TEST REPORT

CERTIFICATE OF CONFORMITY

Standard:	**47 CFR FCC Part 15, Subpart E (Section 15.407)**
Report No.:	RFBHQC-WTW-P22080379-2
FCC ID:	XCNUBN2309
Product:	XGS-PON
Brand:	altice
Model No.:	UBN2309
Series Model:	XSR250GK
Received Date:	2022/7/28
Test Date:	2022/12/7 ~ 2023/5/18
Issued Date:	2023/7/25
Applicant:	Ubee Interactive Holding Corp. Taiwan Branch
Address:	10F-1, No.5, Taiyuan 1st St. Jhubei, Hsinchu, 302, Taiwan
Issued By:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Lin Kou Laboratories
Lab Address:	No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan
Test Location:	No. 19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kewi Shan Dist., Taoyuan City 33383, Taiwan
FCC Registration / Designation Number:	788550 / TW0003

Approved by: Jeremy Lin , **Date:** 2023/7/25

Jeremy Lin / Project Engineer

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Prepared by : Celine Chou / Senior Specialist

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Release Control Record

Issue No.	Description	Date Issued
RFBHQC-WTW-P22080379-2	Original release.	2023/7/25

1 Certificate

Product:	XGS-PON
Brand:	altice
Test Model:	UBN2309
Series Model:	XSR250GK
Sample Status:	Mass product
Applicant:	Ubee Interactive Holding Corp. Taiwan Branch
Test Date:	2022/12/7 ~ 2023/5/18
Standard:	47 CFR FCC Part 15, Subpart E (Section 15.407)
Measurement procedure:	ANSI C63.10-2013 KDB 987594 D02 U-NII 6 GHz EMC Measurement v01v01 KDB 789033 D02 General UNII Test Procedure New Rules v02r01 KDB 412172 D01 Determining ERP and EIRP v01r01

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's RF characteristics under the conditions specified in this report.

2 Summary of Test Results

47 CFR FCC Part 15, Subpart E (Section 15.407)			
Clause	Test Item	Result	Remark
15.407(a)(5)	RF Output Power	Pass	Meet the requirement of limit.
15.407(a)(5)	Power Spectral Density	Pass	Meet the requirement of limit.
15.407(a)(10)	Emission Bandwidth	Pass	Meet the requirement of limit.
15.407(b)(9)	AC Power Conducted Emissions	Pass	Minimum passing margin is -10.06 dB at 0.40600 MHz
15.407(b)(9)	Unwanted Emissions below 1 GHz	Pass	Minimum passing margin is -6.3 dB at 161.92 MHz
15.407(b)(6) 15.407(b)(10)	Unwanted Emissions above 1 GHz	Pass	Minimum passing margin is -0.2 dB at 7125.00 MHz
15.407(b)(7)	In-Band Emission Mask	Pass	Meet the requirement of limit.
15.407(d)(6)	Contention-based Protocol	Pass	Meet the requirement of limit.
15.407(g)	Frequency Stability	Pass	Meet the requirement of limit.
15.407(d)	Operational restrictions for 6 GHz U-NII devices	Pass	Declaration by applicant.
15.203	Antenna Requirement	Pass	Antenna connector is ipex(MHF) not a standard connector.
---	Occupied Bandwidth	-	Reference only.

Note: Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

2.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Measurement	Specification	Expanded Uncertainty (k=2) (±)
AC Power Conducted Emissions	9 kHz ~ 30 MHz	2.99 dB
Unwanted Emissions below 1 GHz	9 kHz ~ 30 MHz	3.59 dB
	30 MHz ~ 1 GHz	3.64 dB
Unwanted Emissions above 1 GHz	1 GHz ~ 18 GHz	2.29 dB
	18 GHz ~ 40 GHz	2.29 dB

The other instruments specified are routine verified to remain within the calibrated levels, no measurement uncertainty is required to be calculated.

2.2 Supplementary Information

There is not any deviation from the test standards for the test method, and no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	XGS-PON
Brand	altice
Test Model	UBN2309
Series Model	XSR250GK
Model Difference	Refer to note
Status of EUT	Mass product
Power Supply Rating	12Vdc from power adapter
Modulation Type	64QAM, 16QAM, QPSK, BPSK for OFDM 1024QAM for OFDMA in 11ax HE mode
Modulation Technology	OFDM, OFDMA
Transfer Rate	802.11a: up to 54 Mbps 802.11ax: up to 4803.9 Mbps
Operating Frequency	5.955 GHz ~ 6.415 GHz 6.435 GHz ~ 6.525 GHz 6.535 GHz ~ 6.865 GHz 6.875 GHz ~ 7.115 GHz
Number of Channel	802.11a, 802.11ax (HE20): 59 802.11ax (HE40): 29 802.11ax (HE80): 14 802.11ax (HE160): 7
Output Power	CDD Mode: 5.955 GHz ~ 6.415 GHz : EIRP : 200.447 mW (23.02 dBm) 6.435 GHz ~ 6.525 GHz : EIRP : 172.982 mW (22.38 dBm) 6.535 GHz ~ 6.865 GHz : EIRP : 199.067 mW (22.99 dBm) 6.875 GHz ~ 7.115 GHz : EIRP : 185.353 mW (22.68 dBm) Beamforming Mode: 5.955 GHz ~ 6.415 GHz : EIRP : 381.066 mW (25.81 dBm) 6.435 GHz ~ 6.525 GHz : EIRP : 390.841 mW (25.92 dBm) 6.535 GHz ~ 6.865 GHz : EIRP : 347.536 mW (25.41 dBm) 6.875 GHz ~ 7.115 GHz : EIRP : 353.997 mW (25.49 dBm)
EUT Category	Low-power indoor Access Point

Note:

1. All models are listed as bleow.

Brand	Model	Difference
altice	UBN2309	All models are electrically identical, difference model names are for marketing purpose.
	XSR250GK	

From the above models, model: UBN2309 was selected as representative model for the test and its data was recorded in this report.

2. The EUT has three radios as following table:

Radio 1	Radio 2	Radio 3
WLAN (2.4GHz)	WLAN (5GHz)	WLAN (6GHz)

3. Simultaneously transmission condition.

Condition	Technology		
1	WLAN(2.4GHz)	WLAN(5GHz)	WLAN(6GHz)
Note: The emission of the simultaneous operation has been evaluated and no non-compliance was found.			

4. The EUT uses following accessories.

Brand	Model	Specification
MOSO	MSS-V3500WR120-042A0-US	AC Input : 100-240Vac, 50/60Hz 1.2A DC Output : 12.0Vdc, 3.5A DC Output Cable : 1.8m non-shielded, without core.

5. The above EUT information is declared by manufacturer and for more detailed features description, please refers to the manufacturer's specifications or user's manual.

3.2 Antenna Description of EUT

1. The antenna information is listed as below.

Antenna NO.	RF Chain NO.	Brand	Antenna Net Gain(dBi)	Frequency range	Antenna Type	Connector Type
DB1	5G Chain 3	WHA YU	3.72	5.15~5.85GHz	Dipole	ipex(MHF)
DB2	2.4G Chain 0 5G Chain 0	WHA YU	3.32	2.4~2.4835GHz	Dipole	ipex(MHF)
		WHA YU	3.8	5.15~5.85GHz	Dipole	ipex(MHF)
DB3	2.4G Chain 1 5G Chain 1	WHA YU	2.93	2.4~2.4835GHz	Dipole	ipex(MHF)
		WHA YU	3.79	5.15~5.85GHz	Dipole	ipex(MHF)
DB4	2.4G Chain 2 5G Chain 2	WHA YU	3.40	2.4~2.4835GHz	Dipole	ipex(MHF)
		WHA YU	3.79	5.15~5.85GHz	Dipole	ipex(MHF)
6G5	6G Chain 3	WHA YU	3.34	5.925GHz~7.125GHz	Dipole	ipex(MHF)
6G6	6G Chain 2	WHA YU	3.49	5.925GHz~7.125GHz	Dipole	ipex(MHF)
6G7	6G Chain 1	WHA YU	3.47	5.925GHz~7.125GHz	Dipole	ipex(MHF)
6G8	6G Chain 0	WHA YU	3.49	5.925GHz~7.125GHz	Dipole	ipex(MHF)

* Detail antenna specification please refer to antenna datasheet and/or antenna measurement report.

2. The EUT incorporates a MIMO function:

6 GHz Band		
Modulation Mode	Tx & Rx Configuration	
802.11a	4TX	4RX
802.11ax (HE20)	4TX	4RX
802.11ax (HE40)	4TX	4RX
802.11ax (HE80)	4TX	4RX
802.11ax (HE160)	4TX	4RX

Note:

1. All of modulation mode support beamforming function except 802.11a modulation mode.
2. The EUT support Beamforming and CDD mode, therefore both mode were investigated and the worst case scenario was identified. The worst case data were presented in test report.
3. For 802.11ax, the EUT not support Partial RU.
4. The EUT device modulation technique OFDMA does not support channel puncturing/bandwidth reduction mechanisms.

3.3 Channel List

U-NII-5:

24 channels are provided for 802.11a, 802.11ax (HE20):

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
1	5955 MHz	5	5975 MHz	9	5995 MHz	13	6015 MHz
17	6035 MHz	21	6055 MHz	25	6075 MHz	29	6095 MHz
33	6115 MHz	37	6135 MHz	41	6155 MHz	45	6175 MHz
49	6195 MHz	53	6215 MHz	57	6235 MHz	61	6255 MHz
65	6275 MHz	69	6295 MHz	73	6315 MHz	77	6335 MHz
81	6355 MHz	85	6375 MHz	89	6395 MHz	93	6415 MHz

12 channels are provided for 802.11ax (HE40):

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
3	5965 MHz	11	6005 MHz	19	6045 MHz	27	6085 MHz
35	6125 MHz	43	6165 MHz	51	6205 MHz	59	6245 MHz
67	6285 MHz	75	6325 MHz	83	6365 MHz	91	6405 MHz

6 channels are provided for 802.11ax (HE80):

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
7	5985 MHz	23	6065 MHz	39	6145 MHz	55	6225 MHz
71	6305 MHz	87	6385 MHz				

3 channels are provided for 802.11ax (HE160):

Channel	Frequency	Channel	Frequency	Channel	Frequency
15	6025 MHz	47	6185 MHz	79	6345 MHz

U-NII-6:

5 channels are provided for 802.11a, 802.11ax (HE20):

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
97	6435 MHz	101	6455 MHz	105	6475 MHz	109	6495 MHz
113	6515 MHz						

3 channels are provided for 802.11ax (HE40):

Channel	Frequency	Channel	Frequency	Channel	Frequency
99	6445 MHz	107	6485 MHz	*115	6525 MHz

1 channel is provided for 802.11ax (HE80):

Channel	Frequency
103	6465 MHz

1 channel is provided for 802.11ax (HE160):

Channel	Frequency
*111	6505 MHz

U-NII-7:

17 channels are provided for 802.11a, 802.11ax (HE20):

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
117	6535 MHz	121	6555 MHz	125	6575 MHz	129	6595 MHz
133	6615 MHz	137	6635 MHz	141	6655 MHz	145	6675 MHz
149	6695 MHz	153	6715 MHz	157	6735 MHz	161	6755 MHz
165	6775 MHz	169	6795 MHz	173	6815 MHz	177	6835 MHz
181	6855 MHz						

8 channels are provided for 802.11ax (HE40):

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
123	6565 MHz	131	6605 MHz	139	6645 MHz	147	6685 MHz
155	6725 MHz	163	6765 MHz	171	6805 MHz	179	6845 MHz

5 channels are provided for 802.11ax (HE80):

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
*119	6545 MHz	135	6625 MHz	151	6705 MHz	167	6785 MHz
*183	6865 MHz						

2 channels are provided for 802.11ax (HE160):

Channel	Frequency	Channel	Frequency
143	6665 MHz	175	*6825 MHz

U-NII-8:

13 channels are provided for 802.11a, 802.11ax (HE20):

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
185	6875 MHz	189	6895 MHz	193	6915 MHz	197	6935 MHz
201	6955 MHz	205	6975 MHz	209	6995 MHz	213	7015 MHz
217	7035 MHz	221	7055 MHz	225	7075 MHz	229	7095 MHz
233	7115 MHz						

6 channels are provided for 802.11ax (HE40):

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
187	6885 MHz	195	6925 MHz	203	6965 MHz	211	7005 MHz
219	7045 MHz	227	7085 MHz				

2 channels are provided for 802.11ax (HE80):

Channel	Frequency	Channel	Frequency
199	6945 MHz	215	7025 MHz

1 channel is provided for 802.11ax (HE160):

Channel	Frequency
207	6985 MHz

Note: * mean these are straddle channels.

3.4 Test Mode Applicability and Tested Channel Detail

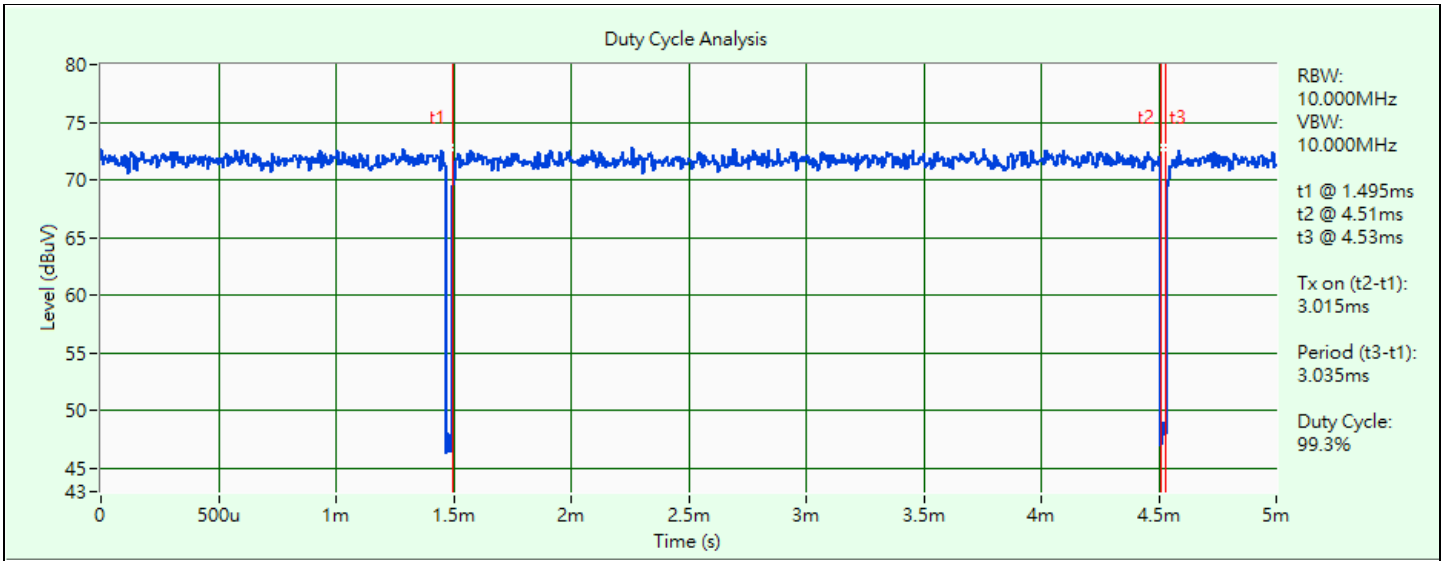
Following channel(s) was (were) selected for the final test as listed below:

Test Item	Mode	Signal Mode	Tested Channel	Modulation	Data Rate Parameter
RF Output Power / Power Spectral	802.11a	CDD	1, 45, 93, 97, 105, 113, 117, 149, 181, 185, 209, 233	BPSK	6Mb/s
	802.11ax (HE20)	CDD & Beamforming	1, 45, 93, 97, 105, 113, 117, 149, 181, 185, 209, 233	BPSK	MCS0
	802.11ax (HE40)		3, 43, 91, 99, 107, 115, 123, 155, 179, 187, 211, 227	BPSK	MCS0
	802.11ax (HE80)		7, 39, 87, 103, 119, 151, 183, 199, 215	BPSK	MCS0
	802.11ax (HE160)		15, 47, 79, 111, 143, 175, 207	BPSK	MCS0
Emission Bandwidth / In-Band Emission Mask / Occupied Bandwidth	802.11a	CDD	1, 45, 93, 97, 105, 113, 117, 149, 181, 185, 209, 233	BPSK	6Mb/s
	802.11ax (HE20)		233	BPSK	MCS0
	802.11ax (HE20)	Beamforming	1, 45, 93, 97, 105, 113, 117, 149, 181, 185, 209	BPSK	MCS0
	802.11ax (HE40)		3, 43, 91, 99, 107, 115, 123, 155, 179, 187, 211, 227	BPSK	MCS0
	802.11ax (HE80)		7, 39, 87, 103, 119, 151, 183, 199, 215	BPSK	MCS0
	802.11ax (HE160)		15, 47, 79, 111, 143, 175, 207	BPSK	MCS0
Frequency Stability	802.11a	-	1	un-modulation	-
Contention-based Protocol	802.11ax (HE20)	-	1, 97, 129, 193	BPSK	MCS0
	802.11ax (HE160)		15, 111, 143, 207	BPSK	MCS0
AC Power Conducted Emissions	802.11ax (HE160)	Beamforming	15	BPSK	MCS0
Unwanted Emissions below 1 GHz	802.11ax (HE160)	Beamforming	15	BPSK	MCS0
Unwanted Emissions above 1 GHz	802.11a	CDD	1, 45, 93, 97, 105, 113, 117, 149, 181, 185, 209, 233	BPSK	6Mb/s
	802.11ax (HE20)		233	BPSK	MCS0
	802.11ax (HE20)	Beamforming	1, 45, 93, 97, 105, 113, 117, 149, 181, 185, 209	BPSK	MCS0
	802.11ax (HE40)		3, 43, 91, 99, 107, 115, 123, 155, 179, 187, 211, 227	BPSK	MCS0
	802.11ax (HE80)		7, 39, 87, 103, 119, 151, 183, 199, 215	BPSK	MCS0
	802.11ax (HE160)		15, 47, 79, 111, 143, 175, 207	BPSK	MCS0

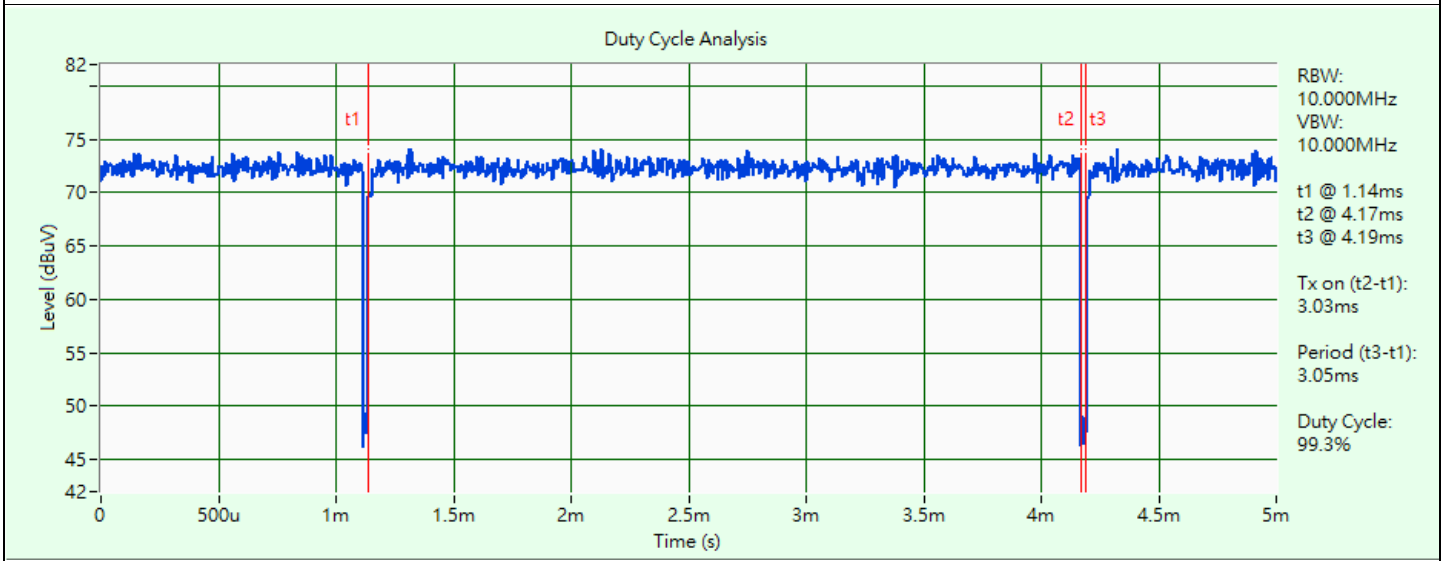
Note: The EUT is designed to be positioned on the Stand-up Mode only.

3.5 Duty Cycle of Test Signal

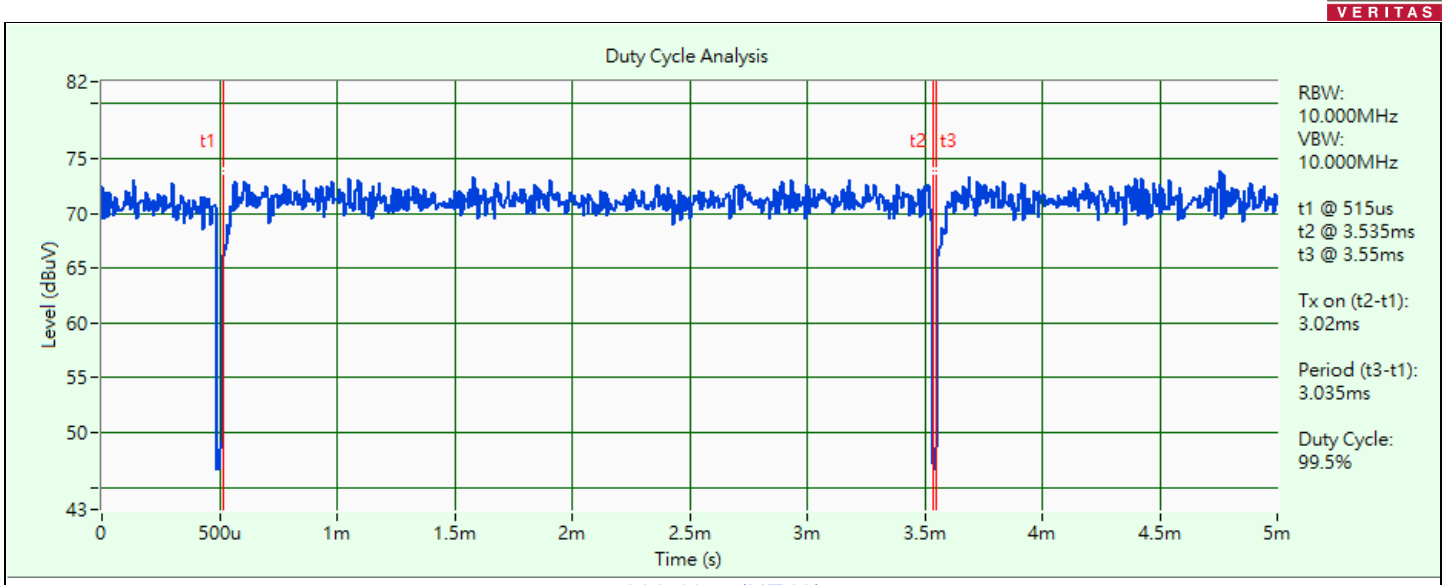
802.11a: Duty cycle = 3.015 ms / 3.035 ms x 100% = 99.3%
802.11ax (HE20): Duty cycle = 3.03 ms / 3.05 ms x 100% = 99.3%
802.11ax (HE40): Duty cycle = 3.02 ms / 3.035 ms x 100% = 99.5%
802.11ax (HE80): Duty cycle = 3.005 ms / 3.025 ms x 100% = 99.3%
802.11ax (HE160): Duty cycle = 3.005 ms / 3.025 ms x 100% = 99.3%



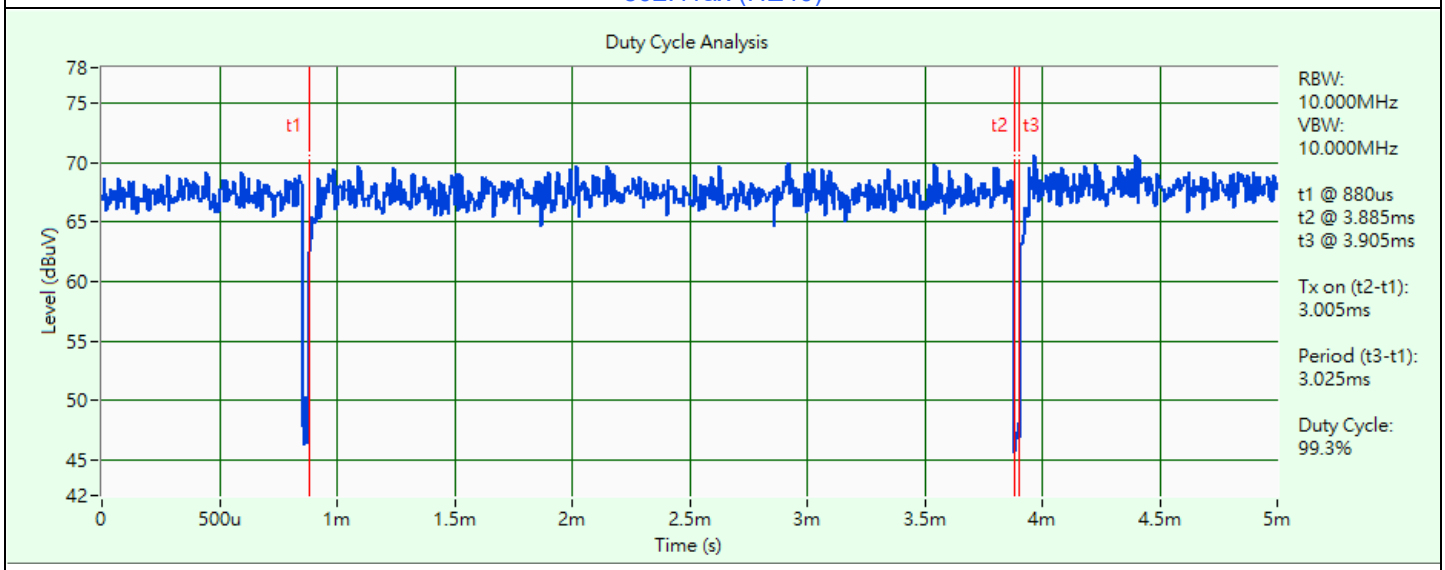
802.11a



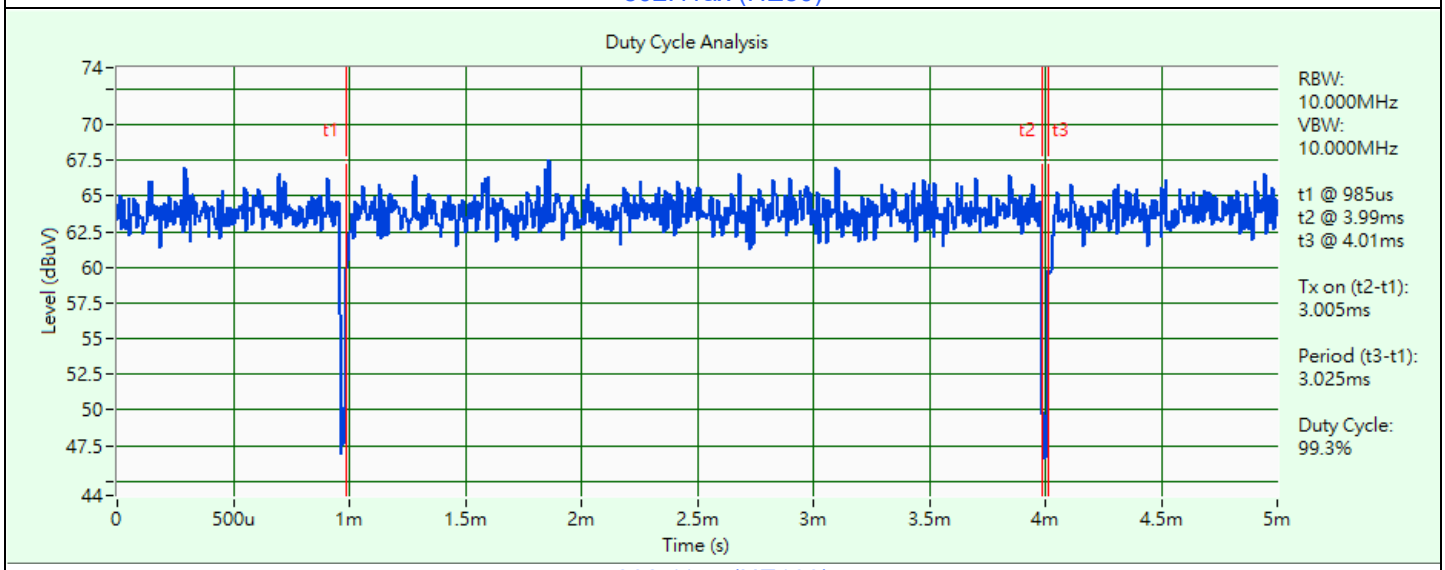
802.11ax (HE20)



802.11ax (HE40)



802.11ax (HE80)

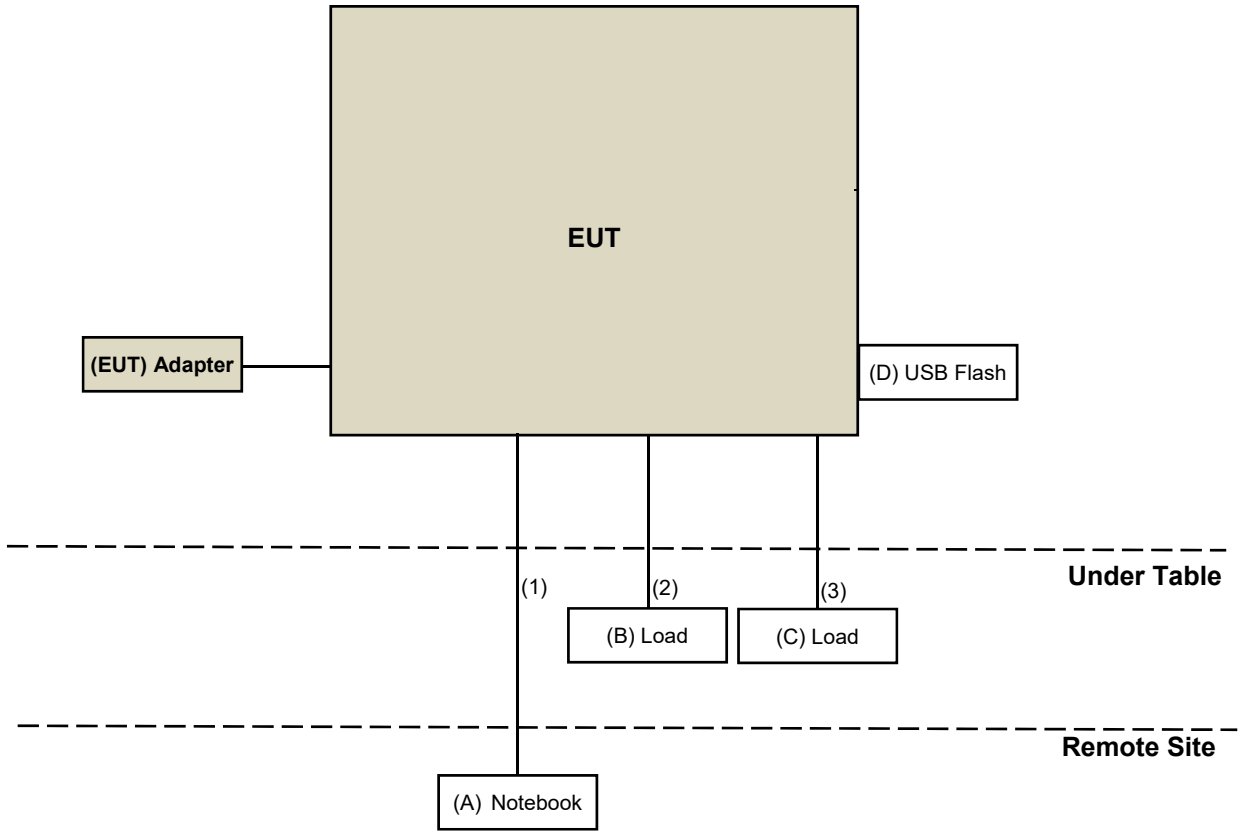


802.11ax (HE160)

3.6 Test Program Used and Operation Descriptions

Controlling software accessMTool_REL_3_3_0_0 has been activated to set the EUT under transmission condition continuously at specific channel frequency.

3.7 Connection Diagram of EUT and Peripheral Devices



3.8 Configuration of Peripheral Devices and Cable Connections

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A	Notebook	DELL	E5430	2RL3YW1	N/A	Provided by Lab
B	Load	N/A	N/A	N/A	N/A	Provided by Lab
C	Load	N/A	N/A	N/A	N/A	Provided by Lab
D	USB Flash	Sandisk	SDDDC3-032G	N/A	N/A	Provided by Lab

ID	Cable Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1	RJ-45 Cable	1	10	N	0	Provided by Lab
2	RJ-45 Cable	4	1.5	N	0	Provided by Lab
3	RJ-11 Cable	2	1.5	N	0	Provided by Lab

4 Test Instruments

The calibration interval of the all test instruments are 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

4.1 RF Output Power

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Antenna Tower inn-co GmbH	MA 4000	010303	N/A	N/A
Boresight antenna tower fixture BV	BAF-02	5	N/A	N/A
Horn Antenna Schwarzbeck	9120D	9120D-408	2022/11/13	2023/11/12
	BBHA 9170	9170-480	2022/11/13	2023/11/12
		BBHA9170241	2022/10/20	2023/10/19
		BBHA9170243	2022/11/13	2023/11/12
Pre-Ammlifier EMCI	EMC 184045	980116	2022/10/1	2023/9/30
Pre_Amplifier KEYSIGHT	83017A	MY53270295	2023/5/7	2024/5/6
RF cable HUBER+SUHNER	Sucoflex 104	MY 13380+295012/04	2023/5/7	2024/5/6
RF Coaxial Cable EMCI	EMC102-KM-KM-600	150928	2022/7/9	2023/7/8
	EMC102-KM-KM-3000	150929	2022/7/9	2023/7/8
RF Coaxial Cable HUBER+SUHNER	SUCOFLEX 104	Cable-CH4-03(250724)	2023/5/7	2024/5/6
Software BV ADT	ADT_Radiated_ V7.6.15.9.5	N/A	N/A	N/A
Spectrum Analyzer R&S	FSW43	101866	2023/1/10	2024/1/9
Test Receiver R&S	ESR3+	102782	2022/12/12	2023/12/11
Turn Table BV ADT	TT100	TT93021705	N/A	N/A
Turn Table Controller BV ADT	SC100	SC93021705	N/A	N/A

Notes:

1. The test was performed in HY - 966 chamber 3.
2. Tested Date: 2023/5/15

4.2 Power Spectral Density

Refer to section 4.1 to get information of the instruments.

4.3 Emission Bandwidth

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Signal & Spectrum Analyzer R&S	FSV3044	101105	2023/2/22	2024/2/21
Software BV	ADT_RF Test Software V6.6.5.4	N/A	N/A	N/A

Notes:

1. The test was performed in Oven room.
2. Tested Date: 2023/5/15

4.4 In-Band Emission Mask

Refer to section 4.3 to get information of the instruments.

4.5 Occupied Bandwidth

Refer to section 4.3 to get information of the instruments.

4.6 Frequency Stability

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
AC power supply JIN YIH Technology	6905S	1720444	N/A	N/A
Digital Multimeter Fluke	87-III	70360742	2022/6/23	2023/6/22
Signal & Spectrum Analyzer R&S	FSV3044	101105	2023/2/22	2024/2/21
Software BV	ADT_RF Test Software V6.6.5.4	N/A	N/A	N/A
Temperature & Humidity Chamber TERCHY	HRM-120RF	931022	2022/12/27	2023/12/26

Notes:

1. The test was performed in Oven room.
2. Tested Date: 2023/5/15

4.7 Contention-based Protocol

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Combiner Mini-Circuits	ZFRSC-123-S+	F698501347_01	2022/1/26	2023/1/25
		F698501347_02	2021/12/22	2022/12/21
Frequency Extender KEYSIGHT	N5182BX07	MY59360198	2022/10/14	2023/10/13
MXG X-Series RF Vector Signal Generator Keysight	N5182B	MY53052647	2022/11/8	2023/11/7
Spectrum Analyzer Keysight	N9030A	MY55410176	2022/6/21	2023/6/20
Spectrum Analyzer R&S	FSV40	101516	2022/3/7	2023/3/6

Notes:

1. The test was performed in Adaptivity room.
2. Tested Date: 2022/12/7

4.8 AC Power Conducted Emissions

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
LISN R&S	ESH3-Z5	100311	2022/9/12	2023/9/11
LISN ROHDE & SCHWARZ	ENV216	101826	2022/3/14	2023/3/13
RF Coaxial Cable WOKEN	5D-FB	Cable-cond1-01	2023/1/7	2024/1/6
Software BVADT	BVADT_Cond_ V7.3.7.4	N/A	N/A	N/A
Test Receiver Rohde&Schwarz	ESCI	100613	2022/12/5	2023/12/4
V-LISN Schwarzbeck	NNBL 8226-2	8226-142	2022/8/31	2023/8/30

Notes:

1. The test was performed in HY - Conduction 1.
2. Tested Date: 2023/1/30

4.9 Unwanted Emissions below 1 GHz

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Antenna Tower inn-co GmbH	MA 4000	010303	N/A	N/A
Bi_Log Antenna Schwarbeck	VULB9168	9168-155	2022/10/21	2023/10/20
Loop Antenna EMCI	EM-6879	269	2022/9/19	2023/9/18
Loop Antenna TESEQ	HLA 6121	45745	2022/7/27	2023/7/26
Pre-amplifier EMCI	EMC001340	980201	2022/9/23	2023/9/22
Pre_Amplifier Agilent	8447D	2944A10631	2023/5/7	2024/5/6
RF Coaxial Cable EMCI	5D-NM-BM	140903+140902	2023/1/7	2024/1/6
RF Coaxial Cable WOKEN	8D-FB	Cable-CH4-01	2022/7/9	2023/7/8
Software BV ADT	ADT_Radiated_ V7.6.15.9.5	N/A	N/A	N/A
Spectrum Analyzer R&S	FSW43	101866	2023/1/10	2024/1/9
Test Receiver R&S	ESR3+	102782	2022/12/12	2023/12/11
Turn Table BV ADT	TT100	TT93021705	N/A	N/A
Turn Table Controller BV ADT	SC100	SC93021705	N/A	N/A

Notes:

1. The test was performed in HY - 966 chamber 3.
2. Tested Date: 2023/5/18

4.10 Unwanted Emissions above 1 GHz

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Antenna Tower inn-co GmbH	MA 4000	010303	N/A	N/A
Boresight antenna tower fixture BV	BAF-02	5	N/A	N/A
EMI Test Receiver R&S	ESR3	102782	2022/12/12	2023/12/11
Horn Antenna Schwarzbeck	9120D	9120D-408	2022/11/13	2023/11/12
	BBHA 9170	9170-480	2022/11/13	2023/11/12
		BBHA9170241	2022/10/20	2023/10/19
		BBHA9170243	2022/11/13	2023/11/12
Pre-Ammlifier EMCI	EMC 184045	980116	2022/10/1	2023/9/30
Preamplifier KEYSIGHT	83017A	MY53270295	2023/5/7	2024/5/6
Pre_Amplifier KEYSIGHT	83017A	MY53270295	2023/5/7	2024/5/6
RF cable HUBER+SUHNER	Sucoflex 104	MY 13380+295012/04	2023/5/7	2024/5/6
RF Coaxial Cable EMCI	EMC102-KM-KM-600	150928	2022/7/9	2023/7/8
	EMC102-KM-KM-3000	150929	2022/7/9	2023/7/8
RF Coaxial Cable HUBER+SUHNER	SUCOFLEX 104	Cable-CH4-03(250724)	2023/5/7	2024/5/6
	Sucoflex 104	MY 13380+295012/04	2023/5/7	2024/5/6
Signal & Spectrum Analyzer R&S	FSW43	101866	2023/1/10	2024/1/9
Software BV ADT	ADT_Radiated_ V7.6.15.9.5	N/A	N/A	N/A
Spectrum Analyzer R&S	FSW43	101866	2023/1/10	2024/1/9
Test Receiver R&S	ESR3+	102782	2022/12/12	2023/12/11
Turn Table BV ADT	TT100	TT93021705	N/A	N/A
Turn Table Controller BV ADT	SC100	SC93021705	N/A	N/A

Notes:

1. The test was performed in HY - 966 chamber 3.
2. Tested Date: 2023/5/15 ~ 2023/5/18

5 Limits of Test Items

5.1 RF Output Power

Operation Band	EUT Category	Limit
		Max Average Power
U-NII-5 U-NII-6 U-NII-7 U-NII-8	Indoor AP	EIRP 30 dBm

5.2 Power Spectral Density

Operation Band	EUT Category	Limit
		Peak Power Density
U-NII-5 U-NII-6 U-NII-7 U-NII-8	Indoor AP	EIRP 5 dBm/MHz

5.3 Emission Bandwidth

The maximum transmitter channel bandwidth for U-NII devices in the 5.925-7.125 GHz band is 320 MHz.

