

Variant FCC Test Report

Report No.: RF131113C05D

FCC ID: W23-JWX6082

Test Model: JWX6082, JWX6083

Received Date: Apr. 19, 2017

Test Date: May 04, 2017 ~ May 09, 2017

Issued Date: May 17, 2017

Applicant: jjPlus CORP.

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Release Control Record

Issue No.	Description	Date Issued
RF131113C05D	Original Release	May 17, 2017

1 Certificate of Conformity

Product: 802.11a/b/g/n 3T3R Mini-PCI Express Module

Brand: jjPlus

Test Model: JWX6082, JWX6083

Sample Status: Identical Prototype

Applicant: jjPlus CORP.

Test Date: May 04, 2017 ~ May 09, 2017

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 EMC characteristics under the conditions specified in this report.

Prepared by : Rona Chen, **Date:** May 17, 2017
Rona Chen / Specialist

Approved by : David Huang, **Date:** May 17, 2017
David Huang / 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	N/A	Test not applicable because of not ancillary equipment.
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	Pass	Meet the requirement of limit. Minimum passing margin is -1.15 dB at 2389.92 MHz and 2483.68 MHz.
15.247(d)	Antenna Port Emission	Pass	Meet the requirement of limit.
15.247(a)(2)	6 dB 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	No antenna connector is used.

2.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT:

The listed uncertainties are the worst case uncertainty for the entire range of measurement. Please note that the uncertainty values are provided for informational purposes only and are not used in determining the PASS/FAIL results.

Measurement	Frequency	Expanded Uncertainty (k=2) (±)
Conducted Emissions at mains ports	150 kHz ~ 30 MHz	2.44 dB
Radiated Emissions up to 1 GHz	30 MHz ~ 200 MHz	2.0153 dB
	200 MHz ~ 1000 MHz	2.0224 dB
Radiated Emissions above 1 GHz	1 GHz ~ 18 GHz	1.0121 dB
	18 GHz ~ 40 GHz	1.1508 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	802.11a/b/g/n 3T3R Mini-PCI Express Module
Brand	jjPlus
Test Model	JWX6082, JWX6083
Status of EUT	Identical Prototype
Power Supply Rating	3.3 Vdc (Host equipment)
Modulation Type	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM
Modulation Technology	DSSS, OFDM
Transfer Rate	802.11b: 11.0 / 5.5 / 2.0 / 1.0 Mbps 802.11g: 54.0 / 48.0 / 36.0 / 24.0 / 18.0 / 12.0 / 9.0 / 6.0 Mbps 802.11n: up to MCS23
Operating Frequency	2412 ~ 2462 MHz
Number of Channel	11 for 802.11b, 802.11g, 802.11n (HT20) 7 for 802.11n (HT40)
Output Power	163.275 mW
Antenna Type	Dipole antenna with 2 dBi gain
Antenna Connector	N/A
Accessory Device	N/A
Data Cable Supplied	N/A

Note:

1. This report is issued as a supplementary report to BV CPS report no.: RF131113C05. The differences compared with original report are adding a new model and upgrading standard to the latest version. Therefore, the EUT is re-tested in this report.
2. The EUT incorporates a MIMO function. Physically, the EUT provides 3 completed transmitters and 3 receivers.

Modulation Mode	TX Function
802.11b	1TX
802.11g	1TX
802.11n (HT20)	3TX
802.11n (HT40)	3TX

3. All models are listed as below.

Brand	Model	Difference
jjPlus	JWX6082	The difference between two model names is temperature operating range only. Other specification is the same.
	JWX6083	

* JWX6082 was chosen for final test.

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

3.2 Description of Test Modes

11 channels are provided for 802.11b, 802.11g and 802.11n (HT20):

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

7 channels are provided for 802.11n (HT40):

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

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT Configure Mode	Applicable To			Description
	RE $\geq$ 1G	RE<1G	APCM	
A	√	√	√	1Tx
B	√	√	√	3Tx

Where **RE $\geq$ 1G**: Radiated Emission above 1 GHz **RE<1G**: Radiated Emission below 1 GHz
APCM: Antenna Port Conducted Measurement

Radiated Emission Test (Above 1 GHz):

- ☒ 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)
A	802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1.0
	802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6.0
B	802.11n (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	MCS0
	802.11n (HT40)	3 to 9	3, 6, 9	OFDM	BPSK	MCS0

Radiated Emission Test (Below 1 GHz):

- ☒ 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)
A	802.11b	1 to 11	1	DSSS	DBPSK	1.0

Bandedge Measurement:

- ☒ 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)
A	802.11b	1 to 11	1, 11	DSSS	DBPSK	1.0
	802.11g	1 to 11	1, 11	OFDM	BPSK	6.0
A, B	802.11n (HT20)	1 to 11	1, 11	OFDM	BPSK	MCS0
	802.11n (HT40)	3 to 9	3, 9	OFDM	BPSK	MCS0

Antenna Port Conducted 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)
A	802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1.0
	802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6.0
A, B	802.11n (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	MCS0
	802.11n (HT40)	3 to 9	3, 6, 9	OFDM	BPSK	MCS0

Test Condition:

Applicable To	Environmental Conditions	Input Power	Tested by
RE $\geq$ 1G	25 deg. C, 65 % RH	120 Vac, 60 Hz	Karl Lee
RE<1G	25 deg. C, 65 % RH	120 Vac, 60 Hz	Karl Lee
APCM	25 deg. C, 65 % RH	3.3 Vdc	Wayne Lin

3.3 Duty Cycle of Test Signal

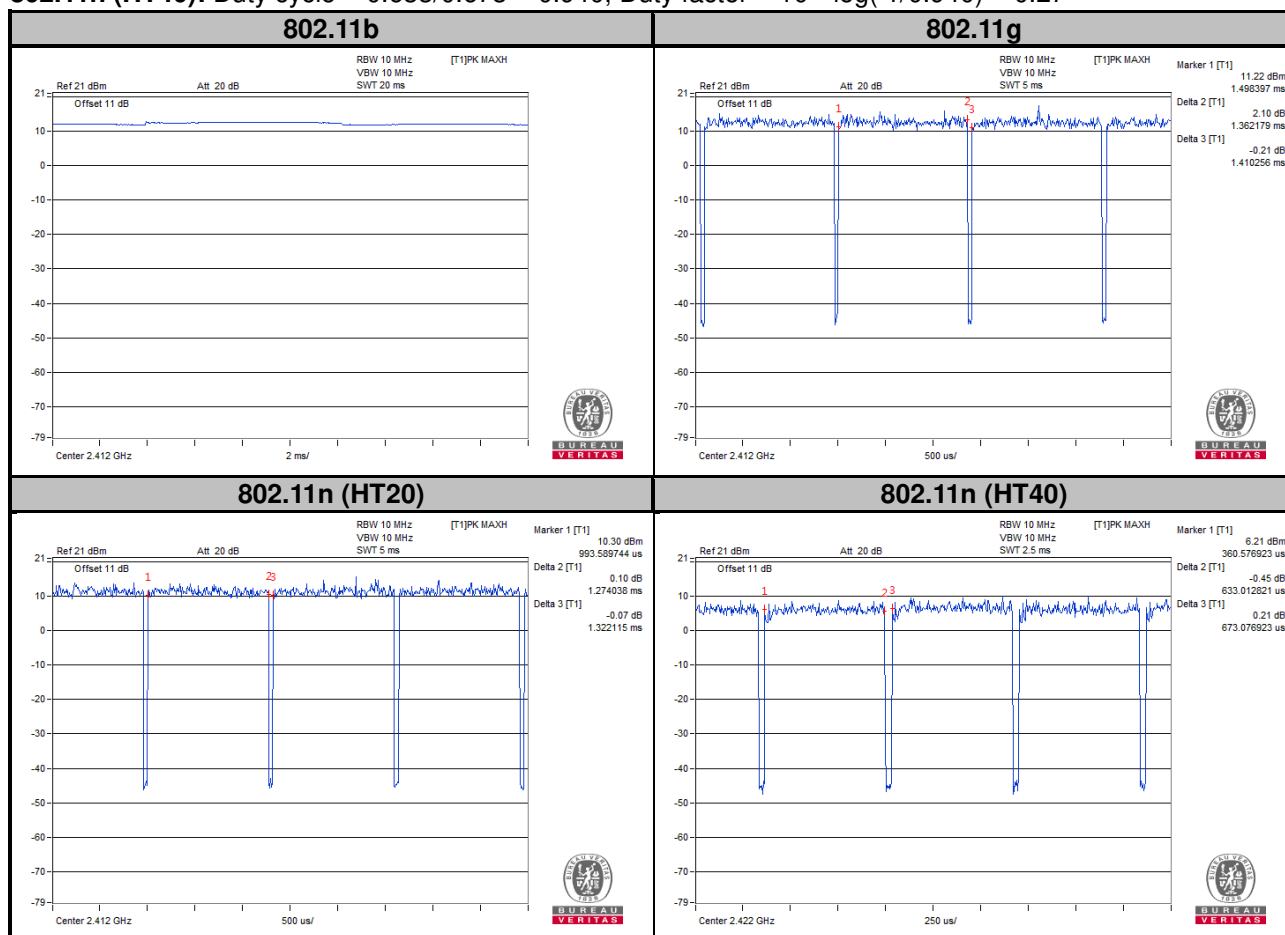
Mode A

802.11b: Duty cycle of test signal is 100 %, duty factor is not required.

802.11g: Duty cycle = $1.362/1.410 = 0.966$, Duty factor = $10 * \log(1/0.966) = 0.15$

802.11n (HT20): Duty cycle = $1.274/1.322 = 0.964$, Duty factor = $10 * \log(1/0.964) = 0.16$

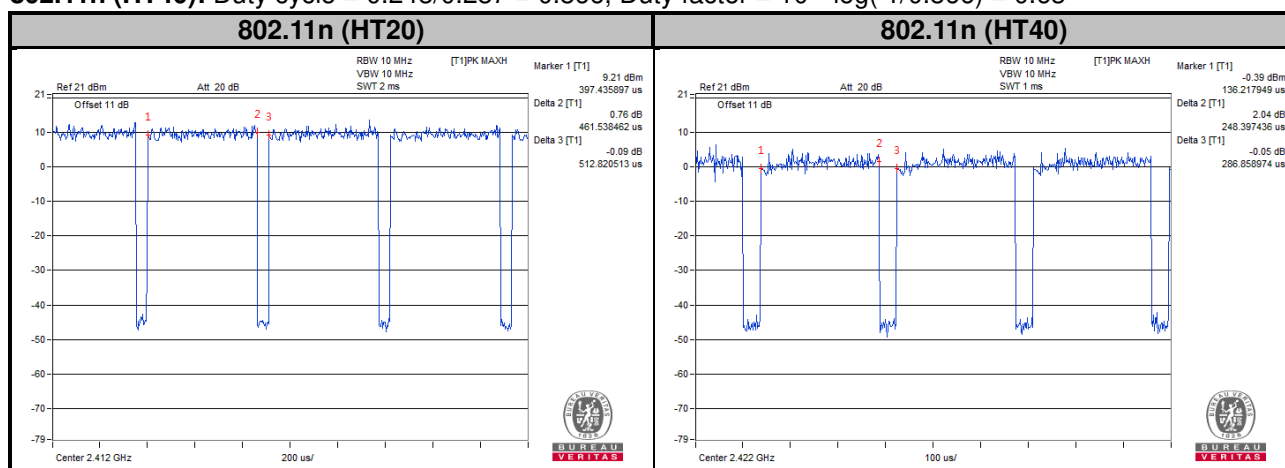
802.11n (HT40): Duty cycle = $0.633/0.673 = 0.940$, Duty factor = $10 * \log(1/0.940) = 0.27$



Mode B

802.11n (HT20): Duty cycle = $0.462/0.513 = 0.900$, Duty factor = $10 * \log(1/0.900) = 0.46$

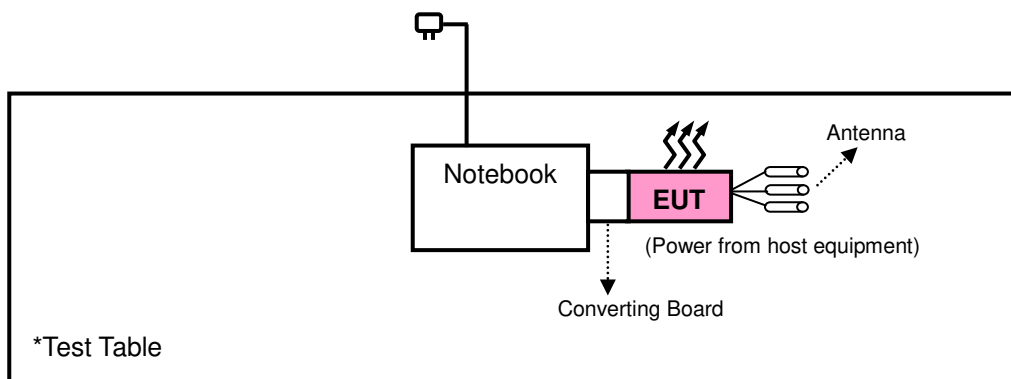
802.11n (HT40): Duty cycle = $0.248/0.287 = 0.866$, Duty factor = $10 * \log(1/0.866) = 0.63$



3.4 Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units.

3.4.1 Configuration of System under Test



3.5 General Description of Applied Standards

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

FCC Part 15, Subpart C (15.247)

558074 D01 DTS Meas Guidance v04

662911 D01 Multiple Transmitter Output v02r01

ANSI C63.10-2013

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

NOTE: The EUT has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B (DoC).
The test report has been issued separately.

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 20 dB 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 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.

4.1.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
Test Receiver Agilent Technologies	N9038A	MY52260177	Jun. 21, 2016	Jun. 20, 2017
Spectrum Analyzer ROHDE & SCHWARZ	FSU43	101261	Dec. 13, 2016	Dec. 12, 2017
BILOG Antenna SCHWARZBECK	VULB9168	9168-472	Dec. 16, 2016	Dec. 15, 2017
HORN Antenna ETS-Lindgren	3117	00143293	Dec. 29, 2016	Dec. 28, 2017
HORN Antenna SCHWARZBECK	BBHA 9170	9170-480	Dec. 14, 2016	Dec. 13, 2017
Fixed Attenuator Mini-Circuits	BW-N10W5+	NA	Jul. 08, 2016	Jul. 07, 2017
Loop Antenna	EM-6879	269	Aug. 11, 2016	Aug. 10, 2017
Preamplifier Agilent	310N	187226	Jun. 24, 2016	Jun. 23, 2017
Preamplifier Agilent	83017A	MY39501357	Jun. 24, 2016	Jun. 23, 2017
Power Meter Anritsu	ML2495A	1232002	Sep. 08, 2016	Sep. 07, 2017
Power Sensor Anritsu	MA2411B	1207325	Sep. 08, 2016	Sep. 07, 2017
RF signal cable ETS-LINDGREN	5D-FB	Cable-CH1-01(R FC-SMS-100-SM S-120+RFC-SMS -100-SMS-400)	Jun. 24, 2016	Jun. 23, 2017
RF signal cable ETS-LINDGREN	8D-FB	Cable-CH1-02(R FC-SMS-100-SM S-24)	Jun. 24, 2016	Jun. 23, 2017
Software BV ADT	E3 8.130425b	NA	NA	NA
Antenna Tower MF	NA	NA	NA	NA
Turn Table MF	NA	NA	NA	NA
Antenna Tower & Turn Table Controller MF	MF-7802	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 HsinTien Chamber 1.
3. The horn antenna and preamplifier (model: 83017A) are used only for the measurement of emission frequency above 1 GHz if tested.
4. The FCC Site Registration No. is 149147.
5. The IC Site Registration No. is IC7450I-1.

