FCC RF Test Report

APPLICANT	:	Inseego Corp.
EQUIPMENT	:	wireless device
BRAND NAME	:	Inseego
MODEL NAME	:	FX20003, FX2000e-3
FCC ID	:	PKRISGFX20003
STANDARD	:	FCC Part 15 Subpart C §15.247
CLASSIFICATION	:	(DTS) Digital Transmission System

The product was received on Feb. 10, 2021 and testing was completed on Feb. 26, 2021. We, Sporton International (Kunshan) Inc., 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 (Kunshan) Inc., the test report shall not be reproduced except in full.

Jason Jia

Reviewed by: Jason Jia / Supervisor

Alex Wang

Approved by: Alex Wang / Manager

Sporton International (Kunshan) Inc.
No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300
People's Republic of China

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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR121027A	Rev. 01	Initial issue of report	Mar. 12, 2021

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	15.247(d)	Radiated Band Edges and Radiated Spurious Emission	15.209(a) & 15.247(d)	Pass	Under limit 0.21 dB at 2389.950 MHz
3.2	15.203 & 15.247(b)	Antenna Requirement	N/A	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.

1 General Description

1.1 Applicant

Inseego Corp.
9710 Scranton Road, Suite 200 San Diego, CA 92121

1.2 Manufacturer

MeiG Smart Technology Co., Ltd
Floor 2, Office Building No.5, Lingxia Road, Fenghuang Community, Fuyong Street, Bao 'an District, Shenzhen

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	wireless device
Brand Name	Inseego
Model Name	FX20003, FX2000e-3
FCC ID	PKRISGFX20003
EUT supports Radios application	WCDMA/LTE/5G NR/GNSS WLAN 2.4GHz 802.11b/g/n HT20/HT40 WLAN 2.4GHz 802.11ac VHT20/VHT40 WLAN 2.4GHz 802.11ax HE20/HE40 WLAN 5GHz 802.11a/n HT20/HT40 WLAN 5GHz 802.11ac VHT20/VHT40/VHT80 WLAN 5GHz 802.11ax HE20/HE40/HE80
IMEI Code	Radiation: 990016670003415
HW Version	Rev1
FVIN	1
EUT Stage	Identical Prototype

Remark:

1. The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.
2. This is a variant report for FX20003, FX2000e-3. The change note could be referred to the product equality declaration which is exhibit separately. Based on the similarity between current and previous project, only the related test cases of RSE from original report (Sporton Report Number FR082812-01A) were verified for the differences.

1.4 Product Specification of Equipment Under Test

Standards-related Product Specification	
Tx/Rx Channel Frequency Range	2412 MHz ~ 2462 MHz
Antenna Type / Gain	Ant. 1: IFA Antenna with gain 3.59 dBi Ant. 2: Monopole Antenna with gain 3.01 dBi
Type of Modulation	802.11b : DSSS (DBPSK / DQPSK / CCK) 802.11g/n/ac/ax : OFDM (BPSK / QPSK / 16QAM / 64QAM / 256QAM / 1024QAM)
Antenna Function for Transmitter	

	Ant. 1	Ant. 2
802.11 b/g/n/ac/ax SISO	V	V
802.11 b/g/n/ac/ax MIMO	V	

1.5 Modification of EUT

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

1.6 Testing Location

Sporton International (Kunshan) Inc. is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.02.

Test Firm	Sporton International (Kunshan) Inc.		
Test Site Location	No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300 People's Republic of China TEL : +86-512-57900158 FAX : +86-512-57900958		
Test Site No.	**Sporton Site No.**	**FCC Designation No.**	**FCC Test Firm Registration No.**
	03CH06-KS	CN1257	314309

1.7 Test Software

Item	Site	Manufacture	Name	Version
1.	03CH06-KS	AUDIX	E3	6.2009-8-24al

1.8 Applicable Standards

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

- 47 CFR Part 15 Subpart C §15.247
- FCC KDB 558074 D01 15.247 Meas Guidance v05r02
- 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. 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

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

2.1 Carrier Frequency and Channel

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)
2400-2483.5 MHz	1	2412	7	2442
	2	2417	8	2447
	3	2422	9	2452
	4	2427	10	2457
	5	2432	11	2462
	6	2437		

