FCC CO-LOCATION RADIO TEST REPORT

FCC ID	:	**A4RG9S9B**
Equipment	:	**Phone**
Model Name	:	**G9S9B**
Applicant	:	**Google LLC** **1600 Amphitheatre Parkway,** **Mountain View, California, 94043 USA**
Standard	:	**FCC Part 15 Subpart E §15.407**

The product was received on Jun. 08, 2021 and testing was started from Jun. 09, 2021 and completed on Jul. 01, 2021. We, Sporton International Inc. EMC & Wireless Communications Laboratory, would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

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

Louis Wu

Approved by: Louis Wu

Sporton International Inc. EMC & Wireless Communications Laboratory
No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.)

Table of Contents

History of this test report

Report No.	Version	Description	Issued Date
FR0D2942-04I	01	Initial issue of report	Jul. 21, 2021
FR0D2942-04I	02	1. Add standard in section 1.5 2. Add limit description for WiFi 6e in section 3.1 3. Revise description in section 3.1.4 4. Revise list of measuring equipment 5. Revise appendix C 6. Add setup photo for SHF	Aug. 04, 2021

Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
3.1	15.407(b)	Unwanted Emissions	Pass	Under limit 1.57 dB at 5150.000 MHz
3.2	15.203 15.407(a)	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: William Chen

Report Producer: Cindy Liu

1 General Description

1.1 Product Feature of Equipment Under Test

Product Feature	
Equipment	Phone
Model Name	G9S9B
FCC ID	A4RG9S9B
EUT supports Radios application	GSM/EGPRS/WCDM/HSPA/LTE/5G NR/NFC/ GNSS/WPC/WPT WLAN 11b/g/n HT20 WLAN 11a/n HT20/HT40 WLAN 11ac VHT20/VHT40/VHT80/VHT160 WLAN 11ax HE20/HE40/HE80/HE160 Bluetooth BR/EDR/LE

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

EUT Information List	
S/N	Performed Test Item
15201FDF60005H 15201FDF60006K	Radiated Spurious Emission

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>2400 MHz ~ 2483.5 MHz
5180 MHz ~ 5240 MHz
5925 MHz ~ 6425 MHz</td></tr>
<tr><td>Antenna Type / Gain</td><td><Bluetooth>
<Ant. 4> : ILA Antenna with gain -1.2 dBi
<Ant. 3> : IFA Antenna with gain -1.1 dBi
<2400 MHz ~ 2483.5 MHz>
<Ant. 4>: ILA Antenna with gain -1.2 dBi
<Ant. 3>: IFA Antenna with gain -1.1 dBi
<5180 MHz ~ 5240 MHz>
<Ant. 4>: ILA Antenna with gain -0.4 dBi
<Ant. 3>: IFA Antenna with gain -3.6 dBi
<5925 MHz ~ 6425 MHz>
<Ant. 4>: ILA Antenna with gain -0.3 dBi
<Ant. 3>: IFA Antenna with gain -1.4 dBi</td></tr>
<tr><td>Type of Modulation</td><td>Bluetooth BR (1Mbps) : GFSK
Bluetooth LE : GFSK
802.11n : OFDM (BPSK / QPSK / 16QAM / 64QAM)
802.11ax : OFDMA (BPSK / QPSK / 16QAM / 64QAM / 256QAM / 1024QAM)</td></tr>
<tr><td>Antenna Function for Transmitter</td><td>
<table>
<tr><th></th><th>Ant. 4</th><th>Ant. 3</th></tr>
<tr><td>802.11
Bluetooth-LE</td><td>V</td><td>-</td></tr>
<tr><td>802.11 n/ax/
Bluetooth
MIMO</td><td>V</td><td>V</td></tr>
</table>
</td></tr>
</table>

Remark:

1. MIMO Ant. 4+3 is a calculated result from sum of the power MIMO Ant. 4 and MIMO Ant. 3.
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.**
	03CH07-HY

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.**
	03CH13-HY (TAF Code: 3786)
Remark	The Radiated Spurious Emissions test item subcontracted to Sporton International Inc. Wensan Laboratory.

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 E
- FCC Part 15 Subpart C §15.247
- FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v05r02
- FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01.
- FCC KDB 987594 D02 U-NII 6 GHz EMC Measurement v01
- 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.

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: radiation emission (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower). The measured emission level of the EUT was maximized by rotating the EUT on a turntable, adjusting the orientation of the EUT and EUT antenna in three orthogonal axis (X: flat, Y: portrait, Z: landscape), and adjusting the measurement antenna orientation, following C63.10 exploratory test procedures and find (X Plane with Notebook for Bluetooth MIMO Ant. 4+3 + 802.11ax HE40 MIMO Ant. 4+3, Bluetooth-LE Ant. 4 + 802.11ax HE40 MIMO Ant. 4+3, 802.11n HT20 MIMO Ant. 4+3 + 802.11ax HE40 MIMO Ant. 4+3; X Plane for Bluetooth MIMO Ant. 4+3 + 802.11ax HE160 MIMO Ant. 4+3, Bluetooth-LE Ant. 4 + 802.11ax HE160 MIMO Ant. 4+3, 802.11n HT20 MIMO Ant. 4+3 + 802.11ax HE160 MIMO Ant. 4+3) as worst plane.

2.1 Carrier Frequency and Channel

2400-2483.5 MHz Bluetooth EDR		2400-2483.5 MHz Bluetooth – LE	
Channel	**Freq. (MHz)**	**Channel**	**Freq. (MHz)**
78	2480	39	2480

2400-2483.5 MHz 802.11n HT20		5150-5250 MHz 802.11ax HE40		5925-6425MHz 802.11ax HE160	
Channel	**Freq. (MHz)**	**Channel**	**Freq. (MHz)**	**Channel**	**Freq. (MHz)**
01	2412	38	5190	15	6025

2.2 Test Mode

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

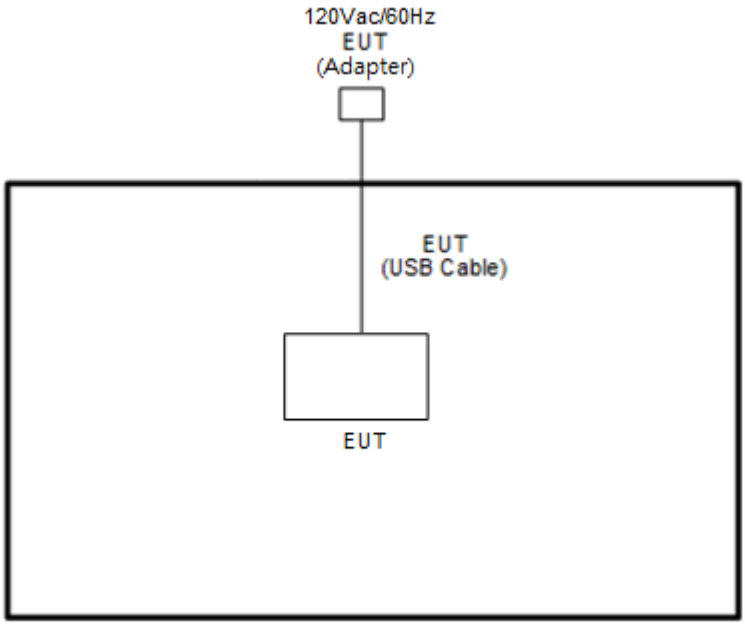
<Co-Location>

Modulation	Data Rate
Bluetooth for MIMO <Ant. 4+3> + WLAN 5GHz 802.11ax HE40 for MIMO <Ant. 4 + 3>	1Mbps + MCS0
Bluetooth-LE for Ant. 4 + WLAN 5GHz 802.11ax HE40 for MIMO <Ant. 4 + 3>	1Mbps + MCS0
WLAN 2.4GHz 802.11n HT20 for MIMO <Ant. 4+3> + WLAN 5GHz 802.11ax HE40 for MIMO <Ant. 4 + 3>	MCS0 + MCS0
Bluetooth for MIMO <Ant. 4+3> + WLAN 6GHz 802.11ax HE160 for MIMO <Ant. 4 + 3>	1Mbps + MCS0
Bluetooth LE for Ant. 4 + WLAN 6GHz 802.11ax HE160 for MIMO <Ant. 4 + 3>	1Mbps + MCS0
WLAN 2.4GHz 802.11n HT20 for MIMO <Ant. 4+3> + WLAN 6GHz 802.11ax HE160 for MIMO <Ant. 4 + 3>	MCS0 + MCS0

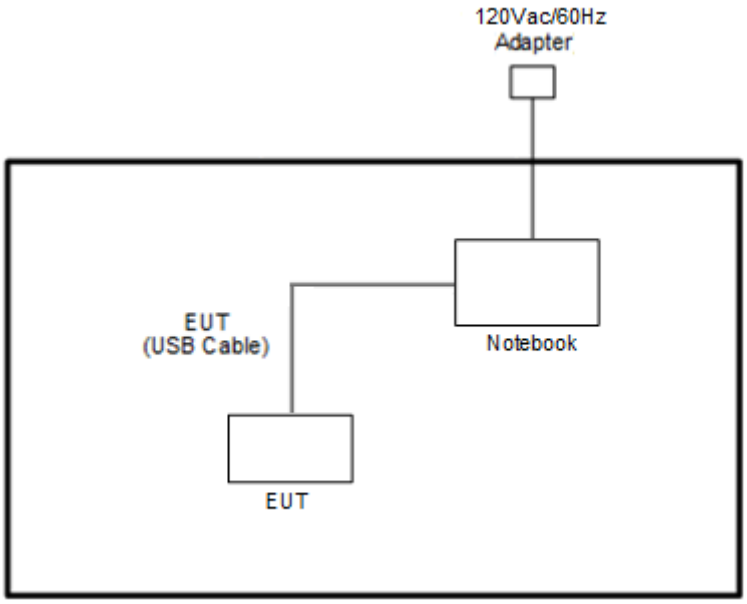
Remark: For Radiated Test Cases, the tests were performed with Adapter 2 and USB Cable 1.

2.3 Connection Diagram of Test System

<Co-Location Tx Mode>



<Co-Location Tx with Notebook Mode>



2.4 EUT Operation Test Setup

The RF test items, utility “CMD V10.0.18362.267 and adb command V_1.0.36” 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.

3 Test Result

3.1 Unwanted Emissions Measurement

This section is to measure unwanted emissions through radiated measurement for band edge spurious emissions and out of band emissions measurement.

<Limit of Unwanted Emissions>

(1) Unwanted spurious emissions fallen in restricted bands shall comply with the general field strength limits as below table:

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

Note: The following formula is used to convert the EIRP to field strength.

$$E=\frac{1000000\sqrt{30P}}{3}$$ μV/m, where P is the eirp (Watts)

EIRP (dBm)	Field Strength at 3m (dBμV/m)
- 27	68.3

(2) KDB789033 D02 v02r01 G)2)c)

(i) Sections 15.407(b)(1-3) specifies the unwanted emissions limit for the U-NII-1 and U-NII-2 bands. As specified, emissions above 1000 MHz that are outside of the restricted bands are subject to a peak emission limit of −27 dBm/MHz.

(ii) Section 15.407(b)(4) specifies the unwanted emissions limit for the U-NII-3 band. A band emissions mask is specified in Section 15.407(b)(4)(i). The emission limits are based on the use of a peak detector.

(3) For transmitters operating within the 5.925-7.125 GHz band: Any emissions outside of the 5.925-7.125 GHz band must not exceed an e.i.r.p. of −27 dBm/MHz.

EIRP (dBm)	Field Strength at 3m (dBμV/m)
- 27 (RMS)	68.3
- 7 (Peak)	88.3

According 987594 D02 U-NII 6GHz EMC Measurement v01 section G:
Unwanted emissions outside of restricted bands are measured with a RMS detector.
In addition, 15.35(b) applies where the peak emissions must be limited to no more than 20 dB above the average limit

3.1.1 Measuring Instruments

See list of measuring equipment of this test report.

3.1.2 Test Procedures

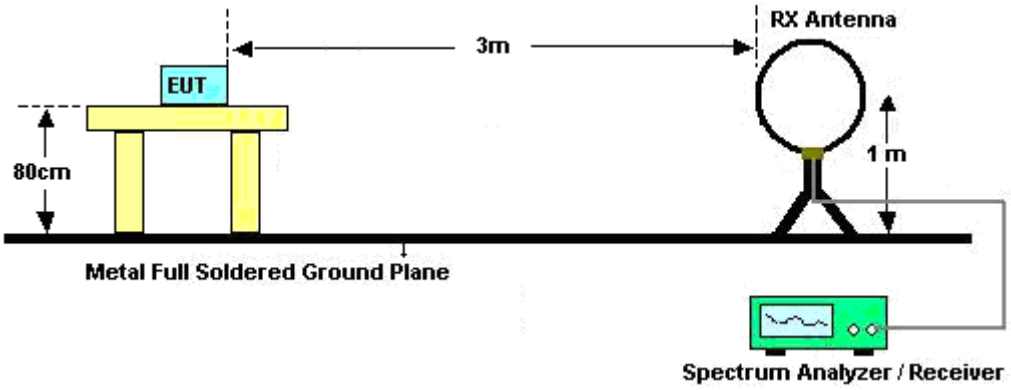
1. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01. Section G) Unwanted emissions measurement.
   (1) Procedure for Unwanted Emissions Measurements Below 1000MHz
   - RBW = 120 kHz
   - VBW = 300 kHz
   - Detector = Peak
   - Trace mode = max hold

   (2) Procedure for Peak Unwanted Emissions Measurements Above 1000 MHz
   - RBW = 1 MHz
   - VBW ≥ 3 MHz
   - Detector = Peak
   - Sweep time = auto
   - Trace mode = max hold

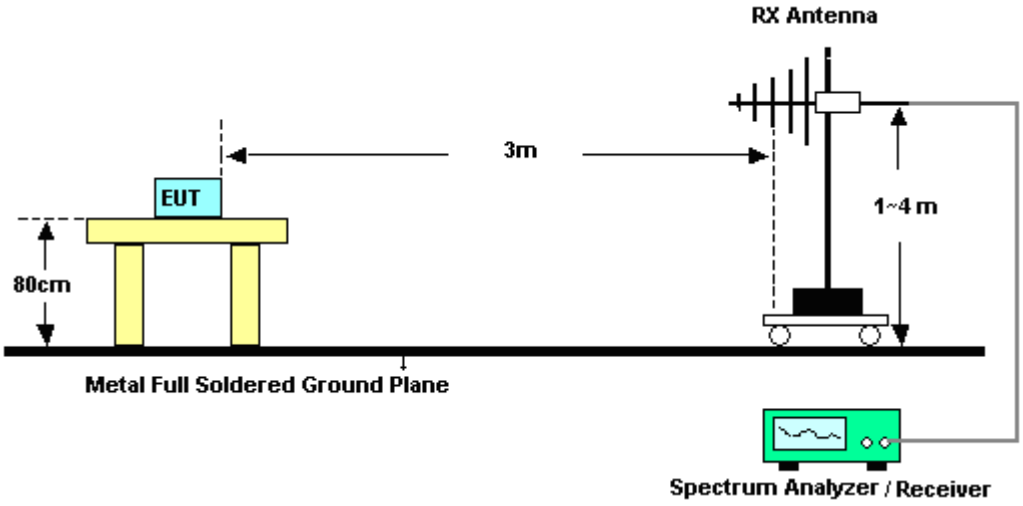
   (3) Procedures for Average Unwanted Emissions Measurements Above 1000MHz
   - RBW = 1 MHz
   - VBW = 10 Hz, when duty cycle is no less than 98 percent.
   - VBW ≥ 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.
2. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
3. The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
4. The antenna is a broadband antenna and its height is adjusted between one meter and four meters above ground to find the maximum value of the field strength for both horizontal polarization and vertical polarization of the antenna.
5. For each suspected emission, the EUT was arranged to its worst case and then adjust the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading.
6. For testing below 1GHz, if the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then peak values of EUT will be reported, otherwise, the emissions will be repeated one by one using the CISPR quasi-peak method and reported.
7. For testing above 1GHz, the emission level of the EUT in peak mode was 20dB lower than average limit (that means the emission level in average mode also complies with the limit in average mode), then peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.

