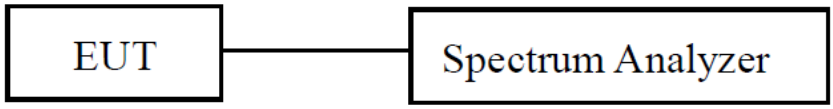
FCC §15.247(a) (2) – 6 dB EMISSION BANDWIDTH

Applicable Standard

Systems using digital modulation techniques may operate in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

EUT Setup



Test Procedure

According to ANSI C63.10-2013 Section 11.8

a) Set RBW = 100 kHz.
b) Set the video bandwidth (VBW) ≥ 3×RBW.
c) Detector = Peak.
d) Trace mode = max hold.
e) Sweep = auto couple.
f) Allow the trace to stabilize.
g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

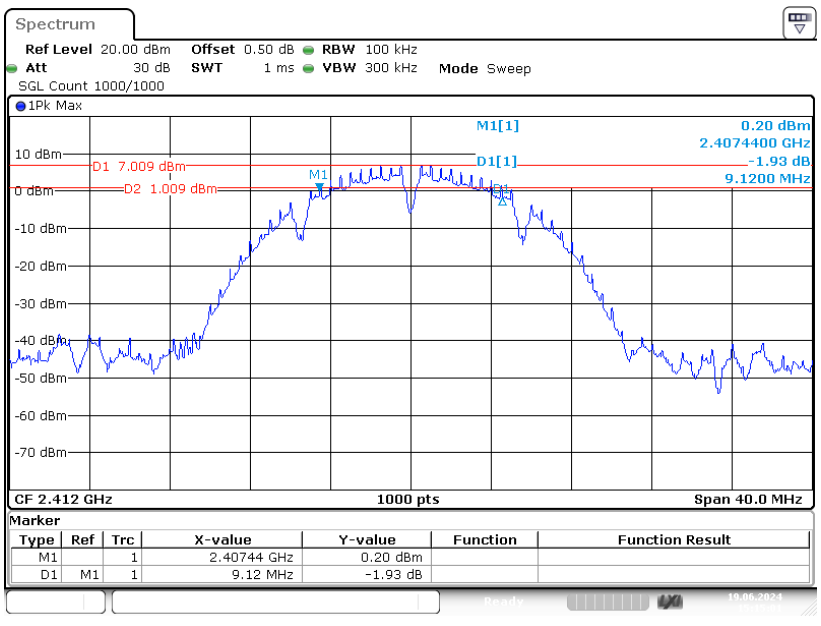
Test Data

Test Mode:	Transmitting	Test Engineer:	Ash Lin
Test Date:	2024-06-19~2024-06-22	Test Voltage:	AC 120V/60Hz
Test Result:	Compliance	Environment:	Temp.: 23.7℃~24.3℃ Humi.: 55%~59% Atm : 100.5 kPa ~101.1kPa

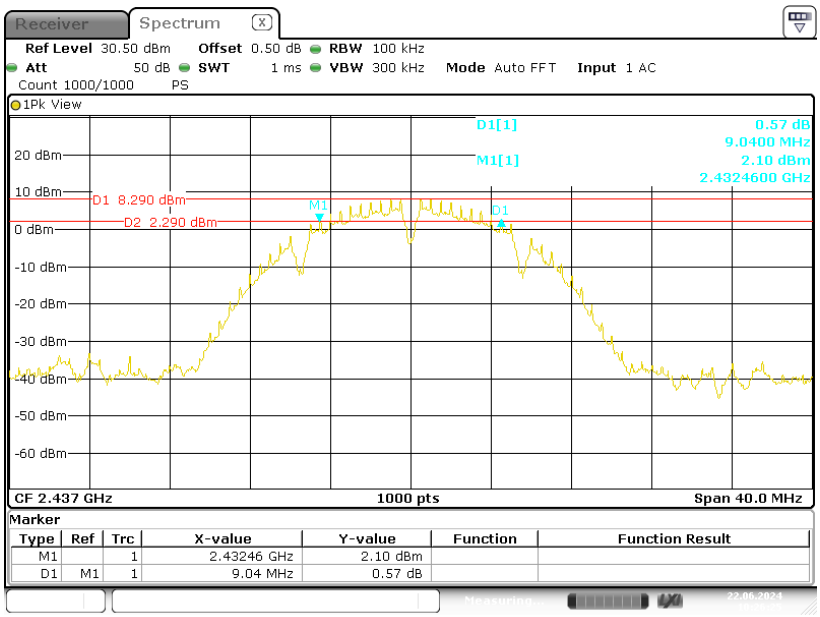
Test Modes	Test Frequency (MHz)	6 dB Bandwidth (MHz)	Limit (MHz)
802.11b	2412	9.12	0.5
	2437	9.04	0.5
	2462	8.96	0.5
802.11g	2412	16.48	0.5
	2437	16.44	0.5
	2462	16.44	0.5
802.11n HT20	2412	17.68	0.5
	2437	17.64	0.5
	2462	17.64	0.5
802.11n HT40	2422	35.92	0.5
	2437	35.92	0.5
	2452	36.16	0.5

Please refer to below plots:

