FCC CO-LOCATION RADIO TEST REPORT

FCC ID	:	**2BBL6-7128**
Equipment	:	**Mixed Reality Headset**
Brand Name	:	**LYNX**
Model Name	:	**Lynx-R1**
Marketing Name		**Lynx-R**
Applicant	:	**SL Process** **47 RUE MARCEL DASSAULT 92514** **BOULOGNE-BILLANCOURT CEDEX, FRANCE**
Manufacturer	:	**SL Process** **47 RUE MARCEL DASSAULT 92514** **BOULOGNE-BILLANCOURT CEDEX, FRANCE**
Standard	:	**FCC Part 15 Subpart E §15.407**

The product was received on Mar. 31, 2023 and testing was performed from Apr. 26, 2023 to May 25, 2023. 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 from 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	Issue Date
FR2N1906F	01	Initial issue of report	Jan. 09, 2024

Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
3.1	15.407(b)	Unwanted Emissions	Pass	7.27 dB under the limit at 50.79 MHz
3.2	15.203	Antenna Requirement	Pass	-

Conformity Assessment Condition:

1. The test results (PASS/FAIL) with all measurement uncertainty excluded are presented against the regulation limits or in accordance with the requirements stipulated by the applicant/manufacturer who shall bear all the risks of non-compliance that may potentially occur if measurement uncertainty is taken into account.
2. The measurement uncertainty please refer to each test result in the section “Measurement Uncertainty”.

Disclaimer:

The product specifications of the EUT presented in the test report that may affect the test assessments are declared by the manufacturer who shall take full responsibility for the authenticity.

Reviewed by: Danny Lee
Report Producer: Lucy Wu

1 General Description

1.1 Product Feature of Equipment Under Test

Product Feature
General Specs Bluetooth, Wi-Fi 2.4GHz 802.11b/g/n/ax, and Wi-Fi 5GHz 802.11a/n/ac/ax. **Antenna Type** WLAN <Ant. 1>: Dipole Antenna <Ant. 2>: Dipole Antenna Bluetooth: Dipole Antenna

Antenna information		
2402 MHz ~ 2480 MHz (Bluetooth)	Peak Gain (dBi)	3.02
5250 MHz ~ 5350 MHz	Peak Gain (dBi)	Ant. 1: 2.56 Ant. 2: 3.83

Remark: The EUT's information above is declared by manufacturer. Please refer to Disclaimer in report summary.

1.2 Modification of EUT

No modifications made to the EUT during the testing.

1.3 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.**
	03CH16-HY

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

FCC designation No.: TW3786

1.4 Applicable Standards

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

- FCC Part 15 Subpart C §15.247
- FCC Part 15 Subpart E
- FCC KDB Publication No. 558074 D01 15.247 Meas Guidance v05r02
- FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01.
- FCC KDB 414788 D01 Radiated Test Site v01r01.
- ANSI C63.10-2013

Remark:

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

2 Test Configuration of Equipment Under Test

a. The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: radiation emission (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower). For radiated measurement, the measured emission level of the EUT was maximized by rotating the EUT on a turntable, adjusting the orientation of the EUT and EUT antenna in three orthogonal axis (X: flat, Y: portrait, Z: landscape), and adjusting the measurement antenna orientation, following C63.10 exploratory test procedures and only the worst case emissions were reported in this report.

2.1 Carrier Frequency and Channel

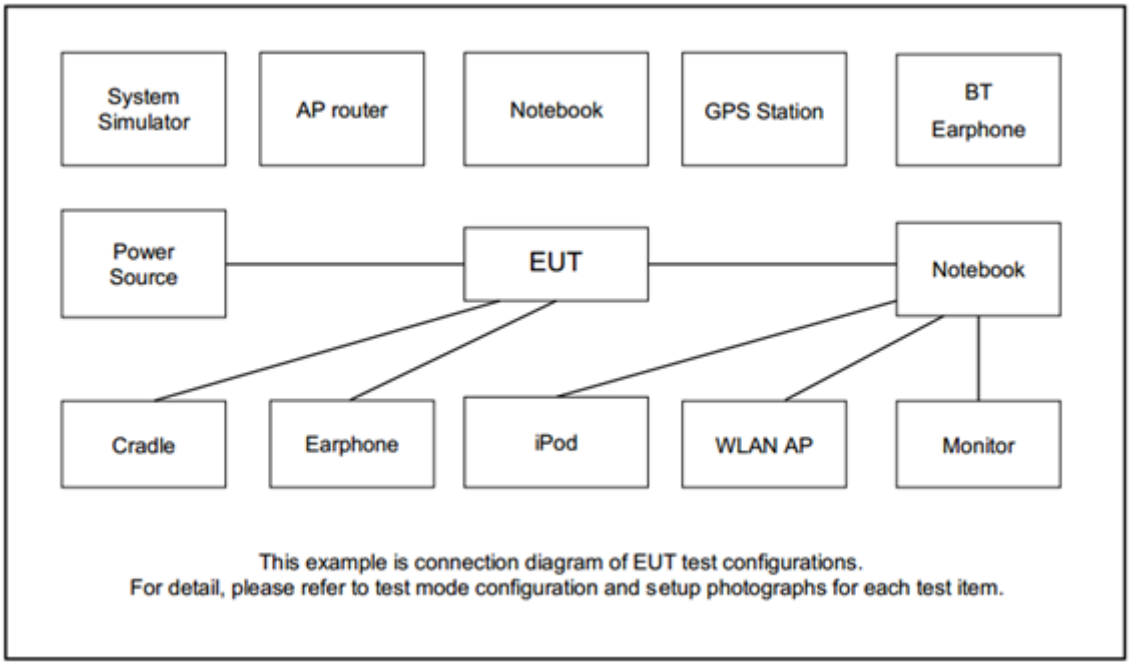
2400-2483.5 MHz		5250-5350 MHz	
Bluetooth		802.11ax HE80	
Channel	Freq. (MHz)	Channel	Freq. (MHz)
78	2480	58	5290

2.2 Test Mode

<Co-Location>

Modulation	Data Rate
Bluetooth for Ant. 1 + 5GHz 802.11ax HE80 for Ant. 1	GFSK + MCS0
Bluetooth for Ant. 1 + 5GHz 802.11ax HE80 for Ant. 2	GFSK + MCS0

2.3 Connection Diagram of Test System



2.4 Support Unit used in test configuration and system

Item	Equipment	Brand Name	Model Name	FCC ID	Data Cable	Power Cord
1.	iPod Earphone	Apple	N/A	Verification	Unshielded, 1.0 m	N/A
2.	AC Adapter	PQI	PDC65WV	NA	N/A	N/A

2.5 EUT Operation Test Setup

For Bluetooth, the RF test items, utility “QRCT_4.0.00206.0” was installed in Notebook which was programmed in order to make the EUT get into the engineering modes to provide channel selection, power level, data rate and the application type and for continuous transmitting signals.

For WLAN, the RF test items, utility “QSPR_5.0-00202” 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.

3.1.1 Limit of Unwanted Emissions

(1) Unwanted spurious emissions falls 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.

3.1.2 Measuring Instruments

Please refer to the measuring equipment list in this test report.

