FCC CO-LOCATION RADIO TEST REPORT

FCC ID	**:**	**A4RG8V0U**
Equipment	**:**	**Phone**
Model Name	**:**	**G8V0U, GF5KQ**
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. 25, 2021 and testing was started from Jul. 03, 2021 and completed on Jul. 20, 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
No.58, Aly. 75, Ln. 564, Wenhua 3rd, Rd., Guishan Dist., Taoyuan City 333010, Taiwan (R.O.C.)

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History of this test report

Report No.	Version	Description	Issued Date
FR121931-04G	01	Initial issue of report	Aug. 13, 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 1.70 dB at 5350.320 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	G8V0U, GF5KQ
FCC ID	A4RG8V0U
EUT supports Radios application	GSM/EGPRS/WCDMA/HSPA/LTE/5G NR/ NFC/GNSS/WPC/WPT/UWB 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
16061FDEE0000Q 16061FDEE0001Q	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
5260 MHz ~ 5320 MHz
5925 MHz ~ 6425 MHz</td></tr>
<tr><td>Antenna Type / Gain</td><td><Bluetooth>
<Ant. 4> : IFA Antenna with gain -1.1 dBi
<Ant. 3> : IFA Antenna with gain -0.6 dBi
<2400 MHz ~ 2483.5 MHz>
<Ant. 4>: IFA Antenna with gain -1.1 dBi
<Ant. 3>: IFA Antenna with gain -0.6 dBi
<5260 MHz ~ 5320 MHz>
<Ant. 7>: Slot Antenna with gain -0.6 dBi
<Ant. 3>: IFA Antenna with gain -2.0 dBi
<5925 MHz ~ 6425 MHz>
<Ant. 7>: Slot Antenna with gain -2.4 dBi
<Ant. 3>: IFA Antenna with gain -2.0 dBi</td></tr>
<tr><td>Type of Modulation</td><td>Bluetooth BR (1Mbps) : GFSK
Bluetooth LE: GFSK
802.11b : DSSS (DBPSK / DQPSK / CCK)
802.11g : 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><td></td><td>Ant. 4</td><td>Ant. 3</td></tr>
<tr><td>Bluetooth-LE</td><td>V</td><td>-</td></tr>
<tr><td>802.11 b/g/ Bluetooth MIMO</td><td>V</td><td>V</td></tr>
</table>
<table>
<tr><td></td><td>Ant. 7</td><td>Ant. 3</td></tr>
<tr><td>802.11 ax 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. MIMO Ant. 7+3 is a calculated result from sum of the power MIMO Ant. 7 and MIMO Ant. 3.
3. 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. 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, 03CH15-HY

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

FCC designation No.: 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.

2.1 Carrier Frequency and Channel

2400-2483.5 MHz Bluetooth EDR		2400-2483.5 MHz Bluetooth – LE for 2Mbps	
Channel	**Freq. (MHz)**	**Channel**	**Freq. (MHz)**
78	2480	39	2480

2400-2483.5 MHz 802.11b		2400-2483.5 MHz 802.11g	
Channel	**Freq. (MHz)**	**Channel**	**Freq. (MHz)**
13	2472	11	2462

5260-5320 MHz 802.11ax HE80		5925-6425MHz 802.11ax HE80	
Channel	**Freq. (MHz)**	**Channel**	**Freq. (MHz)**
58	5290	07	5985

2.2 Test Mode

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

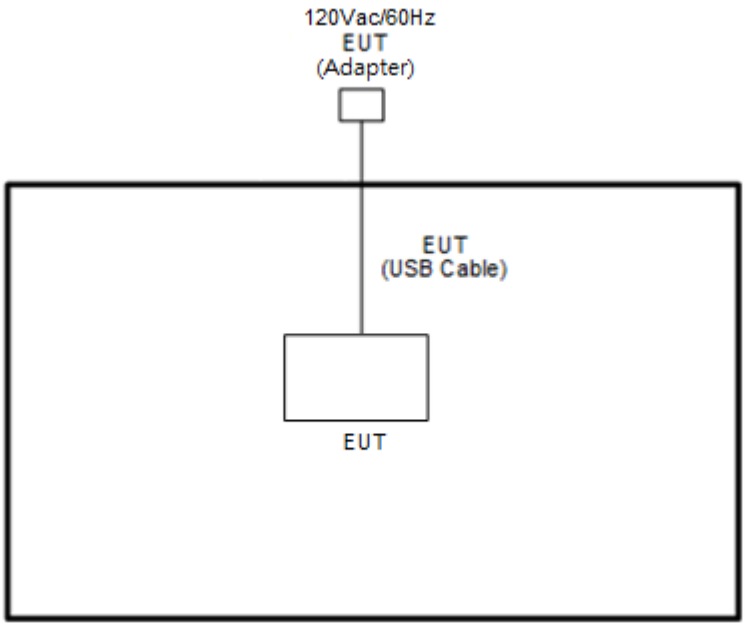
<Co-Location>

Test Mode	Modulation	Plane	Data Rate
Mode 1	Bluetooth for MIMO <Ant. 4+3> + WLAN 5GHz 802.11ax HE80 for MIMO <Ant. 7 + 3>	X	1Mbps + MCS0
Mode 2	Bluetooth-LE for Ant. 4 + WLAN 5GHz 802.11ax HE80 for MIMO <Ant. 7 + 3>	Y	2Mbps + MCS0
Mode 3	WLAN 2.4GHz 802.11b for MIMO <Ant. 4+3> + WLAN 5GHz 802.11ax HE80 for MIMO <Ant. 7 + 3>	X	1Mbps + MCS0
Mode 4	Bluetooth for MIMO <Ant. 4+3> + WLAN 6GHz 802.11ax HE80 for MIMO <Ant. 7 + 3>	X	1Mbps + MCS0
Mode 5	Bluetooth LE for Ant. 4 + WLAN 6GHz 802.11ax HE80 for MIMO <Ant. 7 + 3>	Z	2Mbps + MCS0
Mode 6	WLAN 2.4GHz 802.11g for MIMO <Ant. 4+3> + WLAN 6GHz 802.11ax HE80 for MIMO <Ant. 7 + 3>	Z	6Mbps + 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>



2.4 EUT Operation Test Setup

The RF test items, utility “CMD V10.0.18362.267” 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.

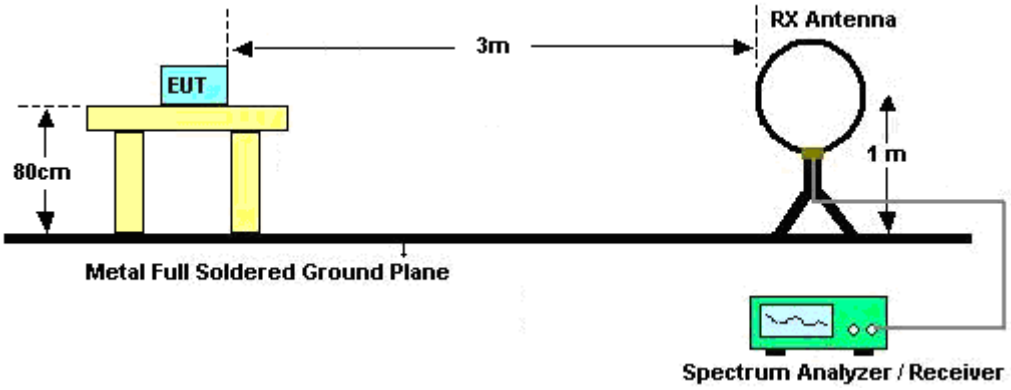
   (1) Procedure for Unwanted Emissions Measurements Below 1000MHz
   - RBW = 120 kHz
   - VBW = 300 kHz
   - Detector = Peak
   - Trace mode = max hold

   (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

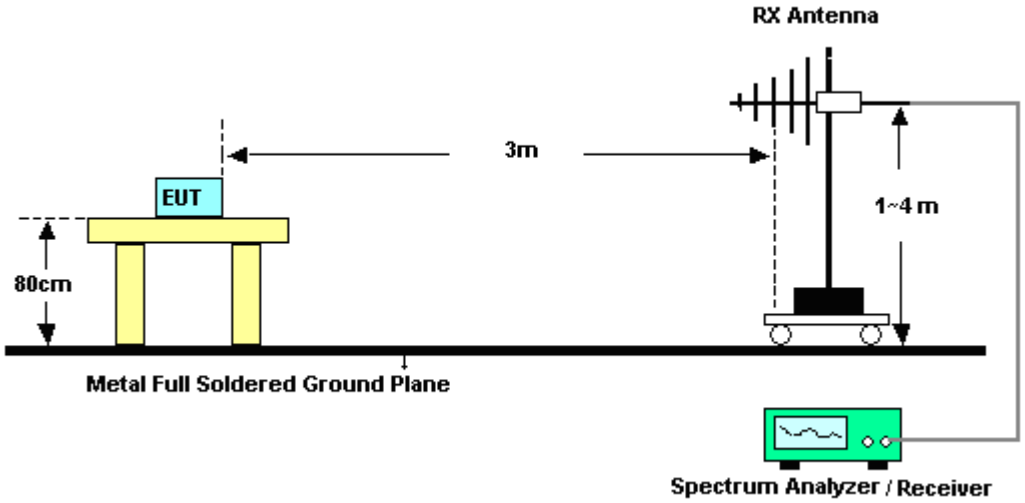
   (3) Procedures for Average Unwanted Emissions Measurements Above 1000MHz
   - RBW = 1 MHz
   - VBW = 10 Hz, when duty cycle is no less than 98 percent.
   - VBW ≥ 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting 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

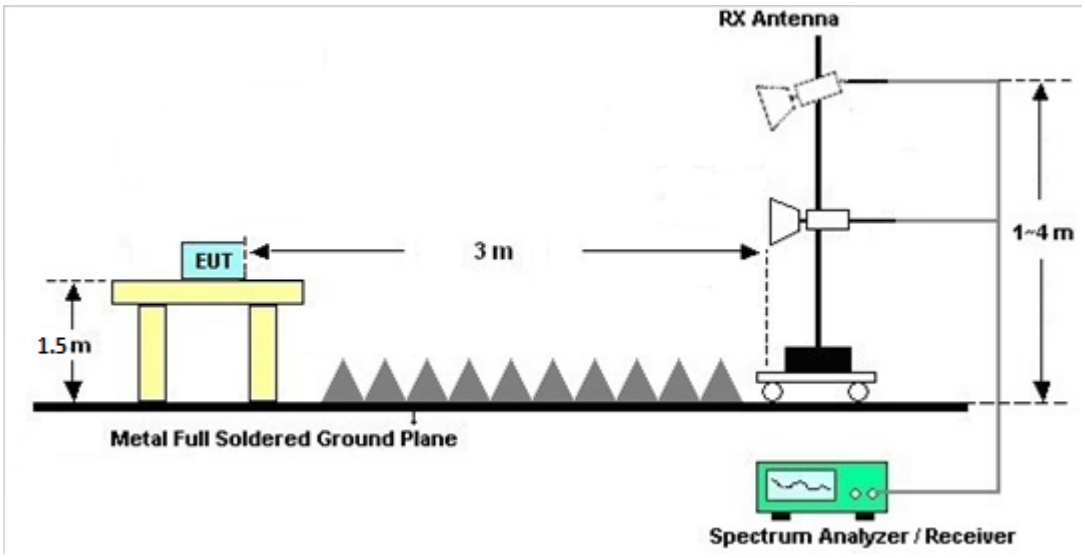
For radiated emissions below 30MHz



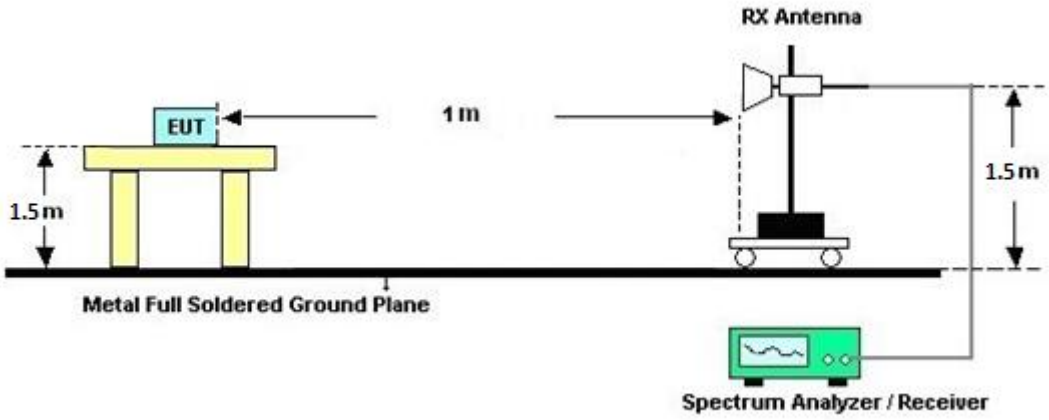
For radiated emissions from 30MHz to 1GHz



