



Partial FCC RF Test Report

APPLICANT : Xiaomi Communications Co., Ltd.
EQUIPMENT : Mobile Phone
BRAND NAME : Xiaomi
MODEL NAME : A301XM
FCC ID : 2AFZZND5R
Standard : FCC Part 15 Subpart E §15.407
CLASSIFICATION : 15E 6 GHz Low Power Indoor Client (6XD)
TEST DATE(S) : Jun. 12, 2023

We, Sporton International Inc. (Shenzhen), 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 report apply exclusively to the tested model / sample. Without written approval of Sporton International Inc. (Shenzhen), the test report shall not be reproduced except in full.

Jason Jia



Approved by: Jason Jia

Sporton International Inc. (ShenZhen)

1/F, 2/F, Bldg 5, Shiling Industrial Zone, Xinwei Village, Xili, Nanshan, Shenzhen, 518055

People's Republic of China



Table of Contents

- 1 General Description 5**
 - 1.1 Applicant 5
 - 1.2 Manufacturer 5
 - 1.3 Product Feature of Equipment Under Test 5
 - 1.4 Product Specification of Equipment Under Test 5
 - 1.5 Modification of EUT 6
 - 1.6 Testing Location 6
 - 1.7 Test Software 6
 - 1.8 Applicable Standards 7
- 2 Test Configuration of Equipment Under Test 8**
 - 2.1 Carrier Frequency and Channel 8
 - 2.2 EUT Operation Test Setup 9
- 3 Test Result 10**
 - 3.1 Contention Based Protocol 10
- 4 List of Measuring Equipment 18**
- Appendix A. Setup Photographs**



History of this test report

Report No.	Version	Description	Issued Date
FR351205-01B	01	Initial issue of report	Jul. 04, 2023



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.



1 General Description

1.1 Applicant

Xiaomi Communications Co., Ltd.

#019, 9th Floor, Building 6, 33 Xi'erqi Middle Road, Haidian District, Beijing, China, 100085

1.2 Manufacturer

Xiaomi Communications Co., Ltd.

#019, 9th Floor, Building 6, 33 Xi'erqi Middle Road, Haidian District, Beijing, China, 100085

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	Mobile Phone
Brand Name	Xiaomi
Model Name	A301XM
IMEI Code	CBP: 861585060020847/861585060020854
HW Version	P2.0
SW Version	MIUI 14
EUT Stage	Identical Prototype

Remark: The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

1.4 Product Specification of Equipment Under Test

Standards-related Product Specification	
Tx/Rx Frequency Range	U-NII-5: 5925 MHz ~ 6425 MHz U-NII-6: 6425 MHz ~ 6525 MHz U-NII-7: 6525 MHz ~ 6875 MHz U-NII-8: 6875 MHz ~ 7125 MHz
Antenna Type / Gain	<p><5925 MHz ~ 6425 MHz > <Ant. 5> : Fixed Internal Antenna with gain -0.43 dBi <Ant. 18> : Fixed Internal Antenna with gain 0 dBi</p> <p><6425 MHz ~ 6525 MHz > <Ant. 5> : Fixed Internal Antenna with gain -2.05 dBi <Ant. 18> : Fixed Internal Antenna with gain -1.54 dBi</p> <p><6525 MHz ~ 6875 MHz > <Ant. 5> : Fixed Internal Antenna with gain -3.01 dBi <Ant. 18> : Fixed Internal Antenna with gain -1.33 dBi</p> <p><6875 MHz ~ 7125 MHz > <Ant. 5> : Fixed Internal Antenna with gain -2.04 dBi <Ant. 18> : Fixed Internal Antenna with gain -1.67 dBi</p>
Type of Modulation	802.11a: OFDM (BPSK / QPSK / 16QAM / 64QAM) 802.11ax: OFDM (BPSK / QPSK / 16QAM / 64QAM / 256QAM / 1024QAM)

Remark:



1. For WLAN SISO & MIMO mode, the whole testing has assessed only MIMO mode by referring to the higher normal conducted power.
2. WLAN MIMO only support CDD mode.
3. U-NII-5/-6/-7/-8 can't transmit simultaneously.
4. 802.11ax support full RU tone and partial RU tone, after assessing, CBP test cases were performed with full RU with its maximum power/PSD.
5. CBP test with minimum antenna gain (Antenna 5 path for each band).
6. For 20M Bandwidth, the CH233 (Center Frequency = 7115MHz) is not supported.

