



RADIO TEST REPORT

Test Report No. : 12804674H-C-R2

Applicant : DENSO Corporation
Type of Equipment : Control Box
Model No. : DNNS097
FCC ID : HYQDNNS097
Test regulation : FCC Part 15 Subpart E: 2019
(Except for DFS)
Test Result : Complied (Refer to SECTION 3.2)

1. This test report shall not be reproduced in full or partial, without the written approval of UL Japan, Inc.
2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with the above regulation.
4. The test results in this report are traceable to the national or international standards.
5. This test report covers Radio technical requirements. It does not cover administrative issues such as Manual or non-Radio test related Requirements. (if applicable)
6. The all test items in this test report are conducted by UL Japan, Inc. Ise EMC Lab.
7. This test report must not be used by the customer to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.
8. The information provided from the customer for this report is identified in SECTION 1.
9. This report is a revised version of 12804674H-C-R1. 12804674H-C-R1 is replaced with this report.

Date of test: July 30 to November 15, 2019

Representative test engineer:


Junki Nagatomi
Engineer
Consumer Technology Division

Approved by:


Satofumi Matsuyama
Engineer
Consumer Technology Division



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- ☐ The testing in which "Non-accreditation" is displayed is outside the accreditation scopes in UL Japan.
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REVISION HISTORY

Original Test Report No.: 12804674H-C

Revision History

Revision	Test report No.	Date	Page revised	Contents
- (Original)	12804674H-C	October 10, 2019	-	-
1	12804674H-C-R1	November 19, 2019	P.6	- Deletion of Clock frequency(ies) in the system - Addition of Clock frequency (maximum) in Radio Specification
1	12804674H-C-R1	November 19, 2019	P.8	Update the Uncertainty table.
1	12804674H-C-R1	November 19, 2019	P.10, 11	Addition of Tested Frequency at Additional band: - 20 MHz band: 5720 MHz - 40 MHz band: 5710 MHz - 80 MHz band: 5690 MHz
1	12804674H-C-R1	November 19, 2019	P.12	Correction of Cable No. 5 and 12 information: - Cable's shield: from Shielded to Unshielded
1	12804674H-C-R1	November 19, 2019	P.17, 18, 50 to 55, 62 to 67, 74 to 79, 115, 131, 144,	Addition of Test data following frequencies: - 20 MHz band: 5720 MHz - 40 MHz band: 5710 MHz - 80 MHz band: 5690 MHz
1	12804674H-C-R1	November 19, 2019	P.18	Correction of test data -11n-40 26 dB Emission Bandwidth (5310 MHz to 5670 MHz) -11ac-40 26 dB Emission Bandwidth (5310 MHz to 5670 MHz)
1	12804674H-C-R1	November 19, 2019	P.20, 22, 24 to 27, 30, 33, 36, 38, 40, 41, 81, 84, 87, 90, 93, 96, 98, 100, 102 to 104	Addition of Wave forms following frequencies: - 20 MHz band: 5720 MHz - 40 MHz band: 5710 MHz - 80 MHz band: 5690 MHz
1	12804674H-C-R1	November 19, 2019	P.27	Correction of Antenna number: From Antenna 1 to Antenna 2
1	12804674H-C-R1	November 19, 2019	P.40	Correction of 11n-40 6 dB Bandwidth data at 5795 MHz
1	12804674H-C-R1	November 19, 2019	P.62 to 67	Addition of Result (Burst power average)
1	12804674H-C-R1	November 19, 2019	P.68 to 70	Deletion of SISO Wave forms
1	12804674H-C-R1	November 19, 2019	P.71 to 73	Addition of Burst rate confirmation (SAR Power)
1	12804674H-C-R1	November 19, 2019	P.79	Correction of Antenna 1+2 table: PSD (Conducted and e.i.r.p.) value at 5290 MHz
1	12804674H-C-R1	November 19, 2019	P.105, 107, 108, 110, 112, 113, 116, 118, 119, 121, 123, 124, 126, 128, 129, 132, 134	Correction of Distance factor for 1 GHz to 10 GHz
1	12804674H-C-R1	November 19, 2019	P.124	Deletion of 5250 MHz data
1	12804674H-C-R1	November 19, 2019	P.132, 134, 140, 142	Correction of Limit
1	12804674H-C-R1	November 19, 2019	P.151, 152	Addition of Test instruments used on October 26 to November 15, 2019
2	12804674H-C-R2	November 28, 2019	P.12	Correction of Name of Cable No.12 from Signal Cable to Signal and DC Cable

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Reference: Abbreviations (Including words undescribed in this report)

A2LA	The American Association for Laboratory Accreditation	MCS	Modulation and Coding Scheme
AC	Alternating Current	MRA	Mutual Recognition Arrangement
AFH	Adaptive Frequency Hopping	N/A	Not Applicable
AM	Amplitude Modulation	NIST	National Institute of Standards and Technology
Amp, AMP	Amplifier	NS	No signal detect.
ANSI	American National Standards Institute	NSA	Normalized Site Attenuation
Ant, ANT	Antenna	NVLAP	National Voluntary Laboratory Accreditation Program
AP	Access Point	OBW	Occupied Band Width
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	Quadri-Phase Shift Keying
CW	Continuous Wave	RBW	Resolution Band Width
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	RSS	Radio Standards Specifications
DSSS	Direct Sequence Spread Spectrum	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	Test Receiver
EN	European Norm	Tx	Transmitting
ERP, e.r.p.	Effective Radiated Power	VBW	Video BandWidth
EU	European Union	Vert.	Vertical
EUT	Equipment Under Test	WLAN	Wireless LAN
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		
LIMS	Laboratory Information Management System		

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SECTION 1: Customer information

Company Name	:	DENSO Corporation
Address	:	1-1 Showa-cho, Kariya-shi, Aichi-ken 448-8661, Japan
Telephone Number	:	+81-566-26-5919
Facsimile Number	:	+81-566-25-4920
Contact Person	:	Isamu Suzuki

The information provided from the customer is as follows;

- Applicant, Type of Equipment, Model No., 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 (E.U.T.)
- SECTION 4: Operation of E.U.T. 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 (E.U.T.)

2.1 Identification of E.U.T.

Type of Equipment	:	Control Box
Model No.	:	DNNS097
Serial No.	:	Refer to SECTION 4.2
Rating	:	DC 12.0 V
Receipt Date of Sample (Information from test lab.)	:	July 24, 2019
Country of Mass-production	:	United States of America
Condition of EUT	:	Production prototype (Not for Sale: This sample is equivalent to mass-produced items.)
Modification of EUT	:	No Modification by the test lab.

2.2 Product Description

Model: DNNS097 (referred to as the EUT in this report) is a Control Box.

Feature of EUT:

Operating Temperature : -30 deg. C to +70 deg. C

Radio Specification

Clock frequency (Maximum) : 37.4 MHz (Bluetooth and Wi-Fi Module IC)

	IEEE802.11b	IEEE802.11g/n (20 M band)	IEEE802.11a/n/ac (20 M band) *1)	IEEE802.11n/ac (40 M band) *1)	IEEE802.11ac (80 M band) *1)
Frequency of operation	2412 MHz - 2462 MHz	2412 MHz - 2462 MHz	(USA) 5180 MHz - 5825 MHz (CANADA) 5280 MHz - 5580 MHz 5660 MHz - 5825 MHz	(USA) 5190 MHz - 5795 MHz (CANADA) 5310 MHz - 5550 MHz 5670 MHz - 5795 MHz	(USA) 5210 MHz - 5775 MHz (CANADA) 5530 MHz 5690 MHz - 5775 MHz
Type of modulation	DSSS/CCK (DQPSK, DBPSK)	OFDM (64QAM, 16QAM, QPSK, BPSK)	OFDM (64QAM, 16QAM, QPSK, BPSK, 256QAM(IEEE802.11ac only))		
Channel spacing	5 MHz		20 MHz	40 MHz	80 MHz
Antenna type	ASSEMBLY WiFi Antenna				
Antenna Connector type	MHF PLUG				
Antenna Gain	-2.9 dBi (max.)				

	GPS/GLONASS	Bluetooth Ver.4.2 with EDR function
Frequency of operation	GPS: 1575.42 MHz GLONASS: 1598.0625 MHz - 1605.375 MHz	2402 MHz - 2480 MHz
Type of modulation	GPS: BPSK GLONASS: FDMA	BT: FHSS (GFSK, $\pi/4$ -DQPSK, 8-DPSK) LE: GFSK
Channel spacing	-	BT: 1 MHz LE: 2 MHz
Antenna type	External Antenna	ASSEMBLY BT Antenna
Antenna Connector type	FAKRA	MHF PLUG
Antenna Gain	26.5 dBic	-2.9 dBi (max.)

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

SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification : FCC Part 15 Subpart E
FCC Part 15 final revised on July 19, 2019 and effective August 19, 2019 except 15.258

Title : FCC 47CFR Part15 Radio Frequency Device Subpart E
Unlicensed National Information Infrastructure Devices
Section 15.407 General technical requirements

* The revisions made after testing date do not affect the test specification applied to the EUT.

3.2 Procedures and results

Item	Test Procedure	Specification	Worst margin	Results	Remarks
Conducted Emission	FCC: ANSI C63.10-2013 ISED: RSS-Gen 8.8	FCC: 15.407 (b) (6) / 15.207 ISED: RSS-Gen 8.8	N/A	N/A	*1)
26 dB Emission Bandwidth	FCC: KDB Publication Number 789033 ISED: -	FCC: 15.407 (a) (1) (2) (3) ISED: -	See data	Complied a)	Conducted
Maximum Conducted Output Power	FCC: KDB Publication Number 789033 ISED: -	FCC: 15.407 (a) (1) (2) (3) ISED: RSS-247 6.2.1.1 6.2.2.1 6.2.3.1 6.2.4.1		Complied b)	Conducted
Maximum Power Spectral Density	FCC: KDB Publication Number 789033 ISED: -	FCC : 15.407 (a) (1) (2) (3) ISED: RSS-247 6.2.1.1 6.2.2.1 6.2.3.1 6.2.4.1		Complied c)	Conducted
Spurious Emission Restricted Band Edge	FCC: ANSI C63.10-2013 KDB Publication Number 789033 ISED: -	FCC: 15.407 (b), 15.205 and 15.209 ISED: RSS-247 6.2.1.2 6.2.2.2 6.2.3.2 6.2.4.2	5.9 dB 160.4170 MHz QP, Vert.	Complied d) / e)	Conducted (< 30 MHz)/ Radiated (> 30 MHz) *2)
6 dB Emission Bandwidth	FCC: ANSI C63.10-2013 ISED: -	FCC: 15.407 (e) ISED: RSS-247 6.2.4.1	See data	Complied f)	Conducted

Note: UL Japan, Inc.'s EMI Work Procedures No. 13-EM-W0420 and 13-EM-W0422.

* For DFS tests, please see the test report number 12804674H-E issued by UL Japan, Inc.

*1) The test is not applicable since the EUT is not the device that is designed to be connected to the public utility (AC) power line.

*2) Radiated test was selected over 30 MHz based on section 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 15.31 (e)

The EUT provides stable voltage constantly to the wireless transmitter regardless of input voltage. Instead of a new battery, DC power supply was used for the test. That does not affect the test result, therefore the 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 vehicle. 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	RSS-Gen 6.7	IC: -	N/A	- a)	Conducted
a) Refer to APPENDIX 1 (data of 26 dB Emission Bandwidth and 99 % Occupied 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.				

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 $k=2$.

Radiated emission

Measurement distance	Frequency range	Uncertainty (+/-)	
		Before September 30, 2019	After October 1, 2019
3 m	9 kHz to 30 MHz	3.3 dB	3.3 dB
10 m		3.2 dB	3.2 dB
3 m	30 MHz to 200 MHz (Horizontal)	4.8 dB	4.8 dB
		5.0 dB	5.0 dB
	200 MHz to 1000 MHz (Horizontal)	5.2 dB	5.2 dB
		6.3 dB	6.3 dB
10 m	30 MHz to 200 MHz (Horizontal)	4.8 dB	4.8 dB
		4.9 dB	4.8 dB
	200 MHz to 1000 MHz (Horizontal)	5.0 dB	5.0 dB
		5.0 dB	5.0 dB
3 m	1 GHz to 6 GHz	5.0 dB	4.9 dB
	6 GHz to 18 GHz	5.3 dB	5.2 dB
1 m	10 GHz to 26.5 GHz	5.8 dB	5.5 dB
	26.5 GHz to 40 GHz	5.8 dB	5.5 dB
10 m	1 GHz to 18 GHz	5.2 dB	5.2 dB

Antenna Terminal test

Test Item	Uncertainty (+/-)	
	Before September 30, 2019	After October 1, 2019
26 dB Emission Bandwidth / 6 dB Emission Bandwidth / 99 % Occupied Bandwidth	0.96 %	0.96%
Maximum Conducted Output Power / Average Output Power	1.3 dB	1.4 dB
Burst Rate	0.10 %	0.10%
Maximum Power Spectral Density	2.7 dB	2.6 dB
Spurious Emission (Conducted)	1.9 dB	2.6 dB

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3.5 Test Location

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Test site	IC Registration Number	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	2973C-1	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	2973C-2	7.5 x 5.8 x 5.2	4.0 x 4.0	-	3 m
No.3 semi-anechoic chamber	2973C-3	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	2973C-4	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.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.11 measurement room	-	6.2 x 4.7 x 3.0	4.8 x 4.6	-	-

* 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.

SECTION 4: Operation of E.U.T. 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 SISO (11a)	48 Mbps, PN9
IEEE 802.11n SISO 20 MHz BW (11n-20)	MCS 3 (1 Tx), PN9
IEEE 802.11n MIMO 20 MHz BW (11n-20)	MCS 15 (2 Tx), PN9
IEEE 802.11n SISO 40 MHz BW (11n-40)	MCS 4 (1 Tx), PN9
IEEE 802.11n MIMO 40 MHz BW (11n-40)	MCS 14 (2 Tx), PN9
IEEE 802.11ac SISO 20 MHz BW (11ac-20)	MCS 4 (1 Tx), PN9
IEEE 802.11ac MIMO 20 MHz BW (11ac-20)	MCS 7 (2 Tx), PN9
IEEE 802.11ac SISO 40 MHz BW (11ac-40)	MCS 7 (1 Tx), PN9
IEEE 802.11ac MIMO 40 MHz BW (11ac-40)	MCS 1 (2 Tx), PN9
IEEE 802.11ac SISO 80 MHz BW (11ac-80)	MCS 8 (1 Tx), PN9
IEEE 802.11ac MIMO 80 MHz BW (11ac-80)	MCS 1 (2 Tx), PN9
*The worst 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 settings: 11a: 11 dBm 11n-20: SISO 11 dBm / MIMO 11 dBm 11n-40: SISO 9 dBm / MIMO 9 dBm 11ac-20: SISO 10 dBm / MIMO 10 dBm 11ac-40: SISO 9 dBm / MIMO 9 dBm 11ac-80: SISO 8 dBm / MIMO 8 dBm Software: TYAA WiFi Validation V1.1.2.67 *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.	

*The details of Operation mode(s)-1/2

Test Item	Operating Mode	Tested Antenna	Tested Frequency			
			Lower Band	Middle Band	Additional Band	Upper Band
26 dB Emission Bandwidth	11a Tx 11n-20 Tx 11ac-20 Tx	1	-	5260 MHz 5300 MHz 5320 MHz	5500 MHz 5580 MHz 5700 MHz 5720 MHz	-
	11n-40 Tx 11ac-40 Tx		-	5270 MHz 5310 MHz	5510 MHz 5550 MHz 5670 MHz 5710 MHz	-
	11ac-80 Tx		-	5290 MHz	5530 MHz 5610 MHz 5690 MHz	-

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*The details of Operation mode(s)-2/2

Test Item	Operating Mode	Tested Antenna	Tested Frequency			
			Lower Band	Middle Band	Additional Band	Upper Band
99 % Occupied Bandwidth,	11a Tx 11n-20 Tx 11ac-20 Tx	1	5180 MHz 5220 MHz 5240 MHz	5260 MHz 5300 MHz 5320 MHz	5500 MHz 5580 MHz 5700 MHz 5720 MHz	5745 MHz 5785 MHz 5825 MHz
	11n-40 Tx 11ac-40 Tx		5190 MHz 5230 MHz	5270 MHz 5310 MHz	5510 MHz 5550 MHz 5670 MHz 5710 MHz	5755 MHz 5795 MHz
	11ac-80 Tx		5210 MHz	5290 MHz	5530 MHz 5610 MHz 5690 MHz	5775 MHz
Maximum Conducted Output Power, Maximum Power Spectral Density	11a Tx	1	5180 MHz 5220 MHz 5240 MHz	5260 MHz 5300 MHz 5320 MHz	5500 MHz 5580 MHz 5700 MHz 5720 MHz	5745 MHz 5785 MHz 5825 MHz
	11n-20 Tx 11ac-20 Tx	1+2, 1, 2	5180 MHz 5220 MHz 5240 MHz	5260 MHz 5300 MHz 5320 MHz	5500 MHz 5580 MHz 5700 MHz 5720 MHz	5745 MHz 5785 MHz 5825 MHz
	11n-40 Tx 11ac-40 Tx		5190 MHz 5230 MHz	5270 MHz 5310 MHz	5510 MHz 5550 MHz 5670 MHz 5710 MHz	5755 MHz 5795 MHz
	11ac-80 Tx		5210 MHz	5290 MHz	5530 MHz 5610 MHz 5690 MHz	5775 MHz
20 dB Bandwidth	11a Tx 11n-20 Tx 11ac-20 Tx	1	5240 MHz	-	-	-
	11n-40 Tx 11ac-40 Tx		5230 MHz	-	-	-
	11ac-80 Tx		5210 MHz	-	-	-
6 dB Bandwidth	11a Tx 11n-20 Tx 11ac-20 Tx	1	-	-	-	5745 MHz 5785 MHz 5825 MHz
	11n-40 Tx 11ac-40 Tx		-	-	-	5855 MHz 5795 MHz
	11ac-80 Tx		-	-	-	5775 MHz
Radiated Spurious Emission (Below 1 GHz)	11n-20 Tx	1+2	5180 MHz	-	-	-
Radiated Spurious Emission (Above 1 GHz)	11n-20 Tx	1+2	5180 MHz	5260 MHz 5320 MHz	5500 MHz 5580 MHz 5700 MHz 5720 MHz	5745 MHz 5785 MHz 5825 MHz
	11n-40 Tx	1+2	5190 MHz	5270 MHz 5310 MHz	5500 MHz 5670 MHz 5710 MHz	5755 MHz 5795 MHz
	11ac-80 Tx	1+2	5210 MHz	5290 MHz	5530 MHz 5610 MHz 5690 MHz	5775 MHz
Conducted Spurious Emission	11n-20 Tx	1	5180 MHz	-	-	-

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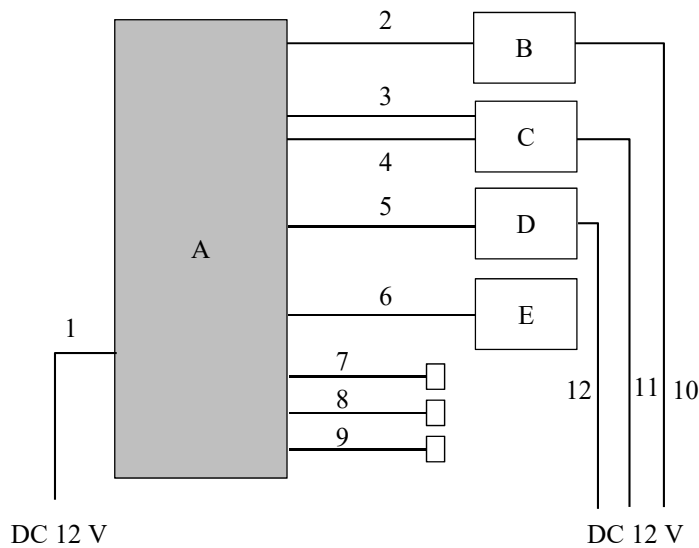
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4.2 Configuration and peripherals



*Cabling and setup 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	Control Box	DNNS097	No.1 for AT* No.2 for RE*	DENSO CORPORATION	EUT
B	Display	39710-TYAA-A010-M1	M17007A-ES1	Panasonic Corporation	-
C	Jig	cPhy	No.6	MICROCHIP	-
D	Touch Pad	-	-	VISTEON CORPORATION	-
E	GPS Antenna	V3-000624	No.6	Yokowo Co.,Ltd	-

List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	DC Cable	2.0	Unshielded	Unshielded	-
2	Display Cable	1.0	Shielded	Shielded	-
3	Signal Cable	1.0	Shielded	Shielded	-
4	Signal Cable	1.0	Shielded	Shielded	-
5	Signal Cable	2.0	Unshielded	Unshielded	-
6	GPS Antenna Cable	2.0	Shielded	Shielded	-
7	USB Cable	1.0	Shielded	Shielded	-
8	USB Cable	1.0	Shielded	Shielded	-
9	USB Cable	1.0	Shielded	Shielded	-
10	DC Cable	2.0	Unshielded	Unshielded	-
11	DC Cable	2.0	Unshielded	Unshielded	-
12	Signal and DC Cable	2.0	Unshielded	Unshielded	-

*AT: Antenna Terminal Conducted tests, RE: Radiated Spurious Emission

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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;

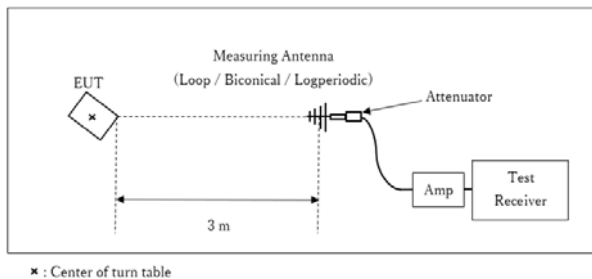
Frequency	30 MHz to 200 MHz	200 MHz to 1 GHz	Above 1 GHz
Antenna Type	Biconical	Logperiodic	Horn

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".

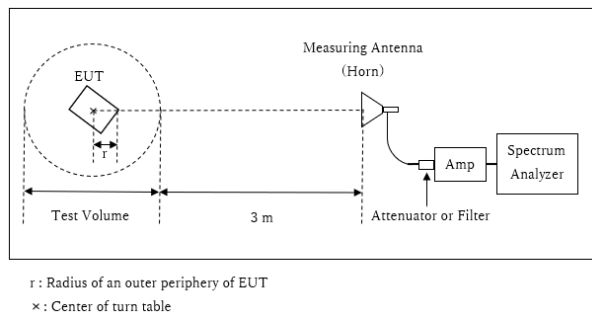
Figure 2: Test Setup

Below 1 GHz



Test Distance: 3 m

1 GHz - 10 GHz



Distance Factor: $20 \times \log (4.0 \text{ m} / 3.0 \text{ m}) = 2.5 \text{ dB}$

* Test Distance: $(3 + \text{Test Volume} / 2) - r = 4.0 \text{ m}$

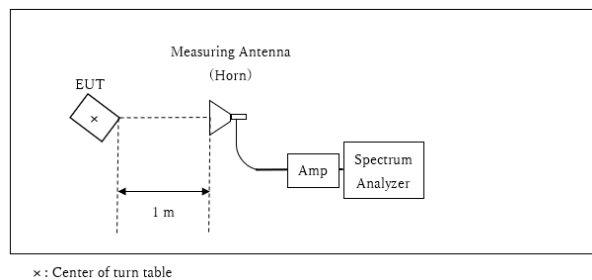
Test Volume : 2.0 m

(Test Volume has been calibrated based on CISPR 16-1-4.)

$r = 0.0 \text{ m}$ *

* The test was performed with $r = 0.0 \text{ m}$ since EUT is small and it was the rather conservative condition.

