

FCC Test Report

Report No.: RFBEMV-WTW-P22040202

FCC ID: XCNUBC1338

Test Model: UBC1338

Received Date: Apr. 26, 2022

Test Date: May 16 ~ May 25, 2022

Issued Date: Jul. 15, 2022

Applicant: Ubee Interactive Corp.

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Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
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**FCC Registration /
Designation Number:** 788550 / TW0003



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Table of Contents

Release Control Record	4
1 Certificate of Conformity	5
2 Summary of Test Results	6
2.1 Measurement Uncertainty.....	6
2.2 Modification Record.....	6
3 General Information	7
3.1 General Description of EUT.....	7
3.2 Description of Test Modes.....	9
3.2.1 Test Mode Applicability and Tested Channel Detail.....	10
3.3 Duty Cycle of Test Signal.....	12
3.4 Description of Support Units.....	13
3.4.1 Configuration of System under Test.....	13
3.5 General Description of Applied Standards and References.....	14
4 Test Types and Results	15
4.1 Radiated Emission and Bandedge Measurement.....	15
4.1.1 Limits of Radiated Emission and Bandedge Measurement.....	15
4.1.2 Test Instruments.....	16
4.1.3 Test Procedures.....	17
4.1.4 Deviation from Test Standard.....	18
4.1.5 Test Setup.....	18
4.1.6 EUT Operating Conditions.....	19
4.1.7 Test Results.....	20
4.2 Conducted Emission Measurement.....	34
4.2.1 Limits of Conducted Emission Measurement.....	34
4.2.2 Test Instruments.....	34
4.2.3 Test Procedures.....	35
4.2.4 Deviation from Test Standard.....	35
4.2.5 Test Setup.....	35
4.2.6 EUT Operating Conditions.....	35
4.2.7 Test Results.....	36
4.3 6dB Bandwidth Measurement.....	38
4.3.1 Limits of 6dB Bandwidth Measurement.....	38
4.3.2 Test Setup.....	38
4.3.3 Test Instruments.....	38
4.3.4 Test Procedure.....	38
4.3.5 Deviation from Test Standard.....	38
4.3.6 EUT Operating Conditions.....	38
4.3.7 Test Result.....	39
4.4 Conducted Output Power Measurement.....	41
4.4.1 Limits of Conducted Output Power Measurement.....	41
4.4.2 Test Setup.....	41
4.4.3 Test Instruments.....	41
4.4.4 Test Procedures.....	41
4.4.5 Deviation from Test Standard.....	41
4.4.6 EUT Operating Conditions.....	41
4.4.7 Test Results.....	42
4.5 Power Spectral Density Measurement.....	46
4.5.1 Limits of Power Spectral Density Measurement.....	46
4.5.2 Test Setup.....	46
4.5.3 Test Instruments.....	46
4.5.4 Test Procedure.....	46
4.5.5 Deviation from Test Standard.....	46
4.5.6 EUT Operating Condition.....	46

4.5.7 Test Results	47
4.6 Conducted Out of Band Emission Measurement.....	52
4.6.1 Limits of Conducted Out of Band Emission Measurement	52
4.6.2 Test Setup.....	52
4.6.3 Test Instruments	52
4.6.4 Test Procedure	52
4.6.5 Deviation from Test Standard	52
4.6.6 EUT Operating Condition	52
4.6.7 Test Results	52
5 Pictures of Test Arrangements.....	69
Annex A - Band Edge Measurement.....	70
Appendix – Information of the Testing Laboratories	75

Release Control Record

Issue No.	Description	Date Issued
RFBEMV-WTW-P22040202	Original Release	Jul. 15, 2022

1 Certificate of Conformity

Product: Wireless eMTA
Brand: Ubee
Test Model: UBC1338
Sample Status: Engineering sample
Applicant: Ubee Interactive Corp.
Test Date: May 16 ~ May 25, 2022
Standards: 47 CFR FCC Part 15, Subpart C (Section 15.247)
ANSI C63.10:2013

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.

Prepared by : Pettie Chen , **Date:** Jul. 15, 2022
Pettie Chen / Senior Specialist

Approved by : Jeremy Lin , **Date:** Jul. 15, 2022
Jeremy Lin / Project Engineer

2 Summary of Test Results

47 CFR FCC Part 15, Subpart C (Section 15.247)			
FCC Clause	Test Item	Result	Remarks
15.207	AC Power Conducted Emission	Pass	Meet the requirement of limit. Minimum passing margin is -16.10dB at 0.15000MHz.
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	Pass	Meet the requirement of limit. Minimum passing margin is -0.1dB at 2390.00MHz, 2483.50MHz.
15.247(d)	Antenna Port Emission	Pass	Meet the requirement of limit.
15.247(a)(2)	6dB bandwidth	Pass	Meet the requirement of limit.
15.247(b)	Conducted power	Pass	Meet the requirement of limit.
15.247(e)	Power Spectral Density	Pass	Meet the requirement of limit.
15.203	Antenna Requirement	Pass	Antenna connector are ipex(MHF) not a standard connector.

Note:

- For 2.4G band compliance with rule 15.247(d) of the band-edge items, the test plots were recorded in Annex A. Test Procedures refer to report 4.1.3.
- 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	Frequency	Expanded Uncertainty (k=2) (\pm)
Conducted Emissions at mains ports	150kHz ~ 30MHz	2.79 dB
Radiated Emissions up to 1 GHz	9kHz ~ 30MHz	3.04 dB
	30MHz ~ 200MHz	3.63 dB
	200MHz ~ 1000MHz	3.64 dB
Radiated Emissions above 1 GHz	1GHz ~ 18GHz	2.29 dB
	18GHz ~ 40GHz	2.29 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	Wireless eMTA
Brand	Ubee
Test Model	UBC1338
Sample Status	Engineering sample
Power Supply Rating	12Vdc from Adapter
Modulation Type	CCK, DQPSK, DBPSK for DSSS 256QAM, 64QAM, 16QAM, QPSK, BPSK for OFDM 1024QAM, 256QAM, 64QAM, 16QAM, QPSK, BPSK for OFDMA
Modulation Technology	DSSS, OFDM, OFDMA
Transfer Rate	802.11b: 11/5.5/2/1Mbps 802.11g: 54/48/36/24/18/12/9/6Mbps 802.11n (HT20/40): up to 600Mbps VHT20/40: up to 800Mbps 802.11ax: up to 1147.1Mbps
Operating Frequency	2412 ~ 2462MHz
Number of Channel	802.11b, 802.11g, 802.11n (HT20), VHT20, 802.11ax (HE20): 11 802.11n (HT40), VHT40, 802.11ax (HE40): 7
Output Power	CDD Mode: 812.052mW Beamforming Mode: 409.593mW
Antenna Type	Refer to note
Antenna Connector	Refer to note
Accessory Device	Adapter
Cable Supplied	1.5m RJ45 non-shielded cable (Brand: CHANGYANG, Model: U-M2602B5LM0015)

Note:

- The EUT incorporates a MIMO function. Physically, the EUT provides 4 completed transmitters and 4 receivers.

Modulation Mode	TX Function	Beamforming Mode
802.11b	4TX	Not Support
802.11g	4TX	Not Support
802.11n (HT20)	4TX	Support
802.11n (HT40)	4TX	Support
VHT20	4TX	Support
VHT40	4TX	Support
802.11ax (HE20)	4TX	Support
802.11ax (HE40)	4TX	Support

* The bandwidth and modulation are similar for HT20/HT40 on 802.11n mode and VHT20/VHT40 on 256QAM mode and HE20/HE40 on 802.11ax mode. Therefore the investigated worst case is the representative mode in test report. (Final test mode refer section 3.2.1)

2. The EUT consumes power from the following adapter.

Adapter	
Brand	ASIAN POWER DEVICES
Model	WA-36N12FU
Input Power	100-240Vac, 50-60Hz
Output Power	12Vdc / 3A
Power cord	1.8m non-shielded cable without core

3. The antenna information is listed as below.

Antenna Type		Dipole antenna				
Antenna Connector		ipex(MHF)				
Antenna No.	RF Chain No.	Gain (dBi)				
		2.4~2.4835GHz	5.15~5.25GHz	5.25~5.35GHz	5.47~5.725GHz	5.725~5.85GHz
Ant1	2G chain1/ 5G chain2	3.90	3.90	3.90	1.82	2.82
Ant2	2G chain2/ 5G chain1	3.97	4.15	4.84	4.76	4.78
Ant3	2G chain0/ 5G chain3	3.90	3.13	3.85	3.05	2.69
Ant4	2G chain3/ 5G chain0	3.08	3.47	3.59	3.42	2.60

*The above Antenna information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications, the laboratory shall not be held responsible.

3.2 Description of Test Modes

11 channels are provided for 802.11b, 802.11g, 802.11n (HT20), VHT20, 802.11ax (HE20):

Channel	Frequency	Channel	Frequency
1	2412MHz	7	2442MHz
2	2417MHz	8	2447MHz
3	2422MHz	9	2452MHz
4	2427MHz	10	2457MHz
5	2432MHz	11	2462MHz
6	2437MHz		

7 channels are provided for 802.11n (HT40), VHT40, 802.11ax (HE40):

Channel	Frequency	Channel	Frequency
3	2422MHz	7	2442MHz
4	2427MHz	8	2447MHz
5	2432MHz	9	2452MHz
6	2437MHz		

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT Configure Mode	Applicable to				Description
	RE \geq 1G	RE $<$ 1G	PLC	APCM	
-	√	√	√	√	-

Where RE \geq 1G: Radiated Emission above 1GHz & Bandedge Measurement
 RE $<$ 1G: Radiated Emission below 1GHz
 PLC: Power Line Conducted Emission
 APCM: Antenna Port Conducted Measurement

Note:

1. The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **Z-plane**.
2. For radiated emission (below 1GHz) and power line conducted emission test items chosen the worst maximum power mode.
3. The EUT doesn't support Tone RU.

Radiated Emission Test (Above 1GHz):

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
-	802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1.0
-	802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6.0
-	802.11ax (HE20)	1 to 11	1, 6, 11	OFDMA	BPSK	MCS0
-	802.11ax (HE40)	3 to 9	3, 6, 9	OFDMA	BPSK	MCS0

Radiated Emission Test (Below 1GHz):

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
-	802.11ax (HE20)	1 to 11	6	OFDMA	BPSK	MCS0

Power Line Conducted Emission Test:

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
-	802.11ax (HE20)	1 to 11	6	OFDMA	BPSK	MCS0

Transmit Power Measurement:

- This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.
- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
-	802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1.0
-	802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6.0
-	802.11n (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	6.5
-	802.11n (HT40)	3 to 9	3, 6, 9	OFDM	BPSK	13.5
-	VHT20	1 to 11	1, 6, 11	OFDM	BPSK	MCS0
-	VHT40	3 to 9	3, 6, 9	OFDM	BPSK	MCS0
-	802.11ax (HE20)	1 to 11	1, 6, 11	OFDMA	BPSK	MCS0
-	802.11ax (HE40)	3 to 9	3, 6, 9	OFDMA	BPSK	MCS0

Bandwidth, Power Spectral Density Measurement:

- This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.
- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
-	802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1.0
-	802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6.0
-	802.11ax (HE20)	1 to 11	1, 6, 11	OFDMA	BPSK	MCS0
-	802.11ax (HE40)	3 to 9	3, 6, 9	OFDMA	BPSK	MCS0

Test Condition:

Applicable to	Environmental Conditions	Input Power (System)	Tested by
RE \geq 1G	23 deg. C, 66% RH	120Vac, 60Hz	Titan Hsu
RE $<$ 1G	23 deg. C, 66% RH	120Vac, 60Hz	Titan Hsu
PLC	25 deg. C, 75% RH	120Vac, 60Hz	Titan Hsu
APCM	25 deg. C, 60% RH	120Vac, 60Hz	Jisyong Wang

3.3 Duty Cycle of Test Signal

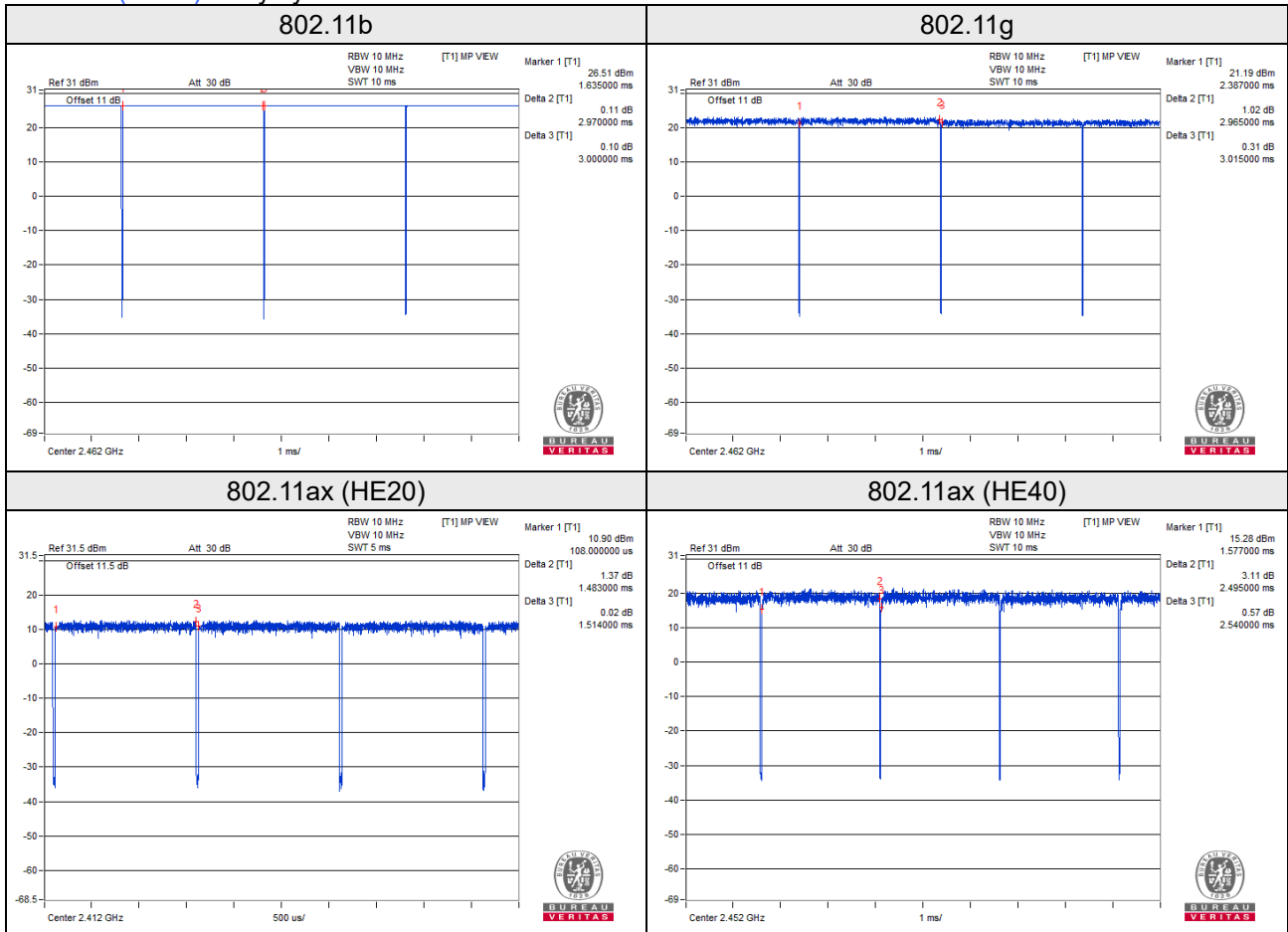
Duty cycle of test signal is $\geq 98\%$, duty factor is not required.

802.11b: Duty cycle = $2.97/3.00 = 0.99$

802.11g: Duty cycle = $2.965/3.015 = 0.983$

802.11ax (HE20): Duty cycle = $1.483/1.514 = 0.98$

802.11ax (HE40): Duty cycle = $2.495/2.54 = 0.982$



3.4 Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	USB Disk	Sandisk	SDDDC3	NA	NA	Provided by Lab
B.	Notebook	DELL	E5430	2RL3YW1	NA	Provided by Lab
C.	Load	NA	NA	NA	NA	Provided by Lab

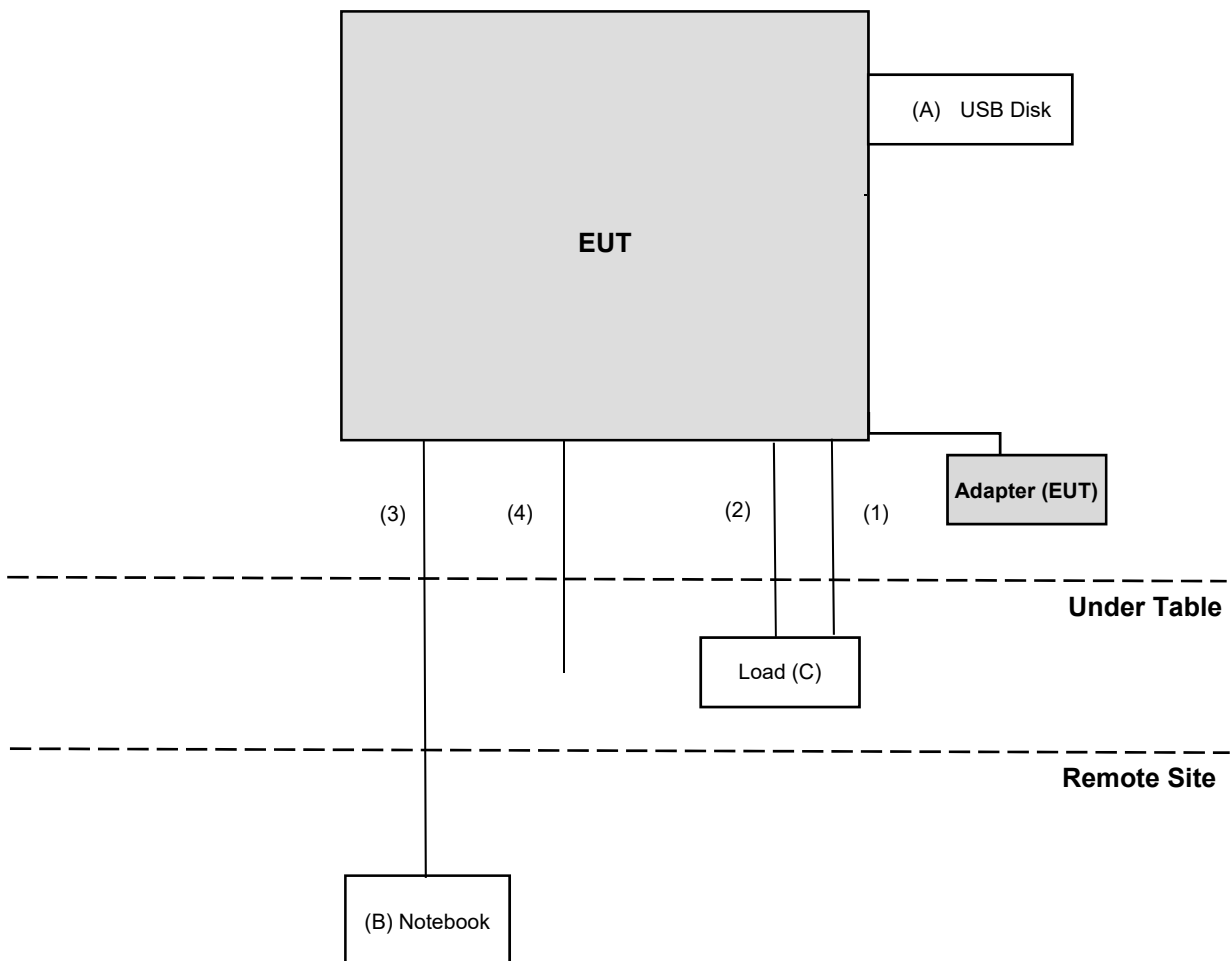
Note:

1. All power cords of the above support units are non-shielded (1.8m).
2. Items A acted as communication partner to transfer data.

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

Note: The core(s) is(are) originally attached to the cable(s).

3.4.1 Configuration of System under Test



3.5 General Description of Applied Standards and References

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards and references:

Test standard:

FCC Part 15, Subpart C (15.247)

ANSI C63.10:2013

All test items have been performed and recorded as per the above standards.

References Test Guidance:

KDB 558074 D01 15.247 Meas Guidance v05r02

KDB 662911 D01 Multiple Transmitter Output v02r01

All test items have been performed as a reference to the above KDB test guidance.

4 Test Types and Results

4.1 Radiated Emission and Bandedge Measurement

4.1.1 Limits of Radiated Emission and Bandedge Measurement

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 30dB below the highest level of the desired power:

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

Note:

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 1000MHz, 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 20dB under any condition of modulation.

4.1.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Test Receiver ROHDE & SCHWARZ	ESCI	100424	Dec. 30, 2021	Dec. 29, 2022
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100040	Sep. 15, 2021	Sep. 14, 2022
BILOG Antenna SCHWARZBECK	VULB9168	9168-155	Nov. 01, 2021	Oct. 31, 2022
HORN Antenna SCHWARZBECK	BBHA 9120D	9120D-1170	Nov. 14, 2021	Nov. 13, 2022
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170241	Oct. 26, 2021	Oct. 25, 2022
Preamplifier Agilent (Below 1GHz)	8447D	2944A10631	Jun. 05, 2021	Jun. 04, 2022
Preamplifier KEYSIGHT (Above 1GHz)	83017A	MY53270295	Jun. 05, 2021	Jun. 04, 2022
RF Coaxial Cable WOKEN With 5dB PAD	8D-FB	Cable-CH4-01	Jul. 24, 2021	Jul. 23, 2022
RF Coaxial Cable EMCI	EMC102-KM-KM-3000	150929	Jul. 24, 2021	Jul. 23, 2022
RF Coaxial Cable EMCI	EMC102-KM-KM-600	150928	Jul. 24, 2021	Jul. 23, 2022
RF signal cable HUBER+SUHNER	SUCOFLEX 104	MY 13380+295012/04	Jun. 05, 2021	Jun. 04, 2022
RF signal cable HUBER+SUHNER	SUCOFLEX 104	Cable-CH4-03 (250724)	Jun. 05, 2021	Jun. 04, 2022
Software BV ADT	ADT_Radiated_ V7.6.15.9.5	NA	NA	NA
Antenna Tower inn-co GmbH	MA 4000	010303	NA	NA
Antenna Tower Controller BV ADT	AT100	AT93021703	NA	NA
Turn Table BV ADT	TT100	TT93021703	NA	NA
Turn Table Controller BV ADT	SC100	SC93021703	NA	NA
Boresight Antenna Fixture	FBA-01	FBA-SIP01	NA	NA
USB Wideband Power Sensor KEYSIGHT	U2021XA	MY55050005/MY5519 0004/MY55190007/MY 55210005	Jul. 12, 2021	Jul. 11, 2022

- Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
 2. The test was performed in HwaYa Chamber 4.

4.1.3 Test Procedures

For Radiated emission below 30MHz

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. 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.

Note:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9kHz at frequency below 30MHz.

For Radiated emission above 30MHz

- a. The EUT was placed on the top of a rotating table 0.8 meters (for 30MHz ~ 1GHz) / 1.5 meters (for above 1GHz) 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 detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- f. The test-receiver system was set to peak and average detect 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.

Note:

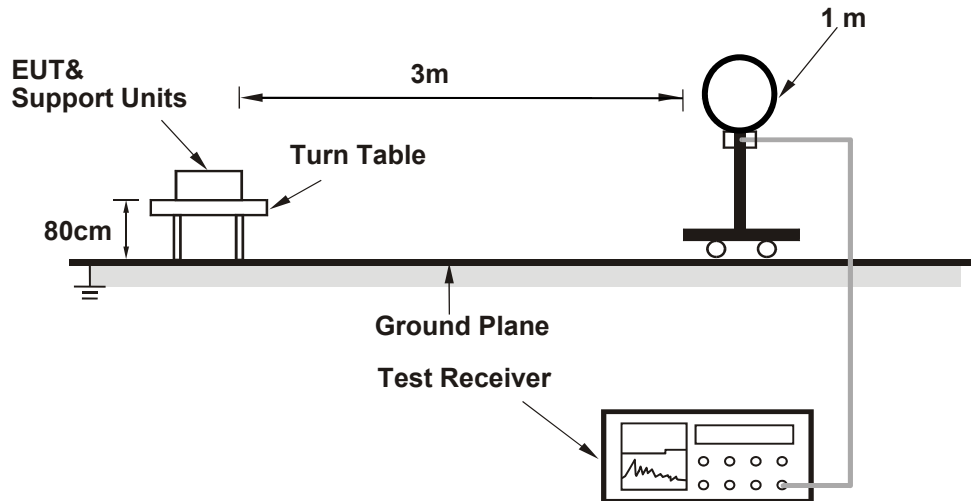
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz (Duty cycle \geq 98%) for Average detection (AV) at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

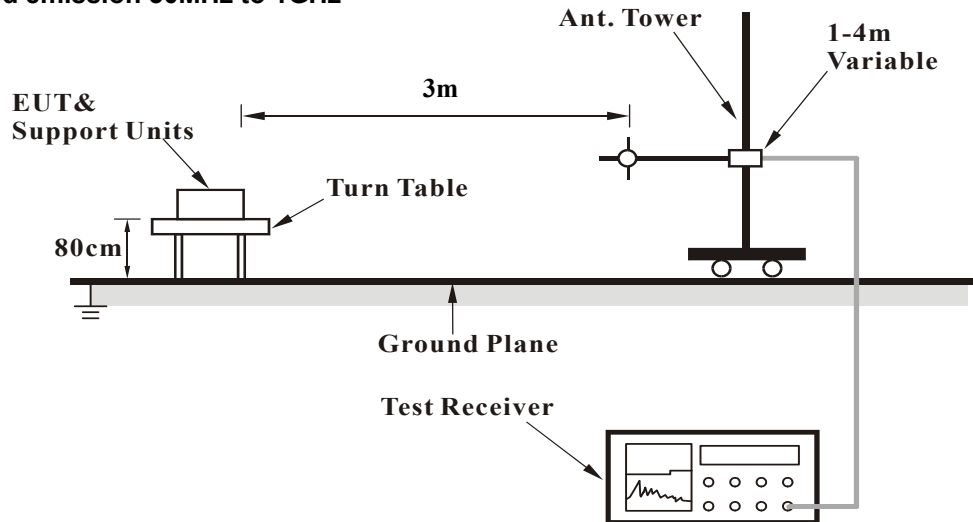
No deviation.

