



FCC RADIO TEST REPORT

FCC ID : B94QCNFA765L434
Equipment : Notebook Computer
Brand Name : HP
Model Name : HSN-I43C-4
Applicant : HP Inc.
1501 Page Mill Road, CA 94304, Palo Alto, USA
Standard : FCC Part 15 Subpart E §15.407

The product was received on Apr. 23, 2021 and testing was started from May 03, 2021 and completed on Jul. 29, 2021. We, Sporton International Inc. EMC & Wireless Communications Laboratory, would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

The test results in this partial report apply exclusively to the tested model / sample. Without written approval of Sporton International Inc. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.

Louis Wu

Approved by: Louis Wu

Sporton International Inc. EMC & Wireless Communications Laboratory

No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.)



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History of this test report

Report No.	Version	Description	Issued Date
FR0N0903-06	01	Initial issue of report	Jul. 07, 2021
FR0N0903-06	02	Add FCC designation No.	Jul. 12, 2021
FR0N0903-06	03	Revise test result plots and description of the test results	Jul. 29, 2021

Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
3.1	15.407(d)(6)	Contention Based Protocol	Pass	-

Declaration of Conformity:

The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.

Comments and Explanations:

The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

Reviewed by: Sheng Kuo
Report Producer: Dara Chiu

1 General Description

1.1 Product Feature of Equipment Under Test

Bluetooth, Wi-Fi 2.4GHz 802.11b/g/n/ac/ax, Wi-Fi 5GHz 802.11a/n/ac/ax, and Wi-Fi 6GHz 802.11a/ax

Product Specification subjective to this standard	
Sample 1	EUT with AWAN Antenna
Sample 2	EUT with WNC Antenna
Sample 3	EUT with Hong-Bo Antenna
Antenna Type	WLAN 2.4GHz: PIFA Antenna WLAN 5GHz: PIFA Antenna WLAN 6GHz: PIFA Antenna Bluetooth: PIFA Antenna

Remark: The above EUT's information was declared by manufacturer. Please refer to Comments and Explanations in report summary.

Antenna Information					
Antenna 1	Manufacturer	AWAN			
	Antenna Type	PIFA Antenna			
	Part number	6036B0281001 (AUP6Y-100071)		6036B0281101 (AUP6Y-100072)	
	Peak gain (dBi)	TX1		TX2	
		5925-6425 MHz	-0.876	5925-6425 MHz	-1.585
		6425-6525 MHz	-3.180	6425-6525 MHz	-2.019
		6525-6875 MHz	-3.180	6525-6875 MHz	-2.019
Antenna 2	Manufacturer	WNC			
	Antenna Type	PIFA Antenna			
	Part number	6036B0277001 (81EABD15.G06)		6036B0277501 (81EABD15.G05)	
	Peak gain (dBi)	TX1		TX2	
		5925-6425 MHz	-2.70	5925-6425 MHz	-0.75
		6425-6525 MHz	-3.02	6425-6525 MHz	-2.51
		6525-6875 MHz	-2.04	6525-6875 MHz	-1.94
Antenna 3	Manufacturer	Hong-Bo			
	Antenna Type	PIFA Antenna			
	Part number	6036B0278201 (260-27442)		6036B0278301 (260-27441)	
	Peak gain (dBi)	TX1		TX2	
		5925-6425 MHz	-3.31	5925-6425 MHz	-2.07
		6425-6525 MHz	-2.25	6425-6525 MHz	-3.76
		6525-6875 MHz	-2.25	6525-6875 MHz	-4.00
		6875-7125 MHz	-2.19	6875-7125 MHz	-4.00

1.2 Modification of EUT

No modifications are made to the EUT during all test items.



1.3 Testing Location

Test Site	Sporton International Inc. EMC & Wireless Communications Laboratory
Test Site Location	No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.) TEL: +886-3-327-3456 FAX: +886-3-328-4978
Test Site No.	Sporton Site No.
	DFS02-HY

FCC designation No.: TW1190

1.4 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- ♦ FCC Part 15 Subpart E
- ♦ FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01.
- ♦ FCC KDB 987594 D02 U-NII 6 GHz EMC Measurement v01
- ♦ ANSI C63.10-2013

Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. The TAF code is not including all the FCC KDB listed without accreditation.



2 Test Configuration of Equipment Under Test

2.1 Carrier Frequency and Channel

BW 20M	Channel	1	5	9	13	17	21	25	29
	Freq. (MHz)	5955	5975	5995	6015	6035	6055	6075	6095
BW 40M	Channel	3		11		19		27	
	Freq. (MHz)	5965		6005		6045		6085	
BW 80M	Channel	7				23			
	Freq. (MHz)	5985				6065			
BW 160M	Channel	15							
	Freq. (MHz)	6025							

BW 20M	Channel	33	37	41	45	49	53	57	61
	Freq. (MHz)	6115	6135	6155	6175	6195	6215	6235	6255
BW 40M	Channel	35		43		51		59	
	Freq. (MHz)	6125		6165		6205		6245	
BW 80M	Channel	39				55			
	Freq. (MHz)	6145				6225			
BW 160M	Channel	47							
	Freq. (MHz)	6185							

BW 20M	Channel	65	69	73	77	81	85	89	93
	Freq. (MHz)	6275	6295	6315	6335	6355	6375	6395	6415
BW 40M	Channel	67		75		83		91	
	Freq. (MHz)	6285		6325		6365		6405	
BW 80M	Channel	71				87			
	Freq. (MHz)	6305				6385			
BW 160M	Channel	79							
	Freq. (MHz)	6345							

BW 20M	Channel	97	101	105	109	113	117	121	125
	Freq. (MHz)	6435	6455	6475	6495	6515	6535	6555	6575
BW 40M	Channel	99		107		115		123	
	Freq. (MHz)	6445		6485		6525		6565	
BW 80M	Channel	103				119			
	Freq. (MHz)	6465				6545			
BW 160M	Channel	111							
	Freq. (MHz)	6505							



BW 20M	Channel	129	133	137	141	145	149	153	157
	Freq. (MHz)	6595	6615	6635	6655	6675	6695	6715	6735
BW 40M	Channel	131		139		147		155	
	Freq. (MHz)	6605		6645		6685		6725	
BW 80M	Channel	135				151			
	Freq. (MHz)	6625				6705			
BW 160M	Channel	143							
	Freq. (MHz)	6665							

BW 20M	Channel	161	165	169	173	177	181	185	189
	Freq. (MHz)	6755	6775	6795	6815	6835	6855	6875	6895
BW 40M	Channel	163		171		179		187	
	Freq. (MHz)	6765		6805		6845		6885	
BW 80M	Channel	167				183			
	Freq. (MHz)	6785				6865			
BW 160M	Channel	175							
	Freq. (MHz)	6825							

BW 20M	Channel	193	197	201	205	209	213	217	221
	Freq. (MHz)	6915	6935	6955	6975	6995	7015	7035	7055
BW 40M	Channel	195		203		211		219	
	Freq. (MHz)	6925		6965		7005		7045	
BW 80M	Channel	199				215			
	Freq. (MHz)	6945				7025			
BW 160M	Channel	207							
	Freq. (MHz)	6985							

BW 20M	Channel	225				229			
	Freq. (MHz)	7075				7095			
BW 40M	Channel	227							
	Freq. (MHz)	7085							

3 Test Result

3.1 Contention Based Protocol

3.1.1 Limit of Contention Based Protocol

<FCC 14-30 CFR 15.407>

(d)(6) Indoor access points, subordinate devices and client devices operating in the 5.925-7.125 GHz band must employ a contention-based protocol.

