




RADIO TEST REPORT

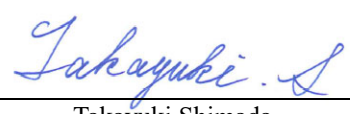
Test Report No. : 14118411H-E-R1

Applicant : ICOM Incorporated
Type of EUT : WLAN TRANSCEIVER
Model Number of EUT : IP110H
FCC ID : AFJ399500
Test regulation : FCC Part 15 Subpart E: 2021
(Except for DFS test)
Test result : Complied (Refer to SECTION 3)

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2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with the limits of the above regulation.
4. The test results in this test report are traceable to the national or international standards.
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6. This test report covers Radio technical requirements.
It does not cover administrative issues such as Manual or non-Radio test related Requirements. (if applicable)
7. The all test items in this test report are conducted by UL Japan, Inc. Ise EMC Lab.
8. The opinions and the interpretations to the result of the description in this report are outside scopes where UL Japan, Inc. has been accredited.
9. The information provided from the customer for this report is identified in Section 1.
10. This report is a revised version of 14118411H-E. 14118411H-E is replaced with this report.

Date of test: December 3, 2021 to March 15, 2022

Representative test engineer: 
Nachi Konegawa
Engineer

Approved by: 
Takayuki Shimada
Leader



CERTIFICATE 5107.02

- The testing in which "Non-accreditation" is displayed is outside the accreditation scopes in UL Japan, Inc.
 There is no testing item of "Non-accreditation".

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REVISION HISTORY

Original Test Report No.: 14118411H-E

Revision	Test report No.	Date	Page revised	Contents
- (Original)	14118411H-E	February 14, 2022	-	-
1	14118411H-E-R1	March 15, 2022	P1	Updated Date of test: December 3 to 20, 2021 → December 3, 2021 to March 15, 2022
1	14118411H-E-R1	March 15, 2022	P17	Corrected Instrument used and Test method for Maximum Conducted Output Power test: PM → PM-G
1	14118411H-E-R1	March 15, 2022	P43	Remeasured Maximum Conducted Output Power and corrected Power Meter Reading value (5785 MHz): -11.62 → -11.74
1	14118411H-E-R1	March 15, 2022	P138	Updated Last Calibration Dates of Local ID: - MOS-24 - MMM-12

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Reference: Abbreviations (Including words undescribed in this report)

A2LA	The American Association for Laboratory Accreditation	LIMS	Laboratory Information Management System
AC	Alternating Current	MCS	Modulation and Coding Scheme
AFH	Adaptive Frequency Hopping	MRA	Mutual Recognition Arrangement
AM	Amplitude Modulation	N/A	Not Applicable
Amp, AMP	Amplifier	NIST	National Institute of Standards and Technology
ANSI	American National Standards Institute	NS	No signal detect.
Ant, ANT	Antenna	NSA	Normalized Site Attenuation
AP	Access Point	OBW	Occupied BandWidth
ASK	Amplitude Shift Keying	OFDM	Orthogonal Frequency Division Multiplexing
Atten., ATT	Attenuator	P/M	Power meter
AV	Average	PCB	Printed Circuit Board
BPSK	Binary Phase-Shift Keying	PER	Packet Error Rate
BR	Bluetooth Basic Rate	PHY	Physical Layer
BT	Bluetooth	PK	Peak
BT LE	Bluetooth Low Energy	PN	Pseudo random Noise
BW	BandWidth	PRBS	Pseudo-Random Bit Sequence
Cal Int	Calibration Interval	PSD	Power Spectral Density
CCK	Complementary Code Keying	QAM	Quadrature Amplitude Modulation
Ch., CH	Channel	QP	Quasi-Peak
CISPR	Comite International Special des Perturbations Radioelectriques	QPSK	Quadrature Phase Shift Keying
CW	Continuous Wave	RBW	Resolution BandWidth
DBPSK	Differential BPSK	RDS	Radio Data System
DC	Direct Current	RE	Radio Equipment
D-factor	Distance factor	RF	Radio Frequency
DFS	Dynamic Frequency Selection	RMS	Root Mean Square
DQPSK	Differential QPSK	RNSS	Radio Navigation Satellite Service
DSSS	Direct Sequence Spread Spectrum	RSS	Radio Standards Specifications
DUT	Device Under Test	Rx	Receiving
EDR	Enhanced Data Rate	SA, S/A	Spectrum Analyzer
EIRP, e.i.r.p.	Equivalent Isotropically Radiated Power	SG	Signal Generator
EMC	ElectroMagnetic Compatibility	SVSWR	Site-Voltage Standing Wave Ratio
EMI	ElectroMagnetic Interference	TR, T/R	Test Receiver
EN	European Norm	Tx	Transmitting
ERP, e.r.p.	Effective Radiated Power	VBW	Video BandWidth
ETSI	European Telecommunications Standards Institute	Vert.	Vertical
EU	European Union	WLAN	Wireless LAN
EUT	Equipment Under Test		
Fac.	Factor		
FCC	Federal Communications Commission		
FHSS	Frequency Hopping Spread Spectrum		
FM	Frequency Modulation		
Freq.	Frequency		
FSK	Frequency Shift Keying		
GFSK	Gaussian Frequency-Shift Keying		
GNSS	Global Navigation Satellite System		
GPS	Global Positioning System		
Hori.	Horizontal		
ICES	Interference-Causing Equipment Standard		
IEC	International Electrotechnical Commission		
IEEE	Institute of Electrical and Electronics Engineers		
IF	Intermediate Frequency		
ILAC	International Laboratory Accreditation Conference		
ISED	Innovation, Science and Economic Development Canada		
ISO	International Organization for Standardization		
JAB	Japan Accreditation Board		
LAN	Local Area Network		

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SECTION 1: Customer information

Company Name : ICOM Incorporated
Address : 1-1-32, Kamiminami, Hirano-Ku, Osaka, 547-0003, Japan
Telephone Number : +81-6-6794-7783
Contact Person : Atushi Tomiyama

The information provided from the customer is as follows;

- Applicant, Type of EUT, Model Number of EUT, FCC ID on the cover and other relevant pages
 - Operating/Test Mode(s) (Mode(s)) on all the relevant pages
 - SECTION 1: Customer information
 - SECTION 2: Equipment under test (EUT) other than the Receipt Date
 - SECTION 4: Operation of EUT during testing
- * The laboratory is exempted from liability of any test results affected from the above information in SECTION 2 and 4.

SECTION 2: Equipment under test (EUT)

2.1 Identification of EUT

Type : WLAN TRANSCEIVER
Model Number : IP110H
Serial Number : Refer to SECTION 4.2
Receipt Date : November 26, 2021
Condition : Engineering prototype
(Not for Sale: This sample is equivalent to mass-produced items.)
Modification : No Modification by the test lab.

2.2 Product Description

Model: IP110H (referred to as the EUT in this report) is a WLAN TRANSCEIVER.

General Specification

Rating : DC 3.75 V (Internal battery)

Radio Specification

WLAN (IEEE802.11b/g/n-20/n-40)

Radio Type	Transceiver
Frequency of Operation	[20 MHz Band] 2412 MHz to 2462 MHz [40 MHz Band] 2422 MHz to 2452 MHz
Modulation	DSSS, OFDM
Antenna type	Split ring (internal)
Antenna Gain	1.15 dBi

WLAN (IEEE802.11a/n-20/n-40/ac-20/ac-40/ac-80)

Radio Type	Transceiver
Frequency of Operation	[20 MHz Band] 5180 MHz to 5240 MHz 5260 MHz to 5320 MHz 5500 MHz to 5580 MHz, 5660 MHz to 5700 MHz 5745 MHz to 5825 MHz [40 MHz Band] 5190 MHz, 5230 MHz 5270 MHz, 5310 MHz 5510 MHz, 5550 MHz, 5670 MHz 5755 MHz, 5795 MHz [80 MHz Band] 5210 MHz 5290 MHz 5530 MHz 5775 MHz
Modulation	OFDM
Antenna type	Split ring (internal)
Antenna Gain	0.15 dBi (5180 MHz to 5320 MHz) 0.62 dBi (5500 MHz to 5825 MHz)

Bluetooth (BR / EDR function)

Radio Type	Transceiver
Frequency of Operation	2402 MHz - 2480 MHz
Modulation	FHSS
Antenna type	$\lambda/4$ printed inverted F antenna
Antenna Gain	-1.5 dBi

*This report applies to WLAN (5 GHz band) part.

SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification : FCC Part 15 Subpart E
FCC Part 15 final revised on May 3, 2021 and effective July 2, 2021

Title : FCC 47 CFR Part 15 Radio Frequency Device Subpart E
Unlicensed National Information Infrastructure Devices
Section 15.407 General technical requirements

* Also the EUT complies with FCC Part 15 Subpart B.