802.11b Mode Low Channel



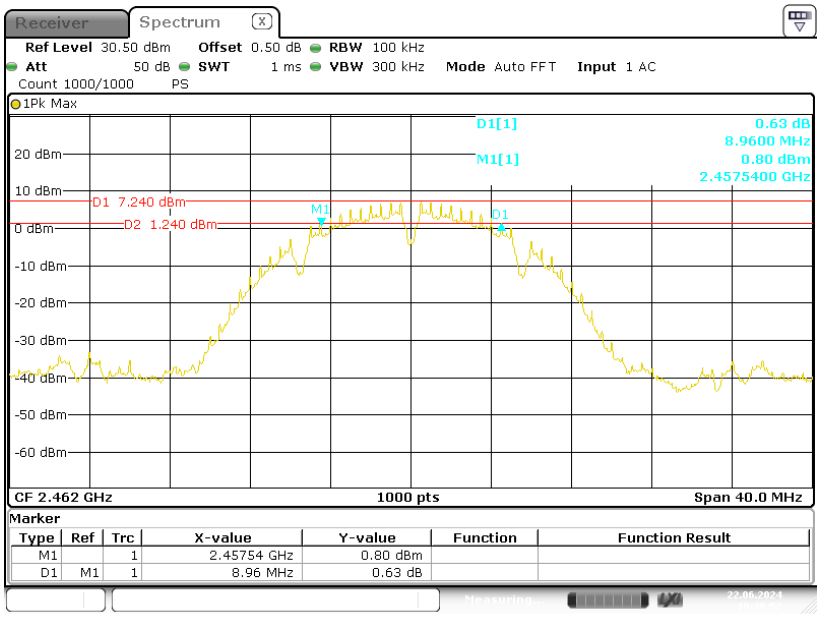
802.11b Mode Middle Channel



Project No. :2407T78483E-RF Tester:Ash Lin

Date: 22.JUN.2024 10:26:25

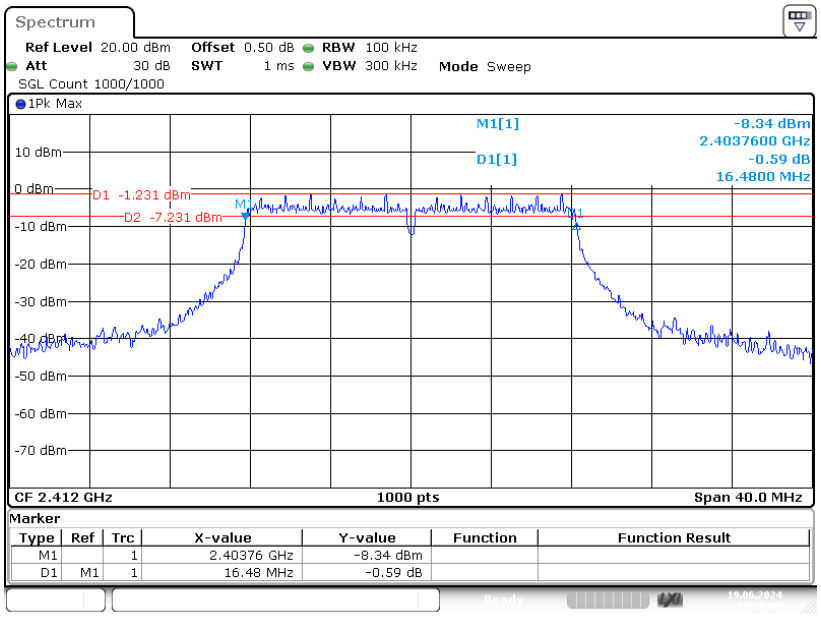
802.11b Mode High Channel



Project No. :2407T78483E-RF Tester:Ash Lin

Date: 22.JUN.2024 10:30:52

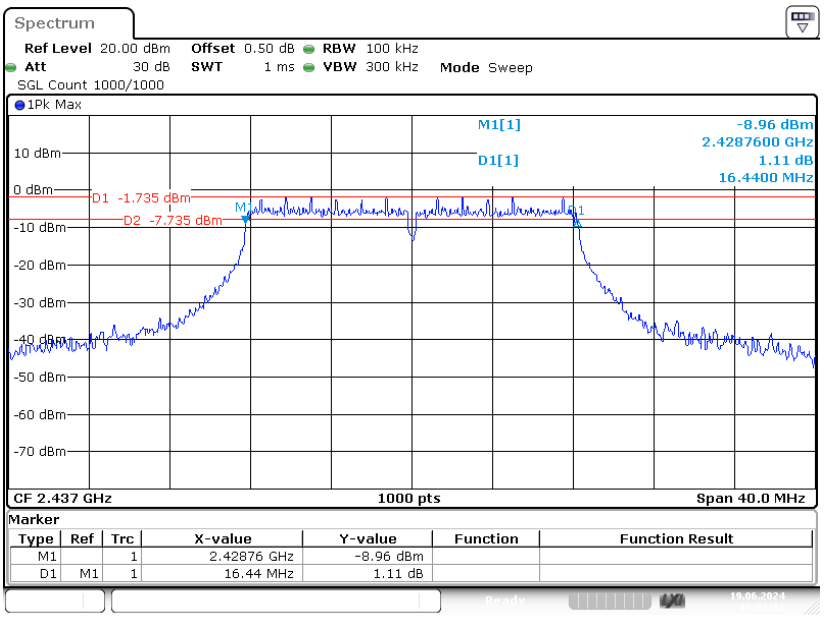
802.11g Mode Low Channel



ProjectNo.:2407T78483E-RF Tester:Ash Lin

Date: 19.JUN.2024 15:20:05

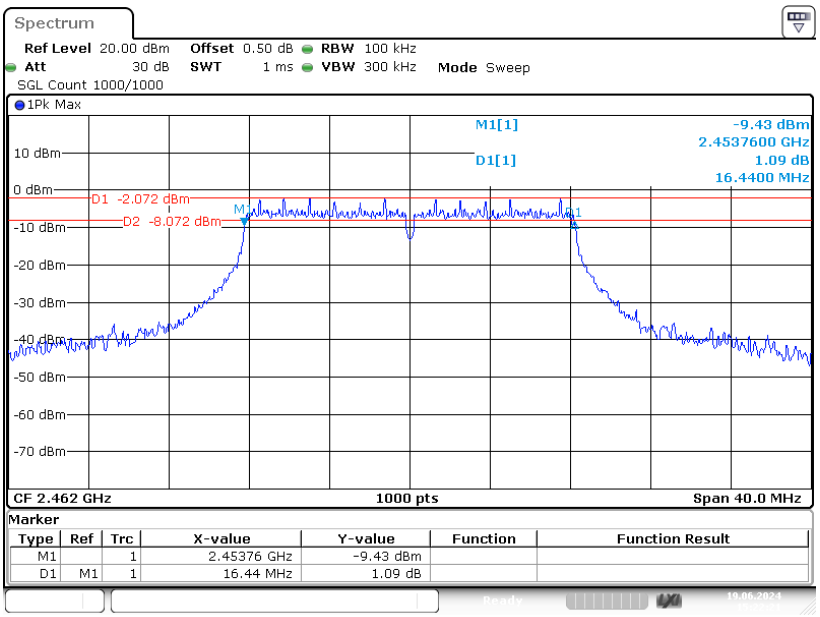
802.11g Mode Middle Channel



ProjectNo.:2407T78483E-RF Tester:Ash Lin

Date: 19.JUN.2024 15:21:10

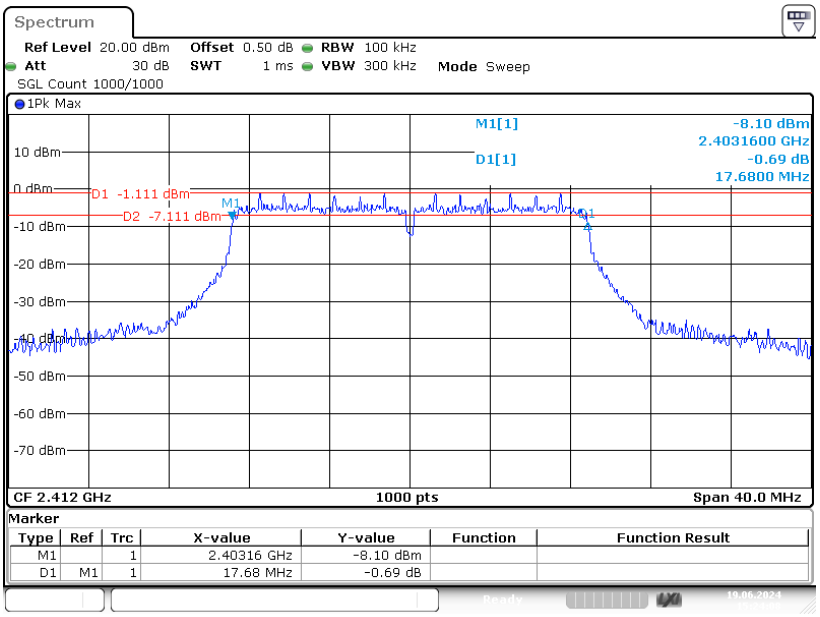
802.11g Mode High Channel



ProjectNo.:2407T78483E-RF Tester:Ash Lin

Date: 19.JUN.2024 15:22:21

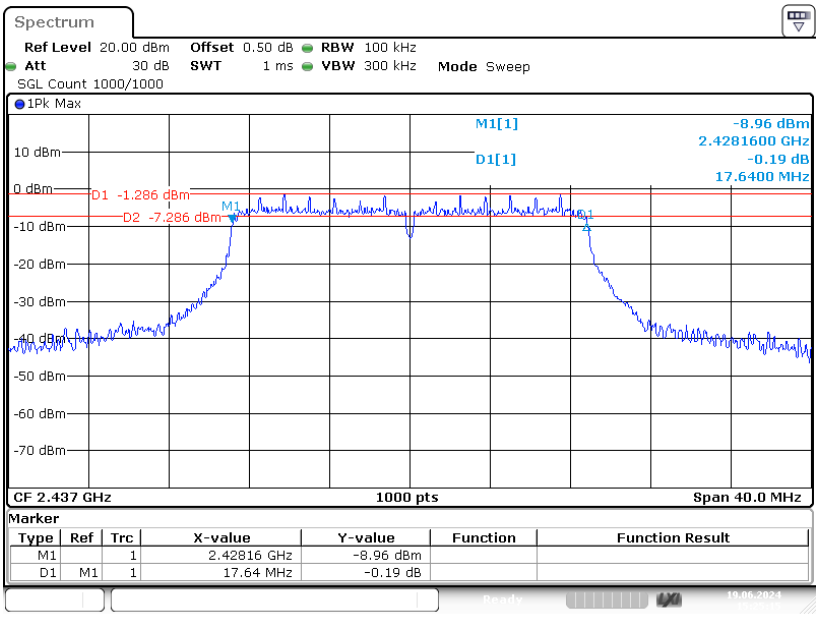
802.11n-ht20 Mode Low Channel



ProjectNo.:2407T78483E-RF Tester:Ash Lin

Date: 19.JUN.2024 15:24:08

