FCC RADIO TEST REPORT

FCC ID	:	**2AFZZPN8EG**
Equipment	:	**Mobile Phone**
Brand Name	:	**Xiaomi**
Model Name	:	**2407FPN8EG**
Applicant	:	**Xiaomi Communications Co., Ltd. #019, 9th Floor, Building 6, 33 Xi'erqi Middle Road, Haidian District, Beijing, China, 100085**
Manufacturer	:	**Xiaomi Communications Co., Ltd. #019, 9th Floor, Building 6, 33 Xi'erqi Middle Road, Haidian District, Beijing, China, 100085**
Standard	:	**FCC Part 15 Subpart E §15.407**

The product was received on Apr. 26, 2024 and testing was performed from Jul. 12, 2024 to Jul. 12, 2024. 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 from 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
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History of this test report

Report No.	Version	Description	Issue Date
FR442005	01	Initial issue of report	Jul. 16, 2024

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	-

Conformity Assessment Condition:

1. The test results (PASS/FAIL) with all measurement uncertainty excluded are presented against the regulation limits or in accordance with the requirements stipulated by the applicant/manufacturer who shall bear all the risks of non-compliance that may potentially occur if measurement uncertainty is taken into account.
2. The measurement uncertainty please refer to each test result in the section “Measurement Uncertainty”.

Disclaimer:

The product specifications of the EUT presented in the test report that may affect the test assessments are declared by the manufacturer who shall take full responsibility for the authenticity.

Reviewed by: Lewis Ho

Report Producer: Michelle Chen

1 General Description

1.1 Product Feature of Equipment Under Test

Product Feature	
General Specs	WCDMA/LTE/5G NR, Bluetooth, Wi-Fi 2.4GHz 802.11b/g/n/ax/be, Wi-Fi 5GHz 802.11a/n/ac/ax/be, Wi-Fi 6GHz 802.11a/ax/be, NFC, WPC Rx and GNSS
Antenna Type	WWAN: **<Ant. 0>**: PIFA Antenna **<Ant. 1>**: PIFA Antenna **<Ant. 2>**: PIFA Antenna **<Ant. 3>**: PIFA Antenna **<Ant. 4>**: PIFA Antenna **<Ant. 5>**: PIFA Antenna **<Ant. 6>**: PIFA Antenna **<Ant. 7>**: PIFA Antenna **<Ant. 8>**: PIFA Antenna **<Ant. 9>**: PIFA Antenna Bluetooth: **<Ant. 6>**: PIFA Antenna **<Ant. 17>**: PIFA Antenna GPS/Glonass/BDS/Galileo/SBAS/QZSS/NavIC: PIFA Antenna NFC: FPC Antenna WPC Rx: Coil Antenna
Sample 1	12+512G (TIANMA LCD)
Sample 2	12+256G (TIANMA LCD)
Sample 3	12+1T (China Star LCD)

Antenna information		
5925 MHz ~ 6425 MHz	Peak Gain (dBi)	Ant. 6: -4.11 Ant. 17: -4.11
6525 MHz ~ 6875 MHz	Peak Gain (dBi)	Ant. 6: -5.37 Ant. 17: -5.37

Remark: The EUT's information above is declared by manufacturer. Please refer to Disclaimer in report summary.

1.2 Modification of EUT

No modifications made to the EUT during the testing.

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.**
	DF02-HY

FCC designation No.: TW1190

1.4 Applicable Standards

According to the specifications declared by 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 v01r01
- ANSI C63.10-2013

Remark:

1. All the test items were validated and recorded in accordance with the standards without any modification during the testing.
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	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							

3 Test Result

3.1 Contention Based Protocol

3.1.1 Limit of Contention Based Protocol

<FCC 14-30 CFR 15.407>

(d)(6) All U-NII transmitters, except for standard power access points and fixed 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 v01r01

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:

$BWEUT$: Transmission bandwidth of EUT signal

$BWInc$: Transmission bandwidth of the simulated incumbent signal (10 MHz wide AWGN signal)

