



RADIO TEST REPORT

Test Report No. : 13024969S-AE-R3

Applicant : Canon Inc.
Type of EUT : Wireless LAN/Bluetooth Combo Module
Model Number of EUT : ES204
FCC ID : AZD241
Test regulation : FCC Part 15 Subpart E: 2019
Test result : Complied (Refer to SECTION 3.2)

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2. The results in this report apply only to the sample tested.
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7. The all test items in this test report are conducted by UL Japan, Inc. Shonan EMC Lab.
8. The opinions and the interpretations to the result of the description in this report are outside scopes where UL Japan 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 13024969S-AE-R2. 13024969S-AE-R2 is replaced with this report.

Date of test: October 31, 2019 to January 16, 2020

Representative test engineer:

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CERTIFICATE 1266.03

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

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REVISION HISTORY

Original Test Report No.: 13024969S-AE

Revision	Test report No.	Date	Page revised	Contents
- (Original)	13024969S-AE	March 9, 2020	-	-
1	13024969S-AE-R1	March 30, 2020	P.13	Addition of Support equipment: No. D Grand Plate
2	13024969S-AE-R2	April 2, 2020	P.13	Modification of Configuration and peripherals 
			P.17	Addition of “* Taking in consideration of antenna characteristics, the setup that does not affect spurious emissions was used.”
3	13024969S-AE-R3	April 6, 2020	P.13	Addition of “* Taking in consideration of antenna characteristics, the setup that does not affect spurious emissions was used.”
			P.17	Deletion of “* Taking in consideration of antenna characteristics, the setup that does not affect spurious emissions was used.”

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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CONTENTS	PAGE
SECTION 1: Customer information.....	5
SECTION 2: Equipment under test (E.U.T.).....	5
SECTION 3: Test specification, procedures & results.....	7
SECTION 4: Operation of E.U.T. during testing.....	11
SECTION 5: Conducted Emission.....	14
SECTION 6: Radiated Spurious Emission and Band Edge Compliance.....	15
SECTION 7: Antenna Terminal Conducted Tests.....	18
APPENDIX 1: Test data	19
Conducted Emission.....	19
26 dB Emission Bandwidth and 99 % Occupied Bandwidth	20
6 dB Bandwidth.....	39
Maximum Conducted Output Power.....	43
Average Output Power	55
Maximum Power Spectral Density.....	64
Radiated Spurious Emission.....	81
Conducted Spurious Emission.....	163
APPENDIX 2: Test instruments	164
APPENDIX 3: Photographs of test setup	166
Conducted Emission.....	166
Radiated Spurious Emission.....	167
Pre-Check Worst Case Position.....	168

SECTION 1: Customer information

Company Name	:	Canon Inc.
Address	:	30-2, Shimomaruko 3-chome, Ohta-ku, Tokyo 146-8501 Japan
Telephone Number	:	+81-3-5482-7283
Contact Person	:	Tomohiro 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	:	Wireless LAN/Bluetooth Combo Module
Model No.	:	ES204
Serial No.	:	Refer to SECTION 4.2
Rating	:	DC 3.3 V
Receipt Date of Sample (Information from test lab.)	:	August 28, 2019
Country of Mass-production	:	Japan
Condition of EUT	:	Engineering 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: ES204 (referred to as the EUT in this report) is a Wireless LAN/Bluetooth Combo Module.

Radio Specification

Wireless LAN/Bluetooth Combo Module : ES204
 Radio Type : Transceiver
 Clock frequency (Maximum) : 38.4 MHz

	Bluetooth (BDR/EDR)	Bluetooth (Low energy)
Frequency of operation	2402 MHz - 2480 MHz	2402 MHz - 2480 MHz
Channel spacing	1 MHz	2 MHz
Modulation	FHSS: GFSK (*, EDR: GFSK+ /4-DQPSK, GFSK+ 8DPSK)	

	IEEE802.11b	IEEE802.11g	IEEE802.11n (20 MHz band)	IEEE802.11n (40 MHz band)
Frequency of operation	2412 MHz - 2462 MHz	2412 MHz - 2462 MHz	2412 MHz - 2462 MHz 5180 MHz - 5240 MHz 5260 MHz - 5320 MHz 5500 MHz - 5700 MHz 5745 MHz - 5825 MHz	2422 MHz - 2452 MHz 5190 MHz - 5230 MHz 5270 MHz - 5310 MHz 5510 MHz - 5670 MHz 5755 MHz - 5795 MHz
Channel spacing	5 MHz		2.4 GHz band 5 MHz 5 GHz band 20 MHz	2.4 GHz band 5 MHz 5 GHz band 40 MHz
Modulation	DSSS: DBPSK, DQPSK, CCK	OFDM: BPSK, QPSK, 16QAM, 64QAM		
	IEEE802.11a	IEEE802.11ac (20 MHz band)	IEEE802.11ac (40 MHz band)	IEEE802.11ac (80 MHz band)
Frequency of operation	5180 MHz - 5240 MHz 5260 MHz - 5320 MHz 5500 MHz - 5700 MHz 5745 MHz - 5825 MHz	5180 MHz - 5240 MHz 5260 MHz - 5320 MHz 5500 MHz - 5700 MHz 5745 MHz - 5825 MHz	5190 MHz - 5230 MHz 5270 MHz - 5310 MHz 5510 MHz - 5670 MHz 5755 MHz - 5795 MHz	5210 MHz 5290 MHz 5530 MHz - 5610 MHz 5775 MHz
Channel spacing	20 MHz		40 MHz	80 MHz
Modulation	OFDM: BPSK, QPSK, 16QAM, 64QAM, 256QAM (*256QAM is only for IEEE802.11ac 80 MHz band)			

Antenna type / connector type	Printed on the PCB.
Antenna gain	2.98 dBi (2.4 GHz band) / 4.94 dBi (5 GHz band) *including cable loss of 0.01m length. 1.75 dBi (2.4 GHz band) / 2.27 dBi (5 GHz band) *including cable loss of 0.2 m length.

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

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	28.3 dB, 0.50311 MHz, L1, QP	Complied a)	-
26 dB Emission Bandwidth	FCC: KDB Publication Number 789033 ISED: -	FCC: 15.407 (a) (1) (2) (3) ISED: -	See data	Complied b)	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 c)	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 d)	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	2.2 dB 5350.000 MHz, AV, Vert. Mode: Tx, 11ac-80 5290 MHz with BLE 2M-PHY 2402 MHz	Complied# e) / f)	Conducted (< 30 MHz) / Radiated (> 30 MHz) *1)
6 dB Emission Bandwidth	FCC: ANSI C63.10-2013 ISED: -	FCC: 15.407 (e) ISED: RSS-247 6.2.4.1	See data	Complied g)	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 13024969S-AG issued by UL Japan, Inc.*1) 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 Conducted Emission) b) Refer to APPENDIX 1 (data of 26 dB Emission Bandwidth and 99 % Occupied Bandwidth) c) Refer to APPENDIX 1 (data of Maximum Conducted Output Power) d) Refer to APPENDIX 1 (data of Maximum Power Spectral Density) e) Refer to APPENDIX 1 (data of Radiated Spurious Emission) f) Refer to APPENDIX 1 (data of Conducted Spurious Emission) g) 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.

FCC Part 15.31 (e)

The RF Module has its own regulator. The RF Module is constantly provided voltage through the regulator regardless of input voltage. Therefore, this EUT complies with the requirement.

FCC Part 15.203/212 Antenna requirement

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

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3.3 Addition to standard

Item	Test Procedure	Specification	Worst margin	Results	Remarks
99 % Occupied Band Width	RSS-Gen 6.7	ISED: -	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 $k=2$.

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Item	Frequency range	Uncertainty (+/-)		
		No. 1 SAC / SR	No. 2 SAC / SR	No. 3 SAC / SR
Conducted emission (AC Mains) LISN	150 kHz-30 MHz	2.6 dB	2.6 dB	2.5 dB
Radiated emission (Measurement distance: 3 m)	9 kHz-30 MHz	3.0 dB	3.0 dB	3.0 dB
	30 MHz-200 MHz	4.6 dB	4.6 dB	4.6 dB
	200 MHz-1 GHz	6.0 dB	6.0 dB	6.0 dB
	1 GHz-6 GHz	4.9 dB	4.9 dB	4.9 dB
	6 GHz-18 GHz	5.5 dB	5.5 dB	5.5 dB
	18 GHz-40 GHz	5.4 dB	5.4 dB	5.4 dB
Radiated emission (Measurement distance: 1 m)	1 GHz-18 GHz	5.8 dB	5.8 dB	5.8 dB
	18 GHz-40 GHz	5.7 dB	5.7 dB	5.7 dB

SAC=Semi-Anechoic Chamber

SR= Shielded Room is applied besides radiated emission

Antenna terminal test	Uncertainty (+/-)
Power Measurement above 1 GHz (Average Detector)_SPM-06	0.98 dB
Power Measurement above 1 GHz (Peak Detector)_SPM-06	1.75 dB
Power Measurement above 1 GHz (Average Detector)_SPM-07	0.89 dB
Power Measurement above 1 GHz (Peak Detector)_SPM-07	1.12 dB
Power Measurement above 1 GHz (Average Detector)_SPM-13	1.06 dB
Power Measurement above 1 GHz (Peak Detector)_SPM-13	1.24 dB
Spurious emission (Conducted) below 1GHz	0.9 dB
Spurious emission (Conducted) 1 GHz-3 GHz	0.9 dB
Spurious emission (Conducted) 3 GHz-18 GHz	2.9 dB
Spurious emission (Conducted) 18 GHz-26.5 GHz	2.6 dB
Spurious emission (Conducted) 26.5 GHz-40 GHz	2.0 dB
Bandwidth Measurement	0.07 %
Duty cycle and Time Measurement	0.262 %
Temperature	0.95 deg.C.
Voltage	0.83 %

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3.5 Test Location

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A2LA Certificate Number: 1266.03 (FCC Test Firm Registration Number: 626366, ISED Lab Company Number: 2973D)

Test site	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Maximum measurement distance
No.1 Semi-anechoic chamber	20.6 x 11.3 x 7.65	20.6 x 11.3	10 m
No.2 Semi-anechoic chamber	20.6 x 11.3 x 7.65	20.6 x 11.3	10 m
No.3 Semi-anechoic chamber	12.7 x 7.7 x 5.35	12.7 x 7.7	5 m
No.4 Semi-anechoic chamber	8.1 x 5.1 x 3.55	8.1 x 5.1	-
No.1 Shielded room	6.8 x 4.1 x 2.7	6.8 x 4.1	-
No.2 Shielded room	6.8 x 4.1 x 2.7	6.8 x 4.1	-
No.3 Shielded room	6.3 x 4.7 x 2.7	6.3 x 4.7	-
No.4 Shielded room	4.4 x 4.7 x 2.7	4.4 x 4.7	-
No.5 Shielded room	7.8 x 6.4 x 2.7	7.8 x 6.4	-
No.6 Shielded room	7.8 x 6.4 x 2.7	7.8 x 6.4	-
No.8 shielded room	3.45 x 5.5 x 2.4	3.45 x 5.5	-
No.1 Measurement room	2.55 x 4.1 x 2.5	-	-

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.

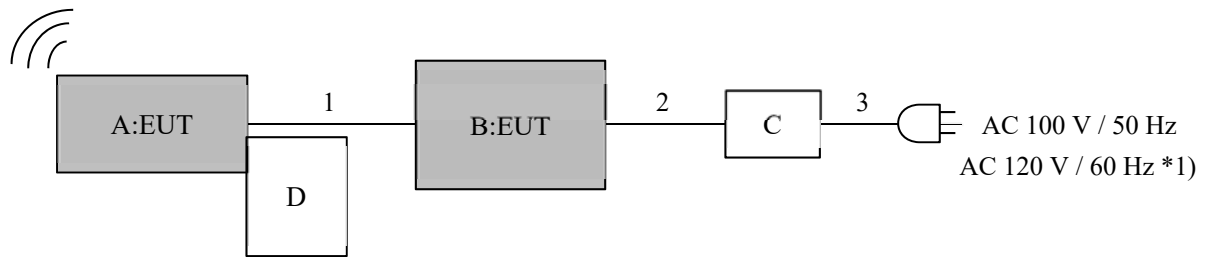
Mode	Remarks*
IEEE 802.11a (11a)	54 Mbps, PN9
IEEE 802.11n 20 MHz BW (11n-20)	MCS 4, PN9
IEEE 802.11n 40 MHz BW (11n-40)	MCS 7, PN9
IEEE 802.11ac 20 MHz BW (11ac-20)	MCS 4, PN9
IEEE 802.11ac 40 MHz BW (11ac-40)	MCS 8, PN9
IEEE 802.11ac 80 MHz BW (11ac-80)	MCS 8, PN9
*Transmitting duty was 100 % other than Simultaneous transmission Radiated emission test. *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 : 7 dBm(5180-5320 MHz), 8 dBm(5500-5700 MHz), 9 dBm(5745-5825 MHz) 11n-20/11n-40/11ac-20/11ac-40/11ac-80 : 6 dBm(5180-5320 MHz), 7 dBm(5500-5700 MHz), 8 dBm(5745-5825 MHz) Software: Tera Term, Version 4.9.8 (Date:2017.8.31, 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.	

*The details of Operation mode(s)

Test Item	Operating Mode	Tested Frequency			
		Lower Band	Middle Band	Additional Band	Upper Band
Conducted emission	11a Tx *1)	5180 MHz	-	-	-
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	
				5670 MHz	
	11ac-80 Tx	-	5290 MHz	5530 MHz	-
				5610 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
				5670 MHz	
	11ac-80 Tx	5210 MHz	5290 MHz	5530 MHz	5775 MHz
				5610 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 (Below 1 GHz)	11a Tx *1)	5180 MHz	-	-	-
Radiated Spurious Emission (Above 1 GHz)	11a Tx	5180 MHz	5320 MHz	5500 MHz	5745 MHz
	11ac-20 Tx	5240 MHz		5580 MHz	5785 MHz
				5700 MHz	5825 MHz
	11ac-40 Tx	5190 MHz	5310 MHz	5510 MHz	5755 MHz
		5230 MHz		5550 MHz	5795 MHz
				5670 MHz	
	11ac-80 Tx	5210 MHz	5290 MHz	5530 MHz	5775 MHz
				5610 MHz	
	11a Tx with DH5 hopping	5180 MHz	5320 MHz	5500 MHz	5745 MHz
	11a Tx with BLE 2M-PHY 2402 MHz			5700 MHz	5825 MHz
	11ac-20 Tx with DH5 hopping	5190 MHz	5310 MHz	5510 MHz	5755 MHz
	11ac-20 Tx with BLE 2M-PHY 2402 MHz				
	11ac-40 Tx with DH5 hopping				
	11ac-40 Tx with BLE 2M-PHY 2402 MHz			5670 MHz	5795 MHz
	11ac-80 Tx with DH5 hopping	5210 MHz	5290 MHz	5530 MHz	5775 MHz
	11ac-80 Tx with BLE 2M-PHY 2402 MHz			5610 MHz	
Conducted Spurious Emission	11a Tx *1)	5180 MHz	-	-	-

*1) The mode was tested as a representative, because it had the highest power at antenna terminal test.

4.2 Configuration and peripherals



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

*1) Conducted Emission test

Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	Antenna	-	1(0.01 m) *2) 4(0.2 m)*2)	Canon Inc.	EUT
B	Wireless LAN/Bluetooth Combo Module	ES204	16 *3) 17 *4)	Canon Inc.	EUT
C	Power Supply	PAN35-10A	ML002085	KIKUSUI	-
D	Grand Plate	-	-	Canon Inc	- *5)

*2) The antenna used for the measurement was confirmed by pre-check, and Serial number 4 was used for the measurement.

*3) Used for Antenna Terminal conducted test

*4) Used for Conducted Emission test and Radiated Emission test

*5) Grand Plate for matching. Taking in consideration of antenna characteristics, the setup that does not affect spurious emissions was used.

List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	Coaxial	0.01 *6) 0.2 *7)	Shielded	Sshielded	-
2	DC	0.06 + 1.5	Unshielded	Unshielded	-
3	AC	1.8	Unshielded	Unshielded	-

*6) Used for Serial number 1 Antenna.

*7) Used for Serial number 4 Antenna.

SECTION 5: Conducted Emission

Test Procedure and conditions

EUT was placed on a urethane platform of nominal size, 1.0 m by 2.0 m, raised 0.8 m above the conducting ground plane. The rear of tabletop was located 40 cm to the vertical conducting plane. The rear of EUT, including peripherals aligned and flushed with rear of tabletop. All other surfaces of tabletop were at least 80 cm from any other grounded conducting surface. EUT was located 80 cm from a Line Impedance Stabilization Network (LISN) / Artificial mains Network (AMN) and excess AC cable was bundled in center.

I/O cables that were connected to the peripherals were bundled in center. They were folded back and forth forming a bundle 30 cm to 40 cm long and were hanged at a 40 cm height to the ground plane.

The AC Mains Terminal Continuous disturbance Voltage has been measured with the EUT via DC power supply in a Semi Anechoic Chamber.

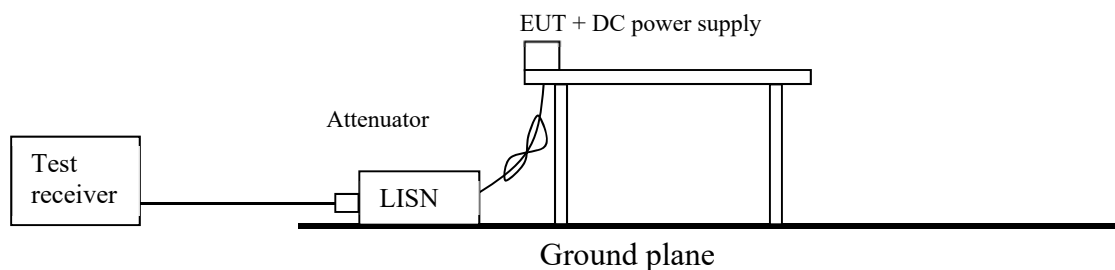
The EUT via DC power supply was connected to a LISN (AMN).

An overview sweep with peak detection has been performed.

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

Detector	: QP and CISPR Average
Measurement range	: 0.15 MHz - 30 MHz
Test data	: APPENDIX
Test result	: Pass

Figure 1: Test Setup



SECTION 6: Radiated Spurious Emission and Band Edge Compliance

Test Procedure

< Below 1GHz >

EUT was placed on a urethane platform of nominal size, 1.0 m by 2.0 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:

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

Test Antennas are used as below;

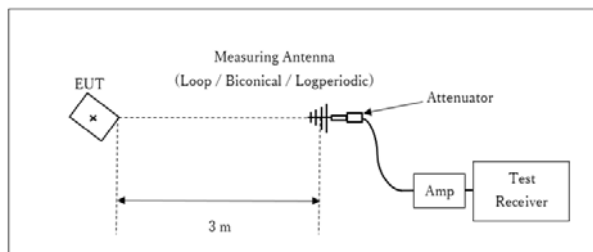
Frequency	30 MHz to 200 MHz	200 MHz to 1 GHz	Above 1 GHz
Antenna Type	Biconical	Logperiodic	Horn

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 VB *1) RBW: 1 MHz VBW: 1/T (T: burst length, refer to Burst rate confirmation sheet) Detector: Peak Trace: Max Hold

*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

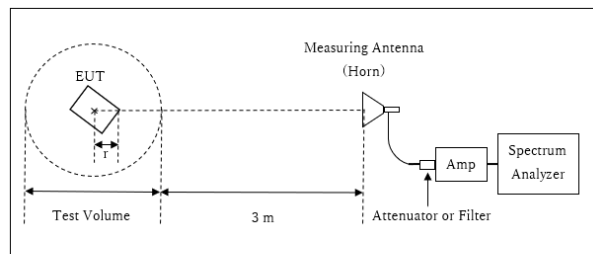
Below 1 GHz



x : Center of turn table

Test Distance: 3 m

1 GHz - 13 GHz



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

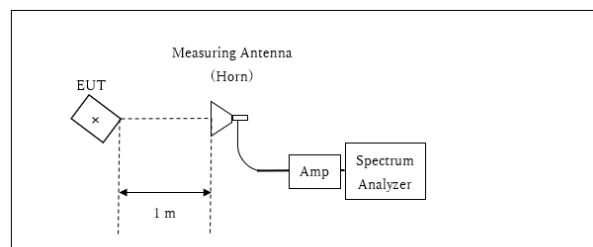
Distance Factor: $20 \times \log (3.93 \text{ m} / 3.0 \text{ m}) = 2.35 \text{ dB}$

* Test Distance: $(3 + \text{Test Volume} / 2) - r = 3.93 \text{ m}$

Test Volume : 2.0 m

(Test Volume has been calibrated based on CISPR 16-1-4.)
 $r = 0.07 \text{ m}$

13 GHz - 40 GHz



x : Center of turn table

Distance Factor: $20 \times \log (1.0 \text{ m} / 3.0 \text{ m}) = -9.54 \text{ dB}$

*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.

Module axis

	Carrier	Spurious				
		Below 1 GHz	1 GHz – 6.4 GHz	6.4 GHz - 13 GHz	13 GHz – 18 GHz	18 GHz – 40 GHz
Horizontal	Y	X	Y	X	Z	X
Vertical	Y	X	Y	X	Y	X

Antenna axis

	Carrier	Spurious				
		Below 1 GHz	1 GHz - 6.4 GHz	6.4 GHz - 13 GHz	13 GHz – 18 GHz	18 GHz – 40 GHz
Horizontal	X	X	X	X	Y	X
Vertical	X	X	X	X	Y	X

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

SECTION 7: 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: 160 MHz BW) (Method PM-G)
Maximum Power Spectral Density	Encompass the entire EBW	1 MHz or 100 kHz *2)	≥ 3 RBW	Auto	RMS Power Averaging (100 times)	Clear Write	Spectrum Analyzer
Conducted Spurious Emission*3)	9 kHz – 150 kHz 150 kHz – 30 MHz	200 Hz 10 kHz	620 Hz 30 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 ($10 \log(500 \text{ kHz} / 100 \text{ kHz})$) 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 = 10 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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Shonan EMC Lab.

