

MEASUREMENT REPORT

FCC PART 15C / WLAN 802.11b/g/n/ax

FCC ID: LNQWEB7200

Applicant: Actiontec Electronics Inc

Application Type: Certification

Product: WiFi 6 Extender

Model No.: WEB7200

Brand Name: Actiontec

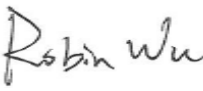
FCC Classification: Digital Transmission System (DTS)

FCC Rule Part(s): Part 15 Subpart C (Section 15.247)

Test Procedure(s): ANSI C63.10-2013

Test Date: April 20 ~ June 08, 2021

Reviewed By: 
Sunny Sun

Approved By: 
Robin Wu



The test results relate only to the samples tested.

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.10-2013. Test results reported herein relate only to the item(s) tested.

The test report shall not be reproduced except in full without the written approval of MRT Technology (Suzhou) Co., Ltd.

Revision History

Report No.	Version	Description	Issue Date	Note
2102RSU047-U2	Rev. 01	Initial Report	07-08-2021	Valid

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1. General Information

1.1. Applicant

Actiontec Electronics Inc
3301 Olcott St, Santa Clara, CA 95054, United States

1.2. Manufacturer

Actiontec Electronics Inc
3301 Olcott St, Santa Clara, CA 95054, United States

1.3. Testing Facility

☒	Test Site - MRT Suzhou Laboratory		
	Laboratory Location (Suzhou - Wuzhong)		
	D8 Building, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China		
	Laboratory Location (Suzhou - SIP)		
	4b Building, Liando U Valley, No.200 Xingpu Rd., Shengpu Town, Suzhou Industrial Park, China		
	Laboratory Accreditations		
A2LA: 3628.01		CNAS: L10551	
FCC: CN1166		ISED: CN0001	
VCCI: R-20025, G-20034, C-20020, T-20020			
☐	Test Site - MRT Shenzhen Laboratory		
	Laboratory Location (Shenzhen)		
	1G, Building A, Junxiangda Building, Zhongshanyuan Road West, Nanshan District, Shenzhen, China		
	Laboratory Accreditations		
	A2LA: 3628.02		CNAS: L10551
	FCC: CN1284		ISED: CN0105
☐	Test Site - MRT Taiwan Laboratory		
	Laboratory Location (Taiwan)		
	No. 38, Fuxing 2nd Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.)		
	Laboratory Accreditations		
	TAF: L3261-190725		
FCC: 291082, TW3261		ISED: TW3261	

1.4. Product Information

Product Name	WiFi 6 Extender
Model No.	WEB7200
Brand Name	Actiontec
Operating Temperature	0 ~ 40°C
Wi-Fi Specification	802.11a/b/g/n/ac/ax
Antenna Information	Refer to section 1.6
Accessories	
AC/DC Adapter 1#	Model: MS-V1500R120-018H0-US Input: 100-240V ~ 50/60Hz, 0.6A MAX Output: 12V, 1.5A
AC/DC Adapter 2#	Model: RD1201500-C55-153MG Input: 100-240V ~ 50-60Hz 0.6A Output: 12V, 1.5A
AC/DC Adapter 3#	Model: ADS024T-W 120150 Input: 100-240V ~ 50-60Hz 0.6A Output: 12V, 1.5A

1.5. Radio Specification under Test

Frequency Range	802.11b/g/n-HT20/ax-HE20: 2412 ~ 2462 MHz 802.11n-HT40/ax-HE40: 2422 ~ 2452 MHz
Channel Number	802.11b/g/n-HT20/ax-HE20: 11 802.11n-HT40/ax-HE40: 7
Type of Modulation	802.11b: DSSS 802.11g/n: OFDM 802.11ax: OFDMA
Data Rate	802.11b: 1/2/5.5/11Mbps 802.11g: 6/9/12/18/24/36/48/54Mbps 802.11n: up to 300Mbps 802.11ax: up to 573.6Mbps

1.6. Description of Available Antennas

Antenna Type	Ant Port	Frequency Band (GHz)	T _x Paths	Antenna Gain (dBi)	Directional Gain (dBi)	
					For Power	For PSD
PCB Antenna	DB1	2.4 ~ 2.5	2	4.56	4.56	7.57
	DB2	5.1 ~ 5.85		4.32	4.32	7.33
Onboard Metal DFS Antenna	DFS	5.1 ~ 5.85	N/A	4.32	--	--

Remark:

1. The EUT supports Cyclic Delay Diversity (CDD) mode.
2. The information of EUT was provided by the manufacturer, and the accuracy of the information shall be the responsibility of the manufacturer.
3. Onboard Metal DFS Antenna only for receive to detect radar signals.

1.7. Working Frequencies for this report

802.11b/g/n-HT20/ax-HE20

Channel	Frequency	Channel	Frequency	Channel	Frequency
01	2412 MHz	02	2417 MHz	03	2422 MHz
04	2427 MHz	05	2432 MHz	06	2437 MHz
07	2442 MHz	08	2447 MHz	09	2452 MHz
10	2457 MHz	11	2462 MHz	--	--

802.11n-HT40/ax-HE40

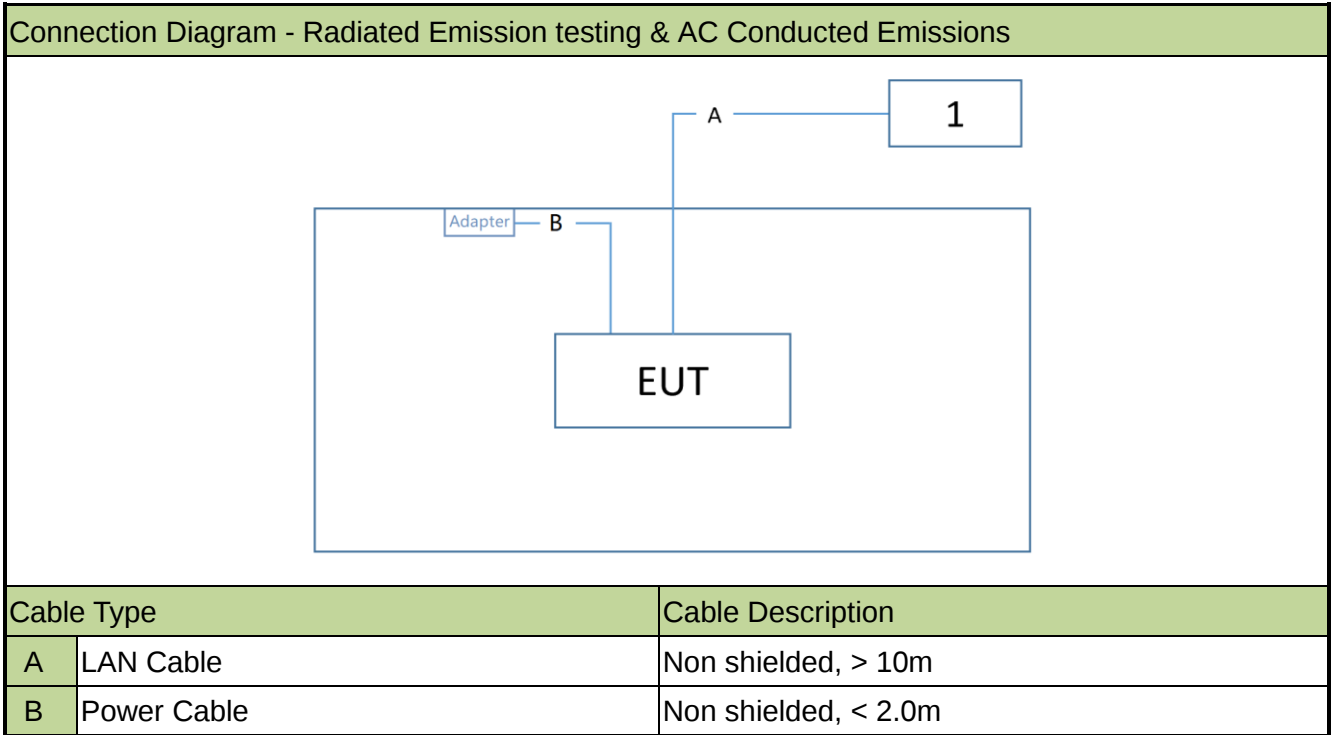
Channel	Frequency	Channel	Frequency	Channel	Frequency
03	2422 MHz	04	2427 MHz	05	2432 MHz
06	2437 MHz	07	2442 MHz	08	2447 MHz
09	2452 MHz	--	--	--	--

1.8. Test Mode

Test Mode	Mode 1: Transmit by 802.11b (1Mbps)
	Mode 2: Transmit by 802.11g (6Mbps)
	Mode 3: Transmit by 802.11n-HT20 (MCS0)
	Mode 4: Transmit by 802.11n-HT40 (MCS0)
	Mode 5: Transmit by 802.11ax-HE20 (MCS0)
	Mode 6: Transmit by 802.11ax-HE40 (MCS0)

1.9. Configuration of Test System

The device was tested per the guidance ANSI C63.10: 2013 was used to reference the appropriate EUT setup for radiated emissions testing and AC line conducted testing.



Note: We only selected AC/DC Adapter 1# for RF testing.

1.10. Test System Details

Product	Manufacturer	Model No.
1	Notebook	Dell
		P62G

1.11. Description of Test Software

The test utility software used during testing was "QATool_Dbg.exe", and the version was 0.0.2.33. Power parameter value refers to operation description.

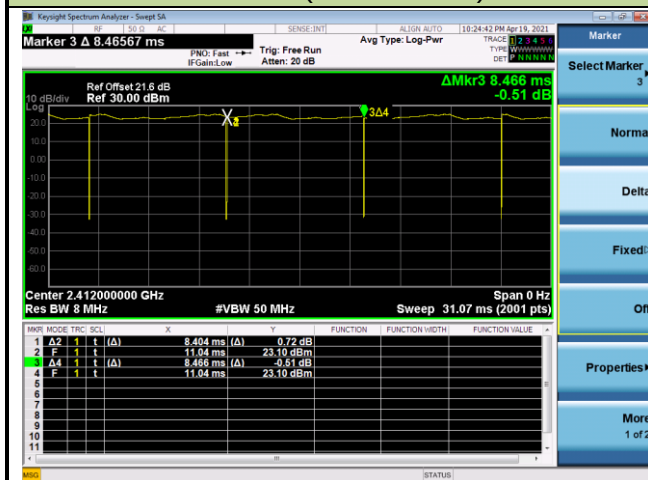
1.12. Duty Cycle

2.4GHz WLAN (DTS) operation is possible in 20MHz channel bandwidths. The maximum achievable duty cycles for all modes were determined based on measurements performed on a spectrum analyzer in zero-span mode with RBW = 8MHz, VBW = 50MHz. The RBW and VBW were both greater than 50/T, where T is the minimum transmission duration, and the number of sweep points across T was greater than 100. The duty cycles are as follows:

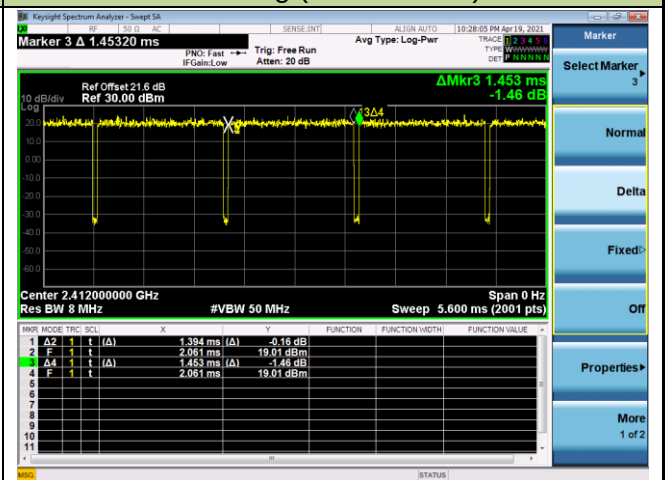
Test Mode	Duty Cycle
802.11b	99.03%
802.11g	95.94%
802.11n-HT20	95.75%
802.11n-HT40	91.67%
802.1ax-HE20	94.52%
802.11ax-HE40	90.14%