$fc1$: Center frequency of EUT transmission

$fc2$: Center frequency of simulated incumbent signal

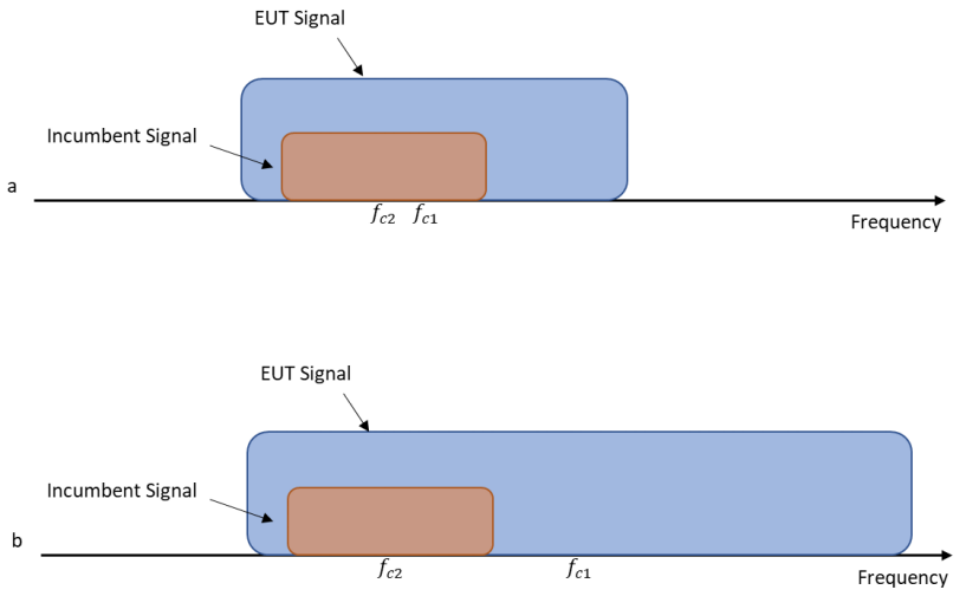


Figure 1. Two possible scenarios where a) center frequency of EUT transmission falls within incumbent's bandwidth, or b) outside of it

3.1.2 Measuring Instruments

Please refer to the measuring equipment list in this test report.

3.1.3 Test Procedures

The testing follows FCC KDB 987594 D02 U-NII 6GHz EMC Measurement v01.
Section I) Contention Based Protocol
Conducted method Step-by-Step Procedure, Conducted Setup

1. Configure the EUT to transmit with a constant duty cycle.
2. Set the operating parameters of the EUT including power level, operating frequency, modulation and bandwidth.
3. Set the signal analyzer center frequency to the nominal EUT channel center frequency. The span range of the signal analyzer shall be between two times and five times the OBW of the EUT.
4. Connect the output port of the EUT to the signal analyzer 2, as shown in test setup Figure 2. Ensure that the attenuator 2 provides enough attenuation to not overload the signal analyzer 2 receiver.
5. Monitoring the signal analyzer 2, verify the EUT is operating and transmitting with the parameters set at step two.
6. 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.
7. Set the AWGN signal power to an extremely low level (more than 20 dB below the -62 dBm threshold). Connect the AWGN signal source, via a 3-dB splitter, to the signal analyzer 1 and the EUT as shown in test setup Figure 2.
8. Transmit the AWGN signal (RF ON) and verify its characteristics on the signal analyzer 1.

9. Monitor the signal analyzer 2 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.
10. (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.
11. 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 5, choose a different center frequency for the AWGN signal and repeat the process.
12. For the contention-based protocol test where only one channel in each supported sub-band needs to be tested. The narrowest and widest bandwidth in each channel shall be measured EUT was driven in MIMO mode, the interferer level was injected to both chains to monitor the performance, while the interferer level is determined according the lowest antenna gain among both antennas (i.e, lower interferer level).

3.1.4 Test Setup

Conducted Setup

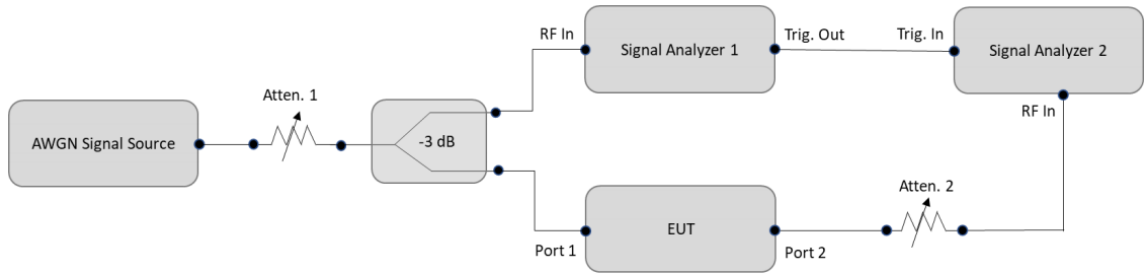


Figure 2. Contention-based protocol test setup, conducted method Step-by-Step Procedure, Conducted Setup

3.1.5 Support Unit used in test configuration and system

Instrument	Brand Name	Model No.	Characteristics
WLAN AP	Qualcomm	Wakiki	Standard AP
Notebook	DELL	Latitude 3400	LAN

3.1.6 Minimum Antenna gain for Contention Based Protocol Test

CBP Antenna Gain	<UNII-5>: -4.11 dBi <UNII-7>: -5.37 dBi

Note: The CBP antenna gain is considering the minimum gain from closed mode as worse case.