1.5 Modification of EUT

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

1.6 Testing Location

Sporton International Inc. (ShenZhen) is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.01.

Test Firm	Sporton International Inc. (ShenZhen)		
Test Site Location	1/F, 2/F, Bldg 5, Shiling Industrial Zone, Xinwei Village, Xili, Nanshan, Shenzhen, 518055 People's Republic of China TEL: +86-755-86379589 FAX: +86-755-86379595		
Test Site No.	Sporton Site No.	FCC Designation No.	FCC Test Firm Registration No.
	DFS01-SZ	CN1256	421272

1.7 Test Software

Item	Site	Manufacture	Name	Version
1.	DFS01-SZ	Sporton	Test Tools	1.0



1.8 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 v01r01
- ♦ FCC KDB 662911 D01 Multiple Transmitter Output v02r01.
- ♦ ANSI C63.10-2013

Remark: All test items were verified and recorded according to the standards and without any deviation during the test.



2 Test Configuration of Equipment Under Test

2.1 Carrier Frequency and Channel

<U-NII-5, 6, 7, 8>

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							

2.2 EUT Operation Test Setup

For WLAN RF test items, an engineering test program (QRCT TX Tool) was provided and enabled to make EUT continuously transmit.



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 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

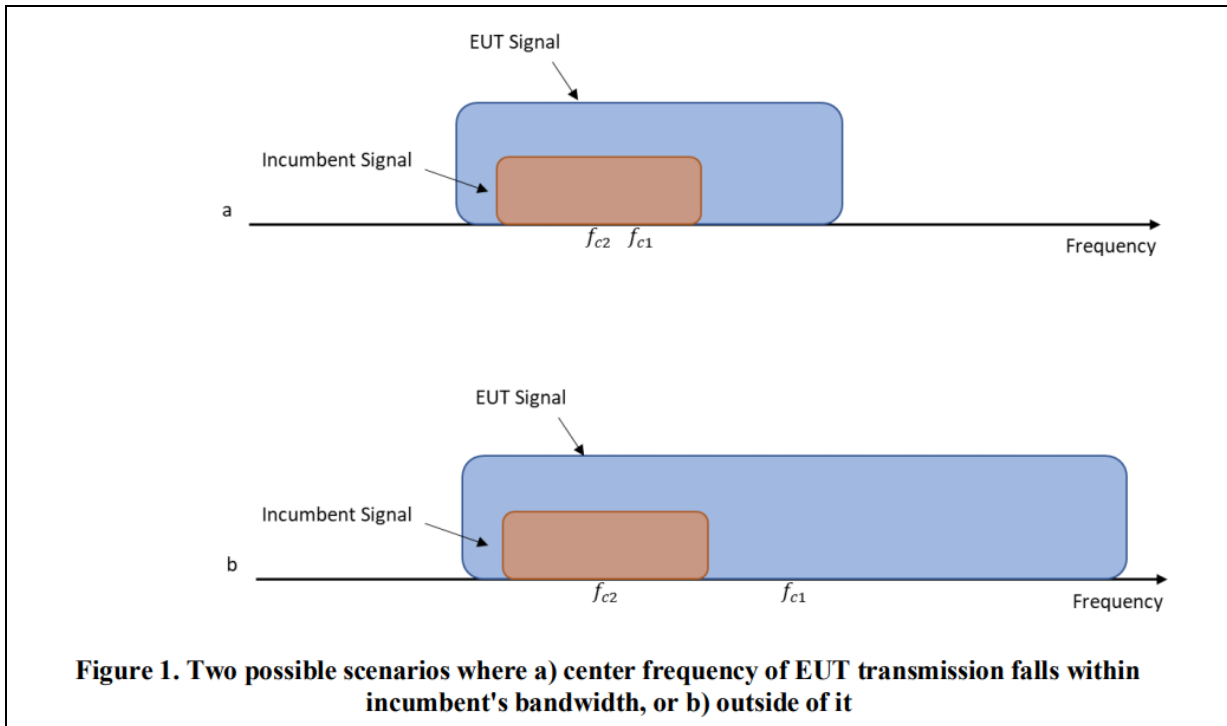
where:

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.

