

FCC Test Report

Report No.: RFCCOG-WTW-P21120247B

FCC ID: 2AH7L-UPSC

Test Model: PAS400

Received Date: Jun. 01, 2023

Test Date: Aug. 11, 2023

Issued Date: Nov. 24, 2023

Applicant: Schneider Electric Industries SAS

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Grenoble cedex 9

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



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Release Control Record

Issue No.	Description	Date Issued
RFCCOG-WTW-P21120247B	Original release	Nov. 24, 2023

1 Certificate of Conformity

Product: EcoStruxure™ Panel Server Entry

Brand: Schneider Electric

Test Model: PAS400

Sample Status: Engineering sample

Applicant: Schneider Electric Industries SAS

Test Date: Aug. 11, 2023

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 :


Polly Chien / Specialist

Date:

Nov. 24, 2023

Approved by :



Jeremy Lin / Project Engineer

Date:

Nov. 24, 2023

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	Refer to Note 1
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	N/A	Refer to Note 1
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	No antenna connector is used.

Note:

1. Only antenna port conducted measurement tests were verified and recorded in this report. Other testing data please refer to report no.: RFBGGV-WTW-P21120247.
2. Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

2.1 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	EcoStruxure™ Panel Server Entry
Brand	Schneider Electric
Test Model	PAS400
Sample Status	Engineering sample
Power Supply rating	110-277Vac/dc with +/-10% tolerance
Modulation Type	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM
Modulation Technology	DSSS, OFDM
Transfer Rate	802.11b:11/5.5/2/1Mbps 802.11g: 54/48/36/24/18/12/9/6Mbps 802.11n: up to 150Mbps
Operating Frequency	2412 ~ 2462MHz
Number of Channel	802.11b, 802.11g, 802.11n (HT20): 11 802.11n (HT40): 7
Output Power	0.4198mW
Antenna Type	PCB antenna with 3.22 dBi gain (Brand: Schneider Electric, model: ANT1_1)
Antenna Connector	NA
Accessory Device	NA
Cable Supplied	NA

Note:

1. This report is issued as a supplementary report of BV CPS report no.: RFBGGV-WTW-P21120247. The differences compared with the original report are reducing power setting and changing internal antenna from 3.5 dBi to 3.22 dBi gain. The output power is lowered via firmware/software settings only (and cannot be changed by end-user / any other third parties). Therefore, only antenna port conducted measurement tests were verified and recorded in this report.

2. The EUT provide 1 completed transmitter and 1 receiver.

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

3. Detail antenna specification please refer to antenna datasheet or an antenna gain measurement report.

3.2 Description of Test Modes

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

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):

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
	APCM	
-	√	EUT + AC power

Where APCM: Antenna Port Conducted Measurement

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)
-	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

Test Condition:

Applicable to	Environmental Conditions	Input Power (System)	Tested by
APCM	25 deg. C, 60% RH	120Vac, 60Hz	Henry Hsu

3.3 Duty Cycle of Test Signal

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

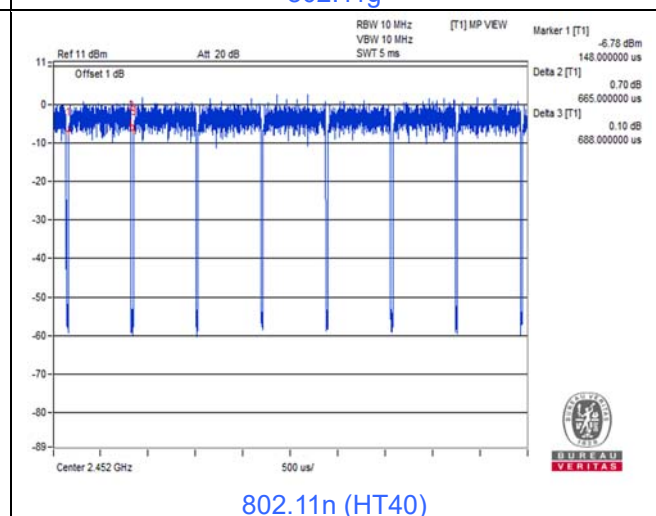
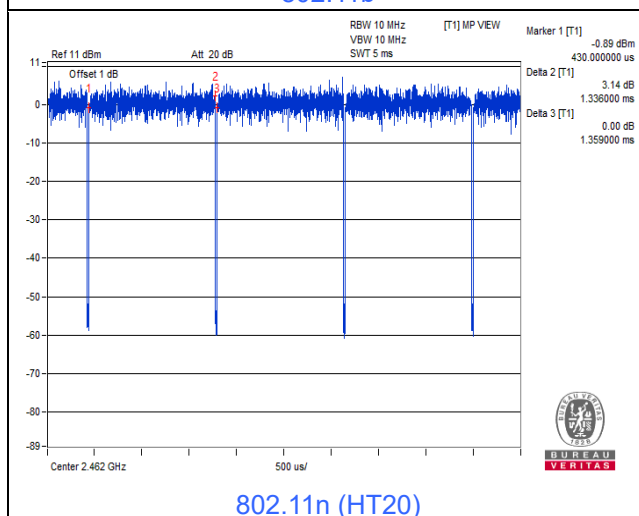
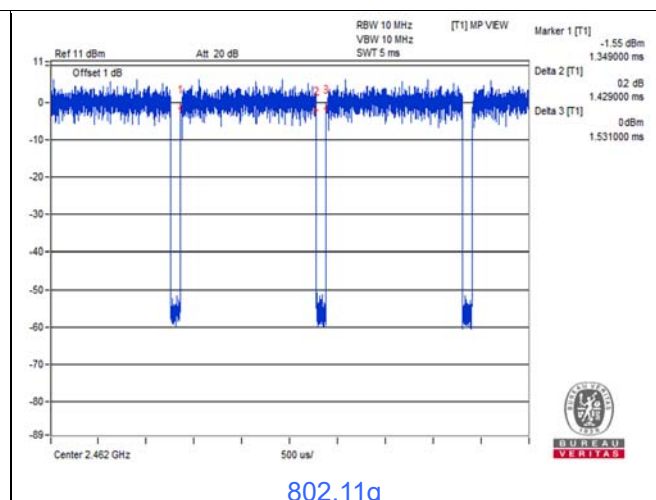
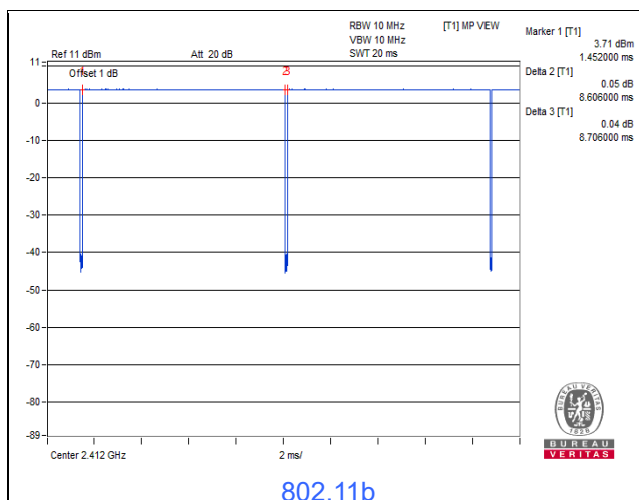
Duty cycle of test signal is $< 98\%$, duty factor shall be considered.

