FCC Test Report

Product Name	IEEE802.11a/b/g/n 2.4+5GHz 1T1R Wi-Fi IoT Module
Model No	ITM-1066A
FCC ID	2AWP5WM1066A

Applicant	IOTTECH Corporation
Address	No.10-1, Shijian Rd., Hukou Township, Hsinchu County 30352, Taiwan (R.O.C.)

Date of Receipt	Jun. 05, 2020
Issued Date	Aug. 17, 2020
Report No.	2060198R-E3032110124
Report Version	V1.0

The test results relate only to the samples tested.
The test results shown in the test report are traceable to the national/international standard through the calibration of the equipment and evaluated measurement uncertainty herein.
The test results shown in the test report are traceable to the national/international standard through the calibration report of the equipment and evaluated measurement uncertainty herein.
This report must not be used to claim product endorsement by TAF or any agency of the government.
The test report shall not be reproduced without the written approval of DEKRA Testing and Certification Co., Ltd.
Measurement uncertainties evaluated for each testing system and associated connections are given here to provide the system information for reference. Compliance determinations do not take into account measurement uncertainties for each testing system, but are based on the results of the compliance measurement.

Test Report

Issued Date: Aug. 17, 2020
Report No.: 2060198R-E3032110124

Product Name	IEEE802.11a/b/g/n 2.4+5GHz 1T1R Wi-Fi IoT Module
Applicant	IOTTECH Corporation
Address	No.10-1, Shijian Rd., Hukou Township, Hsinchu County 30352, Taiwan (R.O.C.)
Manufacturer	IOTTECH Corporation
Model No.	ITM-1066A
FCC ID.	2AWP5WM1066A
EUT Rated Voltage	DC 3.3V
EUT Test Voltage	DC 3.3V
Trade Name	IOTTECH
Applicable Standard	FCC CFR Title 47 Part 15 Subpart E ANSI C63.4: 2014, ANSI C63.10: 2013 KDB Publication 789033
Test Result	Complied

Documented By : April Chen

(Senior Adm. Specialist / April Chen)

Tested By : Yun Che Chen

(Engineer / Yunche Chen)

Approved By :

(Director / Vincent Lin)

TABLE OF CONTENTS

Description Page

Revision History

Report No.	Version	Description	Issued Date
2060198R-E3032110124	V1.0	Initial issue of report.	2020-08-17

1. GENERAL INFORMATION

1.1. EUT Description

Product Name	IEEE802.11a/b/g/n 2.4+5GHz 1T1R Wi-Fi IoT Module
Trade Name	IOTTECH
FCC ID.	2AWP5WM1066A
Model No.	ITM-1066A
Frequency Range	802.11a/n-20MHz: 5180-5240MHz, 5745-5825MHz 802.11n-40MHz: 5190-5230MHz, 5755-5795MHz
Number of Channels	802.11a/n-20MHz: 9, 802.11n-40MHz: 4
Data Rate	802.11a: 6 - 54Mbps 802.11n: up to 150Mbps
Channel Control	Auto
Type of Modulation	802.11a/n: OFDM, BPSK, QPSK, 16QAM, 64QAM
Antenna Type	PCB Antenna
Antenna Gain	Refer to the table “Antenna List”

Antenna List

No.	Manufacturer	Part No.	Antenna Type	Peak Gain
1	IOTTECH	ITM-1066A	PCB Antenna	-1.840dBi for 5.150-5.250 GHz 0.745dBi for 5.725~5.825GHz

Note: The antenna of EUT is conform to FCC 15.203.

802.11a/n-20MHz Center Working Frequency of Each Channel:

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
Channel 36:	5180 MHz	Channel 40:	5200 MHz	Channel 44:	5220 MHz	Channel 48:	5240 MHz
Channel 149:	5745 MHz	Channel 153:	5765 MHz	Channel 157:	5785 MHz	Channel 161:	5805 MHz
Channel 165:	5825 MHz						

802.11n-40MHz Center Working Frequency of Each Channel:

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
Channel 38:	5190 MHz	Channel 46:	5230 MHz	Channel 151:	5755 MHz	Channel 159:	5795 MHz

Note:

1. This device is an IEEE802.11a/b/g/n 2.4+5GHz 1T1R Wi-Fi IoT Module with a built-in 2.4GHz and 5GHz WLAN transceiver , this report for 5GHz WLAN.
2. The radiation measurements are performed in X, Y, Z axis positioning. Only the worst case is shown in the report.
3. Regarding to the operation frequency, the lowest, middle and highest frequency are selected to perform the test.
4. Lowest and highest data rates are tested in each mode. Only worst case is shown in the report.
5. These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15 Subpart E for Unlicensed National Information Infrastructure devices.

Test Mode	Mode 1: Transmit (802.11a-6Mbps) Mode 2: Transmit (802.11n-20BW 7.2Mbps) Mode 3: Transmit (802.11n-40BW 15Mbps)

1.2. Operational Description

The EUT is an IEEE802.11a/b/g/n 2.4+5GHz 1T1R Wi-Fi IoT Module, The device provided of eight kinds of transmitting speed 6, 9, 12, 18, 24, 36, 48 and 54Mbps the device of RF carrier is BPSK, QPSK, 16QAM and 64QAM (IEEE 802.11a).

The device provided of eight kinds of transmitting speed 7.2、14.4、21.7、28.9、43.3、57.8、65 and 72.2Mbps in 802.11n(20BW) mode and 15、30、45、60、90、120、135 and 150Mbps(40BW) mode the device of RF carrier is BPSK, QPSK, 16QAM and 64QAM(IEEE 802.11n), the IEEE 802.11n is Single In, Single Out" (SISO) technology.

The device adapts direct sequence spread spectrum modulation. The antenna provides diversity function to improve the receiving function and the antennas to support 1(Transmit) × 1 (Receive) SISO technology.

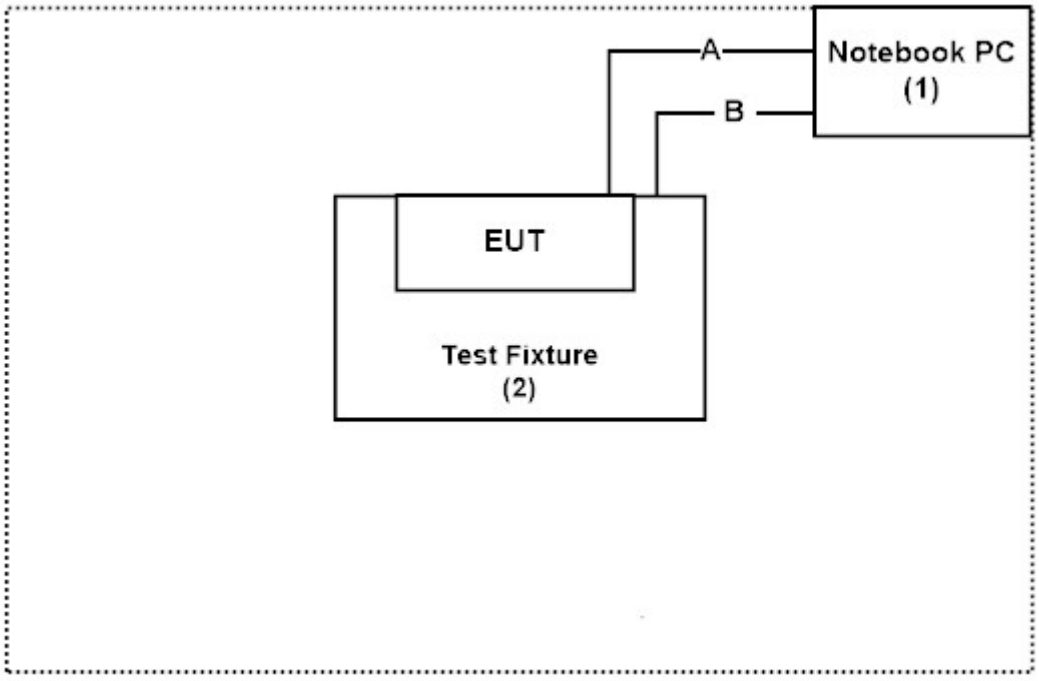
1.3. Tested System Datails

The types for all equipment, plus descriptions of all cables used in the tested system (including inserted cards) are:

	Product	Manufacturer	Model No.	Serial No.	Power Cord
1	Notebook PC	DELL	Latitude 5580	GDZN7H2	Non-Shielded, 0.8m
2	Test Fixture	Brickcom Corporation	N/A	N/A	N/A

Signal Cable Type		Signal cable Description
A	USB Cable	Non-shielded, 1.7m
B	Signal Cable	Non-shielded, 1.7m

1.4. Configuration of tested System



1.5. EUT Exercise Software

1. Setup the EUT as shown in Section 1.4.
2. Execute software “Tera Tern ver. 4.99” on the EUT.
3. Configure the test mode, the test channel, and the data rate.
4. Press “OK” to start the continuous Transmit.
5. Verify that the EUT works properly.

1.6. Test Facility

Ambient conditions in the laboratory:

Performed Item	Items	Required	Actual
Conducted Emission	Temperature (°C)	10~40 °C	25.6 °C
	Humidity (%RH)	10~90 %	49 %
Radiated Emission	Temperature (°C)	10~40 °C	27.8 °C
	Humidity (%RH)	10~90 %	80 %
Conductive	Temperature (°C)	10~40 °C	28.4 °C
	Humidity (%RH)	10~90 %	62.6 %

USA : FCC Registration Number: TW3023
Canada : IC Registration Number: 4075A

Site Description: Accredited by TAF
Accredited Number: 3023

Test Laboratory: DEKRA Testing and Certification Co., Ltd
Address: No.5-22, Ruishukeng, Linkou Dist., New Taipei City 24451, Taiwan, R.O.C.
Phone number: 886-2-8601-3788
Fax number: 886-2-8601-3789
Email address: info.tw@dekra.com
Website: http://www.dekra.com.tw

1.7. List of Test Equipment

For Conducted measurements /CB3/SR8

	Equipment	Manufacturer	Model No.	Serial No.	Cali. Date	Due. Date
	Temperature Chamber	WIT GROUP	TH-1S-B	EQ-201-00146	2020/04/06	2021/04/05
X	Spectrum Analyzer	Agilent	N9010A	MY53470892	2019/09/25	2020/09/24
X	Peak Power Analyzer	Keysight	8990B	MY51000410	2019/07/30	2020/07/29
X	Wideband Power Sensor	Keysight	N1923A	MY56080003	2019/07/30	2020/07/29
X	Wideband Power Sensor	Keysight	N1923A	MY56080004	2019/07/30	2020/07/29
X	EMI Test Receiver	R&S	ESCS 30	100369	2019/11/27	2020/11/26
X	LISN	R&S	ENV216	101105	2020/04/27	2021/04/26
X	LISN	R&S	ESH3-Z5	836679/014	2020/04/26	2021/04/25
X	Coaxial Cable	DEKRA	RG 400	LC018-RG	2020/06/19	2021/06/18

Note:

1. All equipments are calibrated every one year.
2. The test instruments marked with “X” are used to measure the final test results.
3. Test Software version : DEKRA Conduction Test SystemV9.0.5.

For Radiated measurements /Site3/CB8

	Equipment	Manufacturer	Model No.	Serial No.	Cali. Date	Due. Date
X	Test Receiver	R&S	ESR7	101602	2019/12/16	2020/12/15
X	Signal Analyzer	R&S	FSV40	101869	2020/06/24	2021/06/23
X	Loop Antenna	Teseq	HLA6121	37133	2019/10/15	2021/10/14
X	Bilog Antenna	Schaffner Chase	CBL6112B	2916	2020/01/20	2021/01/19
X	Coaxial Cable	DEKRA	L1907-001C	280280.F141.1000D	2019/07/09	2020/07/08
X	Amplifier	EMCI	EMC001330	980254	2020/06/11	2021/06/10
X	Horn Antenna	ETS-LINDGREN	3117	00228113	2020/05/28	2021/05/27
X	Coaxial Cable	DEKRA	L1907-002C	280280.F141.1000D	2019/07/09	2020/07/08
X	Amplifier	EMCI	EMC05820SE	980361	2019/09/23	2020/09/22
X	Amplifier	EMCI	EMC051845SE	980632	2019/08/08	2020/08/07
	Amplifier	SGH	PRAMP118	20200202	2020/03/17	2021/03/16
X	Horn Antenna	Com-Power	AH-1840	101101	2019/10/31	2020/10/30
X	Amplifier + Cable	EMCI	EMC184045SE	980369	2020/04/23	2021/04/22
	Bilog Antenna	Schaffner Chase	CBL6112B	2925	2020/02/20	2021/02/19
	Coaxial Cable	DEKRA	L1907-003C	00100A1B3A120M	2020/07/09	2021/07/08
	Amplifier	EMCI	EMC001330	980255	2020/03/17	2021/03/16
	Filter	MICRO-TRONICS	BRM50702	G270	2019/08/08	2020/08/07
X	Filter	MICRO-TRONICS	BRM50716	G196	2019/08/08	2020/08/07

Note:

1. Loop Antenna is calibrated every two years, the other equipments are calibrated every one year.
2. The test instruments marked with “X” are used to measure the final test results.
3. Test Software version : DEKRA Test SystemV1.1.

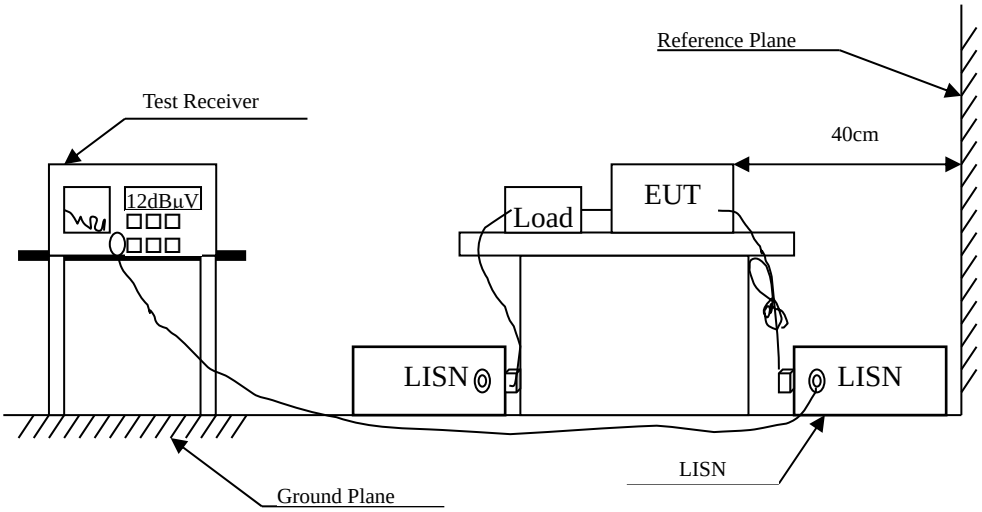
1.8. Uncertainty

Uncertainties have been calculated according to the DEKRA internal document, and is described in each test chapter of this report.
The reported expanded uncertainties are based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95%.
Measurement uncertainties evaluated for each testing system and associated connections are given here to provide the system information for reference. Compliance determinations do not take into account measurement uncertainties for each testing system, but are based on the results of the compliance measurement.

Test item	**Uncertainty**	
Conducted Emission	±3.42 dB	
Maximun conducted output power	Power Meter ±0.89dB	Spectrum Analyzer ±2.06dB
Power Density	±2.06dB	
Radiated Emission	9kHz~30MHz: ±3.88dB 30MHz~1GHz: ±4.06dB 1GHz~18GHz: ±3.71dB 18GHz~40GHz: ±3.73dB 40GHz~50GHz: ±3.75dB 50GHz~325GHz: ±4.39dB	
Band Edge	9kHz~30MHz: ±3.88dB 30MHz~1GHz: ±4.06dB 1GHz~18GHz: ±3.71dB 18GHz~40GHz: ±3.73dB 40GHz~50GHz: ±3.75dB 50GHz~325GHz: ±4.39dB	
Occupied Bandwidth	±1544.74Hz	
Duty Cycle	±2.31msec	

2. Conducted Emission

2.1. Test Setup



2.2. Limits

FCC Part 15 Subpart C Paragraph 15.207 (dBµV) Limit		
Frequency MHz	Limits	
	QP	AV
0.15 - 0.50	66-56	56-46
0.50-5.0	56	46
5.0 - 30	60	50

Remarks : In the above table, the tighter limit applies at the band edges.

2.3. Test Procedure

The EUT and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm /50uH coupling impedance with 50ohm termination. (Please refers to the block diagram of the test setup and photographs.)

Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4:2014 on conducted measurement.

Conducted emissions were invested over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.

2.4. Test Result of Conducted Emission

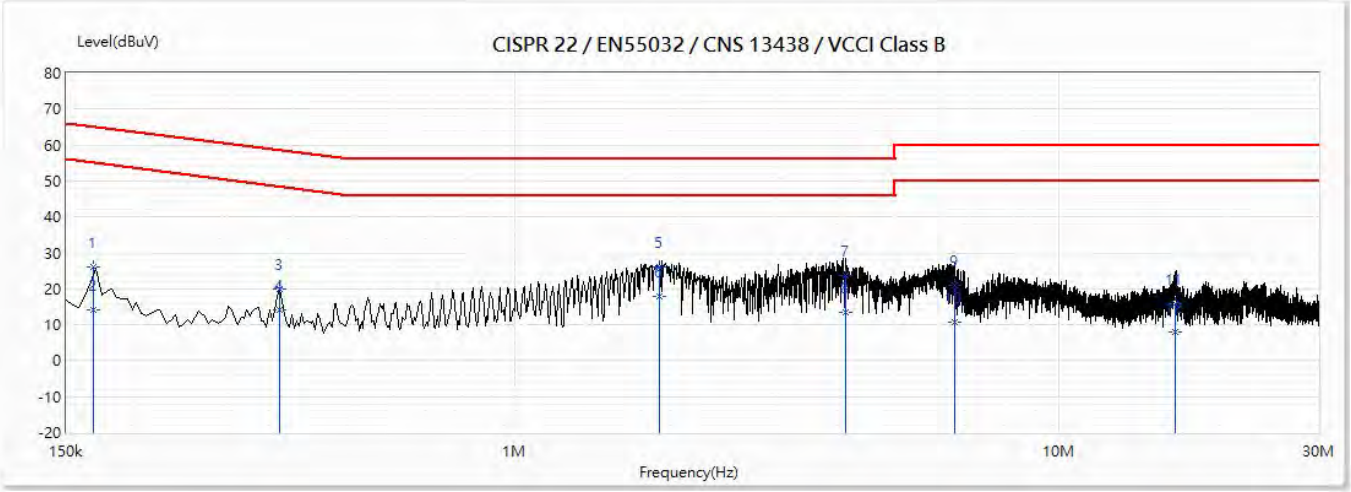
Product : IEEE802.11a/b/g/n 2.4+5GHz 1T1R Wi-Fi IoT Module

Test Item : Conducted Emission Test

Test Mode : Mode 3: Transmit (802.11n-40BW 15Mbps) (5190MHz)

Test Date : 2020/07/07

Line1



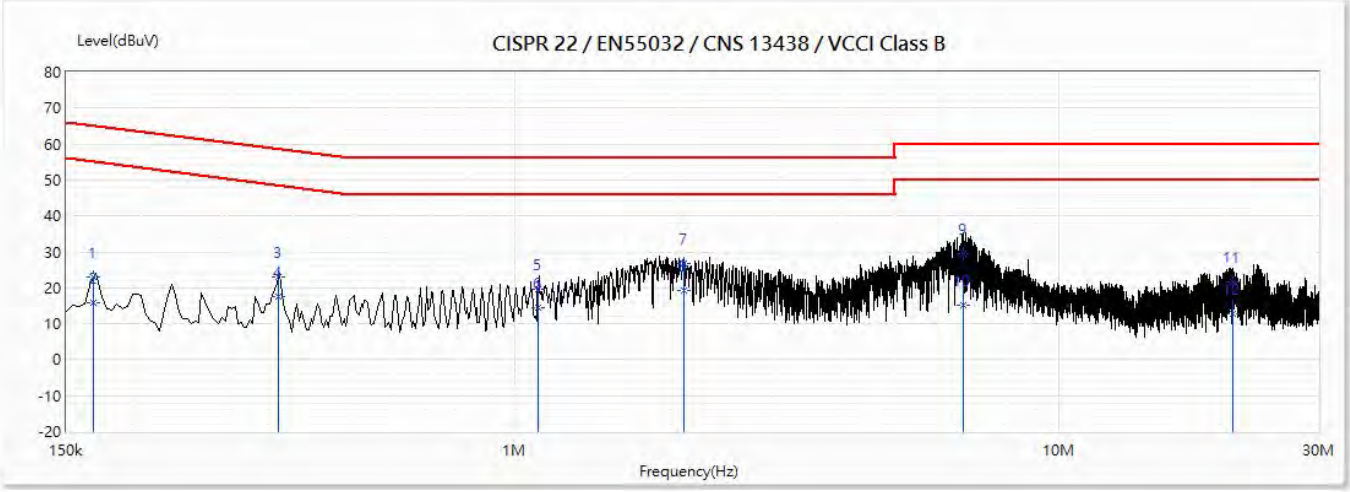
No	Frequency (MHz)	Emission Level (dBuV)	Limit (dBuV)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	0.168	26.10	65.07	-38.98	16.29	9.81	QP
2	0.168	14.10	55.07	-40.97	4.30	9.81	AV
3	0.369	19.88	58.53	-38.65	10.08	9.80	QP
4	0.369	14.01	48.53	-34.52	4.21	9.80	AV
5	1.846	25.97	56.00	-30.03	16.13	9.84	QP
*6	1.846	18.04	46.00	-27.96	8.20	9.84	AV
7	4.052	23.67	56.00	-32.33	13.76	9.92	QP
8	4.052	13.28	46.00	-32.72	3.36	9.92	AV
9	6.448	21.10	60.00	-38.90	11.12	9.98	QP
10	6.448	10.60	50.00	-39.40	0.62	9.98	AV
11	16.328	15.99	60.00	-44.01	5.83	10.17	QP
12	16.328	8.12	50.00	-41.88	-2.05	10.17	AV

Remark:

1. "*" means this data is the worst emission level;"!" means this data is over limit.
2. Emission Level=Reading Level + Correct Factor(Correct Factor=LISN Factor+Cable Loss).
3. Margin=Emission Level-Limit

Product	:	IEEE802.11a/b/g/n 2.4+5GHz 1T1R Wi-Fi IoT Module
Test Item	:	Conducted Emission Test
Test Mode	:	Mode 3: Transmit (802.11n-40BW 15Mbps) (5190MHz)
Test Date	:	2020/07/07

N



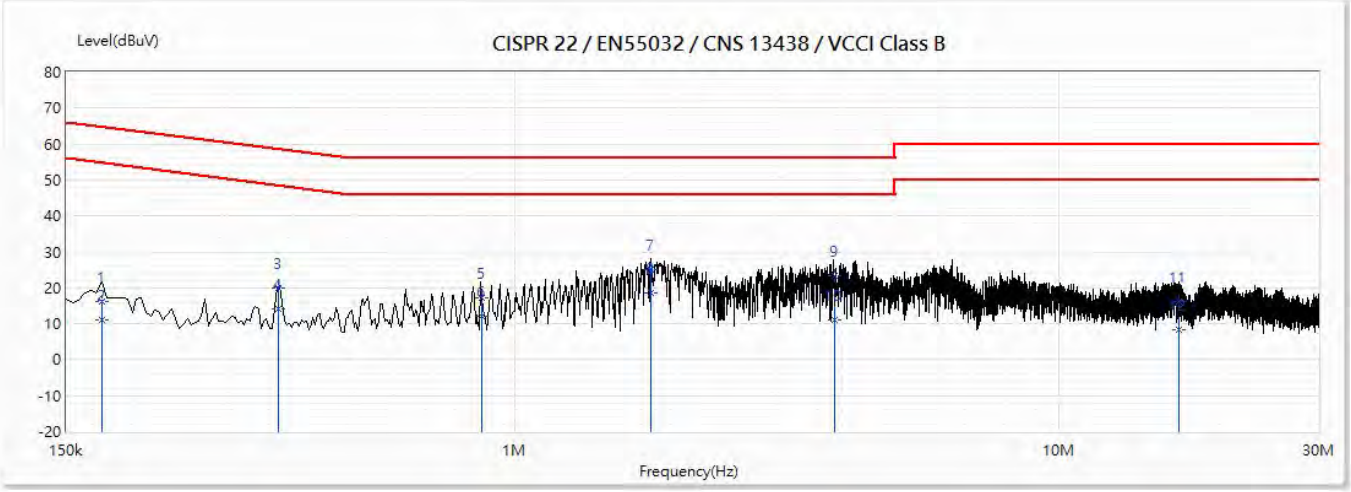
No	Frequency (MHz)	Emission Level (dBuV)	Limit (dBuV)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	0.168	23.07	65.05	-41.97	13.29	9.79	QP
2	0.168	15.90	55.05	-39.14	6.12	9.79	AV
3	0.369	22.88	58.53	-35.65	13.09	9.79	QP
4	0.369	17.65	48.53	-30.88	7.86	9.79	AV
5	1.105	19.72	56.00	-36.28	9.93	9.79	QP
6	1.105	14.34	46.00	-31.66	4.55	9.79	AV
7	2.044	26.69	56.00	-29.31	16.84	9.84	QP
*8	2.044	19.28	46.00	-26.72	9.44	9.84	AV
9	6.667	29.61	60.00	-30.39	19.63	9.98	QP
10	6.667	15.25	50.00	-34.75	5.27	9.98	AV
11	20.819	21.74	60.00	-38.26	11.38	10.36	QP
12	20.819	12.61	50.00	-37.39	2.25	10.36	AV

Remark:

1. "*" means this data is the worst emission level;"!" means this data is over limit.
2. Emission Level=Reading Level + Correct Factor(Correct Factor=LISN Factor+Cable Loss).
3. Margin=Emission Level-Limit

Product	:	IEEE802.11a/b/g/n 2.4+5GHz 1T1R Wi-Fi IoT Module
Test Item	:	Conducted Emission Test
Test Mode	:	Mode 3: Transmit (802.11n-40BW 15Mbps) (5795MHz)
Test Date	:	2020/07/07

Line1



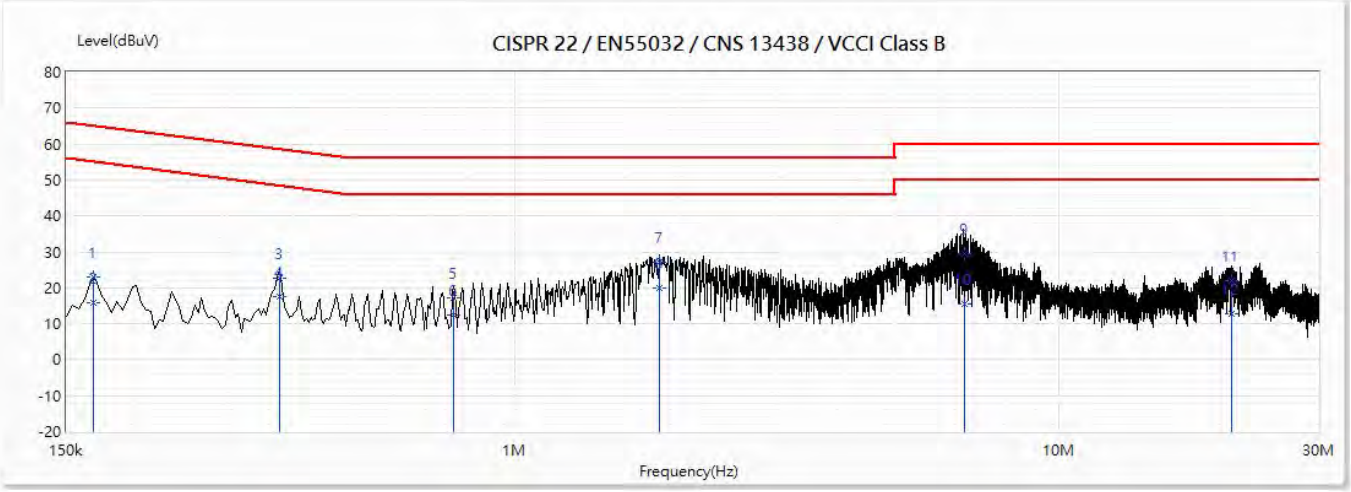
No	Frequency (MHz)	Emission Level (dBuV)	Limit (dBuV)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	0.174	16.24	64.77	-48.53	6.43	9.81	QP
2	0.174	11.15	54.77	-43.62	1.34	9.81	AV
3	0.368	19.92	58.54	-38.62	10.12	9.80	QP
4	0.368	14.00	48.54	-34.54	4.20	9.80	AV
5	0.869	17.12	56.00	-38.88	7.32	9.80	QP
6	0.869	11.98	46.00	-34.02	2.18	9.80	AV
7	1.774	25.07	56.00	-30.93	15.23	9.84	QP
*8	1.774	18.53	46.00	-27.47	8.69	9.84	AV
9	3.863	23.19	56.00	-32.81	13.28	9.91	QP
10	3.863	11.11	46.00	-34.89	1.20	9.91	AV
11	16.62	16.19	60.00	-43.81	6.03	10.17	QP
12	16.62	8.46	50.00	-41.54	-1.71	10.17	AV

Remark:

1. "*" means this data is the worst emission level;"!" means this data is over limit.
2. Emission Level=Reading Level + Correct Factor(Correct Factor=LISN Factor+Cable Loss).
3. Margin=Emission Level-Limit

Product	:	IEEE802.11a/b/g/n 2.4+5GHz 1T1R Wi-Fi IoT Module
Test Item	:	Conducted Emission Test
Test Mode	:	Mode 3: Transmit (802.11n-40BW 15Mbps) (5795MHz)
Test Date	:	2020/07/07

N



No	Frequency (MHz)	Emission Level (dBuV)	Limit (dBuV)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	0.168	23.12	65.05	-41.93	13.33	9.79	QP
2	0.168	15.81	55.05	-39.24	6.03	9.79	AV
3	0.369	22.82	58.52	-35.70	13.03	9.79	QP
4	0.369	17.70	48.52	-30.82	7.91	9.79	AV
5	0.771	17.31	56.00	-38.69	7.52	9.79	QP
6	0.771	12.57	46.00	-33.43	2.78	9.79	AV
7	1.845	27.09	56.00	-28.91	17.26	9.83	QP
*8	1.845	19.99	46.00	-26.01	10.16	9.83	AV
9	6.689	29.59	60.00	-30.41	19.61	9.98	QP
10	6.689	15.62	50.00	-34.38	5.63	9.98	AV
11	20.72	22.02	60.00	-37.98	11.66	10.36	QP
12	20.72	12.75	50.00	-37.25	2.39	10.36	AV

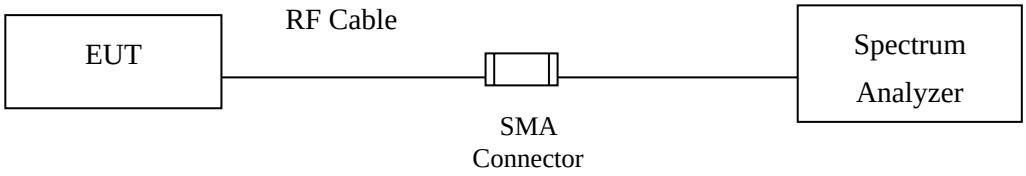
Remark:

1. "*" means this data is the worst emission level;"!" means this data is over limit.
2. Emission Level=Reading Level + Correct Factor(Correct Factor=LISN Factor+Cable Loss).
3. Margin=Emission Level-Limit

3. Maximun conducted output power

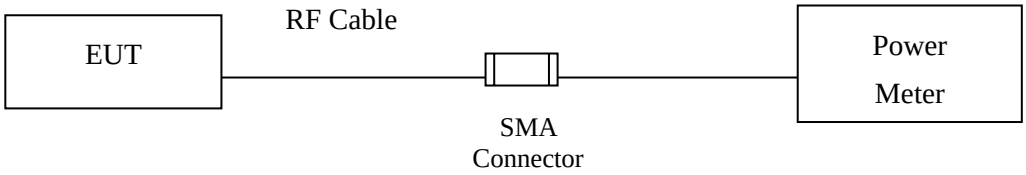
3.1. Test Setup

99% Occupied Bandwidth

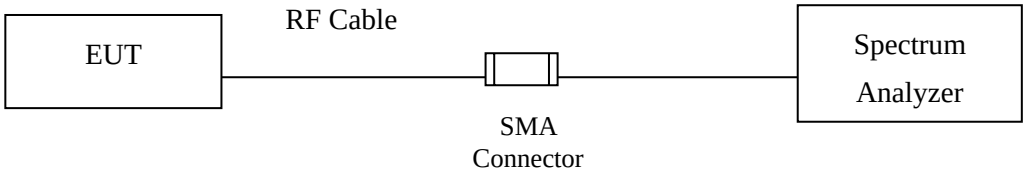


Conduction Power Measurement

Conduction Power Measurement (for 802.11an)



Conduction Power Measurement (for 802.11ac)



3.2. Limits

For the band 5.15-5.25 GHz,

(i) For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. provided the maximum antenna gain does not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).

(ii) For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(iii) For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. Fixed point-topoint U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power is required for each 1 dB of antenna gain in excess of 23 dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

(iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm 10 log B, where B is the 99% emission bandwidth in megahertz. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point UNII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

3.3. Test Procedure

As an alternative to FCC KDB-789033, the EUT maximum conducted output power was measured with an average power meter employing a video bandwidth greater the 6dB BW of the emission under test. Maximum conducted output power was read directly from the meter across all data rates, and across three channels within each sub-band. Special care was used to make sure that the EUT was transmitting in continuous mode. This method exceeds the limitations of FCC KDB-789033, and provides more accurate measurements.

802.11an (BW≦40MHz) Maximum conducted output power using KDB 789033 section E)3)b) Method PM-G (Measurement using a gated RF average power meter)
Note: the power meter have a video bandwidth that is greater than or equal to the measurement bandwidth, (Anritsu/ MA2411B video bandwidth: 65MHz)

802.11ac (BW=80MHz) Maximum conducted output power using KDB 789033 section E)2)b) Method SA-1 (trace averaging with the EUT transmitting at full power throughout each sweep).

When transmitted signals consist of two or more non-contiguous spectrum segments (e.g., 80+80 MHz mode) or when a single spectrum segment of a transmission crosses the boundary between two adjacent U-NII bands, KDB 644545 D03 section D) procedure is used for measurements.

3.4. Test Result of Maximum conducted output power

Product : IEEE802.11a/b/g/n 2.4+5GHz 1T1R Wi-Fi IoT Module
Test Item : Maximum conducted output power
Test Mode : Mode 1: Transmit (802.11a-6Mbps)
Test Date : 2020/06/18

Cable loss=1dB		Maximum conducted output power							
Channel No.	Frequency (MHz)	Data Rate (Mbps)							
		6	9	12	18	24	36	48	54
		Measurement Level (dBm)							
36	5180	13.57	--	--	--	--	--	--	--
44	5220	13.67	13.61	13.58	13.51	13.46	13.34	13.27	13.22
48	5240	13.7	--	--	--	--	--	--	--
149	5745	13.81	--	--	--	--	--	--	--
157	5785	13.81	13.69	13.6	13.56	13.48	13.4	13.32	13.21
165	5825	13.75	--	--	--	--	--	--	--

Note: Maximum conducted output power Value =Reading value on average power meter + cable loss

Maximum conducted output power Measurement:

Channel No	Frequency Range (MHz)	26dB Bandwidth (MHz)	Output Power (dBm)	Output Power Limit	
				(dBm)	dBm+10log(BW)
36	5180	--	13.57	24	--
44	5220	--	13.67	24	--
48	5240	--	13.7	24	--
149	5745	--	13.81	30	--
157	5785	--	13.81	30	--
165	5825	--	13.75	30	--

Note: Power Output Value =Reading value on average power meter + cable loss

Product : IEEE802.11a/b/g/n 2.4+5GHz 1T1R Wi-Fi IoT Module
Test Item : Maximum conducted output power
Test Mode : Mode 2: Transmit (802.11n-20BW 7.2Mbps)
Test Date : 2020/06/18

Cable loss=1dB		Maximum conducted output power							
Channel No.	Frequency (MHz)	Data Rate (Mbps)							
		7.2	14.4	21.7	28.9	43.3	57.8	65	72.2
		Measurement Level (dBm)							
36	5180	13.29	--	--	--	--	--	--	--
44	5220	13.71	13.68	13.59	13.49	13.39	13.34	13.28	13.2
48	5240	13.78	--	--	--	--	--	--	--
149	5745	13.75	--	--	--	--	--	--	--
157	5785	13.72	13.67	13.61	13.52	13.48	13.4	13.3	13.26
165	5825	13.55	--	--	--	--	--	--	--

Note: Maximum conducted output power Value =Reading value on average power meter + cable loss

Maximum conducted output power Measurement:

Channel No	Frequency Range (MHz)	26dB Bandwidth (MHz)	Output Power (dBm)	Output Power Limit	
				(dBm)	dBm+10log(BW)
36	5180	--	13.29	24	--
44	5220	--	13.71	24	--
48	5240	--	13.78	24	--
149	5745	--	13.75	30	--
157	5785	--	13.72	30	--
165	5825	--	13.55	30	--

Note: Power Output Value =Reading value on average power meter + cable loss

Product : IEEE802.11a/b/g/n 2.4+5GHz 1T1R Wi-Fi IoT Module
Test Item : Maximum conducted output power
Test Mode : Mode 3: Transmit (802.11n-40BW 15Mbps)
Test Date : 2020/06/18

Cable loss=1dB		Maximum conducted output power							
Channel No.	Frequency (MHz)	Data Rate (Mbps)							
		15	30	45	60	90	120	135	150
		Measurement Level (dBm)							
38	5190	10.23	--	--	--	--	--	--	--
46	5230	13.78	13.72	13.61	13.53	13.45	13.4	13.33	13.23
151	5755	13.83	--	--	--	--	--	--	--
159	5795	13.66	13.61	13.56	13.51	13.45	13.39	13.32	13.25

Note: Maximum conducted output power Value =Reading value on average power meter + cable loss

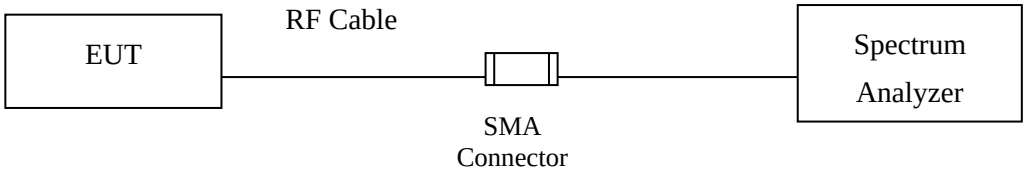
Maximum conducted output power Measurement:

Channel No	Frequency Range (MHz)	26dB Bandwidth (MHz)	Output Power (dBm)	Output Power Limit	
				(dBm)	dBm+10log(BW)
38	5190	--	10.23	24	--
46	5230	--	13.78	24	--
151	5755	--	13.83	30	--
159	5795	--	13.66	30	--

Note: Power Output Value =Reading value on average power meter + cable loss

4. Peak Power Spectral Density

4.1. Test Setup



4.2. Limits

For the band 5.15-5.25 GHz,

(i) For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(ii) For an indoor access point operating in the band 5.15-5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(iii) For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. Fixed point-topoint U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

(iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.+

For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

For the band 5.725-5.85 GHz, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point UNII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

4.3. Test Procedure

The EUT was setup to ANSI C63.10, 2013; tested to UNII test procedure of FCC KDB-789033 for compliance to FCC 47CFR Subpart E requirements.

The Peak Power Spectral Density using KDB 789033 section F) procedure, Create an average power spectrum for the EUT operating mode being tested by following the instructions in section E)2) for measuring maximum conducted output power using a spectrum analyzer.

SA-1 method is selected to run the test.

For the band 5.725-5.85 GHz, Scale the observed power level to an equivalent value in 500 kHz by adjusting (increase) the measured power by a bandwidth correction factor (BWCF) where BWCF = 10log (500 kHz/100 kHz) = 6.98 dB.

