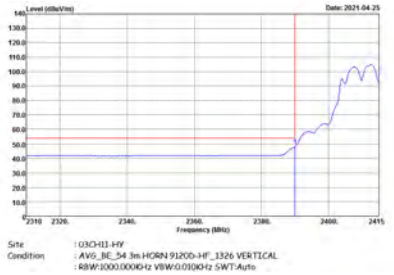
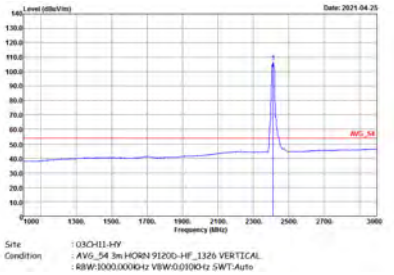
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11b CH11 2462MHz	
1+2	Horizontal	Fundamental
Peak		
Avg.		

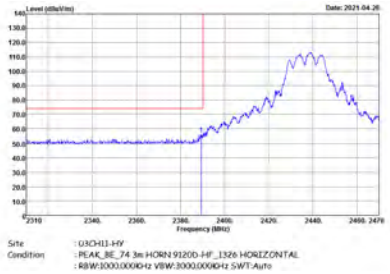
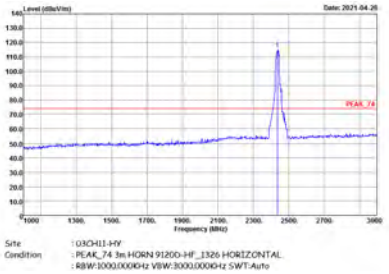
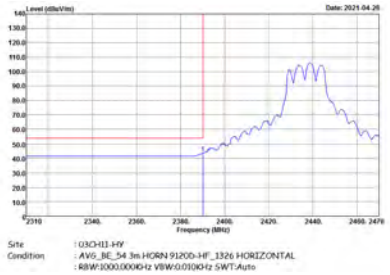
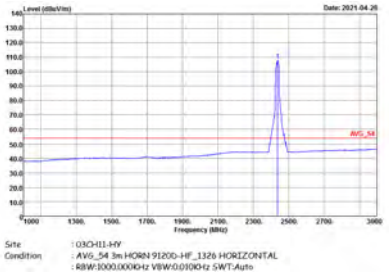
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11b CH11 2462MHz	
1+2	Vertical	Fundamental
Peak		
Avg.		

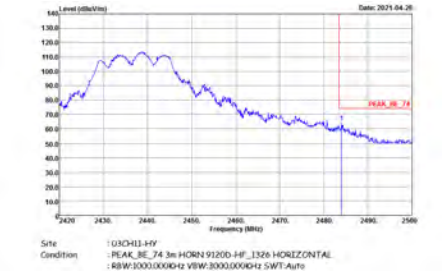
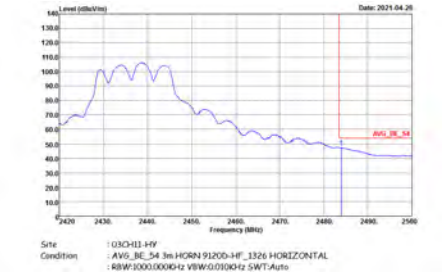
2.4GHz 2400~2483.5MHz

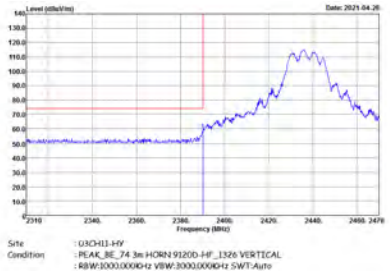
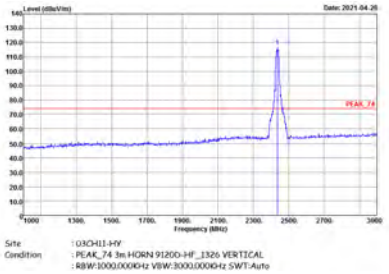
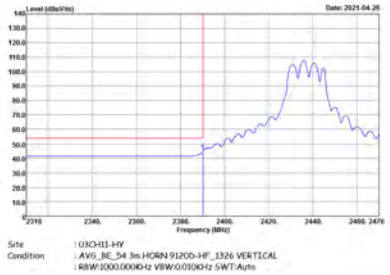
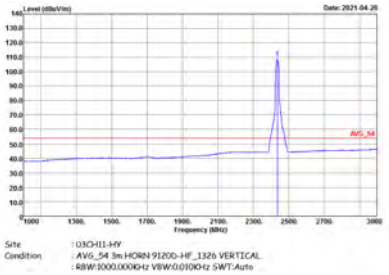
WIFI 802.11g (Band Edge @ 3m)

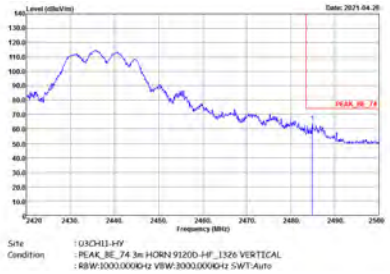
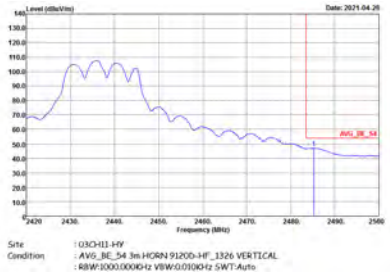
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11g CH01 2412MHz	
1+2	Horizontal	Fundamental
Peak		
Avg.		

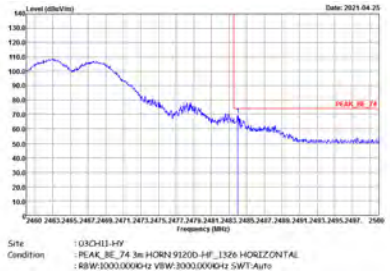
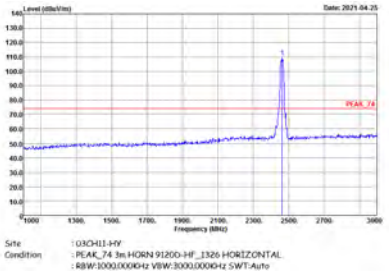
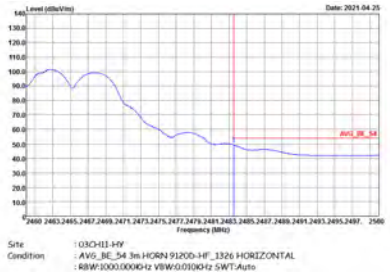
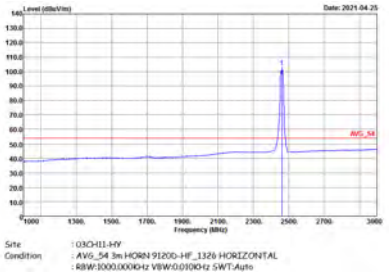
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11g CH01 2412MHz	
1+2	Vertical	Fundamental
Peak		
Avg.		