4.1.5 Test Setup

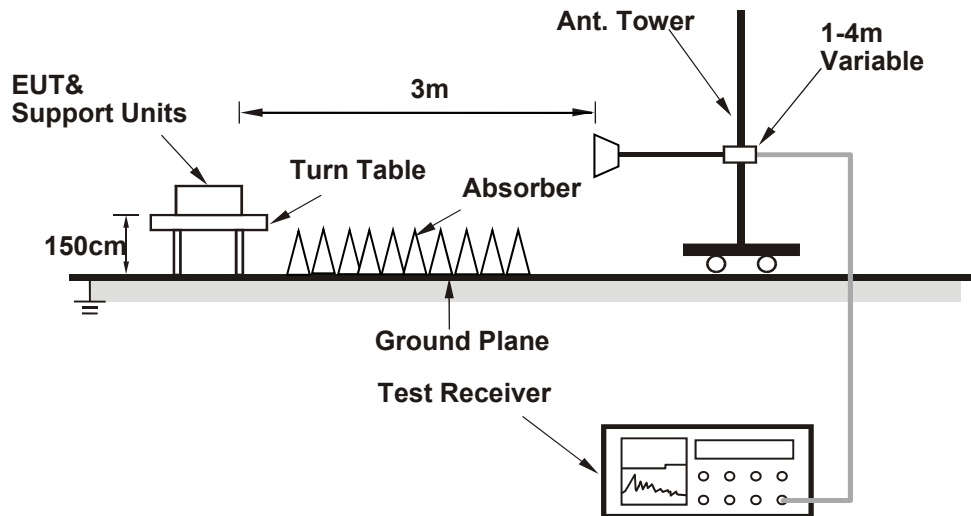
For Radiated emission below 30MHz



For Radiated emission 30MHz to 1GHz



For Radiated emission above 1GHz



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

4.1.6 EUT Operating Conditions

- a. Placed the EUT on the testing table.
- b. Prepared a notebook to act as a communication partner and placed it outside of testing area.
- c. The communication partner connected with EUT via an RJ45 cable and ran a test program (provided by manufacturer) to enable EUT under transmission condition continuously at specific channel frequency.

4.1.7 Test Results

Above 1GHz Data:

RF Mode	TX 802.11b	Channel	CH 1 : 2412 MHz
Frequency Range	1GHz ~ 25GHz	Detector Function	Peak (PK) Average (AV)

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	64.1 PK	74.0	-9.9	1.04 H	112	30.0	34.1
2	2390.00	52.7 AV	54.0	-1.3	1.04 H	112	18.6	34.1
3	*2412.00	117.5 PK			1.04 H	112	83.4	34.1
4	*2412.00	115.2 AV			1.04 H	112	81.1	34.1
5	4824.00	58.2 PK	74.0	-15.8	1.99 H	71	44.6	13.6
6	4824.00	53.9 AV	54.0	-0.1	1.99 H	71	40.3	13.6

Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	63.1 PK	74.0	-10.9	1.82 V	105	29.0	34.1
2	2390.00	49.5 AV	54.0	-4.5	1.82 V	105	15.4	34.1
3	*2412.00	116.1 PK			1.82 V	105	82.0	34.1
4	*2412.00	113.9 AV			1.82 V	105	79.8	34.1
5	4824.00	57.8 PK	74.0	-16.2	1.57 V	74	44.2	13.6
6	4824.00	53.5 AV	54.0	-0.5	1.57 V	74	39.9	13.6

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.

RF Mode	TX 802.11b	Channel	CH 6 : 2437 MHz
Frequency Range	1GHz ~ 25GHz	Detector Function	Peak (PK) Average (AV)

Antenna Polarity & Test Distance : Horizontal at 3 m

No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2437.00	121.6 PK			1.96 H	90	87.3	34.3
2	*2437.00	119.3 AV			1.96 H	90	85.0	34.3
3	4874.00	56.1 PK	74.0	-17.9	2.19 H	76	42.5	13.6
4	4874.00	51.2 AV	54.0	-2.8	2.19 H	76	37.6	13.6

Antenna Polarity & Test Distance : Vertical at 3 m

No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2437.00	117.9 PK			2.18 V	92	83.6	34.3
2	*2437.00	115.6 AV			2.18 V	92	81.3	34.3
3	4874.00	54.7 PK	74.0	-19.3	1.65 V	73	41.1	13.6
4	4874.00	47.6 AV	54.0	-6.4	1.65 V	73	34.0	13.6

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * " : Fundamental frequency.

RF Mode	TX 802.11b	Channel	CH 11 : 2462 MHz
Frequency Range	1GHz ~ 25GHz	Detector Function	Peak (PK) Average (AV)

Antenna Polarity & Test Distance : Horizontal at 3 m

No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2462.00	120.9 PK			1.74 H	90	86.6	34.3
2	*2462.00	118.4 AV			1.74 H	90	84.1	34.3
3	2483.50	65.3 PK	74.0	-8.7	1.74 H	90	31.0	34.3
4	2483.50	53.5 AV	54.0	-0.5	1.74 H	90	19.2	34.3
5	4924.00	51.6 PK	74.0	-22.4	2.23 H	74	38.2	13.4
6	4924.00	42.8 AV	54.0	-11.2	2.23 H	74	29.4	13.4

Antenna Polarity & Test Distance : Vertical at 3 m

No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2462.00	118.5 PK			2.16 V	90	84.2	34.3
2	*2462.00	116.1 AV			2.16 V	90	81.8	34.3
3	2483.50	62.3 PK	74.0	-11.7	2.16 V	90	28.0	34.3
4	2483.50	50.8 AV	54.0	-3.2	2.16 V	90	16.5	34.3
5	4924.00	51.3 PK	74.0	-22.7	1.64 V	67	37.9	13.4
6	4924.00	42.1 AV	54.0	-11.9	1.64 V	67	28.7	13.4

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * " : Fundamental frequency.

RF Mode	TX 802.11g	Channel	CH 1 : 2412 MHz
Frequency Range	1GHz ~ 25GHz	Detector Function	Peak (PK) Average (AV)

Antenna Polarity & Test Distance : Horizontal at 3 m

No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	69.4 PK	74.0	-4.6	1.97 H	80	35.3	34.1
2	2390.00	53.8 AV	54.0	-0.2	1.97 H	80	19.7	34.1
3	*2412.00	118.2 PK			1.97 H	80	84.1	34.1
4	*2412.00	108.5 AV			1.97 H	80	74.4	34.1
5	4824.00	52.2 PK	74.0	-21.8	1.82 H	66	38.6	13.6
6	4824.00	39.8 AV	54.0	-14.2	1.82 H	66	26.2	13.6

Antenna Polarity & Test Distance : Vertical at 3 m

No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	67.7 PK	74.0	-6.3	2.07 V	99	33.6	34.1
2	2390.00	52.9 AV	54.0	-1.1	2.07 V	99	18.8	34.1
3	*2412.00	115.7 PK			2.07 V	99	81.6	34.1
4	*2412.00	106.1 AV			2.07 V	99	72.0	34.1
5	4824.00	51.6 PK	74.0	-22.4	1.89 V	75	38.0	13.6
6	4824.00	39.4 AV	54.0	-14.6	1.89 V	75	25.8	13.6

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.

RF Mode	TX 802.11g	Channel	CH 6 : 2437 MHz
Frequency Range	1GHz ~ 25GHz	Detector Function	Peak (PK) Average (AV)

Antenna Polarity & Test Distance : Horizontal at 3 m

No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2437.00	122.3 PK			2.17 H	95	88.0	34.3
2	*2437.00	112.5 AV			2.17 H	95	78.2	34.3
3	4874.00	52.6 PK	74.0	-21.4	1.85 H	73	39.0	13.6
4	4874.00	40.1 AV	54.0	-13.9	1.85 H	73	26.5	13.6

Antenna Polarity & Test Distance : Vertical at 3 m

No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2437.00	119.8 PK			1.97 V	99	85.5	34.3
2	*2437.00	109.2 AV			1.97 V	99	74.9	34.3
3	4874.00	51.8 PK	74.0	-22.2	1.89 V	72	38.2	13.6
4	4874.00	39.6 AV	54.0	-14.4	1.89 V	72	26.0	13.6

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * " : Fundamental frequency.

RF Mode	TX 802.11g	Channel	CH 11 : 2462 MHz
Frequency Range	1GHz ~ 25GHz	Detector Function	Peak (PK) Average (AV)

Antenna Polarity & Test Distance : Horizontal at 3 m

No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2462.00	117.4 PK			2.18 H	84	83.1	34.3
2	*2462.00	108.1 AV			2.18 H	84	73.8	34.3
3	2483.50	71.9 PK	74.0	-2.1	2.18 H	84	37.6	34.3
4	2483.50	53.9 AV	54.0	-0.1	2.18 H	84	19.6	34.3
5	4924.00	51.6 PK	74.0	-22.4	1.85 H	69	38.2	13.4
6	4924.00	39.4 AV	54.0	-14.6	1.85 H	69	26.0	13.4

Antenna Polarity & Test Distance : Vertical at 3 m

No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2462.00	115.5 PK			1.87 V	96	81.2	34.3
2	*2462.00	105.9 AV			1.87 V	96	71.6	34.3
3	2483.50	68.0 PK	74.0	-6.0	1.87 V	96	33.7	34.3
4	2483.50	52.1 AV	54.0	-1.9	1.87 V	96	17.8	34.3
5	4924.00	51.2 PK	74.0	-22.8	1.89 V	75	37.8	13.4
6	4924.00	39.2 AV	54.0	-14.8	1.89 V	75	25.8	13.4

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * " : Fundamental frequency.

RF Mode	TX 802.11ax (HE20)	Channel	CH 1 : 2412 MHz
Frequency Range	1GHz ~ 25GHz	Detector Function	Peak (PK) Average (AV)

Antenna Polarity & Test Distance : Horizontal at 3 m

No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	69.2 PK	74.0	-4.8	1.90 H	170	35.1	34.1
2	2390.00	53.6 AV	54.0	-0.4	1.90 H	170	19.5	34.1
3	*2412.00	118.1 PK			1.90 H	170	84.0	34.1
4	*2412.00	106.3 AV			1.90 H	170	72.2	34.1
5	4824.00	52.1 PK	74.0	-21.9	1.81 H	71	38.5	13.6
6	4824.00	39.7 AV	54.0	-14.3	1.81 H	71	26.1	13.6

Antenna Polarity & Test Distance : Vertical at 3 m

No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	65.4 PK	74.0	-8.6	1.91 V	97	31.3	34.1
2	2390.00	51.8 AV	54.0	-2.2	1.91 V	97	17.7	34.1
3	*2412.00	115.6 PK			1.91 V	97	81.5	34.1
4	*2412.00	103.6 AV			1.91 V	97	69.5	34.1
5	4824.00	51.6 PK	74.0	-22.4	1.85 V	72	38.0	13.6
6	4824.00	39.5 AV	54.0	-14.5	1.85 V	72	25.9	13.6

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * " : Fundamental frequency.

RF Mode	TX 802.11ax (HE20)	Channel	CH 6 : 2437 MHz
Frequency Range	1GHz ~ 25GHz	Detector Function	Peak (PK) Average (AV)

Antenna Polarity & Test Distance : Horizontal at 3 m

No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2437.00	121.8 PK			1.83 H	161	87.5	34.3
2	*2437.00	109.9 AV			1.83 H	161	75.6	34.3
3	4874.00	52.2 PK	74.0	-21.8	1.82 H	77	38.6	13.6
4	4874.00	40.0 AV	54.0	-14.0	1.82 H	77	26.4	13.6

Antenna Polarity & Test Distance : Vertical at 3 m

No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2437.00	121.1 PK			1.90 V	96	86.8	34.3
2	*2437.00	109.0 AV			1.90 V	96	74.7	34.3
3	4874.00	51.8 PK	74.0	-22.2	1.89 V	79	38.2	13.6
4	4874.00	39.6 AV	54.0	-14.4	1.89 V	79	26.0	13.6

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * " : Fundamental frequency.

RF Mode	TX 802.11ax (HE20)	Channel	CH 11 : 2462 MHz
Frequency Range	1GHz ~ 25GHz	Detector Function	Peak (PK) Average (AV)

Antenna Polarity & Test Distance : Horizontal at 3 m

No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2462.00	118.4 PK			1.83 H	160	84.1	34.3
2	*2462.00	106.4 AV			1.83 H	160	72.1	34.3
3	2483.50	67.9 PK	74.0	-6.1	1.83 H	160	33.6	34.3
4	2483.50	53.6 AV	54.0	-0.4	1.83 H	160	19.3	34.3
5	4924.00	51.6 PK	74.0	-22.4	1.85 H	75	38.2	13.4
6	4924.00	39.4 AV	54.0	-14.6	1.85 H	75	26.0	13.4

Antenna Polarity & Test Distance : Vertical at 3 m

No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2462.00	116.6 PK			1.92 V	99	82.3	34.3
2	*2462.00	105.0 AV			1.92 V	99	70.7	34.3
3	2483.50	65.2 PK	74.0	-8.8	1.92 V	99	30.9	34.3
4	2483.50	52.8 AV	54.0	-1.2	1.92 V	99	18.5	34.3
5	4924.00	51.2 PK	74.0	-22.8	1.59 V	86	37.8	13.4
6	4924.00	39.2 AV	54.0	-14.8	1.59 V	86	25.8	13.4

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * " : Fundamental frequency.

RF Mode	TX 802.11ax (HE40)	Channel	CH 3 : 2422 MHz
Frequency Range	1GHz ~ 25GHz	Detector Function	Peak (PK) Average (AV)

Antenna Polarity & Test Distance : Horizontal at 3 m

No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	66.6 PK	74.0	-7.4	1.84 H	168	32.5	34.1
2	2390.00	53.9 AV	54.0	-0.1	1.84 H	168	19.8	34.1
3	*2422.00	114.8 PK			1.84 H	168	80.7	34.1
4	*2422.00	102.6 AV			1.84 H	168	68.5	34.1
5	4844.00	51.6 PK	74.0	-22.4	1.88 H	76	38.0	13.6
6	4844.00	39.5 AV	54.0	-14.5	1.88 H	76	25.9	13.6

Antenna Polarity & Test Distance : Vertical at 3 m

No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	63.7 PK	74.0	-10.3	1.68 V	9	29.6	34.1
2	2390.00	52.0 AV	54.0	-2.0	1.68 V	9	17.9	34.1
3	*2422.00	110.5 PK			1.68 V	9	76.4	34.1
4	*2422.00	97.9 AV			1.68 V	9	63.8	34.1
5	4844.00	51.1 PK	74.0	-22.9	1.58 V	82	37.5	13.6
6	4844.00	39.1 AV	54.0	-14.9	1.58 V	82	25.5	13.6

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * " : Fundamental frequency.

RF Mode	TX 802.11ax (HE40)	Channel	CH 6 : 2437 MHz
Frequency Range	1GHz ~ 25GHz	Detector Function	Peak (PK) Average (AV)

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	72.8 PK	74.0	-1.2	1.83 H	160	38.7	34.1
2	2390.00	53.8 AV	54.0	-0.2	1.83 H	160	19.7	34.1
3	*2437.00	115.4 PK			1.83 H	160	81.1	34.3
4	*2437.00	103.6 AV			1.83 H	160	69.3	34.3
5	2483.50	70.6 PK	74.0	-3.4	1.83 H	160	36.3	34.3
6	2483.50	53.9 AV	54.0	-0.1	1.83 H	160	19.6	34.3
7	4874.00	51.7 PK	74.0	-22.3	1.83 H	73	38.1	13.6
8	4874.00	39.5 AV	54.0	-14.5	1.83 H	73	25.9	13.6

Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	69.7 PK	74.0	-4.3	1.65 V	3	35.6	34.1
2	2390.00	52.5 AV	54.0	-1.5	1.65 V	3	18.4	34.1
3	*2437.00	112.4 PK			1.65 V	3	78.1	34.3
4	*2437.00	99.9 AV			1.65 V	3	65.6	34.3
5	2483.50	69.4 PK	74.0	-4.6	1.65 V	3	35.1	34.3
6	2483.50	52.9 AV	54.0	-1.1	1.65 V	3	18.6	34.3
7	4874.00	51.2 PK	74.0	-22.8	1.57 V	85	37.6	13.6
8	4874.00	39.2 AV	54.0	-14.8	1.57 V	85	25.6	13.6

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.

RF Mode	TX 802.11ax (HE40)	Channel	CH 9 : 2452 MHz
Frequency Range	1GHz ~ 25GHz	Detector Function	Peak (PK) Average (AV)

Antenna Polarity & Test Distance : Horizontal at 3 m

No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2452.00	114.7 PK			1.84 H	165	80.4	34.3
2	*2452.00	102.2 AV			1.84 H	165	67.9	34.3
3	2483.50	66.5 PK	74.0	-7.5	1.84 H	165	32.2	34.3
4	2483.50	53.9 AV	54.0	-0.1	1.84 H	165	19.6	34.3
5	4904.00	51.3 PK	74.0	-22.7	1.85 H	78	37.8	13.5
6	4904.00	39.3 AV	54.0	-14.7	1.85 H	78	25.8	13.5

Antenna Polarity & Test Distance : Vertical at 3 m

No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2452.00	113.2 PK			1.63 V	6	78.9	34.3
2	*2452.00	100.2 AV			1.63 V	6	65.9	34.3
3	2483.50	65.6 PK	74.0	-8.4	1.63 V	6	31.3	34.3
4	2483.50	53.2 AV	54.0	-0.8	1.63 V	6	18.9	34.3
5	4904.00	51.0 PK	74.0	-23.0	1.55 V	82	37.5	13.5
6	4904.00	39.0 AV	54.0	-15.0	1.55 V	82	25.5	13.5

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * " : Fundamental frequency.

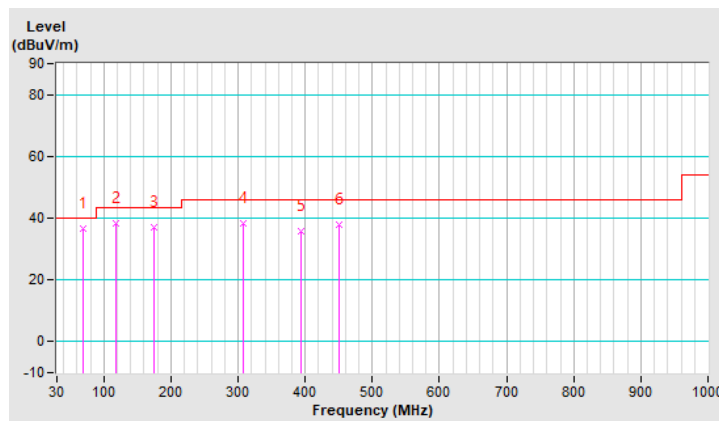
Below 1GHz worst-case data:

RF Mode	TX 802.11ax (HE20)	Channel	CH 6 : 2437 MHz
Frequency Range	30MHz ~ 1GHz	Detector Function	Quasi-Peak (QP)

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	68.80	36.4 QP	40.0	-3.6	1.00 H	260	47.0	-10.6
2	117.30	38.3 QP	43.5	-5.2	1.50 H	221	49.7	-11.4
3	175.50	37.1 QP	43.5	-6.4	1.00 H	255	46.9	-9.8
4	307.42	38.4 QP	46.0	-7.6	1.50 H	274	45.8	-7.4
5	392.78	35.8 QP	46.0	-10.2	1.50 H	193	41.8	-6.0
6	450.98	37.9 QP	46.0	-8.1	1.50 H	149	42.5	-4.6

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30MHz~1000MHz.
5. The emission levels were very low against the limit of frequency range 9kHz~30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.

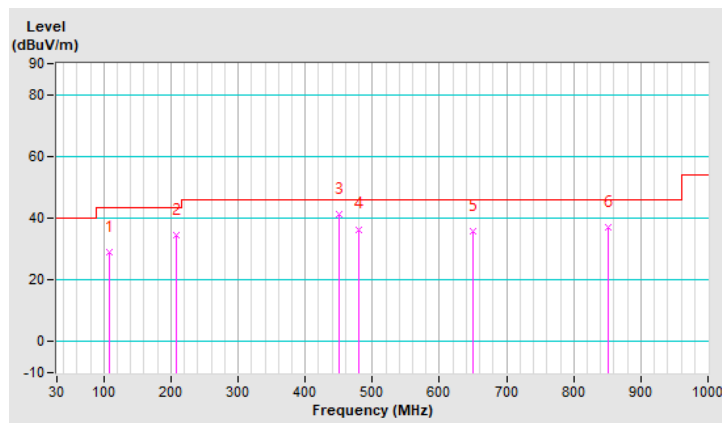


RF Mode	TX 802.11ax (HE20)	Channel	CH 6 : 2437 MHz
Frequency Range	30MHz ~ 1GHz	Detector Function	Quasi-Peak (QP)

Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	107.60	29.0 QP	43.5	-14.5	1.00 V	285	41.2	-12.2
2	208.48	34.5 QP	43.5	-9.0	2.00 V	6	46.1	-11.6
3	450.98	41.4 QP	46.0	-4.6	1.00 V	286	46.0	-4.6
4	480.08	36.4 QP	46.0	-9.6	1.49 V	165	40.8	-4.4
5	650.80	35.9 QP	46.0	-10.1	1.49 V	267	36.7	-0.8
6	850.62	36.9 QP	46.0	-9.1	1.00 V	292	33.3	3.6

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30MHz~1000MHz.
5. The emission levels were very low against the limit of frequency range 9kHz~30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.



4.2 Conducted Emission Measurement

4.2.1 Limits of Conducted Emission Measurement

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

- Note: 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 0.50MHz.

4.2.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Test Receiver ROHDE & SCHWARZ	ESCI	100613	Dec. 03, 2021	Dec. 02, 2022
RF signal cable (with 10dB PAD) Woken	5D-FB	Cable-cond1-01	Jan. 15, 2022	Jan. 14, 2023
LISN ROHDE & SCHWARZ (EUT)	ESH2-Z5	100100	Feb. 17, 2022	Feb. 16, 2023
LISN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100311	Sep. 07, 2021	Sep. 06, 2022
Software ADT	BV ADT_Cond_ V7.3.7.4	NA	NA	NA

- Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
 2. The test was performed in HwaYa Shielded Room 1 (Conduction 1).
 3. The VCCI Site Registration No. is C-12040.

4.2.3 Test Procedures

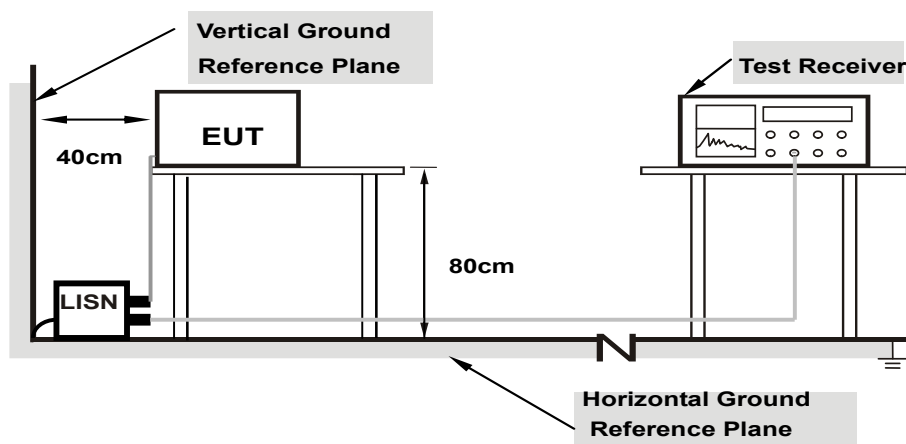
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit – 20dB) was not recorded.

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

4.2.4 Deviation from Test Standard

No deviation.

4.2.5 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).

4.2.6 EUT Operating Conditions

Same as 4.1.6.

4.2.7 Test Results

Worst-case data:

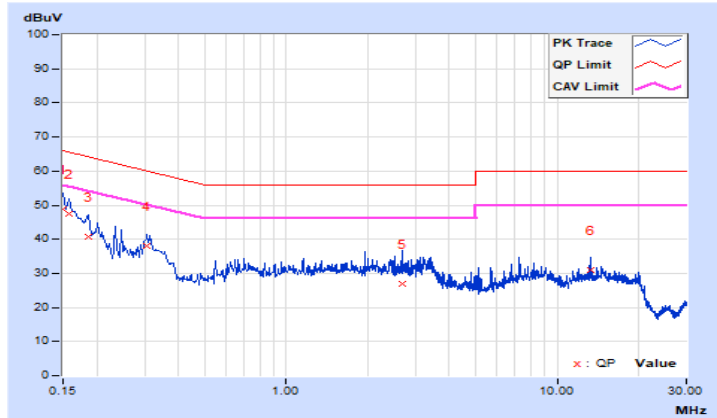
802.11ax (HE20)

Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
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No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	9.68	39.17	30.22	48.85	39.90	66.00	56.00	-17.15	-16.10
2	0.15800	9.69	37.91	28.29	47.60	37.98	65.57	55.57	-17.97	-17.59
3	0.18568	9.71	31.19	20.32	40.90	30.03	64.23	54.23	-23.33	-24.20
4	0.30600	9.76	28.40	16.94	38.16	26.70	60.08	50.08	-21.92	-23.38
5	2.68600	9.92	17.00	11.02	26.92	20.94	56.00	46.00	-29.08	-25.06
6	13.24200	10.10	20.80	17.46	30.90	27.56	60.00	50.00	-29.10	-22.44

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value.

