Test report No.: 2380577R-RFUSV03S-A

TEST REPORT

Product Name	Multimedia device with Bluetooth and WLAN
Trademark	BOSCH
Model and /or type reference	CCS2SBXQ
FCC ID	2AUXS-CCS2SBXQ
Applicant´s name / address	Robert Bosch GmbH Robert-Bosch-Strasse 200, 31139 Hildesheim, Germany
Manufacturer´s name	Robert Bosch GmbH
Test method requested, standard	FCC CFR Title 47 Part 15 Subpart E ANSI C63.4: 2014, ANSI C63.10: 2013 KDB Publication 789033
Verdict Summary	IN COMPLIANCE
Documented By (Supervisor / Jinn Chen)	Jinn Chen
Tested By (Senior Engineer / Ivan Chuang)	Ivan Chuang
Approved By (Senior Engineer / Alan Chen)	Alan Chen
Date of Receipt	2023/08/17
Date of Issue	2023/11/28
Report Version	V1.0

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Competences and Guarantees

DEKRA is a testing laboratory competent to carry out the tests described in this report.

In order to assure the traceability to other national and international laboratories, DEKRA has a calibration and maintenance program for its measurement equipment.

DEKRA guarantees the reliability of the data presented in this report, which is the result of the measurements and the tests performed to the item under test on the date and under the conditions stated in the report and it is based on the knowledge and technical facilities available at DEKRA at the time of performance of the test.

DEKRA is liable to the client for the maintenance of the confidentiality of all information related to the item under test and the results of the test.

The results presented in this Test Report apply only to the particular item under test established in this document.

General conditions

1. The test results relate only to the samples tested.
2. 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.
3. This report must not be used to claim product endorsement by TAF or any agency of the government.
4. The test report shall not be reproduced without the written approval of DEKRA Testing and Certification Co., Ltd.
5. 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.

Revision History

Report No.	Version	Description	Issued Date
2380577R-RFUSV03S-A	V1.0	Initial issue of report.	2023/11/28

1. General Information

1.1. EUT Description

Product Name	Multimedia device with Bluetooth and WLAN
Trademark	BOSCH
Model No.	CCS2SBXQ
EUT Rated Voltage	DC 9V-16V
EUT Test Voltage	DC 12V by Battery
Frequency Range	802.11a/n/ac-20 MHz: 5180-5240 MHz, 5745-5825 MHz 802.11n/ac-40 MHz: 5190-5230 MHz, 5755-5795 MHz
Number of Channels	802.11a/n/ac-20 MHz: 9 802.11n/ac-40 MHz: 4
Data Rate	802.11a: 6-54 Mbps 802.11n: up to 300 Mbps 802.11ac: up to 400 Mbps
Type of Modulation	802.11a/n/ac: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM)
Channel Control	Auto

Antenna List

Internal Antenna

No.	Manufacturer	Part No.	Antenna Type	Peak Gain
1	BOSCH	W701	Integrated as printed circuit board antenna	3.1 dBi for 5150~5250 MHz 0.5 dBi for 5725~5850 MHz
		W702		3.9 dBi for 5150~5250 MHz 3.4 dBi for 5725~5850 MHz

External Antenna

No.	Manufacturer	Part No.	Antenna Type	Peak Gain
1	NISSEI ELECTRIC	ANT2420-161CW/U-AB	Metal Plate Antenna	2.97 dBi for 5150~5250 MHz 3.74 dBi for 5725~5850 MHz
2	NISSEI ELECTRIC	Single ANT2420-161CW/U-AB		4.34 dBi for 5150~5250 MHz 5.77 dBi for 5725~5850 MHz
3	Harada Industry	259D57LA0A		2.89 dBi for 5150~5250 MHz 4.24 dBi for 5725~5850 MHz
4	Harada Industry	Single 259D57LA0A		1.08 dBi for 5150~5250 MHz 2.93 dBi for 5725~5850 MHz

Note:

1. The antenna of EUT is conforming to FCC 15.203.
2. The antenna gain as by the manufacturer provided.
3. Each antenna has been evaluated and only the worst case (higher gain antenna) is presented in the report.

2x Internal antenna

For power CDD Directional gain
3.9 dBi for 5150-5250 MHz 3.4 dBi for 5725-5850 MHz

For CDD mode:
5150MHz-5250MHz: Directional gain = 3.9 dBi
5725MHz-5850MHz: Directional gain = 3.4 dBi
(Directional gain = GANT MAX + Array Gain, Array Gain = 0 dB for $N_{ANT} \leq 4$)

For Power Density Directional gain
5150MHz-5250MHz: Directional gain = 6.52 dBi
5725MHz-5850MHz: Directional gain = 5.08 dBi
Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20})^2 / N_{ANT}]$ dBi

Internal / External antenna

For power CDD Directional gain
4.34 dBi for 5150-5250 MHz 5.77 dBi for 5725-5850 MHz

For CDD mode:
5150MHz-5250MHz: Directional gain = 4.34 dBi
5725MHz-5850MHz: Directional gain = 5.77 dBi
(Directional gain = GANT MAX + Array Gain, Array Gain = 0 dB for $N_{ANT} \leq 4$)

For Power Density Directional gain
5150MHz-5250MHz: Directional gain = 7.13 dBi
5725MHz-5850MHz: Directional gain = 7.68 dBi
Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20})^2 / N_{ANT}]$ dBi

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

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

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

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
38	5190	46	5230	151	5755	159	5795

Note:

1. This device is a Multimedia device with Bluetooth and WLAN with built-in WLAN and Bluetooth transceiver, this report for 5GHz WLAN.
2. The product includes two configurations with the following as below:

Model name	HW Version Identification Number (HVIN)	Description
CCS2SBXQ	NA1	Internal Antenna / External Antenna
	NA2	2x Internal Antenna

3. Usage of samples, samples undergoing test have been selected by: The client.

ID	Bosch Part No	Control Number	Description
01	7 515 752 687-02	PSR-2054085	Internal / External antenna
02	7 515 752 687-02	PSR-2054083	Internal / External antenna (modified)
03	7 515 752 799-01	PSR-2054086	2x Internal antenna

Notes referenced to samples during the project:

ID	Type
01	Radiated
02	Conducted
03	Radiated

4. Regarding to the operation frequency, the lowest, middle and highest frequency are selected to perform the test.
5. Lowest and highest data rates are tested in each mode. Only worst case is shown in the report. (802.11a is 6Mbps, 802.11ac is MCS0)
6. The spectrum plot against conducted item only shows the worst case.
7. DEKRA has evaluated each test mode. Only the worst case is shown in the report.
8. These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance of transmitter with Part 15 Subpart E for Unlicensed National Information Infrastructure devices.

Test Mode	Mode 1	Transmit (802.11a) Transmit (802.11ac-20 MHz) Transmit (802.11ac-40 MHz)

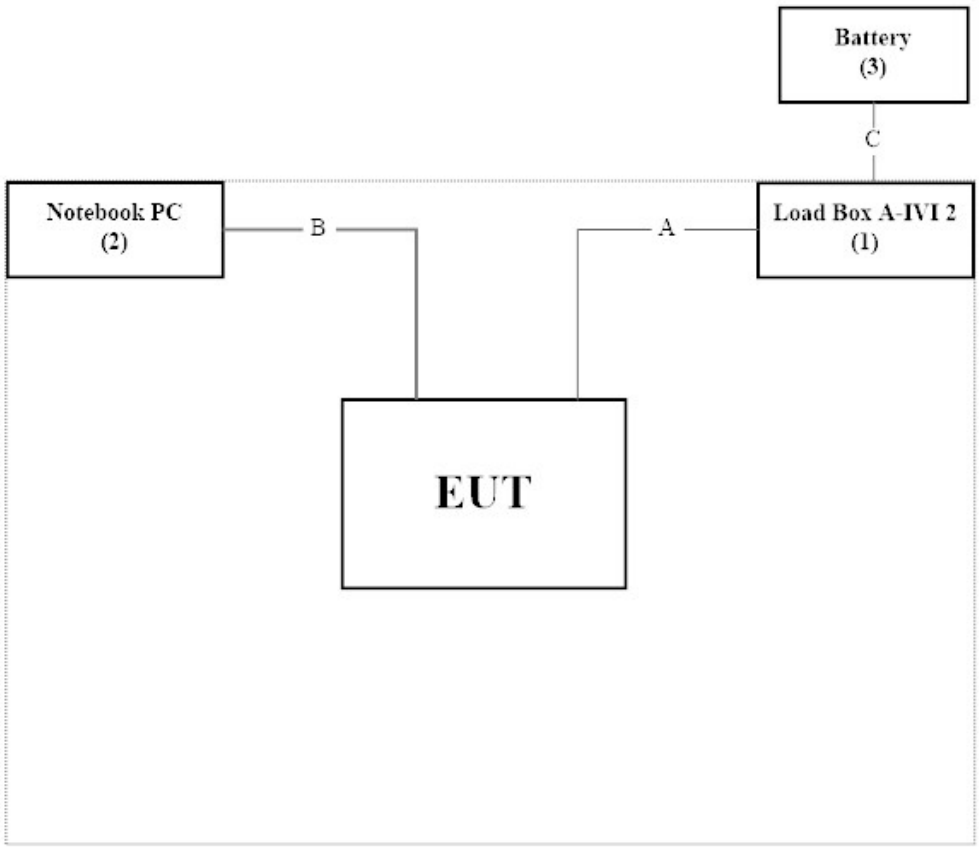
1.2. Tested System Datails

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	Load Box A-IVI 2	BOSCH	N/A	N/A	N/A
2	Notebook PC	DELL	Latitude 5501	4H94P13	N/A
3	Battery	BOSCH	60044	N/A	N/A

Cable Type		Cable Description
A	Signal Cable	Non-shielded, 2m
B	USB Cable	Shielded, 0.9m
C	Power Cable	Non-shielded, 2m

1.3. Configuration of tested System



1.4. EUT Exercise Software

1	Setup the EUT as shown in Section 1.3.
2	Execute software “cmd version 10.0.19045.3570” on the Notebook PC.
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.

1.5. Test Facility

Ambient conditions in the laboratory:

Performed Item	Items	Required	Actual
Radiated Emission	Temperature (°C)	10~40 °C	22.0 °C
	Humidity (%RH)	10~90 %	60.0 %
Conductive	Temperature (°C)	10~40 °C	22.0 °C
	Humidity (%RH)	10~90 %	55.0 %

USA	FCC Registration Number: TW0033
Canada	CAB Identifier Number: TW3023 / Company Number: 26930

Site Description	Accredited by TAF
	Accredited Number: 3023

Test Laboratory	DEKRA Testing and Certification Co., Ltd.
	Linkou Laboratory
Address	No.5-22, Ruishukeng Linkou District, New Taipei City, 24451, Taiwan, R.O.C
Performed Location	No. 26, Huaya 1st Rd., Guishan Dist.,Taoyuan City 333411, Taiwan, R.O.C.
Phone Number	+886-3-275-7255
Fax Number	+886-3-327-8031

1.6. List of Test Equipment

For Conducted Measurements / HY-SR02

	Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Due Date
V	Spectrum Analyzer	R&S	FSV30	103466	2022/12/22	2023/12/21
V	Spectrum Analyzer	KEYSIGHT	N9010A	MY53470892	2023/11/09	2024/11/08
V	Peak Power Analyzer	KEYSIGHT	8990B	MY51000539	2023/05/15	2024/05/14
V	Wideband Power Sensor	KEYSIGHT	N1923A	MY59240002	2023/05/18	2024/05/18
V	Wideband Power Sensor	KEYSIGHT	N1923A	MY59240003	2023/05/18	2024/05/17

Note:

1. All equipments are calibrated every one year.
2. The test instruments marked with "V" are used to measure the final test results.
3. Test Software Version: RF Conducted Test Tools R3 V3.0.0.14.

