



RADIO TEST REPORT

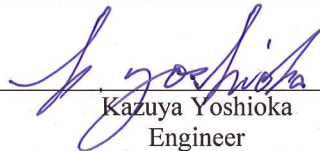
Test Report No. : 11201778H-C

Applicant : KEYENCE CORPORATION
Type of Equipment : Handheld Mobile Computer
Model No. : BT-W85GA
FCC ID : RF41395B
Test regulation : FCC Part 15 Subpart E: 2016
Test Result : Complied

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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 above regulation.
4. The test results in this 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)

Date of test: April 12 to 26, 2016

Representative test engineer:


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13-EM-F0429

REVISION HISTORY

Original Test Report No.: 11201778H-C

Revision	Test report No.	Date	Page revised	Contents
- (Original)	11201778H-C	June 7, 2016	-	-

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SECTION 1: Customer information

Company Name : KEYENCE CORPORATION
Address : 1-3-14, Higashinakajima Higashiyodogawa-ku Osaka 533-8555 Japan
Telephone Number : +81-6-6379-1111
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Contact Person : Tsuyoshi Aoyama

SECTION 2: Equipment under test (E.U.T.)

2.1 Identification of E.U.T.

Type of Equipment : Handheld Mobile Computer
Model No. : BT-W85GA
Serial No. : Refer to Section 4, Clause 4.2
Rating : DC 2.8 V – 4.2 V (Battery)
 : DC 5.3 V (Cradle)
Receipt Date of Sample : April 11, 2016
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: BT-W85GA (referred to as the EUT in this report) is a Handheld Mobile Computer.

General Specification

Clock frequency(ies) in the system : 38.4 MHz (X'tal)
Operating Temperature : -20 deg. C - +50 deg. C

Radio Specification

Radio Type : Transceiver
Power Supply (inner) : DC 1.8 V / DC 3.3 V

	IEEE802.11b	IEEE802.11g/n (20 M band)	IEEE802.11a/n (20 M band) *1)	IEEE802.11n (40 M band) *1)
Frequency of operation	2412 MHz - 2462 MHz	2412 MHz - 2462 MHz	5180 MHz - 5240 MHz 5280 MHz - 5320 MHz 5500 MHz - 5580 MHz 5660 MHz - 5700 MHz 5745 MHz - 5825 MHz	5190 MHz - 5230 MHz 5310 MHz 5510 MHz - 5550 MHz 5670 MHz 5755 MHz - 5795 MHz
Type of modulation	DSSS (CCK, DQPSK, DBPSK)	OFDM-CCK (64QAM, 16QAM, QPSK, BPSK)	OFDM (64QAM, 16QAM, QPSK, BPSK)	
Channel spacing	5MHz		20MHz	40MHz
Antenna type	Multilayer Monopole Antenna			
Antenna Connector type	Soldering			
Antenna Gain	2.1 dBi (2.4 GHz)		2.4 dBi (5 GHz)	

	Bluetooth Ver.2.1 with EDR function
Frequency of operation	2402 MHz - 2480 MHz
Type of modulation	FHSS (GFSK, $\pi/4$ -DQPSK, 8-DPSK)
Channel spacing	1 MHz
Antenna type	Multilayer Monopole Antenna
Antenna Connector type	Soldering
Antenna Gain	2.1 dBi

*1) This test report applies to WLAN (5GHz band) part.
*Wireless LAN and Bluetooth do not transmit simultaneously.

Variant model

This model has a variant model: BT-W80GA.

BT-W80GA is a Laser-type handy scanner. BT-W85GA is a Camera-type handy scanner.

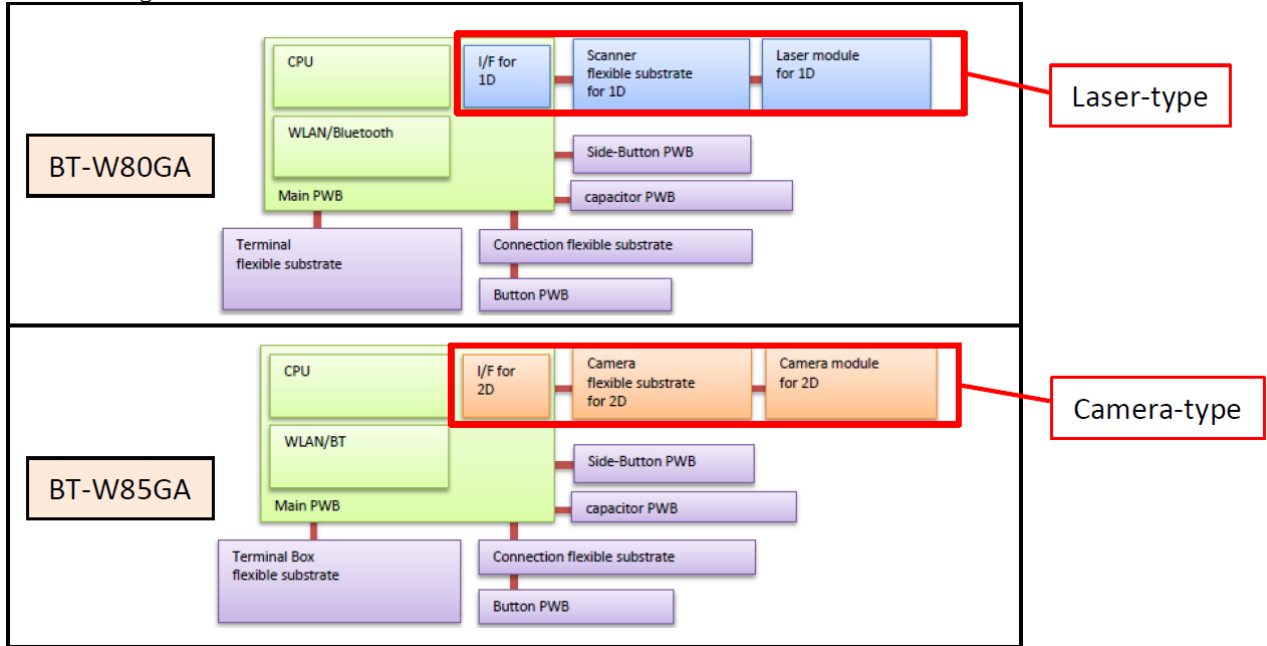
The schematic differences between BT-W80GA and BT-W85GA are the following diagrams.

Circuit design related with WLAN/Bluetooth is same between 2 models.

These difference cause no influence to radio specification.

There was no degradation of EMC characteristic.

Therefore we can consider them electrically identical.



SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification : FCC Part 15 Subpart E
FCC part 15 final revised on April 6, 2016.

Title : FCC 47CFR Part15 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	FCC: 15.407 (b) (6) / 15.207	QP 19.5 dB, 0.15000 MHz, N AV 15.6 dB, 0.64660 MHz, L	Complied	-
	IC: RSS-Gen 8.8	IC: RSS-Gen 8.8			
26 dB Emission Bandwidth	FCC: KDB Publication Number 789033	FCC: 15.407 (a) (1) (2) (3)	See data	N/A	Conducted
	IC: -	IC: -			
Maximum Conducted Output Power	FCC: KDB Publication Number 789033	FCC: 15.407 (a) (1) (2) (3)		Complied	Conducted
	IC: -	IC: RSS-247 6.2.1 (1) 6.2.2 (1) 6.2.3 (1) 6.2.4 (1)			
Maximum Power Spectral Density	FCC: KDB Publication Number 789033	FCC : 15.407 (a) (1) (2) (3)		Complied	Conducted
	IC: -	IC: RSS-247 6.2.1 (1) 6.2.2 (1) 6.2.3 (1) 6.2.4 (1)			
Spurious Emission Restricted Band Edge	FCC: ANSI C63.10-2013 KDB Publication Number 789033	FCC: 15.407 (b), 15.205 and 15.209	0.7 dB 11000.000 MHz, AV, Vert.	Complied	Conducted (< 30 MHz) / Radiated (> 30 MHz) *1)
	IC: -	IC: RSS-247 6.2.1 (2) 6.2.2 (2) 6.2.3 (2) 6.2.4 (2)			
6 dB Emission Bandwidth	FCC: ANSI C63.10-2013	FCC: 15.407 (e)	See data	Complied	Conducted
	IC: -	IC: RSS-247 6.2.4 (1)			

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 11201178H-C 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).

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

FCC Part 15.31 (e)

The test was performed with the New Battery (DC 4.2 V) and the EUT constantly provides the stable voltage to RF part through the regulator regardless of input voltage from New Battery. Therefore, this EUT complies with the requirement.

FCC Part 15.203 Antenna requirement

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

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3.3 Addition to standard

Item	Test Procedure	Specification	Worst margin	Results	Remarks
99 % Occupied Band Width	RSS-Gen 6.6	IC: -	N/A	N/A	Conducted

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

3.4 Uncertainty

EMI

The following uncertainties have been calculated to provide a confidence level of 95 % using a coverage factor $k=2$.
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Antenna terminal test Uncertainty (+/-)							
Power meter		Conducted emission and Power density			Conducted emission		Channel power
Below 1 GHz	Above 1 GHz	Below 1 GHz	1 GHz - 3 GHz	3 GHz - 18 GHz	18 GHz - 26.5 GHz	26.5 GHz - 40 GHz	
0.9 dB	1.0 dB	1.4 dB	1.7 dB	2.8 dB	2.8 dB	2.9 dB	2.6 dB

Frequency range	Conducted emission using AMN(LISN) (+dB)
0.009 - 0.15MHz	3.5 dB
0.15 - 30MHz	2.9 dB

Polarity	Radiated emission (Below 1GHz)			
	(3 m*)(+dB)		(10 m*)(+dB)	
	30 - 200 MHz	200 - 1000MHz	30 - 200 MHz	200 - 1000MHz
Horizontal	4.9 dB	5.2 dB	4.9 dB	5.0 dB
Vertical	4.6 dB	5.9 dB	5.0 dB	5.0 dB

Radiated emission				
(3 m*)(+dB)		(1 m*)(+dB)	(0.5 m*)(+dB)	(10 m*)(+dB)
1 - 6GHz	6 - 18GHz	10 - 26.5 GHz	26.5 - 40GHz	1 - 18 GHz
5.1 dB	5.3 dB	5.1 dB	5.1 dB	5.3 dB

*Measurement distance

Conducted Emission test

The data listed in this test report has enough margin, more than the site margin.

Radiated emission test

The data listed in this report meets the limits unless the uncertainty is taken into consideration.

3.5 Test Location

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Test site	IC Registration Number	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Other rooms	Maximum measurement distance
No.1 semi-anechoic chamber	2973C-1	19.2 x 11.2 x 7.7	7.0 x 6.0	No.1 Power source room	10 m
No.2 semi-anechoic chamber	2973C-2	7.5 x 5.8 x 5.2	4.0 x 4.0	-	3 m
No.3 semi-anechoic chamber	2973C-3	12.0 x 8.5 x 5.9	6.8 x 5.75	No.3 Preparation room	3 m
No.3 shielded room	-	4.0 x 6.0 x 2.7	N/A	-	-
No.4 semi-anechoic chamber	2973C-4	12.0 x 8.5 x 5.9	6.8 x 5.75	No.4 Preparation room	3 m
No.4 shielded room	-	4.0 x 6.0 x 2.7	N/A	-	-
No.5 semi-anechoic chamber	-	6.0 x 6.0 x 3.9	6.0 x 6.0	-	-
No.6 shielded room	-	4.0 x 4.5 x 2.7	4.0 x 4.5	-	-
No.6 measurement room	-	4.75 x 5.4 x 3.0	4.75 x 4.15	-	-
No.7 shielded room	-	4.7 x 7.5 x 2.7	4.7 x 7.5	-	-
No.8 measurement room	-	3.1 x 5.0 x 2.7	N/A	-	-
No.9 measurement room	-	8.8 x 4.6 x 2.8	2.4 x 2.4	-	-
No.11 measurement room	-	6.2 x 4.7 x 3.0	4.8 x 4.6	-	-

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

3.6 Test data, Test instruments, and Test set up

Refer to APPENDIX.

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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.

Mode	Remarks*
IEEE 802.11a (11a)	18 Mbps, PN9
IEEE 802.11n SISO 20 MHz BW (11n-20)	MCS 0, PN9
IEEE 802.11n SISO 40 MHz BW (11n-40)	MCS 1, PN9
*Transmitting duty was 100 % on all tests.	
*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: 13 dBm Software: calibrateG *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, Radiated Spurious Emission (Below 1 GHz), Conducted Spurious Emission	11n-40 Tx *1)	-	-	5670 MHz	-
26 dB Emission Bandwidth	11a Tx 11n-20 Tx	-	5280 MHz 5300 MHz 5320 MHz	5500 MHz 5580 MHz 5700 MHz	-
	11n-40 Tx	-	5310 MHz	5510 MHz 5550 MHz 5670 MHz	-
99 % Occupied Bandwidth, Maximum Conducted Output Power, Maximum Power Spectral Density	11a Tx 11n-20 Tx	5180 MHz 5220 MHz 5240 MHz	5280 MHz 5300 MHz 5320 MHz	5500 MHz 5580 MHz 5700 MHz	5745 MHz 5785 MHz 5825 MHz
	11n-40 Tx	5190 MHz 5230 MHz	5310 MHz	5510 MHz 5550 MHz 5670 MHz	5755 MHz 5795 MHz
6 dB Bandwidth	11a Tx 11n-20 Tx	-	-	-	5745 MHz 5785 MHz 5825 MHz
	11n-40 Tx	-	-	-	5755 MHz 5795 MHz
Radiated Spurious Emission (Above 1 GHz)	11n-20 Tx *2)	5180 MHz 5240 MHz	5320 MHz	5500 MHz 5580 MHz 5700 MHz	5745 MHz 5785 MHz 5825 MHz
	11n-40 Tx	5190 MHz 5230 MHz	5310 MHz	5510 MHz 5550 MHz 5670 MHz	5755 MHz 5795 MHz
*1) The mode was tested as a representative, because it had the highest power at antenna terminal test.					
*2) Since 11a and 11n-20 have the same modulation method and no differences in transmitting specification, test was performed on the representative mode that had the highest peak output power.					

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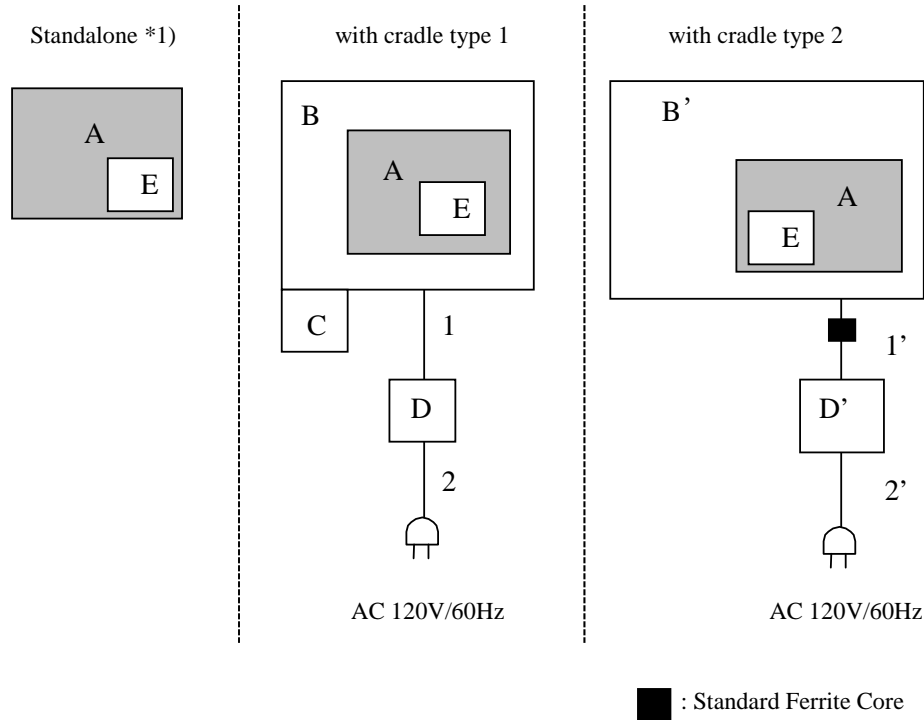
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4.2 Configuration and peripherals



* Cabling and setup(s) were taken into consideration and test data was taken under worse case conditions.
*1) Antenna terminal conducted tests were performed only with this condition.

Description of EUT

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	Handheld Mobile Computer	BT-W85GA	#2A610012 *1) #2A610011 *2)	KEYENCE CORPORATION	EUT
B	Cradle	BT-WCU8UGA	#2A610633	KEYENCE CORPORATION	*3)
B'	Cradle	BT-WCU84GA	-	KEYENCE CORPORATION	-
C	USB Memory	OP-87502	-	KEYENCE CORPORATION	-
D	AC Adaptor	OP-88020	-	KEYENCE CORPORATION	-
D'	AC Adaptor	SEE60N2-16-0	ES057	Sanken Electric Co., Ltd.	-
E	Micro SD	MMAUR02G3AC A-MP	A299220077	Transcend	-

*1) Used for Antenna terminal conducted tests
*2) Used for all tests except for Antenna terminal conducted tests
*3) Used for Conducted emission test as a representative

List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	DC Cable	1.8	Unshielded	Unshielded	-
1'	DC Cable	1.3	Unshielded	Unshielded	-
2	AC Cable	2.0	Unshielded	Unshielded	-
2'	AC Cable	2.0	Unshielded	Unshielded	-

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SECTION 5: Conducted Emission

Test Procedure and conditions

EUT was placed on a urethane platform of nominal size, 0.5 m by 1.0 m, raised 0.8 m above the conducting ground plane.

The rear of tabletop was located 40cm 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 80cm from a Line Impedance Stabilization Network (LISN) / Artificial mains Network (AMN) and excess AC cable was bundled in center.

For the tests on EUT with other peripherals (as a whole system)

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. All unused 50 ohm connectors of the LISN (AMN) were resistivity terminated in 50 ohm when not connected to the measuring equipment.

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

SECTION 6: Radiated Spurious Emission and Band Edge Compliance

Test Procedure

< Below 1GHz >

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

< Above 1GHz >

EUT was placed on a urethane platform of nominal size, 0.5 m by 0.5 m, raised 1.5 m above the conducting ground plane.

The Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with absorbent materials lined on a ground plane.

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

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

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

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

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

< Below 1GHz >

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

< Above 1GHz >

Inside of restricted bands (Section 15.205):

Apply to limit in the Section 15.209 (a).

Outside of the restricted bands:

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

For W58 Bandedge

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

Restricted band edge:

Apply to limit in the Section 15.209 (a).

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

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

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

Test Antennas are used as below;

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

Frequency	Below 1 GHz	Above 1 GHz	
Instrument used	Test Receiver	Spectrum Analyzer	
Detector	QP	Peak	Average
IF Bandwidth	BW: 120 kHz	RBW: 1 MHz VBW: 3 MHz	Method AD *1) RBW: 1 MHz VBW: 3 MHz Detector: Power Averaging (RMS) Trace: ≥ 100 traces If duty cycle was less than 98%, a duty factor was added to the results.
Test Distance	3 m	4.5 m*2) (1 GHz – 10GHz), 1 m*3) (10 GHz – 26.5 GHz), 0.5 m*4) (26.5 GHz – 40 GHz)	

*1) The test method was also referred to KDB 789033 D02 General UNII Test Procedures New Rules v01r02 "Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices Part 15, Subpart E (Issued on April 8, 2016)".

*2) Distance Factor: $20 \times \log(4.5 \text{ m}/3.0 \text{ m}) = 3.53 \text{ dB}$

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

*4) Distance Factor: $20 \times \log(0.5 \text{ m}/3.0 \text{ m}) = -15.6 \text{ dB}$

- The carrier level and noise levels were confirmed at each position of X, Y and Z axes of EUT, EUT on the cradle Type1 and Type2 to see the position of maximum noise, and the test was made at the position that has the maximum noise.

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

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

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
Maximum Conducted Output Power	-	-	-	Auto	Average	-	Power Meter (Sensor: 80 MHz BW) (Method PM-G)
Maximum Power Spectral Density	Encompass the entire EBW	1 MHz or 470 kHz *2)	≥ 3 RBW	Auto	RMS Power Averaging (200 times)	Clear Write	Spectrum Analyzer
Conducted Spurious Emission*3)	9 kHz – 150 kHz	200 Hz	620 Hz	Auto	Peak	Max Hold	Spectrum Analyzer
	150 kHz – 30 MHz	9.1 kHz	27 kHz				

* The test method was also referred to KDB 789033 D02 General UNII Test Procedures New Rules v01r02 "Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices Part 15, Subpart E (Issued on April 8, 2016)".