802.11b: Duty cycle = $8.606 \text{ ms} / 8.706 \text{ ms} \times 100\% = 98.9\%$

802.11g: Duty cycle = $1.429 \text{ ms} / 1.531 \text{ ms} \times 100\% = 93.3\%$, duty factor = $10 \cdot \log(1/\text{Duty cycle}) = 0.30 \text{ dB}$

802.11n (HT20): Duty cycle = $1.336 \text{ ms} / 1.359 \text{ ms} \times 100\% = 98.3\%$

802.11n (HT40): Duty cycle = $0.665 \text{ ms} / 0.688 \text{ ms} \times 100\% = 96.7\%$, duty factor = $10 \cdot \log(1/\text{Duty cycle}) = 0.15 \text{ dB}$



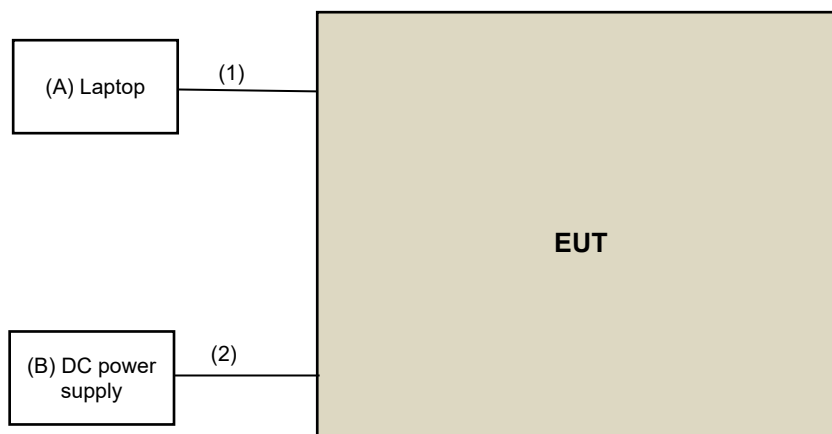
3.4 Description of Support Units

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.	Laptop	Lenovo	80Q7	PF0KUGU6	NA	Provided by Lab
B.	DC power supply	JIN YIH Technology	SP3051	SP30512113402	NA	Provided by Lab

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	USB Cable	1	1	Y	0	Provided by Lab
2.	DC Cable	1	1.5	N	0	Provided by Lab

3.4.1 Configuration of System under Test



Under Table

Remote Site

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

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

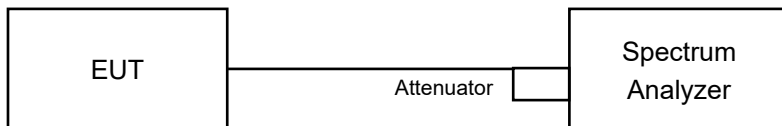
4 Test Types and Results

4.1 6dB Bandwidth Measurement

4.1.1 Limits of 6dB Bandwidth Measurement

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

4.1.2 Test Setup



4.1.3 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100979	Mar. 25, 2023	Mar. 24, 2024
Peak Power Analyzer KEYSIGHT	8990B	MY51000485	Jan. 19, 2023	Jan. 18, 2024
Wideband Power Sensor KEYSIGHT	N1923A	MY58020002	Jan. 18, 2023	Jan. 17, 2024

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 Oven room.

4.1.4 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.

4.1.5 Deviation from Test Standard

No deviation.

4.1.6 EUT Operating Conditions

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

4.1.7 Test Result

802.11b

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	9.02	0.5	Pass
6	2437	9.05	0.5	Pass
11	2462	9.08	0.5	Pass

802.11g

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	16.33	0.5	Pass
6	2437	16.37	0.5	Pass
11	2462	16.33	0.5	Pass

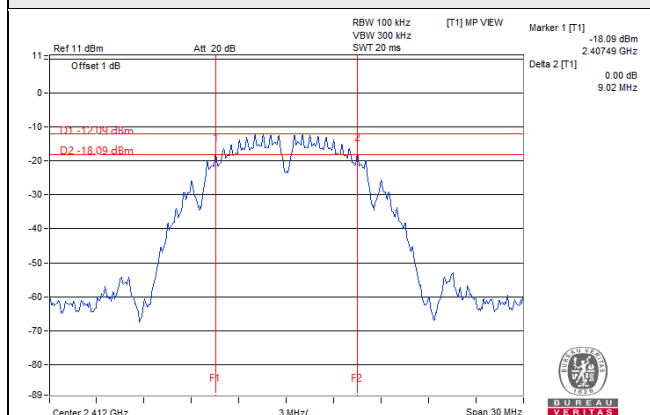
802.11n (HT20)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	17.07	0.5	Pass
6	2437	17.57	0.5	Pass
11	2462	16.34	0.5	Pass