4.1.3 Test Procedures

- a. The EUT was placed on the top of a rotating table 0.8 meters (for below 1 GHz) / 1.5 meters (for above 1 GHz) 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 detected 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:

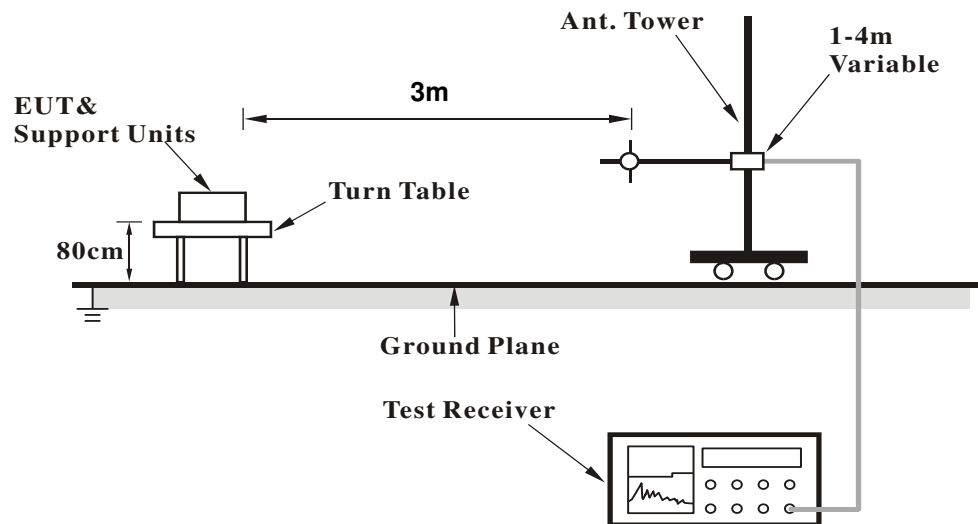
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz & 360 KHz for Quasi-peak detection (QP) at frequency below 1 GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1 GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 1/T for RMS Average (Duty cycle < 98 %) for Peak detection at frequency above 1 GHz.
4. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 10 Hz (Duty cycle ≥ 98 %) for Average detection (AV) at frequency above 1 GHz.
5. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

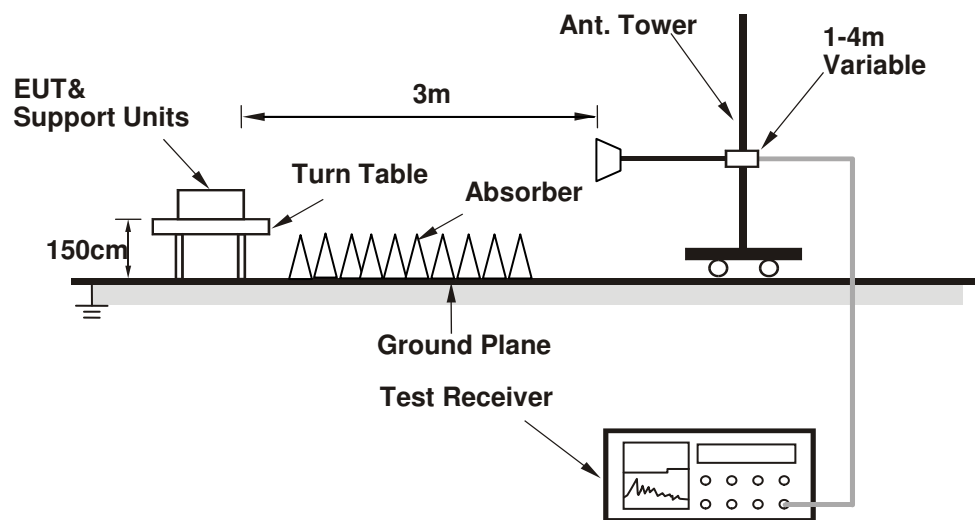
No deviation.

4.1.5 Test Set Up

<Frequency Range below 1 GHz>



<Frequency Range above 1 GHz>



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

4.1.6 EUT Operating Conditions

- Placed the EUT on a testing table.
- Use the software to control the EUT under transmission condition continuously at specific channel frequency.

4.1.7 Test Results

Above 1 GHz Data :

Mode A

802.11b

EUT Test Condition		Measurement Detail	
Channel	Channel 1	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Karl Lee

Antennal Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2385	64.85	63.16	74	-9.15	31.78	5.4	35.49	116	190	Peak
2388	47.15	45.44	54	-6.85	31.8	5.4	35.49	116	190	Average
2412	98.12	96.35			31.81	5.43	35.47	116	190	Average
2412	106.55	104.78			31.81	5.43	35.47	116	190	Peak
2492	47.42	45.4	54	-6.58	31.9	5.53	35.41	116	190	Average
2492	62.83	60.81	74	-11.17	31.9	5.53	35.41	116	190	Peak
Antennal Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2389.92	52.85	51.12	54	-1.15	31.8	5.4	35.47	132	351	Average
2389.92	67.79	66.06	74	-6.21	31.8	5.4	35.47	132	351	Peak
2412	103.43	101.66			31.81	5.43	35.47	132	351	Average
2412	112.68	110.91			31.81	5.43	35.47	132	351	Peak
2492	41.28	39.26	54	-12.72	31.9	5.53	35.41	132	351	Average
2492	56.32	54.3	74	-17.68	31.9	5.53	35.41	132	351	Peak

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- 2412 MHz: Fundamental frequency.

EUT Test Condition		Measurement Detail	
Channel	Channel 6	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Karl Lee

Antennal Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2354	48.73	47.03	54	-5.27	31.87	5.33	35.5	105	58	Average
2354	57.54	55.84	74	-16.46	31.87	5.33	35.5	105	58	Peak
2437	104.57	102.56			32.01	5.46	35.46	105	58	Average
2437	106.83	104.82			32.01	5.46	35.46	105	58	Peak
2488	44.19	41.98	54	-9.81	32.1	5.53	35.42	105	58	Average
2488	56.74	54.53	74	-17.26	32.1	5.53	35.42	105	58	Peak
Antennal Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2354	50.89	49.19	54	-3.11	31.87	5.33	35.5	116	274	Average
2354	57.93	56.23	74	-16.07	31.87	5.33	35.5	116	274	Peak
2437	110.36	108.35			32.01	5.46	35.46	116	274	Average
2437	112.6	110.59			32.01	5.46	35.46	116	274	Peak
2484	51.82	49.64	54	-2.18	32.1	5.5	35.42	116	274	Average
2484	61.55	59.37	74	-12.45	32.1	5.5	35.42	116	274	Peak

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- 2437 MHz: Fundamental frequency.

EUT Test Condition		Measurement Detail	
Channel	Channel 11	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Karl Lee

Antennal Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2386	44.85	43.01	54	-9.15	31.93	5.4	35.49	137	51	Average
2386	56.88	55.04	74	-17.12	31.93	5.4	35.49	137	51	Peak
2462	103.33	101.23			32.04	5.5	35.44	137	51	Average
2462	105.86	103.76			32.04	5.5	35.44	137	51	Peak
2486	45.22	43.01	54	-8.78	32.1	5.53	35.42	137	51	Average
2486	56.58	54.37	74	-17.42	32.1	5.53	35.42	137	51	Peak
Antennal Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2372	50.75	48.97	54	-3.25	31.9	5.37	35.49	151	268	Average
2372	58.15	56.37	74	-15.85	31.9	5.37	35.49	151	268	Peak
2462	109.46	107.36			32.04	5.5	35.44	151	268	Average
2462	111.37	109.27			32.04	5.5	35.44	151	268	Peak
2483.5	52.73	50.58	54	-1.27	32.07	5.5	35.42	151	268	Average
2483.5	61.29	59.14	74	-12.71	32.07	5.5	35.42	151	268	Peak

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- 2462 MHz: Fundamental frequency.

802.11g

EUT Test Condition		Measurement Detail	
Channel	Channel 1	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Karl Lee

Antennal Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2384	45.74	44.05	54	-8.26	31.78	5.4	35.49	170	278	Average
2384	54.89	53.2	74	-19.11	31.78	5.4	35.49	170	278	Peak
2412	92.81	91.04			31.81	5.43	35.47	170	278	Average
2412	100.6	98.83			31.81	5.43	35.47	170	278	Peak
2490	50	47.99	54	-4	31.9	5.53	35.42	170	278	Average
2490	57.17	55.16	74	-16.83	31.9	5.53	35.42	170	278	Peak
Antennal Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2390	46.97	45.24	54	-7.03	31.8	5.4	35.47	108	11	Average
2390	56.29	54.56	74	-17.71	31.8	5.4	35.47	108	11	Peak
2412	99.77	98			31.81	5.43	35.47	108	11	Average
2412	107.99	106.22			31.81	5.43	35.47	108	11	Peak
2496	51.96	49.94	54	-2.04	31.9	5.53	35.41	108	11	Average
2496	59.68	57.66	74	-14.32	31.9	5.53	35.41	108	11	Peak

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- 2412 MHz: Fundamental frequency.

EUT Test Condition		Measurement Detail	
Channel	Channel 6	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Karl Lee

Antennal Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2388	45.06	43.35	54	-8.94	31.8	5.4	35.49	170	278	Average
2388	55.76	54.05	74	-18.24	31.8	5.4	35.49	170	278	Peak
2437	96.88	95.03			31.85	5.46	35.46	170	278	Average
2437	103.6	101.75			31.85	5.46	35.46	170	278	Peak
2492	47.43	45.41	54	-6.57	31.9	5.53	35.41	170	278	Average
2492	56.89	54.87	74	-17.11	31.9	5.53	35.41	170	278	Peak
Antennal Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2390	47.09	45.36	54	-6.91	31.8	5.4	35.47	107	10	Average
2390	57.38	55.65	74	-16.62	31.8	5.4	35.47	107	10	Peak
2437	102.88	101.03			31.85	5.46	35.46	107	10	Average
2437	110.52	108.67			31.85	5.46	35.46	107	10	Peak
2486	51.31	49.32	54	-2.69	31.88	5.53	35.42	107	10	Average
2486	61	59.01	74	-13	31.88	5.53	35.42	107	10	Peak

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- 2437 MHz: Fundamental frequency.

EUT Test Condition		Measurement Detail	
Channel	Channel 11	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Karl Lee

Antennal Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2342	44.64	43.07	54	-9.36	31.74	5.33	35.5	170	278	Average
2342	54.77	53.2	74	-19.23	31.74	5.33	35.5	170	278	Peak
2462	94.05	92.12			31.87	5.5	35.44	170	278	Average
2462	101.49	99.56			31.87	5.5	35.44	170	278	Peak
2483.5	49.61	47.65	54	-4.39	31.88	5.5	35.42	170	278	Average
2483.5	56.23	54.27	74	-17.77	31.88	5.5	35.42	170	278	Peak
Antennal Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2374	43.74	42.08	54	-10.26	31.78	5.37	35.49	107	10	Average
2374	55.85	54.19	74	-18.15	31.78	5.37	35.49	107	10	Peak
2462	99.6	97.67			31.87	5.5	35.44	107	10	Average
2462	107.07	105.14			31.87	5.5	35.44	107	10	Peak
2483.5	51.95	49.99	54	-2.05	31.88	5.5	35.42	107	10	Average
2483.5	58.87	56.91	74	-15.13	31.88	5.5	35.42	107	10	Peak

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- 2462 MHz: Fundamental frequency.

Mode B

802.11n (HT20)

EUT Test Condition		Measurement Detail	
Channel	Channel 1	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Karl Lee

Antennal Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2386	48.06	46.35	54	-5.94	31.8	5.4	35.49	183	236	Average
2386	58.41	56.7	74	-15.59	31.8	5.4	35.49	183	236	Peak
2412	100.77	99			31.81	5.43	35.47	183	236	Average
2412	107.28	105.51			31.81	5.43	35.47	183	236	Peak
2500	49.96	47.94	54	-4.04	31.9	5.53	35.41	183	236	Average
2500	59.49	57.47	74	-14.51	31.9	5.53	35.41	183	236	Peak
Antennal Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2390	51.06	49.33	54	-2.94	31.8	5.4	35.47	109	22	Average
2390	60.57	58.84	74	-13.43	31.8	5.4	35.47	109	22	Peak
2412	102.77	101			31.81	5.43	35.47	107	360	Average
2412	109.77	108			31.81	5.43	35.47	107	360	Peak
2498	52.09	50.07	54	-1.91	31.9	5.53	35.41	104	359	Average
2498	62.97	60.95	74	-11.03	31.9	5.53	35.41	104	359	Peak

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- 2412 MHz: Fundamental frequency.

EUT Test Condition		Measurement Detail	
Channel	Channel 6	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Karl Lee

Antennal Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2372	46.04	44.38	54	-7.96	31.78	5.37	35.49	183	236	Average
2372	57.05	55.39	74	-16.95	31.78	5.37	35.49	183	236	Peak
2437	100.55	98.7			31.85	5.46	35.46	183	236	Average
2437	107.52	105.67			31.85	5.46	35.46	183	236	Peak
2498	48	45.98	54	-6	31.9	5.53	35.41	183	236	Average
2498	56.66	54.64	74	-17.34	31.9	5.53	35.41	183	236	Peak
Antennal Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2344	47.98	46.41	54	-6.02	31.74	5.33	35.5	107	360	Average
2344	57.87	56.3	74	-16.13	31.74	5.33	35.5	107	360	Peak
2437	102.17	100.32			31.85	5.46	35.46	107	360	Average
2437	111.73	109.88			31.85	5.46	35.46	107	360	Peak
2492	51.96	49.94	54	-2.04	31.9	5.53	35.41	104	359	Average
2492	61.25	59.23	74	-12.75	31.9	5.53	35.41	104	359	Peak

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- 2437 MHz: Fundamental frequency.

EUT Test Condition		Measurement Detail	
Channel	Channel 11	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Karl Lee

Antennal Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2390	41.28	39.55	54	-12.72	31.8	5.4	35.47	114	154	Average
2390	56.63	54.9	74	-17.37	31.8	5.4	35.47	114	154	Peak
2462	96.85	94.92			31.87	5.5	35.44	114	152	Average
2462	105.01	103.08			31.87	5.5	35.44	114	152	Peak
2486	41.51	39.52	54	-12.49	31.88	5.53	35.42	114	154	Average
2487	51.24	49.25	74	-22.76	31.88	5.53	35.42	114	154	Peak
Antennal Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2390	41.38	39.65	54	-12.62	31.8	5.4	35.47	137	268	Average
2390	56.63	54.9	74	-17.37	31.8	5.4	35.47	137	268	Peak
2462	102.68	100.75			31.87	5.5	35.44	101	258	Average
2462	111.09	109.16			31.87	5.5	35.44	101	258	Peak
2483.68	52.85	50.89	54	-1.15	31.88	5.5	35.42	137	268	Average
2486.08	61.55	59.56	74	-12.45	31.88	5.53	35.42	137	268	Peak

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- 2462 MHz: Fundamental frequency.

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EUT Test Condition		Measurement Detail	
Channel	Channel 3	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Karl Lee

Antennal Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2390	48.72	46.99	54	-5.28	31.8	5.4	35.47	183	236	Average
2390	58.24	56.51	74	-15.76	31.8	5.4	35.47	183	236	Peak
2422	97.37	95.57			31.83	5.43	35.46	183	236	Average
2422	104.75	102.95			31.83	5.43	35.46	183	236	Peak
2496	47.67	45.65	54	-6.33	31.9	5.53	35.41	183	236	Average
2496	57.13	55.11	74	-16.87	31.9	5.53	35.41	183	236	Peak
Antennal Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2390	52.72	50.99	54	-1.28	31.8	5.4	35.47	108	14	Average
2390	62.57	60.84	74	-11.43	31.8	5.4	35.47	108	14	Peak
2422	101.49	99.69			31.83	5.43	35.46	107	360	Average
2422	109.16	107.36			31.83	5.43	35.46	107	360	Peak
2492	51	48.98	54	-3	31.9	5.53	35.41	107	360	Average
2492	61.11	59.09	74	-12.89	31.9	5.53	35.41	107	360	Peak

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- 2422 MHz: Fundamental frequency.

