FCC Test Report

Product Name	Gigabit LTE Multi-Service Router / LTE Dual-SIM Dual-Band Wireless VoIP VPN Router
Model No	BEC 6600VAL, BEC 6600AEL, BEC 6600X, BiPAC 4520VAOZ R3, BiPAC 4520VAPZ R3, BiPAC 4500VAOZ R3, BiPAC 4500VAPZ R3, BiPAC 4520AZ R3, BiPAC 4520AZL R3, BiPAC 4500AZ R3, BiPAC 4500AZL R3, BiPAC 4520VNOZ R3, BiPAC 4520VNPZ R3, BiPAC 4500VNOZ R3, BiPAC 4500VNPZ R3, BiPAC 4520NZ R3, BiPAC 4520NZL R3, BiPAC 4500NZ R3, BiPAC 4500NZL R3, BiPAC 4520Z R3, BiPAC 4520ZL R3, BiPAC 4500Z R3, BiPAC 4500ZL R3
FCC ID	QI3BEC-6600AEL

Applicant	Billion Electric Co., Ltd.
Address	8F., No.192, Sec. 2, Zhongxing Rd., Xindian Dist., New Taipei City 231, Taiwan (R.O.C.)

Date of Receipt	Aug. 28, 2020
Issued Date	Oct. 29, 2020
Report No.	2080882R-E3032110125
Report Version	V1.0

Testing Laboratory
3023

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

Test Report

Issued Date: Oct. 29, 2020
Report No.: 2080882R-E3032110125

Product Name	Gigabit LTE Multi-Service Router / LTE Dual-SIM Dual-Band Wireless VoIP VPN Router
Applicant	Billion Electric Co., Ltd.
Address	8F., No.192, Sec. 2, Zhongxing Rd., Xindian Dist., New Taipei City 231, Taiwan (R.O.C.)
Manufacturer	Billion Electric Co., Ltd.
Model No.	BEC 6600VAL, BEC 6600AEL, BEC 6600X, BiPAC 4520VAOZ R3, BiPAC 4520VAPZ R3, BiPAC 4500VAOZ R3, BiPAC 4500VAPZ R3, BiPAC 4520AZ R3, BiPAC 4520AZL R3, BiPAC 4500AZ R3, BiPAC 4500AZL R3, BiPAC 4520VNOZ R3, BiPAC 4520VNPZ R3, BiPAC 4500VNOZ R3, BiPAC 4500VNPZ R3, BiPAC 4520NZ R3, BiPAC 4520NZL R3, BiPAC 4500NZ R3, BiPAC 4500NZL R3, BiPAC 4520Z R3, BiPAC 4520ZL R3, BiPAC 4500Z R3, BiPAC 4500ZL R3
FCC ID.	QI3BEC-6600AEL
EUT Rated Voltage	AC 100-240V, 50-60Hz
EUT Test Voltage	AC 120V / 60Hz
Trade Name	BEC, Billion
Applicable Standard	FCC CFR Title 47 Part 15 Subpart E ANSI C63.4: 2014, ANSI C63.10: 2013 KDB Publication 789033
Test Result	Complied

Documented By : Genie Chang
(Senior Adm. Specialist / Genie Chang)

Tested By : Jason Tuan
(Engineer / Jason Tuan)

Approved By :
(Director / Vincent Lin)

TABLE OF CONTENTS

Revision History

Report No.	Version	Description	Issued Date
2080882R-E3032110125	V1.0	Initial issue of report.	2020-10-28

1. GENERAL INFORMATION

1.1. EUT Description

Product Name	Gigabit LTE Multi-Service Router / LTE Dual-SIM Dual-Band Wireless VoIP VPN Router
Trade Name	BEC, Billion
Model No.	BEC 6600VAL, BEC 6600AEL, BEC 6600X, BiPAC 4520VAOZ R3, BiPAC 4520VAPZ R3, BiPAC 4500VAOZ R3, BiPAC 4500VAPZ R3, BiPAC 4520AZ R3, BiPAC 4520AZL R3, BiPAC 4500AZ R3, BiPAC 4500AZL R3, BiPAC 4520VNOZ R3, BiPAC 4520VNPZ R3, BiPAC 4500VNOZ R3, BiPAC 4500VNPZ R3, BiPAC 4520NZ R3, BiPAC 4520NZL R3, BiPAC 4500NZ R3, BiPAC 4500NZL R3, BiPAC 4520Z R3, BiPAC 4520ZL R3, BiPAC 4500Z R3, BiPAC 4500ZL R3
FCC ID.	QI3BEC-6600AEL
Frequency Range	802.11a/n/ac-20MHz: 5180-5240MHz, 5745-5825MHz 802.11n/ac-40MHz: 5190-5230MHz, 5755-5795MHz 802.11ac-80MHz: 5210MHz, 5775MHz
Number of Channels	802.11a/n/ac-20MHz: 9, 802.11n/ac-40MHz: 4, 802.11ac-80MHz: 2
Data Rate	802.11a: 6 - 54Mbps 802.11n: up to 600Mbps 802.11ac-80MHz: up to 1733.3MHz
Type of Modulation	802.11a/n/ac: OFDM, BPSK, QPSK, 16QAM, 64QAM, 256QAM
Antenna Type	PCB/Dipole Antenna
Antenna Gain	Refer to the table “Antenna List”
Channel Control	Auto
Power Adapter	MFR: Billion, M/N: BA040-150200EXU Input: AC 100-240V~1A 50/60Hz Output: 15V⎓2.0A Cable Out: Non-shielded, 1.5m

Antenna List

No.	Manufacturer	Part No.	Antenna Type	Peak Gain
1	Master Wave	98PH8PIPF000(5GHz 1) 98PH7PIPF000(5GHz 2)	PCB Antenna	3.95dBi for 5.150-5.250 GHz 4.90dBi for 5.725-5.850 GHz
		98612PRSX000(5GHz 3) 98612PRSX000(5GHz 4)	Dipole Antenna	3.13dBi for 5.150-5.250 GHz 3.52dBi for 5.725-5.850 GHz

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

The EUT is including twenty three models for different marketing requirement, please see the following table for differences, only the worst-case model (BiPAC 4520VAOZ R3) was tested and recorded in this report.

Note: The different of the each model is shown as below:

Model Name: BEC 6600AEL Gigabit LTE Multi-Service Router
Model Name: BiPAC 4520VAOZ R3 LTE Dual-SIM Dual-Band Wireless VoIP VPN Router

	Trade Name	External LTE Antenna	Wi-Fi Antenna	VPN	VoIP	WiFi 5GHz/2.4GHz	SIM Slot	USB Host	Power Adapter
BEC 6600VAL	BEC	LTE Wide-band Antenna *4pcs	5/ 2.4GHz External WiFi Antenna *2pcs 5/ 2.4GHz Embedded WiFi Antenna *2pcs	X	O	5GHz+2.4GHz	1	O	DC 15V/ 2.0A
BEC 6600AEL	BEC	LTE Wide-band Antenna *4pcs	5/ 2.4GHz External WiFi Antenna *2pcs 5/ 2.4GHz Embedded WiFi Antenna *2pcs	O	X	5GHz+2.4GHz	1	O	DC 15V/ 2.0A
BEC 6600X	BEC	LTE Wide-band Antenna *4pcs	5/ 2.4GHz External WiFi Antenna *2pcs 5/ 2.4GHz Embedded WiFi Antenna *2pcs	O	O	5GHz+2.4GHz	1	O	DC 15V/ 2.0A
BiPAC 4520VAOZ R3	Billion	LTE Wide-band Antenna *4pcs	5/ 2.4GHz External WiFi Antenna *2pcs 5/ 2.4GHz Embedded WiFi Antenna *2pcs	O	O	5GHz+2.4GHz	2	O	DC 15V/ 2.0A
BiPAC 4520VAPZ R3	Billion	LTE Wide-band Antenna *4pcs	5/ 2.4GHz External WiFi Antenna *2pcs 5/ 2.4GHz Embedded WiFi Antenna *2pcs	X	O	5GHz+2.4GHz	2	O	DC 15V/ 2.0A
BiPAC 4500VAOZ R3	Billion	LTE Wide-band Antenna *4pcs	5/ 2.4GHz External WiFi Antenna *2pcs 5/ 2.4GHz Embedded WiFi Antenna *2pcs	O	O	5GHz+2.4GHz	1	O	DC 15V/ 2.0A
BiPAC 4500VAPZ R3	Billion	LTE Wide-band Antenna *4pcs	5/ 2.4GHz External WiFi Antenna *2pcs 5/ 2.4GHz Embedded WiFi Antenna *2pcs	X	O	5GHz+2.4GHz	1	O	DC 15V/ 2.0A
BiPAC 4520AZ R3	Billion	LTE Wide-band Antenna *4pcs	5/ 2.4GHz External WiFi Antenna *2pcs 5/ 2.4GHz Embedded WiFi Antenna *2pcs	O	X	5GHz+2.4GHz	2	O	DC 15V/ 2.0A
BiPAC 4520AZL R3	Billion	LTE Wide-band Antenna *4pcs	5/ 2.4GHz External WiFi Antenna *2pcs 5/ 2.4GHz Embedded WiFi Antenna *2pcs	X	X	5GHz+2.4GHz	2	O	DC 15V/ 2.0A
BiPAC 4500AZ R3	Billion	LTE Wide-band Antenna *4pcs	5/ 2.4GHz External WiFi Antenna *2pcs 5/ 2.4GHz Embedded WiFi Antenna *2pcs	O	X	5GHz+2.4GHz	1	O	DC 15V/ 2.0A
BiPAC 4500AZL R3	Billion	LTE Wide-band Antenna *4pcs	5/ 2.4GHz External WiFi Antenna *2pcs 5/ 2.4GHz Embedded WiFi Antenna *2pcs	X	X	5GHz+2.4GHz	1	O	DC 15V/ 2.0A
BiPAC 4520VNOZ R3	Billion	LTE Wide-band Antenna *4pcs	5/ 2.4GHz External WiFi Antenna *2pcs 5/ 2.4GHz Embedded WiFi Antenna *1pcs	O	O	2.4GHz	2	O	DC 15V/ 2.0A
BiPAC 4520VNPZ R3	Billion	LTE Wide-band Antenna *4pcs	5/ 2.4GHz External WiFi Antenna *2pcs 5/ 2.4GHz Embedded WiFi Antenna *1pcs	X	O	2.4GHz	2	O	DC 15V/ 2.0A
BiPAC 4500VNOZ R3	Billion	LTE Wide-band Antenna *4pcs	5/ 2.4GHz External WiFi Antenna *2pcs 5/ 2.4GHz Embedded WiFi Antenna *1pcs	O	O	2.4GHz	1	O	DC 15V/ 2.0A
BiPAC 4500VNPZ R3	Billion	LTE Wide-band Antenna *4pcs	5/ 2.4GHz External WiFi Antenna *2pcs 5/ 2.4GHz Embedded WiFi Antenna *1pcs	X	O	2.4GHz	1	O	DC 15V/ 2.0A
BiPAC 4520NZ R3	Billion	LTE Wide-band Antenna *4pcs	5/ 2.4GHz External WiFi Antenna *2pcs 5/ 2.4GHz Embedded WiFi Antenna *1pcs	O	X	2.4GHz	2	O	DC 15V/ 2.0A
BiPAC 4520NZL R3	Billion	LTE Wide-band Antenna *4pcs	5/ 2.4GHz External WiFi Antenna *2pcs 5/ 2.4GHz Embedded WiFi Antenna *1pcs	X	X	2.4GHz	2	O	DC 15V/ 2.0A
BiPAC 4500NZ R3	Billion	LTE Wide-band Antenna *4pcs	5/ 2.4GHz External WiFi Antenna *2pcs 5/ 2.4GHz Embedded WiFi Antenna *1pcs	O	X	2.4GHz	1	O	DC 15V/ 2.0A
BiPAC 4500NZL R3	Billion	LTE Wide-band Antenna *4pcs	5/ 2.4GHz External WiFi Antenna *2pcs 5/ 2.4GHz Embedded WiFi Antenna *1pcs	X	X	2.4GHz	1	O	DC 15V/ 2.0A
BiPAC 4520Z *R3*	Billion	LTE Wide-band Antenna *4pcs	X	O	X	X	2	O	DC 15V/ 2.0A
BiPAC 4520ZL *R3*	Billion	LTE Wide-band Antenna *4pcs	X	X	X	X	2	O	DC 15V/ 2.0A
BiPAC 4500Z *R3*	Billion	LTE Wide-band Antenna *4pcs	X	O	X	X	1	O	DC 15V/ 2.0A
BiPAC 4500ZL *R3*	Billion	LTE Wide-band Antenna *4pcs	X	X	X	X	1	O	DC 15V/ 2.0A

Note: "O" means YES, and "X" means NO support in hardware and firmware

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

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

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

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

802.11ac-80MHz Center Working Frequency of Each Channel:

Channel	Frequency	Channel	Frequency
Channel 42:	5210 MHz	Channel 155:	5775 MHz

Note:

1. This EUT is a Gigabit LTE Multi-Service Router / LTE Dual-SIM Dual-Band Wireless VoIP VPN Router with a built-in 2.4GHz & 5GHz WLAN transceiver, this report for 5GHz WLAN.
2. Regarding to the operation frequency, the lowest, middle and highest frequency are selected to perform the test.
3. Lowest and highest data rates are tested in each mode. Only worst case is shown in the report.
4. 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) Mode 2: Transmit (802.11n/ac-20BW) Mode 3: Transmit (802.11n/ac-40BW) Mode 4: Transmit (802.11ac-80BW)

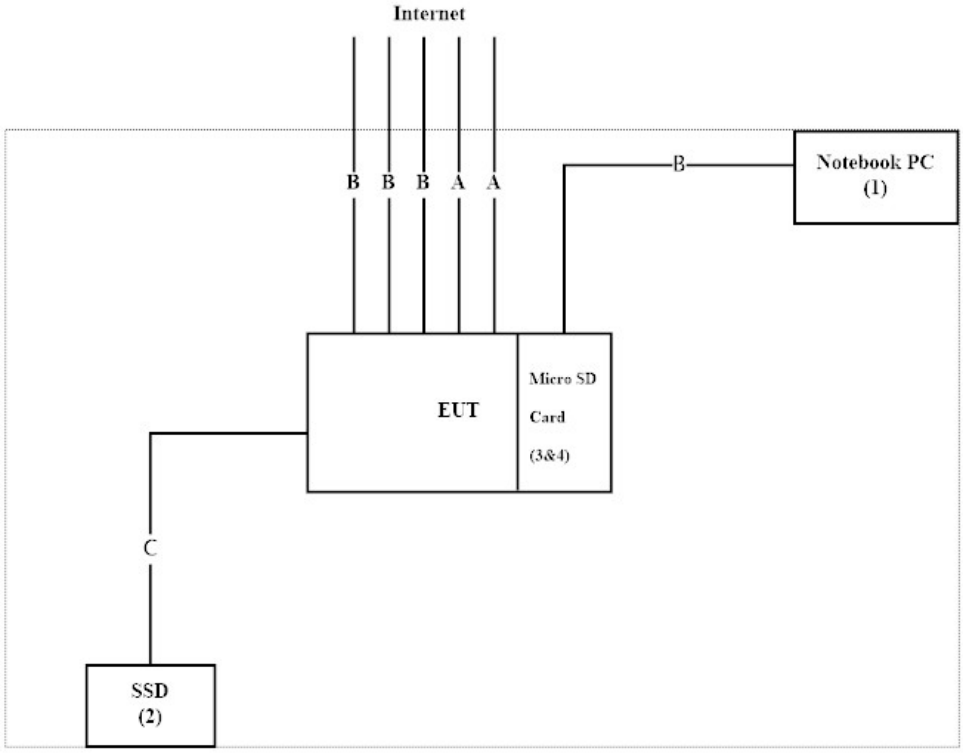
1.2. Tested System Datails

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	Notebook PC	Lenovo	R400	L3AAF9A	N/A
2	SSD(256G)	HP	Portable SSD P600	HBSC28311800016	N/A
3	Micro SD Card 1GB	SanDisk	N/A	0734502841D9M	N/A
4	Micro SD Card 1GB	SanDisk	N/A	0734502841DA7	N/A

Signal Cable Type		Signal cable Description
A	Telecom Cable	Non-shielded, 2m, two PCS.
B	RJ 45 Cable	Non-shielded, 2m, four PCS.
C	USB Cable	Non-shielded, 0.2m

1.3. Configuration of tested System



1.4. EUT Exercise Software

1. Setup the EUT as shown in Section 1.3.
2. Execute software “QATool V0.0.1.7.1” 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
Conducted Emission	Temperature (°C)	10~40 °C	21.4°C
	Humidity (%RH)	10~90 %	58%
Radiated Emission	Temperature (°C)	10~40 °C	24°C
	Humidity (%RH)	10~90 %	71%
Conductive	Temperature (°C)	10~40 °C	24°C
	Humidity (%RH)	10~90 %	58%

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

1.6. 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
	Spectrum Analyzer	Agilent	N9010A	MY53470892	2019/09/25	2020/09/24
X	Spectrum Analyzer	R&S	FSV30	103466	2019/12/16	2020/12/15
X	Peak Power Analyzer	Keysight	8990B	MY51000410	2020/05/12	2021/05/11
X	Wideband Power Sensor	Keysight	N1923A	MY56080003	2020/05/12	2021/05/11
X	Wideband Power Sensor	Keysight	N1923A	MY56080004	2020/05/12	2021/05/11
X	EMI Test Receiver	R&S	ESCS 30	100369	2019/11/27	2020/11/26
X	LISN	R&S	ENV216	101105	2020/04/27	2021/04/26
X	LISN	R&S	ESH3-Z5	836679/014	2020/04/26	2021/04/25
X	Coaxial Cable	DEKRA	RG 400	LC018-RG	2020/06/19	2021/06/18

Note:

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

For Radiated measurements /Site3/CB8

	Equipment	Manufacturer	Model No.	Serial No.	Cali. Date	Due. Date
X	Test Receiver	R&S	ESR7	101602	2019/12/16	2020/12/15
X	Signal Analyzer	R&S	FSV40	101869	2020/06/24	2021/06/23
X	Loop Antenna	Teseq	HLA6121	37133	2019/10/15	2021/10/14
	Bilog Antenna	Schaffner Chase	CBL6112B	2916	2020/01/20	2021/01/19
	Coaxial Cable	DEKRA	L1907-001C	280280.F141.1000D	2019/07/10	2020/07/09
	Amplifier	EMCI	EMC001330	980254	2019/08/22	2020/08/21
	Horn Antenna	ETS-LINDGREN	3117	00228113	2020/05/28	2021/05/27
	Coaxial Cable	DEKRA	L1907-002C	280280.F141.1000D	2019/07/10	2020/07/09
	Amplifier	EMCI	EMC05820SE	980362	2020/06/30	2021/06/29
	Amplifier	EMCI	EMC051845SE	980632	2019/08/08	2020/08/07
X	Horn Antenna	Com-Power	AH-1840	101101	2019/10/31	2020/10/30
X	Amplifier + Cable	EMCI	EMC184045SE	980369	2020/04/23	2021/04/22
X	Bilog Antenna	Schaffner Chase	CBL6112B	2925	2020/02/20	2021/02/19
X	Coaxial Cable	DEKRA	L1907-003C	00100A1B3A120M	2020/07/09	2021/07/08
X	Amplifier	EMCI	EMC001330	980255	2020/03/17	2021/03/16
X	Horn Antenna	ETS-LINDGREN	3117	00228111	2020/05/28	2021/05/27
X	Amplifier	SGH	PRAMP0510	20200206	2020/03/17	2021/03/16
X	Amplifier	SGH	PRAMP118	20200202	2020/03/17	2021/03/16
X	Filter	MICRO-TRONICS	BRM50702	G270	2020/08/17	2021/08/16
X	Filter	MICRO-TRONICS	BRM50716	G196	2020/08/17	2021/08/16

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.