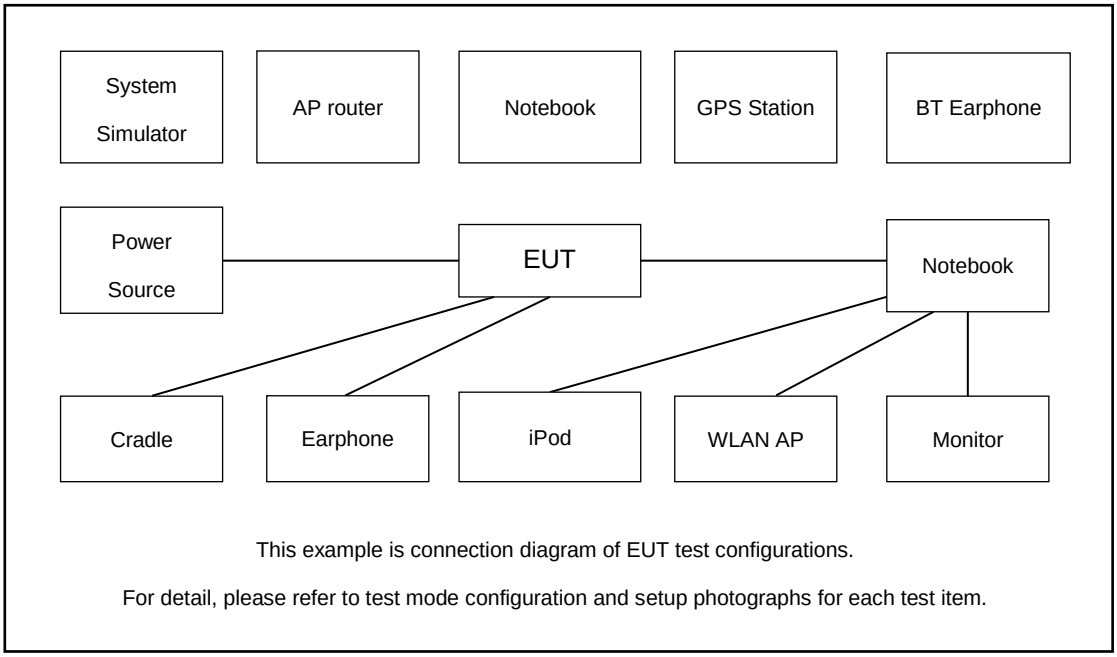
2.2 Test Mode

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

MIMO Antenna

Modulation	Data Rate
802.11b	**1 Mbps**
802.11g	**6 Mbps**
802.11ax HE20	**MCS0**
802.11ax HE40	**MCS0**

2.3 Connection Diagram of Test System



This example is connection diagram of EUT test configurations.

For detail, please refer to test mode configuration and setup photographs for each test item.

2.4 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	Notebook	Lenovo	G480	QDS-BRCM1050I	N/A	AC I/P: Unshielded, 1.8 m DC O/P: Shielded, 1.8 m
2.	Notebook	Lenovo	V130-15IKB005	N/A	N/A	AC I/P: Unshielded, 1.8 m DC O/P: Shielded, 1.8 m
3.	Hard DISK	WD	C6B	N/A	N/A	N/A
4.	Earphone	Lenovo	P121	N/A	Unshielded,1.2m	N/A

2.5 EUT Operation Test Setup

For WLAN RF test items, an engineering test program was provided and enabled to make EUT continuous transmit/receive.

3 Test Result

3.1 Radiated Band Edges and Spurious Emission Measurement

3.1.1 Limit of Radiated band edge and Spurious Emission Measurement

In any 100 kHz bandwidth outside the intentional radiator frequency band, all harmonics/spurious must be at least 20 dB below the highest emission level within the authorized band. If the output power of this device was measured by spectrum analyzer, the attenuation under this paragraph shall be 30 dB instead of 20 dB. In addition, radiated emissions which fall in the restricted bands must also comply with the limits as below.

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30.0	30	30
30 – 88	100	3
88 – 216	150	3
216 - 960	200	3
Above 960	500	3

3.1.2 Measuring Instruments

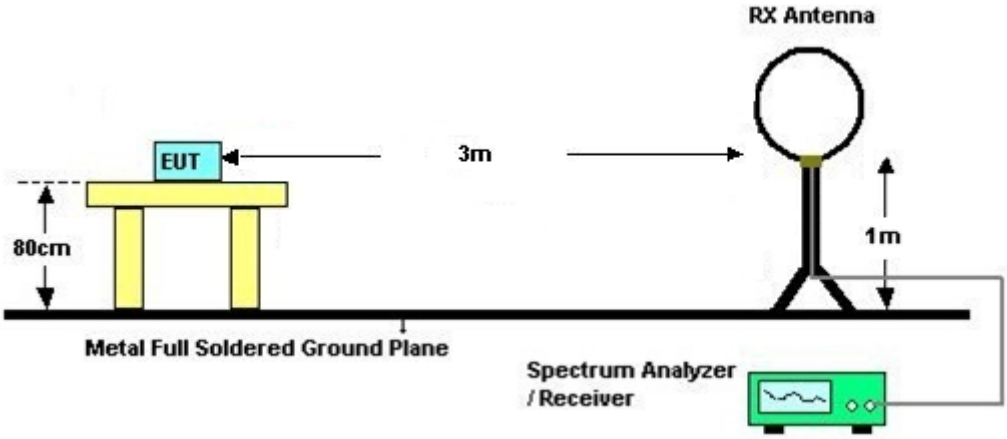
The measuring equipment is listed in the section 4 of this test report.

3.1.3 Test Procedures

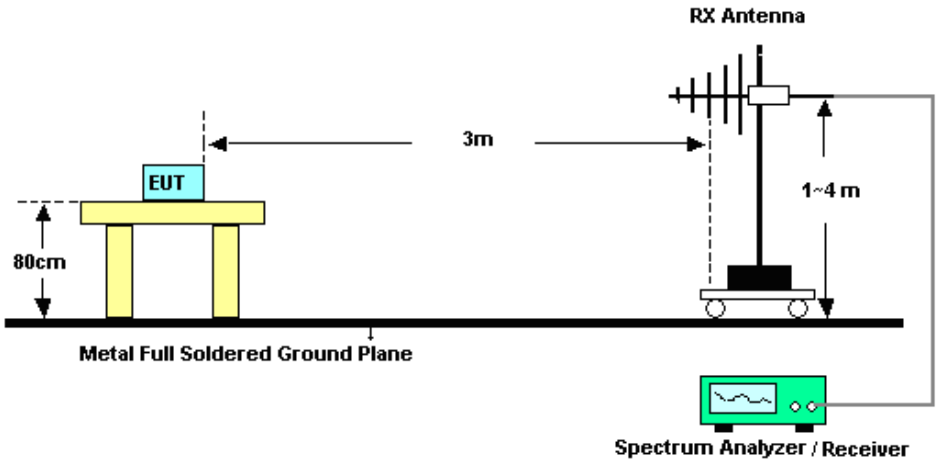
1. The testing follows ANSI C63.10-2013 clause 11.11 & 11.12
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level.
3. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
5. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level
6. For testing below 1GHz, if the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then peak values of EUT will be reported, otherwise, the emissions will be repeated one by one using the CISPR quasi-peak method and reported.
7. For testing above 1GHz, the emission level of the EUT in peak mode was 20dB lower than peak limit (that means the emission level in average mode also complies with the limit in average mode), then peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
8. Use the following spectrum analyzer settings:
   (1) Span shall wide enough to fully capture the emission being measured;
   (2) Set RBW=100 kHz for f < 1 GHz; VBW ≥ RBW; Sweep = auto; Detector function = peak; Trace = max hold;
   (3) Set RBW = 1 MHz, VBW= 3MHz for f ≥ 1 GHz for peak measurement.
   For average measurement:
   - VBW = 10 Hz, when duty cycle is no less than 98 percent.
   - VBW ≥ 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