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

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

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

Then, wide-band noise near the limit was checked separately, however the noise was not detected as shown in the chart. (9 kHz-150 kHz: RBW = 200 Hz, 150 kHz-30 MHz: RBW = 9.1 kHz)

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

Test data : APPENDIX
Test result : Pass

APPENDIX 1: Test data

Conducted Emission

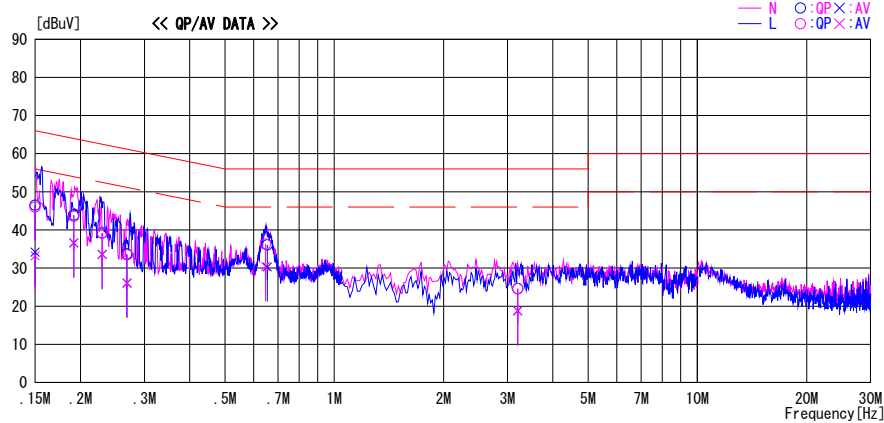
DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Ise EMC Lab. No.1 Semi Anechoic Chamber
Date : 04/15/2016

Report No. : 11201778H
Temp./Humi. : 23deg. C / 43% RH
Engineer : Hiroyuki Furutaka

Mode / Remarks : WLAN 11n-40 MCS1 5670MHz

LIMIT : FCC15.207 QP
FCC15.207 AV



Frequency [MHz]	Reading Level		Corr. Factor [dB]	Results		Limit		Margin		Phase	Comment
	QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dB]	AV [dB]		
0.15000	33.3	21.0	13.2	46.5	34.2	66.0	56.0	19.5	21.8	N	
0.15000	32.8	20.0	13.2	46.0	33.2	66.0	56.0	20.0	22.8	L	
0.19173	30.7	23.4	13.2	43.9	36.6	64.0	54.0	20.1	17.4	N	
0.19175	30.4	23.4	13.2	43.6	36.6	64.0	54.0	20.4	17.4	L	
0.22955	25.9	20.3	13.3	39.2	33.6	62.5	52.5	23.3	18.9	L	
0.22956	25.9	20.3	13.3	39.2	33.6	62.5	52.5	23.3	18.9	N	
0.26850	20.4	12.8	13.3	33.7	26.1	61.2	51.2	27.5	25.1	N	
0.26920	20.2	12.8	13.3	33.5	26.1	61.1	51.1	27.6	25.0	L	
0.64660	22.9	17.0	13.4	36.3	30.4	56.0	46.0	19.7	15.6	L	
0.65400	22.7	16.9	13.4	36.1	30.3	56.0	46.0	19.9	15.7	N	
3.20100	10.8	5.0	13.8	24.6	18.8	56.0	46.0	31.4	27.2	L	
3.20100	10.8	5.0	13.8	24.6	18.8	56.0	46.0	31.4	27.2	N	

CHART : WITH FACTOR. Peak hold data. CALCULATION : RESULT = READING + C.F (LISN + ATTN + CABLE)
Except for the above table : adequate margin data below the limits.

26 dB Emission Bandwidth and 99 % Occupied Bandwidth

Test place : Ise EMC Lab. No.6 Measurement Room
Report No. : 11201778H
Date : April 18, 2016
Temperature / Humidity : 23deg. C / 43 % RH
Engineer : Ken Fujita
Mode : Tx

11a

Frequency [MHz]	26dB Emission Bandwidth [MHz]	99% Occupied Bandwidth [MHz]	Limit [MHz]
5180	-	16.8064	-
5220	-	16.7957	-
5240	-	16.8649	-
5280	19.561	16.8171	-
5300	19.589	16.7942	-
5320	19.592	16.8603	-
5500	19.738	16.8457	-
5580	19.788	16.7863	-
5700	19.609	16.8457	-
5745	-	16.8738	-
5785	-	16.8239	-
5825	-	16.8601	-

11n-20

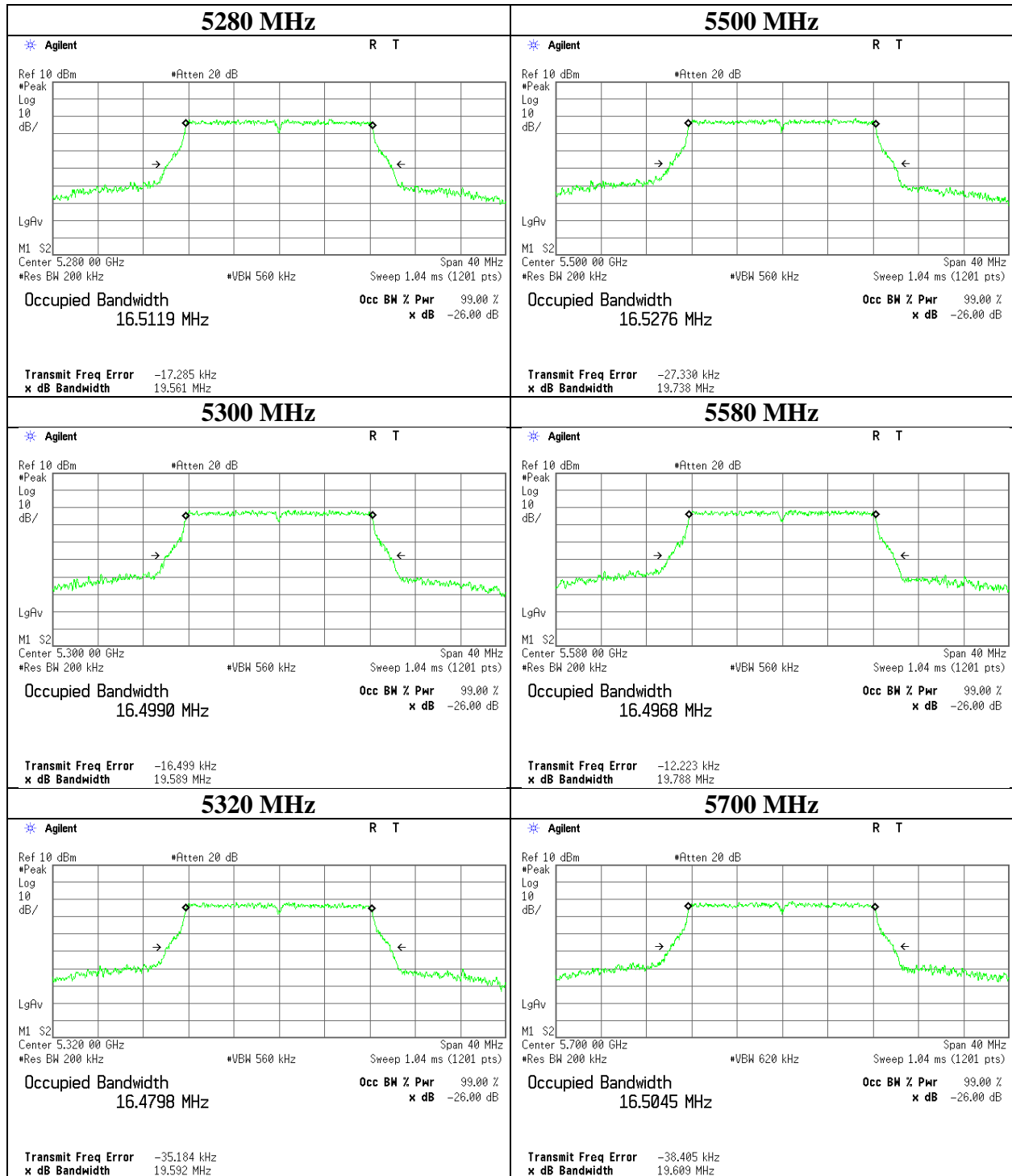
Frequency [MHz]	26dB Emission Bandwidth [MHz]	99% Occupied Bandwidth [MHz]	Limit [MHz]
5180	-	17.9386	-
5220	-	17.9550	-
5240	-	17.9417	-
5280	20.104	17.9724	-
5300	20.028	17.9596	-
5320	20.048	17.9824	-
5500	19.980	17.9609	-
5580	20.211	17.9503	-
5700	20.152	17.9481	-
5745	-	17.9893	-
5785	-	17.9601	-
5825	-	17.9793	-

11n-40

Frequency [MHz]	26dB Emission Bandwidth [MHz]	99% Occupied Bandwidth [MHz]	Limit [MHz]
5190	-	36.4958	-
5230	-	36.4961	-
5310	40.381	36.5280	-
5510	40.448	36.7544	-
5550	40.091	36.5836	-
5670	40.448	36.6032	-
5755	-	36.5861	-
5795	-	36.5658	-

26 dB Emission Bandwidth

11a



UL Japan, Inc.

Ise EMC Lab.

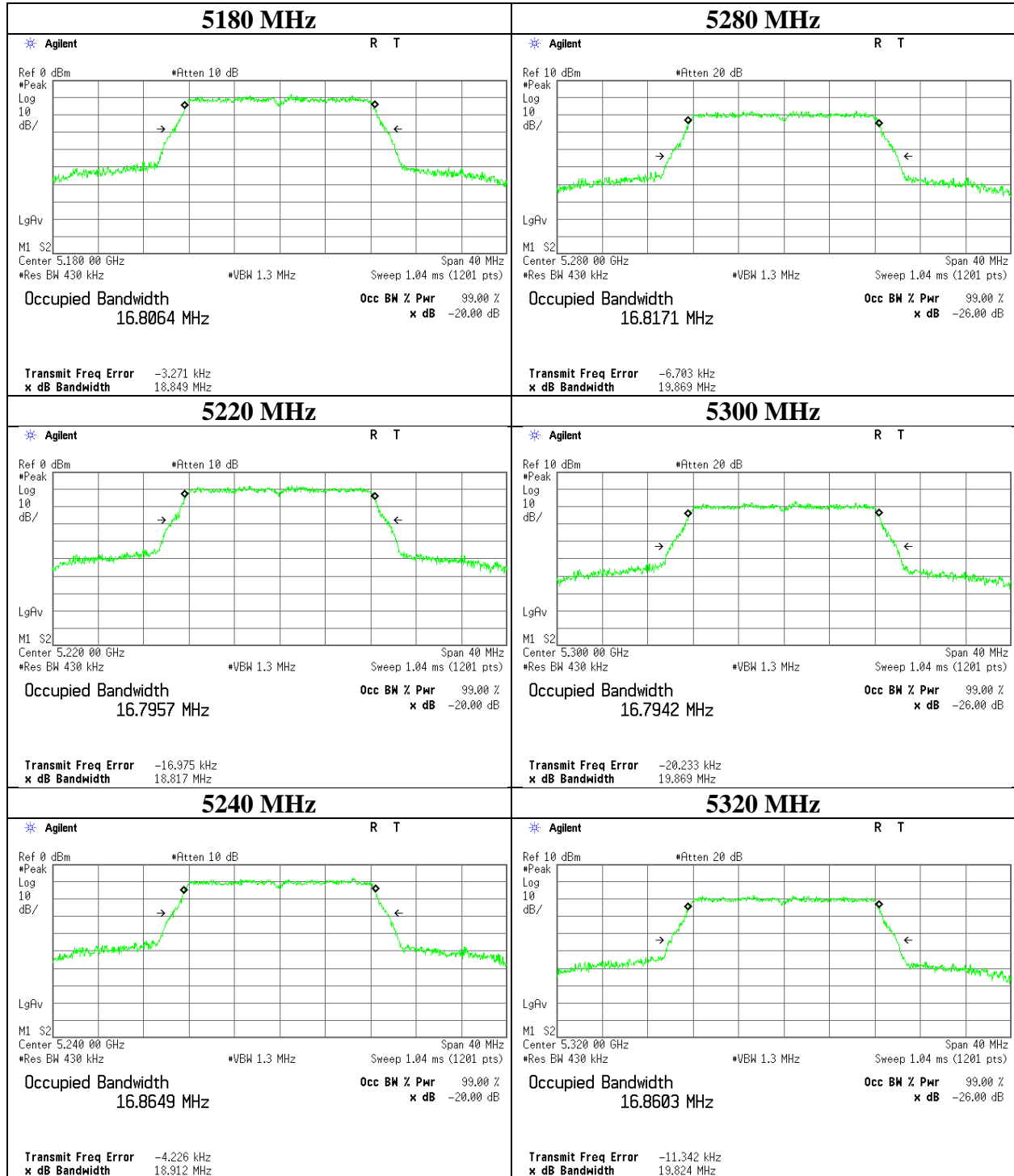
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

99 % Occupied Bandwidth

11a



UL Japan, Inc.

Ise EMC Lab.

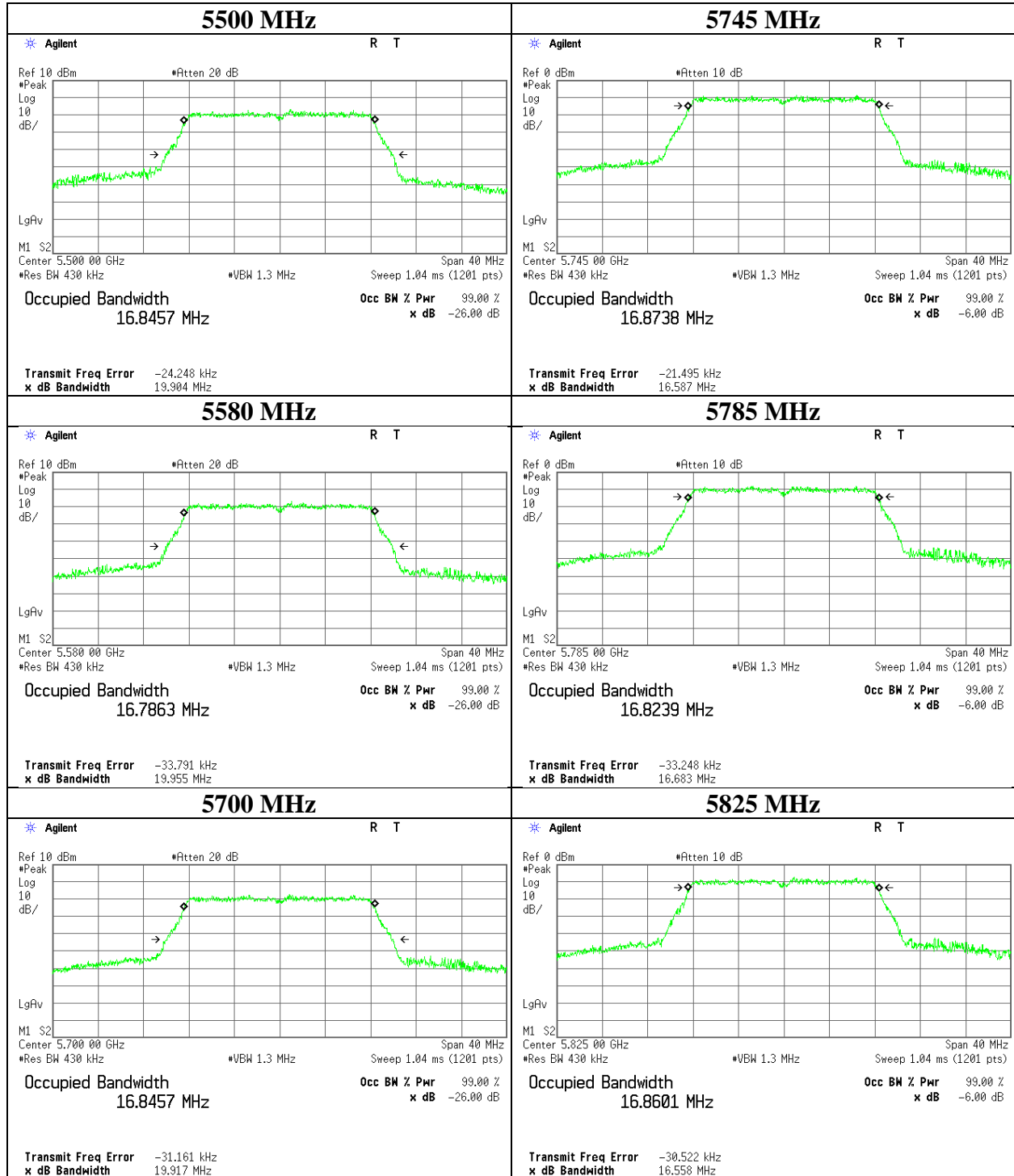
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

99 % Occupied Bandwidth

11a



UL Japan, Inc.

Ise EMC Lab.

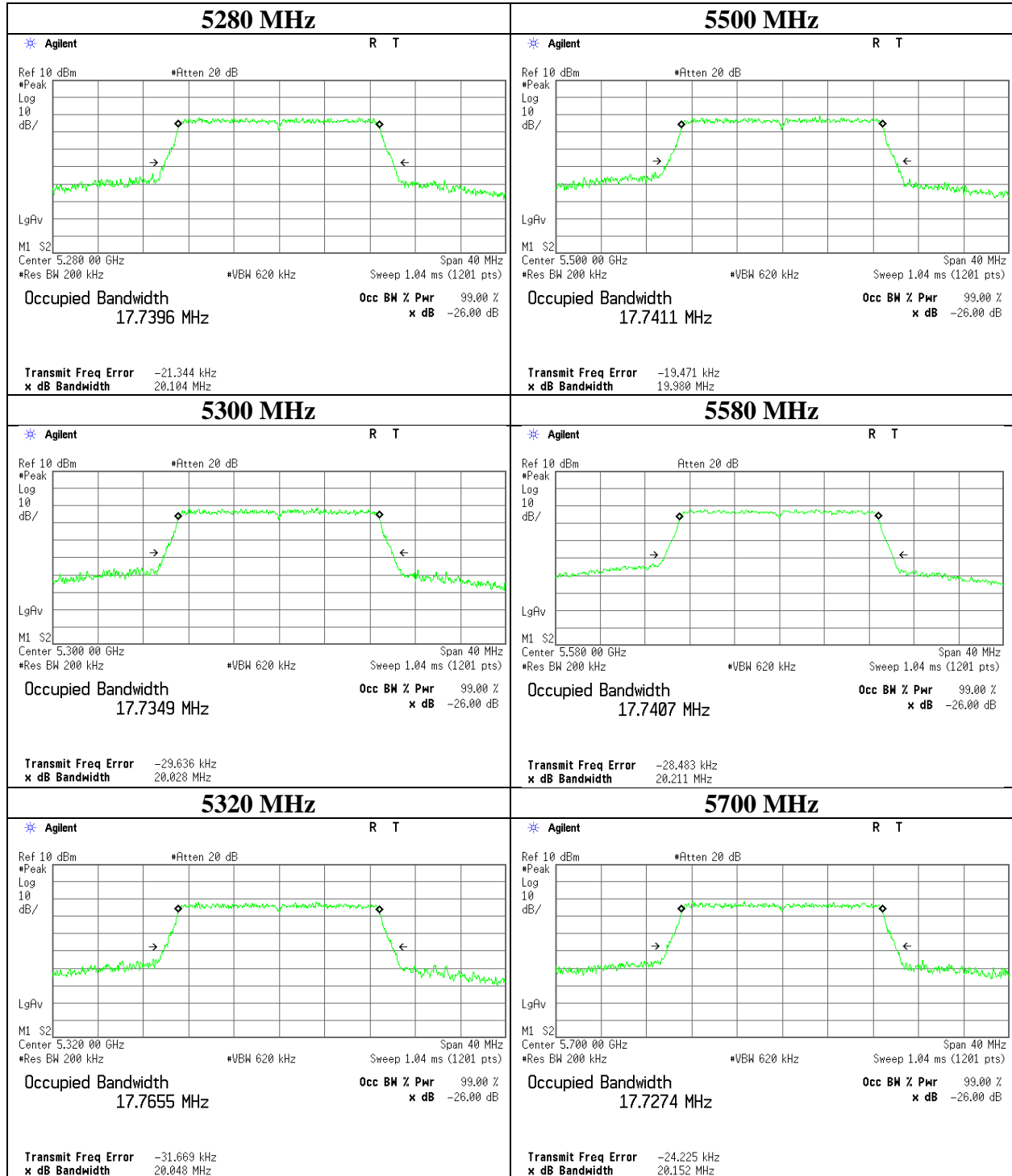
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Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

26 dB Emission Bandwidth

11n-20



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Ise EMC Lab.

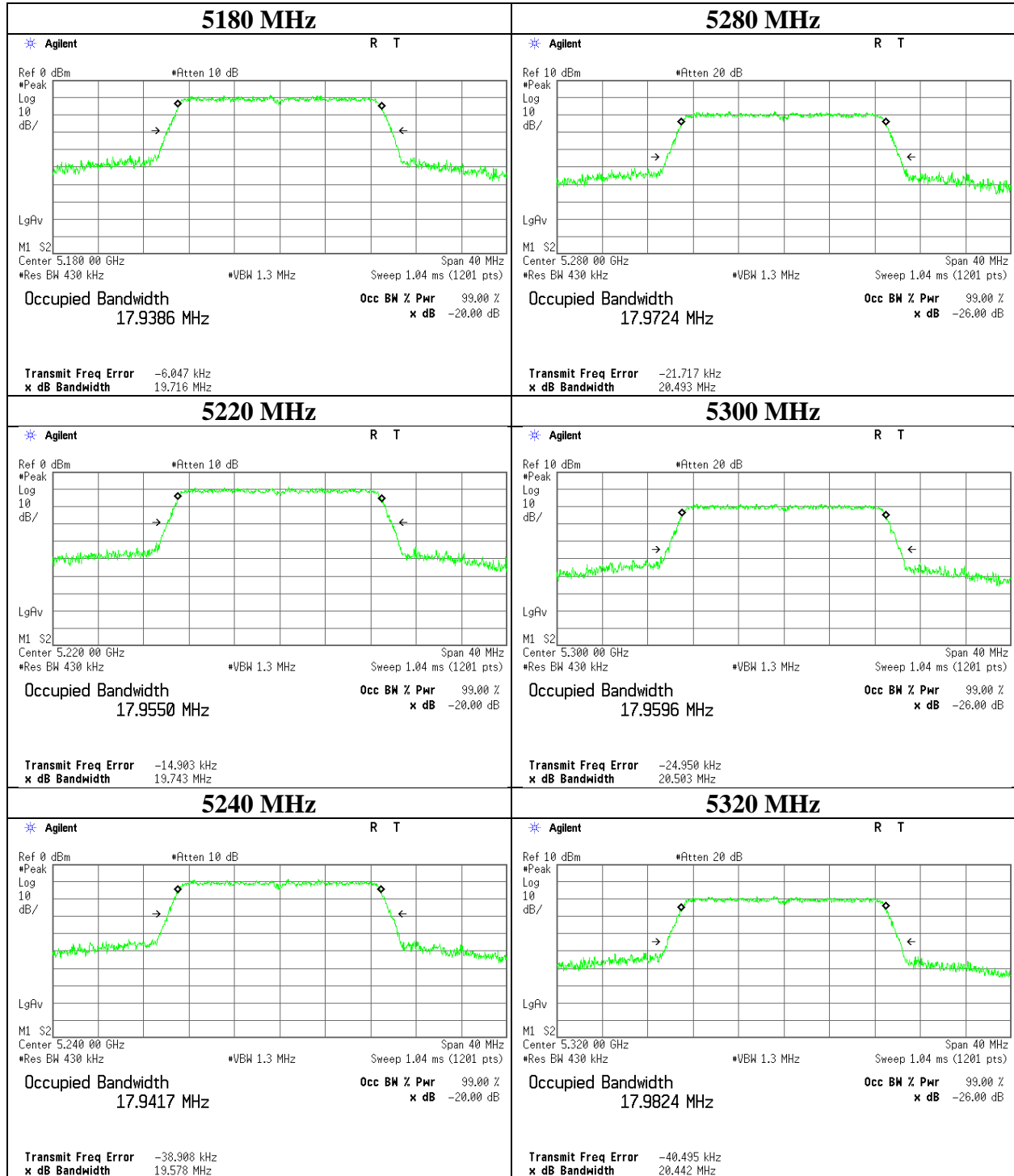
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

99 % Occupied Bandwidth

11n-20



UL Japan, Inc.