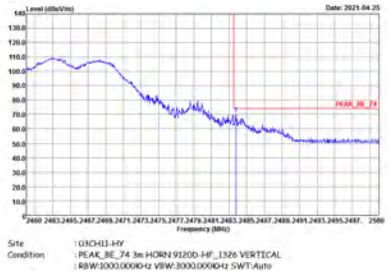
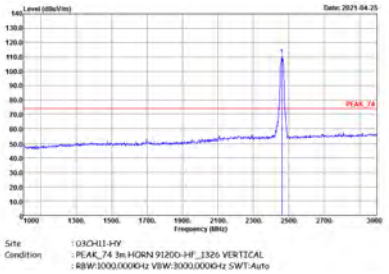
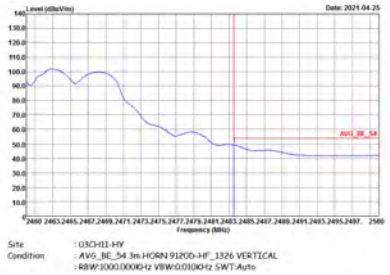
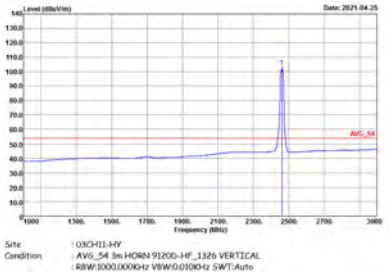
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11g CH06 2437MHz - L	
1+2	Horizontal	Fundamental
Peak		
Avg.		

WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11g CH06 2437MHz - R	
1+2	Horizontal	Fundamental
Peak		Left blank
Avg.		Left blank

WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11g CH06 2437MHz - L	
1+2	Vertical	Fundamental
Peak		
Avg.		

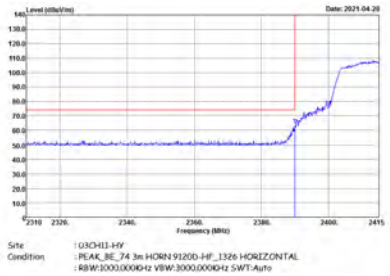
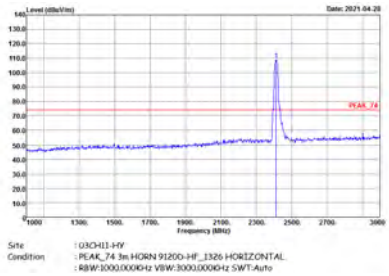
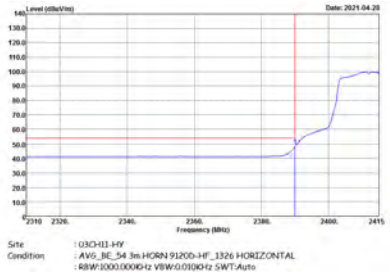
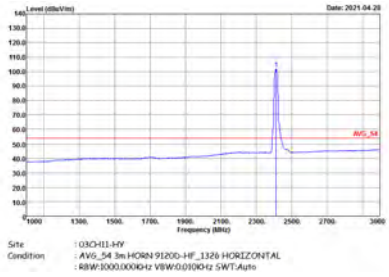
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11g CH06 2437MHz - R	
1+2	Vertical	Fundamental
Peak		Left Blank
Avg.		Left Blank

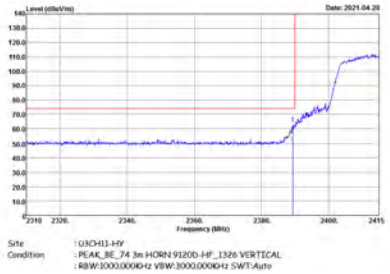
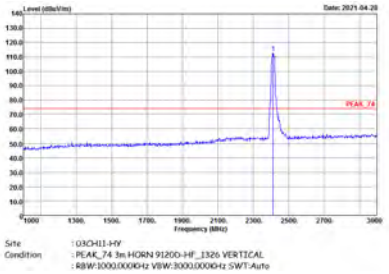
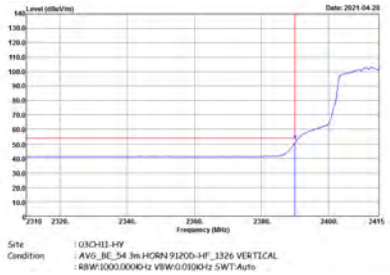
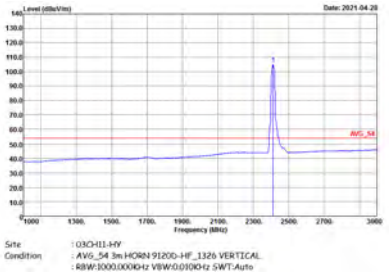
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11g CH11 2462MHz	
1+2	Horizontal	Fundamental
Peak		
Avg.		

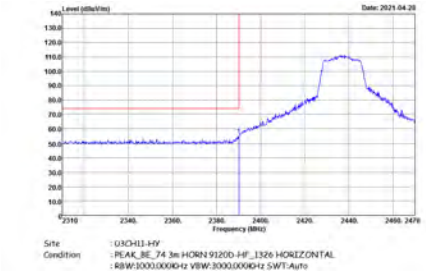
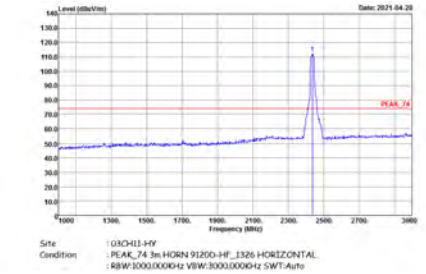
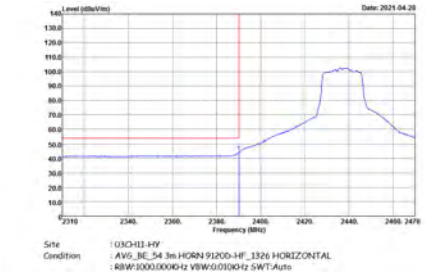
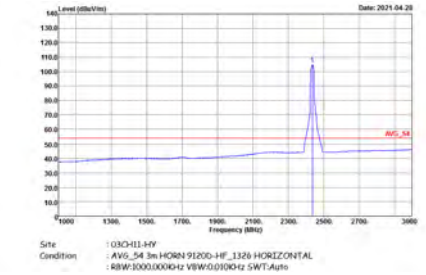
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11g CH11 2462MHz	
1+2	Vertical	Fundamental
Peak		
Avg.		

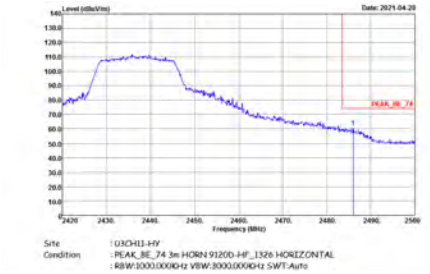
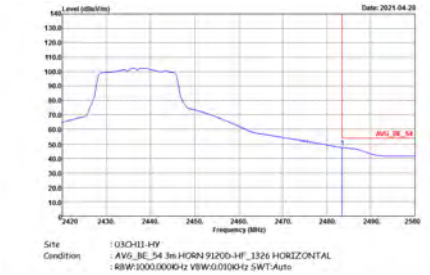
2.4GHz 2400~2483.5MHz

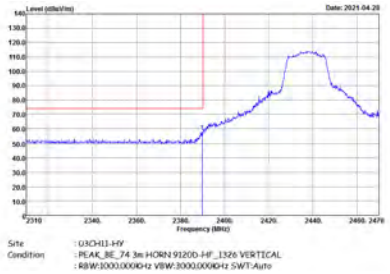
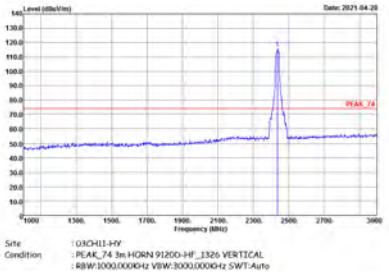
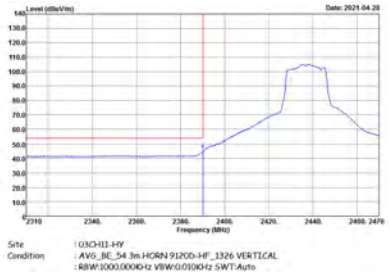
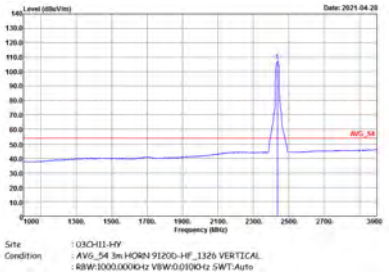
WIFI 802.11ac VHT20 (Band Edge @ 3m)