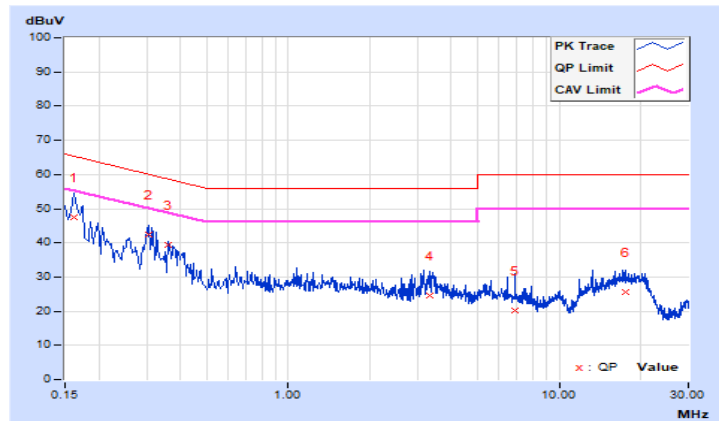


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
-------	-------------	-------------------	--------------------------------

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16190	9.69	37.91	28.09	47.60	37.78	65.37	55.37	-17.77	-17.59
2	0.30550	9.77	32.76	22.61	42.53	32.38	60.09	50.09	-17.56	-17.71
3	0.36200	9.79	29.55	18.59	39.34	28.38	58.68	48.68	-19.34	-20.30
4	3.31400	9.95	14.70	5.94	24.65	15.89	56.00	46.00	-31.35	-30.11
5	6.90200	10.01	10.29	5.46	20.30	15.47	60.00	50.00	-39.70	-34.53
6	17.67800	10.17	15.26	9.83	25.43	20.00	60.00	50.00	-34.57	-30.00

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value.

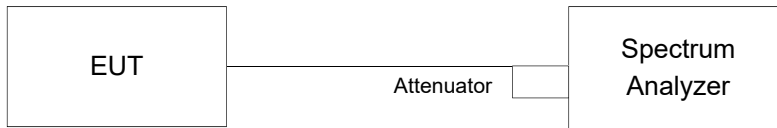


4.3 6dB Bandwidth Measurement

4.3.1 Limits of 6dB Bandwidth Measurement

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

4.3.2 Test Setup



4.3.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.3.4 Test Procedure

- Set resolution bandwidth (RBW) = 100kHz.
- Set the video bandwidth (VBW) $\geq 3 \times$ RBW, Detector = peak.
- Trace mode = max hold.
- Sweep = auto couple.
- Measure the maximum width of the emission that is constrained by the frequencies associated with the two amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

4.3.5 Deviation from Test Standard

No deviation.

4.3.6 EUT Operating Conditions

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

4.3.7 Test Result

802.11b

Channel	Frequency (MHz)	6dB Bandwidth (MHz)				Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3		
1	2412	7.10	7.12	7.09	7.12	0.50	Pass
6	2437	7.08	7.10	7.11	7.10	0.50	Pass
11	2462	7.09	7.10	7.25	7.09	0.50	Pass

802.11g

Channel	Frequency (MHz)	6dB Bandwidth (MHz)				Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3		
1	2412	16.42	16.43	16.44	16.43	0.50	Pass
6	2437	16.44	16.44	16.44	16.43	0.50	Pass
11	2462	16.43	16.44	16.41	16.43	0.50	Pass

802.11ax (HE20)

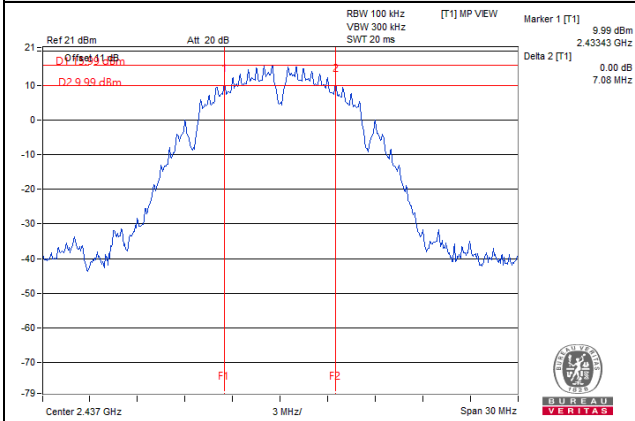
Channel	Frequency (MHz)	6dB Bandwidth (MHz)				Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3		
1	2412	18.96	18.92	19.03	19.04	0.50	Pass
6	2437	18.99	19.03	19.03	19.03	0.50	Pass
11	2462	17.65	18.90	18.86	18.98	0.50	Pass

802.11ax (HE40)

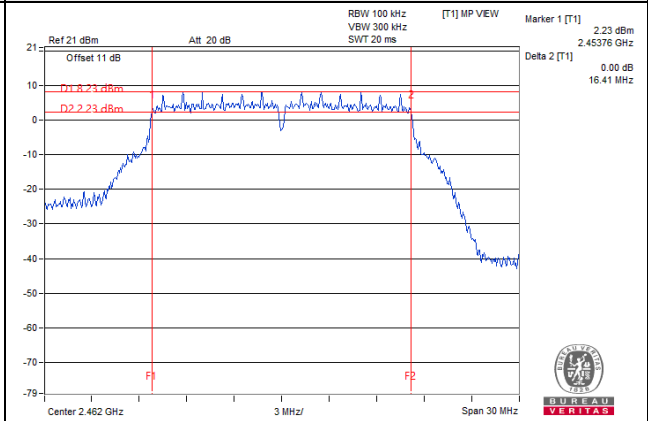
Channel	Frequency (MHz)	6dB Bandwidth (MHz)				Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3		
3	2422	37.98	36.51	37.95	37.90	0.50	Pass
6	2437	36.53	37.90	37.97	37.99	0.50	Pass
9	2452	37.81	37.98	37.80	37.87	0.50	Pass

Spectrum Plot of Worst Value

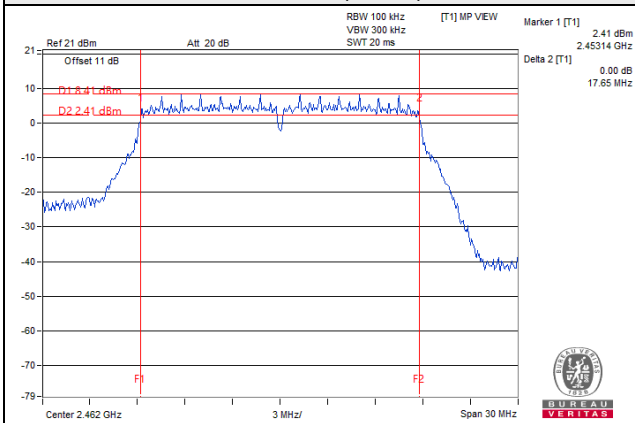
802.11b



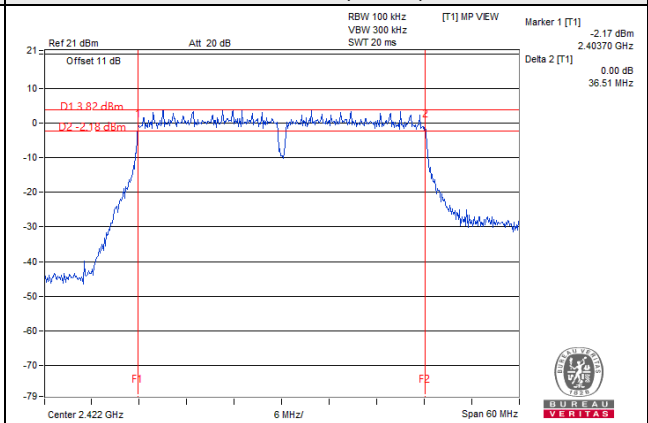
802.11g



802.11ax (HE20)



802.11ax (HE40)



4.4 Conducted Output Power Measurement

4.4.1 Limits of Conducted Output Power Measurement

For systems using digital modulation in the 2400–2483.5 MHz bands: 1 Watt (30dBm)

Per KDB 662911 D01 Multiple Transmitter Output Method of conducted output power measurement on IEEE 802.11 devices,

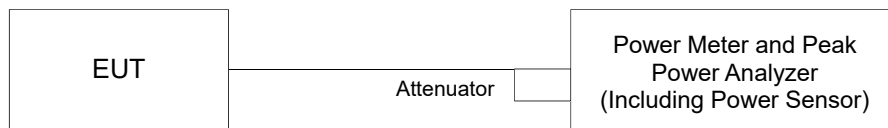
Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leq 4$;

Array Gain = 0 dB (i.e., no array gain) for channel widths ≥ 40 MHz for any N_{ANT} ;

Array Gain = $5 \log(N_{ANT}/N_{SS})$ dB or 3 dB, whichever is less for 20-MHz channel widths with $N_{ANT} \geq 5$.

For power measurements on all other devices: Array Gain = $10 \log(N_{ANT}/N_{SS})$ dB.

4.4.2 Test Setup



4.4.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.4.4 Test Procedures

Average power sensor was used to perform output power measurement, trigger and gating function of wide band power meter is enabled to measure max output power of TX on burst. Duty factor is not added to measured value.

4.4.5 Deviation from Test Standard

No deviation.

4.4.6 EUT Operating Conditions

Same as item 4.3.6.

4.4.7 Test Results

CDD Mode

802.11b

Channel	Frequency (MHz)	Average Power (dBm)				Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
1	2412	22.57	22.57	22.59	22.93	739.322	28.69	30	Pass
6	2437	22.95	22.92	23.05	23.16	801.978	29.04	30	Pass
11	2462	22.92	22.89	23.06	23.13	798.311	29.02	30	Pass

802.11g

Channel	Frequency (MHz)	Average Power (dBm)				Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
1	2412	20.45	20.35	20.35	20.21	432.657	26.36	30	Pass
6	2437	22.92	23.07	23.03	22.97	797.715	29.02	30	Pass
11	2462	19.02	18.82	18.85	18.66	306.195	24.86	30	Pass

802.11n (HT20)

Channel	Frequency (MHz)	Average Power (dBm)				Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
1	2412	18.92	18.94	18.84	18.72	307.359	24.88	30	Pass
6	2437	22.83	22.92	22.86	22.87	774.590	28.89	30	Pass
11	2462	19.33	19.15	19.36	18.86	331.139	25.20	30	Pass

802.11n (HT40)

Channel	Frequency (MHz)	Average Power (dBm)				Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
3	2422	17.67	17.47	17.38	18.05	232.854	23.67	30	Pass
6	2437	18.45	18.39	18.19	18.69	278.886	24.45	30	Pass
9	2452	18.22	17.87	17.76	18.34	255.547	24.07	30	Pass

VHT20

Channel	Frequency (MHz)	Average Power (dBm)				Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
1	2412	19.03	19.03	18.93	18.76	313.292	24.96	30	Pass
6	2437	22.97	23.04	22.93	22.91	791.295	28.98	30	Pass
11	2462	19.42	19.24	19.42	18.91	336.746	25.27	30	Pass

VHT40

Channel	Frequency (MHz)	Average Power (dBm)				Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
3	2422	17.71	17.56	17.46	18.14	236.918	23.75	30	Pass
6	2437	18.56	18.46	18.27	18.78	284.577	24.54	30	Pass
9	2452	18.31	17.93	17.84	18.42	260.167	24.15	30	Pass

802.11ax (HE20)

Channel	Frequency (MHz)	Average Power (dBm)				Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
1	2412	19.12	19.12	19.02	18.87	320.206	25.05	30	Pass
6	2437	23.07	23.15	23.05	23.03	812.052	29.10	30	Pass
11	2462	19.51	19.35	19.53	19.02	344.972	25.38	30	Pass

802.11ax (HE40)

Channel	Frequency (MHz)	Average Power (dBm)				Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
3	2422	17.85	17.65	17.55	18.25	242.884	23.85	30	Pass
6	2437	18.67	18.55	18.39	18.89	291.705	24.65	30	Pass
9	2452	18.42	18.05	17.95	18.47	266.009	24.25	30	Pass

Beamforming Mode

802.11n (HT20)

Channel	Frequency (MHz)	Average Power (dBm)				Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
1	2412	16.93	17.10	17.01	16.75	198.153	22.97	26.26	Pass
6	2437	19.89	19.93	20.02	19.82	392.302	25.94	26.26	Pass
11	2462	17.31	17.12	17.15	16.80	205.093	23.12	26.26	Pass

Note: Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2/4] = 9.74\text{dBi} > 6\text{dBi}$, so the power limit shall be reduced to $30-(9.74-6) = 26.26\text{dBm}$.

802.11n (HT40)

Channel	Frequency (MHz)	Average Power (dBm)				Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
3	2422	16.66	16.67	16.52	16.69	184.337	22.66	26.26	Pass
6	2437	17.41	17.25	17.02	17.63	216.462	23.35	26.26	Pass
9	2452	17.28	17.01	16.63	17.02	200.066	23.01	26.26	Pass

Note: Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2/4] = 9.74\text{dBi} > 6\text{dBi}$, so the power limit shall be reduced to $30-(9.74-6) = 26.26\text{dBm}$.

VHT20

Channel	Frequency (MHz)	Average Power (dBm)				Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
1	2412	17.02	17.11	17.08	16.82	200.889	23.03	26.26	Pass
6	2437	19.93	20.03	20.11	20.02	402.121	26.04	26.26	Pass
11	2462	17.41	17.21	17.25	16.82	208.855	23.20	26.26	Pass

Note: Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2/4] = 9.74\text{dBi} > 6\text{dBi}$, so the power limit shall be reduced to $30-(9.74-6) = 26.26\text{dBm}$.

VHT40

Channel	Frequency (MHz)	Average Power (dBm)				Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
3	2422	16.71	16.71	16.66	17.02	190.457	22.80	26.26	Pass
6	2437	17.52	17.31	17.12	17.71	220.864	23.44	26.26	Pass
9	2452	17.31	17.15	16.71	17.15	204.468	23.11	26.26	Pass

Note: Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2/4] = 9.74\text{dBi} > 6\text{dBi}$, so the power limit shall be reduced to $30-(9.74-6) = 26.26\text{dBm}$.

802.11ax (HE20)

Channel	Frequency (MHz)	Average Power (dBm)				Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
1	2412	17.12	17.22	17.10	16.99	205.535	23.13	26.26	Pass
6	2437	20.01	20.11	20.18	20.11	409.593	26.12	26.26	Pass
11	2462	17.51	17.33	17.41	17.01	215.754	23.34	26.26	Pass

Note: Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2/4] = 9.74\text{dBi} > 6\text{dBi}$, so the power limit shall be reduced to $30-(9.74-6) = 26.26\text{dBm}$.

802.11ax (HE40)

Channel	Frequency (MHz)	Average Power (dBm)				Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
3	2422	16.89	16.89	16.71	17.15	196.492	22.93	26.26	Pass
6	2437	17.66	17.41	17.28	17.78	226.861	23.56	26.26	Pass
9	2452	17.52	17.21	16.89	17.23	210.805	23.24	26.26	Pass

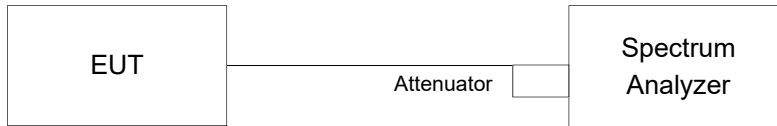
Note: Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2/4] = 9.74\text{dBi} > 6\text{dBi}$, so the power limit shall be reduced to $30-(9.74-6) = 26.26\text{dBm}$.

4.5 Power Spectral Density Measurement

4.5.1 Limits of Power Spectral Density Measurement

The Maximum of Power Spectral Density Measurement is 8dBm in any 3 kHz.

4.5.2 Test Setup



4.5.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.5.4 Test Procedure

For Power (Duty cycle $\geq 98\%$)

- Set instrument center frequency to DTS channel center frequency.
- Set span to at least 1.5 times the OBW.
- Set RBW to: $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$.
- Set VBW $\geq 3 \times \text{RBW}$.
- Detector = power averaging (RMS) or sample detector (when RMS not available).
- Ensure that the number of measurement points in the sweep $\geq 2 \times \text{span}/\text{RBW}$.
- Sweep time = auto couple.
- Employ trace averaging (RMS) mode over a minimum of 100 traces.
- Use the peak marker function to determine the maximum amplitude level.

4.5.5 Deviation from Test Standard

No deviation.

4.5.6 EUT Operating Condition

Same as item 4.3.6

4.5.7 Test Results

802.11b

TX chain	Channel	Frequency (MHz)	PSD w/o Duty Factor (dBm/3kHz)	10 log (N=4) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass / Fail
0	1	2412	-8.55	6.02	-2.53	4.26	Pass
	6	2437	-8.54	6.02	-2.52	4.26	Pass
	11	2462	-8.29	6.02	-2.27	4.26	Pass
1	1	2412	-8.59	6.02	-2.57	4.26	Pass
	6	2437	-8.41	6.02	-2.39	4.26	Pass
	11	2462	-8.50	6.02	-2.48	4.26	Pass
2	1	2412	-8.49	6.02	-2.47	4.26	Pass
	6	2437	-8.18	6.02	-2.16	4.26	Pass
	11	2462	-7.76	6.02	-1.74	4.26	Pass
3	1	2412	-8.21	6.02	-2.19	4.26	Pass
	6	2437	-8.54	6.02	-2.52	4.26	Pass
	11	2462	-8.29	6.02	-2.27	4.26	Pass

Note:

- Method E) 2) c) of power density measurement of KDB 662911 is using for calculating total power density, Measure value and add 10 log (N_{ANT}) dB.
- Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2/4] = 9.74\text{dBi} > 6\text{dBi}$, so the power limit shall be reduced to $8-(9.74-6) = 4.26\text{dBm}$.

802.11g

TX chain	Channel	Frequency (MHz)	PSD w/o Duty Factor (dBm/3kHz)	10 log (N=4) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass / Fail
0	1	2412	-14.02	6.02	-8.00	4.26	Pass
	6	2437	-11.61	6.02	-5.59	4.26	Pass
	11	2462	-16.01	6.02	-9.99	4.26	Pass
1	1	2412	-14.18	6.02	-8.16	4.26	Pass
	6	2437	-11.31	6.02	-5.29	4.26	Pass
	11	2462	-16.05	6.02	-10.03	4.26	Pass
2	1	2412	-14.53	6.02	-8.51	4.26	Pass
	6	2437	-11.33	6.02	-5.31	4.26	Pass
	11	2462	-16.34	6.02	-10.32	4.26	Pass
3	1	2412	-14.60	6.02	-8.58	4.26	Pass
	6	2437	-11.61	6.02	-5.59	4.26	Pass
	11	2462	-16.01	6.02	-9.99	4.26	Pass

Note:

- Method E) 2) c) of power density measurement of KDB 662911 is using for calculating total power density, Measure value and add $10 \log (N_{ANT})$ dB.
- Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2/4] = 9.74\text{dBi} > 6\text{dBi}$, so the power limit shall be reduced to $8-(9.74-6) = 4.26\text{dBm}$.

802.11ax (HE20)

TX chain	Channel	Frequency (MHz)	PSD w/o Duty Factor (dBm/3kHz)	10 log (N=4) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass / Fail
0	1	2412	-17.55	6.02	-11.53	4.26	Pass
	6	2437	-12.51	6.02	-6.49	4.26	Pass
	11	2462	-16.33	6.02	-10.31	4.26	Pass
1	1	2412	-17.57	6.02	-11.55	4.26	Pass
	6	2437	-12.50	6.02	-6.48	4.26	Pass
	11	2462	-17.08	6.02	-11.06	4.26	Pass
2	1	2412	-17.64	6.02	-11.62	4.26	Pass
	6	2437	-12.62	6.02	-6.60	4.26	Pass
	11	2462	-16.26	6.02	-10.24	4.26	Pass
3	1	2412	-17.77	6.02	-11.75	4.26	Pass
	6	2437	-12.51	6.02	-6.49	4.26	Pass
	11	2462	-16.33	6.02	-10.31	4.26	Pass

Note:

- Method E) 2) c) of power density measurement of KDB 662911 is using for calculating total power density, Measure value and add $10 \log (N_{ANT})$ dB.
- Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2/4] = 9.74\text{dBi} > 6\text{dBi}$, so the power limit shall be reduced to $8-(9.74-6) = 4.26\text{dBm}$.

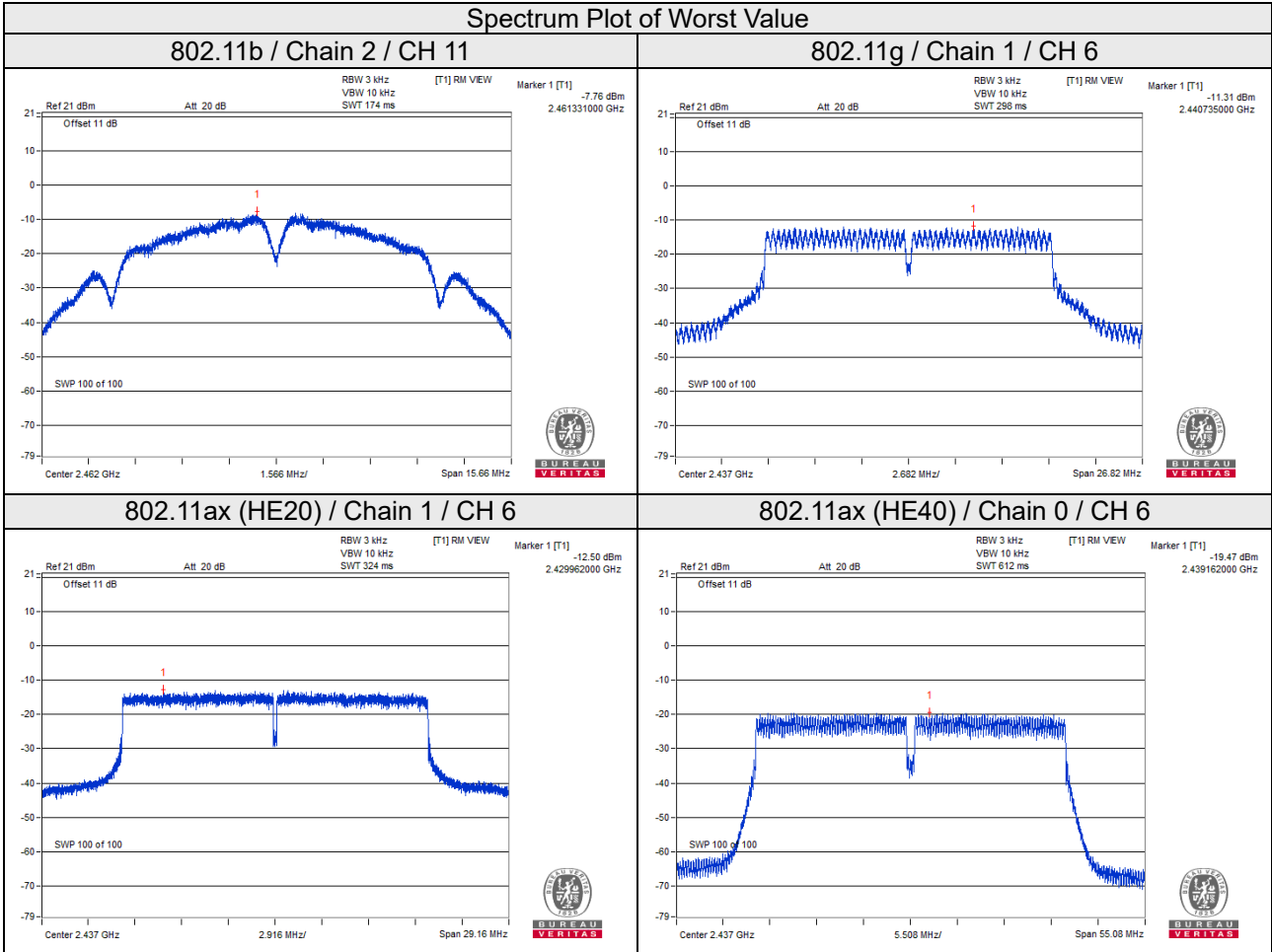
802.11ax (HE40)

TX chain	Channel	Frequency (MHz)	PSD w/o Duty Factor (dBm/3kHz)	10 log (N=4) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass / Fail
0	3	2422	-20.39	6.02	-14.37	4.26	Pass
	6	2437	-19.47	6.02	-13.45	4.26	Pass
	9	2452	-20.09	6.02	-14.07	4.26	Pass
1	3	2422	-20.90	6.02	-14.88	4.26	Pass
	6	2437	-19.78	6.02	-13.76	4.26	Pass
	9	2452	-20.63	6.02	-14.61	4.26	Pass
2	3	2422	-21.07	6.02	-15.05	4.26	Pass
	6	2437	-19.71	6.02	-13.69	4.26	Pass
	9	2452	-20.40	6.02	-14.38	4.26	Pass
3	3	2422	-20.04	6.02	-14.02	4.26	Pass
	6	2437	-19.47	6.02	-13.45	4.26	Pass
	9	2452	-20.09	6.02	-14.07	4.26	Pass

Note:

- Method E) 2) c) of power density measurement of KDB 662911 is using for calculating total power density, Measure value and add $10 \log (N_{ANT})$ dB.
- Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2/4] = 9.74\text{dBi} > 6\text{dBi}$, so the power limit shall be reduced to $8-(9.74-6) = 4.26\text{dBm}$.

Spectrum Plot of Worst Value

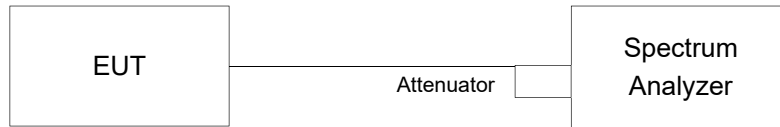


4.6 Conducted Out of Band Emission Measurement

4.6.1 Limits of Conducted Out of Band Emission Measurement

Below 30dB of the highest emission level of operating band (in 100kHz Resolution Bandwidth).

4.6.2 Test Setup



4.6.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.6.4 Test Procedure

MEASUREMENT PROCEDURE REF

- Set the RBW = 100 kHz.
- Set the VBW \geq 300 kHz.
- Detector = peak.
- Sweep time = auto couple.
- Trace mode = max hold.
- Allow trace to fully stabilize.
- Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.

MEASUREMENT PROCEDURE OOB

- Set RBW = 100 kHz.
- Set VBW \geq 300 kHz.
- Detector = peak.
- Sweep = auto couple.
- Trace Mode = max hold.
- Allow trace to fully stabilize.
- Use the peak marker function to determine the maximum amplitude level.

4.6.5 Deviation from Test Standard

No deviation.