3.1.4 Test Setup

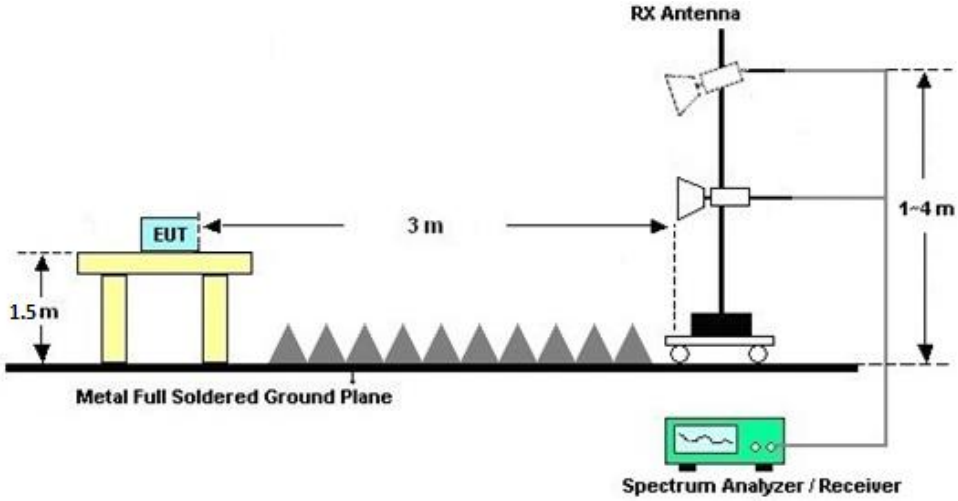
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



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

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line was not reported.

There is a comparison data of both open-field test site and semi-Anechoic chamber, and the result came out very similar.

3.1.6 Test Result of Radiated Spurious at Band Edges

Please refer to Appendix A.

3.1.7 Duty Cycle

Please refer to Appendix B.

3.1.8 Test Result of Radiated Spurious Emission (30MHz ~ 10th Harmonic or 40GHz, whichever is lower)

Please refer to Appendix A.

3.2 Antenna Requirements

3.2.1 Standard Applicable

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

3.2.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

3.2.3 Antenna Gain

<CDD Modes >

FCC KDB 662911 D01 Multiple Transmitter Output v02r01

For CDD transmissions, directional gain is calculated as

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

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

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

For power measurements on IEEE 802.11 devices,

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

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

The EUT supports CDD mode.

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

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

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

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

	Ant. 1 (dBi)	Ant. 2 (dBi)	DG for Power (dBi)	DG for PSD (dBi)	Power Limit Reduction (dB)	PSD Limit Reduction (dB)
2.4 GHz	3.59	3.01	3.59	6.32	0.00	0.32

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

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

4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
EMI Test Receiver	Keysight	N9038A	MY56400004	3Hz~8.5GHz;Max 30dBm	Oct. 17, 2020	Feb. 26, 2021	Oct. 16, 2021	Radiation (03CH06-KS)
EXA Spectrum Analyzer	Keysight	N9010A	MY55150208	10Hz-44GHz	Apr. 14, 2020	Feb. 26, 2021	Apr. 13, 2021	Radiation (03CH06-KS)
Loop Antenna	R&S	HFH2-Z2	100321	9kHz~30MHz	Nov. 01, 2020	Feb. 26, 2021	Oct. 31, 2021	Radiation (03CH06-KS)
Bilog Antenna	TeseQ	CBL6111D	49921	30MHz-1GHz	May 29, 2020	Feb. 26, 2021	May 28, 2021	Radiation (03CH06-KS)
Double Ridge Horn Antenna	ETS-Lindgren	3117	00218652	1GHz~18GHz	Apr. 27, 2020	Feb. 26, 2021	Apr. 26, 2021	Radiation (03CH06-KS)
SHF-EHF Horn	Com-power	AH-840	101115	18GHz~40GHz	Nov. 10, 2020	Feb. 26, 2021	Nov. 09, 2021	Radiation (03CH06-KS)
Amplifier	SONOMA	310N	187289	9KHz ~1GHZ	Apr. 14, 2020	Feb. 26, 2021	Apr. 13, 2021	Radiation (03CH06-KS)
Amplifier	MITEQ	EM18G40GGA	060728	18~40GHz	Jan. 06, 2021	Feb. 26, 2021	Jan. 05, 2022	Radiation (03CH06-KS)
high gain Amplifier	MITEQ	AMF-7D-00101800-30-10P	2025788	1Ghz-18Ghz	Jan. 06, 2021	Feb. 26, 2021	Jan. 05, 2022	Radiation (03CH06-KS)
Amplifier	Keysight	83017A	MY53270203	500MHz~26.5GHz	Apr. 15, 2020	Feb. 26, 2021	Apr. 14, 2021	Radiation (03CH06-KS)
AC Power Source	Chroma	61601	F104090004	N/A	NCR	Feb. 26, 2021	NCR	Radiation (03CH06-KS)
Turn Table	ChamPro	EM 1000-T	060762-T	0~360 degree	NCR	Feb. 26, 2021	NCR	Radiation (03CH06-KS)
Antenna Mast	ChamPro	EM 1000-A	060762-A	1 m~4 m	NCR	Feb. 26, 2021	NCR	Radiation (03CH06-KS)