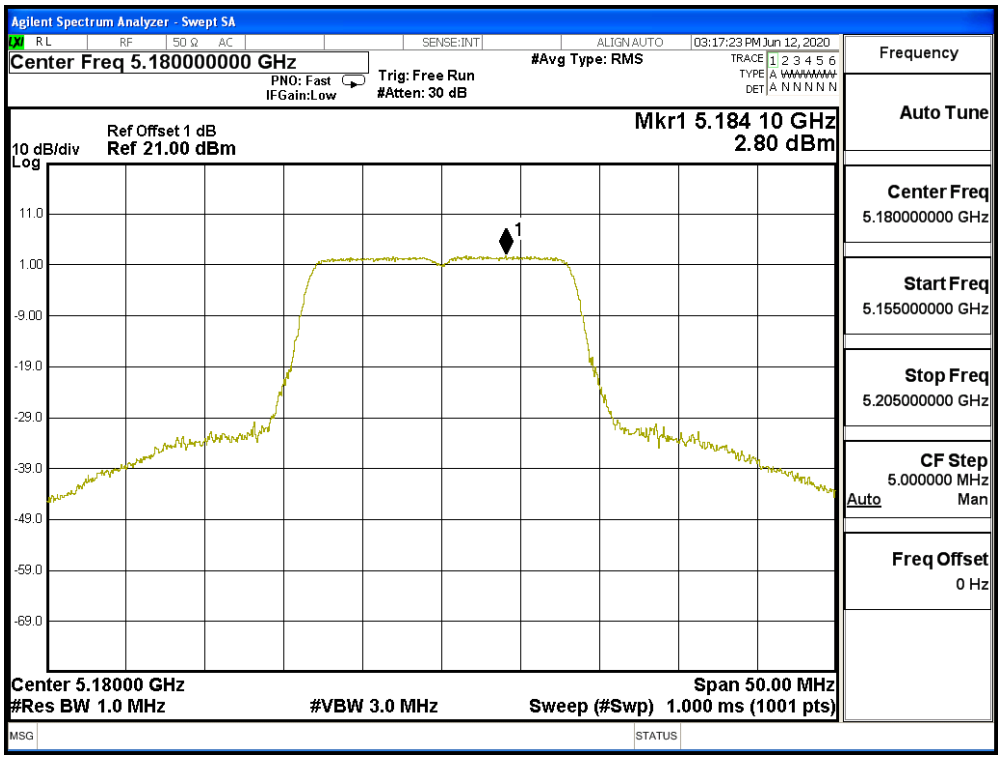
4.4. Test Result of Peak Power Spectral Density

Product : IEEE802.11a/b/g/n 2.4+5GHz 1T1R Wi-Fi IoT Module
Test Item : Peak Power Spectral Density
Test Mode : Mode 1: Transmit (802.11a-6Mbps)
Test Date : 2020/06/18

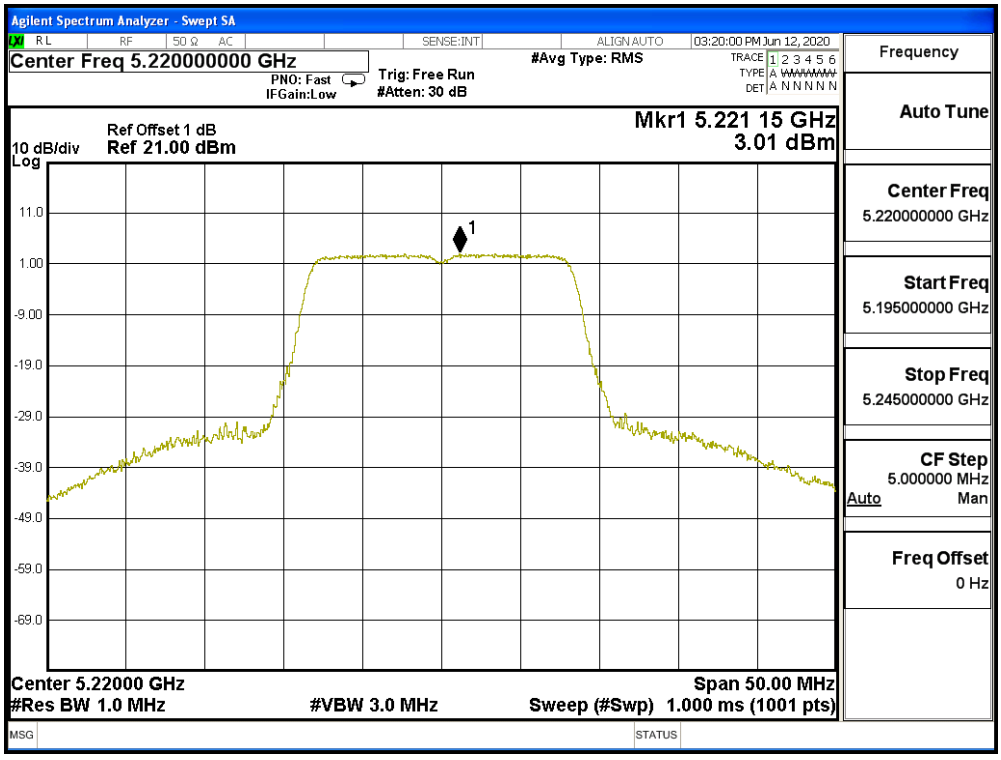
Channel Number	Frequency (MHz)	Data Rata (Mbps)	Measurement Level (dBm)	Required Limit (dBm)	Result
36	5180	6	2.80	<11	Pass
44	5220	6	3.01	<11	Pass
48	5240	6	2.91	<11	Pass

Channel Number	Frequency (MHz)	Data Rata (Mbps)	PPSD (dBm)	BWCF (dB)	Total PPSD (dBm)	Required Limit (dBm)	Result
149	5745	6	-6.67	6.99	0.32	<30	Pass
157	5785	6	-7.65	6.99	-0.66	<30	Pass
165	5825	6	-8.33	6.99	-1.34	<30	Pass

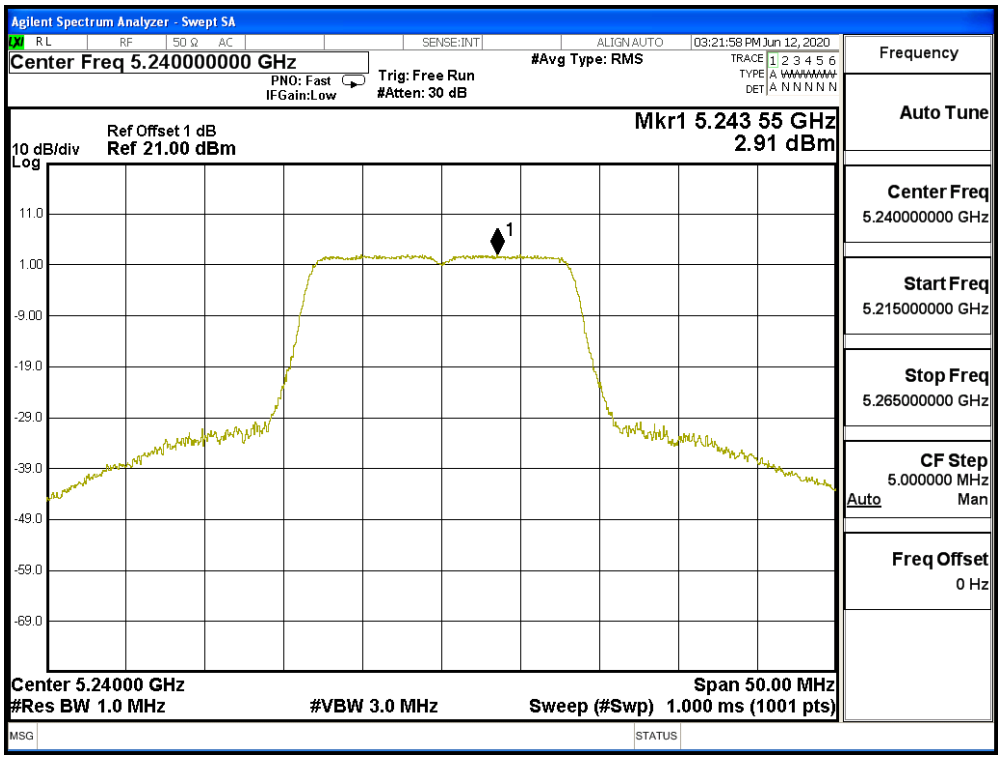
Channel 36:



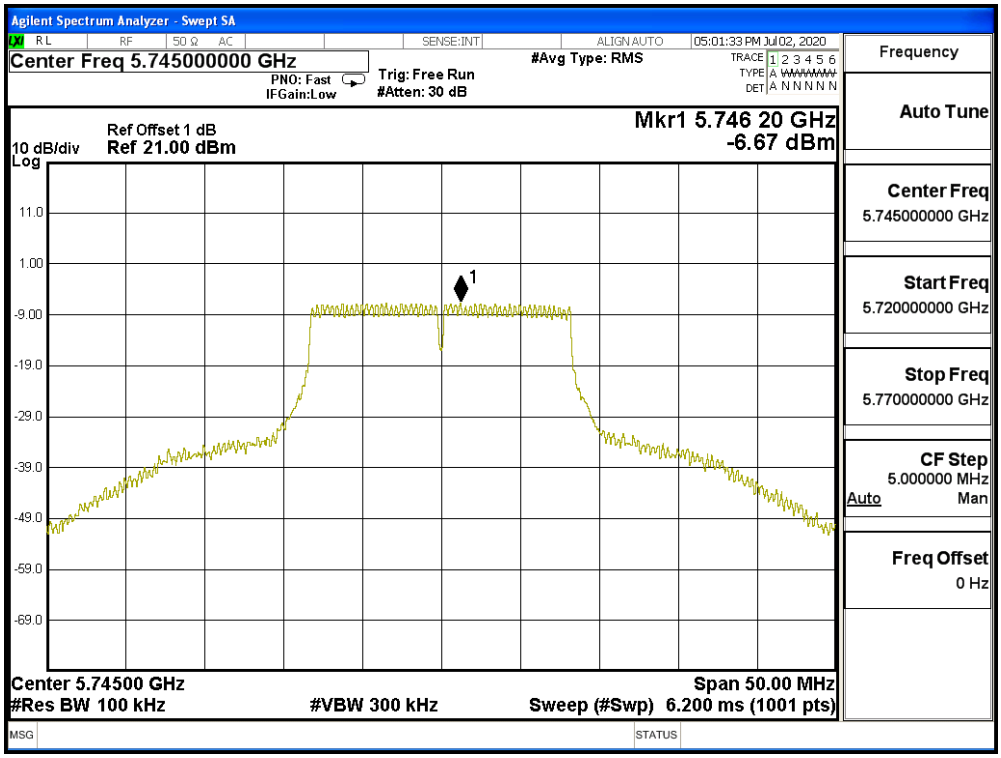
Channel 44:



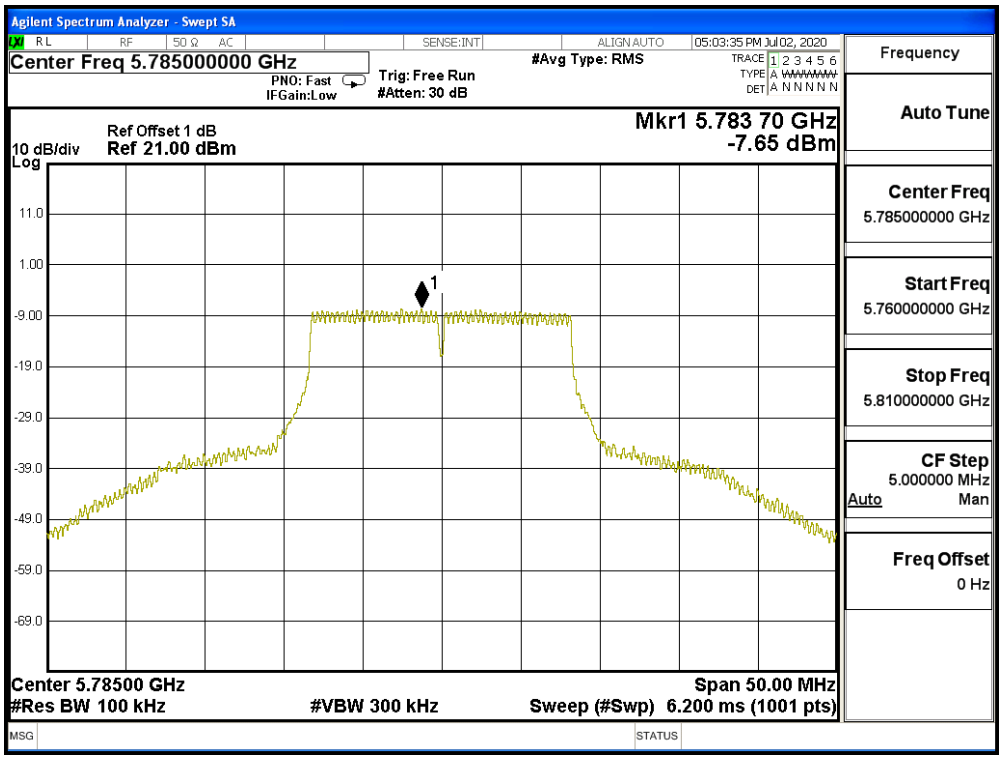
Channel 48:



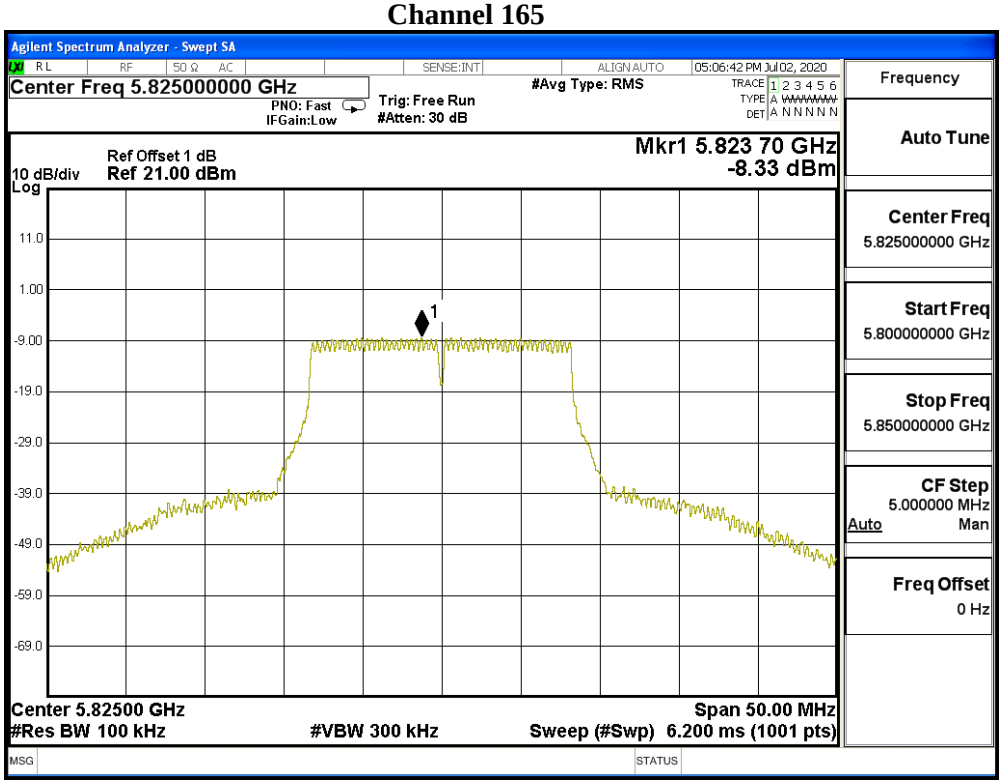
Channel 149



Channel 157



Channel 165

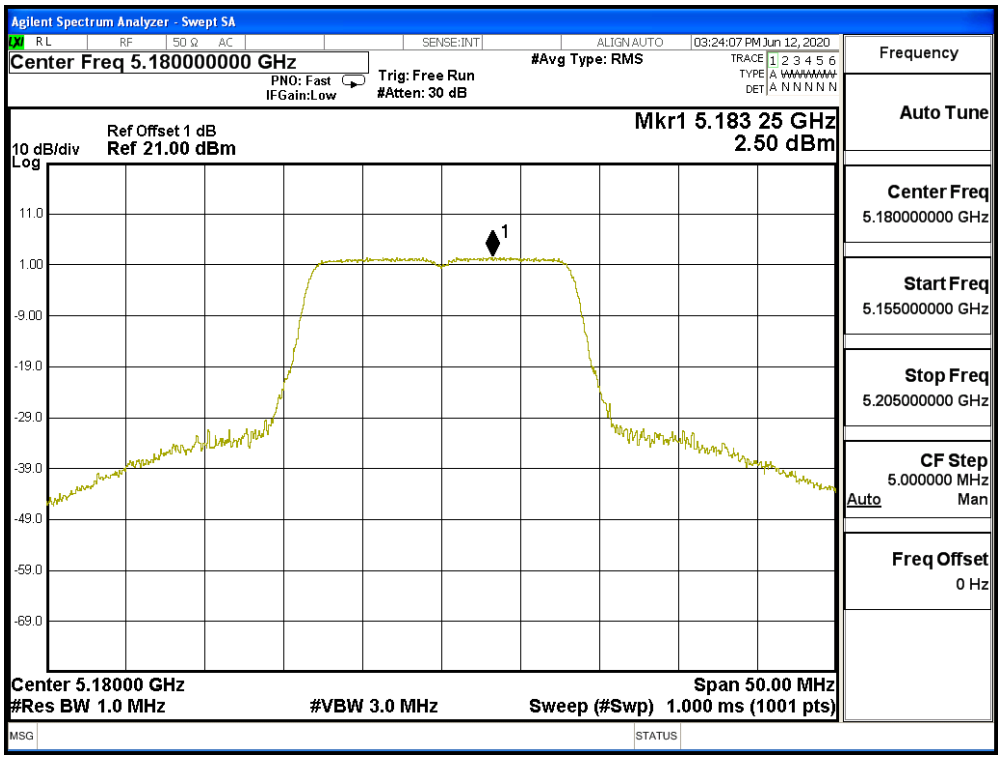


Product : IEEE802.11a/b/g/n 2.4+5GHz 1T1R Wi-Fi IoT Module
Test Item : Peak Power Spectral Density
Test Mode : Mode 2: Transmit (802.11n-20BW 7.2Mbps)
Test Date : 2020/06/18

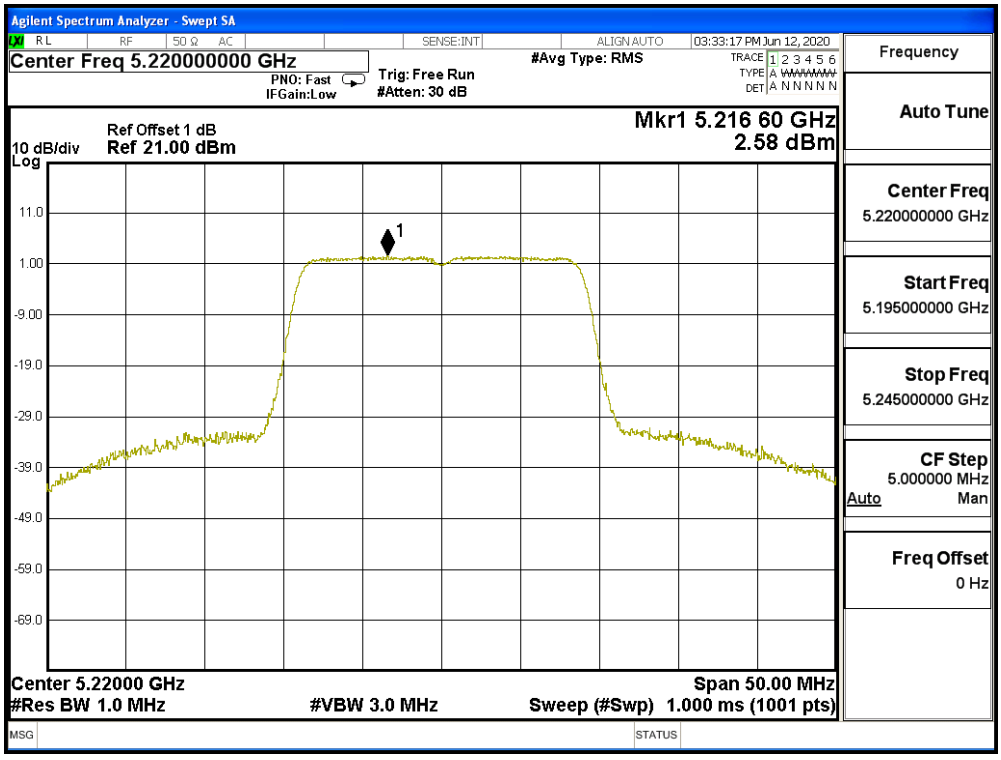
Channel Number	Frequency (MHz)	Data Rata (Mbps)	Measurement Level (dBm)	Required Limit (dBm)	Result
36	5180	7.2	2.50	11	Pass
44	5220	7.2	2.58	11	Pass
48	5240	7.2	2.59	11	Pass

Channel Number	Frequency (MHz)	Data Rata (Mbps)	PPSD (dBm)	BWCF (dB)	Total PPSD (dBm)	Required Limit (dBm)	Result
149	5745	7.2	-7.09	6.99	-0.10	<30	Pass
157	5785	7.2	-8.09	6.99	-1.10	<30	Pass
165	5825	7.2	-8.57	6.99	-1.58	<30	Pass

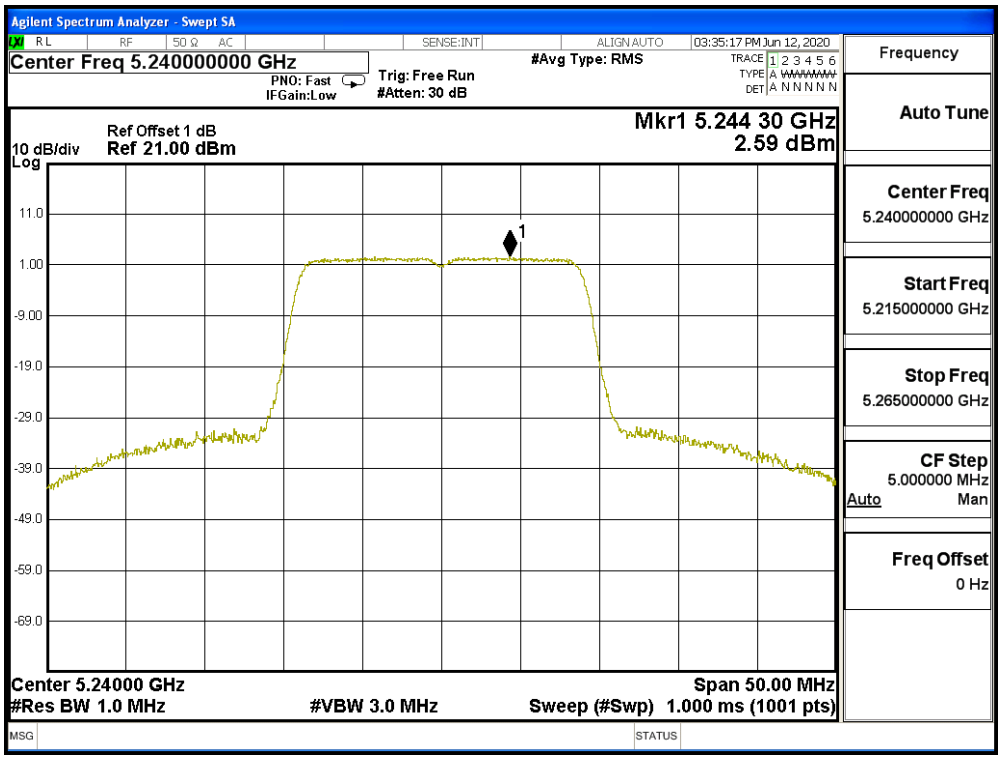
Channel 36:



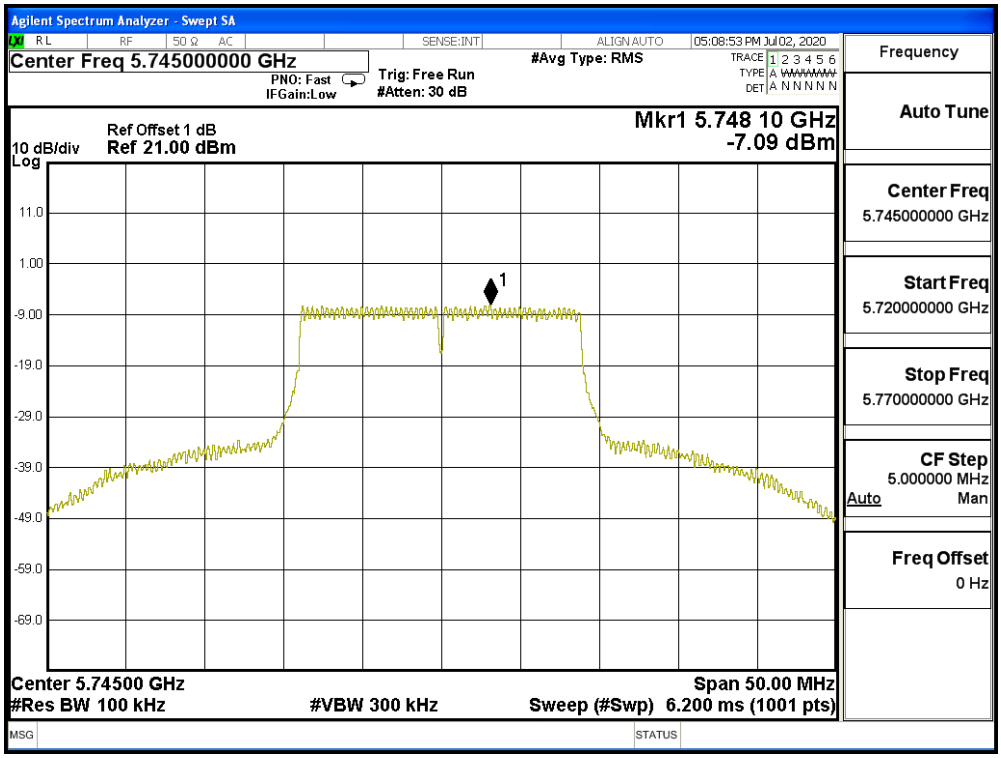
Channel 44:



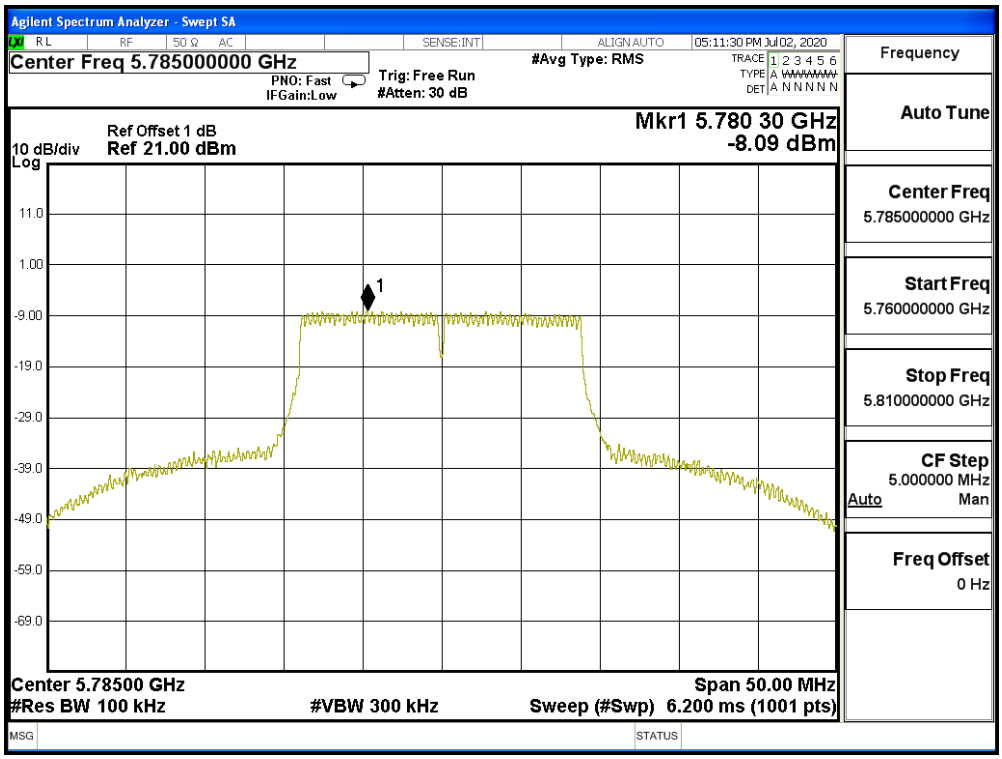
Channel 48:



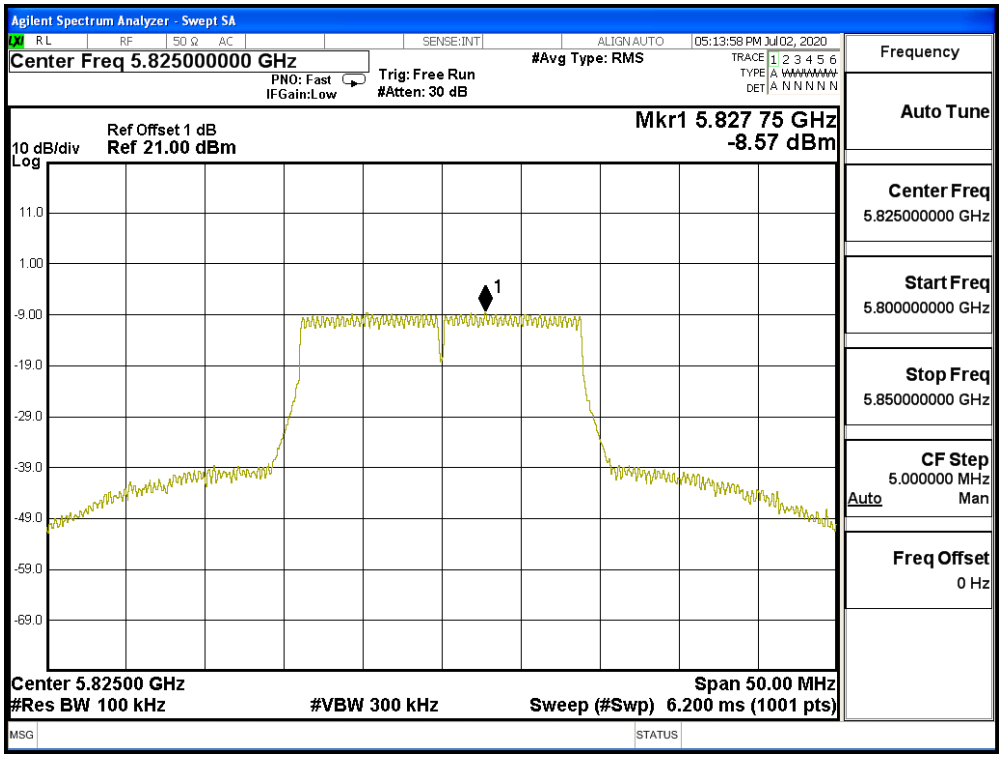
Channel 149:



Channel 157:



Channel 165:

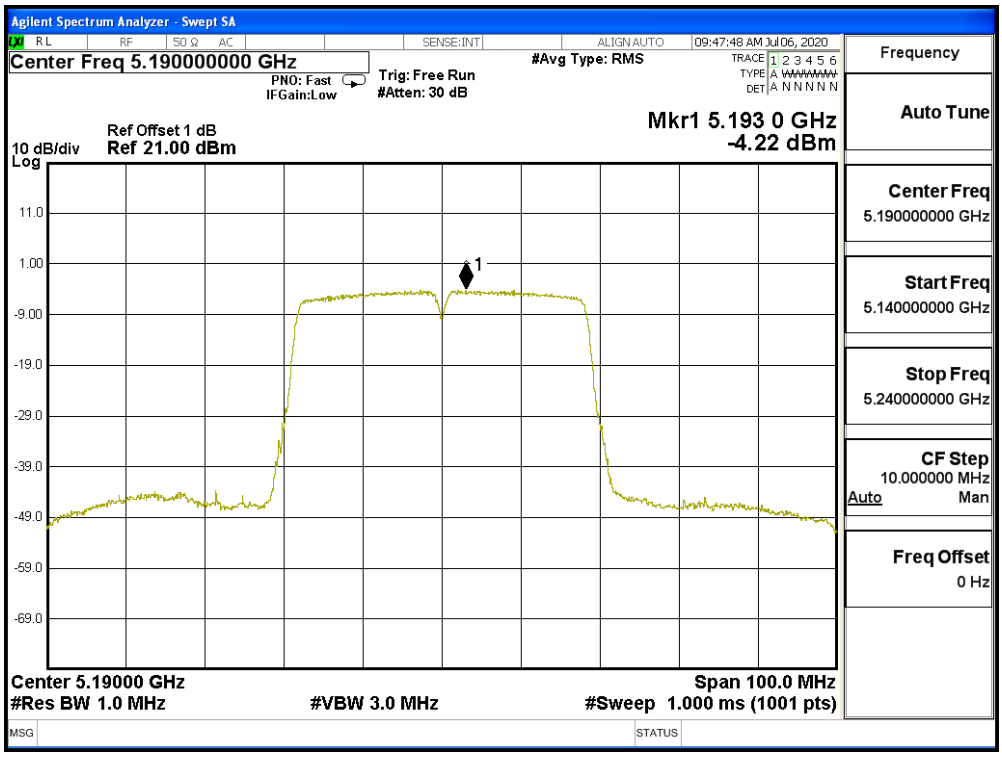


Product : IEEE802.11a/b/g/n 2.4+5GHz 1T1R Wi-Fi IoT Module
Test Item : Peak Power Spectral Density
Test Mode : Mode 3: Transmit (802.11n-40BW 15Mbps)
Test Date : 2020/06/18

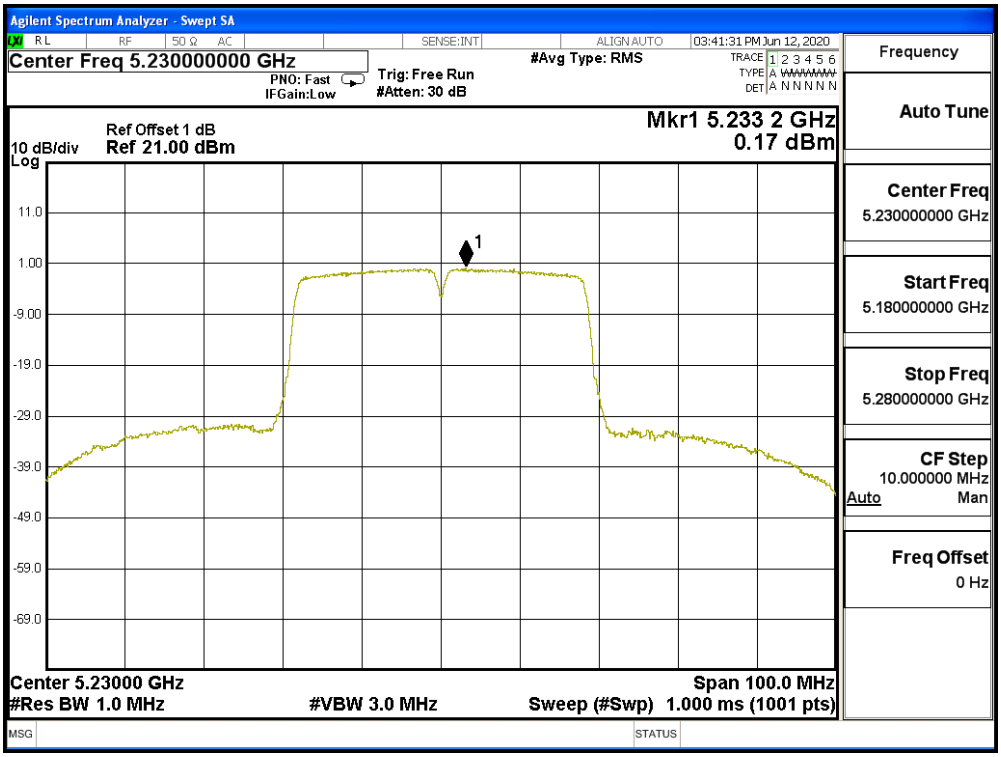
Channel Number	Frequency (MHz)	Data Rata (Mbps)	Measurement Level (dBm)	Required Limit (dBm)	Result
38	5190	15	-4.22	11	Pass
46	5230	15	0.17	11	Pass

Channel Number	Frequency (MHz)	Data Rata (Mbps)	PPSD (dBm)	BWCF (dB)	Total PPSD (dBm)	Required Limit (dBm)	Result
151	5755	15	-12.25	6.99	-5.26	<30	Pass
159	5795	15	-13.56	6.99	-6.57	<30	Pass

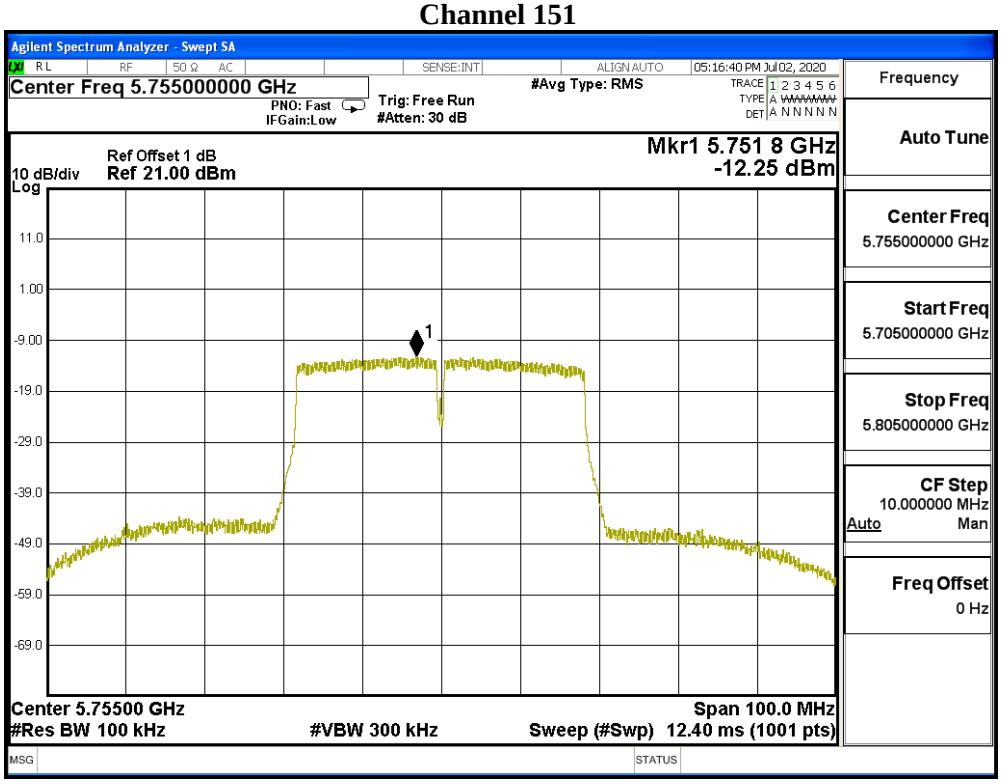
Channel 38



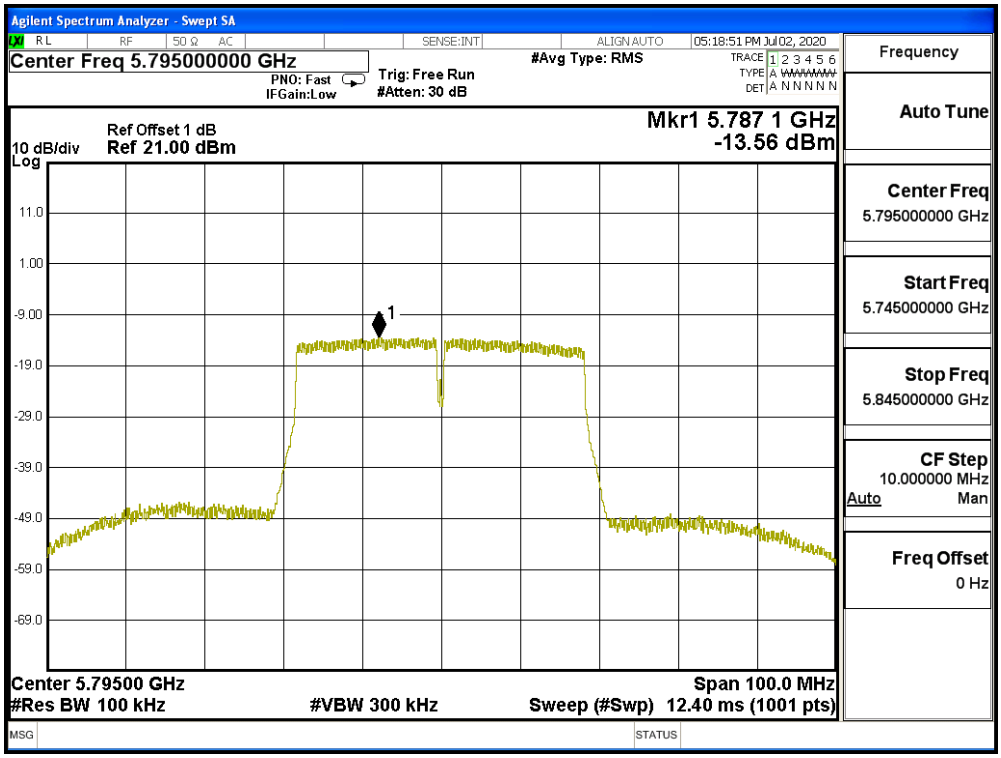
Channel 46



Channel 151



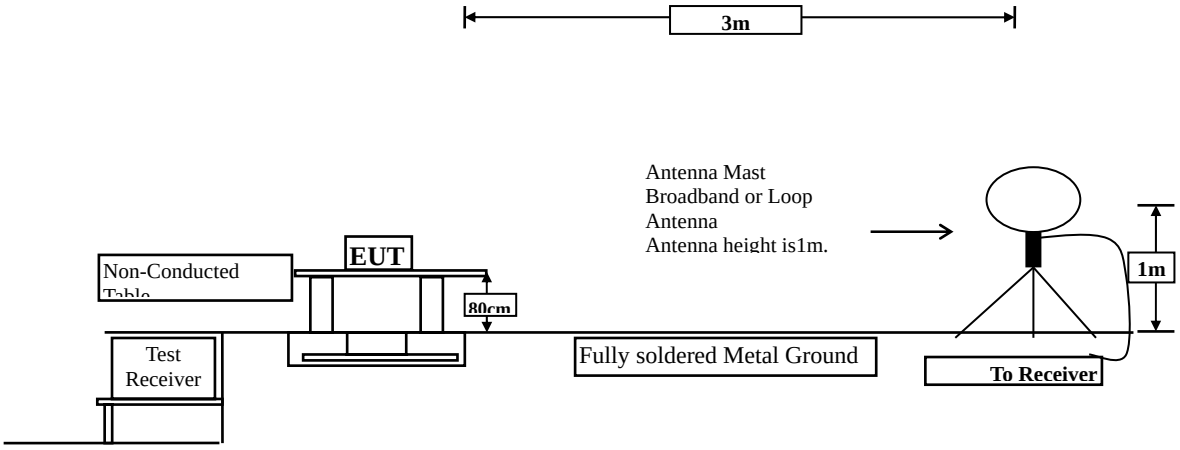
Channel 159



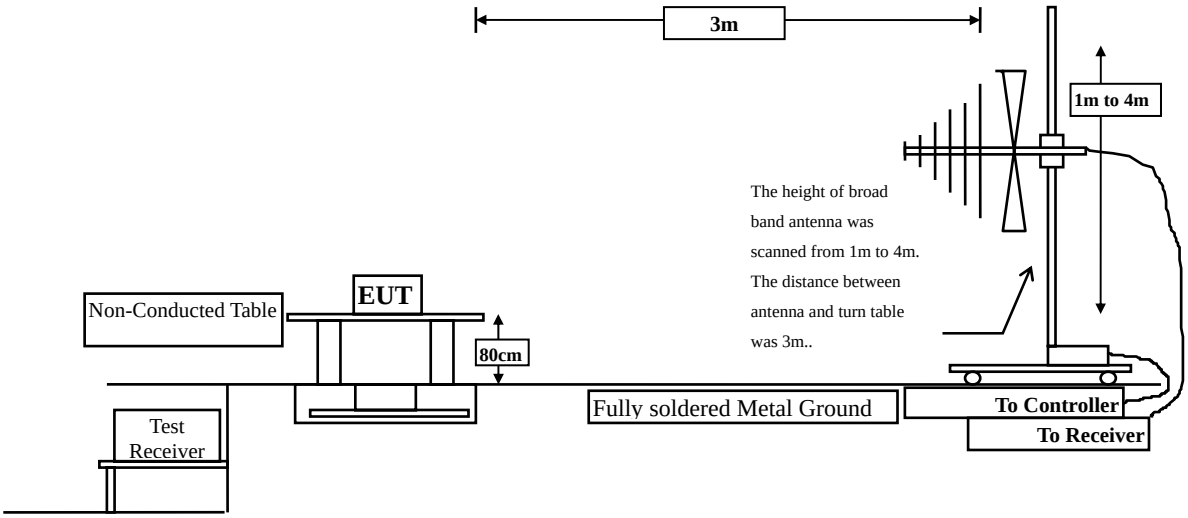
5. Radiated Emission

5.1. Test Setup

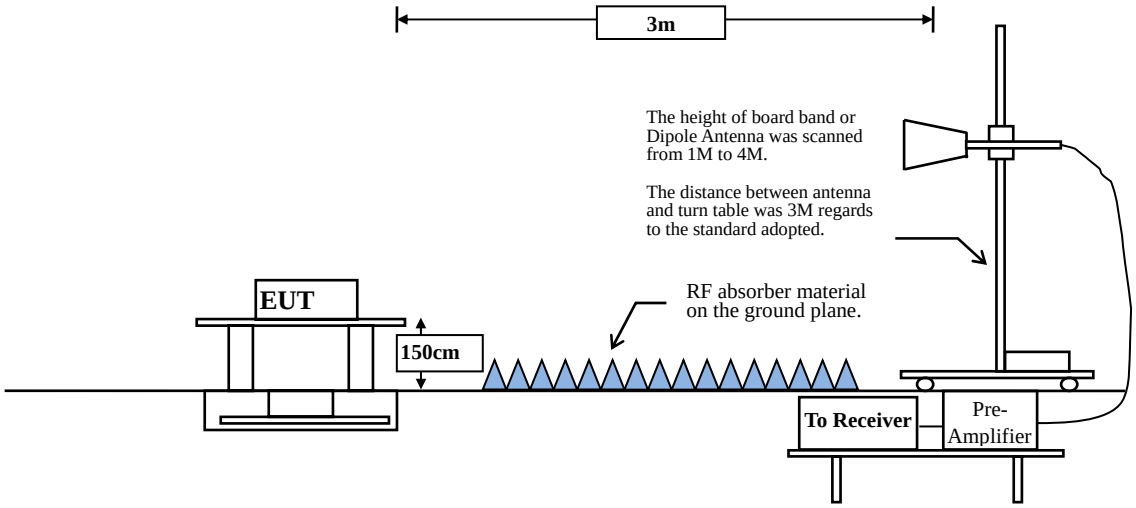
Radiated Emission Under 30MHz



Radiated Emission Below 1GHz



Radiated Emission Above 1GHz



5.2. Limits

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 20dB below the level of the fundamental or to the general radiated emission limits in paragraph 15.209, whichever is the lesser attenuation.