4.6.6 EUT Operating Condition

Same as item 4.3.6

4.6.7 Test Results

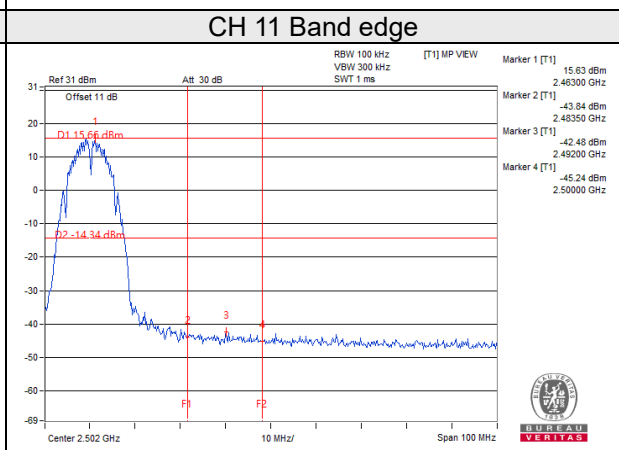
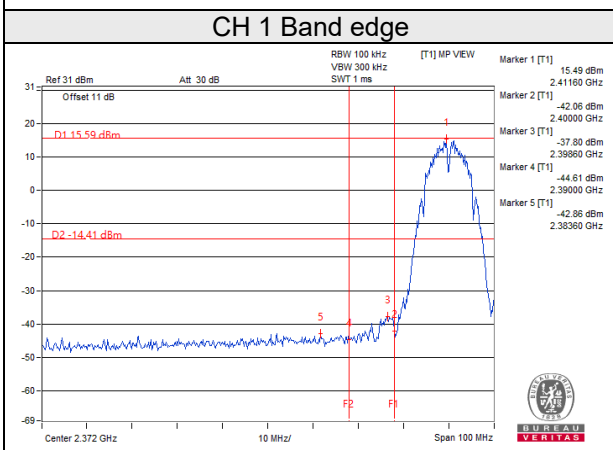
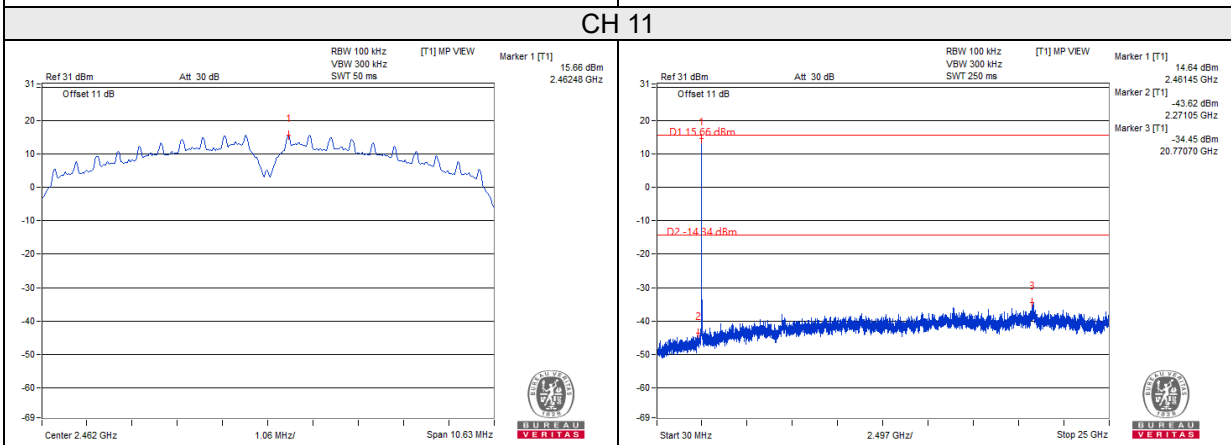
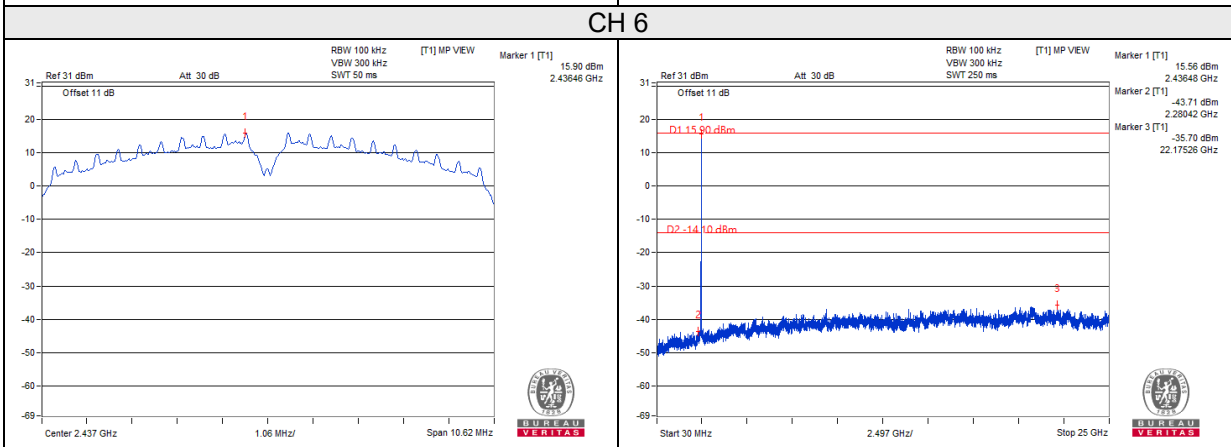
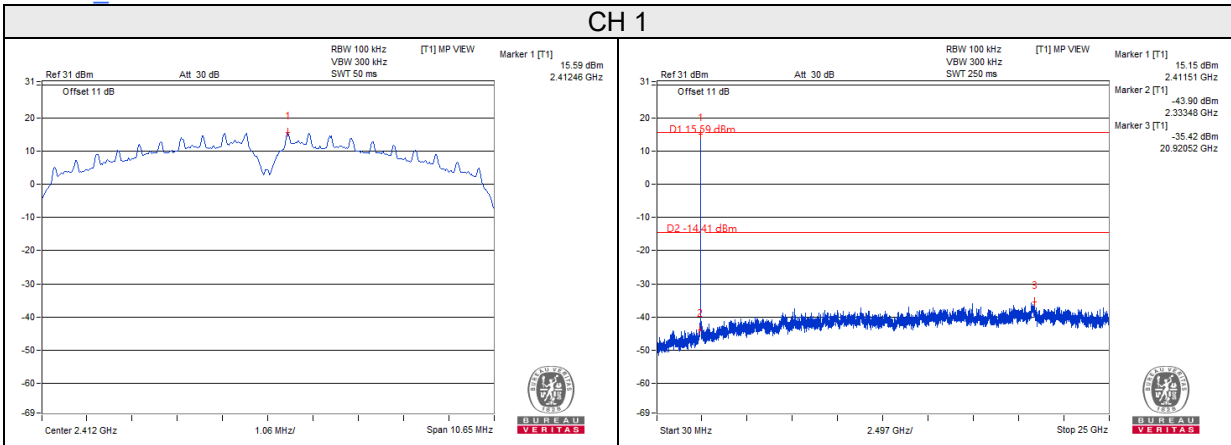
The conducted emission test is performed on each TX port of operating mode without summing or adding 10log (N) since the limit is relative emission limit.

The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 30dB offset below D1. It shows compliance with the requirement.



BUREAU VERITAS

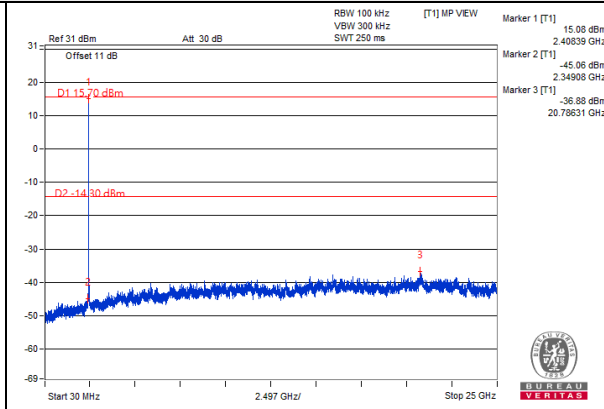
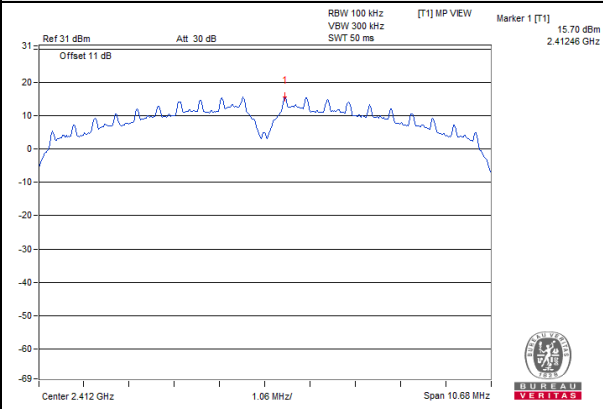
802.11b_Chain 0



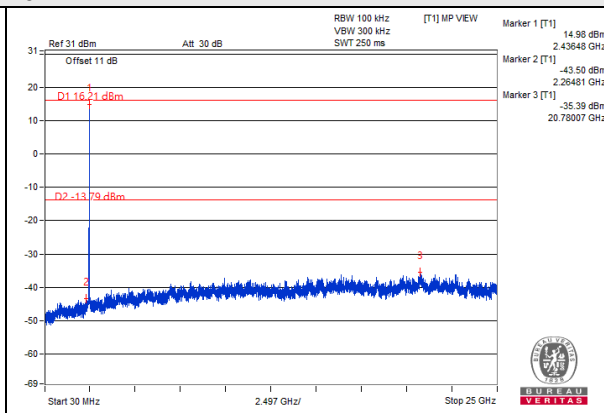
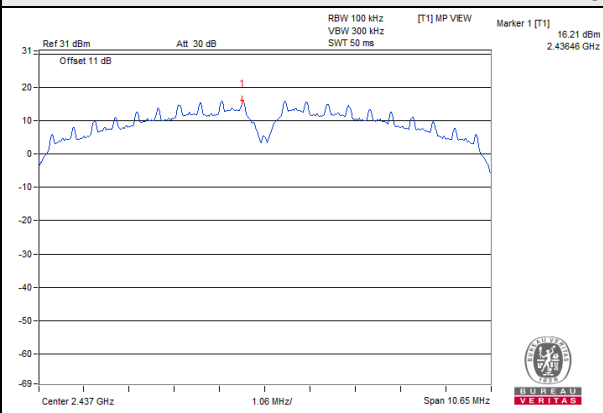


802.11b_Chain 1

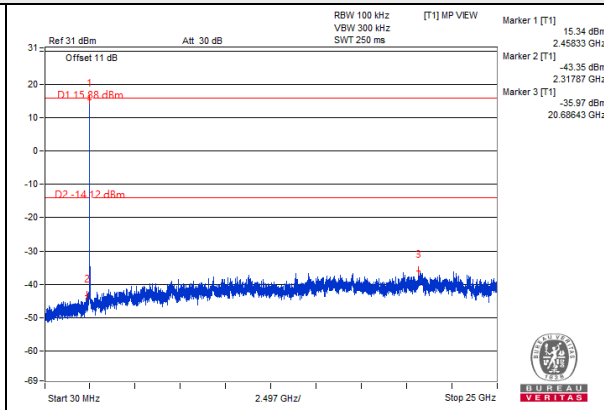
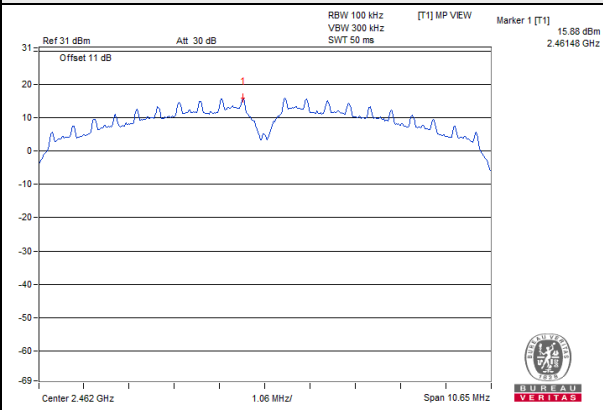
CH 1



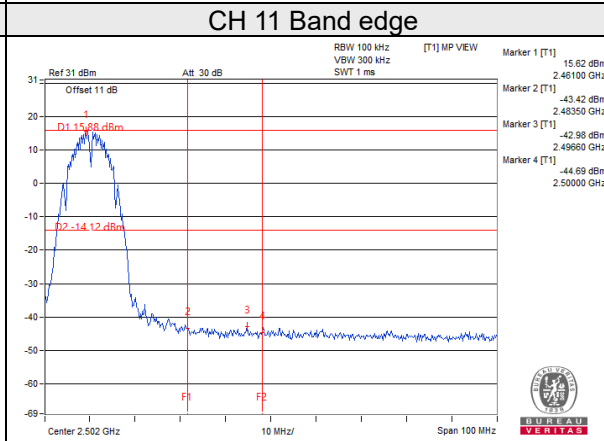
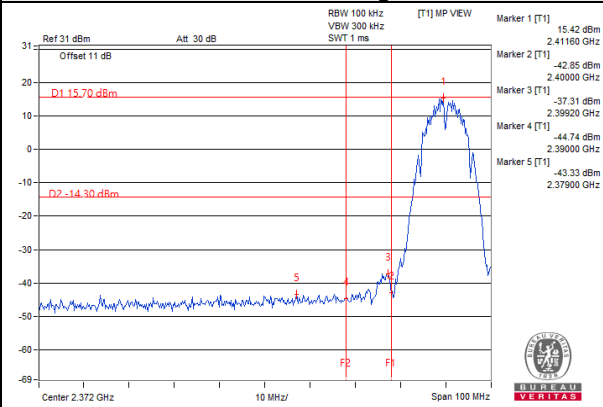
CH 6



CH 11



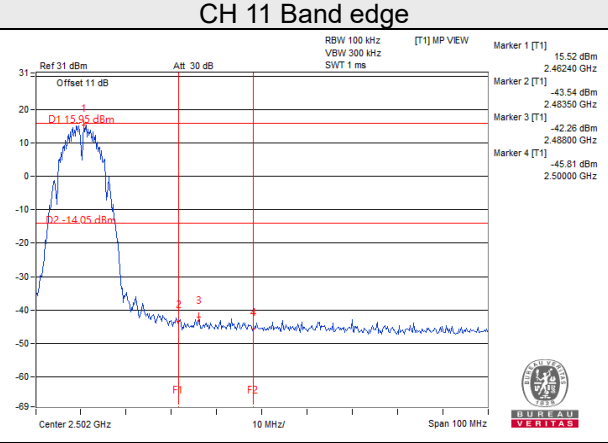
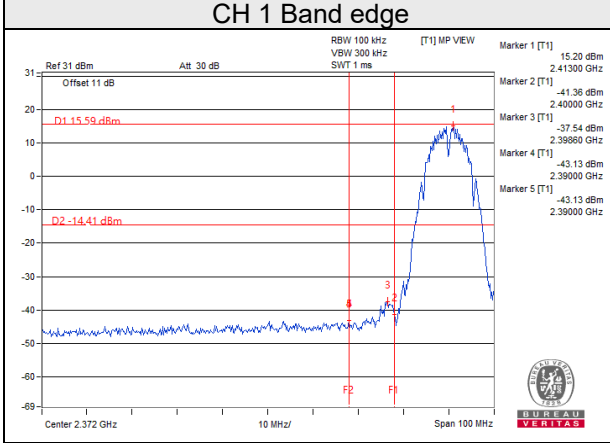
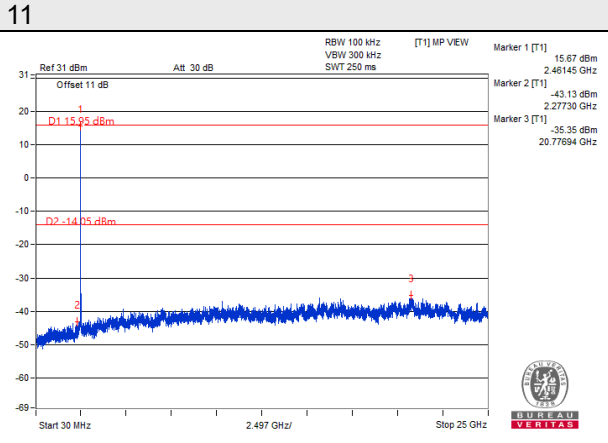
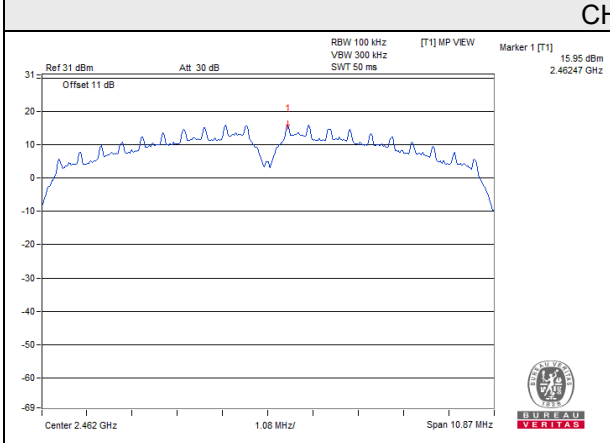
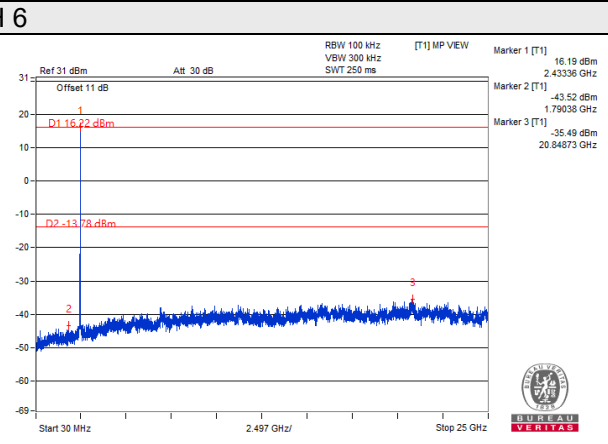
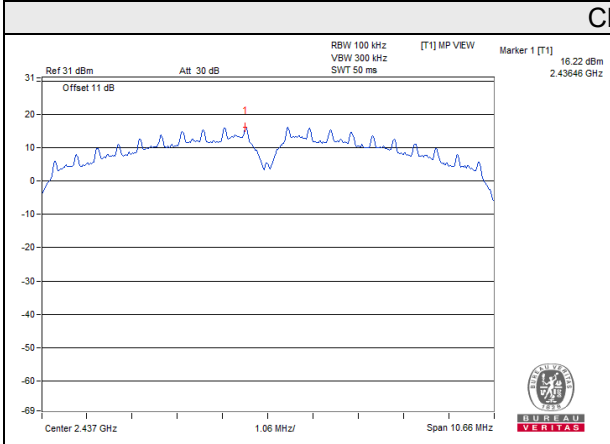
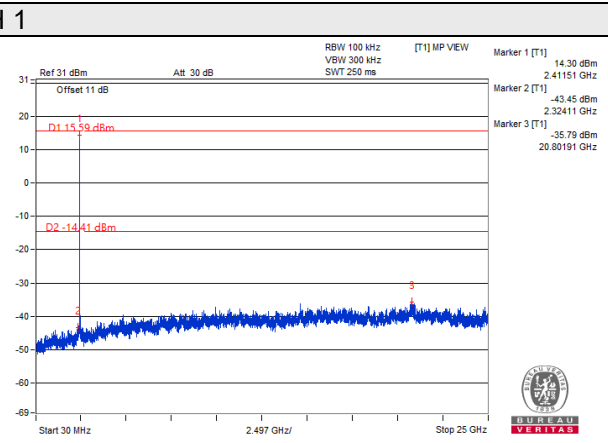
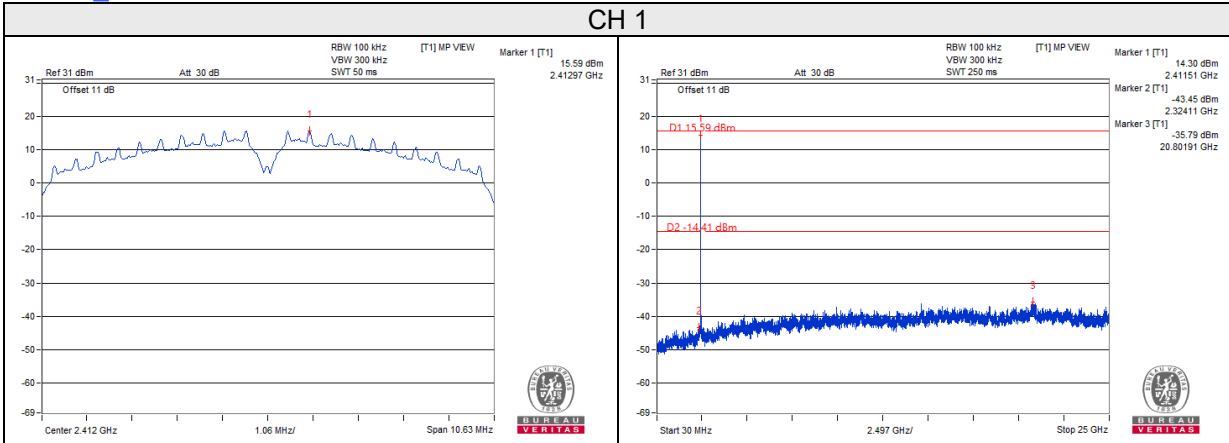
CH 11 Band edge





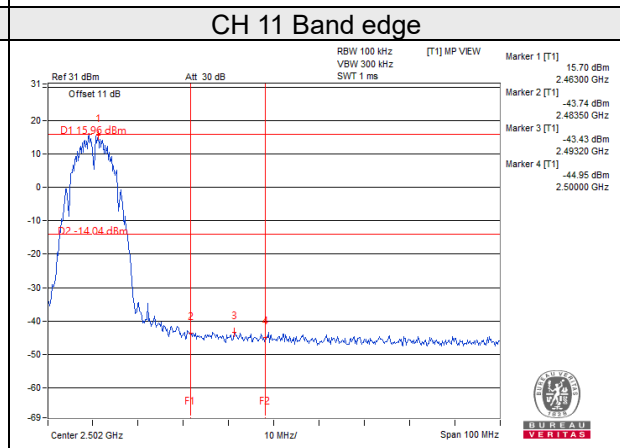
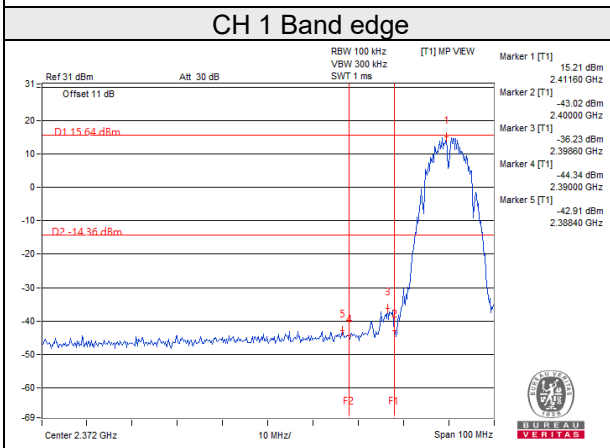
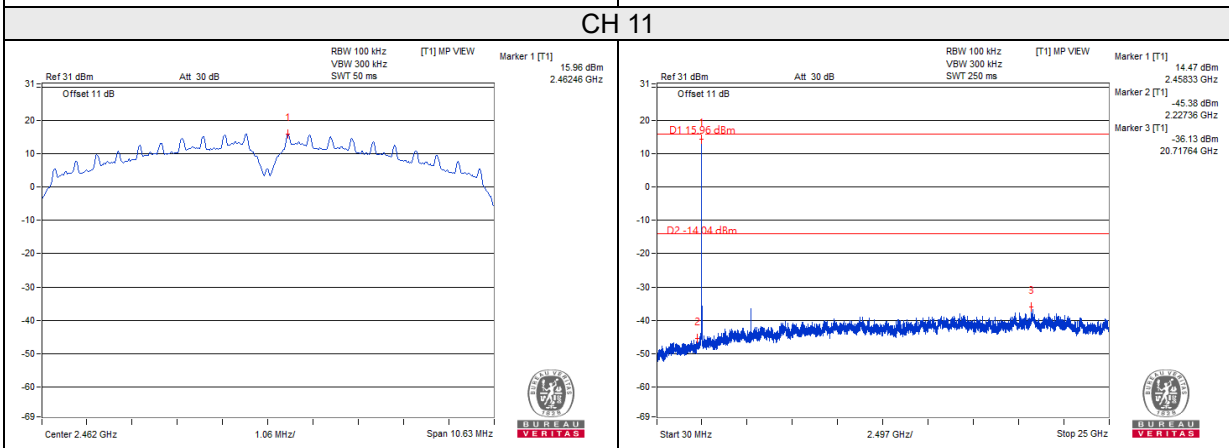
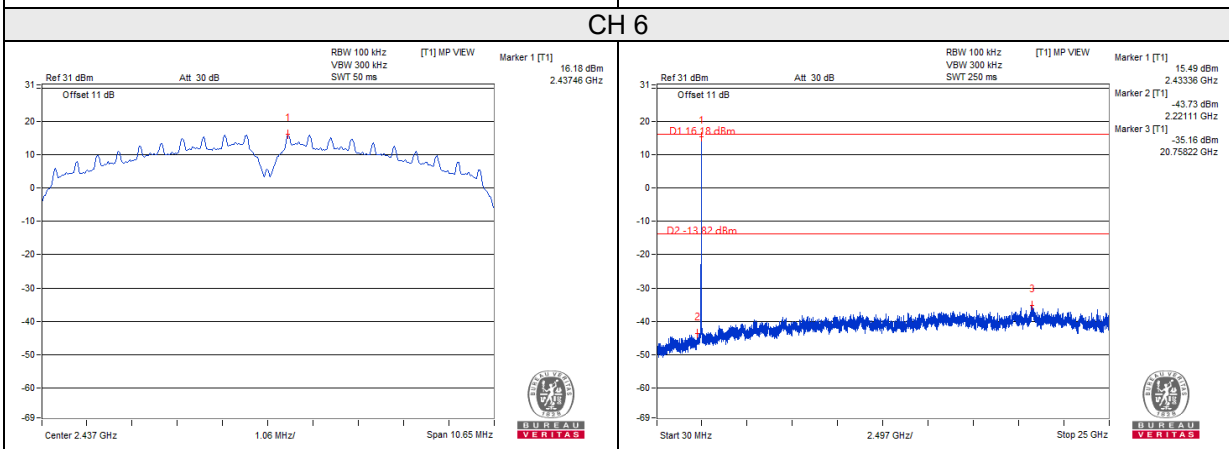
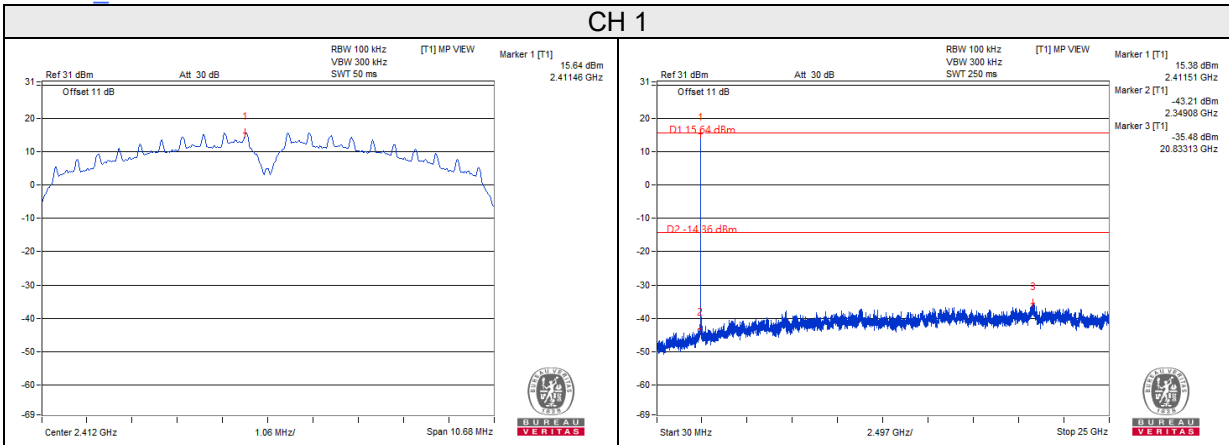
BUREAU VERITAS

