



RADIO TEST REPORT

Test Report No. : 11368501H-A-R1

Applicant : FUNAI ELECTRIC CO., LTD
Type of Equipment : SOUNDBAR
Model No. : FWSB415E A
FCC ID : ADTXHC00UH
Test regulation : FCC Part 15 Subpart C: 2016
Test Result : Complied

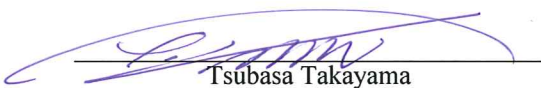
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6. This test report covers Radio technical requirements. It does not cover administrative issues such as Manual or non-Radio test related Requirements. (if applicable)
7. This report is a revised version of 11368501H-A. 11368501H-A is replaced with this report.

Date of test: July 14 to August 4, 2016

Representative test engineer:


Ken Fujita
Engineer
Consumer Technology Division

Approved by:


Tsubasa Takayama
Engineer
Consumer Technology Division



NVLAP LAB CODE: 200572-0

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13-EM-F0429

REVISION HISTORY

Original Test Report No.: 11368501H-A

[illegible]

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SECTION 1: Customer information

Company Name : FUNAI ELECTRIC CO., LTD
Address : 7-1, 7-chome, Nakagaito, Daito, Osaka 574-0013, Japan
Telephone Number : +81-6-6730-8785
Facsimile Number : +81-6-6730-8786
Contact Person : Masao Tani

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

2.1 Identification of E.U.T.

Type of Equipment : SOUNDBAR
Model No. : FWSB415E A
Serial No. : Refer to Section 4, Clause 4.2
Rating : AC 120V / 60 Hz
Receipt Date of Sample : July 12, 2016
Country of Mass-production : China
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: FWSB415E A (referred to as the EUT in this report) is a SOUNDBAR.

General Specification

Clock frequency(ies) in the RF part : System X'tal: 26 MHz
Clock frequency(ies) in the system : System X'tal: 24.576 MHz, System Clock: 148.5 MHz, D-AMP: 98.3 MHz,
SPDIF Clock: 24.576 MHz, AUDIO DAC Clock: 24.576 MHz

Radio Specification

[Bluetooth (Ver4.1 with EDR function)]

Radio Type : Transceiver
Frequency of Operation : 2402 MHz - 2480 MHz
Modulation : FHSS
Power Supply (radio part input) : DC 3.4 V
Antenna type : Monopole Antenna
Antenna Gain : 1.0 dBi
Antenna connector : Direct Connect

Variant model

Model No. FWSB415E A has variant model: No. MSB3610/F7.

Model No.	FWSB415E A	MSB3610/F7
Bland name	SANYO	MAGNAVOX
Remarks	Tested model	Variant model

They are identical in electronic characteristics.

SECTION 3: Test specification, procedures & results

3.1 Test Specification

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

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

* Also the EUT complies with FCC Part 15 Subpart B.

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 10.6 dB, 0.49440 MHz, N 0.49520 MHz, N AV 9.0 dB, 0.35284 MHz, N	Complied	-
Carrier Frequency Separation	FCC: FCC Public Notice DA 00-705 IC: -	FCC: Section15.247(a)(1) IC: RSS-247 5.1 (2)	See data.	Complied	Conducted
20dB Bandwidth	FCC: FCC Public Notice DA 00-705 IC: -	FCC: Section15.247(a)(1) IC: RSS-247 5.1 (1)		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 (4)		Complied	Conducted
Dwell time	FCC: FCC Public Notice DA 00-705 IC: -	FCC: Section15.247(a)(1)(iii) IC: RSS-247 5.1 (4)		Complied	Conducted
Maximum Peak Output Power	FCC: FCC Public Notice DA 00-705 IC: RSS-Gen 6.12	FCC: Section15.247(a)(b)(1) IC: RSS-247 5.4 (2)		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	3.2 dB 216.000 MHz, QP, 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)

This EUT provides stable voltage (DC 3.4 V) constantly to RF Part regardless of input voltage. Therefore, this EUT complies with the requirement.

FCC Part 15.203 Antenna requirement

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

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3.3 Addition to standard

Item	Test Procedure	Specification	Worst margin	Results	Remarks
99% Occupied 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	1.7 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

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

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3.5 Test Location

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

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
Inquiry

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 the test items based on Bluetooth Core specification. *EUT has the power settings by the software as follows; Power settings: BDR : 11, EDR : 11 Software: RDA Host Controller Tester Ver. Ver02.07.01 *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.		

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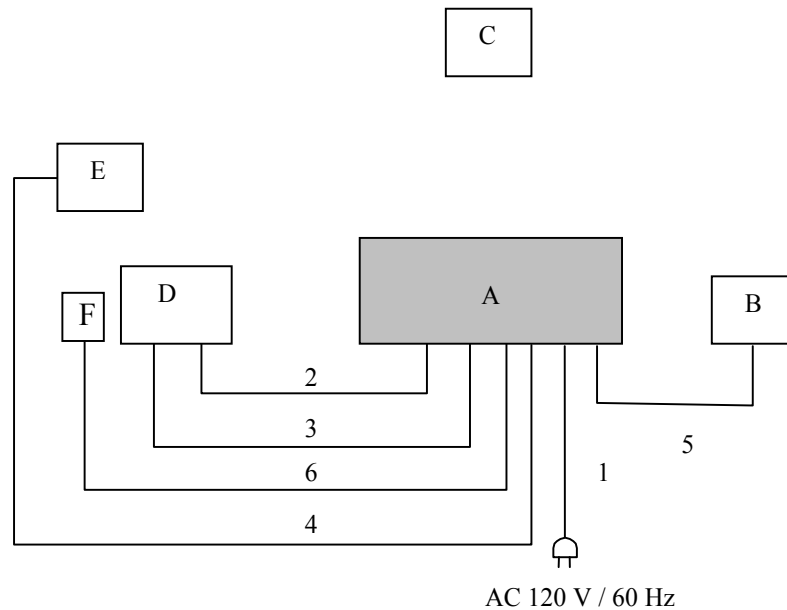
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4.2 Configuration and peripherals



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

Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remark
A	SOUNDBAR	FWSB415E A	J2761004 *1) J2761005 *2)	FUNAI ELECTRIC CO., LTD	EUT
B	SUBWOOFER	FWSB415E A	S0000071 *1)	FUNAI ELECTRIC CO., LTD	-
C	Remote Controller	NC306	RC27600001	FUNAI ELECTRIC CO., LTD	-
D	BD/DVD Player	BDP-BX57	1104409	Sony Corporation	-
E	iPad	A1432	F9GP34WAF196	Apple Inc.	-
F	USB Memory	SDDD2-016G	-	SanDisk Corporation	-

*1) Used for Conducted Emission and Radiated Emission test only.

*2) Used for Antenna Terminal Conducted test only.

List of cables used

No.	Name	Length (m)	Shield		Remark
			Cable	Connector	
1	AC Cable	1.5	Unshielded	Unshielded	-
2	Audio Cable (Line)	1.5	Shielded	Shielded	-
3	Optical Cable	1.0	Unshielded	Unshielded	-
4	Audio Cable	1.5	Shielded	Shielded	-
5	Audio Cable	2.8	Unshielded	Unshielded	-
6	USB Cable	3.0	Shielded	Shielded	-

SECTION 5: Conducted Emission

Test Procedure and conditions

EUT was placed on a urethane platform of nominal size, 1.0 m by 2.0 m, raised 0.8m 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 1GHz]

EUT was placed on a urethane platform of nominal size, 1.0 m by 2.0 m, raised 0.8 m above the conducting ground plane. The Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with a ground plane.

[For above 1GHz]

EUT was placed on a urethane platform of nominal size, 0.5 m by 1.5 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	Below 30 MHz	30 MHz to 200 MHz	200 MHz to 1 GHz	Above 1 GHz
Antenna Type	Loop	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	3.5 m*2) (1 GHz – 10 GHz), 1 m*3) (10 GHz – 26.5 GHz)		3.5 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: $20 \times \log (3.5 \text{ m}/3.0 \text{ m}) = 1.34 \text{ dB}$

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

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

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

Measurement range : 30 M - 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 *1)	Spectrum Analyzer
Maximum Peak Output Power	-	-	-	Auto	Peak Average *3)	-	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 *2)	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) The measurement was performed with Max Hold since the duty cycle was not 100 %.

*2) 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).

*3) Reference data

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

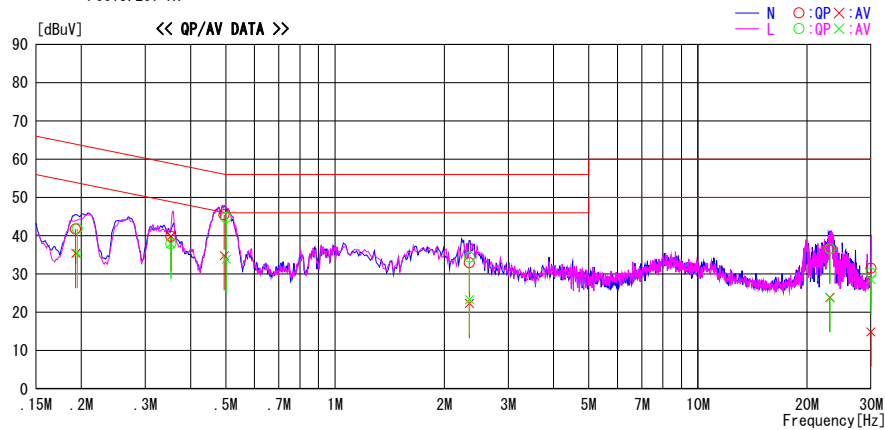
UL Japan, Inc. Ise EMC Lab. No.3 Semi Anechoic Chamber
Date : 2016/07/15

Report No. : 11368501H

Temp./Humi. : 23deg. C / 46% RH
Engineer : Shinichi Miyazono

Mode / Remarks : BT Tx DH5 2402MHz

LIMIT : FCC15.207 QP
FCC15.207 AV

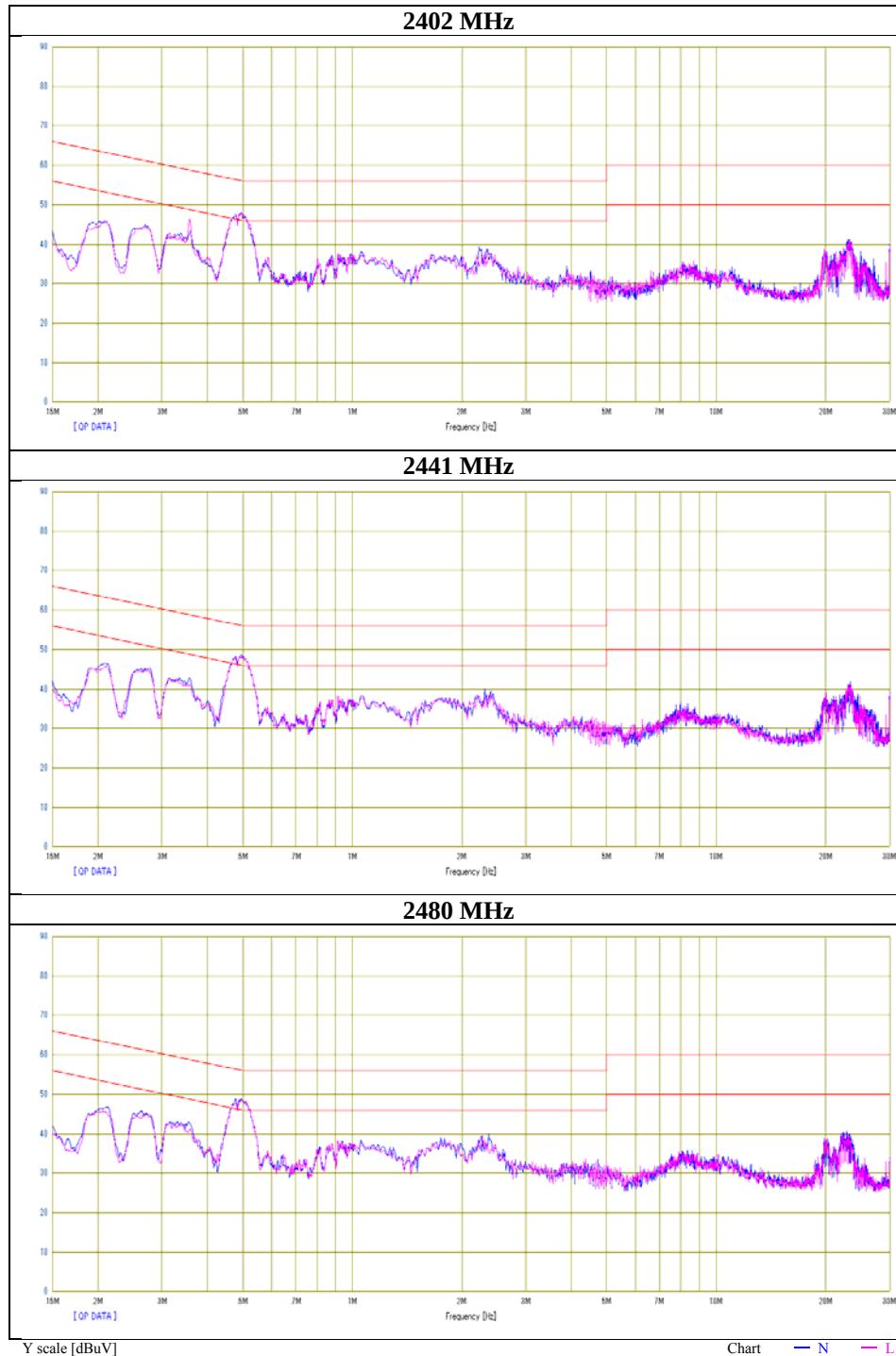


Frequency [MHz]	Reading Level		Corr. Factor	Results		Limit		Margin		Phase	Comment
	QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dB]	AV [dB]		
0.19290	28.5	22.2	13.2	41.7	35.4	63.9	53.9	22.2	18.5	N	
0.35284	26.5	26.6	13.3	39.8	39.9	58.9	48.9	19.1	9.0	N	
0.49520	32.2	21.5	13.3	45.5	34.8	56.1	46.1	10.6	11.3	N	
2.34550	19.4	8.8	13.5	32.9	22.3	56.0	46.0	23.1	23.7	N	
23.07600	22.0	9.3	14.6	36.6	23.9	60.0	50.0	23.4	26.1	N	
29.98838	16.6	0.0	14.9	31.5	14.9	60.0	50.0	28.5	35.1	N	
0.19490	28.6	22.2	13.2	41.8	35.4	63.8	53.8	22.0	18.4	L	
0.35280	24.6	24.6	13.3	37.9	37.9	58.9	48.9	21.0	11.0	L	
0.50160	31.4	20.6	13.3	44.7	33.9	56.0	46.0	11.3	12.1	L	
2.34610	20.9	9.8	13.5	34.4	23.3	56.0	46.0	21.6	22.7	L	
23.13360	22.0	9.2	14.6	36.6	23.8	60.0	50.0	23.4	26.2	L	
29.98844	15.3	13.7	14.9	30.2	28.6	60.0	50.0	29.8	21.4	L	

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

Conducted Emission

Test place	Ise EMC Lab. No.3 Semi Anechoic Chamber
Report No.	11368501H
Date	July 14, 2016
Temperature / Humidity	23 deg. C / 46 % RH
Engineer	Shinichi Miyazono
Mode	Tx, Hopping Off, DH5



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Conducted Emission

DATA OF CONDUCTED EMISSION TEST

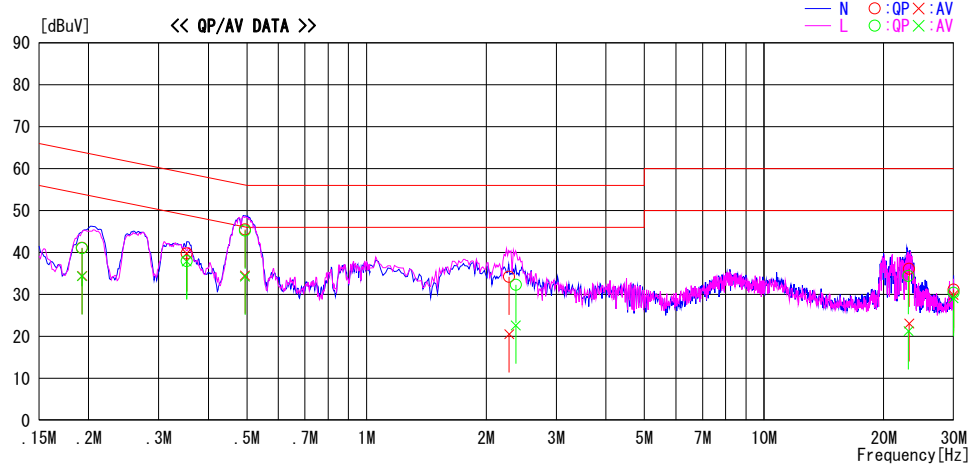
UL Japan, Inc. Ise EMC Lab. No.3 Semi Anechoic Chamber
Date : 2016/07/15