10 GHz - 40 GHz



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
20 dB Bandwidth	Enough to capture the emission	100 kHz	300 kHz	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))
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)	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 not detected as shown in the chart. (9 kHz-150 kHz: RBW = 200 Hz, 150 kHz-30 MHz: RBW = 9.1 kHz)

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.	12804674H
Test place	Ise EMC Lab. No.6 Measurement Room / Shielded Room
Date	September 2, 2019
Temperature / Humidity	24 deg. C / 63 % RH
Engineer	Takumi Shimada
Mode	Tx

11a

Antenna	Tested Frequency [MHz]	26 dB Emission Bandwidth [MHz]	99 % Occupied Bandwidth [kHz]
Antenna 1	5180	-	17062.9
	5220	-	16962.0
	5240	-	16940.6
	5260	20.777	17057.7
	5300	20.675	16988.6
	5320	20.785	17032.7
	5500	20.881	17048.1
	5580	20.766	17006.8
	5700	20.808	17061.6
	5720	20.891	17127.1
	5745	-	17105.7
	5785	-	17023.0
	5825	-	17037.7

11n-20

Antenna	Tested Frequency [MHz]	26 dB Emission Bandwidth [MHz]	99 % Occupied Bandwidth [kHz]
Antenna 1	5180	-	18000.8
	5220	-	18052.3
	5240	-	18090.0
	5260	21.057	18090.1
	5300	21.237	18092.1
	5320	21.002	18133.1
	5500	21.368	18101.9
	5580	21.029	18100.2
	5700	20.862	18103.4
	5720	21.386	18165.7
	5745	-	18063.6
	5785	-	18115.2
	5825	-	18134.3

11ac-20

Antenna	Tested Frequency [MHz]	26 dB Emission Bandwidth [MHz]	99 % Occupied Bandwidth [kHz]
Antenna 1	5180	-	18038.1
	5220	-	18049.0
	5240	-	18080.0
	5260	21.188	18108.0
	5300	21.247	18141.6
	5320	21.271	18105.1
	5500	21.301	18142.6
	5580	21.012	18141.5
	5700	21.280	18170.5
	5720	21.399	18187.4
	5745	-	18155.5
	5785	-	18125.3
	5825	-	18153.5

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26 dB Emission Bandwidth and 99 % Occupied Bandwidth

Report No. 12804674H
Test place Ise EMC Lab. No.6 Measurement Room / Shielded Room
Date September 2, 2019
Temperature / Humidity 24 deg. C / 63 % RH
Engineer Takumi Shimada
Mode Tx

11n-40

Antenna	Tested Frequency [MHz]	26 dB Emission Bandwidth [MHz]	99 % Occupied Bandwidth [kHz]
Antenna 1	5190	-	36384.3
	5230	-	36406.2
	5270	39.518	36577.5
	5310	39.185	36449.7
	5510	39.531	36421.4
	5550	39.301	36466.6
	5670	39.387	36464.1
	5710	39.631	36506.0
	5755	-	36499.3
	5795	-	36357.5

11ac-40

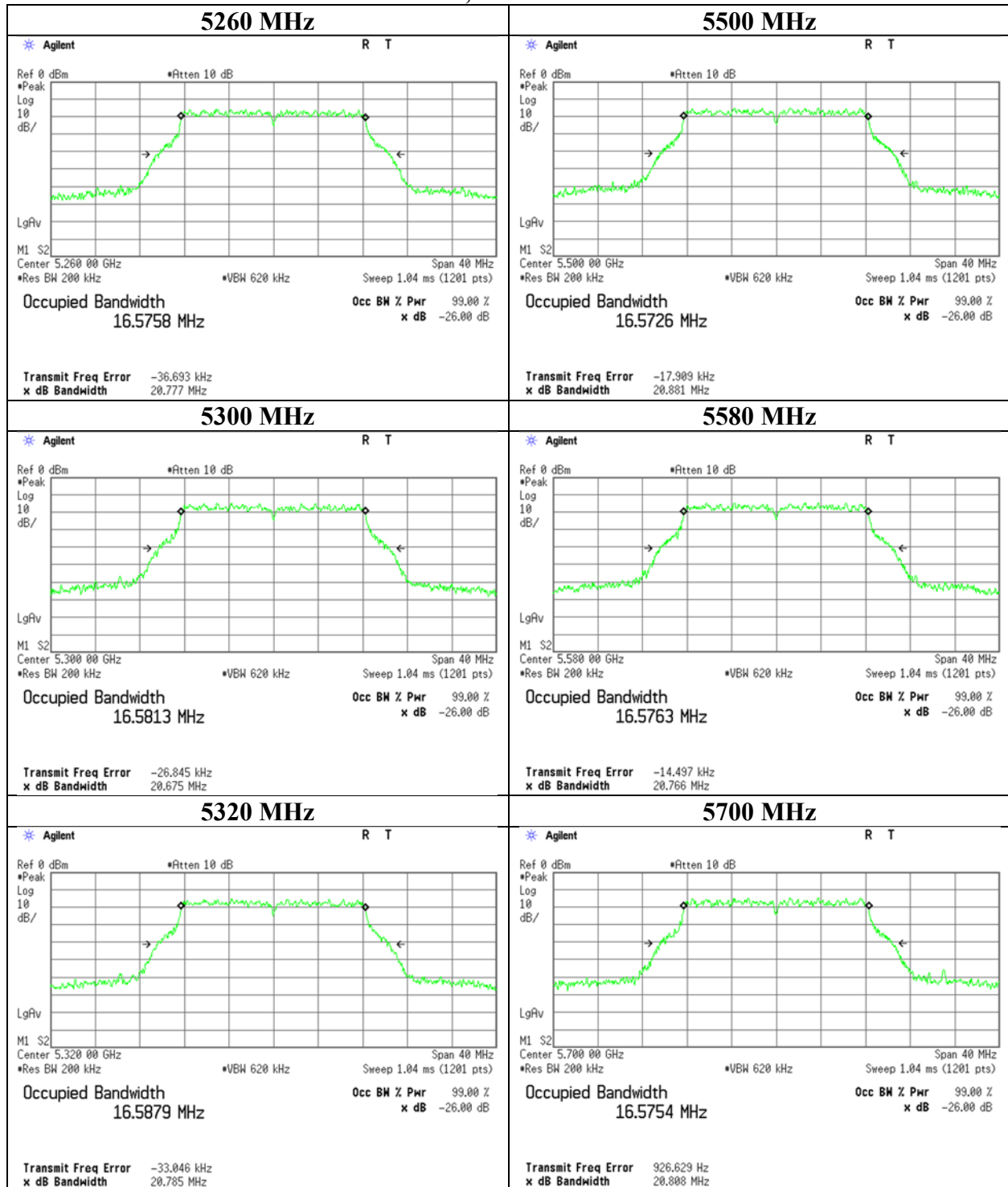
Antenna	Tested Frequency [MHz]	26 dB Emission Bandwidth [MHz]	99 % Occupied Bandwidth [kHz]
Antenna 1	5190	-	36929.8
	5230	-	36420.8
	5270	39.841	36540.7
	5310	39.848	36640.0
	5510	39.871	36582.8
	5550	39.816	36615.7
	5670	39.878	36656.1
	5710	40.098	36666.7
	5755	-	36399.0
	5795	-	36494.4

11ac-80

Antenna	Tested Frequency [MHz]	26 dB Emission Bandwidth [MHz]	99 % Occupied Bandwidth [kHz]
Antenna 2	5210	-	75870.9
	5290	80.816	75732.3
	5530	80.961	75742.5
	5610	81.182	75744.3
	5690	81.301	76119.8
	5775	-	75936.5

26 dB Emission Bandwidth

11a, Antenna 1



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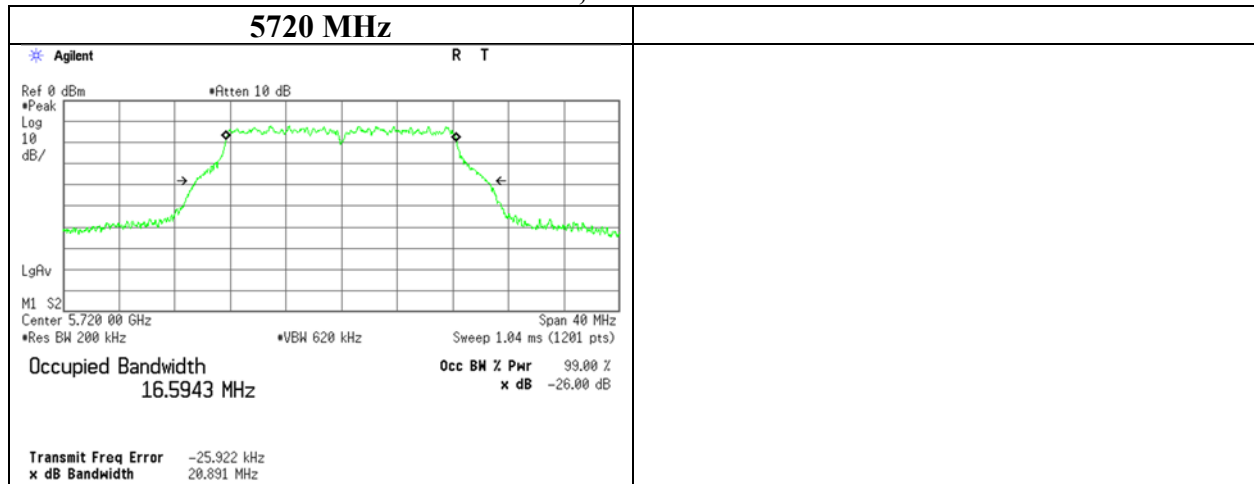
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26 dB Emission Bandwidth

11a, Antenna 1



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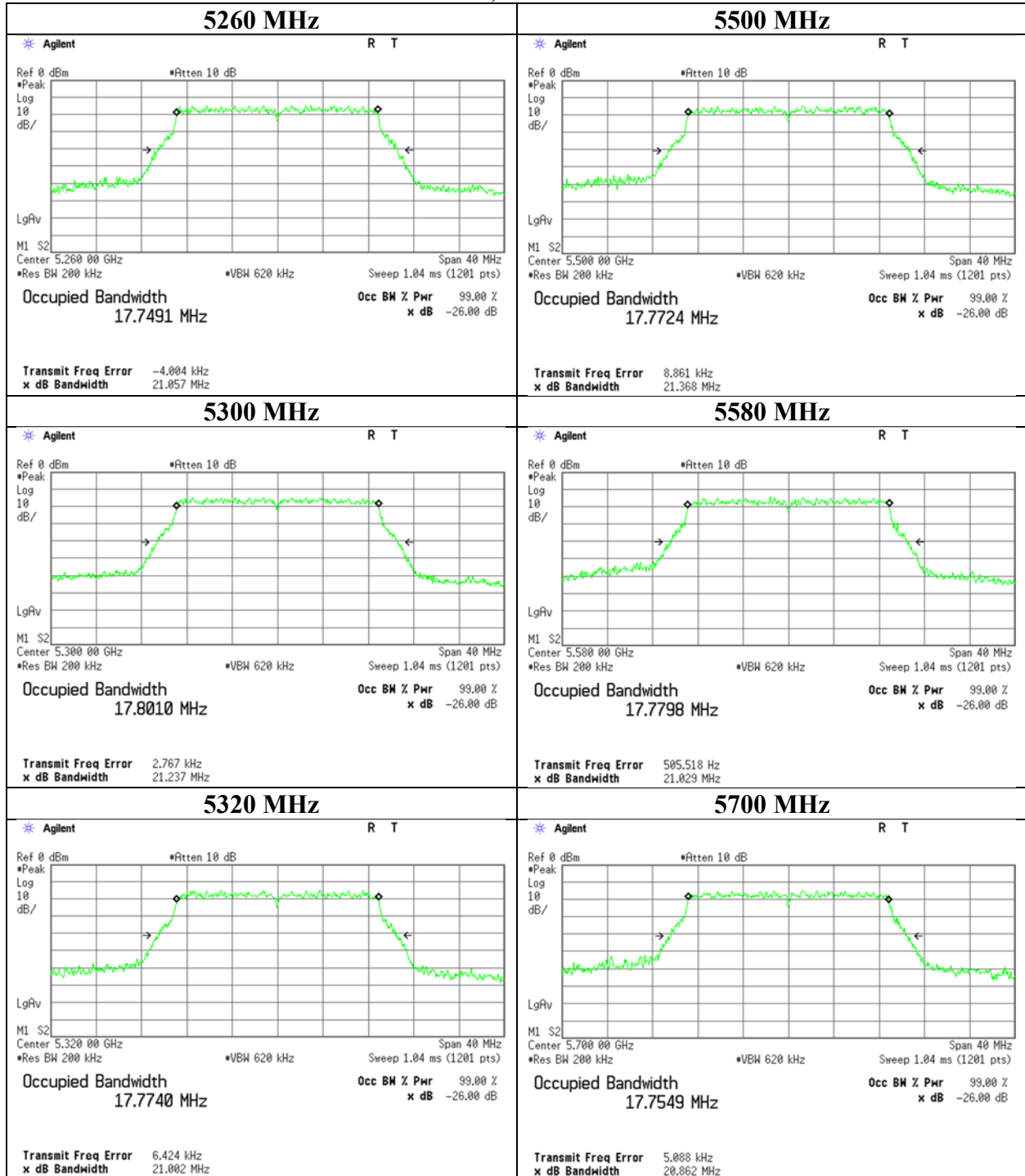
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26 dB Emission Bandwidth

11n-20, Antenna 1



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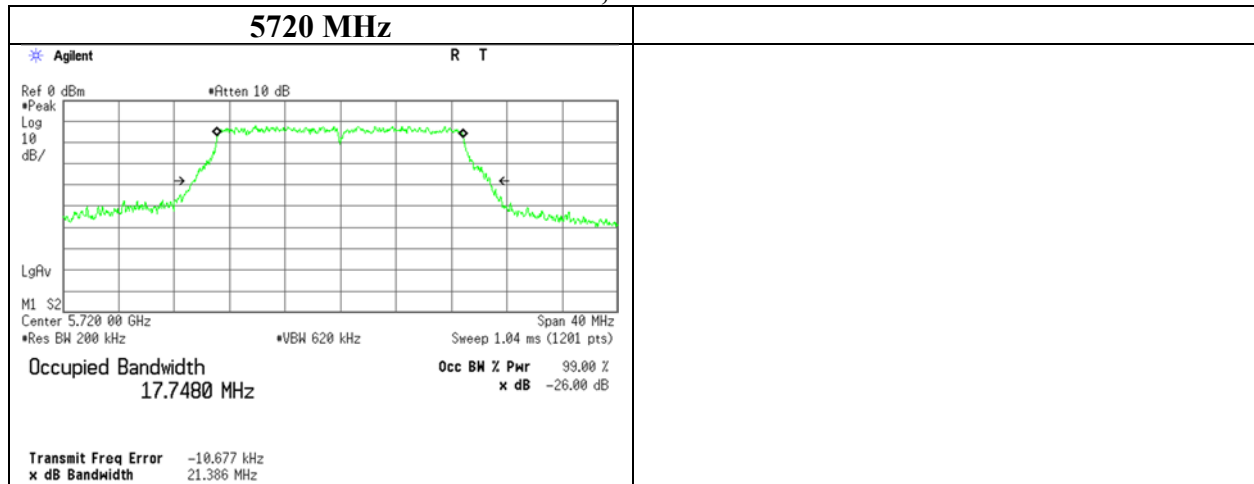
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26 dB Emission Bandwidth

11n-20, Antenna 1



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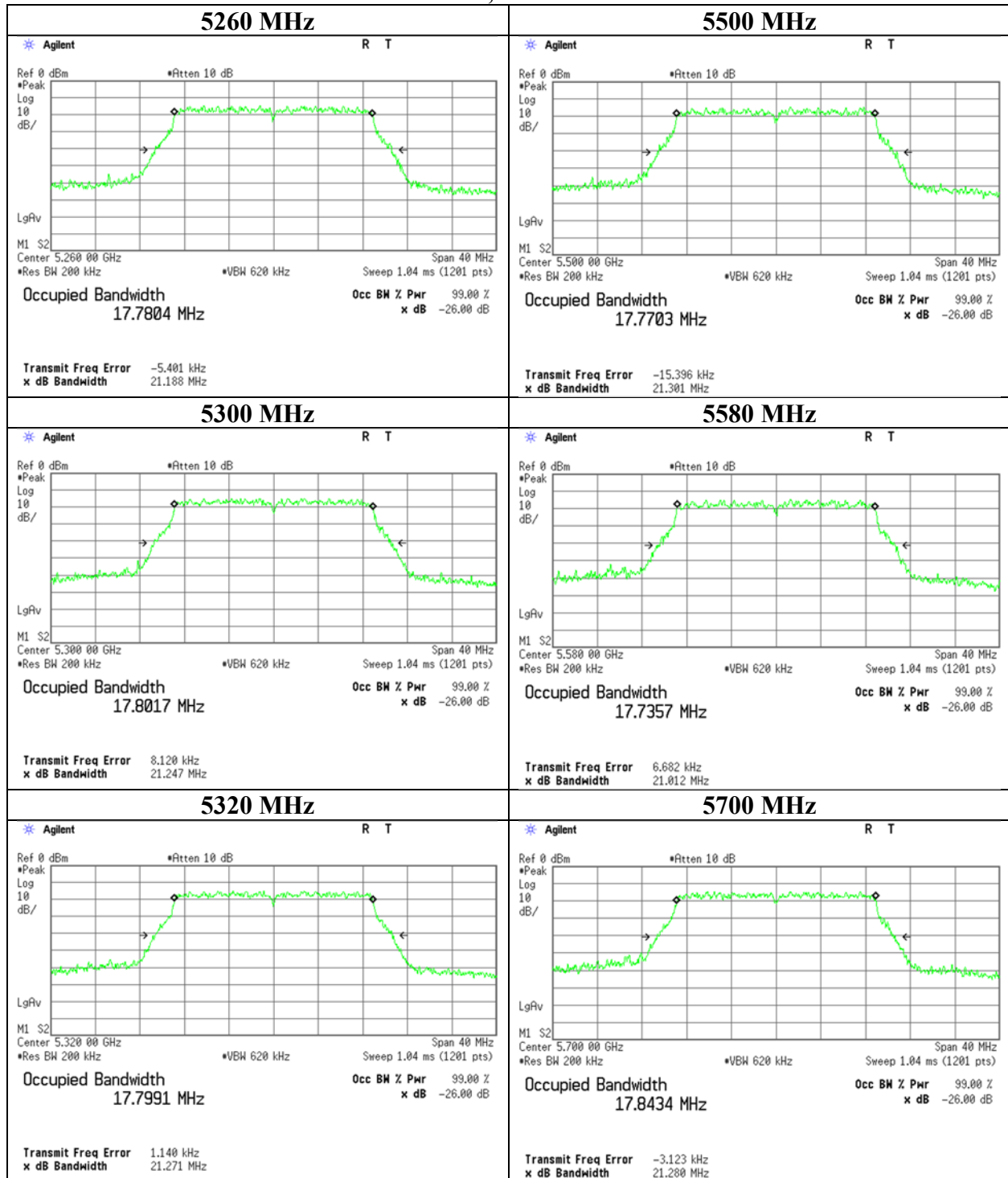
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26 dB Emission Bandwidth

11ac-20, Antenna 1



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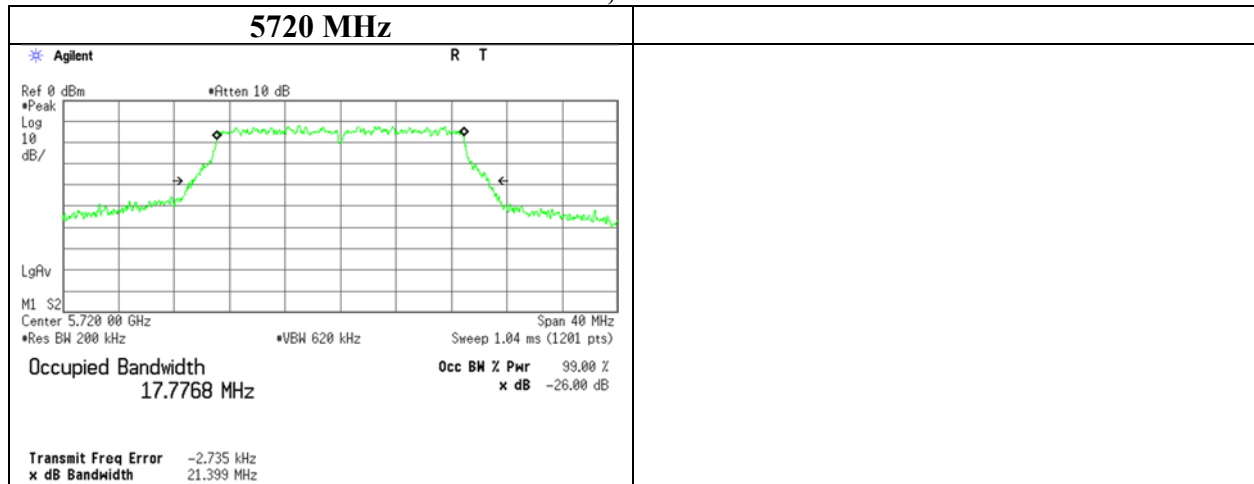
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26 dB Emission Bandwidth

11ac-20, Antenna 1



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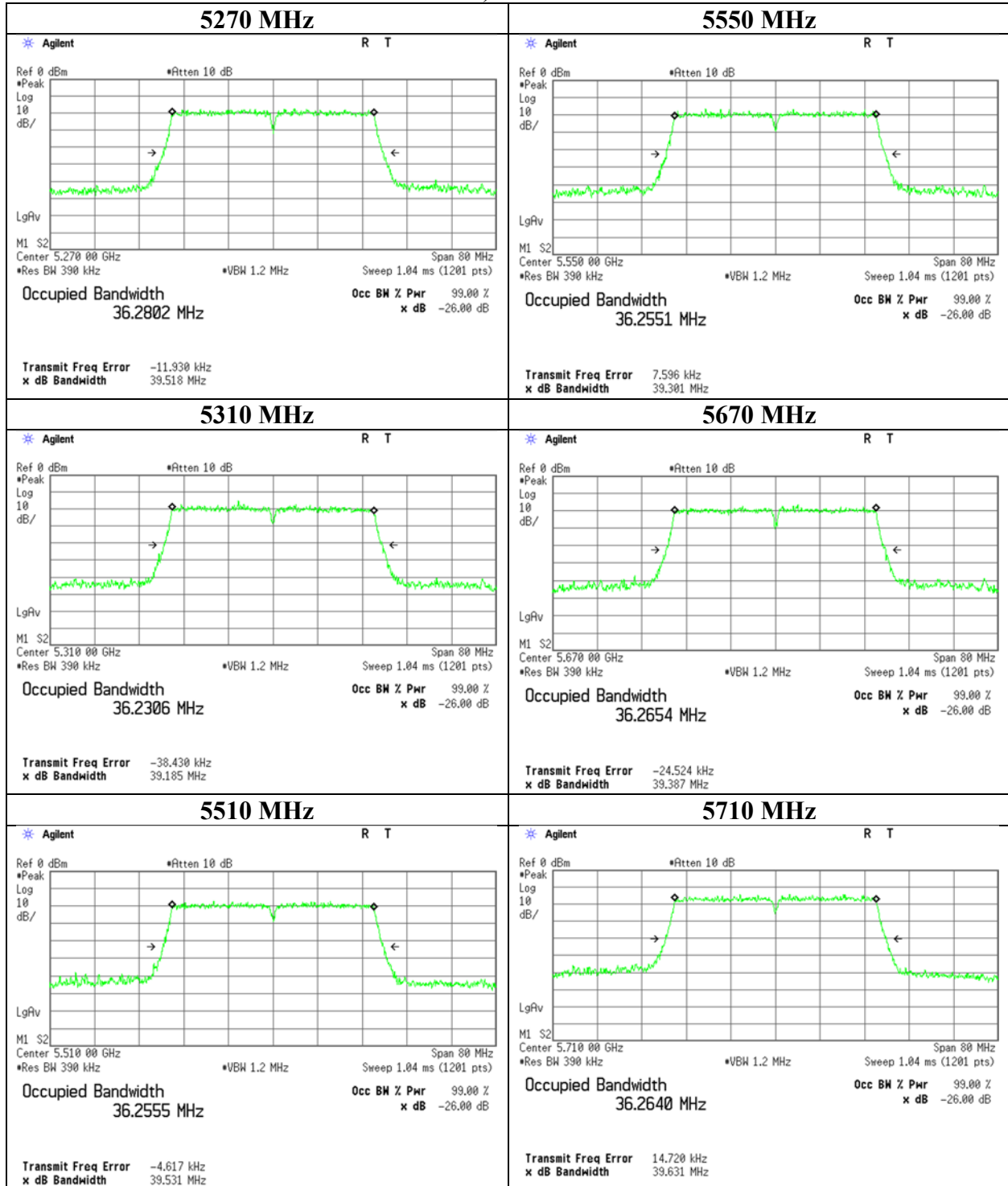
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26 dB Emission Bandwidth