3.1.7 Test Summary of Contention Based Protocol Test

Test Engineer :	Rebecca Li and Kai Liao	Temperature :	24~26℃
		Relative Humidity :	45~50%

Band	Channel Freq. (MHz)	Channel BW (MHz)	Incumbent freq. (MHz)	Injected AWGN Level (dBm)	Detection Rate (%)	Regulated Threshold level (dBm)	Adjusted Power (dBm)	Margin (dB)
UNII Band 5	6135	20	6135	-71.27	100	-62	-67.16	5.16
					Result: Stop Transmission			
				-75.27	< 90	-62	-71.16	9.16
					Result: Minimal Operation			
				-76.27	0	-62	-72.16	10.16
					Result: Normal Operation			
	6265	320	6110	-70.41	100	-62	-66.30	4.30
					Result: Stop Transmission			
				-73.41	< 90	-62	-69.30	7.30
					Result: Minimal Operation			
				-74.41	0	-62	-70.30	8.30
					Result: Normal Operation			
			6265	-71.30	100	-62	-67.19	5.19
					Result: Stop Transmission			
				-72.30	< 90	-62	-68.19	6.19
					Result: Minimal Operation			
				-73.30	0	-62	-69.19	7.19
					Result: Normal Operation			
			6420	-70.30	100	-62	-66.19	4.19
					Result: Stop Transmission			
				-71.30	< 90	-62	-67.19	5.19
					Result: Minimal Operation			
				-72.30	0	-62	-68.19	6.19
					Result: Normal Operation			

Note 1: Adjusted Power = Injected AWGN Level - minimum antenna gain (-4.11 dBi).

Note 2: The antenna gain has included the path loss between RF connector and antenna.

Note 3: Margin = Regulated Threshold level - Adjusted Power.

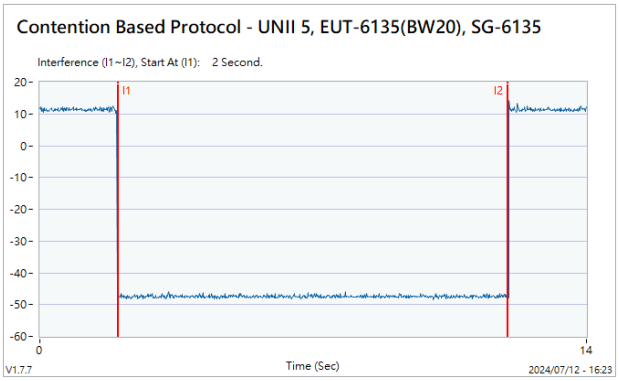
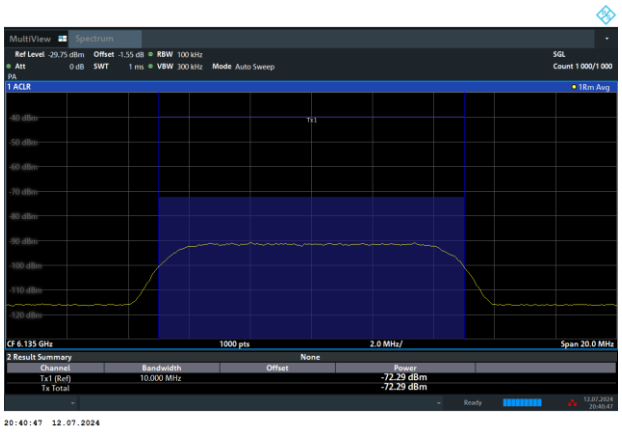
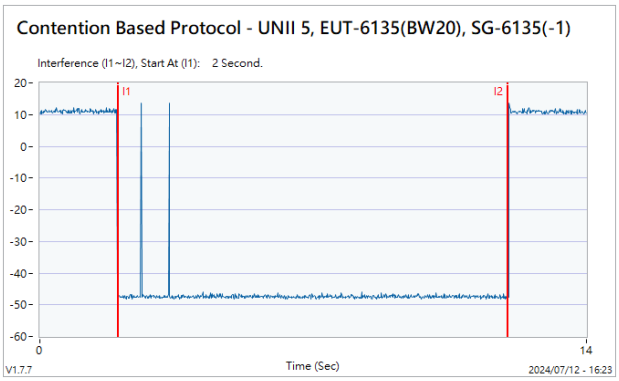
Band	Channel Freq. (MHz)	Channel BW (MHz)	Incumbent freq. (MHz)	Injected AWGN Level (dBm)	Detection Rate (%)	Regulated Threshold level (dBm)	Adjusted Power (dBm)	Margin (dB)
UNII Band 7	6695	20	6695	-70.41	100	-62	-65.04	3.04
					Result: Stop Transmission			
				-74.41	< 90	-62	-69.04	7.04
					Result: Minimal Operation			
				-75.41	0	-62	-71.04	8.04
					Result: Normal Operation			
	6665	160	6590	-72.19	100	-62	-66.82	4.82
					Result: Stop Transmission			
				-74.19	< 90	-62	-68.82	6.82
					Result: Minimal Operation			
				-75.19	0	-62	-69.82	7.82
					Result: Normal Operation			
			6665	-70.44	100	-62	-65.07	3.07
					Result: Stop Transmission			
				-72.44	< 90	-62	-67.07	5.07
					Result: Minimal Operation			
				-73.44	0	-62	-68.07	6.07
					Result: Normal Operation			
			6740	-71.63	100	-62	-66.26	4.26
					Result: Stop Transmission			
				-73.63	< 90	-62	-68.26	6.26
					Result: Minimal Operation			
				-74.63	0	-62	-69.26	7.26
					Result: Normal Operation			