5.4 In-Band Emission Mask

Test Item	Frequencies (MHz)	(X) dBc*1
Emission Mask	At 1 MHz outside of channel edge	20
	At one channel bandwidth from the channel center*2	28
	At one- and one-half times the channel bandwidth away from channel center*3	40
	More than one- and one-half times the channel bandwidth	40

*1 : The power spectral density must be suppressed by “x” dB

*2 : At frequencies between one megahertz outside an unlicensed device’s channel edge and one channel bandwidth from the center of the channel, the limits must be linearly interpolated between 20 dB and 28 dB suppression,

*3 : At frequencies between one and one- and one-half times an unlicensed device’s channel bandwidth, the limits must be linearly interpolated between 28 dB and 40 dB suppression.

5.5 Occupied Bandwidth

The results are for reference only.

5.6 Frequency Stability

The frequency of the carrier signal shall be maintained within band of operation.

5.7 Contention-based Protocol

Unlicensed indoor low-power devices must detect co-channel radio frequency power that is at least -62 dBm (The threshold is referenced to a 0 dBi antenna gain.) or lower. Additionally, indoor low-power devices must detect co-channel energy with 90% or greater certainty.

5.8 AC Power Conducted Emissions

Frequency (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15 - 0.5	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30.0	60	50

Notes:

1. The lower limit shall apply at the transition frequencies.
2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.

5.9 Unwanted Emissions below 1 GHz

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table.

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

Notes:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).

5.10 Unwanted Emissions above 1 GHz

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table.

Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
Above 960	500	3

Notes:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. For frequencies above 1000 MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20 dB under any condition of modulation.

Limits of unwanted emission out of the restricted bands

Frequencies (MHz)	EIRP Limit	Equivalent Field Strength at 3 m
5925 MHz > F > 7125 MHz	Peak: -7 (dBm/MHz)	88.2 (dBuV/m)
	Average: -27 (dBm/MHz)	68.2 (dBuV/m)

Note: The following formula is used to convert the equipment isotropic radiated power (eirp) to field strength:

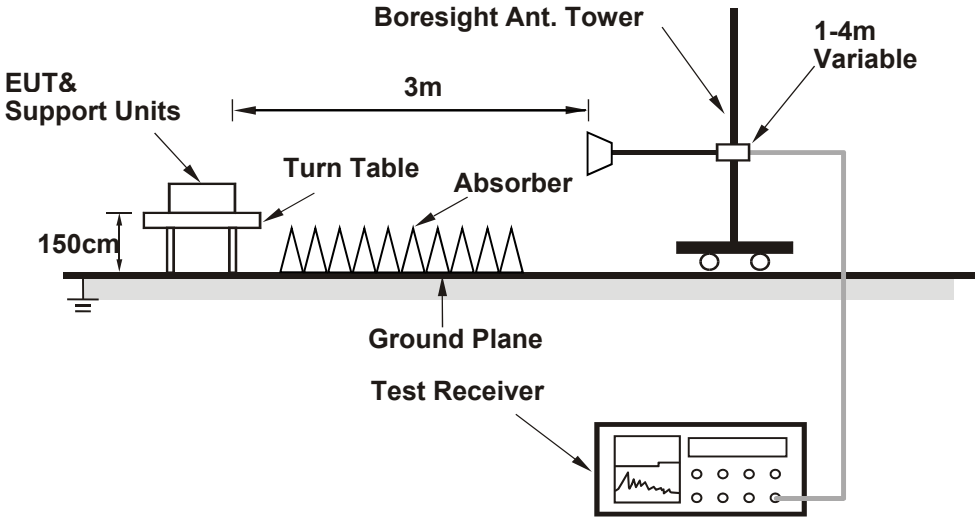
$$E = \frac{1000000\sqrt{30P}}{3}$$ μV/m, where P is the eirp (Watts).

6 Test Arrangements

6.1 RF Output Power

6.1.1 Test Setup

Radiated Measurement Method



6.1.2 Test Procedure

Radiated Measurement Method

a. The EUT was placed on the top of a rotating table 1.5 meters above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
d. Perform a field strength measurement and record the worse read value, is the field strength value via a spectrum reading obtained corrected for antenna factor, cable loss and pre-amplifier factor and then mathematically convert the measured field strength level to EIRP level.
e. Follow ANSI C63.10 section 12.7.3, EIRP Value (dBm) = Field Strength Value (dBuV/m) + Correction Factor @ 3 m.
f. Correction Factor (dB) @ 3 m = 20log(D) – 104.77; where D is the measurement distance @3 m = -95.23 dB

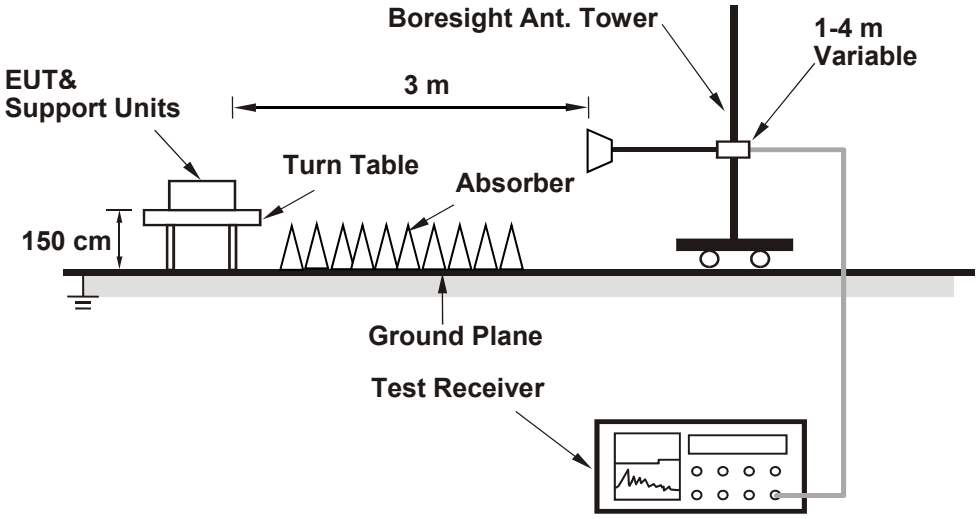
Spectrum analyzer setting as below:
Method SA-1

a. Set span to encompass the entire emission bandwidth (EBW) of the signal.
b. Set RBW = 1 MHz, Set VBW ≥ 3 MHz, Detector = RMS
c. Sweep points ≥ [2 × span / RBW]. (This gives bin-to-bin spacing ≤ RBW / 2, so that narrowband signals are not lost between frequency bins.)
d. Sweep time = auto, trigger set to “free run”.
e. Trace average at least 100 traces in power averaging mode.
f. Record the max value

6.2 Power Spectral Density

6.2.1 Test Setup

Radiated Measurement Method



6.2.2 Test Procedure

Radiated Measurement Method

g. The EUT was placed on the top of a rotating table 1.5 meters above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.

h. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

i. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

j. Perform a field strength measurement and record the worse read value, is the field strength value via a spectrum reading obtained corrected for antenna factor, cable loss and pre-amplifier factor and then mathematically convert the measured field strength level to EIRP level.

k. Follow ANSI C63.10 section 12.7.3, EIRP Value (dBm) = Field Strength Value (dBuV/m) + Correction Factor @ 3 m.

l. Correction Factor (dB) @ 3 m = 20log(D) – 104.77; where D is the measurement distance @3 m = -95.23 dB

Spectrum analyzer setting as below:
Method SA-1

m. Set span to encompass the entire emission bandwidth (EBW) of the signal.

n. Set RBW = 1 MHz, Set VBW ≥ 3 MHz, Detector = RMS

o. Sweep points ≥ [2 × span / RBW]. (This gives bin-to-bin spacing ≤ RBW / 2, so that narrowband signals are not lost between frequency bins.)

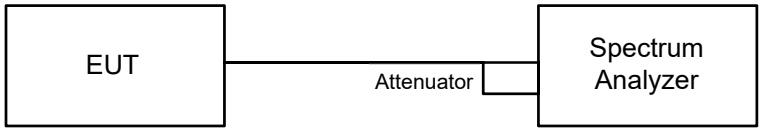
p. Sweep time = auto, trigger set to “free run”.

q. Trace average at least 100 traces in power averaging mode.

r. Record the max value

6.3 Emission Bandwidth

6.3.1 Test Setup

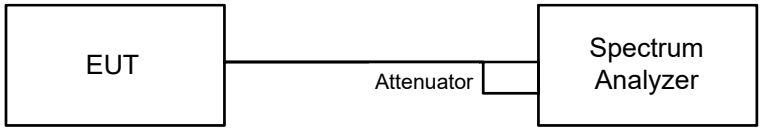


6.3.2 Test Procedure

s. Set RBW = approximately 1% of the emission bandwidth.
t. Set the VBW > RBW.
u. Detector = Peak.
v. Trace mode = max hold.
w. Measure the maximum width of the emission that is 26 dB down from the peak of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.

6.4 In-Band Emission Mask

6.4.1 Test Setup

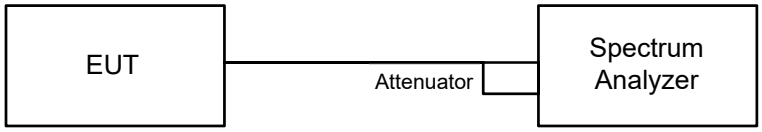


6.4.2 Test Procedure

x. Connect output of the antenna port to a spectrum analyzer and adjust appropriate attenuation.
y. Measure the 26 dB EBW using the test procedure 12.4.1 of ANSI C63.10-2013. (Determine the channel edge.)
z. Measure the power spectral density (for emissions mask reference) using the following procedure:
    a) Set the span to encompass the entire 26 dB EBW of the signal.
    b) Set RBW = same RBW used for 26 dB EBW measurement.
    c) Set VBW ≥ [3 X RBW].
    d) Number of points in sweep ≥ [2 X span / RBW].
    e) Sweep time = auto.
    f) Detector = RMS (i.e., power averaging).
    g) Trace average at least 100 traces in power averaging (rms) mode.
    h) Use the peak search function on the instrument to find the peak of the spectrum.
a. Using the measuring equipment limit line function, develop the emissions mask based on the following requirements. The emissions power spectral density must be reduced below the peak power spectral density (in dB) as follows:
    a) Suppressed by 20 dB at 1 MHz outside of the channel edge. (The channel edge is defined as the 26-dB point on either side of the carrier center frequency.)
    b) Suppressed by 28 dB at one channel bandwidth from the channel center.
    c) Suppressed by 40 dB at one- and one-half times the channel bandwidth from the channel center.
a. Adjust the span to encompass the entire mask as necessary and clear trace.
b. Trace average at least 100 traces in power averaging (rms) mode.
c. Adjust the reference level as necessary so that the crest of the channel touches the top of the emission mask

6.5 Occupied Bandwidth

6.5.1 Test Setup

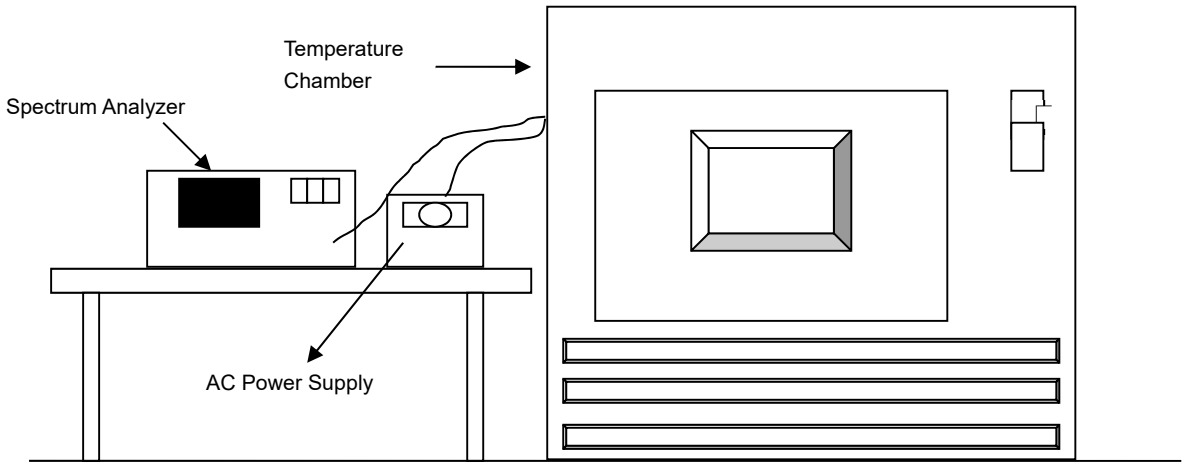


6.5.2 Test Procedure

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with resolution bandwidth in the range of 1% to 5% of the anticipated emission bandwidth, and a video bandwidth at least 3x the resolution bandwidth and set the detector to Sampling. The width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5% of the total mean power of a given emission.

6.6 Frequency Stability

6.6.1 Test Setup

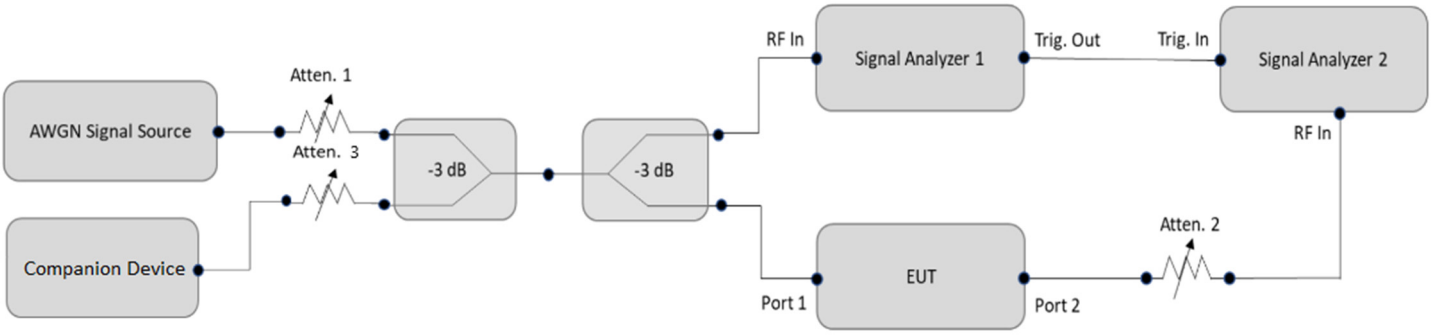


6.6.2 Test Procedure

a. The EUT was placed inside the environmental test chamber and powered by nominal AC voltage.
b. Turn the EUT on and couple its output to a spectrum analyzer.
c. Turn the EUT off and set the chamber to the highest temperature specified.
d. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize, turn the EUT on and measure the operating frequency after 2, 5, and 10 Minutes.
e. Repeat step (d) with the temperature chamber set to the next desired temperature until measurements down to the lowest specified temperature have been completed.
f. The test chamber was allowed to stabilize at +20 degree C for a minimum of 30 Minutes. The supply voltage was then adjusted on the EUT from 85% to 115% and the frequency record.

6.7 Contention-based Protocol

6.7.1 Test Setup



6.7.2 Test Procedure

a. Set the signal analyzer center frequency to the nominal EUT channel center frequency. The span range of the signal analyzer shall be between two times and five times the OBW of the EUT. Connect the output port of the EUT to the signal analyzer 2. Ensure that the attenuator 2 provides enough attenuation to not overload the signal analyzer 2 receiver.

b. Monitoring the signal analyzer 2, verify the EUT is operating and transmitting with the parameters (set as following section 4.7.5 EUT operating condition).

c. Determine number of times detection threshold test as following table,

If	Number of Tests	Placement of Incumbent Transmission
$BW_{EUT} \leqq BW_{Inc}$	Once	Same as EUT transmission
$BW_{Inc} < BW_{EUT} \leqq 2xBW_{Inc}$	Once	Contained within BW_{EUT}
$2xBW_{Inc} < BW_{EUT} \leqq 4xBW_{Inc}$	Twice. (Incumbent transmission is contained within BW_{EUT})	Closely to the lower edge and upper edge of the EUT Channel
$BW_{EUT} > 4xBW_{Inc}$	Three times	Closely to the lower edge ,in the middle and upper edge of the EUT Channel

d. Using an AWGN signal source, generate (but do not transmit, i.e., RF OFF) a 10 MHz-wide AWGN signal. Use step c table to determine the center frequency of the 10 MHz AWGN signal relative to the EUT's channel bandwidth and center frequency.

e. Set the AWGN signal power to an extremely low level (more than 20 dB below the -62 dBm threshold). Connect the AWGN signal source, via a 3-dB splitter, to the signal analyzer 1 and the EUT.

f. Transmit the AWGN signal (RF ON) and verify its characteristics on the signal analyzer 1.

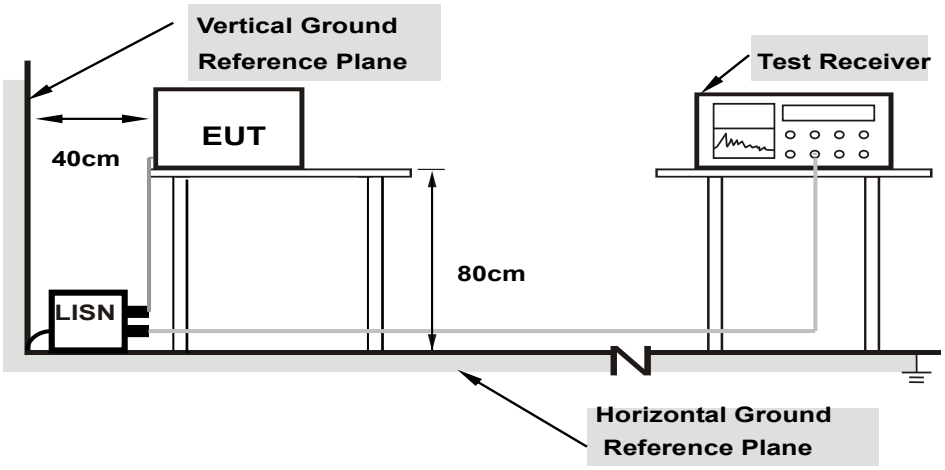
g. Monitor the signal analyzer 2 to verify if the AWGN signal has been detected and the EUT has ceased transmission. If the EUT continues to transmit, then incrementally increase the AWGN signal power level until the EUT stops transmitting.

h. (Including all losses in the RF paths) Determine and record the AWGN signal power level (at the EUT's antenna port) at which the EUT ceased transmission. Repeat the procedure at least 10 times to verify the EUT can detect an AWGN signal with 90% (or better) level of certainty.

i. Refer to step c table to determine number of times the detection threshold testing needs to be repeated. If testing is required more than once, then go back to step d, choose a different center frequency for the AWGN signal and repeat the process.

6.8 AC Power Conducted Emissions

6.8.1 Test Setup



Note: 1.Support units were connected to second LISN.

For the actual test configuration, please refer to the attached file (Test Setup Photo).

6.8.2 Test Procedure

a. The EUT was placed on a 0.8 meter to the top of table and placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50 uH of coupling impedance for the measuring instrument.

b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

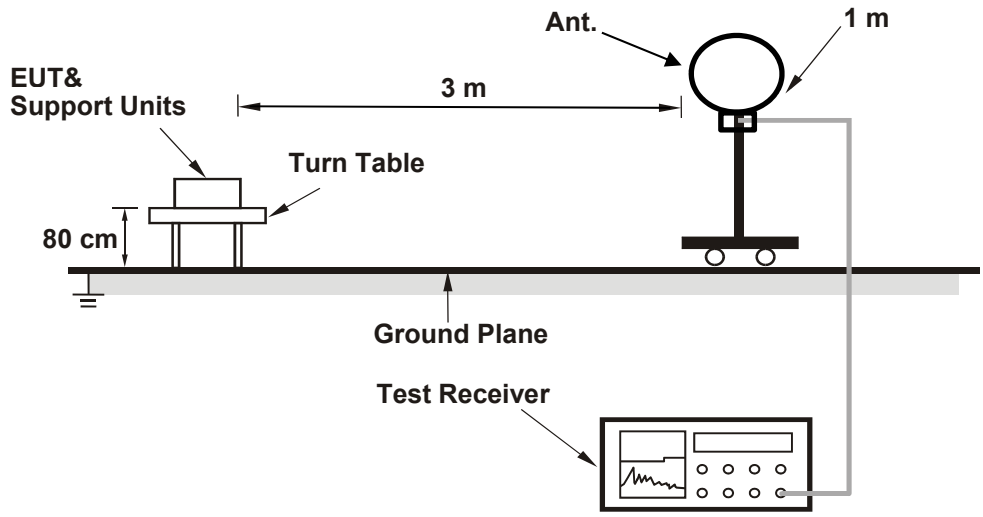
c. The frequency range from 150 kHz to 30 MHz was searched. Emission levels under (Limit – 20 dB) was not recorded.

Note: The resolution bandwidth and video bandwidth of test receiver is 9 kHz for quasi-peak detection (QP) and average detection (AV) at frequency 0.15 MHz-30 MHz.

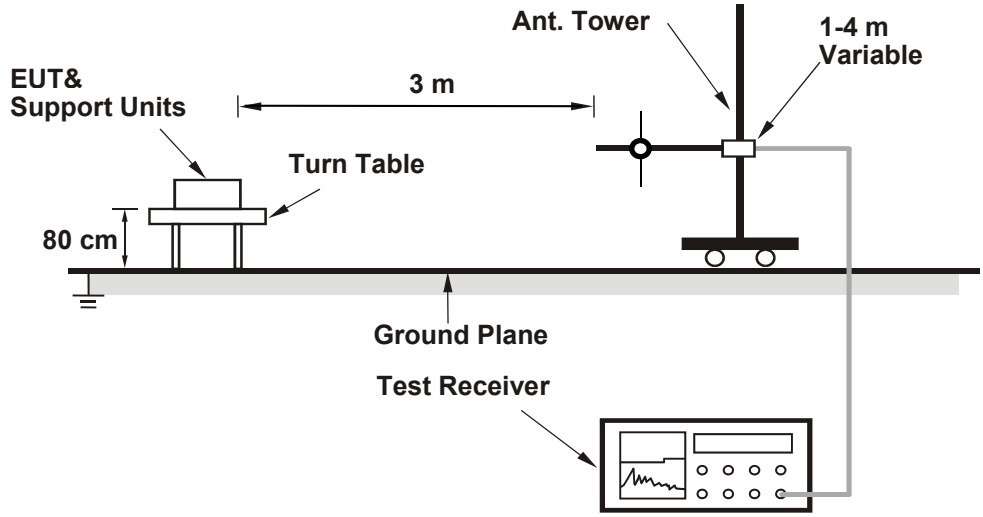
6.9 Unwanted Emissions below 1 GHz

6.9.1 Test Setup

For Radiated emission below 30 MHz



For Radiated emission above 30 MHz



For the actual test configuration, please refer to the attached file (Test Setup Photo).

6.9.2 Test Procedure

For Radiated emission below 30 MHz

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.

b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

c. Parallel, perpendicular, and ground-parallel orientations of the antenna are set to make the measurement.

d. For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

e. The test-receiver system was set to Quasi-Peak Detect Function and Specified Bandwidth with Maximum Hold Mode, except for the frequency band (9 kHz to 90 kHz and 110 kHz to 490 kHz) set to average detect function and peak detect function.

Notes:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 200 Hz at frequency below 150 kHz.
2. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9 kHz or 10 kHz at frequency (150 kHz to 30 MHz).
3. All modes of operation were investigated and the worst-case emissions are reported.

For Radiated emission above 30 MHz

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.

b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

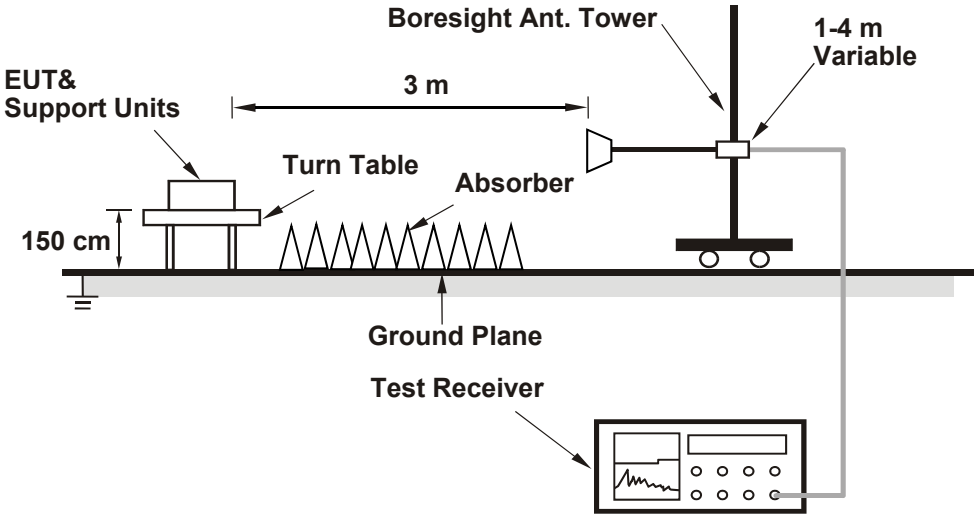
e. The test-receiver system was set to Quasi-peak(QP) detect function, Average(AV) detect function, Peak(PK) detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.

Notes:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection (QP), Average detection (AV), Peak detection (PK) at frequency (30MHz to 1 GHz).
2. All modes of operation were investigated and the worst-case emissions are reported.

6.10 Unwanted Emissions above 1 GHz

6.10.1Test Setup



For the actual test configuration, please refer to the attached file (Test Setup Photo).

6.10.2Test Procedure

a. The EUT was placed on the top of a rotating table 1.5 meters above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.

b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

e. The test-receiver system was set to peak and average detects function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Notes:

1. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) and Average detection (AV) at frequency above 1 GHz.
2. For fundamental and harmonic signal measurement, the resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is ≥ 1/T (Duty cycle < 98%) or 10 Hz (Duty cycle ≥ 98%) for Average detection (AV) at frequency above 1 GHz.
3. All modes of operation were investigated and the worst-case emissions are reported.

7 Test Results of Test Item

7.1 RF Output Power

Input Power:	120 Vac, 60 Hz	Environmental Conditions:	25°C, 60% RH	Tested By:	Edison Lee

802.11a CDD

Chan.	Chan. Freq. (MHz)	Field Strength (dBuV/m)	Correction Factor (dB)	EIRP (mW)	EIRP (dBm)	EIRP Limit (dBm)	Test Result
1	5955	109.68	-95.23	27.861	14.45	30	Pass
45	6175	108.12	-95.23	19.454	12.89	30	Pass
93	6415	108.49	-95.23	21.184	13.26	30	Pass
97	6435	108.32	-95.23	20.37	13.09	30	Pass
105	6475	108.91	-95.23	23.335	13.68	30	Pass
113	6515	108.72	-95.23	22.336	13.49	30	Pass
117	6535	109.35	-95.23	25.823	14.12	30	Pass
149	6695	108.92	-95.23	23.388	13.69	30	Pass
181	6855	108.95	-95.23	23.55	13.72	30	Pass
185	6875	109.11	-95.23	24.434	13.88	30	Pass
209	6995	109.33	-95.23	25.704	14.10	30	Pass
233	7115	105.85	-95.23	11.535	10.62	30	Pass

802.11ax (HE20) CDD

Chan.	Chan. Freq. (MHz)	Field Strength (dBuV/m)	Correction Factor (dB)	EIRP (mW)	EIRP (dBm)	EIRP Limit (dBm)	Test Result
1	5955	108.48	-95.23	21.135	13.25	30	Pass
45	6175	109.35	-95.23	25.823	14.12	30	Pass
93	6415	109.66	-95.23	27.733	14.43	30	Pass
97	6435	110.55	-95.23	34.041	15.32	30	Pass
105	6475	109.50	-95.23	26.73	14.27	30	Pass
113	6515	108.90	-95.23	23.281	13.67	30	Pass
117	6535	110.09	-95.23	30.62	14.86	30	Pass
149	6695	109.86	-95.23	29.04	14.63	30	Pass
181	6855	109.75	-95.23	28.314	14.52	30	Pass
185	6875	109.89	-95.23	29.242	14.66	30	Pass
209	6995	109.56	-95.23	27.102	14.33	30	Pass
233	7115	95.61	-95.23	1.091	0.38	30	Pass

802.11ax (HE40) CDD

Chan.	Chan. Freq. (MHz)	Field Strength (dBuV/m)	Correction Factor (dB)	EIRP (mW)	EIRP (dBm)	EIRP Limit (dBm)	Test Result
3	5965	111.89	-95.23	46.345	16.66	30	Pass
43	6165	112.62	-95.23	54.828	17.39	30	Pass
91	6405	111.38	-95.23	41.21	16.15	30	Pass
99	6445	112.76	-95.23	56.624	17.53	30	Pass
107	6485	112.51	-95.23	53.456	17.28	30	Pass
115	6525	111.67	-95.23	44.055	16.44	30	Pass
123	6565	112.11	-95.23	48.753	16.88	30	Pass
155	6725	112.41	-95.23	52.24	17.18	30	Pass
179	6845	112.58	-95.23	54.325	17.35	30	Pass
187	6885	112.55	-95.23	53.951	17.32	30	Pass
211	7005	112.02	-95.23	47.753	16.79	30	Pass
227	7085	111.16	-95.23	39.174	15.93	30	Pass

802.11ax (HE80) CDD

Chan.	Chan. Freq. (MHz)	Field Strength (dBuV/m)	Correction Factor (dB)	EIRP (mW)	EIRP (dBm)	EIRP Limit (dBm)	Test Result
7	5985	115.65	-95.23	110.154	20.42	30	Pass
39	6145	115.34	-95.23	102.565	20.11	30	Pass
87	6385	115.55	-95.23	107.647	20.32	30	Pass
103	6465	114.98	-95.23	94.406	19.75	30	Pass
119	6545	114.91	-95.23	92.897	19.68	30	Pass
151	6705	115.04	-95.23	95.719	19.81	30	Pass
183	6865	115.65	-95.23	110.154	20.42	30	Pass
199	6945	115.77	-95.23	113.24	20.54	30	Pass
215	7025	116.05	-95.23	120.781	20.82	30	Pass

802.11ax (HE160) CDD

Chan.	Chan. Freq. (MHz)	Field Strength (dBuV/m)	Correction Factor (dB)	EIRP (mW)	EIRP (dBm)	EIRP Limit (dBm)	Test Result
15	6025	118.25	-95.23	200.447	23.02	30	Pass
47	6185	117.72	-95.23	177.419	22.49	30	Pass
79	6345	117.73	-95.23	177.828	22.50	30	Pass
111	6505	117.61	-95.23	172.982	22.38	30	Pass
143	6665	118.22	-95.23	199.067	22.99	30	Pass
175	6825	117.62	-95.23	173.38	22.39	30	Pass
207	6985	117.91	-95.23	185.353	22.68	30	Pass

802.11ax (HE20) Beamforming

Chan.	Chan. Freq. (MHz)	Field Strength (dBuV/m)	Correction Factor (dB)	EIRP (mW)	EIRP (dBm)	EIRP Limit (dBm)	Test Result
1	5955	113.39	-95.23	65.464	18.16	30	Pass
45	6175	113.58	-95.23	68.391	18.35	30	Pass
93	6415	112.92	-95.23	58.749	17.69	30	Pass
97	6435	113.19	-95.23	62.517	17.96	30	Pass
105	6475	112.96	-95.23	59.293	17.73	30	Pass
113	6515	113.06	-95.23	60.674	17.83	30	Pass
117	6535	113.16	-95.23	62.087	17.93	30	Pass
149	6695	113.21	-95.23	62.806	17.98	30	Pass
181	6855	112.87	-95.23	58.076	17.64	30	Pass
185	6875	112.95	-95.23	59.156	17.72	30	Pass
209	6995	112.91	-95.23	58.614	17.68	30	Pass
233	7115	95.52	-95.23	1.069	0.29	30	Pass

802.11ax (HE40) Beamforming

Chan.	Chan. Freq. (MHz)	Field Strength (dBuV/m)	Correction Factor (dB)	EIRP (mW)	EIRP (dBm)	EIRP Limit (dBm)	Test Result
3	5965	116.34	-95.23	129.122	21.11	30	Pass
43	6165	116.27	-95.23	127.057	21.04	30	Pass
91	6405	116.05	-95.23	120.781	20.82	30	Pass
99	6445	115.87	-95.23	115.878	20.64	30	Pass
107	6485	115.65	-95.23	110.154	20.42	30	Pass
115	6525	116.05	-95.23	120.781	20.82	30	Pass
123	6565	116.02	-95.23	119.95	20.79	30	Pass
155	6725	115.51	-95.23	106.66	20.28	30	Pass
179	6845	115.89	-95.23	116.413	20.66	30	Pass
187	6885	115.71	-95.23	111.686	20.48	30	Pass
211	7005	116.02	-95.23	119.95	20.79	30	Pass
227	7085	115.48	-95.23	105.925	20.25	30	Pass

802.11ax (HE80) Beamforming

Chan.	Chan. Freq. (MHz)	Field Strength (dBuV/m)	Correction Factor (dB)	EIRP (mW)	EIRP (dBm)	EIRP Limit (dBm)	Test Result
7	5985	118.38	-95.23	206.538	23.15	30	Pass
39	6145	118.82	-95.23	228.56	23.59	30	Pass
87	6385	118.75	-95.23	224.905	23.52	30	Pass
103	6465	118.72	-95.23	223.357	23.49	30	Pass
119	6545	118.17	-95.23	196.789	22.94	30	Pass
151	6705	118.22	-95.23	199.067	22.99	30	Pass
183	6865	118.39	-95.23	207.014	23.16	30	Pass
199	6945	118.02	-95.23	190.108	22.79	30	Pass
215	7025	118.19	-95.23	197.697	22.96	30	Pass

802.11ax (HE160) Beamforming

Chan.	Chan. Freq. (MHz)	Field Strength (dBuV/m)	Correction Factor (dB)	EIRP (mW)	EIRP (dBm)	EIRP Limit (dBm)	Test Result
15	6025	121.04	-95.23	381.066	25.81	30	Pass
47	6185	120.42	-95.23	330.37	25.19	30	Pass
79	6345	120.86	-95.23	365.595	25.63	30	Pass
111	6505	121.15	-95.23	390.841	25.92	30	Pass
143	6665	120.25	-95.23	317.687	25.02	30	Pass
175	6825	120.64	-95.23	347.536	25.41	30	Pass
207	6985	120.72	-95.23	353.997	25.49	30	Pass

Spectrum Plot of Maximum Value

802.11a CDD : CH 1

802.11ax (HE20) Beamforming : CH 45

802.11ax (HE40) Beamforming : CH 3

802.11ax (HE80) Beamforming : CH 39

802.11ax (HE160) Beamforming : CH 111

7.2 Power Spectral Density

Input Power:	120 Vac, 60 Hz	Environmental Conditions:	25°C, 60% RH	Tested By:	Alan Wu

802.11a CDD

Chan.	Chan. Freq. (MHz)	Field Strength (dBuV/m)	Correction Factor (dB)	EIRP PSD (dBm/MHz)	EIRP PSD Limit (dBm/MHz)	Test Result
1	5955	100.17	-95.23	4.94	5	Pass
45	6175	100.02	-95.23	4.79	5	Pass
93	6415	100.02	-95.23	4.79	5	Pass
97	6435	99.95	-95.23	4.72	5	Pass
105	6475	100.08	-95.23	4.85	5	Pass
113	6515	100.06	-95.23	4.83	5	Pass
117	6535	100.15	-95.23	4.92	5	Pass
149	6695	100.01	-95.23	4.78	5	Pass
181	6855	100.02	-95.23	4.79	5	Pass
185	6875	100.11	-95.23	4.88	5	Pass
209	6995	100.06	-95.23	4.83	5	Pass
233	7115	97.02	-95.23	1.79	5	Pass

802.11ax (HE20) CDD

Chan.	Chan. Freq. (MHz)	Field Strength (dBuV/m)	Correction Factor (dB)	EIRP PSD (dBm/MHz)	EIRP PSD Limit (dBm/MHz)	Test Result
1	5955	100.12	-95.23	4.89	5	Pass
45	6175	100.05	-95.23	4.82	5	Pass
93	6415	100.18	-95.23	4.95	5	Pass
97	6435	100.21	-95.23	4.98	5	Pass
105	6475	100.11	-95.23	4.88	5	Pass
113	6515	99.96	-95.23	4.73	5	Pass
117	6535	100.02	-95.23	4.79	5	Pass
149	6695	100.18	-95.23	4.95	5	Pass
181	6855	100.02	-95.23	4.79	5	Pass
185	6875	100.19	-95.23	4.96	5	Pass
209	6995	100.07	-95.23	4.84	5	Pass
233	7115	85.34	-95.23	-9.89	5	Pass

802.11ax (HE40) CDD

Chan.	Chan. Freq. (MHz)	Field Strength (dBuV/m)	Correction Factor (dB)	EIRP PSD (dBm/MHz)	EIRP PSD Limit (dBm/MHz)	Test Result
3	5965	100.11	-95.23	4.88	5	Pass
43	6165	100.16	-95.23	4.93	5	Pass
91	6405	99.96	-95.23	4.73	5	Pass
99	6445	100.17	-95.23	4.94	5	Pass
107	6485	100.12	-95.23	4.89	5	Pass
115	6525	99.99	-95.23	4.76	5	Pass
123	6565	100.06	-95.23	4.83	5	Pass
155	6725	100.09	-95.23	4.86	5	Pass
179	6845	100.02	-95.23	4.79	5	Pass
187	6885	100.12	-95.23	4.89	5	Pass
211	7005	100.16	-95.23	4.93	5	Pass
227	7085	100.10	-95.23	4.87	5	Pass

802.11ax (HE80) CDD

Chan.	Chan. Freq. (MHz)	Field Strength (dBuV/m)	Correction Factor (dB)	EIRP PSD (dBm/MHz)	EIRP PSD Limit (dBm/MHz)	Test Result
7	5985	100.19	-95.23	4.96	5	Pass
39	6145	100.12	-95.23	4.89	5	Pass
87	6385	100.03	-95.23	4.80	5	Pass
103	6465	100.09	-95.23	4.86	5	Pass
119	6545	99.99	-95.23	4.76	5	Pass
151	6705	100.07	-95.23	4.84	5	Pass
183	6865	100.15	-95.23	4.92	5	Pass
199	6945	100.02	-95.23	4.79	5	Pass
215	7025	100.00	-95.23	4.77	5	Pass

802.11ax (HE160) CDD

Chan.	Chan. Freq. (MHz)	Field Strength (dBuV/m)	Correction Factor (dB)	EIRP PSD (dBm/MHz)	EIRP PSD Limit (dBm/MHz)	Test Result
15	6025	100.18	-95.23	4.95	5	Pass
47	6185	100.15	-95.23	4.92	5	Pass
79	6345	100.17	-95.23	4.94	5	Pass
111	6505	100.02	-95.23	4.79	5	Pass
143	6665	100.09	-95.23	4.86	5	Pass
175	6825	100.02	-95.23	4.79	5	Pass
207	6985	100.14	-95.23	4.91	5	Pass

802.11ax (HE20) Beamforming

Chan.	Chan. Freq. (MHz)	Field Strength (dBuV/m)	Correction Factor (dB)	EIRP PSD (dBm/MHz)	EIRP PSD Limit (dBm/MHz)	Test Result
1	5955	100.05	-95.23	4.82	5	Pass
45	6175	100.21	-95.23	4.98	5	Pass
93	6415	100.16	-95.23	4.93	5	Pass
97	6435	100.17	-95.23	4.94	5	Pass
105	6475	100.02	-95.23	4.79	5	Pass
113	6515	100.18	-95.23	4.95	5	Pass
117	6535	100.16	-95.23	4.93	5	Pass
149	6695	100.18	-95.23	4.95	5	Pass
181	6855	100.03	-95.23	4.80	5	Pass
185	6875	100.18	-95.23	4.95	5	Pass
209	6995	100.02	-95.23	4.79	5	Pass
233	7115	83.17	-95.23	-12.06	5	Pass

802.11ax (HE40) Beamforming

Chan.	Chan. Freq. (MHz)	Field Strength (dBuV/m)	Correction Factor (dB)	EIRP PSD (dBm/MHz)	EIRP PSD Limit (dBm/MHz)	Test Result
3	5965	100.19	-95.23	4.96	5	Pass
43	6165	100.18	-95.23	4.95	5	Pass
91	6405	100.17	-95.23	4.94	5	Pass
99	6445	100.05	-95.23	4.82	5	Pass
107	6485	100.09	-95.23	4.86	5	Pass
115	6525	100.17	-95.23	4.94	5	Pass
123	6565	100.15	-95.23	4.92	5	Pass
155	6725	100.02	-95.23	4.79	5	Pass
179	6845	100.13	-95.23	4.90	5	Pass
187	6885	100.02	-95.23	4.79	5	Pass
211	7005	100.11	-95.23	4.88	5	Pass
227	7085	100.05	-95.23	4.82	5	Pass