EUT Test Condition		Measurement Detail	
Channel	Channel 6	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Karl Lee

Antennal Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2360	44.99	43.36	54	-9.01	31.76	5.37	35.5	183	236	Average
2360	56.79	55.16	74	-17.21	31.76	5.37	35.5	183	236	Peak
2437	97.55	95.7			31.85	5.46	35.46	183	236	Average
2437	105.81	103.96			31.85	5.46	35.46	183	236	Peak
2484	44.98	43.02	54	-9.02	31.88	5.5	35.42	183	236	Average
2484	57.06	55.1	74	-16.94	31.88	5.5	35.42	183	236	Peak
Antennal Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2380	46.71	45.05	54	-7.29	31.78	5.37	35.49	107	360	Average
2380	56.97	55.31	74	-17.03	31.78	5.37	35.49	107	360	Peak
2437	101.84	99.99			31.85	5.46	35.46	107	360	Average
2437	109.6	107.75			31.85	5.46	35.46	107	360	Peak
2496	51.65	49.63	54	-2.35	31.9	5.53	35.41	107	360	Average
2496	61.52	59.5	74	-12.48	31.9	5.53	35.41	107	360	Peak

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- 2437 MHz: Fundamental frequency.

EUT Test Condition		Measurement Detail	
Channel	Channel 9	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Karl Lee

Antennal Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2384	46.29	44.6	54	-7.71	31.78	5.4	35.49	100	54	Average
2384	57.29	55.6	74	-16.71	31.78	5.4	35.49	100	54	Peak
2452	96.55	94.68			31.85	5.46	35.44	100	54	Average
2452	104.3	102.43			31.85	5.46	35.44	100	54	Peak
2484	48.08	46.12	54	-5.92	31.88	5.5	35.42	100	54	Average
2484	60.91	58.95	74	-13.09	31.88	5.5	35.42	100	54	Peak
Antennal Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2340	45.59	44.02	54	-8.41	31.74	5.33	35.5	107	359	Average
2340	57.86	56.29	74	-16.14	31.74	5.33	35.5	107	359	Peak
2452	101.79	99.92			31.85	5.46	35.44	107	359	Average
2452	110.16	108.29			31.85	5.46	35.44	107	359	Peak
2484	52.63	50.67	54	-1.37	31.88	5.5	35.42	107	359	Average
2484	66.64	64.68	74	-7.36	31.88	5.5	35.42	107	359	Peak

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- 2452 MHz: Fundamental frequency.

9 kHz ~ 30 MHz DATA:

The amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required to be report.

30 MHz ~ 1 GHz WORST-CASE DATA:

Mode A

802.11b

EUT Test Condition		Measurement Detail	
Channel	Channel 1	Frequency Range	30 MHz ~ 1 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Quasi-peak (QP)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Karl Lee

Antennal Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
99.66	28.52	49.84	43.5	-14.98	9.66	1.28	32.26	155	215	Peak
166.62	25.26	45.7	43.5	-18.24	10.29	1.52	32.25	162	325	Peak
199.29	38.09	57.9	43.5	-5.41	10.84	1.65	32.3	157	205	Peak
314	37.33	52.66	46	-8.67	14.68	2.11	32.12	156	215	Peak
499.5	38.13	48.6	46	-7.87	19	2.63	32.1	163	332	Peak
700.4	29.21	35.09	46	-16.79	23.1	3.11	32.09	105	116	Peak
Antennal Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
30.54	30.65	44.86	40	-9.35	17.31	0.74	32.26	155	125	Peak
99.93	23.3	44.62	43.5	-20.2	9.66	1.28	32.26	158	51	Peak
166.62	27.31	47.75	43.5	-16.19	10.29	1.52	32.25	165	216	Peak
327.3	33.05	47.75	46	-12.95	15.29	2.11	32.1	195	157	Peak
499.5	34.98	45.45	46	-11.02	19	2.63	32.1	165	226	Peak
778.8	31.28	36.42	46	-14.72	23.68	3.27	32.09	123	220	Peak

Remarks:

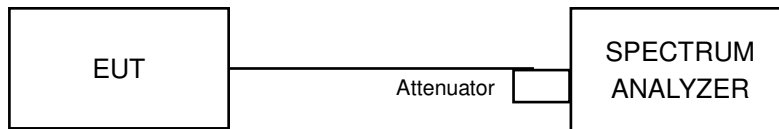
1. Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value

4.2 6 dB Bandwidth Measurement

4.2.1 Limits of 6 dB Bandwidth Measurement

The minimum of 6 dB Bandwidth Measurement is 0.5 MHz.

4.2.2 Test Setup



4.2.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.2.4 Test Procedure

- Set resolution bandwidth (RBW) = 100 kHz
- 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

4.2.5 Deviation from Test Standard

No deviation.

4.2.6 EUT Operating Conditions

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

4.2.7 Test Result

Mode A

802.11b

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	10.11	0.5	Pass
6	2437	10.11	0.5	Pass
11	2462	10.12	0.5	Pass

802.11g

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	16.37	0.5	Pass
6	2437	16.38	0.5	Pass
11	2462	16.38	0.5	Pass

802.11n (HT20)

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	17.60	0.5	Pass
6	2437	17.60	0.5	Pass
11	2462	17.58	0.5	Pass

802.11n (HT40)

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
3	2422	35.48	0.5	Pass
6	2437	35.25	0.5	Pass
9	2452	35.50	0.5	Pass

Mode B

802.11n (HT20)

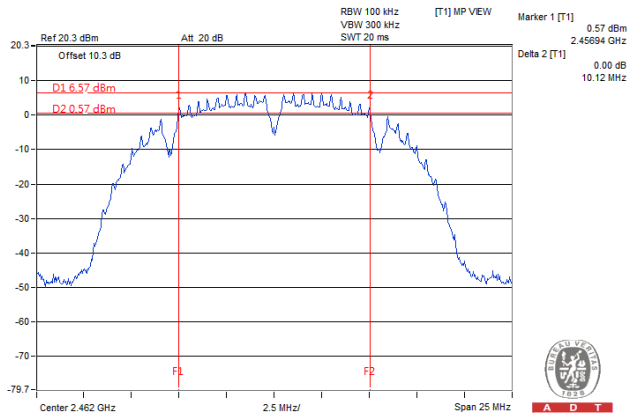
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)			Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2		
1	2412	17.61	17.60	17.61	0.5	Pass
6	2437	17.38	17.62	17.61	0.5	Pass
11	2462	17.62	17.63	17.62	0.5	Pass

802.11n (HT40)

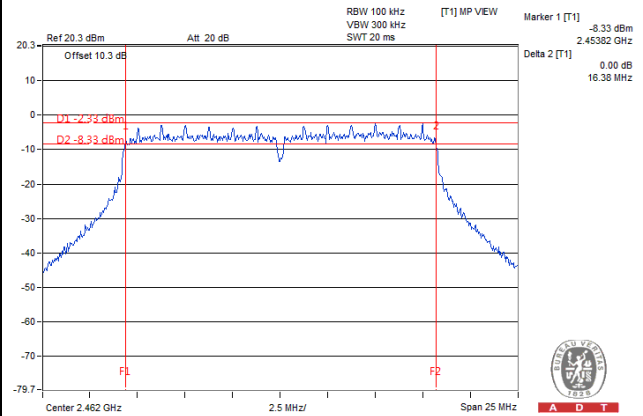
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)			Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2		
3	2422	35.53	35.21	35.20	0.5	Pass
6	2437	35.40	35.25	35.27	0.5	Pass
9	2452	35.26	35.26	35.23	0.5	Pass

Spectrum Plot of Worst Value

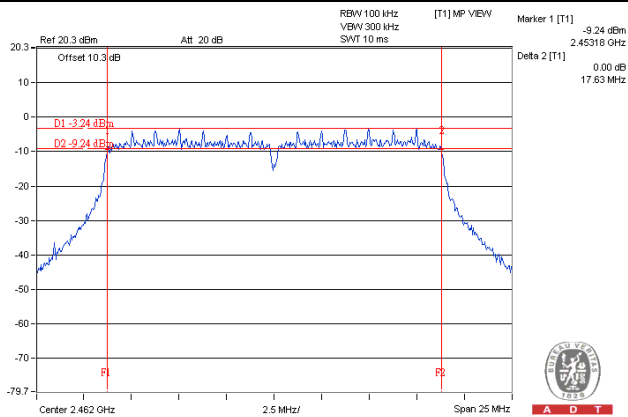
802.11b



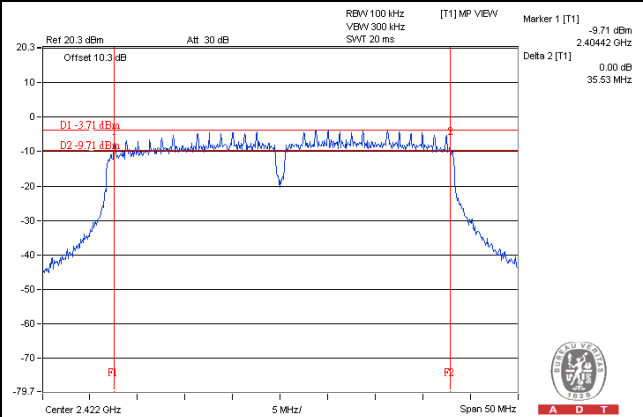
802.11g



802.11n (HT20)



802.11n (HT40)



4.3 Conducted Output Power Measurement

4.3.1 Limits of Conducted Output Power Measurement

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

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

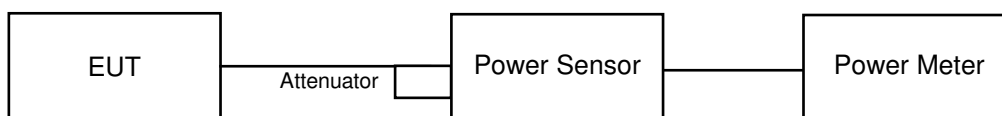
Array Gain = 0 dB (i.e., no array gain) for $NANT \leq 4$;

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

Array Gain = $5 \log(NANT/NSS)$ dB or 3 dB, whichever is less for 20 MHz channel widths with $NANT \geq 5$.

For power measurements on all other devices: Array Gain = $10 \log(NANT/NSS)$ dB.

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 Procedures

A peak power sensor was used on the output port of the EUT. A power meter was used to read the response of the peak power sensor. Record the power level.

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 Results

Mode A

802.11b

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass / Fail
1	2412	14.289	11.55	30	Pass
6	2437	21.878	13.40	30	Pass
11	2462	19.999	13.01	30	Pass

802.11g

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass / Fail
1	2412	87.902	19.44	30	Pass
6	2437	87.498	19.42	30	Pass
11	2462	82.224	19.15	30	Pass

802.11n (HT20)

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass / Fail
1	2412	70.469	18.48	30	Pass
6	2437	67.298	18.28	30	Pass
11	2462	69.502	18.42	30	Pass

802.11n (HT40)

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass / Fail
3	2422	56.624	17.53	30	Pass
6	2437	54.325	17.35	30	Pass
9	2452	41.02	16.13	30	Pass

Mode B

802.11n (HT20)

Channel	Frequency (MHz)	Peak Power (dBm)			Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2				
1	2412	17.35	17.23	17.49	163.275	22.13	30	Pass
6	2437	16.88	16.73	16.89	144.716	21.61	30	Pass
11	2462	16.65	16.53	16.77	138.75	21.42	30	Pass

802.11n (HT40)

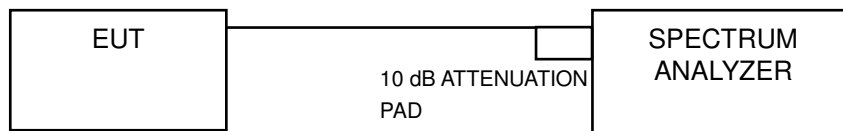
Channel	Frequency (MHz)	Peak Power (dBm)			Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2				
3	2422	13.09	12.98	13.14	60.837	17.84	30	Pass
6	2437	13.12	13.02	13.22	61.546	17.89	30	Pass
9	2452	12.14	12.10	11.96	48.29	16.84	30	Pass

4.4 Power Spectral Density Measurement

4.4.1 Limits of Power Spectral Density Measurement

The Maximum of Power Spectral Density Measurement is 8 dBm.

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 Procedure

- Set analyzer center frequency to DTS channel center frequency.
- Set the span to 1.5 times the DTS bandwidth.
- Set the RBW to: $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$.
- Set the VBW $\geq 3 \times \text{RBW}$.
- Detector = peak.
- Sweep time = auto couple.
- Trace mode = max hold.
- Allow trace to fully stabilize.
- Use the peak marker function to determine the maximum amplitude level within the RBW.

4.4.5 Deviation from Test Standard

No deviation.

4.4.6 EUT Operating Condition

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

4.4.7 Test Results

Mode A

802.11b

Channel	Frequency (MHz)	PSD (dBm)	Limit (dBm)	Pass / Fail
1	2412	-15.53	8	Pass
6	2437	-6.74	8	Pass
11	2462	-7.86	8	Pass

802.11g

Channel	Frequency (MHz)	PSD (dBm)	Limit (dBm)	Pass / Fail
1	2412	-17.21	8	Pass
6	2437	-12.97	8	Pass
11	2462	-16.56	8	Pass

802.11n (HT20)

Channel	Frequency (MHz)	PSD (dBm)	Limit (dBm)	Pass / Fail
1	2412	-18.74	8	Pass
6	2437	-17.19	8	Pass
11	2462	-16.61	8	Pass

802.11n (HT40)

Channel	Frequency (MHz)	PSD (dBm)	Limit (dBm)	Pass / Fail
3	2422	-17.62	8	Pass
6	2437	-16.60	8	Pass
9	2452	-17.65	8	Pass

Mode B

802.11n (HT20)

TX Chain	Channel	Freq. (MHz)	PSD (dBm)	10 log (N=3) dB	Total PSD (dBm)	Limit (dBm)	Pass / Fail
0	1	2412	-16.65	4.77	-11.88	7.23	Pass
	6	2437	-16.22	4.77	-11.45	7.23	Pass
	11	2462	-16.84	4.77	-12.07	7.23	Pass
1	1	2412	-18.63	4.77	-13.86	7.23	Pass
	6	2437	-16.47	4.77	-11.70	7.23	Pass
	11	2462	-17.90	4.77	-13.13	7.23	Pass
2	1	2412	-18.29	4.77	-13.52	7.23	Pass
	6	2437	-16.96	4.77	-12.19	7.23	Pass
	11	2462	-17.96	4.77	-13.19	7.23	Pass

NOTE: Directional gain = 2 dBi + $10\log(3)$ = 6.77 dBi > 6 dBi , so the power density limit shall be reduced to $8-(6.77-6)$ = 7.23 dBm.