Ise EMC Lab.

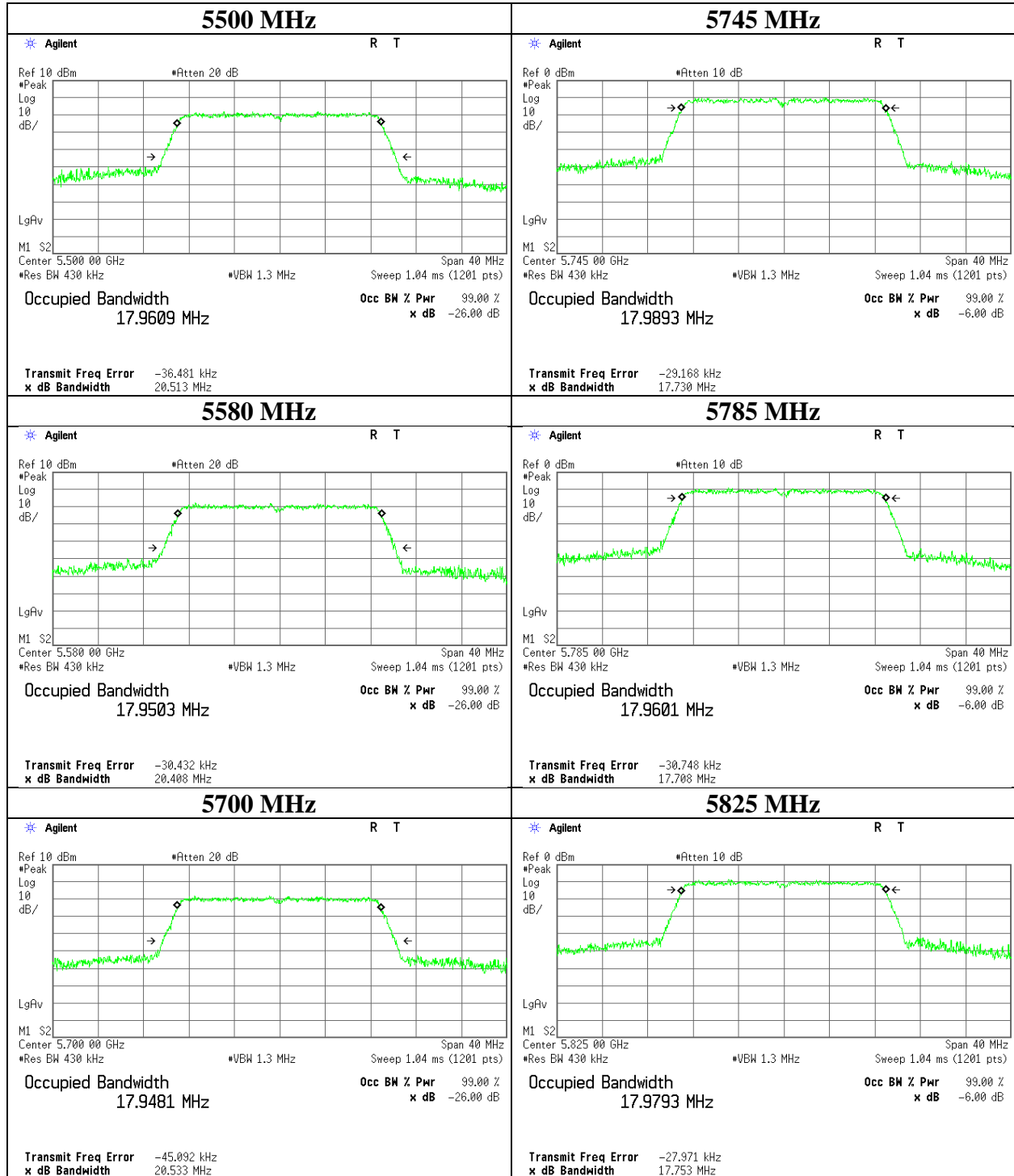
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

99 % Occupied Bandwidth

11n-20



UL Japan, Inc.

Ise EMC Lab.

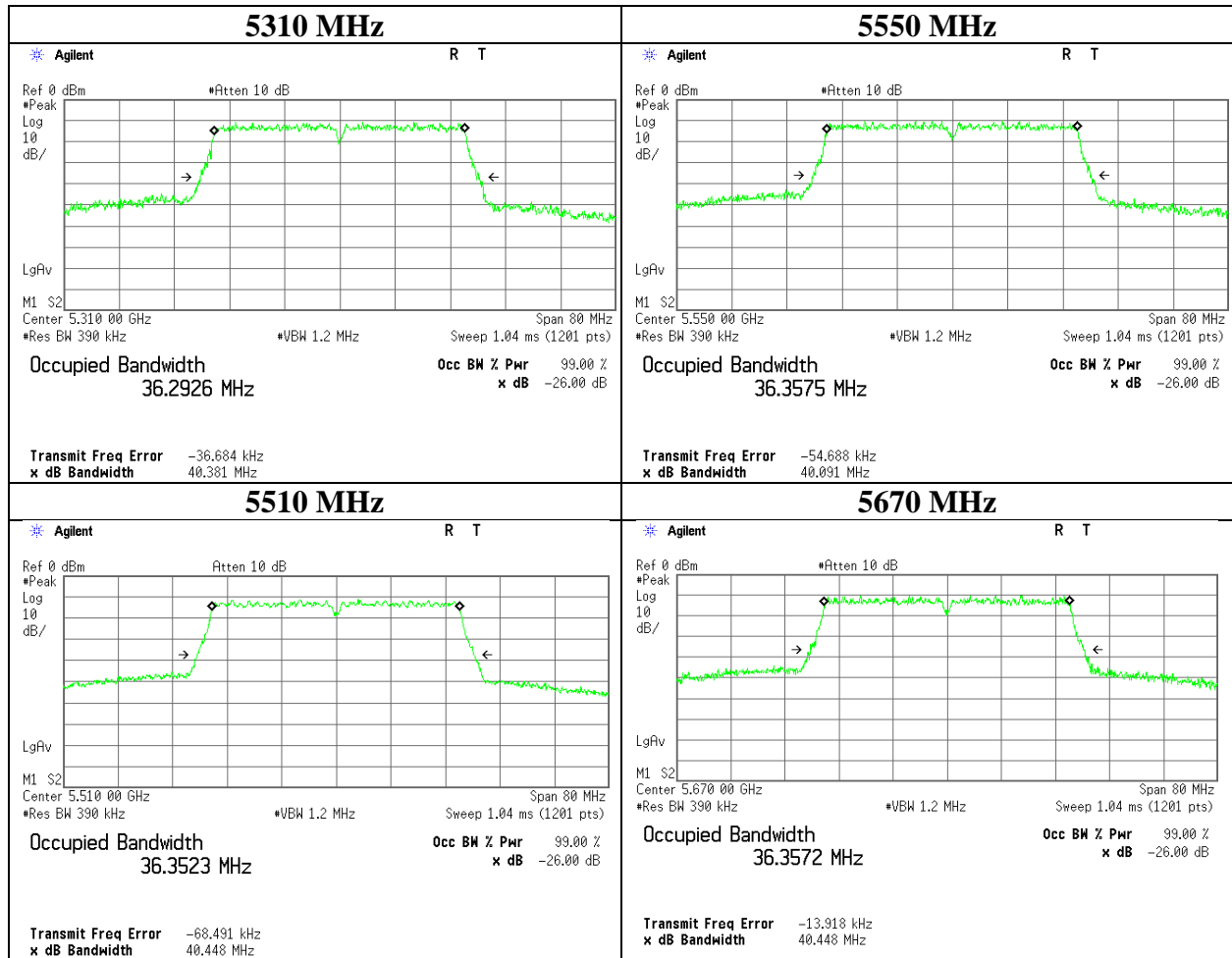
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

26 dB Emission Bandwidth

11n-40



UL Japan, Inc.

Ise EMC Lab.

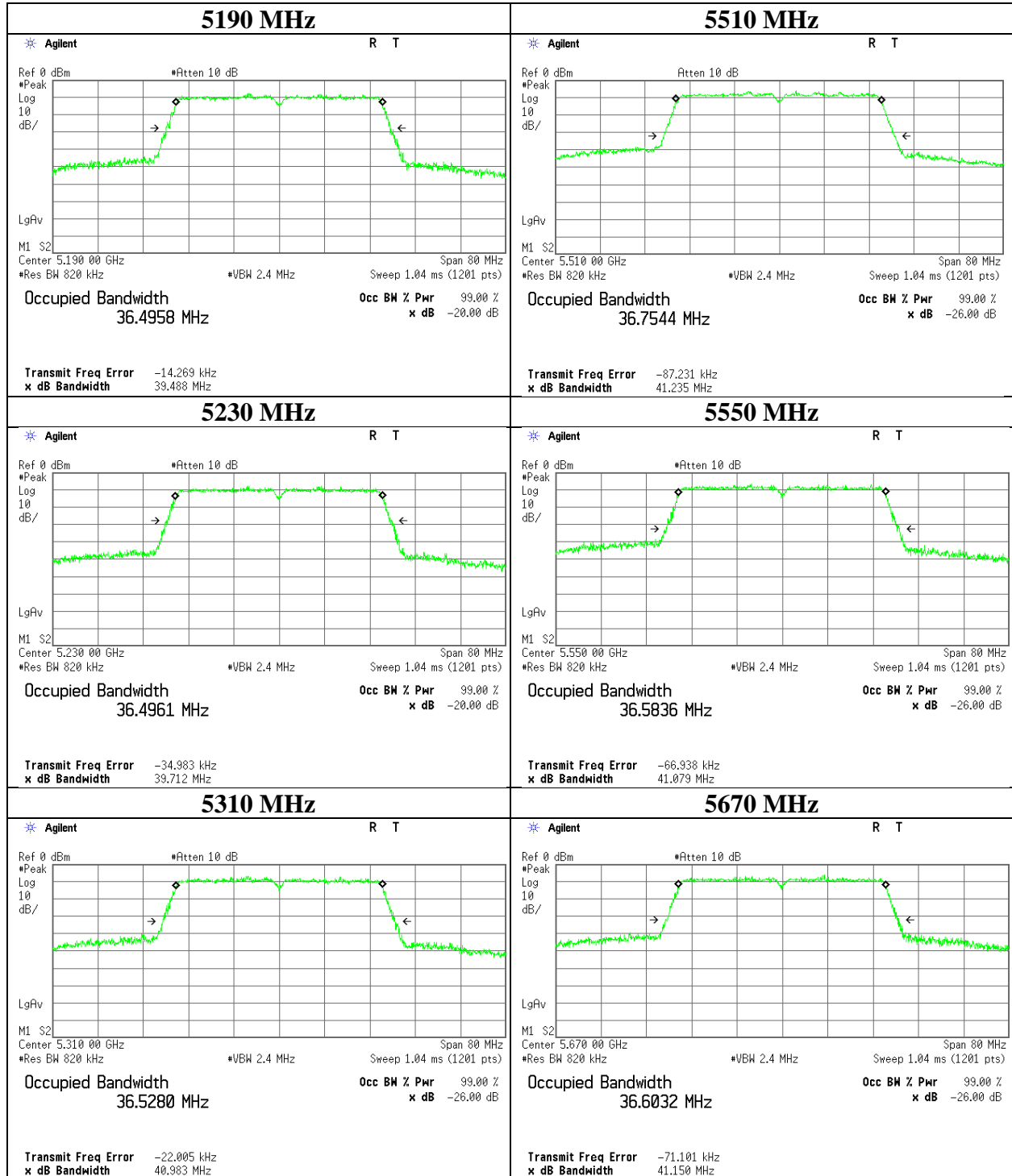
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

99 % Occupied Bandwidth

11n-40



UL Japan, Inc.

Ise EMC Lab.

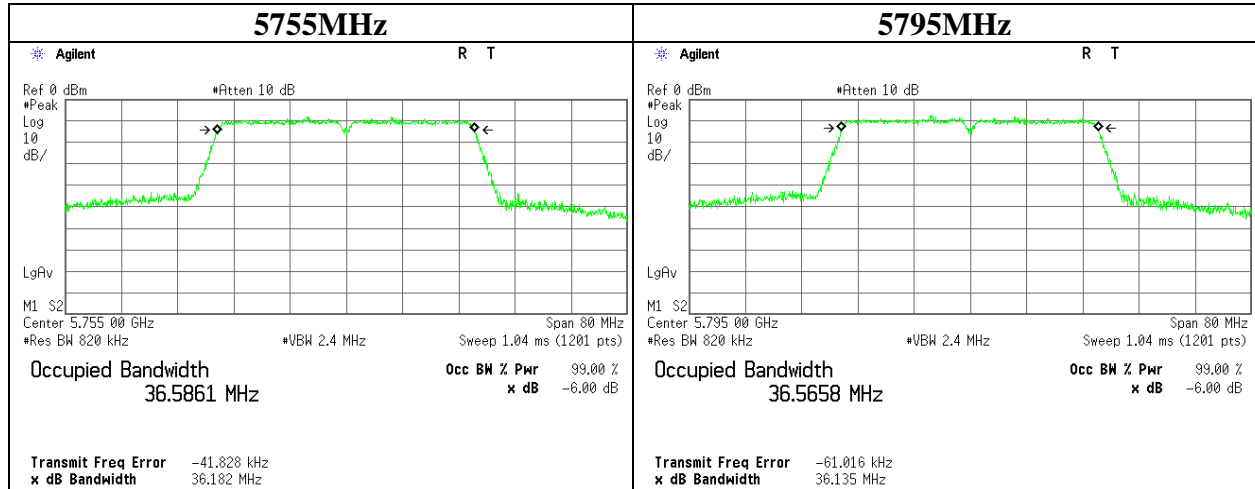
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99 % Occupied Bandwidth

11n-40



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Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

6 dB Bandwidth

Test place Ise EMC Lab. No.6 Measurement Room
Report No. 11201778H
Date April 18, 2016
Temperature / Humidity 23deg. C / 43 % RH
Engineer Ken Fujita
Mode Tx

11a

Tested Frequency [MHz]	6 dB Bandwidth [MHz]	Limit [kHz]
5745	16.560	> 500
5785	16.558	> 500
5825	16.557	> 500

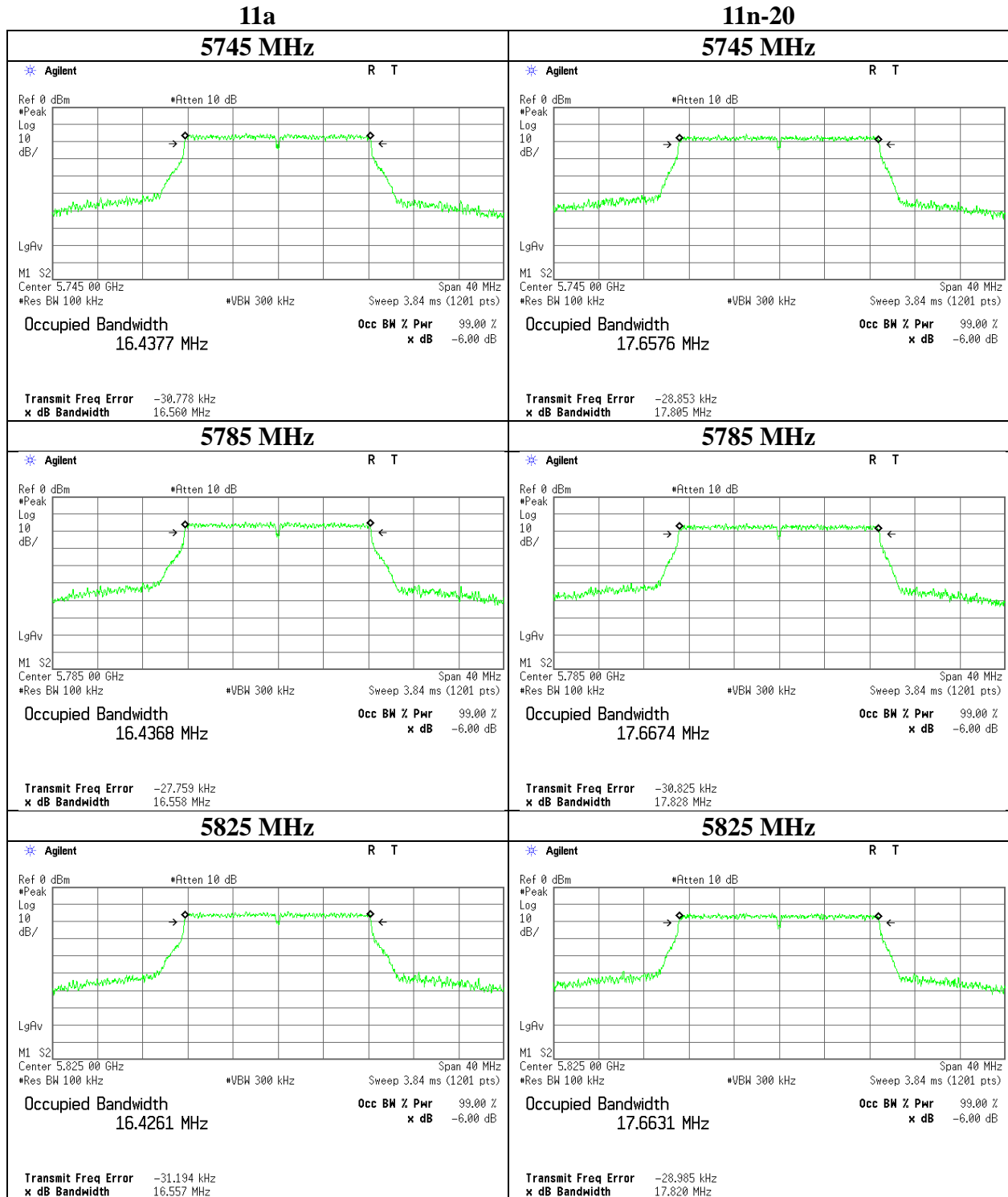
11n-20

Tested Frequency [MHz]	6 dB Bandwidth [MHz]	Limit [kHz]
5745	17.805	> 500
5785	17.828	> 500
5825	17.820	> 500

11n-40

Tested Frequency [MHz]	6 dB Bandwidth [MHz]	Limit [kHz]
5755	36.557	> 500
5795	36.568	> 500

6 dB Bandwidth



UL Japan, Inc.

Ise EMC Lab.