11n-40, Antenna 1



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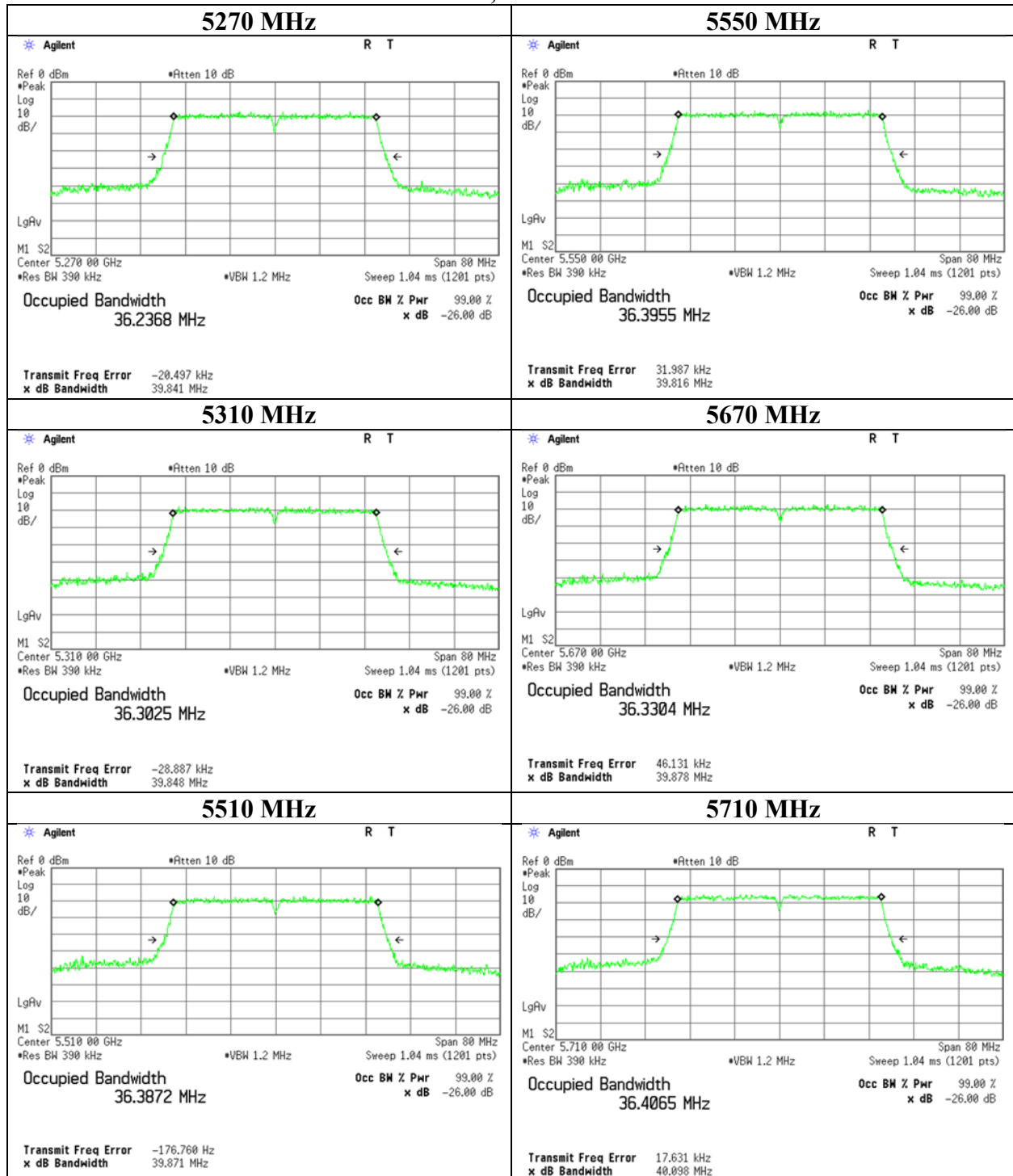
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26 dB Emission Bandwidth

11ac-40, Antenna 1



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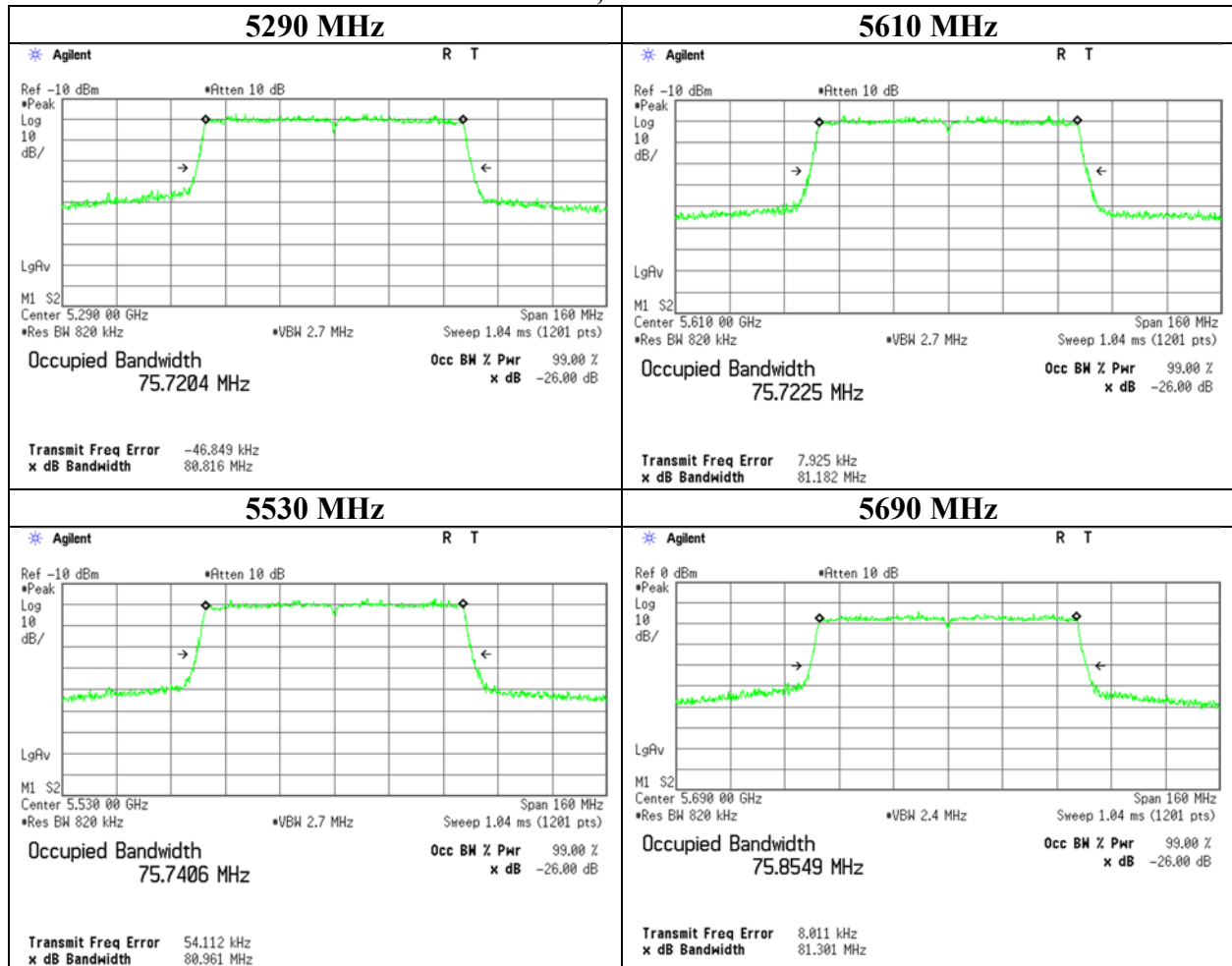
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26 dB Emission Bandwidth

11ac-80, Antenna 2



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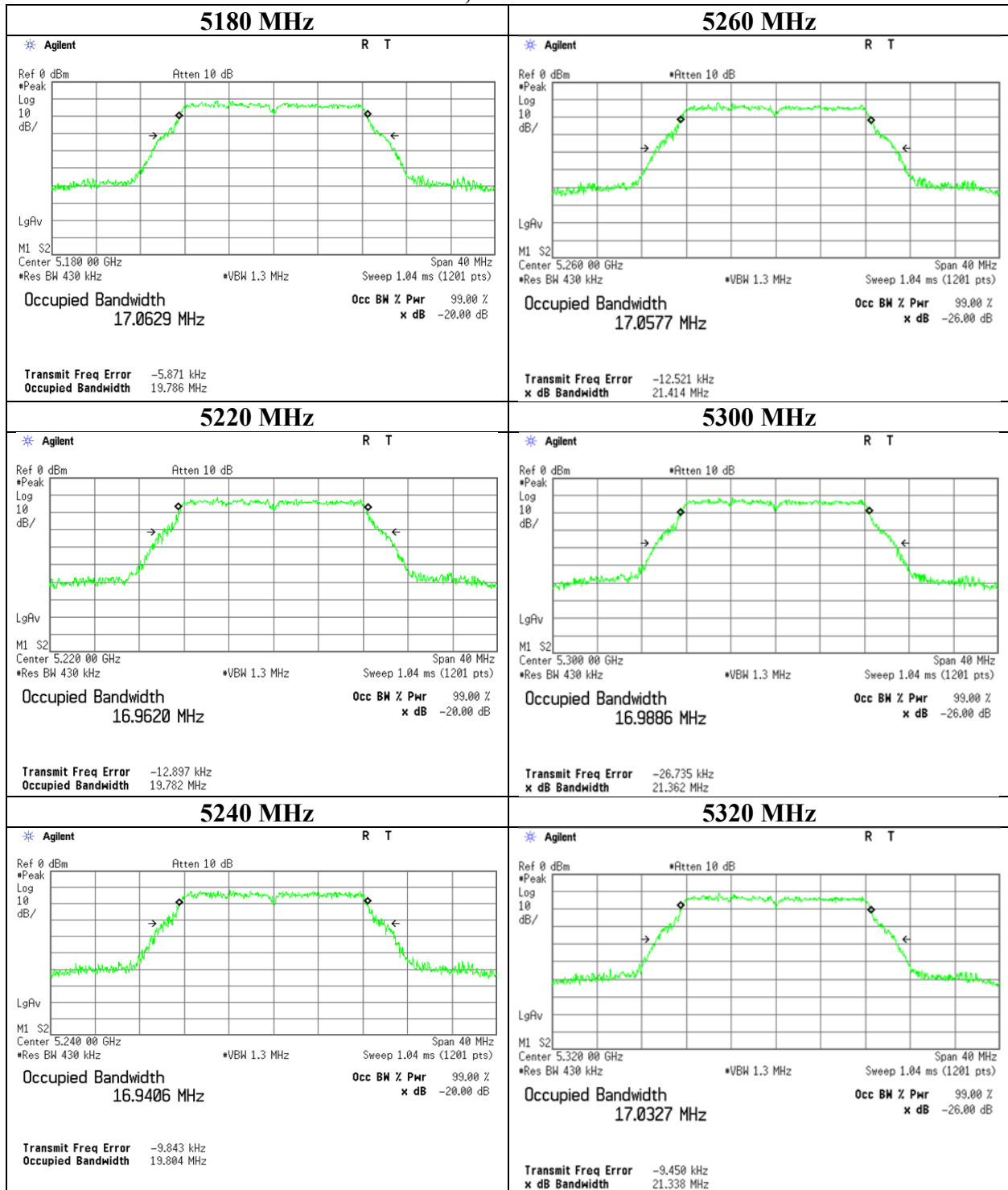
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99 % Occupied Bandwidth

11a, Antenna 1



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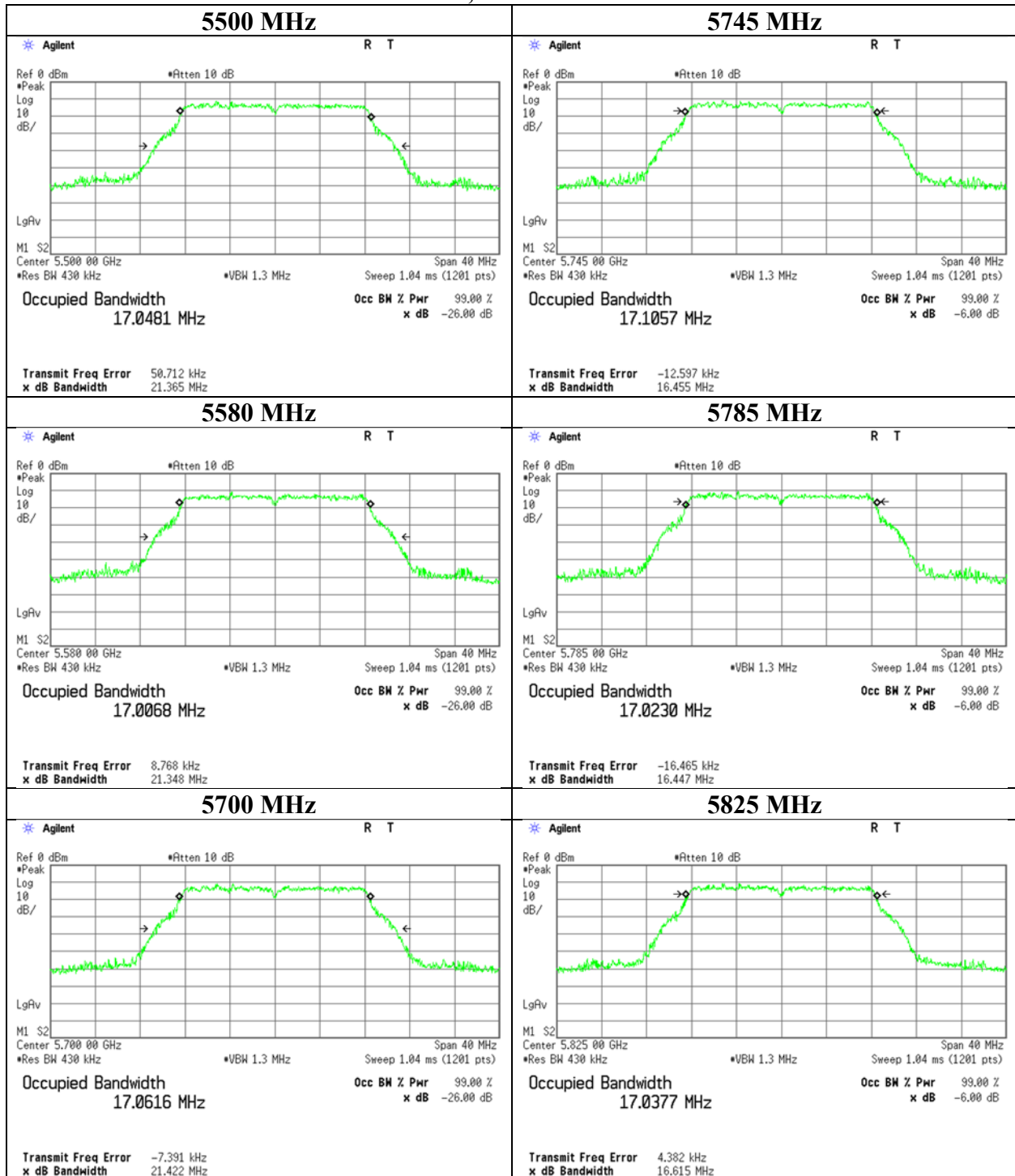
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

99 % Occupied Bandwidth

11a, Antenna 1



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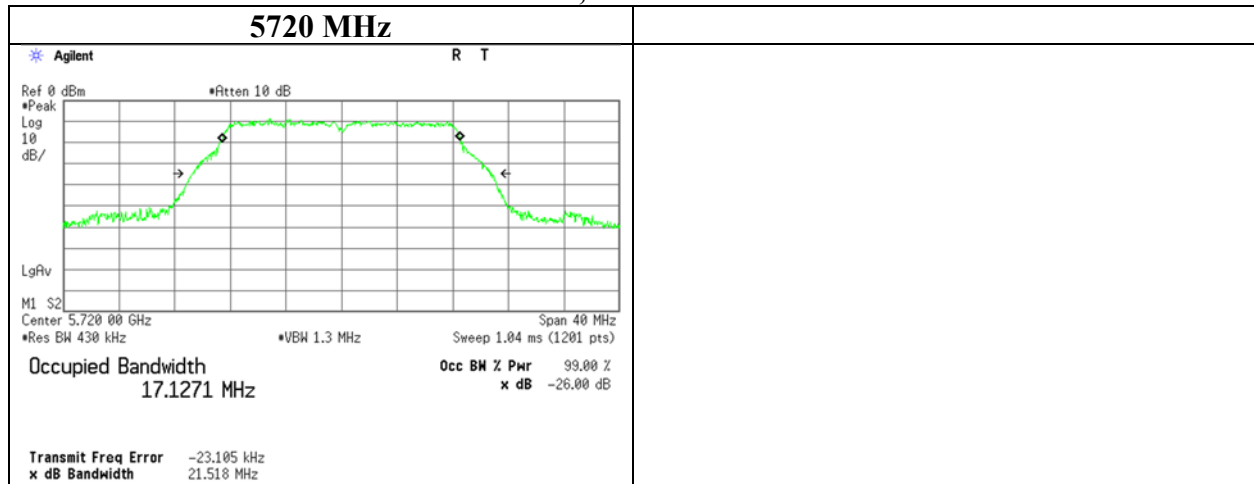
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

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99 % Occupied Bandwidth

11a, Antenna 1



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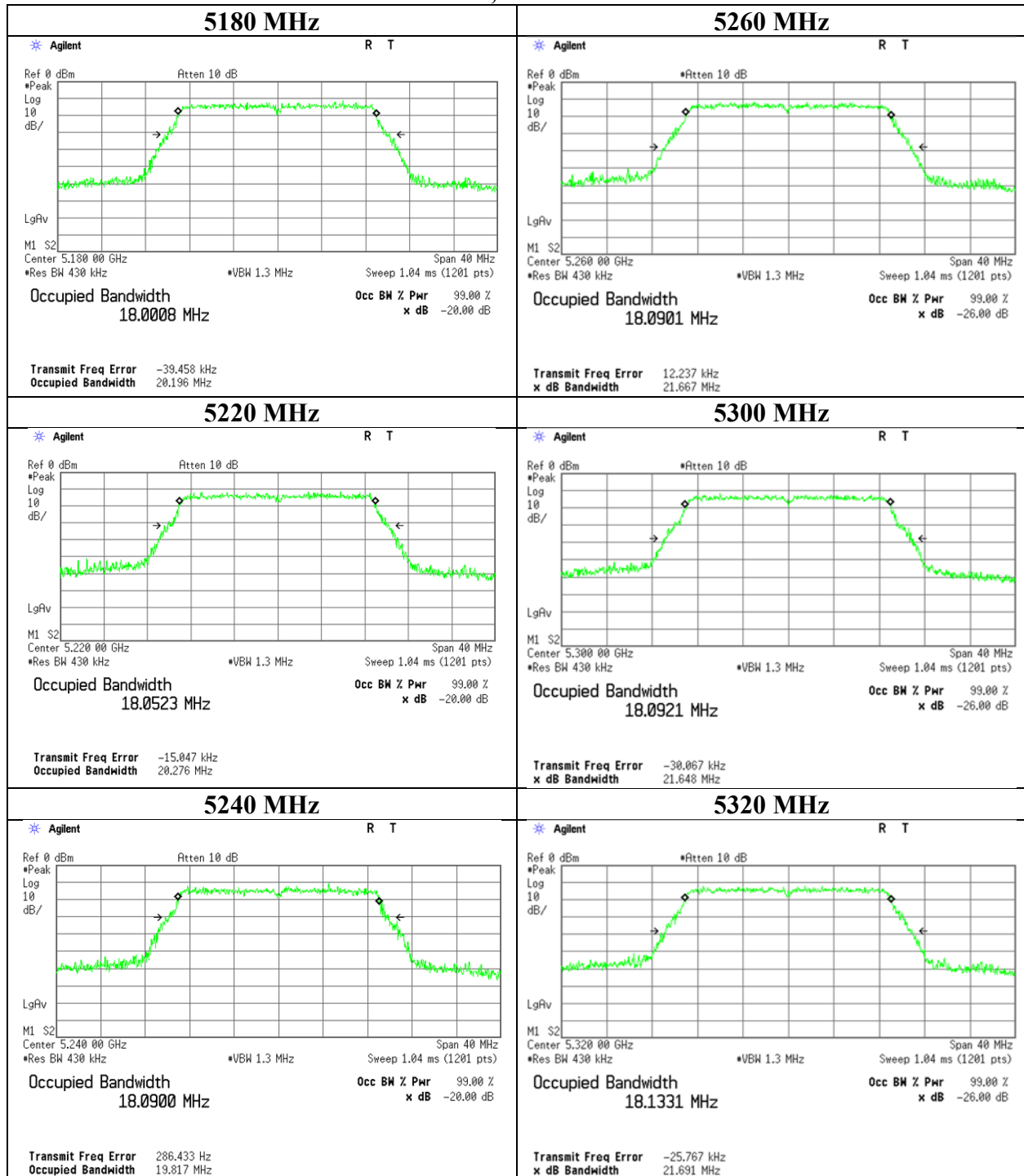
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Facsimile : +81 596 24 8124

99 % Occupied Bandwidth

11n-20, Antenna 1



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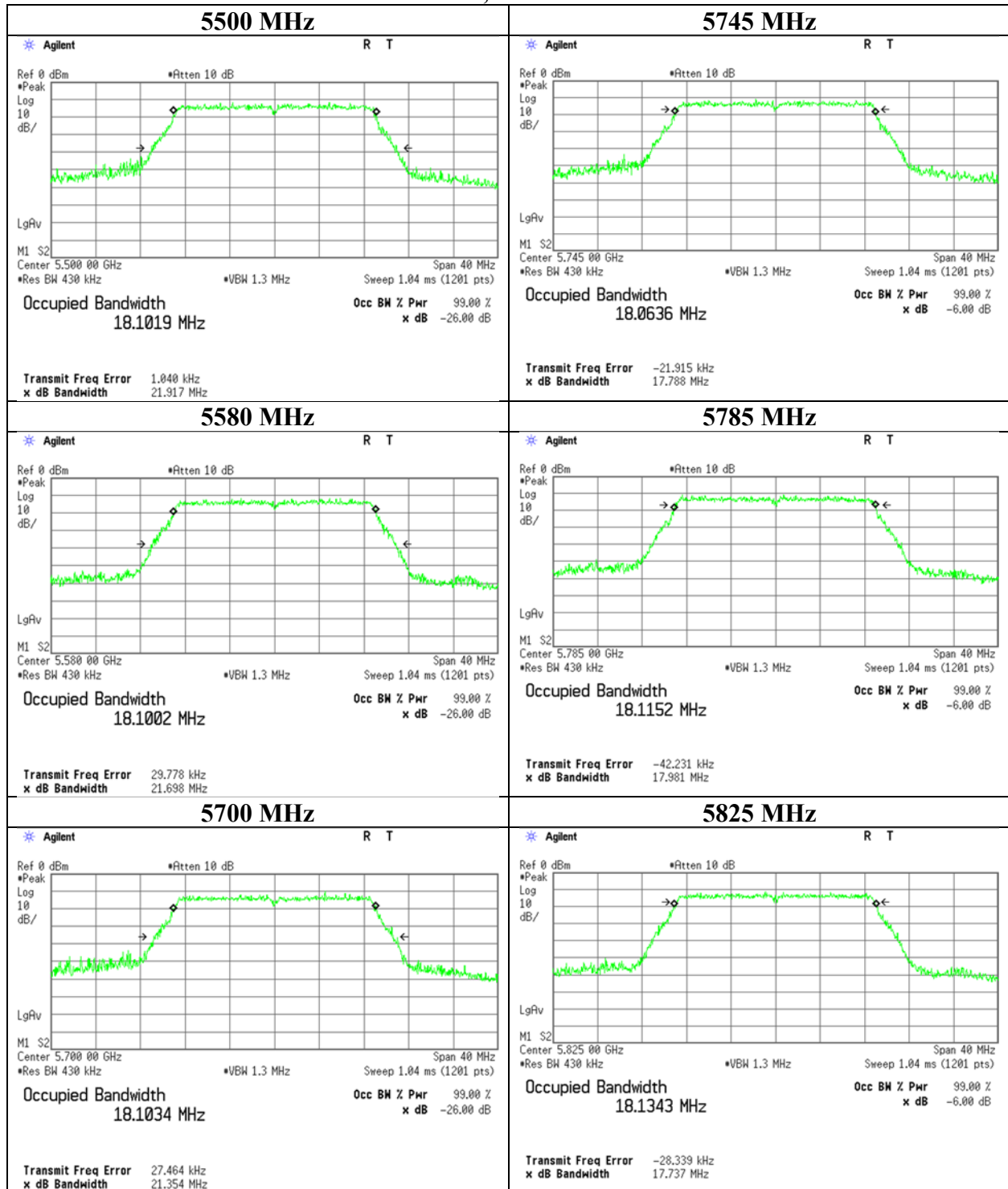
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99 % Occupied Bandwidth