FCC KDB 987594 D02 U-NII 6GHz EMC Measurement v01

Unlicensed low-power indoor devices must detect co-channel radio frequency power that is at least -62 dBm or lower. Upon detection of energy in the band, unlicensed low power indoor devices must vacate the channel and stay off the channel as long as detected radio frequency power is equal to or greater than the threshold (-62 dBm). The -62 dBm (or lower) threshold is referenced to a 0 dBi antenna gain. To ensure incumbent operations are reliably detected in the band, low power indoor devices must detect RF energy throughout their intended operating channel. For example, an 802.11 device that plans to transmit a 40 MHz- wide signal (on a primary 20 MHz channel and a secondary 20 MHz channel) must detect energy throughout the entire 40 MHz channel. Additionally, low-power indoor devices must detect co-channel energy with 90% or greater certainty.

Table 1. Criteria to determine number of times detection threshold test may be performed

If	Number of Tests	Placement of Incumbent Transmission
$BW_{EUT} \leq BW_{Inc}$	Once	Tune incumbent and EUT transmissions ($f_{c1} = f_{c2}$)
$BW_{Inc} < BW_{EUT} \leq 2BW_{Inc}$	Once	Incumbent transmission is contained within BW_{EUT}
$2BW_{Inc} < BW_{EUT} \leq 4BW_{Inc}$	Twice. Incumbent transmission is contained within BW_{EUT}	Incumbent transmission is located as closely as possible to the lower edge and upper edge, respectively, of the EUT channel
$BW_{EUT} > 4BW_{Inc}$	Three times	Incumbent transmission is located as closely as possible to the lower edge of the EUT channel, in the middle of EUT channel, and as closely as possible to the upper edge of the EUT channel

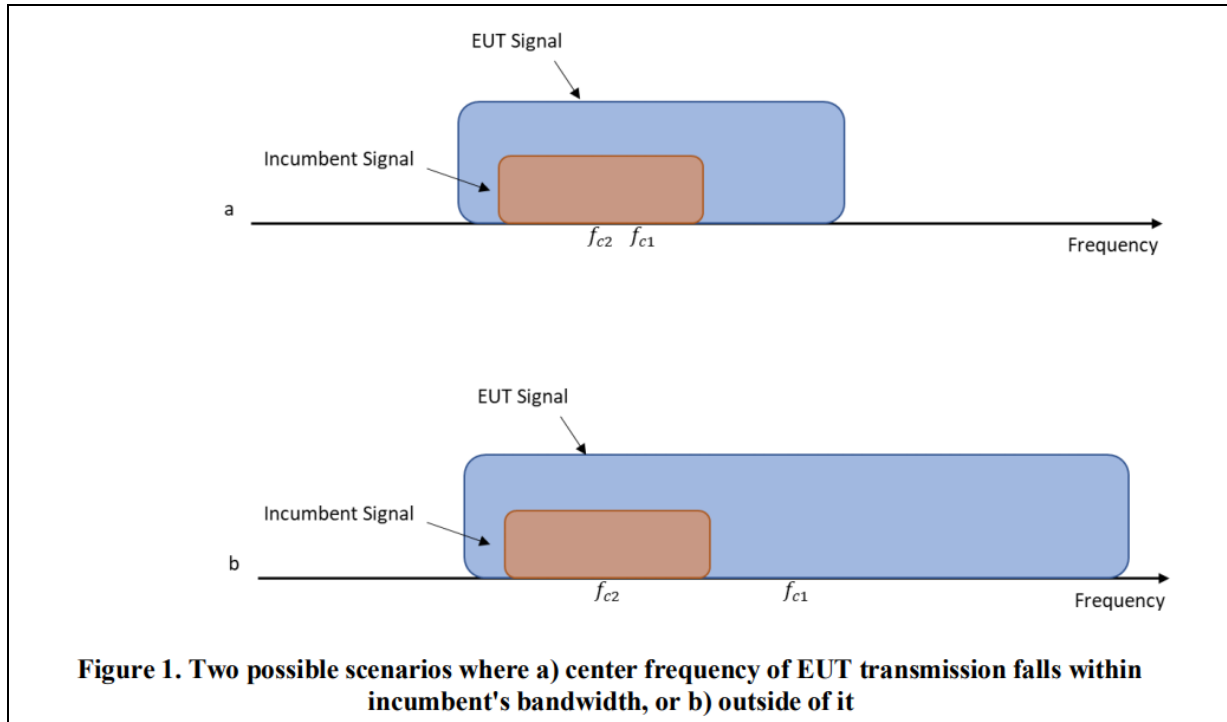
where:

BW_{EUT} : Transmission bandwidth of EUT signal

BW_{Inc} : Transmission bandwidth of the simulated incumbent signal (10 MHz wide AWGN signal)

f_{c1} : Center frequency of EUT transmission

f_{c2} : Center frequency of simulated incumbent signal



3.1.2 Measuring Instruments

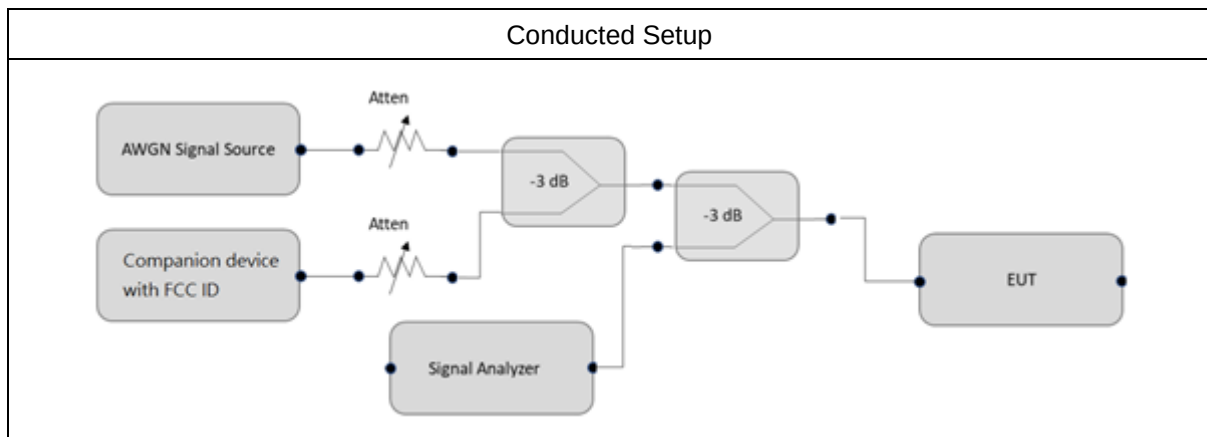
See list of measuring equipment of this test report.