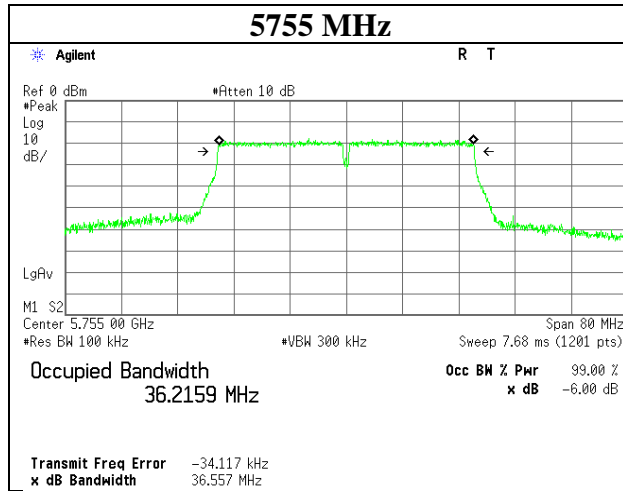
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8999

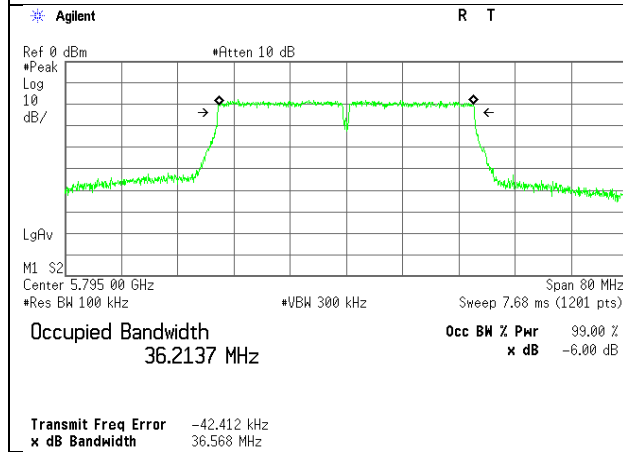
Facsimile : +81 596 24 8124

11n-40

5755 MHz



5795 MHz



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Ise 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

Test place : Ise EMC Lab. No.6 Measurement Room
Report No. : 11201778H
Date : April 13, 2016
Temperature / Humidity : 25 deg. C / 45% RH
Engineer : Masafumi Niwa
Mode : Tx 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 [dBm]	Limit [dBm]	Margin [dB]	Result [dBm]	Limit [dBm]	Margin [dB]		
5180	-1.21	3.05	10.15	0.00	2.4	-	16.806	11.99	15.81	23.97	11.98	14.39	27.48	29.97	15.58
5220	-1.24	3.06	10.15	0.00	2.4	-	16.796	11.97	15.74	23.97	12.00	14.37	27.35	29.97	15.60
5240	-1.32	3.08	10.16	0.00	2.4	-	16.865	11.92	15.56	23.97	12.05	14.32	27.04	29.97	15.65
5280	-0.83	3.08	10.16	0.00	2.4	19.561	16.817	12.41	17.42	23.91	11.50	14.81	30.27	29.97	15.16
5300	-0.98	3.09	10.16	0.00	2.4	19.589	16.794	12.27	16.87	23.92	11.65	14.67	29.31	29.97	15.30
5320	-0.97	3.10	10.17	0.00	2.4	19.592	16.860	12.30	16.98	23.92	11.62	14.70	29.51	29.97	15.27
5500	-0.47	3.15	10.18	0.00	2.4	19.738	16.846	12.86	19.32	23.95	11.09	15.26	33.57	29.97	14.71
5580	-0.52	3.18	10.18	0.00	2.4	19.788	16.786	12.84	19.23	23.96	11.12	15.24	33.42	29.97	14.73
5700	-0.47	3.22	10.17	0.00	2.4	19.609	16.846	12.92	19.59	23.92	11.00	15.32	34.04	29.97	14.65
5745	-2.06	3.23	10.17	0.00	2.4	-	-	11.34	13.61	30.00	18.66	13.74	23.66	36.00	22.26
5785	-1.92	3.24	10.16	0.00	2.4	-	-	11.48	14.06	30.00	18.52	13.88	24.43	36.00	22.12
5825	-1.93	3.25	10.16	0.00	2.4	-	-	11.48	14.06	30.00	18.52	13.88	24.43	36.00	22.12

Sample Calculation:

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

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

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

Maximum Conducted Output Power

Test place : Ise EMC Lab. No.6 Measurement Room
Report No. : 11201778H
Date : April 13, 2016
Temperature / Humidity : 25 deg. C / 45% RH
Engineer : Masafumi Niwa
Mode : Tx 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 [dBm]	[mW]	Limit [dBm]	Margin [dB]	Result [dBm]	[mW]	Limit [dBm]	Margin [dB]
5180	-1.12	3.05	10.15	0.00	2.4	-	17.939	12.08	16.14	23.97	11.89	14.48	28.05	29.97	15.49
5220	-1.14	3.06	10.15	0.00	2.4	-	17.955	12.07	16.11	23.97	11.90	14.47	27.99	29.97	15.50
5240	-1.13	3.08	10.16	0.00	2.4	-	17.942	12.11	16.26	23.97	11.86	14.51	28.25	29.97	15.46
5280	-0.71	3.08	10.16	0.00	2.4	20.104	17.972	12.53	17.91	23.97	11.44	14.93	31.12	29.97	15.04
5300	-0.96	3.09	10.16	0.00	2.4	20.028	17.960	12.29	16.94	23.97	11.68	14.69	29.44	29.97	15.28
5320	-0.95	3.10	10.17	0.00	2.4	20.048	17.982	12.32	17.06	23.97	11.65	14.72	29.65	29.97	15.25
5500	-0.39	3.15	10.18	0.00	2.4	19.980	17.961	12.94	19.68	23.97	11.03	15.34	34.20	29.97	14.63
5580	-0.36	3.18	10.18	0.00	2.4	20.211	17.950	13.00	19.95	23.97	10.97	15.40	34.67	29.97	14.57
5700	-0.42	3.22	10.17	0.00	2.4	20.152	17.948	12.97	19.82	23.97	11.00	15.37	34.43	29.97	14.60
5745	-1.96	3.23	10.17	0.00	2.4	-	-	11.44	13.93	30.00	18.56	13.84	24.21	36.00	22.16
5785	-1.90	3.24	10.16	0.00	2.4	-	-	11.50	14.13	30.00	18.50	13.90	24.55	36.00	22.10
5825	-1.91	3.25	10.16	0.00	2.4	-	-	11.50	14.13	30.00	18.50	13.90	24.55	36.00	22.10

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

Maximum Conducted Output Power

Test place : Ise EMC Lab. No.6 Measurement Room
Report No. : 11201778H
Date : April 13, 2016
Temperature / Humidity : 25 deg. C / 45% RH
Engineer : Masafumi Niwa
Mode : Tx 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 [dBm]	[mW]	Limit [dBm]	Margin [dB]	Result [dBm]	[mW]	Limit [dBm]	Margin [dB]
5190	-1.34	3.06	10.15	0.00	2.4	-	36.496	11.87	15.38	23.97	12.10	14.27	26.73	29.97	15.70
5230	-1.22	3.07	10.16	0.00	2.4	-	36.496	12.01	15.89	23.97	11.96	14.41	27.61	29.97	15.56
5310	-0.73	3.10	10.16	0.00	2.4	40.381	36.528	12.53	17.91	23.97	11.44	14.93	31.12	29.97	15.04
5510	-0.38	3.16	10.18	0.00	2.4	40.448	36.754	12.96	19.77	23.97	11.01	15.36	34.36	29.97	14.61
5550	-0.63	3.17	10.18	0.00	2.4	40.091	36.584	12.72	18.71	23.97	11.25	15.12	32.51	29.97	14.85
5670	-0.29	3.20	10.17	0.00	2.4	40.448	36.603	13.08	20.32	23.97	10.89	15.48	35.32	29.97	14.49
5755	-1.82	3.24	10.17	0.00	2.4	-	-	11.59	14.42	30.00	18.41	13.99	25.06	36.00	22.01
5795	-1.86	3.25	10.16	0.00	2.4	-	-	11.55	14.29	30.00	18.45	13.95	24.83	36.00	22.05

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

Maximum Conducted Output Power

Test place : Ise EMC Lab. No.6 Measurement Room
Report No. : 11201778H
Date : April 12, 2016
Temperature / Humidity : 24 deg. C / 31 % RH
Engineer : Masafumi Niwa
Mode : Tx

5180MHz

Mode	Rate Mbps	Reading (Time average) [dBm]	Duty factor [dB]	Burst power average [dBm]	Remarks
11a	6	-1.15	0.00	-1.15	
	9	-1.37	0.00	-1.37	
	12	-1.14	0.00	-1.14	
	18	-1.12	0.00	-1.12	*
	24	-1.28	0.00	-1.28	
	36	-1.42	0.00	-1.42	
	48	-1.14	0.00	-1.14	
	54	-1.15	0.00	-1.15	

5180MHz

Mode	MCS Number	Reading (Time average) [dBm]	Duty factor [dB]	Burst power average [dBm]	Remarks
11n-20	0	-0.99	0.00	-0.99	*
	1	-1.31	0.00	-1.31	
	3	-1.29	0.00	-1.29	
	4	-1.18	0.00	-1.18	
	5	-1.30	0.00	-1.30	
	6	-1.27	0.00	-1.27	
	7	-1.41	0.00	-1.41	
	8	-1.31	0.00	-1.31	

5190MHz

Mode	MCS Number	Reading (Time average) [dBm]	Duty factor [dB]	Burst power average [dBm]	Remarks
11n-40	0	-1.45	0.00	-1.45	
	1	-1.32	0.00	-1.32	*
	3	-1.42	0.00	-1.42	
	4	-1.40	0.00	-1.40	
	5	-1.33	0.00	-1.33	
	6	-1.43	0.00	-1.43	
	7	-1.39	0.00	-1.39	
	8	-1.35	0.00	-1.35	

* Worst rate

Sample Calculation:

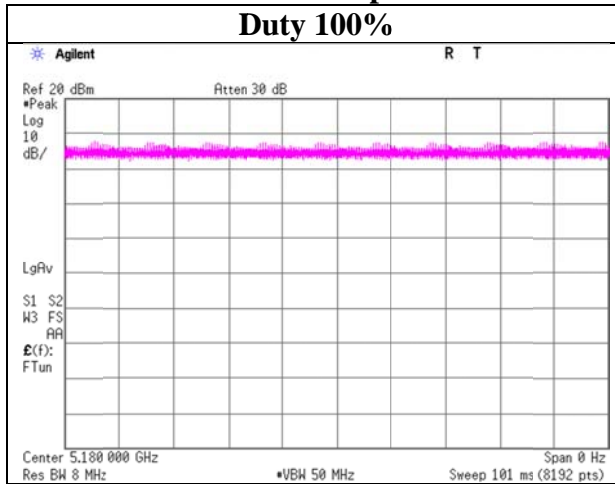
$$\text{Burst power average} = \text{Reading (Time average)} + \text{Duty factor}$$

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

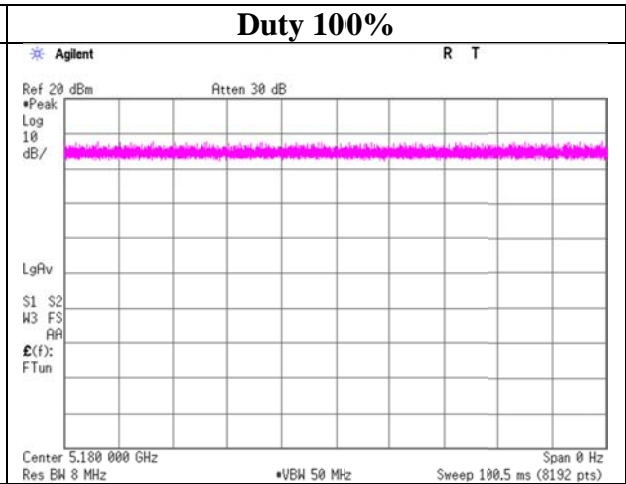
Burst rate confirmation

Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	11201778H
Date	April 18, 2016
Temperature / Humidity	23deg. C / 43 % RH
Engineer	Ken Fujita
Mode	Tx

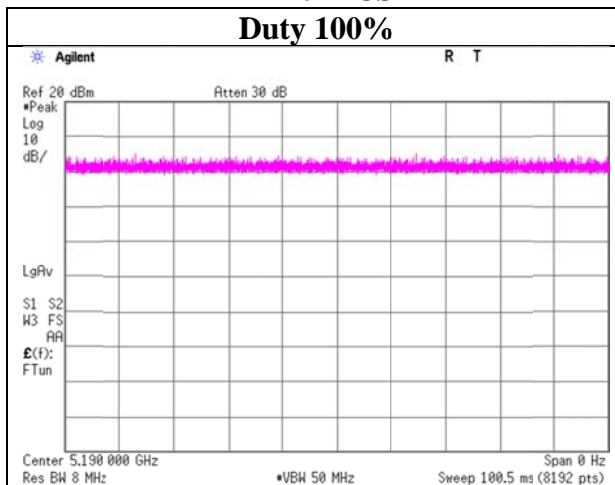
11a 18Mbps
Duty 100%



11n-20 MCS0
Duty 100%



11n-40 MCS1
Duty 100%



Maximum Power Spectral Density

Test place : Ise EMC Lab. No.6 Measurement Room
Report No. : 11201778H
Date : April 18, 2016
Temperature / Humidity : 23deg. C / 43 % RH
Engineer : Ken Fujita
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	-12.72	1.44	10.15	0.00	2.4	0.00	-1.13	11.00	12.13	1.27	17.00	15.73
5220	-11.92	1.46	10.15	0.00	2.4	0.00	-0.31	11.00	11.31	2.09	17.00	14.91
5240	-11.93	1.47	10.16	0.00	2.4	0.00	-0.30	11.00	11.30	2.10	17.00	14.90
5260	-11.43	1.48	10.16	0.00	2.4	0.00	0.21	11.00	10.79	2.61	17.00	14.39
5300	-11.24	1.49	10.16	0.00	2.4	0.00	0.41	11.00	10.59	2.81	17.00	14.19
5320	-11.60	1.50	10.17	0.00	2.4	0.00	0.07	11.00	10.93	2.48	17.00	14.53
5500	-11.26	1.58	10.18	0.00	2.4	0.00	0.50	11.00	10.50	2.90	17.00	14.10
5580	-11.27	1.58	10.18	0.00	2.4	0.00	0.49	11.00	10.51	2.90	17.00	14.11
5700	-11.34	1.59	10.17	0.00	2.4	0.00	0.42	11.00	10.58	2.82	17.00	14.18
5745	-15.77	1.60	10.17	0.00	2.4	0.27	-3.73	30.00	33.73	-1.33	36.00	37.33
5785	-14.96	1.60	10.16	0.00	2.4	0.27	-2.93	30.00	32.93	-0.53	36.00	36.53
5825	-14.74	1.60	10.16	0.00	2.4	0.27	-2.71	30.00	32.71	-0.31	36.00	36.31

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 Factor

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Ise EMC Lab.

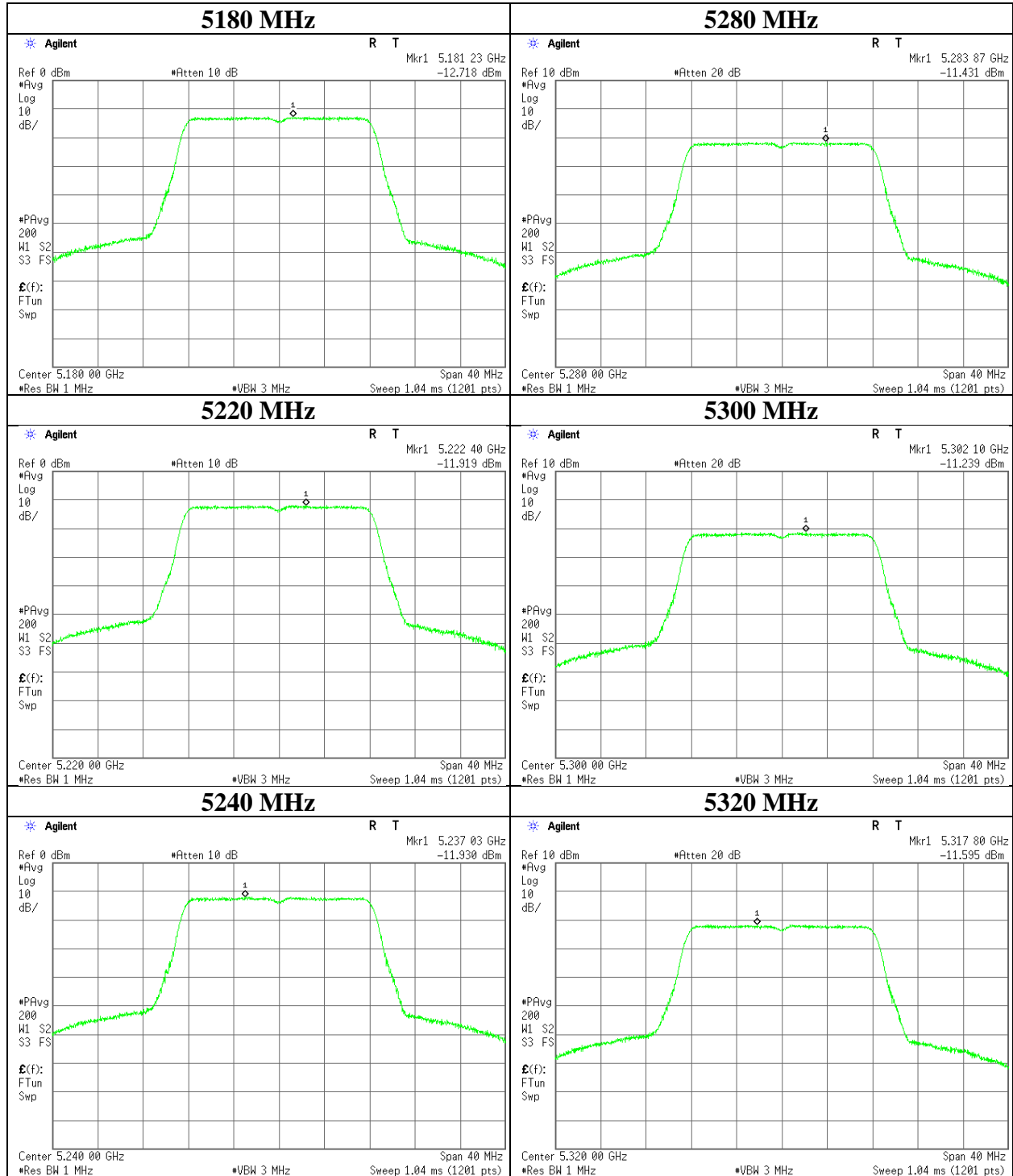
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

Maximum Power Spectral Density

11a



UL Japan, Inc.

Ise EMC Lab.

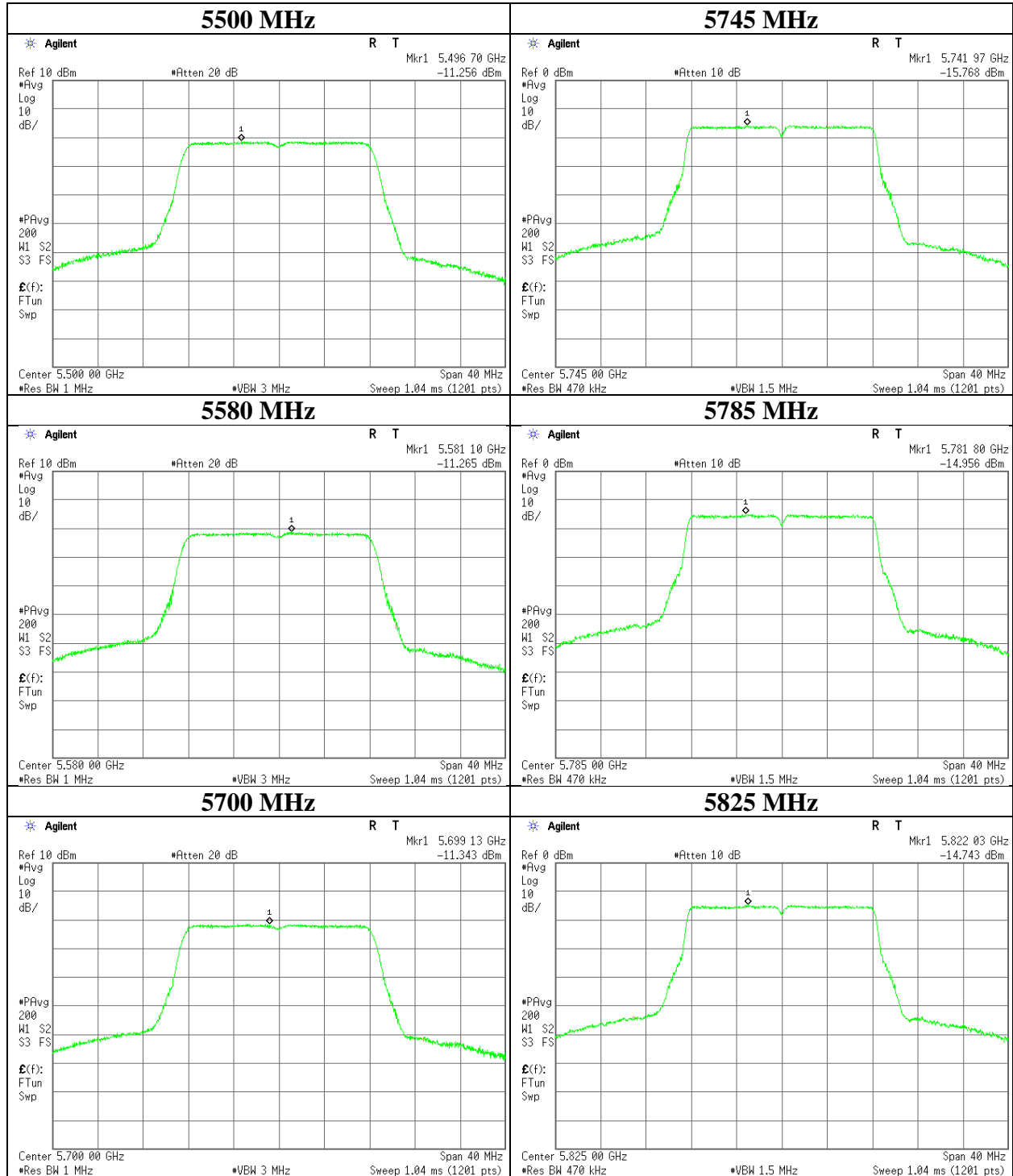
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Maximum Power Spectral Density

11a



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Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

Maximum Power Spectral Density

Test place : Ise EMC Lab. No.6 Measurement Room
Report No. : 11201778H
Date : April 18, 2016
Temperature / Humidity : 23deg. C / 43 % RH
Engineer : Ken Fujita
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	-12.26	1.44	10.15	0.00	2.4	0.00	-0.67	11.00	11.67	1.73	17.00	15.27
5220	-12.33	1.46	10.15	0.00	2.4	0.00	-0.72	11.00	11.72	1.68	17.00	15.32
5240	-12.26	1.47	10.16	0.00	2.4	0.00	-0.63	11.00	11.63	1.77	17.00	15.23
5280	-11.61	1.48	10.16	0.00	2.4	0.00	0.03	11.00	10.97	2.43	17.00	14.57
5300	-11.70	1.49	10.16	0.00	2.4	0.00	-0.04	11.00	11.05	2.36	17.00	14.65
5320	-12.04	1.50	10.17	0.00	2.4	0.00	-0.37	11.00	11.37	2.03	17.00	14.97
5500	-11.35	1.58	10.18	0.00	2.4	0.00	0.41	11.00	10.59	2.81	17.00	14.19
5580	-11.37	1.58	10.18	0.00	2.4	0.00	0.39	11.00	10.61	2.79	17.00	14.21
5700	-11.59	1.59	10.17	0.00	2.4	0.00	0.17	11.00	10.83	2.57	17.00	14.43
5745	-16.37	1.60	10.17	0.00	2.4	0.27	-4.33	30.00	34.33	-1.93	36.00	37.93
5785	-15.94	1.60	10.16	0.00	2.4	0.27	-3.91	30.00	33.91	-1.51	36.00	37.51
5825	-15.54	1.60	10.16	0.00	2.4	0.27	-3.51	30.00	33.51	-1.11	36.00	37.11