3.2 Procedures and results

Item	Test Procedure	Specification	Worst margin	Results	Remarks
Conducted Emission	FCC: ANSI C63.10-2013	FCC: 15.407 (b) (6) / 15.207	-	N/A	*1)
	ISED: RSS-Gen 8.8	ISED: RSS-Gen 8.8			
26 dB Emission Bandwidth	FCC: KDB Publication Number 789033	FCC: 15.407 (a) (1) (2) (3)	See data	Complied a)	Conducted
	ISED: -	ISED: -			
Maximum Conducted Output Power	FCC: KDB Publication Number 789033	FCC: 15.407 (a) (1) (2) (3)		Complied b)	Conducted
	ISED: -	ISED: RSS-247 6.2.1.1 6.2.2.1 6.2.3.1 6.2.4.1			
Maximum Power Spectral Density	FCC: KDB Publication Number 789033	FCC : 15.407 (a) (1) (2) (3)		Complied c)	Conducted
	ISED: -	ISED: RSS-247 6.2.1.1 6.2.2.1 6.2.3.1 6.2.4.1			
Spurious Emission Restricted Band Edge	FCC: ANSI C63.10-2013 KDB Publication Number 789033	FCC: 15.407 (b), 15.205 and 15.209	6.5 dB 5350.0 MHz Horizontal, AV	Complied d) / e)	Conducted (< 30 MHz) / Radiated (> 30 MHz) *1)
	ISED: -	ISED: RSS-247 6.2.1.2 6.2.2.2 6.2.3.2 6.2.4.2			
6 dB Emission Bandwidth	FCC: ANSI C63.10-2013	FCC: 15.407 (e)	See data	Complied f)	Conducted
	ISED: -	ISED: RSS-247 6.2.4.1			
Note: UL Japan, Inc.'s EMI Work Procedures No. 13-EM-W0420 and 13-EM-W0422. *1) The test is not applicable since the user manual specifies that EUT is powered off (transmission is stopped) during the charging. *2) Radiated test was selected over 30 MHz based on FCC 15.407 (b) and KDB 789033 D02 G.3.b). a) Refer to APPENDIX 1 (data of 26 dB Emission Bandwidth and 99 % Occupied Bandwidth) b) Refer to APPENDIX 1 (data of Maximum Conducted Output Power) c) Refer to APPENDIX 1 (data of Maximum Power Spectral Density) d) Refer to APPENDIX 1 (data of Radiated Spurious Emission) e) Refer to APPENDIX 1 (data of Conducted Spurious Emission) f) Refer to APPENDIX 1 (data of 6 dB Bandwidth)					
Symbols: Complied The data of this test item has enough margin, more than the measurement uncertainty. Complied# The data of this test item meets the limits unless the measurement uncertainty is taken into consideration.					

* In case any questions arise about test procedure, ANSI C63.10: 2013 is also referred.

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FCC Part 15.31 (e)

The EUT is a battery-operated device and test was performed with the full-charged battery. Therefore, this EUT complies with the requirement.

FCC Part 15.203 Antenna requirement

It is impossible for end users to replace the antenna, because the antenna is mounted inside of the EUT. Therefore, the equipment complies with the antenna requirement of Section 15.203.

3.3 Addition to standard

Item	Test Procedure	Specification	Worst margin	Results	Remarks
99 % Occupied Band Width	ISED: RSS-Gen 6.7	ISED: -	N/A	- a)	Conducted
a) Refer to APPENDIX 1 (data of 26 dB Emission Bandwidth and 99 % Occupied Bandwidth)					

Other than above, no addition, exclusion nor deviation has been made from the standard.

3.4 Uncertainty

There is no applicable rule of uncertainty in this applied standard. Therefore, the following results are derived depending on whether or not laboratory uncertainty is applied.

The following uncertainties have been calculated to provide a confidence level of 95 % using a coverage factor $k=2$.
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Radiated emission

Measurement distance	Frequency range	Uncertainty (+/-)
3 m	9 kHz to 30 MHz	3.3 dB
10 m		3.2 dB
3 m	30 MHz to 200 MHz (Horizontal)	4.8 dB
		(Vertical) 5.0 dB
	200 MHz to 1000 MHz (Horizontal)	5.2 dB
		(Vertical) 6.3 dB
10 m	30 MHz to 200 MHz (Horizontal)	4.8 dB
		(Vertical) 4.8 dB
	200 MHz to 1000 MHz (Horizontal)	5.0 dB
		(Vertical) 5.0 dB
3 m	1 GHz to 6 GHz	4.9 dB
	6 GHz to 18 GHz	5.2 dB
1 m	10 GHz to 26.5 GHz	5.5 dB
	26.5 GHz to 40 GHz	5.5 dB
0.5 m	26.5 GHz to 40 GHz	5.5 dB
10 m	1 GHz to 18 GHz	5.2 dB

Antenna Terminal test

Test Item	Uncertainty (+/-)
26 dB Emission Bandwidth / 6 dB Emission Bandwidth /	0.96 %
Maximum Conducted Output Power / Average Output Power	1.4 dB
Burst Rate	0.10 %
Maximum Power Spectral Density	2.6 dB
Spurious Emission (Conducted)	2.6 dB

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3.5 Test Location

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*A2LA Certificate Number: 5107.02 / FCC Test Firm Registration Number: 884919

ISED Lab Company Number: 2973C / CAB identifier: JP0002

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Test site	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Other rooms	Maximum measurement distance
No.1 semi-anechoic chamber	19.2 x 11.2 x 7.7	7.0 x 6.0	No.1 Power source room	10 m
No.2 semi-anechoic chamber	7.5 x 5.8 x 5.2	4.0 x 4.0	-	3 m
No.3 semi-anechoic chamber	12.0 x 8.5 x 5.9	6.8 x 5.75	No.3 Preparation room	3 m
No.3 shielded room	4.0 x 6.0 x 2.7	N/A	-	-
No.4 semi-anechoic chamber	12.0 x 8.5 x 5.9	6.8 x 5.75	No.4 Preparation room	3 m
No.4 shielded room	4.0 x 6.0 x 2.7	N/A	-	-
No.5 semi-anechoic chamber	6.0 x 6.0 x 3.9	6.0 x 6.0	-	-
No.5 measurement room	6.4 x 6.4 x 3.0	6.4 x 6.4	-	-
No.6 shielded room	4.0 x 4.5 x 2.7	4.0 x 4.5	-	-
No.6 measurement room	4.75 x 5.4 x 3.0	4.75 x 4.15	-	-
No.7 shielded room	4.7 x 7.5 x 2.7	4.7 x 7.5	-	-
No.8 measurement room	3.1 x 5.0 x 2.7	3.1 x 5.0	-	-
No.9 measurement room	8.8 x 4.6 x 2.8	2.4 x 2.4	-	-
No.10 shielded room	3.8 x 2.8 x 2.8	3.8 x 2.8	-	-
No.11 measurement room	4.0 x 3.4 x 2.5	N/A	-	-
No.12 measurement room	2.6 x 3.4 x 2.5	N/A	-	-

* Size of vertical conducting plane (for Conducted Emission test) : 2.0 x 2.0 m for No.1, No.2, No.3, and No.4 semi-anechoic chambers and No.3 and No.4 shielded rooms.

3.6 Test data, Test instruments, and Test set up

Refer to APPENDIX.

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SECTION 4: Operation of EUT during testing

4.1 Operating Mode(s)

Test operating mode was determined as follows according to “Section 1 of 6 802.11 a/b/g/n testing - Managing Complex Regulatory Approvals -” of TCB Council Workshop October 2009 and also was judged the necessity of 802.11ac mode by the pre-test.

Mode	Remarks*
IEEE 802.11a (11a)	36 Mbps, PN9
IEEE 802.11n SISO 20 MHz BW (11n-20)	MCS 6, PN9
IEEE 802.11ac SISO 20 MHz BW (11ac-20)	MCS 6, PN9
IEEE 802.11n SISO 40 MHz BW (11n-40)	MCS 5, PN9
IEEE 802.11ac SISO 40 MHz BW (11ac-40)	MCS 9, PN9
IEEE 802.11ac SISO 80 MHz BW (11ac-80)	MCS 7, PN9
*The worst antenna and condition was determined based on the test result of Maximum Conducted Output Power.	
*Power of the EUT was set by the software as follows; - Power Setting: See the table below - Software: MFG Tool for IP200H (Date: 2020.03.27 Storage location: Driven by connected PC)*This setting of software is the worst case. Any conditions under the normal use do not exceed the condition of setting. In addition, end users cannot change the settings of the output power of the product.	