11n-20, Antenna 1



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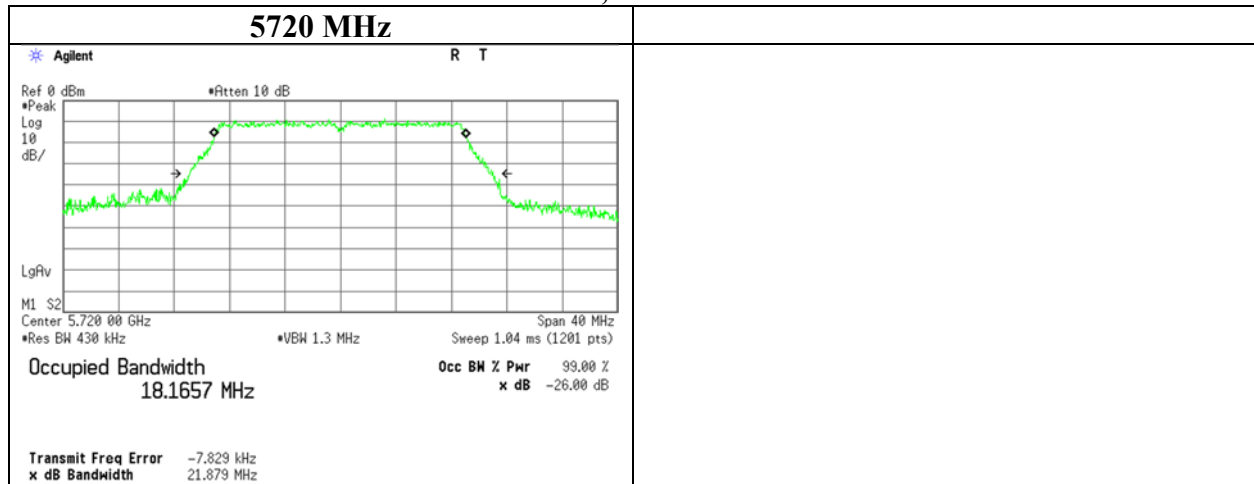
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99 % Occupied Bandwidth

11n-20, Antenna 1



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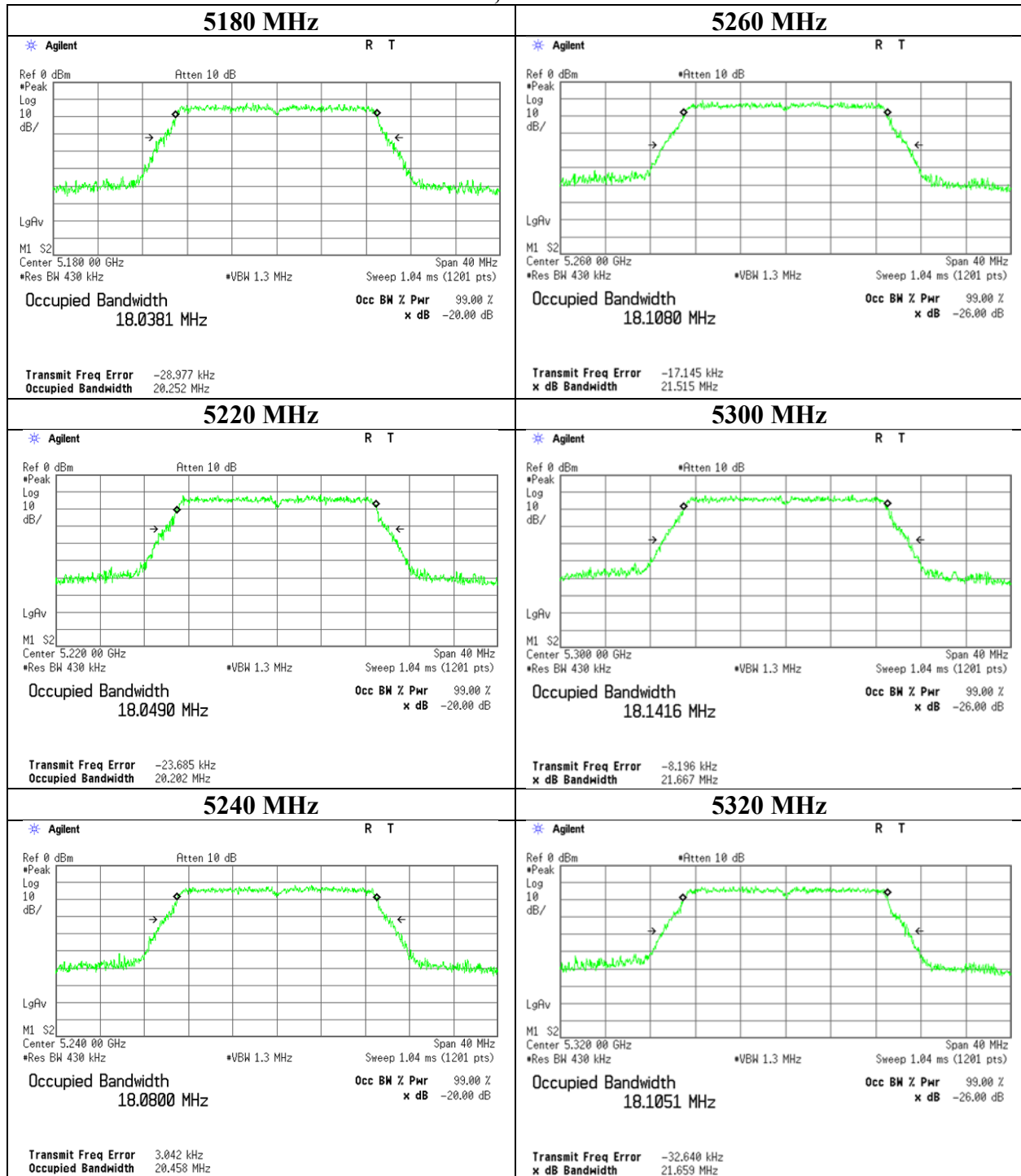
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99 % Occupied Bandwidth

11ac-20, Antenna 1



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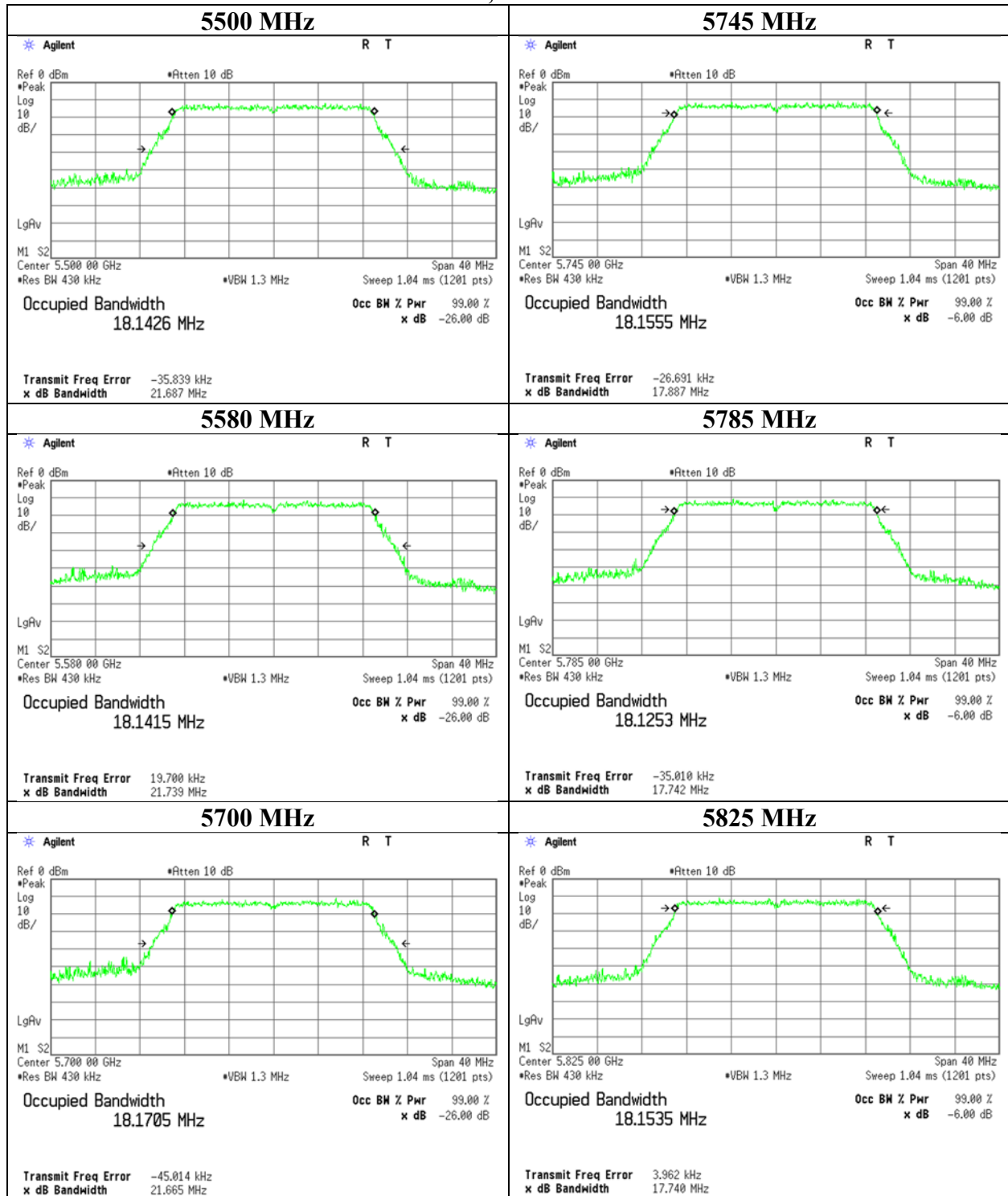
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99 % Occupied Bandwidth

11ac-20, Antenna 1



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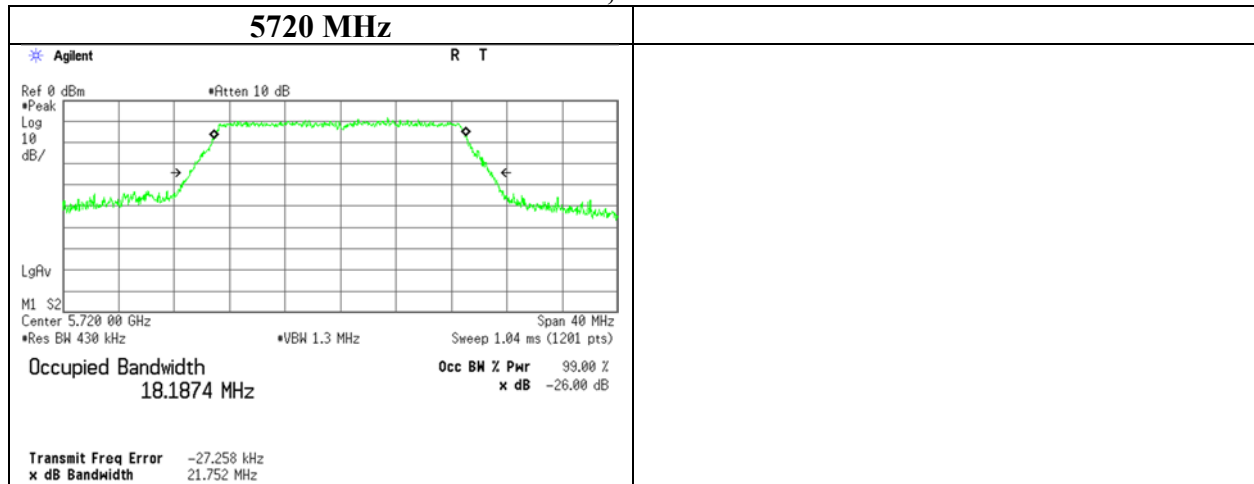
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Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

99 % Occupied Bandwidth

11ac-20, Antenna 1



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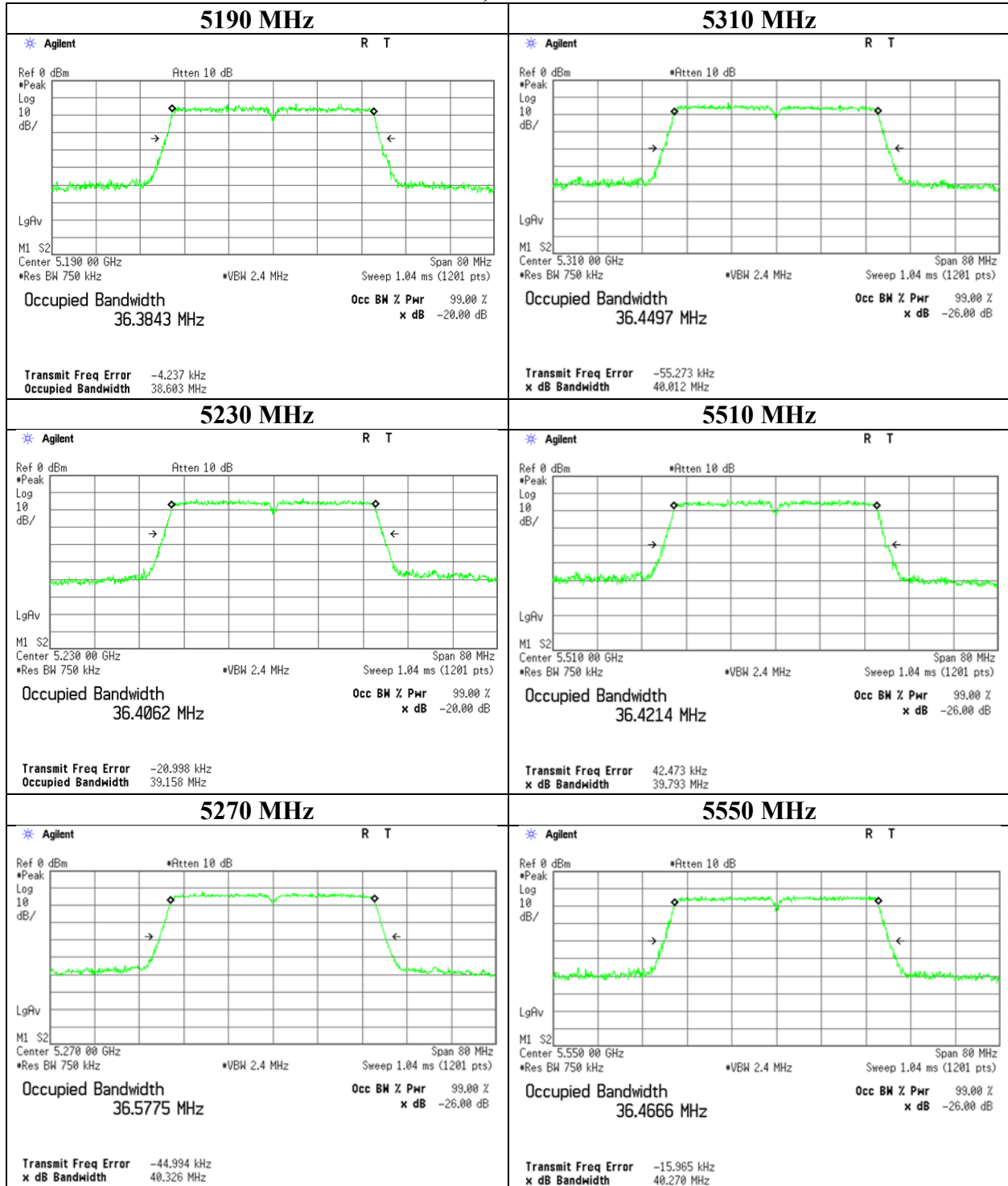
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99 % Occupied Bandwidth

11n-40, Antenna 1



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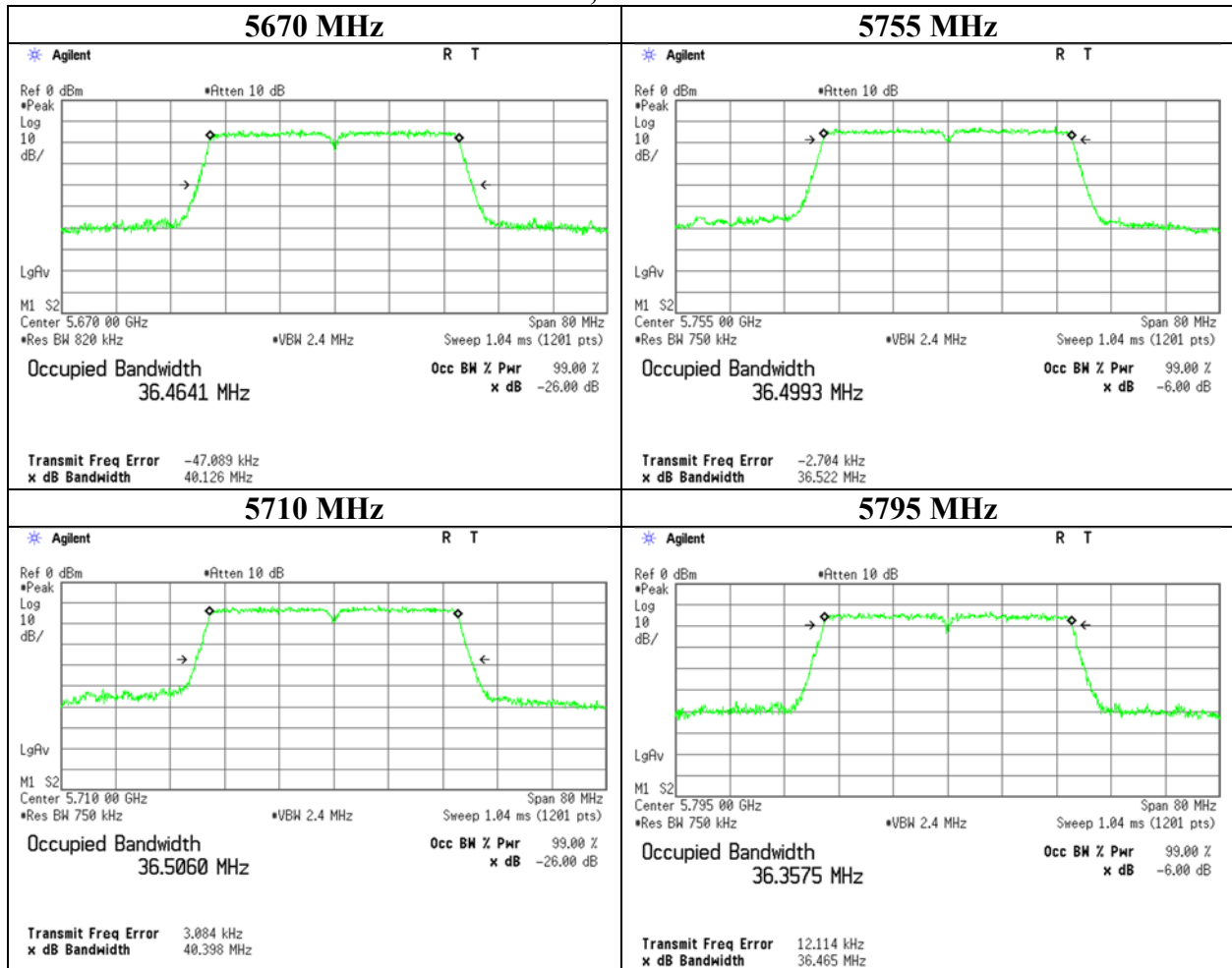
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

99 % Occupied Bandwidth

11n-40, Antenna 1



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Ise EMC Lab.

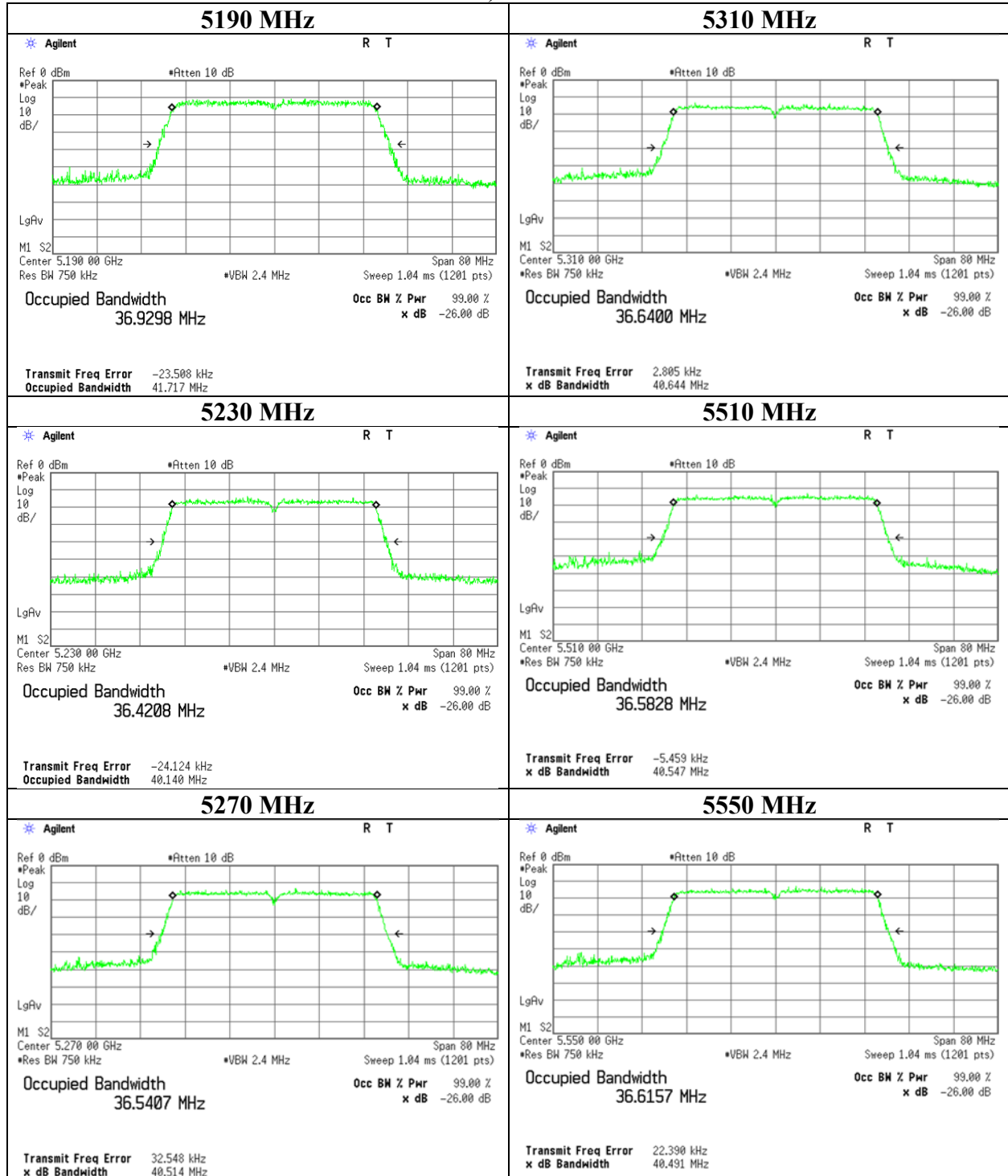
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Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