Sample Calculation:

PSD: Power Spectral Density

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

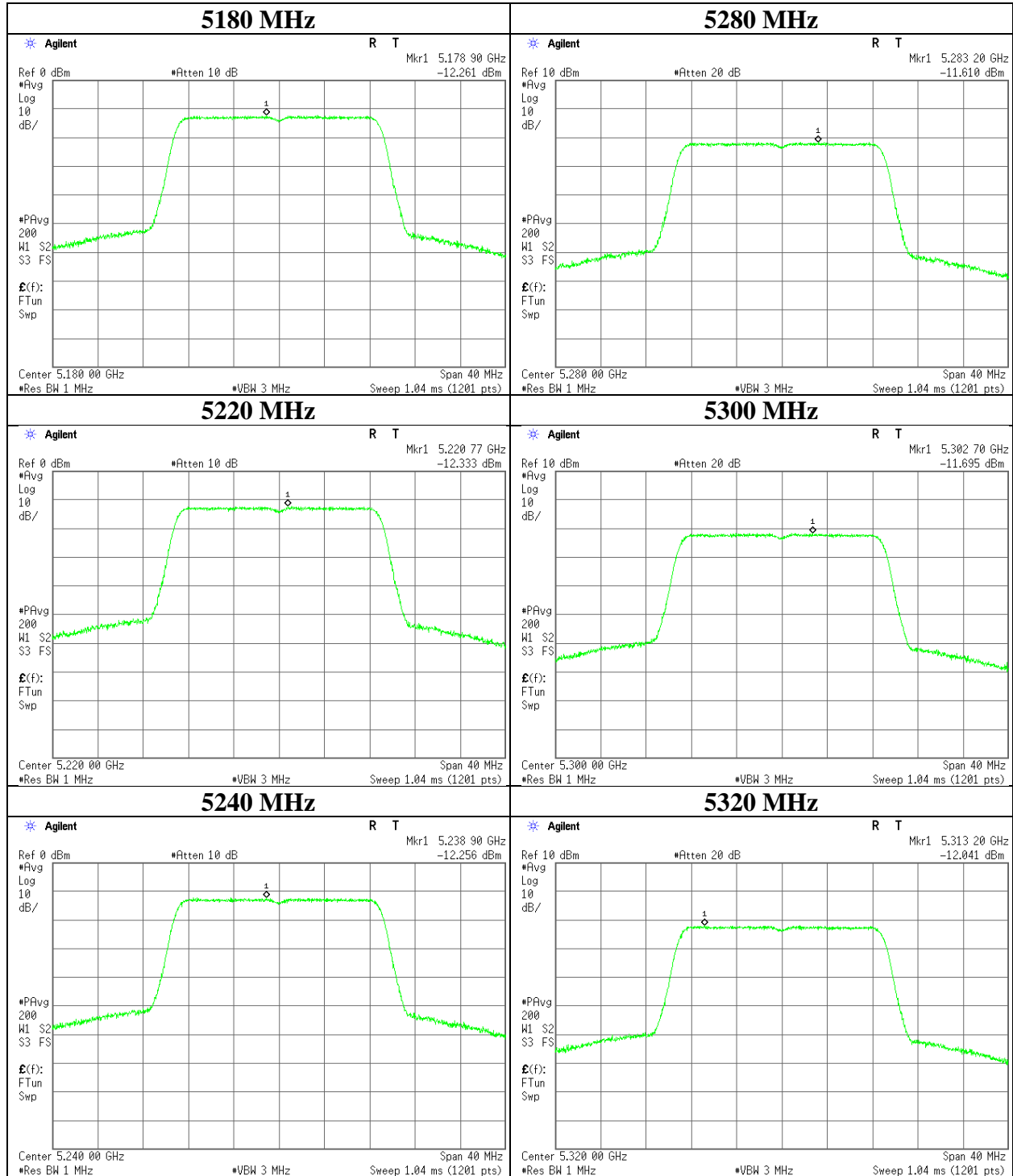
RBW Correction Factor = $10 * \log(\text{Specified bandwidth} / \text{Measured bandwidth})$

PSD Result (Conducted) = Reading + Cable Loss + Atten. Loss + Duty Factor + RBW Correction Factor

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

Maximum Power Spectral Density

11n-20



UL Japan, Inc.

Ise EMC Lab.

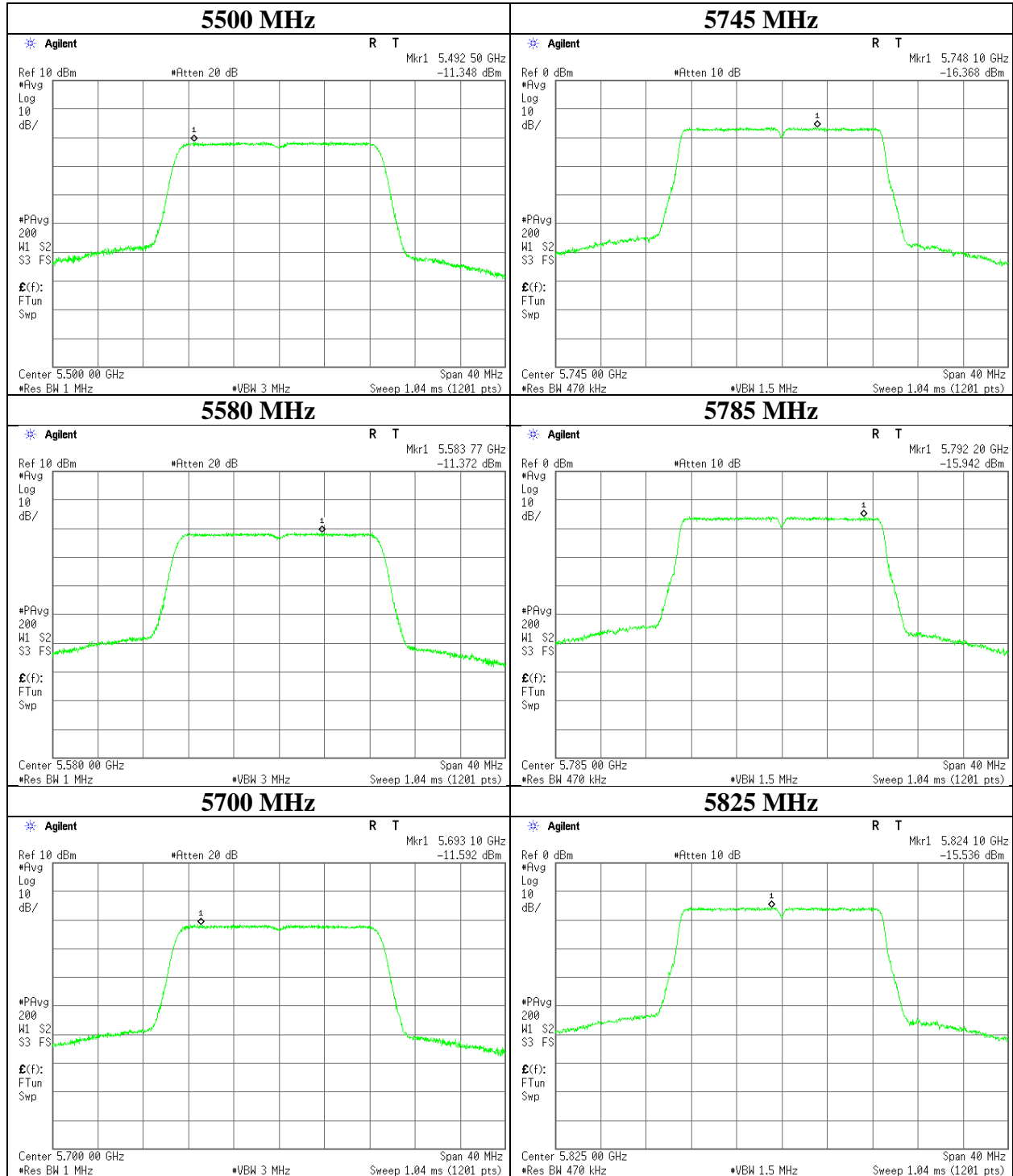
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Maximum Power Spectral Density

11n-20



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Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

Maximum Power Spectral Density

Test place : Ise EMC Lab. No.6 Measurement Room
Report No. : 11201778H
Date : April 18, 2016
Temperature / Humidity : 23deg. C / 43 % RH
Engineer : Ken Fujita
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	-15.35	1.44	10.15	0.00	2.4	0.00	-3.76	11.00	14.76	-1.36	17.00	18.36
5230	-15.39	1.46	10.16	0.00	2.4	0.00	-3.77	11.00	14.77	-1.37	17.00	18.37
5310	-14.44	1.50	10.16	0.00	2.4	0.00	-2.78	11.00	13.78	-0.38	17.00	17.38
5510	-13.88	1.58	10.18	0.00	2.4	0.00	-2.12	11.00	13.12	0.28	17.00	16.72
5550	-13.82	1.58	10.18	0.00	2.4	0.00	-2.06	11.00	13.06	0.34	17.00	16.66
5670	-14.06	1.59	10.17	0.00	2.4	0.00	-2.30	11.00	13.30	0.11	17.00	16.90
5755	-19.04	1.60	10.17	0.00	2.4	0.27	-7.00	30.00	37.00	-4.60	36.00	40.60
5795	-18.58	1.60	10.16	0.00	2.4	0.27	-6.55	30.00	36.55	-4.15	36.00	40.15

Sample Calculation:

PSD: Power Spectral Density

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

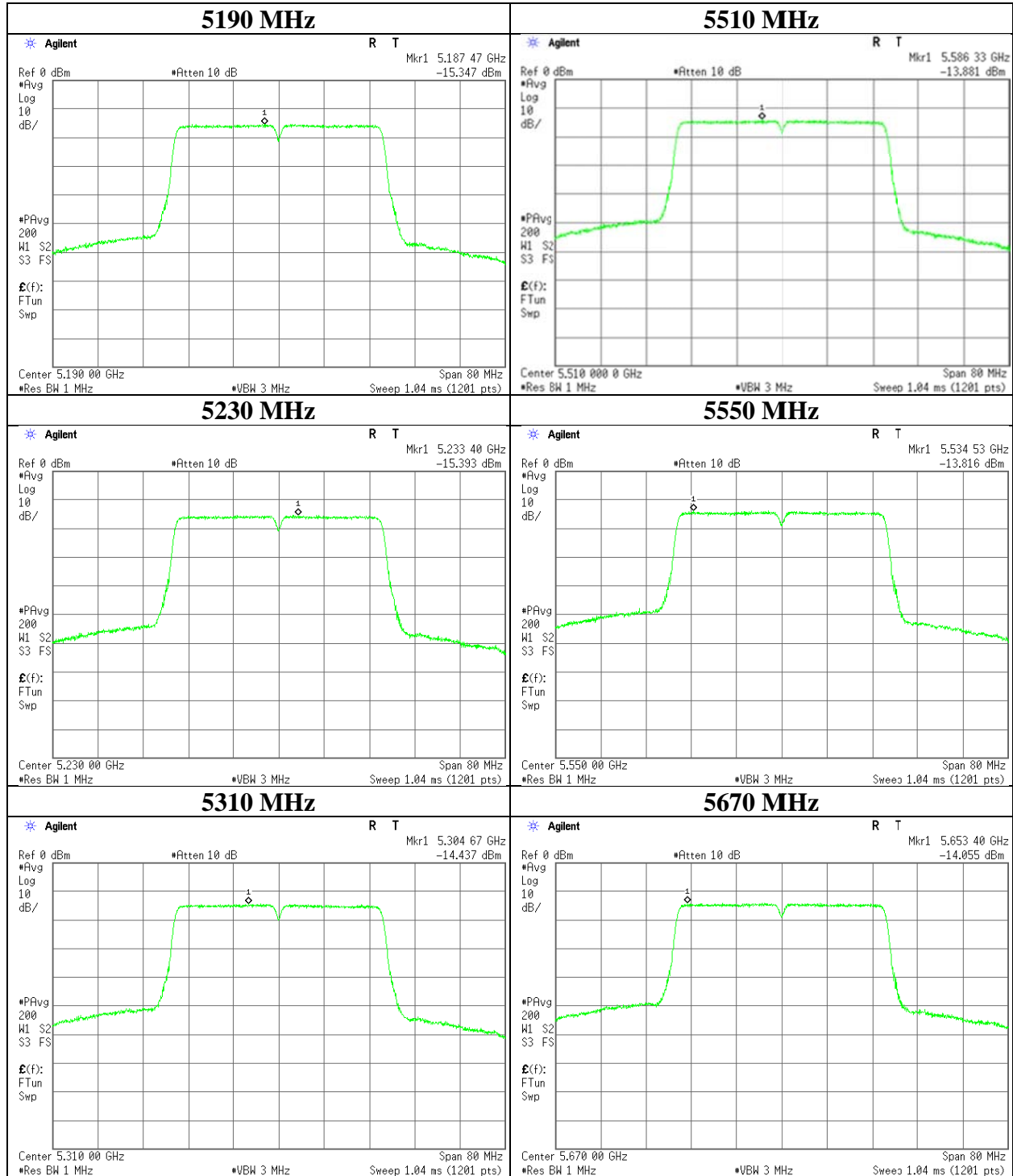
RBW Correction Factor = $10 * \log(\text{Specified bandwidth} / \text{Measured bandwidth})$

PSD Result (Conducted) = Reading + Cable Loss + Atten. Loss + Duty Factor + RBW Correction Factor

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

Maximum Power Spectral Density

11n-40



UL Japan, Inc.

Ise EMC Lab.

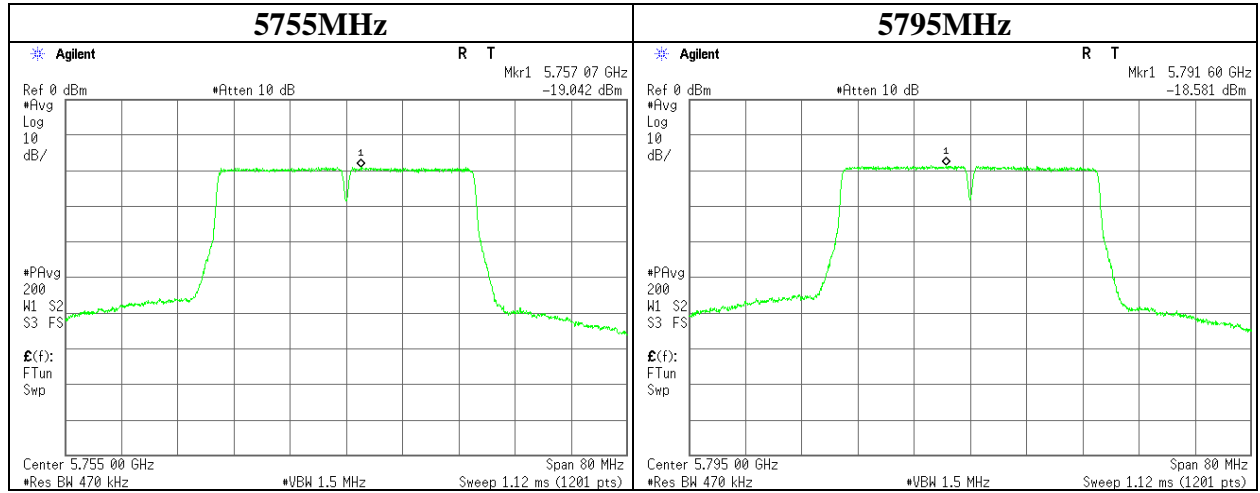
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Facsimile : +81 596 24 8124

Maximum Power Spectral Density

11n-40



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Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

Radiated Spurious Emission

Test place : Ise EMC Lab. No.4 Semi Anechoic Chamber
Report No. : 11201778H
Date : April 14, 2016 April 20, 2016 April 26, 2016
Temperature / Humidity : 23deg. C / 60 % RH 23deg. C / 39 % RH 24 deg. C / 51 % RH
Engineer : Kazuya Yoshioka Kazuya Yoshioka Takafumi Noguchi
 (1 GHz - 10 GHz) (10 GHz - 18 GHz) (18 GHz - 40 GHz)
Mode : Tx 11n-20 5180 MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	5150.000	PK	41.5	33.3	7.6	31.3	51.1	68.2	17.1	
Hori	6906.604	PK	49.1	36.4	8.4	32.4	61.5	68.2	6.7	
Hori	10360.000	PK	56.6	39.2	-1.8	32.9	61.1	68.2	7.1	
Hori	15540.000	PK	41.0	40.0	0.0	32.7	48.3	73.9	25.6	Floor noise
Hori	5150.000	AV	30.7	33.3	7.6	31.3	40.3	53.9	13.6	
Hori	15540.000	AV	33.3	40.0	0.0	32.7	40.6	53.9	13.3	Floor noise
Vert	5150.000	PK	38.4	33.3	7.6	31.3	48.0	68.2	20.2	
Vert	6906.649	PK	49.2	36.4	8.4	32.4	61.6	68.2	6.6	
Vert	10360.000	PK	56.1	39.2	-1.8	32.9	60.6	68.2	7.6	
Vert	15540.000	PK	40.6	40.0	0.0	32.7	47.9	73.9	26.0	Floor noise
Vert	5150.000	AV	31.8	33.3	7.6	31.3	41.4	53.9	12.5	
Vert	15540.000	AV	33.3	40.0	0.0	32.7	40.6	53.9	13.3	Floor noise

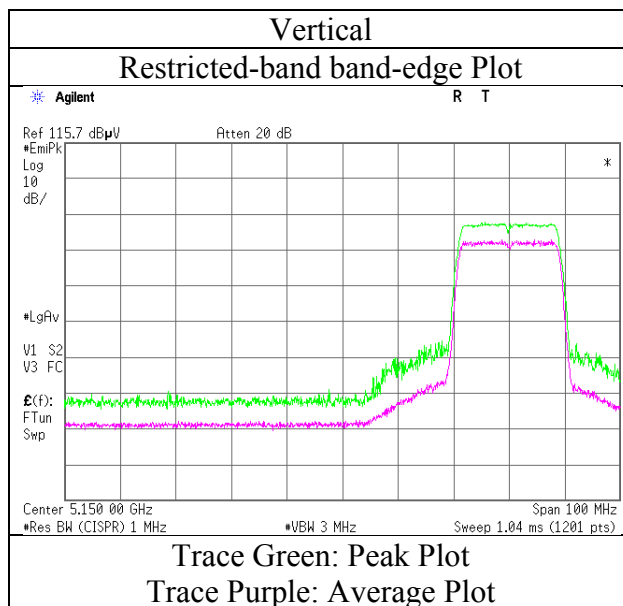
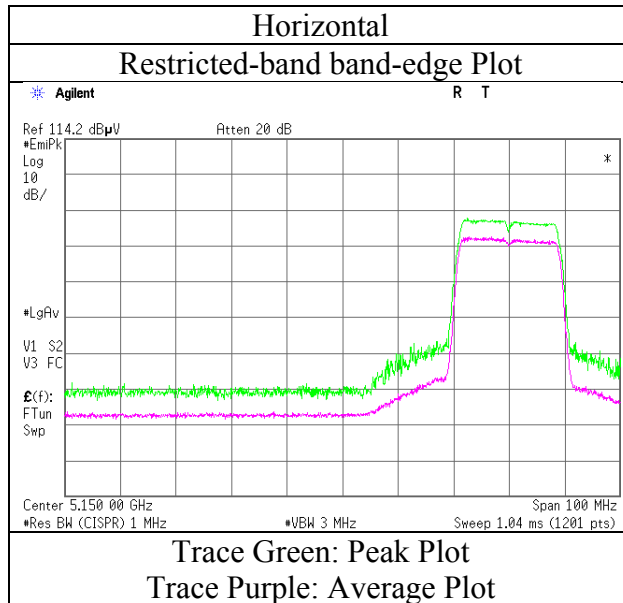
Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)

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

Distance factor: 1 GHz - 10 GHz $20\log(4.5\text{m} / 3.0\text{m}) = 3.53\text{ dB}$
 10 GHz - 26.5 GHz $20\log(1.0\text{m} / 3.0\text{m}) = -9.5\text{ dB}$
 26.5 GHz - 40 GHz $20\log(0.5\text{m} / 3.0\text{m}) = -15.6\text{ dB}$

Radiated Spurious Emission

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber
Report No.	11201778H
Date	April 14, 2016
Temperature / Humidity	23deg. C / 60 % RH
Engineer	Kazuya Yoshioka
Mode	Tx 11n-20 5180 MHz



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

Radiated Spurious Emission

Test place : Ise EMC Lab. No.4 Semi Anechoic Chamber
Report No. : 11201778H
Date : April 14, 2016 April 20, 2016 April 26, 2016
Temperature / Humidity : 23deg. C / 60 % RH 23deg. C / 39 % RH 24 deg. C / 51 % RH
Engineer : Kazuya Yoshioka Kazuya Yoshioka Takafumi Noguchi
 (1 GHz - 10 GHz) (10 GHz - 18 GHz) (18 GHz - 40 GHz)
Mode : Tx 11n-20 5240 MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	6986.636	PK	45.8	36.7	8.4	32.5	58.4	68.2	9.8	
Hori	10480.000	PK	55.6	39.5	-1.8	32.9	60.4	68.2	7.8	
Hori	15720.000	PK	40.8	39.5	0.0	32.7	47.6	73.9	26.3	Floor noise
Hori	15720.000	AV	33.3	39.5	0.0	32.7	40.1	53.9	13.8	Floor noise
Vert	6986.624	PK	46.4	36.7	8.4	32.5	59.0	68.2	9.2	
Vert	10480.000	PK	55.2	39.5	-1.8	32.9	60.0	68.2	8.2	
Vert	15720.000	PK	41.0	39.5	0.0	32.7	47.8	73.9	26.1	Floor noise
Vert	15720.000	AV	33.3	39.5	0.0	32.7	40.1	53.9	13.8	Floor noise