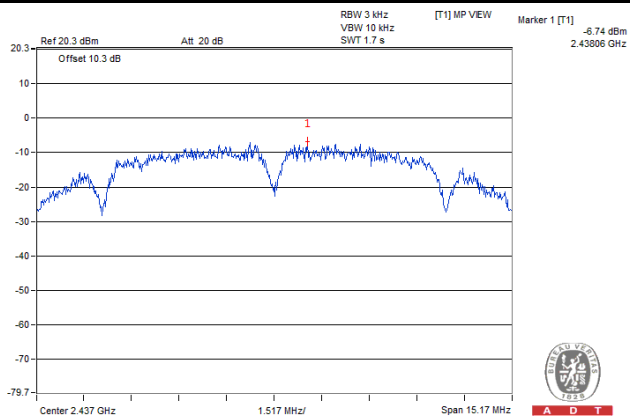
802.11n (HT40)

TX Chain	Channel	Freq. (MHz)	PSD (dBm)	10 log (N=3) dB	Total PSD (dBm)	Limit (dBm)	Pass / Fail
0	3	2422	-18.23	4.77	-13.46	7.23	Pass
	6	2437	-17.01	4.77	-12.24	7.23	Pass
	9	2452	-18.68	4.77	-13.91	7.23	Pass
1	3	2422	-17.51	4.77	-12.74	7.23	Pass
	6	2437	-18.13	4.77	-13.36	7.23	Pass
	9	2452	-20.38	4.77	-15.61	7.23	Pass
2	3	2422	-20.66	4.77	-15.89	7.23	Pass
	6	2437	-19.50	4.77	-14.73	7.23	Pass
	9	2452	-20.35	4.77	-15.58	7.23	Pass

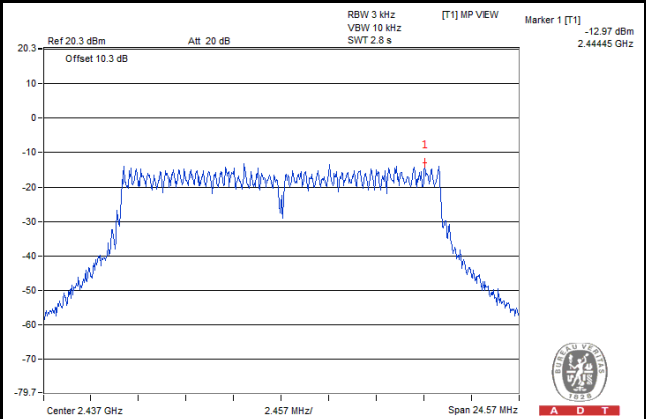
NOTE: Directional gain = 2 dBi + $10\log(3)$ = 6.77 dBi > 6 dBi , so the power density limit shall be reduced to $8-(6.77-6)$ = 7.23 dBm.

Spectrum Plot of Worst Value

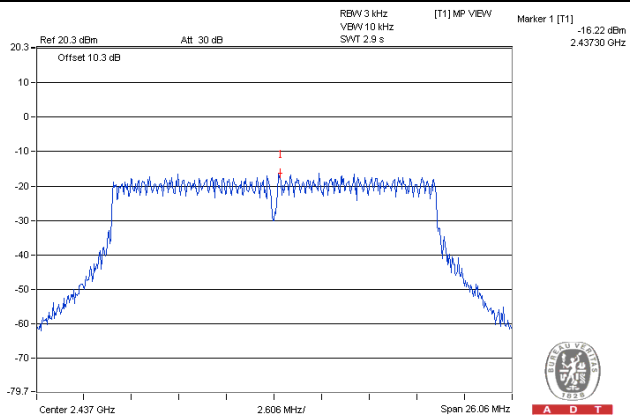
802.11b



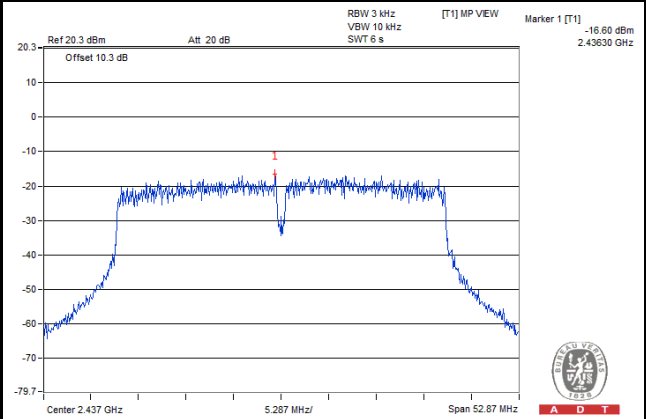
802.11g



802.11n (HT20)



802.11n (HT40)

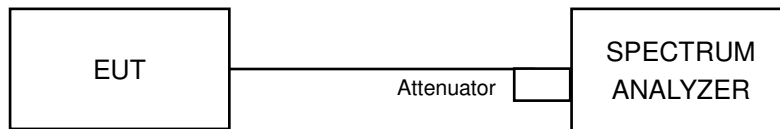


4.5 Conducted Out of Band Emission Measurement

4.5.1 Limits of Conducted Out of Band Emission Measurement

Below 20 dB of the highest emission level of operating band (in 100 kHz Resolution Bandwidth).

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

MEASUREMENT PROCEDURE REF

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

MEASUREMENT PROCEDURE OOB

1. Set RBW = 100 kHz.
2. Set VBW $\geq$ 300 kHz.
3. Detector = peak.
4. Sweep = auto couple.
5. Trace Mode = max hold.
6. Allow trace to fully stabilize.
7. 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

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

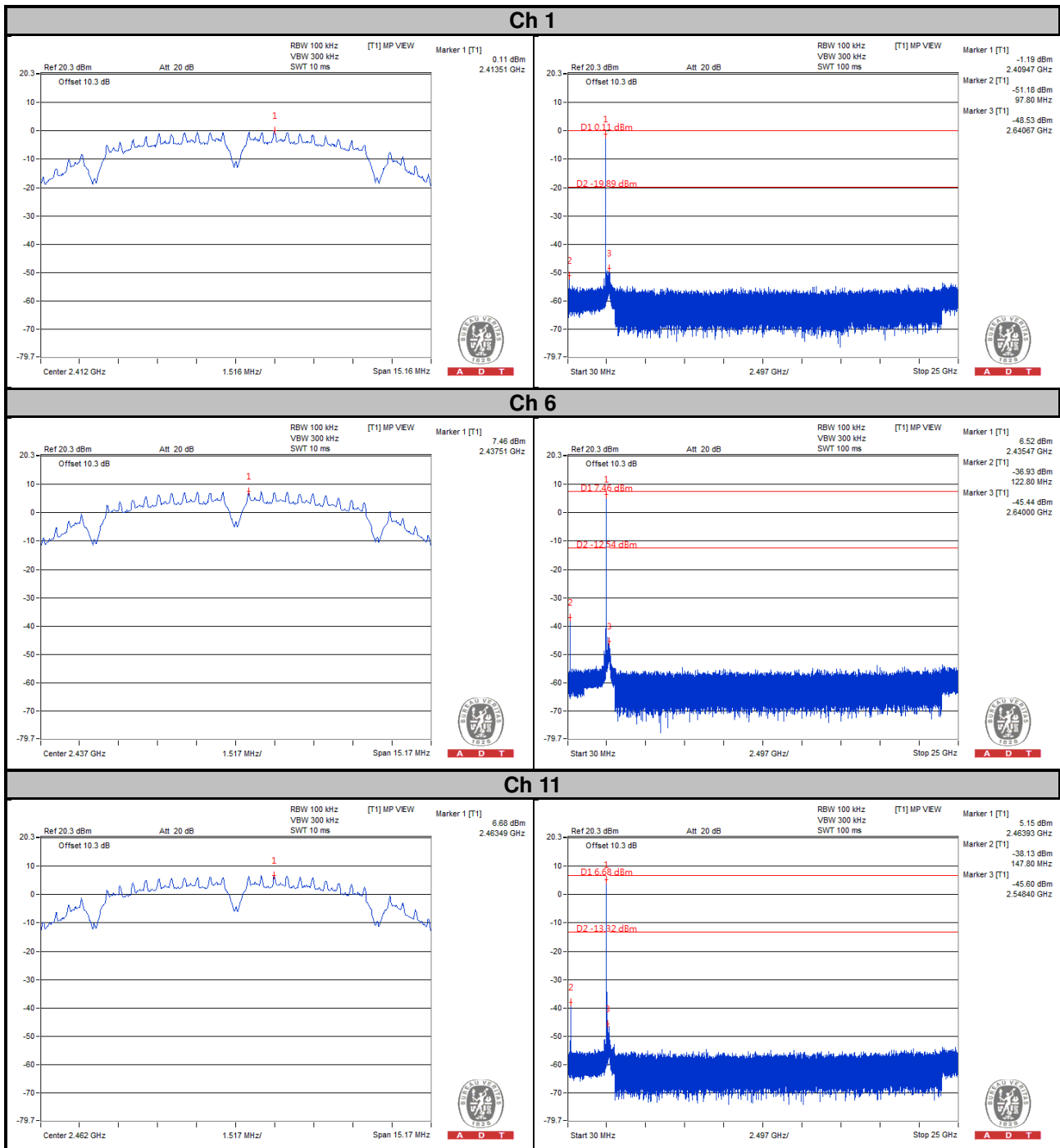
4.5.7 Test Results

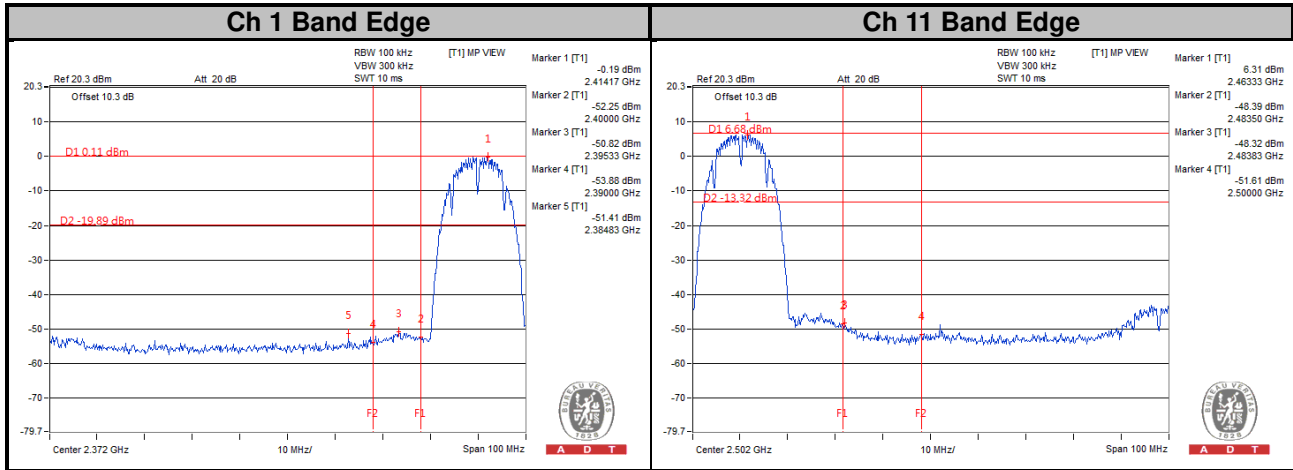
The conducted emission test is performed on each TX port of operating mode without summing or adding 10log (N) since the limit is relative emission limit.

The spectrum plots are attached on the following images. D1 line indicates the highest level, and D2 line indicates the 20 dB offset below D1. It shows compliance with the requirement.

Mode A

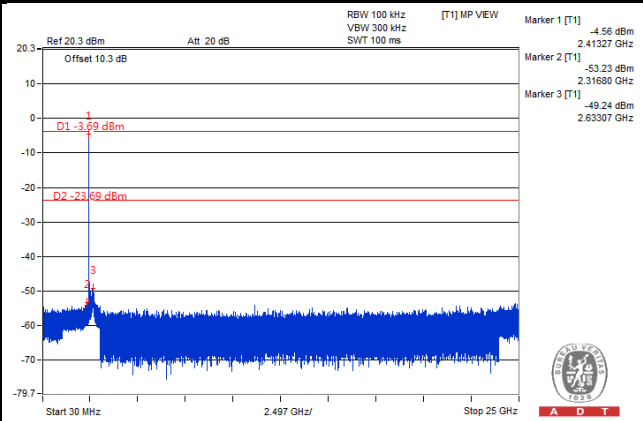
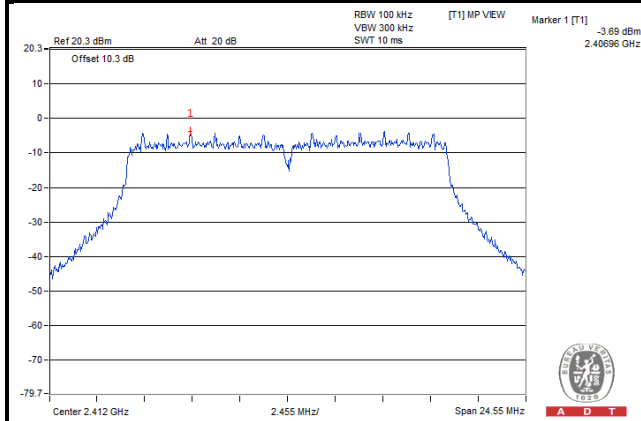
802.11b



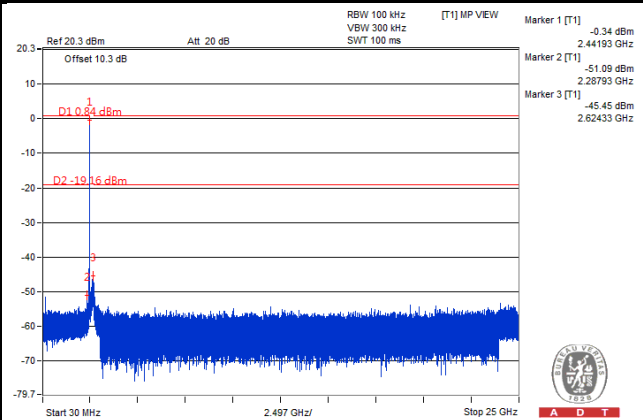
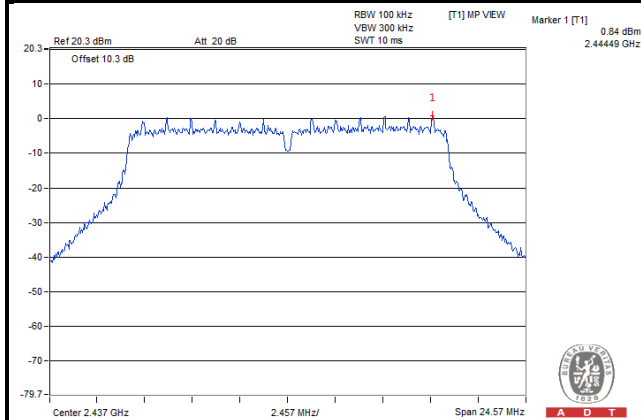


802.11g

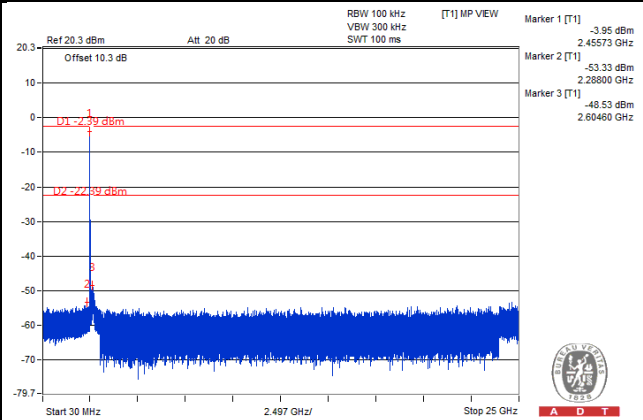
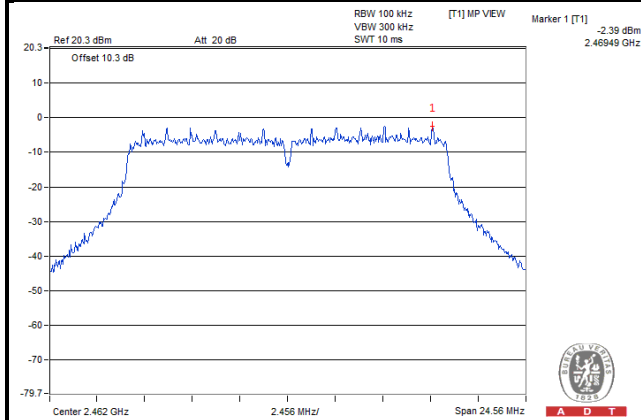
Ch 1