3.1.3 Test Setup

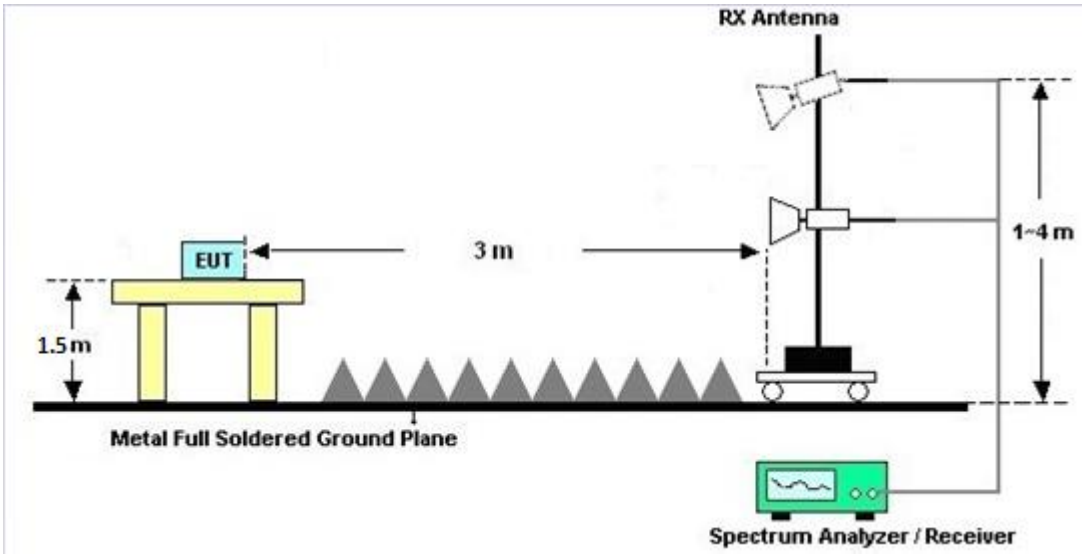
For radiated emissions below 30MHz



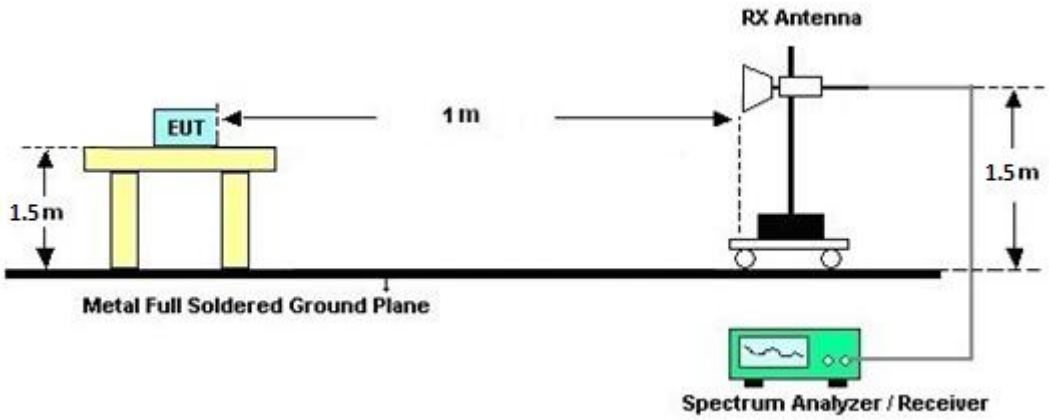
For radiated emissions from 30MHz to 1GHz



For radiated test above 1GHz



For radiated test above 18GHz



3.1.4 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 adequate comparison measurement 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.

3.1.5 Test Result of Radiated Spurious at Band Edges

Please refer to Appendix A and B.

3.1.6 Duty Cycle

Please refer to Appendix C.

3.1.7 Test Result of Radiated Spurious Emissions (30MHz ~ 10th Harmonic)

Please refer to Appendix A and B.

3.2 Antenna Requirements

3.2.1 Standard Applicable

<Bluetooth, Bluetooth-LE, WLAN 2.4GHz and WLAN 5GHz>

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

<WLAN 6GHz>

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.

3.2.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

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	100488	9 kHz~30 MHz	Jul. 14, 2020	Jun. 09, 2021~ Jul. 01, 2021	Jul. 13, 2021	Radiation (03CH13-HY)
Amplifier	Sonoma-Instrument	310 N	187282	9KHz~1GHz	Dec. 16, 2020	Jun. 09, 2021~ Jul. 01, 2021	Dec. 15, 2021	Radiation (03CH13-HY)
Horn Antenna	SCHWARZBECK	BBHA 9120 D	9120D-1241	1GHz ~ 18GHz	Jul. 15, 2020	Jun. 09, 2021~ Jul. 01, 2021	Jul. 14, 2021	Radiation (03CH13-HY)
Preamplifier	MITEQ	AMF-7D-00101800-30-10P	1590074	1GHz~18GHz	May 18, 2021	Jun. 09, 2021~ Jul. 01, 2021	May 17, 2022	Radiation (03CH13-HY)
Preamplifier	Keysight	83017A	MY53270147	1GHz~26.5GHz	Oct. 28, 2020	Jun. 09, 2021~ Jul. 01, 2021	Oct. 27, 2021	Radiation (03CH13-HY)
Signal Generator	Anritsu	MG3694C	163401	0.1Hz~40GHz	Jan. 31, 2021	Jun. 09, 2021~ Jul. 01, 2021	Jan. 30, 2022	Radiation (03CH13-HY)
Spectrum Analyzer	Keysight	N9010A	MY55370526	10Hz~44GHz	Mar. 18, 2021	Jun. 09, 2021~ Jul. 01, 2021	Mar. 17, 2022	Radiation (03CH13-HY)
Controller	EMEC	EM1000	N/A	Control Turn table & Ant Mast	N/A	Jun. 09, 2021~ Jul. 01, 2021	N/A	Radiation (03CH13-HY)
Antenna Mast	EMEC	AM-BS-4500-B	N/A	1m~4m	N/A	Jun. 09, 2021~ Jul. 01, 2021	N/A	Radiation (03CH13-HY)
Turn Table	EMEC	TT2000	N/A	0~360 Degree	N/A	Jun. 09, 2021~ Jul. 01, 2021	N/A	Radiation (03CH13-HY)
Software	Audix	E3 6.2009-8-24	RK-000992	N/A	N/A	Jun. 09, 2021~ Jul. 01, 2021	N/A	Radiation (03CH13-HY)
Preamplifier	EMEC	EM18G40G	060715	18GHz ~ 40GHz	Dec. 11, 2020	Jun. 09, 2021~ Jul. 01, 2021	Dec. 10, 2021	Radiation (03CH13-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 126E	0030/126E	30M-18G	Feb. 10, 2021	Jun. 09, 2021~ Jul. 01, 2021	Feb. 09, 2022	Radiation (03CH13-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	804793/4	30M-18G	Feb. 10, 2021	Jun. 09, 2021~ Jul. 01, 2021	Feb. 09, 2022	Radiation (03CH13-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	505134/2	30M~40GHz	Feb. 22, 2021	Jun. 09, 2021~ Jul. 01, 2021	Feb. 21, 2022	Radiation (03CH13-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	MY4274/2	30MHz~40GHz	Mar. 11, 2021	Jun. 09, 2021~ Jul. 01, 2021	Mar. 10, 2022	Radiation (03CH13-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY24961/4	30M-18G	Feb. 10, 2021	Jun. 09, 2021~ Jul. 01, 2021	Feb. 09, 2022	Radiation (03CH13-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY9837/4PE	9kHz~30MHz	Mar. 11, 2021	Jun. 09, 2021~ Jul. 01, 2021	Mar. 10, 2022	Radiation (03CH13-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170584	18GHz- 40GHz	Dec. 11, 2020	Jun. 09, 2021~ Jul. 01, 2021	Dec. 10, 2021	Radiation (03CH13-HY)
Hygrometer	TECPEL	DTM-303B	TP200879	N/A	Oct. 22, 2020	Jun. 09, 2021~ Jul. 01, 2021	Oct. 21, 2021	Radiation (03CH13-HY)
Filter	Wainwright	WHKX8-5872.5-6750-18000-40ST	Sn5	6.75GHz High Pass Filter	Mar. 11, 2021	Jun. 09, 2021~ Jul. 01, 2021	Mar. 10, 2022	Radiation (03CH13-HY)
Filter	Wainwright	WHKX12-2700-3000-18000-60SS	SN2	3GHz High Pass Filter	Jul. 13, 2020	Jun. 09, 2021~ Jul. 01, 2021	Jul. 12, 2021	Radiation (03CH13-HY)

Instrument	Brand Name	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Bilog Antenna	TESEQ	CBL 6111D & 00800N1D01 N-06	35419 & 03	30MHz~1GHz	Apr. 28, 2021	Jun. 22, 2021~ Jun. 30, 2021	Apr. 27, 2022	Radiation (03CH07-HY)
Double Ridge Horn Antenna	ESCO	3117	00075962	1GHz ~ 18GHz	Dec. 01, 2020	Jun. 22, 2021~ Jun. 30, 2021	Nov. 30, 2021	Radiation (03CH07-HY)
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100315	9 kHz~30 MHz	Jan. 04, 2021	Jun. 22, 2021~ Jun. 30, 2021	Jan. 03, 2022	Radiation (03CH07-HY)
Preamplifier	MITEQ	AMF-7D-0010 1800-30-10P	1590075	1GHz~18GHz	Apr. 22, 2021	Jun. 22, 2021~ Jun. 30, 2021	Apr. 21, 2022	Radiation (03CH07-HY)
Preamplifier	COM-POWER	PA-103A	161241	10MHz~1GHz	May 18, 2021	Jun. 22, 2021~ Jun. 30, 2021	May 17, 2022	Radiation (03CH07-HY)
Preamplifier	Agilent	8449B	3008A02362	1GHz~26.5GHz	Oct. 31, 2020	Jun. 22, 2021~ Jun. 30, 2021	Oct. 30, 2021	Radiation (03CH07-HY)
Preamplifier	EMEC	EM18G40G	0600789	18-40GHz	Jul. 31, 2020	Jun. 22, 2021~ Jun. 30, 2021	Jul. 30, 2021	Radiation (03CH07-HY)
Spectrum Analyzer	Agilent	N9030A	MY52350276	3Hz~44GHz	Jun. 11, 2021	Jun. 22, 2021~ Jun. 30, 2021	Jun. 10, 2022	Radiation (03CH07-HY)
Filter	Wainwright	WLKS1200-8 SS	SN3	1.2GHz Low Pass Filter	Aug. 21, 2020	Jun. 22, 2021~ Jun. 30, 2021	Aug. 20, 2021	Radiation (03CH07-HY)
Filter	Microwave	H3G018G1	SN477219	3GHz High Pass Filter	Oct. 31, 2020	Jun. 22, 2021~ Jun. 30, 2021	Oct. 30, 2021	Radiation (03CH07-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY15682-4	30MHz to 18GHz	Feb. 24, 2021	Jun. 22, 2021~ Jun. 30, 2021	Feb. 23, 2022	Radiation (03CH07-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY24971-4	9kHz to 18GHz	Feb. 24, 2021	Jun. 22, 2021~ Jun. 30, 2021	Feb. 23, 2022	Radiation (03CH07-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY28655-4	9kHz to 18GHz	Feb. 24, 2021	Jun. 22, 2021~ Jun. 30, 2021	Feb. 23, 2022	Radiation (03CH07-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	MY2858/2,80 1606/2	18GHz~40GHz	Feb. 24, 2021	Jun. 22, 2021~ Jun. 30, 2021	Feb. 23, 2022	Radiation (03CH07-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 126	532078/126E	30MHz~18GHz	Sep. 18, 2020	Jun. 22, 2021~ Jun. 30, 2021	Sep. 17, 2021	Radiation (03CH07-HY)
Controller	EMEC	EM1000	N/A	Control Ant Mast	N/A	Jun. 22, 2021~ Jun. 30, 2021	N/A	Radiation (03CH07-HY)
Controller	MF	MF-7802	N/A	Control Turn table	N/A	Jun. 22, 2021~ Jun. 30, 2021	N/A	Radiation (03CH07-HY)
Antenna Mast	EMEC	AM-BS-4500E	N/A	Boresight mast 1M~4M	N/A	Jun. 22, 2021~ Jun. 30, 2021	N/A	Radiation (03CH07-HY)
Turn Table	ChainTek	Chaintek 3000	N/A	0~360 Degree	N/A	Jun. 22, 2021~ Jun. 30, 2021	N/A	Radiation (03CH07-HY)
Attenuator	HONOVA	5910 SMA-50-005-19-NE	ATT-36	N/A	Oct. 31, 2020	Jun. 22, 2021~ Jun. 30, 2021	Oct. 30, 2021	Radiation (03CH07-HY)
Software	Audix	E3 6.2009-8-24	N/A	N/A	N/A	Jun. 22, 2021~ Jun. 30, 2021	N/A	Radiation (03CH07-HY)
USB Data Logger	TECPEL	TR-32	HE17XB249 5	N/A	N/A	Jun. 22, 2021~ Jun. 30, 2021	N/A	Radiation (03CH07-HY)

