

TEST REPORT

For WiFi-2.4GHz Band

Report No. : CHTEW23090037 Report Verification: 

Project No..... : SHT2308036106EW

FCC ID..... : 2AN9S-ABX00087

Applicant's name..... : Arduino S.r.l.

Address..... : Via Andrea Appiani, 25, 20900 MONZA (Italy)

Product Name : Arduino UNO R4 WiFi

Trade Mark : Arduino

Model No. : ABX00087

Listed Model(s) : -

Standard : FCC CFR Title 47 Part 15 Subpart C § 15.247

Date of receipt of test sample..... : Aug.30, 2023

Date of testing..... : Aug.30, 2023- Sep.21, 2023

Date of issue..... : Sep.22, 2023

Result..... : PASS

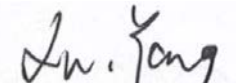
Compiled by
(Position+Printed name+Signature): File administrators Kiki Kong



Supervised by
(Position+Printed name+Signature): Project Engineer Kiki Kong



Approved by
(Position+Printed name+Signature): RF Manager Xu yang



Testing Laboratory Name : Shenzhen Huatongwei International Inspection Co., Ltd.

Address..... : 1/F, Bldg 3, Hongfa Hi-tech Industrial Park, Genyu Road,
Tianliao, Gongming, Shenzhen, China

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1. TEST STANDARDS AND REPORT VERSION

1.1. Test Standards

The tests were performed according to following standards:

- [FCC CFR Title 47 Part 15 Subpart C § 15.247](#): Operation within the bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz
- [ANSI C63.10:2020](#): American National Standard for Testing Unlicensed Wireless Devices
- [KDB 558074 D01 15.247 Meas Guidance v05r02](#): Guidance for Compliance Measurements on Digital Transmission System, Frequency Hopping Spread Spectrum System, and Hybrid System Devices Operating under Section 15.247 of The FCC Rules

1.2. Report version

Revision No.	Date of issue	Description
N/A	2023-09-22	Original

2. TEST DESCRIPTION

Report clause	Test Items	Standard Requirement	Result	Test Engineer
5.1	Antenna Requirement	15.203/15.247(c)	PASS	kongyongshu
5.2	AC Conducted Emission	15.207	PASS	Junman wang
5.3	Peak Output Power	15.247(b)(3)	PASS	kongyongshu
5.4	Power Spectral Density	15.247(e)	PASS	kongyongshu
5.5	6dB Bandwidth	15.247(a)(2)	PASS	kongyongshu
5.6	99% Occupied Bandwidth	-	PASS ^{*1}	kongyongshu
5.7	Duty cycle	-	PASS ^{*1}	kongyongshu
5.8	Conducted Band Edge and Spurious Emission	15.247(d)/15.205	PASS	kongyongshu
5.9	Radiated Band Edge Emission	15.205/15.209	PASS	Yifan Wang
5.10	Radiated Spurious Emission	15.247(d)/15.205/15.209	PASS	Yifan Wang

Note:

- The measurement uncertainty is not included in the test result.
- ^{*1}: No requirement on standard, only report these test data.

3. SUMMARY

3.1. Client Information

Applicant:	Arduino S.r.l.
Address:	Via Andrea Appiani, 25, 20900 MONZA (Italy)
Manufacturer:	Arduino S.r.l.
Address:	Via Andrea Appiani, 25, 20900 MONZA (Italy)

3.2. Product Description

Main unit information:	
Product Name:	Arduino UNO R4 WiFi
Trade Mark:	Arduino
Model No.:	ABX00087
Listed Model(s):	-
Power supply:	DC 5V
Hardware version:	0.3
Software version:	1.0.2

3.3. Radio Specification Description

Support type:	☒ 802.11b	☒ 802.11g	☒ 802.11n
Support bandwidth:	☒ 20MHz	☒ 40MHz	
Modulation:	802.11b:	DBPSK, DQPSK, BPSK, QPSK	
	802.11g/n:	BPSK, QPSK, 16QAM, 64QAM	
Operation frequency:	802.11b/g/n(HT20):	2412MHz~2462MHz	
	802.11n(HT40)	2422MHz~2452MHz	
Channel number:	802.11b/g/n(HT20):	11	
	802.11n(HT40)	7	
Channel separation:	5MHz		
Antenna technology:	☒ SISO	☐ MIMO	
Antenna type:	PCB Antenna		
Antenna gain:	4.54dBi		

3.4. Testing Laboratory Information

Laboratory Name	Shenzhen Huatongwei International Inspection Co., Ltd.	
Laboratory Location	1/F, Bldg 3, Hongfa Hi-tech Industrial Park, Genyu Road, Tianliao, Gongming, Shenzhen, China	
Contact information:	Phone: 86-755-26715499 E-mail: cs@szhtw.com.cn http://www.szhtw.com.cn	
Qualifications	Type	Accreditation Number
	FCC	762235

4. TEST CONFIGURATION

4.1. Test frequency list

According to section 15.31(m), regards to the operating frequency range over 10 MHz, must select three channels which were tested. The Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, please see the below blue front.

802.11b/g/n(HT20)		802.11n(HT40)	
Channel	Frequency (MHz)	Channel	Frequency (MHz)
01	2412	03	2422
02	2417	04	2427
· :	· :	· :	· :
06	2437	06	2437
· :	· :	· :	· :
10	2457	08	2447
11	2462	09	2452

4.2. Test mode

For RF test items
The engineering test program was provided and enabled to make EUT continuous transmit.
For AC power line conducted emissions:
The EUT was set to connect with the WLAN AP under large package sizes transmission.
For Radiated spurious emissions
The engineering test program was provided and enabled to make EUT continuous transmit. The EUT in each of three orthogonal axis emissions had been tested, but only the worst case (X axis) data Recorded in the report.

Preliminary tests were performed in different data rates, final test modes are considering the modulation and worse data rates as below table.

Modulation	Data rate
802.11b	1Mbps
802.11g	6Mbps
802.11n(HT20)	MCS0
802.11n(HT40)	MCS0

4.3. Test sample information

Test item	HTW sample no.
RF Conducted test items	Please refer to the description in the appendix report
RF Radiated test items	YPHT23080361008
EMI test items	YPHT23080361006

Note:

RF Conducted test items: Peak Output Power, Power Spectral Density, 6dB Bandwidth, 99% Occupied Bandwidth, Duty cycle, Conducted Band Edge and Spurious Emission

RF Radiated test items: Radiated Band Edge Emission, Radiated Spurious Emission

EMI test items: AC Conducted Emission

4.4. Support unit used in test configuration and system

The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application.

The following peripheral devices and interface cables were connected during the measurement:

Whether support unit is used?				
✓ Yes				
Item	Equipment	Trade Name	Model No.	Other
1	Laptop	ThinkPad	ThinkPad S3-S440	-
2				

4.5. Testing environmental condition

Type	Requirement	Actual
Temperature:	15~35°C	25°C
Relative Humidity:	25~75%	50%
Air Pressure:	860~1060mbar	1000mbar

4.6. Statement of the measurement uncertainty

No.	Test Items	Measurement Uncertainty
1	AC Conducted Emission	3.21dB
2	Peak Output Power	1.07
3	Power Spectral Density	1.07
4	6dB Bandwidth	0.002%
5	99% Occupied Bandwidth	0.002%
6	Duty cycle	-
7	Conducted Band Edge and Spurious Emission	1.68dB
8	Radiated Band Edge Emission	4.54dB for 30MHz-1GHz 5.10dB for above 1GHz
9	Radiated Spurious Emission	4.54dB for 30MHz-1GHz 5.10dB for above 1GHz

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=1.96.

4.7. Equipment Used during the Test

● RF Conducted test item							
Used	Test Equipment	Manufacturer	Equipment No.	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
●	Signal and spectrum Analyzer	R&S	HTWE0242	FSV40	100048	2023/08/22	2024/08/21
●	Signal & Spectrum Analyzer	R&S	HTWE0262	FSW26	103440	2023/08/22	2024/08/21
●	Vector signal generator	R&S	HTWE0244	SMBV100A	260790	2023/05/23	2024/05/22
●	Test software	Tonscend	N/A	JS1120	N/A	N/A	N/A

● Conducted Emission							
Used	Test Equipment	Manufacturer	Equipment No.	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
●	EMI Test Receiver	R&S	HTWE0111	ESCI	101247	2023/8/22	2024/8/21
●	Artificial Mains	SCHWARZBECK	HTWE0113	NNLK 8121	573	2023/8/18	2024/8/17
●	Protection Network	SCHWARZBECK	HTWE0567	VTSD9561FN	00899	2023/8/18	2024/8/17
●	ISN	FCC	HTWE0148	FCC-TLISN-T2-02	20371	2023/8/18	2024/8/17
●	ISN	FCC	HTWE0150	FCC-TLISN-T8-02	20375	2023/8/18	2024/8/17
●	Test Software	R&S	N/A	EMC32	N/A	N/A	N/A

● Radiated Emission – 9kHz~30MHz							
Used	Test Equipment	Manufacturer	Equipment No.	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
●	Semi-Anechoic Chamber	Albatross projects	HTWE0127	SAC-3m-02	C11121	2023/4/6	2026/4/5
●	EMI Test Receiver	R&S	HTWE0099	ESCI 7	100900	2023/8/22	2024/8/21
●	Loop Antenna	R&S	HTWE0170	HFH2-Z2	100020	2021/4/6	2024/4/5
●	Test Software	R&S	N/A	EMC32	N/A	N/A	N/A

● Radiated Emission - 30MHz~1GHz							
Used	Test Equipment	Manufacturer	Equipment No.	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
●	Semi-Anechoic Chamber	Albatross projects	HTWE0127	SAC-3m-02	C11121	2023/4/6	2026/4/5
●	EMI Test Receiver	R&S	HTWE0099	ESCI 7	100900	2023/8/22	2024/8/21
●	Ultra-Broadband Antenna	SCHWARZBECK	HTWE0119	VULB9163	546	2023/2/22	2026/2/21
●	Pre-Amplifier	SCHWARZBECK	HTWE0295	BBV 9742	/	2023/5/25	2024/5/24
●	Test Software	R&S	N/A	EMC32	N/A	N/A	N/A

● Radiated emission-Above 1GHz

Used	Test Equipment	Manufacturer	Equipment No.	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
●	Semi-Anechoic Chamber	Albatross projects	HTWE0122	SAC-3m-01	C11121	2023/4/17	2026/4/16
●	Spectrum Analyzer	R&S	HTWE0098	FSP40	100597	2023/8/22	2024/8/21
●	Horn Antenna	SCHWARZBECK	HTWE0126	BBHA 9120D	1011	2023/2/14	2026/2/13
●	Horn Antenna	SCHWARZBECK	HTWE0103	BBHA9170	BBHA9170472	2023/2/20	2026/2/19
●	Broadband Pre-amplifier	SCHWARZBECK	HTWE0201	BBV 9718	9718-248	2023/5/25	2024/5/24
●	Test Software	R&S	N/A	EMC32	N/A	N/A	N/A

5. TEST CONDITIONS AND RESULTS

5.1. Antenna Requirement

REQUIREMENT

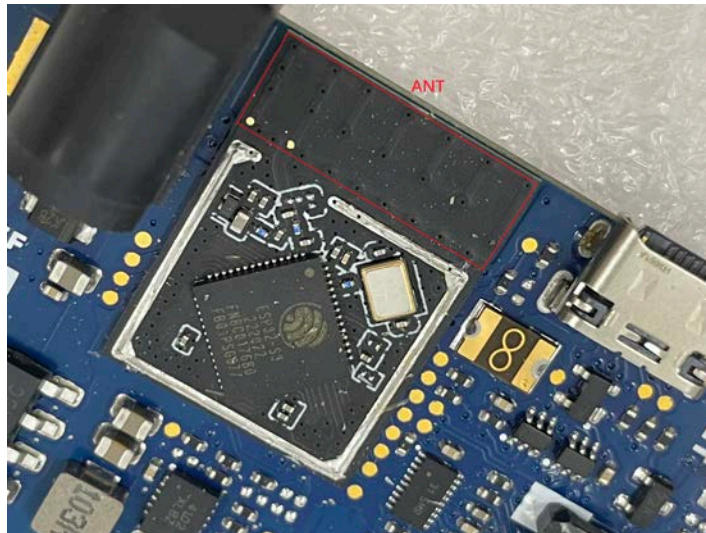
FCC CFR Title 47 Part 15 Subpart C Section 15.203:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

TEST RESULT

☒ **Passed** ☐ **Not Applicable**

The antenna type is a PCB antenna, please refer to the below antenna photo.



5.2. AC Conducted Emission

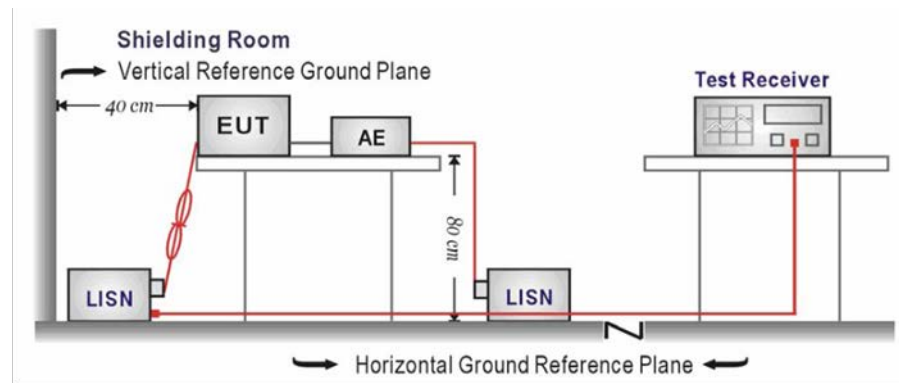
LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.207

Frequency range (MHz)	Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

TEST CONFIGURATION



TEST PROCEDURE

1. The EUT was setup according to ANSI C63.10 requirements.
2. The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm from any other grounded conducting surface.
3. The EUT and simulators are connected to the main power through a line impedances stabilization network (LISN). The LISN provides a 50 ohm /50uH coupling impedance for the measuring equipment.
4. The peripheral devices are also connected to the main power through a LISN. (Please refer to the block diagram of the test setup and photographs)
5. Each current-carrying conductor of the EUT power cord, except the ground (safety) conductor, was individually connected through a LISN to the input power source.
6. The excess length of the power cord between the EUT and the LISN receptacle were folded back and forth at the center of the lead to form a bundle not exceeding 40 cm in length.
7. Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9 kHz.
8. During the above scans, the emissions were maximized by cable manipulation.

TEST MODE

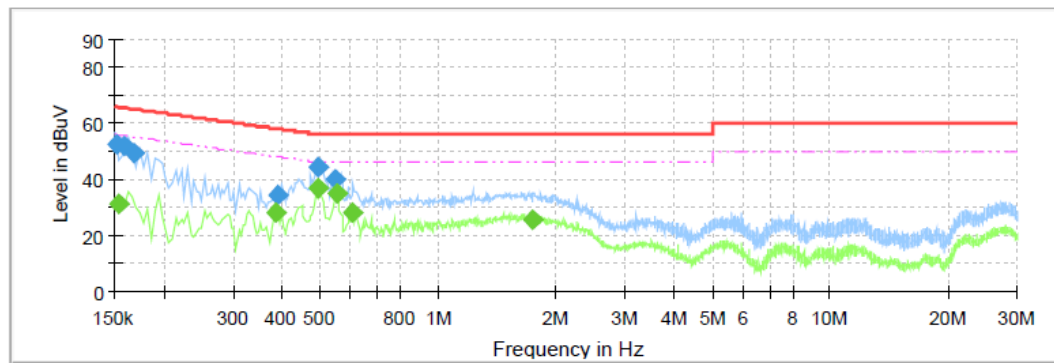
Refer to the clause 4.2

TEST RESULT

☒ Passed ☐ Not Applicable

Test Line:

L

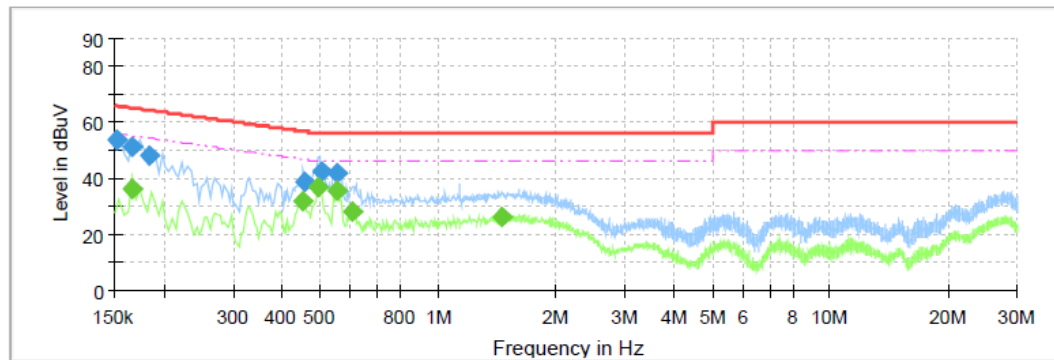


Final Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Corr. (dB)
0.1515	52.22	---	65.92	13.69	L1	10.0
0.1540	---	31.37	55.78	24.41	L1	10.0
0.1580	51.63	---	65.57	13.94	L1	10.0
0.1675	49.30	---	65.08	15.79	L1	10.0
0.3875	---	28.19	48.12	19.93	L1	10.0
0.3915	34.30	---	58.03	23.73	L1	10.0
0.4955	44.31	---	56.08	11.77	L1	10.0
0.4955	---	36.77	46.08	9.31	L1	10.0
0.5475	39.77	---	56.00	16.23	L1	10.0
0.5515	---	34.96	46.00	11.04	L1	10.0
0.6075	---	28.14	46.00	17.86	L1	10.0
1.7395	---	25.90	46.00	20.10	L1	10.0

Test Line:

N



Final Result

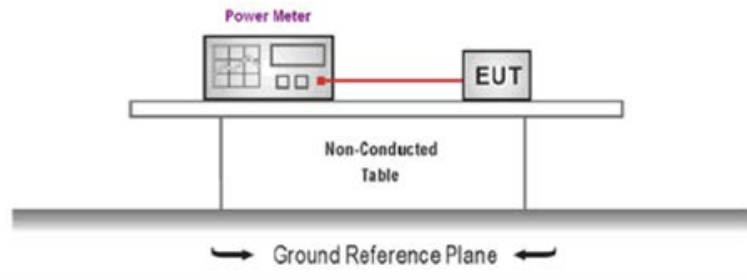
Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Corr. (dB)
0.1515	53.83	---	65.92	12.09	N	10.0
0.1660	---	36.07	55.16	19.08	N	10.0
0.1660	51.19	---	65.16	13.97	N	10.0
0.1835	48.44	---	64.33	15.89	N	10.0
0.4515	---	32.03	46.85	14.82	N	10.0
0.4555	38.46	---	56.77	18.31	N	10.0
0.4955	---	37.10	46.08	8.98	N	10.0
0.5035	42.31	---	56.00	13.69	N	10.0
0.5515	---	35.56	46.00	10.44	N	10.0
0.5515	41.64	---	56.00	14.36	N	10.0
0.6075	---	28.37	46.00	17.63	N	10.0
1.4475	---	26.47	46.00	19.53	N	10.0

5.3. Peak Output Power

LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (b)(3): 30dBm

TEST CONFIGURATION



TEST PROCEDURE

1. The EUT was tested according to ANSI C63.10 and KDB 558074 D01 requirements.
2. The maximum peak conducted output power may be measured using a broadband peak RF power meter.
3. The power meter shall have a video bandwidth that is greater than or equal to the DTS bandwidth and shall utilize a fast-responding diode detector.
4. Record the measurement data.