Report No. : 11368501H

Temp./Humi. : 23deg. C / 46% RH
Engineer : Shinichi Miyazono

Mode / Remarks : BT Tx 3DH5 2402MHz

LIMIT : FCC15.207 QP
FCC15.207 AV



Frequency [MHz]	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]		
0.19260	27.9	21.2	13.2	41.1	34.4	63.9	53.9	22.8	19.5	N	
0.35280	26.4	26.5	13.3	39.7	39.8	58.9	48.9	19.2	9.1	N	
0.49440	32.2	21.2	13.3	45.5	34.5	56.1	46.1	10.6	11.6	N	
2.28400	20.7	7.0	13.5	34.2	20.5	56.0	46.0	21.8	25.5	N	
23.18400	21.5	8.5	14.6	36.1	23.1	60.0	50.0	23.9	26.9	N	
29.98835	16.2	15.0	14.9	31.1	29.9	60.0	50.0	28.9	20.1	N	
0.19230	27.8	21.1	13.2	41.0	34.3	63.9	53.9	22.9	19.6	L	
0.35284	24.6	24.6	13.3	37.9	37.9	58.9	48.9	21.0	11.0	L	
0.49440	31.9	20.9	13.3	45.2	34.2	56.1	46.1	10.9	11.9	L	
2.37340	18.8	9.1	13.5	32.3	22.6	56.0	46.0	23.7	23.4	L	
23.07200	19.8	6.6	14.6	34.4	21.2	60.0	50.0	25.6	28.8	L	
29.98840	15.5	14.2	14.9	30.4	29.1	60.0	50.0	29.6	20.9	L	

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

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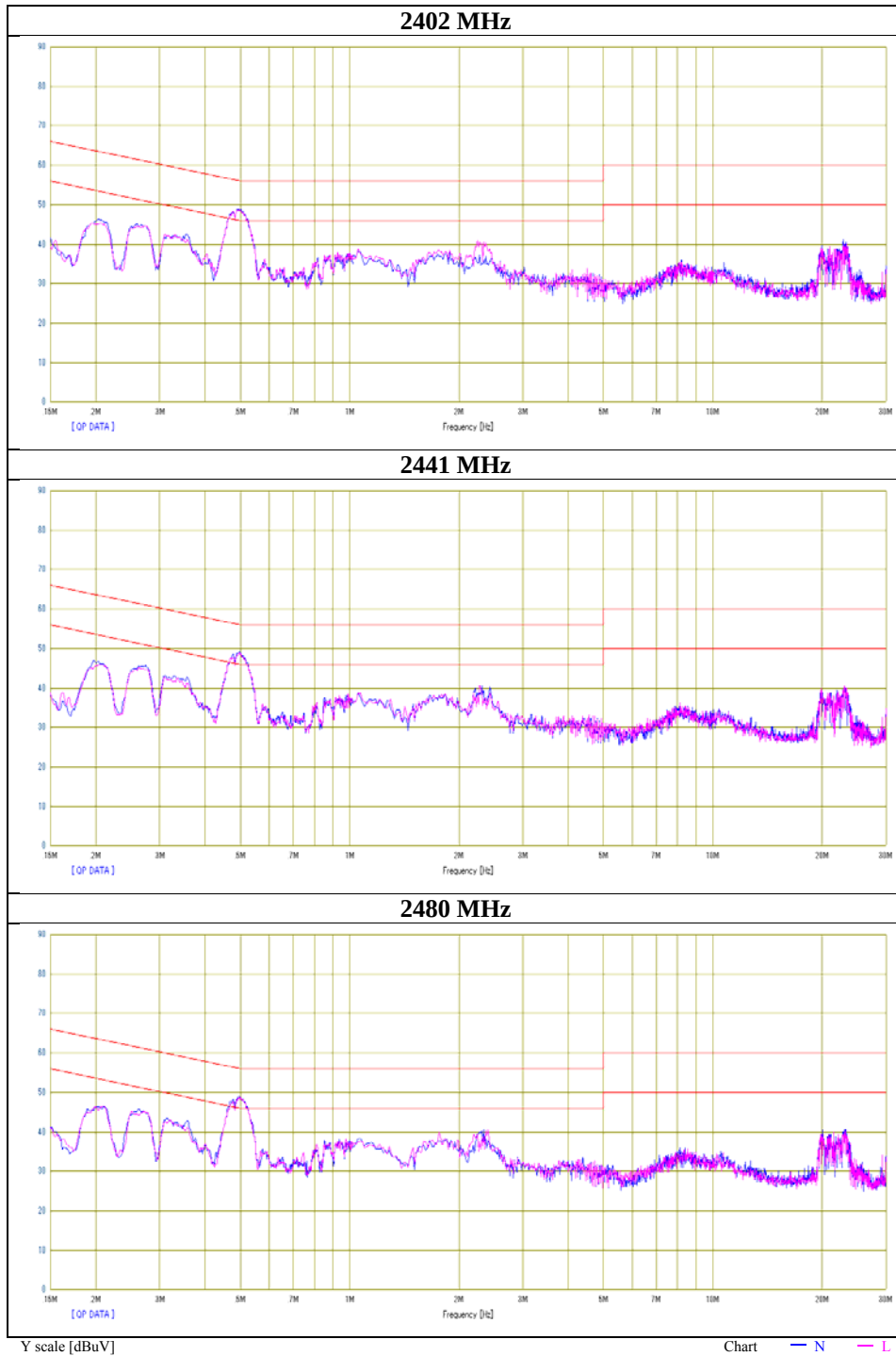
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Conducted Emission

Test place	Ise EMC Lab. No.3 Semi Anechoic Chamber
Report No.	11368501H
Date	July 14, 2016
Temperature / Humidity	23 deg. C / 46 % RH
Engineer	Shinichi Miyazono
Mode	Tx, Hopping Off, 3DH5



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20dB Bandwidth and Carrier Frequency Separation

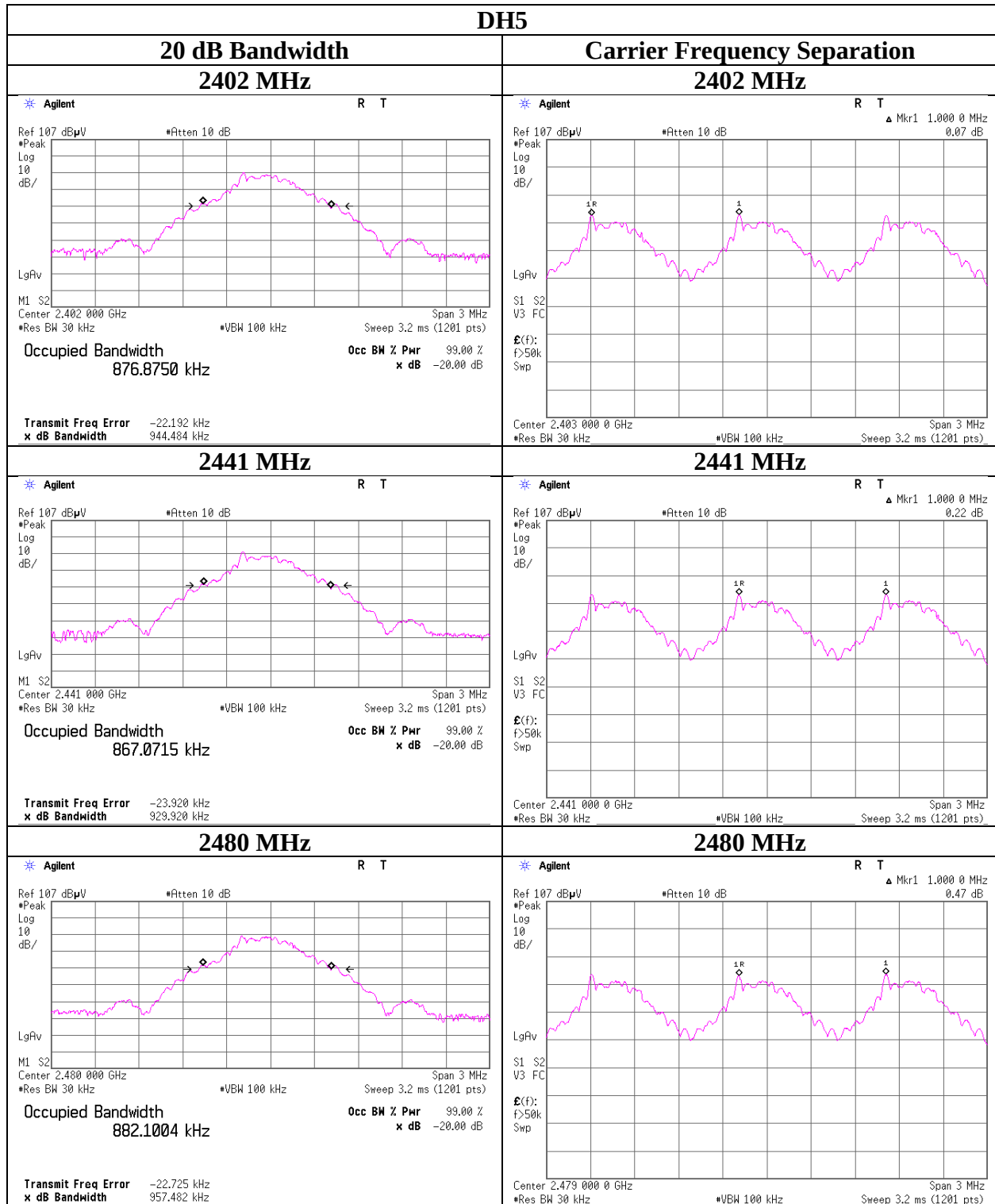
Test place Ise EMC Lab. No.11 Measurement Room
Report No. 11368501H
Date July 14, 2016 July 20, 2016
Temperature / Humidity 23 deg. C / 45 RH 25 deg. C / 50 % RH
Engineer Ken Fujita Masafumi Niwa
Mode Tx, Hopping Off, DH5

Mode	Freq. [MHz]	20dB Bandwidth [MHz]	Carrier Frequency Separation [MHz]	Limit for Carrier Frequency separation [MHz]
DH5	2402.0	0.944	1.000	≥ 0.629
DH5	2441.0	0.930	1.000	≥ 0.620
DH5	2480.0	0.957	1.000	≥ 0.638
3DH5	2402.0	1.260	1.000	≥ 0.840
3DH5	2441.0	1.262	1.000	≥ 0.841
3DH5	2480.0	1.260	1.000	≥ 0.840

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

No limit applies to 20dB Bandwidth.

20dB Bandwidth and Carrier Frequency Separation



UL Japan, Inc.

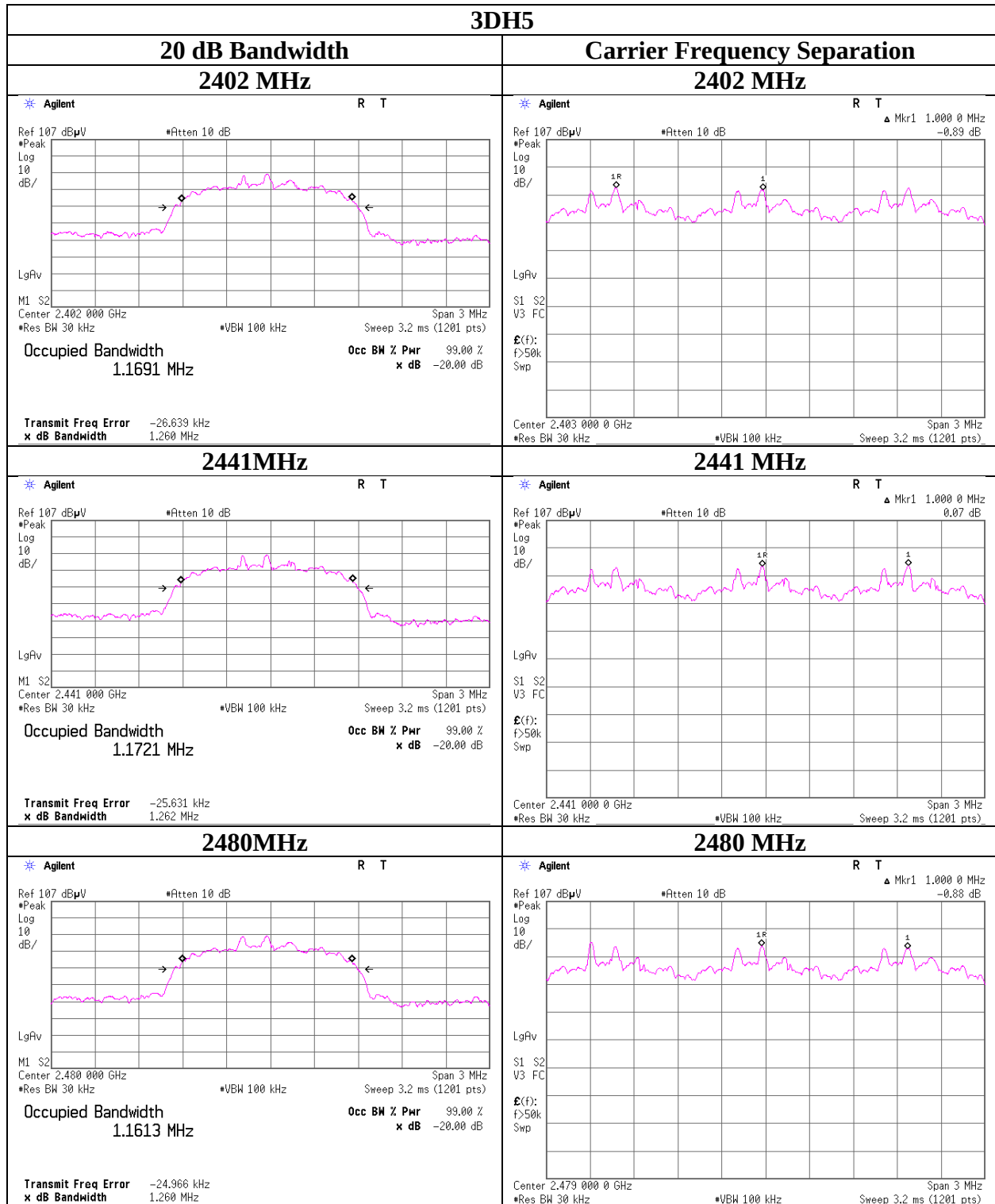
Ise EMC Lab.

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20dB Bandwidth and Carrier Frequency Separation



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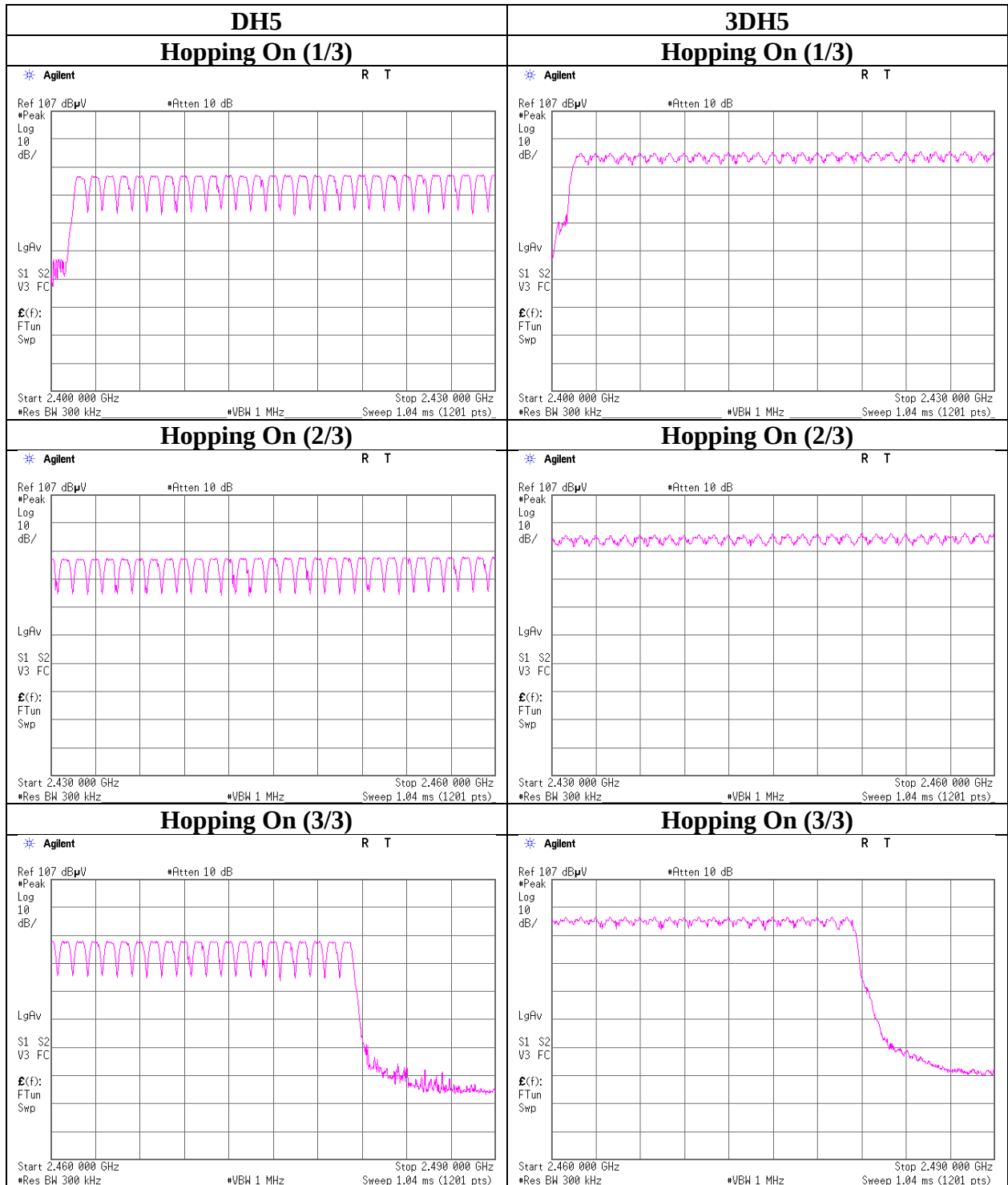
Number of Hopping Frequency