For radiated test from 1GHz to 18GHz



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	100315	9 kHz~30 MHz	Jan. 04, 2021	Jul. 03, 2021~ Jul. 20, 2021	Jan. 03, 2022	Radiation (03CH13-HY)
Amplifier	Sonoma-Instrument	310 N	187282	9KHz~1GHz	Dec. 16, 2020	Jul. 03, 2021~ Jul. 20, 2021	Dec. 15, 2021	Radiation (03CH13-HY)
Horn Antenna	SCHWARZBECK	BBHA 9120 D	9120D-02294	1GHz ~ 18GHz	Jun. 23, 2021	Jul. 03, 2021~ Jul. 20, 2021	Jun. 22, 2022	Radiation (03CH13-HY)
Preamplifier	MITEQ	AMF-7D-0010 1800-30-10P	1590074	1GHz~18GHz	May 18, 2021	Jul. 03, 2021~ Jul. 20, 2021	May 17, 2022	Radiation (03CH13-HY)
Preamplifier	Keysight	83017A	MY53270147	1GHz~26.5GHz	Oct. 28, 2020	Jul. 03, 2021~ Jul. 20, 2021	Oct. 27, 2021	Radiation (03CH13-HY)
Signal Generator	Anritsu	MG3694C	163401	0.1Hz~40GHz	Jan. 31, 2021	Jul. 03, 2021~ Jul. 20, 2021	Jan. 30, 2022	Radiation (03CH13-HY)
Spectrum Analyzer	Keysight	N9010A	MY55370526	10Hz~44GHz	Mar. 18, 2021	Jul. 03, 2021~ Jul. 20, 2021	Mar. 17, 2022	Radiation (03CH13-HY)
Controller	EMEC	EM1000	N/A	Control Turn table & Ant Mast	N/A	Jul. 03, 2021~ Jul. 20, 2021	N/A	Radiation (03CH13-HY)
Antenna Mast	EMEC	AM-BS-4500-B	N/A	1m~4m	N/A	Jul. 03, 2021~ Jul. 20, 2021	N/A	Radiation (03CH13-HY)
Turn Table	EMEC	TT2000	N/A	0~360 Degree	N/A	Jul. 03, 2021~ Jul. 20, 2021	N/A	Radiation (03CH13-HY)
Software	Audix	E3 6.2009-8-24	RK-000992	N/A	N/A	Jul. 03, 2021~ Jul. 20, 2021	N/A	Radiation (03CH13-HY)
Preamplifier	EMEC	EM18G40G	060715	18GHz ~ 40GHz	Dec. 11, 2020	Jul. 03, 2021~ Jul. 20, 2021	Dec. 10, 2021	Radiation (03CH13-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 126E	0030/126E	30M-18G	Feb. 10, 2021	Jul. 03, 2021~ Jul. 20, 2021	Feb. 09, 2022	Radiation (03CH13-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	804793/4	30M-18G	Feb. 10, 2021	Jul. 03, 2021~ Jul. 20, 2021	Feb. 09, 2022	Radiation (03CH13-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	505134/2	30M~40GHz	Feb. 22, 2021	Jul. 03, 2021~ Jul. 20, 2021	Feb. 21, 2022	Radiation (03CH13-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	MY4274/2	30MHz~40GHz	Mar. 11, 2021	Jul. 03, 2021~ Jul. 20, 2021	Mar. 10, 2022	Radiation (03CH13-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY24961/4	30M-18G	Feb. 10, 2021	Jul. 03, 2021~ Jul. 20, 2021	Feb. 09, 2022	Radiation (03CH13-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY9837/4PE	9kHz~30MHz	Mar. 11, 2021	Jul. 03, 2021~ Jul. 20, 2021	Mar. 10, 2022	Radiation (03CH13-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170584	18GHz- 40GHz	Dec. 11, 2020	Jul. 03, 2021~ Jul. 20, 2021	Dec. 10, 2021	Radiation (03CH13-HY)
Hygrometer	TECPEL	DTM-303B	TP200879	N/A	Oct. 22, 2020	Jul. 03, 2021~ Jul. 20, 2021	Oct. 21, 2021	Radiation (03CH13-HY)
Filter	Wainwright	WHKX8-5872.5-6750-18000-40ST	SN5	6.75GHz High Pass Filter	Mar. 11, 2021	Jul. 03, 2021~ Jul. 20, 2021	Mar. 10, 2022	Radiation (03CH13-HY)
Filter	Wainwright	WHKX12-2700-3000-18000-60SS	SN2	3GHz High Pass Filter	May 17, 2021	Jul. 03, 2021~ Jul. 20, 2021	May 16, 2022	Radiation (03CH13-HY)

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	Jul. 10, 2021~ Jul. 16, 2021	Jan. 03, 2022	Radiation (03CH15-HY)
Bilog Antenna	TESEQ	CBL 6111D & 00800N1D01N-06	41912 & 05	30MHz~1GHz	Feb. 08, 2021	Jul. 10, 2021~ Jul. 16, 2021	Feb. 07, 2022	Radiation (03CH15-HY)
Amplifier	SONOMA	310N	363440	9kHz~1GHz	Dec. 28, 2020	Jul. 10, 2021~ Jul. 16, 2021	Dec. 27, 2021	Radiation (03CH15-HY)
Horn Antenna	SCHWARZBECK	BBHA 9120 D	9120D-01620	1GHz~18GHz	Nov. 03, 2020	Jul. 10, 2021~ Jul. 16, 2021	Nov. 02, 2021	Radiation (03CH15-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170251	18GHz~40GHz	Dec. 02, 2020	Jul. 10, 2021~ Jul. 16, 2021	Dec. 01, 2021	Radiation (03CH15-HY)
Preamplifier	Jet-Power	JPA0118-55-303	1710001800055006	1GHz~18GHz	May 06, 2021	Jul. 10, 2021~ Jul. 16, 2021	May 05, 2022	Radiation (03CH15-HY)
Preamplifier	Keysight	83017A	MY53270195	1GHz~26.5GHz	Aug. 21, 2020	Jul. 10, 2021~ Jul. 16, 2021	Aug. 20, 2021	Radiation (03CH15-HY)
Preamplifier	EMEC	EM18G40G	0600789	18-40GHz	Oct. 27, 2020	Jul. 10, 2021~ Jul. 16, 2021	Oct. 26, 2021	Radiation (03CH15-HY)
EMI Test Receiver	Keysight	N9038A(MXE)	MY54130085	20MHz~8.4GHz	Nov. 02, 2020	Jul. 10, 2021~ Jul. 16, 2021	Nov. 01, 2021	Radiation (03CH15-HY
Spectrum Analyzer	Agilent	E4446A	MY50180136	3Hz~44GHz	May 07, 2021	Jul. 10, 2021~ Jul. 16, 2021	May 06, 2022	Radiation (03CH15-HY)
Antenna Mast	ChainTek	MBS-520-1	N/A	1m~4m	N/A	Jul. 10, 2021~ Jul. 16, 2021	N/A	Radiation (03CH15-HY)
Turn Table	ChainTek	T-200-S-1	N/A	0~360 Degree	N/A	Jul. 10, 2021~ Jul. 16, 2021	N/A	Radiation (03CH15-HY)
Software	Audix	E3 6.2009-8-24(k5)	RK-000451	N/A	N/A	Jul. 10, 2021~ Jul. 16, 2021	N/A	Radiation (03CH15-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104, 102E	MY36980/4, MY9838/4PE,508405/2E	30MHz~18G	Nov. 16, 2020	Jul. 10, 2021~ Jul. 16, 2021	Nov. 15, 2021	Radiation (03CH15-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	505134/2	30MHz-40GHz	Feb. 22, 2021	Jul. 10, 2021~ Jul. 16, 2021	Feb. 21, 2022	Radiation (03CH15-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	800740/2	30MHz-40GHz	Feb. 22, 2021	Jul. 10, 2021~ Jul. 16, 2021	Feb. 21, 2022	Radiation (03CH15-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY9837/4PE	9kHz~30MHz	Mar. 11, 2021	Jul. 10, 2021~ Jul. 16, 2021	Mar. 10, 2022	Radiation (03CH15-HY)
Filter	Wainwright	WLJ4-1000-1530-6000-40ST	SN4	1.53GHz Low Pass Filter	Jul. 02, 2021	Jul. 10, 2021~ Jul. 16, 2021	Jul. 01, 2022	Radiation (03CH15-HY)
Filter	Wainwright	WHKX8-5872.5-6750-18000-40ST	SN6	6.75GHz High Pass Filter	Jun. 30, 2021	Jul. 10, 2021~ Jul. 16, 2021	Jun. 29, 2022	Radiation (03CH15-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))	**3.9 dB**

<03CH15-HY>

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

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

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

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

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**4.9 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 2 - 5260~5320MHz

Ant. 4+3_BT_Tx_Ch78 + Ant. 7+3_11ax HE80_Tx_Ch58 (Band Edge @ 3m)

BT 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	110.54	-	-	106.48	27.62	4.26	27.82	333	68	P	H
	*	2480	85.78	-	-	-	-	-	-	-	-	A	H
		2483.76	46.7	-27.3	74	42.61	27.64	4.27	27.82	333	68	P	H
		2483.76	21.94	-32.06	54	-	-	-	-	-	-	A	H
													H
													H
	*	2480	105.41	-	-	101.35	27.62	4.26	27.82	380	117	P	V
	*	2480	80.65	-	-	-	-	-	-	-	-	A	V
		2483.8	44.47	-29.53	74	40.38	27.64	4.27	27.82	380	117	P	V
		2483.8	19.71	-34.29	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. 7+3_11ax HE80_Tx_Ch58 (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.	
7+3		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
		5020.06	53.98	-20.02	74	42.11	33.06	6.25	27.44	190	6	P	H
		5111.52	45.64	-8.36	54	33.69	33.1	6.27	27.42	190	6	A	H
	*	5290	104.04	-	-	92.11	32.96	6.34	27.37	190	6	P	H
	*	5290	94.09	-	-	82.16	32.96	6.34	27.37	190	6	A	H
802.11ax		5353.44	61.72	-12.28	74	50	32.71	6.37	27.36	190	6	P	H
HE80		5356.8	51.77	-2.23	54	40.03	32.73	6.37	27.36	190	6	A	H
CH 58		5076.84	54.28	-19.72	74	42.4	33.05	6.26	27.43	400	342	P	V
5290MHz		5021.08	44.96	-9.04	54	33.09	33.06	6.25	27.44	400	342	A	V
	*	5290	99.19	-	-	87.26	32.96	6.34	27.37	400	342	P	V
	*	5290	90.18	-	-	78.25	32.96	6.34	27.37	400	342	A	V
		5380.08	53.79	-20.21	74	41.94	32.82	6.38	27.35	400	342	P	V
		5350.56	45.66	-8.34	54	33.95	32.7	6.37	27.36	400	342	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. 7+3_11ax HE80_Tx_Ch58 (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+3/7+3		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
BT CH 78 2480MHz + 802.11ax HE80 CH 58 5290MHz		4960	54.77	-19.23	74	43.07	33.02	6.13	27.45	100	0	P	H
		4960	30.01	-23.99	54	-	-	-	-	-	-	A	H
		7440	43.39	-30.61	74	55.36	36.22	8.19	57.17	100	0	P	H
		7440	18.63	-35.37	54	-	-	-	-	-	-	A	H
		10580	45.67	-22.53	68.2	53.02	38.74	9.63	56.35	100	0	P	H
		15870	43.8	-30.2	74	49.81	37.4	11.62	55.48	100	0	P	H
		4960	54.4	-19.6	74	42.7	33.02	6.13	27.45	100	0	P	V
		4960	29.64	-24.36	54	-	-	-	-	-	-	A	V
		7440	44.13	-29.87	74	56.1	36.22	8.19	57.17	100	0	P	V
		7440	19.37	-34.63	54	-	-	-	-	-	-	A	V
		10580	45.71	-22.49	68.2	53.06	38.74	9.63	56.35	100	0	P	V
		15870	43.48	-30.52	74	49.49	37.4	11.62	55.48	100	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 2 - 5260~5320MHz

Ant. 4_BLE_Tx_Ch39 + Ant. 7+3_11ax HE80_Tx_Ch58 (Band Edge @ 3m)

BLE	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	111.21	-	-	97.22	27.62	14.19	27.82	112	159	P	H
	*	2480	109.51	-	-	95.52	27.62	14.19	27.82	112	159	A	H
		2493.72	54.83	-19.17	74	40.78	27.67	14.2	27.82	112	159	P	H
		2483.52	45.82	-8.18	54	31.81	27.63	14.2	27.82	112	159	A	H
													H
													H
	*	2480	108.73	-	-	94.74	27.62	14.19	27.82	189	116	P	V
	*	2480	107.15	-	-	93.16	27.62	14.19	27.82	189	116	A	V
		2485.84	55.14	-18.86	74	41.12	27.64	14.2	27.82	189	116	P	V
		2483.52	45.22	-8.78	54	31.21	27.63	14.2	27.82	189	116	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. 7+3_11ax HE80_Tx_Ch58 (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.	
7+3		(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11ax HE80 CH 58 5290MHz		5035.36	52.9	-21.1	74	41.06	33.03	6.25	27.44	187	48	P	H
		5087.72	45.3	-8.7	54	33.39	33.08	6.26	27.43	187	48	A	H
	*	5290	101.92	-	-	89.99	32.96	6.34	27.37	187	48	P	H
	*	5290	91.95	-	-	80.02	32.96	6.34	27.37	187	48	A	H
		5351.04	59.69	-14.31	74	47.98	32.7	6.37	27.36	187	48	P	H
		5350.08	50.37	-3.63	54	38.66	32.7	6.37	27.36	187	48	A	H
		5071.74	53.42	-20.58	74	41.55	33.04	6.26	27.43	116	0	P	V
		5117.3	45.27	-8.73	54	33.32	33.1	6.27	27.42	116	0	A	V
	*	5290	103.26	-	-	91.33	32.96	6.34	27.37	116	0	P	V
	*	5290	94.2	-	-	82.27	32.96	6.34	27.37	116	0	A	V
		5358	60.09	-13.91	74	48.35	32.73	6.37	27.36	116	0	P	V
		5350.32	52.3	-1.7	54	40.59	32.7	6.37	27.36	116	0	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. 7+3_11ax HE80_Tx_Ch58 (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.	
4/7+3		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
BLE CH 39 2480MHz + 802.11ax HE80 CH 58 5290MHz		4960	59.41	-14.59	74	47.71	33.02	6.13	27.45	116	160	P	H
		4960	43.32	-10.68	54	31.62	33.02	6.13	27.45	116	160	A	H
		7440	43.65	-30.35	74	55.62	36.22	8.98	57.17	100	0	P	H
		10580	45.33	-22.87	68.2	52.68	38.74	10.26	56.35	100	0	P	H
		15870	43.59	-30.41	74	49.6	37.4	12.07	55.48	100	0	P	H
		4960	58.38	-15.62	74	46.68	33.02	6.13	27.45	198	105	P	V
		4960	42.25	-11.75	54	30.55	33.02	6.13	27.45	198	105	A	V
		7440	43.14	-30.86	74	55.11	36.22	8.98	57.17	100	0	P	V
		10580	45.33	-22.87	68.2	52.68	38.74	10.26	56.35	100	0	P	V
		15870	44.18	-29.82	74	50.19	37.4	12.07	55.48	100	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 2 - 5260~5320MHz

