



RADIO TEST REPORT

Test Report No. : 13554183S-I-R1

Applicant : Sony Corporation, Japan and Sony Group Companies
Type of EUT : CONTROL BOX
Model Number of EUT : TMR-A9WT (Module: 1PJ)
FCC ID : AK8TMRA9WT
Test regulation : FCC Part 15 Subpart E: 2021
(Except for DFS test)
Test Result : Complied (Refer to SECTION 3.2)

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2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with the limits of the above regulation.
4. The test results in this test report are traceable to the national or international standards.
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6. This test report covers Radio technical requirements.
It does not cover administrative issues such as Manual or non-Radio test related Requirements. (if applicable)
7. The all test items in this test report are conducted by UL Japan, Inc. 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 13554183S-I. 13554183S-I is replaced with this report.

Date of test: October 19 to November 28, 2020

Representative test engineer:

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Consumer Technology Division



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.: 13554183S-I

Revision	Test report No.	Date	Page revised	Contents
- (Original)	13554183S-I	February 26, 2021	-	-
1	13554183S-I-R1	March 2, 2021	44 - 46	Addition of remarks: *1) PSD was measured with using the gate function of Spectrum analyzer.

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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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CONTENTS	PAGE
SECTION 1: Customer information.....	5
SECTION 2: Equipment under test (EUT).....	5
SECTION 3: Test specification, procedures & results.....	8
SECTION 4: Operation of EUT during testing.....	12
SECTION 5: Conducted Emission.....	15
SECTION 6: Radiated Spurious Emission and Band Edge Compliance.....	16
SECTION 7: Antenna Terminal Conducted Tests.....	19
APPENDIX 1: Test data	20
Conducted Emission	20
26 dB Emission Bandwidth and 99 % Occupied Bandwidth.....	23
6 dB Bandwidth	33
Maximum Conducted Output Power	36
Maximum Power Spectral Density	43
Radiated Spurious Emission	52
Conducted Spurious Emission	170
APPENDIX 2: Test instruments	171
APPENDIX 3: Photographs of test setup	174
Conducted Emission	174
Radiated Spurious Emission	175
Antenna Terminal Conducted Tests.....	176

SECTION 1: Customer information

Company Name	:	Sony Corporation, Japan and Sony Group Companies
Address	:	1-7-1 Konan Minato-ku, Tokyo, 108-0075 Japan
Contact Person	:	Kazuhiko Nagano

The information provided from the customer is as follows;

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

SECTION 2: Equipment under test (EUT)

2.1 Identification of EUT

Type	:	CONTROL BOX
Model Number	:	TMR-A9WT
Serial Number	:	Refer to SECTION 4.2
Rating	:	AC adapter Input: AC 100 V – 240 V, 50/60 Hz DC 12 V
Receipt Date	:	October 1, 2020
Country of Mass-production	:	Malaysia
Condition	:	Engineering prototype (Not for Sale: This sample is equivalent to mass-produced items.)
Modification	:	No Modification by the test lab.

2.2 Product Description

Model: TMR-A9WT (referred to as the EUT in this report) is a CONTROL BOX.

Clock frequency of the EUT	:	48 MHz (MAX) (Module A: WM-BAC-AT-49) 48 MHz (MAX) (Module B: 1PJ)
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Radio Specification

<Module A: model No. WM-BAC-AT-49>

	Bluetooth (BR/EDR) *1)	Bluetooth (Low Energy) *1)
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)	
Antenna type	Dipole antenna	
Antenna Gain	3.54 dBi	
Antenna	U.FL connector	
Connector type		

*1) The Bluetooth part antenna and the Module B antenna are common antenna.

	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 - 5720 MHz 5745 MHz - 5825 MHz	5190 MHz - 5230 MHz 5270 MHz - 5310 MHz 5510 MHz - 5710 MHz 5755 MHz - 5795 MHz
Channel spacing	5 MHz		2.4 GHz band 5 MHz 5 GHz band 20 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 - 5720 MHz 5745 MHz - 5825 MHz	5180 MHz - 5240 MHz 5260 MHz - 5320 MHz 5500 MHz - 5720 MHz 5745 MHz - 5825 MHz	5190 MHz - 5230 MHz 5270 MHz - 5310 MHz 5510 MHz - 5710 MHz 5755 MHz - 5795 MHz	5210 MHz 5290 MHz 5530 MHz - 5610 MHz 5690 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	Dipole antenna			
Antenna Gain	ANT0 : 1.36 dBi (2.4 GHz), 3.71 dBi (U-NII-1), 2.60 dBi (U-NII-2A), 2.48 dBi (U-NII-2C), 3.09 dBi (U-NII-3) ANT1 : 1.90 dBi (2.4 GHz), 5.79 dBi (U-NII-1), 5.79 dBi (U-NII-2A), 5.12 dBi (U-NII-2C), 4.13 dBi (U-NII-3)			
Antenna	U.FL connector			
Connector type				

<Module B: Model No. 1PJ> (* The module covered by this report.)

	IEEE802.11a	IEEE802.11n (20 MHz band)	IEEE802.11n (40 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
Channel spacing	20 MHz	20 MHz	40 MHz
Modulation	DSSS: DBPSK, DQPSK, CCK	OFDM: BPSK, QPSK, 16QAM, 64QAM	
Antenna type	Dipole antenna		
Antenna Gain	ANT : 4.64 dBi (U-NII-1), 4.48 dBi (U-NII-2A), 4.76 dBi (U-NII-2C), 4.76 dBi (U-NII-3)		
Antenna Connector type	U.FL connector		

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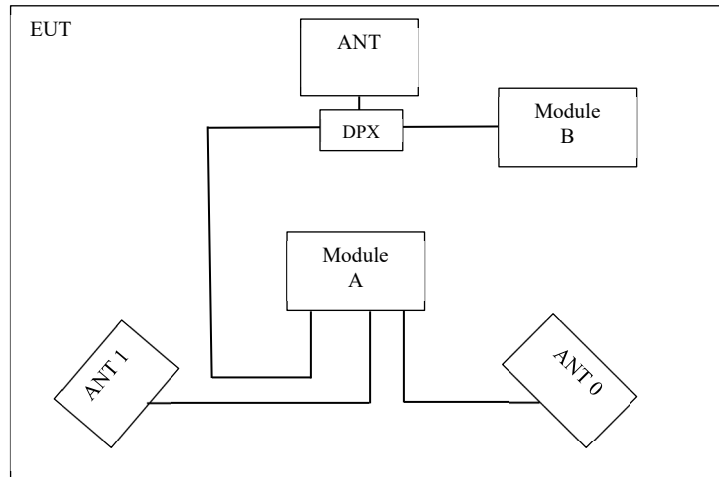
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Additional information of specification:



The EUT has Module A and Module B.

* DPX: Diplexer.

Combination of antennas used

	BT	BT LE	WLAN 2.4 GHz	WLAN 5 GHz
ANT	Module A	Module A	-	Module B
ANT 0	-	-	Module A	Module A
ANT 1	-	-	Module A	Module A

SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification : FCC Part 15 Subpart E
FCC Part 15 final revised on January 12, 2021 and effective February 11, 2021
* The revision does not affect the test result conducted before its effective date.

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	16.5 dB 13.78952 MHz, N, AV, Tx 11n-20 5580 MHz with Module A 11n-20 2437 MHz and Module A BT LE 2 M 2402 MHz	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	0.4 dB 5350.000 MHz, Horizontal, AV, Tx 11n-40 5310 MHz with Module A 11n-20 2437 MHz and Module A BT LE 2 M 2402 MHz Tx 11n-40 5310 MHz with Module A 11n-20 2437 MHz and Module A BT Hopping On 3DH5	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. *1) Radiated test was selected over 30 MHz based on FCC 15.407 (b) and KDB 789033 D02 G.3.b). a) Refer to APPENDIX 1 (data of 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)

This EUT provides the stable voltage constantly to RF Module regardless of input voltage. Therefore, this EUT complies with the requirement.

FCC Part 15.203 Antenna requirement

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

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3.3 Addition to standard

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

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

3.4 Uncertainty

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

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

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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 / CAB identifier: JP0001)

Test site	IC Registration Number	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Maximum measurement distance
No.1 Semi-anechoic chamber	2973D-1	20.6 x 11.3 x 7.65	20.6 x 11.3	10 m
No.2 Semi-anechoic chamber	2973D-2	20.6 x 11.3 x 7.65	20.6 x 11.3	10 m
No.3 Semi-anechoic chamber	2973D-3	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 EUT during testing

4.1 Operating Mode(s)

Test operating mode was determined as follows according to “Section 1 of 6 802.11 a/n testing - Managing Complex Regulatory Approvals -” of TCB Council Workshop October 2009.

Mode	Remarks*
IEEE 802.11a (11a)	18 Mbps, PN9
IEEE 802.11n SISO 20 MHz BW (11n-20)	MCS 6, PN9
IEEE 802.11n SISO 40 MHz BW (11n-40)	MCS 2, PN9
*Transmitting duty was 100 % on all tests.	
*The worst antenna (Ant: x) and condition was determined based on the test result of Maximum Conducted Output Power.	
*Power of the EUT was set by the software as follows; Power settings: 11a: 12 dBm (6 Mbps ~ 48 Mbps), 11 dBm (54 Mbps) 11n-20: 12 dBm (MCS0 ~ MCS6), 10 dBm (MCS7) 11n-40: 9 dBm (5190 MHz), 11 dBm (5310 MHz), 10 dBm (5510 MHz), 12 dBm (5230 MHz, 5550 MHz – 5795 MHz)	
Software: (single transmission) LBEE5ZZ1PJ_331_RF_Test_v1.0 (Date: 2020.10.12, Storage location: Driven by connected PC)	
(simultaneous transmission) AT-49 BT Test Ver 1.2, LBEE5ZZ1PJ_331_RF_Test_v1.1 (Date: 2020.11.06, Storage location: Driven by connected PC) AT-49 RF Test Ver 1.4 (Date: 2020.11.20, 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	11n-20 *1)	-	-	5580 MHz	-
	11n-20 with Module A 11n-20 2437 MHz and Module A BT Hopping On 3DH5	-	-	5580 MHz	-
	11n-20 with ModuleA11n-20 2437 MHz and Module A BT LE 2 M 2402 MHz	-	-	5580 MHz	-
26 dB Emission Bandwidth	11a 11n-20	-	5260 MHz 5300 MHz 5320 MHz	5500 MHz 5580 MHz 5700 MHz	-
	11n-40	-	5260 MHz 5300 MHz 5320 MHz	5510 MHz 5550 MHz 5670 MHz	-
99 % Occupied Bandwidth, Maximum Conducted Output Power, Maximum Power Spectral Density	11a 11n-20	5180 MHz 5220 MHz 5240 MHz	5260 MHz 5300 MHz 5320 MHz	5500 MHz 5580 MHz 5700 MHz	5745 MHz 5785 MHz 5825 MHz
	11n-40	5190 MHz 5230 MHz	5270 MHz 5310 MHz	5510 MHz 5550 MHz 5670 MHz	5755 MHz 5795 MHz
6 dB Bandwidth	11a, 11n-20	-	-	-	5745 MHz 5785 MHz 5825 MHz
	11n-40	-	-	-	5755 MHz 5795 MHz
Radiated Spurious Emission (Below 1 GHz)	11n-20 *1)	-	-	5580 MHz	-
	11n-20 with Module A 11n-20 2437 MHz and Module A BT Hopping On 3DH5	-	-	5580 MHz	-
	11n-20 with ModuleA11n-20 2437 MHz and Module A BT LE 2 M 2402 MHz	-	-	5580 MHz	-
Radiated Spurious Emission (Above 1 GHz)	11a	5180 MHz	5320 MHz	5500 MHz 5700 MHz	5745 MHz 5825 MHz
	11n-20	5180 MHz 5240 MHz	5320 MHz	5500 MHz 5580 MHz 5700 MHz	5745 MHz 5785 MHz 5825 MHz
	11a with Module A 11n-20 2437 MHz and Module A BT Hopping On 3DH5, 11n-20 with ModuleA11n-20 2437 MHz and Module A 3DH5 Hopping	5180 MHz	5320 MHz	5500 MHz 5580 MHz 5700 MHz	5745 MHz 5825 MHz
	11a with Module A 11n-20 2437 MHz and Module A BT Hopping On 3DH5, 11n-20 with ModuleA11n-20 2437 MHz and Module A BT LE 2 M 2402 MHz	5180 MHz	5320 MHz	5500 MHz 5580 MHz 5700 MHz	5745 MHz 5825 MHz
	11n-40 with Module A 11n-20 2437 MHz and Module A BT Hopping On 3DH5	5190 MHz 5230 MHz	5310 MHz	5510 MHz 5670 MHz	5755 MHz 5795 MHz
	11n-40 with ModuleA11n-20 2437 MHz and Module A BT LE 2 M 2402 MHz	5190 MHz	5310 MHz	5510 MHz 5670 MHz	5755 MHz 5795 MHz
	11n-40	5190 MHz 5230 MHz	5310 MHz	5510 MHz 5550 MHz 5670 MHz	5755 MHz 5795 MHz
Conducted Spurious Emission	11n-20 *1)	-	-	5580 MHz	-

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

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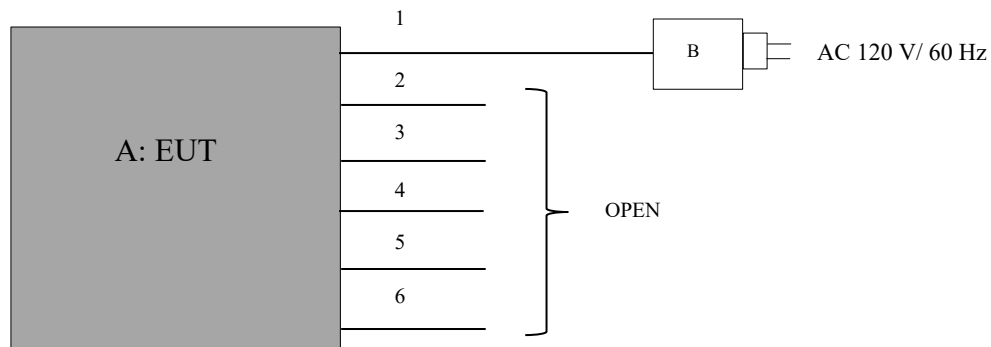
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4.2 Configuration and peripherals



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

Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	CONTROL BOX	TMR-A9WT	036 *1) 1000002 *2) 1000015 *3)	SONY	EUT *4)
B	AC Adaptor	AC-M1215UC	M2090660218	SONY	-

*1) Used for Antenna Terminal conducted test

*2) Used for Radiated Emission test

*3) Used for Conducted Emission test and Radiated Emission test (Simultaneous transmission)

*4) The EUT is mounted Module A(WM-BAC-AT-49) and Module B(1PJ) on its inside.

List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	DC	1.5	Unshielded	Unshielded	-
2	USB	1.7	Shielded	Shielded	-
3	Audio	2.0	Shielded	Shielded	-
4	LAN	1.0	Unshielded	Unshielded	Cat.5e
5	HDMI	1.5	Shielded	Shielded	HDMI OUT
6	HDMI	1.8	Shielded	Shielded	HDMI IN

SECTION 5: Conducted Emission

Test Procedure and conditions

EUT was placed on a urethane platform of nominal size, 1.0 m by 1.5 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 80cm 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.

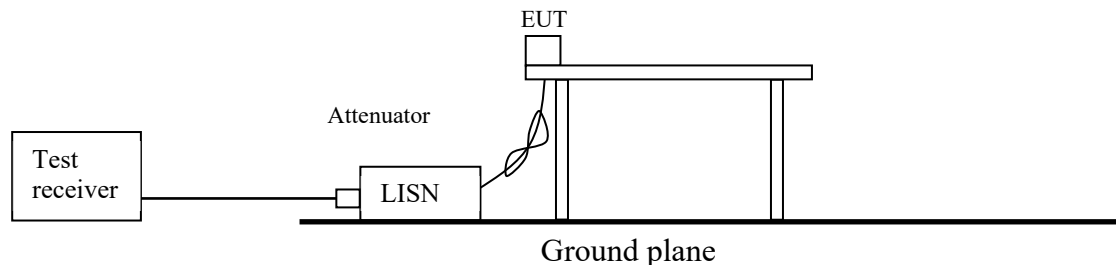
The AC Mains Terminal Continuous disturbance Voltage has been measured with the EUT in a Semi Anechoic Chamber. The EUT was connected to a LISN (AMN).

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 1.5 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;

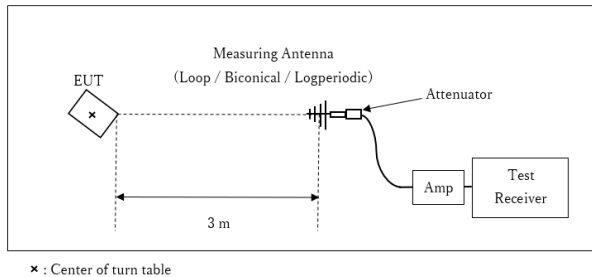
Frequency	30 MHz to 200 MHz	200 MHz to 1 GHz	Above 1 GHz
Antenna Type	Biconical	Logperiodic	Horn

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 VB *1) RBW: 1 MHz VBW: 1/T MHz (T: Burst length, refer to Appendix) Detector: Peak Trace mode: 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".