TEST MODE

Refer to the clause 4.2

TEST RESULT

☒ Passed ☐ Not Applicable

TEST DATA

Refer to the appendix report

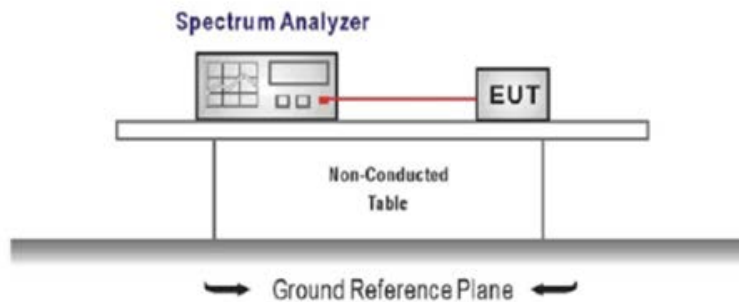
5.4. Power Spectral Density

LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (e):

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3 kHz band during any time interval of continuous transmission.

TEST CONFIGURATION



TEST PROCEDURE

1. Connect the antenna port(s) to the spectrum analyzer input,
2. Configure the spectrum analyzer as shown below:
Center frequency=DTS channel center frequency
Span =1.5 times the DTS bandwidth
 $RBW = 3 \text{ kHz} \leq RBW \leq 100 \text{ kHz}$, $VBW \geq 3 \times RBW$
Sweep time = auto couple
Detector = peak
Trace mode = max hold
3. Place the radio in continuous transmit mode, allow the trace to stabilize, view the transmitter wave form on the spectrum analyzer.
4. Use the peak marker function to determine the maximum amplitude level within the RBW.
5. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

TEST MODE

Refer to the clause 4.2

TEST RESULT

☒ Passed ☐ Not Applicable

TEST DATA

Refer to the appendix report

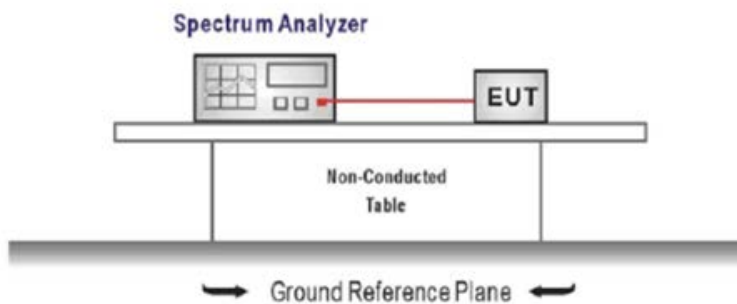
5.5. 6dB bandwidth

LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (a)(2):

For digital modulation systems, the minimum 6 dB bandwidth shall be at least 500 kHz.

TEST CONFIGURATION



TEST PROCEDURE

1. Connect the antenna port(s) to the spectrum analyzer input.
2. Configure the spectrum analyzer as shown below (enter all losses between the transmitter output and the spectrum analyzer).
Center Frequency = DTS channel center frequency
Span = 2 x DTS bandwidth
RBW = 100 kHz, VBW ≥ 3 × RBW
Sweep time = auto couple
Detector = Peak
Trace mode = max hold
3. Place the radio in continuous transmit mode, allow the trace to stabilize, view the transmitter waveform on the spectrum analyzer.
4. 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, and record the pertinent measurements.

TEST MODE

Refer to the clause 4.2

TEST RESULT

☒ Passed ☐ Not Applicable

TEST DATA

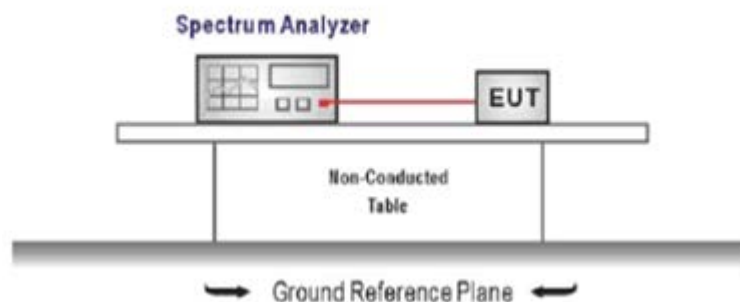
Refer to the appendix report

5.6. 99% Occupied Bandwidth

LIMIT

N/A

TEST CONFIGURATION



TEST PROCEDURE

1. Connect the antenna port(s) to the spectrum analyzer input.
2. Configure the spectrum analyzer as shown below (enter all losses between the transmitter output and the spectrum analyzer).
Center Frequency = channel center frequency
Span $\geq 1.5 \times \text{OBW}$
RBW = 1%~5%OBW
VBW $\geq 3 \times \text{RBW}$
Sweep time = auto couple
Detector = Peak
Trace mode = max hold
3. Place the radio in continuous transmit mode, allow the trace to stabilize, view the transmitter waveform on the spectrum analyzer.

TEST MODE

Refer to the clause 4.2

TEST RESULT

☒ Passed ☐ Not Applicable

TEST DATA

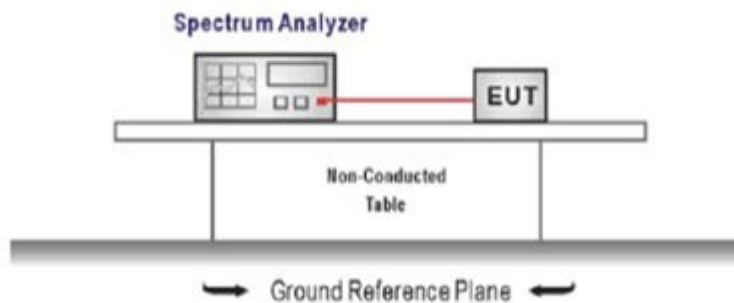
Refer to the appendix report

5.7. Duty Cycle

LIMIT

N/A

TEST CONFIGURATION



TEST PROCEDURE

1. The transmitter output was connected to the spectrum analyzer through an attenuator, the path loss was compensated to the results for each measurement.
2. Set to the maximum power setting and enable the EUT transmit continuously
3. Use the following spectrum analyzer settings:
Span=zero span, Frequency=centered channel, RBW= 1 MHz, VBW $\geq$ RBW
Sweep=as necessary to capture the entire dwell time,
Detector function = peak, Trigger mode
4. Measure and record the duty cycle data

TEST MODE

Refer to the clause 4.2

TEST DATA

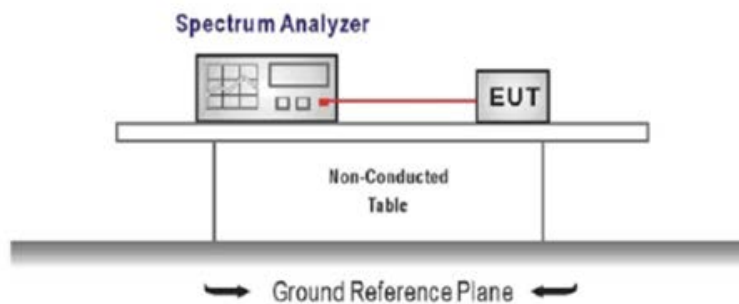
Refer to the appendix report

5.8. Conducted Band edge and Spurious Emission

LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (d): In any 100 kHz bandwidth outside the frequency band in which the spread spectrum 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.

TEST CONFIGURATION



TEST PROCEDURE

1. Connect the antenna port(s) to the spectrum analyzer input.
2. Establish a reference level by using the following procedure
Center frequency=DTS channel center frequency
The span = 1.5 times the DTS bandwidth.
RBW = 100 kHz, VBW $\geq 3 \times$ RBW
Detector = peak, Sweep time = auto couple, Trace mode = max hold
Allow trace to fully stabilize
Use the peak marker function to determine the maximum PSD level

Note that the channel found to contain the maximum PSD level can be used to establish the reference level.

3. Emission level measurement
Set the center frequency and span to encompass frequency range to be measured
RBW = 100 kHz, VBW $\geq 3 \times$ RBW
Detector = peak, Sweep time = auto couple, Trace mode = max hold
Allow trace to fully stabilize
Use the peak marker function to determine the maximum amplitude level.
4. Place the radio in continuous transmit mode, allow the trace to stabilize, view the transmitter waveform on the spectrum analyzer.
5. Ensure that the amplitude of all unwanted emission outside of the authorized frequency band excluding restricted frequency bands) are attenuated by at least the minimum requirements specified (at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz). Report the three highest emission relative to the limit.

TEST MODE

Refer to the clause 4.2

TEST RESULT

☒ **Passed** ☐ **Not Applicable**

TEST DATA

Refer to the appendix report

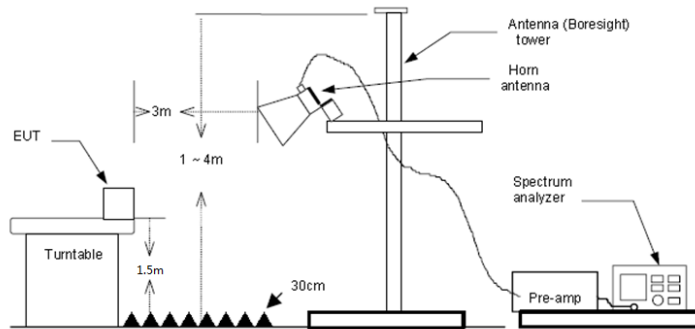
5.9. Radiated Band edge Emission

LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (d):

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, Radiated Emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the Radiated Emissions limits specified in §15.209(a) (see §15.205(c)).

TEST CONFIGURATION



TEST PROCEDURE

1. The EUT was setup and tested according to ANSI C63.10 .
2. The EUT is placed on a turn table which is 1.5 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level.
3. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.
4. The antenna is scanned from 1 meter to 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10 on radiated measurement.
5. Use the following spectrum analyzer settings:
 - a) Span shall wide enough to fully capture the emission being measured
 - b) Set RBW=100kHz for <1GHz, VBW=3*RBW, Sweep time=auto, Detector=peak, Trace=max hold
 - c) Set RBW=1MHz, VBW=3MHz for >1GHz, Sweep time=auto, Detector=peak, Trace=max hold for Peak measurement

For average measurement:

 - VBW=10Hz, When duty cycle is no less than 98 percent
 - VBW $\geq 1/T$, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation, so refer to this clause 5.7 duty cycle.

TEST MODE

Refer to the clause 4.2

TEST RESULT

☒ Passed ☐ Not Applicable

Note:

- 1) Level= Reading + Factor; Factor =Antenna Factor+ Cable Loss- Preamp Factor
- 2) Over Limit = Level– Limit
- 3) Average measurement was not performed if peak level is lower than average limit(54 dBuV/m).

Type	802.11b		Test channel		CH01		Polarity		Horizontal	
Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Aux dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark
1	2310.00	38.68	27.86	4.01	37.55	20.00	53.00	74.00	-21.00	Peak
2	2390.01	39.03	27.54	4.31	37.55	20.00	53.33	74.00	-20.67	Peak
Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Aux dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark
1	2310.00	31.80	27.86	4.01	37.55	20.00	46.12	54.00	-7.88	Average
2	2390.01	32.88	27.54	4.31	37.55	20.00	47.18	54.00	-6.82	Average
Type	802.11b		Test channel		CH01		Polarity		Vertical	
Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Aux dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark
1	2310.00	38.23	27.86	4.01	37.55	20.00	52.55	74.00	-21.45	Peak
2	2390.01	38.99	27.54	4.31	37.55	20.00	53.29	74.00	-20.71	Peak
Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Aux dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark
1	2310.00	31.66	27.86	4.01	37.55	20.00	45.98	54.00	-8.02	Average
2	2390.01	31.94	27.54	4.31	37.55	20.00	46.24	54.00	-7.76	Average

Type	802.11b		Test channel		CH11		Polarity		Horizontal	
Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Aux dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark
1	2483.49	39.62	27.33	4.18	37.64	20.00	53.49	74.00	-20.51	Peak
2	2500.00	38.30	27.30	4.19	37.67	20.00	52.12	74.00	-21.88	Peak
Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Aux dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark
1	2483.49	31.98	27.33	4.18	37.64	20.00	45.85	54.00	-8.15	Average
2	2500.00	31.72	27.30	4.19	37.67	20.00	45.54	54.00	-8.46	Average
Type	802.11b		Test channel		CH11		Polarity		Vertical	
Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Aux dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark
1	2483.49	38.74	27.33	4.18	37.64	20.00	52.61	74.00	-21.39	Peak
2	2500.00	38.95	27.30	4.19	37.67	20.00	52.77	74.00	-21.23	Peak
Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Aux dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark
1	2483.49	31.73	27.33	4.18	37.64	20.00	45.60	54.00	-8.40	Average
2	2500.00	31.37	27.30	4.19	37.67	20.00	45.19	54.00	-8.81	Average

Type	802.11g		Test channel		CH01		Polarity		Horizontal	
Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Aux dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark
1	2310.00	38.93	27.86	4.01	37.55	20.00	53.25	74.00	-20.75	Peak
2	2390.01	56.31	27.54	4.31	37.55	20.00	70.61	74.00	-3.39	Peak
Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Aux dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark
1	2310.00	31.65	27.86	4.01	37.55	20.00	45.97	54.00	-8.03	Average
2	2390.01	35.28	27.54	4.31	37.55	20.00	49.58	54.00	-4.42	Average
Type	802.11g		Test channel		CH01		Polarity		Vertical	
Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Aux dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark
1	2310.00	40.65	27.86	4.01	37.55	20.00	54.97	74.00	-19.03	Peak
2	2390.01	45.18	27.54	4.31	37.55	20.00	59.48	74.00	-14.52	Peak
Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Aux dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark
1	2310.00	31.56	27.86	4.01	37.55	20.00	45.88	54.00	-8.12	Average
2	2390.01	33.82	27.54	4.31	37.55	20.00	48.12	54.00	-5.88	Average

Type	802.11g		Test channel		CH11		Polarity		Horizontal	
Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Aux dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark
1	2483.49	53.31	27.33	4.18	37.64	20.00	67.18	74.00	-6.82	Peak
2	2483.96	55.86	27.33	4.18	37.64	20.00	69.73	74.00	-4.27	Peak
3	2500.00	42.50	27.30	4.19	37.67	20.00	56.32	74.00	-17.68	Peak
Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Aux dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark
1	2483.49	36.35	27.33	4.18	37.64	20.00	50.22	54.00	-3.78	Average
2	2500.00	32.91	27.30	4.19	37.67	20.00	46.73	54.00	-7.27	Average
Type	802.11g		Test channel		CH11		Polarity		Vertical	
Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Aux dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark
1	2483.49	42.64	27.33	4.18	37.64	20.00	56.51	74.00	-17.49	Peak
2	2500.00	37.88	27.30	4.19	37.67	20.00	51.70	74.00	-22.30	Peak
Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Aux dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark
1	2483.49	33.15	27.33	4.18	37.64	20.00	47.02	54.00	-6.98	Average
2	2500.00	31.67	27.30	4.19	37.67	20.00	45.49	54.00	-8.51	Average

Type	802.11n(HT20)		Test channel	CH01	Polarity		Horizontal			
Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Aux dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark
1	2310.00	40.32	27.86	4.01	37.55	20.00	54.64	74.00	-19.36	Peak
2	2390.01	46.20	27.54	4.31	37.55	20.00	60.50	74.00	-13.50	Peak
Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Aux dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark
1	2310.00	31.49	27.86	4.01	37.55	20.00	45.81	54.00	-8.19	Average
2	2390.01	35.31	27.54	4.31	37.55	20.00	49.61	54.00	-4.39	Average
Type	802.11n(HT20)		Test channel	CH01	Polarity		Vertical			
Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Aux dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark
1	2310.00	40.38	27.86	4.01	37.55	20.00	54.70	74.00	-19.30	Peak
2	2390.01	42.32	27.54	4.31	37.55	20.00	56.62	74.00	-17.38	Peak
Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Aux dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark
1	2310.00	31.46	27.86	4.01	37.55	20.00	45.78	54.00	-8.22	Average
2	2390.01	32.65	27.54	4.31	37.55	20.00	46.95	54.00	-7.05	Average

Type	802.11n(HT20)		Test channel	CH11	Polarity		Horizontal			
Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Aux dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark
1	2483.49	43.76	27.33	4.18	37.64	20.00	57.63	74.00	-16.37	Peak
2	2500.00	40.85	27.30	4.19	37.67	20.00	54.67	74.00	-19.33	Peak
Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Aux dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark
1	2483.49	33.77	27.33	4.18	37.64	20.00	47.64	54.00	-6.36	Average
2	2500.00	31.64	27.30	4.19	37.67	20.00	45.46	54.00	-8.54	Average
Type	802.11n(HT20)		Test channel	CH11	Polarity		Vertical			
Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Aux dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark
1	2483.49	40.89	27.33	4.18	37.64	20.00	54.76	74.00	-19.24	Peak
2	2500.00	39.97	27.30	4.19	37.67	20.00	53.79	74.00	-20.21	Peak
Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Aux dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark
1	2483.49	31.88	27.33	4.18	37.64	20.00	45.75	54.00	-8.25	Average
2	2500.00	31.31	27.30	4.19	37.67	20.00	45.13	54.00	-8.87	Average