802.11b_Chain 2





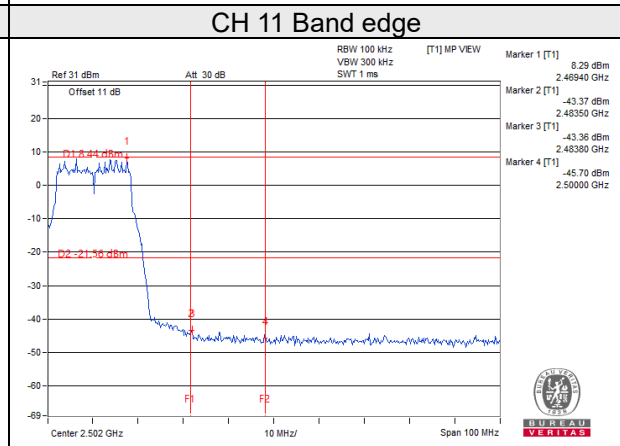
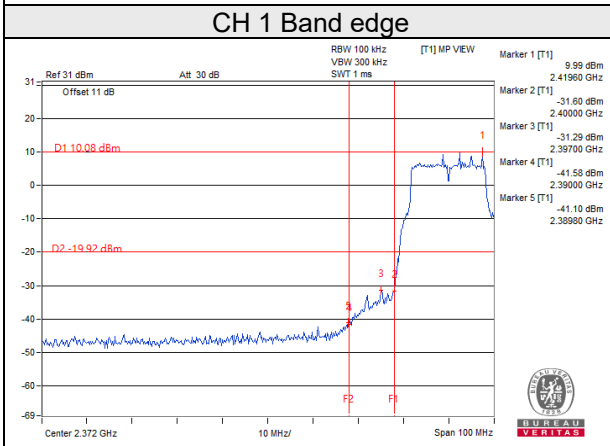
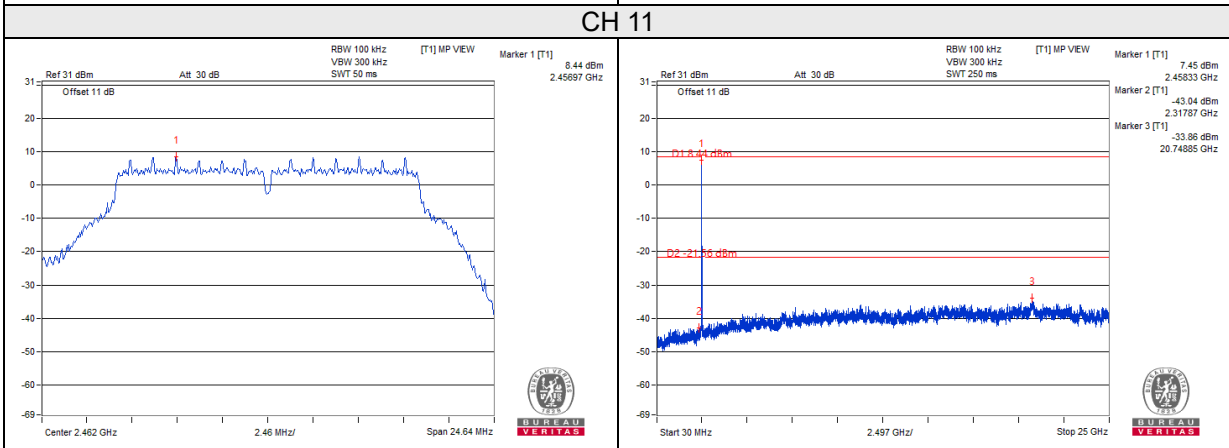
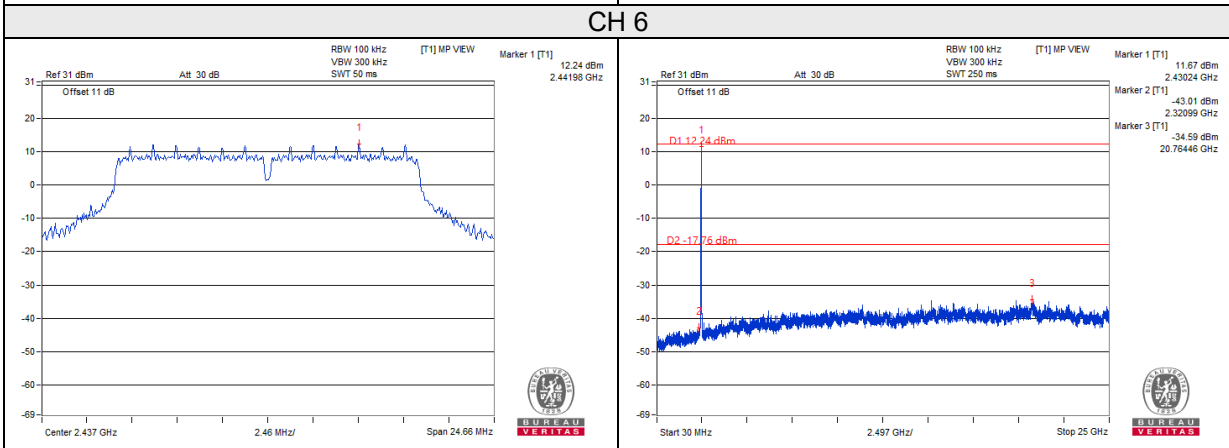
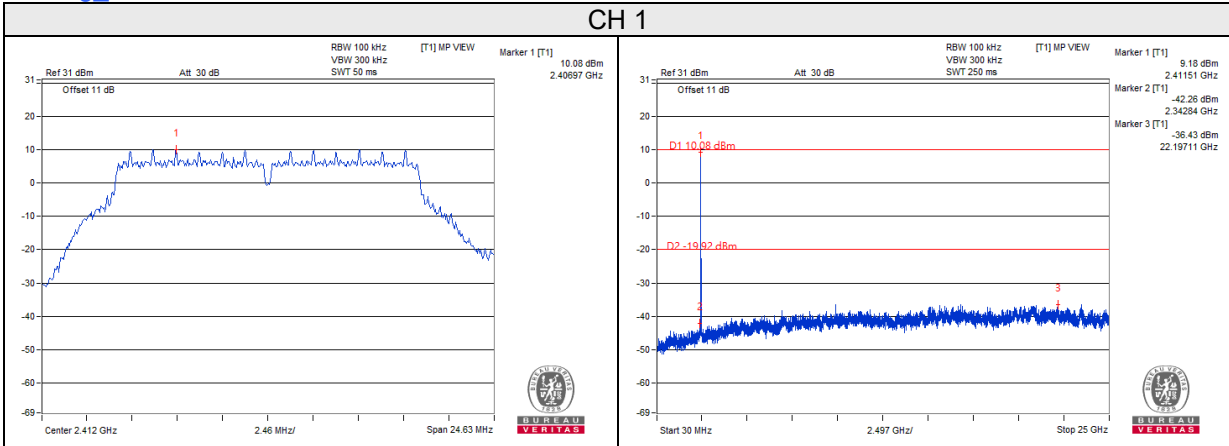
802.11b_Chain 3





BUREAU VERITAS

802.11g_Chain 0

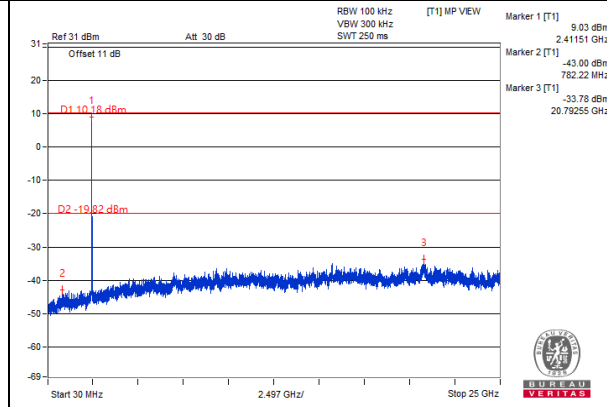
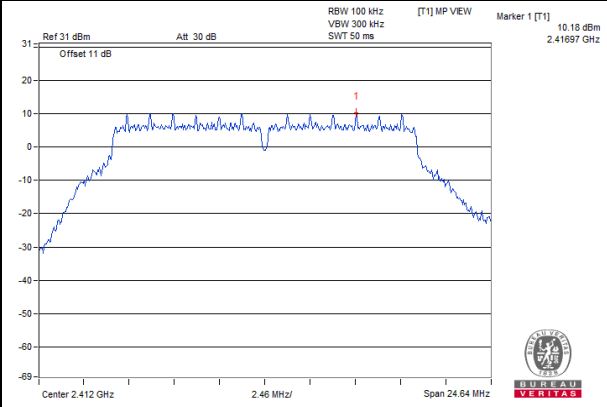




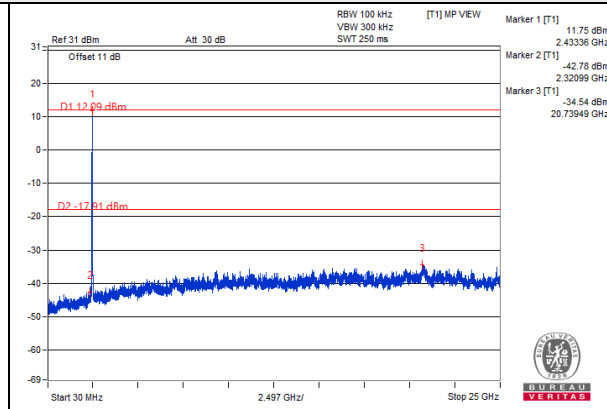
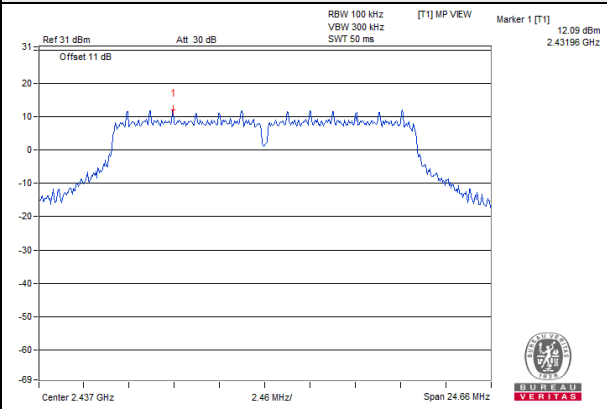
BUREAU VERITAS

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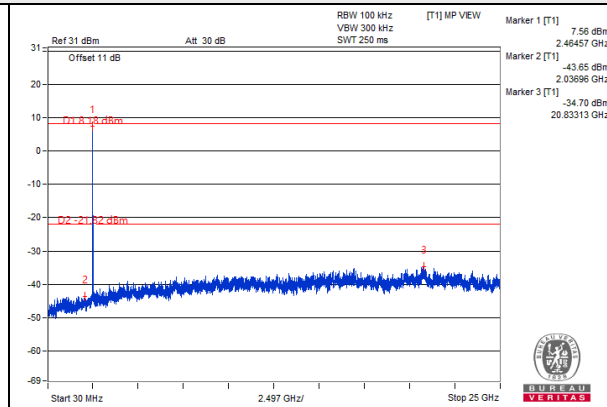
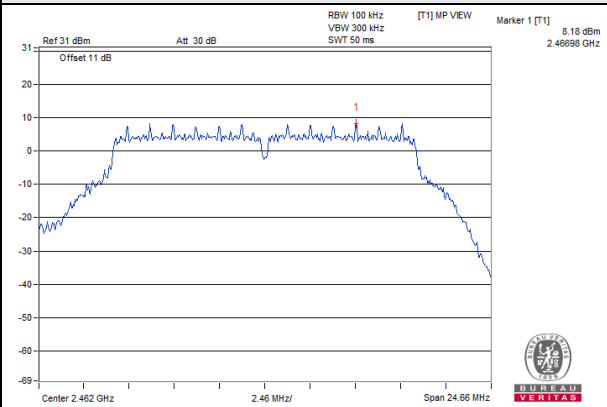
CH 1



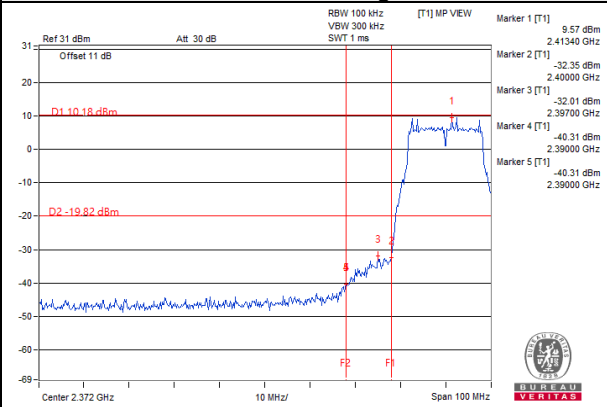
CH 6



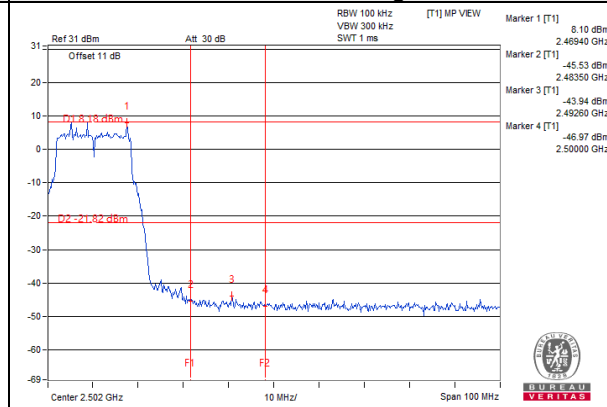
CH 11



CH 1 Band edge



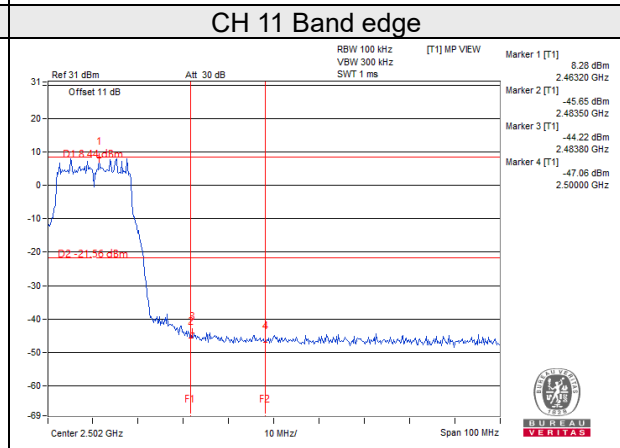
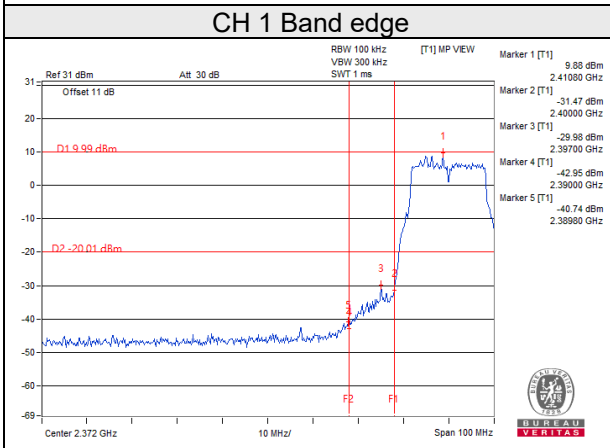
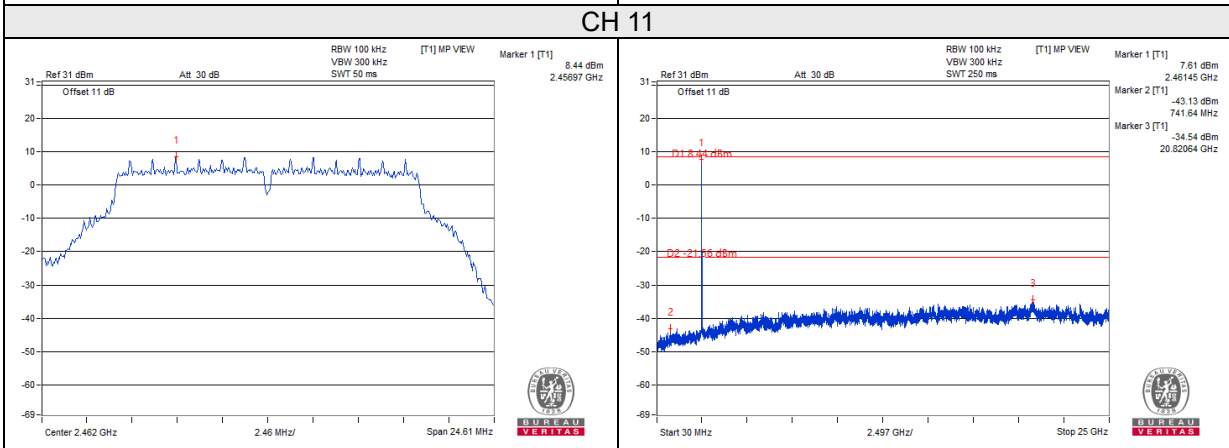
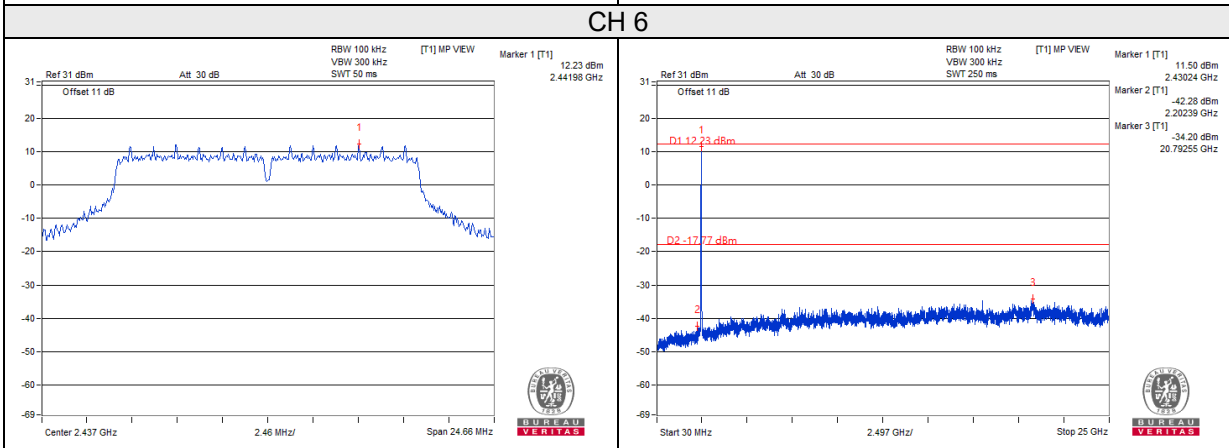
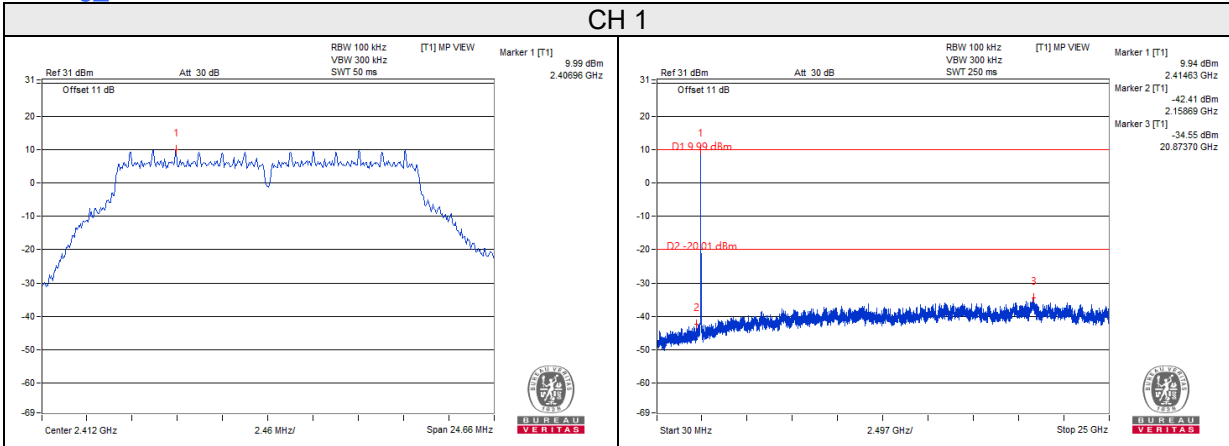
CH 11 Band edge





BUREAU VERITAS

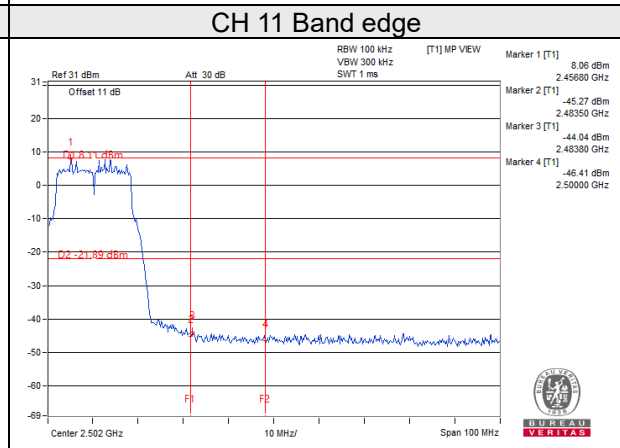
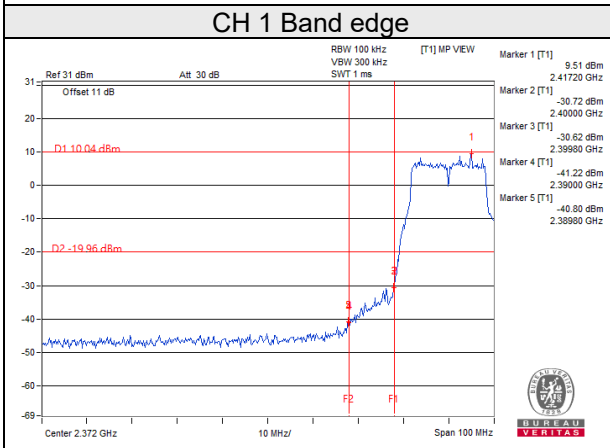
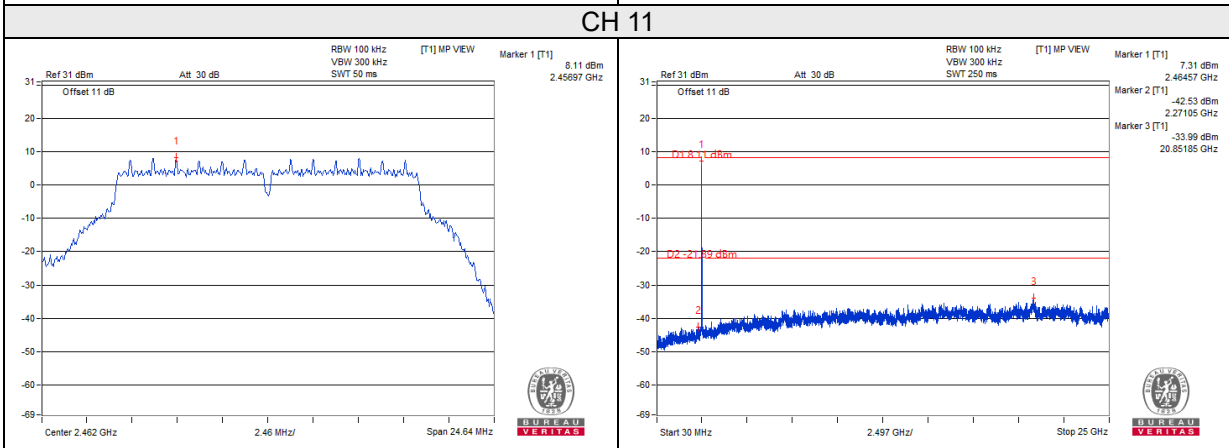
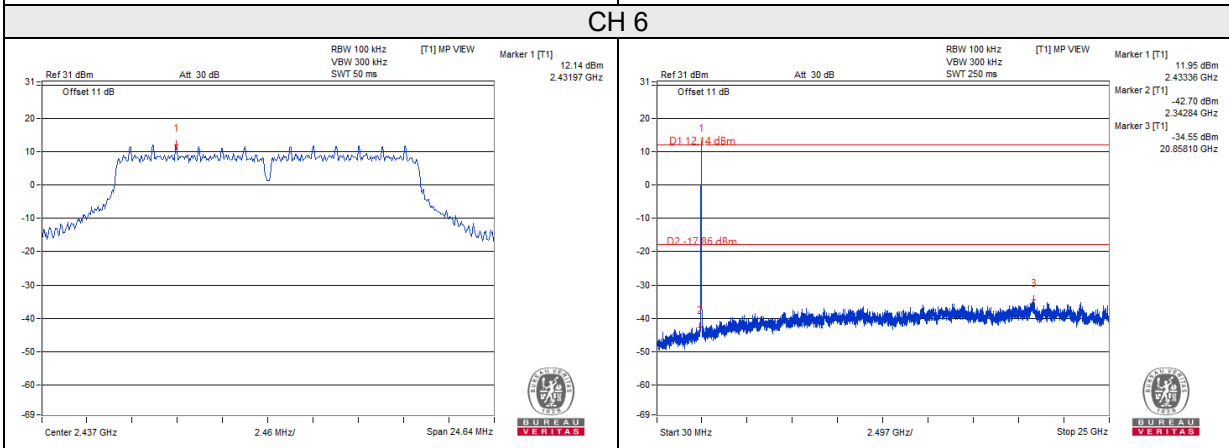
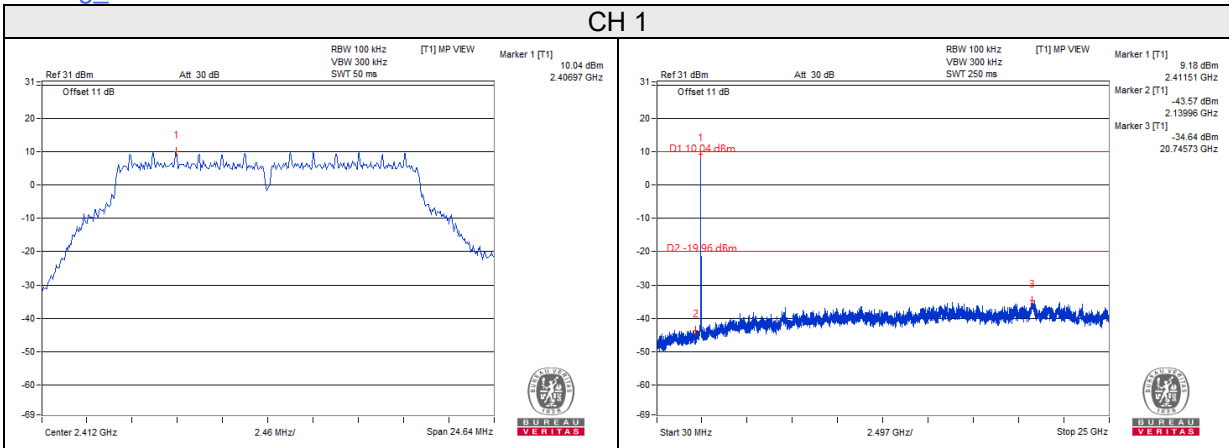
802.11g_Chain 2