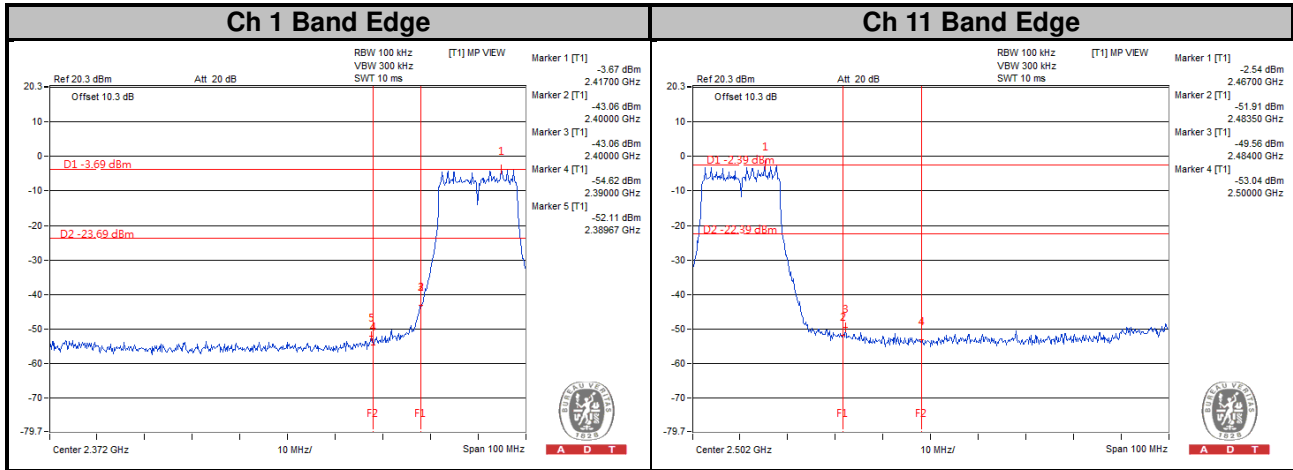


Ch 6



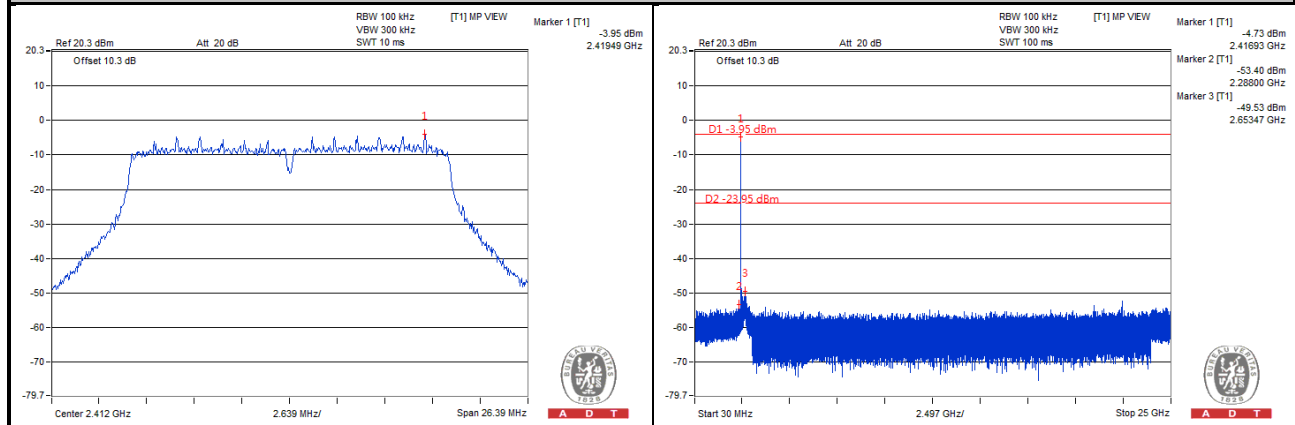
Ch 11



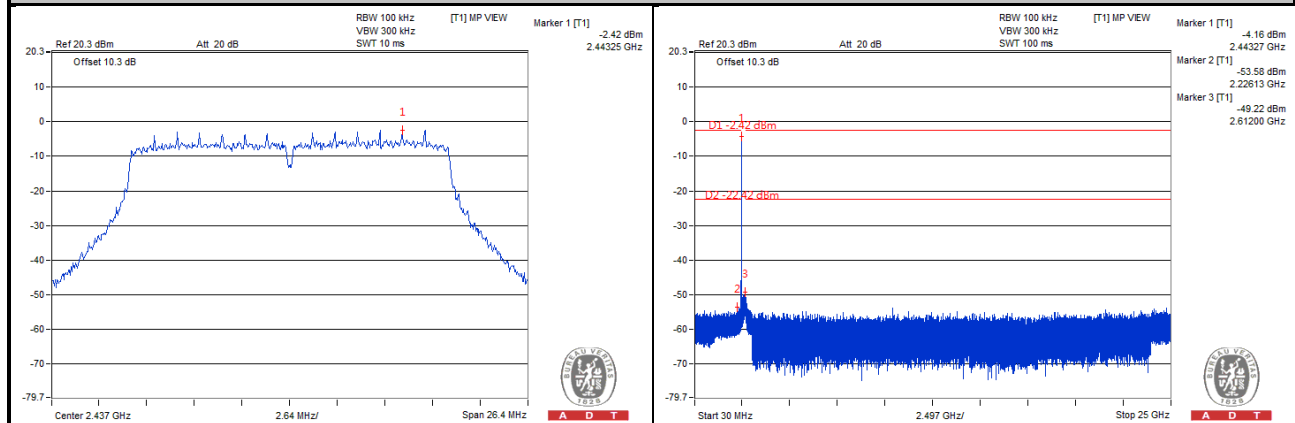


802.11n (HT20)

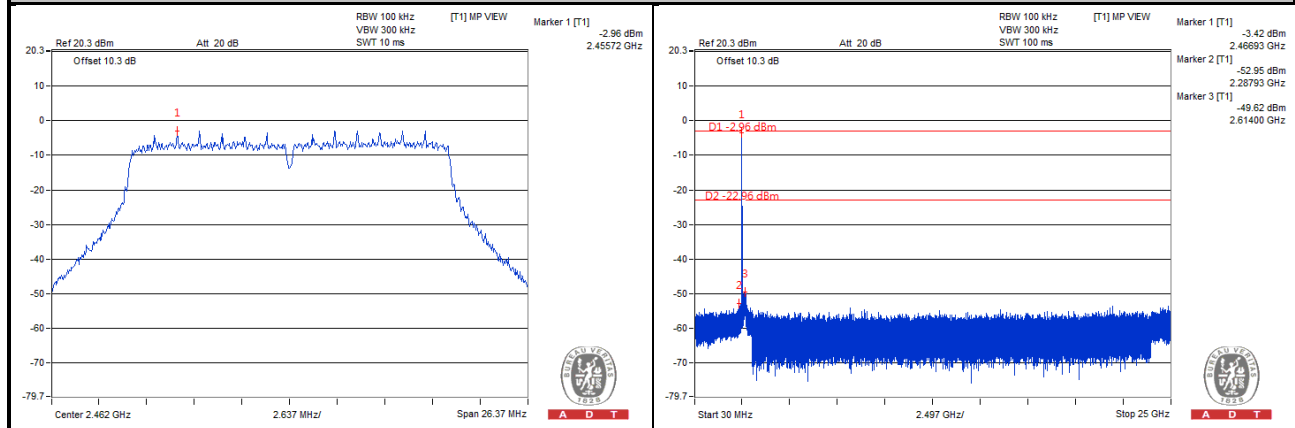
Ch 1

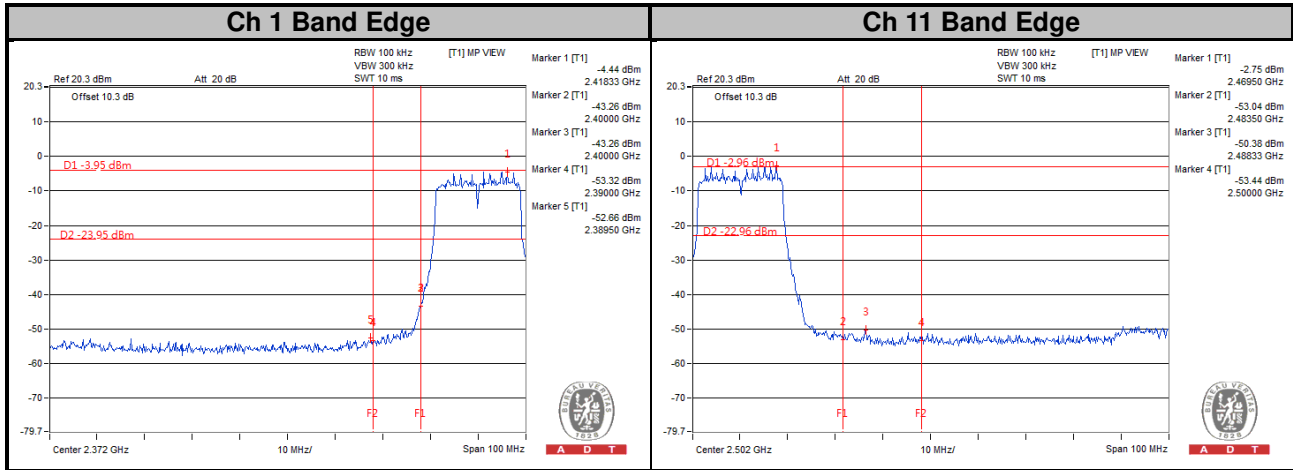


Ch 6



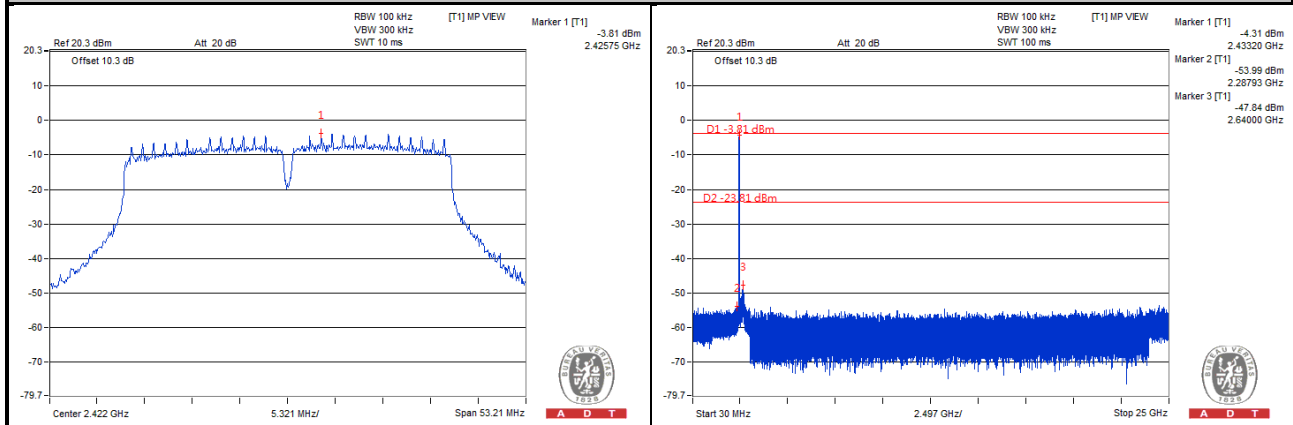
Ch 11



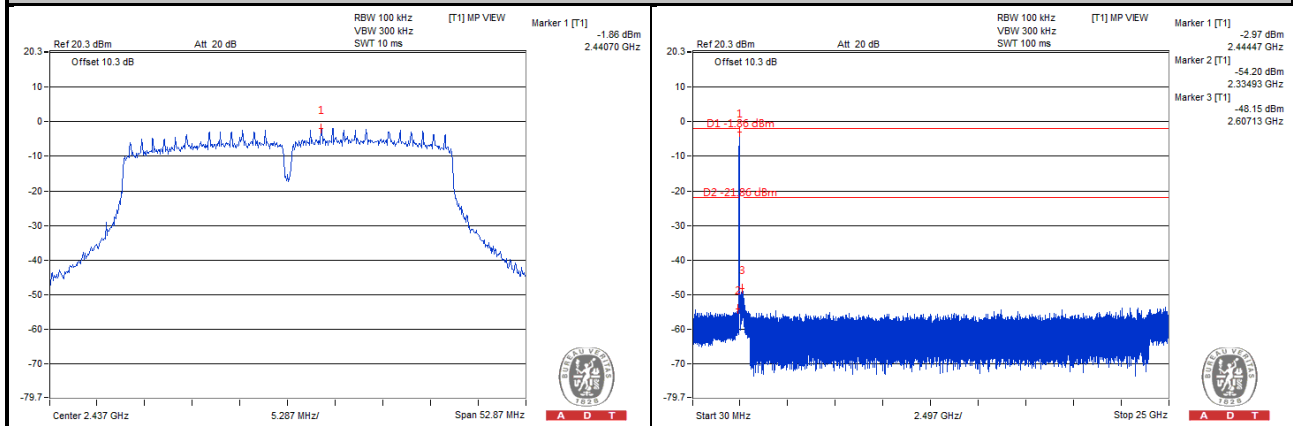


802.11n (HT40)