For Radiated Measurements / HY-CB01

	Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Due Date
	Loop Antenna	AMETEK	HLA6121	56736	2023/05/23	2024/05/24
V	Bi-Log Antenna	SCHWARZBECK	VULB9168	9168-0675	2023/08/09	2025/08/08
V	Horn Antenna	RF SPIN	DRH18-E	210802A18ES	2023/03/23	2024/03/22
V	Horn Antenna	Com-Power	AH-840	101101	2021/11/30	2023/11/29
V	Pre-Amplifier	SGH	0301	20211007-7	2023/01/10	2024/01/09
V	Pre-Amplifier	EMCI	EMC051845SE	980632	2023/01/10	2024/01/09
V	Pre-Amplifier	EMCI	EMC05820SE	980362	2023/01/10	2024/01/09
V	Pre-Amplifier	EMCI	EMC184045SE	980369	2023/01/10	2024/01/09
	Coaxial Cable	EMCI	EMC102-KM-KM-600	1160314		
	Coaxial Cable	EMCI	EMC102-KM-KM-7000	170242		
	Filter	MICRO TRONICS	BRM50702	G251	2023/01/05	2024/01/04
V	Filter	MICRO TRONICS	BRM50716	G067	2023/01/05	2024/01/04
V	EMI Test Receiver	R&S	ESR3	102792	2022/12/29	2023/12/28
V	Spectrum Analyzer	R&S	FSV3044	101115	2023/01/06	2024/01/05
V	Coaxial Cable	SUHNER	SUCOFLEX 106	25450/6	2023/01/10	2024/01/09
	Coaxial Cable	SGH	HA800	GD20110222-8		
	Coaxial Cable	SGH	SGH18	2021003-8		
	Coaxial Cable	EMCI	EMC106	151113		

Note:

1. Bi-Log Antenna and Horn Antenna(AH-840) is calibrated every two years, the other equipments are calibrated every one year.
2. The test instruments marked with "V" are used to measure the final test results.
3. Test Software Version: e3 230303 dekra V9.

1.7. Uncertainty

Uncertainties have been calculated according to the DEKRA internal document.

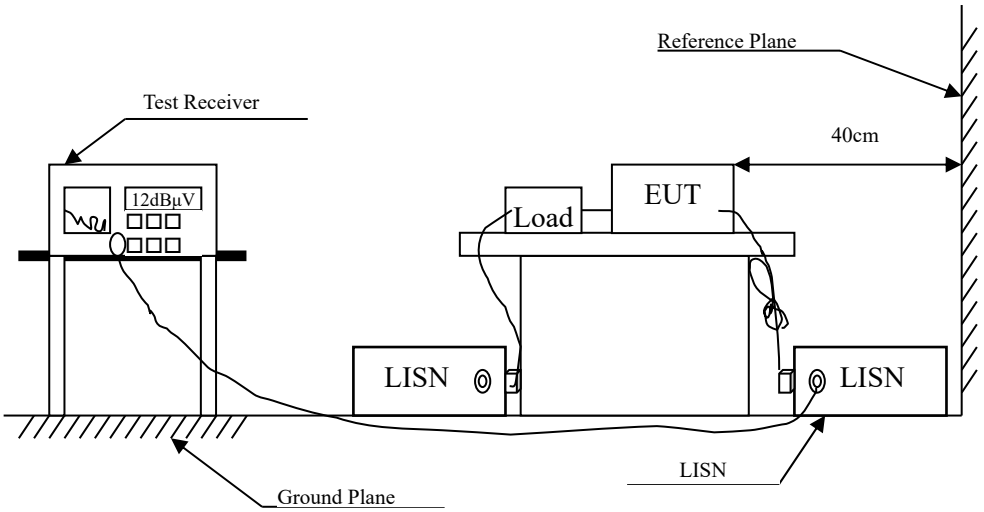
The reported expanded uncertainties are based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95%.

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	±3.50 dB
Maximum conducted output power	Spectrum Analyzer: ±2.14 dB Power Meter: ±1.05 dB
Peak Power Spectral Density	±2.14 dB
Radiated Emission	9 kHz~30 MHz: ±3.88 dB 30 MHz~1 GHz: ±4.42 dB 1 GHz~18 GHz: ±4.28 dB 18 GHz~40 GHz: ±3.90 dB
Band Edge	9 kHz~30 MHz: ±3.88 dB 30 MHz~1 GHz: ±4.42 dB 1 GHz~18 GHz: ±4.28 dB 18 GHz~40 GHz: ±3.90 dB
Occupied Bandwidth	±1580.61 Hz
Duty Cycle	±0.53 %

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 0.15 MHz to 30 MHz using a receiver bandwidth of 9 kHz.

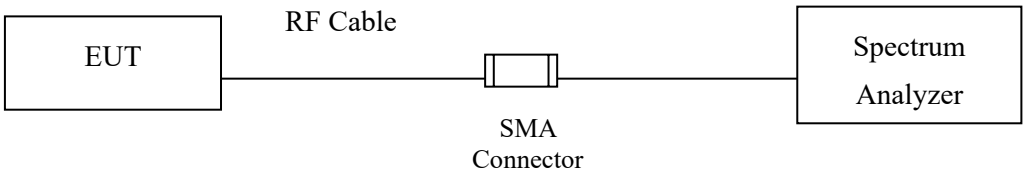
2.4. Test Result of Conducted Emission

Owing to the EUT use battery supply voltage, this test item is not performed.

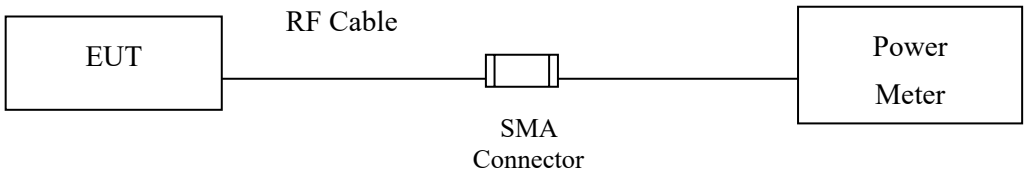
3. Maximum conducted output power

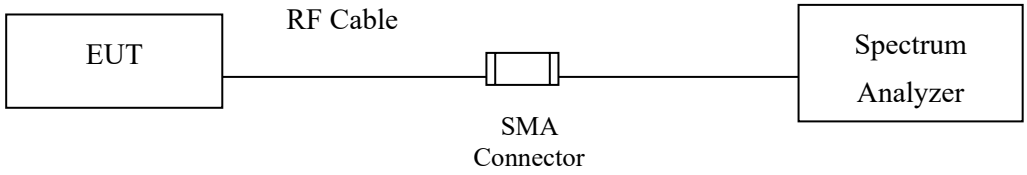
3.1. Test Setup

26dB Occupied Bandwidth



Conduction Power Measurement





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 26dB 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.

The maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

For CDD mode:

2x Internal antenna

5150MHz-5250MHz: Directional gain = 3.9 dBi, Limit= 24 dBm

5725MHz-5850MHz: Directional gain = 3.4 dBi, Limit= 30 dBm

Internal / External antenna

5150MHz-5250MHz: Directional gain = 4.34 dBi, Limit= 24 dBm

5725MHz-5850MHz: Directional gain = 5.77 dBi, Limit= 30 dBm

(Directional gain = $G_{ANT\ MAX}$ + Array Gain, Array Gain = 0 dB for $N_{ANT} \leq 4$)

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.

802.11a/n/ac/ax (BW≦160MHz) 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, (KEYSIGHT / 8990B video bandwidth: 160MHz)

802.11n/ac/ax (BW≧160MHz) 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 : Multimedia device with Bluetooth and WLAN
Test Item : Maximum conducted output power
Test Mode : Transmit (802.11a)
Test Date : 2023/10/17
Test Sample : ID 02

Channel No.	Frequency (MHz)	26dB Bandwidth (MHz)	Chain A Power (dBm)	Chain B Power (dBm)	Duty factor (dB)	Output Power (dBm)	Output Power Limit		Result
							(dBm)	dBm+10log(BW)	
36	5180	--	7.61	9.17	--	11.47	24	--	Pass
44	5220	--	7.41	9.21	--	11.41	24	--	Pass
48	5240	--	7.35	9.22	--	11.40	24	--	Pass
149	5745	--	8.46	11.76	--	13.43	30	--	Pass
157	5785	--	8.16	11.63	--	13.24	30	--	Pass
165	5825	--	8.22	11.61	--	13.25	30	--	Pass

Note:

1. Output Power (dBm) = 10log (Chain A Power (mW)+Chain B Power (mW)) +Duty factor.
2. 26dB Bandwidth is the bandwidth of chain A or chain B whichever is less bandwidth, output power limitation is more stringent.

Product : Multimedia device with Bluetooth and WLAN
Test Item : Maximum conducted output power
Test Mode : Transmit (802.11ac-20 MHz)
Test Date : 2023/10/17
Test Sample : ID 02

Channel No.	Frequency (MHz)	26dB Bandwidth (MHz)	Chain A Power (dBm)	Chain B Power (dBm)	Duty factor (dB)	Output Power (dBm)	Output Power Limit		Result
							(dBm)	dBm+10log(BW)	
36	5180	--	7.20	7.67	--	10.45	24	--	Pass
44	5220	--	7.16	7.66	--	10.43	24	--	Pass
48	5240	--	6.78	7.62	--	10.23	24	--	Pass
149	5745	--	7.92	10.55	--	12.44	30	--	Pass
157	5785	--	7.88	10.42	--	12.34	30	--	Pass
165	5825	--	8.61	10.05	--	12.40	30	--	Pass

Note:

1. Output Power (dBm) = 10log (Chain A Power (mW)+Chain B Power (mW)) +Duty factor.
2. 26dB Bandwidth is the bandwidth of chain A or chain B whichever is less bandwidth, output power limitation is more stringent.

Product : Multimedia device with Bluetooth and WLAN
Test Item : Maximum conducted output power
Test Mode : Transmit (802.11ac-40 MHz)
Test Date : 2023/10/17
Test Sample : ID 02

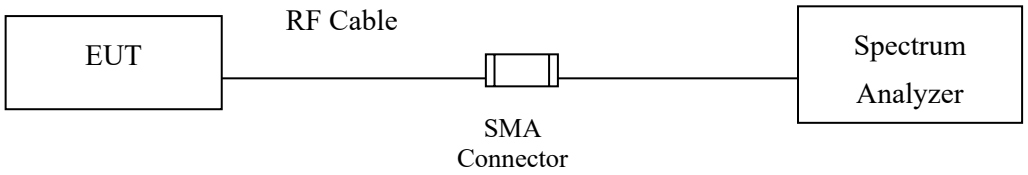
Channel No.	Frequency (MHz)	26dB Bandwidth (MHz)	Chain A Power (dBm)	Chain B Power (dBm)	Duty factor (dB)	Output Power (dBm)	Output Power Limit		Result
							(dBm)	dBm+10log(BW)	
38	5190	--	7.55	7.03	--	10.31	24	--	Pass
46	5230	--	7.27	7.06	--	10.18	24	--	Pass
151	5755	--	8.86	9.56	--	12.23	30	--	Pass
159	5795	--	8.91	9.75	--	12.36	30	--	Pass

Note:

1. Output Power (dBm) = 10log (Chain A Power (mW)+Chain B Power (mW)) +Duty factor.
2. 26dB Bandwidth is the bandwidth of chain A or chain B whichever is less bandwidth, output power limitation is more stringent.

4. Maximum 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.

The maximum peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

For CDD mode:

2x Internal antenna

5150MHz-5250MHz: Directional gain = 6.52 dBi, Limit= 10.48 dBm

5725MHz-5850MHz: Directional gain = 5.08 dBi, Limit= 30.00 dBm

Internal / External antenna

5150MHz-5250MHz: Directional gain = 7.13 dBi, Limit= 9.87 dBm

5725MHz-5850MHz: Directional gain = 7.68 dBi, Limit= 28.32 dBm

Directional gain $= 10 \log[(10^{G1/20} + 10^{G2/20})^2 / N_{ANT}]$ dBi

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.

4.4. Test Result of Maximum Power Spectral Density

Product : Multimedia device with Bluetooth and WLAN
Test Item : Maximum Power Spectral Density
Test Mode : Transmit (802.11a) – NA2
Test Date : 2023/10/19
Test Sample : ID 02

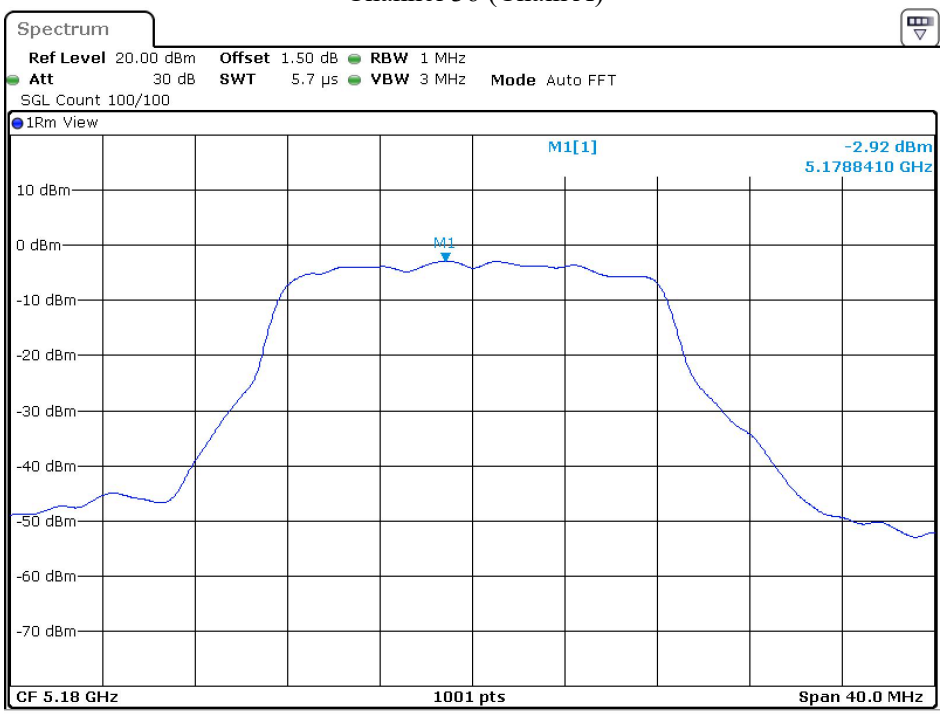
Channel No.	Frequency (MHz)	Data Rate (Mbps)	Chain	PPSD/MHz (dBm)	Duty factor (dB)	Total PPSD/MHz (dBm)	Required Limit (dBm)	Result
36	5180	6	A	-2.92	0.00	1.25	<10.48	Pass
			B	-0.84				Pass
44	5220	6	A	-3.40	0.00	0.80	<10.48	Pass
			B	-1.27				Pass
48	5240	6	A	-3.58	0.00	0.95	<10.48	Pass
			B	-0.94				Pass

Note:
1. Total PPSD/MHz = 10*log (Chain A (mW) + Chain B (mW) + Duty factor.