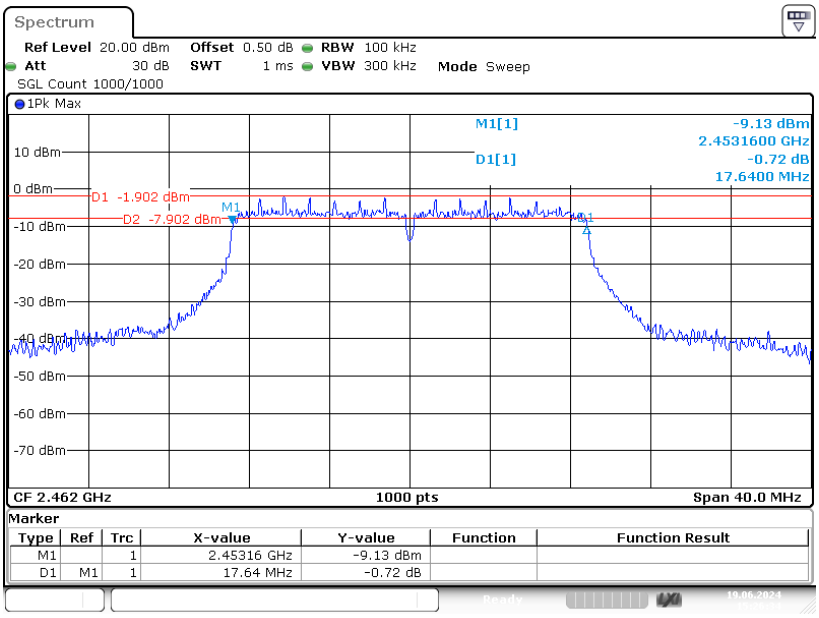
802.11n-ht20 Mode Middle Channel



ProjectNo.:2407T78483E-RF Tester:Ash Lin

Date: 19.JUN.2024 15:25:15

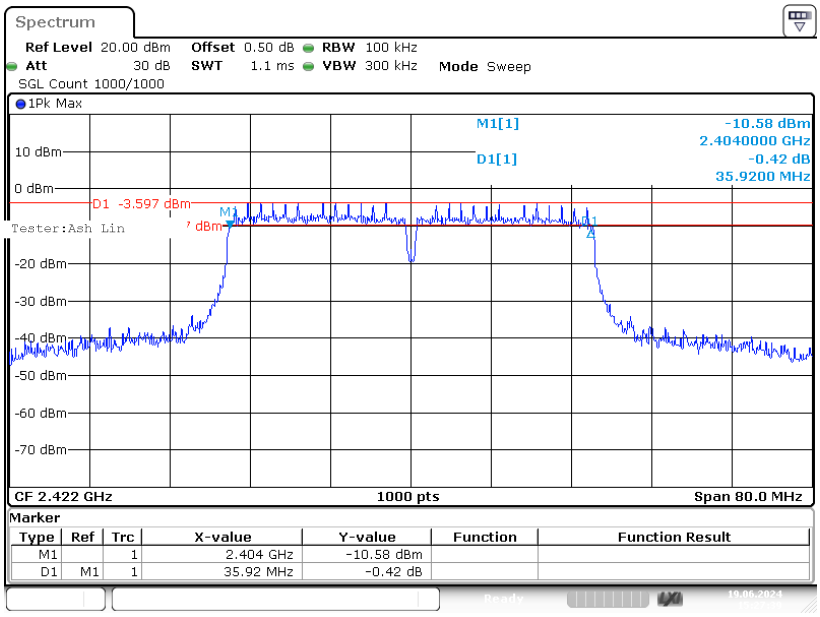
802.11n-ht20 Mode High Channel



ProjectNo.:2407T78483E-RF Tester:Ash Lin

Date: 19.JUN.2024 15:26:34

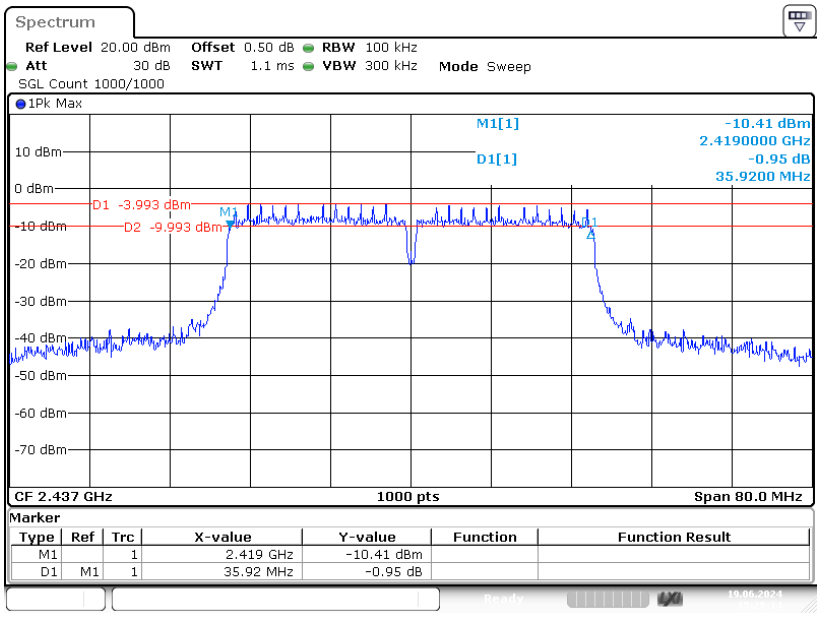
802.11n-ht40 Mode Low Channel



ProjectNo.:2407T78483E-RF Tester:Ash Lin

Date: 19.JUN.2024 15:27:39

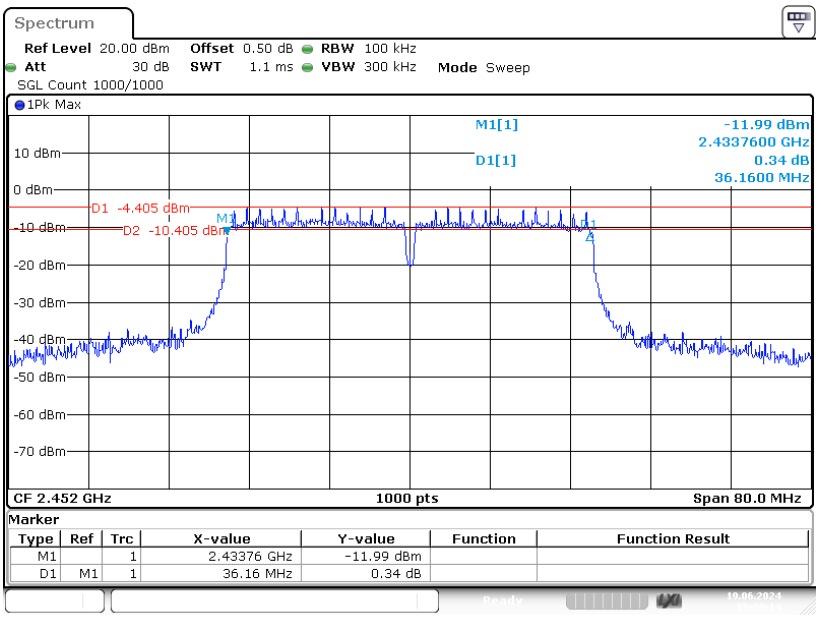
802.11n-ht40 Mode Middle Channel



ProjectNo.:2407T78483E-RF Tester:Ash Lin

Date: 19.JUN.2024 15:28:14

802.11n-ht40 Mode High Channel



ProjectNo.:2407T78483E-RF Tester:Ash Lin

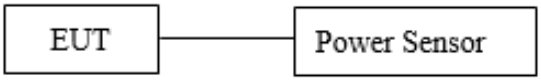
Date: 19.JUN.2024 15:29:14

FCC §15.247(b) (3) - MAXIMUM CONDUCTED OUTPUT POWER

Applicable Standard

According to FCC §15.247(b) (3), for systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