Power Setting

For Radiated Spurious Emission test

		W52	W53	W56	W58
11a		9.0	9.0	9.0	8.0
11n	20 MHz BW	9.0	9.0	9.0	8.0
11ac	20 MHz BW	9.0	9.0	9.0	8.0
	40 MHz BW	6.0	6.0	7.0	6.0
	80 MHz BW	8.0	7.0	5.0	5.0

For Antenna Terminal Conducted test

		W52	W53	W56	W58
11a		8.0	8.0	8.0	8.0
11n	20 MHz BW	7.5	7.5	7.5	7.5
	40 MHz BW	4.5	4.5	5.0	5.0
11ac	20 MHz BW	7.5	7.5	8.0	7.5
	40 MHz BW	4.5	4.5	5.0	5.0
	80 MHz BW	6.5	6.0	4.5	4.0

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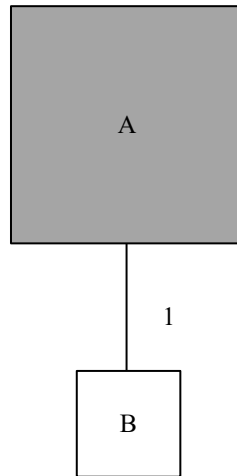
*The details of Operation mode(s)

Test Item	Operating Mode	Tested Frequency			
		Lower Band	Middle Band	Additional Band	Upper Band
26 dB Emission Bandwidth	11a Tx	-	5260 MHz	5500 MHz	-
	11n-20 Tx	-	5300 MHz	5580 MHz	-
	11ac-20 Tx	-	5320 MHz	5700 MHz	-
	11n-40 Tx	-	5270 MHz	5510 MHz	-
	11ac-40 Tx	-	5310 MHz	5550 MHz	-
	11ac-80 Tx	-	5290 MHz	5530 MHz	-
99 % Occupied Bandwidth, Maximum Conducted Output Power, Maximum Power Spectral Density	11a Tx	5180 MHz	5260 MHz	5500 MHz	5745 MHz
	11n-20 Tx	5220 MHz	5300 MHz	5580 MHz	5785 MHz
	11ac-20 Tx	5240 MHz	5320 MHz	5700 MHz	5825 MHz
	11n-40 Tx	5190 MHz	5270 MHz	5510 MHz	5755 MHz
	11ac-40 Tx	5230 MHz	5310 MHz	5550 MHz	5795 MHz
	11ac-80 Tx	5210 MHz	5290 MHz	5530 MHz	5775 MHz
6 dB Bandwidth	11a Tx	-	-	-	5745 MHz
	11n-20 Tx	-	-	-	5785 MHz
	11ac-20 Tx	-	-	-	5825 MHz
	11n-40 Tx	-	-	-	5755 MHz
	11ac-40 Tx	-	-	-	5795 MHz
	11ac-80 Tx	-	-	-	5775 MHz
Radiated Spurious Emission (Above 1 GHz)	11a Tx *1)	5180 MHz	5260 MHz	5500 MHz	5745 MHz
			5320 MHz	5580 MHz	5785 MHz
				5700 MHz	5825 MHz
	11n-20 Tx *2)	5180 MHz	5320 MHz	5500 MHz	5745 MHz
11ac-20 Tx *2)			5700 MHz	5825 MHz	
11ac-40 Tx *3)	5190 MHz	5270 MHz	5510 MHz	5755 MHz	
		5310 MHz	5550 MHz	5795 MHz	
			5670 MHz		
	11ac-80 Tx	5210 MHz	5290 MHz	5530 MHz	5775 MHz
Conducted Spurious Emission Radiated Spurious Emission (Below 1 GHz)	11a Tx *1)	5180 MHz	-	-	-

*1) The mode was tested as a representative, because it had the highest power at antenna terminal test.
*2) Since 11a, 11n-20 and 11ac-20 have the same modulation method, only band edge tests were conducted for 11n-20 and 11ac-20.
*3) Since 11n-40 and 11ac-40 have the same modulation method and no differences in transmitting specification, test was performed on the representative mode that had the highest peak output power.

4.2 Configuration and peripherals

Radiated Spurious Emission test



* Cabling and setup(s) were taken into consideration and test data was taken under worse case conditions.

Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	WLAN TRANSCEIVER	IP110H	1	ICOM Incorporated	EUT
B	Microphone	HM-179PI	-	ICOM Incorporated	-

List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	Microphone Cable	1.0	Unshielded	Unshielded	-

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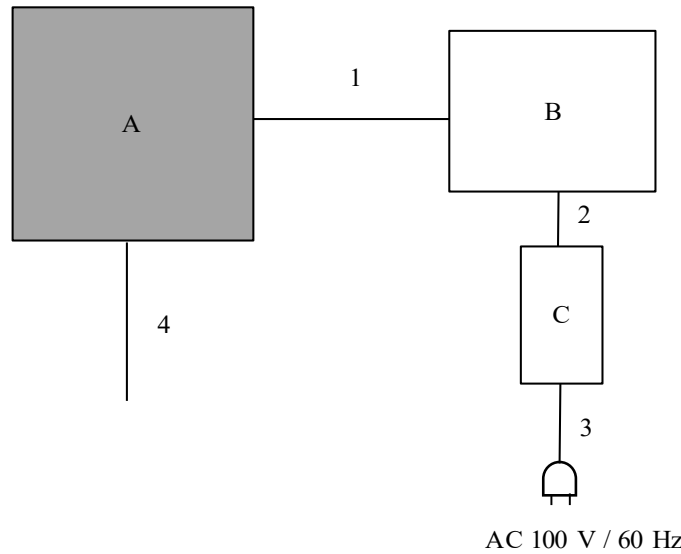
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Antenna Terminal Conducted tests



* Cabling and setup(s) were taken into consideration and test data was taken under worse case conditions.

Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	WLAN TRANSCEIVER	IP110H	12	ICOM Incorporated	EUT
B	Laptop PC	X1 Carbon	R9-OH8OBW 15/9	Lenovo	-
C	AC Adapter	ADLX45NCC2A	8SSA10E75794C1SG 59R0GHF	Lenovo	-

List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	USB Cable	1.1	Shielded	Shielded	-
2	DC Cable	1.4	Unshielded	Unshielded	-
3	AC Cable	1.0	Unshielded	Unshielded	-
4	DC Cable	2.3	Unshielded	Unshielded	*1)

*1) This cable is not used for test, and it also doesn't affect the test results.

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SECTION 5: Radiated Spurious Emission and Band Edge Compliance

Test Procedure

< Below 1GHz >

EUT was placed on a urethane platform of nominal size, 0.5 m by 1.0 m, raised 0.8 m above the conducting ground plane. The Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with a ground plane.

< Above 1GHz >

EUT was placed on a urethane platform of nominal size, 0.5 m by 0.5 m, raised 1.5 m above the conducting ground plane. The Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with absorbent materials lined on a ground plane.

The height of the measuring antenna varied between 1 m and 4 m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field strength.

Test antenna was aimed at the EUT for receiving the maximum signal and always kept within the illumination area of the 3 dB beamwidth of the antenna.

The measurements were performed for both vertical and horizontal antenna polarization with the Test Receiver, or the Spectrum Analyzer.

The measurements were made with the following detector function of the test receiver and the Spectrum analyzer (in linear mode).

The test was made with the detector (RBW/VBW) in the following table.

When using Spectrum analyzer, the test was made with adjusting span to zero by using peak hold.

< Below 1GHz >

The result also satisfied with the general limits specified in section 15.209 (a).

< Above 1GHz >

Inside of restricted bands (Section 15.205):

Apply to limit in the Section 15.209 (a).

Outside of the restricted bands:

Apply to limit 68.2 dBuV/m, 3 m (-27 dBm e.i.r.p. *) in the Section 15.407 (b) (1) (2) (3).

For W58 Bandedge

-27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge in the section 15.407(b)(4)(i).

Restricted band edge:

Apply to limit in the Section 15.209 (a).

Since this limit is severer than the limit of the inside of restricted bands.

*Electric field strength to e.i.r.p. conversion:

$$E = \frac{1000000 \sqrt{30P}}{3} \text{ (uV/m)} \quad :P \text{ is the e.i.r.p. (Watts)}$$

Test Antennas are used as below;

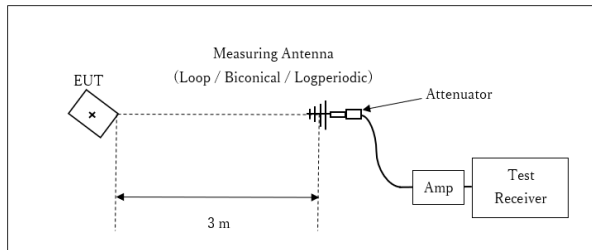
Frequency	30 MHz to 200 MHz	200 MHz to 1 GHz	Above 1 GHz
Antenna Type	Biconical	Logperiodic	Horn

Frequency	Below 1 GHz	Above 1 GHz	
Instrument used	Test Receiver	Spectrum Analyzer	
Detector	QP	Peak	Average
IF Bandwidth	BW: 120 kHz	RBW: 1 MHz VBW: 3 MHz	Method AD *1) RBW: 1 MHz VBW: 3 MHz Detector: Power Averaging (RMS) Trace: ≥ 100 traces If duty cycle was less than 98%, a duty factor was added to the results.

*1) The test method was also referred to KDB 789033 D02 General UNII Test Procedures New Rules v02r01 "Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices Part 15, Subpart E".