Channel No.	Frequency (MHz)	Data Rate (Mbps)	Chain	PPSD (dBm)	Duty factor (dB)	Total PPSD (dBm)	Required Limit (dBm)	Result
149	5745	6	A	-4.82	0.00	-0.50	<30	Pass
			B	-2.51				Pass
157	5785	6	A	-4.02	0.00	-0.37	<30	Pass
			B	-2.82				Pass
165	5825	6	A	-4.50	0.00	-0.23	<30	Pass
			B	-2.27				Pass

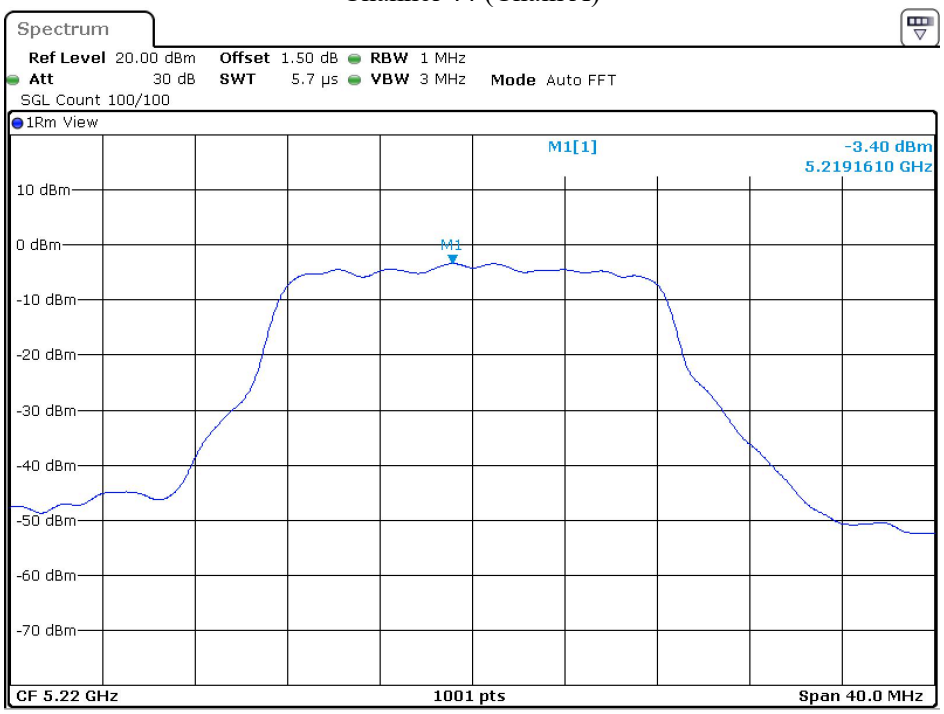
Note:
1. Total PPSD = 10*log (Chain A (mW) + Chain B (mW) + Duty factor.

Channel 36 (Chain A)



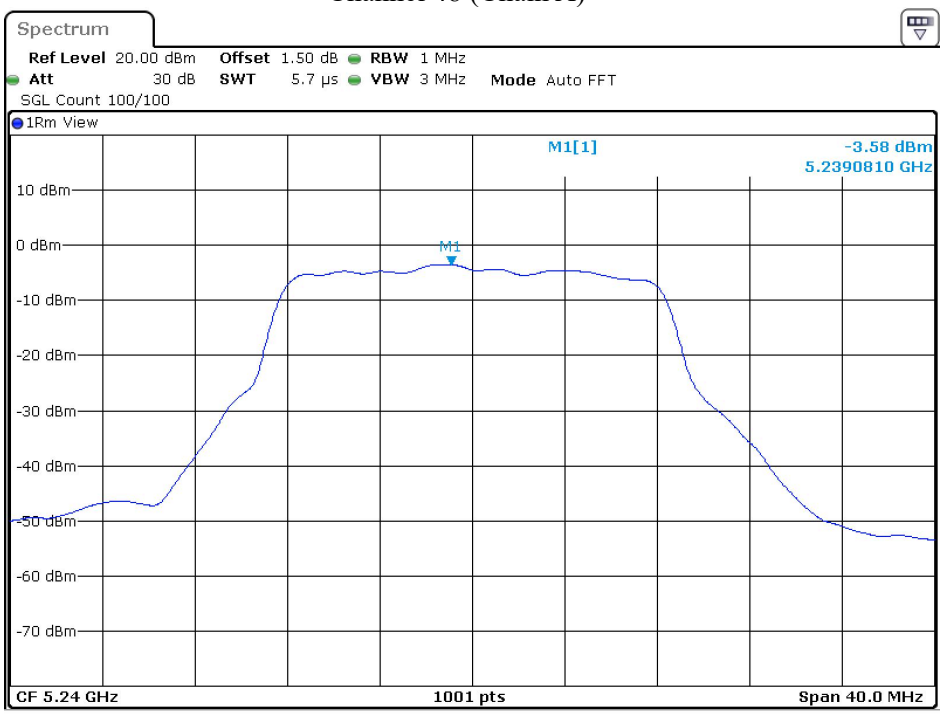
Date: 19.OCT.2023 19:08:19

Channel 44 (Chain A)



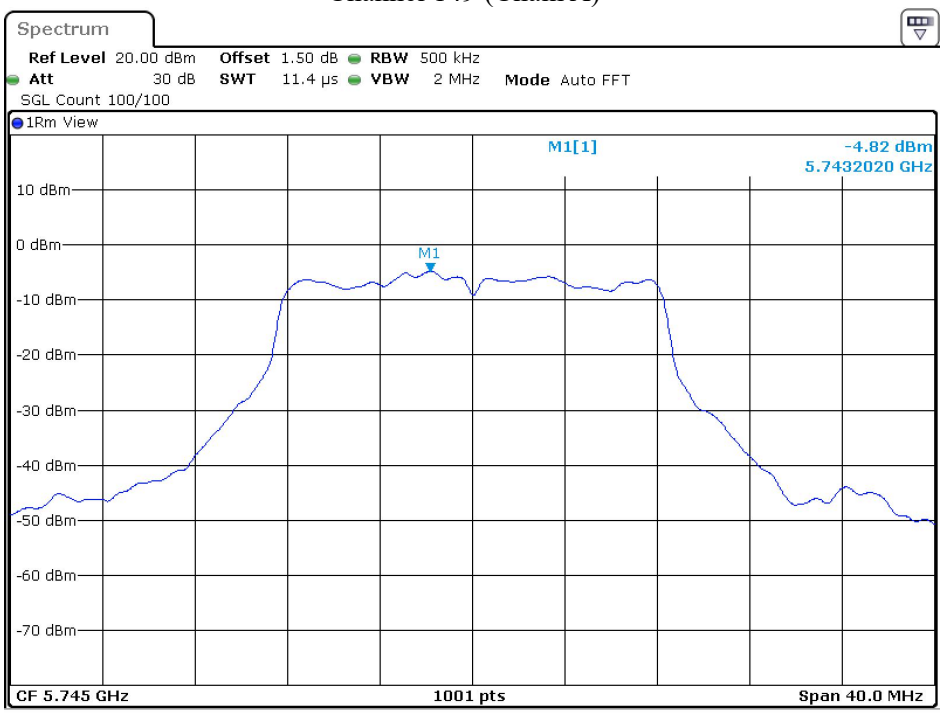
Date: 19.OCT.2023 19:09:21

Channel 48 (Chain A)



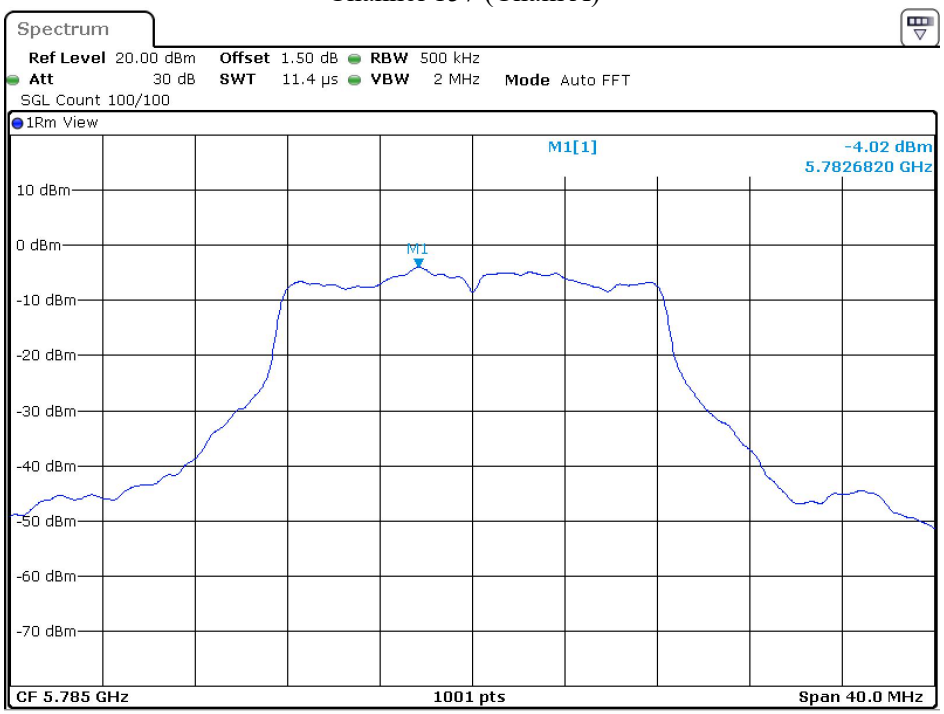
Date: 19.OCT.2023 19:09:57

Channel 149 (Chain A)



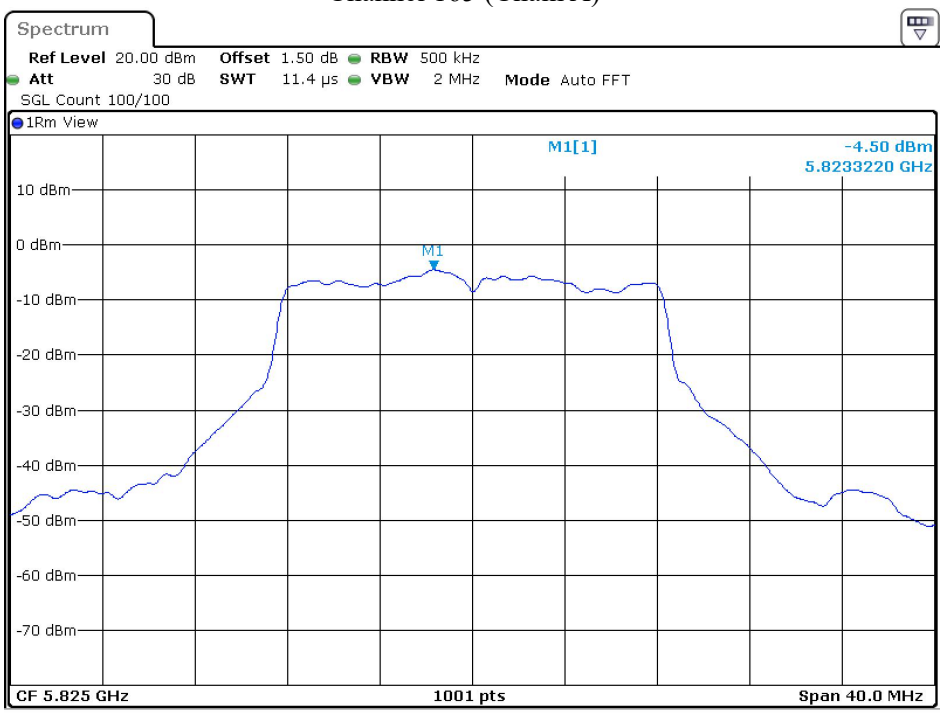
Date: 19.OCT.2023 19:17:35

Channel 157 (Chain A)



