FCC Test Report

Product Name	Industrial WiFi module
Model No	WM-AN-AT-01
FCC ID	SLE-WM-AN-AT-01

Applicant	Moxa Inc.
Address	FL. 4, NO. 135, LANE 235, BAOQIAO RD., XINDIAN DIST., NEW TAIPEI CITY, TAIWAN

Date of Receipt	Apr. 30, 2020
Issued Date	Jun.18, 2020
Report No.	2040838R-E3032110124
Report Version	V1.0

Testing Laboratory
3023

Test Report

Issued Date: Jun.18, 2020
Report No.: 2040838R-E3032110124

Product Name	Industrial WiFi module
Applicant	Moxa Inc.
Address	FL. 4, NO. 135, LANE 235, BAOQIAO RD., XINDIAN DIST., NEW TAIPEI CITY, TAIWAN
Manufacturer	Moxa Inc.
Model No.	WM-AN-AT-01
FCC ID.	SLE-WM-AN-AT-01
EUT Rated Voltage	DC 3.3V (via PCI Express slot)
EUT Test Voltage	DC 3.3V (via PCI Express slot)
Applicable Standard	FCC CFR Title 47 Part 15 Subpart E ANSI C63.4: 2014, ANSI C63.10: 2013 789033 D02 General UNII Test Procedures New Rules v02
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)

Revision History

Report No.	Version	Description	Issued Date
2040838R-E3032110124	V1.0	Initial issue of report.	2020-06-30

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1. GENERAL INFORMATION

1.1. EUT Description

Product Name	Industrial WiFi module
FCC ID.	SLE-WM-AN-AT-01
Model No.	WM-AN-AT-01
Frequency Range	802.11a/n-20MHz: 5180-5320MHz, 5500-5700MHz, 5745-5825MHz 802.11n-40MHz: 5190-5310, 5510-5670MHz, 5755-5795MHz
Number of Channels	802.11a/n-20MHz: 24; 802.11n-40MHz: 11
Data Rate	Auto
Channel Control	802.11a: 6 - 54Mbps 802.11n: up to 150Mbps
Type of Modulation	OFDM, BPSK, QPSK, 16QAM, 64QAM
Antenna Type	Dipole
Antenna Gain	Refer to the table “Antenna List”

Antenna List

No.	Manufacturer	Part No.	Antenna Type	Peak Gain
1	KINSUN	ANT-WDB-ARM-02	Dipole	0.81dBi for 5.150-5.250 GHz 0.38dBi for 5.250-5.350 GHz -1.39dBi for 5.470-5.725 GHz -0.39dBi for 5.725-5.850 GHz

Note: The antenna of EUT is conforming 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 52:	5260 MHz	Channel 56:	5280 MHz	Channel 60:	5300 MHz	Channel 64:	5320 MHz
Channel 100:	5500 MHz	Channel 104:	5520 MHz	Channel 108:	5540 MHz	Channel 112:	5560 MHz
Channel 116:	5580 MHz	Channel 120:	5600 MHz	Channel 124:	5620 MHz	Channel 128:	5640 MHz
Channel 132:	5660 MHz	Channel 136:	5680 MHz	Channel 140:	5700 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 54:	5270 MHz	Channel 62:	5310 MHz
Channel 102:	5510 MHz	Channel 110:	5550 MHz	Channel 118:	5590 MHz	Channel 126:	5630 MHz
Channel 134:	5670 MHz	Channel 151:	5755 MHz	Channel 159:	5795 MHz		

Note:

1. This device is a Industrial WiFi modulewith a built-in 802.11a/b/g/n 2.4GHz and 5GHz WLAN transceiver, the test report is for 5GHz WLAN.
2. Regarding to the operation frequency, the lowest, middle and highest frequency are selected to perform the test.
3. At result of pretests, module supports dual-channel transmission, only the worst case is shown in the report.
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)

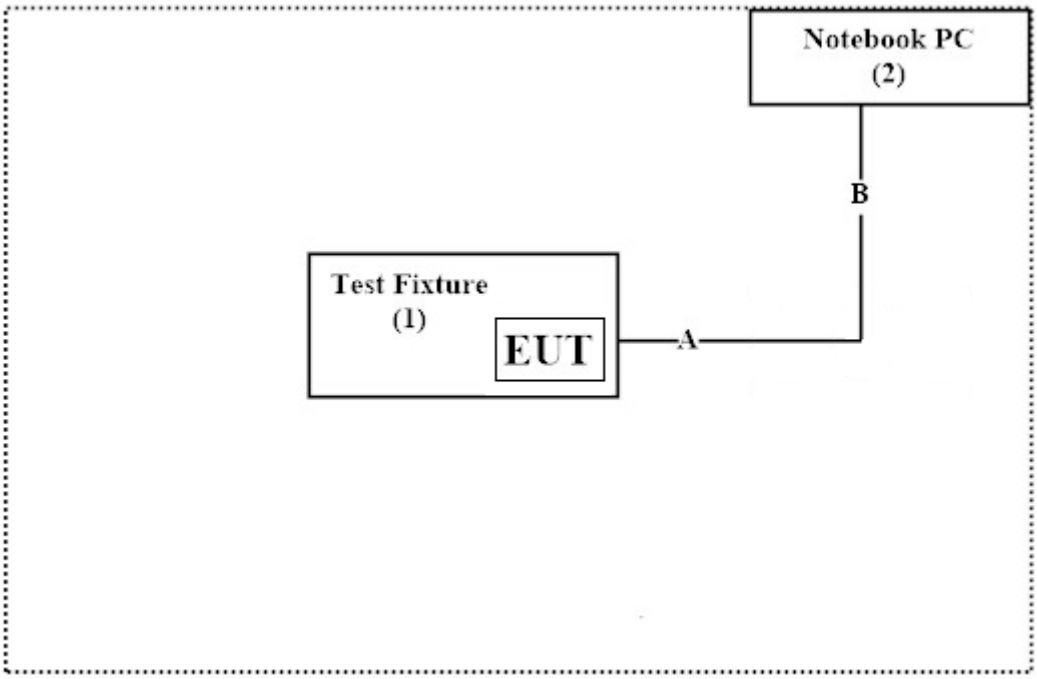
1.3. Tested System Datails

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	Test Fixture	MOXA	N/A	N/A	N/A
2	Notebook PC	DELL	Latitude 5580	GDZN7H2	Non-Shielded, 0.8m

Signal Cable Type		Signal cable Description
A	Signal Cable	Non-shielded, 0.3m
B	RS232 to USB Cable	Shielded, 0.7m

1.4. Configuration of tested System



1.5. EUT Exercise Software

1. Setup the EUT as shown in Section 1.4.
2. Execute software “Putty Version.0.063” 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	24.1 °C
	Humidity (%RH)	10~90 %	60 %
Radiated Emission	Temperature (°C)	10~40 °C	34 °C
	Humidity (%RH)	10~90 %	50 %
Conductive	Temperature (°C)	10~40 °C	25.3 °C
	Humidity (%RH)	10~90 %	71.0 %

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	2019/06/20	2020/06/19

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	2019/07/04	2020/07/03
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	2019/07/10	2020/07/09
X	Amplifier	EMCI	EMC001330	980254	2019/08/22	2020/08/21
X	Horn Antenna	ETS-LINDGREN	3117	00228113	2020/05/01	2021/04/30
X	Coaxial Cable	DEKRA	L1907-002C	280280.F141.1000D	2019/07/10	2020/07/09
X	Amplifier	EMCI	EMC05820SE	980362	2019/06/26	2020/06/25
X	Amplifier	EMCI	EMC051845SE	980632	2019/08/08	2020/08/07
	Horn Antenna	Com-Power	AH-1840	101101	2019/10/31	2020/10/30
	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	2019/07/10	2020/07/09
	Amplifier	EMCI	EMC001330	980255	2020/03/17	2021/03/16
X	Filter	MICRO-TRONICS	BRM50702	G270	2019/08/08	2020/08/07
	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.

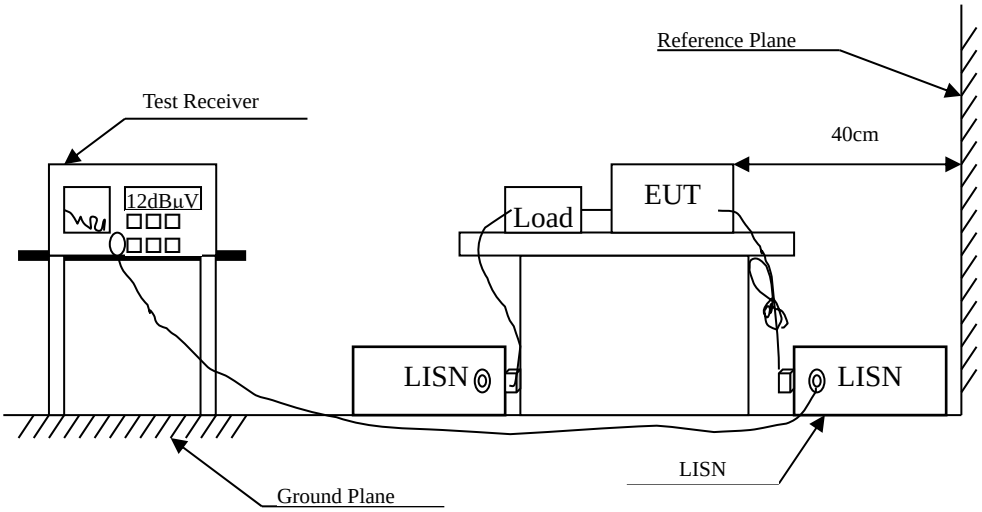
The reported expanded uncertainties are based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95%.

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	±3.42dB	
Maximun conducted output power	Power Meter ±2.06 dB	Spectrum Analyzer ±0.89 dB
Power Density	±2.06 dB	
Radiated Emission	Under 1GHz ±4.06dB	Above 1GHz ±3.73dB
Band Edge	±2.06 dB	
Occupied Bandwidth	±1544.74Hz	
Duty Cycle	±2.31 ms	

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

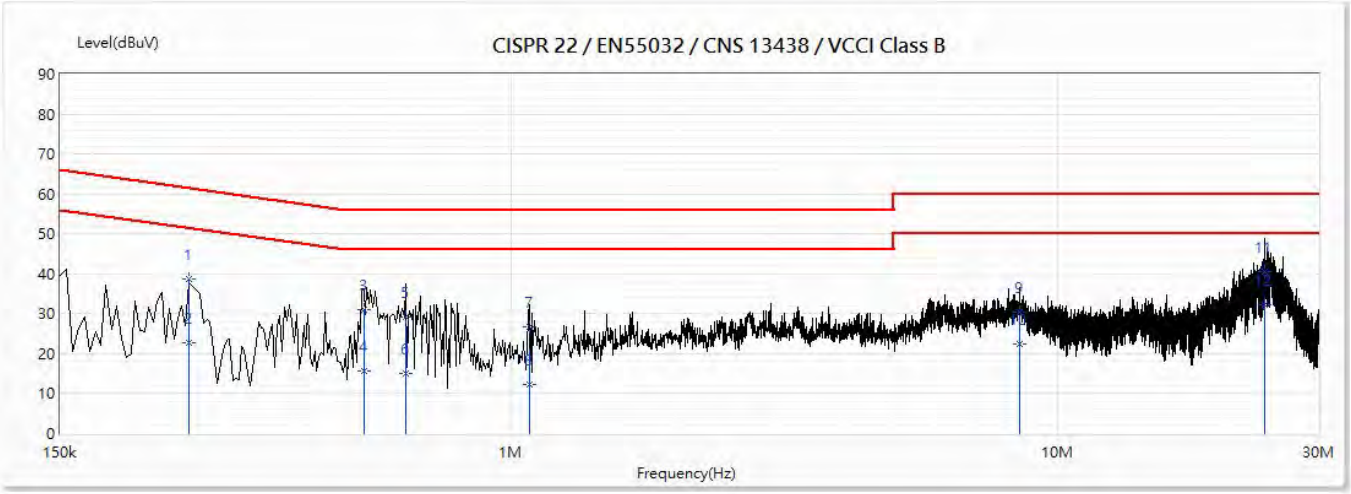
The EUT and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm /50uH coupling 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 : Industrial WiFi module
Test Item : Conducted Emission Test
Power Line : Line 1
Test Mode : Mode 2: Transmit (802.11n-20BW 7.2Mbps) (5220MHz)
Test Date : 2020/06/09

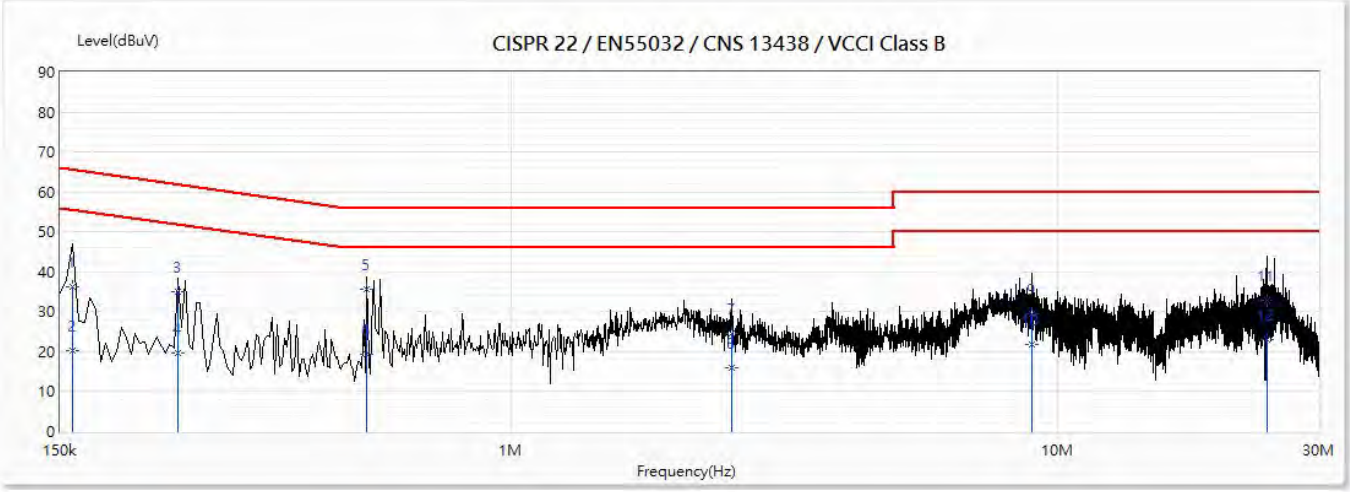


No	Frequency (MHz)	Emission Level (dBuV)	Limit (dBuV)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	0.258	38.82	61.49	-22.67	29.03	9.79	QP
2	0.258	22.82	51.49	-28.67	13.03	9.79	AV
3	0.538	30.88	56.00	-25.12	21.09	9.79	QP
4	0.538	15.79	46.00	-30.21	6.00	9.79	AV
5	0.642	29.17	56.00	-26.83	19.37	9.80	QP
6	0.642	14.99	46.00	-31.01	5.20	9.80	AV
7	1.084	26.81	56.00	-29.19	16.98	9.82	QP
8	1.084	12.31	46.00	-33.69	2.49	9.82	AV
9	8.52	30.31	60.00	-29.69	20.25	10.06	QP
10	8.52	22.53	50.00	-27.47	12.47	10.06	AV
11	23.872	40.41	60.00	-19.59	30.14	10.26	QP
*12	23.872	32.21	50.00	-17.79	21.95	10.26	AV

Note:

1. All Reading Levels are Quasi-Peak and average value.
2. " " means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

Product : Industrial WiFi module
Test Item : Conducted Emission Test
Power Line : Line 2
Test Mode : Mode 2: Transmit (802.11n-20BW 7.2Mbps) (5220MHz)
Test Date : 2020/06/09



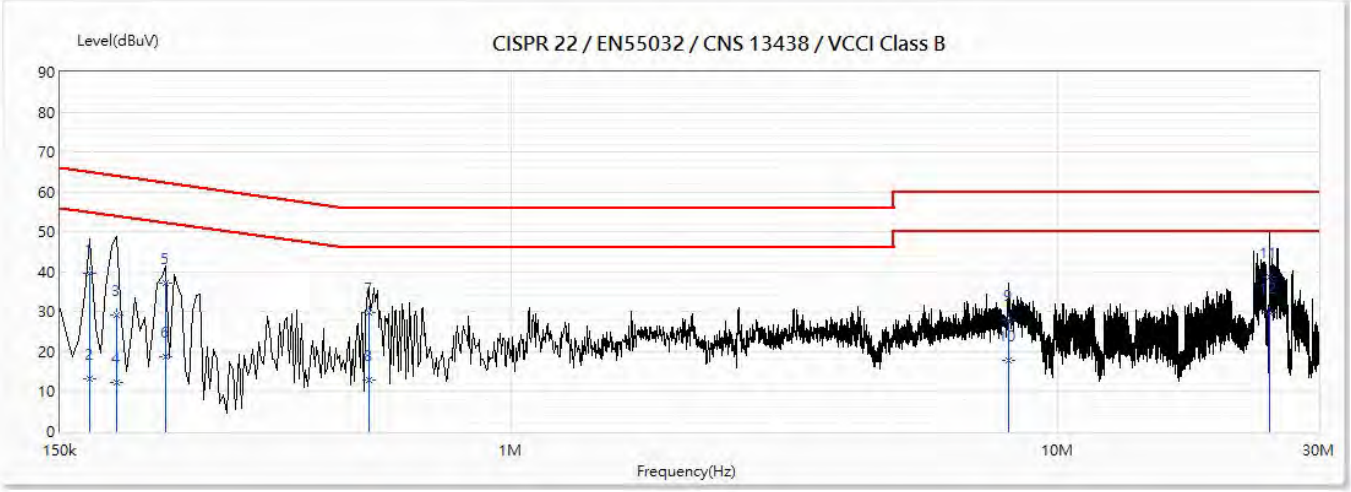
No	Frequency (MHz)	Emission Level (dBuV)	Limit (dBuV)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	0.158	36.35	65.59	-29.24	26.57	9.78	QP
2	0.158	20.28	55.59	-35.31	10.51	9.78	AV
3	0.246	35.15	61.88	-26.72	25.38	9.77	QP
4	0.246	19.69	51.88	-32.19	9.92	9.77	AV
*5	0.546	35.68	56.00	-20.32	25.89	9.78	QP
6	0.546	19.34	46.00	-26.66	9.56	9.78	AV
7	2.532	24.48	56.00	-31.52	14.61	9.87	QP
8	2.532	15.90	46.00	-30.10	6.02	9.87	AV
9	8.968	29.55	60.00	-30.45	19.47	10.09	QP
10	8.968	21.73	50.00	-28.27	11.64	10.09	AV
11	24.112	32.85	60.00	-27.15	22.41	10.44	QP
12	24.112	23.17	50.00	-26.83	12.73	10.44	AV

Note:

1. All Reading Levels are Quasi-Peak and average value.
2. “ “ means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

Product : Industrial WiFi module
Test Item : Conducted Emission Test
Power Line : Line 1
Test Mode : Mode 2: Transmit (802.11n-20BW 7.2Mbps) (5300MHz)
Test Date : 2020/06/09

Line 1



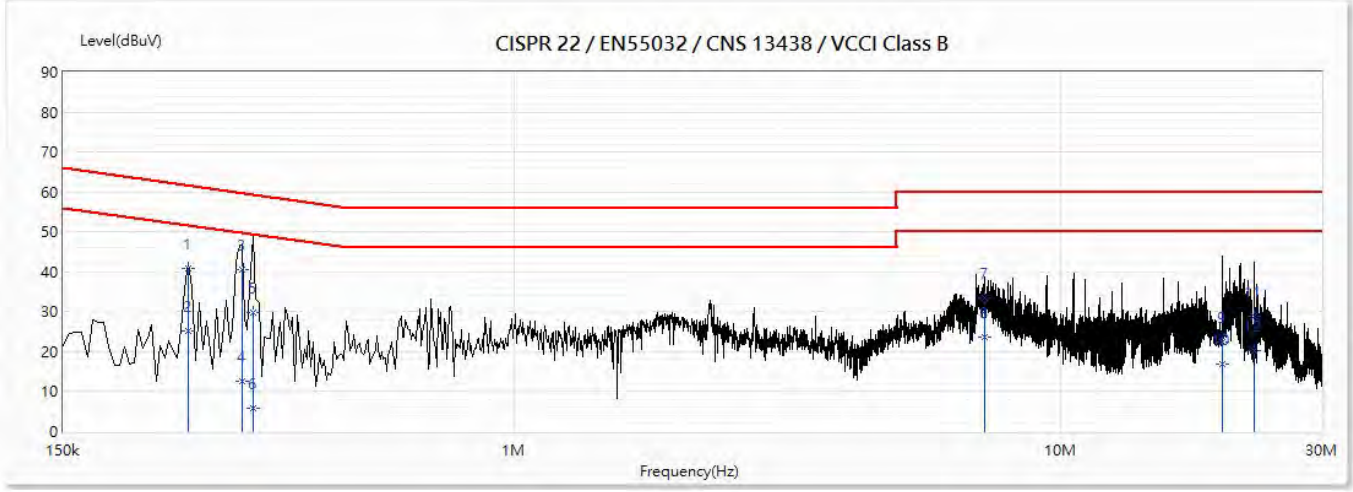
No	Frequency (MHz)	Emission Level (dBuV)	Limit (dBuV)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	0.17	39.60	64.98	-25.39	29.80	9.80	QP
2	0.17	13.32	54.98	-41.66	3.52	9.80	AV
3	0.19	29.03	64.02	-34.99	19.24	9.79	QP
4	0.19	12.36	54.02	-41.66	2.57	9.79	AV
5	0.234	37.22	62.30	-25.08	27.43	9.79	QP
6	0.234	18.73	52.30	-33.58	8.94	9.79	AV
7	0.55	29.89	56.00	-26.11	20.10	9.79	QP
8	0.55	12.85	46.00	-33.15	3.05	9.79	AV
9	8.136	28.10	60.00	-31.90	18.05	10.05	QP
10	8.136	17.81	50.00	-32.19	7.76	10.05	AV
11	24.384	38.65	60.00	-21.35	28.38	10.26	QP
*12	24.384	29.87	50.00	-20.13	19.60	10.26	AV

Note:

1. All Reading Levels are Quasi-Peak and average value.
2. “ “ means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

Product : Industrial WiFi module
Test Item : Conducted Emission Test
Power Line : Line 2
Test Mode : Mode 2: Transmit (802.11n-20BW 7.2Mbps) (5300MHz)
Test Date : 2020/06/09

N



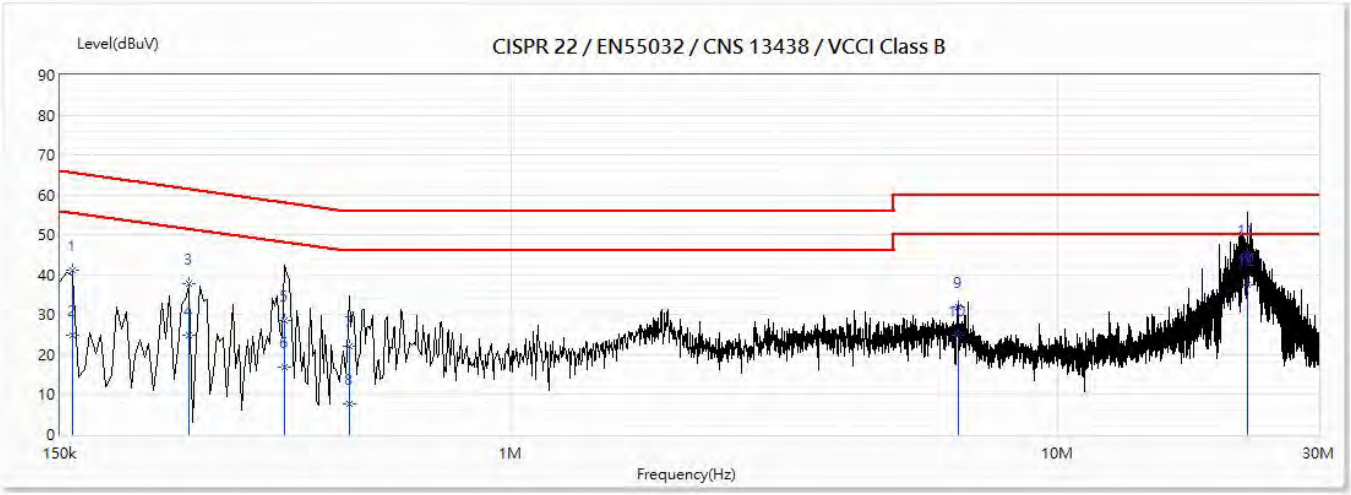
No	Frequency (MHz)	Emission Level (dBuV)	Limit (dBuV)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	0.254	40.81	61.62	-20.81	31.04	9.77	QP
2	0.254	25.28	51.62	-26.34	15.51	9.77	AV
*3	0.318	40.57	59.75	-19.18	30.80	9.77	QP
4	0.318	12.66	49.75	-37.09	2.89	9.77	AV
5	0.334	29.65	59.34	-29.69	19.87	9.78	QP
6	0.334	5.97	49.34	-43.37	-3.80	9.78	AV
7	7.248	33.33	60.00	-26.67	23.30	10.03	QP
8	7.248	23.68	50.00	-26.32	13.65	10.03	AV
9	19.76	22.36	60.00	-37.64	11.98	10.39	QP
10	19.76	16.92	50.00	-33.08	6.53	10.39	AV
11	22.568	28.81	60.00	-31.19	18.39	10.43	QP
12	22.568	20.18	50.00	-29.82	9.76	10.43	AV

Note:

1. All Reading Levels are Quasi-Peak and average value.
2. “ “ means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

Product : Industrial WiFi module
Test Item : Conducted Emission Test
Power Line : Line 1
Test Mode : Mode 2: Transmit (802.11n-20BW 7.2Mbps) (5580MHz)
Test Date : 2020/06/09