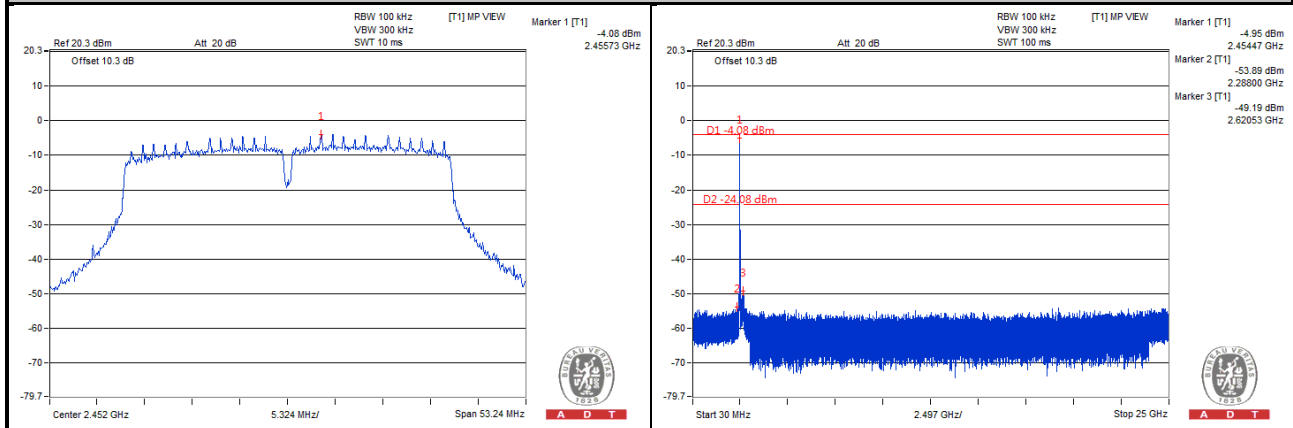
Ch 3

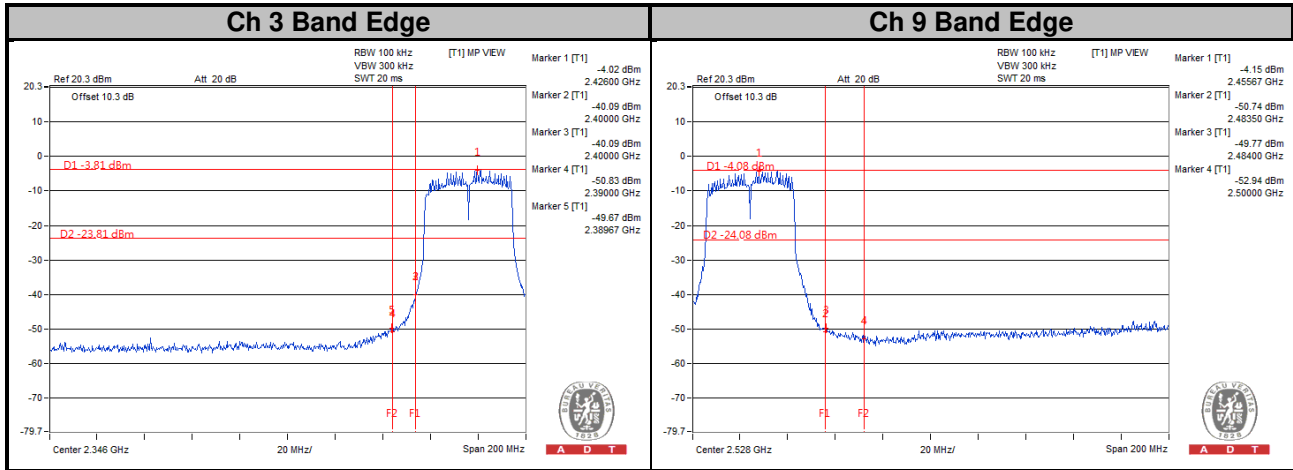


Ch 6



Ch 9



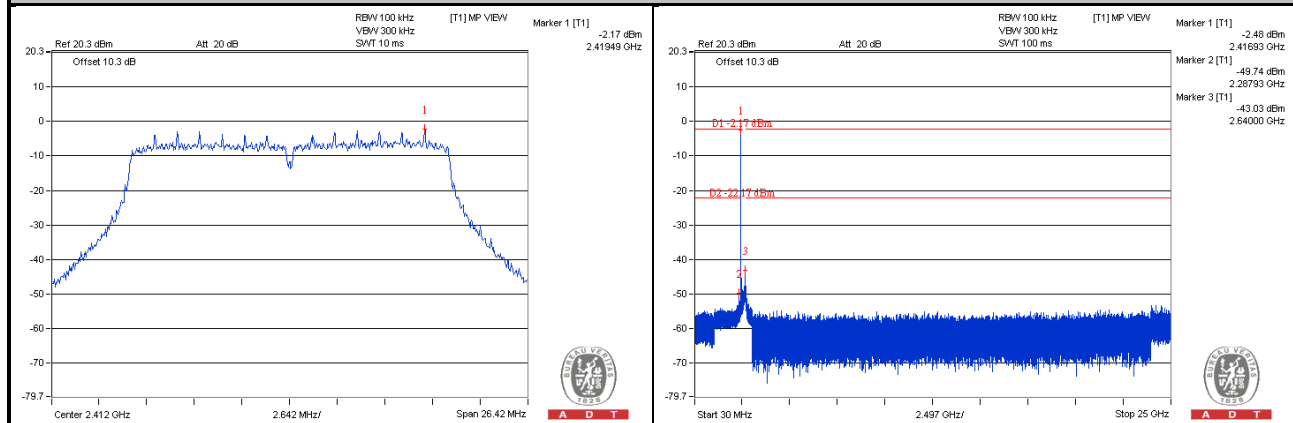


Mode B

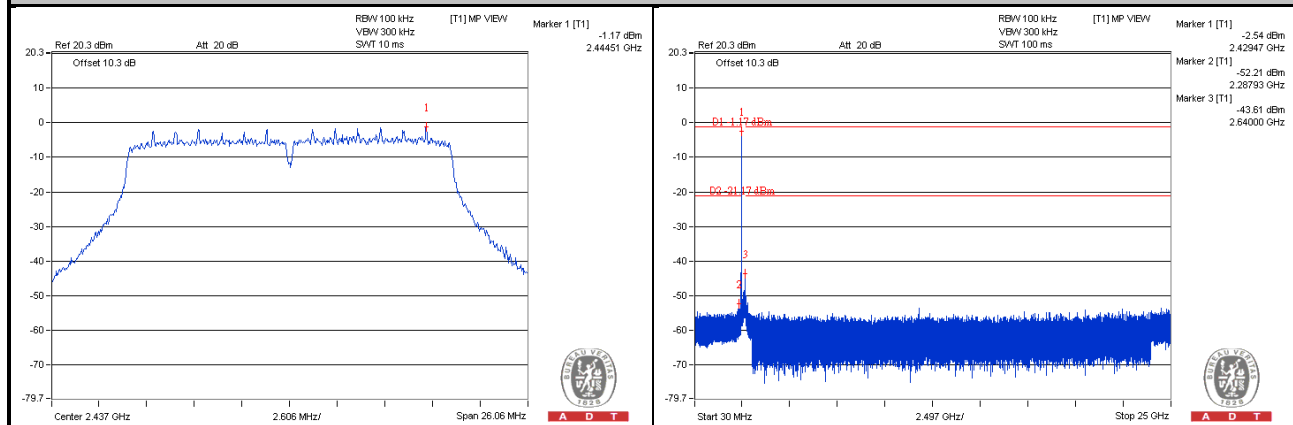
802.11n (HT20)