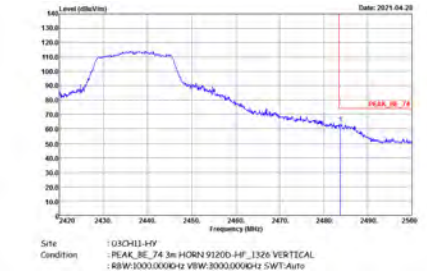
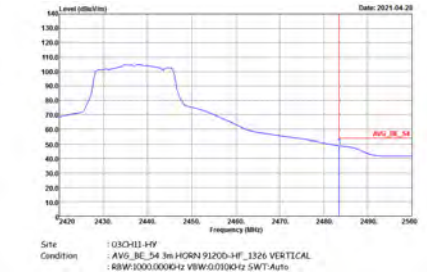
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11ac VHT20 CH01 2412MHz	
1+2	Horizontal	Fundamental
Peak		
Avg.		

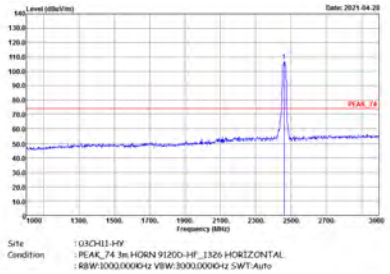
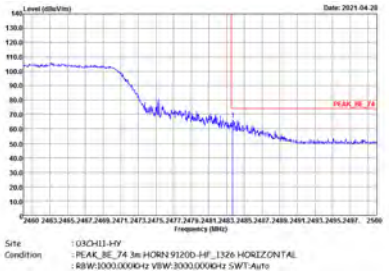
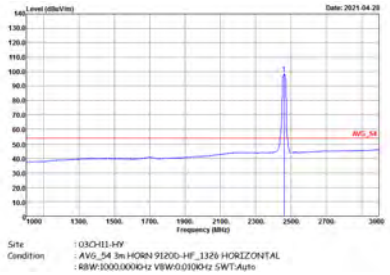
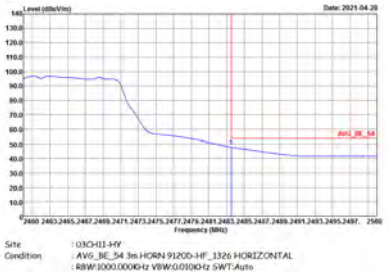
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11ac VHT20 CH01 2412MHz	
1+2	Vertical	Fundamental
Peak		
Avg.		

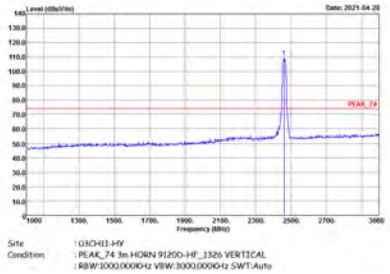
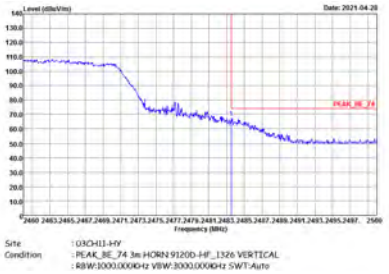
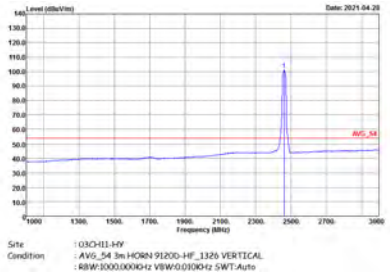
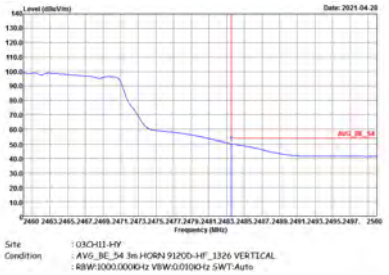
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11ac VHT20 CH06 2437MHz - L	
1+2	Horizontal	Fundamental
Peak		
Avg.		

WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11ac VH20 CH06 2437MHz - R	
1+2	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+2	Vertical	Fundamental
Peak		
Avg.		

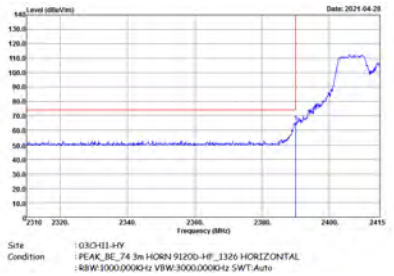
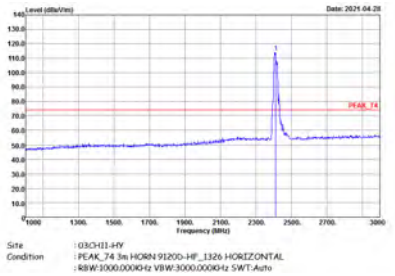
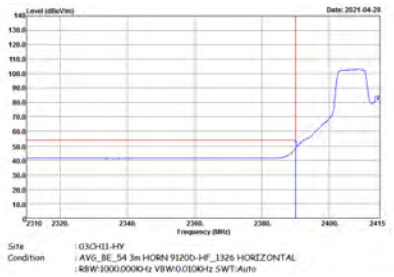
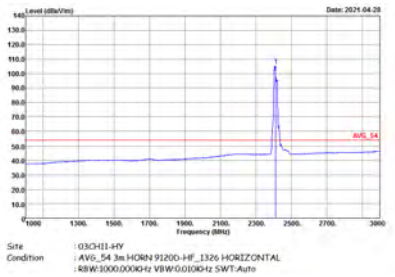
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11ac VH20 CH06 2437MHz - R	
1+2	Vertical	Fundamental
Peak		Left blank
Avg.		Left blank

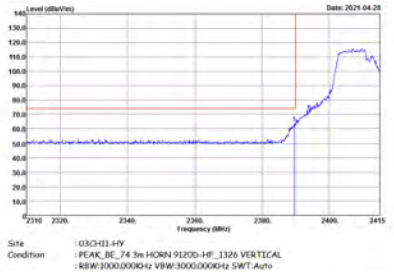
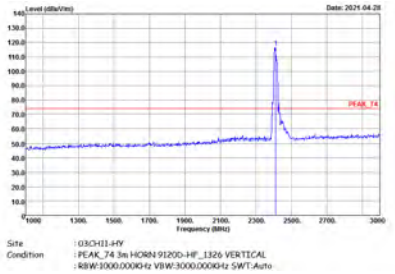
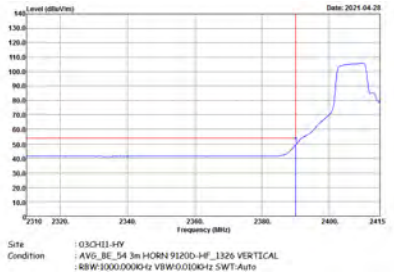
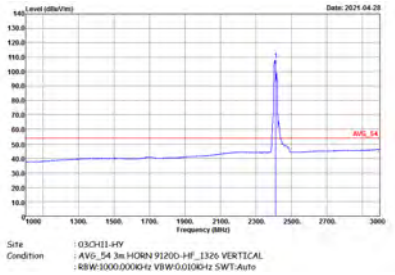
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11ac VH20 CH11 2462MHz	
1+2	Horizontal	Fundamental
Peak		
Avg.		