Test place Ise EMC Lab. No.11 Measurement Room
Report No. 11368501H
Date July 20, 2016
Temperature / Humidity 25 deg. C / 50 % RH
Engineer Masafumi Niwa
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



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Dwell time

Test place : Ise EMC Lab. No.11 Measurement Room
Report No. : 11368501H
Date : July 20, 2016
Temperature / Humidity : 25 deg. C / 50 % RH
Engineer : Masafumi Niwa
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	50.4 times	/	5 sec.	x	31.6 sec. =	319 times	400
DH3	25.4 times	/	5 sec.	x	31.6 sec. =	161 times	400
DH5	16.6 times	/	5 sec.	x	31.6 sec. =	105 times	400
3DH1	50.4 times	/	5 sec.	x	31.6 sec. =	319 times	400
3DH3	25.8 times	/	5 sec.	x	31.6 sec. =	164 times	400
3DH5	16.8 times	/	5 sec.	x	31.6 sec. =	107 times	400

Sample Calculation

Result = Number of transmission x Length of transmission

*Average data of 5 tests.(except Inquiry)

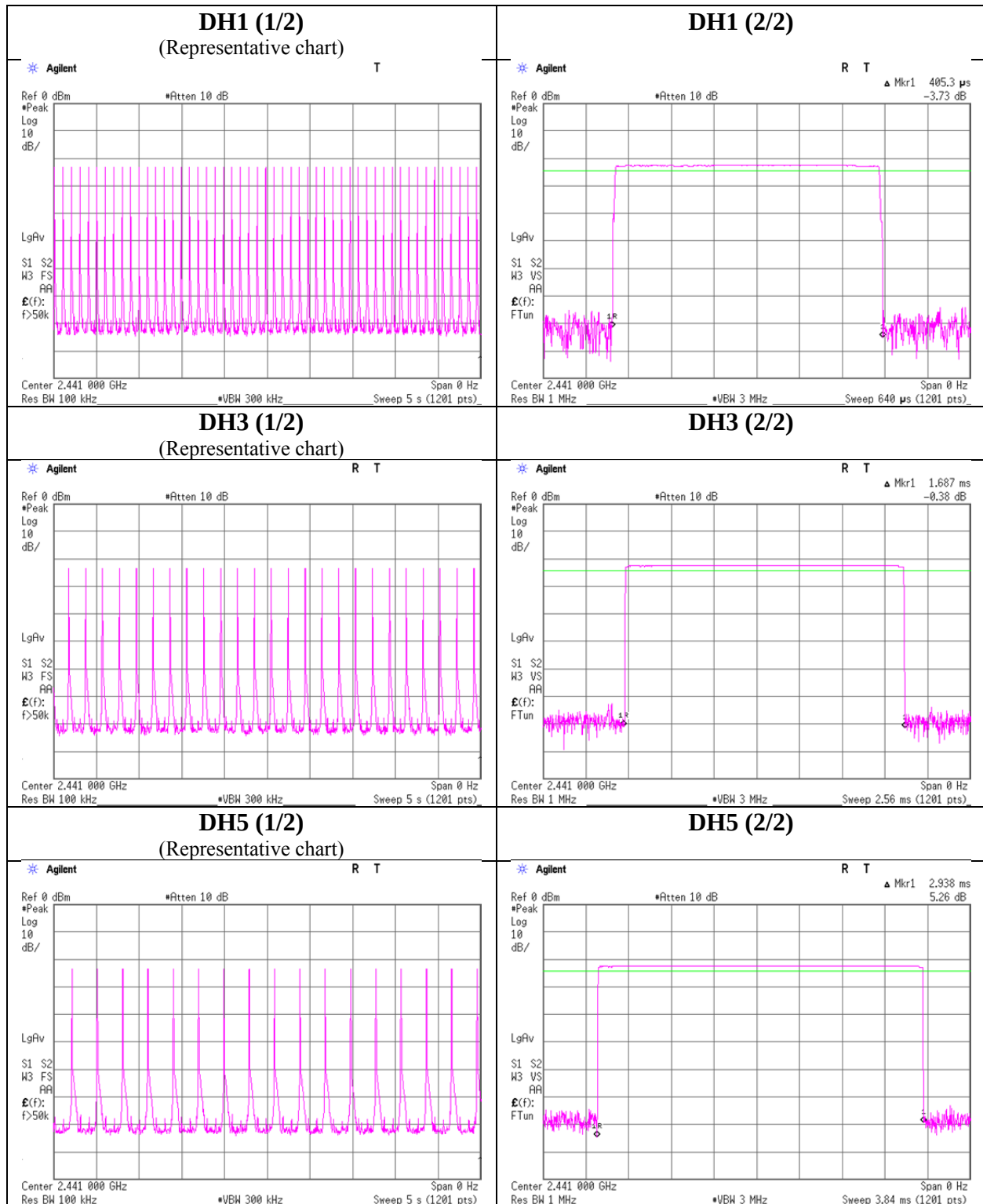
Mode	Sampling [times]					Average [times]
	1	2	3	4	5	
DH1	51	50	50	51	50	50.4
DH3	25	26	26	25	25	25.4
DH5	17	17	17	16	16	16.6
3DH1	50	50	51	50	51	50.4
3DH3	25	26	26	26	26	25.8
3DH5	17	17	17	16	17	16.8

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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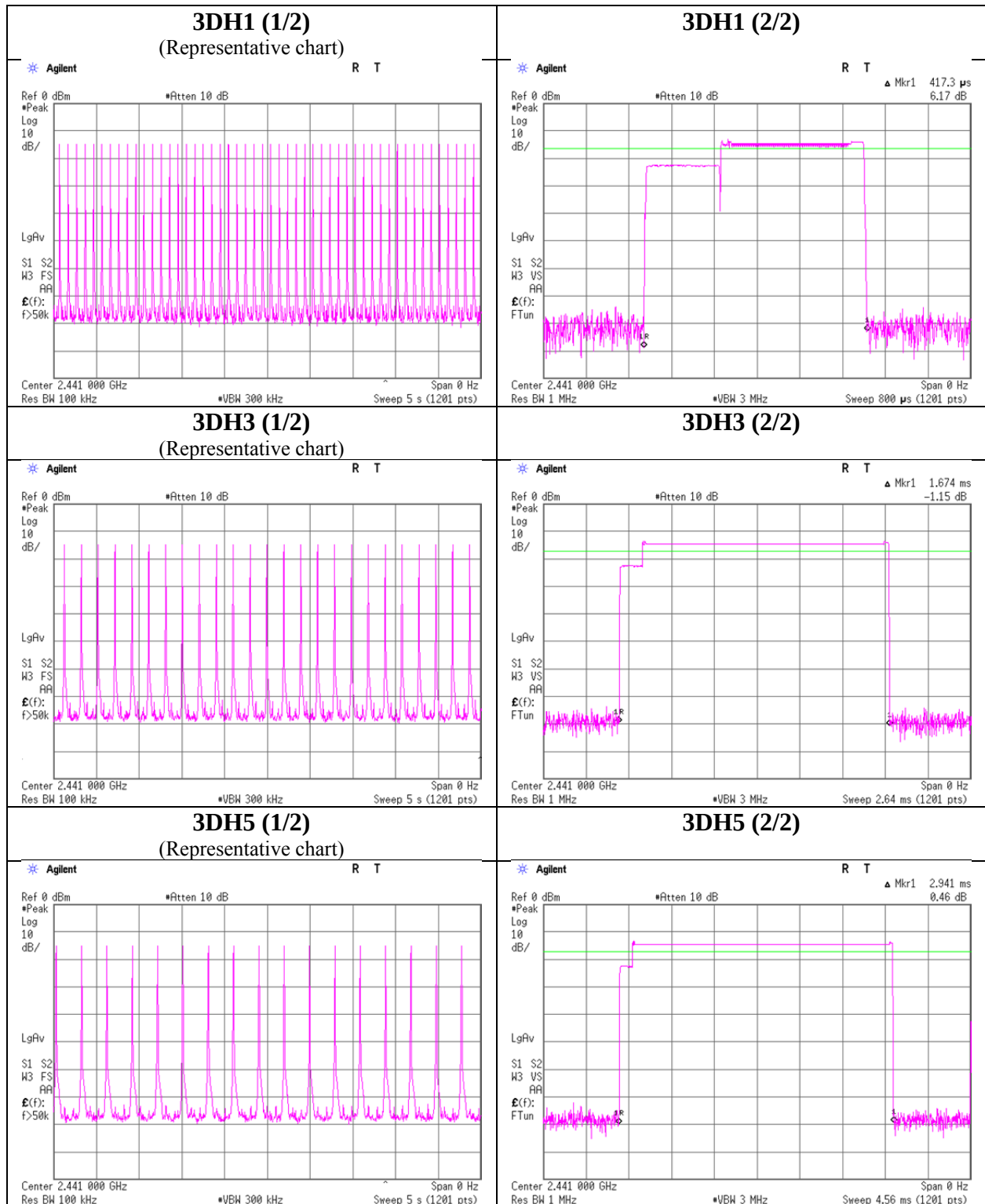
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Dwell time



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Maximum Peak Output Power

Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	11368501H
Date	August 4, 2016
Temperature / Humidity	24 deg. C / 51 % RH
Engineer	Masafumi Niwa
Mode	Tx, Hopping Off

Mode	Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result		Limit		Margin [dB]
					[dBm]	[mW]	[dBm]	[mW]	
DH5	2402.0	-7.25	3.39	0.00	-3.86	0.41	20.96	125	24.82
DH5	2441.0	-7.45	3.40	0.00	-4.05	0.39	20.96	125	25.01
DH5	2480.0	-7.55	3.40	0.00	-4.15	0.38	20.96	125	25.11
2DH5	2402.0	-7.73	3.39	0.00	-4.34	0.37	20.96	125	25.30
2DH5	2441.0	-7.31	3.40	0.00	-3.91	0.41	20.96	125	24.87
2DH5	2480.0	-7.35	3.40	0.00	-3.95	0.40	20.96	125	24.91
3DH5	2402.0	-7.72	3.39	0.00	-4.33	0.37	20.96	125	25.29
3DH5	2441.0	-7.30	3.40	0.00	-3.90	0.41	20.96	125	24.86
3DH5	2480.0	-7.46	3.40	0.00	-4.06	0.39	20.96	125	25.02

Sample Calculation:

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

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

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.

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Average Output Power
(Reference data)

Test place : Ise EMC Lab. No.11 Measurement Room
Report No. : 11368501H
Date : August 4, 2016
Temperature / Humidity : 24 deg. C / 51 % RH
Engineer : Masafumi Niwa
Mode : Tx, Hopping Off

Mode	Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Time average)	
					[dBm]	[mW]
DH5	2402.0	-9.11	3.39	0.00	-5.72	0.27
DH5	2441.0	-9.16	3.40	0.00	-5.76	0.27
DH5	2480.0	-9.20	3.40	0.00	-5.80	0.26
2DH5	2402.0	-10.05	3.39	0.00	-6.66	0.22
2DH5	2441.0	-10.12	3.40	0.00	-6.72	0.21
2DH5	2480.0	-10.22	3.40	0.00	-6.82	0.21
3DH5	2402.0	-10.04	3.39	0.00	-6.65	0.22
3DH5	2441.0	-10.13	3.40	0.00	-6.73	0.21
3DH5	2480.0	-10.00	3.40	0.00	-6.60	0.22

Sample Calculation:

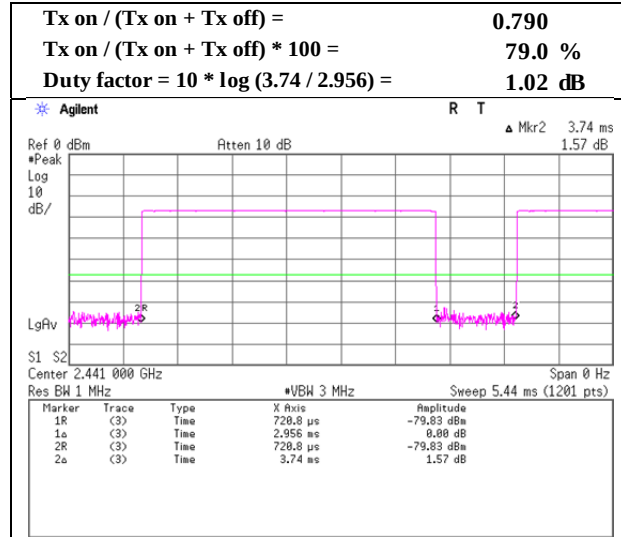
Result (Time average) = Reading + Cable Loss (including the cable(s) customer supplied)

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

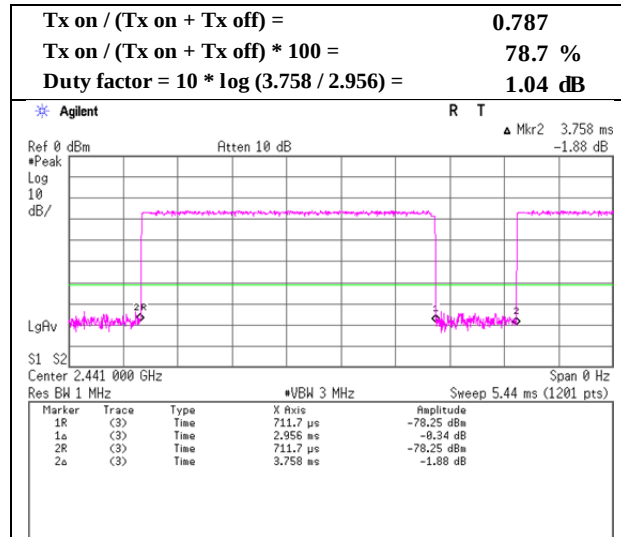
Burst Rate Confirmation

Test place : Ise EMC Lab. No.11 Measurement Room
Report No. : 11368501H
Date : July 20, 2016
Temperature / Humidity : 25 deg. C / 50 % RH
Engineer : Masafumi Niwa
Mode : Tx, Hopping Off