BUREAU VERITAS

802.11g_Chain 3

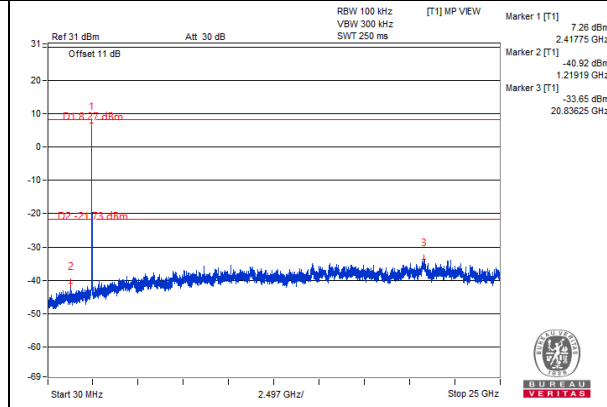
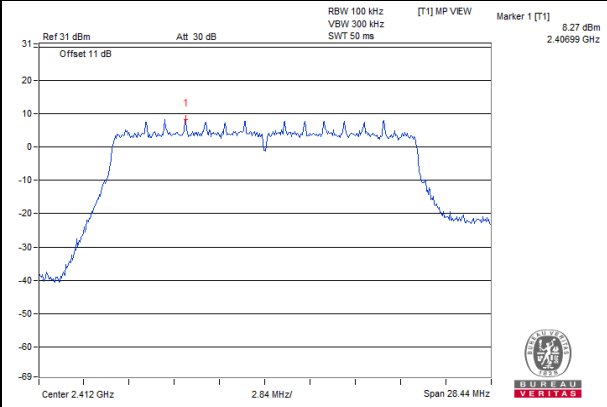




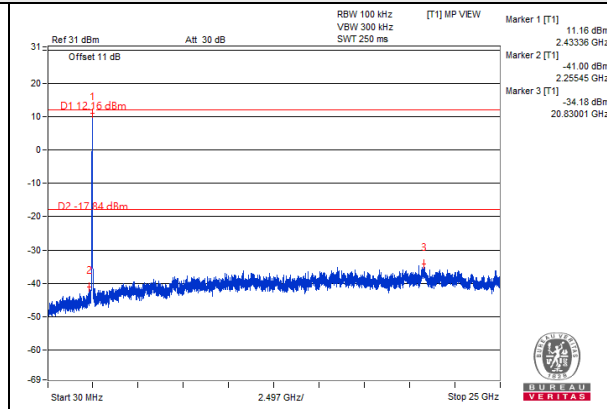
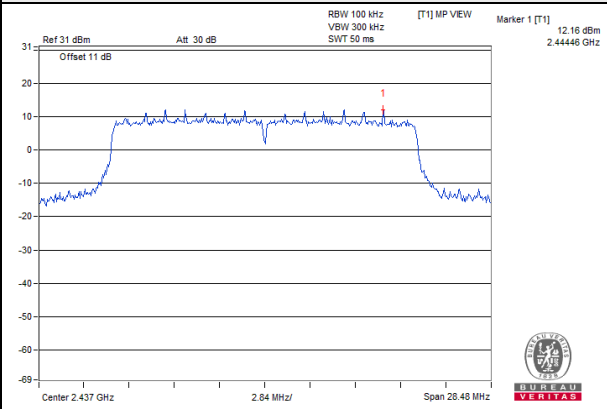
BUREAU VERITAS

802.11ax (HE20)_Chain 0

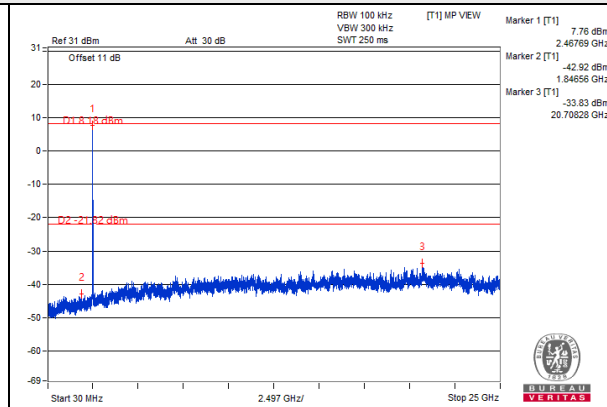
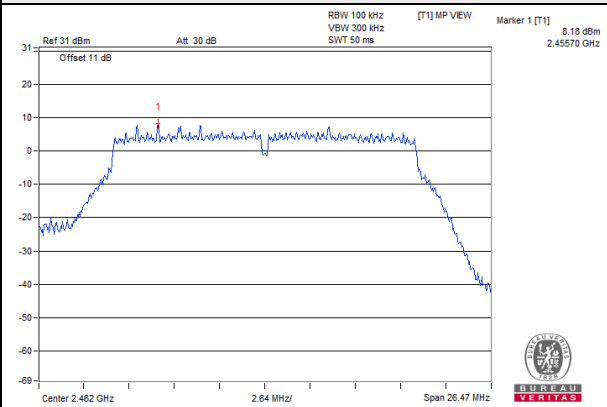
CH 1



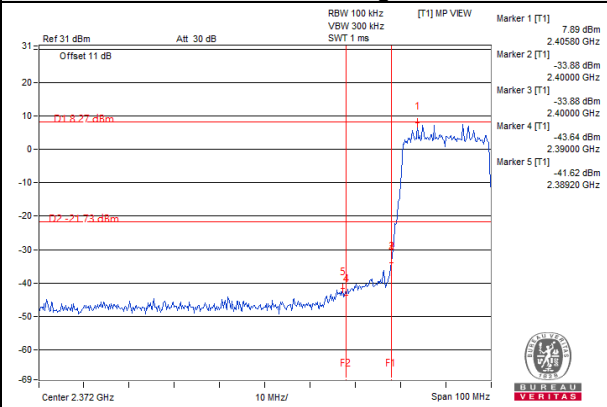
CH 6



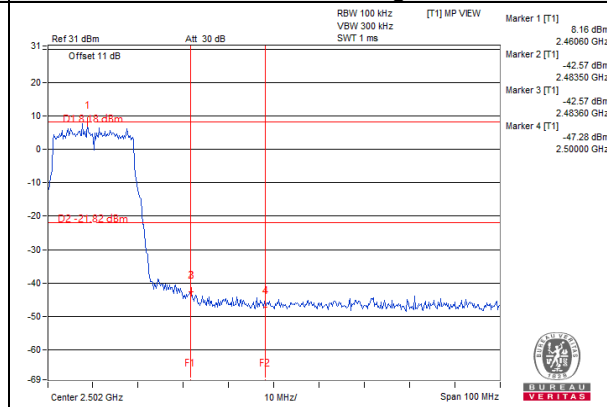
CH 11



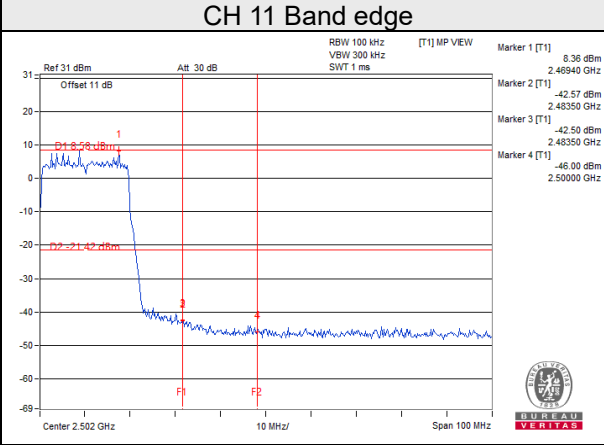
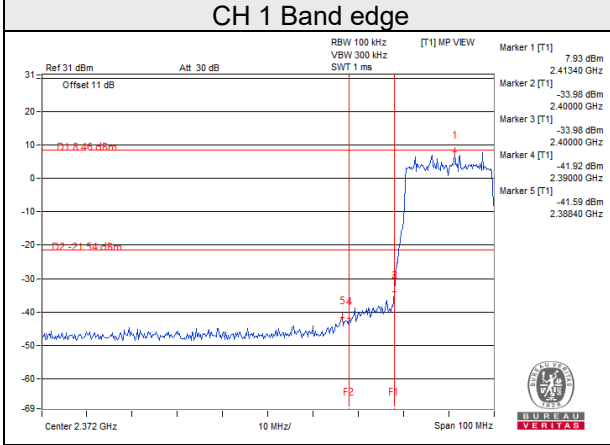
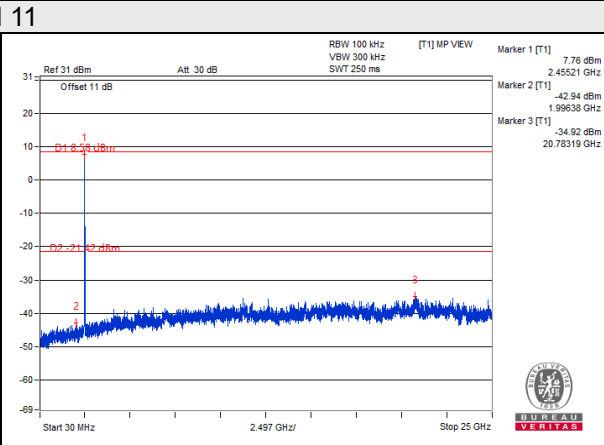
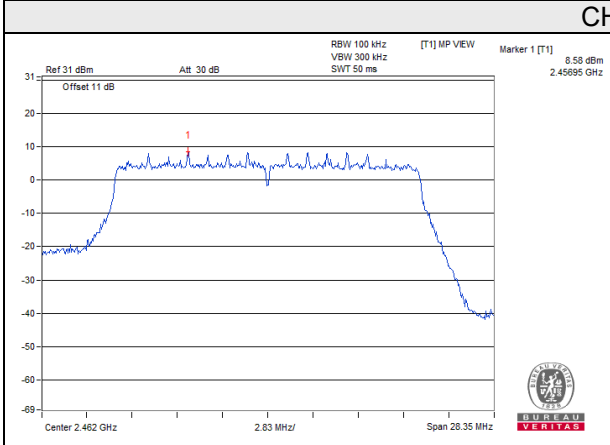
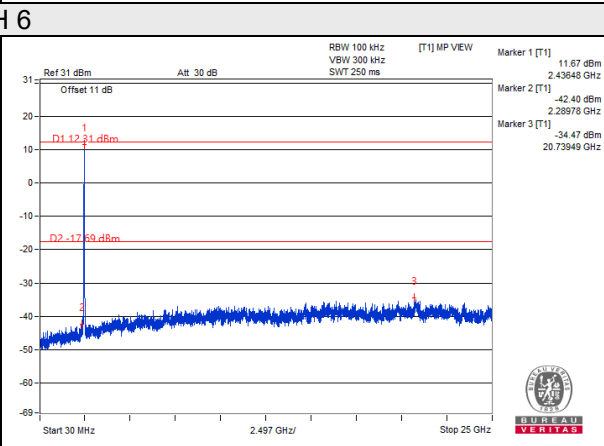
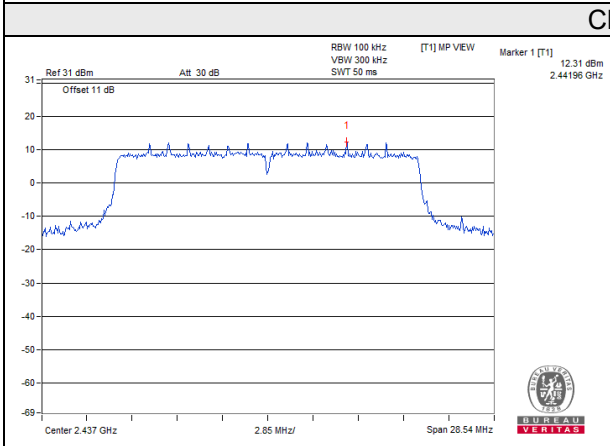
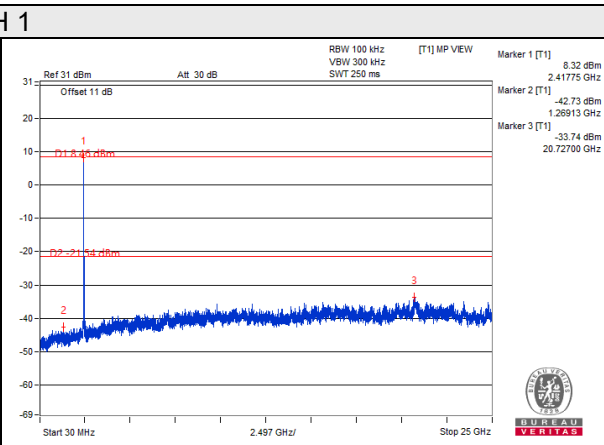
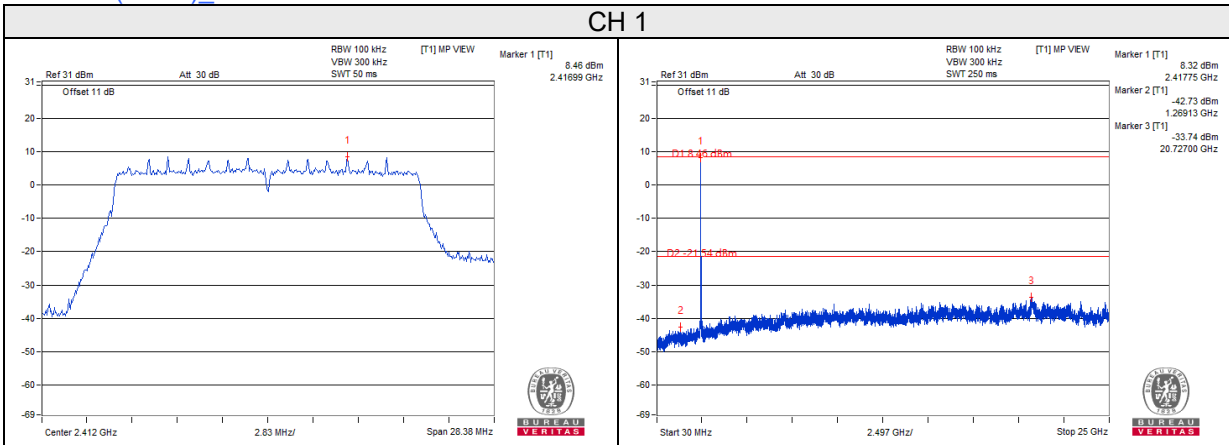
CH 1 Band edge



CH 11 Band edge



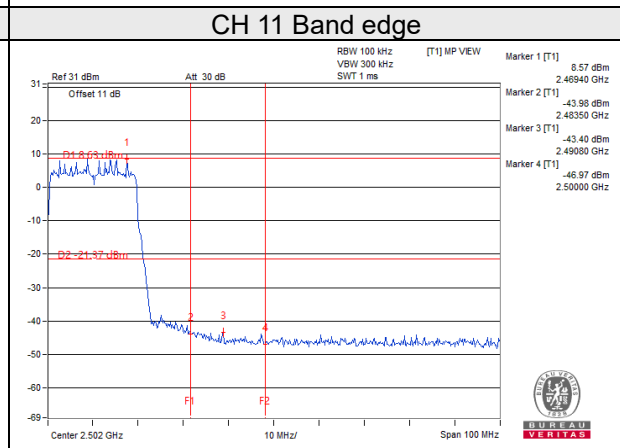
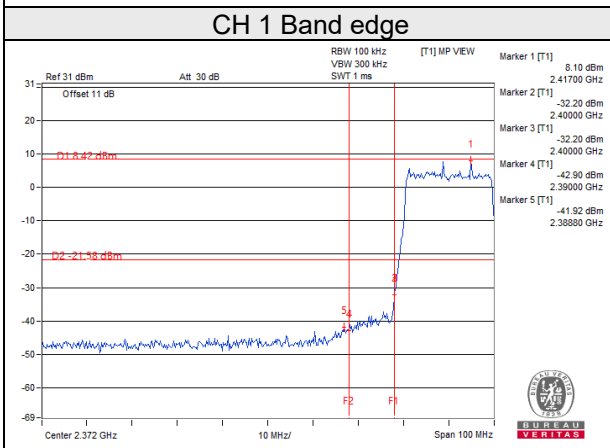
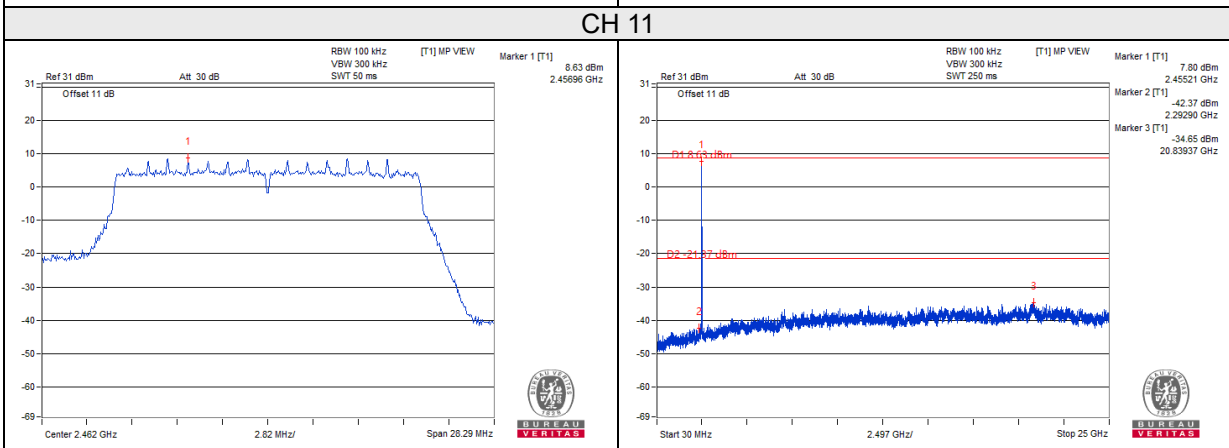
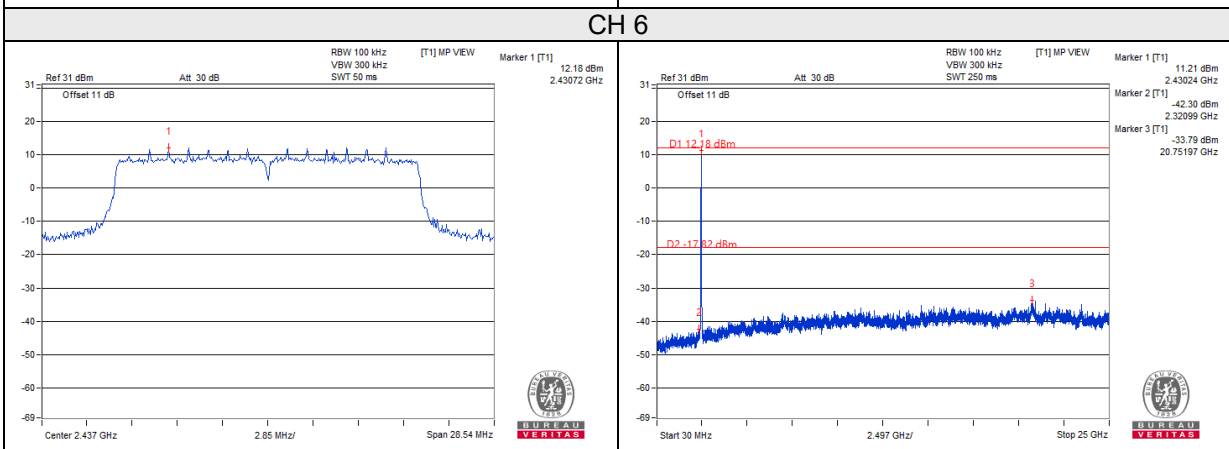
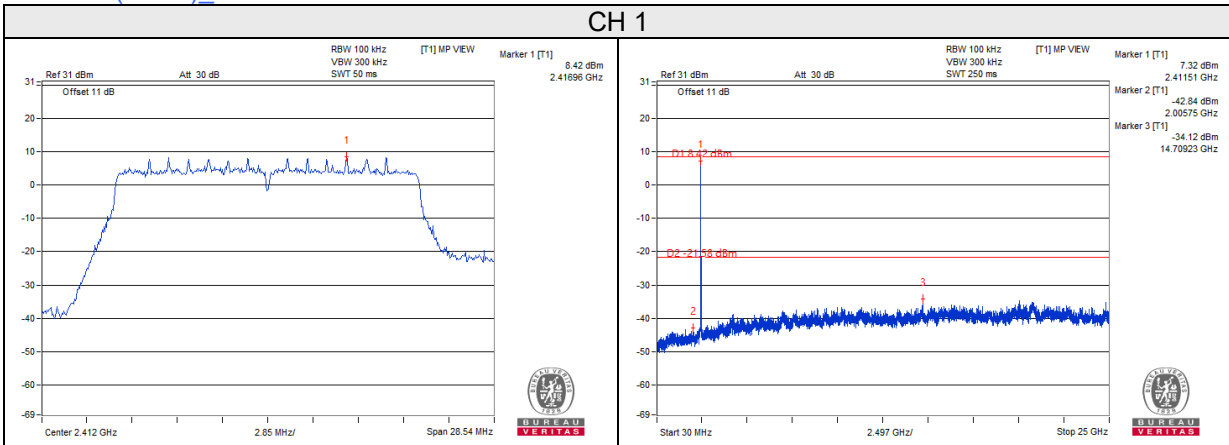
802.11ax (HE20)_Chain 1