3.1.3 Test Procedures

Refer to KDB 987594 D02 v01v01.

1. To ensure EUT reliably detects an incumbent signal in both scenarios shown in Figure 1, the detection threshold test may be repeated more than once with the incumbent signal (having center frequency f_{c2}) tuned to different center frequencies within the UT transmission bandwidth. The criteria specified in Table 1 determines how many times the detection threshold test must be performed
2. Using an AWGN signal source, generate (but do not transmit, i.e., RF OFF) a 10 MHz-wide AWGN signal. Use Table 1 to determine the center frequency of the 10 MHz AWGN signal relative to the EUT's channel bandwidth and center frequency.
3. Monitor the signal analyzer to verify if the AWGN signal has been detected and the EUT has ceased transmission. If the EUT continues to transmit, then incrementally increase the AWGN signal power level until the EUT stops transmitting.
4. (Including all losses in the RF paths) Determine and record the AWGN signal power level (at the EUT's antenna port) at which the EUT ceased transmission. Repeat the procedure at least 10 times to verify the EUT can detect an AWGN signal with 90% (or better) level of certainty.
5. Refer to Table 1 to determine number of times the detection threshold testing needs to be repeated. If testing is required more than once, then go back to step 2, choose a different center frequency for the AWGN signal and repeat the process.

3.1.4 Test Setup



3.1.5 Support Unit used in test configuration and system

Instrument	Brand Name	Model No.	Characteristics
WLAN AP	ASUS	GT-AXE11000	Dual Band AP
Notebook	Acer	N15C1	LAN

3.1.6 Test Summary of Contention Based Protocol Test

Band	Channel Freq. (MHz)	Channel BW (MHz)	Incumbent freq. (MHz)	Measured Detection level (dBm)	Detection Rate (%)	Regulated Threshold level (dBm)	Margin (dB)
UNII Band 5	6135	20	6135	-87.8	100	-68.72	19.08
	6185	160	6110	-83.34	100	-68.72	14.62
			6185	-80.52	100	-68.72	11.8
			6260	-84.52	100	-68.72	15.8
UNII Band 6	6455	20	6455	-87.59	100	-68.72	18.87
	6505	160	6430	-83.96	100	-68.72	15.24
			6505	-79.3	100	-68.72	10.58
			6580	-83.73	100	-68.72	15.01
UNII Band 7	6695	20	6695	-88.41	100	-67.8	20.61
	6665	160	6590	-84.63	100	-67.8	16.83
			6665	-81.27	100	-67.8	13.47
			6740	-84.54	100	-67.8	16.74
UNII Band 8	7015	20	7015	-89.59	100	-68.59	21
	6985	160	6910	-83.9	100	-68.59	15.31
			6985	-79.14	100	-68.59	10.55
			7060	-82.37	100	-68.59	13.78

Note: Threshold Level (TL) = -62dBm + minimum antenna gain

<Minimum Gain>

Manufacturer	AWAN	
Band	Tx1	Tx2
UNII Band 5	-6.72	-4.66
UNII Band 6	-6.72	-3.02
UNII Band 7	-5.80	-4.91
UNII Band 8	-6.59	-6.35

Manufacturer	HB	
Band	Tx1	Tx2
UNII Band 5	-4.82	-4.66
UNII Band 6	-3.31	-4.22
UNII Band 7	-4.05	-4.76
UNII Band 8	-4.82	-4.54

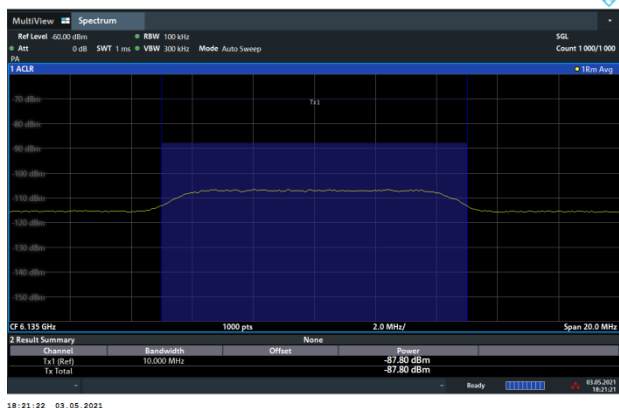
Manufacturer	WNC	
Band	Tx1	Tx2
UNII Band 5	-2.73	-4.66
UNII Band 6	-2.71	-4.16
UNII Band 7	-3.07	-3.93
UNII Band 8	-2.63	-3.79



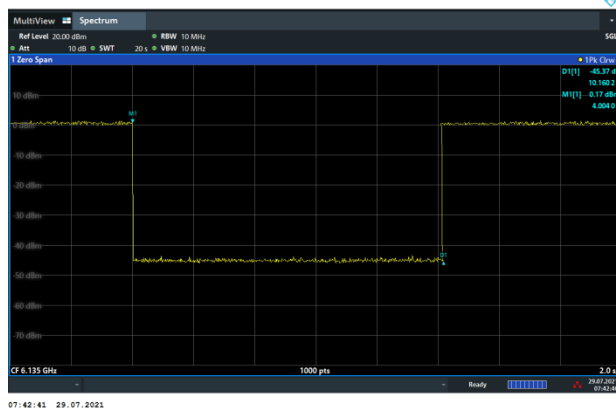
3.1.7 Test Plots of Contention Based Protocol

Contention Based Protocol Result Plots on U-NII 5 (AWGN Interference)

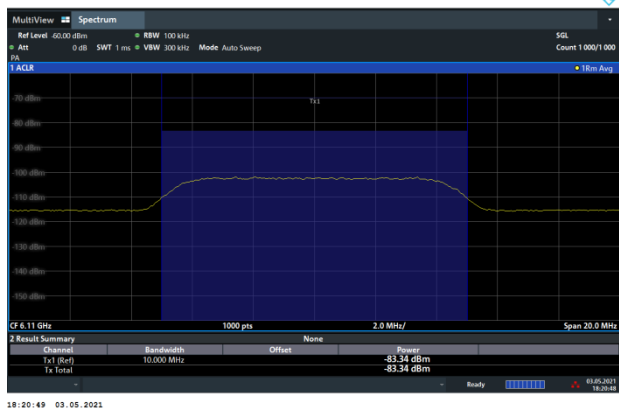
802.11ax (HE20) / 6135MHz
Threshold Level (TL) = -87.8dBm/MHz