Line 1



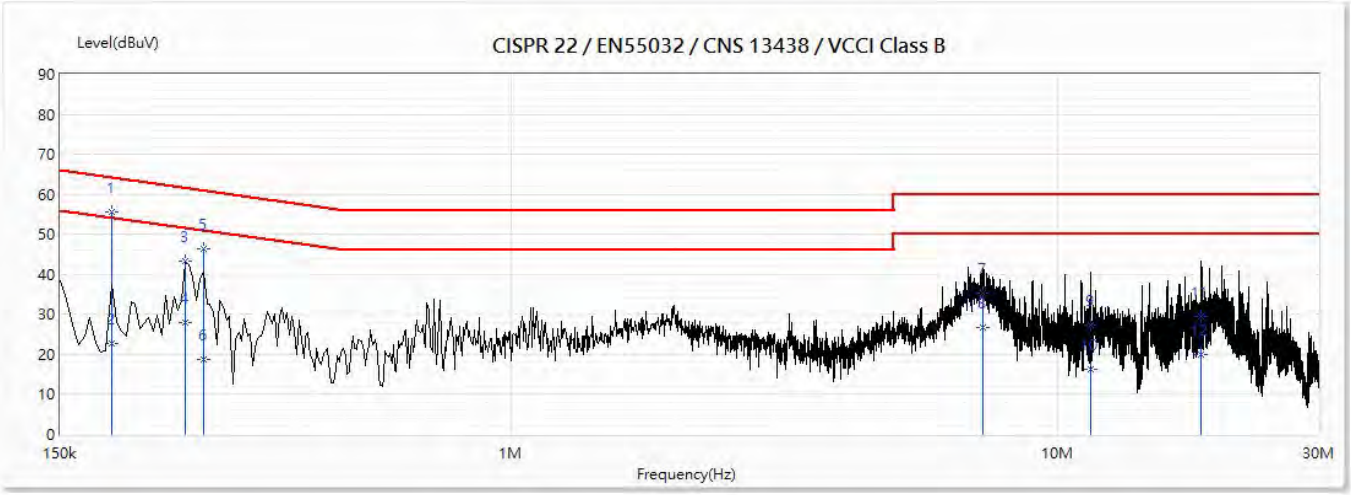
No	Frequency (MHz)	Emission Level (dBuV)	Limit (dBuV)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	0.158	41.14	65.57	-24.42	31.34	9.80	QP
2	0.158	24.84	55.57	-30.72	15.04	9.80	AV
3	0.258	37.64	61.48	-23.85	27.85	9.79	QP
4	0.258	24.81	51.48	-26.68	15.02	9.79	AV
5	0.386	28.65	58.16	-29.51	18.86	9.79	QP
6	0.386	16.91	48.16	-31.25	7.12	9.79	AV
7	0.506	22.15	56.00	-33.85	12.36	9.79	QP
8	0.506	7.64	46.00	-38.36	-2.15	9.79	AV
9	6.568	31.99	60.00	-28.01	21.98	10.01	QP
10	6.568	25.02	50.00	-24.98	15.01	10.01	AV
11	22.256	45.27	60.00	-14.73	35.02	10.25	QP
*12	22.256	37.40	50.00	-12.60	27.14	10.25	AV

Note:

1. All Reading Levels are Quasi-Peak and average value.
2. “ “ means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

Product	:	Industrial WiFi module
Test Item	:	Conducted Emission Test
Power Line	:	Line 2
Test Mode	:	Mode 2: Transmit (802.11n-20BW 7.2Mbps) (5580MHz)
Test Date	:	2020/06/09

N



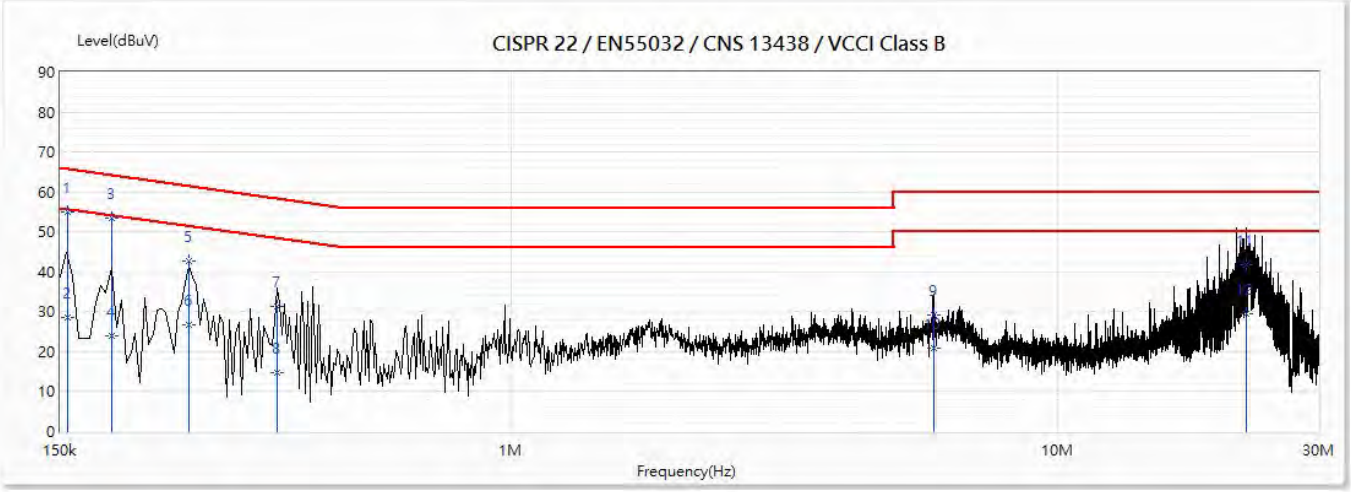
No	Frequency (MHz)	Emission Level (dBuV)	Limit (dBuV)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
*1	0.186	55.51	64.20	-8.70	45.73	9.77	QP
2	0.186	22.62	54.20	-31.58	12.85	9.77	AV
3	0.254	43.18	61.62	-18.44	33.41	9.77	QP
4	0.254	27.87	51.62	-23.75	18.10	9.77	AV
5	0.274	46.38	60.99	-14.60	36.61	9.77	QP
6	0.274	18.89	50.99	-32.10	9.11	9.77	AV
7	7.312	35.38	60.00	-24.62	25.35	10.04	QP
8	7.312	26.64	50.00	-23.36	16.60	10.04	AV
9	11.488	27.20	60.00	-32.80	17.04	10.16	QP
10	11.488	16.42	50.00	-33.58	6.26	10.16	AV
11	18.324	29.34	60.00	-30.66	19.00	10.35	QP
12	18.324	19.96	50.00	-30.04	9.61	10.35	AV

Note:

1. All Reading Levels are Quasi-Peak and average value.
2. “ “ means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

Product : Industrial WiFi module
Test Item : Conducted Emission Test
Power Line : Line 1
Test Mode : Mode 2: Transmit (802.11n-20BW 7.2Mbps) (5785MHz)
Test Date : 2020/06/09

Line 1



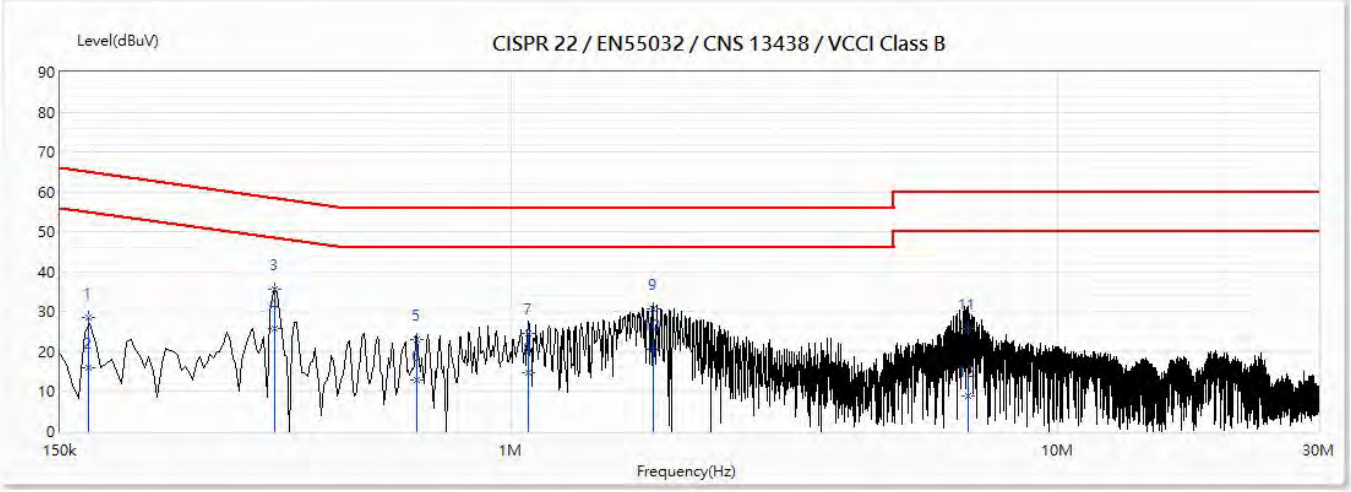
No	Frequency (MHz)	Emission Level (dBuV)	Limit (dBuV)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
*1	0.154	55.13	65.76	-10.63	45.33	9.80	QP
2	0.154	28.58	55.76	-27.18	18.78	9.80	AV
3	0.186	53.33	64.21	-10.87	43.54	9.79	QP
4	0.186	23.96	54.21	-30.24	14.17	9.79	AV
5	0.258	42.57	61.51	-18.94	32.78	9.79	QP
6	0.258	26.83	51.51	-24.68	17.04	9.79	AV
7	0.374	31.47	58.41	-26.94	21.68	9.79	QP
8	0.374	14.62	48.41	-33.79	4.83	9.79	AV
9	5.924	29.05	60.00	-30.95	19.06	10.00	QP
10	5.924	20.99	50.00	-29.01	11.00	10.00	AV
11	22.172	41.91	60.00	-18.09	31.65	10.25	QP
12	22.172	29.42	50.00	-20.58	19.16	10.25	AV

Note:

1. All Reading Levels are Quasi-Peak and average value.
2. “ ” means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

Product	:	Industrial WiFi module
Test Item	:	Conducted Emission Test
Power Line	:	Line 2
Test Mode	:	Mode 2: Transmit (802.11n-20BW 7.2Mbps) (5785MHz)
Test Date	:	2020/06/09

N



No	Frequency (MHz)	Emission Level (dBuV)	Limit (dBuV)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	0.169	28.50	65.00	-36.51	18.72	9.78	QP
2	0.169	15.82	55.00	-39.19	6.04	9.78	AV
*3	0.371	35.78	58.48	-22.70	26.01	9.78	QP
4	0.371	25.66	48.48	-22.83	15.88	9.78	AV
5	0.673	23.07	56.00	-32.93	13.28	9.79	QP
6	0.673	13.03	46.00	-32.97	3.24	9.79	AV
7	1.074	24.51	56.00	-31.49	14.69	9.81	QP
8	1.074	14.76	46.00	-31.24	4.94	9.81	AV
9	1.818	30.57	56.00	-25.43	20.72	9.85	QP
10	1.818	20.72	46.00	-25.28	10.87	9.85	AV
11	6.845	25.66	60.00	-34.34	15.64	10.02	QP
12	6.845	8.89	50.00	-41.11	-1.13	10.02	AV

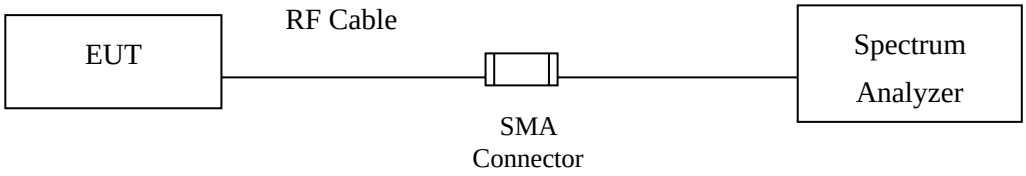
Note:

1. All Reading Levels are Quasi-Peak and average value.
2. “ “ means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

3. Maximun conducted output power

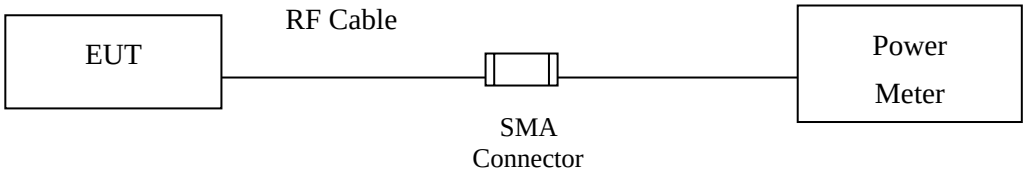
3.1. Test Setup

26dB Bandwidth

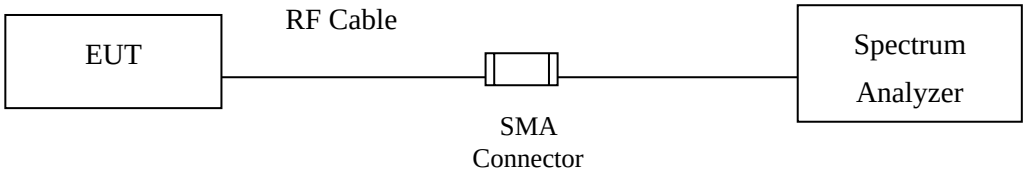


Conduction Power Measurement

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 : Industrial WiFi module
Test Item : Maximum conducted output power
Test Mode : Mode 1: Transmit (802.11a-6Mbps)
Test Date : 2020/05/11

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	14.1	--	--	--	--	--	--	--
44	5220	14.52	14.48	14.41	14.32	14.25	14.14	14.05	14.01
48	5240	14.83	--	--	--	--	--	--	--
52	5260	14.51	--	--	--	--	--	--	--
60	5300	13.94	13.88	13.81	13.74	13.7	13.6	13.52	13.43
64	5320	13.76	--	--	--	--	--	--	--
100	5500	12.78	--	--	--	--	--	--	--
116	5580	12.94	12.89	12.84	12.74	12.64	12.58	12.5	12.45
140	5700	12.85	--	--	--	--	--	--	--
149	5745	13.34	--	--	--	--	--	--	--
157	5785	15.15	15.09	15.02	14.94	14.91	14.85	14.77	14.72
165	5825	15.01	--	--	--	--	--	--	--

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

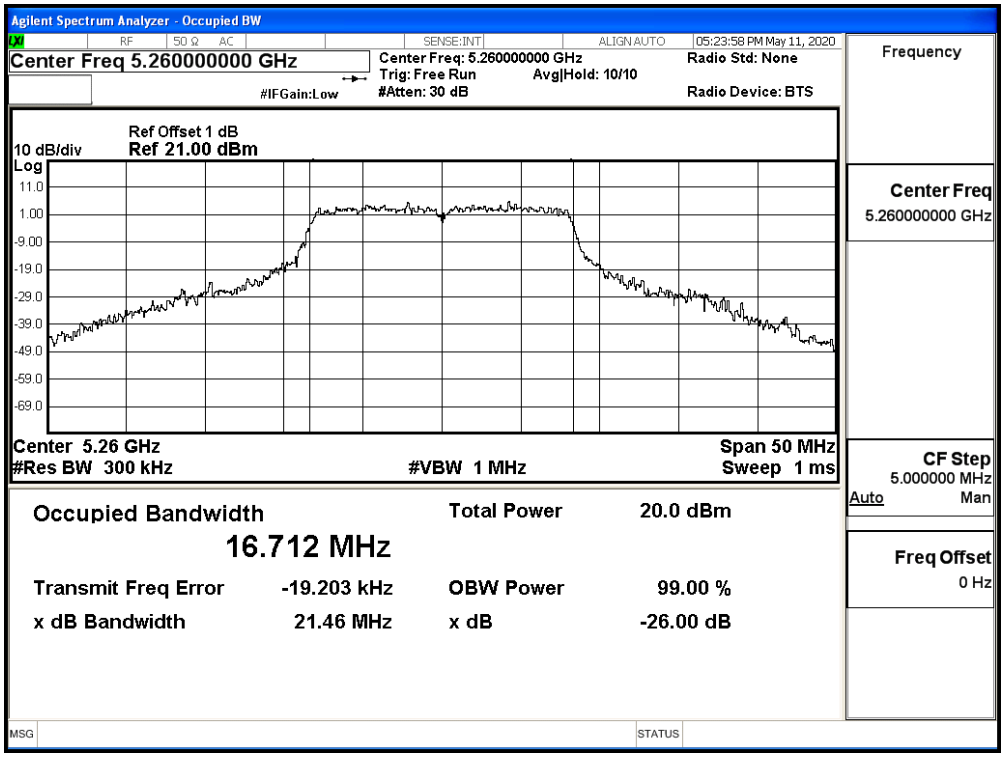
Maximum conducted output power Measurement:

Channel No	Frequency Range (MHz)	26dB Bandwidth (MHz)	Output Power (dBm)	Output Power Limit	
				(dBm)	dBm+10log(BW)
36	5180	--	14.1	24	--
44	5220	--	14.52	24	--
48	5240	--	14.83	24	--
52	5260	21.460	14.51	24	24.32
60	5300	21.600	13.94	24	24.34
64	5320	21.350	13.76	24	24.29
100	5500	21.560	12.78	24	24.34
116	5580	21.390	12.94	24	24.30
140	5700	21.750	12.85	24	24.37
149	5745	--	13.34	30	--
157	5785	--	15.15	30	--
165	5825	--	15.01	30	--

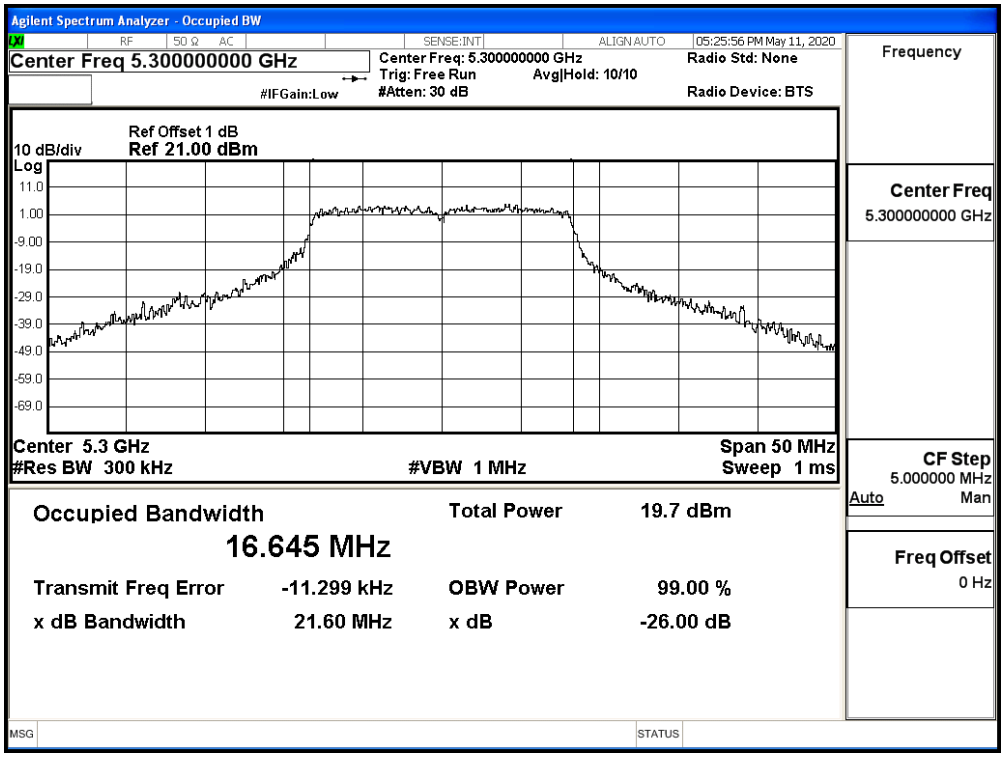
Note: Power Output Value =Reading value on average power meter + cable loss

26dB Bandwidth:

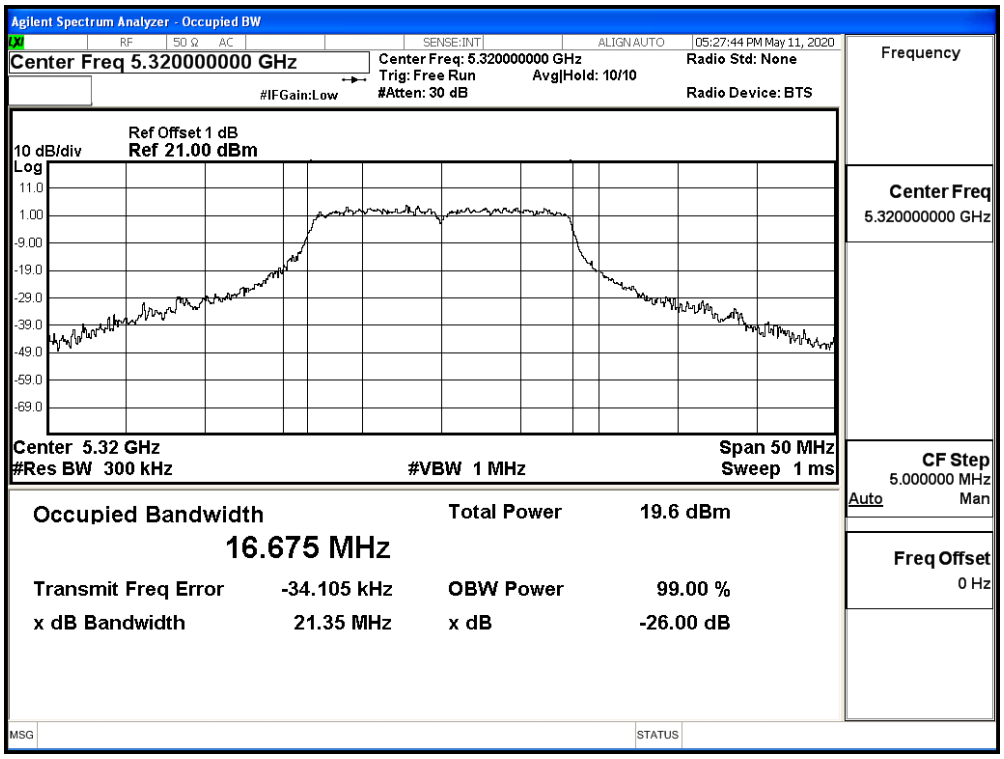
Channel 52:



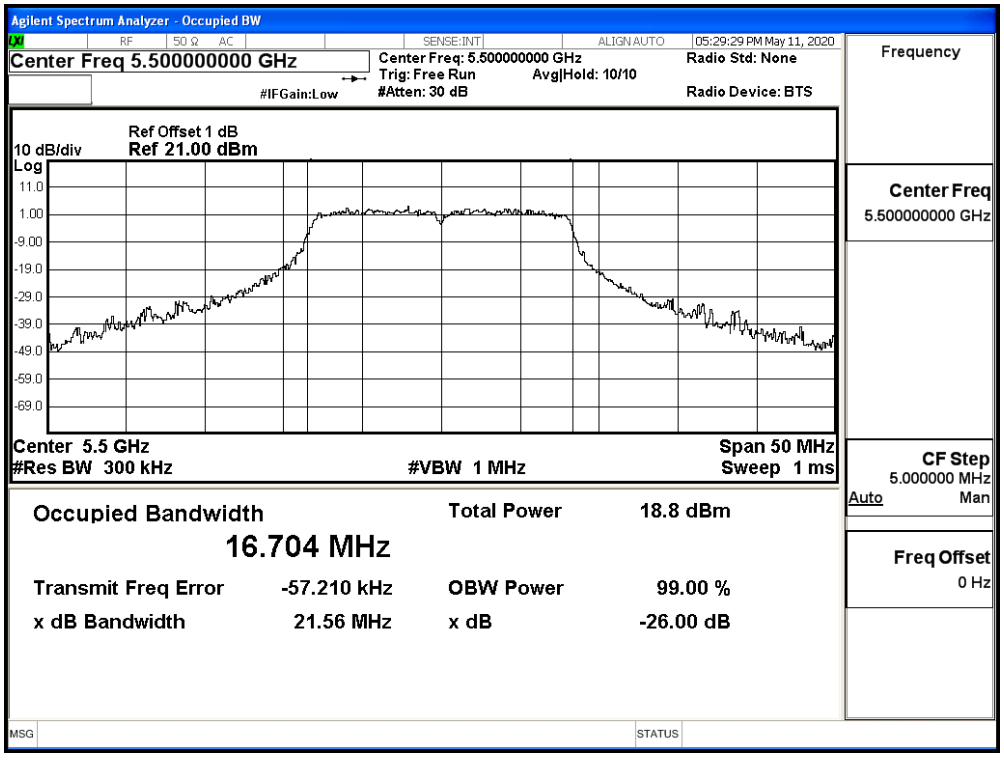
Channel 60:



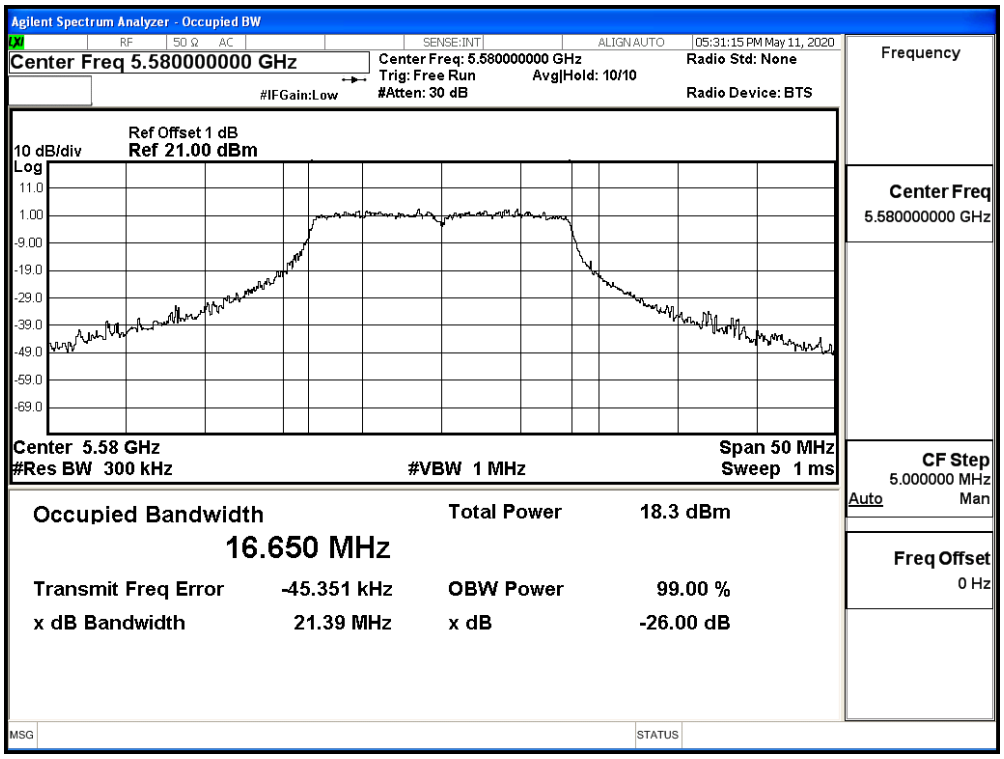
Channel 64:



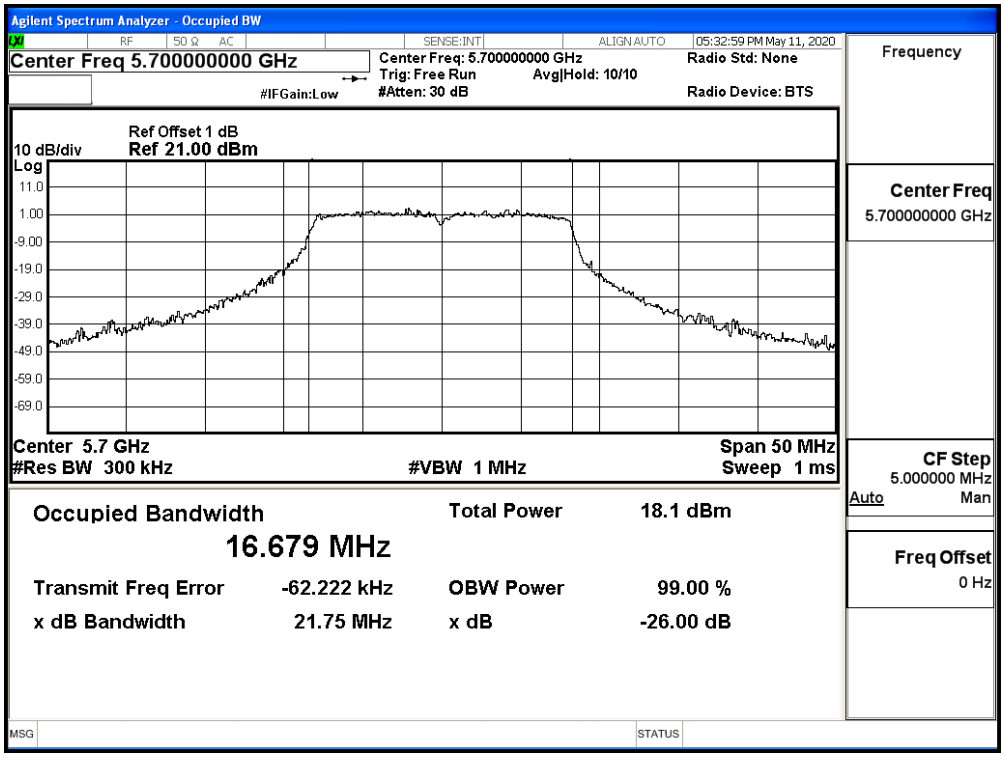
Channel 100:



Channel 116:



Channel 140:



Product : Industrial WiFi module
Test Item : Maximum conducted output power
Test Mode : Mode 2: Transmit (802.11n-20BW 7.2Mbps)
Test Date : 2020/05/11

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	15.08	--	--	--	--	--	--	--
44	5220	14.69	14.62	14.59	14.48	14.38	14.31	14.24	14.19
48	5240	14.91	--	--	--	--	--	--	--
52	5260	15.11	--	--	--	--	--	--	--
60	5300	15.23	15.18	15.12	15.01	14.93	14.82	14.71	14.65
64	5320	14.61	--	--	--	--	--	--	--
100	5500	14.23	--	--	--	--	--	--	--
116	5580	13.31	13.27	13.23	13.19	13.12	13.07	13.02	12.94
140	5700	11.07	--	--	--	--	--	--	--
149	5745	14.67	--	--	--	--	--	--	--
157	5785	14.33	14.29	14.25	14.19	14.15	14.06	13.98	13.93
165	5825	14.72	--	--	--	--	--	--	--

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

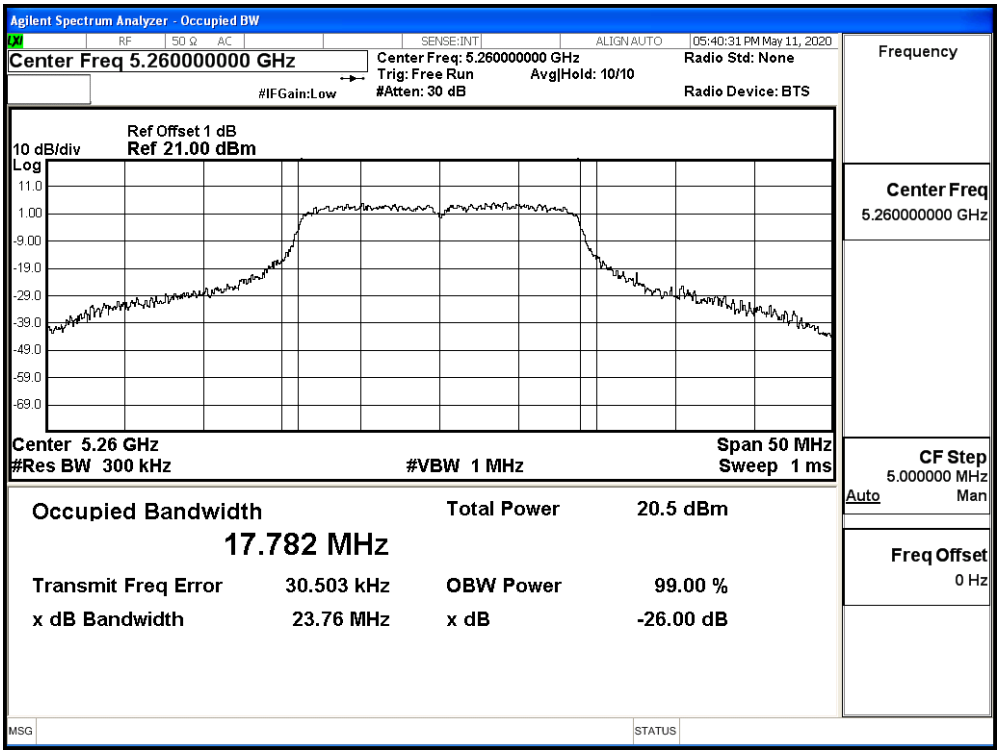
Maximum conducted output power Measurement:

Channel No	Frequency Range (MHz)	26dB Bandwidth (MHz)	Output Power (dBm)	Output Power Limit	
				(dBm)	dBm+10log(BW)
36	5180	--	15.08	24	--
44	5220	--	14.69	24	--
48	5240	--	14.91	24	--
52	5260	23.760	15.11	24	24.76
60	5300	23.430	15.23	24	24.70
64	5320	22.160	14.61	24	24.46
100	5500	22.640	14.23	24	24.55
116	5580	22.370	13.31	24	24.50
140	5700	22.600	11.07	24	24.54
149	5745	--	14.67	30	--
157	5785	--	14.33	30	--
165	5825	--	14.72	30	--

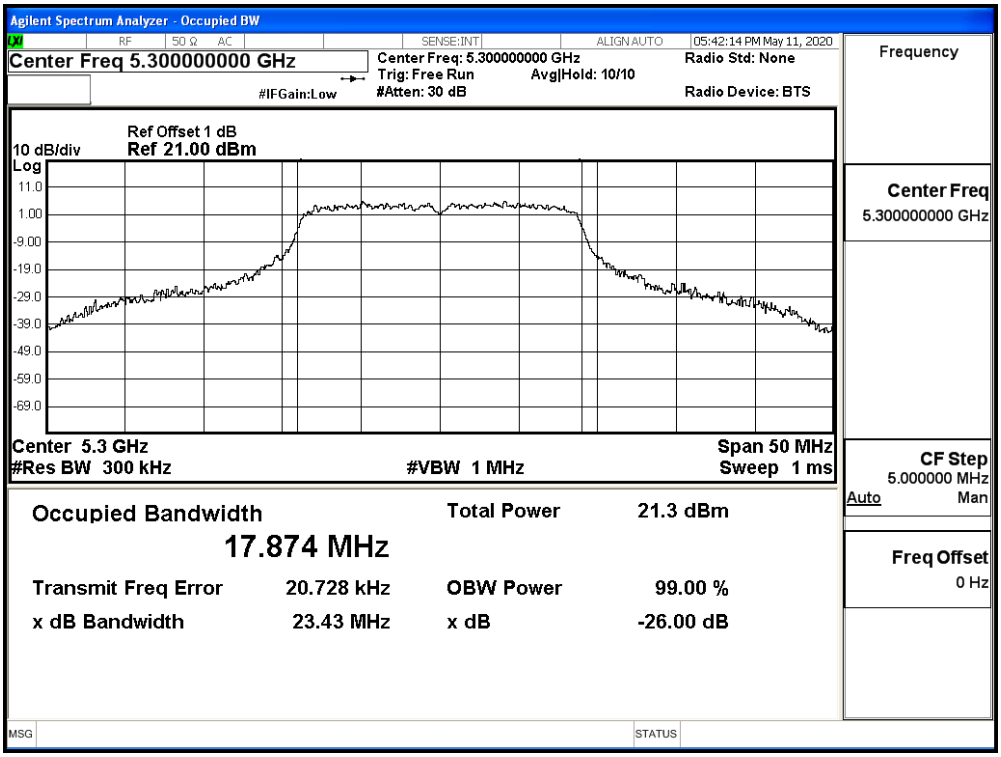
Note: Power Output Value =Reading value on average power meter + cable loss

26dB Bandwidth:

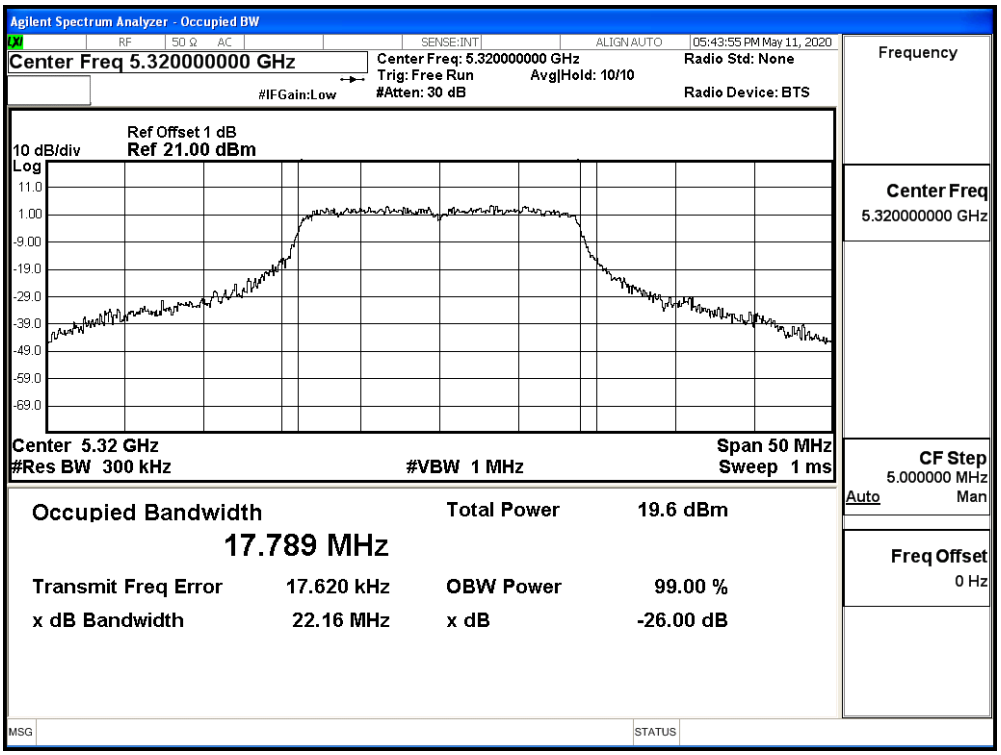
Channel 52:



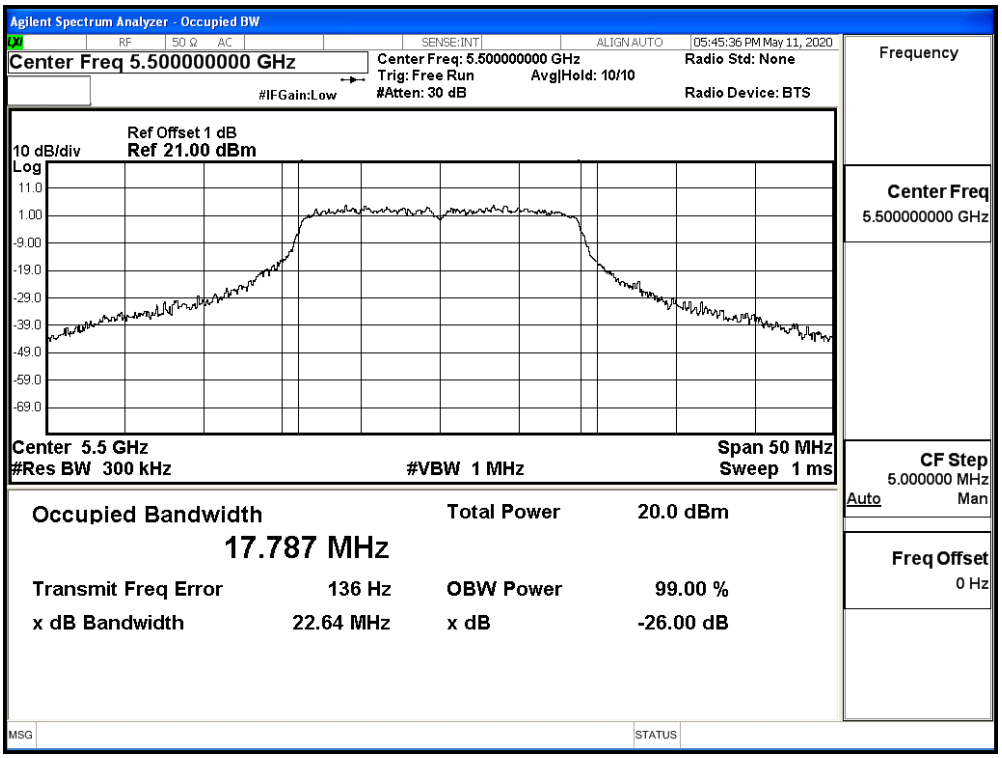
Channel 60:



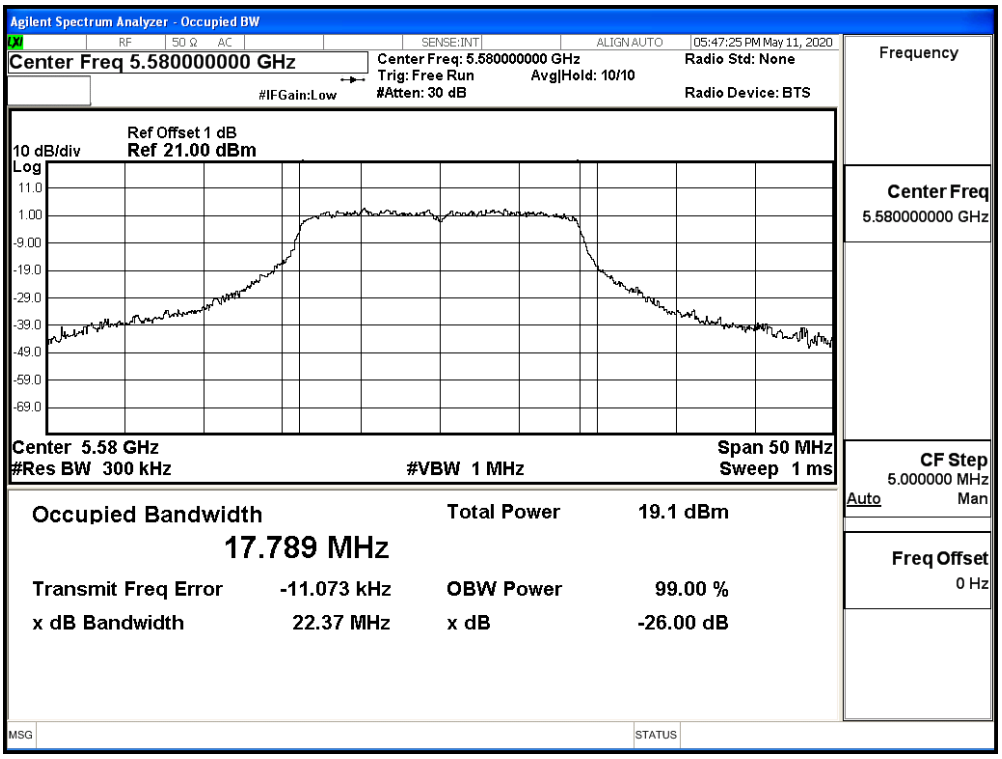
Channel 64:



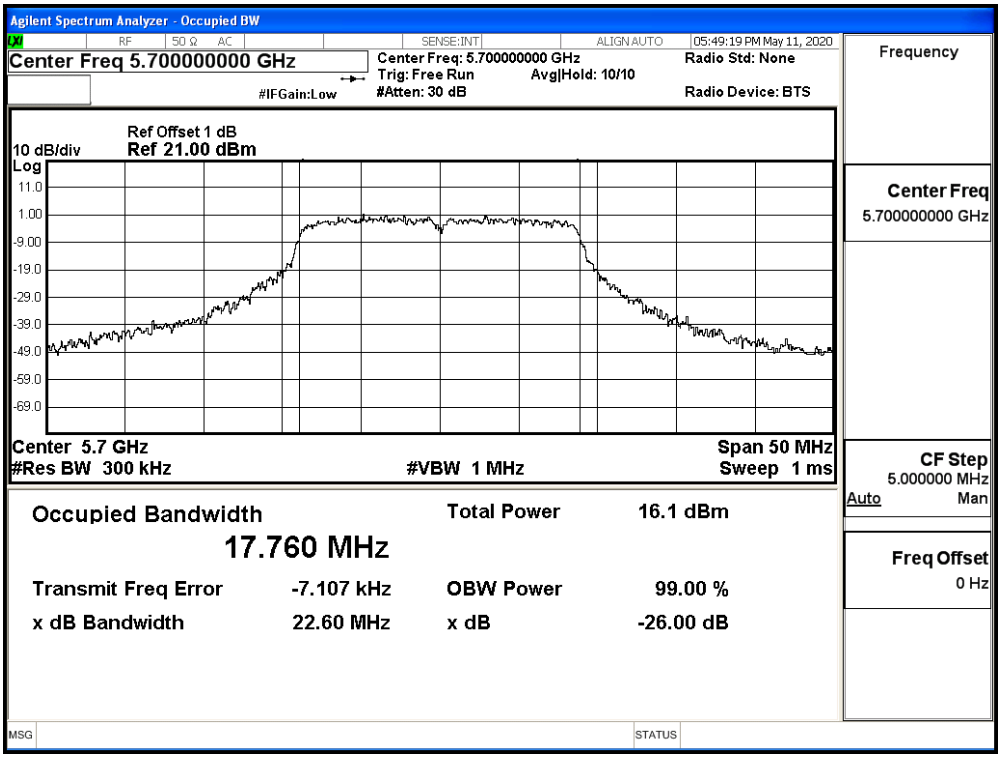
Channel 100:



Channel 116:



Channel 140:



Product : Industrial WiFi module
Test Item : Maximum conducted output power
Test Mode : Mode 3: Transmit (802.11n-40BW 15Mbps)
Test Date : 2020/05/11

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	12.84	--	--	--	--	--	--	--
46	5230	12.92	12.83	12.78	12.75	12.72	12.69	12.59	12.53
54	5270	12.86	--	--	--	--	--	--	--
62	5310	12.98	12.88	12.78	12.69	12.66	12.57	12.49	12.38
102	5510	11.87	--	--	--	--	--	--	--
110	5550	12.71	12.61	12.52	12.42	12.37	12.26	12.21	12.14
134	5670	12.85	--	--	--	--	--	--	--
151	5755	13.39	--	--	--	--	--	--	--
159	5795	12.55	12.46	12.39	12.28	12.23	12.2	12.14	12.11

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

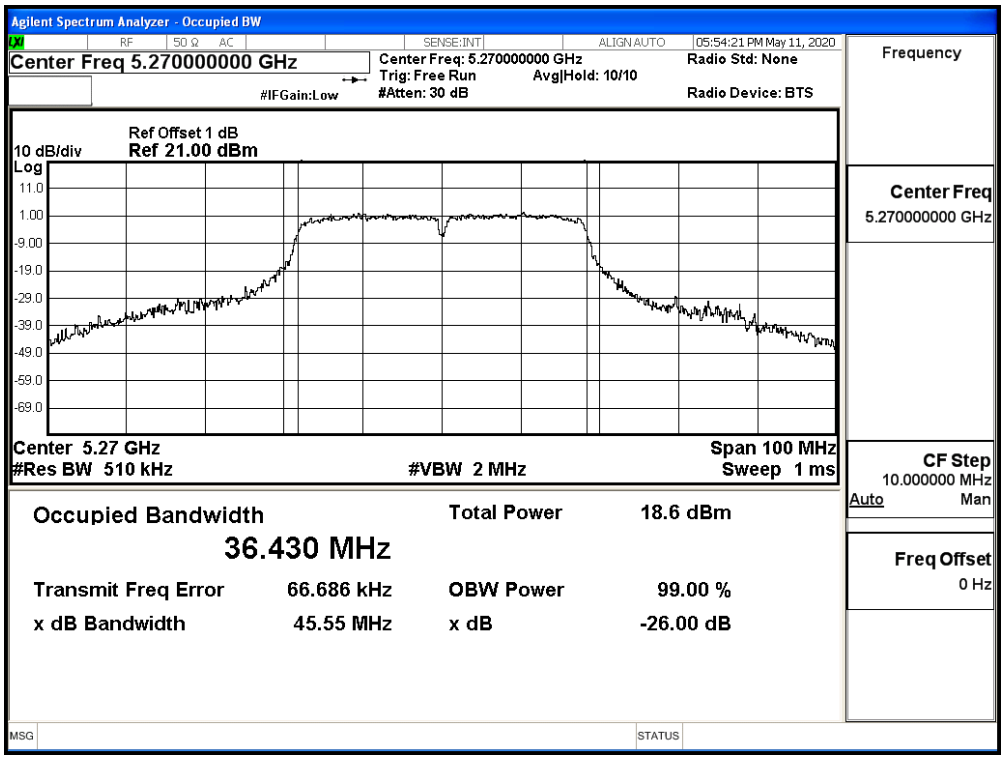
Maximum conducted output power Measurement:

Channel No	Frequency Range (MHz)	26dB Bandwidth (MHz)	Output Power (dBm)	Output Power Limit	
				(dBm)	dBm+10log(BW)
38	5190	--	12.84	24	--
46	5230	--	12.92	24	--
54	5270	45.550	12.86	24	27.58
62	5310	44.720	12.98	24	27.51
102	5510	45.910	11.87	24	27.62
110	5550	45.860	12.71	24	27.61
134	5670	45.720	12.85	24	27.60
151	5755	--	13.39	30	--
159	5795	--	12.55	30	--

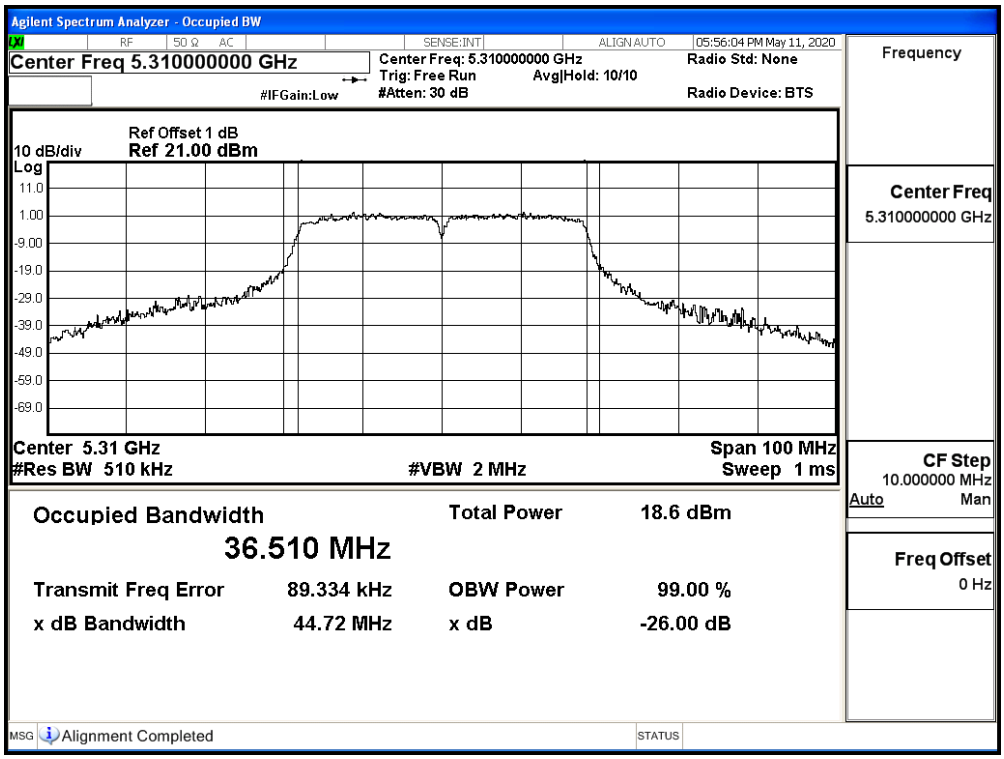
Note: Power Output Value =Reading value on average power meter + cable loss

26dB Bandwidth:

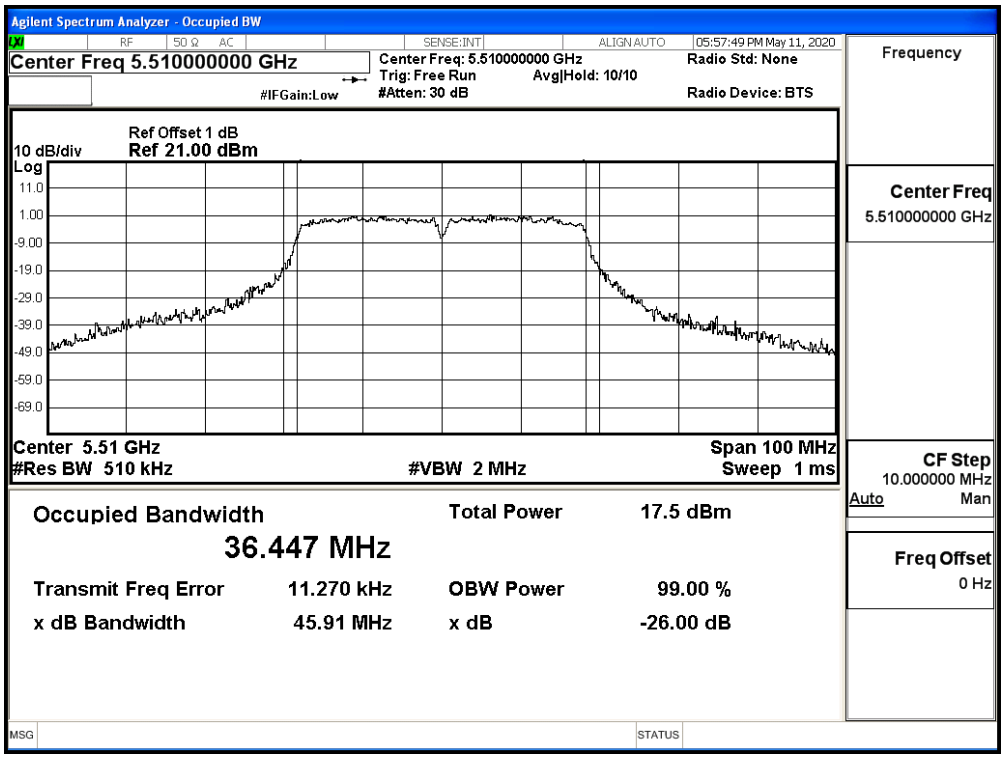
Channel 54



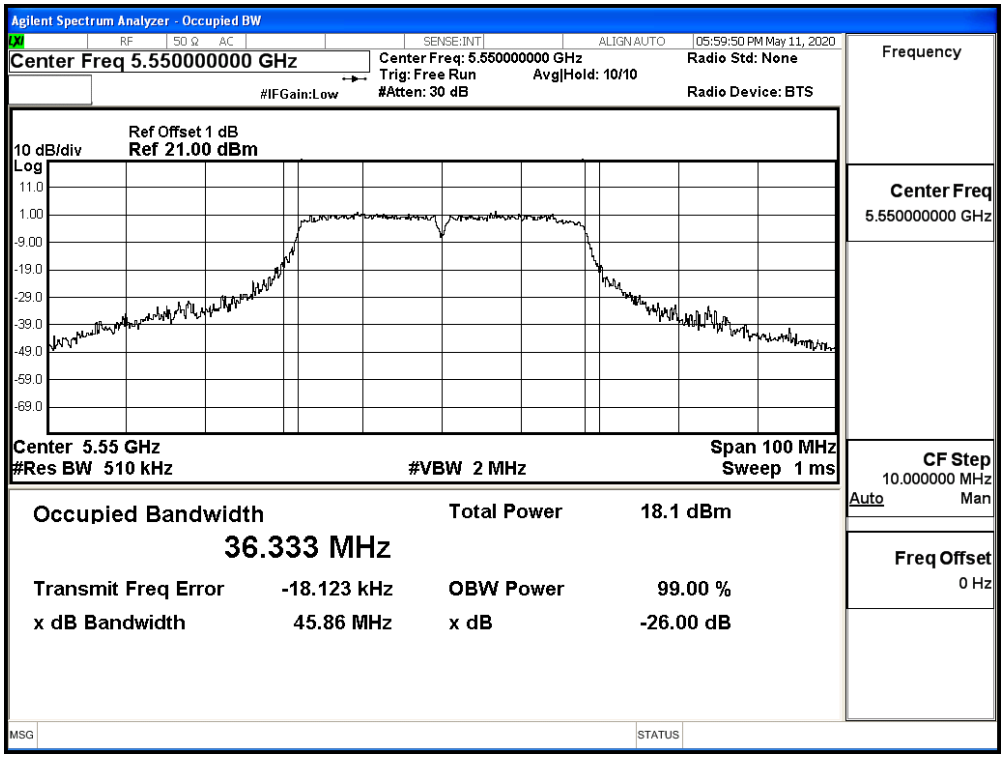
Channel 62



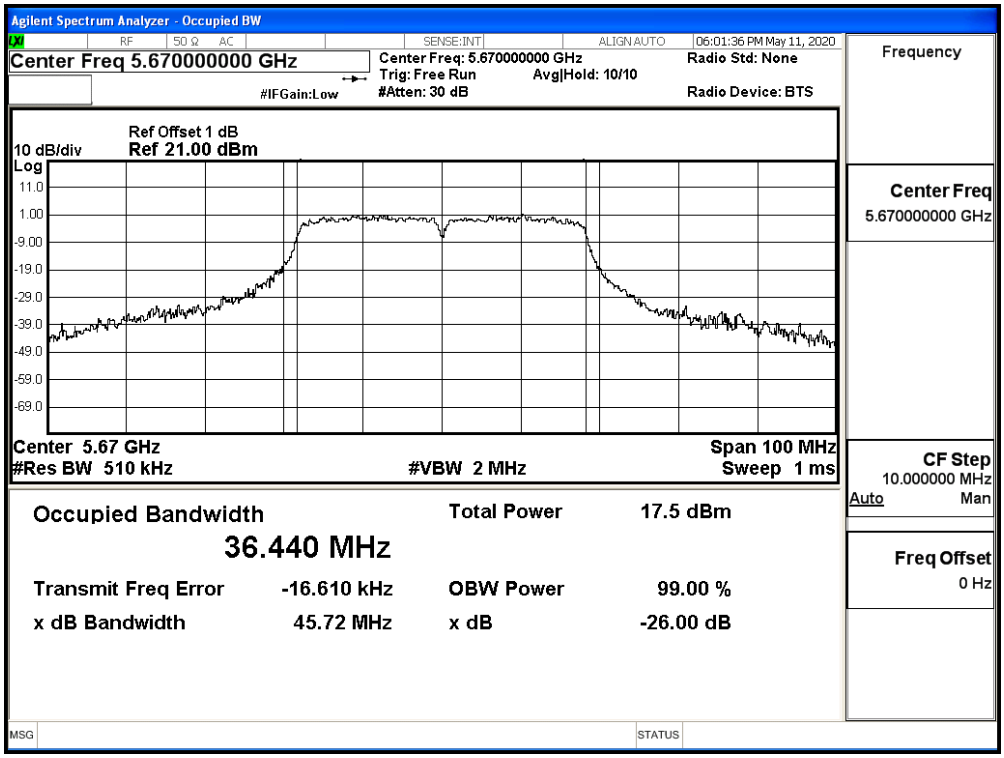
Channel 102



Channel 110

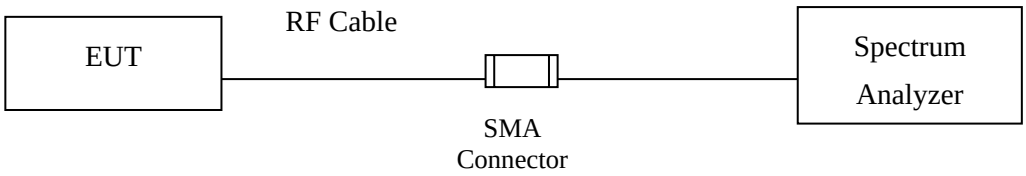


Channel 134


Agilent Spectrum Analyzer - Occupied BW
RF 50 Ω AC
SENSE:INT
ALIGN AUTO
06:01:36 PM May 11, 2020
Center Freq 5.670000000 GHz
Center Freq: 5.670000000 GHz
Trig: Free Run
Avg|Hold: 10/10
#IFGain:Low
#Atten: 30 dB
Radio Std: None
Radio Device: BTS
Frequency
Ref Offset 1 dB
10 dB/div
Ref 21.00 dBm
Log
11.0
1.00
-9.00
-19.0
-29.0
-39.0
-49.0
-59.0
-69.0
Center Freq
5.670000000 GHz
Center 5.67 GHz
#Res BW 510 kHz
#VBW 2 MHz
Span 100 MHz
Sweep 1 ms
CF Step
10.000000 MHz
Auto
Man
Occupied Bandwidth
36.440 MHz
Total Power
17.5 dBm
Freq Offset
0 Hz
Transmit Freq Error
-16.610 kHz
OBW Power
99.00 %
x dB Bandwidth
45.72 MHz
x dB
-26.00 dB
MSG
STATUS

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.

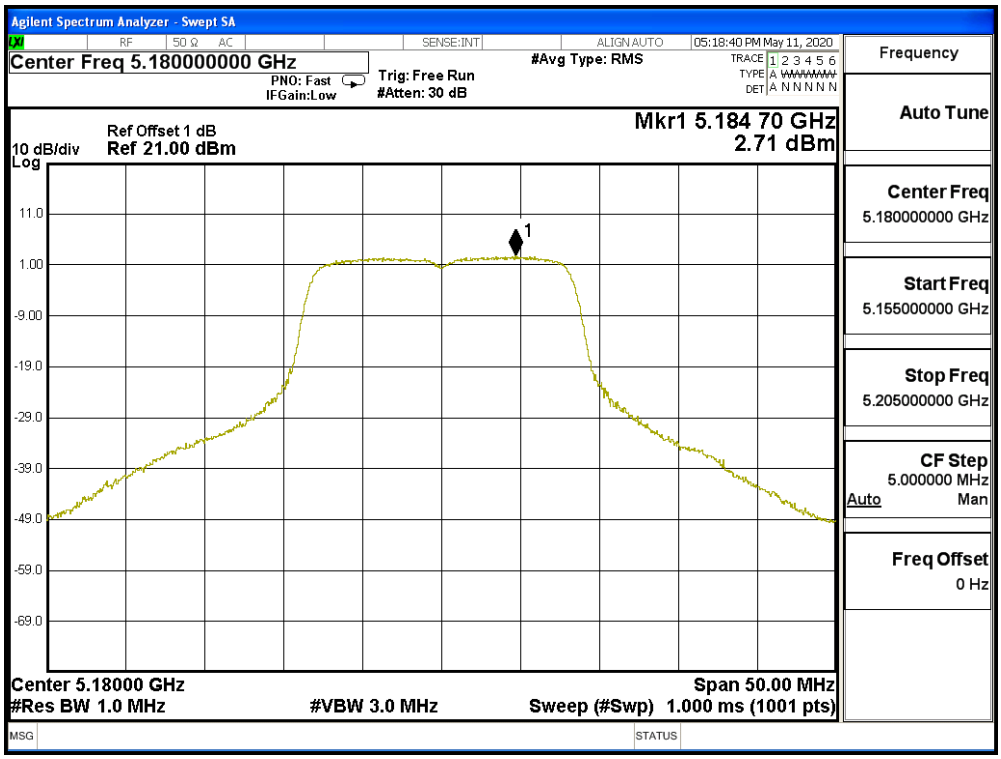
4.4. Test Result of Peak Power Spectral Density

Product : Industrial WiFi module
Test Item : Peak Power Spectral Density
Test Mode : Mode 1: Transmit (802.11a-6Mbps)
Test Date : 2020/05/11

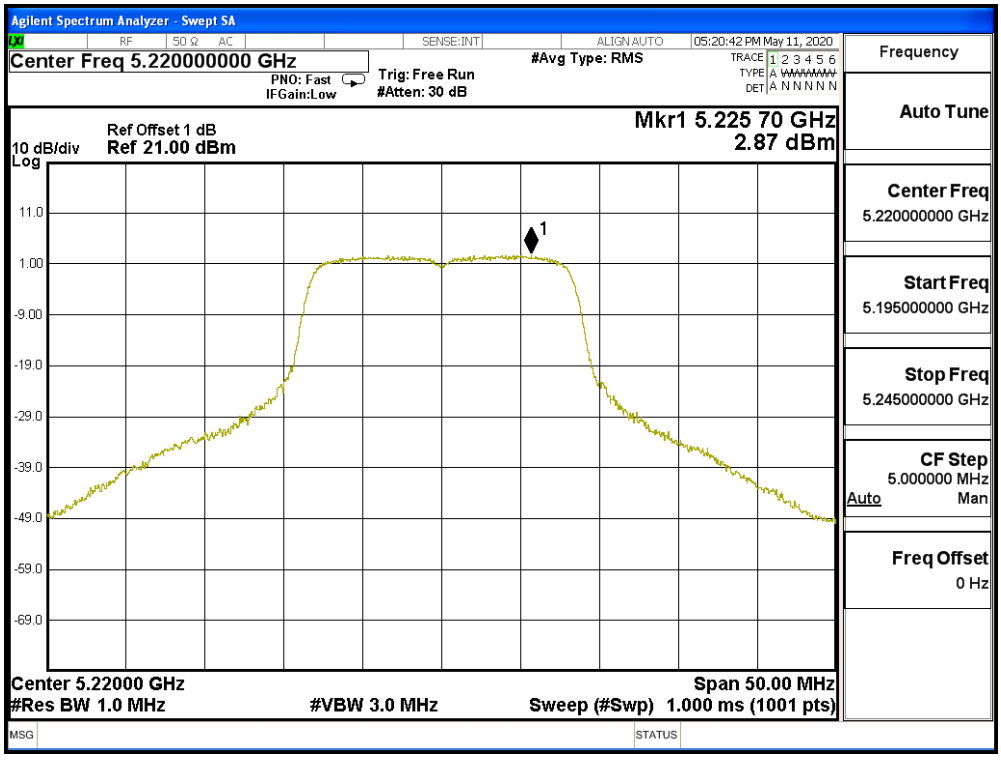
Channel Number	Frequency (MHz)	Data Rata (Mbps)	Measurement Level (dBm)	Required Limit (dBm)	Result
36	5180	6	2.710	<11	Pass
44	5220	6	2.870	<11	Pass
48	5240	6	2.570	<11	Pass
52	5260	6	3.100	<11	Pass
60	5300	6	2.700	<11	Pass
64	5320	6	1.940	<11	Pass
100	5500	6	1.300	<11	Pass
116	5580	6	0.810	<11	Pass
140	5700	6	0.780	<11	Pass

Channel Number	Frequency (MHz)	Data Rata (Mbps)	PPSD (dBm)	BWCF (dB)	Total PPSD (dBm)	Required Limit (dBm)	Result
149	5745	6	-7.990	6.980	-1.010	<30	Pass
157	5785	6	-6.760	6.980	0.220	<30	Pass
165	5825	6	-6.710	6.980	0.270	<30	Pass

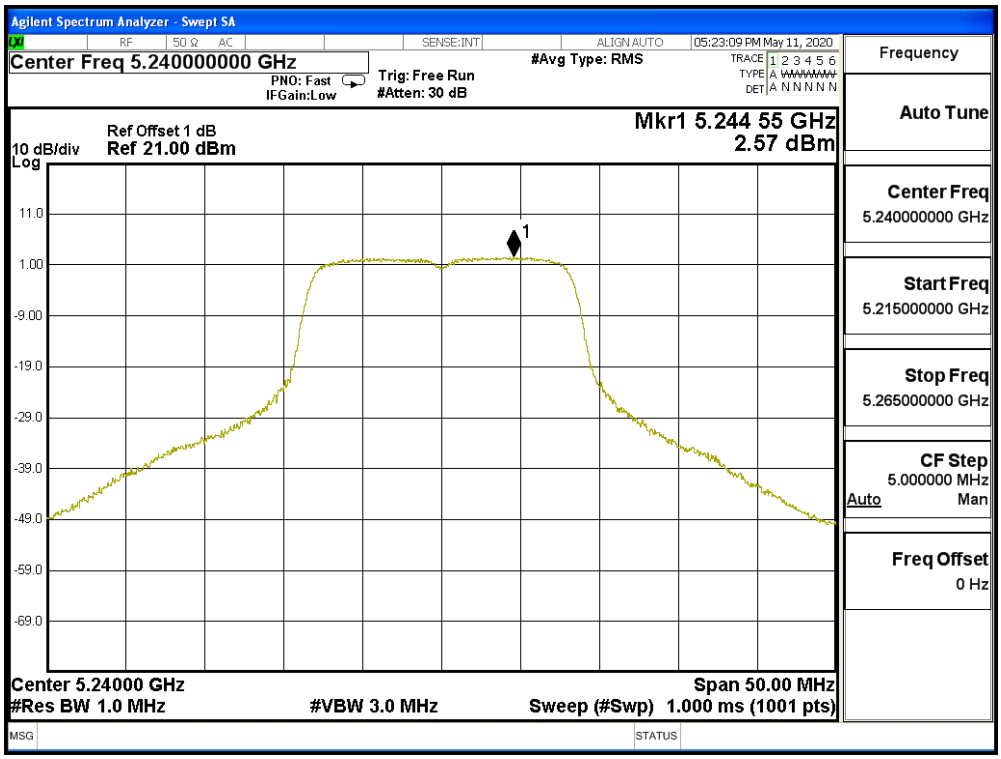
Channel 36:



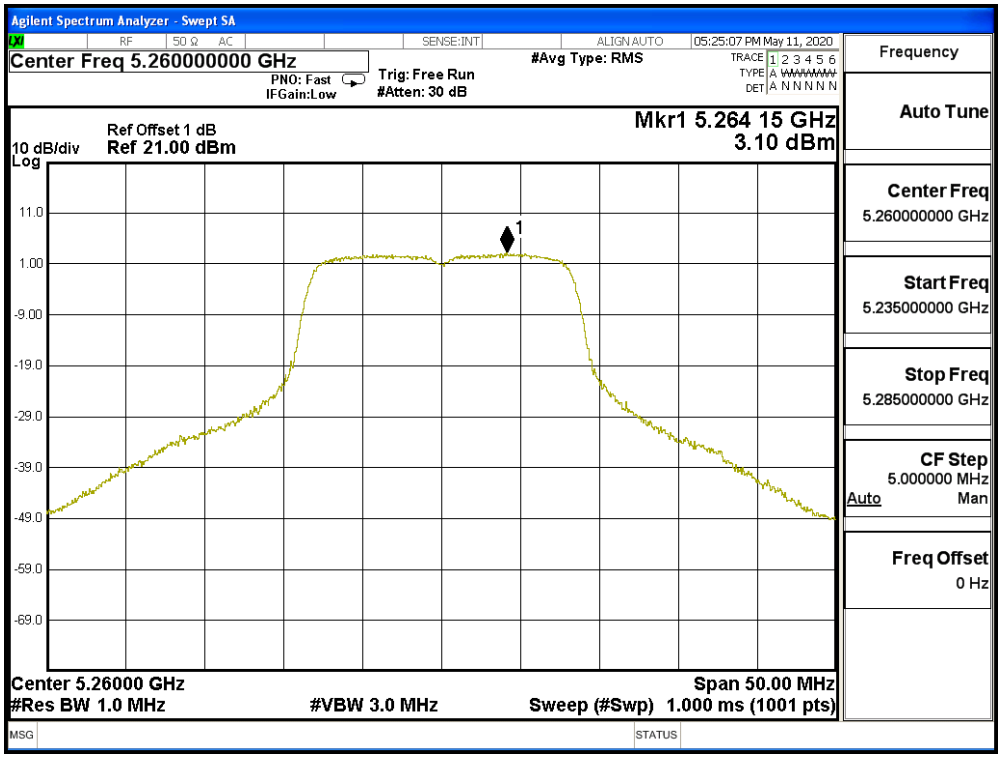
Channel 44:



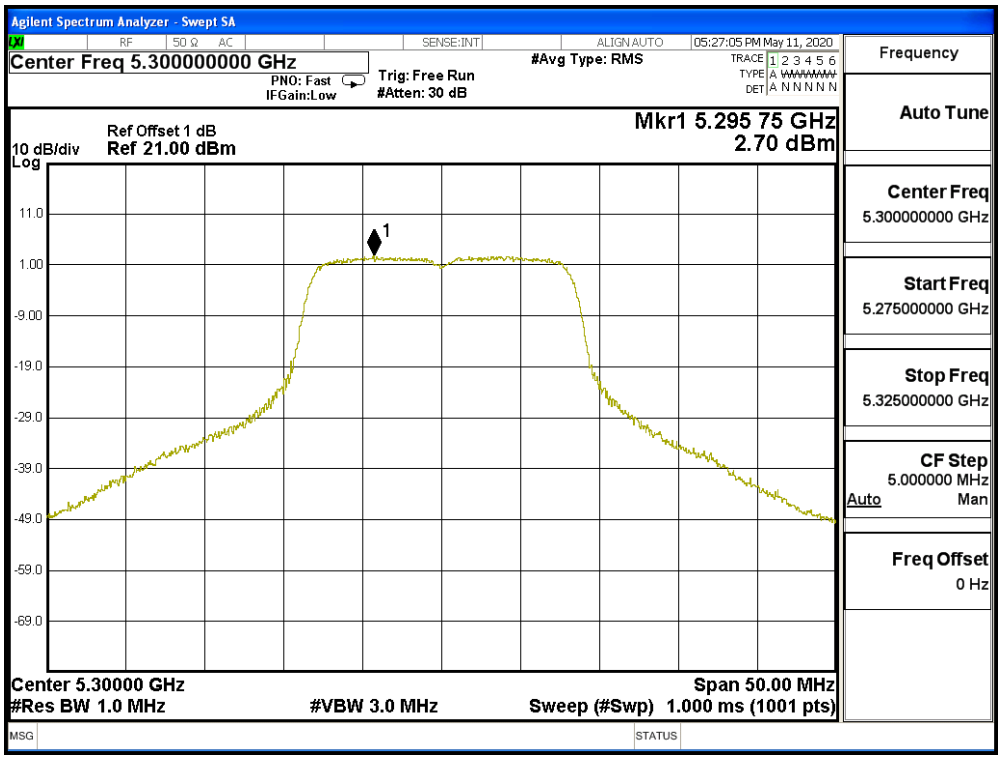
Channel 48:



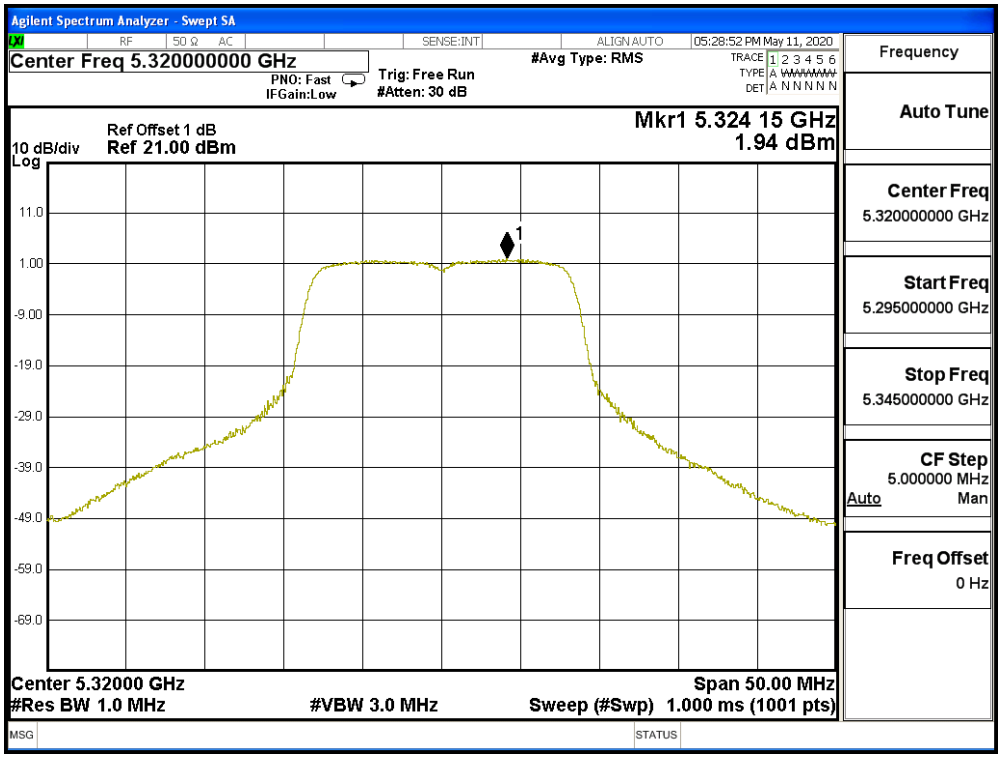
Channel 52:



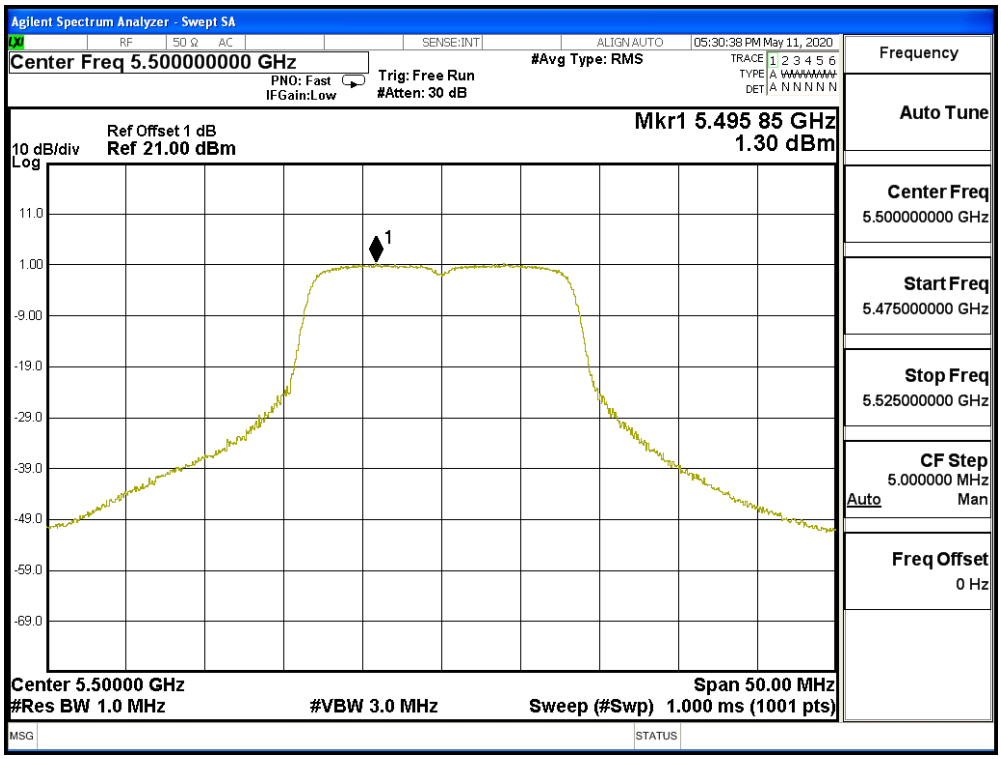
Channel 60:



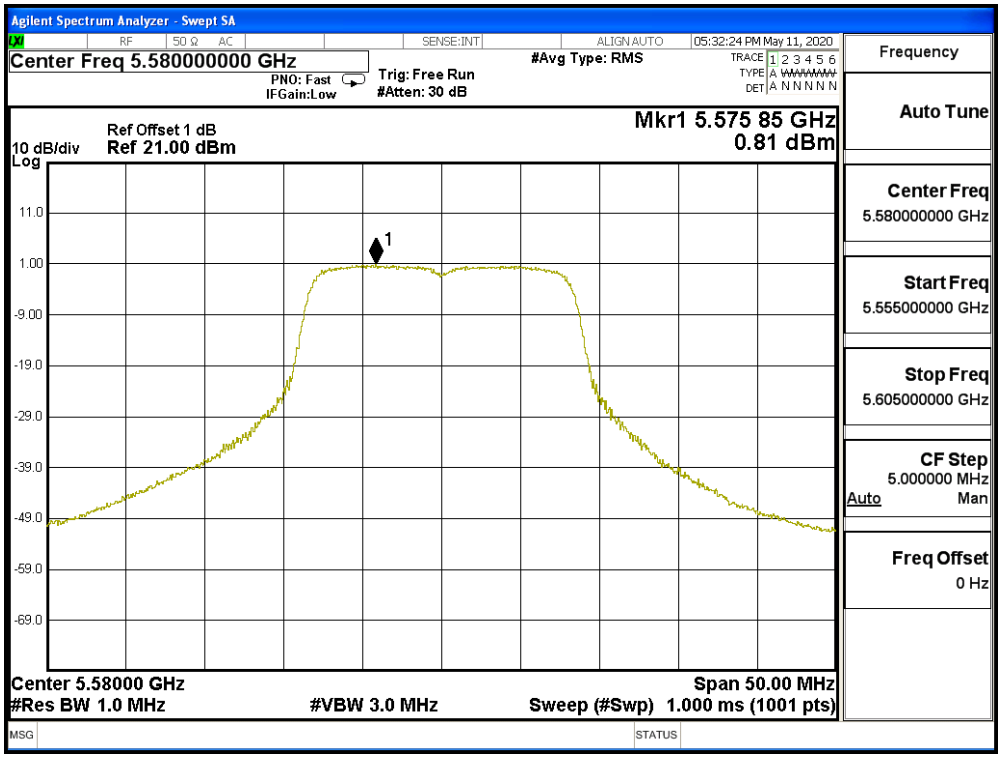
Channel 64:



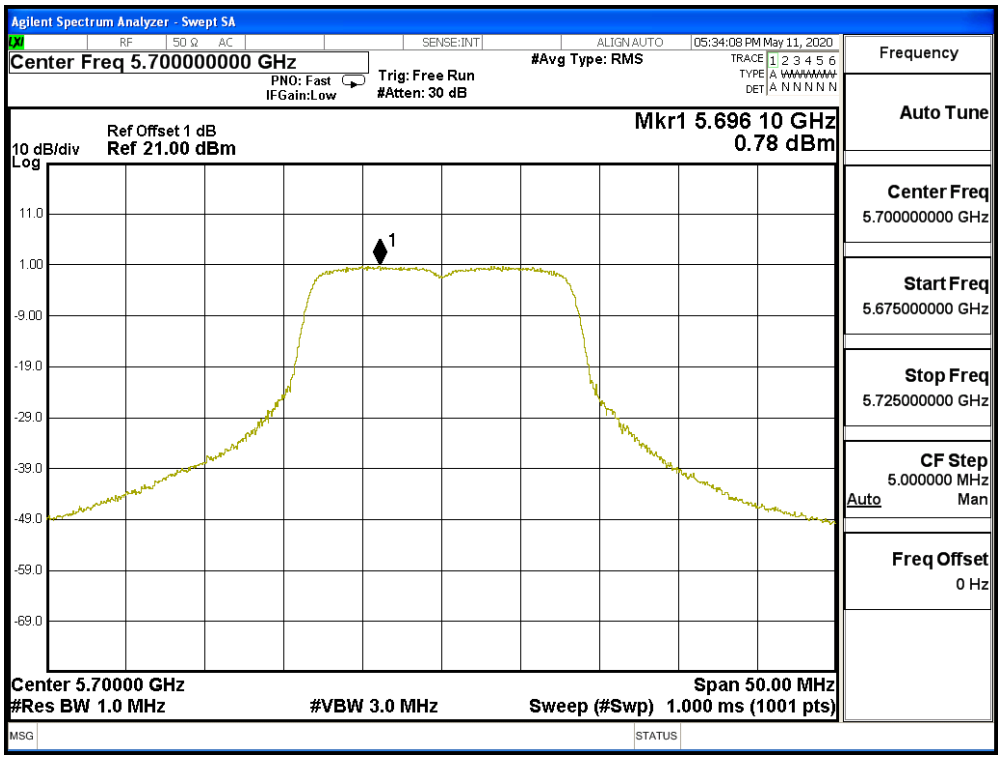
Channel 100:



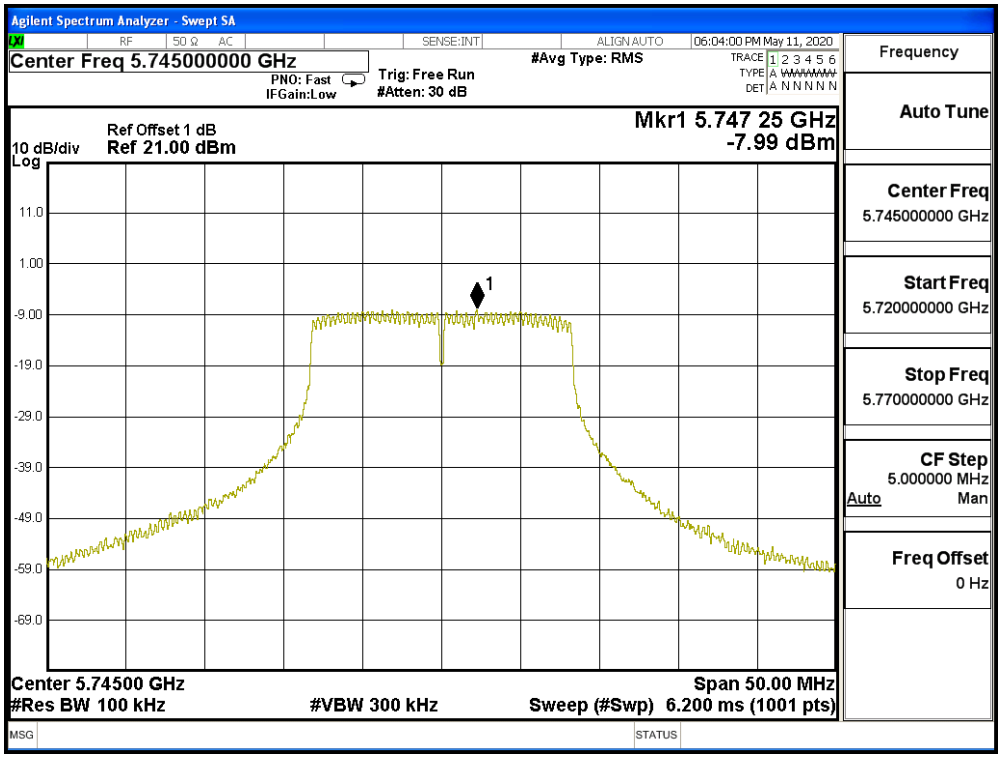
Channel 116:



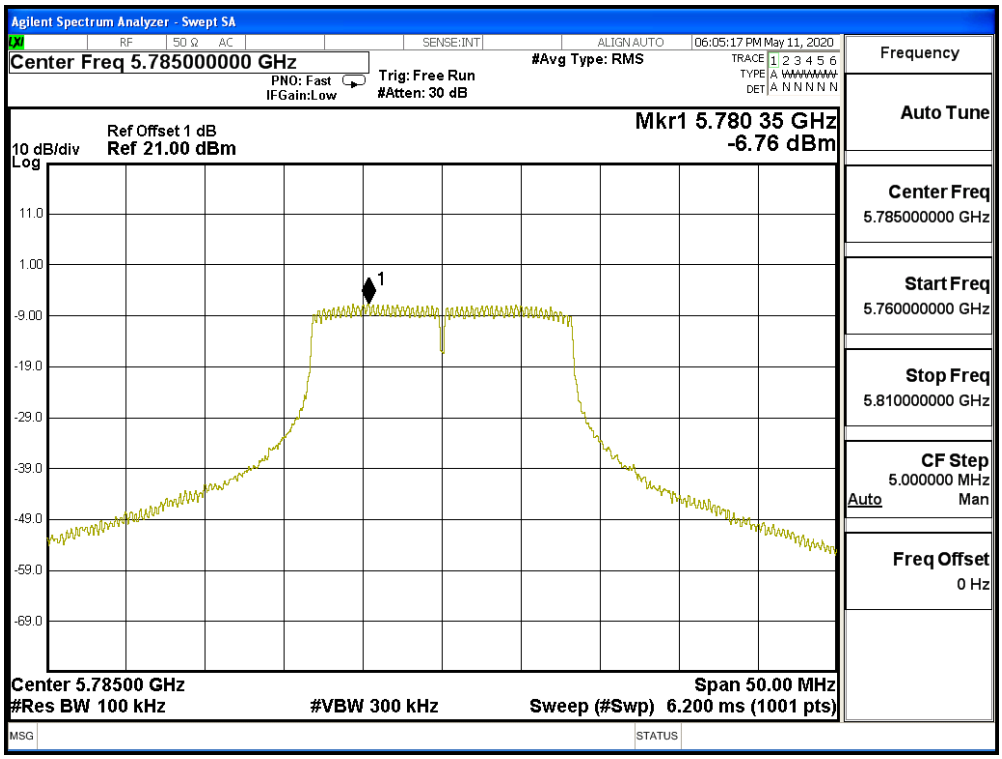
Channel 140:



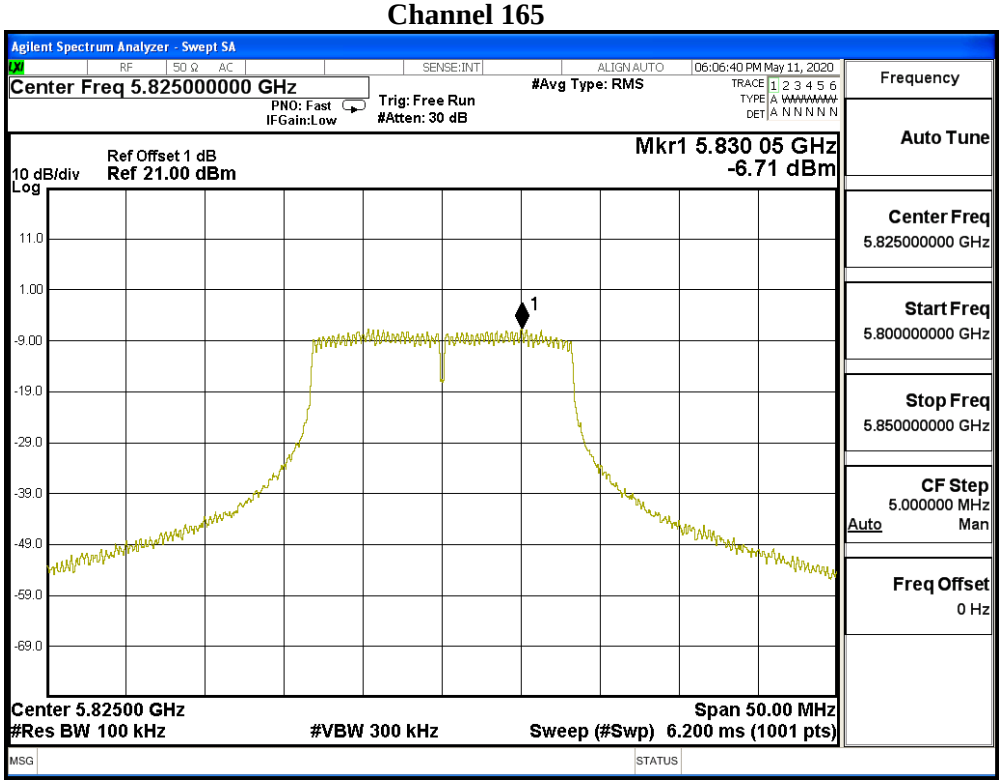
Channel 149



Channel 157



Channel 165

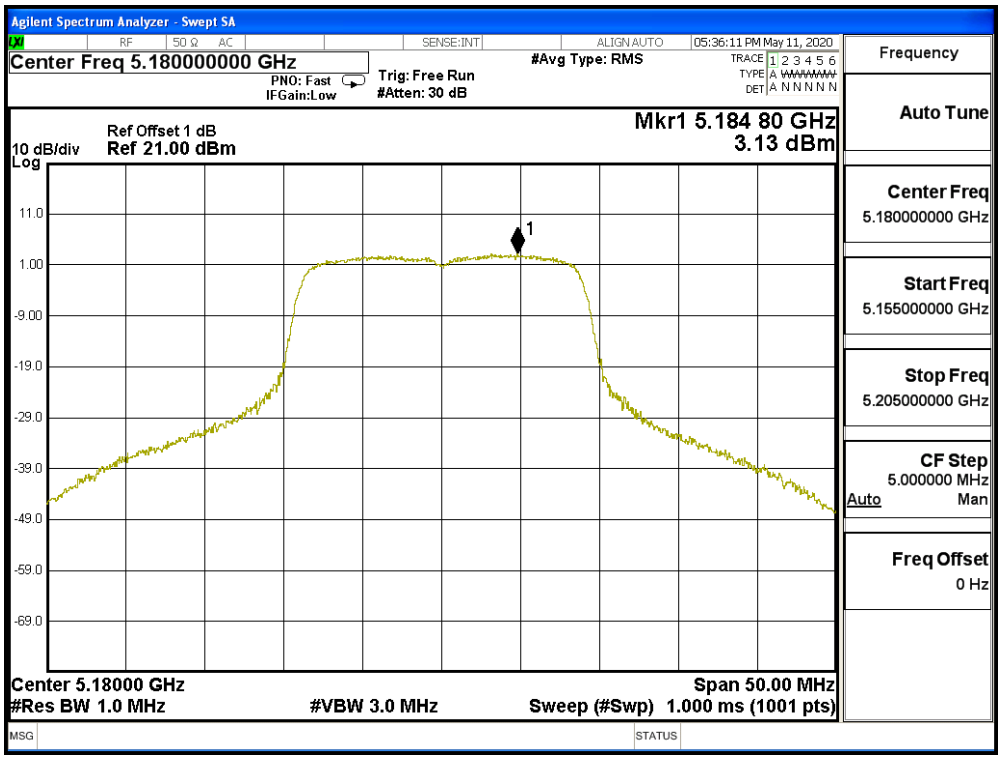


Product : Industrial WiFi module
Test Item : Peak Power Spectral Density
Test Mode : Mode 2: Transmit (802.11n-20BW 7.2Mbps)
Test Date : 2020/05/11

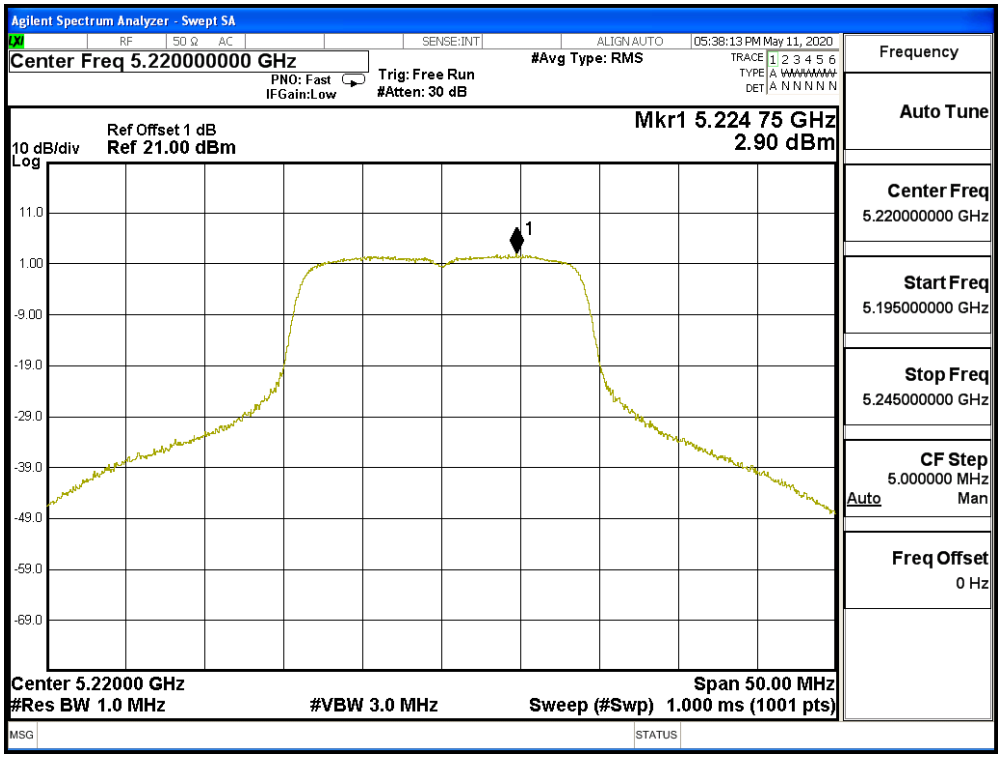
Channel Number	Frequency (MHz)	Data Rata (Mbps)	Measurement Level (dBm)	Required Limit (dBm)	Result
36	5180	7.2	3.130	11	Pass
44	5220	7.2	2.900	11	Pass
48	5240	7.2	3.340	11	Pass
52	5260	7.2	2.810	11	Pass
60	5300	7.2	3.540	11	Pass
64	5320	7.2	2.730	11	Pass
100	5500	7.2	2.200	11	Pass
116	5580	7.2	1.310	11	Pass
140	5700	7.2	-0.840	11	Pass

Channel Number	Frequency (MHz)	Data Rata (Mbps)	PPSD (dBm)	BWCF (dB)	Total PPSD (dBm)	Required Limit (dBm)	Result
149	5745	7.2	-7.140	6.980	-0.160	<30	Pass
157	5785	7.2	-7.820	6.980	-0.840	<30	Pass
165	5825	7.2	-7.200	6.980	-0.220	<30	Pass

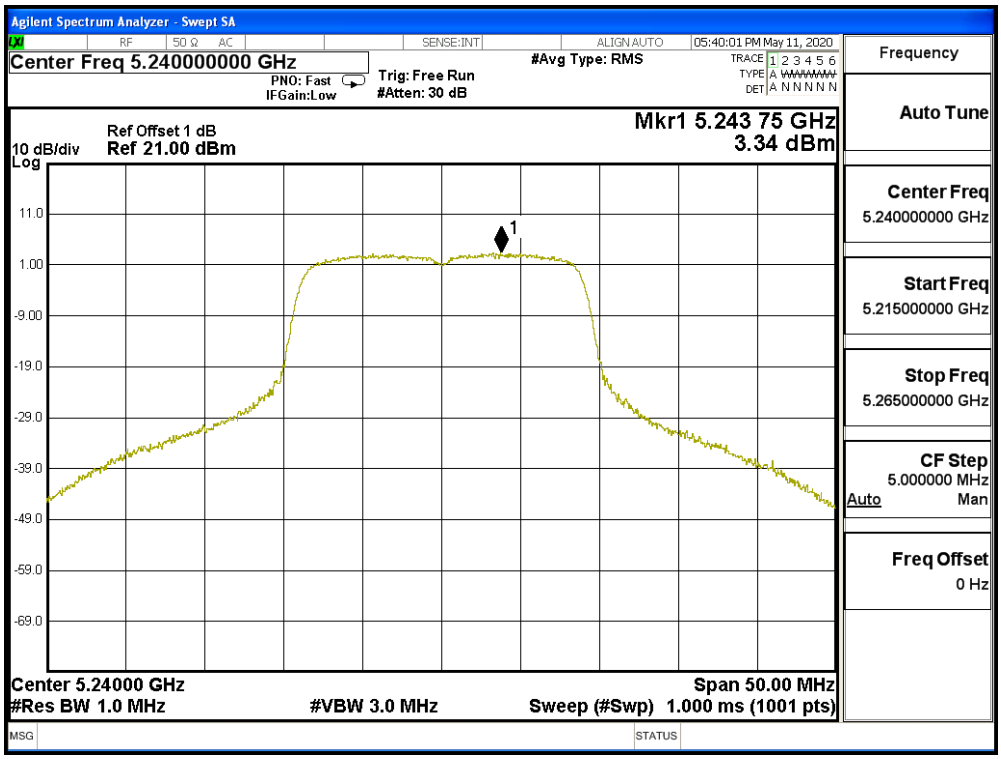
Channel 36:



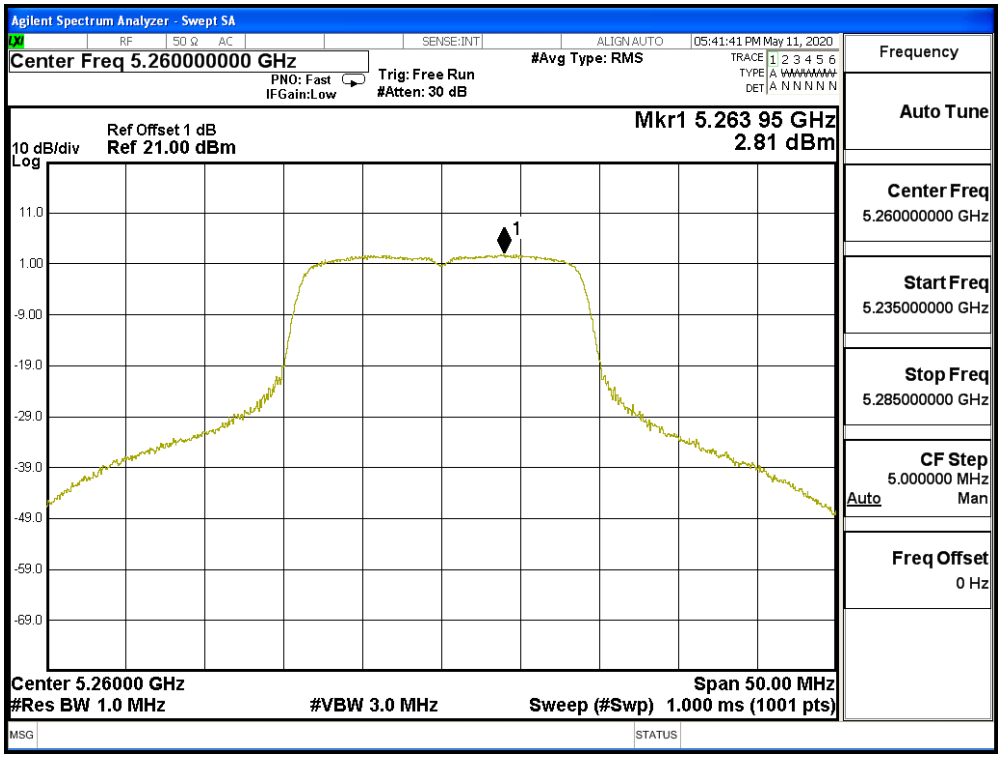
Channel 44:



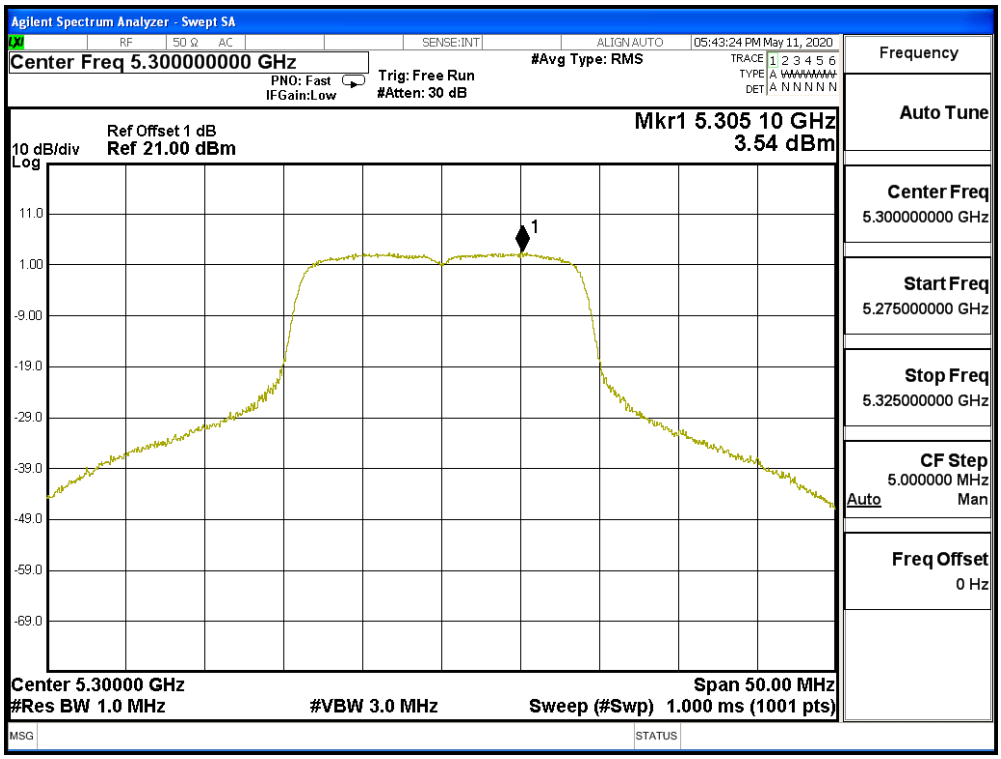
Channel 48:



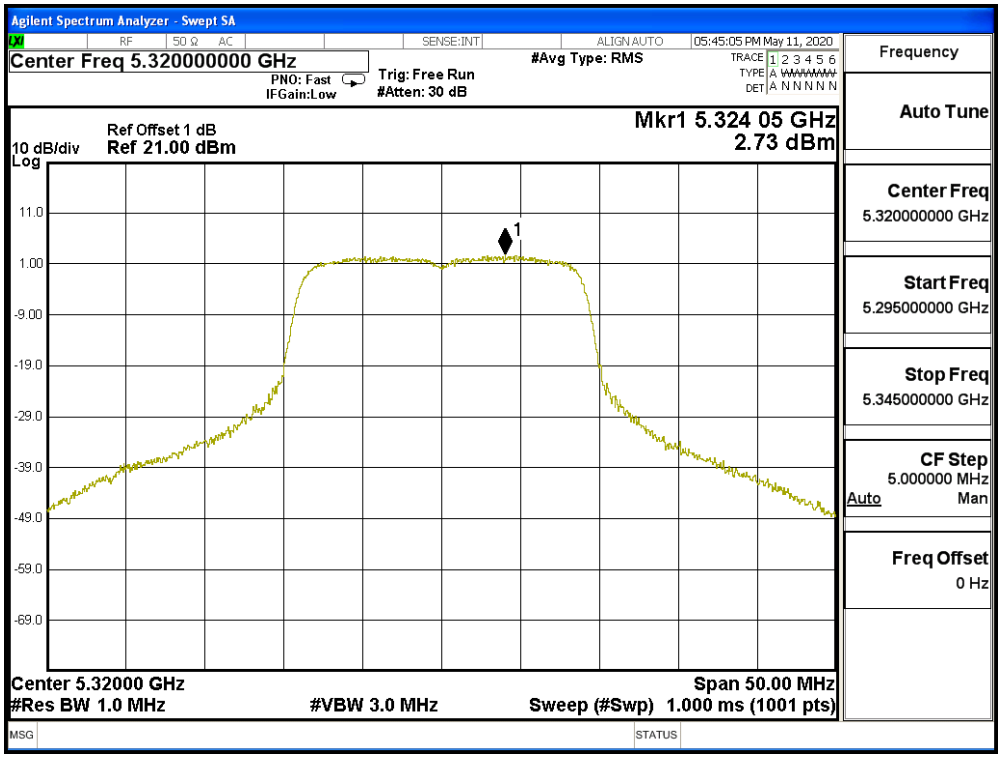
Channel 52:



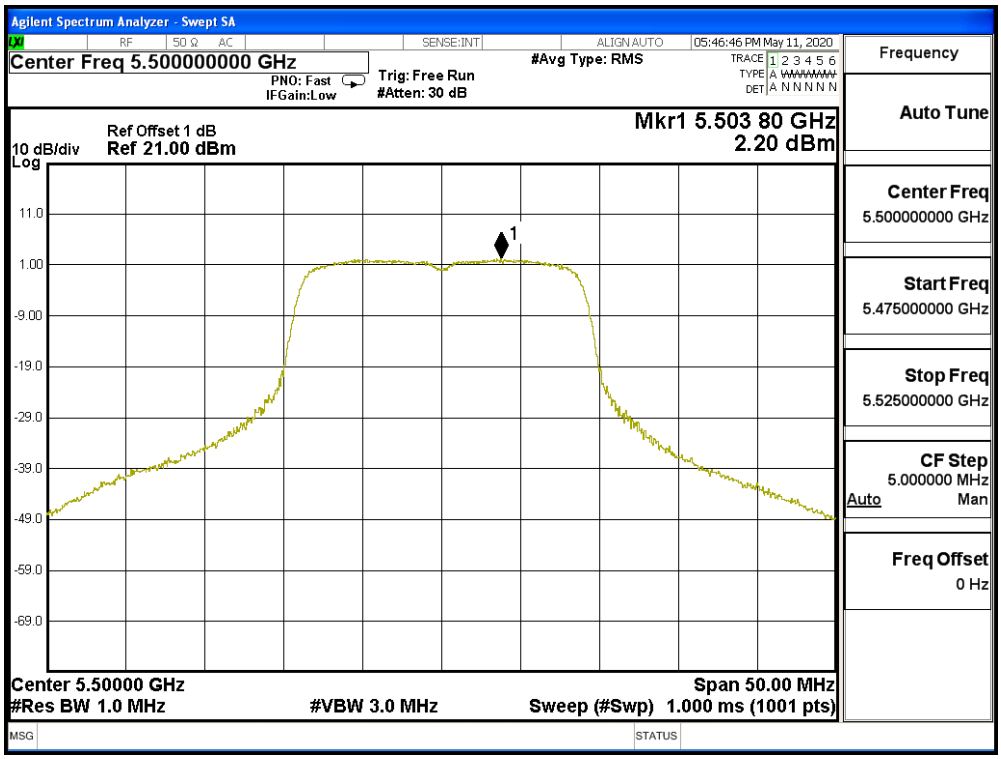
Channel 60:



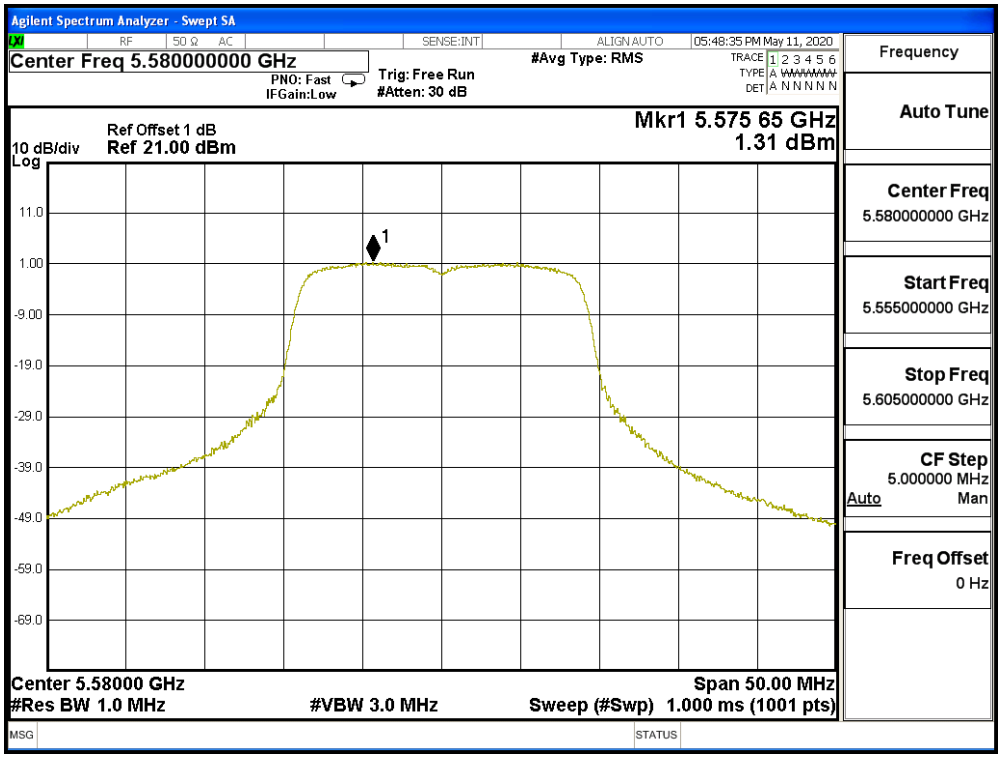
Channel 64:



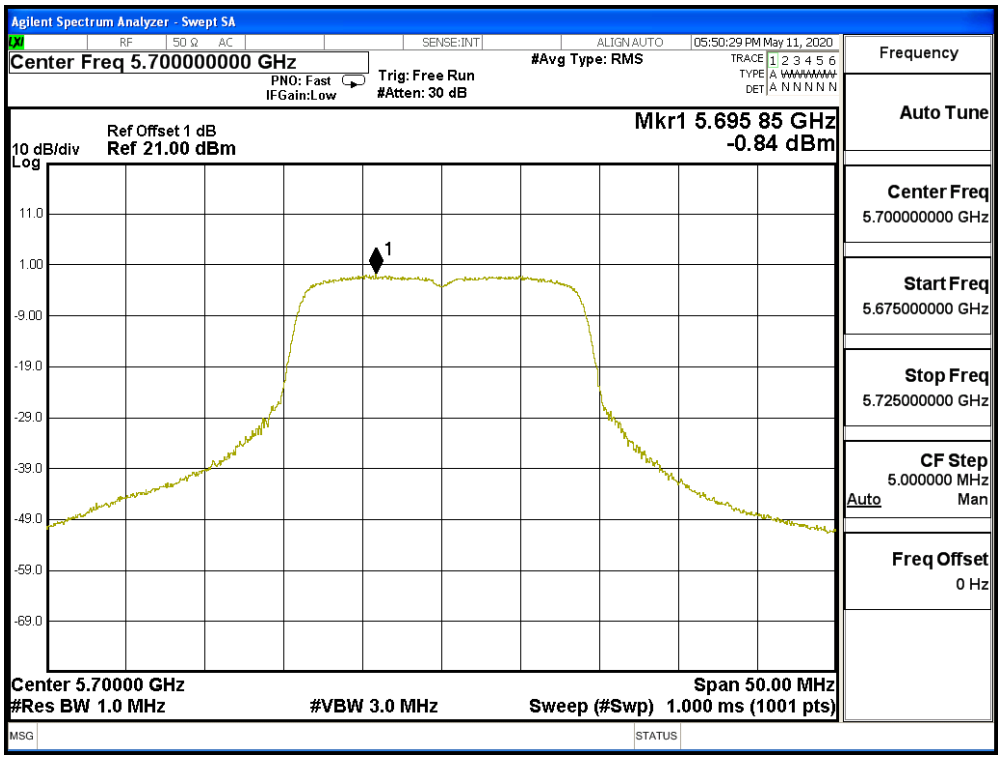
Channel 100:



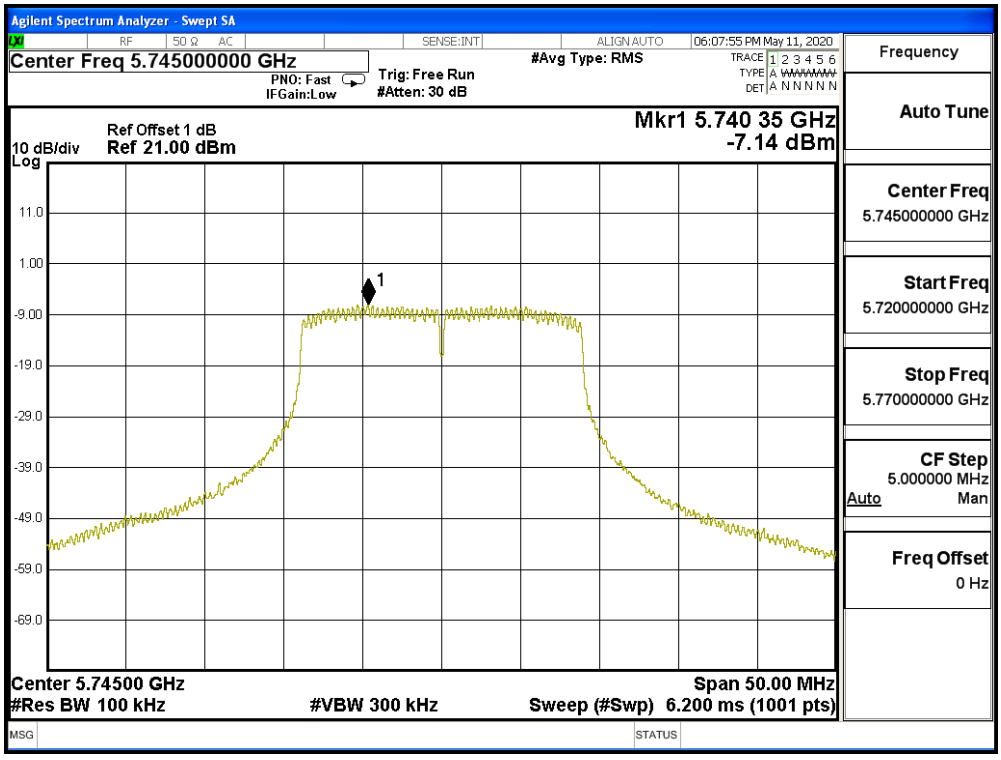
Channel 116:



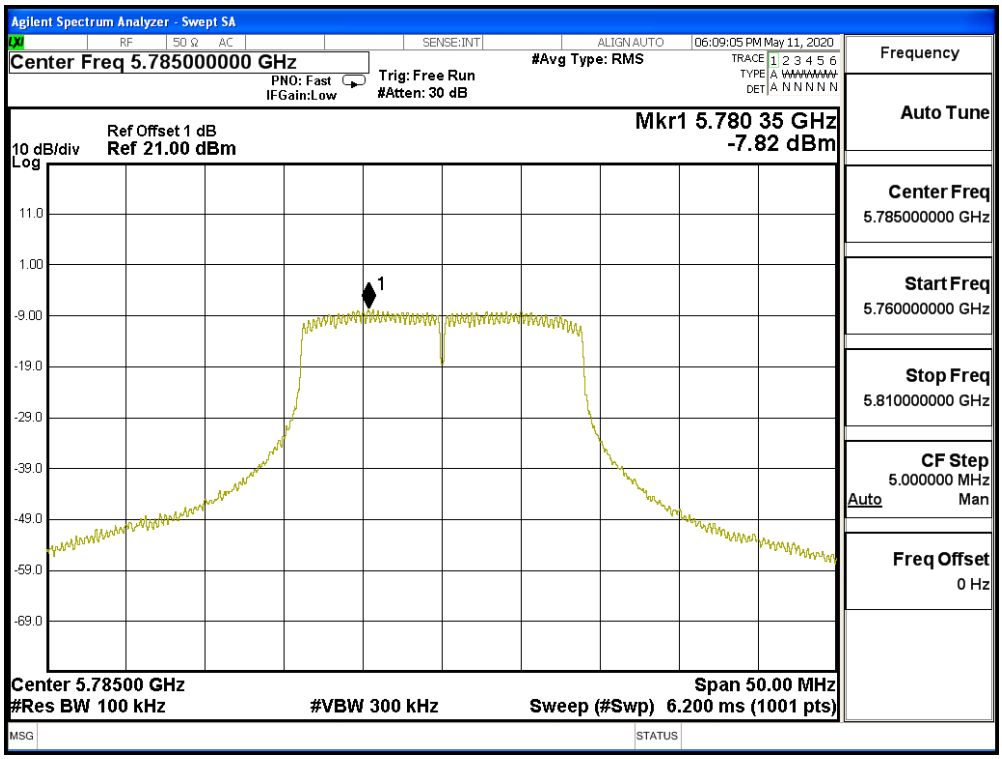
Channel 140:



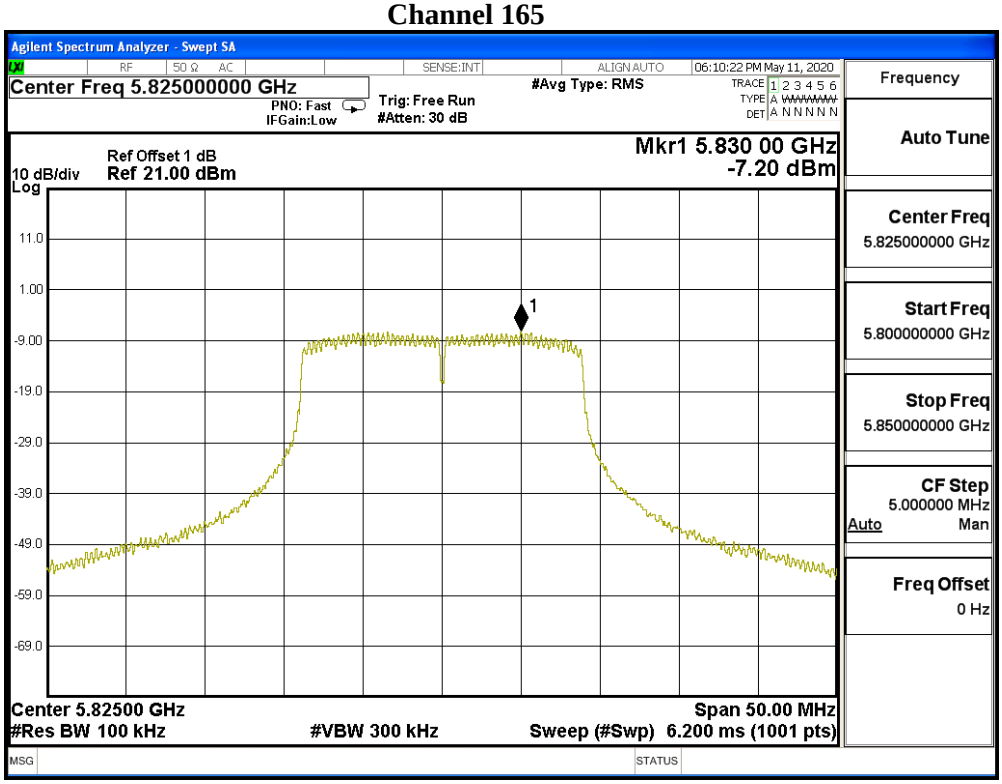
Channel 149



Channel 157



Channel 165

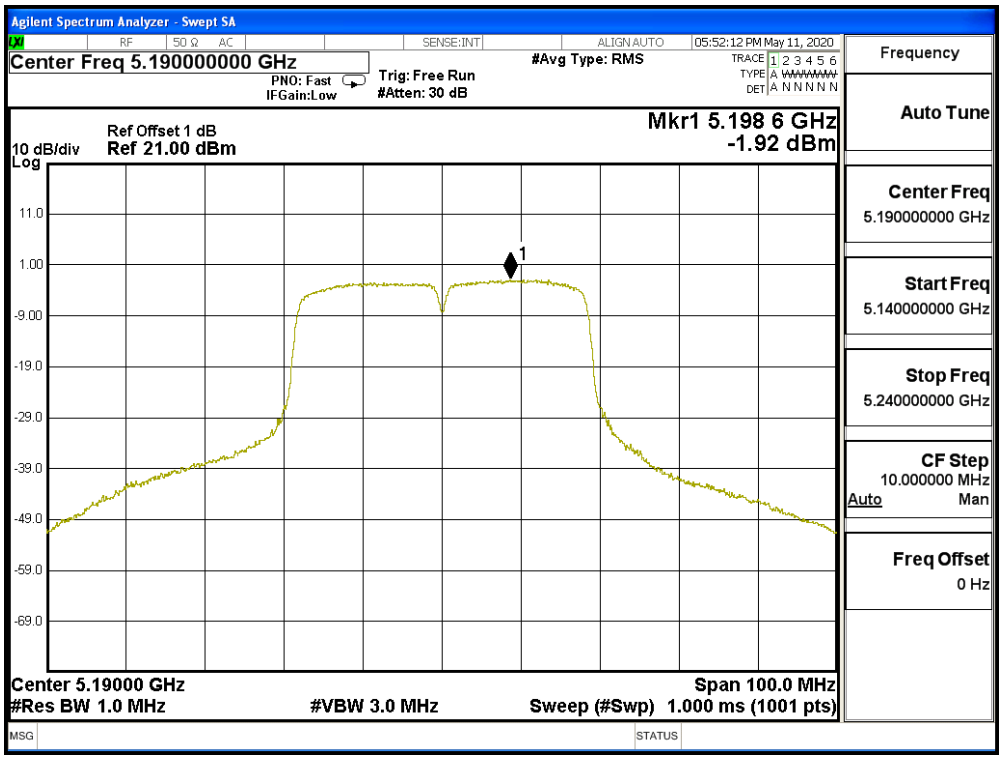


Product : Industrial WiFi module
Test Item : Peak Power Spectral Density
Test Mode : Mode 3: Transmit (802.11n-40BW 15Mbps)
Test Date : 2020/05/11

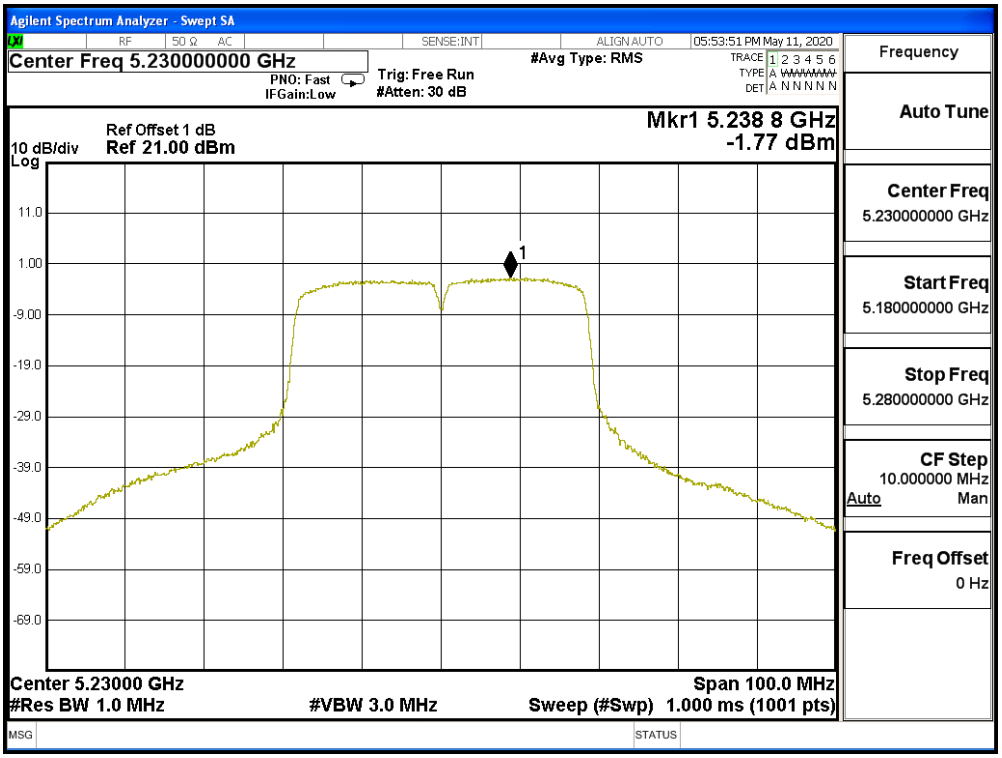
Channel Number	Frequency (MHz)	Data Rata (Mbps)	Measurement Level (dBm)	Required Limit (dBm)	Result
38	5190	15	-1.920	11	Pass
46	5230	15	-1.770	11	Pass
54	5270	15	-2.770	11	Pass
62	5310	15	-2.230	11	Pass
102	5510	15	-3.130	11	Pass
110	5550	15	-2.270	11	Pass
134	5670	15	-2.870	11	Pass

Channel Number	Frequency (MHz)	Data Rata (Mbps)	PPSD (dBm)	BWCF (dB)	Total PPSD (dBm)	Required Limit (dBm)	Result
151	5755	15	-11.010	6.980	-4.030	<30	Pass
159	5795	15	-11.800	6.980	-4.820	<30	Pass