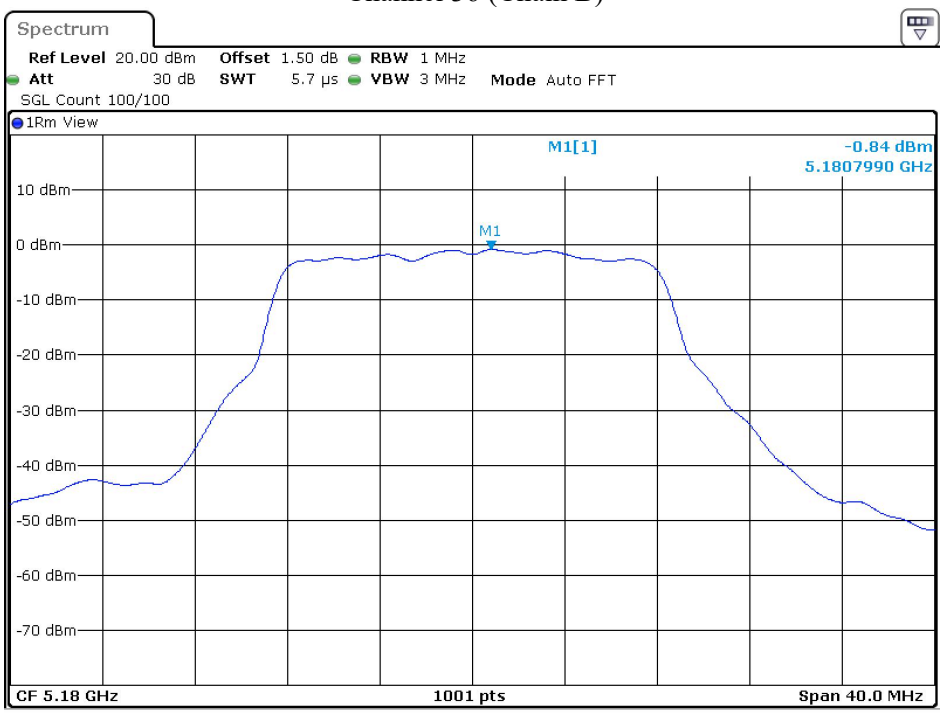
Date: 19.OCT.2023 19:18:24

Channel 165 (Chain A)



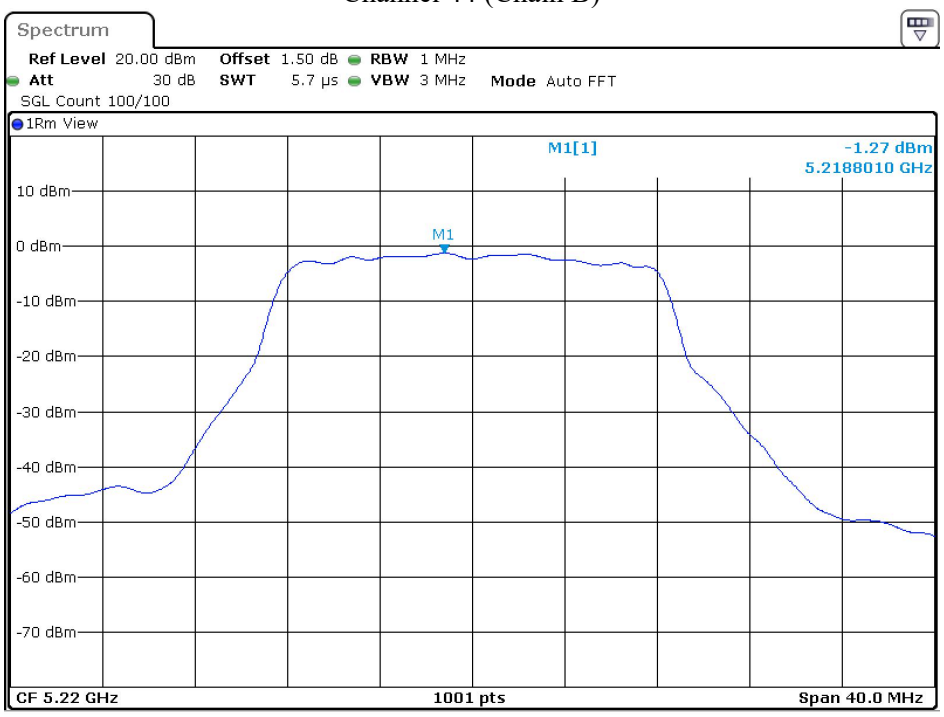
Date: 19.OCT.2023 19:19:41

Channel 36 (Chain B)



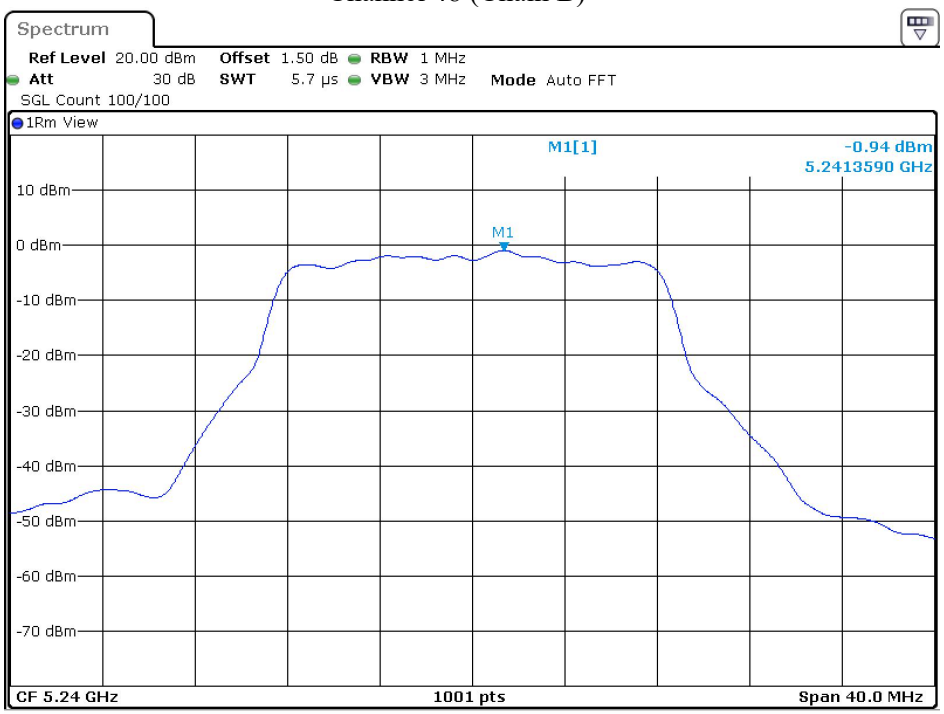
Date: 19.OCT.2023 22:22:30

Channel 44 (Chain B)



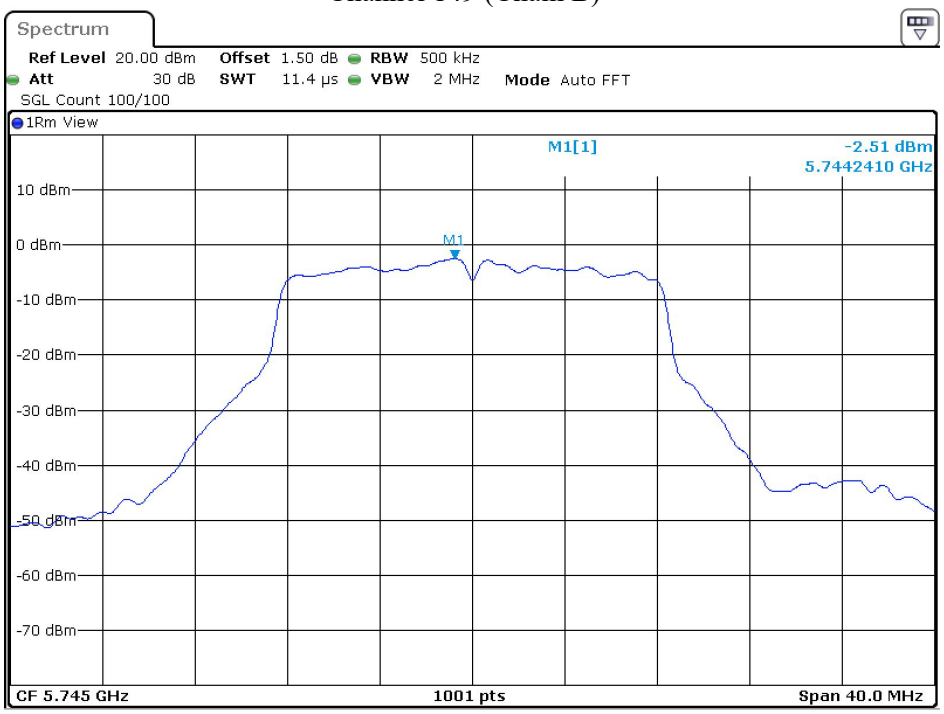
Date: 19.OCT.2023 22:23:13

Channel 48 (Chain B)



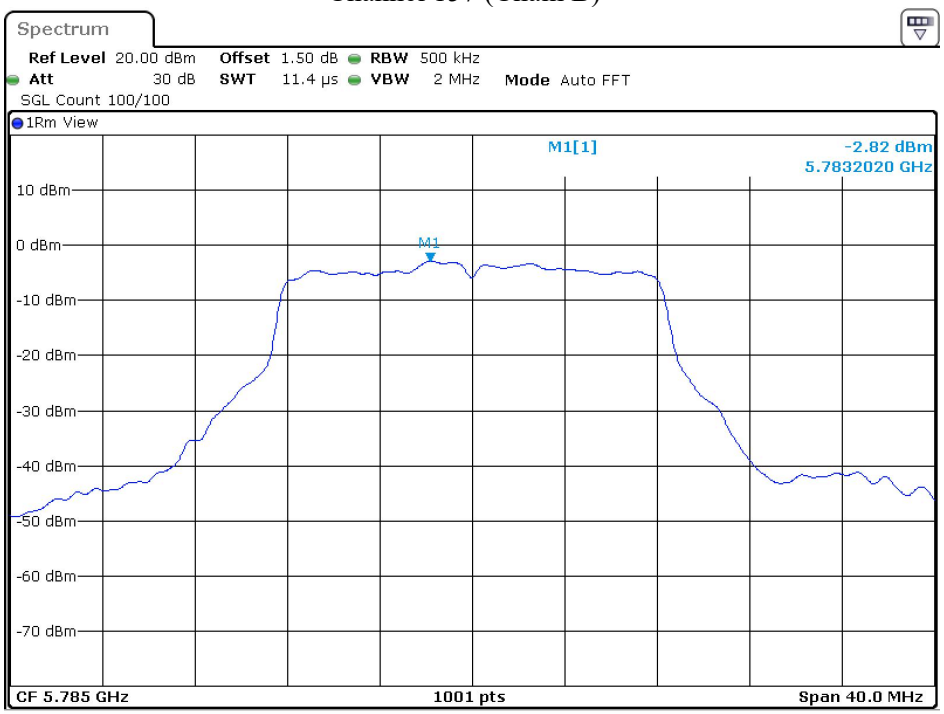
Date: 19.OCT.2023 22:24:33

Channel 149 (Chain B)