FCC Part 15 Subpart C Paragraph 15.209(a) Limits		
Frequency MHz	Field strength (microvolts/meter)	Measurement distance (meter)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Remarks: E field strength (dBμV/m) = 20 log E field strength (uV/m)

5.3. Test Procedure

The EUT was setup according to ANSI C63.10, 2013 and tested according to FCC KDB-789033 test procedure for compliance to FCC 47CFR 15. 407 requirements.

Measuring the frequency range below 1GHz, the EUT is placed on a turn table which is 0.8 meter above ground,when measuring the frequency range above 1GHz, the EUT is placed on a turn table which is 1.5 meter above ground.

The turn table is rotated 360 degrees to determine the position of the maximum emission level.

The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna is scanned between 1 meter and 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10: 2013 on radiated measurement.

The resolution bandwidth below 30MHz setting on the field strength meter is 9kHz and 30MHz~1GHz is 120kHz and above 1GHz is 1MHz.

Radiated emission measurements below 30MHz are made using Loop Antenna and 30MHz~1GHz are made using broadband Bilog antenna and above 1GHz are made using Horn Antennas.

The measurement is divided into the Preliminary Measurement and the Final Measurement.

The suspected frequencies are searched for in Preliminary Measurement with the measurement antenna kept pointed at the source of the emission both in azimuth and elevation, with the polarization of the antenna oriented for maximum response. The antenna is pointed at an angle towards the source of the emission, and the EUT is rotated in both height and polarization to maximize the measured emission. The emission is kept within the illumination area of the 3 dB bandwidth of the antenna.

The measurement frequency range form 9kHz - 10th Harmonic of fundamental was investigated.

RBW and VBW Parameter setting:

According to KDB 789033 section II.G.5 Procedure for Unwanted Maximum Emissions Measurements above 1000 MHz.

RBW = 1MHz.

VBW ≥ 3MHz.

According to KDB 789033 section II.G.6 Procedures for Average Unwanted Emissions Measurements above 1000 MHz.

RBW = 1MHz.

VBW = 10Hz, when duty cycle ≥ 98 %

VBW ≥ 1/T, when duty cycle < 98 %

(T refers to 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.)

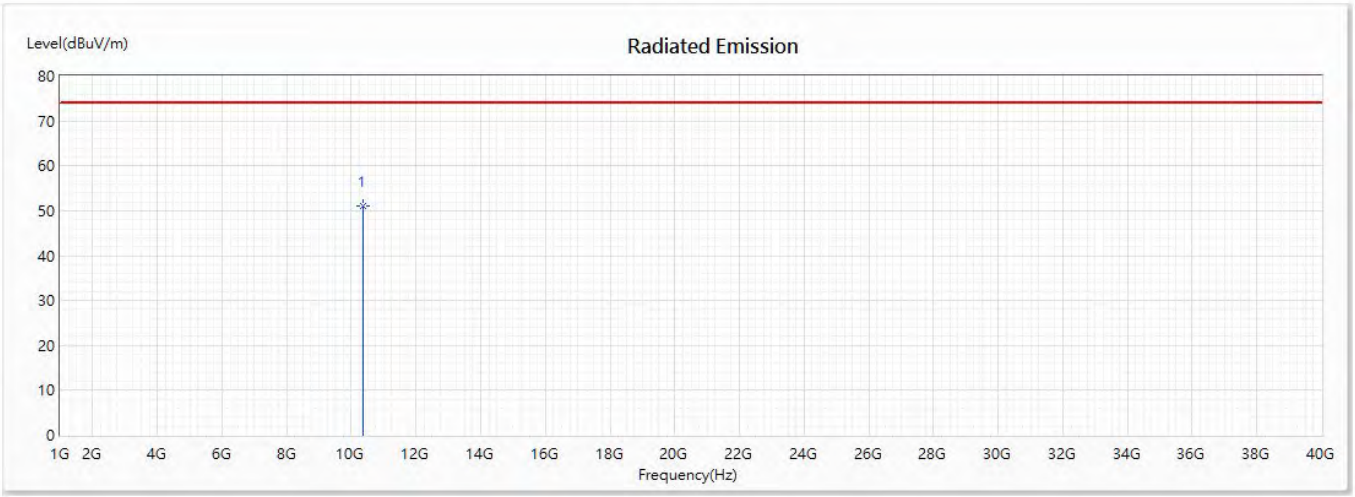
5GHz band	Duty Cycle (%)	T (ms)	1/T (Hz)	VBW (Hz)
802.11a	97.95	1.3841	723	1000
802.11n20	99.21	5.0725	197	10
802.11n40	97.96	2.4348	411	500

Note: Duty Cycle Refer to Section 8.

5.4. Test Result of Radiated Emission

Product	:	IEEE802.11a/b/g/n 2.4+5GHz 1T1R Wi-Fi IoT Module
Test Item	:	Harmonic Radiated Emission Data
Test Mode	:	Mode 1: Transmit (802.11a-6Mbps) (5180MHz)
Test Date	:	2020/06/29

Horizontal



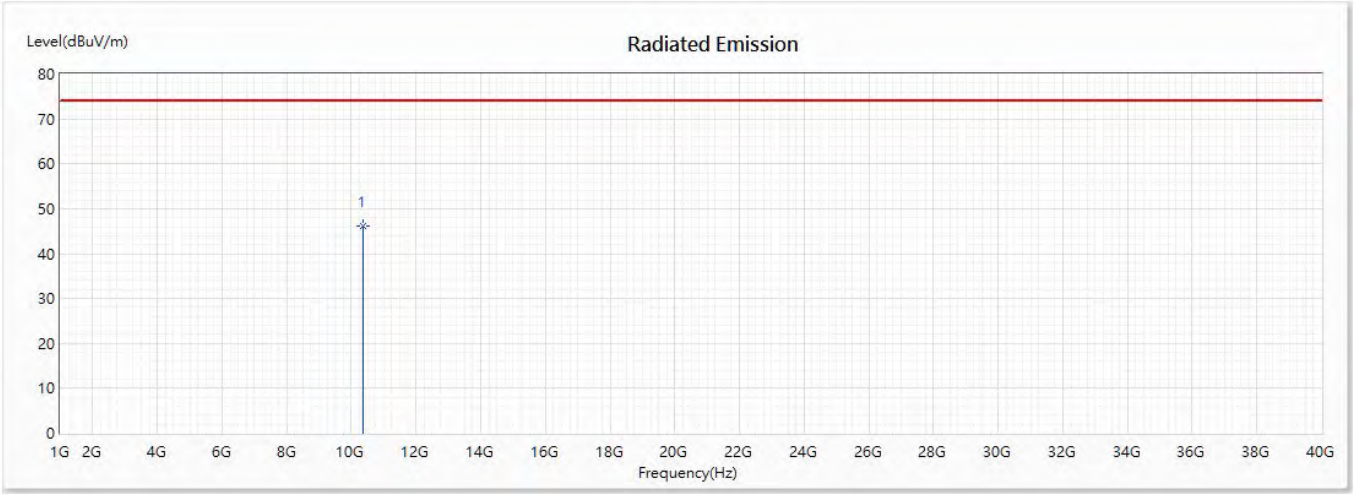
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
* 1	10360	51.07	74.00	-22.93	62.67	-11.60	PK

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product	:	IEEE802.11a/b/g/n 2.4+5GHz 1T1R Wi-Fi IoT Module
Test Item	:	Harmonic Radiated Emission Data
Test Mode	:	Mode 1: Transmit (802.11a-6Mbps) (5180MHz)
Test Date	:	2020/06/29

Vertical



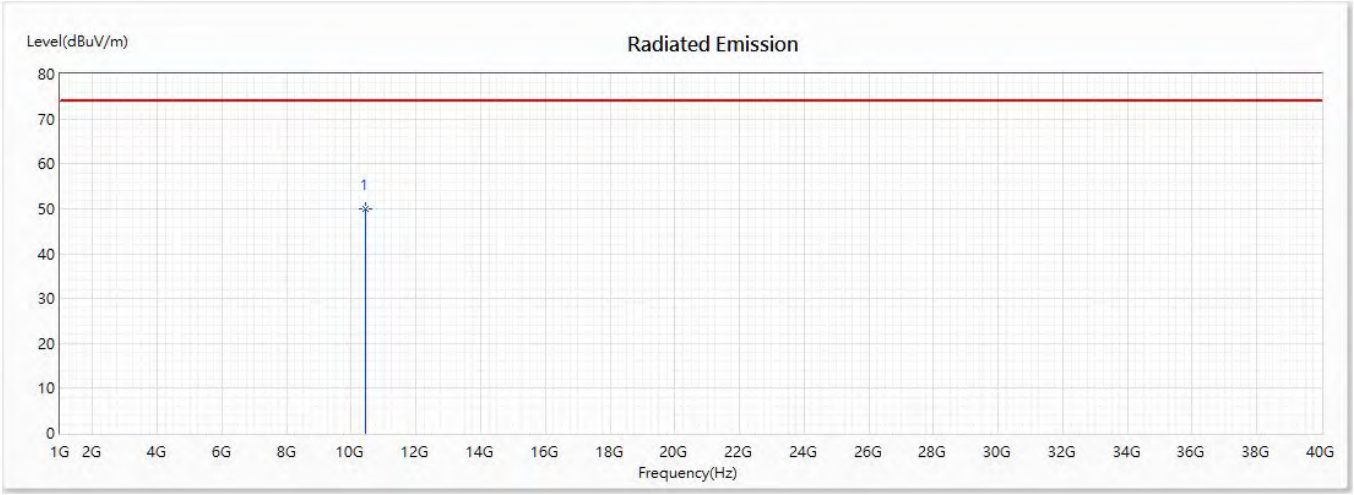
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
* 1	10360	46.11	74.00	-27.89	57.71	-11.60	PK

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product	:	IEEE802.11a/b/g/n 2.4+5GHz 1T1R Wi-Fi IoT Module
Test Item	:	Harmonic Radiated Emission Data
Test Mode	:	Mode 1: Transmit (802.11a-6Mbps) (5220MHz)
Test Date	:	2020/06/29

Horizontal



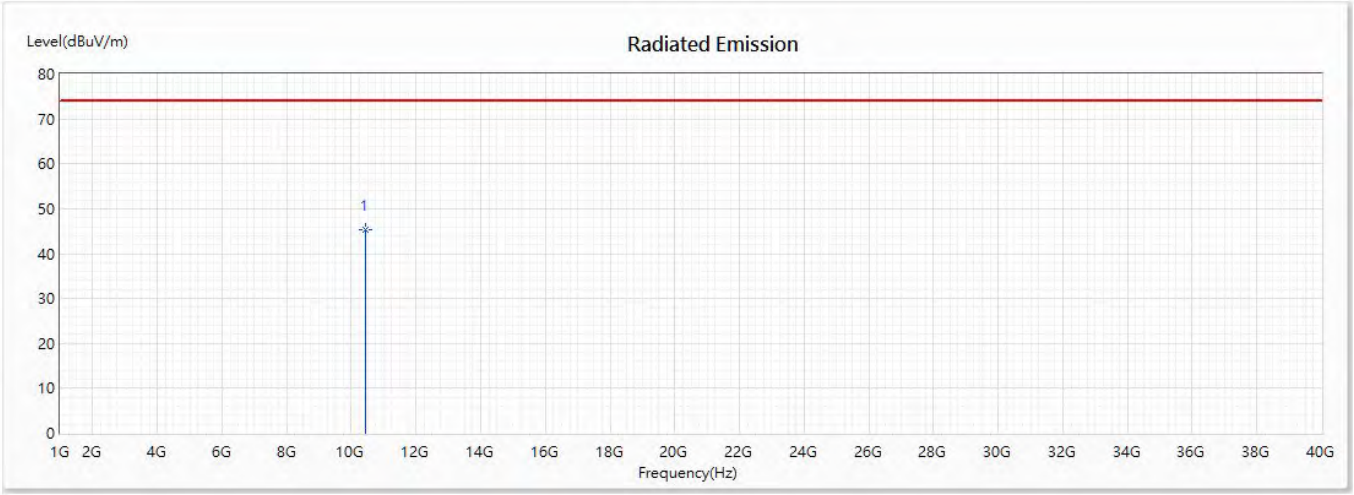
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
* 1	10440	49.95	74.00	-24.05	62.36	-12.41	PK

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product	:	IEEE802.11a/b/g/n 2.4+5GHz 1T1R Wi-Fi IoT Module
Test Item	:	Harmonic Radiated Emission Data
Test Mode	:	Mode 1: Transmit (802.11a-6Mbps) (5220MHz)
Test Date	:	2020/06/29

Vertical



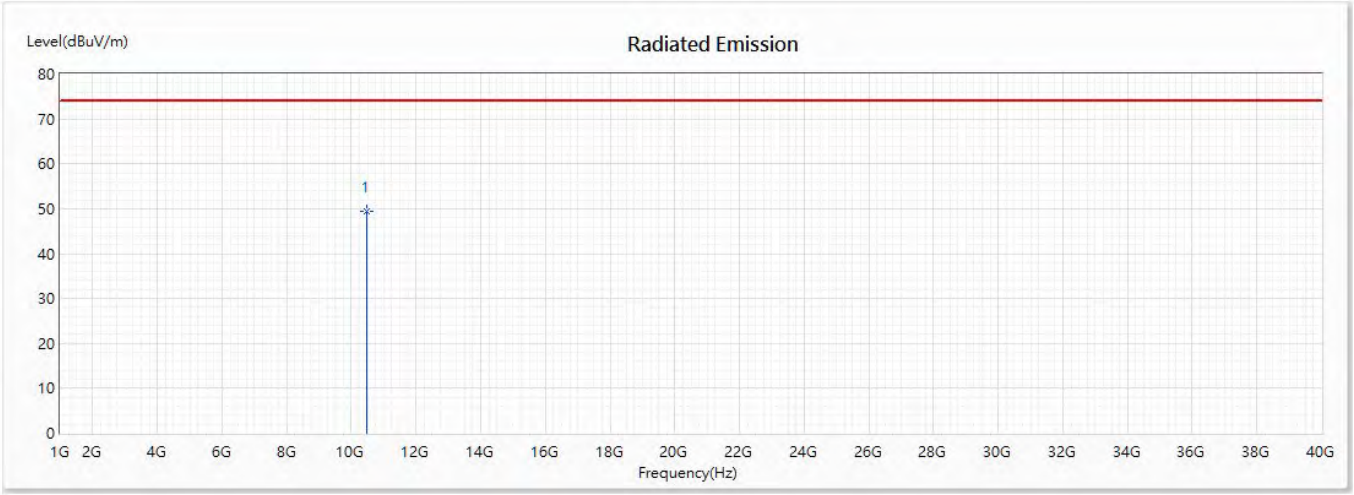
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
* 1	10440	45.41	74.00	-28.59	57.82	-12.41	PK

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product	:	IEEE802.11a/b/g/n 2.4+5GHz 1T1R Wi-Fi IoT Module
Test Item	:	Harmonic Radiated Emission Data
Test Mode	:	Mode 1: Transmit (802.11a-6Mbps) (5240MHz)
Test Date	:	2020/06/29

Horizontal



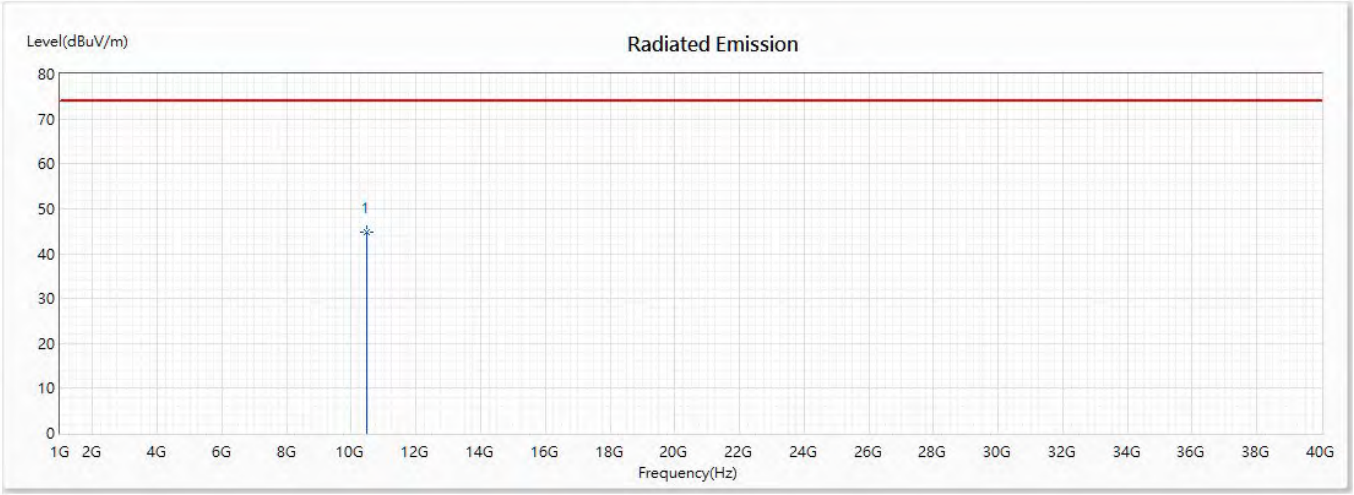
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
* 1	10480	49.51	74.00	-24.49	62.26	-12.75	PK

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product	:	IEEE802.11a/b/g/n 2.4+5GHz 1T1R Wi-Fi IoT Module
Test Item	:	Harmonic Radiated Emission Data
Test Mode	:	Mode 1: Transmit (802.11a-6Mbps) (5240MHz)
Test Date	:	2020/06/29

Vertical



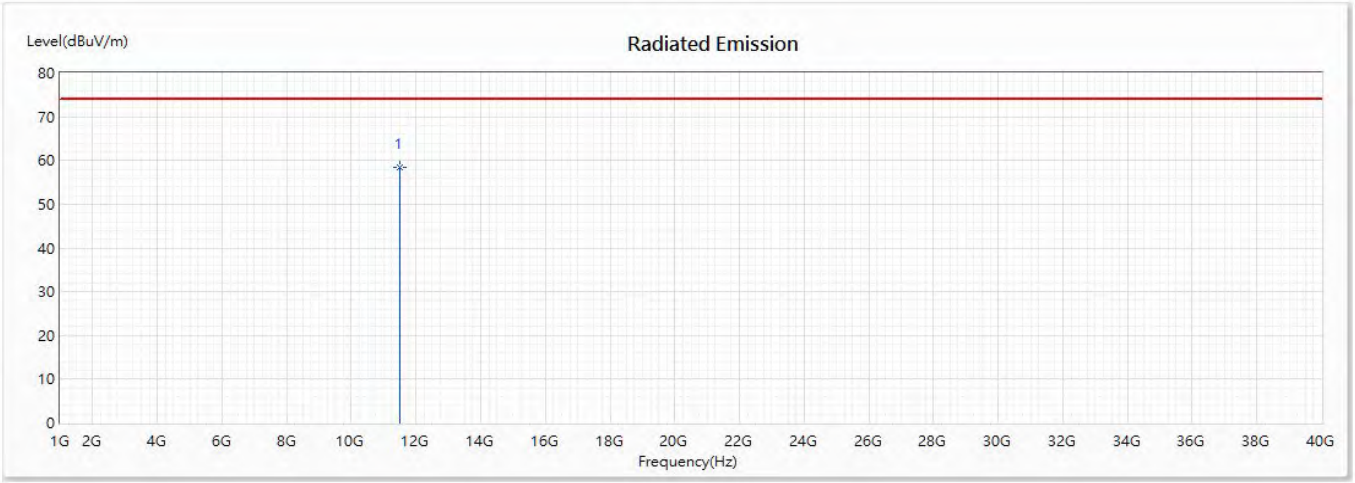
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
* 1	10480	44.65	74.00	-29.35	57.40	-12.75	PK

Note:

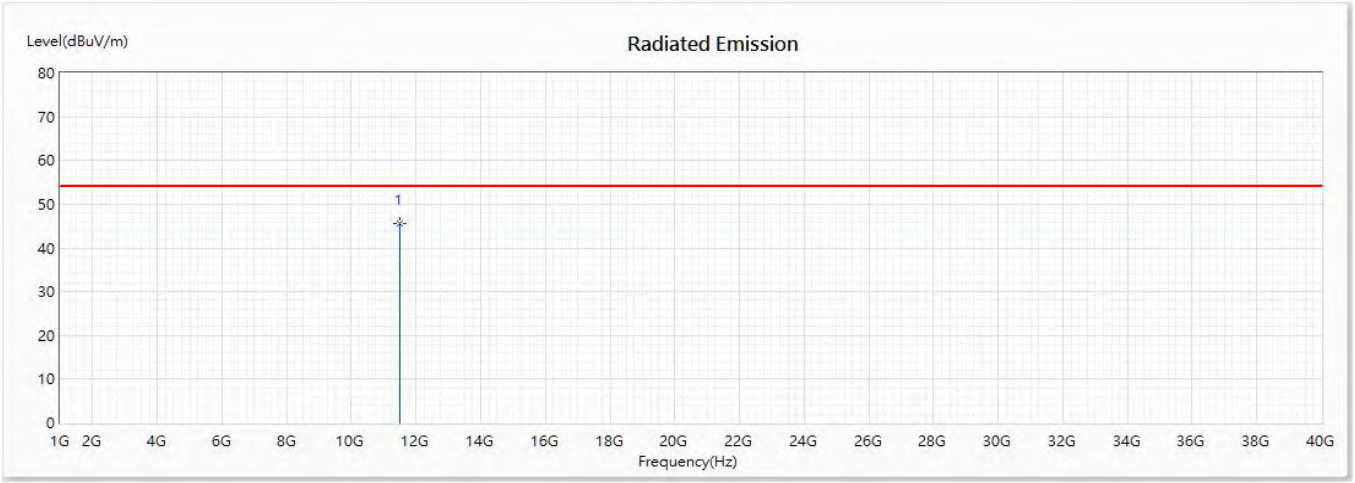
1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product	:	IEEE802.11a/b/g/n 2.4+5GHz 1T1R Wi-Fi IoT Module
Test Item	:	Harmonic Radiated Emission Data
Test Mode	:	Mode 1: Transmit (802.11a-6Mbps) (5745MHz)
Test Date	:	2020/06/29

Horizontal



No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
* 1	11490	58.56	74.00	-15.44	70.33	-11.77	PK



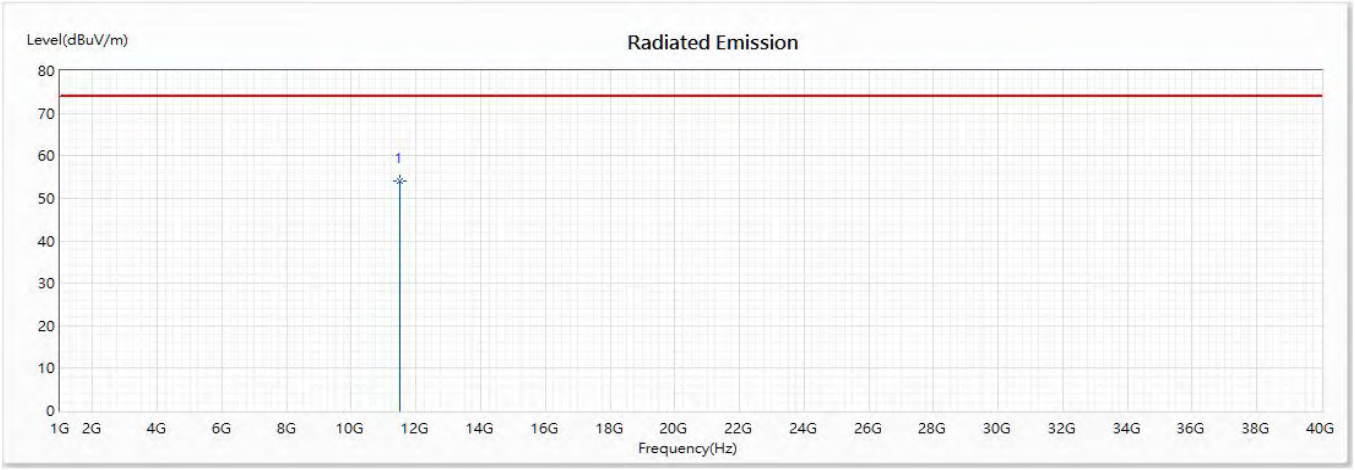
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
* 1	11490	45.52	54.00	-8.48	57.29	-11.77	AV

Note:

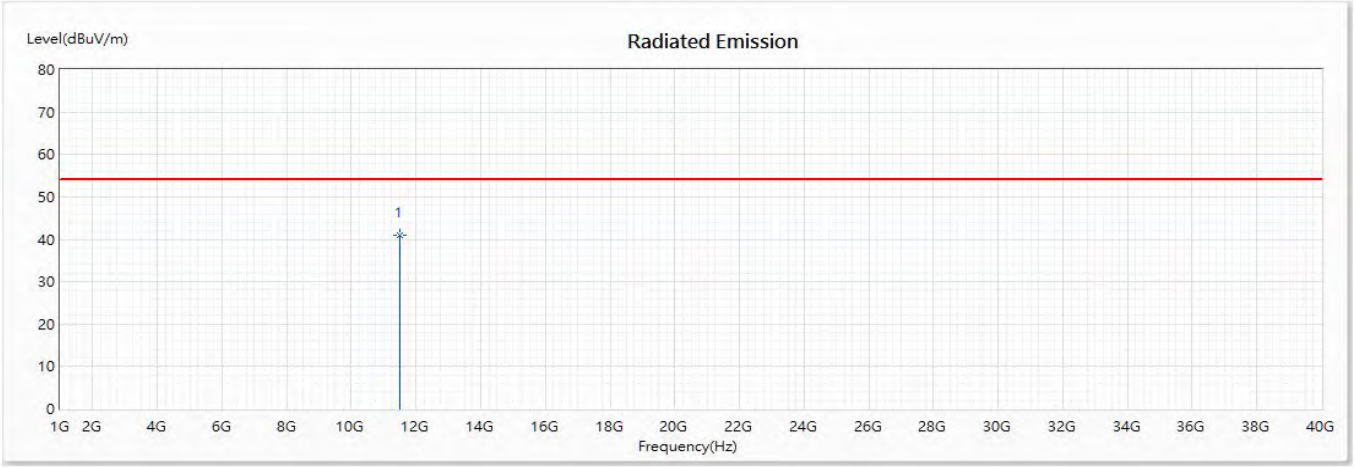
1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product	:	IEEE802.11a/b/g/n 2.4+5GHz 1T1R Wi-Fi IoT Module
Test Item	:	Harmonic Radiated Emission Data
Test Mode	:	Mode 1: Transmit (802.11a-6Mbps) (5745MHz)
Test Date	:	2020/06/29

Vertical



No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
* 1	11490	54.05	74.00	-19.95	65.82	-11.77	PK



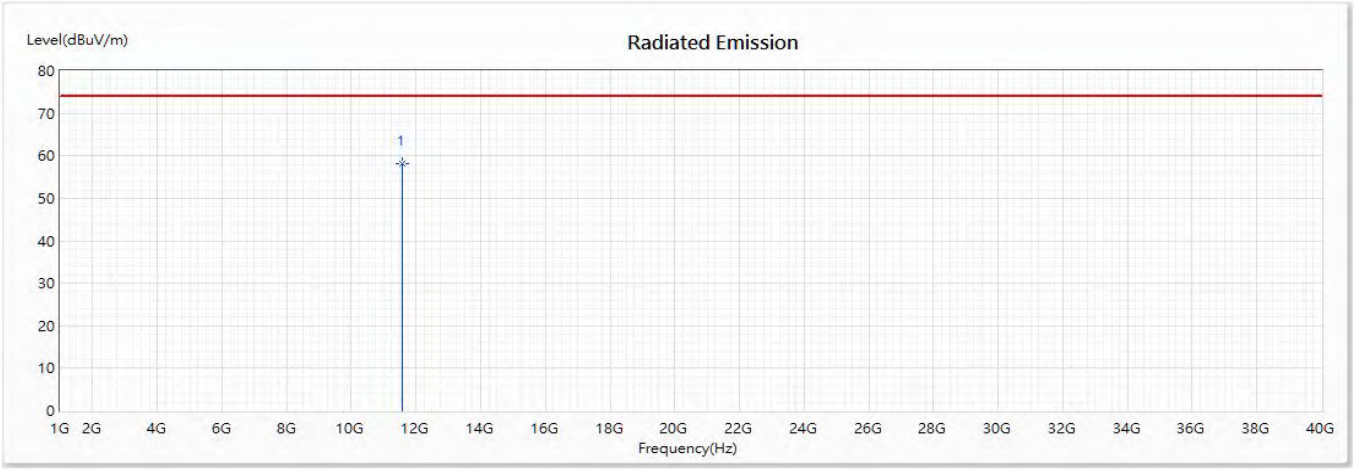
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
* 1	11490	41.01	54.00	-12.99	52.78	-11.77	AV

Note:

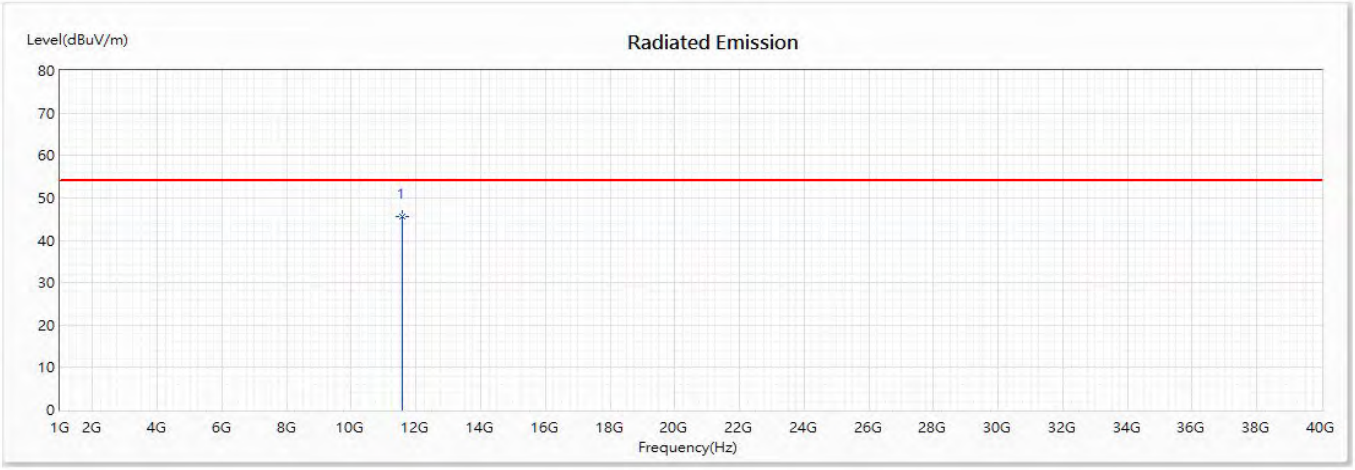
1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product	:	IEEE802.11a/b/g/n 2.4+5GHz 1T1R Wi-Fi IoT Module
Test Item	:	Harmonic Radiated Emission Data
Test Mode	:	Mode 1: Transmit (802.11a-6Mbps) (5785MHz)
Test Date	:	2020/06/29

Horizontal



No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
* 1	11570	58.25	74.00	-15.75	69.66	-11.41	PK



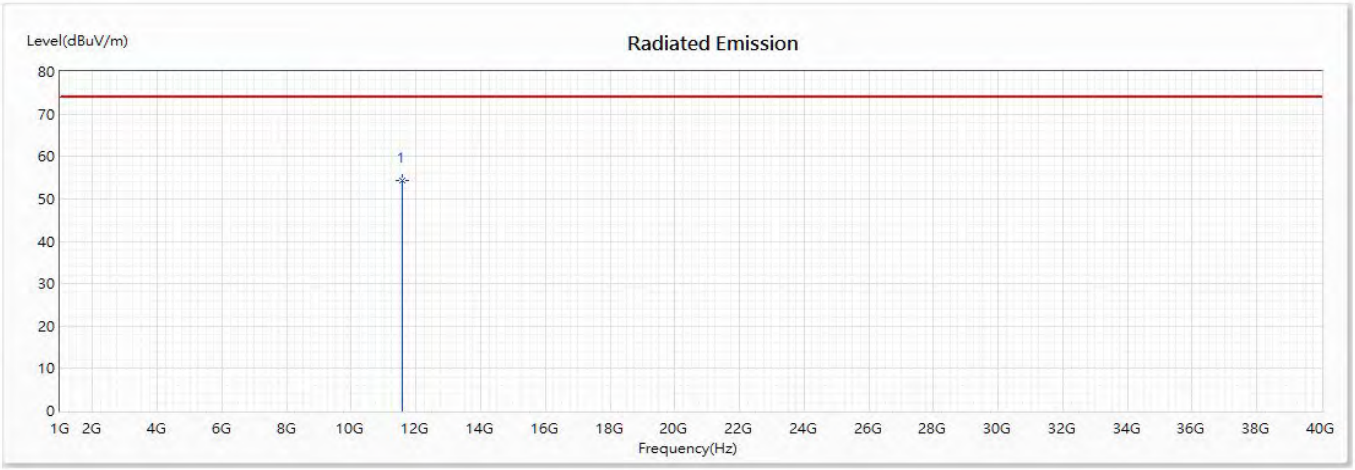
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
* 1	11570	45.61	54.00	-8.39	57.02	-11.41	AV

Note:

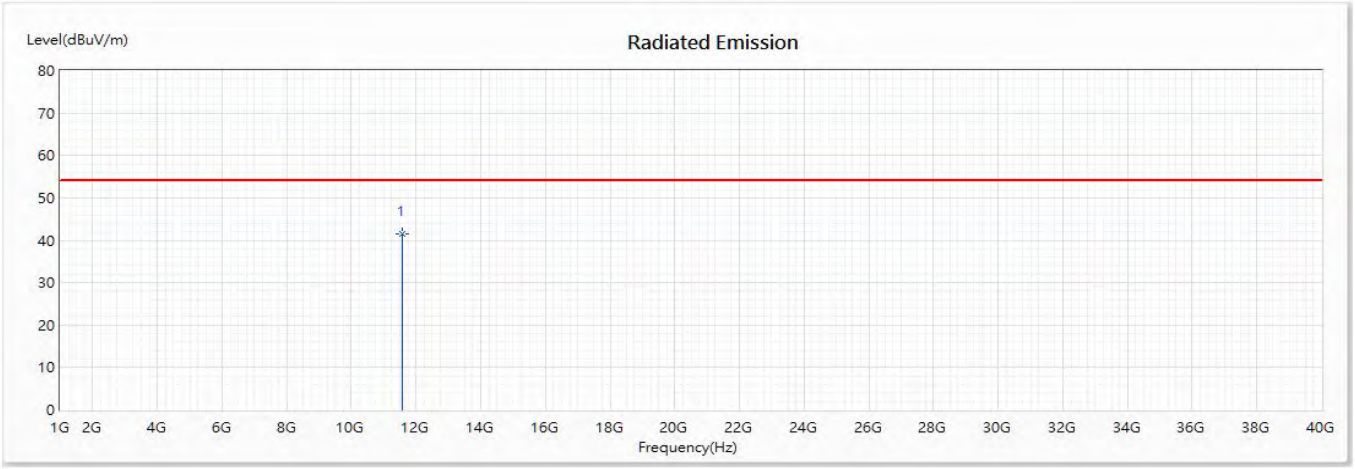
1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product	:	IEEE802.11a/b/g/n 2.4+5GHz 1T1R Wi-Fi IoT Module
Test Item	:	Harmonic Radiated Emission Data
Test Mode	:	Mode 1: Transmit (802.11a-6Mbps) (5785MHz)
Test Date	:	2020/06/29

Vertical



No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
* 1	11570	54.45	74.00	-19.55	65.86	-11.41	PK



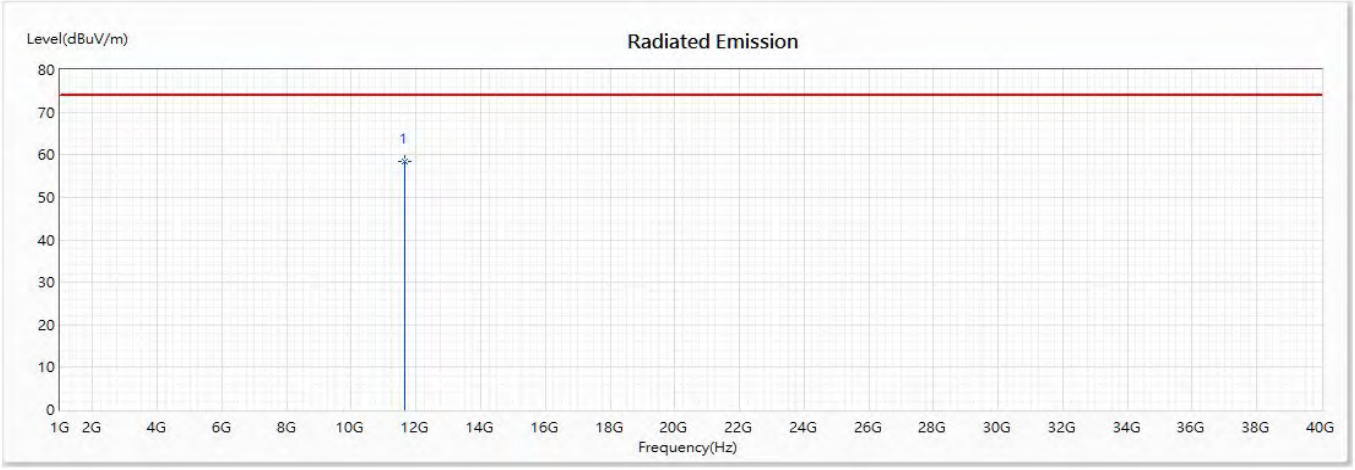
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
* 1	11570	41.57	54.00	-12.43	52.98	-11.41	AV

Note:

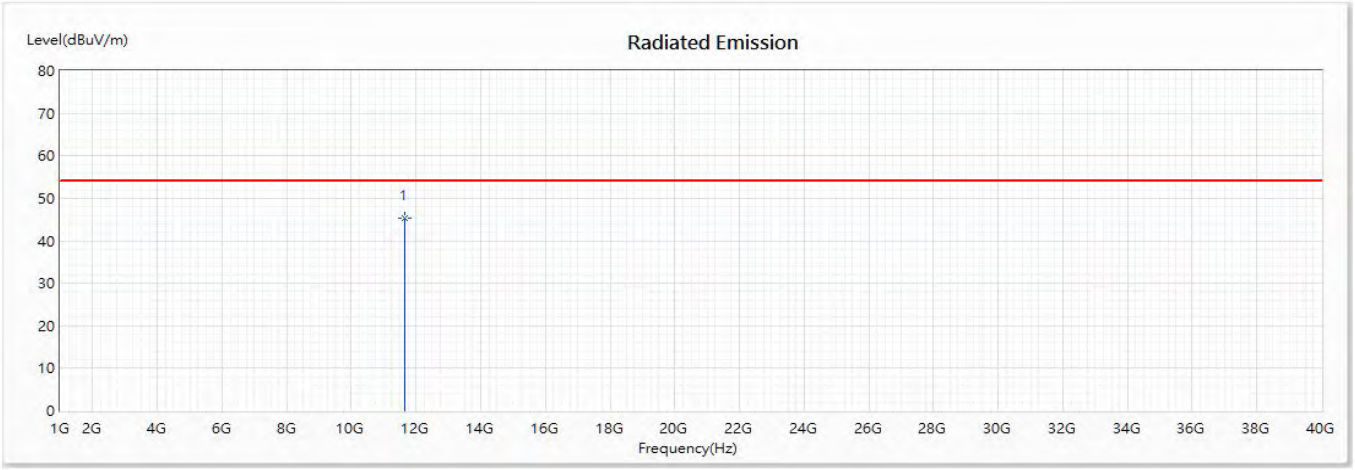
1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product	:	IEEE802.11a/b/g/n 2.4+5GHz 1T1R Wi-Fi IoT Module
Test Item	:	Harmonic Radiated Emission Data
Test Mode	:	Mode 1: Transmit (802.11a-6Mbps) (5825MHz)
Test Date	:	2020/06/29

Horizontal



No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
* 1	11650	58.43	74.00	-15.57	69.31	-10.88	PK



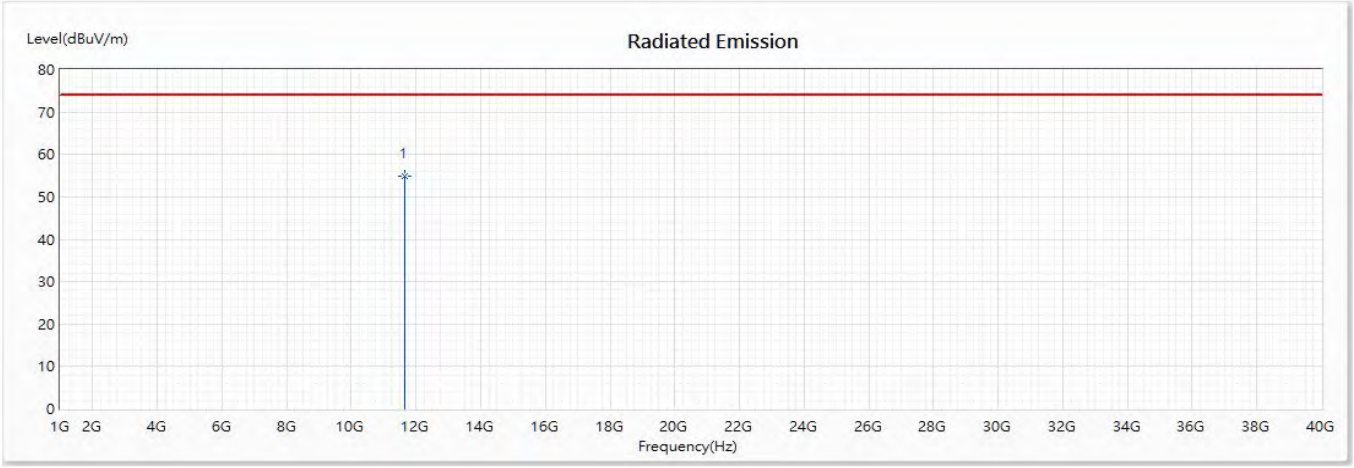
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
* 1	11650	45.31	54.00	-8.69	56.19	-10.88	AV

Note:

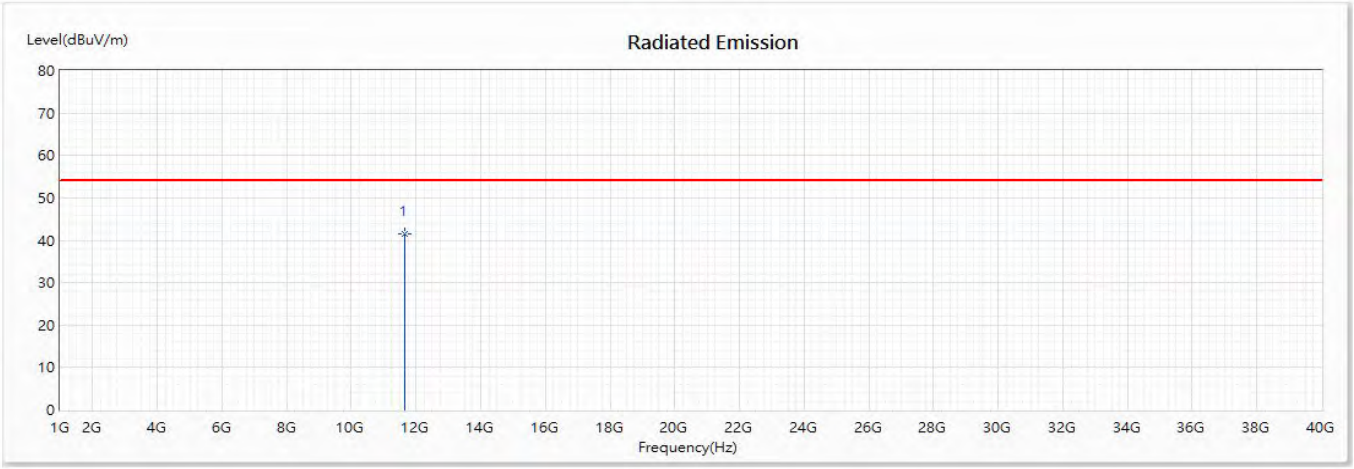
1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product	:	IEEE802.11a/b/g/n 2.4+5GHz 1T1R Wi-Fi IoT Module
Test Item	:	Harmonic Radiated Emission Data
Test Mode	:	Mode 1: Transmit (802.11a-6Mbps) (5825MHz)
Test Date	:	2020/06/29

Vertical



No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
* 1	11650	54.91	74.00	-19.09	65.79	-10.88	PK



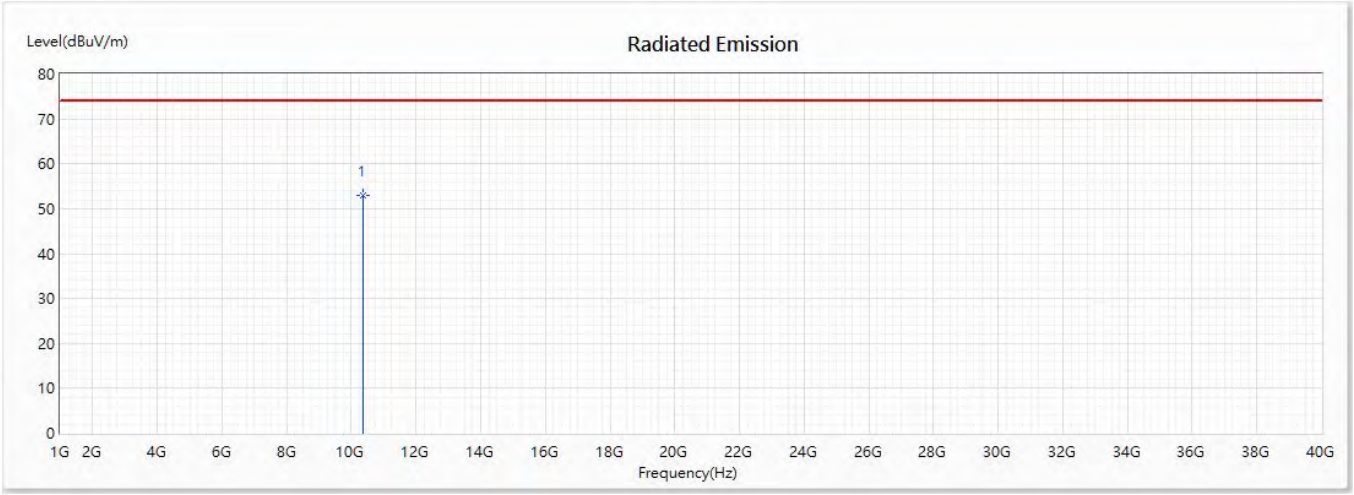
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
* 1	11650	41.61	54.00	-12.39	52.49	-10.88	AV

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product	:	IEEE802.11a/b/g/n 2.4+5GHz 1T1R Wi-Fi IoT Module
Test Item	:	Harmonic Radiated Emission Data
Test Mode	:	Mode 2: Transmit (802.11n-20BW 7.2Mbps) (5180MHz)
Test Date	:	2020/06/29

Horizontal



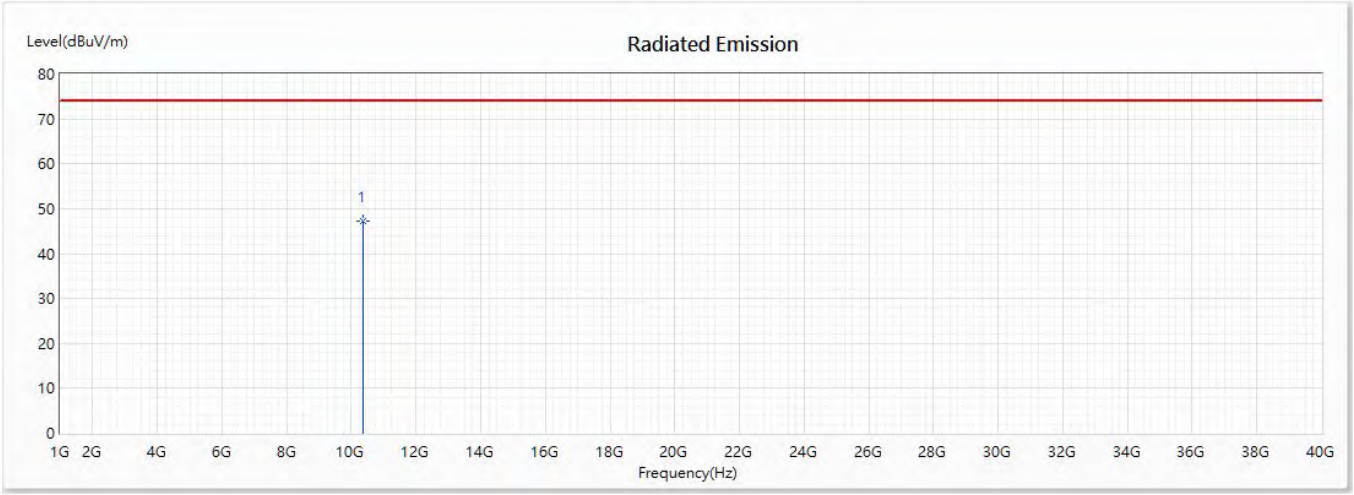
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
* 1	10360	52.92	74.00	-21.08	64.52	-11.60	PK

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product	:	IEEE802.11a/b/g/n 2.4+5GHz 1T1R Wi-Fi IoT Module
Test Item	:	Harmonic Radiated Emission Data
Test Mode	:	Mode 2: Transmit (802.11n-20BW 7.2Mbps) (5180MHz)
Test Date	:	2020/06/15

Vertical



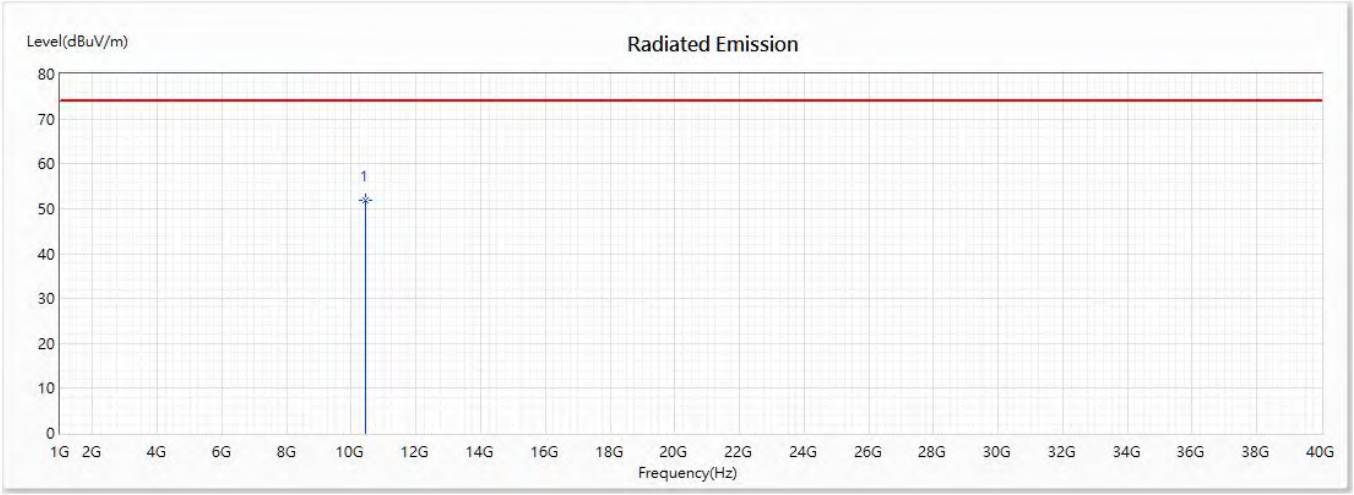
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
* 1	10360	47.33	74.00	-26.67	58.93	-11.60	PK

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product	:	IEEE802.11a/b/g/n 2.4+5GHz 1T1R Wi-Fi IoT Module
Test Item	:	Harmonic Radiated Emission Data
Test Mode	:	Mode 2: Transmit (802.11n-20BW 7.2Mbps) (5220MHz)
Test Date	:	2020/06/29

Horizontal



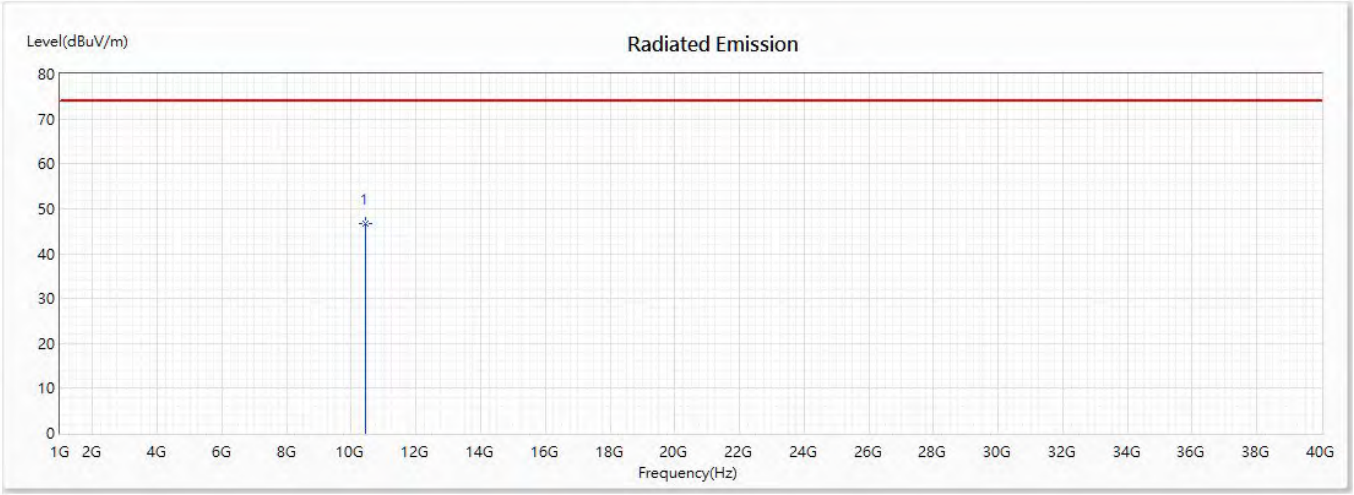
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
* 1	10440	51.88	74.00	-22.12	64.29	-12.41	PK

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product	:	IEEE802.11a/b/g/n 2.4+5GHz 1T1R Wi-Fi IoT Module
Test Item	:	Harmonic Radiated Emission Data
Test Mode	:	Mode 2: Transmit (802.11n-20BW 7.2Mbps) (5220MHz)
Test Date	:	2020/06/15

Vertical



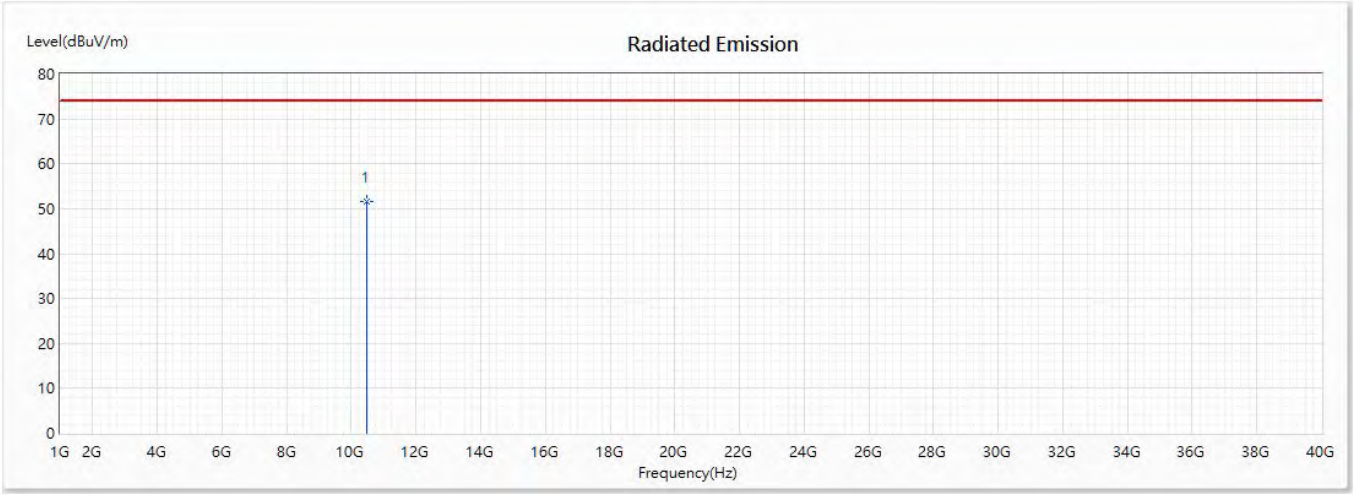
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
* 1	10440	46.77	74.00	-27.23	59.18	-12.41	PK

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product	:	IEEE802.11a/b/g/n 2.4+5GHz 1T1R Wi-Fi IoT Module
Test Item	:	Harmonic Radiated Emission Data
Test Mode	:	Mode 2: Transmit (802.11n-20BW 7.2Mbps) (5240MHz)
Test Date	:	2020/06/29

Horizontal



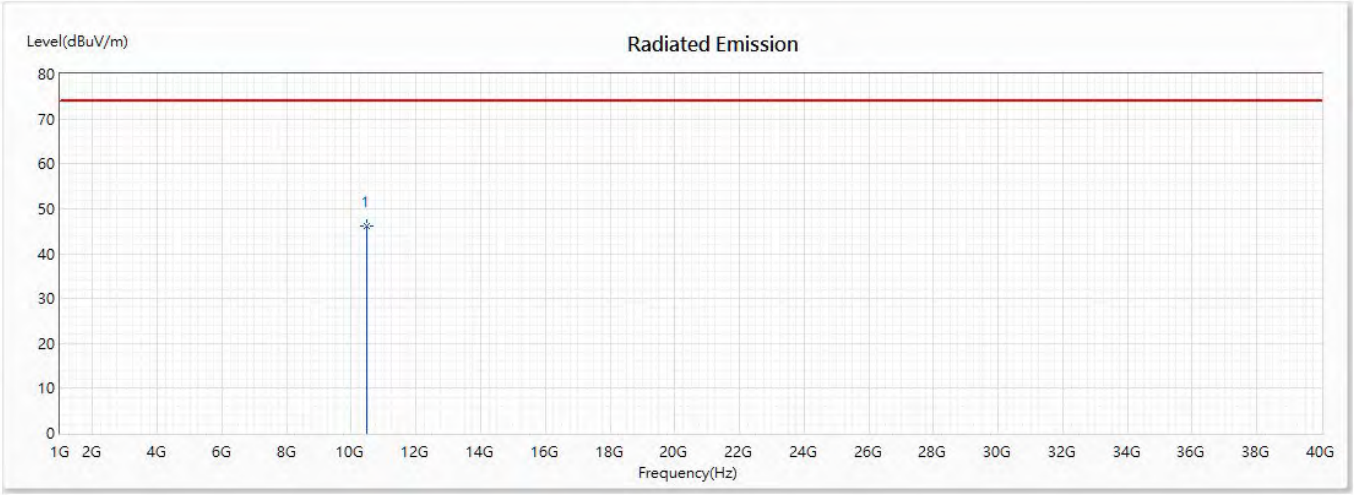
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
* 1	10480	51.49	74.00	-22.51	64.24	-12.75	PK

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product	:	IEEE802.11a/b/g/n 2.4+5GHz 1T1R Wi-Fi IoT Module
Test Item	:	Harmonic Radiated Emission Data
Test Mode	:	Mode 2: Transmit (802.11n-20BW 7.2Mbps) (5240MHz)
Test Date	:	2020/06/15

Vertical



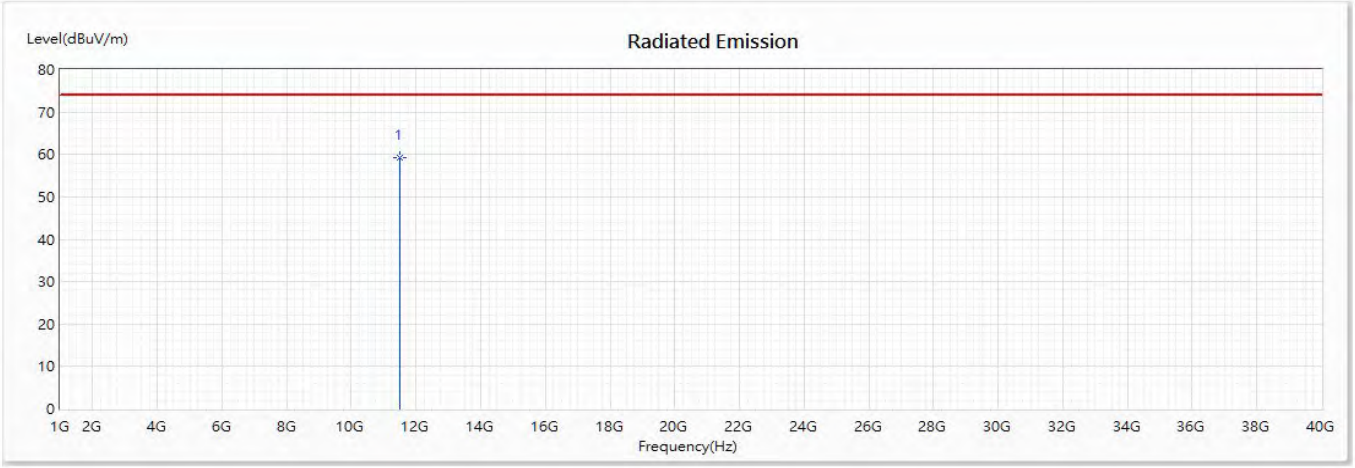
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
* 1	10480	46.25	74.00	-27.75	59.00	-12.75	PK

Note:

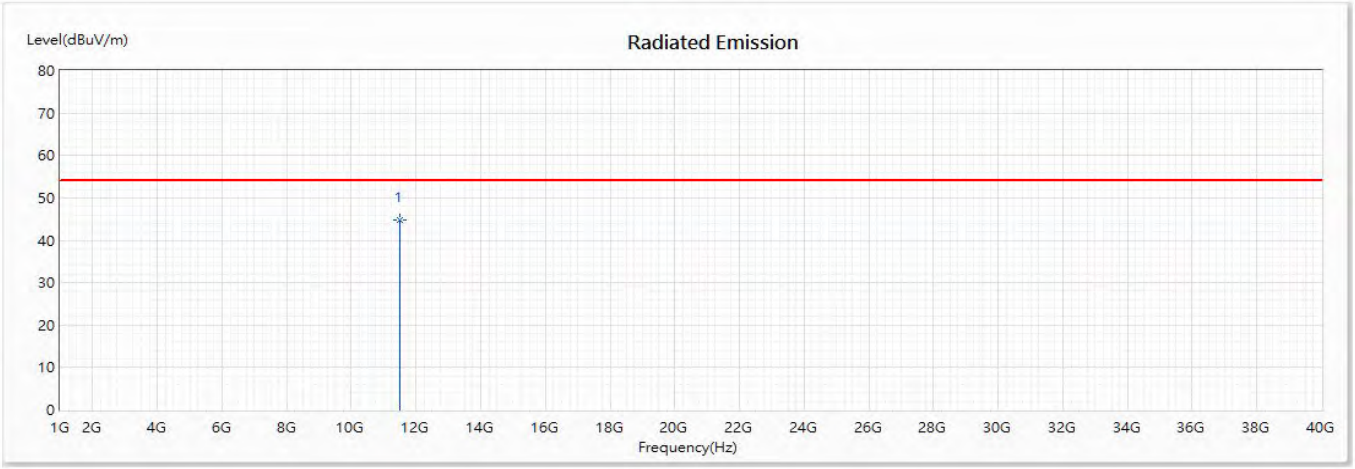
1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product	:	IEEE802.11a/b/g/n 2.4+5GHz 1T1R Wi-Fi IoT Module
Test Item	:	Harmonic Radiated Emission Data
Test Mode	:	Mode 2: Transmit (802.11n-20BW 7.2Mbps) (5745MHz)
Test Date	:	2020/06/29

Horizontal



No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
* 1	11490	59.32	74.00	-14.68	71.09	-11.77	PK



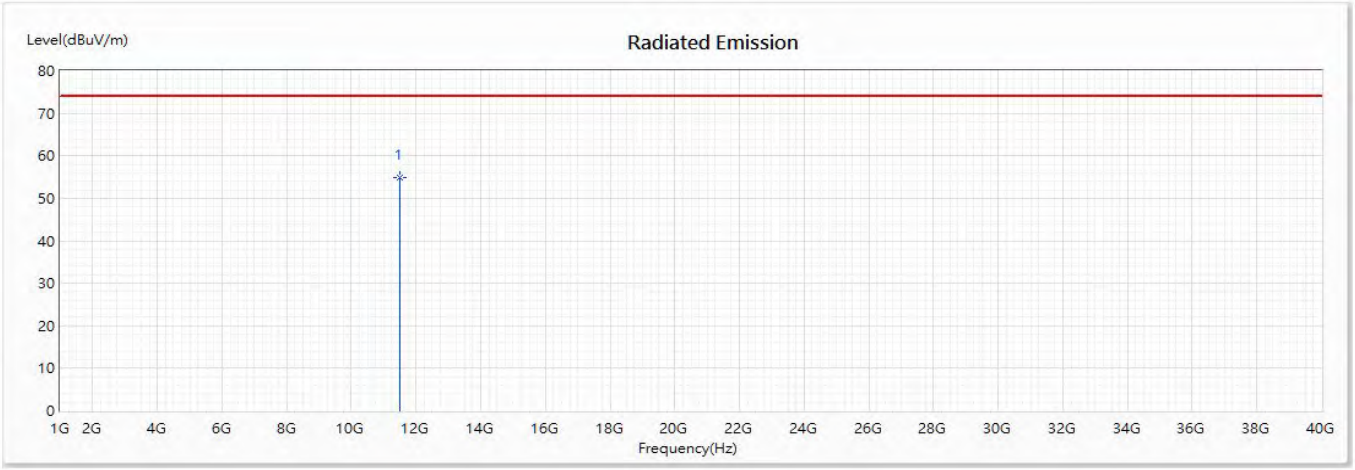
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
* 1	11490	44.65	54.00	-9.35	56.42	-11.77	AV

Note:

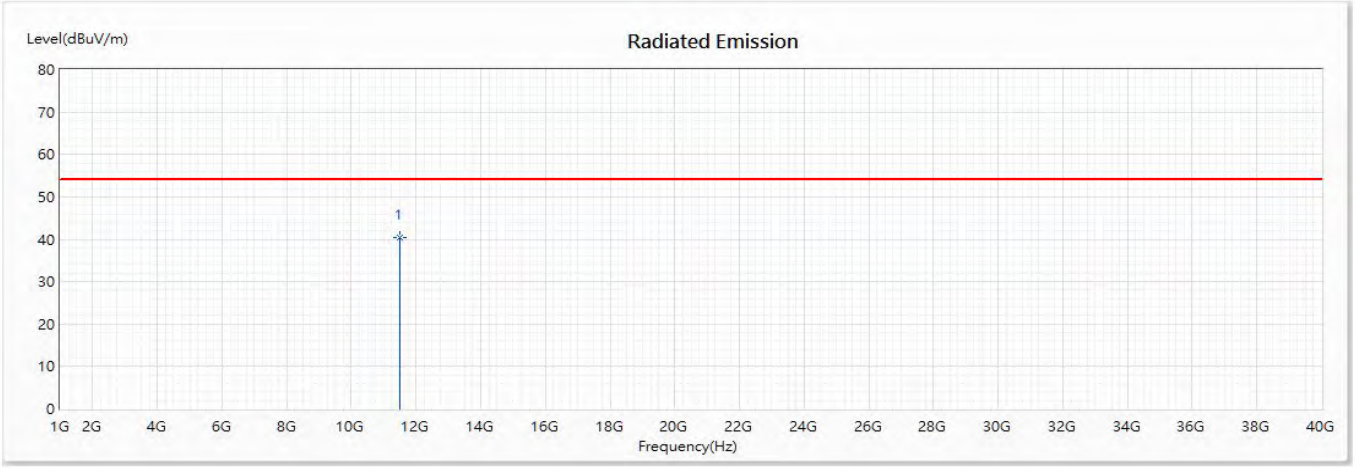
1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product	:	IEEE802.11a/b/g/n 2.4+5GHz 1T1R Wi-Fi IoT Module
Test Item	:	Harmonic Radiated Emission Data
Test Mode	:	Mode 2: Transmit (802.11n-20BW 7.2Mbps) (5745MHz)
Test Date	:	2020/06/29

Vertical



No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
* 1	11490	54.85	74.00	-19.15	66.62	-11.77	PK



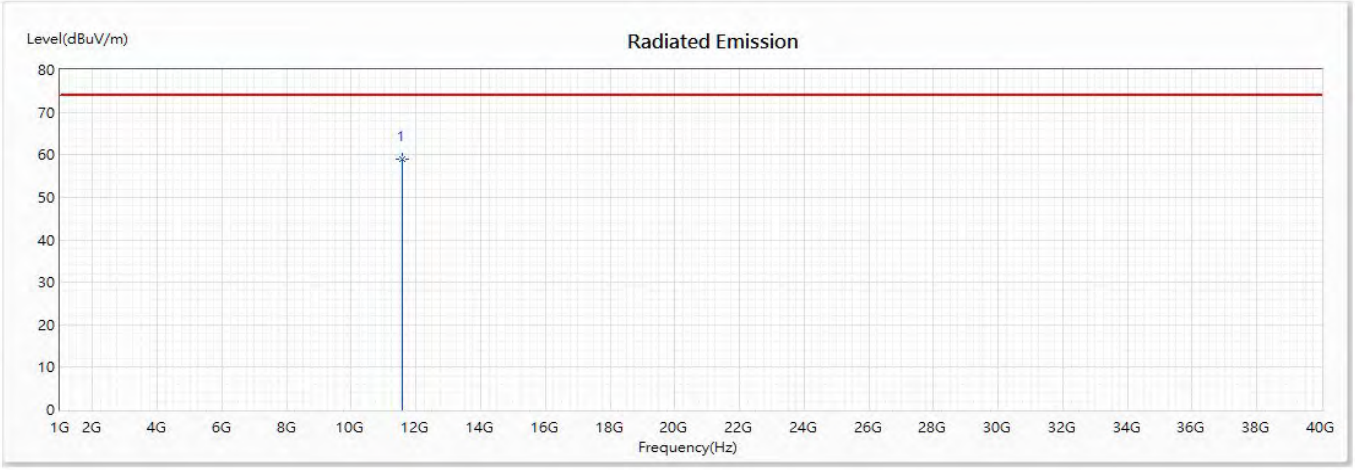
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
* 1	11490	40.35	54.00	-13.65	52.12	-11.77	AV

Note:

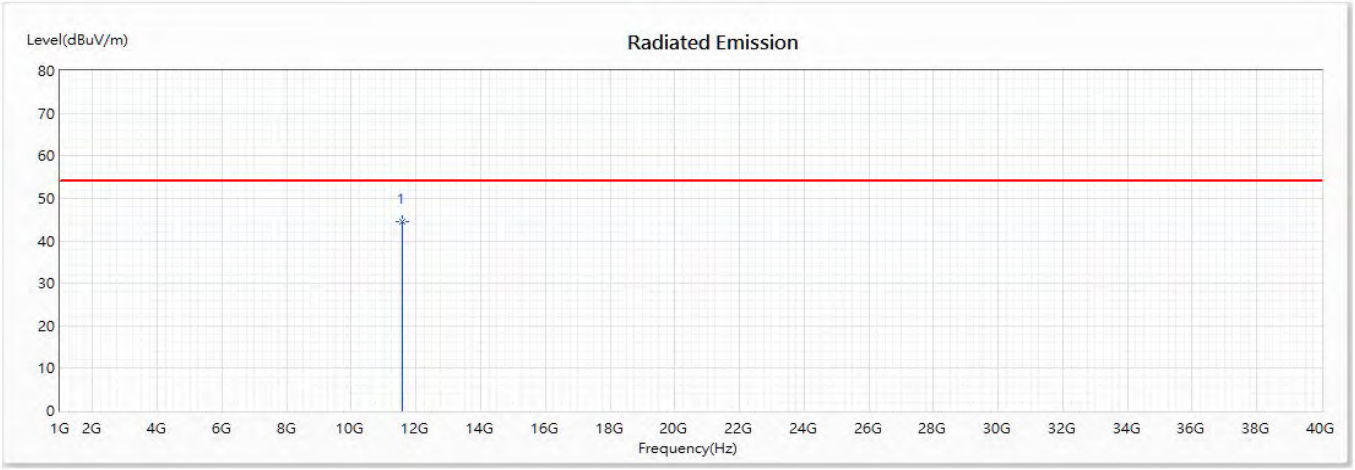
1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product	:	IEEE802.11a/b/g/n 2.4+5GHz 1T1R Wi-Fi IoT Module
Test Item	:	Harmonic Radiated Emission Data
Test Mode	:	Mode 2: Transmit (802.11n-20BW 7.2Mbps) (5785MHz)
Test Date	:	2020/06/29

Horizontal



No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
* 1	11570	58.98	74.00	-15.02	70.39	-11.41	PK



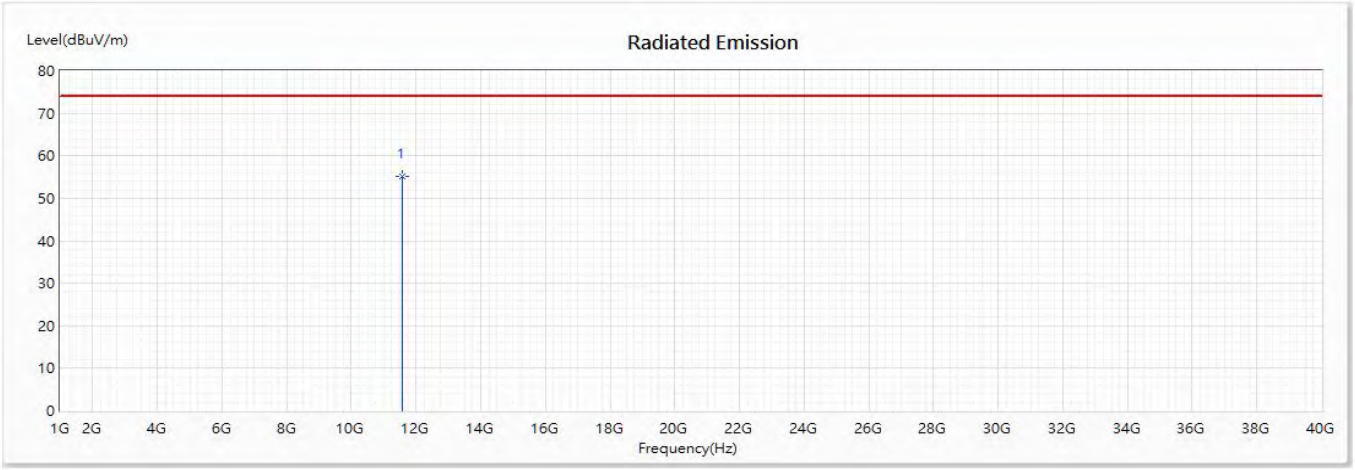
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
* 1	11570	44.62	54.00	-9.38	56.03	-11.41	AV

Note:

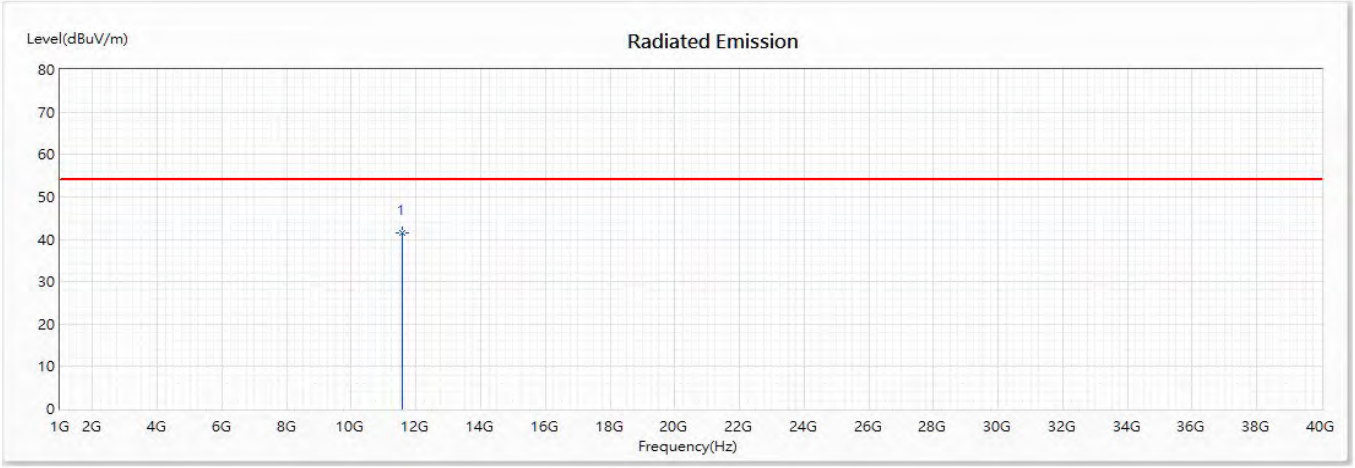
1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product	:	IEEE802.11a/b/g/n 2.4+5GHz 1T1R Wi-Fi IoT Module
Test Item	:	Harmonic Radiated Emission Data
Test Mode	:	Mode 2: Transmit (802.11n-20BW 7.2Mbps) (5785MHz)
Test Date	:	2020/06/29

Vertical



No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
* 1	11570	55.17	74.00	-18.83	66.58	-11.41	PK



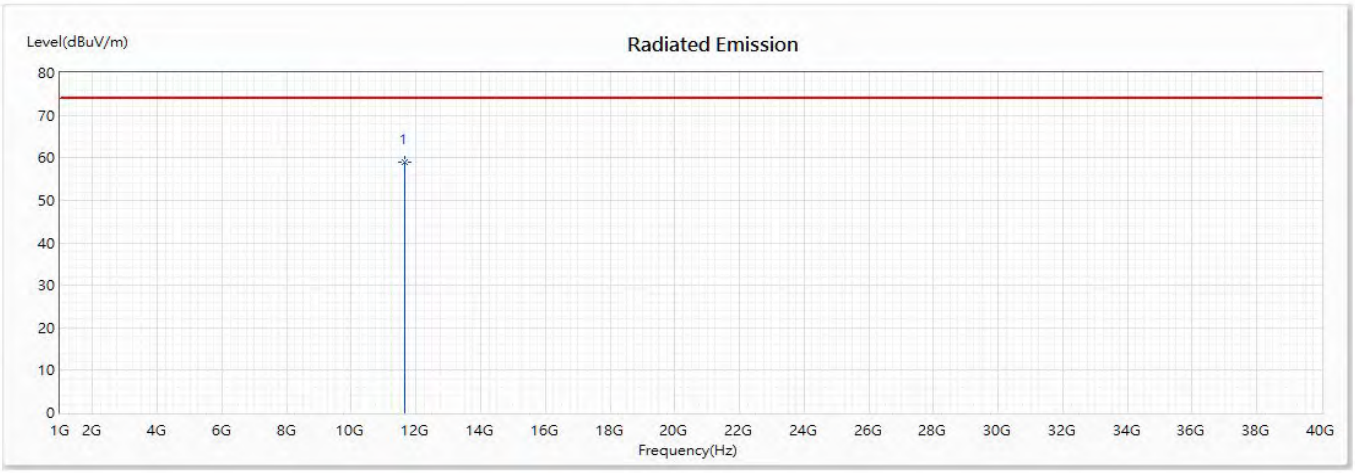
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
* 1	11570	41.49	54.00	-12.51	52.90	-11.41	AV

Note:

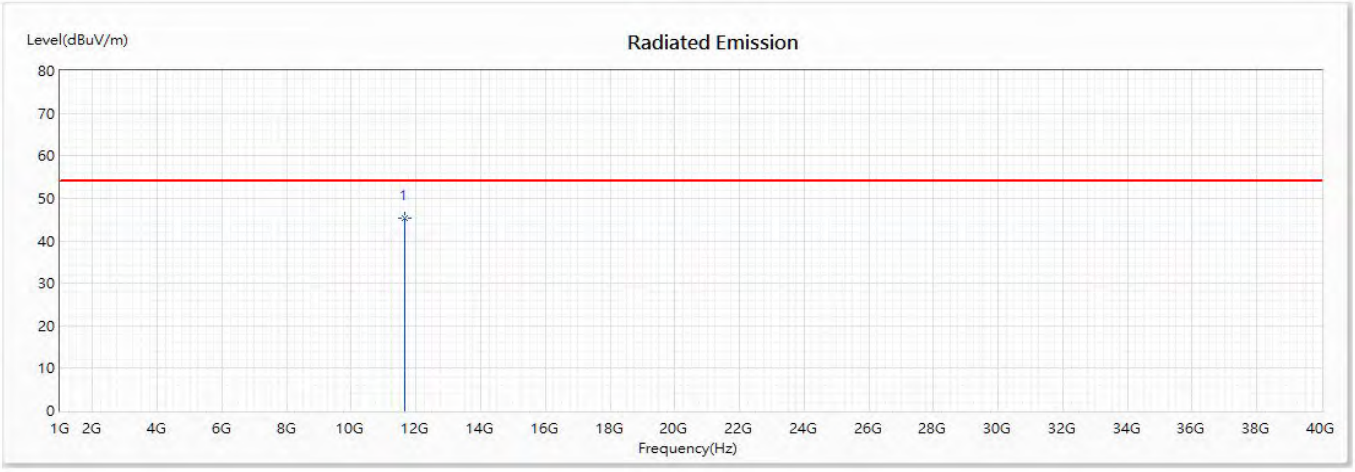
1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product	:	IEEE802.11a/b/g/n 2.4+5GHz 1T1R Wi-Fi IoT Module
Test Item	:	Harmonic Radiated Emission Data
Test Mode	:	Mode 2: Transmit (802.11n-20BW 7.2Mbps) (5825MHz)
Test Date	:	2020/06/29

Horizontal



No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
* 1	11650	59.11	74.00	-14.89	69.99	-10.88	PK



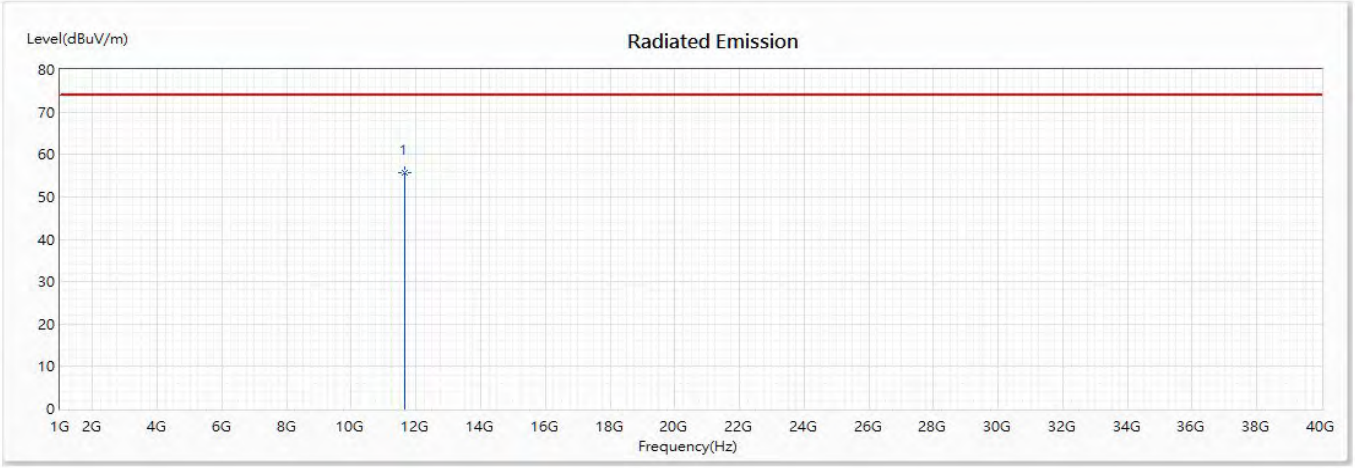
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
* 1	11650	45.25	54.00	-8.75	56.13	-10.88	AV

Note:

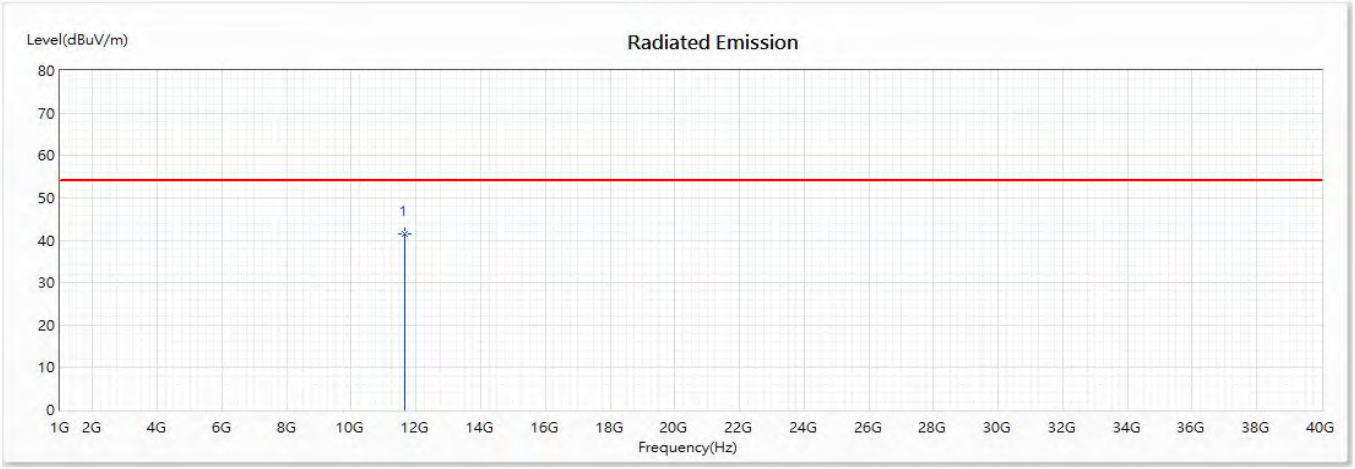
1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product	:	IEEE802.11a/b/g/n 2.4+5GHz 1T1R Wi-Fi IoT Module
Test Item	:	Harmonic Radiated Emission Data
Test Mode	:	Mode 2: Transmit (802.11n-20BW 7.2Mbps) (5825MHz)
Test Date	:	2020/06/29