Type	802.11n(HT40)		Test channel		CH03		Polarity		Horizontal	
Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Aux dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark
1	2310.00	41.08	27.86	4.01	37.55	20.00	55.40	74.00	-18.60	Peak
2	2389.99	47.34	27.54	4.31	37.55	20.00	61.64	74.00	-12.36	Peak
Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Aux dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark
1	2310.00	28.65	27.86	4.01	37.55	20.00	42.97	54.00	-11.03	Average
2	2389.99	36.41	27.54	4.31	37.55	20.00	50.71	54.00	-3.29	Average
Type	802.11n(HT40)		Test channel		CH03		Polarity		Vertical	
Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Aux dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark
1	2310.00	39.48	27.86	4.01	37.55	20.00	53.80	74.00	-20.20	Peak
2	2389.99	41.43	27.54	4.31	37.55	20.00	55.73	74.00	-18.27	Peak
Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Aux dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark
1	2310.00	28.46	27.86	4.01	37.55	20.00	42.78	54.00	-11.22	Average
2	2389.99	30.48	27.54	4.31	37.55	20.00	44.78	54.00	-9.22	Average

Type	802.11n(HT40)		Test channel		CH09		Polarity		Horizontal	
Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Aux dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark
1	2483.50	42.95	27.33	4.18	37.64	20.00	56.82	74.00	-17.18	Peak
2	2500.00	41.37	27.30	4.19	37.67	20.00	55.19	74.00	-18.81	Peak
Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Aux dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark
1	2483.50	33.05	27.33	4.18	37.64	20.00	46.92	54.00	-7.08	Average
2	2500.00	30.20	27.30	4.19	37.67	20.00	44.02	54.00	-9.98	Average
Type	802.11n(HT40)		Test channel		CH09		Polarity		Vertical	
Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Aux dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark
1	2483.50	41.16	27.33	4.18	37.64	20.00	55.03	74.00	-18.97	Peak
2	2500.00	40.13	27.30	4.19	37.67	20.00	53.95	74.00	-20.05	Peak
Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Aux dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark
1	2483.50	29.11	27.33	4.18	37.64	20.00	42.98	54.00	-11.02	Average
2	2500.00	28.63	27.30	4.19	37.67	20.00	42.45	54.00	-11.55	Average

5.10. Radiated Spurious Emission

LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.209

Frequency	Limit (dBuV/m)	Value
0.009 MHz ~0.49 MHz	2400/F(kHz) @300m	Quasi-peak
0.49 MHz ~ 1.705 MHz	24000/F(kHz) @30m	Quasi-peak
1.705 MHz ~30 MHz	30 @30m	Quasi-peak

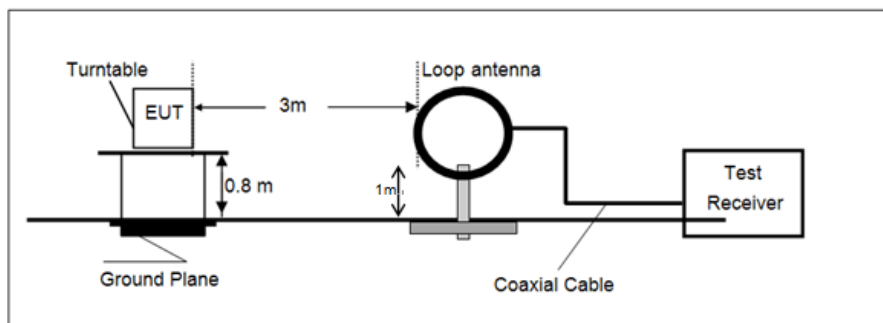
Note: Limit dBuV/m @3m = Limit dBuV/m @300m + $40 \cdot \log(300/3)$ = Limit dBuV/m @300m +80,

Limit dBuV/m @3m = Limit dBuV/m @30m + $40 \cdot \log(30/3)$ = Limit dBuV/m @30m + 40.

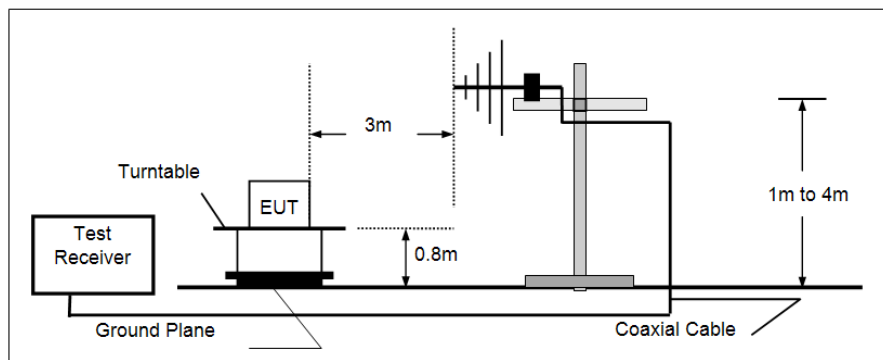
Frequency	Limit (dBuV/m @3m)	Value
30MHz~88MHz	40.00	Quasi-peak
88MHz~216MHz	43.50	Quasi-peak
216MHz~960MHz	46.00	Quasi-peak
960MHz~1GHz	54.00	Quasi-peak
Above 1GHz	54.00	Average
	74.00	Peak

TEST CONFIGURATION

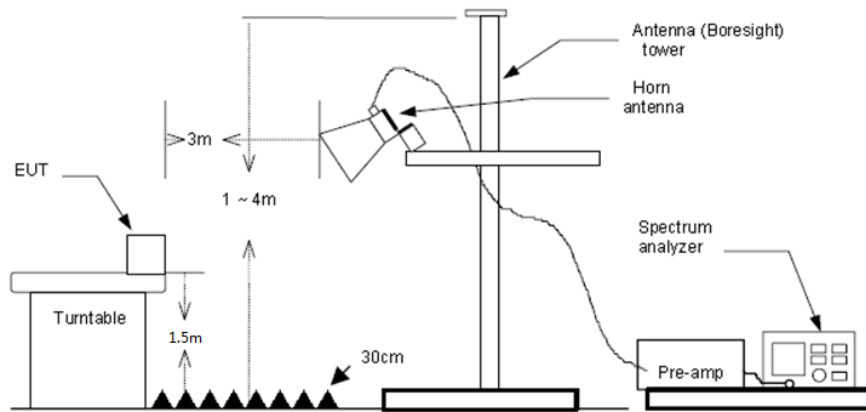
- 9 kHz ~ 30 MHz



- 30 MHz ~ 1 GHz



- Above 1 GHz



TEST PROCEDURE

1. The EUT was setup and tested according to ANSI C63.10 .
2. The EUT is placed on a turn table which is 0.8 meter above ground for below 1 GHz, and 1.5 m for above 1 GHz. The turn table is rotated 360 degrees to determine the position of the maximum emission level.
3. The EUT was set 3 meters from the receiving antenna, which was mounted on the top of a variable height antenna tower.
4. For each suspected emission, the EUT was arranged to its worst case and then tune the Antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level to comply with the guidelines.
5. Set to the maximum power setting and enable the EUT transmit continuously.
6. Use the following spectrum analyzer settings
 - a) Span shall wide enough to fully capture the emission being measured;
 - b) Below 1 GHz:

RBW=120 kHz, VBW=300 kHz, Sweep=auto, Detector function=peak, Trace=max hold;

If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
 - c) Set RBW=1MHz, VBW=3MHz for >1GHz, Sweep time=auto, Detector=peak, Trace=max hold for Peak measurement

For average measurement:

 - VBW=10Hz, When duty cycle is no less than 98 percent
 - VBW $\geq 1/T$, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation, so refer to this clause 5.7 duty cycle.

TEST MODE

Refer to the clause 4.2

TEST RESULT

☒ Passed ☐ Not Applicable

Note:

- 1) Level= Reading + Factor/Transd; Factor/Transd =Antenna Factor+ Cable Loss- Preamp Factor
- 2) Over Limit = Level– Limit
- 3) Average measurement was not performed if peak level is lower than average limit(54 dBuV/m) for above 1GHz.

For 9 kHz ~ 30 MHz

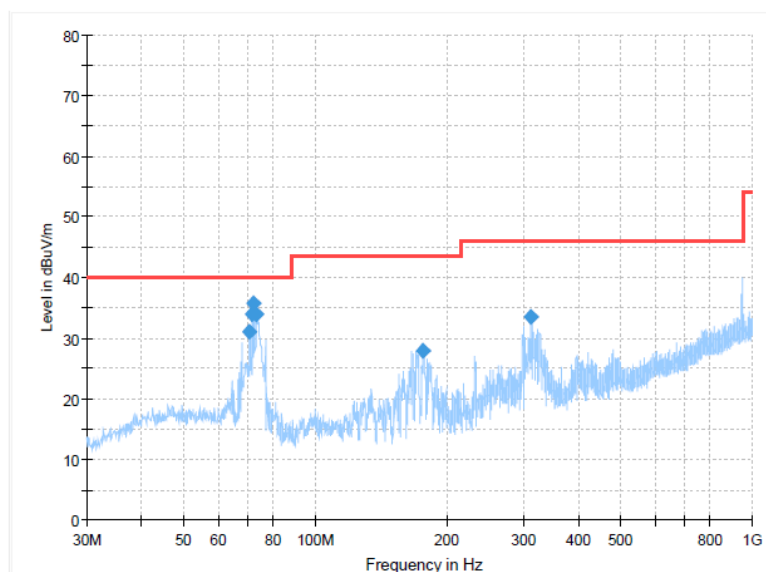
The EUT was pre-scanned this frequency band, found the radiated level 20dB lower than the limit, so don't show data on this report.

For 30 MHz ~ 1000 MHz

Have pre-scan all test channel, found CH06 of 802.11B which it was worst case, so only show the worst case's data on this report.

Polarization:

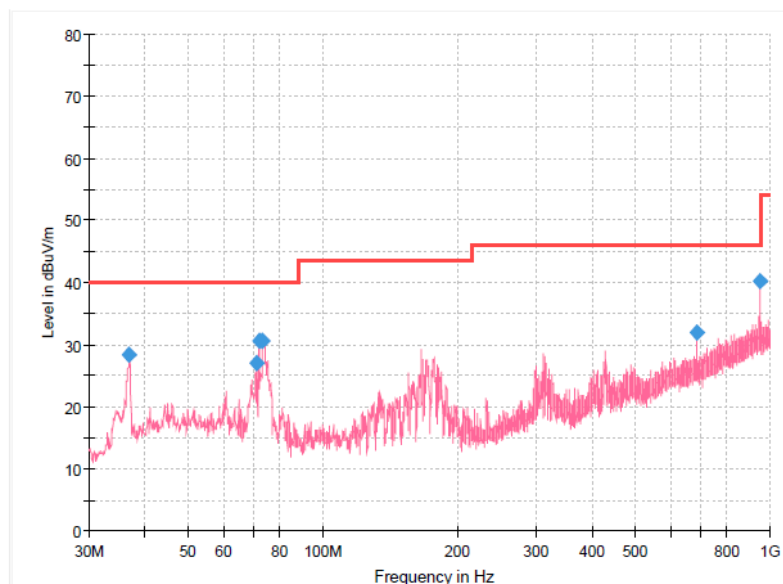
Horizontal

**Final Result**

Frequency (MHz)	MaxPeak (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
70.4975	31.03	40.00	8.97	300.0	H	199.0	-13.3
71.8313	33.99	40.00	6.01	300.0	H	199.0	-13.8
72.4375	35.75	40.00	4.25	300.0	H	242.0	-14.1
73.2863	34.07	40.00	5.93	300.0	H	199.0	-14.5
176.3488	28.01	43.50	15.49	100.0	H	232.0	-12.8
312.0275	33.51	46.00	12.49	100.0	H	294.0	-7.3

Polarization:

Vertical

**Final Result**

Frequency (MHz)	MaxPeak (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
36.9113	28.34	40.00	11.66	100.0	V	206.0	-11.0
71.2250	27.00	40.00	13.00	100.0	V	194.0	-13.6
71.9525	30.62	40.00	9.38	100.0	V	277.0	-13.8
73.4075	30.68	40.00	9.32	100.0	V	277.0	-14.5
687.5388	32.04	46.00	13.96	100.0	V	0.0	2.1
948.4688	40.18	46.00	5.82	100.0	V	0.0	7.1

For 1 GHz ~ 25 GHz

Type	802.11b		Test channel	CH01		Polarity		Horizontal	
Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark
1	1353.80	38.37	25.99	3.95	37.43	30.88	74.00	-43.12	Peak
2	3534.54	40.22	29.14	5.17	37.43	37.10	74.00	-36.90	Peak
3	7009.96	38.69	35.14	7.35	34.24	46.94	74.00	-27.06	Peak
4	9884.60	35.96	39.33	9.50	35.33	49.46	74.00	-24.54	Peak
Type	802.11b		Test channel	CH01		Polarity		Vertical	
Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark
1	1350.36	38.58	26.00	4.09	37.45	31.22	74.00	-42.78	Peak
2	3192.37	40.81	28.90	4.80	37.43	37.08	74.00	-36.92	Peak
3	6868.65	39.06	34.44	7.34	34.20	46.64	74.00	-27.36	Peak
4	9759.59	34.36	39.30	9.46	33.66	49.46	74.00	-24.54	Peak
Type	802.11b		Test channel	CH06		Polarity		Horizontal	
Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark
1	1800.42	39.68	25.30	3.56	37.84	30.70	74.00	-43.30	Peak
2	3033.91	40.49	28.57	4.66	37.32	36.40	74.00	-37.60	Peak
3	6992.14	38.01	35.07	7.34	34.22	46.20	74.00	-27.80	Peak
4	9784.47	34.51	39.30	9.48	33.44	49.85	74.00	-24.15	Peak
Type	802.11b		Test channel	CH06		Polarity		Vertical	
Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark
1	1350.36	37.55	26.00	4.09	37.45	30.19	74.00	-43.81	Peak
2	3151.99	40.19	28.90	4.70	37.27	36.52	74.00	-37.48	Peak
3	6992.14	37.74	35.07	7.34	34.22	45.93	74.00	-28.07	Peak
4	9784.47	34.28	39.30	9.48	33.44	49.62	74.00	-24.38	Peak
Type	802.11b		Test channel	CH11		Polarity		Horizontal	
Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark
1	1367.66	39.24	25.96	3.37	37.34	31.23	74.00	-42.77	Peak
2	3283.02	40.64	28.40	4.83	37.49	36.38	74.00	-37.62	Peak
3	6851.19	38.79	34.40	7.29	34.05	46.43	74.00	-27.57	Peak
4	9784.47	33.48	39.30	9.48	33.44	48.82	74.00	-25.18	Peak
Type	802.11b		Test channel	CH11		Polarity		Vertical	
Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark
1	1141.53	39.89	25.35	2.76	37.71	30.29	74.00	-43.71	Peak
2	3507.65	40.44	29.03	5.11	37.47	37.11	74.00	-36.89	Peak
3	6903.71	38.48	34.53	7.39	34.39	46.01	74.00	-27.99	Peak
4	9834.41	34.90	39.37	9.50	34.13	49.64	74.00	-24.36	Peak

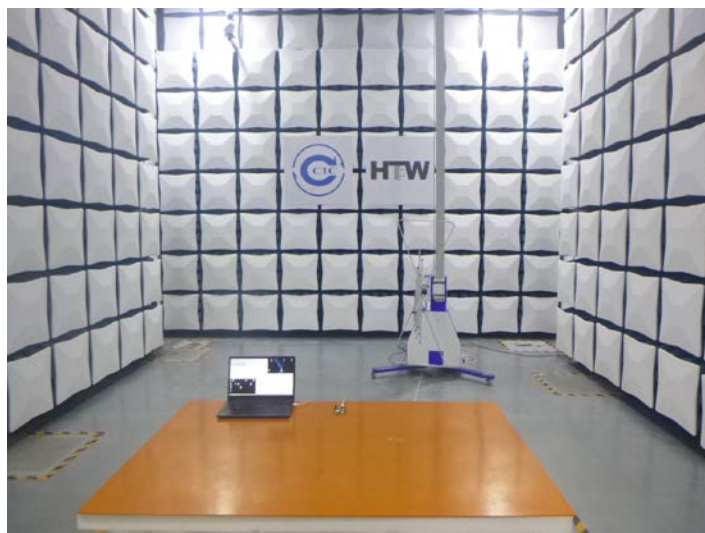
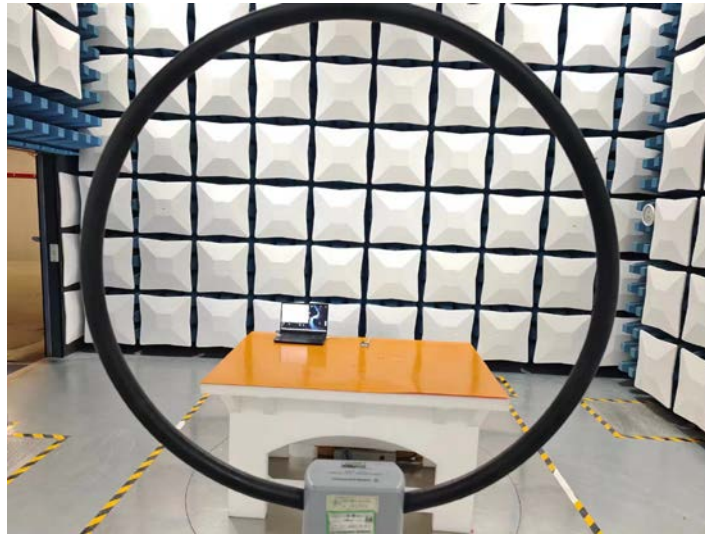
Type	802.11g		Test channel		CH01		Polarity		Horizontal	
Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark	
1	2168.08	40.62	27.75	3.95	37.65	34.67	74.00	-39.33	Peak	
2	3176.16	40.54	28.90	4.73	37.24	36.93	74.00	-37.07	Peak	
3	6851.19	38.43	34.40	7.29	34.05	46.07	74.00	-27.93	Peak	
4	9809.40	34.50	39.32	9.50	33.53	49.79	74.00	-24.21	Peak	
Type	802.11g		Test channel		CH01		Polarity		Vertical	
Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark	
1	1476.19	39.19	25.79	3.18	37.34	30.82	74.00	-43.18	Peak	
2	3200.50	40.92	28.90	4.84	37.52	37.14	74.00	-36.86	Peak	
3	6992.14	38.39	35.07	7.34	34.22	46.58	74.00	-27.42	Peak	
4	9759.59	33.83	39.30	9.46	33.66	48.93	74.00	-25.07	Peak	
Type	802.11g		Test channel		CH06		Polarity		Horizontal	
Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark	
1	1410.08	38.67	25.90	3.09	37.35	30.31	74.00	-43.69	Peak	
2	3728.63	39.40	29.31	5.20	36.95	36.96	74.00	-37.04	Peak	
3	6974.36	38.29	35.00	7.34	34.15	46.48	74.00	-27.52	Peak	
4	9251.58	34.20	39.10	9.26	34.37	48.19	74.00	-25.81	Peak	
Type	802.11g		Test channel		CH06		Polarity		Vertical	
Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark	
1	1487.51	39.10	25.75	3.20	37.33	30.72	74.00	-43.28	Peak	
2	3738.13	39.74	29.35	5.20	36.92	37.37	74.00	-36.63	Peak	
3	6833.77	38.93	34.34	7.27	34.22	46.32	74.00	-27.68	Peak	
4	9784.47	32.94	39.30	9.48	33.44	48.28	74.00	-25.72	Peak	
Type	802.11g		Test channel		CH11		Polarity		Horizontal	
Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark	
1	1350.36	38.66	26.00	4.09	37.45	31.30	74.00	-42.70	Peak	
2	3080.60	42.20	28.72	4.64	37.38	38.18	74.00	-35.82	Peak	
3	6851.19	39.65	34.40	7.29	34.05	47.29	74.00	-26.71	Peak	
4	10614.84	35.42	40.00	9.81	36.01	49.22	74.00	-24.78	Peak	
Type	802.11g		Test channel		CH11		Polarity		Vertical	
Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark	
1	1446.44	40.15	25.90	3.14	37.37	31.82	74.00	-42.18	Peak	
2	3766.79	40.54	29.40	5.17	37.08	38.03	74.00	-35.97	Peak	
3	6992.14	39.24	35.07	7.34	34.22	47.43	74.00	-26.57	Peak	
4	9759.59	34.51	39.30	9.46	33.66	49.61	74.00	-24.39	Peak	

