

RADIO TEST REPORT

Product : Hydrow Touchscreen Monitor
Model Name : D24
FCC ID : 2A3HV-D24
Test Regulation : FCC 47 CFR Part 15 Subpart C (Section 15.247)
Received Date : 2025/4/22
Test Date : 2025/05/06 ~ 2025/05/20
Issued Date : 2025/7/11

Applicant : Hydrow, Inc.
10 Summer St, 5th Floor Boston MA 02110

Issued By : Underwriters Laboratories Taiwan Co., Ltd.
Building A, B and E, No. 372-7, Sec. 4, Zhongxing Rd.,
Zhudong Township, Hsinchu County, Taiwan

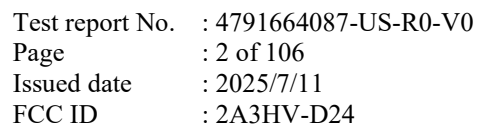


The results reported herein have been performed in accordance with the laboratory's terms of accreditation. This report shall not be reproduced except in full without the written approval of the Laboratory. The results in this report are responsible of the test sample(s) provided by the client only and are not to be used to indicate applicability to other similar products.

Underwriters Laboratories Taiwan Co., Ltd.

Building A, B and E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan
Telephone : +886-2-7737-3000
Facsimile (FAX) : +886-3-583-7948

Doc No: Form-ULID-004737 (DCS:17-EM-F0876) / 6.1



Original Test Report No.: 4791664087-US-R0-V0

Underwriters Laboratories Taiwan Co., Ltd.

Doc No: Form-ULID-004737 (DCS:17-EM-F0876) / 6.1

Table of Contents

1. Attestation of Test Results	4
2. Summary of Test Results	5
3. Test Methodology and Reference Procedures.....	6
4. Facilities and Accreditation	6
5. Measurement Uncertainty	7
6. Equipment under Test.....	8
6.1. Description of EUT	8
6.2. Channel List	9
6.3. Test Condition.....	10
6.4. Description of Available Antennas	11
6.5. Test Mode Applicability and Tested Channel Detail.....	12
6.6. Duty cycle	14
7. Test Equipment	16
8. Description of Test Setup	18
9. Test Results	20
9.1. 6dB Bandwidth	20
9.2. Conducted Output Power	27
9.3. Power Spectral Density	29
9.4. Conducted Out of Band Emission.....	36
9.5. Radiated Spurious Emission	73
9.6. AC Power Line Conducted Emission	103

1. Attestation of Test Results

APPLICANT: Hydrow, Inc.
10 Summer St, 5th Floor Boston MA 02110

MANUFACTURER: InnoComm Mobile Technology Corp.
3F, No. 6, Hsin Ann Rd., Hsinchu Science Park, Hsinchu 30078,
Taiwan

EUT DESCRIPTION: Hydrow Touchscreen Monitor

BRAND: Hydrow, Inc.

MODEL: D24

SAMPLE STAGE: Design Verification Test Sample

DATE of TESTED: 2025/05/06 ~ 2025/05/20

APPLICABLE STANDARDS	
STANDARD	Test Results
FCC 47 CFR PART 15 Subpart C (Section 15.247)	PASS

Underwriters Laboratories Taiwan Co., Ltd. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by Underwriters Laboratories Taiwan Co., Ltd. based on interpretations and/or observations of test results. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by Underwriters Laboratories Taiwan Co., Ltd. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by Underwriters Laboratories Taiwan Co., Ltd. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

Prepared By:



Cindy Hsin
Project Handler

Date : 2025/7/11

Approved and Authorized By:



Eric Lee
Senior Laboratory Engineer

Date : 2025/7/11

Underwriters Laboratories Taiwan Co., Ltd.

Building A, B and E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan

Telephone : +886-2-7737-3000

Facsimile (FAX) : +886-3-583-7948

Doc No: Form-ULID-004737 (DCS:17-EM-F0876) / 6.1

2. Summary of Test Results

Summary of Test Results		
FCC Clause	Test Items	Result
15.247(a)(2)	6dB Bandwidth	PASS
15.247(b)	Conducted Output Power	PASS
15.247(e)	Power Spectral Density	PASS
15.247(d)	Antenna Port Emission	PASS
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	PASS
15.207	AC Power Conducted Emission	PASS
15.203	Antenna Requirement	PASS

Underwriters Laboratories Taiwan Co., Ltd.

Building A, B and E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan

Telephone : +886-2-7737-3000

Facsimile (FAX) : +886-3-583-7948

Doc No: Form-ULID-004737 (DCS:17-EM-F0876) / 6.1

3. Test Methodology and Reference Procedures

The tests documented in this report were performed in accordance with 47 CFR FCC Part 2, KDB558074 D01 Meas Guidance v05r02, KDB414788 D01 Radiated Test Site v01r01, ANSI C63.10-2013 and KDB 662911 D01 Multiple Transmitter Output v02r01.

4. Facilities and Accreditation

Test Location	Underwriters Laboratories Taiwan Co., Ltd.
Address	Building A, B and E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan
Accreditation Certificate	Underwriters Laboratories Taiwan Co., Ltd. is accredited by TAF, Laboratory Code 3398.

Underwriters Laboratories Taiwan Co., Ltd.

Building A, B and E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan

Telephone : +886-2-7737-3000

Facsimile (FAX) : +886-3-583-7948

Doc No: Form-ULID-004737 (DCS:17-EM-F0876) / 6.1

5. Measurement Uncertainty

For statement of conformity, Simple acceptance (Section 3.1.4 of IEC Guide 115) was applied as decision rule for measurement in this test report.

The following uncertainties have been calculated to provide a confidence level of 95 % using a coverage factor $k=2$.

Determining compliance based on the results of the compliance measurement, not considering measurement instrumentation uncertainty.

Measurement	Frequency	Uncertainty
Conducted disturbance at mains terminals ports	150kHz ~ 30MHz	3.1 dB
RF Conducted	9 kHz - 40GHz	2.4 dB
Radiated disturbance below 30MHz	9 kHz - 30 MHz	3.2 dB
Radiated disturbance below 1 GHz	30MHz ~ 1GHz	6.1 dB
Radiated disturbance above 1 GHz	1GHz ~ 40GHz	5.1 dB

Underwriters Laboratories Taiwan Co., Ltd.

Building A, B and E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan

Telephone : +886-2-7737-3000

Facsimile (FAX) : +886-3-583-7948

Doc No: Form-ULID-004737 (DCS:17-EM-F0876) / 6.1

6. Equipment under Test

6.1. Description of EUT

Product	Hydrow Touchscreen Monitor
Brand Name	Hydrow, Inc.
Model Name	D24
Normal Voltage	120Vac from adapter

Operating Frequency	2412MHz ~ 2462MHz
Modulation	CCK, DQPSK, DBPSK for DSSS
	1024QAM, 256QAM, 64QAM, 16QAM, QPSK, BPSK for OFDM
Transfer Rate	802.11b: up to 11 Mbps
	802.11g: up to 54 Mbps
	802.11n: up to MCS15
	802.11ac: up to MCS9
	802.11ax: up to MCS11
Maximum Output Power	2412MHz ~ 2462MHz: 26.81 dBm
Sample ID	Conducted Test:8379125
	Radiated Test:8379125

Note:

- EUT provides a complete 2Tx port and 2Rx port. Please refer to the following working transmission conditions:

Modulation Mode	Tx Function	Rx Function
802.11b	2Tx	2Rx
802.11g	2Tx	2Rx
802.11n(HT20)	2Tx	2Rx
802.11n(HT40)	2Tx	2Rx
802.11ac(VHT20)	2Tx	2Rx
802.11ac(VHT40)	2Tx	2Rx
802.11ax(HE20)	2Tx	2Rx
802.11ax(HE40)	2Tx	2Rx

*The modulation and bandwidth are similar for 802.11n mode, 802.11ac mode, for 20MHz, 40MHz, bandwidth system, therefore investigated one worst case to representative mode in test report.

- The above EUT information is declared by manufacturer and for more detailed features description, please refer the manufacturer's or user's manual, the laboratory shall not be held responsible.

Underwriters Laboratories Taiwan Co., Ltd.

Building A, B and E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan
Telephone : +886-2-7737-3000
Facsimile (FAX) : +886-3-583-7948

Doc No: Form-ULID-004737 (DCS:17-EM-F0876) / 6.1

6.2. Channel List

11 channels are provided for WLAN 20MHz bandwidth system:

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 WLAN 40MHz bandwidth system:

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

Underwriters Laboratories Taiwan Co., Ltd.

Building A, B and E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan

Telephone :+886-2-7737-3000

Facsimile (FAX) :+886-3-583-7948

Doc No: Form-ULID-004737 (DCS:17-EM-F0876) / 6.1

6.3. Test Condition

Test Item	Test Site No.	Environmental	Input Power	Test Date	Tested by
Antenna Port Conducted Measurement	SR4	22~26°C/ 62~68%RH	120Vac/ 60Hz	2025/05/06~ 2025/05/20	Rex Chen
Radiated Spurious Emission	966-2	22~26°C/ 62~68%RH	120Vac/ 60Hz	2025/05/06~ 2025/05/20	Rex Chen
AC power Line Conducted Emission	SR1	24°C/ 62%RH	120Vac/ 60Hz	2025/05/10	Rex Chen

Sample Calculation:

Antenna Port Conducted Measurement:

- Where relevant, the follow sample calculation is provided:
Result Value (dBm) = Reading Value (dBm) + Attenuator Factor (dB) + Cable Loss (dB).
Example: Result Value (10dBm) = Reading Value (-2dBm) + Attenuator Factor (10dB) + Cable Loss(2dB).
*Test plot only shown the “Result Value”.

Radiated Spurious Emission:

- Where relevant, the follow sample calculation is provided:
Result Value (dBuV/m) = Reading Value (dBuV) + Correction Factor (dB/m).
Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Loss (dB) - Preamp Factor (dB).
Example: Result Value (34.5dBuV/m) = Reading Value (40.1dBuV) + Antenna Factor (18.7dB/m) + Cable Loss (4.2dB) - Preamp Factor (28.5dB).

AC power Line Conducted Emission:

- Where relevant, the follow sample calculation is provided:
Result Value (dBuV) = Reading Value (dBuV) + Correction Factor (dB).
Correction Factor (dB) = Insertion loss(dB) + Cable loss(dB).
Example: Result Value (53.7dBuV) = Reading Value (35.1dBuV) + Insertion loss(18.1dB) + Cable loss(0.5dB).

Underwriters Laboratories Taiwan Co., Ltd.

Building A, B and E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan
Telephone :+886-2-7737-3000
Facsimile (FAX) :+886-3-583-7948

Doc No: Form-ULID-004737 (DCS:17-EM-F0876) / 6.1

6.4. Description of Available Antennas

Ant. No.	Transmitter Circuit	Frequency Range	Brand Name	Model Name	Maximum Gain (dBi)	Ant. Type	Connector Type
WiFi 1	Chain0	2402~2480 MHz	INPAQ	Huginn_WIFI1	4.39	PIFA	None
WiFi 2	Chain1	2402~2480 MHz	INPAQ	Huginn_WIFI2	3.82	PIFA	None

Note: The above antenna information was provided from customer and for more detailed features description, please refer the manufacturer's specification or user's manual, the laboratory shall not be held responsible.

6.5. Test Mode Applicability and Tested Channel Detail

Test Item	Mode	Modulation Technology	Available Channel	Test Channel	Data Rate
Radiated Bandedge	802.11b	DSSS	1 to 11	1,6,11	1 Mbps
	802.11g	OFDM	1 to 11	1,6,11	6 Mbps
	802.11ac (VHT20)	OFDM	1 to 11	1,6,11	MCS0 Nss1
	802.11ac (VHT40)	OFDM	3 to 9	3,6,9	MCS0 Nss1
	802.11ax (HE20)	OFDM	1 to 11	1,6,11	MCS0 Nss1
	802.11ax (HE40)	OFDM	3 to 9	3,6,9	MCS0 Nss1
Radiated Emissions (Above 1GHz)	802.11b	DSSS	1 to 11	1,6,11	1 Mbps
	802.11g	OFDM	1 to 11	1,6,11	6 Mbps
Radiated Emissions (Below 1GHz)	802.11b	DSSS	1 to 11	11	1 Mbps
AC Power Line Conducted Emission	802.11ax (HE40)	OFDM	3 to 9	9	MCS0 Nss1
Antenna Port Conducted Measurement	802.11b	DSSS	1 to 11	1,6,11	1 Mbps
	802.11g	OFDM	1 to 11	1,6,11	6 Mbps
	802.11ac (VHT20)	OFDM	1 to 11	1,6,11	MCS0 Nss1
	802.11ac (VHT40)	OFDM	3 to 9	3,6,9	MCS0 Nss1
	802.11ax (HE20)	OFDM	1 to 11	1,6,11	MCS0 Nss1
	802.11ax (HE40)	OFDM	3 to 9	3,6,9	MCS0 Nss1

Underwriters Laboratories Taiwan Co., Ltd.

Building A, B and E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan

Telephone : +886-2-7737-3000

Facsimile (FAX) : +886-3-583-7948

Doc No: Form-ULID-004737 (DCS:17-EM-F0876) / 6.1

- The radiated spurious emission test was performed in all test modes. The worst case was 802.11b and 802.11g, and therefore, only the worst case data is shown in this report to represent all test modes.
- "In the transmit mode, 802.11ax(HE40) channel 9 has the highest RF output power. Therefore, the AC conduction was performed using this worst-case mode."
- In the transmit mode, 802.11b channel 11 has the worst case of Tx spurious emission (above 1GHz). Therefore, all final tests for the spurious emission (below 1GHz) were performed using this worst-case mode.
- For Antenna Port Conducted Measurement, this item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.
- For below 30MHz testing, investigation was done on three antenna orientations (parallel, perpendicular, and ground-parallel), parallel and perpendicular are the worst orientations, therefore testing was performed on these two orientations only.
- 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).

Simultaneously transmission condition:

Condition	Technology			
1	WLAN (2.4GHz)	WLAN (5GHz)	BTLE	Ant Plus

Note: The emission of the simultaneous operation has been evaluated and no non-compliance was found.

6.6. Duty cycle

Mode	On Time (ms)	On+Off Time (ms)	Duty Cycle	Duty Factor (dB)	VBW Set (above 1GHz)
802.11b	16.180	16.920	0.9563	0.19	100Hz
802.11g	3.983	4.763	0.8362	0.78	300Hz
802.11ac(VHT20)	3.713	4.455	0.8334	0.79	300Hz
802.11ac(VHT40)	1.785	2.530	0.7055	1.51	1kHz
802.11ax(HE20)	2.820	3.565	0.7910	1.02	510Hz
802.11ax(HE40)	1.415	2.165	0.6536	1.85	1kHz

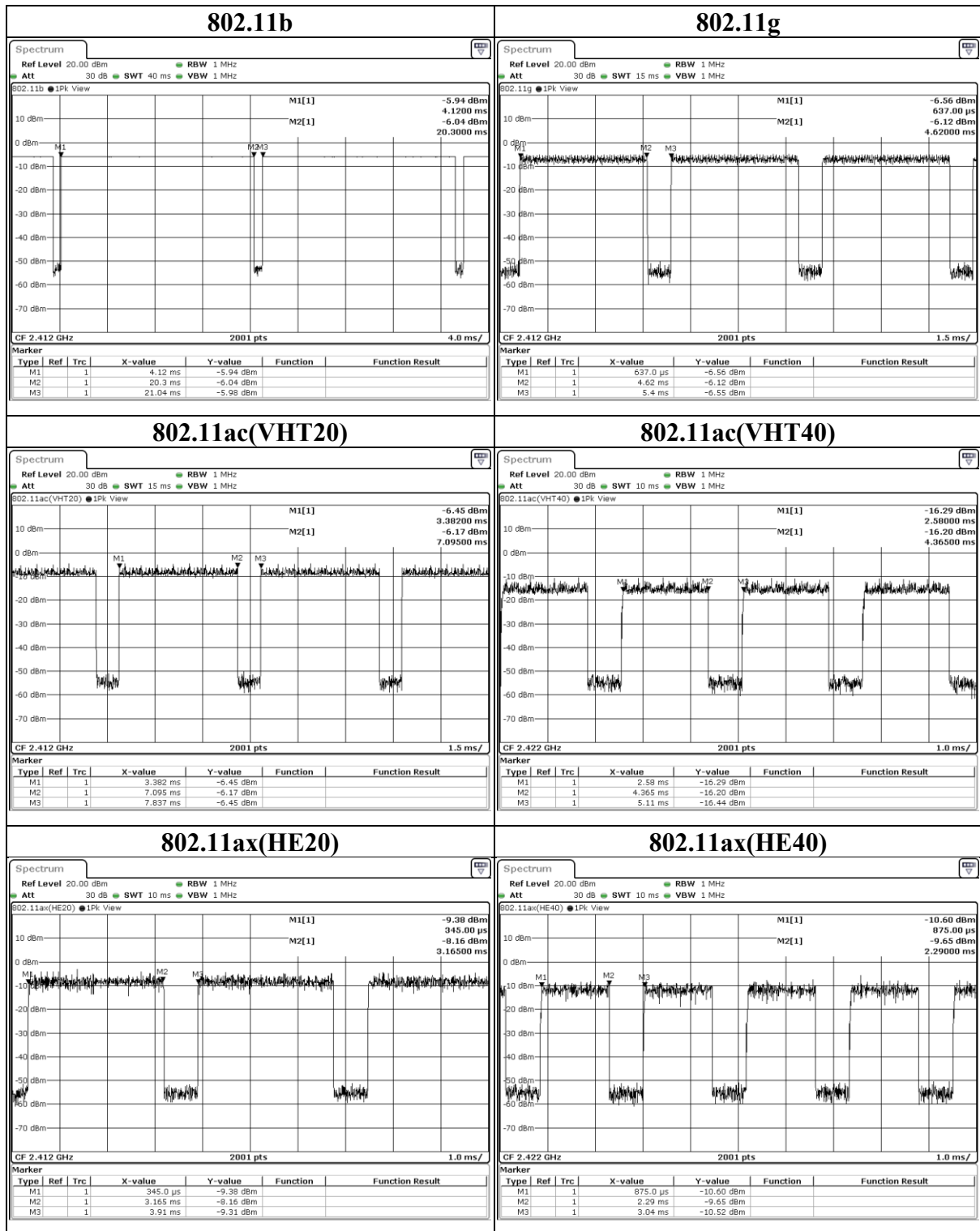
Underwriters Laboratories Taiwan Co., Ltd.