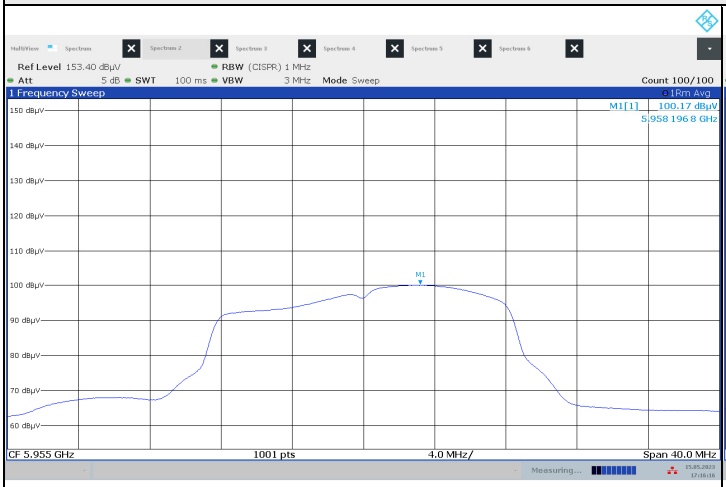
802.11ax (HE80) Beamforming

Chan.	Chan. Freq. (MHz)	Field Strength (dBuV/m)	Correction Factor (dB)	EIRP PSD (dBm/MHz)	EIRP PSD Limit (dBm/MHz)	Test Result
7	5985	100.05	-95.23	4.82	5	Pass
39	6145	100.19	-95.23	4.96	5	Pass
87	6385	100.09	-95.23	4.86	5	Pass
103	6465	100.05	-95.23	4.82	5	Pass
119	6545	100.02	-95.23	4.79	5	Pass
151	6705	100.02	-95.23	4.79	5	Pass
183	6865	100.08	-95.23	4.85	5	Pass
199	6945	100.03	-95.23	4.80	5	Pass
215	7025	100.15	-95.23	4.92	5	Pass

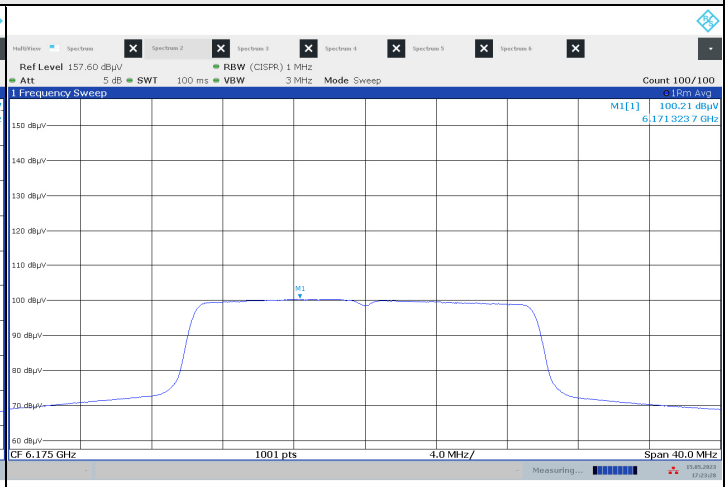
802.11ax (HE160) Beamforming

Chan.	Chan. Freq. (MHz)	Field Strength (dBuV/m)	Correction Factor (dB)	EIRP PSD (dBm/MHz)	EIRP PSD Limit (dBm/MHz)	Test Result
15	6025	100.05	-95.23	4.82	5	Pass
47	6185	100.02	-95.23	4.79	5	Pass
79	6345	100.15	-95.23	4.92	5	Pass
111	6505	100.18	-95.23	4.95	5	Pass
143	6665	100.02	-95.23	4.79	5	Pass
175	6825	100.05	-95.23	4.82	5	Pass
207	6985	100.02	-95.23	4.79	5	Pass

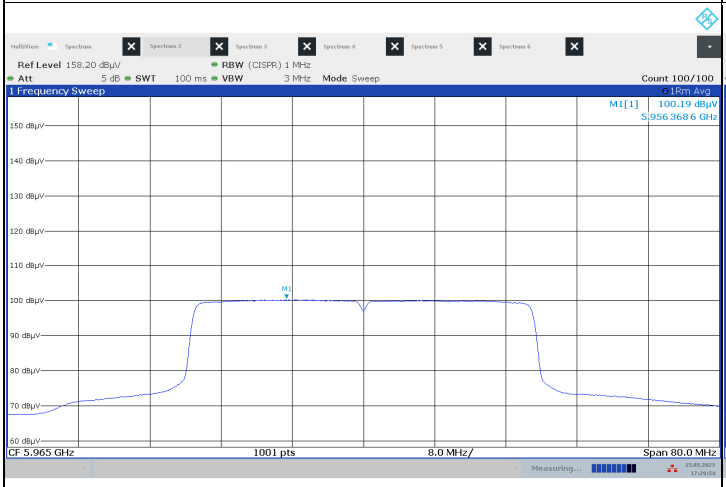
Spectrum Plot of Maximum Value



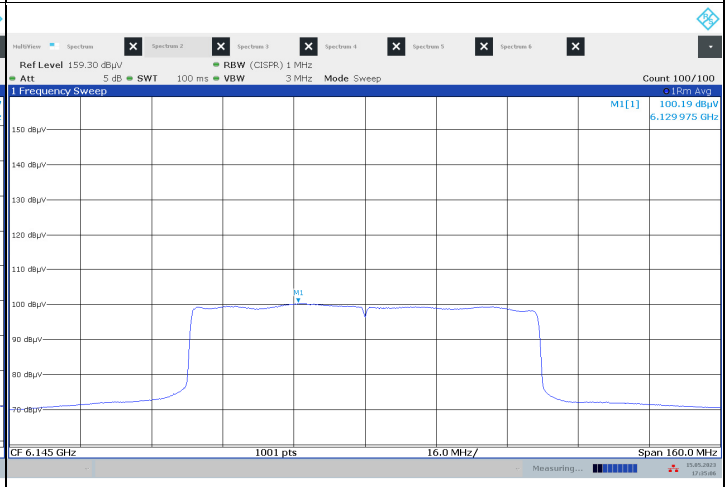
802.11a CDD : CH 1



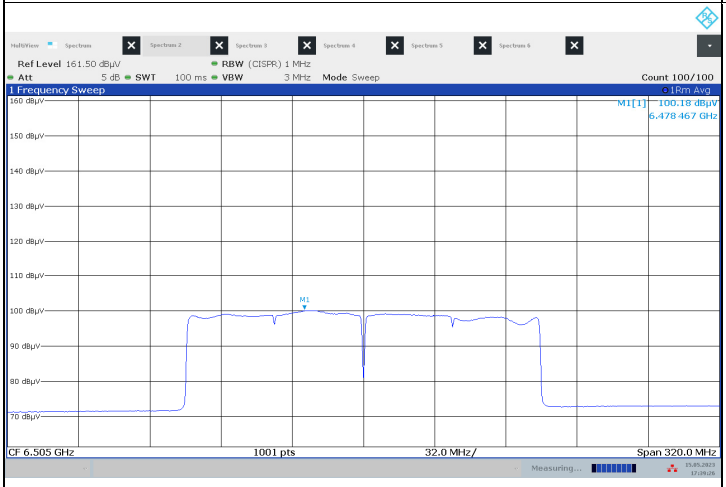
802.11ax (HE20) Beamforming : CH 45



802.11ax (HE40) Beamforming : CH 3



802.11ax (HE80) Beamforming : CH 39



802.11ax (HE160) Beamforming : CH 111

7.3 Emission Bandwidth

Input Power:	120 Vac, 60 Hz	Environmental Conditions:	25°C, 60% RH	Tested By:	Edison Lee

802.11a

Channel	Frequency (MHz)	26dB Bandwidth (MHz)				Maximum Limit (MHz)	Test Result
		Chain 0	Chain 1	Chain 2	Chain 3		
1	5955	22.59	22.91	23.53	24.53	320	Pass
45	6175	22.74	23.11	23.00	22.36	320	Pass
93	6415	22.74	24.48	23.00	22.53	320	Pass
97	6435	23.52	23.42	23.53	22.81	320	Pass
105	6475	23.35	22.85	22.65	23.06	320	Pass
113	6515	22.96	22.92	22.88	24.95	320	Pass
117	6535	24.39	23.82	21.85	21.93	320	Pass
149	6695	21.89	22.63	23.69	23.53	320	Pass
181	6855	22.60	23.23	23.32	22.30	320	Pass
185	6875	22.70	21.84	22.53	21.94	320	Pass
209	6995	23.46	22.85	23.13	23.00	320	Pass
233	7115	24.02	22.81	23.54	24.67	320	Pass

802.11ax (HE20)

Channel	Frequency (MHz)	26dB Bandwidth (MHz)				Maximum Limit (MHz)	Test Result
		Chain 0	Chain 1	Chain 2	Chain 3		
1	5955	26.24	27.41	26.81	29.45	320	Pass
45	6175	24.71	28.53	26.15	29.22	320	Pass
93	6415	26.63	22.84	27.26	26.35	320	Pass
97	6435	26.95	29.13	28.19	28.56	320	Pass
105	6475	21.92	23.34	28.72	27.26	320	Pass
113	6515	22.59	26.04	23.56	27.13	320	Pass
117	6535	29.23	23.28	26.87	24.45	320	Pass
149	6695	26.40	29.53	25.36	22.99	320	Pass
181	6855	27.93	26.92	29.12	29.16	320	Pass
185	6875	23.42	27.84	26.70	29.52	320	Pass
209	6995	29.63	27.04	29.62	23.36	320	Pass
233	7115	28.23	25.15	26.27	27.36	320	Pass

802.11ax (HE40)

Channel	Frequency (MHz)	26dB Bandwidth (MHz)				Maximum Limit (MHz)	Test Result
		Chain 0	Chain 1	Chain 2	Chain 3		
3	5965	46.31	43.02	45.13	45.45	320	Pass
43	6165	42.02	43.17	43.44	41.57	320	Pass
91	6405	43.20	42.69	42.60	42.91	320	Pass
99	6445	42.41	43.99	41.69	48.96	320	Pass
107	6485	42.21	42.50	42.97	41.40	320	Pass
115	6525	43.89	45.44	45.87	42.30	320	Pass
123	6565	41.97	42.66	42.00	42.59	320	Pass
155	6725	45.41	45.11	42.76	43.10	320	Pass
179	6845	42.34	42.71	42.71	42.34	320	Pass
187	6885	42.45	45.32	45.15	41.81	320	Pass
211	7005	42.19	45.65	42.12	45.65	320	Pass
227	7085	49.03	41.55	45.60	43.06	320	Pass

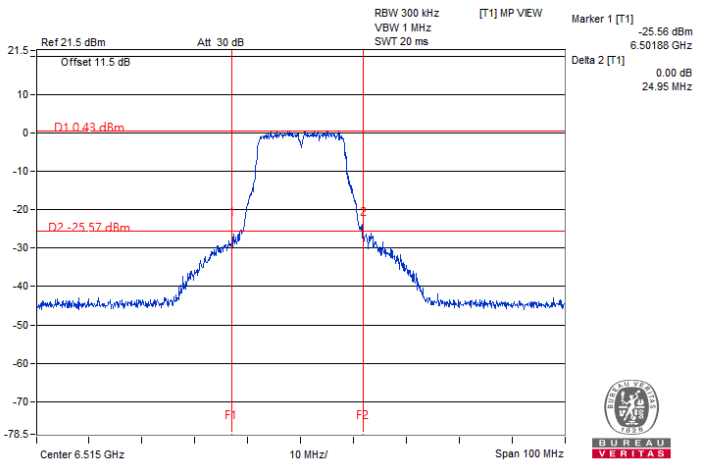
802.11ax (HE80)

Channel	Frequency (MHz)	26dB Bandwidth (MHz)				Maximum Limit (MHz)	Test Result
		Chain 0	Chain 1	Chain 2	Chain 3		
7	5985	84.01	84.74	85.42	85.50	320	Pass
39	6145	83.14	83.33	84.36	83.03	320	Pass
87	6385	84.46	83.38	83.82	83.25	320	Pass
103	6465	82.93	83.74	84.03	83.87	320	Pass
119	6545	83.68	83.32	84.69	83.81	320	Pass
151	6705	83.41	83.71	83.13	84.05	320	Pass
183	6865	85.35	84.53	82.78	83.39	320	Pass
199	6945	84.87	83.83	84.55	83.27	320	Pass
215	7025	84.00	84.54	83.69	84.95	320	Pass

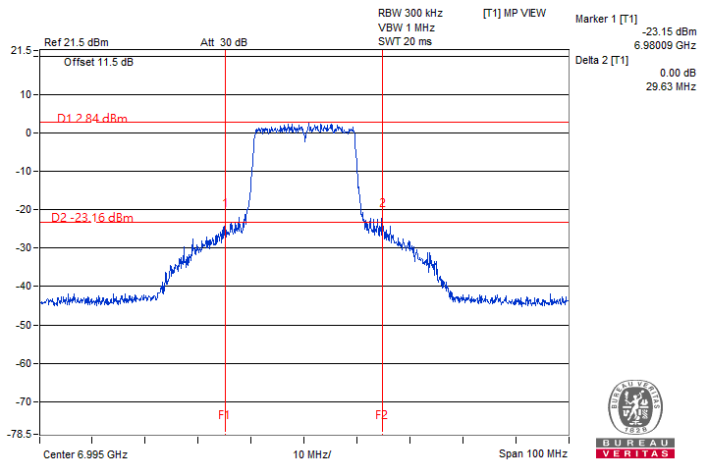
802.11ax (HE160)

Channel	Frequency (MHz)	26dB Bandwidth (MHz)				Maximum Limit (MHz)	Test Result
		Chain 0	Chain 1	Chain 2	Chain 3		
15	6025	166.75	165.96	165.44	166.08	320	Pass
47	6185	166.70	166.27	165.88	165.83	320	Pass
79	6345	167.77	165.83	165.36	166.10	320	Pass
111	6505	167.29	165.76	165.84	166.26	320	Pass
143	6665	166.27	166.35	165.66	165.60	320	Pass
175	6825	166.63	166.55	166.89	165.80	320	Pass
207	6985	166.95	166.06	166.12	165.70	320	Pass

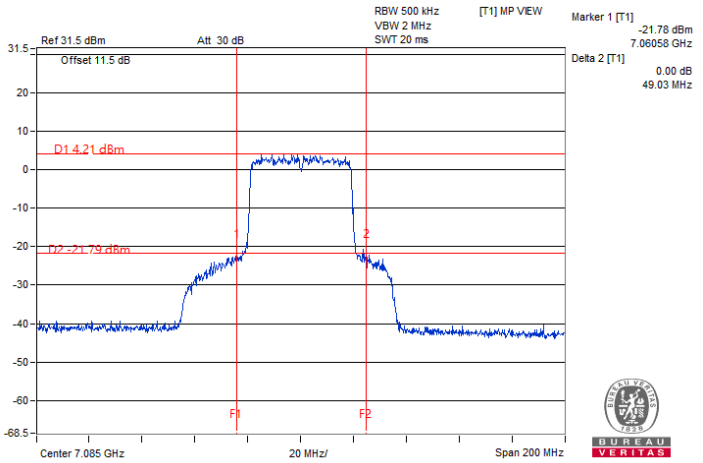
Spectrum Plot of Maximum Value



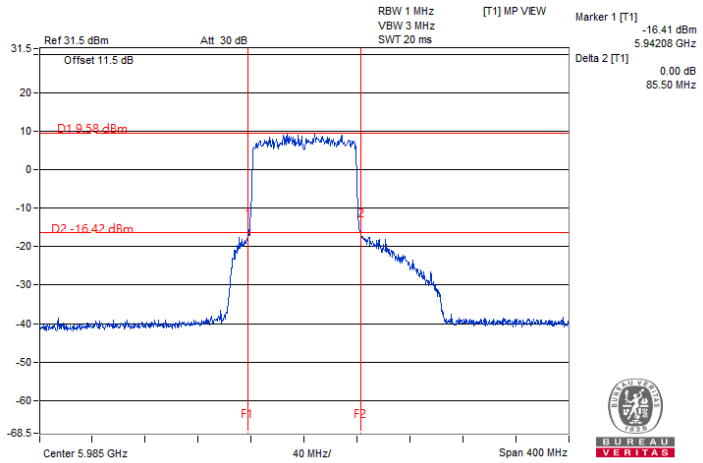
802.11a / Chain 3 : CH 113



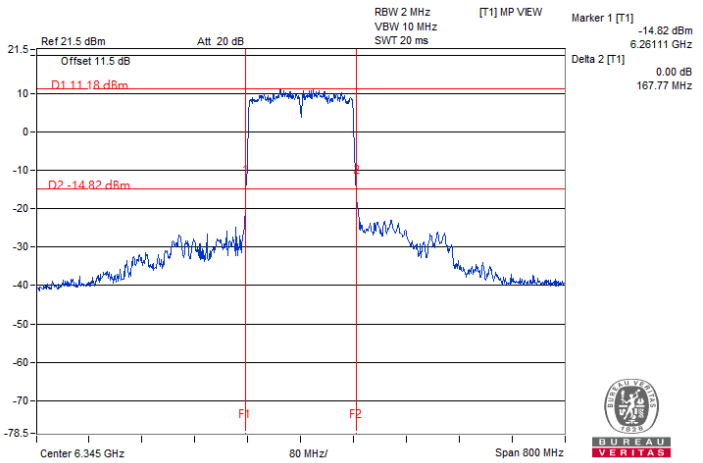
802.11ax (HE20) / Chain 0 : CH 209



802.11ax (HE40) / Chain 0 : CH 227



802.11ax (HE80) / Chain 3 : CH 7

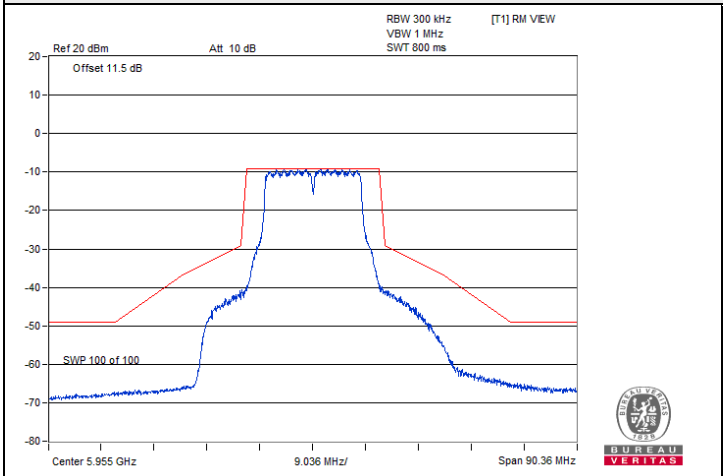
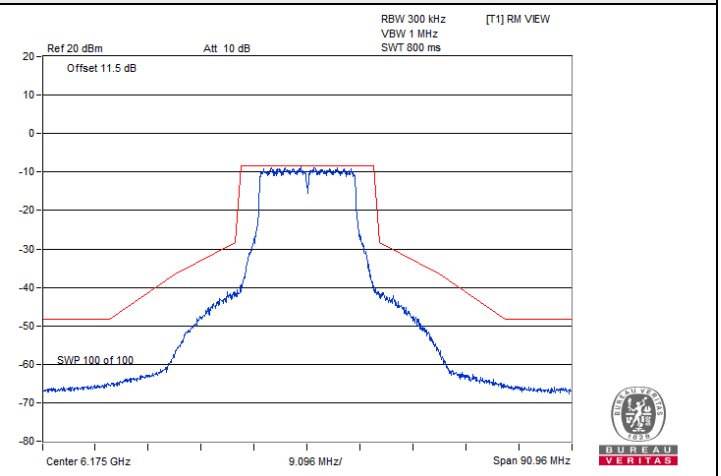
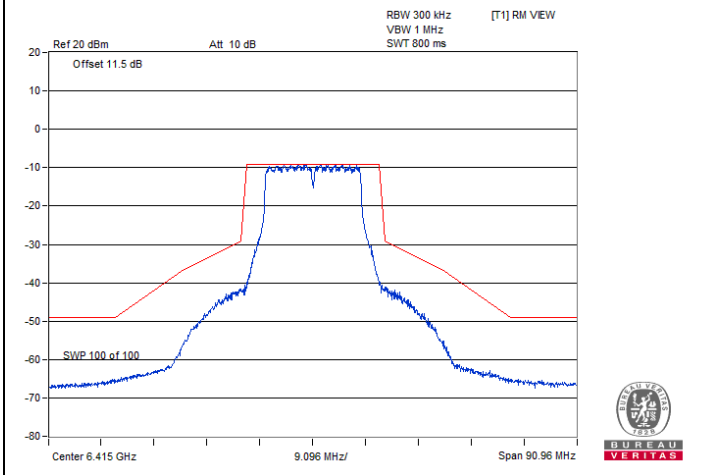
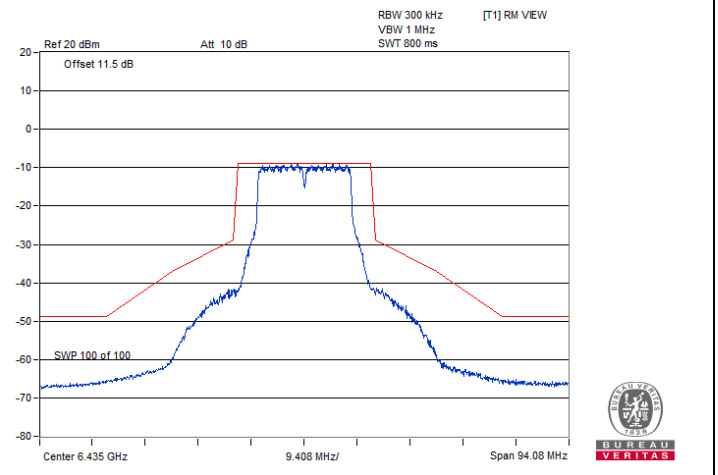
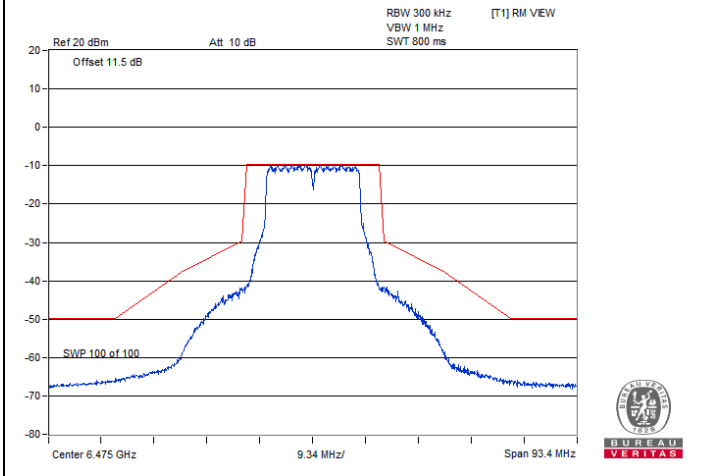
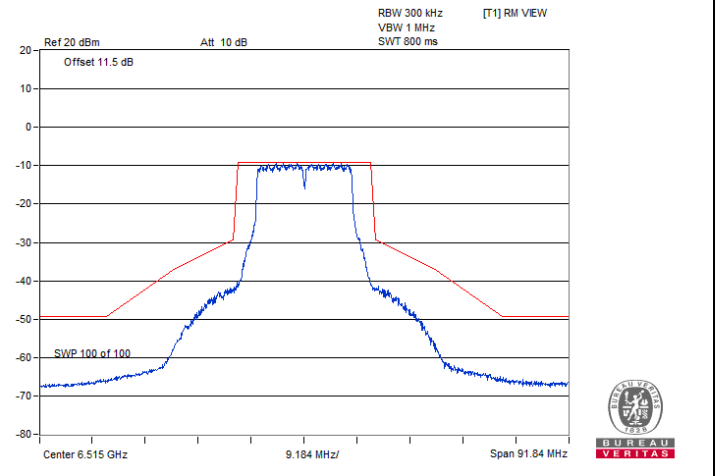


802.11ax (HE160) / Chain 0 : CH 79

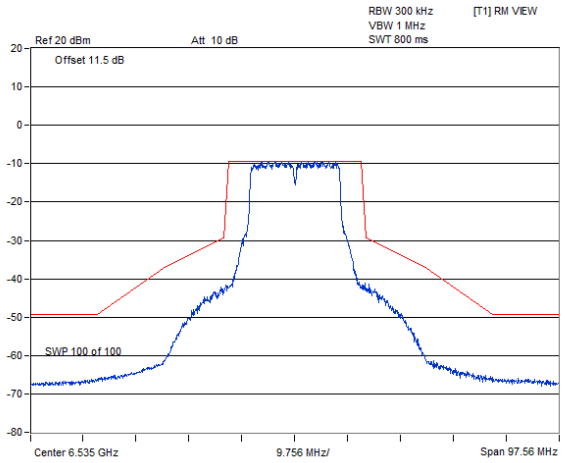
7.4 In-Band Emission Mask

Input Power:	120 Vac, 60 Hz	Environmental Conditions:	25°C, 60% RH	Tested By:	Edison Lee