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APPENDIX 1: Test data

Conducted Emission

DATA OF CONDUCTED EMISSION TEST

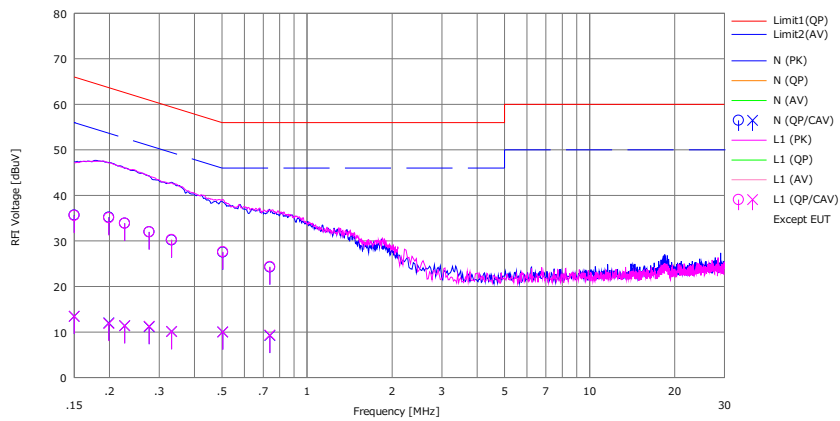
UL Japan, Inc. Shonan EMC Lab. No.3 Semi-Anechoic Chamber
Date : 2020/01/06

Mode : Tx 11a 5180 MHz
Power : DC 3.3 V (AC 120V/ 60 Hz)
Temp./Humi. : 25 deg.C / 30 %RH

Remarks : -

Limit : FCC_Part 15 Subpart C(15.207)

Engineer : Makoto Hosaka



No.	Freq. [MHz]	Reading		C.Fac	Results		Limit		Margin		Phase	Comment
		(QP) [dBuV]	(CAV) [dBuV]		(QP) [dBuV]	(CAV) [dBuV]	(QP) [dBuV]	(AV) [dBuV]	(QP) [dB]	(AV) [dB]		
1	0.15000	23.20	1.00	12.48	35.68	13.48	66.00	56.00	30.3	42.5	N	
2	0.19907	22.70	-0.50	12.50	35.20	12.00	63.65	53.65	28.4	41.6	N	
3	0.22649	21.40	-1.10	12.49	33.89	11.39	62.58	52.58	28.6	41.1	N	
4	0.27639	19.50	-1.30	12.50	32.00	11.20	60.92	50.92	28.9	39.7	N	
5	0.33180	17.70	-2.40	12.50	30.20	10.10	59.41	49.41	29.2	39.3	N	
6	0.50311	15.00	-2.50	12.53	27.53	10.03	56.00	46.00	28.4	35.9	N	
7	0.73909	11.70	-3.30	12.56	24.26	9.26	56.00	46.00	31.7	36.7	N	
8	0.15000	23.10	1.00	12.48	35.58	13.48	66.00	56.00	30.4	42.5	L1	
9	0.19907	22.60	-0.60	12.48	35.08	11.88	63.65	53.65	28.5	41.7	L1	
10	0.22649	21.40	-1.10	12.49	33.89	11.39	62.58	52.58	28.6	41.1	L1	
11	0.27639	19.50	-1.20	12.49	31.99	11.29	60.92	50.92	28.9	39.6	L1	
12	0.33180	17.80	-2.40	12.50	30.30	10.10	59.41	49.41	29.1	39.3	L1	
13	0.50311	15.10	-2.50	12.53	27.63	10.03	56.00	46.00	28.3	35.9	L1	
14	0.73909	11.80	-3.20	12.56	24.36	9.36	56.00	46.00	31.6	36.6	L1	

Calculation: Result[dBuV]=Reading[dBuV]+C.Fac(LISN(AMN)+Cable+ATT)[dB]
LISN(AMN)= SLS-05

26 dB Emission Bandwidth and 99 % Occupied Bandwidth

Report No. 13024969S-AE-R3
Test place Shonan EMC Lab. No.5 Shielded Room
Date December 6, 2019 December 9, 2019
Temperature / Humidity 22 deg. C / 45 % RH 27 deg. C / 45 % RH
Engineer Kazuya Noda Toshinori Yamada
Mode Tx

11a

Tested Frequency [MHz]	26 dB Emission Bandwidth [MHz]	99 % Occupied Bandwidth [kHz]
5180	-	16758.0
5220	-	16778.7
5240	-	16756.9
5260	19.387	16737.0
5300	19.411	16741.3
5320	19.350	16776.2
5500	19.421	16729.7
5580	19.274	16752.9
5700	19.354	16758.6
5745	-	16748.1
5785	-	16784.0
5825	-	16749.7

11n-20

Tested Frequency [MHz]	26 dB Emission Bandwidth [MHz]	99 % Occupied Bandwidth [kHz]
5180	-	17804.5
5220	-	17806.5
5240	-	17835.1
5260	20.041	17841.1
5300	20.222	17830.0
5320	20.226	17793.4
5500	19.899	17833.7
5580	19.993	17836.0
5700	20.095	17828.6
5745	-	17842.4
5785	-	17817.6
5825	-	17795.7

11ac-20

Tested Frequency [MHz]	26 dB Emission Bandwidth [MHz]	99 % Occupied Bandwidth [kHz]
5180	-	17845.5
5220	-	17804.0
5240	-	17837.6
5260	20.021	17805.2
5300	20.045	17824.6
5320	19.979	17826.5
5500	19.787	17803.7
5580	19.973	17825.6
5700	19.920	17796.2
5745	-	17826.5
5785	-	17832.0
5825	-	17830.3

26 dB Emission Bandwidth and 99 % Occupied Bandwidth

Report No.	13024969S-AE-R3
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	December 6, 2019
Temperature / Humidity	22 deg. C / 45 % RH
Engineer	Kazuya Noda
Mode	Tx

11n-40

Tested Frequency [MHz]	26 dB Emission Bandwidth [MHz]	99 % Occupied Bandwidth [kHz]
5190	-	36379.7
5230	-	36379.3
5270	40.264	36409.5
5310	40.133	36376.7
5510	40.300	36448.1
5550	39.964	36441.9
5670	40.181	36389.1
5755	-	36353.4
5795	-	36481.4

11ac-40

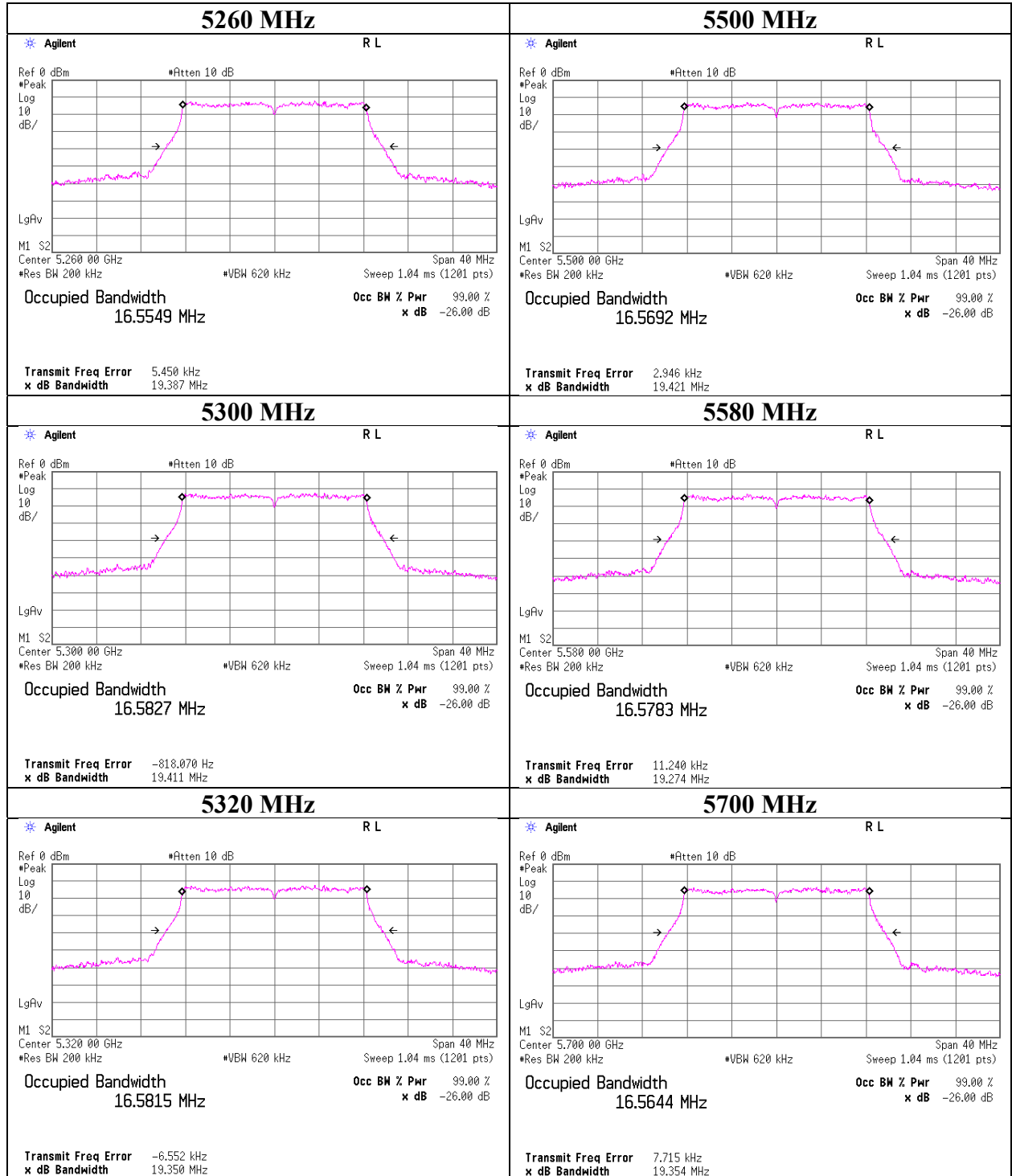
Tested Frequency [MHz]	26 dB Emission Bandwidth [MHz]	99 % Occupied Bandwidth [kHz]
5190	-	36304.0
5230	-	36324.9
5270	39.698	36316.9
5310	39.870	36291.1
5510	39.840	36297.8
5550	39.957	36324.1
5670	39.626	36326.4
5755	-	36335.4
5795	-	36324.2

11ac-80

Tested Frequency [MHz]	26 dB Emission Bandwidth [MHz]	99 % Occupied Bandwidth [kHz]
5210	-	76256.7
5290	81.124	76188.8
5530	80.981	76267.0
5610	81.151	76214.4
5775	-	76234.4

26 dB Emission Bandwidth

11a



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Shonan EMC Lab.

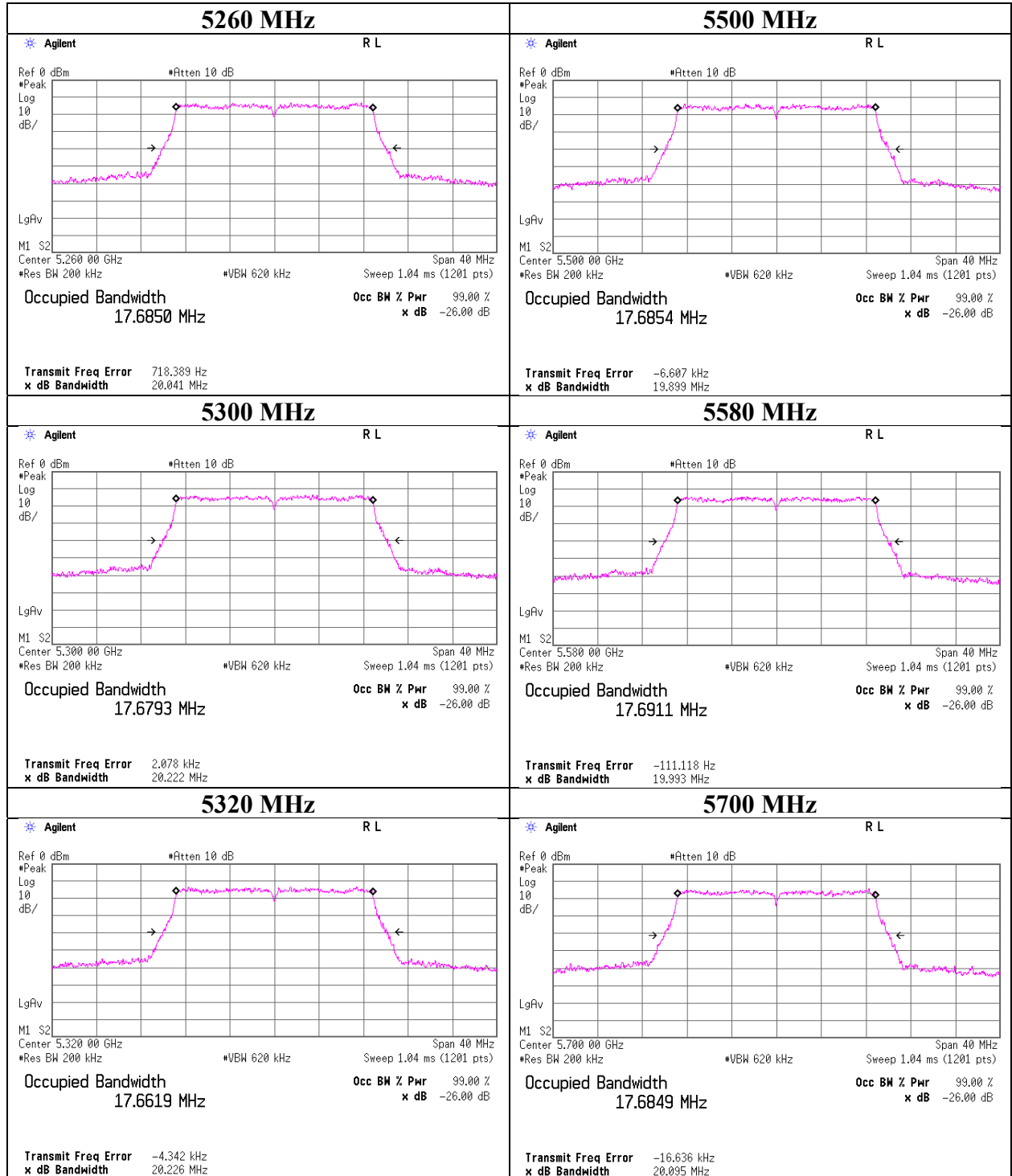
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

26 dB Emission Bandwidth

11n-20



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Shonan EMC Lab.

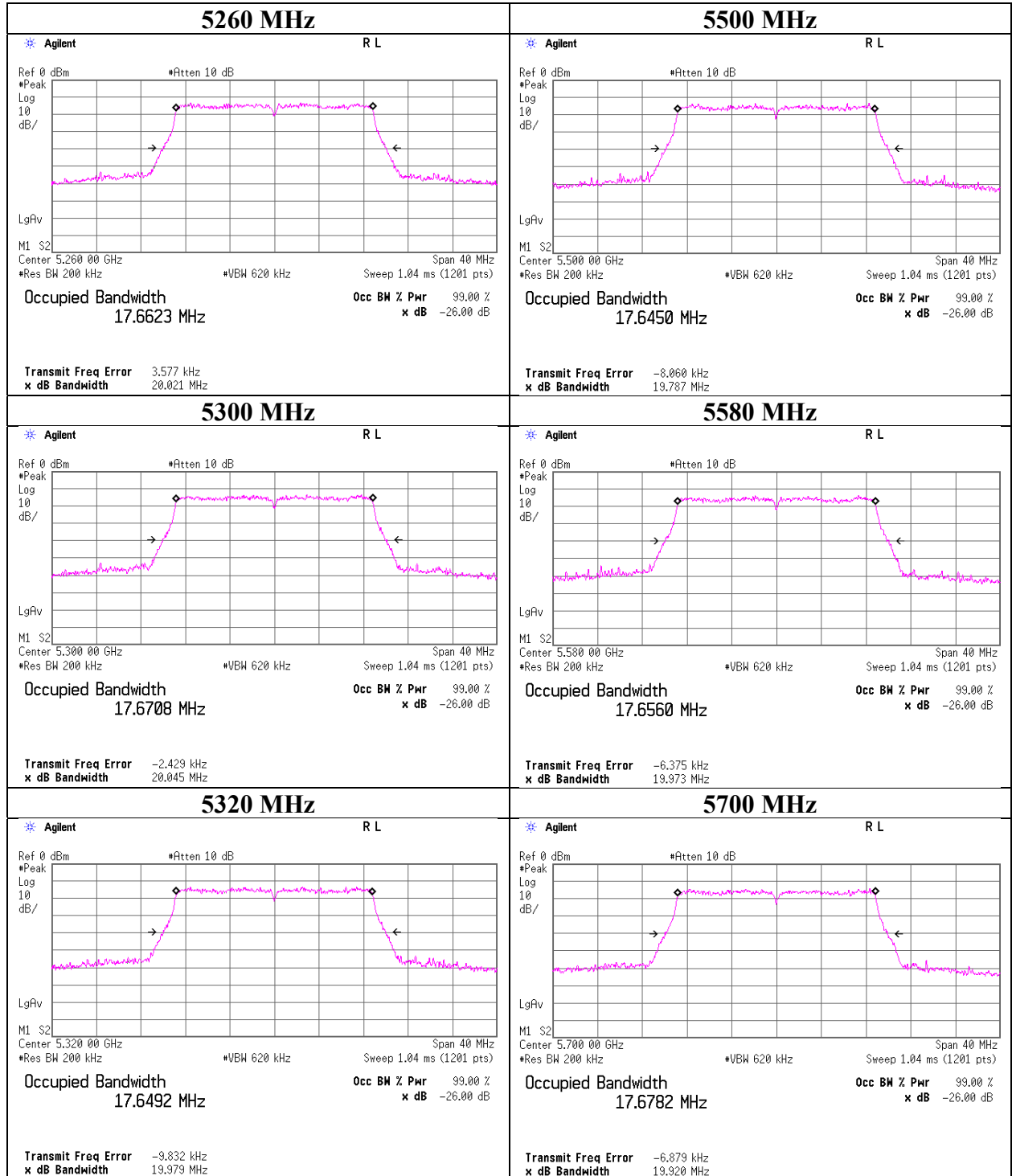
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

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26 dB Emission Bandwidth

11ac-20



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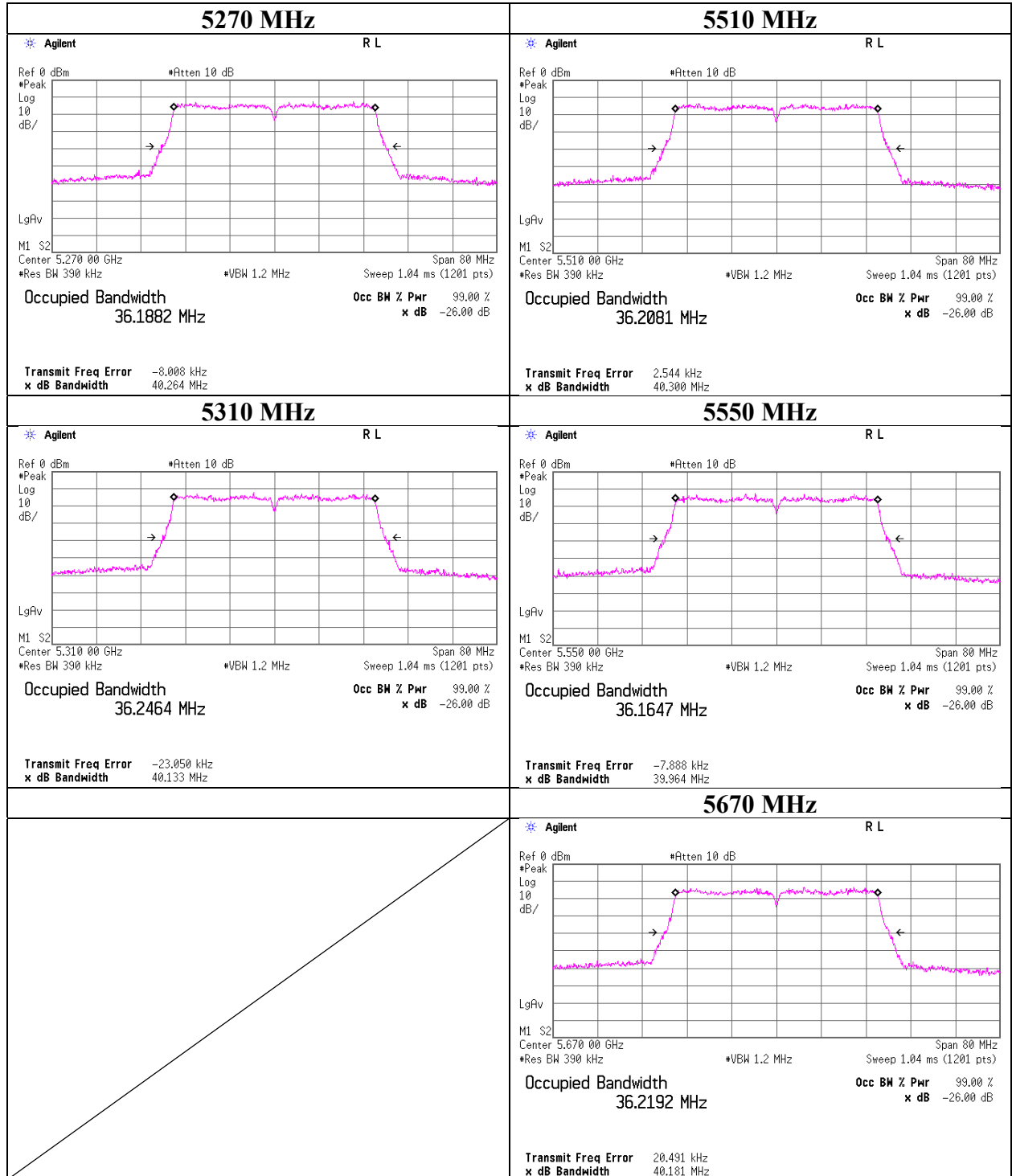
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

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26 dB Emission Bandwidth

11n-40



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Shonan EMC Lab.

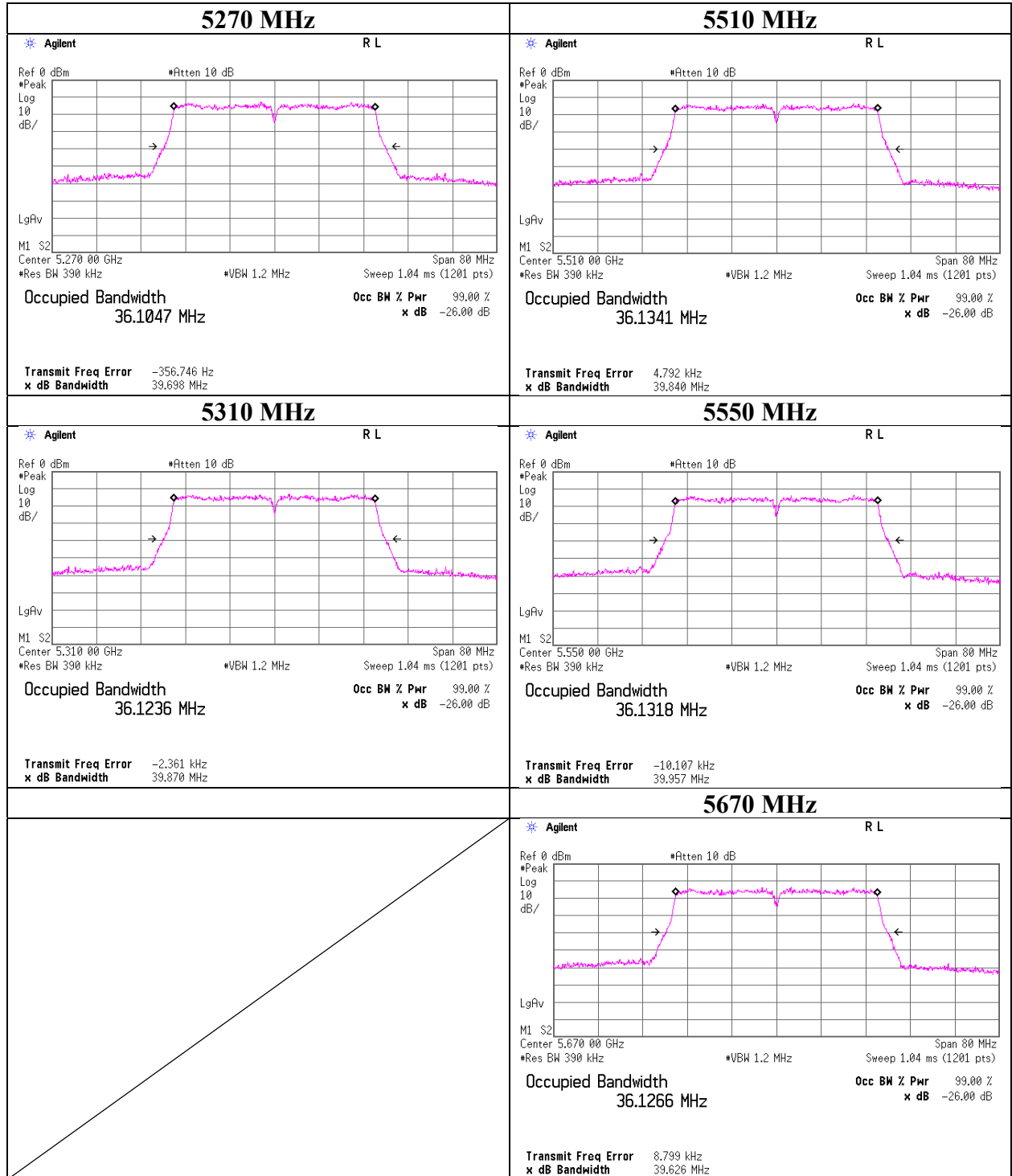
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26 dB Emission Bandwidth

11ac-40



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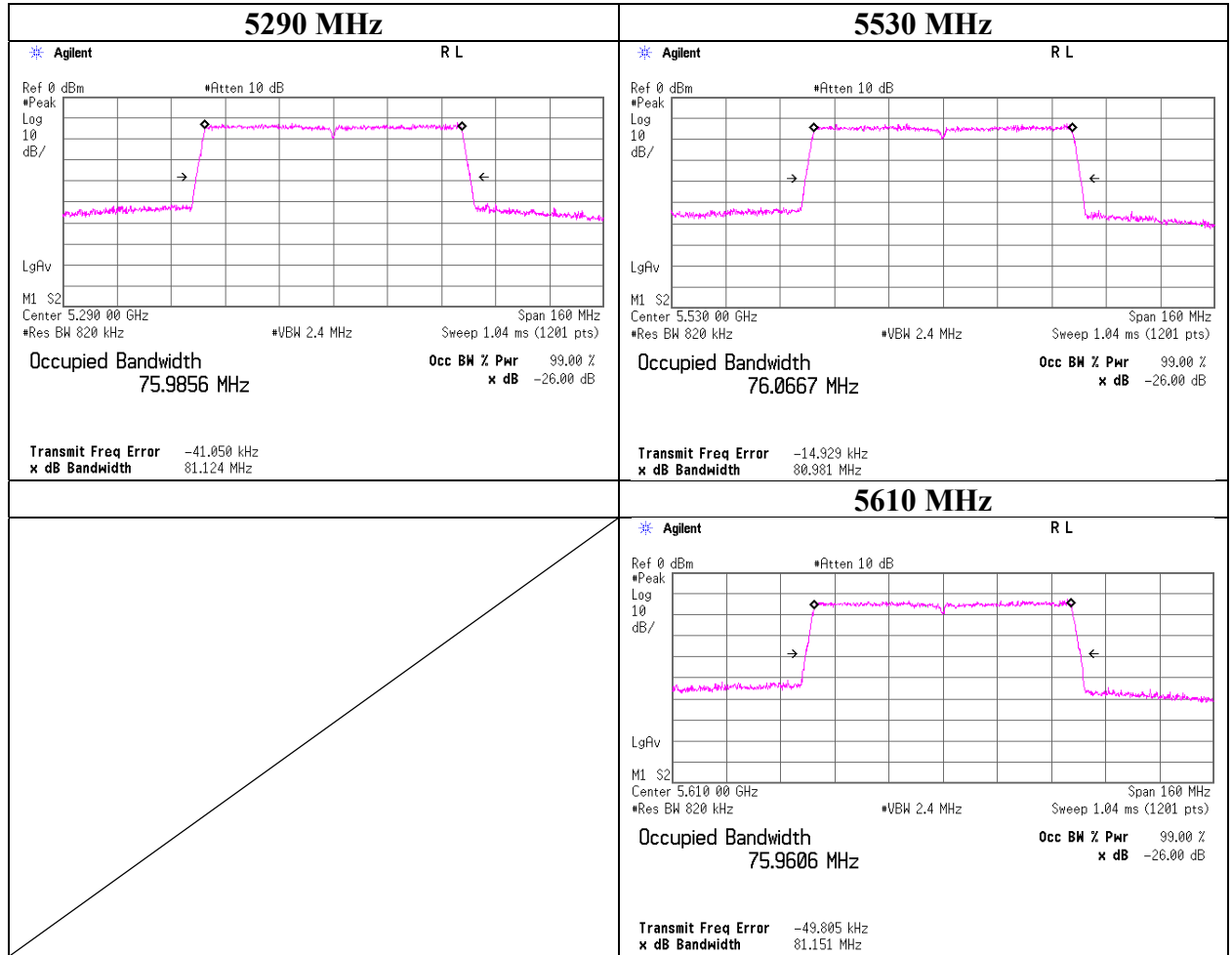
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