Building A, B and E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan

Telephone : +886-2-7737-3000

Facsimile (FAX) : +886-3-583-7948

Doc No: Form-ULID-004737 (DCS:17-EM-F0876) / 6.1



7. Test Equipment

Test Equipment List					
Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Expired date
Radiated Spurious Emission					
Spectrum Analyzer	Keysight	N9010A	MY56070818	2025/3/12	2026/3/11
EMI Test Receiver	Rohde & Schwarz	ESR7	101754	2024/12/24	2025/12/23
Loop Antenna	ETS lindgren	6502	00213440	2024/12/11	2025/12/10
Trilog-Broadband Antenna with 5dB Attenuator	Schwarzbeck & EMCI	VULB 9168 & N-6-05	774 & AT-N0538	2024/12/30	2025/12/29
Horn Antenna (1-18 GHz)	Schwarzbeck	BBHA 9120 D	01690	2024/11/27	2025/11/26
Horn Antenna (18-40 GHz)	Schwarzbeck	BBHA 9170	781	2024/12/18	2025/12/17
Preamplifier (30-1000 MHz)	EMCI	EMC330E	980405	2024/5/28	2025/5/27
Preamplifier (1-18 GHz)	EMCI	EMC051835BE	980406	2025/1/13	2026/1/12
Preamplifier (18-40GHz)	EMCI	EMC184040SEE	980426	2025/4/7	2026/4/6
Cables (9k-18 GHz)	Hanyitek	K1K50-UP0264-K1K50-2500	170214-4 & 170425-2	2024/11/22	2025/11/21
Cables (18-40GHz)	Hanyitek	K1K50-UP0264-K1K50-2500	170214-1 & 170214-2	2024/11/22	2025/11/21

Underwriters Laboratories Taiwan Co., Ltd.

Building A, B and E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan

Telephone :+886-2-7737-3000

Facsimile (FAX) :+886-3-583-7948

Doc No: Form-ULID-004737 (DCS:17-EM-F0876) / 6.1

Test Equipment List					
Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Expired date
Antenna Port Conducted Measurement					
Signal Analyzer	Rohde & Schwarz	FSVA3044	101281	2025/3/5	2026/3/4
Signal Analyzer	Rohde & Schwarz	FSV40	101490	2024/7/1	2025/6/30
Attenuator	EMCI	EMC-40ATK2W10	17002	2024/11/13	2025/11/12
USB Power Sensor	Anritsu	MA24408A	12031	2024/7/13	2025/7/12
Temperature & Humidity Test Chamber	GIANT FORCE	GTH-150- 40-CP-AR	MAA1701-010	2025/2/25	2026/2/24
AC power Line Conducted Emission					
EMI Test Receiver	Rohde & Schwarz	ESR7	101753	2024/10/1	2025/9/30
Two-Line V-Network	Rohde & Schwarz	ENV216	102136	2024/5/14	2025/5/13
Impuls-Begrenzer Pulse Limiter	Rohde & Schwarz	ESH3-Z2	102219-Qt	2024/8/29	2025/8/28
Cables	TITAN	CFD200	T0732ACFD 20020A300-2	2025/4/21	2026/4/20

UL Software		
Description	Name	Version
Radiated measurement	e3	6.191211 (V6)
Conducted measurement	RF-Conducted-FCC 15247	ver 1.0
AC power Line Conducted Emission	EZ_EMG	UL-3A1.2

Underwriters Laboratories Taiwan Co., Ltd.

Building A, B and E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan

Telephone :+886-2-7737-3000

Facsimile (FAX) :+886-3-583-7948

Doc No: Form-ULID-004737 (DCS:17-EM-F0876) / 6.1

8. Description of Test Setup

Tx Mode

Support Equipment

ID	Equipment	Brand Name	Model Name	S/N	Remark
A	AC Adapter	NEUMULLER	ATS050T-P121	N/A	Supplied by Client

I/O Cables

ID	Equipment	Brand Name	Model Name	Length (m)	Remark
1	AC Cable	HOU TA	AL-501	1.83	Supplied by Client

Underwriters Laboratories Taiwan Co., Ltd.

Building A, B and E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan

Telephone : +886-2-7737-3000

Facsimile (FAX) : +886-3-583-7948

Doc No: Form-ULID-004737 (DCS:17-EM-F0876) / 6.1

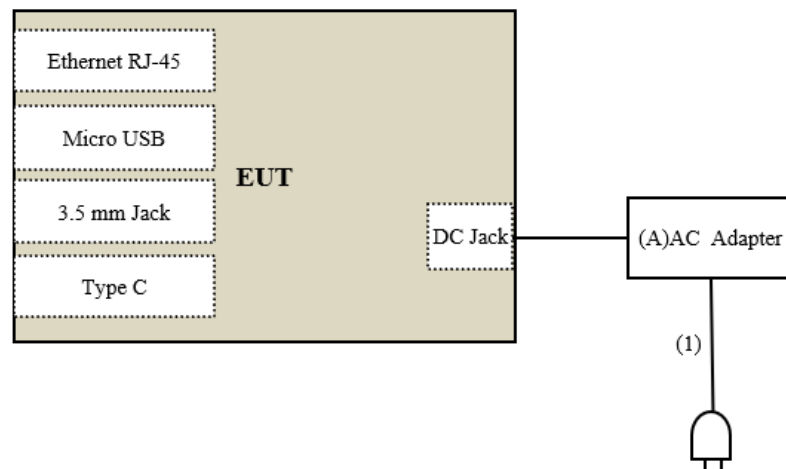
Test Setup

The EUT was worked in engineering mode to transmit signal.

Controlled using a bespoke application (Entering RF commands by ADB interface) on a test Notebook. The application was used to enable a continuous transmission mode and to select the test channels, data rates, modulation schemes and power setting as required.

Setup Diagram for Test

Tx Mode



Under Table

Remote Site

Underwriters Laboratories Taiwan Co., Ltd.

Building A, B and E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan

Telephone : +886-2-7737-3000

Facsimile (FAX) : +886-3-583-7948

Doc No: Form-ULID-004737 (DCS:17-EM-F0876) / 6.1

9. Test Results

9.1. 6dB Bandwidth

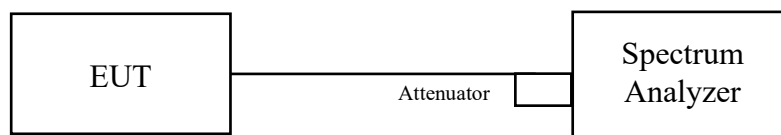
Requirements

The minimum 6 dB bandwidth shall be at least 500 kHz.

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.

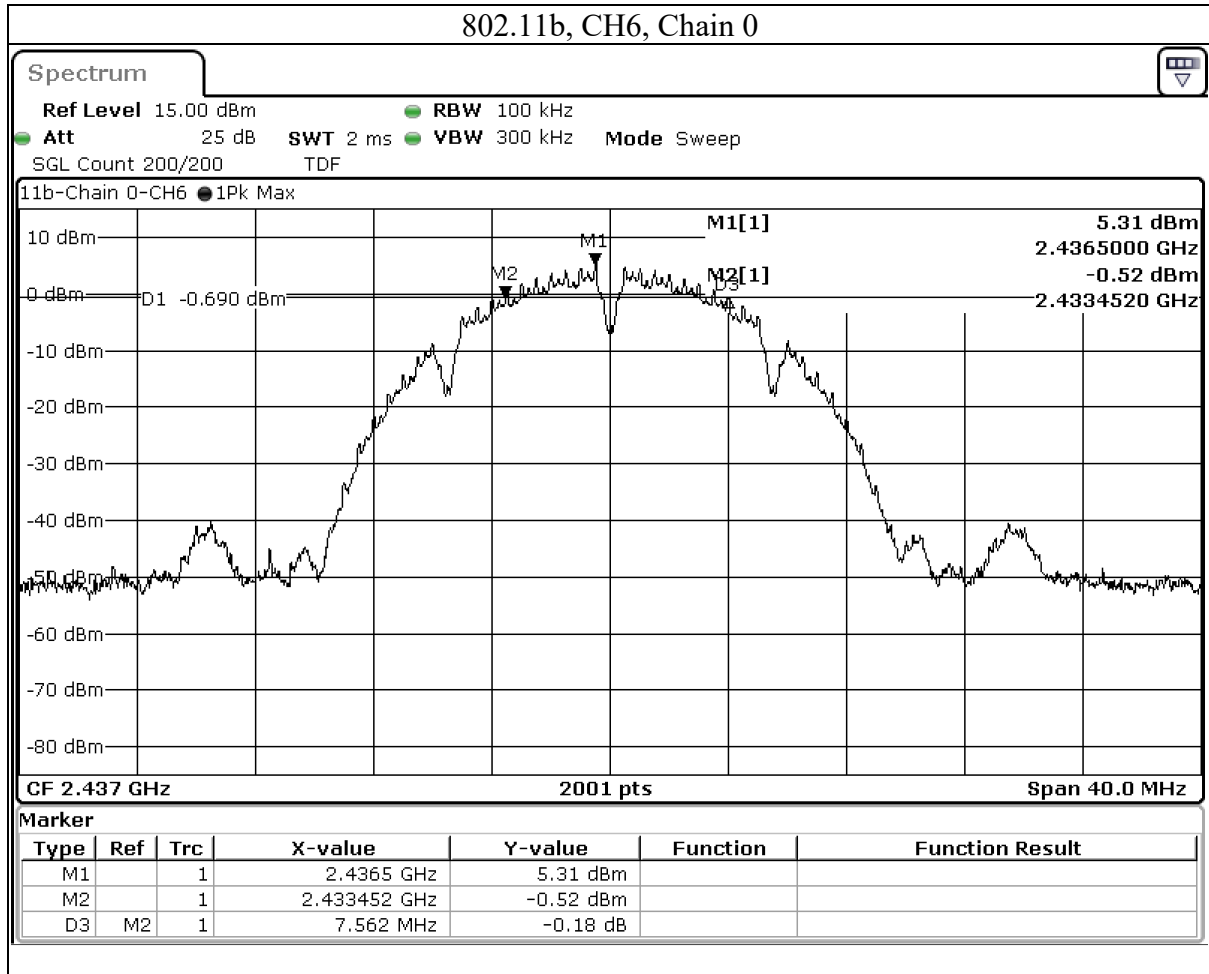
Test Setup



The loss between RF output port of the EUT and the input port of the Spectrum Analyzer has been taken into consideration.

Test Data

Mode	CH	Freq (MHz)	6dB BW (MHz)		Limit (MHz)	Result
			Chain 0	Chain 1		
802.11b	1	2412	8.055	8.077	0.5	PASS
	6	2437	7.562	8.073	0.5	PASS
	11	2462	8.065	8.086	0.5	PASS



Underwriters Laboratories Taiwan Co., Ltd.

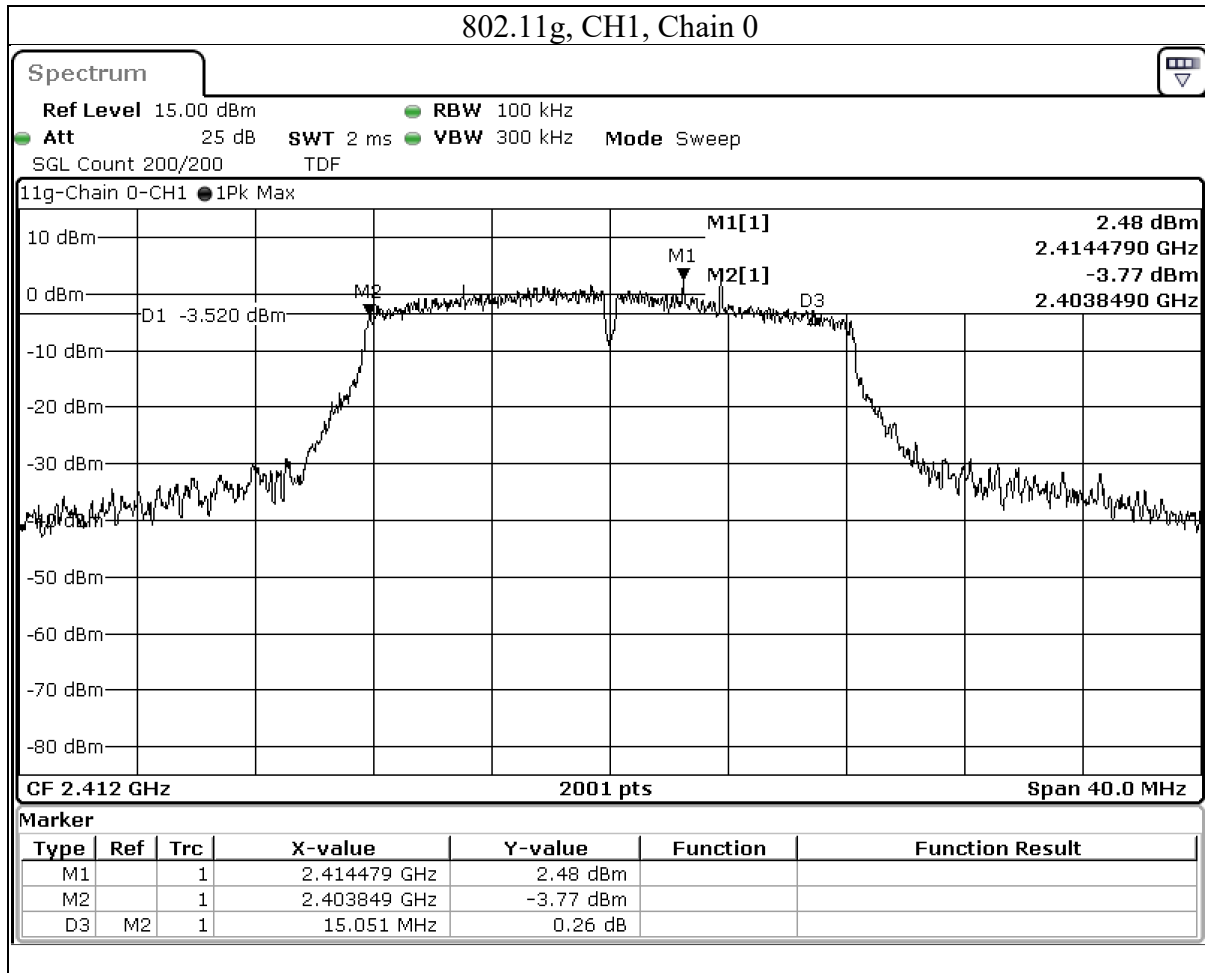
Building A, B and E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan

Telephone : +886-2-7737-3000

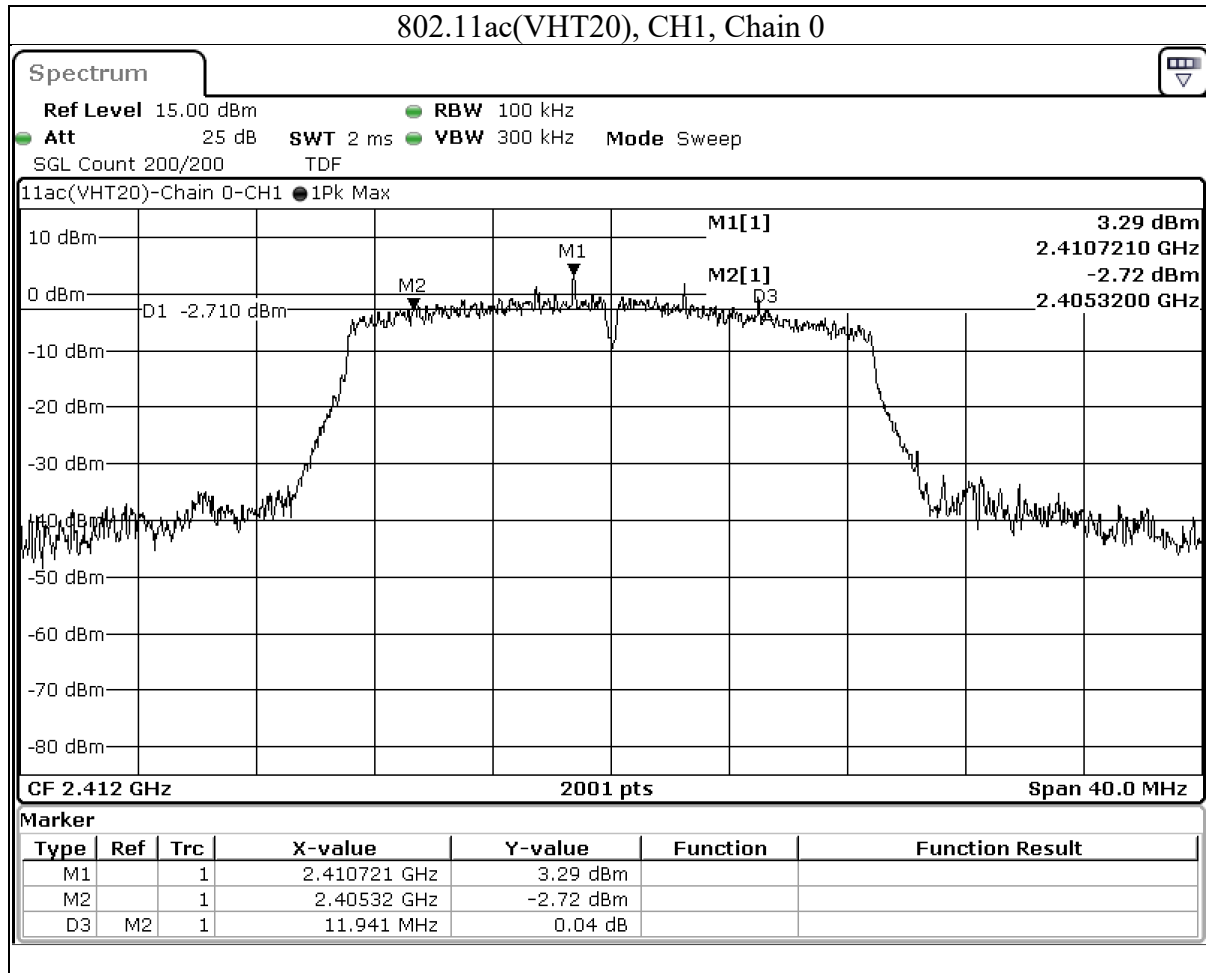
Facsimile (FAX) : +886-3-583-7948

Doc No: Form-ULID-004737 (DCS:17-EM-F0876) / 6.1

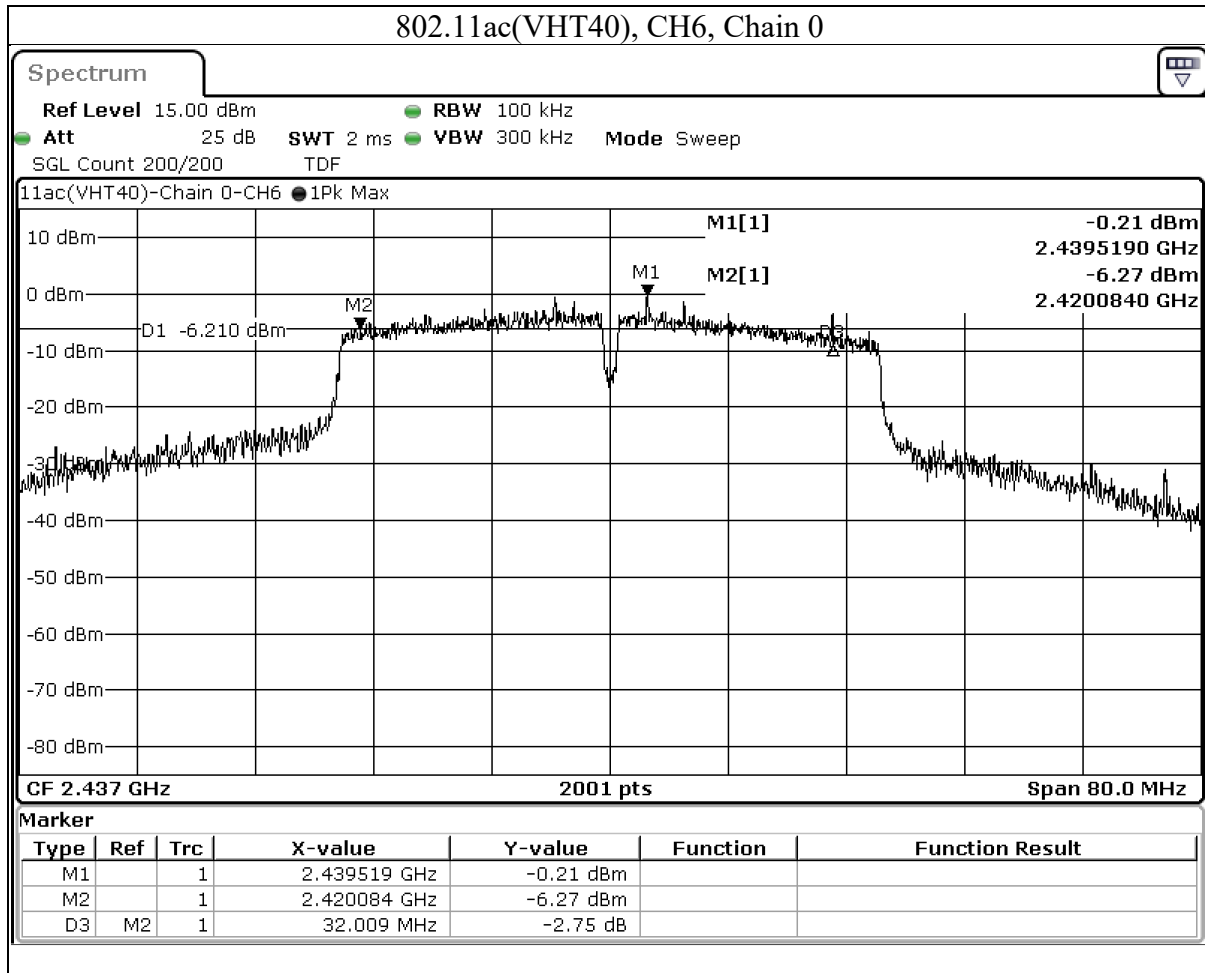
Mode	CH	Freq (MHz)	6dB BW (MHz)		Limit (MHz)	Result
			Chain 0	Chain 1		
802.11g	1	2412	15.051	16.356	0.5	PASS
	6	2437	16.353	15.950	0.5	PASS
	11	2462	16.341	16.363	0.5	PASS