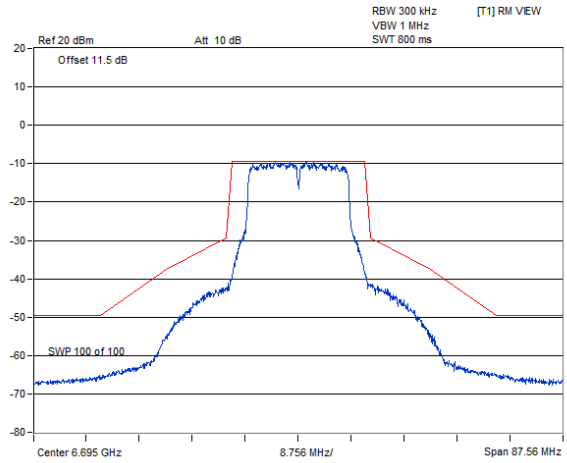
802.11a

Spectrum Plot	
	
802.11a / Chain 0 : CH 1	802.11a / Chain 0 : CH 45
	
802.11a / Chain 0 : CH 93	802.11a / Chain 0 : CH 97
	
802.11a / Chain 0 : CH 105	802.11a / Chain 0 : CH 113

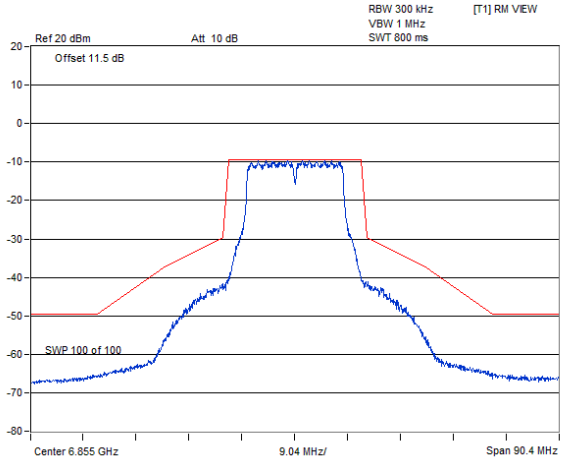
Spectrum Plot



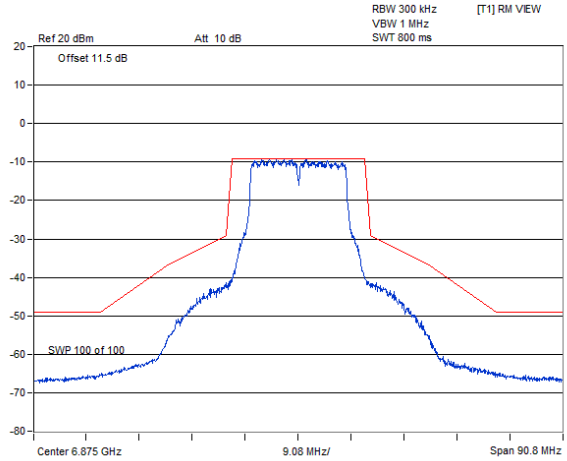
802.11a / Chain 0 : CH 117



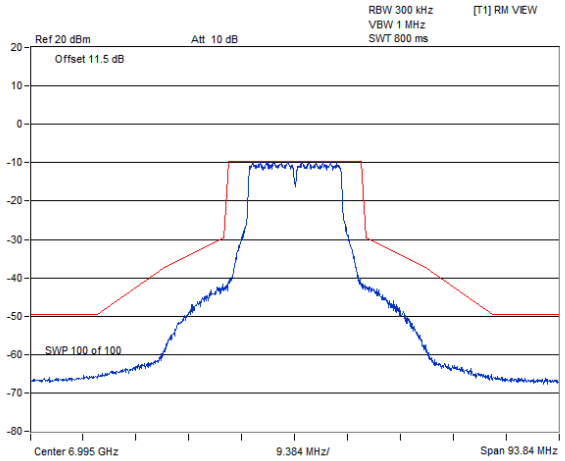
802.11a / Chain 0 : CH 149



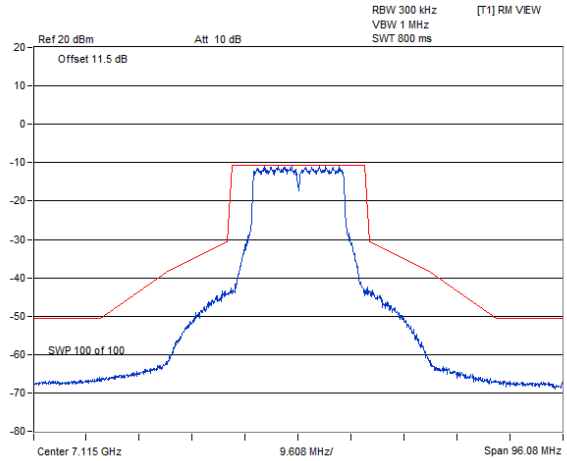
802.11a / Chain 0 : CH 181



802.11a / Chain 0 : CH 185

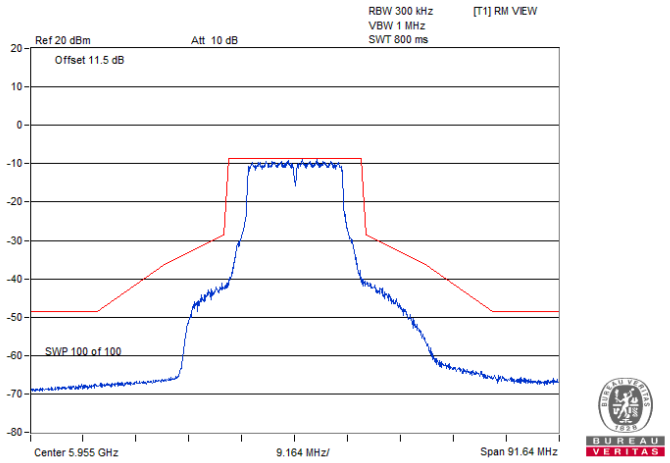


802.11a / Chain 0 : CH 209

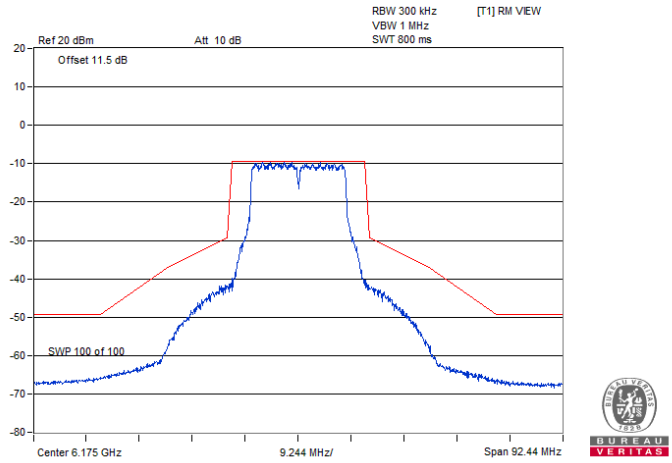


802.11a / Chain 0 : CH 233

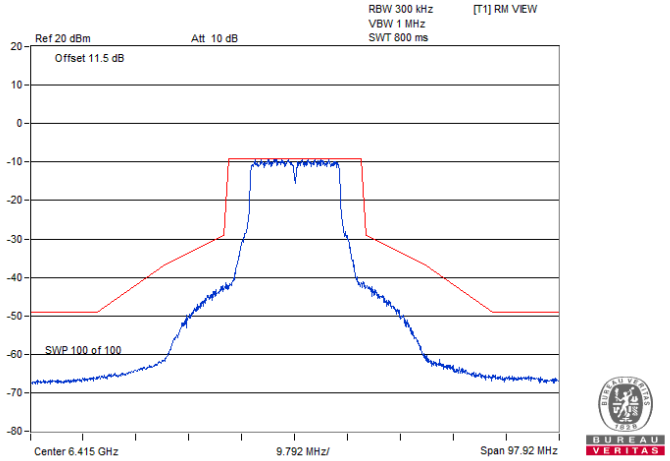
Spectrum Plot



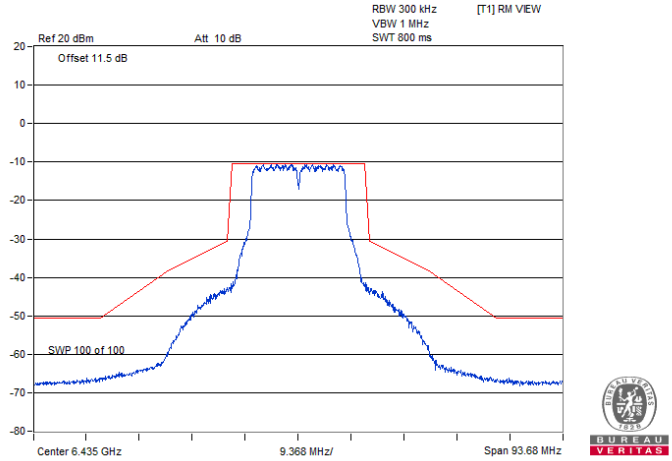
802.11a / Chain 1 : CH 1



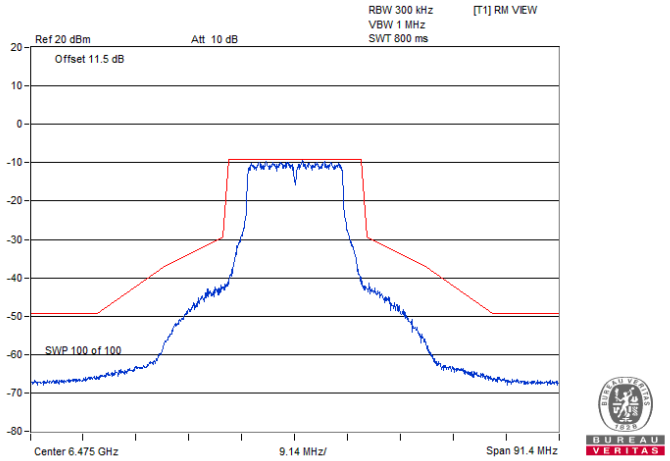
802.11a / Chain 1 : CH 45



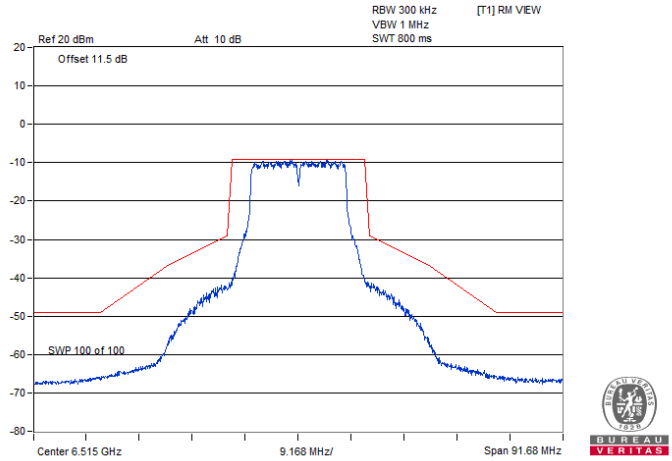
802.11a / Chain 1 : CH 93



802.11a / Chain 1 : CH 97

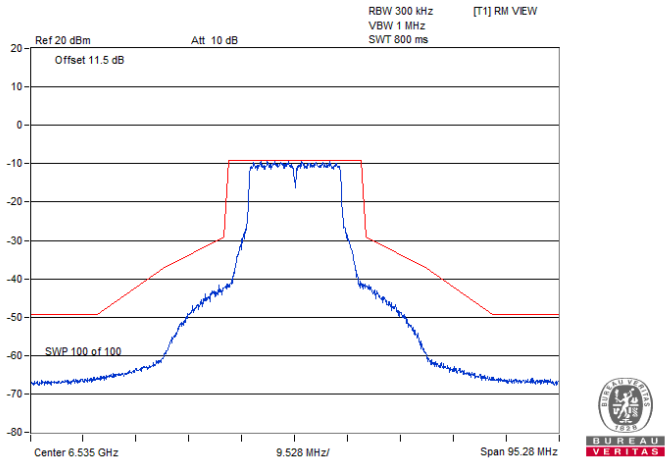


802.11a / Chain 1 : CH 105

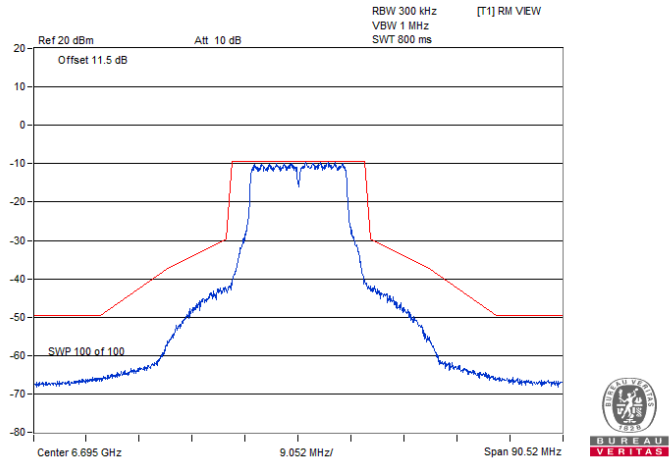


802.11a / Chain 1 : CH 113

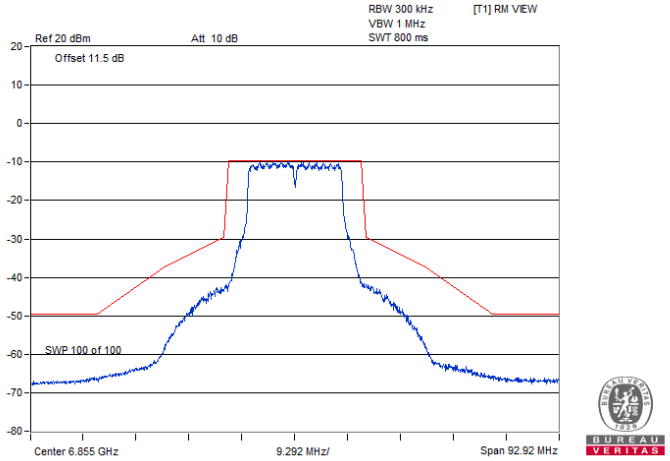
Spectrum Plot



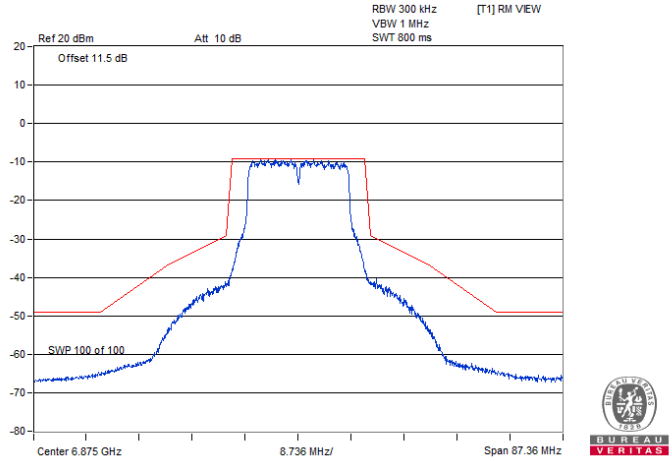
802.11a / Chain 1 : CH 117



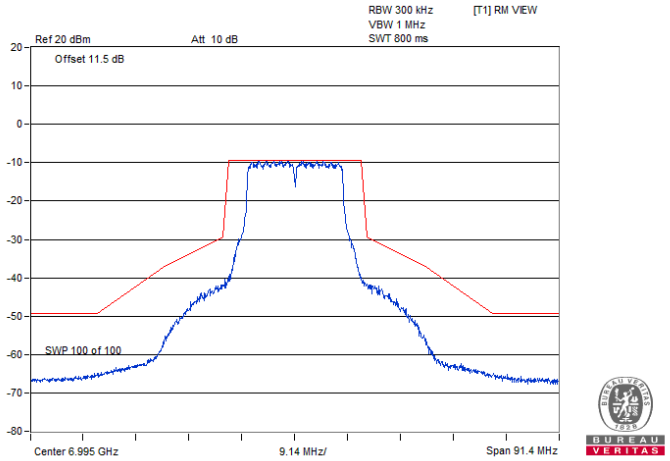
802.11a / Chain 1 : CH 149



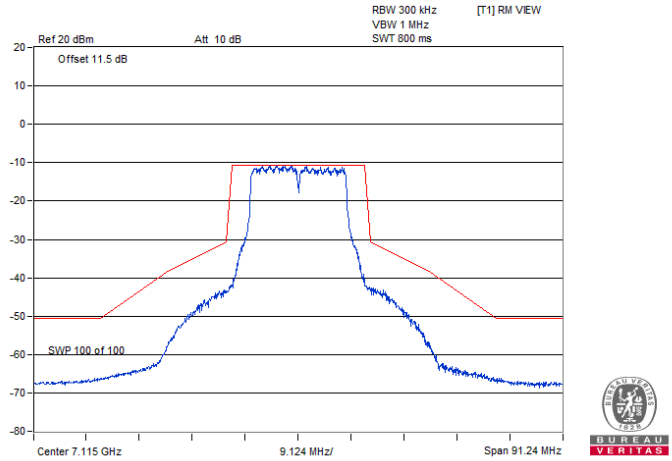
802.11a / Chain 1 : CH 181



802.11a / Chain 1 : CH 185

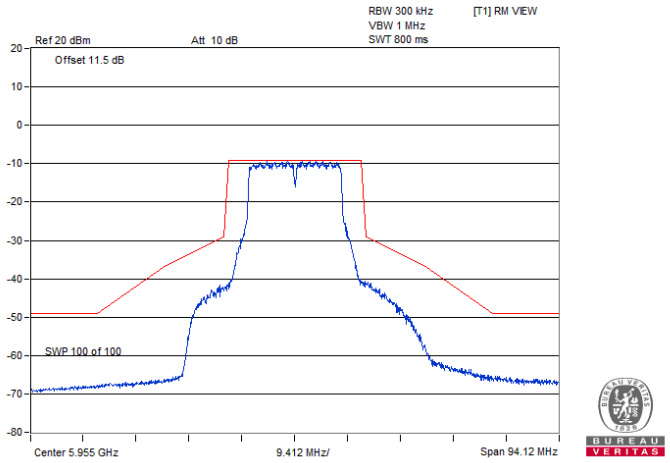


802.11a / Chain 1 : CH 209

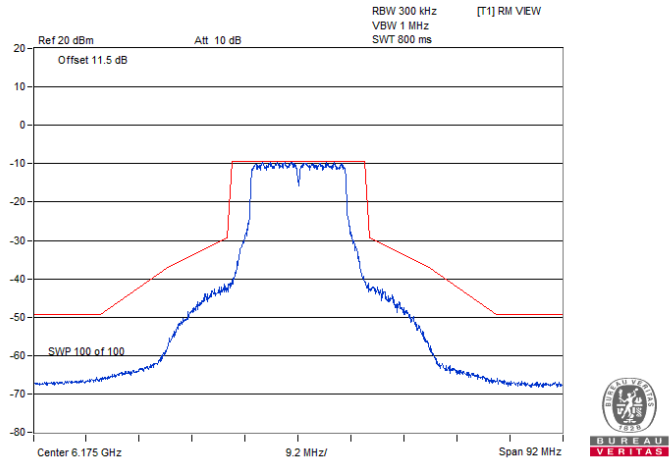


802.11a / Chain 1 : CH 233

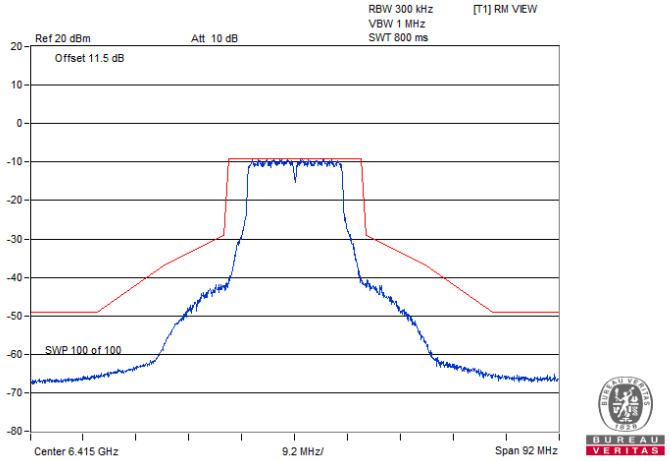
Spectrum Plot



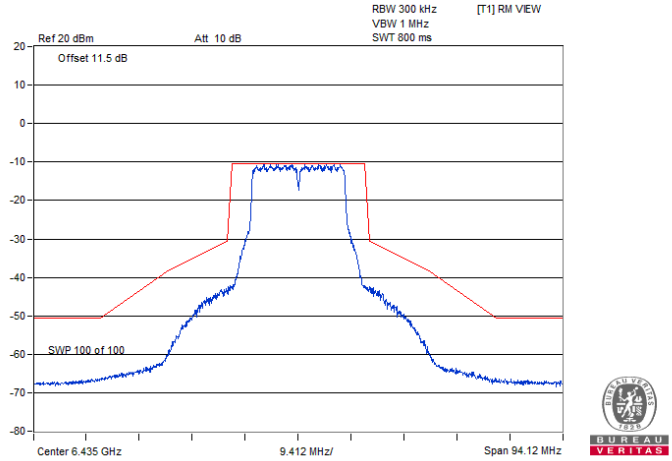
802.11a / Chain 2 : CH 1



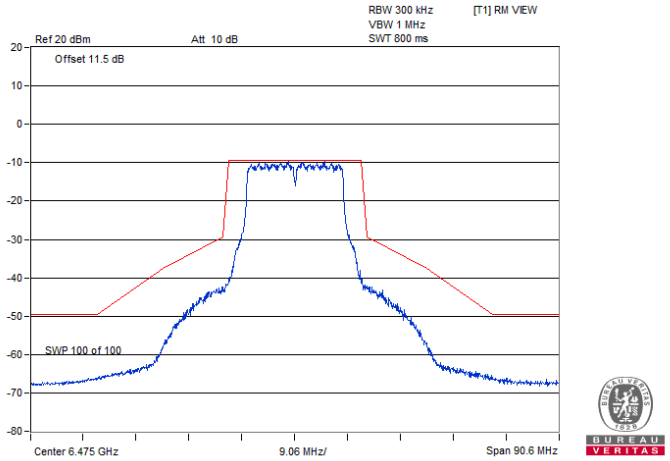
802.11a / Chain 2 : CH 45



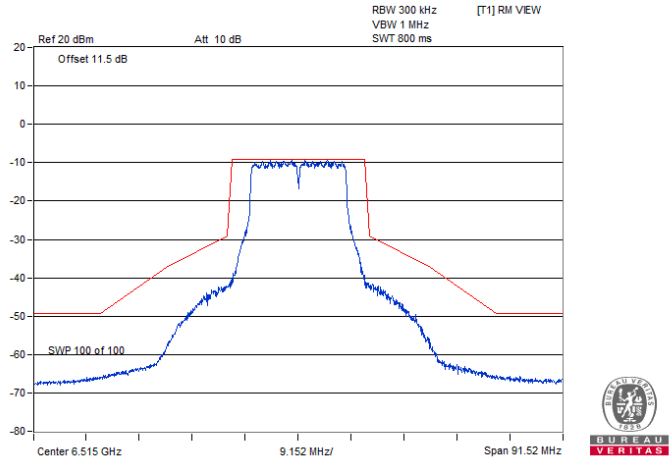
802.11a / Chain 2 : CH 93



802.11a / Chain 2 : CH 97

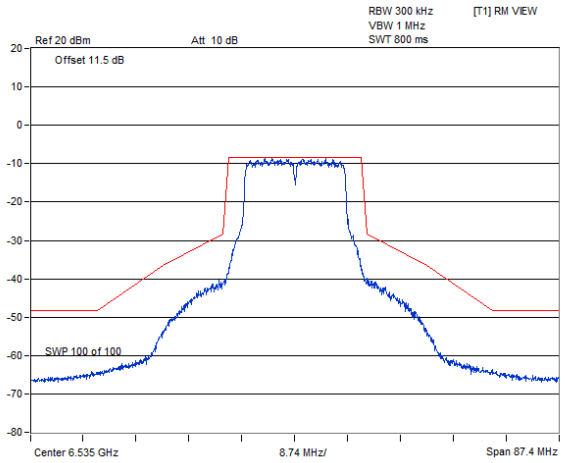


802.11a / Chain 2 : CH 105

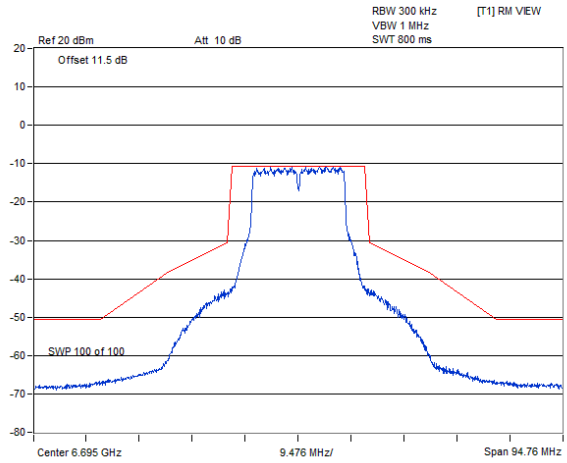


802.11a / Chain 2 : CH 113

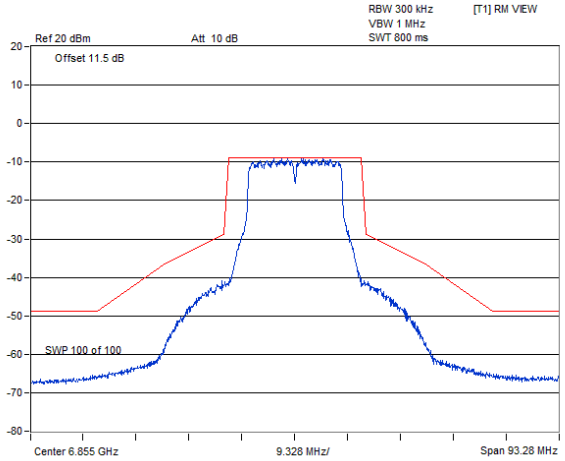
Spectrum Plot



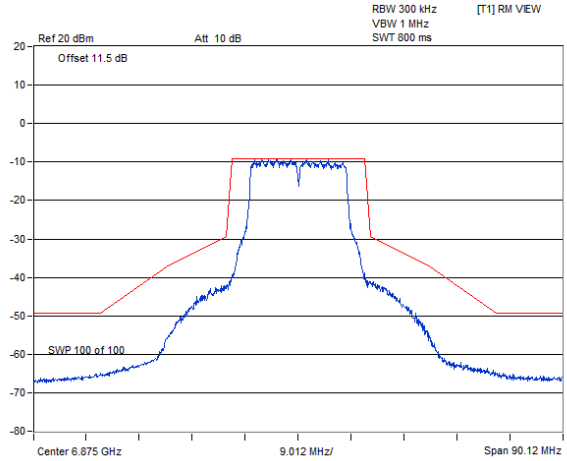
802.11a / Chain 2 : CH 117



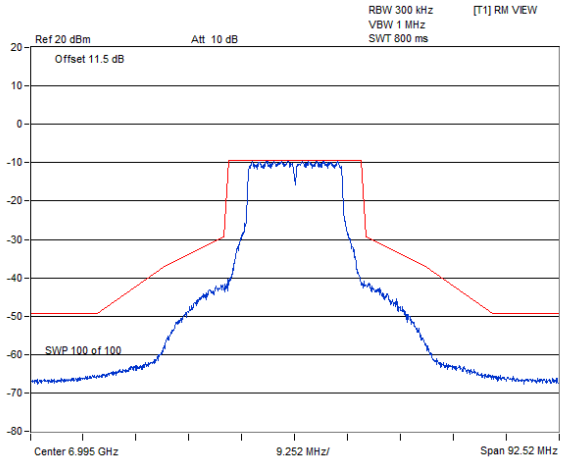
802.11a / Chain 2 : CH 149



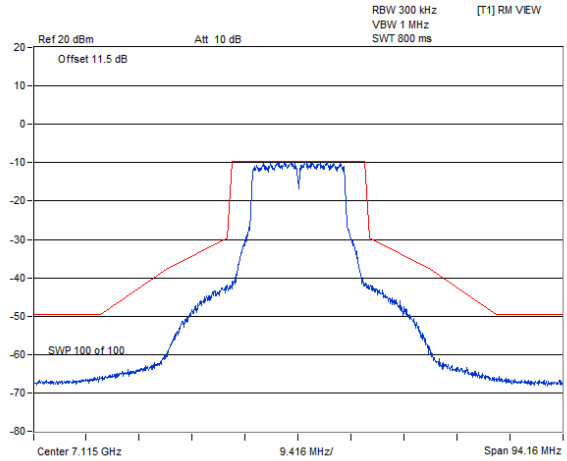
802.11a / Chain 2 : CH 181



802.11a / Chain 2 : CH 185

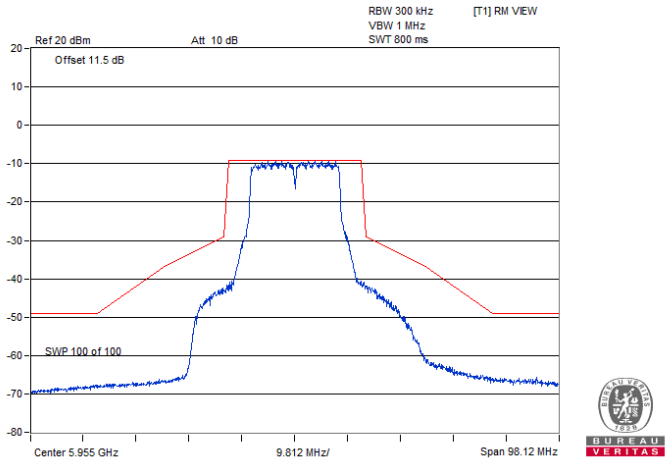


802.11a / Chain 2 : CH 209

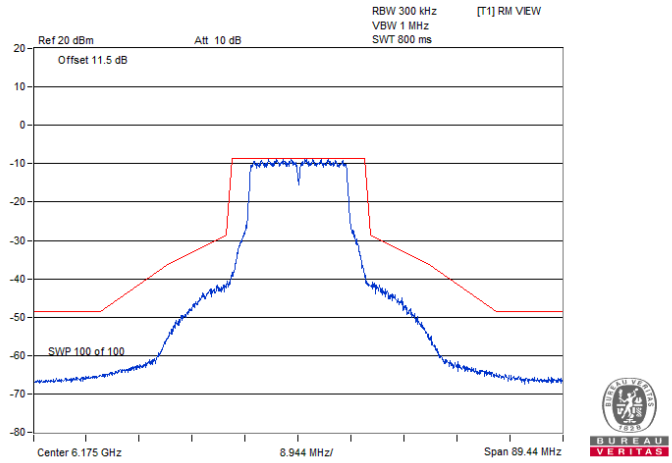


802.11a / Chain 2 : CH 233

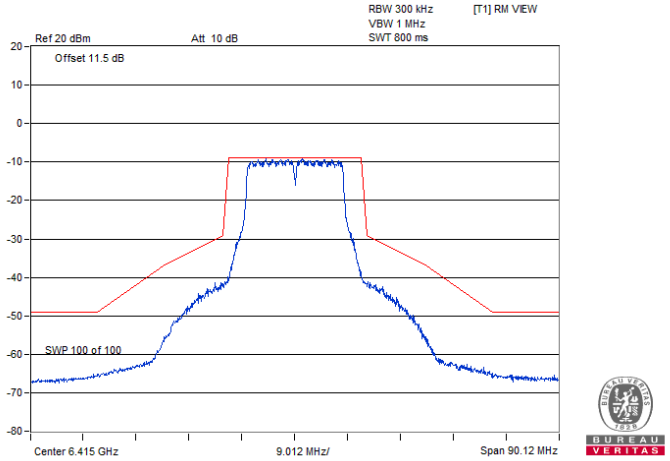
Spectrum Plot



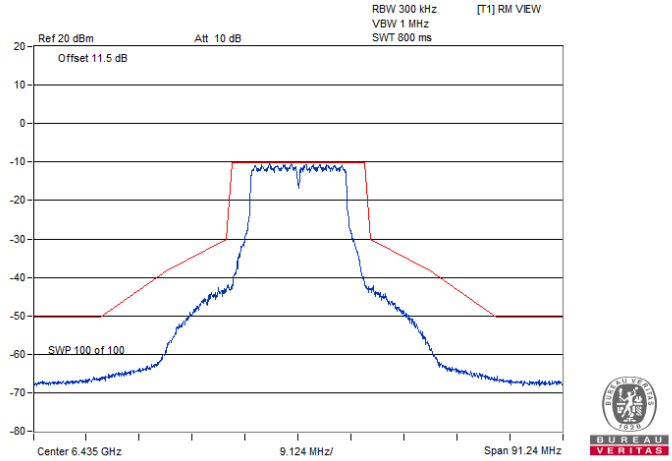
802.11a / Chain 3 : CH 1



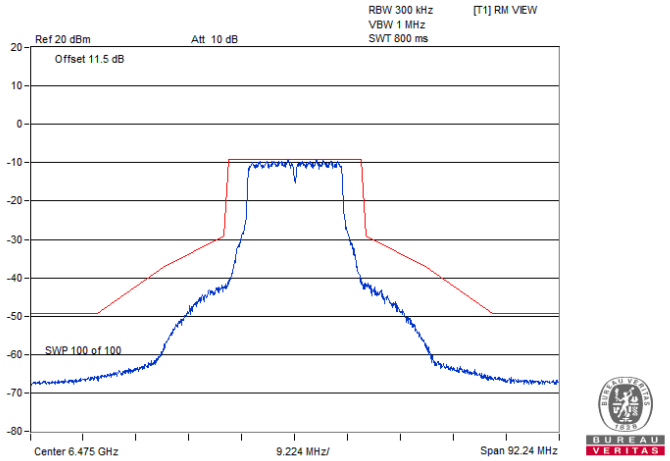
802.11a / Chain 3 : CH 45



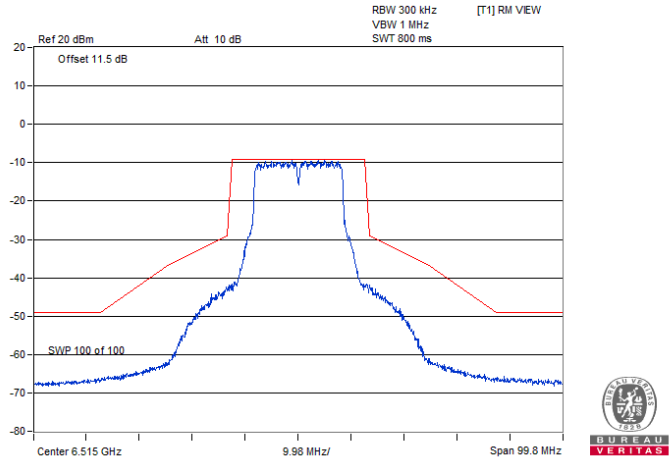
802.11a / Chain 3 : CH 93



802.11a / Chain 3 : CH 97

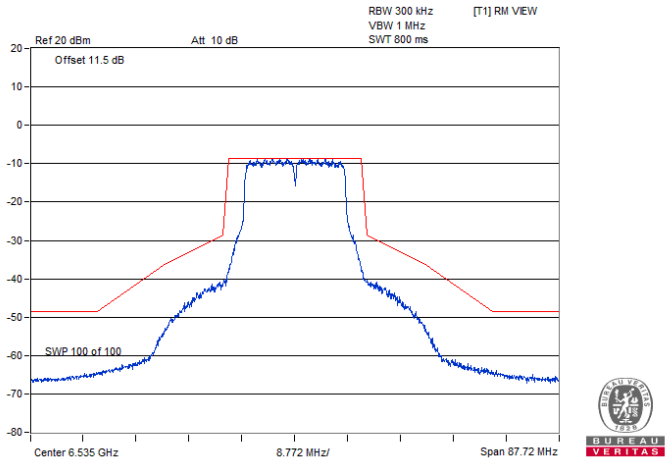


802.11a / Chain 3 : CH 105

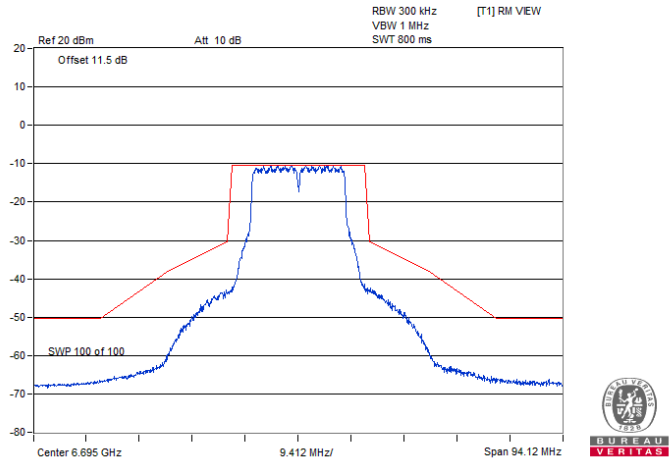


802.11a / Chain 3 : CH 113

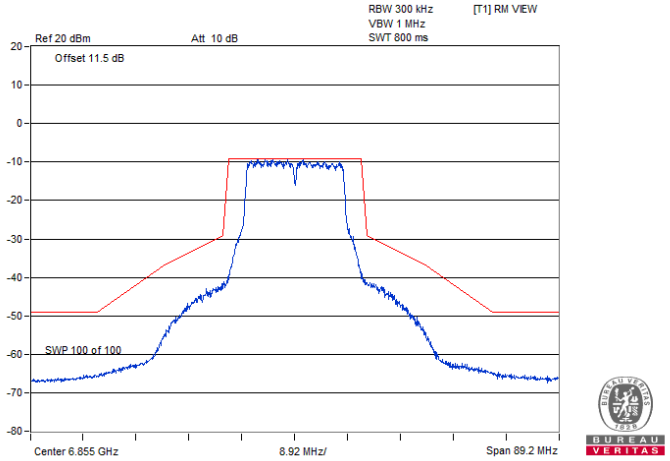
Spectrum Plot



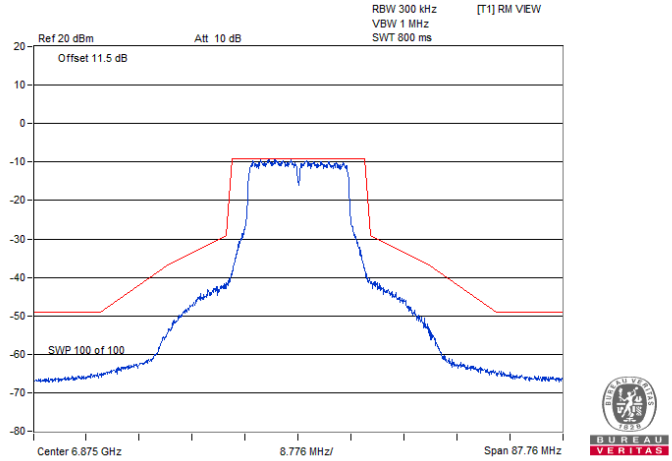
802.11a / Chain 3 : CH 117



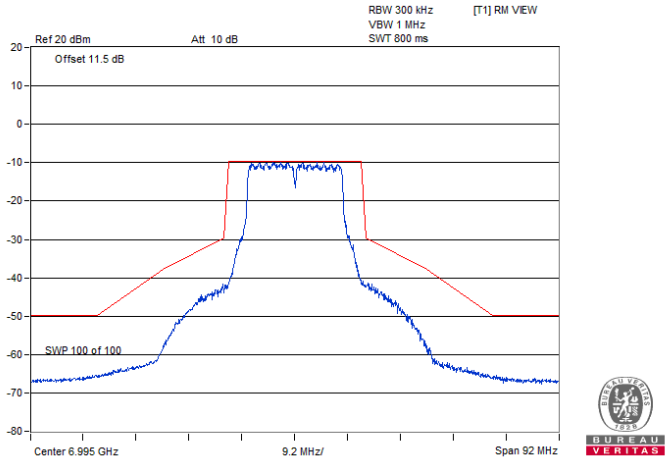
802.11a / Chain 3 : CH 149



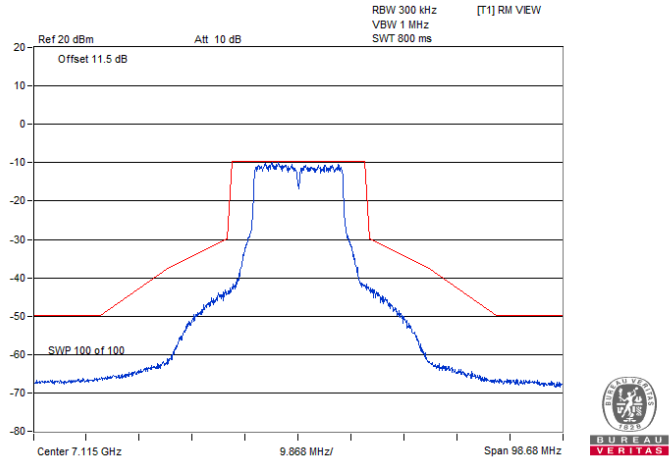
802.11a / Chain 3 : CH 181



802.11a / Chain 3 : CH 185

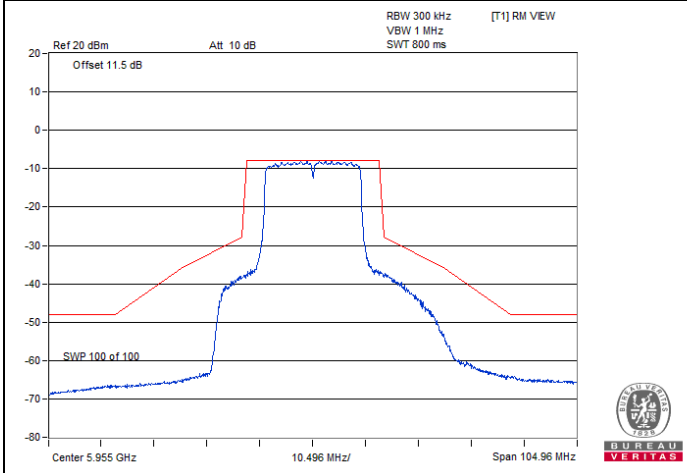
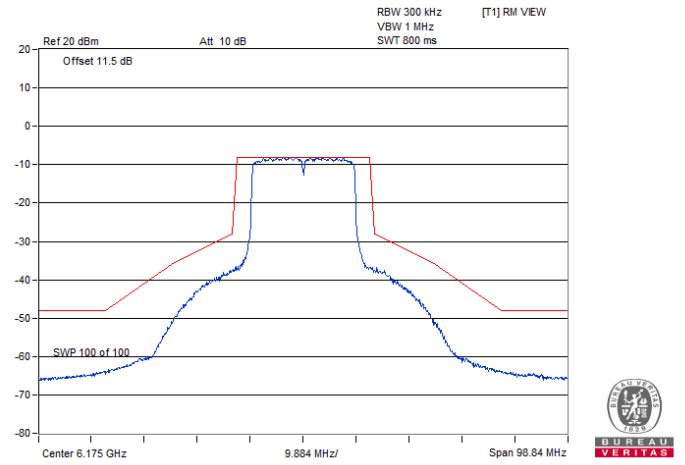
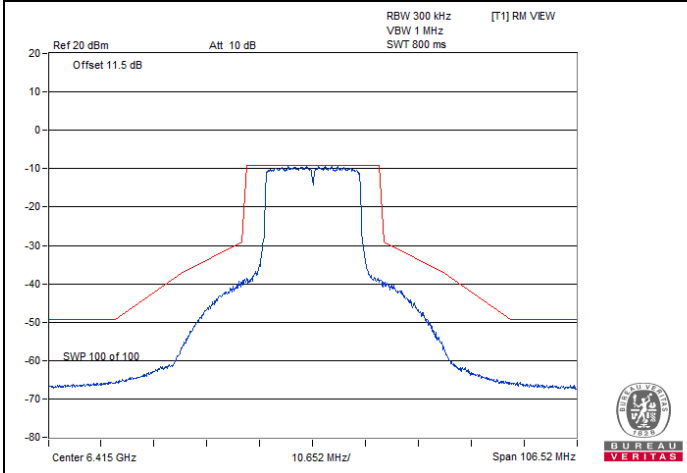
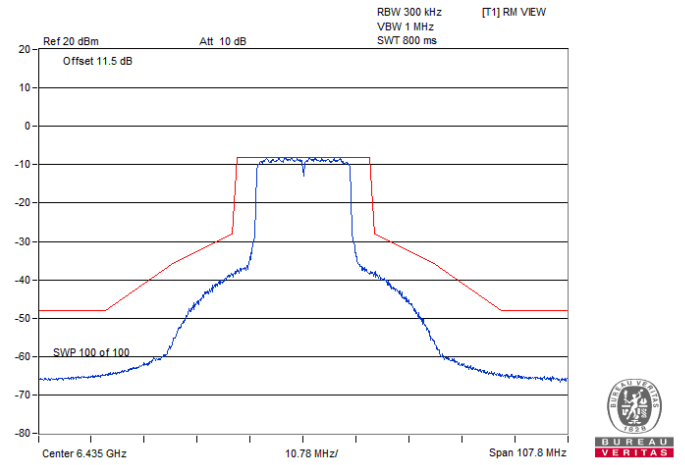
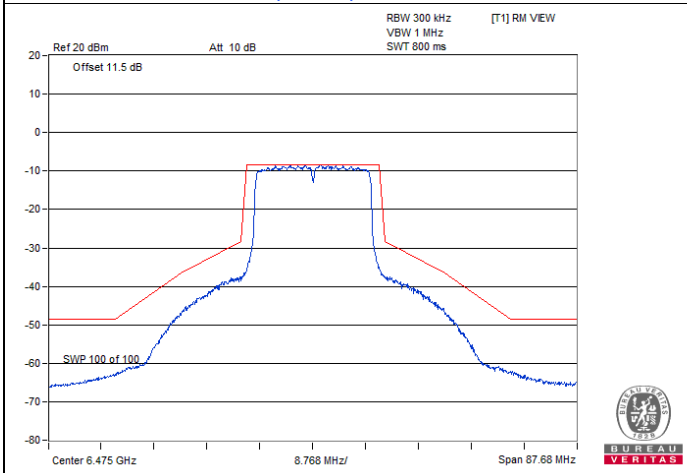
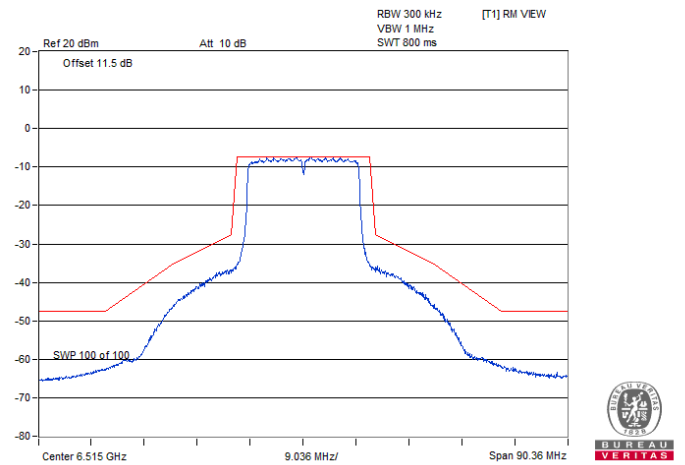


802.11a / Chain 3 : CH 209

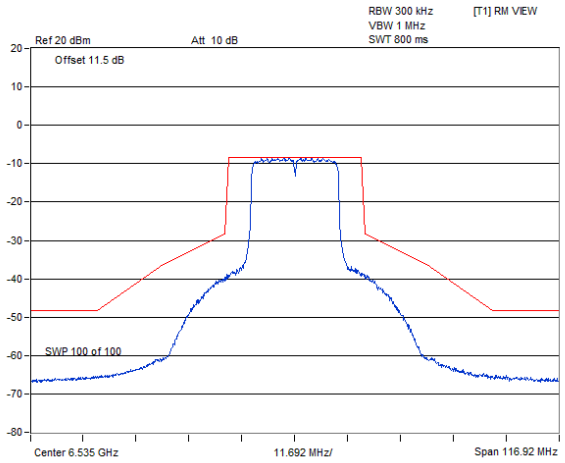


802.11a / Chain 3 : CH 233

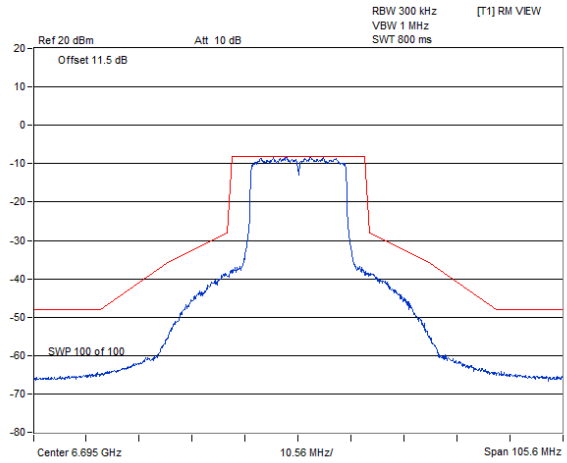
802.11ax (HE20)

