



RADIO TEST REPORT

Test Report No. : 11629248H-A-R1

Applicant : **Panasonic Corporation**
Type of Equipment : **Digital Wireless Stereo Headphones**
Model No. : **RP-HF400B**
FCC ID : **ACJ-RP-HF400B**
Test regulation : **FCC Part 15 Subpart C: 2016**
Test Result : **Complied**

1. This test report shall not be reproduced in full or partial, without the written approval of UL Japan, Inc.
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 11629248H-A. 11629248H-A is replaced with this report.

Date of test: February 27 to March 1, 2017

Representative test engineer:

T. Shimada

Takumi Shimada
Engineer
Consumer Technology Division

Approved by:

Takayuki Shimada

Takayuki Shimada
Engineer
Consumer Technology Division



NVLAP LAB CODE: 200572-0

This laboratory is accredited by the NVLAP LAB CODE 200572-0, U.S.A. The tests reported herein have been performed in accordance with its terms of accreditation.

*As for the range of Accreditation in NVLAP, you may refer to the WEB address,
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13-EM-F0429

REVISION HISTORY

Original Test Report No.: 11629248H-A

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CONTENTS	PAGE
SECTION 1: Customer information.....	4
SECTION 2: Equipment under test (E.U.T.).....	4
SECTION 3: Test specification, procedures & results.....	5
SECTION 4: Operation of E.U.T. during testing.....	8
SECTION 5: Radiated Spurious Emission	10
SECTION 6: Antenna Terminal Conducted Tests.....	11
APPENDIX 1: Test data	12
20dB Bandwidth and Carrier Frequency Separation.....	12
Number of Hopping Frequency	15
Dwell time.....	17
Maximum Peak Output Power	20
Average Output Power	21
Radiated Spurious Emission	24
Conducted Spurious Emission	37
Conducted Emission Band Edge compliance	43
99%Occupied Bandwidth	45
APPENDIX 2: Test instruments	47
APPENDIX 3: Photographs of test setup	48
Radiated Spurious Emission	48
Worst Case Position (Horizontal: Z-axis/ Vertical:X-axis)	49

SECTION 1: Customer information

Company Name : Panasonic Corporation
Address : 1-15 Matsuo-cho, Kadoma-shi, Osaka, 571-8504 Japan
Telephone Number : +81-6-6905-4787
Contact Person : Tsuyoshi Maruoka

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

2.1 Identification of E.U.T.

Type of Equipment : Digital Wireless Stereo Headphones
Model No. : RP-HF400B
Serial No. : Refer to Section 4, Clause 4.2
Rating : DC 3.7 V (Battery)
Receipt Date of Sample : February 27, 2017
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: RP-HF400B (referred to as the EUT in this report) is a Digital Wireless Stereo Headphones.

General Specification

Clock frequency(ies) in the system : 26 MHz

Radio Specification

Bluetooth (Ver.4.1)

Equipment Type	Transceiver
Frequency of Operation	2402 MHz - 2480 MHz
Bandwidth & Channel spacing	Bandwidth : 1 MHz Ch spacing : 1 MHz
Type of Modulation	FHSS
Antenna Type / Antenna Gain	Pattern antenna / 1.41 dBi
Power Supply (inner)	DC 3.3 V / 1.2 V / 1.5 V
Operating temperature range	0 deg. C to +40 deg. C

SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification : FCC Part 15 Subpart C
FCC Part 15 final revised on November 14, 2016 and effective December 14, 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	N/A	N/A *1)	-
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(a)(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	11.3 dB 7206.000 MHz, PK, Horizontal 7440.000 MHz, PK Vertical	Complied	Conducted/ Radiated (above 30 MHz) *2)

Note: UL Japan, Inc.'s EMI Work Procedures No. 13-EM-W0420 and 13-EM-W0422.

*1) The test is not applicable since the EUT is not the device that is designed to be connected to the public utility (AC) power line and during USB charging EUT can not transmit Radio frequency.

*2) 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 3.3 V / 1.2 V / 1.5 V) constantly to RF Module regardless of input voltage. Therefore, this EUT complies with the requirement.

FCC Part 15.203 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

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

3.6 Test data, Test instruments, and Test set up

Refer to APPENDIX.

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

4.1 Operating Mode(s)

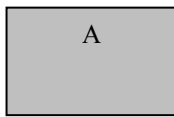
Bluetooth (BT): Transmitting (Tx), Payload: PRBS9

Details of Operating Mode(s)

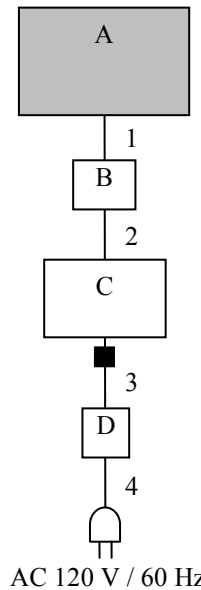
Test Item	Mode	Tested frequency
Conducted Emission, Spurious Emission (Conducted/Radiated)	Tx (Hopping Off) DH5, 3DH5	2402 MHz 2441 MHz 2480 MHz
Carrier Frequency Separation	Tx (Hopping On) DH5, 3DH5	2402 MHz 2441 MHz 2480 MHz
20dB Bandwidth	Tx (Hopping Off) DH5, 3DH5	2402 MHz 2441 MHz 2480 MHz
Number 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: BDR: 0x1212 EDR: 0x1212 Software: AST Test Tool ver 2.3.8.11 *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

<Below 1 GHz>



<Above 1 GHz>



■ : Standard Ferrite Core

* 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	Remark
A	Bluetooth Headphone	RP-HF400B	002 *1) 003 *2)	Panasonic Corporation	EUT
B	Jig	-	-	-	-
C	Laptop PC	CF-N8HWCDPS	OBKSA08729	Panasonic Corporation	-
D	AC Adapter	CF-AA6372B	6372BM610909023E	Panasonic Corporation	-

*1) Used for Radiated emission test

*2) Used for Antenna Terminal Conducted test

List of cables used

No.	Name	Length (m)	Shield		Remark
			Cable	Connector	
1	Signal Cable	0.1	Unshielded	Unshielded	*1)
2	USB Cable	3.0	Unshielded	Unshielded	-
3	DC Cable	1.1	Unshielded	Unshielded	-
4	AC Cable	0.9	Unshielded	Unshielded	-

*1) The use of a jig does not influence on the test result.

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SECTION 5: Radiated Spurious Emission

Test Procedure

[For below 1 GHz]

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

[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	3.7 m*2) (1 GHz – 10 GHz), 1 m*3) (10 GHz – 26.5 GHz)		3.7 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: $20 \times \log (3.7 \text{ m}/3.0 \text{ m}) = 1.83 \text{ dB}$

*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 6: 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 not detected as shown in the chart.

(9 kHz -150 kHz: RBW = 200 Hz, 150 kHz - 30 MHz: RBW = 9.1 kHz)

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

Test data : APPENDIX

Test result : Pass

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APPENDIX 1: Test data

20dB Bandwidth and Carrier Frequency Separation

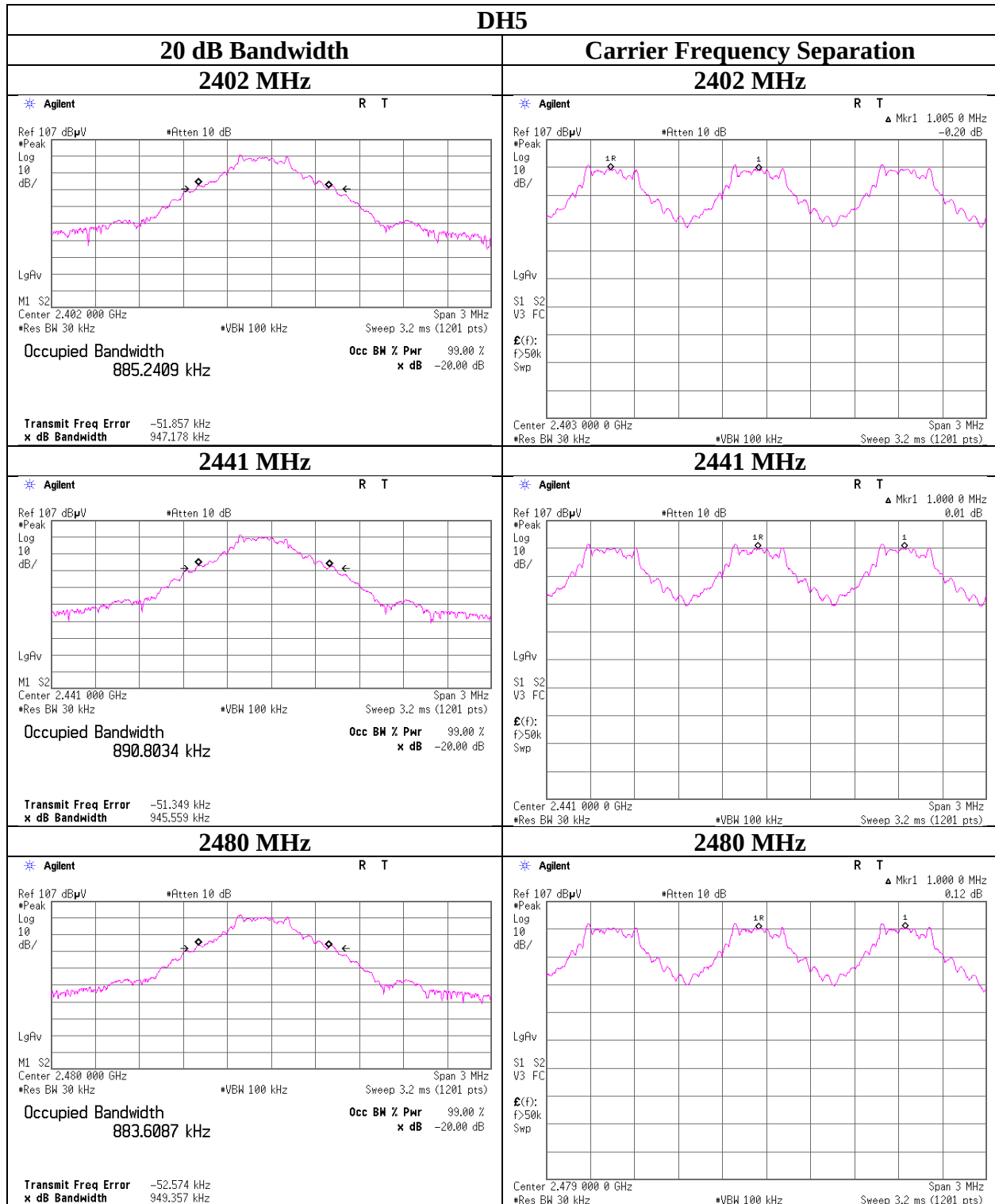
Test place Ise EMC Lab. No.6 Measurement Room
Report No. 11629248H
Date March 1, 2017
Temperature / Humidity 21 deg. C / 34 % RH
Engineer Tomoki Matsui
Mode Tx, Hopping Off/On, DH5/3DH5

Mode	Freq. [MHz]	20dB Bandwidth [MHz]	Carrier Frequency Separation [MHz]	Limit for Carrier Frequency separation [MHz]
DH5	2402.0	0.947	1.005	≥ 0.631
DH5	2441.0	0.946	1.000	≥ 0.631
DH5	2480.0	0.949	1.000	≥ 0.633
3DH5	2402.0	1.284	1.000	≥ 0.856
3DH5	2441.0	1.284	1.000	≥ 0.856
3DH5	2480.0	1.304	0.998	≥ 0.869

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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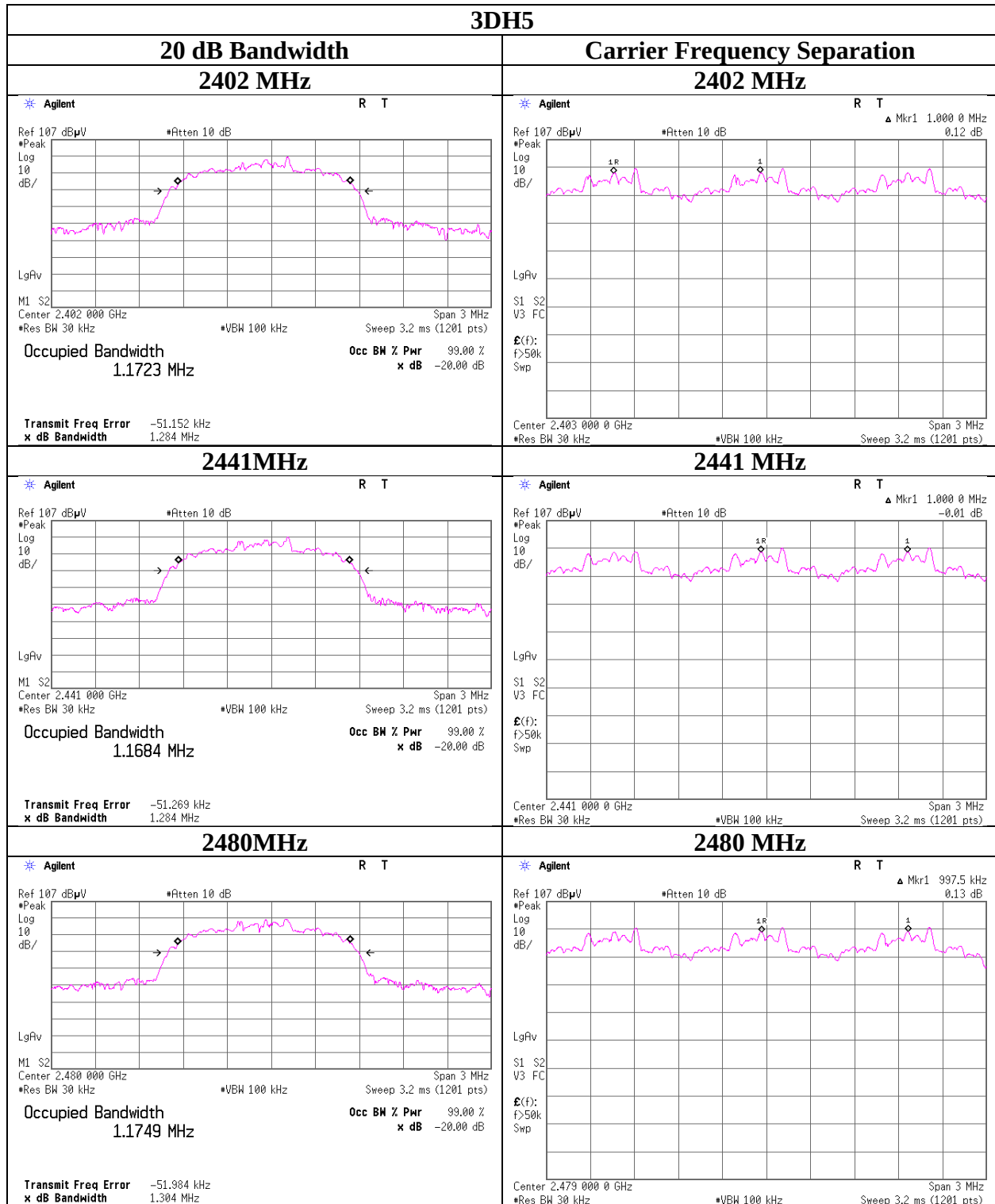
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20dB Bandwidth and Carrier Frequency Separation