3.1.3 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 1000 MHz
   - RBW = 120 kHz
   - VBW = 300 kHz
   - Detector = Peak
   - Trace mode = max hold

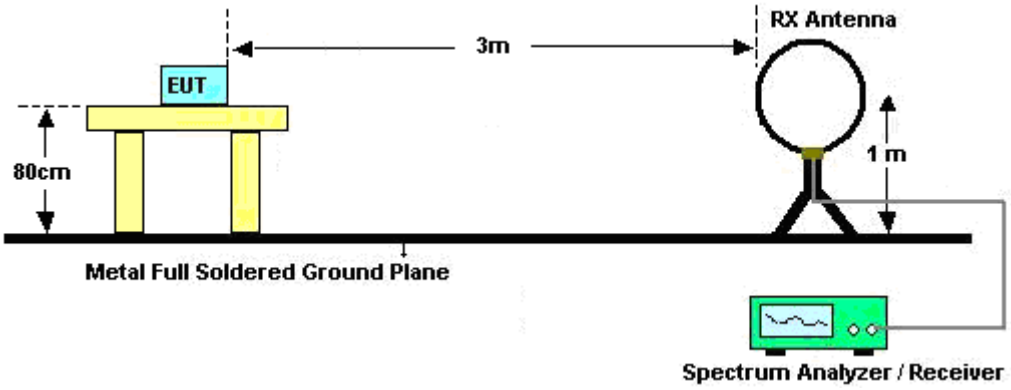
   (2) Procedure for Peak Unwanted Emissions Measurements Above 1000 MHz
   - RBW = 1 MHz
   - VBW ≥ 3 MHz
   - Detector = Peak
   - Sweep time = auto
   - Trace mode = max hold

   (3) Procedures for Average Unwanted Emissions Measurements Above 1000 MHz
   - 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 is placed on a turntable with 0.8 meter for frequency below 1 GHz and 1.5 meter for frequency above 1 GHz respectively above ground.
3. The EUT is set 3 meters away from the receiving antenna which is 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 is 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. Radiated testing below 1 GHz is performed by adjusting the antenna tower from 1 m to 4 m and by rotating the turn table from 0 degree to 360 degrees to find the peak maximum hold reading. When there is no suspected emission found and the emission level is with at least 6 dB margin against QP limit line, the position is marked as “-“.

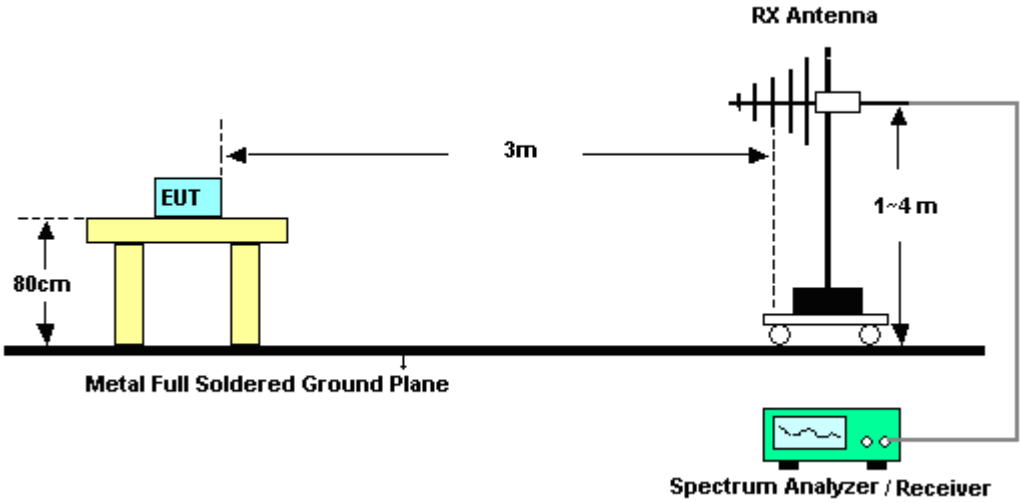
7. Radiated testing above 1 GHz is performed by adjusting the antenna tower from 1 m to 4 m and by rotating the turn table from 0 degree to 360 degrees to find the peak maximum hold reading for scanning all frequencies. When there is no suspected emission found and the harmonic emission level is with at least 6 dB margin against average limit line, the position is marked as "-".

3.1.4 Test Setup

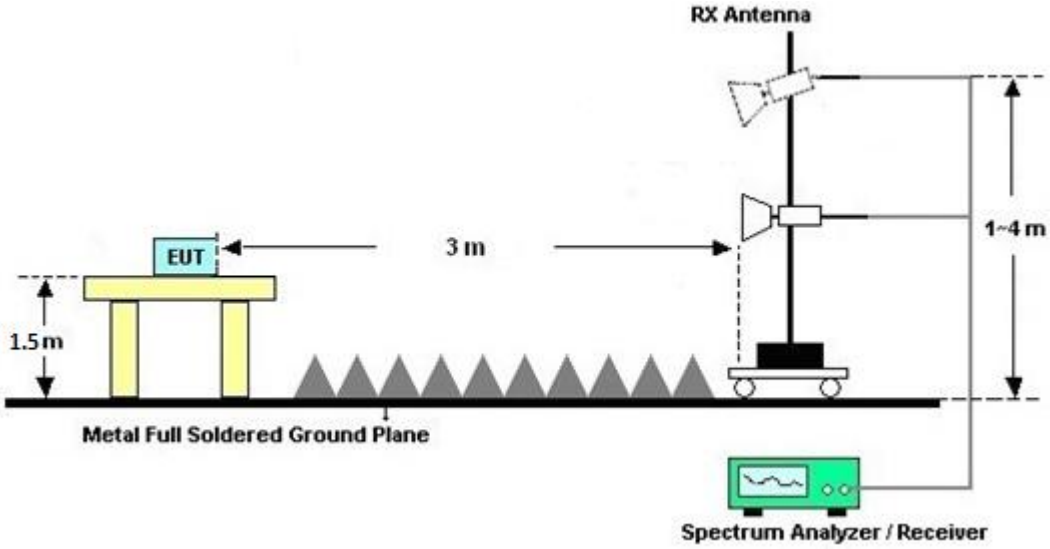
For radiated emissions below 30MHz



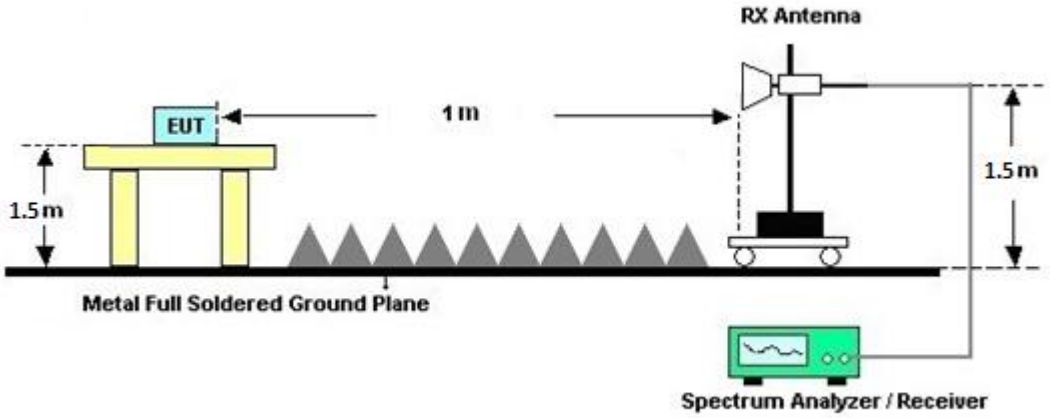
For radiated emissions from 30MHz to 1GHz



For radiated test from 1GHz to 18GHz



For radiated test above 18GHz



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

The low frequency, which starts from 9 kHz to 30 MHz, is pre-scanned and the result which is 20 dB lower than the limit line is 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.

3.1.6 Test Result of Radiated Spurious at Band Edges

Please refer to Appendix A and B.

3.1.7 Duty Cycle

Please refer to Appendix C.