NCR: No Calibration Required

5 Uncertainty of Evaluation

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI 63.10-2013. All the measurement uncertainty value were shown with a coverage K=2 to indicate 95% level of confidence. The measurement data show herein meets or exceeds the CISPR measurement uncertainty values specified in CISPR 16-4-2 and can be compared directly to specified limit to determine compliance.

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

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

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

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

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

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

Appendix A. Radiated Spurious Emission

2.4GHz 2400~2483.5MHz

WIFI 802.11b (Band Edge @ 3m)

WIFI Ant.	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Path Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
1+2		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11b CH 01 2412MHz		2389.82	57.04	-16.96	74	49.52	33.5	7.47	33.45	128	229	P	H
		2389.95	46.5	-7.5	54	38.98	33.5	7.47	33.45	128	229	A	H
	*	2414	112.09	-	-	104.68	33.37	7.48	33.44	128	229	P	H
	*	2414	109.07	-	-	101.66	33.37	7.48	33.44	128	229	A	H
		2337.17	55.98	-18.02	74	49.19	32.87	7.38	33.46	100	28	P	V
		2389.95	45.65	-8.35	54	38.13	33.5	7.47	33.45	100	28	A	V
	*	2412	107.8	-	-	100.39	33.37	7.48	33.44	100	28	P	V
	*	2414	104.81	-	-	97.4	33.37	7.48	33.44	100	28	A	V
802.11b CH 06 2437MHz		2367.07	55.53	-18.47	74	48.49	33.08	7.41	33.45	102	352	P	H
		2388.52	44.6	-9.4	54	37.08	33.5	7.47	33.45	102	352	A	H
		2494.66	56.17	-17.83	74	49.3	32.73	7.56	33.42	102	352	P	H
		2483.74	44.22	-9.78	54	37.24	32.86	7.55	33.43	102	352	A	H
	*	2436	110.29	-	-	102.99	33.24	7.5	33.44	102	352	P	H
	*	2436	107.12	-	-	99.82	33.24	7.5	33.44	102	352	A	H
		2372.53	55.92	-18.08	74	48.64	33.29	7.44	33.45	114	18	P	V
		2389.95	44.58	-9.42	54	37.06	33.5	7.47	33.45	114	18	A	V
		2490.28	55.05	-18.95	74	48.18	32.73	7.56	33.42	114	18	P	V
		2483.74	44.1	-9.9	54	37.12	32.86	7.55	33.43	114	18	A	V
	*	2436	108.8	-	-	101.5	33.24	7.5	33.44	114	18	P	V
	*	2436	105.68	-	-	98.38	33.24	7.5	33.44	114	18	A	V

WIFI Ant. 1+2	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11b CH 11 2462MHz		2486.26	57.32	-16.68	74	50.33	32.86	7.55	33.42	310	37	P	H
		2483.5	44.84	-9.16	54	37.86	32.86	7.55	33.43	310	37	A	H
	*	2462	111.67	-	-	104.58	32.99	7.53	33.43	310	37	P	H
	*	2460	108.41	-	-	101.32	32.99	7.53	33.43	310	37	A	H
		2484.88	54.93	-19.07	74	47.95	32.86	7.55	33.43	142	16	P	V
		2483.5	44.35	-9.65	54	37.37	32.86	7.55	33.43	142	16	A	V
	*	2462	109.63	-	-	102.54	32.99	7.53	33.43	142	16	P	V
	*	2462	106.4	-	-	99.31	32.99	7.53	33.43	142	16	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

2.4GHz 2400~2483.5MHz

WIFI 802.11b (Harmonic @ 3m)

WIFI Ant. 1+2	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11b CH 01 2412MHz		4824	41.09	-32.91	74	57.13	34.84	10.84	61.72	300	0	P	H
		4824	41.92	-32.08	74	57.96	34.84	10.84	61.72	300	360	P	V
802.11b CH 06 2437MHz		4872	41.97	-32.03	74	57.96	34.83	10.89	61.71	300	0	P	H
		7308	43.37	-30.63	74	55.53	36.39	13.35	61.9	300	0	P	H
		4872	41.96	-32.04	74	57.95	34.83	10.89	61.71	300	360	P	V
		7308	42.53	-31.47	74	54.69	36.39	13.35	61.9	300	360	P	V
802.11b CH 11 2462MHz		4926	41.66	-32.34	74	57.62	34.82	10.93	61.71	300	0	P	H
		7386	43	-31	74	55.05	36.44	13.41	61.9	300	0	P	H
		4926	41.06	-32.94	74	57.02	34.82	10.93	61.71	300	360	P	V
		7386	42.66	-31.34	74	54.71	36.44	13.41	61.9	300	360	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

2.4GHz 2400~2483.5MHz

WIFI 802.11g (Band Edge @ 3m)