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26 dB Emission Bandwidth

11ac-80



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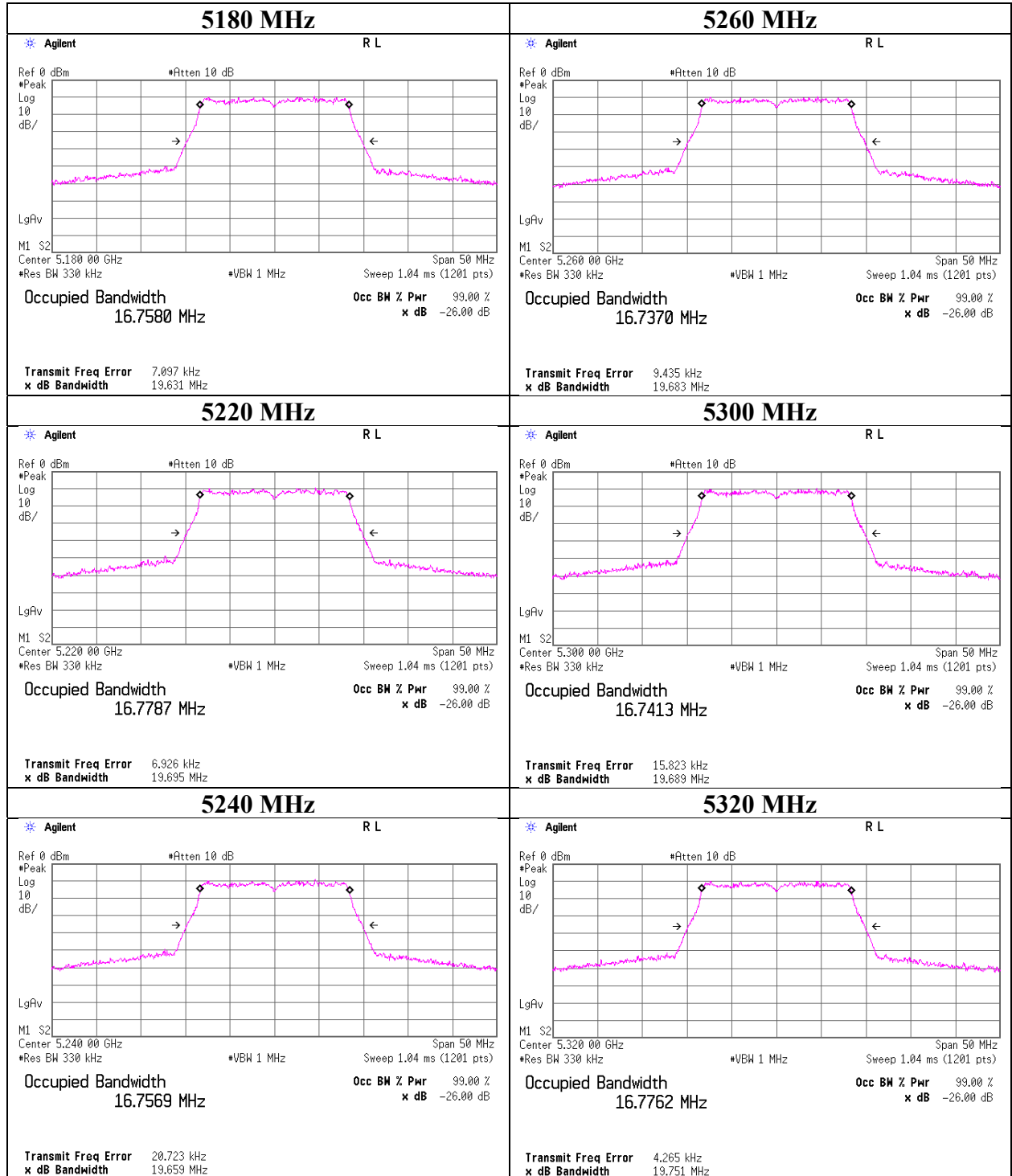
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

99 % Occupied Bandwidth

11a



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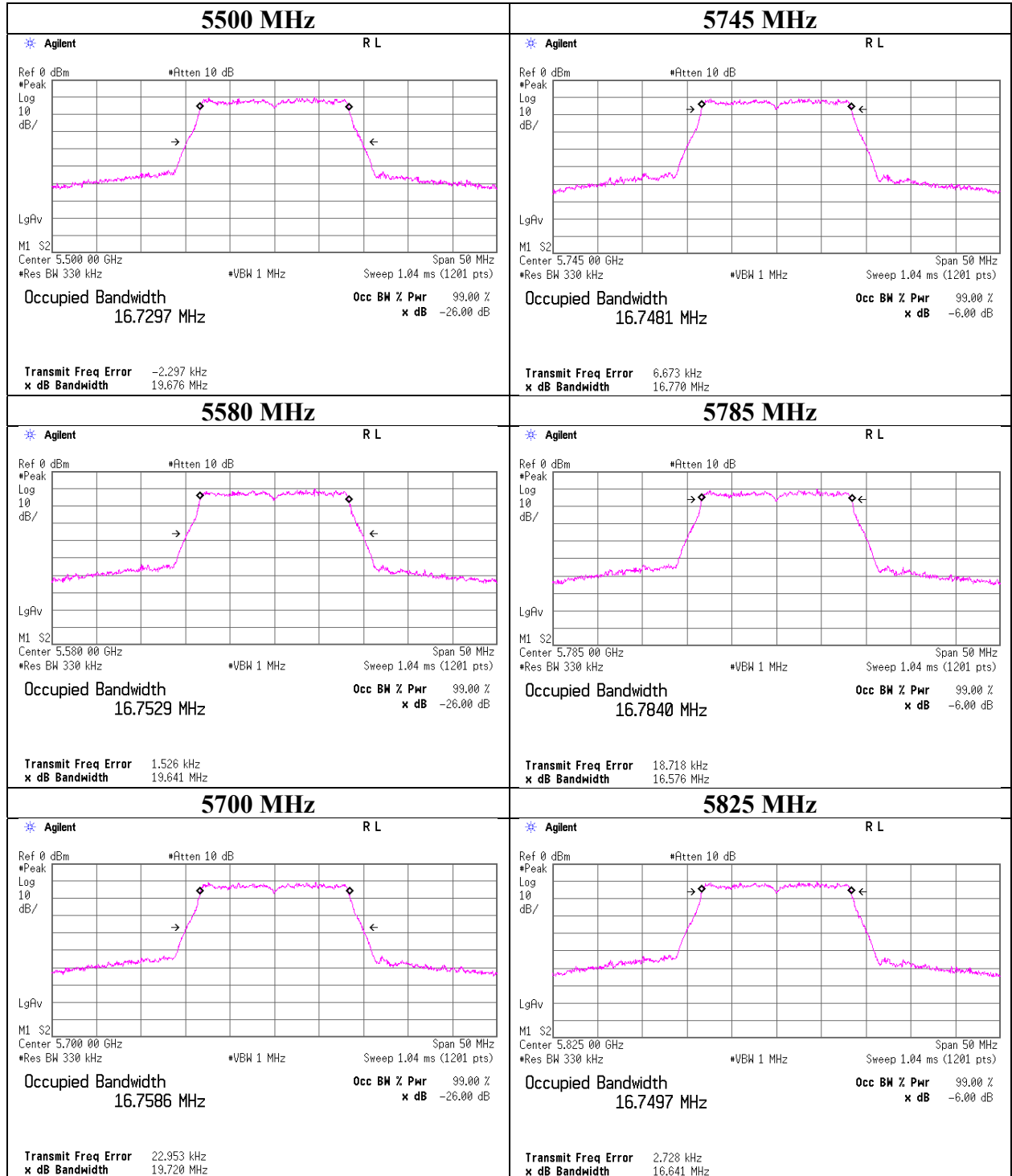
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8999

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99 % Occupied Bandwidth

11a



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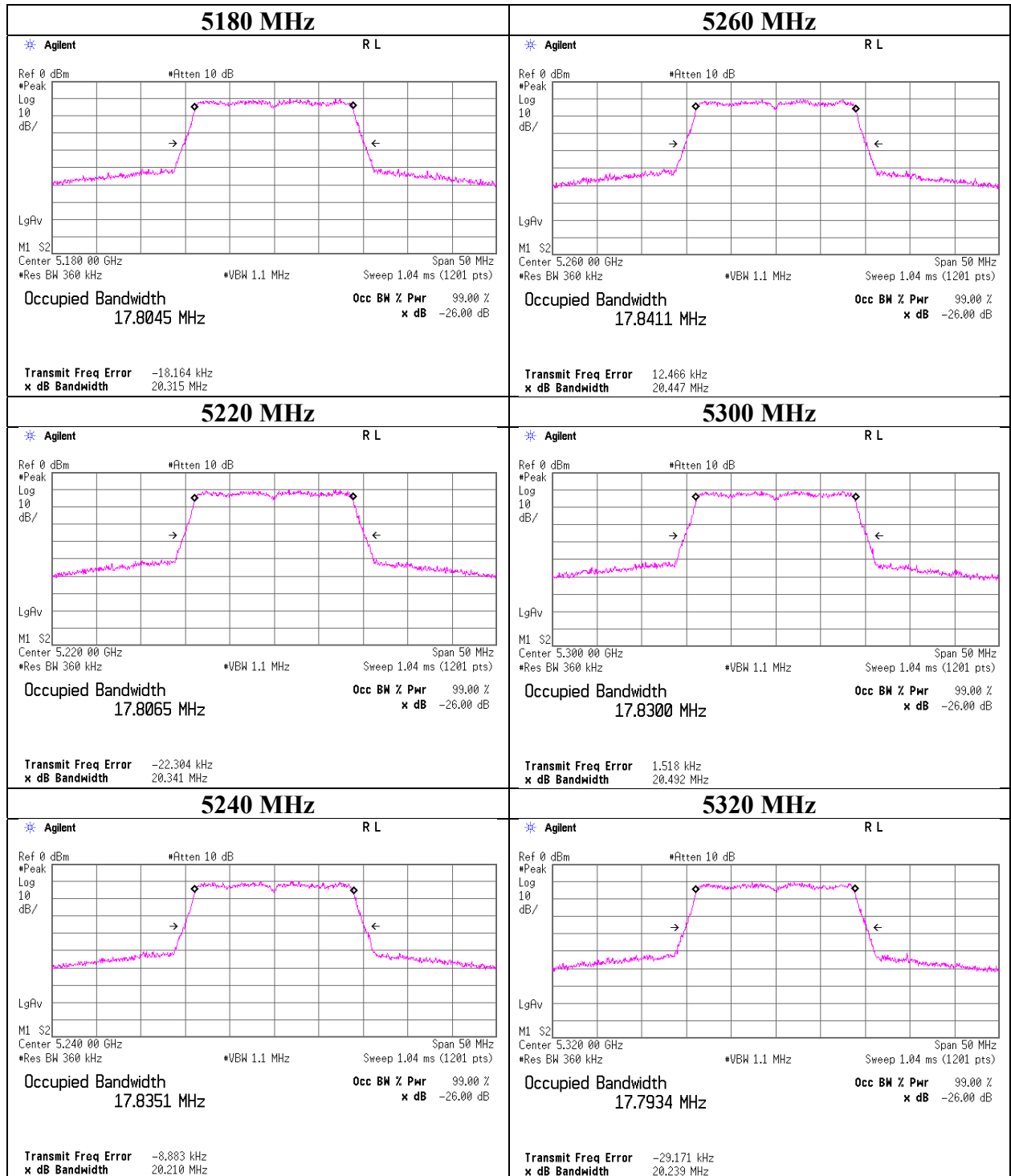
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8999

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99 % Occupied Bandwidth

11n-20



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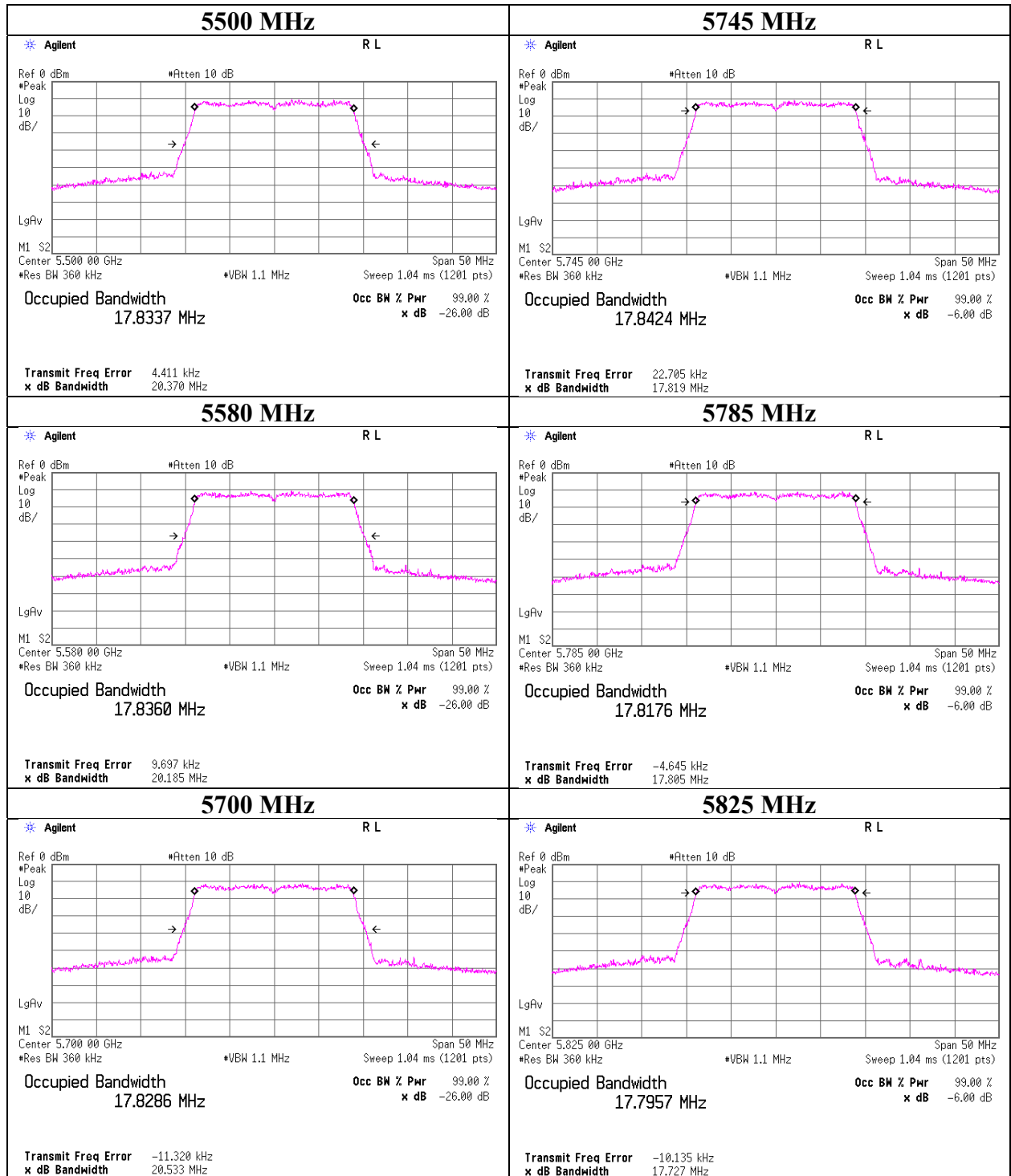
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99 % Occupied Bandwidth

11n-20



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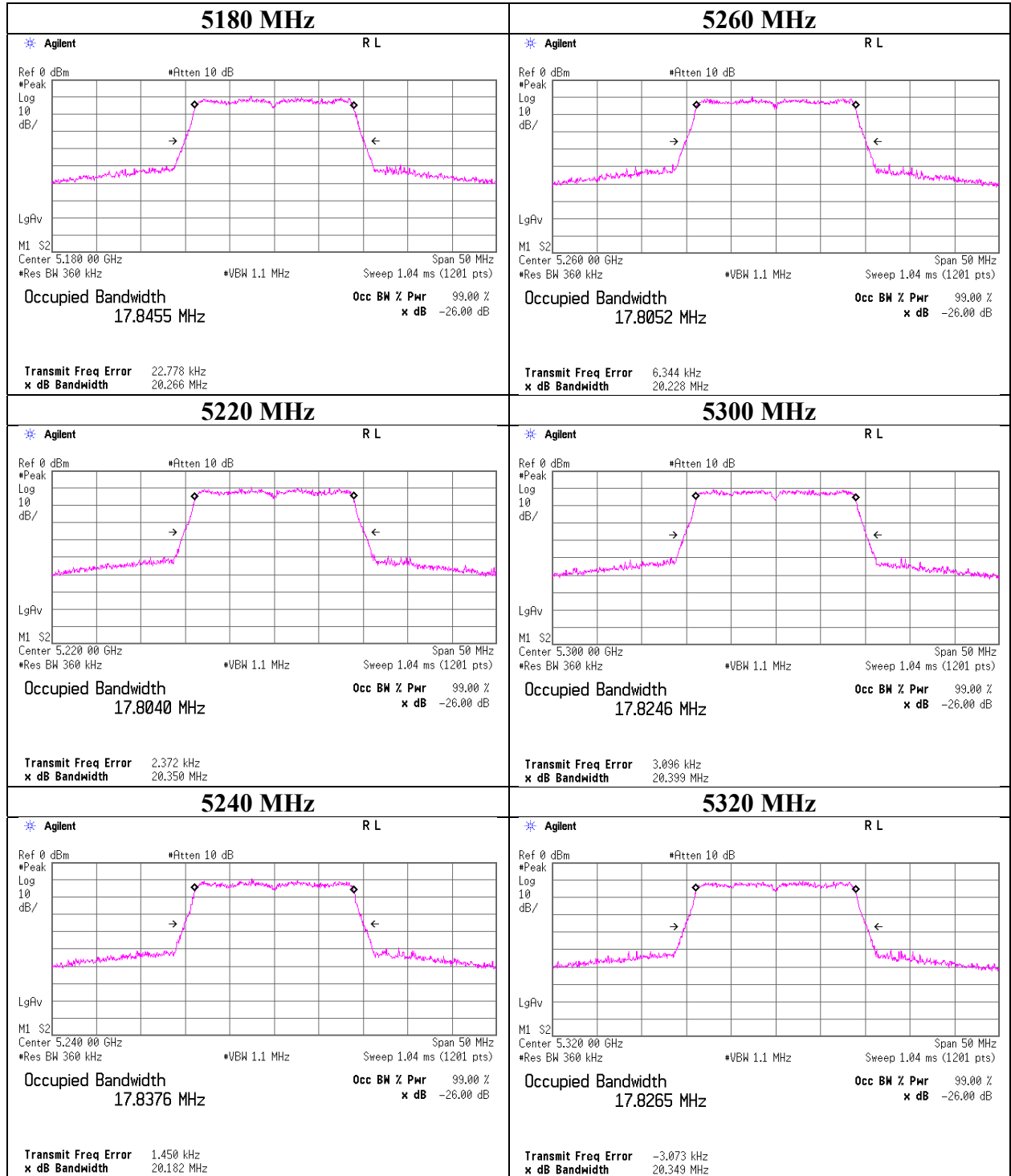
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

99 % Occupied Bandwidth

11ac-20



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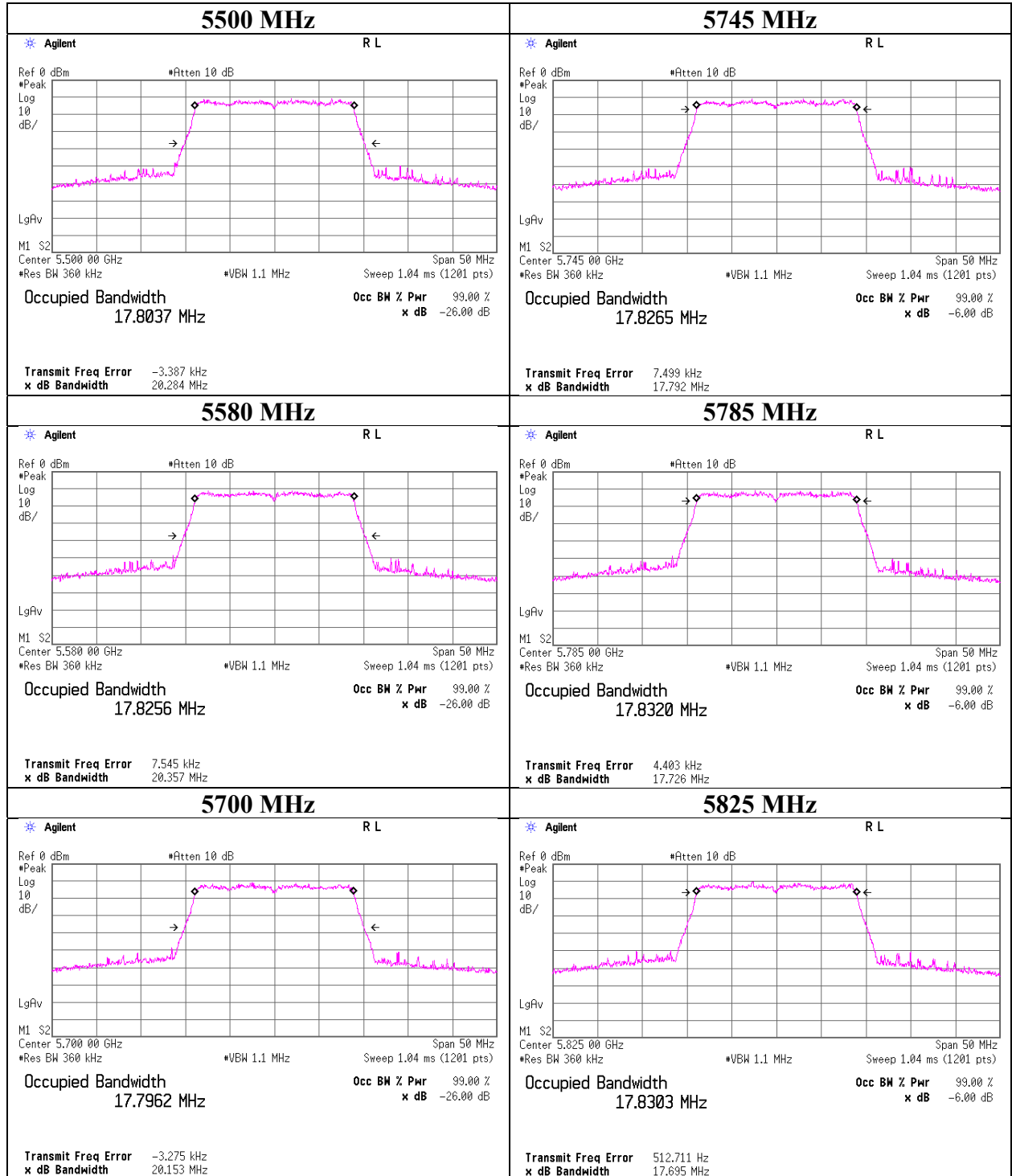
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