Duty Cycle (T = Transmission Duration)

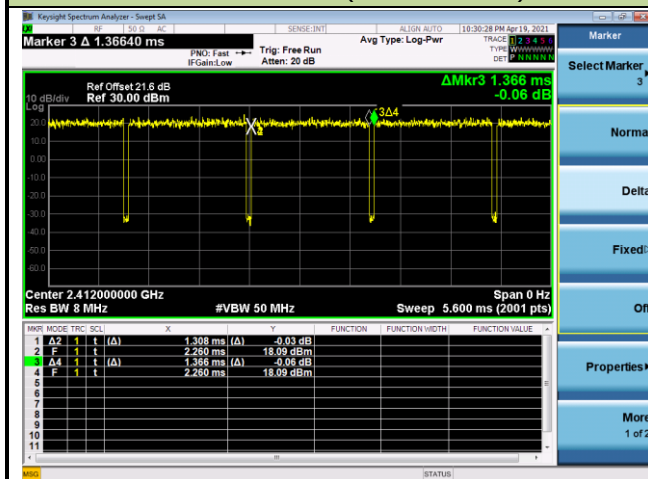
802.11b (T = 8.404ms)



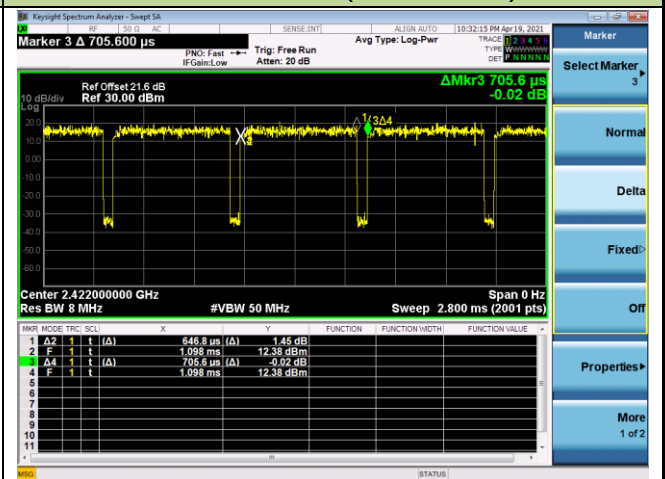
802.11g (T = 1.394ms)

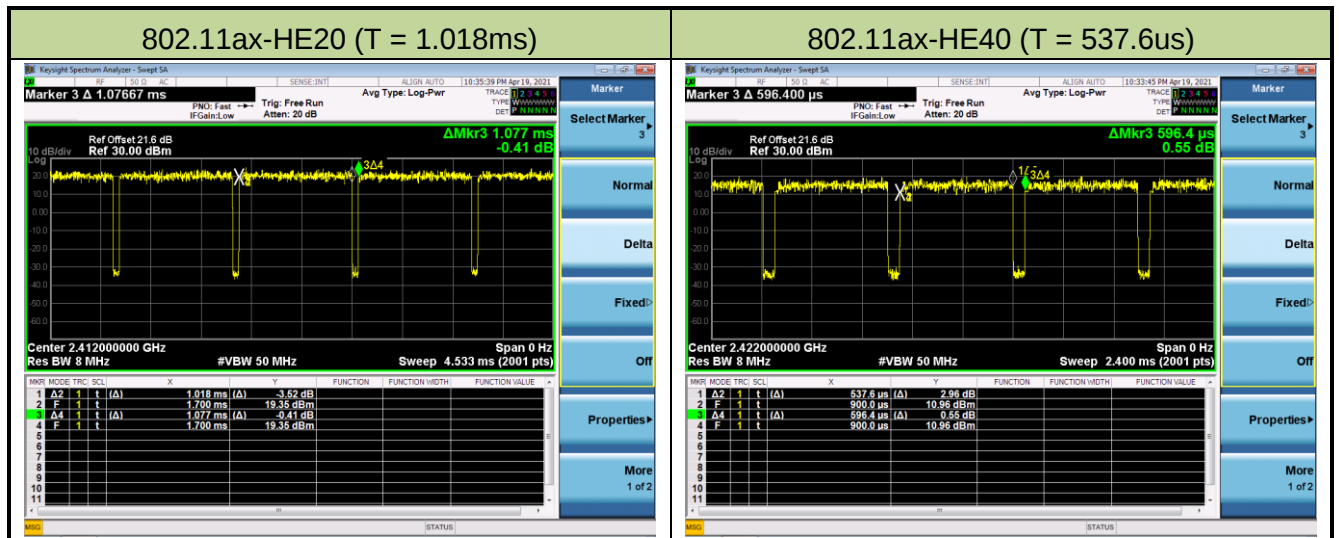


802.11n-HT20 (T = 1.308ms)



802.11n-HT40 (T = 646.8us)





1.13. EMI Suppression Device(s)/Modifications

No EMI suppression device(s) were added and/or no modifications were made during testing.

1.14. Test Environment Condition

Ambient Temp.	15 ~ 35°C
Relative Humidity	20 ~ 75%RH

2. ANTENNA REQUIREMENTS

Excerpt from §15.203 of the FCC Rules/Regulations:

“An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can 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 shall be considered sufficient to comply with the provisions of this section.”

- The antenna of the device is **permanently attached**.
- There are no provisions for connection to an external antenna.

Conclusion:

The unit complies with the requirement of §15.203.

3. TEST EQUIPMENT CALIBRATION DATE

Conducted Emission (WZ-SR2)

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EMI Test Receiver	R&S	ESR3	MRTSUE06185	1 year	2022/01/12
Two-Line V-Network	R&S	ENV216	MRTSUE06002	1 year	2021/09/09
Thermal Hygrometer	testo	608-H1	MRTSUE06404	1 year	2021/07/26
Shielding Room	MIX-BEP	Chamber-SR2	MRTSUE06215	N/A	N/A

Conducted Emission (SIP-SR2)

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EMI Test Receiver	R&S	ESR3	MRTSUE06613	1 year	2021/07/02
Two-Line V-Network	R&S	ENV216	MRTSUE06003	1 year	2021/09/09
Thermal Hygrometer	testo	608-H1	MRTSUE06621	1 year	2021/12/03

Radiated Emission (WZ-AC1)

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EMI Test Receiver	R&S	ESR7	MRTSUE06001	1 year	2022/01/04
PXA Signal Analyzer	Keysight	N9030B	MRTSUE06395	1 year	2021/08/30
Loop Antenna	Schwarzbeck	FMZB 1519	MRTSUE06025	1 year	2021/11/08
Bilog Period Antenna	Schwarzbeck	VULB 9168	MRTSUE06172	1 year	2021/08/08
Horn Antenna	Schwarzbeck	BBHA 9120D	MRTSUE06023	1 year	2021/09/27
Horn Antenna	Schwarzbeck	BBHA9170	MRTSUE06597	1 year	2021/12/14
Horn Antenna	ETS.LINDGEN	3117	MRTSUE06257	1 year	2021/09/27
Microwave System Amplifier	Agilent	83017A	MRTSUE06076	1 year	2021/11/14
Preamplifier	Schwarzbeck	BBV 9721	MRTSUE06121	1 year	2021/06/09
Thermal Hygrometer	testo	608-H1	MRTSUE06403	1 year	2021/07/26
Anechoic Chamber	TDK	Chamber-AC1	MRTSUE06212	1 year	2021/04/28
Anechoic Chamber	TDK	Chamber-AC1	MRTSUE06212	1 year	2022/04/29

Radiated Emission (WZ-AC2)

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
MXE EMI Receiver	Keysight	N9038A	MRTSUE06125	1 year	2021/07/02
Loop Antenna	Schwarzbeck	FMZB 1519	MRTSUE06025	1 year	2021/11/08
Bilog Period Antenna	Schwarzbeck	VULB 9162	MRTSUE06022	1 year	2021/05/23
Bilog Period Antenna	Schwarzbeck	VULB 9162	MRTSUE06022	1 year	2022/05/24
Broad-Band Horn Antenna	Schwarzbeck	BBHA 9120D	MRTSUE06171	1 year	2021/10/25
Horn Antenna	Schwarzbeck	BBHA9170	MRTSUE06597	1 year	2021/12/14
Horn Antenna	ETS.LINDGEN	3117	MRTSUE06257	1 year	2021/09/27
Broadband Coaxial Preamplifier	Schwarzbeck	BBV 9718	MRTSUE06176	1 year	2021/11/14
Preamplifier	Schwarzbeck	BBV 9721	MRTSUE06121	1 year	2021/06/09
Thermal Hygrometer	Minggao	ETH529	MRTSUE06170	1 year	2021/12/08
Anechoic Chamber	RIKEN	Chamber-AC2	MRTSUE06213	1 year	2021/04/28
Anechoic Chamber	RIKEN	Chamber-AC2	MRTSUE06213	1 year	2022/04/29

Radiated Emission (SIP-AC1)

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EMI Test Receiver	R&S	ESR3	MRTSUE06612	1 year	2021/07/02
EXA Signal Analyzer	Keysight	N9010B	MRTSUE06559	1 year	2021/07/23
Loop Antenna	Schwarzbeck	FMZB 1519	MRTSUE06025	1 year	2021/11/08
Bilog Period Antenna	Schwarzbeck	VULB9168	MRTSUE06645	1 year	2021/08/30
Double Ridged Horn Antenna	R&S	HF907	MRTSUE06610	1 year	2021/08/30
Preamplifier	EMCI	EMC051845SE	MRTSUE06600	1 year	2021/11/12
Thermal Hygrometer	testo	608-H1	MRTSUE06620	1 year	2021/12/03
Anechoic Chamber	RIKEN	SIP-AC1	MRTSUE06554	1 year	2021/12/24

Radiated Emission (SIP-AC2)

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EMI Test Receiver	R&S	ESR3	MRTSUE06613	1 year	2021/07/02
MXA Signal Analyzer	Keysight	N9020B	MRTSUE06604	1 year	2021/09/26
Loop Antenna	Schwarzbeck	FMZB 1519	MRTSUE06025	1 year	2021/11/08
Bilog Period Antenna	Schwarzbeck	VULB9168	MRTSUE06646	1 year	2021/08/30
Horn Antenna	Schwarzbeck	BBHA9120D	MRTSUE06648	1 year	2021/11/26
Horn Antenna	Schwarzbeck	BBHA9170	MRTSUE06599	1 year	2021/11/26
Preamplifier	EMCI	EMC051845SE	MRTSUE06644	1 year	2021/11/12
Preamplifier	EMCI	EMC184045SE	MRTSUE06602	1 year	2021/10/13
Thermal Hygrometer	testo	608-H1	MRTSUE06624	1 year	2021/12/03
Anechoic Chamber	RIKEN	SIP-AC2	MRTSUE06781	1 year	2021/12/24

Radiated Emission (SIP-AC3)

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EMI Test Receiver	R&S	ESR3	MRTSUE06612	1 year	2021/07/02
EXA Signal Analyzer	Keysight	N9010B	MRTSUE06559	1 year	2021/07/23
Loop Antenna	Schwarzbeck	FMZB 1519	MRTSUE06025	1 year	2021/11/08
Bilog Period Antenna	Schwarzbeck	VULB9168	MRTSUE06647	1 year	2021/08/08
Double Ridged Horn Antenna	R&S	HF907	MRTSUE06611	1 year	2021/09/13
Horn Antenna	Schwarzbeck	BBHA9170	MRTSUE06598	1 year	2021/11/26
Preamplifier	EMCI	EMC012645SE	MRTSUE06642	1 year	2022/01/14
Preamplifier	EMCI	EMC184045SE	MRTSUE06641	1 year	2022/01/14
Thermal Hygrometer	testo	608-H1	MRTSUE06622	1 year	2021/12/03
Anechoic Chamber	RIKEN	SIP-AC3	MRTSUE06782	1 year	2021/12/24

Conducted Test Equipment (WZ-TR3)