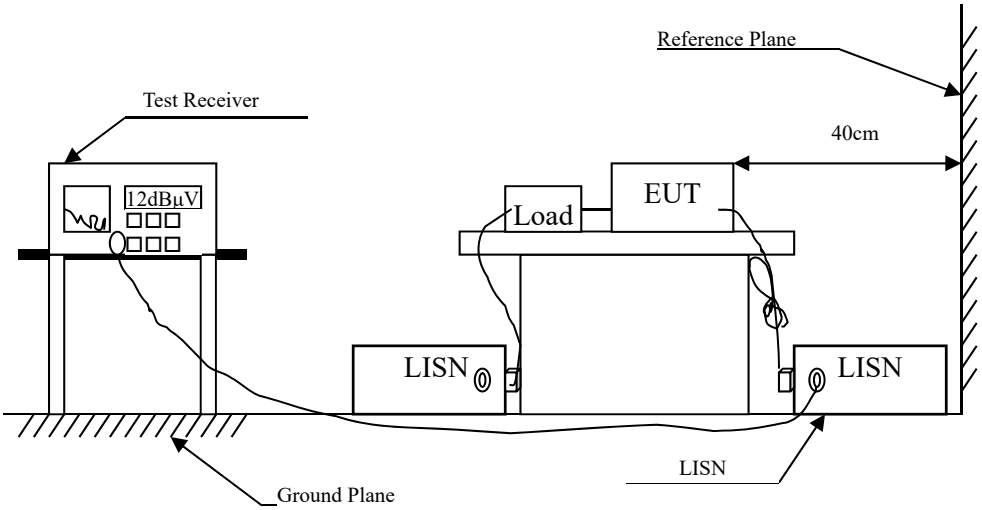
1.7. Uncertainty

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

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

2. Conducted Emission

2.1. Test Setup



2.2. Limits

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

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

2.3. Test Procedure

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

Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10:2013 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

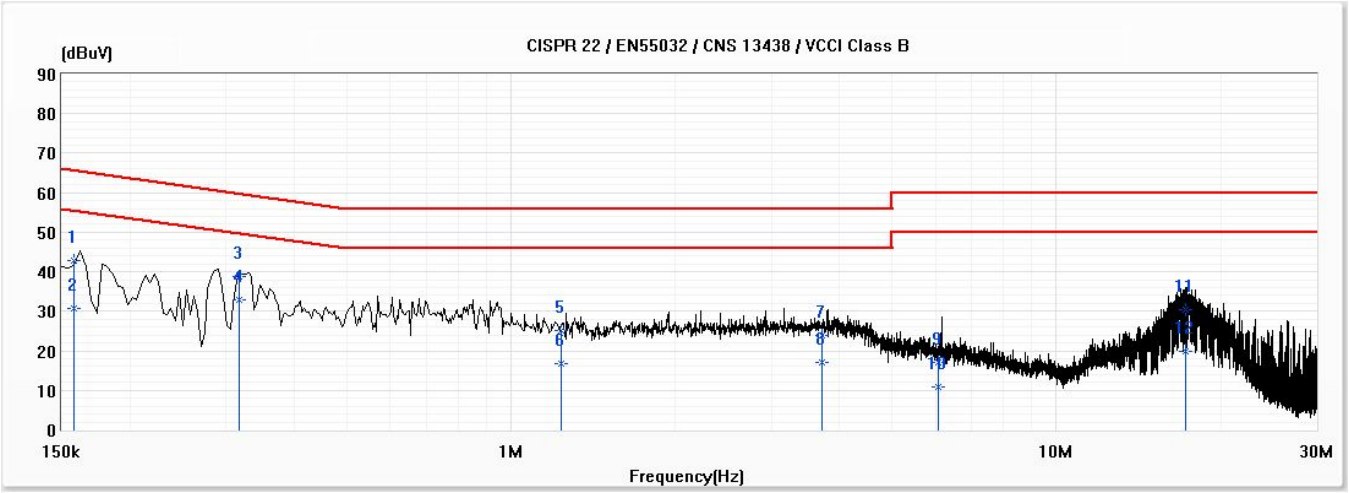
Product : Gigabit LTE Multi-Service Router / LTE Dual-SIM Dual-Band Wireless VoIP VPN Router

Test Item : Conducted Emission Test

Power Line : L1

Test Mode : Mode 4: Transmit (802.11ac-80BW) (5210MHz)

Test Date : 2020/10/26

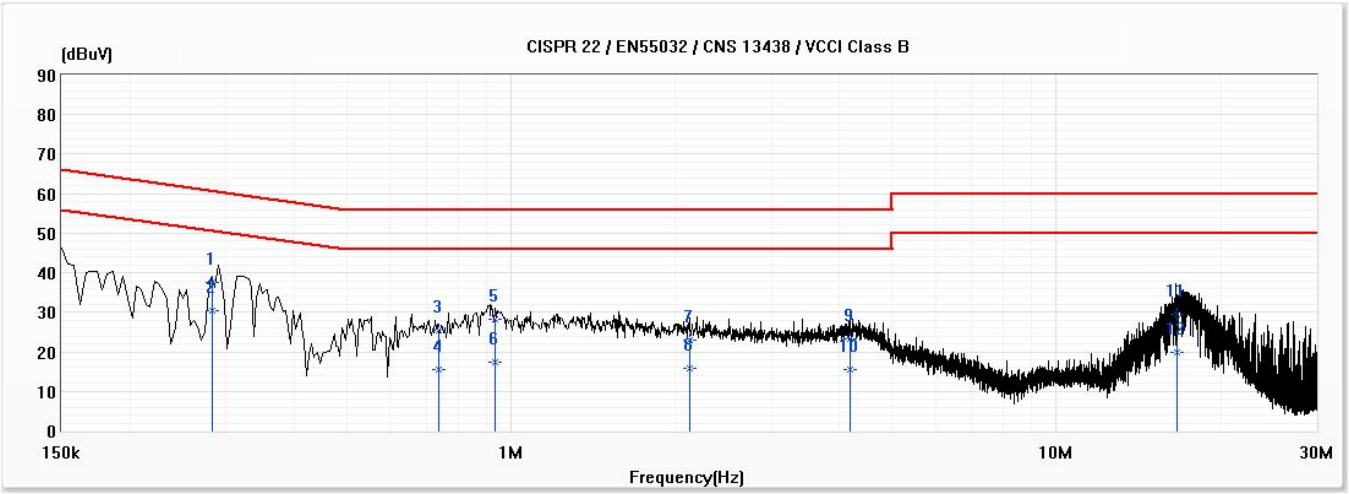


No	Frequency (MHz)	Emission Level (dBuV)	Limit (dBuV)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	0.158	42.88	65.58	-22.70	33.22	9.66	QP
2	0.158	30.82	55.58	-24.75	21.17	9.66	AV
3	0.318	38.91	59.77	-20.86	29.25	9.65	QP
*4	0.318	33.01	49.77	-16.76	23.35	9.65	AV
5	1.237	25.11	56.00	-30.89	15.41	9.70	QP
6	1.237	16.89	46.00	-29.11	7.19	9.70	AV
7	3.725	23.76	56.00	-32.24	14.00	9.76	QP
8	3.725	16.94	46.00	-29.06	7.18	9.76	AV
9	6.067	17.00	60.00	-43.00	7.19	9.82	QP
10	6.067	10.99	50.00	-39.01	1.18	9.82	AV
11	17.277	30.26	60.00	-29.74	20.31	9.95	QP
12	17.277	19.78	50.00	-30.22	9.82	9.95	AV

Note:

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

Product : Gigabit LTE Multi-Service Router / LTE Dual-SIM Dual-Band Wireless VoIP VPN Router
Test Item : Conducted Emission Test
Power Line : N
Test Mode : Mode 4: Transmit (802.11ac-80BW) (5210MHz)
Test Date : 2020/10/26

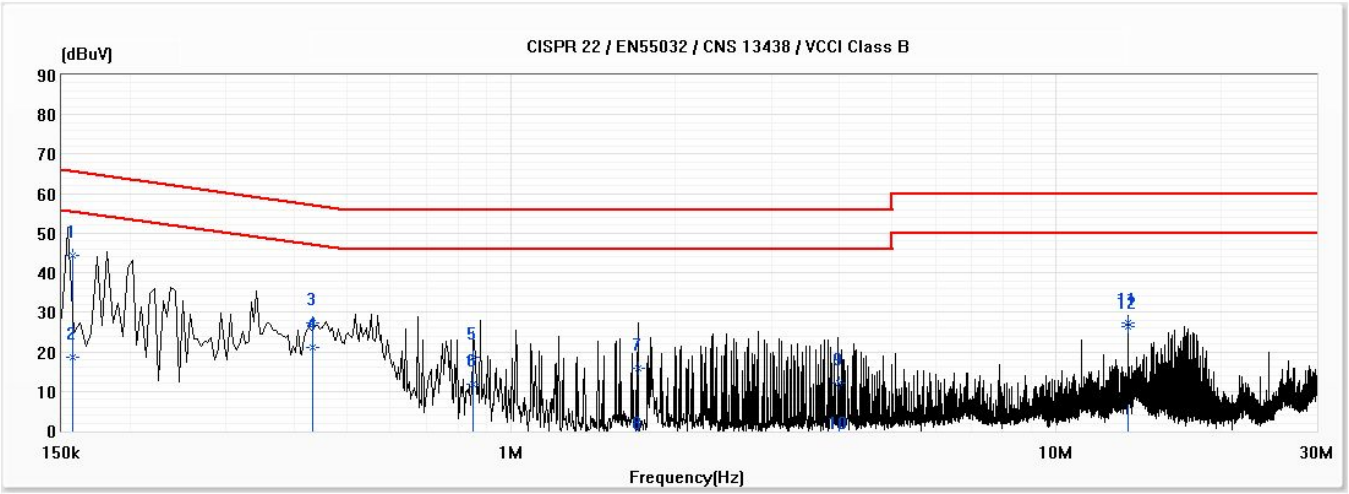


No	Frequency (MHz)	Emission Level (dBuV)	Limit (dBuV)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	0.284	37.60	60.71	-23.11	27.93	9.67	QP
*2	0.284	30.46	50.71	-20.24	20.80	9.67	AV
3	0.739	25.60	56.00	-30.40	15.92	9.68	QP
4	0.739	15.52	46.00	-30.48	5.84	9.68	AV
5	0.936	28.17	56.00	-27.83	18.48	9.69	QP
6	0.936	17.32	46.00	-28.68	7.63	9.69	AV
7	2.129	23.02	56.00	-32.98	13.29	9.73	QP
8	2.129	15.90	46.00	-30.10	6.17	9.73	AV
9	4.183	23.21	56.00	-32.79	13.43	9.78	QP
10	4.183	15.48	46.00	-30.52	5.69	9.78	AV
11	16.650	29.60	60.00	-30.40	19.58	10.01	QP
12	16.650	19.74	50.00	-30.26	9.73	10.01	AV

Note:

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

Product : Gigabit LTE Multi-Service Router / LTE Dual-SIM Dual-Band Wireless VoIP VPN Router
Test Item : Conducted Emission Test
Power Line : L1
Test Mode : Mode 4: Transmit (802.11ac-80BW) (5775MHz)
Test Date : 2020/10/26

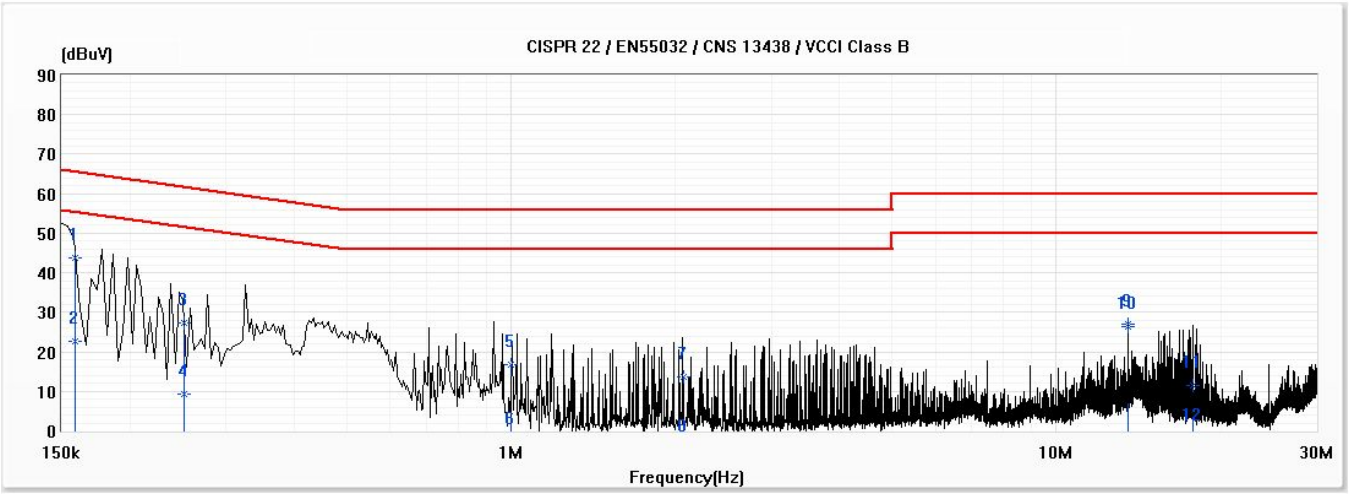


No	Frequency (MHz)	Emission Level (dBuV)	Limit (dBuV)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
*1	0.158	44.45	65.59	-21.14	34.80	9.66	QP
2	0.158	18.76	55.59	-36.83	9.10	9.66	AV
3	0.432	27.37	57.22	-29.85	17.71	9.66	QP
4	0.432	21.13	47.22	-26.08	11.48	9.66	AV
5	0.851	18.75	56.00	-37.25	9.07	9.68	QP
6	0.851	11.94	46.00	-34.06	2.26	9.68	AV
7	1.715	15.76	56.00	-40.24	6.05	9.71	QP
8	1.715	-4.15	46.00	-50.15	-13.86	9.71	AV
9	4.006	11.98	56.00	-44.02	2.21	9.77	QP
10	4.006	-4.18	46.00	-50.18	-13.95	9.77	AV
11	13.561	27.19	60.00	-32.81	17.26	9.93	QP
12	13.561	26.40	50.00	-23.60	16.47	9.93	AV

Note:

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

Product : Gigabit LTE Multi-Service Router / LTE Dual-SIM Dual-Band Wireless VoIP VPN Router
Test Item : Conducted Emission Test
Power Line : N
Test Mode : Mode 4: Transmit (802.11ac-80BW) (5775MHz)
Test Date : 2020/10/26



No	Frequency (MHz)	Emission Level (dBuV)	Limit (dBuV)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
*1	0.159	43.62	65.53	-21.91	33.95	9.67	QP
2	0.159	22.55	55.53	-32.98	12.88	9.67	AV
3	0.251	27.16	61.73	-34.57	17.48	9.67	QP
4	0.251	9.17	51.73	-42.56	-0.50	9.67	AV
5	0.999	16.80	56.00	-39.20	7.11	9.69	QP
6	0.999	-2.79	46.00	-48.79	-12.48	9.69	AV
7	2.069	13.75	56.00	-42.25	4.02	9.73	QP
8	2.069	-4.71	46.00	-50.71	-14.44	9.73	AV
9	13.561	27.04	60.00	-32.96	17.07	9.97	QP
10	13.561	26.25	50.00	-23.75	16.28	9.97	AV
11	17.794	11.54	60.00	-48.46	1.51	10.03	QP
12	17.794	-2.00	50.00	-52.00	-12.03	10.03	AV

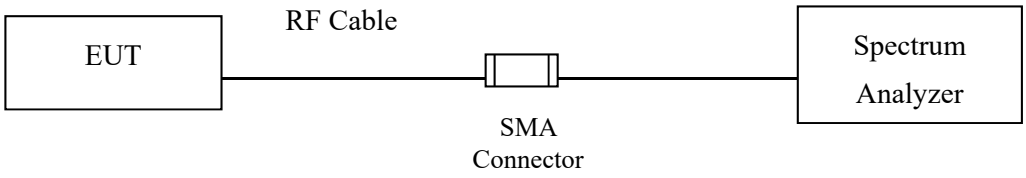
Note:

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

3. Maximun conducted output power

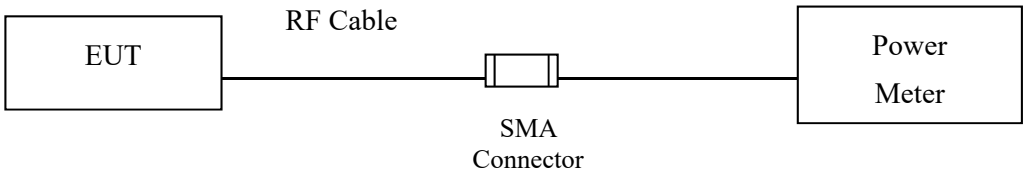
3.1. Test Setup

99% Occupied Bandwidth

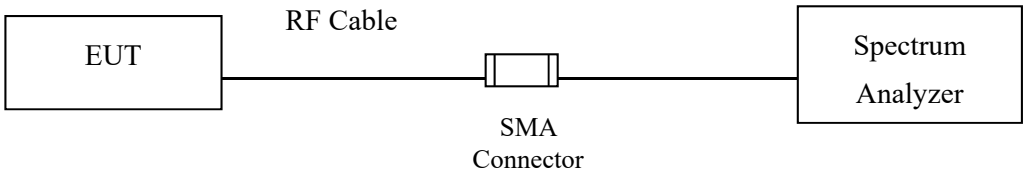


Conduction Power Measurement

Conduction Power Measurement (for 802.11an)



Conduction Power Measurement (for 802.11ac)



3.2. Limits

For the band 5.15-5.25 GHz,

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

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

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

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

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

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

3.3. Test Procedure

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

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

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

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

3.4. Test Result of Maximum conducted output power

Product : Gigabit LTE Multi-Service Router / LTE Dual-SIM Dual-Band Wireless VoIP VPN Router
Test Item : Maximum conducted output power
Test Mode : Mode 1: Transmit (802.11a)
Test Date : 2020/10/19

Chain A

Cable loss=1.5dB		Maximum conducted output power							
Channel No.	Frequency (MHz)	For different Data Rate (Mbps)							
		6	9	12	18	24	36	48	54
		Measurement Level (dBm)							
36	5180	16.77	--	--	--	--	--	--	--
44	5220	16.98	16.93	16.86	16.8	16.74	16.68	16.63	16.57
48	5240	16.77	--	--	--	--	--	--	--
149	5745	19.25	--	--	--	--	--	--	--
157	5785	19.43	19.4	19.34	19.3	19.25	19.21	19.17	19.12
165	5825	20.25	--	--	--	--	--	--	--