Vertical



No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
* 1	11650	55.67	74.00	-18.33	66.55	-10.88	PK



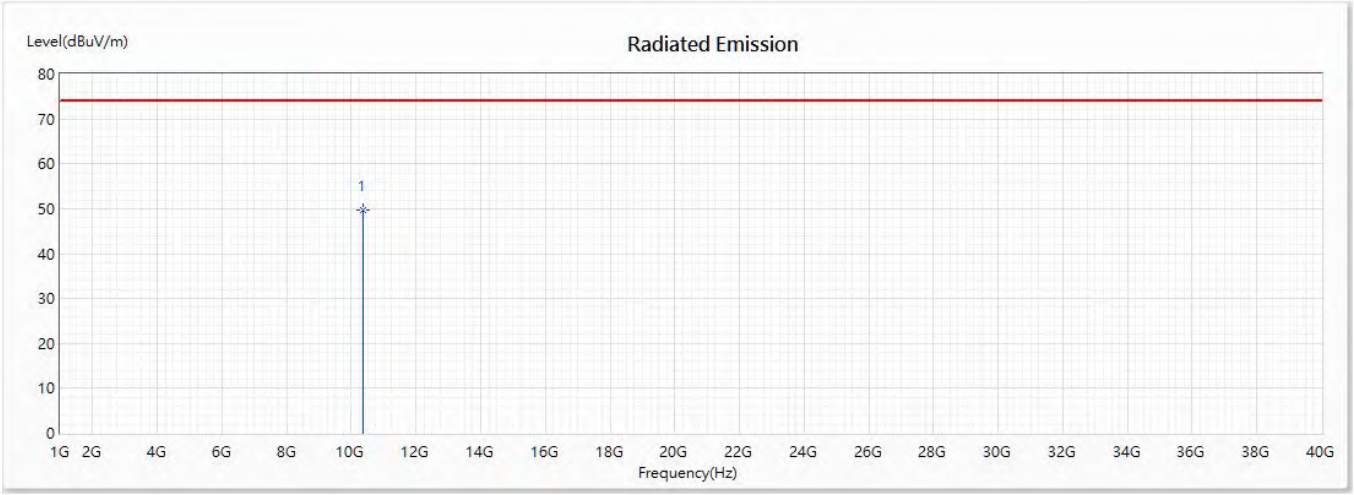
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
* 1	11650	41.55	54.00	-12.45	52.43	-10.88	AV

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product	:	IEEE802.11a/b/g/n 2.4+5GHz 1T1R Wi-Fi IoT Module
Test Item	:	Harmonic Radiated Emission Data
Test Mode	:	Mode 3: Transmit (802.11n-40BW 15Mbps) (5190MHz)
Test Date	:	2020/06/29

Horizontal



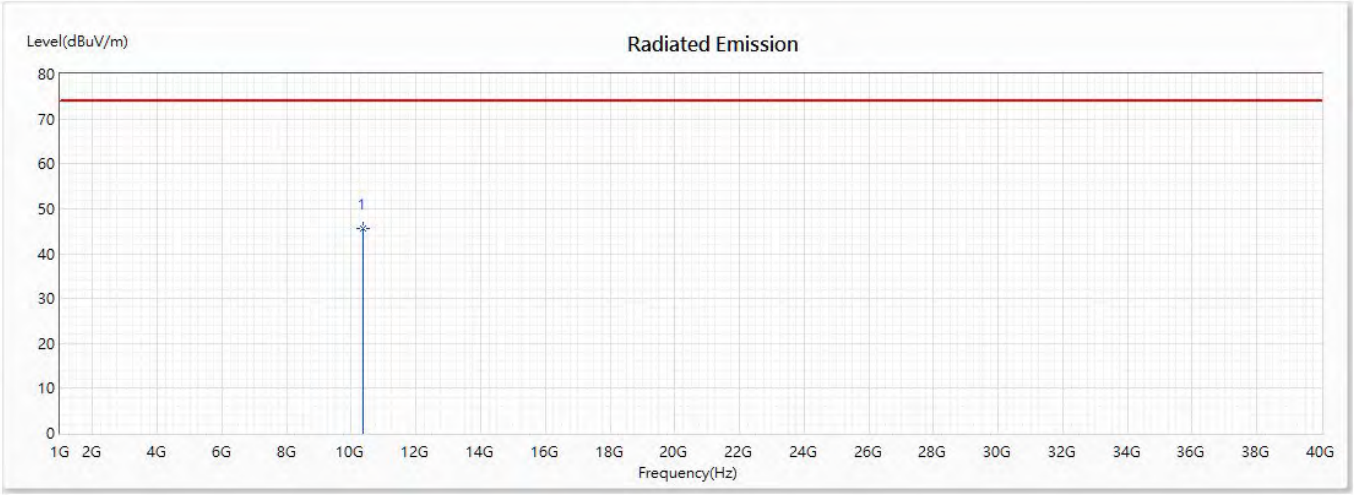
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
* 1	10380	49.72	74.00	-24.28	61.56	-11.84	AV

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product	:	IEEE802.11a/b/g/n 2.4+5GHz 1T1R Wi-Fi IoT Module
Test Item	:	Harmonic Radiated Emission Data
Test Mode	:	Mode 3: Transmit (802.11n-40BW 15Mbps) (5190MHz)
Test Date	:	2020/06/29

Vertical



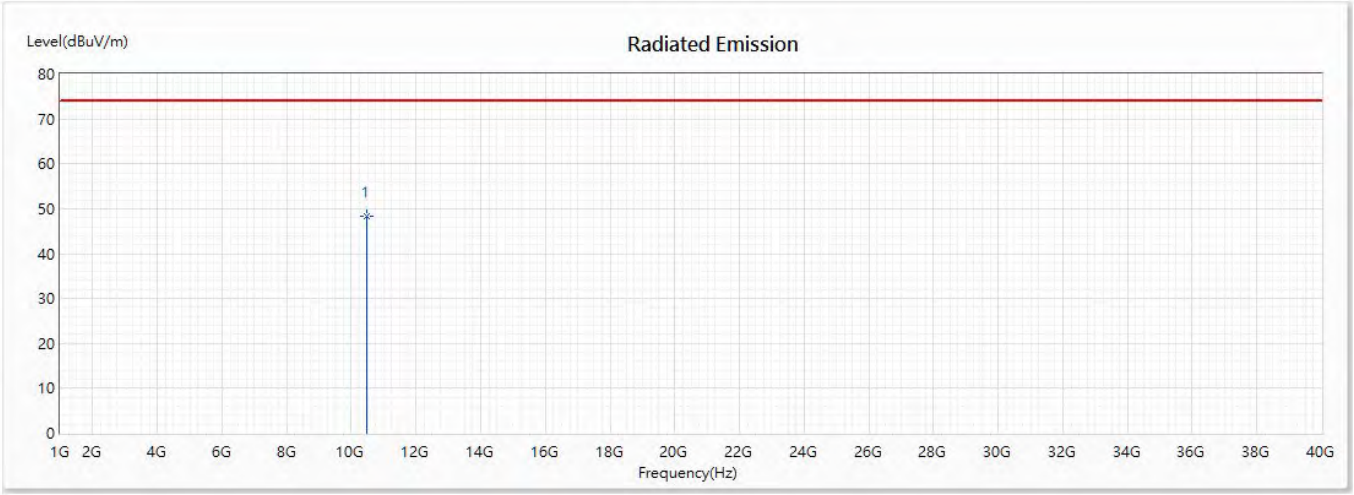
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
* 1	10380	45.67	74.00	-28.33	57.51	-11.84	PK

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product	:	IEEE802.11a/b/g/n 2.4+5GHz 1T1R Wi-Fi IoT Module
Test Item	:	Harmonic Radiated Emission Data
Test Mode	:	Mode 3: Transmit (802.11n-40BW 15Mbps) (5230MHz)
Test Date	:	2020/06/29

Horizontal



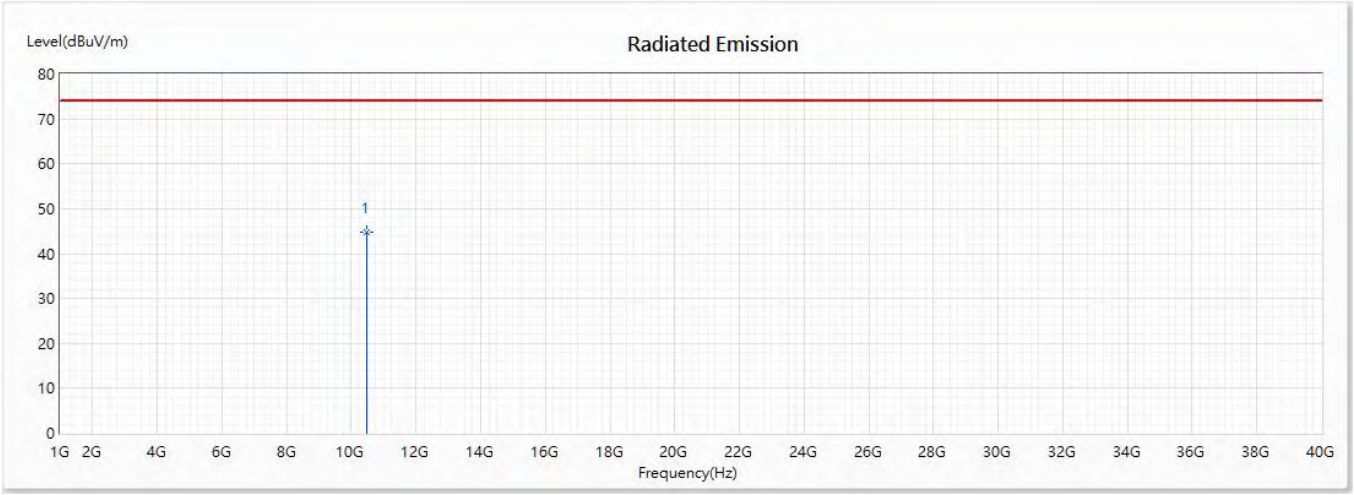
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
* 1	10460	48.35	74.00	-25.65	60.92	-12.57	PK

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product	:	IEEE802.11a/b/g/n 2.4+5GHz 1T1R Wi-Fi IoT Module
Test Item	:	Harmonic Radiated Emission Data
Test Mode	:	Mode 3: Transmit (802.11n-40BW 15Mbps) (5230MHz)
Test Date	:	2020/06/29

Vertical



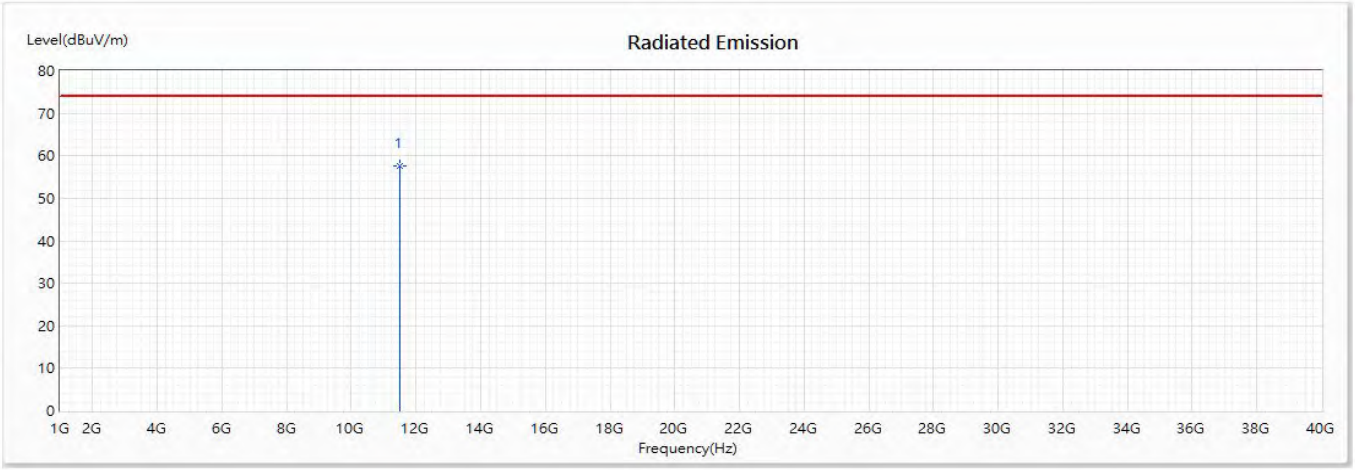
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
* 1	10460	44.76	74.00	-29.24	57.33	-12.57	PK

Note:

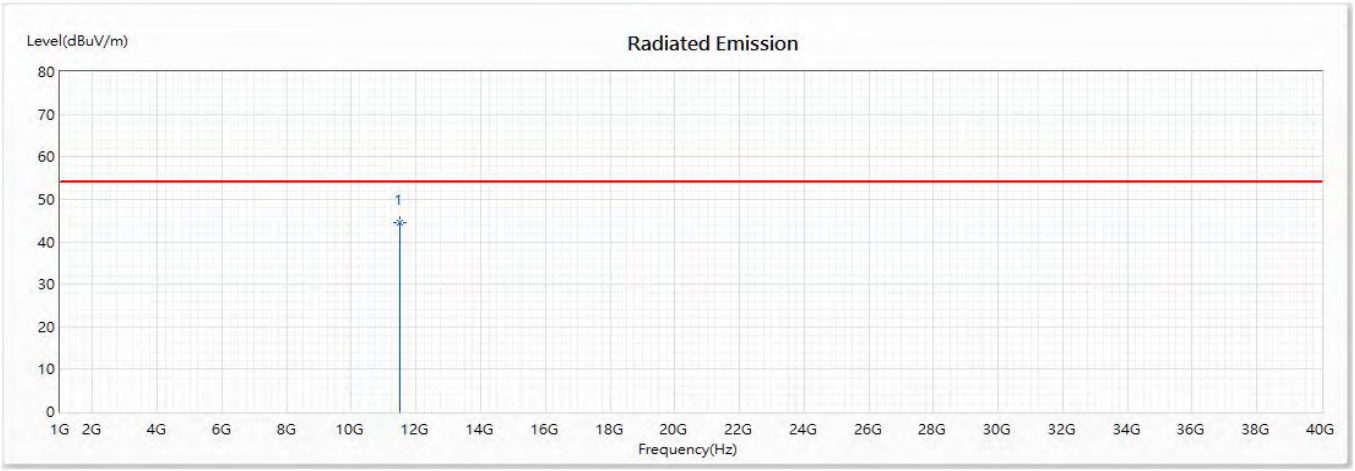
1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product	:	IEEE802.11a/b/g/n 2.4+5GHz 1T1R Wi-Fi IoT Module
Test Item	:	Harmonic Radiated Emission Data
Test Mode	:	Mode 3: Transmit (802.11n-40BW 15Mbps) (5755MHz)
Test Date	:	2020/06/30

Horizontal



No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
* 1	11510	57.62	74.00	-16.38	69.39	-11.77	PK



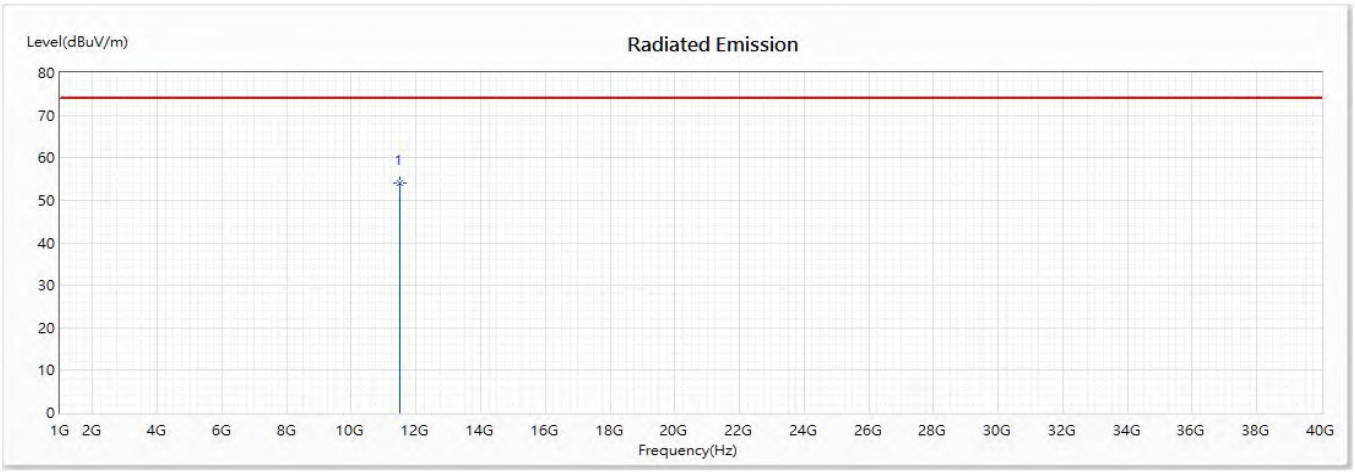
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
* 1	11510	44.51	54.00	-9.49	56.28	-11.77	AV

Note:

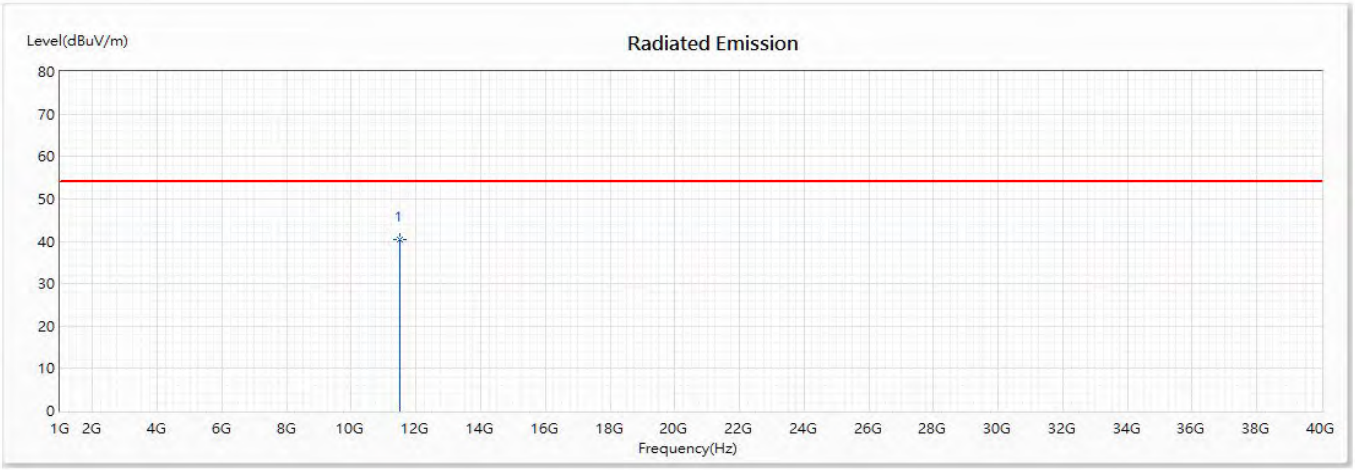
1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product	:	IEEE802.11a/b/g/n 2.4+5GHz 1T1R Wi-Fi IoT Module
Test Item	:	Harmonic Radiated Emission Data
Test Mode	:	Mode 3: Transmit (802.11n-40BW 15Mbps) (5755MHz)
Test Date	:	2020/06/30

Vertical



No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
* 1	11510	54.12	74.00	-19.88	65.89	-11.77	PK



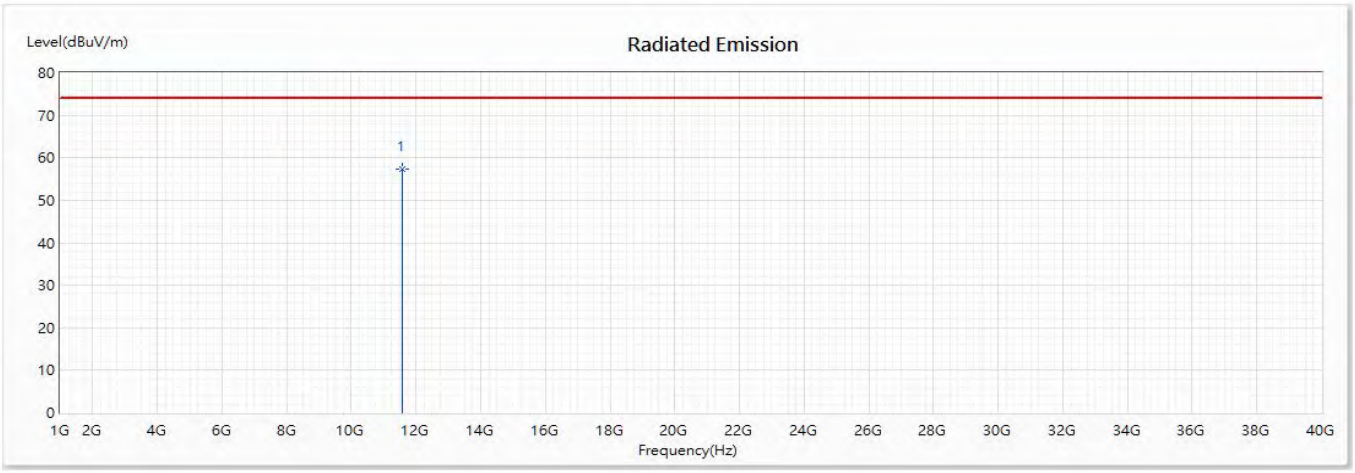
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
* 1	11510	40.31	54.00	-13.69	52.08	-11.77	AV

Note:

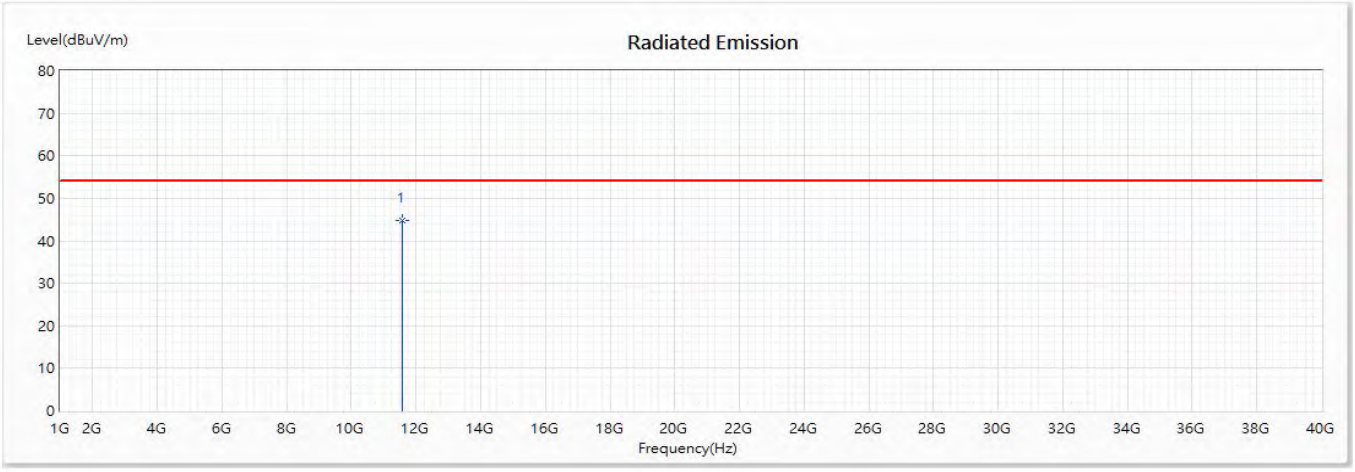
1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product	:	IEEE802.11a/b/g/n 2.4+5GHz 1T1R Wi-Fi IoT Module
Test Item	:	Harmonic Radiated Emission Data
Test Mode	:	Mode 3: Transmit (802.11n-40BW 15Mbps) (5795MHz)
Test Date	:	2020/06/30

Horizontal



No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
* 1	11590	57.35	74.00	-16.65	68.63	-11.28	PK



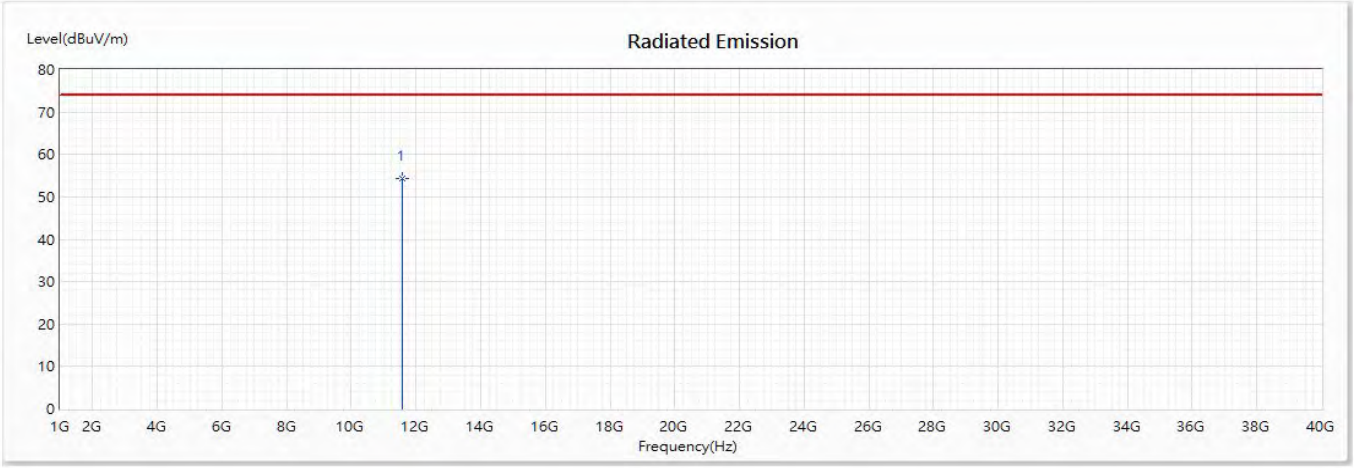
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
* 1	11590	44.67	54.00	-9.33	55.95	-11.28	AV

Note:

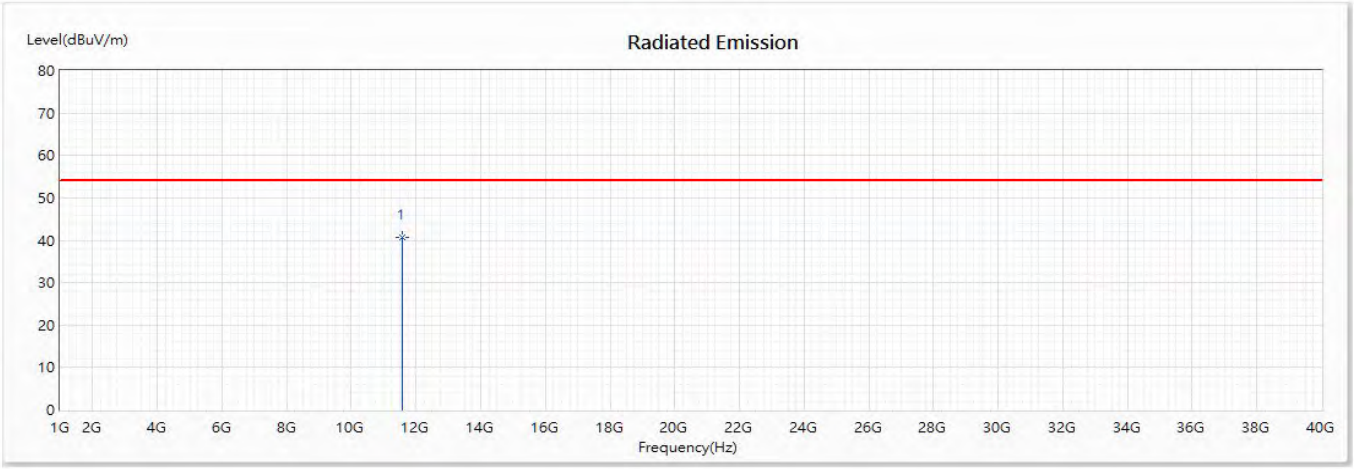
1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product	:	IEEE802.11a/b/g/n 2.4+5GHz 1T1R Wi-Fi IoT Module
Test Item	:	Harmonic Radiated Emission Data
Test Mode	:	Mode 3: Transmit (802.11n-40BW 15Mbps) (5795MHz)
Test Date	:	2020/06/30

Vertical



No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
* 1	11590	54.29	74.00	-19.71	65.57	-11.28	PK



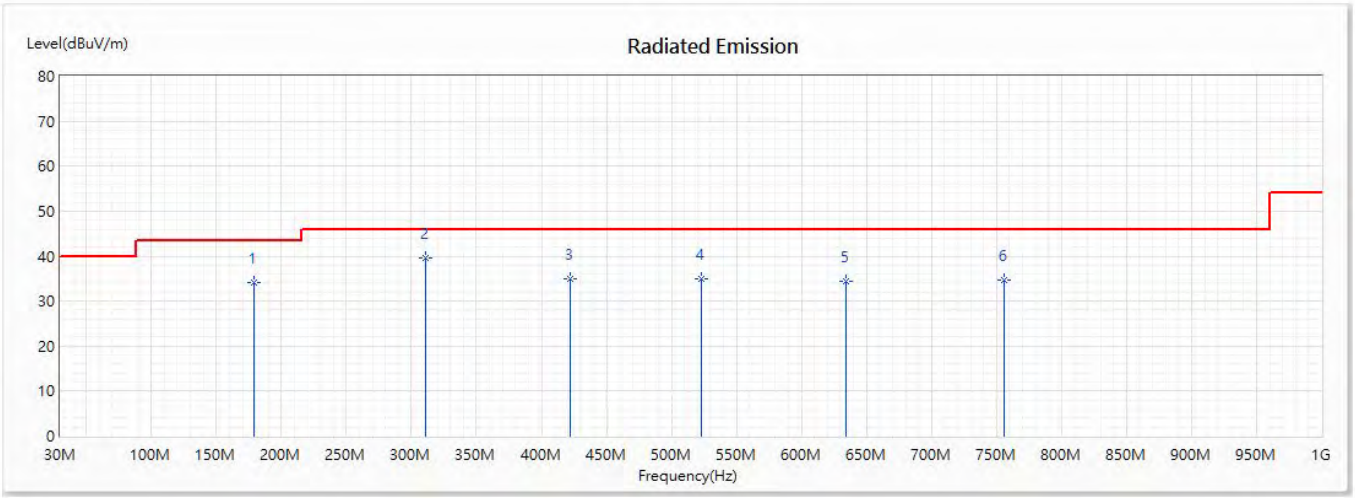
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
* 1	11590	40.78	54.00	-13.22	52.06	-11.28	AV

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product	:	IEEE802.11a/b/g/n 2.4+5GHz 1T1R Wi-Fi IoT Module
Test Item	:	General Radiated Emission
Test Mode	:	Mode 1: Transmit (802.11a-6Mbps) (5220MHz)
Test Date	:	2020/06/29

Horizontal



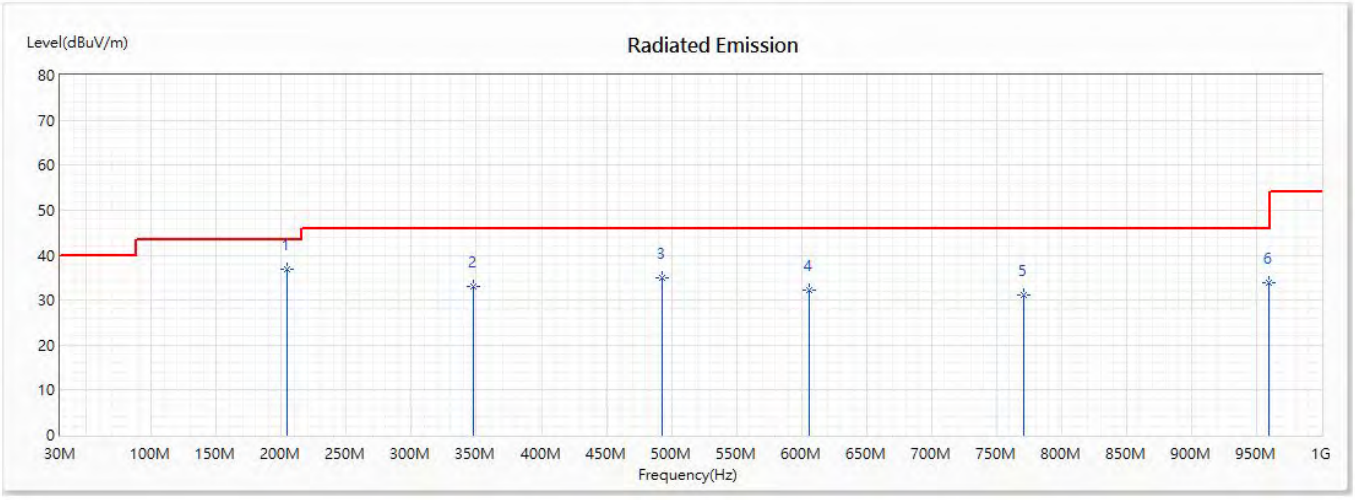
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
1	179.014	34.21	43.50	-9.29	47.16	-12.95	QP
* 2	311.159	39.47	46.00	-6.53	47.41	-7.94	QP
3	422.217	35.01	46.00	-10.99	40.18	-5.17	QP
4	523.435	34.92	46.00	-11.08	39.72	-4.80	QP
5	634.493	34.38	46.00	-11.62	36.73	-2.35	QP
6	755.391	34.66	46.00	-11.34	35.74	-1.08	QP

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The emission levels of other frequencies are very lower than the limit and not show in test report.
5. No emission found between lowest internal used/generated frequency to 30MHz.

Product	:	IEEE802.11a/b/g/n 2.4+5GHz 1T1R Wi-Fi IoT Module
Test Item	:	General Radiated Emission
Test Mode	:	Mode 1: Transmit (802.11a-6Mbps) (5220MHz)
Test Date	:	2020/06/29

Vertical



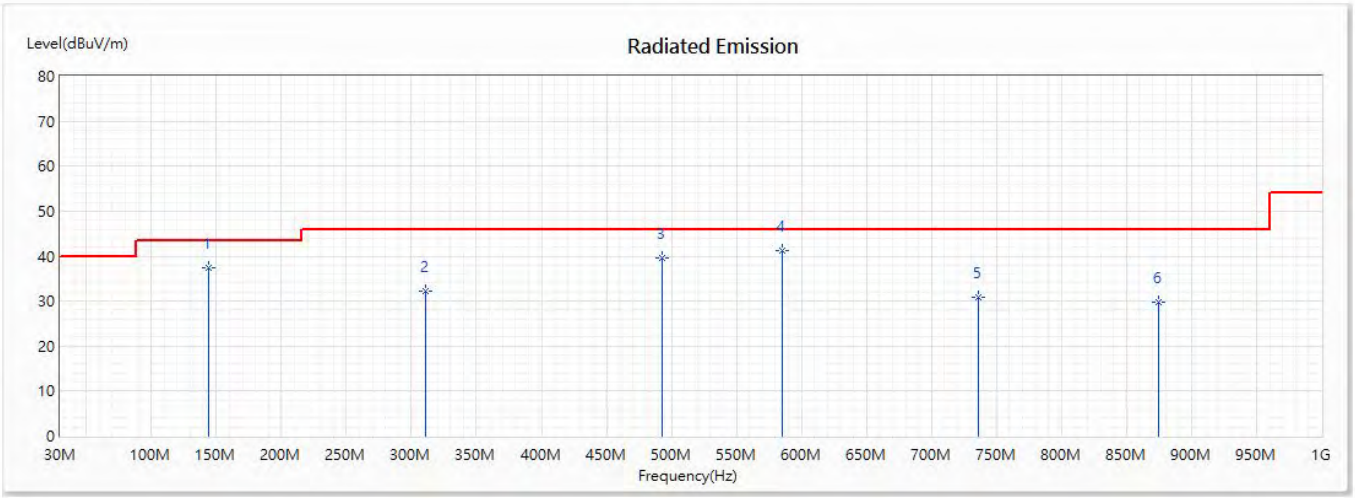
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
* 1	204.319	36.76	43.50	-6.74	48.41	-11.65	QP
2	347.71	32.97	46.00	-13.03	40.07	-7.10	QP
3	492.507	35.01	46.00	-10.99	39.94	-4.93	QP
4	606.377	32.10	46.00	-13.90	32.75	-0.65	QP
5	770.855	31.20	46.00	-14.80	33.20	-2.00	QP
6	959.232	33.90	46.00	-12.10	36.05	-2.15	QP

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The emission levels of other frequencies are very lower than the limit and not show in test report.
5. No emission found between lowest internal used/generated frequency to 30MHz.

Product	:	IEEE802.11a/b/g/n 2.4+5GHz 1T1R Wi-Fi IoT Module
Test Item	:	General Radiated Emission
Test Mode	:	Mode 1: Transmit (802.11a-6Mbps) (5785MHz)
Test Date	:	2020/06/29

Horizontal



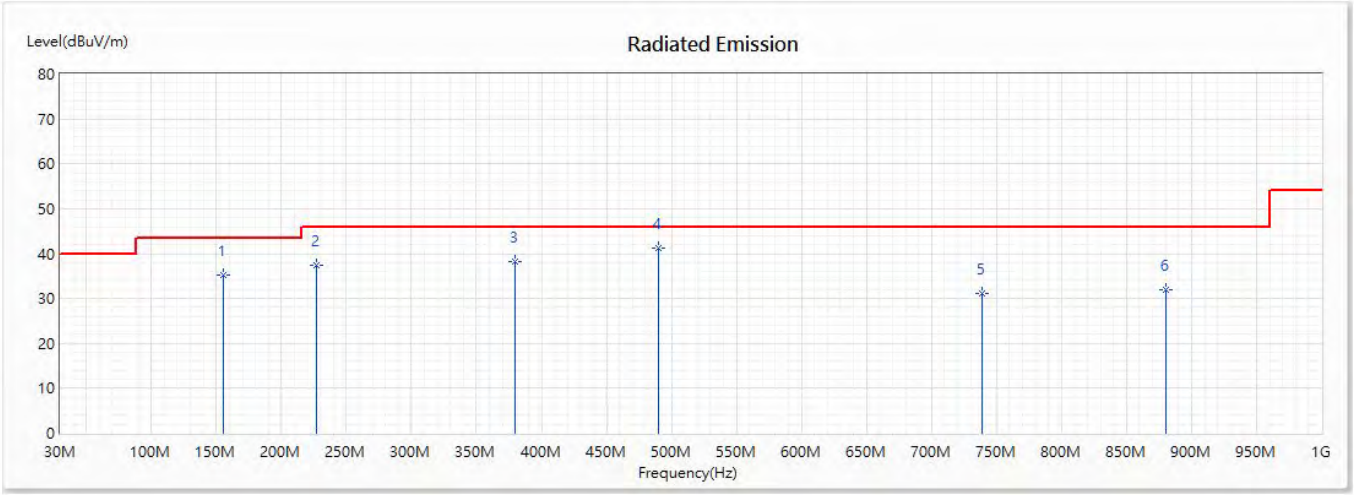
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
1	143.87	37.44	43.50	-6.06	49.11	-11.67	QP
2	311.159	32.22	46.00	-13.78	40.16	-7.94	QP
3	492.507	39.46	46.00	-6.54	44.39	-4.93	QP
* 4	585.29	41.31	46.00	-4.69	42.12	-0.81	QP
5	735.71	30.76	46.00	-15.24	30.83	-0.07	QP
6	874.884	29.65	46.00	-16.35	31.75	-2.10	QP

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The emission levels of other frequencies are very lower than the limit and not show in test report.
5. No emission found between lowest internal used/generated frequency to 30MHz.

Product	:	IEEE802.11a/b/g/n 2.4+5GHz 1T1R Wi-Fi IoT Module
Test Item	:	General Radiated Emission
Test Mode	:	Mode 1: Transmit (802.11a-6Mbps) (5785MHz)
Test Date	:	2020/06/29

Vertical



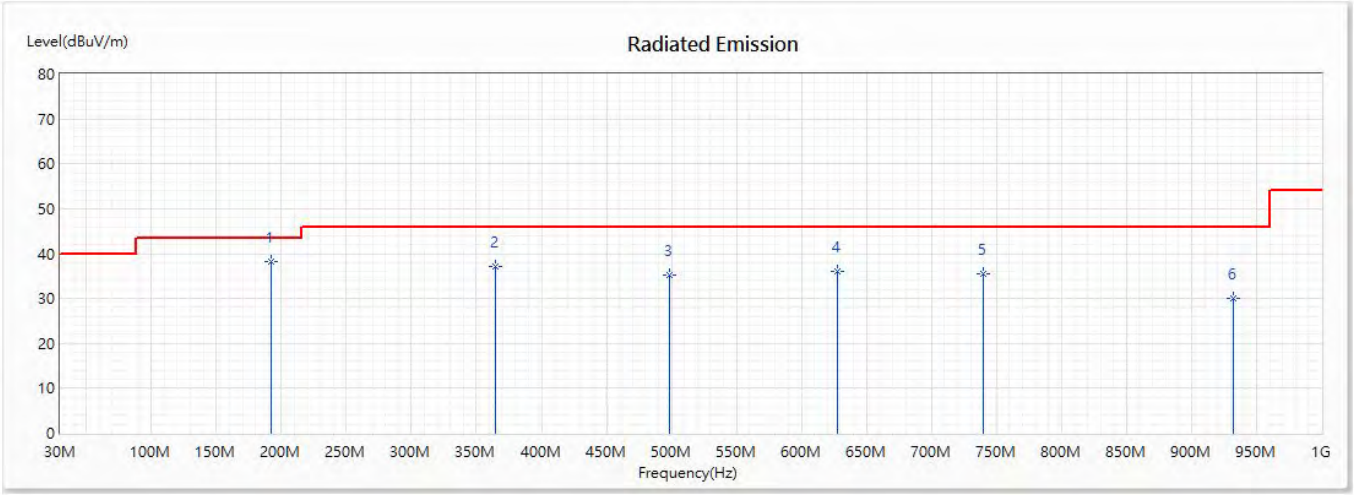
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
1	155.116	35.32	43.50	-8.18	48.83	-13.51	QP
2	226.812	37.49	46.00	-8.51	48.80	-11.31	QP
3	380.043	38.30	46.00	-7.70	44.14	-5.84	QP
* 4	489.696	41.34	46.00	-4.66	46.44	-5.10	QP
5	738.522	31.17	46.00	-14.83	30.74	0.43	QP
6	880.507	32.02	46.00	-13.98	34.16	-2.14	QP

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The emission levels of other frequencies are very lower than the limit and not show in test report.
5. No emission found between lowest internal used/generated frequency to 30MHz.