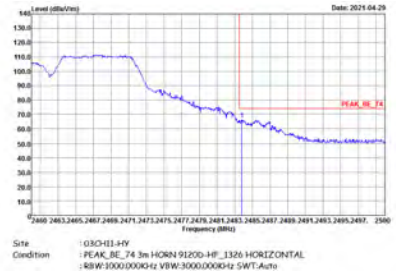
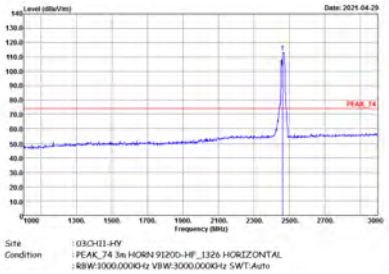
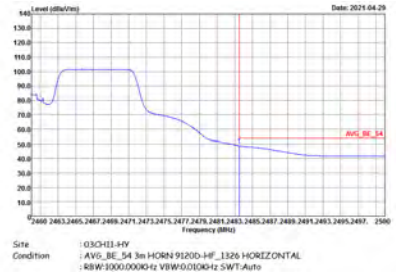
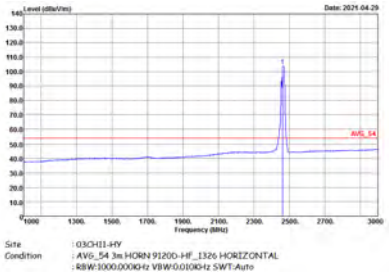
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11ac VH20 CH11 2462MHz	
1+2	Vertical	Fundamental
Peak		
Avg.		

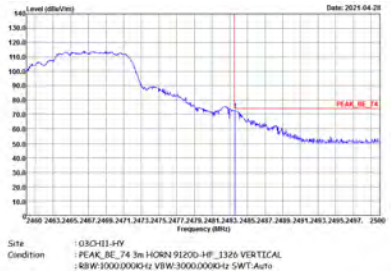
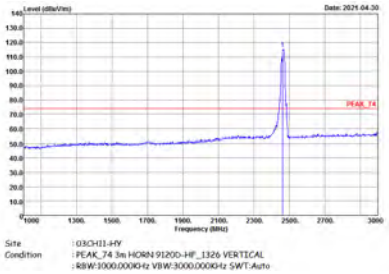
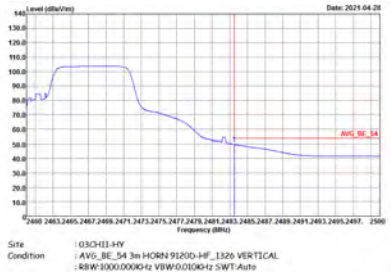
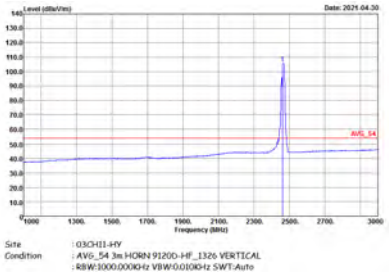
2.4GHz 2400~2483.5MHz

WIFI 802.11ax HE20 Partial 106 (Band Edge @ 3m)

WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11ax HE20 Partial 106/53 CH01 2412MHz	
1+2	Horizontal	Fundamental
Peak		
Avg.		

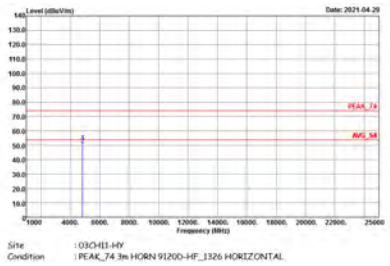
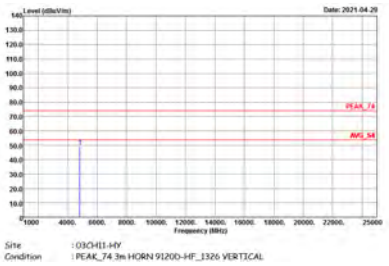
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11ax HE20 Partial 106/53 CH01 2412MHz	
1+2	Vertical	Fundamental
Peak		
Avg.		

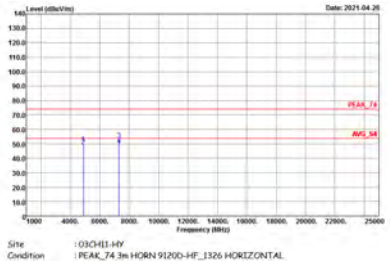
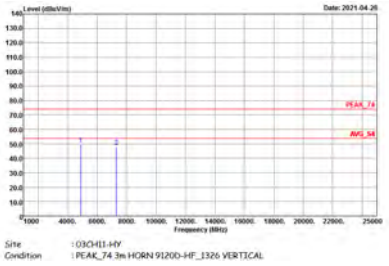
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11ax HE20 Partial 106/54 CH11 2462MHz	
1+2	Horizontal	Fundamental
Peak		
Avg.		

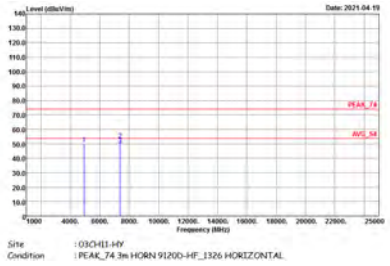
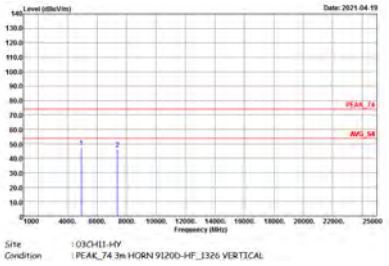
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11ax HE20 Partial 106/54 CH11 2462MHz	
1+2	Vertical	Fundamental
Peak		
Avg.		

2.4GHz 2400~2483.5MHz

WIFI 802.11b (Harmonic @ 3m)

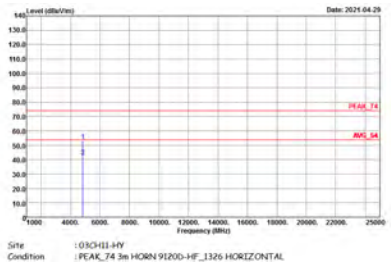
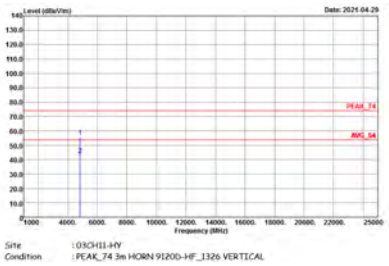
WIFI	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	802.11b CH01 2412MHz	
1+2	Horizontal	Vertical
Peak Avg.		

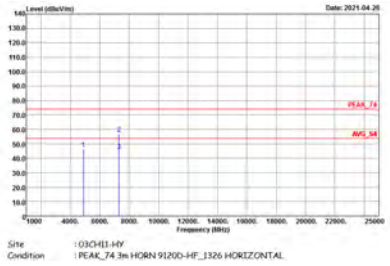
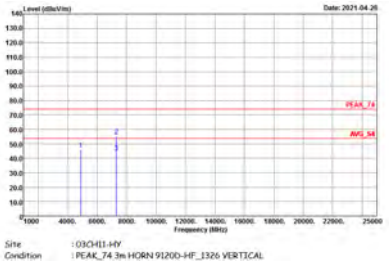
WIFI	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	802.11b CH06 2437MHz	
1+2	Horizontal	Vertical
Peak Avg.		