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

Chain B

Cable loss=1.5dB		Maximum conducted output power							
Channel No.	Frequency (MHz)	For different Data Rate (Mbps)							
		6	9	12	18	24	36	48	54
		Measurement Level (dBm)							
36	5180	17.53	--	--	--	--	--	--	--
44	5220	17.69	17.64	17.59	17.55	17.49	17.44	17.39	17.36
48	5240	17.49	--	--	--	--	--	--	--
149	5745	20.89	--	--	--	--	--	--	--
157	5785	21.29	21.25	21.19	21.15	21.09	21.04	20.98	20.92
165	5825	21.26	--	--	--	--	--	--	--

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

Chain C

Cable loss=1.5dB		Maximum conducted output power							
Channel No.	Frequency (MHz)	For different Data Rate (Mbps)							
		6	9	12	18	24	36	48	54
		Measurement Level (dBm)							
36	5180	17.43	--	--	--	--	--	--	--
44	5220	17.51	17.47	17.43	17.4	17.34	17.31	17.28	17.22
48	5240	17.36	--	--	--	--	--	--	--
149	5745	20.24	--	--	--	--	--	--	--
157	5785	20.85	20.79	20.73	20.66	20.6	20.54	20.49	20.46
165	5825	21.54	--	--	--	--	--	--	--

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

Chain D

Cable loss=1.5dB		Maximum conducted output power							
Channel No.	Frequency (MHz)	For different Data Rate (Mbps)							
		6	9	12	18	24	36	48	54
		Measurement Level (dBm)							
36	5180	16.34	--	--	--	--	--	--	--
44	5220	16.1	16.07	16.02	15.96	15.89	15.83	15.77	15.71
48	5240	15.93	--	--	--	--	--	--	--
149	5745	20.14	--	--	--	--	--	--	--
157	5785	20.31	20.24	20.21	20.15	20.12	20.09	20.05	20.01
165	5825	21.31	--	--	--	--	--	--	--

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)	Chain A Power (dBm)	Chain B Power (dBm)	Chain C Power (dBm)	Chain D Power (dBm)	Output Power (dBm)	Output Power Limit		Result
								(dBm)	dBm+10log(BW)	
36	5180	--	16.77	17.53	17.43	16.34	23.07	30	--	Pass
44	5220	--	16.98	17.69	17.51	16.10	23.13	30	--	Pass
48	5240	--	16.77	17.49	17.36	15.93	22.95	30	--	Pass
149	5745	--	19.25	20.89	20.24	20.14	26.19	30	--	Pass
157	5785	--	19.43	21.29	20.85	20.31	26.54	30	--	Pass
165	5825	--	20.25	21.26	21.54	21.31	27.14	30	--	Pass

Note: Output Power Value (dBm) = 10*LOG (Chain A(mW)+ Chain B(mW)+ Chain C(mW)+ Chain D(mW))

Product : Gigabit LTE Multi-Service Router / LTE Dual-SIM Dual-Band Wireless VoIP VPN Router
Test Item : Maximum conducted output power
Test Mode : Mode 2: Transmit (802.11n/ac-20BW)
Test Date : 2020/10/19

Chain A

Cable loss=1.5dB		Maximum conducted output power									
Channel No.	Frequency (MHz)	For different Data Rate (VHT index)									
		0	1	2	3	4	5	6	7	8	9
		Measurement Level (dBm)									
36	5180	15.14	--	--	--	--	--	--	--	--	--
44	5220	15.1	15.05	15	14.97	14.94	14.9	14.83	14.79	14.65	14.52
48	5240	15.17	--	--	--	--	--	--	--	--	--
149	5745	18.96	--	--	--	--	--	--	--	--	--
157	5785	18.4	18.34	18.28	18.25	18.19	18.12	18.09	18.02	17.94	17.85
165	5825	20.38	--	--	--	--	--	--	--	--	--

Note: Maximum conducted output power Value =Reading value on Spectrum Analyzer + cable loss

Chain B

Cable loss=1.5dB		Maximum conducted output power									
Channel No.	Frequency (MHz)	For different Data Rate (VHT index)									
		0	1	2	3	4	5	6	7	8	9
		Measurement Level (dBm)									
36	5180	16.17	--	--	--	--	--	--	--	--	--
44	5220	15.97	15.94	15.89	15.84	15.77	15.73	15.66	15.61	15.54	15.43
48	5240	16.01	--	--	--	--	--	--	--	--	--
149	5745	20.7	--	--	--	--	--	--	--	--	--
157	5785	20.44	20.38	20.31	20.24	20.19	20.12	20.08	20.03	19.95	19.84
165	5825	21.44	--	--	--	--	--	--	--	--	--

Note: Maximum conducted output power Value =Reading value on Spectrum Analyzer + cable loss

Chain C

Cable loss=1.5dB		Maximum conducted output power									
Channel No.	Frequency (MHz)	For different Data Rate (VHT index)									
		0	1	2	3	4	5	6	7	8	9
		Measurement Level (dBm)									
36	5180	16.14	--	--	--	--	--	--	--	--	--
44	5220	16.79	16.75	16.71	16.67	16.64	16.61	16.57	16.54	16.43	16.31
48	5240	15.84	--	--	--	--	--	--	--	--	--
149	5745	20.05	--	--	--	--	--	--	--	--	--
157	5785	19.99	19.92	19.89	19.84	19.78	19.72	19.68	19.64	19.5	19.38
165	5825	20.95	--	--	--	--	--	--	--	--	--

Note: Maximum conducted output power Value =Reading value on Spectrum Analyzer + cable loss

Chain D

Cable loss=1.5dB		Maximum conducted output power									
Channel No.	Frequency (MHz)	For different Data Rate (VHT index)									
		0	1	2	3	4	5	6	7	8	9
		Measurement Level (dBm)									
36	5180	15.1	--	--	--	--	--	--	--	--	--
44	5220	15.19	15.14	15.09	15.03	14.98	14.94	14.89	14.84	14.7	14.59
48	5240	14.18	--	--	--	--	--	--	--	--	--
149	5745	19.29	--	--	--	--	--	--	--	--	--
157	5785	19.28	19.24	19.18	19.14	19.11	19.07	19.02	18.98	18.82	18.7
165	5825	20.73	--	--	--	--	--	--	--	--	--

Note: Maximum conducted output power Value =Reading value on Spectrum Analyzer + cable loss

Maximum conducted output power Measurement:

Channel No	Frequency Range (MHz)	26dB Bandwidth (MHz)	Chain A Power (dBm)	Chain B Power (dBm)	Chain C Power (dBm)	Chain D Power (dBm)	Output Power (dBm)	Output Power Limit		Result
								(dBm)	dBm+10log(BW)	
36	5180	--	15.14	16.17	16.14	15.10	21.69	30	--	Pass
44	5220	--	15.10	15.97	16.79	15.19	21.84	30	--	Pass
48	5240	--	15.17	16.01	15.84	14.18	21.38	30	--	Pass
149	5745	--	18.96	20.70	20.05	19.29	25.82	30	--	Pass
157	5785	--	18.40	20.44	19.99	19.28	25.62	30	--	Pass
165	5825	--	20.38	21.44	20.95	20.73	26.91	30	--	Pass

Note: Output Power Value (dBm) = 10*LOG (Chain A(mW)+ Chain B(mW)+ Chain C(mW)+ Chain D(mW))

Product : Gigabit LTE Multi-Service Router / LTE Dual-SIM Dual-Band Wireless VoIP VPN Router
Test Item : Maximum conducted output power
Test Mode : Mode 3: Transmit (802.11n/ac-40BW)
Test Date : 2020/10/19

Chain A

Cable loss=1.5dB		Maximum conducted output power									
Channel No	Frequency (MHz)	For different Data Rate (VHT index)									
		0	1	2	3	4	5	6	7	8	9
38	5190	16.48	--	--	--	--	--	--	--	--	--
46	5230	16.31	16.27	16.23	16.2	16.14	16.09	16.06	16.02	15.93	15.82
151	5755	19.08	--	--	--	--	--	--	--	--	--
159	5795	20.9	20.83	20.78	20.75	20.68	20.65	20.59	20.54	20.41	20.3

Note: Maximum conducted output power Value =Reading value on Spectrum Analyzer + cable loss

Chain B

Cable loss=1.5dB		Maximum conducted output power									
Channel No	Frequency (MHz)	For different Data Rate (VHT index)									
		0	1	2	3	4	5	6	7	8	9
38	5190	17.34	--	--	--	--	--	--	--	--	--
46	5230	17.21	17.18	17.13	17.06	17.01	16.97	16.92	16.87	16.74	16.6
151	5755	20.98	--	--	--	--	--	--	--	--	--
159	5795	22.96	22.91	22.87	22.82	22.76	22.69	22.64	22.57	22.43	22.31

Note: Maximum conducted output power Value =Reading value on Spectrum Analyzer + cable loss

Chain C

Cable loss=1.5dB		Maximum conducted output power									
Channel No	Frequency (MHz)	For different Data Rate (VHT index)									
		0	1	2	3	4	5	6	7	8	9
38	5190	17.2	--	--	--	--	--	--	--	--	--
46	5230	17.04	17	16.94	16.88	16.82	16.78	16.73	16.69	16.53	16.43
151	5755	20.35	--	--	--	--	--	--	--	--	--
159	5795	22.48	22.42	22.36	22.3	22.24	22.18	22.12	22.06	21.95	21.8

Note: Maximum conducted output power Value =Reading value on Spectrum Analyzer + cable loss

Chain D

Cable loss=1.5dB		Maximum conducted output power									
Channel No	Frequency (MHz)	For different Data Rate (VHT index)									
		0	1	2	3	4	5	6	7	8	9
38	5190	16.03	--	--	--	--	--	--	--	--	--
46	5230	15.3	15.26	15.2	15.16	15.11	15.04	14.99	14.93	14.82	14.7
151	5755	19.65	--	--	--	--	--	--	--	--	--
159	5795	21.76	21.73	21.69	21.63	21.59	21.54	21.47	21.41	21.31	21.18

Note: Maximum conducted output power Value =Reading value on Spectrum Analyzer + cable loss

Maximum conducted output power Measurement:

Channel No	Frequency Range (MHz)	26dB Bandwidth (MHz)	Chain A Power (dBm)	Chain B Power (dBm)	Chain C Power (dBm)	Chain D Power (dBm)	Output Power (dBm)	Output Power Limit		Result
								(dBm)	dBm+10log(BW)	
38	5190	--	16.48	17.34	17.20	16.03	22.82	30	--	Pass
46	5230	--	16.31	17.21	17.04	15.30	22.55	30	--	Pass
151	5755	--	19.08	20.98	20.35	19.65	26.09	30	--	Pass
159	5795	--	20.90	22.96	22.48	21.76	28.11	30	--	Pass

Note: Output Power Value (dBm) = 10*LOG (Chain A(mW)+ Chain B(mW)+ Chain C(mW)+ Chain D(mW))

Product : Gigabit LTE Multi-Service Router / LTE Dual-SIM Dual-Band Wireless VoIP VPN Router
Test Item : Maximum conducted output power
Test Mode : Mode 4: Transmit (802.11ac-80BW)
Test Date : 2020/10/19

Chain A

Cable loss=1.5dB		Maximum conducted output power									
Channel No	Frequency (MHz)	For different Data Rate (VHT index)									
		0	1	2	3	4	5	6	7	8	9
42	5210	11.68	11.62	11.57	11.5	11.45	11.38	11.33	11.3	11.27	11.2
155ac80	5775	14.41	14.35	14.29	14.24	14.17	14.12	14.06	14.01	13.96	13.90

Note: Maximum conducted output power Value =Reading value on Spectrum Analyzer + cable loss

Chain B

Cable loss=1.5dB		Maximum conducted output power									
Channel No	Frequency (MHz)	For different Data Rate (VHT index)									
		0	1	2	3	4	5	6	7	8	9
42	5210	12.33	12.26	12.22	12.18	12.14	12.07	12.02	11.99	11.95	11.92
155ac80	5775	15.07	15.02	14.99	14.94	14.9	14.86	14.79	14.73	14.67	14.63

Note: Maximum conducted output power Value =Reading value on Spectrum Analyzer + cable loss

Chain C

Cable loss=1.5dB		Maximum conducted output power									
Channel No	Frequency (MHz)	For different Data Rate (VHT index)									
		0	1	2	3	4	5	6	7	8	9
42	5210	11.23	11.17	11.1	11.07	11.03	10.99	10.95	10.91	10.85	10.82
155ac80	5775	15.54	15.5	15.46	15.40	15.36	15.31	15.27	15.21	15.15	15.11

Note: Maximum conducted output power Value =Reading value on Spectrum Analyzer + cable loss

Chain D

Cable loss=1.5dB		Maximum conducted output power									
Channel No	Frequency (MHz)	For different Data Rate (VHT index)									
		0	1	2	3	4	5	6	7	8	9
42	5210	12.35	12.28	12.24	12.21	12.16	12.12	12.07	12.02	11.96	11.92
155ac80	5775	15.41	15.37	15.31	15.26	15.21	15.17	15.14	15.09	15.02	14.98

Note: Maximum conducted output power Value =Reading value on Spectrum Analyzer + cable loss

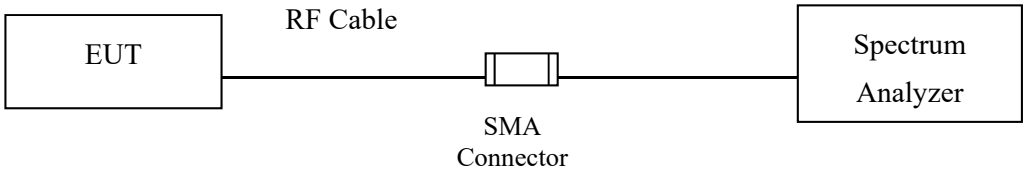
Maximum conducted output power Measurement

Channel No	Frequency Range (MHz)	26dB Bandwidth (MHz)	Chain A Power (dBm)	Chain B Power (dBm)	Chain C Power (dBm)	Chain D Power (dBm)	Output Power (dBm)	Output Power Limit		Result
								(dBm)	dBm+10log(BW)	
42	5210	--	11.68	12.33	11.23	12.35	17.94	30	--	Pass
155	5775	--	14.41	15.07	15.54	15.41	21.15	30	--	Pass

Note: Output Power Value (dBm) = 10*LOG (Chain A(mW)+ Chain B(mW)+ Chain C(mW)+ Chain D(mW))

4. Peak Power Spectral Density

4.1. Test Setup



4.2. Limits

(1) 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.

(2) 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.

(3) 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 : Gigabit LTE Multi-Service Router / LTE Dual-SIM Dual-Band Wireless VoIP VPN Router
Test Item : Peak Power Spectral Density
Test Mode : Mode 1: Transmit (802.11a)

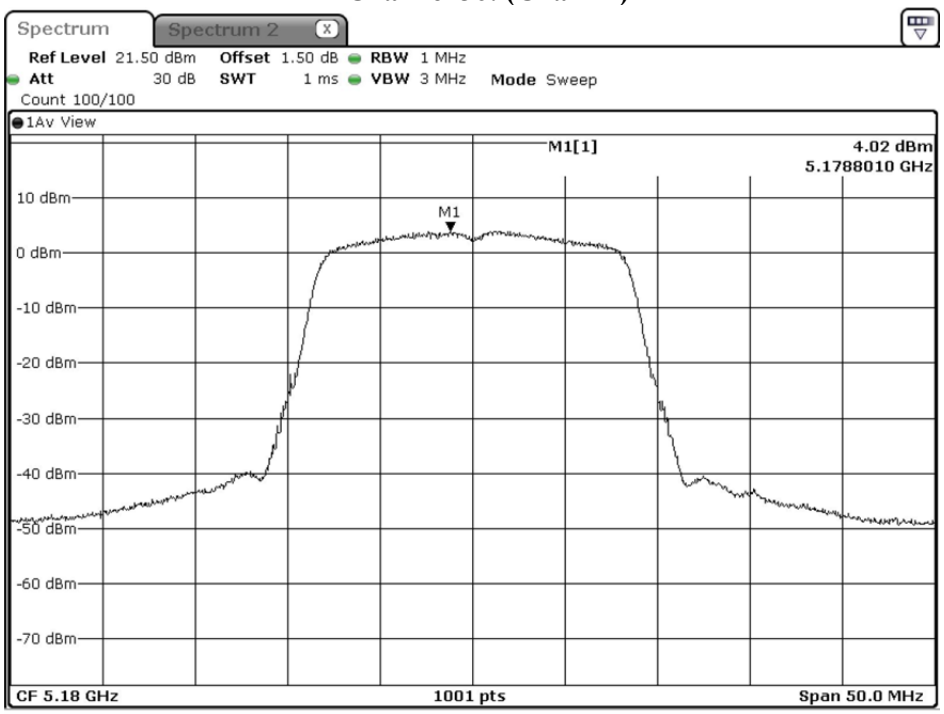
Channel Number	Frequency (MHz)	Chain	PPSD (dBm)	Duty Factor (dB)	Total PPSD (dBm)	Required Limit (dBm)	Result
36	5180	A	4.02	1.01	11.05	17	Pass
		B	2.28	1.01	9.31		Pass
		C	4.01	1.01	11.04		Pass
		D	4.75	1.01	11.78		Pass
44	5220	A	3.70	1.01	10.73	17	Pass
		B	4.51	1.01	11.54		Pass
		C	4.65	1.01	11.68		Pass
		D	4.09	1.01	11.12		Pass
48	5240	A	3.50	1.01	10.53	17	Pass
		B	4.10	1.01	11.13		Pass
		C	4.00	1.01	11.03		Pass
		D	4.05	1.01	11.08		Pass
		D	4.02	1.01	11.05		Pass

Note: The quantity 10*log 4 (four antennas) is added to the spectrum peak value according to document 662911 D01.