CHAIN 0

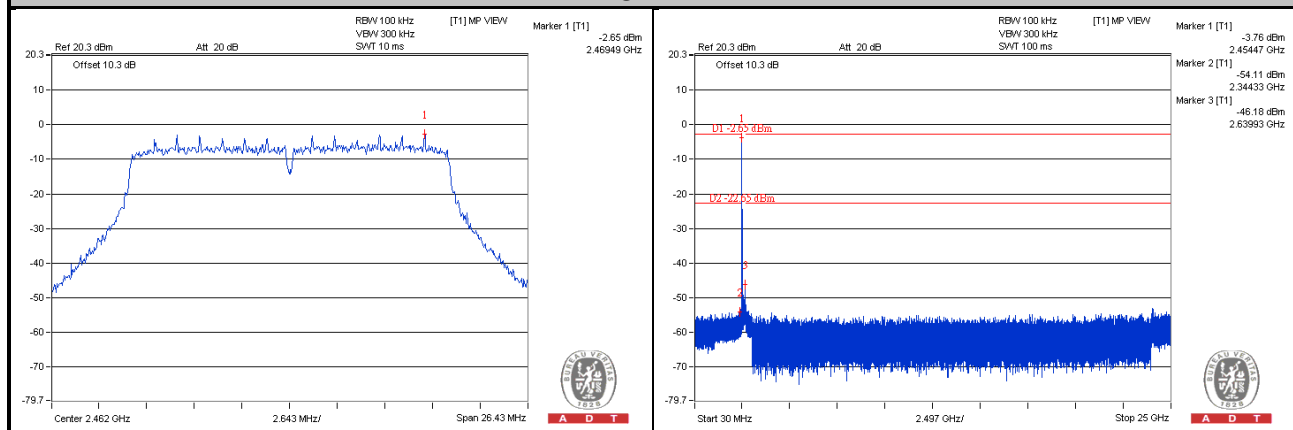
Ch 1

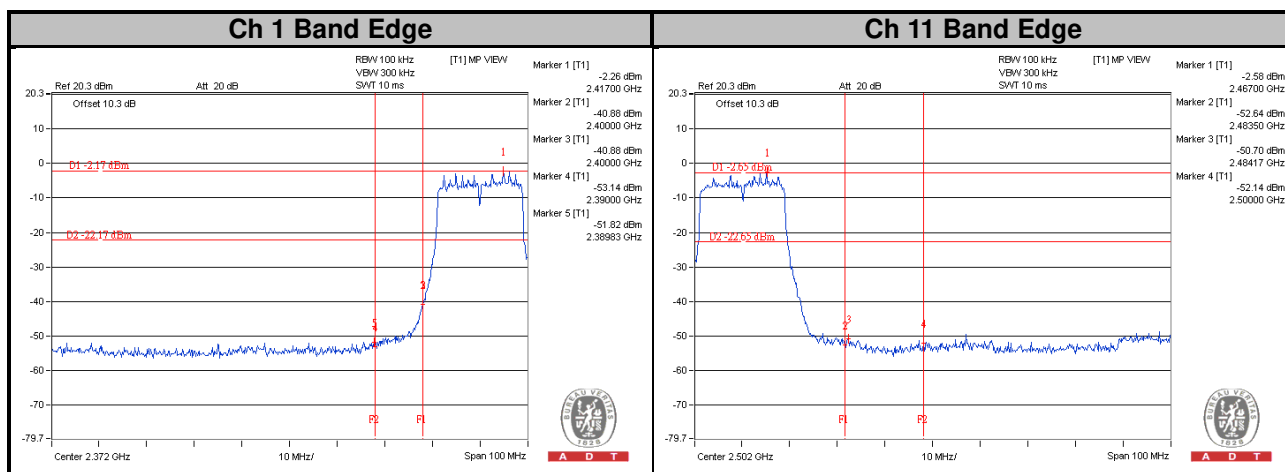


Ch 6



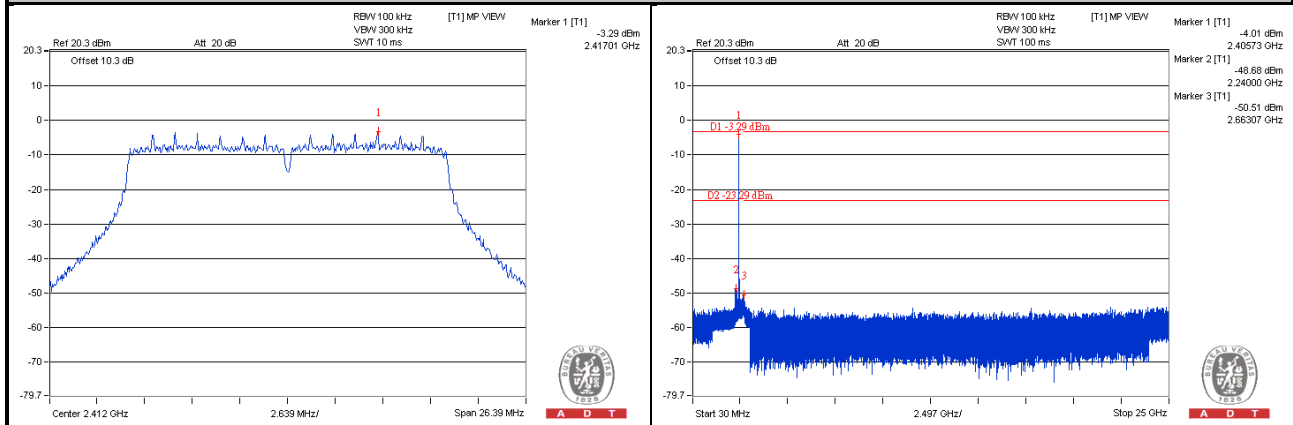
Ch 11



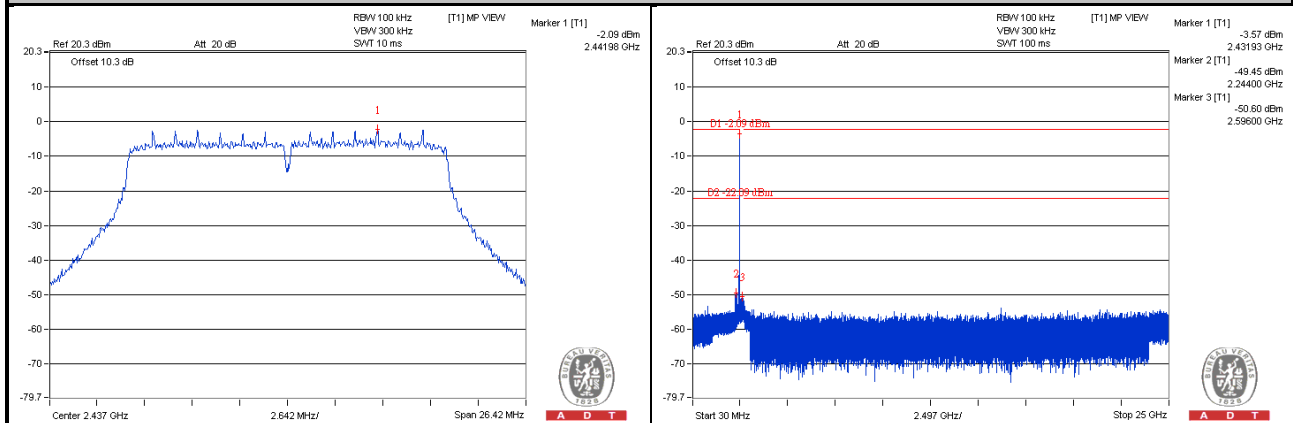


CHAIN 1

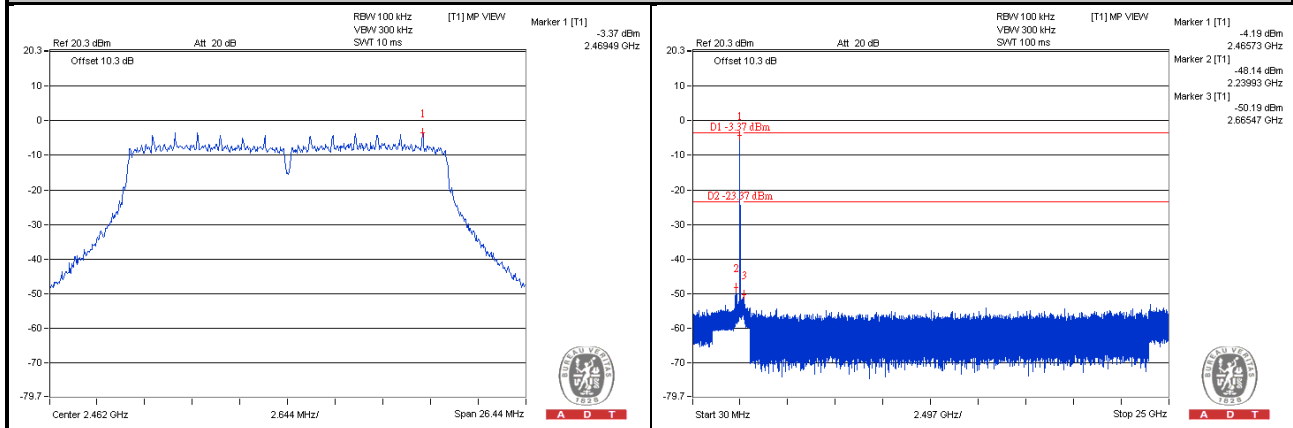
Ch 1

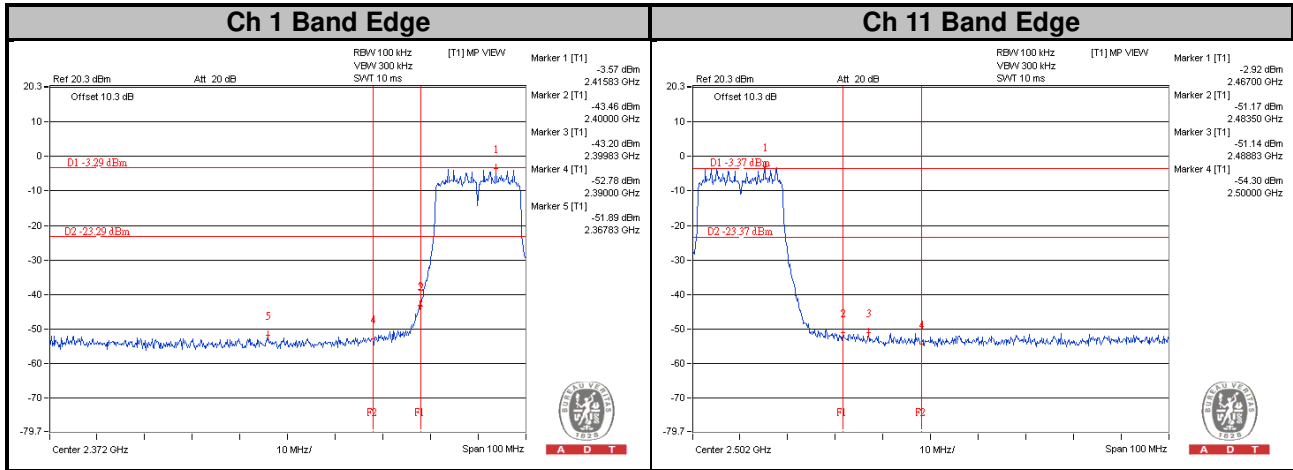


Ch 6



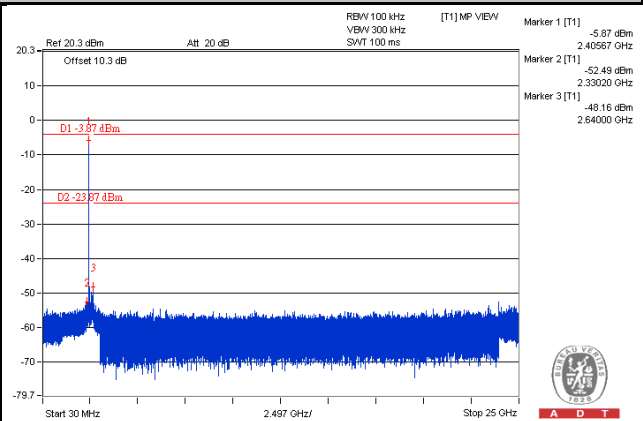
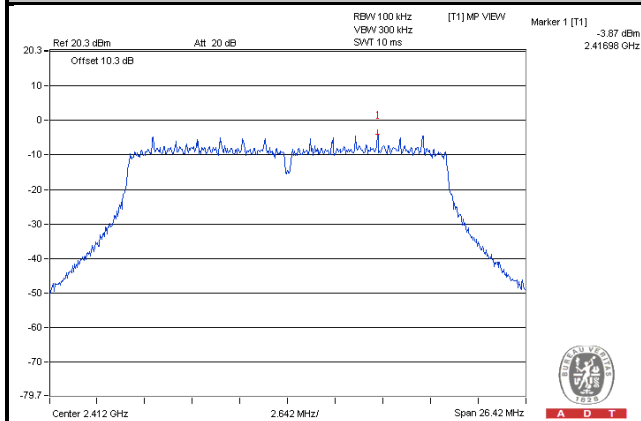
Ch 11



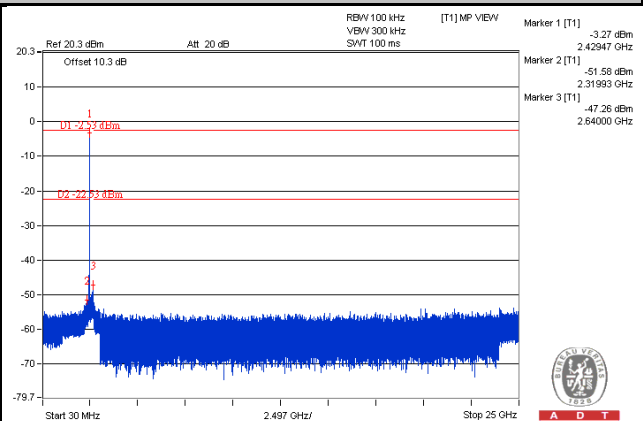
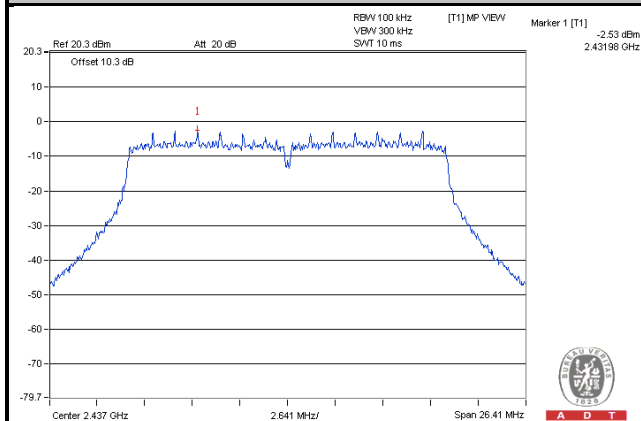


CHAIN 2

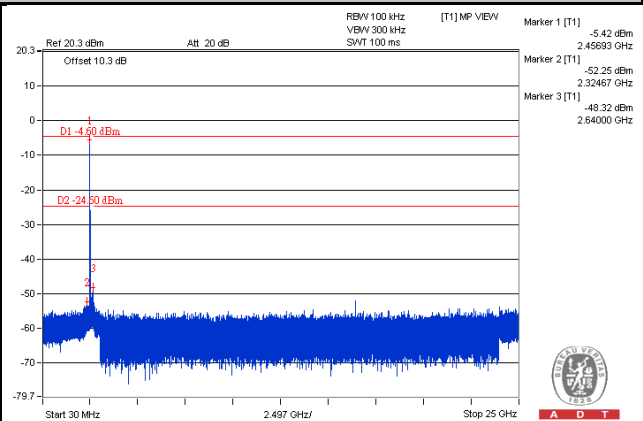
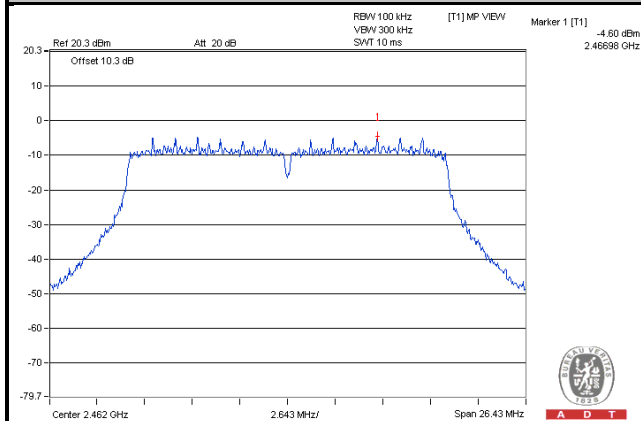
Ch 1