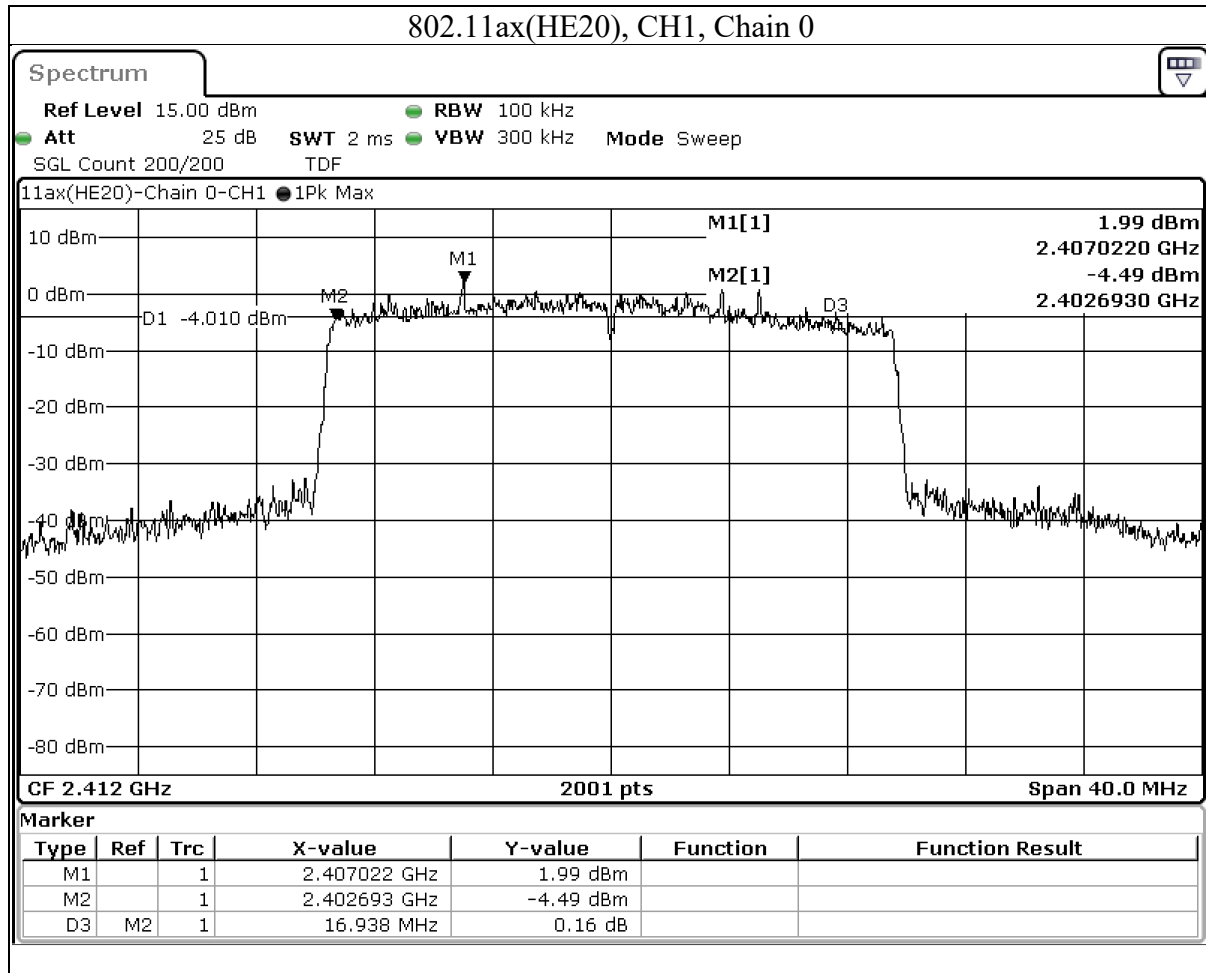
Mode	CH	Freq (MHz)	6dB BW (MHz)		Limit (MHz)	Result
			Chain 0	Chain 1		
802.11ac(VHT20)	1	2412	11.941	16.825	0.5	PASS
	6	2437	16.435	17.570	0.5	PASS
	11	2462	16.022	16.918	0.5	PASS



Mode	CH	Freq (MHz)	6dB BW (MHz)		Limit (MHz)	Result
			Chain 0	Chain 1		
802.11ac(VHT40)	3	2422	34.458	34.466	0.5	PASS
	6	2437	32.009	35.083	0.5	PASS
	9	2452	34.432	34.452	0.5	PASS



Mode	CH	Freq (MHz)	6dB BW (MHz)		Limit (MHz)	Result
			Chain 0	Chain 1		
802.11ax(HE20)	1	2412	16.938	18.193	0.5	PASS
	6	2437	18.696	17.938	0.5	PASS
	11	2462	19.043	17.555	0.5	PASS



Underwriters Laboratories Taiwan Co., Ltd.

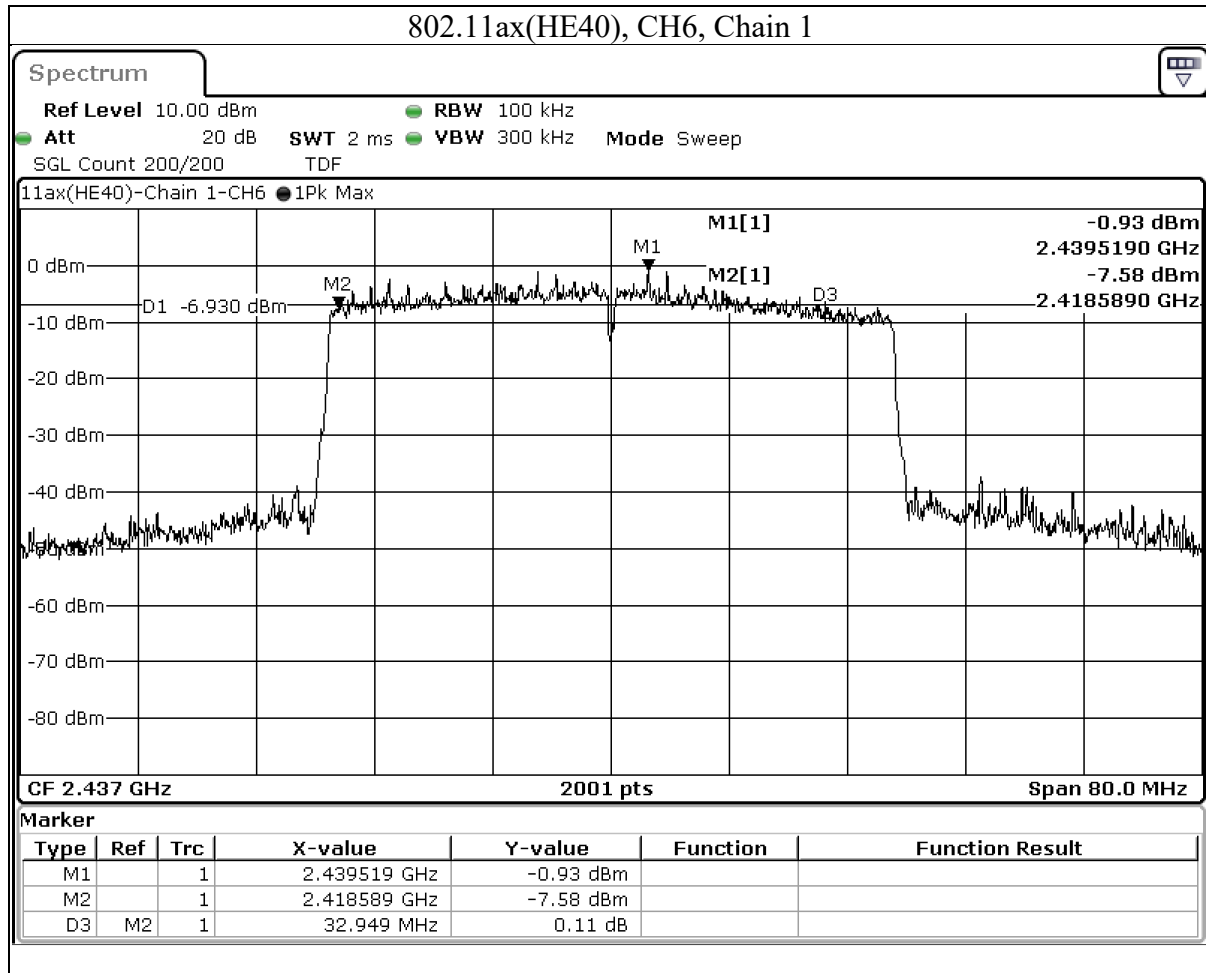
Building A, B and E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan

Telephone : +886-2-7737-3000

Facsimile (FAX) : +886-3-583-7948

Doc No: Form-ULID-004737 (DCS:17-EM-F0876) / 6.1

Mode	CH	Freq (MHz)	6dB BW (MHz)		Limit (MHz)	Result
			Chain 0	Chain 1		
802.11ax(HE40)	3	2422	36.136	35.345	0.5	PASS
	6	2437	37.278	32.949	0.5	PASS
	9	2452	35.189	35.083	0.5	PASS



9.2. Conducted Output Power

Requirements

For systems using digital modulation in the 2400-2483.5 MHz bands: 1 Watt.

Note:

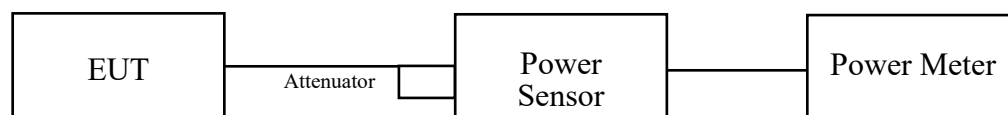
1. P_{Out} = maximum conducted output power in dBm, G_{TX} = the maximum transmitting antenna directional gain in dBi, B is the 26 dB emission bandwidth in megahertz
2. If EUT with Multiple Transmitter Output:
 - a. Directional Gain = $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{Gn/20})^2 / \text{Nant}]$ dBi.
Nant: Number of Transmit Antennas
G1, G2,..., Gn: Gain of Individual Antennas
Example: two antenna and gain 5 dBi / 3dBi, so if it was used for TxBF power measurement
Directional Gain = $10 \log[(105/20 + 103/20)^2 / 2]$ dBi = 7.07 dBi
 - b. Per KDB 662911 Method of conducted output power measurement on IEEE 802.11 devices, CDD
Array Gain = 0 dB (i.e., no array gain) for $\text{NANT} \leq 4$;
Array Gain = 0 dB (i.e., no array gain) for channel widths ≥ 40 MHz for any NANT;
Array Gain = $5 \log(\text{NANT}/\text{NSS})$ dB or 3 dB, whichever is less for 20-MHz channel widths with $\text{NANT} \geq 5$.
Example: Maximum antenna gain = 5 dBi and $\text{NANT} \leq 4$, so if it was used for CDD power measurement
Directional Gain = 5 dBi + Array Gain = 5 dBi + 0 dB = 5 dBi
 - c. For power measurement of KDB 662911 is used with multiple transmitter output. Total conducted power is the sum of the conducted power levels measured at the various output ports.

Test Procedure

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.

- a. Set the RBW $\geq$ DTS bandwidth.
- b. Set VBW $\geq 3 \times$ RBW.
- c. Set span $\geq 3 \times$ RBW.
- d. Sweep time = auto couple.
- e. Detector = peak.
- f. Trace mode = max hold.
- g. Allow trace to fully stabilize.
- h. Use peak marker function to determine the peak amplitude level.

Test Setup



The loss between RF output port of the EUT and the input port of the Power Meter has been taken into consideration.

Underwriters Laboratories Taiwan Co., Ltd.

Building A, B and E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan

Telephone : +886-2-7737-3000

Facsimile (FAX) : +886-3-583-7948

Doc No: Form-ULID-004737 (DCS:17-EM-F0876) / 6.1

Test Data

Mode	CH	Freq. (MHz)	Peak Power (dBm)		Total PK Power (mW)	Total PK Power (dBm)	AVG Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Result
			Chain 0	Chain 1			Chain 0	Chain 1				
802.11b	1	2412	17.22	16.79	100.462	20.02	14.66	14.22	55.719	17.46	30	PASS
	6	2437	17.43	16.88	103.992	20.17	14.84	14.34	57.677	17.61	30	PASS
	11	2462	18.63	18.09	137.404	21.38	16.03	15.52	75.683	18.79	30	PASS
802.11g	1	2412	23.96	23.01	448.745	26.52	15.83	15.13	70.795	18.5	30	PASS
	6	2437	23.65	22.8	422.669	26.26	15.95	15.24	72.778	18.62	30	PASS
	11	2462	23.63	22.01	389.942	25.91	15.73	14.51	65.615	18.17	30	PASS
802.11ac(VHT20)	1	2412	23.16	22.41	381.066	25.81	14.37	14.09	52.966	17.24	30	PASS
	6	2437	23.39	21.75	368.129	25.66	14.87	14.26	57.412	17.59	30	PASS
	11	2462	23.15	21.34	342.768	25.35	14.7	13.66	52.723	17.22	30	PASS
802.11ac(VHT40)	3	2422	22.45	22.79	365.595	25.63	14.4	13.87	51.88	17.15	30	PASS
	6	2437	23.66	22.63	415.911	26.19	14.83	14.17	56.494	17.52	30	PASS
	9	2452	23.7	23.05	436.516	26.4	15.02	14.4	59.293	17.73	30	PASS
802.11ax(HE20)	1	2412	22.78	22.88	383.707	25.84	14.84	14.07	55.976	17.48	30	PASS
	6	2437	23.36	21.91	372.392	25.71	14.79	14.43	57.81	17.62	30	PASS
	11	2462	23.27	21.28	346.737	25.4	14.76	13.6	52.845	17.23	30	PASS
802.11ax(HE40)	3	2422	23.44	23.63	451.856	26.55	14.69	14.06	54.954	17.4	30	PASS
	6	2437	23.72	23.01	435.512	26.39	14.97	14.46	59.293	17.73	30	PASS
	9	2452	23.89	23.7	479.733	26.81	15.29	14.59	62.517	17.96	30	PASS

Note: Average Power is for reference Only.

Underwriters Laboratories Taiwan Co., Ltd.

Building A, B and E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan

Telephone : +886-2-7737-3000

Facsimile (FAX) : +886-3-583-7948

Doc No: Form-ULID-004737 (DCS:17-EM-F0876) / 6.1

9.3. Power Spectral Density

Requirements

The Maximum of Power Spectral Density Measurement is 8dBm in any 3 kHz (If $G_{TX} > 6$ dBi, then $PSD = 8 - (G_{TX} - 6)$).

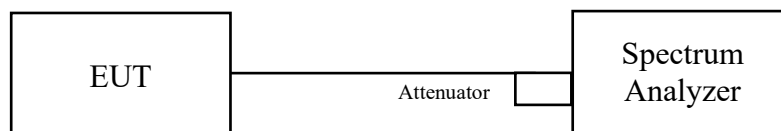
Note:

1. PSD = power spectral density that the same method as used to determine the conducted output power shall be used to determine the power spectral density. And power spectral density in dBm/MHz.
2. G_{TX} = the maximum transmitting antenna directional gain in dBi.
3. If EUT with Multiple Transmitter Output:
 - a. Directional Gain = $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{Gn/20})^2 / Nant]$ dBi.
Nant: Number of Transmit Antennas
 $G1, G2, \dots, Gn$: Gain of Individual Antennas
Example: two antenna and gain 5 dBi / 3dBi, so if it was used for power density measurement
Directional Gain = $10 \log[(10^{5/20} + 10^{3/20})^2 / 2]$ dBi = 7.07 dBi
 - b. "PSD per chain" of the report shown is maximum value for each chain, at the "Total PSD" is summing entire spectra across corresponding frequency bins on the various outputs by computer, refer KDB 662911 Method a) for calculating total power density.
 - c. Method a) of power density measurement of KDB 662911 is used for calculating total power density with multiple transmitter output. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.