3.1.8 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

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
Horn Antenna	SCHWARZBECK	BBHA 9120 D	9120D-1522	1GHz~18GHz	Mar. 23, 2023	Apr. 26, 2023~ May 25, 2023	Mar. 22, 2024	Radiation (03CH16-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA9170	00993	18GHz-40GHz	Nov. 24, 2022	Apr. 26, 2023~ May 25, 2023	Nov. 23, 2023	Radiation (03CH16-HY)
Bilog Antenna	TESEQ	CBL 6111D & 00802N1D01N-06	47020 & 06	30MHz~1GHz	Oct. 08, 2022	Apr. 26, 2023~ May 25, 2023	Oct. 07, 2023	Radiation (03CH16-HY)
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100488	9 kHz~30 MHz	Sep. 20, 2022	Apr. 26, 2023~ May 25, 2023	Sep. 19, 2023	Radiation (03CH16-HY)
Preamplifier	EMEC	EM18G40G	060801	18GHz~40GHz	Jun. 28, 2022	Apr. 26, 2023~ May 25, 2023	Jun. 27, 2023	Radiation (03CH16-HY)
Preamplifier	EMEC	EM1G18G	060812	1GHz~18GHz	Dec. 26, 2022	Apr. 26, 2023~ May 25, 2023	Dec. 25, 2023	Radiation (03CH16-HY)
Preamplifier	Keysight	83017A	MY53270264	1GHz~26.5GHz	Dec. 09, 2022	Apr. 26, 2023~ May 25, 2023	Dec. 08, 2023	Radiation (03CH16-HY)
Amplifier	SONOMA	310N	371607	9kHz~1GHz	Jul. 04, 2022	Apr. 26, 2023~ May 25, 2023	Jul. 03, 2023	Radiation (03CH16-HY)
EMI Test Receiver	Keysight	N9038A(MXE)	MY57290111	3Hz~26.5GHz	Dec. 15, 2022	Apr. 26, 2023~ May 25, 2023	Dec. 14, 2023	Radiation (03CH16-HY)
Signal Analyzer	Keysight	N9010B	MY62170278	10Hz~44GHz	Sep. 11, 2022	Apr. 26, 2023~ May 25, 2023	Sep. 10, 2023	Radiation (03CH16-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	805935/4	N/A	Aug. 09, 2022	Apr. 26, 2023~ May 25, 2023	Aug. 08, 2023	Radiation (03CH16-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	802434/4	N/A	Aug. 09, 2022	Apr. 26, 2023~ May 25, 2023	Aug. 08, 2023	Radiation (03CH16-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	EC-A5-300-5 757	N/A	Aug. 09, 2022	Apr. 26, 2023~ May 25, 2023	Aug. 08, 2023	Radiation (03CH16-HY)
Software	Audix	E3 6.2009-8-24	RK-001136	N/A	N/A	Apr. 26, 2023~ May 25, 2023	N/A	Radiation (03CH16-HY)
Antenna Mast	ChainTek	MBS-520-1	N/A	1m~4m	N/A	Apr. 26, 2023~ May 25, 2023	N/A	Radiation (03CH16-HY)
Turn Table	ChainTek	T-200-S-1	N/A	0~360 Degree	N/A	Apr. 26, 2023~ May 25, 2023	N/A	Radiation (03CH16-HY)

5 Measurement Uncertainty

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	6.5 dB

Uncertainty of Radiated Emission Measurement (1000 MHz ~ 6000 MHz)

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

Uncertainty of Radiated Emission Measurement (6000 MHz ~ 18000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	4.5 dB

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	5.6 dB

Appendix A. Radiated Spurious Emission

Test Engineer :	HAO QUN, Gary Guo and Steven Wu	Temperature :	20~25°C
		Relative Humidity :	50~65%

BT_Tx_Ch78 + WLAN 802.11ax HE80_Tx_Ch58

2.4GHz 2400~2483.5MHz

Bluetooth (Band Edge @ 3m)

BT	Note	Frequency (MHz)	Level (dBμV/m)	Margin (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	*	2480	107.84	-	-	103	27.7	7.58	30.44	119	22	P	H
	*	2480	83.05	-	-	-	-	-	-	-	-	A	H
		2483.52	48.73	-25.27	74	43.84	27.74	7.59	30.44	119	22	P	H
		2483.52	23.94	-30.06	54	-	-	-	-	-	-	A	H
													H
													H
	*	2480	99.31	-	-	94.47	27.7	7.58	30.44	119	22	P	V
	*	2480	74.52	-	-	-	-	-	-	-	-	A	V
		2494.6	45.15	-28.85	74	40.18	27.8	7.6	30.43	119	22	P	V
		2494.6	20.36	-33.64	54	-	-	-	-	-	-	A	V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Band 2 - 5250~5350MHz

WIFI 802.11ax HE80 (Band Edge @ 3m)

WIFI Ant.	Note	Frequency	Level	Margin	Limit Line	Read Level	Antenna Factor	Path Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11ax HE80 Full CH 58 5290MHz		5095.54	53.6	-20.4	74	39.05	33.02	10.95	29.42	260	0	P	H
		5148.58	41.69	-12.31	54	27.2	33	10.96	29.47	260	0	A	H
	*	5290	103.68	-	-	89.25	32.98	11.05	29.6	260	0	P	H
	*	5290	93.82	-	-	79.39	32.98	11.05	29.6	260	0	A	H
		5351.76	54.67	-19.33	74	40.33	32.9	11.1	29.66	260	0	P	H
		5352.24	44.56	-9.44	54	30.22	32.9	11.1	29.66	260	0	A	H
		5086.36	52.81	-21.19	74	38.22	33.05	10.95	29.41	257	0	P	V
		5061.88	41.33	-12.67	54	26.62	33.15	10.95	29.39	257	0	A	V
	*	5290	98.47	-	-	84.04	32.98	11.05	29.6	257	0	P	V
	*	5290	88.99	-	-	74.56	32.98	11.05	29.6	257	0	A	V
		5366.4	53.57	-20.43	74	39.22	32.9	11.12	29.67	257	0	P	V
		5351.04	42.69	-11.31	54	28.35	32.9	11.1	29.66	257	0	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

BT_Tx_CH78 + WLAN 802.11ax HE80_Tx_CH58

(Harmonic @ 3m)

BT+WIFI Ant. Simultaneously	Note	Frequency (MHz)	Level (dBμV/m)	Margin (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 Full Ch58 5290MHz		4960	55.4	-18.6	74	39.46	32.88	12.43	29.37	-	-	P	H
		4960	30.61	-23.39	54	-	-	-	-	-	-	A	H
		7440	43.59	-30.41	74	59.71	36.44	13.82	66.38	-	-	P	H
		7440	18.80	-35.20	54	-	-	-	-	-	-	A	H
		10580	46.78	-21.42	68.2	58.41	38.92	16.39	66.94	-	-	P	H
		15870	45.96	-28.04	74	56.01	37.08	16.98	67.11	-	-	P	H
													H
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		4960	55.65	-18.35	74	39.71	32.88	12.43	29.37	-	-	P	V
		4960	30.86	-23.14	54	-	-	-	-	-	-	A	V
		7440	43.1	-30.9	74	59.22	36.44	13.82	66.38	-	-	P	V
		7440	18.31	-35.69	54	-	-	-	-	-	-	A	V
		10580	46.11	-22.09	68.2	57.74	38.92	16.39	66.94	-	-	P	V
		15870	45.37	-28.63	74	55.42	37.08	16.98	67.11	-	-	P	V
													V
													V
													V
													V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line. 3. The emission position marked as "-" means no suspected emission found with sufficient margin against limit line or noise floor only.												

Emission above 18GHz

BT_Tx_CH78 + WLAN 802.11ax HE80_Tx_CH58 (SHF @ 1m)

BT+WIFI Ant. Simultaneously	Note	Frequency (MHz)	Level (dBμV/m)	Margin (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 Full Ch58 5290MHz		39216	46.71	-27.29	74	59.82	44.32	8.74	56.63	-	-	P	H
													H
													H
													H
													H
													H
													H
													H
													H
													H
													H
													H
													V
		38488	46.14	-27.86	74	60.07	43.58	9.04	57.01	-	-	P	V
													V
													V
													V
													V
													V
													V
													V
													V
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													V
Remark	1. No other spurious found. 2. All results are PASS against limit line. 3. The emission position marked as "-" means no suspected emission found with sufficient margin against limit line or noise floor only.												