Figure 2: Test Setup

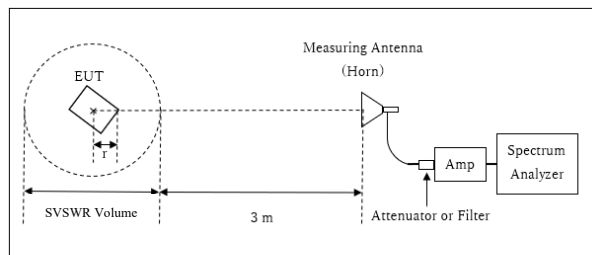
Below 1 GHz



× : Center of turn table

Test Distance: 3 m

1 GHz - 10 GHz

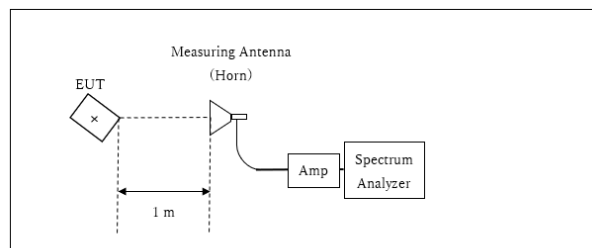


r : Radius of an outer periphery of EUT
 × : Center of turn table

Distance Factor: $20 \times \log(3.95 \text{ m} / 3.0 \text{ m}) = 2.39 \text{ dB}$
 * Test Distance: $(3 + \text{SVSWR Volume} / 2) - r = 3.95 \text{ m}$

SVSWR Volume : 2.0 m
 (SVSWR Volume has been calibrated based on CISPR 16-1-4.)
 r = 0.05 m

10 GHz - 40 GHz



× : Center of turn table

Distance Factor: $20 \times \log(1.0 \text{ m} / 3.0 \text{ m}) = -9.5 \text{ dB}$
 *Test Distance: 1 m

- The carrier level and noise levels were confirmed at each position of X, Y and Z axes of EUT to see the position of maximum noise, and the test was made at the position that has the maximum noise.

The test results and limit are rounded off to one decimal place, so some differences might be observed.

Measurement range : 30 MHz - 40 GHz
Test data : APPENDIX
Test result : Pass

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SECTION 6: Antenna Terminal Conducted Tests

Test Procedure

The tests were made with below setting connected to the antenna port.

Test	Span	RBW	VBW	Sweep time	Detector	Trace	Instrument used and Test method
26 dB Bandwidth	Enough to capture the emission	Close to 1 % of EBW	> RBW	Auto	Peak	Max Hold	Spectrum Analyzer
99 % Occupied Bandwidth *1)	Enough width to display emission skirts	1 % to 5 % of OBW	≥ 3 RBW	Auto	Peak	Max Hold	Spectrum Analyzer
6 dB Bandwidth	Enough to capture the emission	100 kHz	300 kHz	Auto	Peak	Max Hold	Spectrum Analyzer
Maximum Conducted Output Power	-	-	-	Auto	Average	-	Power Meter (Sensor: 80 MHz BW) (Method PM-G)
Maximum Power Spectral Density	Encompass the entire EBW	1 MHz or 470 kHz *2)	≥ 3 RBW	Auto	RMS Power Averaging (200 times)	Clear Write	Spectrum Analyzer
Conducted Spurious Emission*3) *4)	9 kHz – 150 kHz 150 kHz – 30 MHz	200 Hz 9.1 kHz	620 Hz 27 kHz	Auto	Peak	Max Hold	Spectrum Analyzer

* The test method was also referred to KDB 789033 D02 General UNII Test Procedures New Rules v02r01 "Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices Part 15, Subpart E".

*1) Peak hold was applied as Worst-case measurement.

*2) KDB 789033 D02 says that RBW is set to be 500 kHz for 5.725 GHz-5.850 GHz, but it is not possible with spectrum analyzer, so RBW Correction Factor ($10 \log(500 \text{ kHz} / 470 \text{ kHz})$) was added to the test result.

*3) In the frequency range below 30 MHz, RBW was narrowed to separate the noise contents.

Then, wide-band noise near the limit was checked separately, however the noise was low enough as shown in the chart. (9 kHz-150 kHz: RBW = 200 Hz, 150 kHz-30 MHz: RBW = 9.1 kHz).

*4) The limits in CFR 47, Part 15, Subpart C, paragraph 15.209(a), are identical to those in RSS-Gen section 8.9, Table 6, since the measurements are performed in terms of magnetic field strength and converted to electric field strength levels (as reported in the table) using the free space impedance of 377 Ohms. For example, the measurement at frequency 9 kHz resulted in a level of 45.5 dBuV/m, which is equivalent to $45.5 - 51.5 = -6.0$ dBuA/m, which has the same margin, 3 dB, to the corresponding RSS-Gen Table 6 limit as it has to 15.209(a) limit.

The test results and limit are rounded off to two decimals place, so some differences might be observed.
The equipment and cables were not used for factor 0 dB of the data sheets.

Test data : APPENDIX
Test result : Pass

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APPENDIX 1: Test data

26 dB Emission Bandwidth and 99 % Occupied Bandwidth

Report No.	14118411H	
Test place	Ise EMC Lab. No.8 Measurement Room	
Date	December 16, 2021	January 19, 2022
Temperature / Humidity	24 deg. C / 29 % RH	24 deg. C / 40 % RH
Engineer	Nachi Konegawa	Nachi Konegawa
Mode	Tx	

11a

Tested Frequency [MHz]	26 dB Emission Bandwidth [MHz]	99 % Occupied Bandwidth [kHz]
5180	-	16931.1
5220	-	16922.4
5240	-	16948.2
5260	20.932	16988.4
5300	20.519	17009.4
5320	21.073	17000.9
5500	20.549	16939.4
5580	20.903	16930.5
5700	20.924	16972.1
5745	-	16956.9
5785	-	17027.6
5825	-	16995.3

11n-20

Tested Frequency [MHz]	26 dB Emission Bandwidth [MHz]	99 % Occupied Bandwidth [kHz]
5180	-	17983.3
5220	-	18008.2
5240	-	18047.5
5260	21.782	18014.6
5300	21.379	18077.2
5320	21.257	18008.0
5500	21.389	18029.0
5580	21.183	18019.4
5700	21.254	18006.8
5745	-	18036.2
5785	-	18032.0
5825	-	18048.1

11ac-20

Tested Frequency [MHz]	26 dB Emission Bandwidth [MHz]	99 % Occupied Bandwidth [kHz]
5180	-	18080.6
5220	-	18069.2
5240	-	18008.1
5260	21.293	18006.2
5300	21.370	18029.3
5320	21.543	18036.5
5500	21.334	18013.0
5580	21.160	18052.5
5700	21.315	18039.5
5745	-	18069.5
5785	-	18099.0
5825	-	18043.8

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26 dB Emission Bandwidth and 99 % Occupied Bandwidth

Report No. 14118411H
Test place Ise EMC Lab. No.8 Measurement Room
Date December 16, 2021 January 19, 2022
Temperature / Humidity 24 deg. C / 29 % RH 24 deg. C / 40 % RH
Engineer Nachi Konegawa Nachi Konegawa
Mode Tx

11n-40

Tested Frequency [MHz]	26 dB Emission Bandwidth [MHz]	99 % Occupied Bandwidth [kHz]
5190	-	36717.9
5230	-	36746.0
5270	43.097	36628.9
5310	42.478	36731.4
5510	42.510	36756.2
5550	42.794	36738.2
5670	43.021	36744.9
5755	-	36768.1
5795	-	36665.0