Instrument	Brand Name	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170251	18GHz~40GHz	Dec. 02, 2020	Jun. 22, 2021~ Jun. 30, 2021	Dec. 01, 2021	Radiation (03CH07-HY)
Filter	Wainwright	WHKX8-5872.5-6750-18000-40ST	SN7	6.75GHz High Pass Filter	Aug. 21, 2020	Jun. 22, 2021~ Jun. 30, 2021	Aug. 20, 2021	Radiation (03CH07-HY)
Filter	Wainwright	WHW2-7100-10000-18000-40CC	SN3	10GHz High Pass Filter	May 25, 2021	Jun. 22, 2021~ Jun. 30, 2021	May 24, 2022	Radiation (03CH07-HY)
Notch Filter	Wainwright	WRCQV14-6025-6425-7125-7525-60SS	SN1	N/A	Jan. 08, 2021	Jun. 22, 2021~ Jun. 30, 2021	Jan. 07, 2022	Radiation (03CH07-HY)
Notch Filter	Wainwright	WRCQV14-5425-5825-6525-6925-60SS	SN2	N/A	Jan. 08, 2021	Jun. 22, 2021~ Jun. 30, 2021	Jan. 07, 2022	Radiation (03CH07-HY)

5 Uncertainty of Evaluation

<03CH13-HY>

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

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

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**5.8 dB**

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**4.6 dB**

<03CH07-HY>

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**4.9 dB**

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**6.1 dB**

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

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

Appendix A. Radiated Spurious Emission

Test Engineer :	Daniel Lee, Jacky Hong and Wilson Wu	**Temperature :**	20~25°C
		Relative Humidity :	40~60%

2.4GHz 2400~2483.5MHz + Band 1 - 5150~5250MHz

Ant. 4+3_BT_Tx_Ch78 + Ant. 4+3_11ax HE40_Tx_Ch38 (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.
4+3		(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
BT CH 78 2480MHz	*	2480	111.9	-	-	107.96	27.5	4.26	27.82	147	271	P	H
	*	2480	87.11	-	-	-	-	-	-	-	-	A	H
		2483.52	45.68	-28.32	74	41.73	27.5	4.27	27.82	147	271	P	H
		2483.52	20.89	-33.11	54	-	-	-	-	-	-	A	H
													H
													H
	*	2480	105.37	-	-	101.43	27.5	4.26	27.82	294	91	P	V
	*	2480	80.58	-	-	-	-	-	-	-	-	A	V
		2492.2	43.87	-30.13	74	39.92	27.5	4.27	27.82	294	91	P	V
		2492.2	19.08	-34.92	54	-	-	-	-	-	-	A	V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Ant. 4+3_BT_Tx_Ch78 + Ant. 4+3_11ax HE40_Tx_Ch38 (Band Edge @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
4+3		(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
		5150	64.73	-9.27	74	53.96	31.9	6.28	27.41	273	62	P	H
		5150	52.43	-1.57	54	41.66	31.9	6.28	27.41	273	62	A	H
	*	5190	108.54	-	-	97.91	31.74	6.29	27.4	273	62	P	H
	*	5190	99.5	-	-	88.87	31.74	6.29	27.4	273	62	A	H
802.11ax		5400.64	52.02	-21.98	74	41.48	31.5	6.39	27.35	273	62	P	H
HE40		5355.56	43.32	-10.68	54	32.99	31.32	6.37	27.36	273	62	A	H
CH 38		5149.76	58.25	-15.75	74	47.48	31.9	6.28	27.41	400	353	P	V
5190MHz		5150	48.82	-5.18	54	38.05	31.9	6.28	27.41	400	353	A	V
	*	5190	106.91	-	-	96.28	31.74	6.29	27.4	400	353	P	V
	*	5190	96.65	-	-	86.02	31.74	6.29	27.4	400	353	A	V
		5372.36	50.59	-23.41	74	40.17	31.39	6.38	27.35	400	353	P	V
		5456.08	41.91	-12.09	54	31.12	31.71	6.41	27.33	400	353	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Ant. 4+3_BT_Tx_Ch78 + Ant. 4+3_11ax HE40_Tx_Ch38 (Harmonic @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
4+3		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
BT CH 78 2480MHz + 802.11ax HE40 CH 38 5190MHz		4960	50.95	-23.05	74	40.85	31.42	6.13	27.45	100	0	P	H
		4960	26.16	-27.84	54	-	-	-	-	-	-	A	H
		7440	44.44	-29.56	74	55.81	36.82	8.98	57.17	100	0	P	H
		7440	19.65	-34.35	54	-	-	-	-	-	-	A	H
		10380	46.8	-21.4	68.2	53.18	39.92	10.16	56.46	100	0	P	H
		15570	45.21	-28.79	74	50.85	38.45	12.03	56.12	100	0	P	H
		17978	55.7	-18.3	74	51.75	47.48	13.19	56.72	132	208	P	H
		17978	47.68	-6.32	54	43.73	47.48	13.19	56.72	132	208	A	H
		4960	51.48	-22.52	74	41.38	31.42	6.13	27.45	100	0	P	V
		4960	26.69	-27.31	54	-	-	-	-	-	-	A	V
		7440	46.03	-27.97	74	57.4	36.82	8.98	57.17	100	0	P	V
		7440	21.24	-32.76	54	-	-	-	-	-	-	A	V
		10380	48.4	-19.8	68.2	54.78	39.92	10.16	56.46	100	0	P	V
		15570	46.02	-27.98	74	51.66	38.45	12.03	56.12	100	0	P	V
		17989	55.67	-18.33	74	51.41	47.79	13.19	56.72	165	238	P	V
		17989	47.92	-6.08	54	43.66	47.79	13.19	56.72	165	238	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

2.4GHz 2400~2483.5MHz + Band 1 - 5150~5250MHz

Ant. 4_BLE_Tx_Ch39 + Ant. 4+3_11ax HE40_Tx_Ch38 (Band Edge @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
4		(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
BLE CH 39 2480MHz	*	2480	111.87	-	-	98	27.5	14.19	27.82	111	299	P	H
	*	2480	109.41	-	-	95.54	27.5	14.19	27.82	111	299	A	H
		2491.08	54.7	-19.3	74	40.82	27.5	14.2	27.82	111	299	P	H
		2483.52	45.89	-8.11	54	32.01	27.5	14.2	27.82	111	299	A	H
													H
													H
	*	2480	107.54	-	-	93.67	27.5	14.19	27.82	380	43	P	V
	*	2480	106.06	-	-	92.19	27.5	14.19	27.82	380	43	A	V
		2484.88	54.77	-19.23	74	40.89	27.5	14.2	27.82	380	43	P	V
		2483.52	44.78	-9.22	54	30.9	27.5	14.2	27.82	380	43	A	V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Ant. 4_BLE_Tx_Ch39 + Ant. 4+3_11ax HE40_Tx_Ch38 (Band Edge @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
4+3		(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11ax HE40 CH 38 5190MHz		5149.5	62.05	-11.95	74	51.28	31.9	6.28	27.41	110	320	P	H
		5148.72	51.2	-2.8	54	40.43	31.9	6.28	27.41	110	320	A	H
	*	5190	108.8	-	-	98.17	31.74	6.29	27.4	110	320	P	H
	*	5190	98.7	-	-	88.07	31.74	6.29	27.4	110	320	A	H
		5396.72	51.2	-22.8	74	40.67	31.49	6.39	27.35	110	320	P	H
		5392.24	42.34	-11.66	54	31.83	31.47	6.39	27.35	110	320	A	H
		5145.34	58.94	-15.06	74	48.16	31.91	6.28	27.41	400	354	P	V
		5149.5	48.14	-5.86	54	37.37	31.9	6.28	27.41	400	354	A	V
	*	5190	105.23	-	-	94.6	31.74	6.29	27.4	400	354	P	V
	*	5190	96	-	-	85.37	31.74	6.29	27.4	400	354	A	V
		5399.8	50.46	-23.54	74	39.92	31.5	6.39	27.35	400	354	P	V
		5457.48	41.76	-12.24	54	30.97	31.71	6.41	27.33	400	354	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Ant. 4_BLE_Tx_Ch39 + Ant. 4+3_11ax HE40_Tx_Ch38 (Harmonic @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
4/4+3		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
BLE CH 39 2480MHz + 802.11ax HE40 CH 38 5190MHz		4960	55.49	-18.51	74	43.24	31.42	8.28	27.45	100	152	P	H
		4960	45.64	-8.36	54	33.39	31.42	8.28	27.45	100	152	A	H
		7440	44.09	-29.91	74	55.46	36.82	8.98	57.17	100	0	P	H
		10380	46.89	-21.31	68.2	53.27	39.92	10.16	56.46	100	0	P	H
		15570	45.24	-28.76	74	50.88	38.45	12.03	56.12	100	0	P	H
		17978	55.06	-18.94	74	51.11	47.48	13.19	56.72	139	205	P	H
		17978	44.98	-9.02	54	41.03	47.48	13.19	56.72	139	205	A	H
		4960	55.12	-18.88	74	42.87	31.42	8.28	27.45	156	108	P	V
		4960	45.53	-8.47	54	33.28	31.42	8.28	27.45	156	108	A	V
		7440	43.63	-30.37	74	55	36.82	8.98	57.17	100	0	P	V
		10380	48.6	-19.6	68.2	54.98	39.92	10.16	56.46	100	0	P	V
		15570	46.14	-27.86	74	51.78	38.45	12.03	56.12	100	0	P	V
		17978	55.79	-18.21	74	51.84	47.48	13.19	56.72	177	251	P	V
		17978	45.7	-8.3	54	41.75	47.48	13.19	56.72	177	251	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

2.4GHz 2400~2483.5MHz + Band 1 - 5150~5250MHz

Ant. 4+3_11n HT20_Tx_Ch01 + Ant. 4+3_11ax HE40_Tx_Ch38 (Band Edge @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
4+3		(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
11n HT20 CH 01 2412MHz		2388.75	63.49	-10.51	74	49.59	27.62	14.12	27.84	225	20	P	H
		2390	51.71	-2.29	54	37.81	27.62	14.12	27.84	225	20	A	H
	*	2412	109.61	-	-	95.73	27.58	14.14	27.84	225	20	P	H
	*	2412	102.25	-	-	88.37	27.58	14.14	27.84	225	20	A	H
													H
													H
		2388.645	62.22	-11.78	74	48.32	27.62	14.12	27.84	320	81	P	V
		2389.905	51.38	-2.62	54	37.48	27.62	14.12	27.84	320	81	A	V
	*	2412	112.51	-	-	98.63	27.58	14.14	27.84	320	81	P	V
	*	2412	105.43	-	-	91.55	27.58	14.14	27.84	320	81	A	V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Ant. 4+3_11n HT20_Tx_Ch01 + Ant. 4+3_11ax HE40_Tx_Ch38 (Band Edge @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
4+3		(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11ax HE40 CH 38 5190MHz		5148.72	61.94	-12.06	74	51.17	31.9	6.28	27.41	190	131	P	H
		5148.72	51.92	-2.08	54	41.15	31.9	6.28	27.41	190	131	A	H
	*	5190	106.57	-	-	95.94	31.74	6.29	27.4	190	131	P	H
	*	5190	97.03	-	-	86.4	31.74	6.29	27.4	190	131	A	H
		5421.08	51.33	-22.67	74	40.69	31.58	6.4	27.34	190	131	P	H
		5437.6	42.08	-11.92	54	31.37	31.65	6.4	27.34	190	131	A	H
		5147.42	65.6	-8.4	74	54.82	31.91	6.28	27.41	310	100	P	V
		5150	52.18	-1.82	54	41.41	31.9	6.28	27.41	310	100	A	V
	*	5190	108.35	-	-	97.72	31.74	6.29	27.4	310	100	P	V
	*	5190	98.09	-	-	87.46	31.74	6.29	27.4	310	100	A	V
		5459.44	51.97	-22.03	74	41.17	31.72	6.41	27.33	310	100	P	V
		5455.24	42.36	-11.64	54	31.57	31.71	6.41	27.33	310	100	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Ant. 4+3_11n HT20_Tx_Ch01 + Ant. 4+3_11ax HE40_Tx_Ch38 (Harmonic @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
4+3		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
11n HT20 CH 01 2412MHz + 802.11ax HE40 CH 38 5190MHz		4804	54.63	-19.37	74	43.11	31.11	7.88	27.47	100	166	P	H
		4804	44.72	-9.28	54	33.2	31.11	7.88	27.47	100	166	A	H
		10380	47.14	-21.06	68.2	53.52	39.92	10.16	56.46	100	0	P	H
		15570	46.41	-27.59	74	52.05	38.45	12.03	56.12	100	0	P	H
		18000	56.78	-17.22	74	52.2	48.1	13.2	56.72	245	302	P	H
		18000	46.88	-7.12	54	42.3	48.1	13.2	56.72	245	302	A	H
		4804	54.65	-19.35	74	43.13	31.11	7.88	27.47	189	136	P	V
		4804	44.82	-9.18	54	33.3	31.11	7.88	27.47	189	136	A	V
		10380	47.15	-21.05	68.2	53.53	39.92	10.16	56.46	100	0	P	V
		15570	45.24	-28.76	74	50.88	38.45	12.03	56.12	100	0	P	V
		18000	56.48	-17.52	74	51.9	48.1	13.2	56.72	298	220	P	V
		18000	46.78	-7.22	54	42.2	48.1	13.2	56.72	298	220	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Emission below 1GHz