Spectrum Plot	
	
802.11ax (HE20) / Chain 0 : CH 1	802.11ax (HE20) / Chain 0 : CH 45
	
802.11ax (HE20) / Chain 0 : CH 93	802.11ax (HE20) / Chain 0 : CH 97
	
802.11ax (HE20) / Chain 0 : CH 105	802.11ax (HE20) / Chain 0 : CH 113

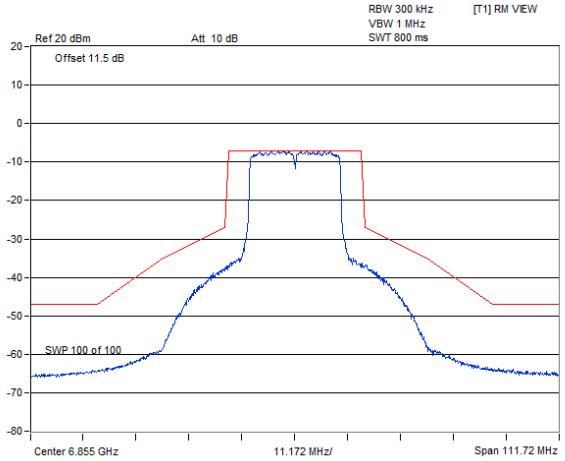
Spectrum Plot



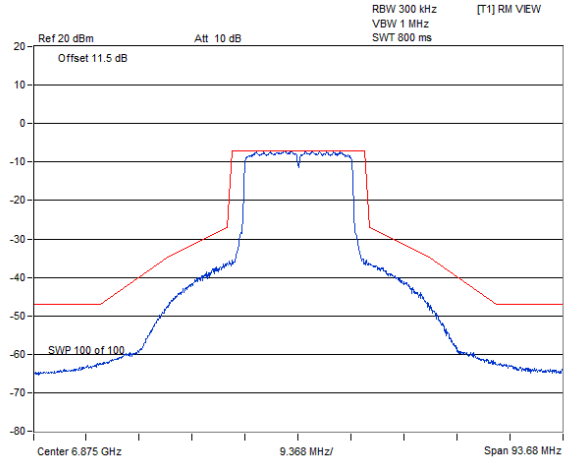
802.11ax (HE20) / Chain 0 : CH 117



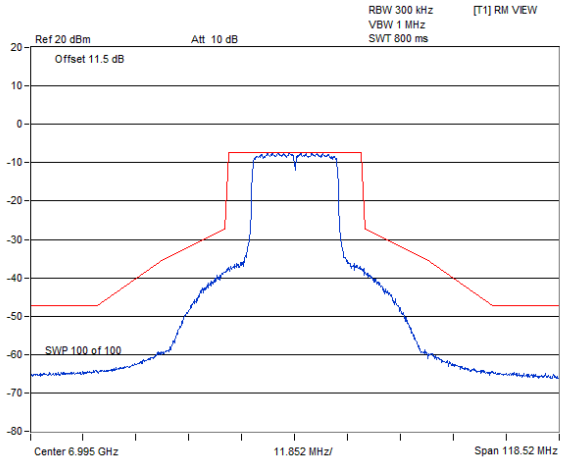
802.11ax (HE20) / Chain 0 : CH 149



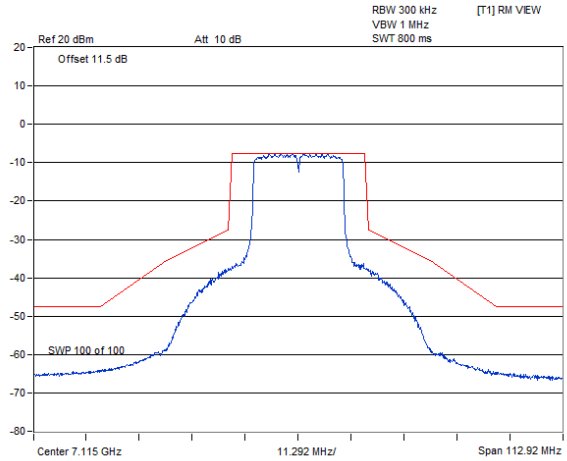
802.11ax (HE20) / Chain 0 : CH 181



802.11ax (HE20) / Chain 0 : CH 185

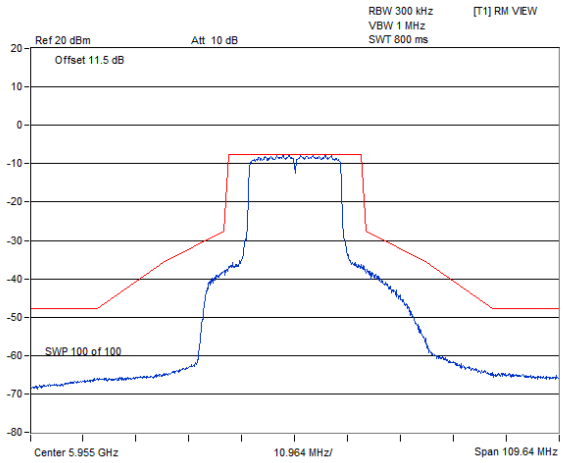


802.11ax (HE20) / Chain 0 : CH 209

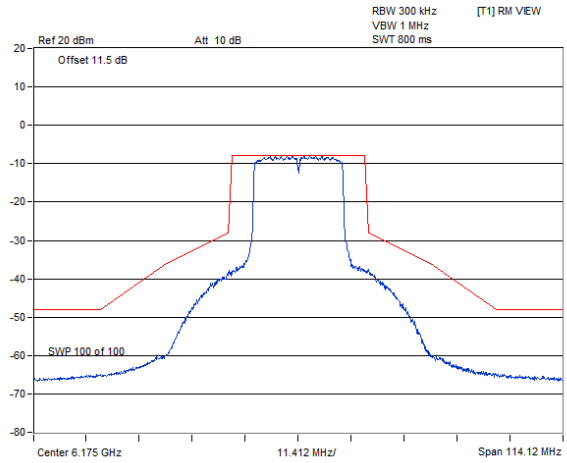


802.11ax (HE20) / Chain 0 : CH 233

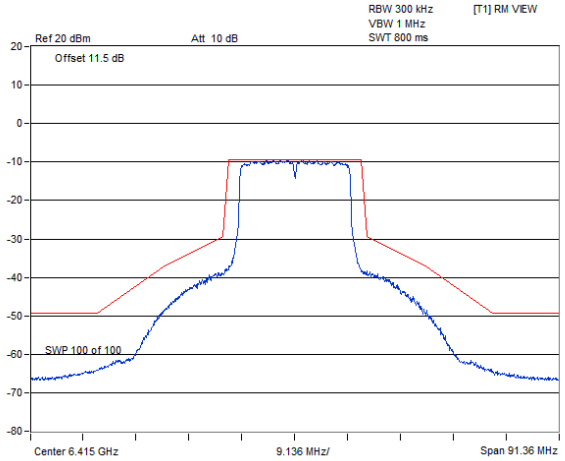
Spectrum Plot



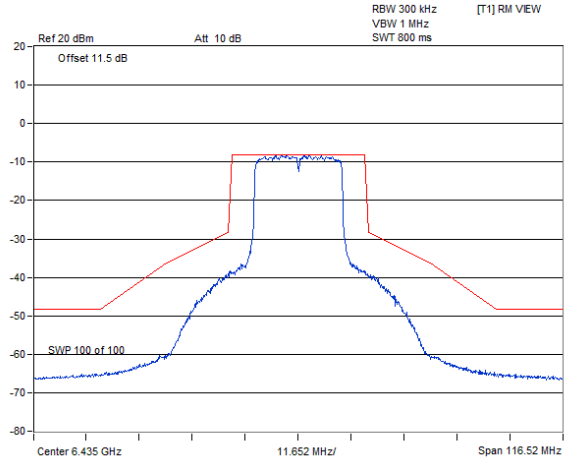
802.11ax (HE20) / Chain 1 : CH 1



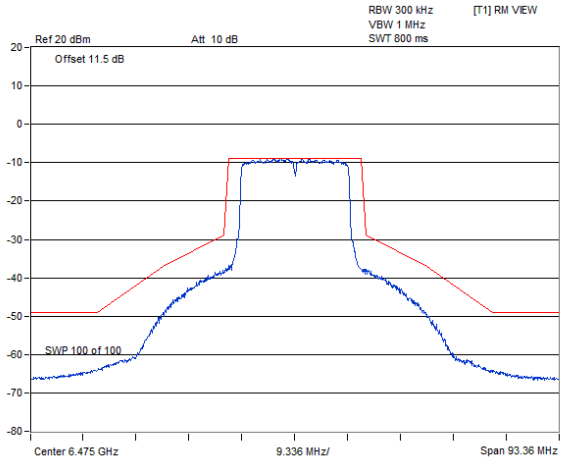
802.11ax (HE20) / Chain 1 : CH 45



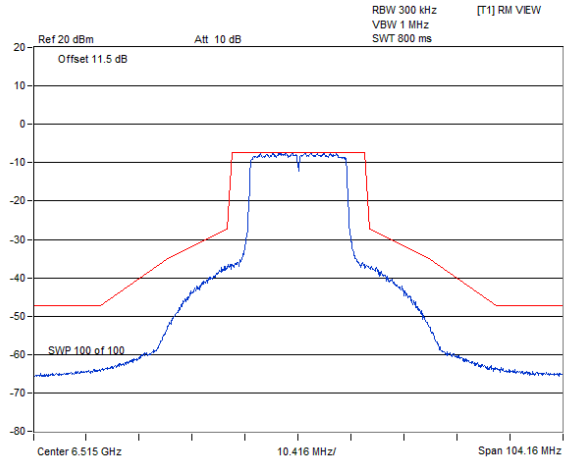
802.11ax (HE20) / Chain 1 : CH 93



802.11ax (HE20) / Chain 1 : CH 97

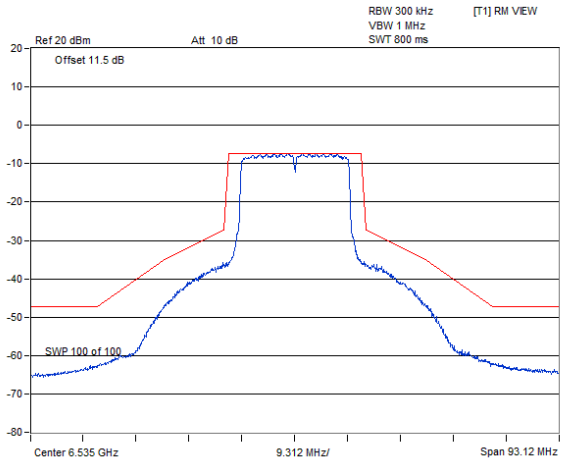


802.11ax (HE20) / Chain 1 : CH 105

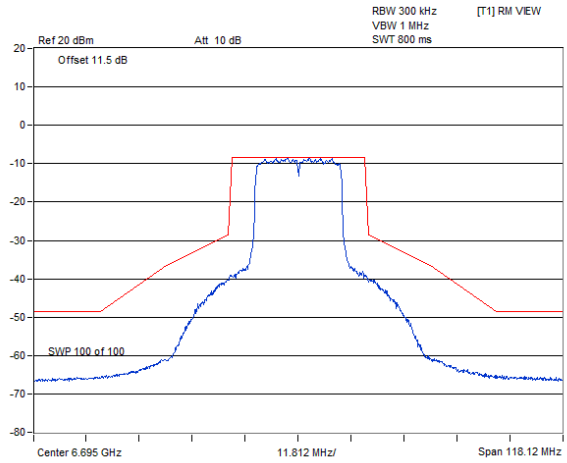


802.11ax (HE20) / Chain 1 : CH 113

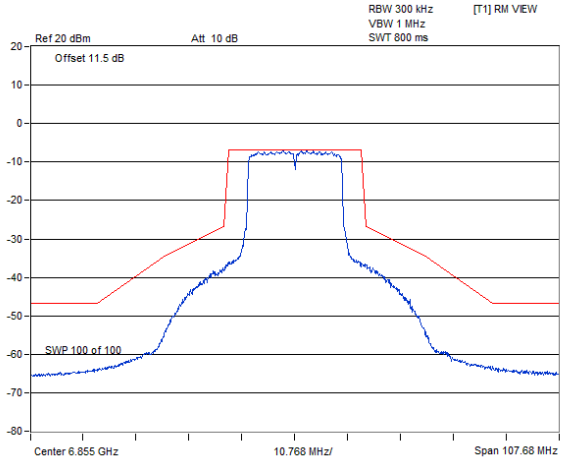
Spectrum Plot



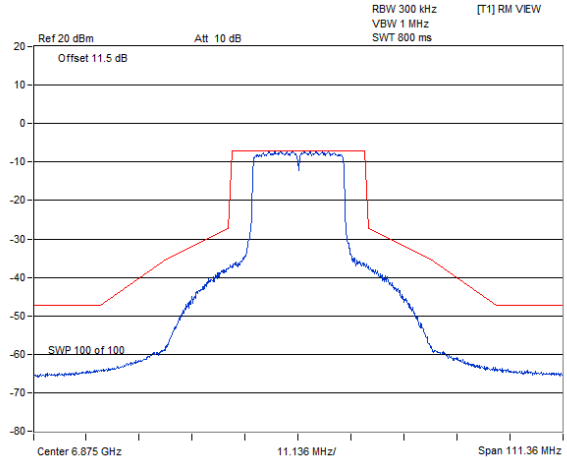
802.11ax (HE20) / Chain 1 : CH 117



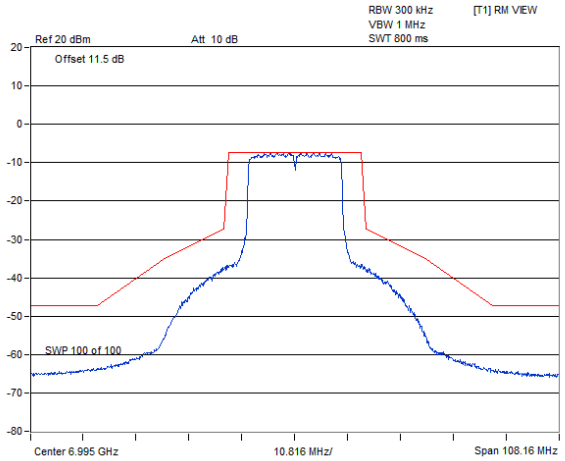
802.11ax (HE20) / Chain 1 : CH 149



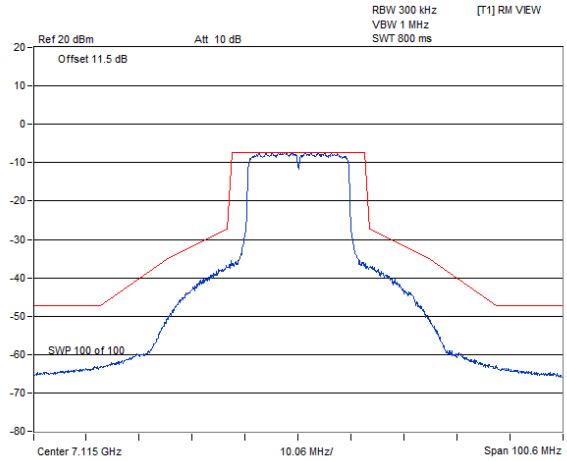
802.11ax (HE20) / Chain 1 : CH 181



802.11ax (HE20) / Chain 1 : CH 185

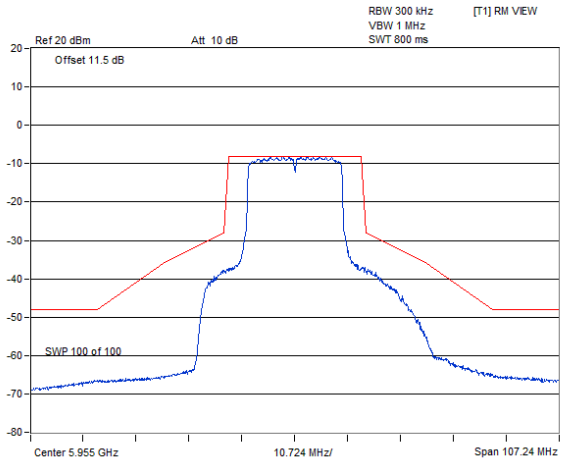


802.11ax (HE20) / Chain 1 : CH 209

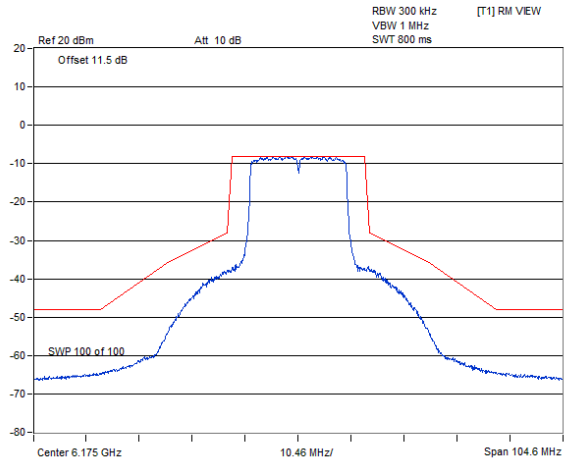


802.11ax (HE20) / Chain 1 : CH 233

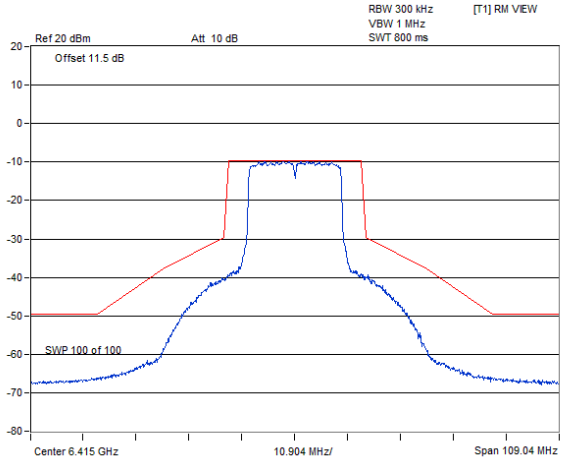
Spectrum Plot



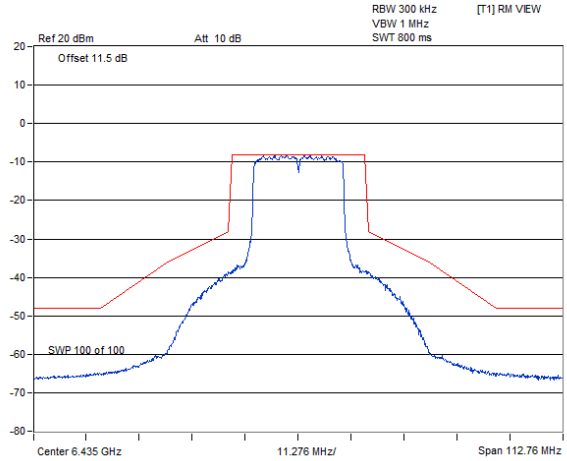
802.11ax (HE20) / Chain 2 : CH 1



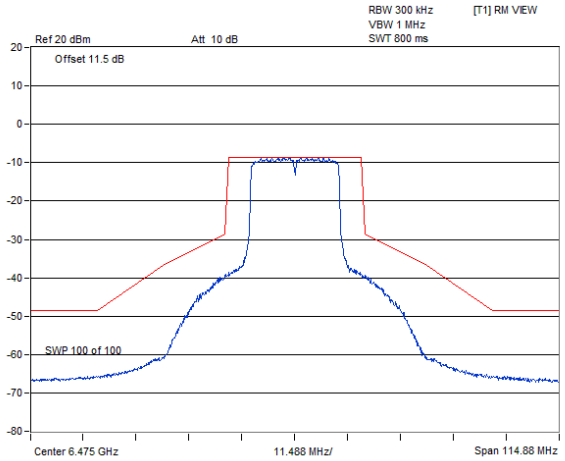
802.11ax (HE20) / Chain 2 : CH 45



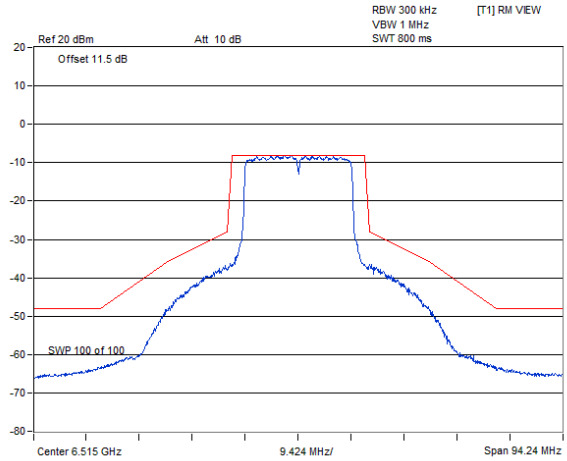
802.11ax (HE20) / Chain 2 : CH 93



802.11ax (HE20) / Chain 2 : CH 97

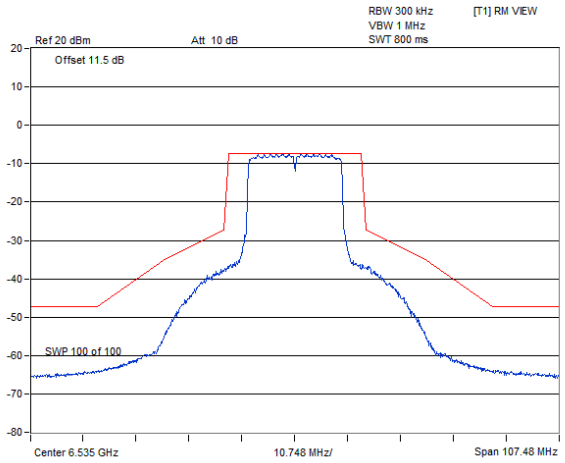


802.11ax (HE20) / Chain 2 : CH 105

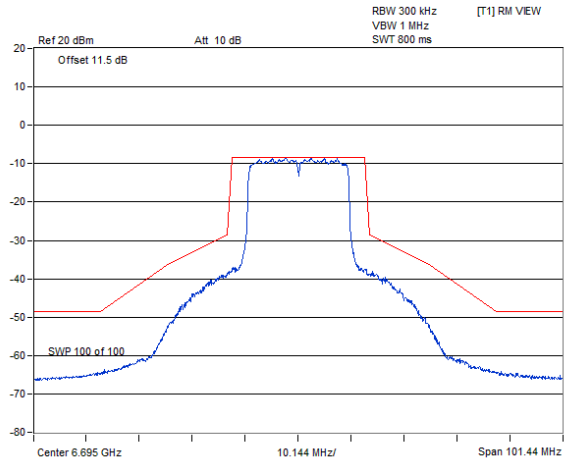


802.11ax (HE20) / Chain 2 : CH 113

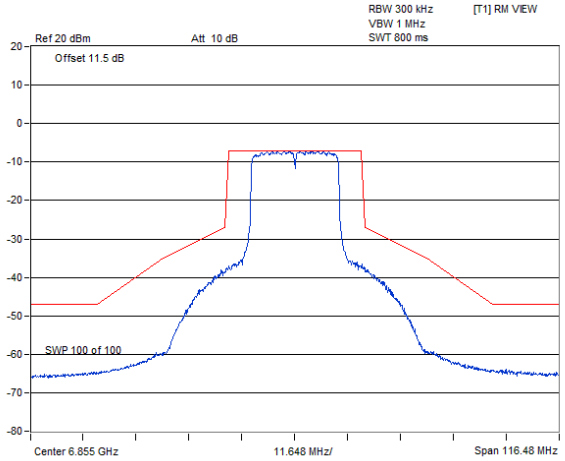
Spectrum Plot



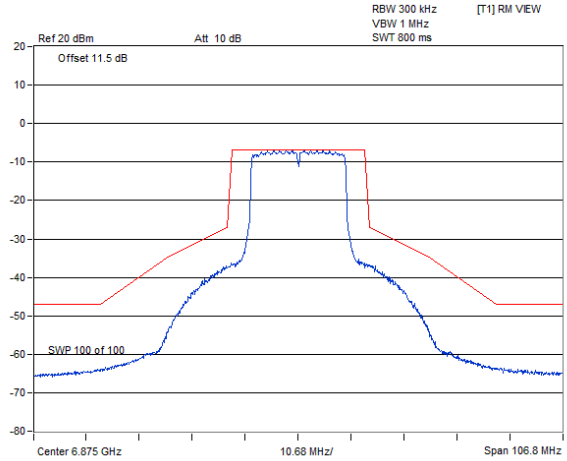
802.11ax (HE20) / Chain 2 : CH 117



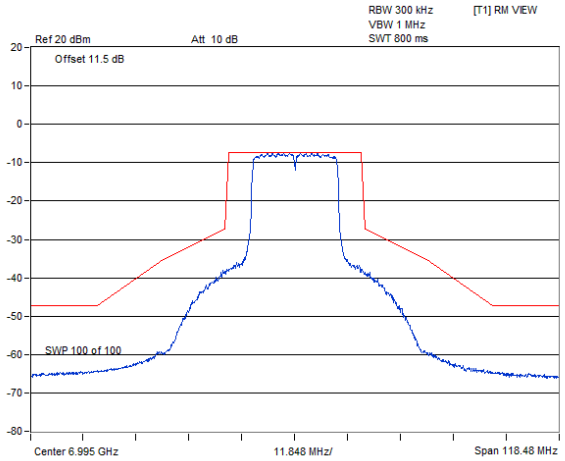
802.11ax (HE20) / Chain 2 : CH 149



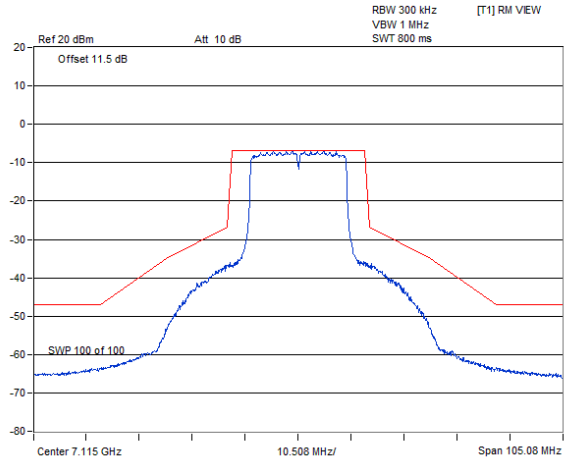
802.11ax (HE20) / Chain 2 : CH 181



802.11ax (HE20) / Chain 2 : CH 185

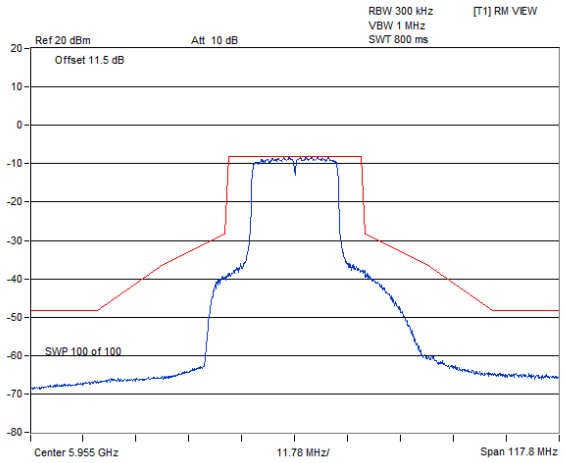


802.11ax (HE20) / Chain 2 : CH 209

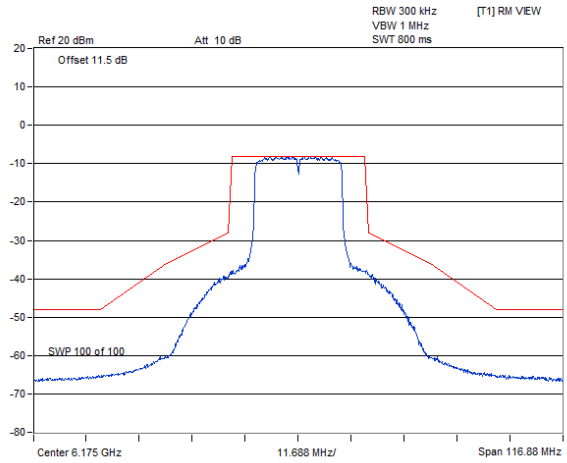


802.11ax (HE20) / Chain 2 : CH 233

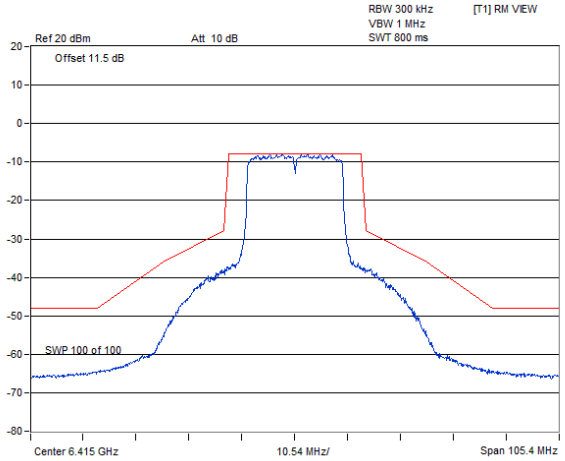
Spectrum Plot



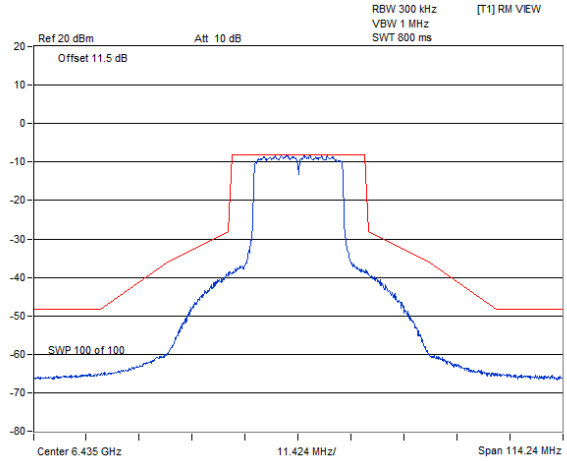
802.11ax (HE20) / Chain 3 : CH 1



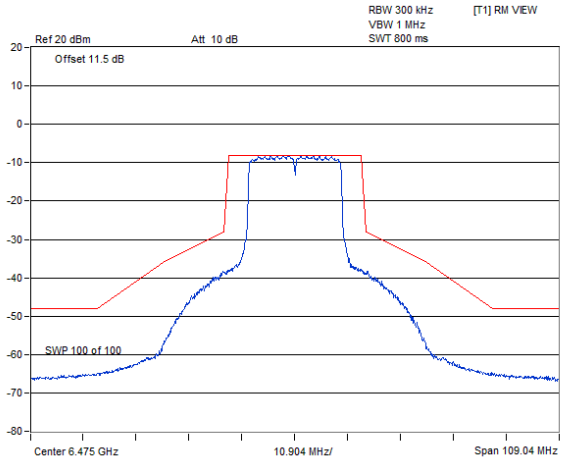
802.11ax (HE20) / Chain 3 : CH 45



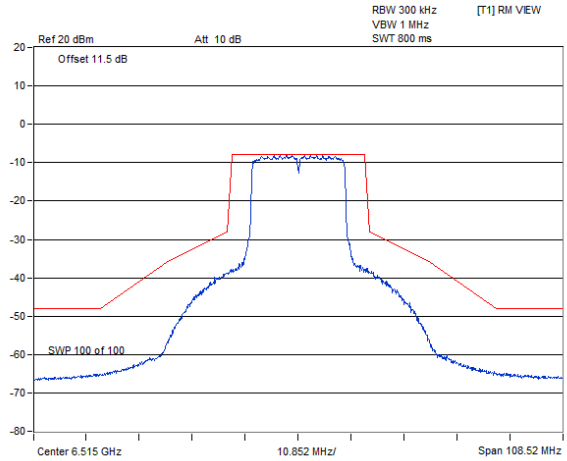
802.11ax (HE20) / Chain 3 : CH 93



802.11ax (HE20) / Chain 3 : CH 97

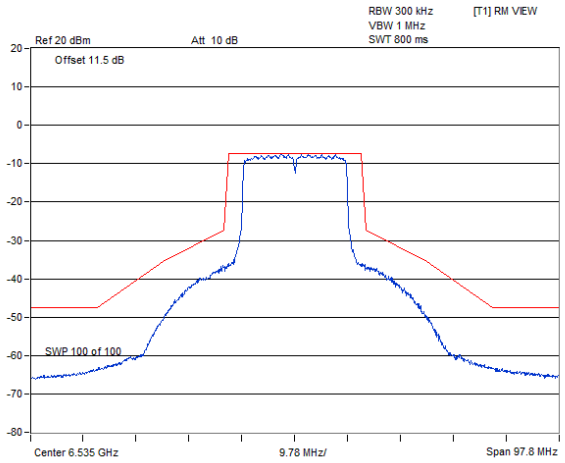


802.11ax (HE20) / Chain 3 : CH 105

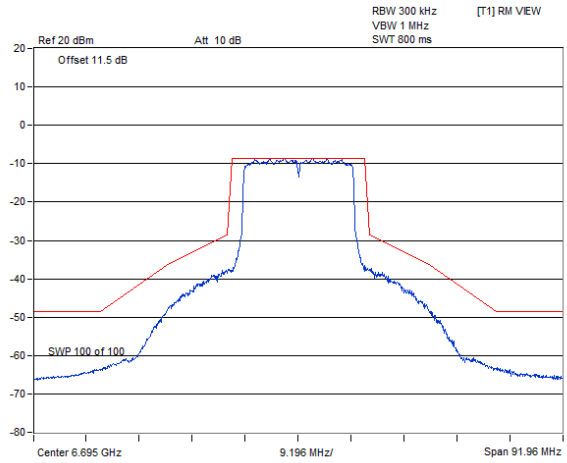


802.11ax (HE20) / Chain 3 : CH 113

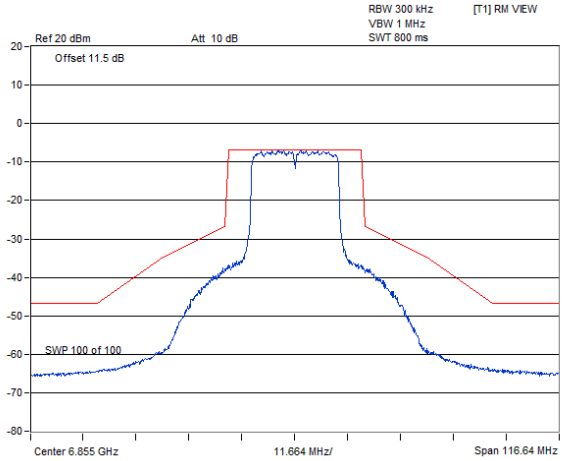
Spectrum Plot



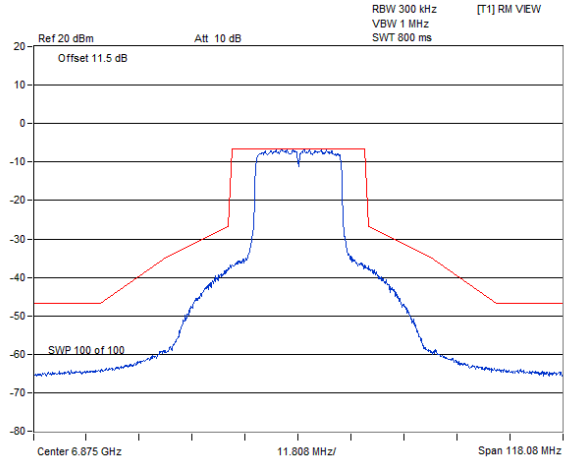
802.11ax (HE20) / Chain 3 : CH 117



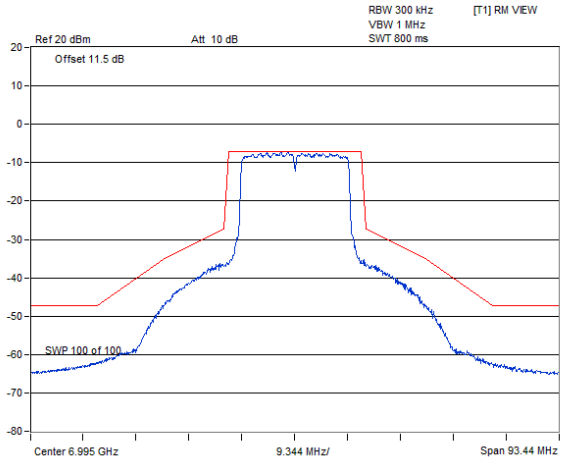
802.11ax (HE20) / Chain 3 : CH 149



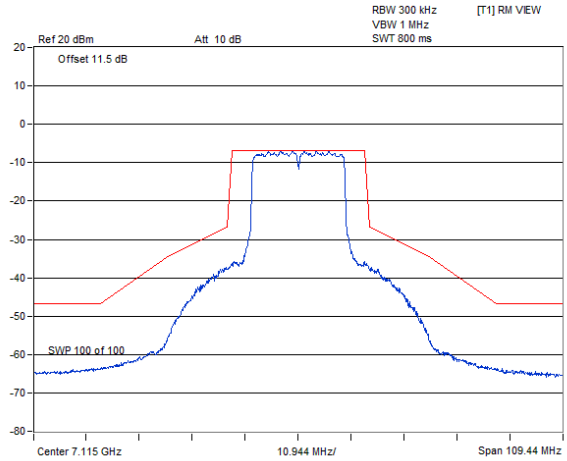
802.11ax (HE20) / Chain 3 : CH 181



802.11ax (HE20) / Chain 3 : CH 185

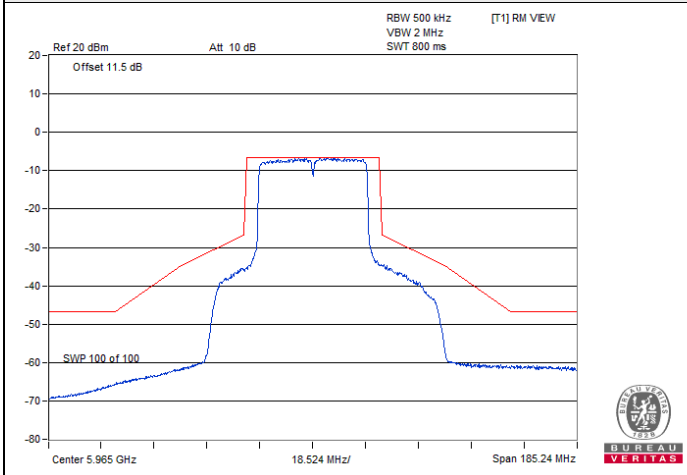
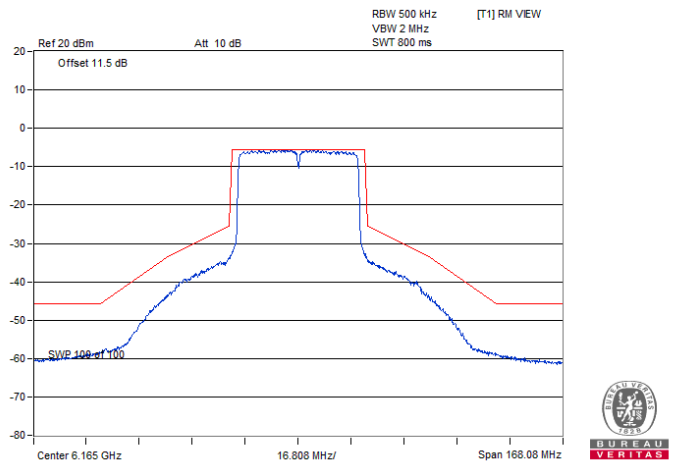
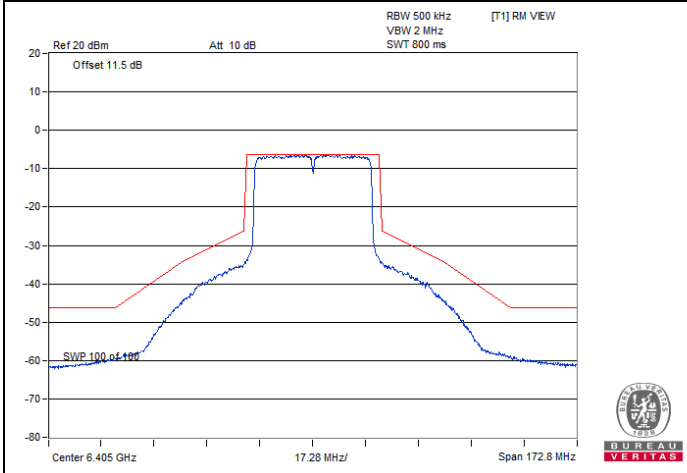
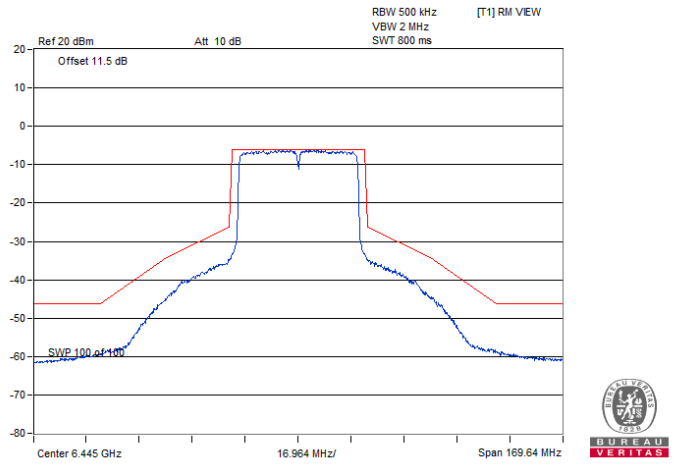
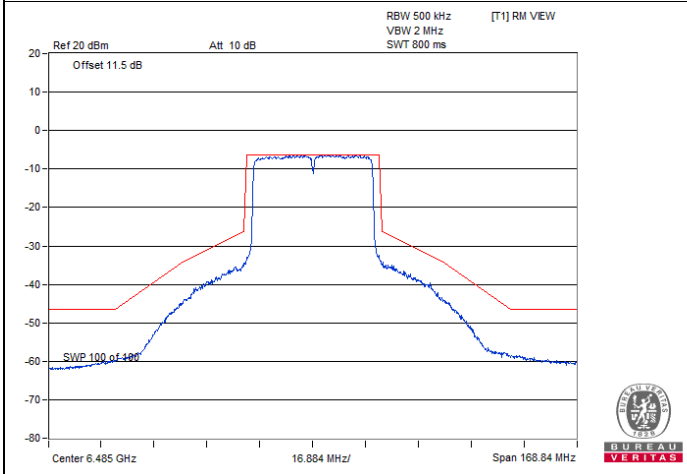
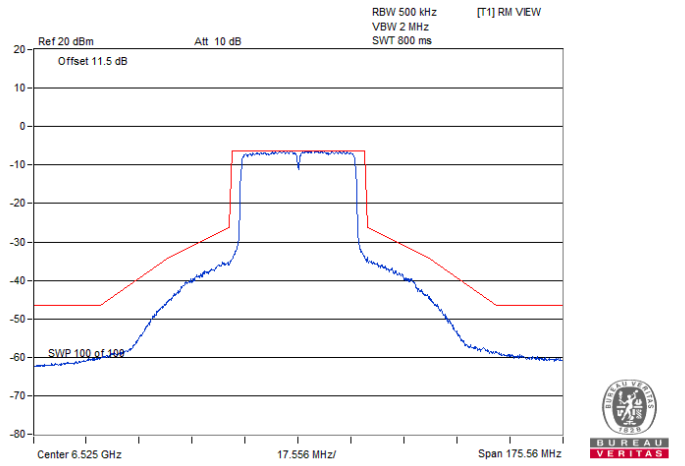


802.11ax (HE20) / Chain 3 : CH 209

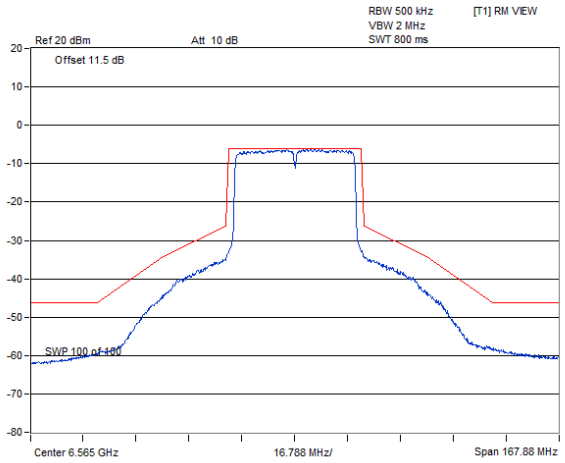


802.11ax (HE20) / Chain 3 : CH 233

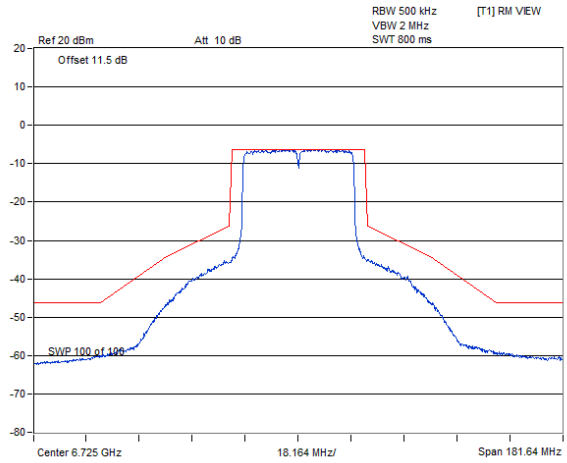
802.11ax (HE40)