EUT Setup



Test Procedure

According to ANSI C63.10-2013 11.9.2.3.1 Method AVGPM

a) As an alternative to spectrum analyzer or EMI receiver measurements, measurements may be performed using a wideband RF power meter with a thermocouple detector or equivalent if all of the conditions listed below are satisfied:
1) The EUT is configured to transmit continuously, or to transmit with a constant duty cycle.
2) At all times when the EUT is transmitting, it shall be transmitting at its maximum power control level.
3) The integration period of the power meter exceeds the repetition period of the transmitted signal by at least a factor of five.
b) If the transmitter does not transmit continuously, measure the duty cycle, D, of the transmitter output signal as described in 11.6.
c) Measure the average power of the transmitter. This measurement is an average over both the ON and OFF periods of the transmitter.
d) Adjust the measurement in dBm by adding [10 log (1 / D)], where D is the duty cycle.

Test Data

Test Mode:	Transmitting	**Test Engineer:**	Ash Lin
Test Date:	2024-06-19	**Test Voltage:**	AC 120V/60Hz
Test Result:	Compliance	**Environment:**	Temp.: 23.7℃ Humi.: 59% Atm.:100.5kPa

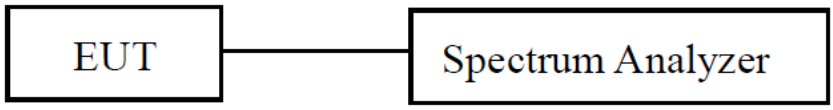
Test Modes	**Test Frequency (MHz)**	**Maximum Conducted Average Output Power (dBm)**	**Duty Factor (dB)**	**Result (dBm)**	**Limit (dBm)**
802.11b	2412	15.13	0	15.13	30
	2437	14.53	0	14.53	30
	2462	13.94	0	13.94	30
802.11g	2412	10	0.23	10.23	30
	2437	9.41	0.23	9.64	30
	2462	8.82	0.23	9.05	30
802.11n HT20	2412	10.11	0.18	10.29	30
	2437	9.49	0.18	9.67	30
	2462	8.87	0.18	9.05	30
802.11n HT40	2422	9.96	0.45	10.41	30
	2437	9.42	0.45	9.87	30
	2452	9.05	0.45	9.50	30

FCC §15.247(d) – 100 kHz BANDWIDTH OF FREQUENCY BAND EDGE

Applicable Standard

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. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

EUT Setup



Test Procedure

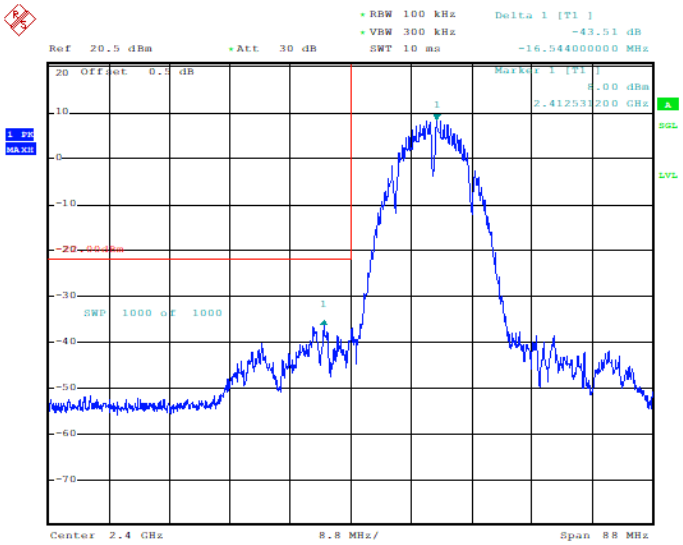
1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set RBW to 100 kHz and VBW of spectrum analyzer to 300 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

Test Data

Test Mode:	Transmitting	**Test Engineer:**	Ash Lin
Test Date:	2024-06-19	**Test Voltage:**	AC 120V/60Hz
Test Result:	Compliance	**Environment:**	Temp.: 23.8℃ Humi.: 56% Atm : 100.8kPa

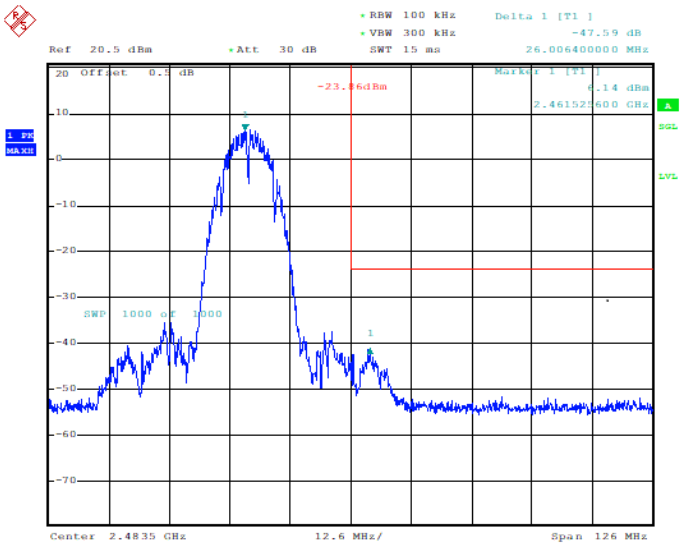
Please refer to below plots:

802.11b Mode Left Side



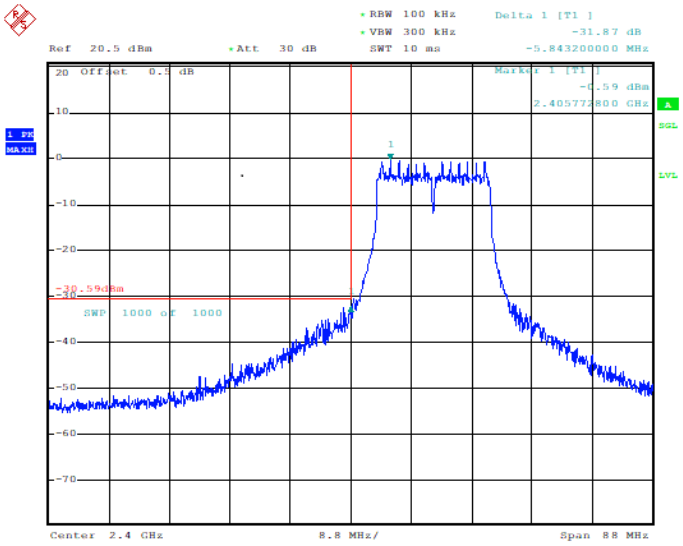
ProjectNo.:2407T78483E-RF Tester:Ash Lin
Date: 19.JUN.2024 20:14:44

802.11b Mode Right Side



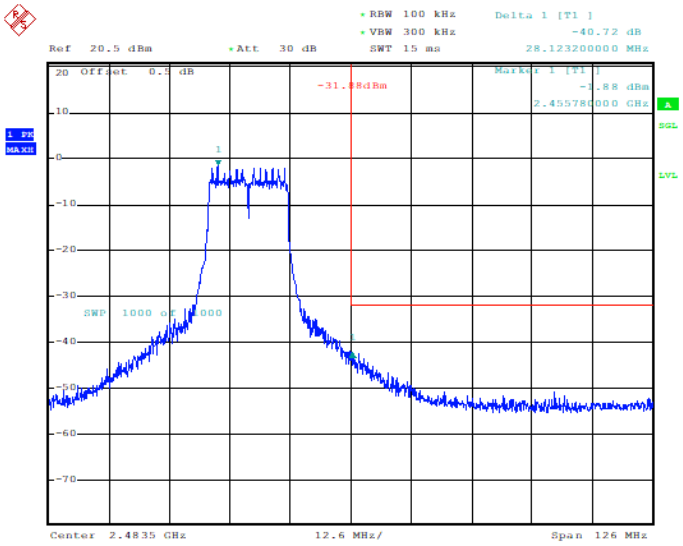
ProjectNo.:2407T78483E-RF Tester:Ash Lin
Date: 19.JUN.2024 20:23:03