Ant. 4+3_BT_Tx_Ch78 + Ant. 4+3_11ax HE40_Tx_Ch38 (LF)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
4+3		(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
		30.97	21.44	-18.56	40	29.3	23.85	0.52	32.23	-	-	P	H
		167.74	24.31	-19.19	43.5	39.57	15.78	1.22	32.26	-	-	P	H
		331.67	27.59	-18.41	46	37.98	19.74	1.63	31.76	-	-	P	H
		551.86	29.09	-16.91	46	34.3	24.98	2.09	32.28	-	-	P	H
		892.33	31.4	-14.6	46	31.1	28.67	2.7	31.07	-	-	P	H
		941.8	32.04	-13.96	46	30.3	29.79	2.78	30.83	100	0	P	H
													H
													H
BT													H
CH 78													H
2480MHz													H
+													H
802.11ax		35.82	31.94	-8.06	40	42.11	21.5	0.57	32.24	100	0	P	V
HE40		96.93	34.1	-9.4	43.5	49.84	15.57	0.92	32.23	-	-	P	V
CH 38		167.74	24.58	-18.92	43.5	39.84	15.78	1.22	32.26	-	-	P	V
5190MHz		271.53	24.22	-21.78	46	35.75	18.94	1.51	31.98	-	-	P	V
		867.11	30.83	-15.17	46	30.46	28.85	2.66	31.14	-	-	P	V
		958.29	32.95	-13.05	46	30.15	30.73	2.82	30.75	-	-	P	V
													V
													V
													V
													V
													V
													V

Remark

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

Ant. 4_BLE_Tx_Ch39 + Ant. 4+3_11ax HE40_Tx_Ch38 (LF)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
4/4+3		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
		30.97	21.78	-18.22	40	29.64	23.85	0.52	32.23	-	-	P	H
		65.89	20.04	-19.96	40	39.72	11.82	0.77	32.27	-	-	P	H
		167.74	21.64	-21.86	43.5	36.9	15.78	1.22	32.26	-	-	P	H
		551.86	28.35	-17.65	46	33.56	24.98	2.09	32.28	-	-	P	H
		829.28	30.47	-15.53	46	31.33	27.77	2.61	31.24	-	-	P	H
		937.92	31.85	-14.15	46	30.33	29.59	2.78	30.85	100	0	P	H
													H
													H
													H
BLE													H
CH 39													H
2480MHz													H
+													H
802.11ax		30.97	31.57	-8.43	40	39.43	23.85	0.52	32.23	100	0	P	V
HE40		97.9	33.94	-9.56	43.5	49.52	15.72	0.93	32.23	-	-	P	V
CH 38		167.74	24.05	-19.45	43.5	39.31	15.78	1.22	32.26	-	-	P	V
5190MHz		264.74	24.51	-21.49	46	35.28	19.74	1.49	32	-	-	P	V
		551.86	26.64	-19.36	46	31.85	24.98	2.09	32.28	-	-	P	V
		943.74	31.78	-14.22	46	29.97	29.85	2.78	30.82	-	-	P	V
													V
													V
													V
													V
													V
													V

Remark

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

Ant. 4+3_11n HT20_Tx_Ch01 + Ant. 4+3_11ax HE40_Tx_Ch38 (LF)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
4+3		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
		31.94	21.91	-18.09	40	30.25	23.36	0.52	32.23	-	-	P	H
		122.15	20.47	-23.03	43.5	34.21	17.46	0.97	32.24	-	-	P	H
		471.35	24.59	-21.41	46	31.06	23.44	1.84	31.83	-	-	P	H
		572.23	26.15	-19.85	46	30.62	25.81	2.04	32.41	-	-	P	H
		756.53	30.32	-15.68	46	31.78	27.71	2.34	31.65	-	-	P	H
		948.59	32.3	-13.7	46	30.1	30.2	2.59	30.8	100	0	P	H
													H
													H
													H
11g(n20)													H
CH 01													H
2412MHz													H
+													H
802.11ax		31.94	28	-12	40	36.34	23.36	0.52	32.23	100	0	P	V
HE40		91.11	25.18	-18.32	43.5	41.8	14.75	0.83	32.24	-	-	P	V
CH 38		123.12	21.44	-22.06	43.5	35.11	17.53	0.97	32.24	-	-	P	V
5190MHz		652.74	26.45	-19.55	46	30.43	26.05	2.18	32.32	-	-	P	V
		843.83	31.24	-14.76	46	31.25	28.56	2.47	31.2	-	-	P	V
		947.62	32.67	-13.33	46	30.55	30.12	2.59	30.8	-	-	P	V
													V
													V
													V
													V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against limit line.												

Test Engineer :	Jesse Wang, Stan Hsieh and Ken Wu	Temperature :	20.2~27.4°C
		Relative Humidity :	48.9~63.1%

2.4GHz 2400~2483.5MHz + Band 5 - 5925~6425MHz

Ant. 4+3_BT_Tx_Ch78 + Ant. 4+3_11ax HE160_Tx _Ch15 (Band Edge @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
4+3		(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
BT CH 78 2480MHz	*	2480	110.15	-	-	104.9	32.47	8.23	35.45	100	301	P	H
	*	2480	85.54	-	-	-	-	-	-	-	-	A	H
		2483.52	48	-26	74	42.74	32.47	8.24	35.45	100	301	P	H
		2483.52	23.39	-30.61	54	-	-	-	-	-	-	A	H
													H
													H
	*	2480	102.59	-	-	97.34	32.47	8.23	35.45	323	16	P	V
	*	2480	77.98	-	-	-	-	-	-	-	-	A	V
		2497.8	45.71	-28.29	74	40.31	32.6	8.26	35.46	323	16	P	V
		2497.8	21.1	-32.9	54	-	-	-	-	-	-	A	V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Ant. 4+3_BT_Tx_Ch78 + Ant. 4+3_11ax HE160_Tx _Ch15 (Band Edge @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
4+3		(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
		5913	60.73	-27.47	88.2	48.45	34.93	12.55	35.2	100	326	P	H
		5916.84	48.55	-19.65	68.2	36.26	34.93	12.56	35.2	100	326	A	H
	*	6025	97.05	-	-	84.43	35.2	12.64	35.22	100	326	P	H
	*	6025	89.22	-	-	76.6	35.2	12.64	35.22	100	326	A	H
802.11ax													H
HE160													H
CH 15		5876.2	57.17	-31.03	88.2	44.93	34.9	12.53	35.19	340	141	P	V
6025MHz		5907.56	46.08	-22.12	68.2	33.79	34.93	12.55	35.19	340	141	A	V
	*	6025	97.7	-	-	85.08	35.2	12.64	35.22	340	141	P	V
	*	6025	88.32	-	-	75.7	35.2	12.64	35.22	340	141	A	V
													V
													V

Remark

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

Ant. 4+3_BT_Tx_Ch78 + Ant. 4+3_11ax HE160_Tx _Ch15 (Harmonic @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
4+3		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
		4960	42.09	-31.91	74	53.1	34.2	12.6	57.81	100	0	P	H
		7440	41.98	-32.02	74	48.99	35.6	15.43	58.04	100	0	P	H
		12050	44.33	-29.67	74	43.18	38.8	19.08	56.73	100	0	P	H
		18075	32.68	-41.32	74	50.4	37.43	4.74	59.89	150	0	P	H
BT													H
CH 78													H
2480MHz													H
+													H
802.11ax		4960	41.82	-32.18	74	52.83	34.2	12.6	57.81	100	0	P	V
HE160		7440	43.19	-30.81	74	50.2	35.6	15.43	58.04	100	0	P	V
CH 15		12050	44.55	-29.45	74	43.4	38.8	19.08	56.73	100	0	P	V
6025MHz		18075	33.04	-40.96	74	50.76	37.43	4.74	59.89	150	0	P	V
													V
													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 + Band 5 - 5925~6425MHz

Ant. 4_BLE_Tx_Ch39 + Ant. 4+3_11ax HE160_Tx _Ch15 (Band Edge @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
4		(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
BLE CH 39 2480MHz	*	2480	112.59	-	-	97.34	32.47	18.23	35.45	150	287	P	H
	*	2480	109.16	-	-	93.91	32.47	18.23	35.45	150	287	A	H
		2489.64	54.83	-19.17	74	39.44	32.6	18.24	35.45	150	287	P	H
		2483.52	46.75	-7.25	54	31.5	32.47	18.23	35.45	150	287	A	H
													H
													H
	*	2480	108.13	-	-	92.88	32.47	18.23	35.45	299	101	P	V
	*	2480	105.49	-	-	90.24	32.47	18.23	35.45	299	101	A	V
		2488.32	54.94	-19.06	74	39.56	32.6	18.23	35.45	299	101	P	V
		2485.2	45.48	-8.52	54	30.23	32.47	18.23	35.45	299	101	A	V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Ant. 4_BLE_Tx_Ch39 + Ant. 4+3_11ax HE160_Tx _Ch15 (Band Edge @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
4+3		(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
		5917.8	59.06	-29.14	88.2	46.77	34.93	12.56	35.2	100	326	P	H
		5916.84	49.59	-18.61	68.2	37.3	34.93	12.56	35.2	100	326	A	H
	*	6025	97.63	-	-	85.01	35.2	12.64	35.22	100	326	P	H
	*	6025	90.52	-	-	77.9	35.2	12.64	35.22	100	326	A	H
802.11ax													H
HE160													H
CH 15		5911.72	54.99	-33.21	88.2	42.71	34.93	12.55	35.2	339	143	P	V
6025MHz		5916.52	46.61	-21.59	68.2	34.32	34.93	12.56	35.2	339	143	A	V
	*	6025	97.52	-	-	84.9	35.2	12.64	35.22	339	143	P	V
	*	6025	88.92	-	-	76.3	35.2	12.64	35.22	339	143	A	V
													V
													V

Remark

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

Ant. 4_BLE_Tx_Ch39 + Ant. 4+3_11ax HE160_Tx _Ch15 (Harmonic @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
4/4+3		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
		4960	49.75	-24.25	74	60.76	34.2	12.6	57.81	100	0	P	H
		7440	43.31	-30.69	74	50.32	35.6	15.43	58.04	100	0	P	H
		12050	43.85	-30.15	74	42.7	38.8	19.08	56.73	100	0	P	H
		18075	32.85	-41.15	74	50.57	37.43	4.74	59.89	150	0	P	H
BLE													
CH 39													
2480MHz													
+													
802.11ax		4960	48.27	-25.73	74	59.28	34.2	12.6	57.81	100	0	P	V
HE160		7440	42.7	-31.3	74	49.71	35.6	15.43	58.04	100	0	P	V
CH 15		12050	43.99	-30.01	74	42.84	38.8	19.08	56.73	100	0	P	V
6025MHz		18075	33.59	-40.41	74	51.31	37.43	4.74	59.89	150	0	P	V

Remark

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

2.4GHz 2400~2483.5MHz + Band 5 - 5925~6425MHz

Ant. 4+3_11n HT20_Tx_Ch01 + Ant. 4+3_11ax HE160_Tx _Ch15 (Band Edge @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
4+3		(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
11n HT20 CH 01 2412MHz		2389.695	62.17	-11.83	74	47.57	31.9	18.11	35.41	100	294	P	H
		2389.905	50.59	-3.41	54	36	31.9	18.11	35.42	100	294	A	H
	*	2412	111.97	-	-	97.23	32	18.16	35.42	100	294	P	H
	*	2412	104.24	-	-	89.5	32	18.16	35.42	100	294	A	H
													H
													H
		2316.195	54.22	-19.78	74	40.08	31.73	17.8	35.39	306	110	P	V
		2388.75	45.62	-8.38	54	31.02	31.9	18.11	35.41	306	110	A	V
	*	2412	105.98	-	-	91.24	32	18.16	35.42	306	110	P	V
	*	2412	98.91	-	-	84.17	32	18.16	35.42	306	110	A	V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Ant. 4+3_11n HT20_Tx_Ch01 + Ant. 4+3_11ax HE160_Tx _Ch15 (Band Edge @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
4+3		(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
		5923.88	57.47	-30.73	88.2	45.14	34.97	12.56	35.2	100	327	P	H
		5907.56	48.54	-19.66	68.2	36.25	34.93	12.55	35.19	100	327	A	H
	*	6025	97.74	-	-	85.12	35.2	12.64	35.22	100	327	P	H
	*	6025	90.02	-	-	77.4	35.2	12.64	35.22	100	327	A	H
802.11ax													H
HE160													H
CH 15		5921	56.19	-32.01	88.2	43.9	34.93	12.56	35.2	342	144	P	V
6025MHz		5917.48	45.33	-22.87	68.2	33.04	34.93	12.56	35.2	342	144	A	V
	*	6025	95.95	-	-	83.33	35.2	12.64	35.22	342	144	P	V
	*	6025	89.13	-	-	76.51	35.2	12.64	35.22	342	144	A	V
													V
													V

Remark

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

Ant. 4+3_11n HT20_Tx_Ch01 + Ant. 4+3_11ax HE160_Tx _Ch15 (Harmonic @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
4+3		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
		4824	43.04	-30.96	74	54.51	34.05	11.66	57.97	100	0	P	H
		12050	44.25	-29.75	74	43.1	38.8	18.38	56.73	100	0	P	H
		18075	33.63	-40.37	74	51.35	37.43	14.28	59.89	150	0	P	H
11n HT20													
CH 01													
2412MHz													
+													
802.11ax		4824	42.07	-31.93	74	53.54	34.05	11.66	57.97	100	0	P	V
HE160		12050	44.31	-29.69	74	43.16	38.8	18.38	56.73	100	0	P	V
CH 15		18075	33.41	-40.59	74	51.13	37.43	14.28	59.89	150	0	P	V
6025MHz													

Remark

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

Emission below 1GHz

Ant. 4+3_11n HT20_Tx_Ch01 + Ant. 4+3_11ax HE160_Tx _Ch15 (LF)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
4+3		(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
		30	22.5	-17.5	40	27.27	24.32	0.94	30.03	-	-	P	H
		92.1	25.78	-17.72	43.5	38.99	14.98	1.8	29.99	-	-	P	H
		134.76	21.36	-22.14	43.5	31.68	17.55	2.11	29.98	-	-	P	H
		744.5	32.26	-13.74	46	29.72	27.77	4.46	29.69	-	-	P	H
		878.9	32.31	-13.69	46	27.5	28.89	4.97	29.05	-	-	P	H
		933.5	34.02	-11.98	46	28.26	29.36	5.18	28.78	100	0	P	H
													H
													H
11n HT20													H
CH 01													H
2412MHz													H
+													H
802.11ax		30	32.96	-7.04	40	37.73	24.32	0.94	30.03	100	0	P	V
HE160		52.14	27.23	-12.77	40	42.35	13.47	1.42	30.01	-	-	P	V
CH 15		84.54	25.24	-14.76	40	39.63	13.84	1.77	30	-	-	P	V
6025MHz		860	32.27	-13.73	46	27.66	28.9	4.89	29.18	-	-	P	V
		900.6	32.94	-13.06	46	27.97	28.82	5.06	28.91	-	-	P	V
		958	33.75	-12.25	46	26.72	30.44	5.27	28.68	-	-	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.
				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
		(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 B. Radiated Spurious Emission Plots