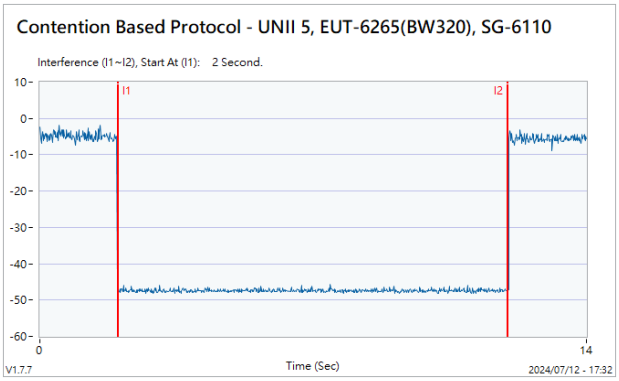
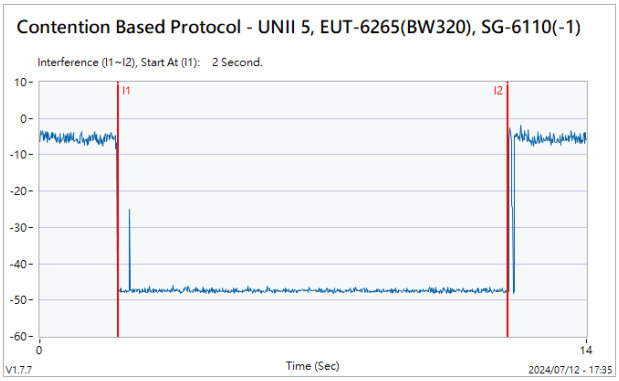
Note 1: Adjusted Power = Injected AWGN Level - minimum antenna gain (-5.37 dBi).

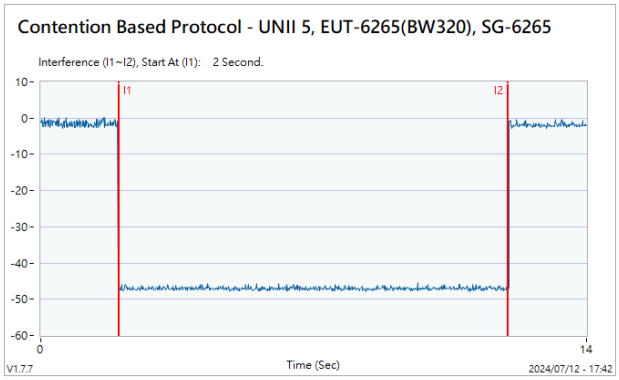
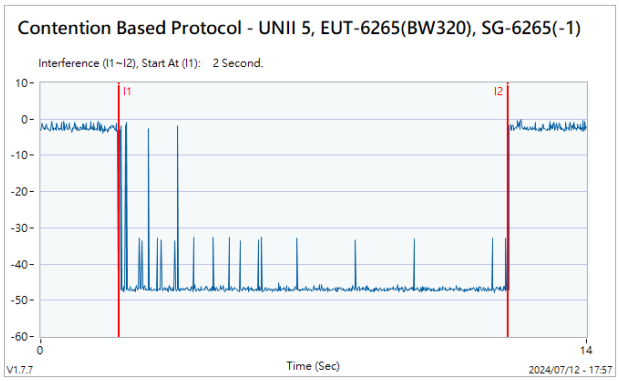
Note 2: The antenna gain has included the path loss between RF connector and antenna.

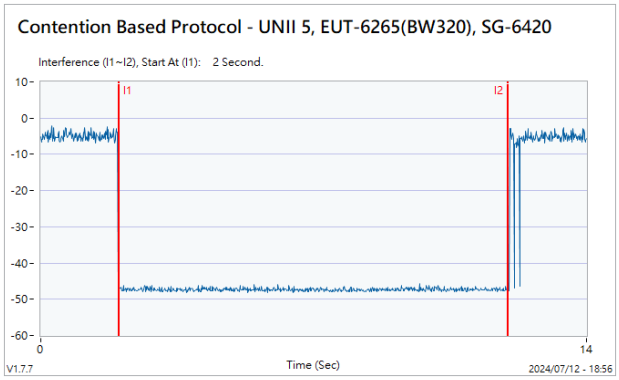
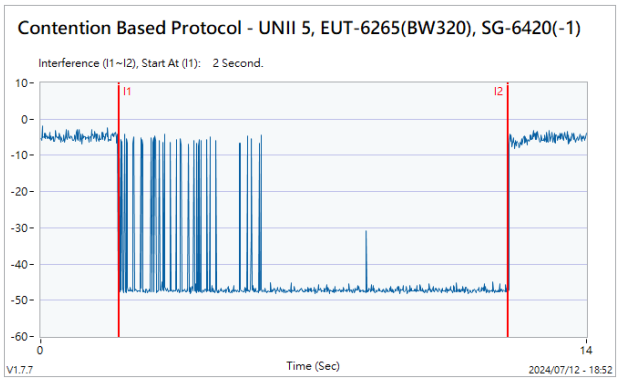
Note 3: Margin = Regulated Threshold level - Adjusted Power.

