



RADIO TEST REPORT

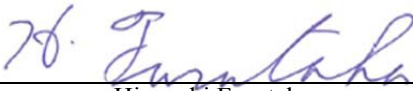
Test Report No. : 11706542H-B-R1

Applicant : Canon Inc.
Type of Equipment : Wireless Module
Model No. : WM600
FCC ID : AZD600
Test regulation : FCC Part 15 Subpart C: 2017
(Bluetooth part)
Test Result : Complied

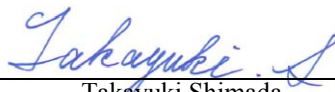
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2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with the above regulation.
4. The test results in this report are traceable to the national or international standards.
5. This test report must not be used by the customer to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.
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. This report is a revised version of 11706542H-B. 11706542H-B is replaced with this report.

Date of test: April 20 to 29, 2017

Representative test engineer:


Hiroyuki Furutaka
Engineer
Consumer Technology Division

Approved by:


Takayuki Shimada
Engineer
Consumer Technology Division



NVLAP LAB CODE: 200572-0

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13-EM-F0429

REVISION HISTORY

Original Test Report No.: 11706542H-B

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SECTION 1: Customer information

Company Name	:	Canon Inc.
Address	:	30-2, Shimomaruko 3-chome, Ohta-ku, Tokyo 146-8501, Japan
Telephone Number	:	+81-3-3757-6798
Facsimile Number	:	+81-3-3757-8431
Contact Person	:	Ryoji Kon

***Remarks:**

Canon Inc. designates Murata Manufacturing Co., Ltd. as manufacturer of the product (Wireless Module).

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

2.1 Identification of E.U.T.

Type of Equipment	:	Wireless Module
Model No.	:	WM600
Serial No.	:	Refer to Section 4, Clause 4.2
Rating	:	VDD : Typ. 3.3 V, Min. 3.0 V, Max. 4.8 V *VIO : Typ. 3.3 V, Min. 1.71 V, Max. 3.63 V *VIO does not influence the RF characteristic.
Receipt Date of Sample	:	April 14, 2017
Country of Mass-production	:	China, Japan
Condition of EUT	:	Production prototype (Not for Sale: This sample is equivalent to mass-produced items.)
Modification of EUT	:	No Modification by the test lab

2.2 Product Description

Model: WM600 (referred to as the EUT in this report) is a Wireless Module.

General Specification

Clock frequency(ies) in the system	:	37.4 MHz
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Radio Specification

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

Equipment Type	Transceiver
Frequency of Operation	2412 MHz - 2462 MHz
Type of Modulation	DSSS, OFDM
Bandwidth & Channel spacing	20 MHz & 5 MHz
Method of frequency generation	Synthesizer
Power Supply (inner)	PA : 3.0 V to 3.3 V LNA : 2.5 V
Antenna Type	Pattern Antenna
Antenna Gain	1.7 dBi

Bluetooth (Ver. 4.1 with EDR function)

Equipment Type	Transceiver
Frequency of Operation	2402 MHz - 2480 MHz
Type of Modulation	BT: FHSS (GFSK, $\pi/4$ DQPSK, 8DPSK) LE: GFSK
Bandwidth & Channel spacing	BT: 1 MHz & 1 MHz LE: 1 MHz & 2 MHz
Method of frequency generation	Synthesizer
Power Supply (inner)	PA : 3.0 V to 3.3 V LNA : 2.5 V
Antenna Type	Pattern Antenna
Antenna Gain	1.7 dBi

*This test report applies for Bluetooth part.

SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification : FCC Part 15 Subpart C
FCC Part 15 final revised on June 14, 2017 and effective July 14, 2017

Title : FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators
Section 15.207 Conducted limits
Section 15.247 Operation within the bands 902-928MHz,
2400-2483.5MHz, and 5725-5850MHz

* The revision on June 14, 2017, does not affect the test specification applied to the EUT.

3.2 Procedures and results

Item	Test Procedure	Specification	Worst Margin	Results	Remarks
Conducted Emission	FCC: ANSI C63.10-2013 6. Standard test methods IC: RSS-Gen 8.8	FCC: Section 15.207 IC: RSS-Gen 8.8	QP 31.6 dB, 0.15000 MHz, L AV 32.4 dB, 0.58377 MHz, L/ 0.58597 MHz, N	Complied	-
Carrier Frequency Separation	FCC: FCC Public Notice DA 00-705 IC: -	FCC: Section15.247(a)(1) IC: RSS-247 5.1 (b)	See data.	Complied	Conducted
20dB Bandwidth	FCC: FCC Public Notice DA 00-705 IC: -	FCC: Section15.247(a)(1) IC: RSS-247 5.1 (a)		Complied	Conducted
Number of Hopping Frequency	FCC: FCC Public Notice DA 00-705 IC: -	FCC: Section15.247(a)(1)(iii) IC: RSS-247 5.1 (d)		Complied	Conducted
Dwell time	FCC: FCC Public Notice DA 00-705 IC: -	FCC: Section15.247(a)(1)(iii) IC: RSS-247 5.1 (d)		Complied	Conducted
Maximum Peak Output Power	FCC: FCC Public Notice DA 00-705 IC: RSS-Gen 6.12	FCC: Section15.247 (b)(1) IC: RSS-247 5.4 (b)		Complied	Conducted
Spurious Emission & Band Edge Compliance	FCC: FCC Public Notice DA 00-705 IC: RSS-Gen 6.13	FCC: Section15.247(d) IC: RSS-247 5.5 RSS-Gen 8.9 RSS-Gen 8.10	14.6 dB 2483.500 MHz, AV, Vertical	Complied	Conducted/ Radiated (above 30 MHz) *1)

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 section 15.247(d).

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

FCC Part 15.31 (e)

The worst case stable voltage was provided to the EUT during the all tests.
And maximum and minimum voltage were provided to the EUT during the output power measurement test.
Therefore, the EUT complies with the requirement.

FCC Part 15.203/212 Antenna requirement

The antenna is not removable from 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 Bandwidth	IC: RSS-Gen 6.6	IC: -	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	1.5 dB	2.8 dB	2.8 dB	2.9 dB	2.6 dB

Frequency range	Conducted emission using AMN(LISN) (+/-)
0.009 MHz - 0.15 MHz	3.5 dB
0.15 MHz - 30 MHz	3.0 dB

Test distance	Radiated emission (+/-) 9 kHz - 30 MHz
3 m	3.8 dB
10 m	3.7 dB

Polarity	Radiated emission (Below 1 GHz)			
	(3 m*) (+/-)		(10 m*) (+/-)	
	30 MHz - 200 MHz	200 MHz - 1000 MHz	30 MHz - 200 MHz	200 MHz - 1000 MHz
Horizontal	5.0 dB	5.3 dB	5.0 dB	5.0 dB
Vertical	4.7 dB	5.9 dB	5.0 dB	5.1 dB

Radiated emission (Above 1 GHz)				
(3 m*) (+/-)		(1 m*) (+/-)		(10 m*) (+/-)
1 GHz - 6 GHz	6 GHz - 18 GHz	10 GHz - 26.5 GHz	26.5 GHz - 40 GHz	1 GHz - 18 GHz
5.2 dB	5.4 dB	5.5 dB	5.5 dB	5.4 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 test report has enough margin, more than the site margin.

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3.5 Test Location

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NVLAP Lab. code: 200572-0 / FCC Test Firm Registration Number: 199967

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 m x 2.0m for No.1, No.2, No.3, and No.4 semi-anechoic chambers and No.3 and No.4 shielded rooms.

3.6 Test data, Test instruments, and Test set up

Refer to APPENDIX.

SECTION 4: Operation of E.U.T. during testing

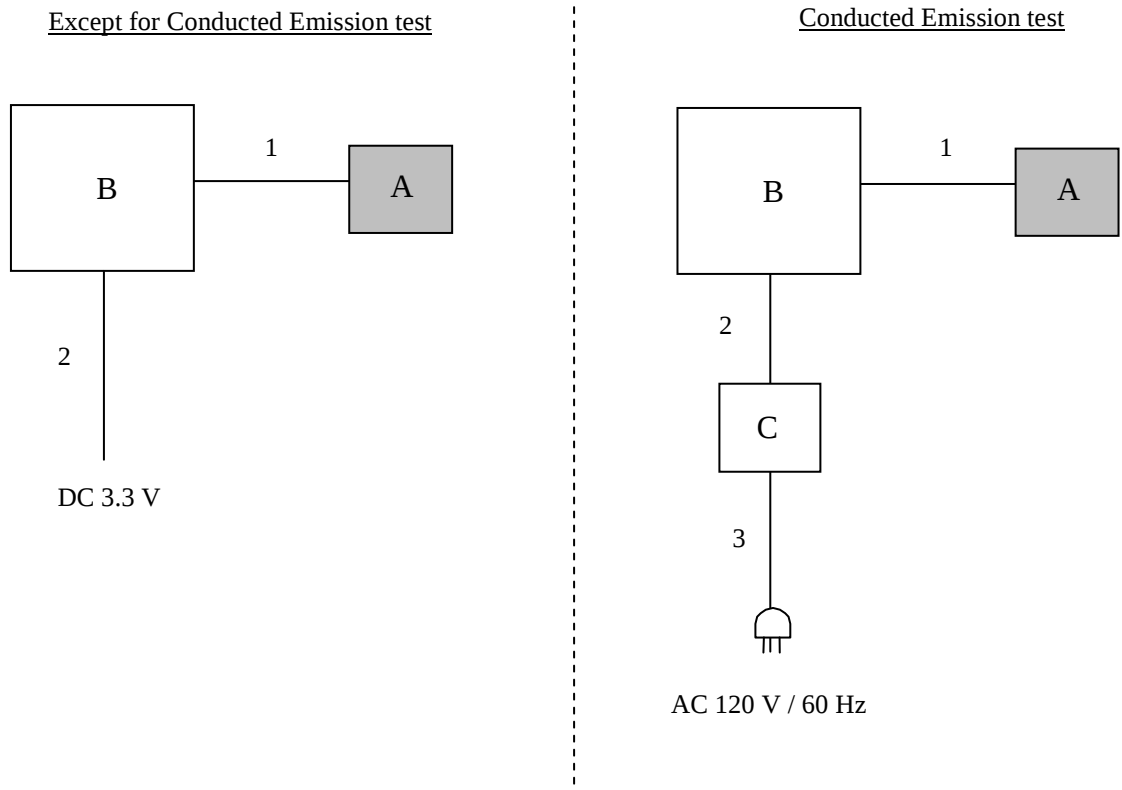
4.1 Operating Mode(s)

Bluetooth (BT): Transmitting (Tx), Payload: PRBS9

Details of Operating Mode(s)

Test Item	Mode	Tested frequency
Conducted Emission, Spurious Emission (Conducted/Radiated)	Tx (Hopping Off) DH5, 3DH5	2402 MHz 2441 MHz 2480 MHz
Carrier Frequency Separation	Tx (Hopping On) DH5, 3DH5	2402 MHz 2441 MHz 2480 MHz
20dB Bandwidth	Tx (Hopping Off) DH5, 3DH5	2402 MHz 2441 MHz 2480 MHz
Number of Hopping Frequency	Tx (Hopping On) DH5, 3DH5	-
Dwell time	Tx (Hopping On), -DH1, DH3, DH5 -3DH1, 3DH3, 3DH5	-
Maximum Peak Output Power	Tx (Hopping Off) DH5, 2DH5, 3DH5	2402 MHz 2441 MHz 2480 MHz
Band Edge Compliance (Conducted)	Tx DH5, 3DH5 -Hopping On -Hopping Off	2402 MHz 2480 MHz
99% Occupied Bandwidth	Tx DH5, 3DH5 -Hopping On -Hopping Off	2402 MHz 2441 MHz 2480 MHz
*As a result of preliminary test, the formal test was performed with the above modes, which had the maximum payload length (except Dwell time test) *2DH mode (2Mb/s EDR: pi/4DQPSK) was excluded for other tests than power measurement by using 3DH mode (3 Mb/s EDR: 8DPSK) as a representative. * It is considered that the non-tested packet type (e.g. inquiry) can be omitted as it is complied with above all test items based on Bluetooth Core specification. *EUT has the power settings by the software as follows; Power settings: 7.5 Software: Blue tool 1.8.9.3 *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.		

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	Wireless Module	WM600	3	Murata Manufacturing Co., Ltd.	EUT
B	Jig Board	-	-	Murata Manufacturing Co., Ltd.	*1)
C	Power Supply	DMC35-2A	13090501	KIKUSUI	-

*1) The input voltage was supplied to the EUT (A) through the jig board, but the voltage was not regulated inside the Jig board.

List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	Flat Cable	0.1	Unshielded	Unshielded	-
2	DC Cable	2.0	Unshielded	Unshielded	-
3	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, 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 80 cm from any other grounded conducting surface. EUT was located 80 cm from a Line Impedance Stabilization Network (LISN) / Artificial mains Network (AMN) and excess AC cable was bundled in center.

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 AV
Measurement range	: 0.15 MHz - 30 MHz
Test data	: APPENDIX
Test result	: Pass

SECTION 6: Radiated Spurious Emission

Test Procedure

[For below 1 GHz]

EUT was placed on a urethane platform of nominal size, 1.0 m by 0.5 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.

[For above 1 GHz]

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.

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

In any 100 kHz bandwidth outside the restricted band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator confirmed 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on a radiated measurement.

20 dBc was applied to the frequency over the limit of FCC 15.209 / Table 4 of RSS-Gen 8.9 (IC) and outside the restricted band of FCC15.205 / Table 6 of RSS-Gen 8.10 (IC).

Frequency	Below 1 GHz	Above 1 GHz		20 dBc
Instrument used	Test Receiver	Spectrum Analyzer		Spectrum Analyzer
Detector	QP	PK	AV	PK
IF Bandwidth	BW 120 kHz	RBW: 1 MHz VBW: 3 MHz	RBW: 1 MHz VBW: 10 Hz *1)	RBW: 100 kHz VBW: 300 kHz
Test Distance	3 m	3.75 m*2) (1 GHz – 10 GHz), 1 m*3) (10 GHz – 26.5 GHz),		3.75 m*2) (1 GHz – 10 GHz), 1 m*3) (10 GHz – 26.5 GHz),

*1) Although DA 00-705 accepts VBW = 10 Hz for AV measurements, it was confirmed that superfluous smoothing was not performed.

*2) Distance Factor: $20 \times \log (3.75 \text{ m}/3.0 \text{ m}) = 1.94 \text{ dB}$

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

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

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

Measurement range	: 30 MHz - 26.5 GHz
Test data	: APPENDIX
Test result	: Pass

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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
20dB Bandwidth	3 MHz	30 kHz	100 kHz	Auto	Peak	Max Hold	Spectrum Analyzer
99% Occupied Bandwidth *1)	Enough width to display emission skirts	1 to 5 % of OBW	Three times of RBW	Auto	Peak	Max Hold	Spectrum Analyzer
Maximum Peak Output Power	-	-	-	Auto	Peak Average *2)	-	Power Meter (Sensor: 50MHz BW)
Carrier Frequency Separation	3 MHz	30 kHz	100 kHz	Auto	Peak	Max Hold	Spectrum Analyzer
Number of Hopping Frequency	30 MHz	300 kHz	1 MHz	Auto	Peak	Max Hold	Spectrum Analyzer
Dwell Time	Zero Span	100 kHz, 1 MHz	300 kHz, 3 MHz	As necessary capture the entire dwell time per hopping channel	Peak	Clear Write	Spectrum Analyzer
Conducted Spurious Emission *3)	9 kHz to 150 kHz	200 Hz	620 Hz	Auto	Peak	Max Hold	Spectrum Analyzer
	150 kHz to 30 MHz	9.1 kHz	27 kHz				
	30 MHz to 25 GHz	100 kHz	300 kHz				
Conducted Spurious Emission Band Edge compliance	10 MHz	100 kHz	300 kHz	Auto	Peak	Max Hold	Spectrum Analyzer

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

*2) Reference data

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

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

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APPENDIX 1: Test data

Conducted Emission

DATA OF CONDUCTED EMISSION TEST

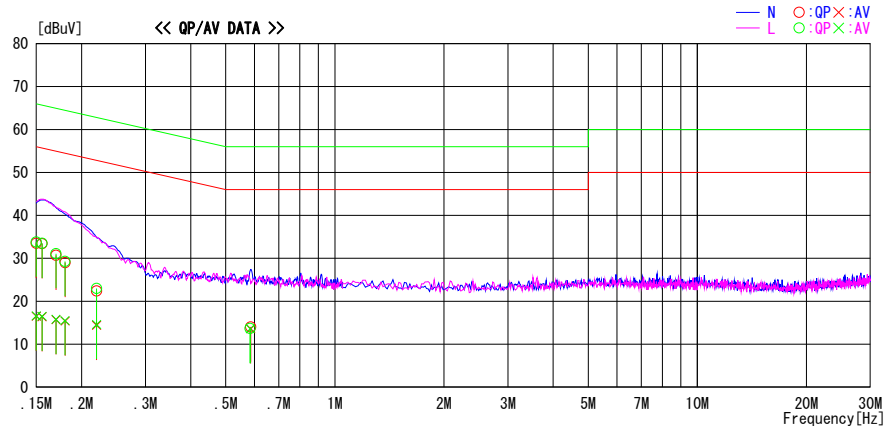
UL Japan, Inc. Ise EMC Lab. No. 4 Semi Anechoic Chamber
Date : 2017/04/29