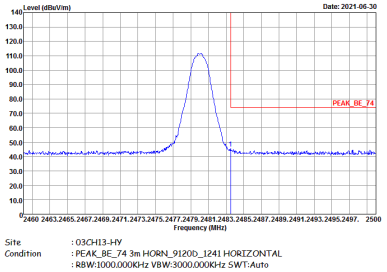
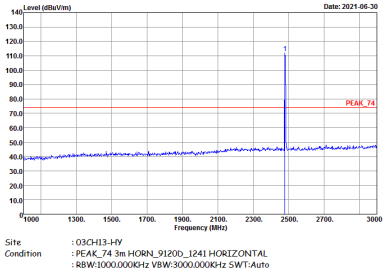
Test Engineer :	Daniel Lee, Jacky Hong and Wilson Wu	**Temperature :**	20~25°C
		Relative Humidity :	40~60%

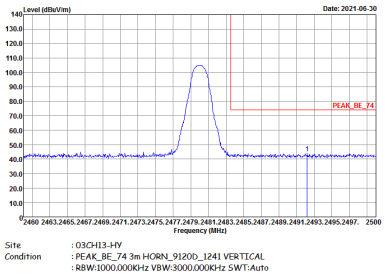
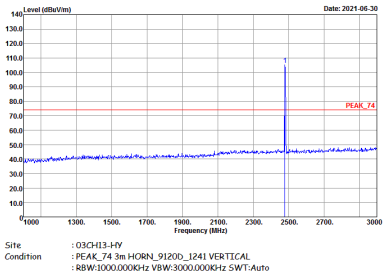
Note symbol

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

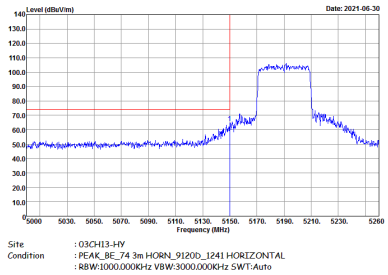
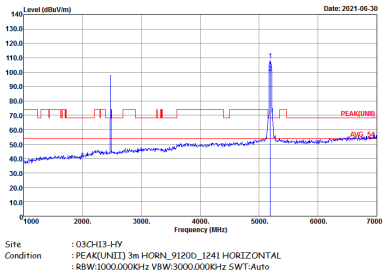
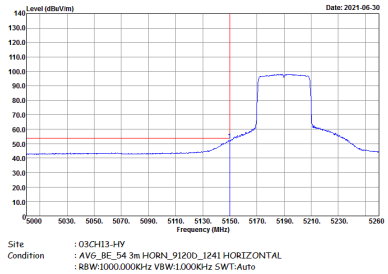
2.4GHz 2400~2483.5MHz + Band 1 - 5150~5250MHz

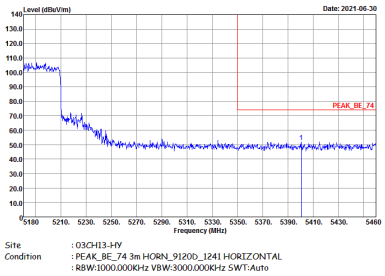
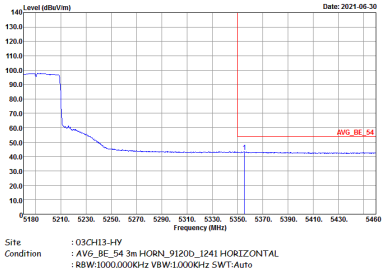
Ant. 4+3_BT_Tx_Ch78 + Ant. 4+3_11ax HE40_Tx_Ch38 (Band Edge @ 3m)

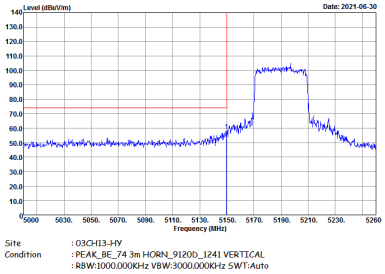
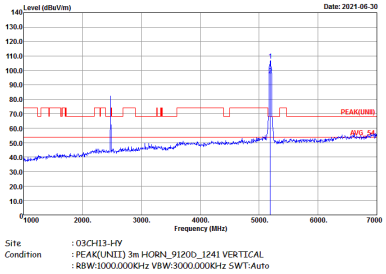
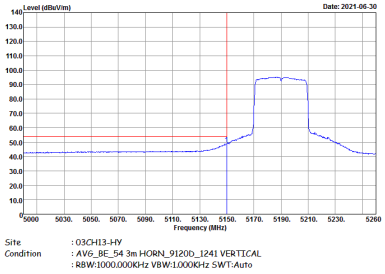
BT	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BT CH78 2480MHz	
4+3	Horizontal	Fundamental
Peak		

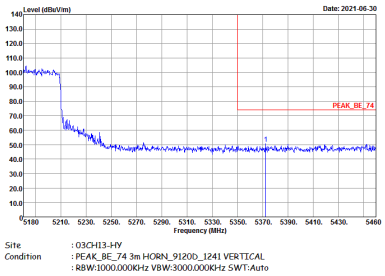
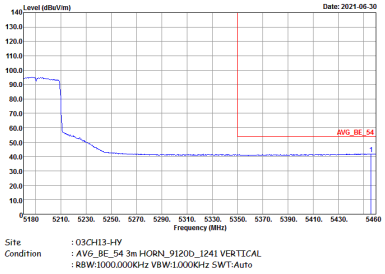
BT	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BT CH78 2480MHz	
4+3	Vertical	Fundamental
Peak		

Ant. 4+3_BT_Tx_Ch78 + Ant. 4+3_11ax HE40_Tx_Ch38 (Band Edge @ 3m)

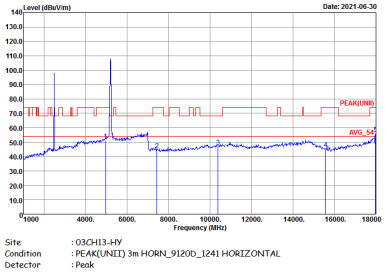
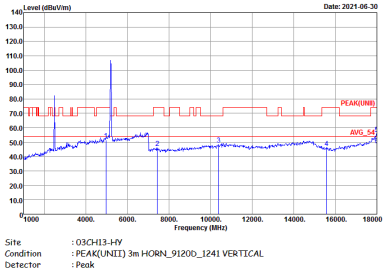
WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11ax HE40 CH38 5190MHz - L	
4+3	Horizontal	Fundamental
Peak		
Avg.		Left blank

WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11ax HE40 CH38 5190MHz - L	
4+3	Horizontal	Fundamental
Peak		Left blank
Avg.		Left blank

WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11ax HE40 CH38 5190MHz - L	
4+3	Vertical	Fundamental
Peak		
Avg.		Left blank

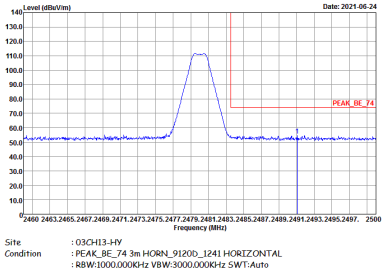
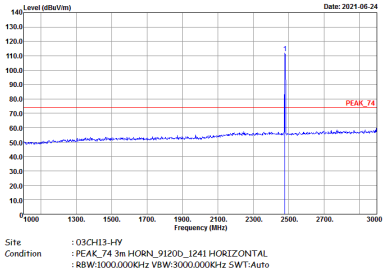
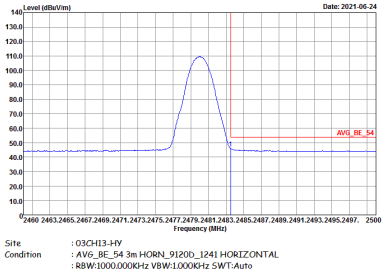
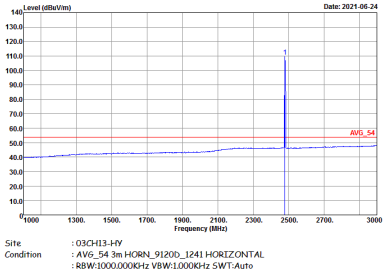
WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11ax HE40 CH38 5190MHz - L	
4+3	Vertical	Fundamental
Peak		Left blank
Avg.		Left blank

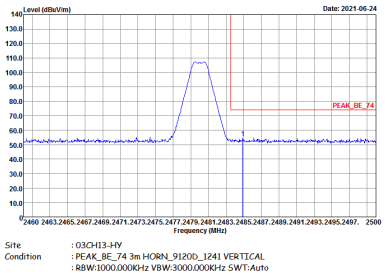
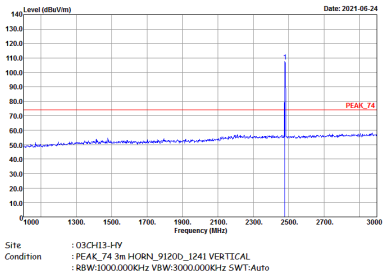
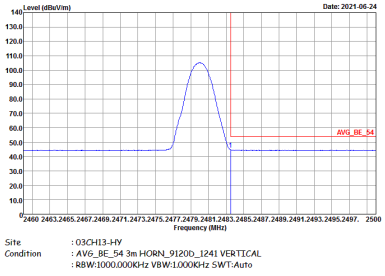
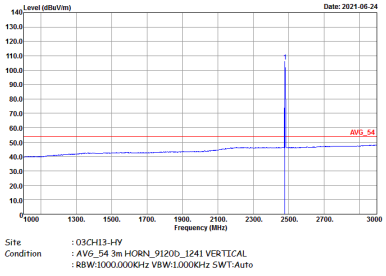
Ant. 4+3_BT_Tx_Ch78 + Ant. 4+3_11ax HE40_Tx_Ch38 (Harmonic @ 3m)

BT + WIFI	2.4GHz 2400~2483.5MHz + Band 1 5150~5250MHz Harmonic @ 3m	
ANT	BT_CH78 + 11ax HE40_CH38	
4+3	Horizontal	Vertical
Peak Avg.		

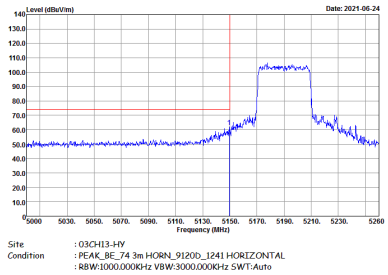
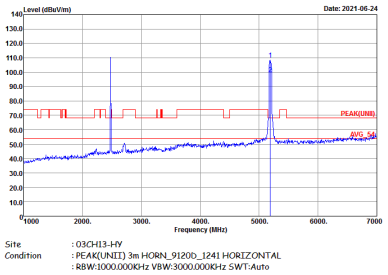
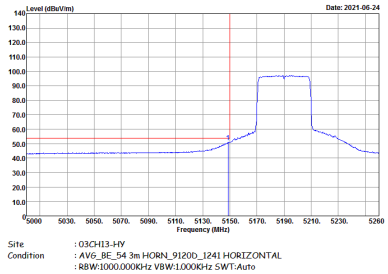
2.4GHz 2400~2483.5MHz + Band 1 - 5150~5250MHz

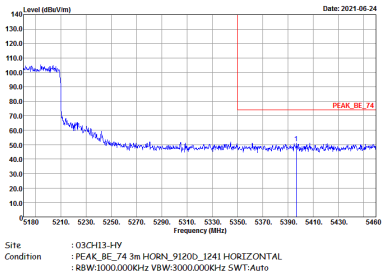
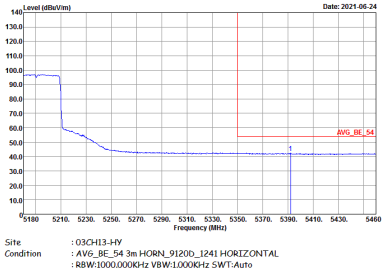
Ant. 4_BLE_Tx_Ch39 + Ant. 4+3_11ax HE40_Tx_Ch38 (Band Edge @ 3m)

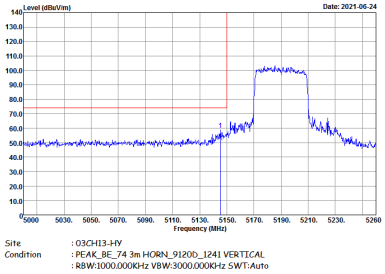
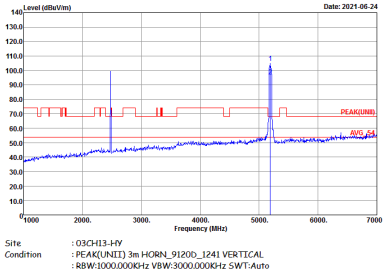
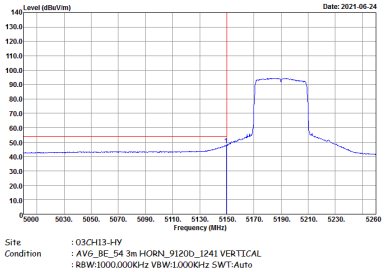
BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BLE_CH39 2480MHz	
4	Horizontal	Fundamental
Peak		
Avg.		