Emission below 1GHz

BT_Tx_CH78 + WLAN 802.11ax HE80_Tx_CH58 (LF @ 3m)

BT+WIFI Ant. Simultaneously	Note	Frequency (MHz)	Level (dBμV/m)	Margin (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 Full Ch58 5290MHz		89.4	33.84	-9.66	43.5	50.12	14.6	1.41	32.29	-	-	P	H
		152.04	35.36	-8.14	43.5	48.69	17.06	1.89	32.28	-	-	P	H
		224.94	29.57	-16.43	46	43.86	15.74	2.29	32.32	-	-	P	H
		364.4	25.06	-20.94	46	33.69	20.85	2.93	32.41	-	-	P	H
		542.2	28.3	-17.7	46	33.16	24.14	3.59	32.59	-	-	P	H
		722.1	33.38	-12.62	46	34.85	26.86	4.16	32.49	-	-	P	H
													H
													H
													H
													H
													H
													H
		50.52	32.65	-7.35	40	50	14.03	0.91	32.29	-	-	P	V
		133.14	35.4	-8.1	43.5	48.45	17.45	1.78	32.28	-	-	P	V
		221.43	22.78	-23.22	46	38.1	14.72	2.28	32.32	-	-	P	V
		367.9	24.2	-21.8	46	32.82	20.85	2.94	32.41	-	-	P	V
		542.2	35.74	-10.26	46	40.6	24.14	3.59	32.59	-	-	P	V
		891.5	33.27	-12.73	46	31.9	28.51	4.65	31.79	-	-	P	V
													V
													V
													V
													V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against limit line. 3. The emission position marked as "-" means no suspected emission found and emission level has at least 6dB margin against limit or emission is noise floor only.												

BT_Tx_Ch78 + WLAN 802.11ax HE80_Tx_Ch58

2.4GHz 2400~2483.5MHz

Bluetooth (Band Edge @ 3m)

BT	Note	Frequency	Level	Margin	Limit Line	Read Level	Antenna Factor	Path Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
		(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
BT CH 78 2480MHz	*	2480	109.23	-	-	104.39	27.7	7.58	30.44	307	3	P	H
	*	2480	84.44	-	-	-	-	-	-	-	-	A	H
		2483.6	49.19	-24.81	74	44.3	27.74	7.59	30.44	307	3	P	H
		2483.6	24.4	-29.6	54	-	-	-	-	-	-	A	H
													H
													H
	*	2480	101.36	-	-	96.52	27.7	7.58	30.44	193	0	P	V
	*	2480	76.57	-	-	-	-	-	-	-	-	A	V
		2487.12	45.16	-28.84	74	40.23	27.77	7.59	30.43	193	0	P	V
		2487.12	20.37	-33.63	54	-	-	-	-	-	-	A	V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Band 2 - 5250~5350MHz

WIFI 802.11ax HE80 (Band Edge @ 3m)

WIFI Ant. 2	Note	Frequency (MHz)	Level (dBμV/m)	Margin (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)
802.11ax HE80 Full CH 58 5290MHz		5149.94	53.98	-20.02	74	39.49	33	10.96	29.47	398	113	P	H
		5142.8	41.98	-12.02	54	27.48	33	10.96	29.46	398	113	A	H
	*	5290	97.34	-	-	82.91	32.98	11.05	29.6	398	113	P	H
	*	5290	88.85	-	-	74.42	32.98	11.05	29.6	398	113	A	H
		5380.56	52.46	-21.54	74	38.12	32.9	11.13	29.69	398	113	P	H
		5383.68	41.11	-12.89	54	26.77	32.9	11.13	29.69	398	113	A	H
		5111.86	53.4	-20.6	74	38.88	33	10.96	29.44	100	58	P	V
		5149.6	41.83	-12.17	54	27.34	33	10.96	29.47	100	58	A	V
	*	5290	97.06	-	-	82.63	32.98	11.05	29.6	100	58	P	V
	*	5290	86.66	-	-	72.23	32.98	11.05	29.6	100	58	A	V
		5379.36	53.18	-20.82	74	38.84	32.9	11.13	29.69	100	58	P	V
		5350.56	41.31	-12.69	54	26.97	32.9	11.1	29.66	100	58	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

BT_Tx_CH78 + WLAN 802.11ax HE80_Tx_CH58

(Harmonic @ 3m)

BT+WIFI Ant. Simultaneously	Note	Frequency (MHz)	Level (dBμV/m)	Margin (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 Full Ch58 5290MHz		4960	56.08	-17.92	74	40.14	32.88	12.43	29.37	-	-	P	H
		4960	31.29	-22.71	54	-	-	-	-	-	-	A	H
		7440	43.9	-30.1	74	60.02	36.44	13.82	66.38	-	-	P	H
		7440	19.11	-34.89	54	-	-	-	-	-	-	A	H
		10580	46.66	-21.54	68.2	58.29	38.92	16.39	66.94	-	-	P	H
		15870	45.86	-28.14	74	55.91	37.08	19.98	67.11	-	-	P	H
													H
													H
													H
													H
													H
													H
		4960	55.99	-18.01	74	40.05	32.88	12.43	29.37	-	-	P	V
		4960	31.2	-22.8	54	-	-	-	-	-	-	A	V
		7440	42.63	-31.37	74	58.75	36.44	13.82	66.38	-	-	P	V
		7440	17.84	-36.16	54	-	-	-	-	-	-	A	V
		10580	47.27	-20.93	68.2	58.9	38.92	16.39	66.94	-	-	P	V
		15870	46.12	-27.88	74	56.17	37.08	19.98	67.11	-	-	P	V
													V
													V
													V
													V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line. 3. The emission position marked as "-" means no suspected emission found with sufficient margin against limit line or noise floor only.												

Emission above 18GHz

BT_Tx_CH78 + WLAN 802.11ax HE80_Tx_CH58 (SHF @ 1m)

BT+WIFI Ant. Simultaneously	Note	Frequency (MHz)	Level (dBμV/m)	Margin (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 Full Ch58 5290MHz		38460	47.21	-26.79	74	61.23	43.54	9.02	57.04	-	-	P	H
													H
													H
													H
													H
													H
													H
													H
													H
													H
													H
													H
													V
		37004	46.44	-27.56	74	62.51	42.9	8.57	58	-	-	P	V
													V
													V
													V
													V
													V
													V
													V
													V
													V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against limit line. 3. The emission position marked as "-" means no suspected emission found with sufficient margin against limit line or noise floor only.												

Emission below 1GHz

BT_Tx_CH78 + WLAN 802.11ax HE80_Tx_CH58 (LF @ 3m)

BT+WIFI Ant. Simultaneously	Note	Frequency (MHz)	Level (dBμV/m)	Margin (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 Full Ch58 5290MHz		88.59	33.05	-10.45	43.5	49.41	14.53	1.4	32.29	-	-	P	H
		148.8	35.38	-8.12	43.5	48.47	17.32	1.87	32.28	-	-	P	H
		219	29.04	-16.96	46	43.86	15.24	2.26	32.32	-	-	P	H
		365.1	26.05	-19.95	46	34.68	20.85	2.93	32.41	-	-	P	H
		542.2	27.79	-18.21	46	32.65	24.14	3.59	32.59	-	-	P	H
		720.7	32.76	-13.24	46	34.31	26.79	4.16	32.5	-	-	P	H
													H
													H
													H
													H
													H
													H
		50.79	32.73	-7.27	40	50.19	13.92	0.91	32.29	-	-	P	V
		132.87	35.29	-8.21	43.5	48.35	17.45	1.77	32.28	-	-	P	V
		220.08	23.46	-22.54	46	38.23	15.28	2.27	32.32	-	-	P	V
		365.1	24.78	-21.22	46	33.41	20.85	2.93	32.41	-	-	P	V
		542.2	34.07	-11.93	46	38.93	24.14	3.59	32.59	-	-	P	V
		894.3	37.43	-8.57	46	36	28.54	4.66	31.77	-	-	P	V
													V
													V
													V
													V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against limit line. 3. The emission position marked as "-" means no suspected emission found and emission level has at least 6dB margin against limit or emission is noise floor only.												