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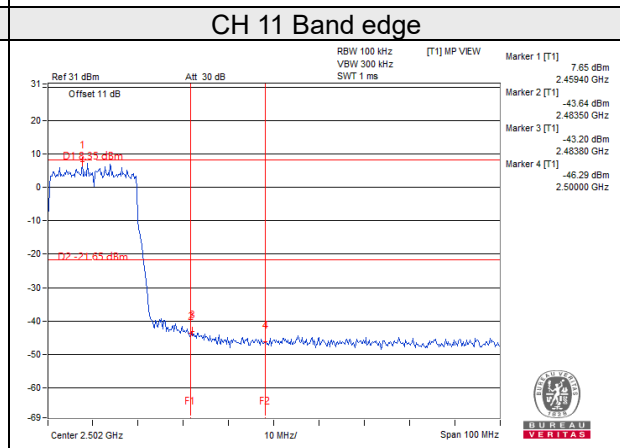
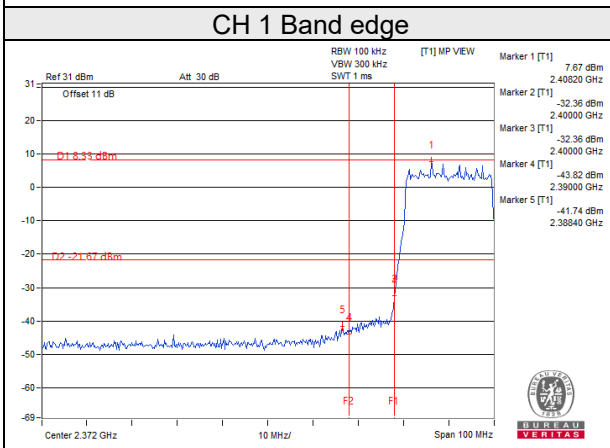
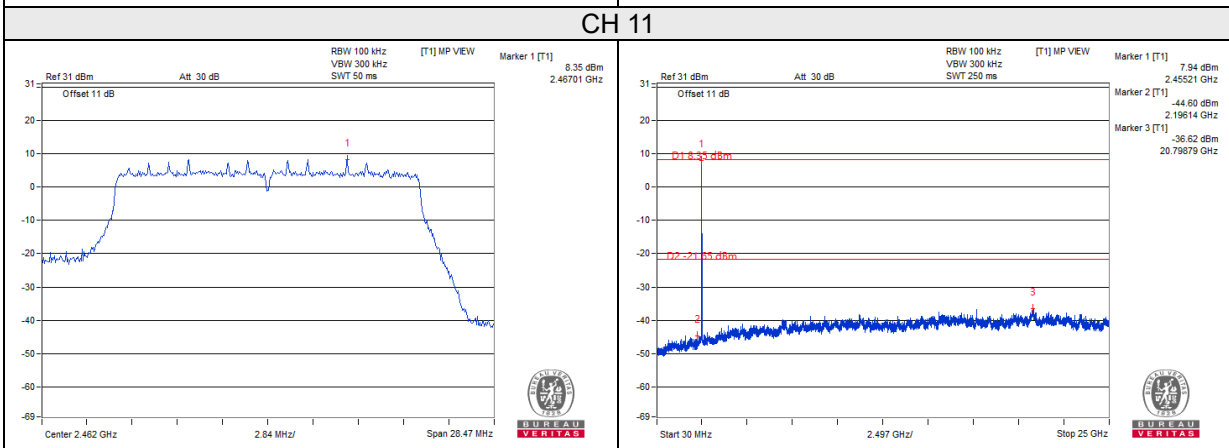
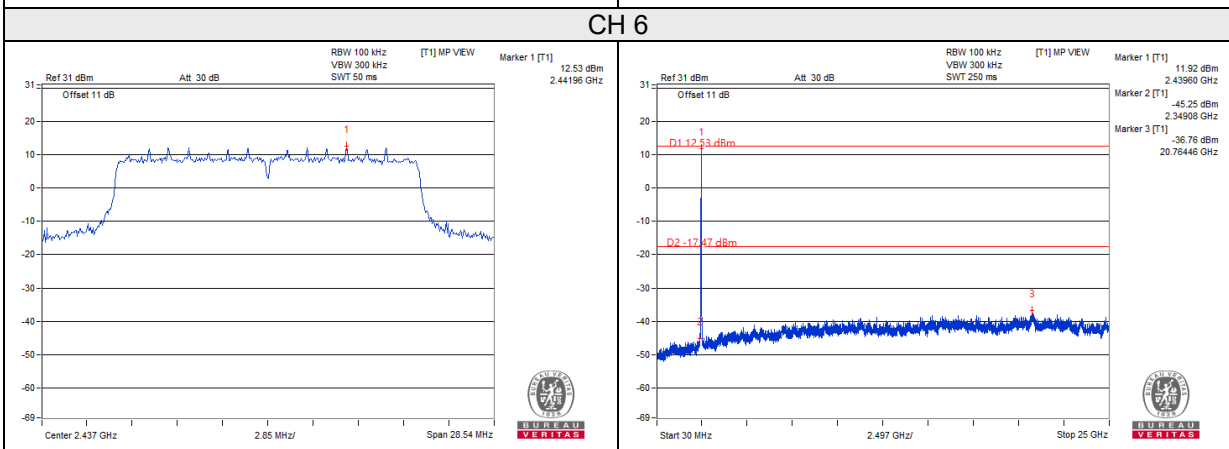
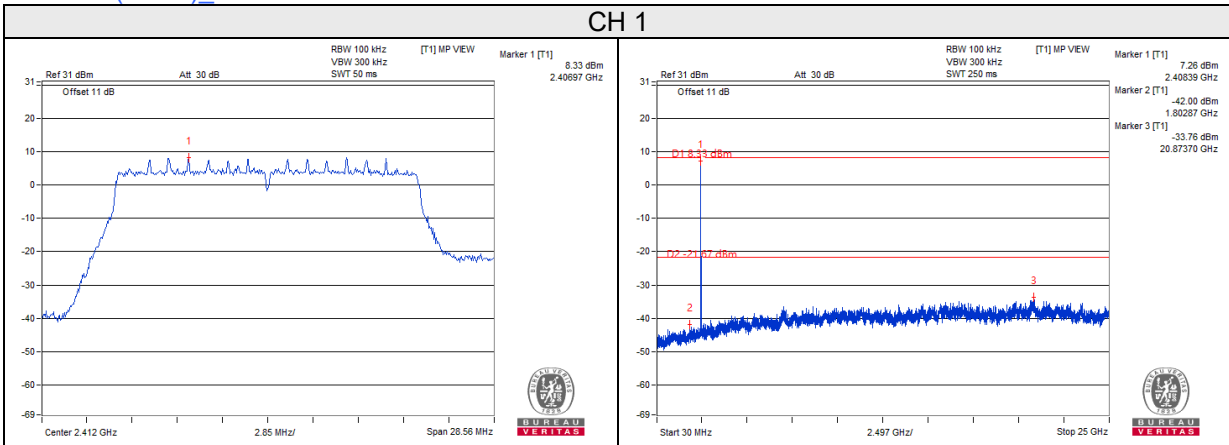
802.11ax (HE20)_Chain 2



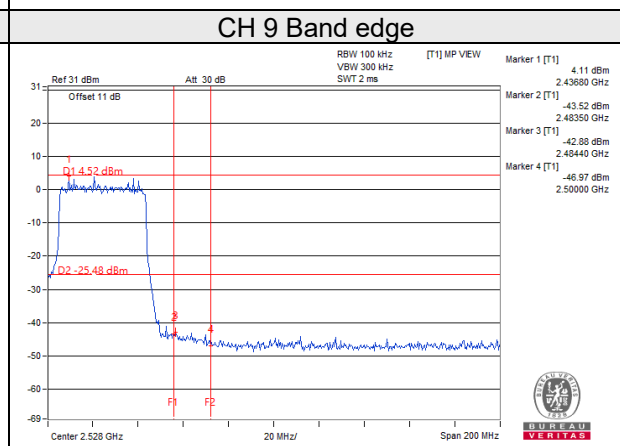
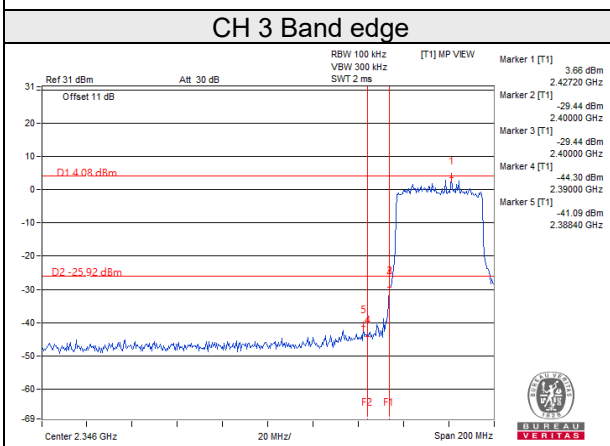
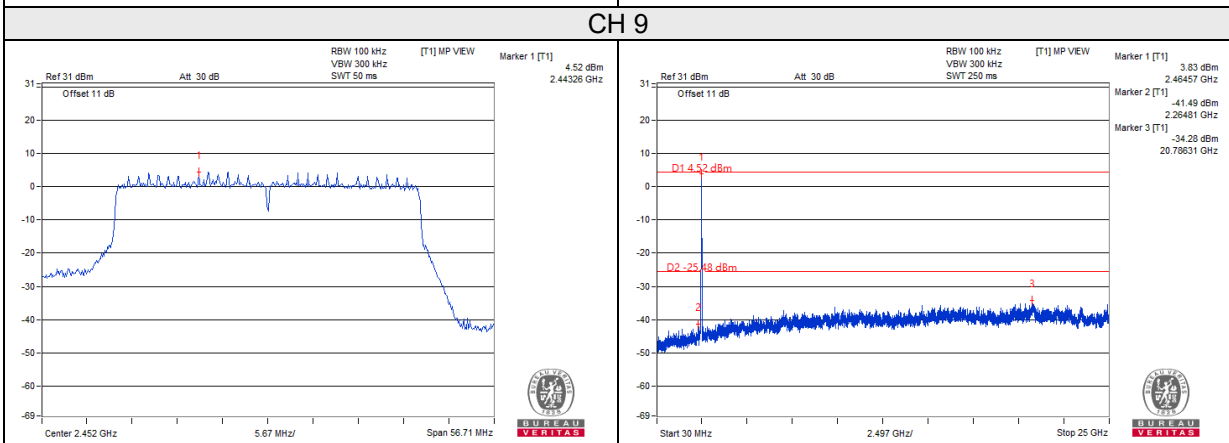
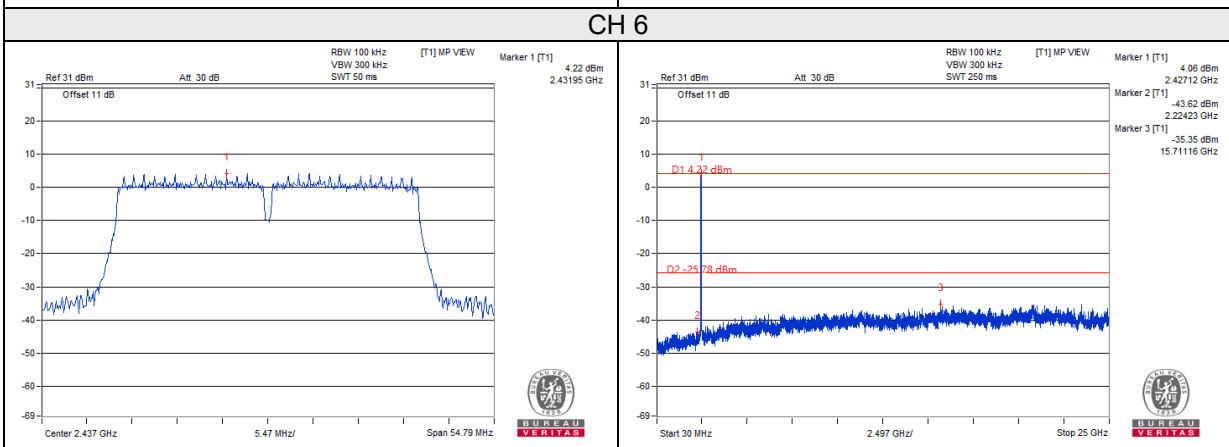
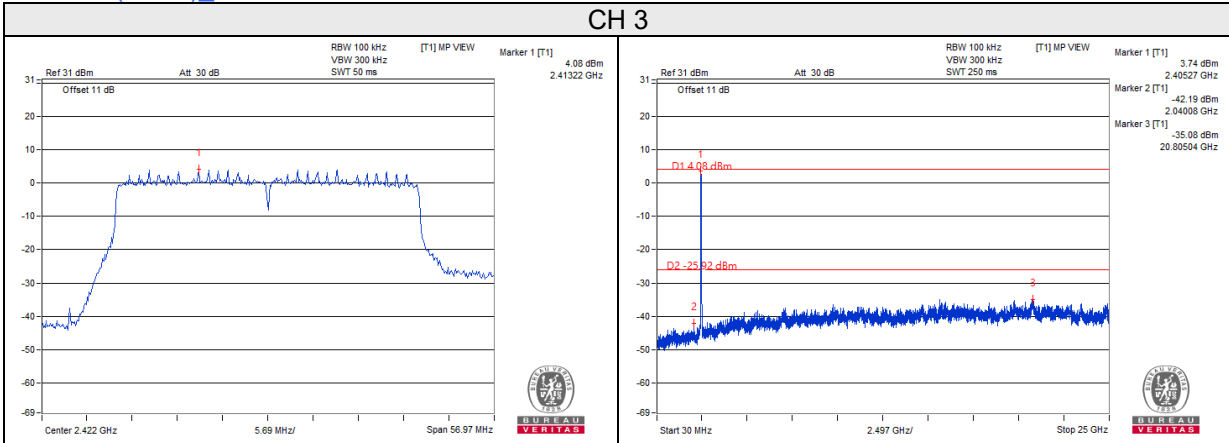


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802.11ax (HE20)_Chain 3



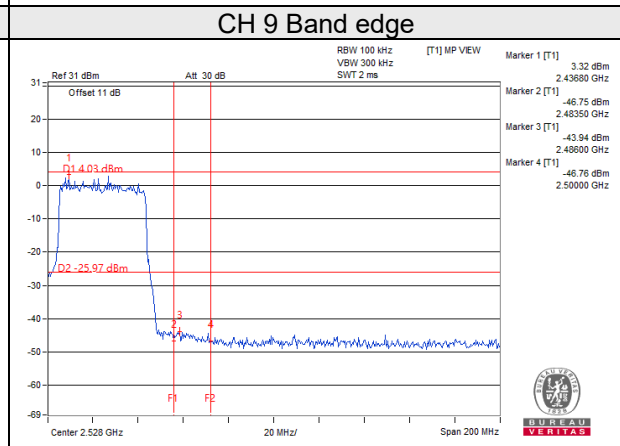
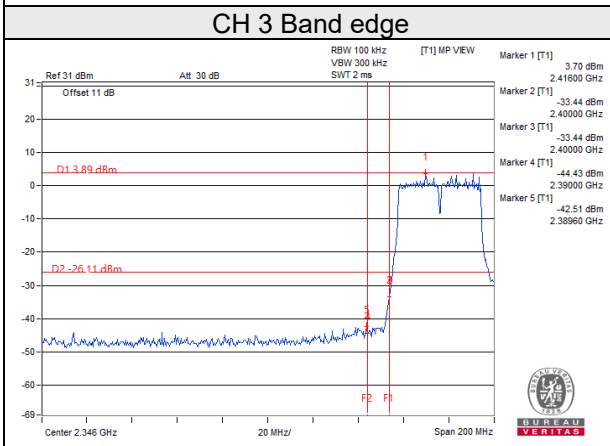
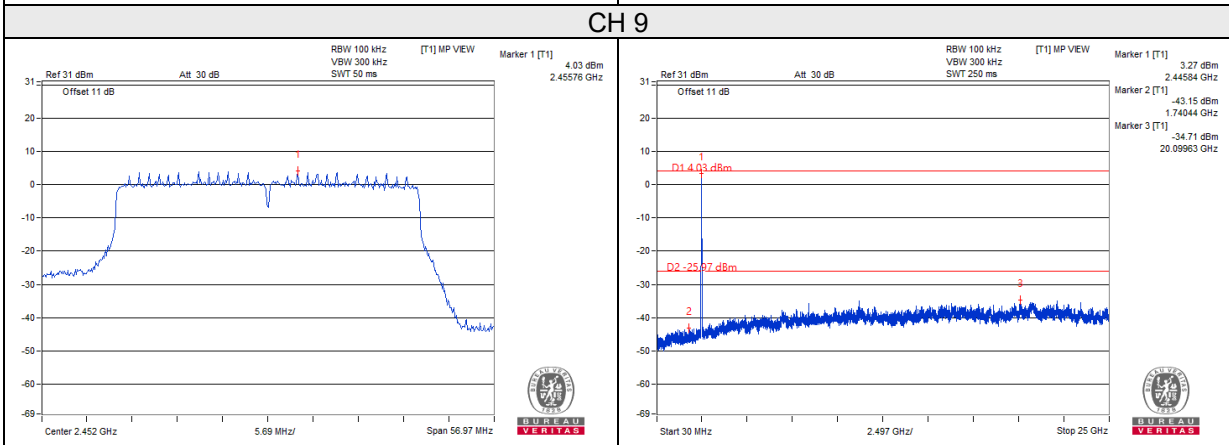
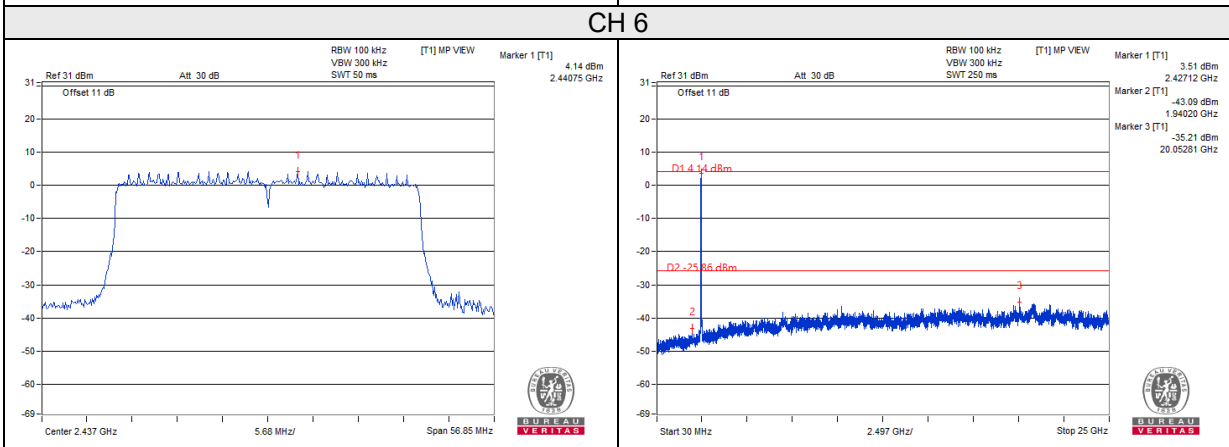
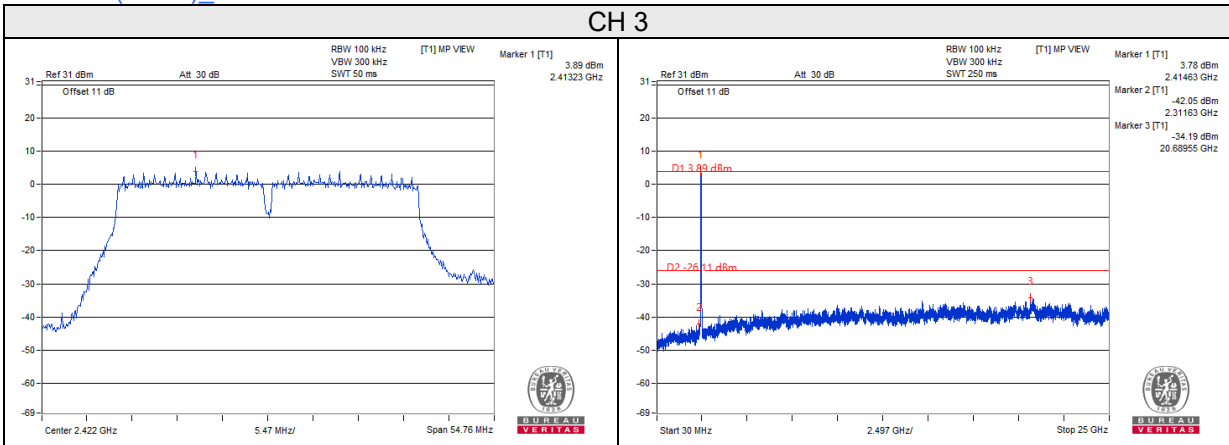
802.11ax (HE40)_Chain 0



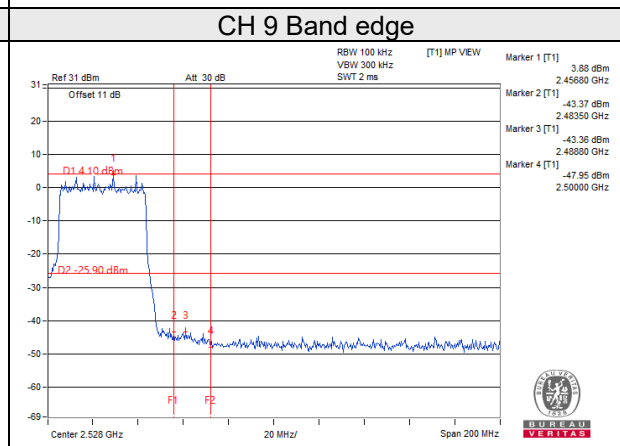
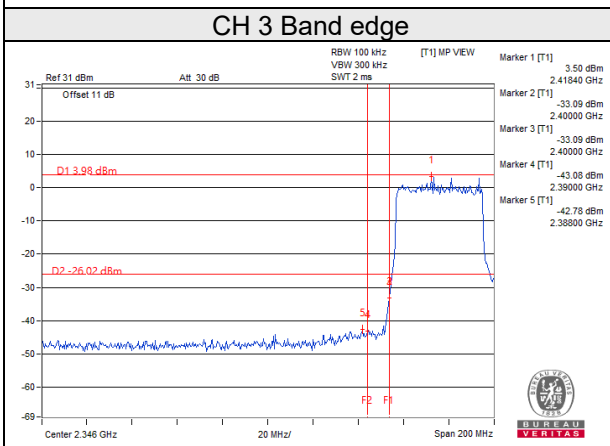
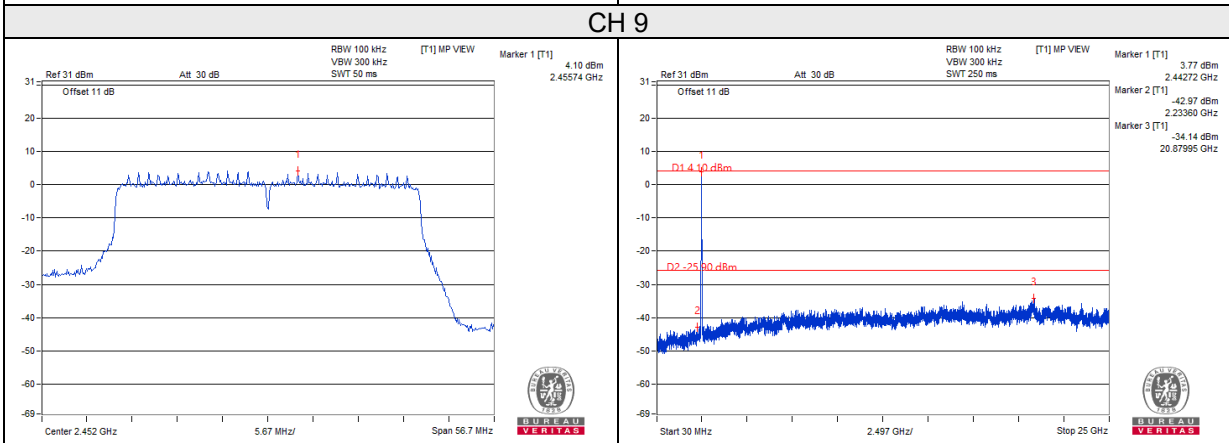
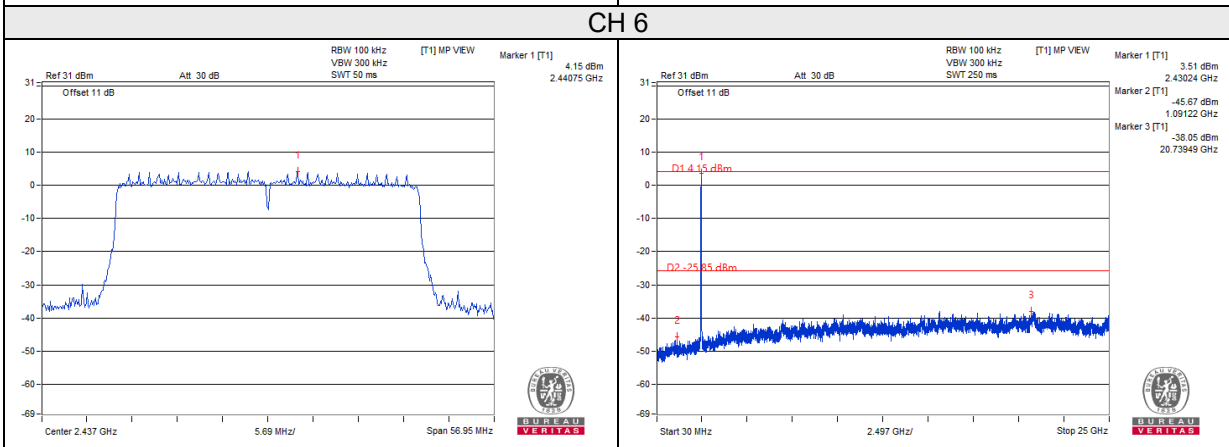
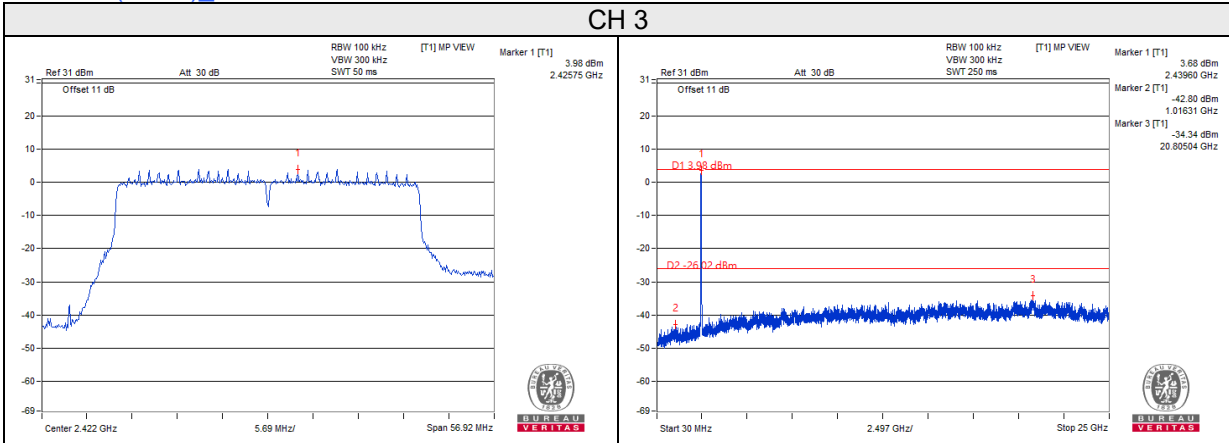