802.11g Mode Left Side



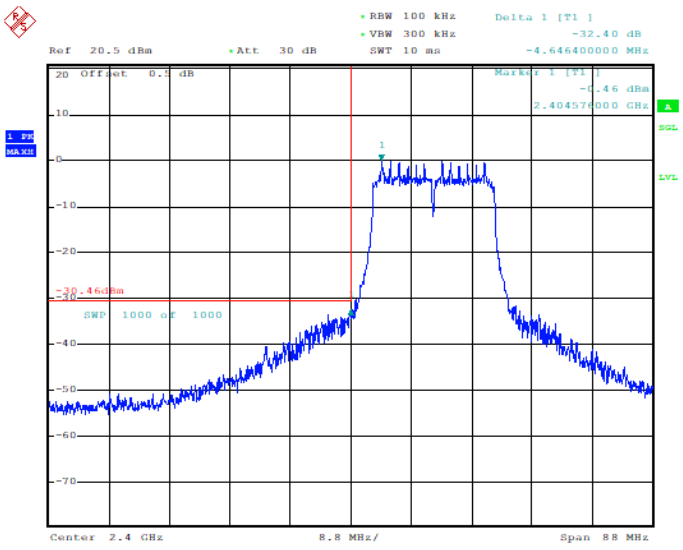
ProjectNo.:2407T78483E-RF Tester:Ash Lin
Date: 19.JUN.2024 20:25:14

802.11g Mode Right Side



ProjectNo.:2407T78483E-RF Tester:Ash Lin
Date: 19.JUN.2024 20:28:49

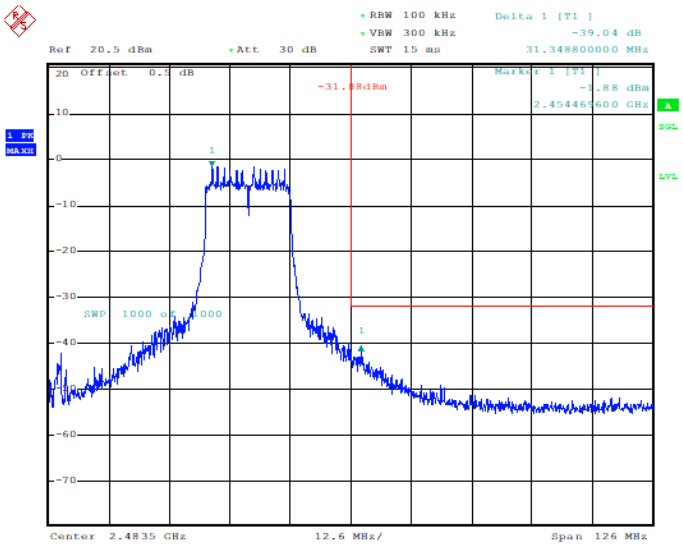
802.11n-ht20 Mode Left Side



ProjectNo.:2407T78483E-RF Tester:Ash Lin

Date: 19.JUN.2024 20:30:39

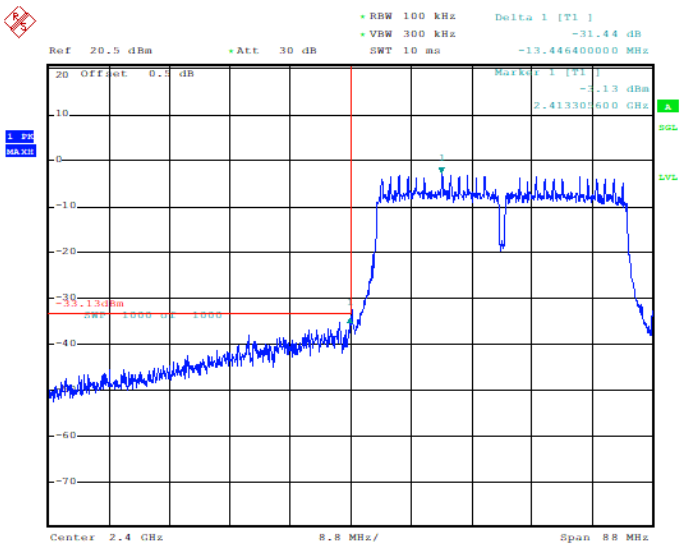
802.11n-ht20 Mode Right Side



ProjectNo.:2407T78483E-RF Tester:Ash Lin

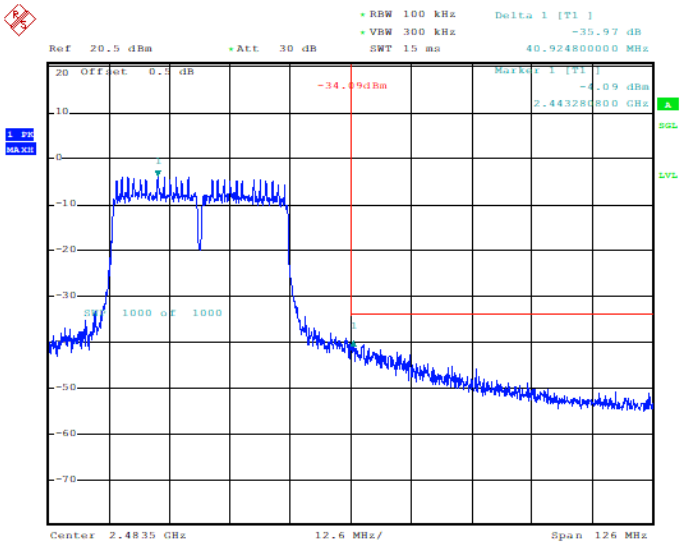
Date: 19.JUN.2024 20:32:30

802.11n-ht40 Mode Left Side



ProjectNo.:2407T78483E-RF Tester:Ash Lin
Date: 19.JUN.2024 20:34:24

802.11n-ht40 Mode Right Side



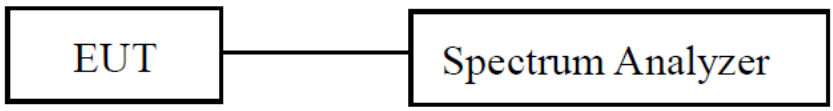
ProjectNo.:2407T78483E-RF Tester:Ash Lin
Date: 19.JUN.2024 20:36:24

FCC §15.247(e) - POWER SPECTRAL DENSITY

Applicable Standard

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

EUT Setup



Test Procedure

1. Use this procedure when the maximum peak conducted output power in the fundamental emission is used to demonstrate compliance.
2. Set the RBW to: 3kHz≤ RBW≤100 kHz.
3. Set the VBW ≥ 3×RBW.
4. Set the span to 1.5 times the DTS bandwidth.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level within the RBW.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