Channel Number	Frequency (MHz)	Chain	PPSD (dBm)	BWCF (dB)	Duty Factor (dB)	Total PPSD (dBm)	Required Limit (dBm)	Result
149	5745	A	-1.74	6.98	1.01	12.27	30	Pass
		B	-0.36	6.98	1.01	13.65		Pass
		C	-1.35	6.98	1.01	12.66		Pass
		D	-1.35	6.98	1.01	12.66		Pass
157	5785	A	-2.11	6.98	1.01	11.90	30	Pass
		B	0.75	6.98	1.01	14.76		Pass
		C	-1.04	6.98	1.01	12.97		Pass
		D	-1.19	6.98	1.01	12.82		Pass
165	5825	A	0.24	6.98	1.01	14.25	30	Pass
		B	0.68	6.98	1.01	14.69		Pass
		C	-0.69	6.98	1.01	13.32		Pass
		D	-0.23	6.98	1.01	13.78		Pass

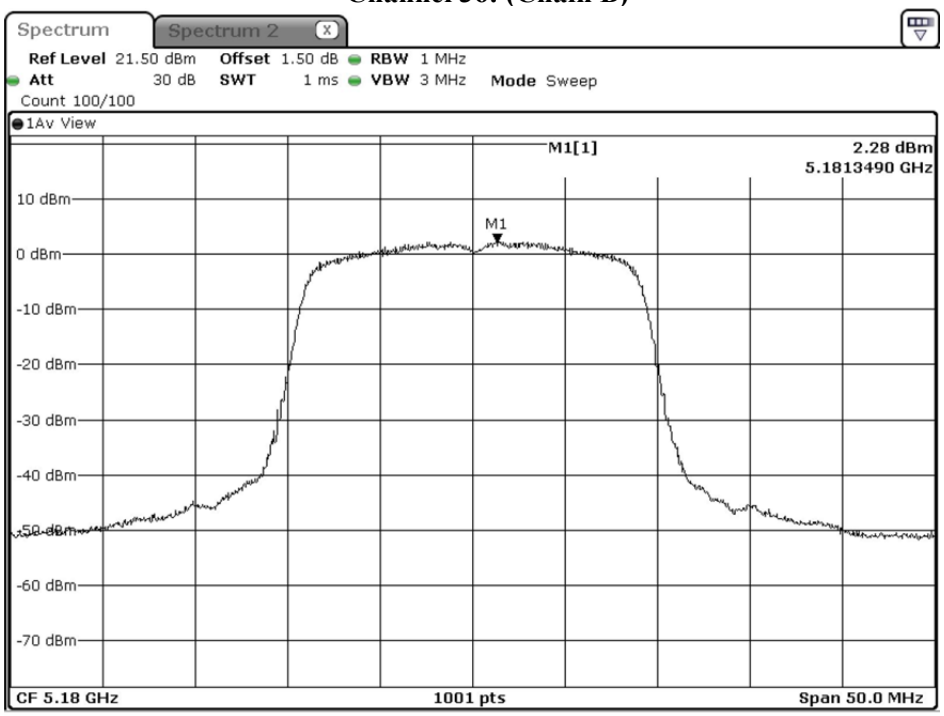
Note: The quantity 10*log 4 (four antennas) is added to the spectrum peak value according to document 662911 D01.

Channel 36: (Chain A)



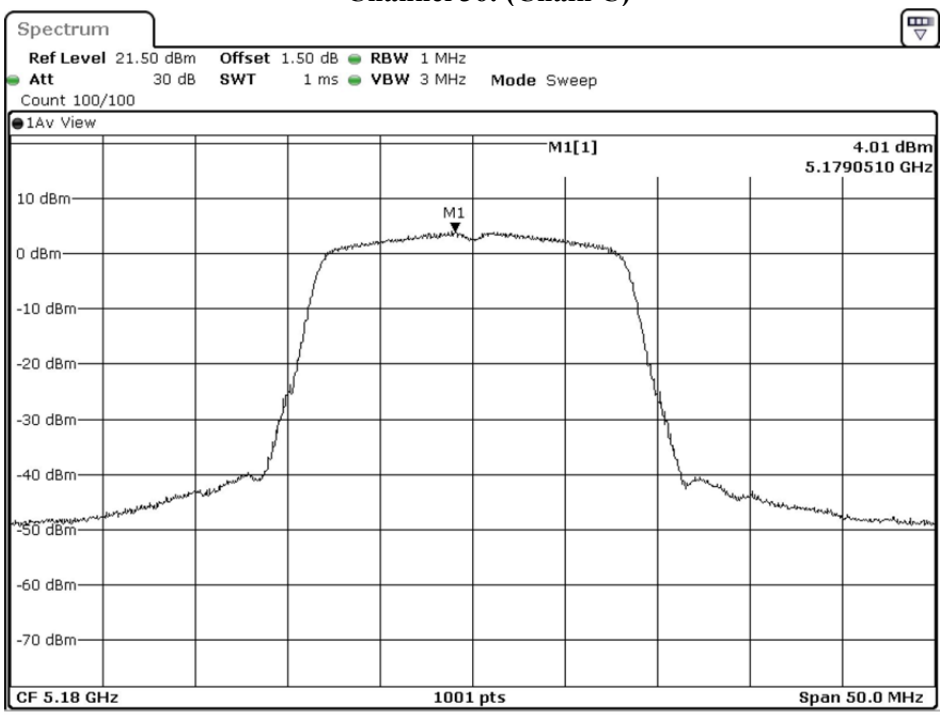
Date: 17.OCT.2020 14:57:04

Channel 36: (Chain B)



Date: 17.OCT.2020 16:06:44

Channel 36: (Chain C)

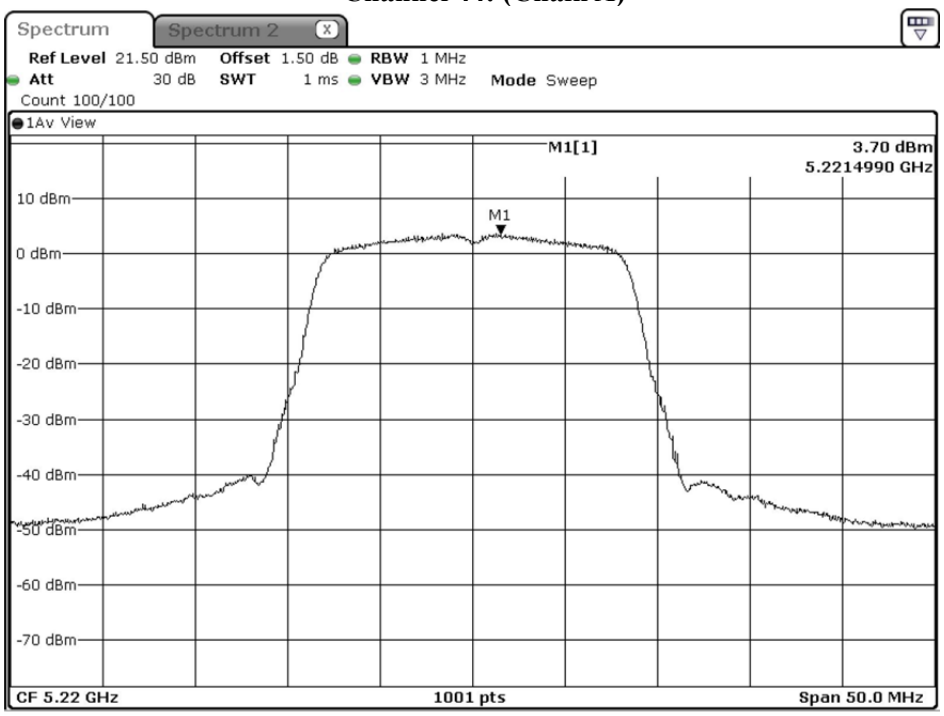


Date: 19.OCT.2020 09:41:04

Channel 36: (Chain D)

Date: 19.OCT.2020 10:31:53

Channel 44: (Chain A)

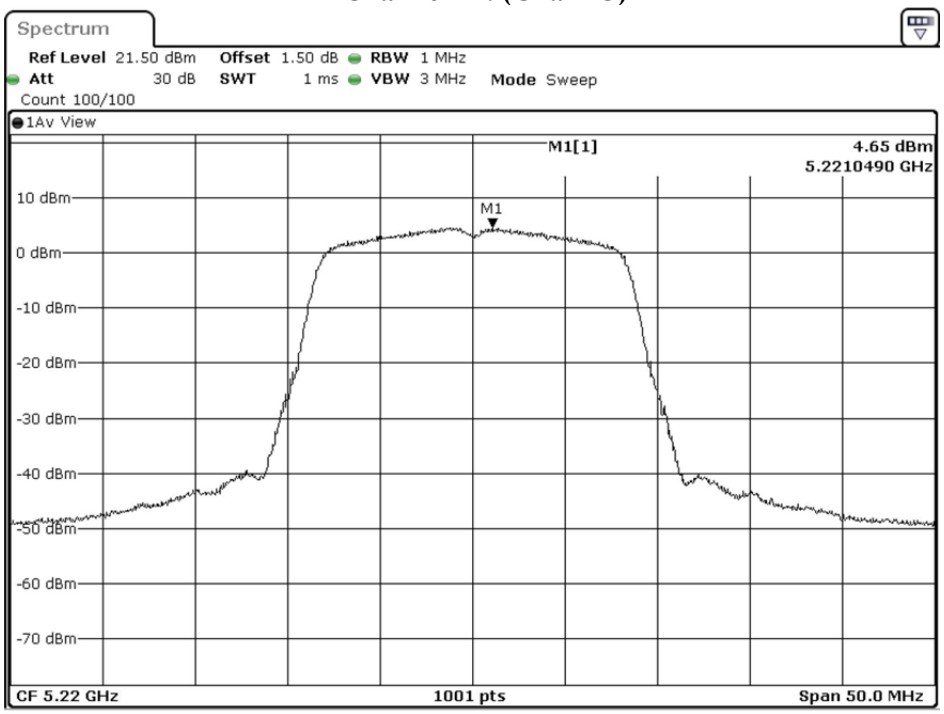


Date: 17.OCT.2020 14:59:18

Channel 44: (Chain B)

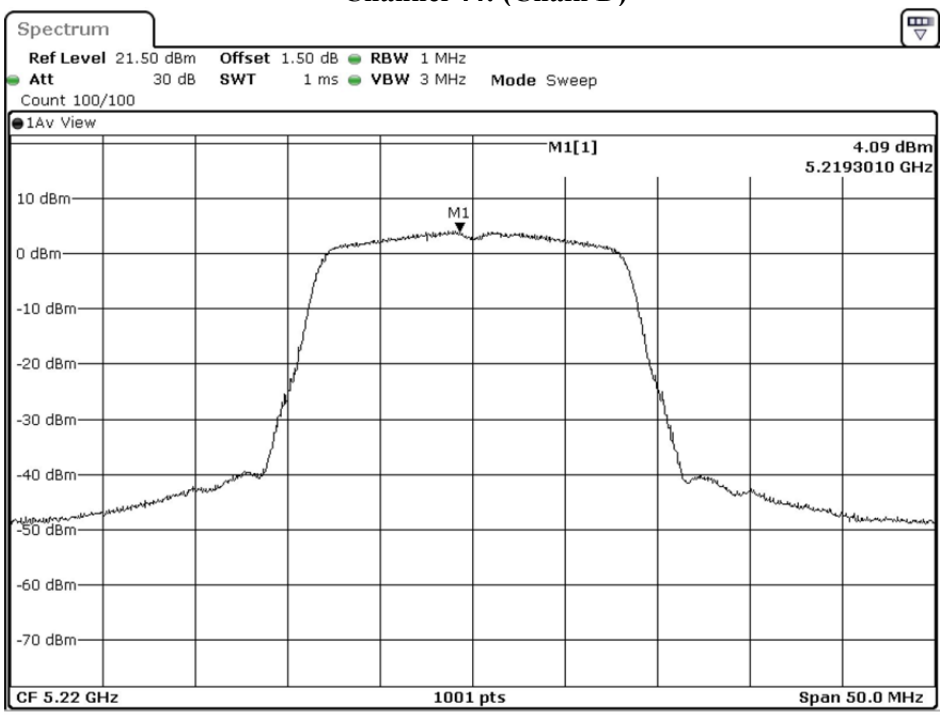
Date: 17.OCT.2020 16:09:10

Channel 44: (Chain C)



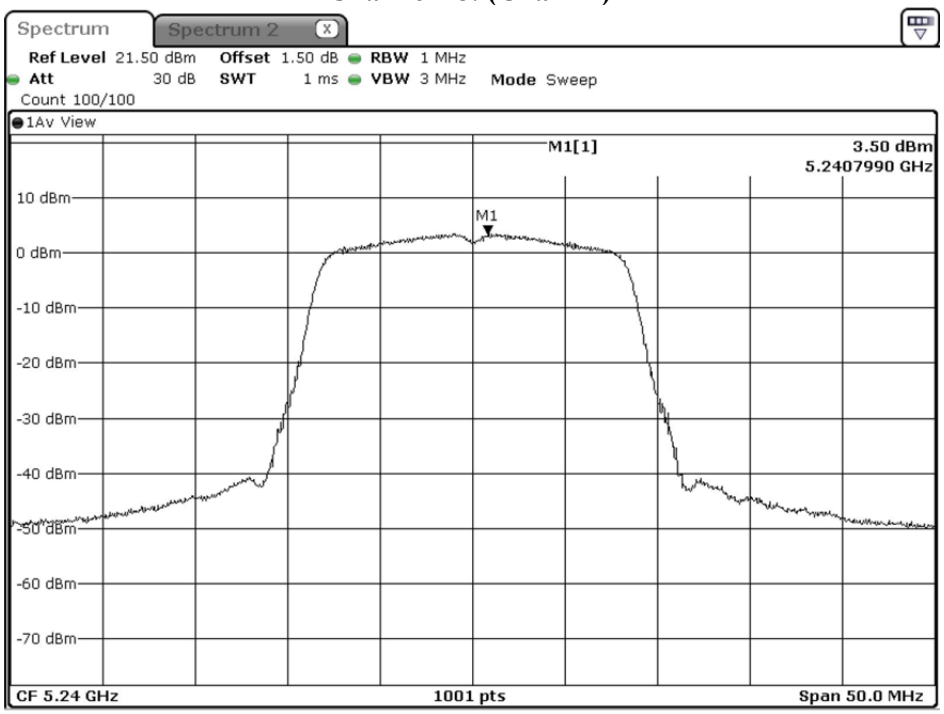
Date: 19.OCT.2020 09:43:25

Channel 44: (Chain D)



Date: 19.OCT.2020 10:34:04

Channel 48: (Chain A)

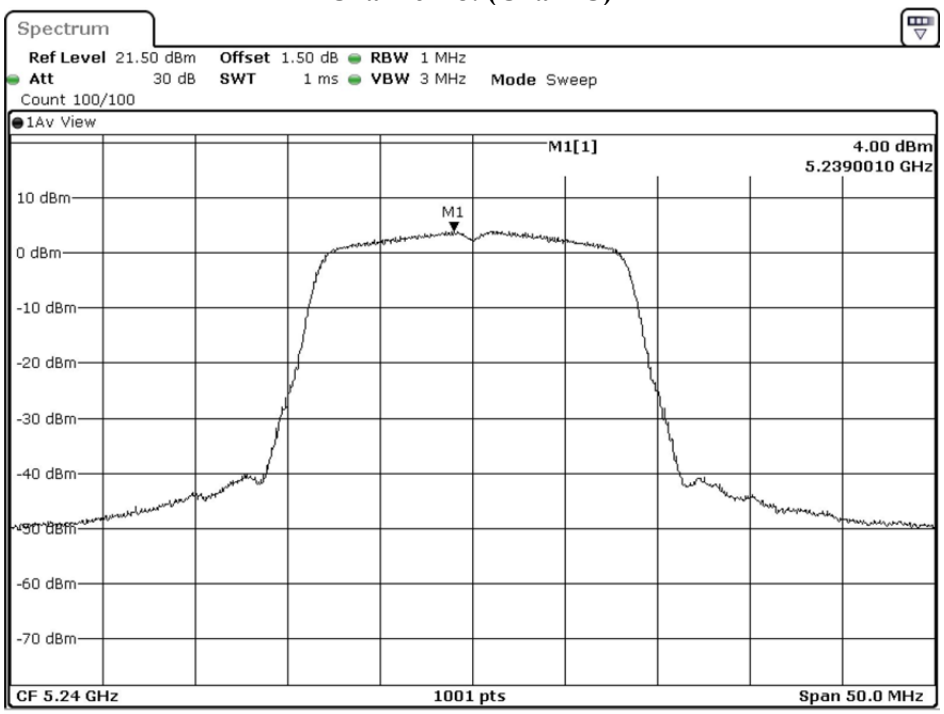


Date: 17.OCT.2020 15:02:07

Channel 48: (Chain B)

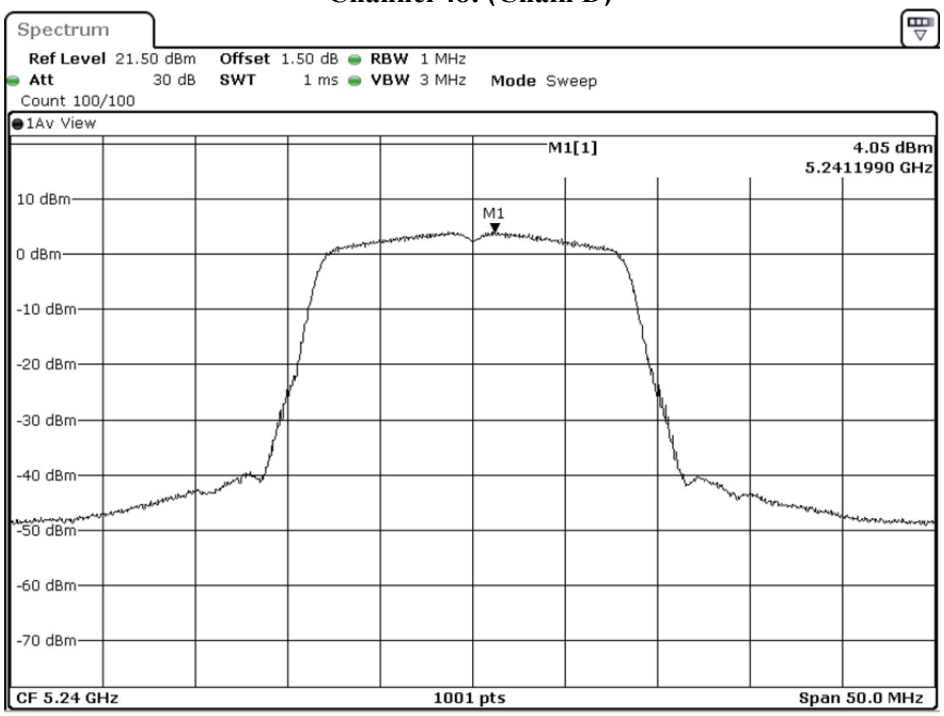
Date: 17.OCT.2020 16:11:38

Channel 48: (Chain C)



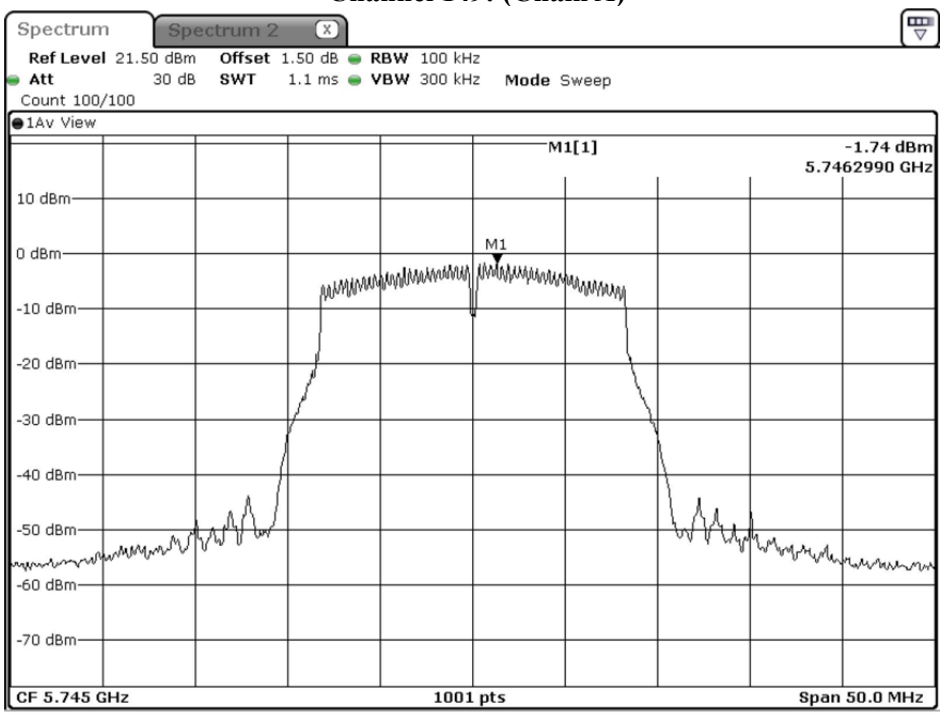
Date: 19.OCT.2020 09:45:58

Channel 48: (Chain D)