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 **Margin** 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	Margin	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
Ant.					Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
Simultaneously		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11a CH 58 5290MHz		5150	55.45	-32.75	88.2	54.51	32.22	4.58	35.86	103	308	P	H
		5150	43.54	-24.66	68.2	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. Margin(dB) = Level(dBμV/m) – Limit Line(dBμV/m)

For Peak Limit @ 5150MHz:

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. Margin(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 55.45(dBμV/m) – 74(dBμV/m)

= -32.75(dB)

For Average Limit @ 5150MHz:

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. Margin(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 43.54(dBμV/m) – 54(dBμV/m)

= -24.66(dB)

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

Appendix B. Radiated Spurious Emission Plots

Test Engineer :	HAO QUN, Gary Guo and Steven Wu	**Temperature :**	20~25°C
		Relative Humidity :	50~65%

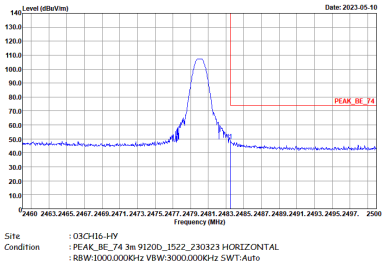
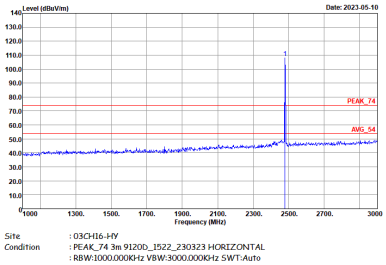
Note symbol

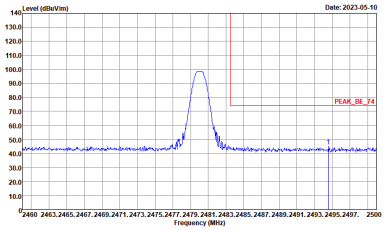
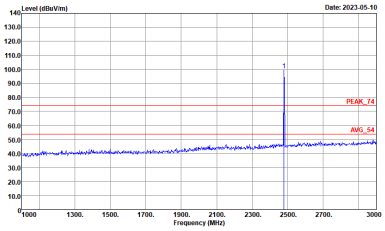
-L	**Low channel location**
-R	**High channel location**

BT_Tx_Ch78 + WLAN 802.11ax HE80_Tx_Ch58

2.4GHz 2400~2483.5MHz

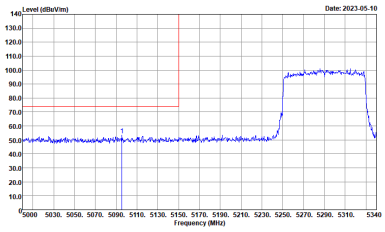
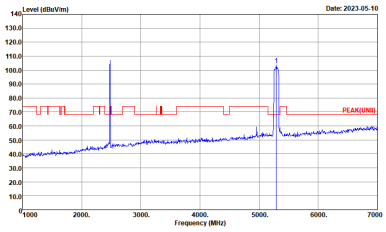
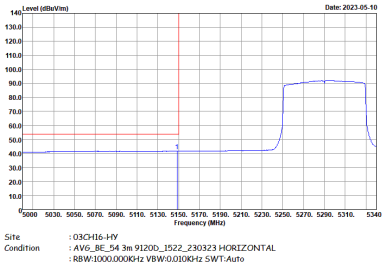
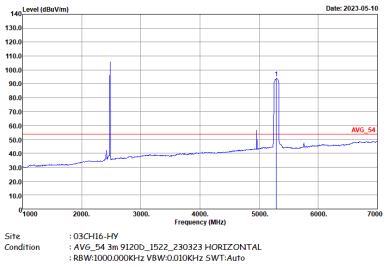
Bluetooth (Band Edge @ 3m)

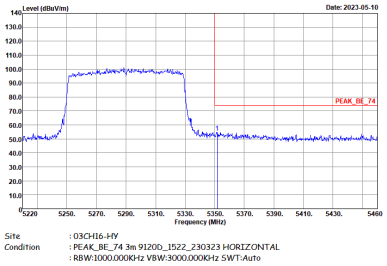
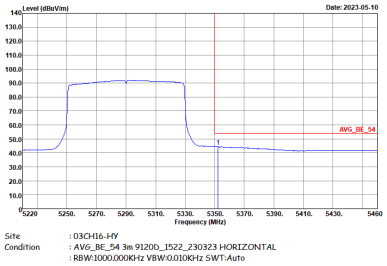
BT	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	BT CH78 2480MHz	
	Horizontal	Fundamental
Peak		

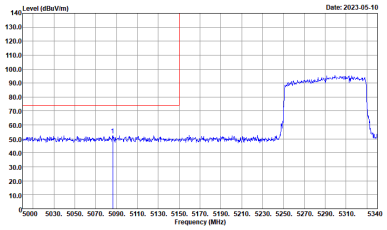
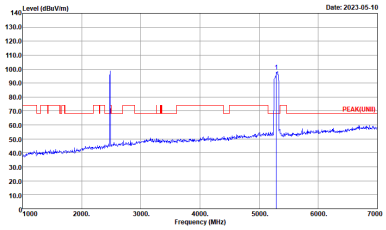
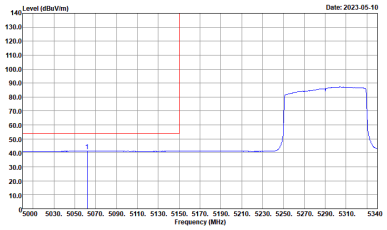
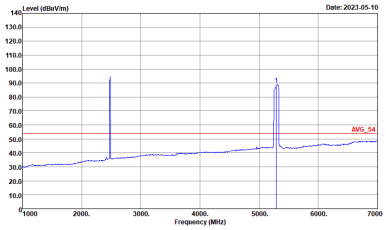
BT	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	BT CH78 2480MHz	
	Vertical	Fundamental
Peak	 Site : 03CH16-HY Condition : PEAK_BE_74 3m 9120D_1522_230323 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	 Site : 03CH16-HY Condition : PEAK_74 3m 9120D_1522_230323 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto

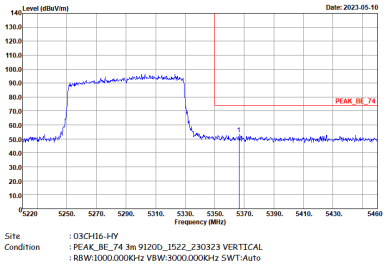
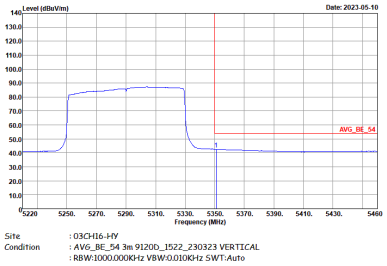
Band 2 - 5250~5350MHz

WIFI 802.11ax HE80 (Band Edge @ 3m)

WIFI	5250~5350MHz Band Edge @ 3m	
ANT	802.11ax HE80 Full CH58 5290MHz - L	
1	Horizontal	Fundamental
Peak		
Avg.		

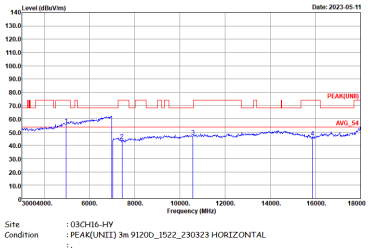
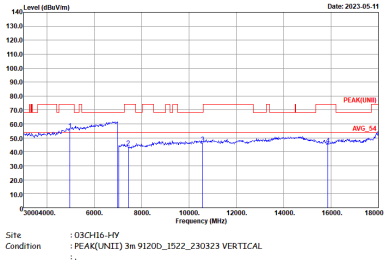
WIFI	5250~5350MHz Band Edge @ 3m	
ANT	802.11ax HE80 Full CH58 5290MHz - R	
1	Horizontal	Fundamental
Peak		Left blank
Avg.		Left blank