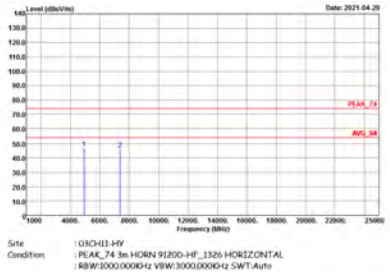
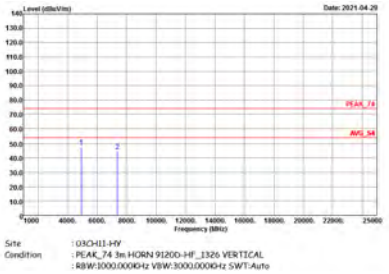
WIFI	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	802.11b CH11 2462MHz	
1+2	Horizontal	Vertical
Peak Avg.		

2.4GHz 2400~2483.5MHz

WIFI 802.11g (Harmonic @ 3m)

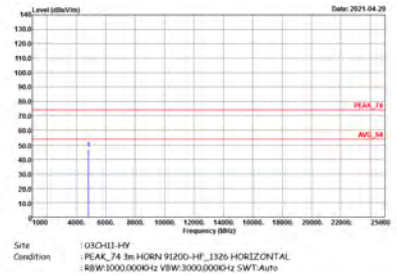
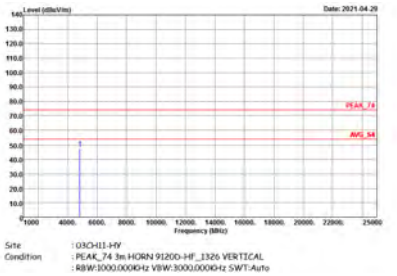
WIFI	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	802.11g CH01 2412MHz	
1+2	Horizontal	Vertical
Peak Avg.		

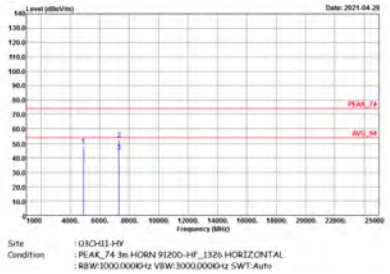
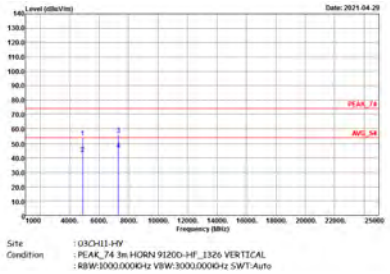
WIFI	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	802.11g CH06 2437MHz	
1+2	Horizontal	Vertical
Peak Avg.		

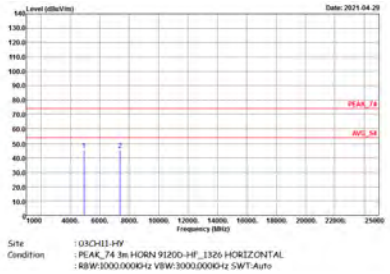
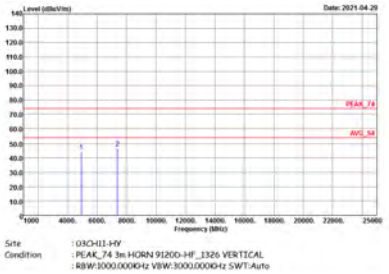
WIFI	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	802.11g CH11 2462MHz	
1+2	Horizontal	Vertical
Peak Avg.		

2.4GHz 2400~2483.5MHz

WIFI 802.11ac VHT20 (Harmonic @ 3m)

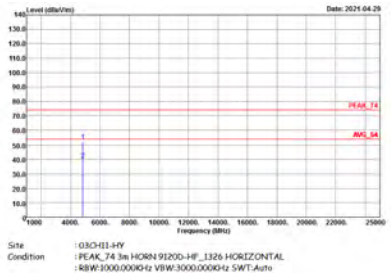
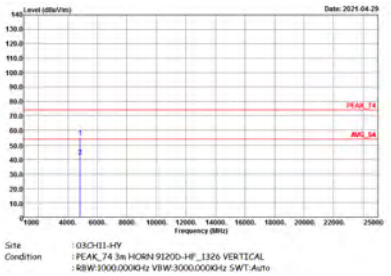
WIFI	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	802.11ac VHT20 CH01 2412MHz	
1+2	Horizontal	Vertical
Peak Avg.		

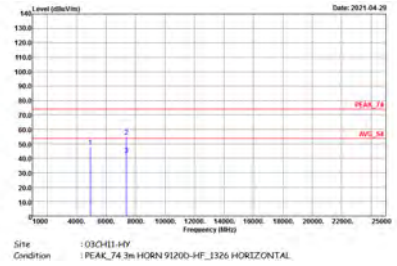
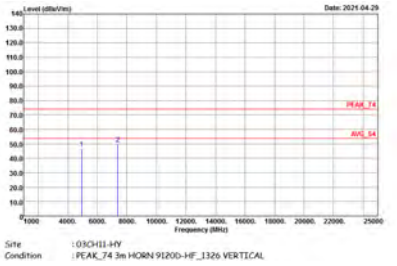
WIFI	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	802.11ac VHT20 CH06 2437MHz	
1+2	Horizontal	Vertical
Peak Avg.		

WIFI	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	802.11ac VHT20 CH11 2462MHz	
1+2	Horizontal	Vertical
Peak Avg.		

2.4GHz 2400~2483.5MHz

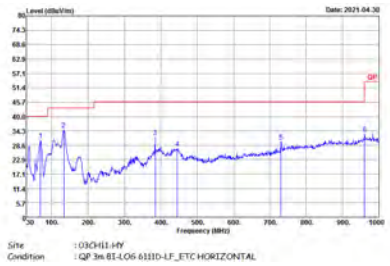
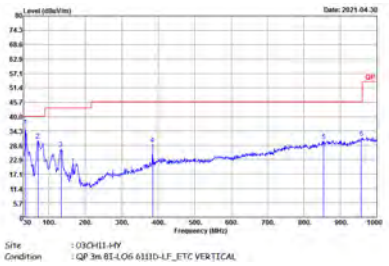
WIFI 802.11ax HE20 Partial 106 (Harmonic @ 3m)

WIFI	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	802.11ax HE20 Partial 106/53 CH01 2412MHz	
1+2	Horizontal	Vertical
Peak Avg.		

WIFI	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	802.11ax HE20 Partial 106/54 CH11 2462MHz	
1+2	Horizontal	Vertical
Peak Avg.		