Spectrum Plot	
	
802.11ax (HE40) / Chain 0 : CH 3	802.11ax (HE40) / Chain 0 : CH 43
	
802.11ax (HE40) / Chain 0 : CH 91	802.11ax (HE40) / Chain 0 : CH 99
	
802.11ax (HE40) / Chain 0 : CH 107	802.11ax (HE40) / Chain 0 : CH 115

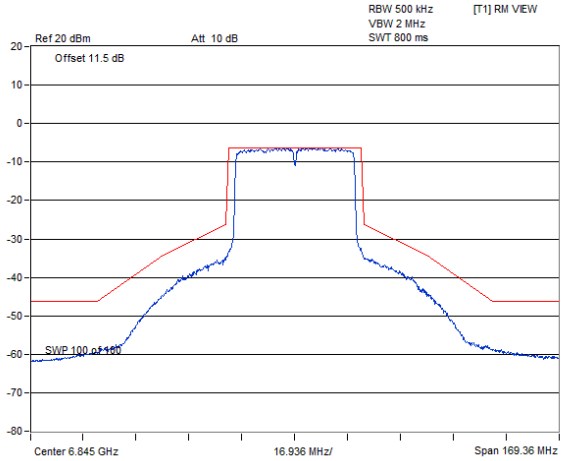
Spectrum Plot



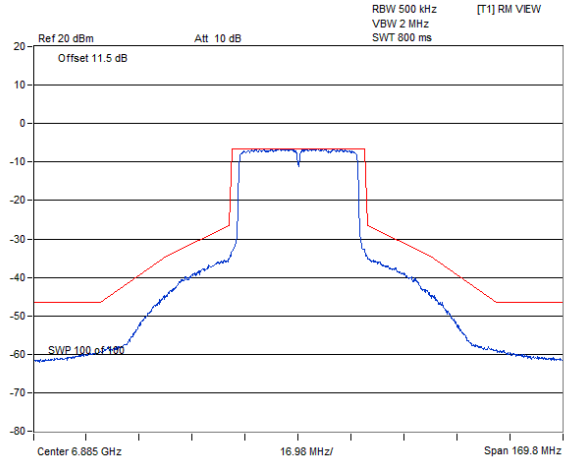
802.11ax (HE40) / Chain 0 : CH 123



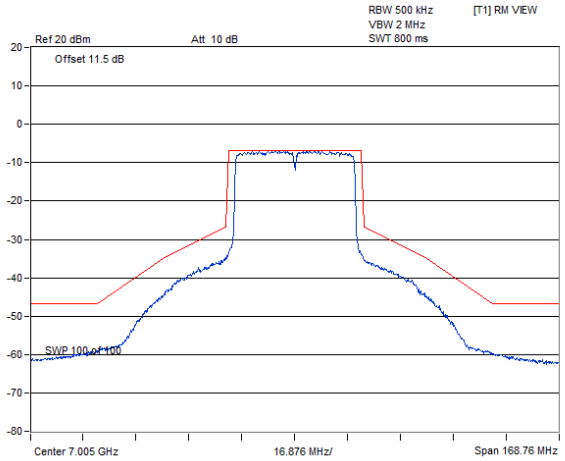
802.11ax (HE40) / Chain 0 : CH 155



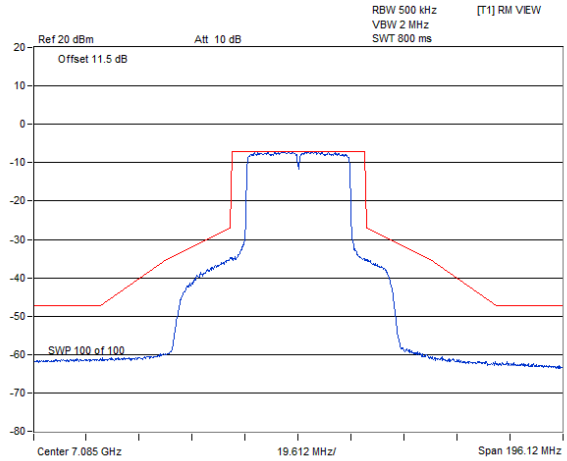
802.11ax (HE40) / Chain 0 : CH 179



802.11ax (HE40) / Chain 0 : CH 187

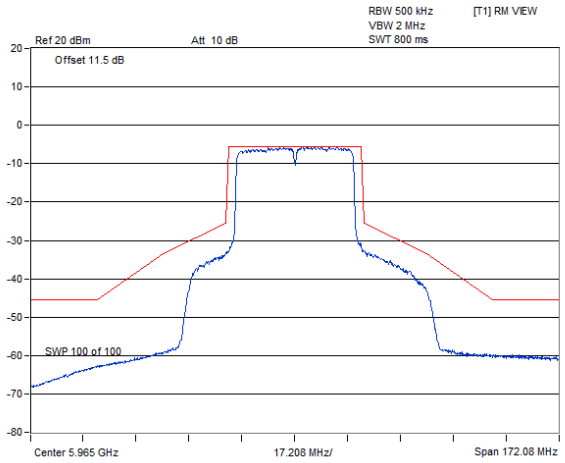


802.11ax (HE40) / Chain 0 : CH 211

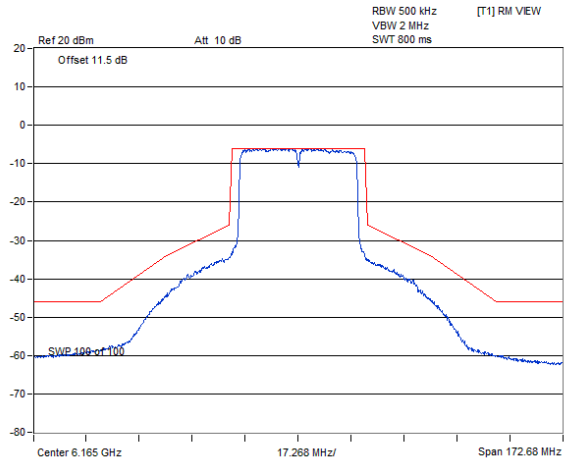


802.11ax (HE40) / Chain 0 : CH 227

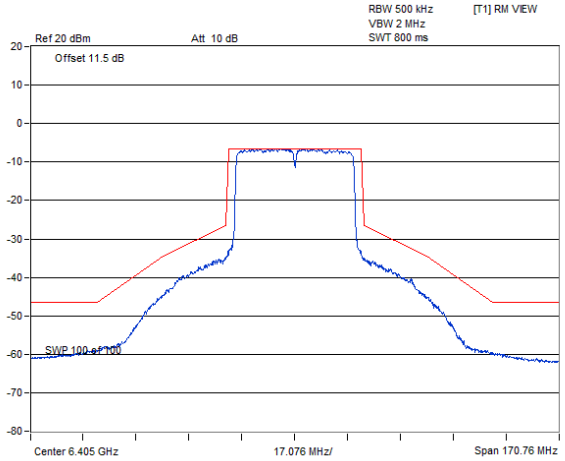
Spectrum Plot



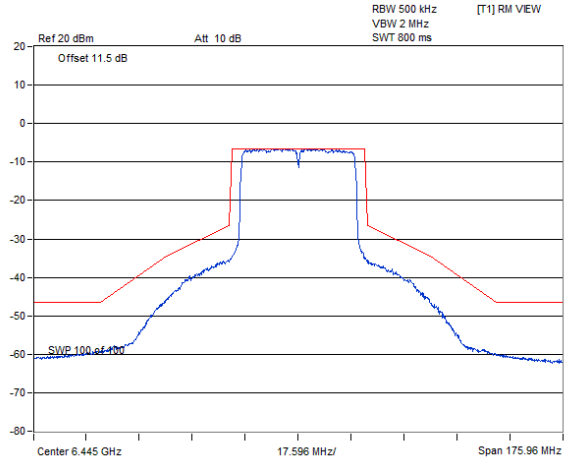
802.11ax (HE40) / Chain 1 : CH 3



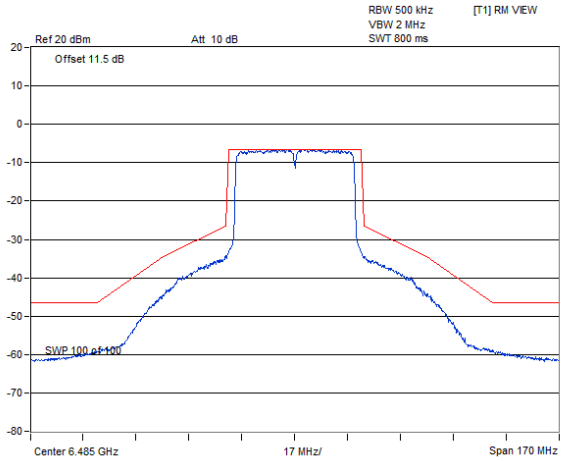
802.11ax (HE40) / Chain 1 : CH 43



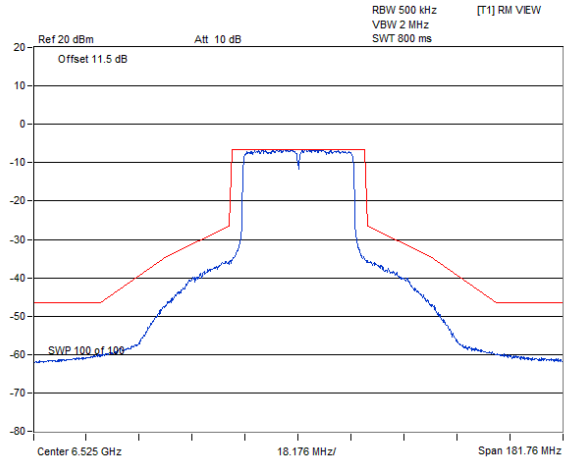
802.11ax (HE40) / Chain 1 : CH 91



802.11ax (HE40) / Chain 1 : CH 99

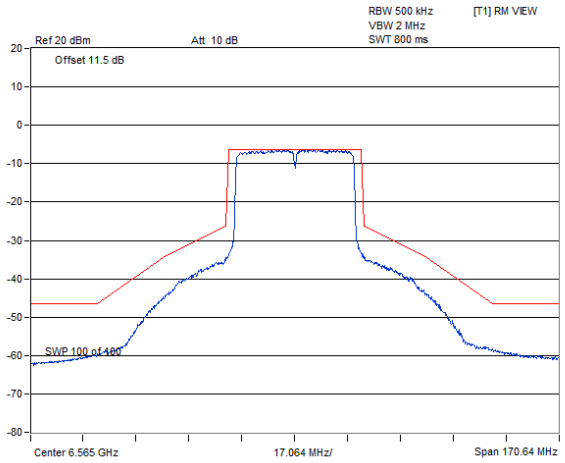


802.11ax (HE40) / Chain 1 : CH 107

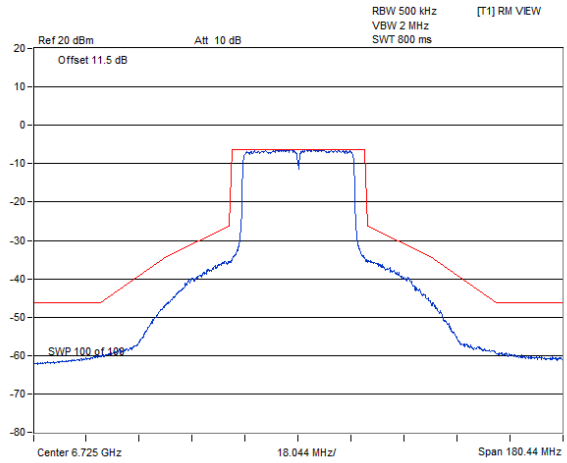


802.11ax (HE40) / Chain 1 : CH 115

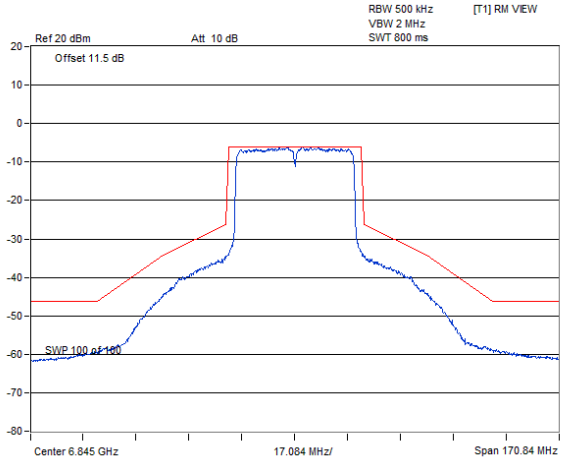
Spectrum Plot



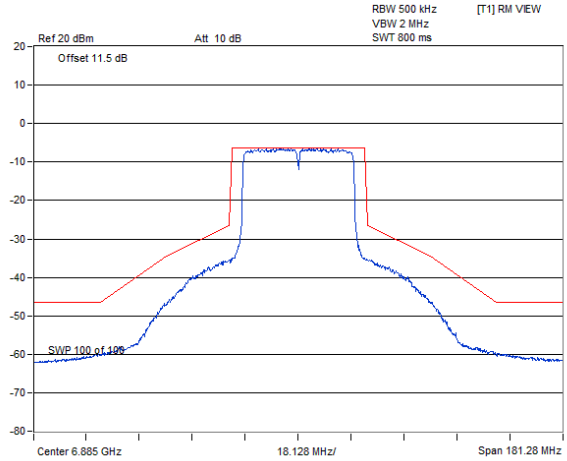
802.11ax (HE40) / Chain 1 : CH 123



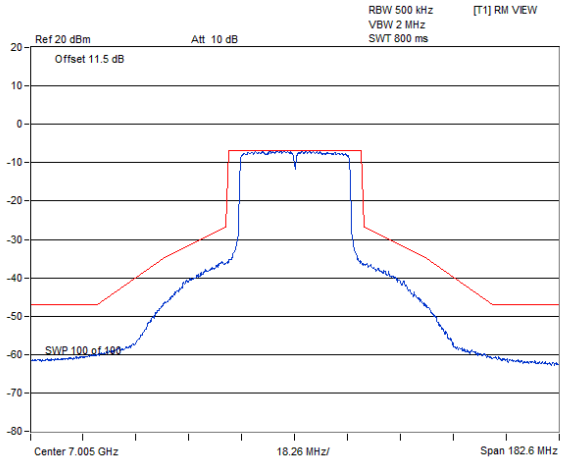
802.11ax (HE40) / Chain 1 : CH 155



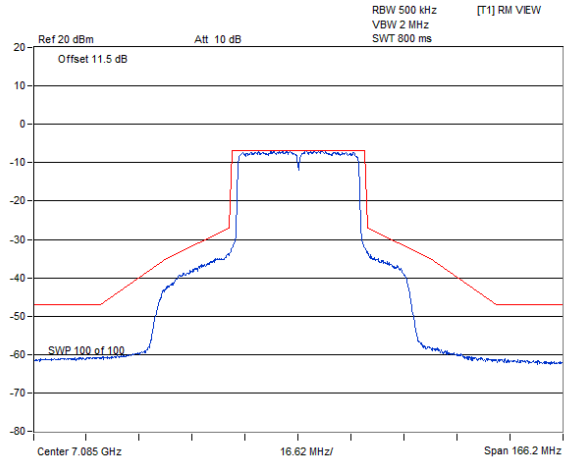
802.11ax (HE40) / Chain 1 : CH 179



802.11ax (HE40) / Chain 1 : CH 187

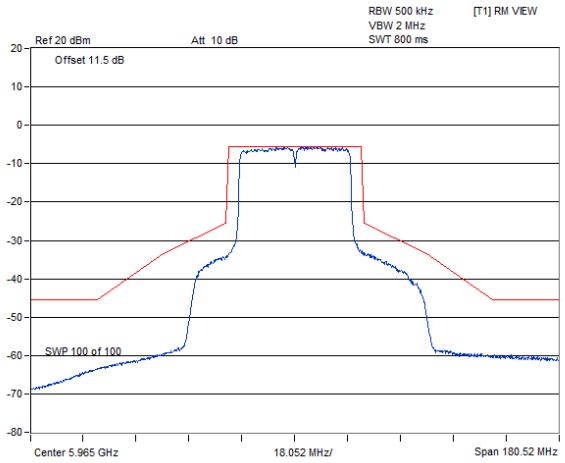


802.11ax (HE40) / Chain 1 : CH 211

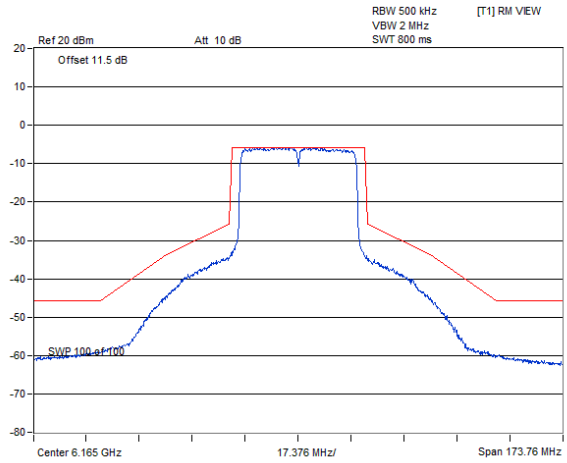


802.11ax (HE40) / Chain 1 : CH 227

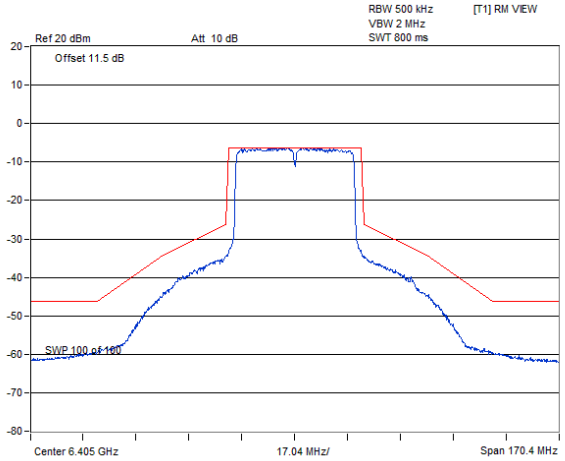
Spectrum Plot



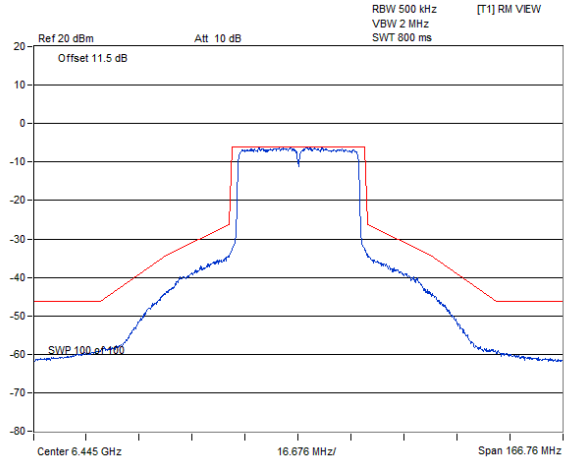
802.11ax (HE40) / Chain 2 : CH 3



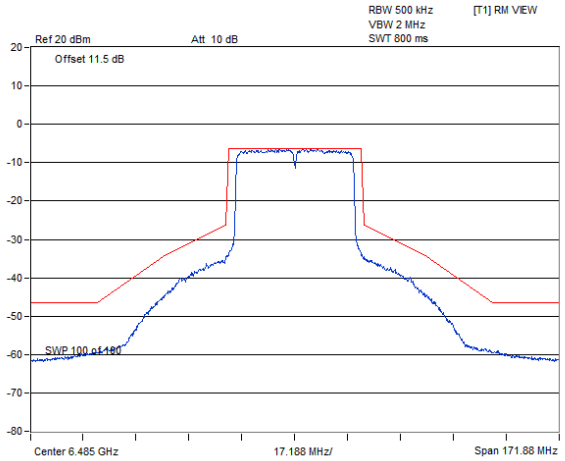
802.11ax (HE40) / Chain 2 : CH 43



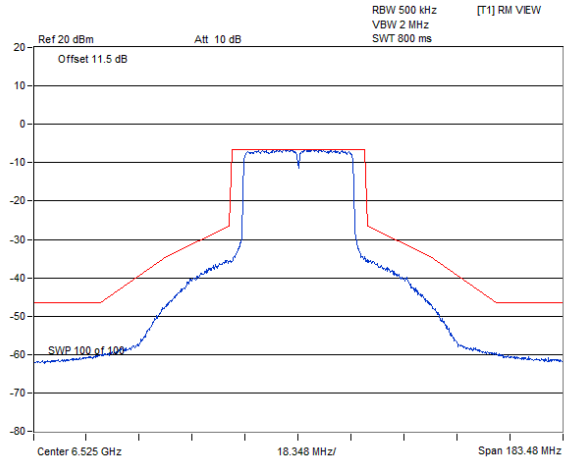
802.11ax (HE40) / Chain 2 : CH 91



802.11ax (HE40) / Chain 2 : CH 99

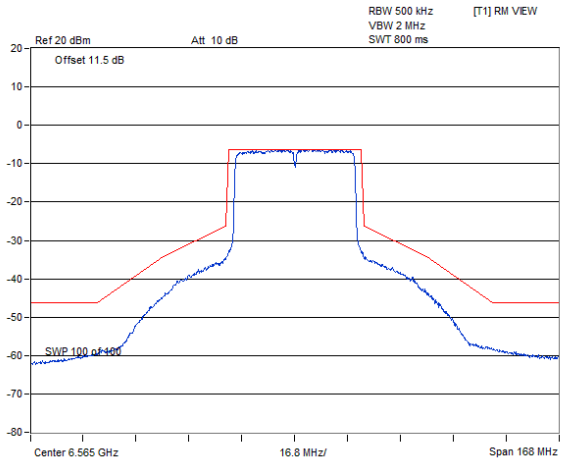


802.11ax (HE40) / Chain 2 : CH 107

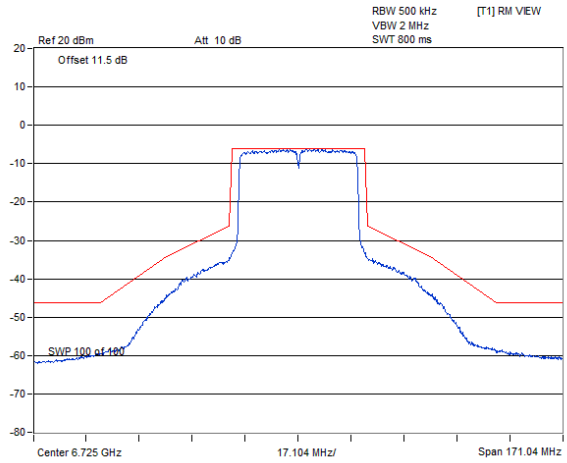


802.11ax (HE40) / Chain 2 : CH 115

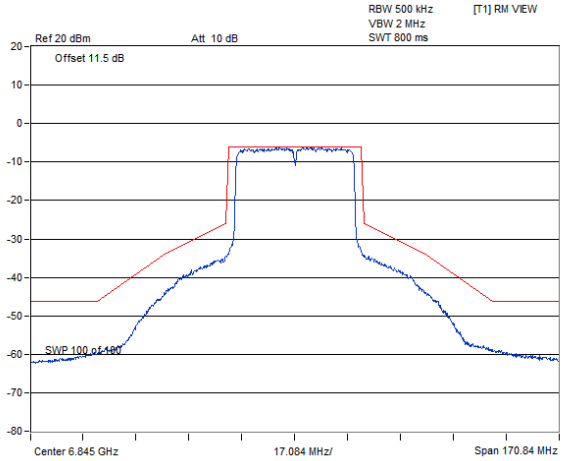
Spectrum Plot



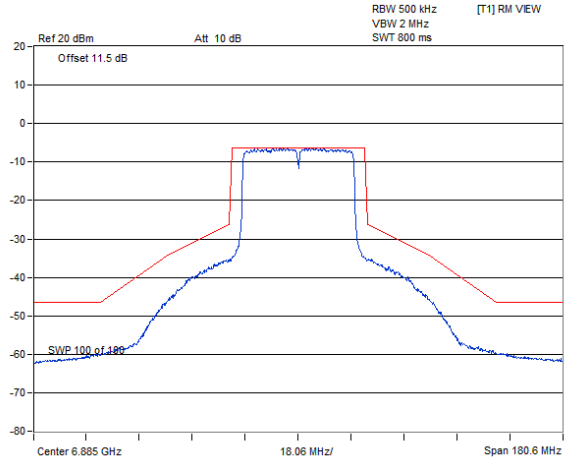
802.11ax (HE40) / Chain 2 : CH 123



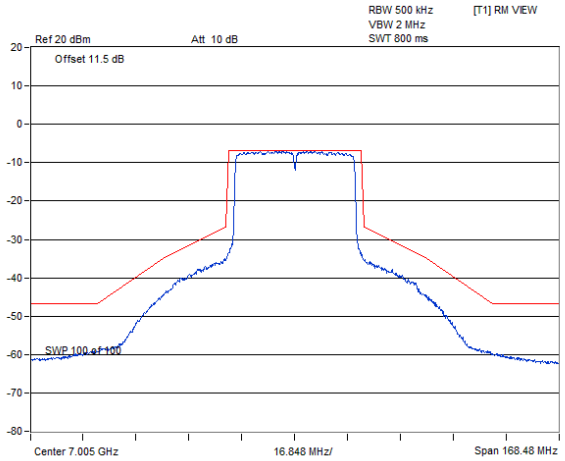
802.11ax (HE40) / Chain 2 : CH 155



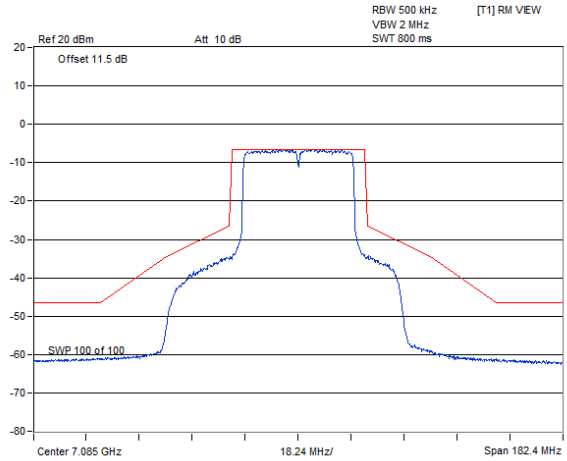
802.11ax (HE40) / Chain 2 : CH 179



802.11ax (HE40) / Chain 2 : CH 187

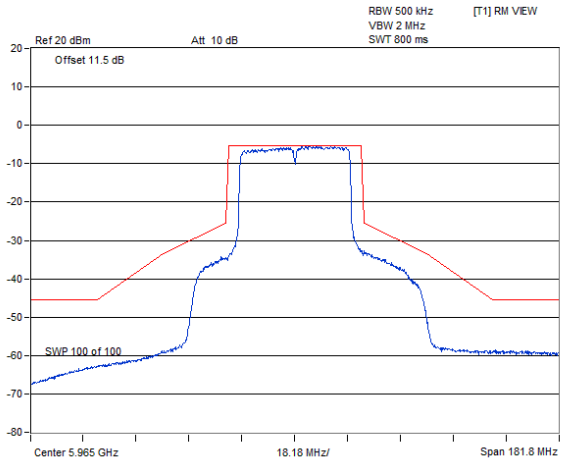


802.11ax (HE40) / Chain 2 : CH 211

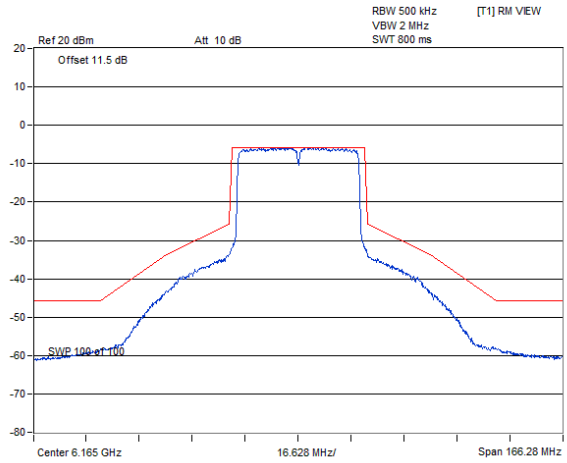


802.11ax (HE40) / Chain 2 : CH 227

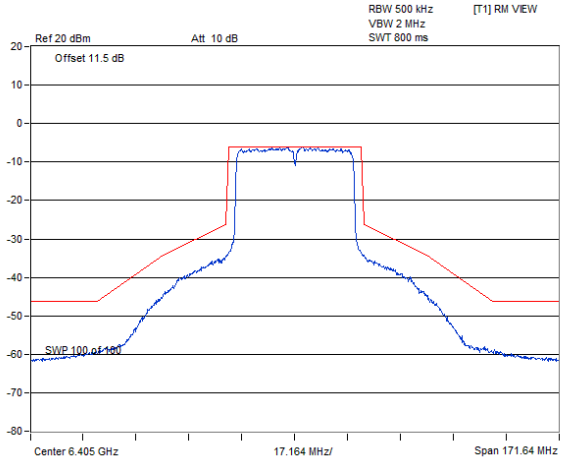
Spectrum Plot



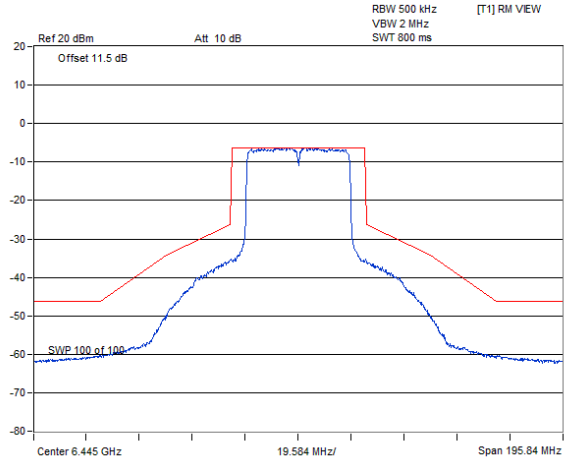
802.11ax (HE40) / Chain 3 : CH 3



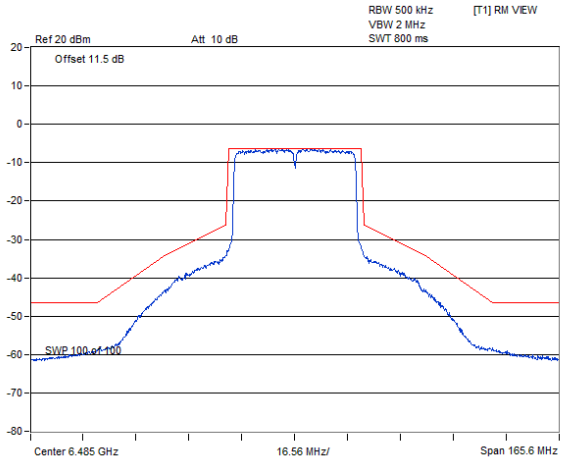
802.11ax (HE40) / Chain 3 : CH 43



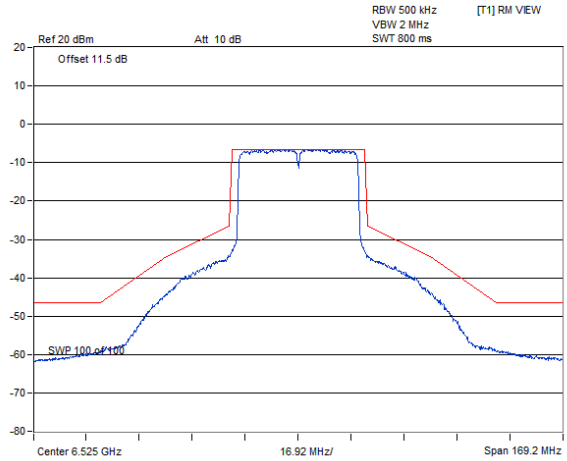
802.11ax (HE40) / Chain 3 : CH 91



802.11ax (HE40) / Chain 3 : CH 99

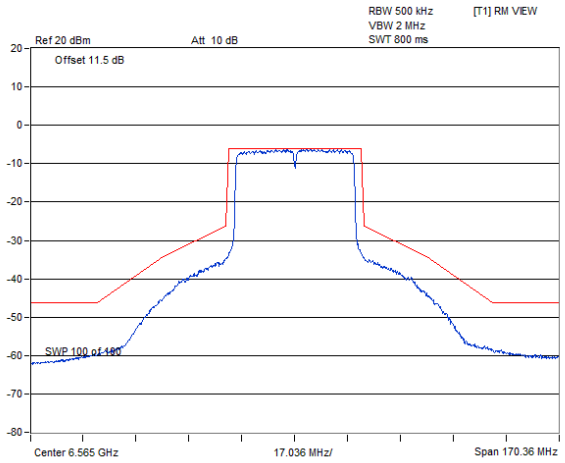


802.11ax (HE40) / Chain 3 : CH 107

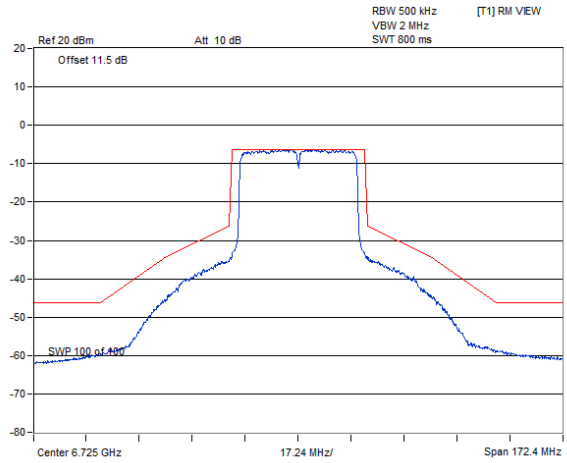


802.11ax (HE40) / Chain 3 : CH 115

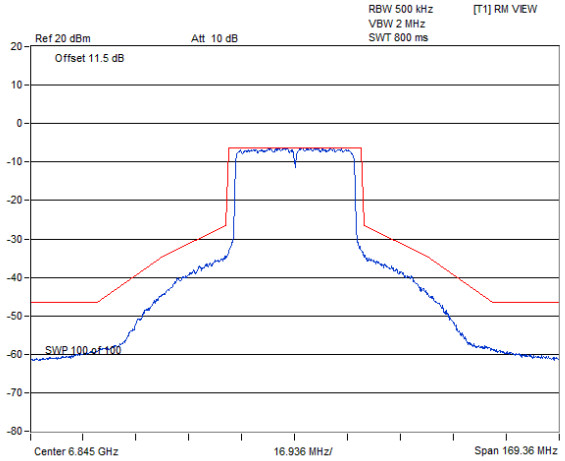
Spectrum Plot



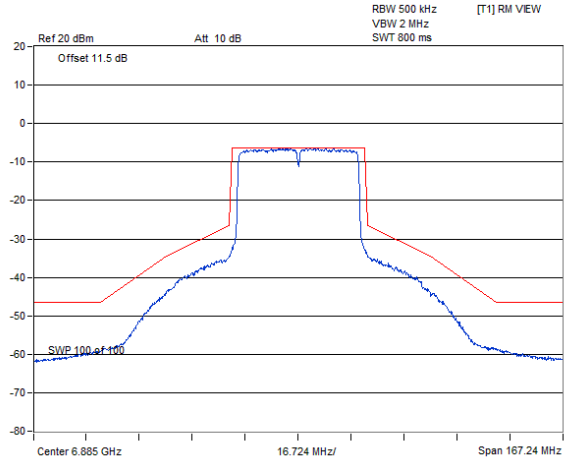
802.11ax (HE40) / Chain 3 : CH 123



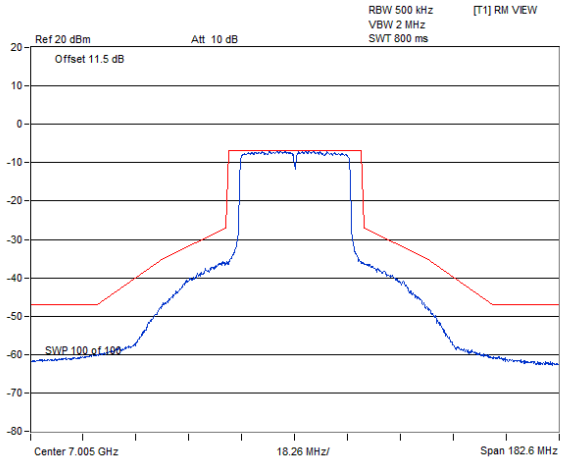
802.11ax (HE40) / Chain 3 : CH 155



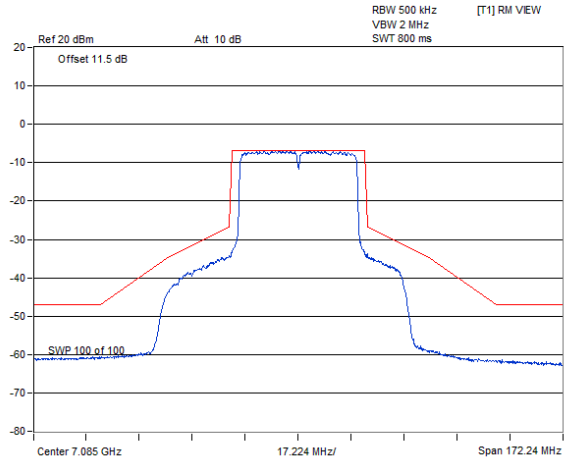
802.11ax (HE40) / Chain 3 : CH 179



802.11ax (HE40) / Chain 3 : CH 187

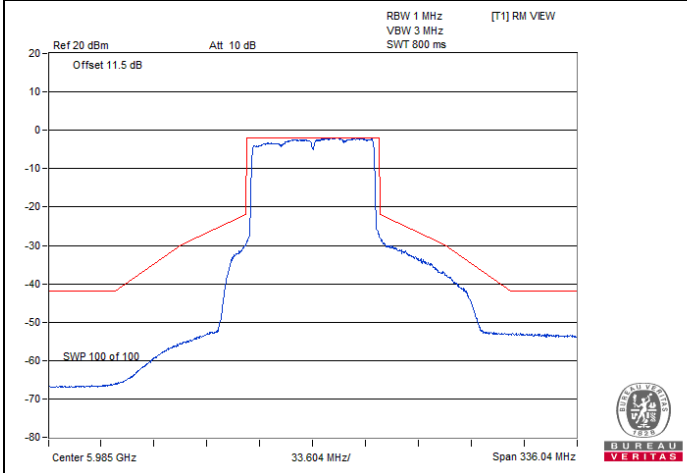
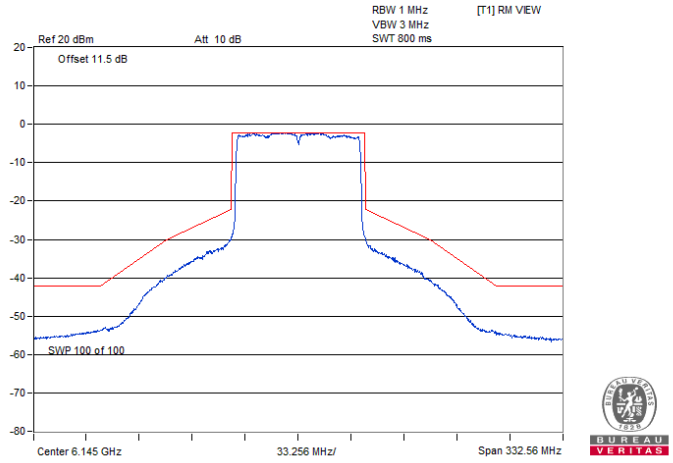
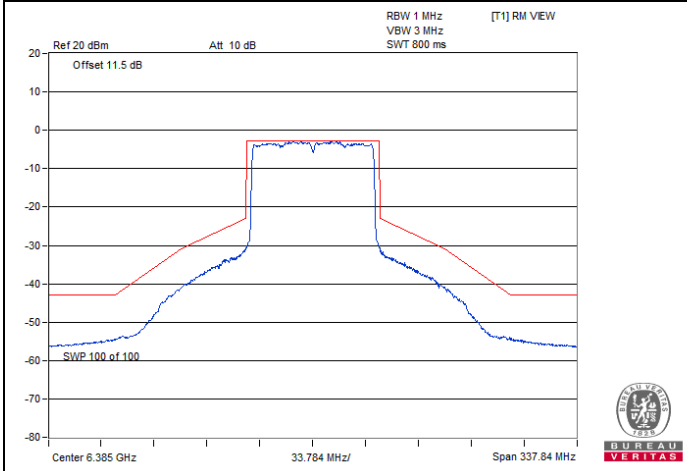
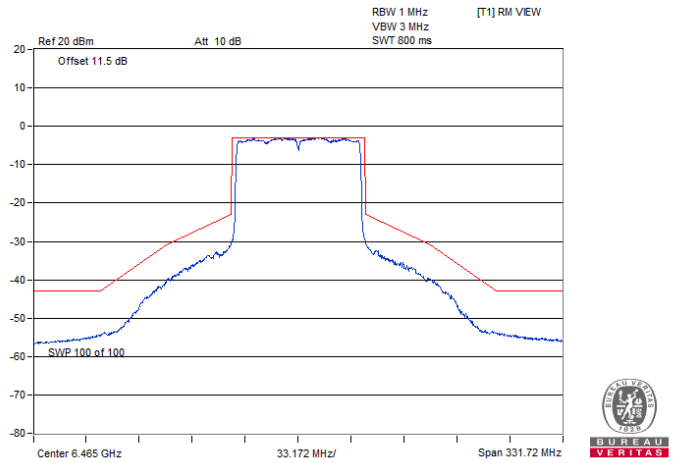
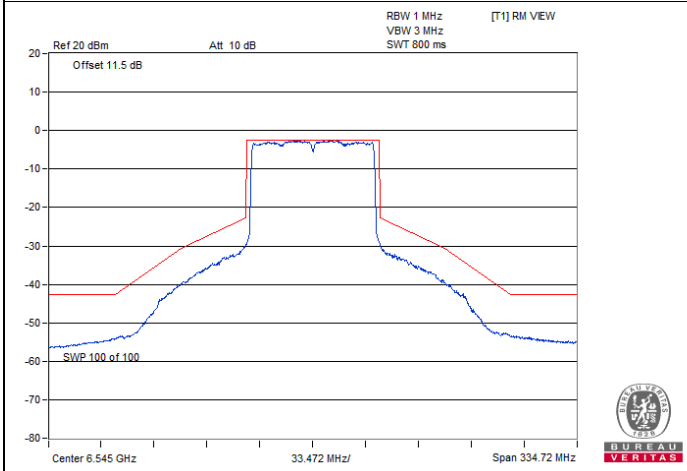
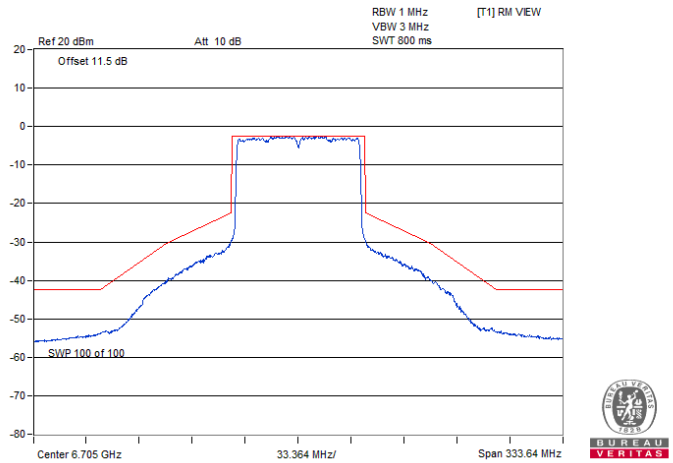


802.11ax (HE40) / Chain 3 : CH 211

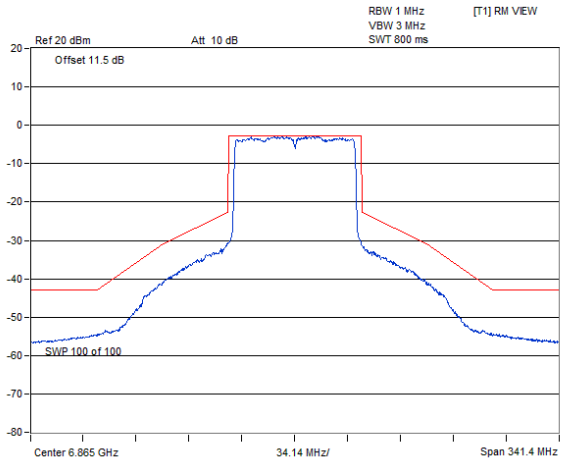


802.11ax (HE40) / Chain 3 : CH 227

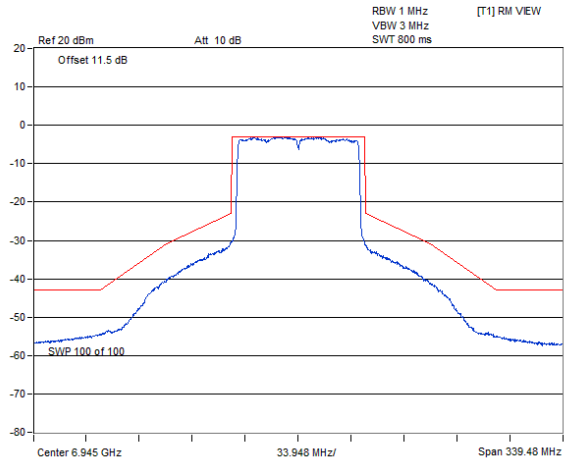
802.11ax (HE80)