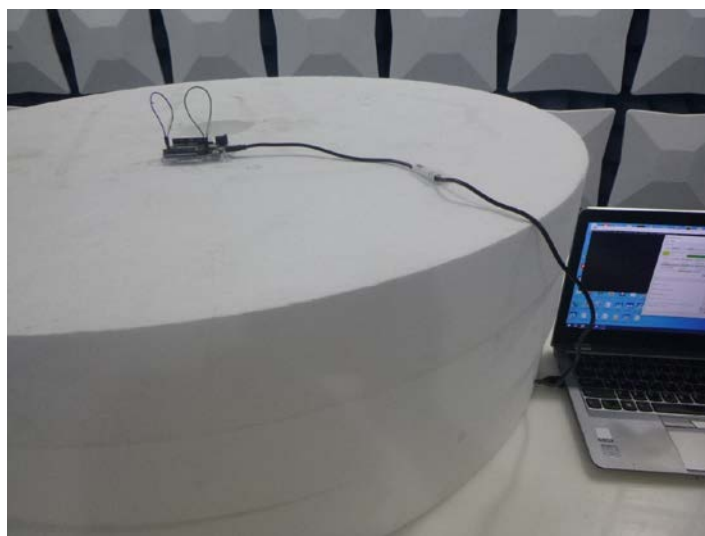
Type	802.11n(HT20)		Test channel	CH01		Polarity		Horizontal	
Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark
1	1350.36	39.93	26.00	4.09	37.45	32.57	74.00	-41.43	Peak
2	3135.99	41.82	28.87	4.68	37.31	38.06	74.00	-35.94	Peak
3	6921.30	39.25	34.67	7.39	34.41	46.90	74.00	-27.10	Peak
4	10217.17	36.95	39.35	9.61	36.13	49.78	74.00	-24.22	Peak
Type	802.11n(HT20)		Test channel	CH01		Polarity		Vertical	
Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark
1	1228.98	40.42	25.62	2.92	37.52	31.44	74.00	-42.56	Peak
2	3625.67	40.75	29.25	5.07	37.27	37.80	74.00	-36.20	Peak
3	6974.36	39.41	35.00	7.34	34.15	47.60	74.00	-26.40	Peak
4	9784.47	34.68	39.30	9.48	33.44	50.02	74.00	-23.98	Peak
Type	802.11n(HT20)		Test channel	CH06		Polarity		Horizontal	
Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark
1	1483.73	40.74	25.76	3.19	37.33	32.36	74.00	-41.64	Peak
2	3672.11	40.14	29.20	5.12	37.06	37.40	74.00	-36.60	Peak
3	6974.36	39.43	35.00	7.34	34.15	47.62	74.00	-26.38	Peak
4	9809.40	34.18	39.32	9.50	33.53	49.47	74.00	-24.53	Peak
Type	802.11n(HT20)		Test channel	CH06		Polarity		Vertical	
Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark
1	1367.66	39.45	25.96	3.37	37.34	31.44	74.00	-42.56	Peak
2	3104.22	41.31	28.81	4.65	37.42	37.35	74.00	-36.65	Peak
3	6992.14	38.62	35.07	7.34	34.22	46.81	74.00	-27.19	Peak
4	9784.47	33.82	39.30	9.48	33.44	49.16	74.00	-24.84	Peak
Type	802.11n(HT20)		Test channel	CH11		Polarity		Horizontal	
Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark
1	1329.89	39.15	25.96	2.95	37.47	30.59	74.00	-43.41	Peak
2	3507.65	40.18	29.03	5.11	37.47	36.85	74.00	-37.15	Peak
3	6956.63	38.04	34.93	7.35	34.16	46.16	74.00	-27.84	Peak
4	9834.41	33.76	39.37	9.50	34.13	48.50	74.00	-25.50	Peak
Type	802.11n(HT20)		Test channel	CH11		Polarity		Vertical	
Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark
1	1350.36	38.82	26.00	4.09	37.45	31.46	74.00	-42.54	Peak
2	3072.77	40.48	28.69	4.64	37.36	36.45	74.00	-37.55	Peak
3	6921.30	38.53	34.67	7.39	34.41	46.18	74.00	-27.82	Peak
4	9710.03	34.19	39.30	9.41	34.11	48.79	74.00	-25.21	Peak

Type	802.11n(HT40)	Test channel	CH03	Polarity	Horizontal				
Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark
1	1417.28	38.85	25.90	3.10	37.35	30.50	74.00	-43.50	Peak
2	3498.74	40.76	28.99	5.08	37.48	37.35	74.00	-36.65	Peak
3	6851.19	38.58	34.40	7.29	34.05	46.22	74.00	-27.78	Peak
4	9809.40	33.79	39.32	9.50	33.53	49.08	74.00	-24.92	Peak
Type	802.11n(HT40)	Test channel	CH03	Polarity	Vertical				
Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark
1	1350.36	39.35	26.00	4.09	37.45	31.99	74.00	-42.01	Peak
2	3151.99	41.05	28.90	4.70	37.27	37.38	74.00	-36.62	Peak
3	6886.15	39.28	34.47	7.39	34.35	46.79	74.00	-27.21	Peak
4	9809.40	33.94	39.32	9.50	33.53	49.23	74.00	-24.77	Peak
Type	802.11n(HT40)	Test channel	CH06	Polarity	Horizontal				
Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark
1	1353.80	39.90	25.99	3.95	37.43	32.41	74.00	-41.59	Peak
2	3096.33	41.52	28.79	4.65	37.42	37.54	74.00	-36.46	Peak
3	6921.30	39.55	34.67	7.39	34.41	47.20	74.00	-26.80	Peak
4	9960.38	37.29	39.28	9.50	36.00	50.07	74.00	-23.93	Peak
Type	802.11n(HT40)	Test channel	CH06	Polarity	Vertical				
Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark
1	1350.36	40.08	26.00	4.09	37.45	32.72	74.00	-41.28	Peak
2	3176.16	41.29	28.90	4.73	37.24	37.68	74.00	-36.32	Peak
3	6974.36	39.59	35.00	7.34	34.15	47.78	74.00	-26.22	Peak
4	9759.59	35.72	39.30	9.46	33.66	50.82	74.00	-23.18	Peak
Type	802.11n(HT40)	Test channel	CH09	Polarity	Horizontal				
Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark
1	1464.96	39.86	25.84	3.16	37.35	31.51	74.00	-42.49	Peak
2	3096.33	41.63	28.79	4.65	37.42	37.65	74.00	-36.35	Peak
3	6956.63	39.35	34.93	7.35	34.16	47.47	74.00	-26.53	Peak
4	9784.47	35.20	39.30	9.48	33.44	50.54	74.00	-23.46	Peak
Type	802.11n(HT40)	Test channel	CH09	Polarity	Vertical				
Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark
1	1860.99	39.77	25.54	3.60	37.79	31.12	74.00	-42.88	Peak
2	3151.99	41.48	28.90	4.70	37.27	37.81	74.00	-36.19	Peak
3	6974.36	39.92	35.00	7.34	34.15	48.11	74.00	-25.89	Peak
4	9909.80	36.61	39.30	9.50	35.75	49.66	74.00	-24.34	Peak

6. TEST SETUP PHOTOS

Radiated Emission





AC Conducted Emission



7. EXTERNAL AND INTERNAL PHOTOS

Refer to the test report No. CHTEW23090036

8. APPENDIX REPORT

APPENDIX REPORT

Project No.	SHT2308036106EW	Radio Specification	WIFI 2.4G
Test sample No.	YPHT23080361007	Model No.	ABX00087
Start test date	2023-09-14	Finish date	202-09-14
Temperature	25.2℃	Humidity	52%
Test Engineer	Kongyongshu	Auditor	Xiaodong Zheo

Appendix clause	Test item	Result
A	Conducted Peak Output Power	Pass
B	Power Spectral Density	Pass
C	6 dB Bandwidth	Pass
D	99% Occupied Bandwidth	Pass
E	Duty Cycle	Pass
F	Band edge and Spurious Emissions (conducted)	Pass

Appendix A: Conducted Peak Output Power

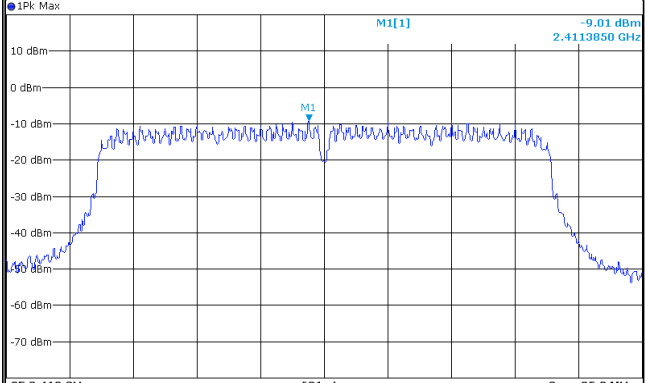
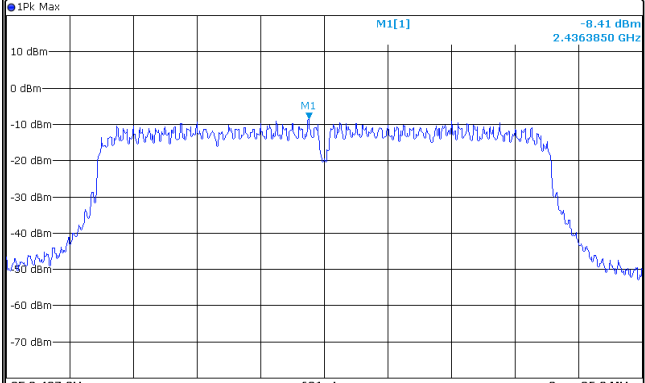
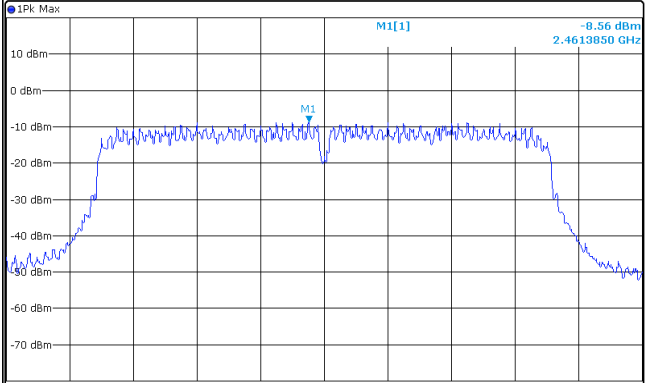
Type	Channel	Peak Output power (dBm)	Average Output power (dBm)	Limit (dBm)	Result
802.11b	01	15.12	12.98	≤ 30.00	Pass
	06	15.78	13.15		
	11	16.13	13.97		
802.11g	01	15.97	12.84	≤ 30.00	Pass
	06	16.59	13.29		
	11	17.01	13.99		
802.11n (HT20)	01	14.75	12.01	≤ 30.00	Pass
	06	15.43	13.16		
	11	15.79	13.47		
802.11n(HT40)	03	15.35	13.01	≤ 30.00	Pass
	06	15.46	13.14		
	09	15.86	13.36		

Appendix B: Power Spectral Density

Type	Channel	Power Spectral Density (dBm/30KHz)	Limit (dBm/3KHz)	Result
802.11b	01	-4.00	≤8.00	Pass
	06	-4.14		
	11	-2.82		
802.11g	01	-7.83	≤8.00	Pass
	06	-6.99		
	11	-7.17		
802.11n(HT20)	01	-9.01	≤8.00	Pass
	06	-8.41		
	11	-8.56		
802.11n(HT40)	03	-11.65	≤8.00	Pass
	06	-11.53		
	09	-11.22		

Type:		802.11 b
CH01	Spectrum Ref Level 20.00 dBm Att 30 dB Count 100/100 Offset 0.50 dB SWT 126.4 μs RBW 30 kHz VBW 100 kHz Mode Auto FFT 1Pk Max M1[1] -4.00 dBm 2.4127180 GHz M1 -10 dBm 2.4127180 GHz CF 2.412 GHz 691 pts Span 16.0 MHz	
CH06	Spectrum Ref Level 20.00 dBm Att 30 dB Count 100/100 Offset 0.50 dB SWT 126.4 μs RBW 30 kHz VBW 100 kHz Mode Auto FFT 1Pk Max M1[1] -4.14 dBm 2.4362820 GHz M1 -10 dBm 2.4362820 GHz CF 2.437 GHz 691 pts Span 16.0 MHz	
CH11	Spectrum Ref Level 20.00 dBm Att 30 dB Count 100/100 Offset 0.50 dB SWT 126.4 μs RBW 30 kHz VBW 100 kHz Mode Auto FFT 1Pk Max M1[1] -2.82 dBm 2.4614210 GHz M1 -10 dBm 2.4614210 GHz CF 2.462 GHz 691 pts Span 16.0 MHz	

Type:		802.11 g
CH01	Spectrum Ref Level 20.00 dBm Att 30 dB Count 100/100 Offset 0.50 dB SWT 189.6 μs RBW 30 kHz VBW 100 kHz Mode Auto FFT 1Pk Max M1[1] -7.83 dBm 2.4107340 GHz 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm CF 2.412 GHz 691 pts Span 25.0 MHz	
CH06	Spectrum Ref Level 20.00 dBm Att 30 dB Count 100/100 Offset 0.50 dB SWT 189.6 μs RBW 30 kHz VBW 100 kHz Mode Auto FFT 1Pk Max M1[1] -6.99 dBm 2.4363850 GHz 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm CF 2.437 GHz 691 pts Span 25.0 MHz	
CH11	Spectrum Ref Level 20.00 dBm Att 30 dB Count 100/100 Offset 0.50 dB SWT 189.6 μs RBW 30 kHz VBW 100 kHz Mode Auto FFT 1Pk Max M1[1] -7.17 dBm 2.4582370 GHz 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm CF 2.462 GHz 691 pts Span 25.0 MHz	

Type: 802.11n(HT20)	
CH01	Spectrum Ref Level 20.00 dBm Att 30 dB Count 100/100 Offset 0.50 dB SWT 189.6 μs RBW 30 kHz VBW 100 kHz Mode Auto FFT 1Pk Max M1 M1[1] -9.01 dBm 2.4113850 GHz  CF 2.412 GHz691 ptsSpan 25.0 MHz
CH06	Spectrum Ref Level 20.00 dBm Att 30 dB Count 100/100 Offset 0.50 dB SWT 189.6 μs RBW 30 kHz VBW 100 kHz Mode Auto FFT 1Pk Max M1 M1[1] -9.41 dBm 2.4363850 GHz  CF 2.437 GHz691 ptsSpan 25.0 MHz
CH11	Spectrum Ref Level 20.00 dBm Att 30 dB Count 100/100 Offset 0.50 dB SWT 189.6 μs RBW 30 kHz VBW 100 kHz Mode Auto FFT 1Pk Max M1 M1[1] -9.56 dBm 2.4613850 GHz  CF 2.462 GHz691 ptsSpan 25.0 MHz

Type: 802.11n(HT40)	
CH03	Spectrum Ref Level 20.00 dBm Att 30 dB Count 100/100 Offset 0.50 dB SWT 442.4 μs RBW 30 kHz VBW 100 kHz Mode Auto FFT 1Pk Max M1[1] -11.65 dBm 2.4244670 GHz M1 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm CF 2.422 GHz 691 pts Span 55.0 MHz
CH06	Spectrum Ref Level 20.00 dBm Att 30 dB Count 100/100 Offset 0.50 dB SWT 442.4 μs RBW 30 kHz VBW 100 kHz Mode Auto FFT 1Pk Max M1[1] -11.53 dBm 2.4394670 GHz M1 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm CF 2.437 GHz 691 pts Span 55.0 MHz
CH09	Spectrum Ref Level 20.00 dBm Att 30 dB Count 100/100 Offset 0.50 dB SWT 442.4 μs RBW 30 kHz VBW 100 kHz Mode Auto FFT 1Pk Max M1[1] -11.22 dBm 2.4544670 GHz M1 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm CF 2.452 GHz 691 pts Span 55.0 MHz