Ant. 4+3_11b_Tx_Ch13 + Ant. 7+3_11ax HE80_Tx_Ch58 (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)
802.11b CH 13 2472MHz	*	2472	107.29	-	-	93.34	27.59	14.19	27.83	201	314	P	H
	*	2472	104.16	-	-	90.21	27.59	14.19	27.83	201	314	A	H
		2486.12	57.29	-16.71	74	43.27	27.64	14.2	27.82	201	314	P	H
		2486.68	50.16	-3.84	54	36.13	27.65	14.2	27.82	201	314	A	H
													H
													H
	*	2472	106.4	-	-	92.45	27.59	14.19	27.83	390	40	P	V
	*	2472	103.22	-	-	89.27	27.59	14.19	27.83	390	40	A	V
		2485.6	57.66	-16.34	74	43.64	27.64	14.2	27.82	390	40	P	V
		2486.68	49.24	-4.76	54	35.21	27.65	14.2	27.82	390	40	A	V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Ant. 4+3_11b_Tx_Ch13 + Ant. 7+3_11ax HE80_Tx_Ch58 (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.	
7+3		(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
		5090.44	53.46	-20.54	74	41.55	33.08	6.26	27.43	186	50	P	H
		5011.22	45.27	-8.73	54	33.4	33.08	6.24	27.45	186	50	A	H
	*	5290	99.73	-	-	87.8	32.96	6.34	27.37	186	50	P	H
	*	5290	90.87	-	-	78.94	32.96	6.34	27.37	186	50	A	H
802.11ax		5358.24	55.91	-18.09	74	44.17	32.73	6.37	27.36	186	50	P	H
HE80		5351.76	49.46	-4.54	54	37.74	32.71	6.37	27.36	186	50	A	H
CH 58		5116.62	53.09	-20.91	74	41.14	33.1	6.27	27.42	142	0	P	V
5290MHz		5096.9	45.37	-8.63	54	33.44	33.09	6.26	27.42	142	0	A	V
	*	5290	102.15	-	-	90.22	32.96	6.34	27.37	142	0	P	V
	*	5290	93.26	-	-	81.33	32.96	6.34	27.37	142	0	A	V
		5352.96	60.68	-13.32	74	48.96	32.71	6.37	27.36	142	0	P	V
		5357.04	51.17	-2.83	54	39.43	32.73	6.37	27.36	142	0	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Ant. 4+3_11b_Tx_Ch13 + Ant. 7+3_11ax HE80_Tx_Ch58 (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+3/7+3		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
		4944	56.81	-17.19	74	45.22	32.96	6.09	27.46	117	208	P	H
		4944	42.12	-11.88	54	30.53	32.96	6.09	27.46	117	208	A	H
		7416	43.5	-30.5	74	55.35	36.27	9	57.12	100	0	P	H
		10580	45.01	-23.19	68.2	52.36	38.74	10.26	56.35	100	0	P	H
802.11b		15870	43.36	-30.64	74	49.37	37.4	12.07	55.48	100	0	P	H
CH 13													
2472MHz													
+													
802.11ax		4944	58.48	-15.52	74	46.89	32.96	6.09	27.46	154	303	P	V
HE80		4944	43.52	-10.48	54	31.93	32.96	6.09	27.46	154	303	A	V
CH 58		7416	44.65	-29.35	74	56.5	36.27	9	57.12	100	0	P	V
5290MHz		10580	45.47	-22.73	68.2	52.82	38.74	10.26	56.35	100	0	P	V
		15870	43.34	-30.66	74	49.35	37.4	12.07	55.48	100	0	P	V

Remark

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

Emission above 18GHz

Ant. 4+3_BT_Tx_Ch78 + Ant. 7+3_11ax HE80_Tx_Ch58 (SHF)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
4+3/7+3		(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
		37294	45.41	-22.79	68.2	61.07	43.25	8.45	57.82	150	0	P	H
												P	H
												P	H
												P	H
												P	H
												P	H
													H
													H
													H
BT													
CH 78													H
2480MHz													H
+													H
802.11ax		37624	44.34	-23.86	68.2	60.03	43	8.5	57.65	150	0	P	V
HE80												P	V
CH 58												P	V
5290MHz												P	V
												P	V
												P	V
												P	V
													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. 7+3_11ax HE80_Tx_Ch58 (SHF)

WIFI Ant. 4/7+3	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)
		39604	45.23	-28.77	74	58.73	43.78	8.46	56.2	150	0	P	H
												P	H
												P	H
												P	H
												P	H
												P	H
													H
													H
BLE													H
CH 39													H
2480MHz													H
+													H
802.11ax		37734	44.8	-23.4	68.2	60.46	43	8.49	57.61	150	0	P	V
HE80												P	V
CH 58												P	V
5290MHz												P	V
												P	V
												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_11b_Tx_Ch13 + Ant. 7+3_11ax HE80_Tx_Ch58 (SHF)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
4+3/7+3		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
		35028	44.21	-23.99	68.2	61.47	42.78	8.12	58.62	150	0	P	H
												P	H
												P	H
												P	H
												P	H
												P	H
													H
													H
802.11b													H
CH 13													H
2472MHz													H
+													H
802.11ax		37206	43.83	-24.37	68.2	59.55	43.28	8.42	57.88	150	0	P	V
HE80												P	V
CH 58												P	V
5290MHz												P	V
												P	V
												P	V
													V
													V
													V
													V
													V
													V

Remark

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

Emission below 1GHz

Ant. 4+3_BT_Tx_Ch78 + Ant. 7+3_11ax HE80_Tx_Ch58 (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+3/7+3		(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
		30.97	23.92	-16.08	40	29.83	23.85	2.47	32.23	-	-	P	H
		97.9	25.9	-17.6	43.5	41.19	15.72	1.22	32.23	-	-	P	H
		128.94	24.62	-18.88	43.5	37.91	17.53	1.42	32.24	-	-	P	H
		676.99	27.65	-18.35	46	31.09	26.17	2.59	32.2	-	-	P	H
		806.97	30.53	-15.47	46	31.3	27.64	2.89	31.3	-	-	P	H
		955.38	32.34	-13.66	46	29.65	30.56	2.89	30.76	100	0	P	H
													H
													H
BT													H
CH 78													H
2480MHz													H
+													H
802.11ax		33.88	24.12	-15.88	40	31.78	22.58	2	32.24	-	-	P	V
HE80		93.05	22.94	-20.56	43.5	38.81	15.15	1.22	32.24	-	-	P	V
CH 58		120.21	25.32	-18.18	43.5	38.67	17.5	1.39	32.24	-	-	P	V
5290MHz		577.08	26.77	-19.23	46	31.02	25.65	2.54	32.44	-	-	P	V
		787.57	30.12	-15.88	46	30.89	27.82	2.82	31.41	-	-	P	V
		949.56	32.73	-13.27	46	30.35	30.28	2.89	30.79	100	0	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. 7+3_11ax HE80_Tx_Ch58 (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.	
4/7+3		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
		30	24.14	-15.86	40	29.17	24.57	2.62	32.22	-	-	P	H
		97.9	26.36	-17.14	43.5	41.65	15.72	1.22	32.23	-	-	P	H
		129.91	25.05	-18.45	43.5	38.4	17.47	1.42	32.24	-	-	P	H
		560.59	25.99	-20.01	46	29.95	25.89	2.48	32.33	-	-	P	H
		796.3	29.97	-16.03	46	30.65	27.81	2.86	31.35	-	-	P	H
		951.5	32.97	-13.03	46	30.47	30.39	2.89	30.78	100	0	P	H
													H
													H
													H
BLE													H
CH 39													H
2480MHz													H
+													H
802.11ax		30	24.12	-15.88	40	29.15	24.57	2.62	32.22	-	-	P	V
HE80		91.11	22.65	-20.85	43.5	38.92	14.75	1.22	32.24	-	-	P	V
CH 58		120.21	24.74	-18.76	43.5	38.09	17.5	1.39	32.24	-	-	P	V
5290MHz		676.99	27.82	-18.18	46	31.26	26.17	2.59	32.2	-	-	P	V
		796.3	30.55	-15.45	46	31.23	27.81	2.86	31.35	-	-	P	V
		955.38	32.84	-13.16	46	30.15	30.56	2.89	30.76	100	0	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_11b_Tx_Ch13 + Ant. 7+3_11ax HE80_Tx_Ch58 (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+3/7+3		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
		31.94	24.2	-15.8	40	30.76	23.36	2.31	32.23	-	-	P	H
		96.93	25.47	-18.03	43.5	40.91	15.57	1.22	32.23	-	-	P	H
		131.85	24.06	-19.44	43.5	37.33	17.54	1.43	32.24	-	-	P	H
		654.68	27.03	-18.97	46	30.68	26.05	2.61	32.31	-	-	P	H
		871.96	32.84	-13.16	46	32.26	28.77	2.94	31.13	-	-	P	H
		959.26	33.1	-12.9	46	30.16	30.79	2.89	30.74	100	0	P	H
													H
													H
802.11b													H
CH 13													H
2472MHz													H
+													H
802.11ax		30	23.49	-16.51	40	28.52	24.57	2.62	32.22	-	-	P	V
HE80		93.05	23.44	-20.06	43.5	39.31	15.15	1.22	32.24	-	-	P	V
CH 58		120.21	24.63	-18.87	43.5	37.98	17.5	1.39	32.24	-	-	P	V
5290MHz		592.6	26.48	-19.52	46	31.04	25.37	2.6	32.53	-	-	P	V
		891.36	36.47	-9.53	46	35.88	28.68	2.98	31.07	100	0	P	V
		949.56	32.44	-13.56	46	30.06	30.28	2.89	30.79	-	-	P	V
													V
													V
													V
													V
													V
													V

Remark

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

Test Engineer :	Leo Lee, Mancy Chou and Bigshow Wang	Temperature :	24~26°C
		Relative Humidity :	48~55%

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

Ant. 4+3_BT_Tx_Ch78 + Ant. 7+3_11ax HE80_Tx_Ch07 (Band Edge @ 3m)

BT	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	113.16	-	-	109.82	27.44	6.78	30.88	139	257	P	H
	*	2480	88.4	-	-	-	-	-	-	-	-	A	H
		2483.8	48.65	-25.35	74	45.31	27.43	6.79	30.88	139	257	P	H
		2483.8	23.89	-30.11	54	-	-	-	-	-	-	A	H
													H
													H
	*	2480	108.9	-	-	105.56	27.44	6.78	30.88	400	210	P	V
	*	2480	84.14	-	-	-	-	-	-	-	-	A	V
		2483.52	47.94	-26.06	74	44.6	27.43	6.79	30.88	400	210	P	V
		2483.52	23.18	-30.82	54	-	-	-	-	-	-	A	V
													V
													V

Ant. 4+3_BT_Tx_Ch78 + Ant. 7+3_11ax HE80_Tx_Ch07 (Band Edge @ 3m)

WIFI Ant. 7+3	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)
		5904.52	50.06	-38.14	88.2	37.04	32.11	11.19	30.28	100	284	P	H
		5894.92	41.77	-26.43	68.2	28.76	32.09	11.19	30.27	100	284	A	H
		5104.4	52.25	-21.75	74	40.05	31.8	10.41	30.01	100	284	P	H
		5104.4	42.73	-11.27	54	30.53	31.8	10.41	30.01	100	284	A	H
802.11ax	*	5985	89.54	-	-	76.42	32.2	11.26	30.34	100	284	P	H
HE80	*	5985	81.8	-	-	68.68	32.2	11.26	30.34	100	284	A	H
CH 07		5911.08	51.14	-37.06	88.2	38.11	32.12	11.2	30.29	100	269	P	V
5985MHz		5916.36	42.08	-26.12	68.2	29.04	32.13	11.2	30.29	100	269	A	V
		5110.6	52.35	-21.65	74	40.13	31.8	10.43	30.01	100	269	P	V
		5110.6	42.5	-11.5	54	30.28	31.8	10.43	30.01	100	269	A	V
	*	5985	93.75	-	-	80.63	32.2	11.26	30.34	100	269	P	V
	*	5985	85.99	-	-	72.87	32.2	11.26	30.34	100	269	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. 7+3_11ax HE80_Tx_Ch07 (Harmonic @ 3m)

WIFI Ant. 4+3/7+3	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)
BT CH 78 2480MHz + 802.11ax HE80 CH 07 5985MHz		4960	50.83	-23.17	74	38.47	31.22	11.17	30.03	100	0	P	H
		4960	26.07	-27.93	54	-	-	-	-	-	-	A	H
		7440	44.68	-29.32	74	53.93	36.3	12.65	58.2	100	0	P	H
		7440	19.92	-34.08	54	-	-	-	-	-	-	A	H
		11970	47.43	-26.57	74	54.76	38.77	15.27	61.37	100	0	P	H
		18000	60.59	-13.41	74	49.79	49	19.04	57.24	100	30	P	H
		18000	50.55	-3.45	54	39.75	49	19.04	57.24	100	30	A	H
		4960	50.15	-23.85	74	37.79	31.22	11.17	30.03	100	0	P	V
		4960	25.39	-28.61	54	-	-	-	-	-	-	A	V
		7440	44.45	-29.55	74	53.7	36.3	12.65	58.2	100	0	P	V
		7440	19.69	-34.31	54	-	-	-	-	-	-	A	V
		11970	48.4	-25.6	74	55.73	38.77	15.27	61.37	100	0	P	V
		18000	60.18	-13.82	74	49.38	49	19.04	57.24	100	20	P	V
		18000	50.19	-3.81	54	39.39	49	19.04	57.24	100	20	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. 7+3_11ax HE80_Tx_Ch07 (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+3/7+3		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
BT CH 78 2480MHz + 802.11ax HE80 CH 07 5985MHz		40.67	23.75	-16.25	40	36.41	19.12	0.78	32.56	-	-	P	H
		98.87	30.59	-12.91	43.5	46.07	15.71	1.31	32.5	-	-	P	H
		168.71	24.91	-18.59	43.5	39.88	15.7	1.82	32.49	-	-	P	H
		674.08	35.34	-10.66	46	37.98	26.26	3.5	32.4	-	-	P	H
		719.67	37.41	-8.59	46	39.39	26.85	3.62	32.45	100	0	P	H
		890.39	37.12	-8.88	46	35.89	28.83	4.08	31.68	-	-	P	H
													H
													H
													H
													H
													H
													H
		40.67	29.57	-10.43	40	42.23	19.12	0.78	32.56	-	-	P	V
		81.41	24.68	-15.32	40	42.41	13.56	1.2	32.49	-	-	P	V
		95.96	24.09	-19.41	43.5	39.83	15.45	1.29	32.48	-	-	P	V
		166.77	20.51	-22.99	43.5	35.23	15.95	1.82	32.49	-	-	P	V
		674.08	36.08	-9.92	46	38.72	26.26	3.5	32.4	-	-	P	V
		895.24	37.71	-8.29	46	36.41	28.86	4.09	31.65	100	0	P	V
													V
													V
													V
													V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against limit line.												