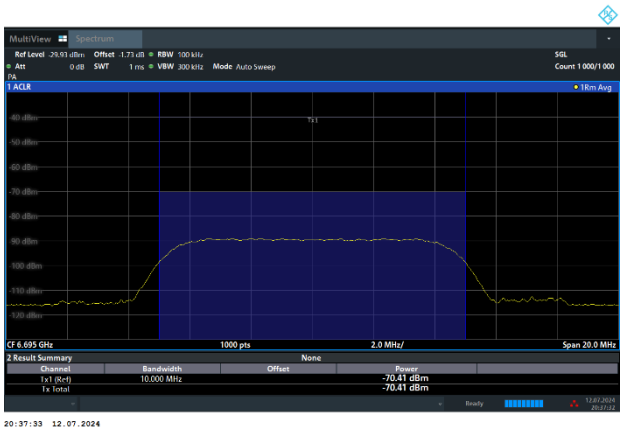
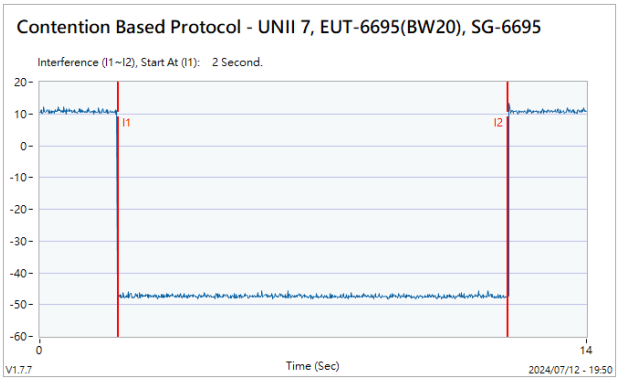
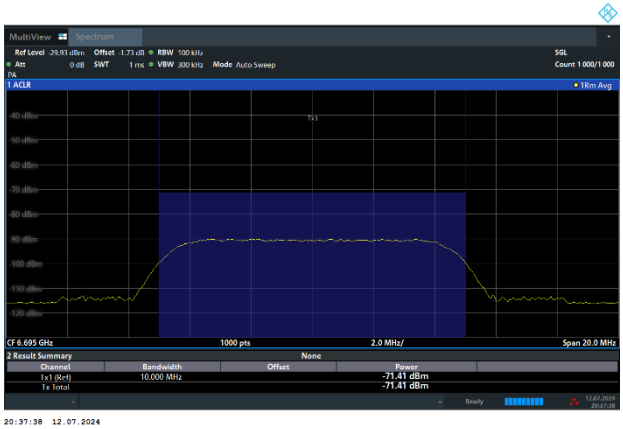
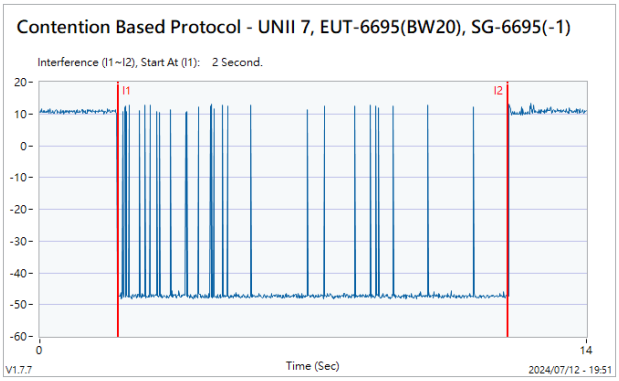
3.1.8 Test Plots of Contention Based Protocol Test

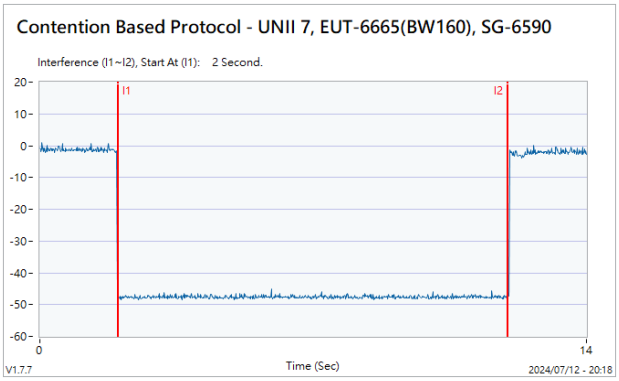
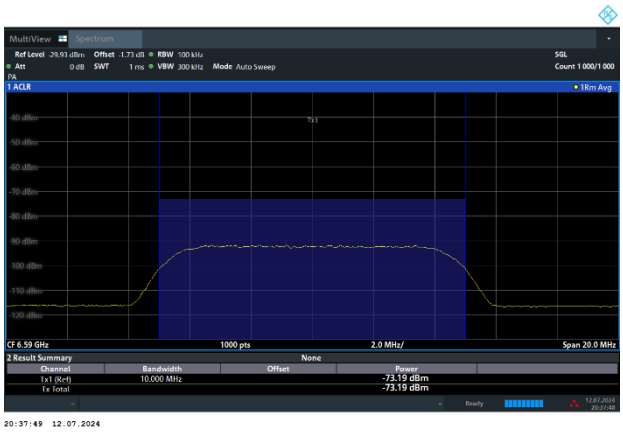
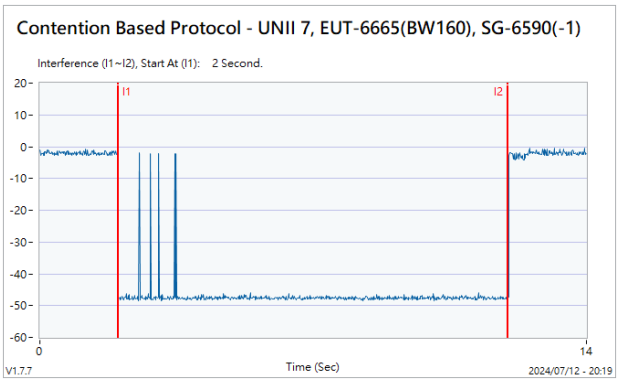
Contention Based Protocol Result Plots on U-NII 5 (AWGN Interference)	
802.11be (EHT20) / 6135MHz Threshold Level (TL) =-71.27dBm	802.11be (EHT20) / CH37 Test result is pass due to no transmission occur.
	