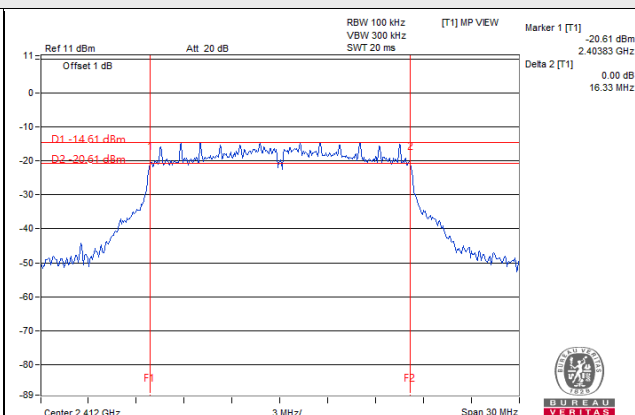
802.11n (HT40)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
3	2422	35.79	0.5	Pass
6	2437	36.43	0.5	Pass
9	2452	35.95	0.5	Pass

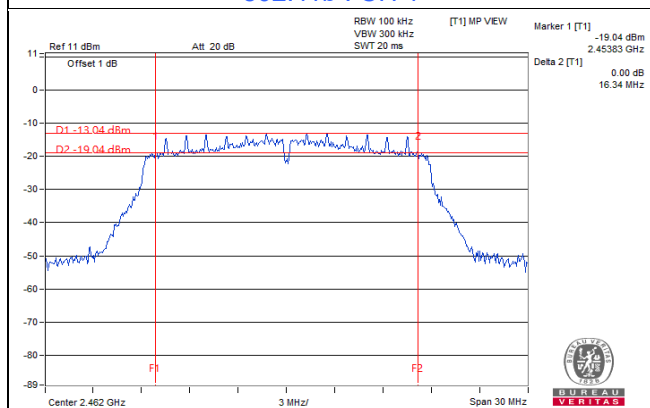
Spectrum Plot of Minimum Value



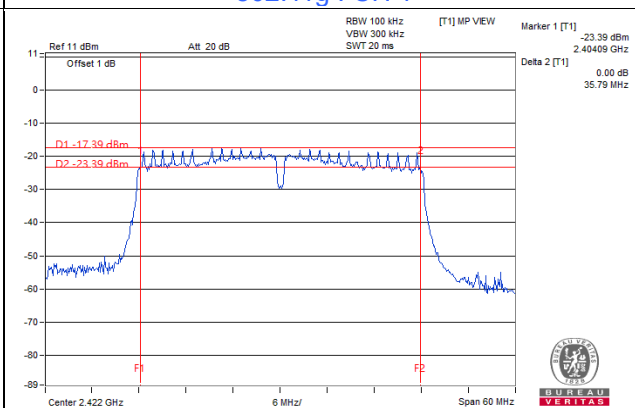
802.11b : CH 1



802.11g : CH 1



802.11n (HT20) : CH 11



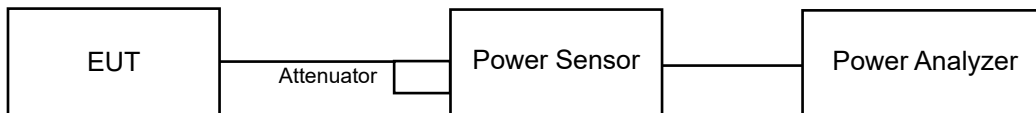
802.11n (HT40) : CH 3

4.2 Conducted Output Power Measurement

4.2.1 Limits of Conducted Output Power Measurement

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

4.2.2 Test Setup



4.2.3 Test Instruments

Refer to section 4.1.3 to get information of above instrument.

4.2.4 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.

4.2.5 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 Results

802.11b

Chan.	Chan. Freq. (MHz)	Average Power (mW)	Average Power (dBm)	Power Limit (dBm)	Test Result
1	2412	0.3963	-4.02	30	Pass
6	2437	0.4198	-3.77	30	Pass
11	2462	0.4064	-3.91	30	Pass

Note: The antenna gain is 3.22 dBi < 6 dBi, so the output power limit shall not be reduced.

802.11g

Chan.	Chan. Freq. (MHz)	Average Power (mW)	Average Power (dBm)	Power Limit (dBm)	Test Result
1	2412	0.3954	-4.03	30	Pass
6	2437	0.415	-3.82	30	Pass
11	2462	0.399	-3.99	30	Pass

Note: The antenna gain is 3.22 dBi < 6 dBi, so the output power limit shall not be reduced.

802.11n (HT20)

Chan.	Chan. Freq. (MHz)	Average Power (mW)	Average Power (dBm)	Power Limit (dBm)	Test Result
1	2412	0.3945	-4.04	30	Pass
6	2437	0.3882	-4.11	30	Pass
11	2462	0.3819	-4.18	30	Pass

Note: The antenna gain is 3.22 dBi < 6 dBi, so the output power limit shall not be reduced.

802.11n (HT40)

Chan.	Chan. Freq. (MHz)	Average Power (mW)	Average Power (dBm)	Power Limit (dBm)	Test Result
3	2422	0.2056	-6.87	30	Pass
6	2437	0.2051	-6.88	30	Pass
9	2452	0.2032	-6.92	30	Pass

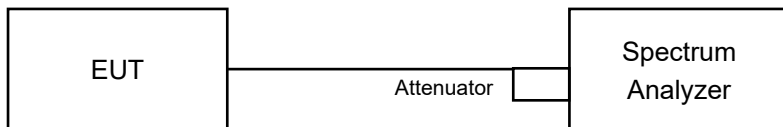
Note: The antenna gain is 3.22 dBi < 6 dBi, so the output power limit shall not be reduced.

4.3 Power Spectral Density Measurement

4.3.1 Limits of Power Spectral Density Measurement

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

4.3.2 Test Setup



4.3.3 Test Instruments

Refer to section 4.1.3 to get information of above instrument.