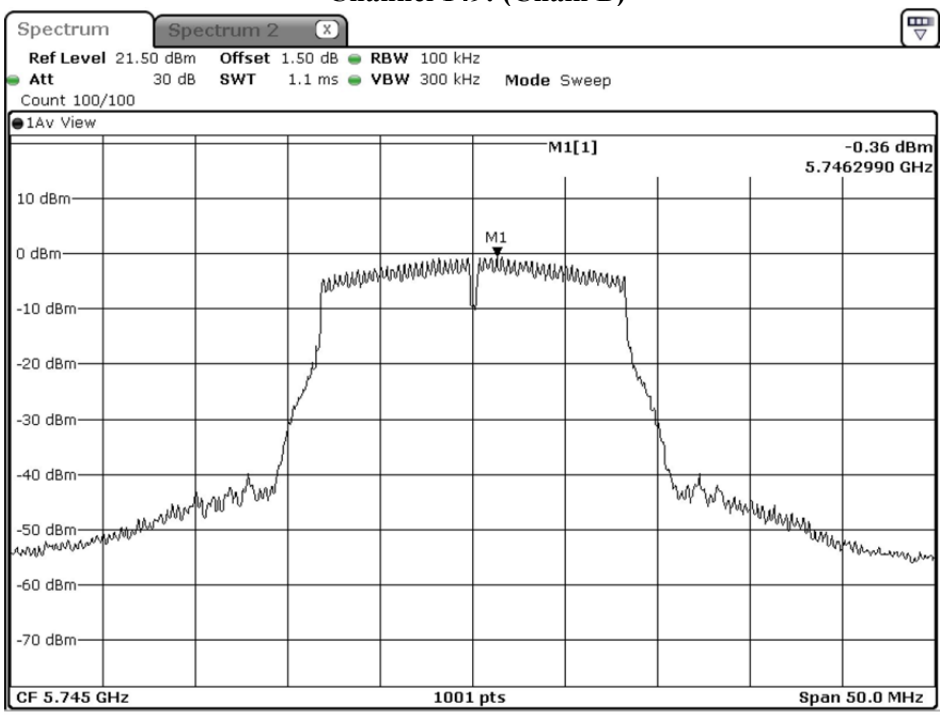
Date: 19.OCT.2020 10:36:30

Channel 149: (Chain A)



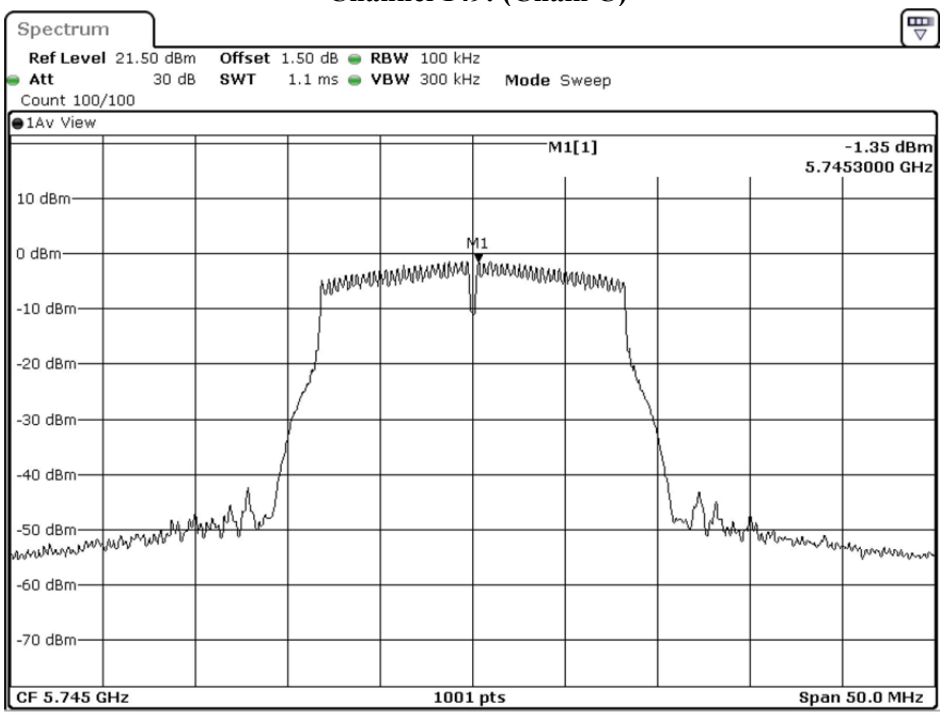
Date: 17.OCT.2020 15:22:13

Channel 149: (Chain B)



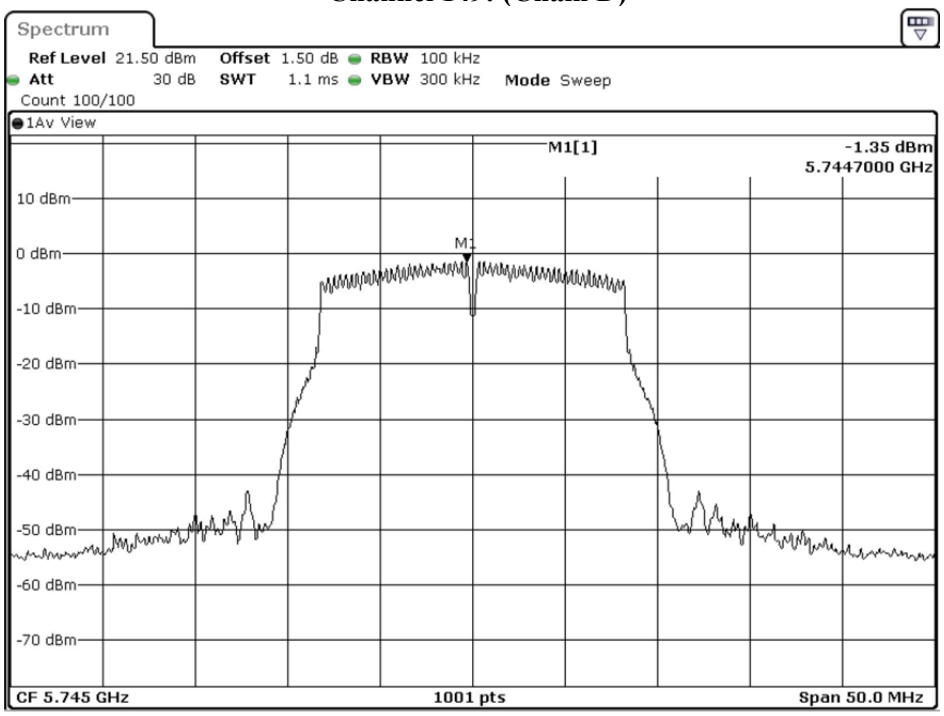
Date: 17.OCT.2020 16:33:19

Channel 149: (Chain C)



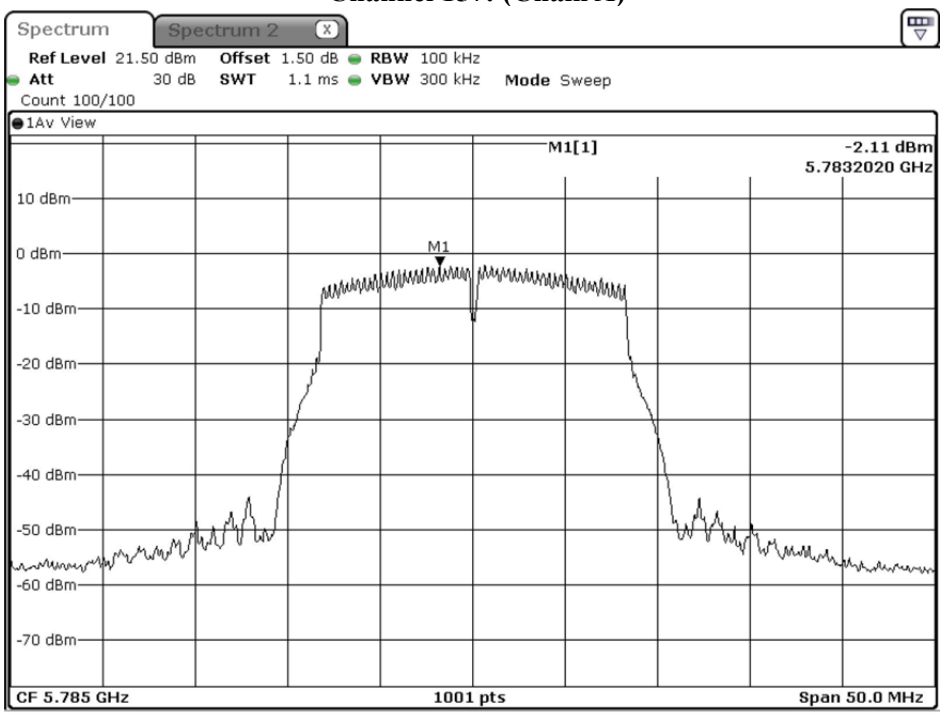
Date: 19.OCT.2020 10:06:25

Channel 149: (Chain D)



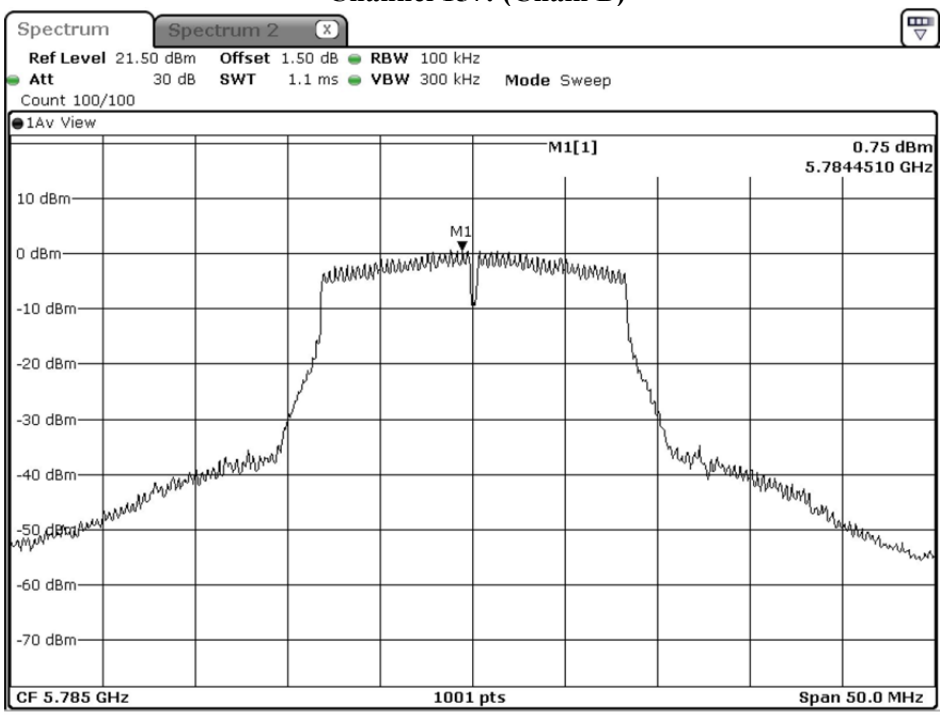
Date: 19.OCT.2020 11:09:37

Channel 157: (Chain A)



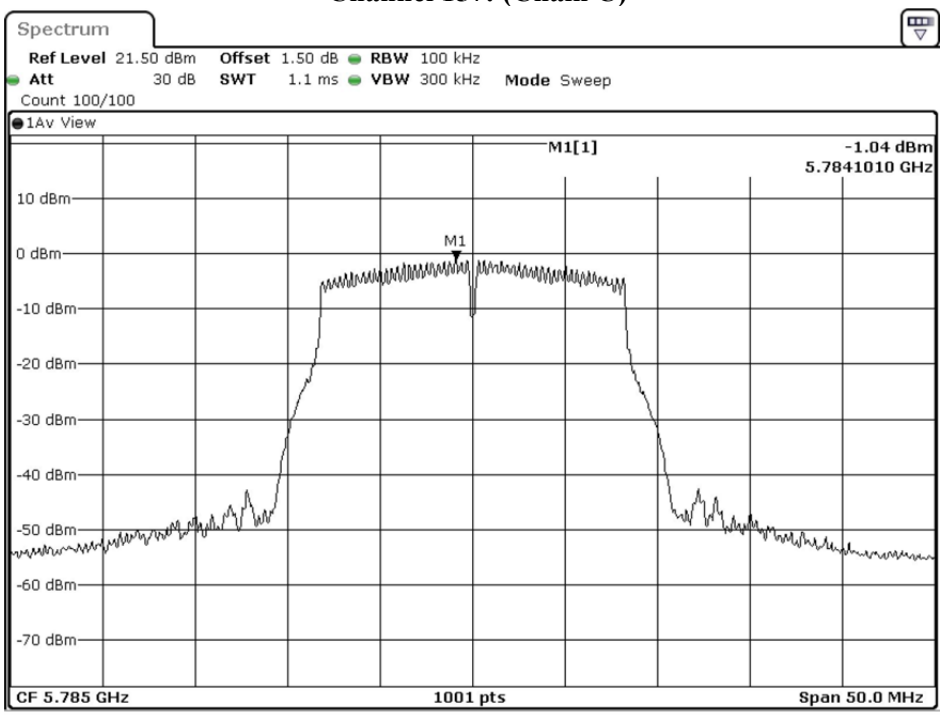
Date: 17.OCT.2020 15:24:33

Channel 157: (Chain B)



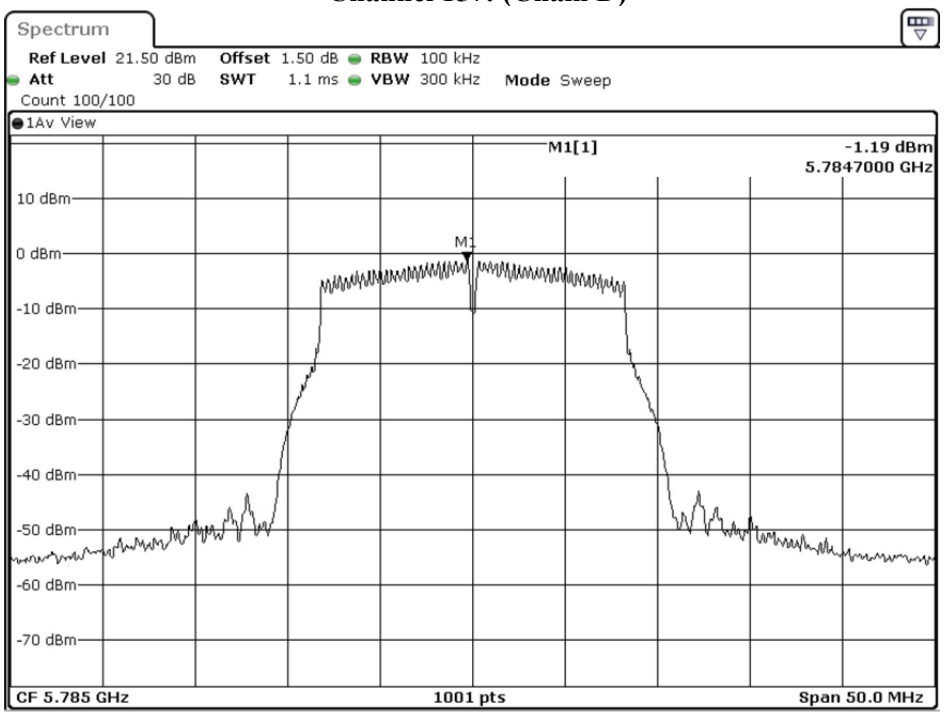
Date: 17.OCT.2020 16:35:54

Channel 157: (Chain C)



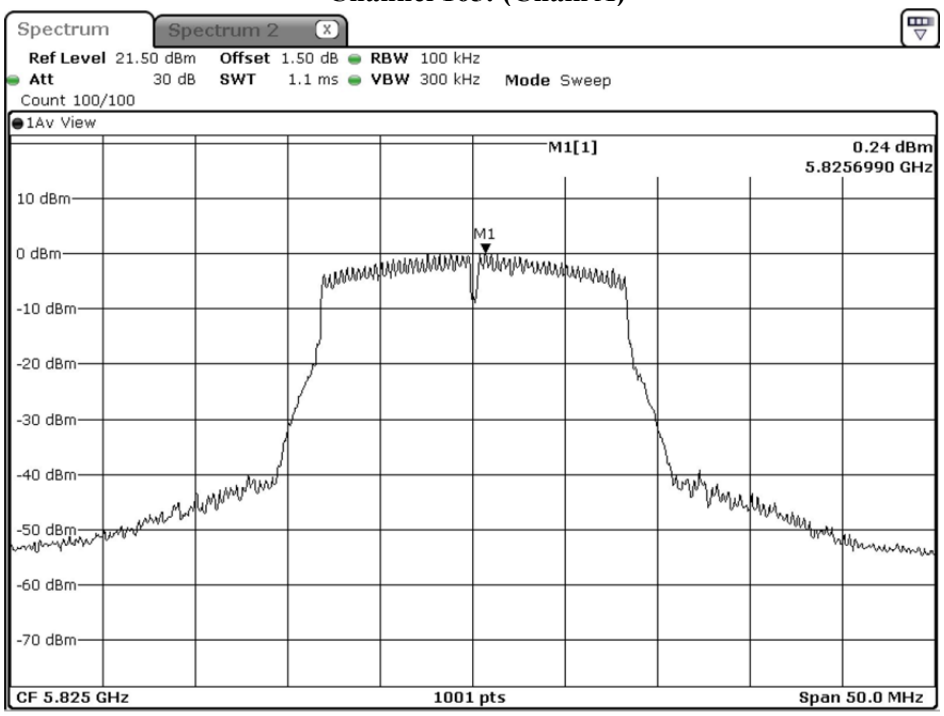
Date: 19.OCT.2020 10:08:22

Channel 157: (Chain D)