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

Ant. 4_BLE_Tx_Ch39 + Ant. 7+3_11ax HE80_Tx_Ch07 (Band Edge @ 3m)

BLE	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	97.64	-	-	84.38	27.44	6.78	30.88	291	314	P	H
	*	2480	97.13	-	-	83.87	27.44	6.78	30.88	291	314	P	H
		2498.04	53.2	-20.8	74	39.94	27.4	6.81	30.87	291	314	P	H
		2493.04	43.29	-10.71	54	30.03	27.41	6.8	30.87	291	314	A	H
													H
													H
	*	2480	101.52	-	-	88.26	27.44	6.78	30.88	100	131	P	V
	*	2480	98.6	-	-	85.34	27.44	6.78	30.88	100	131	P	V
		2497.64	53.45	-20.55	74	40.19	27.4	6.81	30.87	100	131	P	V
		2483.52	43.23	-10.77	54	29.97	27.43	6.79	30.88	100	131	A	V
													V
													V

Ant. 4_BLE_Tx_Ch39 + Ant. 7+3_11ax HE80_Tx_Ch07 (Band Edge @ 3m)

WIFI Ant. 7+3	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)
		5923.88	51.14	-37.06	88.2	38.08	32.15	11.21	30.3	250	300	P	H
		5922.76	42.66	-25.54	68.2	29.59	32.15	11.21	30.29	250	300	A	H
		5433	51.76	-22.24	74	39.4	31.53	10.82	29.99	100	0	P	H
		5433	42.29	-11.71	54	29.93	31.53	10.82	29.99	100	0	A	H
802.11ax	*	5985	98.67	-	-	85.55	32.2	11.26	30.34	250	300	P	H
HE80	*	5985	88.5	-	-	75.38	32.2	11.26	30.34	250	300	A	H
CH 07		5903.08	50.94	-37.26	88.2	37.92	32.11	11.19	30.28	100	344	P	V
5985MHz		5923.4	42.04	-26.16	68.2	28.97	32.15	11.21	30.29	100	344	A	V
		4992.8	51.84	-22.16	74	40.38	31.29	10.19	30.02	100	0	P	V
		4992.8	41.38	-12.62	54	29.92	31.29	10.19	30.02	100	0	A	V
	*	5985	96.12	-	-	83	32.2	11.26	30.34	100	344	P	V
	*	5985	85.28	-	-	72.16	32.2	11.26	30.34	100	344	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. 7+3_11ax HE80_Tx_Ch07 (Harmonic @ 3m)

WIFI Ant. 4/7+3	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)
BLE CH 39 2480MHz + 802.11ax HE80 CH 07 5985MHz		4960	51.68	-22.32	74	39.32	31.22	11.17	30.03	100	0	P	H
		4960	41.88	-12.12	54	29.52	31.22	11.17	30.03	100	0	A	H
		7440	44.87	-29.13	74	54.12	36.3	12.65	58.2	100	0	P	H
		11970	46.79	-27.21	74	54.12	38.77	15.27	61.37	100	0	P	H
		18000	61.01	-12.99	74	50.21	49	19.04	57.24	100	31	P	H
		18000	50.93	-3.07	54	40.13	49	19.04	57.24	100	31	A	
													H
													H
		4960	50.88	-23.12	74	38.52	31.22	11.17	30.03	100	0	P	V
		4960	41.79	-12.21	54	29.43	31.22	11.17	30.03	100	0	A	V
		7440	43.5	-30.5	74	52.75	36.3	12.65	58.2	100	0	P	V
		11970	46.59	-27.41	74	53.92	38.77	15.27	61.37	100	0	P	V
		17988.9	59.99	-14.01	74	49.43	48.8	19.03	57.27	100	21	P	V
		17988.9	50.03	-3.97	54	39.47	48.8	19.03	57.27	100	21	A	V
													V
													V

Remark

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

Emission below 1GHz

Ant. 4_BLE_Tx_Ch39 + Ant. 7+3_11ax HE80_Tx_Ch07 (LF)

WIFI Ant. 4/7+3	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)
		40.67	24.98	-15.02	40	37.64	19.12	0.78	32.56	-	-	P	H
		98.87	30.51	-12.99	43.5	45.99	15.71	1.31	32.5	-	-	P	H
		168.71	24.76	-18.74	43.5	39.73	15.7	1.82	32.49	-	-	P	H
		703.18	34.77	-11.23	46	37.24	26.4	3.58	32.45	-	-	P	H
		719.67	38.25	-7.75	46	40.23	26.85	3.62	32.45	-	-	P	H
		899.12	38.8	-7.2	46	37.43	28.9	4.1	31.63	100	0	P	H
													H
													H
BLE													H
CH 39													H
2480MHz													H
+													H
802.11ax		40.67	29.68	-10.32	40	42.34	19.12	0.78	32.56	-	-	P	V
HE80		81.41	24.48	-15.52	40	42.21	13.56	1.2	32.49	-	-	P	V
CH 07		95.96	24.31	-19.19	43.5	40.05	15.45	1.29	32.48	-	-	P	V
5985MHz		166.77	20.21	-23.29	43.5	34.93	15.95	1.82	32.49	-	-	P	V
		674.08	36.21	-9.79	46	38.85	26.26	3.5	32.4	-	-	P	V
		896.21	39.05	-6.95	46	37.74	28.87	4.09	31.65	100	0	P	V
													V
													V
													V
													V
													V
													V

Remark

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

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

Ant. 4+3_11g_Tx_Ch11 + Ant. 7+3_11ax HE80_Tx_Ch07 (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)
802.11g CH 11 2462MHz	*	2472	106.46	-	-	93.19	27.46	16.69	30.88	320	302	P	H
	*	2472	103.24	-	-	89.97	27.46	16.69	30.88	320	302	P	H
		2485.76	57.1	-16.9	74	43.84	27.43	16.71	30.88	320	302	P	H
		2485.08	46.53	-7.47	54	33.27	27.43	16.71	30.88	320	302	A	H
													H
													H
	*	2472	109.96	-	-	96.69	27.46	16.69	30.88	100	299	P	V
	*	2472	106.68	-	-	93.41	27.46	16.69	30.88	100	299	P	V
		2484.72	57.67	-16.33	74	44.41	27.43	16.71	30.88	100	299	P	V
		2484.96	51.07	-2.93	54	37.81	27.43	16.71	30.88	100	299	A	V
													V
													V

Ant. 4+3_11g_Tx_Ch11 + Ant. 7+3_11ax HE80_Tx_Ch07 (Band Edge @ 3m)

WIFI Ant. 7+3	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)
		5907.72	50.94	-37.26	88.2	37.9	32.12	11.2	30.28	250	301	P	H
		5923.24	42.52	-25.68	68.2	29.45	32.15	11.21	30.29	250	301	A	H
		5457.8	52.17	-21.83	74	39.71	31.6	10.85	29.99	100	0	P	H
		5457.8	42.39	-11.61	54	29.93	31.6	10.85	29.99	100	0	A	H
802.11ax	*	5985	97.14	-	-	84.02	32.2	11.26	30.34	250	301	P	H
HE80	*	5985	87.35	-	-	74.23	32.2	11.26	30.34	250	301	A	H
CH 07		5876.68	51.47	-36.73	88.2	38.51	32.05	11.17	30.26	100	340	P	V
5985MHz		5921.64	42.3	-25.9	68.2	29.24	32.14	11.21	30.29	100	340	A	V
		5457.8	52.54	-21.46	74	40.08	31.6	10.85	29.99	100	0	P	V
		5457.8	42.41	-11.59	54	29.95	31.6	10.85	29.99	100	0	A	V
	*	5985	96.74	-	-	83.62	32.2	11.26	30.34	100	340	P	V
	*	5985	87.04	-	-	73.92	32.2	11.26	30.34	100	340	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Ant. 4+3_11g_Tx_Ch11 + Ant. 7+3_11ax HE80_Tx_Ch07 (Harmonic @ 3m)

WIFI Ant. 4+3/7+3	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 11 2462MHz + 802.11ax HE80 CH 07 5985MHz		4944	52.7	-21.3	74	40.41	31.18	11.15	30.04	100	0	P	H
		4944	41.37	-12.63	54	29.08	31.18	11.15	30.04	100	0	A	H
		7416	43.77	-30.23	74	53.08	36.3	12.63	58.24	100	0	P	H
		11970	46.93	-27.07	74	54.26	38.77	15.27	61.37	100	0	P	H
		18000	59.2	-14.8	74	48.4	49	19.04	57.24	100	32	P	H
		18000	49.22	-4.78	54	38.42	49	19.04	57.24	100	32	A	H
													H
		4944	51.92	-22.08	74	39.63	31.18	11.15	30.04	100	0	P	V
		4944	41.34	-12.66	54	29.05	31.18	11.15	30.04	100	0	A	V
		7416	43.35	-30.65	74	52.66	36.3	12.63	58.24	100	0	P	V
		11970	47.04	-26.96	74	54.37	38.77	15.27	61.37	100	0	P	V
		17988.9	60.2	-13.8	74	49.64	48.8	19.03	57.27	100	22	P	V
		17988.9	50.27	-3.73	54	39.71	48.8	19.03	57.27	100	22	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_11g_Tx_Ch11 + Ant. 7+3_11ax HE80_Tx_Ch07 (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+3/7+3		(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
		40.67	25.62	-14.38	40	38.28	19.12	0.78	32.56	-	-	P	H
		98.87	30.91	-12.59	43.5	46.39	15.71	1.31	32.5	-	-	P	H
		168.71	25.28	-18.22	43.5	40.25	15.7	1.82	32.49	-	-	P	H
		704.15	32.57	-13.43	46	35.02	26.42	3.58	32.45	-	-	P	H
		719.67	34.41	-11.59	46	36.39	26.85	3.62	32.45	-	-	P	H
		896.21	38.53	-7.47	46	37.22	28.87	4.09	31.65	100	0	P	H
													H
													H
802.11g													H
CH 11													H
2462MHz													H
+													H
802.11ax		40.67	26.93	-13.07	40	39.59	19.12	0.78	32.56	-	-	P	V
HE80		81.41	26.89	-13.11	40	44.62	13.56	1.2	32.49	-	-	P	V
CH 07		98.87	25.44	-18.06	43.5	40.92	15.71	1.31	32.5	-	-	P	V
5985MHz		166.77	20.51	-22.99	43.5	35.23	15.95	1.82	32.49	-	-	P	V
		674.08	32.33	-13.67	46	34.97	26.26	3.5	32.4	-	-	P	V
		895.24	37.71	-8.29	46	36.41	28.86	4.09	31.65	100	0	P	V
													V
													V
													V
													V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against limit line.												

Note symbol

*	**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

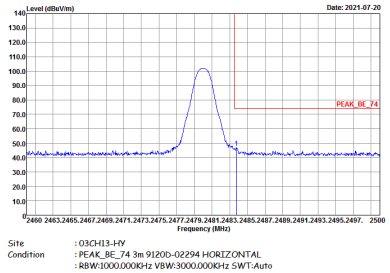
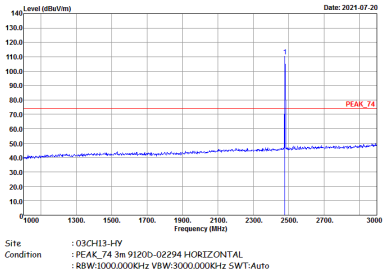
Test Engineer :	Daniel Lee, Jacky Hong and Wilson Wu	**Temperature :**	20~25°C
		Relative Humidity :	40~60%

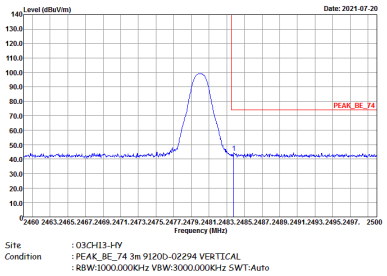
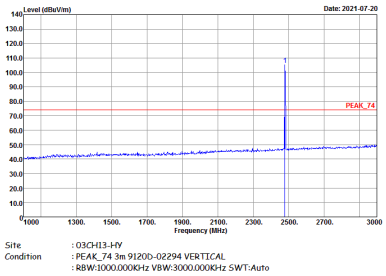
Note symbol

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

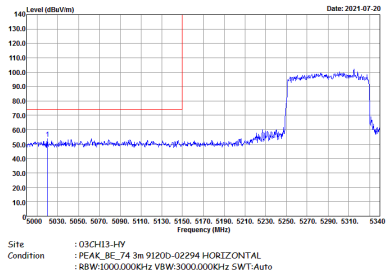
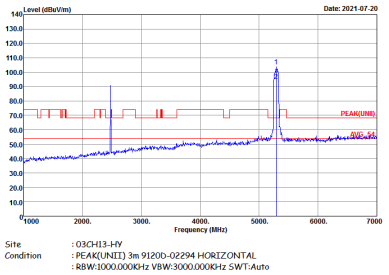
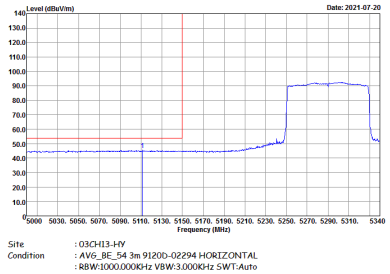
2.4GHz 2400~2483.5MHz + Band 2 - 5260~5320MHz

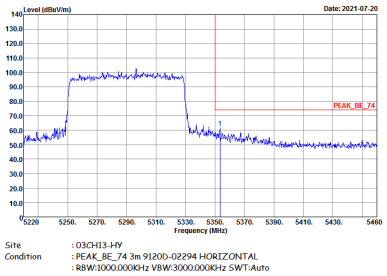
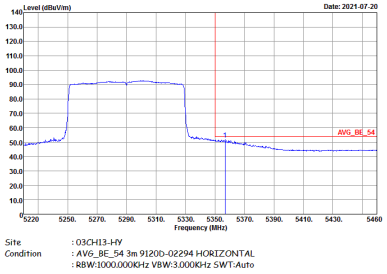
Ant. 4+3_BT_Tx_Ch78 + Ant. 7+3_11ax HE80_Tx_Ch58 (Band Edge @ 3m)

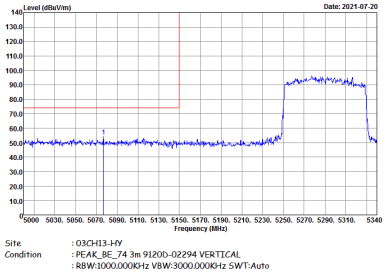
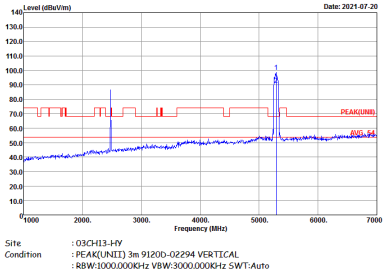
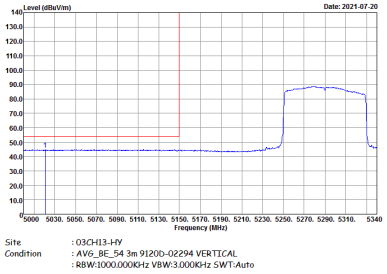
BT	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BT CH78 2480MHz	
4+3	Horizontal	Fundamental
Peak		

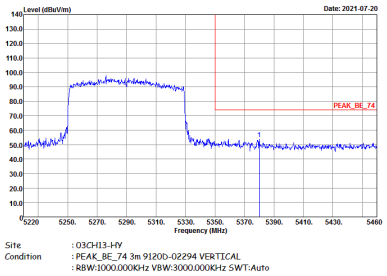
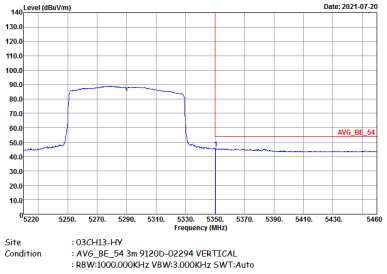
BT	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BT CH78 2480MHz	
4+3	Vertical	Fundamental
Peak		