Report No. : 11706542H

Temp./Humi. : 23deg. C / 40% RH
Engineer : Hiroyuki Furutaka

Mode / Remarks : Tx DH5 2402MHz

LIMIT : FCC15.207 QP
FCC15.207 AV



Frequency	Reading Level		Corr. Factor	Results		Limit		Margin		Phase	Comment
	QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dB]	AV [dB]		
0.15000	20.3	3.1	13.5	33.8	16.6	66.0	56.0	32.2	39.4	L	
0.15000	20.0	3.0	13.5	33.5	16.5	66.0	56.0	32.5	39.5	N	
0.15561	19.9	2.9	13.5	33.4	16.4	65.7	55.7	32.3	39.3	N	
0.15561	20.0	3.0	13.5	33.5	16.5	65.7	55.7	32.2	39.2	L	
0.17000	17.2	2.2	13.5	30.7	15.7	65.0	55.0	34.3	39.3	N	
0.18032	15.5	1.9	13.5	29.0	15.4	64.5	54.5	35.5	39.1	N	
0.17000	17.6	2.3	13.5	31.1	15.8	65.0	55.0	33.9	39.2	L	
0.22001	8.9	0.9	13.5	22.4	14.4	62.8	52.8	40.4	38.4	N	
0.18000	15.8	2.0	13.5	29.3	15.5	64.5	54.5	35.2	39.0	L	
0.22000	9.5	1.1	13.5	23.0	14.6	62.8	52.8	39.8	38.2	L	
0.58377	0.2	0.1	13.5	13.7	13.6	56.0	46.0	42.3	32.4	L	
0.58597	0.5	0.1	13.5	14.0	13.6	56.0	46.0	42.0	32.4	N	

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

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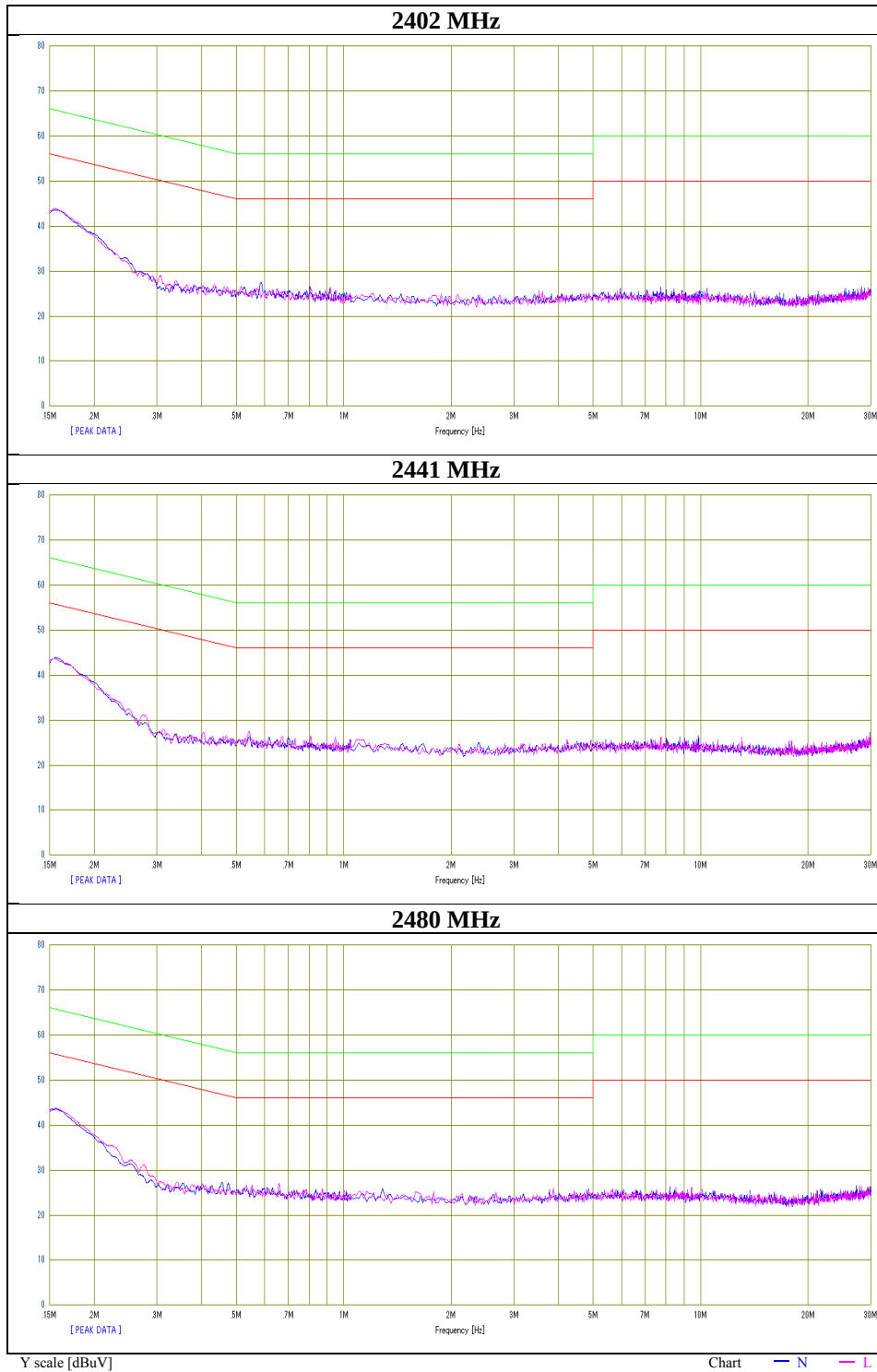
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Conducted Emission

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber
Report No.	11706542H
Date	April 29, 2017
Temperature / Humidity	23 deg. C / 40 % RH
Engineer	Hiroyuki Furutaka
Mode	Tx, Hopping Off, DH5



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Conducted Emission

DATA OF CONDUCTED EMISSION TEST

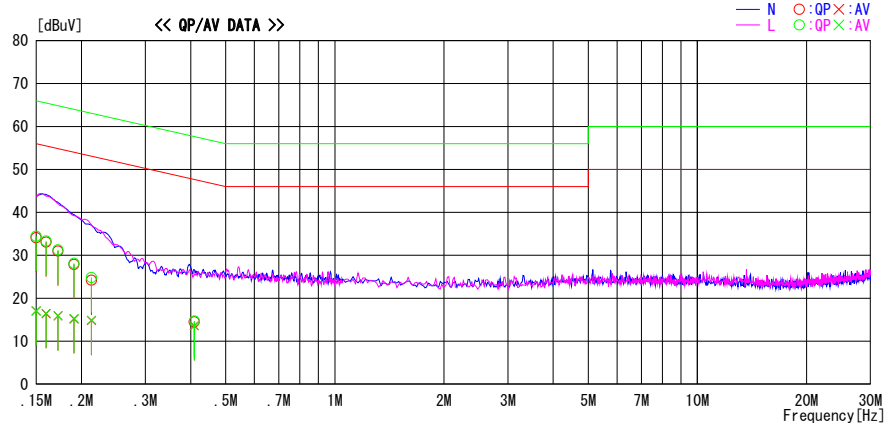
UL Japan, Inc. Ise EMC Lab. No. 4 Semi Anechoic Chamber
Date : 2017/04/29

Report No. : 11706542H

Temp./Humi. : 23deg. C / 40% RH
Engineer : Hiroyuki Furutaka

Mode / Remarks : Tx 3DH5 2402MHz

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	20.6	3.5	13.5	34.1	17.0	66.0	56.0	31.9	39.0	N	
0.15982	19.6	2.9	13.5	33.1	16.4	65.5	55.5	32.4	39.1	N	
0.17245	17.5	2.4	13.5	31.0	15.9	64.8	54.8	33.8	38.9	N	
0.19068	14.4	1.7	13.5	27.9	15.2	64.0	54.0	36.1	38.8	N	
0.21313	10.7	1.3	13.5	24.2	14.8	63.1	53.1	38.9	38.3	N	
0.40952	1.0	0.1	13.5	14.5	13.6	57.7	47.7	43.2	34.1	N	
0.15000	20.9	3.6	13.5	34.4	17.1	66.0	56.0	31.6	38.9	L	
0.15982	19.8	3.0	13.5	33.3	16.5	65.5	55.5	32.2	39.0	L	
0.17245	17.8	2.4	13.5	31.3	15.9	64.8	54.8	33.5	38.9	L	
0.19068	14.6	1.8	13.5	28.1	15.3	64.0	54.0	35.9	38.7	L	
0.21313	11.3	1.4	13.5	24.8	14.9	63.1	53.1	38.3	38.2	L	
0.41022	1.2	0.1	13.5	14.7	13.6	57.6	47.6	42.9	34.0	L	

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

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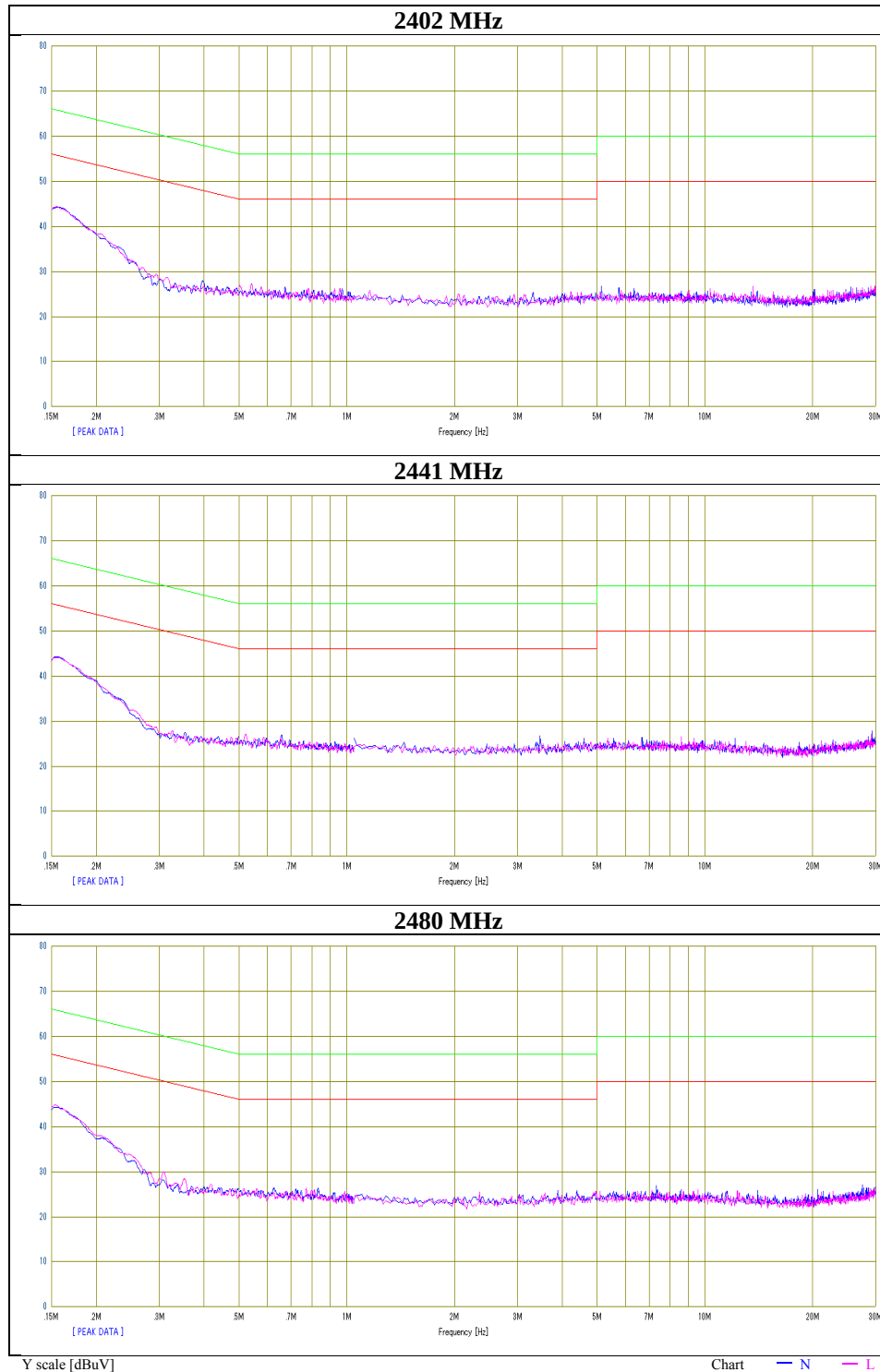
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

Conducted Emission

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber
Report No.	11706542H
Date	April 29, 2017
Temperature / Humidity	23 deg. C / 40 % RH
Engineer	Hiroyuki Furutaka
Mode	Tx, Hopping Off, 3DH5



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20dB Bandwidth and Carrier Frequency Separation

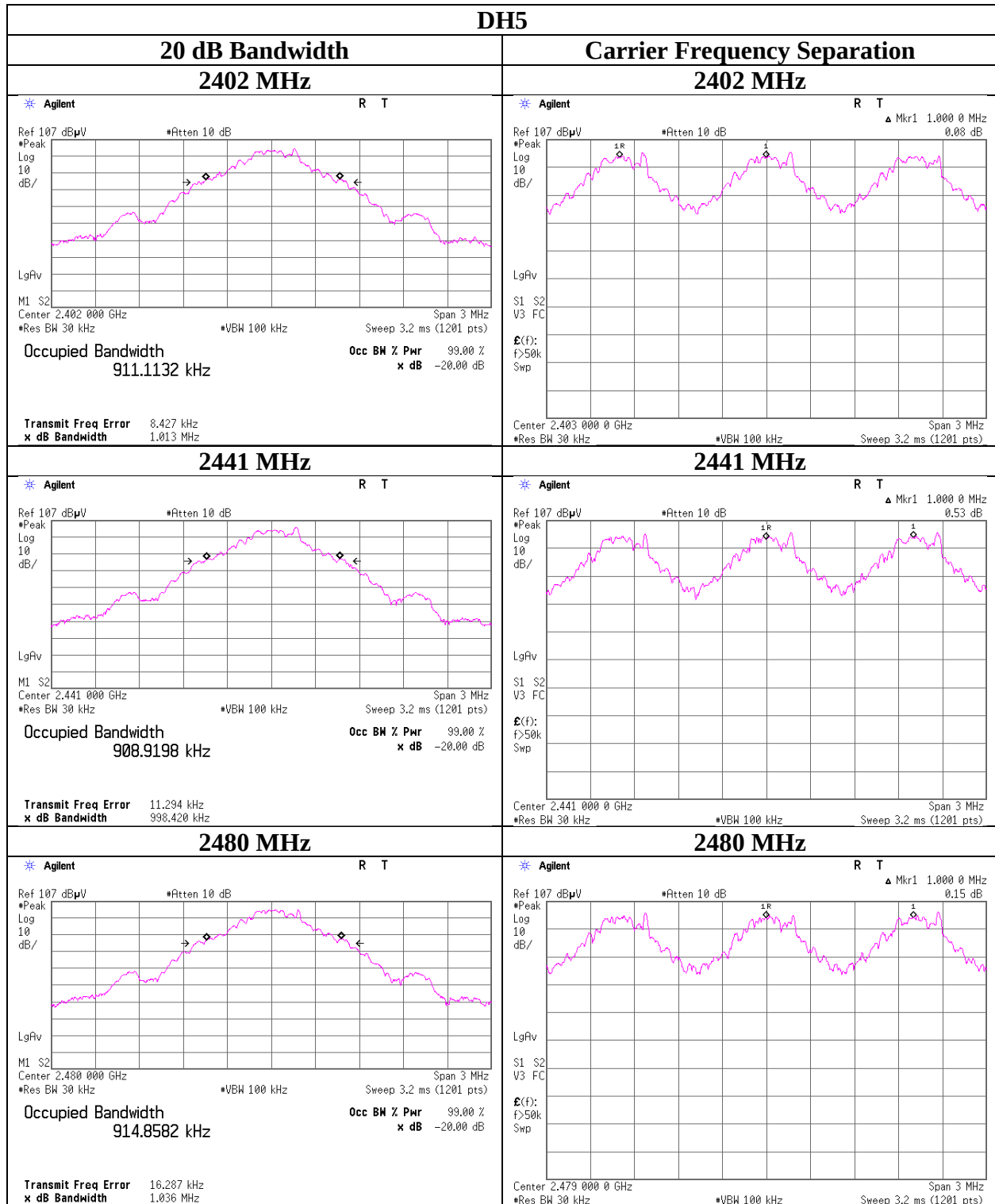
Test place Ise EMC Lab. No.6 Measurement Room
Report No. 11706542H
Date April 27, 2017
Temperature / Humidity 23 deg. C / 38 % RH
Engineer Ken Fujita
Mode Tx, Hopping Off

Mode	Freq. [MHz]	20dB Bandwidth [MHz]	Carrier Frequency Separation [MHz]	Limit for Carrier Frequency separation [MHz]
DH5	2402.0	1.013	1.000	≥ 0.675
DH5	2441.0	0.998	1.000	≥ 0.665
DH5	2480.0	1.036	1.000	≥ 0.691
3DH5	2402.0	1.312	1.000	≥ 0.875
3DH5	2441.0	1.315	1.000	≥ 0.877
3DH5	2480.0	1.316	1.000	≥ 0.877

Limit: Two-thirds of 20dB Bandwidth or 25kHz (whichever is greater).

No limit applies to 20dB Bandwidth.