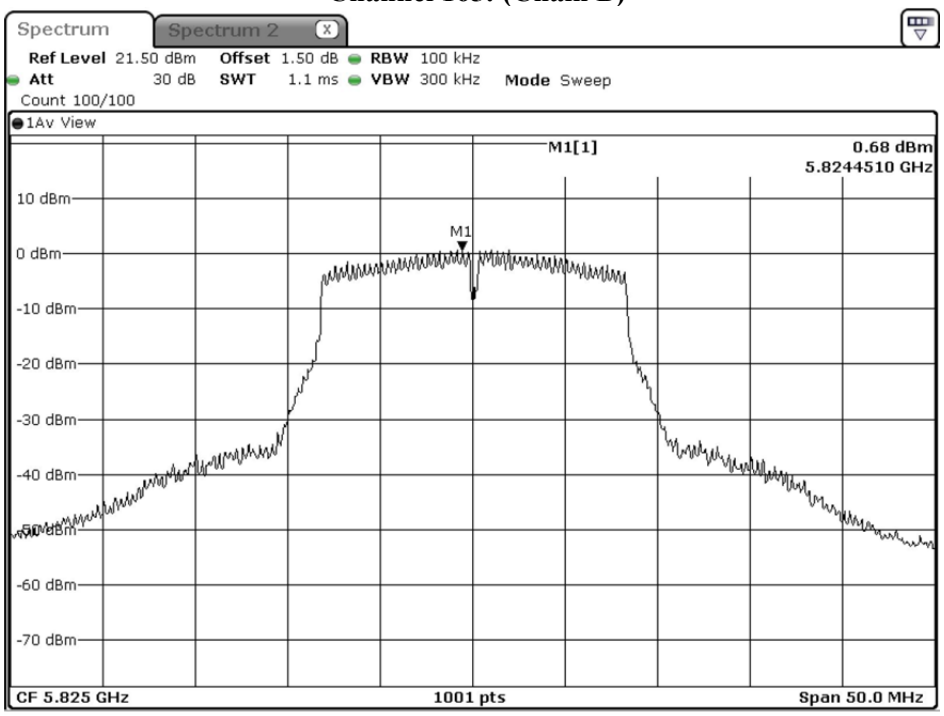
Date: 19.OCT.2020 11:11:24

Channel 165: (Chain A)



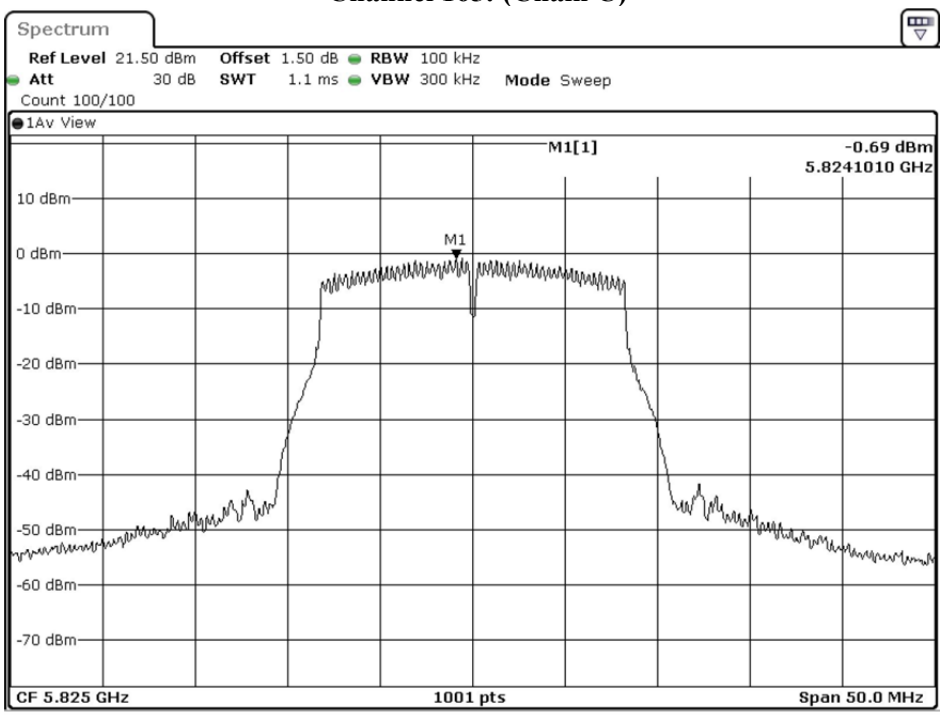
Date: 17.OCT.2020 15:27:00

Channel 165: (Chain B)



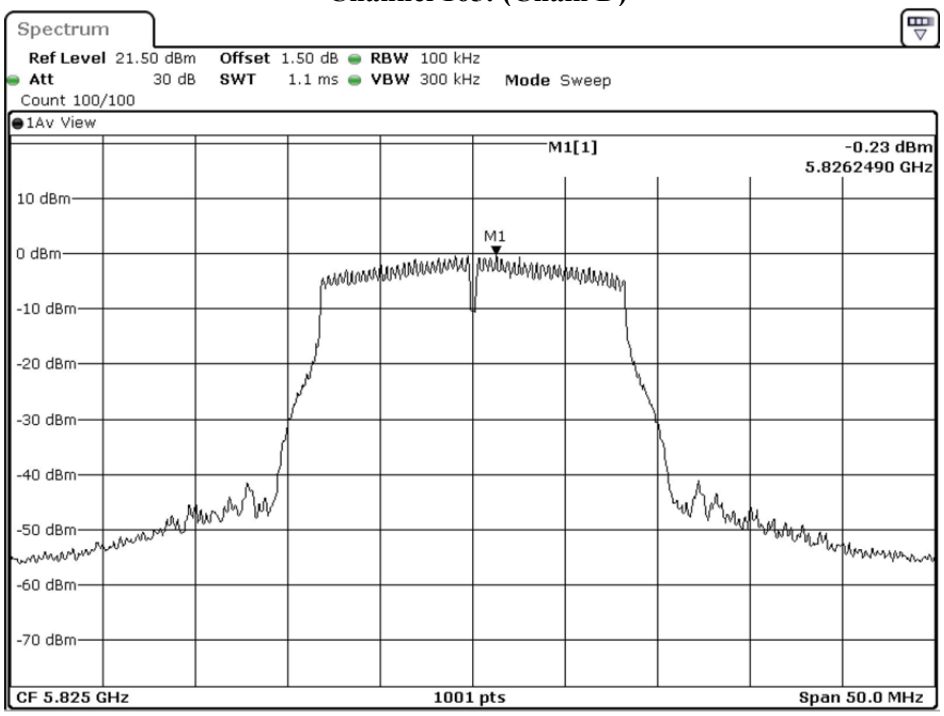
Date: 17.OCT.2020 16:37:51

Channel 165: (Chain C)



Date: 19.OCT.2020 10:10:57

Channel 165: (Chain D)



Date: 19.OCT.2020 11:13:12

Product : Gigabit LTE Multi-Service Router / LTE Dual-SIM Dual-Band Wireless VoIP VPN Router
Test Item : Peak Power Spectral Density
Test Mode : Mode 2: Transmit (802.11n/ac-20BW)
Test Date : 2020/10/19

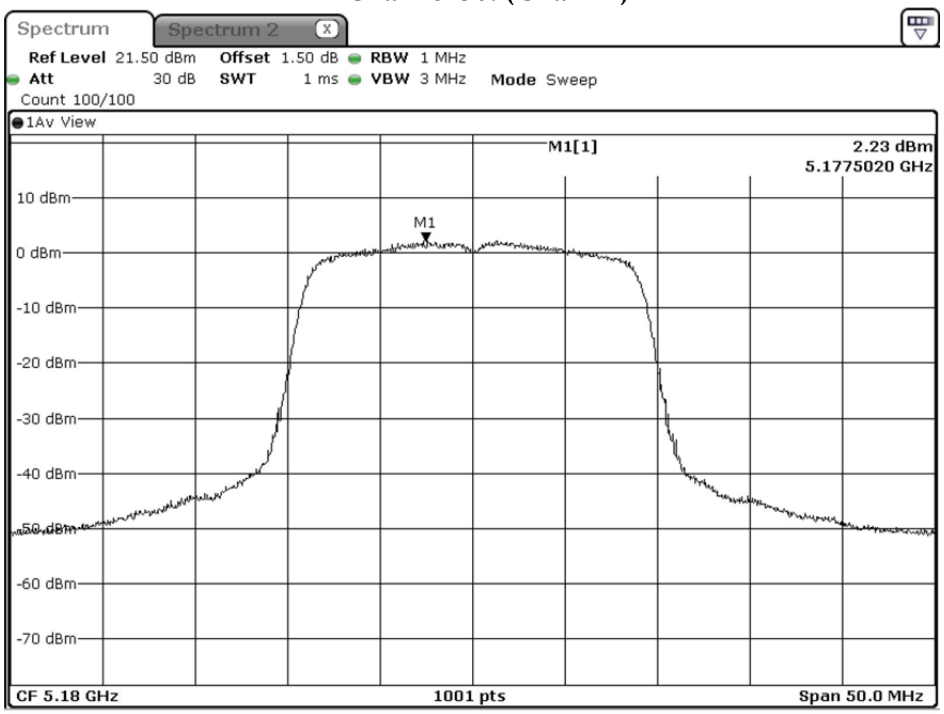
Channel Number	Frequency (MHz)	Chain	PPSD (dBm)	Duty Factor (dB)	Total PPSD (dBm)	Required Limit (dBm)	Result
36	5180	A	2.23	2.85	11.10	17	Pass
		B	3.01	2.85	11.88		Pass
		C	3.08	2.85	11.95		Pass
		D	3.44	2.85	12.31		Pass
44	5220	A	0.70	2.85	9.57	17	Pass
		B	0.73	2.85	9.60		Pass
		C	-0.11	2.85	8.76		Pass
		D	0.85	2.85	9.72		Pass
48	5240	A	0.55	2.85	9.42	17	Pass
		B	1.29	2.85	10.16		Pass
		C	0.52	2.85	9.39		Pass
		D	1.92	2.85	10.79		Pass

Note: The quantity 10*log 4 (four antennas) is added to the spectrum peak value according to document 662911 D01.

Channel Number	Frequency (MHz)	Chain	PPSD (dBm)	BWCF (dB)	Duty Factor (dB)	Total PPSD (dBm)	Required Limit (dBm)	Result
149	5745	A	-3.32	6.98	2.85	12.53	30	Pass
		B	-1.64	6.98	2.85	14.21		Pass
		C	-1.81	6.98	2.85	14.04		Pass
		D	-2.41	6.98	2.85	13.44		Pass
157	5785	A	-3.98	6.98	2.85	11.87	30	Pass
		B	-2.15	6.98	2.85	13.70		Pass
		C	-2.58	6.98	2.85	13.27		Pass
		D	-2.26	6.98	2.85	13.59		Pass
165	5825	A	-1.81	6.98	2.85	14.04	30	Pass
		B	-1.76	6.98	2.85	14.09		Pass
		C	-1.34	6.98	2.85	14.51		Pass
		D	-0.91	6.98	2.85	14.94		Pass

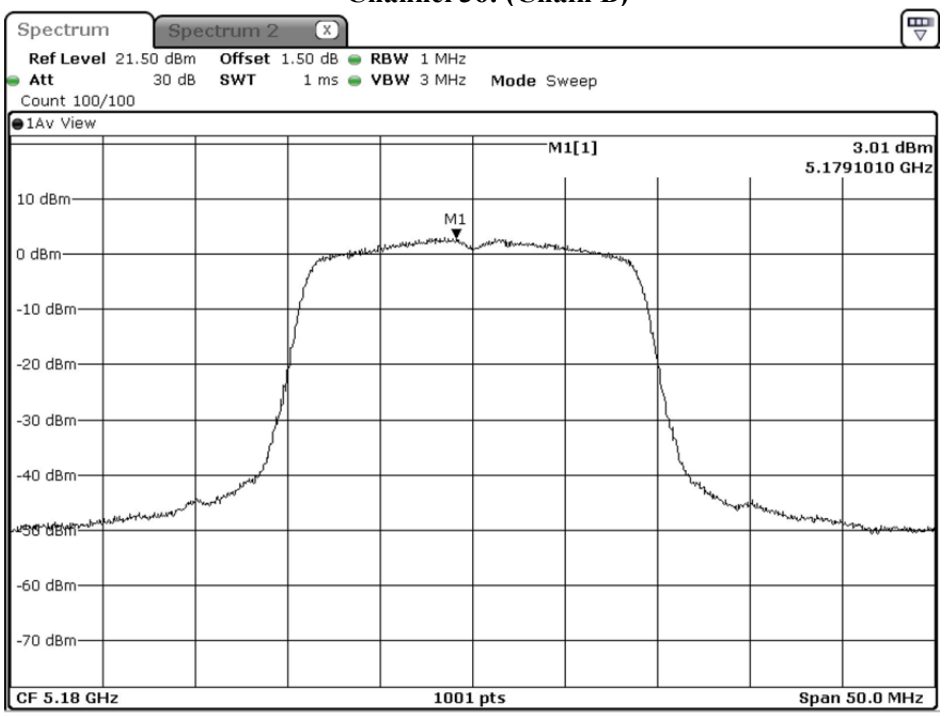
Note: The quantity 10*log 4 (four antennas) is added to the spectrum peak value according to document 662911 D01.

Channel 36: (Chain A)



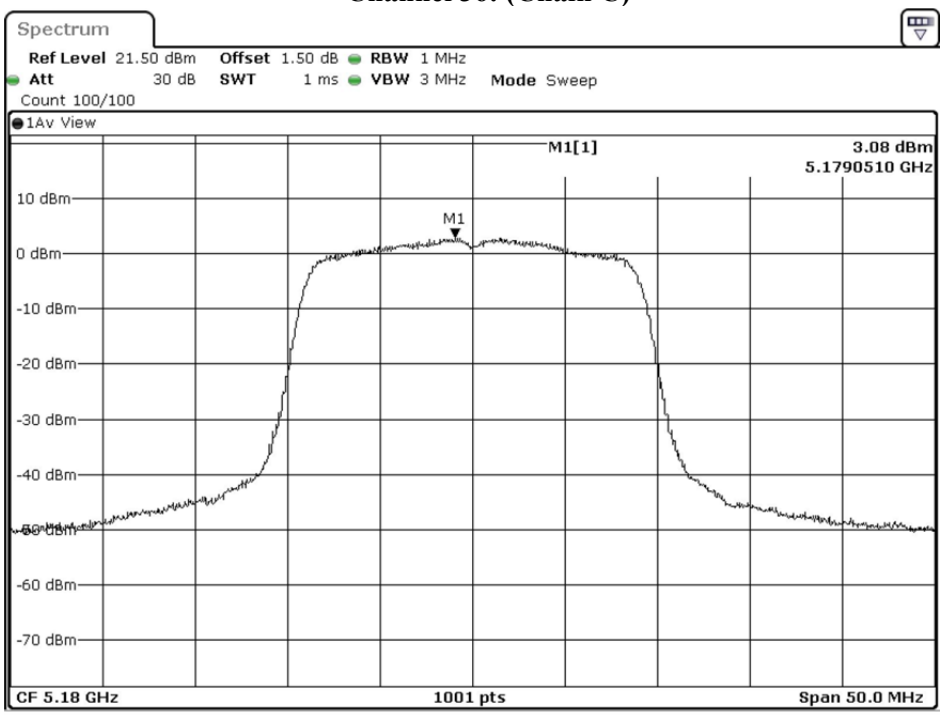
Date: 17.OCT.2020 15:08:30

Channel 36: (Chain B)



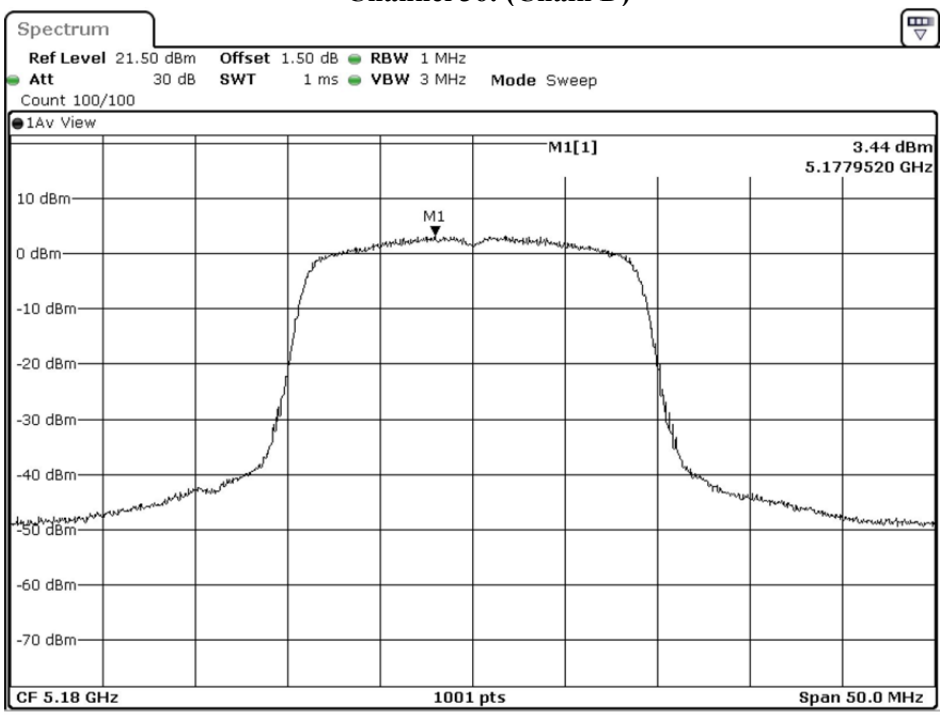
Date: 17.OCT.2020 16:19:21

Channel 36: (Chain C)



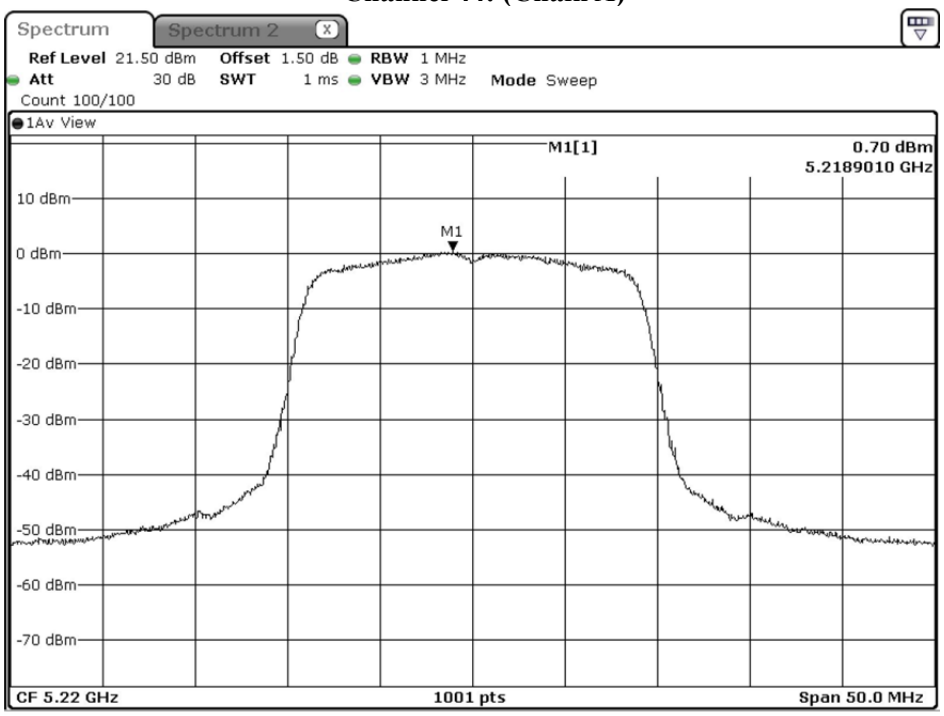
Date: 19.OCT.2020 09:53:18

Channel 36: (Chain D)