99 % Occupied Bandwidth

11ac-20



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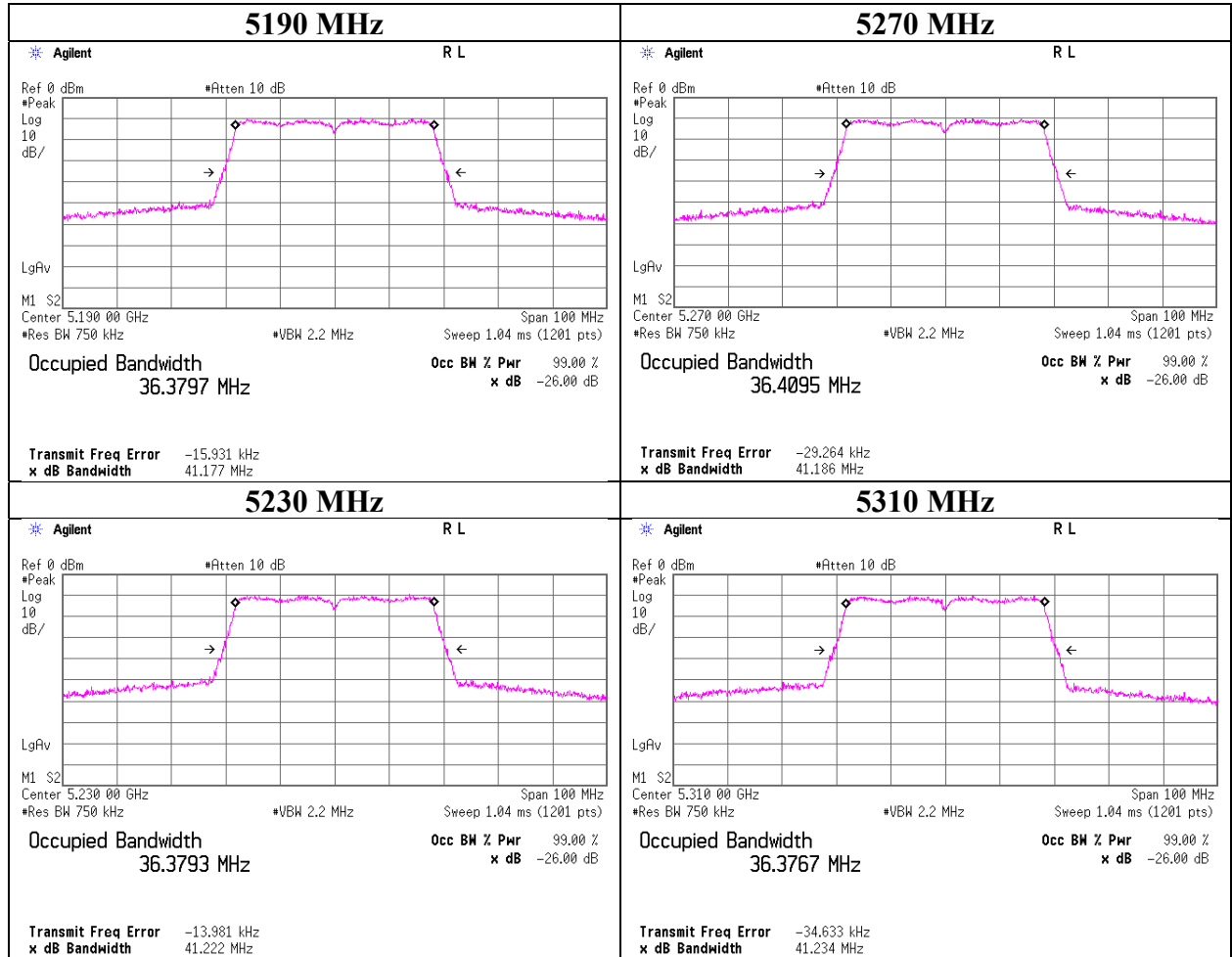
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99 % Occupied Bandwidth

11n-40



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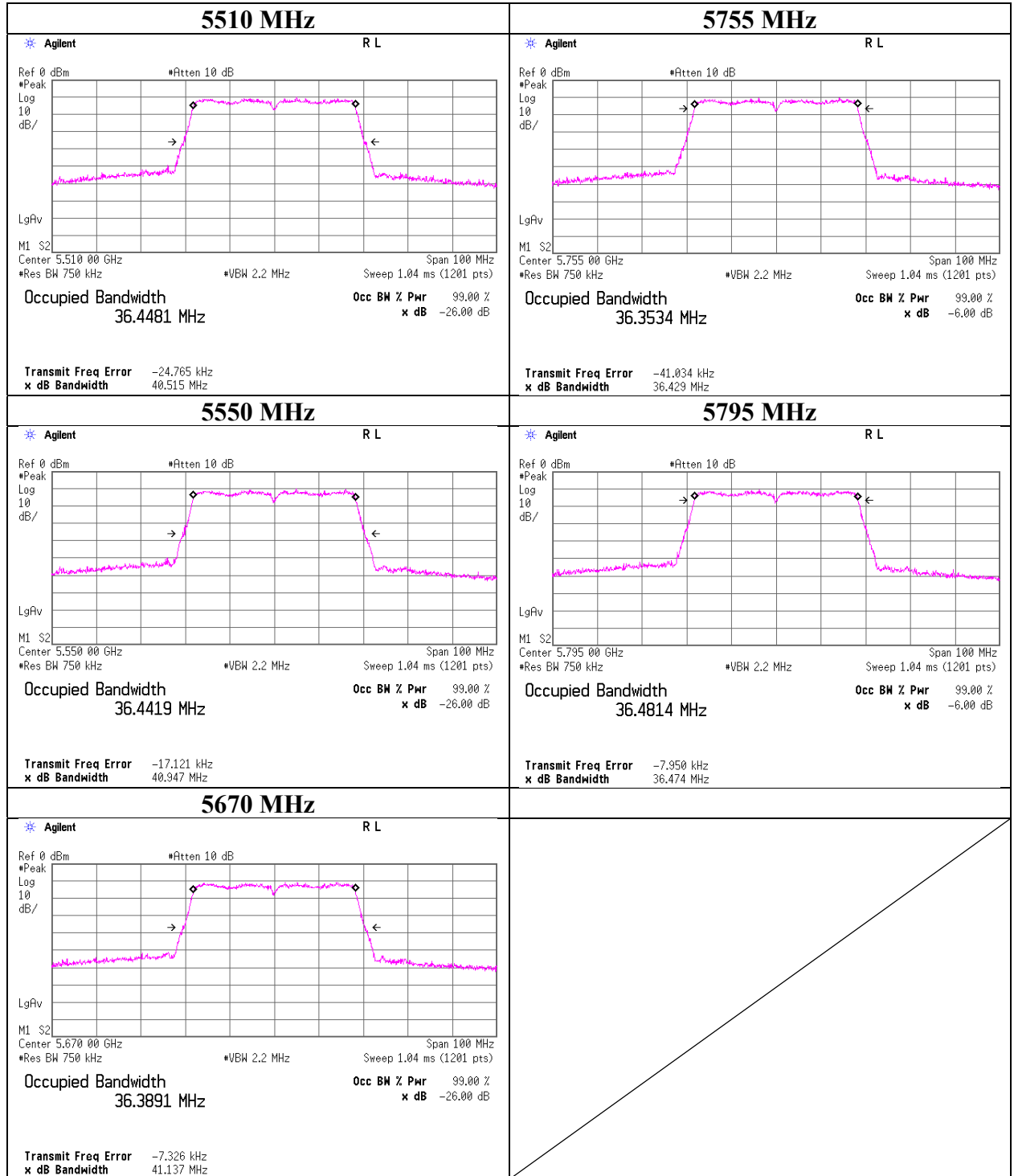
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Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

99 % Occupied Bandwidth

11n-40



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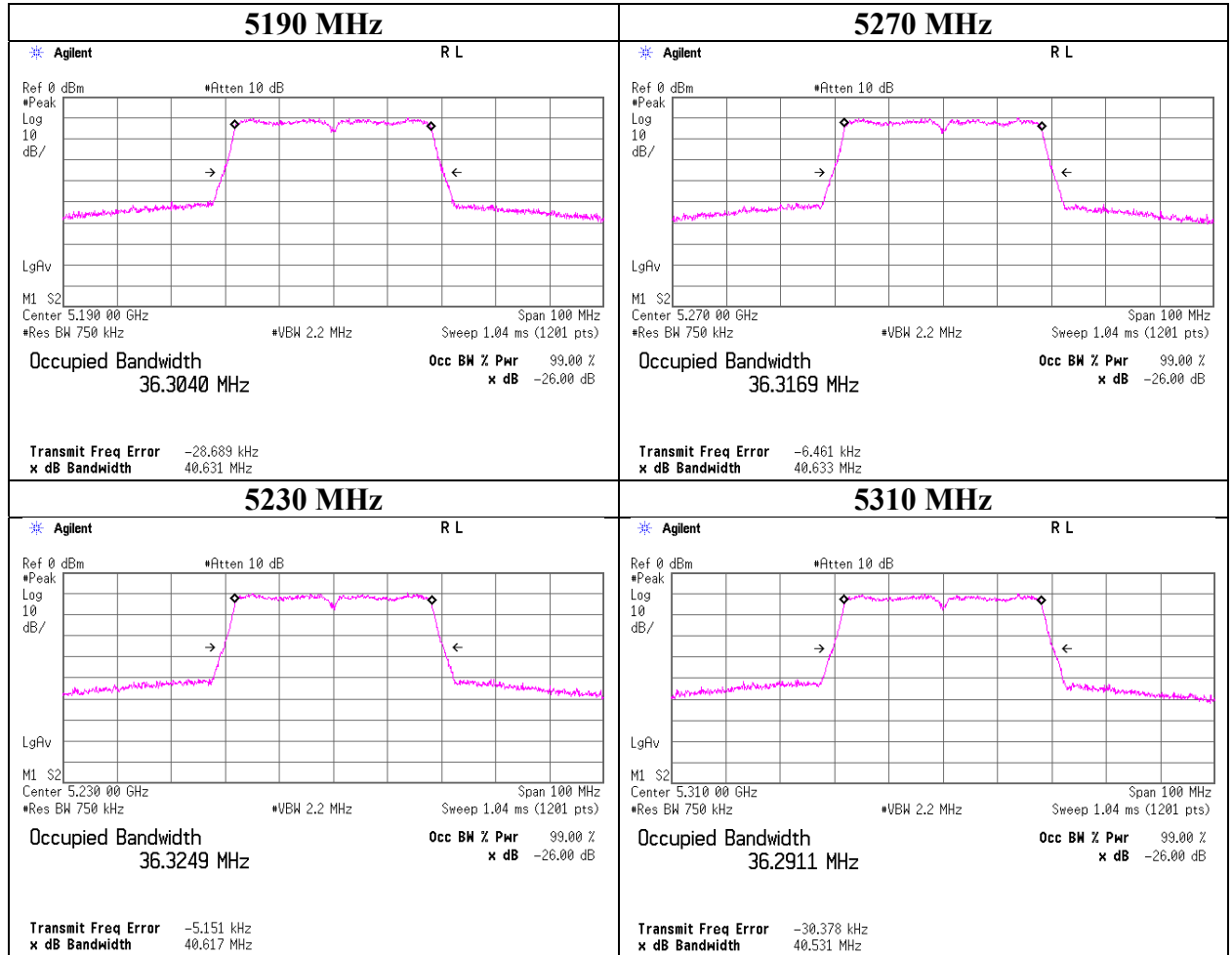
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

99 % Occupied Bandwidth

11ac-40



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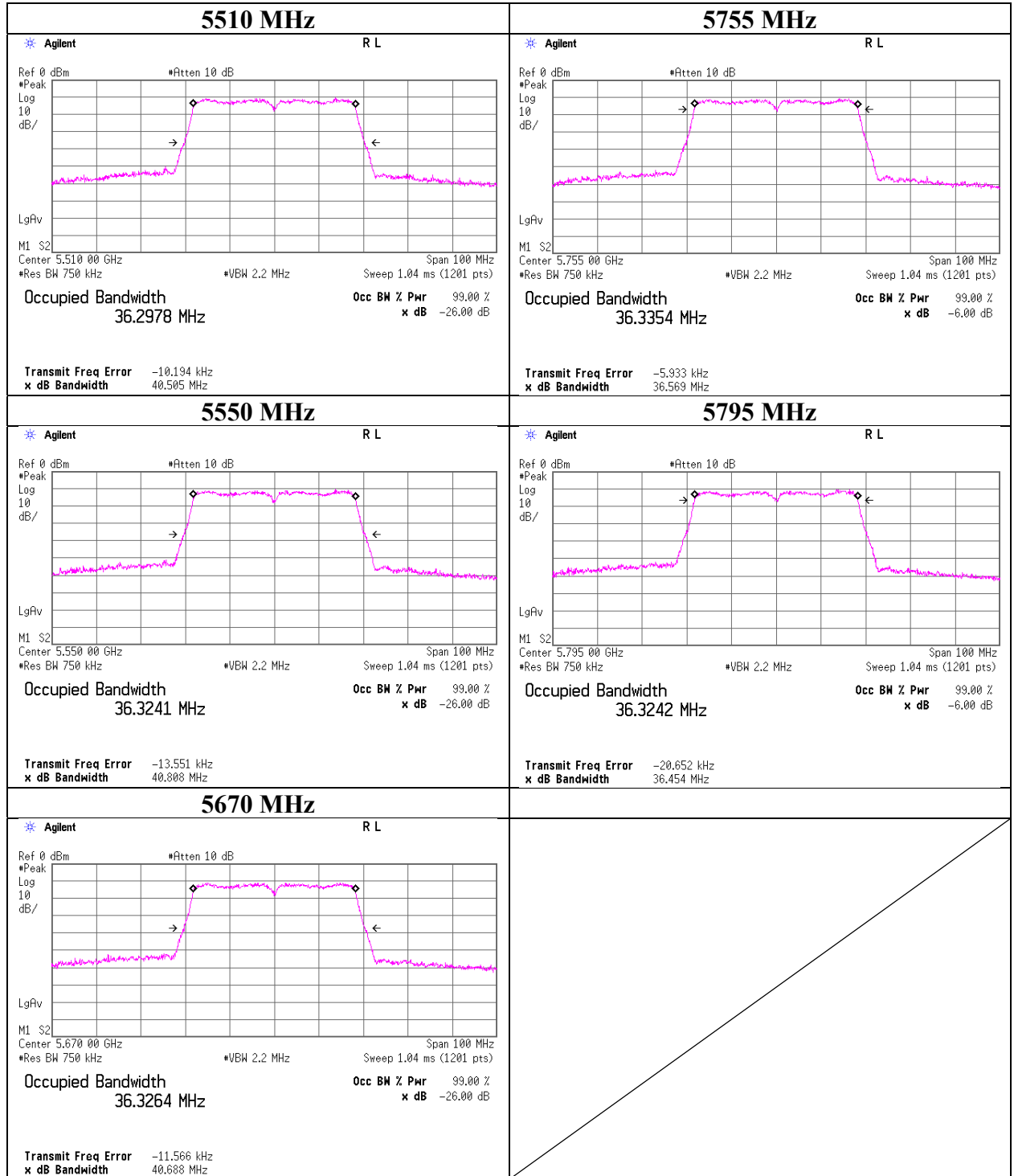
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99 % Occupied Bandwidth

11ac-40



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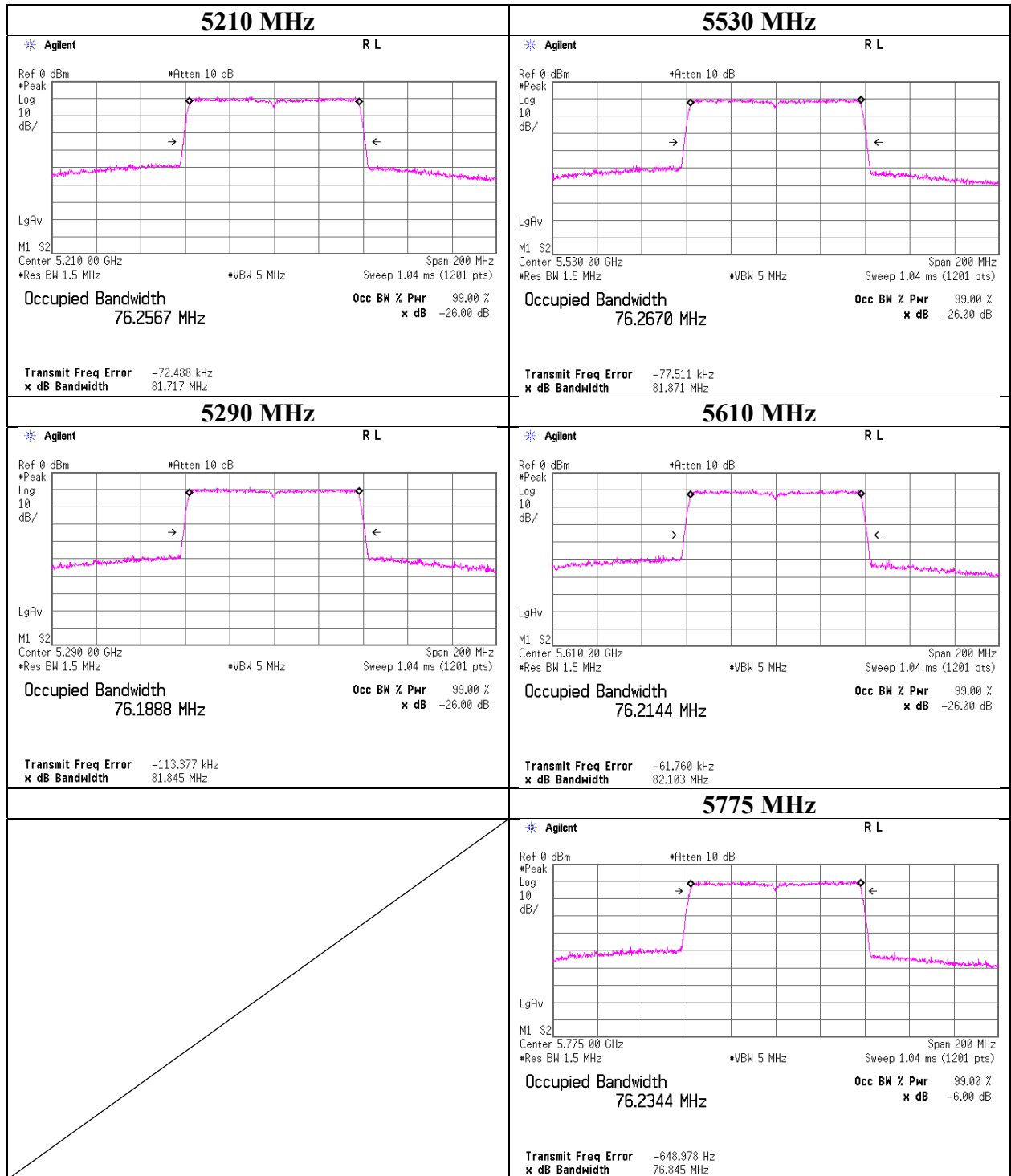
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99 % Occupied Bandwidth

11ac-80



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Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

6 dB Bandwidth

Report No.	13024969S-AE-R3
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	December 9, 2019
Temperature / Humidity	27 deg. C / 45 % RH
Engineer	Toshinori Yamada
Mode	Tx

11a

Tested Frequency [MHz]	6 dB Bandwidth [MHz]	Limit [MHz]
5745	16.573	> 0.500
5785	16.588	> 0.500
5825	16.594	> 0.500

11n-20

Tested Frequency [MHz]	6 dB Bandwidth [MHz]	Limit [MHz]
5745	17.791	> 0.500
5785	17.787	> 0.500
5825	17.791	> 0.500

11ac-20

Tested Frequency [MHz]	6 dB Bandwidth [MHz]	Limit [MHz]
5745	17.809	> 0.500
5785	17.806	> 0.500
5825	17.776	> 0.500

11n-40

Tested Frequency [MHz]	6 dB Bandwidth [MHz]	Limit [MHz]
5755	36.557	> 0.500
5795	36.547	> 0.500

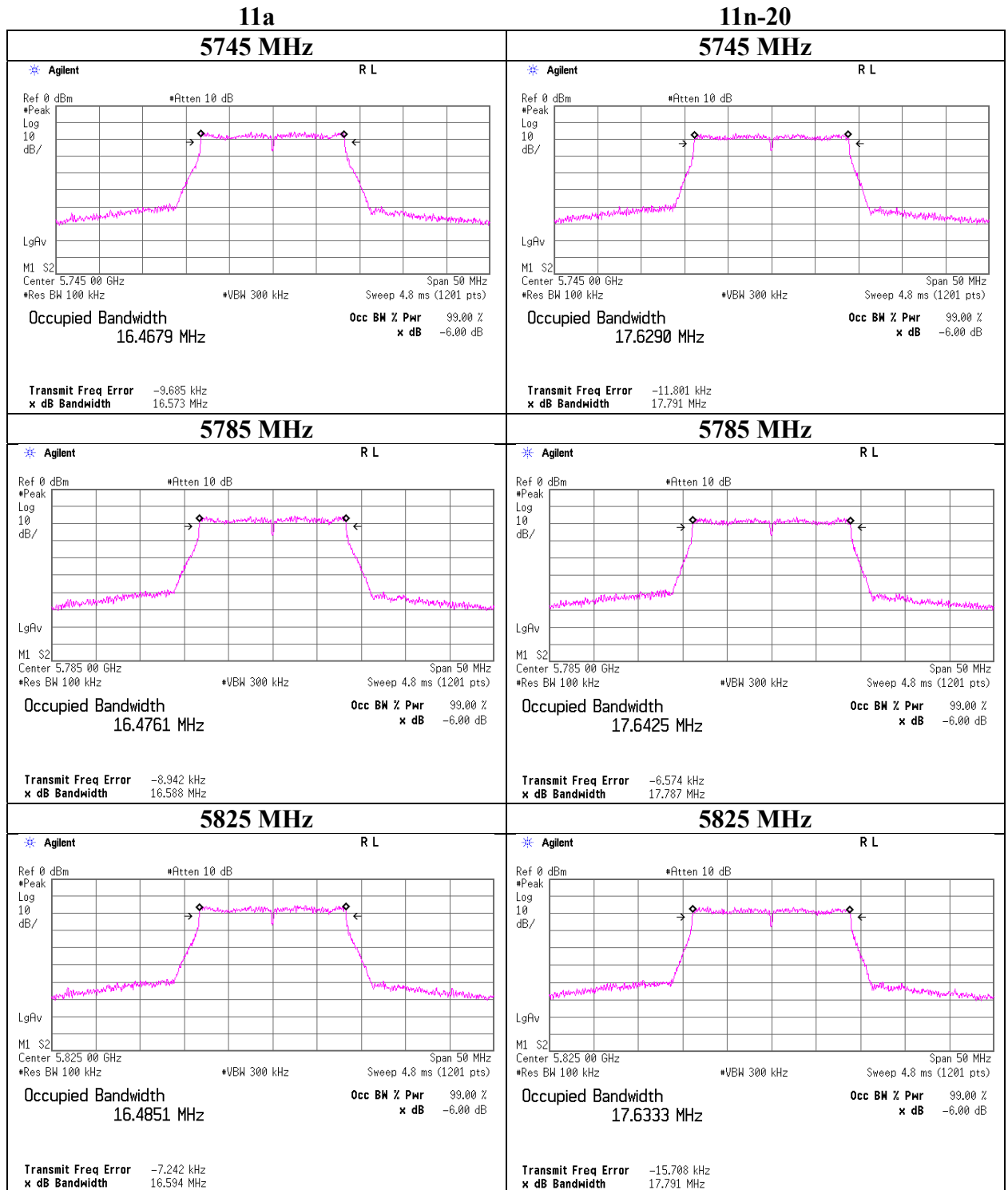
11ac-40

Tested Frequency [MHz]	6 dB Bandwidth [MHz]	Limit [MHz]
5755	36.490	> 0.500
5795	36.519	> 0.500

11ac-80

Tested Frequency [MHz]	6 dB Bandwidth [MHz]	Limit [MHz]
5775	76.661	> 0.500

6 dB Bandwidth



UL Japan, Inc.

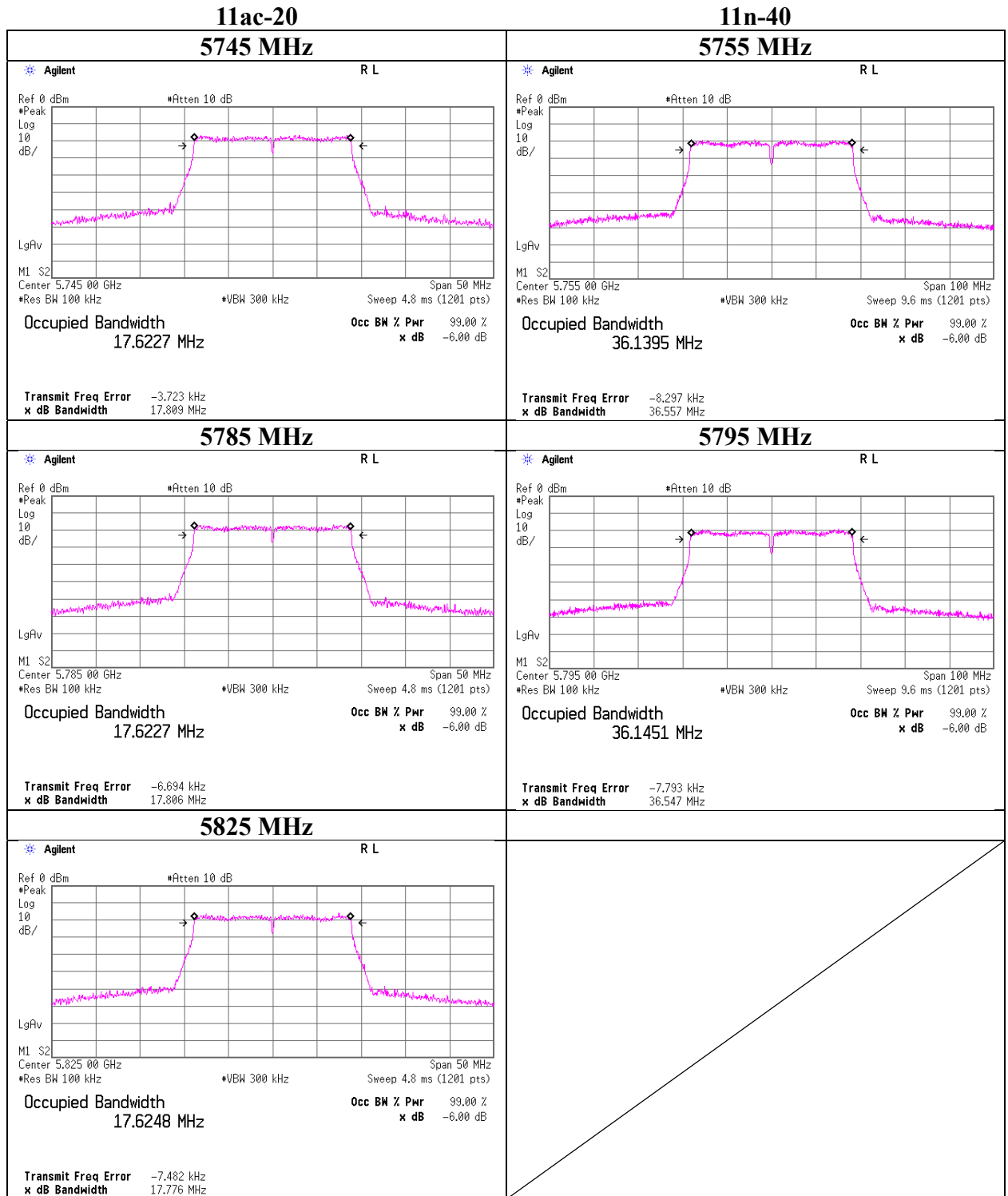
Shonan EMC Lab.