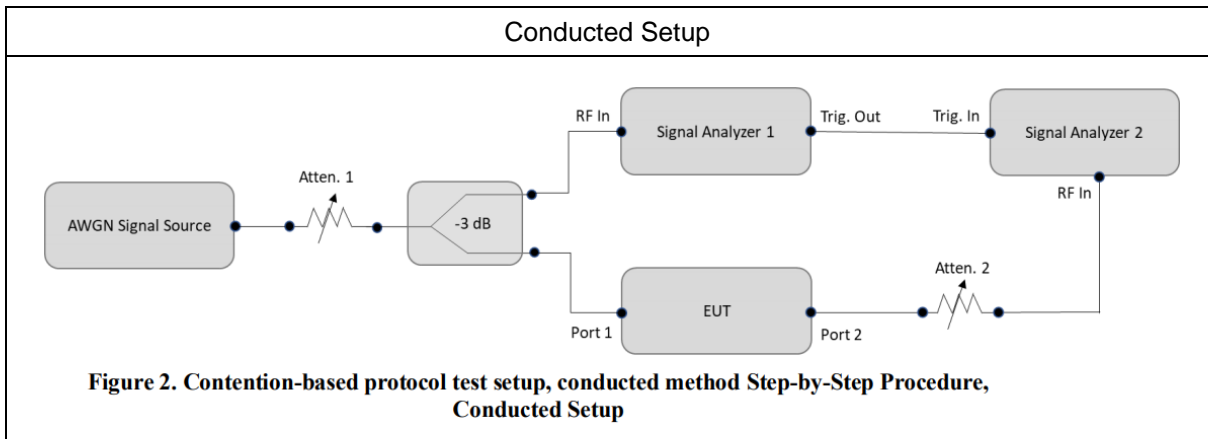
3.1.3 Test Procedures

Refer to KDB 987594 D02 v01r01.

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.
 6. EUT was driven in MIMO mode, the interferer signal was injected to both chains to monitor the performance, while the interferer level is determined according to the lowest antenna gain among both antennas.

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)	Injected AWGN Level (dBm)	Detection Rate (%)	Regulated Threshold level (dBm)	Adjusted Power (dBm)	Margin (dB)		
UNII Band 5	6135	20	6135	-73.52	100	-62	-73.09	11.09		
				Result: Stop Transmission						
				-74.52	<90	-62	-74.09	12.09		
				Result: Minimal Operation						
				-75.52	=0	-62	-75.09	13.09		
				Result: Normal Operation						
	6185	160	6110	-73.28	100	-62	-72.85	10.85		
				Result: Stop Transmission						
				-74.28	<90	-62	-73.85	11.85		
				Result: Minimal Operation						
				-75.28	=0	-62	-74.85	12.85		
				Result: Normal Operation						
			6260	160	6185	-69.05	100	-62	-68.62	6.62
						Result: Stop Transmission				
						-70.05	<90	-62	-69.62	7.62
						Result: Minimal Operation				
6260	160	6185	-71.05	=0	-62	-70.62	8.62			
			Result: Normal Operation							
			-72.05	100	-62	-71.62	9.62			
			Result: Stop Transmission							
6260	160	6260	-73.05	<90	-62	-72.62	10.62			
			Result: Minimal Operation							
6260	160	6260	-74.05	=0	-62	-73.62	11.62			
			Result: Normal Operation							

Note 1: Adjusted Power = Injected AWGN Level - minimum antenna gain (Antenna 5, gain = -0.43 dBi)

Note 2: Path Loss between antenna and RF connector is negligible. (0 dB)

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 6	6455	20	6455	-75.68	100	-62	-73.63	11.63
				Result: Stop Transmission				
				-76.68	<90	-62	-74.63	12.63
				Result: Minimal Operation				
				-77.68	=0	-62	-75.63	13.63
				Result: Normal Operation				
	6505	160	6430	-74.20	100	-62	-72.15	10.15
				Result: Stop Transmission				
				-75.20	<90	-62	-73.15	11.15
				Result: Minimal Operation				
				-76.20	=0	-62	-74.15	12.15
				Result: Normal Operation				
			6505	-69.12	100	-62	-67.07	5.07
				Result: Stop Transmission				
				-70.12	<90	-62	-68.07	6.07
				Result: Minimal Operation				
				-71.12	=0	-62	-69.07	7.07
				Result: Normal Operation				
6580	-77.86	100	-62	-75.81	13.81			
	Result: Stop Transmission							
	-78.86	<90	-62	-76.81	14.81			
	Result: Minimal Operation							
-79.86	=0	-62	-77.81	15.81				
Result: Normal Operation								