Product	:	IEEE802.11a/b/g/n 2.4+5GHz 1T1R Wi-Fi IoT Module
Test Item	:	General Radiated Emission
Test Mode	:	Mode 2: Transmit (802.11n-20BW 7.2Mbps) (5220MHz)
Test Date	:	2020/06/29

Horizontal



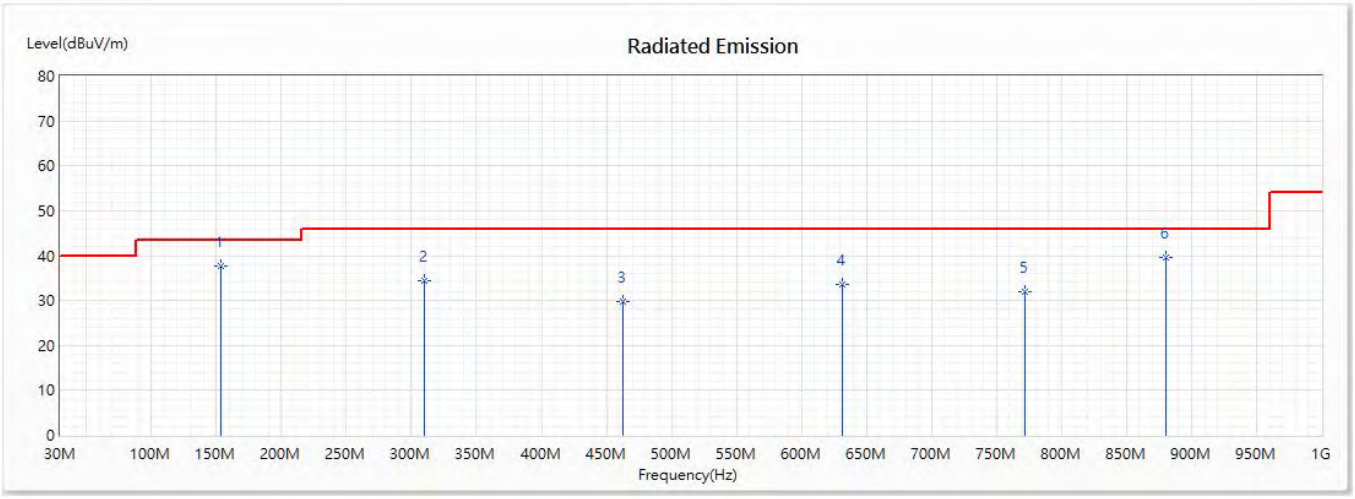
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
* 1	191.667	38.12	43.50	-5.38	50.35	-12.23	QP
2	364.58	37.24	46.00	-8.76	43.36	-6.12	QP
3	498.13	35.21	46.00	-10.79	39.79	-4.58	QP
4	627.464	36.03	46.00	-9.97	38.10	-2.07	QP
5	739.928	35.50	46.00	-10.50	34.81	0.69	QP
6	932.522	29.99	46.00	-16.01	32.90	-2.91	QP

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The emission levels of other frequencies are very lower than the limit and not show in test report.
5. No emission found between lowest internal used/generated frequency to 30MHz.

Product	:	IEEE802.11a/b/g/n 2.4+5GHz 1T1R Wi-Fi IoT Module
Test Item	:	General Radiated Emission
Test Mode	:	Mode 2: Transmit (802.11n-20BW 7.2Mbps) (5220MHz)
Test Date	:	2020/06/29

Vertical



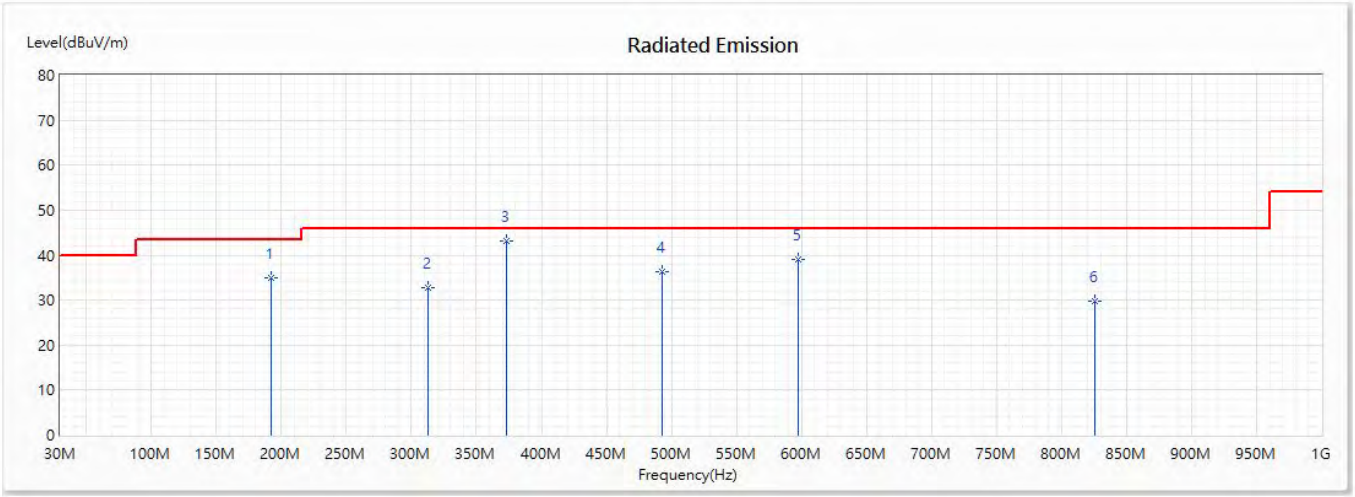
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
* 1	153.71	37.67	43.50	-5.83	51.07	-13.40	QP
2	309.754	34.43	46.00	-11.57	42.41	-7.98	QP
3	462.986	29.73	46.00	-16.27	34.10	-4.37	QP
4	631.681	33.57	46.00	-12.43	35.82	-2.25	QP
5	772.261	31.87	46.00	-14.13	33.92	-2.05	QP
6	880.507	39.70	46.00	-6.30	41.84	-2.14	QP

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The emission levels of other frequencies are very lower than the limit and not show in test report.
5. No emission found between lowest internal used/generated frequency to 30MHz.

Product	:	IEEE802.11a/b/g/n 2.4+5GHz 1T1R Wi-Fi IoT Module
Test Item	:	General Radiated Emission
Test Mode	:	Mode 2: Transmit (802.11n-20BW 7.2Mbps) (5785MHz)
Test Date	:	2020/06/29

Horizontal



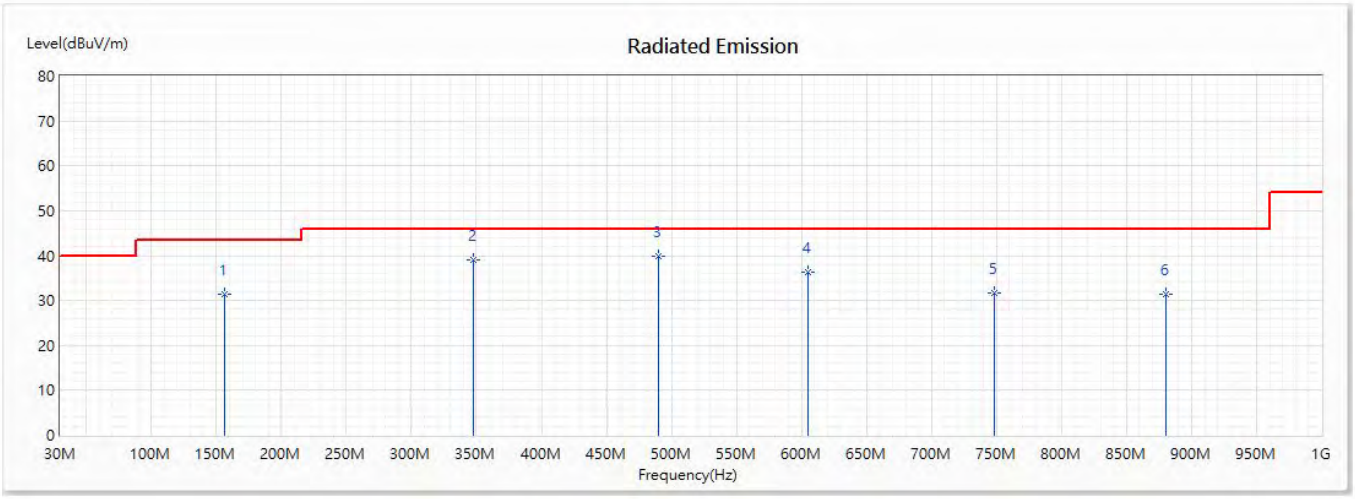
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
1	191.667	34.90	43.50	-8.60	47.13	-12.23	QP
2	312.565	32.65	46.00	-13.35	40.55	-7.90	QP
* 3	373.014	43.06	46.00	-2.94	49.03	-5.97	QP
4	492.507	36.23	46.00	-9.77	41.16	-4.93	QP
5	597.942	39.07	46.00	-6.93	39.32	-0.25	QP
6	825.681	29.80	46.00	-16.20	32.47	-2.67	QP

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The emission levels of other frequencies are very lower than the limit and not show in test report.
5. No emission found between lowest internal used/generated frequency to 30MHz.

Product	:	IEEE802.11a/b/g/n 2.4+5GHz 1T1R Wi-Fi IoT Module
Test Item	:	General Radiated Emission
Test Mode	:	Mode 2: Transmit (802.11n-20BW 7.2Mbps) (5785MHz)
Test Date	:	2020/06/29

Vertical



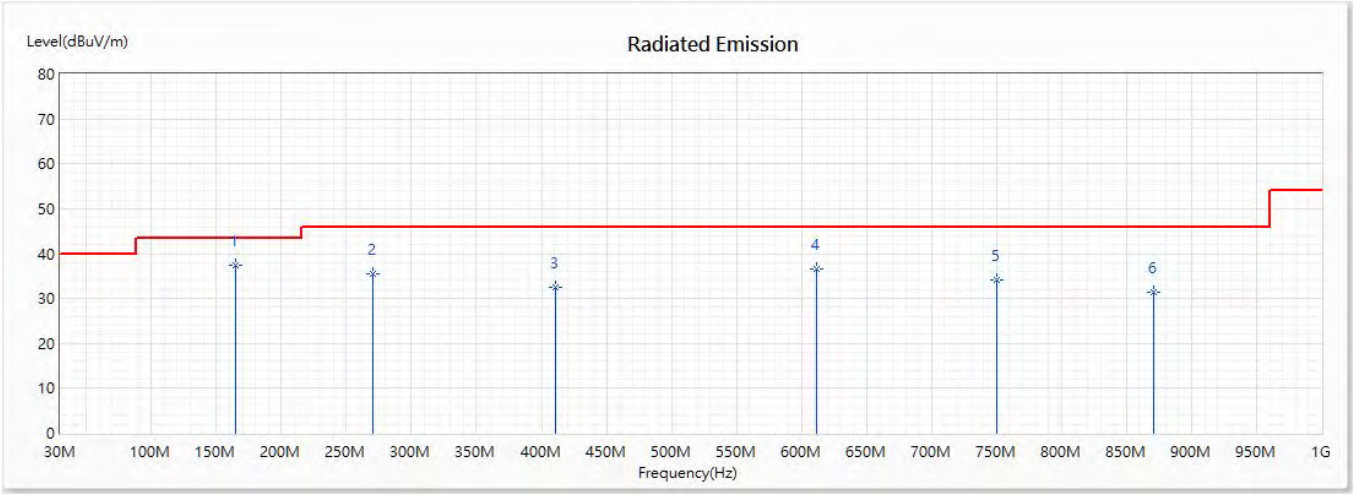
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
1	156.522	31.31	43.50	-12.19	44.93	-13.62	QP
2	347.71	38.93	46.00	-7.07	46.03	-7.10	QP
* 3	489.696	39.83	46.00	-6.17	44.93	-5.10	QP
4	604.971	36.32	46.00	-9.68	36.86	-0.54	QP
5	748.362	31.68	46.00	-14.32	31.94	-0.26	QP
6	880.507	31.39	46.00	-14.61	33.53	-2.14	QP

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The emission levels of other frequencies are very lower than the limit and not show in test report.
5. No emission found between lowest internal used/generated frequency to 30MHz.

Product	:	IEEE802.11a/b/g/n 2.4+5GHz 1T1R Wi-Fi IoT Module
Test Item	:	General Radiated Emission
Test Mode	:	Mode 3: Transmit (802.11n-40BW 15Mbps) (5230MHz)
Test Date	:	2020/06/29

Horizontal



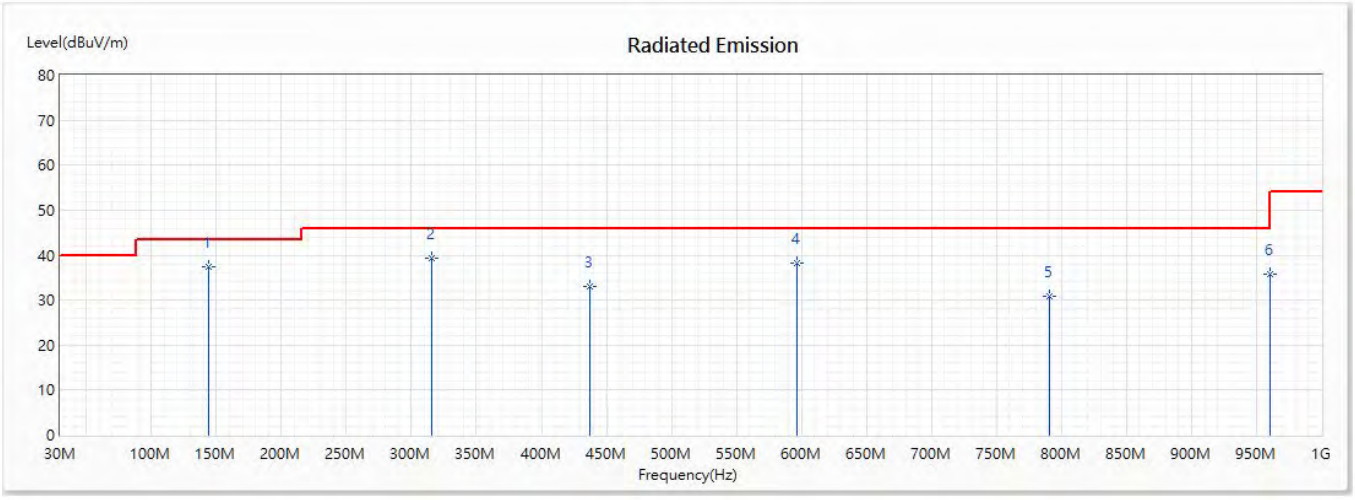
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
* 1	164.957	37.54	43.50	-5.96	51.26	-13.72	QP
2	270.391	35.62	46.00	-10.38	48.03	-12.41	QP
3	410.971	32.40	46.00	-13.60	38.67	-6.27	QP
4	612	36.64	46.00	-9.36	37.74	-1.10	QP
5	749.768	34.08	46.00	-11.92	34.50	-0.42	QP
6	870.667	31.33	46.00	-14.67	33.44	-2.11	QP

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The emission levels of other frequencies are very lower than the limit and not show in test report.
5. No emission found between lowest internal used/generated frequency to 30MHz.

Product	:	IEEE802.11a/b/g/n 2.4+5GHz 1T1R Wi-Fi IoT Module
Test Item	:	General Radiated Emission
Test Mode	:	Mode 3: Transmit (802.11n-40BW 15Mbps) (5230MHz)
Test Date	:	2020/06/29

Vertical



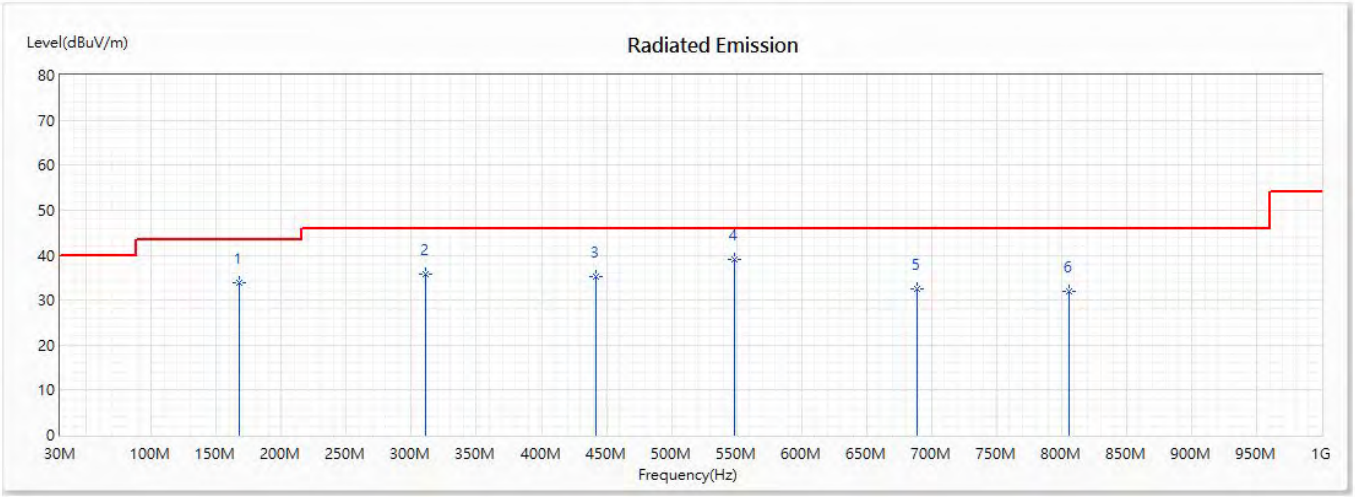
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
* 1	143.87	37.40	43.50	-6.10	49.07	-11.67	QP
2	315.377	39.42	46.00	-6.58	47.26	-7.84	QP
3	437.681	32.96	46.00	-13.04	36.61	-3.65	QP
4	596.536	38.12	46.00	-7.88	38.43	-0.31	QP
5	790.536	30.88	46.00	-15.12	33.40	-2.52	QP
6	960.638	35.66	54.00	-18.34	37.79	-2.13	QP

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The emission levels of other frequencies are very lower than the limit and not show in test report.
5. No emission found between lowest internal used/generated frequency to 30MHz.

Product	:	IEEE802.11a/b/g/n 2.4+5GHz 1T1R Wi-Fi IoT Module
Test Item	:	General Radiated Emission
Test Mode	:	Mode 3: Transmit (802.11n-40BW 15Mbps) (5795MHz)
Test Date	:	2020/06/30

Horizontal



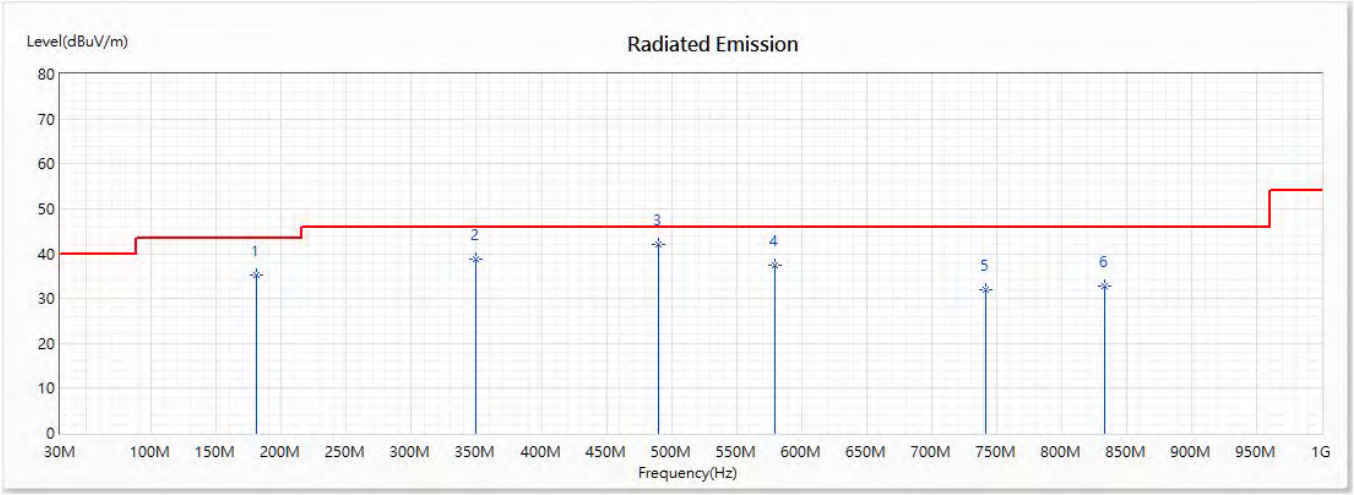
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
1	167.768	33.93	43.50	-9.57	47.57	-13.64	QP
2	311.159	35.76	46.00	-10.24	43.70	-7.94	QP
3	441.899	35.30	46.00	-10.70	38.80	-3.50	QP
* 4	548.739	39.11	46.00	-6.89	43.68	-4.57	QP
5	689.319	32.51	46.00	-13.49	35.55	-3.04	QP
6	806	31.94	46.00	-14.06	34.68	-2.74	QP

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The emission levels of other frequencies are very lower than the limit and not show in test report.
5. No emission found between lowest internal used/generated frequency to 30MHz.

Product	:	IEEE802.11a/b/g/n 2.4+5GHz 1T1R Wi-Fi IoT Module
Test Item	:	General Radiated Emission
Test Mode	:	Mode 3: Transmit (802.11n-40BW 15Mbps) (5795MHz)
Test Date	:	2020/06/30

Vertical



No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
1	180.42	35.19	43.50	-8.31	48.04	-12.85	QP
2	349.116	38.74	46.00	-7.26	45.74	-7.00	QP
* 3	489.696	42.16	46.00	-3.84	47.26	-5.10	QP
4	579.667	37.46	46.00	-8.54	38.56	-1.10	QP
5	741.333	31.83	46.00	-14.17	31.29	0.54	QP
6	832.71	32.68	46.00	-13.32	35.13	-2.45	QP

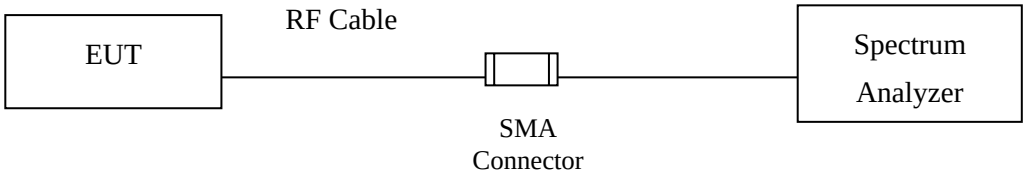
Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The emission levels of other frequencies are very lower than the limit and not show in test report.
5. No emission found between lowest internal used/generated frequency to 30MHz.

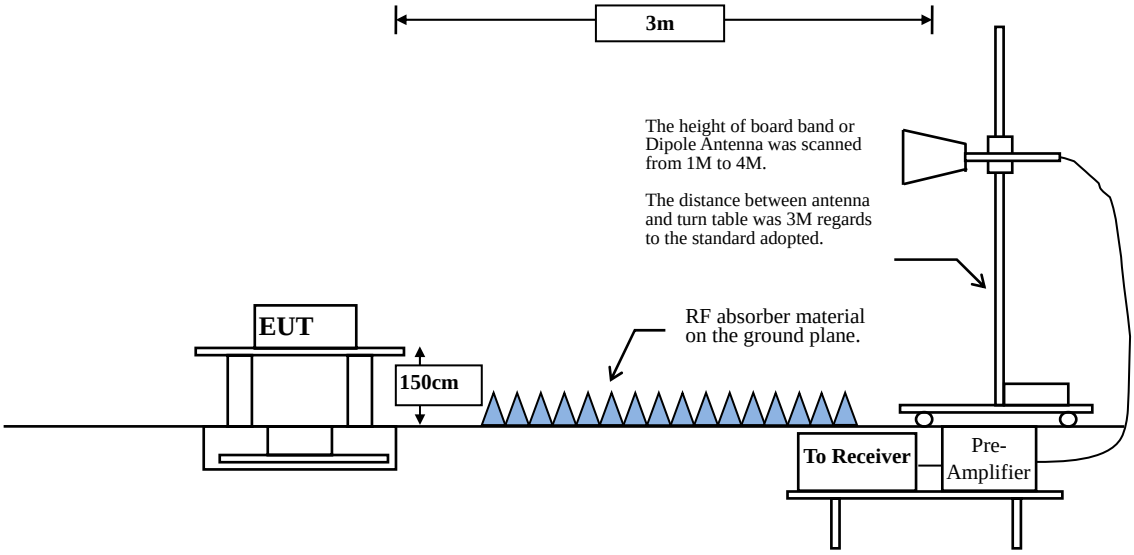
6. Band Edge

6.1. Test Setup

RF Conducted Measurement:



RF Radiated Measurement:



6.2. Limits

The provisions of Section 15.205 of this part apply to intentional radiators operating under this section.

Radiated emissions which fall in the restricted bands, as defined in Section 15.205, must also comply with the radiated emission limits specified in Section 15.209:

FCC Part 15 Subpart C Paragraph 15.209 Limits		
Frequency MHz	uV/m @3m	dBμV/m@3m
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

Remarks : 1. RF Voltage (dBμV) = 20 log RF Voltage (uV)

2. In the Above Table, the tighter limit applies at the band edges.

3. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

6.3. Test Procedure

The EUT is placed on a turn table which is 1.5 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level.

Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C63.10:2013 on radiated measurement.

The bandwidth below 1GHz setting on the field strength meter is 120 kHz, above 1GHz are 1 MHz.

The EUT was setup to ANSI C63.10, 2013; tested to UNII test procedure of FCC KDB-789033 for compliance to FCC 47CFR Subpart E requirements.

RBW and VBW Parameter setting:

According to KDB 789033 section II.G.5 Procedure for Unwanted Maximum Emissions Measurements above 1000 MHz.

RBW = 1MHz.

VBW ≥ 3MHz.

According to KDB 789033 section II.G.6 Procedures for Average Unwanted Emissions Measurements above 1000 MHz.

RBW = 1MHz.

VBW = 10Hz, when duty cycle ≥ 98 %

VBW ≥ 1/T, when duty cycle < 98 %

(T refers to 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.)

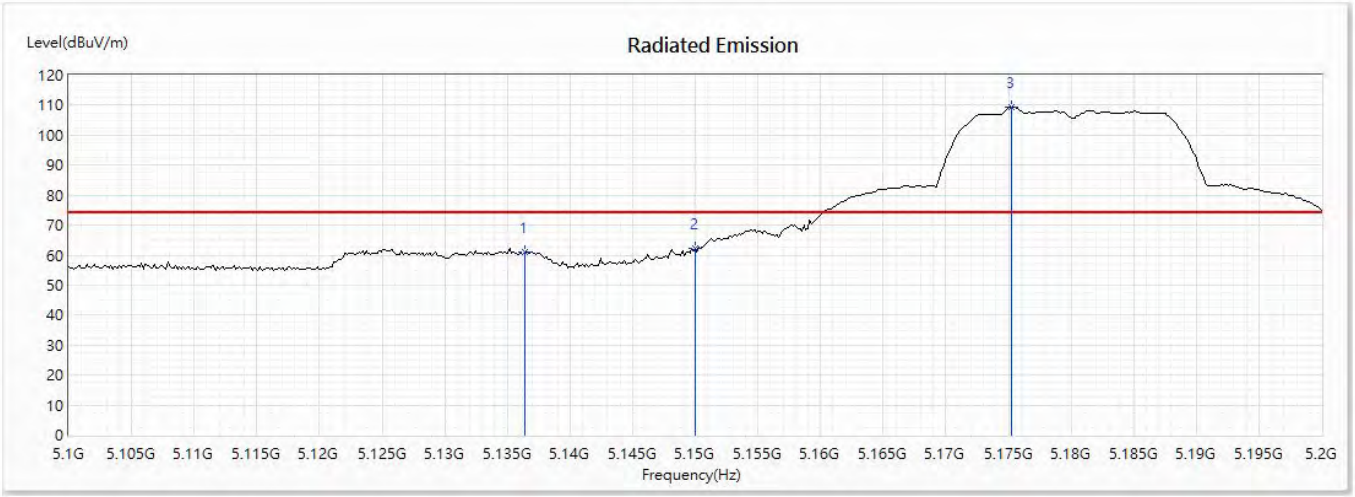
5GHz band	Duty Cycle (%)	T (ms)	1/T (Hz)	VBW (Hz)
802.11a	97.95	1.3841	723	1000
802.11n20	99.21	5.0725	197	10
802.11n40	97.96	2.4348	411	500

Note: Duty Cycle Refer to Section 8.

6.4. Test Result of Band Edge

Product	:	IEEE802.11a/b/g/n 2.4+5GHz 1T1R Wi-Fi IoT Module
Test Item	:	Band Edge Data
Test Mode	:	Mode 1: Transmit (802.11a-6Mbps) (5180MHz)
Test Date	:	2020/06/29

Horizontal



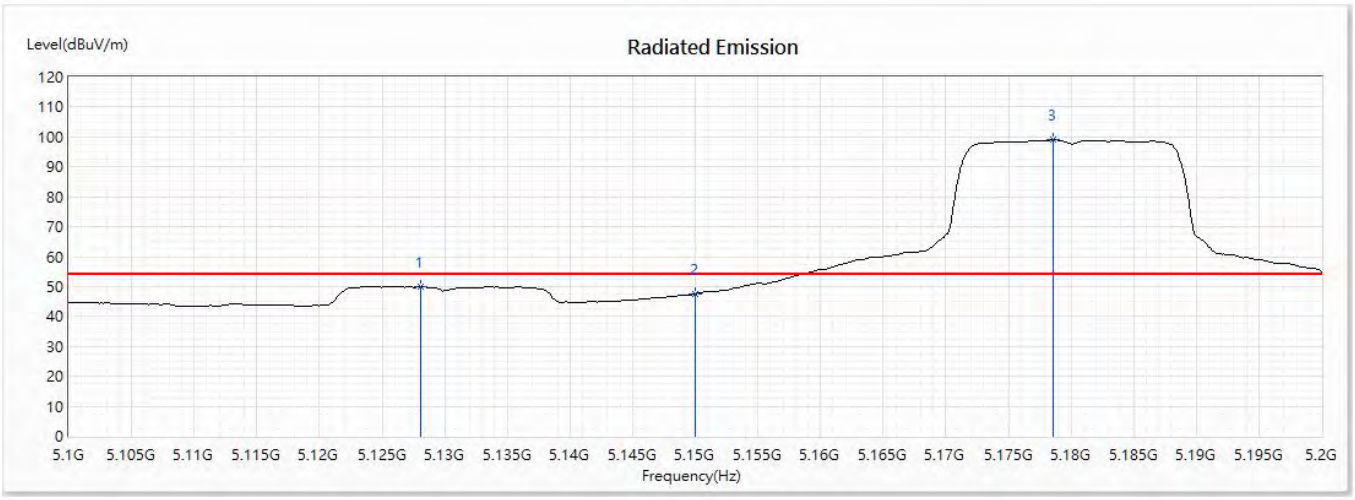
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
1	5136.377	61.12	74.00	-12.88	42.70	18.42	PK
2	5150	62.10	74.00	-11.90	43.73	18.37	PK
! 3	5175.217	109.28	--	--	90.99	18.29	PK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.

Product	:	IEEE802.11a/b/g/n 2.4+5GHz 1T1R Wi-Fi IoT Module
Test Item	:	Band Edge Data
Test Mode	:	Mode 1: Transmit (802.11a-6Mbps) (5180MHz)
Test Date	:	2020/06/29

Horizontal



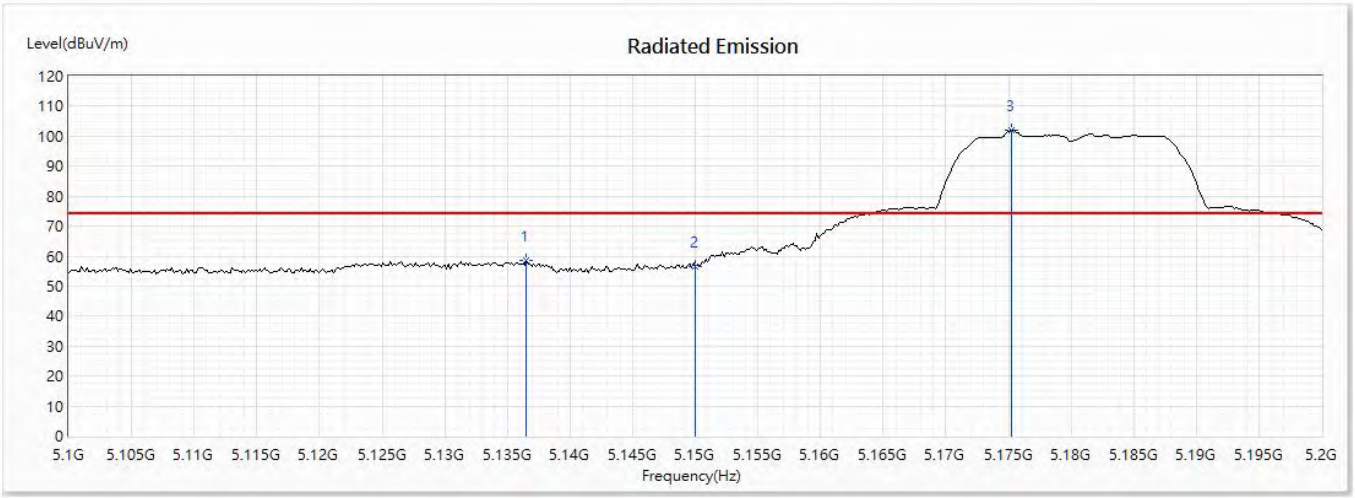
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
1	5128.116	50.01	54.00	-3.99	31.57	18.44	AV
2	5150	47.62	54.00	-6.38	29.25	18.37	AV
! 3	5178.551	99.01	--	--	80.74	18.27	AV

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.

Product	:	IEEE802.11a/b/g/n 2.4+5GHz 1T1R Wi-Fi IoT Module
Test Item	:	Band Edge Data
Test Mode	:	Mode 1: Transmit (802.11a-6Mbps) (5180MHz)
Test Date	:	2020/06/29

Vertical



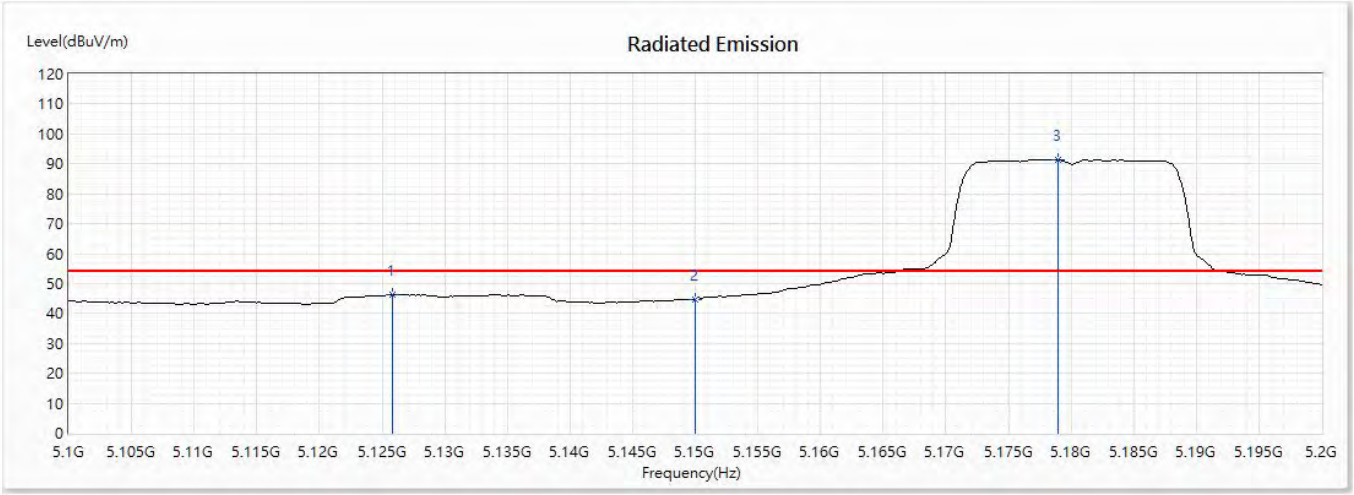
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
1	5136.522	58.76	74.00	-15.24	40.34	18.42	PK
2	5150	56.63	74.00	-17.37	38.26	18.37	PK
! 3	5175.217	101.82	--	--	83.53	18.29	PK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.

Product	:	IEEE802.11a/b/g/n 2.4+5GHz 1T1R Wi-Fi IoT Module
Test Item	:	Band Edge Data
Test Mode	:	Mode 1: Transmit (802.11a-6Mbps) (5180MHz)
Test Date	:	2020/06/29

Vertical



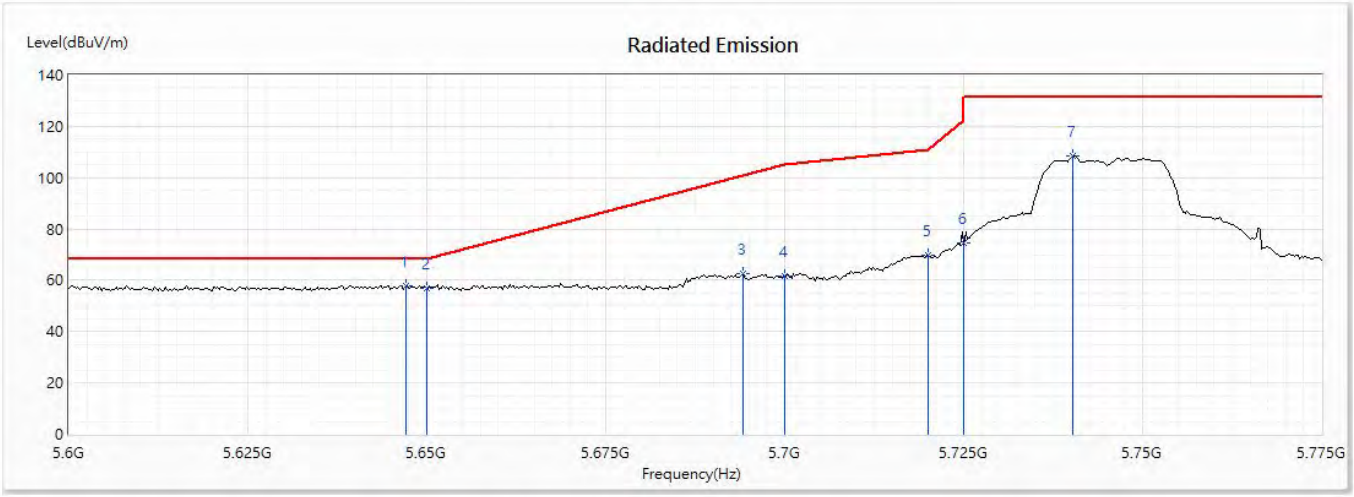
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
1	5125.797	46.39	54.00	-7.61	27.94	18.45	AV
2	5150	44.72	54.00	-9.28	26.35	18.37	AV
! 3	5178.986	91.38	--	--	73.10	18.28	AV

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.

Product	:	IEEE802.11a/b/g/n 2.4+5GHz 1T1R Wi-Fi IoT Module
Test Item	:	Band Edge Data
Test Mode	:	Mode 1: Transmit (802.11a-6Mbps) (5745MHz)
Test Date	:	2020/06/30

Horizontal



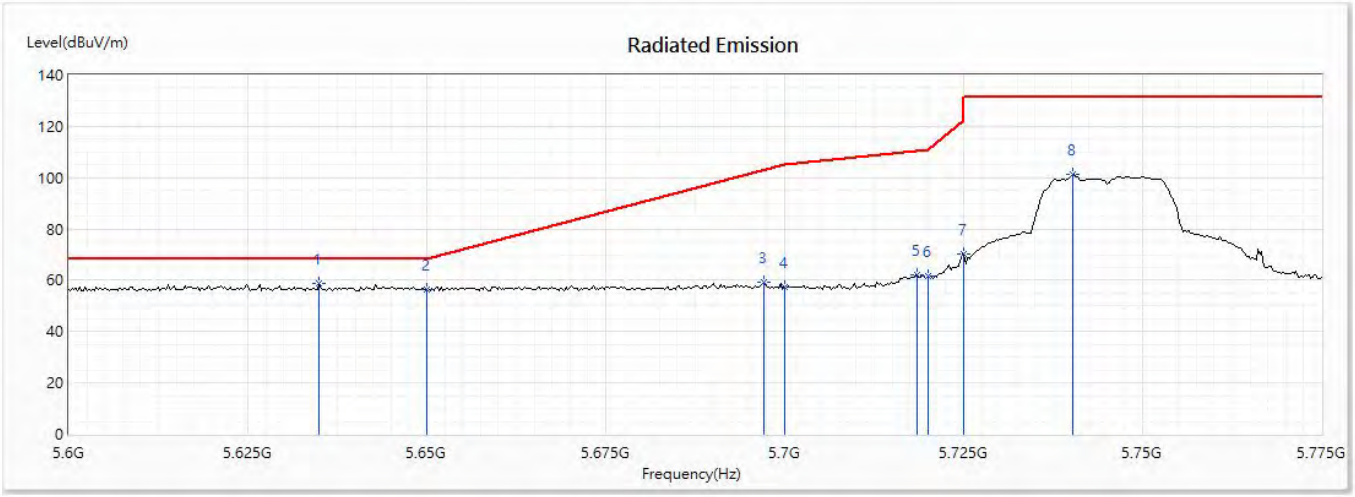
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
* 1	5647.174	58.02	68.22	-10.20	38.70	19.32	PK
2	5650	57.06	68.22	-11.16	37.75	19.31	PK
3	5694.094	62.40	100.85	-38.45	43.12	19.28	PK
4	5700	61.57	105.20	-43.63	42.30	19.27	PK
5	5720	69.71	110.80	-41.09	50.46	19.25	PK
6	5725	74.53	122.20	-47.67	55.28	19.25	PK
7	5740.254	108.27	131.20	-22.93	89.04	19.23	PK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.

Product	:	IEEE802.11a/b/g/n 2.4+5GHz 1T1R Wi-Fi IoT Module
Test Item	:	Band Edge Data
Test Mode	:	Mode 1: Transmit (802.11a-6Mbps) (5745MHz)
Test Date	:	2020/06/30

Vertical



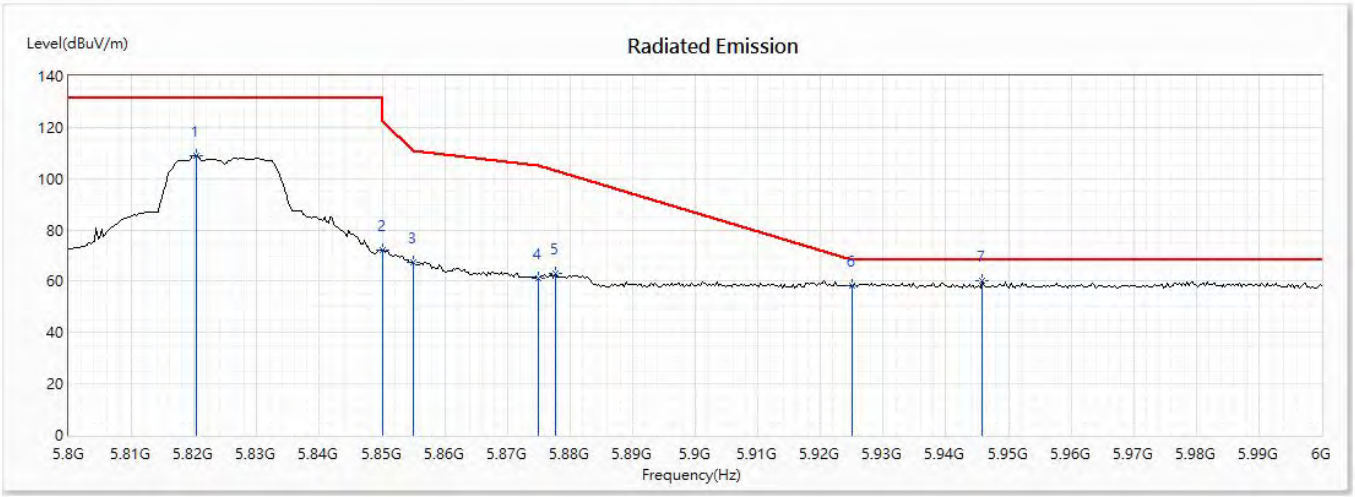
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
* 1	5635	58.82	68.22	-9.40	39.47	19.35	PK
2	5650	56.62	68.22	-11.60	37.31	19.31	PK
3	5697.138	59.29	103.09	-43.80	40.02	19.27	PK
4	5700	57.29	105.20	-47.91	38.02	19.27	PK
5	5718.442	62.14	110.36	-48.22	42.88	19.26	PK
6	5720	61.51	110.80	-49.29	42.26	19.25	PK
7	5725	70.04	122.20	-52.16	50.79	19.25	PK
8	5740.254	101.17	131.20	-30.03	81.94	19.23	PK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.