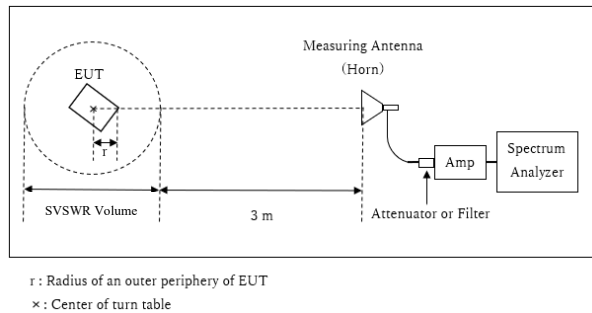
Figure 2: Test Setup

Below 1 GHz



Test Distance: 3 m

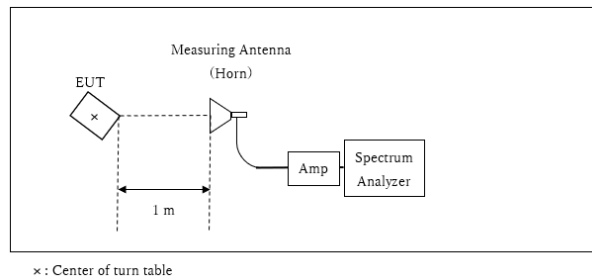
1 GHz - 10 GHz



Distance Factor: $20 \times \log (3.9 \text{ m} / 3.0 \text{ m}) = 2.28 \text{ dB}$
* Test Distance: $(3 + \text{SVSWR Volume} / 2) - r = 3.9 \text{ m}$

SVSWR Volume : 2.0 m
(SVSWR Volume has been calibrated based on CISPR 16-1-4.)
r = 0.1 m

10 GHz - 40 GHz



Distance Factor: $20 \times \log (1.0 \text{ m} / 3.0 \text{ m}) = -9.54 \text{ dB}$
*Test Distance: 1 m

The test was made on EUT at the normal use position.

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) *4)	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)

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

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

Test data : APPENDIX
Test result : Pass

APPENDIX 1: Test data

Conducted Emission

DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Shonan EMC Lab. No.1 Shielded Room
Date : 2020/11/28

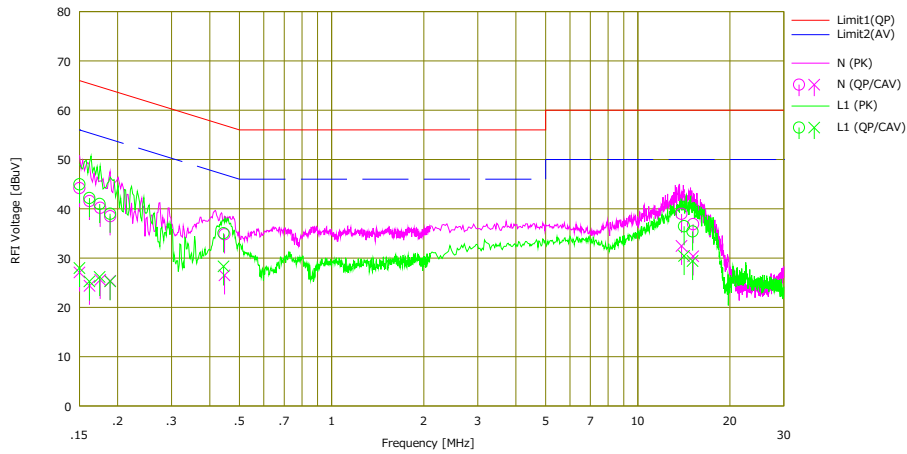
Mode : Tx 11n-20 5580 MHz

Power : AC 120 V / 60 Hz
Temp./Humi. : 22 deg.C / 45 %RH

Remarks : -

Limit : FCC_Part 15 Subpart C(15.207)

Engineer : Kazuya Noda



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	31.60	14.50	12.60	44.20	27.10	66.00	56.00	21.8	28.9	N	
2	0.16186	29.00	11.80	12.59	41.59	24.39	65.37	55.37	23.7	30.9	N	
3	0.17544	27.60	13.00	12.59	40.19	25.59	64.70	54.70	24.5	29.1	N	
4	0.18912	25.90	12.80	12.59	38.49	25.39	64.08	54.08	25.5	28.6	N	
5	0.44680	22.20	13.90	12.62	34.82	26.52	56.93	46.93	22.1	20.4	N	
6	13.89300	25.00	18.50	13.97	38.97	32.47	60.00	50.00	21.0	17.5	N	
7	15.17210	22.80	16.30	14.08	36.88	30.38	60.00	50.00	23.1	19.6	N	
8	0.15000	32.40	15.40	12.58	44.98	27.98	66.00	56.00	21.0	28.0	L1	
9	0.16174	29.60	12.70	12.58	42.18	25.28	65.37	55.37	23.1	30.0	L1	
10	0.17470	28.40	13.60	12.58	40.98	26.18	64.73	54.73	23.7	28.5	L1	
11	0.18908	26.40	12.70	12.59	38.99	25.29	64.08	54.08	25.0	28.7	L1	
12	0.44345	22.40	15.70	12.64	35.04	28.34	57.00	47.00	21.9	18.6	L1	
13	14.16804	22.70	16.70	13.75	36.45	30.45	60.00	50.00	23.5	19.5	L1	
14	15.10210	21.60	15.60	13.82	35.42	29.42	60.00	50.00	24.5	20.5	L1	

Calculation: Result[dBuV] = Reading[dBuV] + C.Fac(LISN(AMN) + Cable + ATT)[dB]
LISN(AMN): SLS-02

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Conducted Emission

DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Shonan EMC Lab. No.1 Shielded Room
Date : 2020/11/28

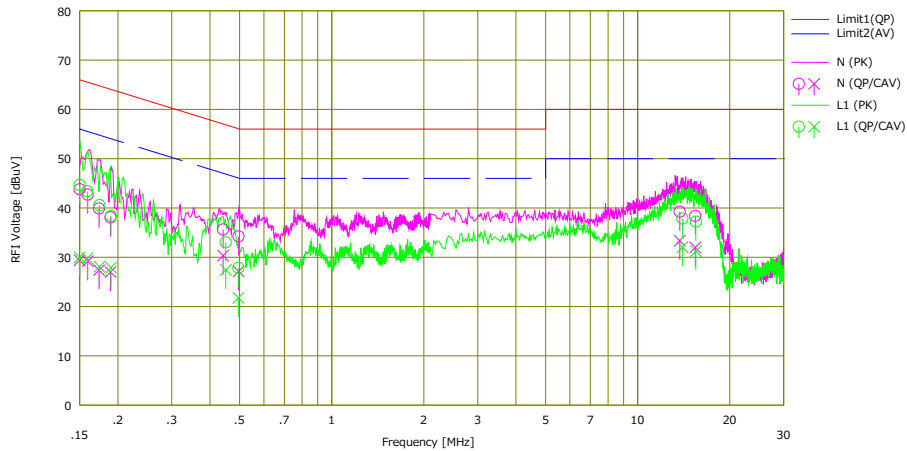
Mode : Tx 11n-20 5580 MHz

Power : AC 120 V / 60 Hz
Temp./Humi. : 22 deg.C / 45 %RH

Remarks : with Module A 11n-20 2437 MHz and Module A BT Hopping On 3DH5

Limit : FCC_Part 15 Subpart C(15.207)

Engineer : Kazuya Noda



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	31.20	16.80	12.60	43.80	29.40	66.00	56.00	22.2	26.6	N	
2	0.15938	30.10	16.60	12.60	42.70	29.20	65.50	55.50	22.8	26.3	N	
3	0.17355	27.30	14.80	12.59	39.89	27.39	64.79	54.79	24.9	27.4	N	
4	0.18920	25.50	14.40	12.59	38.09	26.99	64.07	54.07	25.9	27.0	N	
5	0.44140	23.00	17.70	12.62	35.62	30.32	57.04	47.04	21.4	16.7	N	
6	0.49610	21.60	14.50	12.63	34.23	27.13	56.07	46.07	21.8	18.9	N	
7	13.72140	25.30	19.40	13.95	39.25	33.35	60.00	50.00	20.7	16.6	N	
8	15.42944	24.30	17.90	14.10	38.40	32.00	60.00	50.00	21.6	18.0	N	
9	0.15000	32.10	17.40	12.58	44.68	29.98	66.00	56.00	21.3	26.0	L1	
10	0.15894	30.80	17.20	12.58	43.38	29.78	65.52	55.52	22.1	25.7	L1	
11	0.17416	28.00	15.50	12.58	40.58	28.08	64.76	54.76	24.1	26.6	L1	
12	0.18998	25.80	15.30	12.59	38.39	27.89	64.04	54.04	25.6	26.1	L1	
13	0.45020	20.40	14.80	12.64	33.04	27.44	56.87	46.87	23.8	19.4	L1	
14	0.49530	15.20	9.10	12.65	27.85	21.75	56.08	46.08	28.2	24.3	L1	
15	14.00200	24.10	18.30	13.75	37.85	32.05	60.00	50.00	22.1	17.9	L1	
16	15.49544	23.40	17.40	13.84	37.24	31.24	60.00	50.00	22.7	18.7	L1	

Calculation: Result[dBuV]=Reading[dBuV]+C.Fac(LISN(AMN)+Cable+ATT)[dB]
LISN(AMN): SLS-02

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Conducted Emission

DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Shonan EMC Lab. No.1 Shielded Room
Date : 2020/11/28

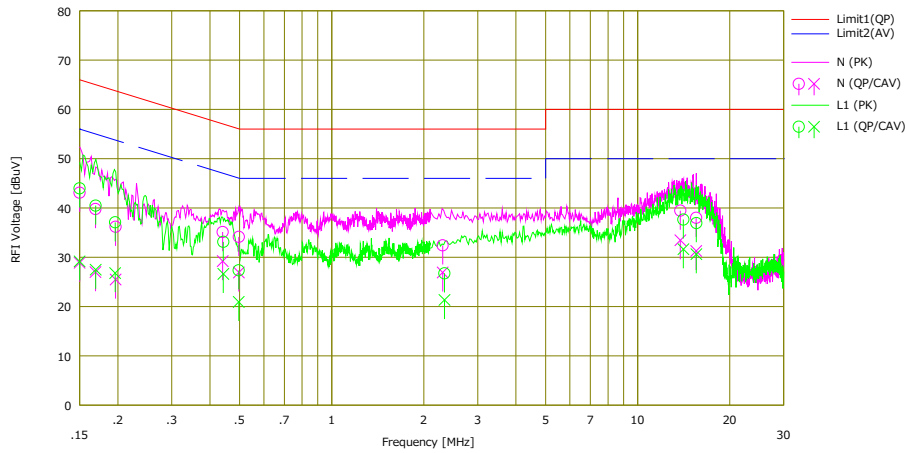
Mode : Tx 11n-20 5580 MHz

Power : AC 120 V / 60 Hz
Temp./Humi. : 22 deg.C / 45 %RH

Remarks : with Module A 11n-20 2437 MHz and Module A BT LE 2 M 2402 MHz

Limit : FCC_Part 15 Subpart C(15.207)

Engineer : Kazuya Noda



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	30.50	16.30	12.60	43.10	28.90	66.00	56.00	22.9	27.1	N	
2	0.16908	27.20	14.40	12.59	39.79	26.99	65.01	55.01	25.2	28.0	N	
3	0.19662	23.60	12.90	12.59	36.19	25.49	63.75	53.75	27.5	28.2	N	
4	0.44004	22.50	16.60	12.62	35.12	29.22	57.06	47.06	21.9	17.8	N	
5	0.49718	21.50	14.30	12.63	34.13	26.93	56.05	46.05	21.9	19.1	N	
6	2.30460	19.60	14.10	12.82	32.42	26.92	56.00	46.00	23.5	19.0	N	
7	13.78952	25.50	19.50	13.96	39.46	33.46	60.00	50.00	20.5	16.5	N	
8	15.52503	23.90	17.20	14.10	38.00	31.30	60.00	50.00	22.0	18.7	N	
9	0.15000	31.40	16.60	12.58	43.98	29.18	66.00	56.00	22.0	26.8	L1	
10	0.16932	27.90	14.90	12.58	40.48	27.48	64.99	54.99	24.5	27.5	L1	
11	0.19602	24.50	14.20	12.59	37.09	26.79	63.78	53.78	26.6	26.9	L1	
12	0.44220	20.50	14.00	12.64	33.14	26.64	57.02	47.02	23.8	20.3	L1	
13	0.49670	14.70	8.30	12.65	27.35	20.95	56.06	46.06	28.7	25.1	L1	
14	2.33613	13.90	8.50	12.84	26.74	21.34	56.00	46.00	29.2	24.6	L1	
15	14.10200	23.90	17.90	13.75	37.65	31.65	60.00	50.00	22.3	18.3	L1	
16	15.55103	23.10	16.80	13.84	36.94	30.64	60.00	50.00	23.0	19.3	L1	

Calculation: Result[dBuV]=Reading[dBuV]+C.Fac(LISN(AMN)+Cable+ATT)[dB]
LISN(AMN): SLS-02

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26 dB Emission Bandwidth and 99 % Occupied Bandwidth

Report No.	13554183S-I-R1
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	October 19, 2020
Temperature / Humidity	25 deg. C / 41 % RH
Engineer	Makoto Hosaka
Mode	Tx

11a

Tested Frequency [MHz]	26 dB Emission Bandwidth [MHz]	99 % Occupied Bandwidth [kHz]
5180	-	16458.3
5220	-	16456.7
5240	-	16457.6
5260	19.456	16449.5
5300	18.862	16460.7
5320	19.392	16498.2
5500	19.315	16487.1
5580	18.746	16466.9
5700	19.159	16475.6
5745	-	16455.8
5785	-	16451.8
5825	-	16423.8

11n-20

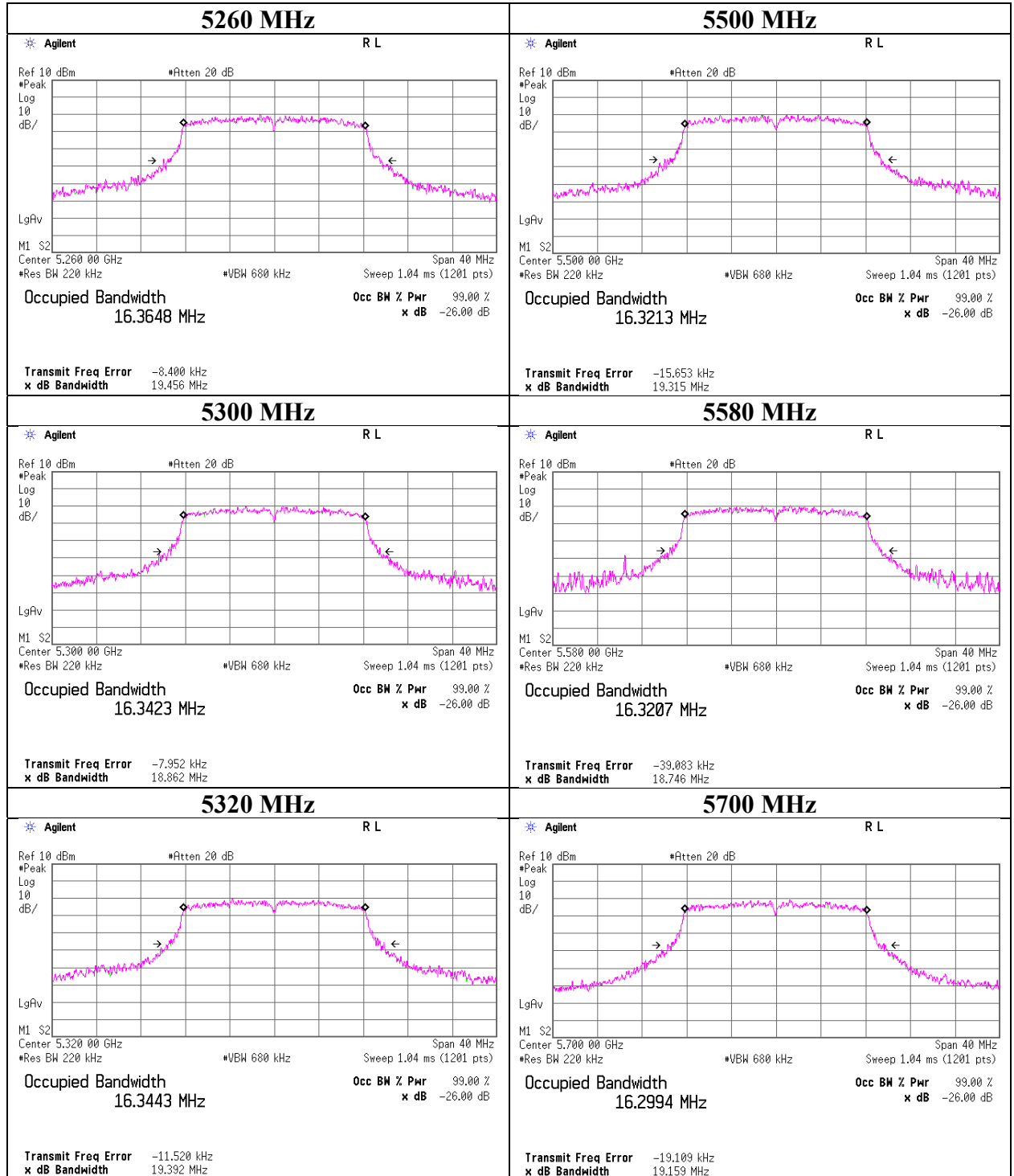
Tested Frequency [MHz]	26 dB Emission Bandwidth [MHz]	99 % Occupied Bandwidth [kHz]
5180	-	18178.6
5220	-	18120.5
5240	-	18169.1
5260	21.033	18133.6
5300	21.388	18164.7
5320	21.341	18083.8
5500	20.988	18162.5
5580	21.224	18191.8
5700	21.671	18181.6
5745	-	18057.7
5785	-	18178.2
5825	-	18142.7

11n-40

Tested Frequency [MHz]	26 dB Emission Bandwidth [MHz]	99 % Occupied Bandwidth [kHz]
5190	-	36096.5
5230	-	36028.6
5270	39.844	35949.1
5310	39.715	36092.6
5510	40.596	36045.0
5550	39.998	35981.4
5670	40.805	36041.3
5755	-	36038.5
5795	-	36053.9

26 dB Emission Bandwidth

11a



UL Japan, Inc.

Shonan EMC Lab.