Appendix C: 6dB bandwidth

Type	Channel	6dB Bandwidth (MHz)	Limit (MHz)	Result
802.11b	01	9.15	≥0.5	Pass
	06	8.25		
	11	9.15		
802.11g	01	16.38	≥0.5	Pass
	06	16.50		
	11	16.50		
802.11n(HT20)	01	16.86	≥0.5	Pass
	06	17.19		
	11	17.16		
802.11n(HT40)	03	32.40	≥0.5	Pass
	06	34.62		
	09	34.56		

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Appendix report page: 11 of 35

Spectrum

Ref Level 20.50 dBm Offset 0.50 dB RBW 100 kHz
Att 30 dB SWT 132.7 μ s VBW 300 kHz Mode Auto FFT
Count 500/500

1Pk View

10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm

M1[1] -13.30 dBm
M2[1] -7.11 dBm
2.4056800 GHz
2.4169600 GHz

D1 -13.110 dBm
D3

CF 2.422 GHz 1001 pts Span 60.0 MHz

Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.40568 GHz	-13.30 dBm		
M2		1	2.41696 GHz	-7.11 dBm		
D3	M1	1	32.4 MHz	-0.32 dB		

Spectrum

Ref Level 20.50 dBm Offset 0.50 dB RBW 100 kHz
Att 30 dB SWT 132.7 μ s VBW 300 kHz Mode Auto FFT
Count 500/500

1Pk View

M1[1] -16.55 dBm
M2[1] -7.23 dBm
2.4193600 GHz
2.4407200 GHz

D1 -13.23 dBm

CF 2.437 GHz 1001 pts Span 60.0 MHz

Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.41936 GHz	-16.55 dBm		
M2		1	2.44072 GHz	-7.23 dBm		
D3	M1	1	34.62 MHz	2.09 dB		

Spectrum

Ref Level 20.50 dBm Offset 0.50 dB RBW 100 kHz
Att 30 dB SWT 132.7 μ s VBW 300 kHz Mode Auto FFT
Count 500/500

1Pk View

M1[1] -15.16 dBm 2.4350200 GHz
M2[1] -7.82 dBm 2.4494800 GHz
D1 -13.821 dBm

CF 2.452 GHz 1001 pts Span 60.0 MHz

Marker

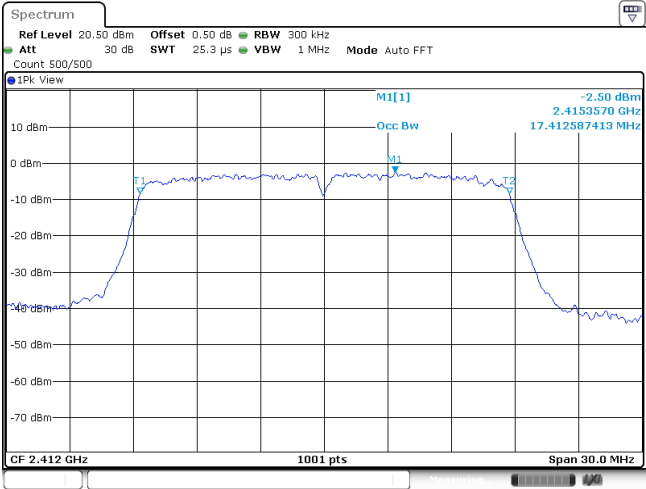
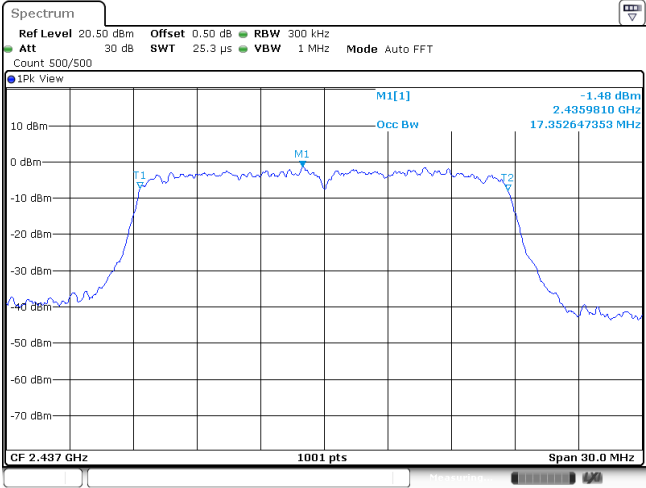
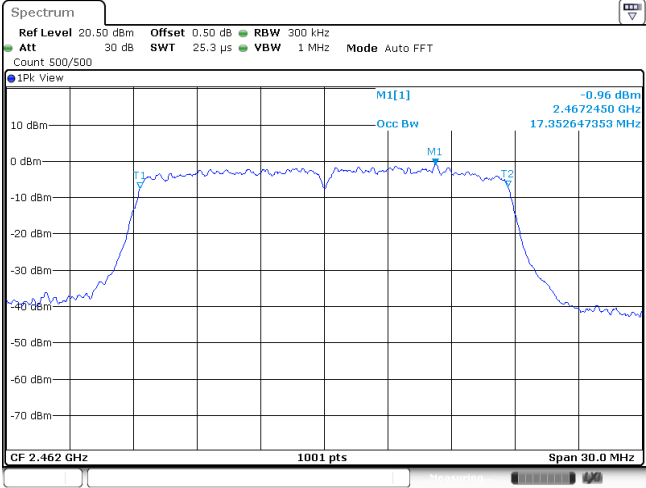
Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.43502 GHz	-15.16 dBm		
M2		1	2.44948 GHz	-7.82 dBm		
D3	M1	1	34.56 MHz	0.22 dB		

Appendix D: 99% Occupied Bandwidth

Type	Channel	99% Bandwidth (MHz)	Limit (kHz)	Result
802.11b	01	12.83	-	Pass
	06	12.83		
	11	12.71		
802.11g	01	16.54	-	Pass
	06	16.51		
	11	16.54		
802.11n(HT20)	01	17.41	-	Pass
	06	17.35		
	11	17.35		
802.11n(HT40)	03	35.78	-	Pass
	06	35.78		
	09	35.78		

Type:		802.11 b
CH01	Spectrum Ref Level 20.50 dBm Att 30 dB Count 500/500 Offset 0.50 dB SWT 25.3 μs RBW 300 kHz VBW 1 MHz Mode Auto FFT 1Pk View 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm M1[1] 4.04 dBm 2.4125090 GHz 12.827172827 MHz Occ Bw T1 T2 CF 2.412 GHz 1001 pts Span 30.0 MHz	
CH06	Spectrum Ref Level 20.50 dBm Att 30 dB Count 500/500 Offset 0.50 dB SWT 25.3 μs RBW 300 kHz VBW 1 MHz Mode Auto FFT 1Pk View 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm M1[1] 4.14 dBm 2.4379890 GHz 12.827172827 MHz Occ Bw T1 T2 CF 2.437 GHz 1001 pts Span 30.0 MHz	
CH11	Spectrum Ref Level 20.50 dBm Att 30 dB Count 500/500 Offset 0.50 dB SWT 25.3 μs RBW 300 kHz VBW 1 MHz Mode Auto FFT 1Pk View 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm M1[1] 4.75 dBm 2.4625090 GHz 12.707292707 MHz Occ Bw T1 T2 CF 2.462 GHz 1001 pts Span 30.0 MHz	

Type:		802.11 g
CH01	Spectrum Ref Level 20.50 dBm Att 30 dB Count 500/500 Offset 0.50 dB SWT 25.3 μs RBW 300 kHz VBW 1 MHz Mode Auto FFT 1Pk View 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm M1[1] Occ Bw M1 M2 -0.55 dBm 2.4134090 GHz 16.543456543 MHz CF 2.412 GHz 1001 pts Span 30.0 MHz	
CH06	Spectrum Ref Level 20.50 dBm Att 30 dB Count 500/500 Offset 0.50 dB SWT 25.3 μs RBW 300 kHz VBW 1 MHz Mode Auto FFT 1Pk View 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm M1[1] Occ Bw M1 M2 -0.34 dBm 2.4411360 GHz 16.513486513 MHz CF 2.437 GHz 1001 pts Span 30.0 MHz	
CH11	Spectrum Ref Level 20.50 dBm Att 30 dB Count 500/500 Offset 0.50 dB SWT 25.3 μs RBW 300 kHz VBW 1 MHz Mode Auto FFT 1Pk View 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm M1[1] Occ Bw M1 M2 -0.05 dBm 2.4628690 GHz 16.543456543 MHz CF 2.462 GHz 1001 pts Span 30.0 MHz	

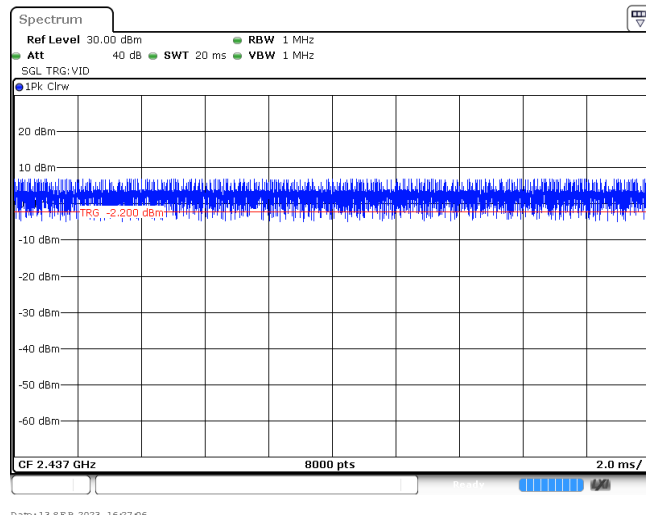
Type: 802.11n(HT20)	
CH01	 Spectrum plot for CH01. The plot shows a signal centered at 2.412 GHz. The peak level is -2.50 dBm. The plot includes frequency markers T1, M1, and T2, and a noise floor around -40 dBm.
CH06	 Spectrum plot for CH06. The plot shows a signal centered at 2.437 GHz. The peak level is -1.48 dBm. The plot includes frequency markers T1, M1, and T2, and a noise floor around -40 dBm.
CH11	 Spectrum plot for CH11. The plot shows a signal centered at 2.462 GHz. The peak level is -0.96 dBm. The plot includes frequency markers T1, M1, and T2, and a noise floor around -40 dBm.

Type: 802.11n(HT40)	
CH03	Spectrum Ref Level 20.50 dBm Att 30 dB Count 500/500 Offset 0.50 dB SWT 1 ms RBW 500 kHz VBW 2 MHz Mode Auto Sweep 1Pk View M1[1] -1.50 dBm 2.4254770 GHz 35.784215784 MHz Occ Bw M1 1 2 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm CF 2.422 GHz 1001 pts Span 60.0 MHz
CH06	Spectrum Ref Level 20.50 dBm Att 30 dB Count 500/500 Offset 0.50 dB SWT 1 ms RBW 500 kHz VBW 2 MHz Mode Auto Sweep 1Pk View M1[1] -1.51 dBm 2.4404770 GHz 35.784215784 MHz Occ Bw M1 1 2 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm CF 2.437 GHz 1001 pts Span 60.0 MHz
CH09	Spectrum Ref Level 20.50 dBm Att 30 dB Count 500/500 Offset 0.50 dB SWT 1 ms RBW 500 kHz VBW 2 MHz Mode Auto Sweep 1Pk View M1[1] -1.10 dBm 2.4554170 GHz 35.784215784 MHz Occ Bw M1 1 2 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm CF 2.452 GHz 1001 pts Span 60.0 MHz

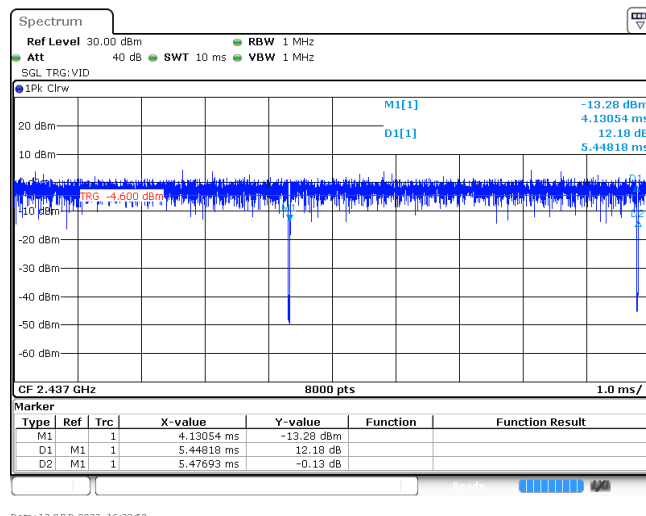
Appendix E: Duty Cycle

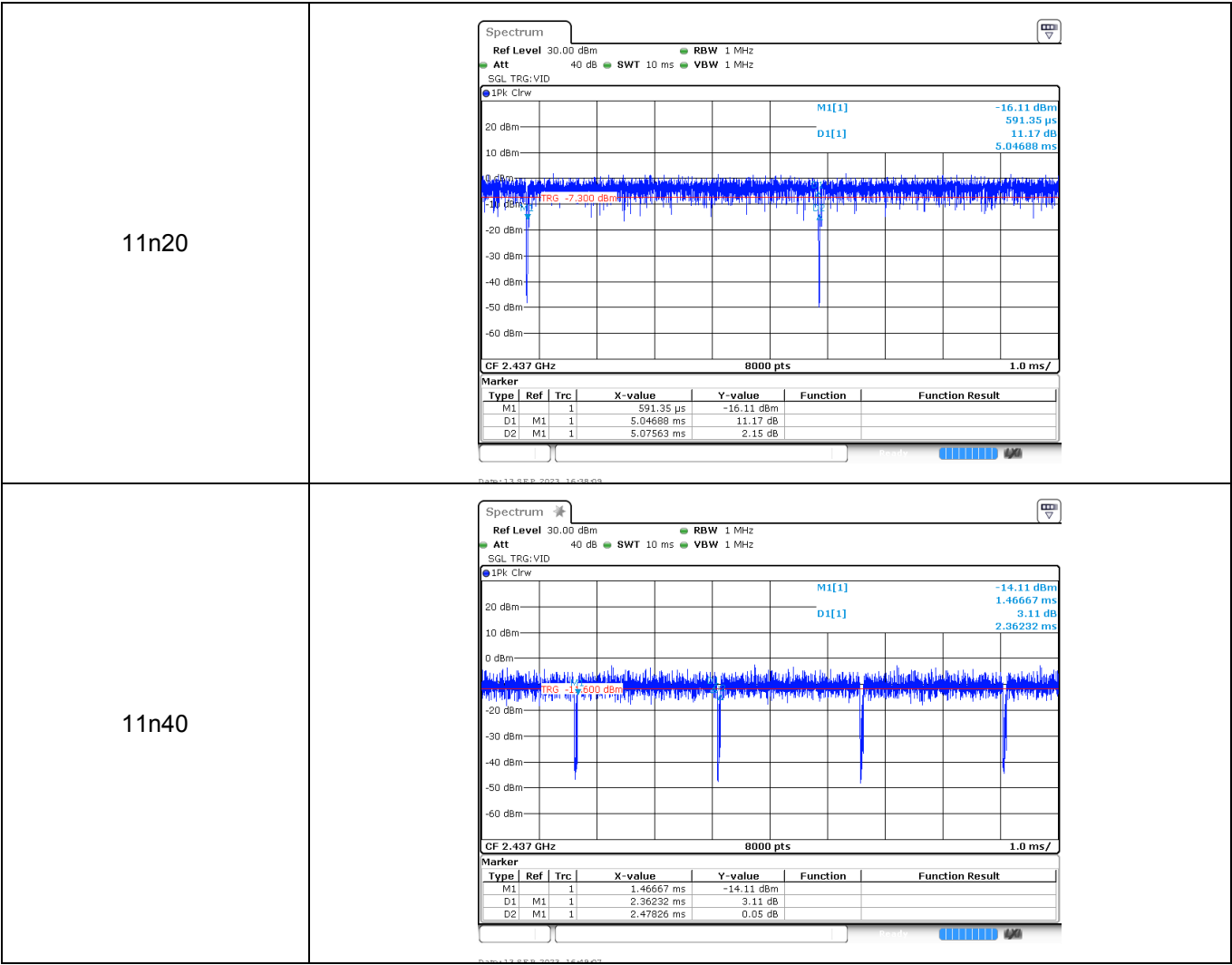
Modulation Type	Test Frequency (MHz)	T _{on time} for single burst (ms)	T _{period} (ms)	Duty cycle	1/T _{on time} (kHz)
11b	2437	1.00	1.00	100%	1
11g	2437	5.45	5.48	99.5%	0.18
11n20	2437	5.05	5.08	99.4%	0.20
11n40	2437	2.36	2.48	95.2%	0.42