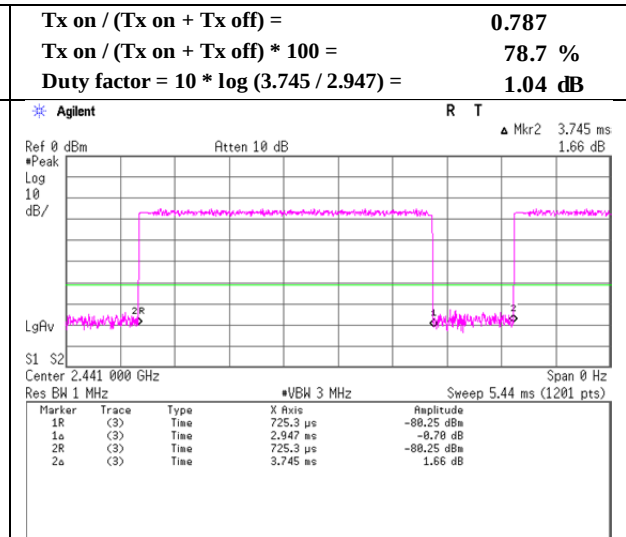
DH5



2DH5

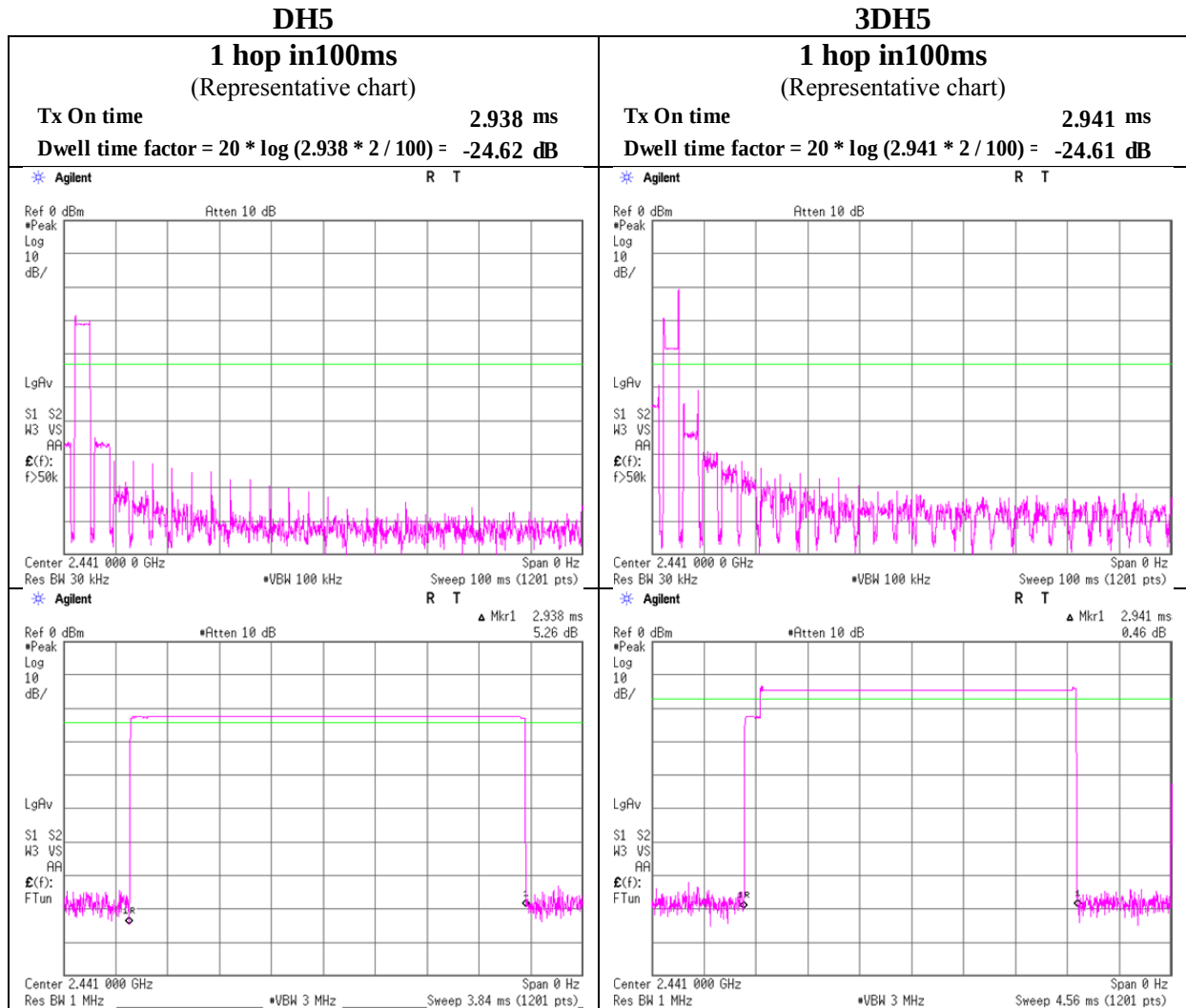


3DH5



Dwell time factor

Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	11368501H
Date	July 20, 2016
Temperature / Humidity	25 deg. C / 50 % RH
Engineer	Masafumi Niwa
Mode	Tx, Hopping On



A hopping channel might be occupied 2 times within 100 ms on minimum hopping mode (AFH). Therefore Tx On time was multiplied by 2. As for Tx On time, refer to “Burst Rate Confirmation”.

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Radiated Spurious Emission

Test place : Ise EMC Lab. No.4 Semi Anechoic Chamber
Report No. : 11368501H
Date : July 19, 2016 July 19, 2016
Temperature / Humidity : 23 deg. C / 53 % RH 24 deg. C / 50 % RH
Engineer : Satofumi Matsuyama Tomoki Matsui
(Above 1GHz) (Below 1GHz)
Mode : Tx, Hopping Off, DH5 2402 MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	72.012	QP	46.0	6.2	7.9	32.1	-	28.0	40.0	12.0	
Hori	120.038	QP	39.9	12.8	8.4	32.0	-	29.1	43.5	14.4	
Hori	180.629	QP	45.9	16.1	9.0	32.0	-	39.0	43.5	4.5	
Hori	192.021	QP	41.7	16.2	9.1	31.9	-	35.1	43.5	8.4	
Hori	216.000	QP	48.5	11.5	9.3	31.9	-	37.4	43.5	6.1	
Hori	330.226	QP	43.9	14.2	10.0	31.9	-	36.2	46.0	9.8	
Hori	2390.000	PK	56.0	27.9	4.5	32.1	-	56.3	73.9	17.6	
Hori	2609.987	PK	46.7	28.1	4.6	32.0	-	47.4	73.9	26.5	
Hori	4804.000	PK	50.9	32.8	6.8	31.3	-	59.2	73.9	14.7	
Hori	7206.000	PK	44.7	36.8	7.9	32.6	-	56.8	73.9	17.1	
Hori	9608.000	PK	39.2	38.1	8.7	32.6	-	53.4	73.9	20.5	Floor noise
Hori	2390.000	AV	28.0	27.9	4.5	32.1	-	28.3	53.9	25.6	
Hori	2609.987	AV	38.6	28.1	4.6	32.0	-	39.3	53.9	14.6	
Vert	58.916	QP	46.6	7.8	7.7	32.1	-	30.0	40.0	10.0	
Vert	72.012	QP	53.1	6.2	7.9	32.1	-	35.1	40.0	4.9	
Vert	120.038	QP	45.9	12.8	8.4	32.0	-	35.1	43.5	8.4	
Vert	180.629	QP	43.7	16.1	9.0	32.0	-	36.8	43.5	6.7	
Vert	192.021	QP	44.6	16.2	9.1	31.9	-	38.0	43.5	5.5	
Vert	216.000	QP	51.4	11.5	9.3	31.9	-	40.3	43.5	3.2	
Vert	2390.000	PK	58.3	27.9	4.5	32.1	-	58.6	73.9	15.3	
Vert	2609.987	PK	48.3	28.1	4.6	32.0	-	49.0	73.9	24.9	
Vert	4804.000	PK	50.7	32.8	6.8	31.3	-	59.0	73.9	14.9	
Vert	7206.000	PK	44.7	36.8	7.9	32.6	-	56.8	73.9	17.1	
Vert	9608.000	PK	39.4	38.1	8.7	32.6	-	53.6	73.9	20.3	Floor noise
Vert	2390.000	AV	29.9	27.9	4.5	32.1	-	30.2	53.9	23.7	
Vert	2609.987	AV	42.7	28.1	4.6	32.0	-	43.4	53.9	10.5	

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 (3.5 m / 3.0 m) = 1.34 dB
10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB

Dwell time factor relaxation

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Dwell Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	4804.000	AV	42.9	32.8	6.8	31.3	-24.6	26.6	53.9	27.3	*
Hori	7206.000	AV	33.7	36.8	7.9	32.6	-24.6	21.2	53.9	32.7	*
Hori	9608.000	AV	26.9	38.1	8.7	32.6	-24.6	16.5	53.9	37.4	*
Vert	4804.000	AV	42.4	32.8	6.8	31.3	-24.6	26.1	53.9	27.8	*
Vert	7206.000	AV	32.3	36.8	7.9	32.6	-24.6	19.8	53.9	34.1	*
Vert	9608.000	AV	26.9	38.1	8.7	32.6	-24.6	16.5	53.9	37.4	*

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

- Gain(Amplifier) + Dwell time factor (Refer to dwell time data sheet)

*Above noise was synchronized with carrier frequency.

Distance factor: 1 GHz - 10 GHz 20log (3.5 m / 3.0 m) = 1.34 dB
10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5dB

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	87.6	28.0	4.5	32.1	88.0	-	-	Carrier
Hori	2400.000	PK	49.8	28.0	4.5	32.1	50.2	68.0	17.8	
Vert	2402.000	PK	90.3	28.0	4.5	32.1	90.7	-	-	Carrier
Vert	2400.000	PK	52.1	28.0	4.5	32.1	52.5	70.7	18.2	

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

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Ise EMC Lab.

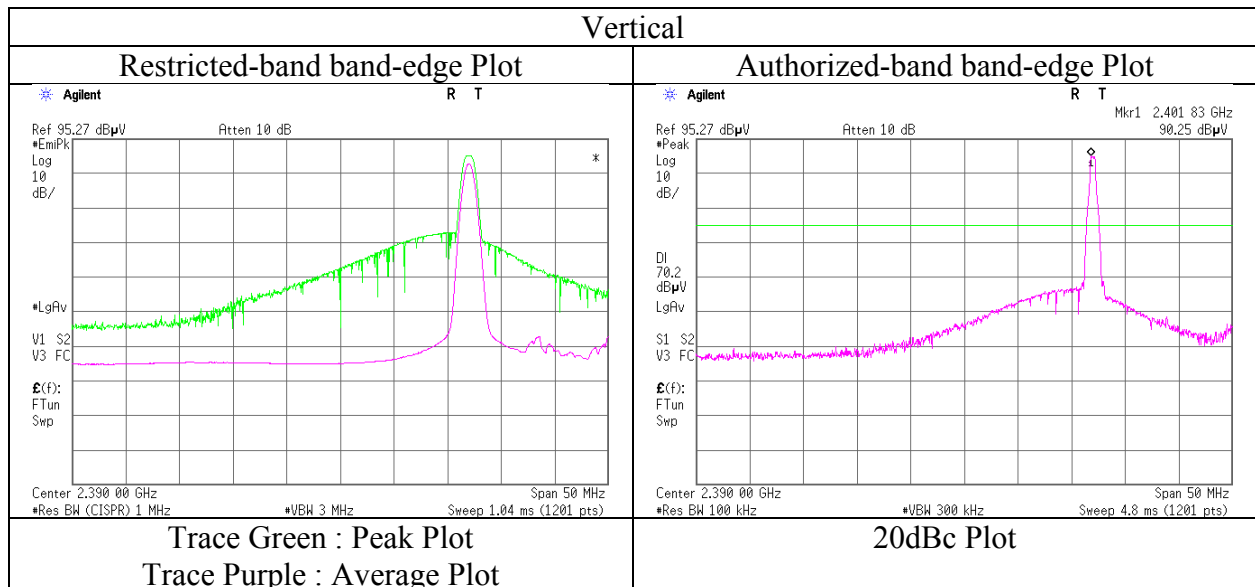
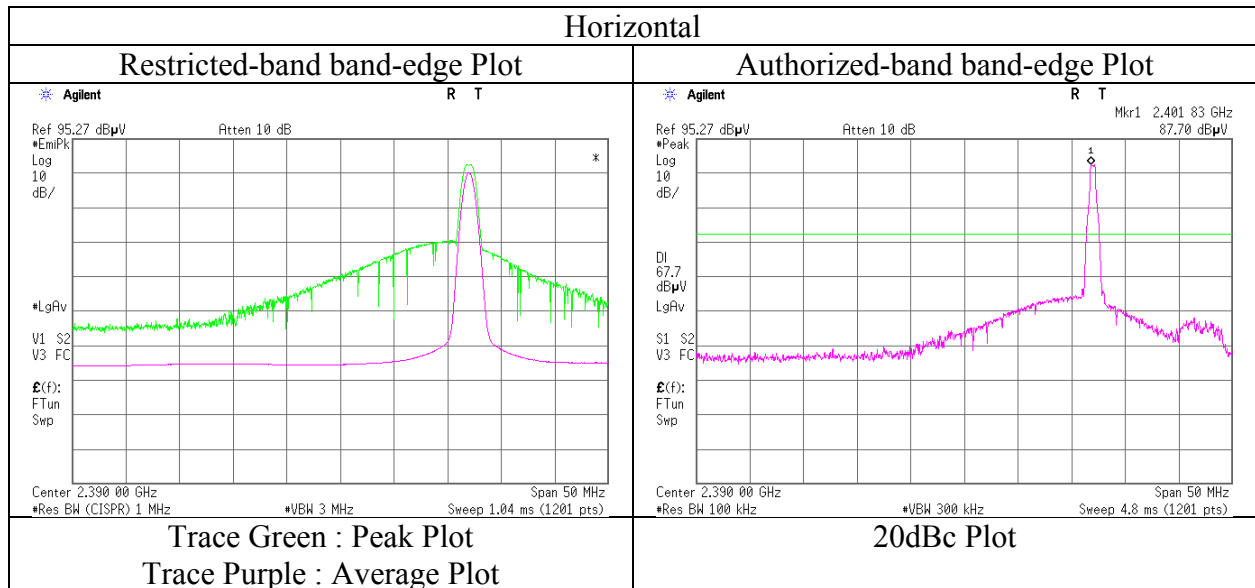
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Radiated Spurious Emission (Reference Plot for band-edge)

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber
Report No.	11368501H
Date	July 19, 2016
Temperature / Humidity	23 deg. C / 53 % RH
Engineer	Satofumi Matsuyama
Mode	Tx, Hopping Off, DH5 2402 MHz



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

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Radiated Spurious Emission

Test place : Ise EMC Lab. No.4 Semi Anechoic Chamber
Report No. : 11368501H
Date : July 19, 2016 July 19, 2016
Temperature / Humidity : 23 deg. C / 53 % RH 24 deg. C / 50 % RH
Engineer : Satofumi Matsuyama Tomoki Matsui
(Above 1GHz) (Below 1GHz)
Mode : Tx, Hopping Off, DH5 2441 MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	72.012	QP	46.0	6.2	7.9	32.1	-	28.0	40.0	12.0	
Hori	120.038	QP	39.9	12.8	8.4	32.0	-	29.1	43.5	14.4	
Hori	180.629	QP	45.9	16.1	9.0	32.0	-	39.0	43.5	4.5	
Hori	192.021	QP	41.5	16.2	9.1	31.9	-	34.9	43.5	8.6	
Hori	216.000	QP	48.5	11.5	9.3	31.9	-	37.4	43.5	6.1	
Hori	330.226	QP	43.8	14.2	10.0	31.9	-	36.1	46.0	9.9	
Hori	2648.866	PK	47.1	28.1	4.6	32.0	-	47.8	73.9	26.1	
Hori	4882.000	PK	49.5	33.1	6.8	31.3	-	58.1	73.9	15.8	
Hori	7323.000	PK	41.8	36.8	7.9	32.6	-	53.9	73.9	20.0	
Hori	9764.000	PK	39.8	38.2	8.8	32.7	-	54.1	73.9	19.8	Floor noise
Hori	2648.866	AV	40.9	28.1	4.6	32.0	-	41.6	53.9	12.3	
Vert	58.916	QP	46.6	7.8	7.7	32.1	-	30.0	40.0	10.0	
Vert	72.012	QP	53.1	6.2	7.9	32.1	-	35.1	40.0	4.9	
Vert	120.038	QP	45.8	12.8	8.4	32.0	-	35.0	43.5	8.5	
Vert	180.629	QP	43.6	16.1	9.0	32.0	-	36.7	43.5	6.8	
Vert	192.021	QP	44.3	16.2	9.1	31.9	-	37.7	43.5	5.8	
Vert	216.000	QP	51.4	11.5	9.3	31.9	-	40.3	43.5	3.2	
Vert	2648.866	PK	47.5	28.1	4.6	32.0	-	48.2	73.9	25.7	
Vert	4882.000	PK	50.2	33.1	6.8	31.3	-	58.8	73.9	15.1	
Vert	7323.000	PK	43.0	36.8	7.9	32.6	-	55.1	73.9	18.8	
Vert	9764.000	PK	39.5	38.2	8.8	32.7	-	53.8	73.9	20.1	Floor noise
Vert	2648.866	AV	41.1	28.1	4.6	32.0	-	41.8	53.9	12.1	

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 (3.5 m / 3.0 m) = 1.34 dB
10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB

Dwell time factor relaxation

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Dwell Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	4882.000	AV	44.0	33.1	6.8	31.3	-24.6	28.0	53.9	25.9	*
Hori	7323.000	AV	30.1	36.8	7.9	32.6	-24.6	17.6	53.9	36.3	*
Hori	9764.000	AV	28.1	38.2	8.8	32.7	-24.6	17.8	53.9	36.1	*
Vert	4882.000	AV	44.8	33.1	6.8	31.3	-24.6	28.8	53.9	25.1	*
Vert	7323.000	AV	31.4	36.8	7.9	32.6	-24.6	18.9	53.9	35.0	*
Vert	9764.000	AV	28.1	38.2	8.8	32.7	-24.6	17.8	53.9	36.1	*

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

- Gain(Amplifier) + Dwell time factor (Refer to dwell time data sheet)

*Above noise was synchronized with carrier frequency.