Test procedure

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

Test Setup

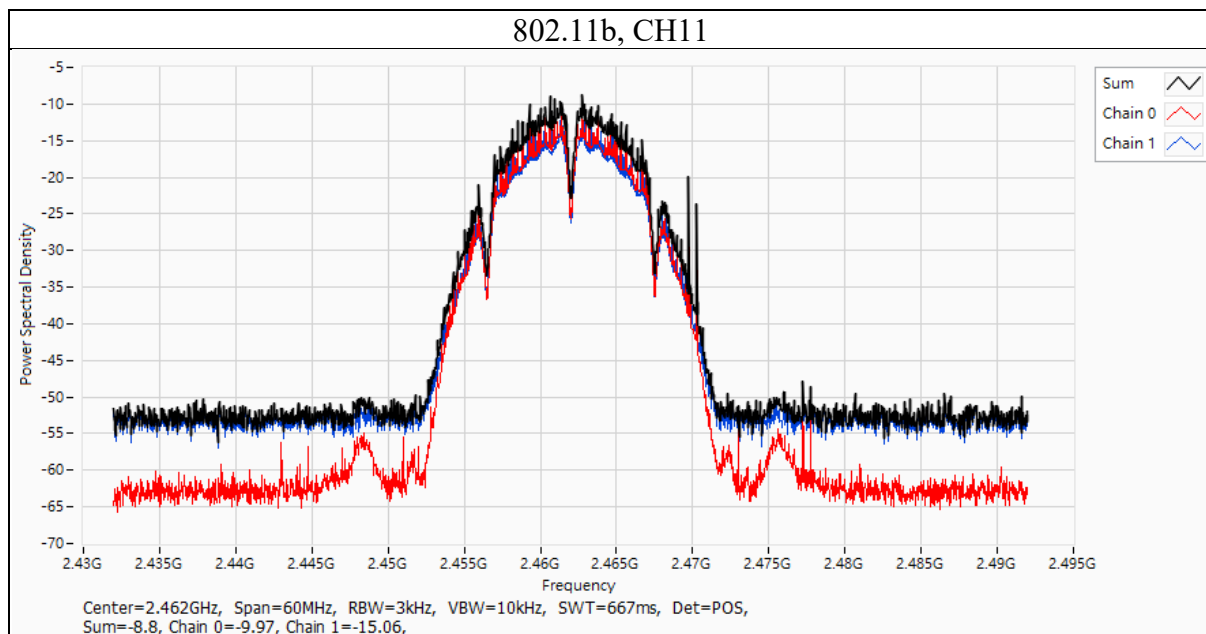


The loss between RF output port of the EUT and the input port of the Spectrum Analyzer has been taken into consideration.

Test Data

Mode	CH	Freq (MHz)	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	Directional Gain (dBi)	Result
802.11b	1	2412	-10.51	6.88	7.12	PASS
	6	2437	-10.15	6.88	7.12	PASS
	11	2462	-8.8	6.88	7.12	PASS

Mode	CH	Freq (MHz)	PSD per Chain (dBm/3kHz)	
			Chain 0	Chain 1
802.11b	1	2412	-12.39	-12.87
	6	2437	-11.12	-12.75
	11	2462	-9.74	-11.79



Underwriters Laboratories Taiwan Co., Ltd.

Building A, B and E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan

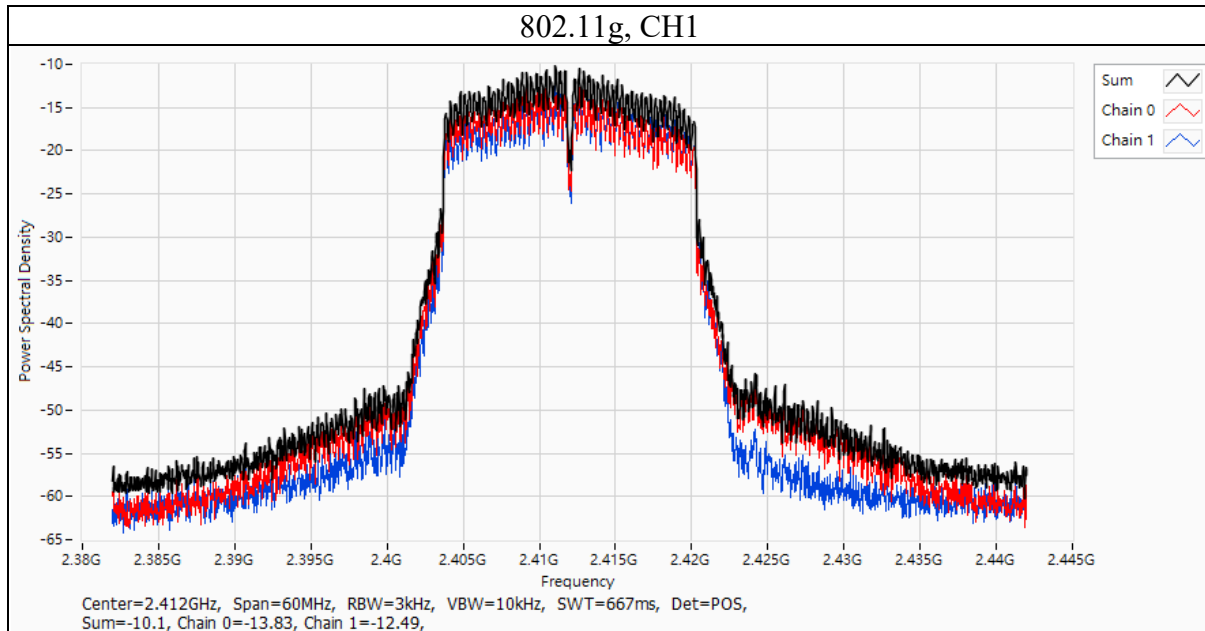
Telephone : +886-2-7737-3000

Facsimile (FAX) : +886-3-583-7948

Doc No: Form-ULID-004737 (DCS:17-EM-F0876) / 6.1

Mode	CH	Freq (MHz)	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	Directional Gain (dBi)	Result
802.11g	1	2412	-10.1	6.88	7.12	PASS
	6	2437	-10.53	6.88	7.12	PASS
	11	2462	-11.13	6.88	7.12	PASS

Mode	CH	Freq (MHz)	PSD per Chain (dBm/3kHz)	
			Chain 0	Chain 1
802.11g	1	2412	-12.58	-12.49
	6	2437	-12.27	-13.82
	11	2462	-13.14	-14.1



Underwriters Laboratories Taiwan Co., Ltd.

Building A, B and E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan

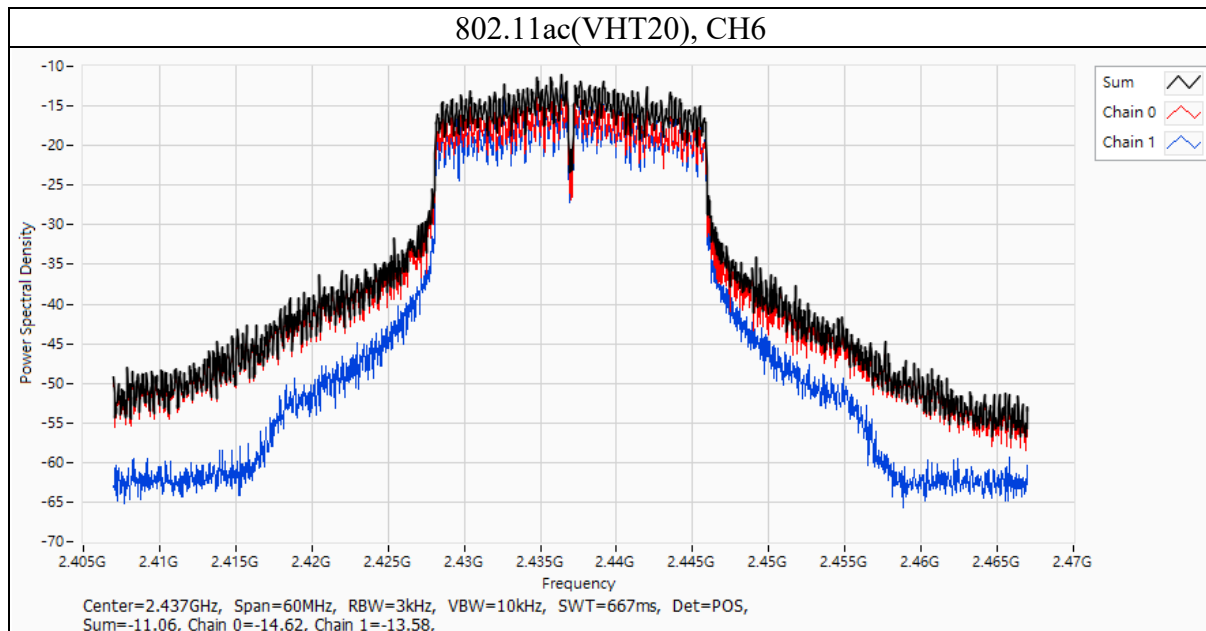
Telephone : +886-2-7737-3000

Facsimile (FAX) : +886-3-583-7948

Doc No: Form-ULID-004737 (DCS:17-EM-F0876) / 6.1

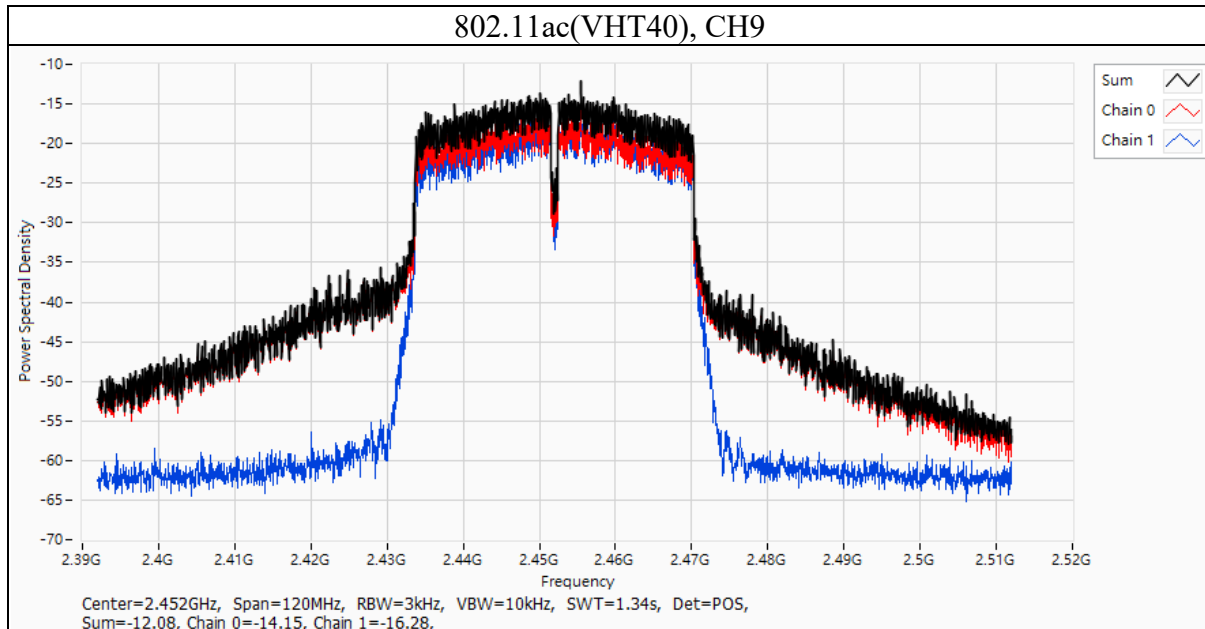
Mode	CH	Freq (MHz)	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	Directional Gain (dBi)	Result
802.11ac(VHT20)	1	2412	-11.61	6.88	7.12	PASS
	6	2437	-11.06	6.88	7.12	PASS
	11	2462	-11.94	6.88	7.12	PASS

Mode	CH	Freq (MHz)	PSD per Chain (dBm/3kHz)	
			Chain 0	Chain 1
802.11ac(VHT20)	1	2412	-14.02	-14.05
	6	2437	-13.5	-13.58
	11	2462	-14.01	-14.71



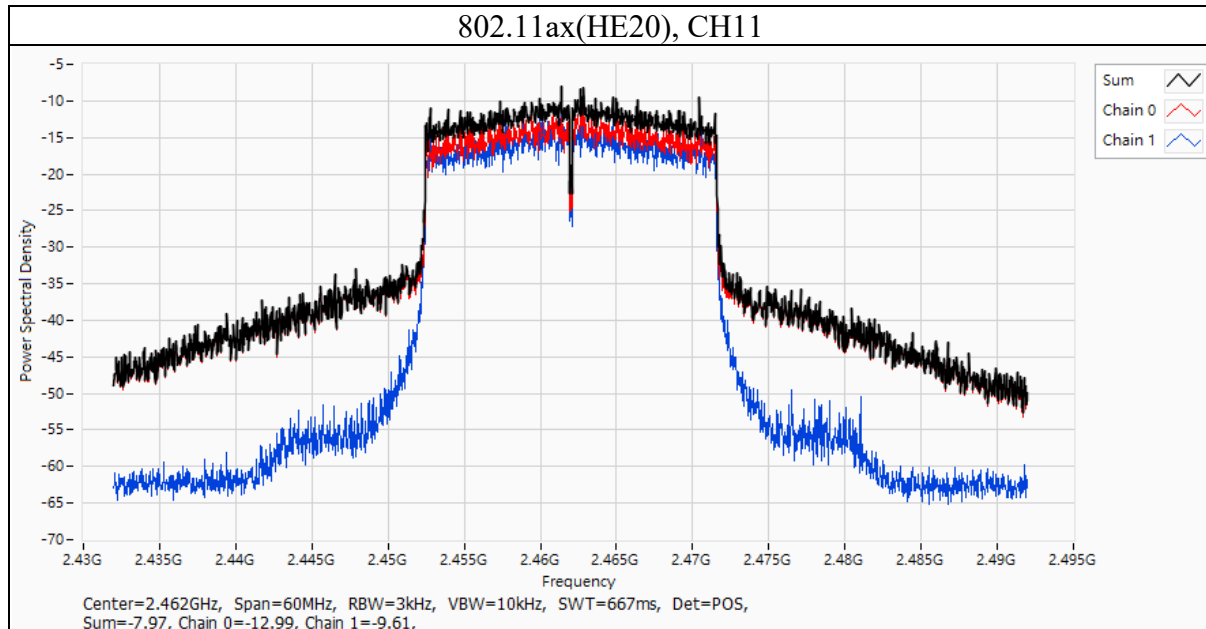
Mode	CH	Freq (MHz)	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	Directional Gain (dBi)	Result
802.11ac(VHT40)	3	2422	-13.66	6.88	7.12	PASS
	6	2437	-12.8	6.88	7.12	PASS
	9	2452	-12.08	6.88	7.12	PASS

Mode	CH	Freq (MHz)	PSD per Chain (dBm/3kHz)	
			Chain 0	Chain 1
802.11ac(VHT40)	3	2422	-15.5	-16.83
	6	2437	-14.91	-16.94
	9	2452	-14.15	-16.28



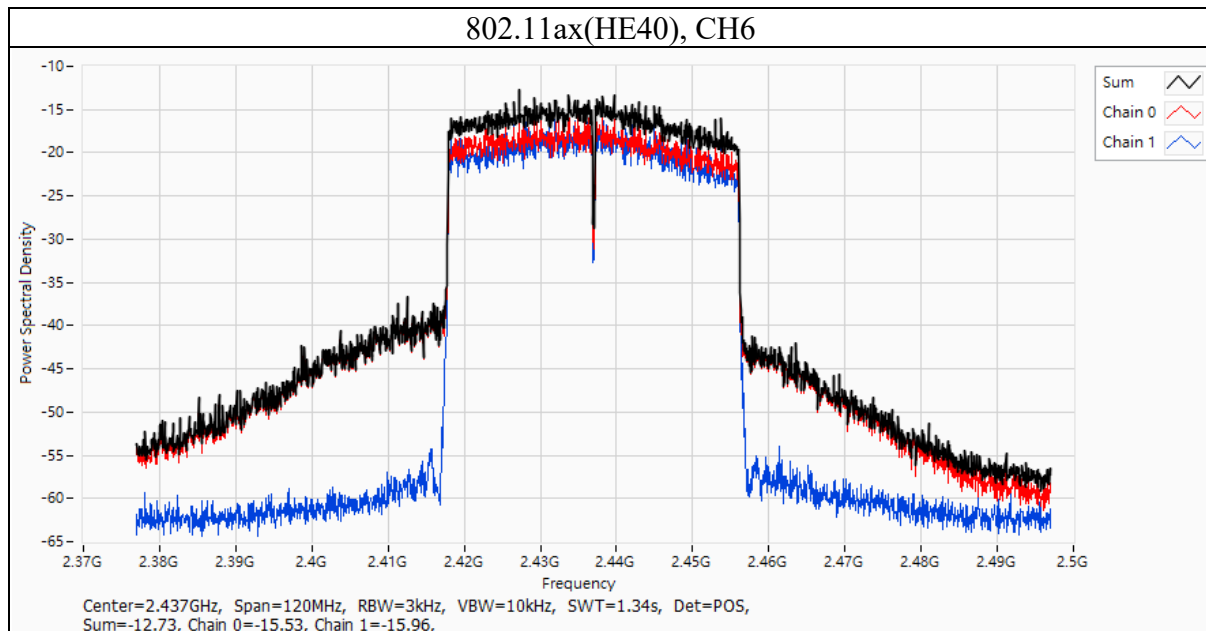
Mode	CH	Freq (MHz)	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	Directional Gain (dBi)	Result
802.11ax(HE20)	1	2412	-8.98	6.88	7.12	PASS
	6	2437	-8.77	6.88	7.12	PASS
	11	2462	-7.97	6.88	7.12	PASS

Mode	CH	Freq (MHz)	PSD per Chain (dBm/3kHz)	
			Chain 0	Chain 1
802.11ax(HE20)	1	2412	-11.48	-11.21
	6	2437	-9.77	-11.74
	11	2462	-9.89	-9.61



Mode	CH	Freq (MHz)	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	Directional Gain (dBi)	Result
802.11ax(HE40)	3	2422	-13.28	6.88	7.12	PASS
	6	2437	-12.73	6.88	7.12	PASS
	9	2452	-13	6.88	7.12	PASS

Mode	CH	Freq (MHz)	PSD per Chain (dBm/3kHz)	
			Chain 0	Chain 1
802.11ax(HE40)	3	2422	-14.81	-16.31
	6	2437	-14.67	-15.96
	9	2452	-14.64	-15.41



9.4. Conducted Out of Band Emission

Requirements

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b) (3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209 (a) is not required.

Test procedure

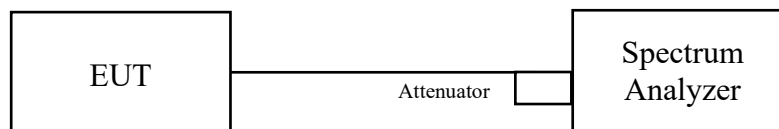
Measurement Procedure REF

1. Set the RBW = 100 kHz.
2. Set the VBW $\geq$ 300 kHz.
3. Set the span to 1.5 times the DTS bandwidth.
4. Detector = peak.
5. Sweep time = auto couple.
6. Trace mode = max hold.
7. Allow trace to fully stabilize.
8. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.

Measurement Procedure OOBE

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.