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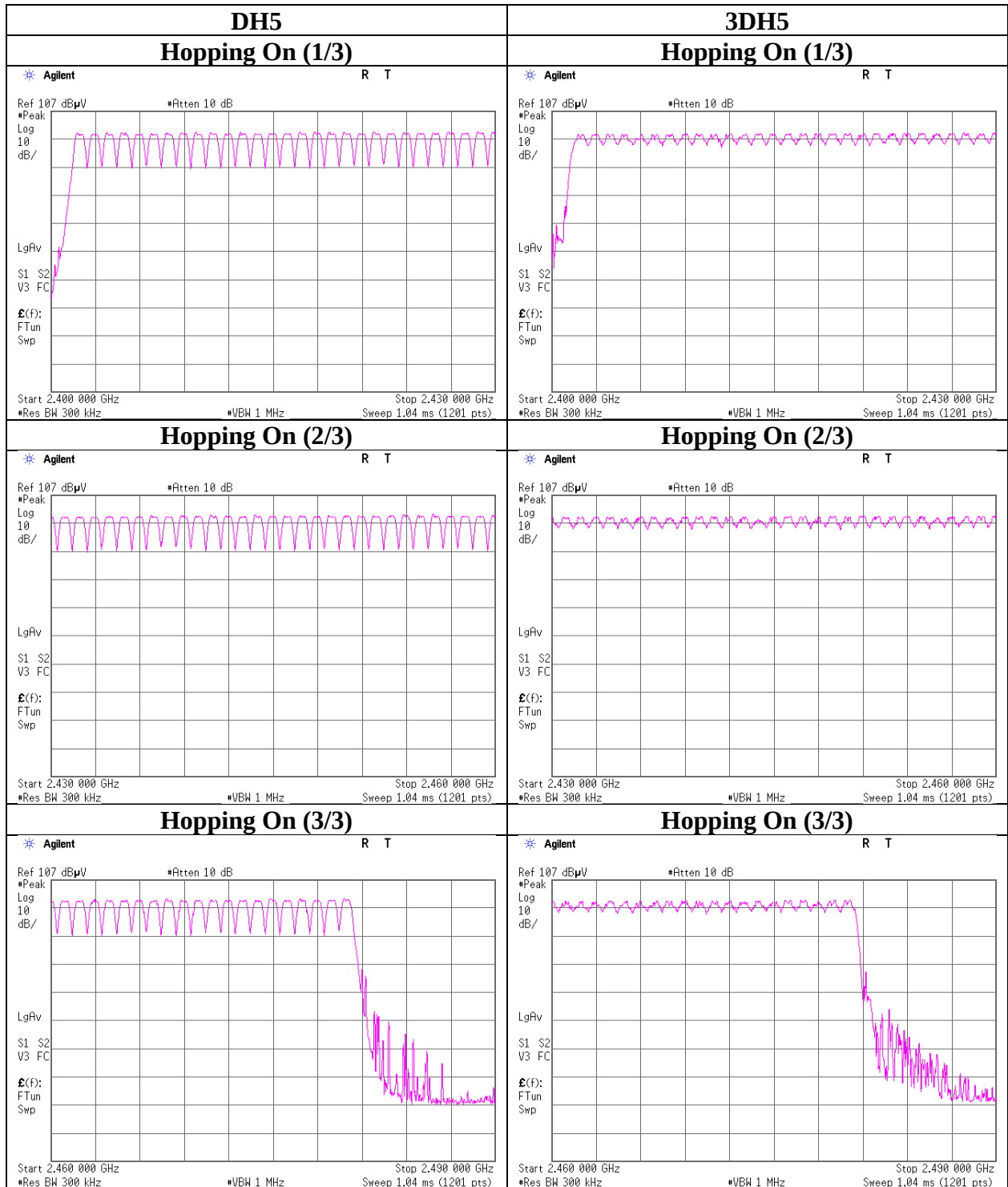
Number of Hopping Frequency

Test place Ise EMC Lab. No.6 Measurement Room
Report No. 11629248H
Date March 1, 2017
Temperature / Humidity 21 deg. C / 34 % RH
Engineer Tomoki Matsui
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.	11629248H
Date	March 1, 2017
Temperature / Humidity	21 deg. C / 34 % RH
Engineer	Tomoki Matsui
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	48.6 times /	5 sec. x	31.6 sec. =	308 times	0.403	124
DH3	24.2 times /	5 sec. x	31.6 sec. =	153 times	1.673	256
DH5	18.0 times /	5 sec. x	31.6 sec. =	114 times	2.915	332
3DH1	47.6 times /	5 sec. x	31.6 sec. =	301 times	0.402	121
3DH3	26.0 times /	5 sec. x	31.6 sec. =	165 times	1.651	272
3DH5	19.4 times /	5 sec. x	31.6 sec. =	123 times	2.936	361

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	50	47	50	50	46	48.6
DH3	27	20	22	22	30	24.2
DH5	14	15	21	19	21	18
3DH1	48	48	49	48	45	47.6
3DH3	26	24	28	28	24	26
3DH5	16	19	23	20	19	19.4

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 $N = 79$.

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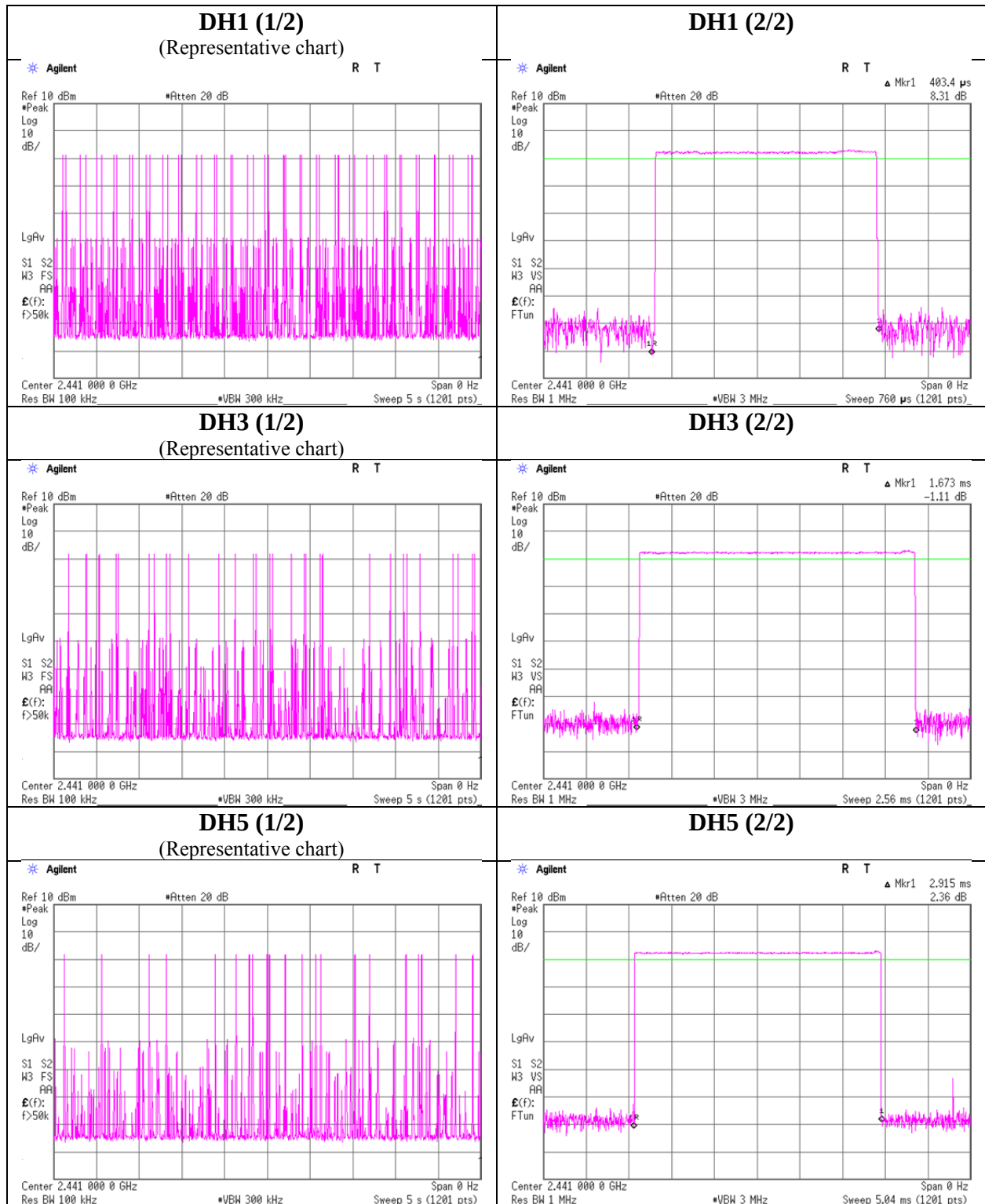
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Dwell time



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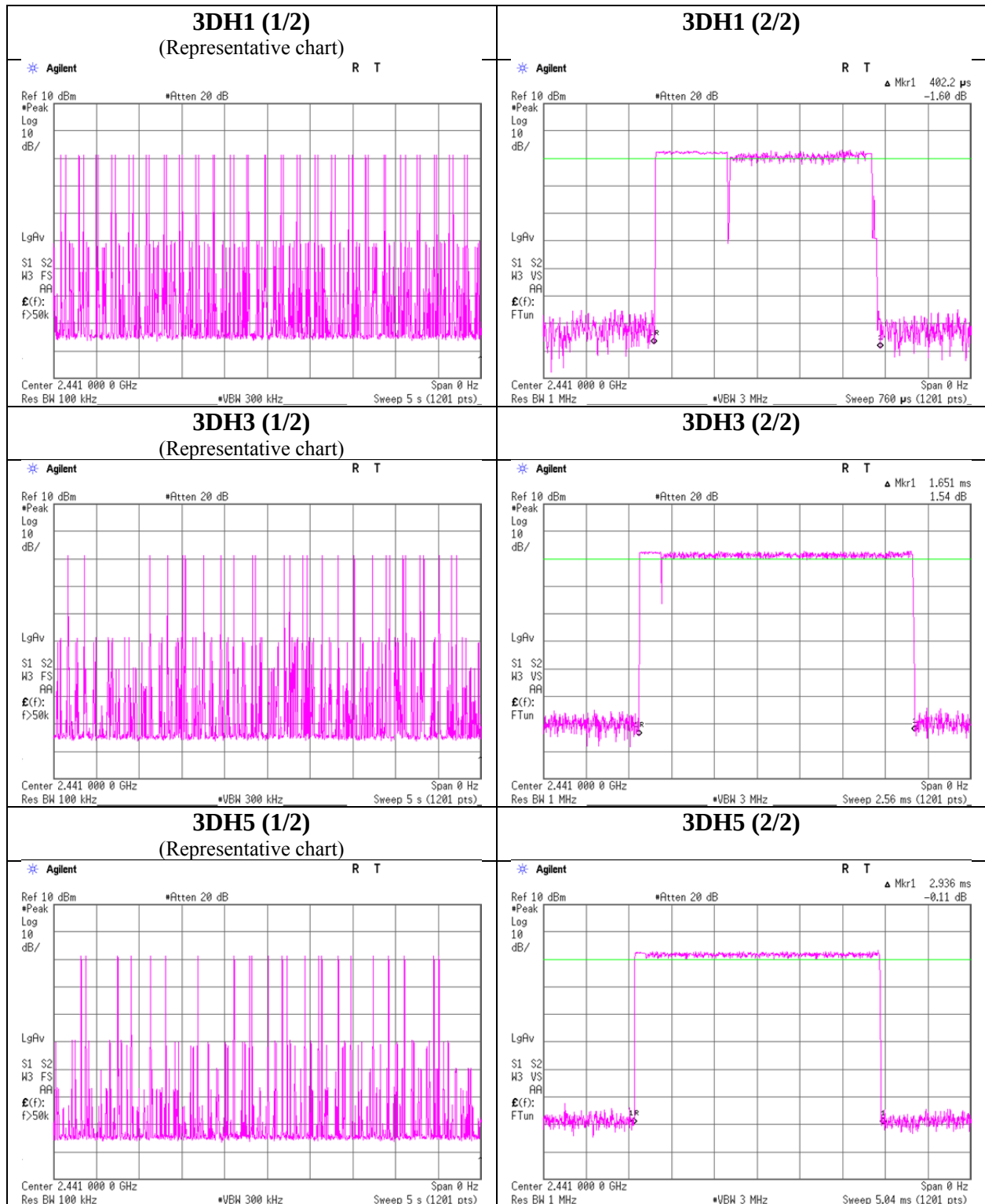
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Dwell time