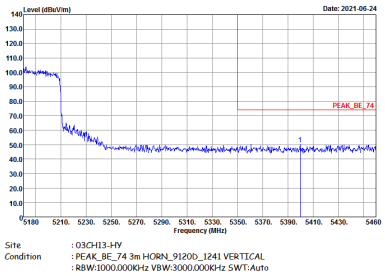
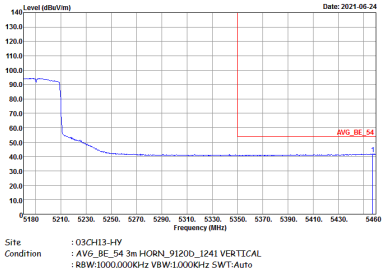
BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BLE_CH39 2480MHz	
4	Vertical	Fundamental
Peak	 Site : 03CH13-HY Condition : PEAK_BE_74 3m HORN_9120D_1241 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	 Site : 03CH13-HY Condition : PEAK_74 3m HORN_9120D_1241 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto
Avg.	 Site : 03CH13-HY Condition : AVG_BE_54 3m HORN_9120D_1241 VERTICAL : RBW:1000.000KHz VBW:1.000KHz SWT:Auto	 Site : 03CH13-HY Condition : AVG_54 3m HORN_9120D_1241 VERTICAL : RBW:1000.000KHz VBW:1.000KHz SWT:Auto

Ant. 4_BLE_Tx_Ch39 + Ant. 4+3_11ax HE40_Tx_Ch38 (Band Edge @ 3m)

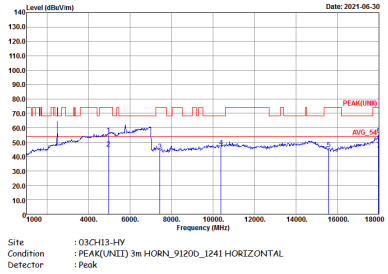
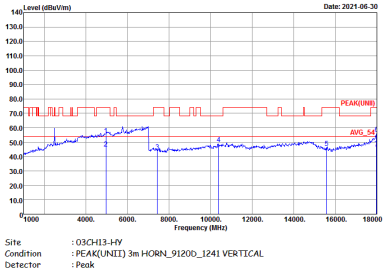
WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11ax HE40 CH38 5190MHz - L	
4+3	Horizontal	Fundamental
Peak		
Avg.		Left blank

WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11ax HE40 CH38 5190MHz - L	
4+3	Horizontal	Fundamental
Peak		Left blank
Avg.		Left blank

WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11ax HE40 CH38 5190MHz - L	
4+3	Vertical	Fundamental
Peak		
Avg.		Left blank

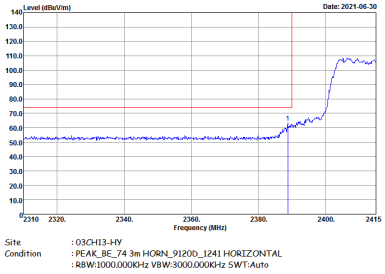
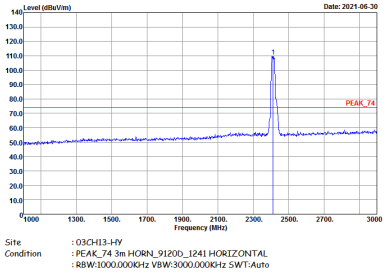
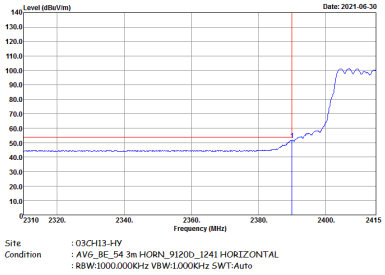
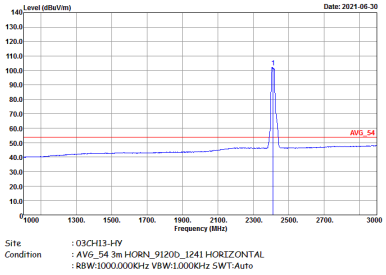
WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11ax HE40 CH38 5190MHz - L	
4+3	Vertical	Fundamental
Peak		Left blank
Avg.		Left blank

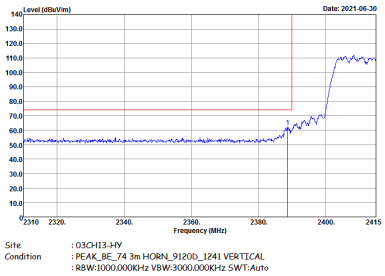
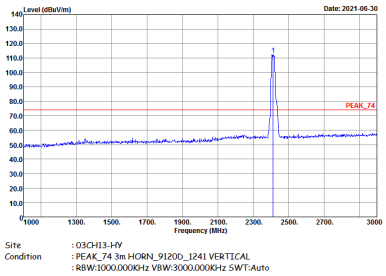
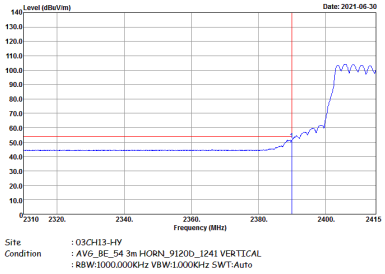
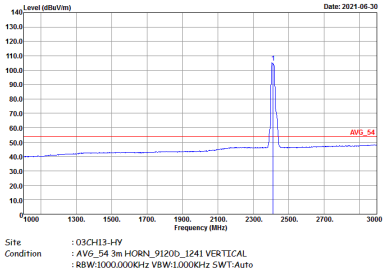
Ant. 4_BLE_Tx_Ch39 + Ant. 4+3_11ax HE40_Tx_Ch38 (Harmonic @ 3m)

BLE + WIFI	2.4GHz 2400~2483.5MHz + Band 1 5150~5250MHz Harmonic @ 3m	
ANT	BLE_CH39 + 11ax HE40_CH38	
4/4+3	Horizontal	Vertical
Peak Avg.		

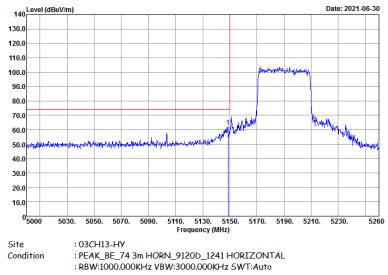
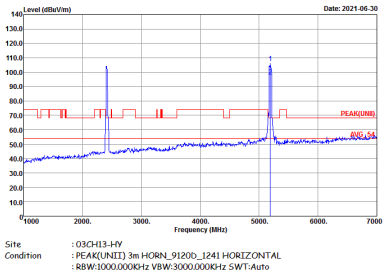
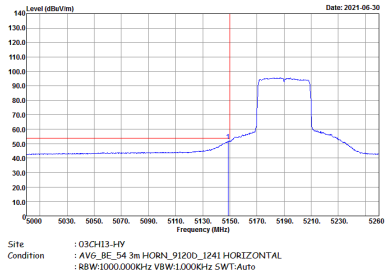
2.4GHz 2400~2483.5MHz + Band 1 - 5150~5250MHz

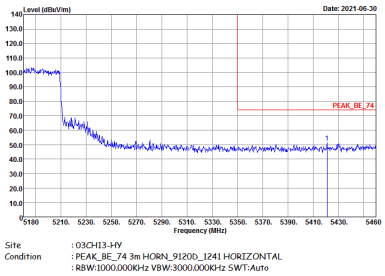
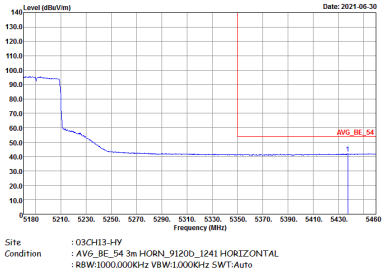
Ant. 4+3_11n HT20_Tx_Ch01 + Ant. 4+3_11ax HE40_Tx_Ch38 (Band Edge @ 3m)

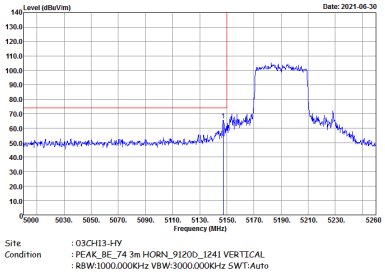
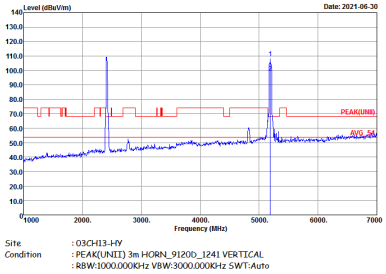
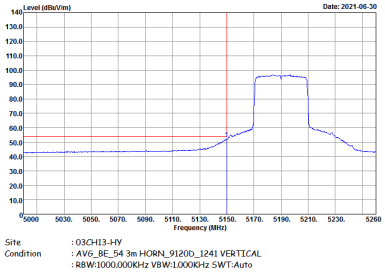
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	11n HT20_CH01 2412MHz	
4+3	Horizontal	Fundamental
Peak		
Avg.		

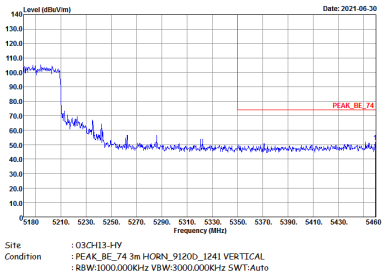
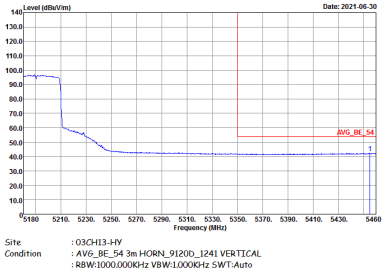
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	11n HT20_CH01 2412MHz	
4+3	Vertical	Fundamental
Peak		
Avg.		

Ant. 4+3_11n HT20_Tx_Ch01 + Ant. 4+3_11ax HE40_Tx_Ch38 (Band Edge @ 3m)

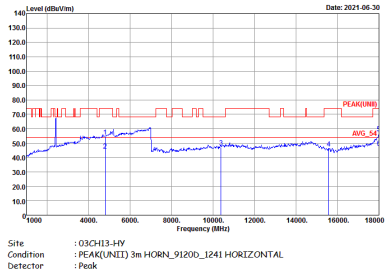
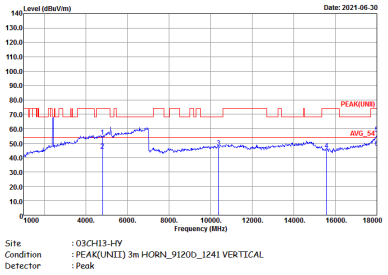
WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11ax HE40 CH38 5190MHz - L	
4+3	Horizontal	Fundamental
Peak		
Avg.		Left blank

WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11ax HE40 CH38 5190MHz - L	
4+3	Horizontal	Fundamental
Peak		Left blank
Avg.		Left blank

WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11ax HE40 CH38 5190MHz - L	
4+3	Vertical	Fundamental
Peak		
Avg.		Left blank

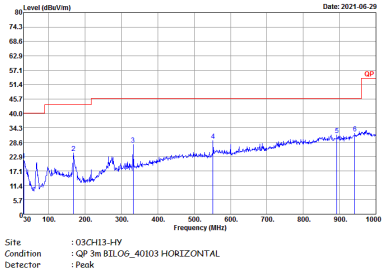
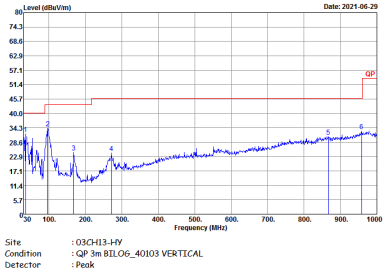
WIFI	Band 1 5150~5250MHz Band Edge @ 3m	
ANT	802.11ax HE40 CH38 5190MHz - L	
4+3	Vertical	Fundamental
Peak		Left blank
Avg.		Left blank

Ant. 4+3_11n HT20_Tx_Ch01 + Ant. 4+3_11ax HE40_Tx_Ch38 (Harmonic @ 3m)

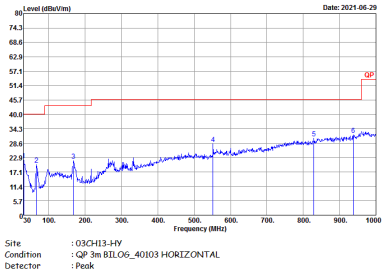
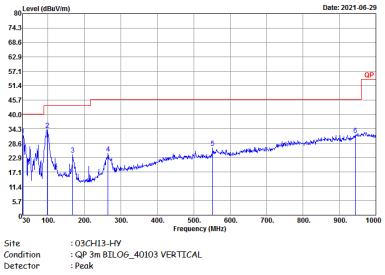
WIFI	2.4GHz 2400~2483.5MHz + Band 1 5150~5250MHz Harmonic @ 3m	
ANT	11n HT20_CH11 + 11ax HE40_CH38	
4+3	Horizontal	Vertical
Peak Avg.		