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802.11ax (HE40)_Chain 1



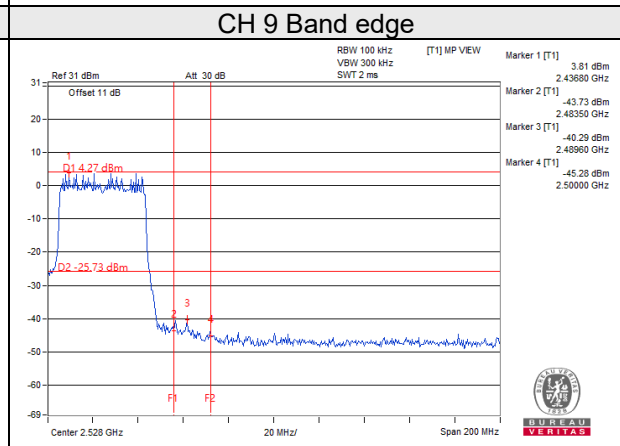
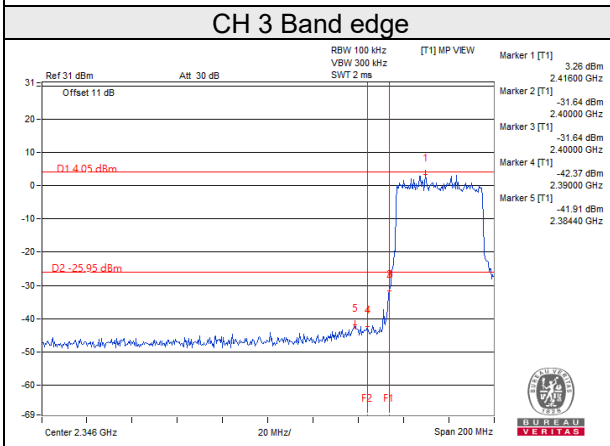
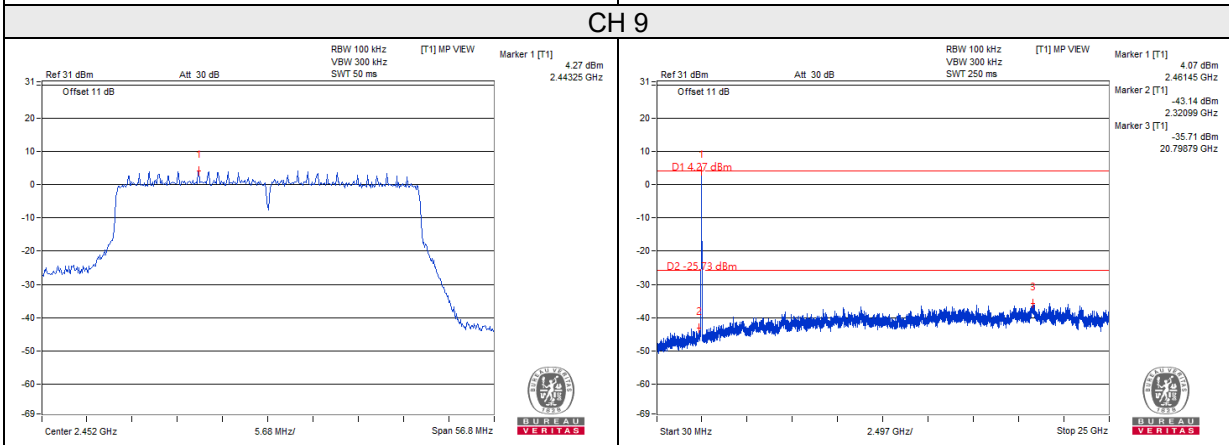
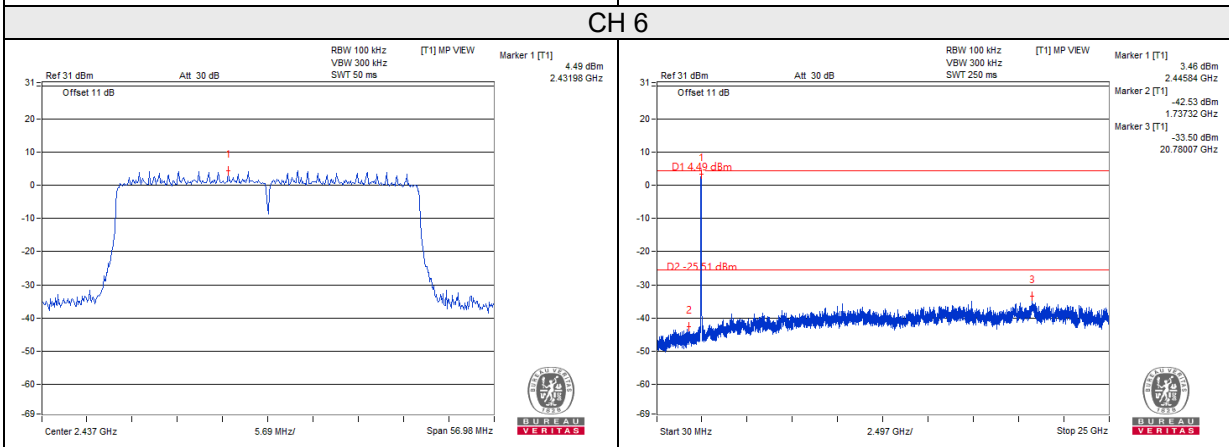
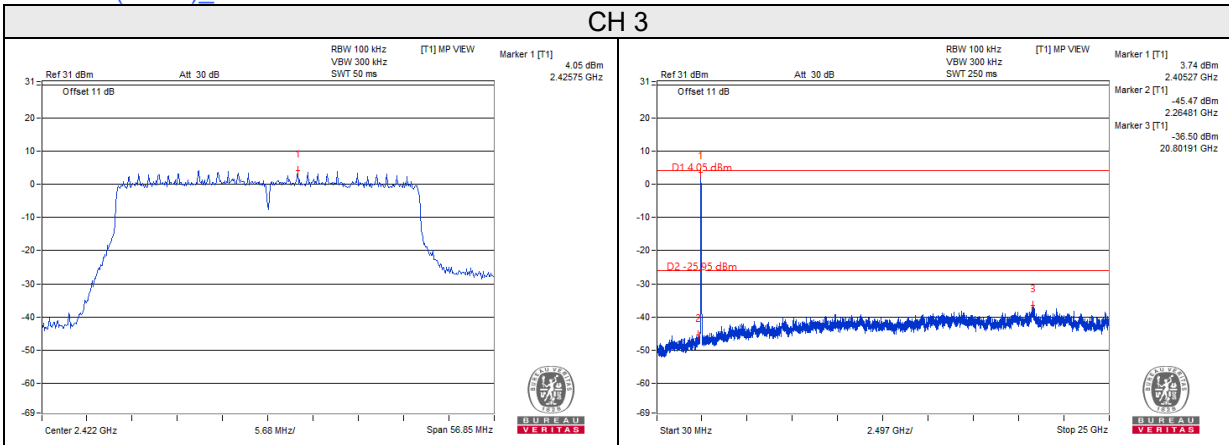
802.11ax (HE40)_Chain 2





BUREAU VERITAS

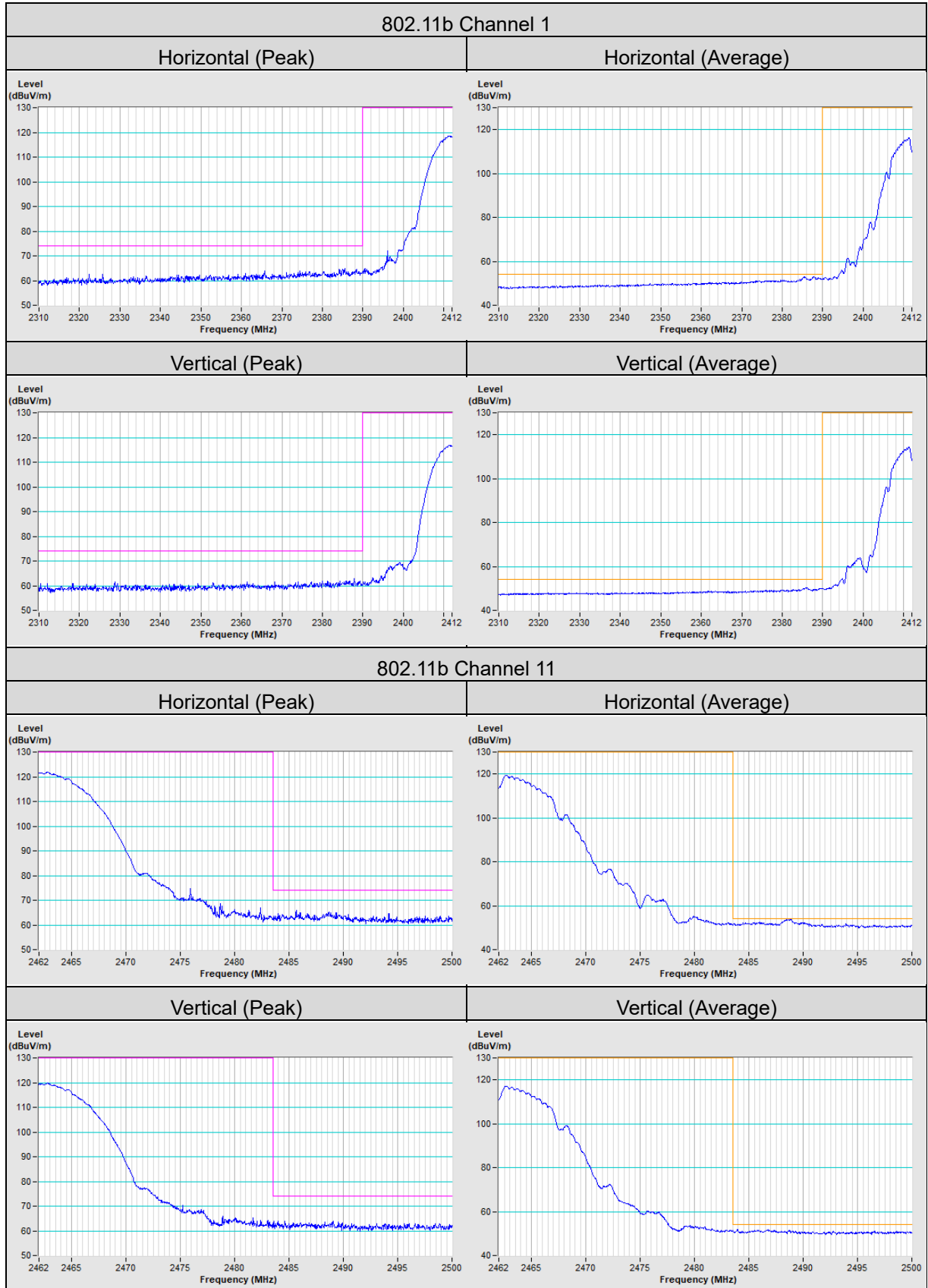
802.11ax (HE40)_Chain 3

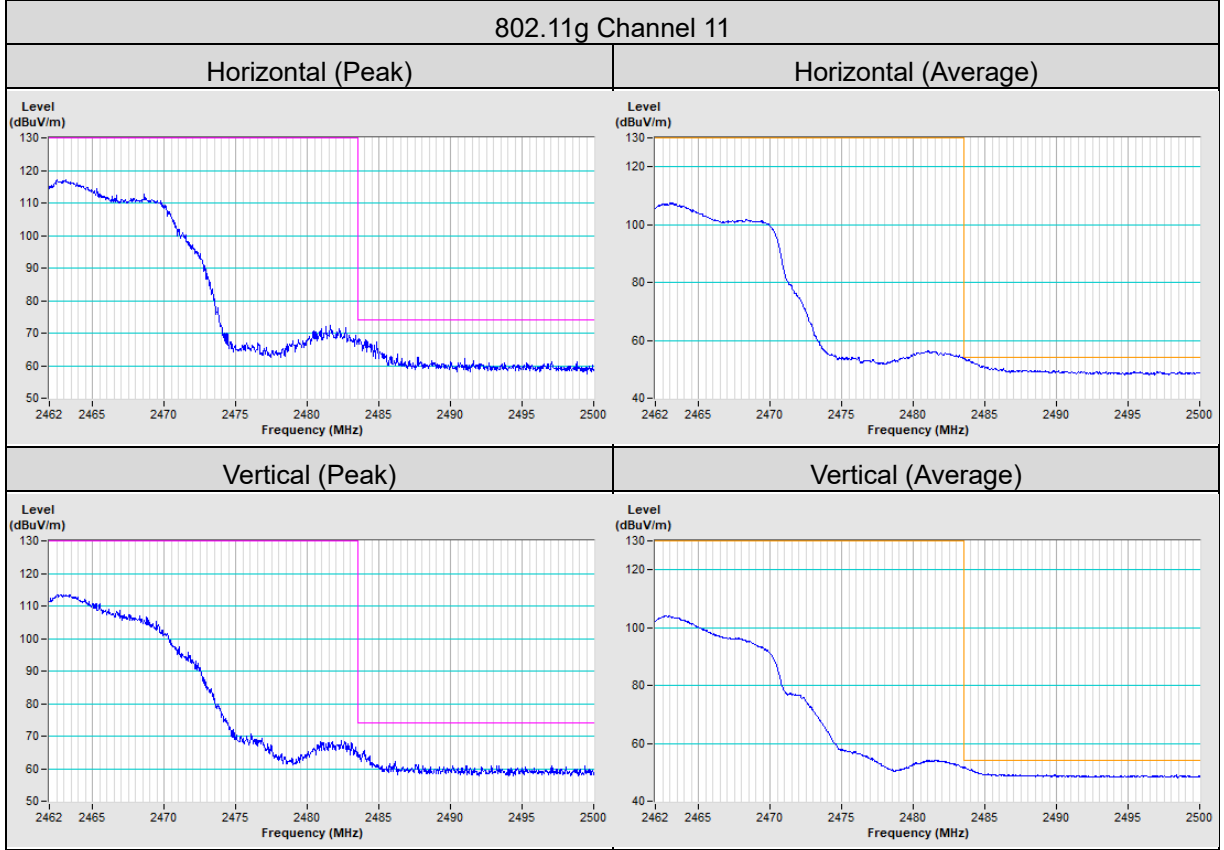
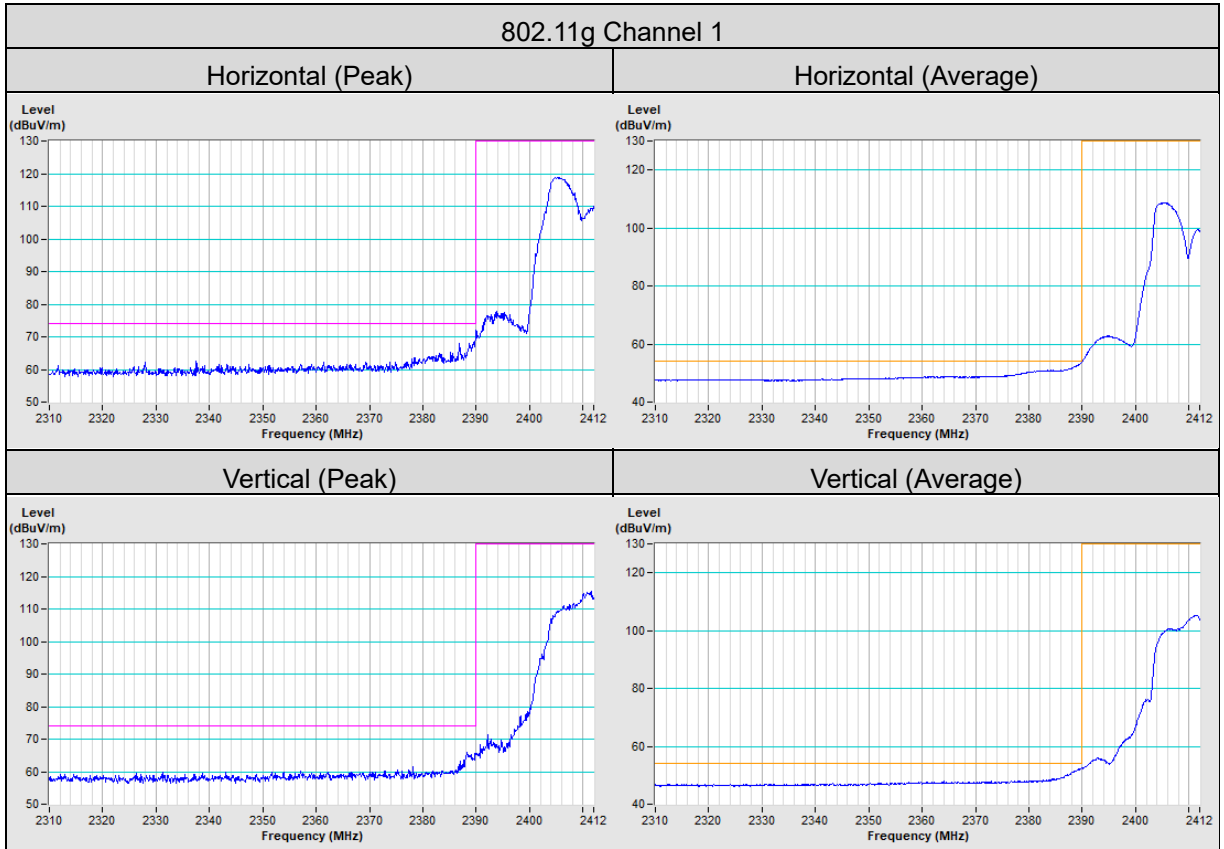


5 Pictures of Test Arrangements

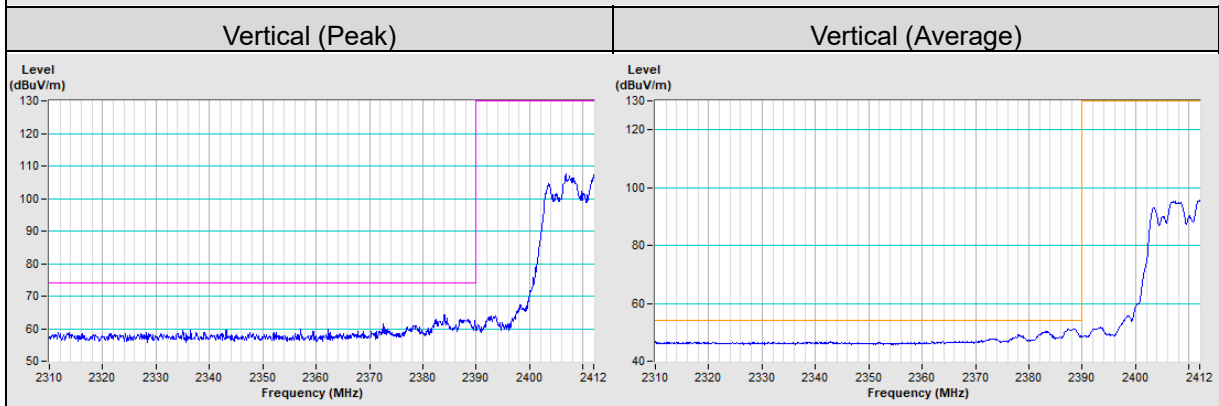
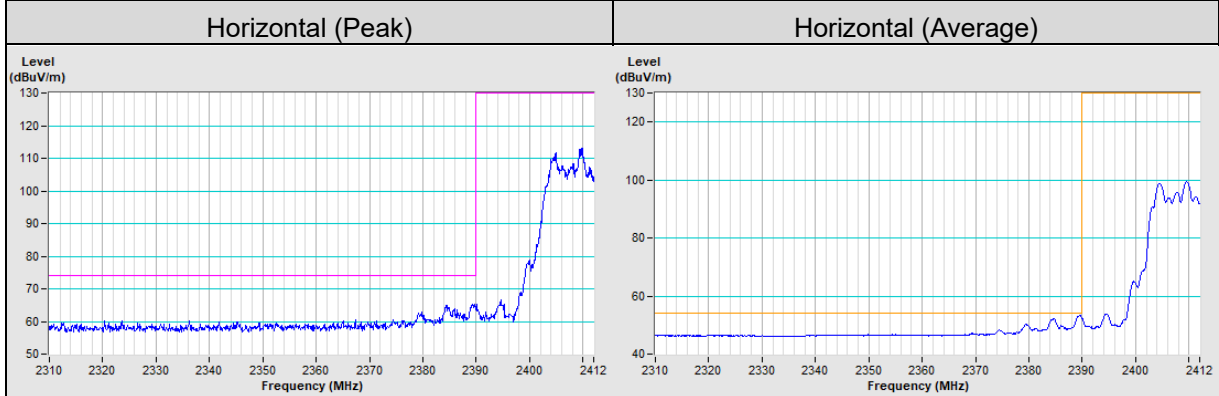
Please refer to the attached file (Test Setup Photo).

Annex A - Band Edge Measurement

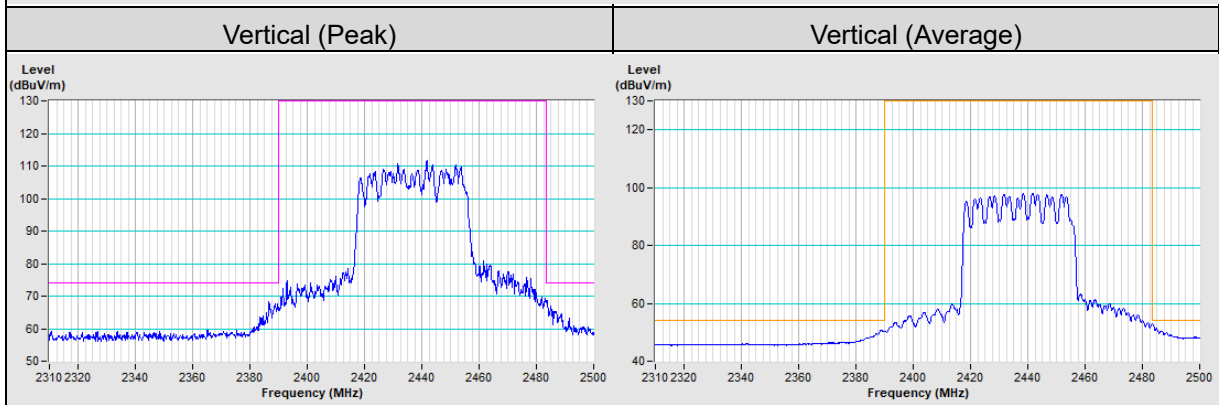
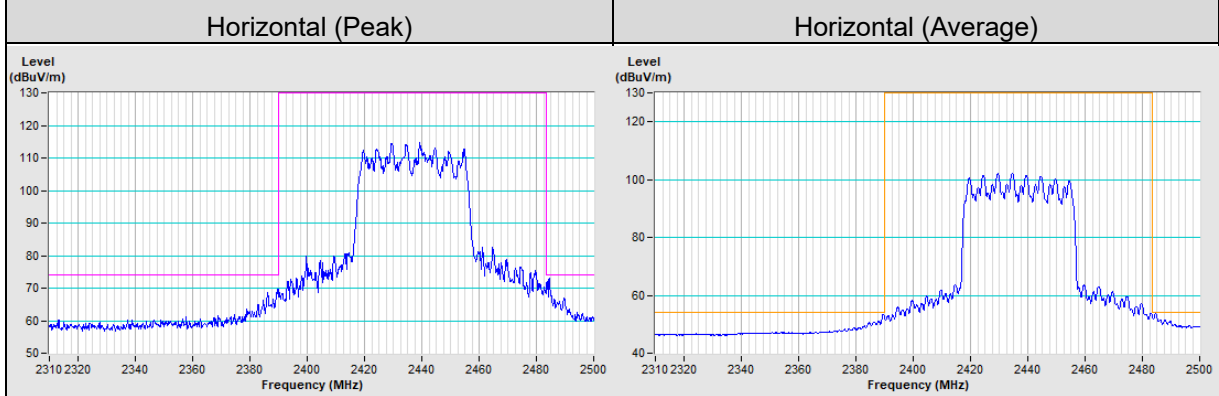




802.11ax (HE40) Channel 3

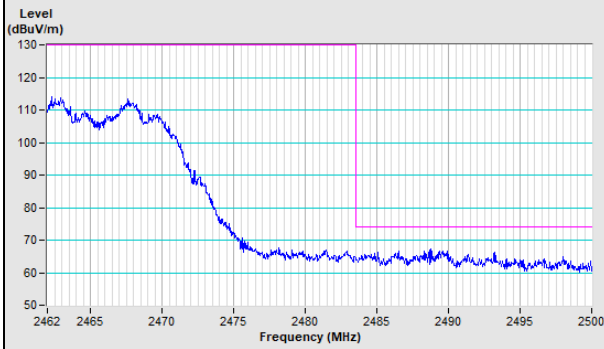


802.11ax (HE40) Channel 6

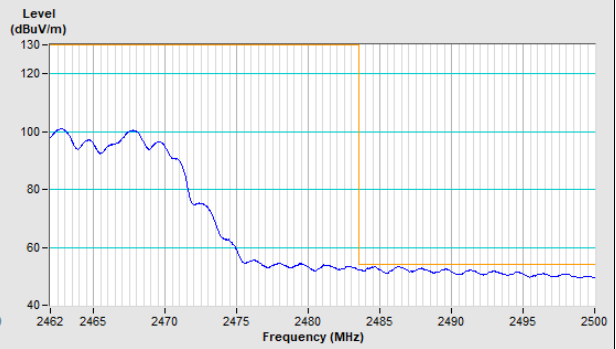


802.11ax (HE40) Channel 9

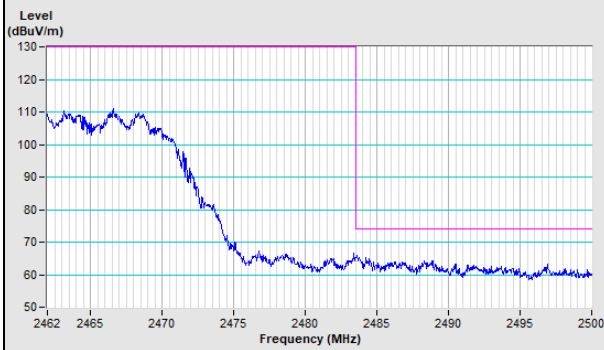
Horizontal (Peak)



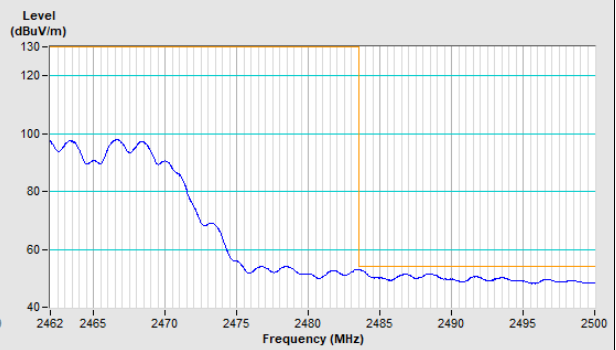
Horizontal (Average)



Vertical (Peak)



Vertical (Average)



Appendix – Information of the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are FCC recognized accredited test firms and accredited and approved according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

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Fax: 886-2-26051924

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Fax: 886-3-6668323

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Email: service.adt@tw.bureauveritas.com

Web Site: www.bureauveritas-adt.com

The address and road map of all our labs can be found in our web site also.

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