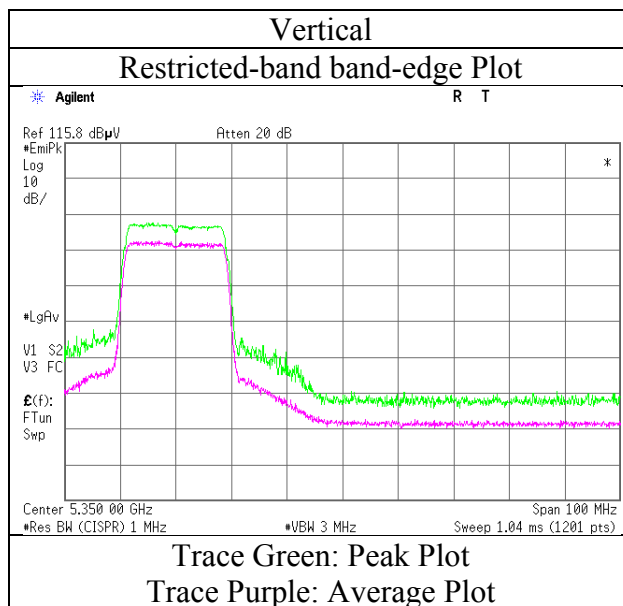
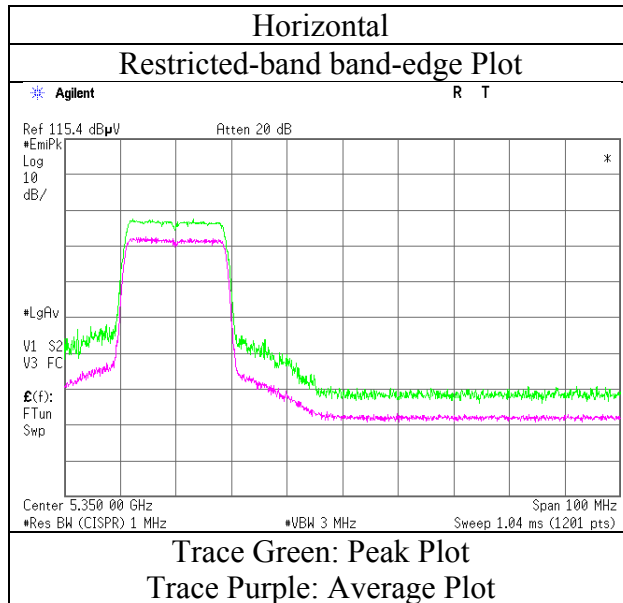
Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)

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

Distance factor: 1 GHz - 10 GHz 20log (4.5m / 3.0 m) = 3.53 dB
 10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB
 26.5 GHz - 40 GHz 20log (0.5 m / 3.0 m) = -15.6 dB

Radiated Spurious Emission

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber
Report No.	11201778H
Date	April 14, 2016
Temperature / Humidity	23deg. C / 60 % RH
Engineer	Kazuya Yoshioka
Mode	Tx 11n-20 5320 MHz



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

Radiated Spurious Emission

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber		
Report No.	11201778H		
Date	April 14, 2016	April 20, 2016	April 26, 2016
Temperature / Humidity	23deg. C / 60 % RH	23deg. C / 39 % RH	24 deg. C / 51 % RH
Engineer	Kazuya Yoshioka (1 GHz - 10 GHz)	Kazuya Yoshioka (10 GHz - 18 GHz)	Takafumi Noguchi (18 GHz - 40 GHz)
Mode	Tx 11n-20 5500 MHz		

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	5460.000	PK	39.2	33.0	7.7	31.4	48.5	73.9	25.4	
Hori	5470.000	PK	43.6	33.0	7.7	31.4	52.9	68.2	15.3	
Hori	7333.328	PK	44.2	36.8	8.5	32.6	56.9	73.9	17.0	
Hori	11000.000	PK	55.5	40.1	-1.6	33.0	61.0	73.9	12.9	
Hori	16500.000	PK	43.6	40.3	0.0	32.6	51.3	73.9	22.6	
Hori	5460.000	AV	32.6	33.0	7.7	31.4	41.9	53.9	12.0	
Hori	7333.328	AV	37.7	36.8	8.5	32.6	50.4	53.9	3.5	
Hori	11000.000	AV	46.6	40.1	-1.6	33.0	52.1	53.9	1.8	
Hori	16500.000	AV	36.2	40.3	0.0	32.6	43.9	53.9	10.0	
Vert	5460.000	PK	40.5	33.0	7.7	31.4	49.8	73.9	24.1	
Vert	5470.000	PK	43.9	33.0	7.7	31.4	53.2	68.2	15.0	
Vert	7333.295	PK	42.3	36.8	8.5	32.6	55.0	73.9	18.9	
Vert	11000.000	PK	56.1	40.1	-1.6	33.0	61.6	73.9	12.3	
Vert	16500.000	PK	46.1	40.3	0.0	32.6	53.8	73.9	20.1	
Vert	5460.000	AV	31.6	33.0	7.7	31.4	40.9	53.9	13.0	
Vert	7333.295	AV	37.7	36.8	8.5	32.6	50.4	53.9	3.5	
Vert	11000.000	AV	47.7	40.1	-1.6	33.0	53.2	53.9	0.7	
Vert	16500.000	AV	37.6	40.3	0.0	32.6	45.3	53.9	8.6	

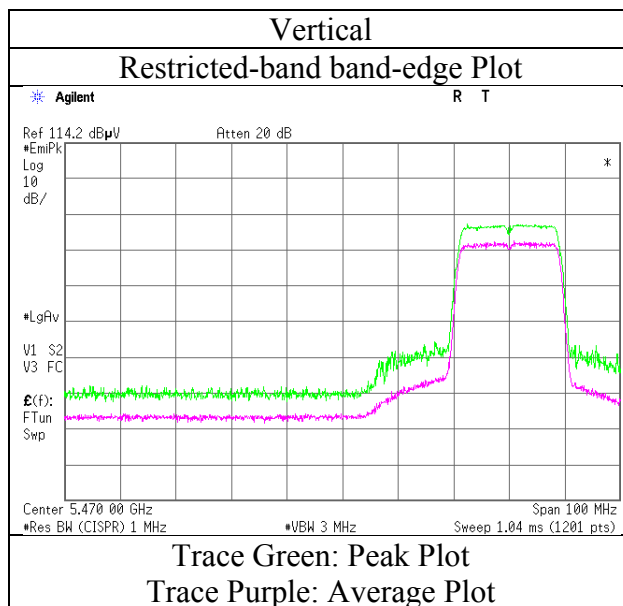
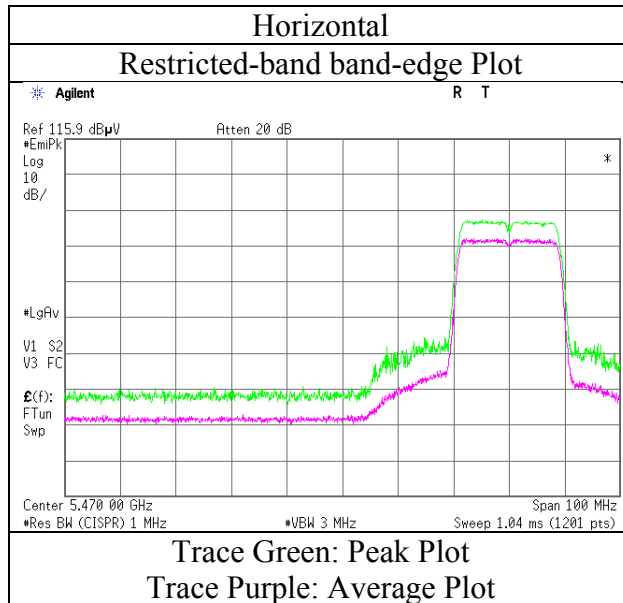
Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)

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

Distance factor:
1 GHz - 10 GHz $20\log(4.5\text{ m} / 3.0\text{ m}) = 3.53\text{ dB}$
10 GHz - 26.5 GHz $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$
26.5 GHz - 40 GHz $20\log(0.5\text{ m} / 3.0\text{ m}) = -15.6\text{ dB}$

Radiated Spurious Emission

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber
Report No.	11201778H
Date	April 14, 2016
Temperature / Humidity	23deg. C / 60 % RH
Engineer	Kazuya Yoshioka
Mode	Tx 11n-20 5500 MHz



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

Radiated Spurious Emission

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber		
Report No.	11201778H		
Date	April 14, 2016	April 20, 2016	April 26, 2016
Temperature / Humidity	23deg. C / 60 % RH	23deg. C / 39 % RH	24 deg. C / 51 % RH
Engineer	Kazuya Yoshioka (1 GHz - 10 GHz)	Kazuya Yoshioka (10 GHz - 18 GHz)	Takafumi Noguchi (18 GHz - 40 GHz)
Mode	Tx 11n-20 5580 MHz		

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	7439.930	PK	42.4	36.8	8.5	32.7	55.0	73.9	18.9	
Hori	11160.000	PK	53.4	40.1	-1.6	33.1	58.8	73.9	15.1	
Hori	16740.000	PK	44.6	41.0	0.0	32.6	53.0	73.9	20.9	
Hori	7439.930	AV	38.1	36.8	8.5	32.7	50.7	53.9	3.2	
Hori	11160.000	AV	44.4	40.1	-1.6	33.1	49.8	53.9	4.1	
Hori	16740.000	AV	36.1	41.0	0.0	32.6	44.5	53.9	9.4	
Vert	7439.932	PK	43.0	36.8	8.5	32.7	55.6	73.9	18.3	
Vert	11160.000	PK	53.9	40.1	-1.6	33.1	59.3	73.9	14.6	
Vert	16740.000	PK	43.9	41.0	0.0	32.6	52.3	73.9	21.6	
Vert	7439.932	AV	38.0	36.8	8.5	32.7	50.6	53.9	3.3	
Vert	11160.000	AV	45.7	40.1	-1.6	33.1	51.1	53.9	2.8	
Vert	16740.000	AV	36.5	41.0	0.0	32.6	44.9	53.9	9.0	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)

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

Distance factor: 1 GHz - 10 GHz $20\log(4.5\text{m} / 3.0\text{m}) = 3.53\text{ dB}$
 10 GHz - 26.5 GHz $20\log(1.0\text{m} / 3.0\text{m}) = -9.5\text{ dB}$
 26.5 GHz - 40 GHz $20\log(0.5\text{m} / 3.0\text{m}) = -15.6\text{ dB}$

Radiated Spurious Emission

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber		
Report No.	11201778H		
Date	April 14, 2016	April 20, 2016	April 26, 2016
Temperature / Humidity	23deg. C / 60 % RH	23deg. C / 39 % RH	24 deg. C / 51 % RH
Engineer	Kazuya Yoshioka (1 GHz - 10 GHz)	Kazuya Yoshioka (10 GHz - 18 GHz)	Takafumi Noguchi (18 GHz - 40 GHz)
Mode	Tx 11n-20 5700 MHz		

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	5725.000	PK	47.1	33.1	7.8	31.4	56.6	73.9	17.3	
Hori	7599.958	PK	44.1	37.0	8.6	32.7	57.0	73.9	16.9	
Hori	11400.000	PK	51.0	40.2	-1.6	33.1	56.5	73.9	17.4	
Hori	17100.000	PK	42.6	42.0	0.0	32.6	52.0	73.9	21.9	
Hori	5725.000	AV	35.8	33.1	7.8	31.4	45.3	53.9	8.6	
Hori	7599.958	AV	36.1	37.0	8.6	32.7	49.0	53.9	4.9	
Hori	11400.000	AV	43.1	40.2	-1.6	33.1	48.6	53.9	5.3	
Hori	17100.000	AV	35.7	42.0	0.0	32.6	45.1	53.9	8.8	
Vert	5725.000	PK	52.5	33.1	7.8	31.4	62.0	73.9	11.9	
Vert	7599.967	PK	43.2	37.0	8.6	32.7	56.1	73.9	17.8	
Vert	11400.000	PK	52.4	40.2	-1.6	33.1	57.9	73.9	16.0	
Vert	17100.000	PK	44.7	42.0	0.0	32.6	54.1	73.9	19.8	
Vert	5725.000	AV	35.6	33.1	7.8	31.4	45.1	53.9	8.8	
Vert	7599.967	AV	36.8	37.0	8.6	32.7	49.7	53.9	4.2	
Vert	11400.000	AV	44.5	40.2	-1.6	33.1	50.0	53.9	3.9	
Vert	17100.000	AV	36.6	42.0	0.0	32.6	46.0	53.9	7.9	

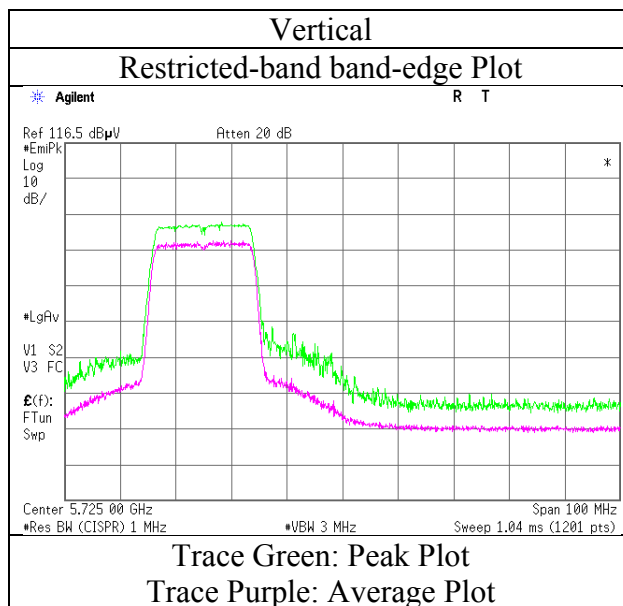
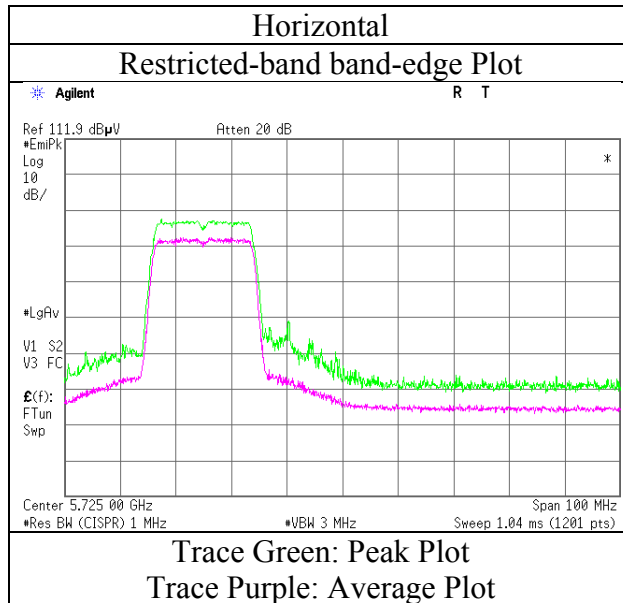
Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)

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

Distance factor: 1 GHz - 10 GHz $20\log(4.5\text{m} / 3.0\text{m}) = 3.53\text{ dB}$
 10 GHz - 26.5 GHz $20\log(1.0\text{m} / 3.0\text{m}) = -9.5\text{ dB}$
 26.5 GHz - 40 GHz $20\log(0.5\text{m} / 3.0\text{m}) = -15.6\text{ dB}$

Radiated Spurious Emission

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber
Report No.	11201778H
Date	April 14, 2016
Temperature / Humidity	23deg. C / 60 % RH
Engineer	Kazuya Yoshioka
Mode	Tx 11n-20 5700 MHz



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

Radiated Spurious Emission

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber		
Report No.	11201778H		
Date	April 14, 2016	April 20, 2016	April 26, 2016
Temperature / Humidity	23deg. C / 60 % RH	23deg. C / 39 % RH	24 deg. C / 51 % RH
Engineer	Kazuya Yoshioka (1 GHz - 10 GHz)	Kazuya Yoshioka (10 GHz - 18 GHz)	Takafumi Noguchi (18 GHz - 40 GHz)
Mode	Tx 11n-20 5745 MHz		

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	5650.000	PK	40.0	33.1	7.8	31.4	49.5	68.2	18.7	
Hori	5700.000	PK	39.2	33.1	7.8	31.4	48.7	105.2	56.5	
Hori	5720.000	PK	44.9	33.1	7.8	31.4	54.4	110.8	56.4	
Hori	5725.000	PK	50.5	33.1	7.8	31.4	60.0	122.2	62.2	
Hori	7659.803	PK	44.3	37.2	8.6	32.7	57.4	73.9	16.5	
Hori	11490.000	PK	49.8	40.2	-1.7	33.1	55.2	73.9	18.7	
Hori	17235.000	PK	42.2	42.2	0.1	32.6	51.9	73.9	22.0	
Hori	7659.803	AV	36.5	37.2	8.6	32.7	49.6	53.9	4.3	
Hori	11490.000	AV	42.1	40.2	-1.7	33.1	47.5	53.9	6.4	
Hori	17235.000	AV	35.5	42.2	0.1	32.6	45.2	53.9	8.7	
Vert	5650.000	PK	40.1	33.1	7.8	31.4	49.6	68.2	18.6	
Vert	5700.000	PK	40.4	33.1	7.8	31.4	49.9	105.2	55.3	
Vert	5720.000	PK	48.7	33.1	7.8	31.4	58.2	110.8	52.6	
Vert	5725.000	PK	52.7	33.1	7.8	31.4	62.2	122.2	60.0	
Vert	7659.868	PK	42.8	37.2	8.6	32.7	55.9	73.9	18.0	
Vert	11490.000	PK	50.9	40.2	-1.7	33.1	56.3	73.9	17.6	
Vert	17235.000	PK	44.3	42.2	0.1	32.6	54.0	73.9	19.9	
Vert	7659.868	AV	36.5	37.2	8.6	32.7	49.6	53.9	4.3	
Vert	11490.000	AV	42.9	40.2	-1.7	33.1	48.3	53.9	5.6	
Vert	17235.000	AV	36.0	42.2	0.1	32.6	45.7	53.9	8.2	

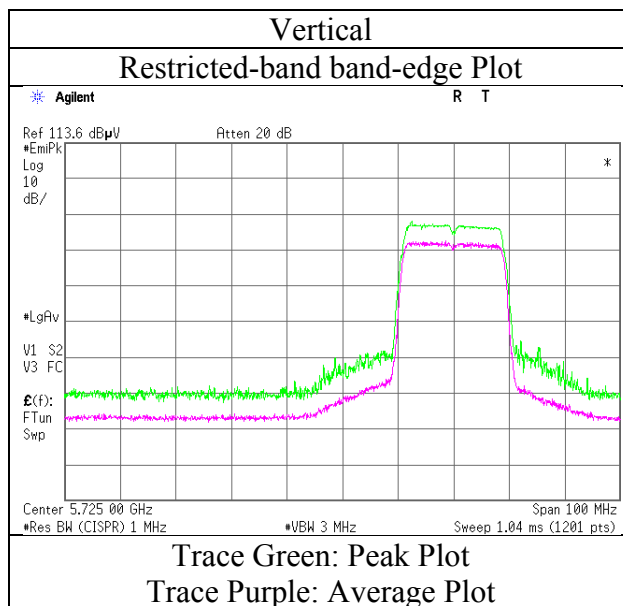
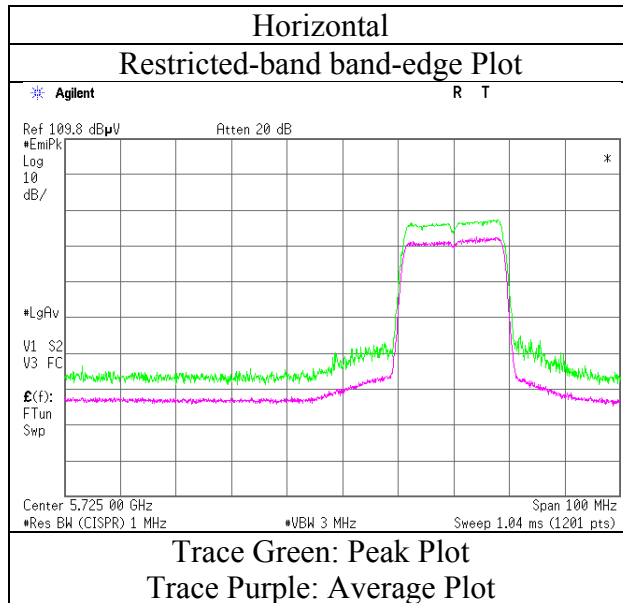
Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)

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

Distance factor: 1 GHz - 10 GHz 20log (4.5m / 3.0 m) = 3.53 dB
 10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB
 26.5 GHz - 40 GHz 20log (0.5 m / 3.0 m) = -15.6 dB

Radiated Spurious Emission

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber
Report No.	11201778H
Date	April 14, 2016
Temperature / Humidity	23deg. C / 60 % RH
Engineer	Kazuya Yoshioka
Mode	Tx 11n-20 5745 MHz