11ac-40

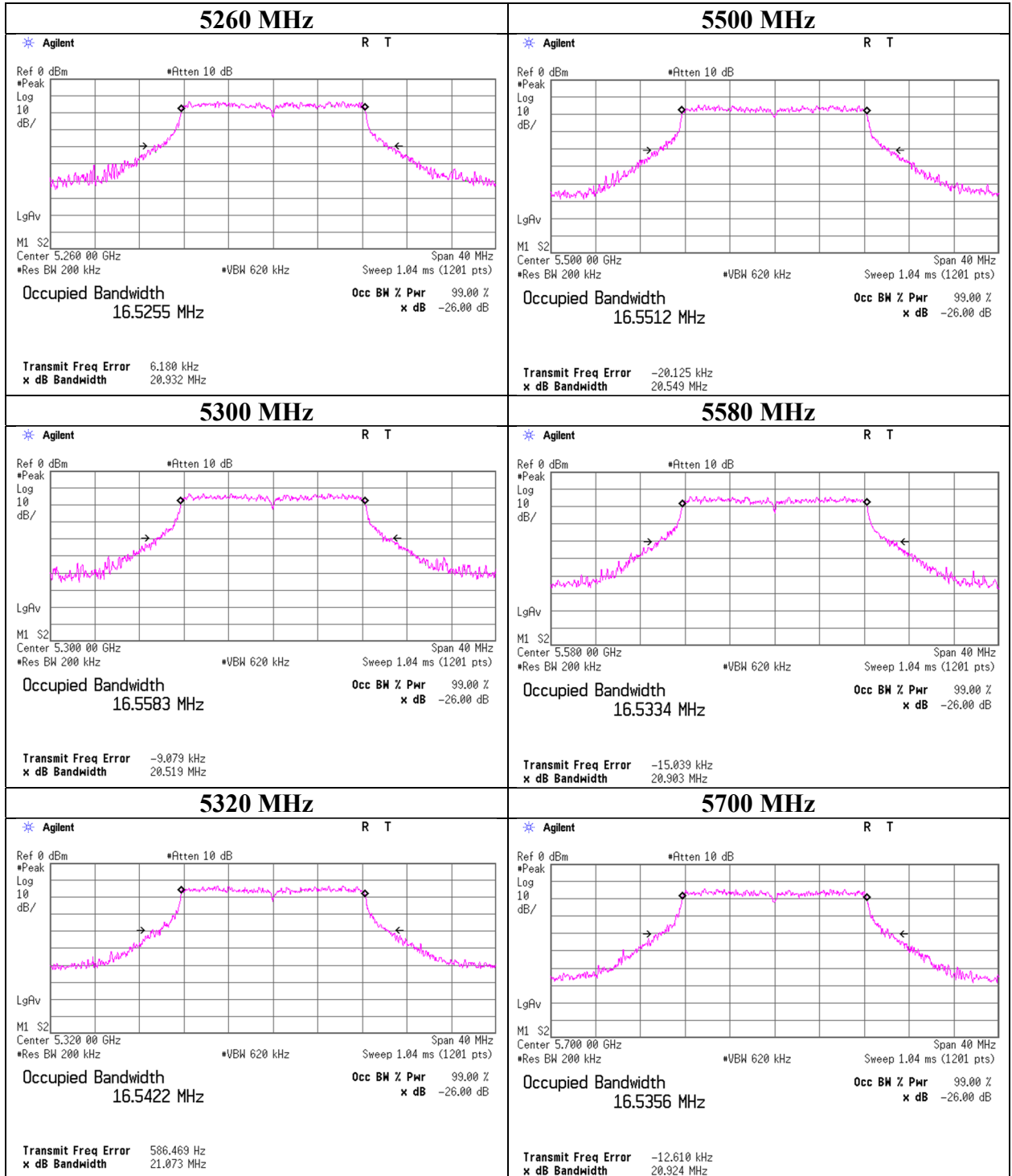
Tested Frequency [MHz]	26 dB Emission Bandwidth [MHz]	99 % Occupied Bandwidth [kHz]
5190	-	36713.6
5230	-	36550.8
5270	43.087	36687.7
5310	43.002	36697.8
5510	42.040	36793.1
5550	43.502	36749.1
5670	42.602	36722.5
5755	-	36637.5
5795	-	36766.5

11ac-80

Tested Frequency [MHz]	26 dB Emission Bandwidth [MHz]	99 % Occupied Bandwidth [kHz]
5210	-	76806.7
5290	90.102	76688.9
5530	89.493	76821.2
5775	-	76728.8

26 dB Bandwidth

11a



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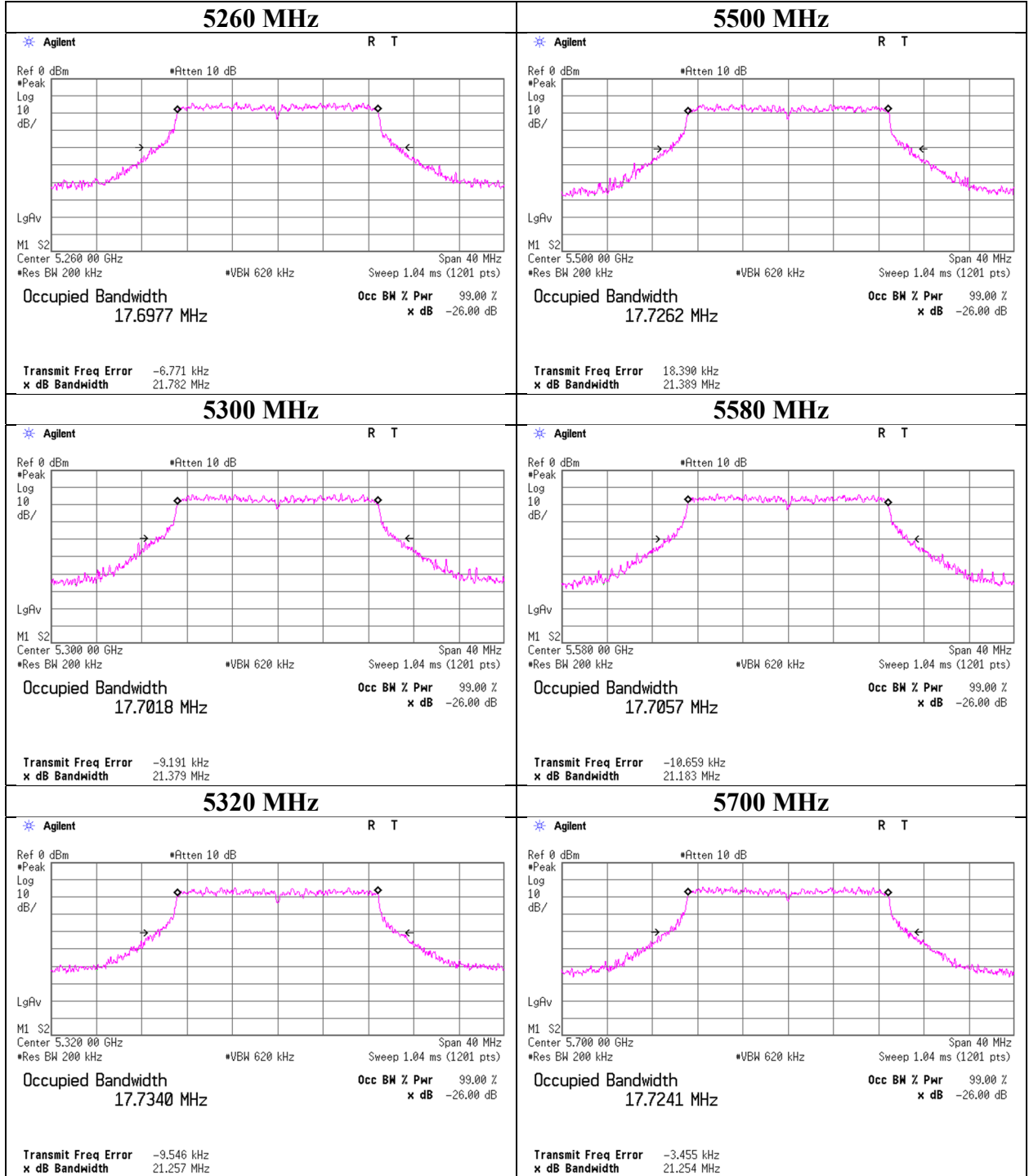
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26 dB Bandwidth

11n-20



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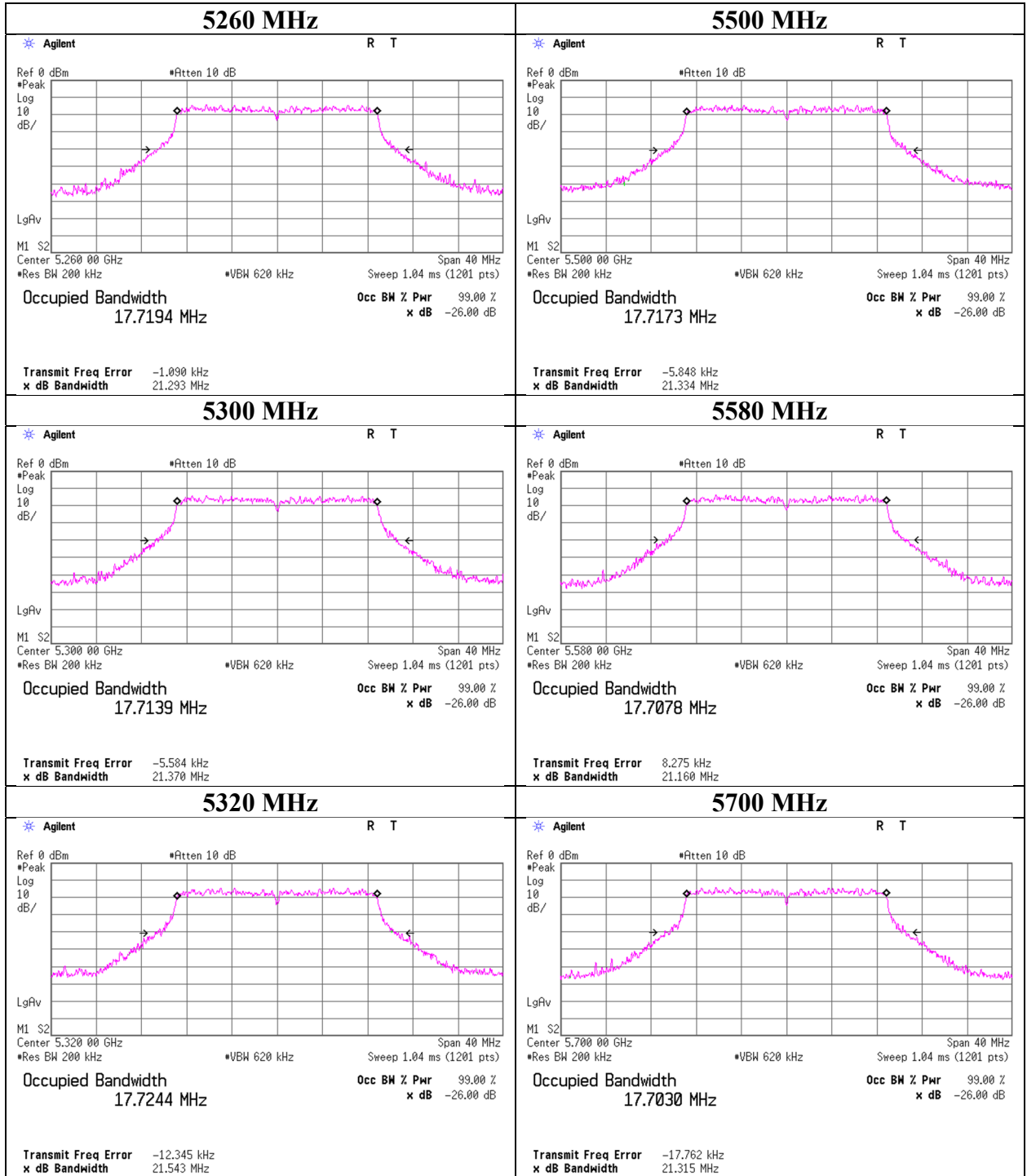
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26 dB Bandwidth