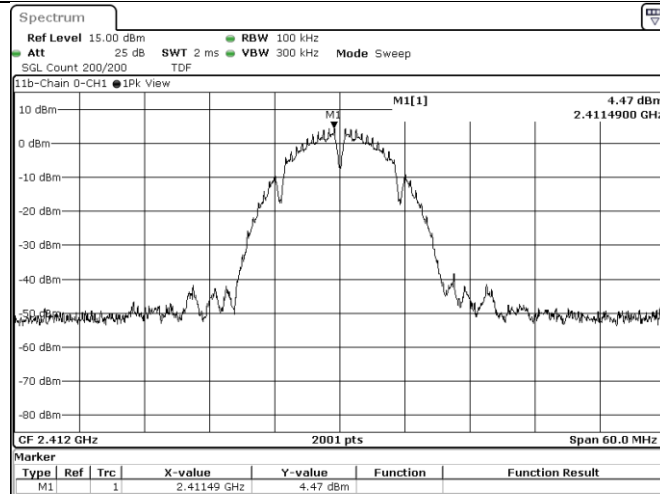
Test Setup



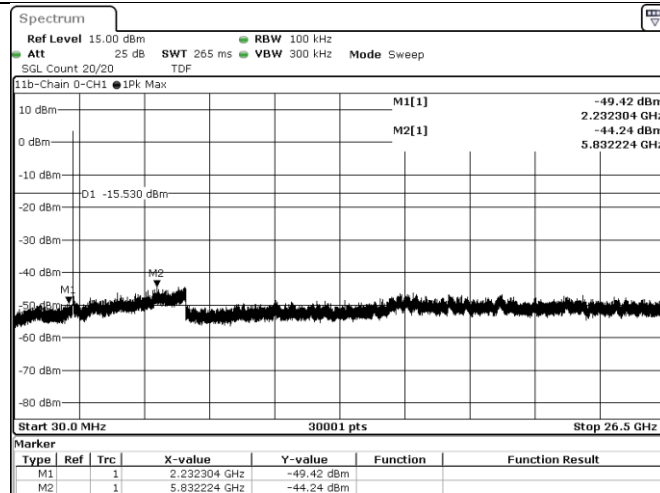
The loss between RF output port of the EUT and the input port of the Spectrum Analyzer has been taken into consideration.

Test Data

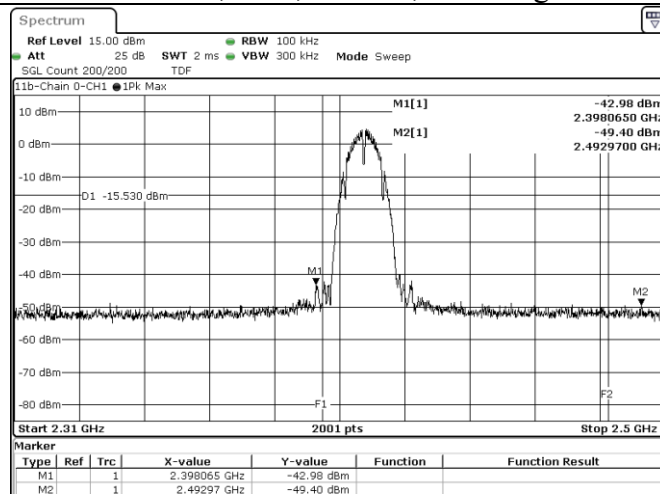
802.11b, CH1, Chain 0, Reference



802.11b, CH1, Chain 0, Conducted Emission



802.11b, CH1, Chain 0, Band edge



Underwriters Laboratories Taiwan Co., Ltd.

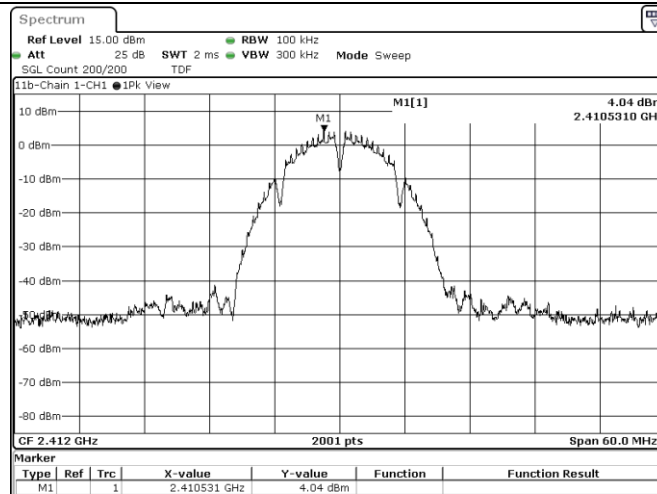
Building A, B and E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan

Telephone : +886-2-7737-3000

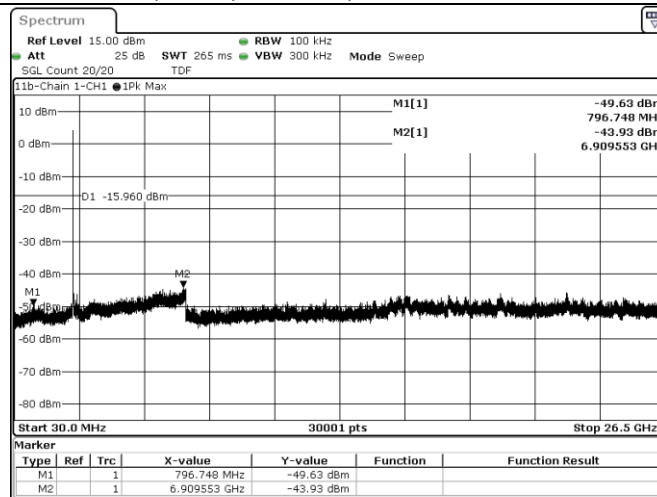
Facsimile (FAX) : +886-3-583-7948

Doc No: Form-ULID-004737 (DCS:17-EM-F0876) / 6.1

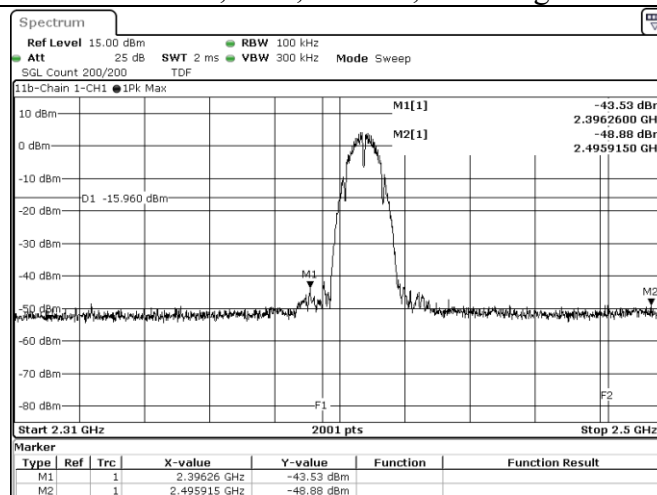
802.11b, CH1, Chain 1, Reference



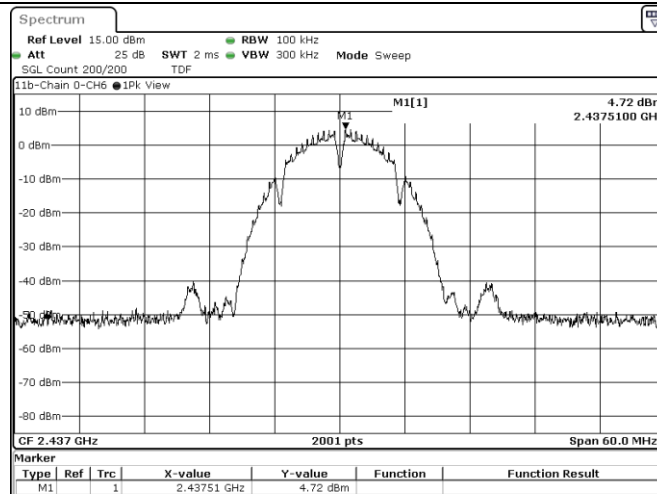
802.11b, CH1, Chain 1, Conducted Emission



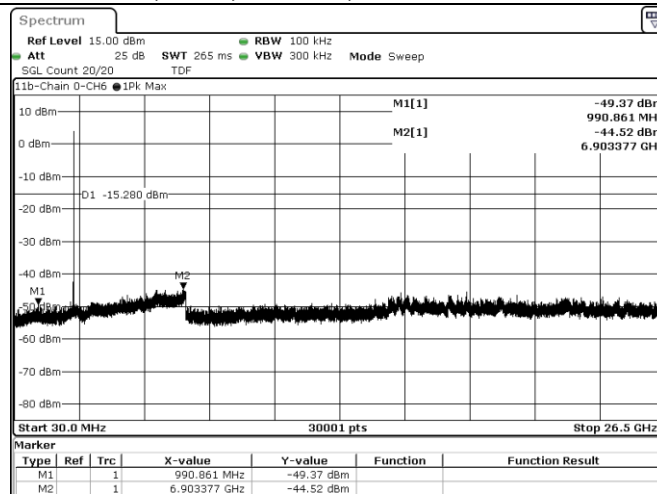
802.11b, CH1, Chain 1, Band edge



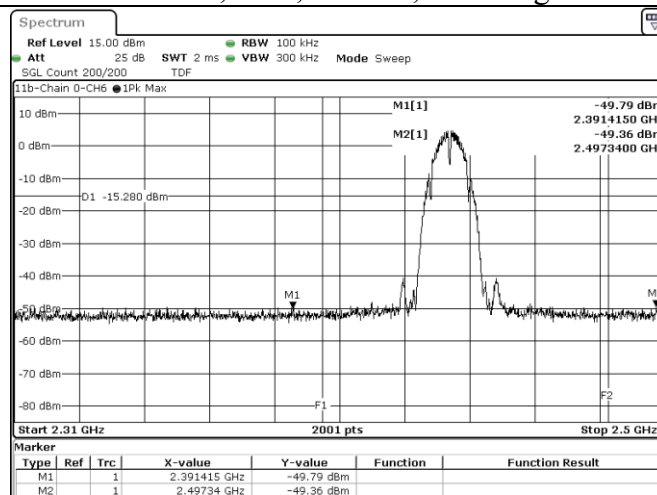
802.11b, CH6, Chain 0, Reference



802.11b, CH6, Chain 0, Conducted Emission



802.11b, CH6, Chain 0, Band edge



Underwriters Laboratories Taiwan Co., Ltd.

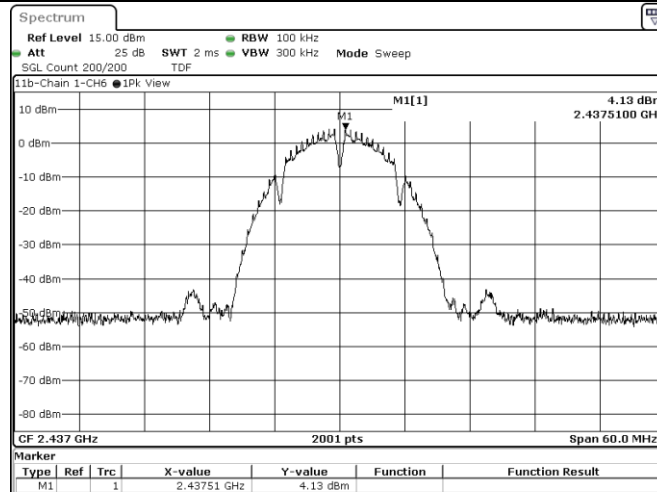
Building A, B and E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan

Telephone : +886-2-7737-3000

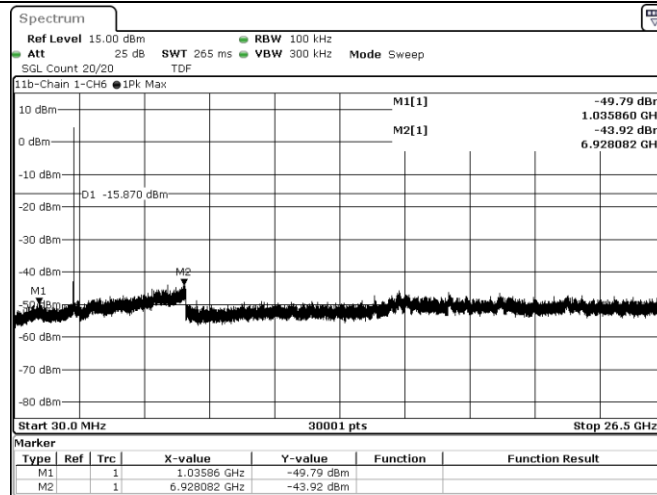
Facsimile (FAX) : +886-3-583-7948

Doc No: Form-ULID-004737 (DCS:17-EM-F0876) / 6.1

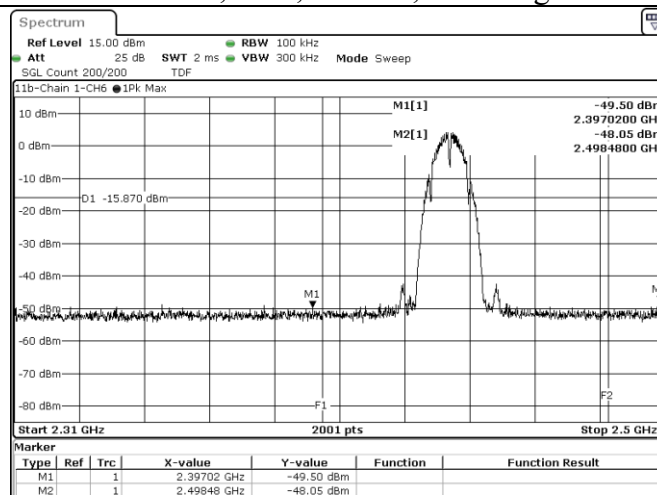
802.11b, CH6, Chain 1, Reference



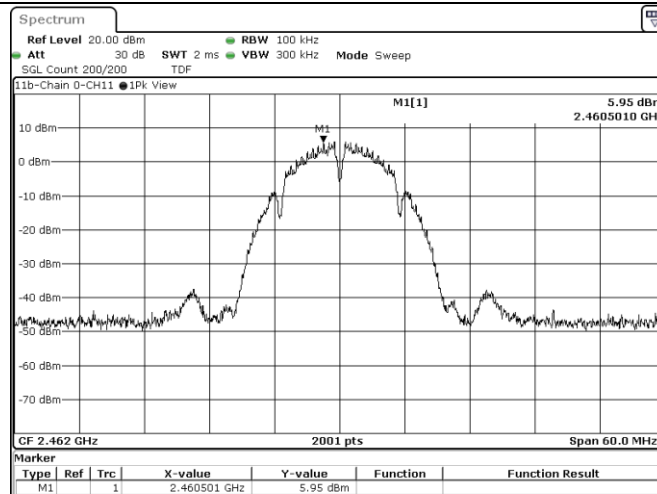
802.11b, CH6, Chain 1, Conducted Emission



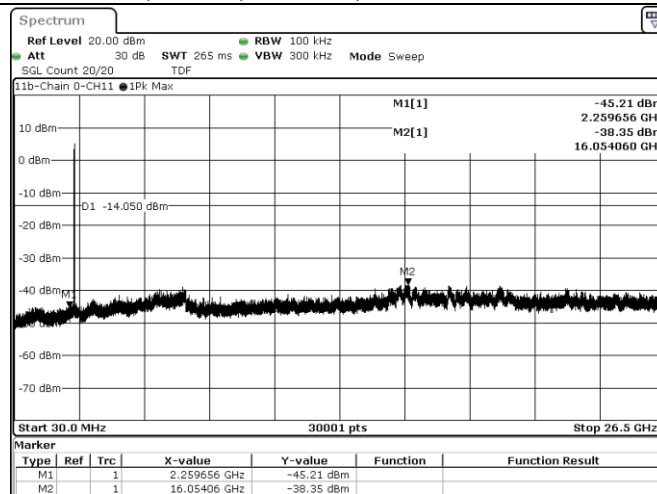
802.11b, CH6, Chain 1, Band edge



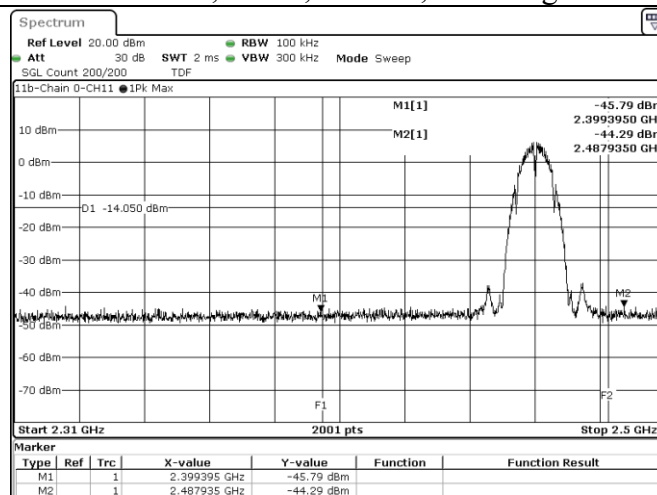
802.11b, CH11, Chain 0, Reference



802.11b, CH11, Chain 0, Conducted Emission



802.11b, CH11, Chain 0, Band edge



Underwriters Laboratories Taiwan Co., Ltd.