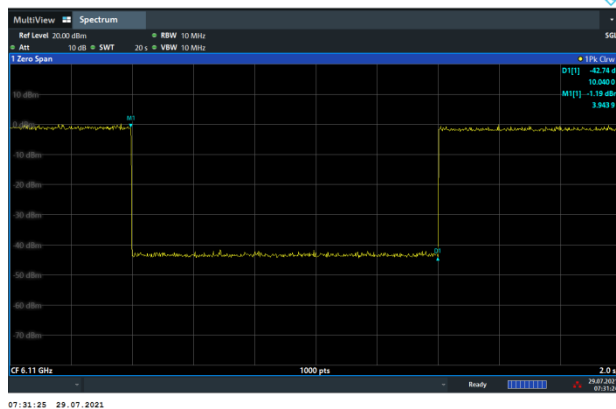
802.11ax (HE20) / CH37
Test result is pass, due not any transmission occurred in 10s monitoring time.



802.11ax (HE160) / 6110MHz (Lower edge)
Threshold Level (TL) = -83.34dBm/MHz

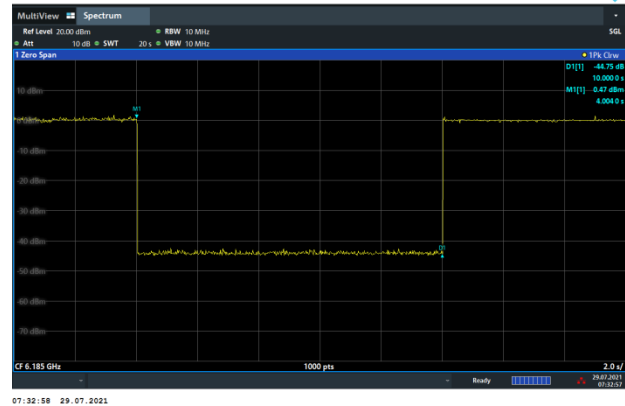
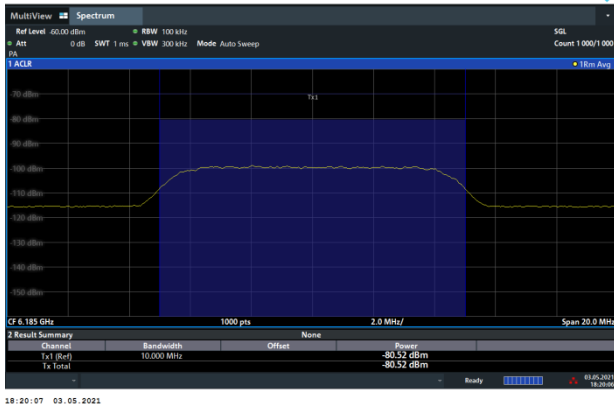


802.11ax (HE160) / CH47 (Lower edge)
Test result is pass, due not any transmission occurred in 10s monitoring time.



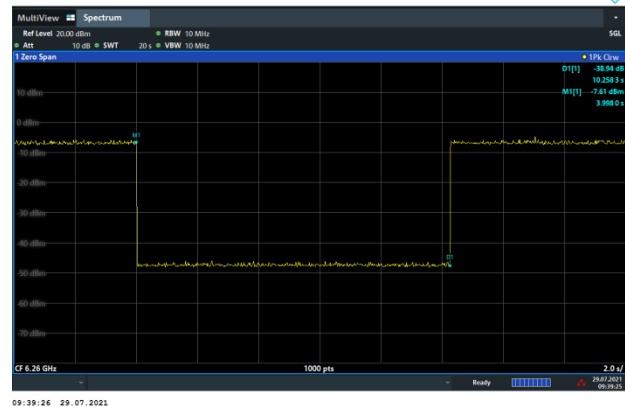
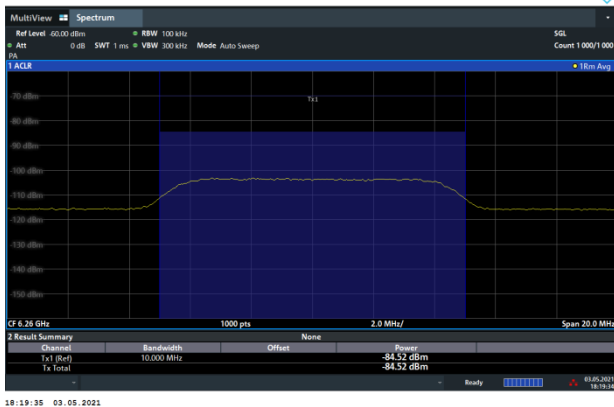
802.11ax (HE160) / 6185MHz (Middle)
Threshold Level (TL) = -80.52dBm/MHz

802.11ax (HE160) / CH47 (Middle)
Test result is pass, due not any transmission
occurred in 10s monitoring time.



802.11ax (HE160) / 6260MHz (Upper edge)
Threshold Level (TL) = -84.52dBm/MHz

802.11ax (HE160) / CH47 (Upper edge)
Test result is pass, due not any transmission
occurred in 10s monitoring time.

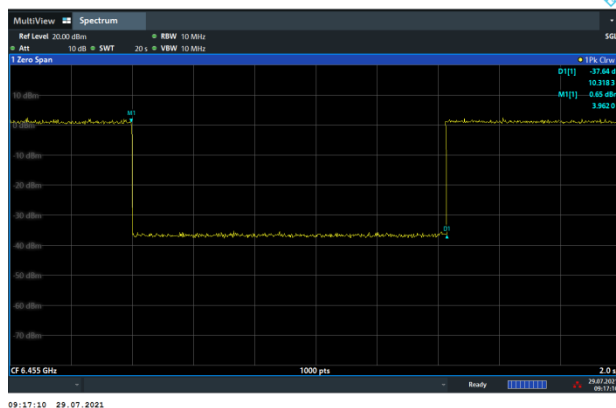
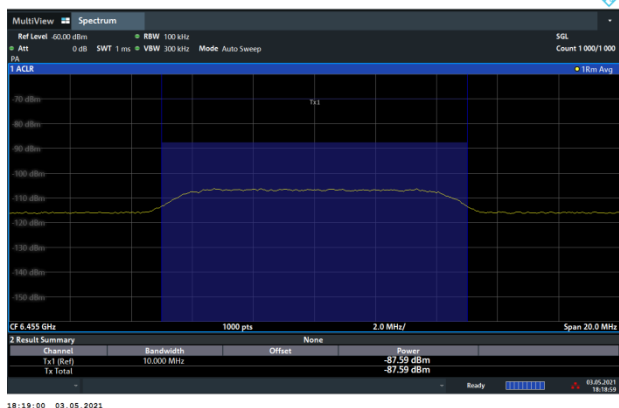