Note 1: Adjusted Power = Injected AWGN Level - minimum antenna gain (Antenna 5, gain = -2.05dBi)

Note 2: Path Loss between antenna and RF connector is negligible. (0 dB)

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	-76.31	100	-62	-73.30	11.30			
				Result: Stop Transmission							
				-77.31	<90	-62	-74.30	12.30			
				Result: Minimal Operation							
				-78.31	=0	-62	-75.30	13.30			
				Result: Normal Operation							
	6665	160	6590	6590	-70.26	100	-62	-67.25	5.25		
					Result: Stop Transmission						
					-71.26	<90	-62	-68.25	6.25		
					Result: Minimal Operation						
					-72.26	=0	-62	-69.25	7.25		
					Result: Normal Operation						
			6665	160	6665	6665	-68.77 (worst)	100	-62	-65.76	3.76
							Result: Stop Transmission				
							-69.77	<90	-62	-66.76	4.76
							Result: Minimal Operation				
							-70.77	=0	-62	-67.76	5.76
							Result: Normal Operation				
	6740	160	6740	6740	-76.96	100	-62	-73.95	11.95		
					Result: Stop Transmission						
					-77.96	<90	-62	-74.95	12.95		
					Result: Minimal Operation						
					-78.96	=0	-62	-75.95	13.95		
					Result: Normal Operation						

Note 1: Adjusted Power = Injected AWGN Level - minimum antenna gain (Antenna 5, gain = -3.01dBi)

Note 2: Path Loss between antenna and RF connector is negligible. (0 dB)

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 8	7015	20	7015	-78.06	100	-62	-76.02	14.02			
				Result: Stop Transmission							
				-79.06	<90	-62	-77.02	15.02			
				Result: Minimal Operation							
				-80.06	=0	-62	-78.02	16.02			
				Result: Normal Operation							
	6985	160	6910	6910	-77.77	100	-62	-75.73	13.73		
					Result: Stop Transmission						
					-78.77	<90	-62	-76.73	14.73		
					Result: Minimal Operation						
					-79.77	=0	-62	-77.73	15.73		
					Result: Normal Operation						
			6985	6985	6985	6985	-69.25	100	-62	-67.21	5.21
							Result: Stop Transmission				
							-70.25	<90	-62	-68.21	6.21
							Result: Minimal Operation				
							-71.25	=0	-62	-69.21	7.21
							Result: Normal Operation				
			7060	7060	7060	7060	-72.44	100	-62	-70.40	8.40
							Result: Stop Transmission				
							-73.44	<90	-62	-71.40	9.40
							Result: Minimal Operation				
							-74.44	=0	-62	-72.40	10.40
							Result: Normal Operation				