Ant. 4+3_BT_Tx_Ch78 + Ant. 7+3_11ax HE80_Tx_Ch58 (Band Edge @ 3m)

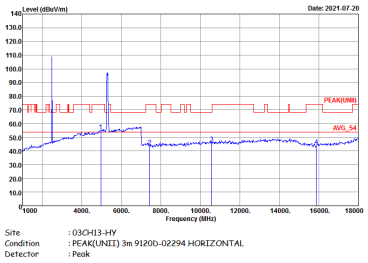
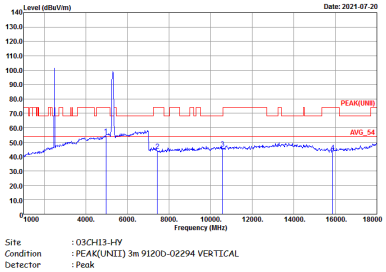
WIFI	Band 2 5260~5320MHz Band Edge @ 3m	
ANT	802.11ax HE80 CH58 5290MHz - L	
7+3	Horizontal	Fundamental
Peak		
Avg.		Left blank

WIFI	Band 2 5260~5320MHz Band Edge @ 3m	
ANT	802.11ax HE80 CH58 5290MHz - L	
7+3	Horizontal	Fundamental
Peak		Left blank
Avg.		Left blank

WIFI	Band 2 5260~5320MHz Band Edge @ 3m	
ANT	802.11ax HE80 CH58 5290MHz - L	
7+3	Vertical	Fundamental
Peak		
Avg.		Left blank

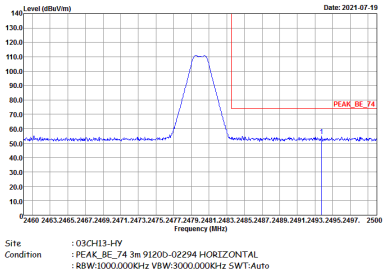
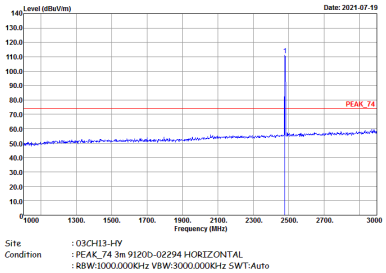
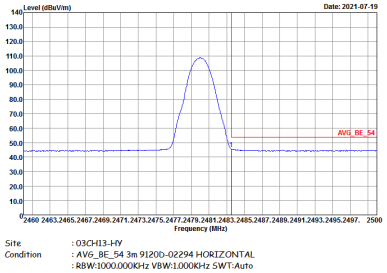
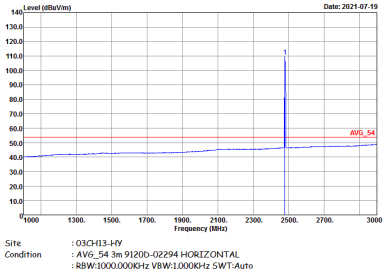
WIFI	Band 2 5260~5320MHz Band Edge @ 3m	
ANT	802.11ax HE80 CH58 5290MHz - L	
7+3	Vertical	Fundamental
Peak		Left blank
Avg.		Left blank

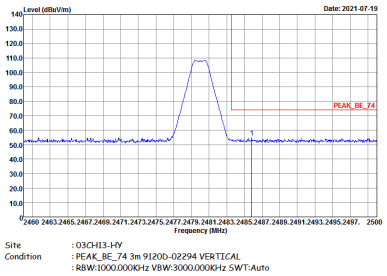
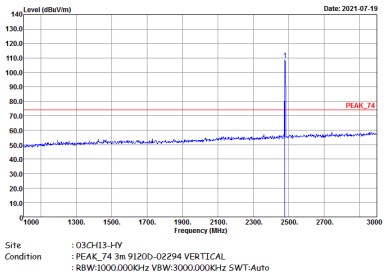
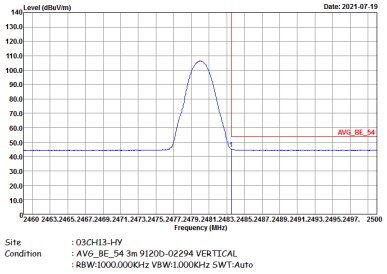
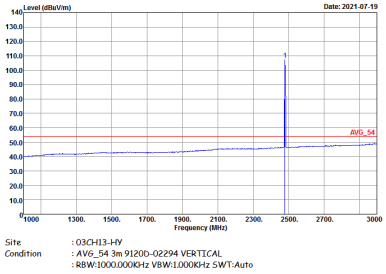
Ant. 4+3_BT_Tx_Ch78 + Ant. 7+3_11ax HE80_Tx_Ch58 (Harmonic @ 3m)

BT+ WIFI	2.4GHz 2400~2483.5MHz + Band 2 5260~5320MHz Harmonic @ 3m	
ANT	BT CH78 2480MHz + 802.11ax HE80 CH58 5290MHz	
4+3/7+3	Horizontal	Vertical
Peak Avg.		

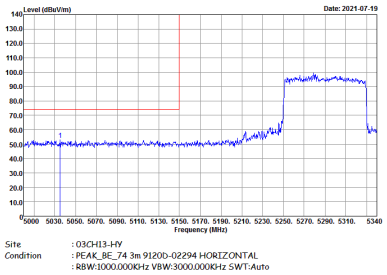
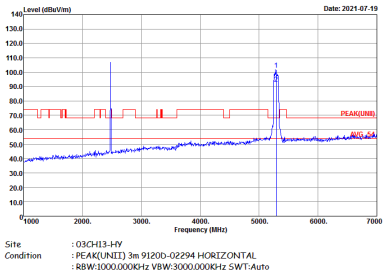
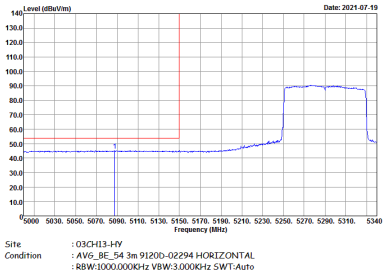
2.4GHz 2400~2483.5MHz + Band 2 - 5260~5320MHz

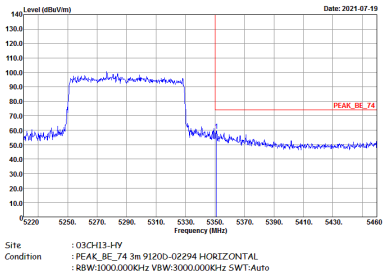
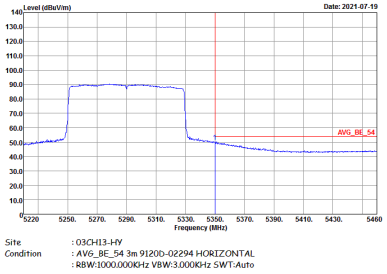
Ant. 4_BLE_Tx_Ch39 + Ant. 7+3_11ax HE80_Tx_Ch58 (Band Edge @ 3m)

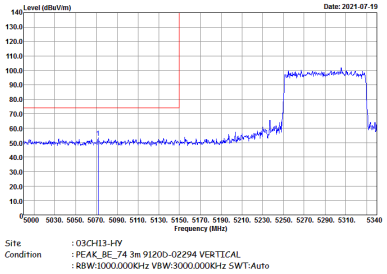
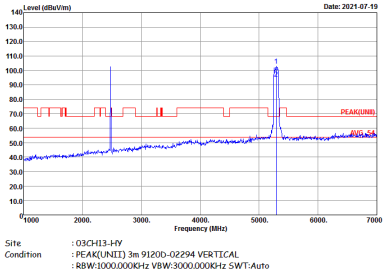
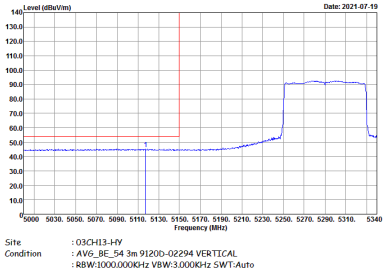
BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BLE_CH39 2480MHz	
4	Horizontal	Fundamental
Peak		
Avg.		

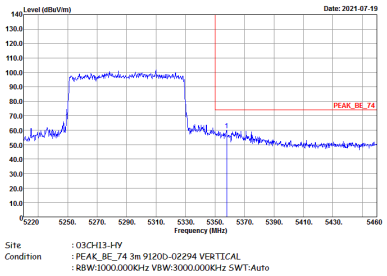
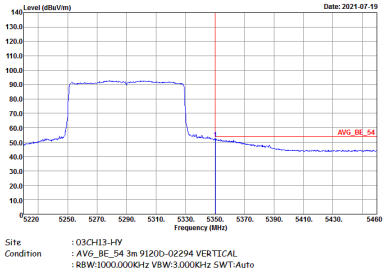
BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BLE_CH39 2480MHz	
4	Vertical	Fundamental
Peak		
Avg.		

Ant. 4_BLE_Tx_Ch39 + Ant. 7+3_11ax HE80_Tx_Ch58 (Band Edge @ 3m)

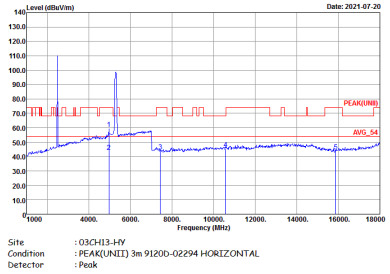
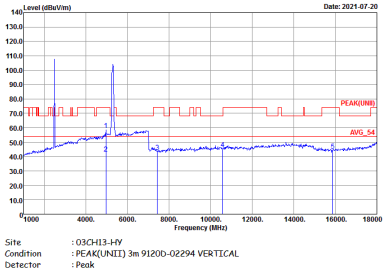
WIFI	Band 2 5260~5320MHz Band Edge @ 3m	
ANT	802.11ax HE80 CH58 5290MHz - L	
7+3	Horizontal	Fundamental
Peak		
Avg.		Left blank

WIFI	Band 2 5260~5320MHz Band Edge @ 3m	
ANT	802.11ax HE80 CH58 5290MHz - L	
7+3	Horizontal	Fundamental
Peak		Left blank
Avg.		Left blank

WIFI	Band 2 5260~5320MHz Band Edge @ 3m	
ANT	802.11ax HE80 CH58 5290MHz - L	
7+3	Vertical	Fundamental
Peak		
Avg.		Left blank

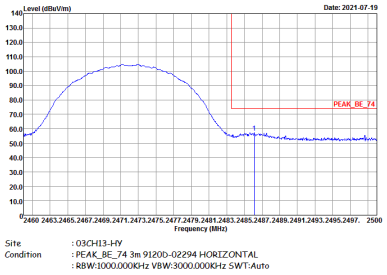
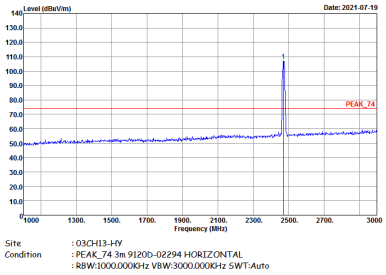
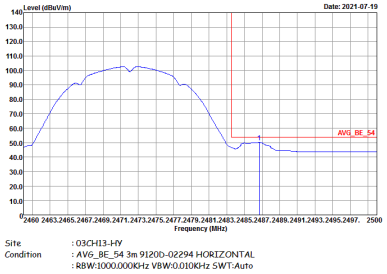
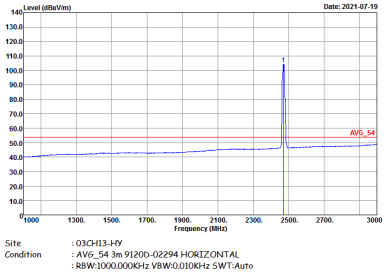
WIFI	Band 2 5260~5320MHz Band Edge @ 3m	
ANT	802.11ax HE80 CH58 5290MHz - L	
7+3	Vertical	Fundamental
Peak		Left blank
Avg.		Left blank

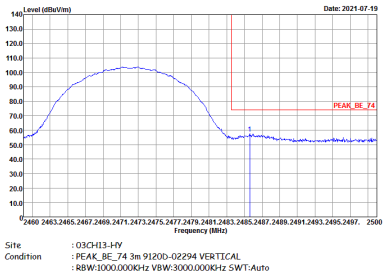
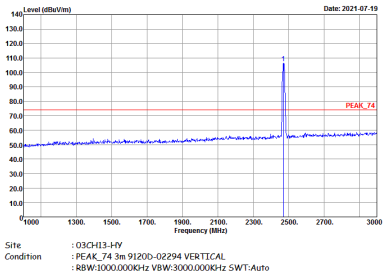
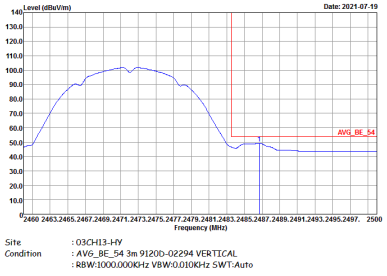
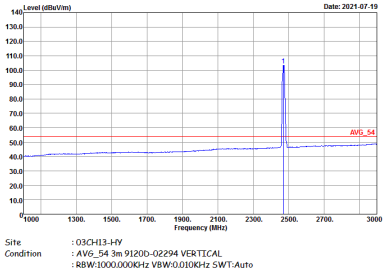
Ant. 4_BLE_Tx_Ch39 + Ant. 7+3_11ax HE80_Tx_Ch58 (Harmonic @ 3m)

BLE+ WIFI	2.4GHz 2400~2483.5MHz + Band 2 5260~5320MHz Harmonic @ 3m	
ANT	BLE_CH39 2480MHz + 802.11ax HE80 CH58 5290MHz	
4/7+3	Horizontal	Vertical
Peak Avg.		