20dB Bandwidth and Carrier Frequency Separation



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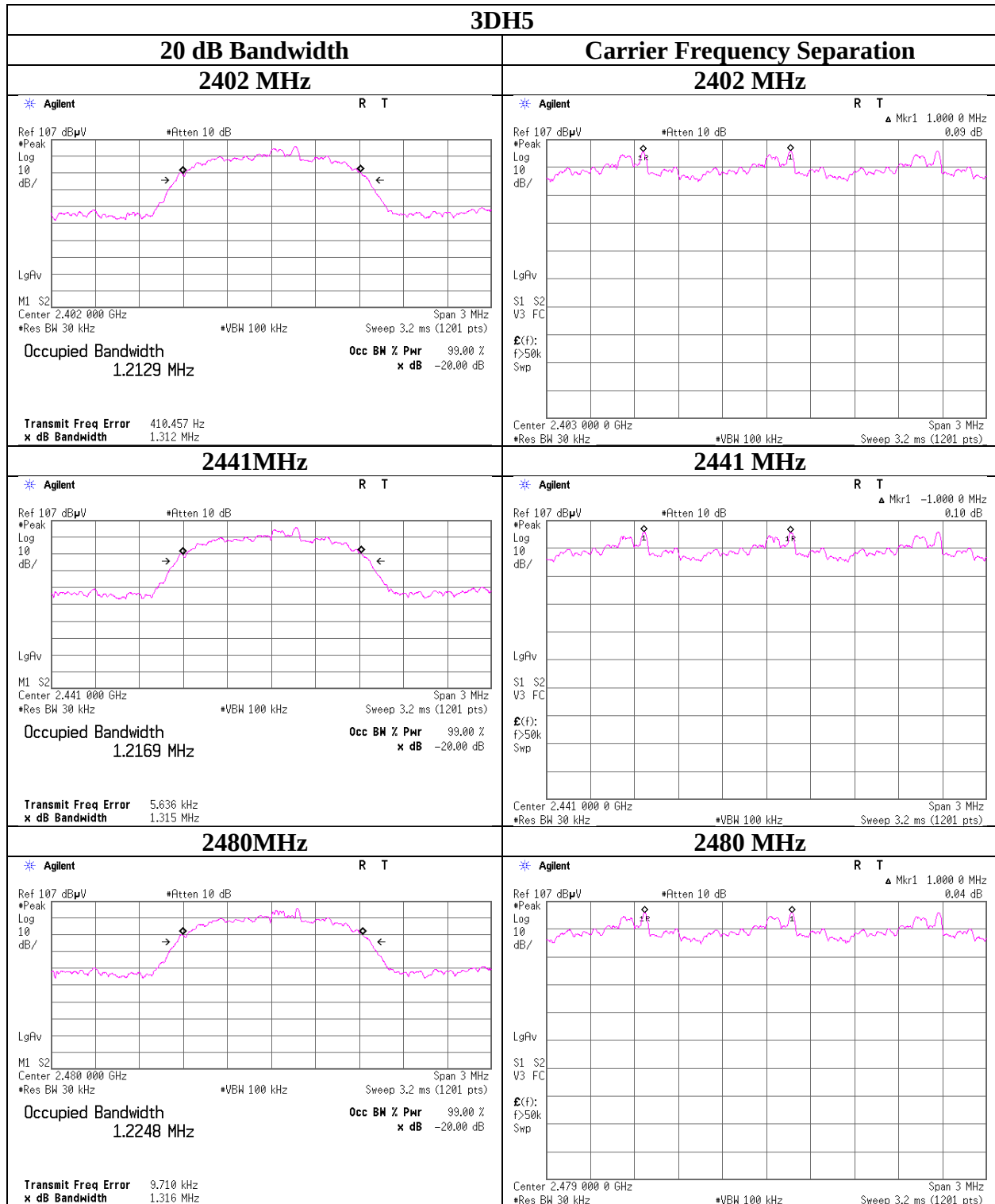
Ise EMC Lab.

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20dB Bandwidth and Carrier Frequency Separation



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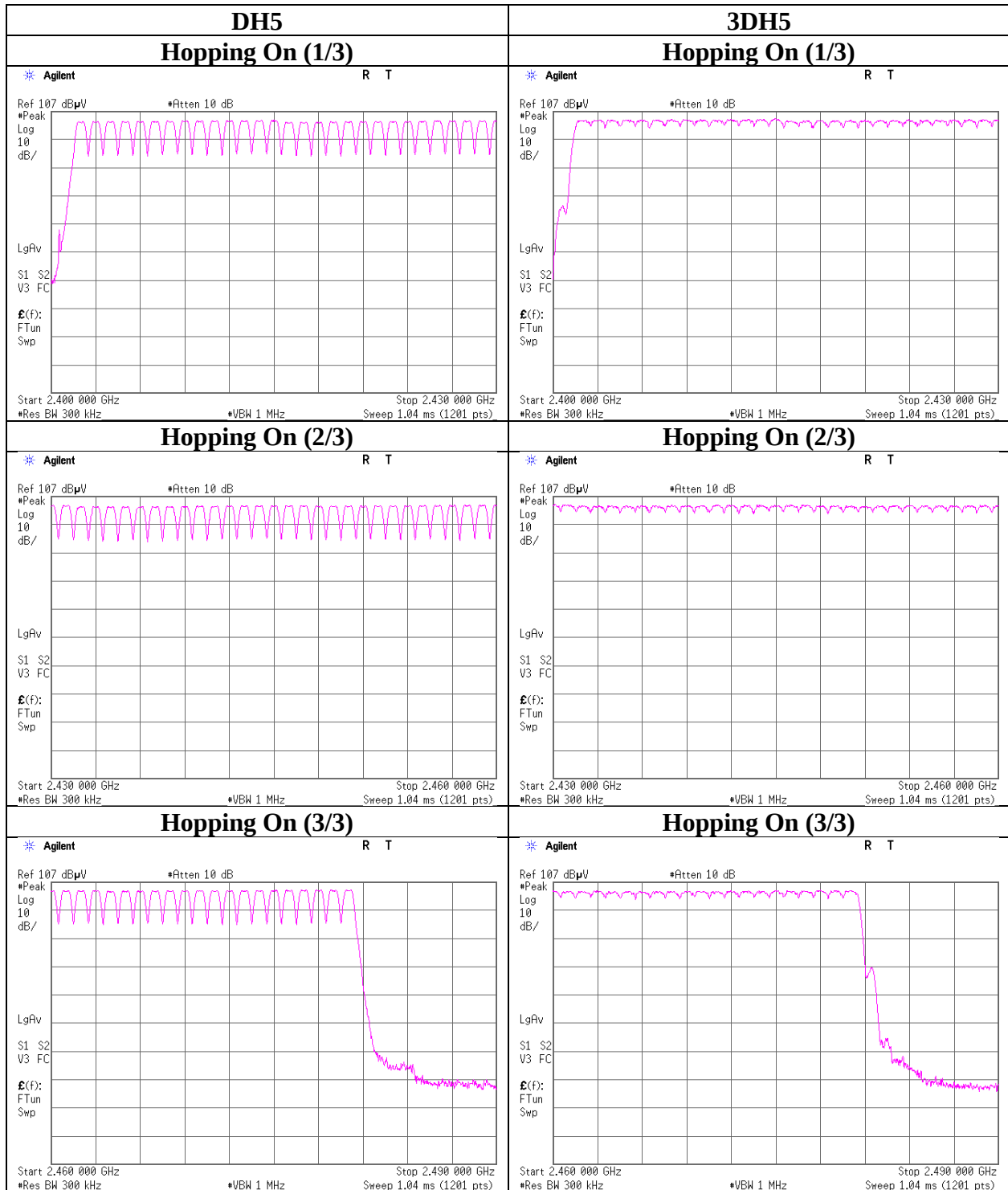
Number of Hopping Frequency

Test place Ise EMC Lab. No.6 Measurement Room
Report No. 11706542H
Date April 27, 2017
Temperature / Humidity 23 deg. C / 38 % RH
Engineer Ken Fujita
Mode Tx, Hopping On

Mode	Number of channel [channels]	Limit [channels]
DH5	79	≥ 15
3DH5	79	≥ 15

Test was not performed at AFH mode whose number of hopping channel is 20 channels because this Bluetooth radio is in compliance of Bluetooth Specification.

Number of Hopping Frequency



Dwell time

Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	11706542H
Date	April 27, 2017
Temperature / Humidity	23 deg. C / 38 % RH
Engineer	Ken Fujita
Mode	Tx, Hopping On

Mode	Number of transmission in a 31.6(79 Hopping x 0.4) / 12.8 (32 Hopping x 0.4) second period				Length of transmission [msec]	Result [msec]	Limit [msec]
DH1	42.2 times	/	5 sec. x	31.6 sec. = 267 times	0.417	111	400
DH3	25.8 times	/	5 sec. x	31.6 sec. = 164 times	1.677	275	400
DH5	20.6 times	/	5 sec. x	31.6 sec. = 131 times	2.924	383	400
3DH1	42.4 times	/	5 sec. x	31.6 sec. = 268 times	0.416	111	400
3DH3	27.2 times	/	5 sec. x	31.6 sec. = 172 times	1.680	289	400
3DH5	17.6 times	/	5 sec. x	31.6 sec. = 112 times	2.923	327	400

Sample Calculation

Result = Number of transmission x Length of transmission

*Average data of 5 tests.(except Inquiry)

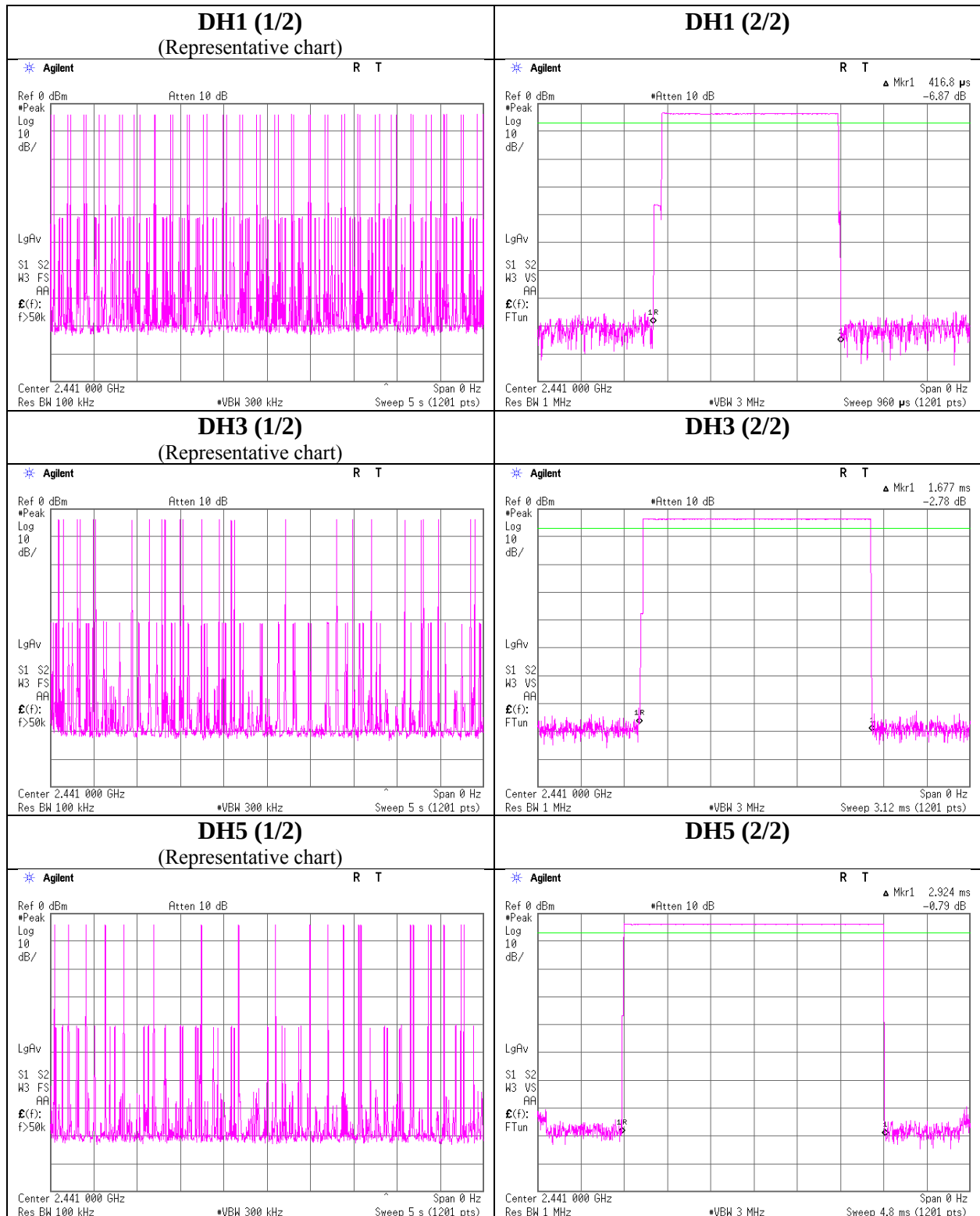
Mode	Sampling [times]					Average [times]
	1	2	3	4	5	
DH1	43	41	42	42	43	42.2
DH3	26	26	25	26	26	25.8
DH5	21	21	20	21	20	20.6
3DH1	42	43	43	42	42	42.4
3DH3	27	28	26	28	27	27.2
3DH5	18	17	18	17	18	17.6

Sample Calculation

Average = Summation (Sampling 1 to 5) / 5

This device complies with the Bluetooth protocol for FHSS operation, employing a pseudo random channel selection and hopping rate to ensure that the occupancy time in $N \times 0.4s$, where N is the number of channels being used in the hopping sequence ($20 \leq N \leq 79$), is always less than $0.4s$ regardless of packet size. This is confirmed in the test report for $N = 79$.

Dwell time



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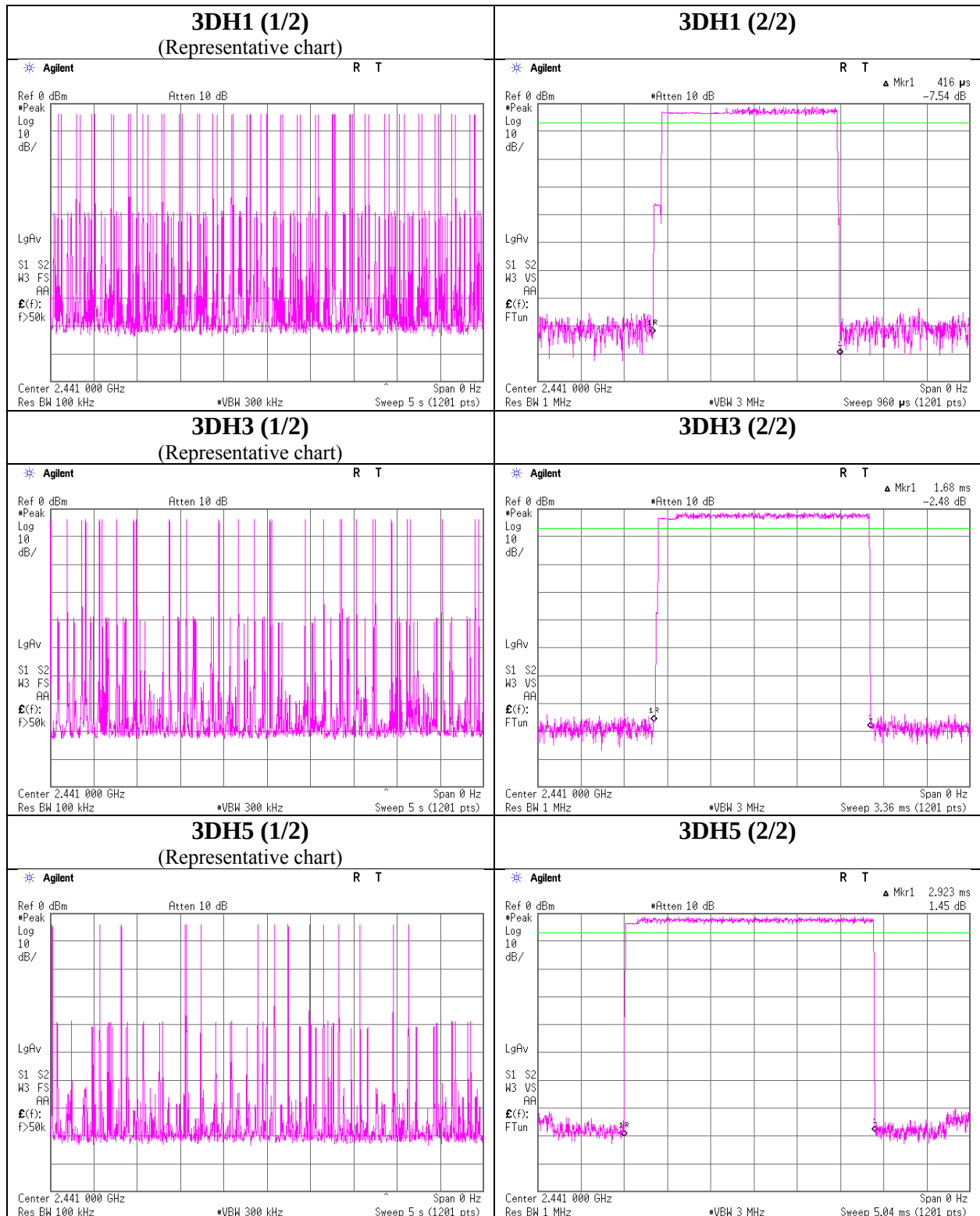
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Dwell time



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Maximum Peak Output Power

Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	11706542H
Date	April 27, 2017
Temperature / Humidity	23 deg. C / 38 % RH
Engineer	Ken Fujita
Mode	Tx, Hopping Off

3.3V

Mode	Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result		Limit		Margin [dB]
					[dBm]	[mW]	[dBm]	[mW]	
DH5	2402.0	-4.12	2.07	9.48	7.43	5.53	20.96	125	13.53
DH5	2441.0	-3.97	2.08	9.48	7.59	5.74	20.96	125	13.37
DH5	2480.0	-3.69	2.09	9.48	7.88	6.14	20.96	125	13.08
2DH5	2402.0	-1.53	2.07	9.48	10.02	10.05	20.96	125	10.94
2DH5	2441.0	-1.54	2.08	9.48	10.02	10.05	20.96	125	10.94
2DH5	2480.0	-1.57	2.09	9.48	10.00	10.00	20.96	125	10.96
3DH5	2402.0	-1.32	2.07	9.48	10.23	10.54	20.96	125	10.73
3DH5	2441.0	-1.35	2.08	9.48	10.21	10.50	20.96	125	10.75
3DH5	2480.0	-1.42	2.09	9.48	10.15	10.35	20.96	125	10.81

3.0V

Mode	Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result		Limit		Margin [dB]
					[dBm]	[mW]	[dBm]	[mW]	
DH5	2402.0	-2.78	0.30	9.48	7.00	5.01	20.96	125	13.96
DH5	2441.0	-2.72	0.30	9.48	7.06	5.08	20.96	125	13.90
DH5	2480.0	-2.66	0.30	9.48	7.12	5.15	20.96	125	13.84
2DH5	2402.0	-0.32	0.30	9.48	9.46	8.83	20.96	125	11.50
2DH5	2441.0	-0.31	0.30	9.48	9.47	8.85	20.96	125	11.49
2DH5	2480.0	-0.36	0.30	9.48	9.42	8.75	20.96	125	11.54
3DH5	2402.0	0.33	0.30	9.48	10.11	10.26	20.96	125	10.85
3DH5	2441.0	0.30	0.30	9.48	10.08	10.19	20.96	125	10.88
3DH5	2480.0	0.24	0.30	9.48	10.02	10.05	20.96	125	10.94

4.8V

Mode	Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result		Limit		Margin [dB]
					[dBm]	[mW]	[dBm]	[mW]	
DH5	2402.0	-2.52	0.30	9.48	7.26	5.32	20.96	125	13.70
DH5	2441.0	-2.44	0.30	9.48	7.34	5.42	20.96	125	13.62
DH5	2480.0	-2.36	0.30	9.48	7.42	5.52	20.96	125	13.54
2DH5	2402.0	0.12	0.30	9.48	9.90	9.77	20.96	125	11.06
2DH5	2441.0	0.14	0.30	9.48	9.92	9.82	20.96	125	11.04
2DH5	2480.0	0.15	0.30	9.48	9.93	9.84	20.96	125	11.03
3DH5	2402.0	0.39	0.30	9.48	10.17	10.40	20.96	125	10.79
3DH5	2441.0	0.31	0.30	9.48	10.09	10.21	20.96	125	10.87
3DH5	2480.0	0.25	0.30	9.48	10.03	10.07	20.96	125	10.93

Sample Calculation:

Result = Reading + Cable Loss (including the cable(s) customer supplied) + Attenuator Loss

Test was not performed at AFH mode, because the decrease of number of channel (min: 20ch) at AFH mode does not influence on the output power and bandwidth of the EUT.