99 % Occupied Bandwidth

11ac-40, Antenna 1



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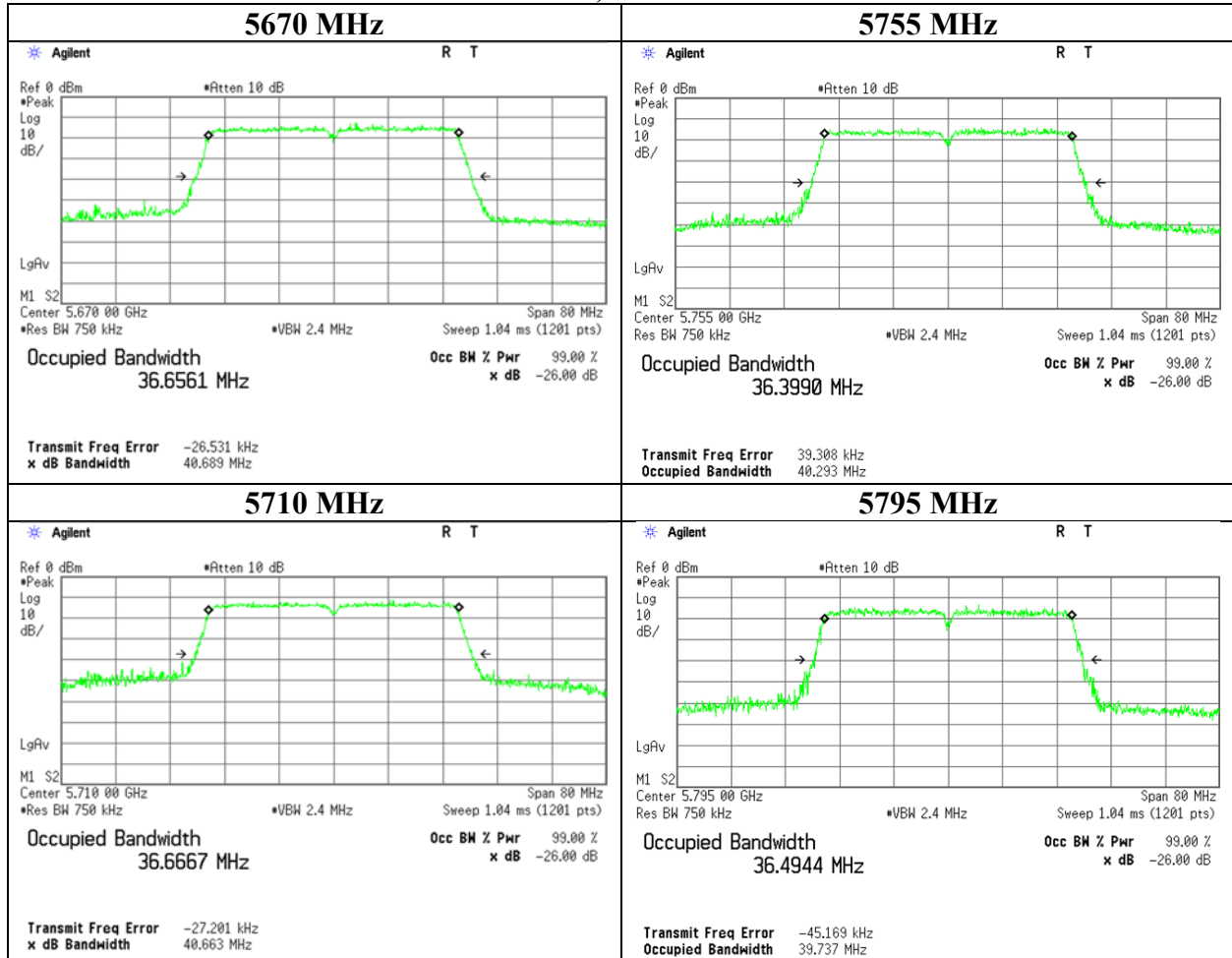
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99 % Occupied Bandwidth

11ac-40, Antenna 1



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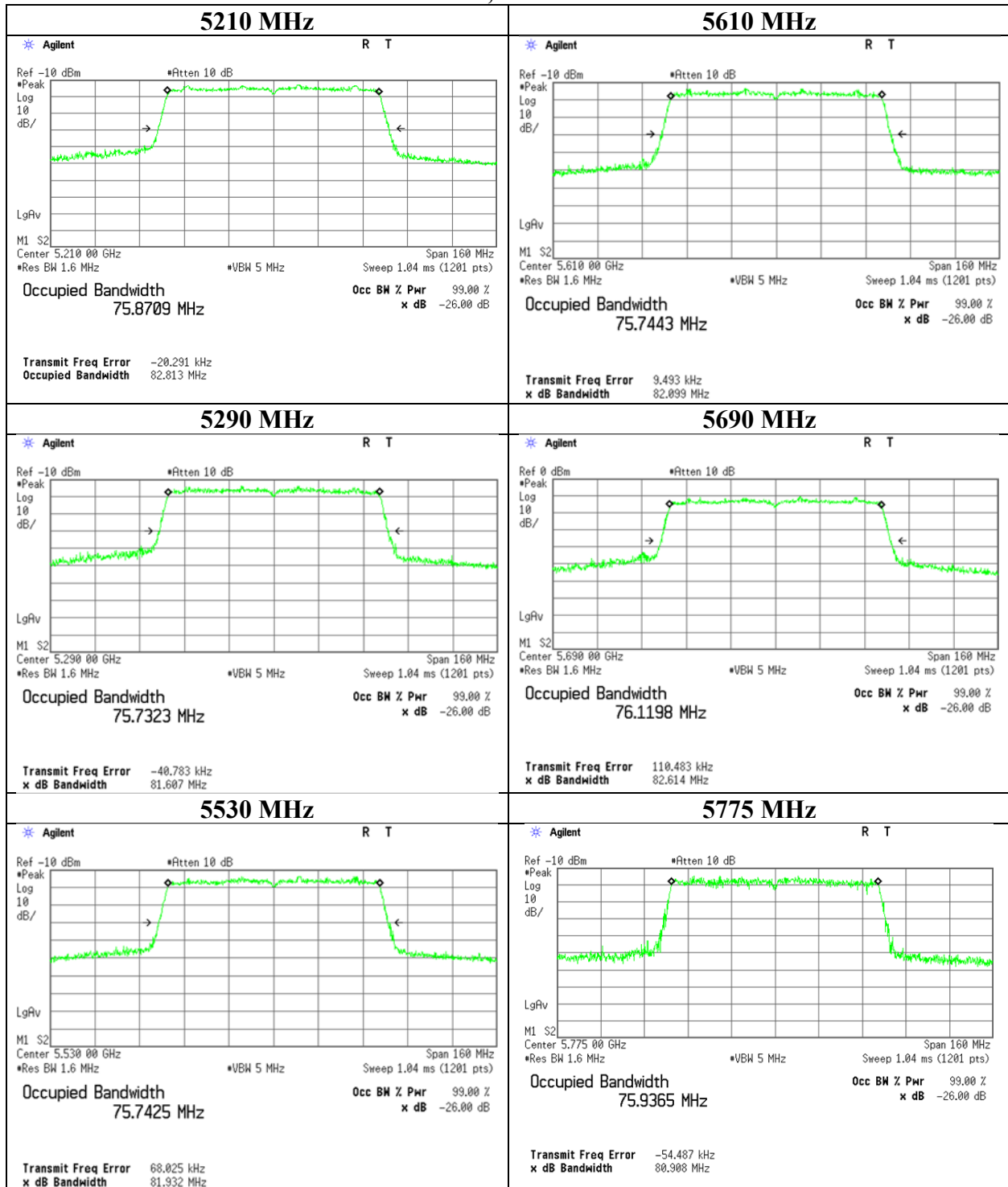
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99 % Occupied Bandwidth

11ac-80, Antenna 2



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20 dB Bandwidth

Report No. 12804674H
Test place Ise EMC Lab. No.6 Measurement Room
Date September 4, 2019
Temperature / Humidity 22 deg. C / 60 % RH
Engineer Takumi Shimada
Mode Tx

11a

Antenna	Tested Frequency [MHz]	20 dB Emission Bandwidth [MHz]
Antenna 1	5240	17.668

11n-20

Antenna	Tested Frequency [MHz]	20 dB Emission Bandwidth [MHz]
Antenna 1	5240	18.824

11ac-20

Antenna	Tested Frequency [MHz]	20 dB Emission Bandwidth [MHz]
Antenna 1	5240	18.532

11n-40

Antenna	Tested Frequency [MHz]	20 dB Emission Bandwidth [MHz]
Antenna 1	5230	37.518

11ac-40

Antenna	Tested Frequency [MHz]	20 dB Emission Bandwidth [MHz]
Antenna 1	5230	37.585

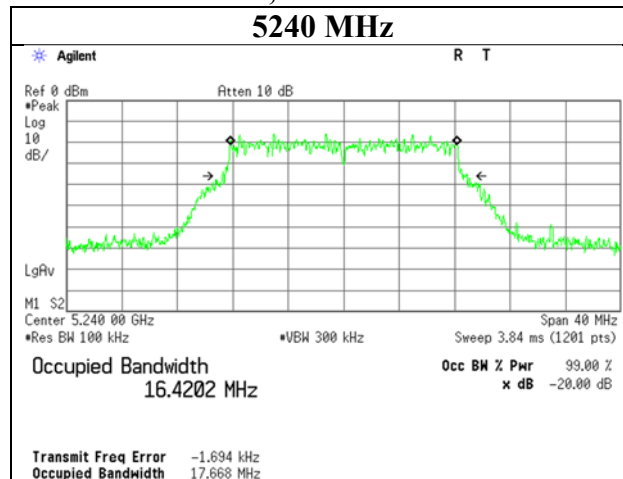
11ac-80

Antenna	Tested Frequency [MHz]	20 dB Emission Bandwidth [MHz]
Antenna 2	5210	77.243

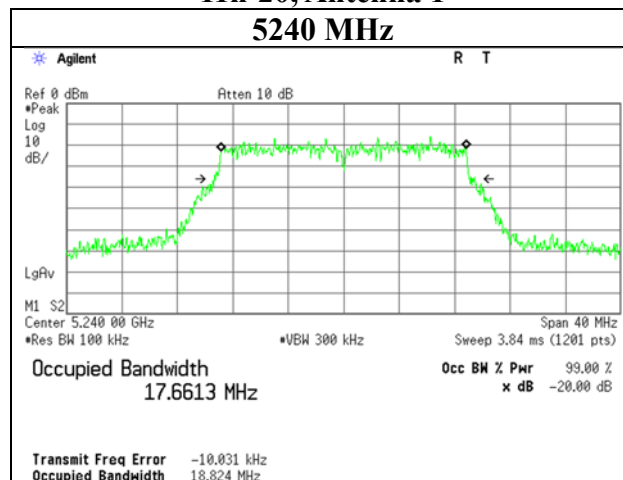
20 dB Bandwidth

Report No. 12804674H
Test place Ise EMC Lab. No.6 Measurement Room
Date September 4, 2019
Temperature / Humidity 22 deg. C / 60 % RH
Engineer Takumi Shimada
Mode Tx

11a, Antenna 1



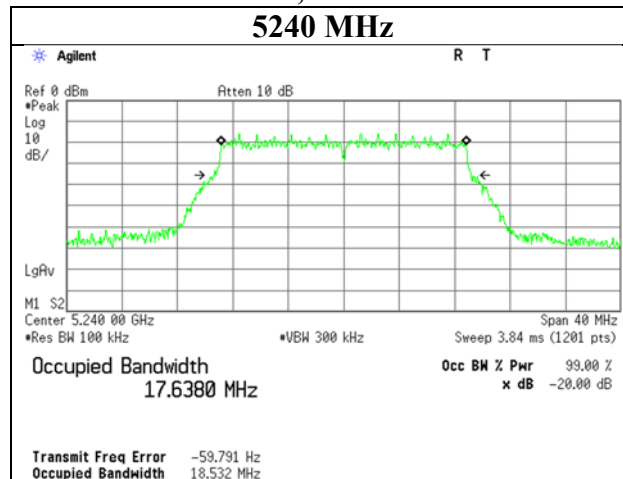
11n-20, Antenna 1



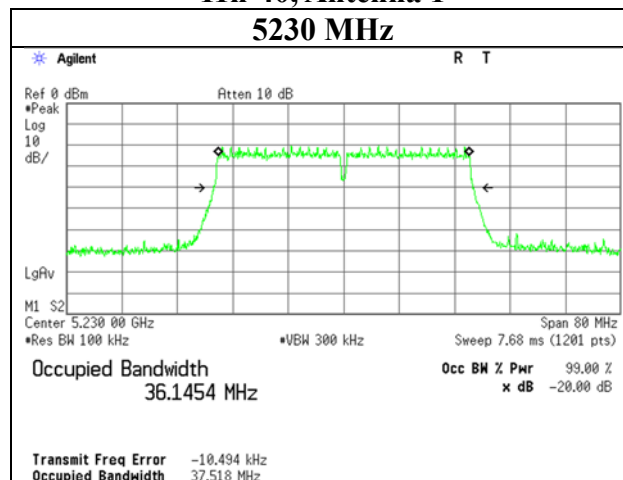
20 dB Bandwidth

Report No. 12804674H
Test place Ise EMC Lab. No.6 Measurement Room
Date September 4, 2019
Temperature / Humidity 22 deg. C / 60 % RH
Engineer Takumi Shimada
Mode Tx

11ac-20, Antenna 1



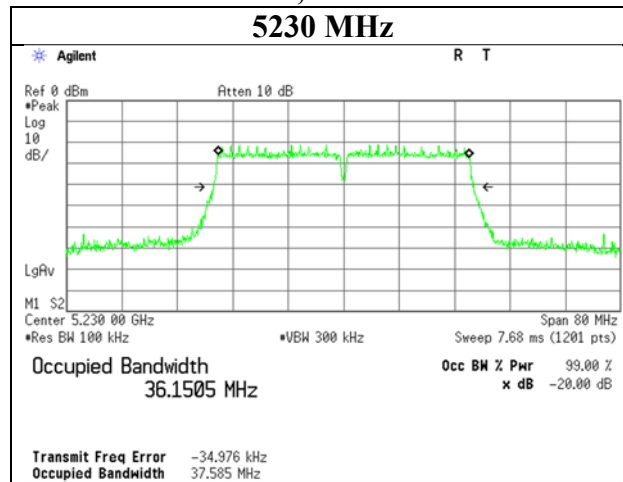
11n-40, Antenna 1



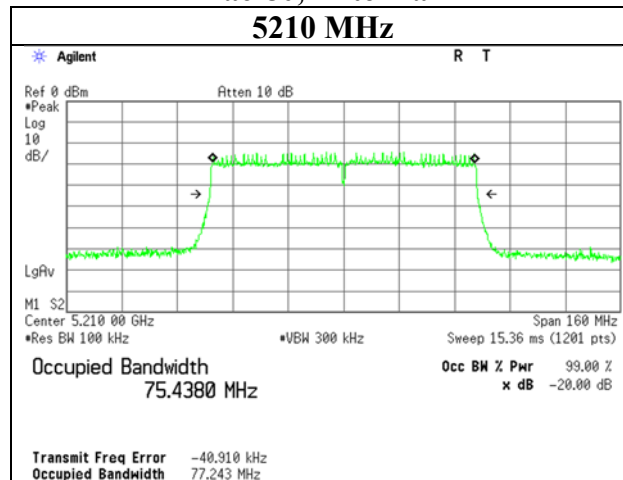
20 dB Bandwidth

Report No. 12804674H
Test place Ise EMC Lab. No.6 Measurement Room
Date September 4, 2019
Temperature / Humidity 22 deg. C / 60 % RH
Engineer Takumi Shimada
Mode Tx

11ac-40, Antenna 1



11ac-80, Antenna 2



6 dB Bandwidth

Report No.	12804674H
Test place	Ise EMC Lab. No.6 Measurement Room / Shielded Room
Date	September 2, 2019
Temperature / Humidity	24 deg. C / 63 % RH
Engineer	Takumi Shimada
Mode	Tx

11a

Antenna	Tested Frequency [MHz]	6 dB Bandwidth [MHz]	Limit [MHz]
Antenna 1	5745	16.472	> 0.500
	5785	16.470	> 0.500
	5825	16.453	> 0.500

11n-20

Antenna	Tested Frequency [MHz]	6 dB Bandwidth [MHz]	Limit [MHz]
Antenna 1	5745	17.714	> 0.500
	5785	17.705	> 0.500
	5825	17.718	> 0.500

11ac-20

Antenna	Tested Frequency [MHz]	6 dB Bandwidth [MHz]	Limit [MHz]
Antenna 1	5745	17.605	> 0.500
	5785	17.647	> 0.500
	5825	17.736	> 0.500

11n-40

Antenna	Tested Frequency [MHz]	6 dB Bandwidth [MHz]	Limit [MHz]
Antenna 1	5755	36.406	> 0.500
	5795	36.385	> 0.500

11ac-40

Antenna	Tested Frequency [MHz]	6 dB Bandwidth [MHz]	Limit [MHz]
Antenna 1	5755	36.387	> 0.500
	5795	36.364	> 0.500

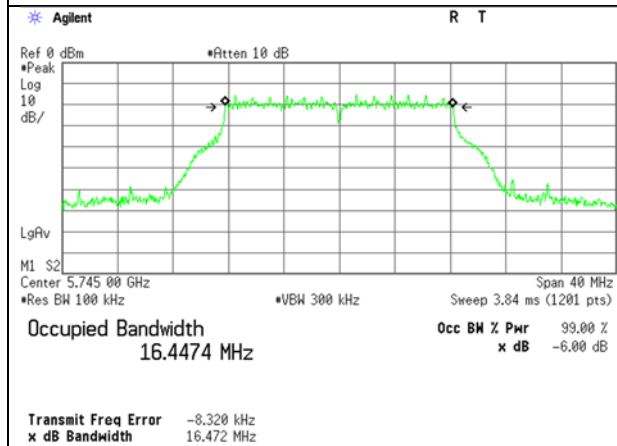
11ac-80

Antenna	Tested Frequency [MHz]	6 dB Bandwidth [MHz]	Limit [MHz]
Antenna 2	5775	75.817	> 0.500

6 dB Bandwidth

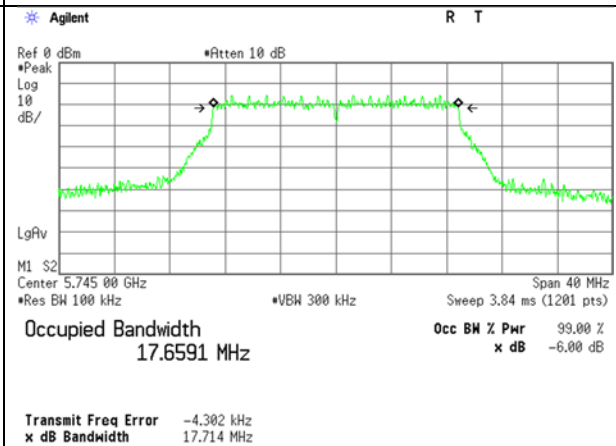
11a, Antenna 1

5745 MHz

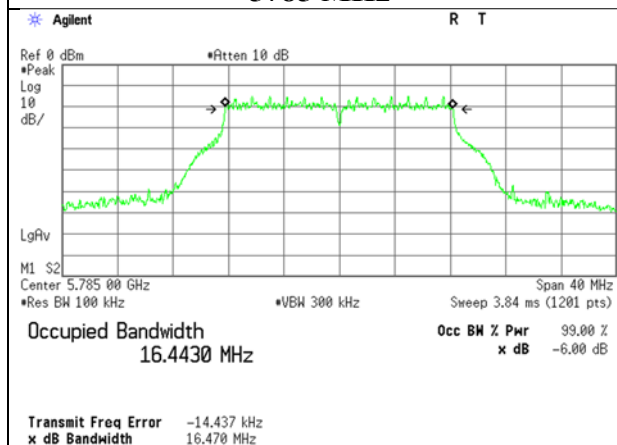


11n-20, Antenna 1

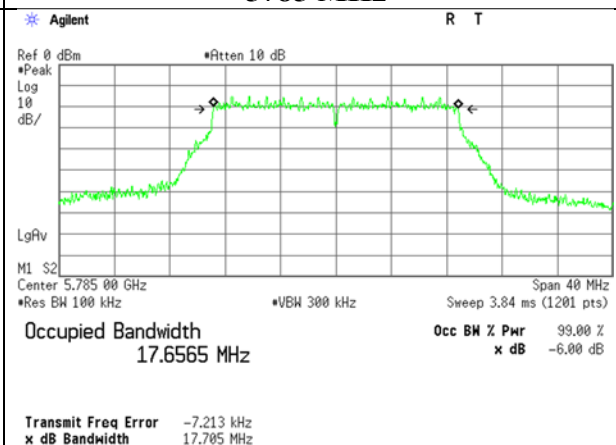
5745 MHz



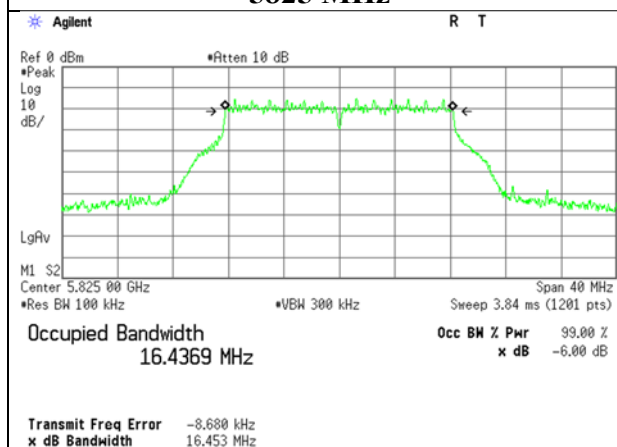
5785 MHz



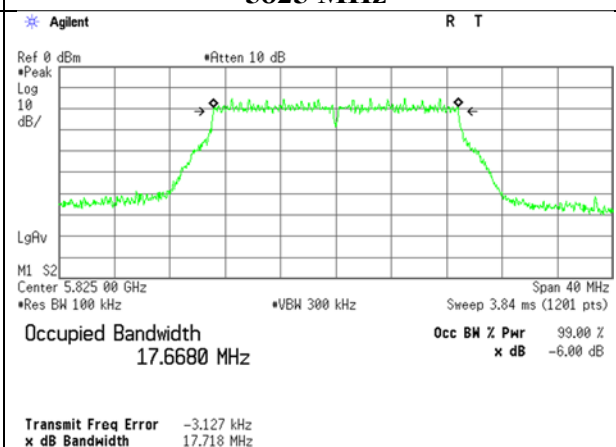
5785 MHz



5825 MHz



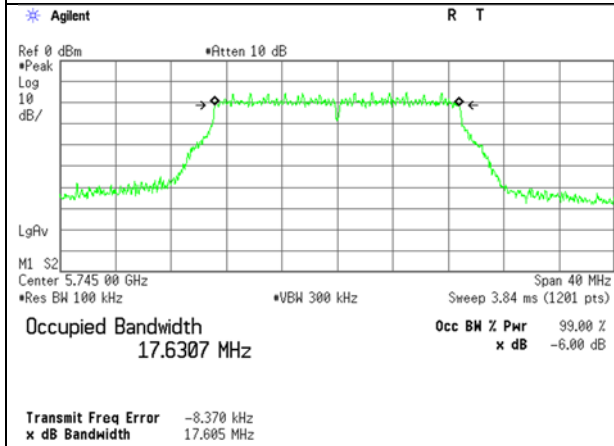
5825 MHz



6 dB Bandwidth

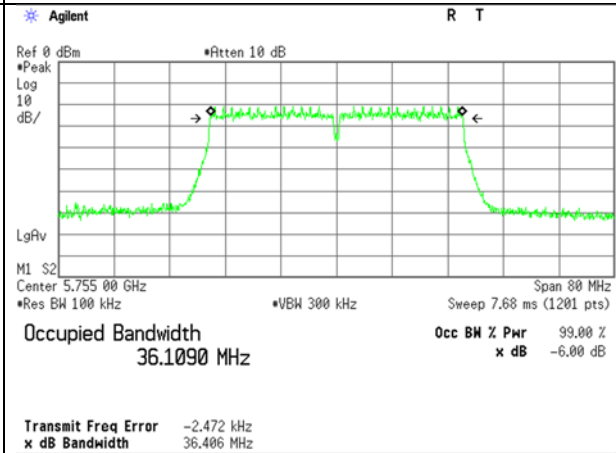
11ac-20, Antenna 1

5745 MHz

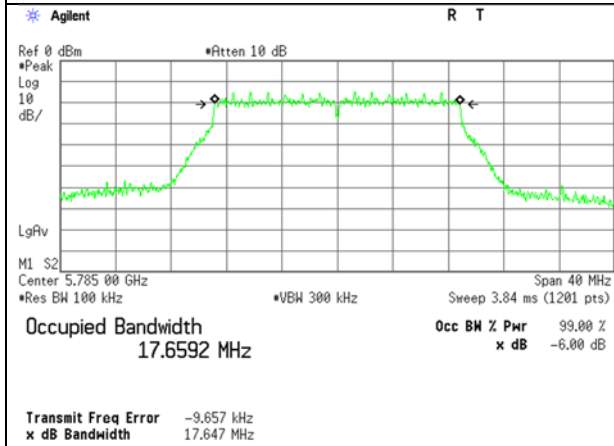


11n-40, Antenna 1

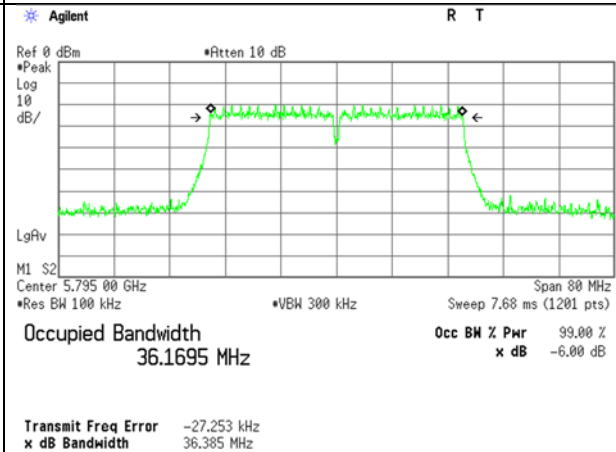
5755 MHz



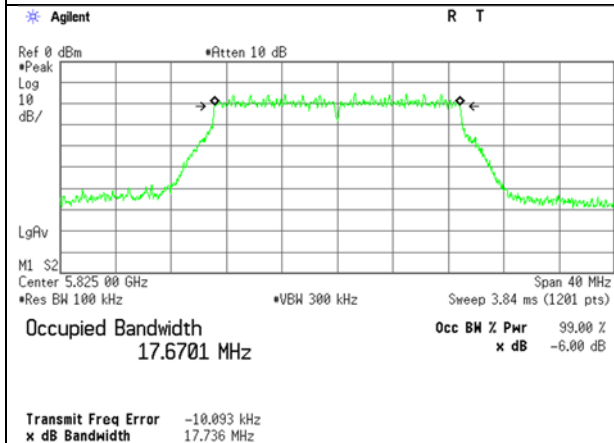
5785 MHz



5795 MHz



5825 MHz



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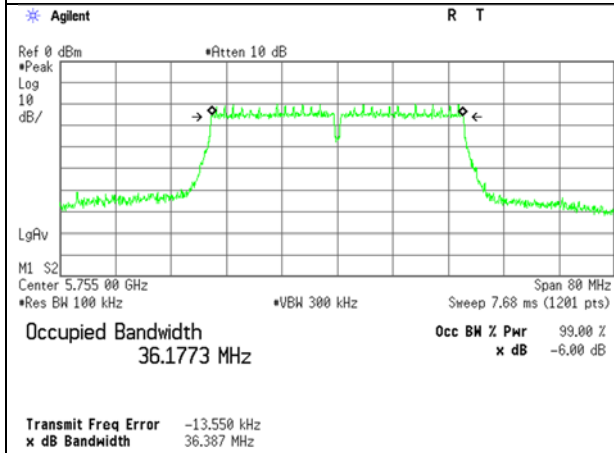
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