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EXA Signal Analyzer	Agilent	N9020A	MRTSUE06106	1 year	2021/04/12
EXA Signal Analyzer	Agilent	N9020A	MRTSUE06106	1 year	2022/04/13
EXA Signal Analyzer	Keysight	N9010B	MRTSUE06607	1 year	2022/01/07
Signal Analyzer	R&S	FSV40	MRTSUE06218	1 year	2021/04/12
Signal Analyzer	R&S	FSV40	MRTSUE06218	1 year	2022/04/13
Power Meter	Agilent	U2021XA	MRTSUE06030	1 year	2021/10/22
USB wideband power sensor	Keysight	U2021XA	MRTSUE06446	1 year	2021/08/30
USB wideband power sensor	Keysight	U2021XA	MRTSUE06447	1 year	2021/08/08
Attenuator	MVE	001	MRTSUE06547	NA	NA
Attenuator	MVE	001	MRTSUE06529	NA	NA
Attenuator	MVE	001	MRTSUE06540	NA	NA
Bluetooth Test Set	Anritsu	MT8852B-042	MRTSUE06389	1 year	2021/06/07
Bluetooth Test Set	Anritsu	MT8852B-042	MRTSUE06389	1 year	2022/06/08
Audio Analyzer	Agilent	U8903B	MRTSUE06143	1 year	2021/05/18
Audio Analyzer	Agilent	U8903B	MRTSUE06143	1 year	2022/05/19
Modulation Analyzer	HP	HP8901A	MRTSUE06098	1 year	2021/09/26
Wideband Radio Communication Tester	R&S	CMW 500	MRTSUE06243	1 year	2021/10/20
DC Power Supply	GWINSTEK	DPS-3303C	MRTSUE06064	N/A	N/A
Temperature & Humidity Chamber	BAOYT	BYH-150CL	MRTSUE06051	1 year	2021/10/22
Thermal Hygrometer	testo	608-H1	MRTSUE06401	1 year	2021/07/26

Conducted Test Equipment (SIP-SR5)

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
Signal Analyzer	R&S	FSV40	MRTSUE06218	1 year	2021/04/12
Signal Analyzer	R&S	FSV40	MRTSUE06218	1 year	2022/04/13
PXA Signal Analyzer	Keysight	N9030B	MRTSUE06395	1 year	2021/08/30
USB wideband power sensor	Agilent	U2021XA	MRTSUE06595	1 year	2021/09/26
USB wideband power sensor	Agilent	U2021XA	MRTSUE06596	1 year	2021/09/26
Attenuator	MVE	001	MRTSUE06547	NA	NA
Attenuator	MVE	001	MRTSUE06529	NA	NA
Attenuator	MVE	001	MRTSUE06540	NA	NA
Wideband Radio Communication Tester	R&S	CMW 500	MRTSUE06243	1 year	2021/10/20
Bluetooth Test Set	Anritsu	MT8852B-042	MRTSUE06389	1 year	2021/06/07
Bluetooth Test Set	Anritsu	MT8852B-042	MRTSUE06389	1 year	2022/06/08
Temperature Chamber	BAOYT	BYG-408CS	MRTSUE06847	1 year	2022/02/23
Thermal Hygrometer	testo	622	MRTSUE06629	1 year	2021/11/25

Software	Version	Function
EMI Software	V3	EMI Test Software

4. MEASUREMENT UNCERTAINTY

Where relevant, the following test uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k = 2$.

AC Conducted Emission Measurement
Measurement Uncertainty for a Level of Confidence of 95% ($U=2Uc(y)$): 9kHz~150kHz: 3.74dB 150kHz~30MHz: 3.44dB
Radiated Disturbance
Measurement Uncertainty for a Level of Confidence of 95% ($U=2Uc(y)$): Horizontal: 30MHz~300MHz: 5.04dB 300MHz~1GHz: 4.95dB 1GHz~40GHz: 6.40dB Vertical: 30MHz~300MHz: 5.24dB 300MHz~1GHz: 6.03dB 1GHz~40GHz: 6.40dB
Spurious Emissions, Conducted
Measuring Uncertainty for a Level of Confidence of 95% ($U=2Uc(y)$): 0.78dB
Output Power
Measuring Uncertainty for a Level of Confidence of 95% ($U=2Uc(y)$): 1.13dB
Power Spectrum Density
Measuring Uncertainty for a Level of Confidence of 95% ($U=2Uc(y)$): 1.15dB
Occupied Bandwidth
Measuring Uncertainty for a Level of Confidence of 95% ($U=2Uc(y)$): 0.28%

5. TEST RESULT

5.1. Summary

FCC Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
15.247(a)(2)	6dB Bandwidth	$\geq 500\text{kHz}$	Conducted	Pass	Section 5.2
15.247(b)(3)	Output Power	$\leq 1\text{Watt}$		Pass	Section 5.3
15.247(e)	Power Spectral Density	$\leq 8\text{dBm} / 3\text{kHz}$		Pass	Section 5.4
15.247(d)	Band Edge / Out-of-Band Emissions	$\geq 30\text{dBc}$ (Average)		Pass	Section 5.5
15.205 15.209	General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	Emissions in restricted bands must meet the radiated limits detailed in 15.209	Radiated	Pass	Section 5.6 & 5.7
15.207	AC Conducted Emissions 150kHz - 30MHz	$< \text{FCC 15.207 limits}$	Line Conducted	Pass	Section 5.8

Notes:

- 1) The analyzer plots shown in this section were all taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables and attenuators used as part of the system to connect the EUT to the analyzer at all frequencies of interest.
- 2) Output power test was verified over all data rates of each mode, and then choose the maximum power output (high data rate for 802.11b and low data rate for 802.11g/n/ax) for the final test of each channel.
- 3) Test Item "General Field Strength Limits (Restricted Bands and Radiated Emission Limits)" choose the low data rate for 802.11b, as the harmonic emissions higher than high data rate.
- 4) Test Items "6dB Bandwidth" showed the worst test data in this report.
- 5) EUT supports one configuration only in 802.11ax full RU mode, i.e. 242 tone in 11ax-HE20 and 484 tone in 11ax-HE40.

5.2. 6dB Bandwidth Measurement

5.2.1. Test Limit

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

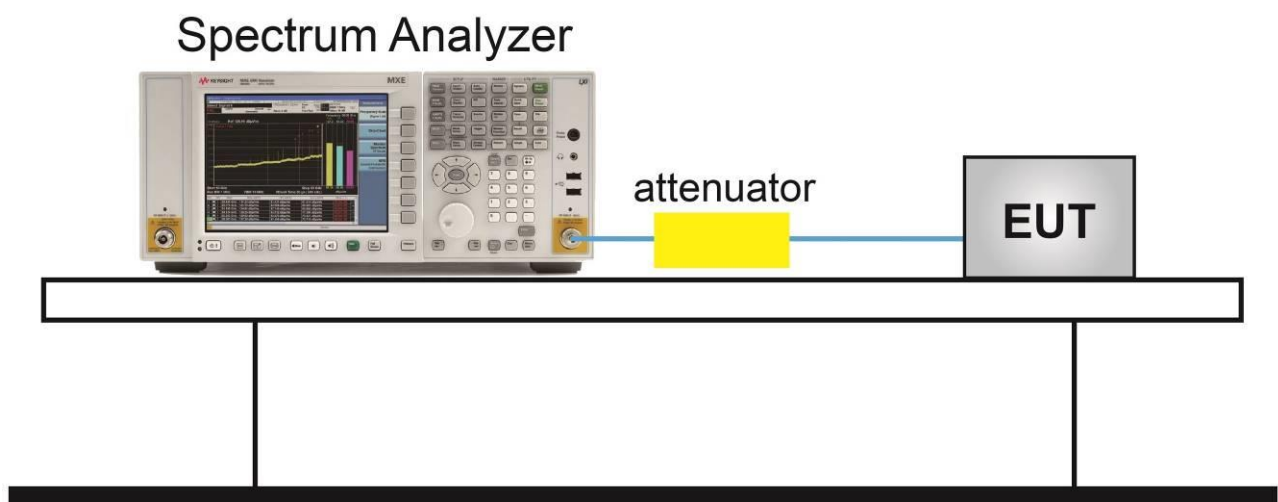
5.2.2. Test Procedure used

ANSI C63.10-2013 - Section 11.8

5.2.3. Test Setting

1. The Spectrum's automatic bandwidth measurement capability was used to perform the 6dB bandwidth measurement. The "X" dB bandwidth parameter was set to $X = 6$. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
2. Set RBW = 100 kHz
3. $VBW \geq 3 \times RBW$
4. Detector = Peak
5. Trace mode = Max hold
6. Sweep = Auto couple
7. Allow the trace was allowed to stabilize

5.2.4. Test Setup



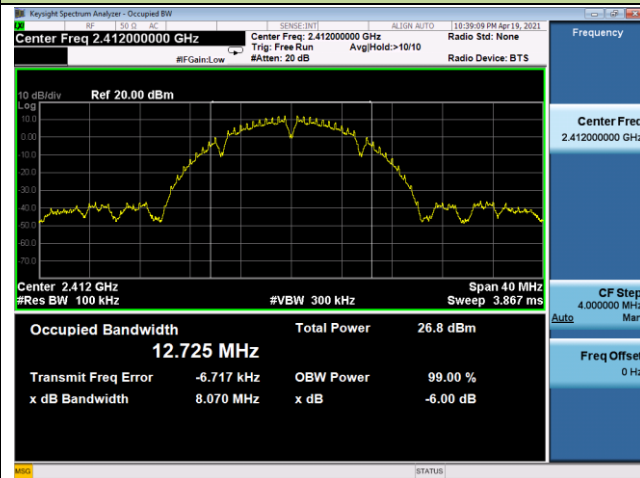
5.2.5.Test Result

Product	WiFi 6 Extender	Test Engineer	Amy Zhang
Test Site	WZ-TR3	Test Date	2021/04/19

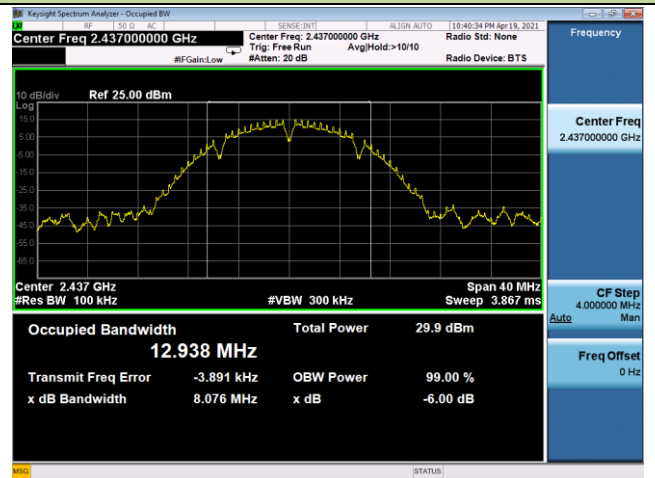
Test Mode	Data Rate / MCS	Channel No.	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)	Result
802.11b	11Mbps	01	2412	8.07	≥ 0.5	Pass
802.11b	11Mbps	06	2437	8.08	≥ 0.5	Pass
802.11b	11Mbps	11	2462	8.07	≥ 0.5	Pass
802.11g	6Mbps	01	2412	15.14	≥ 0.5	Pass
802.11g	6Mbps	06	2437	15.13	≥ 0.5	Pass
802.11g	6Mbps	11	2462	15.14	≥ 0.5	Pass
802.11n-HT20	MCS0	01	2412	16.88	≥ 0.5	Pass
802.11n-HT20	MCS0	06	2437	16.27	≥ 0.5	Pass
802.11n-HT20	MCS0	11	2462	16.30	≥ 0.5	Pass
802.11n-HT40	MCS0	03	2422	35.13	≥ 0.5	Pass
802.11n-HT40	MCS0	06	2437	35.12	≥ 0.5	Pass
802.11n-HT40	MCS0	09	2452	35.12	≥ 0.5	Pass
802.11ax-HE20	MCS0	01	2412	18.73	≥ 0.5	Pass
802.11ax-HE20	MCS0	06	2437	18.14	≥ 0.5	Pass
802.11ax-HE20	MCS0	11	2462	18.82	≥ 0.5	Pass
802.11ax-HE40	MCS0	03	2422	36.60	≥ 0.5	Pass
802.11ax-HE40	MCS0	06	2437	36.26	≥ 0.5	Pass
802.11ax-HE40	MCS0	09	2452	37.13	≥ 0.5	Pass