Distance factor: 1 GHz - 10 GHz 20log (3.5 m / 3.0 m) = 1.34 dB
10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5dB

Radiated Spurious Emission

Test place : Ise EMC Lab. No.4 Semi Anechoic Chamber
Report No. : 11368501H
Date : July 19, 2016 July 19, 2016
Temperature / Humidity : 23 deg. C / 53 % RH 24 deg. C / 50 % RH
Engineer : Satofumi Matsuyama Tomoki Matsui
(Above 1GHz) (Below 1GHz)
Mode : Tx, Hopping Off, DH5 2480 MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	72.012	QP	46.0	6.2	7.9	32.1	-	28.0	40.0	12.0	
Hori	120.038	QP	39.9	12.8	8.4	32.0	-	29.1	43.5	14.4	
Hori	180.629	QP	45.9	16.1	9.0	32.0	-	39.0	43.5	4.5	
Hori	192.021	QP	41.5	16.2	9.1	31.9	-	34.9	43.5	8.6	
Hori	216.000	QP	48.5	11.5	9.3	31.9	-	37.4	43.5	6.1	
Hori	330.226	QP	43.9	14.2	10.0	31.9	-	36.2	46.0	9.8	
Hori	2483.500	PK	59.0	28.1	4.6	32.1	-	59.6	73.9	14.3	
Hori	2687.987	PK	46.7	28.2	4.8	32.0	-	47.7	73.9	26.2	
Hori	4960.000	PK	48.1	33.4	6.9	31.2	-	57.2	73.9	16.7	
Hori	7440.000	PK	39.6	36.8	7.9	32.7	-	51.6	73.9	22.3	Floor noise
Hori	9920.000	PK	39.7	38.3	8.9	32.8	-	54.1	73.9	19.8	Floor noise
Hori	2483.500	AV	33.3	28.1	4.6	32.1	-	33.9	53.9	20.0	
Hori	2687.987	AV	39.8	28.2	4.8	32.0	-	40.8	53.9	13.1	
Vert	58.916	QP	46.6	7.8	7.7	32.1	-	30.0	40.0	10.0	
Vert	72.012	QP	53.1	6.2	7.9	32.1	-	35.1	40.0	4.9	
Vert	120.038	QP	45.8	12.8	8.4	32.0	-	35.0	43.5	8.5	
Vert	180.629	QP	43.6	16.1	9.0	32.0	-	36.7	43.5	6.8	
Vert	192.021	QP	44.3	16.2	9.1	31.9	-	37.7	43.5	5.8	
Vert	216.000	QP	51.4	11.5	9.3	31.9	-	40.3	43.5	3.2	
Vert	2483.500	PK	62.5	28.1	4.6	32.1	-	63.1	73.9	10.8	
Vert	2687.987	PK	47.6	28.2	4.8	32.0	-	48.6	73.9	25.3	
Vert	4960.000	PK	49.8	33.4	6.9	31.2	-	58.9	73.9	15.0	
Vert	7440.000	PK	39.0	36.8	7.9	32.7	-	51.0	73.9	22.9	Floor noise
Vert	9920.000	PK	39.8	38.3	8.9	32.8	-	54.2	73.9	19.7	Floor noise
Vert	2483.500	AV	35.3	28.1	4.6	32.1	-	35.9	53.9	18.0	
Vert	2687.987	AV	41.3	28.2	4.8	32.0	-	42.3	53.9	11.6	

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 $20\log(3.5\text{ m} / 3.0\text{ m}) = 1.34\text{ dB}$
10 GHz - 26.5 GHz $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

Dwell time factor relaxation

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Dwell Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	4960.000	AV	42.0	33.4	6.9	31.2	-24.6	26.5	53.9	27.4	*
Hori	7440.000	AV	28.3	36.8	7.9	32.7	-24.6	15.7	53.9	38.2	*
Hori	9920.000	AV	28.3	38.3	8.9	32.8	-24.6	18.1	53.9	35.8	*
Vert	4960.000	AV	44.0	33.4	6.9	31.2	-24.6	28.5	53.9	25.4	*
Vert	7440.000	AV	28.3	36.8	7.9	32.7	-24.6	15.7	53.9	38.2	*
Vert	9920.000	AV	28.3	38.3	8.9	32.8	-24.6	18.1	53.9	35.8	*

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

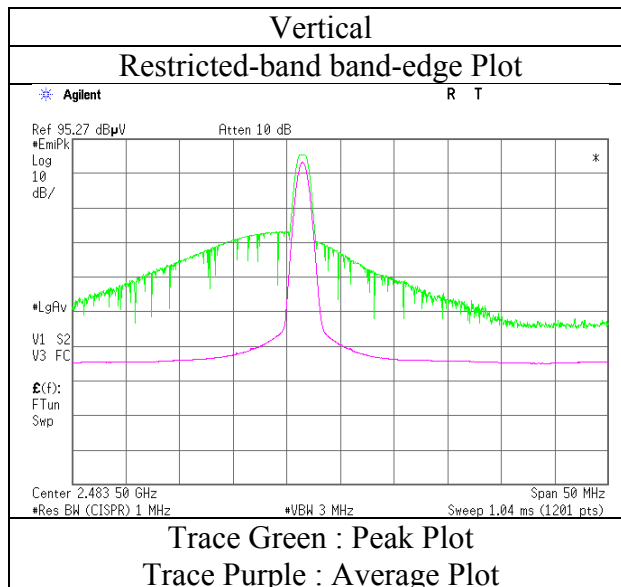
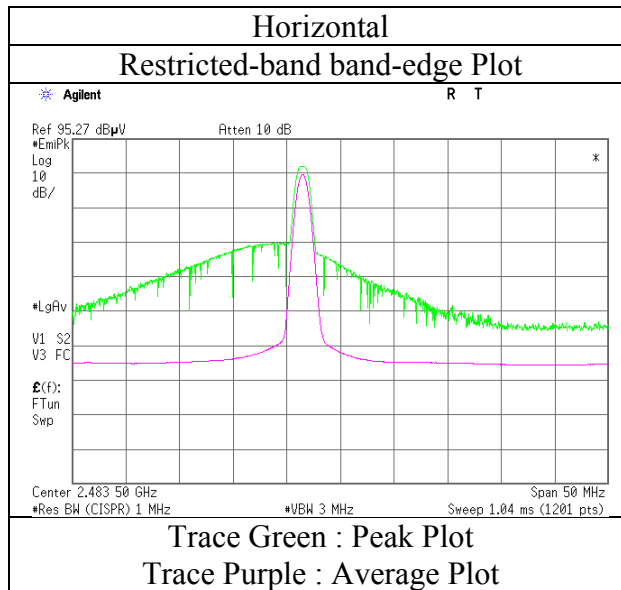
- Gain(Amplifier) + Dwell time factor (Refer to dwell time data sheet)

*Above noise was synchronized with carrier frequency.

Distance factor: 1 GHz - 10 GHz $20\log(3.5\text{ m} / 3.0\text{ m}) = 1.34\text{ dB}$
10 GHz - 26.5 GHz $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

Radiated Spurious Emission (Reference Plot for band-edge)

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber
Report No.	11368501H
Date	July 19, 2016
Temperature / Humidity	23 deg. C / 53 % RH
Engineer	Satofumi Matsuyama (Above 1GHz)
Mode	Tx, Hopping Off, DH5 2480 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. : 11368501H
Date : July 19, 2016 July 19, 2016
Temperature / Humidity : 23 deg. C / 53 % RH 24 deg. C / 50 % RH
Engineer : Satofumi Matsuyama Tomoki Matsui
(Above 1GHz) (Below 1GHz)
Mode : Tx, Hopping Off, 3DH5 2402 MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	72.012	QP	46.0	6.2	7.9	32.1	-	28.0	40.0	12.0	
Hori	120.038	QP	39.9	12.8	8.4	32.0	-	29.1	43.5	14.4	
Hori	180.629	QP	45.9	16.1	9.0	32.0	-	39.0	43.5	4.5	
Hori	192.021	QP	41.5	16.2	9.1	31.9	-	34.9	43.5	8.6	
Hori	216.000	QP	48.5	11.5	9.3	31.9	-	37.4	43.5	6.1	
Hori	330.226	QP	43.9	14.2	10.0	31.9	-	36.2	46.0	9.8	
Hori	2390.000	PK	55.9	27.9	4.5	32.1	-	56.2	73.9	17.7	
Hori	2609.785	PK	46.9	28.1	4.6	32.0	-	47.6	73.9	26.3	
Hori	4804.000	PK	50.7	32.8	6.8	31.3	-	59.0	73.9	14.9	
Hori	7206.000	PK	44.5	36.8	7.9	32.6	-	56.6	73.9	17.3	
Hori	9608.000	PK	40.0	38.1	8.7	32.6	-	54.2	73.9	19.7	Floor noise
Hori	2390.000	AV	27.3	27.9	4.5	32.1	-	27.6	53.9	26.3	
Hori	2609.785	AV	37.6	28.1	4.6	32.0	-	38.3	53.9	15.6	
Vert	58.916	QP	46.6	7.8	7.7	32.1	-	30.0	40.0	10.0	
Vert	72.012	QP	53.1	6.2	7.9	32.1	-	35.1	40.0	4.9	
Vert	120.038	QP	45.8	12.8	8.4	32.0	-	35.0	43.5	8.5	
Vert	180.629	QP	43.6	16.1	9.0	32.0	-	36.7	43.5	6.8	
Vert	192.021	QP	44.3	16.2	9.1	31.9	-	37.7	43.5	5.8	
Vert	216.000	QP	51.4	11.5	9.3	31.9	-	40.3	43.5	3.2	
Vert	2390.000	PK	56.9	27.9	4.5	32.1	-	57.2	73.9	16.7	
Vert	2609.785	PK	48.8	28.1	4.6	32.0	-	49.5	73.9	24.4	
Vert	4804.000	PK	50.0	32.8	6.8	31.3	-	58.3	73.9	15.6	
Vert	7206.000	PK	45.8	36.8	7.9	32.6	-	57.9	73.9	16.0	
Vert	9608.000	PK	39.5	38.1	8.7	32.6	-	53.7	73.9	20.2	Floor noise
Vert	2390.000	AV	29.5	27.9	4.5	32.1	-	29.8	53.9	24.1	
Vert	2609.785	AV	40.0	28.1	4.6	32.0	-	40.7	53.9	13.2	

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 (3.5 m / 3.0 m) = 1.34 dB
10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB

Dwell time factor relaxation

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Dwell Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	4804.000	AV	40.0	32.8	6.8	31.3	-24.6	23.7	53.9	30.2	*
Hori	7206.000	AV	31.6	36.8	7.9	32.6	-24.6	19.1	53.9	34.8	*
Hori	9608.000	AV	27.1	38.1	8.7	32.6	-24.6	16.7	53.9	37.2	*
Vert	4804.000	AV	39.6	32.8	6.8	31.3	-24.6	23.3	53.9	30.6	*
Vert	7206.000	AV	34.3	36.8	7.9	32.6	-24.6	21.8	53.9	32.1	*
Vert	9608.000	AV	27.1	38.1	8.7	32.6	-24.6	16.7	53.9	37.2	*

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

- Gain(Amplifier) + Dwell time factor (Refer to dwell time data sheet)

*Above noise was synchronized with carrier frequency.

Distance factor: 1 GHz - 10 GHz 20log (3.5 m / 3.0 m) = 1.34 dB
10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB

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	87.9	28.0	4.5	32.1	88.3	-	-	Carrier
Hori	2400.000	PK	49.7	28.0	4.5	32.1	50.1	68.3	18.2	
Vert	2402.000	PK	89.4	28.0	4.5	32.1	89.8	-	-	Carrier
Vert	2400.000	PK	51.0	28.0	4.5	32.1	51.4	69.8	18.4	

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

UL Japan, Inc.

Ise EMC Lab.

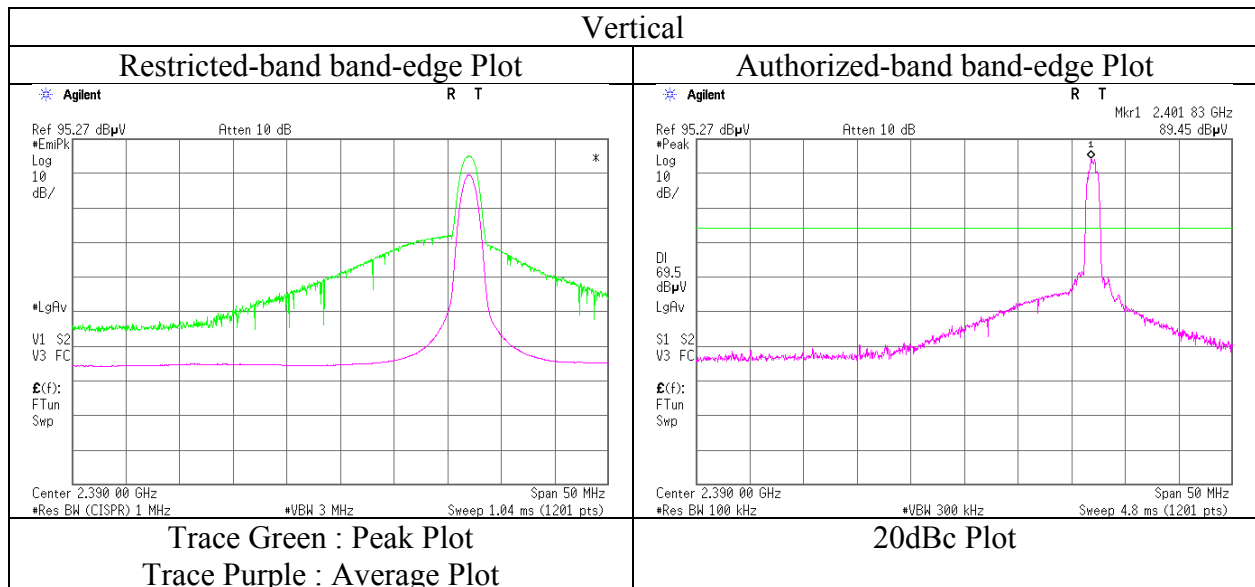
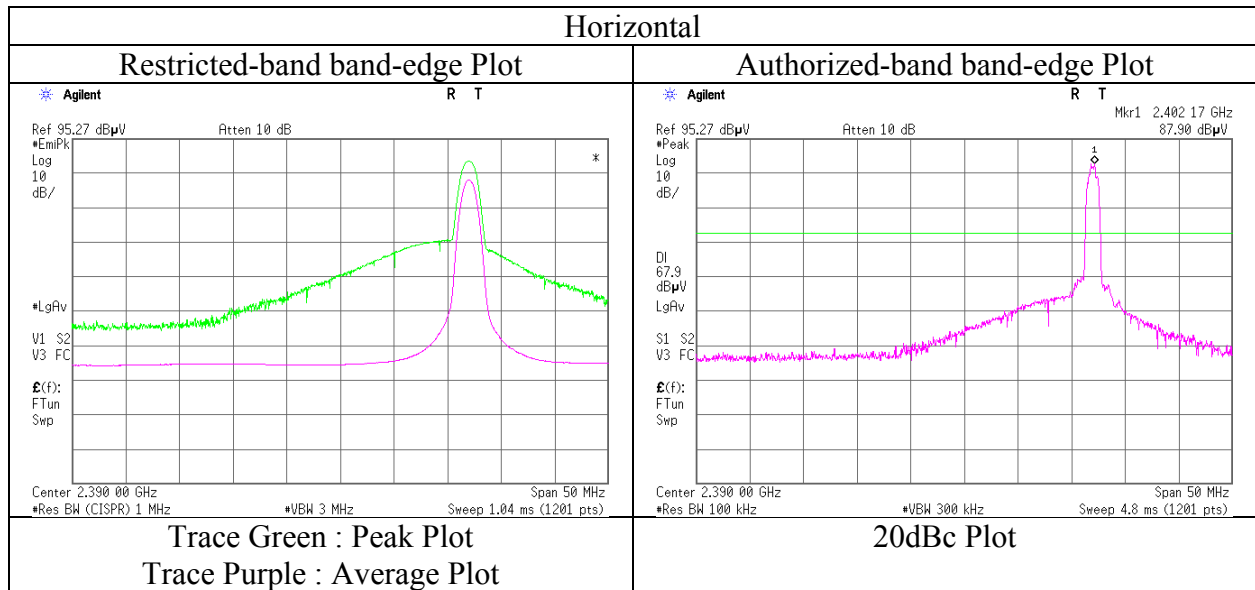
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

Radiated Spurious Emission (Reference Plot for band-edge)

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber
Report No.	11368501H
Date	July 19, 2016
Temperature / Humidity	23 deg. C / 53 % RH
Engineer	Satofumi Matsuyama (Above 1GHz)
Mode	Tx, Hopping Off, 3DH5 2402 MHz



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

UL Japan, Inc.

Ise EMC Lab.