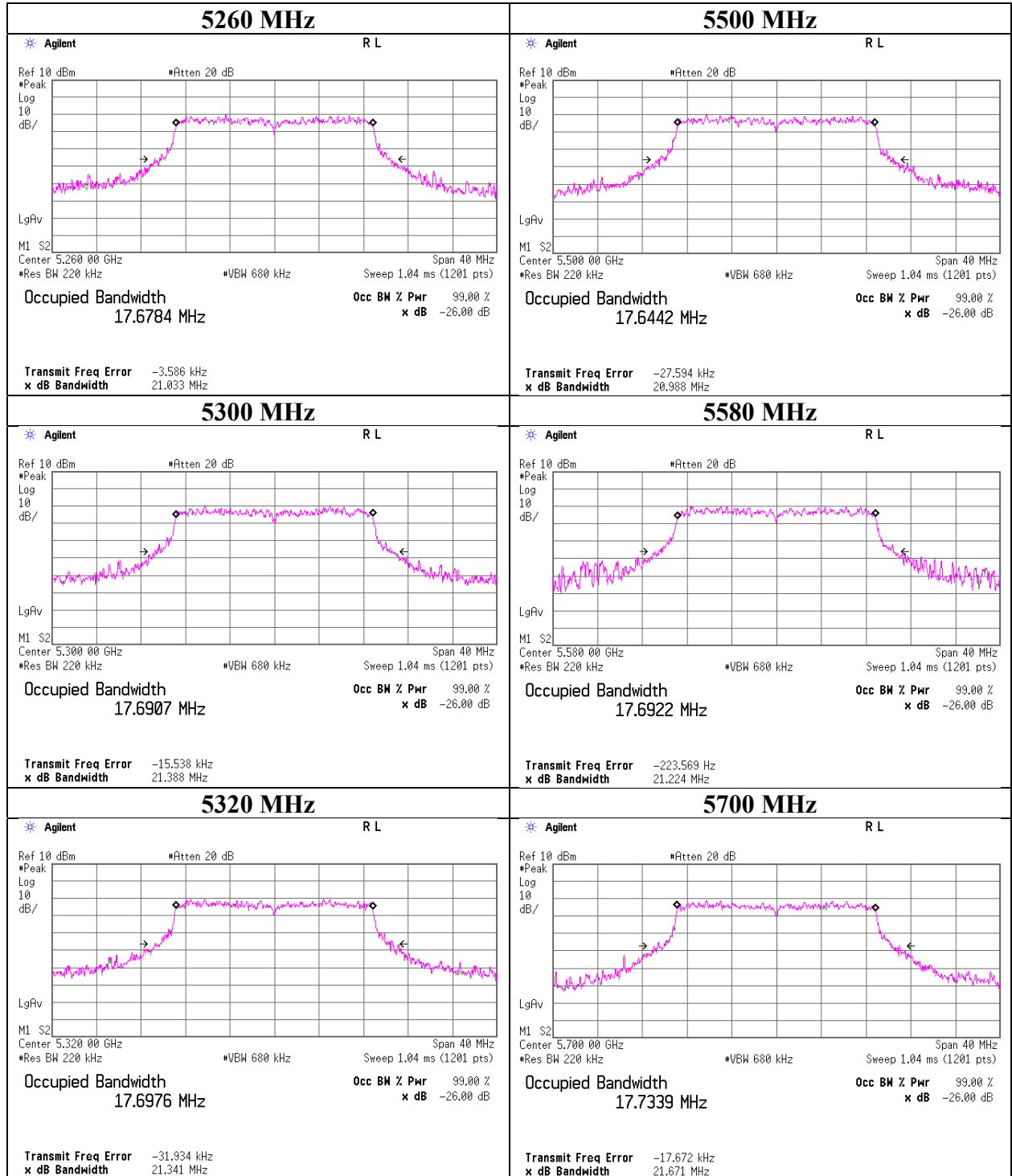
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

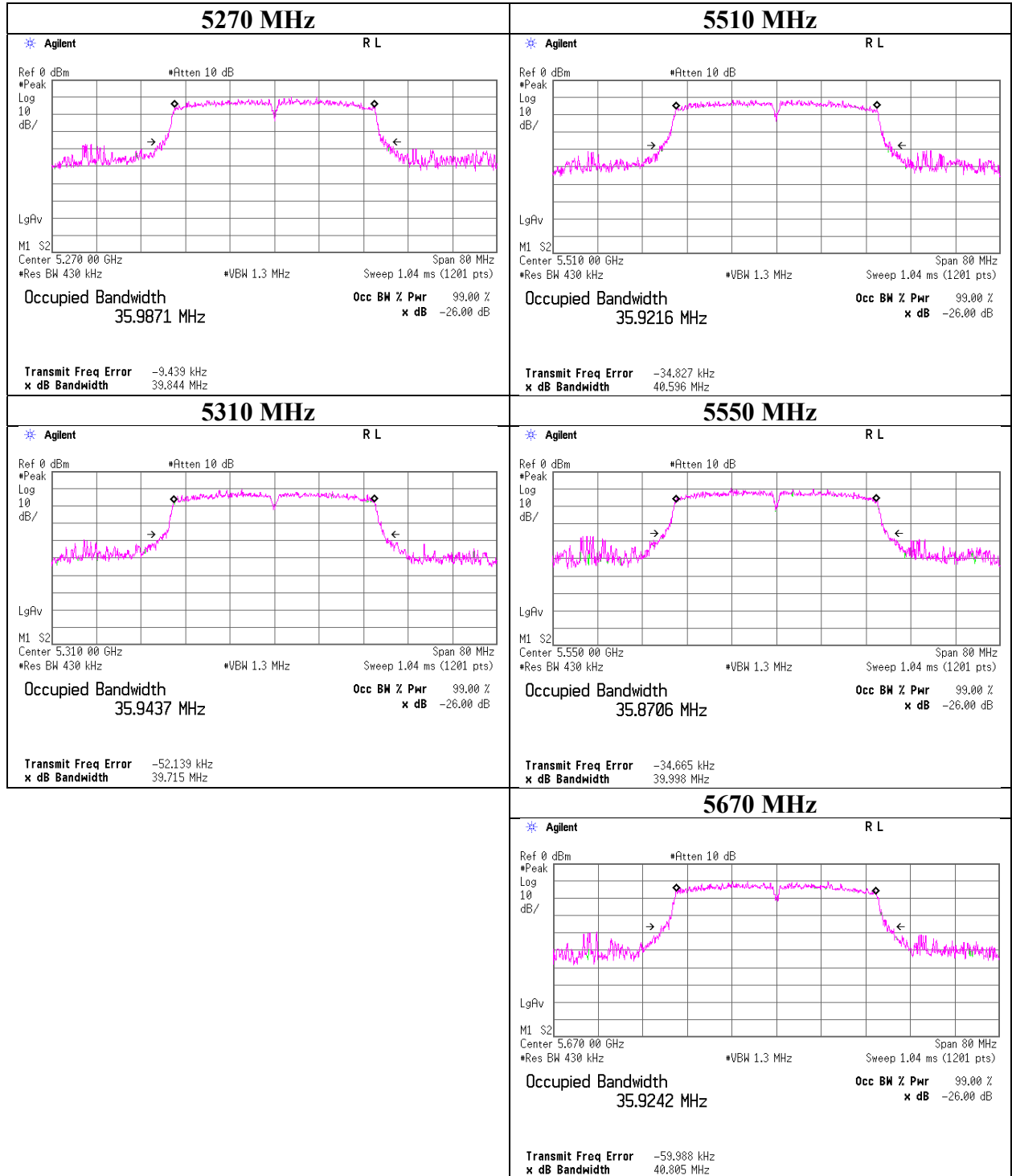
26 dB Emission Bandwidth

11n-20



26 dB Emission Bandwidth

11n-40



UL Japan, Inc.

Shonan EMC Lab.

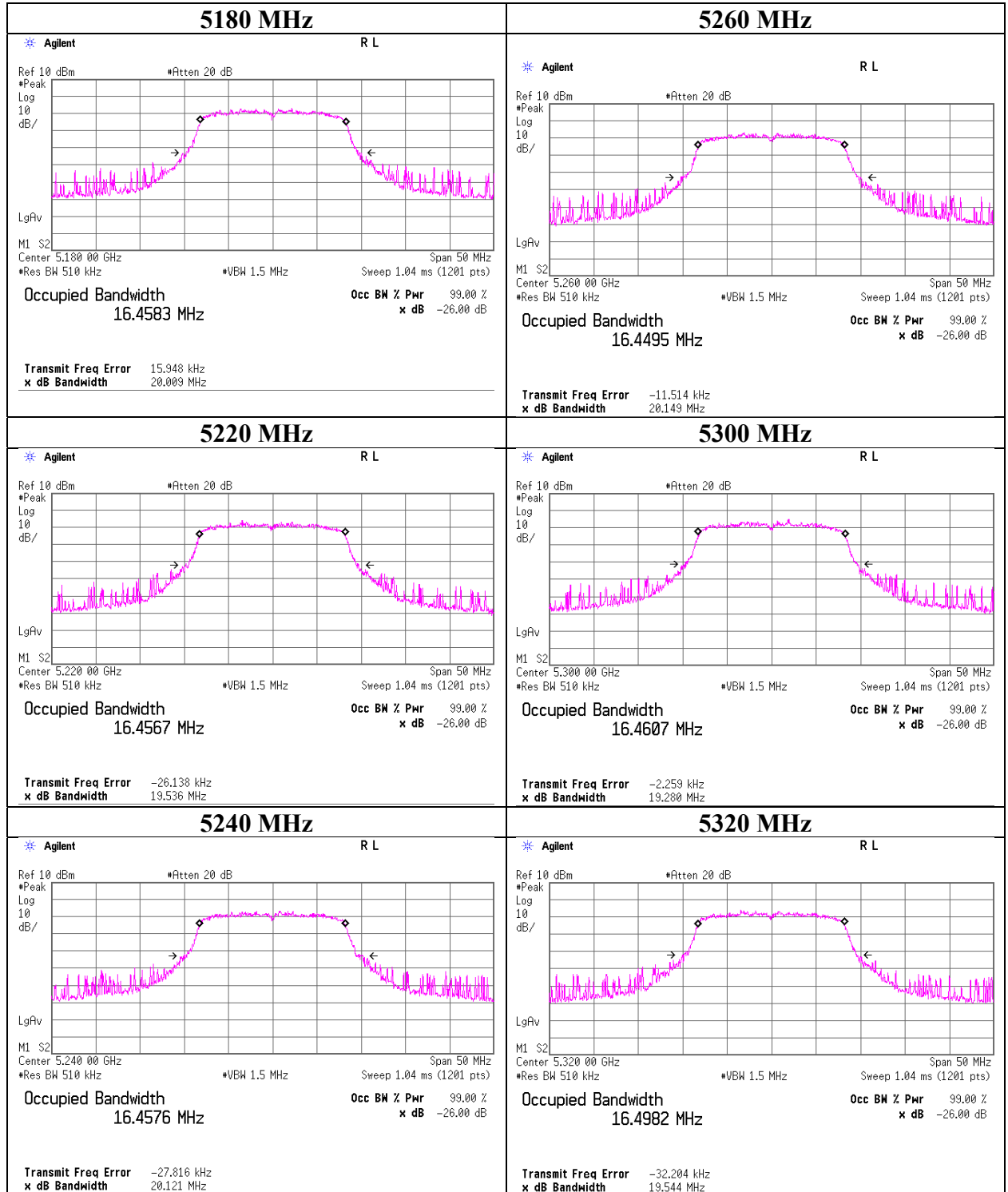
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

99 % Occupied Bandwidth

11a



UL Japan, Inc.

Shonan EMC Lab.

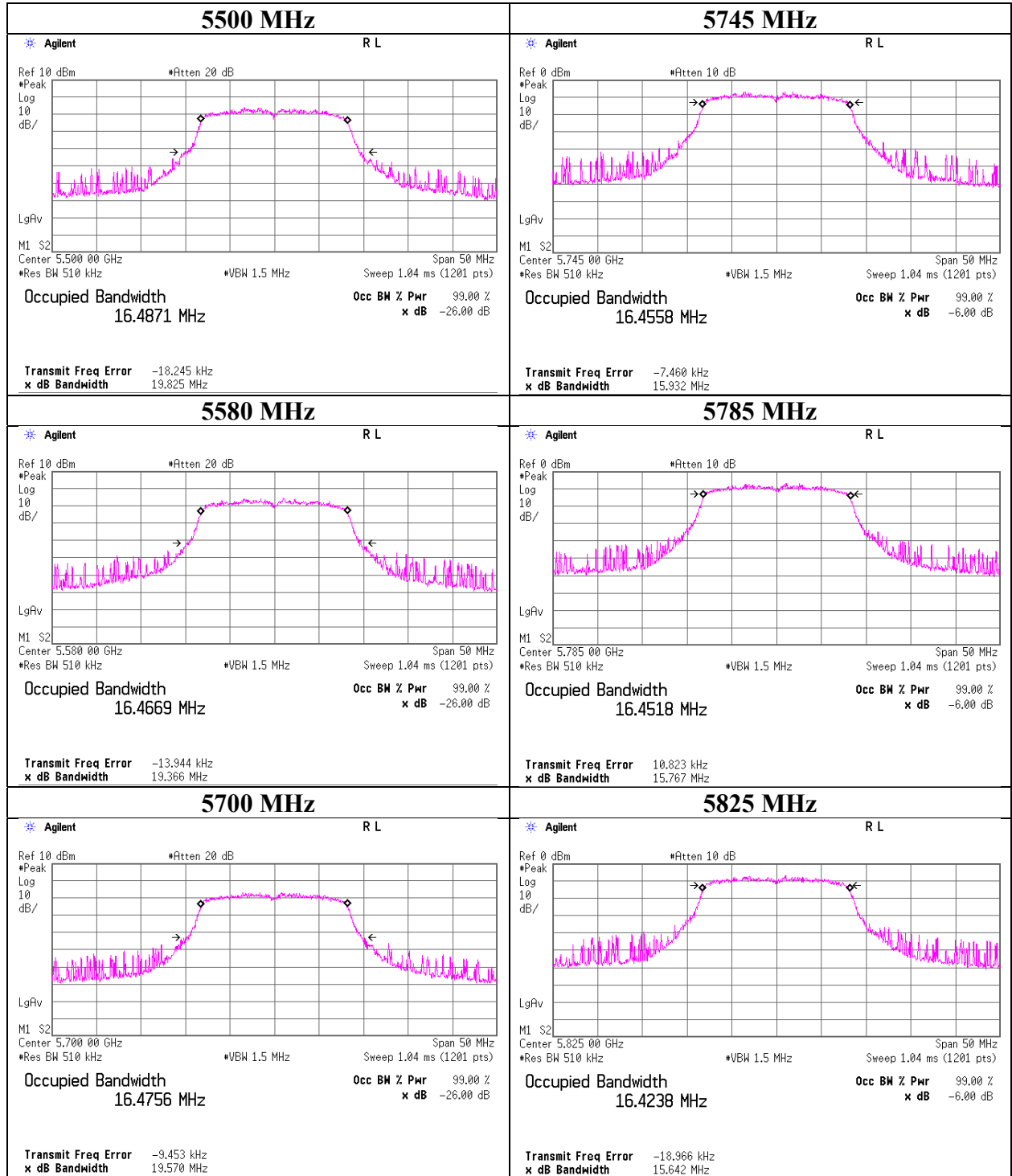
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

99 % Occupied Bandwidth

11a



UL Japan, Inc.

Shonan EMC Lab.

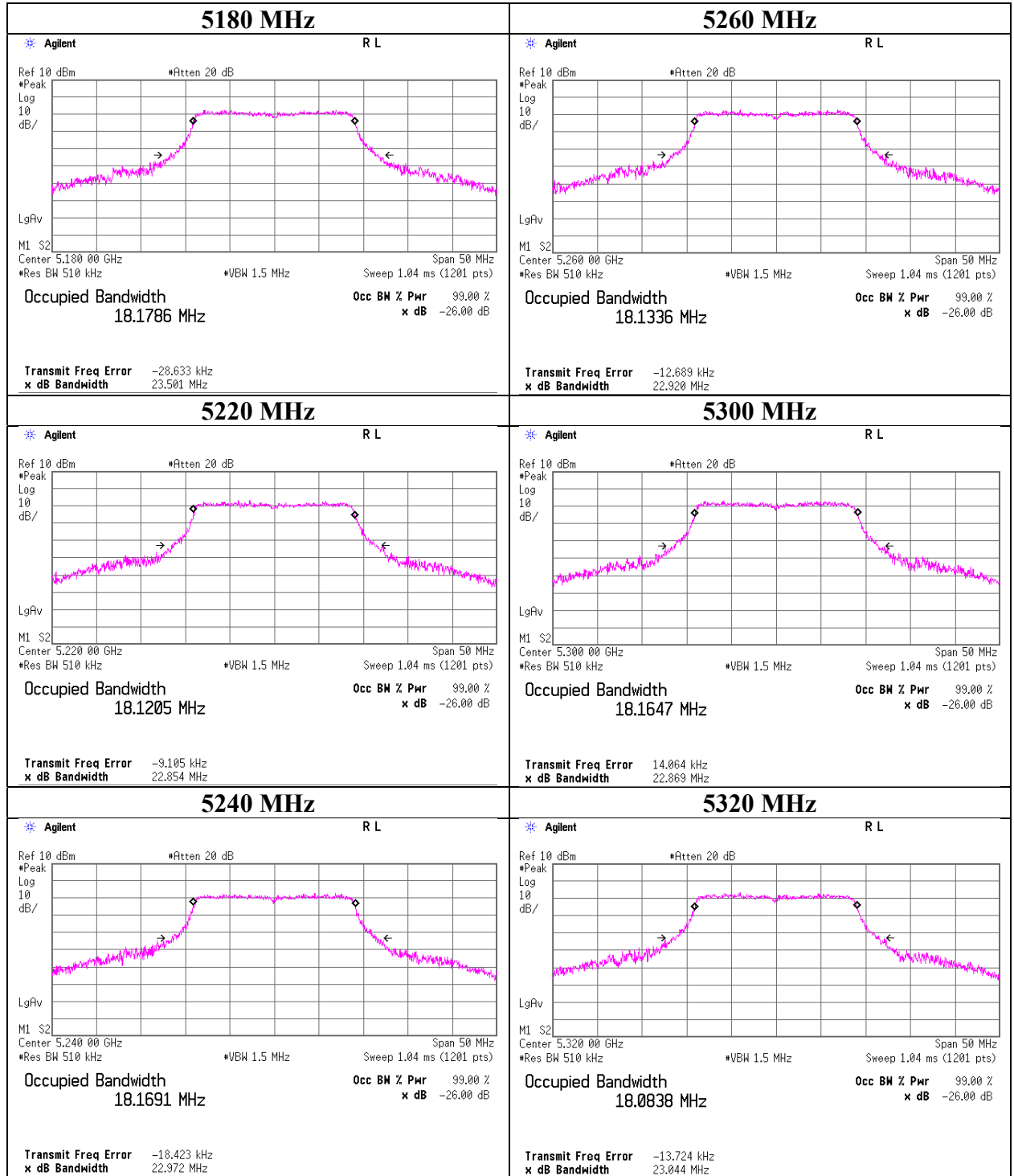
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

99 % Occupied Bandwidth

11n-20



UL Japan, Inc.