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

Radiated Spurious Emission

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber		
Report No.	11201778H		
Date	April 14, 2016	April 20, 2016	April 26, 2016
Temperature / Humidity	23deg. C / 60 % RH	23deg. C / 39 % RH	24 deg. C / 51 % RH
Engineer	Kazuya Yoshioka (1 GHz - 10 GHz)	Kazuya Yoshioka (10 GHz - 18 GHz)	Takafumi Noguchi (18 GHz - 40 GHz)
Mode	Tx 11n-20 5785 MHz		

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	7713.493	PK	43.4	37.3	8.6	32.8	56.5	73.9	17.4	
Hori	11570.000	PK	49.2	40.1	-1.7	33.1	54.5	73.9	19.4	
Hori	17355.000	PK	40.9	42.4	0.0	32.6	50.7	73.9	23.2	Floor noise
Hori	7713.493	AV	37.3	37.3	8.6	32.8	50.4	53.9	3.5	
Hori	11570.000	AV	40.8	40.1	-1.7	33.1	46.1	53.9	7.8	
Hori	17355.000	AV	33.4	42.4	0.0	32.6	43.2	53.9	10.7	Floor noise
Vert	7713.096	PK	43.2	37.3	8.6	32.8	56.3	73.9	17.6	
Vert	11570.000	PK	50.5	40.1	-1.7	33.1	55.8	73.9	18.1	
Vert	17355.000	PK	41.0	42.4	0.0	32.6	50.8	73.9	23.1	Floor noise
Vert	7713.096	AV	36.6	37.3	8.6	32.8	49.7	53.9	4.2	
Vert	11570.000	AV	42.6	40.1	-1.7	33.1	47.9	53.9	6.0	
Vert	17355.000	AV	33.4	42.4	0.0	32.6	43.2	53.9	10.7	Floor noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)

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

Distance factor: 1 GHz - 10 GHz $20\log(4.5\text{m} / 3.0\text{m}) = 3.53\text{ dB}$
 10 GHz - 26.5 GHz $20\log(1.0\text{m} / 3.0\text{m}) = -9.5\text{ dB}$
 26.5 GHz - 40 GHz $20\log(0.5\text{m} / 3.0\text{m}) = -15.6\text{ dB}$

Radiated Spurious Emission

Test place Ise EMC Lab. No.4 Semi Anechoic Chamber
Report No. 11201778H
Date April 14, 2016 April 20, 2016 April 26, 2016
Temperature / Humidity 23deg. C / 60 % RH 23deg. C / 39 % RH 24 deg. C / 51 % RH
Engineer Kazuya Yoshioka Kazuya Yoshioka Takafumi Noguchi
(1 GHz - 10 GHz) (10 GHz - 18 GHz) (18 GHz - 40 GHz)
Mode Tx 11n-20 5825 MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	5850.000	PK	42.1	33.2	7.9	31.5	51.7	122.2	70.5	
Hori	5855.000	PK	39.5	33.2	7.9	31.5	49.1	110.8	61.7	
Hori	5875.000	PK	39.0	33.2	7.9	31.5	48.6	105.2	56.6	
Hori	5925.000	PK	39.3	33.2	7.9	31.5	48.9	68.2	19.3	
Hori	7766.600	PK	43.8	37.4	8.6	32.8	57.0	68.2	11.2	
Hori	11650.000	PK	51.0	40.1	-1.6	33.1	56.4	73.9	17.5	
Hori	17475.000	PK	41.3	42.6	0.0	32.6	51.3	73.9	22.6	Floor noise
Hori	11650.000	AV	43.1	40.1	-1.6	33.1	48.5	53.9	5.4	
Hori	17475.000	AV	33.8	42.6	0.0	32.6	43.8	53.9	10.1	Floor noise
Vert	5850.000	PK	43.9	33.2	7.9	31.5	53.5	122.2	68.7	
Vert	5855.000	PK	43.5	33.2	7.9	31.5	53.1	110.8	57.7	
Vert	5875.000	PK	39.8	33.2	7.9	31.5	49.4	105.2	55.8	
Vert	5925.000	PK	40.9	33.2	7.9	31.5	50.5	68.2	17.7	
Vert	7766.942	PK	42.7	37.4	8.6	32.8	55.9	68.2	12.3	
Vert	11650.000	PK	51.5	40.1	-1.6	33.1	56.9	73.9	17.0	
Vert	17475.000	PK	41.5	42.6	0.0	32.6	51.5	73.9	22.4	Floor noise
Vert	11650.000	AV	43.1	40.1	-1.6	33.1	48.5	53.9	5.4	
Vert	17475.000	AV	33.8	42.6	0.0	32.6	43.8	53.9	10.1	Floor noise

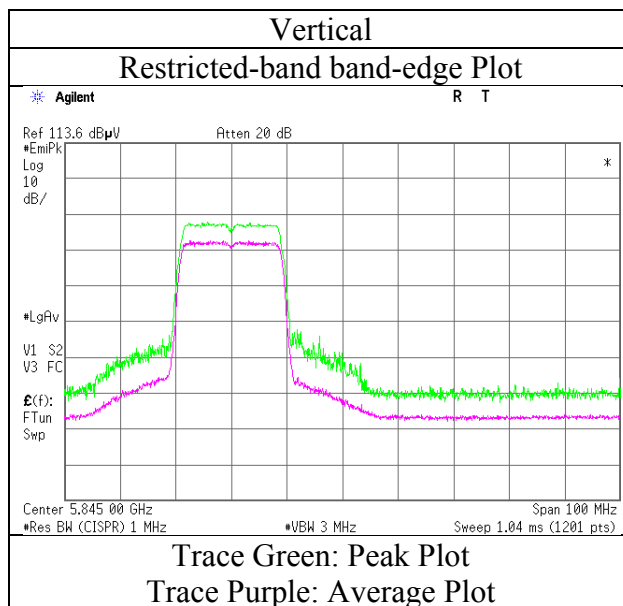
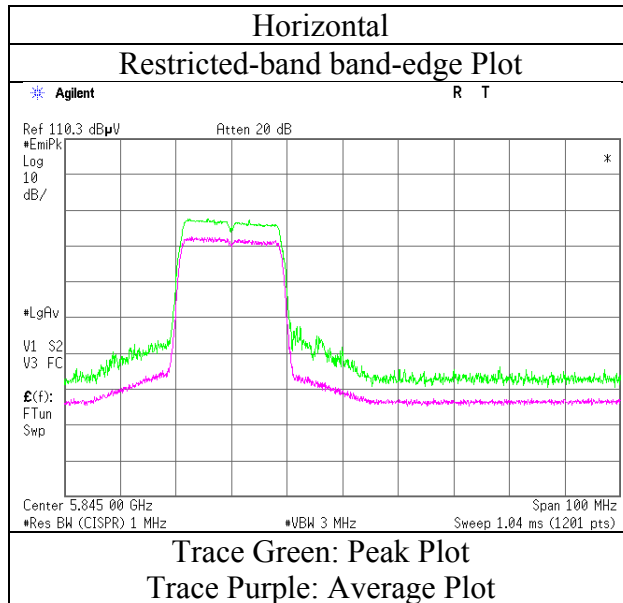
Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)

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

Distance factor: 1 GHz - 10 GHz $20\log(4.5\text{m} / 3.0\text{m}) = 3.53\text{ dB}$
10 GHz - 26.5 GHz $20\log(1.0\text{m} / 3.0\text{m}) = -9.5\text{ dB}$
26.5 GHz - 40 GHz $20\log(0.5\text{m} / 3.0\text{m}) = -15.6\text{ dB}$

Radiated Spurious Emission

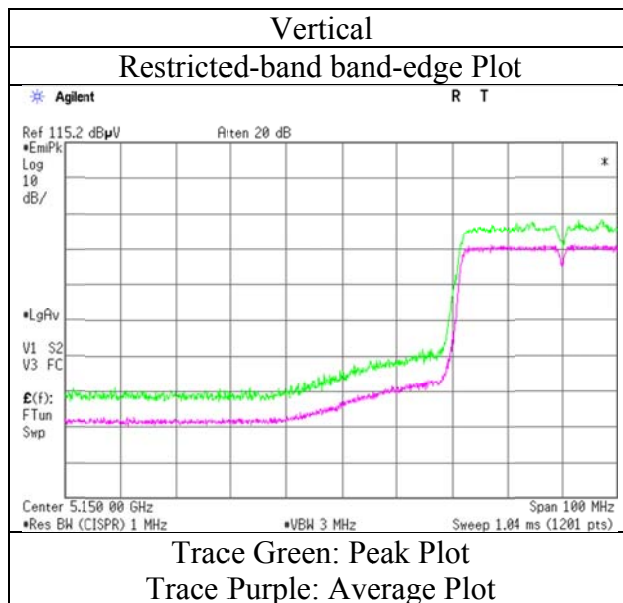
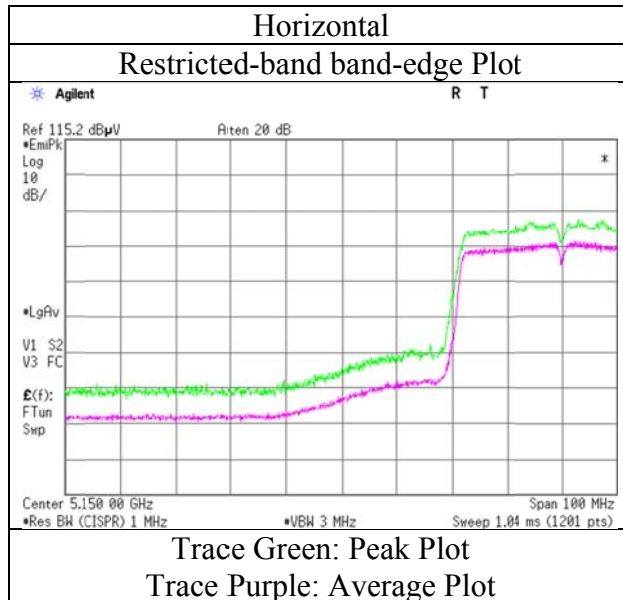
Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber
Report No.	11201778H
Date	April 14, 2016
Temperature / Humidity	23deg. C / 60 % RH
Engineer	Kazuya Yoshioka
Mode	Tx 11n-20 5825 MHz



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

Radiated Spurious Emission

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber
Report No.	11201778H
Date	April 15, 2016
Temperature / Humidity	22deg. C / 41 % RH
Engineer	Shinichi Miyazono
Mode	Tx 11n-40 5190 MHz



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

Radiated Spurious Emission

Test place Ise EMC Lab. No.4 Semi Anechoic Chamber
Report No. 11201778H
Date April 15, 2016 April 20, 2016 April 26, 2016
Temperature / Humidity 22deg. C / 41 % RH 23deg. C / 39 % RH 24 deg. C / 51 % RH
Engineer Shinichi Miyazono Kazuya Yoshioka Takafumi Noguchi
(1 GHz - 10 GHz) (10 GHz - 18 GHz) (18 GHz - 40 GHz)
Mode Tx 11n-40 5230 MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	6973.323	PK	45.7	36.6	11.1	32.5	60.9	68.2	7.3	
Hori	10460.000	PK	51.1	39.5	-1.8	32.9	55.9	68.2	12.3	
Hori	15690.000	PK	40.6	39.6	-0.1	32.7	47.4	73.9	26.5	Floor noise
Hori	15690.000	AV	33.5	39.6	-0.1	32.7	40.3	53.9	13.6	Floor noise
Vert	6973.323	PK	46.1	36.6	11.1	32.5	61.3	68.2	6.9	
Vert	10460.000	PK	50.9	39.5	-1.8	32.9	55.7	68.2	12.5	
Vert	15690.000	PK	40.9	39.6	-0.1	32.7	47.7	73.9	26.2	Floor noise
Vert	15690.000	AV	33.5	39.6	-0.1	32.7	40.3	53.9	13.6	Floor noise

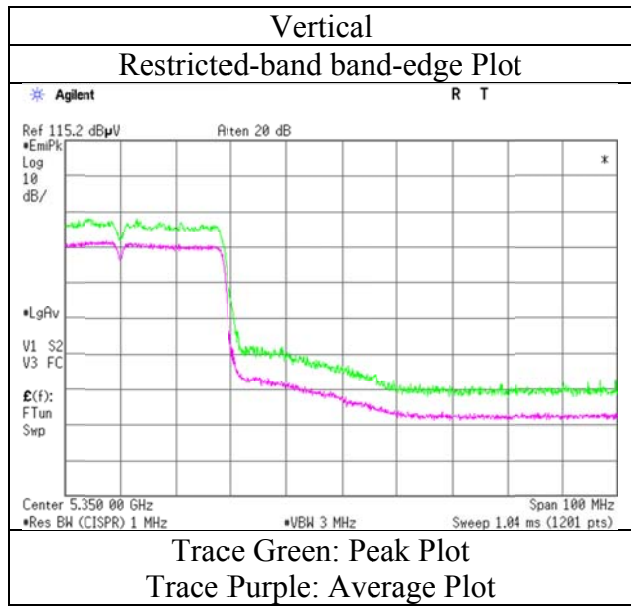
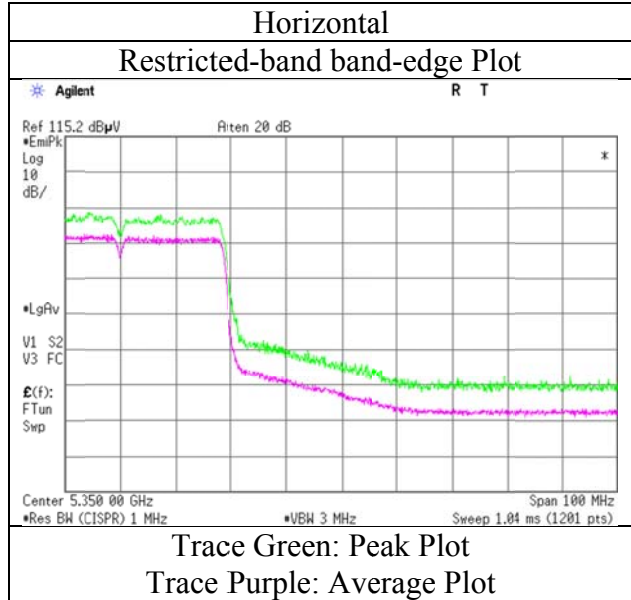
Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)

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

Distance factor: 1 GHz - 10 GHz $20\log(4.5\text{m} / 3.0\text{m}) = 3.53\text{ dB}$
10 GHz - 26.5 GHz $20\log(1.0\text{m} / 3.0\text{m}) = -9.5\text{ dB}$
26.5 GHz - 40 GHz $20\log(0.5\text{m} / 3.0\text{m}) = -15.6\text{ dB}$

Radiated Spurious Emission

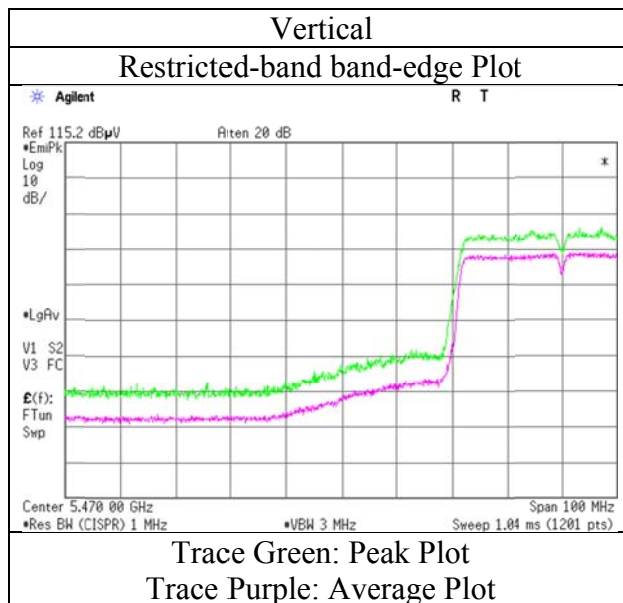
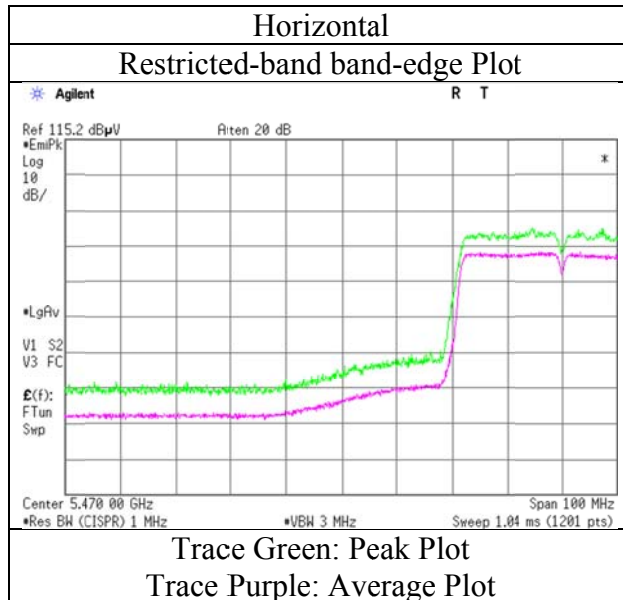
Test place Ise EMC Lab. No.4 Semi Anechoic Chamber
Report No. 11201778H
Date April 15, 2016
Temperature / Humidity 22deg. C / 41 % RH
Engineer Shinichi Miyazono
Mode Tx 11n-40 5310 MHz



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

Radiated Spurious Emission

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber
Report No.	11201778H
Date	April 15, 2016
Temperature / Humidity	22deg. C / 41 % RH
Engineer	Shinichi Miyazono
Mode	Tx 11n-40 5510 MHz



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

Radiated Spurious Emission

Test place Ise EMC Lab. No.4 Semi Anechoic Chamber
Report No. 11201778H
Date April 15, 2016 April 20, 2016 April 23, 2016 April 26, 2016
Temperature / Humidity 22deg. C / 41 % RH 23deg. C / 39 % RH 23deg. C / 49 % RH 24 deg. C / 51 % RH
Engineer Shinichi Miyazono Kazuya Yoshioka Koji Yamamoto Takafumi Noguchi
(1 GHz - 10 GHz) (10 GHz - 18 GHz) (Below 1GHz) (18 GHz - 40 GHz)
Mode Tx 11n-40 5670 MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	168.629	QP	43.8	15.6	8.8	32.0	36.2	43.5	7.3	
Hori	173.380	QP	44.0	15.8	8.9	32.0	36.7	43.5	6.8	
Hori	175.751	QP	42.2	15.9	8.9	32.0	35.0	43.5	8.5	
Hori	256.489	QP	41.8	12.5	9.6	31.9	32.0	46.0	14.0	
Hori	299.198	QP	42.2	13.4	9.9	31.8	33.7	46.0	12.3	
Hori	798.000	QP	33.8	20.7	12.8	31.6	35.7	46.0	10.3	
Hori	5725.000	PK	42.3	33.1	7.8	31.4	51.8	73.9	22.1	
Hori	7560.000	PK	44.9	36.9	8.5	32.7	57.6	73.9	16.3	
Hori	11340.000	PK	46.7	40.1	-1.6	33.1	52.1	73.9	21.8	
Hori	17010.000	PK	42.5	41.8	0.0	32.6	51.7	73.9	22.2	Floor noise
Hori	5725.000	AV	33.0	33.1	7.8	31.4	42.5	53.9	11.4	
Hori	7560.000	AV	37.4	36.9	8.5	32.7	50.1	53.9	3.8	
Hori	11340.000	AV	39.9	40.1	-1.6	33.1	45.3	53.9	8.6	
Hori	17010.000	AV	34.3	41.8	0.0	32.6	43.5	53.9	10.4	Floor noise
Vert	74.300	QP	50.1	6.3	7.8	32.1	32.1	40.0	7.9	
Vert	173.302	QP	41.1	15.8	8.9	32.0	33.8	43.5	9.7	
Vert	175.755	QP	38.2	15.9	8.9	32.0	31.0	43.5	12.5	
Vert	242.249	QP	44.5	12.2	9.5	31.9	34.3	46.0	11.7	
Vert	318.251	QP	39.0	13.9	10.0	31.9	31.0	46.0	15.0	
Vert	798.000	QP	35.6	20.7	12.8	31.6	37.5	46.0	8.5	
Vert	5725.000	PK	42.0	33.1	7.8	31.4	51.5	73.9	22.4	
Vert	7560.000	PK	44.3	36.9	8.5	32.7	57.0	73.9	16.9	
Vert	11340.000	PK	49.1	40.1	-1.6	33.1	54.5	73.9	19.4	
Vert	17010.000	PK	42.8	41.8	0.0	32.6	52.0	73.9	21.9	Floor noise
Vert	5725.000	AV	33.7	33.1	7.8	31.4	43.2	53.9	10.7	
Vert	7560.000	AV	37.0	36.9	8.5	32.7	49.7	53.9	4.2	
Vert	11340.000	AV	41.8	40.1	-1.6	33.1	47.2	53.9	6.7	
Vert	17010.000	AV	34.3	41.8	0.0	32.6	43.5	53.9	10.4	Floor noise