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Maximum Peak Output Power

Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	11629248H
Date	March 1, 2017
Temperature / Humidity	21 deg. C / 34 % RH
Engineer	Tomoki Matsui
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	2.56	0.50	0.00	3.06	2.02	20.96	125	17.90
DH5	2441.0	3.15	0.50	0.00	3.65	2.32	20.96	125	17.31
DH5	2480.0	3.59	0.50	0.00	4.09	2.56	20.96	125	16.87
2DH5	2402.0	2.99	0.50	0.00	3.49	2.23	20.96	125	17.47
2DH5	2441.0	3.58	0.50	0.00	4.08	2.56	20.96	125	16.88
2DH5	2480.0	3.99	0.50	0.00	4.49	2.81	20.96	125	16.47
3DH5	2402.0	3.24	0.50	0.00	3.74	2.37	20.96	125	17.22
3DH5	2441.0	3.81	0.50	0.00	4.31	2.70	20.96	125	16.65
3DH5	2480.0	4.19	0.50	0.00	4.69	2.94	20.96	125	16.27

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 for RF Exposure)

Test place Ise EMC Lab. No.6 Measurement Room
Report No. 11629248H
Date March 1, 2017
Temperature / Humidity 21 deg. C / 34 % RH
Engineer Tomoki Matsui
Mode Tx, Hopping Off

Mode	Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Time average)	
					[dBm]	[mW]
DH5	2402.0	0.49	0.50	0.00	0.99	1.26
DH5	2441.0	1.05	0.50	0.00	1.55	1.43
DH5	2480.0	1.43	0.50	0.00	1.93	1.56
2DH5	2402.0	-1.17	0.50	0.00	-0.67	0.86
2DH5	2441.0	-0.56	0.50	0.00	-0.06	0.99
2DH5	2480.0	-0.13	0.50	0.00	0.37	1.09
3DH5	2402.0	-1.16	0.50	0.00	-0.66	0.86
3DH5	2441.0	-0.57	0.50	0.00	-0.07	0.98
3DH5	2480.0	-0.12	0.50	0.00	0.38	1.09

Sample Calculation:

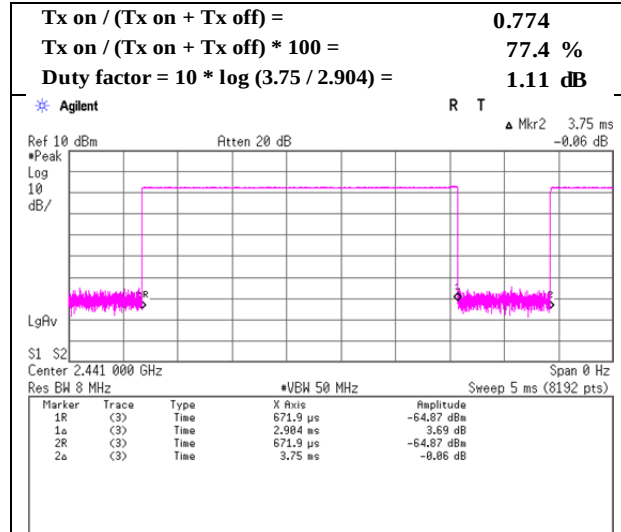
Result (Time average) = Reading + Cable Loss (including the cable(s) customer supplied)

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

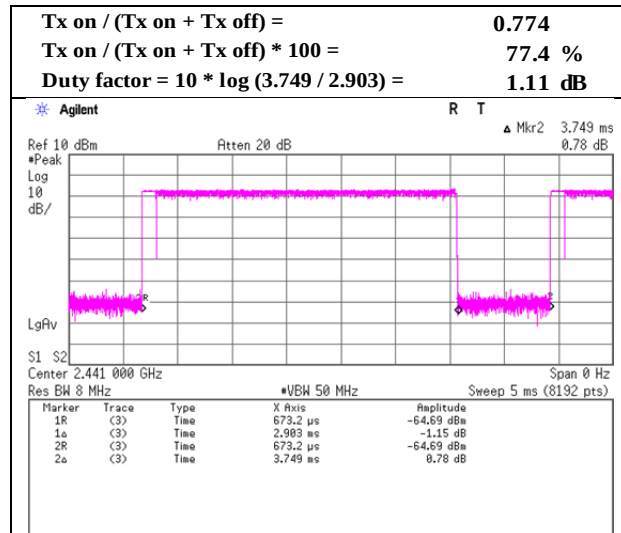
Burst Rate Confirmation

Test place : Ise EMC Lab. No.6 Measurement Room
Report No. : 11629248H
Date : March 1, 2017
Temperature / Humidity : 21 deg. C / 34 % RH
Engineer : Tomoki Matsui
Mode : Tx, Hopping Off

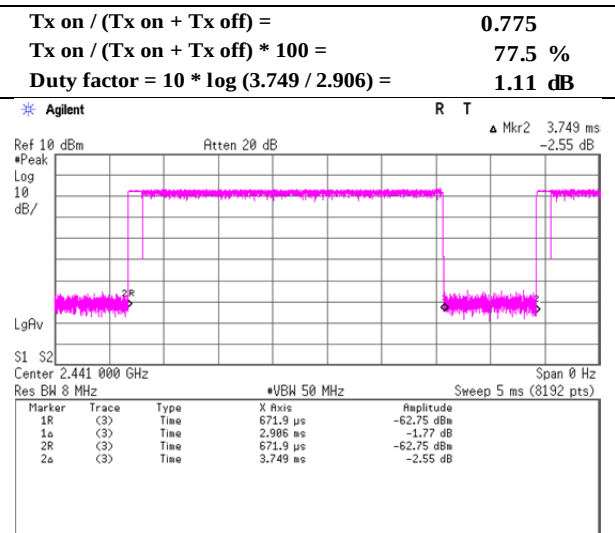
DH5



2DH5



3DH5



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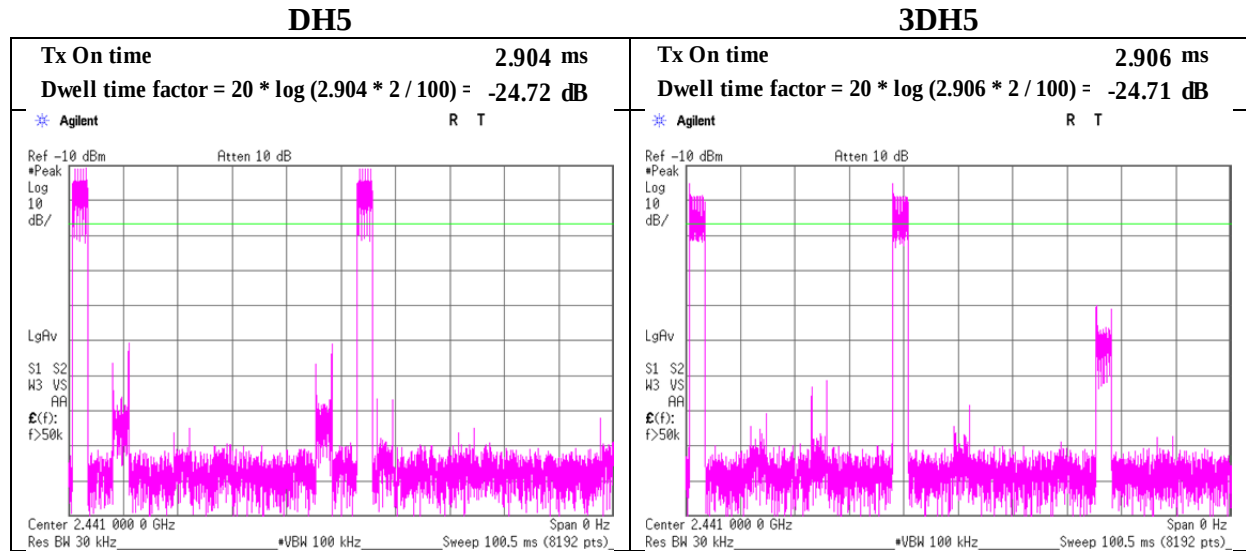
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Dwell time factor

Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	11629248H
Date	March 1, 2017
Temperature / Humidity	21 deg. C / 34 % RH
Engineer	Tomoki Matsui
Mode	Tx, Hopping On



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Radiated Spurious Emission

Test place	Ise EMC Lab.	
Semi Anechoic Chamber	No.2	No. 3
Report No.	11629248H	
Date	February 27, 2017	March 1, 2017
Temperature / Humidity	21 deg. C / 32 % RH	24 deg. C / 38 % RH
Engineer	Tomoki Matsui	Takumi Shimada
	(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]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	39.320	QP	25.5	14.6	7.3	32.2	15.2	40.0	24.8	
Hori.	49.158	QP	27.8	11.2	7.4	32.2	14.2	40.0	25.8	
Hori.	52.398	QP	25.6	10.1	7.5	32.2	11.0	40.0	29.0	
Hori.	64.000	QP	26.2	7.3	7.7	32.2	9.0	40.0	31.0	
Hori.	80.011	QP	27.7	6.3	7.9	32.2	9.7	40.0	30.3	
Hori.	88.470	QP	25.3	7.9	8.0	32.2	9.0	43.5	34.5	
Hori.	2390.000	PK	44.1	27.4	4.8	34.6	41.7	73.9	32.2	
Hori.	2498.050	PK	48.8	27.4	5.0	34.6	46.6	73.9	27.3	
Hori.	2593.882	PK	48.9	27.6	5.1	34.6	47.0	73.9	26.9	
Hori.	4804.000	PK	55.8	30.8	7.5	33.8	60.3	73.9	13.6	
Hori.	7206.000	PK	52.0	36.2	8.3	33.9	62.6	73.9	11.3	
Hori.	9608.000	PK	43.3	38.4	9.2	34.5	56.4	73.9	17.5	Floor noise
Hori.	2390.000	AV	33.4	27.4	4.8	34.6	31.0	53.9	22.9	
Hori.	2498.050	AV	41.3	27.4	5.0	34.6	39.1	53.9	14.8	
Hori.	2593.882	AV	42.8	27.6	5.1	34.6	40.9	53.9	13.0	
Hori.	9608.000	AV	31.8	38.4	9.2	34.5	44.9	53.9	9.0	Floor noise
Vert.	39.320	QP	29.2	14.6	7.3	32.2	18.9	40.0	21.1	
Vert.	49.158	QP	30.7	11.2	7.4	32.2	17.1	40.0	22.9	
Vert.	52.398	QP	27.9	10.1	7.5	32.2	13.3	40.0	26.7	
Vert.	64.000	QP	27.1	7.3	7.7	32.2	9.9	40.0	30.1	
Vert.	80.011	QP	29.2	6.3	7.9	32.2	11.2	40.0	28.8	
Vert.	88.470	QP	27.0	7.9	8.0	32.2	10.7	43.5	32.8	
Vert.	2390.000	PK	44.2	27.4	4.8	34.6	41.8	73.9	32.1	
Vert.	2498.015	PK	47.4	27.4	5.0	34.6	45.2	73.9	28.7	
Vert.	2594.010	PK	49.6	27.6	5.1	34.6	47.7	73.9	26.2	
Vert.	4804.000	PK	56.6	30.8	7.5	33.8	61.1	73.9	12.8	
Vert.	7206.000	PK	48.1	36.2	8.3	33.9	58.7	73.9	15.2	
Vert.	9608.000	PK	43.8	38.4	9.2	34.5	56.9	73.9	17.0	Floor noise
Vert.	2390.000	AV	33.8	27.4	4.8	34.6	31.4	53.9	22.5	
Vert.	2498.015	AV	40.4	27.4	5.0	34.6	38.2	53.9	15.7	
Vert.	2594.010	AV	43.6	27.6	5.1	34.6	41.7	53.9	12.2	
Vert.	9608.000	AV	31.3	38.4	9.2	34.5	44.4	53.9	9.5	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 (3.7 m / 3.0 m) = 1.83 dB
 10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB

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Radiated Spurious Emission

Test place	Ise EMC Lab.	
Semi Anechoic Chamber	No.2	No. 3
Report No.	11629248H	
Date	February 27, 2017	March 1, 2017
Temperature / Humidity	21 deg. C / 32 % RH	24 deg. C / 38 % RH
Engineer	Tomoki Matsui	Takumi Shimada
	(Above 1GHz)	(Below 1GHz)
Mode	Tx, Hopping Off, DH5 2402 MHz	

20dBc Data Sheet

Polarity	Frequency	Detector	Reading	Ant Factor	Loss	Gain	Result	Limit	Margin	Remark
	[MHz]		[dBuV]	[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
Hori	2402.000	PK	99.6	27.4	4.9	34.6	97.3	-	-	Carrier
Hori	2400.000	PK	57.2	27.4	4.9	34.6	54.9	77.3	22.4	
Vert	2402.000	PK	97.4	27.4	4.9	34.6	95.1	-	-	Carrier
Vert	2400.000	PK	55.0	27.4	4.9	34.6	52.7	75.1	22.4	

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

Dwell time factor relaxation

Polarity	Frequency	Detector	Reading	Ant Factor	Loss	Gain	Dwell Factor	Result	Limit	Margin	Remark
	[MHz]		[dBuV]	[dB/m]	[dB]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
Hori	4804.000	AV	48.2	30.8	7.5	33.8	-24.7	28.0	53.9	25.9	*
Hori	7206.000	AV	42.4	36.2	8.3	33.9	-24.7	28.3	53.9	25.6	*
Vert	4804.000	AV	49.0	30.8	7.5	33.8	-24.7	28.8	53.9	25.1	*
Vert	7206.000	AV	38.1	36.2	8.3	33.9	-24.7	24.0	53.9	29.9	*