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

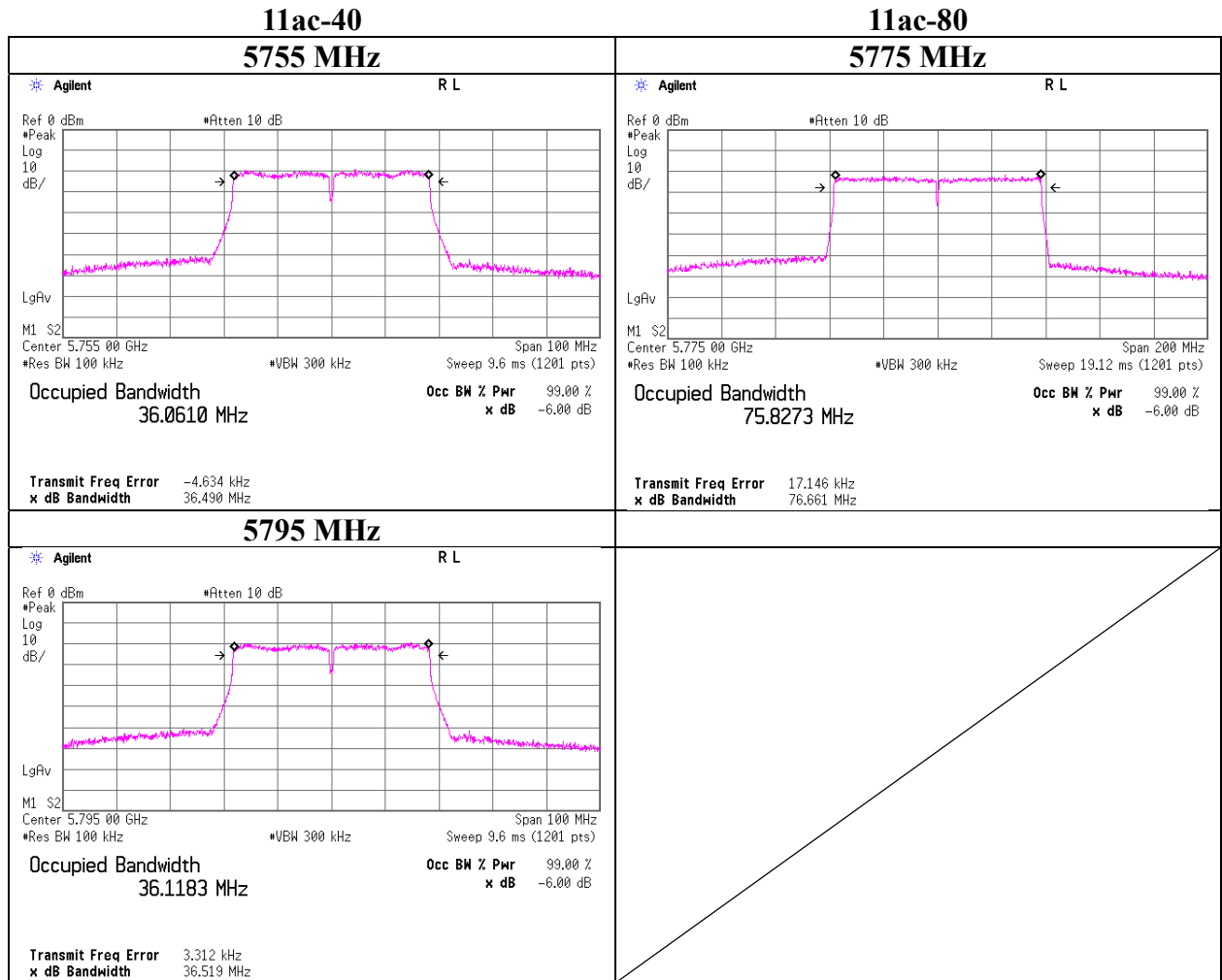
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

6 dB Bandwidth



6 dB Bandwidth



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Shonan EMC Lab.

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

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

Maximum Conducted Output Power

Report No. 13024969S-AE-R3
Test place Shonan EMC Lab. No.5 Shielded Room
Date December 5, 2019
Temperature / Humidity 22 deg. C / 45 % RH
Engineer Kazuya Noda
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	-2.86	1.65	9.94	0.00	4.9	-	16.758	8.73	7.46	23.97	15.24	13.67	23.28	29.97	16.30
5220	-2.80	1.66	9.94	0.00	4.9	-	16.779	8.80	7.59	23.97	15.17	13.74	23.66	29.97	16.23
5240	-2.97	1.66	9.94	0.00	4.9	-	16.757	8.63	7.29	23.97	15.34	13.57	22.75	29.97	16.40
5260	-3.07	1.66	9.93	0.00	4.9	19.387	16.737	8.52	7.11	23.87	15.35	13.46	22.18	29.97	16.51
5300	-3.06	1.67	9.93	0.00	4.9	19.411	16.741	8.54	7.14	23.88	15.34	13.48	22.28	29.97	16.49
5320	-3.24	1.67	9.93	0.00	4.9	19.350	16.776	8.36	6.85	23.86	15.50	13.30	21.38	29.97	16.67
5500	-3.50	1.70	9.93	0.00	4.9	19.421	16.730	8.13	6.50	23.88	15.75	13.07	20.28	29.97	16.90
5580	-3.72	1.70	9.93	0.00	4.9	19.274	16.753	7.91	6.18	23.84	15.93	12.85	19.28	29.97	17.12
5700	-3.89	1.70	9.94	0.00	4.9	19.354	16.759	7.75	5.96	23.86	16.11	12.69	18.58	29.97	17.28
5745	-3.51	1.70	9.94	0.00	4.9	-	16.748	8.13	6.50	30.00	21.87	13.07	20.28	36.00	22.93
5785	-3.49	1.71	9.94	0.00	4.9	-	16.784	8.16	6.55	30.00	21.84	13.10	20.42	36.00	22.90
5825	-3.53	1.71	9.94	0.00	4.9	-	16.750	8.12	6.49	30.00	21.88	13.06	20.23	36.00	22.94

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

*[U-NII-1 band for FCC]

Although the EUT operates on Master mode, more stringent limit for Client device was applied.

Also, the maximum e.i.r.p. Result is less than 125 mW (21 dBm).

Maximum Conducted Output Power

Report No. 13024969S-AE-R3
Test place Shonan EMC Lab. No.5 Shielded Room
Date December 5, 2019
Temperature / Humidity 22 deg. C / 45 % RH
Engineer Kazuya Noda
Mode Tx 11n-20

11n-20

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	-3.39	1.65	9.94	0.00	4.9	-	17.804	8.20	6.61	23.97	15.77	13.14	20.61	29.97	16.83
5220	-3.33	1.66	9.94	0.00	4.9	-	17.807	8.27	6.71	23.97	15.70	13.21	20.94	29.97	16.76
5240	-3.51	1.66	9.94	0.00	4.9	-	17.835	8.09	6.44	23.97	15.88	13.03	20.09	29.97	16.94
5260	-3.63	1.66	9.93	0.00	4.9	20.041	17.841	7.96	6.25	23.97	16.01	12.90	19.50	29.97	17.07
5300	-3.61	1.67	9.93	0.00	4.9	20.222	17.830	7.99	6.30	23.97	15.98	12.93	19.63	29.97	17.04
5320	-3.78	1.67	9.93	0.00	4.9	20.226	17.793	7.82	6.05	23.97	16.15	12.76	18.88	29.97	17.21
5500	-4.10	1.70	9.93	0.00	4.9	19.899	17.834	7.53	5.66	23.97	16.44	12.47	17.66	29.97	17.50
5580	-4.30	1.70	9.93	0.00	4.9	19.993	17.836	7.33	5.41	23.97	16.64	12.27	16.87	29.97	17.70
5700	-4.47	1.70	9.94	0.00	4.9	20.095	17.829	7.17	5.21	23.97	16.80	12.11	16.26	29.97	17.86
5745	-4.08	1.70	9.94	0.00	4.9	-	17.842	7.56	5.70	30.00	22.44	12.50	17.78	36.00	23.50
5785	-4.05	1.71	9.94	0.00	4.9	-	17.818	7.60	5.75	30.00	22.40	12.54	17.95	36.00	23.46
5825	-4.08	1.71	9.94	0.00	4.9	-	17.796	7.57	5.71	30.00	22.43	12.51	17.82	36.00	23.49

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

*[U-NII-1 band for FCC]

Although the EUT operates on Master mode, more stringent limit for Client device was applied.

Also, the maximum e.i.r.p. Result is less than 125 mW (21 dBm).

Maximum Conducted Output Power

Report No. 13024969S-AE-R3
Test place Shonan EMC Lab. No.5 Shielded Room
Date December 5, 2019
Temperature / Humidity 22 deg. C / 45 % RH
Engineer Kazuya Noda
Mode Tx 11ac-20

11ac-20

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	-3.39	1.65	9.94	0.00	4.9	-	17.846	8.20	6.61	23.97	15.77	13.14	20.61	29.97	16.83
5220	-3.31	1.66	9.94	0.00	4.9	-	17.804	8.29	6.75	23.97	15.68	13.23	21.04	29.97	16.74
5240	-3.53	1.66	9.94	0.00	4.9	-	17.838	8.07	6.41	23.97	15.90	13.01	20.00	29.97	16.96
5260	-3.65	1.66	9.93	0.00	4.9	20.021	17.805	7.94	6.22	23.97	16.03	12.88	19.41	29.97	17.09
5300	-3.62	1.67	9.93	0.00	4.9	20.045	17.825	7.98	6.28	23.97	15.99	12.92	19.59	29.97	17.05
5320	-3.82	1.67	9.93	0.00	4.9	19.979	17.827	7.78	6.00	23.97	16.19	12.72	18.71	29.97	17.25
5500	-4.10	1.70	9.93	0.00	4.9	19.787	17.804	7.53	5.66	23.96	16.43	12.47	17.66	29.97	17.50
5580	-4.31	1.70	9.93	0.00	4.9	19.973	17.826	7.32	5.40	23.97	16.65	12.26	16.83	29.97	17.71
5700	-4.48	1.70	9.94	0.00	4.9	19.920	17.796	7.16	5.20	23.97	16.81	12.10	16.22	29.97	17.87
5745	-4.09	1.70	9.94	0.00	4.9	-	17.827	7.55	5.69	30.00	22.45	12.49	17.74	36.00	23.51
5785	-4.07	1.71	9.94	0.00	4.9	-	17.832	7.58	5.73	30.00	22.42	12.52	17.86	36.00	23.48
5825	-4.06	1.71	9.94	0.00	4.9	-	17.830	7.59	5.74	30.00	22.41	12.53	17.91	36.00	23.47

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

*[U-NII-1 band for FCC]

Although the EUT operates on Master mode, more stringent limit for Client device was applied.

Also, the maximum e.i.r.p. Result is less than 125 mW (21 dBm).

Maximum Conducted Output Power

Report No.	13024969S-AE-R3
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	December 5, 2019
Temperature / Humidity	22 deg. C / 45 % RH
Engineer	Kazuya Noda
Mode	Tx 11n-40

11n-40

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]
5190	-3.60	1.65	9.94	0.00	4.9	-	36.380	7.99	6.30	23.97	15.98	12.93	19.63	29.97	17.04
5230	-3.62	1.66	9.94	0.00	4.9	-	36.379	7.98	6.28	23.97	15.99	12.92	19.59	29.97	17.05
5270	-3.87	1.66	9.93	0.00	4.9	40.264	36.410	7.72	5.92	23.97	16.25	12.66	18.45	29.97	17.31
5310	-3.91	1.67	9.93	0.00	4.9	40.133	36.377	7.69	5.87	23.97	16.28	12.63	18.32	29.97	17.34
5510	-4.32	1.70	9.93	0.00	4.9	40.300	36.448	7.31	5.38	23.97	16.66	12.25	16.79	29.97	17.72
5550	-4.44	1.70	9.93	0.00	4.9	39.964	36.442	7.19	5.24	23.97	16.78	12.13	16.33	29.97	17.84
5670	-4.60	1.70	9.94	0.00	4.9	40.181	36.389	7.04	5.06	23.97	16.93	11.98	15.78	29.97	17.99
5755	-4.24	1.71	9.94	0.00	4.9	-	36.353	7.41	5.51	30.00	22.59	12.35	17.18	36.00	23.65
5795	-4.29	1.71	9.94	0.00	4.9	-	36.481	7.36	5.45	30.00	22.64	12.30	16.98	36.00	23.70

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

*[U-NII-1 band for FCC]

Although the EUT operates on Master mode, more stringent limit for Client device was applied.

Also, the maximum e.i.r.p. Result is less than 125 mW (21 dBm).

Maximum Conducted Output Power

Report No.	13024969S-AE-R3
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	December 5, 2019
Temperature / Humidity	22 deg. C / 45 % RH
Engineer	Kazuya Noda
Mode	Tx 11ac-40

11ac-40

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]
5190	-3.55	1.65	9.94	0.00	4.9	-	36.304	8.04	6.37	23.97	15.93	12.98	19.86	29.97	16.99
5230	-3.58	1.66	9.94	0.00	4.9	-	36.325	8.02	6.34	23.97	15.95	12.96	19.77	29.97	17.01
5270	-3.86	1.66	9.93	0.00	4.9	39.698	36.317	7.73	5.93	23.97	16.24	12.67	18.49	29.97	17.30
5310	-3.90	1.67	9.93	0.00	4.9	39.870	36.291	7.70	5.89	23.97	16.27	12.64	18.37	29.97	17.33
5510	-4.33	1.70	9.93	0.00	4.9	39.840	36.298	7.30	5.37	23.97	16.67	12.24	16.75	29.97	17.73
5550	-4.48	1.70	9.93	0.00	4.9	39.957	36.324	7.15	5.19	23.97	16.82	12.09	16.18	29.97	17.88
5670	-4.63	1.70	9.94	0.00	4.9	39.626	36.326	7.01	5.02	23.97	16.96	11.95	15.67	29.97	18.02
5755	-4.24	1.71	9.94	0.00	4.9	-	36.335	7.41	5.51	30.00	22.59	12.35	17.18	36.00	23.65
5795	-4.25	1.71	9.94	0.00	4.9	-	36.324	7.40	5.50	30.00	22.60	12.34	17.14	36.00	23.66

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

*[U-NII-1 band for FCC]

Although the EUT operates on Master mode, more stringent limit for Client device was applied.

Also, the maximum e.i.r.p. Result is less than 125 mW (21 dBm).

Maximum Conducted Output Power

Report No.	13024969S-AE-R3
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	December 5, 2019
Temperature / Humidity	22 deg. C / 45 % RH
Engineer	Kazuya Noda
Mode	Tx 11ac-80

11ac-80

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]
5210	-3.25	1.65	9.94	0.00	4.9	-	76.257	8.34	6.82	23.97	15.63	13.28	21.28	29.97	16.69
5290	-3.50	1.67	9.93	0.00	4.9	81.124	76.189	8.10	6.46	23.97	15.87	13.04	20.14	29.97	16.93
5530	-3.93	1.70	9.93	0.00	4.9	80.981	76.267	7.70	5.89	23.97	16.27	12.64	18.37	29.97	17.33
5610	-4.03	1.70	9.93	0.00	4.9	81.151	76.214	7.60	5.75	23.97	16.37	12.54	17.95	29.97	17.43
5775	-3.80	1.71	9.94	0.00	4.9	-	76.234	7.85	6.10	30.00	22.15	12.79	19.01	36.00	23.21

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

*[U-NII-1 band for FCC]

Although the EUT operates on Master mode, more stringent limit for Client device was applied.

Also, the maximum e.i.r.p. Result is less than 125 mW (21 dBm).

Maximum Conducted Output Power

Report No. 13024969S-AE-R3
Test place Shonan EMC Lab. No.5 Shielded Room
Date October 31, 2019
Temperature / Humidity 24 deg. C / 45 % RH
Engineer Makoto Hosaka
Mode Tx 11a

5180 MHz

Mode	Rate Mbps	Reading (timed average) [dBm]	Duty factor [dB]	Burst power [dBm]	Remarks
11a	6	-4.02	0.00	-4.02	
	9	-3.99	0.00	-3.99	
	12	-4.01	0.00	-4.01	
	18	-4.00	0.00	-4.00	
	24	-4.04	0.00	-4.04	
	36	-4.10	0.00	-4.10	
	48	-4.05	0.00	-4.05	
	54	-3.83	0.00	-3.83	*

* Worst rate

Sample Calculation:

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

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

Difference between worst rate check data and formal test result is due to the different test condition.

Maximum Conducted Output Power

Report No. 13024969S-AE-R3
Test place Shonan EMC Lab. No.5 Shielded Room
Date October 31, 2019
Temperature / Humidity 24 deg. C / 45 % RH
Engineer Makoto Hosaka
Mode Tx 11n-20

5180 MHz

Mode	MCS Number	Reading (timed average) [dBm]	Duty factor [dB]	Burst power [dBm]	Remarks
11n-20	0	-4.85	0.00	-4.85	
	1	-4.95	0.00	-4.95	
	2	-4.83	0.00	-4.83	
	3	-4.86	0.00	-4.86	
	4	-4.49	0.00	-4.49	*
	5	-4.88	0.00	-4.88	
	6	-4.67	0.00	-4.67	
	7	-4.69	0.00	-4.69	

* Worst rate

Sample Calculation:

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

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

Difference between worst rate check data and formal test result is due to the different test condition.

Maximum Conducted Output Power

Report No. 13024969S-AE-R3
Test place Shonan EMC Lab. No.5 Shielded Room
Date October 31, 2019
Temperature / Humidity 24 deg. C / 45 % RH
Engineer Makoto Hosaka
Mode Tx 11ac-20

5180 MHz

Mode	MCS Number	Reading (timed average) [dBm]	Duty factor [dB]	Burst power [dBm]	Remarks
11ac-20	0	-4.84	0.00	-4.84	
	1	-4.94	0.00	-4.94	
	2	-4.82	0.00	-4.82	
	3	-4.87	0.00	-4.87	
	4	-4.50	0.00	-4.50	*
	5	-4.88	0.00	-4.88	
	6	-4.67	0.00	-4.67	
	7	-4.69	0.00	-4.69	
	8	-4.52	0.00	-4.52	

* Worst rate

Sample Calculation:

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

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

Difference between worst rate check data and formal test result is due to the different test condition.

Maximum Conducted Output Power

Report No. 13024969S-AE-R3
Test place Shonan EMC Lab. No.5 Shielded Room
Date October 31, 2019
Temperature / Humidity 24 deg. C / 45 % RH
Engineer Makoto Hosaka
Mode Tx 11n-40

5190 MHz

Mode	MCS Number	Reading (timed average) [dBm]	Duty factor [dB]	Burst power [dBm]	Remarks
11n-40	0	-4.97	0.00	-4.97	
	1	-4.98	0.00	-4.98	
	2	-4.96	0.00	-4.96	
	3	-5.01	0.00	-5.01	
	4	-4.79	0.00	-4.79	
	5	-5.02	0.00	-5.02	
	6	-4.75	0.00	-4.75	
	7	-4.73	0.00	-4.73	*

* Worst rate

Sample Calculation:

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

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

Difference between worst rate check data and formal test result is due to the different test condition.

Maximum Conducted Output Power

Report No.	13024969S-AE-R3
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	October 31, 2019
Temperature / Humidity	24 deg. C / 45 % RH
Engineer	Makoto Hosaka
Mode	Tx 11ac-40

5190 MHz

Mode	MCS Number	Reading (timed average) [dBm]	Duty factor [dB]	Burst power [dBm]	Remarks
11ac-40	0	-4.92	0.00	-4.92	
	1	-4.91	0.00	-4.91	
	2	-4.97	0.00	-4.97	
	3	-5.01	0.00	-5.01	
	4	-4.79	0.00	-4.79	
	5	-5.05	0.00	-5.05	
	6	-4.76	0.00	-4.76	
	7	-4.74	0.00	-4.74	
	8	-4.73	0.00	-4.73	*
	9	-5.04	0.00	-5.04	

* Worst rate

Sample Calculation:

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

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

Difference between worst rate check data and formal test result is due to the different test condition.

Maximum Conducted Output Power

Report No. 13024969S-AE-R3
Test place Shonan EMC Lab. No.5 Shielded Room
Date October 31, 2019
Temperature / Humidity 24 deg. C / 45 % RH
Engineer Makoto Hosaka
Mode Tx 11ac-80

5210 MHz

Mode	MCS Number	Reading (timed average) [dBm]	Duty factor [dB]	Burst power [dBm]	Remarks
11ac-80	0	-4.70	0.00	-4.70	
	1	-4.73	0.00	-4.73	
	2	-4.69	0.00	-4.69	
	3	-4.71	0.00	-4.71	
	4	-4.57	0.00	-4.57	
	5	-4.87	0.00	-4.87	
	6	-4.58	0.00	-4.58	
	7	-4.67	0.00	-4.67	
	8	-4.51	0.00	-4.51	*
	9	-4.88	0.00	-4.88	

* Worst rate

Sample Calculation:

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

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

Difference between worst rate check data and formal test result is due to the different test condition.

Average Output Power
(Reference data for RF Exposure)

Report No. 13024969S-AE-R3
Test place Shonan EMC Lab. No.5 Shielded Room
Date December 5, 2019
Temperature / Humidity 22 deg. C / 45 % RH
Engineer Kazuya Noda
Mode Tx 11a

11a

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	-2.86	1.65	9.94	8.73	7.46	0.00	8.73	7.46
5220	-2.80	1.66	9.94	8.80	7.59	0.00	8.80	7.59
5240	-2.97	1.66	9.94	8.63	7.29	0.00	8.63	7.29
5260	-3.07	1.66	9.93	8.52	7.11	0.00	8.52	7.11
5300	-3.06	1.67	9.93	8.54	7.14	0.00	8.54	7.14
5320	-3.24	1.67	9.93	8.36	6.85	0.00	8.36	6.85
5500	-3.50	1.70	9.93	8.13	6.50	0.00	8.13	6.50
5580	-3.72	1.70	9.93	7.91	6.18	0.00	7.91	6.18
5700	-3.89	1.70	9.94	7.75	5.96	0.00	7.75	5.96
5745	-3.51	1.70	9.94	8.13	6.50	0.00	8.13	6.50
5785	-3.49	1.71	9.94	8.16	6.55	0.00	8.16	6.55
5825	-3.53	1.71	9.94	8.12	6.49	0.00	8.12	6.49

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 equipment and cables were not used for factor 0 dB of the data sheets.

Average Output Power **(Reference data for RF Exposure)**

Report No.	13024969S-AE-R3
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	December 5, 2019
Temperature / Humidity	22 deg. C / 45 % RH
Engineer	Kazuya Noda
Mode	Tx 11n-20

11n-20

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	-3.39	1.65	9.94	8.20	6.61	0.00	8.20	6.61
5220	-3.33	1.66	9.94	8.27	6.71	0.00	8.27	6.71
5240	-3.51	1.66	9.94	8.09	6.44	0.00	8.09	6.44
5260	-3.63	1.66	9.93	7.96	6.25	0.00	7.96	6.25
5300	-3.61	1.67	9.93	7.99	6.30	0.00	7.99	6.30
5320	-3.78	1.67	9.93	7.82	6.05	0.00	7.82	6.05
5500	-4.10	1.70	9.93	7.53	5.66	0.00	7.53	5.66
5580	-4.30	1.70	9.93	7.33	5.41	0.00	7.33	5.41
5700	-4.47	1.70	9.94	7.17	5.21	0.00	7.17	5.21
5745	-4.08	1.70	9.94	7.56	5.70	0.00	7.56	5.70
5785	-4.05	1.71	9.94	7.60	5.75	0.00	7.60	5.75
5825	-4.08	1.71	9.94	7.57	5.71	0.00	7.57	5.71

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 equipment and cables were not used for factor 0 dB of the data sheets.