Shonan EMC Lab.

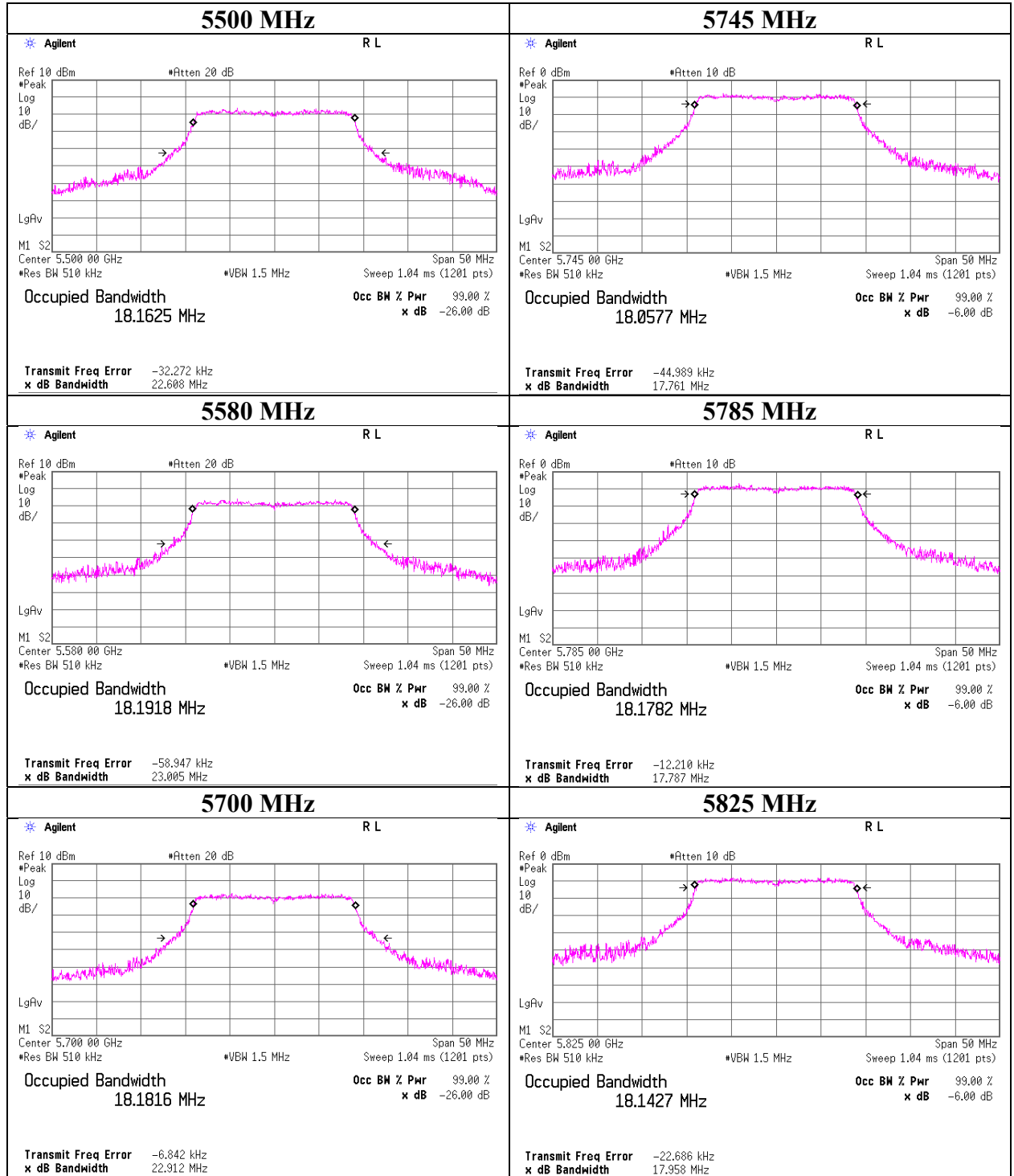
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

99 % Occupied Bandwidth

11n-20



UL Japan, Inc.

Shonan EMC Lab.

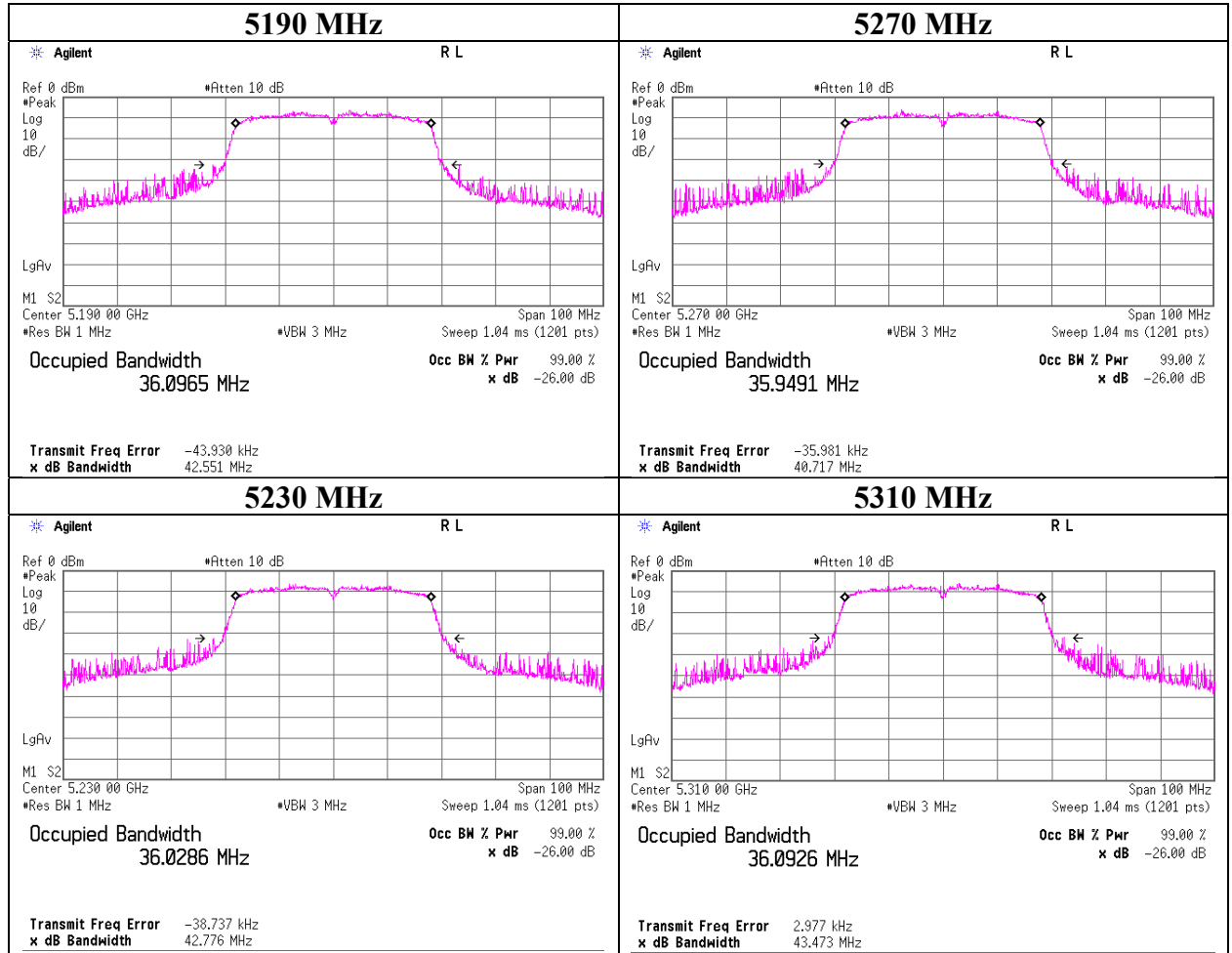
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

99 % Occupied Bandwidth

11n-40



UL Japan, Inc.

Shonan EMC Lab.

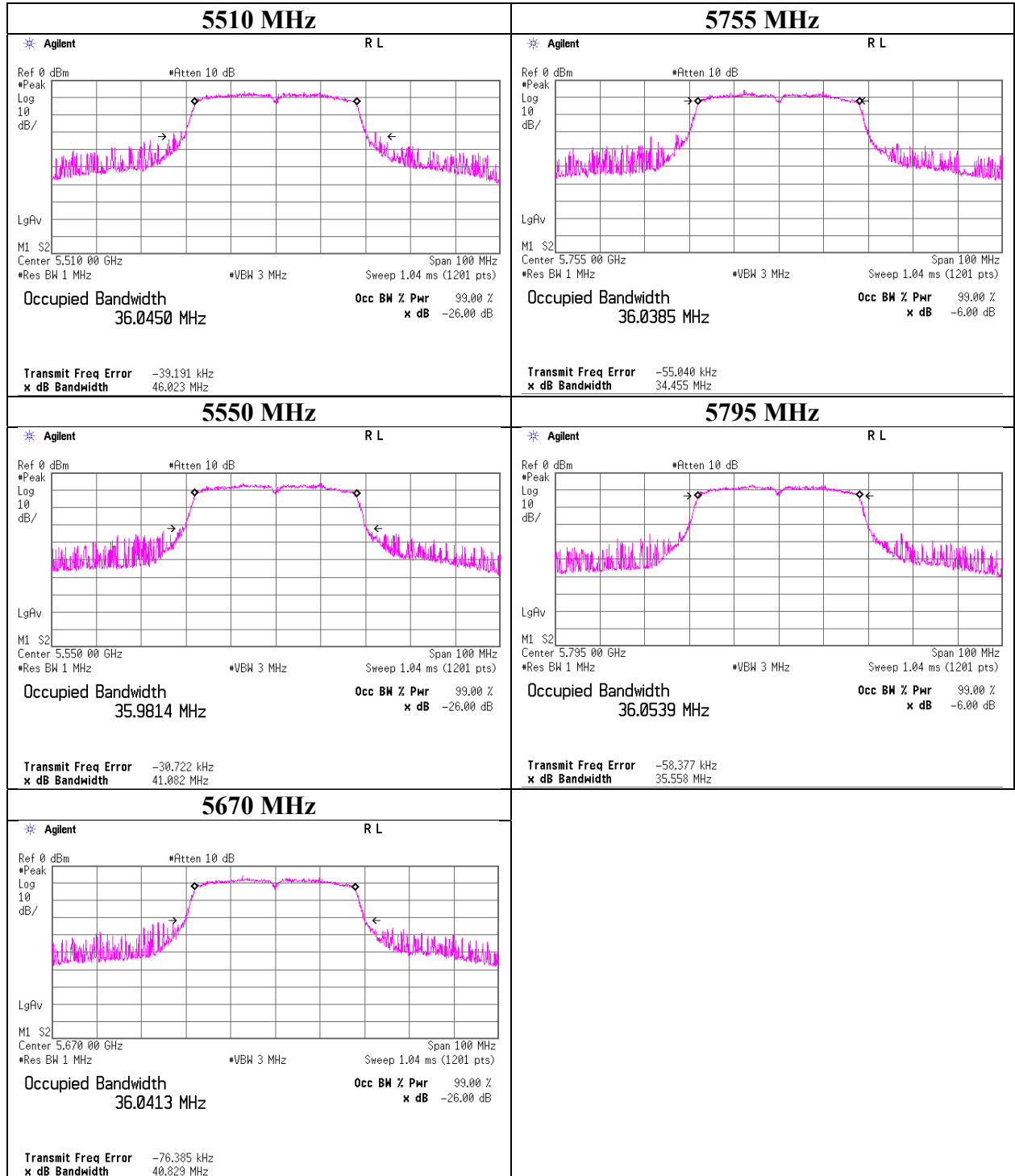
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

99 % Occupied Bandwidth

11n-40



UL Japan, Inc.

Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

6 dB Bandwidth

Report No. 13554183S-I-R1
Test place Shonan EMC Lab. No.5 Shielded Room
Date October 19, 2020
Temperature / Humidity 25 deg. C / 41 % RH
Engineer Makoto Hosaka
Mode Tx

11a

Tested Frequency [MHz]	6 dB Bandwidth [MHz]	Limit [MHz]
5745	15.227	> 0.500
5785	15.044	> 0.500
5825	15.150	> 0.500

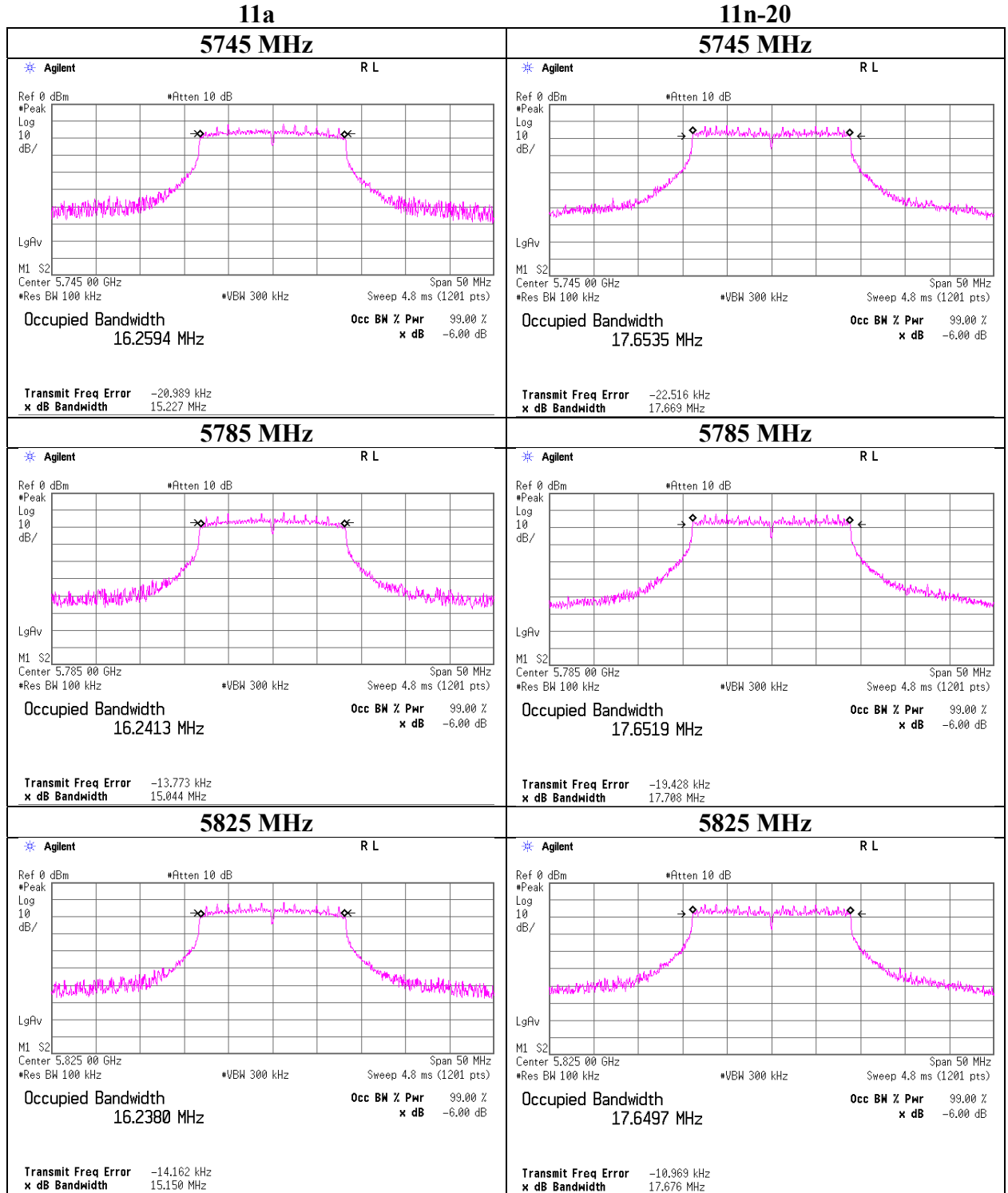
11n-20

Tested Frequency [MHz]	6 dB Bandwidth [MHz]	Limit [MHz]
5745	17.669	> 0.500
5785	17.708	> 0.500
5825	17.676	> 0.500

11n-40

Tested Frequency [MHz]	6 dB Bandwidth [MHz]	Limit [MHz]
5755	35.181	> 0.500
5795	35.112	> 0.500

6 dB Bandwidth



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1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

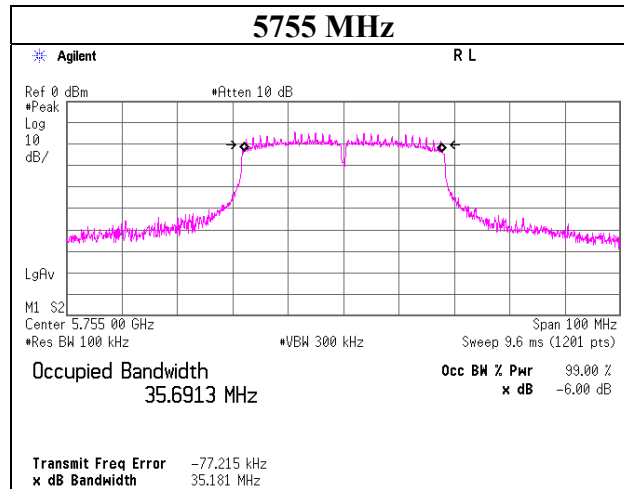
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