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

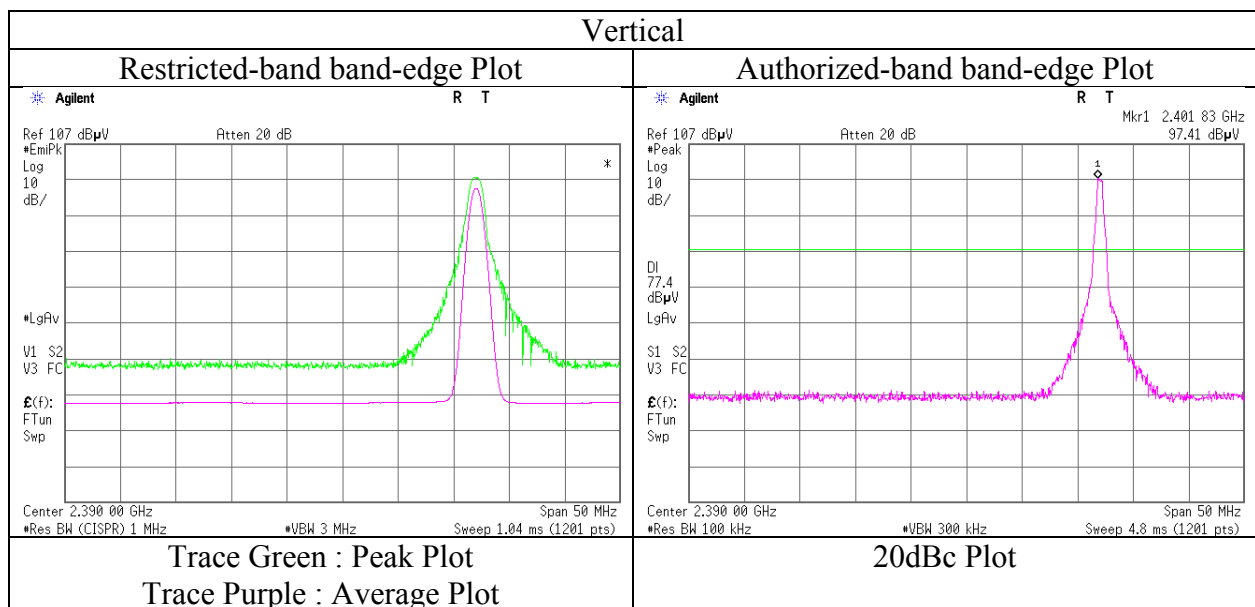
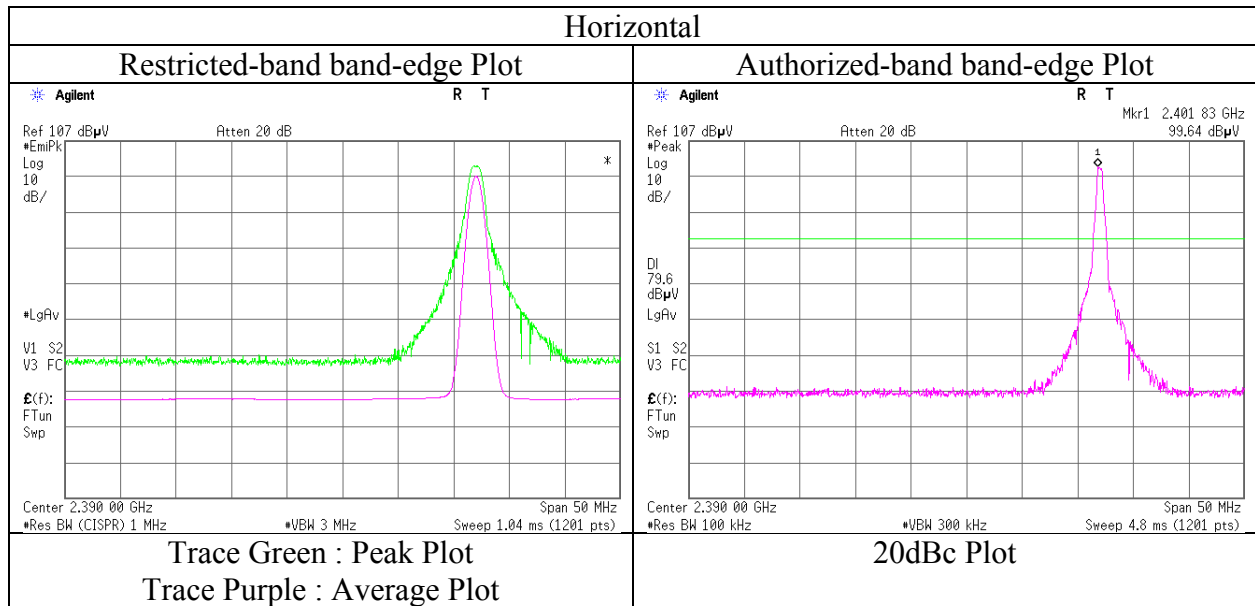
- Gain(Amplifier) + Dwell time factor (Refer to dwell time data sheet)

*Above noise was synchronized with carrier frequency.

Distance factor: 1 GHz - 10 GHz $20\log(3.7\text{ m} / 3.0\text{ m}) = 1.83\text{ dB}$
 10 GHz - 40 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.2 Semi Anechoic Chamber
Report No.	11629248H
Date	February 27, 2017
Temperature / Humidity	21 deg. C / 32 % RH
Engineer	Tomoki Matsui (Above 1GHz)
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.
Semi Anechoic Chamber : No.2 No. 3
Report No. : 11629248H
Date : February 27, 2017 March 1, 2017
Temperature / Humidity : 21 deg. C / 32 % RH 24 deg. C / 38 % RH
Engineer : Tomoki Matsui Takumi Shimada
(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]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	39.316	QP	25.3	14.6	7.3	32.2	15.0	40.0	25.0	
Hori.	49.153	QP	27.1	11.2	7.4	32.2	13.5	40.0	26.5	
Hori.	52.391	QP	25.3	10.1	7.5	32.2	10.7	40.0	29.3	
Hori.	64.000	QP	26.6	7.3	7.7	32.2	9.4	40.0	30.6	
Hori.	80.010	QP	27.4	6.3	7.9	32.2	9.4	40.0	30.6	
Hori.	88.472	QP	25.2	7.9	8.0	32.2	8.9	43.5	34.6	
Hori.	2536.940	PK	48.9	27.5	5.0	34.6	46.8	73.9	27.1	
Hori.	2632.967	PK	49.6	27.7	5.1	34.6	47.8	73.9	26.1	
Hori.	4882.000	PK	55.6	31.1	7.5	33.8	60.4	73.9	13.5	
Hori.	7323.000	PK	50.2	36.4	8.4	33.9	61.1	73.9	12.8	
Hori.	9764.000	PK	43.4	38.6	9.1	34.5	56.6	73.9	17.3	Floor noise
Hori.	2536.940	AV	42.3	27.5	5.0	34.6	40.2	53.9	13.7	
Hori.	2632.967	AV	44.0	27.7	5.1	34.6	42.2	53.9	11.7	
Hori.	9764.000	AV	32.0	38.6	9.1	34.5	45.2	53.9	8.7	Floor noise
Vert.	39.316	QP	29.2	14.6	7.3	32.2	18.9	40.0	21.1	
Vert.	49.153	QP	30.4	11.2	7.4	32.2	16.8	40.0	23.2	
Vert.	52.391	QP	27.7	10.1	7.5	32.2	13.1	40.0	26.9	
Vert.	64.000	QP	27.2	7.3	7.7	32.2	10.0	40.0	30.0	
Vert.	80.010	QP	29.3	6.3	7.9	32.2	11.3	40.0	28.7	
Vert.	88.472	QP	27.1	7.9	8.0	32.2	10.8	43.5	32.7	
Vert.	2537.125	PK	47.9	27.5	5.0	34.6	45.8	73.9	28.1	
Vert.	2633.122	PK	50.0	27.7	5.1	34.6	48.2	73.9	25.7	
Vert.	4882.000	PK	56.2	31.1	7.5	33.8	61.0	73.9	12.9	
Vert.	7323.000	PK	48.9	36.4	8.4	33.9	59.8	73.9	14.1	
Vert.	9764.000	PK	44.1	38.6	9.1	34.5	57.3	73.9	16.6	Floor noise
Vert.	2537.125	AV	41.1	27.5	5.0	34.6	39.0	53.9	14.9	
Vert.	2633.122	AV	44.1	27.7	5.1	34.6	42.3	53.9	11.6	
Vert.	9764.000	AV	31.7	38.6	9.1	34.5	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 $20\log(3.7\text{ m} / 3.0\text{ m}) = 1.83\text{ dB}$
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	47.9	31.1	7.5	33.8	-24.7	28.0	53.9	25.9	*
Hori	7323.000	AV	40.0	36.4	8.4	33.9	-24.7	26.2	53.9	27.7	*
Vert	4882.000	AV	48.7	31.1	7.5	33.8	-24.7	28.8	53.9	25.1	*
Vert	7323.000	AV	39.7	36.4	8.4	33.9	-24.7	25.9	53.9	28.0	*

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 $20\log(3.7\text{ m} / 3.0\text{ m}) = 1.83\text{ dB}$
10 GHz - 40 GHz $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

Radiated Spurious Emission

Test place : Ise EMC Lab.
Semi Anechoic Chamber : No.2 No. 3
Report No. : 11629248H
Date : February 27, 2017 March 1, 2017
Temperature / Humidity : 21 deg. C / 32 % RH 24 deg. C / 38 % RH
Engineer : Tomoki Matsui Takumi Shimada
(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]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	39.315	QP	25.4	14.6	7.3	32.2	15.1	40.0	24.9	
Hori.	49.153	QP	27.2	11.2	7.4	32.2	13.6	40.0	26.4	
Hori.	52.392	QP	25.1	10.1	7.5	32.2	10.5	40.0	29.5	
Hori.	64.000	QP	26.6	7.3	7.7	32.2	9.4	40.0	30.6	
Hori.	80.012	QP	27.1	6.3	7.9	32.2	9.1	40.0	30.9	
Hori.	88.477	QP	25.3	7.9	8.0	32.2	9.0	43.5	34.5	
Hori.	2483.500	PK	61.1	27.4	5.0	34.6	58.9	73.9	15.0	
Hori.	2575.821	PK	48.2	27.6	5.1	34.6	46.3	73.9	27.6	
Hori.	2671.980	PK	48.1	27.8	5.1	34.6	46.4	73.9	27.5	
Hori.	4960.000	PK	50.6	31.4	7.5	33.8	55.7	73.9	18.2	
Hori.	7440.000	PK	50.5	36.5	8.4	34.0	61.4	73.9	12.5	
Hori.	9920.000	PK	43.5	38.8	9.2	34.6	56.9	73.9	17.0	Floor noise
Hori.	2483.500	AV	32.2	27.4	5.0	34.6	30.0	53.9	23.9	
Hori.	2575.821	AV	41.6	27.6	5.1	34.6	39.7	53.9	14.2	
Hori.	2671.980	AV	42.2	27.8	5.1	34.6	40.5	53.9	13.4	
Hori.	9920.000	AV	32.2	38.8	9.2	34.6	45.6	53.9	8.3	Floor noise
Vert.	39.315	QP	29.2	14.6	7.3	32.2	18.9	40.0	21.1	
Vert.	49.153	QP	30.2	11.2	7.4	32.2	16.6	40.0	23.4	
Vert.	52.392	QP	27.8	10.1	7.5	32.2	13.2	40.0	26.8	
Vert.	64.000	QP	27.3	7.3	7.7	32.2	10.1	40.0	29.9	
Vert.	80.012	QP	29.1	6.3	7.9	32.2	11.1	40.0	28.9	
Vert.	88.477	QP	27.1	7.9	8.0	32.2	10.8	43.5	32.7	
Vert.	2483.500	PK	61.0	27.4	5.0	34.6	58.8	73.9	15.1	
Vert.	2576.200	PK	47.9	27.6	5.1	34.6	46.0	73.9	27.9	
Vert.	2671.938	PK	49.9	27.8	5.1	34.6	48.2	73.9	25.7	
Vert.	4960.000	PK	56.3	31.4	7.5	33.8	61.4	73.9	12.5	
Vert.	7440.000	PK	51.5	36.5	8.4	34.0	62.4	73.9	11.5	
Vert.	9920.000	PK	43.8	38.8	9.2	34.6	57.2	73.9	16.7	Floor noise
Vert.	2483.500	AV	32.2	27.4	5.0	34.6	30.0	53.9	23.9	
Vert.	2576.200	AV	41.3	27.6	5.1	34.6	39.4	53.9	14.5	
Vert.	2671.938	AV	43.8	27.8	5.1	34.6	42.1	53.9	11.8	
Vert.	9920.000	AV	31.4	38.8	9.2	34.6	44.8	53.9	9.1	Floor noise

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

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

Distance factor: 1 GHz - 10 GHz 20log (3.7 m / 3.0 m) = 1.83 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	4960.000	AV	41.3	31.4	7.5	33.8	-24.7	21.7	53.9	32.2	*
Hori	7440.000	AV	40.9	36.5	8.4	34.0	-24.7	27.1	53.9	26.8	*
Vert	4960.000	AV	48.7	31.4	7.5	33.8	-24.7	29.1	53.9	24.8	*
Vert	7440.000	AV	42.1	36.5	8.4	34.0	-24.7	28.3	53.9	25.6	*

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 (3.7 m / 3.0 m) = 1.83 dB
10 GHz - 40 GHz 20log (1.0 m / 3.0 m) = -9.5dB

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Ise EMC Lab.