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

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Radiated Spurious Emission

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber
Report No.	11368501H
Date	July 19, 2016 July 19, 2016
Temperature / Humidity	23 deg. C / 53 % RH 24 deg. C / 50 % RH
Engineer	Satofumi Matsuyama Tomoki Matsui
	(Above 1GHz) (Below 1GHz)
Mode	Tx, Hopping Off, 3DH5 2441 MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	72.012	QP	46.0	6.2	7.9	32.1	-	28.0	40.0	12.0	
Hori	120.038	QP	39.9	12.8	8.4	32.0	-	29.1	43.5	14.4	
Hori	180.629	QP	45.9	16.1	9.0	32.0	-	39.0	43.5	4.5	
Hori	192.021	QP	41.5	16.2	9.1	31.9	-	34.9	43.5	8.6	
Hori	216.000	QP	48.5	11.5	9.3	31.9	-	37.4	43.5	6.1	
Hori	330.226	QP	43.8	14.2	10.0	31.9	-	36.1	46.0	9.9	
Hori	2649.053	PK	46.5	28.1	4.6	32.0	-	47.2	73.9	26.7	
Hori	4882.000	PK	49.7	33.1	6.8	31.3	-	58.3	73.9	15.6	
Hori	7323.000	PK	43.1	36.8	7.9	32.6	-	55.2	73.9	18.7	
Hori	9764.000	PK	40.7	38.2	8.8	32.7	-	55.0	73.9	18.9	Floor noise
Hori	2649.053	AV	38.9	28.1	4.6	32.0	-	39.6	53.9	14.3	
Vert	58.916	QP	46.6	7.8	7.7	32.1	-	30.0	40.0	10.0	
Vert	72.012	QP	53.1	6.2	7.9	32.1	-	35.1	40.0	4.9	
Vert	120.038	QP	45.8	12.8	8.4	32.0	-	35.0	43.5	8.5	
Vert	180.629	QP	43.6	16.1	9.0	32.0	-	36.7	43.5	6.8	
Vert	192.021	QP	44.3	16.2	9.1	31.9	-	37.7	43.5	5.8	
Vert	216.000	QP	51.4	11.5	9.3	31.9	-	40.3	43.5	3.2	
Vert	2649.053	PK	47.6	28.1	4.6	32.0	-	48.3	73.9	25.6	
Vert	4882.000	PK	50.1	33.1	6.8	31.3	-	58.7	73.9	15.2	
Vert	7323.000	PK	44.3	36.8	7.9	32.6	-	56.4	73.9	17.5	
Vert	9764.000	PK	40.2	38.2	8.8	32.7	-	54.5	73.9	19.4	Floor noise
Vert	2649.053	AV	40.2	28.1	4.6	32.0	-	40.9	53.9	13.0	

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 $20\log(3.5\text{ m} / 3.0\text{ m}) = 1.34\text{ dB}$
 10 GHz - 26.5 GHz $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

Dwell time factor relaxation

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Dwell Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	4882.000	AV	41.2	33.1	6.8	31.3	-24.6	25.2	53.9	28.7	*
Hori	7323.000	AV	31.5	36.8	7.9	32.6	-24.6	19.0	53.9	34.9	*
Hori	9764.000	AV	29.2	38.2	8.8	32.7	-24.6	18.9	53.9	35.0	*
Vert	4882.000	AV	41.9	33.1	6.8	31.3	-24.6	25.9	53.9	28.0	*
Vert	7323.000	AV	33.1	36.8	7.9	32.6	-24.6	20.6	53.9	33.3	*
Vert	9764.000	AV	29.2	38.2	8.8	32.7	-24.6	18.9	53.9	35.0	*

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

- Gain(Amplifier) + Dwell time factor (Refer to dwell time data sheet)

*Above noise was synchronized with carrier frequency.

Distance factor: 1 GHz - 10 GHz $20\log(3.5\text{ m} / 3.0\text{ m}) = 1.34\text{ dB}$
 10 GHz - 26.5 GHz $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

Radiated Spurious Emission

Test place : Ise EMC Lab. No.4 Semi Anechoic Chamber
Report No. : 11368501H
Date : July 19, 2016 July 19, 2016
Temperature / Humidity : 23 deg. C / 53 % RH 24 deg. C / 50 % RH
Engineer : Satofumi Matsuyama Tomoki Matsui
(Above 1GHz) (Below 1GHz)
Mode : Tx, Hopping Off, 3DH5 2480 MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	72.012	QP	46.0	6.2	7.9	32.1	-	28.0	40.0	12.0	
Hori	120.038	QP	39.9	12.8	8.4	32.0	-	29.1	43.5	14.4	
Hori	180.629	QP	45.9	16.1	9.0	32.0	-	39.0	43.5	4.5	
Hori	192.021	QP	41.5	16.2	9.1	31.9	-	34.9	43.5	8.6	
Hori	216.000	QP	48.5	11.5	9.3	31.9	-	37.4	43.5	6.1	
Hori	330.226	QP	43.8	14.2	10.0	31.9	-	36.1	46.0	9.9	
Hori	2483.500	PK	59.5	28.1	4.6	32.1	-	60.1	73.9	13.8	
Hori	2688.103	PK	47.4	28.2	4.8	32.0	-	48.4	73.9	25.5	
Hori	4960.000	PK	49.8	33.4	6.9	31.2	-	58.9	73.9	15.0	
Hori	7440.000	PK	41.9	36.8	7.9	32.7	-	53.9	73.9	20.0	Floor noise
Hori	9920.000	PK	41.5	38.3	8.9	32.8	-	55.9	73.9	18.0	Floor noise
Hori	2483.500	AV	32.8	28.1	4.6	32.1	-	33.4	53.9	20.5	
Hori	2688.103	AV	37.7	28.2	4.8	32.0	-	38.7	53.9	15.2	
Vert	58.916	QP	46.6	7.8	7.7	32.1	-	30.0	40.0	10.0	
Vert	72.012	QP	53.1	6.2	7.9	32.1	-	35.1	40.0	4.9	
Vert	120.038	QP	45.8	12.8	8.4	32.0	-	35.0	43.5	8.5	
Vert	180.629	QP	43.6	16.1	9.0	32.0	-	36.7	43.5	6.8	
Vert	192.021	QP	44.3	16.2	9.1	31.9	-	37.7	43.5	5.8	
Vert	216.000	QP	51.4	11.5	9.3	31.9	-	40.3	43.5	3.2	
Vert	2483.500	PK	62.0	28.1	4.6	32.1	-	62.6	73.9	11.3	
Vert	2688.103	PK	47.1	28.2	4.8	32.0	-	48.1	73.9	25.8	
Vert	4960.000	PK	49.3	33.4	6.9	31.2	-	58.4	73.9	15.5	
Vert	7440.000	PK	41.0	36.8	7.9	32.7	-	53.0	73.9	20.9	Floor noise
Vert	9920.000	PK	41.2	38.3	8.9	32.8	-	55.6	73.9	18.3	Floor noise
Vert	2483.500	AV	37.2	28.1	4.6	32.1	-	37.8	53.9	16.1	
Vert	2688.103	AV	37.6	28.2	4.8	32.0	-	38.6	53.9	15.3	

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 $20\log(3.5\text{ m} / 3.0\text{ m}) = 1.34\text{ dB}$
10 GHz - 26.5 GHz $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

Dwell time factor relaxation

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Dwell Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	4960.000	AV	38.7	33.4	6.9	31.2	-24.6	23.2	53.9	30.7	*
Hori	7440.000	AV	28.6	36.8	7.9	32.7	-24.6	16.0	53.9	37.9	*
Hori	9920.000	AV	28.4	38.3	8.9	32.8	-24.6	18.2	53.9	35.7	*
Vert	4960.000	AV	38.3	33.4	6.9	31.2	-24.6	22.8	53.9	31.1	*
Vert	7440.000	AV	28.6	36.8	7.9	32.7	-24.6	16.0	53.9	37.9	*
Vert	9920.000	AV	28.4	38.3	8.9	32.8	-24.6	18.2	53.9	35.7	*

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

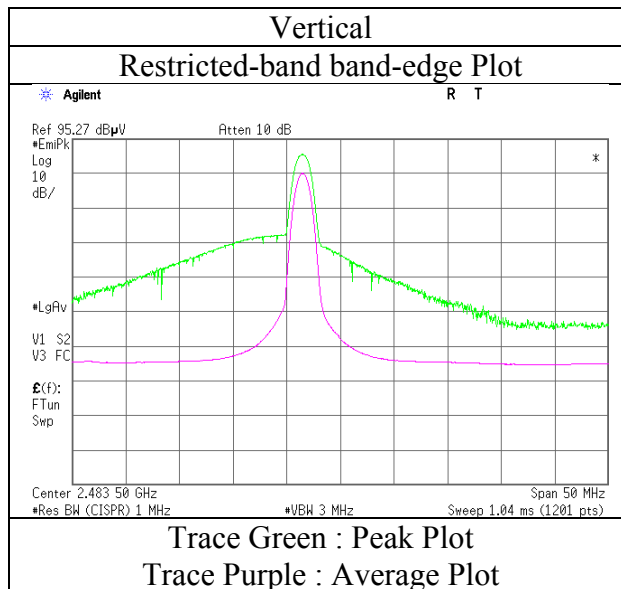
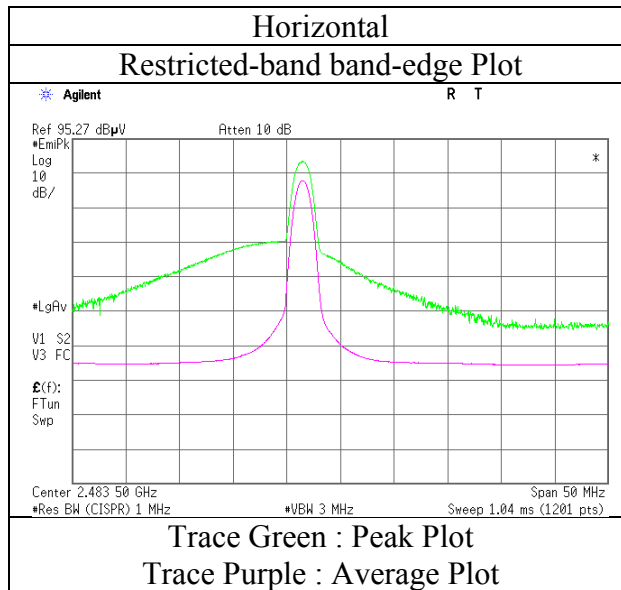
- Gain(Amplifier) + Dwell time factor (Refer to dwell time data sheet)

*Above noise was synchronized with carrier frequency.

Distance factor: 1 GHz - 10 GHz $20\log(3.5\text{ m} / 3.0\text{ m}) = 1.34\text{ dB}$
10 GHz - 26.5 GHz $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

Radiated Spurious Emission (Reference Plot for band-edge)

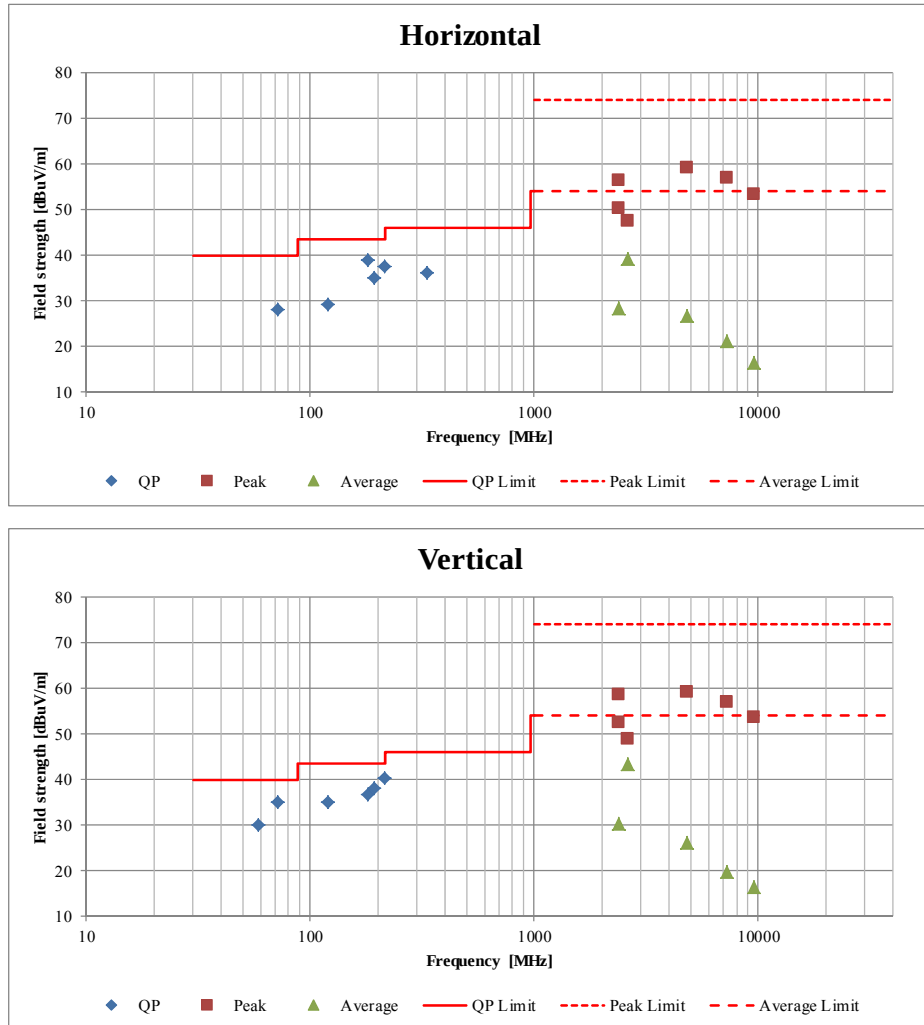
Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber
Report No.	11368501H
Date	July 19, 2016
Temperature / Humidity	23 deg. C / 53 % RH
Engineer	Satofumi Matsuyama (Above 1GHz)
Mode	Tx, Hopping Off, 3DH5 2480 MHz



* 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.	11368501H		
Date	July 19, 2016	July 19, 2016	
Temperature / Humidity	23 deg. C / 53 % RH	24 deg. C / 50 % RH	
Engineer	Satofumi Matsuyama	Tomoki Matsui	
	(Above 1GHz)	(Below 1GHz)	
Mode	Tx, Hopping Off, DH5 2402 MHz		



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

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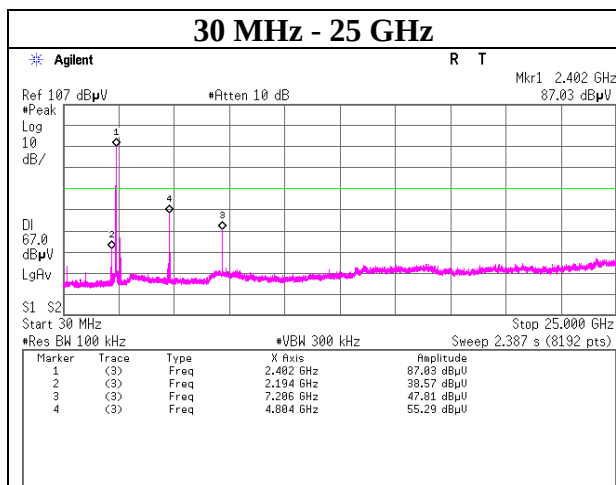
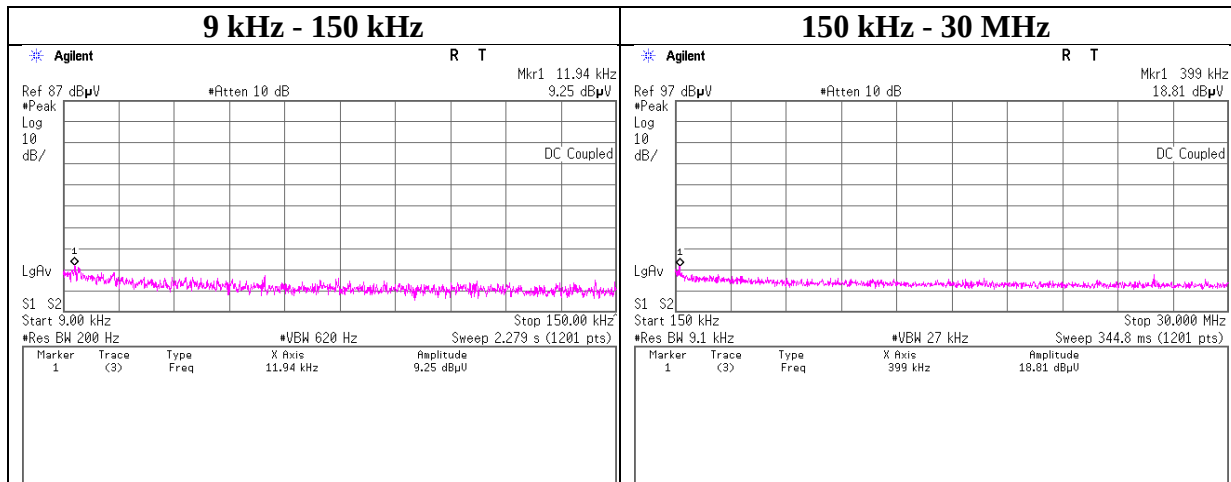
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

Conducted Spurious Emission

Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	11368501H
Date	July 14, 2016
Temperature / Humidity	23 deg. C / 45 RH
Engineer	Ken Fujita
Mode	Tx, Hopping Off, DH5