Product	:	IEEE802.11a/b/g/n 2.4+5GHz 1T1R Wi-Fi IoT Module
Test Item	:	Band Edge Data
Test Mode	:	Mode 1: Transmit (802.11a-6Mbps) (5825MHz)
Test Date	:	2020/06/30

Horizontal



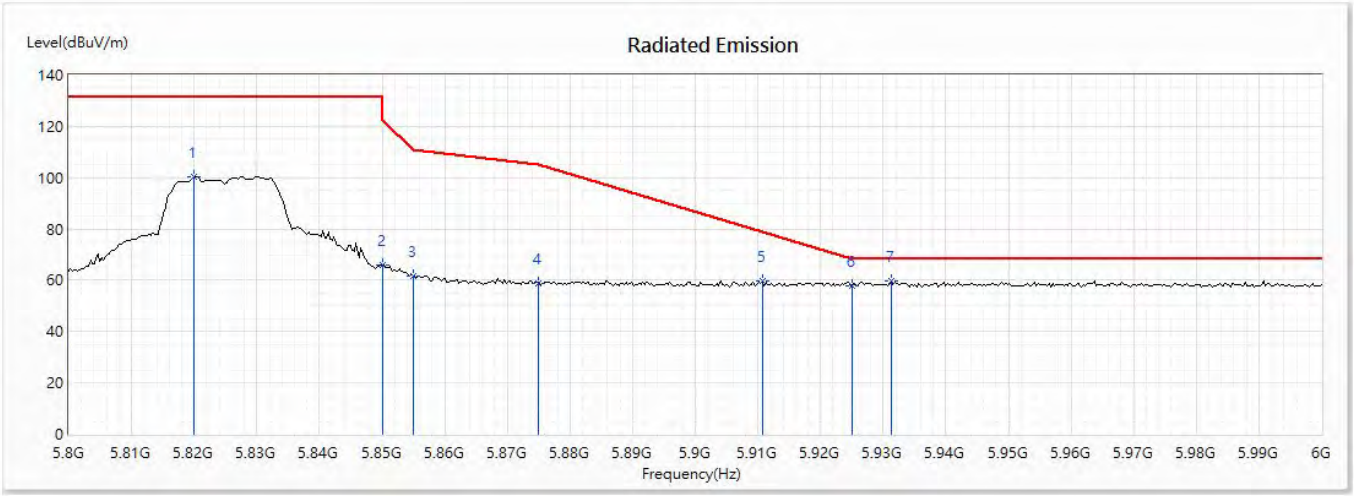
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
1	5820.29	109.14	131.20	-22.06	89.60	19.54	PK
2	5850	72.28	122.20	-49.92	52.64	19.64	PK
3	5855	67.30	110.80	-43.50	47.65	19.65	PK
4	5875	61.29	105.20	-43.91	41.57	19.72	PK
5	5877.681	63.01	103.21	-40.20	43.28	19.73	PK
6	5925	58.08	68.20	-10.12	38.16	19.92	PK
* 7	5945.797	60.41	68.20	-7.79	40.38	20.03	PK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.

Product	:	IEEE802.11a/b/g/n 2.4+5GHz 1T1R Wi-Fi IoT Module
Test Item	:	Band Edge Data
Test Mode	:	Mode 1: Transmit (802.11a-6Mbps) (5825MHz)
Test Date	:	2020/06/30

Vertical



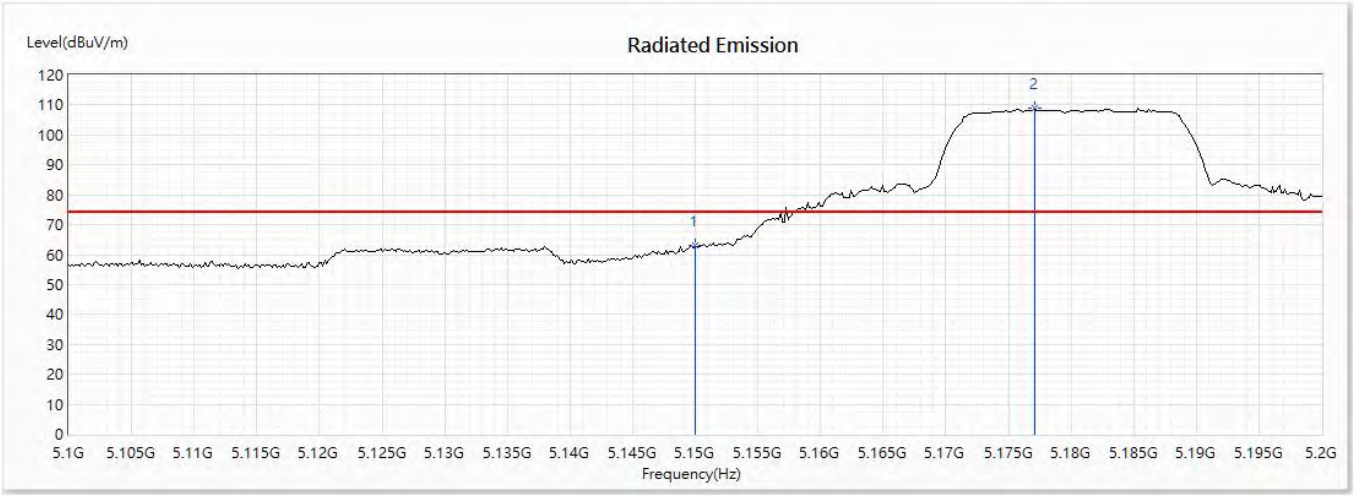
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
1	5820	100.56	131.20	-30.64	81.02	19.54	PK
2	5850	65.87	122.20	-56.33	46.23	19.64	PK
3	5855	61.78	110.80	-49.02	42.13	19.65	PK
4	5875	58.81	105.20	-46.39	39.09	19.72	PK
5	5910.725	59.62	78.73	-19.11	39.77	19.85	PK
6	5925	57.94	68.20	-10.26	38.02	19.92	PK
* 7	5931.304	59.61	68.20	-8.59	39.65	19.96	PK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.

Product	:	IEEE802.11a/b/g/n 2.4+5GHz 1T1R Wi-Fi IoT Module
Test Item	:	Band Edge Data
Test Mode	:	Mode 2: Transmit (802.11n-20BW 7.2Mbps) (5180MHz)
Test Date	:	2020/06/29

Horizontal



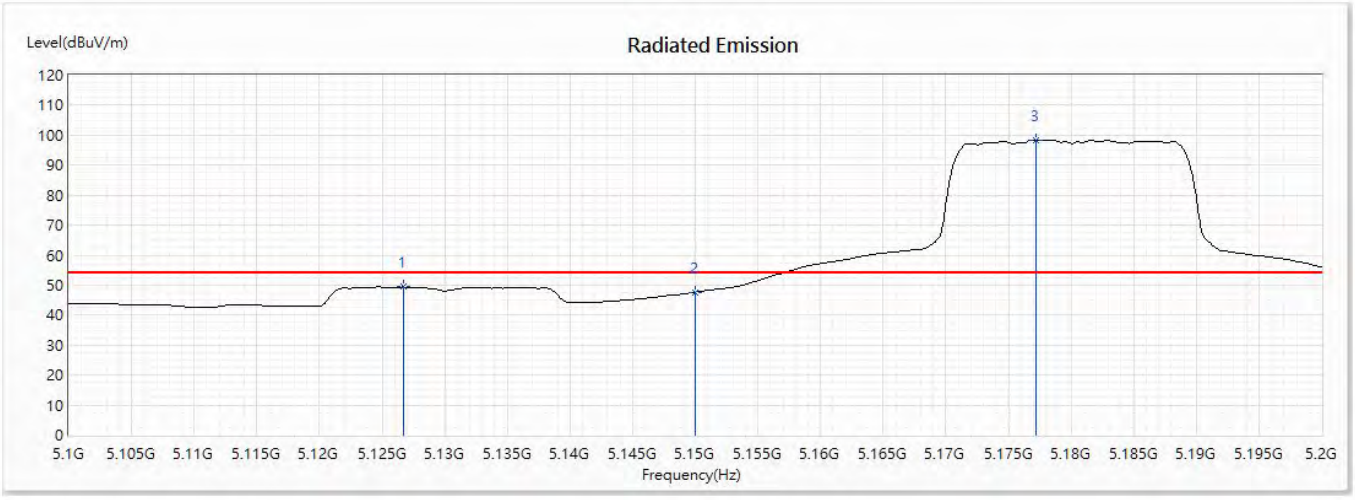
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
1	5150	63.17	74.00	-10.83	44.80	18.37	PK
! 2	5177.101	109.00	--	--	90.71	18.29	PK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.

Product	:	IEEE802.11a/b/g/n 2.4+5GHz 1T1R Wi-Fi IoT Module
Test Item	:	Band Edge Data
Test Mode	:	Mode 2: Transmit (802.11n-20BW 7.2Mbps) (5180MHz)
Test Date	:	2020/06/29

Horizontal



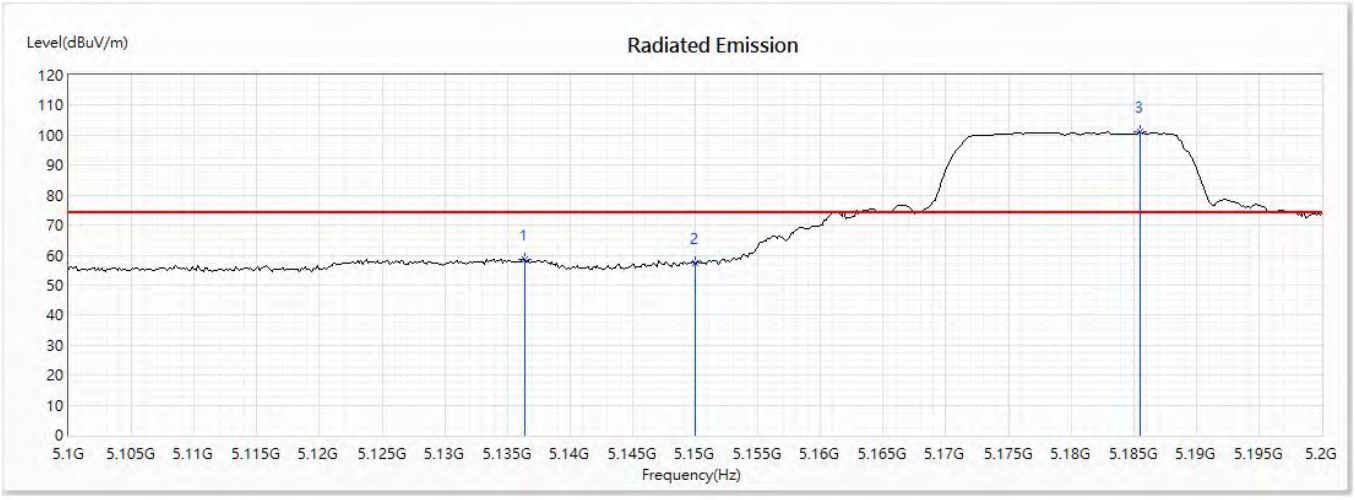
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
1	5126.667	49.36	54.00	-4.64	30.90	18.46	AV
2	5150	47.61	54.00	-6.39	29.24	18.37	AV
! 3	5177.246	98.27	--	--	79.99	18.28	AV

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.

Product	:	IEEE802.11a/b/g/n 2.4+5GHz 1T1R Wi-Fi IoT Module
Test Item	:	Band Edge Data
Test Mode	:	Mode 2: Transmit (802.11n-20BW 7.2Mbps) (5180MHz)
Test Date	:	2020/06/29

Vertical



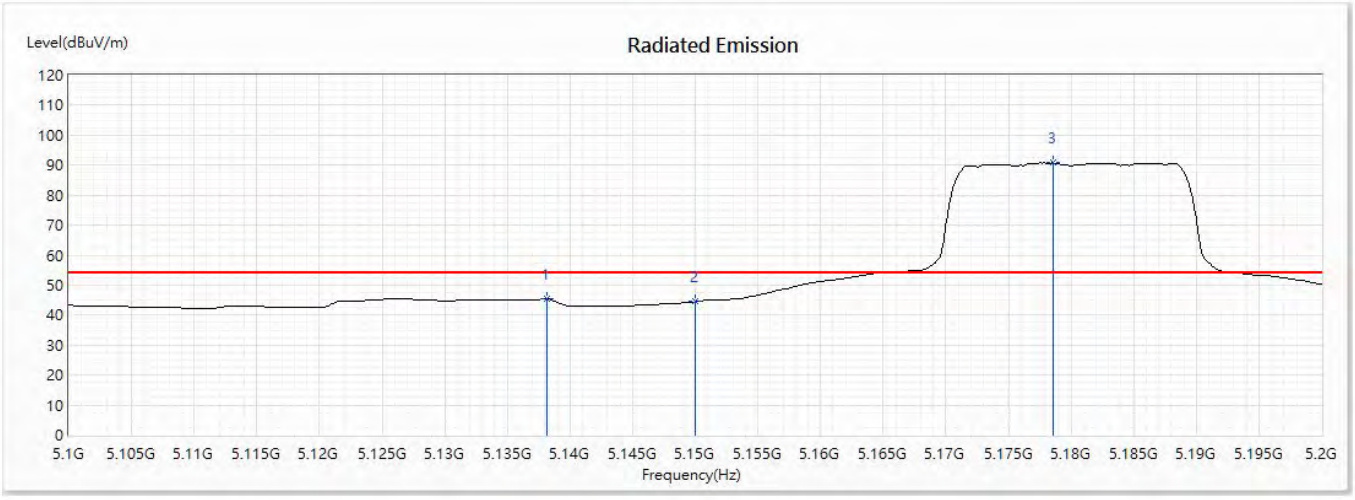
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
1	5136.377	58.66	74.00	-15.34	40.24	18.42	PK
2	5150	57.18	74.00	-16.82	38.81	18.37	PK
! 3	5185.507	100.96	--	--	82.70	18.26	PK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.

Product	:	IEEE802.11a/b/g/n 2.4+5GHz 1T1R Wi-Fi IoT Module
Test Item	:	Band Edge Data
Test Mode	:	Mode 2: Transmit (802.11n-20BW 7.2Mbps) (5180MHz)
Test Date	:	2020/06/29

Vertical



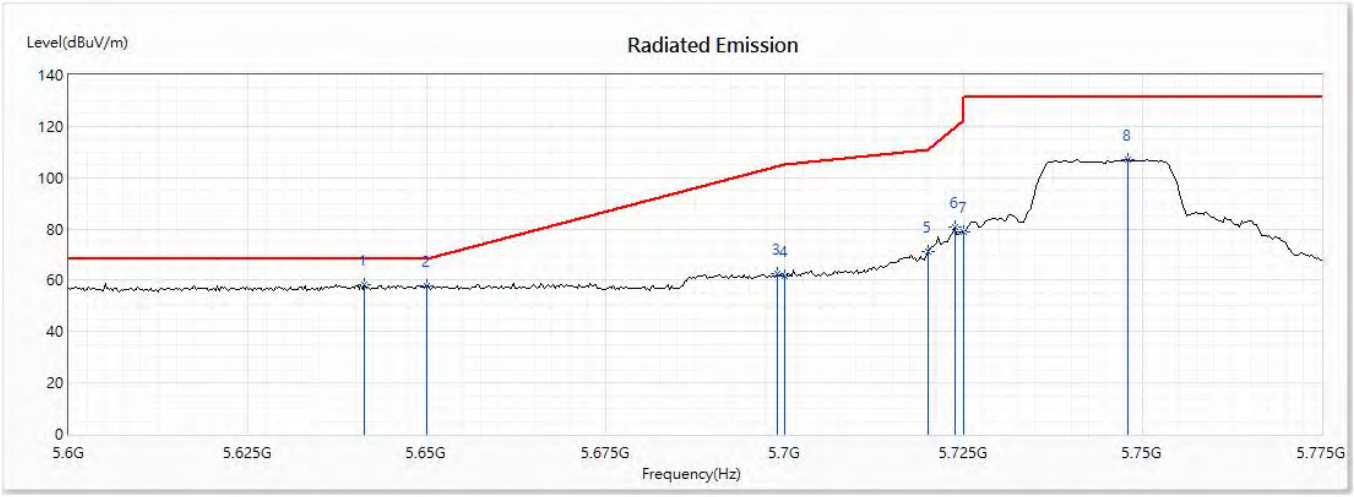
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
1	5138.116	45.36	54.00	-8.64	26.95	18.41	AV
2	5150	44.52	54.00	-9.48	26.15	18.37	AV
! 3	5178.551	90.73	--	--	72.46	18.27	AV

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.

Product	:	IEEE802.11a/b/g/n 2.4+5GHz 1T1R Wi-Fi IoT Module
Test Item	:	Band Edge Data
Test Mode	:	Mode 2: Transmit (802.11n-20BW 7.2Mbps) (5745MHz)
Test Date	:	2020/06/30

Horizontal



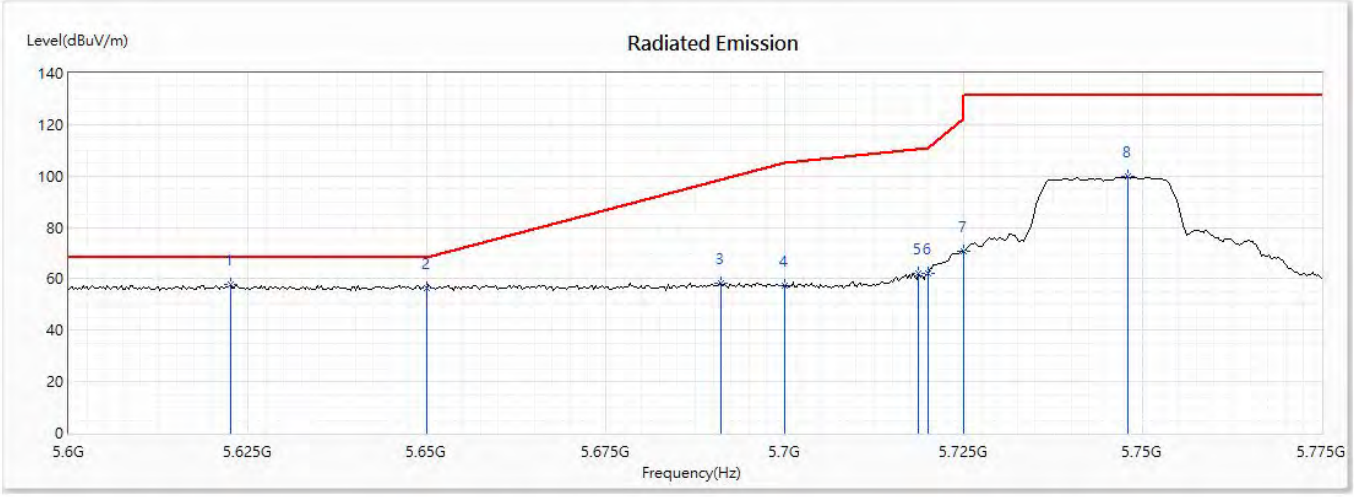
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
* 1	5641.341	58.51	68.22	-9.71	39.17	19.34	PK
2	5650	57.82	68.22	-10.40	38.51	19.31	PK
3	5698.913	62.72	104.40	-41.68	43.45	19.27	PK
4	5700	61.64	105.20	-43.56	42.37	19.27	PK
5	5720	71.11	110.80	-39.69	51.86	19.25	PK
6	5723.768	80.74	119.39	-38.66	61.49	19.25	PK
7	5725	79.03	122.20	-43.17	59.78	19.25	PK
8	5747.862	107.08	131.20	-24.12	87.85	19.23	PK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.

Product	:	IEEE802.11a/b/g/n 2.4+5GHz 1T1R Wi-Fi IoT Module
Test Item	:	Band Edge Data
Test Mode	:	Mode 2: Transmit (802.11n-20BW 7.2Mbps) (5745MHz)
Test Date	:	2020/06/30

Vertical



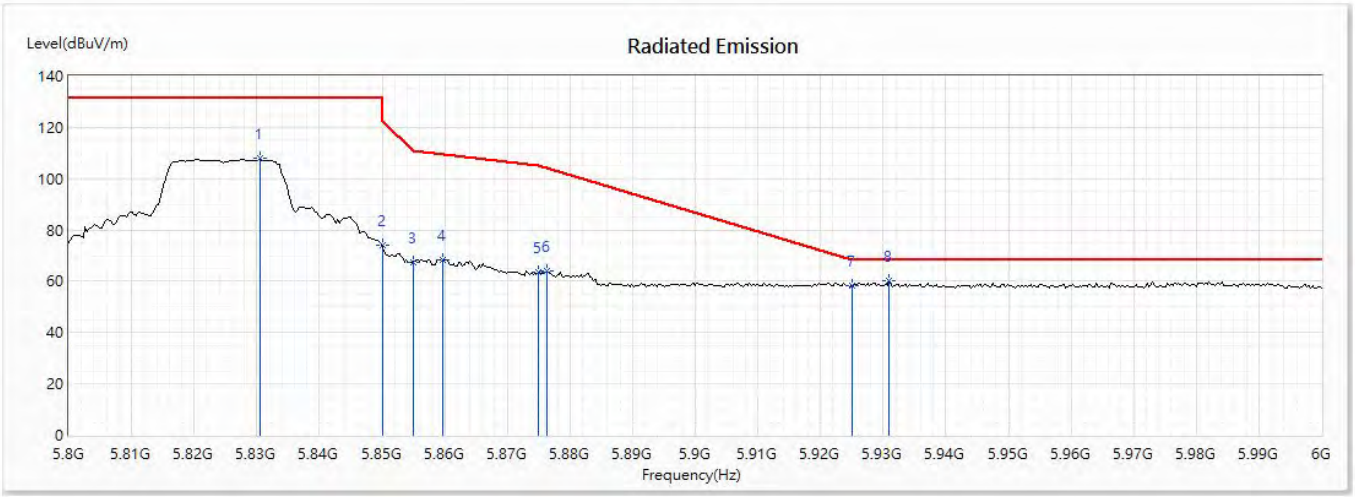
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
* 1	5622.572	57.88	68.22	-10.34	38.49	19.39	PK
2	5650	56.59	68.22	-11.63	37.28	19.31	PK
3	5691.051	58.50	98.61	-40.10	39.22	19.28	PK
4	5700	57.16	105.20	-48.04	37.89	19.27	PK
5	5718.696	62.35	110.44	-48.09	43.09	19.26	PK
6	5720	61.91	110.80	-48.89	42.66	19.25	PK
7	5725	70.59	122.20	-51.61	51.34	19.25	PK
8	5747.862	99.72	131.20	-31.48	80.49	19.23	PK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.

Product	:	IEEE802.11a/b/g/n 2.4+5GHz 1T1R Wi-Fi IoT Module
Test Item	:	Band Edge Data
Test Mode	:	Mode 2: Transmit (802.11n-20BW 7.2Mbps) (5825MHz)
Test Date	:	2020/06/30

Horizontal



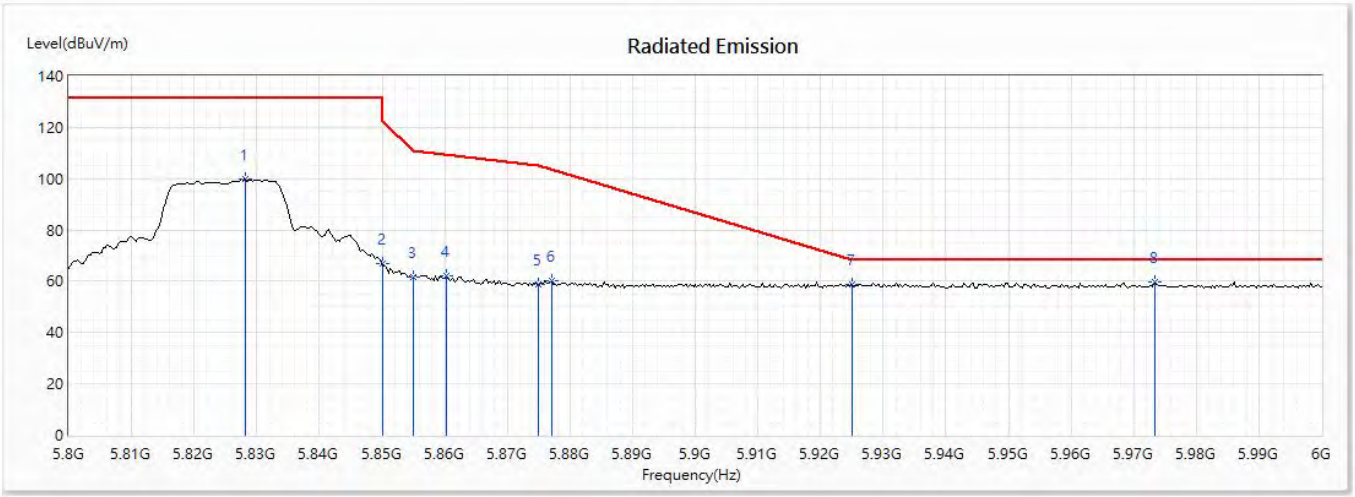
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
1	5830.435	107.81	131.20	-23.39	88.23	19.58	PK
2	5850	73.91	122.20	-48.29	54.27	19.64	PK
3	5855	67.51	110.80	-43.29	47.86	19.65	PK
4	5859.71	68.41	109.48	-41.07	48.74	19.67	PK
5	5875	63.47	105.20	-41.73	43.75	19.72	PK
6	5876.232	63.95	104.28	-40.33	44.23	19.72	PK
7	5925	58.37	68.20	-9.83	38.45	19.92	PK
* 8	5931.014	60.13	68.20	-8.07	40.18	19.95	PK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.

Product	:	IEEE802.11a/b/g/n 2.4+5GHz 1T1R Wi-Fi IoT Module
Test Item	:	Band Edge Data
Test Mode	:	Mode 2: Transmit (802.11n-20BW 7.2Mbps) (5825MHz)
Test Date	:	2020/06/30

Vertical



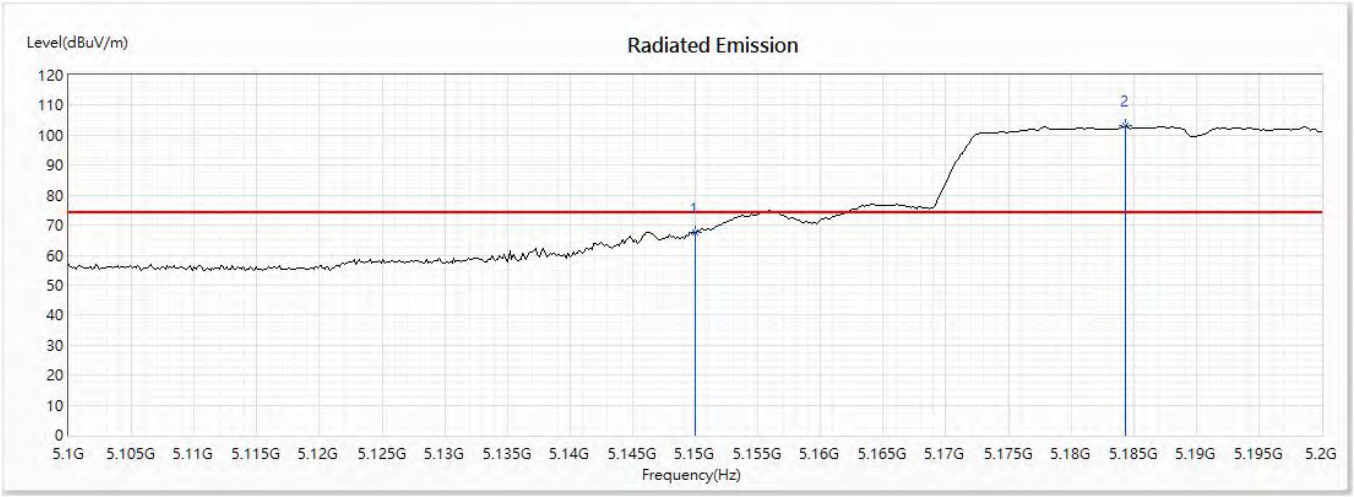
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
1	5828.116	99.91	131.20	-31.29	80.34	19.57	PK
2	5850	67.06	122.20	-55.14	47.42	19.64	PK
3	5855	61.60	110.80	-49.20	41.95	19.65	PK
4	5860.29	62.17	109.32	-47.15	42.50	19.67	PK
5	5875	58.70	105.20	-46.50	38.98	19.72	PK
6	5877.101	60.32	103.64	-43.32	40.60	19.72	PK
7	5925	58.64	68.20	-9.56	38.72	19.92	PK
* 8	5973.333	59.63	68.20	-8.57	39.55	20.08	PK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.

Product	:	IEEE802.11a/b/g/n 2.4+5GHz 1T1R Wi-Fi IoT Module
Test Item	:	Band Edge Data
Test Mode	:	Mode 3: Transmit (802.11n-40BW 15Mbps) (5190MHz)
Test Date	:	2020/06/29

Horizontal



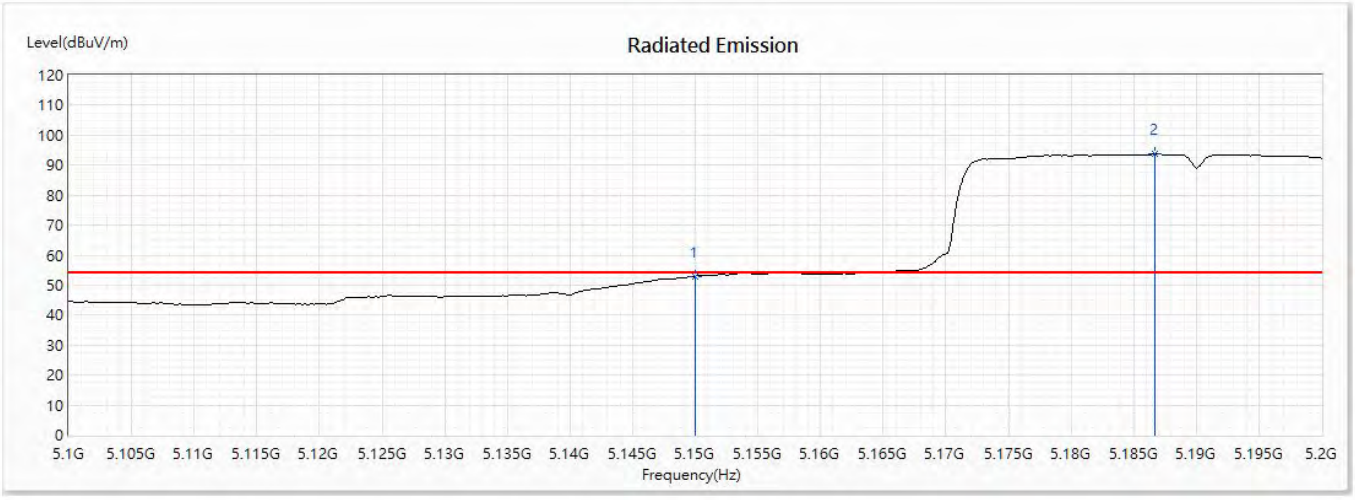
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
1	5150	67.76	74.00	-6.24	49.39	18.37	PK
! 2	5184.348	103.08	--	--	84.82	18.26	PK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.

Product	:	IEEE802.11a/b/g/n 2.4+5GHz 1T1R Wi-Fi IoT Module
Test Item	:	Band Edge Data
Test Mode	:	Mode 3: Transmit (802.11n-40BW 15Mbps) (5190MHz)
Test Date	:	2020/06/29

Horizontal



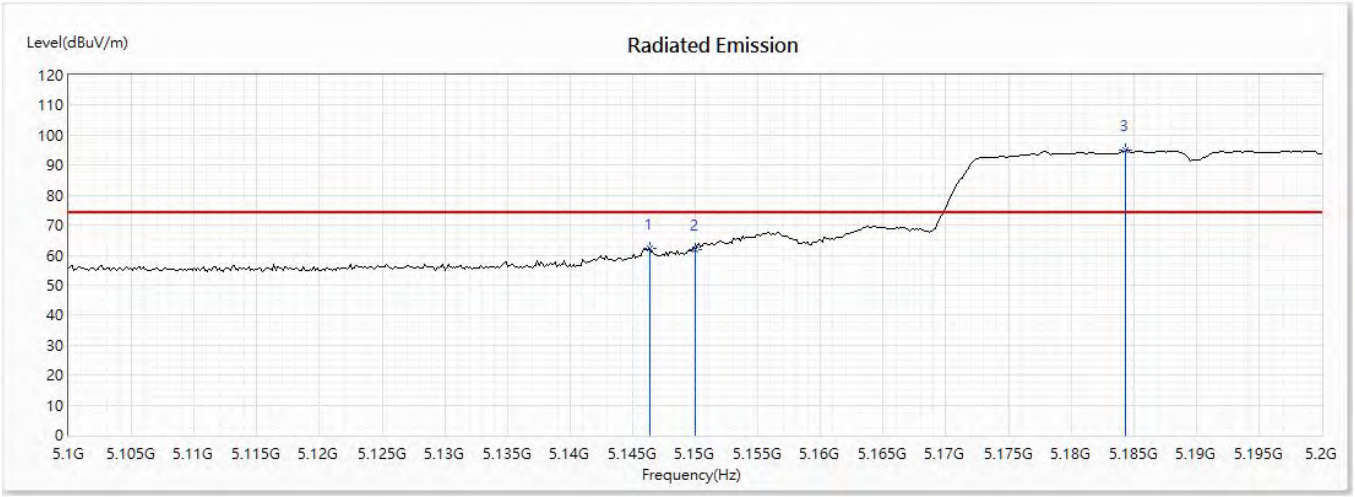
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
* 1	5150	52.93	54.00	-1.07	34.56	18.37	AV
! 2	5186.667	93.69	--	--	75.43	18.26	AV

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.

Product	:	IEEE802.11a/b/g/n 2.4+5GHz 1T1R Wi-Fi IoT Module
Test Item	:	Band Edge Data
Test Mode	:	Mode 3: Transmit (802.11n-40BW 15Mbps) (5190MHz)
Test Date	:	2020/06/29

Vertical



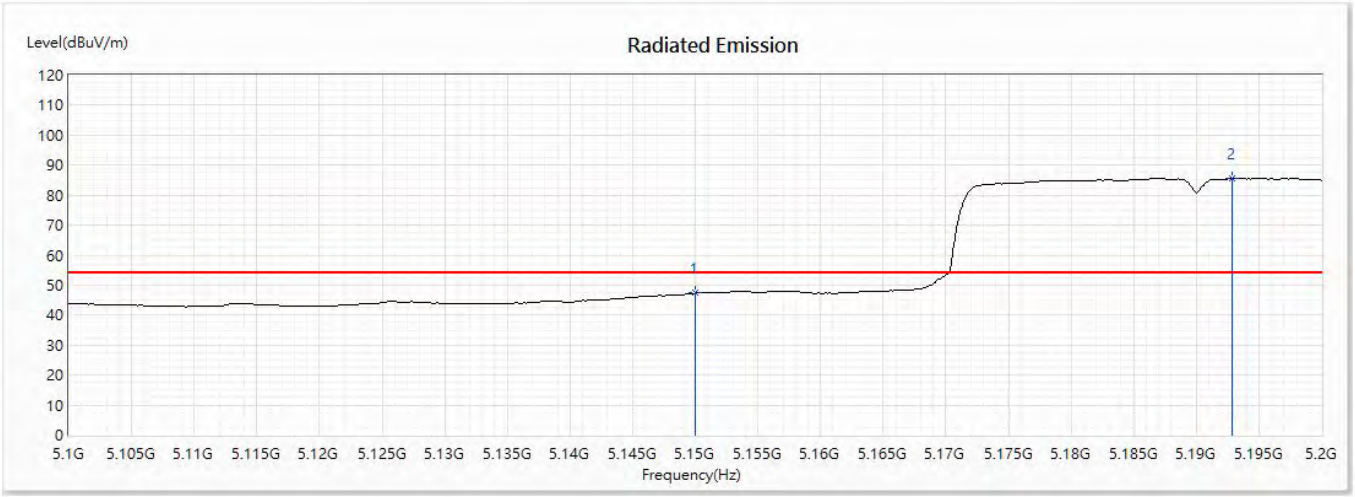
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
1	5146.377	62.43	74.00	-11.57	44.04	18.39	PK
2	5150	61.82	74.00	-12.18	43.45	18.37	PK
! 3	5184.348	94.89	--	--	76.63	18.26	PK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.

Product	:	IEEE802.11a/b/g/n 2.4+5GHz 1T1R Wi-Fi IoT Module
Test Item	:	Band Edge Data
Test Mode	:	Mode 3: Transmit (802.11n-40BW 15Mbps) (5190MHz)
Test Date	:	2020/06/29

Vertical



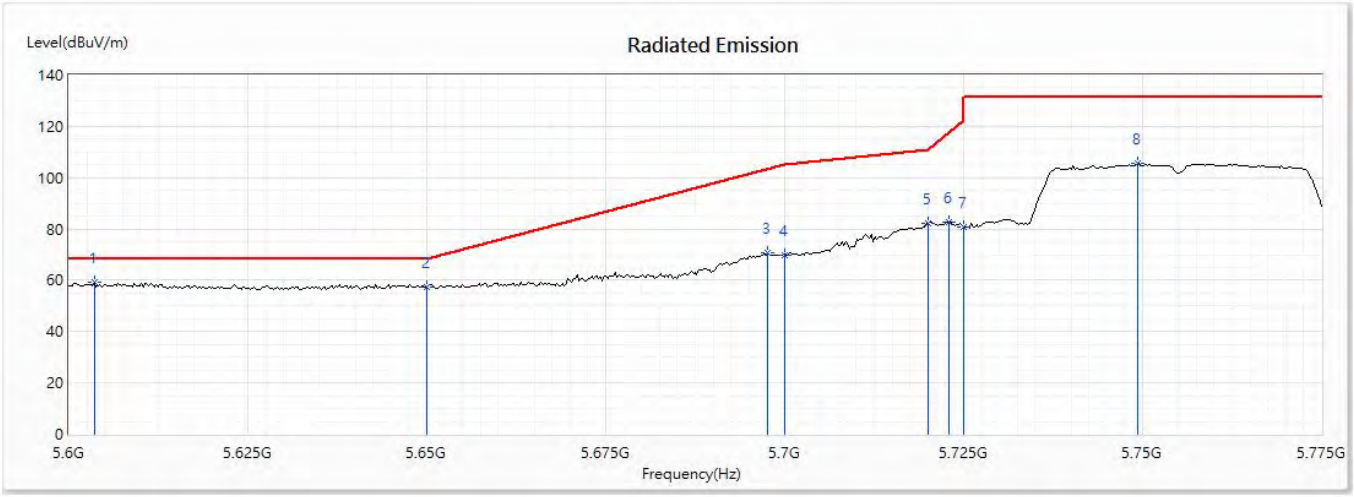
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
1	5150	47.35	54.00	-6.65	28.98	18.37	AV
! 2	5192.899	85.54	--	--	67.31	18.23	AV

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.

Product	:	IEEE802.11a/b/g/n 2.4+5GHz 1T1R Wi-Fi IoT Module
Test Item	:	Band Edge Data
Test Mode	:	Mode 3: Transmit (802.11n-40BW 15Mbps) (5755MHz)
Test Date	:	2020/06/30

Horizontal



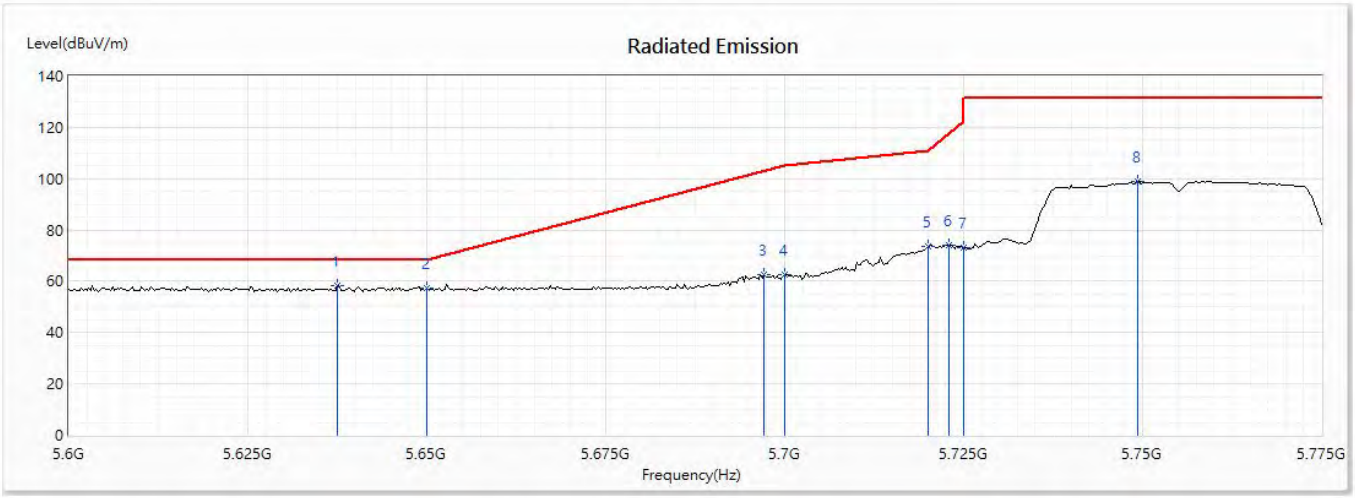
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
* 1	5603.551	59.34	68.22	-8.88	39.89	19.45	PK
2	5650	57.44	68.22	-10.78	38.13	19.31	PK
3	5697.645	70.94	103.47	-32.53	51.66	19.28	PK
4	5700	69.98	105.20	-35.22	50.71	19.27	PK
5	5720	82.27	110.80	-28.53	63.02	19.25	PK
6	5723.007	82.57	117.66	-35.09	63.32	19.25	PK
7	5725	80.95	122.20	-41.25	61.70	19.25	PK
8	5749.384	105.44	131.20	-25.76	86.21	19.23	PK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.