6 dB Bandwidth

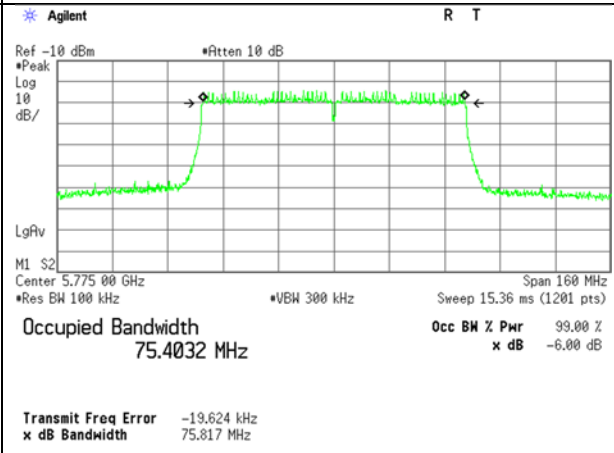
11ac-40, Antenna 1

5755 MHz

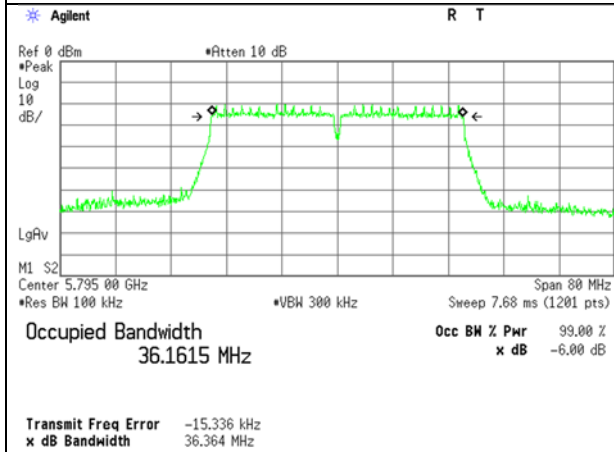


11ac-80, Antenna 2

5775 MHz



5795 MHz



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Telephone : +81 596 24 8999

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Maximum Conducted Output Power

Report No. 12804674H
Test place Ise EMC Lab. No.6 Measurement Room
Date August 11, 2019 September 2, 2019 November 15, 2019
Temperature / Humidity 24 deg. C / 65 % RH 24 deg. C / 63 % RH 24 deg. C / 40 % RH
Engineer Yuta Moriya Takumi Shimada Yuta Moriya
Mode Tx 11a

11a

Applied limit: 15.407, mobile and portable client device

Tested Frequency [MHz]	Power Meter Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Duty Factor [dB]	Antenna Gain [dBi]	26 dB EBW (B for FCC) [MHz]	99% OBW (B for IC) [MHz]	Conducted Power				e.i.r.p.			
								Result	Limit	Margin		Result	Limit	Margin	
								[dBm]	[mW]	[dBm]	[dB]	[dBm]	[mW]	[dBm]	[dB]
5180	-4.88	2.90	10.13	1.72	-2.9	-	17.063	9.87	9.71	23.97	14.10	6.97	4.98	29.97	23.00
5220	-4.43	2.90	10.13	1.72	-2.9	-	16.962	10.32	10.76	23.97	13.65	7.42	5.52	29.97	22.55
5240	-4.21	2.90	10.13	1.72	-2.9	-	16.941	10.54	11.32	23.97	13.43	7.64	5.81	29.97	22.33
5260	-4.50	2.90	10.14	1.72	-2.9	20.777	17.058	10.26	10.62	23.97	13.71	7.36	5.45	29.97	22.61
5300	-4.81	2.90	10.14	1.72	-2.9	20.675	16.989	9.95	9.89	23.97	14.02	7.05	5.07	29.97	22.92
5320	-4.93	2.90	10.14	1.72	-2.9	20.785	17.033	9.83	9.62	23.97	14.14	6.93	4.93	29.97	23.04
5500	-4.99	2.90	10.14	1.72	-2.9	20.881	17.048	9.77	9.48	23.97	14.20	6.87	4.86	29.97	23.10
5580	-4.25	2.90	10.15	1.72	-2.9	20.766	17.007	10.52	11.27	23.97	13.45	7.62	5.78	29.97	22.35
5700	-4.43	2.90	10.16	1.72	-2.9	20.808	17.062	10.35	10.84	23.97	13.62	7.45	5.56	29.97	22.52
5720	-4.51	2.90	10.12	1.72	-2.9	20.891	17.127	10.23	10.54	23.97	13.74	7.33	5.41	29.97	22.64
5745	-4.20	2.90	10.16	1.72	-2.9	-	17.106	10.58	11.43	30.00	19.42	7.68	5.86	36.00	28.32
5785	-4.25	2.90	10.16	1.72	-2.9	-	17.023	10.53	11.30	30.00	19.47	7.63	5.79	36.00	28.37
5825	-4.52	2.90	10.16	1.72	-2.9	-	17.038	10.26	10.62	30.00	19.74	7.36	5.45	36.00	28.64

Sample Calculation:

Conducted Power Result = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss + Duty Factor

e.i.r.p. Result = Conducted Power Result + Antenna Gain

Conducted Power Limit (5250 MHz-5350 MHz, 5470 MHz-5725 MHz) = 250 mW or (11 + 10logB) dBm, whichever is lower

Conducted Power Limit (5725 MHz-5850 MHz) = 1W

UL Japan, Inc.

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Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

Maximum Conducted Output Power

Report No. 12804674H
Test place Ise EMC Lab. No.6 Measurement Room
Date August 11, 2019 September 2, 2019 November 15, 2019
Temperature / Humidity 24 deg. C / 65 % RH 24 deg. C / 63 % RH 24 deg. C / 40 % RH
Engineer Yuta Moriya Takumi Shimada Yuta Moriya
Mode Tx 11n-20

Antenna 1+2

Applied limit: 15.407, mobile and portable client device

Tested Frequency [MHz]	26 dB EBW (B for FCC) [MHz]	99% OBW (B for 1C) [MHz]	Conducted power						e.i.r.p.					
			Antenna			Result [dBm]	Limit [dBm]	Margin [dB]	Antenna			Result [dBm]	Limit [dBm]	Margin [dB]
			1 [mW]	2 [mW]	Sum [mW]				1 [mW]	2 [mW]	Sum [mW]			
5180	-	18.001	9.91	9.44	19.35	12.87	23.97	11.10	5.08	4.84	9.92	9.97	29.97	20.00
5220	-	18.052	10.91	10.00	20.91	13.20	23.97	10.77	5.60	5.13	10.73	10.30	29.97	19.67
5240	-	18.090	11.14	10.30	21.45	13.31	23.97	10.66	5.71	5.28	11.00	10.41	29.97	19.56
5260	21.057	18.090	10.79	10.00	20.79	13.18	23.97	10.79	5.53	5.13	10.66	10.28	29.97	19.69
5300	21.237	18.092	10.00	9.53	19.53	12.91	23.97	11.06	5.13	4.89	10.02	10.01	29.97	19.96
5320	21.002	18.133	9.93	9.31	19.24	12.84	23.97	11.13	5.09	4.78	9.87	9.94	29.97	20.03
5500	21.368	18.102	9.91	9.08	18.99	12.78	23.97	11.19	5.08	4.66	9.74	9.88	29.97	20.09
5580	21.029	18.100	11.40	10.26	21.66	13.36	23.97	10.61	5.85	5.26	11.11	10.46	29.97	19.51
5700	20.862	18.103	10.94	10.05	20.99	13.22	23.97	10.75	5.61	5.15	10.76	10.32	29.97	19.65
5720	21.386	18.166	10.79	9.75	20.54	13.13	23.97	10.84	5.53	5.00	10.53	10.23	29.97	19.74
5745	-	18.064	11.69	9.73	21.42	13.31	30.00	16.69	6.00	4.99	10.99	10.41	36.00	25.59
5785	-	18.115	11.35	10.00	21.35	13.29	30.00	16.71	5.82	5.13	10.95	10.39	36.00	25.61
5825	-	18.134	10.89	9.42	20.31	13.08	30.00	16.92	5.58	4.83	10.42	10.18	36.00	25.82

		Antenna 1							Antenna 2					
Tested Frequency	Duty Factor	Power Meter Reading	Cable Loss	Atten. Loss	Antenna Gain	Result		Power Meter Reading	Cable Loss	Atten. Loss	Antenna Gain	Result		
						Cond. Power	e.i.r.p.					Cond. Power	e.i.r.p.	
[MHz]	[dB]	[dBm]	[dB]	[dB]	[dBi]	[dBm]	[dBm]	[dBm]	[dB]	[dB]	[dBi]	[dBm]	[dBm]	
5180	1.94	-5.01	2.90	10.13	-2.90	9.96	7.06	-5.25	2.90	10.16	-2.90	9.75	6.85	
5220	1.94	-4.59	2.90	10.13	-2.90	10.38	7.48	-5.00	2.90	10.16	-2.90	10.00	7.10	
5240	1.94	-4.50	2.90	10.13	-2.90	10.47	7.57	-4.87	2.90	10.16	-2.90	10.13	7.23	
5260	1.94	-4.65	2.90	10.14	-2.90	10.33	7.43	-5.00	2.90	10.16	-2.90	10.00	7.10	
5300	1.94	-4.98	2.90	10.14	-2.90	10.00	7.10	-5.21	2.90	10.16	-2.90	9.79	6.89	
5320	1.94	-5.01	2.90	10.14	-2.90	9.97	7.07	-5.31	2.90	10.16	-2.90	9.69	6.79	
5500	1.94	-5.02	2.90	10.14	-2.90	9.96	7.06	-5.43	2.90	10.17	-2.90	9.58	6.68	
5580	1.94	-4.42	2.90	10.15	-2.90	10.57	7.67	-4.90	2.90	10.17	-2.90	10.11	7.21	
5700	1.94	-4.61	2.90	10.16	-2.90	10.39	7.49	-4.99	2.90	10.17	-2.90	10.02	7.12	
5720	1.94	-4.63	2.90	10.12	-2.90	10.33	7.43	-5.07	2.90	10.12	-2.90	9.89	6.99	
5745	1.94	-4.32	2.90	10.16	-2.90	10.68	7.78	-5.13	2.90	10.17	-2.90	9.88	6.98	
5785	1.94	-4.45	2.90	10.16	-2.90	10.55	7.65	-5.01	2.90	10.17	-2.90	10.00	7.10	
5825	1.94	-4.63	2.90	10.16	-2.90	10.37	7.47	-5.26	2.90	10.16	-2.90	9.74	6.84	

Sample Calculation:

Conducted Power Result = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss + Duty Factor

e.i.r.p. Result = Conducted Power Result + Antenna Gain

Conducted Power Limit (5250 MHz-5350 MHz, 5470 MHz-5725 MHz) = 250 mW or (11 + 10logB) dBm, whichever is lower

Conducted Power Limit (5725 MHz-5850 MHz) = 1W

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Maximum Conducted Output Power

Report No. 12804674H
Test place Ise EMC Lab. No.6 Measurement Room
Date August 11, 2019 September 2, 2019 November 15, 2019
Temperature / Humidity 24 deg. C / 65 % RH 24 deg. C / 63 % RH 24 deg. C / 40 % RH
Engineer Yuta Moriya Takumi Shimada Yuta Moriya
Mode Tx 11ac-20

Antenna 1+2

Applied limit: 15.407, mobile and portable client device

Tested Frequency [MHz]	26 dB EBW (B for FCC) [MHz]	99% OBW (B for 1C) [MHz]	Conducted power						e.i.r.p.					
			Antenna		Sum	Result	Limit	Margin	Antenna			Result	Limit	Margin
			1	2					1	2	Sum			
[MHz]	[MHz]	[MHz]	[mW]	[mW]	[mW]	[dBm]	[dBm]	[dB]	[mW]	[mW]	[mW]	[dBm]	[dBm]	[dB]
5180	-	18.038	9.98	9.35	19.33	12.86	23.97	11.11	5.12	4.80	9.91	9.96	29.97	20.01
5220	-	18.049	10.94	9.98	20.92	13.20	23.97	10.77	5.61	5.12	10.73	10.30	29.97	19.67
5240	-	18.080	11.19	10.26	21.45	13.31	23.97	10.66	5.74	5.26	11.00	10.41	29.97	19.56
5260	21.188	18.108	10.62	10.16	20.78	13.18	23.97	10.79	5.45	5.21	10.66	10.28	29.97	19.69
5300	21.247	18.142	10.09	9.40	19.49	12.90	23.97	11.07	5.18	4.82	10.00	10.00	29.97	19.97
5320	21.271	18.105	9.93	9.27	19.20	12.83	23.97	11.14	5.09	4.75	9.85	9.93	29.97	20.04
5500	21.301	18.143	9.82	9.08	18.90	12.76	23.97	11.21	5.04	4.66	9.69	9.86	29.97	20.11
5580	21.012	18.142	11.40	10.28	21.68	13.36	23.97	10.61	5.85	5.27	11.12	10.46	29.97	19.51
5700	21.280	18.171	10.69	10.09	20.78	13.18	23.97	10.79	5.48	5.18	10.66	10.28	29.97	19.69
5720	21.399	18.187	10.91	10.14	21.05	13.23	23.97	10.74	5.60	5.20	10.80	10.33	29.97	19.64
5745	-	18.156	11.40	10.05	21.45	13.31	30.00	16.69	5.85	5.15	11.00	10.41	36.00	25.59
5785	-	18.125	11.22	9.86	21.08	13.24	30.00	16.76	5.75	5.06	10.81	10.34	36.00	25.66
5825	-	18.154	10.79	9.42	20.21	13.06	30.00	16.94	5.53	4.83	10.36	10.16	36.00	25.84

		Antenna 1						Antenna 2					
Tested Frequency	Duty Factor	Power Meter Reading	Cable Loss	Atten. Loss	Antenna Gain	Result		Power Meter Reading	Cable Loss	Atten. Loss	Antenna Gain	Result	
						Cond. Power	e.i.r.p.					Cond. Power	e.i.r.p.
[MHz]	[dB]	[dBm]	[dB]	[dB]	[dBi]	[dBm]	[dBm]	[dBm]	[dB]	[dB]	[dBi]	[dBm]	[dBm]
5180	1.91	-4.95	2.90	10.13	-2.90	9.99	7.09	-5.26	2.90	10.16	-2.90	9.71	6.81
5220	1.91	-4.55	2.90	10.13	-2.90	10.39	7.49	-4.98	2.90	10.16	-2.90	9.99	7.09
5240	1.91	-4.45	2.90	10.13	-2.90	10.49	7.59	-4.86	2.90	10.16	-2.90	10.11	7.21
5260	1.91	-4.69	2.90	10.14	-2.90	10.26	7.36	-4.90	2.90	10.16	-2.90	10.07	7.17
5300	1.91	-4.91	2.90	10.14	-2.90	10.04	7.14	-5.24	2.90	10.16	-2.90	9.73	6.83
5320	1.91	-4.98	2.90	10.14	-2.90	9.97	7.07	-5.30	2.90	10.16	-2.90	9.67	6.77
5500	1.91	-5.03	2.90	10.14	-2.90	9.92	7.02	-5.40	2.90	10.17	-2.90	9.58	6.68
5580	1.91	-4.39	2.90	10.15	-2.90	10.57	7.67	-4.86	2.90	10.17	-2.90	10.12	7.22
5700	1.91	-4.68	2.90	10.16	-2.90	10.29	7.39	-4.94	2.90	10.17	-2.90	10.04	7.14
5720	1.91	-4.55	2.90	10.12	-2.90	10.38	7.48	-4.87	2.90	10.12	-2.90	10.06	7.16
5745	1.91	-4.40	2.90	10.16	-2.90	10.57	7.67	-4.96	2.90	10.17	-2.90	10.02	7.12
5785	1.91	-4.47	2.90	10.16	-2.90	10.50	7.60	-5.04	2.90	10.17	-2.90	9.94	7.04
5825	1.91	-4.64	2.90	10.16	-2.90	10.33	7.43	-5.23	2.90	10.16	-2.90	9.74	6.84

Sample Calculation:

Conducted Power Result = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss + Duty Factor

e.i.r.p. Result = Conducted Power Result + Antenna Gain

Conducted Power Limit (5250 MHz-5350 MHz, 5470 MHz-5725 MHz) = 250 mW or (11 + 10logB) dBm, whichever is lower

Conducted Power Limit (5725 MHz-5850 MHz) = 1W

UL Japan, Inc.

Ise EMC Lab.

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Telephone : +81 596 24 8999

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Maximum Conducted Output Power

Report No.	12804674H		
Test place	Ise EMC Lab. No.6 Measurement Room		
Date	August 11, 2019	September 2, 2019	November 15, 2019
Temperature / Humidity	24 deg. C / 65 % RH	24 deg. C / 63 % RH	24 deg. C / 40 % RH
Engineer	Yuta Moriya	Takumi Shimada	Yuta Moriya
Mode	Tx 11n-40		

Antenna 1+2

Applied limit: 15.407, mobile and portable client device

Tested Frequency [MHz]	26 dB EBW (B for FCC) [MHz]	99% OBW (B for 1C) [MHz]	Conducted power						e.i.r.p.					
			Antenna			Result [dBm]	Limit [dBm]	Margin [dB]	Antenna			Result [dBm]	Limit [dBm]	Margin [dB]
			1 [mW]	2 [mW]	Sum [mW]				1 [mW]	2 [mW]	Sum [mW]			
5190	-	36.384	6.19	6.03	12.22	10.87	23.97	13.10	3.18	3.09	6.27	7.97	29.97	22.00
5230	-	36.406	6.53	6.40	12.93	11.12	23.97	12.85	3.35	3.28	6.63	8.22	29.97	21.75
5270	39.518	36.578	6.41	5.97	12.38	10.93	23.97	13.04	3.29	3.06	6.35	8.03	29.97	21.94
5310	39.185	36.450	5.92	5.58	11.50	10.61	23.97	13.36	3.03	2.86	5.90	7.71	29.97	22.26
5510	39.531	36.421	6.78	5.52	12.30	10.90	23.97	13.07	3.48	2.83	6.31	8.00	29.97	21.97
5550	39.301	36.467	7.26	6.07	13.33	11.25	23.97	12.72	3.72	3.11	6.84	8.35	29.97	21.62
5670	39.387	36.464	7.21	6.05	13.26	11.23	23.97	12.74	3.70	3.10	6.80	8.33	29.97	21.64
5710	39.631	36.506	6.38	5.69	12.07	10.82	23.97	13.15	3.27	2.92	6.19	7.92	29.97	22.05
5755	-	36.499	7.19	6.50	13.70	11.37	30.00	18.63	3.69	3.33	7.02	8.47	36.00	27.53
5795	-	36.358	7.06	6.59	13.65	11.35	30.00	18.65	3.62	3.38	7.00	8.45	36.00	27.55

		Antenna 1						Antenna 2					
Tested Frequency	Duty Factor	Power Meter Reading	Cable Loss	Atten. Loss	Antenna Gain	Result		Power Meter Reading	Cable Loss	Atten. Loss	Antenna Gain	Result	
[MHz]	[dB]	[dBm]	[dB]	[dB]	[dBi]	Cond. Power [dBm]	e.i.r.p. [dBm]	[dBm]	[dB]	[dB]	[dBi]	Cond. Power [dBm]	e.i.r.p. [dBm]
5190	2.72	-7.83	2.90	10.13	-2.90	7.92	5.02	-7.98	2.90	10.16	-2.90	7.80	4.90
5230	2.72	-7.60	2.90	10.13	-2.90	8.15	5.25	-7.72	2.90	10.16	-2.90	8.06	5.16
5270	2.72	-7.69	2.90	10.14	-2.90	8.07	5.17	-8.02	2.90	10.16	-2.90	7.76	4.86
5310	2.72	-8.04	2.90	10.14	-2.90	7.72	4.82	-8.31	2.90	10.16	-2.90	7.47	4.57
5510	2.72	-7.45	2.90	10.14	-2.90	8.31	5.41	-8.37	2.90	10.17	-2.90	7.42	4.52
5550	2.72	-7.16	2.90	10.15	-2.90	8.61	5.71	-7.96	2.90	10.17	-2.90	7.83	4.93
5670	2.72	-7.20	2.90	10.16	-2.90	8.58	5.68	-7.97	2.90	10.17	-2.90	7.82	4.92
5710	2.72	-7.69	2.90	10.12	-2.90	8.05	5.15	-8.19	2.90	10.12	-2.90	7.55	4.65
5755	2.72	-7.21	2.90	10.16	-2.90	8.57	5.67	-7.66	2.90	10.17	-2.90	8.13	5.23
5795	2.72	-7.29	2.90	10.16	-2.90	8.49	5.59	-7.59	2.90	10.16	-2.90	8.19	5.29

Sample Calculation:

Conducted Power Result = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss + Duty Factor

e.i.r.p. Result = Conducted Power Result + Antenna Gain

Conducted Power Limit (5250 MHz-5350 MHz, 5470 MHz-5725 MHz) = 250 mW or (11 + 10logB) dBm, whichever is lower

Conducted Power Limit (5725 MHz-5850 MHz) = 1W

UL Japan, Inc.