4.3.4 Test Procedure

For Average 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 $\geq 2 \times \text{span/RBW}$.
- 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.

For Average Power (Duty cycle $< 98\%$)

- Measure the duty cycle (x).
- 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 $\geq 2 \times \text{span/RBW}$.
- Sweep time = auto couple.
- Do not use sweep triggering. Allow sweep to "free run".
- Employ trace averaging (RMS) mode over a minimum of 100 traces.
- Use the peak marker function to determine the maximum amplitude level.
- Add $10 \log (1/x)$, where x is the duty cycle measured in step (a), to the measured PSD to compute the average PSD during the actual transmission time.

4.3.5 Deviation from Test Standard

No deviation.

4.3.6 EUT Operating Condition

Same as item 4.2.6

4.3.7 Test Results

802.11b

Channel	Frequency (MHz)	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass / Fail
1	2412	-36.68	8.00	Pass
6	2437	-36.36	8.00	Pass
11	2462	-36.60	8.00	Pass

Note: The antenna gain is 3.22 dBi < 6 dBi, so the power density limit shall not be reduced.

802.11g

Channel	Frequency (MHz)	PSD W/O Duty Factor (dBm/3kHz)	Duty Factor (dB)	Total PSD With Duty Factor (dBm/3kHz)	Limit (dBm/3kHz)	Pass / Fail
1	2412	-32.49	0.30	-32.19	8.00	Pass
6	2437	-32.02	0.30	-31.72	8.00	Pass
11	2462	-32.05	0.30	-31.75	8.00	Pass

Note: The antenna gain is 3.22 dBi < 6 dBi, so the power density limit shall not be reduced.

802.11n (HT20)

Channel	Frequency (MHz)	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass / Fail
1	2412	-33.40	8.00	Pass
6	2437	-33.54	8.00	Pass
11	2462	-33.99	8.00	Pass

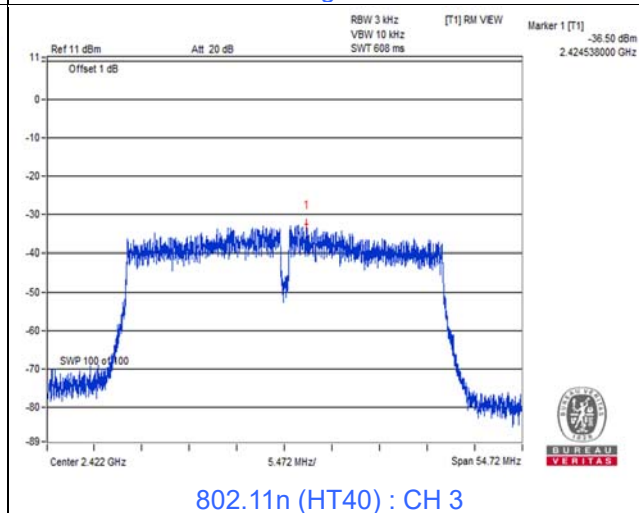
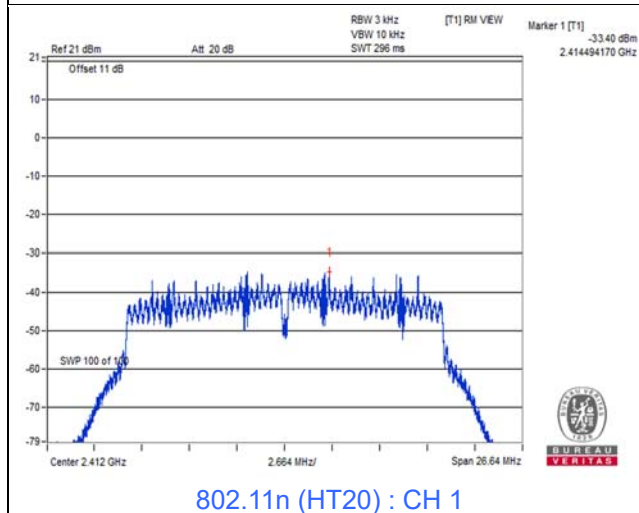
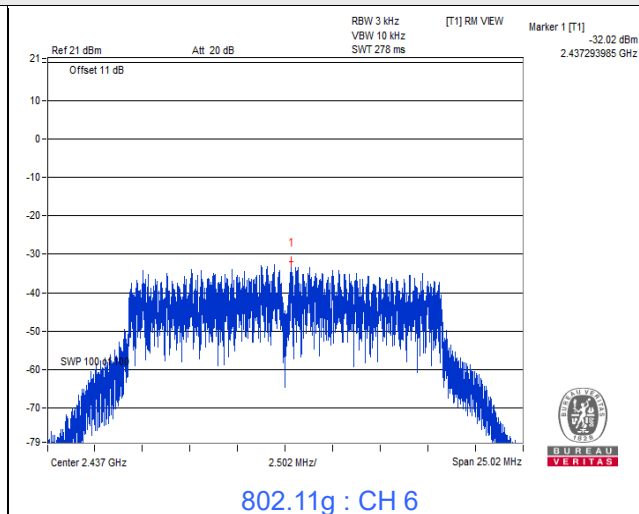
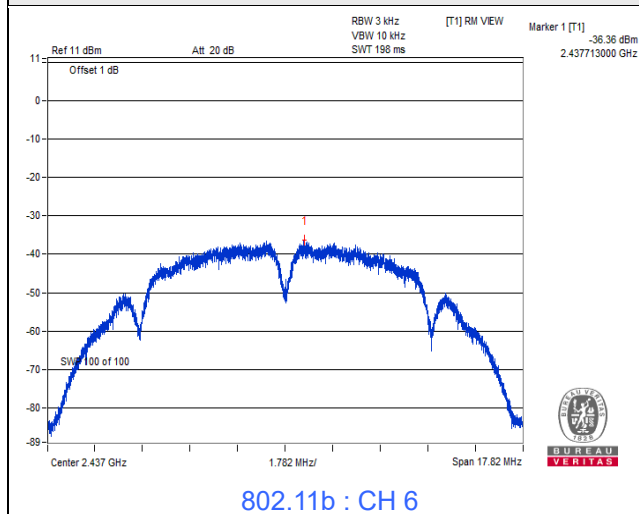
Note: The antenna gain is 3.22 dBi < 6 dBi, so the power density limit shall not be reduced.