11b



11g





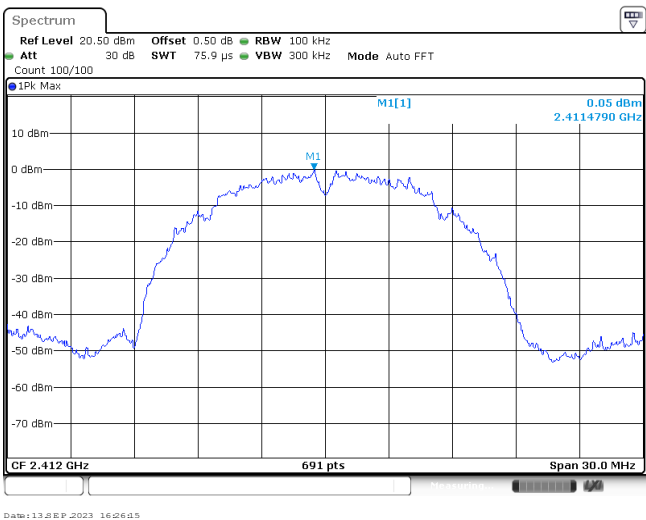
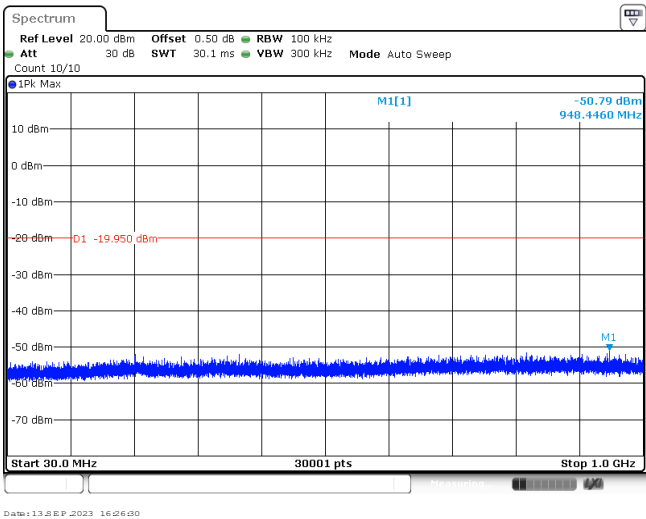
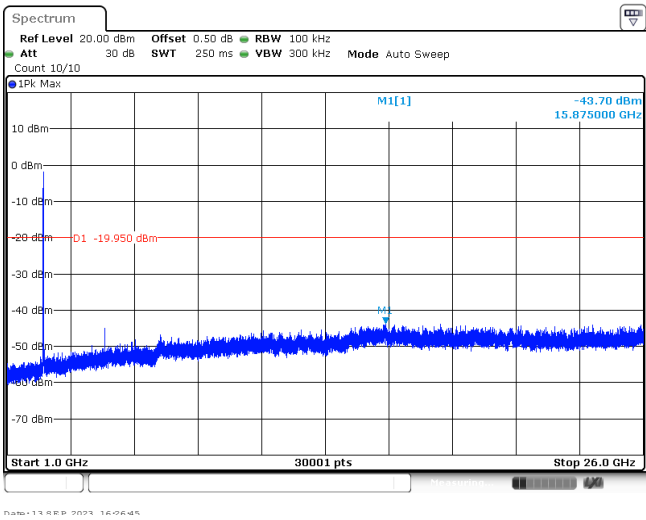
Appendix F: Band edge and Spurious Emissions (conducted)

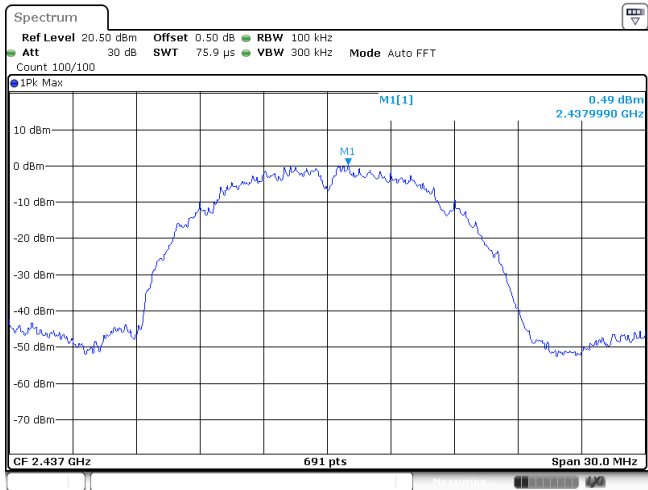
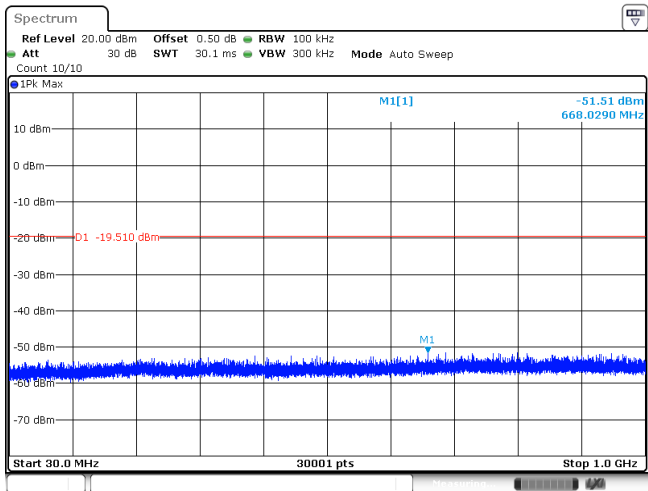
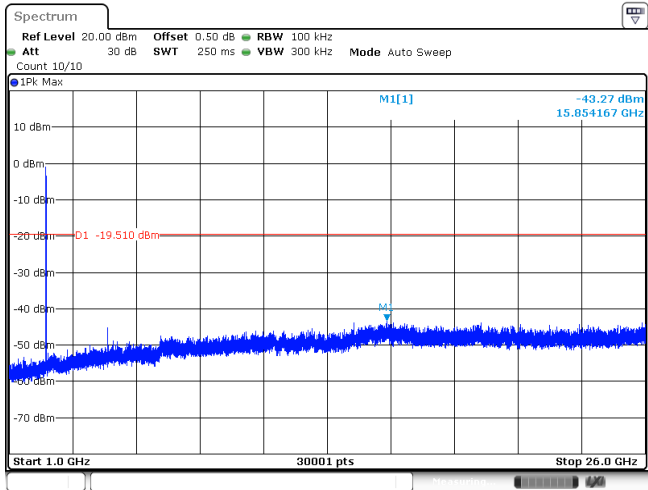
Test Item:	Bandedge	Type:	802.11 b																																										
CH01	Spectrum Ref Level 20.00 dBm Offset 0.50 dB RBW 100 kHz Att 30 dB SWT 246.5 μs VBW 300 kHz Mode Auto FFT Count 300/300 1Pk Max 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm M1[1] M2[1] M3 M4 M5 -0.07 dBm 2.412520 GHz -49.18 dBm 2.412500 GHz -57.12 dBm 2.397003 GHz D1 -20.070 dBm Start 2.31 GHz 691 pts Stop 2.422 GHz Marker <table><tr><th>Type</th><th>Ref</th><th>Trc</th><th>X-value</th><th>Y-value</th><th>Function</th><th>Function Result</th></tr><tr><td>M1</td><td>1</td><td></td><td>2.41252 GHz</td><td>-0.07 dBm</td><td></td><td></td></tr><tr><td>M2</td><td>1</td><td></td><td>2.4 GHz</td><td>-49.18 dBm</td><td></td><td></td></tr><tr><td>M3</td><td>1</td><td></td><td>2.39 GHz</td><td>-57.12 dBm</td><td></td><td></td></tr><tr><td>M4</td><td>1</td><td></td><td>2.31 GHz</td><td>-58.62 dBm</td><td></td><td></td></tr><tr><td>M5</td><td>1</td><td></td><td>2.397003 GHz</td><td>-42.50 dBm</td><td></td><td></td></tr></table>			Type	Ref	Trc	X-value	Y-value	Function	Function Result	M1	1		2.41252 GHz	-0.07 dBm			M2	1		2.4 GHz	-49.18 dBm			M3	1		2.39 GHz	-57.12 dBm			M4	1		2.31 GHz	-58.62 dBm			M5	1		2.397003 GHz	-42.50 dBm		
Type	Ref	Trc	X-value	Y-value	Function	Function Result																																							
M1	1		2.41252 GHz	-0.07 dBm																																									
M2	1		2.4 GHz	-49.18 dBm																																									
M3	1		2.39 GHz	-57.12 dBm																																									
M4	1		2.31 GHz	-58.62 dBm																																									
M5	1		2.397003 GHz	-42.50 dBm																																									
CH11	Spectrum Ref Level 20.00 dBm Offset 0.50 dB RBW 100 kHz Att 30 dB SWT 113.8 μs VBW 300 kHz Mode Auto FFT Count 300/300 1Pk Max 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm M1[1] M2[1] M3 M4 0.89 dBm 2.4614820 GHz -55.42 dBm 2.4835000 GHz -52.53 dBm 2.4881043 GHz D1 -19.110 dBm Start 2.452 GHz 691 pts Stop 2.5 GHz Marker <table><tr><th>Type</th><th>Ref</th><th>Trc</th><th>X-value</th><th>Y-value</th><th>Function</th><th>Function Result</th></tr><tr><td>M1</td><td>1</td><td></td><td>2.461482 GHz</td><td>0.89 dBm</td><td></td><td></td></tr><tr><td>M2</td><td>1</td><td></td><td>2.4635 GHz</td><td>-55.42 dBm</td><td></td><td></td></tr><tr><td>M3</td><td>1</td><td></td><td>2.5 GHz</td><td>-57.01 dBm</td><td></td><td></td></tr><tr><td>M4</td><td>1</td><td></td><td>2.4881043 GHz</td><td>-52.53 dBm</td><td></td><td></td></tr></table>			Type	Ref	Trc	X-value	Y-value	Function	Function Result	M1	1		2.461482 GHz	0.89 dBm			M2	1		2.4635 GHz	-55.42 dBm			M3	1		2.5 GHz	-57.01 dBm			M4	1		2.4881043 GHz	-52.53 dBm									
Type	Ref	Trc	X-value	Y-value	Function	Function Result																																							
M1	1		2.461482 GHz	0.89 dBm																																									
M2	1		2.4635 GHz	-55.42 dBm																																									
M3	1		2.5 GHz	-57.01 dBm																																									
M4	1		2.4881043 GHz	-52.53 dBm																																									

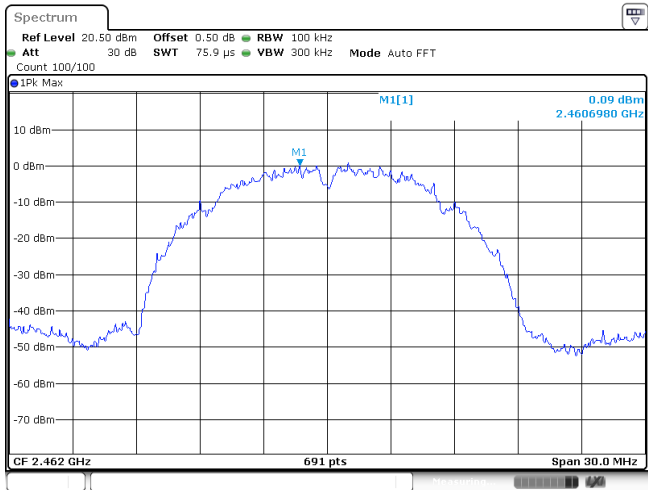
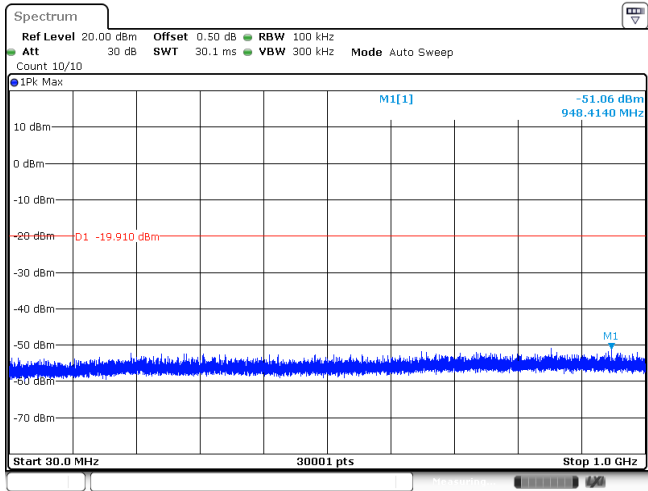
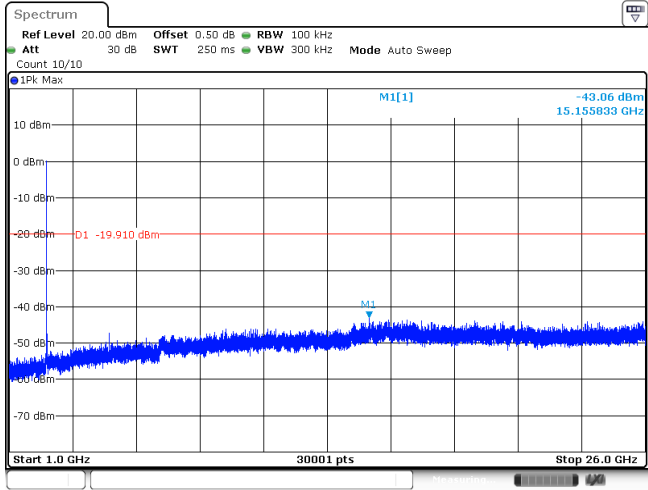
Test Item:	Bandedge	Type:	802.11 g																																										
CH01	Spectrum Ref Level 20.00 dBm Offset 0.50 dB RBW 100 kHz Att 30 dB SWT 246.5 μs VBW 300 kHz Mode Auto FFT Count 300/300 1Pk Max 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm M1[1] M2[1] D1 -26.140 dBm -6.14 dBm 2.412680 GHz -38.04 dBm 2.400000 GHz Start 2.31 GHz 691 pts Stop 2.422 GHz Marker <table><tr><th>Type</th><th>Ref</th><th>Trc</th><th>X-value</th><th>Y-value</th><th>Function</th><th>Function Result</th></tr><tr><td>M1</td><td></td><td>1</td><td>2.41268 GHz</td><td>-6.14 dBm</td><td></td><td></td></tr><tr><td>M2</td><td></td><td>1</td><td>2.4 GHz</td><td>-38.04 dBm</td><td></td><td></td></tr><tr><td>M3</td><td></td><td>1</td><td>2.39 GHz</td><td>-46.18 dBm</td><td></td><td></td></tr><tr><td>M4</td><td></td><td>1</td><td>2.31 GHz</td><td>-59.73 dBm</td><td></td><td></td></tr><tr><td>M5</td><td></td><td>1</td><td>2.398951 GHz</td><td>-34.82 dBm</td><td></td><td></td></tr></table>			Type	Ref	Trc	X-value	Y-value	Function	Function Result	M1		1	2.41268 GHz	-6.14 dBm			M2		1	2.4 GHz	-38.04 dBm			M3		1	2.39 GHz	-46.18 dBm			M4		1	2.31 GHz	-59.73 dBm			M5		1	2.398951 GHz	-34.82 dBm		
Type	Ref	Trc	X-value	Y-value	Function	Function Result																																							
M1		1	2.41268 GHz	-6.14 dBm																																									
M2		1	2.4 GHz	-38.04 dBm																																									
M3		1	2.39 GHz	-46.18 dBm																																									
M4		1	2.31 GHz	-59.73 dBm																																									
M5		1	2.398951 GHz	-34.82 dBm																																									
CH11	Spectrum Ref Level 20.00 dBm Offset 0.50 dB RBW 100 kHz Att 30 dB SWT 113.8 μs VBW 300 kHz Mode Auto FFT Count 300/300 1Pk Max 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm M1[1] M2[1] D1 -24.650 dBm -4.66 dBm 2.4694700 GHz -44.88 dBm 2.4835000 GHz Start 2.452 GHz 691 pts Stop 2.5 GHz Marker <table><tr><th>Type</th><th>Ref</th><th>Trc</th><th>X-value</th><th>Y-value</th><th>Function</th><th>Function Result</th></tr><tr><td>M1</td><td></td><td>1</td><td>2.46947 GHz</td><td>-4.66 dBm</td><td></td><td></td></tr><tr><td>M2</td><td></td><td>1</td><td>2.4835 GHz</td><td>-44.88 dBm</td><td></td><td></td></tr><tr><td>M3</td><td></td><td>1</td><td>2.5 GHz</td><td>-56.24 dBm</td><td></td><td></td></tr><tr><td>M4</td><td></td><td>1</td><td>2.4847652 GHz</td><td>-43.77 dBm</td><td></td><td></td></tr></table>			Type	Ref	Trc	X-value	Y-value	Function	Function Result	M1		1	2.46947 GHz	-4.66 dBm			M2		1	2.4835 GHz	-44.88 dBm			M3		1	2.5 GHz	-56.24 dBm			M4		1	2.4847652 GHz	-43.77 dBm									
Type	Ref	Trc	X-value	Y-value	Function	Function Result																																							
M1		1	2.46947 GHz	-4.66 dBm																																									
M2		1	2.4835 GHz	-44.88 dBm																																									
M3		1	2.5 GHz	-56.24 dBm																																									
M4		1	2.4847652 GHz	-43.77 dBm																																									