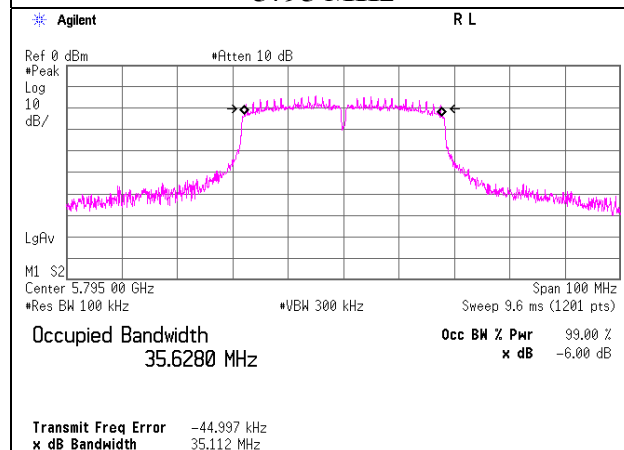
6 dB Bandwidth

11n-40

5755 MHz



5795 MHz



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Telephone : +81 463 50 6400

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Maximum Conducted Output Power

Report No. 13554183S-I-R1
Test place Shonan EMC Lab. No.5 Shielded Room
Date October 19, 2020
Temperature / Humidity 25 deg. C / 41 % RH
Engineer Makoto Hosaka
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 *1) [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	-0.85	1.51	9.72	0.00	4.64	-	16.458	10.38	10.91	23.97	13.59	15.02	31.77	29.97	14.95
5220	-0.56	1.51	9.72	0.00	4.64	-	16.457	10.67	11.67	23.97	13.30	15.31	33.96	29.97	14.66
5240	-0.82	1.44	9.72	0.00	4.64	-	16.458	10.34	10.81	23.97	13.63	14.98	31.48	29.97	14.99
5260	-0.84	1.50	9.72	0.00	4.48	19.456	16.450	10.38	10.91	23.89	13.51	14.86	30.62	29.97	15.11
5300	-0.22	1.50	9.72	0.00	4.48	18.862	16.461	11.00	12.59	23.75	12.75	15.48	35.32	29.97	14.49
5320	-0.51	1.64	9.72	0.00	4.48	19.392	16.498	10.85	12.16	23.87	13.02	15.33	34.12	29.97	14.64
5500	-0.23	1.68	9.73	0.00	4.76	19.315	16.487	11.18	13.12	23.85	12.67	15.94	39.26	29.97	14.03
5580	-0.05	1.68	9.73	0.00	4.76	18.746	16.467	11.36	13.68	23.72	12.36	16.12	40.93	29.97	13.85
5700	-0.95	1.56	9.74	0.00	4.76	19.159	16.476	10.35	10.84	23.82	13.47	15.11	32.43	29.97	14.86
5745	-1.01	1.50	9.74	0.00	4.76	-	16.456	10.23	10.54	30.00	19.77	14.99	31.55	36.00	21.01
5785	-1.42	1.50	9.74	0.00	4.76	-	16.452	9.82	9.59	30.00	20.18	14.58	28.71	36.00	21.42
5825	-1.13	1.53	9.74	0.00	4.76	-	16.424	10.14	10.33	30.00	19.86	14.90	30.90	36.00	21.10

Sample Calculation:

(*1) Power was measured with using the gate function of power meter.)

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

Although the EUT operates on Master mode, more stringent limit for Client device was applied. (W52 for FCC)

Maximum Conducted Output Power

Report No. 13554183S-I-R1
Test place Shonan EMC Lab. No.5 Shielded Room
Date October 19, 2020 November 20, 2020
Temperature / Humidity 25 deg. C / 41 % RH 24 deg. C / 38 % RH
Engineer Makoto Hosaka Yusuke Tanikawara
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 *1) [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	-0.93	1.51	9.72	0.00	4.64	-	18.179	10.30	10.72	23.97	13.67	14.94	31.19	29.97	15.03
5220	-0.73	1.51	9.72	0.00	4.64	-	18.121	10.50	11.22	23.97	13.47	15.14	32.66	29.97	14.83
5240	-0.96	1.44	9.72	0.00	4.64	-	18.169	10.20	10.47	23.97	13.77	14.84	30.48	29.97	15.13
5260	-0.97	1.50	9.72	0.00	4.48	21.033	18.134	10.25	10.59	23.97	13.72	14.73	29.72	29.97	15.24
5300	-0.38	1.50	9.72	0.00	4.48	21.388	18.165	10.84	12.13	23.97	13.13	15.32	34.04	29.97	14.65
5320	-0.59	1.64	9.72	0.00	4.48	21.341	18.084	10.77	11.94	23.97	13.20	15.25	33.50	29.97	14.72
5500	-0.31	1.68	9.73	0.00	4.76	20.988	18.163	11.10	12.88	23.97	12.87	15.86	38.55	29.97	14.11
5580	-0.16	1.68	9.73	0.00	4.76	21.224	18.192	11.25	13.34	23.97	12.72	16.01	39.90	29.97	13.96
5700	-1.10	1.56	9.74	0.00	4.76	21.671	18.182	10.20	10.47	23.97	13.77	14.96	31.33	29.97	15.01
5745	-1.11	1.50	9.74	0.00	4.76	-	18.058	10.13	10.30	30.00	19.87	14.89	30.83	36.00	21.11
5785	-1.44	1.50	9.74	0.00	4.76	-	18.178	9.80	9.55	30.00	20.20	14.56	28.58	36.00	21.44
5825	-1.24	1.53	9.74	0.00	4.76	-	18.143	10.03	10.07	30.00	19.97	14.79	30.13	36.00	21.21

Sample Calculation:

(*1) Power was measured with using the gate function of power meter.)

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

Although the EUT operates on Master mode, more stringent limit for Client device was applied. (W52 for FCC)

Maximum Conducted Output Power

Report No. 13554183S-I-R1
Test place Shonan EMC Lab. No.5 Shielded Room
Date October 19, 2020
Temperature / Humidity 25 deg. C / 41 % RH
Engineer Makoto Hosaka
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 *1) [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	-3.91	1.55	9.93	0.00	4.64	-	36.097	7.57	5.71	23.97	16.40	12.21	16.63	29.97	17.76
5230	-0.88	1.51	9.72	0.00	4.64	-	36.029	10.35	10.84	23.97	13.62	14.99	31.55	29.97	14.98
5270	-1.00	1.50	9.72	0.00	4.48	39.844	35.949	10.22	10.52	23.97	13.75	14.70	29.51	29.97	15.27
5310	-1.19	1.54	9.93	0.00	4.48	39.715	36.093	10.28	10.67	23.97	13.69	14.76	29.92	29.97	15.21
5510	-2.09	1.72	9.94	0.00	4.76	40.596	36.045	9.57	9.06	23.97	14.40	14.33	27.10	29.97	15.64
5550	-0.37	1.68	9.73	0.00	4.76	39.998	35.981	11.04	12.71	23.97	12.93	15.80	38.02	29.97	14.17
5670	-1.03	1.49	9.74	0.00	4.76	40.805	36.041	10.20	10.47	23.97	13.77	14.96	31.33	29.97	15.01
5755	-1.34	1.50	9.74	0.00	4.76	-	36.039	9.90	9.77	30.00	20.10	14.66	29.24	36.00	21.34
5795	-1.40	1.50	9.74	0.00	4.76	-	36.054	9.84	9.64	30.00	20.16	14.60	28.84	36.00	21.40

Sample Calculation:

(*1) Power was measured with using the gate function of power meter.)

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

Although the EUT operates on Master mode, more stringent limit for Client device was applied. (W52 for FCC)

Maximum Conducted Output Power

Report No.	13554183S-I-R1
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	October 19, 2020
Temperature / Humidity	25 deg. C / 41 % RH
Engineer	Makoto Hosaka
Mode	Tx 11a

5180 MHz

Mode	Rate	Reading (timed average)	Duty factor *1)	Burst power	Remarks
	Mbps	[dBm]	[dB]	[dBm]	
11a	6	-1.01	0.00	-1.01	
	9	-1.04	0.00	-1.04	
	12	-1.10	0.00	-1.10	
	18	-0.85	0.00	-0.85	*
	24	-1.19	0.00	-1.19	
	36	-1.08	0.00	-1.08	
	48	-0.91	0.00	-0.91	
	54	-2.01	0.00	-2.01	

* Worst rate (*1) Power was measured with using the gate function of power meter.)

Sample Calculation:

Burst power = Reading (timed average) + Duty factor

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

Maximum Conducted Output Power

Report No. 13554183S-I-R1
Test place Shonan EMC Lab. No.5 Shielded Room
Date October 19, 2020
Temperature / Humidity 25 deg. C / 41 % RH
Engineer Makoto Hosaka
Mode Tx 11n-20

5180 MHz

Mode	MCS Number	Reading (timed average) [dBm]	Duty factor *1) [dB]	Burst power [dBm]	Remarks
11n-20	0	-1.32	0.00	-1.32	
	1	-1.50	0.00	-1.50	
	2	-1.19	0.00	-1.19	
	3	-1.15	0.00	-1.15	
	4	-1.14	0.00	-1.14	
	5	-1.01	0.00	-1.01	
	6	-0.93	0.00	-0.93	*
	7	-3.01	0.00	-3.01	

* Worst rate (*1) Power was measured with using the gate function of power meter.)

Sample Calculation:

Burst power = Reading (timed average) + Duty factor

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

Maximum Conducted Output Power

Report No. 13554183S-I-R1
Test place Shonan EMC Lab. No.5 Shielded Room
Date October 19, 2020
Temperature / Humidity 25 deg. C / 41 % RH
Engineer Makoto Hosaka
Mode Tx 11n-40

5190 MHz

Mode	MCS Number	Reading (timed average) [dBm]	Duty factor *1) [dB]	Burst power [dBm]	Remarks
11n-20	0	-4.03	0.00	-4.03	
	1	-4.00	0.00	-4.00	
	2	-3.91	0.00	-3.91	*
	3	-4.84	0.00	-4.84	
	4	-4.77	0.00	-4.77	
	5	-6.68	0.00	-6.68	
	6	-6.73	0.00	-6.73	
	7	-6.69	0.00	-6.69	

* Worst rate (*1) Power was measured with using the gate function of power meter.)

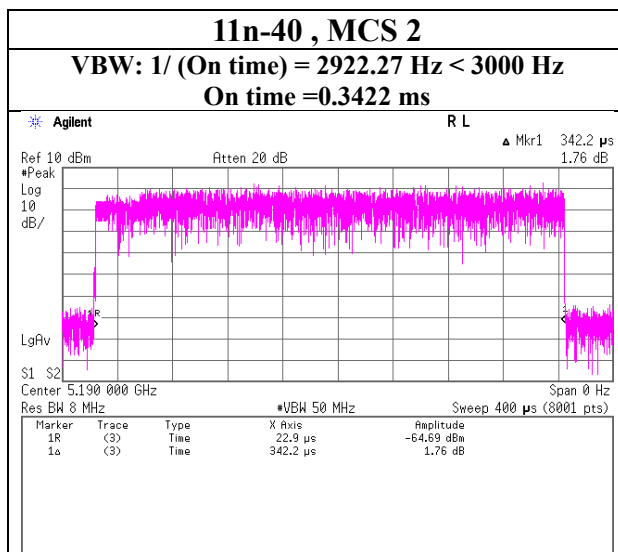
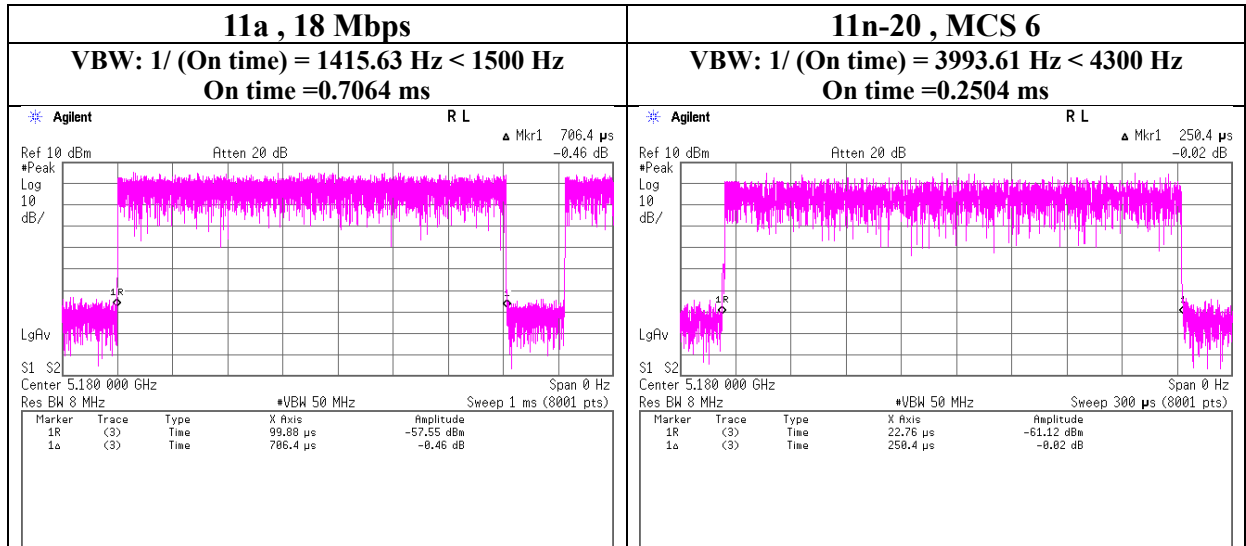
Sample Calculation:

Burst power = Reading (timed average) + Duty factor

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

Burst rate confirmation

Report No.	13554183S-I-R1
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	October 19, 2020
Temperature / Humidity	25 deg. C / 41 % RH
Engineer	Makoto Hosaka
Mode	Tx



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Shonan EMC Lab.

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Telephone : +81 463 50 6400

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Maximum Power Spectral Density

Report No. 13554183S-I-R1
Test place Shonan EMC Lab. No.5 Shielded Room
Date November 18, 2020
Temperature / Humidity 22 deg. C / 52 % RH
Engineer Kazuya Noda
Mode Tx 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 *1) [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	-12.26	1.55	9.93	0.00	4.64	0.00	-0.78	11.00	11.78	3.86	17.00	13.14
5220	-11.83	1.55	9.93	0.00	4.64	0.00	-0.35	11.00	11.35	4.29	17.00	12.71
5240	-11.95	1.48	9.93	0.00	4.64	0.00	-0.54	11.00	11.54	4.10	17.00	12.90
5260	-11.86	1.53	9.93	0.00	4.48	0.00	-0.40	11.00	11.40	4.08	17.00	12.92
5300	-11.54	1.54	9.93	0.00	4.48	0.00	-0.07	11.00	11.07	4.41	17.00	12.59
5320	-11.68	1.68	9.93	0.00	4.48	0.00	-0.07	11.00	11.07	4.41	17.00	12.59
5500	-11.40	1.72	9.94	0.00	4.76	0.00	0.26	11.00	10.74	5.02	17.00	11.98
5580	-11.17	1.72	9.93	0.00	4.76	0.00	0.48	11.00	10.52	5.24	17.00	11.76
5700	-12.17	1.60	9.93	0.00	4.76	0.00	-0.64	11.00	11.64	4.12	17.00	12.88
5745	-20.85	1.54	9.93	0.00	4.76	6.99	-2.39	30.00	32.39	2.37	36.00	33.63
5785	-21.18	1.54	9.93	0.00	4.76	6.99	-2.72	30.00	32.72	2.04	36.00	33.96
5825	-21.55	1.57	9.93	0.00	4.76	6.99	-3.06	30.00	33.06	1.70	36.00	34.30

Sample Calculation:

(*1) PSD was measured with using the gate function of Spectrum analyzer.)

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 Factor

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

RBW Correction Factor = $10 \times \log (500 \text{ [kHz]} / 100 \text{ [kHz]})$

Although the EUT operates on Master mode, more stringent limit for Client device was applied. (W52 for FCC)

Maximum Power Spectral Density

Report No. 13554183S-I-R1
Test place Shonan EMC Lab. No.5 Shielded Room
Date November 18, 2020
Temperature / Humidity 22 deg. C / 52 % RH
Engineer Kazuya Noda
Mode Tx 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 *1) [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	-13.31	1.55	9.93	0.00	4.64	0.00	-1.83	11.00	12.83	2.81	17.00	14.19
5220	-12.71	1.55	9.93	0.00	4.64	0.00	-1.23	11.00	12.23	3.41	17.00	13.59
5240	-12.83	1.48	9.93	0.00	4.64	0.00	-1.42	11.00	12.42	3.22	17.00	13.78
5260	-13.04	1.53	9.93	0.00	4.48	0.00	-1.58	11.00	12.58	2.90	17.00	14.10
5300	-12.70	1.54	9.93	0.00	4.48	0.00	-1.23	11.00	12.23	3.25	17.00	13.75
5320	-12.71	1.68	9.93	0.00	4.48	0.00	-1.10	11.00	12.10	3.38	17.00	13.62
5500	-12.23	1.72	9.94	0.00	4.76	0.00	-0.57	11.00	11.57	4.19	17.00	12.81
5580	-12.05	1.72	9.93	0.00	4.76	0.00	-0.40	11.00	11.40	4.36	17.00	12.64
5700	-13.18	1.60	9.93	0.00	4.76	0.00	-1.65	11.00	12.65	3.11	17.00	13.89
5745	-21.92	1.54	9.93	0.00	4.76	6.99	-3.46	30.00	33.46	1.30	36.00	34.70
5785	-22.08	1.54	9.93	0.00	4.76	6.99	-3.62	30.00	33.62	1.14	36.00	34.86
5825	-22.37	1.57	9.93	0.00	4.76	6.99	-3.88	30.00	33.88	0.88	36.00	35.12

Sample Calculation:

(*1) PSD was measured with using the gate function of Spectrum analyzer.)