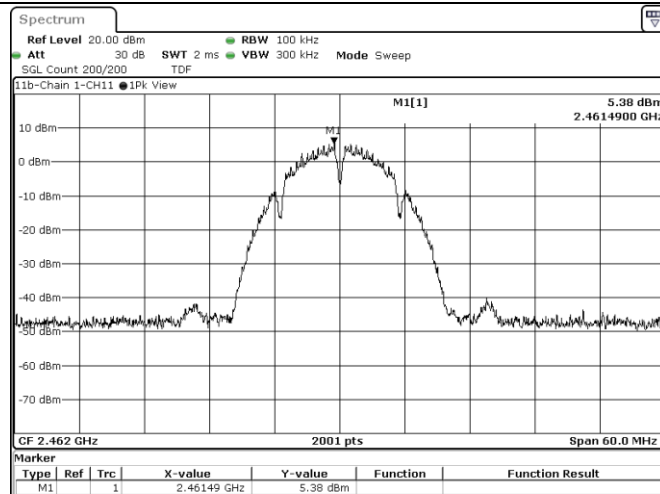
Building A, B and E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan

Telephone : +886-2-7737-3000

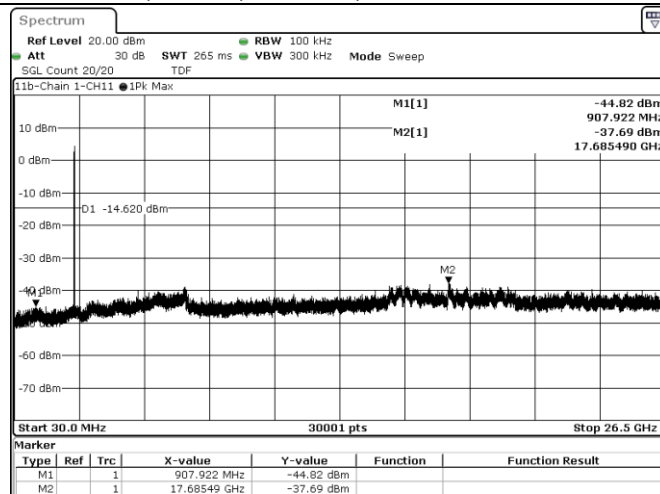
Facsimile (FAX) : +886-3-583-7948

Doc No: Form-ULID-004737 (DCS:17-EM-F0876) / 6.1

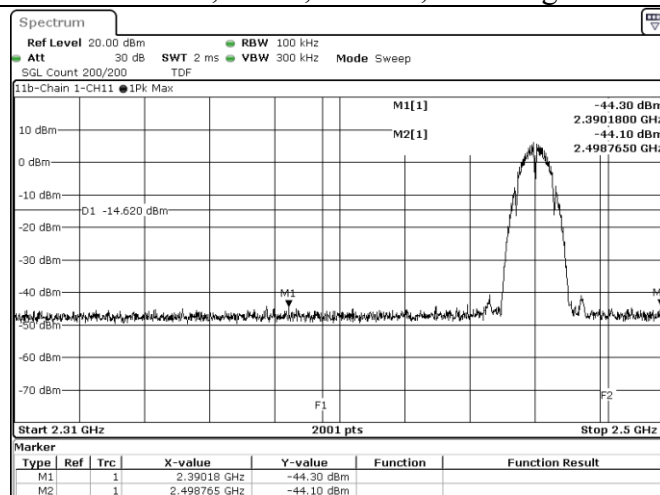
802.11b, CH11, Chain 1, Reference



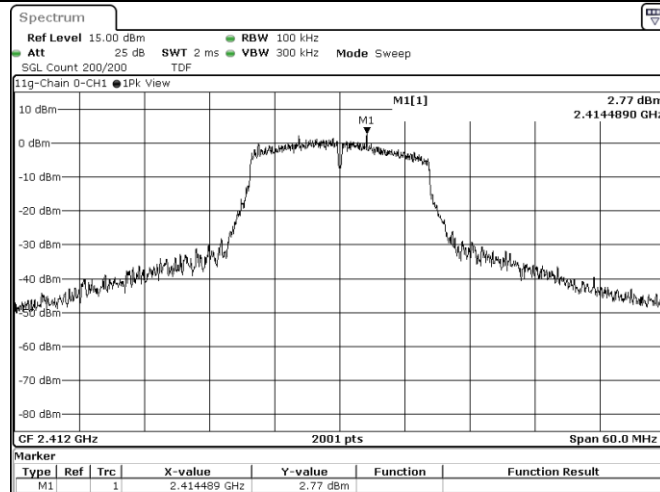
802.11b, CH11, Chain 1, Conducted Emission



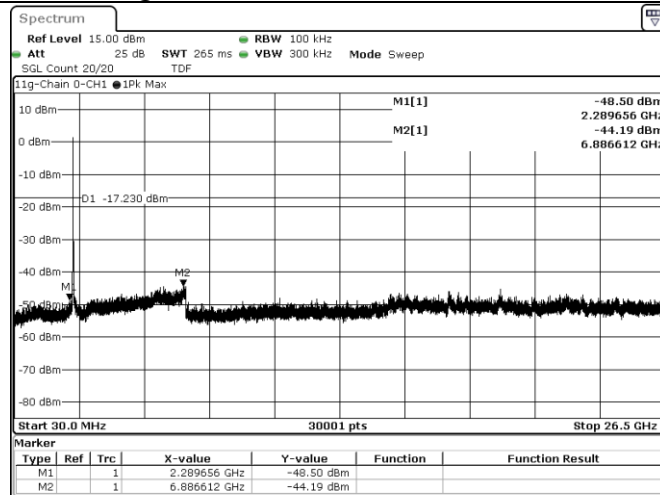
802.11b, CH11, Chain 1, Band edge



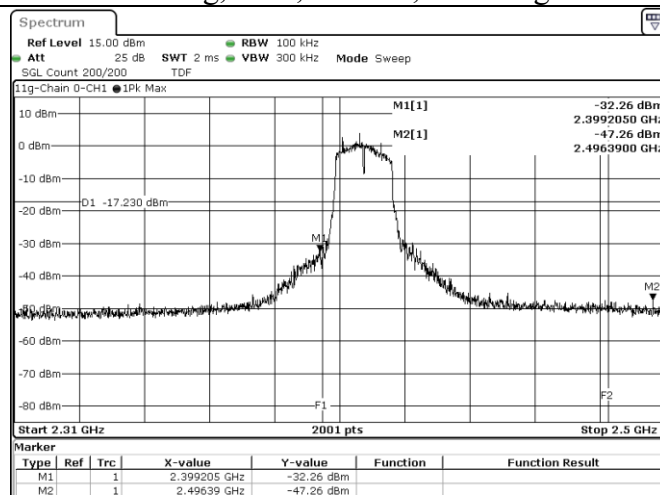
802.11g, CH1, Chain 0, Reference



802.11g, CH1, Chain 0, Conducted Emission



802.11g, CH1, Chain 0, Band edge



Underwriters Laboratories Taiwan Co., Ltd.

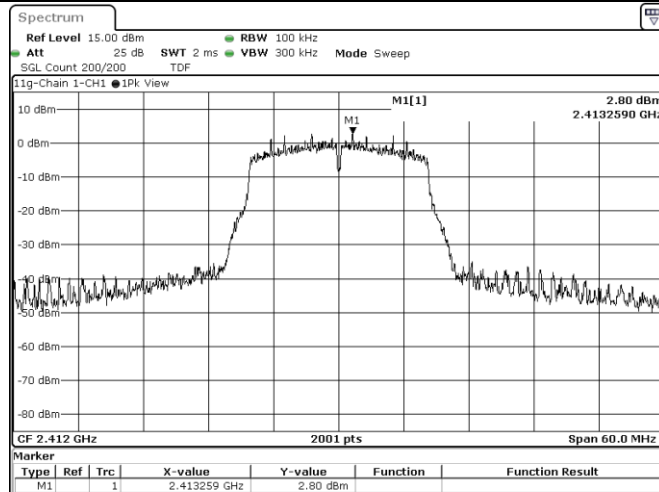
Building A, B and E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan

Telephone : +886-2-7737-3000

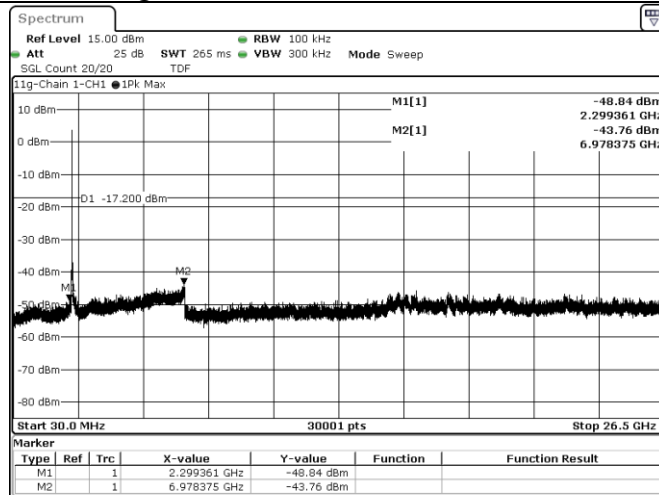
Facsimile (FAX) : +886-3-583-7948

Doc No: Form-ULID-004737 (DCS:17-EM-F0876) / 6.1

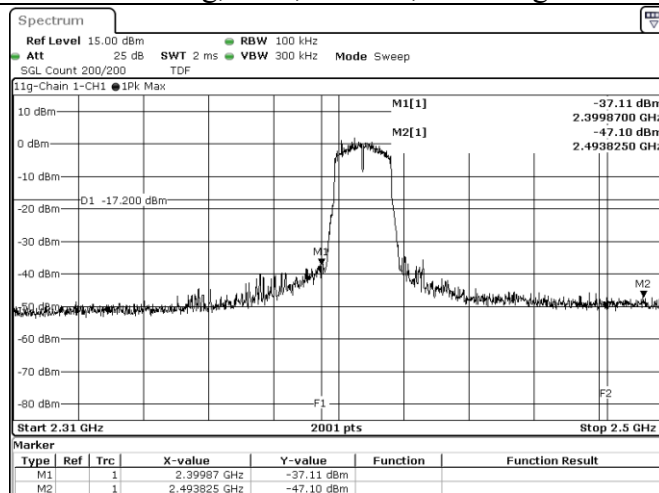
802.11g, CH1, Chain 1, Reference



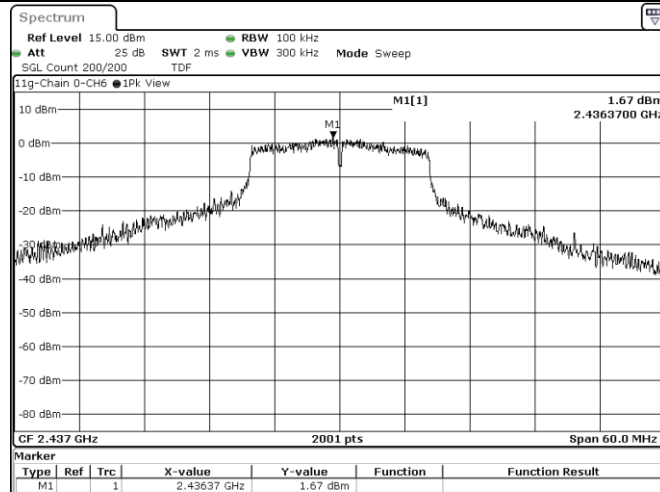
802.11g, CH1, Chain 1, Conducted Emission



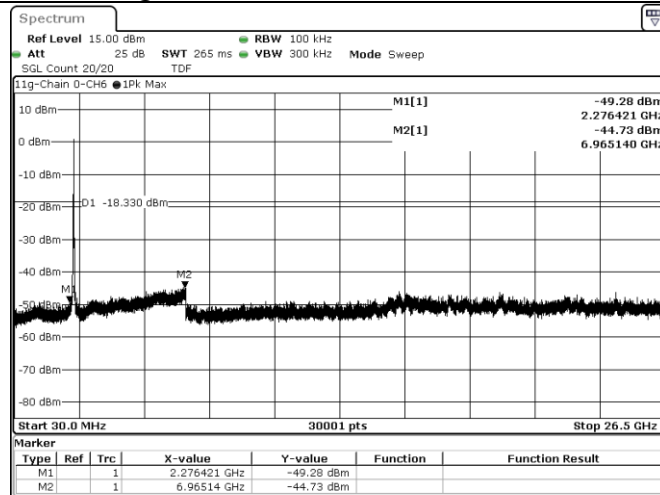
802.11g, CH1, Chain 1, Band edge



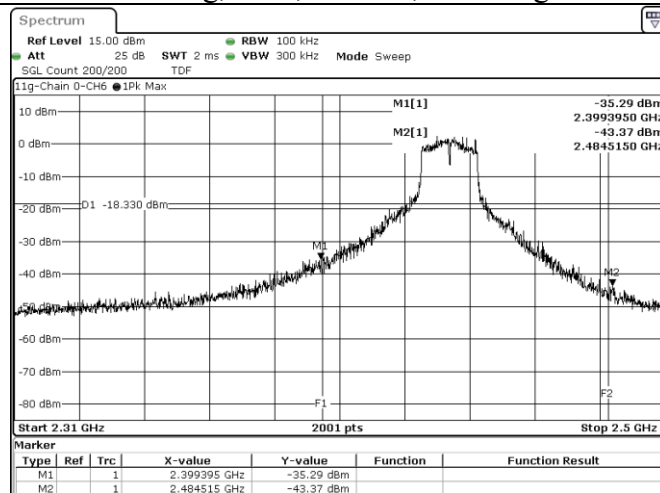
802.11g, CH6, Chain 0, Reference



802.11g, CH6, Chain 0, Conducted Emission



802.11g, CH6, Chain 0, Band edge



Underwriters Laboratories Taiwan Co., Ltd.

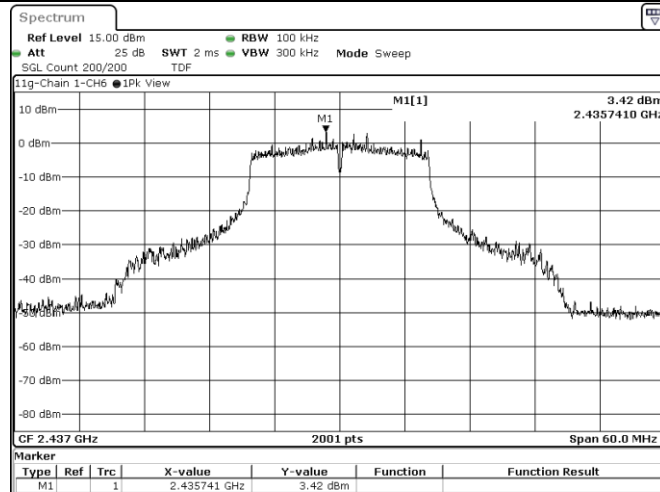
Building A, B and E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan

Telephone : +886-2-7737-3000

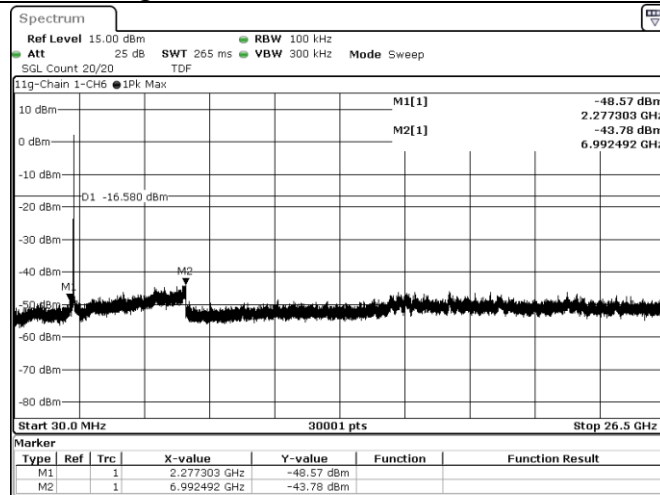
Facsimile (FAX) : +886-3-583-7948

Doc No: Form-ULID-004737 (DCS:17-EM-F0876) / 6.1

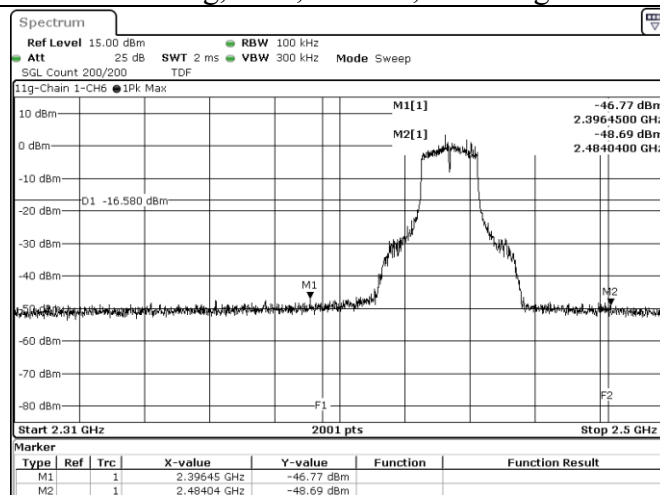
802.11g, CH6, Chain 1, Reference



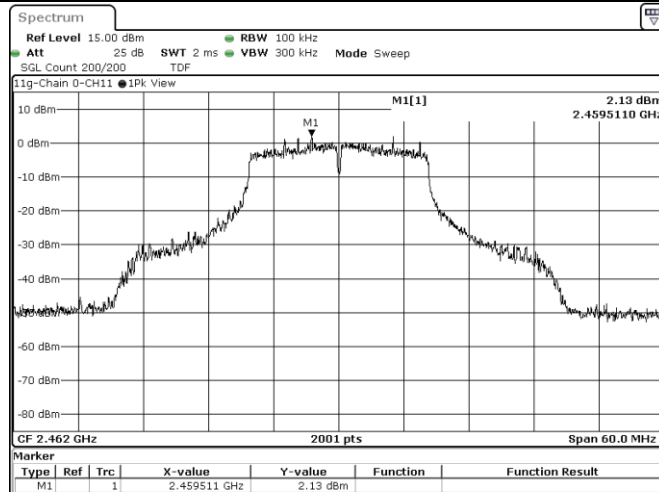
802.11g, CH6, Chain 1, Conducted Emission



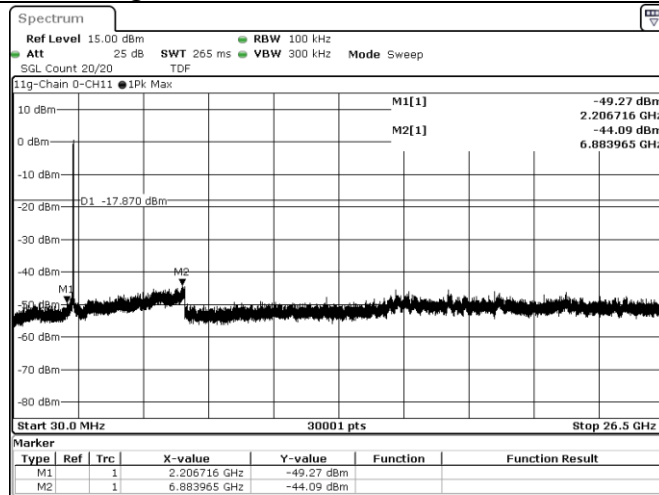
802.11g, CH6, Chain 1, Band edge



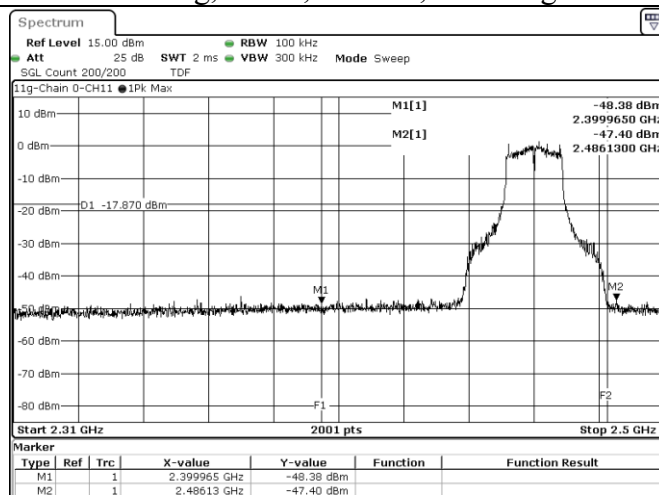
802.11g, CH11, Chain 0, Reference



802.11g, CH11, Chain 0, Conducted Emission



802.11g, CH11, Chain 0, Band edge



Underwriters Laboratories Taiwan Co., Ltd.