WIFI Ant. 1+2	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11g CH 01 2412MHz		2389.43	62.91	-11.09	74	55.39	33.5	7.47	33.45	136	27	P	H
		2389.95	50.08	-3.92	54	42.56	33.5	7.47	33.45	136	27	A	H
	*	2416	110.55	-	-	103.14	33.37	7.48	33.44	136	27	P	H
	*	2416	102.66	-	-	95.25	33.37	7.48	33.44	136	27	A	H
		2387.48	57.16	-16.84	74	49.64	33.5	7.47	33.45	101	309	P	V
		2389.95	46.31	-7.69	54	38.79	33.5	7.47	33.45	101	309	A	V
	*	2414	107.74	-	-	100.33	33.37	7.48	33.44	101	309	P	V
	*	2414	99.45	-	-	92.04	33.37	7.48	33.44	101	309	A	V
802.11g CH 06 2437MHz		2367.46	56.31	-17.69	74	49.27	33.08	7.41	33.45	100	207	P	H
		2389.56	44.96	-9.04	54	37.44	33.5	7.47	33.45	100	207	A	H
		2497	55.27	-18.73	74	48.4	32.73	7.56	33.42	100	207	P	H
		2483.56	44.21	-9.79	54	37.23	32.86	7.55	33.43	100	207	A	H
	*	2432	111.21	-	-	103.91	33.24	7.5	33.44	100	207	P	H
	*	2430	103.32	-	-	96.02	33.24	7.5	33.44	100	207	A	H
		2368.11	56.09	-17.91	74	49.05	33.08	7.41	33.45	101	226	P	V
		2389.95	44.88	-9.12	54	37.36	33.5	7.47	33.45	101	226	A	V
		2489.68	55.43	-18.57	74	48.56	32.73	7.56	33.42	101	226	P	V
		2483.5	44.21	-9.79	54	37.23	32.86	7.55	33.43	101	226	A	V
	*	2432	108.98	-	-	101.68	33.24	7.5	33.44	101	226	P	V
	*	2432	101.01	-	-	93.71	33.24	7.5	33.44	101	226	A	V

WIFI Ant. 1+2	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11g CH 11 2462MHz		2484.58	60.51	-13.49	74	53.53	32.86	7.55	33.43	160	18	P	H
		2483.5	48.23	-5.77	54	41.25	32.86	7.55	33.43	160	18	A	H
	*	2464	111.79	-	-	104.7	32.99	7.53	33.43	160	18	P	H
	*	2464	103.47	-	-	96.38	32.99	7.53	33.43	160	18	A	H
		2484.64	58.02	-15.98	74	51.04	32.86	7.55	33.43	100	227	P	V
		2483.5	46.63	-7.37	54	39.65	32.86	7.55	33.43	100	227	A	V
	*	2458	107.71	-	-	100.62	32.99	7.53	33.43	100	227	P	V
	*	2462	99.83	-	-	92.74	32.99	7.53	33.43	100	227	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

2.4GHz 2400~2483.5MHz

WIFI 802.11g (Harmonic @ 3m)

WIFI Ant. 1+2	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11g CH 01 2412MHz		4824	40.28	-33.72	74	56.32	34.84	10.84	61.72	300	0	P	H
		4824	41.38	-32.62	74	57.42	34.84	10.84	61.72	300	360	P	V
802.11g CH 06 2437MHz		4872	40.71	-33.29	74	56.7	34.83	10.89	61.71	300	0	P	H
		7308	43.23	-30.77	74	55.39	36.39	13.35	61.9	300	0	P	H
		4872	41.44	-32.56	74	57.43	34.83	10.89	61.71	300	360	P	V
		7308	42.45	-31.55	74	54.61	36.39	13.35	61.9	300	360	P	V
802.11g CH 11 2462MHz		4926	40.64	-33.36	74	56.6	34.82	10.93	61.71	300	0	P	H
		7386	42.85	-31.15	74	54.9	36.44	13.41	61.9	300	0	P	H
		4926	40.66	-33.34	74	56.62	34.82	10.93	61.71	300	360	P	V
		7386	42.37	-31.63	74	54.42	36.44	13.41	61.9	300	360	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

2.4GHz 2400~2483.5MHz

WIFI 802.11 ax HE20 Full (Band Edge @ 3m)

WIFI Ant. 1+2	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
		2389.04	64.02	-9.98	74	56.5	33.5	7.47	33.45	185	143	P	H
		2389.95	52.89	-1.11	54	45.37	33.5	7.47	33.45	185	143	A	H
802.11ax	*	2416	113.81	-	-	106.4	33.37	7.48	33.44	185	143	P	H
HE20 Full	*	2416	102.68	-	-	95.27	33.37	7.48	33.44	185	143	A	H
CH 01		2389.69	61.47	-12.53	74	53.95	33.5	7.47	33.45	121	122	P	V
2412MHz		2389.95	49.07	-4.93	54	41.55	33.5	7.47	33.45	121	122	A	V
	*	2416	110.39	-	-	102.98	33.37	7.48	33.44	121	122	P	V
	*	2416	100.45	-	-	93.04	33.37	7.48	33.44	121	122	A	V
		2483.86	63.62	-10.38	74	56.64	32.86	7.55	33.43	351	40	P	H
		2483.5	50.76	-3.24	54	43.78	32.86	7.55	33.43	351	40	A	H
8802.11ax	*	2464	112.23	-	-	105.14	32.99	7.53	33.43	351	40	P	H
HE20 Full	*	2464	101.82	-	-	94.73	32.99	7.53	33.43	351	40	A	H
CH 11		2485.48	61.24	-12.76	74	54.26	32.86	7.55	33.43	145	16	P	V
2462MHz		2483.5	48.43	-5.57	54	41.45	32.86	7.55	33.43	145	16	A	V
	*	2464	111.67	-	-	104.58	32.99	7.53	33.43	145	16	P	V
	*	2464	100.24	-	-	93.15	32.99	7.53	33.43	145	16	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