Emission below 1GHz

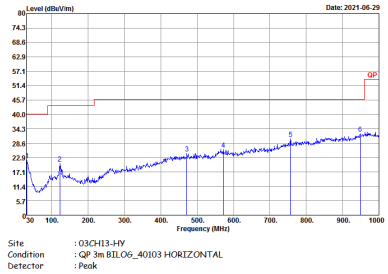
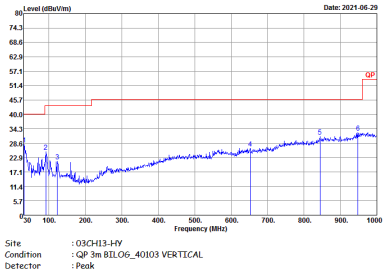
Ant. 4+3_BT_Tx_Ch78 + Ant. 4+3_11ax HE40_Tx_Ch38 (LF)

WIFI	2.4GHz 2400~2483.5MHz + Band 1 5150~5250MHz	
ANT	BT_CH78 + 11ax HE40_CH38	
4+3	Horizontal	Vertical
QP / Peak		

Ant. 4_BLE_Tx_Ch39 + Ant. 4+3_11ax HE40_Tx_Ch38 (LF)

WIFI	2.4GHz 2400~2483.5MHz + Band 1 5150~5250MHz	
ANT	BLE_CH39 + 11ax HE40_CH38	
4/4+3	Horizontal	Vertical
QP / Peak		

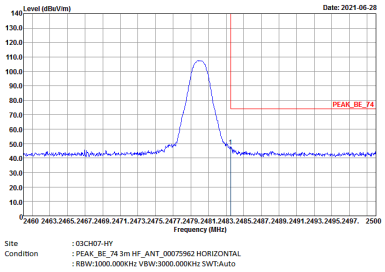
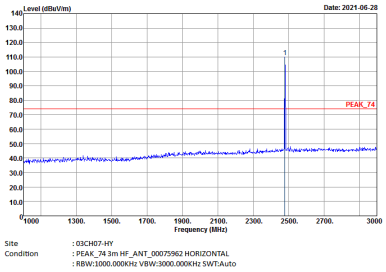
Ant. 4+3_11n HT20_Tx_Ch01 + Ant. 4+3_11ax HE40_Tx_Ch38 (LF)

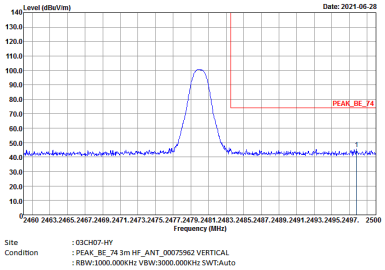
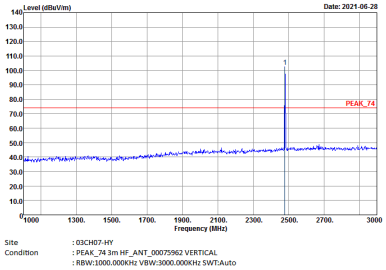
WIFI	2.4GHz 2400~2483.5MHz + Band 1 5150~5250MHz	
ANT	11n HT20_CH11 + 11ax HE40_CH38	
4+3	Horizontal	Vertical
QP / Peak		

Test Engineer :	Jesse Wang, Stan Hsieh and Ken Wu	Temperature :	20.2~27.4°C
		Relative Humidity :	48.9~63.1%

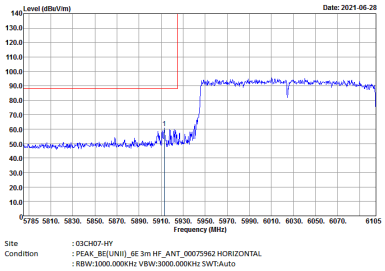
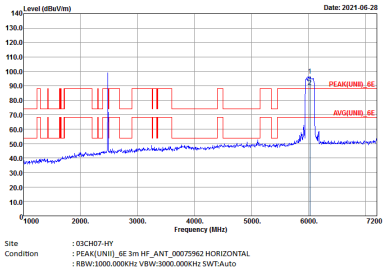
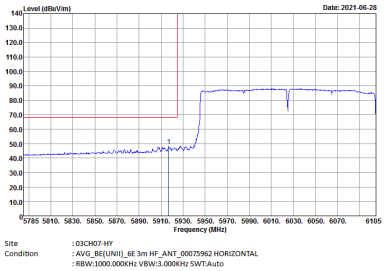
2.4GHz 2400~2483.5MHz + Band 5 - 5925~6425MHz

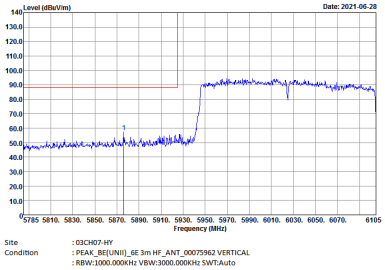
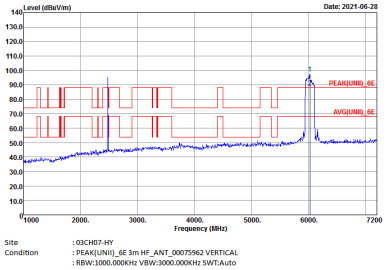
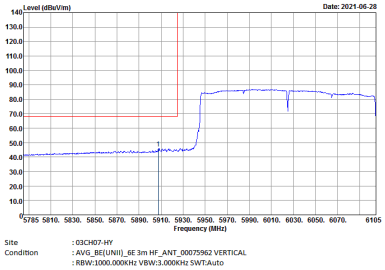
Ant. 4+3_BT_Tx_Ch78 + Ant. 4+3_11ax HE160_Tx _Ch15 (Band Edge @ 3m)

BT	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BT CH78 2480MHz	
4+3	Horizontal	Fundamental
Peak		

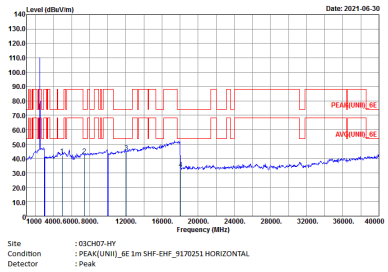
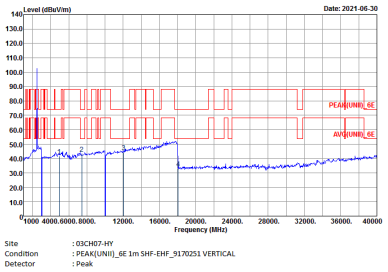
BT	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BT CH78 2480MHz	
4+3	Vertical	Fundamental
Peak		

Ant. 4+3_BT_Tx_Ch78 + Ant. 4+3_11ax HE160_Tx _Ch15 (Band Edge @ 3m)

WIFI	Band 5 5925~6425MHz Band Edge @ 3m	
ANT	802.11ax HE160 CH15 6025MHz - L	
4+3	Horizontal	Fundamental
Peak		
Avg.		Left blank

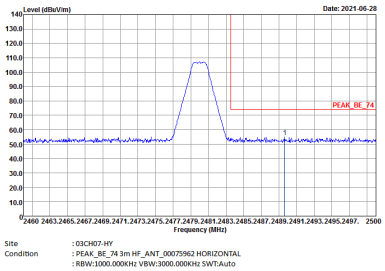
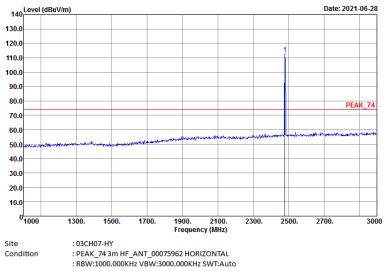
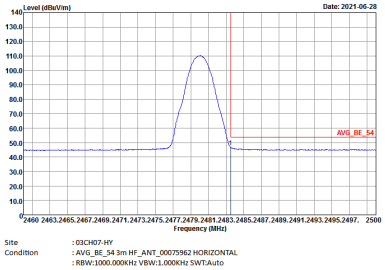
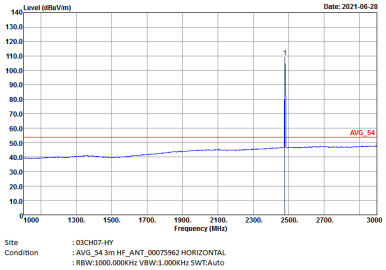
WIFI	Band 5 5925~6425MHz Band Edge @ 3m	
ANT	802.11ax HE160 CH15 6025MHz - L	
4+3	Vertical	Fundamental
Peak		
Avg.		Left blank

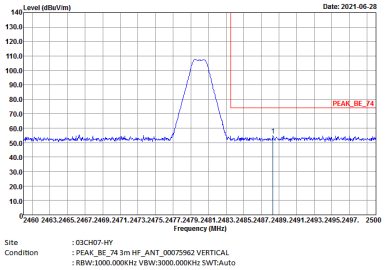
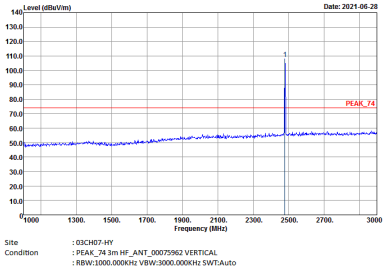
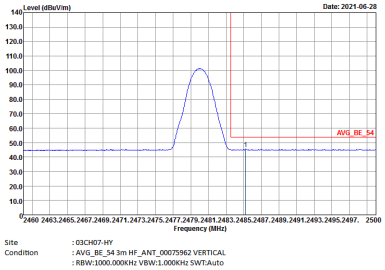
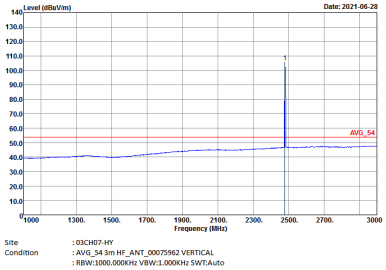
Ant. 4+3_BT_Tx_Ch78 + Ant. 4+3_11ax HE160_Tx _Ch15 (Harmonic @ 3m)

BT+ WIFI	2.4GHz 2400~2483.5MHz + Band 5 5925~6425MHz Harmonic @ 3m	
ANT	BT_CH78 + 11ax HE160_CH15	
4+3	Horizontal	Vertical
Peak Avg.		

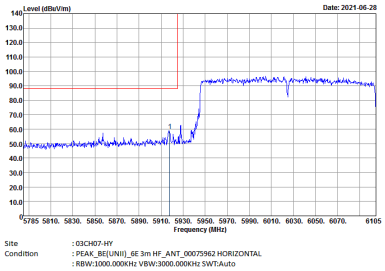
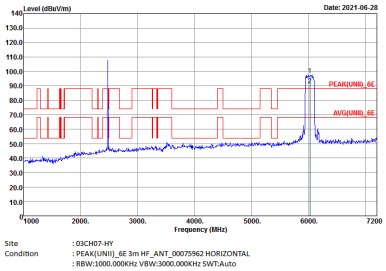
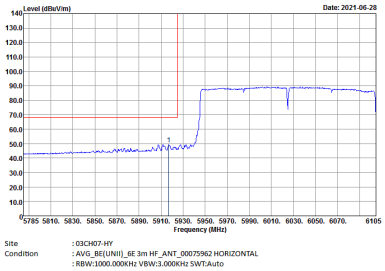
2.4GHz 2400~2483.5MHz + Band 5 - 5925~6425MHz

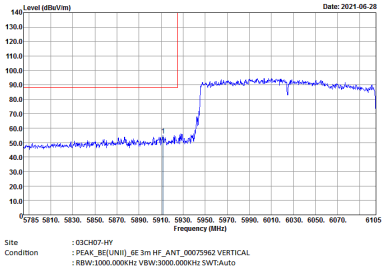
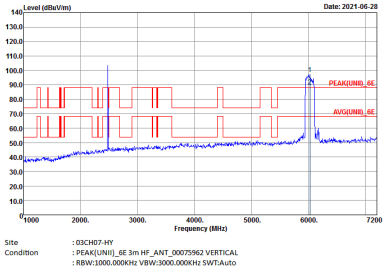
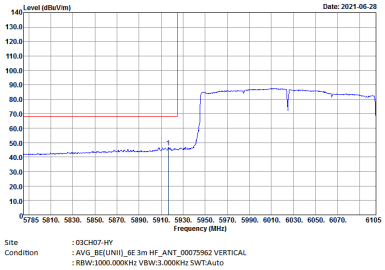
Ant. 4_BLE_Tx_Ch39 + Ant. 4+3_11ax HE160_Tx _Ch15 (Band Edge @ 3m)

BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BLE_CH39 2480MHz	
4	Horizontal	Fundamental
Peak		
Avg.		

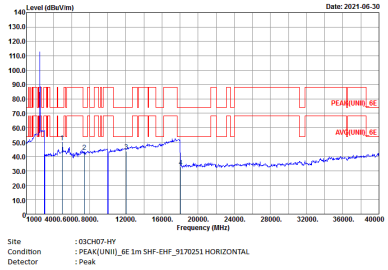
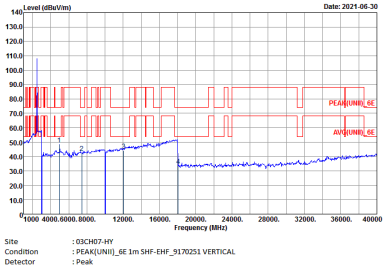
BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BLE_CH39 2480MHz	
4	Vertical	Fundamental
Peak		
Avg.		

Ant. 4_BLE_Tx_Ch39 + Ant. 4+3_11ax HE160_Tx _Ch15 (Band Edge @ 3m)

WIFI	Band 5 5925~6425MHz Band Edge @ 3m	
ANT	802.11ax HE160 CH15 6025MHz - L	
4+3	Horizontal	Fundamental
Peak		
Avg.		Left blank

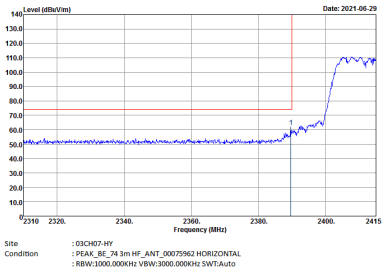
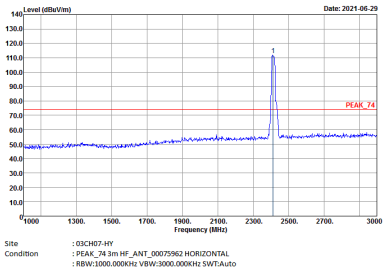
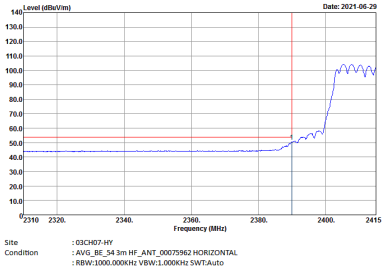
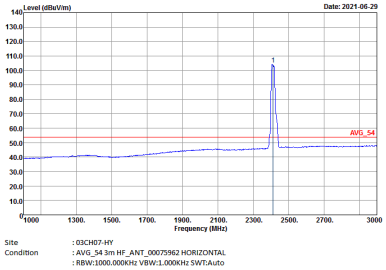
WIFI	Band 5 5925~6425MHz Band Edge @ 3m	
ANT	802.11ax HE160 CH15 6025MHz - L	
4+3	Vertical	Fundamental
Peak		
Avg.		Left blank

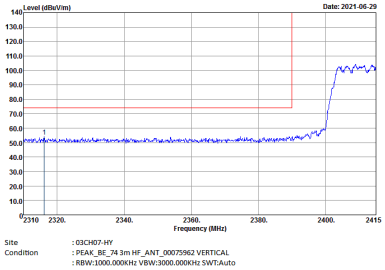
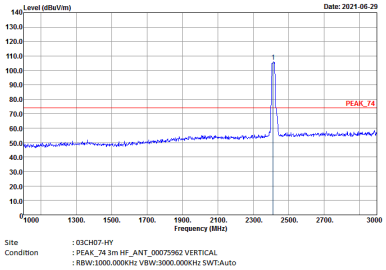
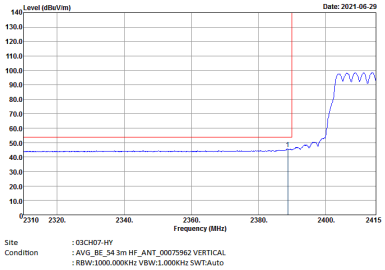
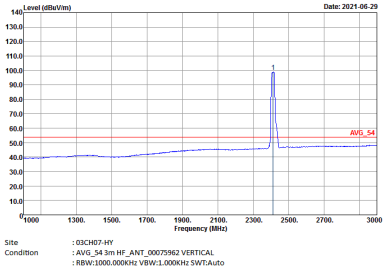
Ant. 4_BLE_Tx_Ch39 + Ant. 4+3_11ax HE160_Tx _Ch15 (Harmonic @ 3m)

BLE+ WIFI	2.4GHz 2400~2483.5MHz + Band 5 5925~6425MHz Harmonic @ 3m	
ANT	BLE_CH39 + 11ax HE160_CH15	
4/4+3	Horizontal	Vertical
Peak Avg.		