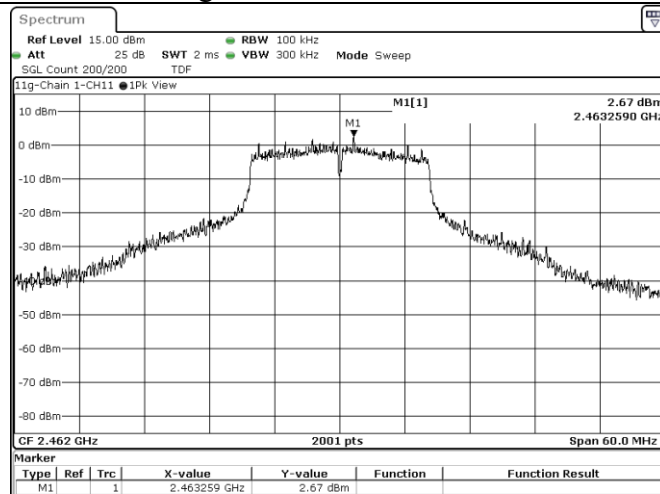
Building A, B and E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan

Telephone : +886-2-7737-3000

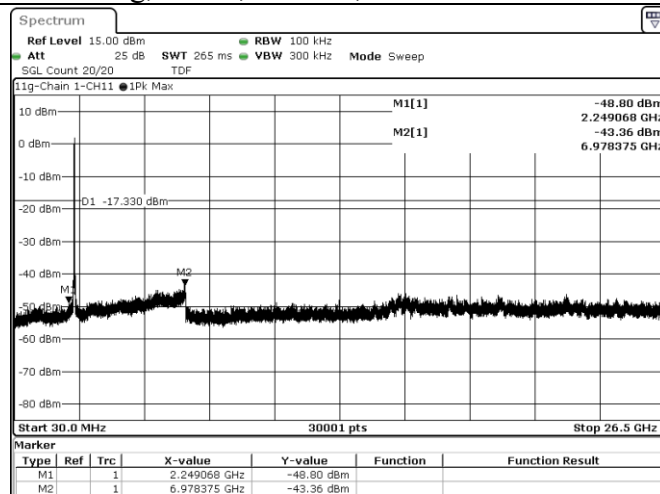
Facsimile (FAX) : +886-3-583-7948

Doc No: Form-ULID-004737 (DCS:17-EM-F0876) / 6.1

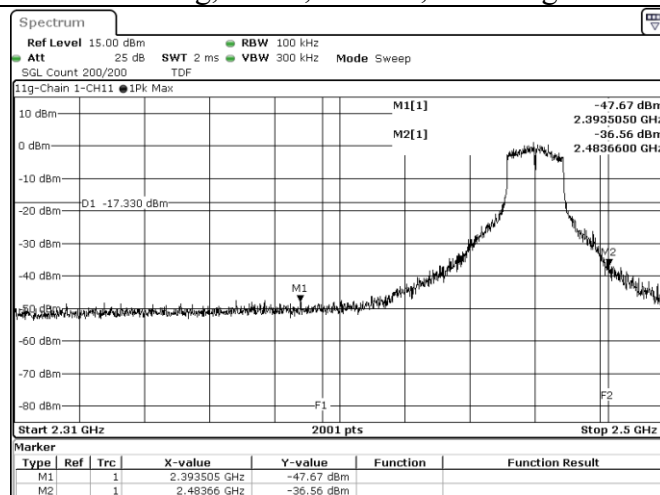
802.11g, CH11, Chain 1, Reference



802.11g, CH11, Chain 1, Conducted Emission



802.11g, CH11, Chain 1, Band edge



Underwriters Laboratories Taiwan Co., Ltd.

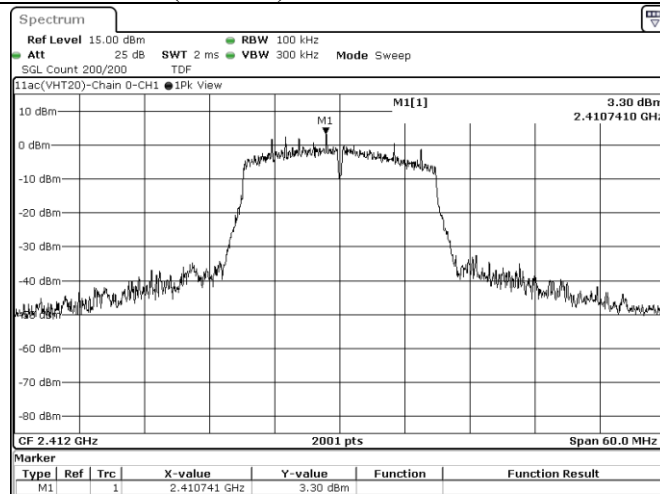
Building A, B and E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan

Telephone : +886-2-7737-3000

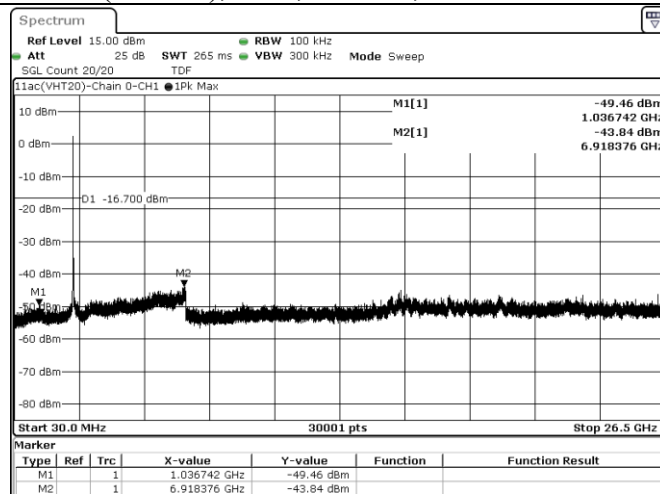
Facsimile (FAX) : +886-3-583-7948

Doc No: Form-ULID-004737 (DCS:17-EM-F0876) / 6.1

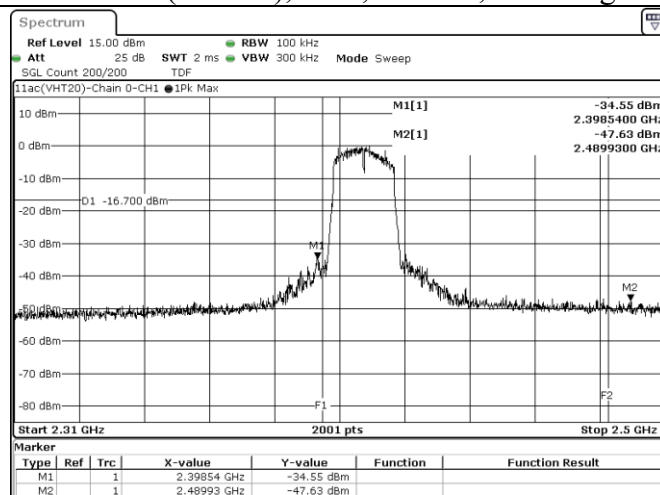
802.11ac(VHT20), CH1, Chain 0, Reference



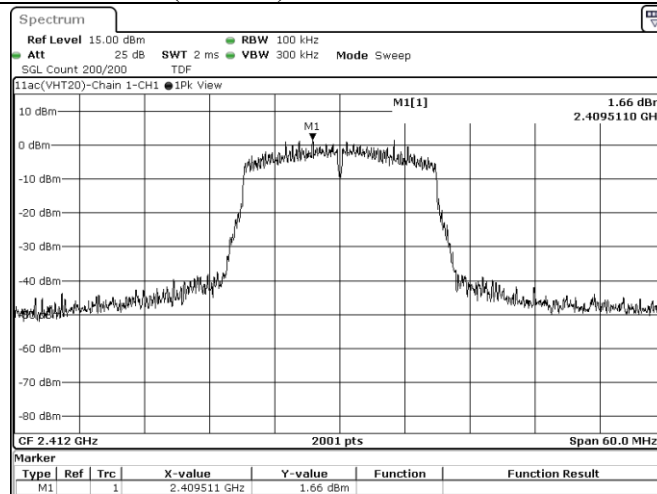
802.11ac(VHT20), CH1, Chain 0, Conducted Emission



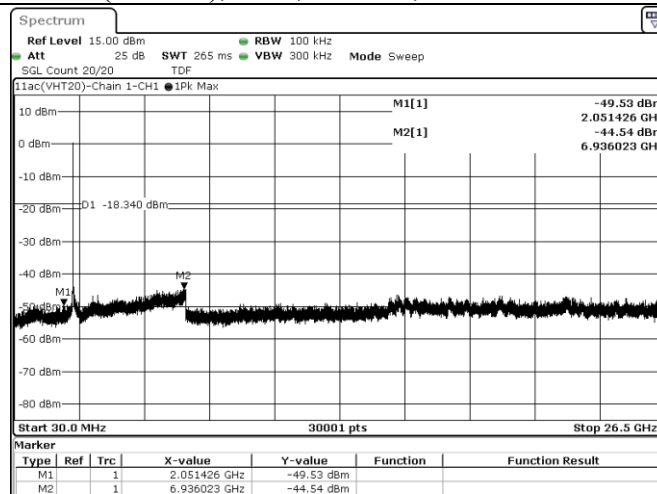
802.11ac(VHT20), CH1, Chain 0, Band edge



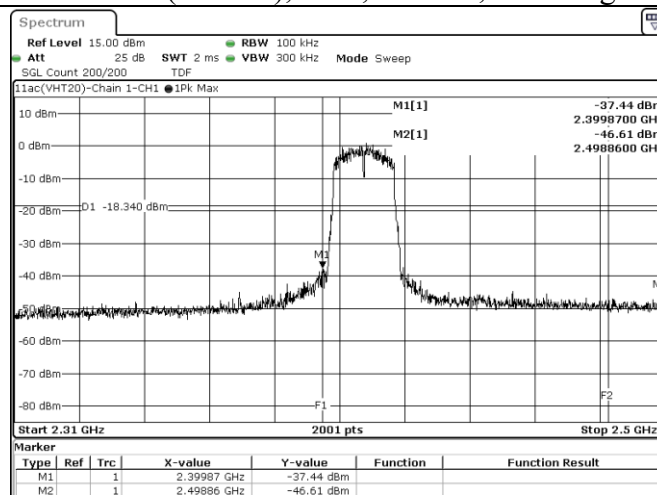
802.11ac(VHT20), CH1, Chain 1, Reference



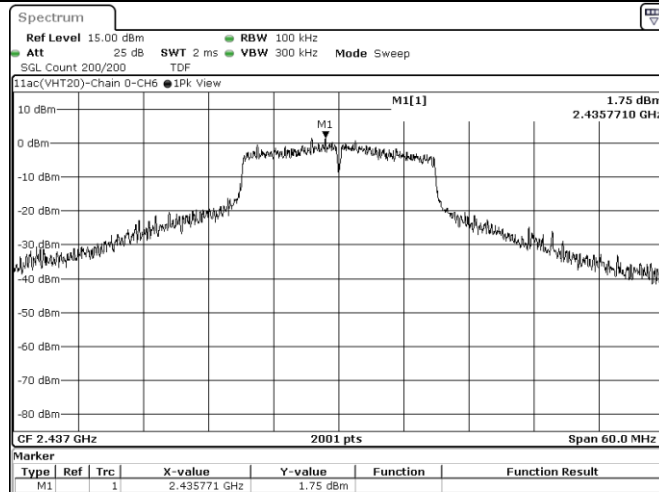
802.11ac(VHT20), CH1, Chain 1, Conducted Emission



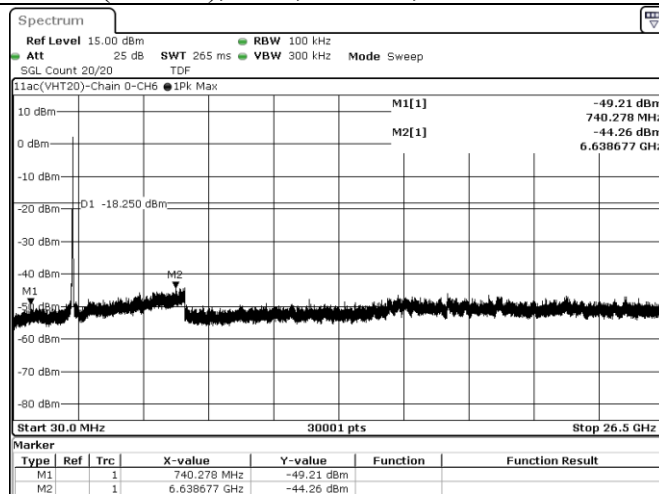
802.11ac(VHT20), CH1, Chain 1, Band edge



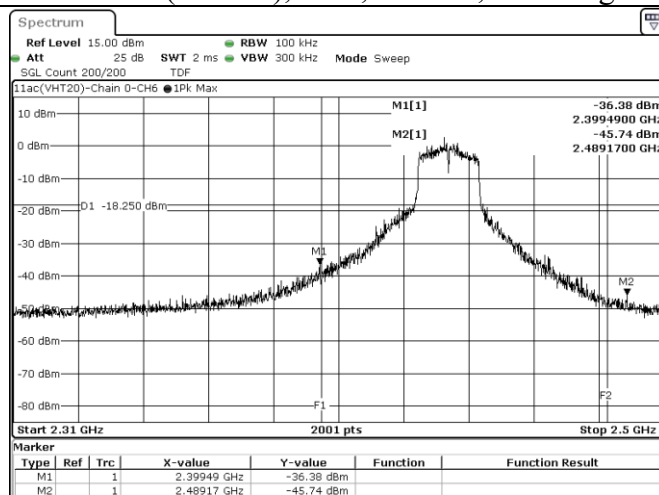
802.11ac(VHT20), CH6, Chain 0, Reference



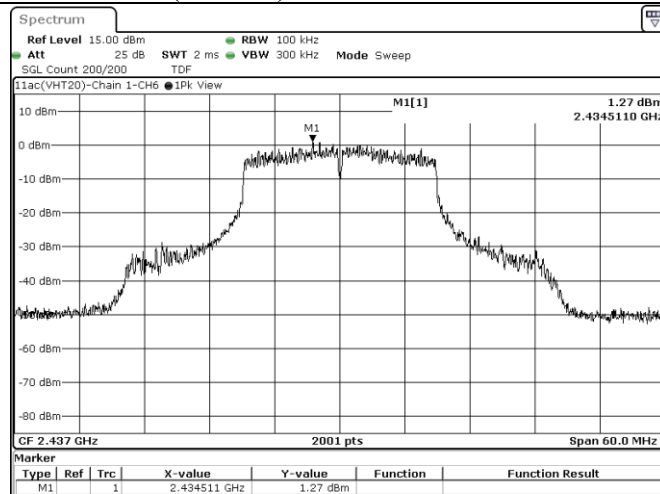
802.11ac(VHT20), CH6, Chain 0, Conducted Emission



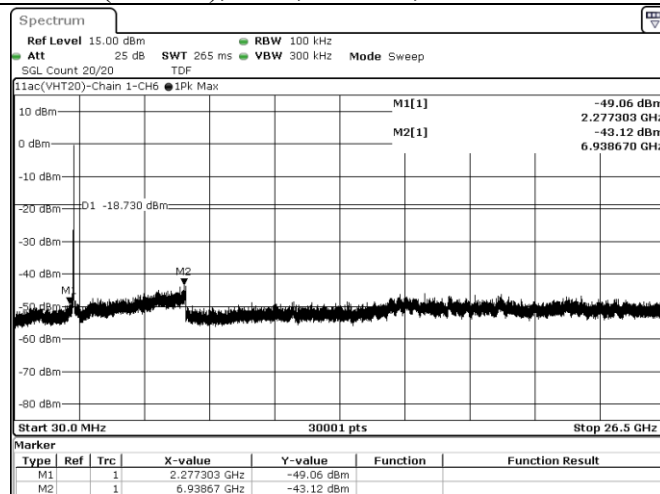
802.11ac(VHT20), CH6, Chain 0, Band edge



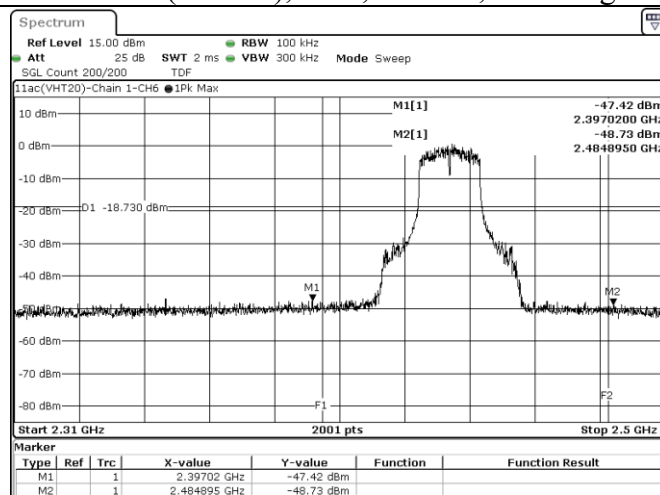
802.11ac(VHT20), CH6, Chain 1, Reference



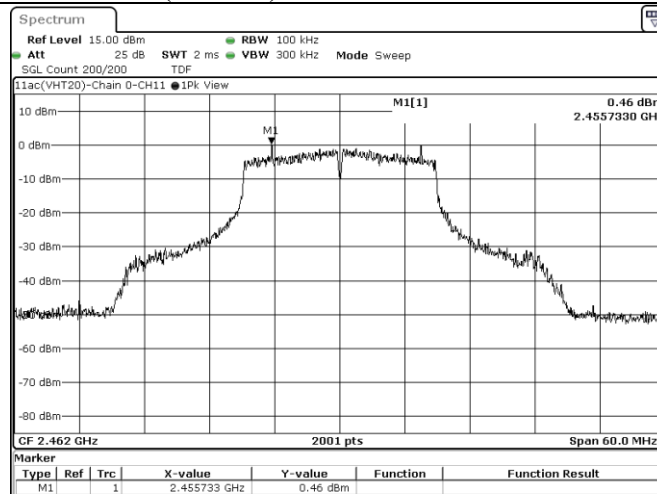
802.11ac(VHT20), CH6, Chain 1, Conducted Emission



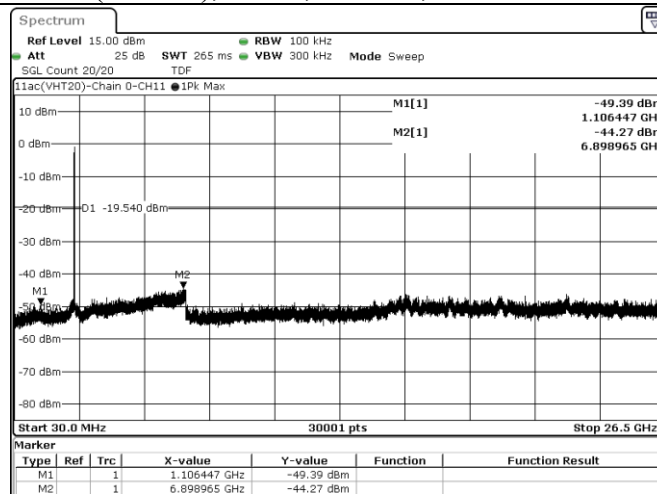
802.11ac(VHT20), CH6, Chain 1, Band edge



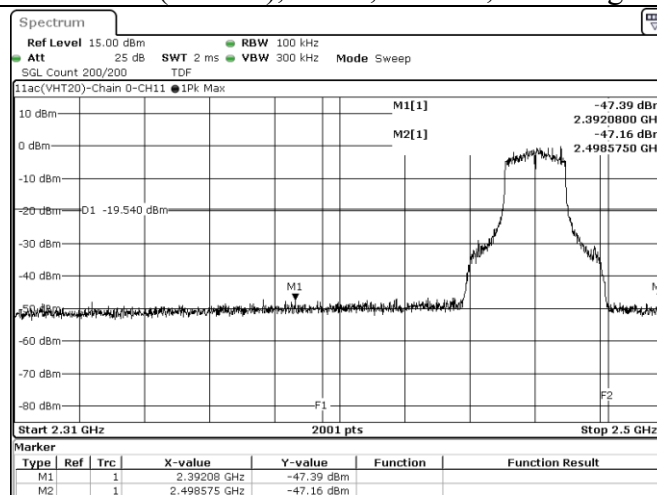
802.11ac(VHT20), CH11, Chain 0, Reference