2.4GHz 2400~2483.5MHz

WIFI 802.11 ax HE40 Full (Band Edge @ 3m)

WIFI Ant. 1+2	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
		2389.82	65.25	-8.75	74	57.73	33.5	7.47	33.45	107	145	P	H
		2389.95	53.79	-0.21	54	46.27	33.5	7.47	33.45	107	145	A	H
		2487.28	55.59	-18.41	74	48.6	32.86	7.55	33.42	107	145	P	H
		2483.62	44.27	-9.73	54	37.29	32.86	7.55	33.43	107	145	A	H
802.11ax	*	2420	108.91	-	-	101.61	33.24	7.5	33.44	107	145	P	H
HE40 Full	*	2420	98.11	-	-	90.81	33.24	7.5	33.44	107	145	A	H
CH 03		2389.17	61.33	-12.67	74	53.81	33.5	7.47	33.45	121	16	P	V
2422MHz		2389.95	50.62	-3.38	54	43.1	33.5	7.47	33.45	121	16	A	V
		2492.26	55.41	-18.59	74	48.54	32.73	7.56	33.42	121	16	P	V
		2483.5	43.96	-10.04	54	36.98	32.86	7.55	33.43	121	16	A	V
	*	2420	107.52	-	-	100.22	33.24	7.5	33.44	121	16	P	V
	*	2420	95.74	-	-	88.44	33.24	7.5	33.44	121	16	A	V
		2382.93	55.91	-18.09	74	48.63	33.29	7.44	33.45	232	9	P	H
		2389.82	44.86	-9.14	54	37.34	33.5	7.47	33.45	232	9	A	H
		2486.8	65.14	-8.86	74	58.15	32.86	7.55	33.42	232	9	P	H
		2484.28	53.57	-0.43	54	46.59	32.86	7.55	33.43	232	9	A	H
802.11ax	*	2456	106.71	-	-	99.62	32.99	7.53	33.43	232	9	P	H
HE40 Full	*	2458	96.68	-	-	89.59	32.99	7.53	33.43	232	9	A	H
CH 09		2382.28	55.15	-18.85	74	47.87	33.29	7.44	33.45	144	15	P	V
2452MHz		2389.82	44.41	-9.59	54	36.89	33.5	7.47	33.45	144	15	A	V
		2484.46	59.75	-14.25	74	52.77	32.86	7.55	33.43	144	15	P	V
		2483.86	47.99	-6.01	54	41.01	32.86	7.55	33.43	144	15	A	V
	*	2464	104.64	-	-	97.55	32.99	7.53	33.43	144	15	P	V
	*	2460	93.51	-	-	86.42	32.99	7.53	33.43	144	15	A	V

Remark

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

2.4GHz 2400~2483.5MHz

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

WIFI Ant. 1+2	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
		2389.43	63.22	-10.78	74	55.7	33.5	7.47	33.45	100	208	P	H
802.11ax		2389.82	45.29	-8.71	54	37.77	33.5	7.47	33.45	100	208	A	H
HE20		2408	113.34	-	-	105.93	33.37	7.48	33.44	100	208	P	H
Partial		2408	103.78	-	-	96.37	33.37	7.48	33.44	100	208	A	H
106/53		2388.26	60.82	-13.18	74	53.3	33.5	7.47	33.45	119	16	P	V
CH 01		2389.43	44.87	-9.13	54	37.35	33.5	7.47	33.45	119	16	A	V
2412MHz		2404	113.38	-	-	105.97	33.37	7.48	33.44	119	16	P	V
		2408	102.51	-	-	95.1	33.37	7.48	33.44	119	16	A	V
		2483.8	69.04	-4.96	74	62.06	32.86	7.55	33.43	304	39	P	H
802.11ax		2483.62	47.88	-6.12	54	40.9	32.86	7.55	33.43	304	39	A	H
HE20		2466	112.41	-	-	105.32	32.99	7.53	33.43	304	39	P	H
Partial		2466	102.4	-	-	95.31	32.99	7.53	33.43	304	39	A	H
106/54		2483.5	64.14	-9.86	74	57.16	32.86	7.55	33.43	102	15	P	V
CH 11		2483.56	44.81	-9.19	54	37.83	32.86	7.55	33.43	102	15	A	V
2462MHz		2464	112.09	-	-	105	32.99	7.53	33.43	102	15	P	V
		2468	100.99	-	-	93.9	32.99	7.53	33.43	102	15	A	V

2.4GHz 2400~2483.5MHz

WIFI 802.11ax HE40 Partial 242 (Band Edge @ 3m)