As this device had AFH mode and frequency separation could not meet the requirement of over 20dB BW without 2/3 relaxation, 125mW power limit was applied to it.

UL Japan, Inc.

Ise EMC Lab.

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Telephone : +81 596 24 8999

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Average Output Power (Reference data for RF Exposure / SAR testing)

Test place : Ise EMC Lab. No.6 Measurement Room
Report No. : 11706542H
Date : April 27, 2017
Temperature / Humidity : 23 deg. C / 38 % RH
Engineer : Ken Fujita
Mode : Tx, Hopping Off

3.3V

Mode	Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Time average)		Duty factor [dB]	Result (Burst power average)	
					[dBm]	[mW]		[dBm]	[mW]
DH5	2402.0	-5.63	2.07	9.48	5.92	3.91	1.03	6.95	4.95
DH5	2441.0	-5.22	2.08	9.48	6.34	4.31	1.03	7.37	5.46
DH5	2480.0	-5.08	2.09	9.48	6.49	4.46	1.04	7.53	5.66
2DH5	2402.0	-5.12	2.07	9.48	6.43	4.40	1.03	7.46	5.57
2DH5	2441.0	-5.08	2.08	9.48	6.48	4.45	1.03	7.51	5.64
2DH5	2480.0	-5.08	2.09	9.48	6.49	4.46	1.04	7.53	5.66
3DH5	2402.0	-5.11	2.07	9.48	6.44	4.41	1.03	7.47	5.58
3DH5	2441.0	-5.03	2.08	9.48	6.53	4.50	1.03	7.56	5.70
3DH5	2480.0	-5.05	2.09	9.48	6.52	4.49	1.04	7.56	5.70

3.0V

Mode	Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Time average)		Duty factor [dB]	Result (Burst power average)	
					[dBm]	[mW]		[dBm]	[mW]
DH5	2402.0	-4.44	0.30	9.48	5.34	3.42	1.03	6.37	4.34
DH5	2441.0	-4.32	0.30	9.48	5.46	3.52	1.03	6.49	4.46
DH5	2480.0	-4.20	0.30	9.48	5.58	3.61	1.04	6.62	4.59
2DH5	2402.0	-3.78	0.30	9.48	6.00	3.98	1.03	7.03	5.05
2DH5	2441.0	-3.79	0.30	9.48	5.99	3.97	1.03	7.02	5.04
2DH5	2480.0	-3.80	0.30	9.48	5.98	3.96	1.04	7.02	5.04
3DH5	2402.0	-3.76	0.30	9.48	6.02	4.00	1.03	7.05	5.07
3DH5	2441.0	-3.80	0.30	9.48	5.98	3.96	1.03	7.01	5.02
3DH5	2480.0	-3.71	0.30	9.48	6.07	4.05	1.04	7.11	5.14

4.8V

Mode	Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Time average)		Duty factor [dB]	Result (Burst power average)	
					[dBm]	[mW]		[dBm]	[mW]
DH5	2402.0	-3.99	0.30	9.48	5.79	3.79	1.03	6.82	4.81
DH5	2441.0	-3.89	0.30	9.48	5.89	3.88	1.03	6.92	4.92
DH5	2480.0	-3.76	0.30	9.48	6.02	4.00	1.04	7.06	5.08
2DH5	2402.0	-3.44	0.30	9.48	6.34	4.31	1.03	7.37	5.46
2DH5	2441.0	-3.50	0.30	9.48	6.28	4.25	1.03	7.31	5.38
2DH5	2480.0	-3.47	0.30	9.48	6.31	4.28	1.04	7.35	5.43
3DH5	2402.0	-3.43	0.30	9.48	6.35	4.32	1.03	7.38	5.47
3DH5	2441.0	-3.47	0.30	9.48	6.31	4.28	1.03	7.34	5.42
3DH5	2480.0	-3.45	0.30	9.48	6.33	4.30	1.04	7.37	5.46

Sample Calculation:

Result (Time average) = Reading + Cable Loss (including the cable(s) customer supplied) + Attenuator Loss

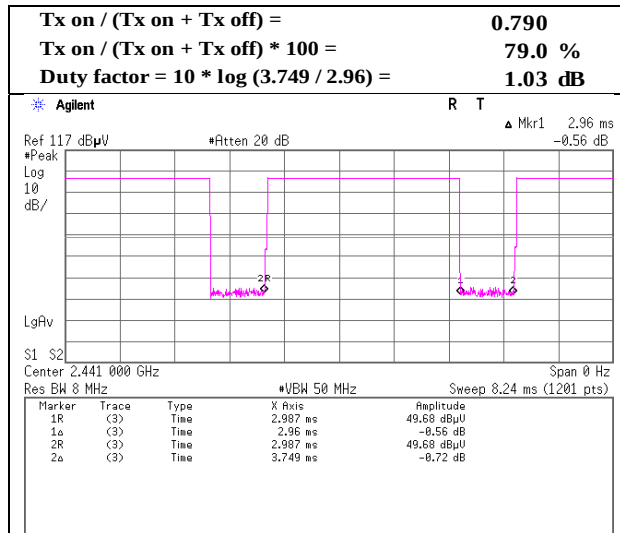
Result (Burst power average) = Time average + Duty factor

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

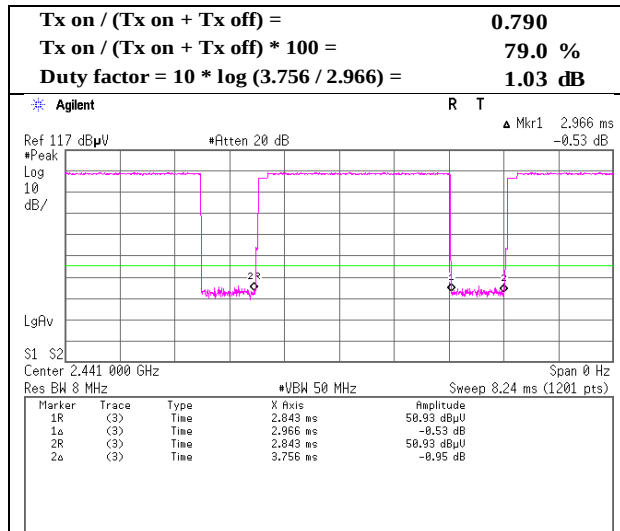
Burst Rate Confirmation

Test place : Ise EMC Lab. No.6 Measurement Room
Report No. : 11706542H
Date : April 27, 2017
Temperature / Humidity : 23 deg. C / 38 % RH
Engineer : Ken Fujita
Mode : Tx, Hopping Off

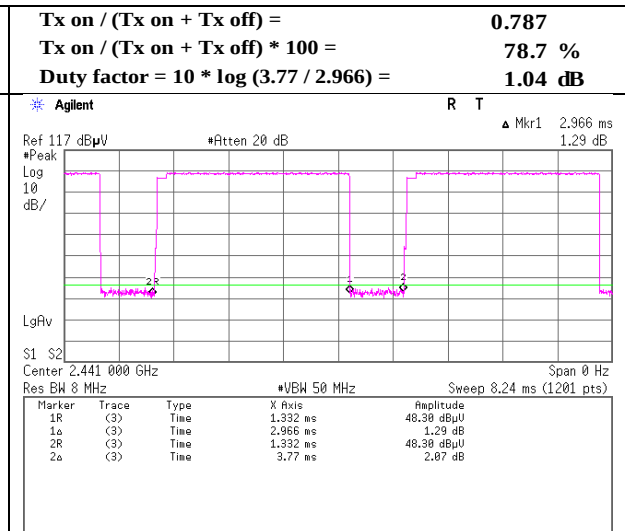
DH5



2DH5



3DH5



Radiated Spurious Emission

Report No. 11706542H
Test place Ise EMC Lab.
Semi Anechoic Chamber No.2 No.2 No.4
Date April 20, 2017 April 21, 2017 April 29, 2017
Temperature / Humidity 24 deg. C / 30 % RH 22 deg. C / 35 % RH 23 deg. C / 40 % RH
Engineer Hiroyuki Furutaka Hiroyuki Furutaka Hiroyuki Furutaka
(1 GHz -10 GHz) (10 GHz -26.5 GHz) (Below 1GHz)
Mode Tx, Hopping Off, DH5 2402 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	38.176	QP	20.2	14.9	7.4	32.1	10.4	40.0	29.6	
Hori	68.497	QP	21.0	6.2	7.9	32.1	3.0	40.0	37.0	
Hori	96.000	QP	24.1	9.4	8.2	32.1	9.6	43.5	33.9	
Hori	198.000	QP	20.3	16.3	9.1	31.9	13.8	43.5	29.7	
Hori	530.000	QP	20.3	18.1	11.2	32.1	17.5	46.0	28.5	
Hori	902.000	QP	20.0	22.1	13.0	31.1	24.0	46.0	22.0	
Hori	2390.000	PK	44.9	27.0	4.9	34.6	42.2	73.9	31.7	
Hori	4804.000	PK	42.8	31.3	7.6	33.8	47.9	73.9	26.0	Floor noise
Hori	7206.000	PK	43.2	35.6	8.4	33.9	53.3	73.9	20.6	Floor noise
Hori	9608.000	PK	44.2	38.2	9.3	34.5	57.2	73.9	16.7	Floor noise
Hori	2390.000	AV	32.6	27.0	4.9	34.6	29.9	53.9	24.0	
Hori	4804.000	AV	30.9	31.3	7.6	33.8	36.0	53.9	17.9	Floor noise
Hori	7206.000	AV	31.2	35.6	8.4	33.9	41.3	53.9	12.6	Floor noise
Hori	9608.000	AV	32.3	38.2	9.3	34.5	45.3	53.9	8.6	Floor noise
Vert	38.517	QP	20.4	14.8	7.4	32.1	10.5	40.0	29.5	
Vert	68.497	QP	20.8	6.2	7.9	32.1	2.8	40.0	37.2	
Vert	96.000	QP	26.8	9.4	8.2	32.1	12.3	43.5	31.2	
Vert	198.000	QP	20.2	16.3	9.1	31.9	13.7	43.5	29.8	
Vert	530.000	QP	20.1	18.1	11.2	32.1	17.3	46.0	28.7	
Vert	902.000	QP	20.1	22.1	13.0	31.1	24.1	46.0	21.9	
Vert	2390.000	PK	45.0	27.0	4.9	34.6	42.3	73.9	31.6	
Vert	4804.000	PK	42.5	31.3	7.6	33.8	47.6	73.9	26.3	Floor noise
Vert	7206.000	PK	43.6	35.6	8.4	33.9	53.7	73.9	20.2	Floor noise
Vert	9608.000	PK	44.5	38.2	9.3	34.5	57.5	73.9	16.4	Floor noise
Vert	2390.000	AV	32.9	27.0	4.9	34.6	30.2	53.9	23.7	
Vert	4804.000	AV	30.6	31.3	7.6	33.8	35.7	53.9	18.2	Floor noise
Vert	7206.000	AV	31.3	35.6	8.4	33.9	41.4	53.9	12.5	Floor noise
Vert	9608.000	AV	32.5	38.2	9.3	34.5	45.5	53.9	8.4	Floor noise

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

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

Distance factor: 1 GHz - 10 GHz $20\log(3.75\text{ m} / 3.0\text{ m}) = 1.94\text{ dB}$
10 GHz - 26.5 GHz $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

***These results have sufficient margin without taking account Dwell time factor.**

20dBc Data Sheet

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2402.000	PK	104.7	27.0	5.0	34.6	102.1	-	-	Carrier
Hori	2400.000	PK	47.5	27.0	5.0	34.6	44.9	82.1	37.2	
Vert	2402.000	PK	105.8	27.0	5.0	34.6	103.2	-	-	Carrier
Vert	2400.000	PK	48.4	27.0	5.0	34.6	45.8	83.2	37.4	

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

Distance factor: 1 GHz - 10 GHz $20\log(3.75\text{ m} / 3.0\text{ m}) = 1.94\text{ dB}$
10 GHz - 26.5 GHz $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

UL Japan, Inc.

Ise EMC Lab.

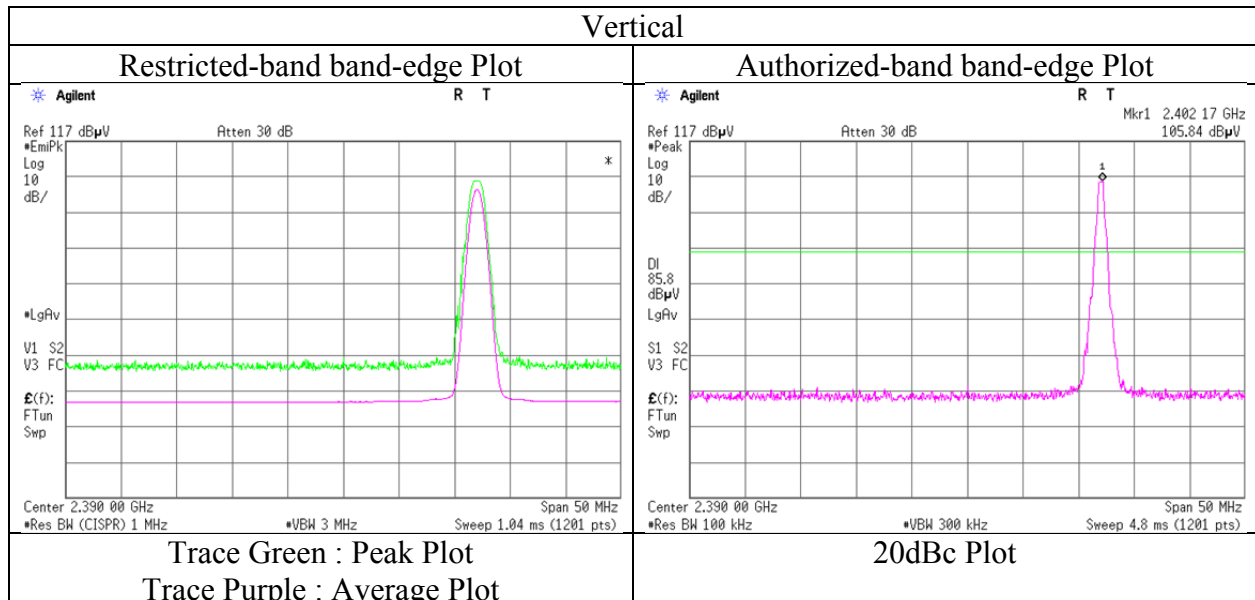
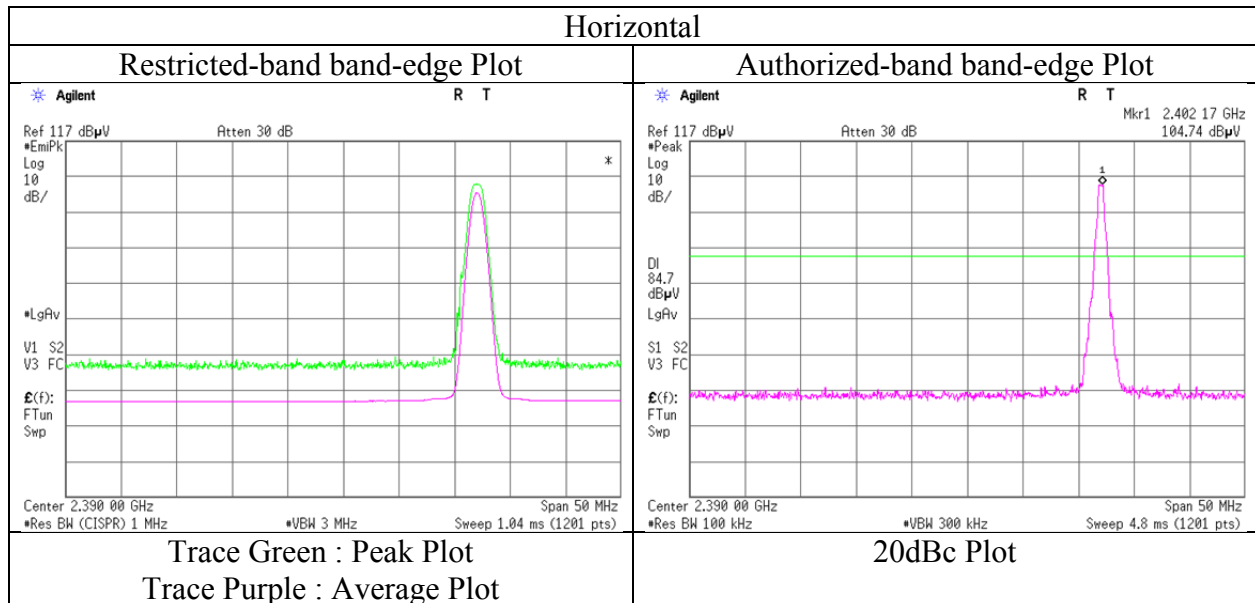
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8999

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Radiated Spurious Emission (Reference Plot for band-edge)

Report No.	11706542H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.2
Date	April 20, 2017
Temperature / Humidity	24 deg. C / 30 % RH
Engineer	Hiroyuki Furutaka
Mode	Tx, Hopping Off, DH5 2402 MHz



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

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Ise EMC Lab.