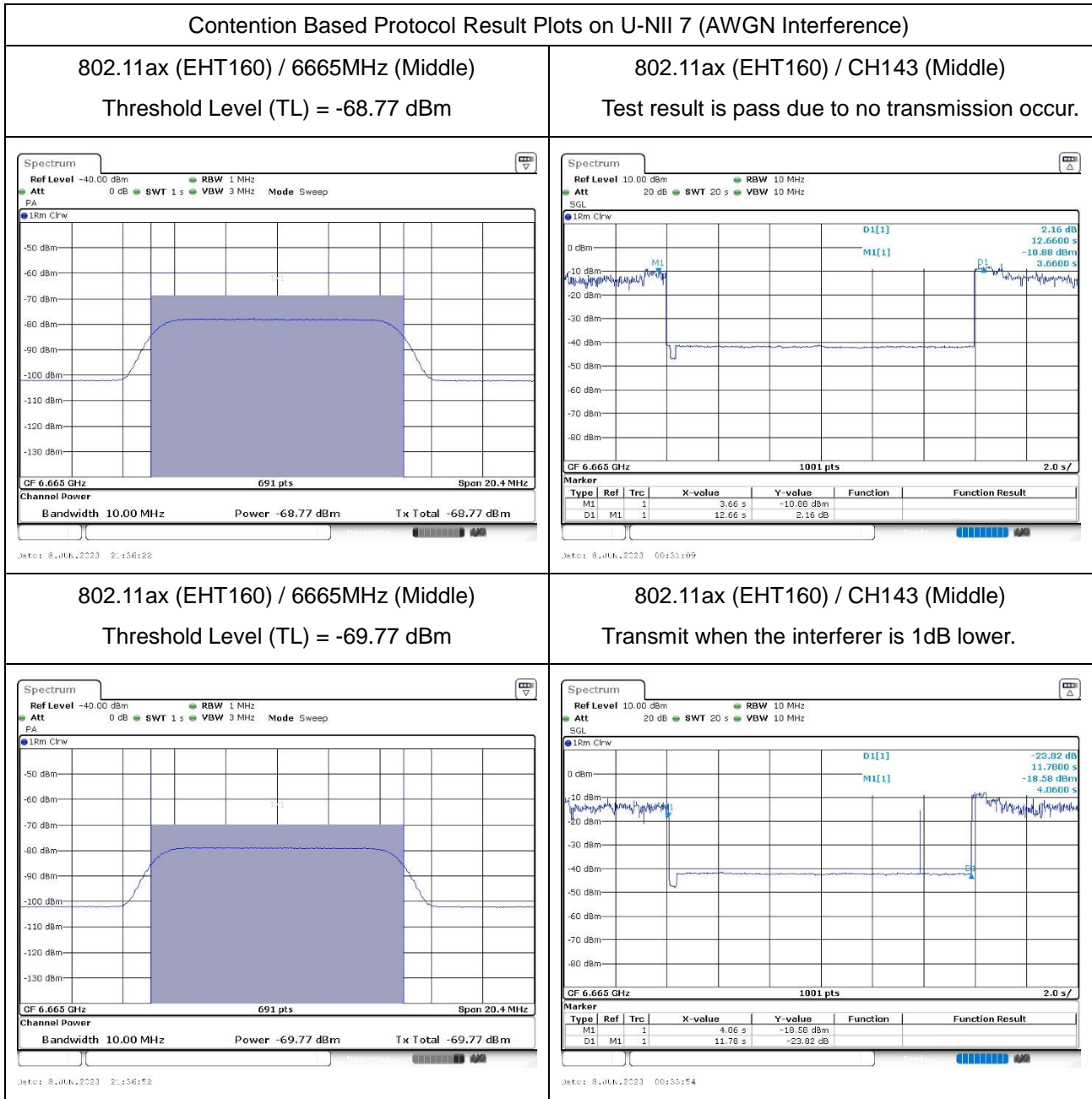
Note 1: Adjusted Power = Injected AWGN Level - minimum antenna gain (Antenna 5, gain = -2.04dBi)

Note 2: Path Loss between antenna and RF connector is negligible. (0 dB)

Note 3: Margin = Regulated Threshold level - Adjusted Power



3.1.7 Worst Case Plots of Contention Based Protocol



Remark: M1: Injection of AWGN signal, D1: Removal of AWGN signal



4 List of Measuring Equipment

Instrument	Brand Name	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSV40	101078	10Hz~40GHz	Apr. 06, 2023	Jun. 12, 2023	Apr. 05, 2024	CBP (DFS01- SZ)
MXG-B RF Vector Signal Generator	Keysight	N5182B	MY562004 24	9kHz~6GHz	Apr. 04, 2023	Jun. 12, 2023	Apr. 03, 2024	CBP (DFS01- SZ)
Shielding Box	Hongyitong	182-200	AGTE2013 182200016	Shielded Effect: MAX 70dB	Oct. 17, 2022	Jun. 12, 2023	Oct. 16, 2023	CBP (DFS01- SZ)
Combiner	MTJ Cooperation	MTJ7112	N/A	0.4-6GHz	NCR	Jun. 12, 2023	NCR	CBP (DFS01- SZ)

NCR: No Calibration Required

----- THE END -----