Average Output Power
(Reference data for RF Exposure)

Report No. 13024969S-AE-R3
Test place Shonan EMC Lab. No.5 Shielded Room
Date December 5, 2019
Temperature / Humidity 22 deg. C / 45 % RH
Engineer Kazuya Noda
Mode Tx 11ac-20

11ac-20

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	-3.39	1.65	9.94	8.20	6.61	0.00	8.20	6.61
5220	-3.31	1.66	9.94	8.29	6.75	0.00	8.29	6.75
5240	-3.53	1.66	9.94	8.07	6.41	0.00	8.07	6.41
5260	-3.65	1.66	9.93	7.94	6.22	0.00	7.94	6.22
5300	-3.62	1.67	9.93	7.98	6.28	0.00	7.98	6.28
5320	-3.82	1.67	9.93	7.78	6.00	0.00	7.78	6.00
5500	-4.10	1.70	9.93	7.53	5.66	0.00	7.53	5.66
5580	-4.31	1.70	9.93	7.32	5.40	0.00	7.32	5.40
5700	-4.48	1.70	9.94	7.16	5.20	0.00	7.16	5.20
5745	-4.09	1.70	9.94	7.55	5.69	0.00	7.55	5.69
5785	-4.07	1.71	9.94	7.58	5.73	0.00	7.58	5.73
5825	-4.06	1.71	9.94	7.59	5.74	0.00	7.59	5.74

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 equipment and cables were not used for factor 0 dB of the data sheets.

Average Output Power
(Reference data for RF Exposure)

Report No. 13024969S-AE-R3
Test place Shonan EMC Lab. No.5 Shielded Room
Date December 5, 2019
Temperature / Humidity 22 deg. C / 45 % RH
Engineer Kazuya Noda
Mode Tx 11n-40

11n-40

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	-3.60	1.65	9.94	7.99	6.30	0.00	7.99	6.30
5230	-3.62	1.66	9.94	7.98	6.28	0.00	7.98	6.28
5270	-3.87	1.66	9.93	7.72	5.92	0.00	7.72	5.92
5310	-3.91	1.67	9.93	7.69	5.87	0.00	7.69	5.87
5510	-4.32	1.70	9.93	7.31	5.38	0.00	7.31	5.38
5550	-4.44	1.70	9.93	7.19	5.24	0.00	7.19	5.24
5670	-4.60	1.70	9.94	7.04	5.06	0.00	7.04	5.06
5755	-4.24	1.71	9.94	7.41	5.51	0.00	7.41	5.51
5795	-4.29	1.71	9.94	7.36	5.45	0.00	7.36	5.45

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 equipment and cables were not used for factor 0 dB of the data sheets.

Average Output Power (Reference data for RF Exposure)

Report No.	13024969S-AE-R3
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	December 5, 2019
Temperature / Humidity	22 deg. C / 45 % RH
Engineer	Kazuya Noda
Mode	Tx 11ac-40

11ac-40

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	-3.55	1.65	9.94	8.04	6.37	0.00	8.04	6.37
5230	-3.58	1.66	9.94	8.02	6.34	0.00	8.02	6.34
5270	-3.86	1.66	9.93	7.73	5.93	0.00	7.73	5.93
5310	-3.90	1.67	9.93	7.70	5.89	0.00	7.70	5.89
5510	-4.33	1.70	9.93	7.30	5.37	0.00	7.30	5.37
5550	-4.48	1.70	9.93	7.15	5.19	0.00	7.15	5.19
5670	-4.63	1.70	9.94	7.01	5.02	0.00	7.01	5.02
5755	-4.24	1.71	9.94	7.41	5.51	0.00	7.41	5.51
5795	-4.25	1.71	9.94	7.40	5.50	0.00	7.40	5.50

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 equipment and cables were not used for factor 0 dB of the data sheets.

Average Output Power
(Reference data for RF Exposure)

Report No. 13024969S-AE-R3
Test place Shonan EMC Lab. No.5 Shielded Room
Date December 5, 2019
Temperature / Humidity 22 deg. C / 45 % RH
Engineer Kazuya Noda
Mode Tx 11ac-80

11ac-80

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	-3.25	1.65	9.94	8.34	6.82	0.00	8.34	6.82
5290	-3.50	1.67	9.93	8.10	6.46	0.00	8.10	6.46
5530	-3.93	1.70	9.93	7.70	5.89	0.00	7.70	5.89
5610	-4.03	1.70	9.93	7.60	5.75	0.00	7.60	5.75
5775	-3.80	1.71	9.94	7.85	6.10	0.00	7.85	6.10

Sample Calculation:

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

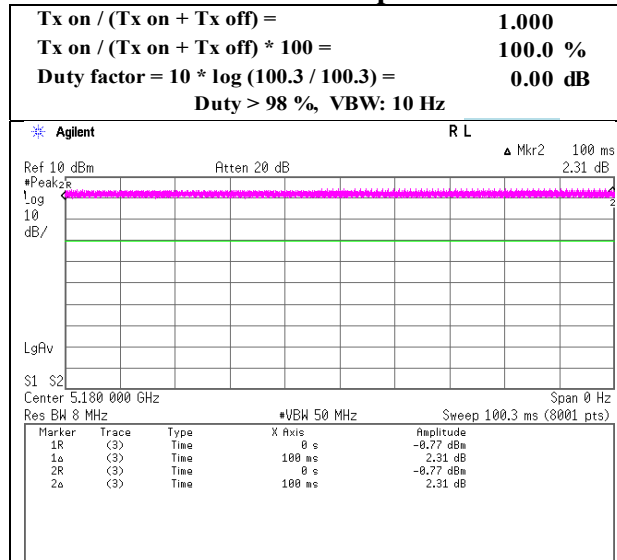
Result (Burst power average) = Time average + Duty factor

*The equipment and cables were not used for factor 0 dB of the data sheets.

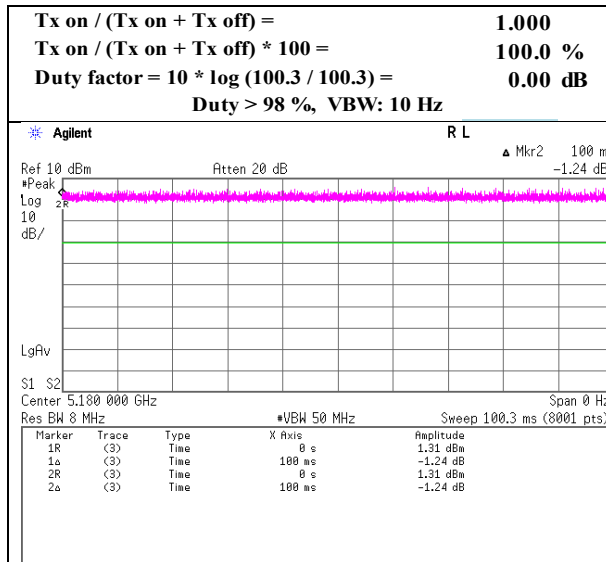
Burst rate confirmation

Report No.	13024969S-AE-R3
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	October 21, 2019
Temperature / Humidity	24 deg. C / 49 % RH
Engineer	Makoto Hosaka
Mode	Tx

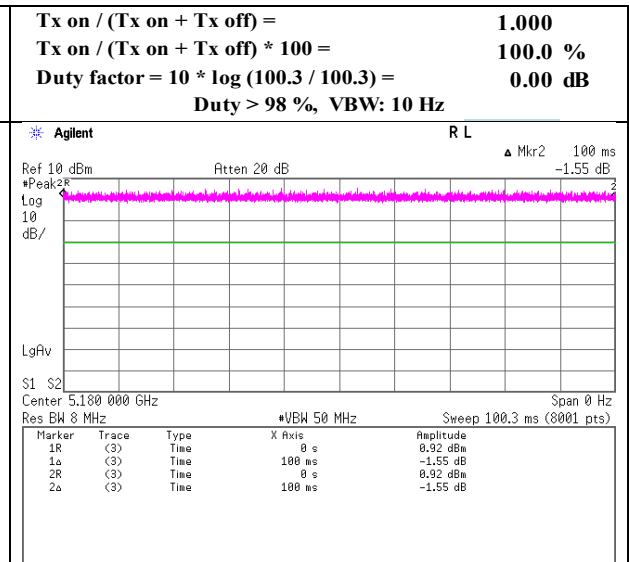
11a 54 Mbps



11n-20 MCS 4



11ac-20 MCS 4



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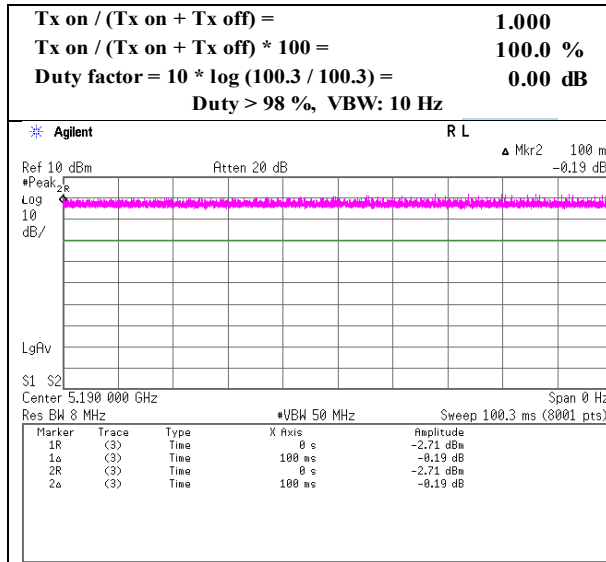
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

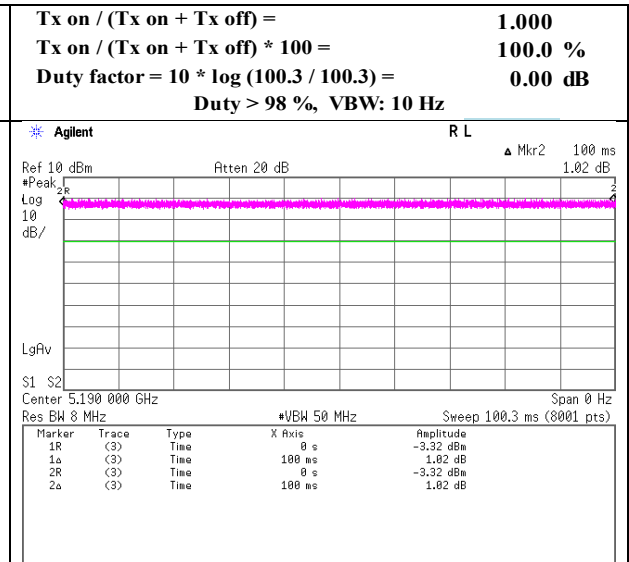
Burst rate confirmation

Report No. 13024969S-AE-R3
Test place Shonan EMC Lab. No.5 Shielded Room
Date October 21, 2019
Temperature / Humidity 24 deg. C / 49 % RH
Engineer Makoto Hosaka
Mode Tx

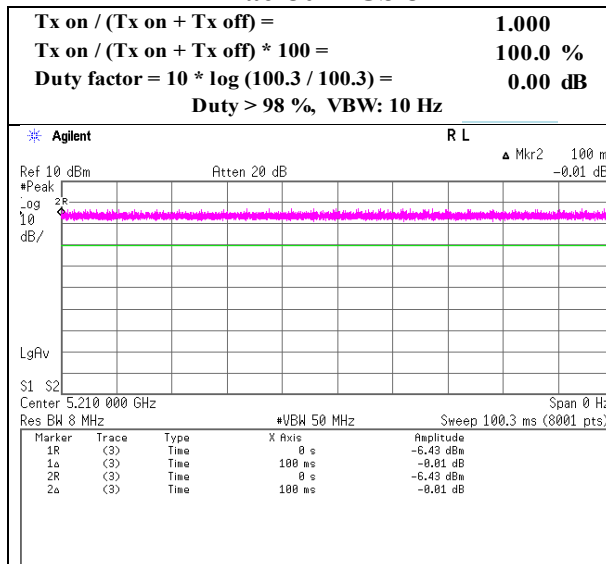
11n-40 MCS 7



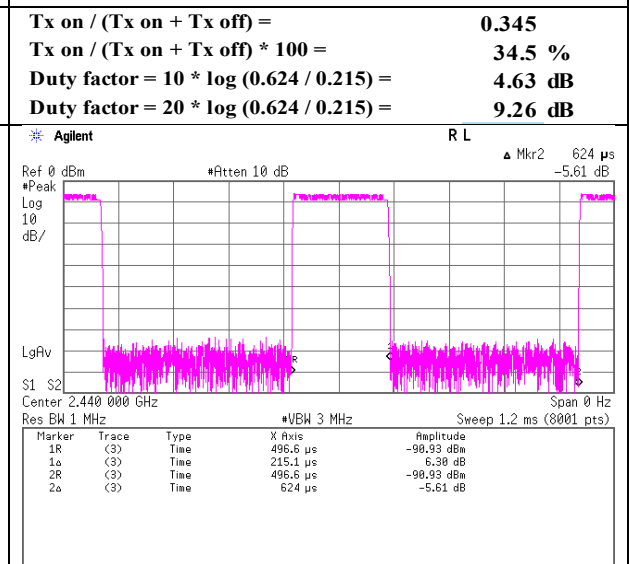
11ac-40 MCS 8



11ac-80 MCS 8



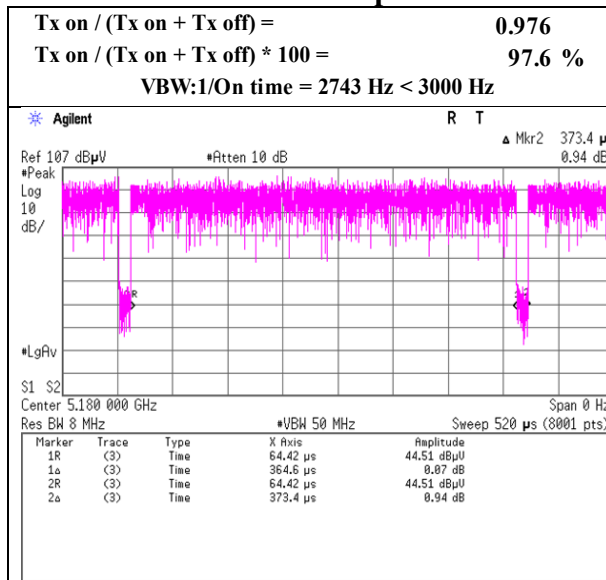
BT LE 2 M-PHY



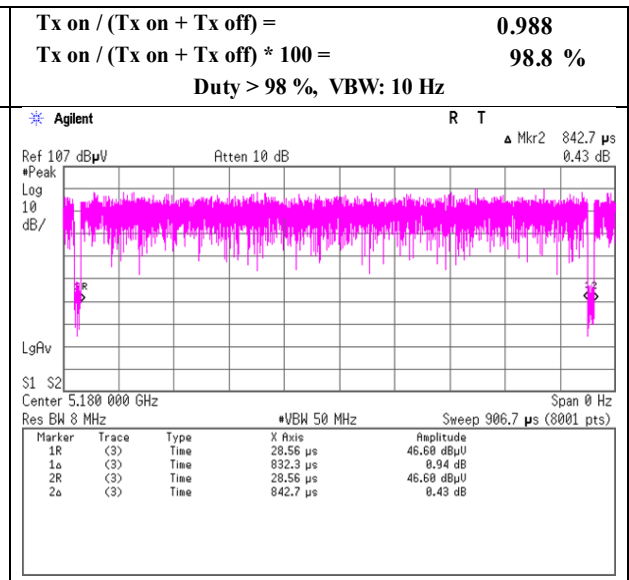
Burst rate confirmation(for Simultaneous Radiated Emission)

Report No. 13024969S-AE-R3
Test place Shonan EMC Lab. No.3 Semi Anechoic Chamber
Date January 9, 2020
Temperature / Humidity 24 deg. C / 40 % RH
Engineer Hiromasa Sato
Mode Tx with Bluetooth

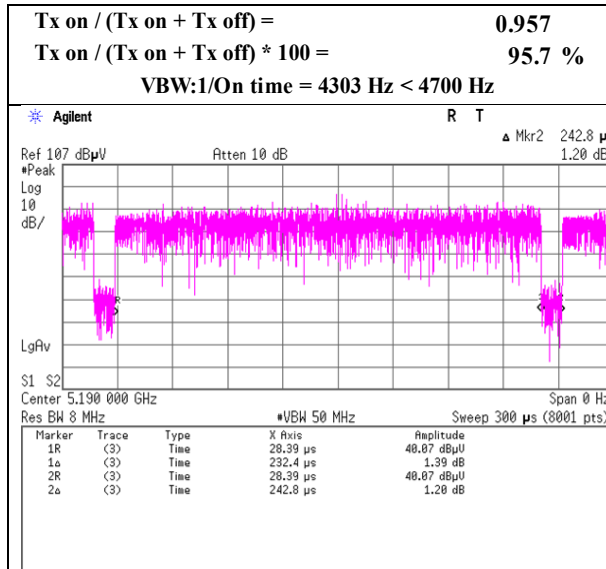
11a 54 Mbps



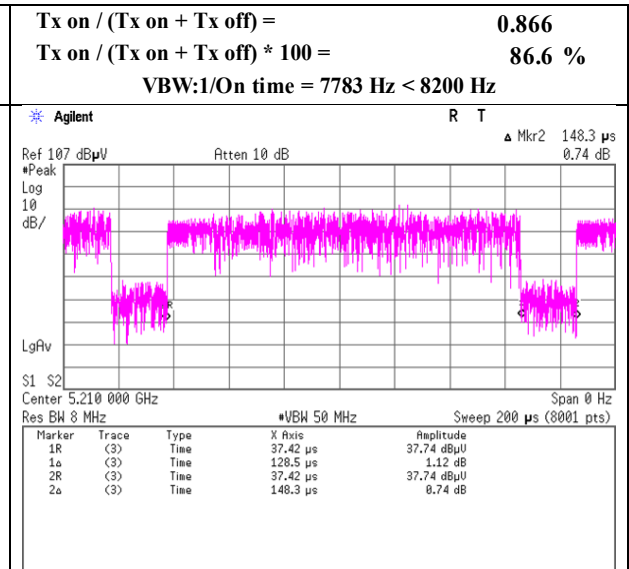
11ac-20 MCS 4



11ac-40 MCS 8



11ac-80 MCS 8



Maximum Power Spectral Density

Report No. 13024969S-AE-R3
Test place Shonan EMC Lab. No.5 Shielded Room
Date December 6, 2019
Temperature / Humidity 22 deg. C / 45 % RH
Engineer Kazuya Noda
Mode Tx 11a

11a

Applied limit: 15.407, mobile and portable client device

Tested Frequency [MHz]	PSD Reading [dBm /MHz]	Cable Loss [dB]	Atten. Loss [dB]	Duty Factor [dB]	Antenna Gain [dBi]	RBW Correction Factor [dB]	PSD (Conducted)			PSD (e.i.r.p.)		
							Result [dBm /MHz]	Limit [dBm /MHz]	Margin [dB]	Result [dBm /MHz]	Limit [dBm /MHz]	Margin [dB]
5180	-12.99	1.65	9.94	0.00	4.9	0.00	-1.40	11.00	12.40	3.55	17.00	13.46
5220	-13.06	1.66	9.94	0.00	4.9	0.00	-1.46	11.00	12.46	3.48	17.00	13.52
5240	-12.68	1.66	9.94	0.00	4.9	0.00	-1.08	11.00	12.08	3.86	17.00	13.14
5260	-12.47	1.66	9.93	0.00	4.9	0.00	-0.88	11.00	11.88	4.06	17.00	12.94
5300	-13.06	1.67	9.93	0.00	4.9	0.00	-1.46	11.00	12.46	3.49	17.00	13.52
5320	-13.28	1.67	9.93	0.00	4.9	0.00	-1.68	11.00	12.68	3.26	17.00	13.74
5500	-13.35	1.70	9.93	0.00	4.9	0.00	-1.72	11.00	12.72	3.22	17.00	13.78
5580	-13.46	1.70	9.93	0.00	4.9	0.00	-1.83	11.00	12.83	3.11	17.00	13.89
5700	-14.03	1.70	9.94	0.00	4.9	0.00	-2.39	11.00	13.39	2.55	17.00	14.45
5745	-22.18	1.70	9.94	0.00	4.9	6.99	-3.55	30.00	33.55	1.39	36.00	34.61
5785	-22.57	1.71	9.94	0.00	4.9	6.99	-3.93	30.00	33.93	1.01	36.00	34.99
5825	-22.67	1.71	9.94	0.00	4.9	6.99	-4.03	30.00	34.03	0.91	36.00	35.09

*[U-NII-1 band for FCC]

Although the EUT operates on Master mode, more stringent limit for Client device was applied.

Sample Calculation:

PSD: Power Spectral Density

The PSD within 5725 MHz to 5825 MHz are based on any 500 kHz band.

RBW Correction Factor = $10 \cdot \log(\text{Specified bandwidth} / \text{Measured bandwidth})$

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

PSD Result (e.i.r.p.) = Conducted PSD Result + Antenna Gain

Maximum Power Spectral Density

Report No. 13024969S-AE-R3
Test place Shonan EMC Lab. No.5 Shielded Room
Date December 6, 2019 December 9, 2019
Temperature / Humidity 22 deg. C / 45 % RH 27 deg. C / 45 % RH
Engineer Kazuya Noda Toshinori Yamada
Mode Tx 11n-20

11n-20

Applied limit: 15.407, mobile and portable client device

Tested Frequency [MHz]	PSD Reading [dBm /MHz]	Cable Loss [dB]	Atten. Loss [dB]	Duty Factor [dB]	Antenna Gain [dBi]	RBW Correction Factor [dB]	PSD (Conducted)			PSD (e.i.r.p.)		
							Result [dBm /MHz]	Limit [dBm /MHz]	Margin [dB]	Result [dBm /MHz]	Limit [dBm /MHz]	Margin [dB]
5180	-14.13	1.65	9.94	0.00	4.9	0.00	-2.54	11.00	13.54	2.41	17.00	14.60
5220	-13.52	1.66	9.94	0.00	4.9	0.00	-1.92	11.00	12.92	3.02	17.00	13.98
5240	-13.79	1.66	9.94	0.00	4.9	0.00	-2.19	11.00	13.19	2.75	17.00	14.25
5260	-13.72	1.66	9.93	0.00	4.9	0.00	-2.13	11.00	13.13	2.82	17.00	14.19
5300	-13.81	1.67	9.93	0.00	4.9	0.00	-2.21	11.00	13.21	2.73	17.00	14.27
5320	-14.10	1.67	9.93	0.00	4.9	0.00	-2.50	11.00	13.50	2.44	17.00	14.56
5500	-14.53	1.70	9.93	0.00	4.9	0.00	-2.90	11.00	13.90	2.04	17.00	14.96
5580	-14.67	1.70	9.93	0.00	4.9	0.00	-3.04	11.00	14.04	1.90	17.00	15.10
5700	-14.59	1.70	9.94	0.00	4.9	0.00	-2.95	11.00	13.95	1.99	17.00	15.01
5745	-23.30	1.70	9.94	0.00	4.9	6.99	-4.67	30.00	34.67	0.27	36.00	35.73
5785	-23.27	1.71	9.94	0.00	4.9	6.99	-4.63	30.00	34.63	0.31	36.00	35.69
5825	-22.99	1.71	9.94	0.00	4.9	6.99	-4.35	30.00	34.35	0.59	36.00	35.41

*[U-NII-1 band for FCC]

Although the EUT operates on Master mode, more stringent limit for Client device was applied.

Sample Calculation:

PSD: Power Spectral Density

The PSD within 5725 MHz to 5825 MHz are based on any 500 kHz band.

RBW Correction Factor = $10 * \log(\text{Specified bandwidth} / \text{Measured bandwidth})$

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

PSD Result (e.i.r.p.) = Conducted PSD Result + Antenna Gain

Maximum Power Spectral Density

Report No. 13024969S-AE-R3
Test place Shonan EMC Lab. No.5 Shielded Room
Date December 6, 2019 December 9, 2019
Temperature / Humidity 22 deg. C / 45 % RH 27 deg. C / 45 % RH
Engineer Kazuya Noda Toshinori Yamada
Mode Tx 11n-20

11ac-20

Applied limit: 15.407, mobile and portable client device

Tested Frequency [MHz]	PSD Reading [dBm /MHz]	Cable Loss [dB]	Atten. Loss [dB]	Duty Factor [dB]	Antenna Gain [dBi]	RBW Correction Factor [dB]	PSD (Conducted)			PSD (e.i.r.p.)		
							Result [dBm /MHz]	Limit [dBm /MHz]	Margin [dB]	Result [dBm /MHz]	Limit [dBm /MHz]	Margin [dB]
5180	-14.07	1.65	9.94	0.00	4.9	0.00	-2.48	11.00	13.48	2.46	17.00	14.54
5220	-13.83	1.66	9.94	0.00	4.9	0.00	-2.23	11.00	13.23	2.71	17.00	14.29
5240	-13.92	1.66	9.94	0.00	4.9	0.00	-2.32	11.00	13.32	2.62	17.00	14.38
5260	-13.49	1.66	9.93	0.00	4.9	0.00	-1.90	11.00	12.90	3.04	17.00	13.96
5300	-13.77	1.67	9.93	0.00	4.9	0.00	-2.17	11.00	13.17	2.77	17.00	14.23
5320	-14.25	1.67	9.93	0.00	4.9	0.00	-2.65	11.00	13.65	2.29	17.00	14.71
5500	-14.56	1.70	9.93	0.00	4.9	0.00	-2.93	11.00	13.93	2.01	17.00	14.99
5580	-14.72	1.70	9.93	0.00	4.9	0.00	-3.09	11.00	14.09	1.85	17.00	15.15
5700	-15.04	1.70	9.94	0.00	4.9	0.00	-3.40	11.00	14.40	1.54	17.00	15.46
5745	-23.49	1.70	9.94	0.00	4.9	6.99	-4.86	30.00	34.86	0.08	36.00	35.92
5785	-22.57	1.71	9.94	0.00	4.9	6.99	-3.93	30.00	33.93	1.01	36.00	34.99
5825	-23.42	1.71	9.94	0.00	4.9	6.99	-4.78	30.00	34.78	0.16	36.00	35.84

*[U-NII-1 band for FCC]

Although the EUT operates on Master mode, more stringent limit for Client device was applied.