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Radiated Spurious Emission

Report No. 11706542H
Test place Ise EMC Lab.
Semi Anechoic Chamber No.2
Date April 20, 2017
Temperature / Humidity 24 deg. C / 30 % RH
Engineer Hiroyuki Furutaka
Mode Tx, Hopping Off, DH5 2441 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	39.870	QP	21.1	14.4	7.5	32.1	10.9	40.0	29.1	
Hori	70.000	QP	21.0	6.0	7.9	32.1	2.8	40.0	37.2	
Hori	96.000	QP	25.8	9.4	8.2	32.1	11.3	43.5	32.2	
Hori	198.000	QP	20.3	16.3	9.1	31.9	13.8	43.5	29.7	
Hori	552.000	QP	20.3	18.4	11.3	32.1	17.9	46.0	28.1	
Hori	889.000	QP	20.2	21.9	13.0	31.2	23.9	46.0	22.1	
Hori	4882.000	PK	43.2	31.4	7.5	33.8	48.3	73.9	25.6	Floor noise
Hori	7323.000	PK	43.3	35.8	8.5	33.9	53.7	73.9	20.2	Floor noise
Hori	9764.000	PK	44.5	38.2	9.2	34.5	57.4	73.9	16.5	Floor noise
Hori	4882.000	AV	31.0	31.4	7.5	33.8	36.1	53.9	17.8	Floor noise
Hori	7323.000	AV	31.1	35.8	8.5	33.9	41.5	53.9	12.4	Floor noise
Hori	9764.000	AV	31.9	38.2	9.2	34.5	44.8	53.9	9.1	Floor noise
Vert	38.517	QP	20.7	14.8	7.4	32.1	10.8	40.0	29.2	
Vert	68.497	QP	21.0	6.2	7.9	32.1	3.0	40.0	37.0	
Vert	96.000	QP	27.8	9.4	8.2	32.1	13.3	43.5	30.2	
Vert	198.000	QP	20.4	16.3	9.1	31.9	13.9	43.5	29.6	
Vert	552.000	QP	20.1	18.4	11.3	32.1	17.7	46.0	28.3	
Vert	889.000	QP	20.1	21.9	13.0	31.2	23.8	46.0	22.2	
Vert	4882.000	PK	43.0	31.4	7.5	33.8	48.1	73.9	25.8	Floor noise
Vert	7323.000	PK	43.5	35.8	8.5	33.9	53.9	73.9	20.0	Floor noise
Vert	9764.000	PK	44.3	38.2	9.2	34.5	57.2	73.9	16.7	Floor noise
Vert	4882.000	AV	30.9	31.4	7.5	33.8	36.0	53.9	17.9	Floor noise
Vert	7323.000	AV	31.0	35.8	8.5	33.9	41.4	53.9	12.5	Floor noise
Vert	9764.000	AV	32.4	38.2	9.2	34.5	45.3	53.9	8.6	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 $20\log(3.75\text{ m} / 3.0\text{ m}) = 1.94\text{ dB}$
10 GHz - 26.5 GHz $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

***These results have sufficient margin without taking account Dwell time factor.**

Radiated Spurious Emission

Report No.	11706542H		
Test place	Ise EMC Lab.		
Semi Anechoic Chamber	No.2	No.2	No.4
Date	April 20, 2017	April 21, 2017	April 29, 2017
Temperature / Humidity	24 deg. C / 30 % RH	22 deg. C / 35 % RH	23 deg. C / 40 % RH
Engineer	Hiroyuki Furutaka	Hiroyuki Furutaka	Hiroyuki Furutaka
	(1 GHz -10 GHz)	(10 GHz -26.5 GHz)	(Below 1GHz)
Mode	Tx, Hopping Off, DH5 2480 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	39.870	QP	21.0	14.4	7.5	32.1	10.8	40.0	29.2	
Hori	70.000	QP	21.2	6.0	7.9	32.1	3.0	40.0	37.0	
Hori	96.000	QP	26.0	9.4	8.2	32.1	11.5	43.5	32.0	
Hori	198.000	QP	20.4	16.3	9.1	31.9	13.9	43.5	29.6	
Hori	552.000	QP	20.1	18.4	11.3	32.1	17.7	46.0	28.3	
Hori	889.000	QP	20.1	21.9	13.0	31.2	23.8	46.0	22.2	
Hori	2483.500	PK	52.2	27.0	5.1	34.6	49.7	73.9	24.2	
Hori	4960.000	PK	43.5	31.6	7.6	33.8	48.9	73.9	25.0	Floor noise
Hori	7440.000	PK	42.0	35.9	8.5	34.0	52.4	73.9	21.5	Floor noise
Hori	9920.000	PK	44.7	38.2	9.3	34.6	57.6	73.9	16.3	Floor noise
Hori	2483.500	AV	40.0	27.0	5.1	34.6	37.5	53.9	16.4	
Hori	4960.000	AV	31.2	31.6	7.6	33.8	36.6	53.9	17.3	Floor noise
Hori	7440.000	AV	30.9	35.9	8.5	34.0	41.3	53.9	12.6	Floor noise
Hori	9920.000	AV	31.6	38.2	9.3	34.6	44.5	53.9	9.4	Floor noise
Vert	38.517	QP	20.9	14.8	7.4	32.1	11.0	40.0	29.0	
Vert	70.000	QP	21.0	6.0	7.9	32.1	2.8	40.0	37.2	
Vert	96.000	QP	28.0	9.4	8.2	32.1	13.5	43.5	30.0	
Vert	198.000	QP	20.5	16.3	9.1	31.9	14.0	43.5	29.5	
Vert	552.000	QP	20.0	18.4	11.3	32.1	17.6	46.0	28.4	
Vert	889.000	QP	20.1	21.9	13.0	31.2	23.8	46.0	22.2	
Vert	2483.500	PK	52.0	27.0	5.1	34.6	49.5	73.9	24.4	
Vert	4960.000	PK	43.7	31.6	7.6	33.8	49.1	73.9	24.8	Floor noise
Vert	7440.000	PK	42.7	35.9	8.5	34.0	53.1	73.9	20.8	Floor noise
Vert	9920.000	PK	43.9	38.2	9.3	34.6	56.8	73.9	17.1	Floor noise
Vert	2483.500	AV	39.6	27.0	5.1	34.6	37.1	53.9	16.8	
Vert	4960.000	AV	31.0	31.6	7.6	33.8	36.4	53.9	17.5	Floor noise
Vert	7440.000	AV	31.0	35.9	8.5	34.0	41.4	53.9	12.5	Floor noise
Vert	9920.000	AV	32.0	38.2	9.3	34.6	44.9	53.9	9.0	Floor noise

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

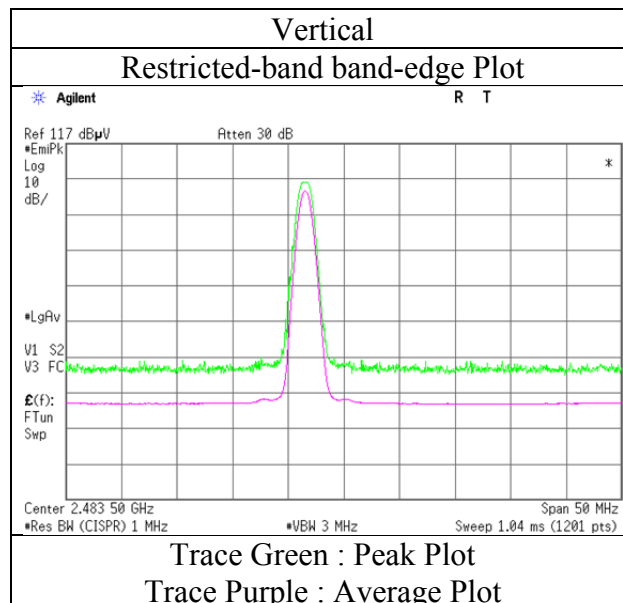
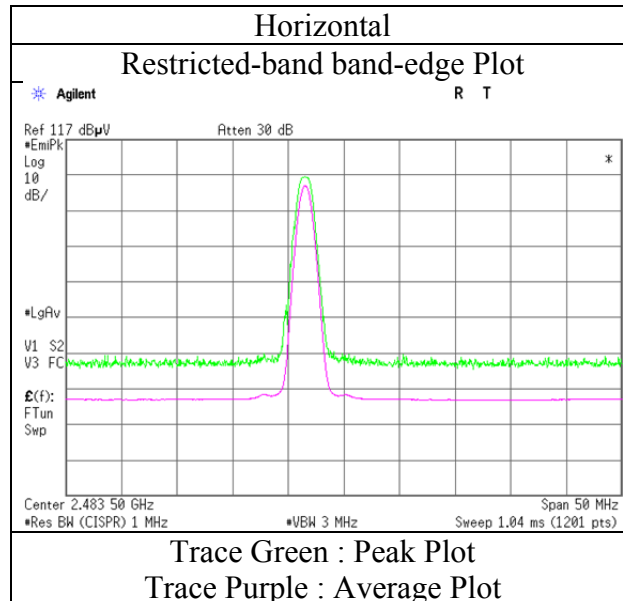
*Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).

Distance factor: 1 GHz - 10 GHz 20log (3.75 m / 3.0 m) = 1.94 dB
10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB

***These results have sufficient margin without taking account Dwell time factor.**

Radiated Spurious Emission (Reference Plot for band-edge)

Report No.	11706542H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.2
Date	April 20, 2017
Temperature / Humidity	24 deg. C / 30 % RH
Engineer	Hiroyuki Furutaka
Mode	Tx, Hopping Off, DH5 2480 MHz



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

UL Japan, Inc.

Ise EMC Lab.

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Radiated Spurious Emission

Report No. 11706542H
Test place Ise EMC Lab.
Semi Anechoic Chamber No.2 No.4
Date April 21, 2017 April 29, 2017
Temperature / Humidity 22 deg. C / 35 % RH 23 deg. C / 40 % RH
Engineer Hiroyuki Furutaka Hiroyuki Furutaka
(1 GHz -26.5 GHz) (Below 1GHz)
Mode Tx, Hopping On, 3DH5 2402 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	39.900	QP	21.1	14.4	7.5	32.1	10.9	40.0	29.1	
Hori	70.001	QP	21.3	6.0	7.9	32.1	3.1	40.0	36.9	
Hori	96.000	QP	26.1	9.4	8.2	32.1	11.6	43.5	31.9	
Hori	195.000	QP	20.4	16.3	9.1	31.9	13.9	43.5	29.6	
Hori	563.000	QP	20.1	18.6	11.4	32.1	18.0	46.0	28.0	
Hori	812.000	QP	20.5	20.8	12.6	31.5	22.4	46.0	23.6	
Hori	2390.000	PK	44.7	27.0	4.9	34.6	42.0	73.9	31.9	
Hori	4804.000	PK	43.5	31.3	7.6	33.8	48.6	73.9	25.3	Floor noise
Hori	7206.000	PK	43.4	35.6	8.4	33.9	53.5	73.9	20.4	Floor noise
Hori	9608.000	PK	44.6	38.2	9.3	34.5	57.6	73.9	16.3	Floor noise
Hori	2390.000	AV	32.4	27.0	4.9	34.6	29.7	53.9	24.2	
Hori	4804.000	AV	31.0	31.3	7.6	33.8	36.1	53.9	17.8	Floor noise
Hori	7206.000	AV	31.3	35.6	8.4	33.9	41.4	53.9	12.5	Floor noise
Hori	9608.000	AV	32.5	38.2	9.3	34.5	45.5	53.9	8.4	Floor noise
Vert	39.871	QP	21.0	14.4	7.5	32.1	10.8	40.0	29.2	
Vert	69.987	QP	21.1	6.0	7.9	32.1	2.9	40.0	37.1	
Vert	96.000	QP	28.2	9.4	8.2	32.1	13.7	43.5	29.8	
Vert	195.000	QP	20.5	16.3	9.1	31.9	14.0	43.5	29.5	
Vert	563.000	QP	20.2	18.6	11.4	32.1	18.1	46.0	27.9	
Vert	812.000	QP	20.6	20.8	12.6	31.5	22.5	46.0	23.5	
Vert	2390.000	PK	44.8	27.0	4.9	34.6	42.1	73.9	31.8	
Vert	4804.000	PK	43.4	31.3	7.6	33.8	48.5	73.9	25.4	Floor noise
Vert	7206.000	PK	43.3	35.6	8.4	33.9	53.4	73.9	20.5	Floor noise
Vert	9608.000	PK	44.7	38.2	9.3	34.5	57.7	73.9	16.2	Floor noise
Vert	2390.000	AV	32.5	27.0	4.9	34.6	29.8	53.9	24.1	
Vert	4804.000	AV	30.7	31.3	7.6	33.8	35.8	53.9	18.1	Floor noise
Vert	7206.000	AV	31.3	35.6	8.4	33.9	41.4	53.9	12.5	Floor noise
Vert	9608.000	AV	32.4	38.2	9.3	34.5	45.4	53.9	8.5	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 (3.75 m / 3.0 m) = 1.94 dB
10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB

***These results have sufficient margin without taking account Dwell time factor.**

20dBc Data Sheet

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2402.000	PK	103.5	27.0	5.0	34.6	100.9	-	-	Carrier
Hori	2400.000	PK	50.0	27.0	5.0	34.6	47.4	80.9	33.5	
Vert	2402.000	PK	104.5	27.0	5.0	34.6	101.9	-	-	Carrier
Vert	2400.000	PK	50.6	27.0	5.0	34.6	48.0	81.9	33.9	

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

Distance factor: 1 GHz - 10 GHz 20log (3.75 m / 3.0 m) = 1.94 dB
10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5dB

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Ise EMC Lab.

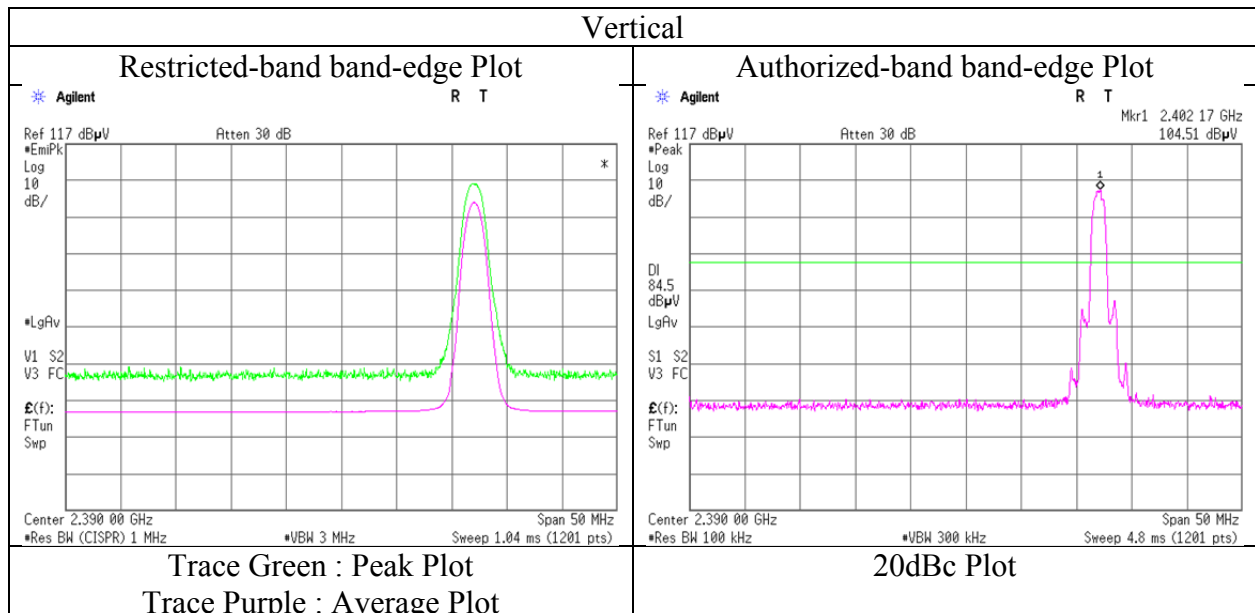
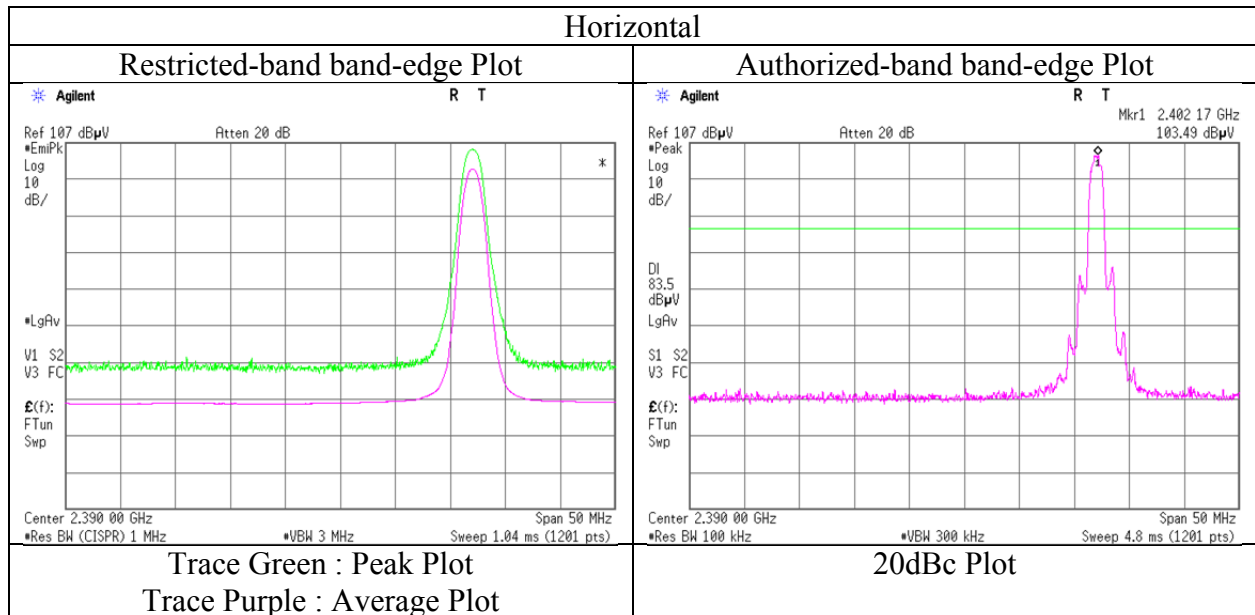
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Radiated Spurious Emission (Reference Plot for band-edge)

Report No.	11706542H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.2
Date	April 21, 2017
Temperature / Humidity	22 deg. C / 35 % RH
Engineer	Hiroyuki Furutaka
Mode	Tx, Hopping On, 3DH5 2402 MHz



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

UL Japan, Inc.