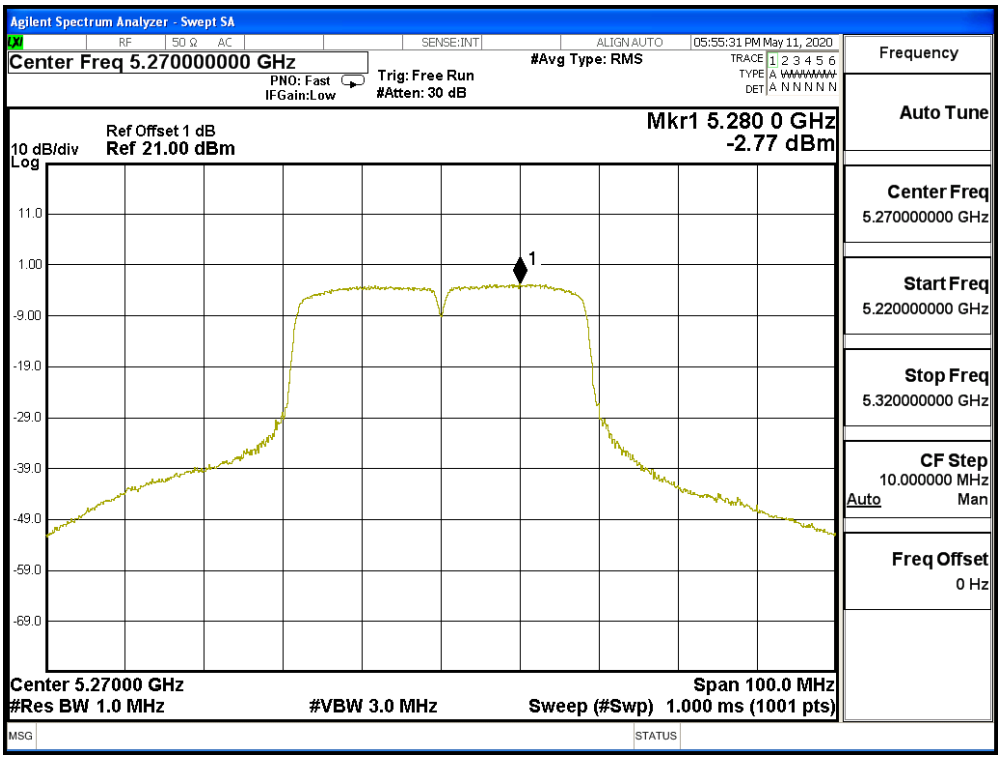
Channel 38



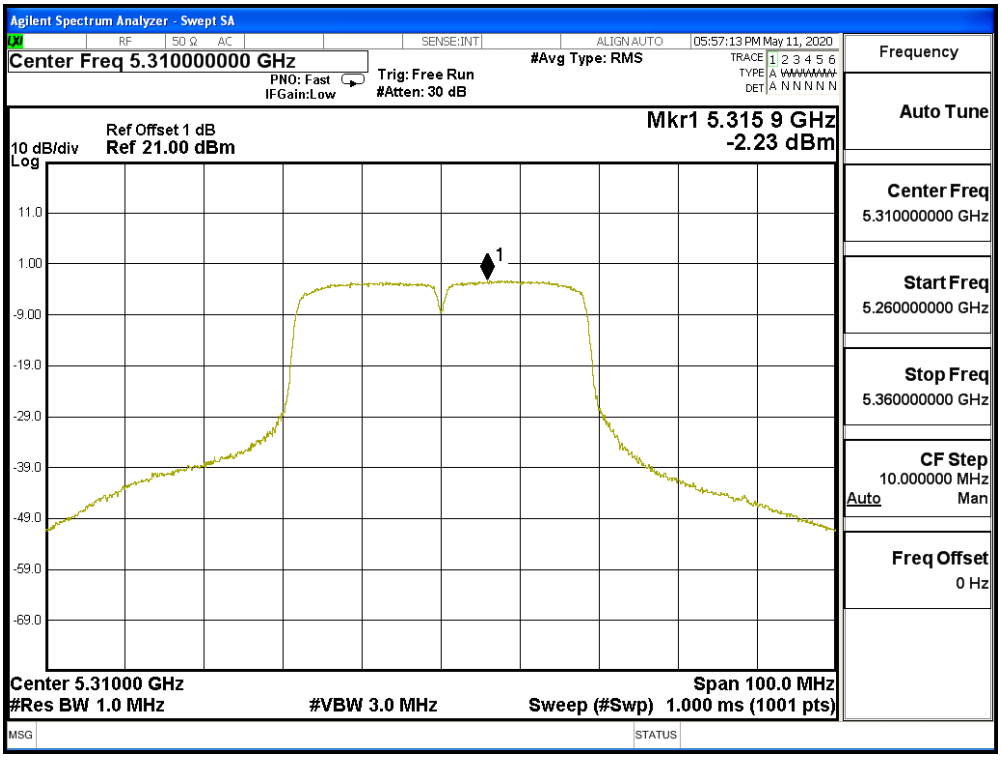
Channel 46



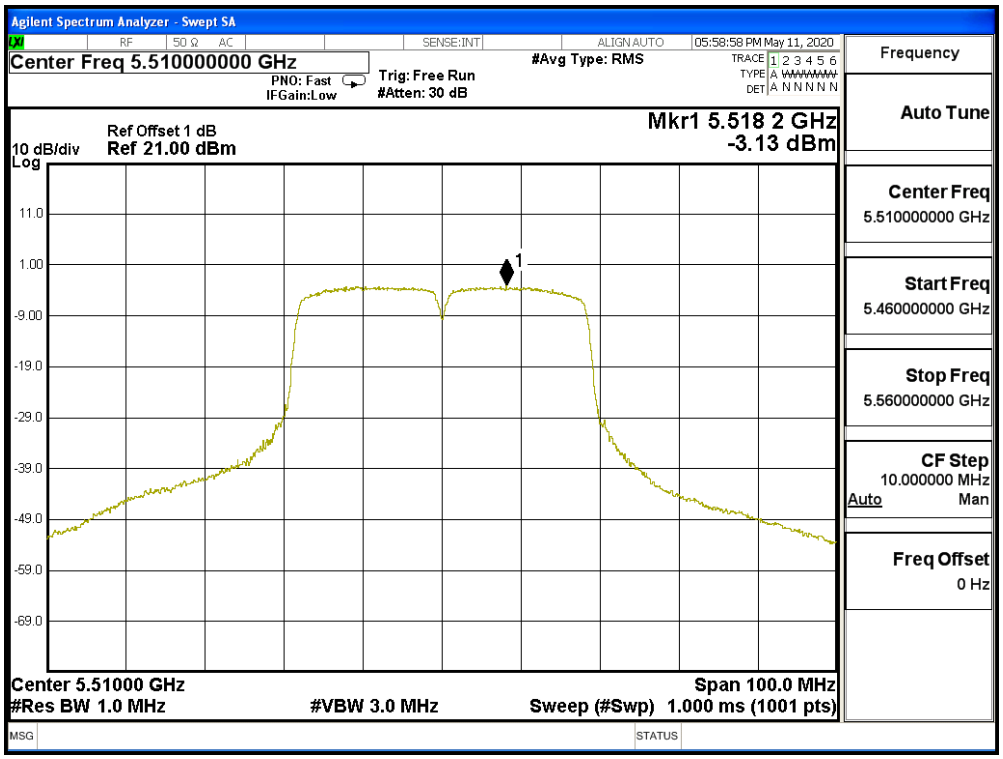
Channel 54



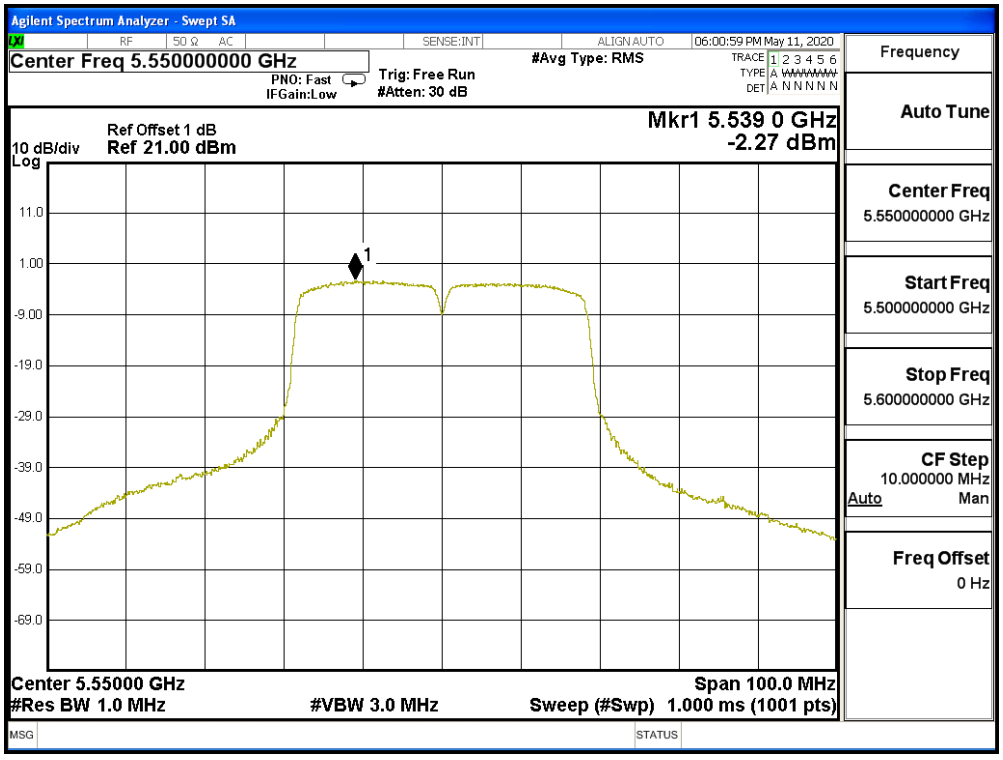
Channel 62



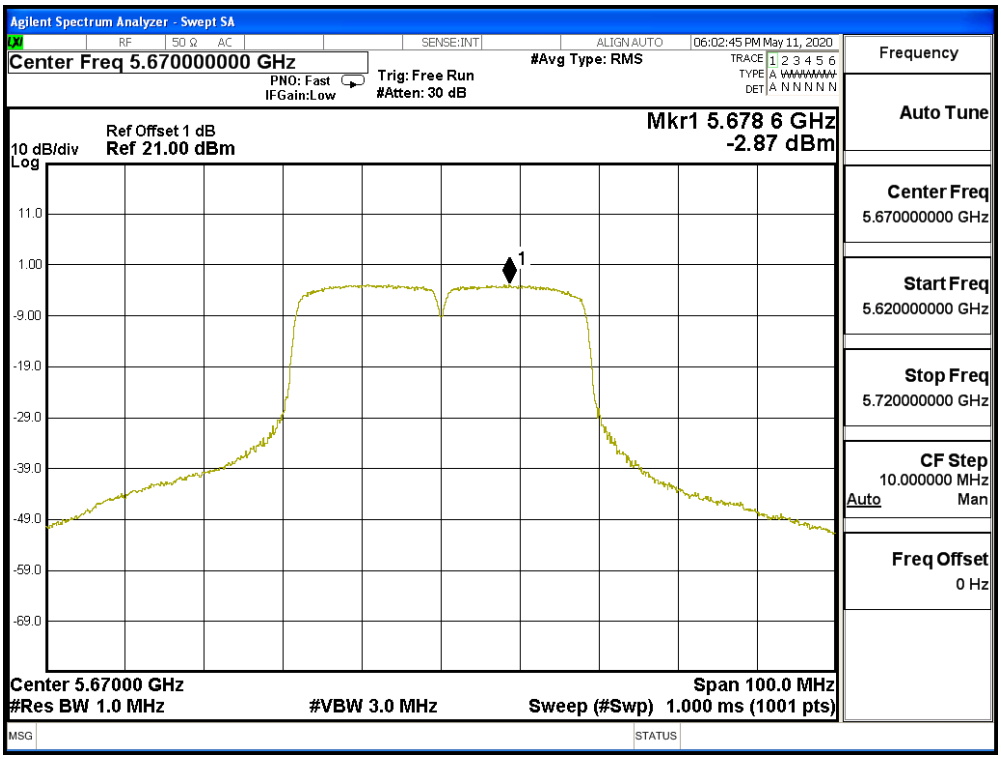
Channel 102



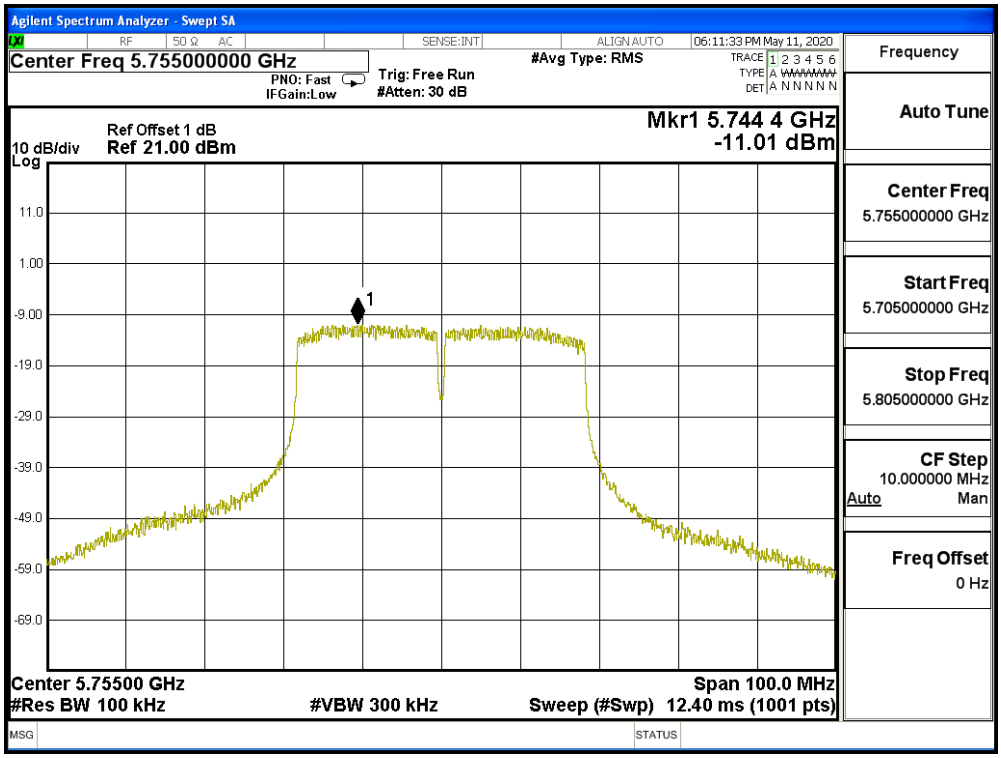
Channel 110



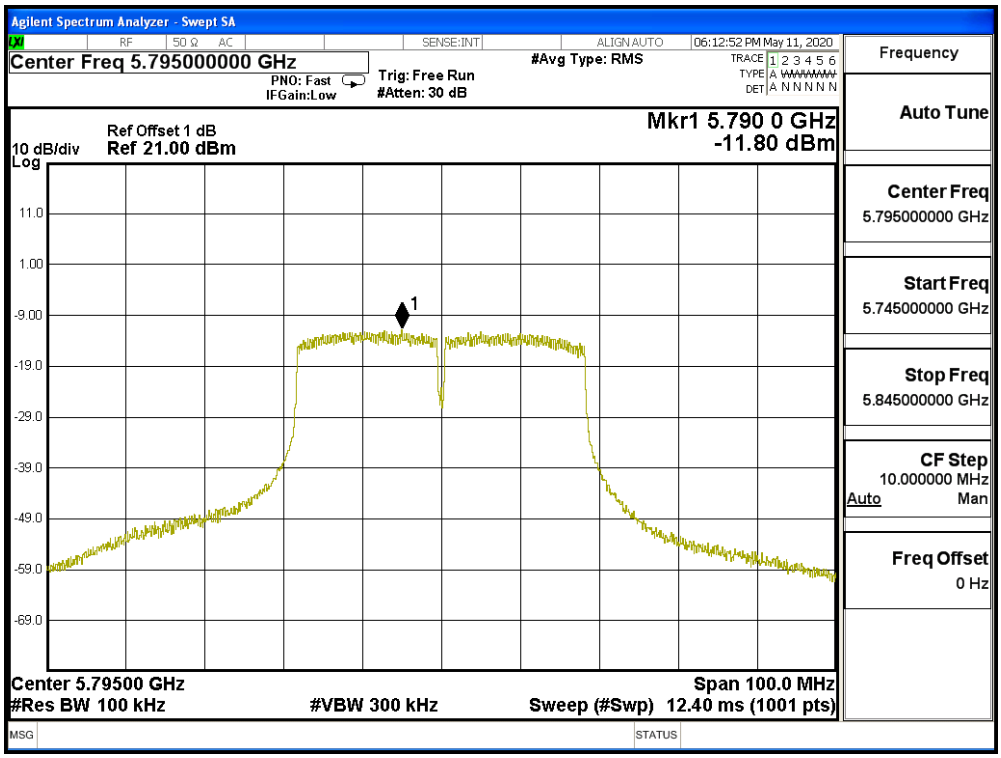
Channel 134



Channel 151



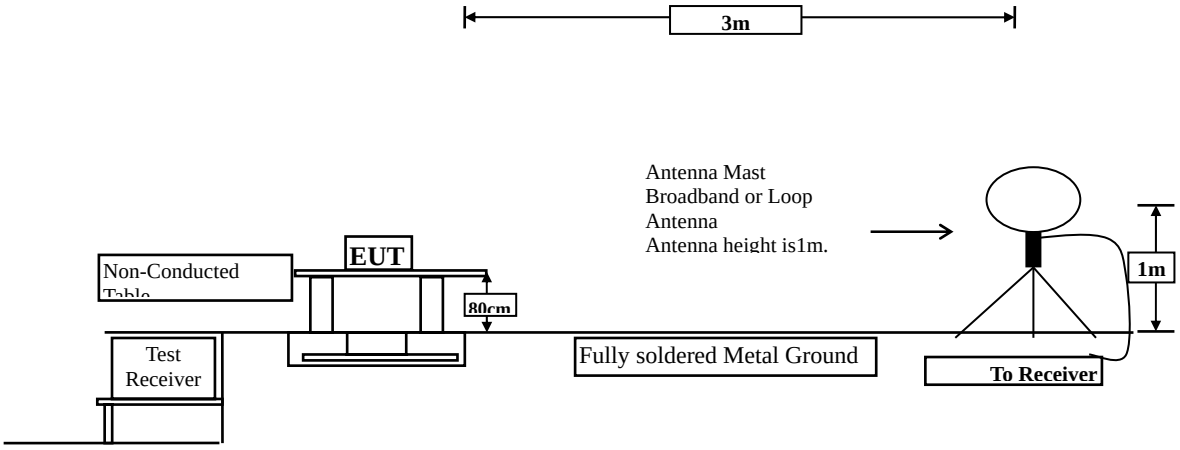
Channel 159


Agilent Spectrum Analyzer - Swept SA
RF
50 Ω AC
SENSE:INT
ALIGN AUTO
06:12:52 PM May 11, 2020
Center Freq 5.795000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
#Avg Type: RMS
TRACE 1 2 3 4 5 6
TYPE A WWWWW
DET A N N N N N
Ref Offset 1 dB
10 dB/div
Log
Ref 21.00 dBm
Mkr1 5.790 0 GHz
-11.80 dBm
11.0
1.00
-9.00
-19.0
-29.0
-39.0
-49.0
-59.0
-69.0
Center 5.79500 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 100.0 MHz
Sweep (#Swp) 12.40 ms (1001 pts)
MSG
STATUS
Frequency
Auto Tune
Center Freq
5.795000000 GHz
Start Freq
5.745000000 GHz
Stop Freq
5.845000000 GHz
CF Step
10.000000 MHz
Auto
Man
Freq Offset
0 Hz

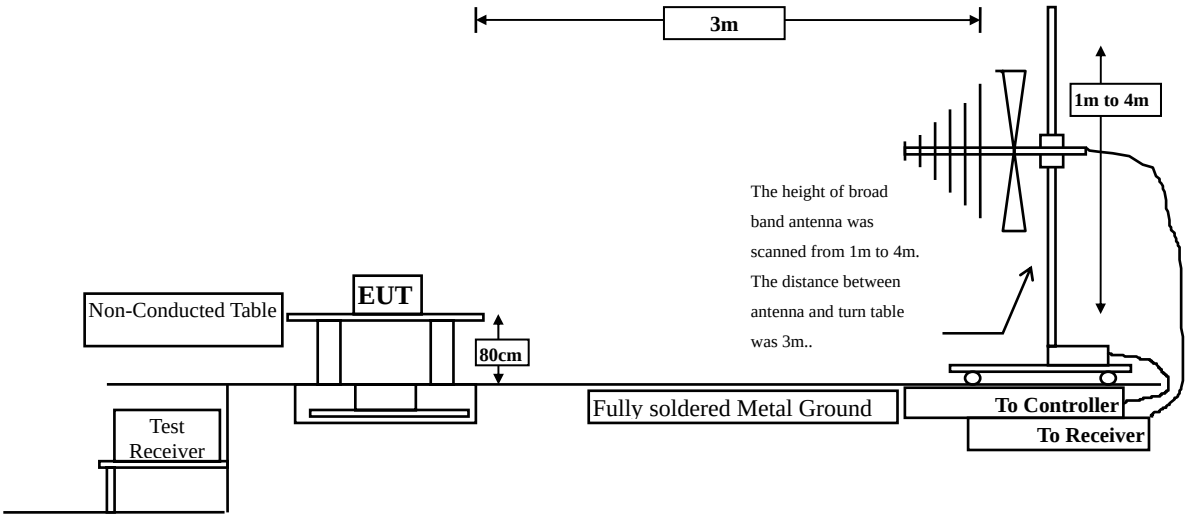
5. Radiated Emission

5.1. Test Setup

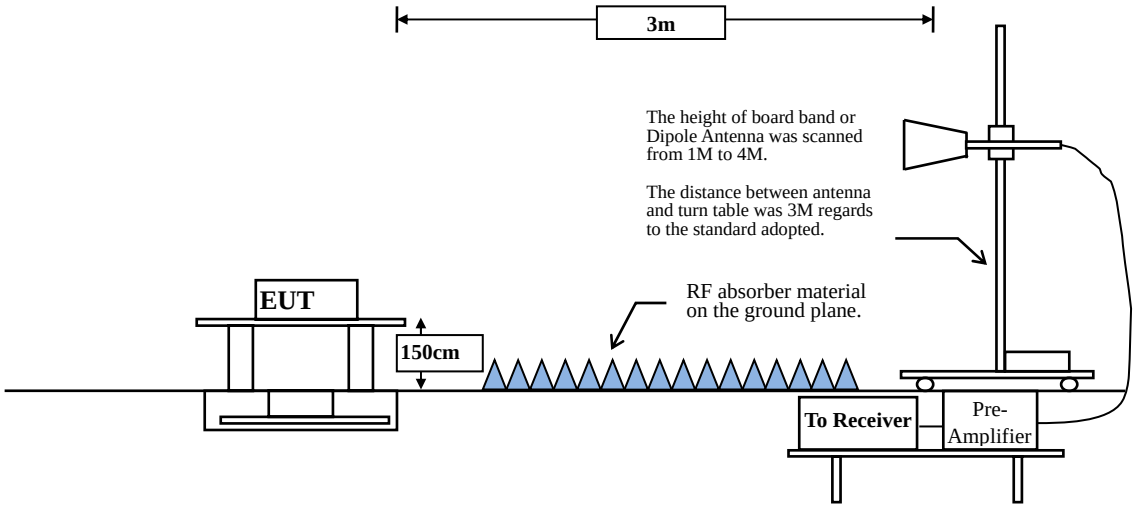
Radiated Emission Under 30MHz



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.)

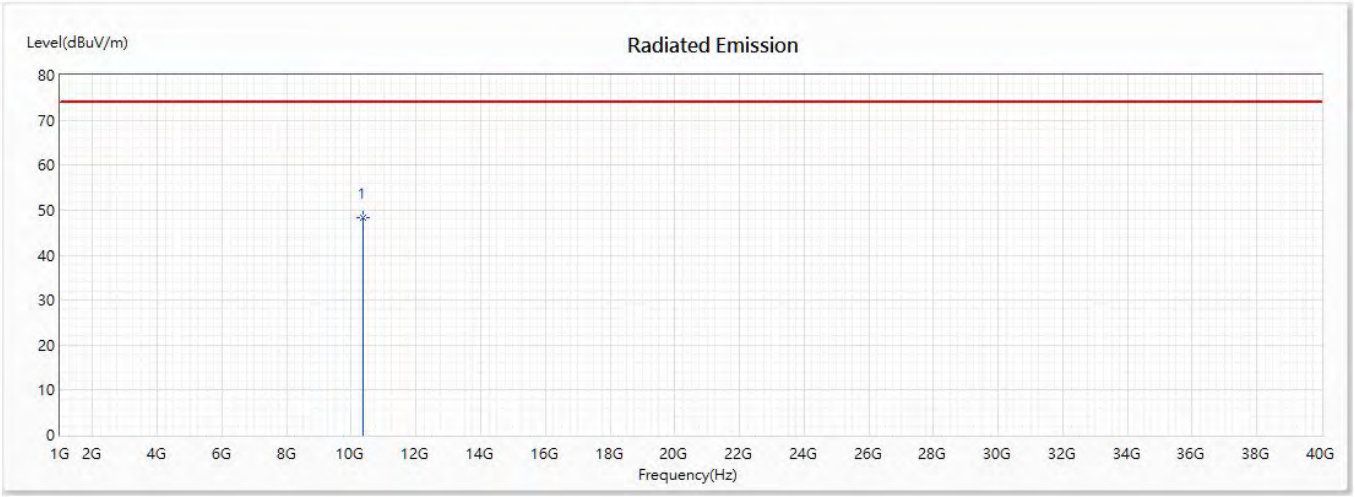
2.4GHz band	Duty Cycle (%)	T (ms)	1/T (Hz)	VBW (Hz)
802.11a	96.55	2.0290	493	500
802.11n20	97.78	1.9130	523	1000
802.11n40	93.35	0.9130	1095	2000

Note: Duty Cycle Refer to Section 8

5.4. Test Result of Radiated Emission

Product : Industrial WiFi module
Test Item : Harmonic Radiated Emission Data
Test Mode : Mode 1: Transmit (802.11a-6Mbps) (5180MHz)
Test Date : 2020/05/19

Horizontal



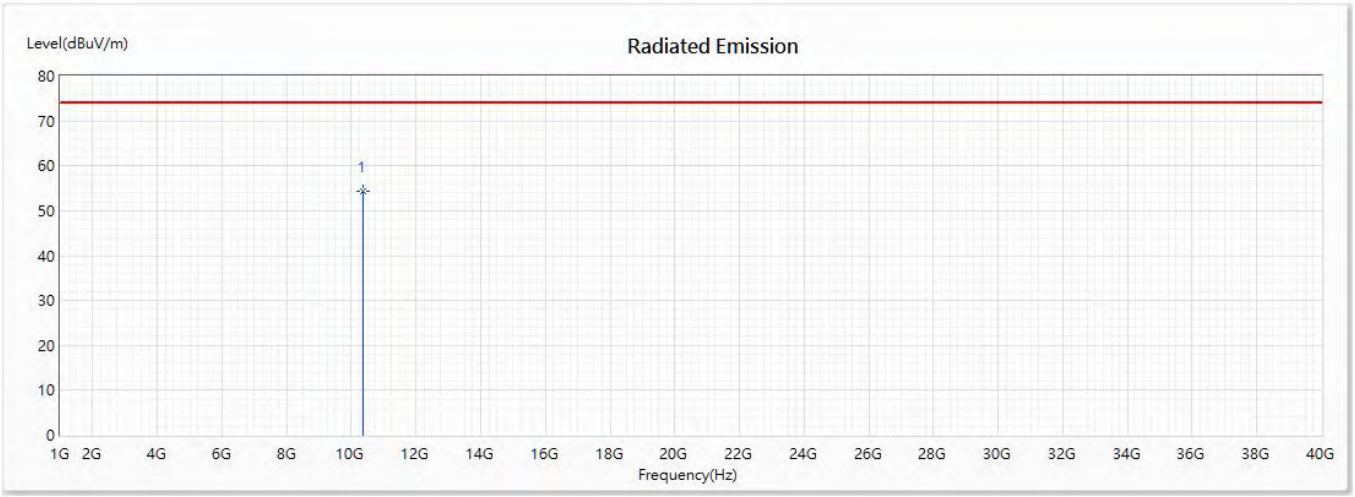
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
* 1	10360	48.21	74.00	-25.79	59.79	-11.58	PK

Note:

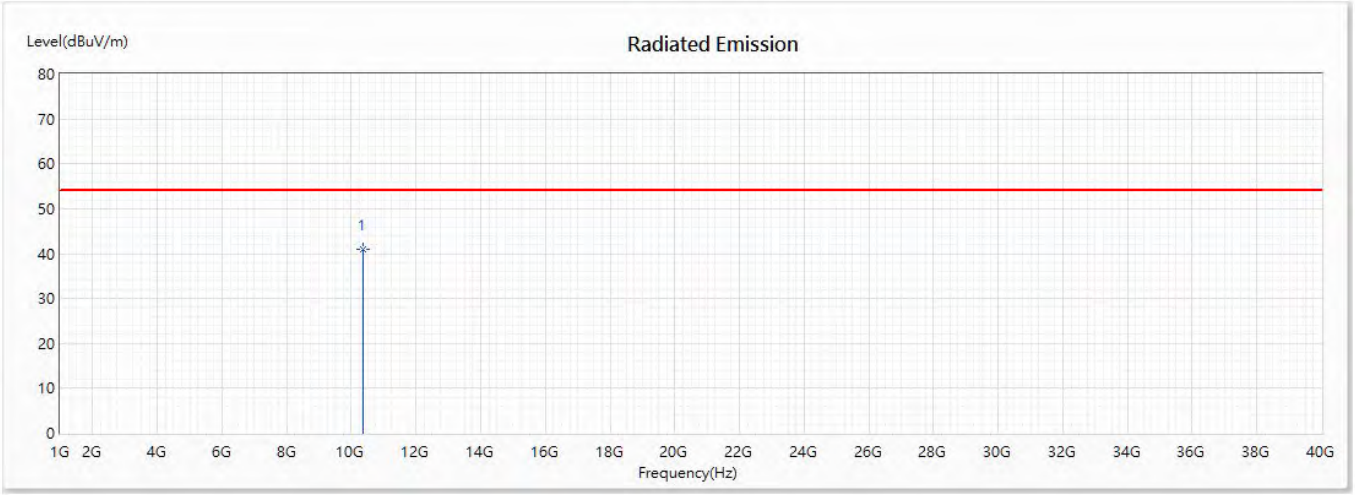
1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The average measurement was not performed when the peak measured 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 : Industrial WiFi module
Test Item : Harmonic Radiated Emission Data
Test Mode : Mode 1: Transmit (802.11a-6Mbps) (5180MHz)
Test Date : 2020/05/19

Vertical



No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
* 1	10360	54.28	74.00	-19.72	65.86	-11.58	PK



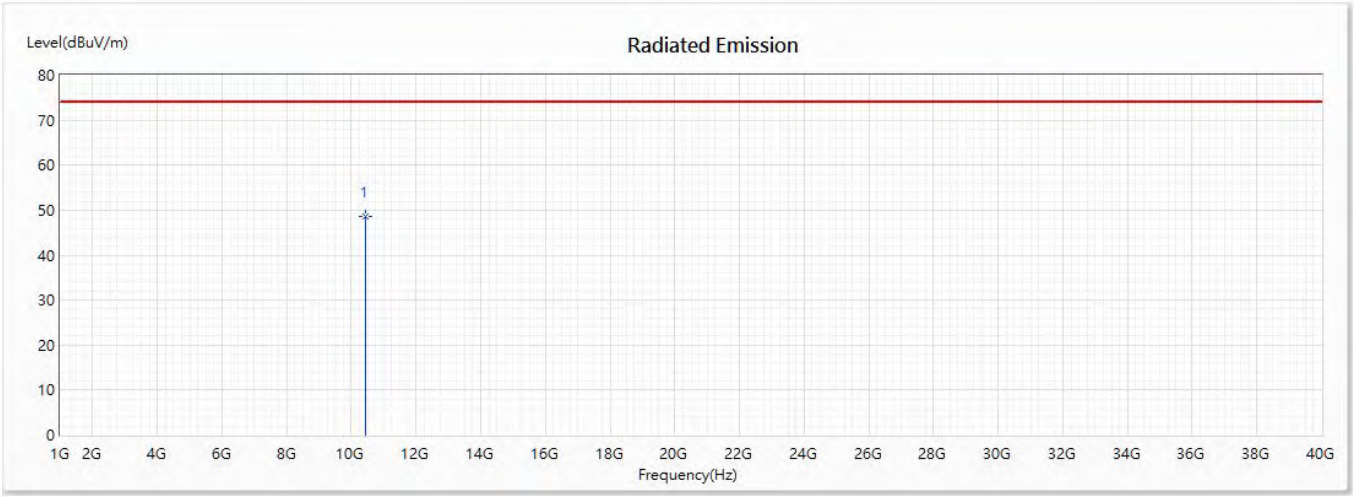
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
* 1	10360	40.93	54.00	-13.07	52.51	-11.58	AV

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement 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 : Industrial WiFi module
Test Item : Harmonic Radiated Emission Data
Test Mode : Mode 1: Transmit (802.11a-6Mbps) (5220MHz)
Test Date : 2020/05/19

Horizontal



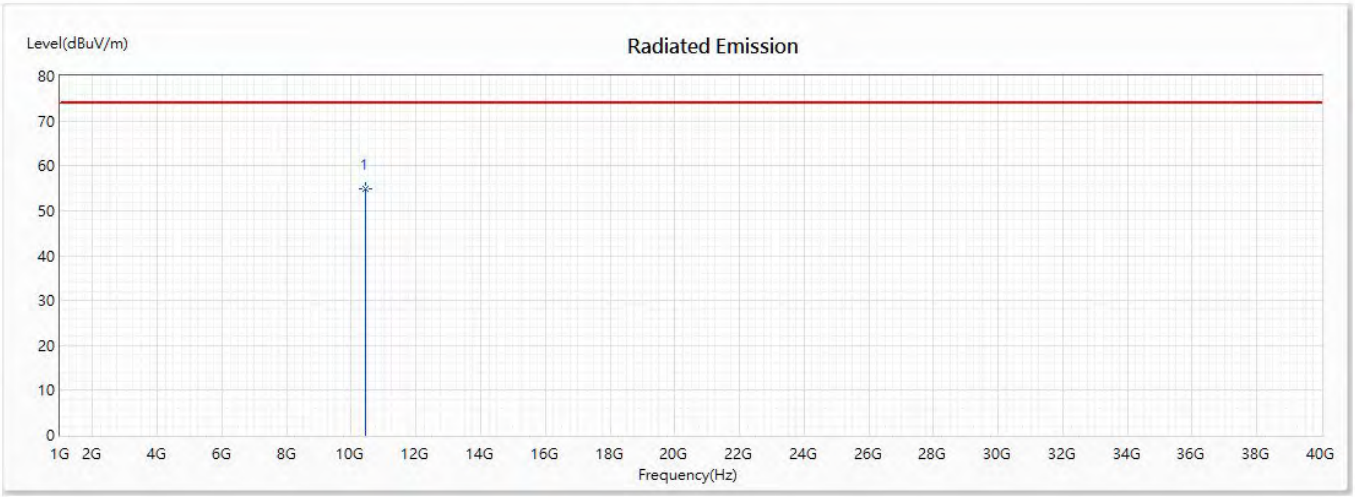
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
* 1	10440	48.66	74.00	-25.34	61.01	-12.35	PK

Note:

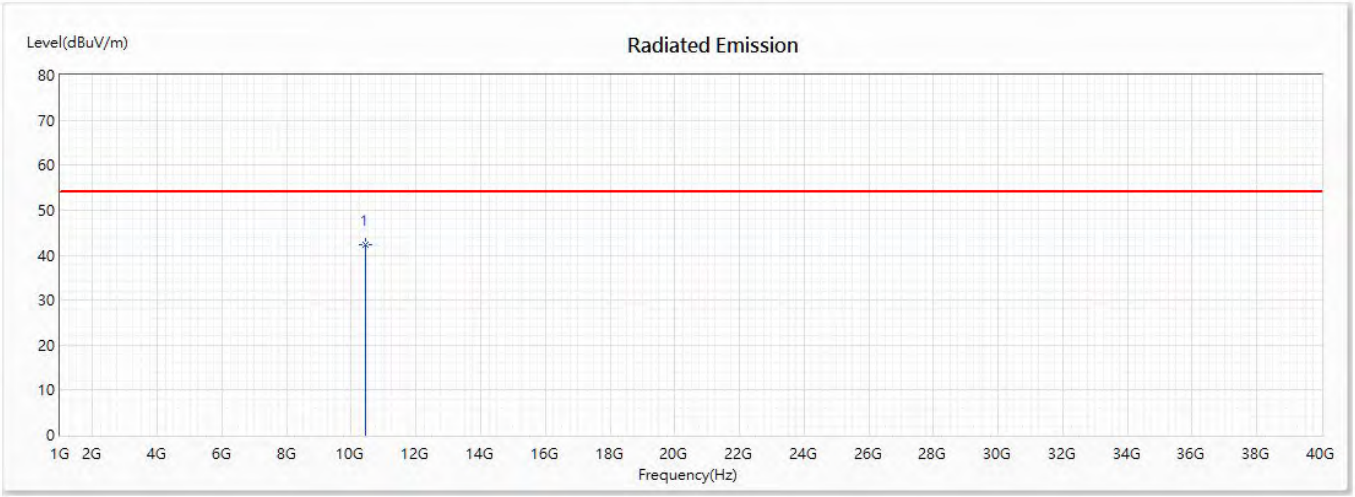
1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The average measurement was not performed when the peak measured 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 : Industrial WiFi module
Test Item : Harmonic Radiated Emission Data
Test Mode : Mode 1: Transmit (802.11a-6Mbps) (5220MHz)
Test Date : 2020/05/19

Vertical



No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
* 1	10440	54.92	74.00	-19.08	67.27	-12.35	PK



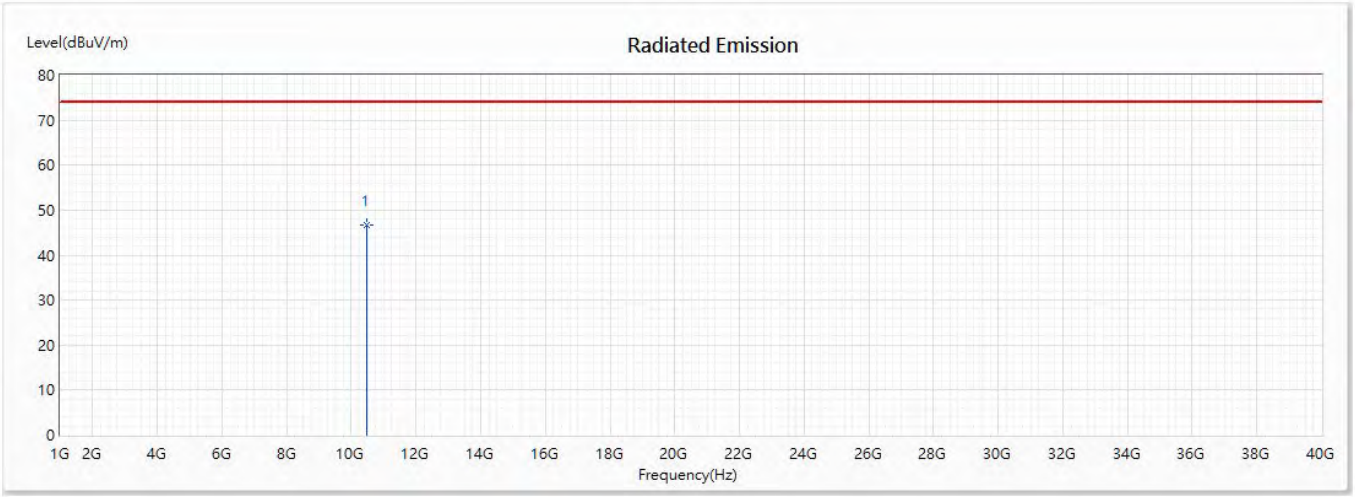
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
* 1	10440	42.41	54.00	-11.59	54.76	-12.35	AV

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement 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 : Industrial WiFi module
Test Item : Harmonic Radiated Emission Data
Test Mode : Mode 1: Transmit (802.11a-6Mbps) (5240MHz)
Test Date : 2020/05/19

Horizontal



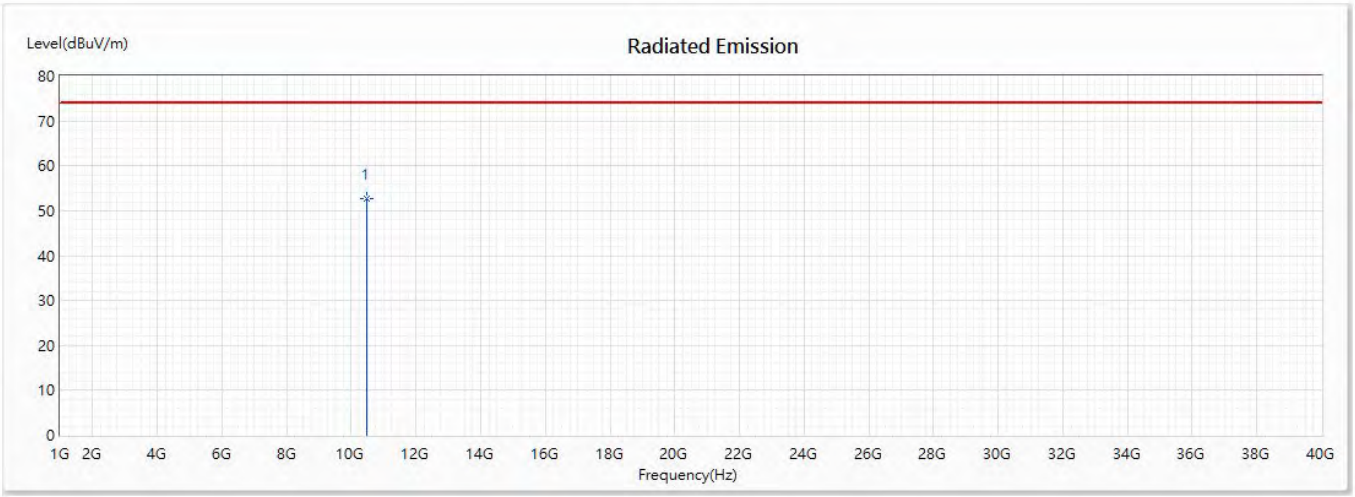
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
* 1	10480	46.61	74.00	-27.39	59.34	-12.73	PK

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement 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 : Industrial WiFi module
Test Item : Harmonic Radiated Emission Data
Test Mode : Mode 1: Transmit (802.11a-6Mbps) (5240MHz)
Test Date : 2020/05/19

Vertical



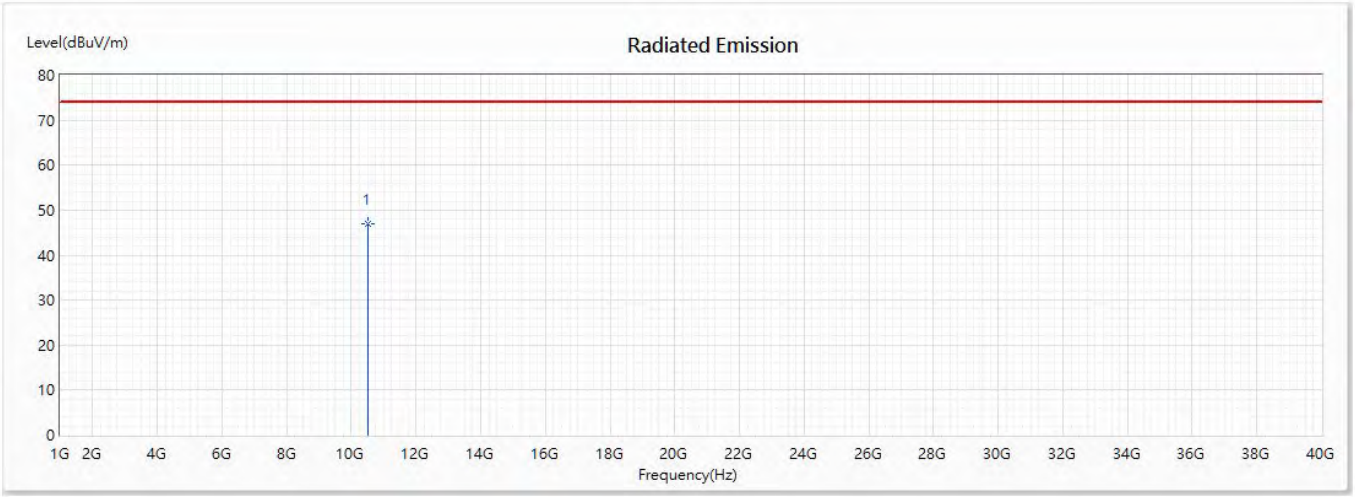
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
* 1	10480	52.63	74.00	-21.37	65.36	-12.73	PK

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement 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	:	Industrial WiFi module
Test Item	:	Harmonic Radiated Emission Data
Test Mode	:	Mode 1: Transmit (802.11a-6Mbps) (5260MHz)
Test Date	:	2020/05/19

Horizontal



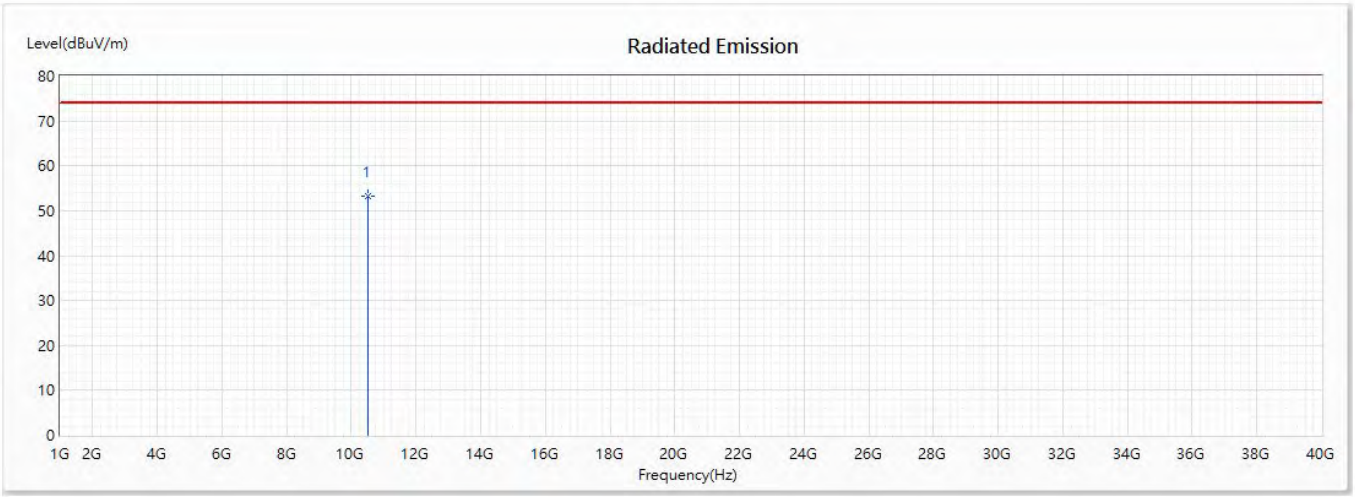
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
* 1	10520	46.95	74.00	-27.05	60.01	-13.06	PK

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement 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 : Industrial WiFi module
Test Item : Harmonic Radiated Emission Data
Test Mode : Mode 1: Transmit (802.11a-6Mbps) (5260MHz)
Test Date : 2020/05/19

Vertical



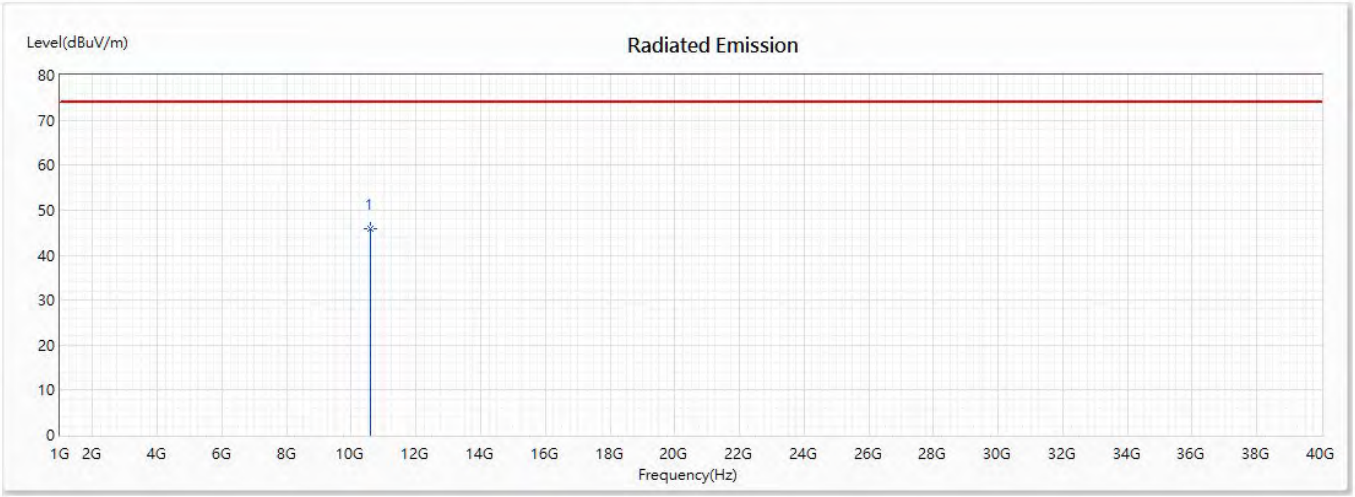
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
* 1	10520	53.12	74.00	-20.88	66.18	-13.06	PK

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement 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	:	Industrial WiFi module
Test Item	:	Harmonic Radiated Emission Data
Test Mode	:	Mode 1: Transmit (802.11a-6Mbps) (5300MHz)
Test Date	:	2020/05/19

Horizontal



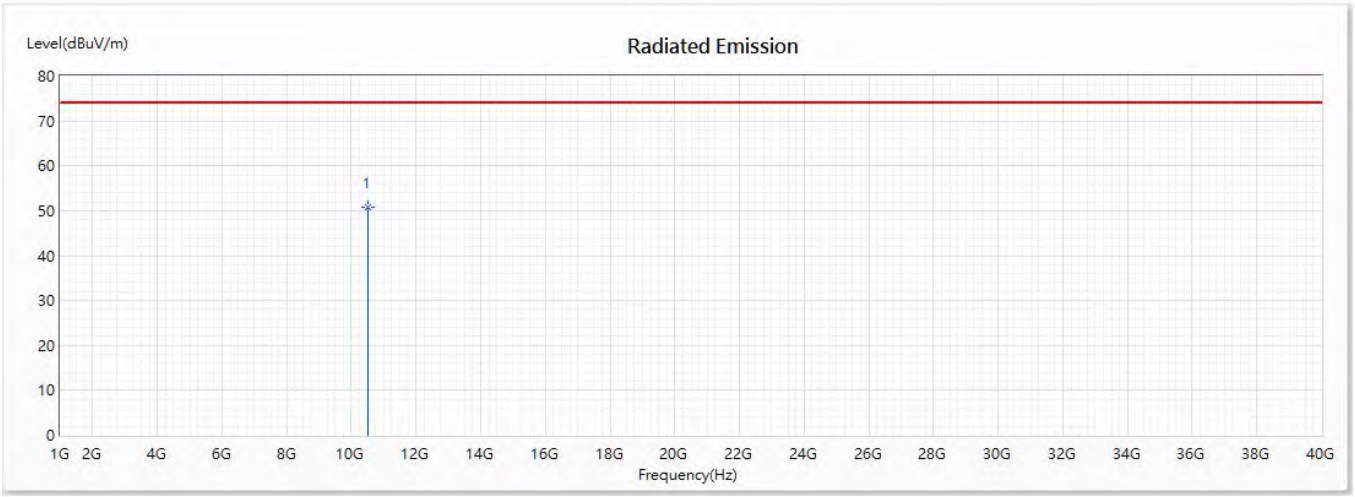
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
* 1	10600	45.82	74.00	-28.18	59.47	-13.65	PK

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement 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 : Industrial WiFi module
Test Item : Harmonic Radiated Emission Data
Test Mode : Mode 1: Transmit (802.11a-6Mbps) (5300MHz)
Test Date : 2020/05/19

Vertical



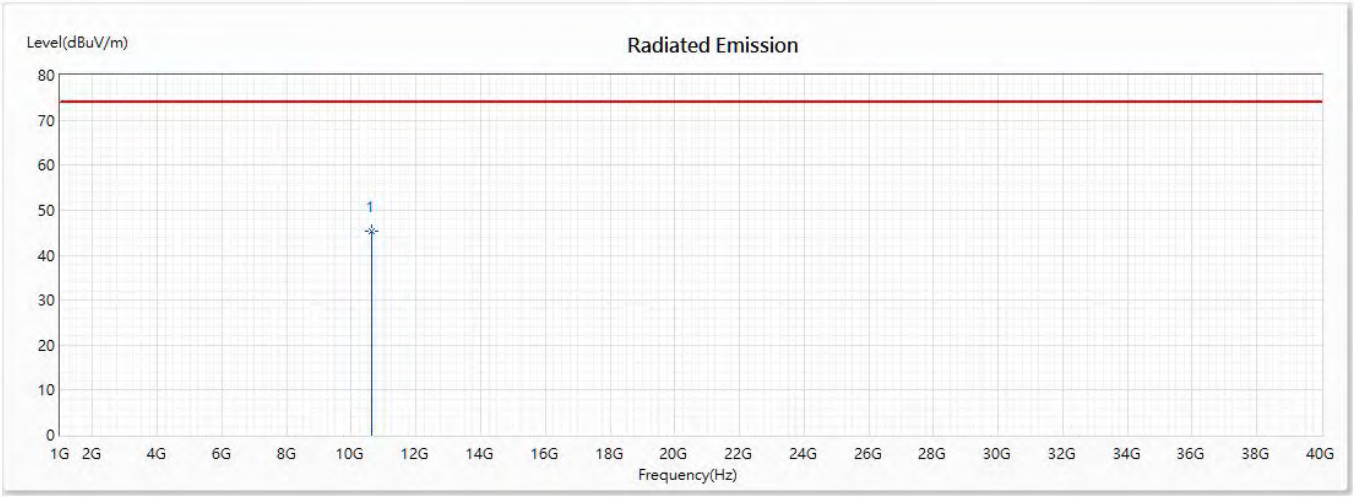
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
* 1	10520	50.85	74.00	-23.15	63.91	-13.06	PK

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement 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 : Industrial WiFi module
Test Item : Harmonic Radiated Emission Data
Test Mode : Mode 1: Transmit (802.11a-6Mbps) (5320MHz)
Test Date : 2020/05/19

Horizontal



No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB/m)	Detector Type
* 1	10640	45.27	74.00	-28.73	59.26	-13.99	PK

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement 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.