Sample Calculation:

PSD: Power Spectral Density

The PSD within 5725 MHz to 5825 MHz are based on any 500 kHz band.

RBW Correction Factor = $10 * \log (\text{Specified bandwidth} / \text{Measured bandwidth})$

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

PSD Result (e.i.r.p.) = Conducted PSD Result + Antenna Gain

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Shonan EMC Lab.

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Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

Maximum Power Spectral Density

Report No. 13024969S-AE-R3
Test place Shonan EMC Lab. No.5 Shielded Room
Date December 6, 2019 December 9, 2019
Temperature / Humidity 22 deg. C / 45 % RH 27 deg. C / 45 % RH
Engineer Kazuya Noda Toshinori Yamada
Mode Tx 11n-40

11n-40

Applied limit: 15.407, mobile and portable client device

Tested Frequency [MHz]	PSD Reading [dBm /MHz]	Cable Loss [dB]	Atten. Loss [dB]	Duty Factor [dB]	Antenna Gain [dBi]	RBW Correction Factor [dB]	PSD (Conducted)			PSD (e.i.r.p.)		
							Result [dBm /MHz]	Limit [dBm /MHz]	Margin [dB]	Result [dBm /MHz]	Limit [dBm /MHz]	Margin [dB]
5190	-16.96	1.65	9.94	0.00	4.9	0.00	-5.37	11.00	16.37	-0.43	17.00	17.43
5230	-16.89	1.66	9.94	0.00	4.9	0.00	-5.29	11.00	16.29	-0.35	17.00	17.35
5270	-16.99	1.66	9.93	0.00	4.9	0.00	-5.40	11.00	16.40	-0.46	17.00	17.46
5310	-17.26	1.67	9.93	0.00	4.9	0.00	-5.66	11.00	16.66	-0.71	17.00	17.72
5510	-17.51	1.70	9.93	0.00	4.9	0.00	-5.88	11.00	16.88	-0.94	17.00	17.94
5550	-17.57	1.70	9.93	0.00	4.9	0.00	-5.94	11.00	16.94	-1.00	17.00	18.00
5670	-18.08	1.70	9.94	0.00	4.9	0.00	-6.44	11.00	17.44	-1.50	17.00	18.50
5755	-26.54	1.71	9.94	0.00	4.9	6.99	-7.90	30.00	37.90	-2.96	36.00	38.96
5795	-26.35	1.71	9.94	0.00	4.9	6.99	-7.71	30.00	37.71	-2.77	36.00	38.77

*[U-NII-1 band for FCC]

Although the EUT operates on Master mode, more stringent limit for Client device was applied.

Sample Calculation:

PSD: Power Spectral Density

The PSD within 5725 MHz to 5825 MHz are based on any 500 kHz band.

RBW Correction Factor = $10 * \log(\text{Specified bandwidth} / \text{Measured bandwidth})$

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

PSD Result (e.i.r.p.) = Conducted PSD Result + Antenna Gain

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Maximum Power Spectral Density

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Test place Shonan EMC Lab. No.5 Shielded Room
Date December 6, 2019 December 9, 2019
Temperature / Humidity 22 deg. C / 45 % RH 27 deg. C / 45 % RH
Engineer Kazuya Noda Toshinori Yamada
Mode Tx 11ac-40

11ac-40

Applied limit: 15.407, mobile and portable client device

Tested Frequency [MHz]	PSD Reading [dBm /MHz]	Cable Loss [dB]	Atten. Loss [dB]	Duty Factor [dB]	Antenna Gain [dBi]	RBW Correction Factor [dB]	PSD (Conducted)			PSD (e.i.r.p.)		
							Result [dBm /MHz]	Limit [dBm /MHz]	Margin [dB]	Result [dBm /MHz]	Limit [dBm /MHz]	Margin [dB]
5190	-16.42	1.65	9.94	0.00	4.9	0.00	-4.83	11.00	15.83	0.11	17.00	16.89
5230	-16.49	1.66	9.94	0.00	4.9	0.00	-4.89	11.00	15.89	0.05	17.00	16.95
5270	-16.51	1.66	9.93	0.00	4.9	0.00	-4.92	11.00	15.92	0.02	17.00	16.98
5310	-16.75	1.67	9.93	0.00	4.9	0.00	-5.15	11.00	16.15	-0.21	17.00	17.21
5510	-17.04	1.70	9.93	0.00	4.9	0.00	-5.41	11.00	16.41	-0.47	17.00	17.47
5550	-17.50	1.70	9.93	0.00	4.9	0.00	-5.87	11.00	16.87	-0.93	17.00	17.93
5670	-17.59	1.70	9.94	0.00	4.9	0.00	-5.95	11.00	16.95	-1.01	17.00	18.01
5755	-26.39	1.71	9.94	0.00	4.9	6.99	-7.75	30.00	37.75	-2.81	36.00	38.81
5795	-26.84	1.71	9.94	0.00	4.9	6.99	-8.20	30.00	38.20	-3.26	36.00	39.26

*[U-NII-1 band for FCC]

Although the EUT operates on Master mode, more stringent limit for Client device was applied.

Sample Calculation:

PSD: Power Spectral Density

The PSD within 5725 MHz to 5825 MHz are based on any 500 kHz band.

RBW Correction Factor = $10 \cdot \log(\text{Specified bandwidth} / \text{Measured bandwidth})$

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

PSD Result (e.i.r.p.) = Conducted PSD Result + Antenna Gain

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Maximum Power Spectral Density

Report No. 13024969S-AE-R3
Test place Shonan EMC Lab. No.5 Shielded Room
Date December 6, 2019 December 9, 2019
Temperature / Humidity 22 deg. C / 45 % RH 27 deg. C / 45 % RH
Engineer Kazuya Noda Toshinori Yamada
Mode Tx 11ac-80

11ac-80

Applied limit: 15.407, mobile and portable client device

Tested Frequency [MHz]	PSD Reading [dBm /MHz]	Cable Loss [dB]	Atten. Loss [dB]	Duty Factor [dB]	Antenna Gain [dBi]	RBW Correction Factor [dB]	PSD (Conducted)			PSD (e.i.r.p.)		
							Result [dBm /MHz]	Limit [dBm /MHz]	Margin [dB]	Result [dBm /MHz]	Limit [dBm /MHz]	Margin [dB]
5210	-20.11	1.65	9.94	0.00	4.9	0.00	-8.52	11.00	19.52	-3.58	17.00	20.58
5290	-20.27	1.67	9.93	0.00	4.9	0.00	-8.67	11.00	19.67	-3.73	17.00	20.73
5530	-20.37	1.70	9.93	0.00	4.9	0.00	-8.74	11.00	19.74	-3.80	17.00	20.80
5610	-20.61	1.70	9.93	0.00	4.9	0.00	-8.98	11.00	19.98	-4.04	17.00	21.04
5775	-29.89	1.71	9.94	0.00	4.9	6.99	-11.25	30.00	41.25	-6.31	36.00	42.31

*[U-NII-1 band for FCC]

Although the EUT operates on Master mode, more stringent limit for Client device was applied.

Sample Calculation:

PSD: Power Spectral Density

The PSD within 5725 MHz to 5825 MHz are based on any 500 kHz band.

RBW Correction Factor = $10 * \log(\text{Specified bandwidth} / \text{Measured bandwidth})$

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

PSD Result (e.i.r.p.) = Conducted PSD Result + Antenna Gain

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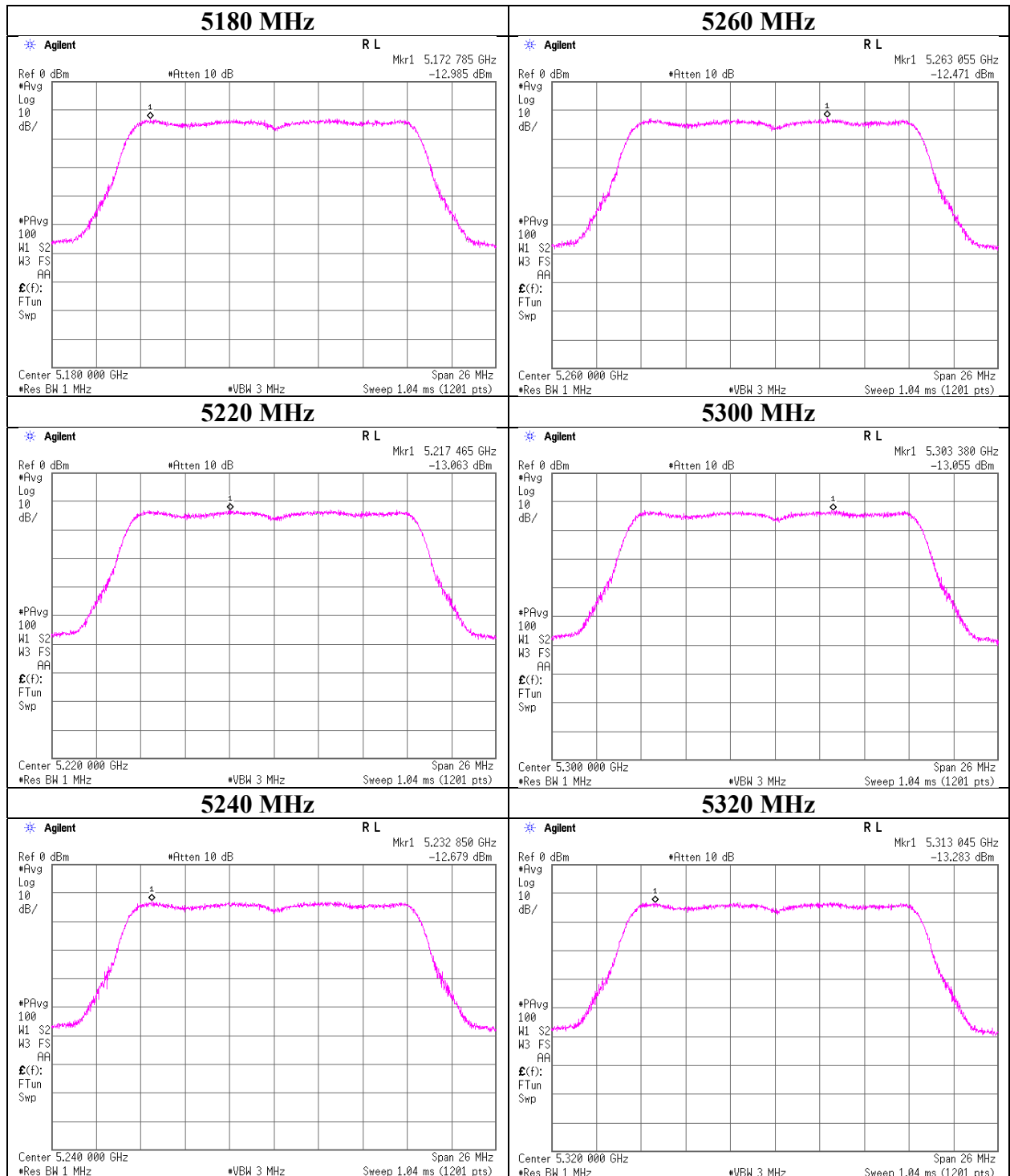
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Facsimile : +81 596 24 8124

Maximum Power Spectral Density

Report No. 13024969S-AE-R3
Test place Shonan EMC Lab. No.5 Shielded Room
Date December 6, 2019 December 9, 2019
Temperature / Humidity 22 deg. C / 45 % RH 27 deg. C / 45 % RH
Engineer Kazuya Noda Toshinori Yamada
Mode Tx 11a

11a



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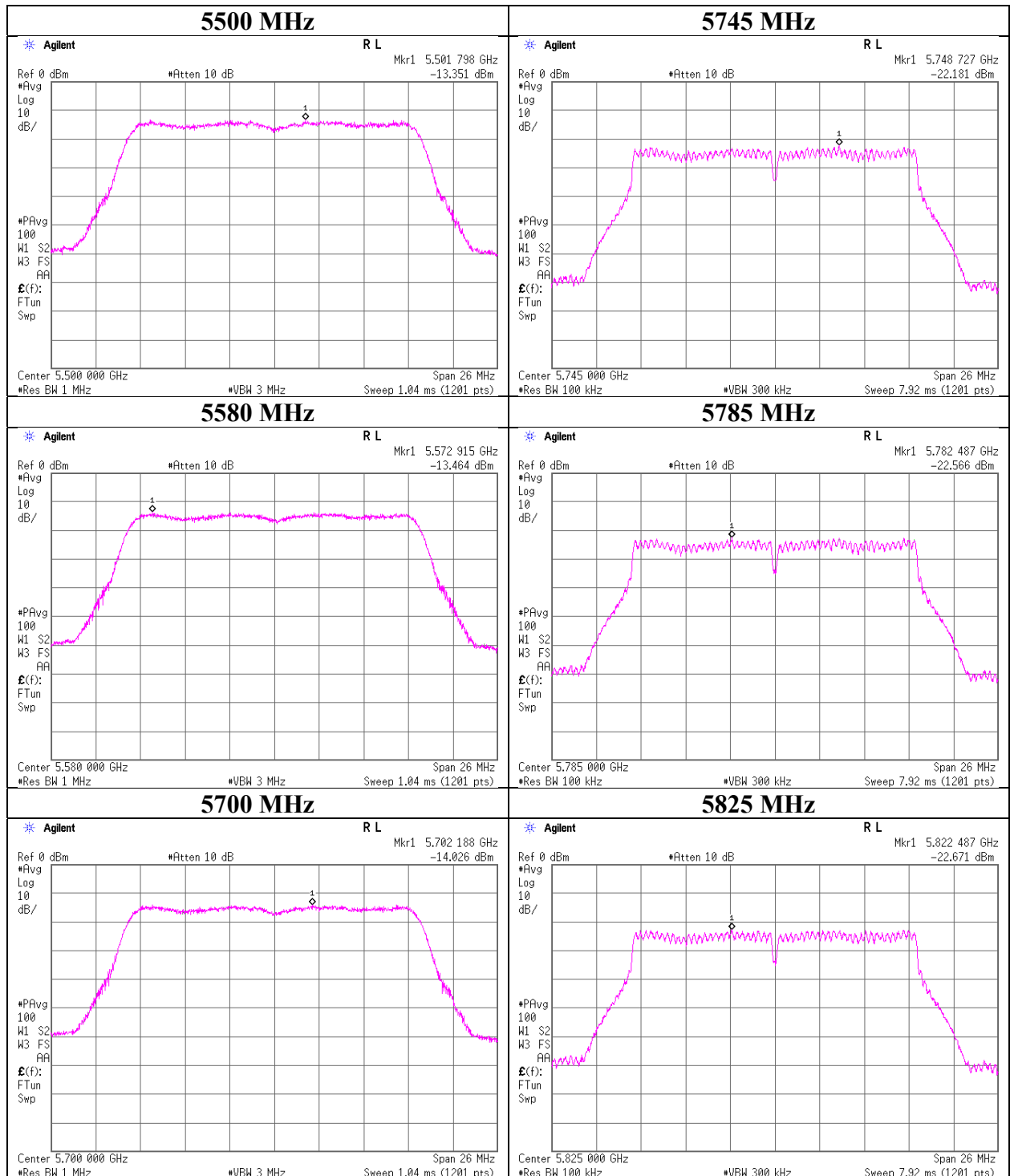
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

Maximum Power Spectral Density

Report No. 13024969S-AE-R3
Test place Shonan EMC Lab. No.5 Shielded Room
Date December 6, 2019
Temperature / Humidity 22 deg. C / 45 % RH
Engineer Kazuya Noda
Mode Tx 11a
December 9, 2019
27 deg. C / 45 % RH
Toshinori Yamada

11a



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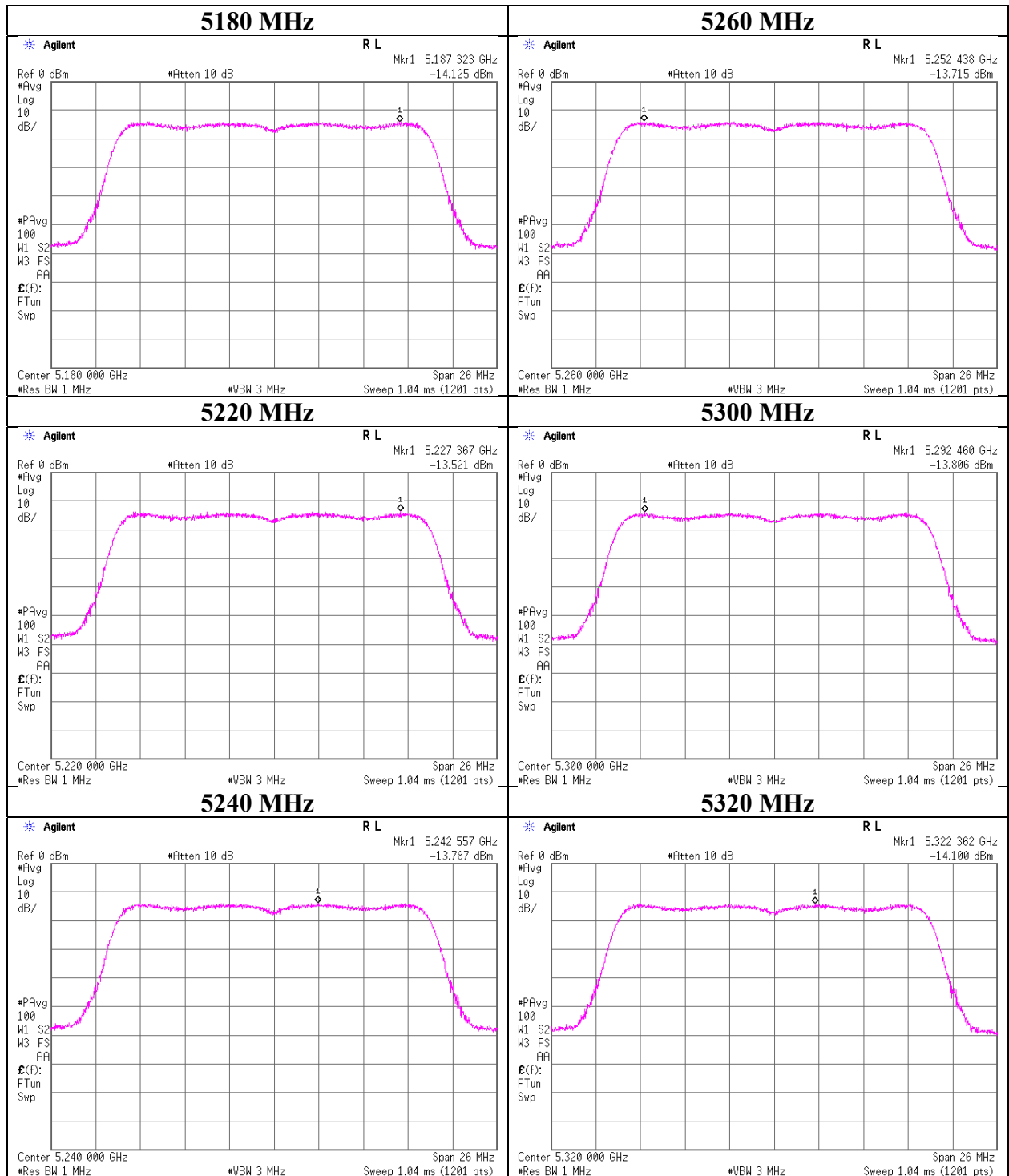
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Engineer Kazuya Noda Toshinori Yamada
Mode Tx 11n-20

11n-20



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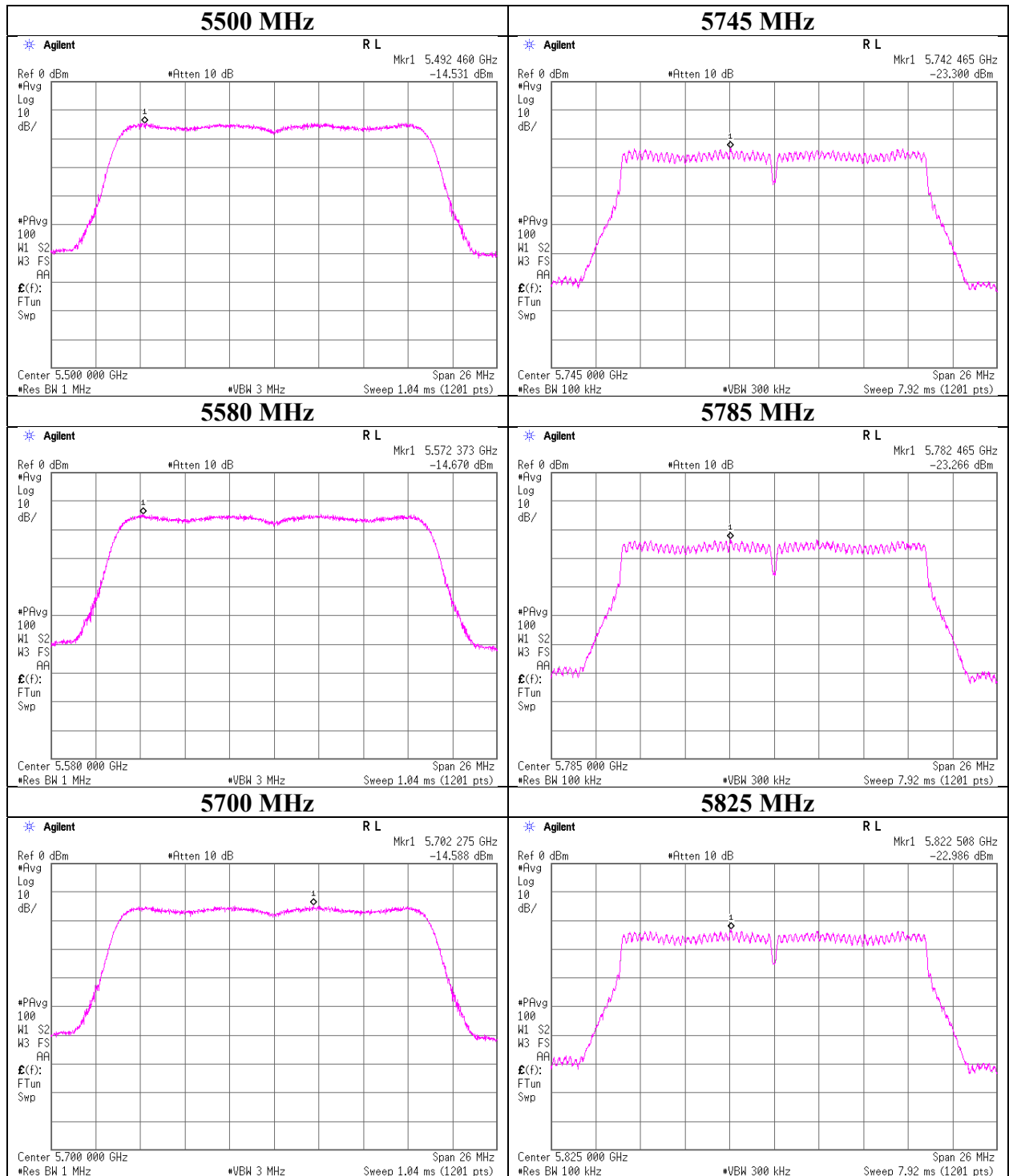
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Mode Tx 11n-20

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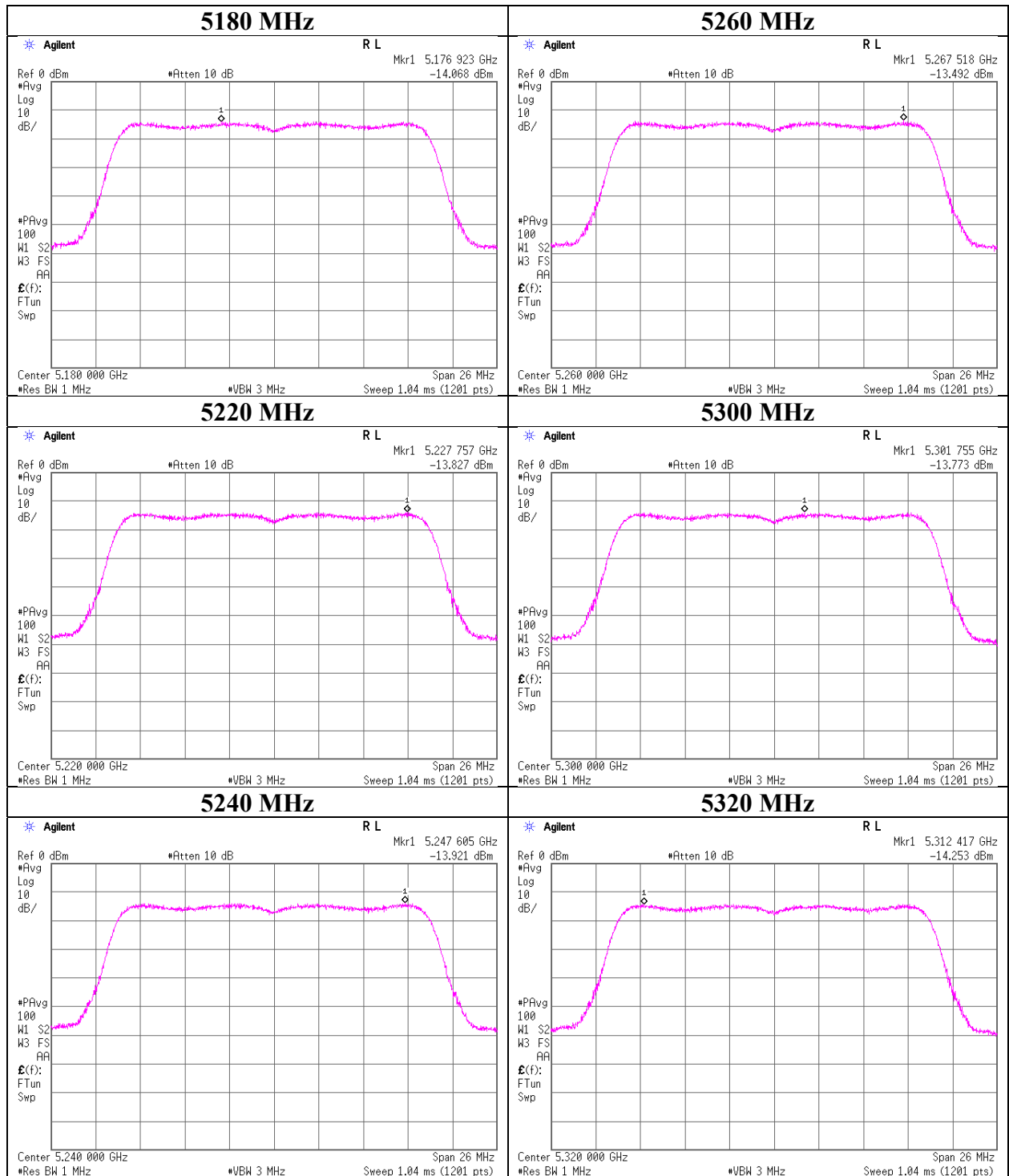
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Mode Tx 11ac-20