Ise EMC Lab.

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Radiated Spurious Emission

Report No.	11706542H	
Test place	Ise EMC Lab.	
Semi Anechoic Chamber	No.2	No.4
Date	April 21, 2017	April 29, 2017
Temperature / Humidity	22 deg. C / 35 % RH	23 deg. C / 40 % RH
Engineer	Hiroyuki Furutaka	Hiroyuki Furutaka
	(1 GHz -26.5 GHz)	(Below 1GHz)
Mode	Tx, Hopping On, 3DH5 2441 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	40.000	QP	21.4	14.4	7.5	32.1	11.2	40.0	28.8	
Hori	67.987	QP	21.2	6.3	7.9	32.1	3.3	40.0	36.7	
Hori	96.000	QP	26.2	9.4	8.2	32.1	11.7	43.5	31.8	
Hori	196.000	QP	20.7	16.3	9.1	31.9	14.2	43.5	29.3	
Hori	563.000	QP	20.2	18.6	11.4	32.1	18.1	46.0	27.9	
Hori	812.000	QP	20.7	20.8	12.6	31.5	22.6	46.0	23.4	
Hori	4882.000	PK	42.9	31.4	7.5	33.8	48.0	73.9	25.9	Floor noise
Hori	7323.000	PK	43.5	35.8	8.5	33.9	53.9	73.9	20.0	Floor noise
Hori	9764.000	PK	44.3	38.2	9.2	34.5	57.2	73.9	16.7	Floor noise
Hori	4882.000	AV	31.3	31.4	7.5	33.8	36.4	53.9	17.5	Floor noise
Hori	7323.000	AV	30.8	35.8	8.5	33.9	41.2	53.9	12.7	Floor noise
Hori	9764.000	AV	31.9	38.2	9.2	34.5	44.8	53.9	9.1	Floor noise
Vert	40.000	QP	21.3	14.4	7.5	32.1	11.1	40.0	28.9	
Vert	67.987	QP	21.3	6.3	7.9	32.1	3.4	40.0	36.6	
Vert	96.000	QP	28.4	9.4	8.2	32.1	13.9	43.5	29.6	
Vert	196.000	QP	20.6	16.3	9.1	31.9	14.1	43.5	29.4	
Vert	563.000	QP	20.3	18.6	11.4	32.1	18.2	46.0	27.8	
Vert	812.000	QP	20.6	20.8	12.6	31.5	22.5	46.0	23.5	
Vert	4882.000	PK	43.5	31.4	7.5	33.8	48.6	73.9	25.3	Floor noise
Vert	7323.000	PK	43.0	35.8	8.5	33.9	53.4	73.9	20.5	Floor noise
Vert	9764.000	PK	43.8	38.2	9.2	34.5	56.7	73.9	17.2	Floor noise
Vert	4882.000	AV	30.7	31.4	7.5	33.8	35.8	53.9	18.1	Floor noise
Vert	7323.000	AV	30.8	35.8	8.5	33.9	41.2	53.9	12.7	Floor noise
Vert	9764.000	AV	31.8	38.2	9.2	34.5	44.7	53.9	9.2	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 (3.75 m / 3.0 m) = 1.94 dB
10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB

***These results have sufficient margin without taking account Dwell time factor.**

Radiated Spurious Emission

Report No. 11706542H
Test place Ise EMC Lab.
Semi Anechoic Chamber No.2 No.4
Date April 21, 2017 April 29, 2017
Temperature / Humidity 22 deg. C / 35 % RH 23 deg. C / 40 % RH
Engineer Hiroyuki Furutaka Hiroyuki Furutaka
(1 GHz -26.5 GHz) (Below 1GHz)
Mode Tx, Hopping On, 3DH5 2480 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	40.000	QP	21.5	14.4	7.5	32.1	11.3	40.0	28.7	
Hori	68.002	QP	21.3	6.3	7.9	32.1	3.4	40.0	36.6	
Hori	96.000	QP	26.3	9.4	8.2	32.1	11.8	43.5	31.7	
Hori	197.000	QP	20.7	16.3	9.1	31.9	14.2	43.5	29.3	
Hori	564.000	QP	20.3	18.6	11.4	32.1	18.2	46.0	27.8	
Hori	812.000	QP	20.6	20.8	12.6	31.5	22.5	46.0	23.5	
Hori	2483.500	PK	59.0	27.0	5.1	34.6	56.5	73.9	17.4	
Hori	4960.000	PK	43.0	31.6	7.6	33.8	48.4	73.9	25.5	Floor noise
Hori	7440.000	PK	43.0	35.9	8.5	34.0	53.4	73.9	20.5	Floor noise
Hori	9920.000	PK	44.4	38.2	9.3	34.6	57.3	73.9	16.6	Floor noise
Hori	2483.500	AV	42.1	27.0	5.1	34.6	39.6	53.9	14.3	
Hori	4960.000	AV	31.0	31.6	7.6	33.8	36.4	53.9	17.5	Floor noise
Hori	7440.000	AV	30.8	35.9	8.5	34.0	41.2	53.9	12.7	Floor noise
Hori	9920.000	AV	32.1	38.2	9.3	34.6	45.0	53.9	8.9	Floor noise
Vert	40.000	QP	21.4	14.4	7.5	32.1	11.2	40.0	28.8	
Vert	68.002	QP	21.4	6.3	7.9	32.1	3.5	40.0	36.5	
Vert	96.000	QP	28.2	9.4	8.2	32.1	13.7	43.5	29.8	
Vert	197.000	QP	20.6	16.3	9.1	31.9	14.1	43.5	29.4	
Vert	564.000	QP	20.4	18.6	11.4	32.1	18.3	46.0	27.7	
Vert	813.000	QP	20.5	20.8	12.6	31.5	22.4	46.0	23.6	
Vert	2483.500	PK	58.6	27.0	5.1	34.6	56.1	73.9	17.8	
Vert	4960.000	PK	42.3	31.6	7.6	33.8	47.7	73.9	26.2	Floor noise
Vert	7440.000	PK	42.4	35.9	8.5	34.0	52.8	73.9	21.1	Floor noise
Vert	9920.000	PK	44.4	38.2	9.3	34.6	57.3	73.9	16.6	Floor noise
Vert	2483.500	AV	41.8	27.0	5.1	34.6	39.3	53.9	14.6	
Vert	4960.000	AV	30.9	31.6	7.6	33.8	36.3	53.9	17.6	Floor noise
Vert	7440.000	AV	30.7	35.9	8.5	34.0	41.1	53.9	12.8	Floor noise
Vert	9920.000	AV	32.3	38.2	9.3	34.6	45.2	53.9	8.7	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).

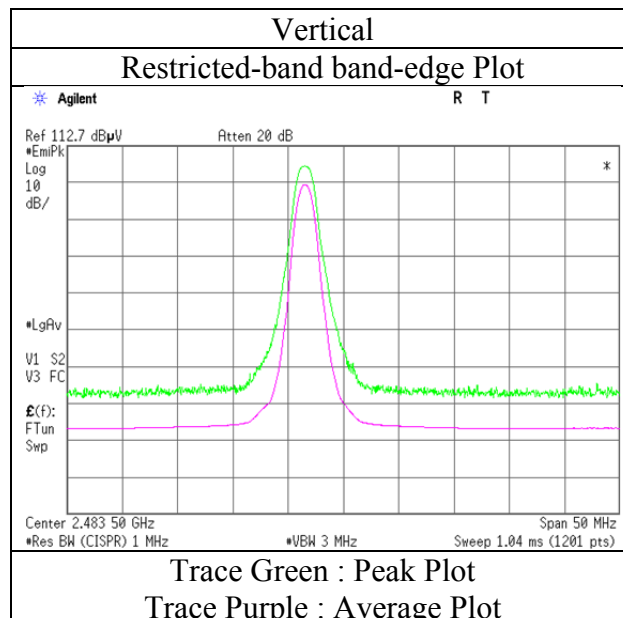
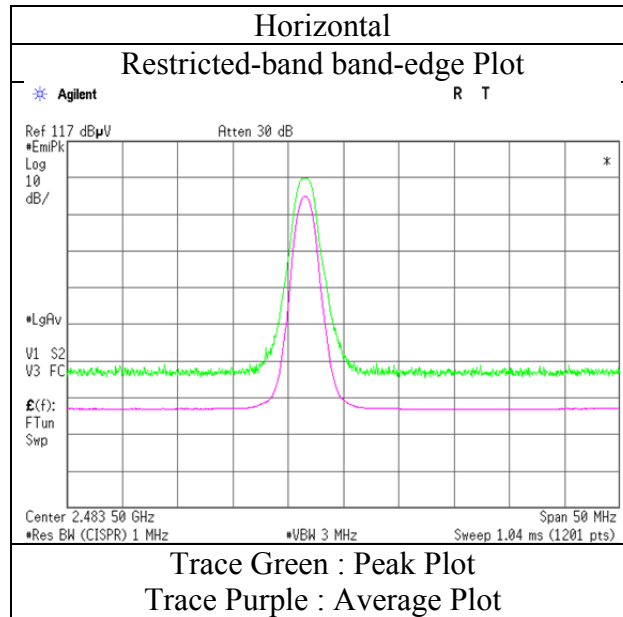
Distance factor: 1 GHz - 10 GHz $20\log(3.75\text{ m} / 3.0\text{ m}) = 1.94\text{ dB}$

10 GHz - 26.5 GHz $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

***These results have sufficient margin without taking account Dwell time factor.**

Radiated Spurious Emission **(Reference Plot for band-edge)**

Report No.	11706542H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.2
Date	April 21, 2017
Temperature / Humidity	22 deg. C / 35 % RH
Engineer	Hiroyuki Furutaka
Mode	Tx, Hopping On, 3DH5 2480 MHz



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

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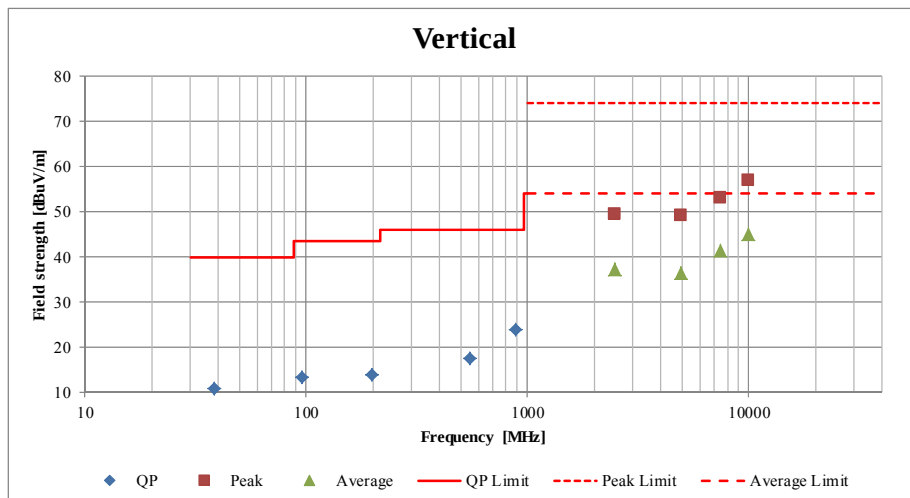
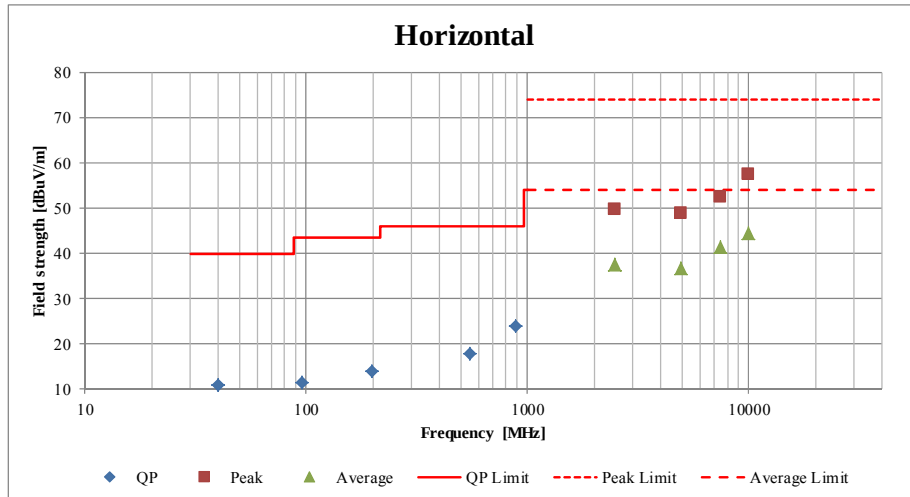
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Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

Radiated Spurious Emission (Plot data, Worst case)

Report No.	11706542H		
Test place	Ise EMC Lab.		
Semi Anechoic Chamber	No.2	No.2	No.4
Date	April 20, 2017	April 21, 2017	April 29, 2017
Temperature / Humidity	24 deg. C / 30 % RH	22 deg. C / 35 % RH	23 deg. C / 40 % RH
Engineer	Hiroyuki Furutaka (1 GHz -10 GHz)	Hiroyuki Furutaka (10 GHz -26.5 GHz)	Hiroyuki Furutaka (Below 1GHz)
Mode	Tx, Hopping Off, DH5 2480 MHz		



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

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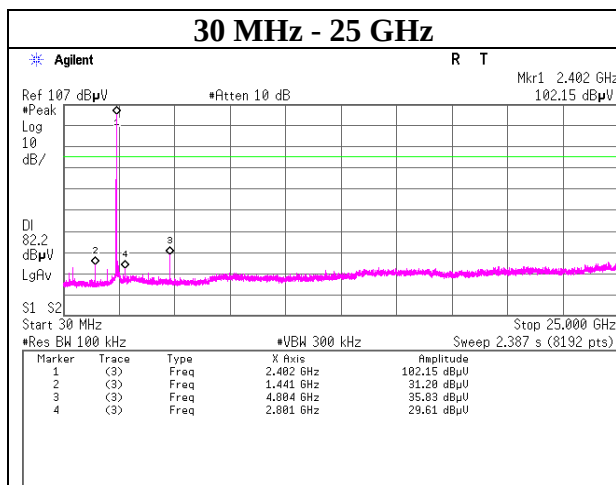
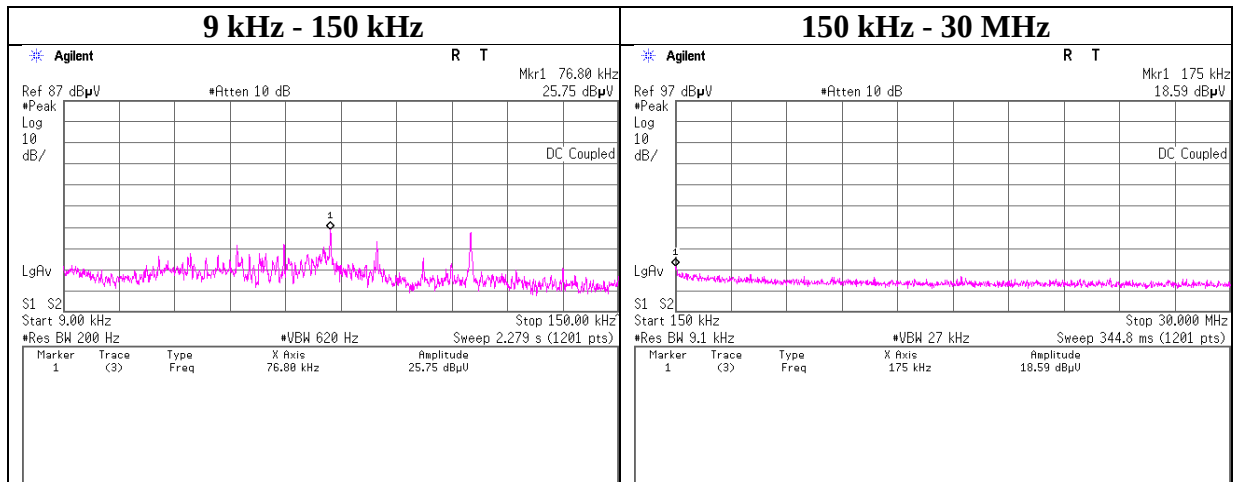
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

Conducted Spurious Emission

Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	11706542H
Date	April 27, 2017
Temperature / Humidity	23 deg. C / 38 % RH
Engineer	Ken Fujita
Mode	Tx, Hopping Off, DH5