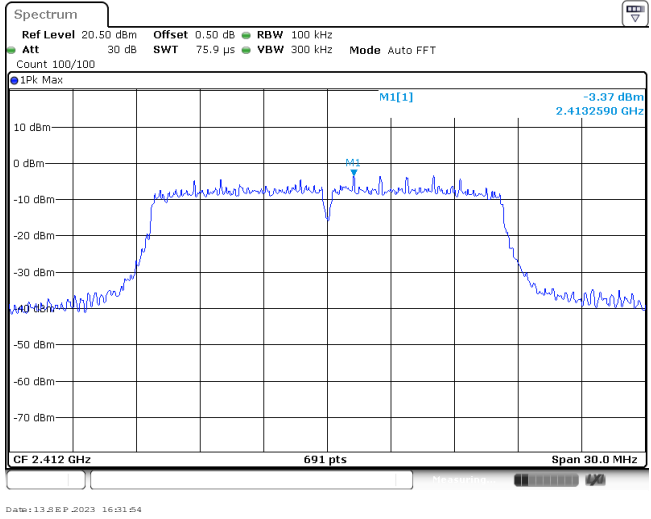
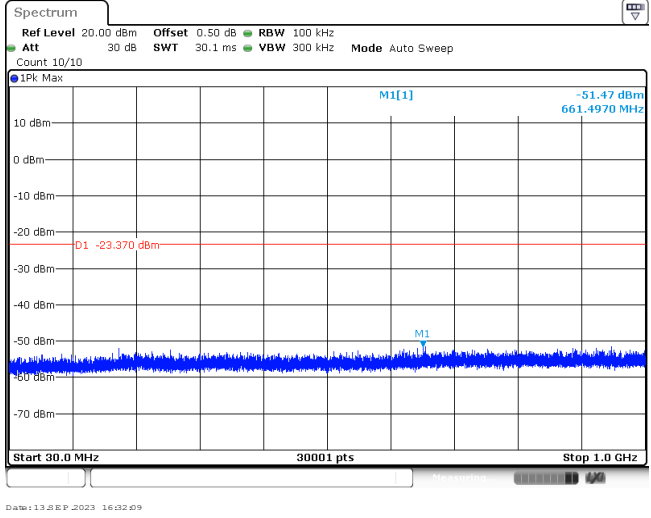
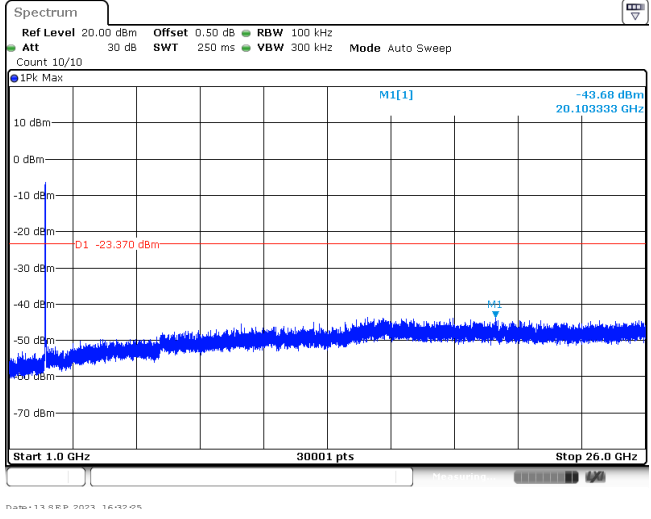
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CH01	Spectrum Ref Level 20.00 dBm Att 30 dB Offset 0.50 dB RBW 100 kHz SWT 246.5 μs VBW 300 kHz Mode Auto FFT Count 300/300 1Pk Max 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm M1[1] M2[1] M3 M4 -7.35 dBm 2.411380 GHz -42.55 dBm 2.400000 GHz D1 -27.350 dBm Start 2.31 GHz 691 pts Stop 2.422 GHz Marker <table><tr><th>Type</th><th>Ref</th><th>Trc</th><th>X-value</th><th>Y-value</th><th>Function</th><th>Function Result</th></tr><tr><td>M1</td><td></td><td>1</td><td>2.41138 GHz</td><td>-7.35 dBm</td><td></td><td></td></tr><tr><td>M2</td><td></td><td>1</td><td>2.4 GHz</td><td>-42.55 dBm</td><td></td><td></td></tr><tr><td>M3</td><td></td><td>1</td><td>2.39 GHz</td><td>-51.10 dBm</td><td></td><td></td></tr><tr><td>M4</td><td></td><td>1</td><td>2.31 GHz</td><td>-58.90 dBm</td><td></td><td></td></tr><tr><td>M5</td><td></td><td>1</td><td>2.399762 GHz</td><td>-42.07 dBm</td><td></td><td></td></tr></table>			Type	Ref	Trc	X-value	Y-value	Function	Function Result	M1		1	2.41138 GHz	-7.35 dBm			M2		1	2.4 GHz	-42.55 dBm			M3		1	2.39 GHz	-51.10 dBm			M4		1	2.31 GHz	-58.90 dBm			M5		1	2.399762 GHz	-42.07 dBm		
Type	Ref	Trc	X-value	Y-value	Function	Function Result																																							
M1		1	2.41138 GHz	-7.35 dBm																																									
M2		1	2.4 GHz	-42.55 dBm																																									
M3		1	2.39 GHz	-51.10 dBm																																									
M4		1	2.31 GHz	-58.90 dBm																																									
M5		1	2.399762 GHz	-42.07 dBm																																									
CH11	Spectrum Ref Level 20.00 dBm Att 30 dB Offset 0.50 dB RBW 100 kHz SWT 113.8 μs VBW 300 kHz Mode Auto FFT Count 300/300 1Pk Max 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm M1[1] M2[1] -3.50 dBm 2.4569670 GHz -50.00 dBm 2.4835000 GHz D1 -23.500 dBm Start 2.452 GHz 691 pts Stop 2.5 GHz Marker <table><tr><th>Type</th><th>Ref</th><th>Trc</th><th>X-value</th><th>Y-value</th><th>Function</th><th>Function Result</th></tr><tr><td>M1</td><td></td><td>1</td><td>2.456967 GHz</td><td>-3.50 dBm</td><td></td><td></td></tr><tr><td>M2</td><td></td><td>1</td><td>2.4835 GHz</td><td>-50.00 dBm</td><td></td><td></td></tr><tr><td>M3</td><td></td><td>1</td><td>2.5 GHz</td><td>-57.86 dBm</td><td></td><td></td></tr><tr><td>M4</td><td></td><td>1</td><td>2.4836522 GHz</td><td>-48.85 dBm</td><td></td><td></td></tr></table>			Type	Ref	Trc	X-value	Y-value	Function	Function Result	M1		1	2.456967 GHz	-3.50 dBm			M2		1	2.4835 GHz	-50.00 dBm			M3		1	2.5 GHz	-57.86 dBm			M4		1	2.4836522 GHz	-48.85 dBm									
Type	Ref	Trc	X-value	Y-value	Function	Function Result																																							
M1		1	2.456967 GHz	-3.50 dBm																																									
M2		1	2.4835 GHz	-50.00 dBm																																									
M3		1	2.5 GHz	-57.86 dBm																																									
M4		1	2.4836522 GHz	-48.85 dBm																																									

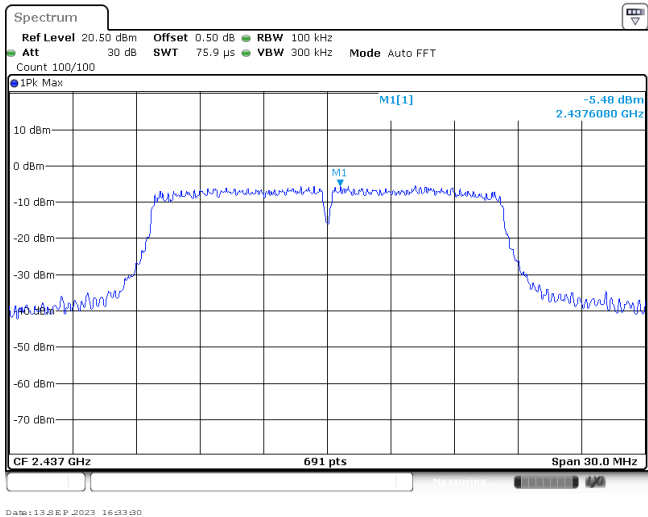
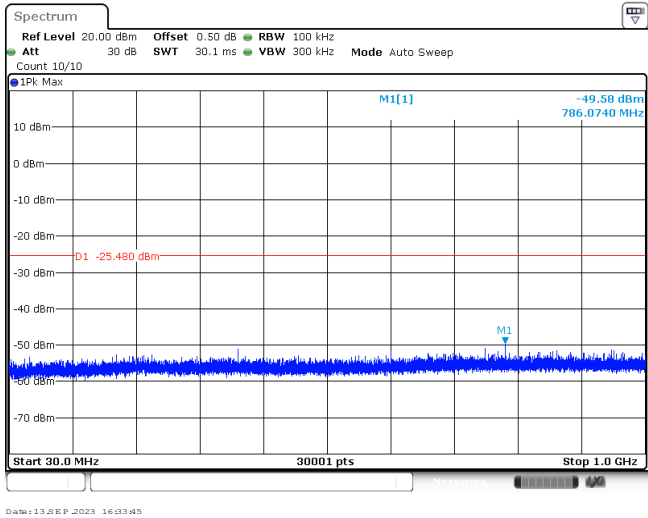
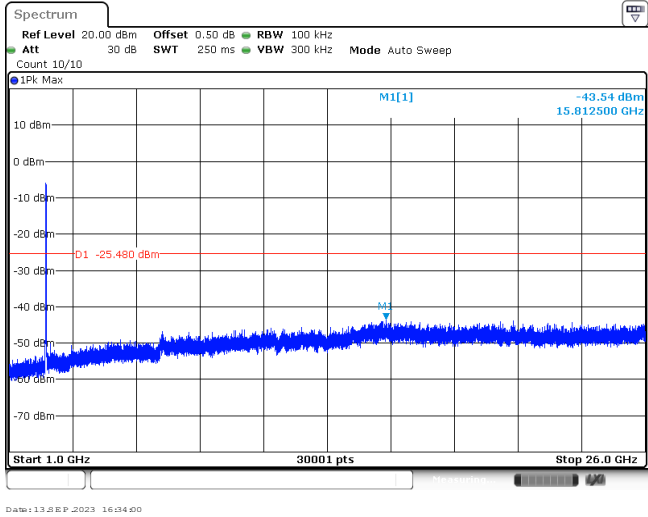
Test Item:	Bandedge	Type:	802.11 n(HT40)																																									
CH03	Spectrum Ref Level 20.00 dBm Offset 0.50 dB RBW 100 kHz Att 30 dB SWT 303.4 μs VBW 300 kHz Mode Auto FFT Count 263/300 1Pk Max 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm M1[1] M2[1] M3 M4 M5 -6.94 dBm 2.427000 GHz -45.29 dBm 2.400000 GHz -26.940 dBm Start 2.31 GHz 691 pts Stop 2.442 GHz Marker <table><tr><th>Type</th><th>Ref</th><th>Trc</th><th>X-value</th><th>Y-value</th><th>Function</th><th>Function Result</th></tr><tr><td>M1</td><td></td><td>1</td><td>2.427 GHz</td><td>-6.94 dBm</td><td></td><td></td></tr><tr><td>M2</td><td></td><td>1</td><td>2.4 GHz</td><td>-45.29 dBm</td><td></td><td></td></tr><tr><td>M3</td><td></td><td>1</td><td>2.39 GHz</td><td>-49.65 dBm</td><td></td><td></td></tr><tr><td>M4</td><td></td><td>1</td><td>2.31 GHz</td><td>-58.16 dBm</td><td></td><td></td></tr><tr><td>M5</td><td></td><td>1</td><td>2.39073 GHz</td><td>-42.94 dBm</td><td></td><td></td></tr></table>	Type	Ref	Trc	X-value	Y-value	Function	Function Result	M1		1	2.427 GHz	-6.94 dBm			M2		1	2.4 GHz	-45.29 dBm			M3		1	2.39 GHz	-49.65 dBm			M4		1	2.31 GHz	-58.16 dBm			M5		1	2.39073 GHz	-42.94 dBm			
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CH09	Spectrum Ref Level 20.00 dBm Offset 0.50 dB RBW 100 kHz Att 30 dB SWT 1.1 ms VBW 300 kHz Mode Auto Sweep Count 300/300 1Pk Max 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm M1[1] M2[1] M3 M4 -5.97 dBm 2.4557660 GHz -48.07 dBm 2.4835000 GHz -25.970 dBm Start 2.432 GHz 691 pts Stop 2.5 GHz Marker <table><tr><th>Type</th><th>Ref</th><th>Trc</th><th>X-value</th><th>Y-value</th><th>Function</th><th>Function Result</th></tr><tr><td>M1</td><td></td><td>1</td><td>2.455766 GHz</td><td>-5.97 dBm</td><td></td><td></td></tr><tr><td>M2</td><td></td><td>1</td><td>2.4835 GHz</td><td>-48.07 dBm</td><td></td><td></td></tr><tr><td>M3</td><td></td><td>1</td><td>2.5 GHz</td><td>-50.75 dBm</td><td></td><td></td></tr><tr><td>M4</td><td></td><td>1</td><td>2.4845275 GHz</td><td>-44.93 dBm</td><td></td><td></td></tr></table>	Type	Ref	Trc	X-value	Y-value	Function	Function Result	M1		1	2.455766 GHz	-5.97 dBm			M2		1	2.4835 GHz	-48.07 dBm			M3		1	2.5 GHz	-50.75 dBm			M4		1	2.4845275 GHz	-44.93 dBm										
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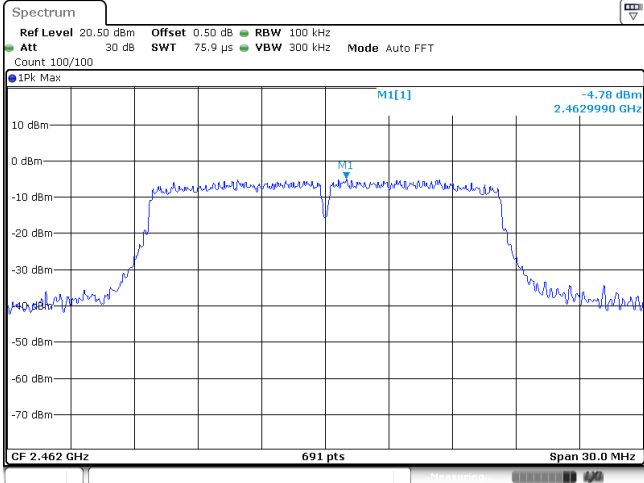
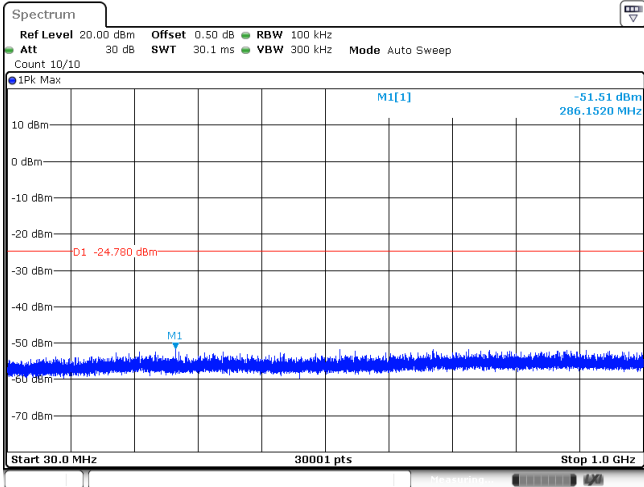
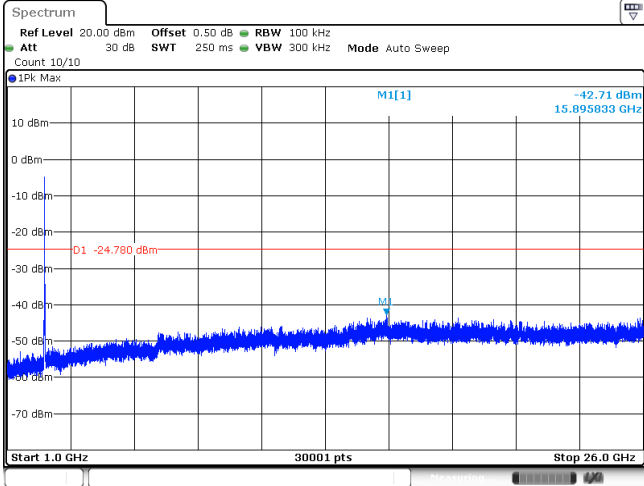
Test Item:	SE	Type:	802.11b
CH01 Reference level			
CH01 30MHz~1000MHz			
CH01 1GHz~26GHz			

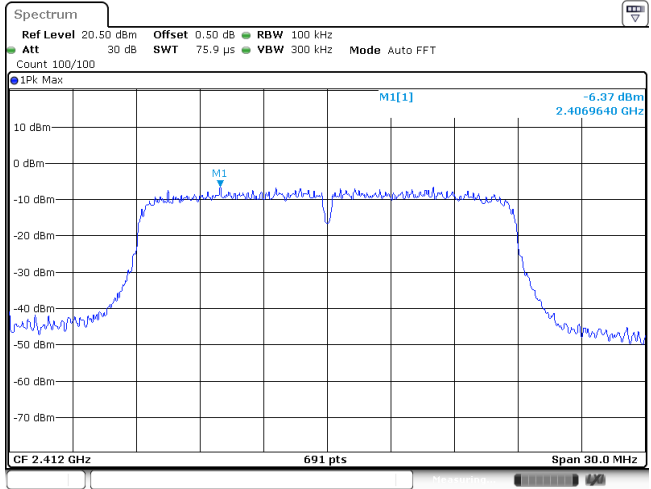
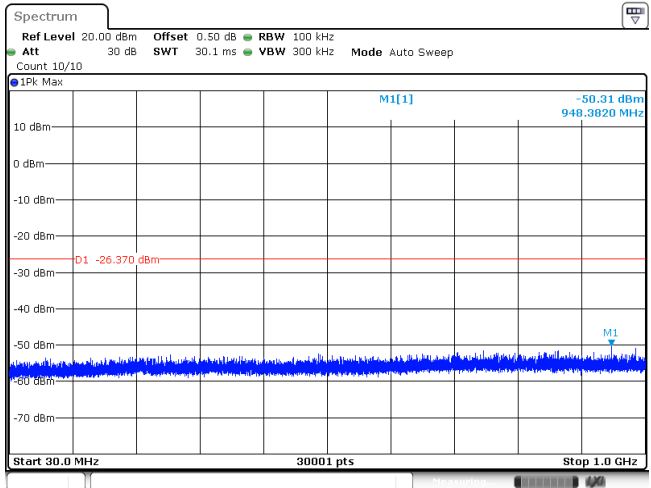
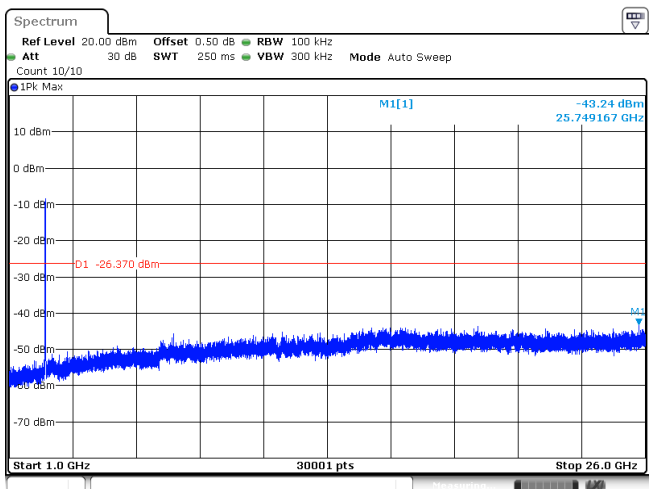
CH06 Reference level	 The spectrum plot shows a single signal peak at 2.437 GHz. The peak level is 0.49 dBm. The plot is titled 'Spectrum' and includes parameters: Ref Level 20.50 dBm, Att 30 dB, Offset 0.50 dB, RBW 100 kHz, Mode Auto FFT, Count 100/100, and Span 30.0 MHz. The x-axis is labeled 'CF 2.437 GHz' and the y-axis is labeled 'dBm'.
CH06 30MHz~1000MHz	 The spectrum plot shows a signal at 668.0290 MHz. The peak level is -51.51 dBm. The plot is titled 'Spectrum' and includes parameters: Ref Level 20.00 dBm, Att 30 dB, Offset 0.50 dB, RBW 100 kHz, Mode Auto Sweep, Count 10/10, and Span 30.0 MHz. The x-axis is labeled 'Start 30.0 MHz' and the y-axis is labeled 'dBm'.
CH06 1GHz~26GHz	 The spectrum plot shows a signal at 15.854167 GHz. The peak level is -43.27 dBm. The plot is titled 'Spectrum' and includes parameters: Ref Level 20.00 dBm, Att 30 dB, Offset 0.50 dB, RBW 100 kHz, Mode Auto Sweep, Count 10/10, and Span 30.0 MHz. The x-axis is labeled 'Start 1.0 GHz' and the y-axis is labeled 'dBm'.