802.11b 6dB Bandwidth

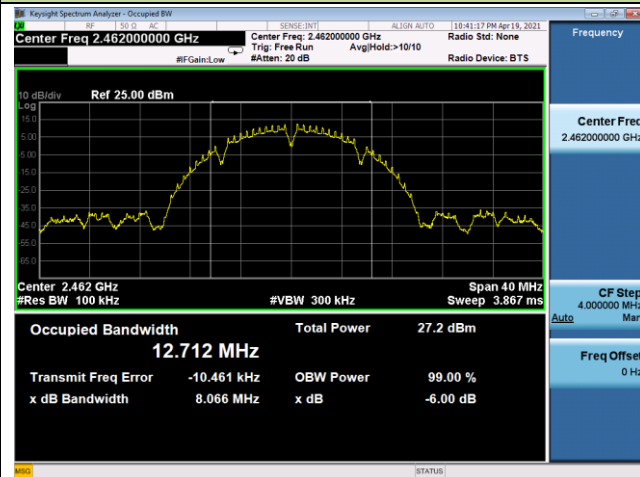
Channel 01 (2412MHz)



Channel 06 (2437MHz)

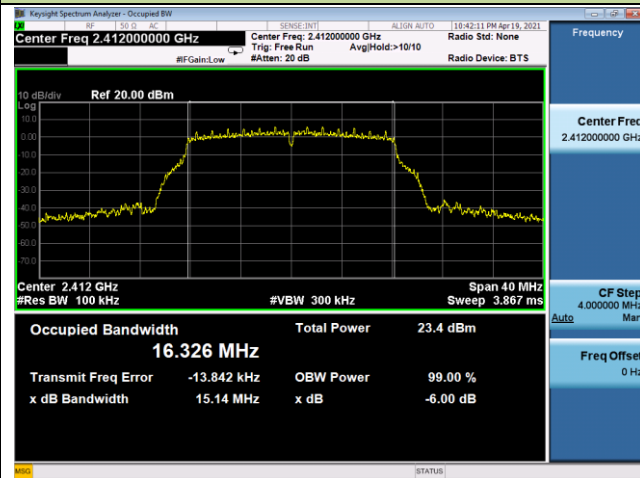


Channel 11 (2462MHz)

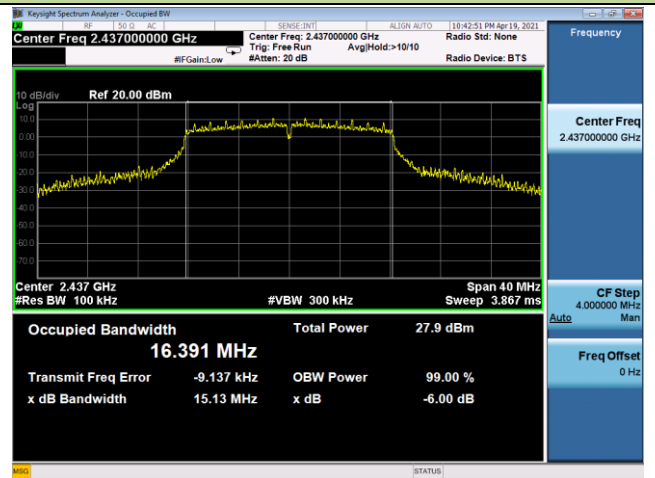


802.11g 6dB Bandwidth

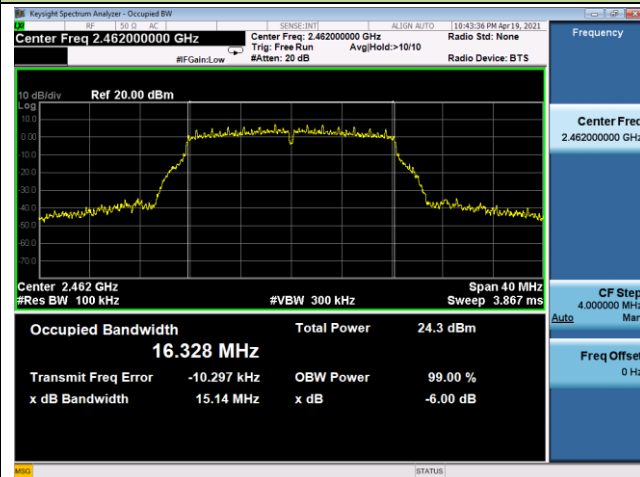
Channel 01 (2412MHz)



Channel 06 (2437MHz)

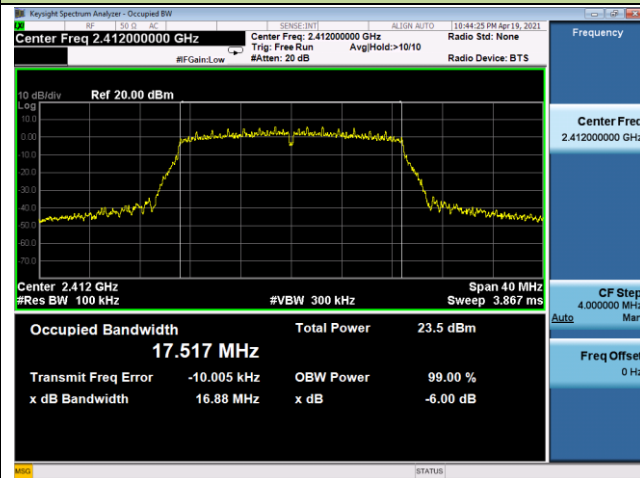


Channel 11 (2462MHz)

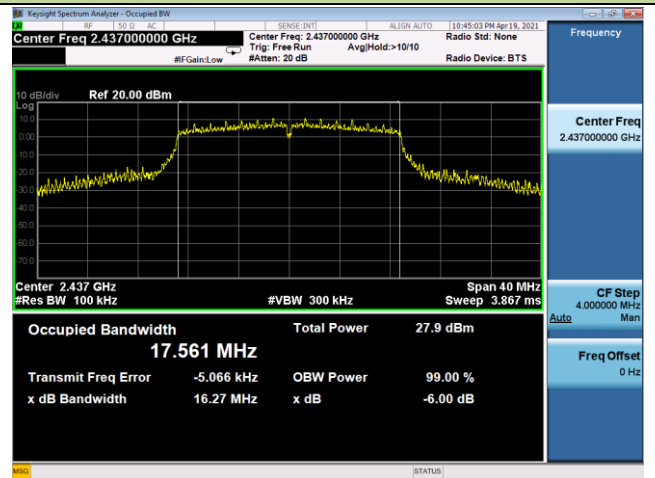


802.11n-HT20 6dB Bandwidth

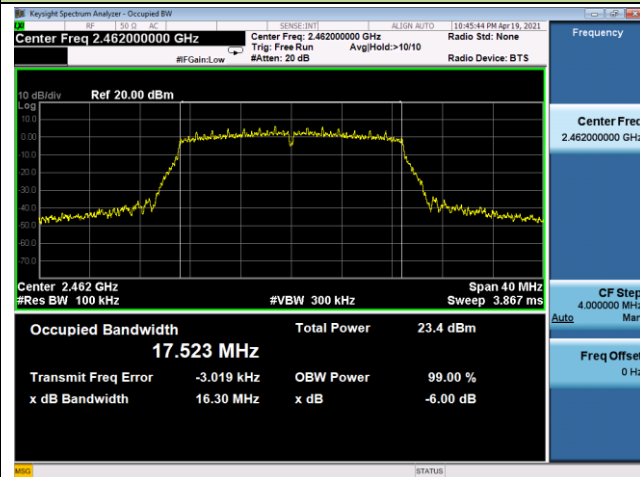
Channel 01 (2412MHz)



Channel 06 (2437MHz)

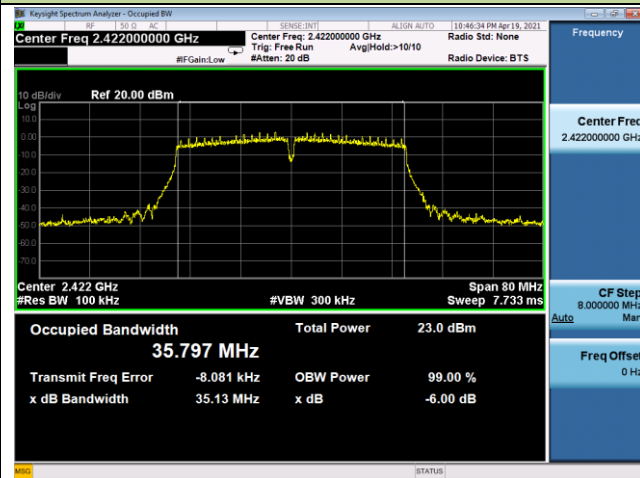


Channel 11 (2462MHz)

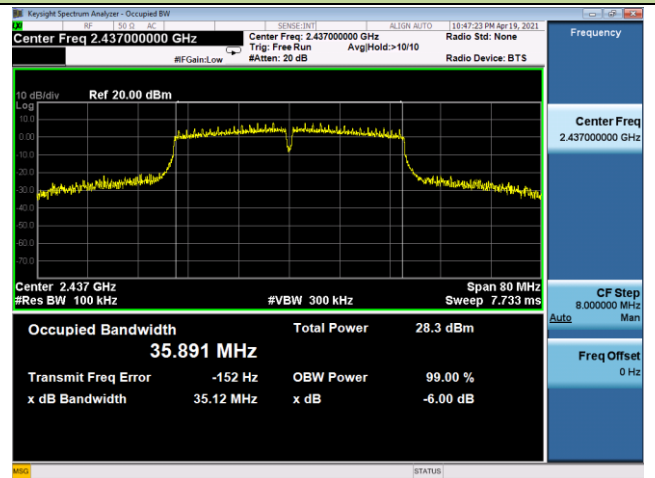


802.11n-HT40 6dB Bandwidth

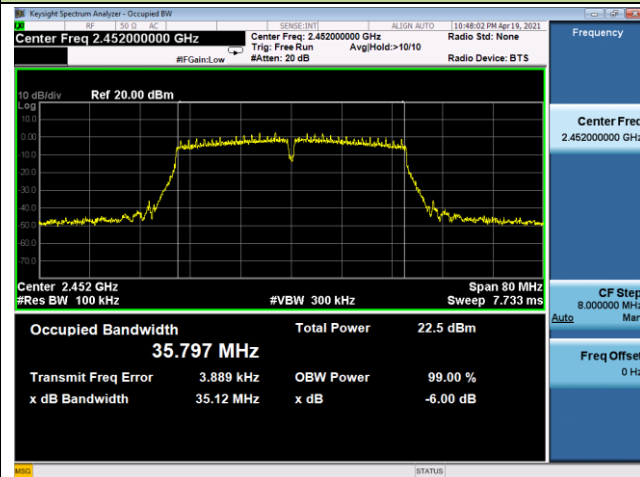
Channel 03 (2422MHz)



Channel 06 (2437MHz)

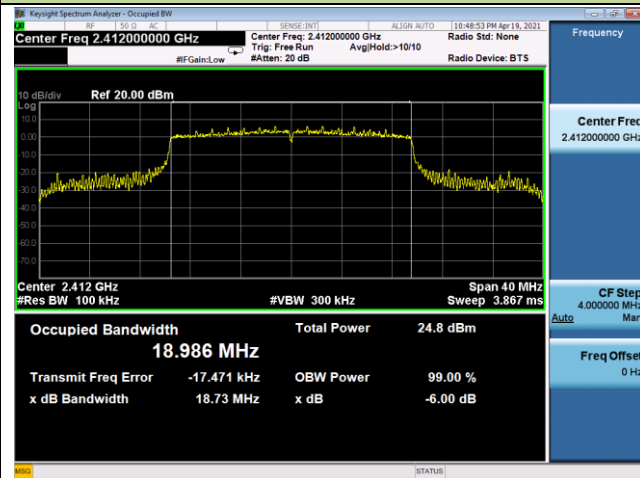


Channel 09 (2452MHz)