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 Factor

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

RBW Correction Factor = $10 \times \log (500 \text{ [kHz]} / 100 \text{ [kHz]})$

Although the EUT operates on Master mode, more stringent limit for Client device was applied. (W52 for FCC)

Maximum Power Spectral Density

Report No. 13554183S-I-R1
Test place Shonan EMC Lab. No.5 Shielded Room
Date November 18, 2020
Temperature / Humidity 22 deg. C / 52 % RH
Engineer Kazuya Noda
Mode Tx 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 *1) [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	-18.29	1.55	9.93	0.00	4.64	0.00	-6.81	11.00	17.81	-2.17	17.00	19.17
5230	-14.96	1.55	9.93	0.00	4.64	0.00	-3.48	11.00	14.48	1.16	17.00	15.84
5270	-15.10	1.54	9.93	0.00	4.48	0.00	-3.63	11.00	14.63	0.85	17.00	16.15
5310	-15.55	1.54	9.93	0.00	4.48	0.00	-4.08	11.00	15.08	0.40	17.00	16.60
5510	-16.42	1.72	9.94	0.00	4.76	0.00	-4.76	11.00	15.76	0.00	17.00	17.00
5550	-14.03	1.72	9.93	0.00	4.76	0.00	-2.38	11.00	13.38	2.38	17.00	14.62
5670	-15.05	1.53	9.93	0.00	4.76	0.00	-3.59	11.00	14.59	1.17	17.00	15.83
5755	-24.38	1.54	9.93	0.00	4.76	6.99	-5.92	30.00	35.92	-1.16	36.00	37.16
5795	-24.71	1.54	9.93	0.00	4.76	6.99	-6.25	30.00	36.25	-1.49	36.00	37.49

Sample Calculation: (*1) PSD was measured with using the gate function of Spectrum analyzer.)

PSD: Power Spectral Density

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

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

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

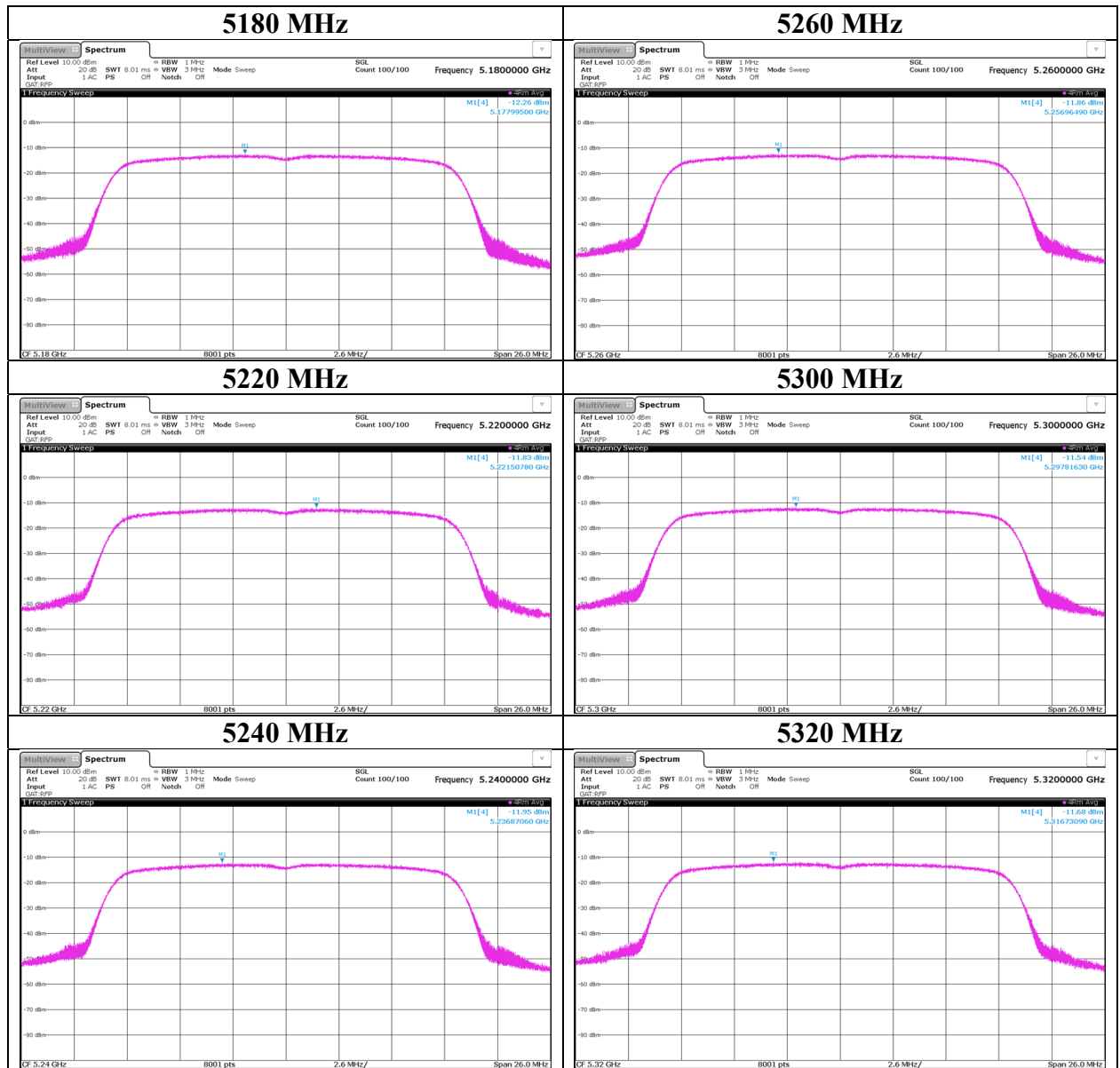
RBW Correction Factor = $10 \times \log (500 \text{ [kHz]} / 100 \text{ [kHz]})$

Although the EUT operates on Master mode, more stringent limit for Client device was applied. (W52 for FCC)

Maximum Power Spectral Density

Report No. 13554183S-I-R1
Test place Shonan EMC Lab. No.5 Shielded Room
Date November 18, 2020
Temperature / Humidity 22 deg. C / 52 % RH
Engineer Kazuya Noda
Mode Tx 11a

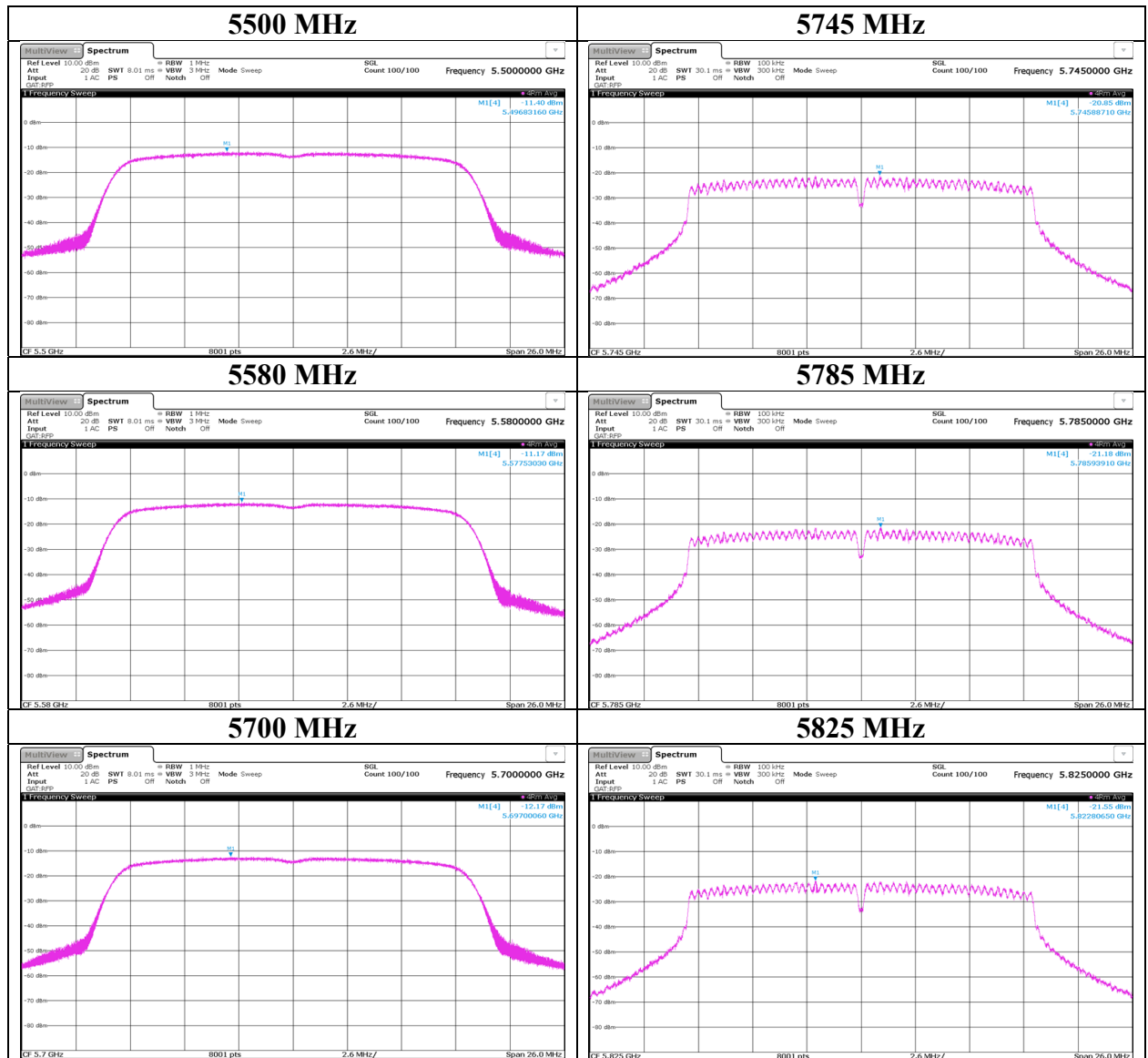
11a



Maximum Power Spectral Density

Report No. 13554183S-I-R1
Test place Shonan EMC Lab. No.5 Shielded Room
Date November 18, 2020
Temperature / Humidity 22 deg. C / 52 % RH
Engineer Kazuya Noda
Mode Tx 11a

11a



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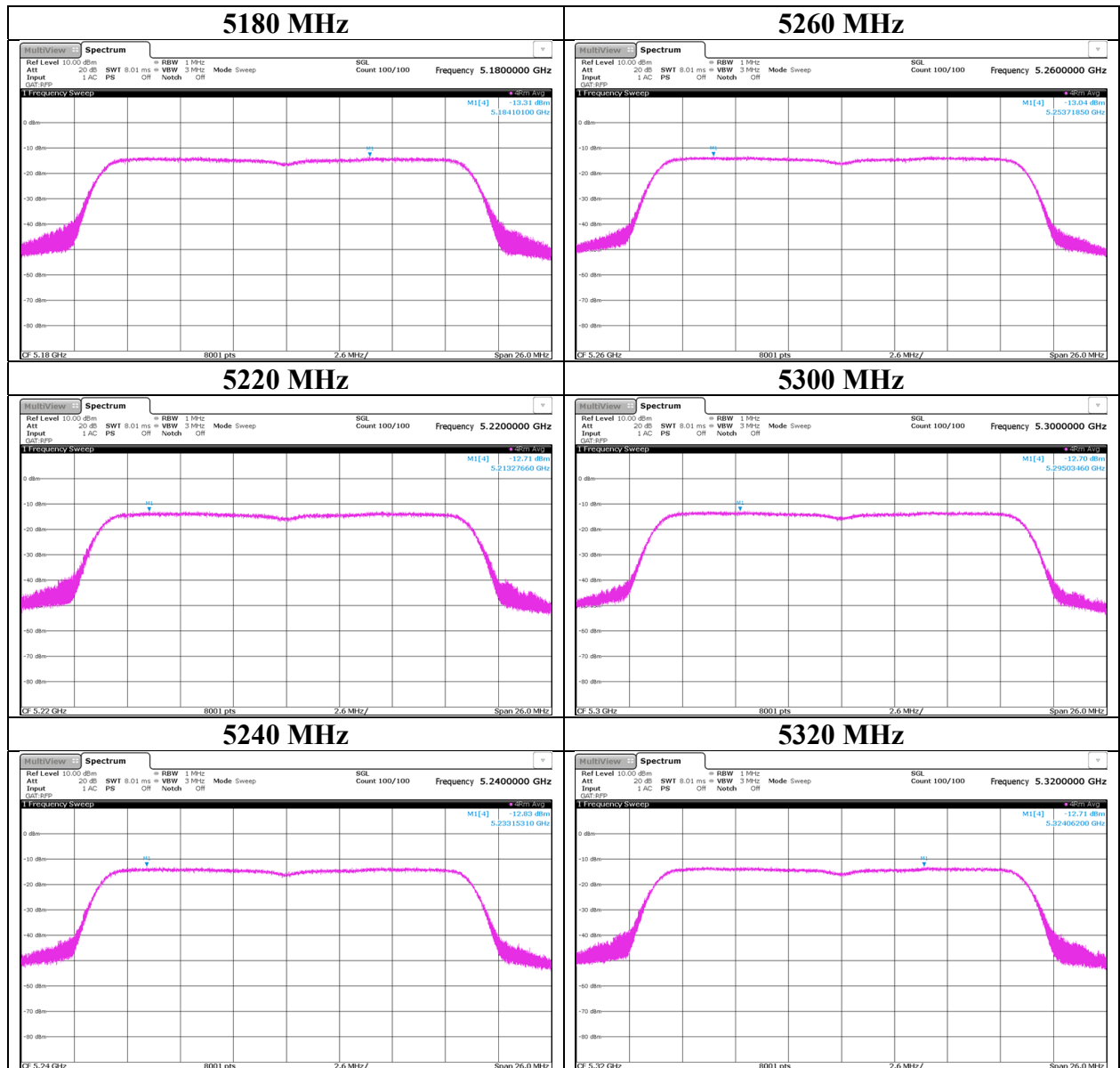
Telephone : +81 463 50 6400

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Maximum Power Spectral Density

Report No. 13554183S-I-R1
Test place Shonan EMC Lab. No.5 Shielded Room
Date November 18, 2020
Temperature / Humidity 22 deg. C / 52 % RH
Engineer Kazuya Noda
Mode Tx 11n-20

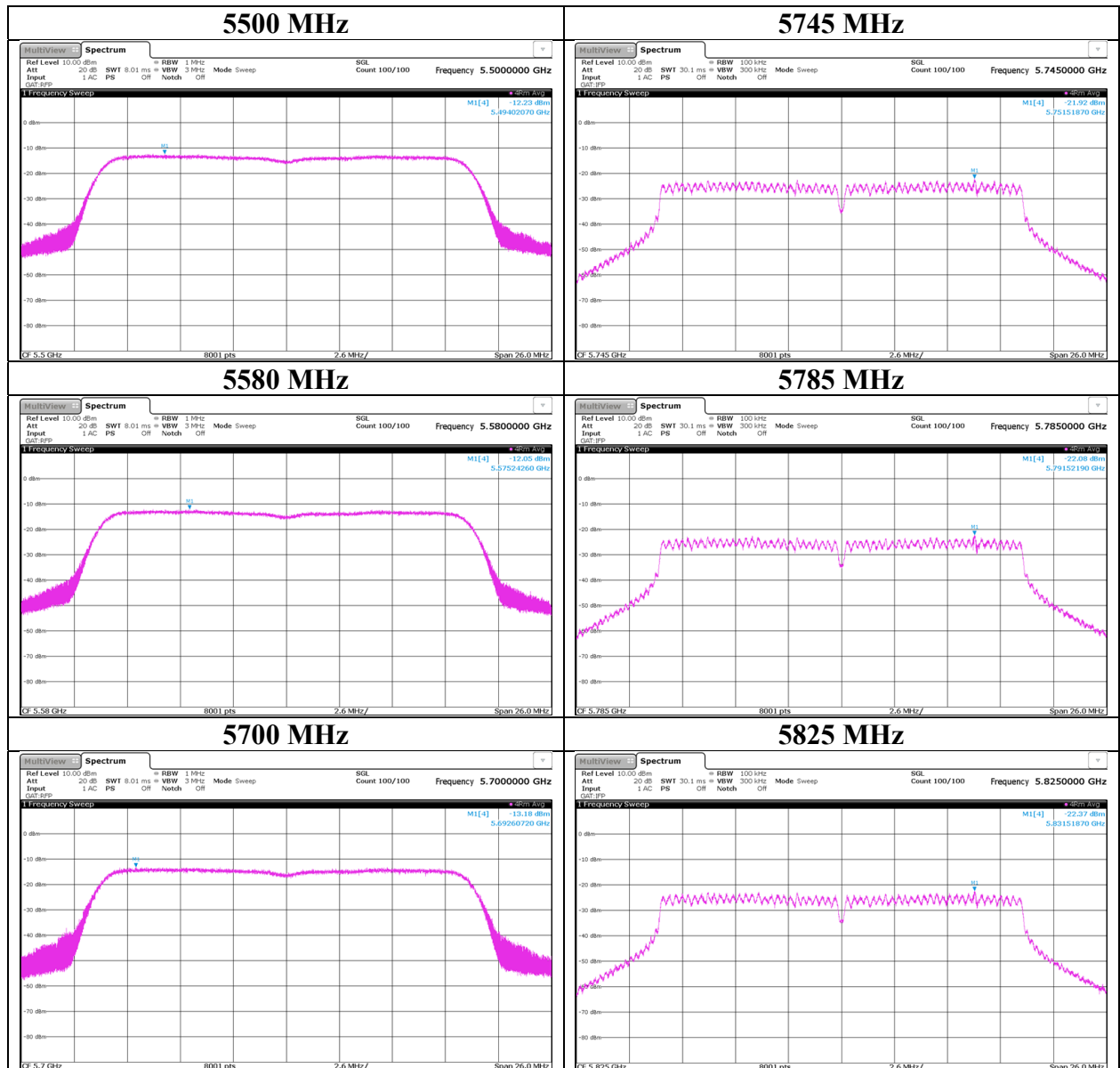
11n-20



Maximum Power Spectral Density

Report No. 13554183S-I-R1
Test place Shonan EMC Lab. No.5 Shielded Room
Date November 18, 2020
Temperature / Humidity 22 deg. C / 52 % RH
Engineer Kazuya Noda
Mode Tx 11n-20