802.11be (EHT20) / 6135MHz Threshold Level (TL) = -72.29dBm	802.11be (EHT20) / CH37 Transmit when the interferer is 1dB lower.
	

Contention Based Protocol Result Plots on U-NII 5 (AWGN Interference)	
802.11be (EHT320) / 6110MHz (Lower edge) Threshold Level (TL) = -70.41dBm	802.11be (EHT320) / CH63 (Lower edge) Test result is pass due to no transmission occur.
	
802.11be (EHT320) / 6110MHz (Lower edge) Threshold Level (TL) = -71.42dBm	802.11be (EHT320) / CH63 (Lower edge) Transmit when the interferer is 1dB lower.
	

Contention Based Protocol Result Plots on U-NII 5 (AWGN Interference)	
802.11be (EHT320) / 6265MHz (Middle) Threshold Level (TL) = -71.30dBm	802.11be (EHT320) / CH63 (Middle) Test result is pass due to no transmission occur.
	
802.11be (EHT320) / 6265MHz (Middle) Threshold Level (TL) = -72.27dBm	802.11be (EHT320) / CH63 (Middle) Transmit when the interferer is 1dB lower.
	

Contention Based Protocol Result Plots on U-NII 5 (AWGN Interference)	
802.11be (EHT320) / 6420MHz (Upper edge) Threshold Level (TL) = -70.30Bm	802.11be (EHT320) / CH63 (Upper edge) Test result is pass due to no transmission occur.
	
802.11be (EHT320) / 6420MHz (Upper edge) Threshold Level (TL) = -71.28dBm	802.11be (EHT320) / CH63 (Upper edge) Transmit when the interferer is 1dB lower.
	

Contention Based Protocol Result Plots on U-NII 7 (AWGN Interference)	
802.11be (EHT20) / 6695MHz Threshold Level (TL) = -70.41dBm	802.11be (EHT20) / CH149 Test result is pass due to no transmission occur.
	
802.11be (EHT20) / 6695MHz Threshold Level (TL) = -71.41dBm	802.11be (EHT20) / CH149 Transmit when the interferer is 1dB lower.
	

Contention Based Protocol Result Plots on U-NII 7 (AWGN Interference)	
802.11be (EHT160) / 6590MHz (Lower edge) Threshold Level (TL) = -72.19dBm	802.11be (EHT160) / CH143 (Lower edge) Test result is pass due to no transmission occur.
	
802.11be (EHT160) / 6590MHz (Lower edge) Threshold Level (TL) = -73.19dBm	802.11be (EHT160) / CH143 (Lower edge) Transmit when the interferer is 1dB lower.
	