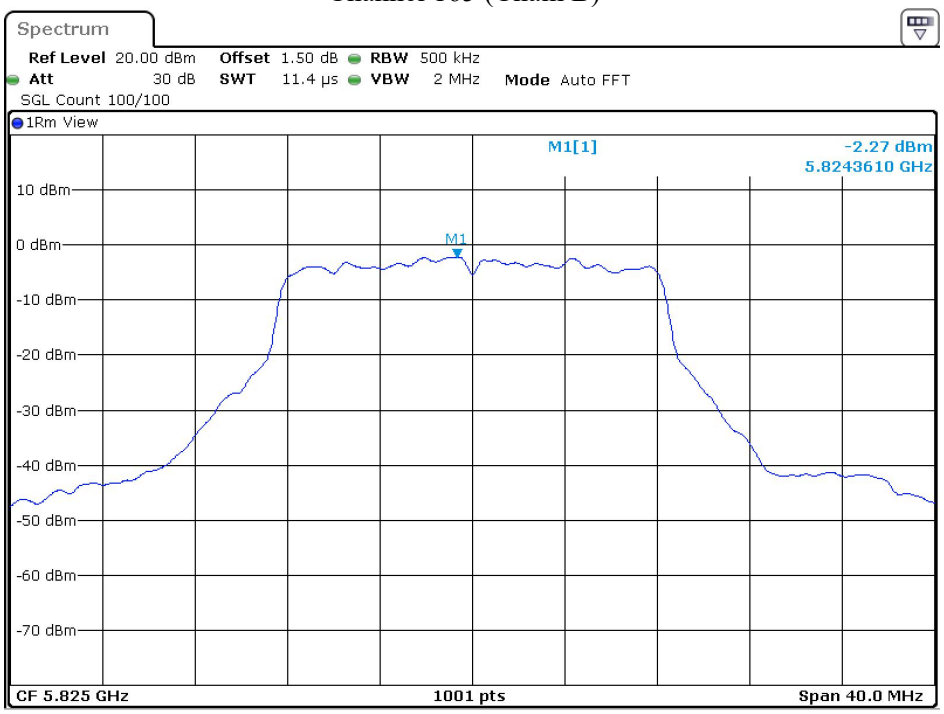
Date: 19.OCT.2023 22:32:34

Channel 157 (Chain B)



Date: 19.OCT.2023 22:33:22

Channel 165 (Chain B)



Date: 19.OCT.2023 22:34:10

Product : Multimedia device with Bluetooth and WLAN
Test Item : Maximum Power Spectral Density
Test Mode : Transmit (802.11ac-20 MHz) – NA2
Test Date : 2023/10/19
Test Sample : ID 02

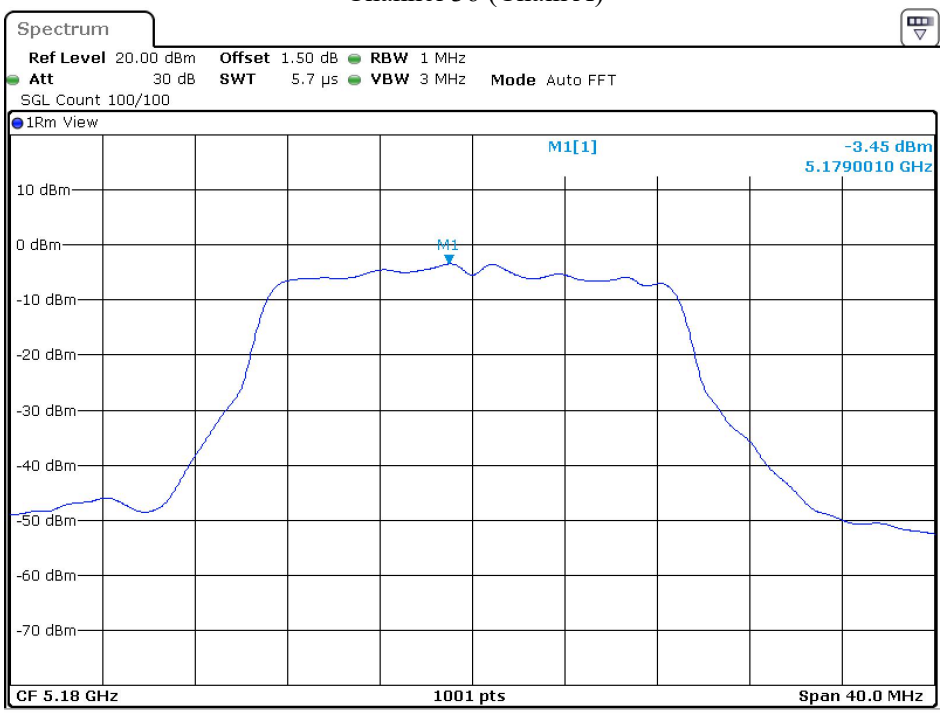
Channel No.	Frequency (MHz)	Data Rate (Mbps)	Chain	PPSD/MHz (dBm)	Duty factor (dB)	Total PPSD/MHz (dBm)	Required Limit (dBm)	Result
36	5180	6	A	-3.45	0.17	0.45	<10.48	Pass
			B	-2.11				Pass
44	5220	6	A	-4.78	0.17	0.26	<10.48	Pass
			B	-1.63				Pass
48	5240	6	A	-5.28	0.17	-0.04	<10.48	Pass
			B	-1.83				Pass

Note:
1. Total PPSD/MHz = 10*log (Chain A (mW) + Chain B (mW) + Duty factor.

Channel No.	Frequency (MHz)	Data Rate (Mbps)	Chain	PPSD (dBm)	Duty factor (dB)	Total PPSD (dBm)	Required Limit (dBm)	Result
149	5745	6	A	-6.97	0.17	-1.86	<30	Pass
			B	-3.71				Pass
157	5785	6	A	-6.38	0.17	-1.50	<30	Pass
			B	-3.47				Pass
165	5825	6	A	-6.04	0.17	-0.76	<30	Pass
			B	-2.53				Pass

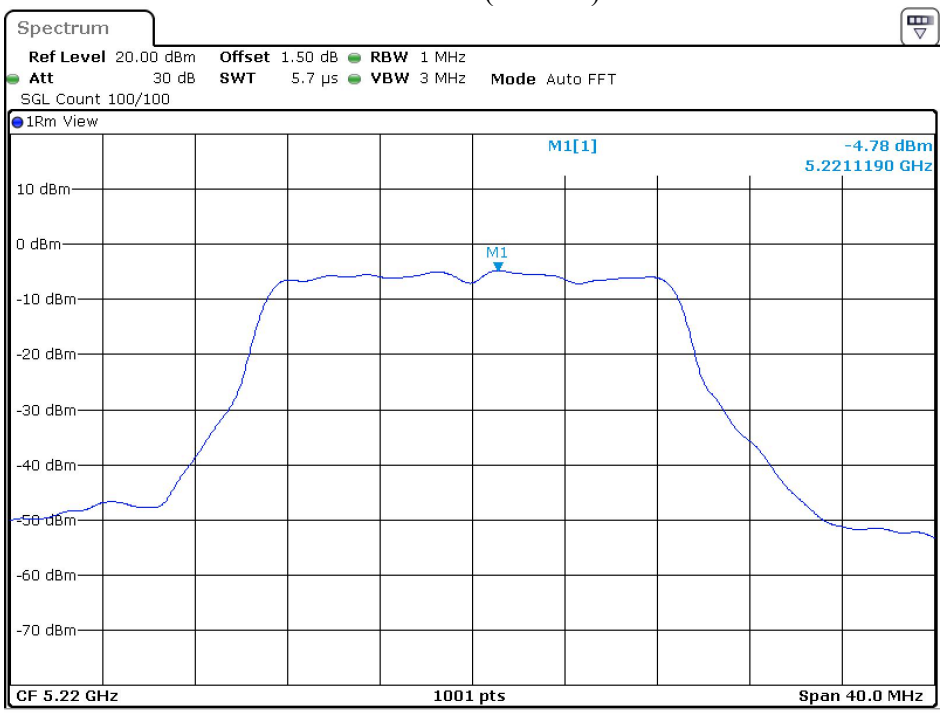
Note:
1. Total PPSD = 10*log (Chain A (mW) + Chain B (mW) + Duty factor.

Channel 36 (Chain A)



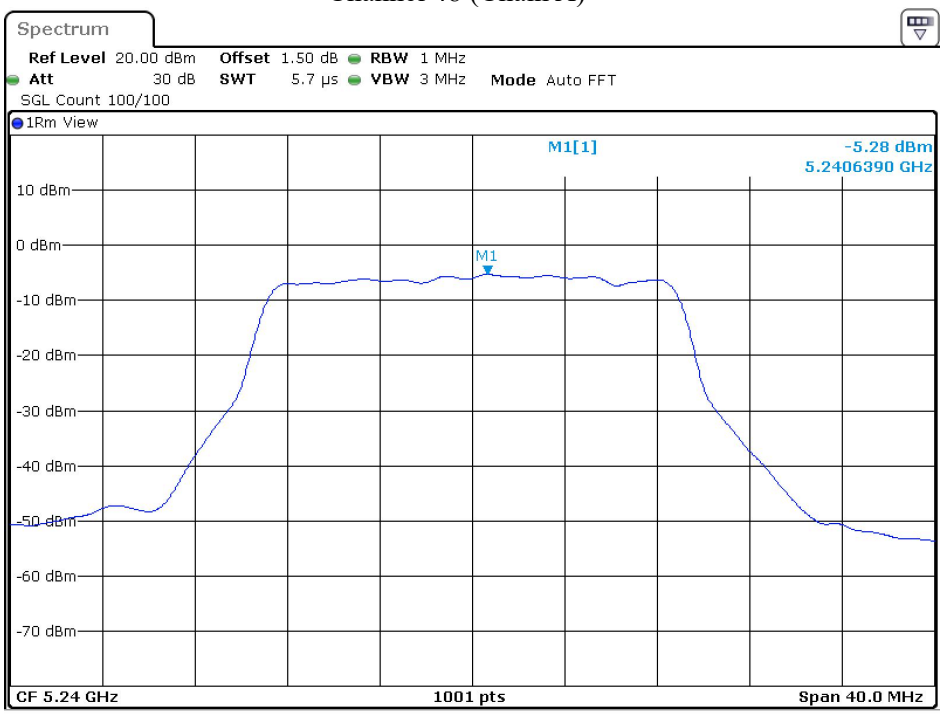
Date: 19.OCT.2023 19:20:41

Channel 44 (Chain A)



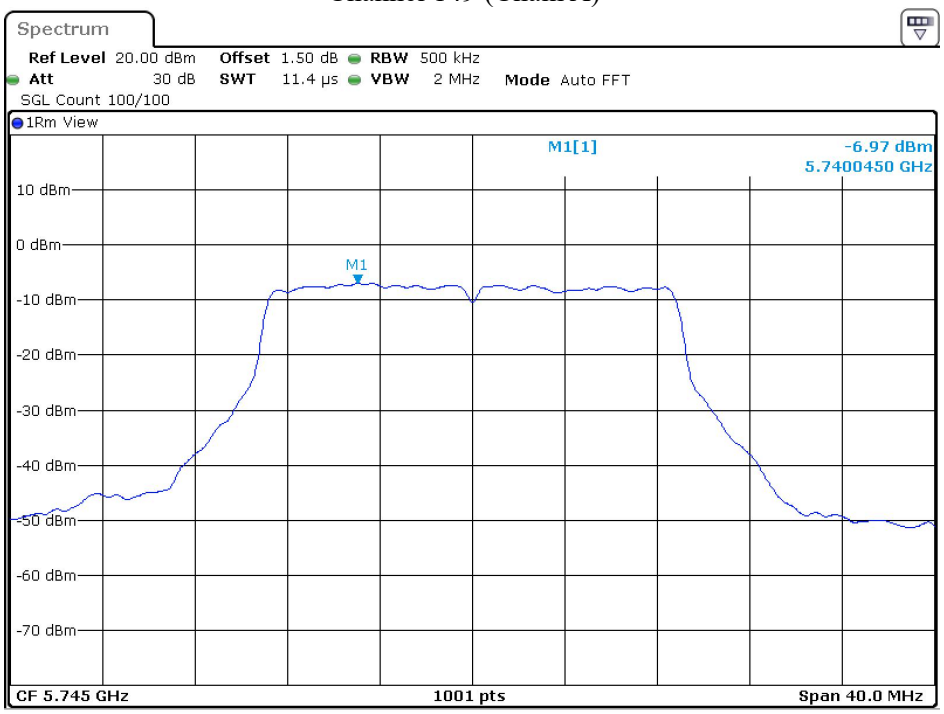
Date: 19.OCT.2023 19:21:13

Channel 48 (Chain A)