Contention Based Protocol Result Plots on U-NII 6 (AWGN Interference)

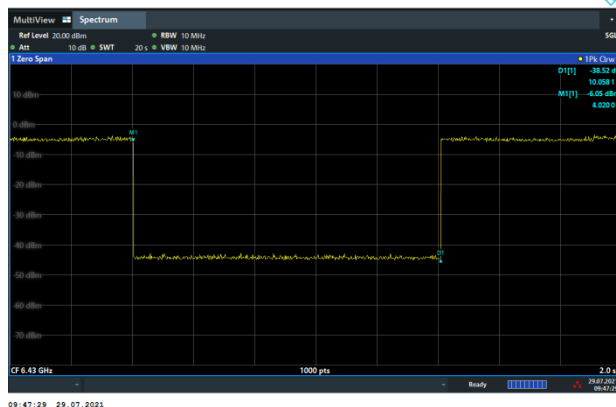
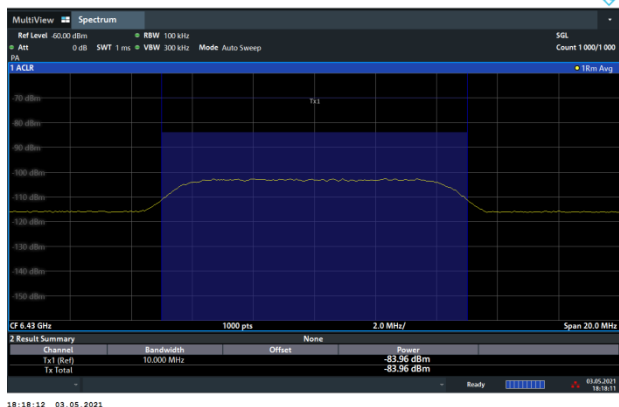
802.11ax (HE20) / 6455MHz
Threshold Level (TL) = -87.59dBm/MHz

802.11ax (HE20) / CH101
Test result is pass, due not any transmission
occurred in 10s monitoring time.



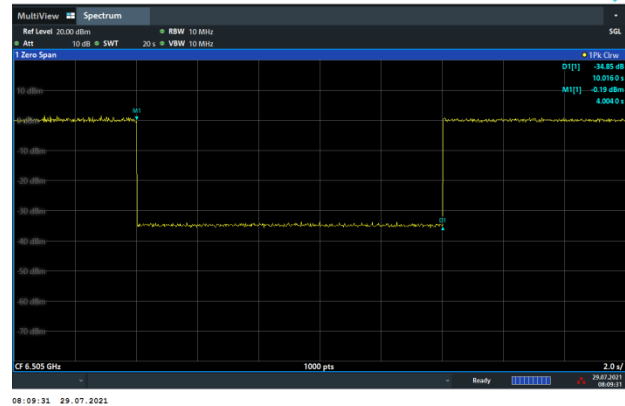
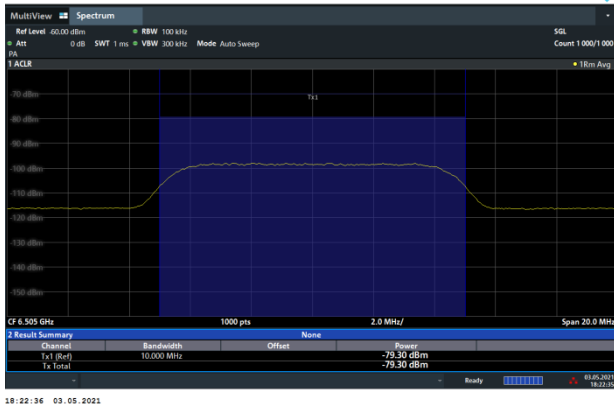
802.11ax (HE160) / 6430MHz (Lower edge)
Threshold Level (TL) = -83.96dBm/MHz

802.11ax (HE160) / CH111 (Lower edge)
Test result is pass, due not any transmission
occurred in 10s monitoring time.



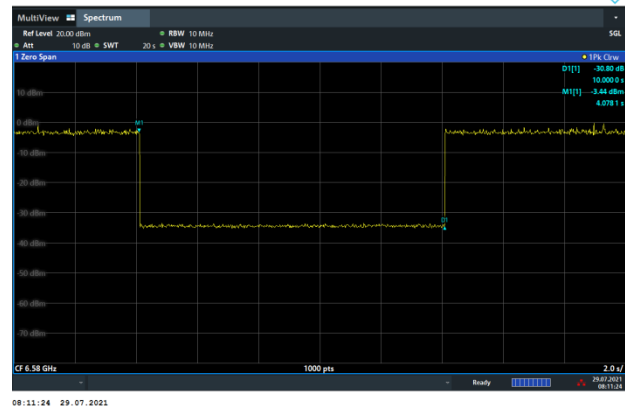
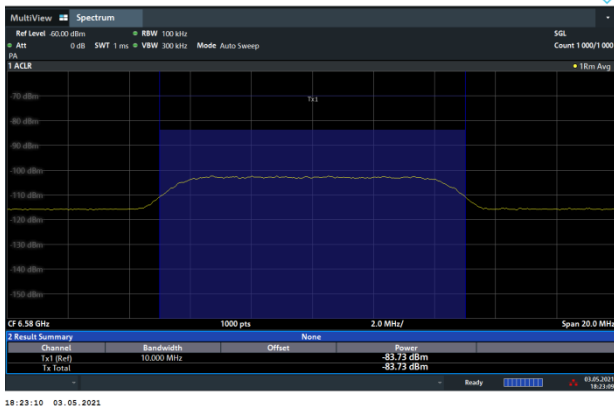
802.11ax (HE160) / 6505MHz (Middle)
Threshold Level (TL) = -79.3dBm/MHz

802.11ax (HE160) / CH111 (Middle)
Test result is pass, due not any transmission
occurred in 10s monitoring time.