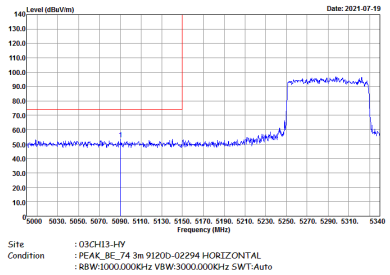
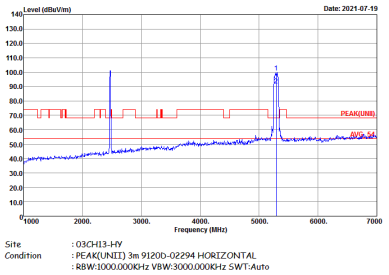
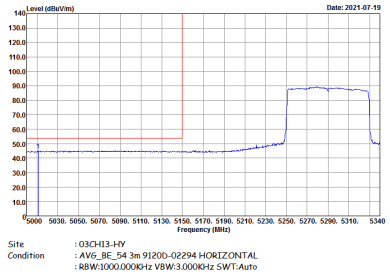
2.4GHz 2400~2483.5MHz + Band 2 - 5260~5320MHz

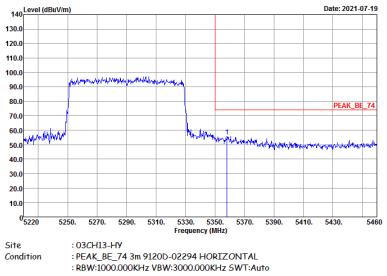
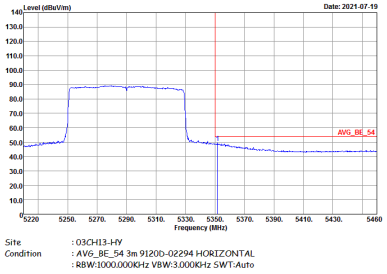
Ant. 4+3_11b_Tx_Ch13 + Ant. 7+3_11ax HE80_Tx_Ch58 (Band Edge @ 3m)

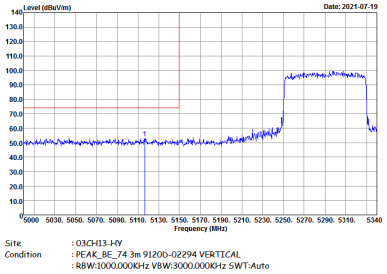
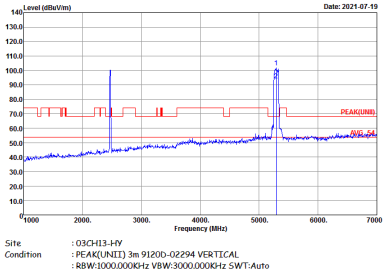
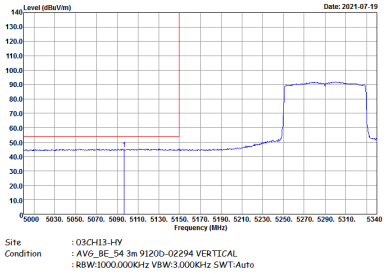
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11b_CH13 2472MHz	
4+3	Horizontal	Fundamental
Peak		
Avg.		

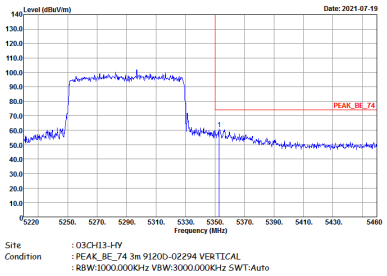
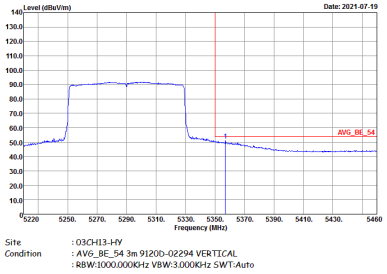
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11b_CH13 2472MHz	
4+3	Vertical	Fundamental
Peak	 Site : 03CH13-HY Condition : PEAK_BE_74 3m 9120D-02294 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	 Site : 03CH13-HY Condition : PEAK_74 3m 9120D-02294 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto
Avg.	 Site : 03CH13-HY Condition : AVG_BE_54 3m 9120D-02294 VERTICAL : RBW:1000.000KHz VBW:0.010KHz SWT:Auto	 Site : 03CH13-HY Condition : AVG_54 3m 9120D-02294 VERTICAL : RBW:1000.000KHz VBW:0.010KHz SWT:Auto

Ant. 4+3_11b_Tx_Ch13 + Ant. 7+3_11ax HE80_Tx_Ch58 (Band Edge @ 3m)

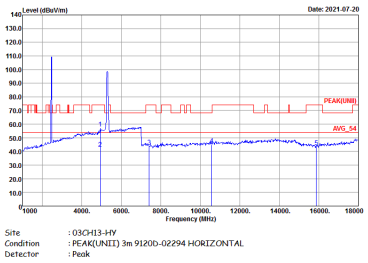
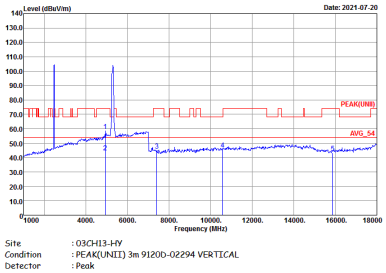
WIFI	Band 2 5260~5320MHz Band Edge @ 3m	
ANT	802.11ax HE80 CH58 5290MHz - L	
7+3	Horizontal	Fundamental
Peak		
Avg.		Left blank

WIFI	Band 2 5260~5320MHz Band Edge @ 3m	
ANT	802.11ax HE80 CH58 5290MHz - L	
7+3	Horizontal	Fundamental
Peak		Left blank
Avg.		Left blank

WIFI	Band 2 5260~5320MHz Band Edge @ 3m	
ANT	802.11ax HE80 CH58 5290MHz - L	
7+3	Vertical	Fundamental
Peak		
Avg.		Left blank

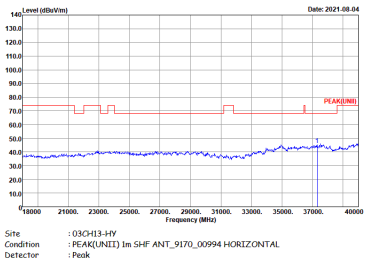
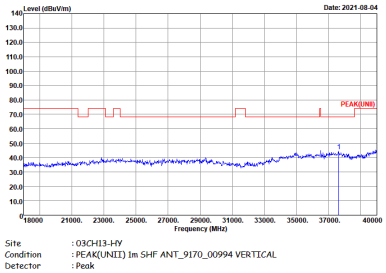
WIFI	Band 2 5260~5320MHz Band Edge @ 3m	
ANT	802.11ax HE80 CH58 5290MHz - L	
7+3	Vertical	Fundamental
Peak		Left blank
Avg.		Left blank

Ant. 4+3_11b_Tx_Ch13 + Ant. 7+3_11ax HE80_Tx_Ch58 (Harmonic @ 3m)

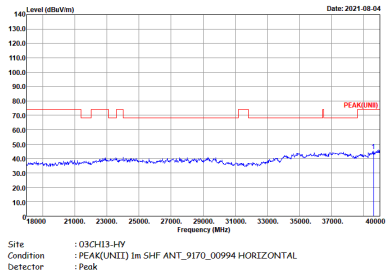
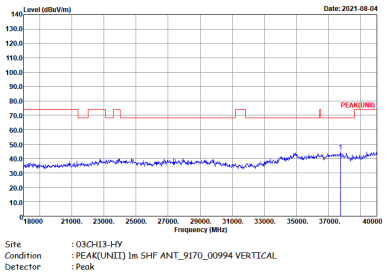
WIFI	2.4GHz 2400~2483.5MHz + Band 2 5260~5320MHz Harmonic @ 3m	
ANT	802.11b_CH13 2472MHz + 802.11ax HE80 CH58 5290MHz	
4+3/7+3	Horizontal	Vertical
Peak Avg.		

Emission above 18GHz

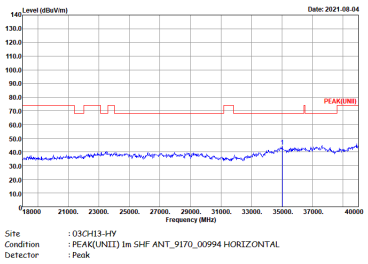
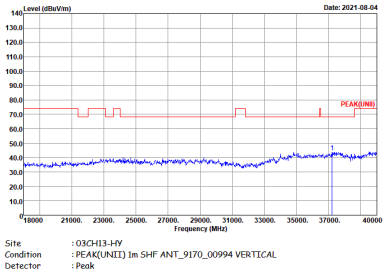
Ant. 4+3_BT_Tx_Ch78 + Ant. 7+3_11ax HE80_Tx_Ch58 (SHF)

BT+ WIFI	2.4GHz 2400~2483.5MHz + Band 2 5260~5320MHz	
ANT	BT CH78 2480MHz + 802.11ax HE80 CH58 5290MHz	
4+3/7+3	Horizontal	Vertical
Peak Avg.		

Ant. 4_BLE_Tx_Ch39 + Ant. 7+3_11ax HE80_Tx_Ch58 (SHF)

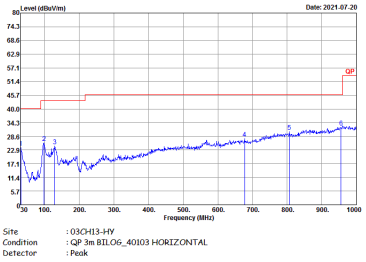
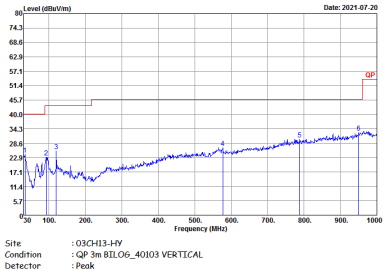
BLE+ WIFI	2.4GHz 2400~2483.5MHz + Band 2 5260~5320MHz	
ANT	BLE_CH39 + 802.11ax HE80 CH58 5290MHz	
4/7+3	Horizontal	Vertical
Peak Avg.		

Ant. 4+3_11b_Tx_Ch13 + Ant. 7+3_11ax HE80_Tx_Ch58 (SHF)

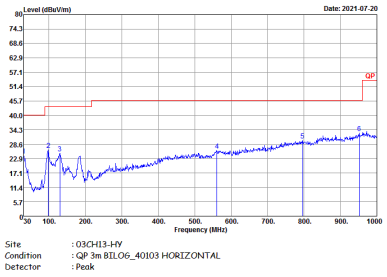
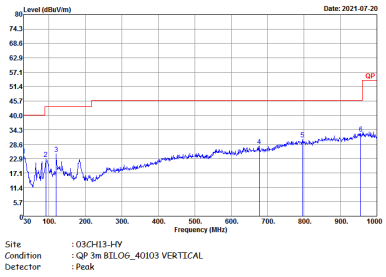
WIFI	2.4GHz 2400~2483.5MHz + Band 2 5260~5320MHz	
ANT	802.11b_CH13 + 802.11ax HE80 CH58 5290MHz	
4+3/7+3	Horizontal	Vertical
Peak Avg.		

Emission below 1GHz

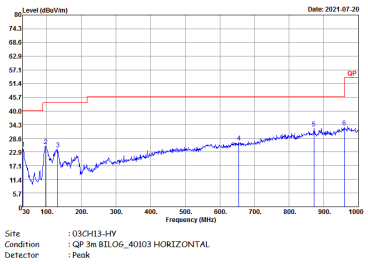
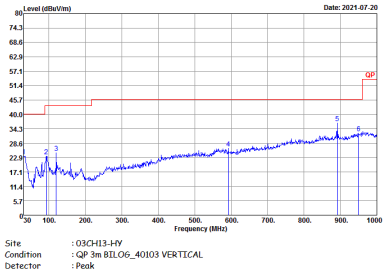
Ant. 4+3_BT_Tx_Ch78 + Ant. 7+3_11ax HE80_Tx_Ch58 (LF)

BT+ WIFI	2.4GHz 2400~2483.5MHz + Band 2 5260~5320MHz	
ANT	BT_CH78 + 802.11ax HE80 CH58 5290MHz	
4+3/7+3	Horizontal	Vertical
QP / Peak		

Ant. 4_BLE_Tx_Ch39 + Ant. 7+3_11ax HE80_Tx_Ch58 (LF)

BLE+ WIFI	2.4GHz 2400~2483.5MHz + Band 2 5260~5320MHz	
ANT	BLE_CH39 + 802.11ax HE80 CH58 5290MHz	
4/7+3	Horizontal	Vertical
QP / Peak		

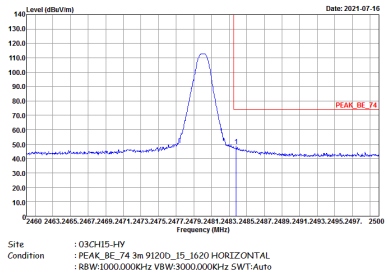
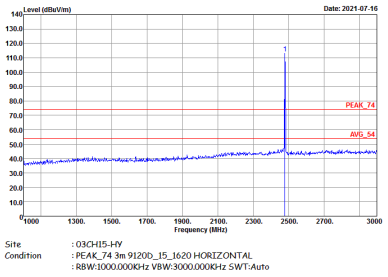
Ant. 4+3_11b_Tx_Ch13 + Ant. 7+3_11ax HE80_Tx_Ch58 (LF)

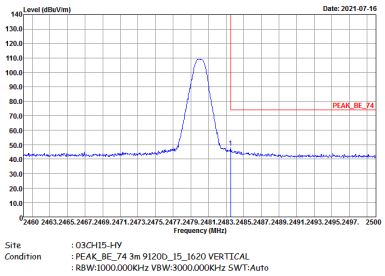
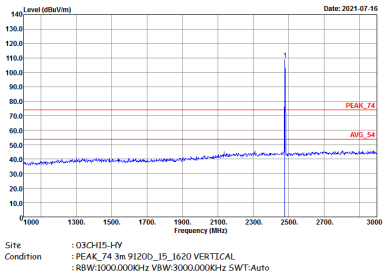
WIFI	2.4GHz 2400~2483.5MHz + Band 2 5260~5320MHz	
ANT	802.11b_CH13 + 802.11ax HE80 CH58 5290MHz	
4+3/7+3	Horizontal	Vertical
QP / Peak		

Test Engineer :	Leo Lee, Mancy Chou and Bigshow Wang	Temperature :	24~26°C
		Relative Humidity :	48~55%

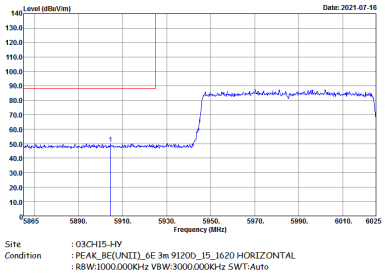
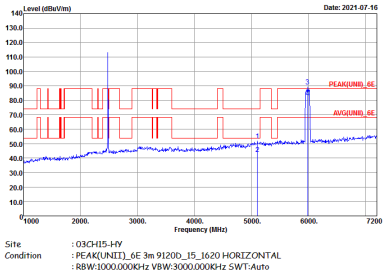
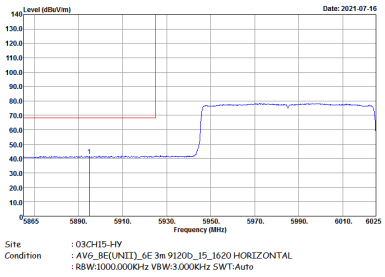
2.4GHz 2400~2483.5MHz + Band 5 - 5925~6425MHz