11ac-20



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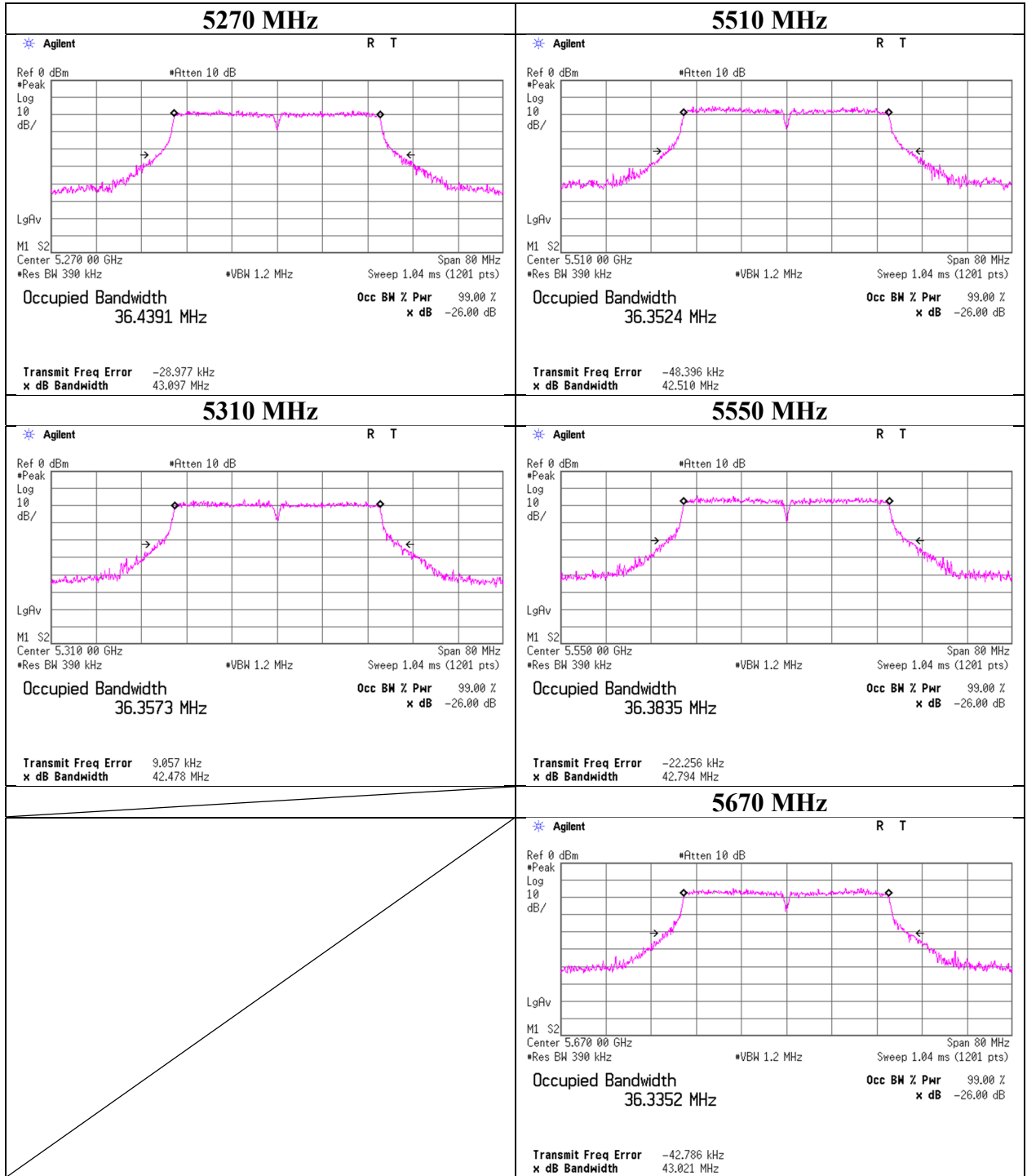
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26 dB Bandwidth

11n-40



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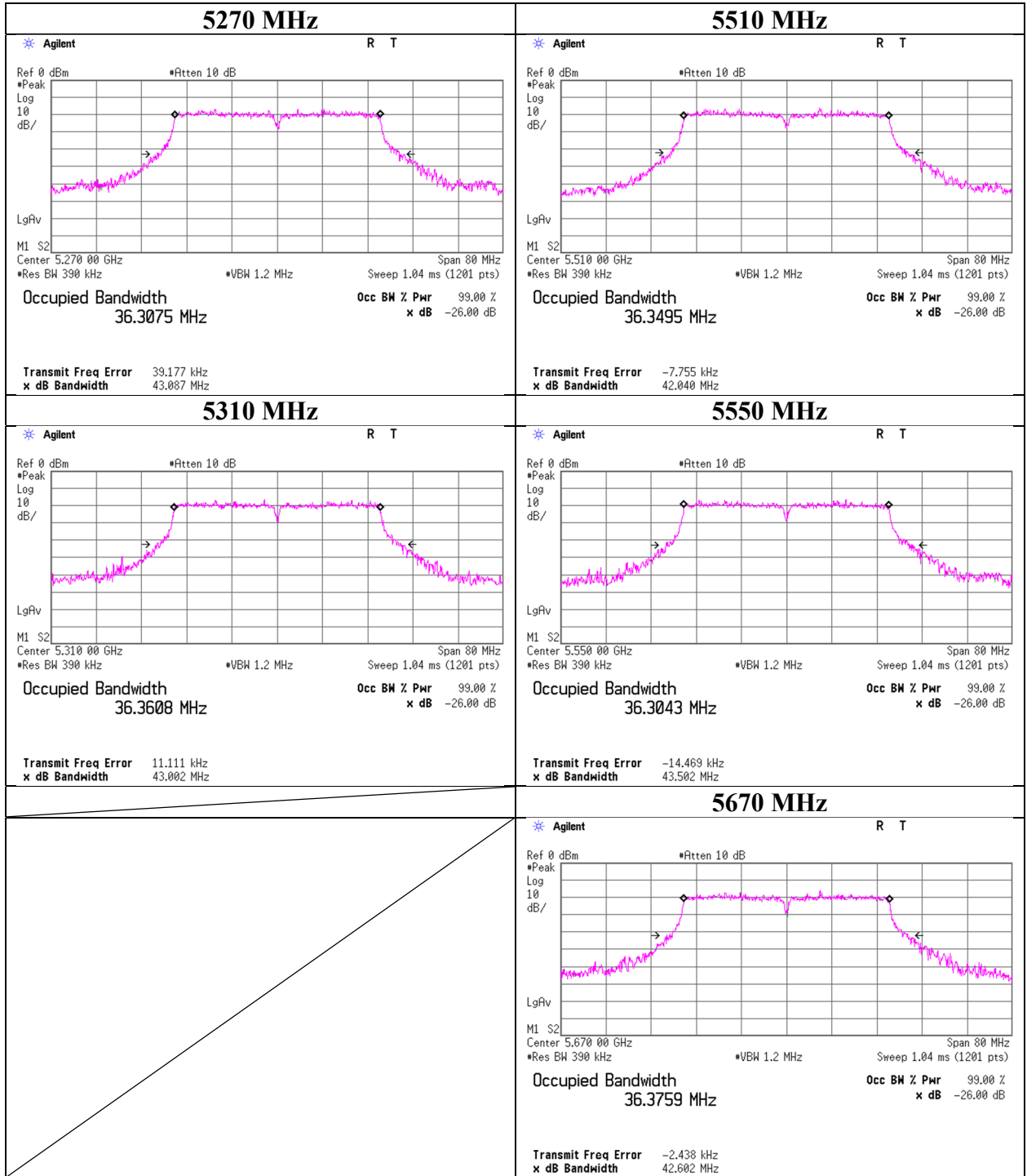
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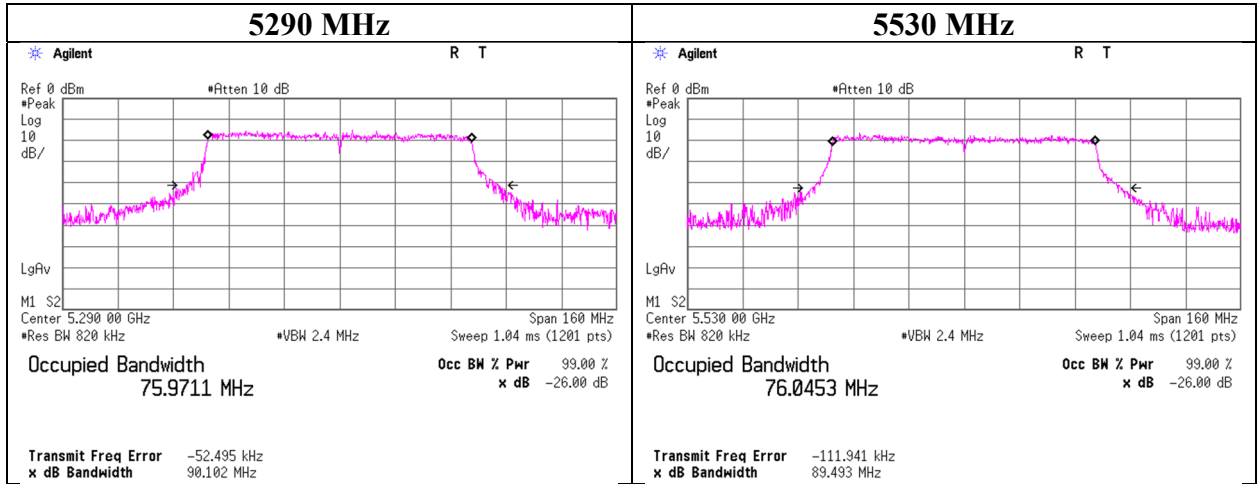
26 dB Bandwidth