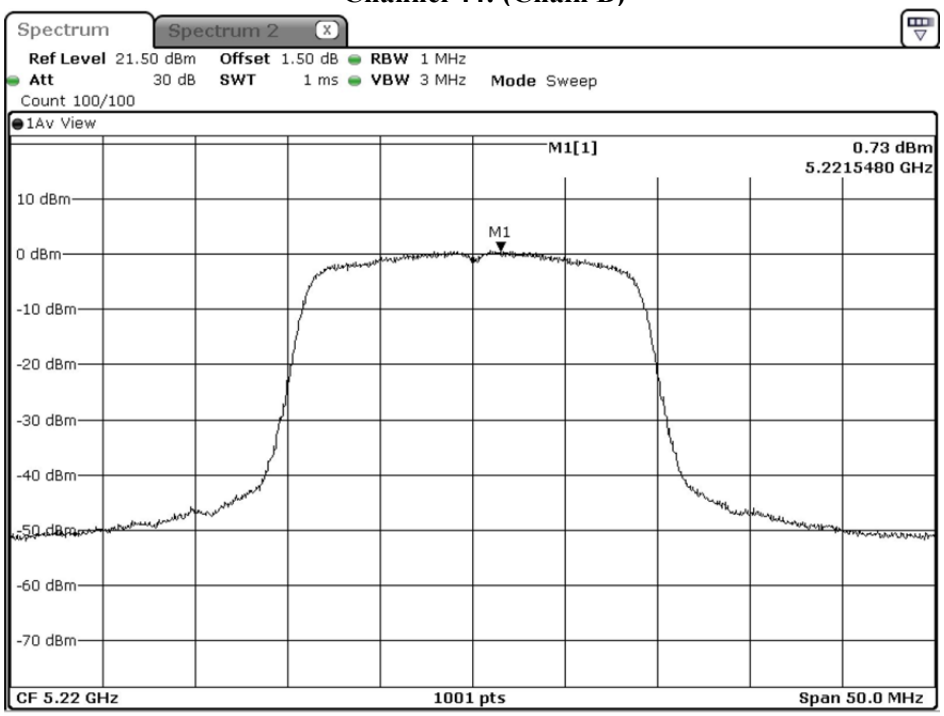
Date: 19.OCT.2020 10:42:14

Channel 44: (Chain A)



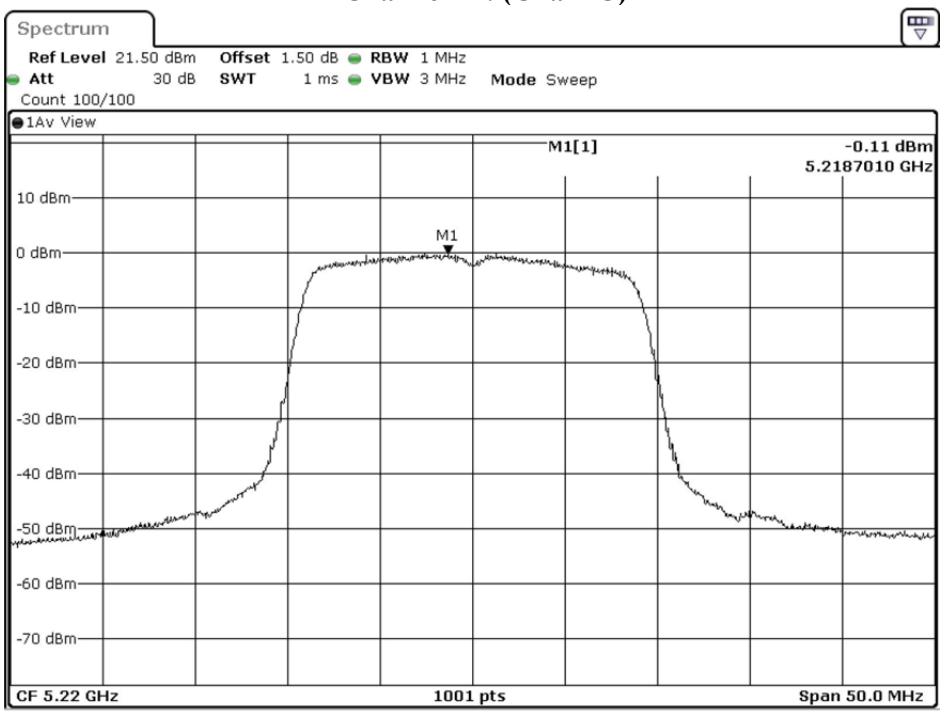
Date: 17.OCT.2020 15:11:28

Channel 44: (Chain B)



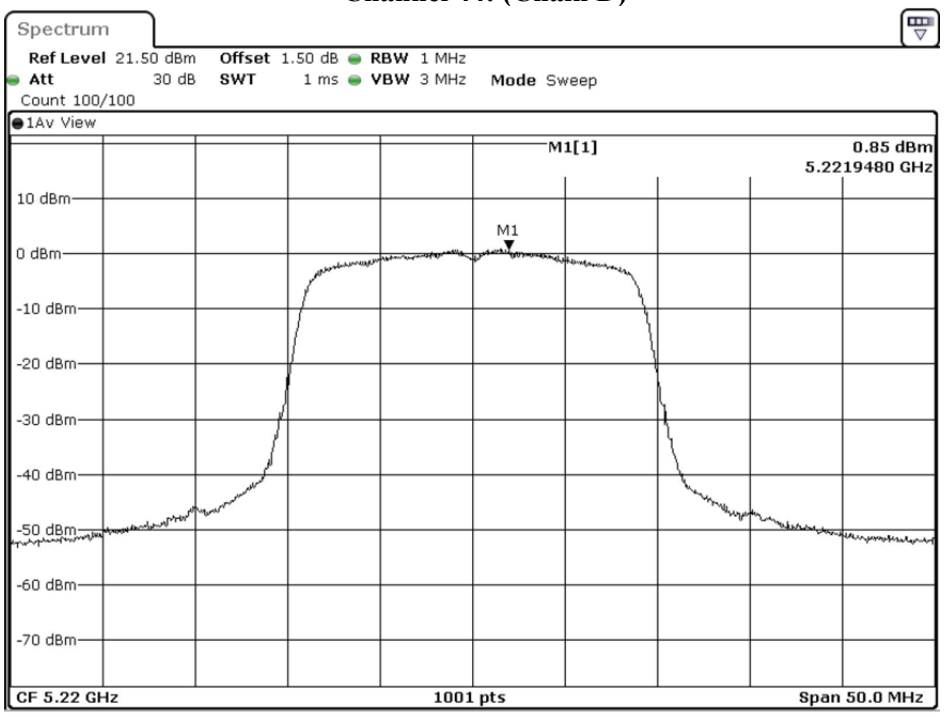
Date: 17.OCT.2020 16:21:59

Channel 44: (Chain C)



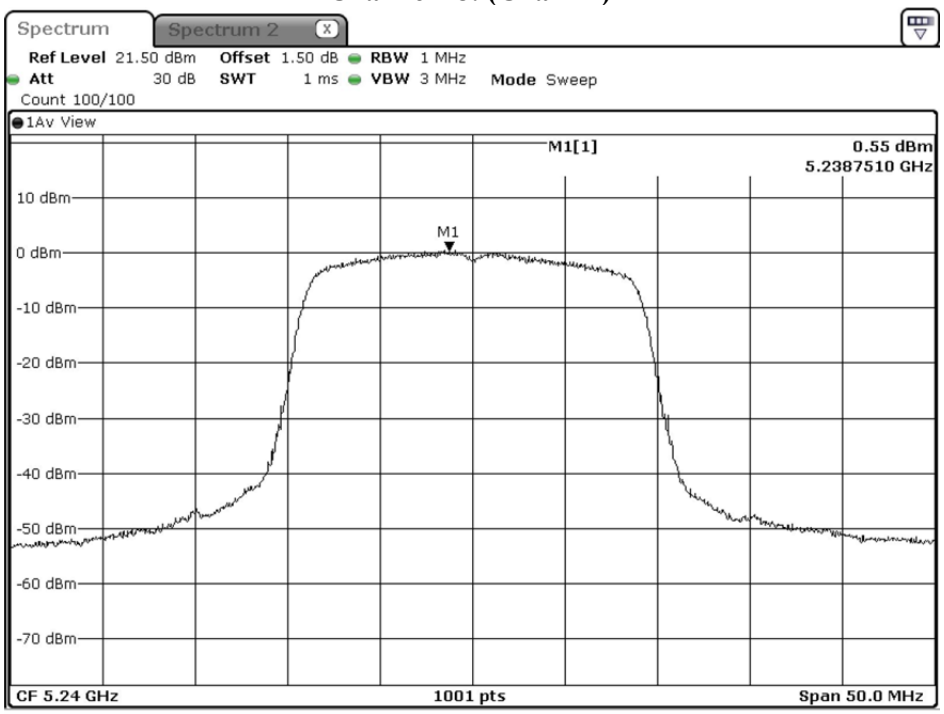
Date: 19.OCT.2020 09:55:40

Channel 44: (Chain D)



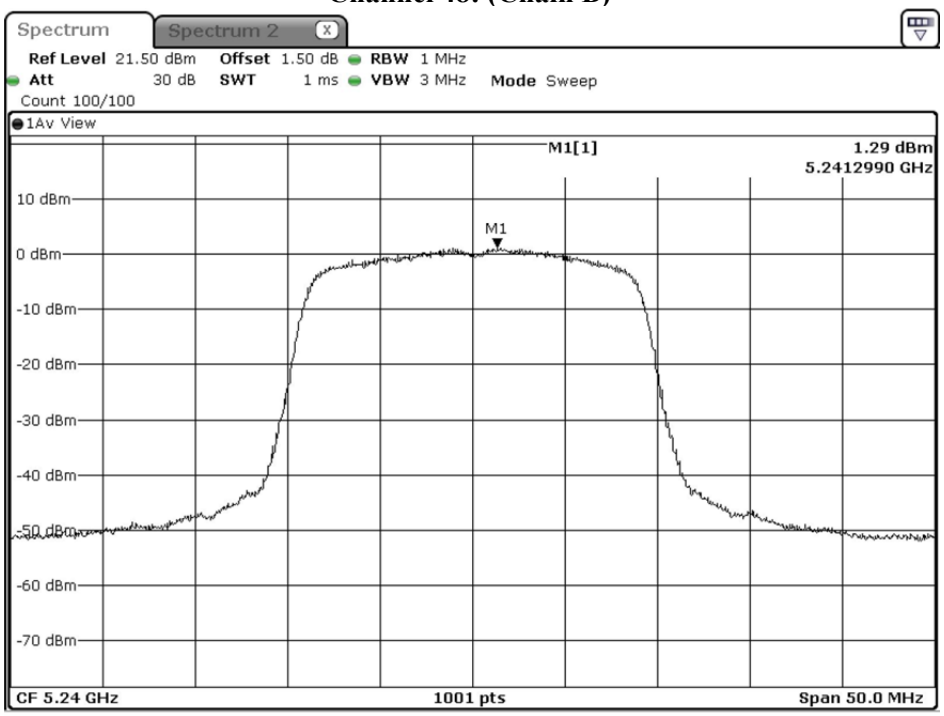
Date: 19.OCT.2020 10:44:28

Channel 48: (Chain A)



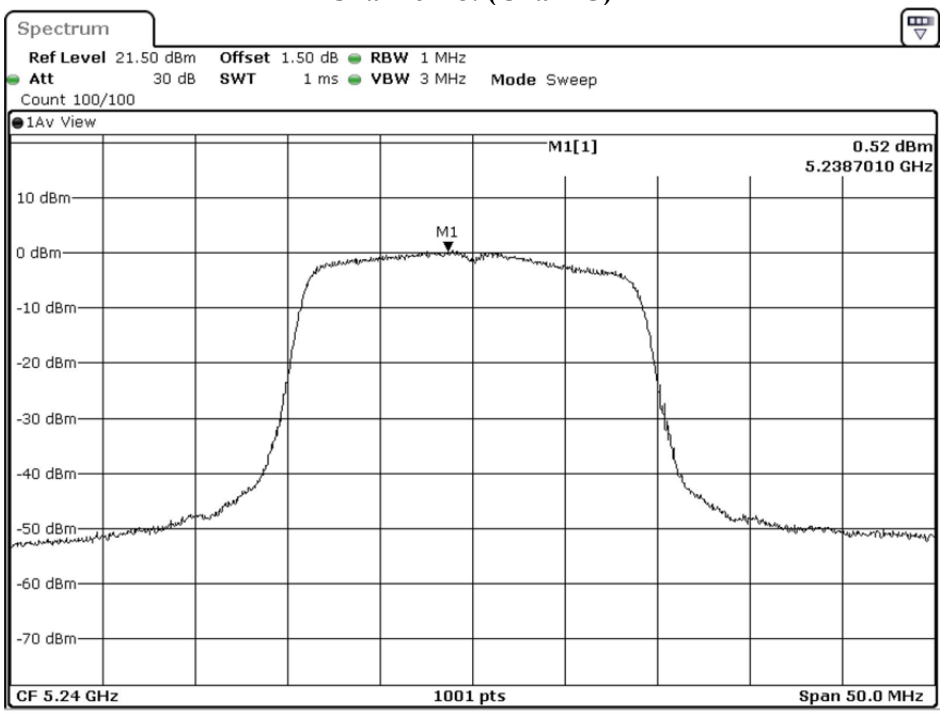
Date: 17.OCT.2020 15:13:56

Channel 48: (Chain B)



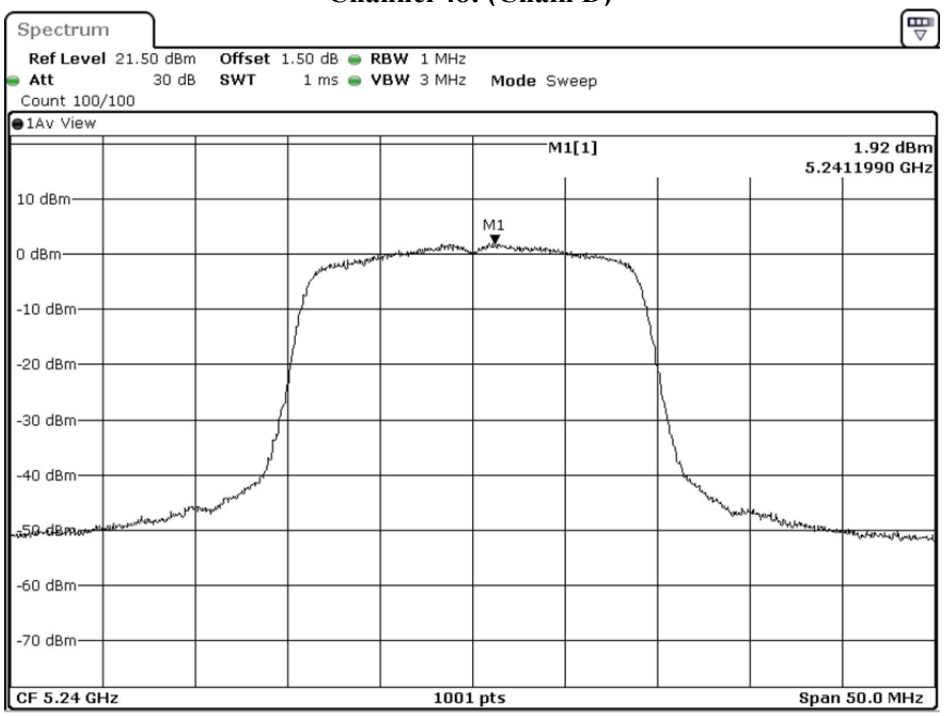
Date: 17.OCT.2020 16:24:40

Channel 48: (Chain C)



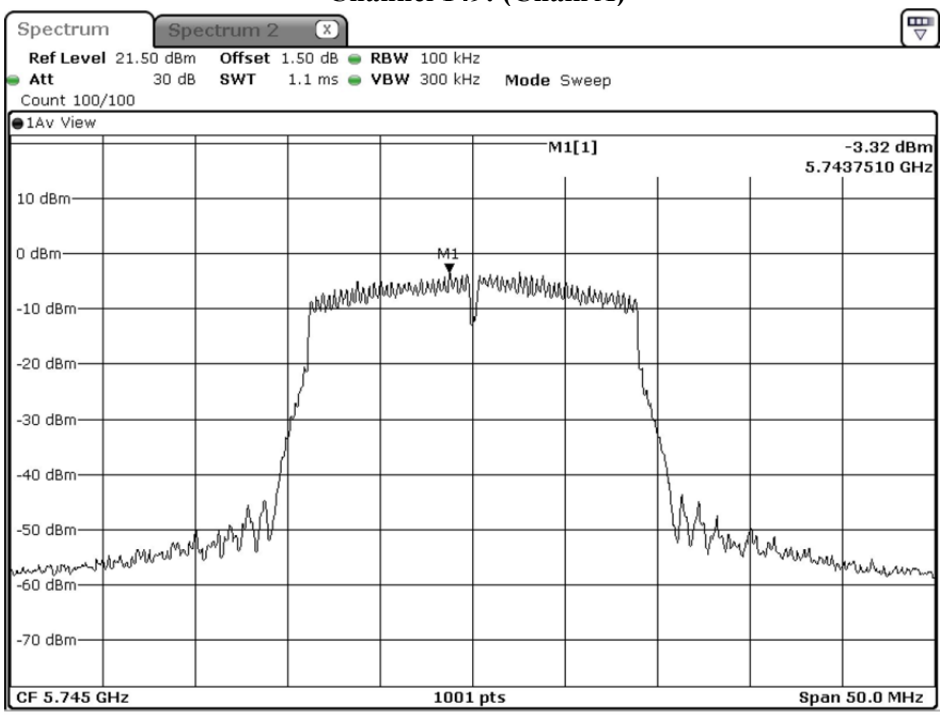
Date: 19.OCT.2020 09:58:18

Channel 48: (Chain D)