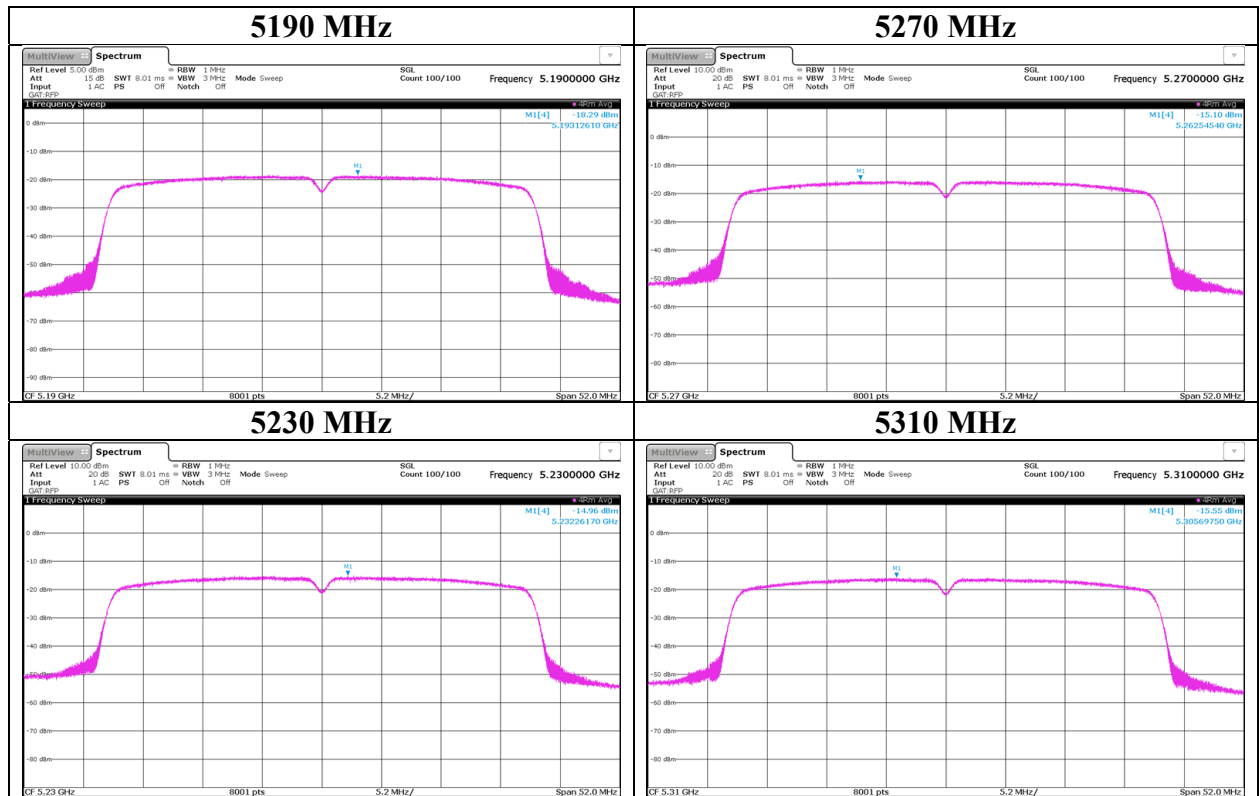
11n-20



Maximum Power Spectral Density

Report No. 13554183S-I-R1
Test place Shonan EMC Lab. No.5 Shielded Room
Date November 18, 2020
Temperature / Humidity 22 deg. C / 52 % RH
Engineer Kazuya Noda
Mode Tx 11n-40

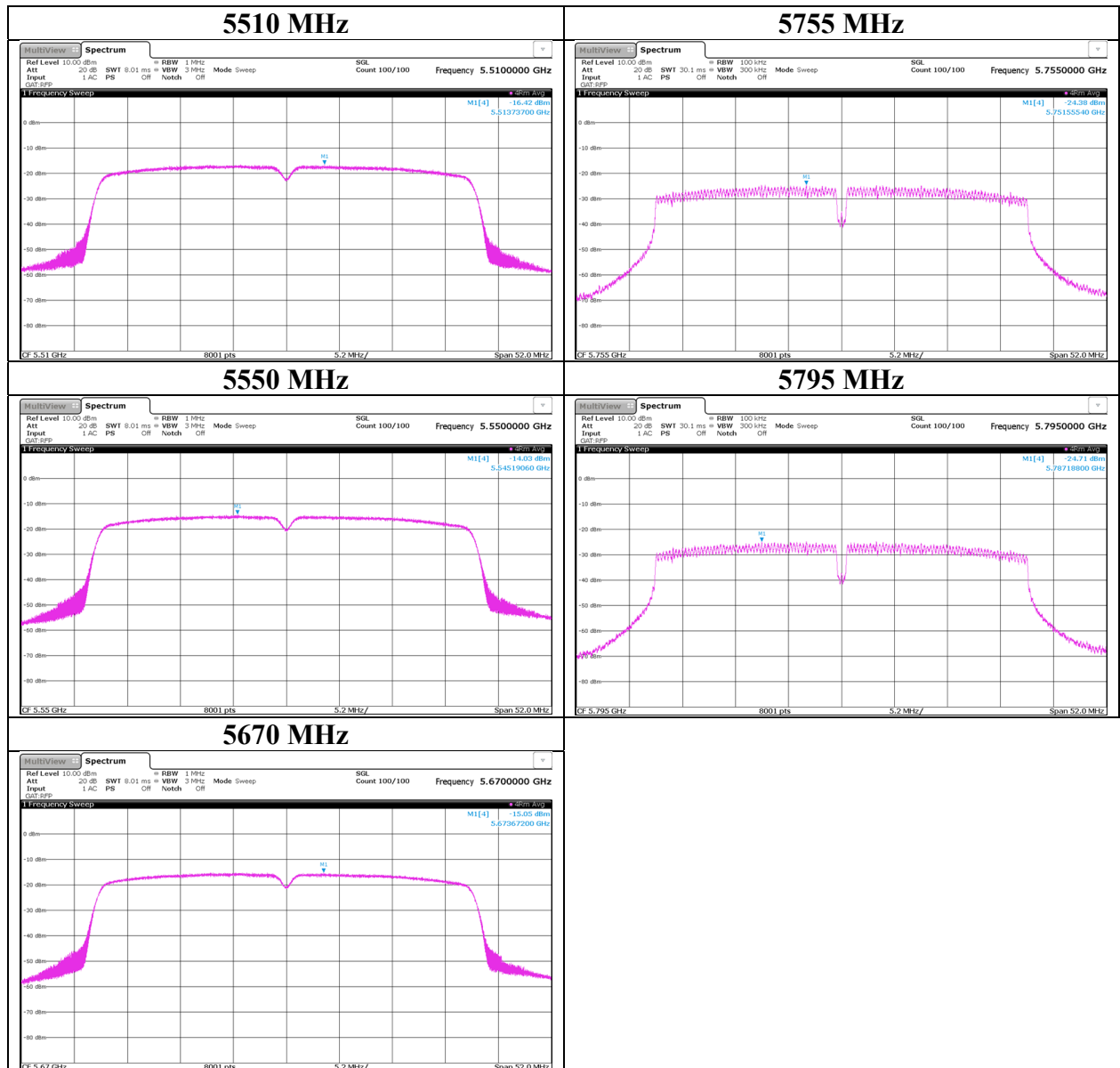
11n-40



Maximum Power Spectral Density

Report No. 13554183S-I-R1
Test place Shonan EMC Lab. No.5 Shielded Room
Date November 18, 2020
Temperature / Humidity 22 deg. C / 52 % RH
Engineer Kazuya Noda
Mode Tx 11n-40

11n-40



Radiated Spurious Emission

Report No. 13554183S-I-R1
Test place Shonan EMC Lab.
Semi Anechoic Chamber 3
Date Nov 17, 2020
Temperature / Humidity 22 deg.C, 43 %RH
Engineer Yusuke Tanikawara
(1 GHz – 6.4 GHz)
Mode Tx 11a 5180 MHz

(above 1 GHz Inside of the restricted band)

(* PK: Peak, AV: Average, QP: Quasi-Peak)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg.]	Remark
Hori.	5150.000	PK	53.69	32.12	16.41	43.11	2.28	61.39	73.9	12.5	102	357	-
Hori.	5150.000	AV	41.77	32.12	16.41	43.11	2.28	49.47	53.9	4.4	102	357	VBW:1.5 kHz
Vert.	5150.000	PK	50.11	32.12	16.41	43.11	2.28	57.81	73.9	16.0	217	324	-
Vert.	5150.000	AV	38.32	32.12	16.41	43.11	2.28	46.02	53.9	7.8	217	324	VBW:1.5 kHz

Result [dBuV/m] = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

*Other frequency noises omitted in this report were not seen or have enough margin (more than 20 dB).

Distance factor : 1 GHz - 10 GHz : $20\log(3.90\text{ m} / 3.0\text{ m}) = 2.28\text{ dB}$

10 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

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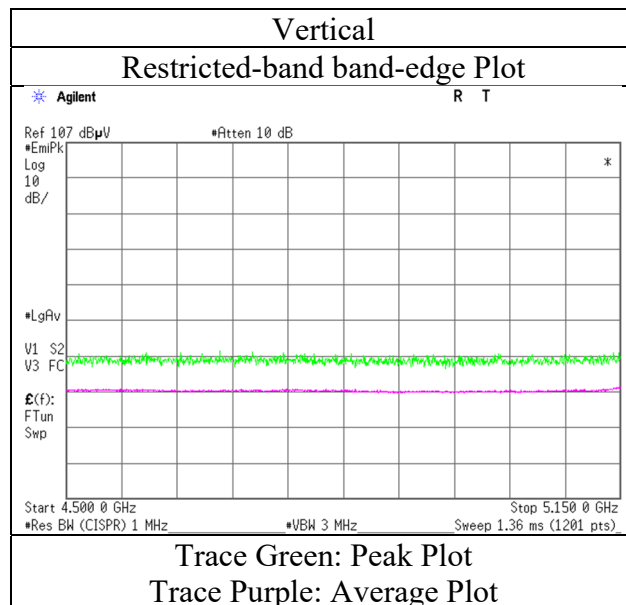
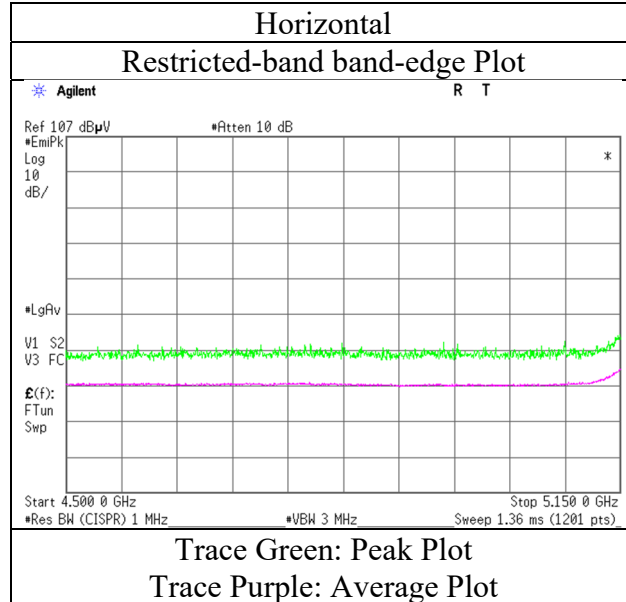
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

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Facsimile : +81 463 50 6401

Radiated Spurious Emission

Report No.	13554183S-I-R1
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	3
Date	Nov 17, 2020
Temperature / Humidity	22 deg.C, 43 %RH
Engineer	Yusuke Tanikawara
Mode	Tx 11a 5180 MHz



* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions.

Final result of restricted band edge was shown in tabular data.

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1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

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Radiated Spurious Emission

Report No.	13554183S-I-R1
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	3
Date	Nov 17, 2020
Temperature / Humidity	22 deg.C, 43 %RH
Engineer	Yusuke Tanikawara
	(1 GHz -6.4 GHz)
Mode	Tx 11a 5320 MHz

(above 1 GHz Inside of the restricted band)

(* PK: Peak, AV: Average, QP: Quasi-Peak)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg.]	Remark
Hori.	5350.000	PK	54.98	31.83	16.55	43.33	2.28	62.31	73.9	11.5	106	359	-
Hori.	5350.000	AV	41.01	31.83	16.55	43.33	2.28	48.34	53.9	5.5	106	359	VBW:1.5 kHz
Vert.	5350.000	PK	49.86	31.83	16.55	43.33	2.28	57.19	73.9	16.7	291	319	-
Vert.	5350.000	AV	38.15	31.83	16.55	43.33	2.28	45.48	53.9	8.4	291	319	VBW:1.5 kHz

Result [dBuV/m] = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

*Other frequency noises omitted in this report were not seen or have enough margin (more than 20 dB).

Distance factor : 1 GHz - 10 GHz : $20\log(3.90\text{ m} / 3.0\text{ m}) = 2.28\text{ dB}$

10 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

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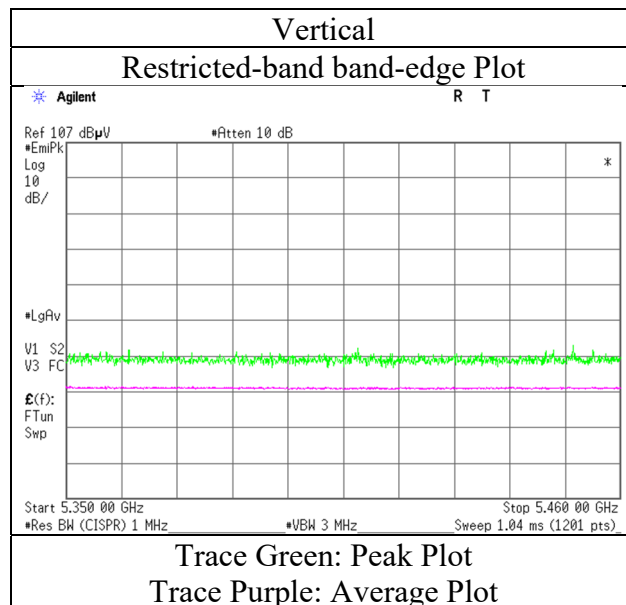
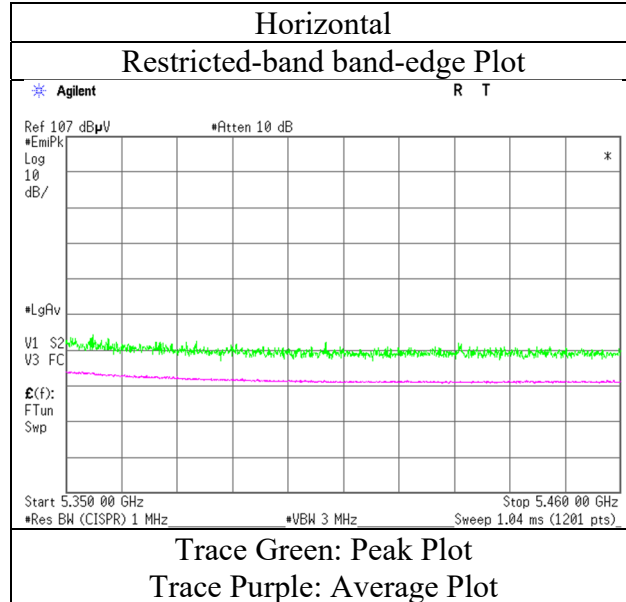
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Radiated Spurious Emission

Report No.	13554183S-I-R1
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	3
Date	Nov 17, 2020
Temperature / Humidity	22 deg.C, 43 %RH
Engineer	Yusuke Tanikawara
Mode	Tx 11a 5320 MHz



* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions.

Final result of restricted band edge was shown in tabular data.

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Shonan EMC Lab.

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Radiated Spurious Emission

Report No. 13554183S-I-R1
Test place Shonan EMC Lab.
Semi Anechoic Chamber 3
Date Nov 17, 2020
Temperature / Humidity 22 deg.C, 43 %RH
Engineer Yusuke Tanikawara
(1 GHz -6.4 GHz)
Mode Tx 11a 5500 MHz

(above 1 GHz Inside of the restricted band)

(* PK: Peak, AV: Average, QP: Quasi-Peak)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg.]	Remark
Hori.	5460.000	PK	52.63	32.30	16.63	43.45	2.28	60.39	73.9	13.5	107	1	-
Hori.	5460.000	AV	41.03	32.30	16.63	43.45	2.28	48.79	53.9	5.1	107	1	VBW:1.5 kHz
Vert.	5460.000	PK	50.62	32.30	16.63	43.45	2.28	58.38	73.9	15.5	236	300	-
Vert.	5460.000	AV	38.45	32.30	16.63	43.45	2.28	46.21	53.9	7.6	236	300	VBW:1.5 kHz

Result [dBuV/m] = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

*Other frequency noises omitted in this report were not seen or have enough margin (more than 20 dB).