Spectrum Plot	
	
802.11ax (HE80) / Chain 0 : CH 7	802.11ax (HE80) / Chain 0 : CH 39
	
802.11ax (HE80) / Chain 0 : CH 87	802.11ax (HE80) / Chain 0 : CH 103
	
802.11ax (HE80) / Chain 0 : CH 119	802.11ax (HE80) / Chain 0 : CH 151

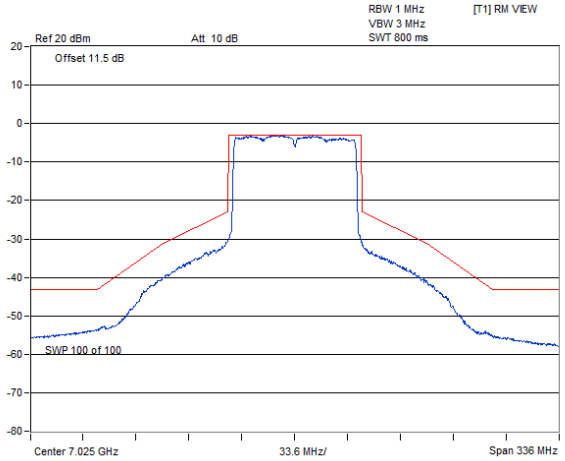
Spectrum Plot



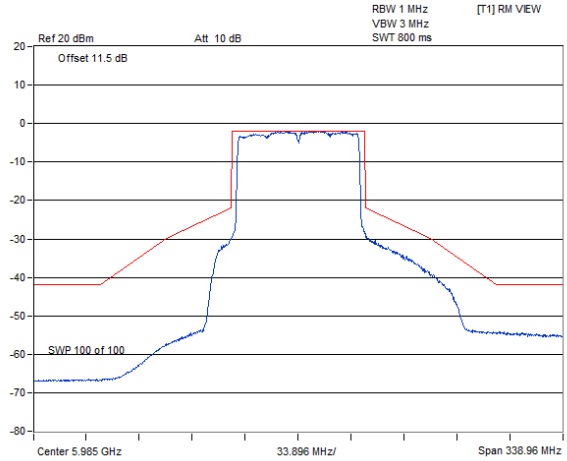
802.11ax (HE80) / Chain 0 : CH 183



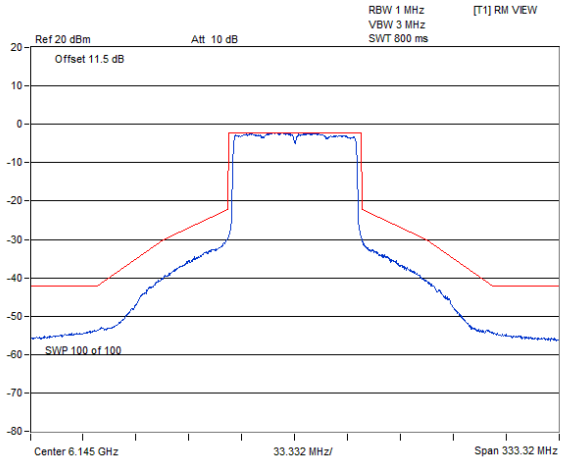
802.11ax (HE80) / Chain 0 : CH 199



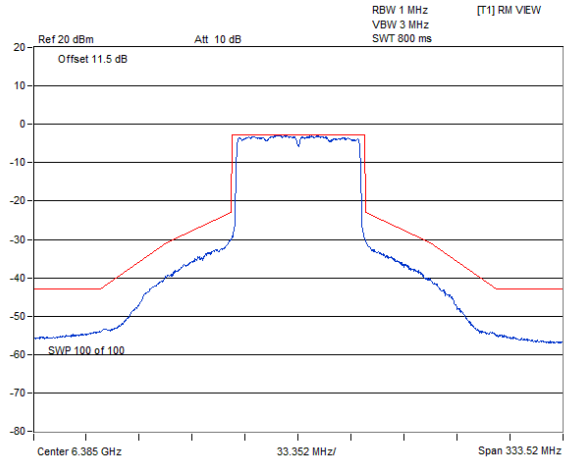
802.11ax (HE80) / Chain 0 : CH 215



802.11ax (HE80) / Chain 1 : CH 7

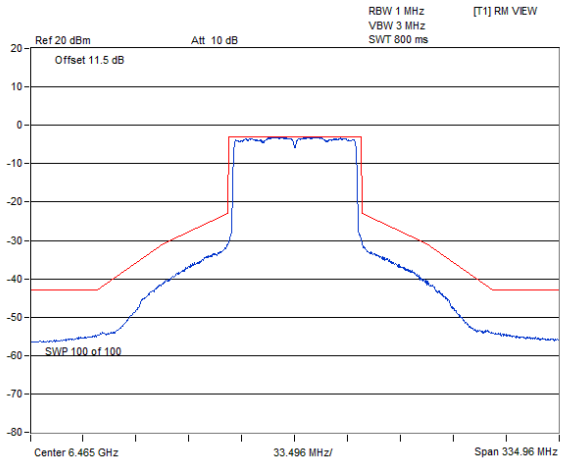


802.11ax (HE80) / Chain 1 : CH 39

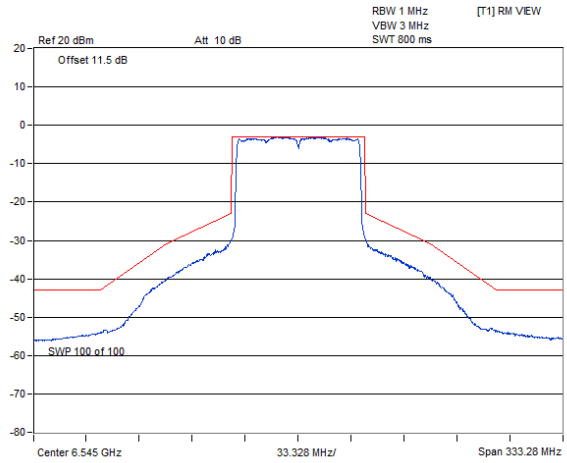


802.11ax (HE80) / Chain 1 : CH 87

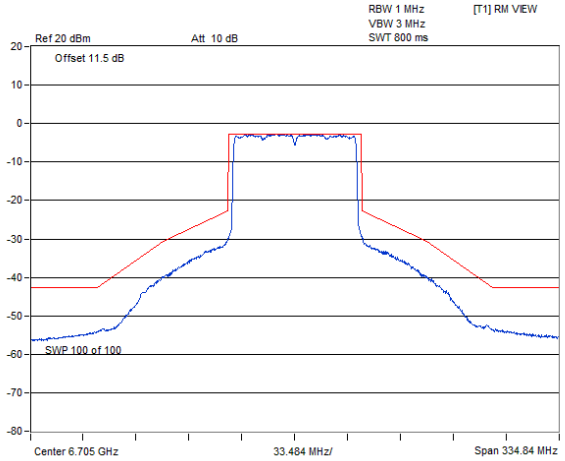
Spectrum Plot



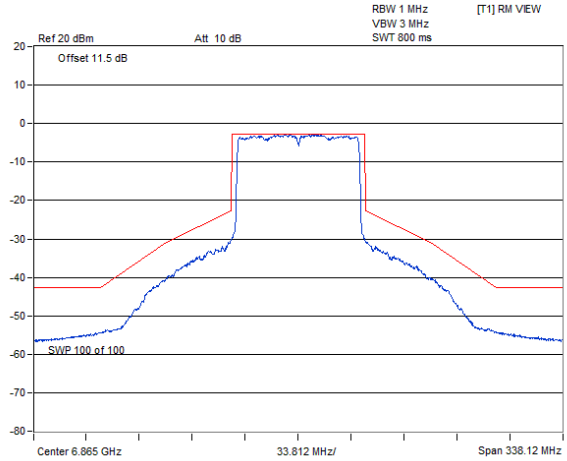
802.11ax (HE80) / Chain 1 : CH 103



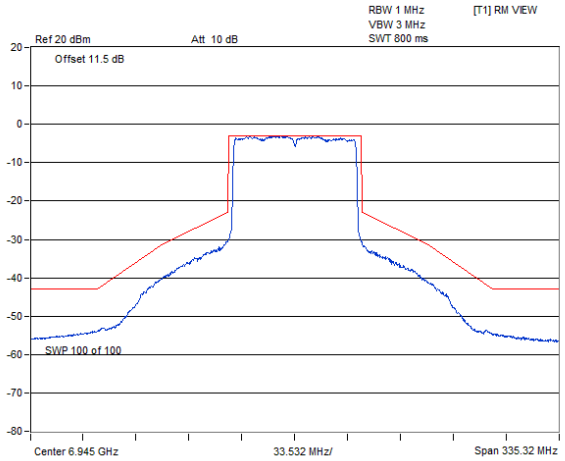
802.11ax (HE80) / Chain 1 : CH 119



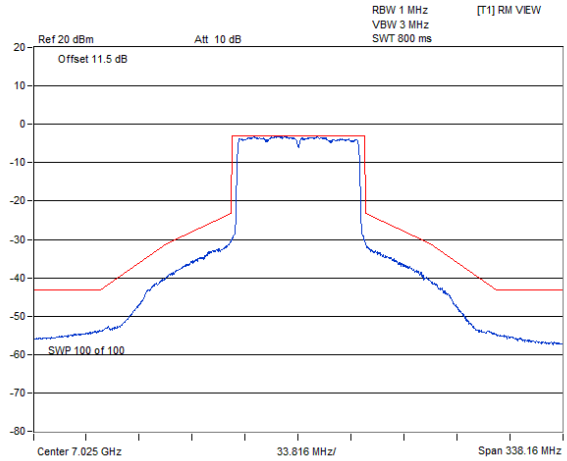
802.11ax (HE80) / Chain 1 : CH 151



802.11ax (HE80) / Chain 1 : CH 183

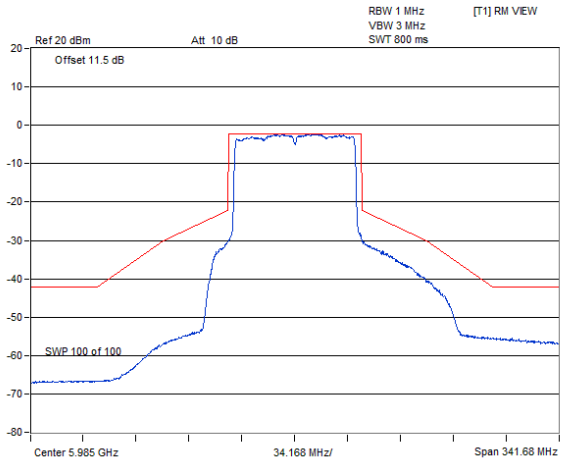


802.11ax (HE80) / Chain 1 : CH 199

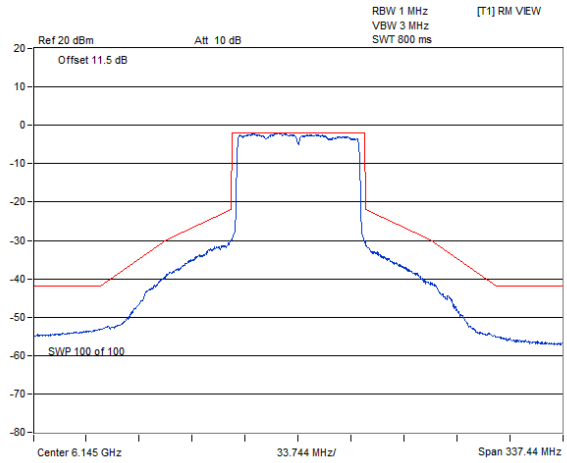


802.11ax (HE80) / Chain 1 : CH 215

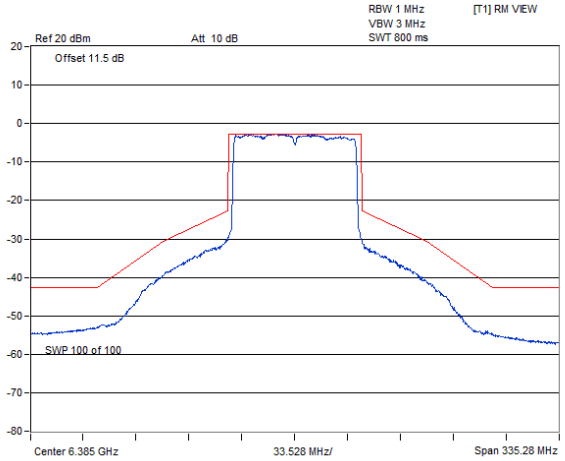
Spectrum Plot



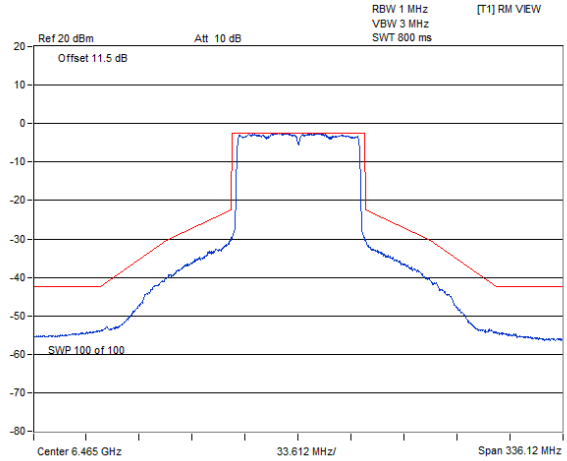
802.11ax (HE80) / Chain 2 : CH 7



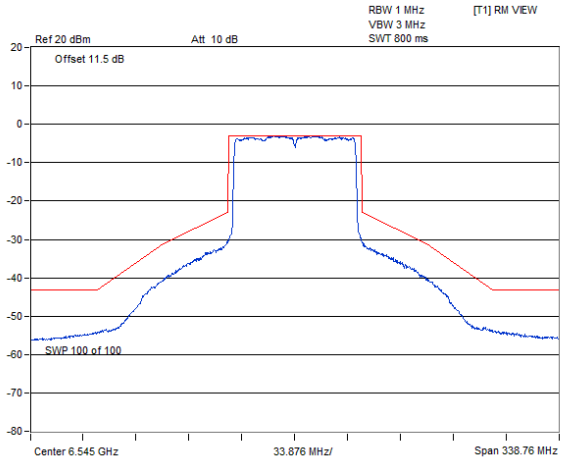
802.11ax (HE80) / Chain 2 : CH 39



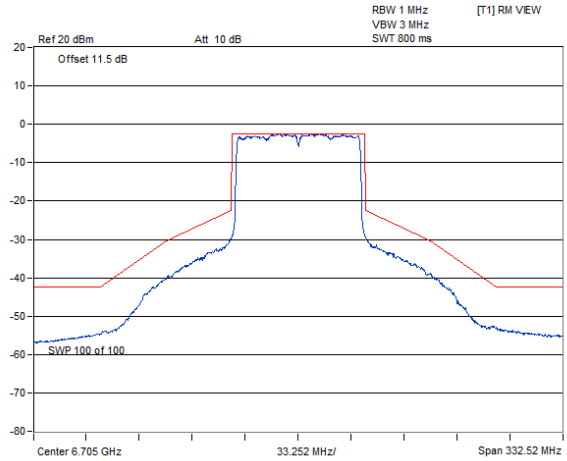
802.11ax (HE80) / Chain 2 : CH 87



802.11ax (HE80) / Chain 2 : CH 103

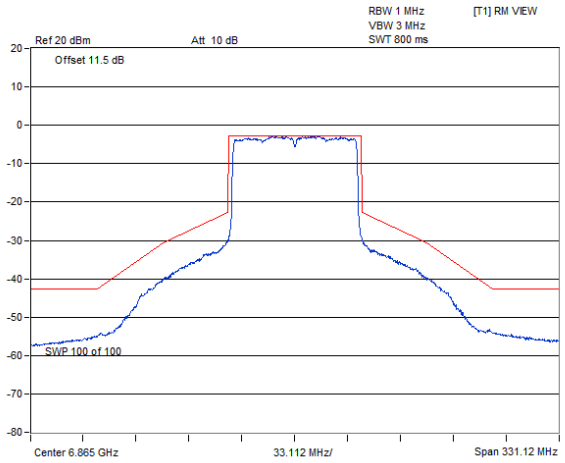


802.11ax (HE80) / Chain 2 : CH 119

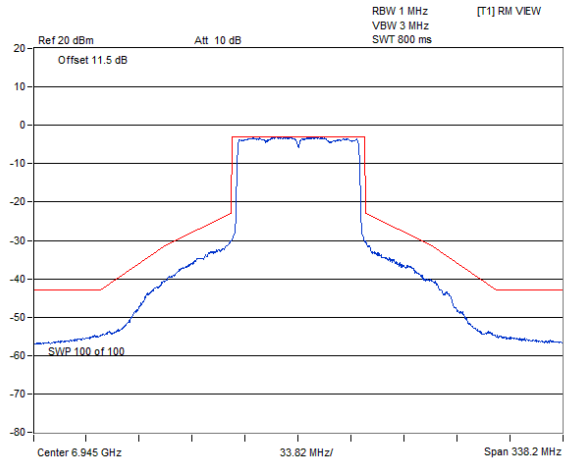


802.11ax (HE80) / Chain 2 : CH 151

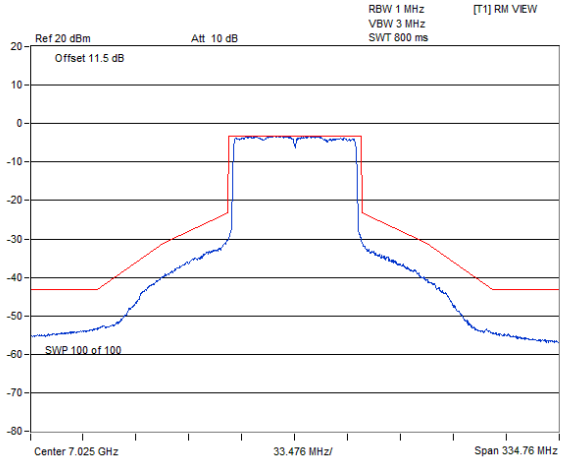
Spectrum Plot



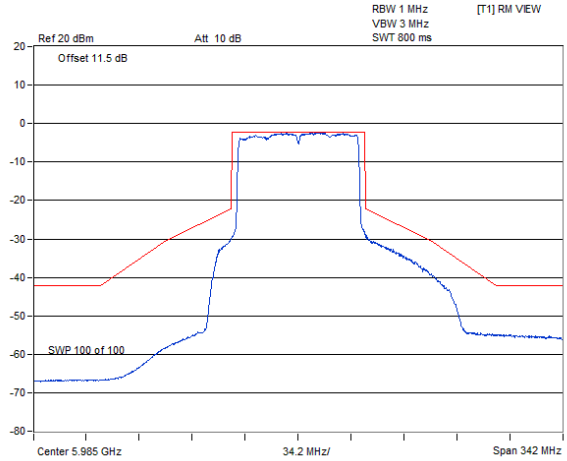
802.11ax (HE80) / Chain 2 : CH 183



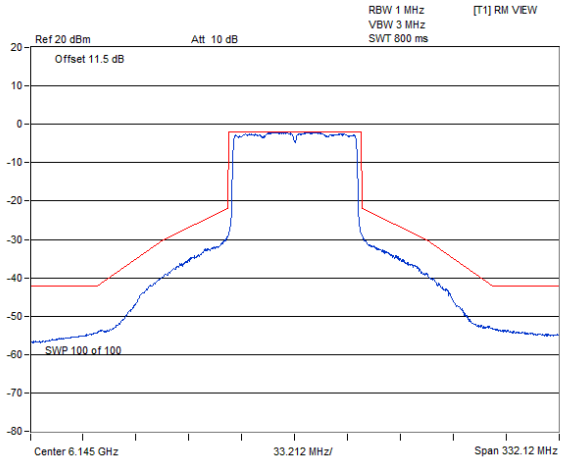
802.11ax (HE80) / Chain 2 : CH 199



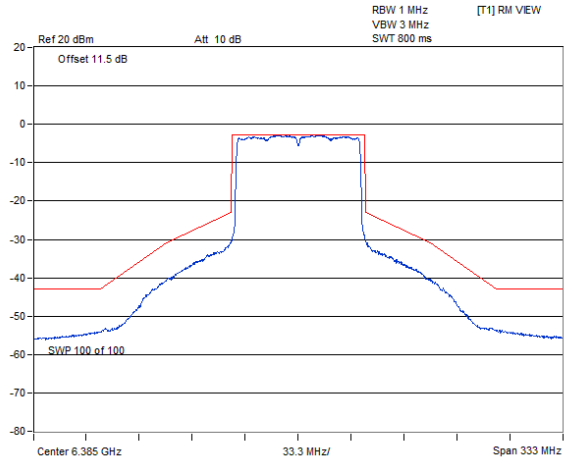
802.11ax (HE80) / Chain 2 : CH 215



802.11ax (HE80) / Chain 3 : CH 7

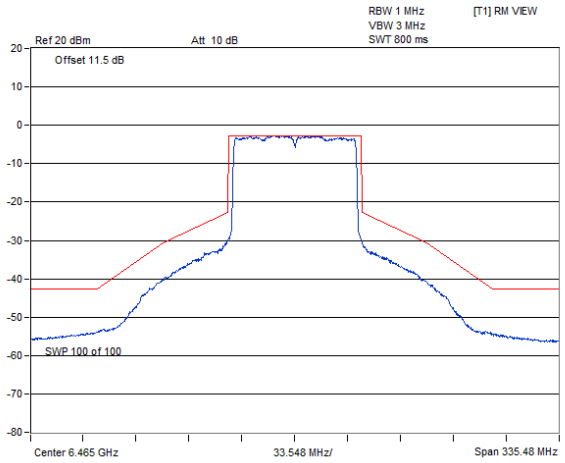


802.11ax (HE80) / Chain 3 : CH 39

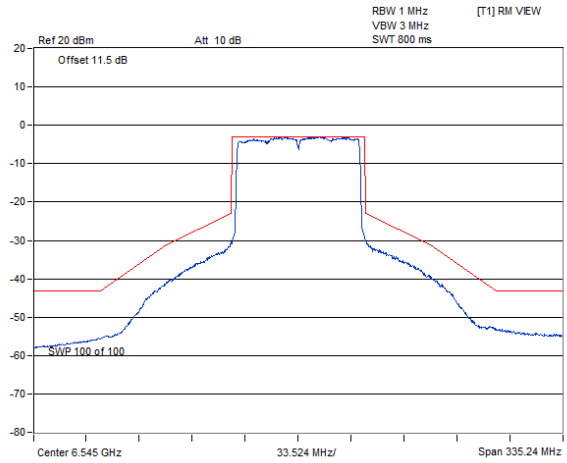


802.11ax (HE80) / Chain 3 : CH 87

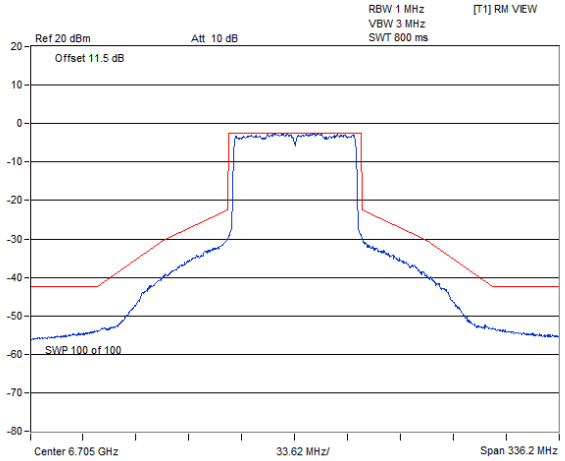
Spectrum Plot



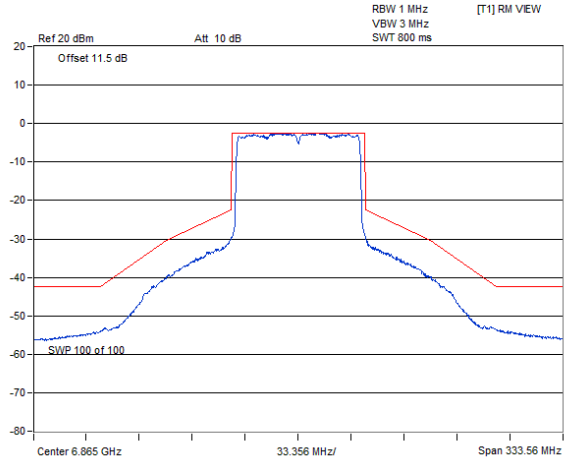
802.11ax (HE80) / Chain 3 : CH 103



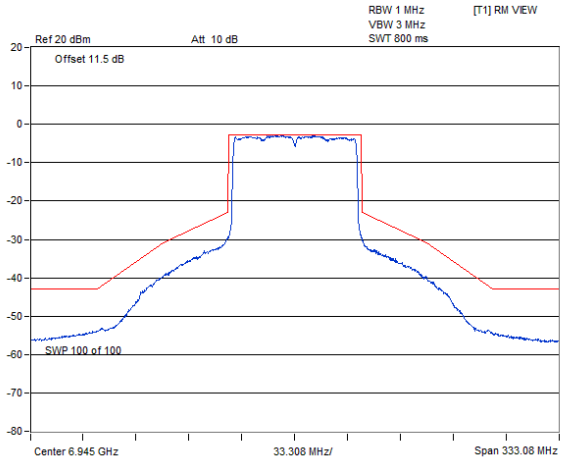
802.11ax (HE80) / Chain 3 : CH 119



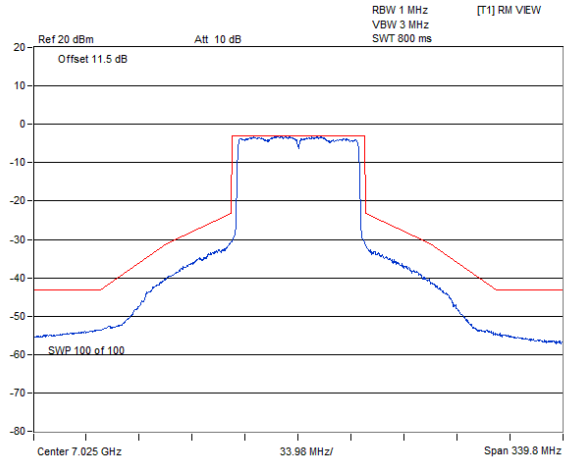
802.11ax (HE80) / Chain 3 : CH 151



802.11ax (HE80) / Chain 3 : CH 183

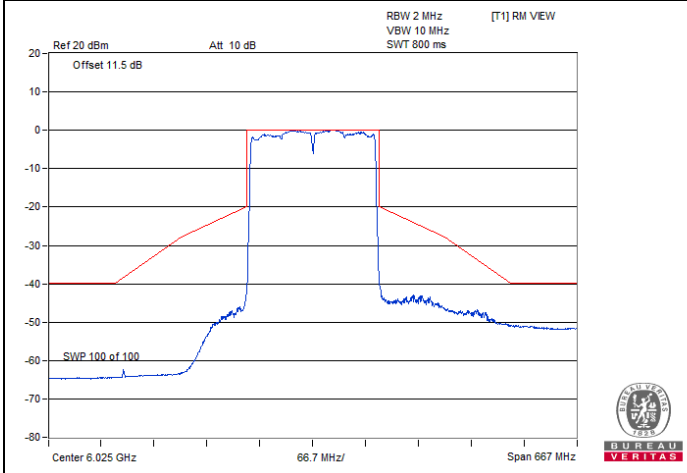
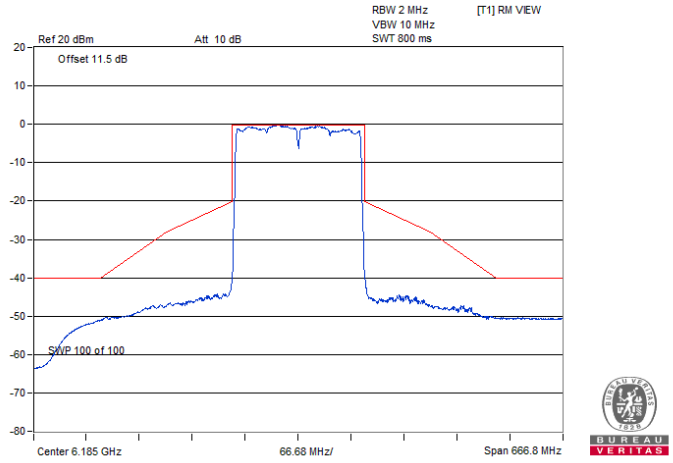
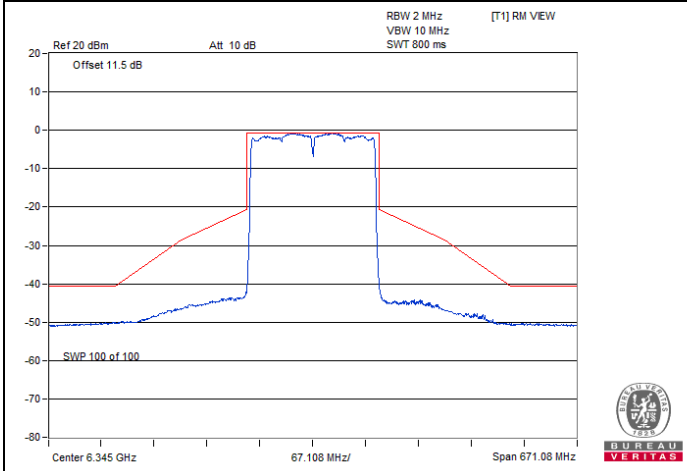
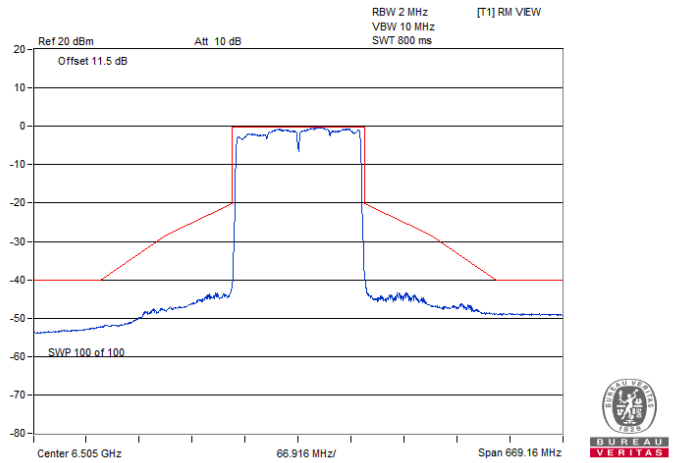
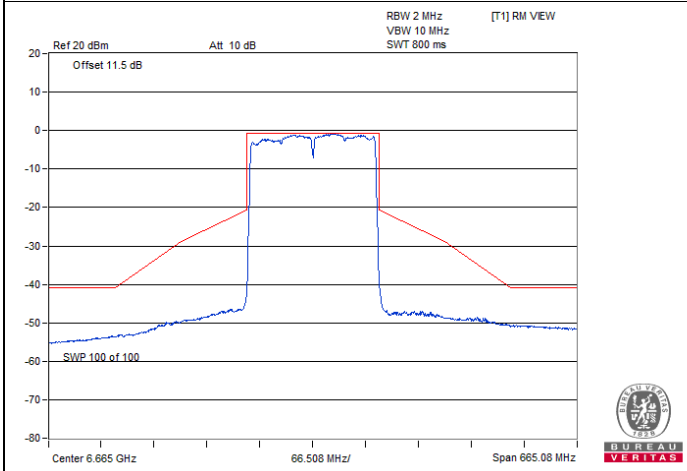
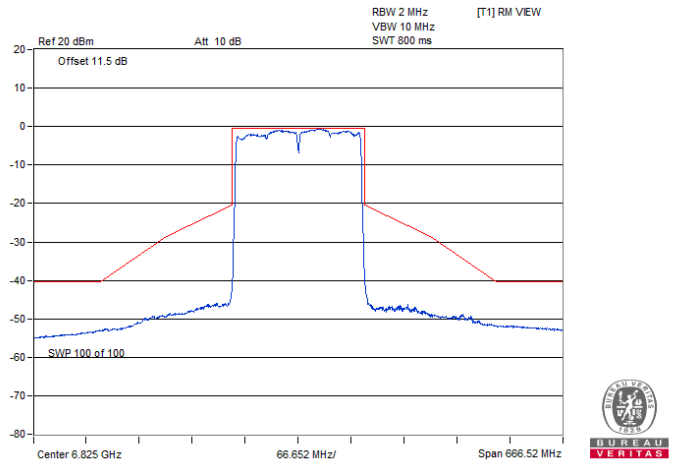


802.11ax (HE80) / Chain 3 : CH 199

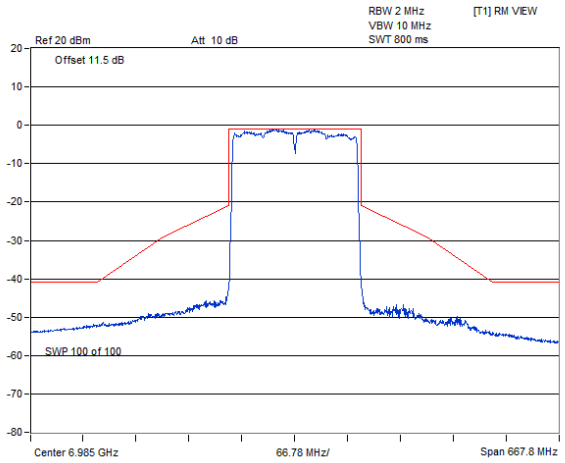


802.11ax (HE80) / Chain 3 : CH 215

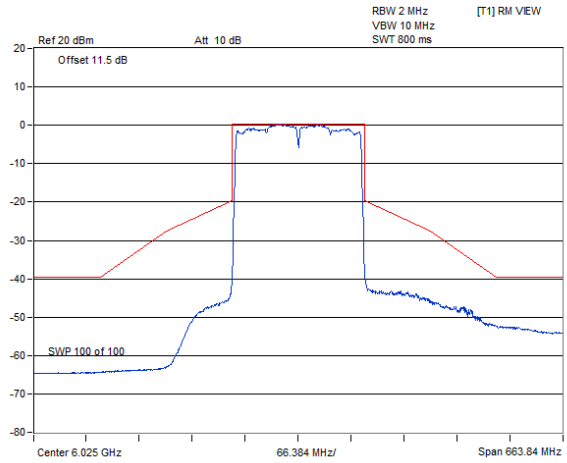
802.11ax (HE160)