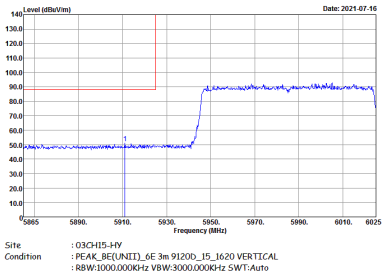
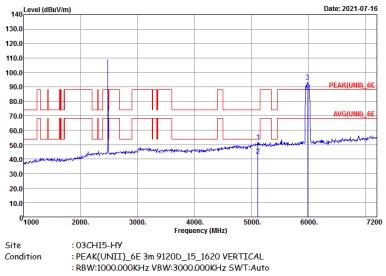
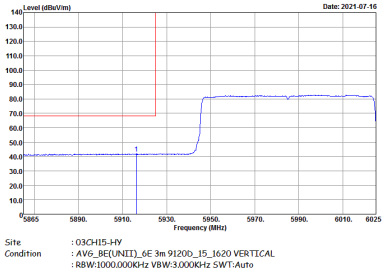
Ant. 4+3_BT_Tx_Ch78 + Ant. 7+3_11ax HE80_Tx_Ch07 (Band Edge @ 3m)

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

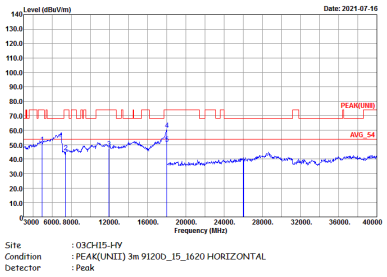
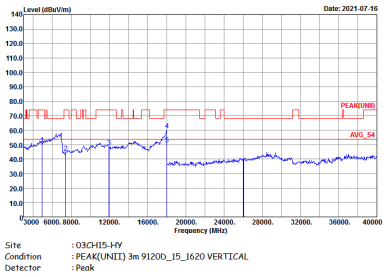
BT	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BT CH78 2480MHz	
4+3	Vertical	Fundamental
Peak		

Ant. 4+3_BT_Tx_Ch78 + Ant. 7+3_11ax HE80_Tx_Ch07 (Band Edge @ 3m)

WIFI	Band 5 5925~6425MHz Band Edge @ 3m	
ANT	802.11ax HE80 CH07 5985MHz - L	
7+3	Horizontal	Fundamental
Peak		
Avg.		Left blank

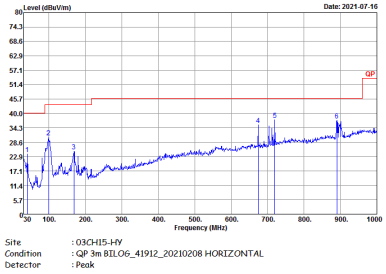
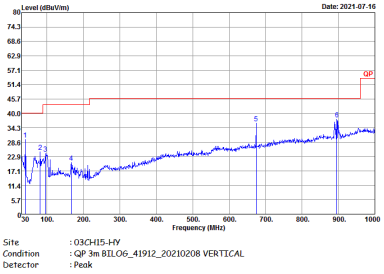
WIFI	Band 5 5925~6425MHz Band Edge @ 3m	
ANT	802.11ax HE80 CH07 5985MHz - L	
7+3	Vertical	Fundamental
Peak		
Avg.		Left blank

Ant. 4+3_BT_Tx_Ch78 + Ant. 7+3_11ax HE80_Tx_Ch07 (Harmonic @ 3m)

BT + WIFI	2.4GHz 2400~2483.5MHz + Band 5 5925~6425MHz Harmonic @ 3m	
ANT	BT CH78 2480MHz + 802.11ax HE80 CH07 5985MHz	
4+3/7+3	Horizontal	Vertical
Peak Avg.		

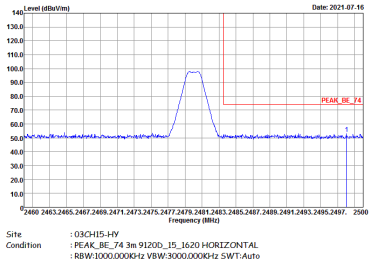
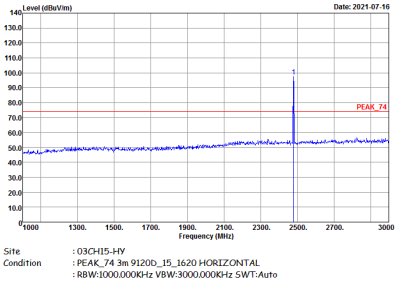
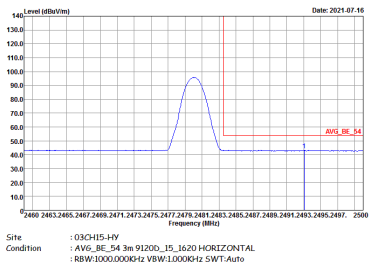
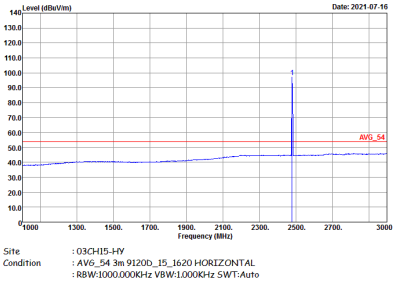
Emission below 1GHz

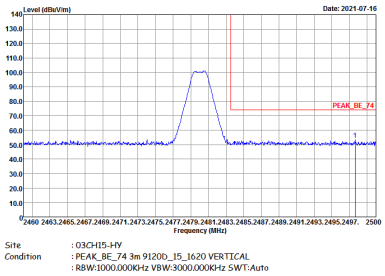
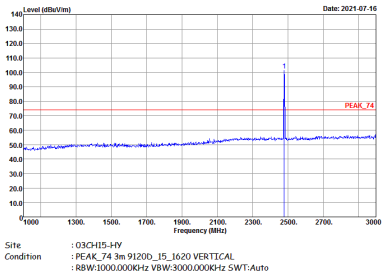
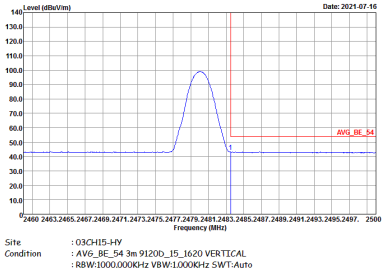
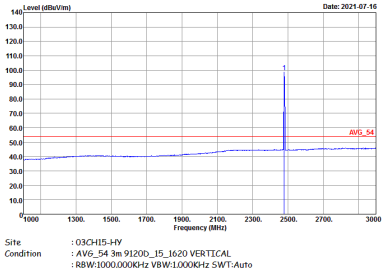
Ant. 4+3_BT_Tx_Ch78 + Ant. 7+3_11ax HE80_Tx_Ch07 (LF)

BT + WIFI	2.4GHz 2400~2483.5MHz + Band 5 5925~6425MHz Harmonic @ 3m	
ANT	BT CH78 2480MHz + 802.11ax HE80 CH07 5985MHz	
4+3/7+3	Horizontal	Vertical
QP / Peak		

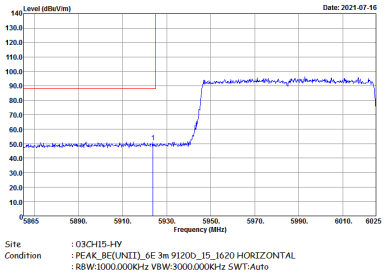
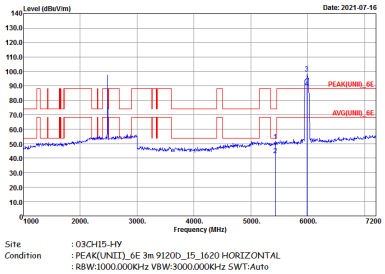
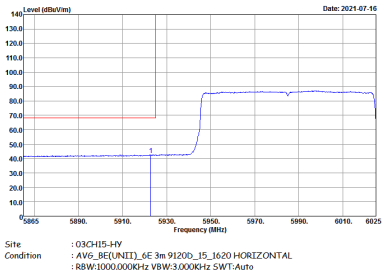
2.4GHz 2400~2483.5MHz + Band 5 - 5925~6425MHz

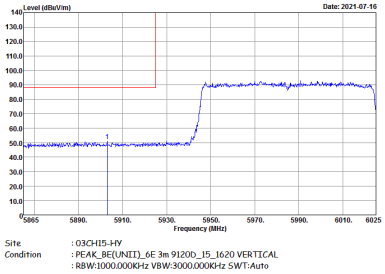
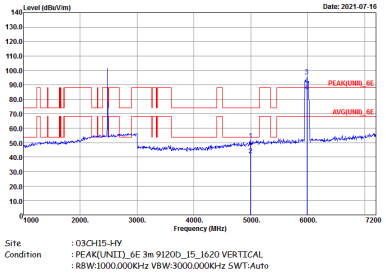
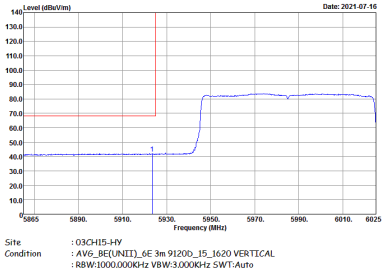
Ant. 4_BLE_Tx_Ch39 + Ant. 7+3_11ax HE80_Tx_Ch07 (Band Edge @ 3m)

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

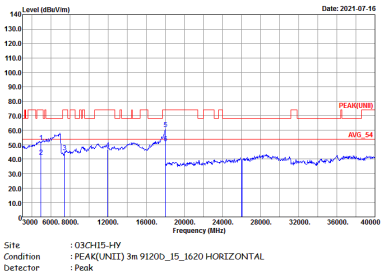
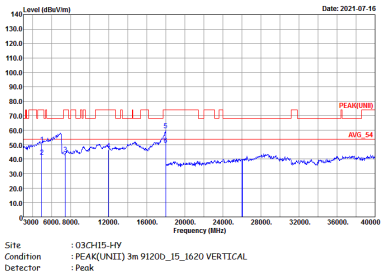
BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BLE_CH39 2480MHz	
4	Vertical	Fundamental
Peak	 Site : 03CH15-HY Condition : PEAK_BE_74 3m 9120D_15_1620 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	 Site : 03CH15-HY Condition : PEAK_74 3m 9120D_15_1620 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto
Avg.	 Site : 03CH15-HY Condition : AVG_BE_54 3m 9120D_15_1620 VERTICAL : RBW:1000.000KHz VBW:1.000KHz SWT:Auto	 Site : 03CH15-HY Condition : AVG_54 3m 9120D_15_1620 VERTICAL : RBW:1000.000KHz VBW:1.000KHz SWT:Auto

Ant. 4_BLE_Tx_Ch39 + Ant. 7+3_11ax HE80_Tx_Ch07 (Band Edge @ 3m)

WIFI	Band 5 5925~6425MHz Band Edge @ 3m	
ANT	802.11ax HE80 CH07 5985MHz	
7+3	Horizontal	Fundamental
Peak		
Avg.		Left blank

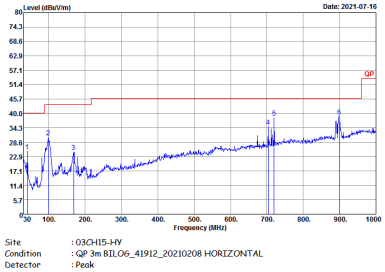
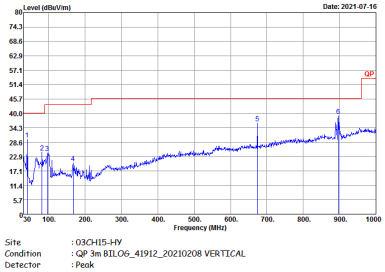
WIFI	Band 5 5925~6425MHz Band Edge @ 3m	
ANT	802.11ax HE80 CH07 5985MHz	
7+3	Vertical	Fundamental
Peak		
Avg.		Left blank

Ant. 4_BLE_Tx_Ch39 + Ant. 7+3_11ax HE80_Tx_Ch07 (Harmonic @ 3m)

BLE + WIFI	2.4GHz 2400~2483.5MHz + Band 5 5925~6425MHz Harmonic @ 3m	
ANT	BLE_CH39 2480MHz + 802.11ax HE80 CH07 5985MHz	
4/7+3	Horizontal	Vertical
Peak Avg.		

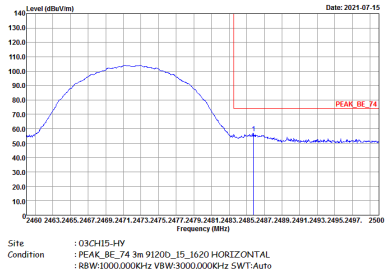
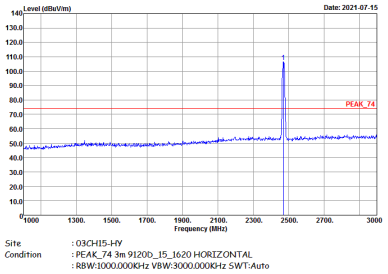
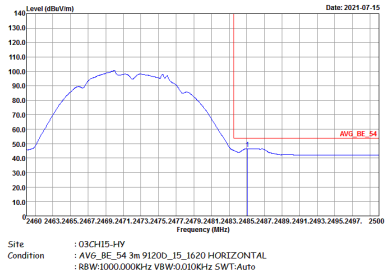
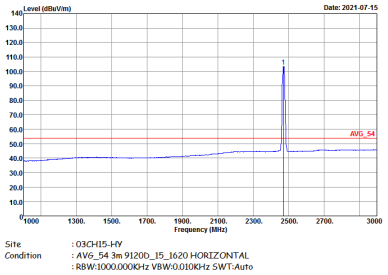
Emission below 1GHz

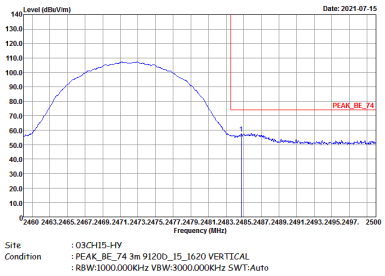
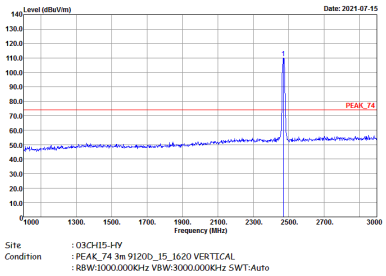
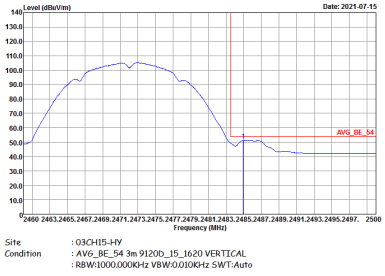
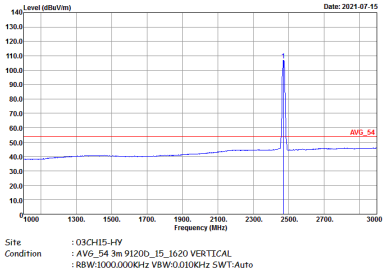
Ant. 4_BLE_Tx_Ch39 + Ant. 7+3_11ax HE80_Tx_Ch07 (LF)