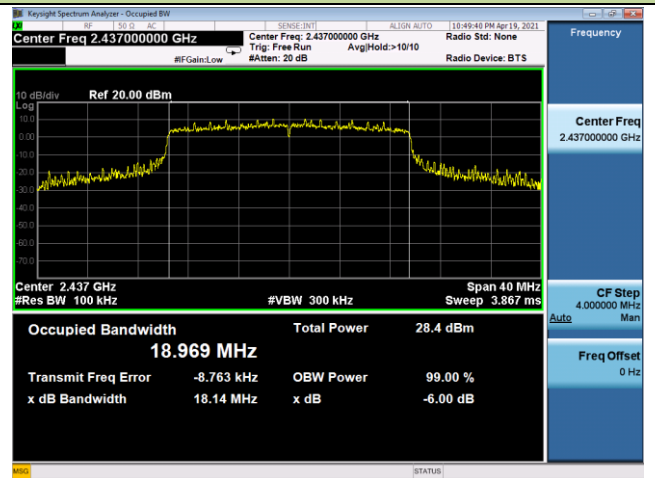


802.11ax-HE20 6dB Bandwidth

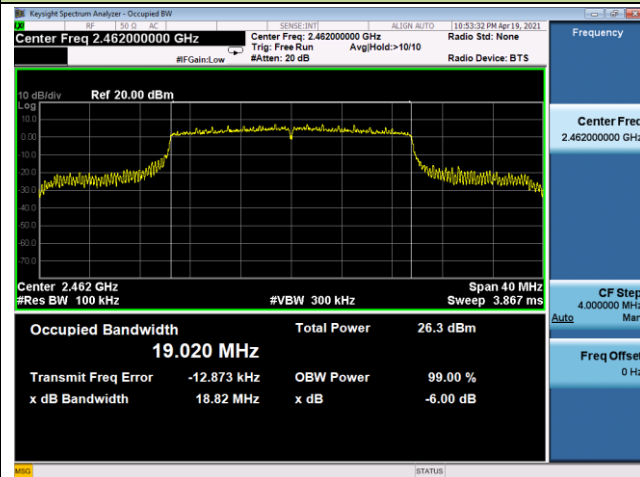
Channel 01 (2412MHz)



Channel 06 (2437MHz)

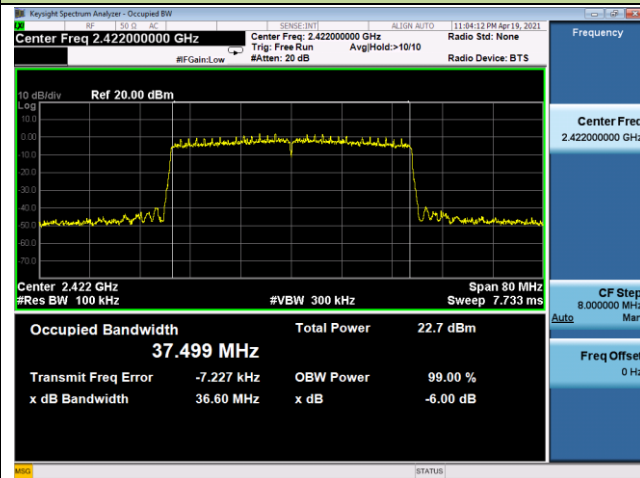


Channel 11 (2462MHz)

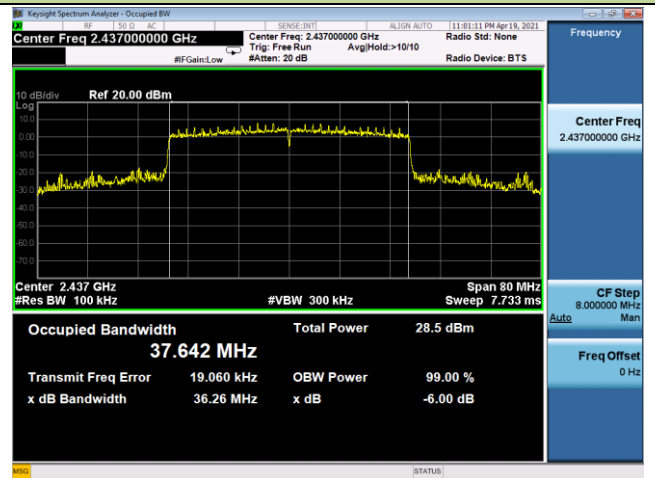


802.11ax-HE40 6dB Bandwidth

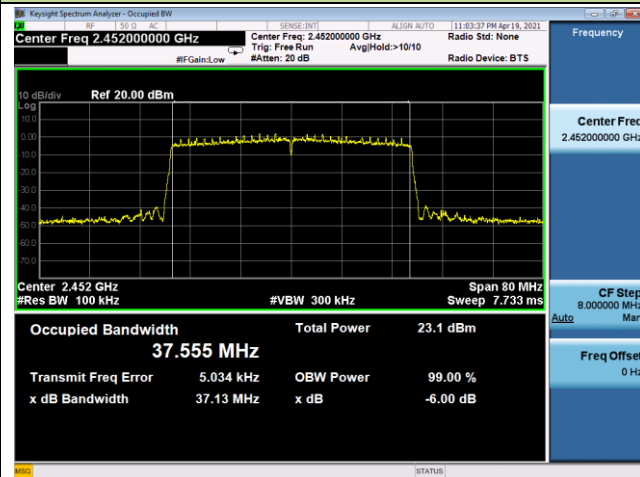
Channel 03 (2422MHz)



Channel 06 (2437MHz)



Channel 09 (2452MHz)



5.3. Output Power Measurement

5.3.1. Test Limit

The maximum output power shall be less 1 Watt (30dBm).

The conducted output power limit specified in paragraph FCC Part 15.247(b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs FCC Part 15.247(b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

5.3.2. Test Procedure Used

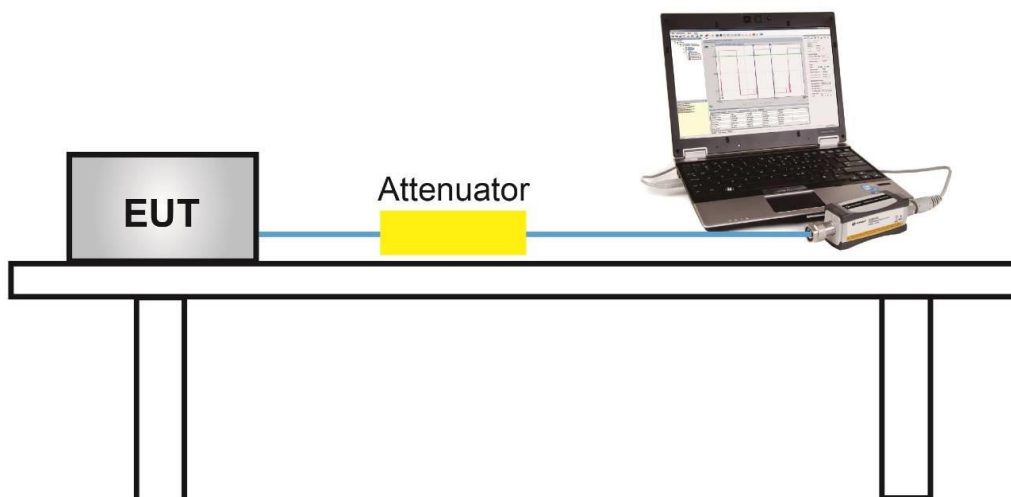
ANSI C63.10-2013 - Section 11.9.2.3.2

5.3.3. Test Setting

Average Power Measurement

Average power measurements were performed only when the EUT was transmitting at its maximum power control level using a broadband power meter with a pulse sensor. The power meter implemented triggering and gating capabilities which were set up such that power measurements were recorded only during the ON time of the transmitter.

5.3.4. Test Setup



5.3.5.Test Result

Power output test was verified over all data rates of each mode shown as below, and then choose the maximum power output (gray marker) for final test of each channel.

Test Mode	Bandwidth (MHz)	Channel No.	Frequency (MHz)	Data Rate / MCS	Average Power (dBm)
802.11b	20	6	2437	1Mbps	22.39
				5.5Mbps	22.45
				11Mbps	22.59
802.11g	20	6	2437	6Mbps	20.22
				24Mbps	20.16
				54Mbps	19.89
802.11n	20	6	2437	MCS0	20.33
				MCS3	20.26
				MCS7	20.14
802.11n	40	6	2437	MCS0	17.13
				MCS3	17.05
				MCS7	16.98
802.11ax	20	6	2437	MCS0	18.92
				MCS3	18.74
				MCS7	18.67
802.11ax	40	6	2437	MCS0	16.21
				MCS3	16.17
				MCS7	16.09

Product	WiFi 6 Extender	Test Engineer	Amy Zhang
Test Site	WZ-TR3	Test Date	2021/04/20

Test Mode	Data Rate / MCS	Channel No.	Freq. (MHz)	Average Power (dBm)		Total Average Power (dBm)	Limit (dBm)	Result
				Ant 0	Ant 1			
11b	11Mbps	01	2412	19.64	19.67	22.67	≤ 30.00	Pass
11b	11Mbps	06	2437	22.59	22.82	25.72	≤ 30.00	Pass
11b	11Mbps	11	2462	19.88	20.04	22.97	≤ 30.00	Pass
11g	6Mbps	01	2412	16.45	16.47	19.47	≤ 30.00	Pass
11g	6Mbps	06	2437	20.22	20.43	23.34	≤ 30.00	Pass
11g	6Mbps	11	2462	17.28	17.28	20.29	≤ 30.00	Pass
11n-HT20	MCS0	01	2412	16.34	16.36	19.36	≤ 30.00	Pass
11n-HT20	MCS0	06	2437	20.33	20.46	23.41	≤ 30.00	Pass
11n-HT20	MCS0	11	2462	16.10	16.39	19.26	≤ 30.00	Pass
11n-HT40	MCS0	03	2422	15.52	15.63	18.59	≤ 30.00	Pass
11n-HT40	MCS0	06	2437	17.13	16.98	20.07	≤ 30.00	Pass
11n-HT40	MCS0	09	2452	14.98	15.03	18.02	≤ 30.00	Pass
11ax-HE20	MCS0	01	2412	15.33	14.56	19.97	≤ 30.00	Pass
11ax-HE20	MCS0	06	2437	18.92	18.34	21.65	≤ 30.00	Pass
11ax-HE20	MCS0	11	2462	17.66	18.14	20.92	≤ 30.00	Pass
11ax-HE40	MCS0	03	2422	15.19	15.43	18.32	≤ 30.00	Pass
11ax-HE40	MCS0	06	2437	16.21	15.72	18.98	≤ 30.00	Pass
11ax-HE40	MCS0	09	2452	15.09	15.27	18.19	≤ 30.00	Pass

Note: Total Average Power (dBm) = $10 \cdot \log\{10^{(\text{ANT 0 Average Power} / 10)} + 10^{(\text{ANT 1 Average Power} / 10)}\}$ (dBm).

5.4. Power Spectral Density Measurement

5.4.1. Test Limit

The maximum permissible power spectral density is 8dBm in any 3 kHz band.

The same method of determining the conducted output power shall be used to determine the power spectral density.