11ac-40



26 dB Bandwidth

11ac-80



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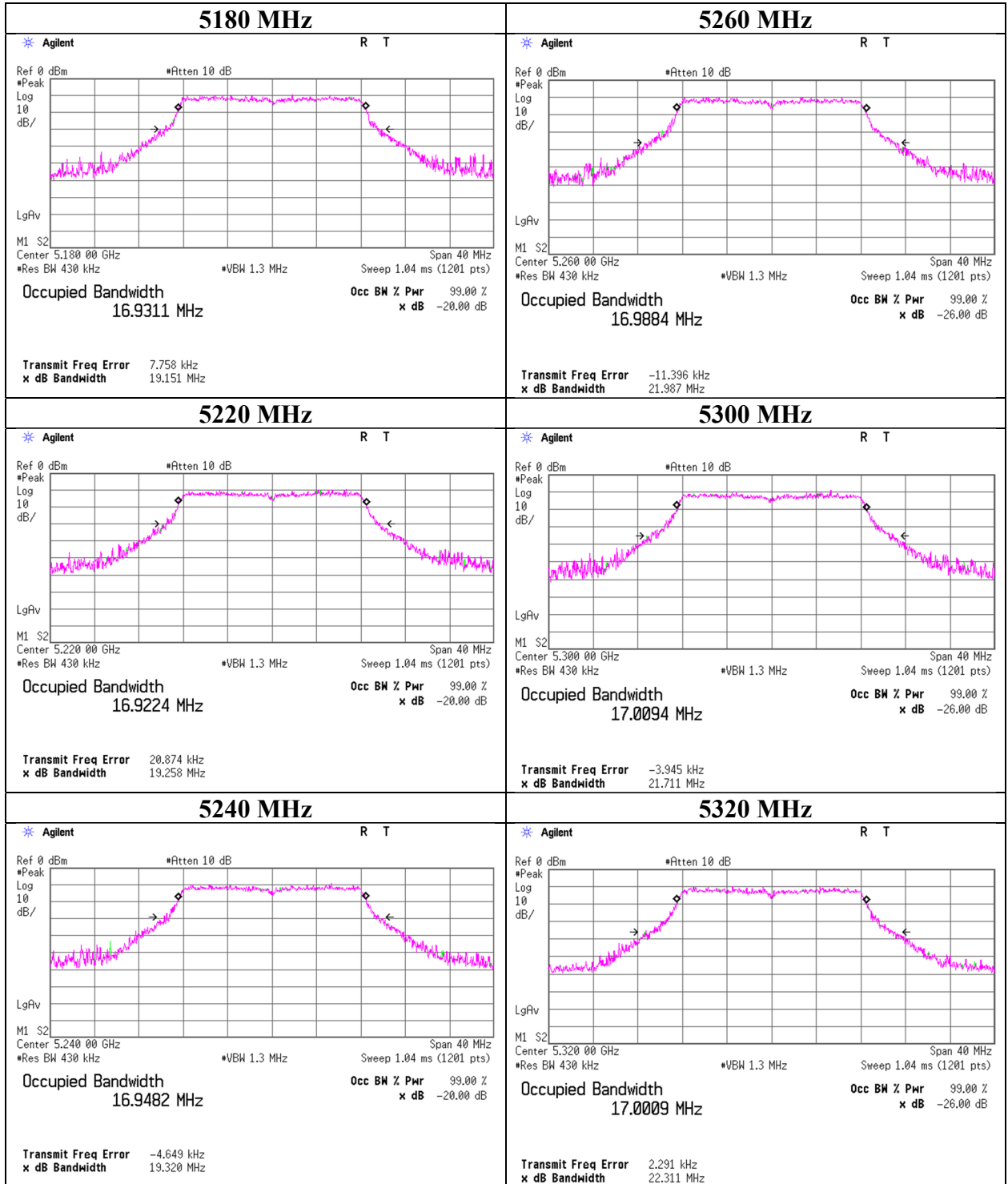
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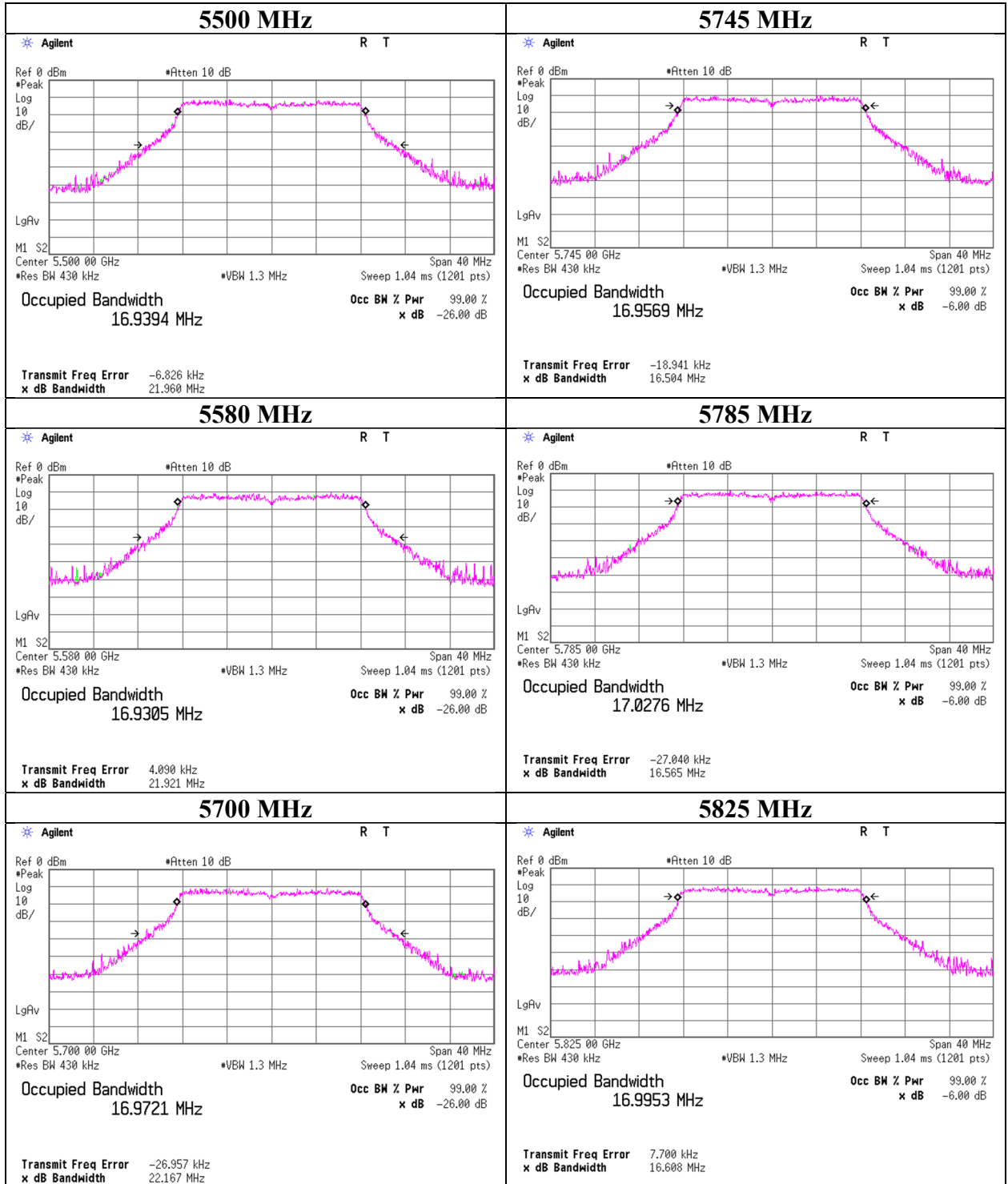
99 % Occupied Bandwidth