802.11n (HT40)

Channel	Frequency (MHz)	PSD W/O Duty Factor (dBm/3kHz)	Duty Factor (dB)	Total PSD With Duty Factor (dBm/3kHz)	Limit (dBm/3kHz)	Pass / Fail
3	2422	-36.5	0.15	-36.35	8.00	Pass
6	2437	-36.56	0.15	-36.41	8.00	Pass
9	2452	-36.66	0.15	-36.51	8.00	Pass

Note: The antenna gain is 3.22 dBi < 6 dBi, so the power density limit shall not be reduced.

Spectrum Plot of Maximum Value



4.4 Conducted Out of Band Emission Measurement

4.4.1 Limits of Conducted Out of Band Emission Measurement

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

4.4.2 Test Setup



4.4.3 Test Instruments

Refer to section 4.1.3 to get information of above instrument.

4.4.4 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.

4.4.5 Deviation from Test Standard

No deviation.

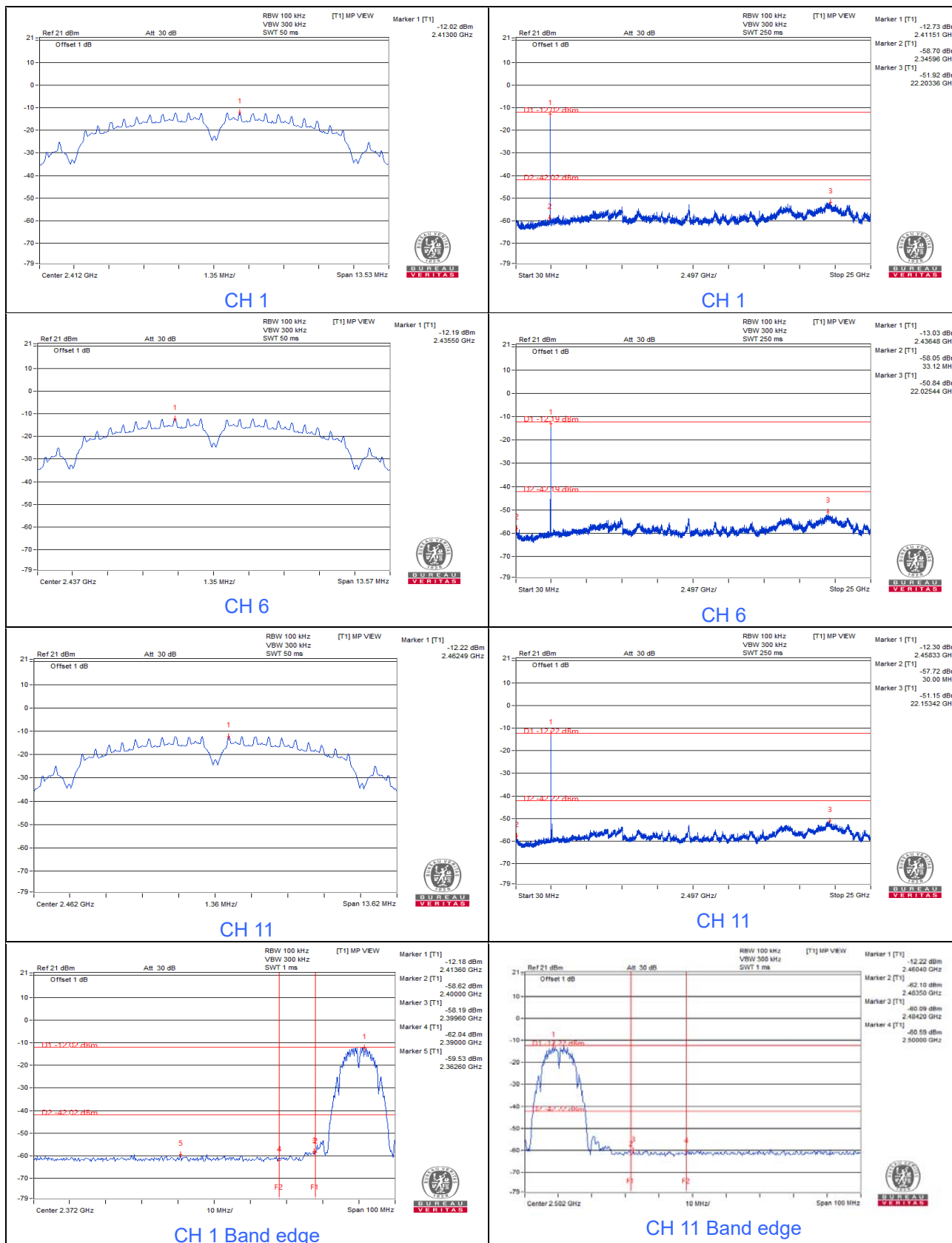
4.4.6 EUT Operating Condition

Same as item 4.3.6

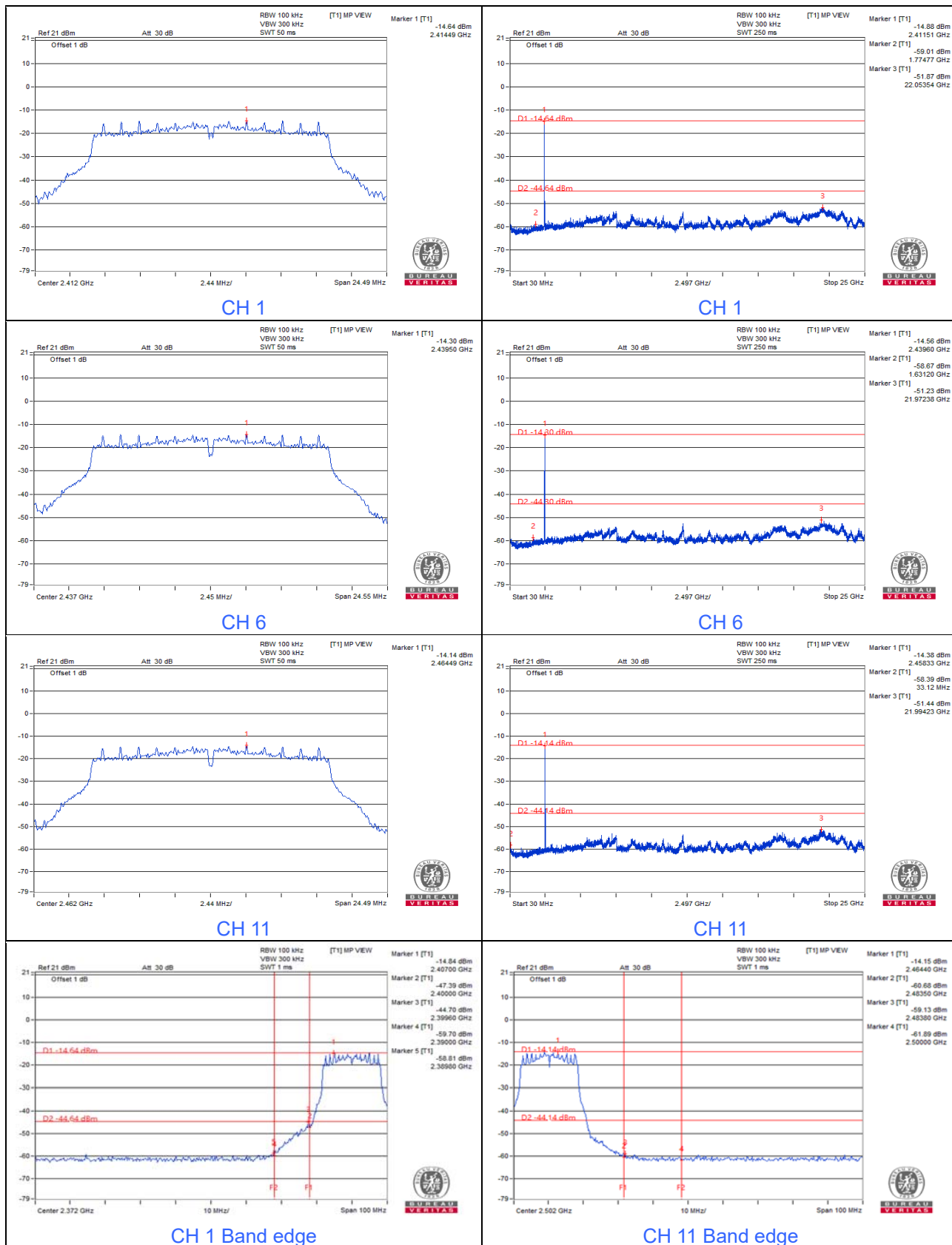
4.4.7 Test Results

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.