Contention Based Protocol Result Plots on U-NII 7 (AWGN Interference)	
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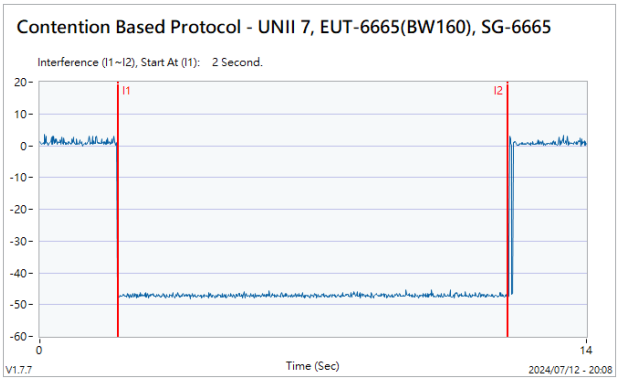
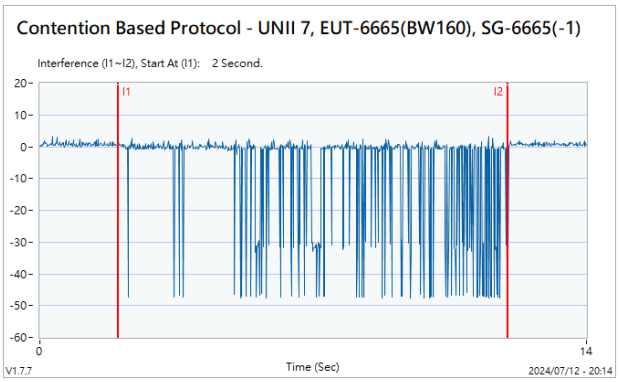
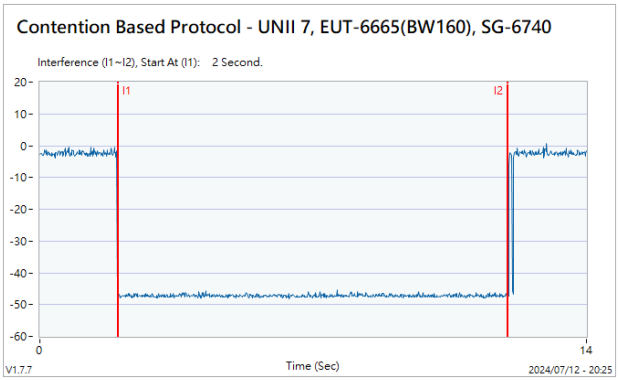
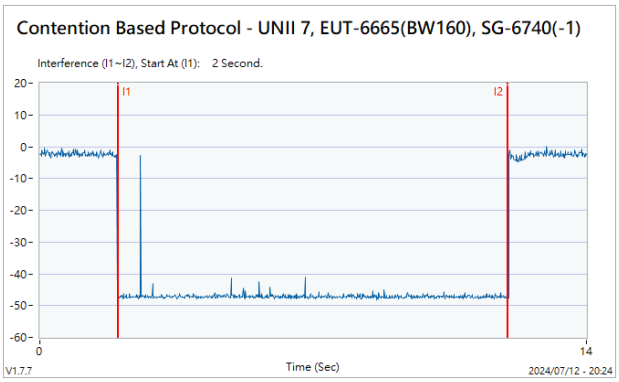
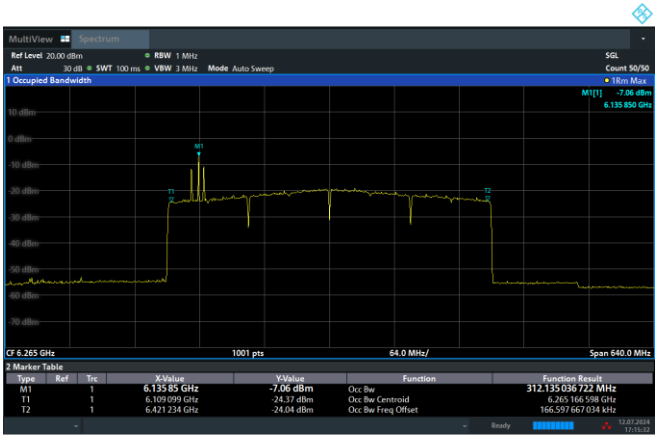
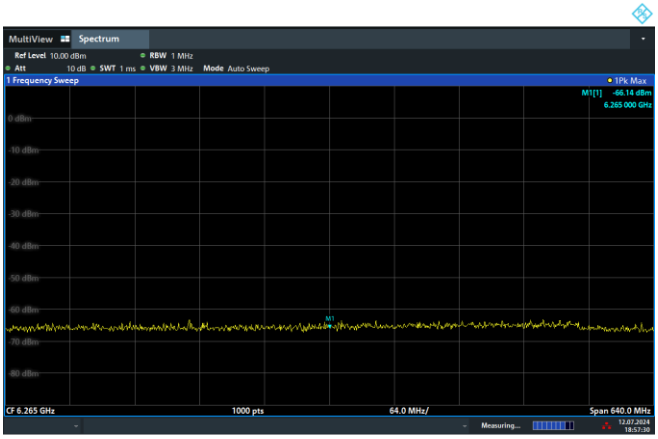
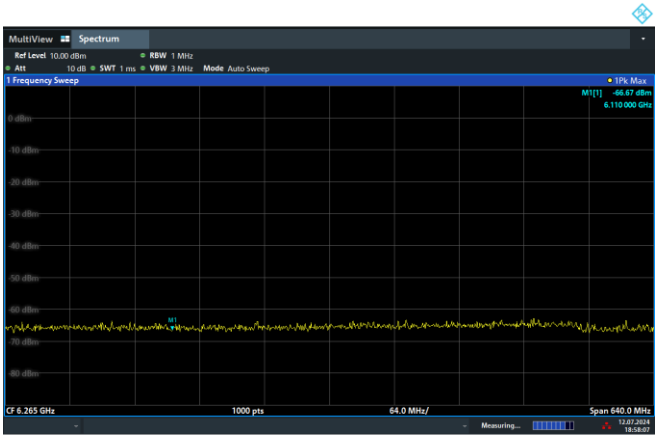
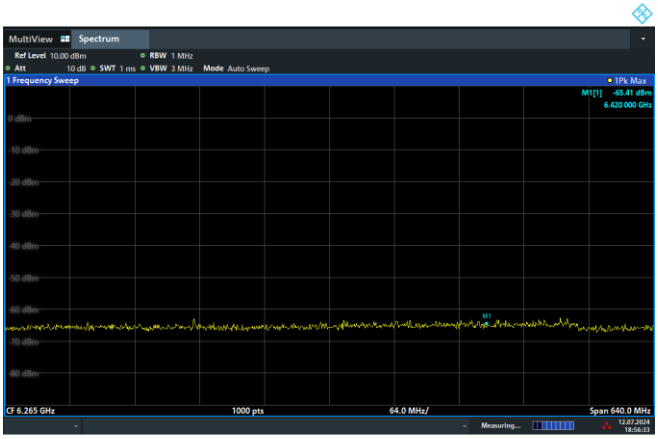
	