2402 MHz



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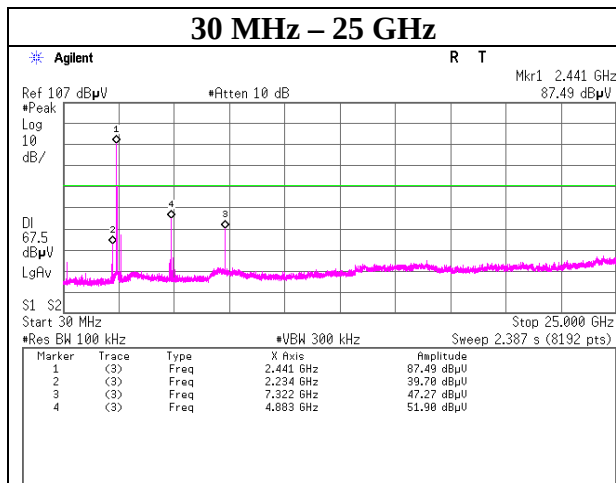
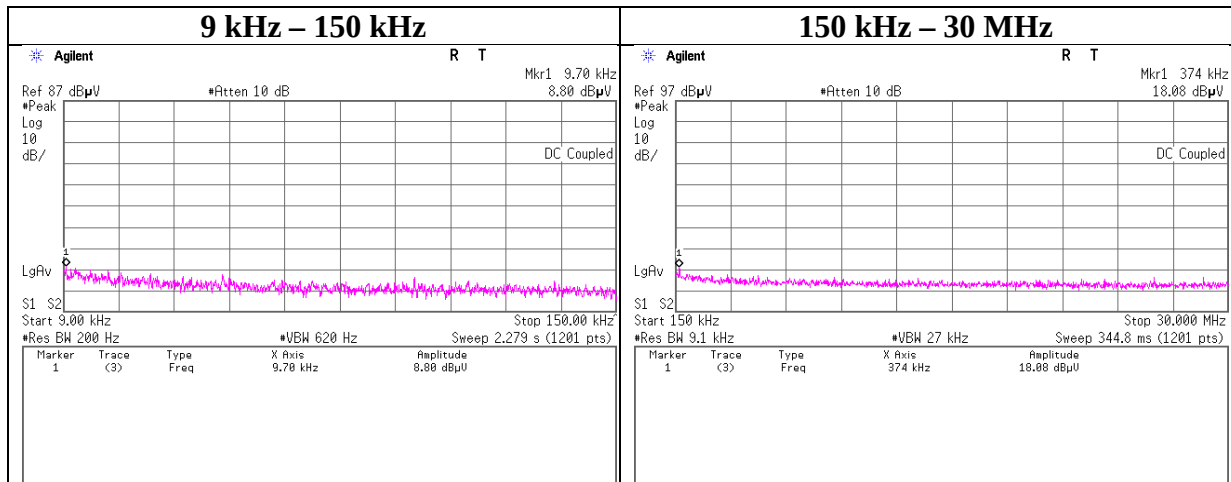
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

Conducted Spurious Emission

Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	11368501H
Date	July 14, 2016
Temperature / Humidity	23 deg. C / 45 RH
Engineer	Ken Fujita
Mode	Tx, Hopping Off, DH5

2441 MHz



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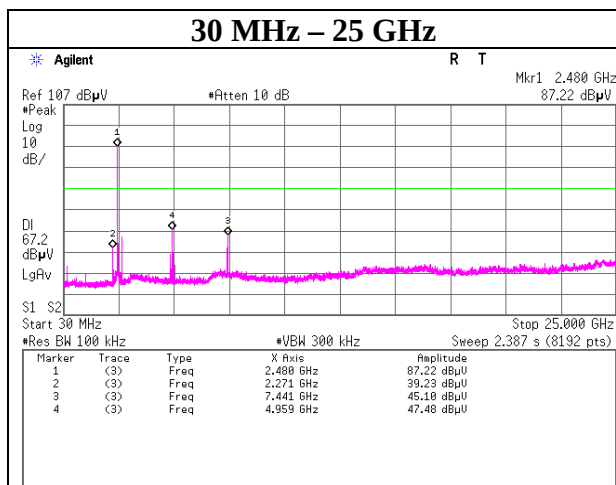
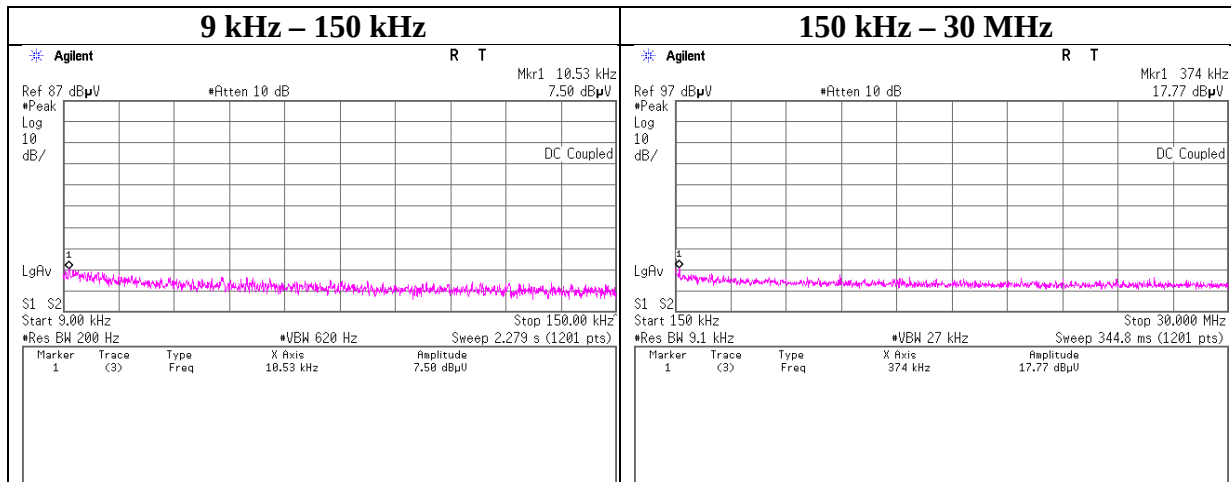
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

Conducted Spurious Emission

Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	11368501H
Date	July 14, 2016
Temperature / Humidity	23 deg. C / 45 RH
Engineer	Ken Fujita
Mode	Tx, Hopping Off, DH5

2480 MHz



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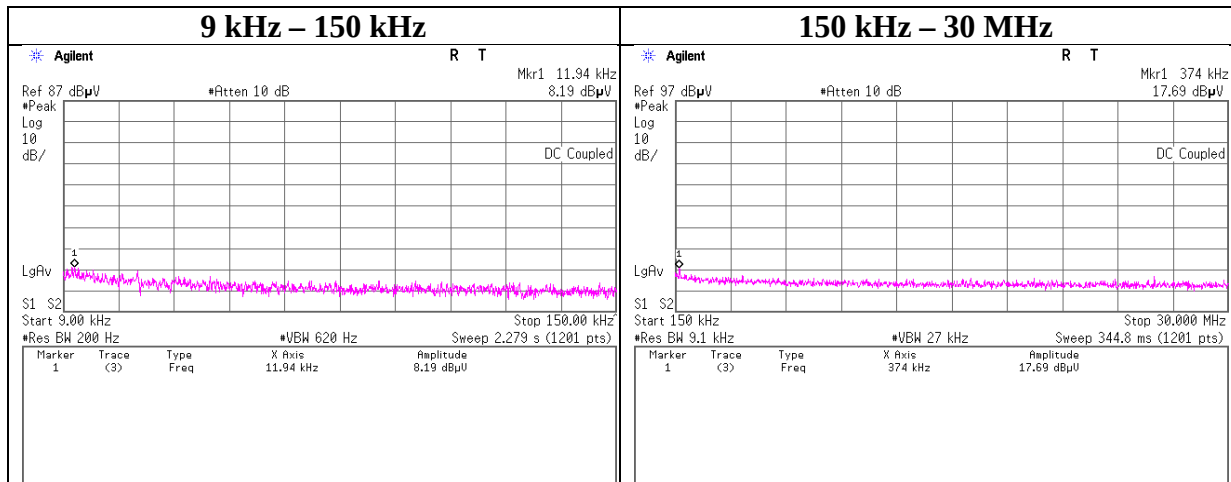
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

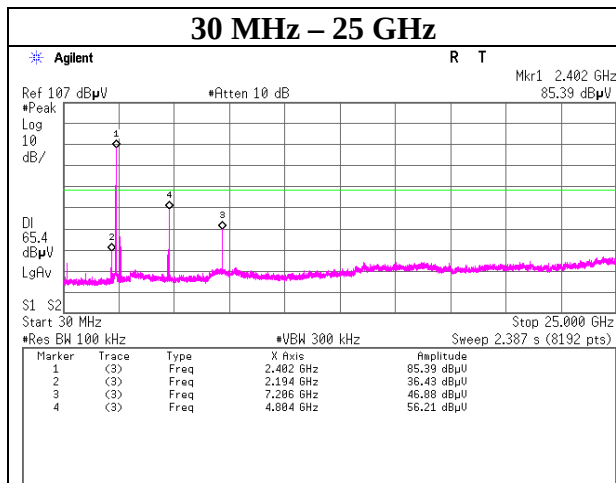
Conducted Spurious Emission

Test place : Ise EMC Lab. No.11 Measurement Room
Report No. : 11368501H
Date : July 14, 2016
Temperature / Humidity : 23 deg. C / 45 RH
Engineer : Ken Fujita
Mode : Tx, Hopping Off, 3DH5

2402 MHz



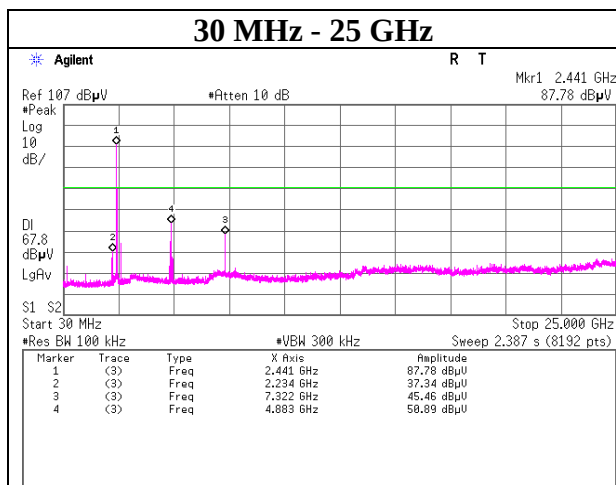
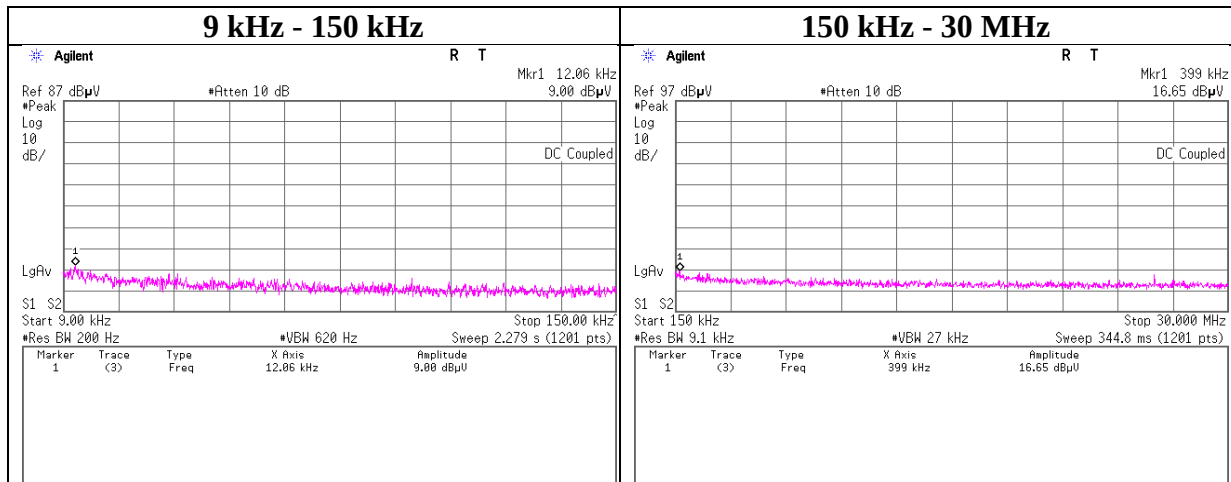
30 MHz – 25 GHz



Conducted Spurious Emission

Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	11368501H
Date	July 14, 2016
Temperature / Humidity	23 deg. C / 45 RH
Engineer	Ken Fujita
Mode	Tx, Hopping Off, 3DH5

2441 MHz



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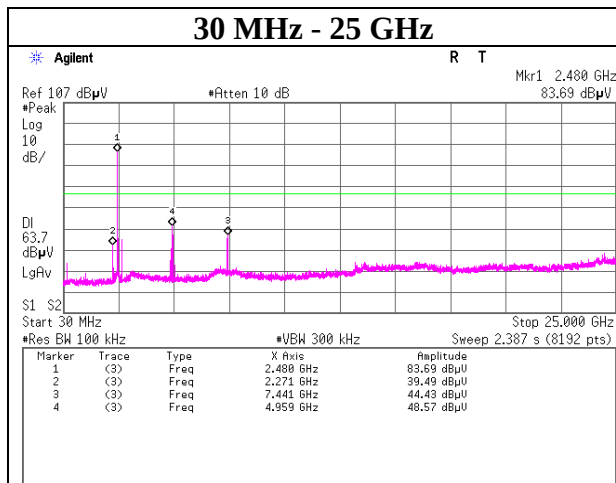
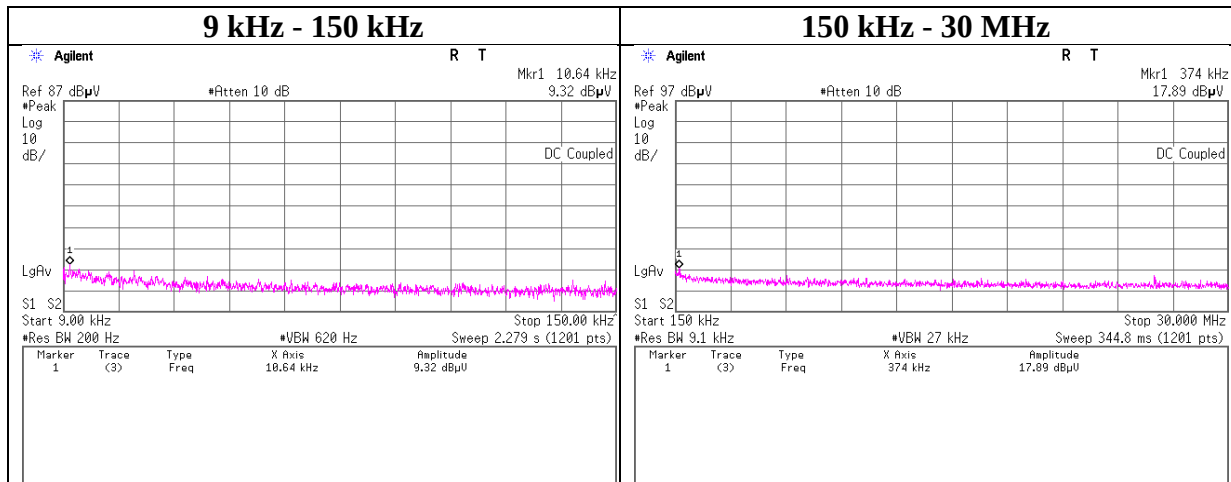
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

Conducted Spurious Emission

Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	11368501H
Date	July 14, 2016
Temperature / Humidity	23 deg. C / 45 RH
Engineer	Ken Fujita
Mode	Tx, Hopping Off, 3DH5

2480 MHz



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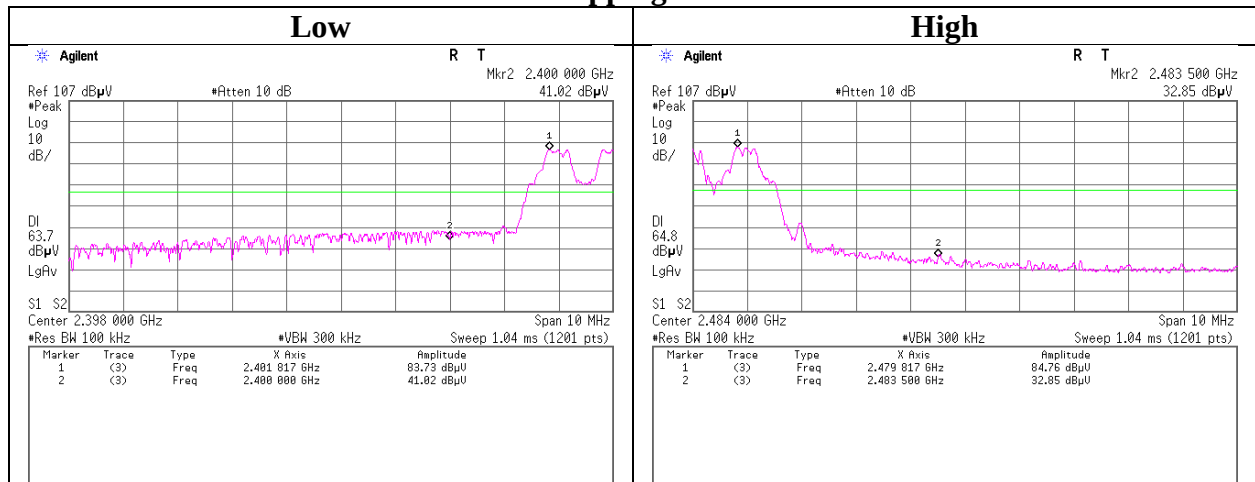
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