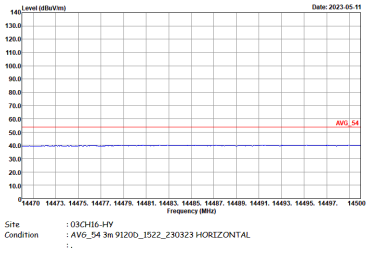
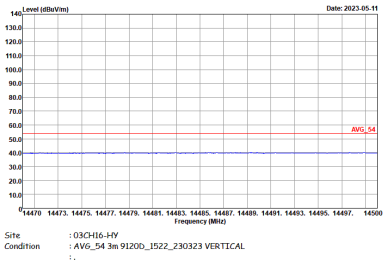
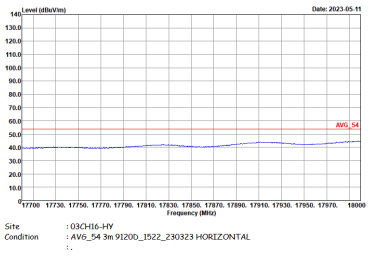
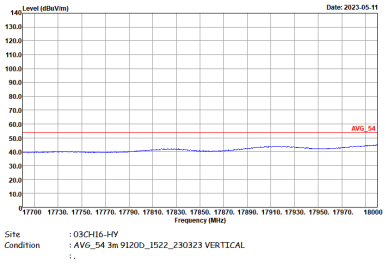
WIFI	5250~5350MHz Band Edge @ 3m	
ANT	802.11ax HE80 Full CH58 5290MHz - L	
1	Vertical	Fundamental
Peak	 Site : 03CH16-HY Condition : PEAK_BE_74 3m 9120D_1522_230323 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	 Site : 03CH16-HY Condition : PEAK(UNII) 3m 9120D_1522_230323 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto
Avg.	 Site : 03CH16-HY Condition : AVG_BE_54 3m 9120D_1522_230323 VERTICAL : RBW:1000.000KHz VBW:0.010KHz SWT:Auto	 Site : 03CH16-HY Condition : AVG_54 3m 9120D_1522_230323 VERTICAL : RBW:1000.000KHz VBW:0.010KHz SWT:Auto

WIFI	5250~5350MHz Band Edge @ 3m	
ANT	802.11ax HE80 Full CH58 5290MHz - R	
1	Vertical	Fundamental
Peak		Left blank
Avg.		Left blank

BT_Tx_CH78 + WLAN 802.11ax HE80_Tx_CH58

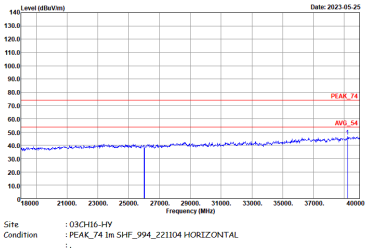
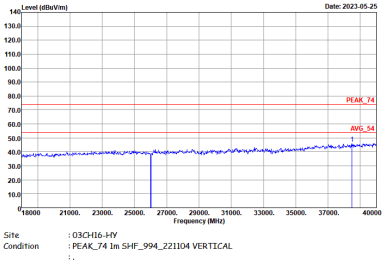
(Harmonic @ 3m)

ANT	BT Ch78 2480 MHz + 802.11ax HE80 Full Ch58 5290 MHz	
Simultaneously	Horizontal	Vertical
Peak Avg.		

ANT	BT Ch78 2480 MHz + 802.11ax HE80 Full Ch58 5290 MHz	
Simultaneously	Horizontal	Vertical
14.47G ~14.5G Avg.		
17.7G ~18G Avg.		

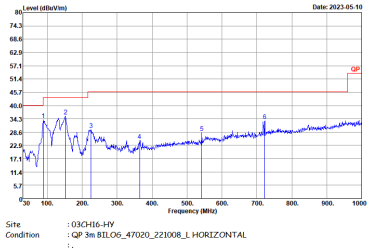
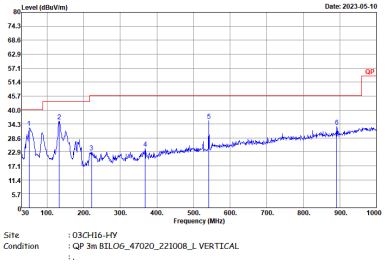
Emission above 18GHz

BT_Tx_CH78 + WLAN 802.11ax HE80_Tx_CH58 (SHF @ 1m)

ANT	BT Ch78 2480 MHz + 802.11ax HE80 Full Ch58 5290 MHz	
Simultaneously	Horizontal	Vertical
Peak Avg.		

Emission below 1GHz

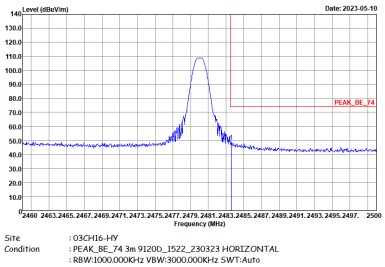
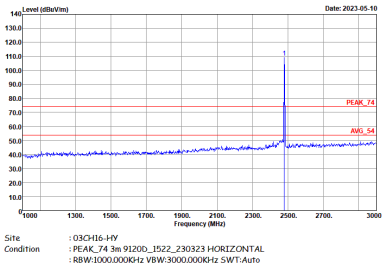
BT_Tx_CH78 + WLAN 802.11ax HE80_Tx_CH58 (LF @ 3m)

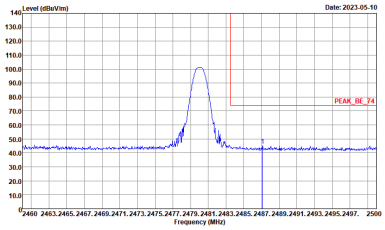
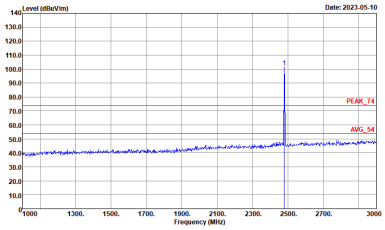
ANT	BT Ch78 2480 MHz + 802.11ax HE80 Full Ch58 5290 MHz	
Simultaneously	Horizontal	Vertical
QP / Peak		

BT_Tx_Ch78 + WLAN 802.11ax HE80_Tx_Ch58

2.4GHz 2400~2483.5MHz

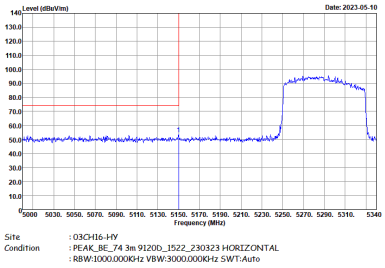
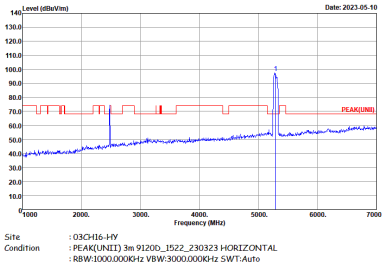
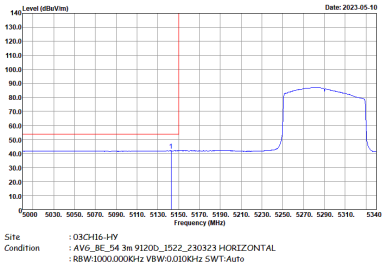
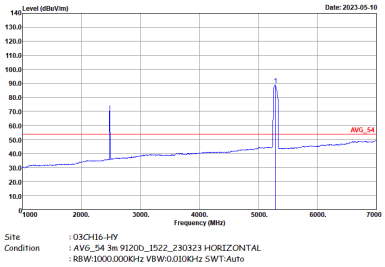
Bluetooth (Band Edge @ 3m)

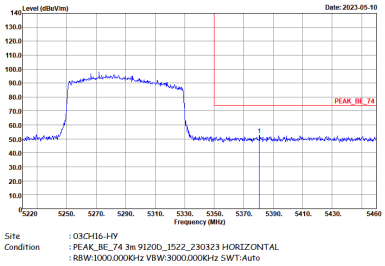
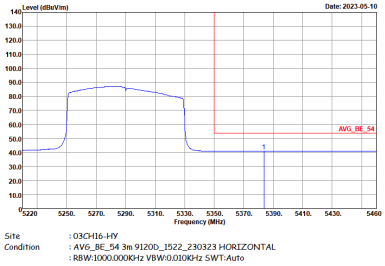
BT	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	BT CH78 2480MHz	
	Horizontal	Fundamental
Peak		