11a



99 % Occupied Bandwidth

11a



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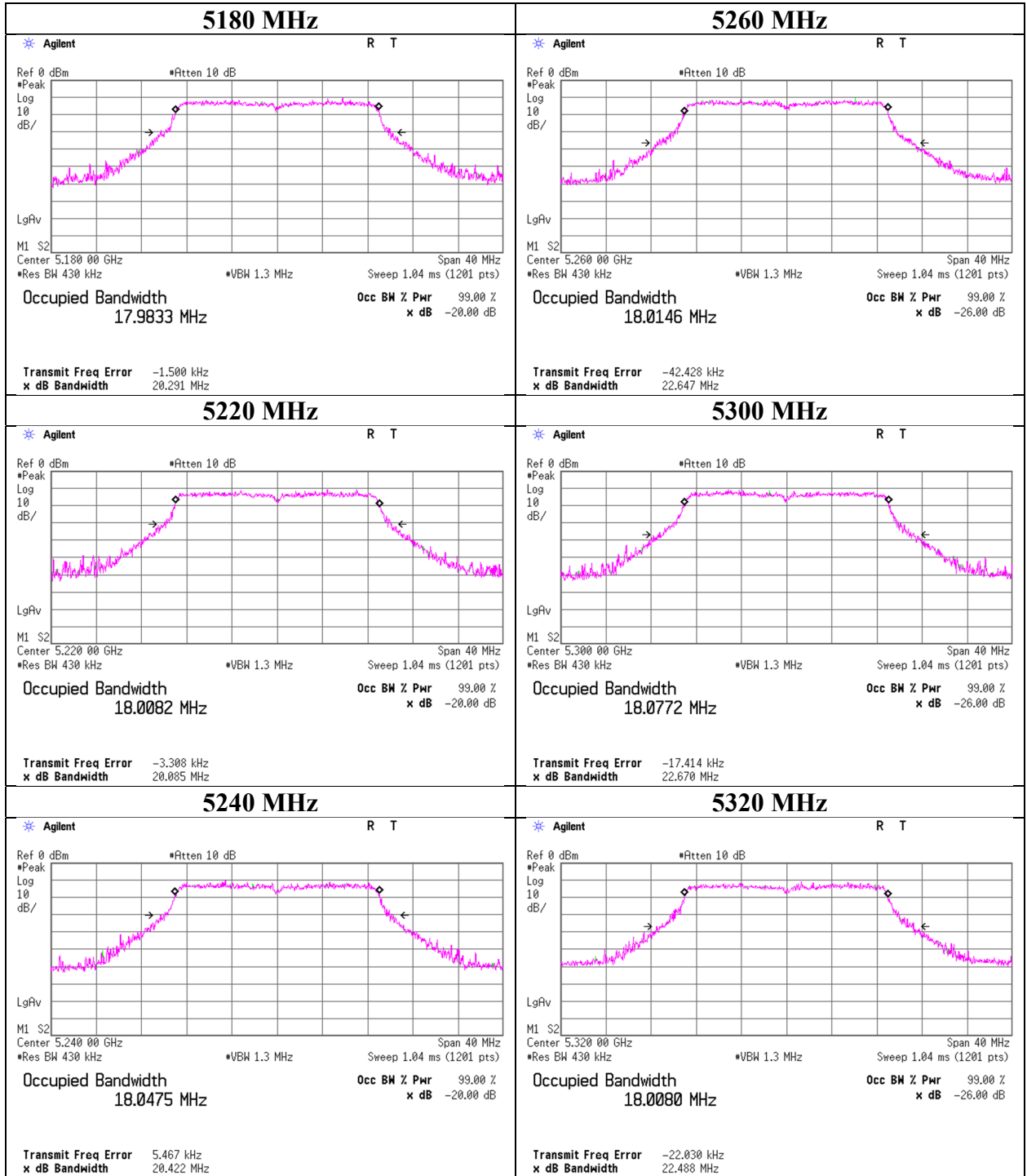
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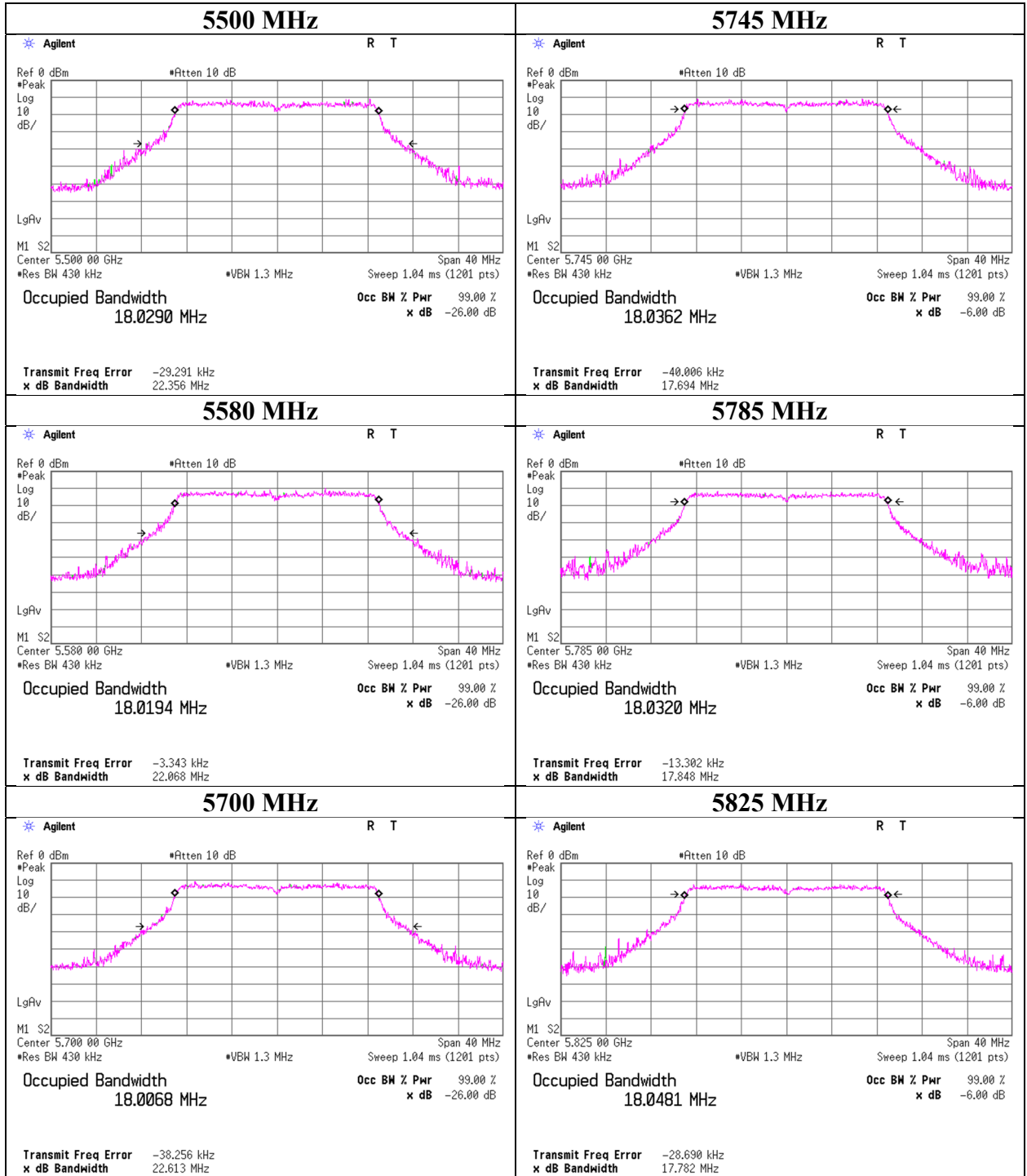
99 % Occupied Bandwidth

11n-20



99 % Occupied Bandwidth

11n-20



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