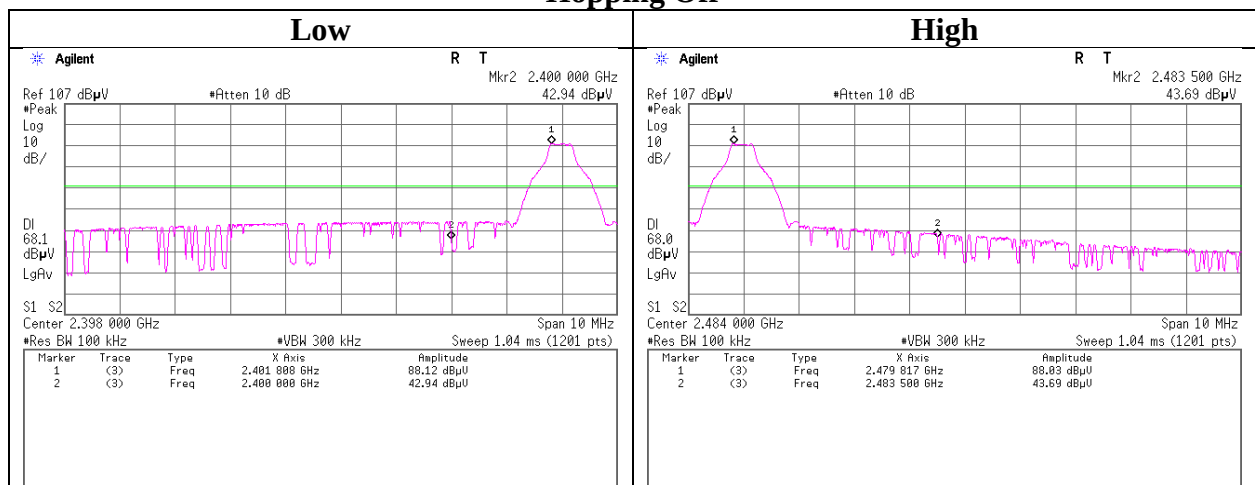
Conducted Emission Band Edge compliance

Test place : Ise EMC Lab. No.11 Measurement Room
Report No. : 11368501H
Date : July 14, 2016
Temperature / Humidity : 25 deg. C / 45 RH
Engineer : Ken Fujita
Mode : Tx DH5
July 20, 2016
25 deg. C / 50 % RH
Masafumi Niwa

Hopping On



Hopping Off



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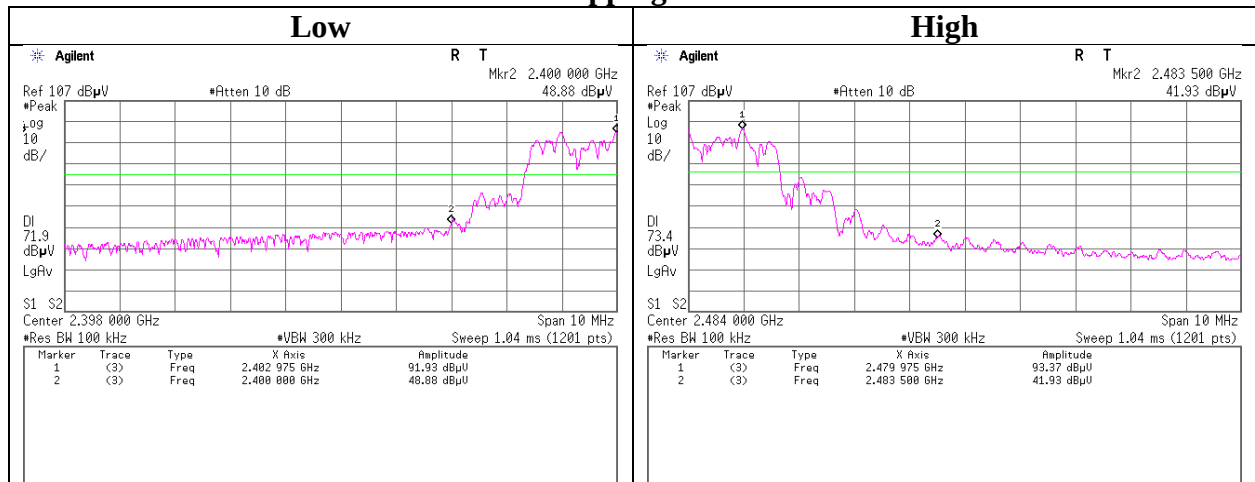
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

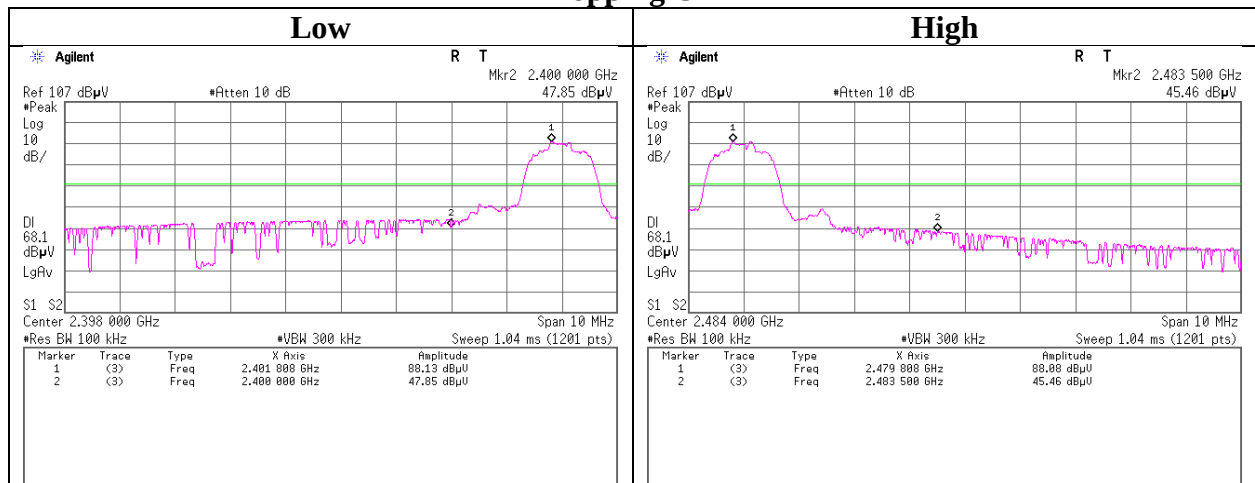
Conducted Emission Band Edge compliance

Test place : Ise EMC Lab. No.11 Measurement Room
Report No. : 11368501H
Date : July 14, 2016
Temperature / Humidity : 25 deg. C / 45 RH
Engineer : Ken Fujita
Mode : Tx 3DH5
July 20, 2016
25 deg. C / 50 % RH
Masafumi Niwa

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.11 Measurement Room

Report No.

11368501H

Date

July 14, 2016

Temperature / Humidity

23 deg. C / 45 RH

Engineer

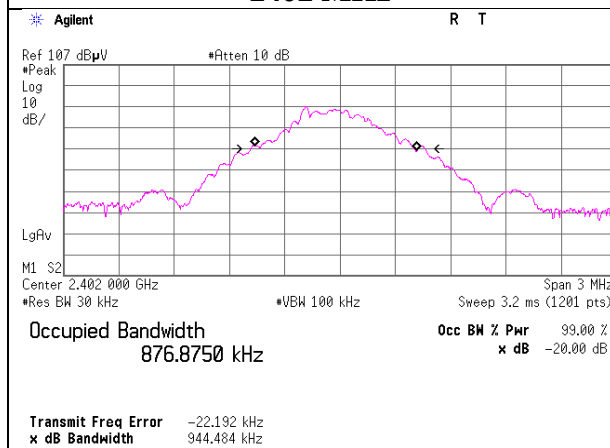
Ken Fujita

Mode

Tx Hopping Off

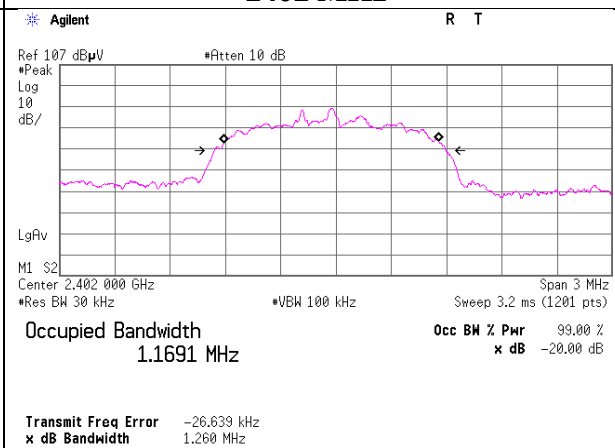
Hopping Off, DH5

2402 MHz

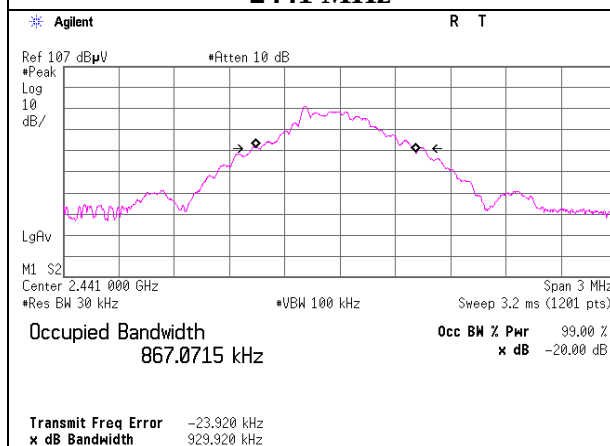


Hopping Off, 3DH5

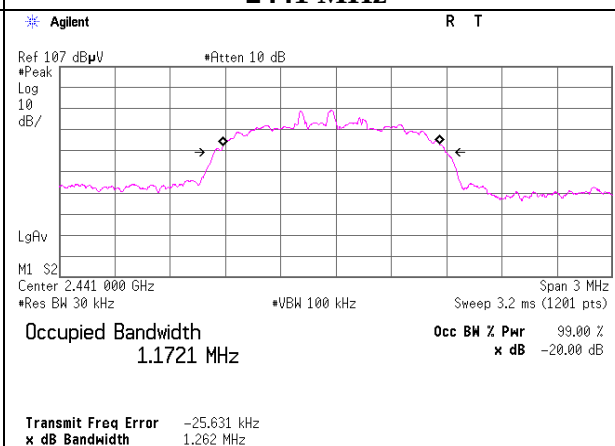
2402 MHz



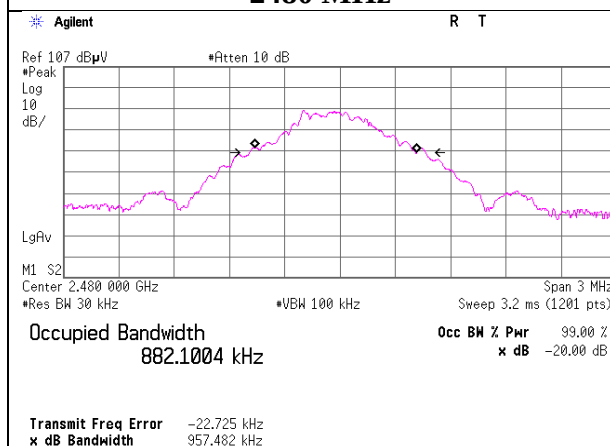
2441 MHz



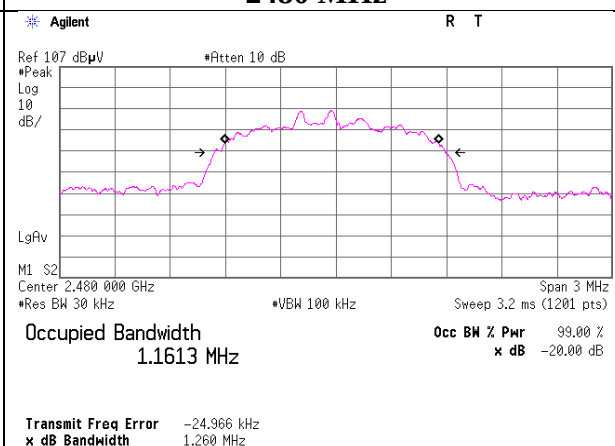
2441 MHz



2480 MHz



2480 MHz



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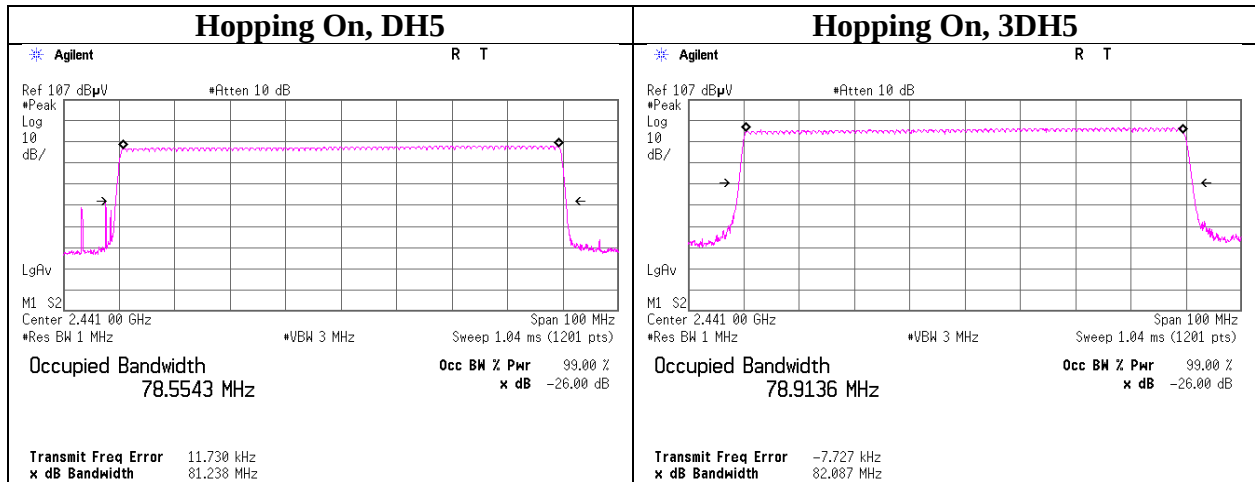
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Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

99% Occupied Bandwidth

Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	11368501H
Date	July 20, 2016
Temperature / Humidity	25 deg. C / 50 % RH
Engineer	Masafumi Niwa
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)
MAEC-03	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	CE	2015/10/01 * 12
MOS-13	Thermo-Hygrometer	Custom	CTH-180	1301	CE	2016/01/21 * 12
MJM-16	Measure	KOMELON	KMC-36	-	CE	-
COTS-MEMI	EMI measurement program	TSJ	TEPTO-DV	-	CE/RE	-
MSA-03	Spectrum Analyzer	Agilent	E4448A	MY44020357	CE	2016/05/19 * 12
MTR-08	Test Receiver	Rohde & Schwarz	ESCI	100767	CE	2015/09/02 * 12
MMM-08	DIGITAL HiTESTER	Hioki	3805	051201197	CE	2016/01/13 * 12
MLS-23	LISN(AMN)	Schwarzbeck	NSLK8127	8127-729	CE(EUT)	2016/07/07 * 12
MLS-24	LISN(AMN)	Schwarzbeck	NSLK8127	8127-730	CEAE)	2016/07/11 * 12
MTA-53	Terminator	TME	CT-01BP	-	CE	2015/12/01 * 12
MCC-112	Coaxial cable	Fujikura/Suhner/TSJ	5D-2W(10m)/ SFM141(3m) /suoform141-PE(1m)/ 421-010(1.5m)/ RFM-E321(Switcher)	-/00640	CE	2015/07/02 * 12
MAT-66	Attenuator(13dB)	JFW Industries, Inc.	50FP-013H2 N	-	CE	2016/01/14 * 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	-
MSA-16	Spectrum Analyzer	Agilent	E4440A	MY46186390	RE	2016/02/08 * 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	2016/06/21 * 12
MPA-12	MicroWave System Amplifier	Agilent	83017A	00650	RE	2015/10/01 * 12
MHA-17	Horn Antenna 15-40GHz	Schwarzbeck	BBHA9170	BBHA9170307	RE	2016/06/24 * 12
MMM-10	DIGITAL HiTESTER	Hioki	3805	051201148	RE	2016/01/18 * 12
MHF-26	High Pass Filter 3.5-18.0GHz	UL Japan	HPF SELECTOR	002	RE	2015/09/17 * 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	2016/06/20 * 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
MOS-19	Thermo-Hygrometer	Custom	CTH-201	0001	AT	2015/12/08 * 12
MMM-17	DIGITAL HiTESTER	Hioki	3805	070900530	AT	2016/01/13 * 12
MPM-09	Power Meter	Anritsu	ML2495A	6K00003348	AT	2015/10/19 * 12
MPSE-12	Power sensor	Anritsu	MA2411B	011598	AT	2015/10/19 * 12
MRENT-130	Spectrum Analyzer	Agilent	E4440A	MY46187750	AT	2016/06/03 * 12
MCC-67	Microwave Cable 1G-40GHz	Suhner	SUCOFLEX102	28635/2	AT	2016/04/18 * 12
MAT-22	Attenuator(10dB) 1-18GHz	Orient Microwave	BX10-0476-00	-	AT	2016/03/18 * 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 test
 RE: Radiated Emission test
 AT: Antenna Terminal Conducted test