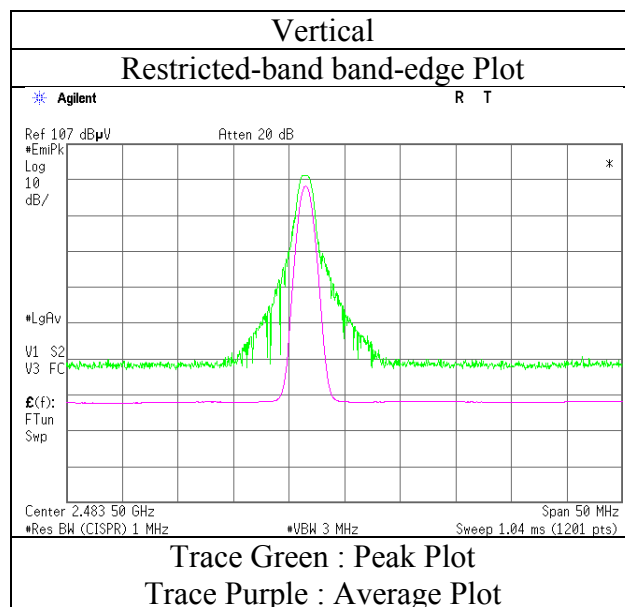
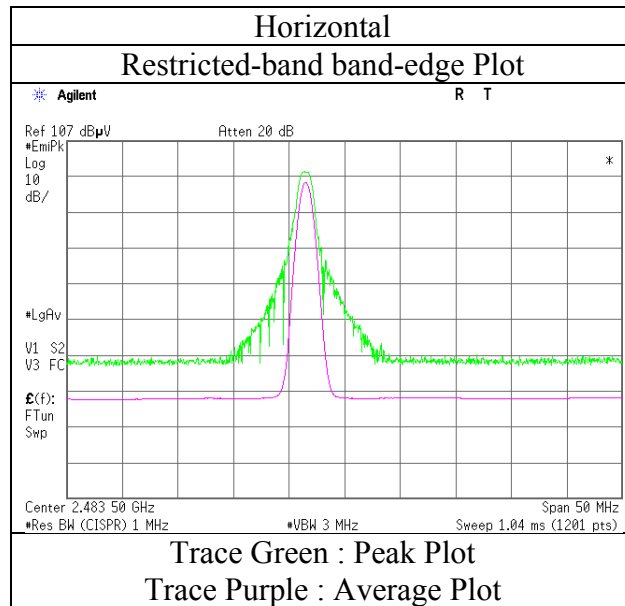
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Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

Radiated Spurious Emission (Reference Plot for band-edge)

Test place	Ise EMC Lab. No.2 Semi Anechoic Chamber
Report No.	11629248H
Date	February 27, 2017
Temperature / Humidity	21 deg. C / 32 % RH
Engineer	Tomoki Matsui (Above 1GHz)
Mode	Tx, Hopping Off, DH5 2480 MHz



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

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Radiated Spurious Emission

Test place : Ise EMC Lab.
Semi Anechoic Chamber : No.2 No. 3
Report No. : 11629248H
Date : February 27, 2017 March 1, 2017
Temperature / Humidity : 21 deg. C / 32 % RH 24 deg. C / 38 % RH
Engineer : Tomoki Matsui Takumi Shimada
(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]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	39.312	QP	25.2	14.6	7.3	32.2	14.9	40.0	25.1	
Hori.	49.156	QP	27.4	11.2	7.4	32.2	13.8	40.0	26.2	
Hori.	52.393	QP	25.3	10.1	7.5	32.2	10.7	40.0	29.3	
Hori.	64.000	QP	26.1	7.3	7.7	32.2	8.9	40.0	31.1	
Hori.	80.009	QP	27.4	6.3	7.9	32.2	9.4	40.0	30.6	
Hori.	88.471	QP	25.2	7.9	8.0	32.2	8.9	43.5	34.6	
Hori.	2390.000	PK	43.3	27.4	4.8	34.6	40.9	73.9	33.0	
Hori.	2497.150	PK	48.3	27.4	5.0	34.6	46.1	73.9	27.8	
Hori.	2593.937	PK	48.7	27.6	5.1	34.6	46.8	73.9	27.1	
Hori.	4804.000	PK	55.7	30.8	7.5	33.8	60.2	73.9	13.7	
Hori.	7206.000	PK	51.2	36.2	8.3	33.9	61.8	73.9	12.1	
Hori.	9608.000	PK	43.3	38.4	9.2	34.5	56.4	73.9	17.5	Floor noise
Hori.	2390.000	AV	31.7	27.4	4.8	34.6	29.3	53.9	24.6	
Hori.	2497.150	AV	41.1	27.4	5.0	34.6	38.9	53.9	15.0	
Hori.	2593.937	AV	42.7	27.6	5.1	34.6	40.8	53.9	13.1	
Hori.	9608.000	AV	31.8	38.4	9.2	34.5	44.9	53.9	9.0	Floor noise
Vert.	39.312	QP	29.3	14.6	7.3	32.2	19.0	40.0	21.0	
Vert.	49.156	QP	30.1	11.2	7.4	32.2	16.5	40.0	23.5	
Vert.	52.393	QP	27.6	10.1	7.5	32.2	13.0	40.0	27.0	
Vert.	64.000	QP	27.3	7.3	7.7	32.2	10.1	40.0	29.9	
Vert.	80.009	QP	29.3	6.3	7.9	32.2	11.3	40.0	28.7	
Vert.	88.471	QP	27.4	7.9	8.0	32.2	11.1	43.5	32.4	
Vert.	2390.000	PK	43.5	27.4	4.8	34.6	41.1	73.9	32.8	
Vert.	2498.209	PK	47.2	27.4	5.0	34.6	45.0	73.9	28.9	
Vert.	2594.321	PK	49.2	27.6	5.1	34.6	47.3	73.9	26.6	
Vert.	4804.000	PK	54.7	30.8	7.5	33.8	59.2	73.9	14.7	
Vert.	7206.000	PK	48.3	36.2	8.3	33.9	58.9	73.9	15.0	
Vert.	9608.000	PK	43.8	38.4	9.2	34.5	56.9	73.9	17.0	Floor noise
Vert.	2390.000	AV	33.6	27.4	4.8	34.6	31.2	53.9	22.7	
Vert.	2498.209	AV	40.4	27.4	5.0	34.6	38.2	53.9	15.7	
Vert.	2594.321	AV	43.5	27.6	5.1	34.6	41.6	53.9	12.3	
Vert.	9608.000	AV	31.3	38.4	9.2	34.5	44.4	53.9	9.5	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 $20\log(3.7\text{ m} / 3.0\text{ m}) = 1.83\text{ dB}$
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.	
Semi Anechoic Chamber	No.2	No. 3
Report No.	11629248H	
Date	February 27, 2017	March 1, 2017
Temperature / Humidity	21 deg. C / 32 % RH	24 deg. C / 38 % RH
Engineer	Tomoki Matsui	Takumi Shimada
	(Above 1GHz)	(Below 1GHz)
Mode	Tx, Hopping Off, 3DH5 2402 MHz	

20dBc Data Sheet

Polarity	Frequency	Detector	Reading	Ant Factor	Loss	Gain	Result	Limit	Margin	Remark
	[MHz]		[dBuV]	[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
Hori	2402.000	PK	98.4	27.4	4.9	34.6	96.1	-	-	Carrier
Hori	2400.000	PK	55.8	27.4	4.9	34.6	53.5	76.1	22.6	
Vert	2402.000	PK	97.0	27.4	4.9	34.6	94.7	-	-	Carrier
Vert	2400.000	PK	54.7	27.4	4.9	34.6	52.4	74.7	22.3	

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

Dwell time factor relaxation

Polarity	Frequency	Detector	Reading	Ant Factor	Loss	Gain	Dwell Factor	Result	Limit	Margin	Remark
	[MHz]		[dBuV]	[dB/m]	[dB]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
Hori	4804.000	AV	48.0	30.8	7.5	33.8	-24.7	27.8	53.9	26.1	*
Hori	7206.000	AV	42.2	36.2	8.3	33.9	-24.7	28.1	53.9	25.8	*
Vert	4804.000	AV	44.9	30.8	7.5	33.8	-24.7	24.7	53.9	29.2	*
Vert	7206.000	AV	38.3	36.2	8.3	33.9	-24.7	24.2	53.9	29.7	*

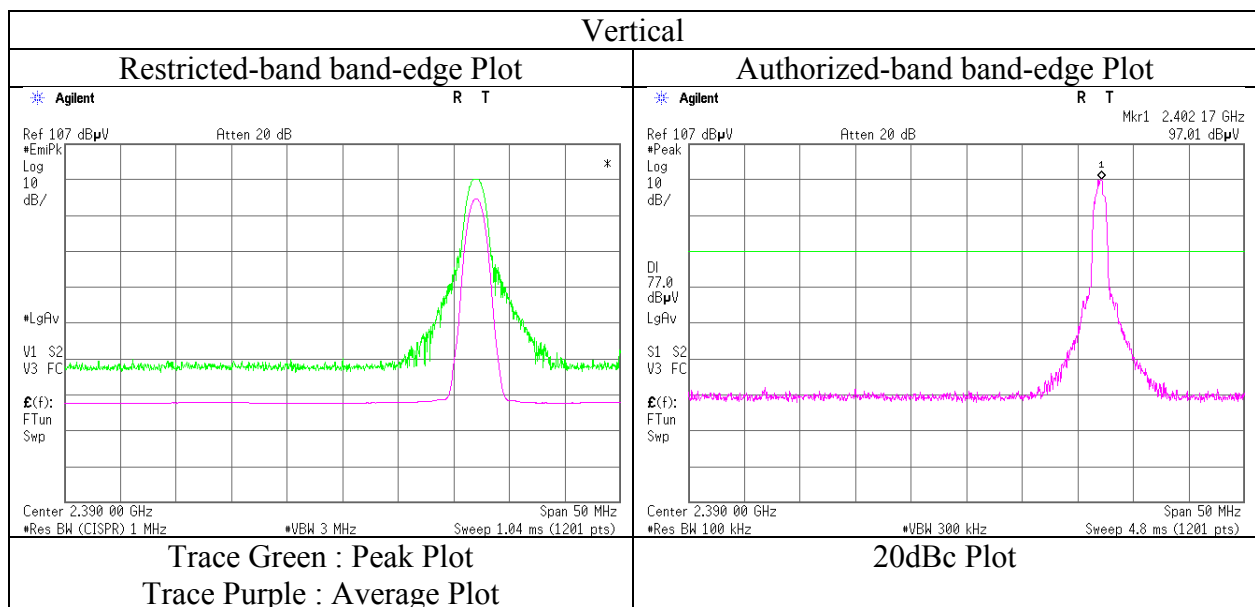
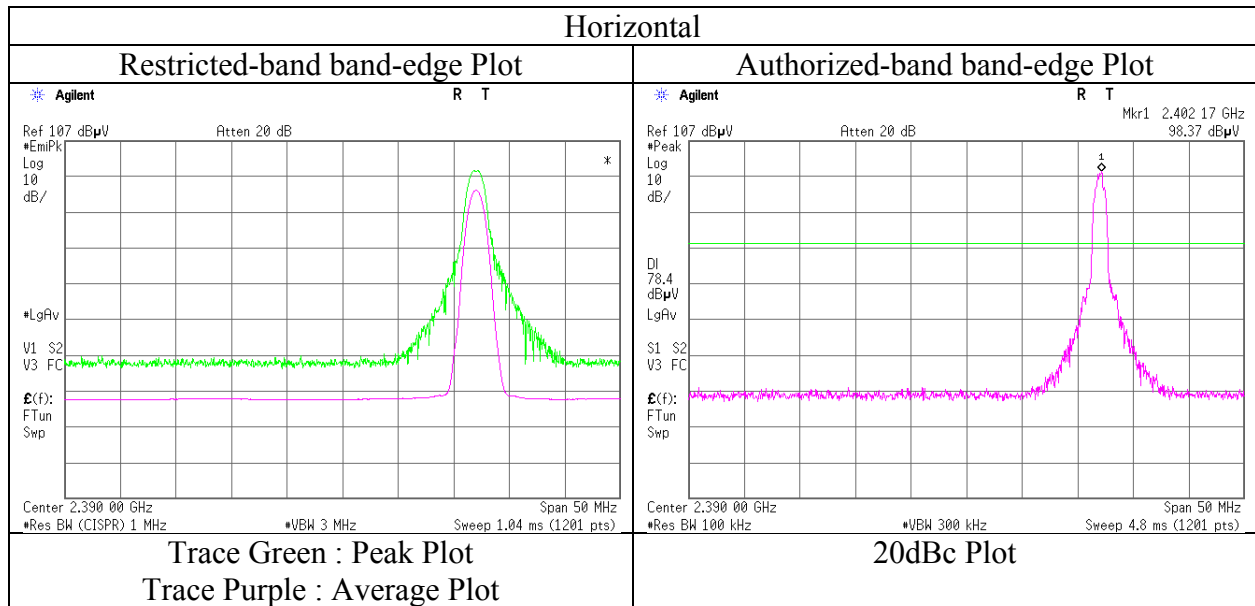
Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz))
- Gain(Amplifier) + Dwell time factor (Refer to dwell time data sheet)

*Above noise was synchronized with carrier frequency.

Distance factor: 1 GHz - 10 GHz $20\log(3.7\text{ m} / 3.0\text{ m}) = 1.83\text{ dB}$
 10 GHz - 40 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.2 Semi Anechoic Chamber
Report No.	11629248H
Date	February 27, 2017
Temperature / Humidity	21 deg. C / 32 % RH
Engineer	Tomoki Matsui (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.