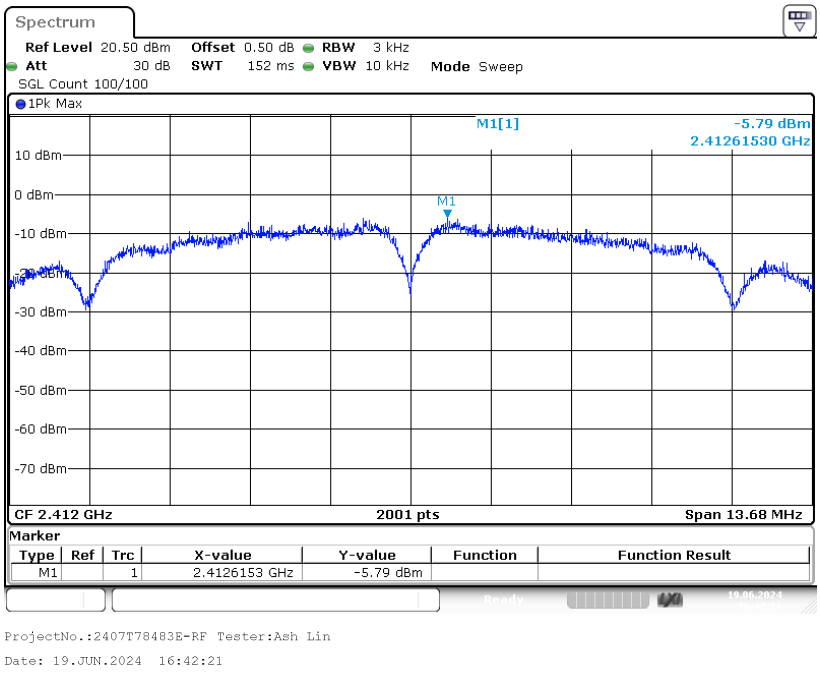
Test Data

Test Mode:	Transmitting	Test Engineer:	Ash Lin
Test Date:	2024-06-19~2024-06-22	Test Voltage:	AC 120V/60Hz
Test Result:	Compliance	Environment:	Temp.: 23.7℃~24.3℃ Humi.: 55%~59% Atm : 100.5 kPa ~101.1kPa

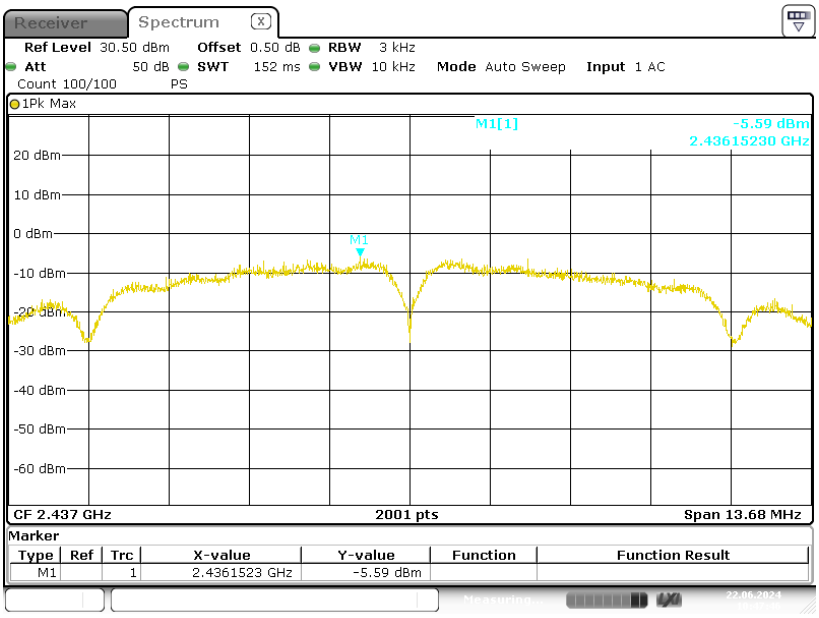
Test Modes	Test Frequency (MHz)	Reading (dBm/3kHz)	Limit (dBm/3kHz)
802.11b	2412	-5.79	8.00
	2437	-5.59	8.00
	2462	-6.85	8.00
802.11g	2412	-13.24	8.00
	2437	-13.79	8.00
	2462	-14.45	8.00
802.11nHT20	2412	-14.45	8.00
	2437	-15.11	8.00
	2462	-15.72	8.00
802.11nHT40	2422	-17.42	8.00
	2437	-17.68	8.00
	2452	-18.15	8.00

Please refer to below plots:

802.11b Mode Low Channel



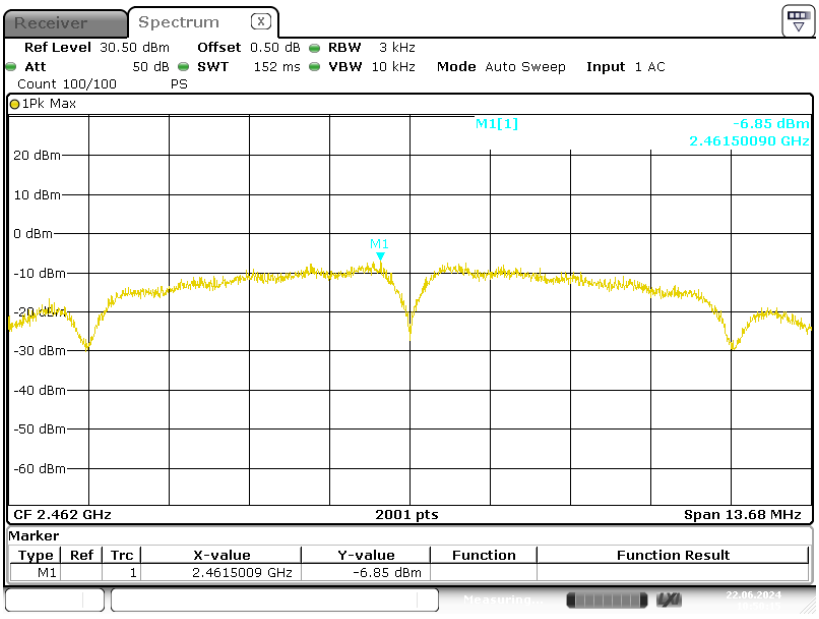
802.11b Mode Middle Channel



Project No. :2407T78483E-RF Tester:Ash Lin

Date: 22.JUN.2024 10:47:46

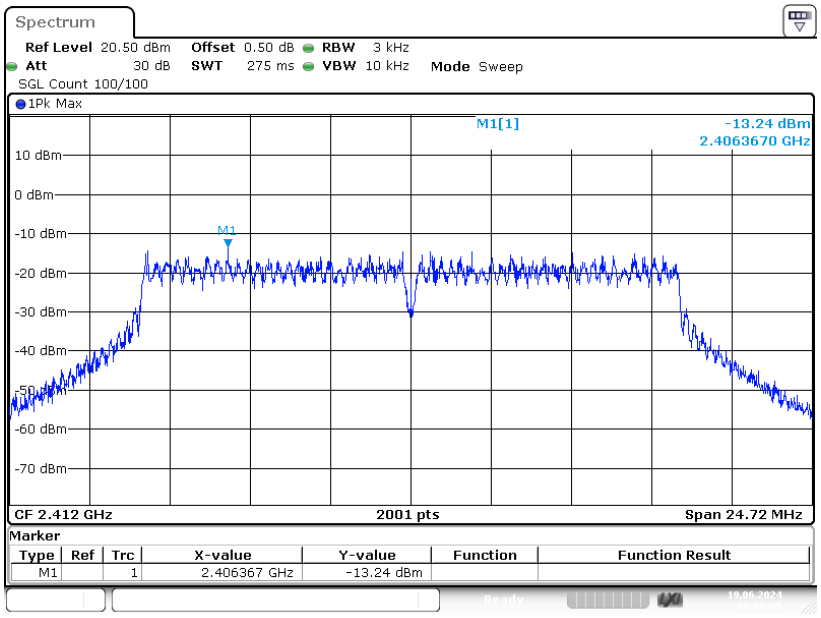
802.11b Mode High Channel



Project No. :2407T78483E-RF Tester:Ash Lin

Date: 22.JUN.2024 10:50:15

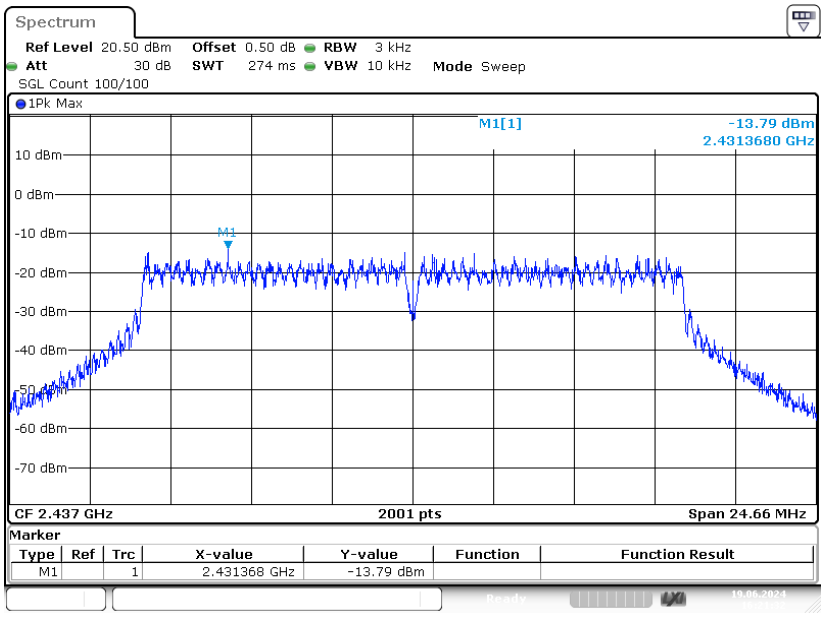
802.11g Mode Low Channel



ProjectNo.:2407T78483E-RF Tester:Ash Lin

Date: 19.JUN.2024 16:20:24

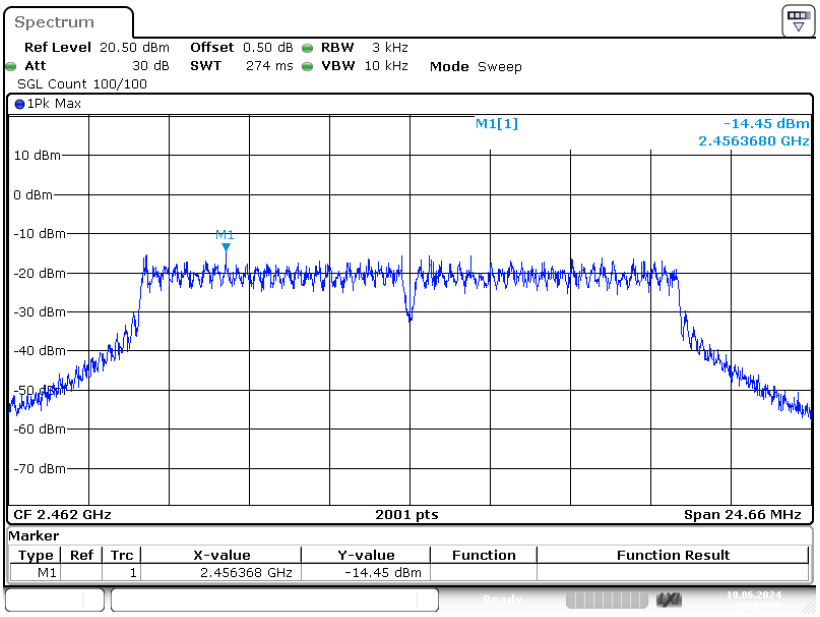
802.11g Mode Middle Channel



ProjectNo.:2407T78483E-RF Tester:Ash Lin

Date: 19.JUN.2024 16:21:32

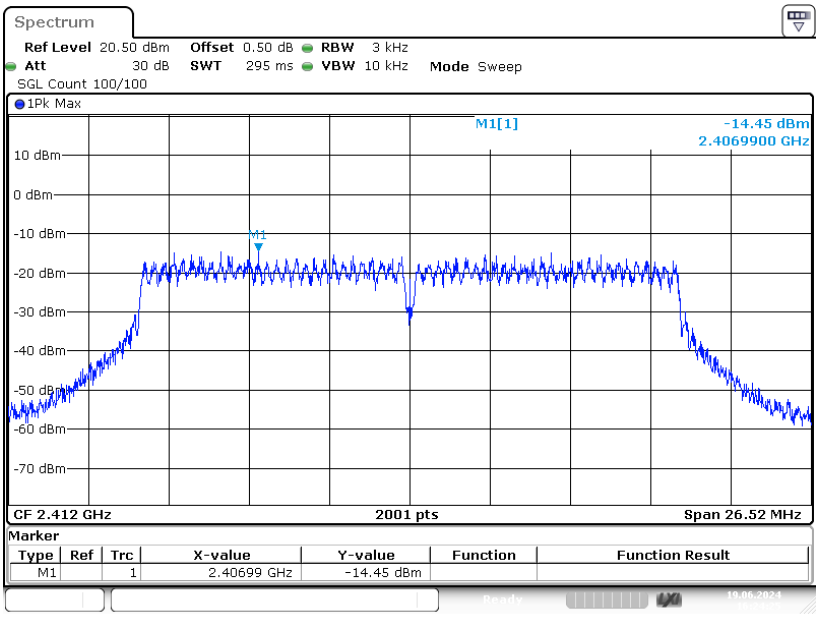
802.11g Mode High Channel



ProjectNo.:2407T78483E-RF Tester:Ash Lin

Date: 19.JUN.2024 16:22:35

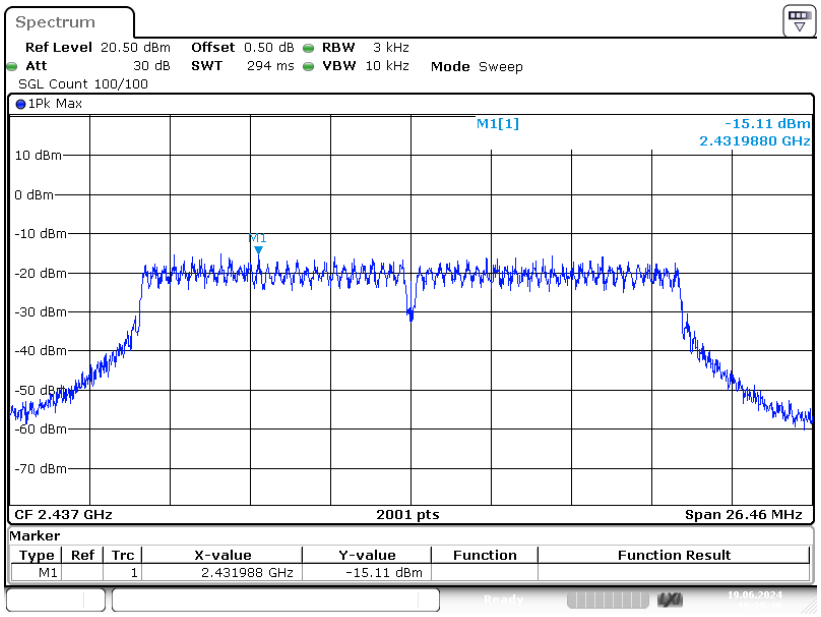
802.11n-ht20 Mode Low Channel



ProjectNo.:2407T78483E-RF Tester:Ash Lin

Date: 19.JUN.2024 16:24:25

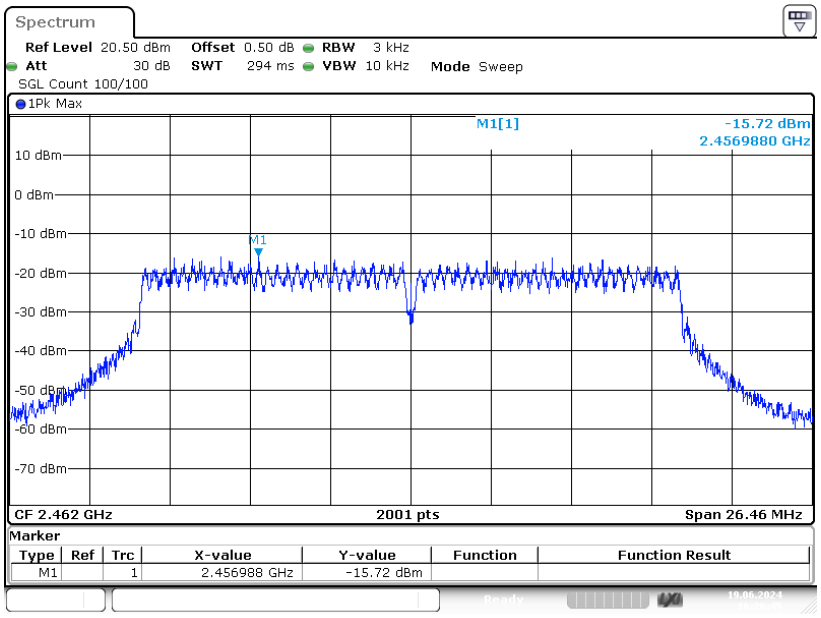
802.11n-ht20 Mode Middle Channel



ProjectNo.:2407T78483E-RF Tester:Ash Lin

Date: 19.JUN.2024 16:25:36

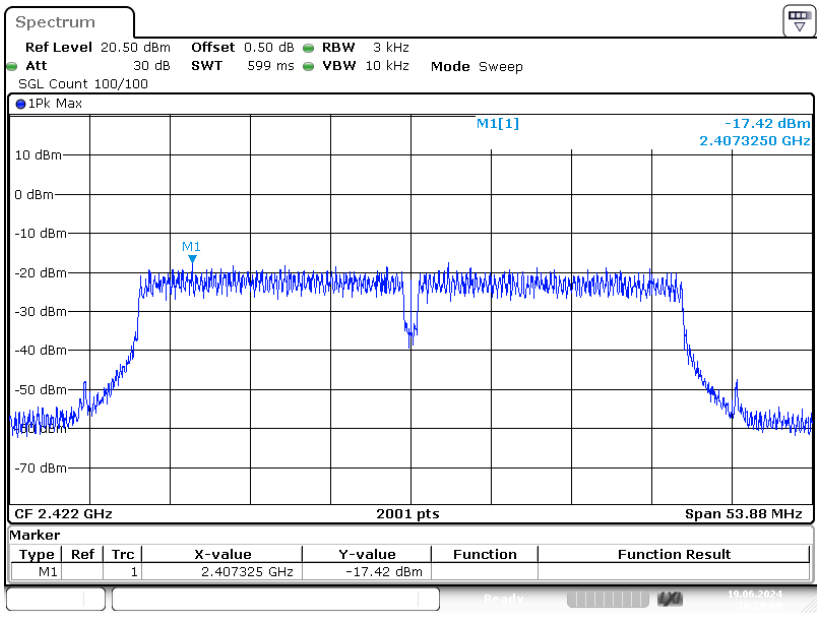
802.11n-ht20 Mode High Channel



ProjectNo.:2407T78483E-RF Tester:Ash Lin

Date: 19.JUN.2024 16:26:45

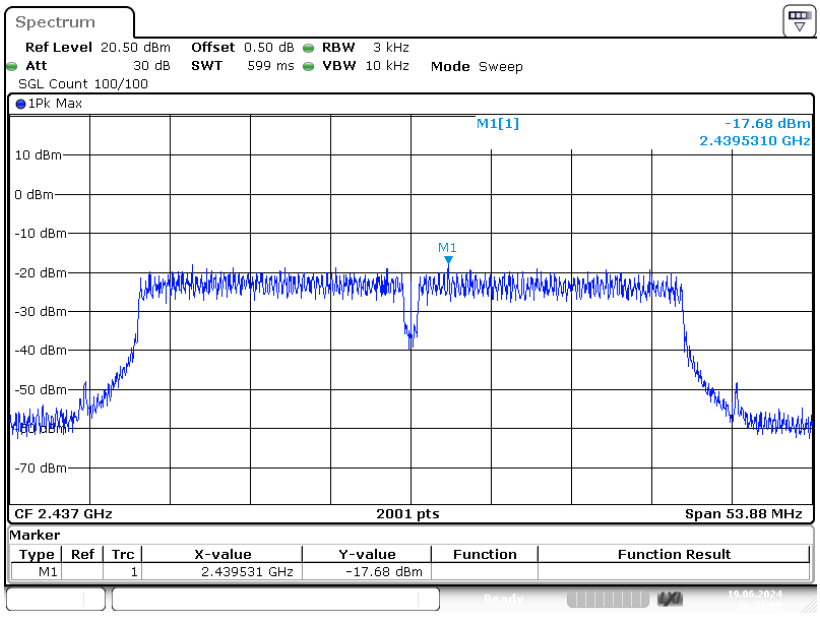
802.11n-ht40 Mode Low Channel



ProjectNo.:2407T78483E-RF Tester:Ash Lin

Date: 19.JUN.2024 16:29:09

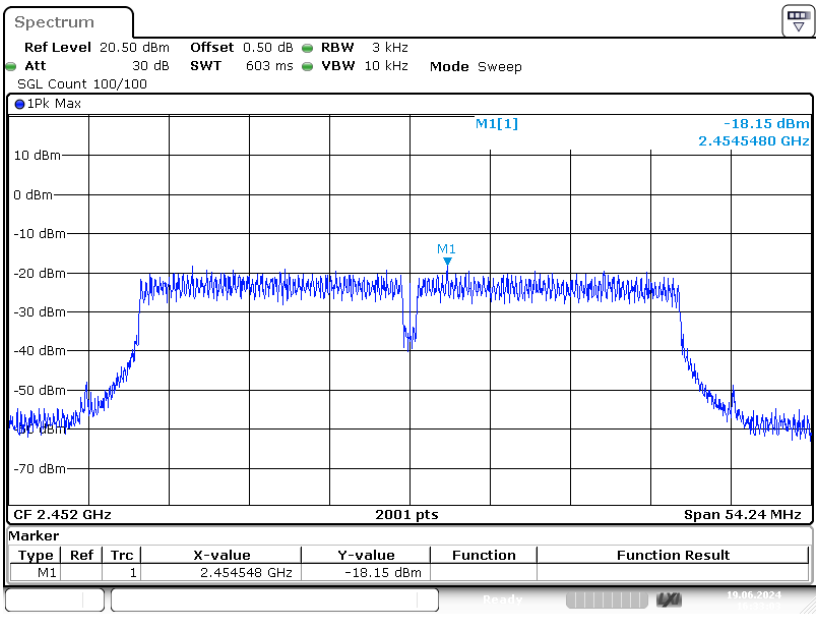