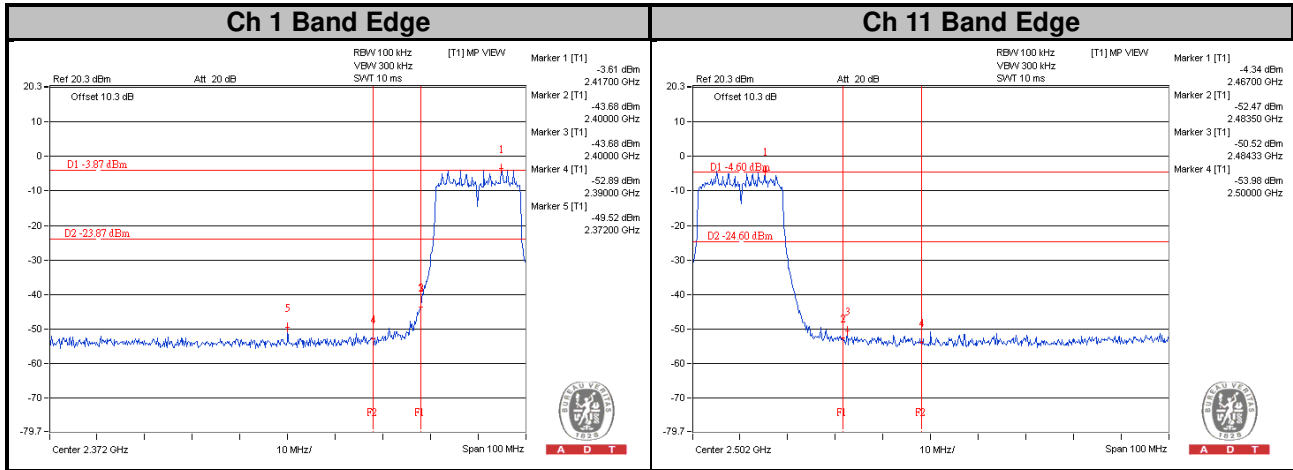


Ch 6



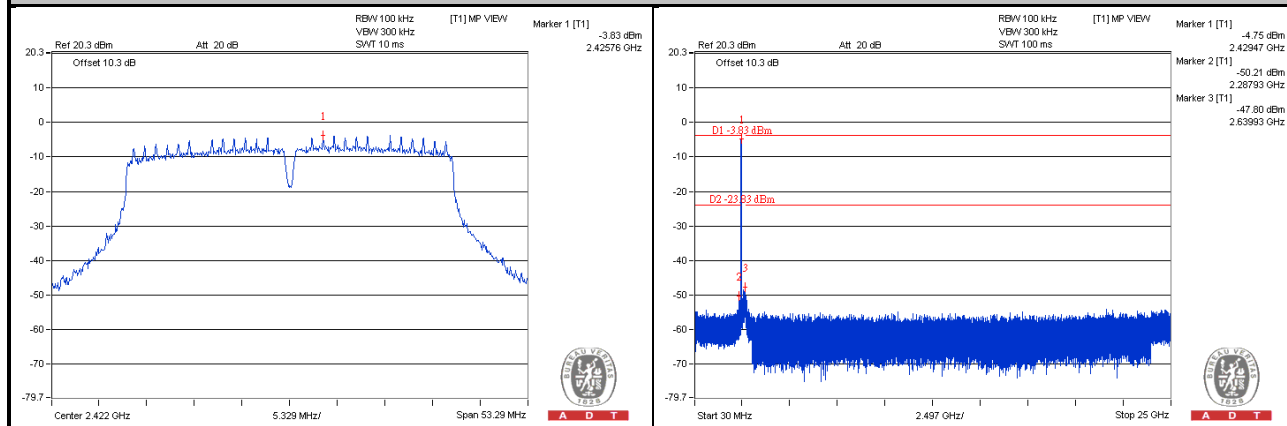
Ch 11



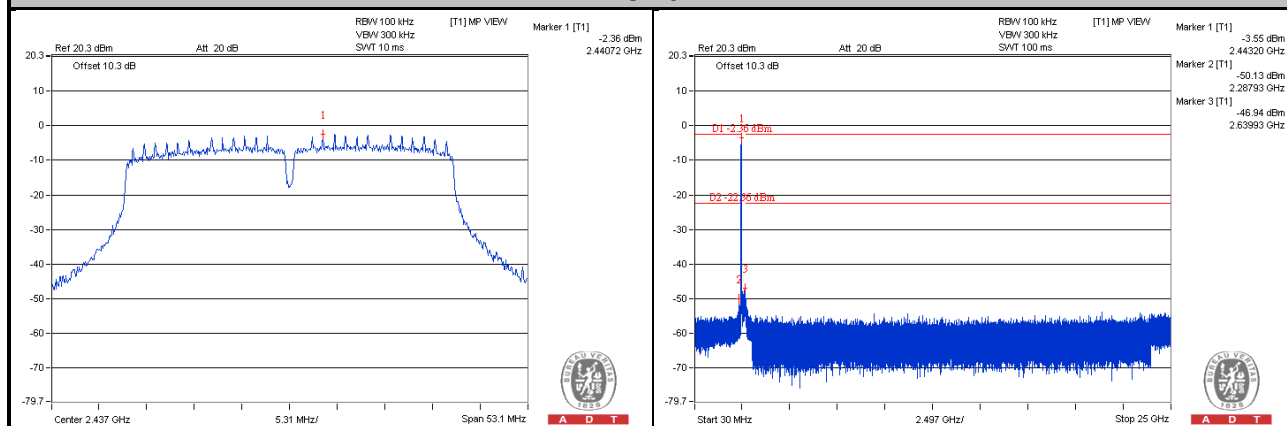


802.11n (HT40) CHAIN 0

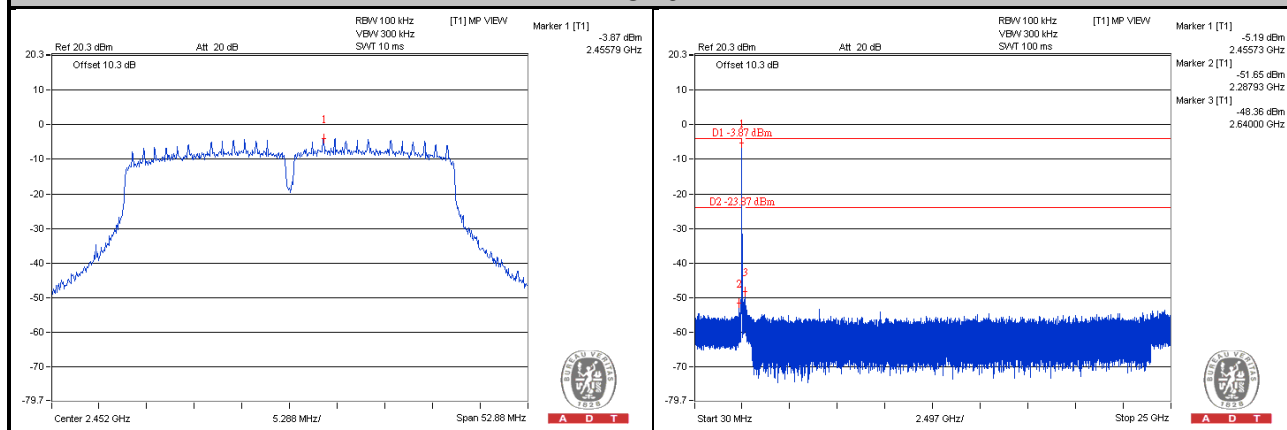
Ch 3

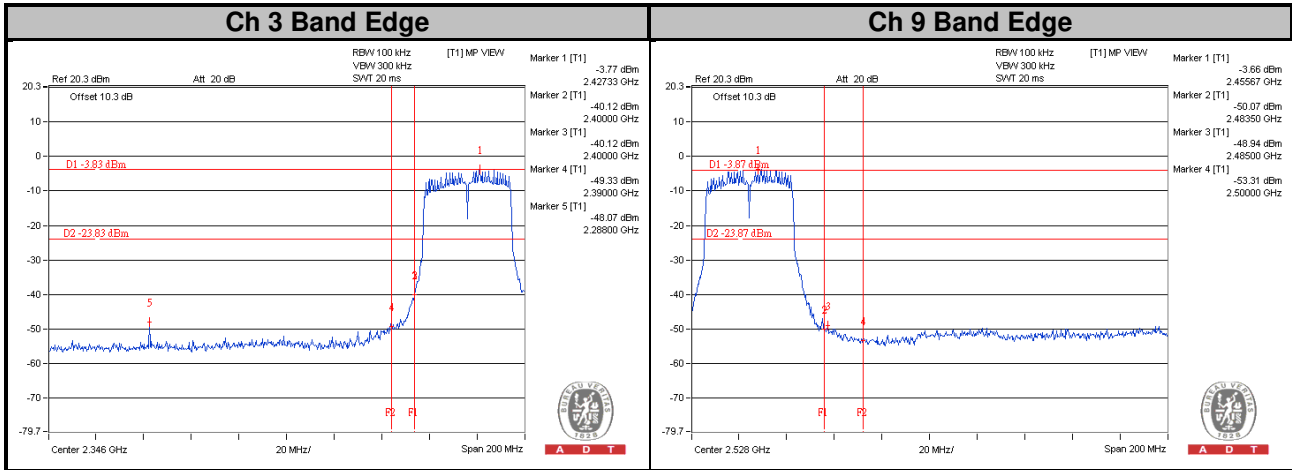


Ch 6



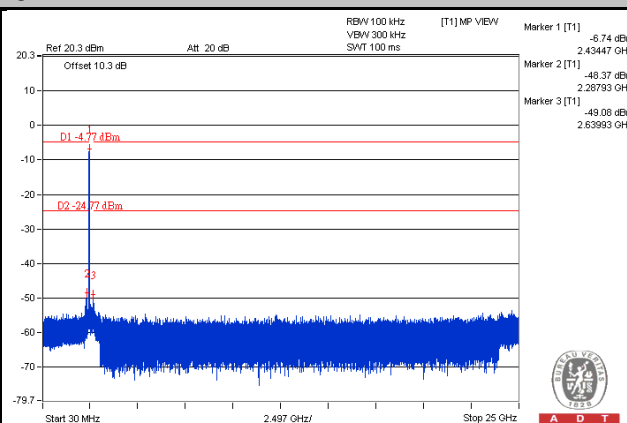
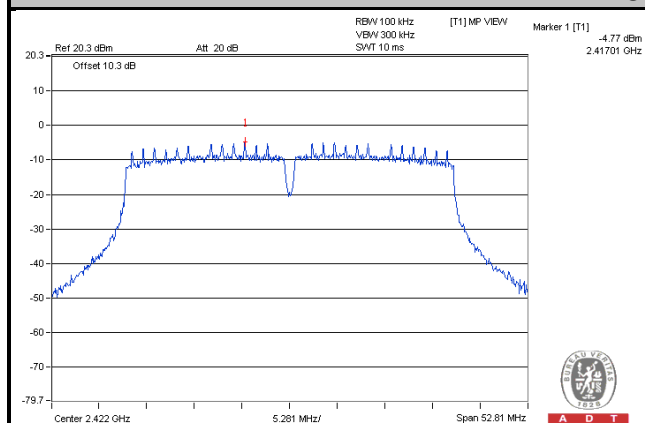
Ch 9



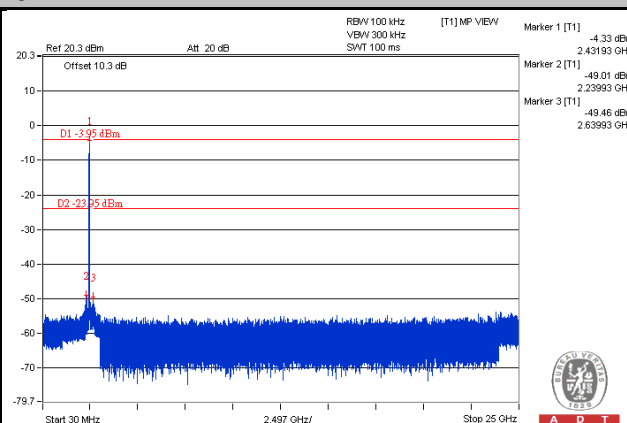
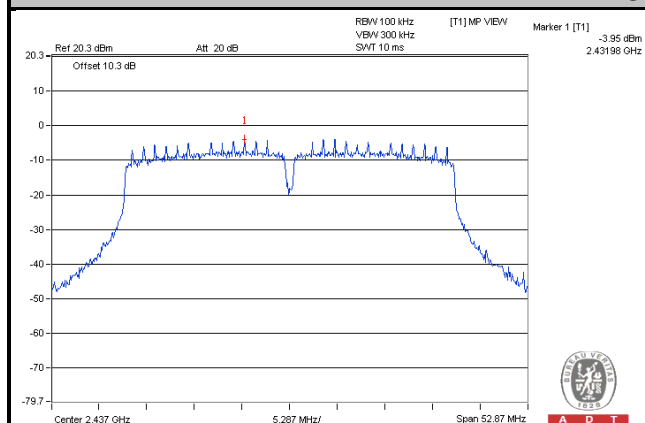


CHAIN 1

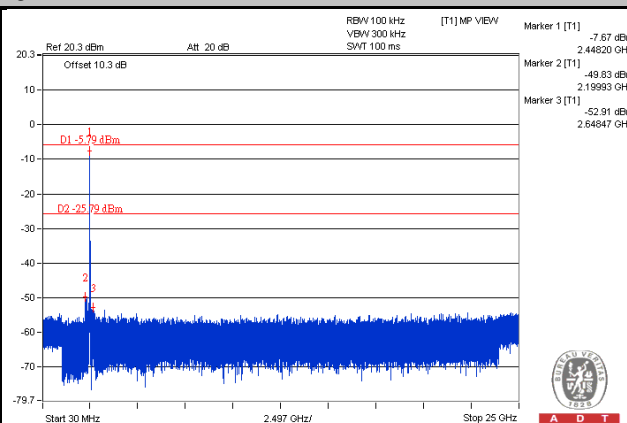
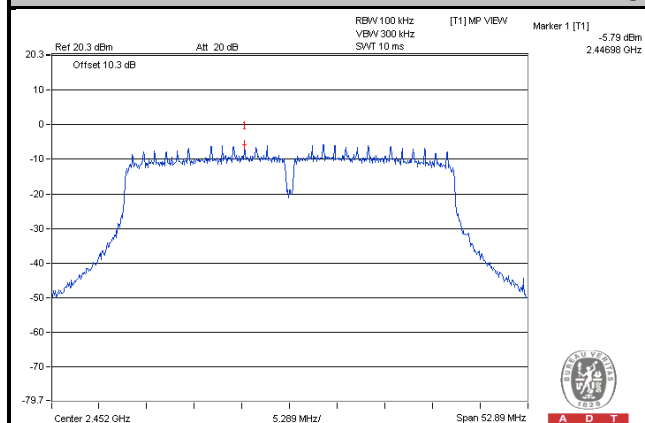
Ch 3

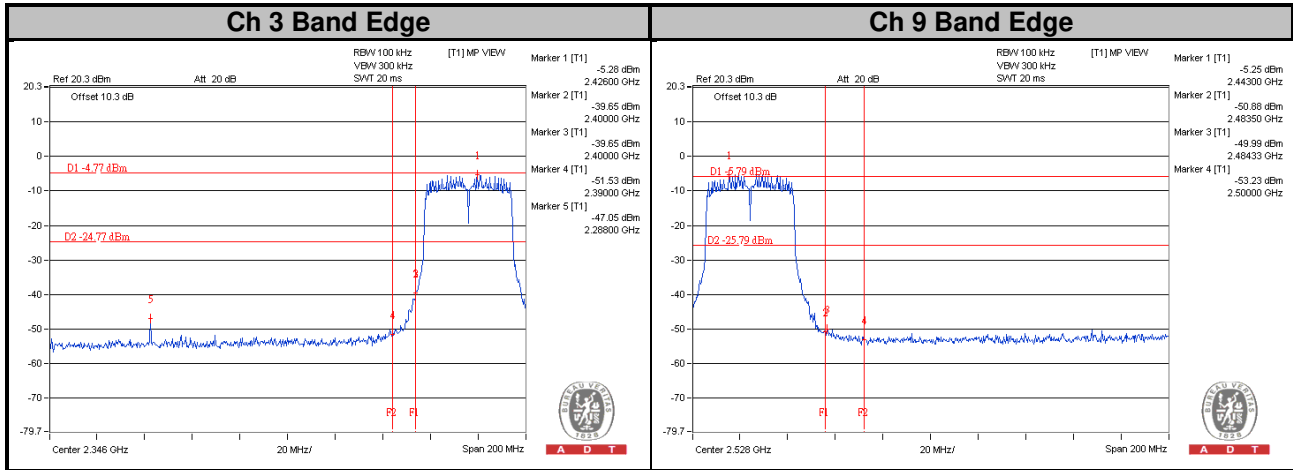


Ch 6



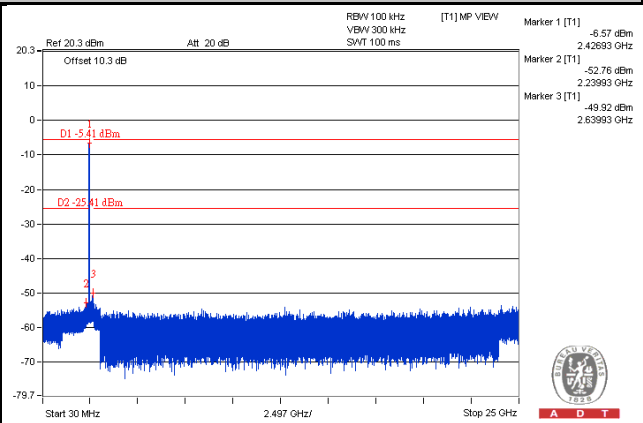
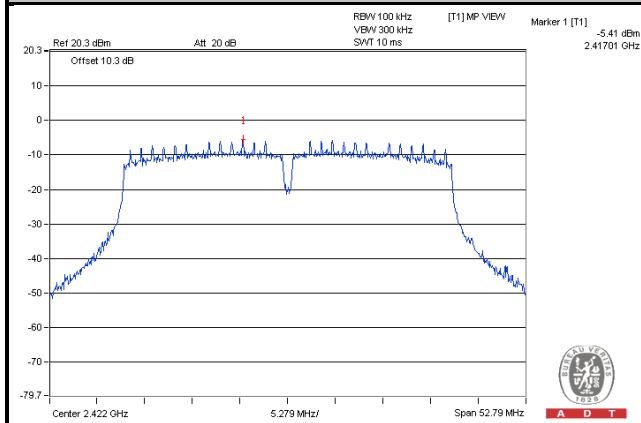
Ch 9



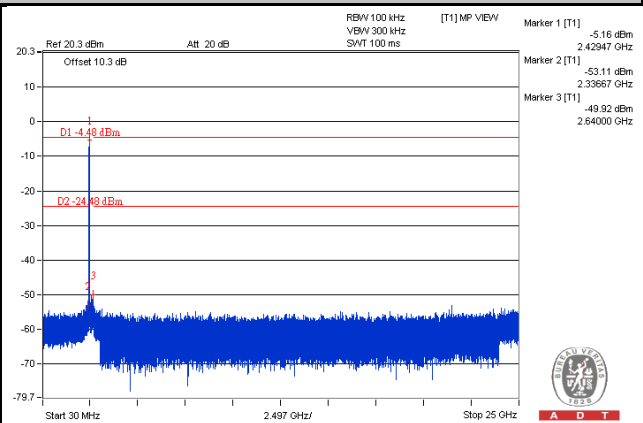
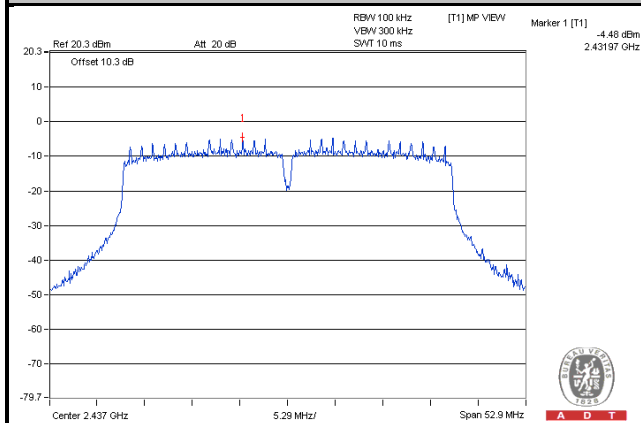


CHAIN 2

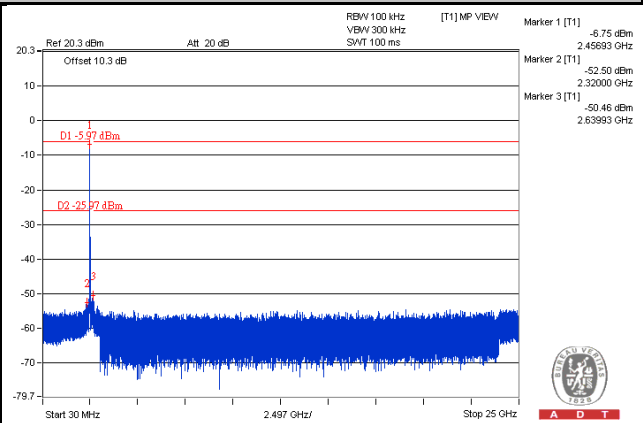
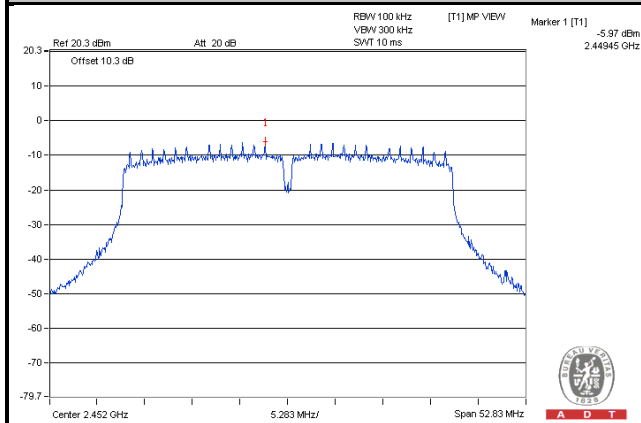
Ch 3

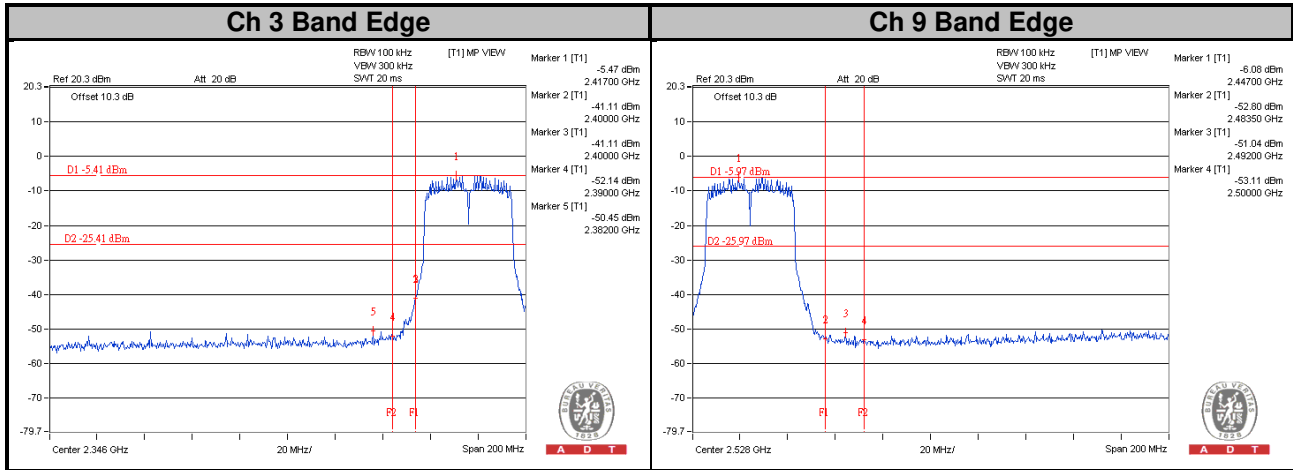


Ch 6



Ch 9





5 Pictures of Test Arrangements

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

Appendix – Information on 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 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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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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