Ise EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8999

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Maximum Conducted Output Power

Report No. 12804674H
Test place Ise EMC Lab. No.6 Measurement Room
Date August 11, 2019 September 2, 2019 November 15, 2019
Temperature / Humidity 24 deg. C / 65 % RH 24 deg. C / 63 % RH 24 deg. C / 40 % RH
Engineer Yuta Moriya Takumi Shimada Yuta Moriya
Mode Tx 11ac-40

Antenna 1+2

Applied limit: 15.407, mobile and portable client device

Tested Frequency [MHz]	26 dB EBW (B for FCC) [MHz]	99% OBW (B for 1C) [MHz]	Conducted power						e.i.r.p.					
			Antenna			Result [dBm]	Limit [dBm]	Margin [dB]	Antenna			Result [dBm]	Limit [dBm]	Margin [dB]
			1 [mW]	2 [mW]	Sum [mW]				1 [mW]	2 [mW]	Sum [mW]			
5190	-	36.930	6.17	6.04	12.21	10.87	23.97	13.10	3.16	3.10	6.26	7.97	29.97	22.00
5230	-	36.421	6.70	6.24	12.94	11.12	23.97	12.85	3.44	3.20	6.63	8.22	29.97	21.75
5270	39.841	36.541	6.15	6.14	12.29	10.90	23.97	13.07	3.16	3.15	6.30	8.00	29.97	21.97
5310	39.848	36.640	5.86	5.55	11.41	10.57	23.97	13.40	3.01	2.84	5.85	7.67	29.97	22.30
5510	39.871	36.583	6.53	5.78	12.31	10.90	23.97	13.07	3.35	2.96	6.31	8.00	29.97	21.97
5550	39.816	36.616	7.13	6.11	13.24	11.22	23.97	12.75	3.66	3.13	6.79	8.32	29.97	21.65
5670	39.878	36.656	6.95	6.31	13.26	11.23	23.97	12.74	3.56	3.24	6.80	8.33	29.97	21.64
5710	40.098	36.667	6.73	5.83	12.56	10.99	23.97	12.98	3.45	2.99	6.44	8.09	29.97	21.88
5755	-	36.399	7.03	6.31	13.34	11.25	30.00	18.75	3.61	3.24	6.84	8.35	36.00	27.65
5795	-	36.494	6.82	6.34	13.16	11.19	30.00	18.81	3.50	3.25	6.75	8.29	36.00	27.71

		Antenna 1						Antenna 2					
Tested Frequency	Duty Factor	Power Meter Reading	Cable Loss	Atten. Loss	Antenna Gain	Result		Power Meter Reading	Cable Loss	Atten. Loss	Antenna Gain	Result	
[MHz]	[dB]	[dBm]	[dB]	[dB]	[dBi]	Cond. Power [dBm]	e.i.r.p. [dBm]	[dBm]	[dB]	[dB]	[dBi]	Cond. Power [dBm]	e.i.r.p. [dBm]
5190	1.04	-6.17	2.90	10.13	-2.90	7.90	5.00	-6.29	2.90	10.16	-2.90	7.81	4.91
5230	1.04	-5.81	2.90	10.13	-2.90	8.26	5.36	-6.15	2.90	10.16	-2.90	7.95	5.05
5270	1.04	-6.19	2.90	10.14	-2.90	7.89	4.99	-6.22	2.90	10.16	-2.90	7.88	4.98
5310	1.04	-6.40	2.90	10.14	-2.90	7.68	4.78	-6.66	2.90	10.16	-2.90	7.44	4.54
5510	1.04	-5.93	2.90	10.14	-2.90	8.15	5.25	-6.49	2.90	10.17	-2.90	7.62	4.72
5550	1.04	-5.56	2.90	10.15	-2.90	8.53	5.63	-6.25	2.90	10.17	-2.90	7.86	4.96
5670	1.04	-5.68	2.90	10.16	-2.90	8.42	5.52	-6.11	2.90	10.17	-2.90	8.00	5.10
5710	1.04	-5.78	2.90	10.12	-2.90	8.28	5.38	-6.40	2.90	10.12	-2.90	7.66	4.76
5755	1.04	-5.63	2.90	10.16	-2.90	8.47	5.57	-6.11	2.90	10.17	-2.90	8.00	5.10
5795	1.04	-5.76	2.90	10.16	-2.90	8.34	5.44	-6.08	2.90	10.16	-2.90	8.02	5.12

Sample Calculation:

Conducted Power Result = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss + Duty Factor

e.i.r.p. Result = Conducted Power Result + Antenna Gain

Conducted Power Limit (5250 MHz-5350 MHz, 5470 MHz-5725 MHz) = 250 mW or (11 + 10logB) dBm, whichever is lower

Conducted Power Limit (5725 MHz-5850 MHz) = 1W

Maximum Conducted Output Power

Report No.	12804674H		
Test place	Ise EMC Lab. No.6 Measurement Room		
Date	August 11, 2019	September 2, 2019	November 15, 2019
Temperature / Humidity	24 deg. C / 65 % RH	24 deg. C / 63 % RH	24 deg. C / 40 % RH
Engineer	Yuta Moriya	Takumi Shimada	Yuta Moriya
Mode	Tx 11ac-80		

Antenna 1+2

Applied limit: 15.407, mobile and portable client device

Tested Frequency [MHz]	26 dB EBW (B for FCC) [MHz]	99% OBW (B for IC) [MHz]	Conducted power						e.i.r.p.					
			Antenna			Result [dBm]	Limit [dBm]	Margin [dB]	Antenna			Result [dBm]	Limit [dBm]	Margin [dB]
			1 [mW]	2 [mW]	Sum [mW]				1 [mW]	2 [mW]	Sum [mW]			
5210	-	75.871	5.38	5.41	10.79	10.33	23.97	13.64	2.76	2.77	5.53	7.43	29.97	22.54
5290	80.816	75.732	5.43	5.00	10.43	10.18	23.97	13.79	2.79	2.56	5.35	7.28	29.97	22.69
5530	80.961	75.743	5.52	5.01	10.53	10.23	23.97	13.74	2.83	2.57	5.40	7.33	29.97	22.64
5610	81.182	75.744	5.89	5.38	11.27	10.52	23.97	13.45	3.02	2.76	5.78	7.62	29.97	22.35
5690	81.301	76.120	5.64	5.14	10.78	10.32	23.97	13.65	2.89	2.64	5.53	7.42	29.97	22.55
5775	-	75.937	5.90	5.26	11.16	10.48	30.00	19.52	3.03	2.70	5.72	7.58	36.00	28.42

		Antenna 1						Antenna 2					
Tested Frequency	Duty Factor	Power Meter Reading	Cable Loss	Atten. Loss	Antenna Gain	Result		Power Meter Reading	Cable Loss	Atten. Loss	Antenna Gain	Result	
						Cond. Power	e.i.r.p.					Cond. Power	e.i.r.p.
[MHz]	[dB]	[dBm]	[dB]	[dB]	[dBi]	[dBm]	[dBm]	[dBm]	[dB]	[dB]	[dBi]	[dBm]	[dBm]
5210	1.79	-7.51	2.90	10.13	-2.90	7.31	4.41	-7.52	2.90	10.16	-2.90	7.33	4.43
5290	1.79	-7.48	2.90	10.14	-2.90	7.35	4.45	-7.86	2.90	10.16	-2.90	6.99	4.09
5530	1.79	-7.41	2.90	10.14	-2.90	7.42	4.52	-7.86	2.90	10.17	-2.90	7.00	4.10
5610	1.79	-7.15	2.90	10.16	-2.90	7.70	4.80	-7.55	2.90	10.17	-2.90	7.31	4.41
5690	1.79	-7.30	2.90	10.12	-2.90	7.51	4.61	-7.70	2.90	10.12	-2.90	7.11	4.21
5775	1.79	-7.14	2.90	10.16	-2.90	7.71	4.81	-7.64	2.90	10.16	-2.90	7.21	4.31

Sample Calculation:

Conducted Power Result = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss + Duty Factor

e.i.r.p. Result = Conducted Power Result + Antenna Gain

Conducted Power Limit (5250 MHz-5350 MHz, 5470 MHz-5725 MHz) = 250 mW or (11 + 10logB) dBm, whichever is lower

Conducted Power Limit (5725 MHz-5850 MHz) = 1W

UL Japan, Inc.

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Facsimile : +81 596 24 8124

Maximum Conducted Output Power

Report No.	12804674H
Test place	Ise EMC Lab. No.6 Measurement Room
Date	July 30, 2019
Temperature / Humidity	23 deg. C / 62 % RH
Engineer	Junki Nagatomi
Mode	Tx 11a

5180 MHz		Ant1	On time			
Mode	Rate	[At1]Reading (timed average)	[AT2]Reading (timed average)	Duty factor	Burst power	Remarks
	Mbps	[dBm]	[dBm]	[dB]	[dBm]	
11a	6	-14.93		0.00	-14.93	
	9	-14.89		0.00	-14.89	
	12	-14.86		0.00	-14.86	
	18	-14.70		0.00	-14.70	
	24	-14.72		0.00	-14.72	
	36	-14.60		0.00	-14.60	
	48	-14.46	-14.51	0.00	-14.46	* 1Tx
	54	-14.50		0.00	-14.50	

* Worst rate

Sample Calculation:

Burst power = Reading (timed average) + Duty factor

All comparison were carried out on same frequency and measurement factors.

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Maximum Conducted Output Power

Report No.	12804674H
Test place	Ise EMC Lab. No.6 Measurement Room
Date	July 30, 2019
Temperature / Humidity	23 deg. C / 62 % RH
Engineer	Junki Nagatomi
Mode	Tx 11n-20

5180 MHz

Mode	MCS Number	Reading (timed average)						Burst power			Remarks
		Antenna						Antenna			
		1 [dBm]	2 [dBm]	1 [mW]	2 [mW]	1+2 [mW]	1+2 [dBm]	1 [dBm]	2 [dBm]	1+2 [dBm]	
11n-20	0	-15.80		-	-	-	-	-	-	-	
	1	-15.66		-	-	-	-	-	-	-	
	2	-14.45		-	-	-	-	-	-	-	
	3	-14.40	-15.15	-	-	-	-	-	-	-	* 1 TX
	4	-14.82		-	-	-	-	-	-	-	
	5	-14.79		-	-	-	-	-	-	-	
	6	-14.68		-	-	-	-	-	-	-	
	7	-14.60		-	-	-	-	-	-	-	
	8	-14.73	-14.90	0.03	0.03	0.07	-11.80	-	-	-11.80	
	9	-14.75	-15.01	0.03	0.03	0.07	-11.87	-	-	-11.87	
	10	-14.62	-14.85	0.03	0.03	0.07	-11.72	-	-	-11.72	
	11	-14.43	-14.84	0.04	0.03	0.07	-11.62	-	-	-11.62	
	12	-14.78	-15.04	0.03	0.03	0.06	-11.90	-	-	-11.90	
	13	-14.56	-14.93	0.03	0.03	0.07	-11.73	-	-	-11.73	
	14	-14.60	-14.86	0.03	0.03	0.07	-11.72	-	-	-11.72	
	15	-14.42	-14.77	0.04	0.03	0.07	-11.58	-	-	-11.58	* 2 TX

* Worst rate

Sample Calculation:

Burst power = Reading (timed average)

All comparison were carried out on same frequency and measurement factors.

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Maximum Conducted Output Power

Report No.	12804674H
Test place	Ise EMC Lab. No.6 Measurement Room
Date	July 30, 2019
Temperature / Humidity	23 deg. C / 62 % RH
Engineer	Junki Nagatomi
Mode	Tx 11ac-20

5180 MHz

Mode	MCS Number	Reading (timed average)						Burst power	Remarks
		Antenna		Antenna		Sum			
		1 [dBm]	2 [dBm]	1 [mW]	2 [mW]	[mW]	[dBm]	[dBm]	
11ac-20 SISO	0	-14.88		-	-	-	-	-	
	1	-14.57		-	-	-	-	-	
	2	-14.55		-	-	-	-	-	
	3	-14.45		-	-	-	-	-	
	4	-14.32	-15.05	-	-	-	-	-	*1Tx
	5	-14.71		-	-	-	-	-	
	6	-14.7		-	-	-	-	-	
	7	-14.68		-	-	-	-	-	
	8	-15.77		-	-	-	-	-	
MIMO	0	-14.41	-14.91	0.04	0.03	0.07	-11.64	-11.64	
	1	-14.70	-14.64	0.03	0.03	0.07	-11.66	-11.66	
	2	-14.71	-14.84	0.03	0.03	0.07	-11.76	-11.76	
	3	-14.76	-14.85	0.03	0.03	0.07	-11.79	-11.79	
	4	-14.85	-14.89	0.03	0.03	0.07	-11.86	-11.86	
	5	-14.72	-15.08	0.03	0.03	0.06	-11.89	-11.89	
	6	-14.66	-14.81	0.03	0.03	0.07	-11.72	-11.72	
	7	-14.42	-14.88	0.04	0.03	0.07	-11.63	-11.63	* 2Tx
	8	-15.49	-15.72	0.03	0.03	0.06	-12.59	-12.59	

* Worst rate

Sample Calculation:

Burst power = Reading (timed average)

Maximum Conducted Output Power

Report No.	12804674H
Test place	Ise EMC Lab. No.6 Measurement Room
Date	July 30, 2019
Temperature / Humidity	23 deg. C / 62 % RH
Engineer	Junki Nagatomi
Mode	Tx 11n-40

5190 MHz

Mode	MCS Number	Reading (timed average)						Burst power			Remarks
		Antenna						Antenna			
		1 [dBm]	2 [dBm]	1 [mW]	2 [mW]	1+2 [mW]	1+2 [dBm]	1 [dBm]	2 [dBm]	1+2 [dBm]	
11n-40	0	-14.66		-	-	-	-	-14.66	0.00	-	
	1	-14.63		-	-	-	-	-14.63	0.00	-	
	2	-14.59		-	-	-	-	-14.59	0.00	-	
	3	-14.42		-	-	-	-	-14.42	0.00	-	
	4	-14.34	-15.13	-	-	-	-	-14.34	-15.13	-	* 1Tx
	5	-14.74		-	-	-	-	-14.74	0.00	-	
	6	-14.65		-	-	-	-	-14.65	0.00	-	
	7	-14.75		-	-	-	-	-14.75	0.00	-	
	8	-15.11	-15.48	0.03	0.03	0.06	-12.28	-	-	-12.28	
	9	-14.61	-14.63	0.03	0.03	0.07	-11.61	-	-	-11.61	
	10	-14.52	-14.80	0.04	0.03	0.07	-11.65	-	-	-11.65	
	11	-14.41	-14.91	0.04	0.03	0.07	-11.64	-	-	-11.64	
	12	-14.41	-15.01	0.04	0.03	0.07	-11.69	-	-	-11.69	
	13	-14.79	-14.59	0.03	0.03	0.07	-11.68	-	-	-11.68	
	14	-14.48	-14.76	0.04	0.03	0.07	-11.61	-	-	-11.61	* 2 Tx
	15	-14.36	-14.92	0.04	0.03	0.07	-11.62	-	-	-11.62	

* Worst rate

Sample Calculation:

Burst power = Reading (timed average) + Duty factor

All comparison were carried out on same frequency and measurement factors.

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Maximum Conducted Output Power

Report No.	12804674H
Test place	Ise EMC Lab. No.6 Measurement Room
Date	July 30, 2019
Temperature / Humidity	23 deg. C / 62 % RH
Engineer	Junki Nagatomi
Mode	Tx 11ac-40

5190 MHz

Mode	MCS Number	Reading (timed average)						Burst power	Remarks
		Antenna		Antenna		Sum			
		1 [dBm]	2 [dBm]	1 [mW]	2 [mW]	[mW]	[dBm]	[dBm]	
11ac-40 SISO	0	-14.78		-	-	-	-	-	
	1	-15.28		-	-	-	-	-	
	2	-15.27		-	-	-	-	-	
	3	-15.00		-	-	-	-	-	
	4	-14.91		-	-	-	-	-	
	5	-14.83		-	-	-	-	-	
	6	-14.77		-	-	-	-	-	
	7	-14.71	-15.35	-	-	-	-	-	* 1Tx
	8	-14.82		-	-	-	-	-	
	9	-14.82		-	-	-	-	-	
MIMO	0	-14.78	-15.03	0.03	0.03	0.06	-11.89	-11.89	
	1	-14.79	-14.82	0.03	0.03	0.07	-11.79	-11.79	* 2Tx
	2	-15.14	-14.89	0.03	0.03	0.06	-12.00	-12.00	
	3	-14.99	-15.24	0.03	0.03	0.06	-12.10	-12.10	
	4	-14.79	-14.94	0.03	0.03	0.07	-11.85	-11.85	
	5	-15.01	-14.80	0.03	0.03	0.06	-11.89	-11.89	
	6	-15.12	-15.13	0.03	0.03	0.06	-12.11	-12.11	
	7	-14.87	-15.07	0.03	0.03	0.06	-11.96	-11.96	
	8	-15.00	-14.99	0.03	0.03	0.06	-11.98	-11.98	
	9	-14.79	-15.01	0.03	0.03	0.06	-11.89	-11.89	

* Worst rate

Sample Calculation:

$$\text{Burst power} = \text{Reading (timed average)} + \text{Duty factor}$$

Maximum Conducted Output Power

Report No.	12804674H
Test place	Ise EMC Lab. No.6 Measurement Room
Date	July 30, 2019
Temperature / Humidity	23 deg. C / 62 % RH
Engineer	Junki Nagatomi
Mode	Tx 11ac-80

5210 MHz

Mode	MCS Number	Reading (timed average)						Burst power	Remarks
		Antenna		Antenna		Sum			
		1 [dBm]	2 [dBm]	1 [mW]	2 [mW]	[mW]	[dBm]	[dBm]	
11ac-80 SISO	0	-15.86		-	-	-	-	-	
	1	-16.00		-	-	-	-	-	
	2	-15.87		-	-	-	-	-	
	3	-16.14		-	-	-	-	-	
	4	-15.86		-	-	-	-	-	
	5	-15.83		-	-	-	-	-	
	6	-15.85		-	-	-	-	-	
	7	-15.80		-	-	-	-	-	
	8	-15.65	-16.13	-	-	-	-	-	* 1Tx
	9	-15.73		-	-	-	-	-	
MIMO	0	-15.86	-15.70	0.03	0.03	0.05	-12.77	-12.77	
	1	-15.61	-15.56	0.03	0.03	0.06	-12.57	-12.57	* 2Tx
	2	-15.84	-15.54	0.03	0.03	0.05	-12.68	-12.68	
	3	-15.86	-15.82	0.03	0.03	0.05	-12.83	-12.83	
	4	-16.02	-15.78	0.03	0.03	0.05	-12.89	-12.89	
	5	-16.07	-15.58	0.02	0.03	0.05	-12.81	-12.81	
	6	-15.96	-15.58	0.03	0.03	0.05	-12.76	-12.76	
	7	-15.98	-15.70	0.03	0.03	0.05	-12.83	-12.83	
	8	-15.98	-15.63	0.03	0.03	0.05	-12.79	-12.79	
	9	-15.85	-16.02	0.03	0.03	0.05	-12.92	-12.92	

* Worst rate

Sample Calculation:

$$\text{Burst power} = \text{Reading (timed average)} + \text{Duty factor}$$

Average Output Power (Reference data for RF Exposure)

Report No.	12804674H		
Test place	Ise EMC Lab. No.6 Measurement Room		
Date	September 3, 2019	September 17, 2019	November 15, 2019
Temperature / Humidity	24 deg. C / 64 % RH	24 deg. C / 53 % RH	24 deg. C / 40 % RH
Engineer	Takumi Shimada	Yuta Moriya	Yuta Moriya
Mode	Tx 11a		

Antenna 1 SISO 6Mbps

Tested Frequency [MHz]	Power Meter Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Timed average)		Duty factor [dB]	Result (Burst power average)	
				[dBm]	[mW]		[dBm]	[mW]
5180	-3.48	2.90	10.13	9.55	9.02	0.28	9.83	9.62
5220	-3.04	2.90	10.13	9.99	9.98	0.28	10.27	10.64
5240	-2.90	2.90	10.13	10.13	10.30	0.28	10.41	10.99
5260	-3.08	2.90	10.14	9.96	9.91	0.28	10.24	10.57
5300	-3.47	2.90	10.14	9.57	9.06	0.28	9.85	9.66
5320	-3.52	2.90	10.14	9.52	8.95	0.28	9.80	9.55
5500	-3.60	2.90	10.14	9.44	8.79	0.28	9.72	9.38
5580	-2.84	2.90	10.15	10.21	10.50	0.28	10.49	11.19
5700	-3.05	2.90	10.16	10.01	10.02	0.28	10.29	10.69
5720	-2.94	2.90	10.12	10.08	10.19	0.28	10.36	10.86
5745	-2.78	2.90	10.16	10.28	10.67	0.28	10.56	11.38
5785	-2.88	2.90	10.16	10.18	10.42	0.28	10.46	11.12
5825	-3.13	2.90	10.16	9.93	9.84	0.28	10.21	10.50

Sample Calculation:

Result (Timed average) = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss

Result (Burst power average) = Time average + Duty factor

The average output power was measured with the lowest order modulation and lowest data rate configuration in each IEEE 802.11 mode based on KDB 248227 D01.

Average Output Power (Reference data for RF Exposure)

Report No. 12804674H
Test place Ise EMC Lab. No.6 Measurement Room
Date September 3, 2019 September 17, 2019 November 15, 2019
Temperature / Humidity 24 deg. C / 64 % RH 24 deg. C / 53 % RH 24 deg. C / 40 % RH
Engineer Takumi Shimada Yuta Moriya Yuta Moriya
Mode Tx 11n-20

Antenna 1 SISO MCS0

Tested Frequency [MHz]	Power Meter Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Timed average)		Duty factor [dB]	Result (Burst power average)	
				[dBm]	[mW]		[dBm]	[mW]
5180	-3.51	2.90	10.13	9.52	8.95	0.29	9.81	9.57
5220	-3.12	2.90	10.13	9.91	9.79	0.29	10.20	10.47
5240	-3.06	2.90	10.13	9.97	9.93	0.29	10.26	10.62
5260	-3.08	2.90	10.14	9.96	9.91	0.29	10.25	10.59
5300	-3.45	2.90	10.14	9.59	9.10	0.29	9.88	9.73
5320	-3.53	2.90	10.14	9.51	8.93	0.29	9.80	9.55
5500	-3.51	2.90	10.14	9.53	8.97	0.29	9.82	9.59
5580	-2.79	2.90	10.15	10.26	10.62	0.29	10.55	11.35
5700	-3.04	2.90	10.16	10.02	10.05	0.29	10.31	10.74
5720	-3.06	2.90	10.12	9.96	9.91	0.29	10.25	10.59
5745	-2.82	2.90	10.16	10.24	10.57	0.29	10.53	11.30
5785	-2.78	2.90	10.16	10.28	10.67	0.29	10.57	11.40
5825	-3.01	2.90	10.16	10.05	10.12	0.29	10.34	10.81

Sample Calculation:

Result (Timed average) = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss

Result (Burst power average) = Time average + Duty factor

MIMO MCS0

Tested Frequency [MHz]	Duty Factor [dB]	Antenna 1				Antenna 2				Antenna 1+2			
		Power Meter Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Burst average) [dBm]	Power Meter Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Burst average) [dBm]	Result (Burst average)		Sum 1+2 [mW]	[dBm]
										Antenna 1 [mW]	Antenna 2 [mW]		
5180	0.3	-3.36	2.90	10.13	9.97	-3.65	2.90	10.16	9.71	9.93	9.35	19.29	12.85
5220	0.3	-3.09	2.90	10.13	10.24	-3.35	2.90	10.16	10.01	10.57	10.02	20.59	13.14
5240	0.3	-2.97	2.90	10.13	10.36	-3.30	2.90	10.16	10.06	10.86	10.14	21.00	13.22
5260	0.3	-3.05	2.90	10.14	10.29	-3.33	2.90	10.16	10.03	10.69	10.07	20.76	13.17
5300	0.3	-3.39	2.90	10.14	9.95	-3.57	2.90	10.16	9.79	9.89	9.53	19.41	12.88
5320	0.3	-3.48	2.90	10.14	9.86	-3.68	2.90	10.16	9.68	9.68	9.29	18.97	12.78
5500	0.3	-3.48	2.90	10.14	9.86	-3.86	2.90	10.17	9.51	9.68	8.93	18.62	12.70
5580	0.3	-2.91	2.90	10.15	10.44	-3.23	2.90	10.17	10.14	11.07	10.33	21.39	13.30
5700	0.3	-3.08	2.90	10.16	10.28	-3.44	2.90	10.17	9.93	10.67	9.84	20.51	13.12
5720	0.3	-3.00	2.90	10.12	10.32	-3.13	2.90	10.12	10.19	10.76	10.45	21.21	13.27
5745	0.3	-2.94	2.90	10.16	10.42	-3.36	2.90	10.17	10.01	11.02	10.02	21.04	13.23
5785	0.3	-2.88	2.90	10.16	10.48	-3.41	2.90	10.17	9.96	11.17	9.91	21.08	13.24
5825	0.3	-3.18	2.90	10.16	10.18	-3.63	2.90	10.16	9.73	10.42	9.40	19.82	12.97

Sample Calculation:

Result (Burst poer average) = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss + Duty factor

The average output power was measured with the lowest order modulation and lowest data rate configuration in each IEEE 802.11 mode based on KDB 248227 D01.

UL Japan, Inc.