WIFI Ant. 1+2	Note	Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
		2387.74	70.24	-3.76	74	62.72	33.5	7.47	33.45	108	209	P	H
		2389.95	48.57	-5.43	54	41.05	33.5	7.47	33.45	108	209	A	H
		2496.4	55.12	-18.88	74	48.25	32.73	7.56	33.42	108	209	P	H
802.11ax		2484.16	43.81	-10.19	54	36.83	32.86	7.55	33.43	108	209	A	H
HE40		2418	108.94	-	-	101.53	33.37	7.48	33.44	108	209	P	H
Partial		2418	99.25	-	-	91.84	33.37	7.48	33.44	108	209	A	H
242/61		2388.26	68.89	-5.11	74	61.37	33.5	7.47	33.45	120	18	P	V
CH 03		2389.95	46.52	-7.48	54	39	33.5	7.47	33.45	120	18	A	V
2422MHz		2485.84	56.78	-17.22	74	49.79	32.86	7.55	33.42	120	18	P	V
		2484.22	43.83	-10.17	54	36.85	32.86	7.55	33.43	120	18	A	V
		2418	108.8	-	-	101.39	33.37	7.48	33.44	120	18	P	V
		2418	97.95	-	-	90.54	33.37	7.48	33.44	120	18	A	V
		2389.3	56.75	-17.25	74	49.23	33.5	7.47	33.45	267	24	P	H
		2389.69	44.79	-9.21	54	37.27	33.5	7.47	33.45	267	24	A	H
		2485.12	71.53	-2.47	74	64.55	32.86	7.55	33.43	267	24	P	H
802.11ax		2484.4	50.59	-3.41	54	43.61	32.86	7.55	33.43	267	24	A	H
HE40		2458	110.06	-	-	102.97	32.99	7.53	33.43	267	24	P	H
Partial		2458	99.38	-	-	92.29	32.99	7.53	33.43	267	24	A	H
242/62		2389.95	56.9	-17.1	74	49.38	33.5	7.47	33.45	104	17	P	V
CH 09		2386.05	44.43	-9.57	54	36.91	33.5	7.47	33.45	104	17	A	V
2452MHz		2483.5	62.52	-11.48	74	55.54	32.86	7.55	33.43	104	17	P	V
		2483.5	45.1	-8.9	54	38.12	32.86	7.55	33.43	104	17	A	V
		2466	106.62	-	-	99.53	32.99	7.53	33.43	104	17	P	V
		2462	96.23	-	-	89.14	32.99	7.53	33.43	104	17	A	V

Emission below 1GHz

2.4GHz WIFI 802.11ax HE40 (LF)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1+2		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
2.4GHz 802.11ax HE40 LF		30	21.76	-18.24	40	28.76	25	0.7	32.7	-	-	P	H
		120.21	29.45	-14.05	43.5	43.82	16.92	1.57	32.86	100	0	P	H
		217.21	30.81	-15.19	46	45.18	16.54	2.19	33.1	-	-	P	H
		265.71	26.21	-19.79	46	38.05	18.75	2.45	33.04	-	-	P	H
		301.6	19.49	-26.51	46	30.42	19.35	2.62	32.9	-	-	P	H
		756.53	26.85	-19.15	46	29.34	25.93	4.25	32.67	-	-	P	H
		33.88	29.85	-10.15	40	38.52	23.42	0.76	32.85	-	-	P	V
		69.77	30.78	-9.22	40	49.44	13.2	1.14	33	100	360	P	V
		139.61	26.56	-16.94	43.5	40.03	17.63	1.72	32.82	-	-	P	V
		221.09	26.26	-19.74	46	39.54	17.61	2.21	33.1	-	-	P	V
		264.74	29.57	-16.43	46	40.53	19.64	2.44	33.04	-	-	P	V
		549.92	25.68	-20.32	46	28.78	25.9	3.6	32.6	-	-	P	V
Remark	1. No other spurious found. 2. All results are PASS against limit line.												

Note symbol

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

A calculation example for radiated spurious emission is shown as below:

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1+2		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11b CH 01 2412MHz		2390	55.45	-18.55	74	54.51	32.22	4.58	35.86	103	308	P	H
		2390	43.54	-10.46	54	42.6	32.22	4.58	35.86	103	308	A	H

1. Path Loss(dB) = Cable loss(dB) + Filter loss(dB) + Attenuator loss(dB)
2. Level(dBμV/m) =

Antenna Factor(dB/m) + Path Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)

3. Over Limit(dB) = Level(dBμV/m) – Limit Line(dBμV/m)

For Peak Limit @ 2390MHz:

1. Level(dBμV/m)

= Antenna Factor(dB/m) + Path Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)

= 32.22(dB/m) + 4.58(dB) + 54.51(dBμV) – 35.86 (dB)

= 55.45 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 55.45(dBμV/m) – 74(dBμV/m)

= -18.55(dB)

For Average Limit @ 2390MHz:

1. Level(dBμV/m)

= Antenna Factor(dB/m) + Path Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)

= 32.22(dB/m) + 4.58(dB) + 42.6(dBμV) – 35.86 (dB)

= 43.54 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 43.54(dBμV/m) – 54(dBμV/m)

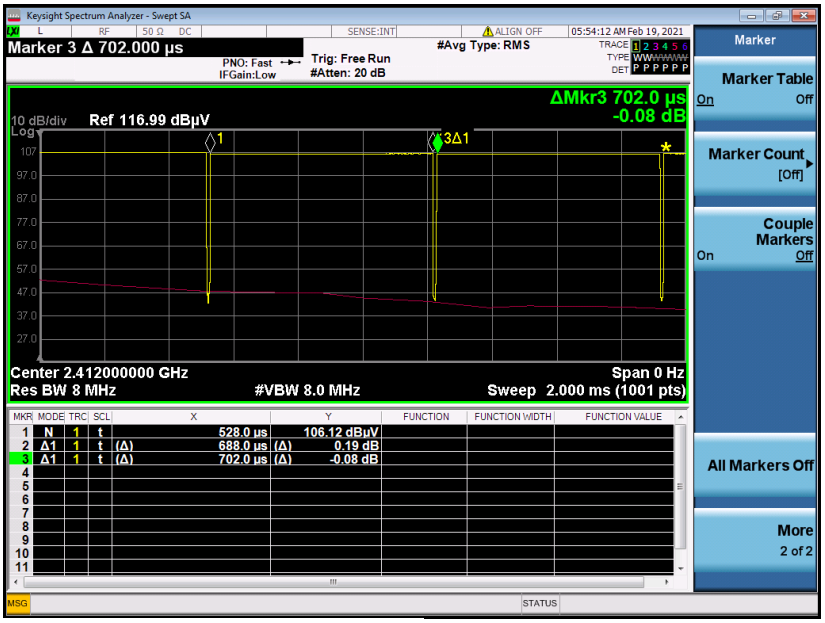
= -10.46(dB)