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Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

Radiated Spurious Emission

Test place : Ise EMC Lab.
Semi Anechoic Chamber : No.2 No. 3
Report No. : 11629248H
Date : February 27, 2017 March 1, 2017
Temperature / Humidity : 21 deg. C / 32 % RH 24 deg. C / 38 % RH
Engineer : Tomoki Matsui Takumi Shimada
(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]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	39.313	QP	25.3	14.6	7.3	32.2	15.0	40.0	25.0	
Hori.	49.152	QP	27.1	11.2	7.4	32.2	13.5	40.0	26.5	
Hori.	52.396	QP	25.1	10.1	7.5	32.2	10.5	40.0	29.5	
Hori.	64.000	QP	26.1	7.3	7.7	32.2	8.9	40.0	31.1	
Hori.	80.011	QP	27.6	6.3	7.9	32.2	9.6	40.0	30.4	
Hori.	88.472	QP	25.4	7.9	8.0	32.2	9.1	43.5	34.4	
Hori.	2537.104	PK	48.4	27.5	5.0	34.6	46.3	73.9	27.6	
Hori.	2632.999	PK	49.0	27.7	5.1	34.6	47.2	73.9	26.7	
Hori.	4882.000	PK	55.1	31.1	7.5	33.8	59.9	73.9	14.0	
Hori.	7323.000	PK	50.2	36.4	8.4	33.9	61.1	73.9	12.8	
Hori.	9764.000	PK	43.5	38.6	9.1	34.5	56.7	73.9	17.2	Floor noise
Hori.	2537.104	AV	42.2	27.5	5.0	34.6	40.1	53.9	13.8	
Hori.	2632.999	AV	43.8	27.7	5.1	34.6	42.0	53.9	11.9	
Hori.	9764.000	AV	32.1	38.6	9.1	34.5	45.3	53.9	8.6	Floor noise
Vert.	39.313	QP	29.2	14.6	7.3	32.2	18.9	40.0	21.1	
Vert.	49.152	QP	29.9	11.2	7.4	32.2	16.3	40.0	23.7	
Vert.	52.396	QP	27.3	10.1	7.5	32.2	12.7	40.0	27.3	
Vert.	64.000	QP	27.6	7.3	7.7	32.2	10.4	40.0	29.6	
Vert.	80.011	QP	29.1	6.3	7.9	32.2	11.1	40.0	28.9	
Vert.	88.472	QP	27.3	7.9	8.0	32.2	11.0	43.5	32.5	
Vert.	2537.123	PK	48.0	27.5	5.0	34.6	45.9	73.9	28.0	
Vert.	2633.129	PK	49.7	27.7	5.1	34.6	47.9	73.9	26.0	
Vert.	4882.000	PK	56.0	31.1	7.5	33.8	60.8	73.9	13.1	
Vert.	7323.000	PK	48.7	36.4	8.4	33.9	59.6	73.9	14.3	
Vert.	9764.000	PK	44.4	38.6	9.1	34.5	57.6	73.9	16.3	Floor noise
Vert.	2537.123	AV	41.2	27.5	5.0	34.6	39.1	53.9	14.8	
Vert.	2633.129	AV	44.1	27.7	5.1	34.6	42.3	53.9	11.6	
Vert.	9764.000	AV	31.8	38.6	9.1	34.5	45.0	53.9	8.9	Floor noise

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

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

Distance factor: 1 GHz - 10 GHz $20\log(3.7\text{ m} / 3.0\text{ m}) = 1.83\text{ dB}$
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	47.6	31.1	7.5	33.8	-24.7	27.7	53.9	26.2	*
Hori	7323.000	AV	39.8	36.4	8.4	33.9	-24.7	26.0	53.9	27.9	*
Vert	4882.000	AV	48.7	31.1	7.5	33.8	-24.7	28.8	53.9	25.1	*
Vert	7323.000	AV	39.6	36.4	8.4	33.9	-24.7	25.8	53.9	28.1	*

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 $20\log(3.7\text{ m} / 3.0\text{ m}) = 1.83\text{ dB}$
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.
Semi Anechoic Chamber : No.2
Report No. : 11629248H
Date : February 27, 2017
Temperature / Humidity : 21 deg. C / 32 % RH
Engineer : Tomoki Matsui
Mode : Tx, Hopping Off, 3DH5 2480 MHz

No. 3

March 1, 2017

24 deg. C / 38 % RH

Takumi Shimada

(Below 1GHz)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	39.315	QP	25.1	14.6	7.3	32.2	14.8	40.0	25.2	
Hori.	49.149	QP	27.3	11.2	7.4	32.2	13.7	40.0	26.3	
Hori.	52.392	QP	25.2	10.1	7.5	32.2	10.6	40.0	29.4	
Hori.	64.000	QP	26.4	7.3	7.7	32.2	9.2	40.0	30.8	
Hori.	80.012	QP	27.1	6.3	7.9	32.2	9.1	40.0	30.9	
Hori.	88.475	QP	25.2	7.9	8.0	32.2	8.9	43.5	34.6	
Hori.	2483.500	PK	62.2	27.4	5.0	34.6	60.0	73.9	13.9	
Hori.	2575.768	PK	48.9	27.6	5.1	34.6	47.0	73.9	26.9	
Hori.	2672.002	PK	48.4	27.8	5.1	34.6	46.7	73.9	27.2	
Hori.	4960.000	PK	50.0	31.4	7.5	33.8	55.1	73.9	18.8	
Hori.	7440.000	PK	51.2	36.5	8.4	34.0	62.1	73.9	11.8	
Hori.	9920.000	PK	43.9	38.8	9.2	34.6	57.3	73.9	16.6	Floor noise
Hori.	2483.500	AV	33.2	27.4	5.0	34.6	31.0	53.9	22.9	
Hori.	2575.768	AV	42.6	27.6	5.1	34.6	40.7	53.9	13.2	
Hori.	2672.002	AV	42.8	27.8	5.1	34.6	41.1	53.9	12.8	
Hori.	9920.000	AV	32.3	38.8	9.2	34.6	45.7	53.9	8.2	Floor noise
Vert.	39.315	QP	29.1	14.6	7.3	32.2	18.8	40.0	21.2	
Vert.	49.149	QP	30.0	11.2	7.4	32.2	16.4	40.0	23.6	
Vert.	52.392	QP	27.1	10.1	7.5	32.2	12.5	40.0	27.5	
Vert.	64.000	QP	27.4	7.3	7.7	32.2	10.2	40.0	29.8	
Vert.	80.012	QP	29.3	6.3	7.9	32.2	11.3	40.0	28.7	
Vert.	88.475	QP	27.3	7.9	8.0	32.2	11.0	43.5	32.5	
Vert.	2483.500	PK	62.2	27.4	5.0	34.6	60.0	73.9	13.9	
Vert.	2576.120	PK	47.4	27.6	5.1	34.6	45.5	73.9	28.4	
Vert.	2671.983	PK	50.0	27.8	5.1	34.6	48.3	73.9	25.6	
Vert.	4960.000	PK	56.1	31.4	7.5	33.8	61.2	73.9	12.7	
Vert.	7440.000	PK	51.7	36.5	8.4	34.0	62.6	73.9	11.3	
Vert.	9920.000	PK	44.2	38.8	9.2	34.6	57.6	73.9	16.3	Floor noise
Vert.	2483.500	AV	33.2	27.4	5.0	34.6	31.0	53.9	22.9	
Vert.	2576.120	AV	41.2	27.6	5.1	34.6	39.3	53.9	14.6	
Vert.	2671.983	AV	43.8	27.8	5.1	34.6	42.1	53.9	11.8	
Vert.	9920.000	AV	31.5	38.8	9.2	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 (3.7 m / 3.0 m) = 1.83 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	4960.000	AV	41.0	31.4	7.5	33.8	-24.7	21.4	53.9	32.5	*
Hori	7440.000	AV	41.3	36.5	8.4	34.0	-24.7	27.5	53.9	26.4	*
Vert	4960.000	AV	48.3	31.4	7.5	33.8	-24.7	28.7	53.9	25.2	*
Vert	7440.000	AV	42.0	36.5	8.4	34.0	-24.7	28.2	53.9	25.7	*

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 20log (3.7 m / 3.0 m) = 1.83 dB
10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5dB

UL Japan, Inc.

Ise EMC Lab.

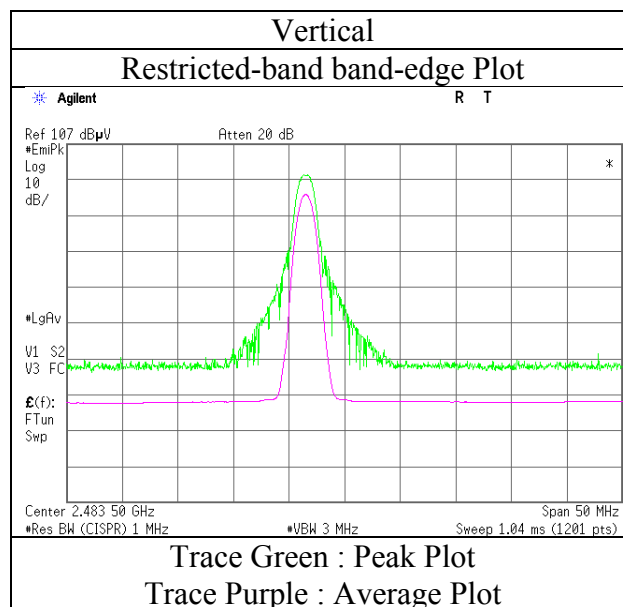
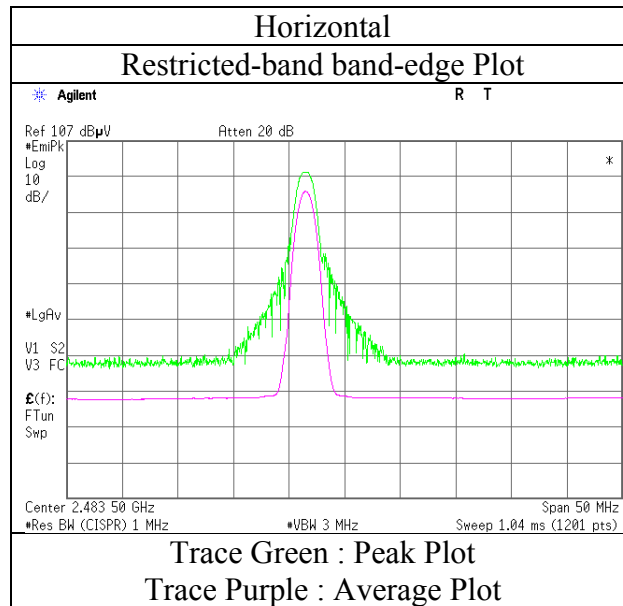
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8999

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Radiated Spurious Emission
(Reference Plot for band-edge)

Test place : Ise EMC Lab. No.2 Semi Anechoic Chamber
Report No. : 11629248H
Date : February 27, 2017
Temperature / Humidity : 21 deg. C / 32 % RH
Engineer : Tomoki Matsui
(Above 1GHz)
Mode : Tx, Hopping Off, 3DH5 2480 MHz



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

UL Japan, Inc.

Ise EMC Lab.

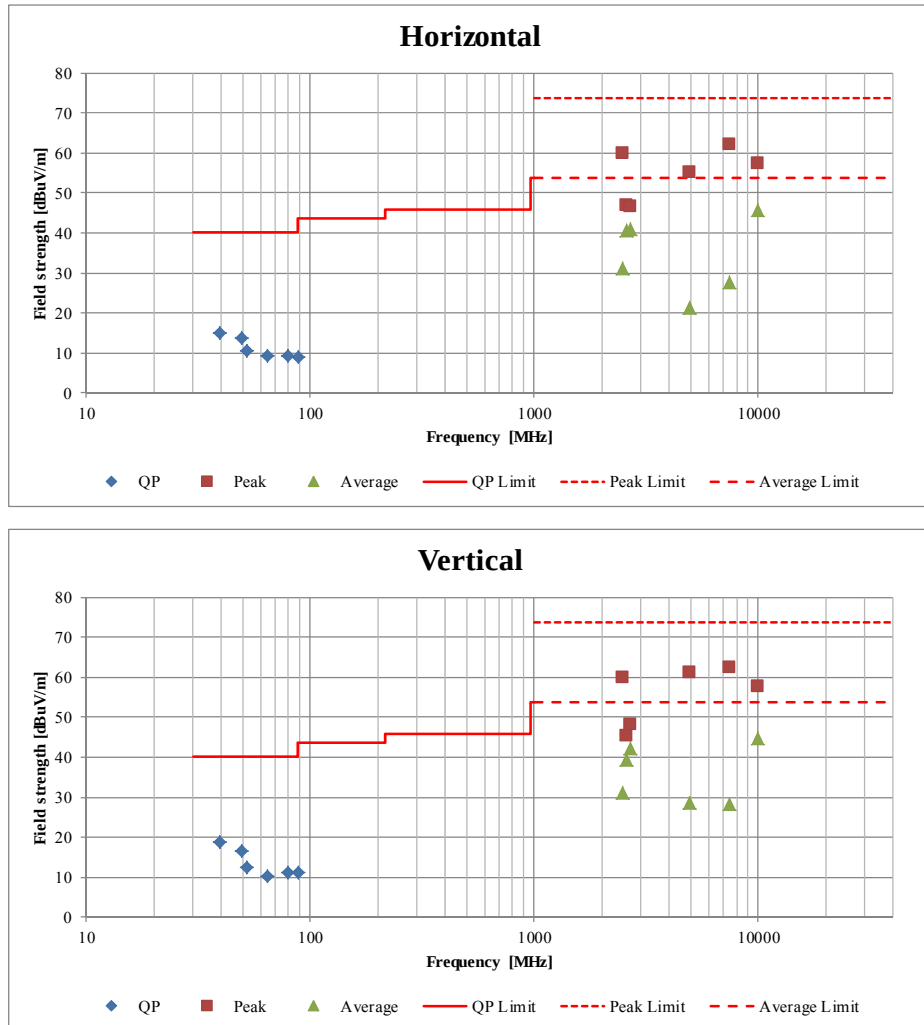
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

Radiated Spurious Emission (Plot data, Worst case)

Test place	Ise EMC Lab.	
Semi Anechoic Chamber	No.2	No. 3
Report No.	11629248H	
Date	February 27, 2017	March 1, 2017
Temperature / Humidity	21 deg. C / 32 % RH	24 deg. C / 38 % RH
Engineer	Tomoki Matsui (Above 1GHz)	Takumi Shimada (Below 1GHz)
Mode	Tx, Hopping Off, 3DH5 2480 MHz	