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Average Output Power (Reference data for RF Exposure)

Report No. 12804674H
Test place Ise EMC Lab. No.6 Measurement Room
Date September 3, 2019 September 17, 2019 November 15, 2019
Temperature / Humidity 24 deg. C / 64 % RH 24 deg. C / 53 % RH 24 deg. C / 40 % RH
Engineer Takumi Shimada Yuta Moriya Yuta Moriya
Mode Tx 11ac-20

Antenna 1 SISO MCS0

Tested Frequency [MHz]	Power Meter Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Timed average)		Duty factor [dB]	Result (Burst power average)	
				[dBm]	[mW]		[dBm]	[mW]
5180	-3.56	2.90	10.13	9.47	8.85	0.29	9.76	9.46
5220	-3.26	2.90	10.13	9.77	9.48	0.29	10.06	10.14
5240	-3.07	2.90	10.13	9.96	9.91	0.29	10.25	10.59
5260	-3.13	2.90	10.14	9.91	9.79	0.29	10.20	10.47
5300	-3.44	2.90	10.14	9.60	9.12	0.29	9.89	9.75
5320	-3.45	2.90	10.14	9.59	9.10	0.29	9.88	9.73
5500	-3.51	2.90	10.14	9.53	8.97	0.29	9.82	9.59
5580	-2.93	2.90	10.15	10.12	10.28	0.29	10.41	10.99
5700	-3.05	2.90	10.16	10.01	10.02	0.29	10.30	10.72
5720	-3.15	2.90	10.12	9.87	9.71	0.29	10.16	10.38
5745	-2.92	2.90	10.16	10.14	10.33	0.29	10.43	11.04
5785	-2.88	2.90	10.16	10.18	10.42	0.29	10.47	11.14
5825	-3.08	2.90	10.16	9.98	9.95	0.29	10.27	10.64

Sample Calculation:

Result (Timed average) = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss

Result (Burst power average) = Time average + Duty factor

MIMO MCS0

Tested Frequency [MHz]	Duty Factor [dB]	Antenna 1					Antenna 2				Antenna 1+2			
		Power Meter Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Burst average) [dBm]		Power Meter Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Burst average) [dBm]	Result (Burst power average) Antenna		Sum 1+2	
											1 [mW]	2 [mW]	1+2 [mW]	[dBm]
5180	0.3	-3.39	2.90	10.13	9.94		-3.61	2.90	10.16	9.75	9.86	9.44	19.30	12.86
5220	0.3	-2.96	2.90	10.13	10.37		-3.35	2.90	10.16	10.01	10.89	10.02	20.91	13.20
5240	0.3	-2.91	2.90	10.13	10.42		-3.19	2.90	10.16	10.17	11.02	10.40	21.41	13.31
5260	0.3	-3.01	2.90	10.14	10.33		-3.35	2.90	10.16	10.01	10.79	10.02	20.81	13.18
5300	0.3	-3.31	2.90	10.14	10.03		-3.61	2.90	10.16	9.75	10.07	9.44	19.51	12.90
5320	0.3	-3.48	2.90	10.14	9.86		-3.70	2.90	10.16	9.66	9.68	9.25	18.93	12.77
5500	0.3	-3.56	2.90	10.14	9.78		-3.94	2.90	10.17	9.43	9.51	8.77	18.28	12.62
5580	0.3	-2.82	2.90	10.15	10.53		-3.36	2.90	10.17	10.01	11.30	10.02	21.32	13.29
5700	0.3	-3.02	2.90	10.16	10.34		-3.39	2.90	10.17	9.98	10.81	9.95	20.77	13.17
5720	0.3	-2.91	2.90	10.12	10.41		-3.42	2.90	10.12	9.90	10.99	9.77	20.76	13.17
5745	0.3	-2.77	2.90	10.16	10.59		-3.38	2.90	10.17	9.99	11.46	9.98	21.43	13.31
5785	0.3	-2.86	2.90	10.16	10.50		-3.47	2.90	10.17	9.90	11.22	9.77	20.99	13.22
5825	0.3	-3.09	2.90	10.16	10.27		-3.57	2.90	10.16	9.79	10.64	9.53	20.17	13.05

Sample Calculation:

Result (Burst power average) = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss + Duty factor

The average output power was measured with the lowest order modulation and lowest data rate configuration in each IEEE 802.11 mode based on KDB 248227 D01.

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Average Output Power (Reference data for RF Exposure)

Report No. 12804674H
Test place Ise EMC Lab. No.6 Measurement Room
Date September 3, 2019 September 17, 2019 November 15, 2019
Temperature / Humidity 24 deg. C / 64 % RH 24 deg. C / 53 % RH 24 deg. C / 40 % RH
Engineer Takumi Shimada Yuta Moriya Yuta Moriya
Mode Tx 11n-40

Antenna 1 SISO MCS0

Tested Frequency [MHz]	Power Meter Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Timed average)		Duty factor [dB]	Result (Burst power average)	
				[dBm]	[mW]		[dBm]	[mW]
5190	-5.71	2.90	10.13	7.32	5.40	0.58	7.90	6.17
5230	-5.70	2.90	10.13	7.33	5.41	0.58	7.91	6.18
5270	-5.70	2.90	10.14	7.34	5.42	0.58	7.92	6.19
5310	-5.69	2.90	10.14	7.35	5.43	0.58	7.93	6.21
5510	-5.62	2.90	10.14	7.42	5.52	0.58	8.00	6.31
5550	-5.46	2.90	10.15	7.59	5.74	0.58	8.17	6.56
5670	-5.25	2.90	10.16	7.81	6.04	0.58	8.39	6.90
5710	-5.28	2.90	10.12	7.74	5.94	0.58	8.32	6.79
5755	-5.21	2.90	10.16	7.85	6.10	0.58	8.43	6.97
5795	-5.33	2.90	10.16	7.73	5.93	0.58	8.31	6.78

Sample Calculation:

Result (Timed average) = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss

Result (Burst power average) = Time average + Duty factor

MIMO MCS0

Tested Frequency [MHz]	Duty Factor [dB]	Antenna 1				Antenna 2				Antenna 1+2			
		Power Meter Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Burst average) [dBm]	Power Meter Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Burst average) [dBm]	Result (Burst power average)		Sum	
										Antenna 1	Antenna 2	1+2	
										[mW]	[mW]	[mW]	[dBm]
5190	0.59	-5.86	2.90	10.13	7.76	-5.93	2.90	10.16	7.72	5.97	5.92	11.89	10.75
5230	0.59	-5.49	2.90	10.13	8.13	-5.58	2.90	10.16	8.07	6.50	6.41	12.91	11.11
5270	0.59	-5.69	2.90	10.14	7.94	-5.76	2.90	10.16	7.89	6.22	6.15	12.37	10.93
5310	0.59	-6.17	2.90	10.14	7.46	-6.28	2.90	10.16	7.37	5.57	5.46	11.03	10.43
5510	0.59	-5.70	2.90	10.14	7.93	-6.21	2.90	10.17	7.45	6.21	5.56	11.77	10.71
5550	0.59	-5.20	2.90	10.15	8.44	-5.87	2.90	10.17	7.79	6.98	6.01	12.99	11.14
5670	0.59	-5.25	2.90	10.16	8.40	-5.94	2.90	10.17	7.72	6.92	5.92	12.83	11.08
5710	0.59	-5.23	2.90	10.12	8.38	-5.77	2.90	10.12	7.84	6.89	6.08	12.97	11.13
5755	0.59	-5.24	2.90	10.16	8.41	-5.64	2.90	10.17	8.02	6.93	6.34	13.27	11.23
5795	0.59	-5.31	2.90	10.16	8.34	-5.83	2.90	10.16	7.82	6.82	6.05	12.88	11.10

Sample Calculation:

Result (Burst power average) = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss + Duty factor

The average output power was measured with the lowest order modulation and lowest data rate configuration in each IEEE 802.11 mode based on KDB 248227 D01.

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Average Output Power (Reference data for RF Exposure)

Report No.	12804674H
Test place	Ise EMC Lab. No.6 Measurement Room
Date	September 3, 2019 November 15, 2019
Temperature / Humidity	24 deg. C / 64 % RH 24 deg. C / 40 % RH
Engineer	Takumi Shimada Yuta Moriya
Mode	Tx 11ac-40

Antenna 1 SISO MCS0

Tested Frequency [MHz]	Power Meter Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Timed average)		Duty factor [dB]	Result (Burst power average)	
				[dBm]	[mW]		[dBm]	[mW]
5190	-5.87	2.90	10.13	7.16	5.20	0.58	7.74	5.94
5230	-5.56	2.90	10.13	7.47	5.58	0.58	8.05	6.38
5270	-5.64	2.90	10.14	7.40	5.50	0.58	7.98	6.28
5310	-5.98	2.90	10.14	7.06	5.08	0.58	7.64	5.81
5510	-5.65	2.90	10.14	7.39	5.48	0.58	7.97	6.27
5550	-5.14	2.90	10.15	7.91	6.18	0.58	8.49	7.06
5670	-5.44	2.90	10.16	7.62	5.78	0.58	8.20	6.61
5710	-5.18	2.90	10.12	7.84	6.08	0.58	8.42	6.95
5755	-5.23	2.90	10.16	7.83	6.07	0.58	8.41	6.93
5795	-5.45	2.90	10.16	7.61	5.77	0.58	8.19	6.59

Sample Calculation:

Result (Timed average) = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss

Result (Burst power average) = Time average + Duty factor

MIMO MCS0

Tested Frequency [MHz]	Duty Factor [dB]	Antenna 1				Antenna 2				Antenna 1+2			
		Power Meter Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Burst average) [dBm]	Power Meter Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Burst average) [dBm]	Result (Burst power average)			
										Antenna		Sum 1+2	
										1 [mW]	2 [mW]	1+2 [mW]	[dBm]
5190	0.59	-5.78	2.90	10.13	7.84	-5.96	2.90	10.16	7.69	6.08	5.87	11.96	10.78
5230	0.59	-5.41	2.90	10.13	8.21	-5.70	2.90	10.16	7.95	6.62	6.24	12.86	11.09
5270	0.59	-5.68	2.90	10.14	7.95	-6.01	2.90	10.16	7.64	6.24	5.81	12.04	10.81
5310	0.59	-5.94	2.90	10.14	7.69	-6.29	2.90	10.16	7.36	5.87	5.45	11.32	10.54
5510	0.59	-5.43	2.90	10.14	8.20	-6.12	2.90	10.17	7.54	6.61	5.68	12.28	10.89
5550	0.59	-5.17	2.90	10.15	8.47	-5.73	2.90	10.17	7.93	7.03	6.21	13.24	11.22
5670	0.59	-5.16	2.90	10.16	8.49	-5.80	2.90	10.17	7.86	7.06	6.11	13.17	11.20
5710	0.59	-5.22	2.90	10.12	8.39	-5.95	2.90	10.12	7.66	6.90	5.83	12.74	11.05
5755	0.59	-5.28	2.90	10.16	8.37	-5.55	2.90	10.17	8.11	6.87	6.47	13.34	11.25
5795	0.59	-5.34	2.90	10.16	8.31	-5.61	2.90	10.16	8.04	6.78	6.37	13.14	11.19

Sample Calculation:

Result (Burst power average) = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss + Duty factor

The average output power was measured with the lowest order modulation and lowest data rate configuration in each IEEE 802.11 mode based on KDB 248227 D01.

UL Japan, Inc.

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Average Output Power (Reference data for RF Exposure)

Report No.	12804674H
Test place	Ise EMC Lab. No.6 Measurement Room
Date	September 3, 2019 November 15, 2019
Temperature / Humidity	24 deg. C / 64 % RH 24 deg. C / 40 % RH
Engineer	Takumi Shimada Yuta Moriya
Mode	Tx 11ac-80

Antenna 1 SISO MCS0

Tested Frequency [MHz]	Power Meter Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Timed average)		Duty factor [dB]	Result (Burst power average)	
				[dBm]	[mW]		[dBm]	[mW]
5210	-6.99	2.90	10.13	6.04	4.02	1.11	7.15	5.19
5290	-7.05	2.90	10.14	5.99	3.97	1.11	7.10	5.13
5530	-6.85	2.90	10.14	6.19	4.16	1.11	7.30	5.37
5610	-6.48	2.90	10.16	6.58	4.55	1.11	7.69	5.87
5690	-6.89	2.90	10.12	6.13	4.10	1.11	7.24	5.30
5775	-6.68	2.90	10.16	6.38	4.35	1.11	7.49	5.61

Sample Calculation:

Result (Timed average) = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss

Result (Burst power average) = Time average + Duty factor

MIMO MCS0

Tested Frequency [MHz]	Duty Factor [dB]	Antenna 1				Antenna 2				Antenna 1+2			
		Power Meter Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Burst average) [dBm]	Power Meter Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Burst average) [dBm]	Result (Burst power average) Antenna		Sum 1+2	
		[dBm]	[dB]	[dB]	[dBm]	[dBm]	[dB]	[dB]	[dBm]	1 [mW]	2 [mW]	1+2 [mW]	[dBm]
5210	1.11	-6.84	2.90	10.13	7.30	-6.85	2.90	10.16	7.32	5.37	5.40	10.77	10.32
5290	1.11	-6.91	2.90	10.14	7.24	-7.22	2.90	10.16	6.95	5.30	4.95	10.25	10.11
5530	1.11	-6.92	2.90	10.14	7.23	-7.17	2.90	10.17	7.01	5.28	5.02	10.31	10.13
5610	1.11	-6.47	2.90	10.16	7.70	-6.88	2.90	10.17	7.30	5.89	5.37	11.26	10.51
5690	1.11	-6.94	2.90	10.12	7.19	-6.66	2.90	10.12	7.47	5.24	5.58	10.82	10.34
5775	1.11	-6.63	2.90	10.16	7.54	-6.92	2.90	10.16	7.25	5.68	5.31	10.98	10.41

Sample Calculation:

Result (Burst power average) = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss + Duty factor

The average output power was measured with the lowest order modulation and lowest data rate configuration in each IEEE 802.11 mode based on KDB 248227 D01.

UL Japan, Inc.

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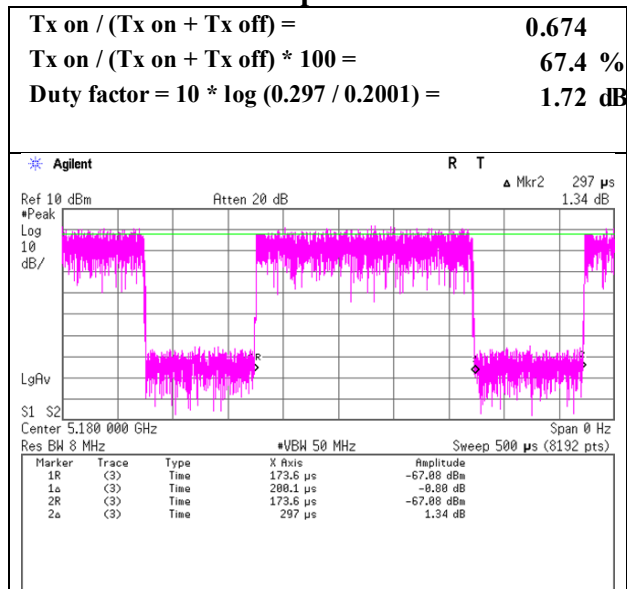
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

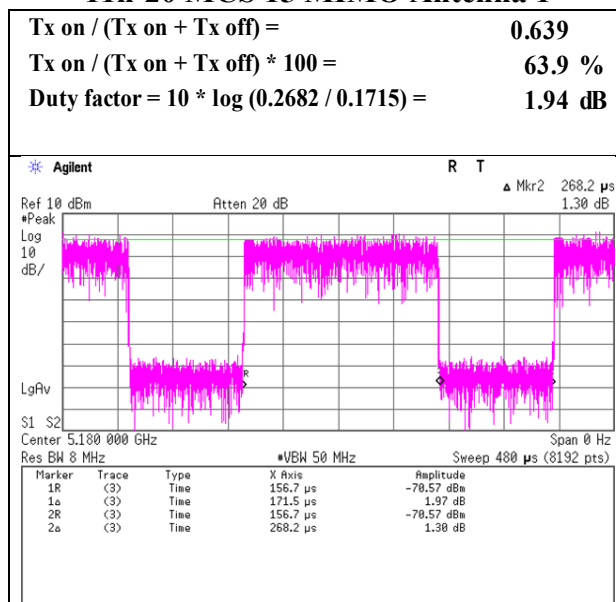
Burst rate confirmation

Report No.	12804674H
Test place	Ise EMC Lab. No.6 Measurement Room
Date	September 4, 2019
Temperature / Humidity	22 deg. C / 60 % RH
Engineer	Takumi Shimada
Mode	Tx

11a 48 Mbps Antenna 1



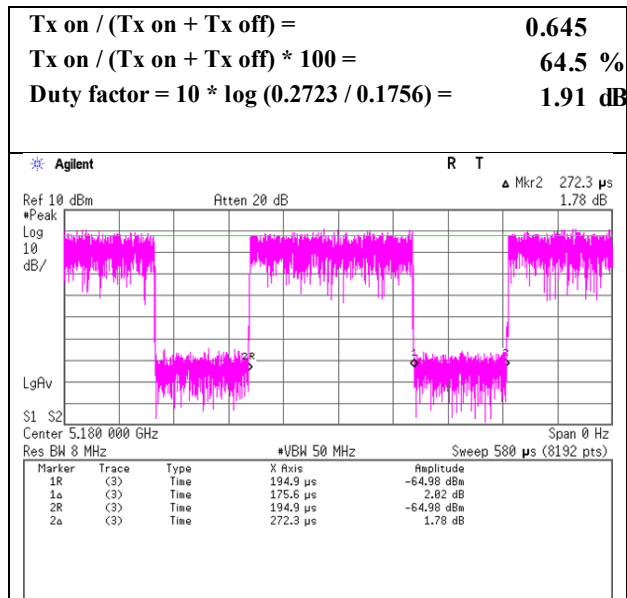
11n-20 MCS 15 MIMO Antenna 1



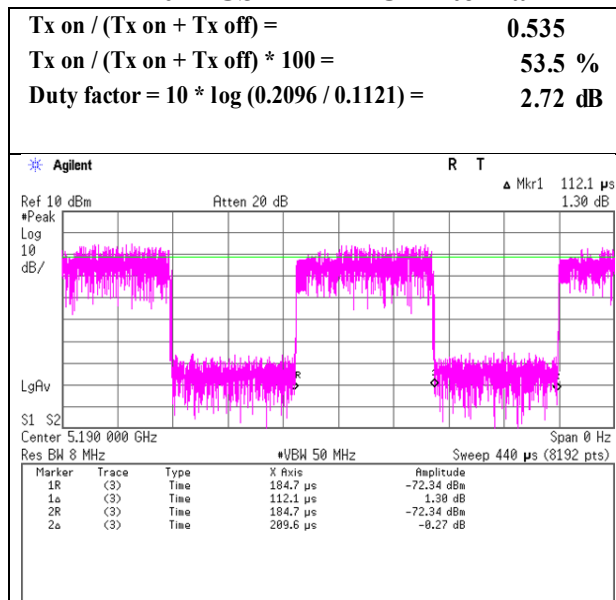
Burst rate confirmation

Report No.	12804674H
Test place	Ise EMC Lab. No.6 Measurement Room
Date	September 4, 2019
Temperature / Humidity	22 deg. C / 60 % RH
Engineer	Takumi Shimada
Mode	Tx

11ac-20 MCS 7 MIMO Antenna 1



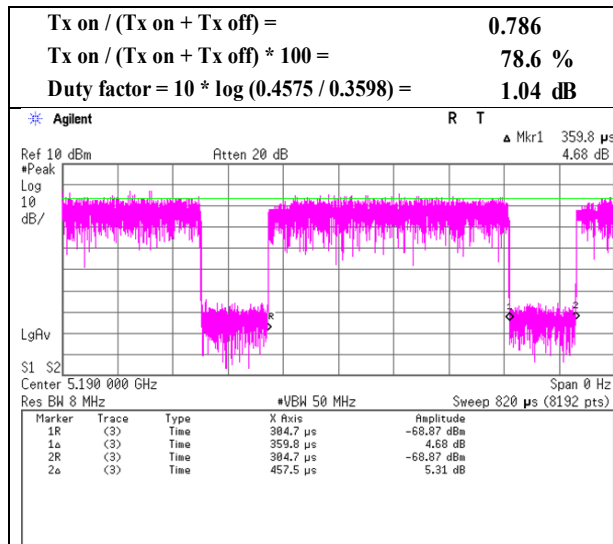
11n-40 MCS 14 MIMO Antenna 1



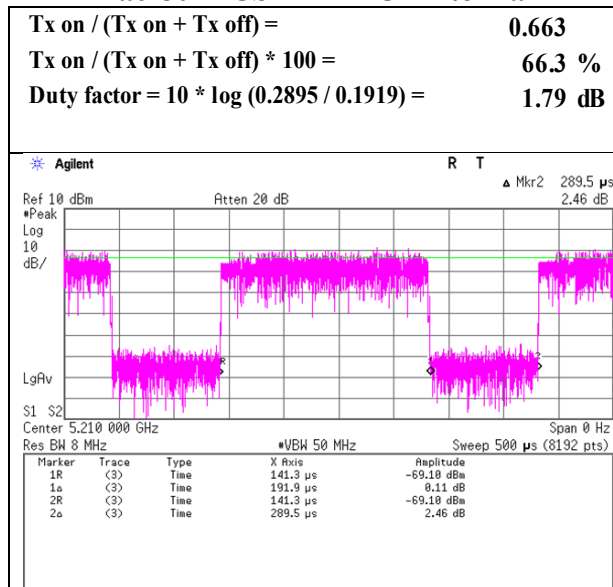
Burst rate confirmation

Report No.	12804674H
Test place	Ise EMC Lab. No.6 Measurement Room
Date	September 4, 2019
Temperature / Humidity	22 deg. C / 60 % RH
Engineer	Takumi Shimada
Mode	Tx

11ac-40 MCS 1 MIMO Antenna 1



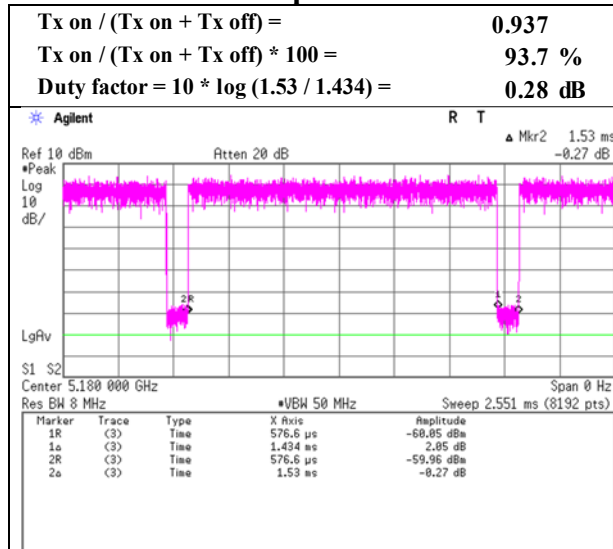
11ac-80 MCS 1 MIMO Antenna 2



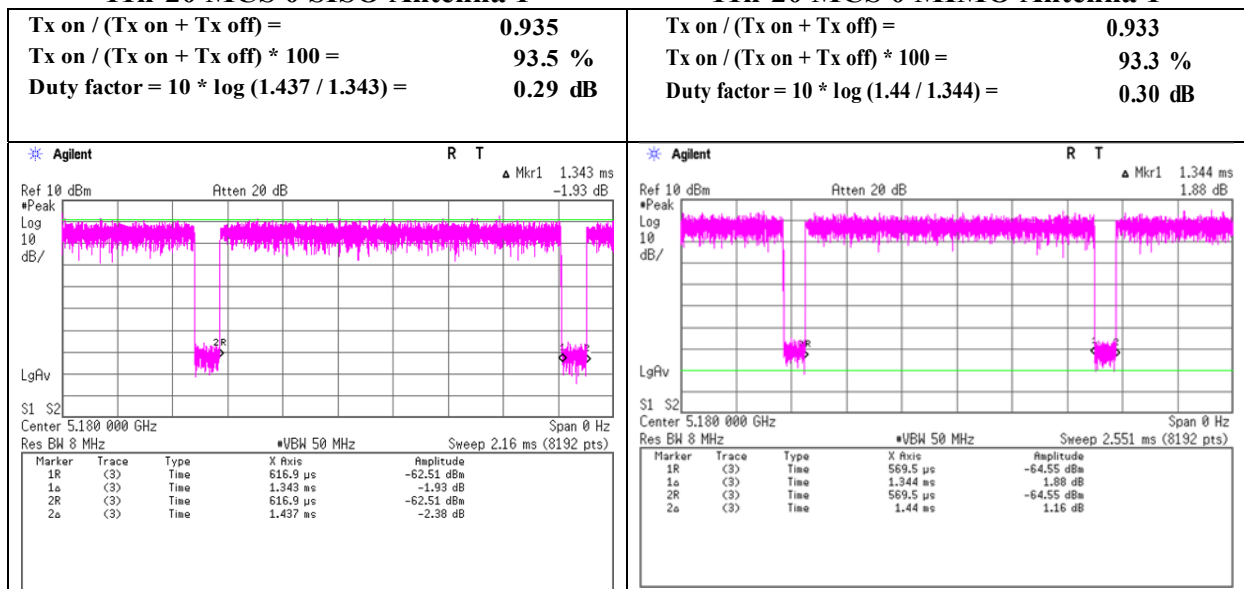
Burst rate confirmation (SAR Power)

Report No. 12804674H
Test place Ise EMC Lab. No.6 Measurement Room
Date September 4, 2019 October 26, 2019
Temperature / Humidity 22 deg. C / 60 % RH 22 deg. C / 54 % RH
Engineer Takumi Shimada Takafumi Noguchi
Mode Tx

11a 6 Mbps Antenna 1



11n-20 MCS 0 SISO Antenna 1



11n-20 MCS 0 MIMO Antenna 1