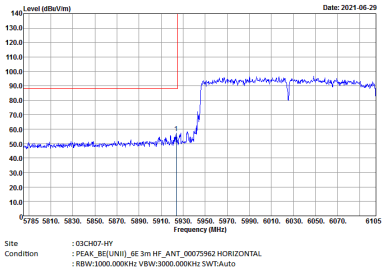
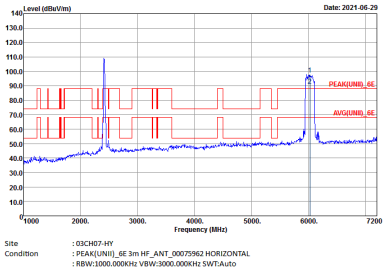
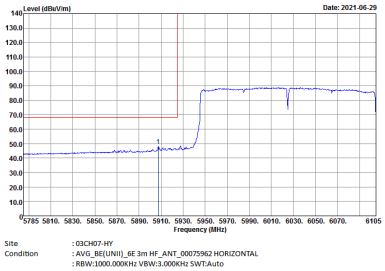
2.4GHz 2400~2483.5MHz + Band 5 - 5925~6425MHz

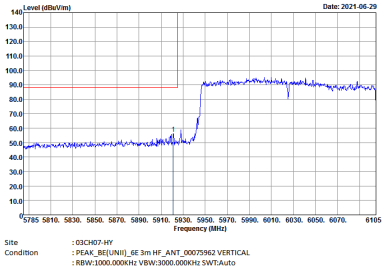
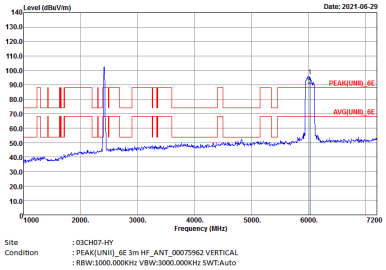
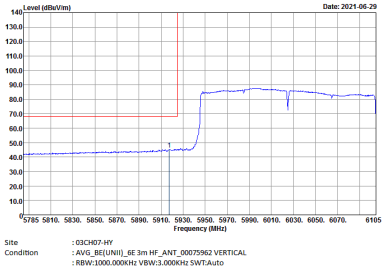
Ant. 4+3_11n HT20_Tx_Ch01 + Ant. 4+3_11ax HE160_Tx _Ch15 (Band Edge @ 3m)

WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	11n HT20_CH01 2412MHz	
4+3	Horizontal	Fundamental
Peak		
Avg.		

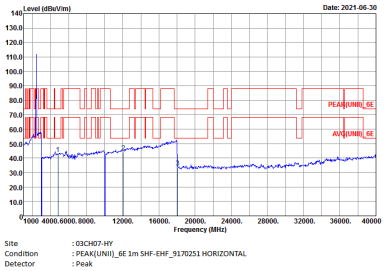
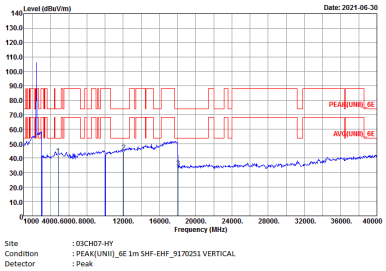
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	11n HT20_CH01 2412MHz	
4+3	Vertical	Fundamental
Peak		
Avg.		

Ant. 4+3_11n HT20_Tx_Ch01 + Ant. 4+3_11ax HE160_Tx _Ch15 (Band Edge @ 3m)

WIFI	Band 5 5925~6425MHz Band Edge @ 3m	
ANT	802.11ax HE160 CH15 6025MHz - L	
4+3	Horizontal	Fundamental
Peak		
Avg.		Left blank

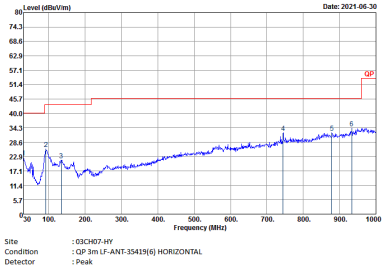
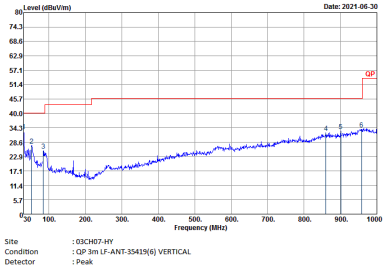
WIFI	Band 5 5925~6425MHz Band Edge @ 3m	
ANT	802.11ax HE160 CH15 6025MHz - L	
4+3	Vertical	Fundamental
Peak		
Avg.		Left blank

Ant. 4+3_11n HT20_Tx_Ch01 + Ant. 4+3_11ax HE160_Tx _Ch15 (Harmonic @ 3m)

WIFI	2.4GHz 2400~2483.5MHz + Band 5 5925~6425MHz Harmonic @ 3m	
ANT	11n HT20_CH11 + 11ax HE160_CH15	
4+3	Horizontal	Vertical
Peak Avg.		

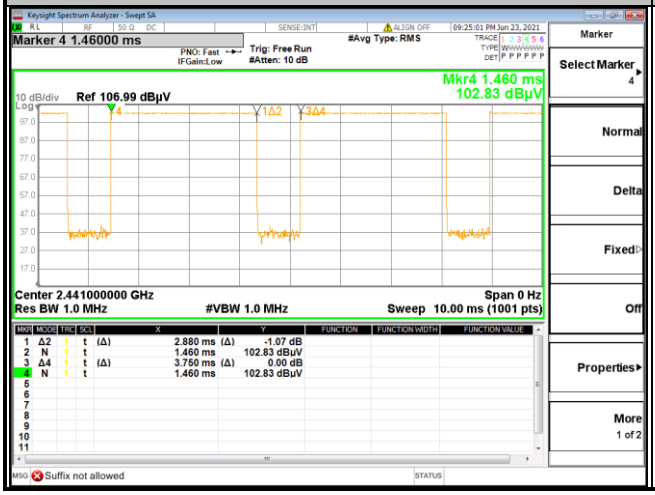
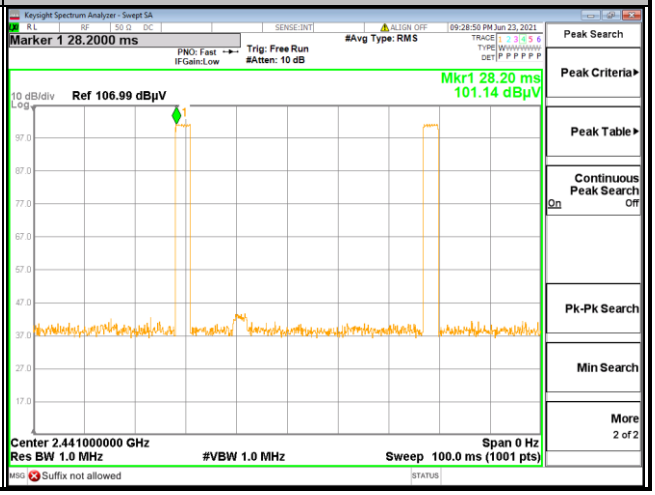
Emission below 1GHz

Ant. 4+3_11n HT20_Tx_Ch01 + Ant. 4+3_11ax HE160_Tx _Ch15 (LF)

WIFI	2.4GHz 2400~2483.5MHz + Band 5 5925~6425MHz	
ANT	11n HT20_CH11 + 11ax HE160_CH15	
4+3	Horizontal	Vertical
QP / Peak		

Appendix C. Duty Cycle Plots

MIMO <Ant. 4+3>

DH5 on time (One Pulse) Plot on Channel 39	on time (Count Pulses) Plot on Channel 39
	

Note:

1. Worst case Duty cycle = on time/100 milliseconds = 2 * 2.88 / 100 = 5.76 %
2. Worst case Duty cycle correction factor = 20*log(Duty cycle) = -24.79 dB
3. **DH5** has the highest duty cycle worst case and is reported.

Duty Cycle Correction Factor Consideration for AFH mode:

Bluetooth normal hopping rate is 1600Hz and reduced to 800Hz in AFH mode; due to the reduced number of hopping frequencies, with the same packet configuration the dwell time in each channel frequency within 100msec period is longer in AFH mode than normal mode.

In AFH mode, the minimum hopping frequencies are 20, to get the longest dwell time DH5 packet is observed; the on time period to have DH5 packet completing one hopping sequence is

2.88 ms x 20 channels = 57.6 ms

There cannot be 2 complete hopping sequences within 100ms period, considering the random hopping behavior, maximum 2 hops can be possibly observed within the period. [100 ms / 57.6 ms] = 2 hops

Thus, the maximum possible ON time:

2.88 ms x 2 = 5.76 ms

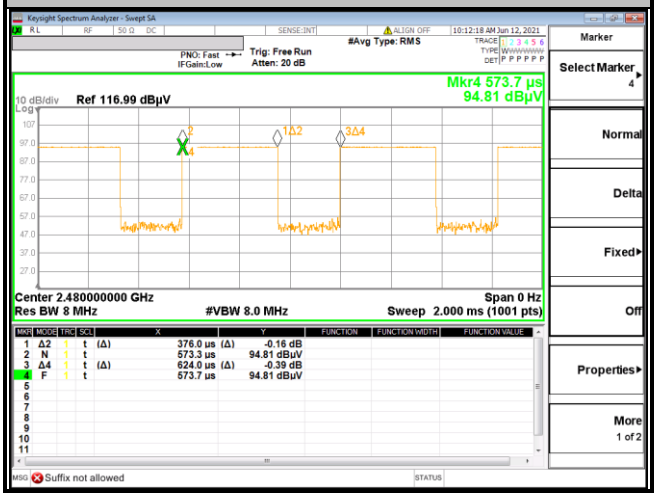
Worst case Duty Cycle Correction factor, which is derived from the maximum possible ON time,

20 x log(5.76 ms/100 ms) = -24.79 dB

Antenna	Band	Duty Cycle(%)	T(us)	1/T(kHz)	VBW Setting
4	Bluetooth – LE for 1Mbps	60.26	376	2.66	3kHz
4+3	2.4GHz 802.11n HT20	93.03	1335	0.75	1kHz
4+3	5GHz 802.11ax HE40 Full RU	91.14	1235	0.81	1kHz
4+3	5GHz 802.11ax HE160 Full RU	85.07	570	1.75	3kHz

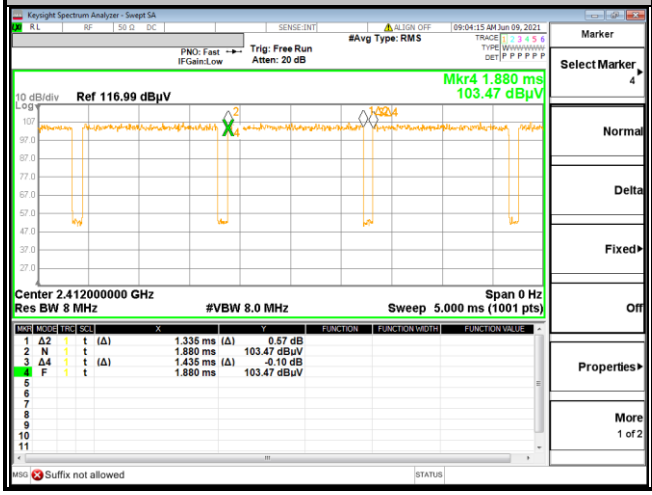
<Ant. 4>

Bluetooth – LE for 1Mbps

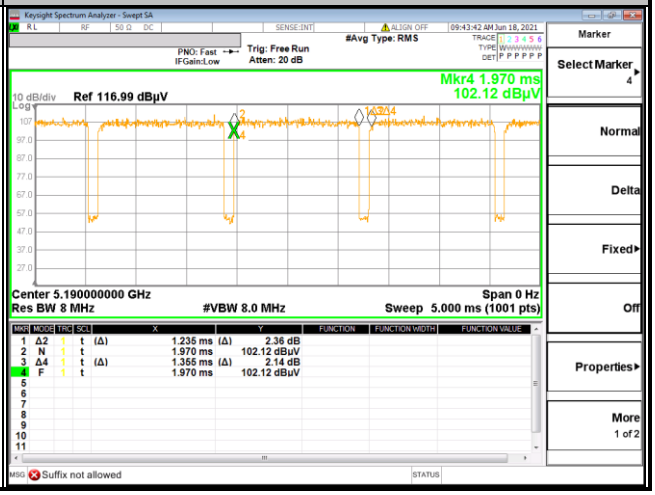


MIMO <Ant. 4+3>

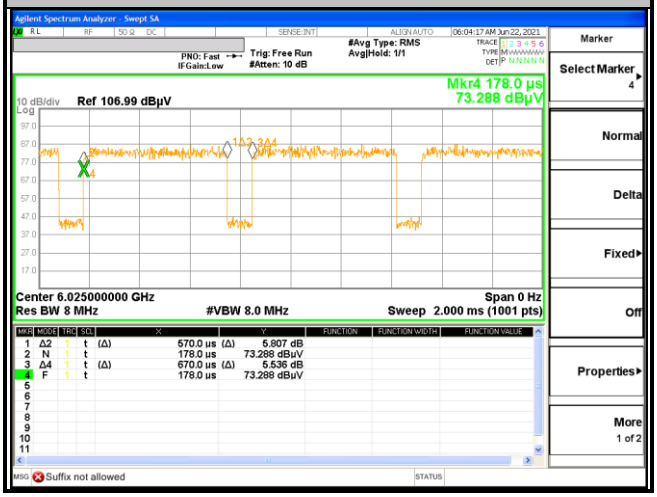
802.11n HT20



802.11ax HE40 Full RU



802.11ax HE160 Full RU



———THE END———