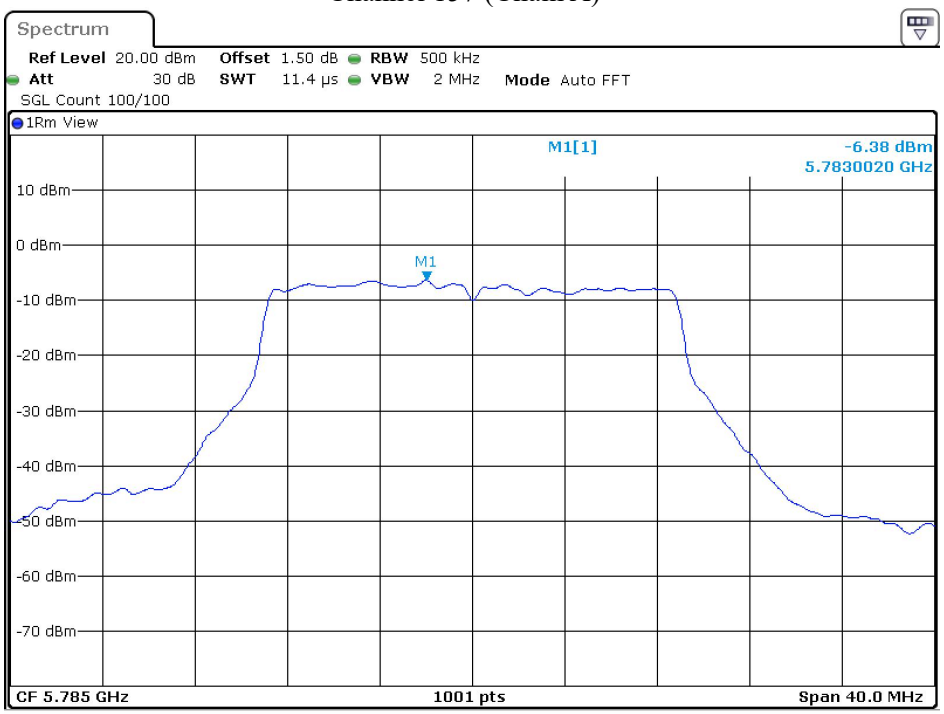
Date: 19.OCT.2023 19:21:44

Channel 149 (Chain A)



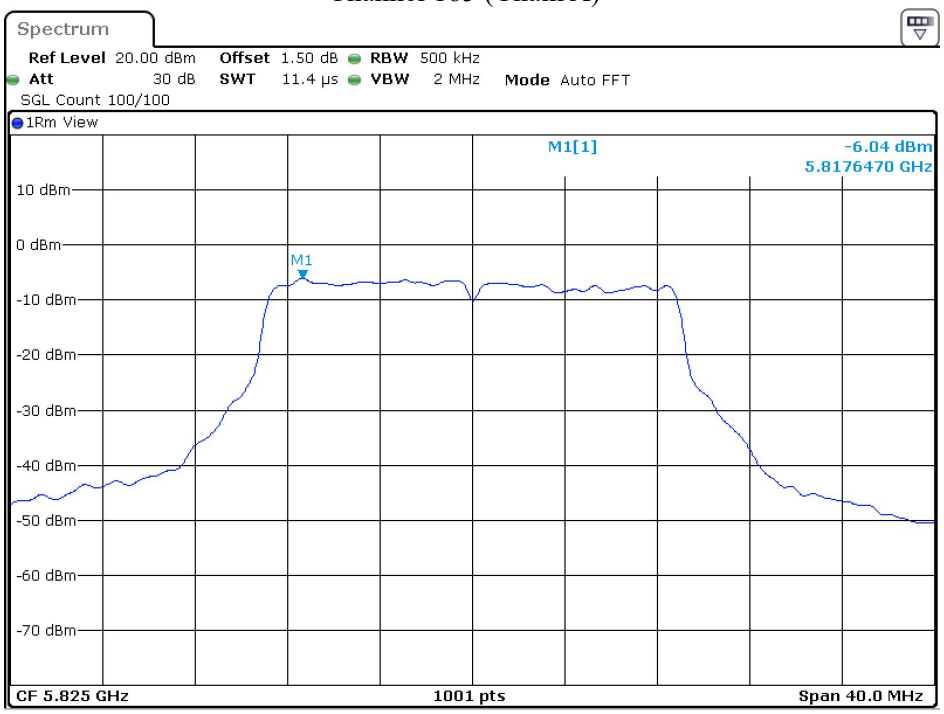
Date: 19.OCT.2023 19:31:07

Channel 157 (Chain A)



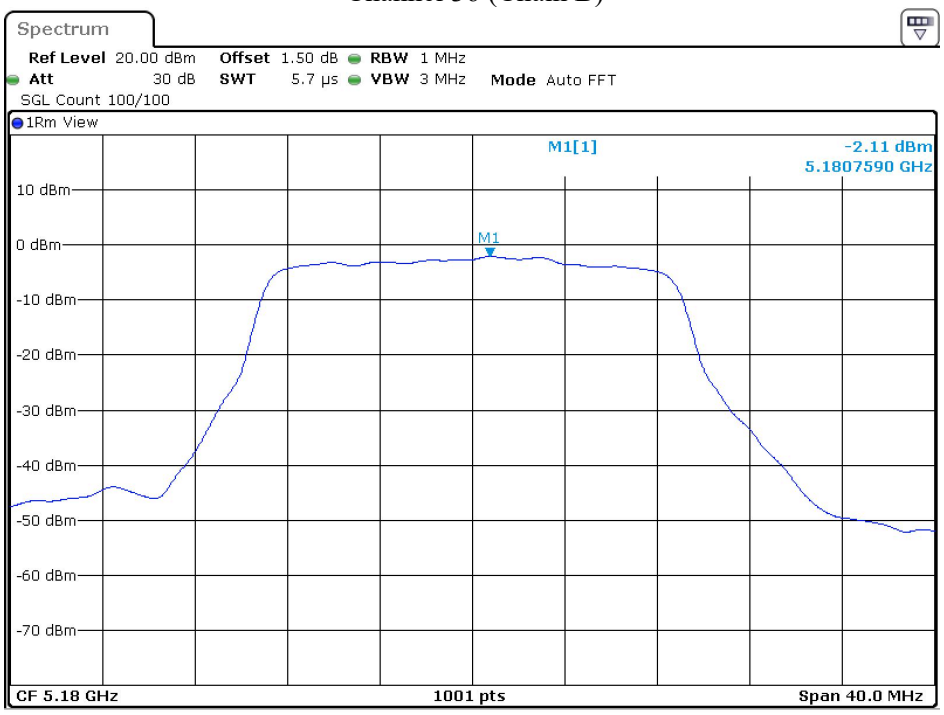
Date: 19.OCT.2023 19:32:33

Channel 165 (Chain A)



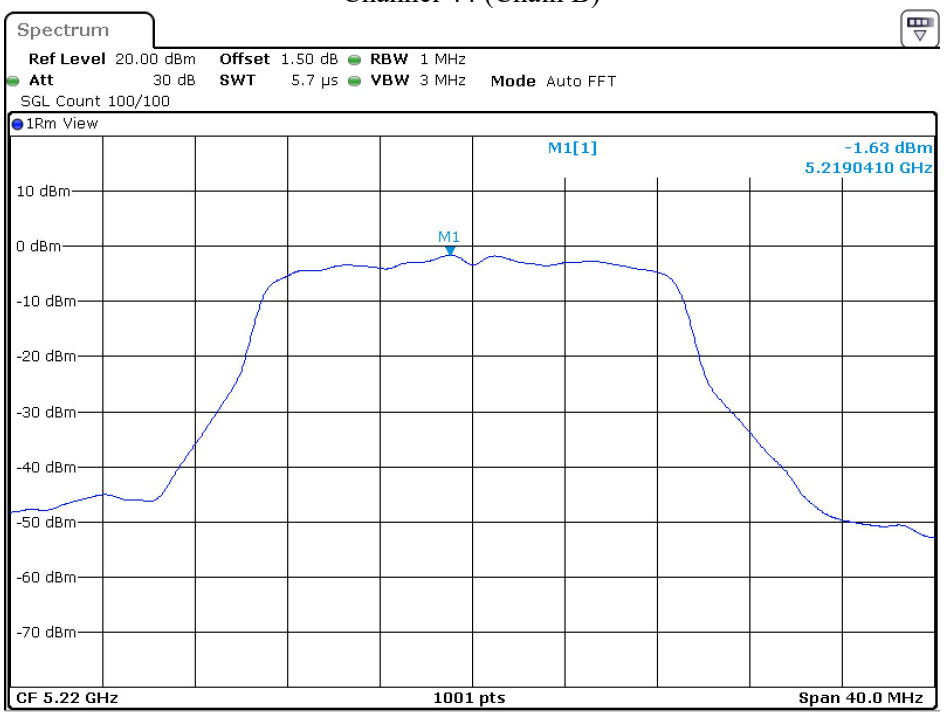
Date: 19.OCT.2023 19:33:30

Channel 36 (Chain B)



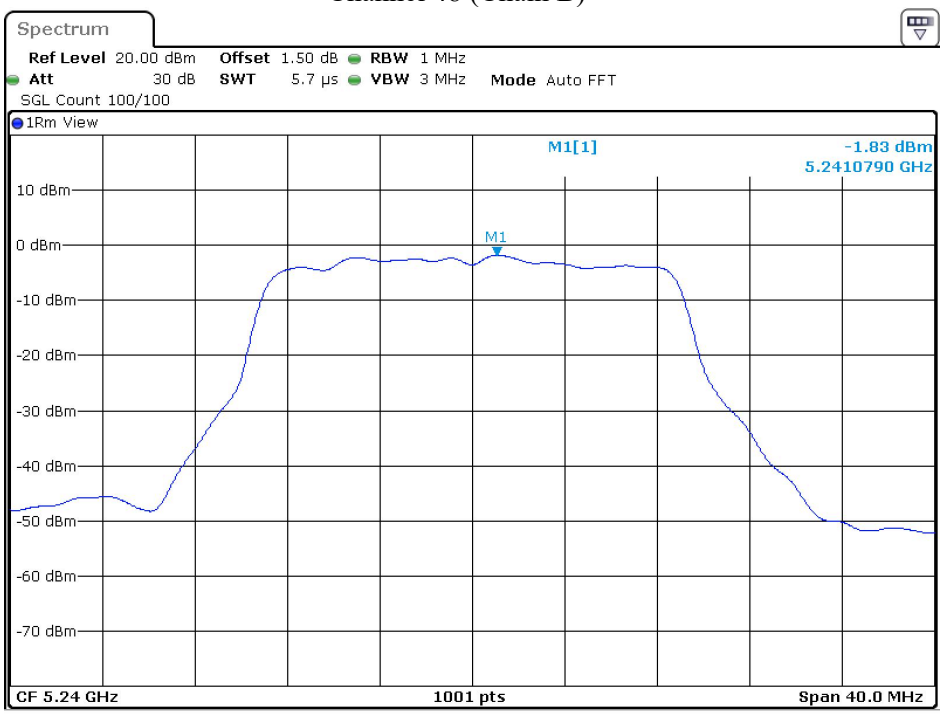
Date: 19.OCT.2023 22:10:44

Channel 44 (Chain B)



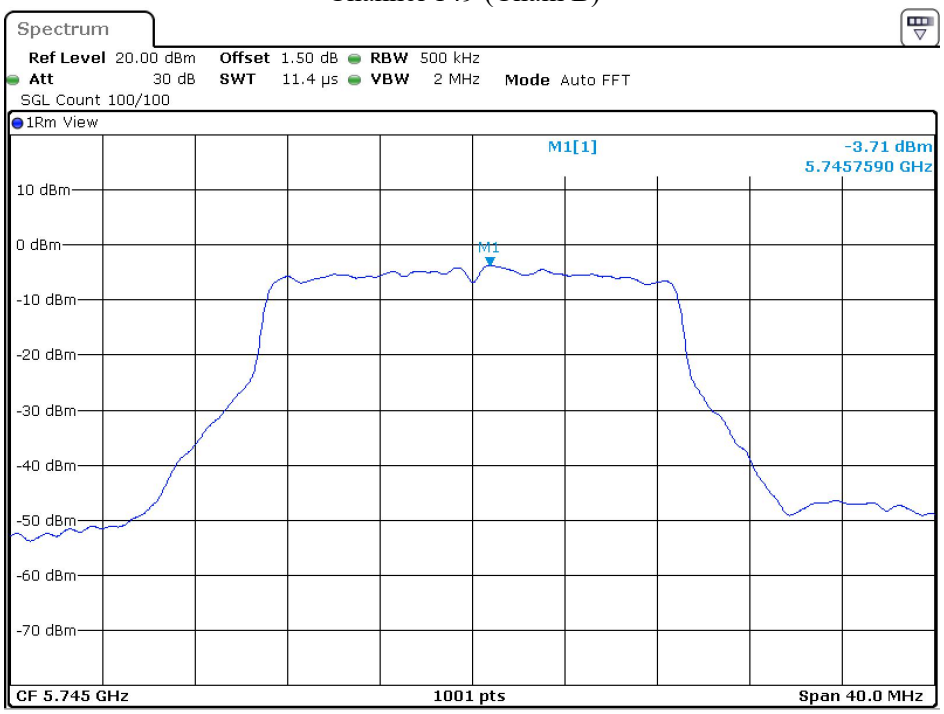
Date: 19.OCT.2023 22:11:26

Channel 48 (Chain B)