Spectrum Plot	
	
802.11ax (HE160) / Chain 0 : CH 15	802.11ax (HE160) / Chain 0 : CH 47
	
802.11ax (HE160) / Chain 0 : CH 79	802.11ax (HE160) / Chain 0 : CH 111
	
802.11ax (HE160) / Chain 0 : CH 143	802.11ax (HE160) / Chain 0 : CH 175

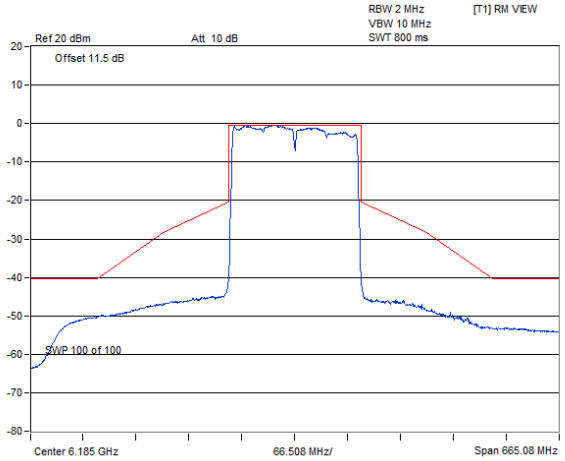
Spectrum Plot



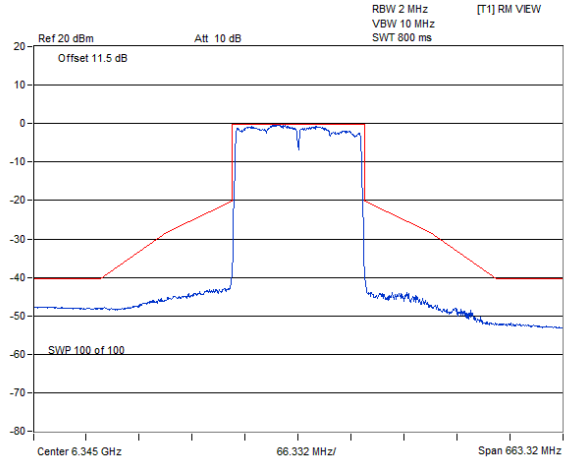
802.11ax (HE160) / Chain 0 : CH 207



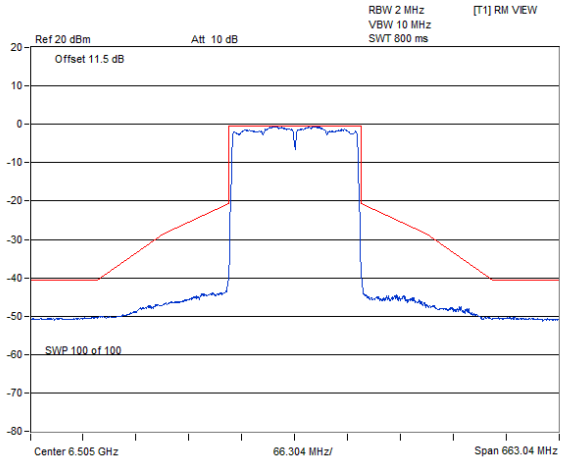
802.11ax (HE160) / Chain 1 : CH 15



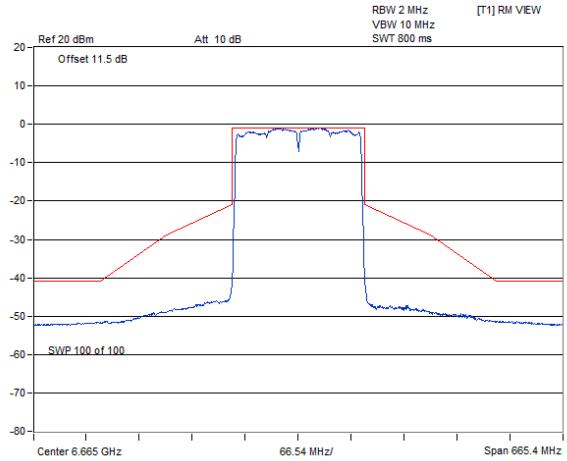
802.11ax (HE160) / Chain 1 : CH 47



802.11ax (HE160) / Chain 1 : CH 79

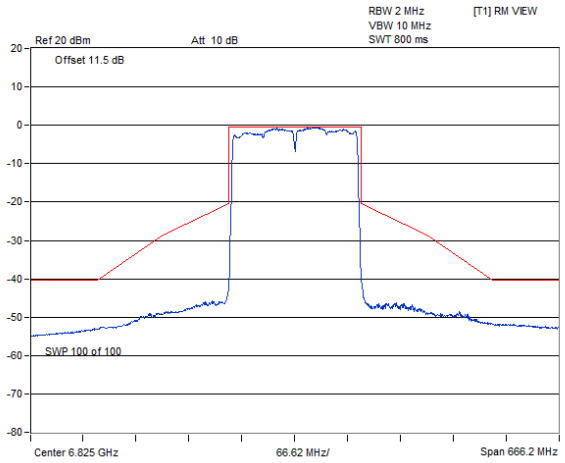


802.11ax (HE160) / Chain 1 : CH 111

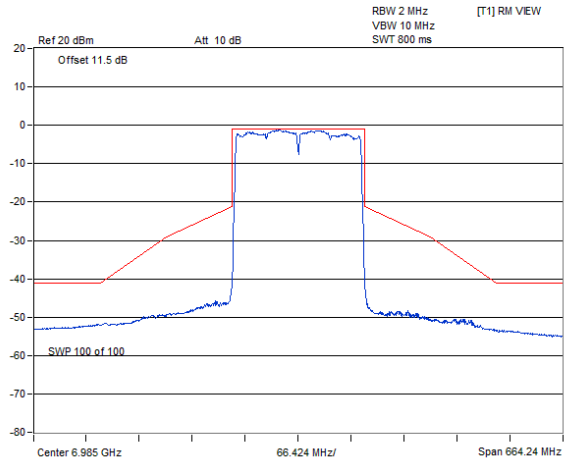


802.11ax (HE160) / Chain 1 : CH 143

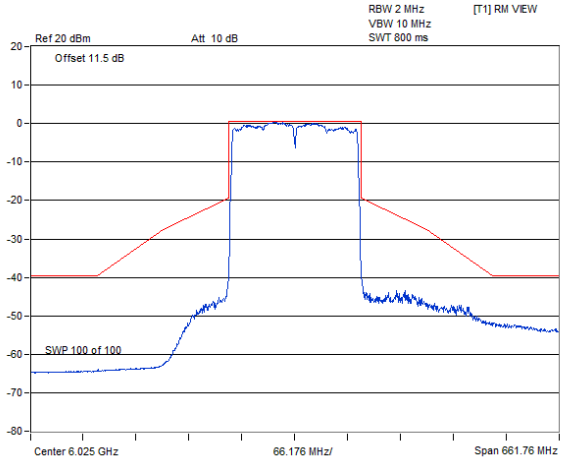
Spectrum Plot



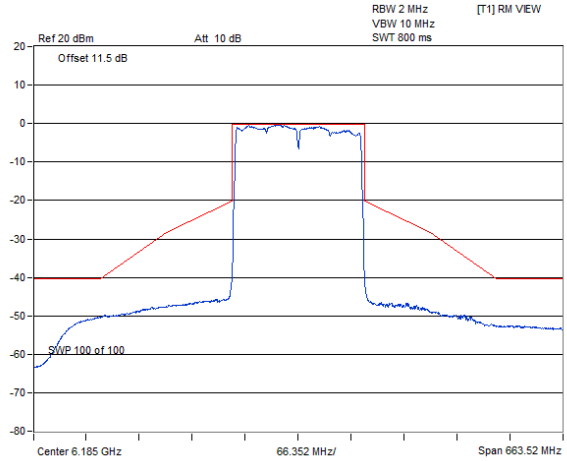
802.11ax (HE160) / Chain 1 : CH 175



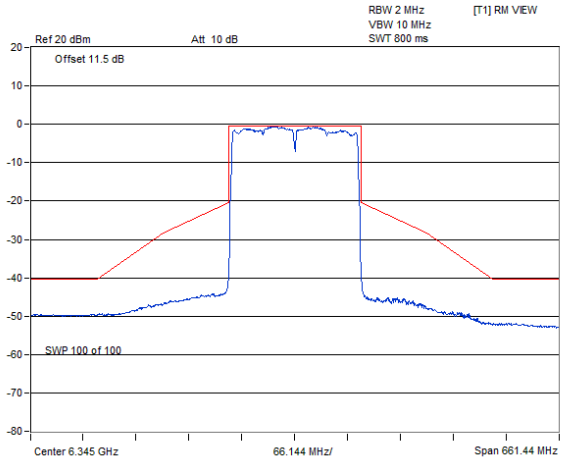
802.11ax (HE160) / Chain 1 : CH 207



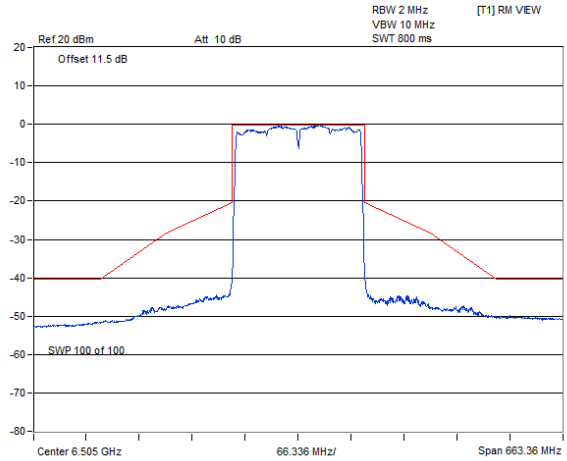
802.11ax (HE160) / Chain 2 : CH 15



802.11ax (HE160) / Chain 2 : CH 47

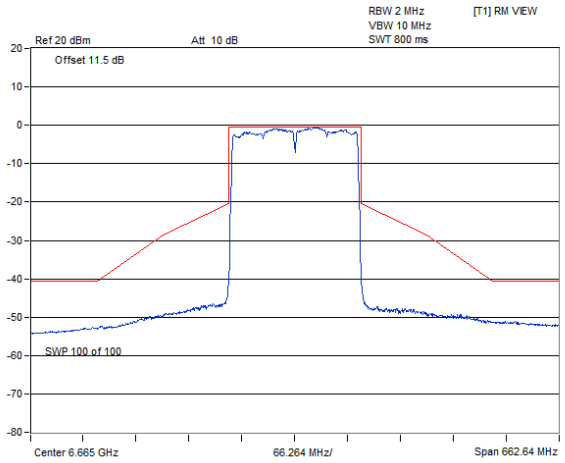


802.11ax (HE160) / Chain 2 : CH 79

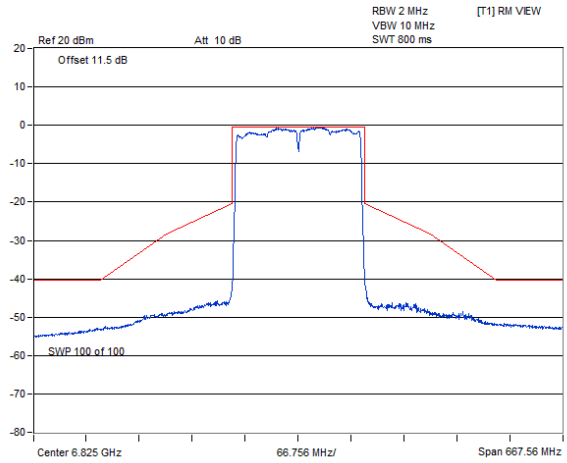


802.11ax (HE160) / Chain 2 : CH 111

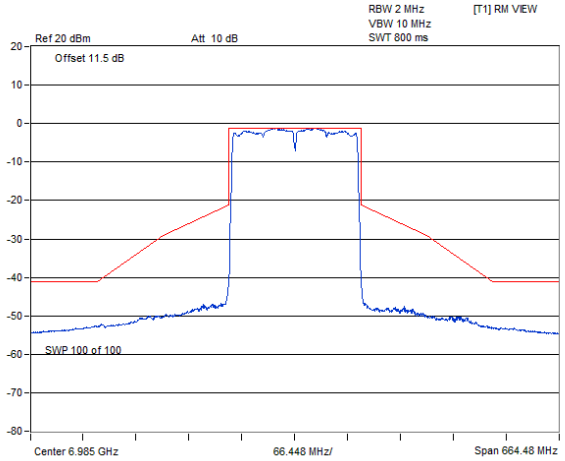
Spectrum Plot



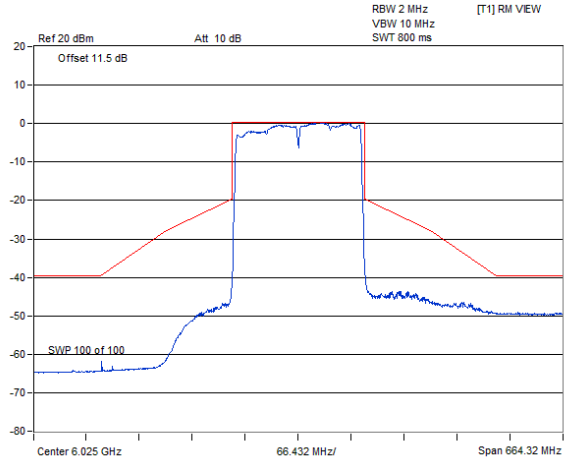
802.11ax (HE160) / Chain 2 : CH 143



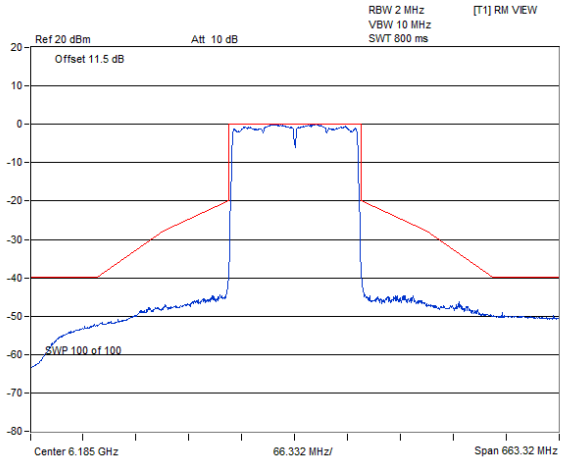
802.11ax (HE160) / Chain 2 : CH 175



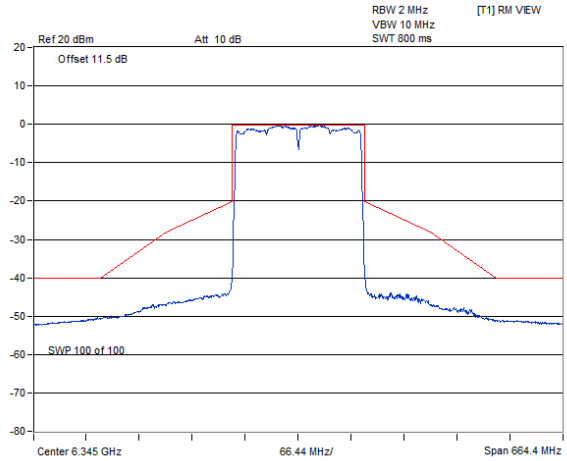
802.11ax (HE160) / Chain 2 : CH 207



802.11ax (HE160) / Chain 3 : CH 15

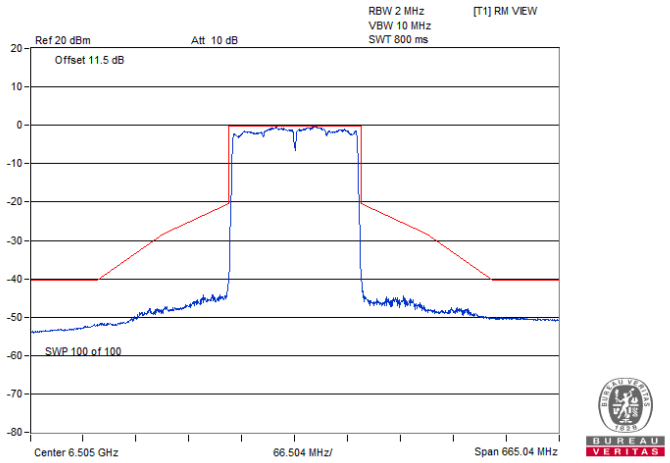


802.11ax (HE160) / Chain 3 : CH 47

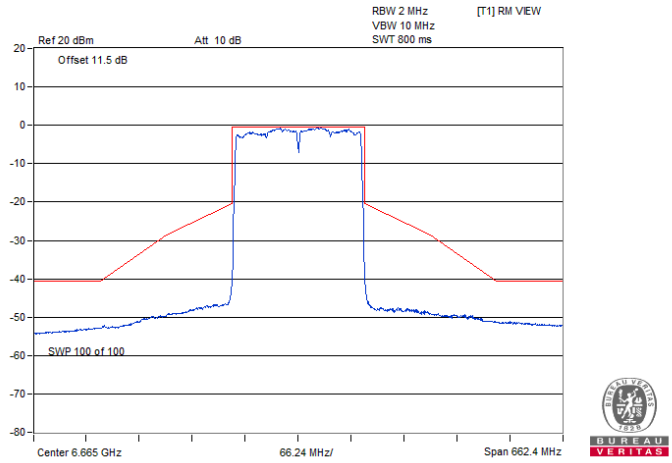


802.11ax (HE160) / Chain 3 : CH 79

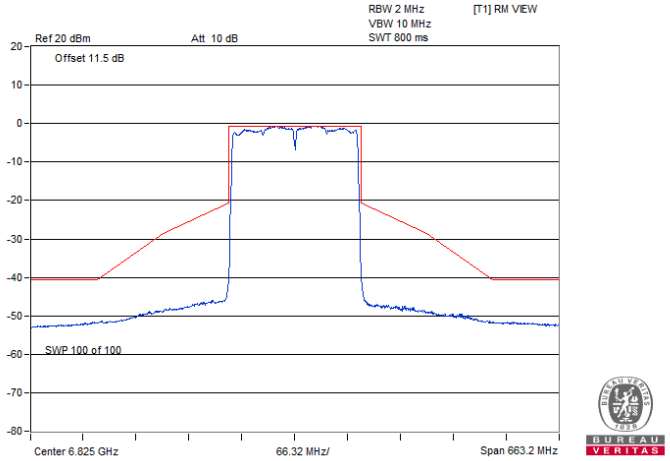
Spectrum Plot



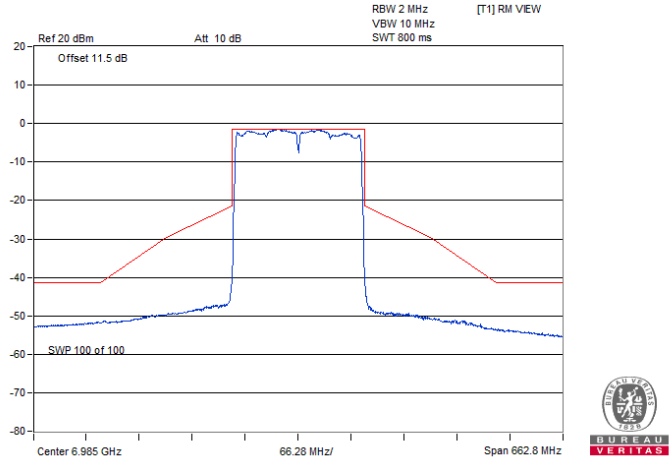
802.11ax (HE160) / Chain 3 : CH 111



802.11ax (HE160) / Chain 3 : CH 143



802.11ax (HE160) / Chain 3 : CH 175



802.11ax (HE160) / Chain 3 : CH 207

7.5 Occupied Bandwidth

Input Power:	120 Vac, 60 Hz	Environmental Conditions:	25°C, 60% RH	Tested By:	Edison Lee

802.11a

Channel	Frequency (MHz)	Occupied Bandwidth (MHz)			
		Chain 0	Chain 1	Chain 2	Chain 3
1	5955	17.22	17.22	17.10	17.16
45	6175	17.10	17.16	17.10	17.10
93	6415	17.16	17.16	17.10	17.04
97	6435	17.22	17.22	17.16	17.10
105	6475	17.10	17.16	17.10	17.04
113	6515	17.16	17.22	17.16	17.04
117	6535	17.16	17.28	17.16	17.04
149	6695	17.28	17.22	17.16	17.10
181	6855	17.22	17.16	17.04	17.16
185	6875	17.22	17.10	17.04	17.10
209	6995	17.22	17.16	17.10	17.22
233	7115	17.28	17.16	17.16	17.22

802.11ax (HE20)

Channel	Frequency (MHz)	Occupied Bandwidth (MHz)			
		Chain 0	Chain 1	Chain 2	Chain 3
1	5955	19.20	19.14	19.14	19.20
45	6175	19.20	19.08	19.14	19.20
93	6415	19.20	19.08	19.14	19.20
97	6435	19.14	19.20	19.20	19.14
105	6475	19.14	19.20	19.14	19.20
113	6515	19.20	19.14	19.20	19.14
117	6535	19.14	19.20	19.14	19.14
149	6695	19.20	19.08	19.20	19.20
181	6855	19.20	19.32	19.20	19.26
185	6875	19.14	19.20	19.20	19.20
209	6995	19.14	19.26	19.20	19.14
233	7115	19.20	19.20	19.20	19.20

802.11ax (HE40)

Channel	Frequency (MHz)	Occupied Bandwidth (MHz)			
		Chain 0	Chain 1	Chain 2	Chain 3
3	5965	38.04	37.92	37.92	37.92
43	6165	38.04	38.04	38.16	38.04
91	6405	38.04	38.04	38.16	38.04
99	6445	37.92	38.04	37.92	37.92
107	6485	38.04	38.04	38.04	38.16
115	6525	38.04	37.92	37.92	38.16
123	6565	37.92	38.04	38.04	38.16
155	6725	38.04	38.04	38.16	38.04
179	6845	38.04	38.04	38.04	37.92
187	6885	38.04	38.16	38.16	37.92
211	7005	38.04	38.04	38.04	38.04
227	7085	38.04	38.16	38.28	38.04

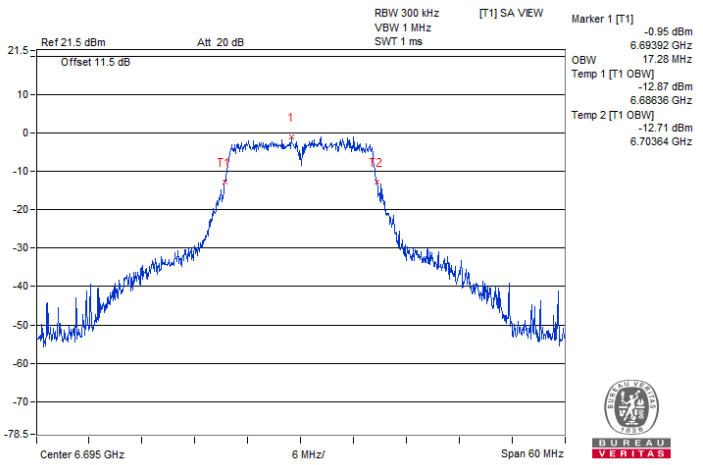
802.11ax (HE80)

Channel	Frequency (MHz)	Occupied Bandwidth (MHz)			
		Chain 0	Chain 1	Chain 2	Chain 3
7	5985	77.28	77.04	77.28	77.28
39	6145	77.28	77.52	77.28	77.28
87	6385	77.52	77.52	77.28	77.28
103	6465	77.28	77.28	77.52	77.28
119	6545	77.28	77.28	77.52	77.28
151	6705	77.28	77.52	77.28	77.28
183	6865	77.52	77.28	77.52	77.28
199	6945	77.28	77.28	77.28	77.28
215	7025	77.28	77.52	77.52	77.28

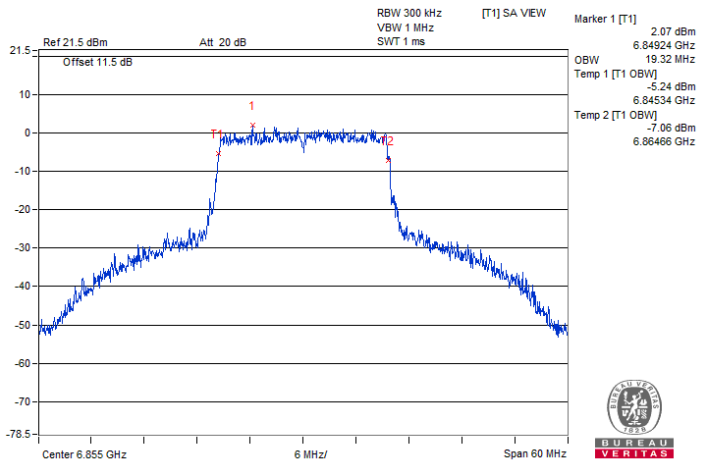
802.11ax (HE160)

Channel	Frequency (MHz)	Occupied Bandwidth (MHz)			
		Chain 0	Chain 1	Chain 2	Chain 3
15	6025	156.48	156.96	156.48	156.48
47	6185	156.96	157.44	156.96	156.96
79	6345	156.96	156.48	156.96	156.48
111	6505	156.00	156.48	156.48	156.48
143	6665	156.00	156.48	156.48	156.48
175	6825	156.96	157.44	156.96	156.48
207	6985	156.00	156.96	156.96	156.48

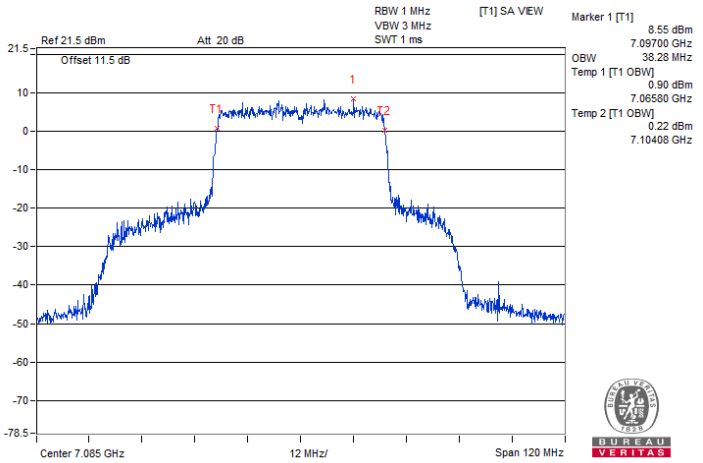
Spectrum Plot of Maximum Value



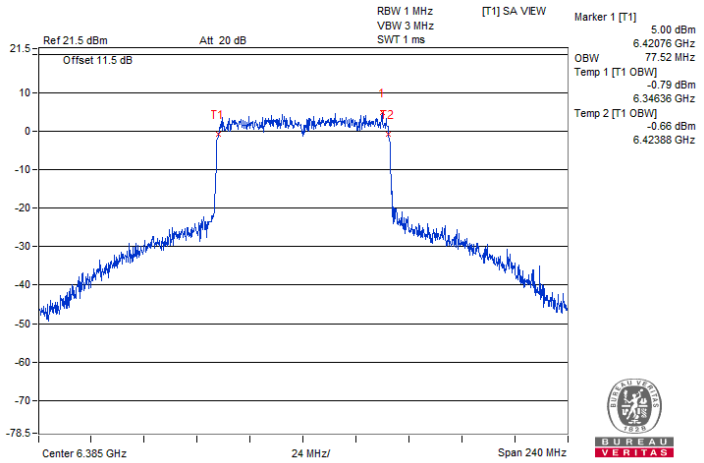
802.11a / Chain 0 : CH 149



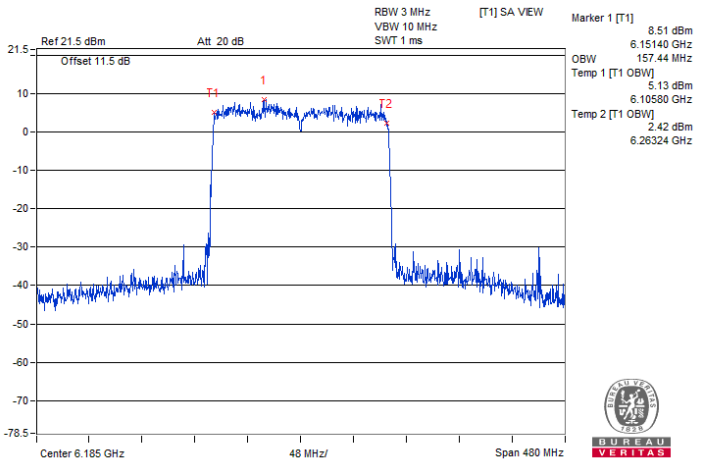
802.11ax (HE20) / Chain 1 : CH 181



802.11ax (HE40) / Chain 2 : CH 227



802.11ax (HE80) / Chain 0 : CH 87



802.11ax (HE160) / Chain 1 : CH 47

7.6 Frequency Stability

Input Power:	120 Vac, 60 Hz	Environmental Conditions:	25°C, 60% RH	Tested By:	Edison Lee

802.11a

Frequency Stability Versus Temperature									
Operating Frequency: 5955 MHz									
Temp. (℃)	Power Supply (Vac)	0 Minute		2 Minutes		5 Minutes		10 Minutes	
		Measured Frequency (MHz)	Test Result	Measured Frequency (MHz)	Test Result	Measured Frequency (MHz)	Test Result	Measured Frequency (MHz)	Test Result
40	120	5955.0311	Pass	5955.0298	Pass	5955.0262	Pass	5955.031	Pass
30	120	5955.0154	Pass	5955.0107	Pass	5955.0147	Pass	5955.0146	Pass
20	120	5955.0046	Pass	5955.0077	Pass	5955.0043	Pass	5955.0058	Pass
10	120	5955.0176	Pass	5955.0196	Pass	5955.018	Pass	5955.0184	Pass
0	120	5954.9774	Pass	5954.9771	Pass	5954.9733	Pass	5954.9754	Pass

Frequency Stability Versus Voltage									
Operating Frequency: 5955 MHz									
Temp. (℃)	Power Supply (Vac)	0 Minute		2 Minutes		5 Minutes		10 Minutes	
		Measured Frequency (MHz)	Test Result	Measured Frequency (MHz)	Test Result	Measured Frequency (MHz)	Test Result	Measured Frequency (MHz)	Test Result
20	138	5955.0058	Pass	5955.0024	Pass	5955.0052	Pass	5955.0059	Pass
	120	5955.0046	Pass	5955.0077	Pass	5955.0043	Pass	5955.0058	Pass
	102	5955.0096	Pass	5955.01	Pass	5955.0117	Pass	5955.0141	Pass

7.7 Contention-based Protocol

Input Power:	120 Vac, 60 Hz	Environmental Conditions:	25°C, 60% RH	Tested By:	Tobey Chen

Model No.	Software/Firmware Version
UBN2309	17.10.188.6401

Companion Device Information			
Product	**Brand**	**Model No.**	**Software/Firmware Version**
Wifi 6E TRI-Band Gaming Router	ASUS	GT-AXE11000	3.0.0.4.386_43986

For U-NII-5

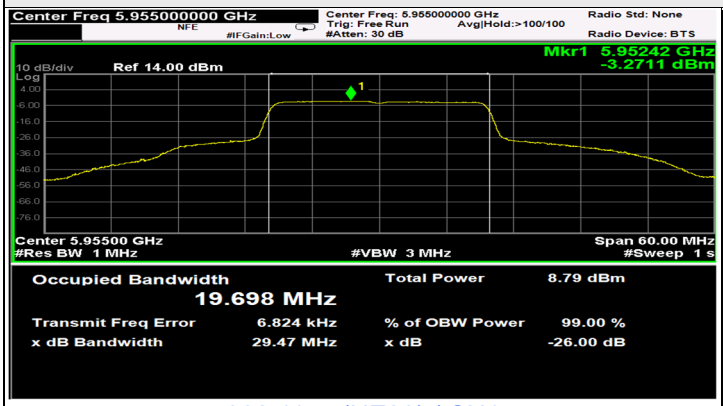
Contention Based Protocol Measurement										
Operation Mode	Channel Bandwidth (MHz)	Channel Number	Channel Freq. (MHz)	Injected Signal (AWGN)		Antenna Gain (dBi)	Path Loss (dB) (Note 3)	Adjusted Power (dBm)	Detection Limit	EUT TX Status
				Freq. (MHz)	Power (dBm)					
802.11ax	20	1	5955	5955	-63.25	3.34	0	-66.59	-62	OFF
					-63.75	3.34	0	-67.09	-62	Minimal
					-78.66	3.34	0	-82	-62	ON
	160	15	6025	5950	-61.27	3.34	0	-64.61	-62	OFF
					-61.77	3.34	0	-65.11	-62	Minimal
					-78.66	3.34	0	-82	-62	ON
				6025	-62.37	3.34	0	-65.71	-62	OFF
					-63.87	3.34	0	-67.21	-62	Minimal
					-78.66	3.34	0	-82	-62	ON
				6100	-62.65	3.34	0	-65.99	-62	OFF
					-63.15	3.34	0	-66.49	-62	Minimal
					-78.66	3.34	0	-82	-62	ON

Notes:

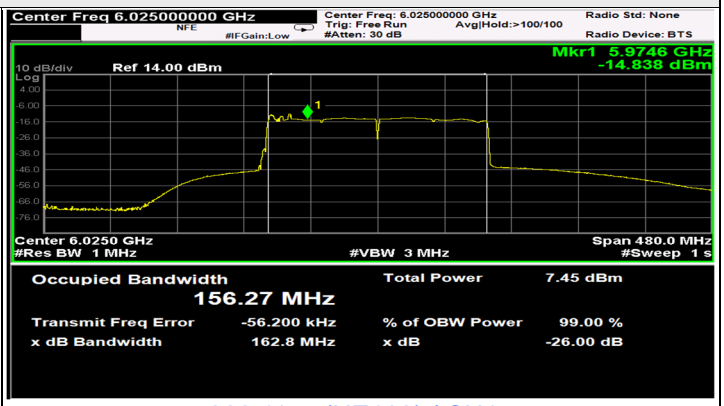
1. After investigation (consider antenna gain and path loss), the one representative port (Chain 3) was measured and presented in the report.
2. Adjusted Power (dBm) = Injected Signal (AWGN) Power (dBm) - Antenna Gain (dBi) + Path Loss (dB)
3. Antenna gain values include all the applicable path losses.

Contention Based Protocol Detection Probability														
Operation Mode	Channel Bandwidth (MHz)	AWGN Signal Freq. (MHz)	#01	#02	#03	#04	#05	#06	#07	#08	#09	#10	Detection Probability	Detection Limit	Test Result
802.11ax	20	5955	v	v	v	v	v	v	v	v	v	v	100%	90%	Pass
	160	5950	v	v	v	v	v	v	v	v	v	v	100%	90%	Pass
		6025	v	v	v	v	v	v	v	v	v	v	100%	90%	Pass
		6100	v	v	v	v	v	v	v	v	v	v	100%	90%	Pass

Plots of EUT Tx waveform

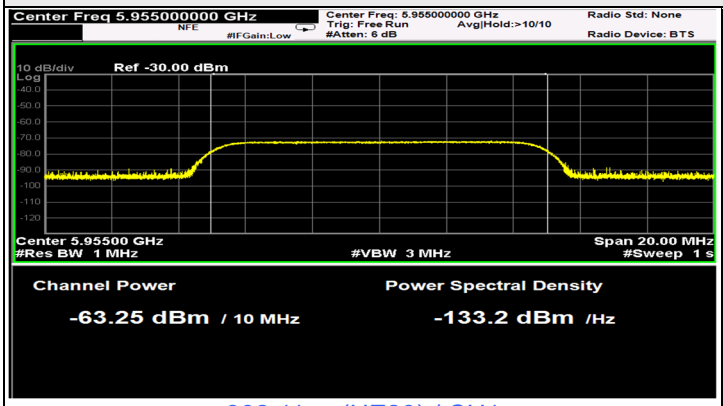


802.11ax (HE20) / CH1

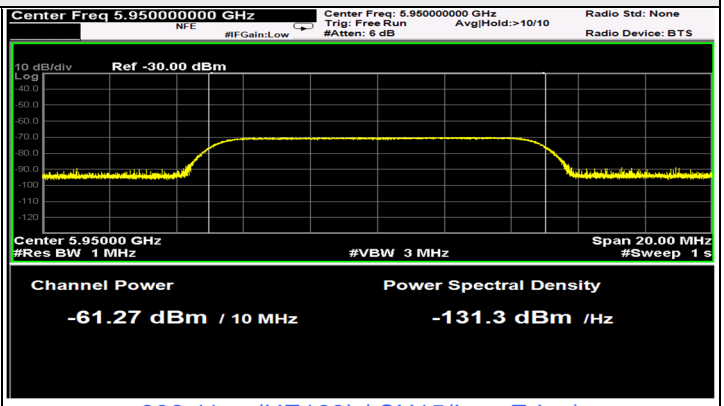


802.11ax (HE160) / CH15

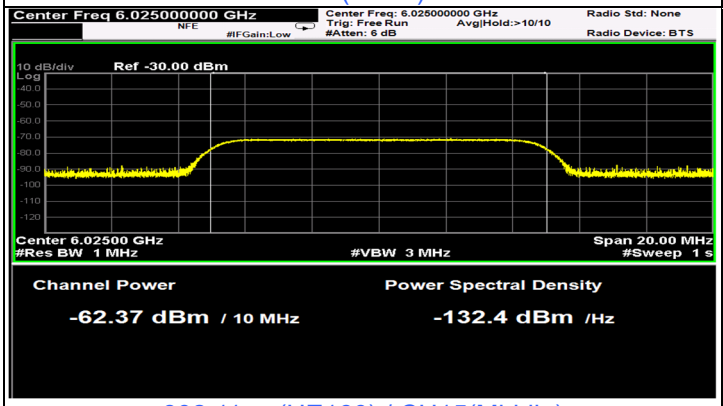
Plots of Injected signal (AWGN) level



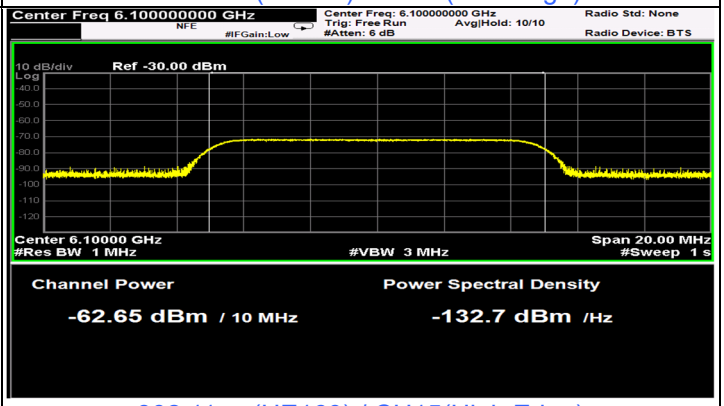
802.11ax (HE20) / CH1



802.11ax (HE160) / CH15(Low Edge)

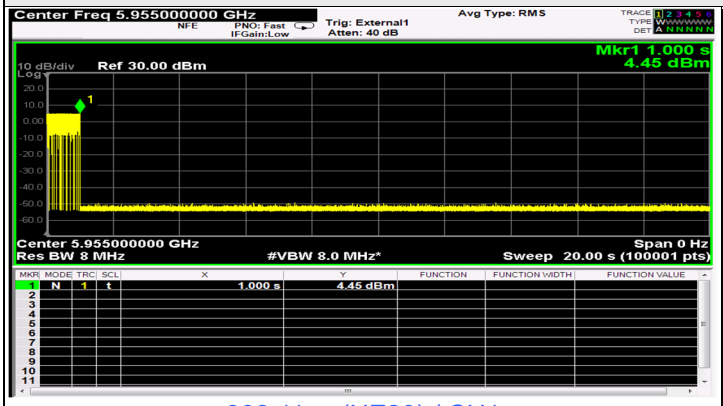


802.11ax (HE160) / CH15(Middle)

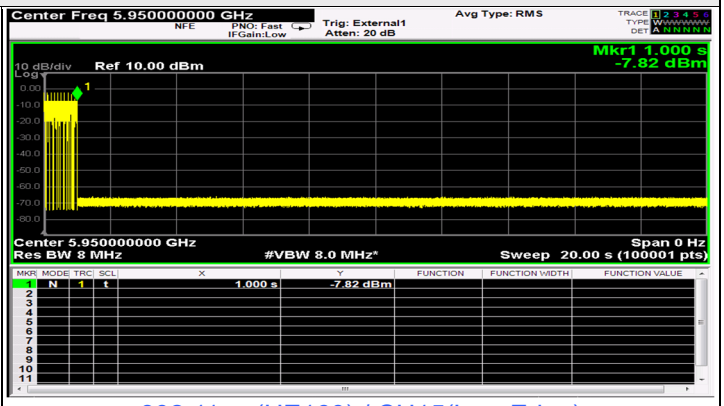


802.11ax (HE160) / CH15(High Edge)

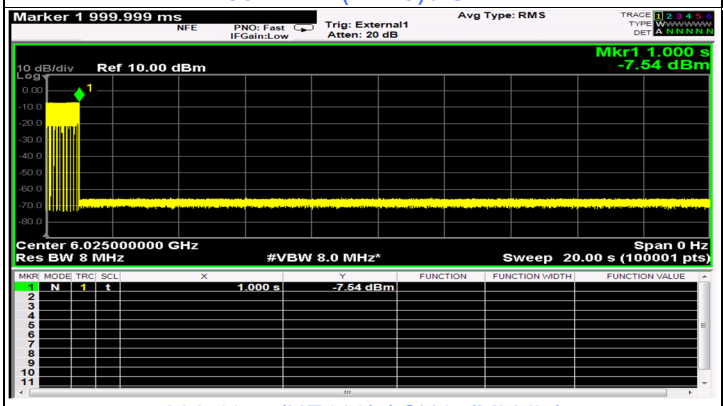
Plots of EUT ceased transmission in the time domain



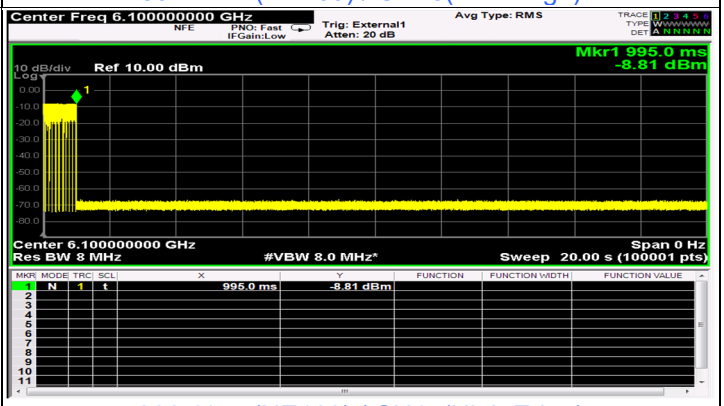
802.11ax (HE20) / CH1



802.11ax (HE160) / CH15(Low Edge)



802.11ax (HE160) / CH15(Middle)



802.11ax (HE160) / CH15(High Edge)

For U-NII-6

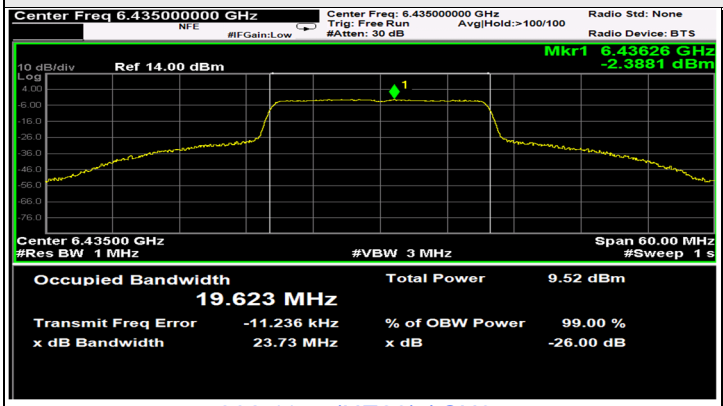
Contention Based Protocol Measurement										
Operation Mode	Channel Bandwidth (MHz)	Channel Number	Channel Freq. (MHz)	Injected Signal (AWGN)		Antenna Gain (dBi)	Path Loss (dB) (Note 3)	Adjusted Power (dBm)	Detection Limit	EUT TX Status
				Freq. (MHz)	Power (dBm)					
802.11ax	20	97	6435	6435	-63.38	3.34	0	-66.72	-62	OFF
					-63.88	3.34	0	-67.22	-62	Minimal
					-78.66	3.34	0	-82	-62	ON
	160	111	6505	6430	-61.4	3.34	0	-64.74	-62	OFF
					-61.9	3.34	0	-65.24	-62	Minimal
					-78.66	3.34	0	-82	-62	ON
				6505	-61.33	3.34	0	-64.67	-62	OFF
					-61.83	3.34	0	-65.17	-62	Minimal
					-78.66	3.34	0	-82	-62	ON
				6580	-62.37	3.34	0	-65.71	-62	OFF
					-62.87	3.34	0	-66.21	-62	Minimal
					-78.66	3.34	0	-82	-62	ON

Notes:

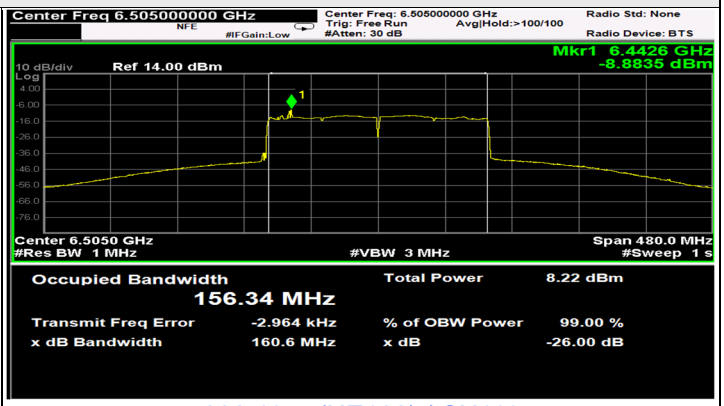
1. After investigation (consider antenna gain and path loss), the one representative port (Chain 3) was measured and presented in the report.
2. Adjusted Power (dBm) = Injected Signal (AWGN) Power (dBm) - Antenna Gain (dBi) + Path Loss (dB)
3. Antenna gain values include all the applicable path losses.

Contention Based Protocol Detection Probability														
Operation Mode	Channel Bandwidth (MHz)	AWGN Signal Freq. (MHz)	#01	#02	#03	#04	#05	#06	#07	#08	#09	#10	Detection Probability	Detection Limit	Test Result
802.11ax	20	6435	v	v	v	v	v	v	v	v	v	v	100%	90%	Pass
	160	6430	v	v	v	v	v	v	v	v	v	v	100%	90%	Pass
		6505	v	v	v	v	v	v	x	v	v	v	90%	90%	Pass
		6580	v	v	v	v	v	v	v	v	v	v	100%	90%	Pass

Plots of EUT Tx waveform



802.11ax (HE20) / CH97



802.11ax (HE160) / CH111