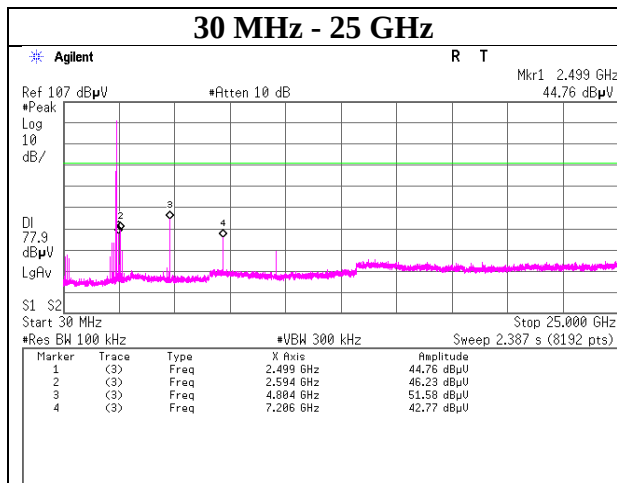
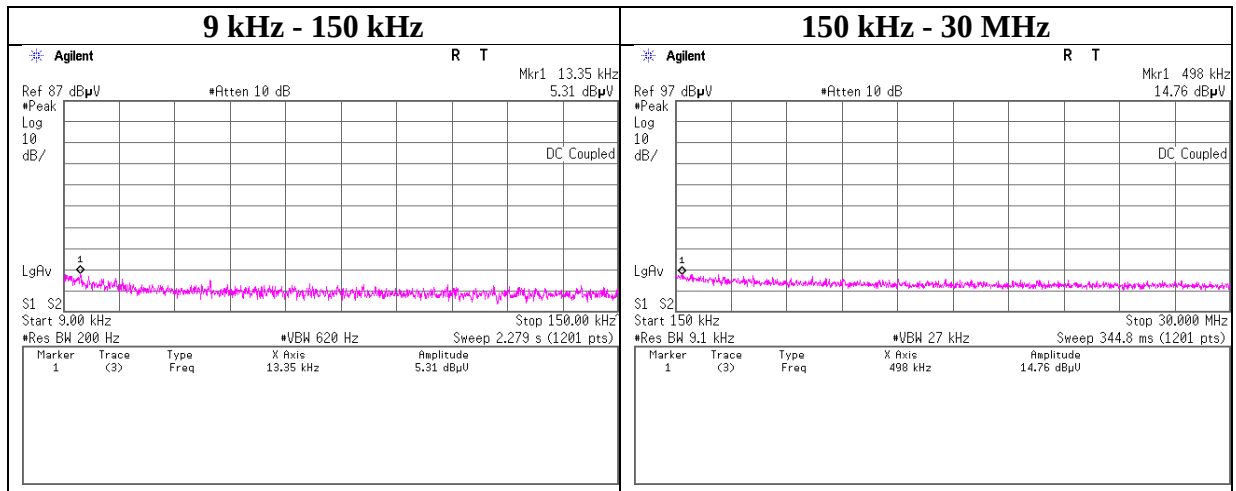


*These plots data contains sufficient number to show the trend of characteristic features for EUT.

Conducted Spurious Emission

Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	11629248H
Date	March 1, 2017
Temperature / Humidity	21 deg. C / 34 % RH
Engineer	Tomoki Matsui
Mode	Tx, Hopping Off, DH5

2402 MHz



UL Japan, Inc.

Ise EMC Lab.

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

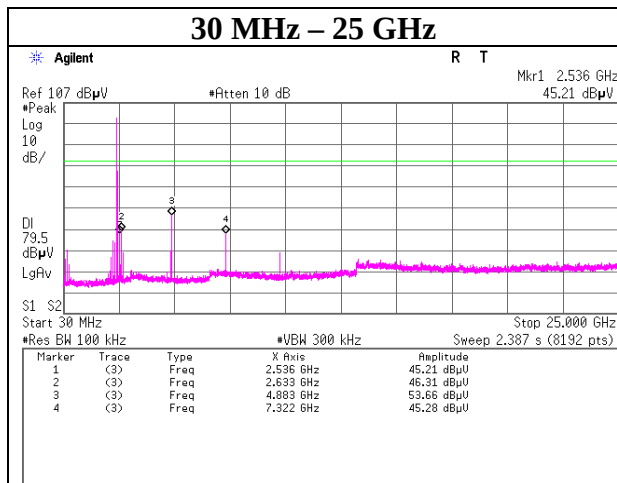
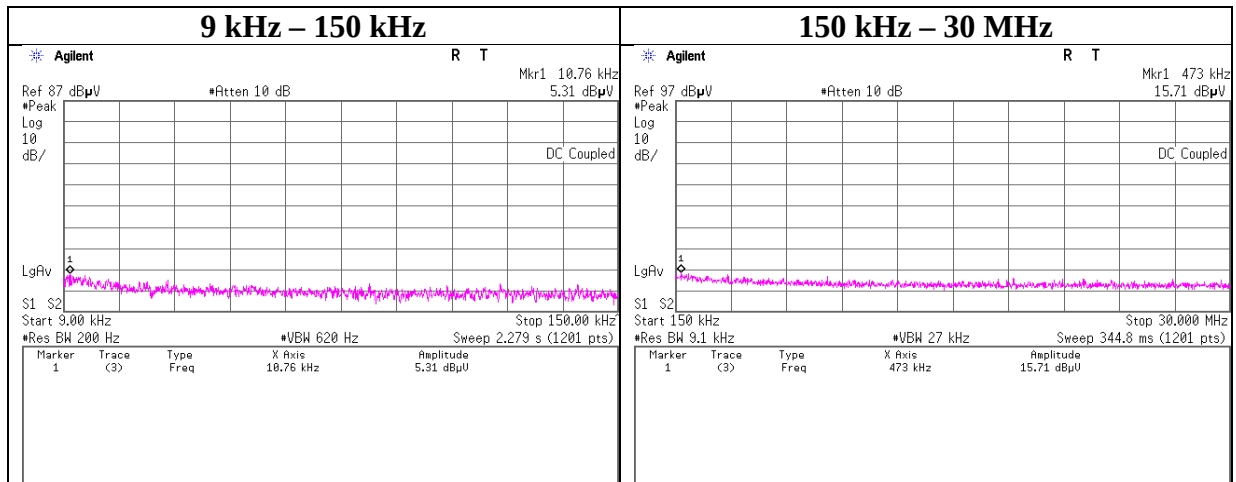
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

Conducted Spurious Emission

Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	11629248H
Date	March 1, 2017
Temperature / Humidity	21 deg. C / 34 % RH
Engineer	Tomoki Matsui
Mode	Tx, Hopping Off, DH5

2441 MHz



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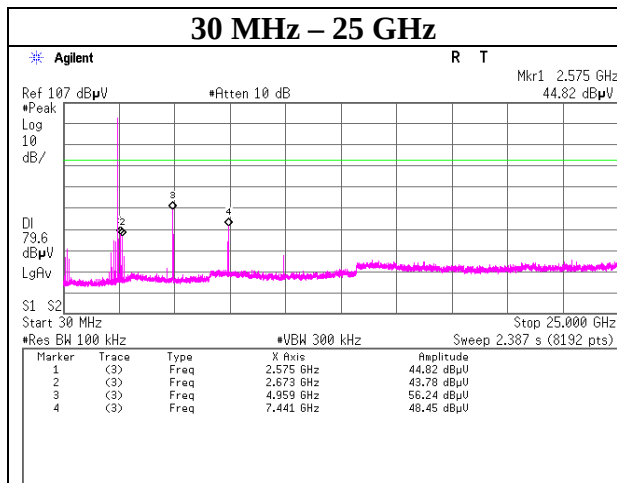
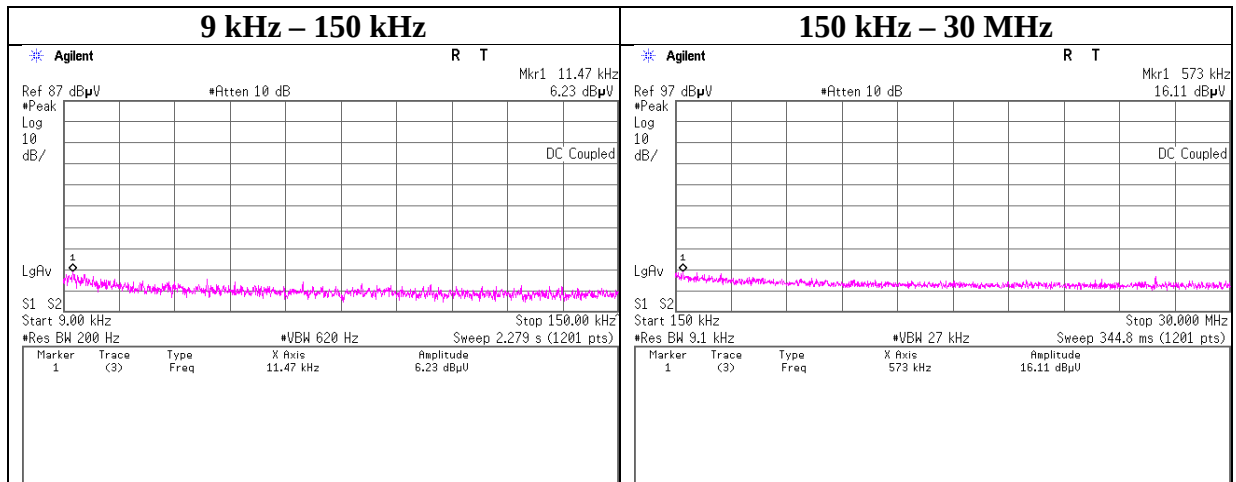
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

Conducted Spurious Emission

Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	11629248H
Date	March 1, 2017
Temperature / Humidity	21 deg. C / 34 % RH
Engineer	Tomoki Matsui
Mode	Tx, Hopping Off, DH5

2480 MHz



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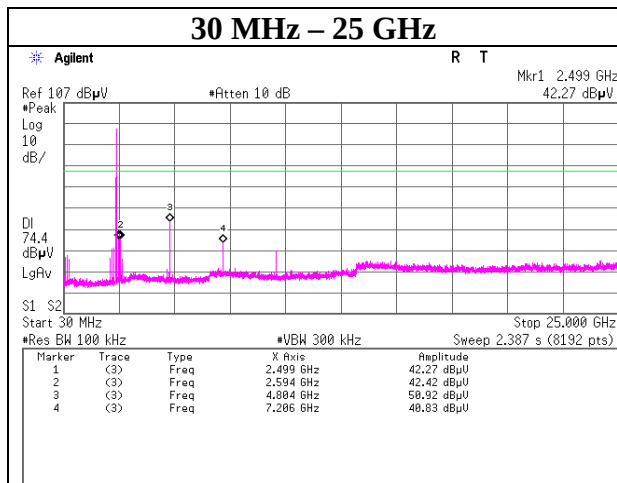
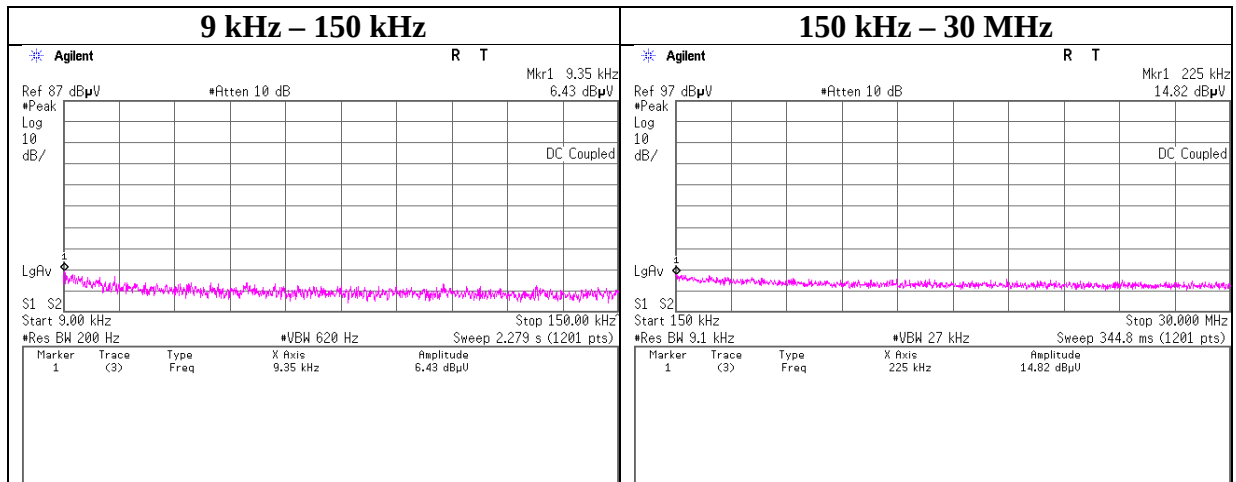
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

Conducted Spurious Emission

Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	11629248H
Date	March 1, 2017
Temperature / Humidity	21 deg. C / 34 % RH
Engineer	Tomoki Matsui
Mode	Tx, Hopping Off, 3DH5