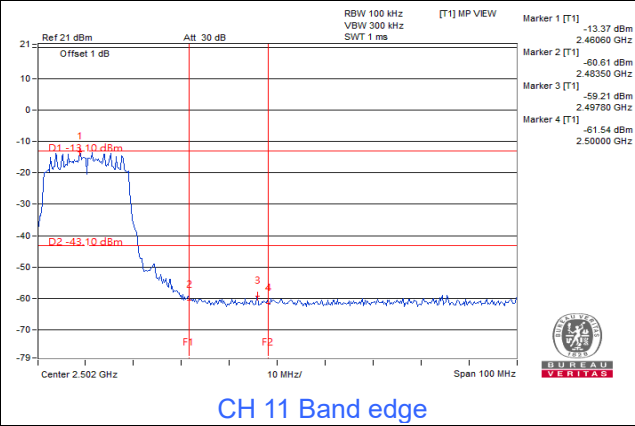
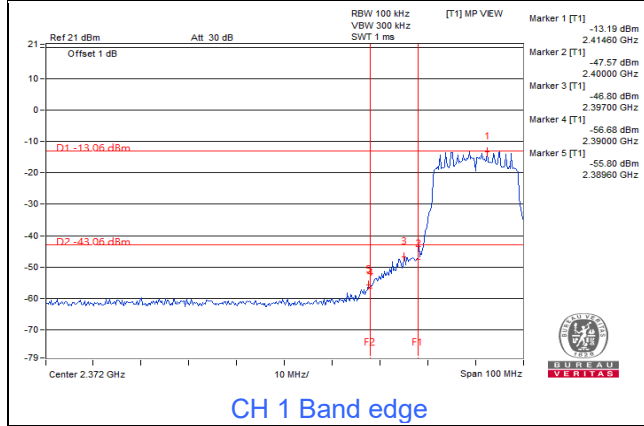
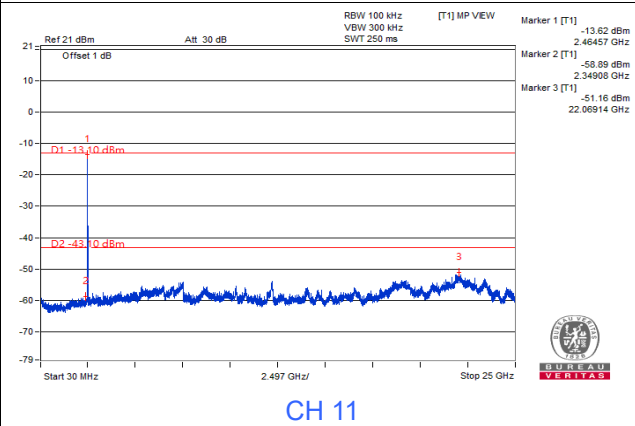
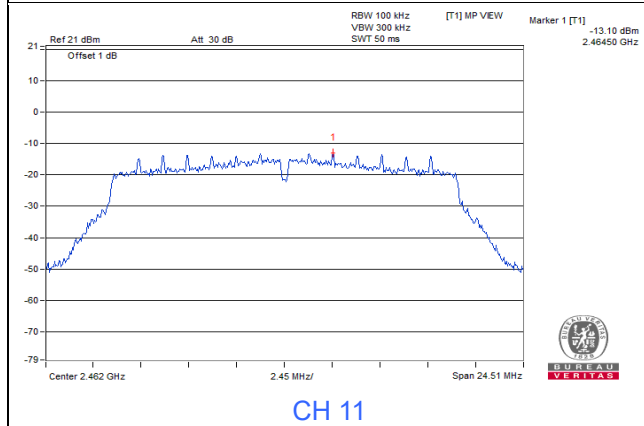
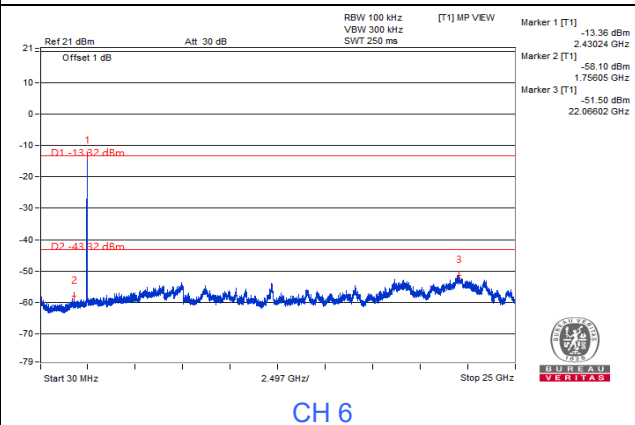
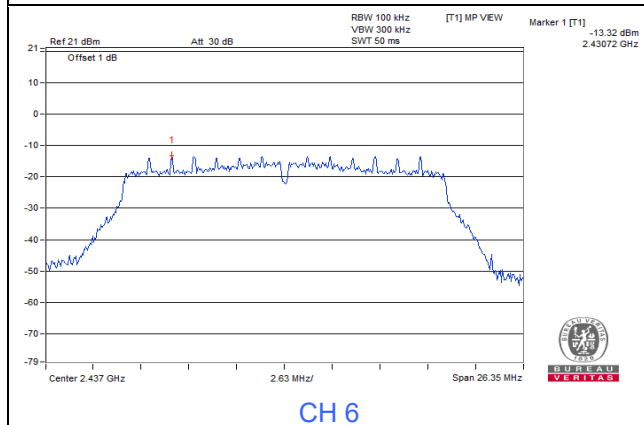
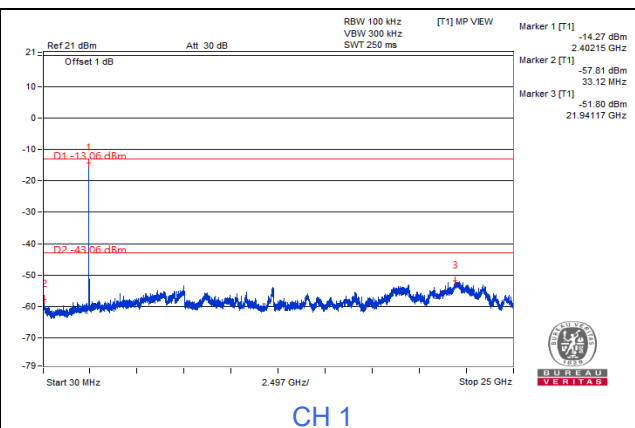
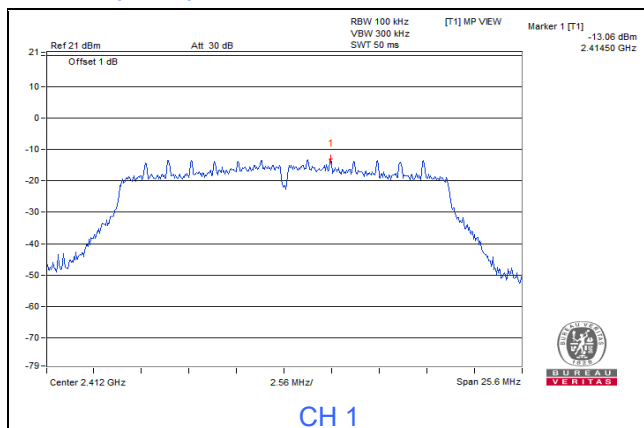
802.11b