802.11be (EHT160) / 6665MHz (Middle) Threshold Level (TL) = -71.42dBm	802.11be (EHT160) / CH143 (Middle) Transmit when the interferer is 1dB lower.
	

Contention Based Protocol Result Plots on U-NII 7 (AWGN Interference)	
802.11be (EHT160) / 6740MHz (Upper edge) Threshold Level (TL) = -71.63dBm	802.11be (EHT160) / CH143 (Upper edge) Test result is pass due to no transmission occur.
	
802.11be (EHT160) / 6740MHz (Upper edge) Threshold Level (TL) = -72.62dBm	802.11be (EHT160) / CH143 (Upper edge) Transmit when the interferer is 1dB lower.
	

CBP verify with frequency domain plots

The device does not support channel puncturing with regards to Contention Based Protocol.

The entire bandwidth 320MHz stops transmission after the incumbent signal appears.

Before incumbent injected on 320MHz channel	After 10MHz incumbent injected on center of channel, the entire 320MHz bandwidth stops transmission.
	
After 10MHz incumbent injected on bottom of channel, the entire 320MHz bandwidth stops transmission.	After 10MHz incumbent injected on top of channel, the entire 320MHz bandwidth stops transmission.
	

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	Dec. 20, 2023	Jul. 12, 2024	Dec. 19, 2024	CBP (DF02-HY)
Spectrum Analyzer	Rohde & Schwarz	FSV3013	101549	10Hz~13.6GHz	Jan. 30, 2024	Jul. 12, 2024	Jan. 29, 2025	CBP (DF02-HY)
Power Divider	Woken	2Way Divider	DCMB1KW7A2	0.5GHz-18GHz	Calibration from System	Jul. 12, 2024	Calibration from System	CBP (DF02-HY)
Power Divider	Woken	3Way SMA Power Divder Rated to 20W	STI08-0010(#2)	2GHz-8GHz	Calibration from System	Jul. 12, 2024	Calibration from System	CBP (DF02-HY)
Power Divider	Woken	3Way SMA Power Divder Rated to 20W	STI08-0010(#3)	2GHz-8GHz	Calibration from System	Jul. 12, 2024	Calibration from System	CBP (DF02-HY)
Power Divider	Woken	0120A04051801O	DCMB1CW3A7	0.5-18GHz	Calibration from System	Jul. 12, 2024	Calibration from System	CBP (DF02-HY)
Coupler	Woken	10dB 30W SMA	DOM5CIW3A1	0.5-18GHz	Calibration from System	Jul. 12, 2024	Calibration from System	CBP (DF02-HY)
RF Cable	MTJ Cooperstion	SBF405-105FLEX	MTJ-30cm-01	30 kHz~18GHz	Calibration from System	Jul. 12, 2024	Calibration from System	CBP (DF02-HY)
RF Cable	MTJ Cooperstion	SBF405-105FLEX	MTJ-30cm-03	30 kHz~18GHz	Calibration from System	Jul. 12, 2024	Calibration from System	CBP (DF02-HY)
RF Cable	MTJ Cooperstion	SBF405-105FLEX	MTJ-30cm-05	30 kHz~18GHz	Calibration from System	Jul. 12, 2024	Calibration from System	CBP (DF02-HY)
RF Cable	EM	SFL402	SFL402-30cm-#8	30 kHz~18GHz	Calibration from System	Jul. 12, 2024	Calibration from System	CBP (DF02-HY)
RF Cable	EC	SS405	SS405-100cm-05	30 kHz~18GHz	Calibration from System	Jul. 12, 2024	Calibration from System	CBP (DF02-HY)
RF Cable	EC	SS405	SS405-100cm-06	30 kHz~18GHz	Calibration from System	Jul. 12, 2024	Calibration from System	CBP (DF02-HY)
RF Cable	EC	SLF405	EC-SFL405-100cm-#8	30 kHz~18GHz	Calibration from System	Jul. 12, 2024	Calibration from System	CBP (DF02-HY)
RF Cable	EC	SLF405	EC-SFL405-100cm-#9	30 kHz~18GHz	Calibration from System	Jul. 12, 2024	Calibration from System	CBP (DF02-HY)
RF Cable	MVE	SPF141	SPF141-100cm-#12	30 kHz~18GHz	Calibration from System	Jul. 12, 2024	Calibration from System	CBP (DF02-HY)
Software 1	Sporton	Adaptivity Test Tools	N/A	Ver 1.7.7	NCR	Jul. 12, 2024	NCR	CBP (DF02-HY)