BLE + WIFI	2.4GHz 2400~2483.5MHz + Band 5 5925~6425MHz	
ANT	BLE_CH39 2480MHz + 802.11ax HE80 CH07 5985MHz	
4/7+3	Horizontal	Vertical
QP / Peak		

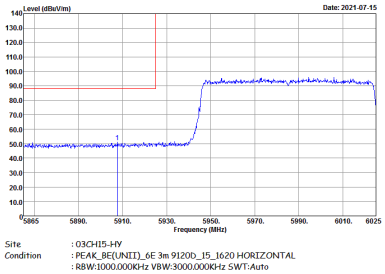
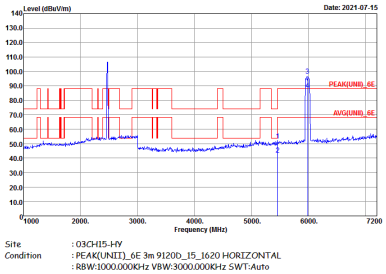
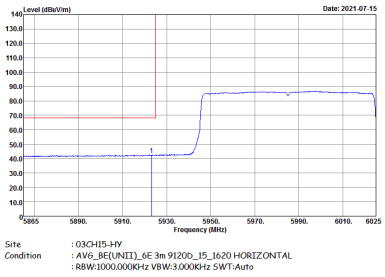
2.4GHz 2400~2483.5MHz + Band 5 - 5925~6425MHz

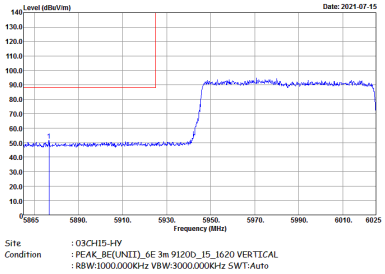
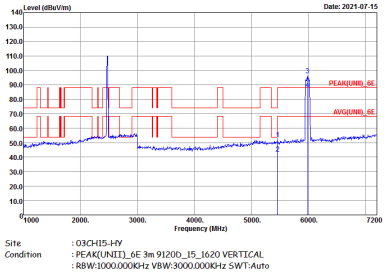
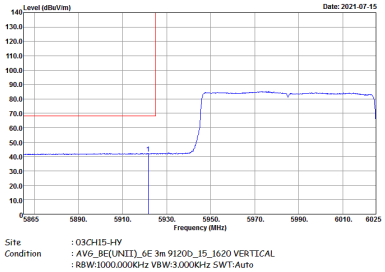
Ant. 4+3_11g_Tx_Ch11 + Ant. 7+3_11ax HE80_Tx_Ch07 (Band Edge @ 3m)

WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11g CH11 2462MHz	
4+3	Horizontal	Fundamental
Peak		
Avg.		

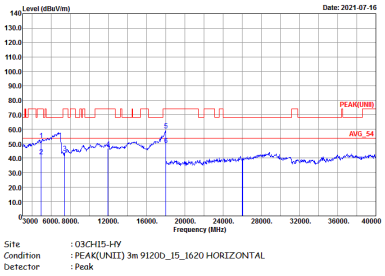
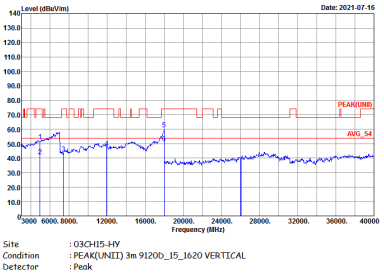
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11g CH11 2462MHz	
4+3	Vertical	Fundamental
Peak	 Site : 03CH15-HY Condition : PEAK_BE_74 3m 9120D_15_1620 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	 Site : 03CH15-HY Condition : PEAK_74 3m 9120D_15_1620 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto
Avg	 Site : 03CH15-HY Condition : AVG_BE_54 3m 9120D_15_1620 VERTICAL : RBW:1000.000KHz VBW:0.010KHz SWT:Auto	 Site : 03CH15-HY Condition : AVG_54 3m 9120D_15_1620 VERTICAL : RBW:1000.000KHz VBW:0.010KHz SWT:Auto

Ant. 4+3_11g_Tx_Ch11 + Ant. 7+3_11ax HE80_Tx_Ch07 (Band Edge @ 3m)

WIFI	Band 5 5925~6425MHz Band Edge @ 3m	
ANT	802.11ax HE80 CH07 5985MHz	
7+3	Horizontal	Fundamental
Peak		
Avg.		Left bank

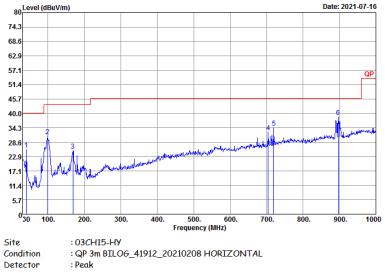
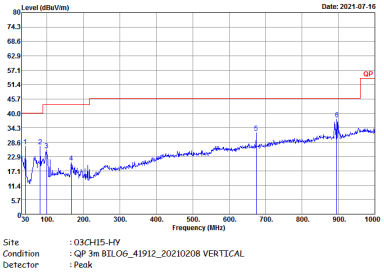
WIFI	Band 5 5925~6425MHz Band Edge @ 3m	
ANT	802.11ax HE80 CH07 5985MHz	
7+3	Vertical	Fundamental
Peak		
Avg.		Left blank

Ant. 4+3_11g_Tx_Ch11 + Ant. 7+3_11ax HE80_Tx_Ch07 (Harmonic @ 3m)

WIFI	2.4GHz 2400~2483.5MHz + Band 5 5925~6425MHz Harmonic @ 3m	
ANT	802.11g CH11 2462MHz + 802.11ax HE80 CH07 5985MHz	
4+3/7+3	Horizontal	Vertical
Peak Avg.		

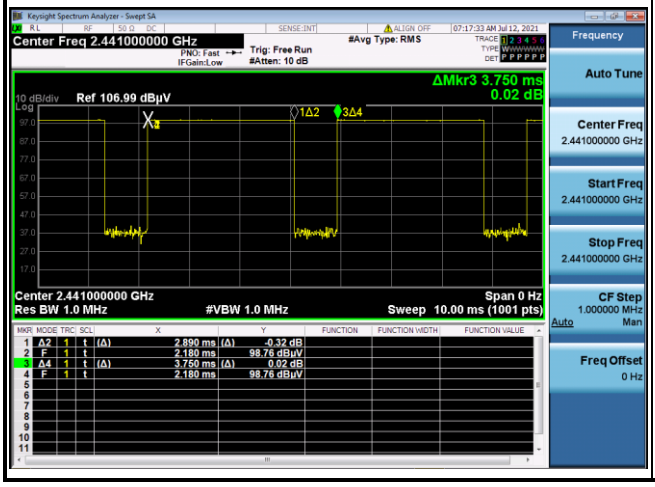
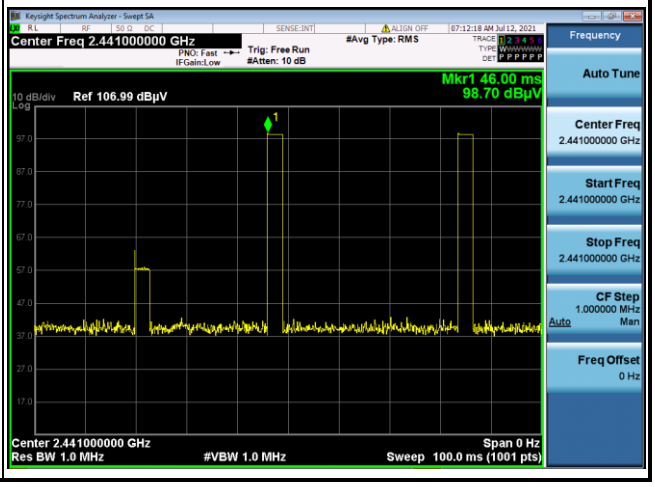
Emission below 1GHz

11g_Ch11 + 11ax (HE80) Ch07 (LF)

WIFI	2.4GHz 2400~2483.5MHz + Band 5 5925~6425MHz	
ANT	802.11g CH11 2462MHz + 802.11ax HE80 CH07 5985MHz	
4+3/7+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 * 2.89 / 100 = 5.78 %
2. Worst case Duty cycle correction factor = 20*log(Duty cycle) = -24.76 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

2.89 ms x 20 channels = 57.8 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 / 57.8 ms] = 2 hops

Thus, the maximum possible ON time:

2.89 ms x 2 = 5.78 ms

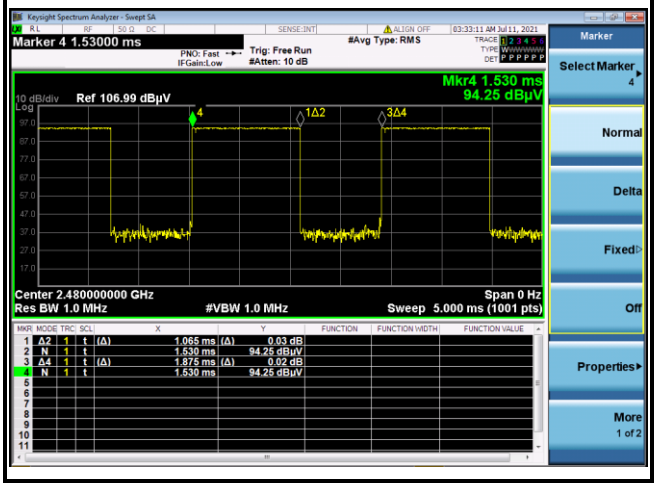
Worst case Duty Cycle Correction factor, which is derived from the maximum possible ON time,

20 x log(5.78 ms/100 ms) = -24.76 dB

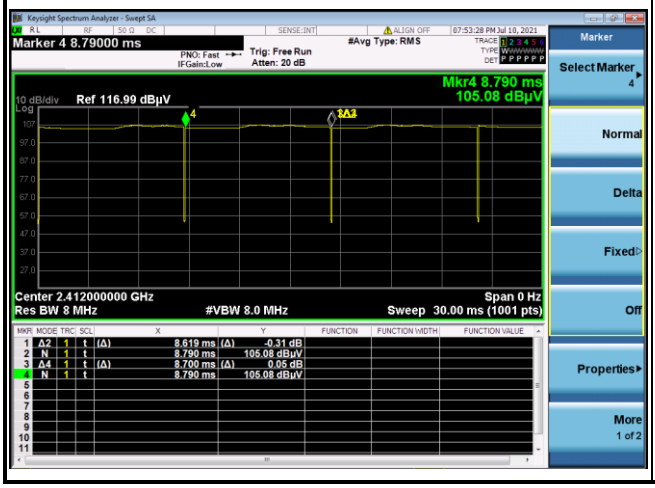
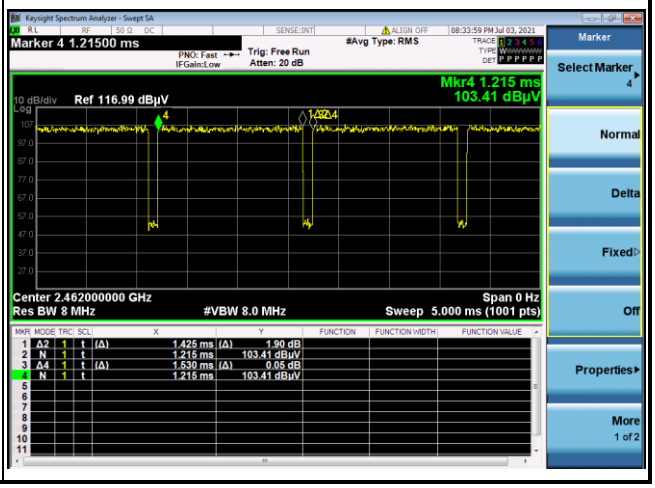
Antenna	Band	Duty Cycle(%)	T(us)	1/T(kHz)	VBW Setting
4	Bluetooth – LE for 2Mbps	56.80	1065	0.94	1kHz
4+3	802.11b	99.07	-	-	10Hz
4+3	802.11g	93.14	1425.00	0.70	1kHz
7+3	5GHz 802.11ax HE80 Full RU for Band 2	83.88	609	1.64	3kHz
7+3	5GHz 802.11ax HE80 Full RU for Band 5	85.95	624	1.60	3kHz

<Ant. 4>

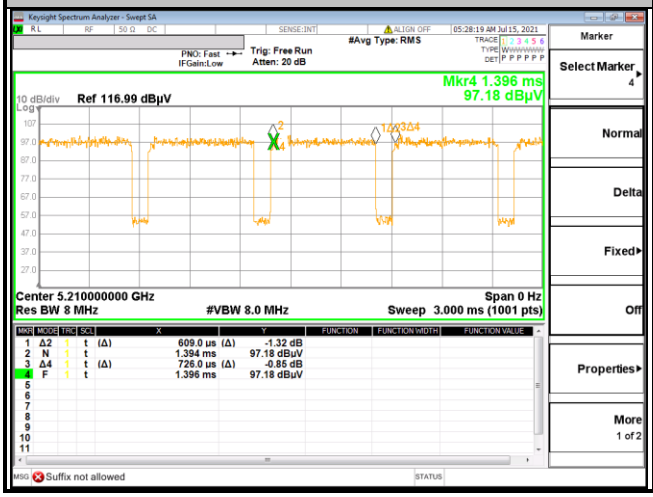
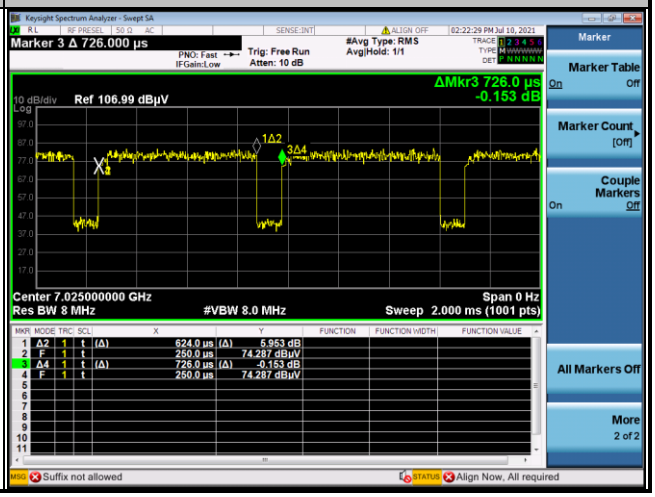
Bluetooth – LE for 2Mbps



MIMO <Ant. 4+3>

802.11b	802.11g
	

MIMO <Ant. 7+3>

802.11ax HE80 Full RU for Band 2	802.11ax HE80 Full RU for Band 5
	

———THE END———