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

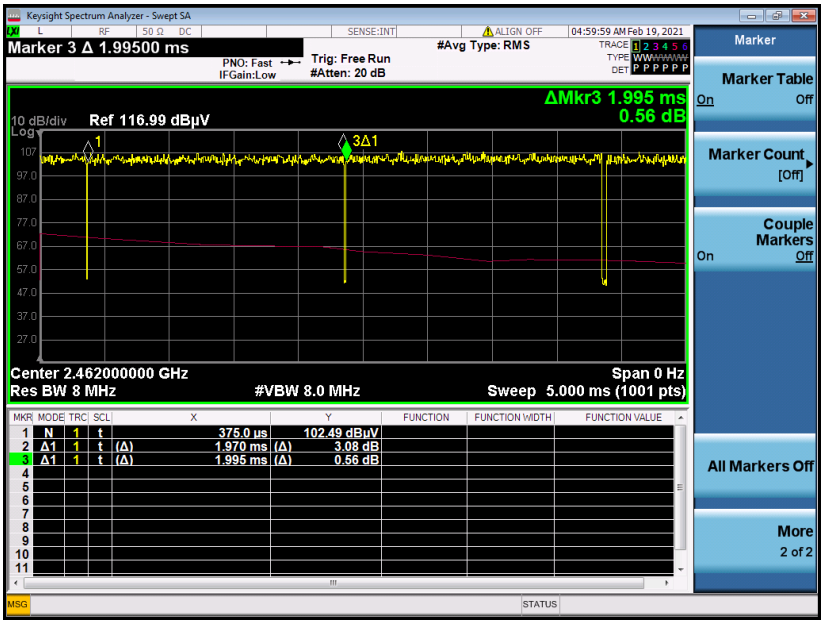
Appendix B. Duty Cycle Plots

Antenna	Band	Duty Cycle(%)	T(ms)	1/T(kHz)	VBW Setting
1+2	802.11b	98.00	-	-	10Hz
1+2	802.11g	98.75	-	-	10Hz
1+2	802.11ax HE20	100	-	-	10Hz
1+2	802.11ax HE40	100	-	-	10Hz

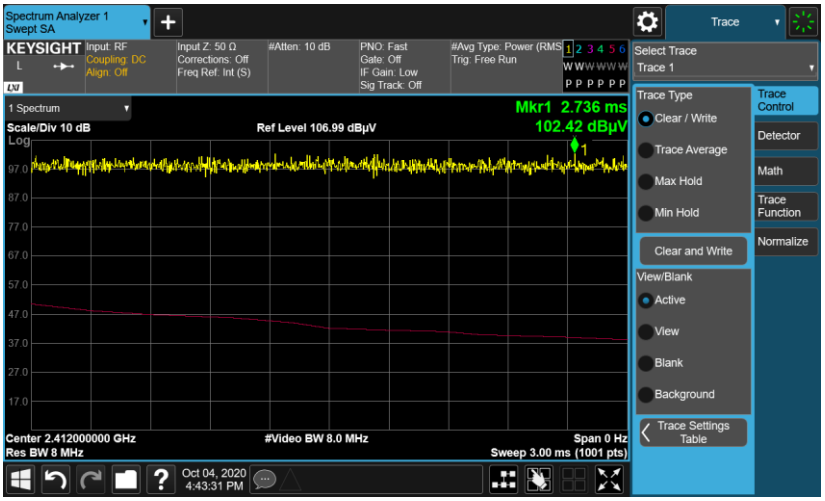
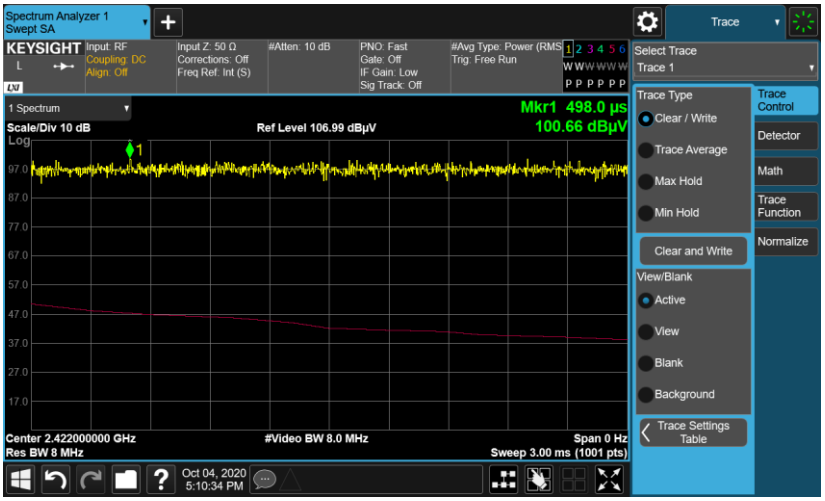
802.11b



802.11g



802.11ax HE20



802.11ax HE40