Emission below 1GHz

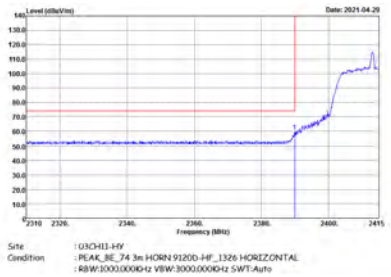
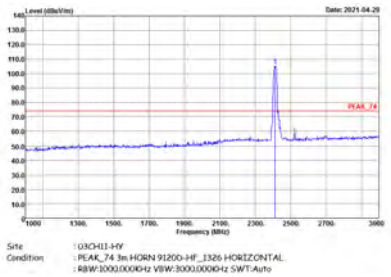
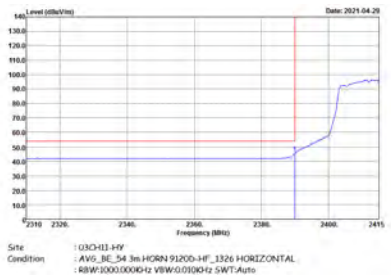
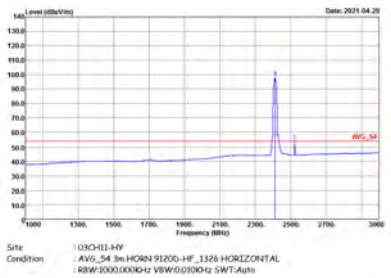
2.4GHz WIFI 802.11ax HE20 Partial RU 106 (LF)

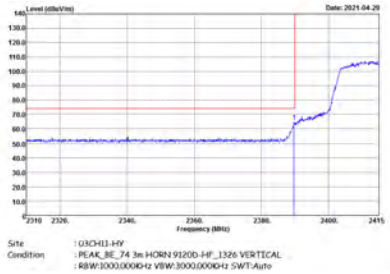
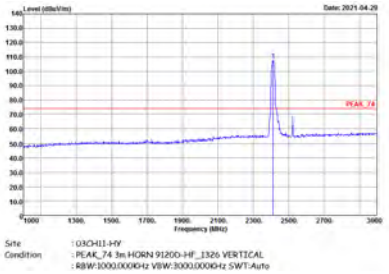
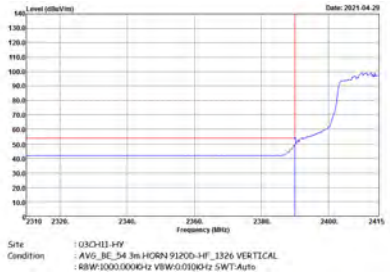
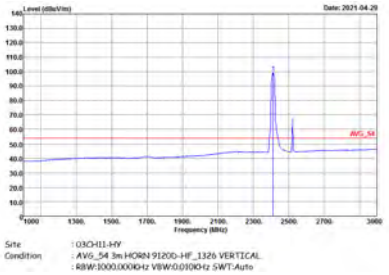
WIFI	2.4GHz 2400~2483.5MHz	
ANT	802.11ax HE20 Partial RU 106 LF	
1+2	Horizontal	Vertical
QP / Peak		

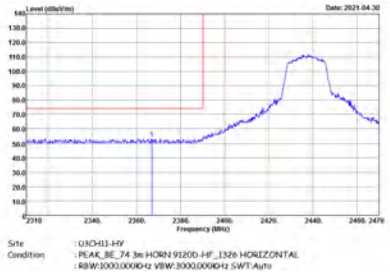
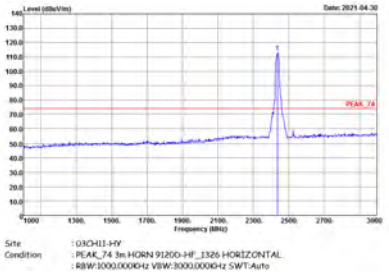
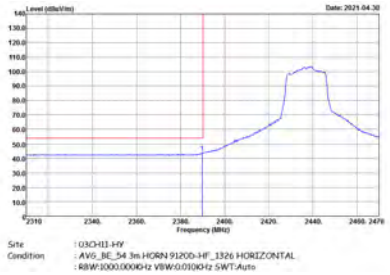
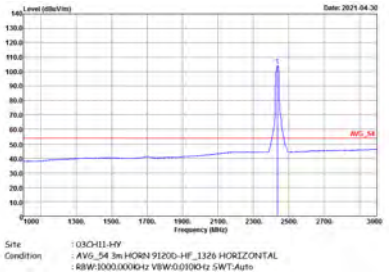
<TXBF Mode>

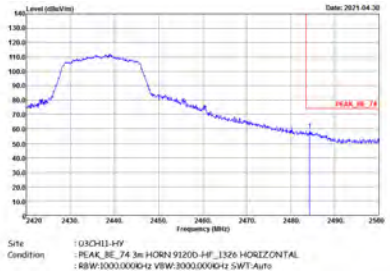
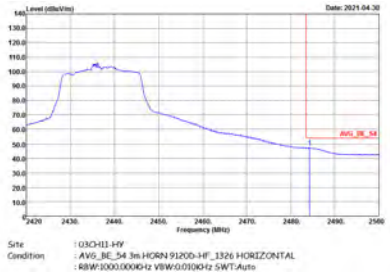
2.4GHz 2400~2483.5MHz

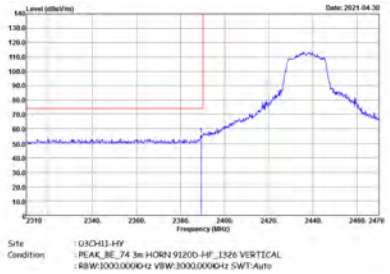
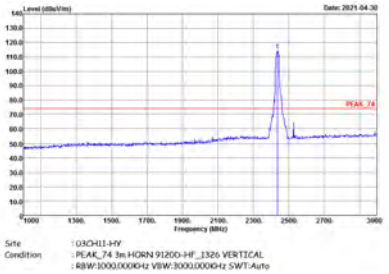
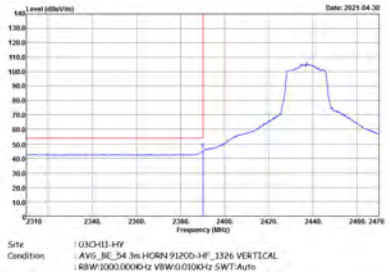
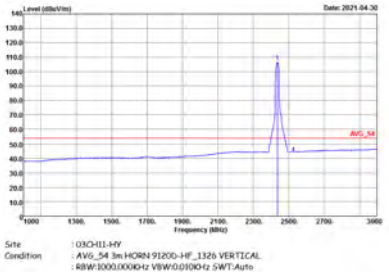
WIFI 802.11ac VHT20 (Band Edge @ 3m)

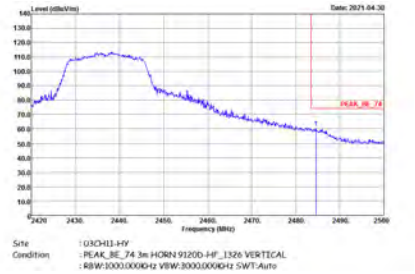
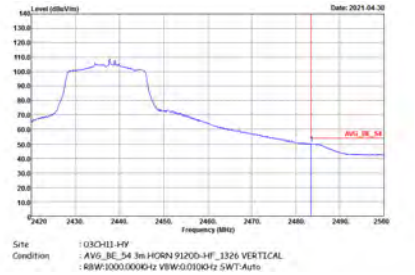
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11ac VHT20 CH01 2412MHz	
1+2	Horizontal	Fundamental
Peak		
Avg.		