2402 MHz



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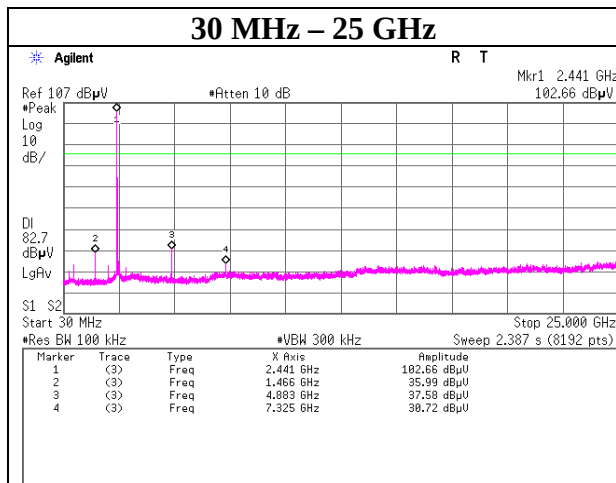
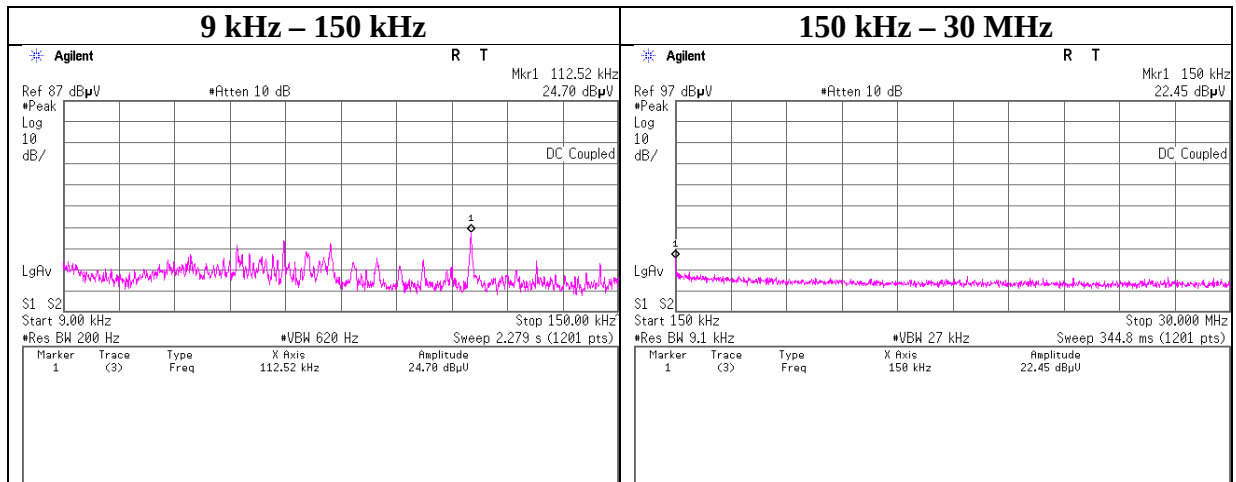
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

Conducted Spurious Emission

Test place : Ise EMC Lab. No.6 Measurement Room
Report No. : 11706542H
Date : April 27, 2017
Temperature / Humidity : 23 deg. C / 38 % RH
Engineer : Ken Fujita
Mode : Tx, Hopping Off, DH5

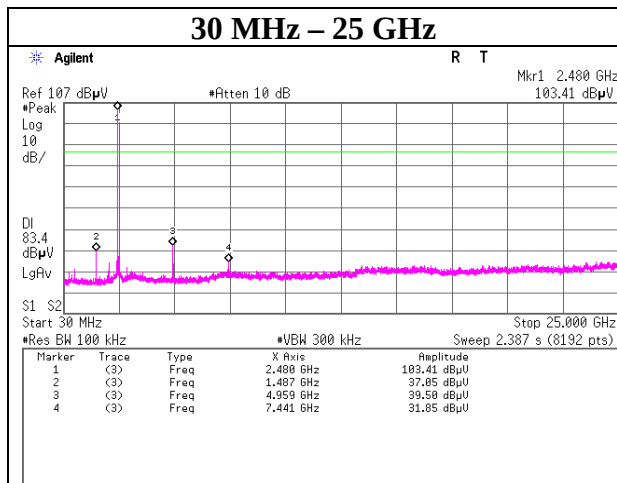
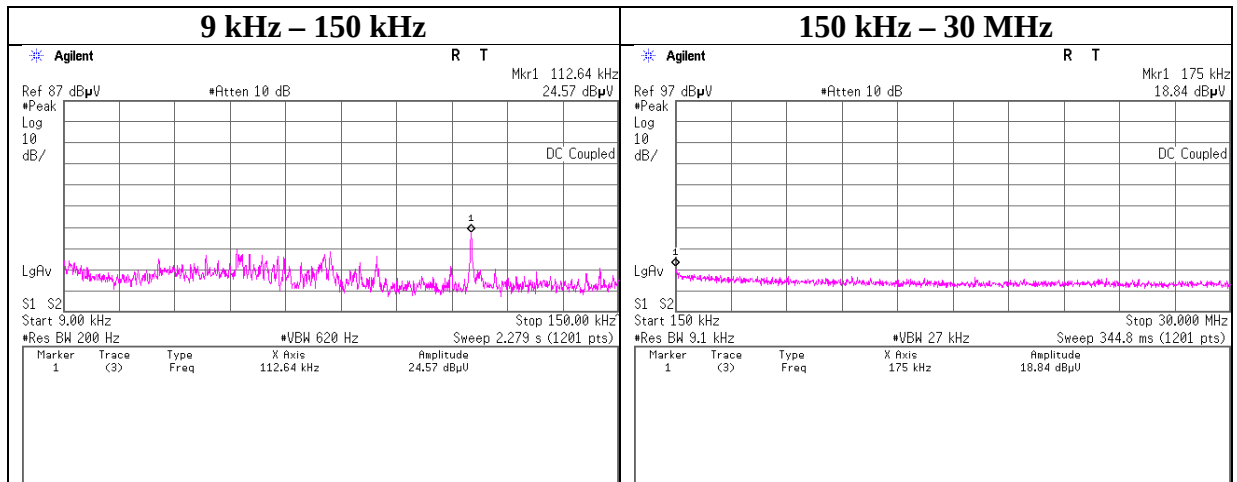
2441 MHz



Conducted Spurious Emission

Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	11706542H
Date	April 27, 2017
Temperature / Humidity	23 deg. C / 38 % RH
Engineer	Ken Fujita
Mode	Tx, Hopping Off, DH5

2480 MHz



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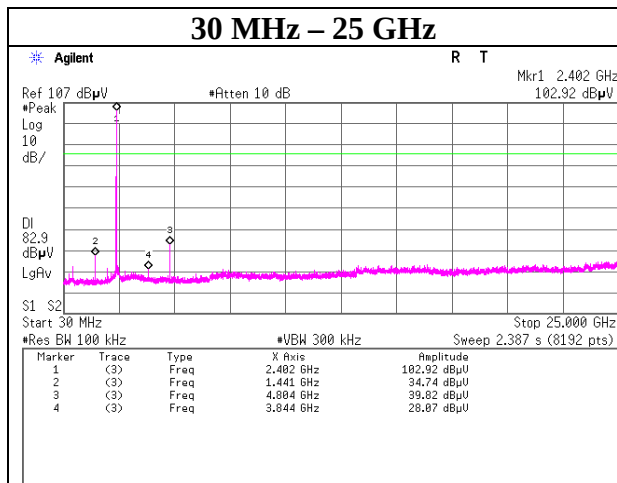
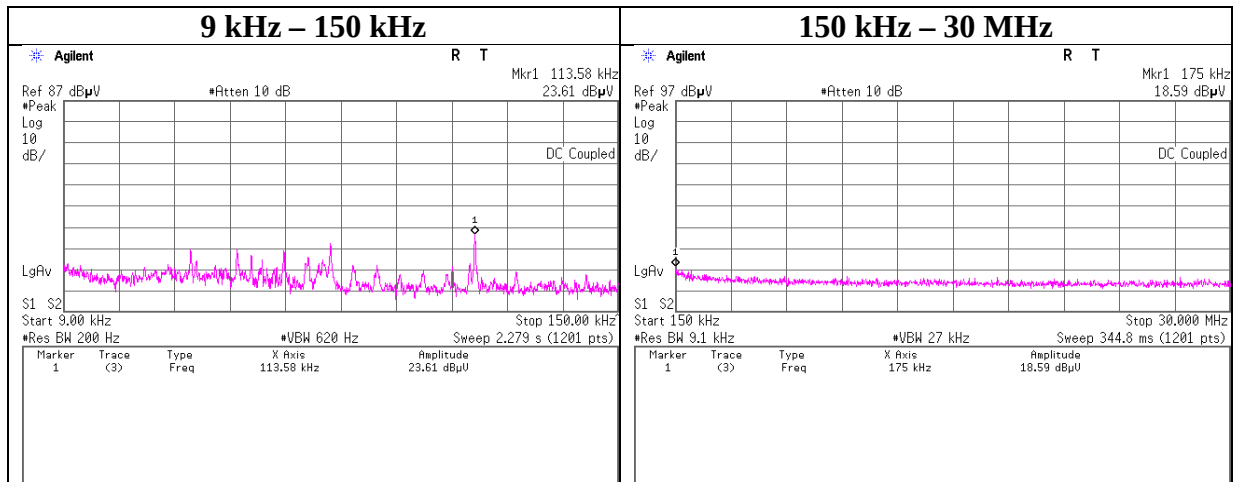
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

Conducted Spurious Emission

Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	11706542H
Date	April 27, 2017
Temperature / Humidity	23 deg. C / 38 % RH
Engineer	Ken Fujita
Mode	Tx, Hopping Off, 3DH5

2402 MHz



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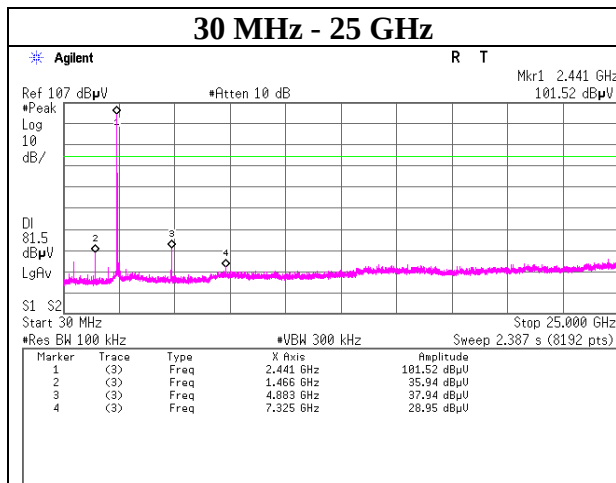
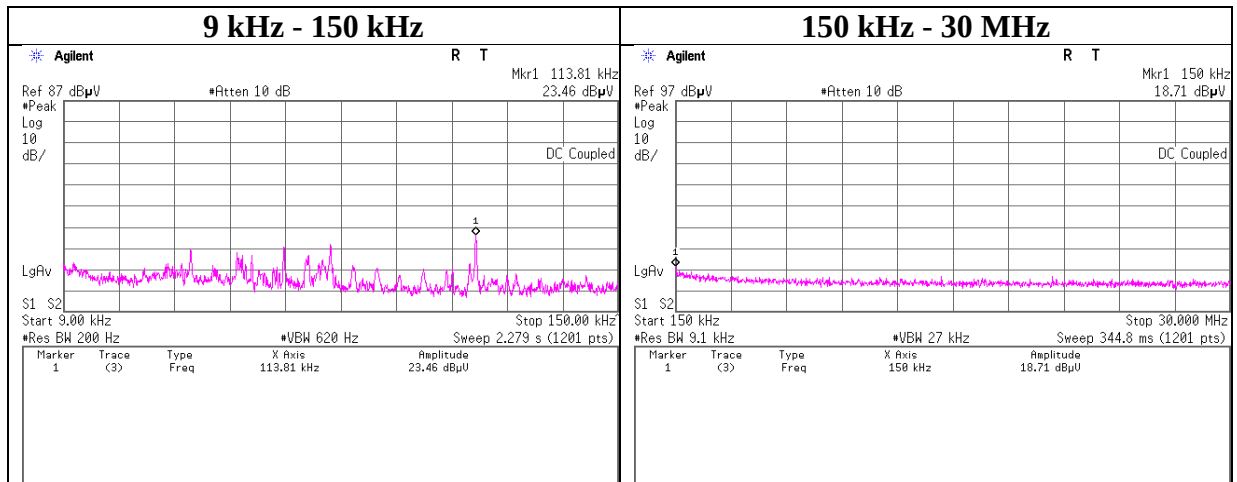
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

Conducted Spurious Emission

Test place Ise EMC Lab. No.6 Measurement Room
Report No. 11706542H
Date April 27, 2017
Temperature / Humidity 23 deg. C / 38 % RH
Engineer Ken Fujita
Mode Tx, Hopping Off, 3DH5

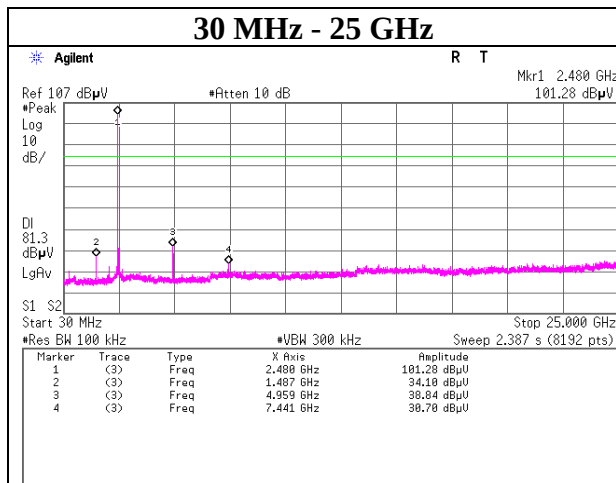
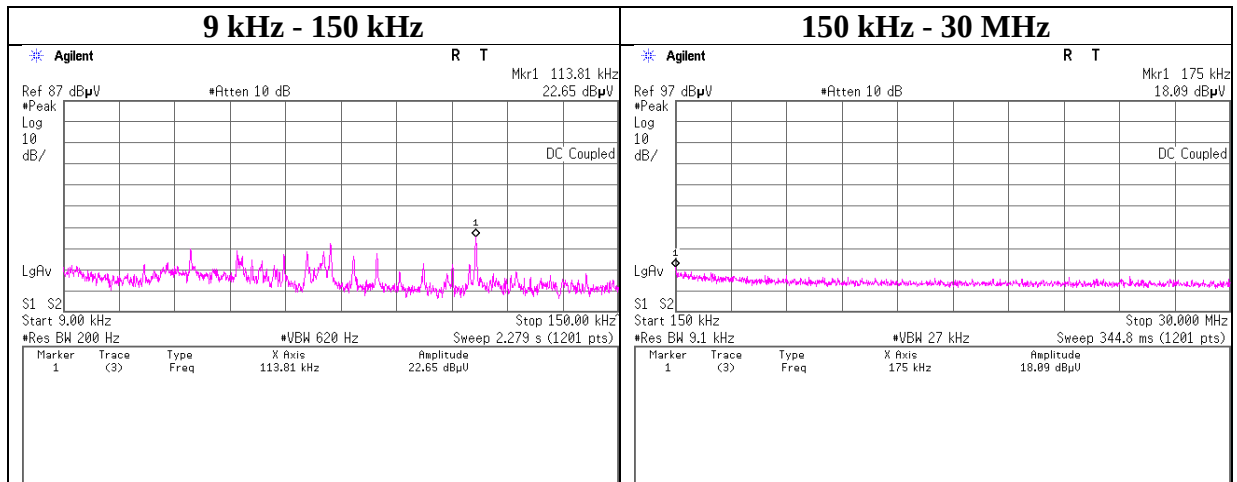
2441 MHz



Conducted Spurious Emission

Test place Ise EMC Lab. No.6 Measurement Room
Report No. 11706542H
Date April 27, 2017
Temperature / Humidity 23 deg. C / 38 % RH
Engineer Ken Fujita
Mode Tx, Hopping Off, 3DH5

2480 MHz



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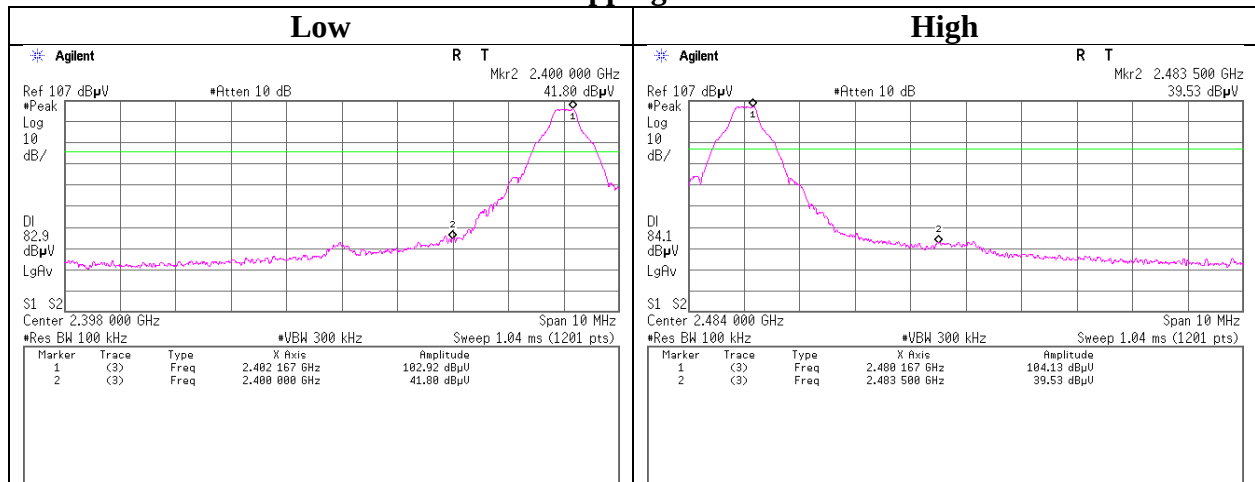
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