Distance factor : 1 GHz - 10 GHz : $20\log(3.90\text{ m} / 3.0\text{ m}) = 2.28\text{ dB}$

10 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

(Calculation) (above 1 GHz Outside of the restricted band)

(* PK: Peak, AV: Average, QP: Quasi-Peak)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Result (EIRP) [dBm]	Limit [dBm]	Margin [dB]	Height [cm]	Angle [deg.]	Remark
Hori.	5470.000	PK	54.31	32.33	16.63	43.46	2.28	62.09	-33.14	-27.0	6.1	107	1	-
Vert.	5470.000	PK	50.30	32.33	16.63	43.46	2.28	58.08	-37.15	-27.0	10.1	236	300	-

Result [dBuV/m] = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Result (EIRP [dBm]) = $10 * \text{LOG}((10^{\wedge}(\text{Electric Field Strength [dBuV/m] / 20}) * 10^{\wedge}(-6)) * \text{Distance : } 3\text{ [m]})^{\wedge}2 / 30 * 10^{\wedge}3)$

*Other frequency noises omitted in this report were not seen or have enough margin (more than 20 dB).

Distance factor : 1 GHz - 10 GHz : $20\log(3.90\text{ m} / 3.0\text{ m}) = 2.28\text{ dB}$

10 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

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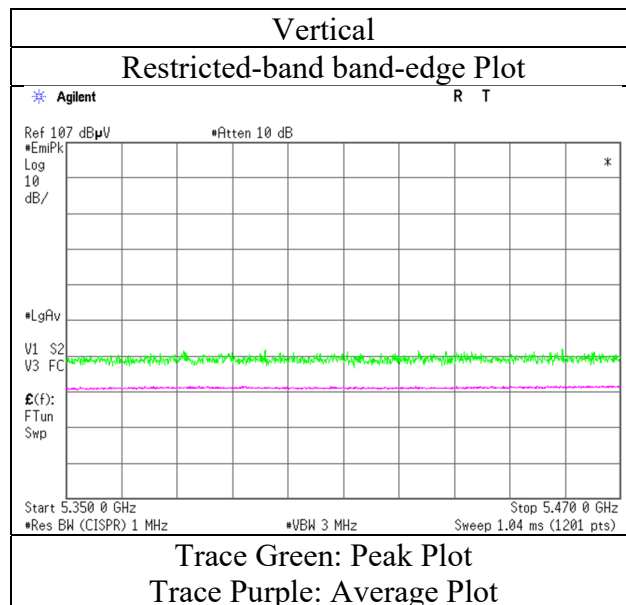
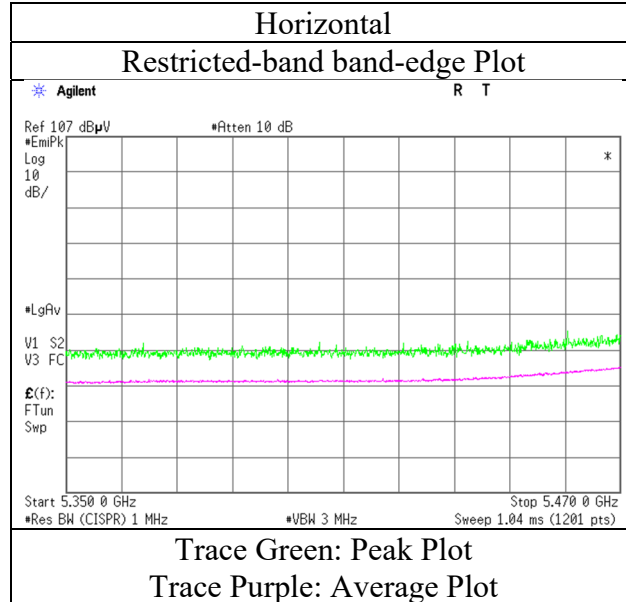
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Facsimile : +81 463 50 6401

Radiated Spurious Emission

Report No. 13554183S-I-R1
Test place Shonan EMC Lab.
Semi Anechoic Chamber 3
Date Nov 17, 2020
Temperature / Humidity 22 deg.C, 43 %RH
Engineer Yusuke Tanikawara
Mode Tx 11a 5500 MHz



* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions.

Final result of restricted band edge was shown in tabular data.

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Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

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Radiated Spurious Emission

Report No. 13554183S-I-R1
Test place Shonan EMC Lab.
Semi Anechoic Chamber 3
Date Nov 17, 2020
Temperature / Humidity 22 deg.C, 43 %RH
Engineer Yusuke Tanikawara
(1 GHz -6.4 GHz)
Mode Tx 11a 5700 MHz

(Calculation) (above 1 GHz Outside of the restricted band)

(* PK: Peak, AV: Average, QP: Quasi-Peak)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Result (EIRP) [dBm]	Limit [dBm]	Margin [dB]	Height [cm]	Angle [deg.]	Remark
Hori.	5725.000	PK	51.97	32.68	16.81	43.44	2.28	60.30	-34.93	-27.0	7.9	110	1	-
Vert.	5725.000	PK	50.34	32.68	16.81	43.44	2.28	58.67	-36.56	-27.0	9.5	384	85	-

Result [dBuV/m] = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Result (EIRP [dBm]) = $10 * \text{LOG}((10^{\wedge}(\text{Electric Field Strength [dBuV/m]} / 20)) * 10^{\wedge}(-6) * \text{Distance : 3 [m]})^2 / 30 * 10^{\wedge}3)$

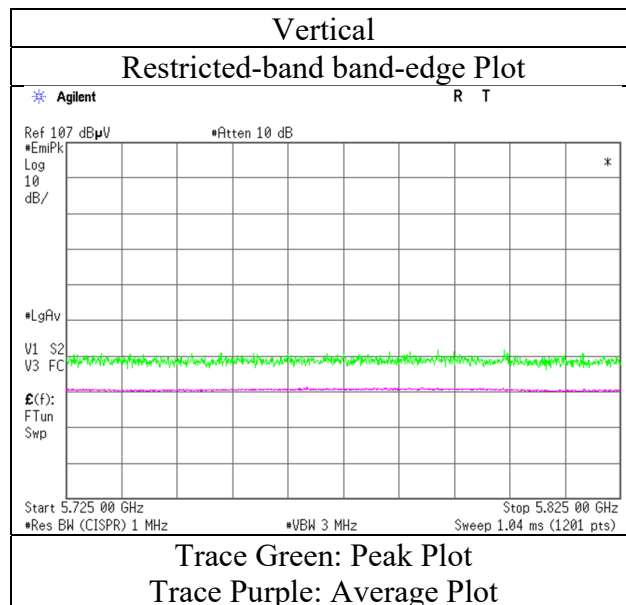
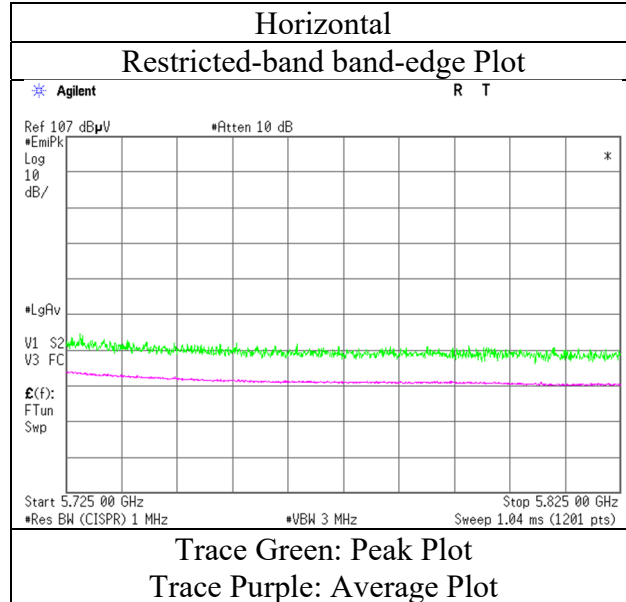
*Other frequency noises omitted in this report were not seen or have enough margin (more than 20 dB).

Distance factor : 1 GHz - 10 GHz : $20\text{log}(3.90 \text{ m} / 3.0 \text{ m}) = 2.28 \text{ dB}$

10 GHz - 40 GHz : $20\text{log}(1.0 \text{ m} / 3.0 \text{ m}) = -9.54 \text{ dB}$

Radiated Spurious Emission

Report No.	13554183S-I-R1
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	3
Date	Nov 17, 2020
Temperature / Humidity	22 deg.C, 43 %RH
Engineer	Yusuke Tanikawara
Mode	Tx 11a 5700 MHz



* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions.

Final result of restricted band edge was shown in tabular data.

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Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

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Radiated Spurious Emission

Report No. 13554183S-I-R1
Test place Shonan EMC Lab.
Semi Anechoic Chamber 3
Date Nov 19, 2020
Temperature / Humidity 23 deg.C, 51 %RH
Engineer Yusuke Tanikawara
(1 GHz -6.4 GHz)
Mode Tx 11a 5745 MHz

(Calculation) (above 1 GHz Outside of the restricted band)

(* PK: Peak, AV: Average, QP: Quasi-Peak)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Result (EIRP) [dBm]	Limit [dBm]	Margin [dB]	Height [cm]	Angle [deg.]	Remark
Hori.	5650.000	PK	48.96	32.49	16.76	43.46	2.28	57.03	-38.20	-27.0	11.2	100	2	-
Hori.	5700.000	PK	50.48	32.60	16.79	43.45	2.28	58.70	-36.53	10.0	46.5	100	2	-
Hori.	5720.000	PK	53.48	32.66	16.80	43.44	2.28	61.78	-33.45	15.6	49.0	100	2	-
Hori.	5725.000	PK	53.73	32.68	16.81	43.44	2.28	62.06	-33.17	27.0	60.1	100	2	-
Vert.	5650.000	PK	49.28	32.49	16.76	43.46	2.28	57.35	-37.88	-27.0	10.8	276	293	-
Vert.	5700.000	PK	49.21	32.60	16.79	43.45	2.28	57.43	-37.80	10.0	47.8	276	293	-
Vert.	5720.000	PK	49.40	32.66	16.80	43.44	2.28	57.70	-37.53	15.6	53.1	276	293	-
Vert.	5725.000	PK	50.26	32.68	16.81	43.44	2.28	58.59	-36.64	27.0	63.6	276	293	-

Result [dBuV/m] = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Result (EIRP [dBm]) = 10 * LOG ((10 ^ (Electric Field Strength [dBuV/m] / 20) * 10 ^ (-6) * Distance : 3 [m]) ^ 2 / 30 * 10 ^ 3)

*Other frequency noises omitted in this report were not seen or have enough margin (more than 20 dB).

Distance factor : 1 GHz - 10 GHz : 20log (3.90 m / 3.0 m) = 2.28 dB

10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

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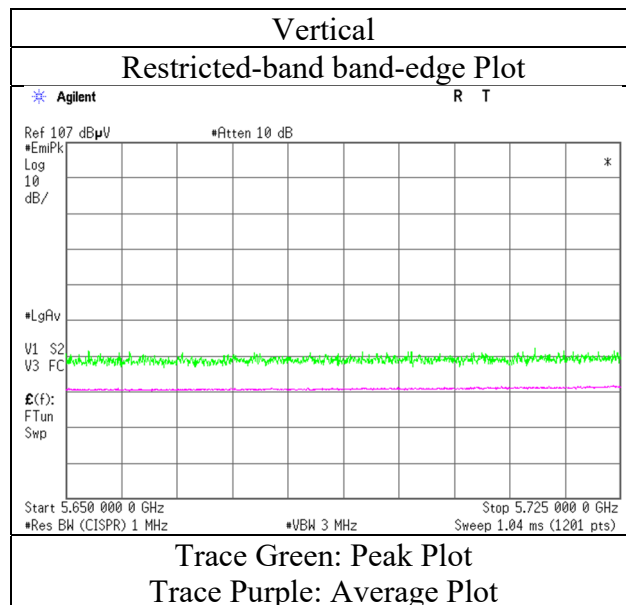
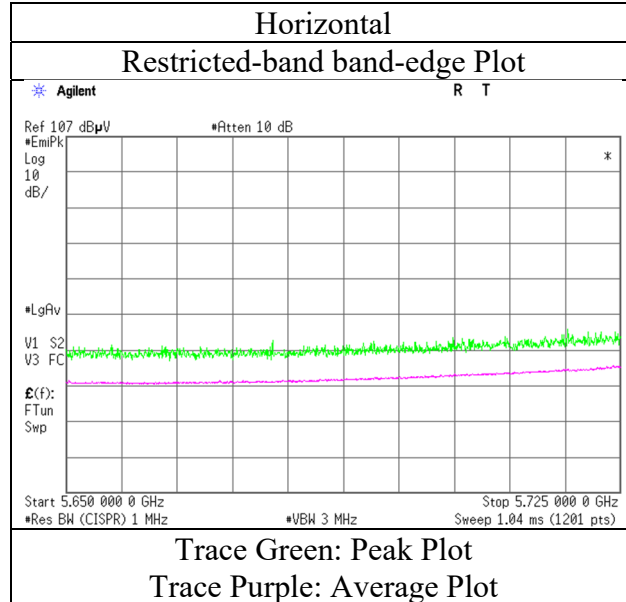
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Radiated Spurious Emission

Report No. 13554183S-I-R1
Test place Shonan EMC Lab.
Semi Anechoic Chamber 3
Date Nov 19, 2020
Temperature / Humidity 23 deg.C, 51 %RH
Engineer Yusuke Tanikawara
Mode Tx 11a 5745 MHz



* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions.
Final result of restricted band edge was shown in tabular data.

Radiated Spurious Emission

Report No. 13554183S-I-R1
Test place Shonan EMC Lab.
Semi Anechoic Chamber 3
Date Nov 19, 2020
Temperature / Humidity 23 deg.C, 51 %RH
Engineer Yusuke Tanikawara
(1 GHz -6.4 GHz)
Mode Tx 11a 5825 MHz

(Calculation) (above 1 GHz Outside of the restricted band)

(* PK: Peak, AV: Average, QP: Quasi-Peak)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Result (EIRP) [dBm]	Limit [dBm]	Margin [dB]	Height [cm]	Angle [deg.]	Remark
Hori.	5850.000	PK	53.09	33.07	16.88	43.41	2.28	61.91	-33.32	27.0	60.3	100	3	-
Hori.	5855.000	PK	51.85	33.08	16.88	43.41	2.28	60.68	-34.55	15.6	50.1	100	3	-
Hori.	5875.000	PK	50.42	33.12	16.92	43.41	2.28	59.33	-35.90	10.0	45.9	100	3	-
Hori.	5925.000	PK	50.04	33.21	16.94	43.40	2.28	59.07	-36.16	-27.0	9.1	100	3	-
Vert.	5850.000	PK	49.63	33.07	16.88	43.41	2.28	58.45	-36.78	27.0	63.7	256	296	-
Vert.	5855.000	PK	49.60	33.08	16.88	43.41	2.28	58.43	-36.80	15.6	52.4	256	296	-
Vert.	5875.000	PK	49.41	33.12	16.92	43.41	2.28	58.32	-36.91	10.0	46.9	256	296	-
Vert.	5925.000	PK	49.36	33.21	16.94	43.40	2.28	58.39	-36.84	-27.0	9.8	256	296	-

Result [dBuV/m] = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Result (EIRP [dBm]) = 10 * LOG((10 ^ (Electric Field Strength [dBuV/m] / 20) * 10 ^ (-6) * Distance : 3 [m]) ^ 2 / 30 * 10 ^ 3)

*Other frequency noises omitted in this report were not seen or have enough margin (more than 20 dB).

Distance factor : 1 GHz - 10 GHz : 20log (3.90 m / 3.0 m) = 2.28 dB

10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

UL Japan, Inc.

Shonan EMC Lab.

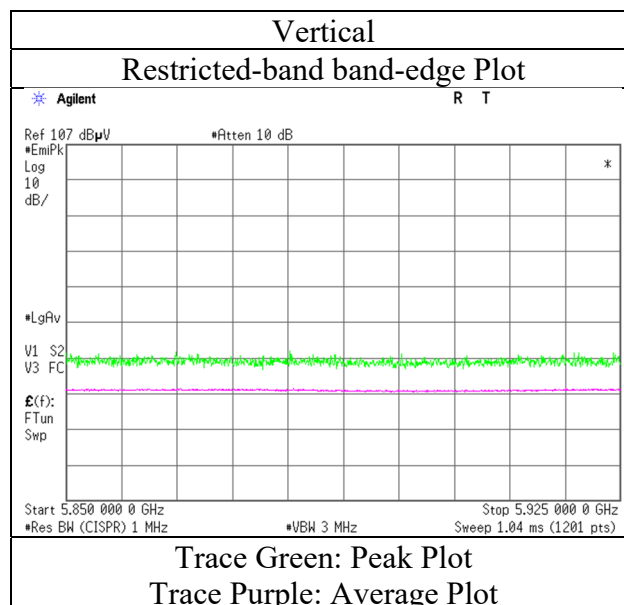
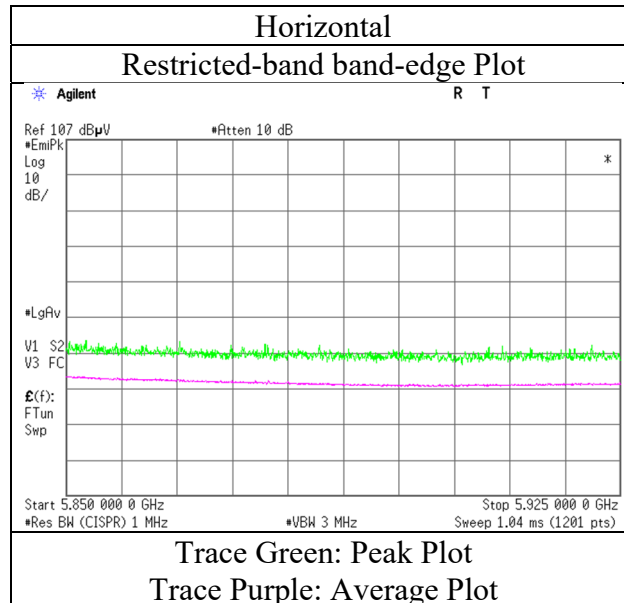
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Radiated Spurious Emission

Report No. 13554183S-I-R1
Test place Shonan EMC Lab.
Semi Anechoic Chamber 3
Date Nov 19, 2020
Temperature / Humidity 23 deg.C, 51 %RH
Engineer Yusuke Tanikawara
Mode Tx 11a 5825 MHz



* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions.
Final result of restricted band edge was shown in tabular data.