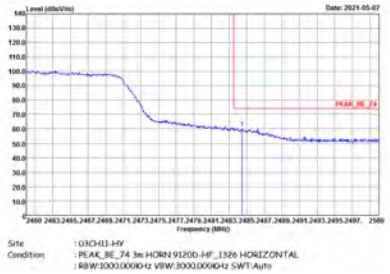
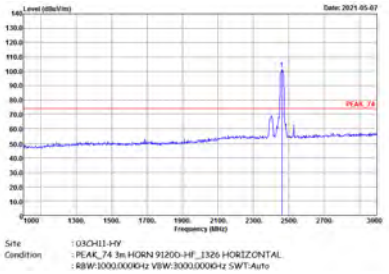
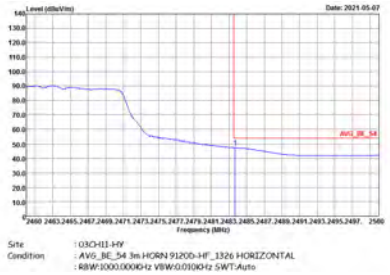
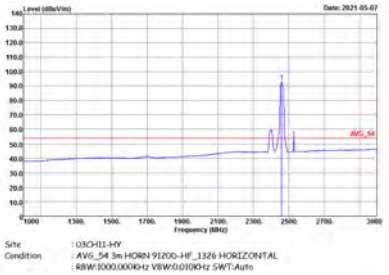
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11ac VHT20 CH01 2412MHz	
1+2	Vertical	Fundamental
Peak		
Avg.		

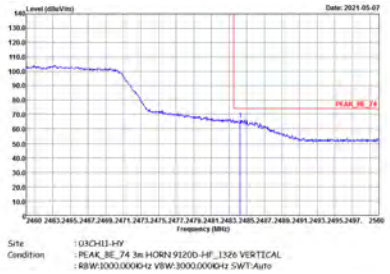
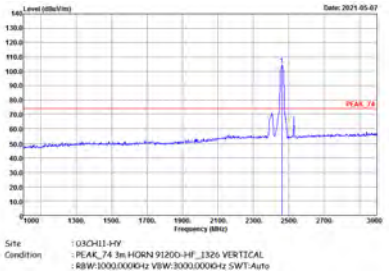
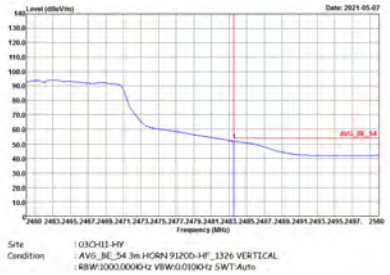
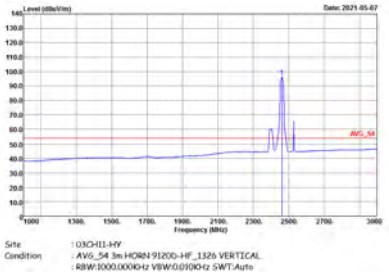
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11ac VHT20 CH06 2437MHz - L	
1+2	Horizontal	Fundamental
Peak		
Avg.		

WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11ac VH20 CH06 2437MHz - R	
1+2	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+2	Vertical	Fundamental
Peak		
Avg.		

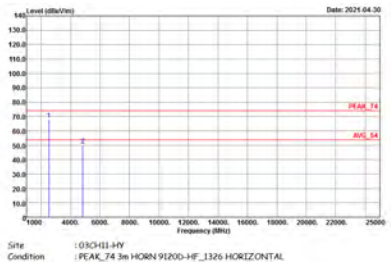
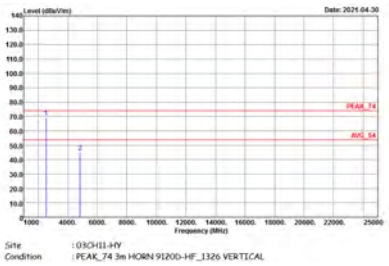
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11ac VH20 CH06 2437MHz - R	
1+2	Vertical	Fundamental
Peak		Left blank
Avg.		Left blank

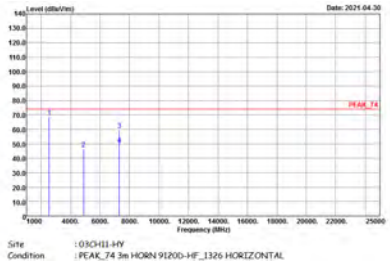
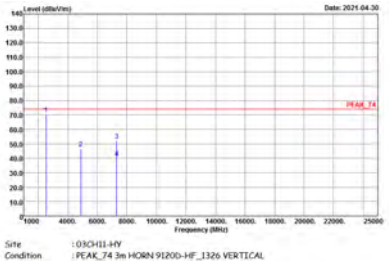
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11ac VH20 CH11 2462MHz	
1+2	Horizontal	Fundamental
Peak		
Avg.		

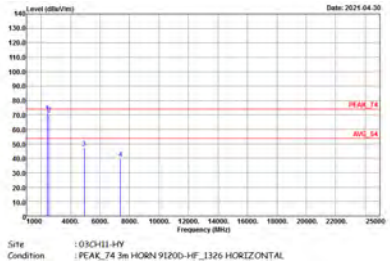
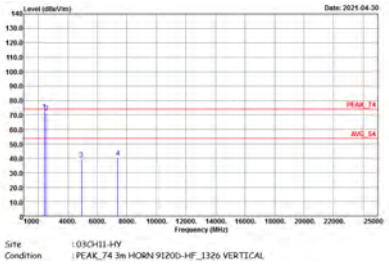
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11ac VH20 CH11 2462MHz	
1+2	Vertical	Fundamental
Peak		
Avg.		

2.4GHz 2400~2483.5MHz

WIFI 802.11ac VHT20 (Harmonic @ 3m)

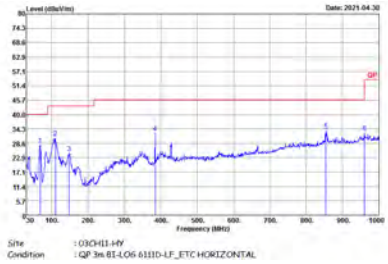
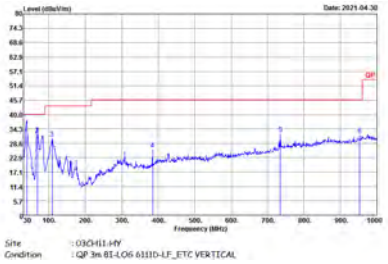
WIFI	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	802.11ac VHT20 CH01 2412MHz	
1+2	Horizontal	Vertical
Peak Avg.		

WIFI	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	802.11ac VHT20 CH06 2437MHz	
1+2	Horizontal	Vertical
Peak Avg.		

WIFI	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	802.11ac VHT20 CH11 2462MHz	
1+2	Horizontal	Vertical
Peak Avg.		

Emission below 1GHz

2.4GHz WIFI 802.11ac VHT20 (LF)

WIFI	2.4GHz 2400~2483.5MHz	
ANT	802.11ac VHT20 LF	
1+2	Horizontal	Vertical
QP / Peak		

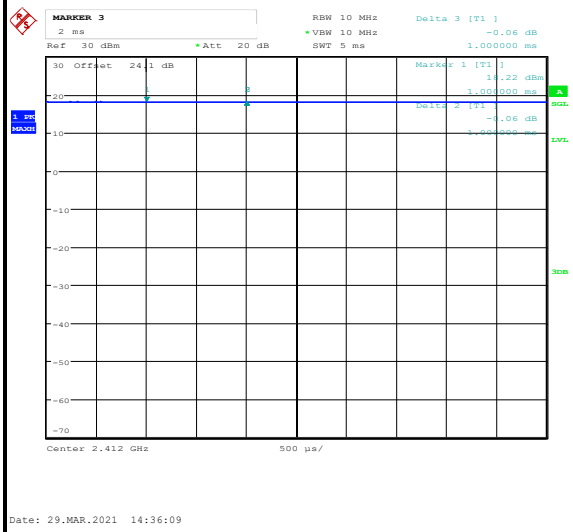
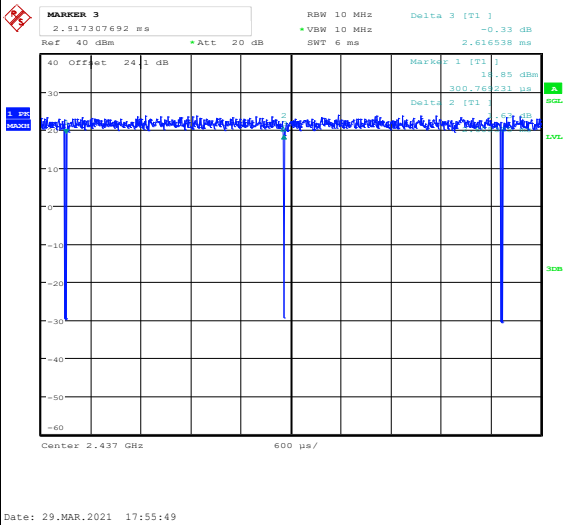
Appendix D. Duty Cycle Plots