802.11ax (HE160) / 6580MHz (Upper edge)
Threshold Level (TL) = -83.73dBm/MHz

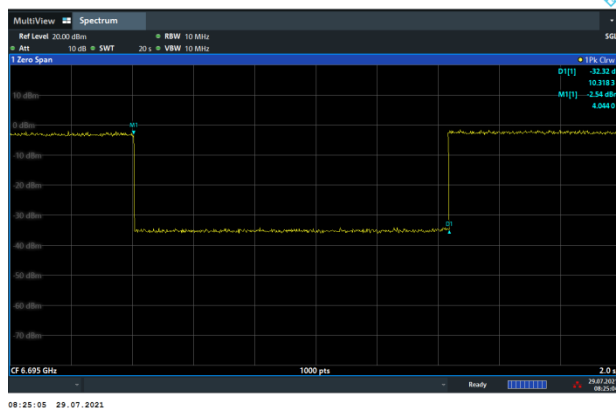
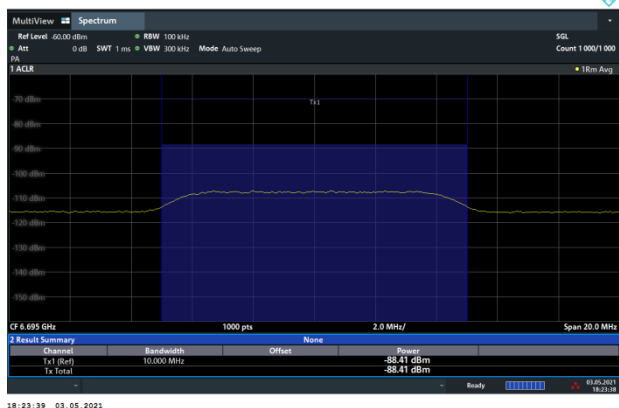
802.11ax (HE160) / CH111 (Upper edge)
Test result is pass, due not any transmission
occurred in 10s monitoring time.



Contention Based Protocol Result Plots on U-NII 7 (AWGN Interference)

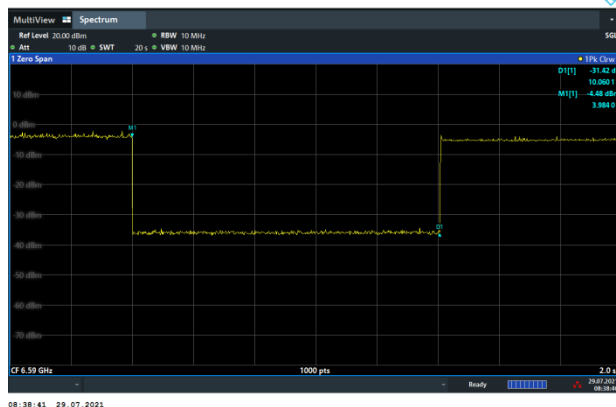
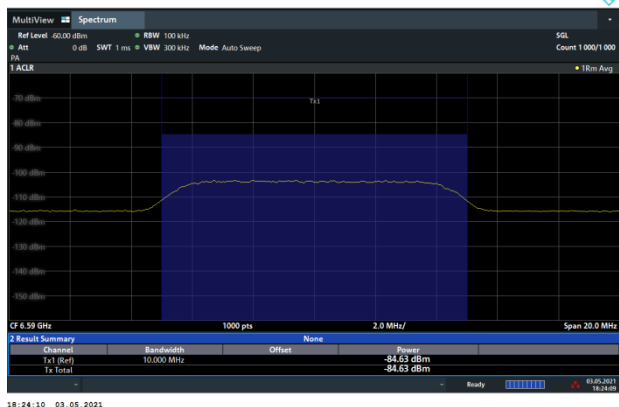
802.11ax (HE20) / 6695MHz
Threshold Level (TL) = -88.41dBm/MHz

802.11ax (HE20) / CH149
Test result is pass, due not any transmission occurred in 10s monitoring time.



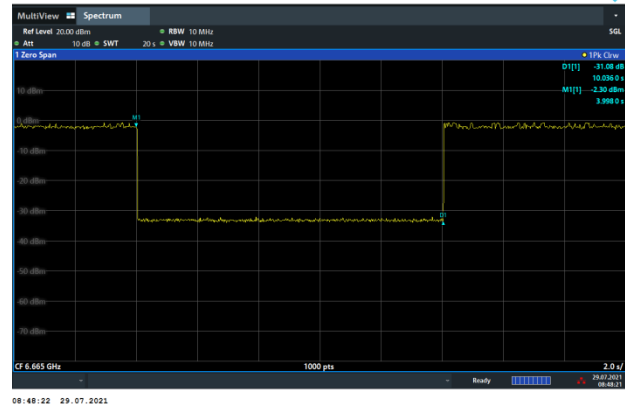
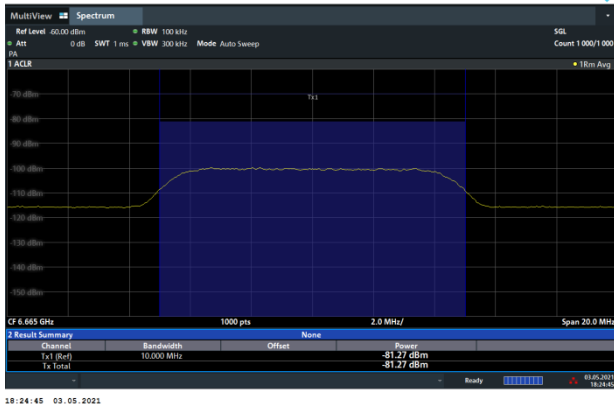
802.11ax (HE160) / 6590MHz (Lower edge)
Threshold Level (TL) = -84.63dBm/MHz

802.11ax (HE160) / CH143 (Lower edge)
Test result is pass, due not any transmission occurred in 10s monitoring time.



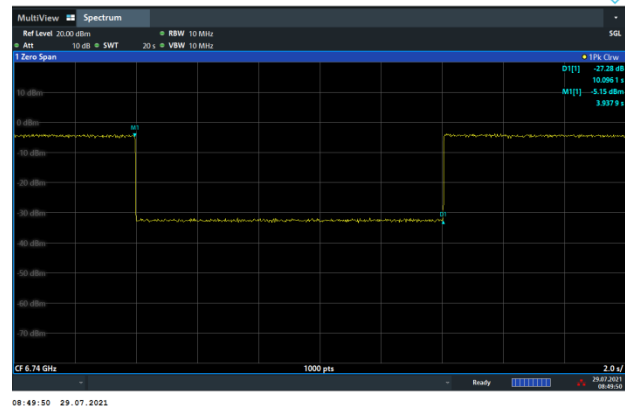
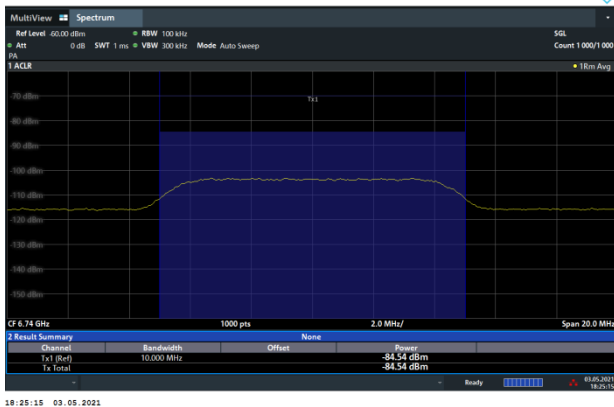
802.11ax (HE160) / 6665MHz (Middle)
Threshold Level (TL) = -81.27dBm/MHz

802.11ax (HE160) / CH143 (Middle)
Test result is pass, due not any transmission
occurred in 10s monitoring time.