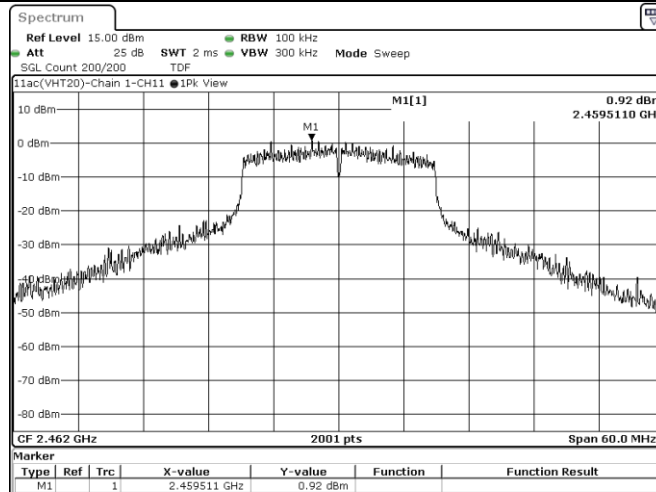
802.11ac(VHT20), CH11, Chain 0, Conducted Emission



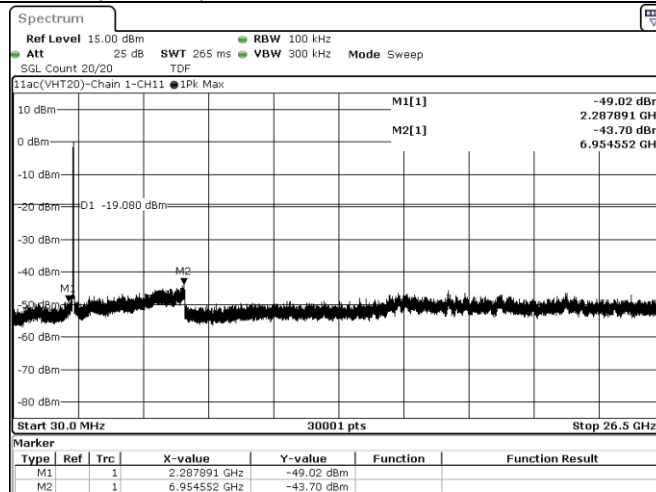
802.11ac(VHT20), CH11, Chain 0, Band edge



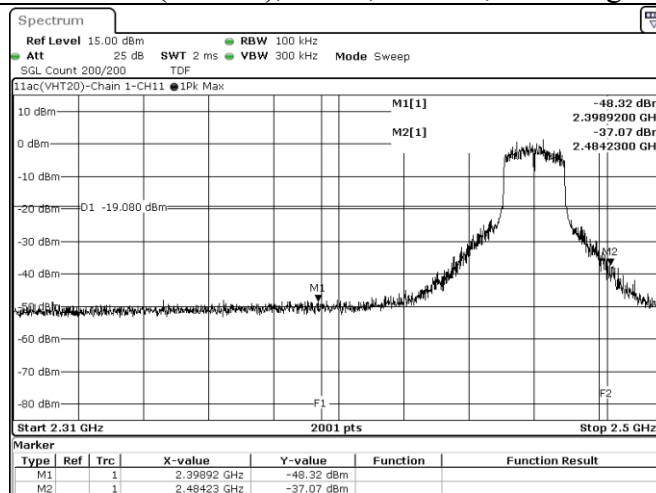
802.11ac(VHT20), CH11, Chain 1, Reference



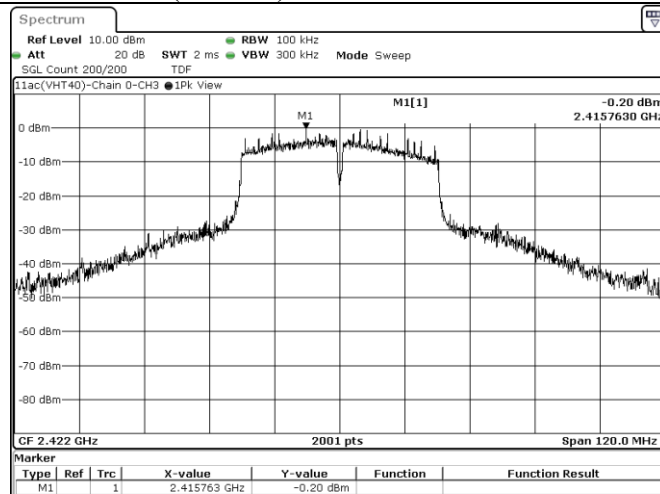
802.11ac(VHT20), CH11, Chain 1, Conducted Emission



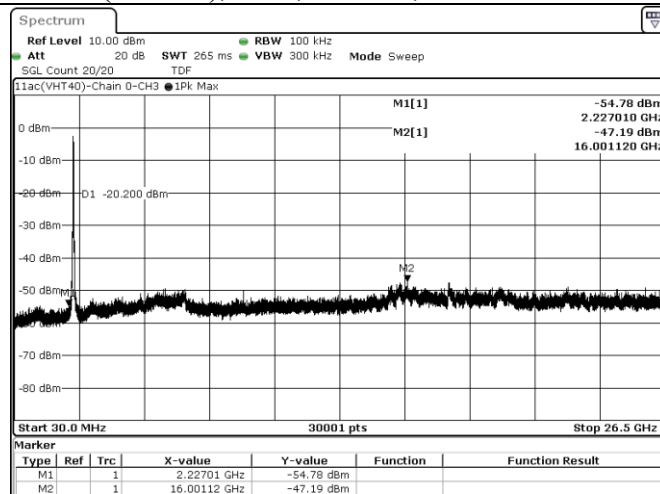
802.11ac(VHT20), CH11, Chain 1, Band edge



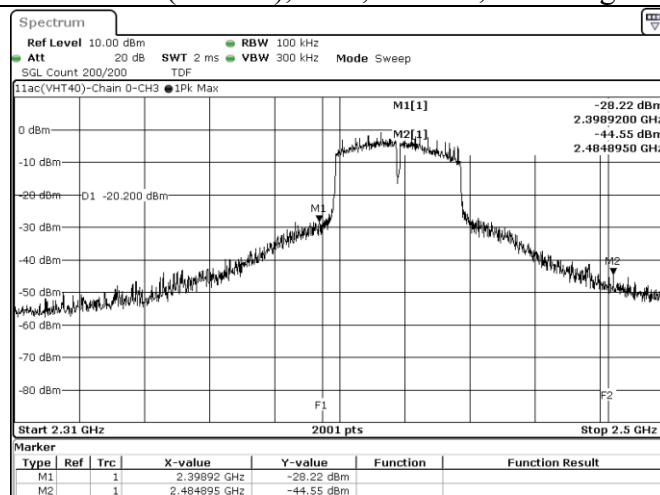
802.11ac(VHT40), CH3, Chain 0, Reference



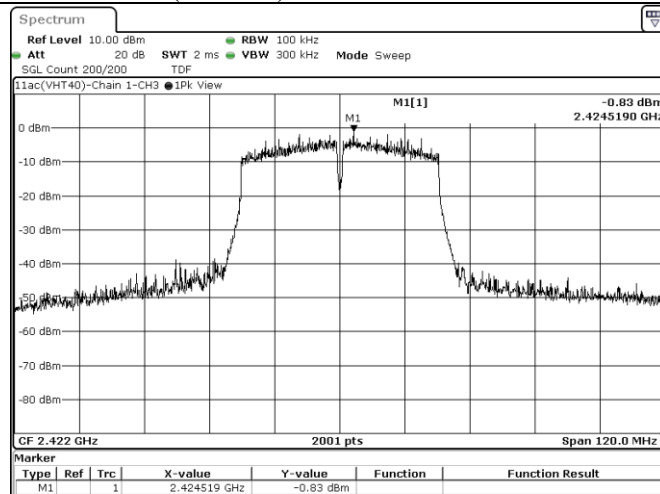
802.11ac(VHT40), CH3, Chain 0, Conducted Emission



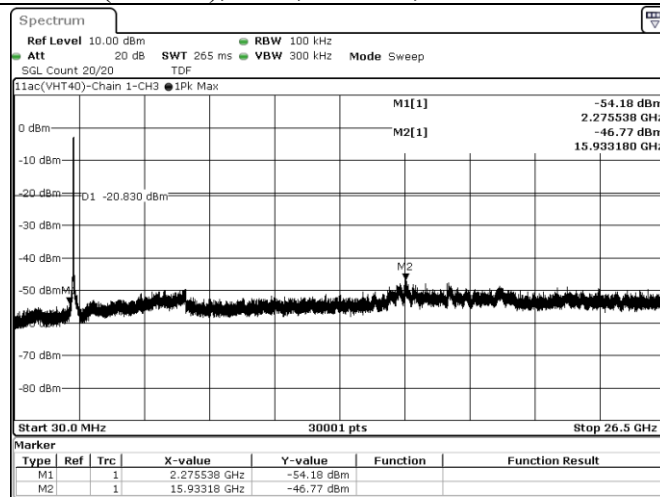
802.11ac(VHT40), CH3, Chain 0, Band edge



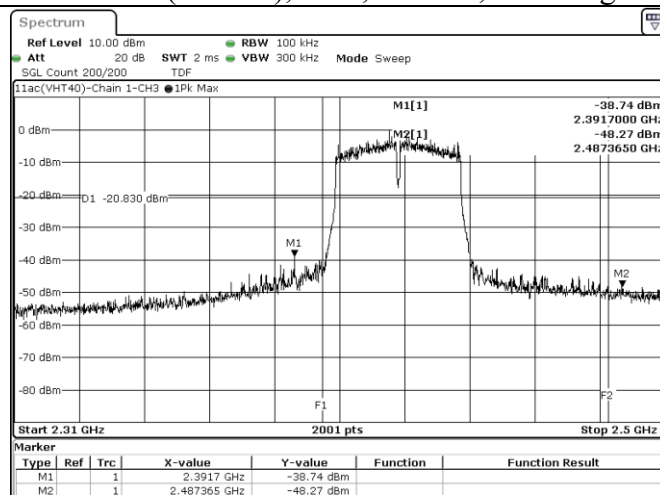
802.11ac(VHT40), CH3, Chain 1, Reference



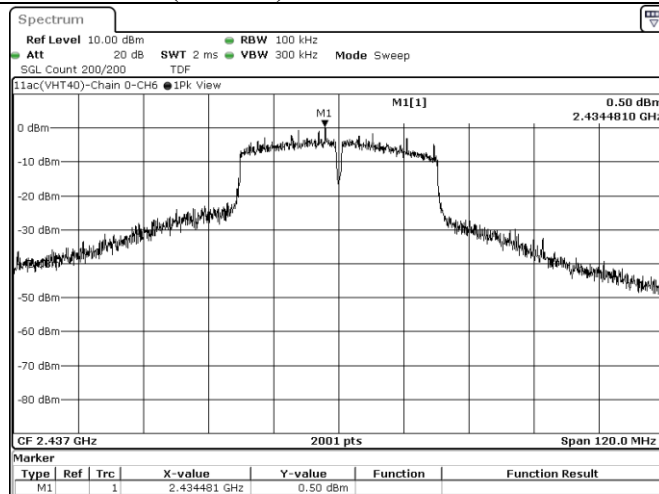
802.11ac(VHT40), CH3, Chain 1, Conducted Emission



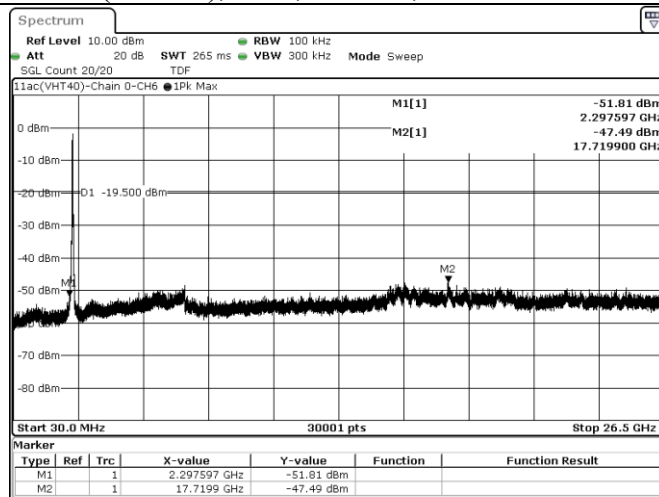
802.11ac(VHT40), CH3, Chain 1, Band edge



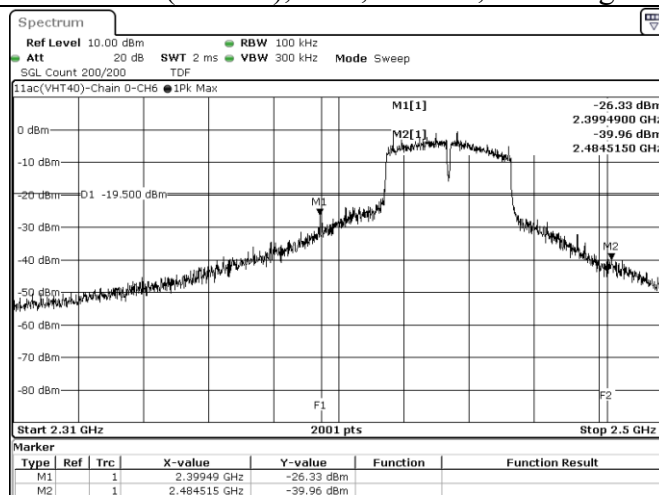
802.11ac(VHT40), CH6, Chain 0, Reference



802.11ac(VHT40), CH6, Chain 0, Conducted Emission



802.11ac(VHT40), CH6, Chain 0, Band edge



Underwriters Laboratories Taiwan Co., Ltd.

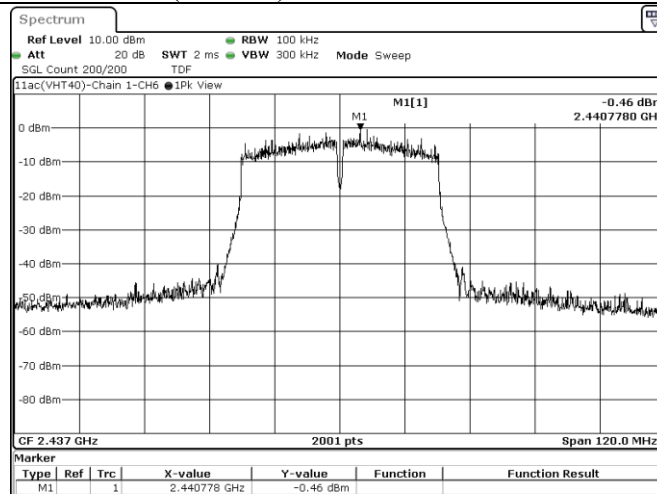
Building A, B and E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan

Telephone : +886-2-7737-3000

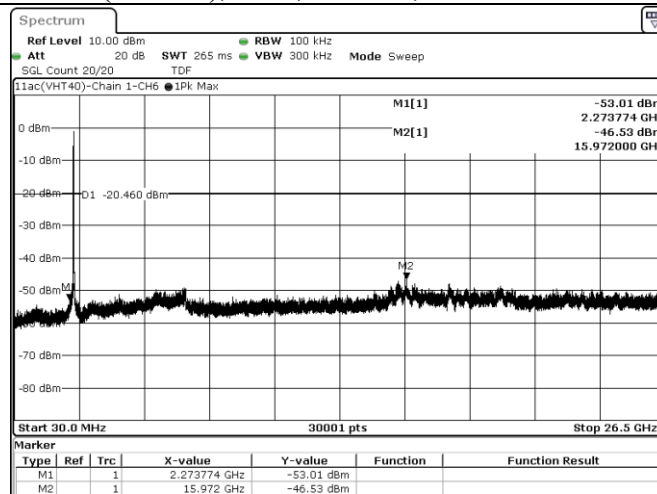
Facsimile (FAX) : +886-3-583-7948

Doc No: Form-ULID-004737 (DCS:17-EM-F0876) / 6.1

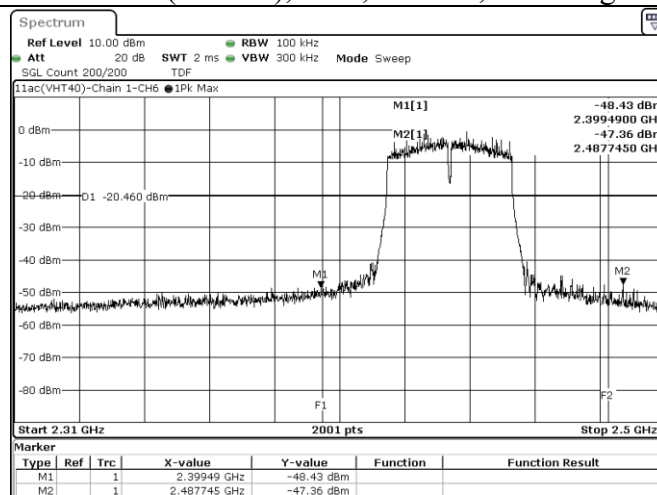
802.11ac(VHT40), CH6, Chain 1, Reference



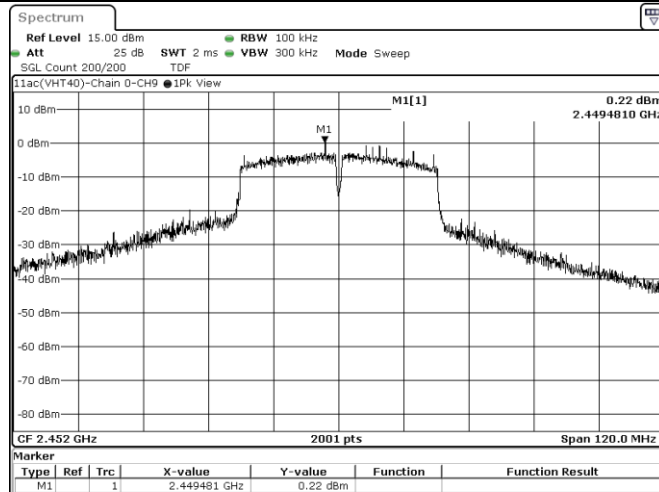
802.11ac(VHT40), CH6, Chain 1, Conducted Emission



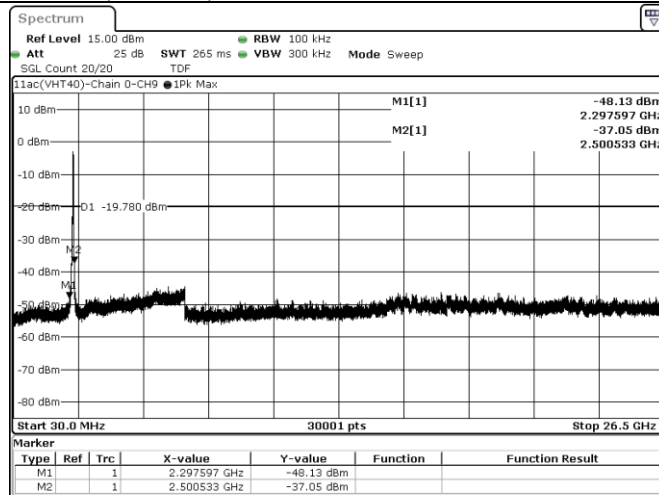
802.11ac(VHT40), CH6, Chain 1, Band edge



802.11ac(VHT40), CH9, Chain 0, Reference



802.11ac(VHT40), CH9, Chain 0, Conducted Emission



802.11ac(VHT40), CH9, Chain 0, Band edge