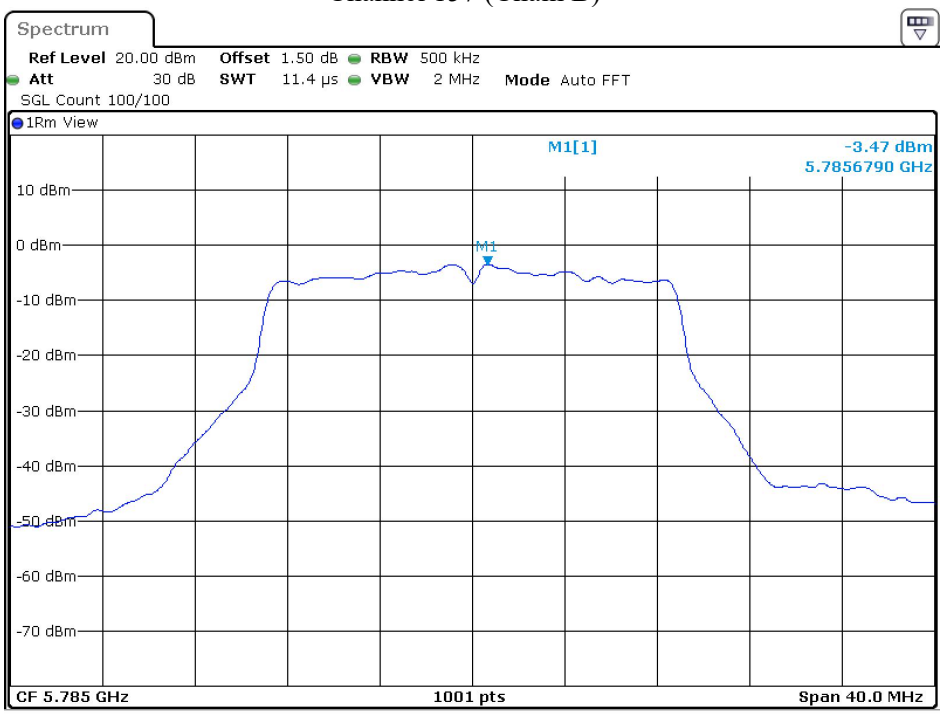
Date: 19.OCT.2023 22:12:03

Channel 149 (Chain B)



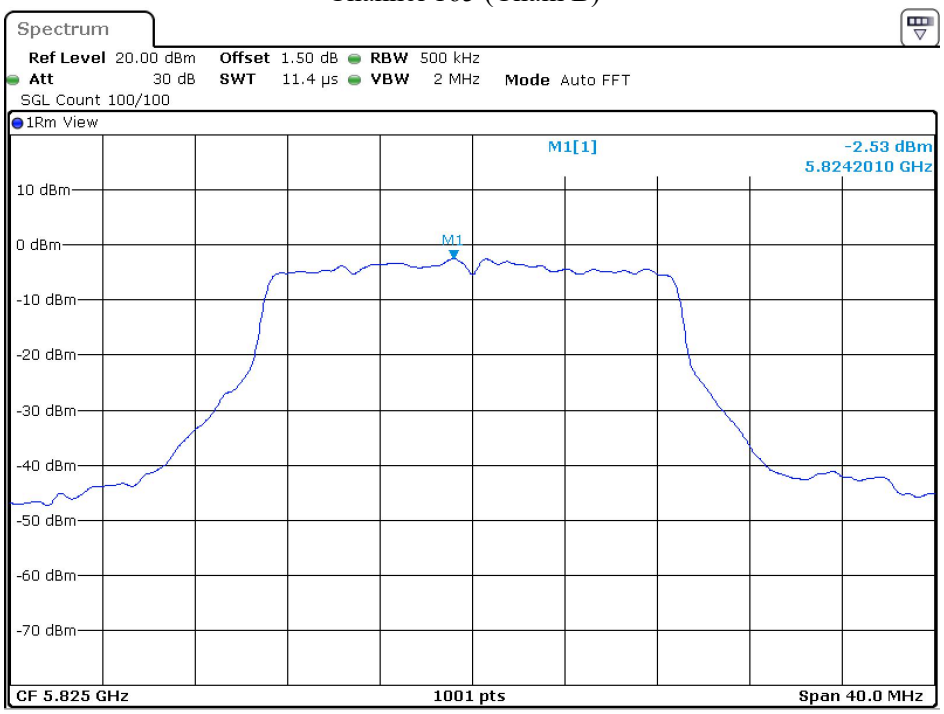
Date: 19.OCT.2023 22:19:27

Channel 157 (Chain B)



Date: 19.OCT.2023 22:20:16

Channel 165 (Chain B)



Date: 19.OCT.2023 22:21:14

Product : Multimedia device with Bluetooth and WLAN
Test Item : Peak Power Spectral Density
Test Mode : Transmit (802.11ac-40 MHz) - NA2
Test Date : 2023/10/19
Test Sample : ID 02

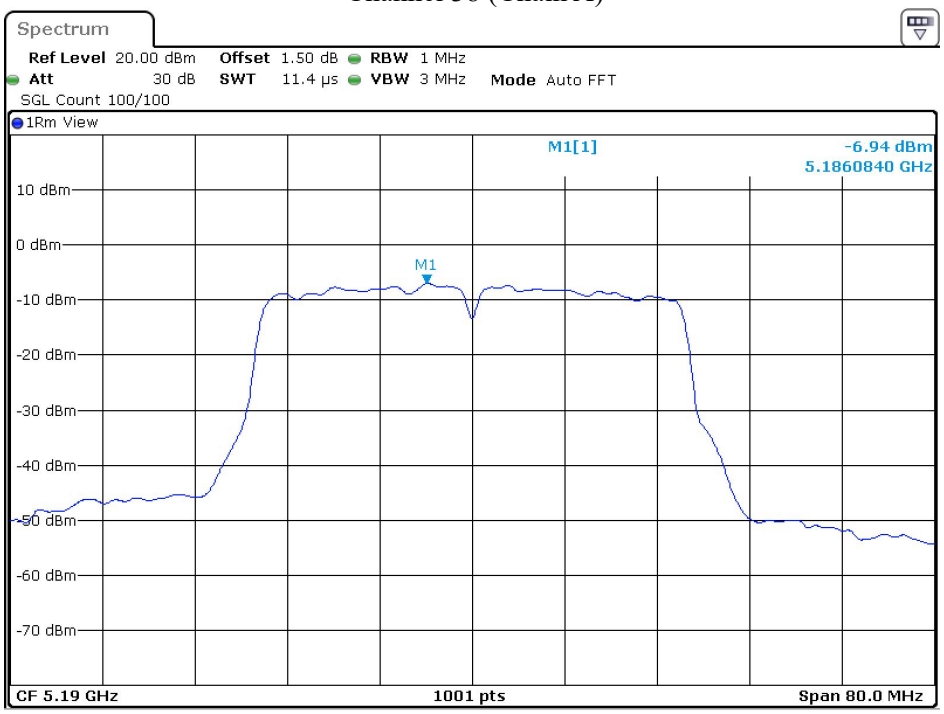
Channel No.	Frequency (MHz)	Data Rate (Mbps)	Chain	PPSD/MHz (dBm)	Duty factor (dB)	Total PPSD/MHz (dBm)	Required Limit (dBm)	Result
38	5190	MCS0	A	-6.94	0.32	-2.77	<10.48	Pass
			B	-5.40				Pass
46	5230	MCS0	A	-7.14	0.32	-2.38	<10.48	Pass
			B	-4.64				Pass

Note:
1. Total PPSD/MHz = 10*log (Chain A (mW) + Chain B (mW) + Duty factor.

Channel No.	Frequency (MHz)	Data Rate (Mbps)	Chain	PPSD (dBm)	Duty factor (dB)	Total PPSD (dBm)	Required Limit (dBm)	Result
151	5755	MCS0	A	-8.92	0.32	-4.27	<30	Pass
			B	-6.59				Pass
159	5795	MCS0	A	-8.48	0.32	-4.02	<30	Pass
			B	-6.46				Pass

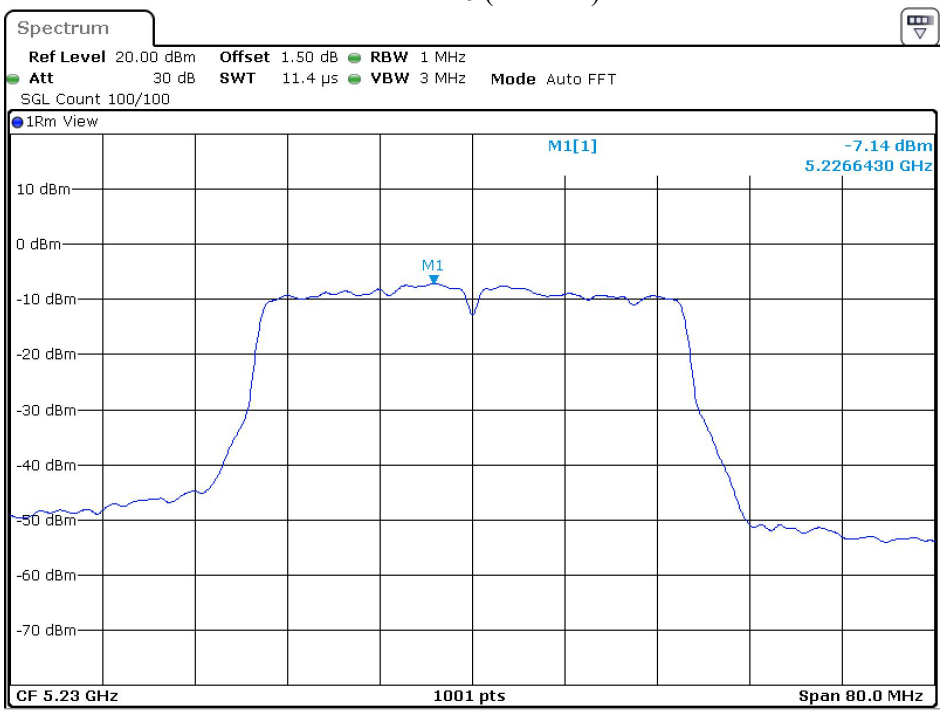
Note:
1. Total PPSD = 10*log (Chain A (mW) + Chain B (mW) + Duty factor.

Channel 38 (Chain A)



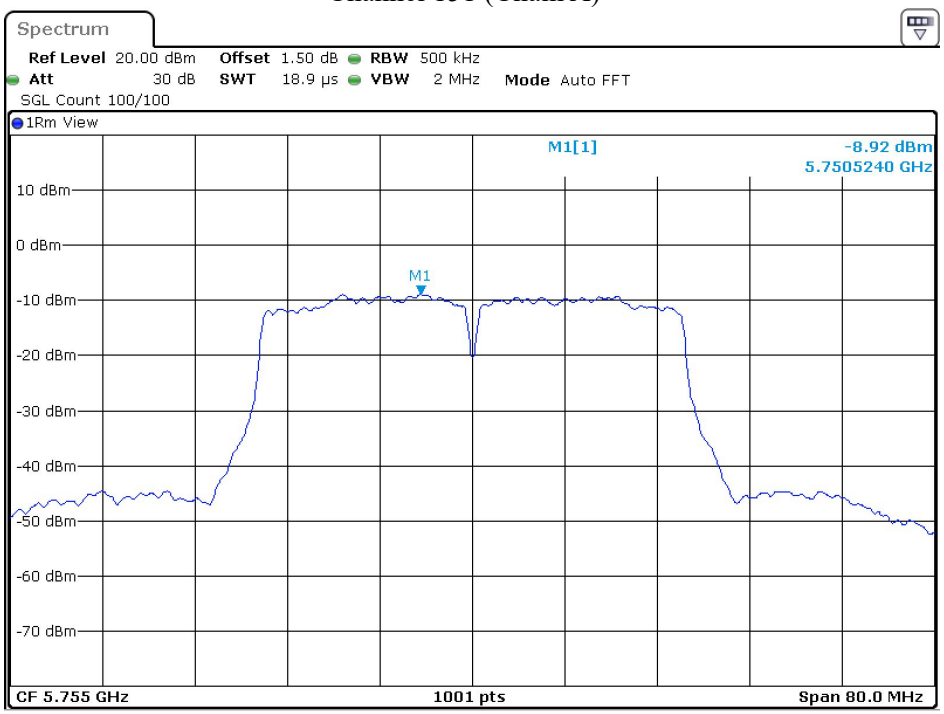
Date: 19.OCT.2023 19:34:59

Channel 46 (Chain A)