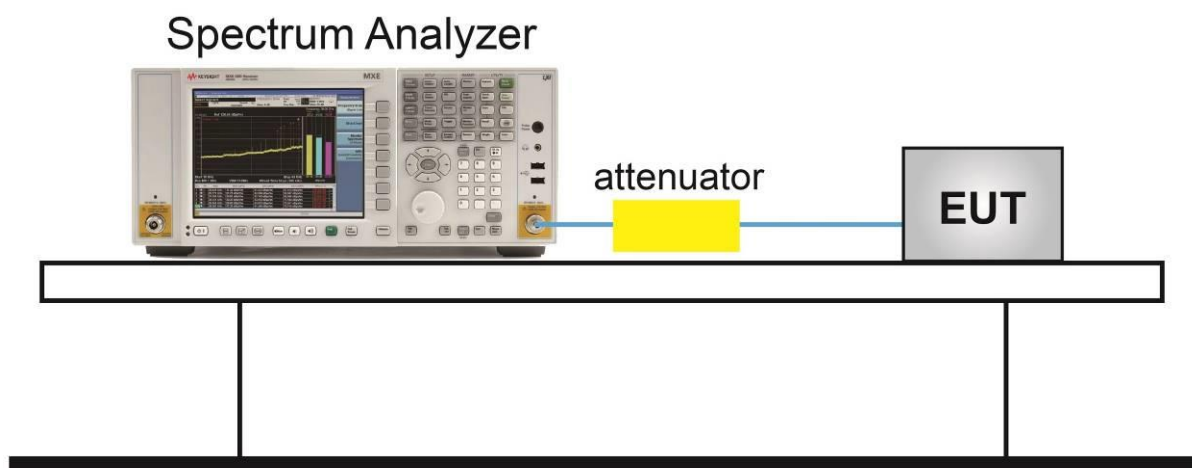
5.4.2. Test Procedure Used

ANSI C63.10-2013 - Section 11.10.3 & 11.10.5

5.4.3. Test Setting

1. Analyzer was set to the center frequency of the DTS channel under investigation
2. Span = 1.5 times the OBW
3. RBW = 3kHz
4. VBW = 10kHz
5. Detector = RMS
6. Employ trace averaging (rms) mode over a minimum of 100 traces.
7. Sweep time = auto couple
8. Trace mode = max hold
9. Trace was allowed to stabilize

5.4.4. Test Setup



5.4.5. Test Result

Product	WiFi 6 Extender	Test Engineer	Amy Zhang
Test Site	WZ-TR3	Test Date	2021/04/20

Test Mode	Data Rate/ MCS	Channel No.	Freq. (MHz)	AVG PSD (dBm / 10kHz)		Duty Cycle (%)	Total AVG PSD (dBm / 10kHz)	Limit (dBm / 3kHz)	Result
				ANT 0	ANT 1				
11b	11Mbps	01	2412	-5.71	-5.88	99.03	-2.78	≤ 6.43	Pass
11b	11Mbps	06	2437	-3.17	-3.29	99.03	-0.22	≤ 6.43	Pass
11b	11Mbps	11	2462	-5.84	-6.01	99.03	-2.91	≤ 6.43	Pass
11g	6Mbps	01	2412	-11.59	-11.97	95.94	-8.59	≤ 6.43	Pass
11g	6Mbps	06	2437	-7.21	-7.44	95.94	-4.13	≤ 6.43	Pass
11g	6Mbps	11	2462	-11.07	-10.94	95.94	-7.81	≤ 6.43	Pass
11n-HT20	MCS0	01	2412	-11.71	-11.88	95.75	-8.59	≤ 6.43	Pass
11n-HT20	MCS0	06	2437	-7.67	-7.42	95.75	-4.35	≤ 6.43	Pass
11n-HT20	MCS0	11	2462	-12.23	-11.71	95.75	-8.76	≤ 6.43	Pass
11n-HT40	MCS0	03	2422	-15.57	-14.99	91.67	-11.88	≤ 6.43	Pass
11n-HT40	MCS0	06	2437	-10.02	-9.69	91.67	-6.46	≤ 6.43	Pass
11n-HT40	MCS0	09	2452	-15.96	-15.85	91.67	-12.52	≤ 6.43	Pass
11ax-HE20	MCS0	01	2412	-12.81	-12.51	94.52	-9.40	≤ 6.43	Pass
11ax-HE20	MCS0	06	2437	-8.88	-8.32	94.52	-5.34	≤ 6.43	Pass
11ax-HE20	MCS0	11	2462	-11.41	-10.73	94.52	-7.80	≤ 6.43	Pass
11ax-HE40	MCS0	03	2422	-16.35	-16.28	90.14	-12.85	≤ 6.43	Pass
11ax-HE40	MCS0	06	2437	-10.63	-10.78	90.14	-7.24	≤ 6.43	Pass
11ax-HE40	MCS0	09	2452	-16.60	-16.70	90.14	-13.19	≤ 6.43	Pass

Note:

When EUT duty cycle > 98%, Total AVG PSD = $10 \cdot \log \{10^{(\text{Ant 0 AVG PSD}/10)} + 10^{(\text{Ant 1 AVG PSD}/10)} + 10^{(\text{Ant 2 AVG PSD}/10)}\}$.

When EUT duty cycle ≤ 98%, Total AVG PSD = $10 \cdot \log \{10^{(\text{Ant 0 AVG PSD}/10)} + 10^{(\text{Ant 1 AVG PSD}/10)} + 10^{(\text{Ant 2 AVG PSD}/10)}\} + 10 \cdot \log (1/\text{Duty Cycle})$.

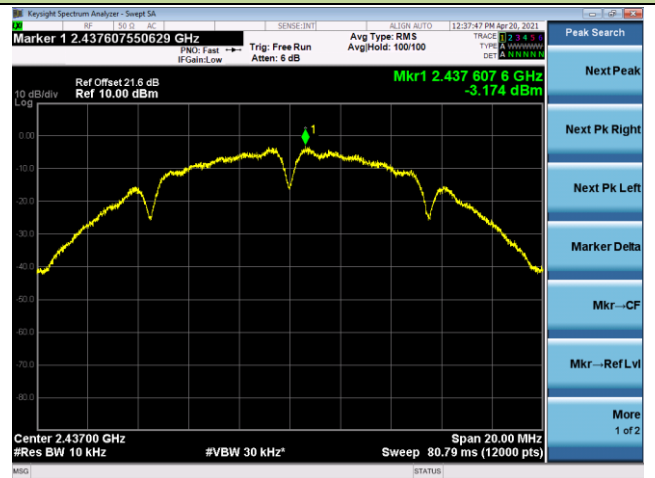
PSD Limit = 8 dBm/3kHz - (7.57 - 6) = 6.43 dBm/3kHz.

802.11b AVGPDS - Ant 0

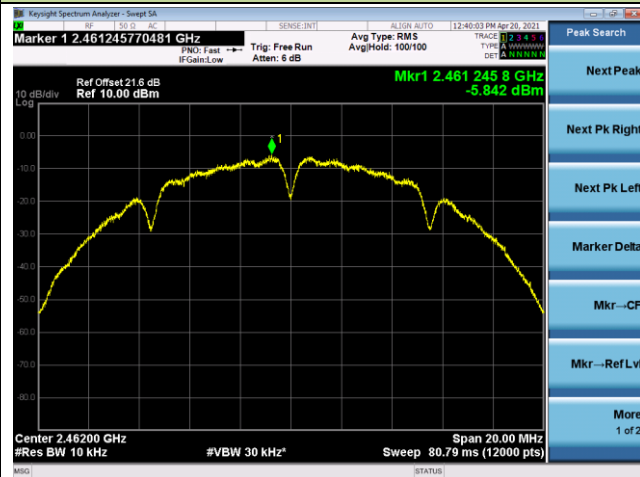
Channel 01 (2412MHz)



Channel 06 (2437MHz)

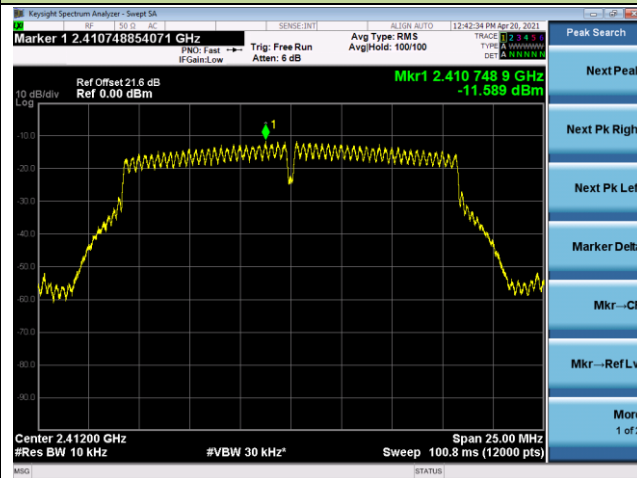


Channel 11 (2462MHz)

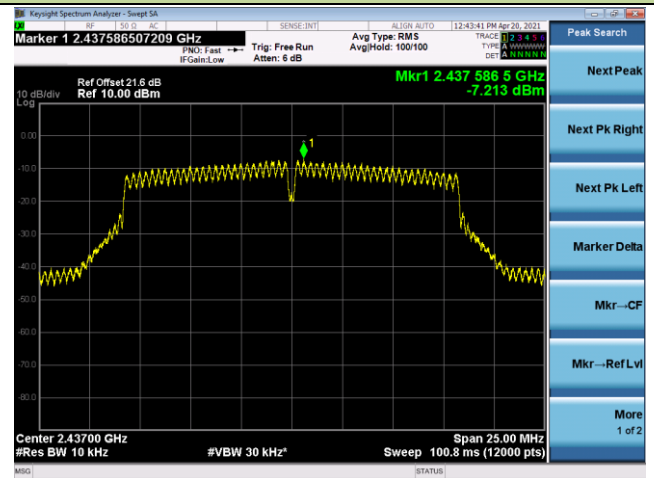


802.11g - AVGPSD- Ant 0

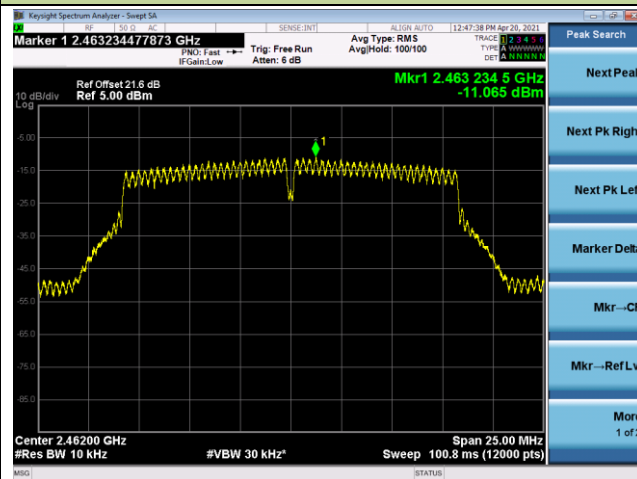
Channel 01 (2412MHz)



Channel 06 (2437MHz)

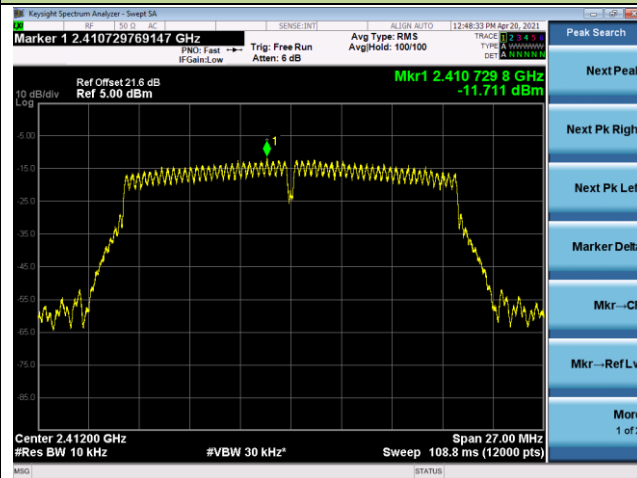


Channel 11 (2462MHz)