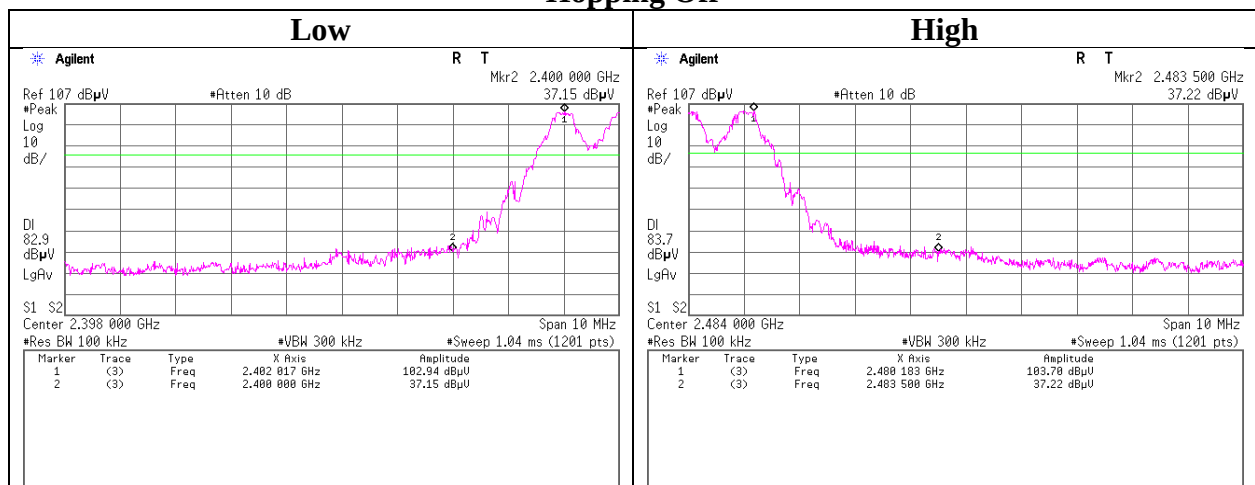
Conducted Emission Band Edge compliance

Test place : Ise EMC Lab. No.6 Measurement Room
Report No. : 11706542H
Date : April 27, 2017
Temperature / Humidity : 23 deg. C / 38 % RH
Engineer : Ken Fujita
Mode : Tx DH5

Hopping On



Hopping Off



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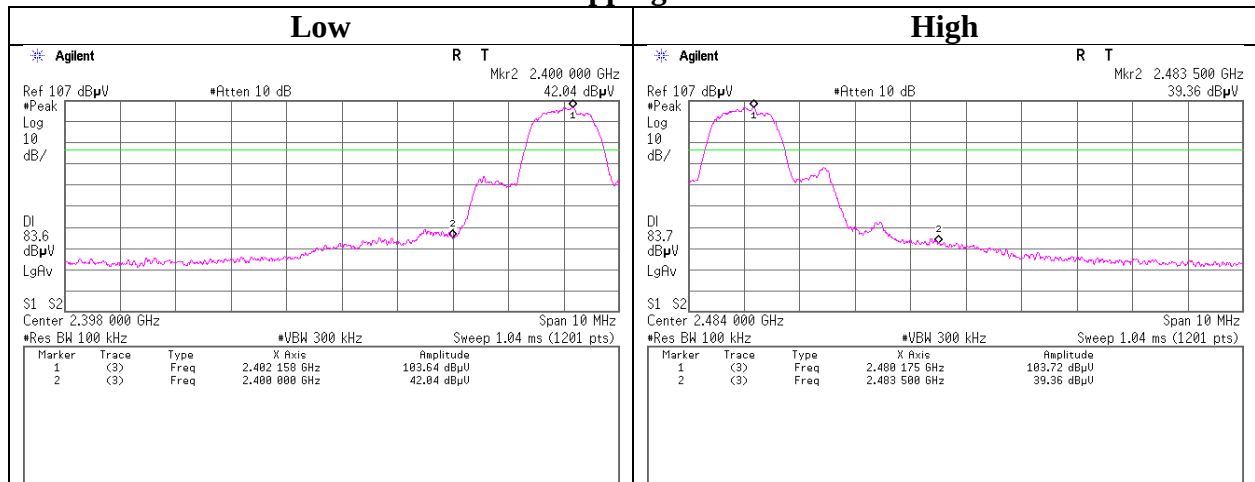
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

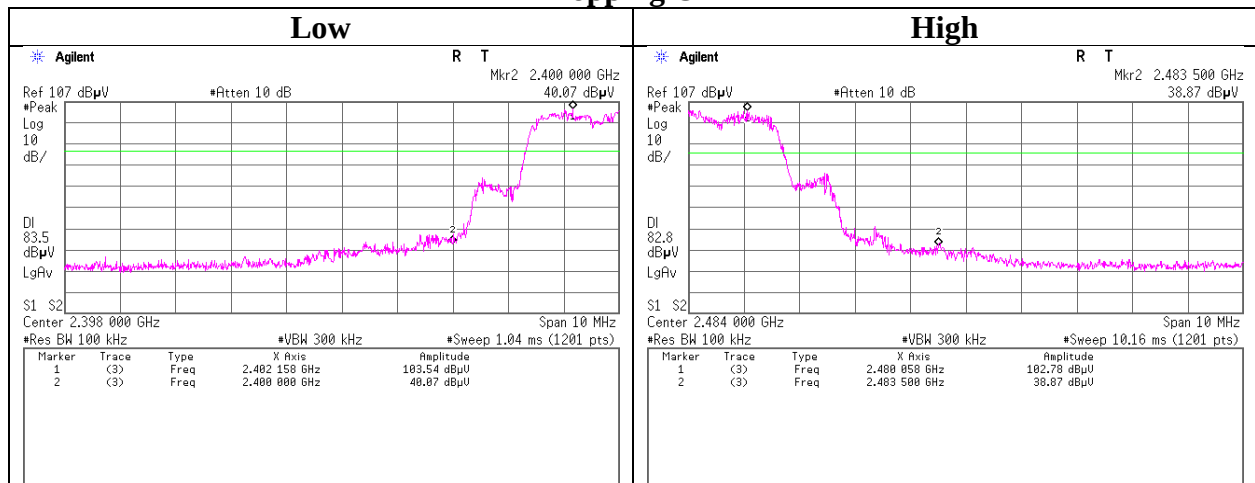
Conducted Emission Band Edge compliance

Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	11706542H
Date	April 27, 2017
Temperature / Humidity	23 deg. C / 38 % RH
Engineer	Ken Fujita
Mode	Tx 3DH5

Hopping On



Hopping Off



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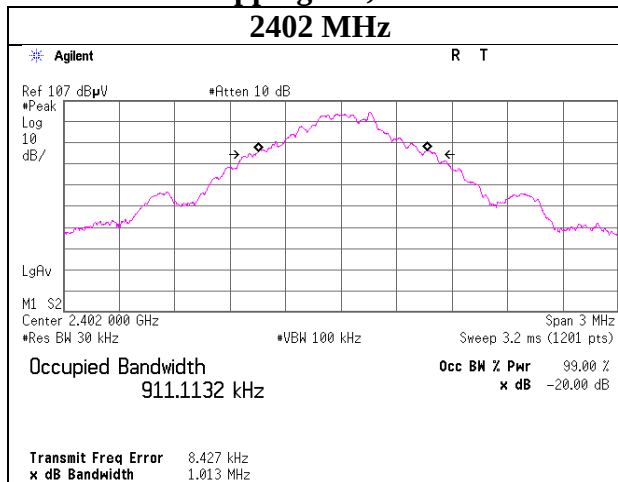
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

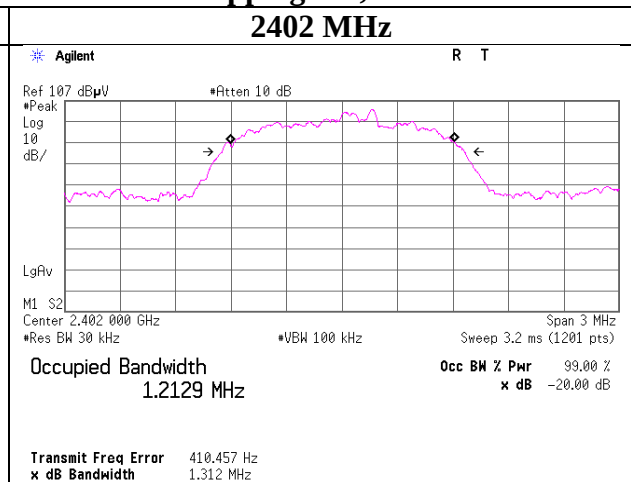
99% Occupied Bandwidth

Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	11706542H
Date	April 27, 2017
Temperature / Humidity	23 deg. C / 38 % RH
Engineer	Ken Fujita
Mode	Tx Hopping Off

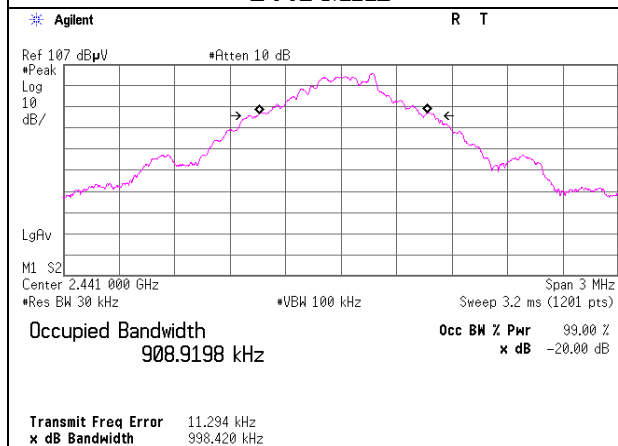
Hopping Off, DH5



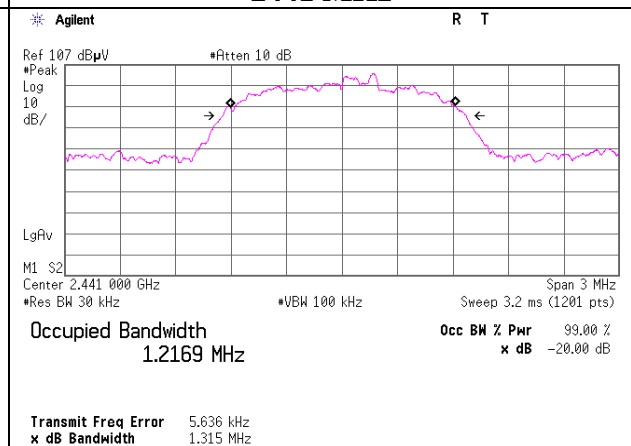
Hopping Off, 3DH5



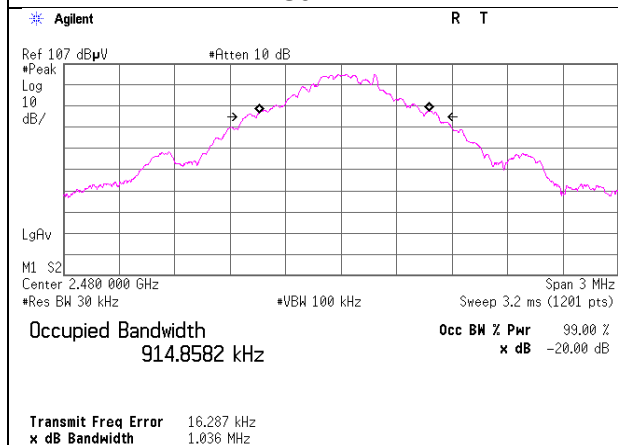
2441 MHz



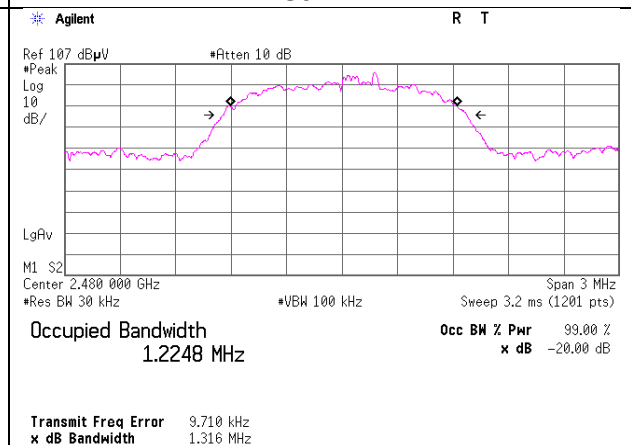
2441 MHz



2480 MHz



2480 MHz



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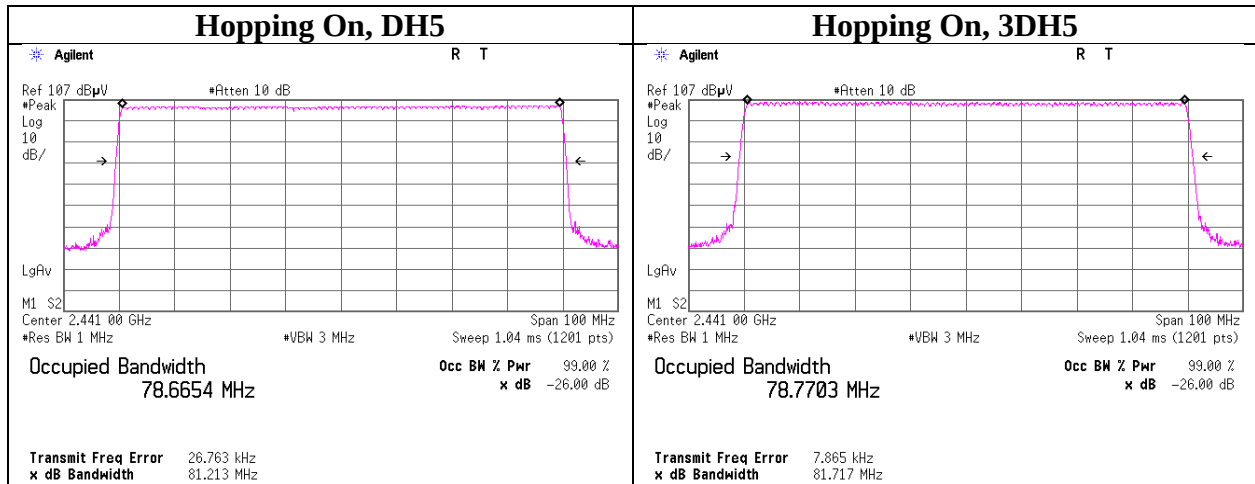
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Telephone : +81 596 24 8999

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99% Occupied Bandwidth

Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	11706542H
Date	April 27, 2017
Temperature / Humidity	23 deg. C / 38 % RH
Engineer	Ken Fujita
Mode	Tx Hopping On



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APPENDIX 2: Test instruments

Test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MOS-22	Thermo-Hygrometer	Custom	CTH-201	0003	RE	2016/12/13 * 12
MMM-01	Digital Tester	Fluke	FLUKE 26-3	78030611	RE	2016/08/23 * 12
MAEC-02	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-06902	RE	2016/08/02 * 12
MJM-14	Measure	KOMELON	KMC-36	-	RE	-
COTS-MEMI	EMI measurement program	TSJ	TEPTO-DV	-	RE/CE	-
MSA-04	Spectrum Analyzer	Agilent	E4448A	US44300523	RE	2016/11/10 * 12
MHA-06	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	254	RE	2017/02/24 * 12
MCC-216	Microwave Cable	Junkosha	MWX221	1604S253(1 m) / 1608S087(5 m)	RE	2016/08/29 * 12
MPA-10	Pre Amplifier	Agilent	8449B	3008A02142	RE	2017/01/16 * 12
MHF-26	High Pass Filter 3.5-18.0GHz	UL Japan	HPF SELECTOR	002	RE	2016/09/19 * 12
MHA-17	Horn Antenna 15-40GHz	Schwarzbeck	BBHA9170	BBHA9170307	RE	2016/06/24 * 12
MOS-14	Thermo-Hygrometer	Custom	CTH-201	1401	AT	2017/01/20 * 12
MMM-12	DIGITAL HiTESTER	Hioki	3805	060500120	AT	2017/02/15 * 12
MRENT-126	Spectrum Analyzer	KEYSIGHT	E4440A	MY46185516	AT	2016/07/01 * 12
MAT-90	Attenuator	Weinschel Associates	WA56-10	56100306	AT	2016/06/09 * 12
MCC-66	Microwave Cable 1G-40GHz	Suhner	SUCOFLEX102	28636/2	AT	2017/04/04 * 12
MPM-16	Power Meter	Agilent	8990B	MY51000271	AT	2017/04/28 * 12
MPSE-23	Power sensor	Agilent	N1923A	MY54070004	AT	2017/04/28 * 12
MAEC-04	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	RE/CE	2016/10/19 * 12
MOS-15	Thermo-Hygrometer	Custom	CTH-180	1501	RE/CE	2017/01/20 * 12
MJM-26	Measure	KOMELON	KMC-36	-	RE/CE	-
MTR-10	EMI Test Receiver	Rohde & Schwarz	ESR26	101408	RE/CE	2017/01/12 * 12
MLS-23	LISN(AMN)	Schwarzbeck	NSLK8127	8127-729	CE(EUT)	2016/07/07 * 12
MAT-67	Attenuator(13dB)	JFW Industries, Inc.	50FP-013H2 N	-	CE	2016/12/24 * 12
MCC-113	Coaxial cable	Fujikura/Suhner/TSJ	5D-2W(10m)/SF M141(5m)/421-0 10(1m)/sucfor m141-PE(1m)/R FM-E121(Switc her)	-/04178	CE	2016/07/20 * 12
MMM-10	DIGITAL HiTESTER	Hioki	3805	051201148	RE/CE	2017/01/19 * 12
MBA-05	Biconical Antenna	Schwarzbeck	BBA9106	1302	RE	2016/11/23 * 12
MLA-23	Logperiodic Antenna(200-1000MHz)	Schwarzbeck	VUSLP9111B	911B-192	RE	2017/01/26 * 12
MCC-50	Coaxial Cable	UL Japan	-	-	RE	2016/06/20 * 12
MAT-97	Attenuator	KEYSIGHT	8491A	MY52462282	RE	2016/10/31 * 12
MPA-14	Pre Amplifier	SONOMA INSTRUMENT	310	260833	RE	2017/03/27 * 12

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 test
RE: Radiated Emission test
AT: Antenna Terminal Conducted test

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