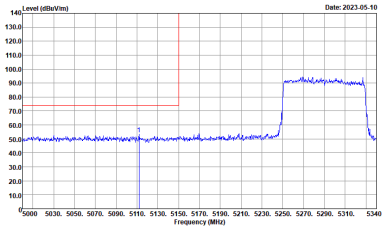
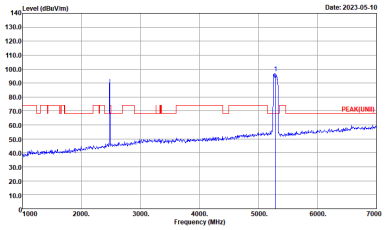
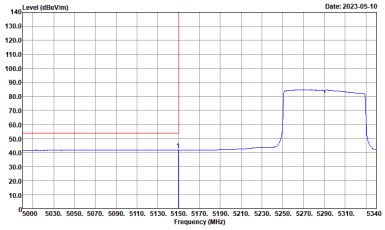
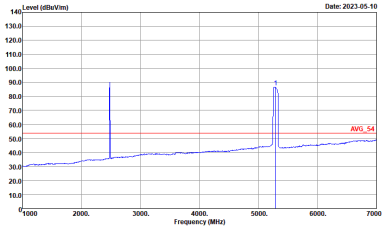
BT	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	BT CH78 2480MHz	
	Vertical	Fundamental
Peak	 Site : 03CH16-HY Condition : PEAK_BE_74 3m 9120D_1522_230323 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	 Site : 03CH16-HY Condition : PEAK_74 3m 9120D_1522_230323 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto

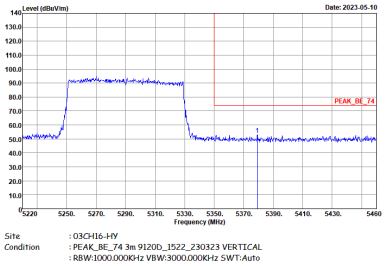
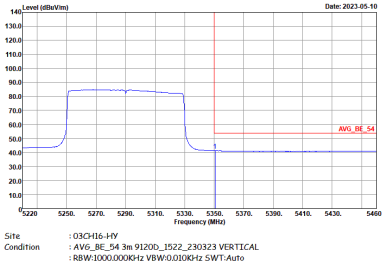
Band 2 - 5250~5350MHz

WIFI 802.11ax HE80 (Band Edge @ 3m)

WIFI	5250~5350MHz Band Edge @ 3m	
ANT	802.11ax HE80 Full CH58 5290MHz - L	
2	Horizontal	Fundamental
Peak		
Avg.		

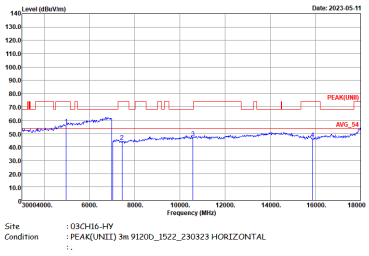
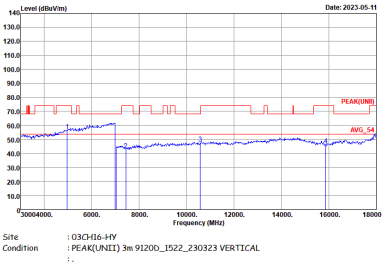
WIFI	5250~5350MHz Band Edge @ 3m	
ANT	802.11ax HE80 Full CH58 5290MHz - R	
2	Horizontal	Fundamental
Peak		Left blank
Avg.		Left blank

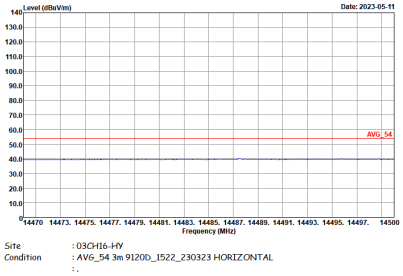
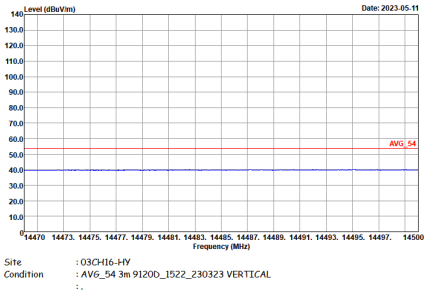
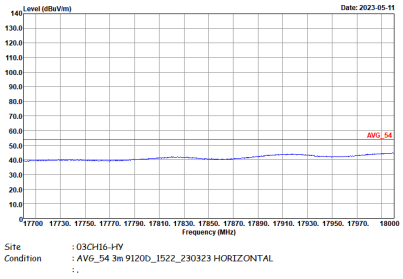
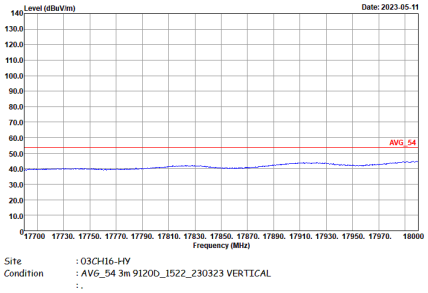
WIFI	5250~5350MHz Band Edge @ 3m	
ANT	802.11ax HE80 Full CH58 5290MHz - L	
2	Vertical	Fundamental
Peak	 Site : 03CH16-HY Condition : PEAK_BE_74 3m 9120D_1522_230323 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	 Site : 03CH16-HY Condition : PEAK(UNII) 3m 9120D_1522_230323 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto
Avg.	 Site : 03CH16-HY Condition : AVG_BE_54 3m 9120D_1522_230323 VERTICAL : RBW:1000.000KHz VBW:0.010KHz SWT:Auto	 Site : 03CH16-HY Condition : AVG_54 3m 9120D_1522_230323 VERTICAL : RBW:1000.000KHz VBW:0.010KHz SWT:Auto

WIFI	5250~5350MHz Band Edge @ 3m	
ANT	802.11ax HE80 Full CH58 5290MHz - R	
2	Vertical	Fundamental
Peak		Left blank
Avg.		Left blank

BT_Tx_CH78 + WLAN 802.11ax HE80_Tx_CH58

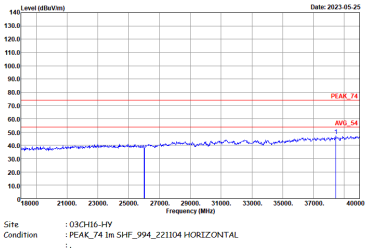
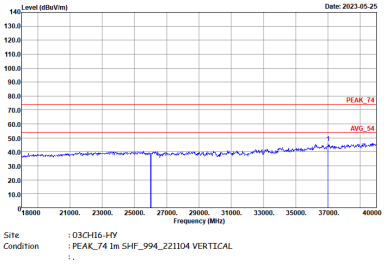
(Harmonic @ 3m)

ANT	BT Ch78 2480 MHz + 802.11ax HE80 Full Ch58 5290 MHz	
Simultaneously	Horizontal	Vertical
Peak Avg.		

ANT	BT Ch78 2480 MHz + 802.11ax HE80 Full Ch58 5290 MHz	
Simultaneously	Horizontal	Vertical
14.47G ~14.5G Avg.		
17.7G ~18G Avg.		

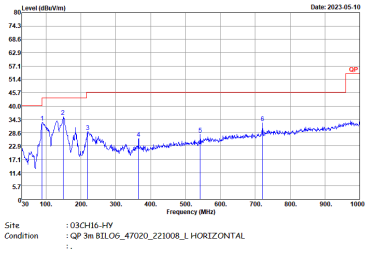
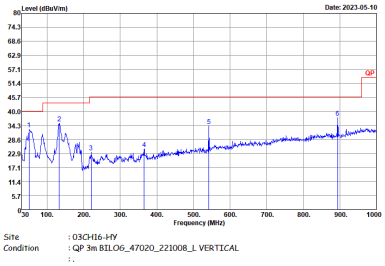
Emission above 18GHz

BT_Tx_CH78 + WLAN 802.11ax HE80_Tx_CH58 (SHF @ 1m)

ANT	BT Ch78 2480 MHz + 802.11ax HE80 Full Ch58 5290 MHz	
Simultaneously	Horizontal	Vertical
Peak Avg.		