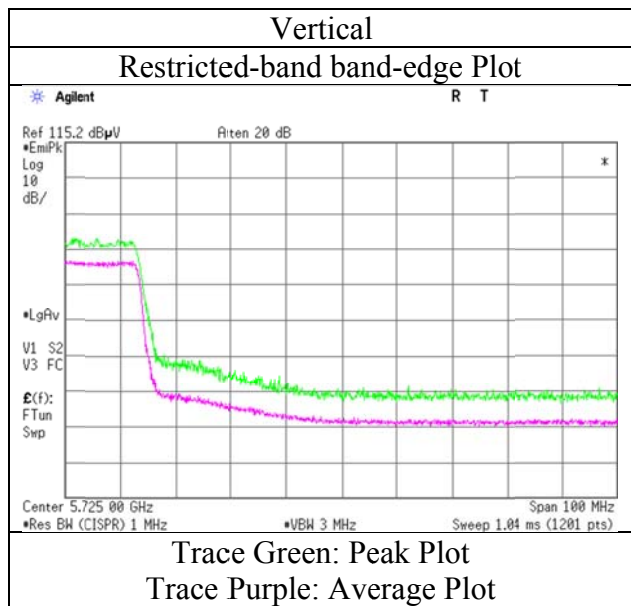
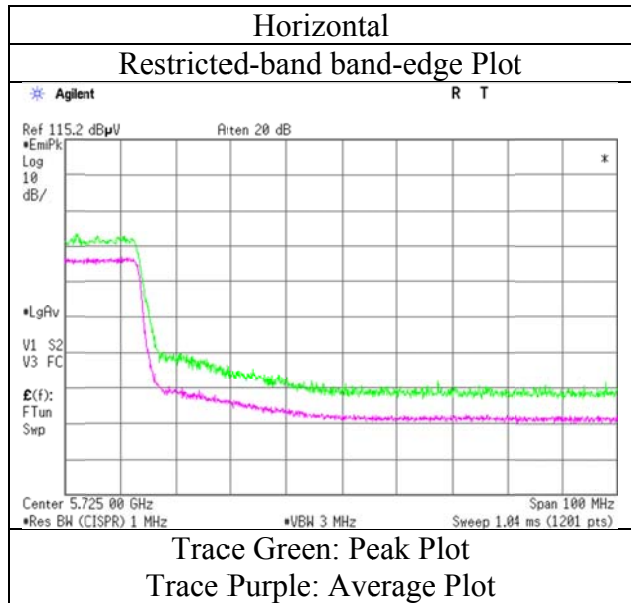
Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)

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

Distance factor: 1 GHz - 10 GHz 20log (4.5m / 3.0 m) = 3.53 dB
10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB
26.5 GHz - 40 GHz 20log (0.5 m / 3.0 m) = -15.6 dB

Radiated Spurious Emission

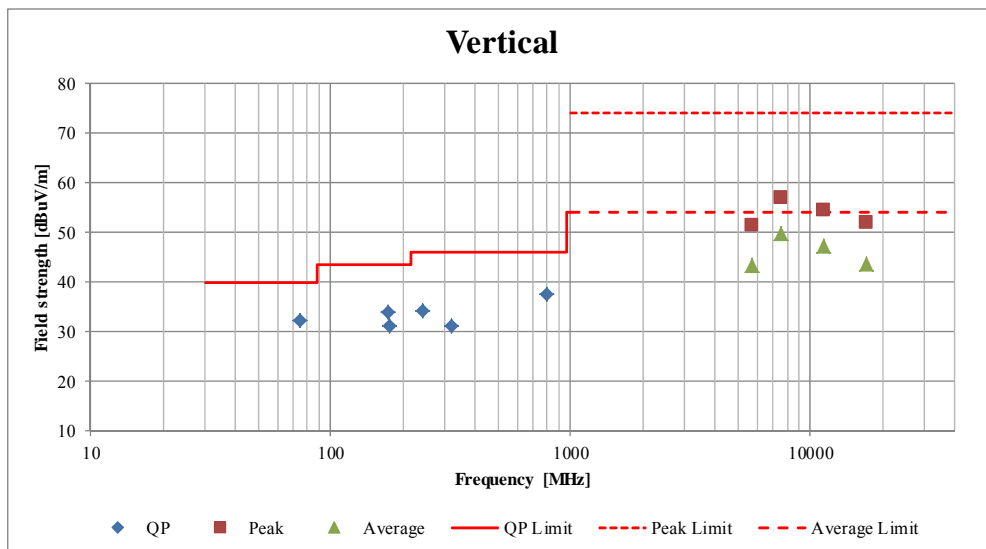
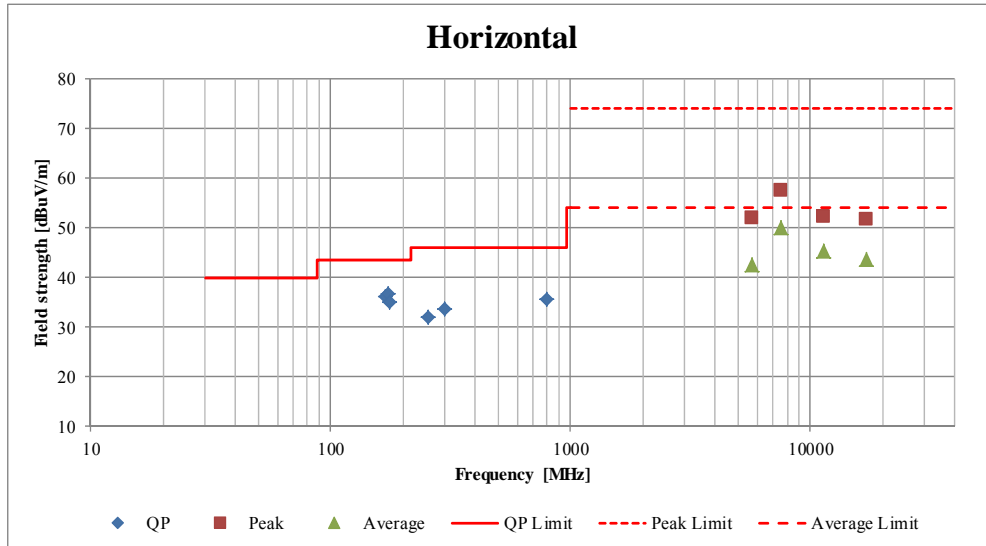
Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber
Report No.	11201778H
Date	April 15, 2016
Temperature / Humidity	22deg. C / 41 % RH
Engineer	Shinichi Miyazono
Mode	Tx 11n-40 5670 MHz



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

Radiated Spurious Emission
(Plot data, Worst case)

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber			
Report No.	11201778H			
Date	April 15, 2016	April 20, 2016	April 23, 2016	April 26, 2016
Temperature / Humidity	22deg. C / 41 % RH	23deg. C / 39 % RH	23deg. C / 49 % RH	24 deg. C / 51 % RH
Engineer	Shinichi Miyazono (1 GHz - 10 GHz)	Kazuya Yoshioka (10 GHz - 18 GHz)	Koji Yamamoto (Below 1GHz)	Takafumi Noguchi (18 GHz -4 0 GHz)
Mode	Tx 11n-40 5670 MHz			



*These plots data contains sufficient number to show the trend of characteristic features for EUT.

Radiated Spurious Emission

Test place Ise EMC Lab. No.4 Semi Anechoic Chamber
Report No. 11201778H
Date April 15, 2016 April 20, 2016 April 26, 2016
Temperature / Humidity 24deg. C / 38 % RH 23deg. C / 39 % RH 24 deg. C / 51 % RH
Engineer Kazuya Yoshioka Kazuya Yoshioka Takafumi Noguchi
(1 GHz - 10 GHz) (10 GHz - 18 GHz) (18 GHz - 40 GHz)
Mode Tx 11n-40 5755 MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	5650.000	PK	39.6	33.1	7.8	31.4	49.1	68.2	19.1	
Hori	5700.000	PK	39.9	33.1	7.8	31.4	49.4	105.2	55.8	
Hori	5720.000	PK	49.8	33.1	7.8	31.4	59.3	110.8	51.5	
Hori	5725.000	PK	51.3	33.1	7.8	31.4	60.8	122.2	61.4	
Hori	7673.575	PK	43.6	37.2	8.6	32.7	56.7	73.9	17.2	
Hori	11510.000	PK	45.6	40.2	-1.7	33.1	51.0	73.9	22.9	
Hori	17265.000	PK	40.9	42.3	0.0	32.6	50.6	73.9	23.3	Floor noise
Hori	7673.575	AV	36.6	37.2	8.6	32.7	49.7	53.9	4.2	
Hori	11510.000	AV	39.5	40.2	-1.7	33.1	44.9	53.9	9.0	
Hori	17265.000	AV	34.3	42.3	0.0	32.6	44.0	53.9	9.9	Floor noise
Vert	5650.000	PK	40.5	33.1	7.8	31.4	50.0	68.2	18.2	
Vert	5700.000	PK	41.5	33.1	7.8	31.4	51.0	105.2	54.2	
Vert	5720.000	PK	50.4	33.1	7.8	31.4	59.9	110.8	50.9	
Vert	5725.000	PK	52.0	33.1	7.8	31.4	61.5	122.2	60.7	
Vert	7673.287	PK	42.8	37.2	8.6	32.7	55.9	73.9	18.0	
Vert	11510.000	PK	45.2	40.2	-1.7	33.1	50.6	73.9	23.3	
Vert	17265.000	PK	41.0	42.3	0.0	32.6	50.7	73.9	23.2	Floor noise
Vert	7673.287	AV	36.8	37.2	8.6	32.7	49.9	53.9	4.0	
Vert	11510.000	AV	39.5	40.2	-1.7	33.1	44.9	53.9	9.0	
Vert	17265.000	AV	34.3	42.3	0.0	32.6	44.0	53.9	9.9	Floor noise

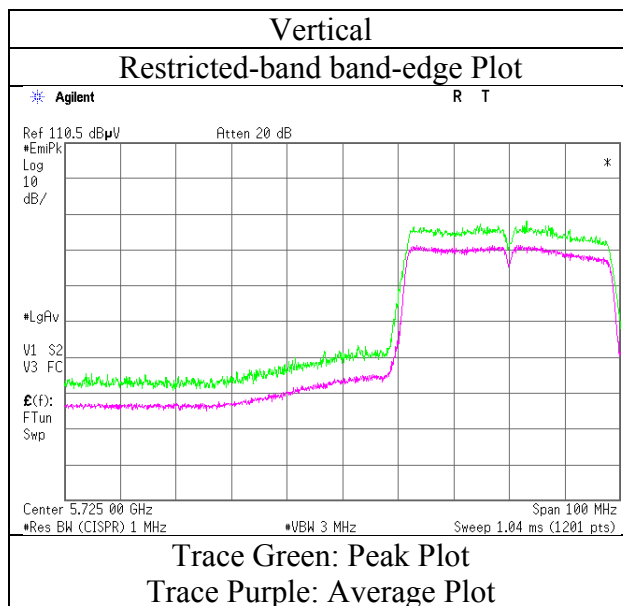
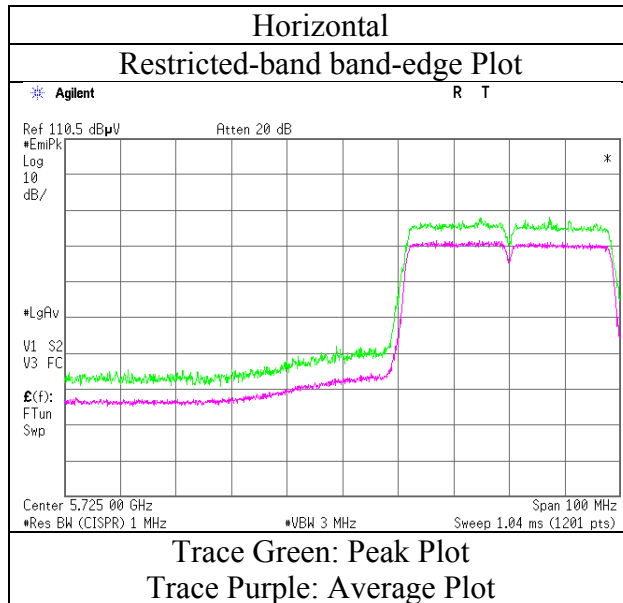
Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)

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

Distance factor: 1 GHz - 10 GHz 20log (4.5m / 3.0 m) = 3.53 dB
10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB
26.5 GHz - 40 GHz 20log (0.5 m / 3.0 m) = -15.6 dB

Radiated Spurious Emission

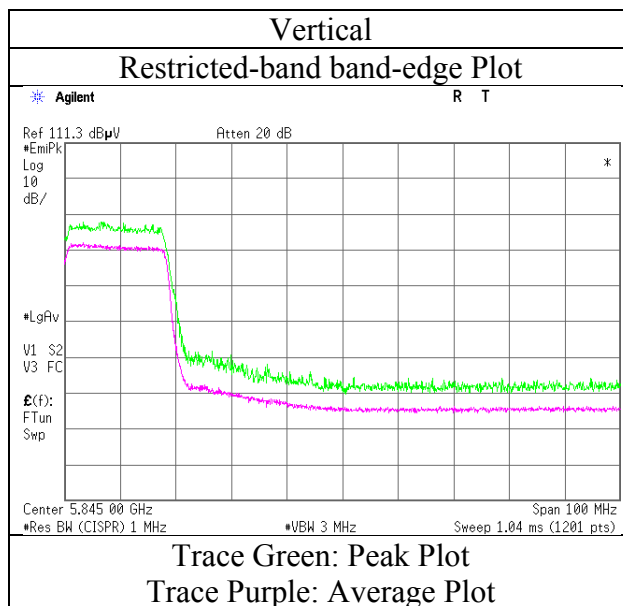
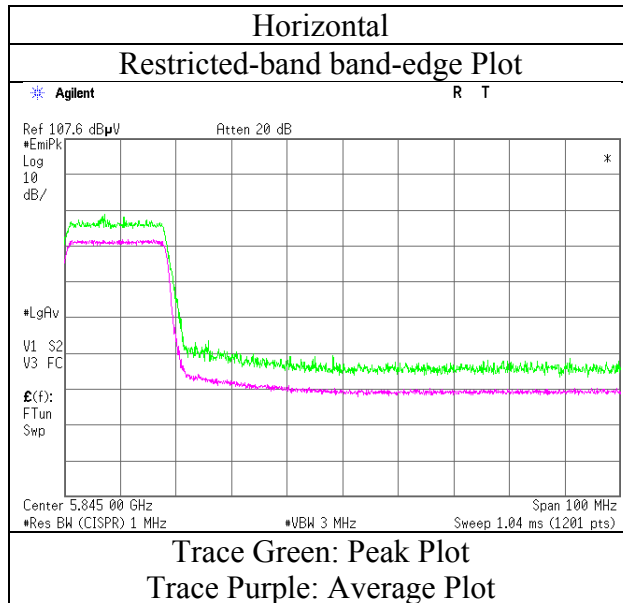
Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber
Report No.	11201778H
Date	April 15, 2016
Temperature / Humidity	24deg. C / 38 % RH
Engineer	Kazuya Yoshioka
Mode	Tx 11n-40 5755 MHz



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

Radiated Spurious Emission

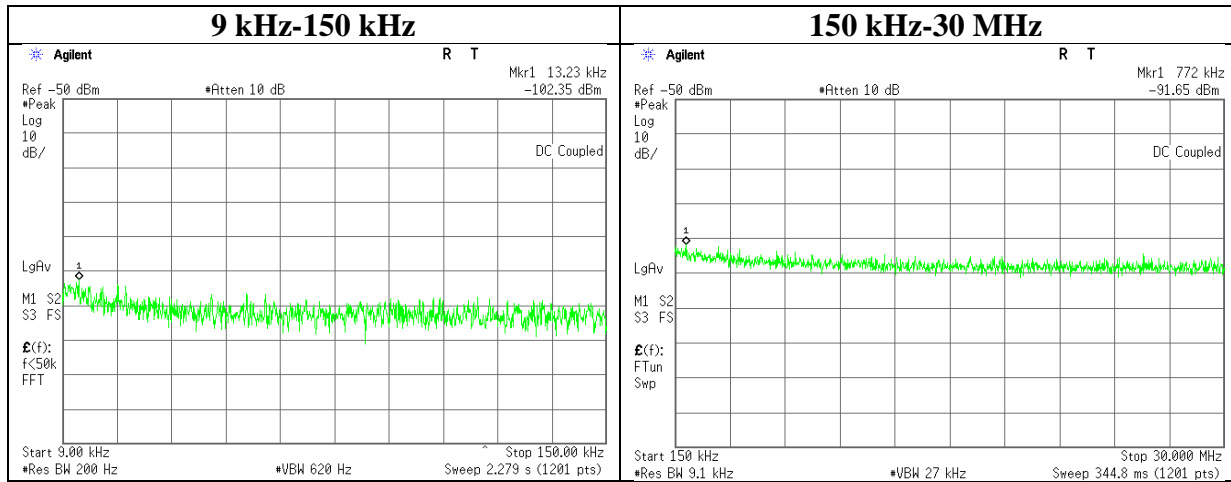
Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber
Report No.	11201778H
Date	April 15, 2016
Temperature / Humidity	24deg. C / 38 % RH
Engineer	Kazuya Yoshioka
Mode	Tx 11n-40 5795 MHz



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

Conducted Spurious Emission

Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	11201778H
Date	April 18, 2016
Temperature / Humidity	23deg. C / 43 % RH
Engineer	Ken Fujita
Mode	Tx 11n-40 5670 MHz



Frequency [kHz]	Reading [dBm]	Cable Loss [dB]	Attenuator [dB]	Antenna Gain [dBi]	N (Number of Output)	EIRP [dBm]	Distance [m]	Ground bounce [dB]	E (field strength) [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
13.23	-102.4	0.01	10.0	2.4	1	-89.9	300	6.0	-28.7	45.1	73.8	
772.00	-91.7	0.01	10.0	2.4	1	-79.2	30	6.0	2.0	29.8	27.8	

$$E = \text{EIRP} - 20 \cdot \log(D) + \text{Ground bounce} + 104.8 \text{ [dBuV/m]}$$

$$\text{EIRP} = \text{Reading} + \text{Cable Loss} + \text{Attenuator} + \text{Antenna Gain} + 10 \cdot \log(N)$$

APPENDIX 2: Test instruments

Test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MOS-14	Thermo-Hygrometer	Custom	CTH-201	1401	AT	2016/01/21 * 12
MPM-16	Power Meter	Agilent	8990B	MY51000271	AT	2016/04/07 * 12
MPSE-23	Power sensor	Agilent	N1923A	MY54070004	AT	2016/04/07 * 12
MCC-144	Microwave Cable	Junkosha	MWX221	1207S407	AT	2015/08/06 * 12
MAT-22	Attenuator(10dB) 1-18GHz	Orient Microwave	BX10-0476-00	-	AT	2016/03/18 * 12
MSA-14	Spectrum Analyzer	Agilent	E4440A	MY48250080	AT	2015/10/07 * 12
MAT-10	Attenuator(10dB)	Weinschel Corp	2	BL1173	AT	2015/11/10 * 12
MAEC-04	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	RE	2015/10/02 * 12
MOS-15	Thermo-Hygrometer	Custom	CTH-180	1501	RE	2016/01/21 * 12
MJM-26	Measure	KOMELON	KMC-36	-	RE	-
COTS-MEMI	EMI measurement program	TSJ	TEPTO-DV	-	RE,CE	-
MSA-04	Spectrum Analyzer	Agilent	E4448A	US44300523	RE	2015/11/06 * 12
MHA-21	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	9120D-557	RE	2015/08/10 * 12
MCC-141	Microwave Cable	Junkosha	MWX221	1305S002R(1m) / 1405S146(5m)	RE	2015/06/22 * 12
MPA-12	MicroWave System Amplifier	Agilent	83017A	00650	RE	2015/10/01 * 12
MMM-10	DIGITAL HiTESTER	Hioki	3805	051201148	RE	2016/01/18 * 12
MAEC-01	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 10m	DA-06881	CE	2015/09/19 * 12
MOS-27	Thermo-Hygrometer	CUSTOM	CTH-201	A08Q26	CE	2016/01/21 * 12
MJM-25	Measure	KOMELON	KMC-36	-	CE	-
MTR-09	EMI Test Receiver	Rohde & Schwarz	ESU26	100412	CE	2015/06/08 * 12
MLS-25	LISN(AMN)	Schwarzbeck	NSLK8127	8127-731	CE	2015/07/17 * 12
MCC-03	Coaxial Cable	Fujikura/Suhner/TSJ	5D-2W(20m)/3D-2W(7.5m)/RG400u(1.5m)/RFM-E421(Switcher)	-/01068(Switcher)	CE	2015/09/29 * 12
MAT-64	Attenuator(13dB)	JFW Industries, Inc.	50FP-013H2 N	-	CE	2016/01/14 * 12
MMM-03	Digital Tester	Fluke	FLUKE 26-3	78030621	CE	2015/08/19 * 12
MCC-178	Microwave Cable	Junkosha	MMX221-00500D MSDMS	1502S305	RE	2016/03/10 * 12
MHF-23	High Pass Filter 7-20GHz	TOKIMEC	TF37NCCC	603	RE	2016/01/19 * 12
MSA-03	Spectrum Analyzer	Agilent	E4448A	MY44020357	RE	2015/05/18 * 12
MTR-10	EMI Test Receiver	Rohde & Schwarz	ESR26	101408	RE	2016/01/29 * 12
MBA-05	Biconical Antenna	Schwarzbeck	BBA9106	1302	RE	2015/11/02 * 12
MLA-23	Logperiodic Antenna(200-1000MHz)	Schwarzbeck	VUSLP9111B	911B-192	RE	2016/01/30 * 12
MCC-50	Coaxial Cable	UL Japan	-	-	RE	2015/06/19 * 12
MAT-68	Attenuator	Anritsu	MP721B	6200961025	RE	2015/11/12 * 12
MPA-14	Pre Amplifier	SONOMA INSTRUMENT	310	260833	RE	2016/03/18 * 12
MHA-29	Horn Antenna 26.5-40GHz	ETS LINDGREN	3160-10	00152399	RE	2015/09/04 * 12
MCC-54	Microwave Cable	Suhner	SUCOFLEX101	2873(1m) / 2876(5m)	RE	2016/03/18 * 12
MPA-22	Pre Amplifier	MITEQ, Inc	AMF-6F-2600400-3 3-8P / AMF-4F-2600400-3 3-8P	1871355 /1871328	RE	2015/09/03 * 12

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The expiration date of the calibration is the end of the expired month.

All equipment is calibrated with valid calibrations. Each measurement data is traceable to the national or international standards.

As for some calibrations performed after the tested dates, those test equipment have been controlled by means of an unbroken chains of calibrations.

**Test Item: CE: Conducted Emission
 RE: Radiated Emission
 AT: Antenna Terminal Conducted test**