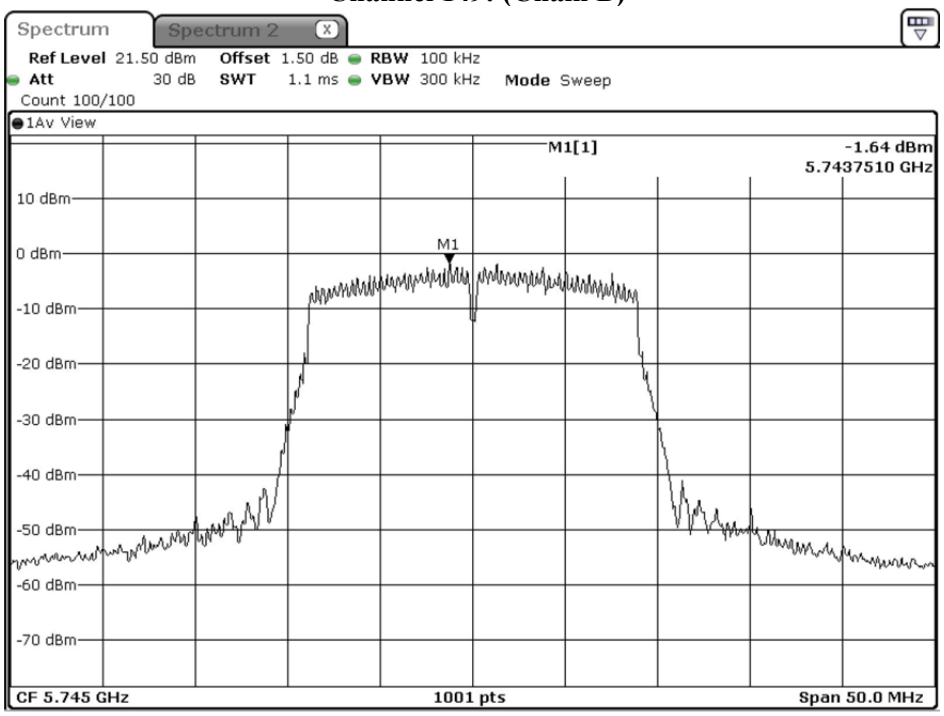
Date: 19.OCT.2020 11:01:28

Channel 149: (Chain A)



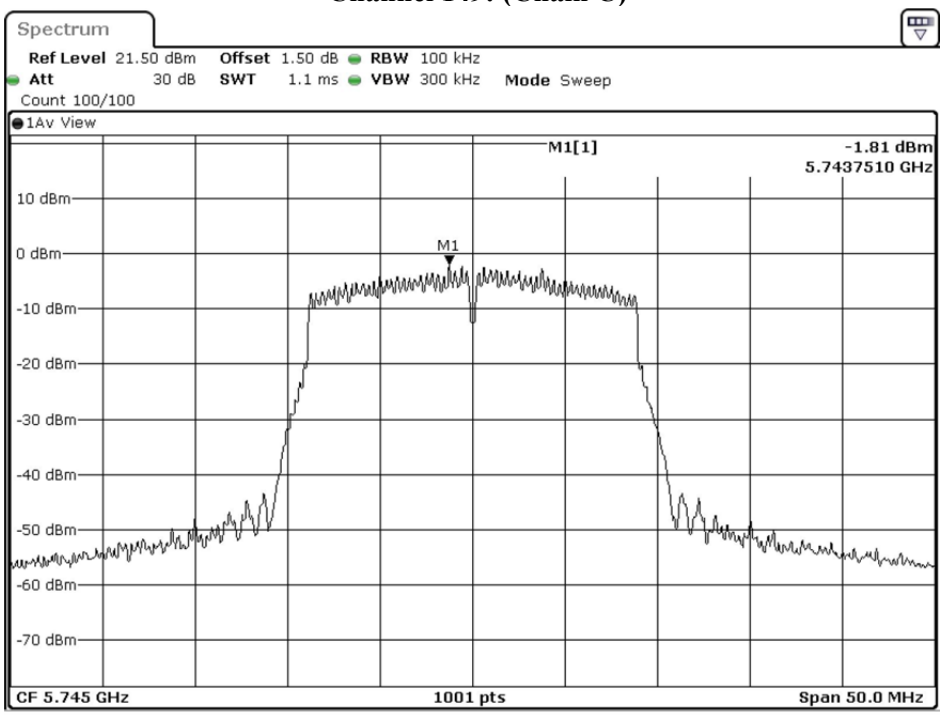
Date: 17.OCT.2020 15:32:07

Channel 149: (Chain B)



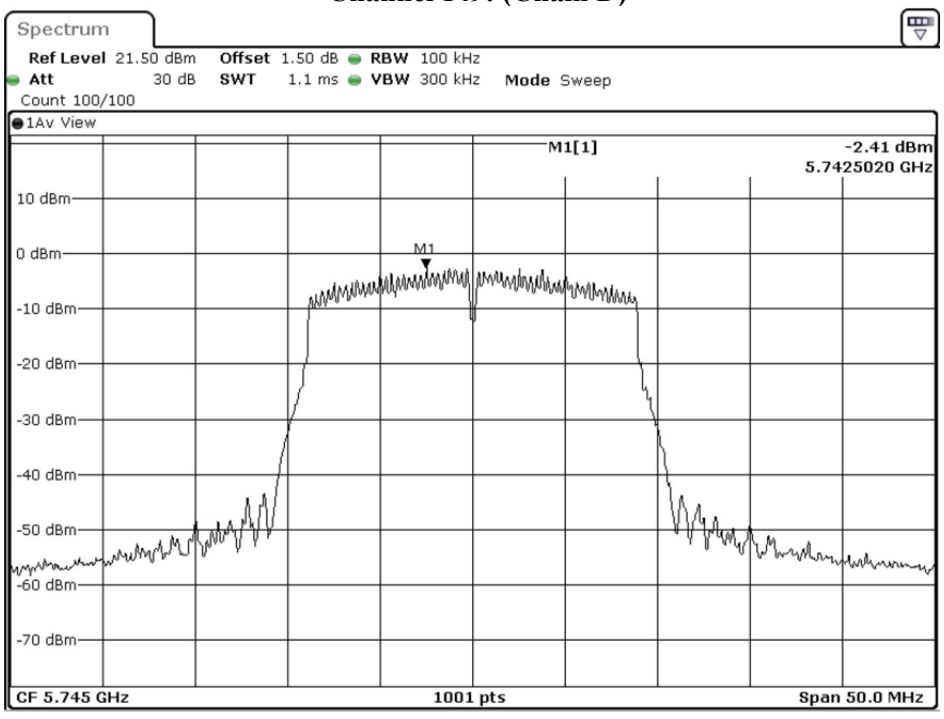
Date: 17.OCT.2020 16:43:01

Channel 149: (Chain C)



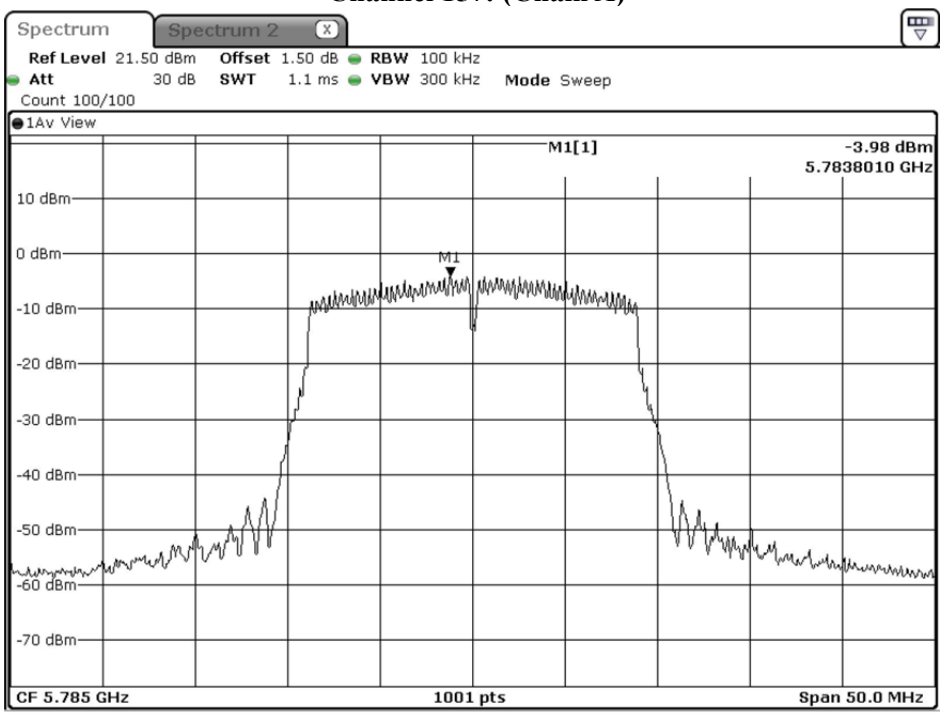
Date: 19.OCT.2020 10:15:43

Channel 149: (Chain D)



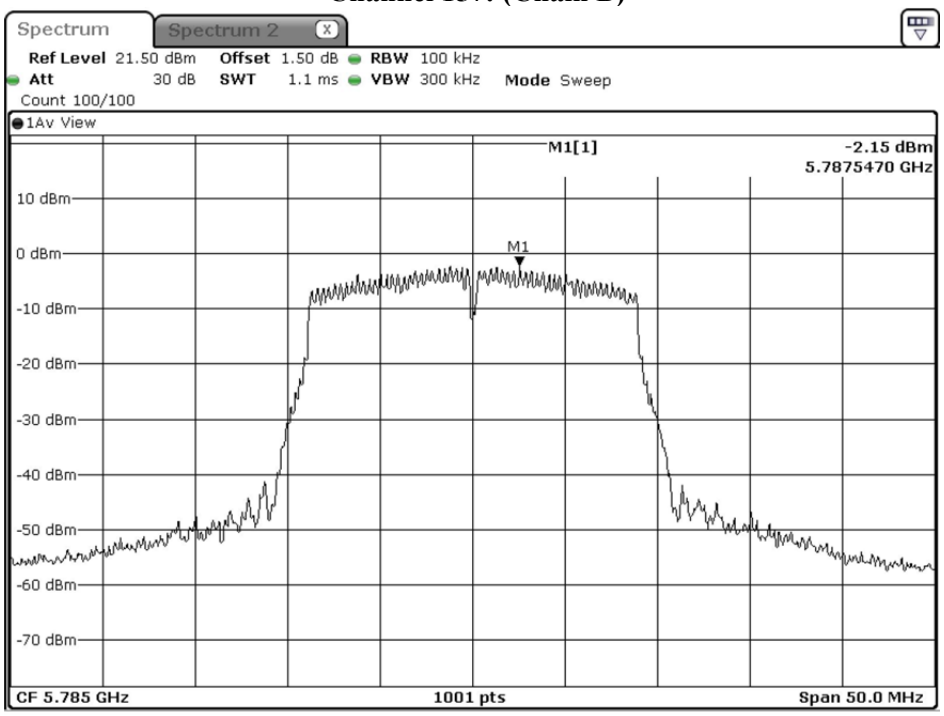
Date: 19.OCT.2020 11:17:49

Channel 157: (Chain A)



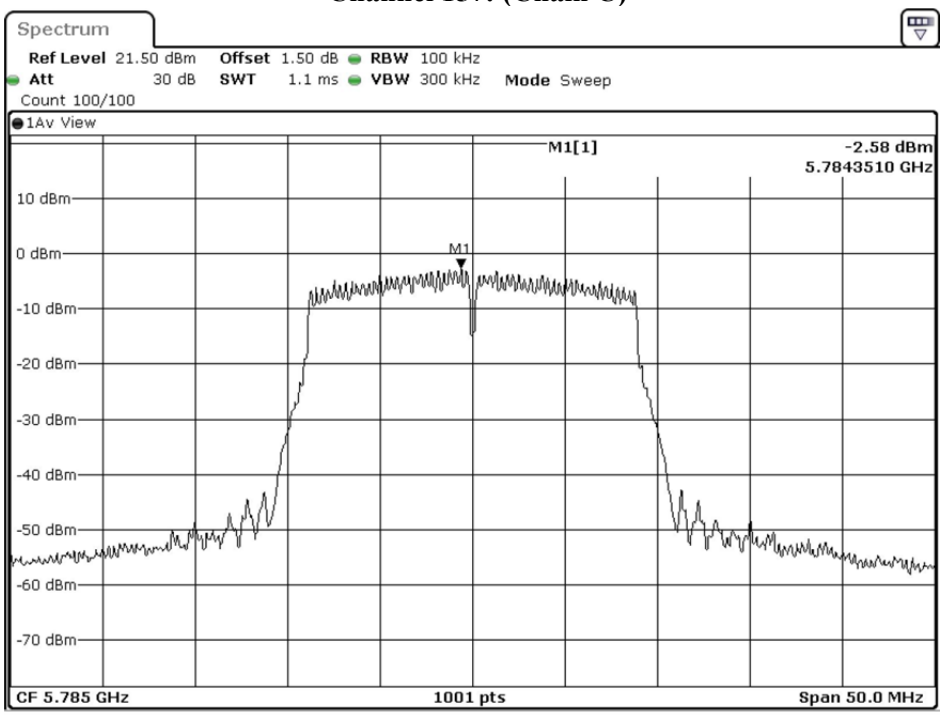
Date: 17.OCT.2020 15:34:31

Channel 157: (Chain B)



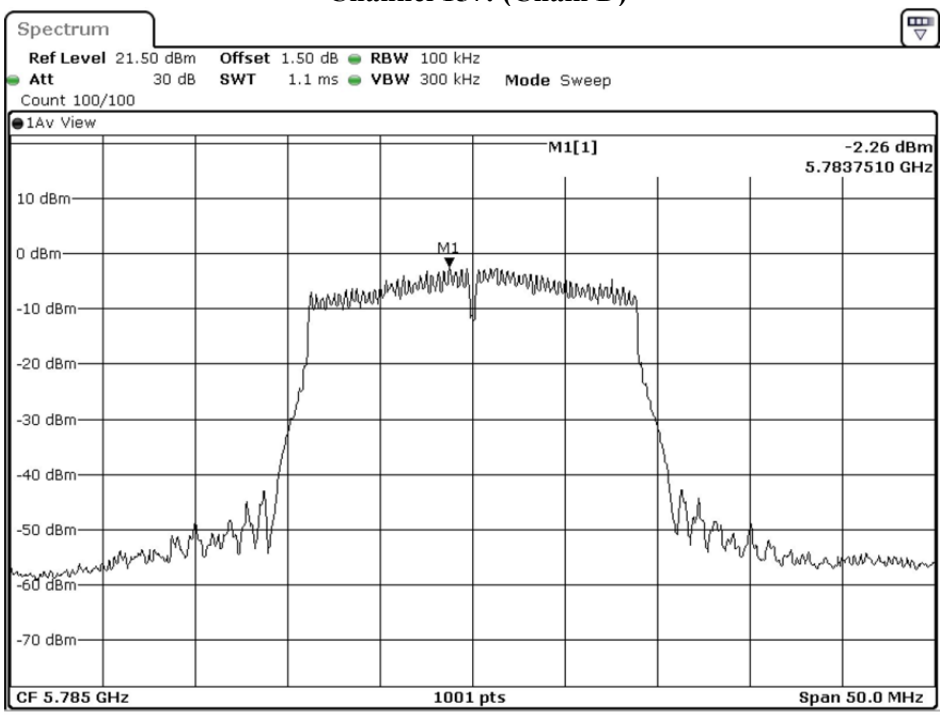
Date: 17.OCT.2020 16:45:00

Channel 157: (Chain C)



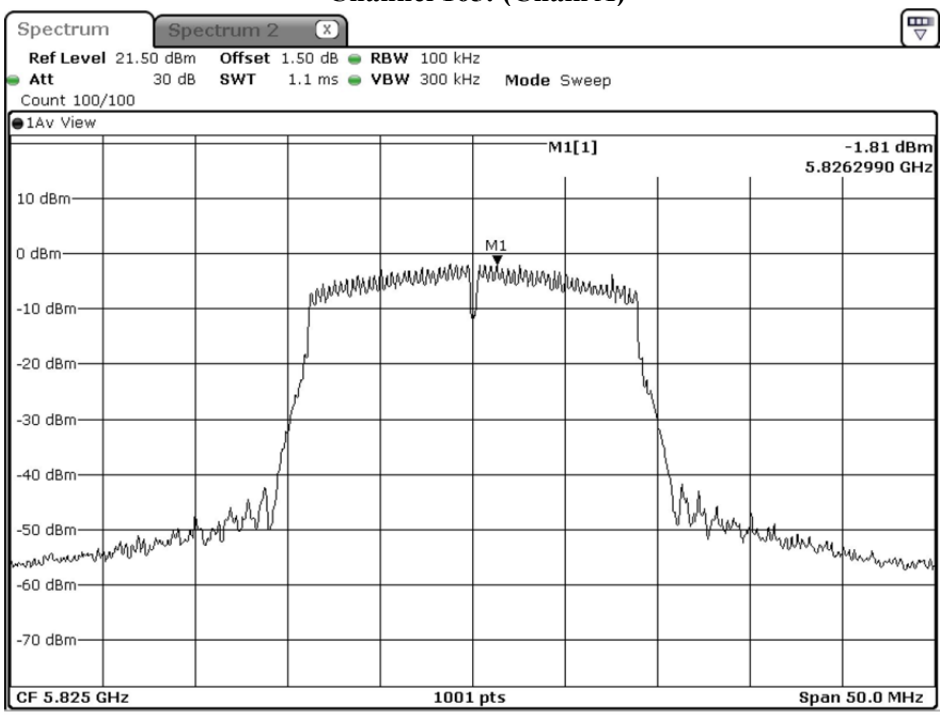
Date: 19.OCT.2020 10:18:18

Channel 157: (Chain D)



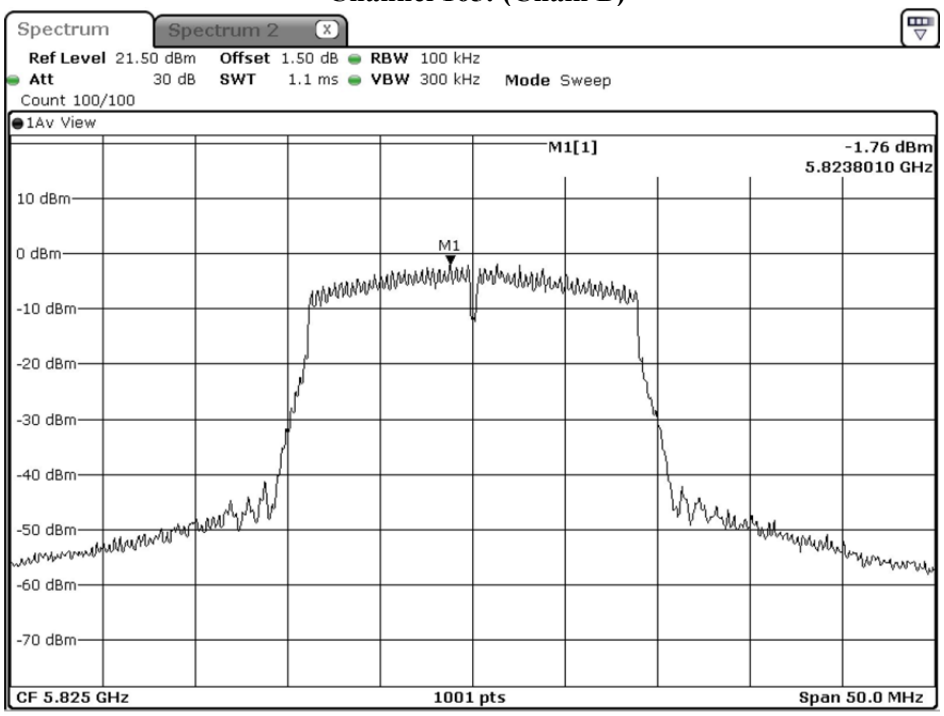
Date: 19.OCT.2020 11:19:33

Channel 165: (Chain A)



Date: 17.OCT.2020 15:36:39

Channel 165: (Chain B)



Date: 17.OCT.2020 16:46:59