Product	:	IEEE802.11a/b/g/n 2.4+5GHz 1T1R Wi-Fi IoT Module
Test Item	:	Band Edge Data
Test Mode	:	Mode 3: Transmit (802.11n-40BW 15Mbps) (5755MHz)
Test Date	:	2020/06/30

Vertical



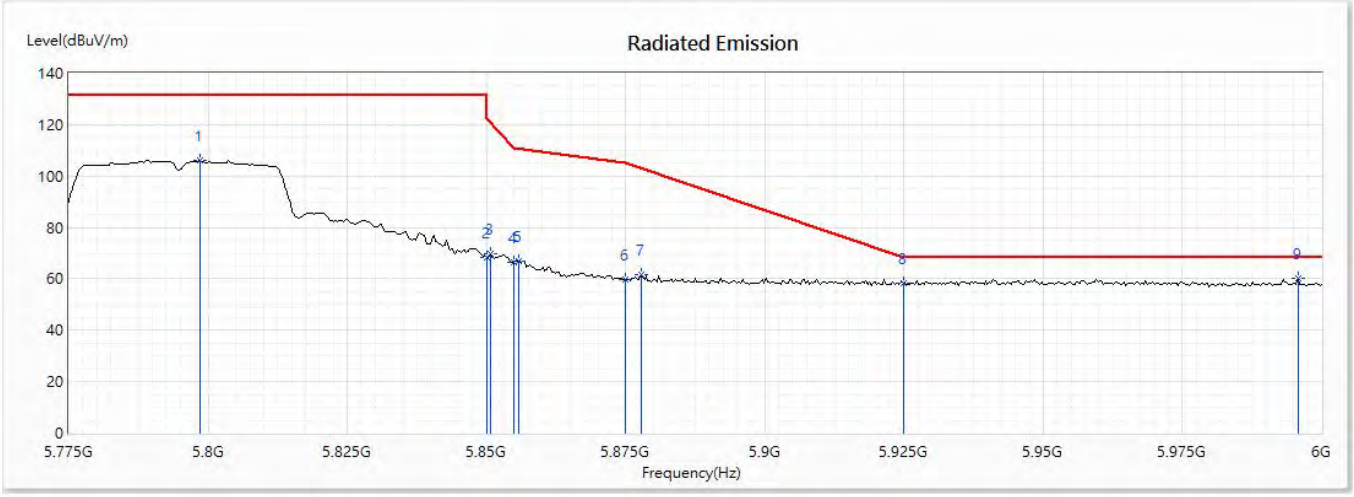
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
* 1	5637.536	58.13	68.22	-10.09	38.79	19.34	PK
2	5650	57.24	68.22	-10.98	37.93	19.31	PK
3	5697.138	62.55	103.09	-40.54	43.28	19.27	PK
4	5700	62.44	105.20	-42.76	43.17	19.27	PK
5	5720	73.51	110.80	-37.29	54.26	19.25	PK
6	5723.007	74.12	117.66	-43.53	54.87	19.25	PK
7	5725	72.93	122.20	-49.27	53.68	19.25	PK
8	5749.384	98.90	131.20	-32.30	79.67	19.23	PK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.

Product	:	IEEE802.11a/b/g/n 2.4+5GHz 1T1R Wi-Fi IoT Module
Test Item	:	Band Edge Data
Test Mode	:	Mode 3: Transmit (802.11n-40BW 15Mbps) (5795MHz)
Test Date	:	2020/06/30

Horizontal



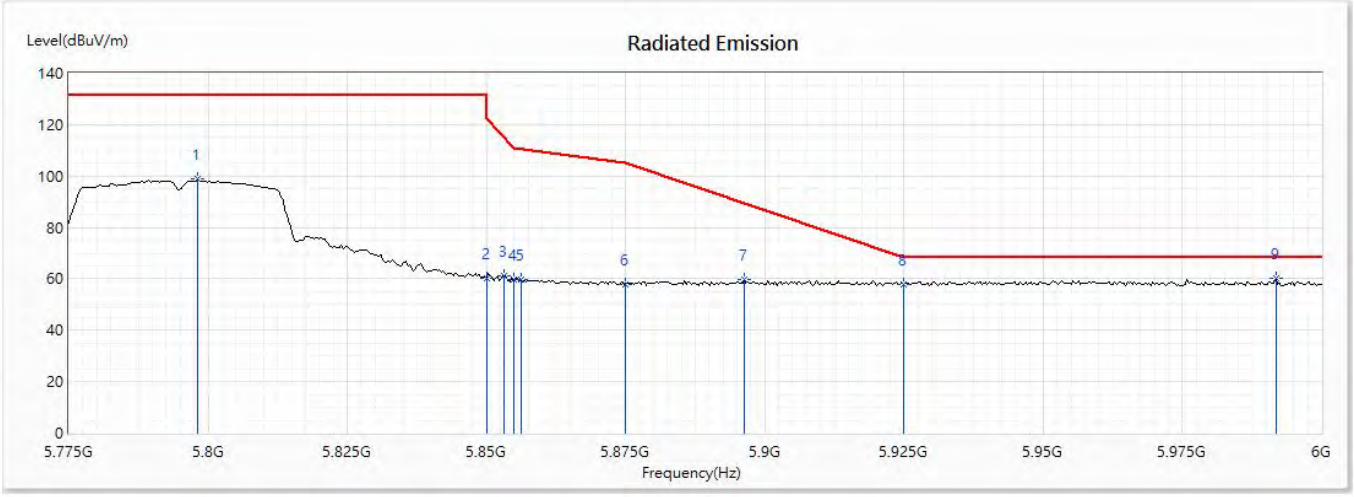
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
1	5798.478	106.07	131.20	-25.13	86.60	19.47	PK
2	5850	68.53	122.20	-53.67	48.89	19.64	PK
3	5850.652	69.54	120.71	-51.17	49.90	19.64	PK
4	5855	66.27	110.80	-44.53	46.62	19.65	PK
5	5855.87	66.96	110.56	-43.60	47.31	19.65	PK
6	5875	59.58	105.20	-45.62	39.86	19.72	PK
7	5877.717	61.55	103.18	-41.63	41.82	19.73	PK
8	5925	58.12	68.20	-10.08	38.20	19.92	PK
* 9	5995.761	60.18	68.20	-8.02	40.07	20.11	PK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.

Product	:	IEEE802.11a/b/g/n 2.4+5GHz 1T1R Wi-Fi IoT Module
Test Item	:	Band Edge Data
Test Mode	:	Mode 3: Transmit (802.11n-40BW 15Mbps) (5795MHz)
Test Date	:	2020/06/30

Vertical



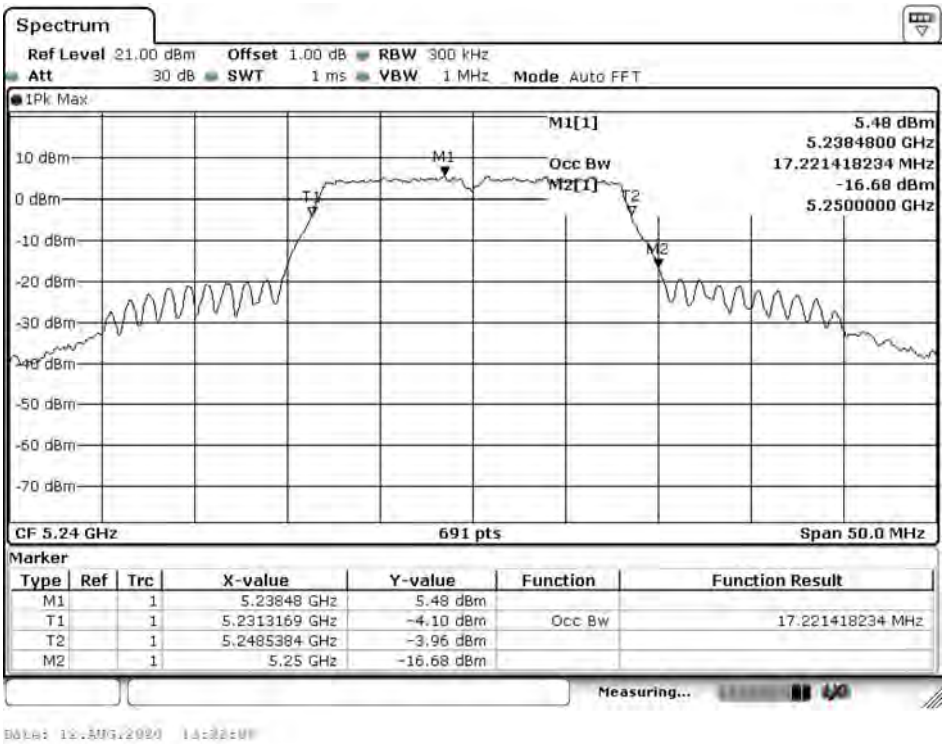
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
1	5798.152	98.80	131.20	-32.40	79.33	19.47	PK
2	5850	60.36	122.20	-61.84	40.72	19.64	PK
3	5853.261	61.31	114.76	-53.45	41.66	19.65	PK
4	5855	59.54	110.80	-51.26	39.89	19.65	PK
5	5856.196	59.60	110.46	-50.87	39.95	19.65	PK
6	5875	58.01	105.20	-47.19	38.29	19.72	PK
7	5896.304	59.81	89.40	-29.58	40.03	19.78	PK
8	5925	57.99	68.20	-10.21	38.07	19.92	PK
* 9	5991.848	60.42	68.20	-7.78	40.32	20.10	PK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.

Product : IEEE802.11a/b/g/n 2.4+5GHz 1T1R Wi-Fi IoT Module
Test Item : Band Edge Data
Test Mode : Mode 1: Transmit (802.11a-6Mbps)

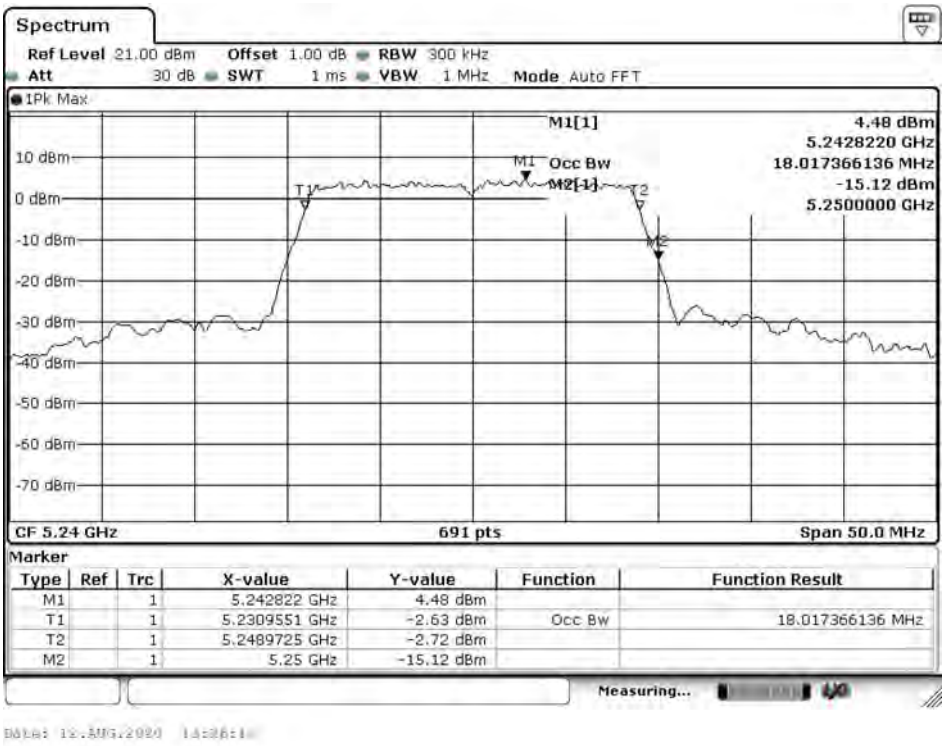
Test Frequency (MHz)	Measurement Level (MHz)	Limit (MHz)	Result
5240	5248.54	<5250	PASS



Note:T1~T2 is 99% Occupied Bandwidth.

Product : IEEE802.11a/b/g/n 2.4+5GHz 1T1R Wi-Fi IoT Module
Test Item : Band Edge Data
Test Mode : Mode 2: Transmit (802.11n-20BW 7.2Mbps)

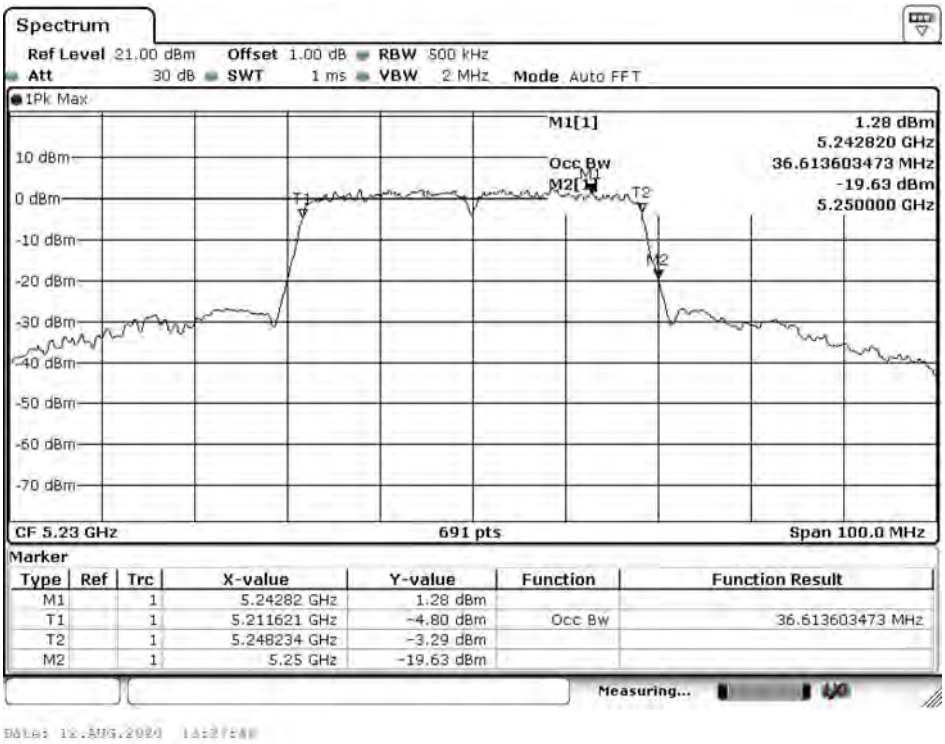
Test Frequency (MHz)	Measurement Level (MHz)	Limit (MHz)	Result
5240	5248.97	<5250	PASS



Note:T1~T2 is 99% Occupied Bandwidth.

Product : IEEE802.11a/b/g/n 2.4+5GHz 1T1R Wi-Fi IoT Module
Test Item : Band Edge Data
Test Mode : Mode 3: Transmit (802.11n-40BW 15Mbps)

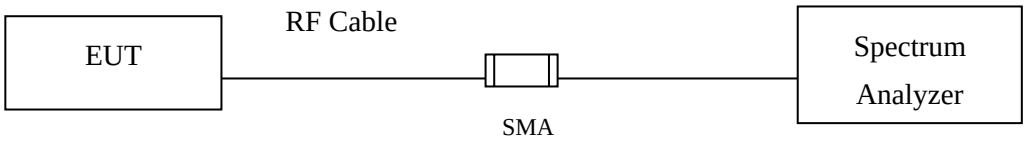
Test Frequency (MHz)	Measurement Level (MHz)	Limit (MHz)	Result
5230	5248.23	<5250	PASS



Note:T1~T2 is 99% Occupied Bandwidth.

7. Occupied Bandwidth

7.1. Test Setup



7.2. Limits

For the 5.725-5.85 GHz band, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz

7.3. Test Procedure

The EUT was setup to ANSI C63.10, 2013; tested to UNII test procedure of FCC KDB-789033 for compliance to FCC 47CFR Subpart E requirements.

7.4. Test Result of Occupied Bandwidth

Product : IEEE802.11a/b/g/n 2.4+5GHz 1T1R Wi-Fi IoT Module
Test Item : Occupied Bandwidth Data
Test Mode : Mode 1: Transmit (802.11a-6Mbps)
Test Date : 2020/06/18

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
149	5745	16400	>500	Pass
157	5785	16400	>500	Pass
165	5825	16450	>500	Pass

Figure Channel 149:

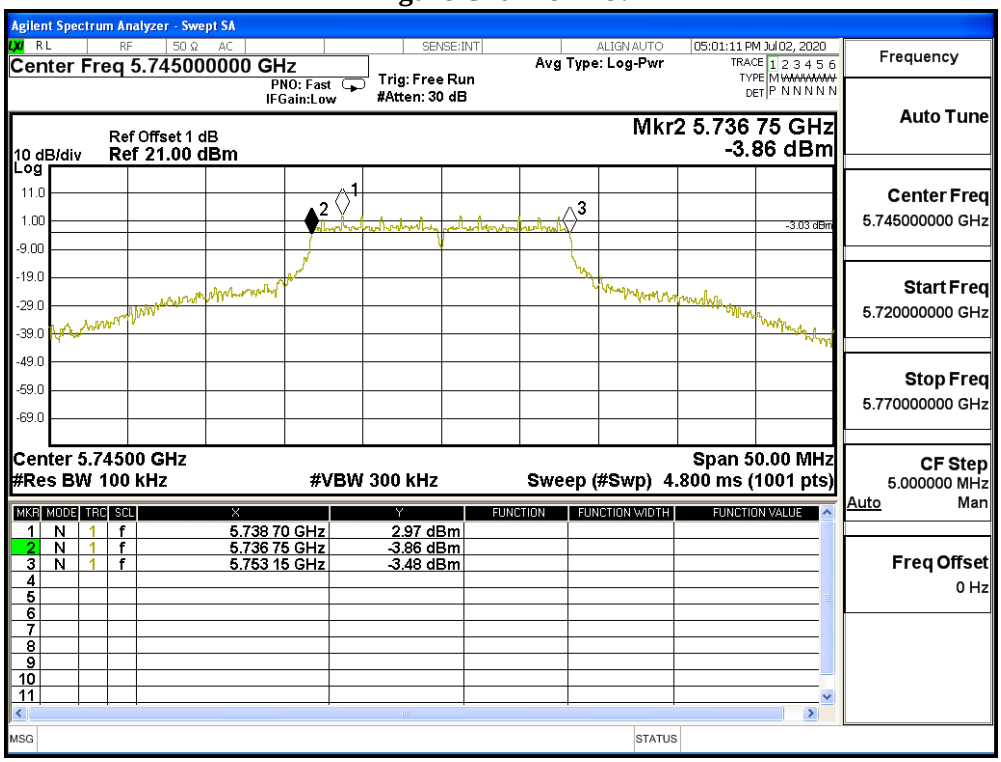


Figure Channel 157:

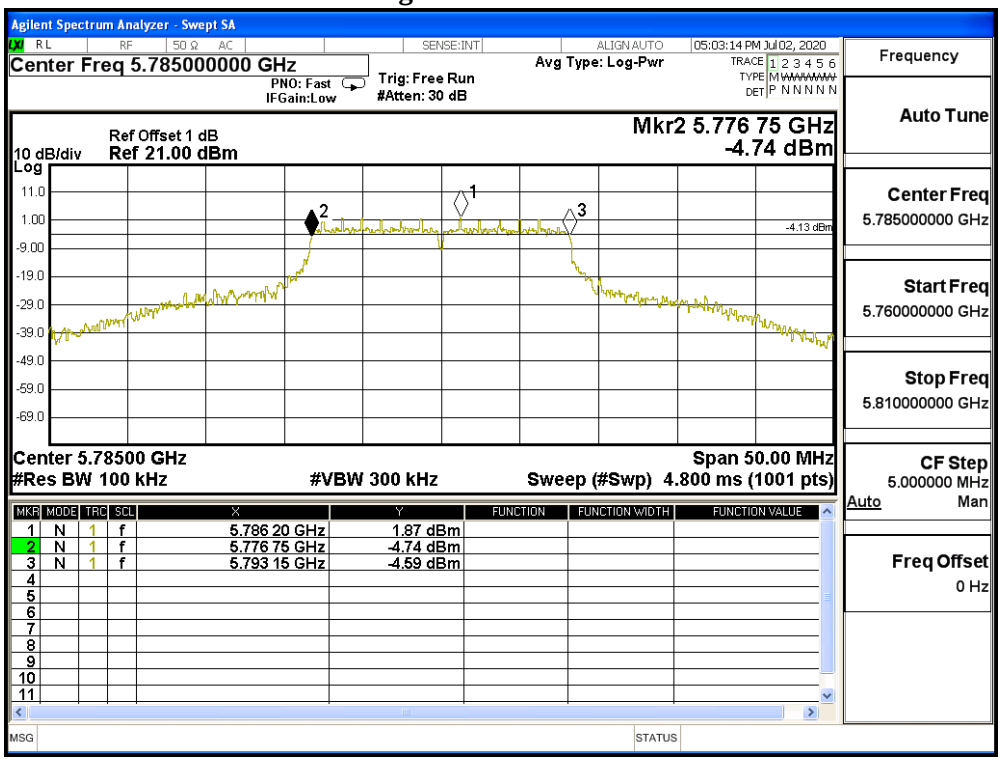
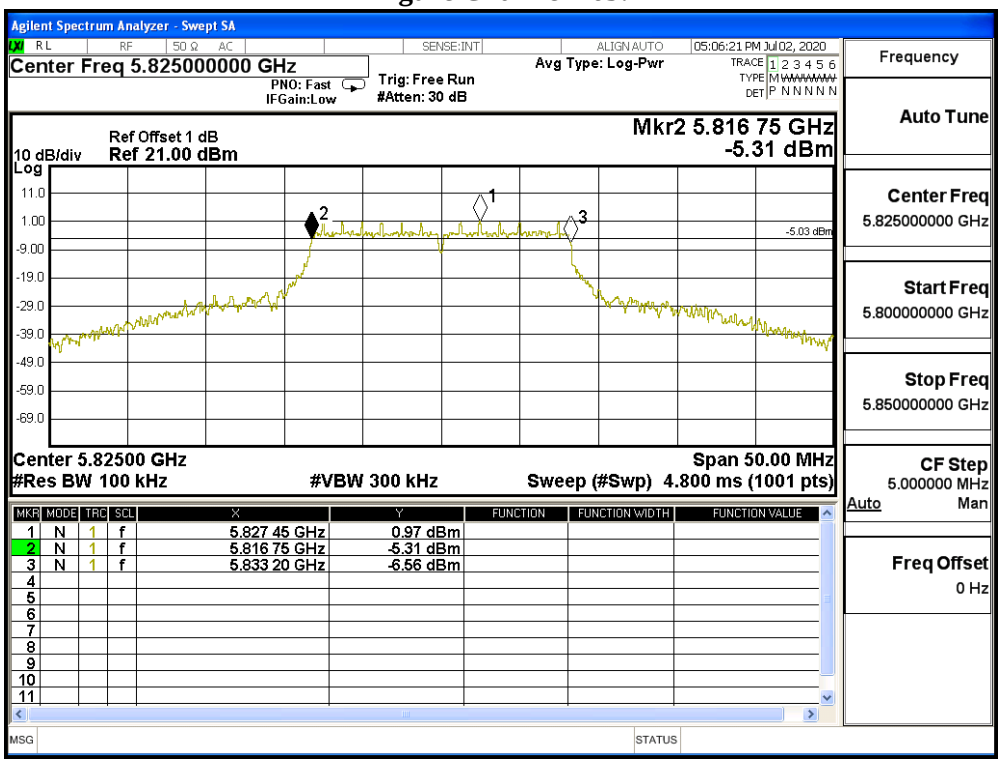


Figure Channel 165:



Product : IEEE802.11a/b/g/n 2.4+5GHz 1T1R Wi-Fi IoT Module
Test Item : Occupied Bandwidth Data
Test Mode : Mode 2: Transmit (802.11n-20BW 7.2Mbps)
Test Date : 2020/06/18

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
149	5745	17700	>500	Pass
157	5785	17700	>500	Pass
165	5825	17700	>500	Pass

Figure Channel 149:

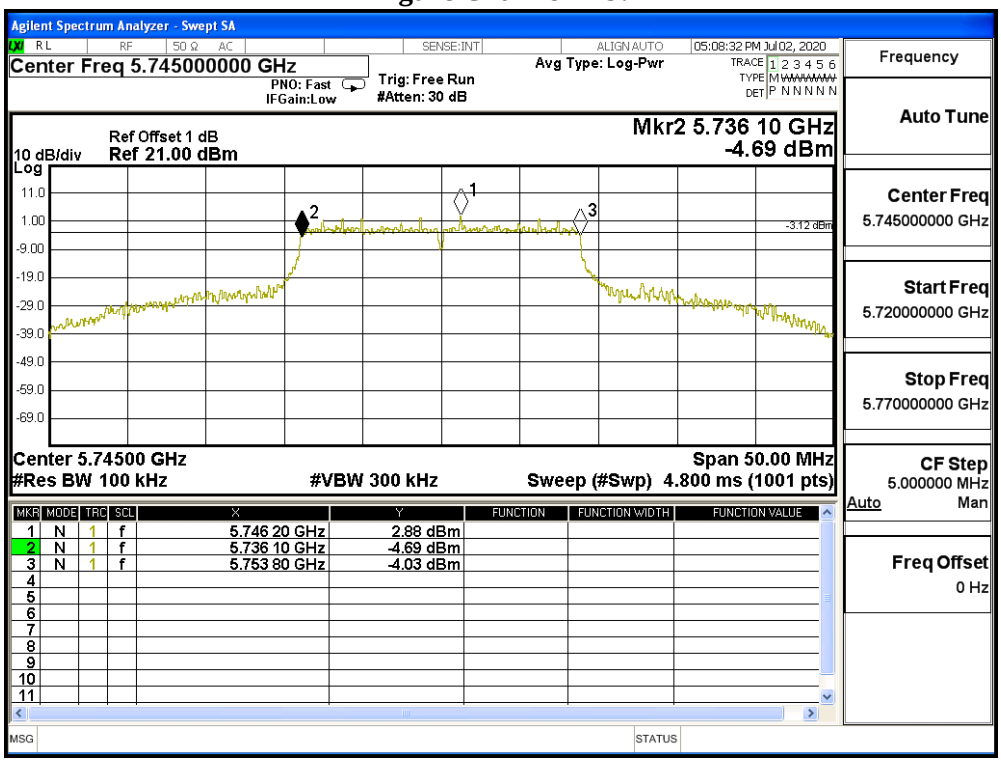


Figure Channel 157:

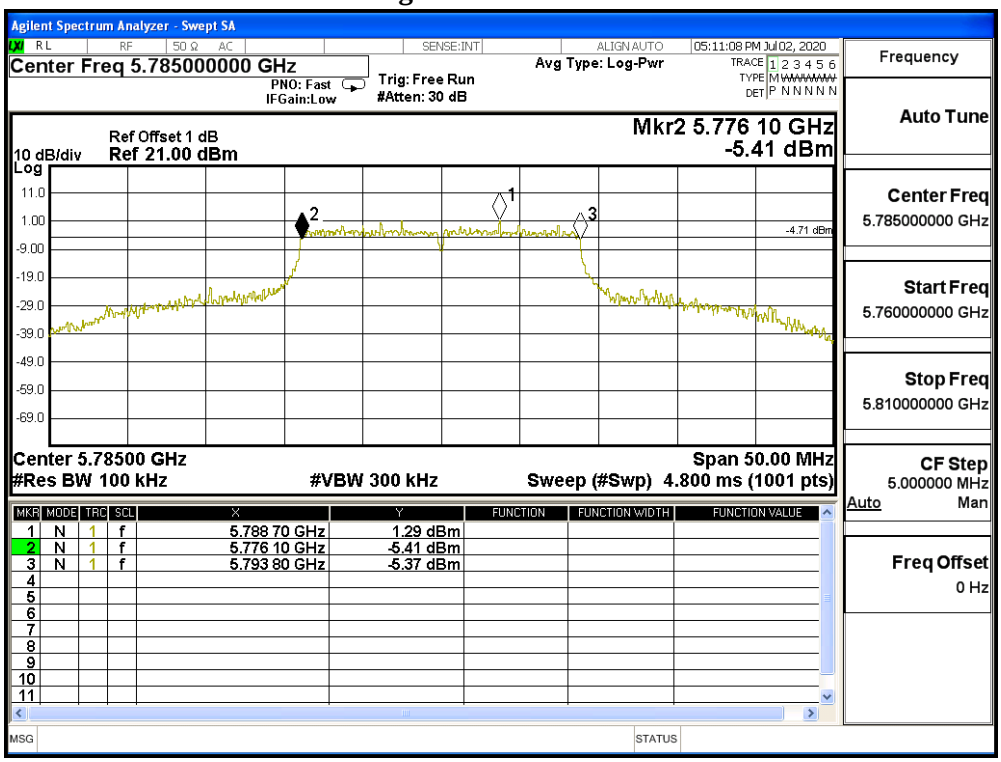
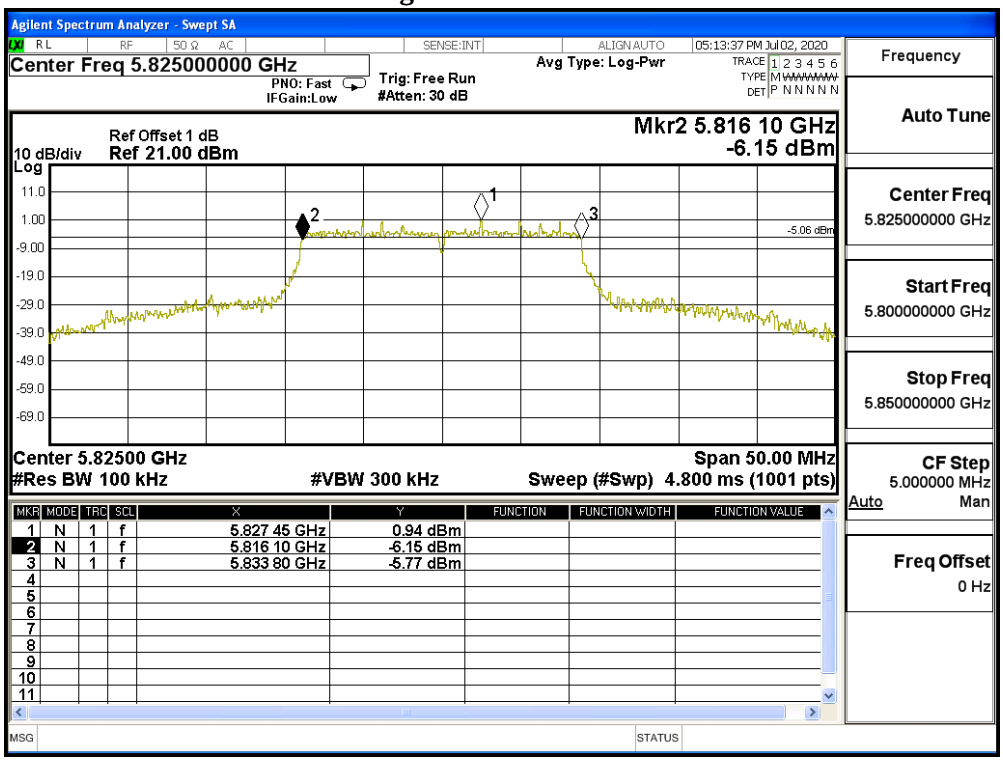


Figure Channel 165:



Product : IEEE802.11a/b/g/n 2.4+5GHz 1T1R Wi-Fi IoT Module
Test Item : Occupied Bandwidth Data
Test Mode : Mode 3: Transmit (802.11n-40BW 15Mbps)
Test Date : 2020/06/18

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
151	5755	35600	>500	Pass
159	5795	35900	>500	Pass

Figure Channel 151:

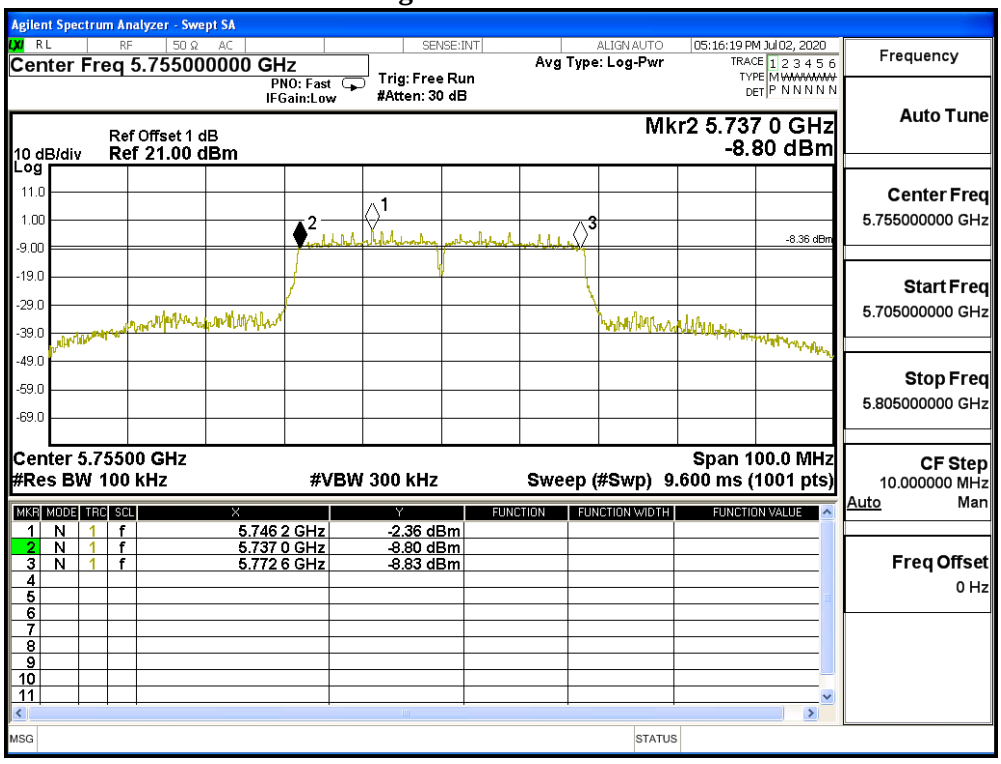
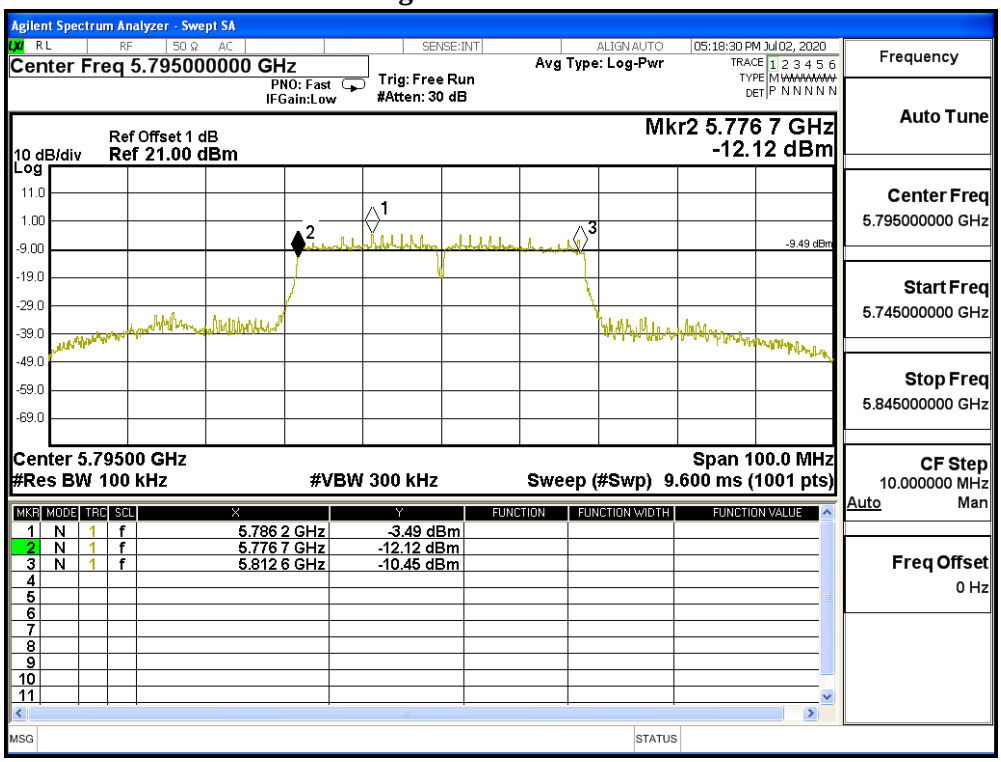
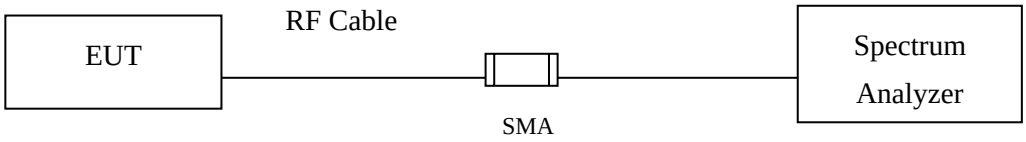


Figure Channel 159:



8. Duty Cycle

8.1. Test Setup



8.2. Test Procedure

The EUT was setup according to ANSI C63.10 2013; tested according to U-NII test procedure of KDB789033 for compliance to FCC 47CFR 15.407 requirements.

8.3. Test Result of Duty Cycle

Product : IEEE802.11a/b/g/n 2.4+5GHz 1T1R Wi-Fi IoT Module
Test Item : Duty Cycle
Test Mode : Transmit

Duty Cycle Formula:

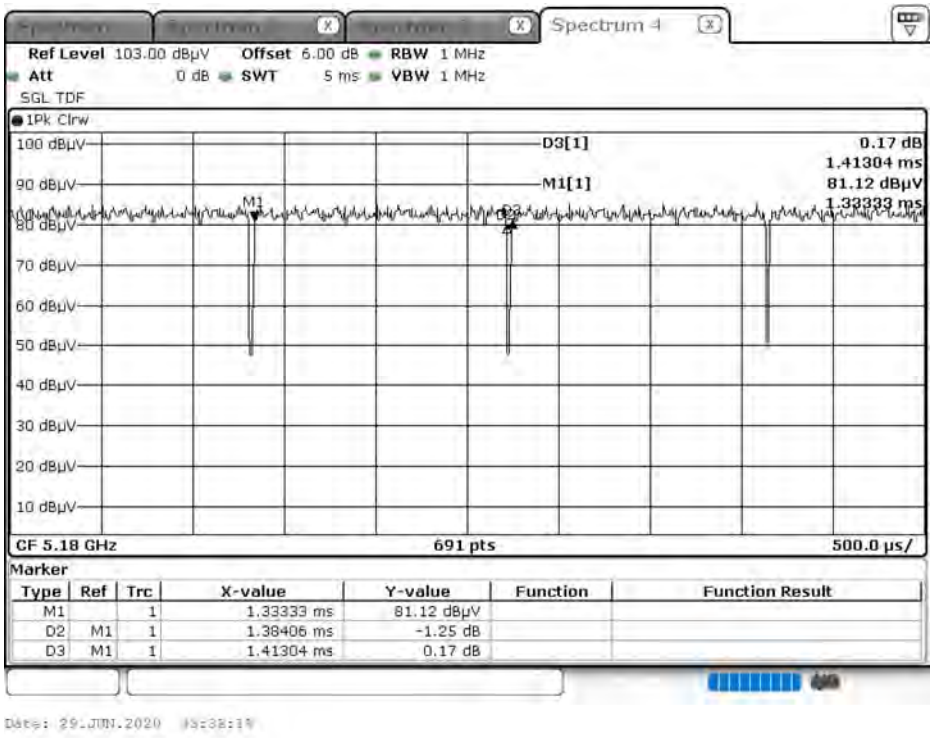
Duty Cycle = Ton / (Ton + Toff)

Duty Factor = 10 Log (1/Duty Cycle)

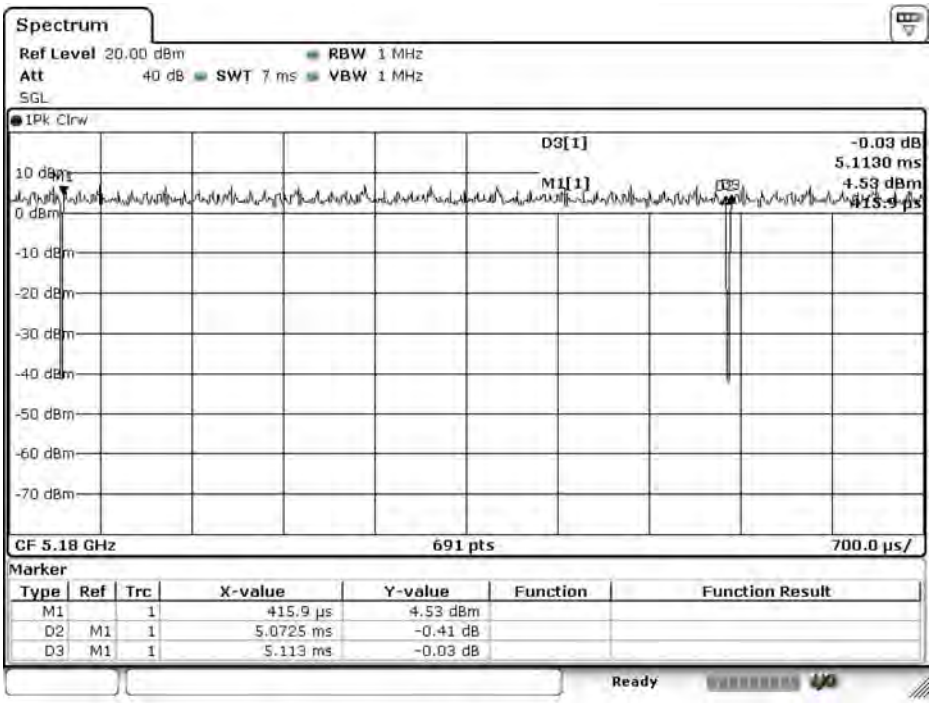
Results:

5GHz band	Ton (ms)	Ton + Toff (ms)	Duty Cycle (%)	Duty Factor (dB)
802.11a	1.3841	1.4130	97.95	0.09
802.11n20	5.0725	5.1130	99.21	0.03
802.11n40	2.4348	2.4855	97.96	0.09

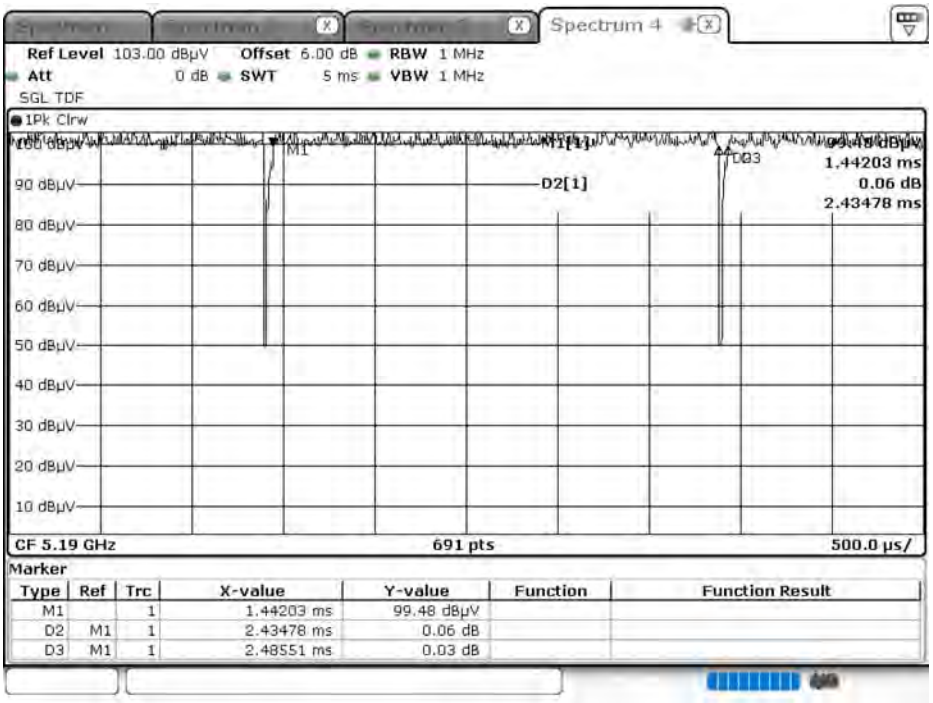
802.11a



802.11n20



802.11n40



9. EMI Reduction Method During Compliance Testing

No modification was made during testing.