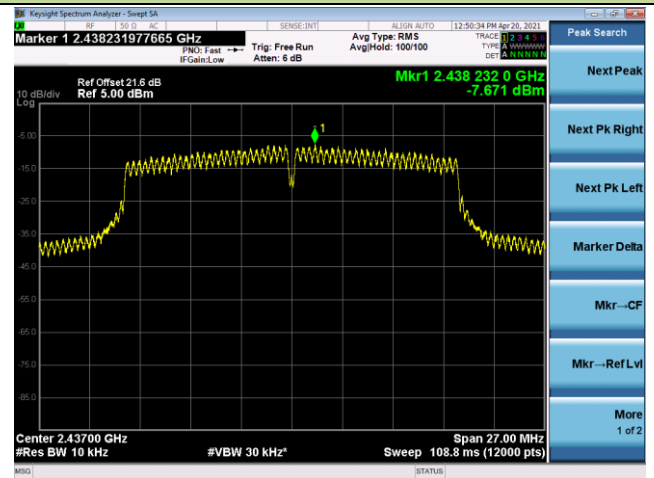


802.11n-HT20 - AVGPDS - Ant 0

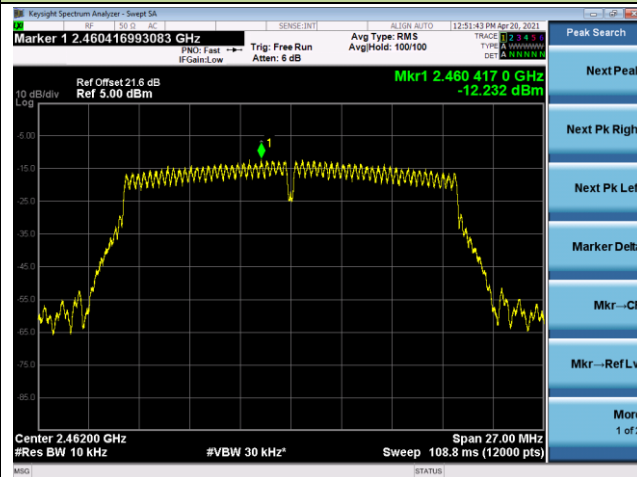
Channel 01 (2412MHz)



Channel 06 (2437MHz)

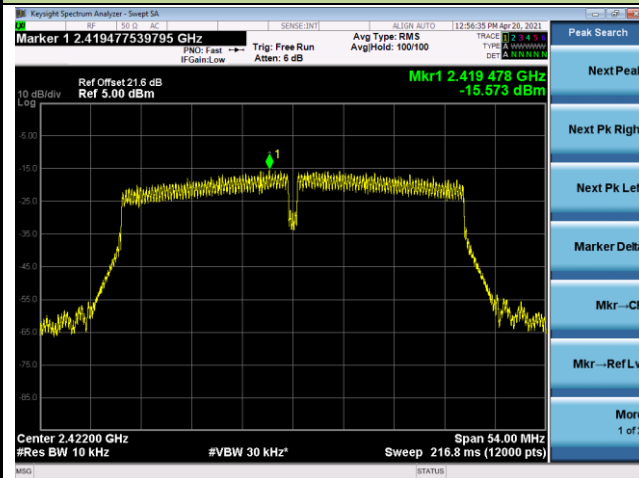


Channel 11 (2462MHz)

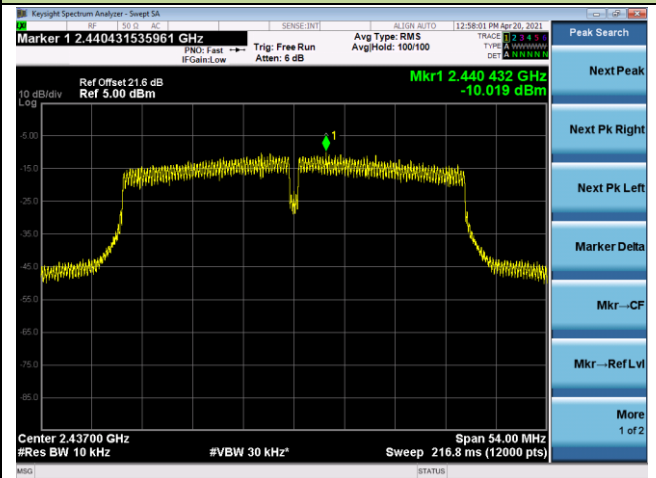


802.11n-HT40 - AVGPSD - Ant 0

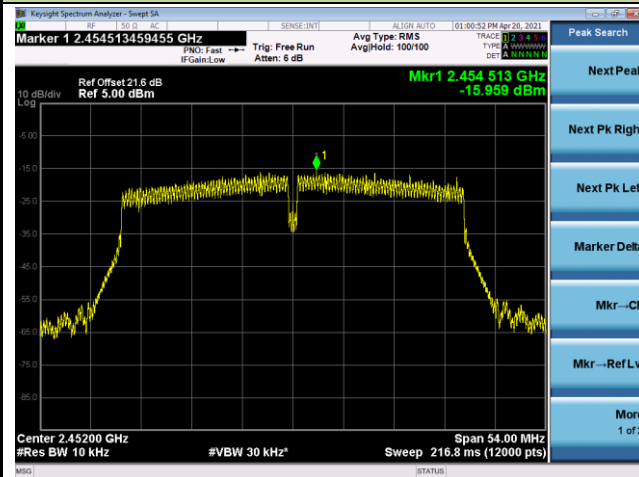
Channel 03 (2422MHz)



Channel 06 (2437MHz)

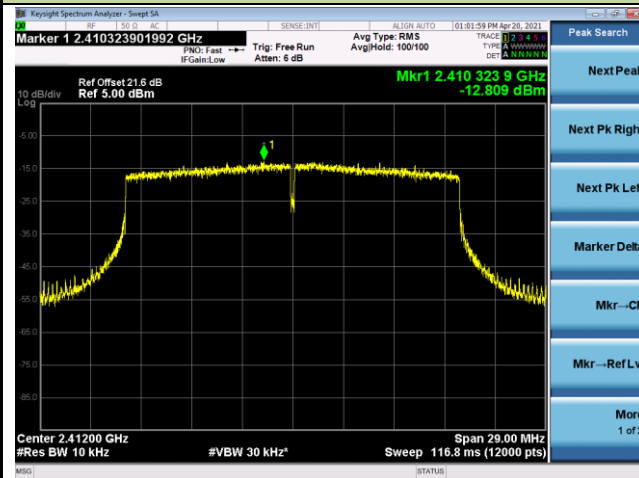


Channel 09 (2452MHz)

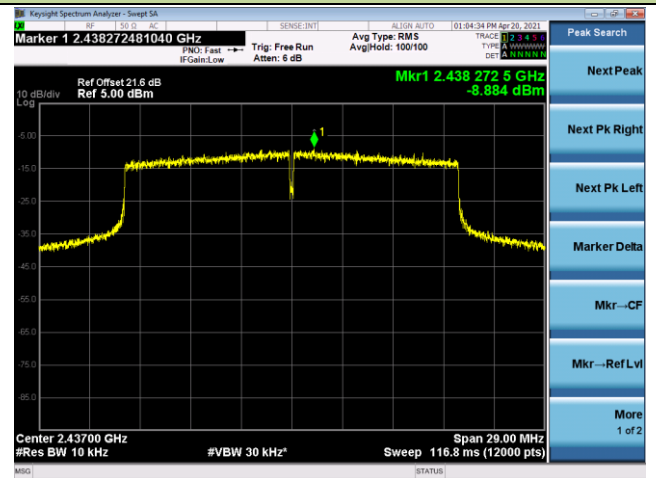


802.11ax-HE20 - AVGPDS - Ant 0

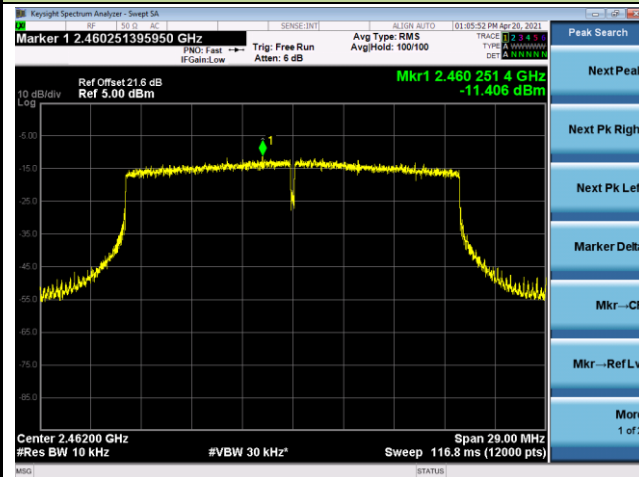
Channel 01 (2412MHz)



Channel 06 (2437MHz)

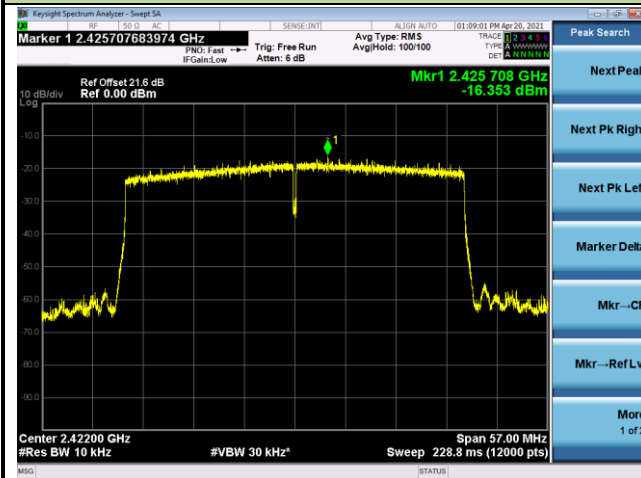


Channel 11 (2462MHz)

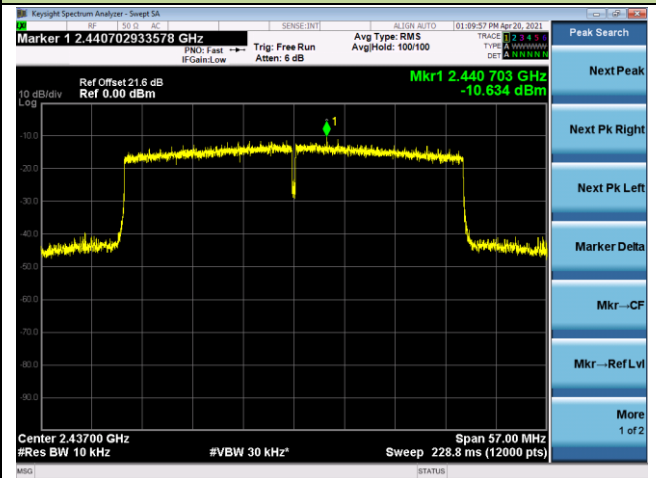


802.11ax-HE40 - AVGPDS - Ant 0

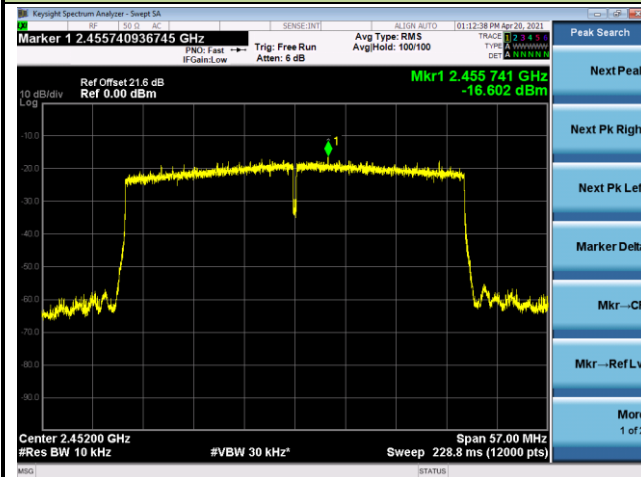
Channel 03 (2422MHz)



Channel 06 (2437MHz)



Channel 09 (2452MHz)



802.11b - AVGPSSD - Ant 1

Channel 01 (2412MHz)



Channel 06 (2437MHz)