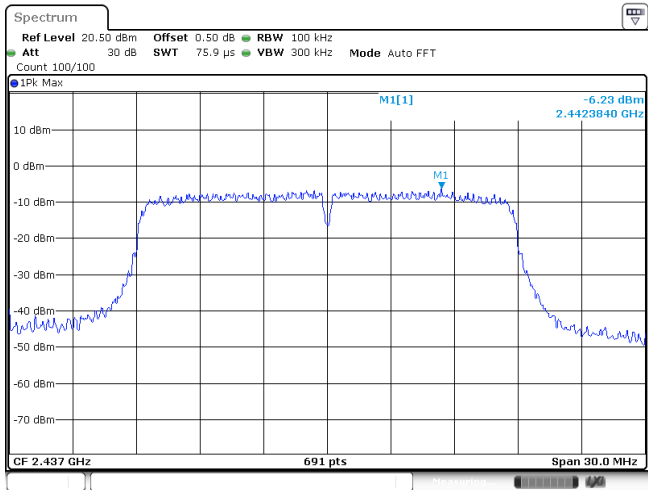
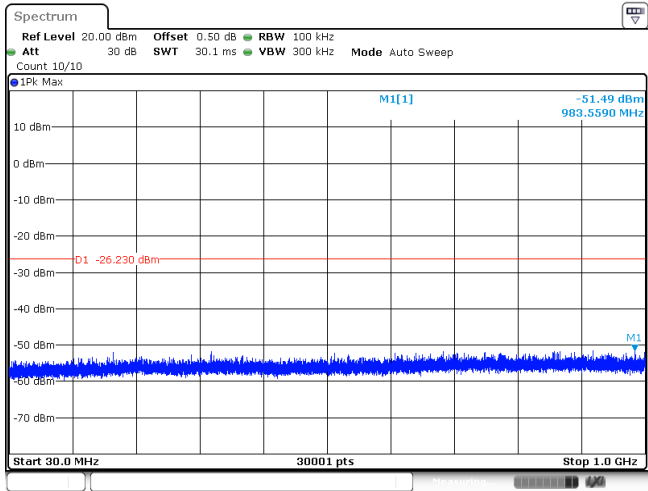
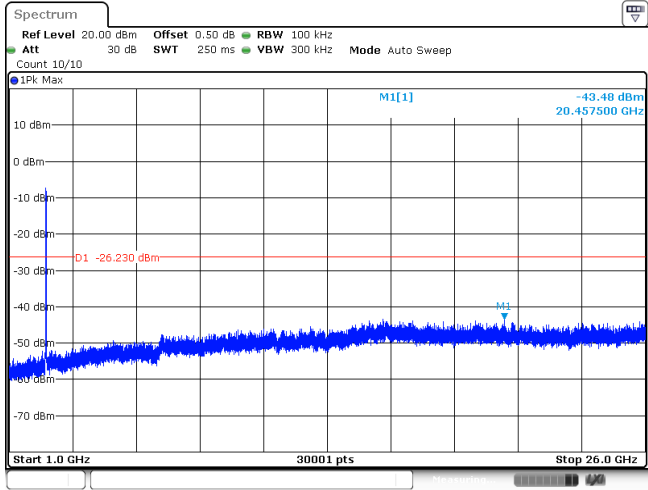
CH11 Reference level	
CH11 30MHz~1000MHz	
CH11 1GHz~26GHz	

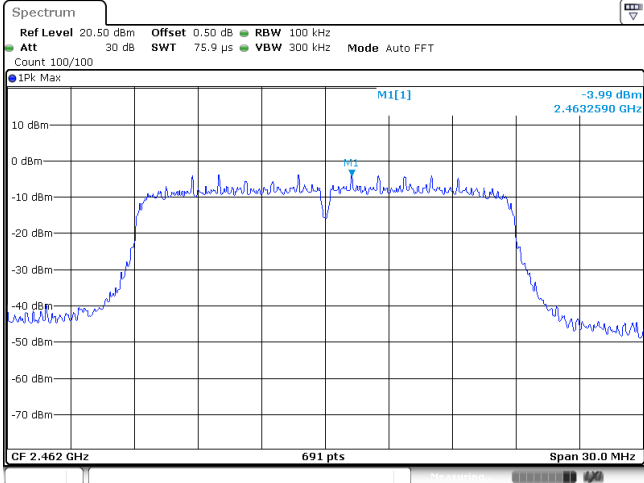
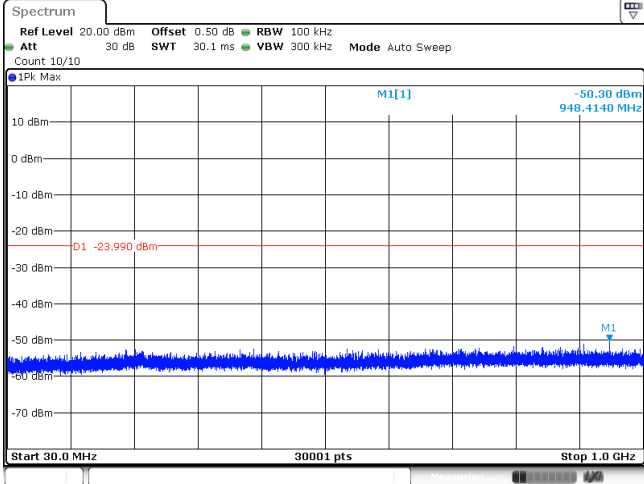
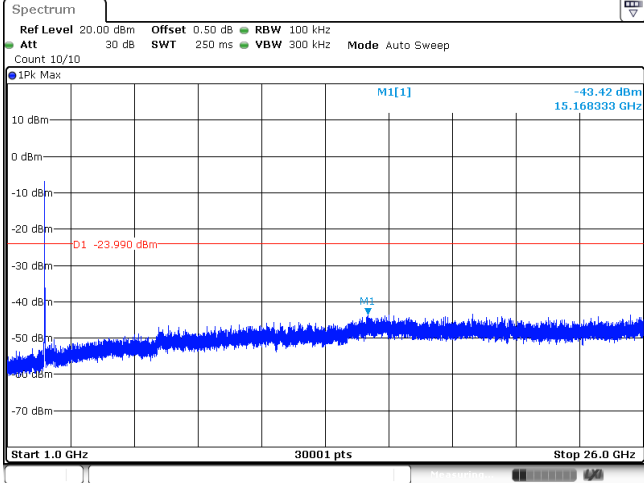
Test Item:	SE	Type:	802.11g
CH01 Reference level			
CH01 30MHz~1000MHz			
CH01 1GHz~26GHz			

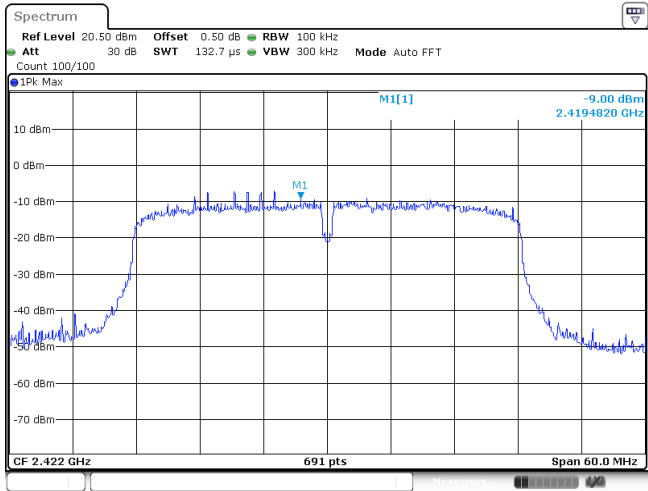
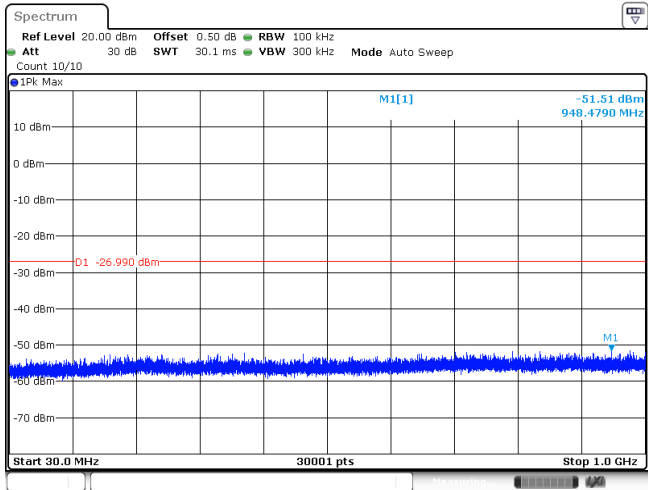
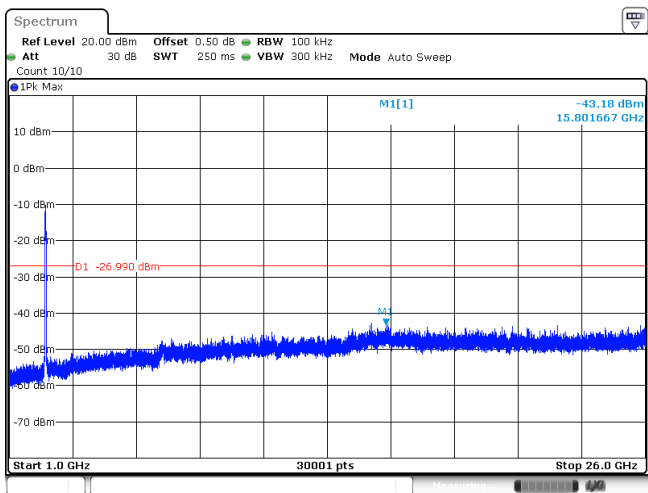
CH06 Reference level	
CH06 30MHz~1000MHz	
CH06 1GHz~26GHz	

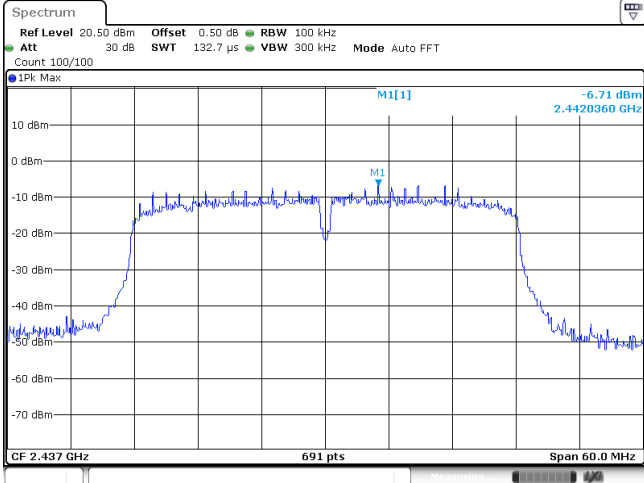
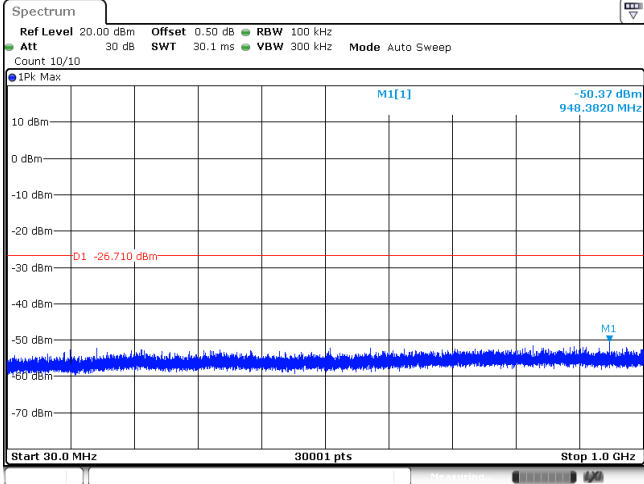
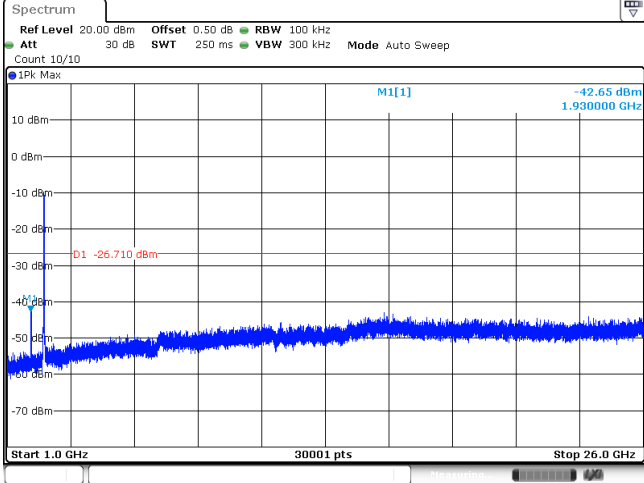
CH11 Reference level	
CH11 30MHz~1000MHz	
CH11 1GHz~26GHz	

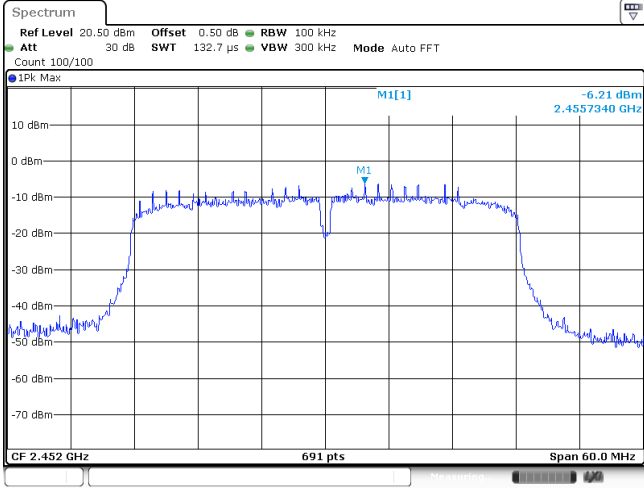
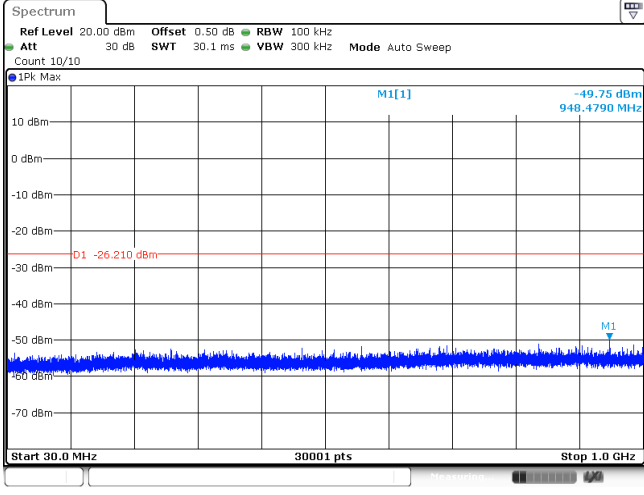
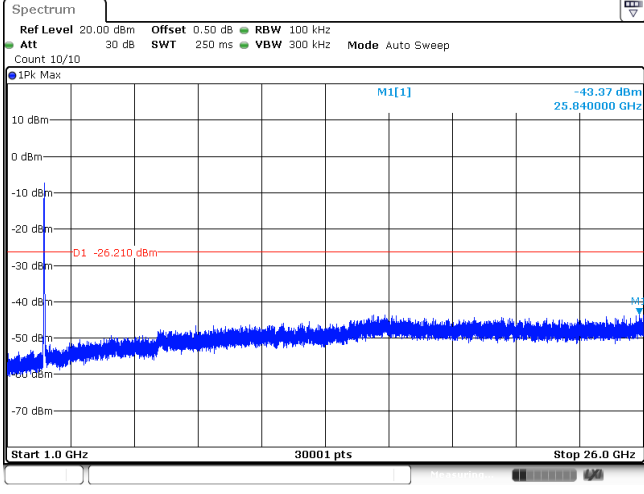
Test Item:	SE	Type:	802.11n(HT20)
CH01 Reference level			
CH01 30MHz~1000MHz			
CH01 1GHz~26GHz			

CH06 Reference level	
CH06 30MHz~1000MHz	
CH06 1GHz~26GHz	

CH11 Reference level	
CH11 30MHz~1000MHz	
CH11 1GHz~26GHz	

Test Item:	SE	Type:	802.11n(HT40)
CH03 Reference level			
CH03 30MHz~1000MHz			
CH03 1GHz~26GHz			

CH06 Reference level	 Spectrum Ref Level 20.50 dBm Offset 0.50 dB RBW 100 kHz Att 30 dB SWT 132.7 μs VBW 300 kHz Mode Auto FFT Count 100/100 1Pk Max M1[1] -6.71 dBm 2.420360 GHz CF 2.417 GHz 691 pts Span 60.0 MHz Date: 13 SEP 2023 16:44:16
CH06 30MHz~1000MHz	 Spectrum Ref Level 20.00 dBm Offset 0.50 dB RBW 100 kHz Att 30 dB SWT 30.1 ms VBW 300 kHz Mode Auto Sweep Count 10/10 1Pk Max M1[1] -50.37 dBm 948.3820 MHz D1 -26.710 dBm Start 30.0 MHz 30001 pts Stop 1.0 GHz Date: 13 SEP 2023 16:44:31
CH06 1GHz~26GHz	 Spectrum Ref Level 20.00 dBm Offset 0.50 dB RBW 100 kHz Att 30 dB SWT 250 ms VBW 300 kHz Mode Auto Sweep Count 10/10 1Pk Max M1[1] -42.65 dBm 1.930000 GHz D1 -26.710 dBm Start 1.0 GHz 30001 pts Stop 26.0 GHz Date: 13 SEP 2023 16:44:47

CH09 Reference level	
CH09 30MHz~1000MHz	
CH09 1GHz~26GHz	

-----End of Report-----