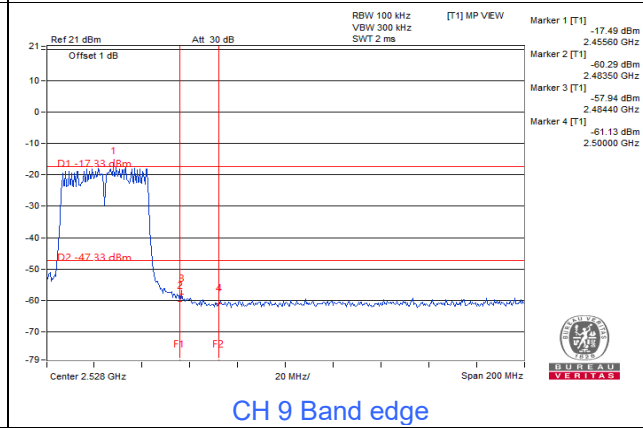
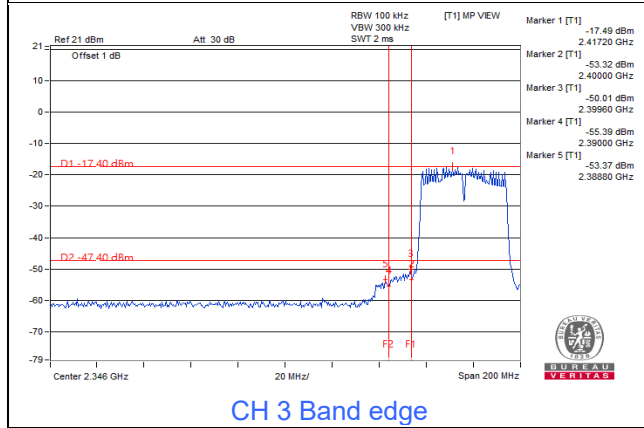
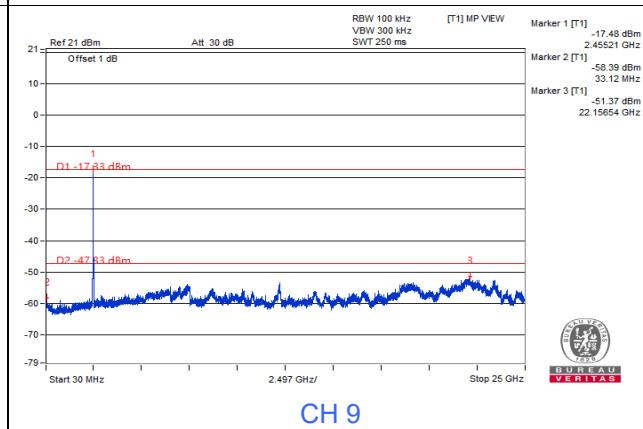
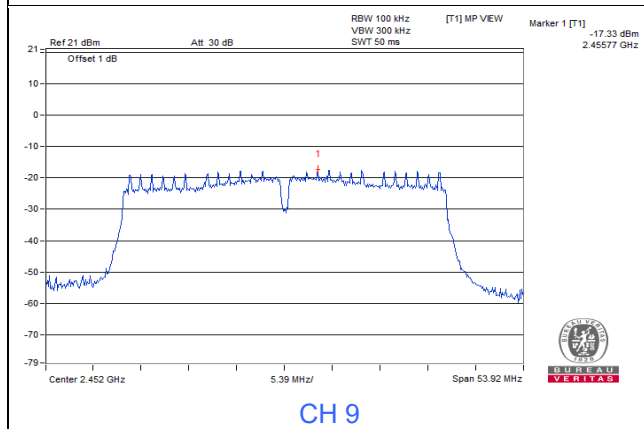
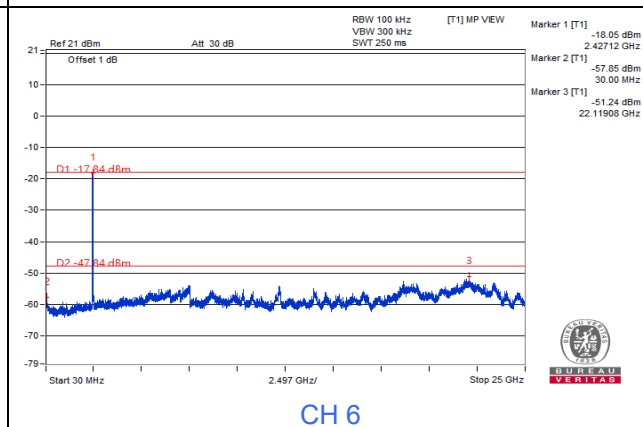
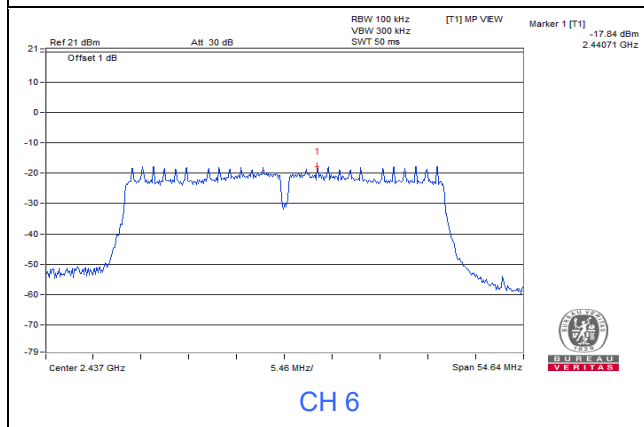
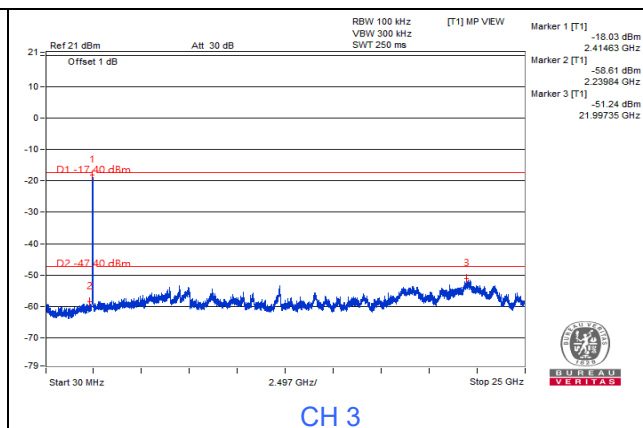
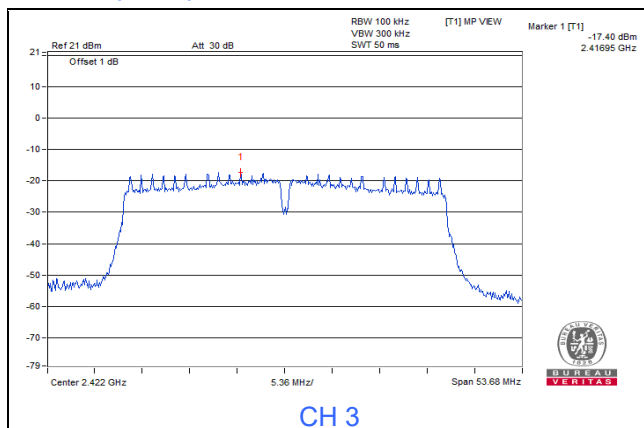
802.11g



802.11n (HT20)



802.11n (HT40)



5 Pictures of Test Arrangements

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

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.

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Web Site: <http://ee.bureauveritas.com.tw>

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

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