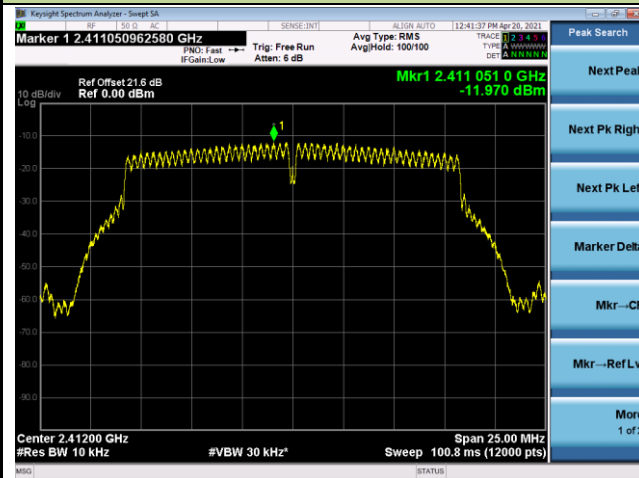


Channel 11 (2462MHz)

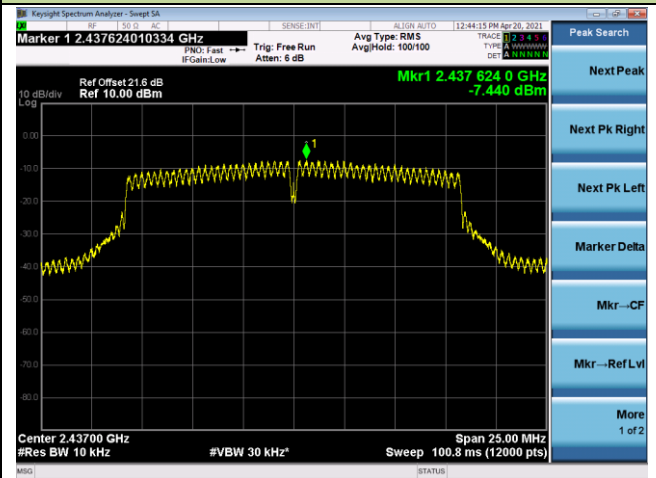


802.11g - AVGPSD- Ant 1

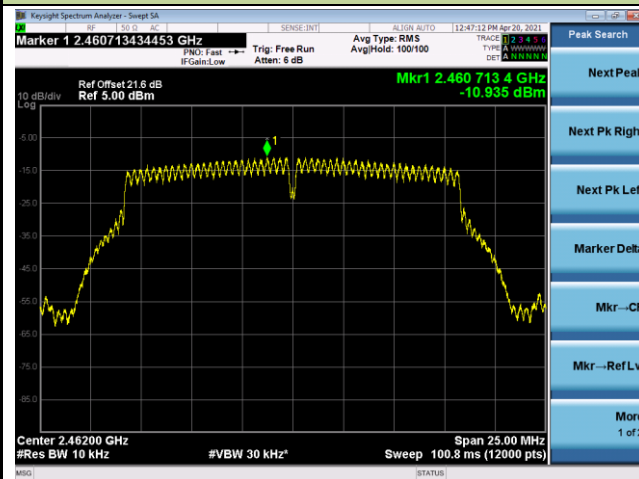
Channel 01 (2412MHz)



Channel 06 (2437MHz)

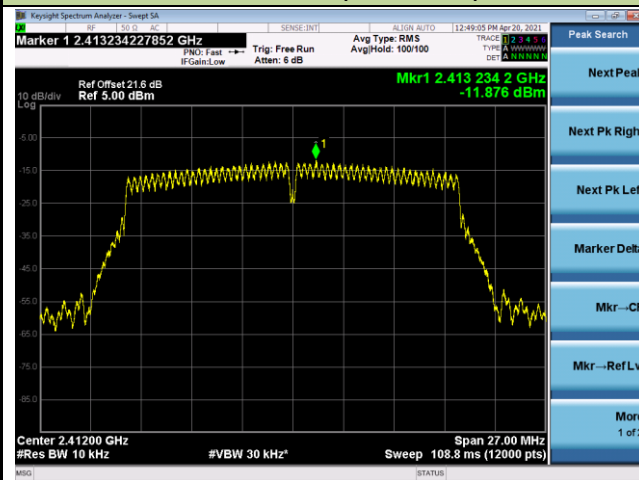


Channel 11 (2462MHz)

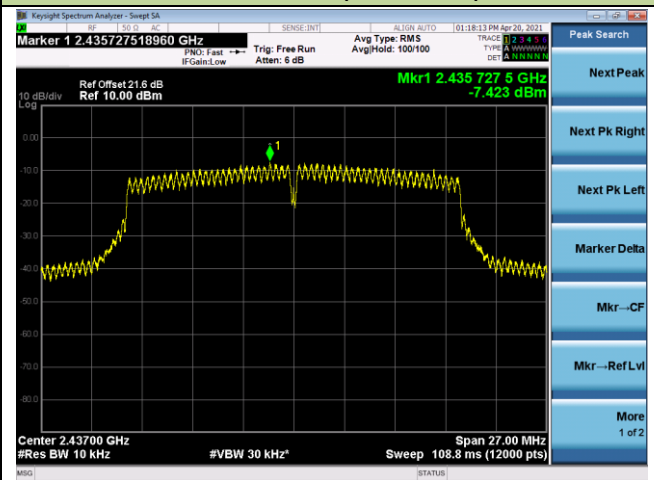


802.11n-HT20 - AVGPDS - Ant 1

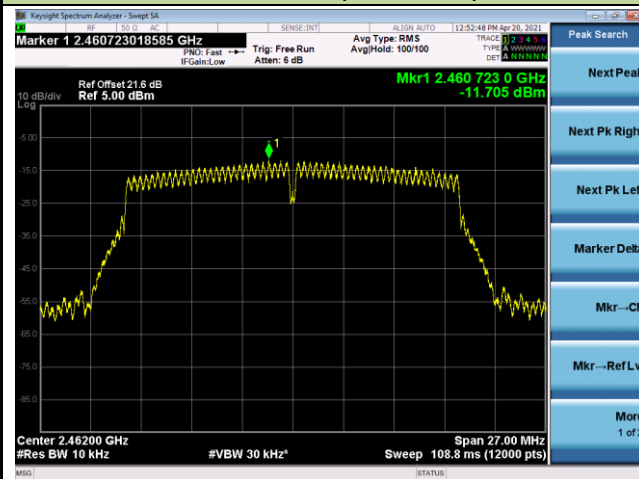
Channel 01 (2412MHz)



Channel 06 (2437MHz)

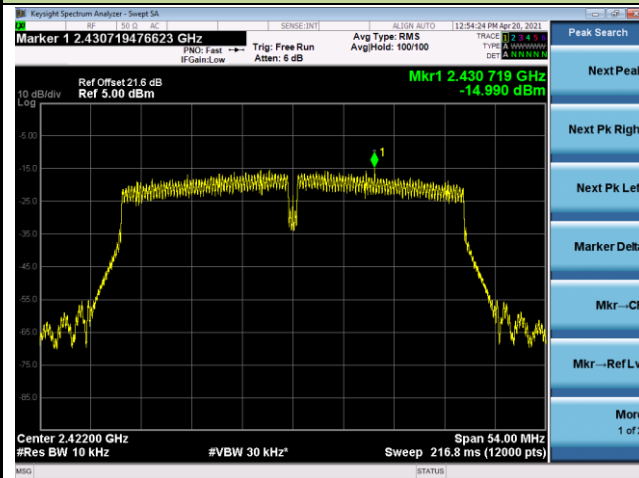


Channel 11 (2462MHz)

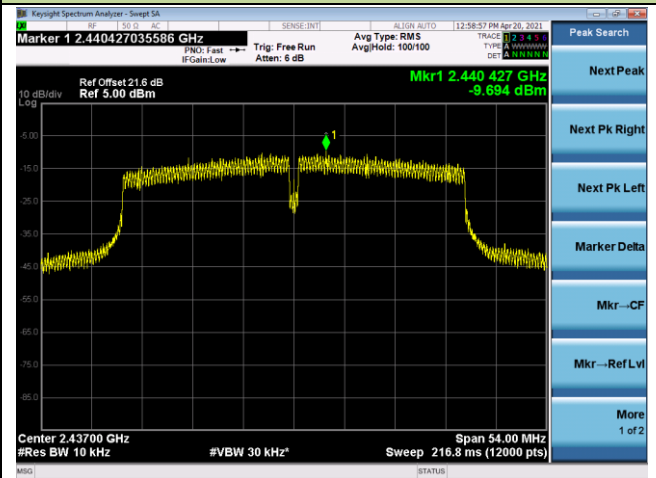


802.11n-HT40 - AVGPDS - Ant 1

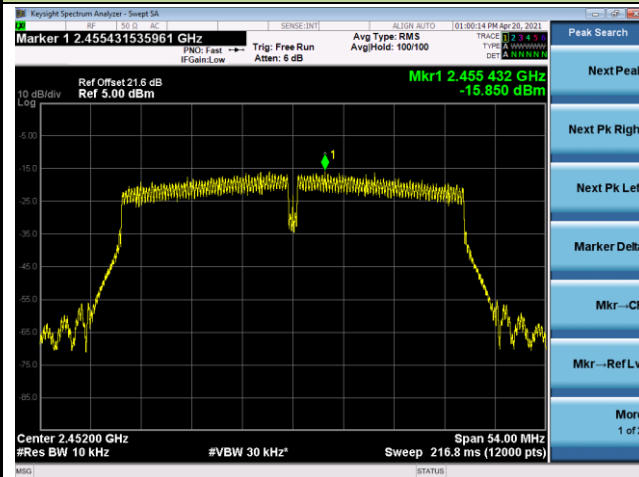
Channel 03 (2422MHz)



Channel 06 (2437MHz)

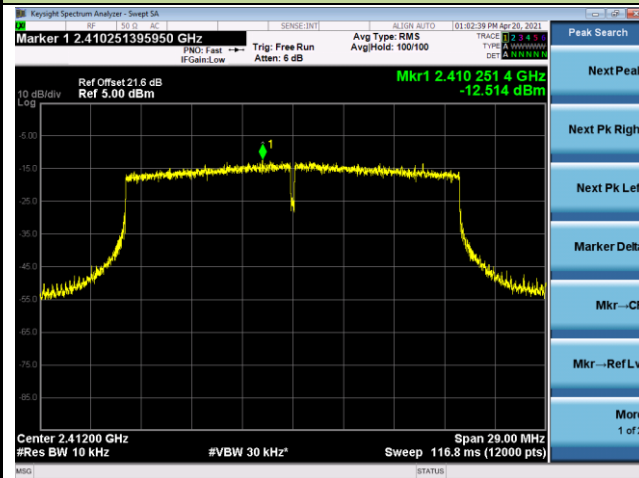


Channel 09 (2452MHz)

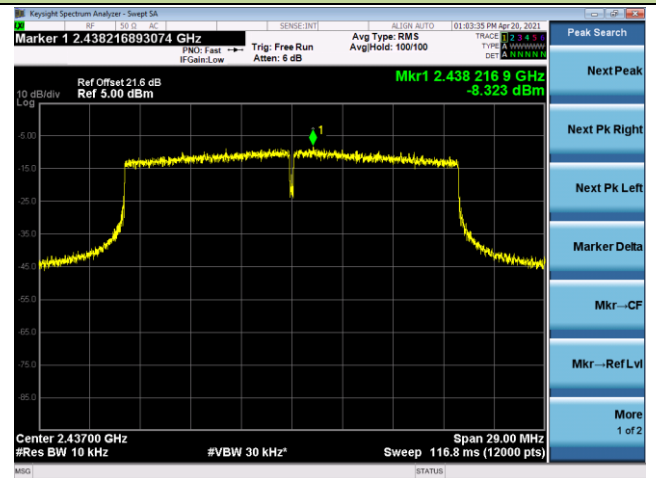


802.11ax-HE20 - AVGPDS - Ant 1

Channel 01 (2412MHz)



Channel 06 (2437MHz)



Channel 11 (2462MHz)