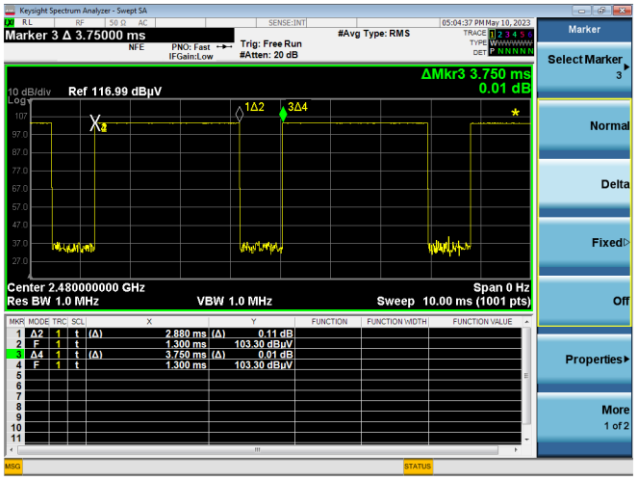
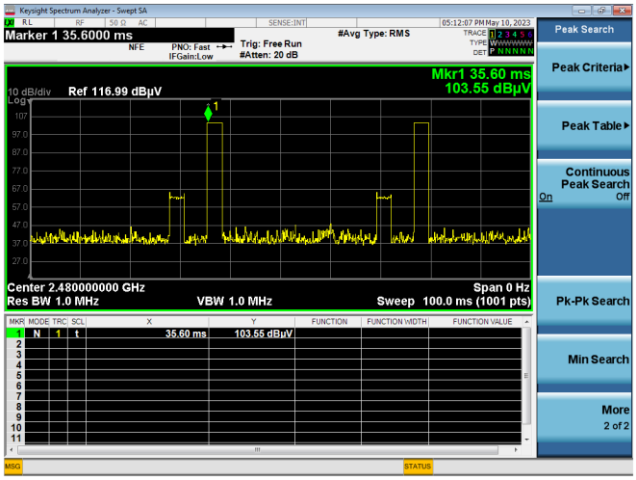
Emission below 1GHz

BT_Tx_CH78 + WLAN 802.11ax HE80_Tx_CH58 (LF @ 3m)

ANT	BT Ch78 2480 MHz + 802.11ax HE80 Full Ch58 5290 MHz	
Simultaneously	Horizontal	Vertical
QP / Peak		

Appendix C. Duty Cycle Plots

<For Mode 1>

DH5 on time (One Pulse) Plot on Channel 78	on time (Count Pulses) Plot on Channel 78
	

Note:

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

Duty Cycle Correction Factor Consideration for AFH mode:

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

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

2.88 ms x 20 channels = 57.6 ms

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

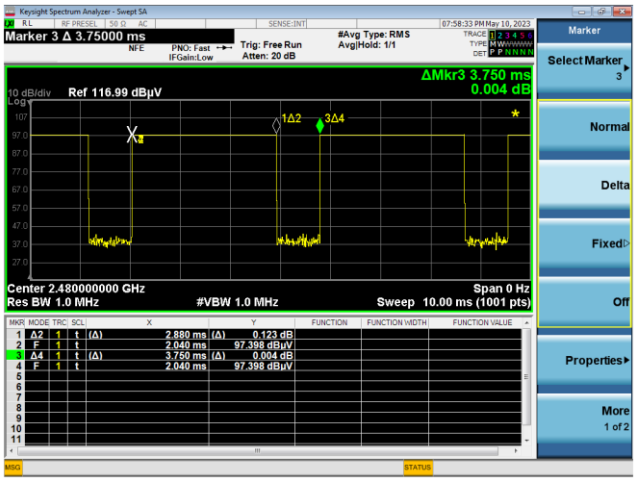
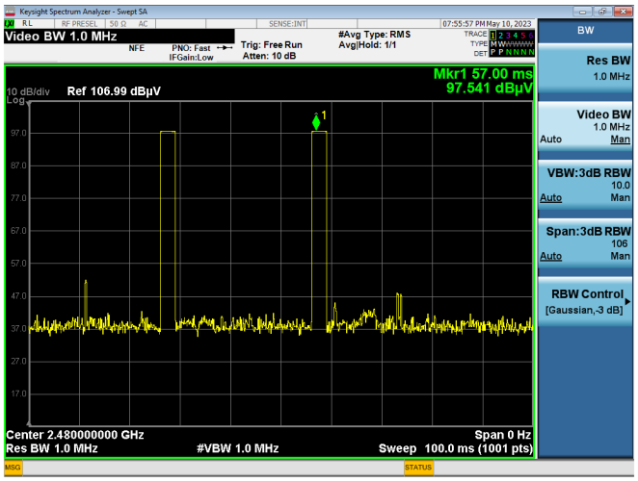
Thus, the maximum possible ON time:

2.88 ms x 2 = 5.76 ms

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

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

<For Mode 2>

DH5 on time (One Pulse) Plot on Channel 78	on time (Count Pulses) Plot on Channel 78
	

Note:

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

Duty Cycle Correction Factor Consideration for AFH mode:

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

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

2.88 ms x 20 channels = 57.6 ms

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

Thus, the maximum possible ON time:

2.88 ms x 2 = 5.76 ms

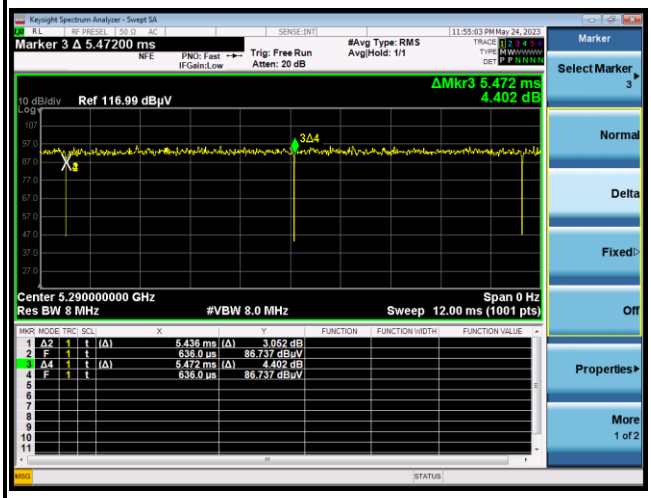
Worst case Duty Cycle Correction factor, which is derived from the maximum possible ON time,

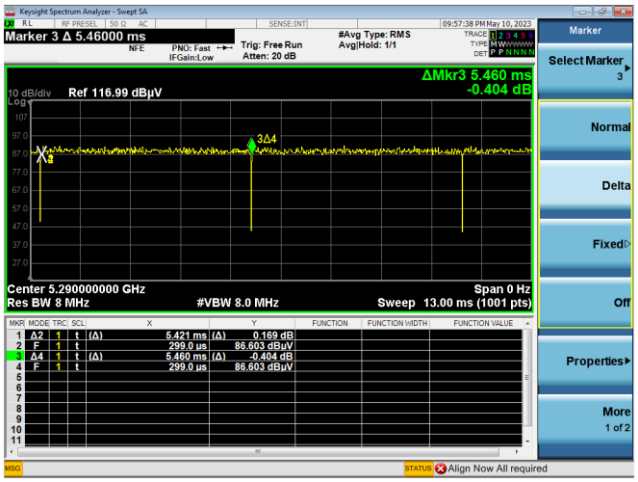
20 x log(5.76 ms/100 ms) = -24.79 dB

Antenna	Band	Duty Cycle(%)	T(us)	1/T(kHz)	VBW Setting
1	5GHz 802.11ax HE80 Full RU	99.34	-	-	10Hz
2	5GHz 802.11ax HE80 Full RU	99.29	-	-	10Hz

<Ant. 1>

5GHz 802.11ax HE80 Full RU



<Ant. 2>

5GHz 802.11ax HE80 Full RU