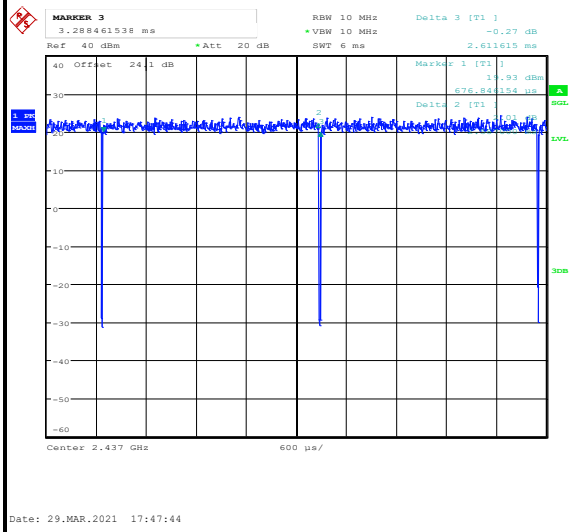
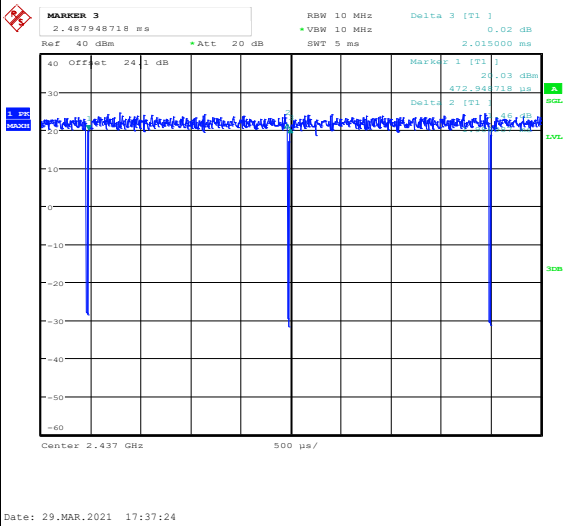
<CDD Mode>

Antenna	Band	Duty Cycle(%)	T(us)	1/T(kHz)	VBW Setting	Duty Factor(dB)
1+2	802.11b for Ant. 1	100.00	-	-	10Hz	0.00
1+2	802.11b for Ant. 2	100.00	-	-	10Hz	0.00
1+2	802.11g for Ant. 1	99.57	-	-	10Hz	0.02
1+2	802.11g for Ant. 2	99.29	-	-	10Hz	0.03
1+2	2.4GHz 802.11ac VHT20 for Ant. 1	99.06	-	-	10Hz	0.04
1+2	2.4GHz 802.11ac VHT20 for Ant. 2	99.25	-	-	10Hz	0.03
1+2	2.4GHz 802.11ax HE20 Full RU for Ant. 1	98.61	-	-	10Hz	0.06
1+2	2.4GHz 802.11ax HE20 Full RU for Ant. 2	99.24	-	-	10Hz	0.03

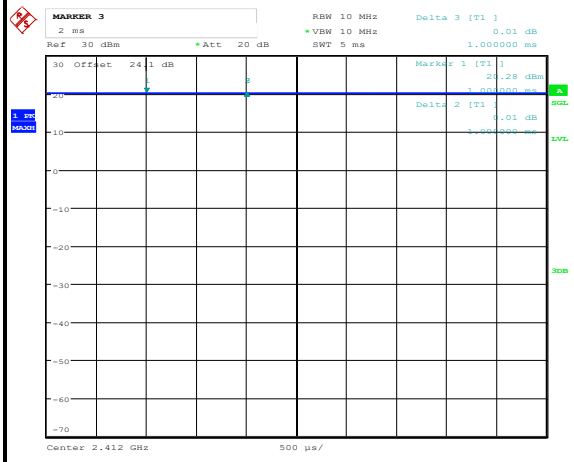
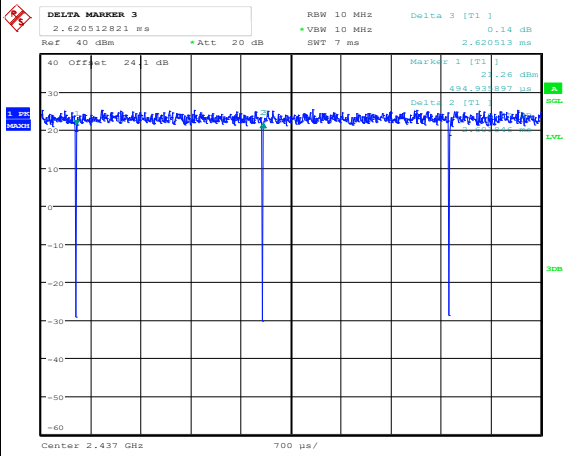
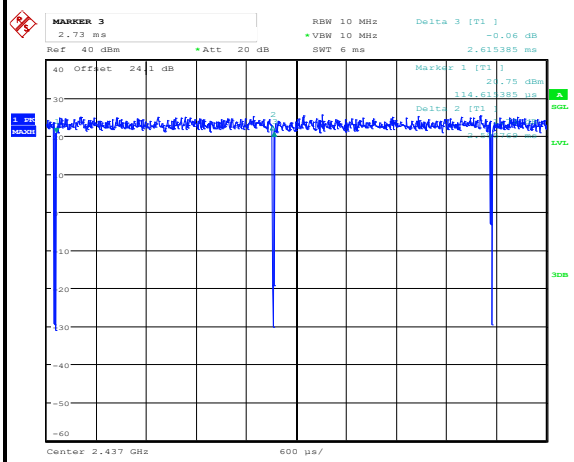
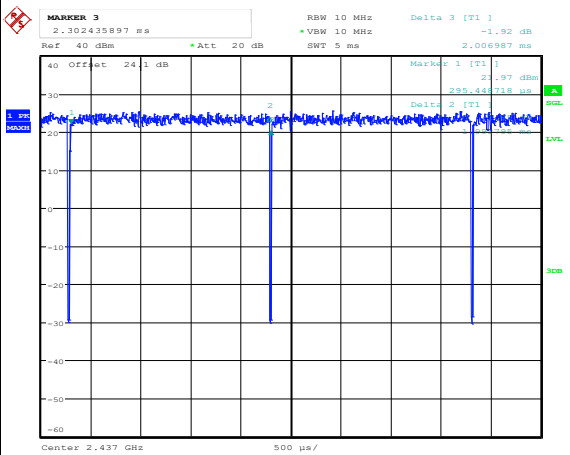
<CDD Mode>

MIMO <Ant. 1>

802.11b	802.11g
	

802.11ac VHT20	802.11ax HE20 Full RU
	

MIMO <Ant. 2>

802.11b	802.11g
	
	

802.11ac VHT20	802.11ax HE20 Full RU