802.11ax (HE160) / 6740MHz (Upper edge)
Threshold Level (TL) = -84.54dBm/MHz

802.11ax (HE160) / CH143 (Upper edge)
Test result is pass, due not any transmission
occurred in 10s monitoring time.

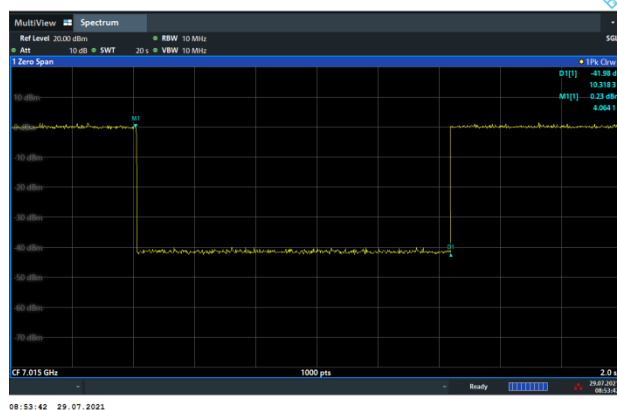
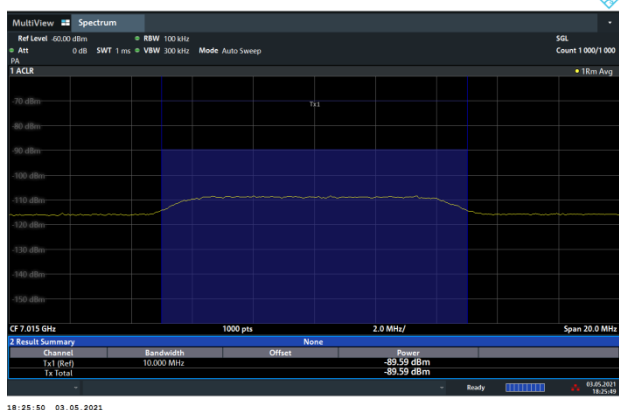




Contention Based Protocol Result Plots on U-NII 8 (AWGN Interference)

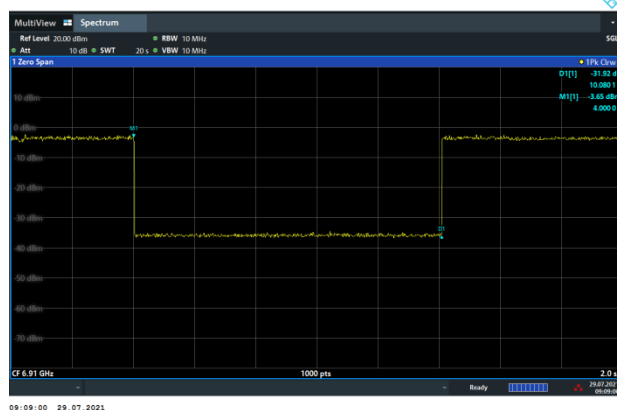
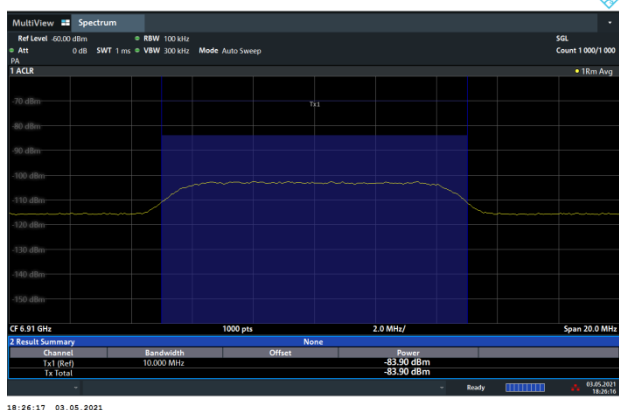
802.11ax (HE20) / 7015MHz
Threshold Level (TL) = -89.59dBm/MHz

802.11ax (HE20) / CH213
Test result is pass, due not any transmission
occurred in 10s monitoring time.



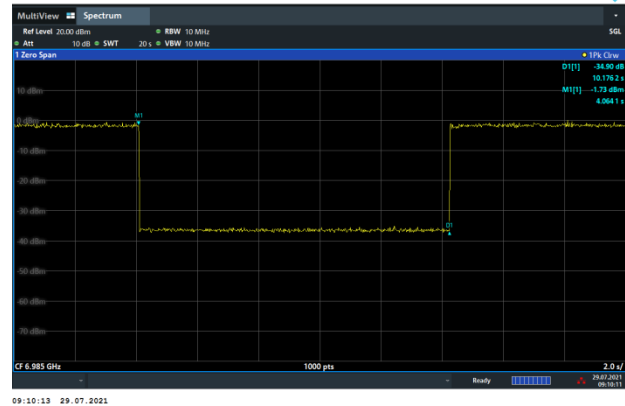
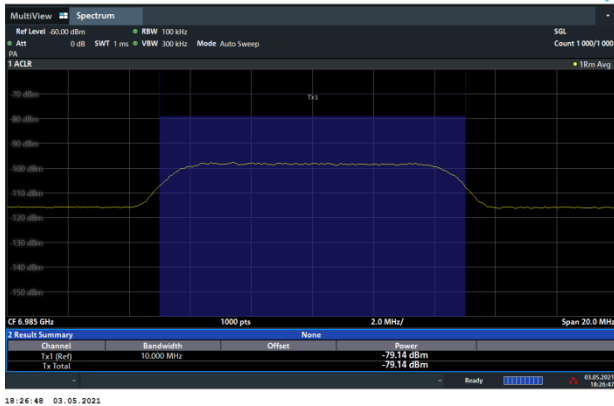
802.11ax (HE160) / 6910MHz (Lower edge)
Threshold Level (TL) = -83.90dBm/MHz

802.11ax (HE160) / CH207 (Lower edge)
Test result is pass, due not any transmission
occurred in 10s monitoring time.