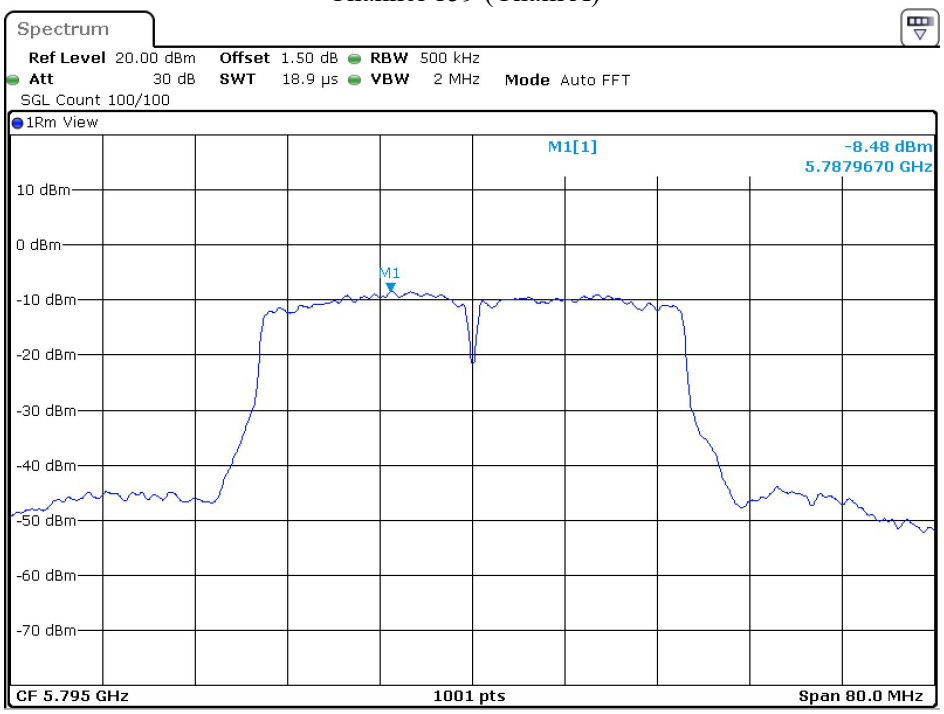
Date: 19.OCT.2023 19:35:28

Channel 151 (Chain A)



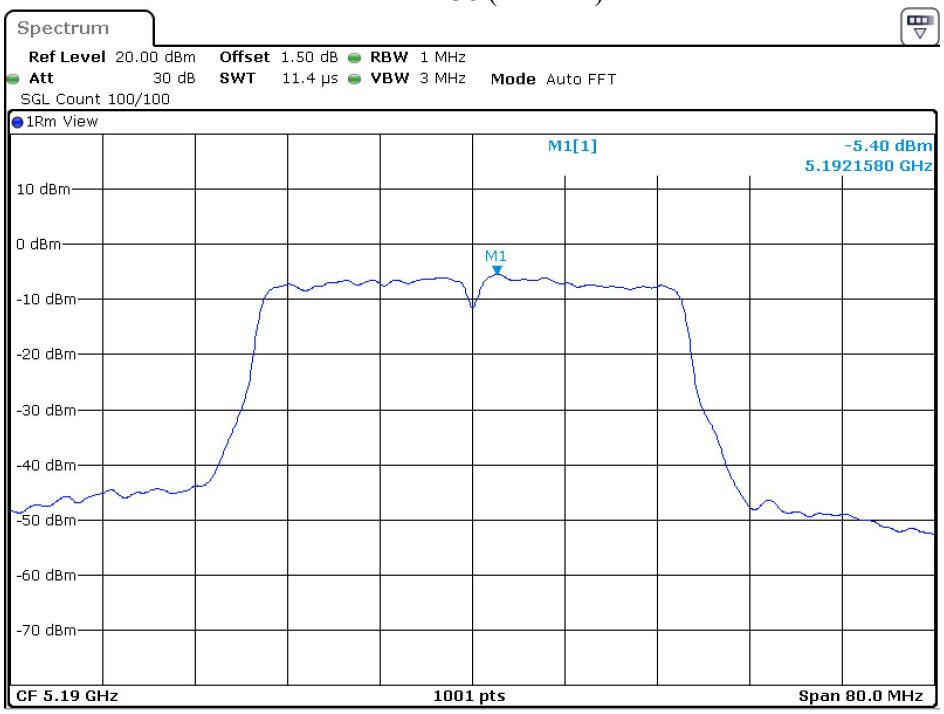
Date: 19.OCT.2023 19:44:26

Channel 159 (Chain A)



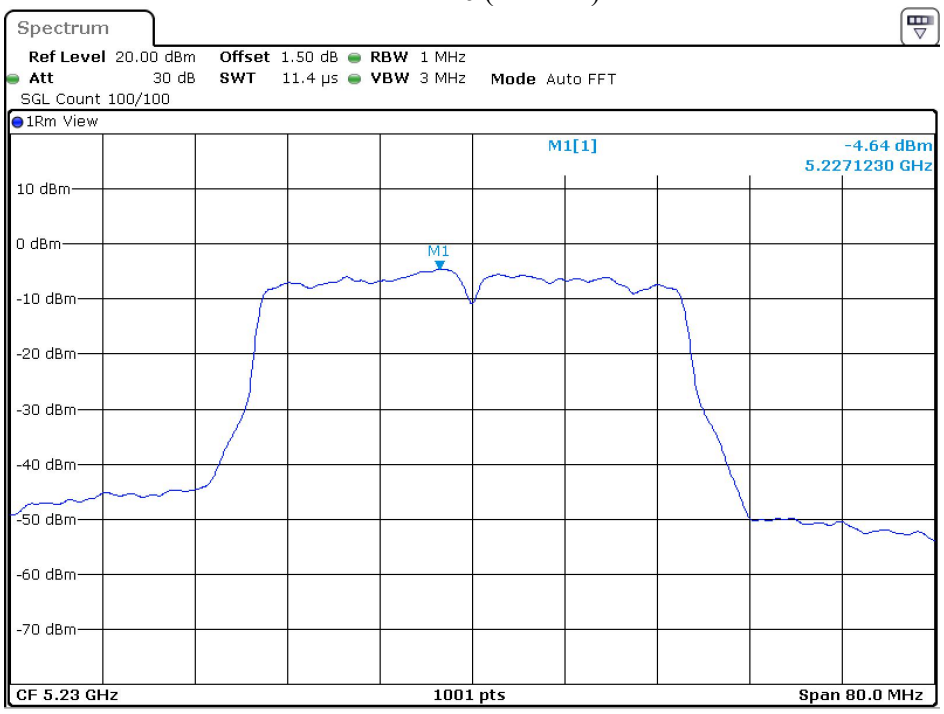
Date: 19.OCT.2023 19:45:43

Channel 38 (Chain B)



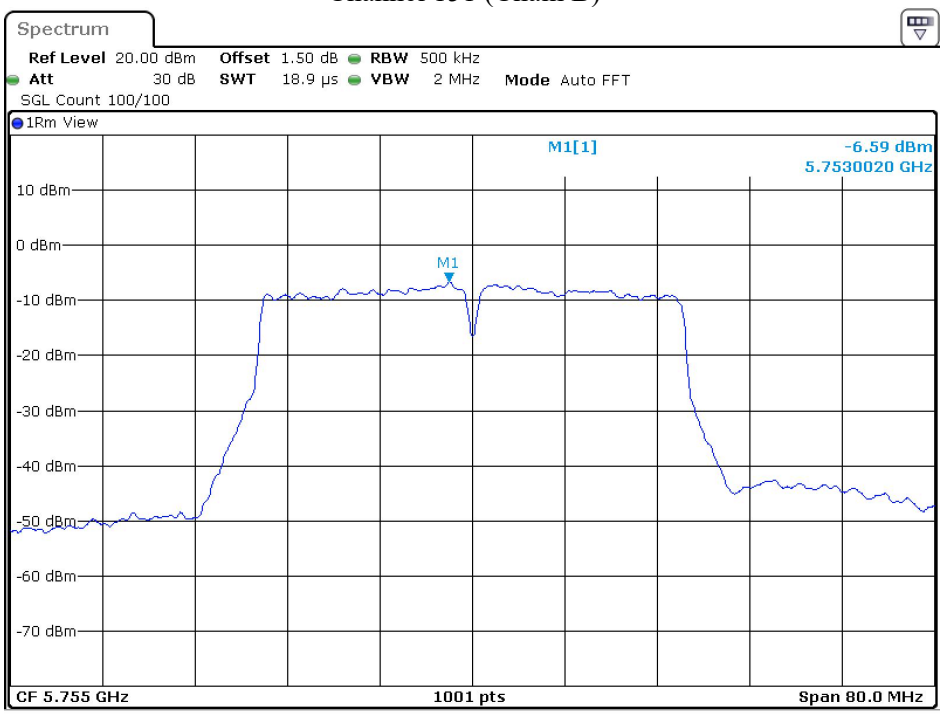
Date: 19.OCT.2023 21:55:12

Channel 46 (Chain B)



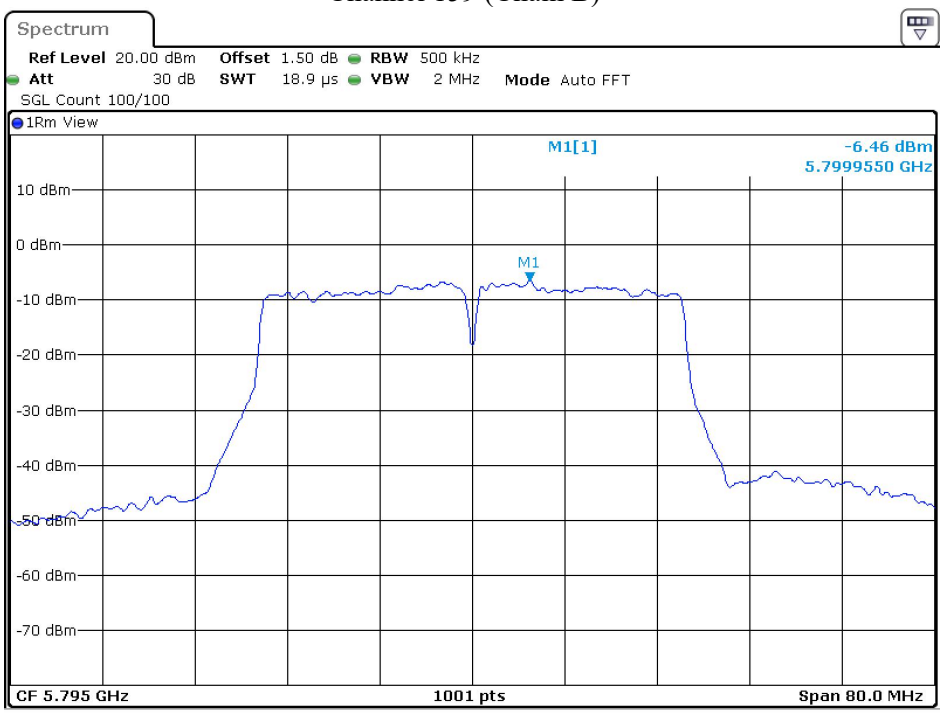
Date: 19.OCT.2023 21:58:12

Channel 151 (Chain B)



Date: 19.OCT.2023 22:08:38

Channel 159 (Chain B)



Date: 19.OCT.2023 22:09:50

Product : Multimedia device with Bluetooth and WLAN
Test Item : Peak Power Spectral Density
Test Mode : Transmit (802.11a) - NA1
Test Date : 2023/10/19
Test Sample : ID 02

Channel No.	Frequency (MHz)	Data Rate (Mbps)	Chain	PPSD/MHz (dBm)	Duty factor (dB)	Total PPSD/MHz (dBm)	Required Limit (dBm)	Result
36	5180	6	A	-2.92	0.00	1.25	<9.87	Pass
			B	-0.84				Pass
44	5220	6	A	-3.40	0.00	0.80	<9.87	Pass
			B	-1.27				Pass
48	5240	6	A	-3.58	0.00	0.95	<9.87	Pass
			B	-0.94				Pass

Note:
1. Total PPSD/MHz = 10*log (Chain A (mW) + Chain B (mW) + Duty factor.

Channel No.	Frequency (MHz)	Data Rate (Mbps)	Chain	PPSD (dBm)	Duty factor (dB)	Total PPSD (dBm)	Required Limit (dBm)	Result
149	5745	6	A	-4.82	0.00	-0.50	<28.32	Pass
			B	-2.51				Pass
157	5785	6	A	-4.02	0.00	-0.37	<28.32	Pass
			B	-2.82				Pass
165	5825	6	A	-4.50	0.00	-0.23	<28.32	Pass
			B	-2.27				Pass

Note:
1. Total PPSD = 10*log (Chain A (mW) + Chain B (mW) + Duty factor.