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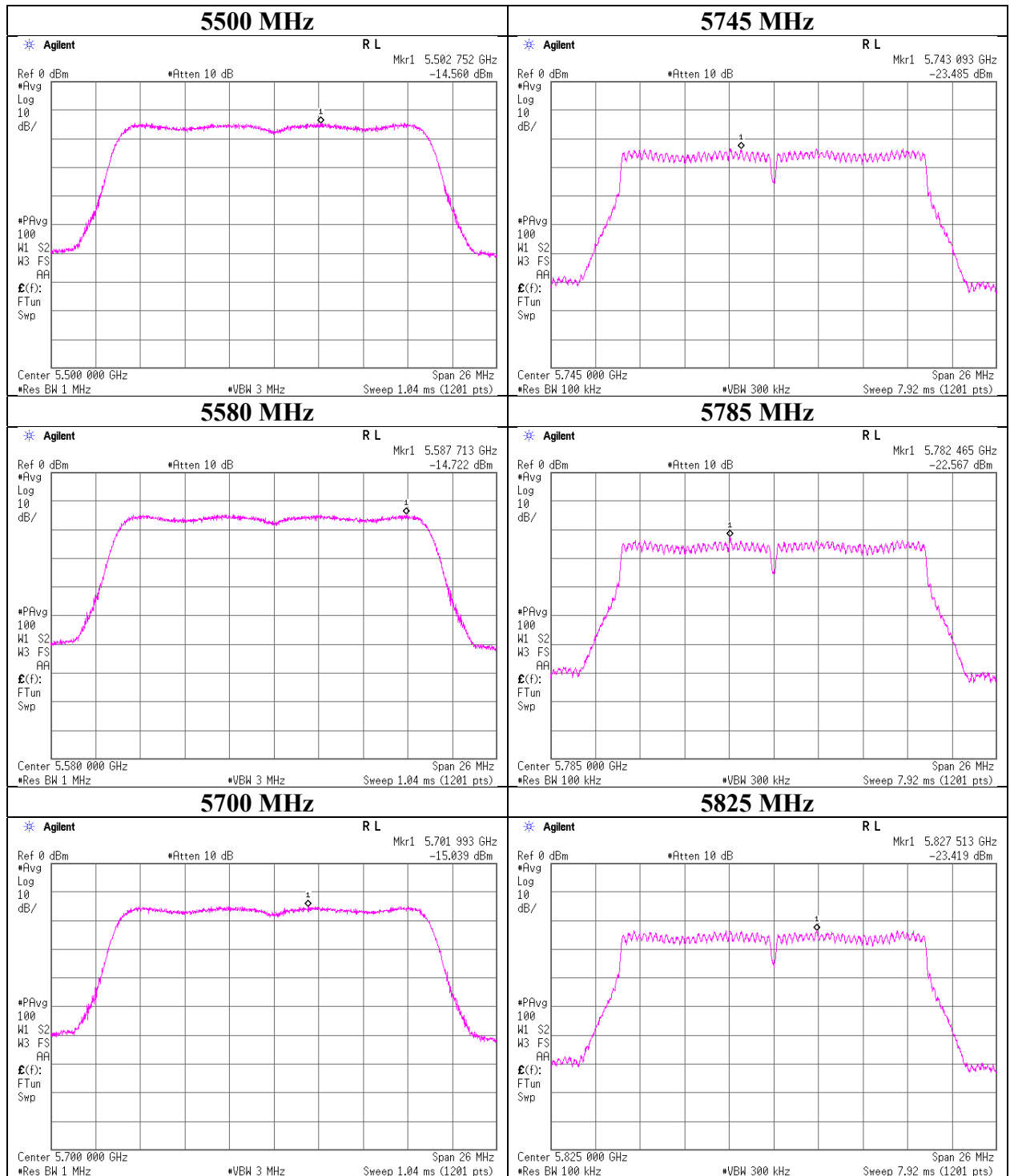
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Mode Tx 11ac-20

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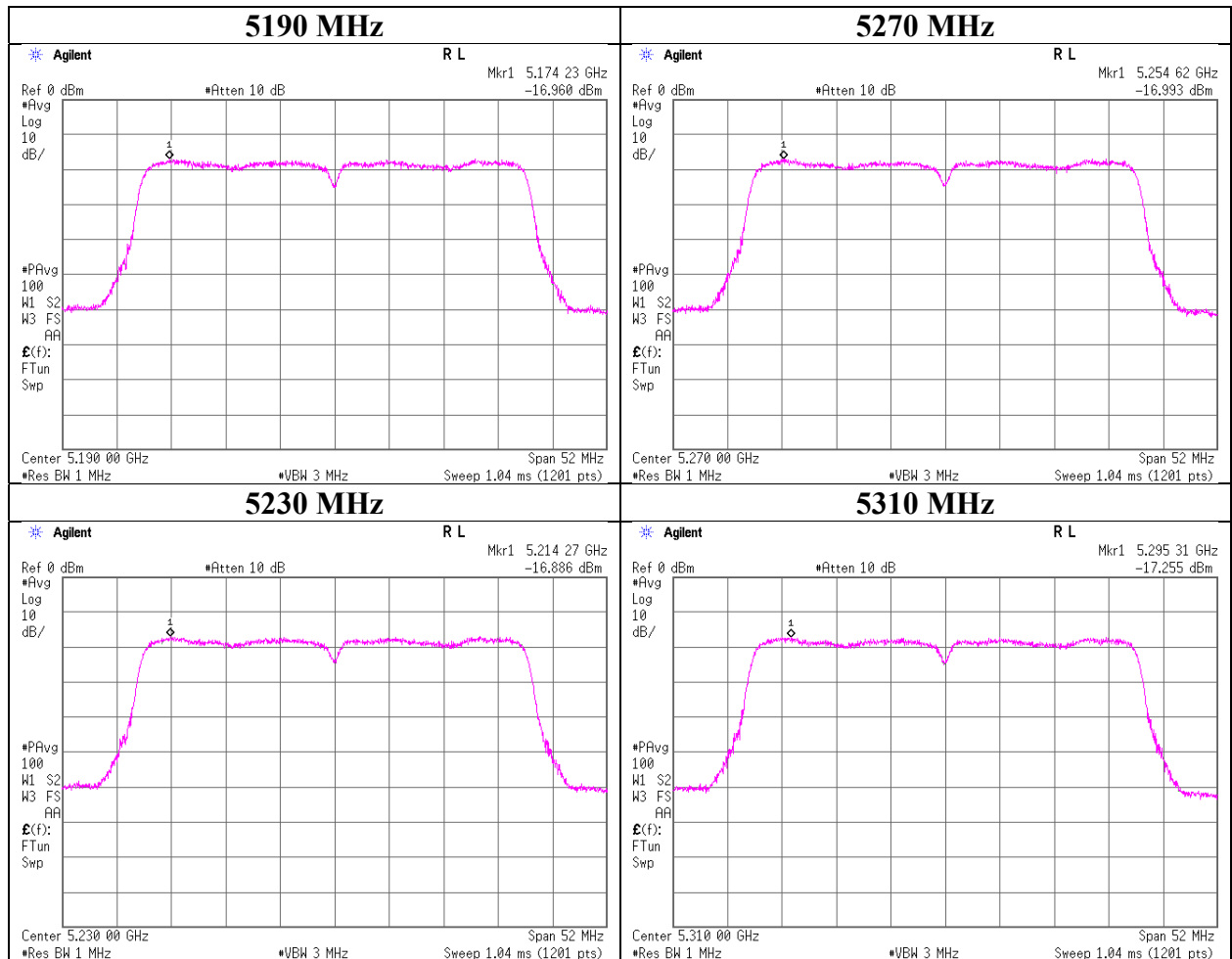
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Maximum Power Spectral Density

Report No.	13024969S-AE-R3	
Test place	Shonan EMC Lab. No.5 Shielded Room	
Date	December 6, 2019	December 9, 2019
Temperature / Humidity	22 deg. C / 45 % RH	27 deg. C / 45 % RH
Engineer	Kazuya Noda	Toshinori Yamada
Mode	Tx 11n-40	

11n-40



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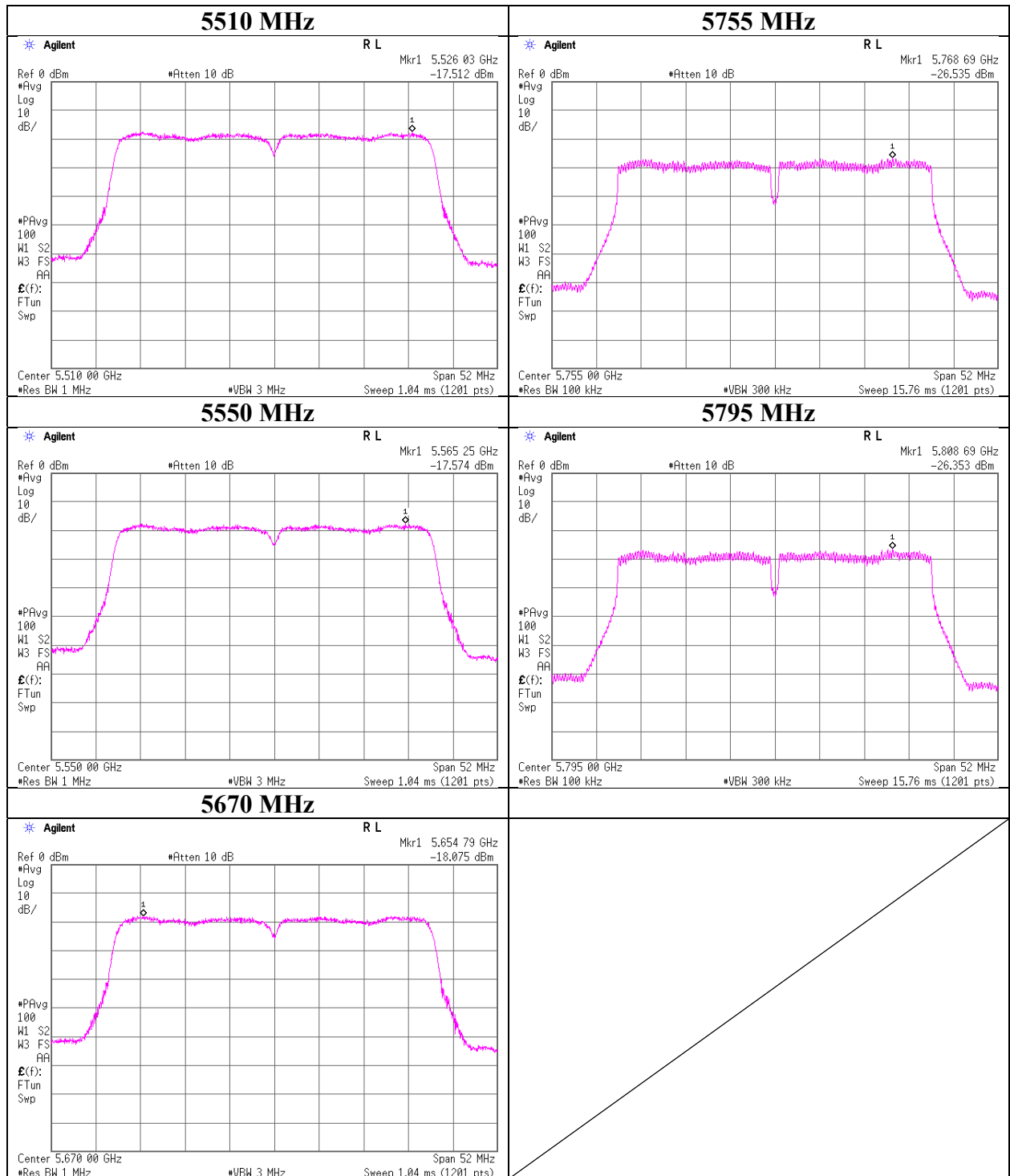
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Maximum Power Spectral Density

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Engineer Kazuya Noda
Mode Tx 11n-40
December 9, 2019
27 deg. C / 45 % RH
Toshinori Yamada

11n-40



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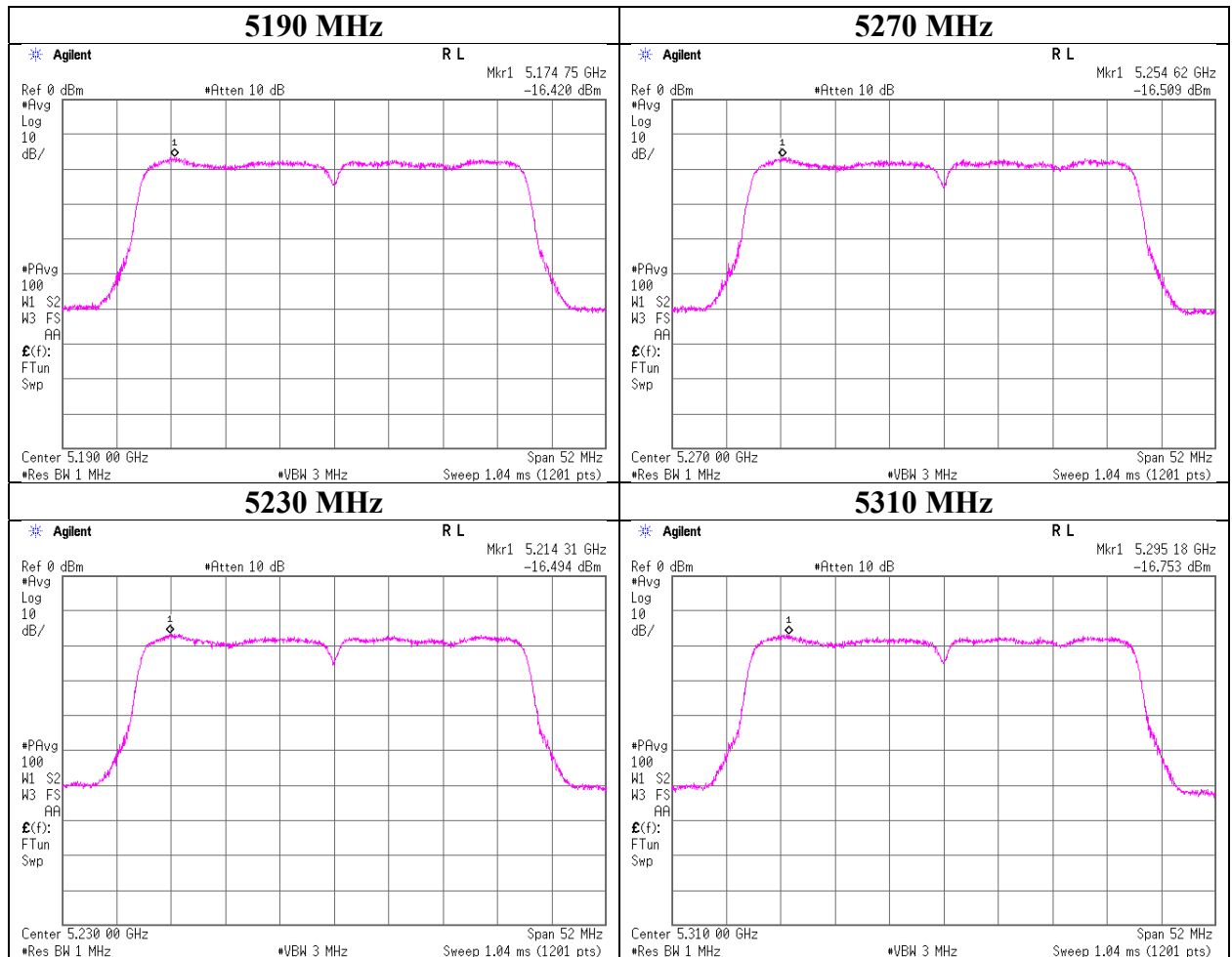
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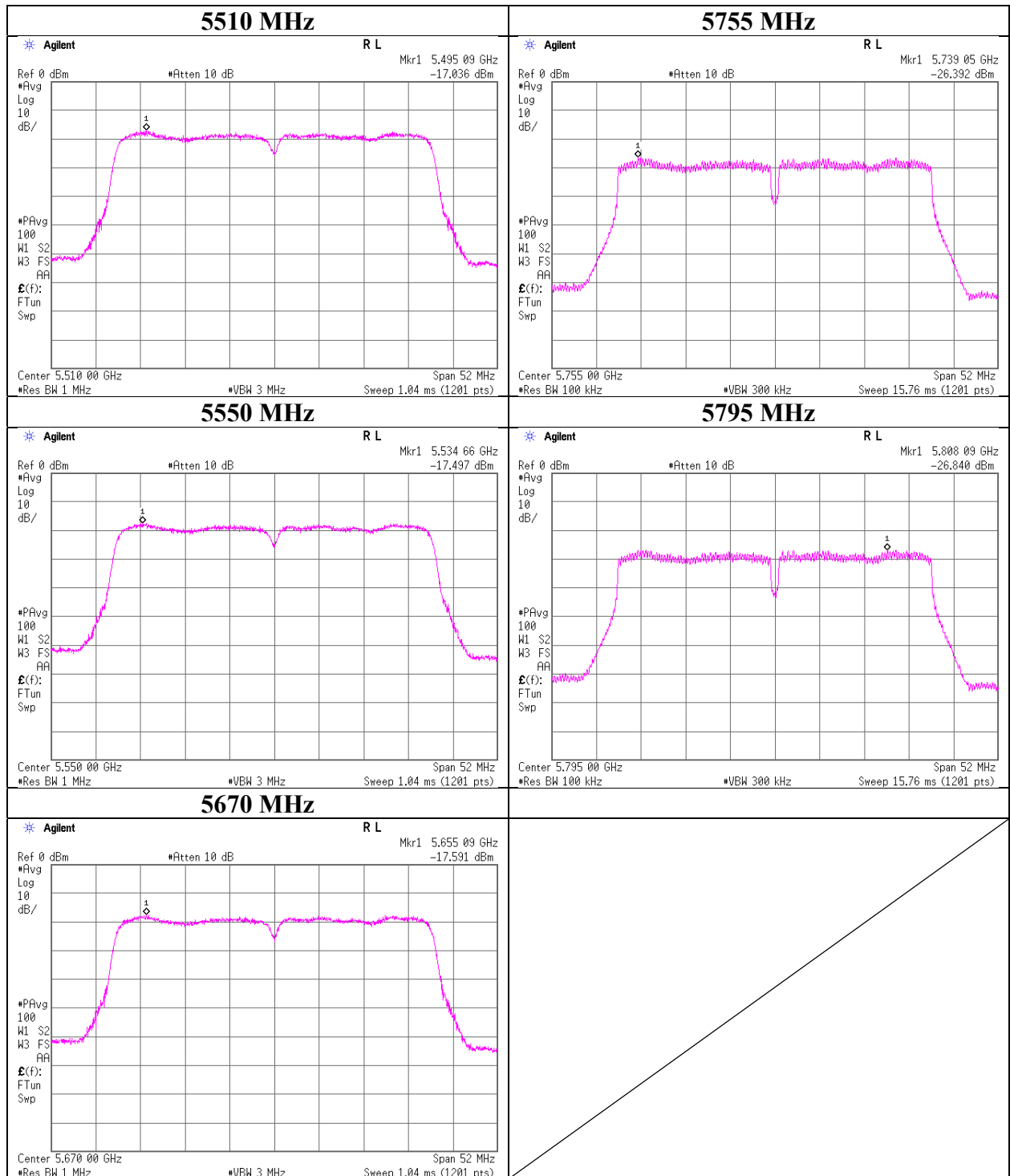
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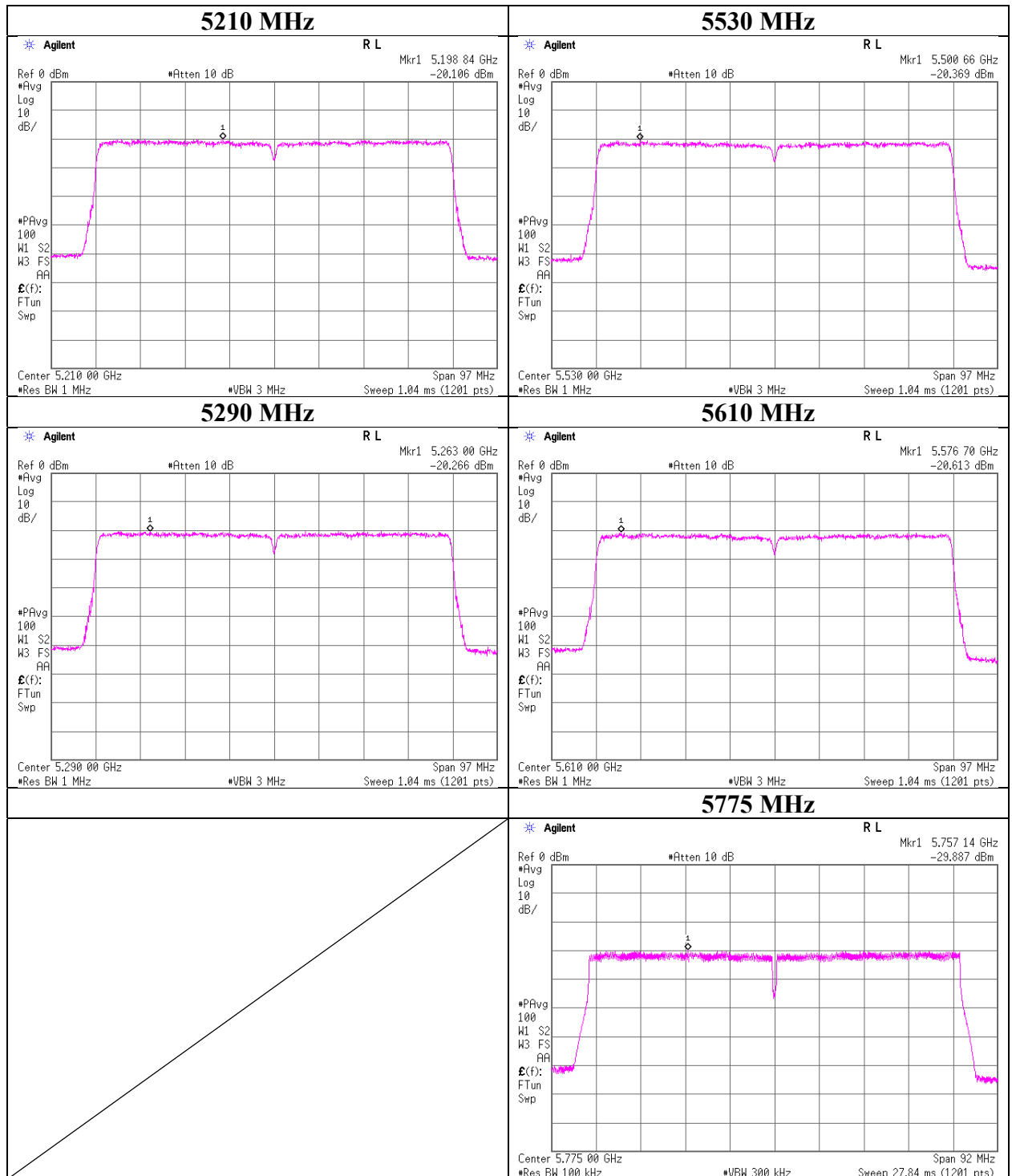
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Maximum Power Spectral Density

Report No.	13024969S-AE-R3	
Test place	Shonan EMC Lab. No.5 Shielded Room	
Date	December 6, 2019	December 9, 2019
Temperature / Humidity	22 deg. C / 45 % RH	27 deg. C / 45 % RH
Engineer	Kazuya Noda	Toshinori Yamada
Mode	Tx 11ac-80	

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