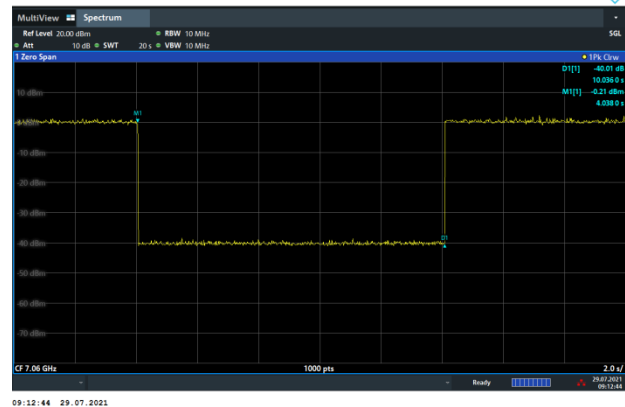
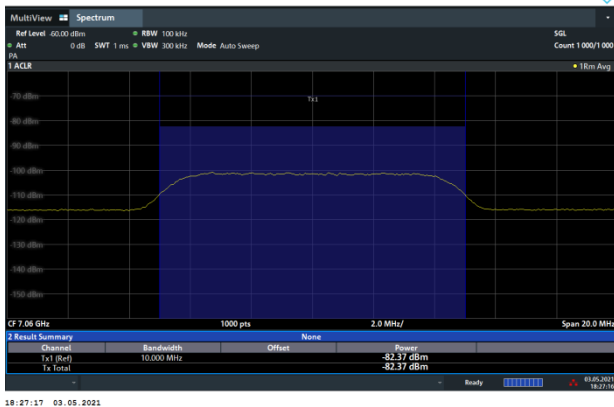
802.11ax (HE160) / 6985MHz (Middle)
Threshold Level (TL) = -79.14dBm/MHz

802.11ax (HE160) / CH207 (Middle)
Test result is pass, due not any transmission
occurred in 10s monitoring time.

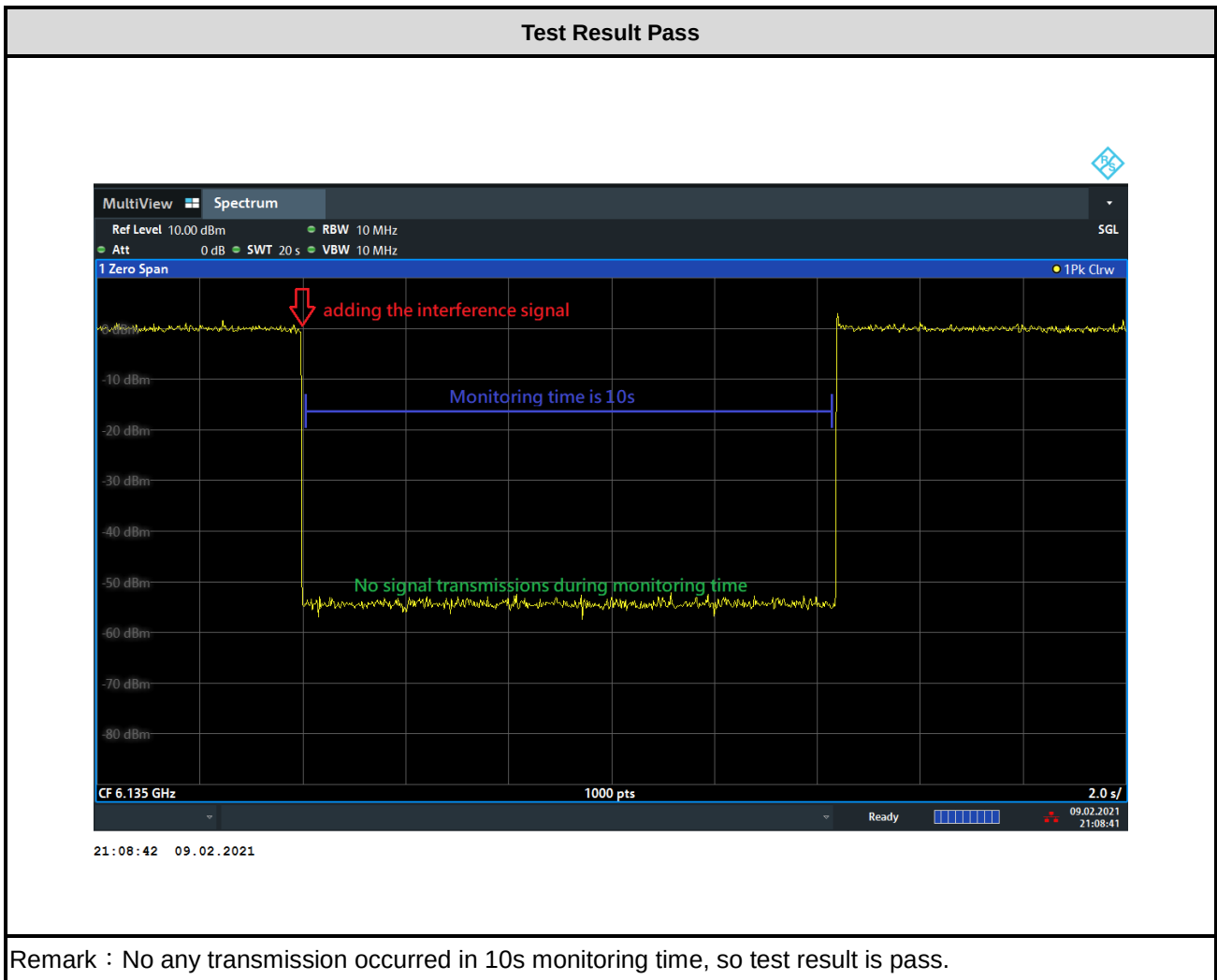


802.11ax (HE160) / 7060MHz (Upper edge)
Threshold Level (TL) = -82.37dBm/MHz

802.11ax (HE160) / CH207 (Upper edge)
Test result is pass, due not any transmission
occurred in 10s monitoring time.



3.1.8 Example of test result





4 List of Measuring Equipment

Instrument	Brand Name	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Signal Generator (Interferer)	Rohde & Schwarz	SMW200A	109425	100kHz ~ 7.5GHz	Jan. 11, 2021	May 03, 2021 ~ Jul. 29, 2021	Jan. 10, 2022	CBP (DFS02-HY)
Spectrum Analyzer	Rohde & Schwarz	FSV3044	101103	10Hz~44GHz	Jan. 11, 2021	May 03, 2021 ~ Jul. 29, 2021	Jan. 10, 2022	CBP (DFS02-HY)
Power Divider	Woken	2Way Divider	DCMB1KW7A 1	0.5GHz-18GHz	Calibration from System	May 03, 2021 ~ Jul. 29, 2021	Calibration from System	CBP (DFS02-HY)
Power Divider	Woken	2Way Divider	DCMB1KW7A 2	0.5GHz-18GHz	Calibration from System	May 03, 2021 ~ Jul. 29, 2021	Calibration from System	CBP (DFS02-HY)
Coupler	Woken	10dB 30W SMA	DOM5CIW3A 1	0.5-18GHz	Calibration from System	May 03, 2021 ~ Jul. 29, 2021	Calibration from System	CBP (DFS02-HY)
Power Divider	Woken	3Way SMA Power Divder Rated to 20W	STI08-0010(# 2)	2GHz-8GHz	Calibration from System	May 03, 2021 ~ Jul. 29, 2021	Calibration from System	CBP (DFS02-HY)