802.11n-ht40 Mode Middle Channel



ProjectNo.:2407T78483E-RF Tester:Ash Lin

Date: 19.JUN.2024 16:31:00

802.11n-ht40 Mode High Channel



ProjectNo.:2407T78483E-RF Tester:Ash Lin

Date: 19.JUN.2024 16:33:04

EUT PHOTOGRAPHS

Please refer to the attachment 2407T78483E-RF-EXP EUT EXTERNAL PHOTOGRAPHS and 2407T78483E-RF-INP EUT INTERNAL PHOTOGRAPHS.

TEST SETUP PHOTOGRAPHS

Please refer to the attachment 2407T78483E-RF-TSP SETUP PHOTOGRAPHS.

Declarations

1. Bay Area Compliance Laboratories Corp. (Xiamen) is not responsible for authenticity of any information provided by the applicant. Information from the applicant that may affect test results are marked with an asterisk "★".

2. Unless otherwise stated, the results shown in this test report refer only to the sample(s) tested.

3. Unless required by the rule provided by the applicant or product regulations, then decision rule in this report did not consider the uncertainty.

4. The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor k=2 with the 95.45% confidence interval.

5. This report cannot be reproduced except in full, without prior written approval of Bay Area Compliance Laboratories Corp. (Xiamen).

6. This report is valid only with a valid digital signature. The digital signature may be available only under the adobe software above version 7.0.

******* END OF REPORT *******