2402 MHz



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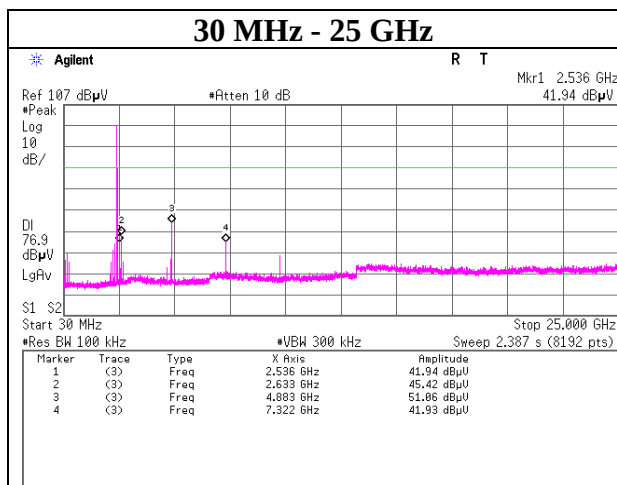
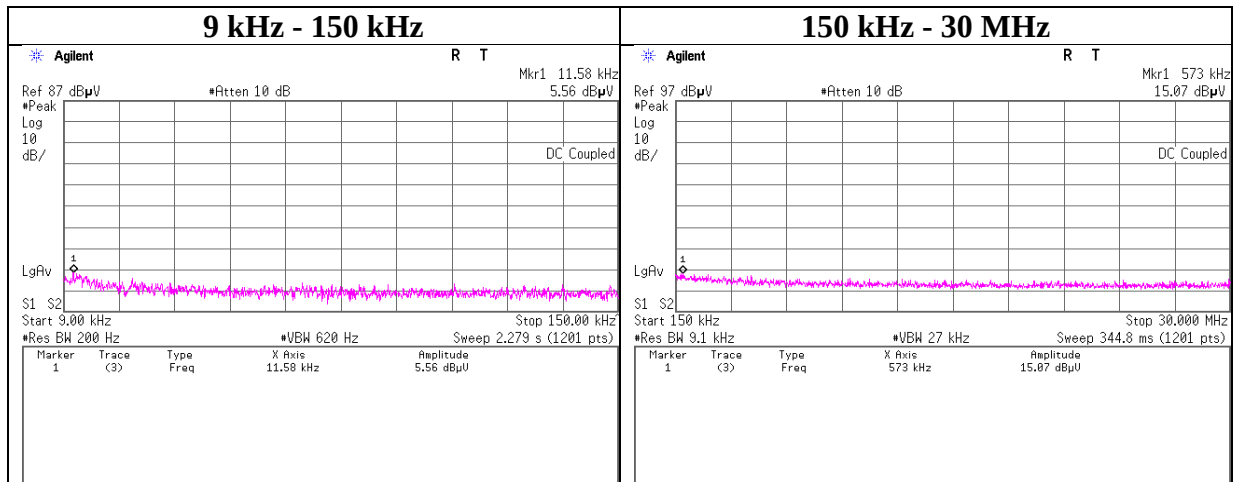
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

Conducted Spurious Emission

Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	11629248H
Date	March 1, 2017
Temperature / Humidity	21 deg. C / 34 % RH
Engineer	Tomoki Matsui
Mode	Tx, Hopping Off, 3DH5

2441 MHz



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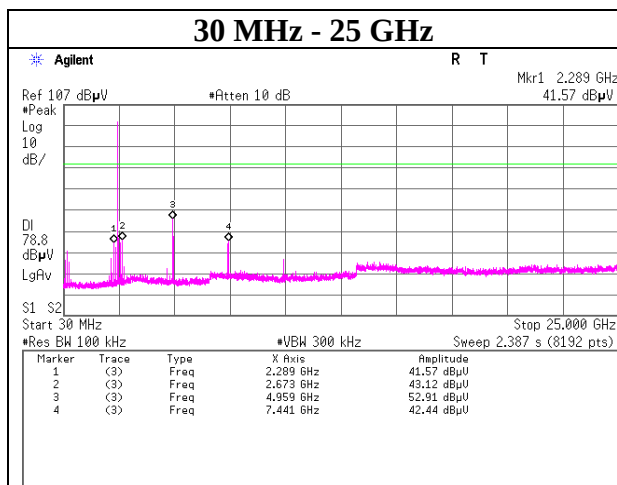
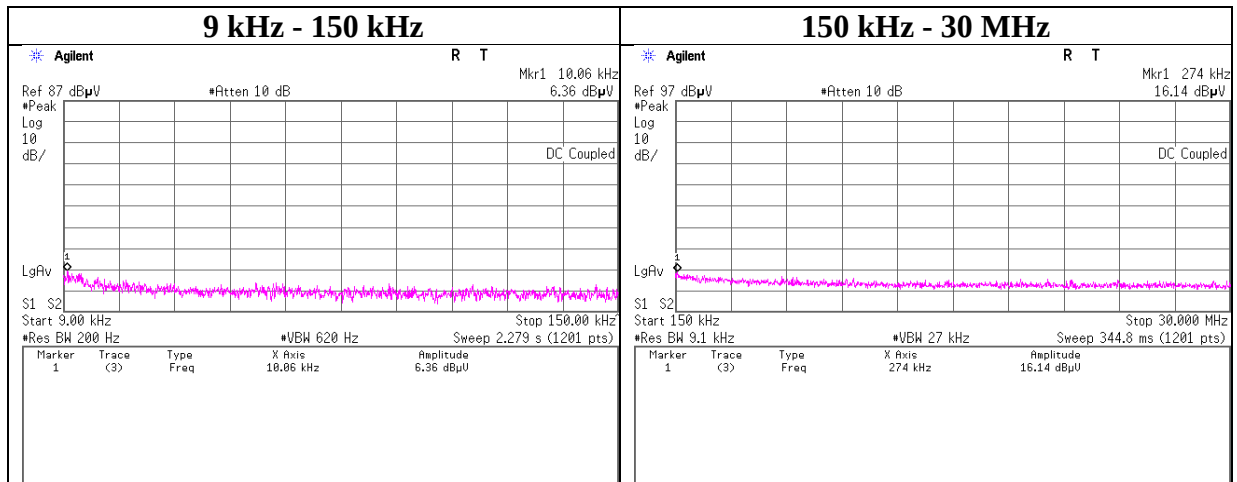
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

Conducted Spurious Emission

Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	11629248H
Date	March 1, 2017
Temperature / Humidity	21 deg. C / 34 % RH
Engineer	Tomoki Matsui
Mode	Tx, Hopping Off, 3DH5

2480 MHz



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Ise EMC Lab.

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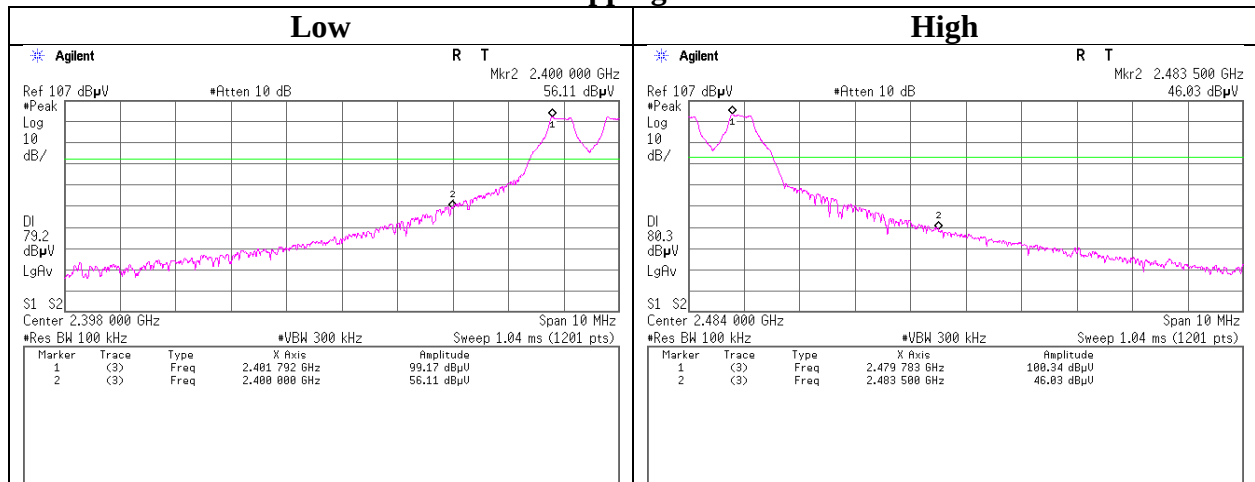
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

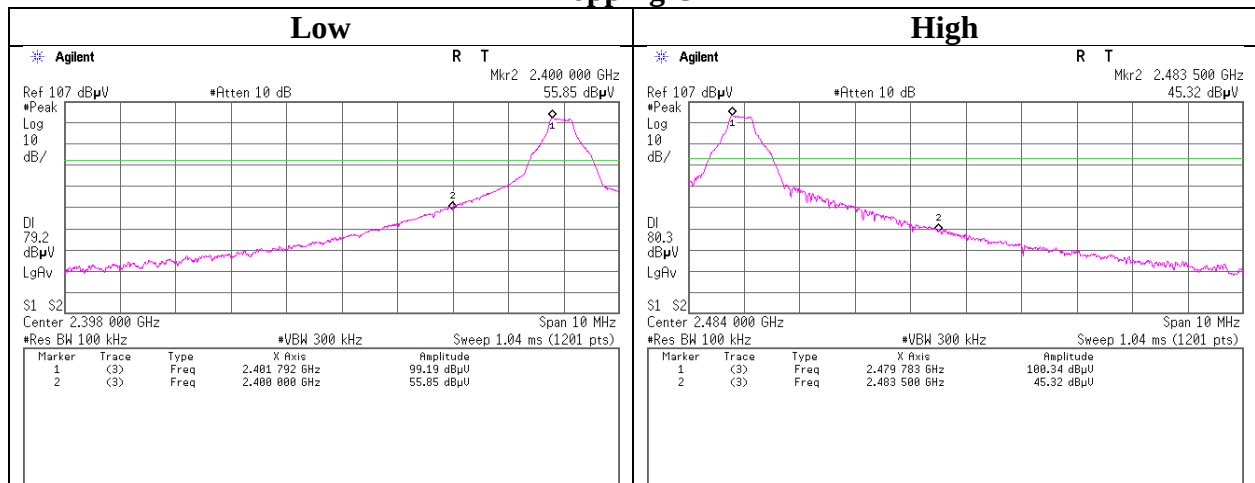
Conducted Emission Band Edge compliance

Test place : Ise EMC Lab. No.6 Measurement Room
Report No. : 11629248H
Date : March 1, 2017
Temperature / Humidity : 21 deg. C / 34 % RH
Engineer : Tomoki Matsui
Mode : Tx DH5

Hopping On



Hopping Off



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Ise EMC Lab.

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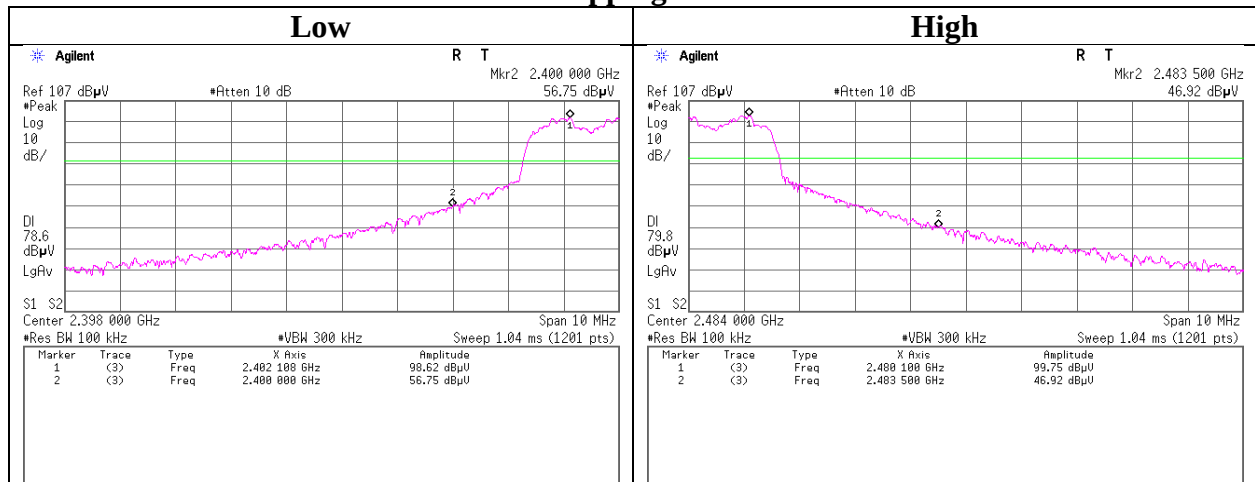
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

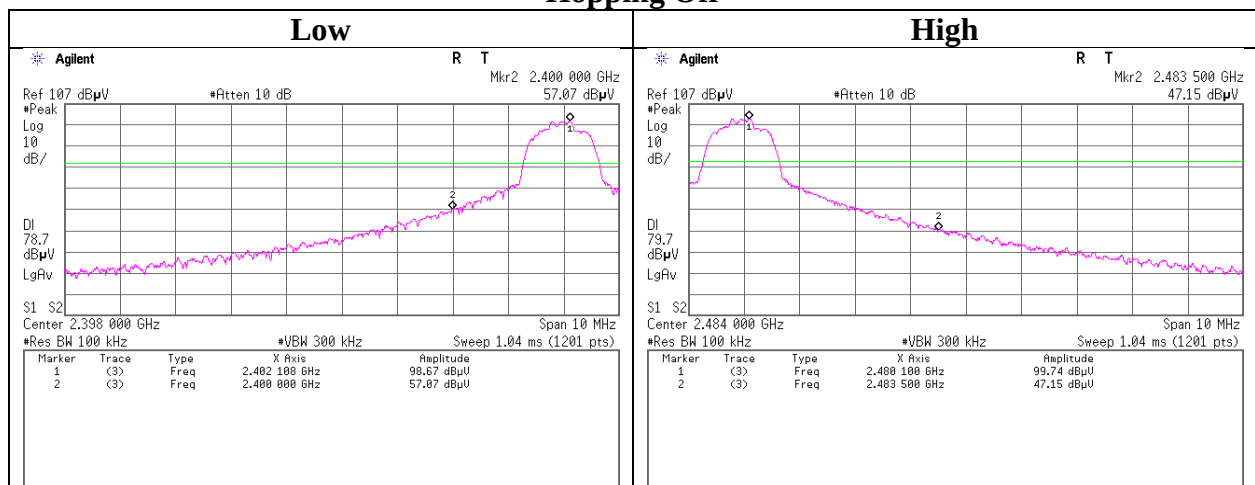
Conducted Emission Band Edge compliance

Test place : Ise EMC Lab. No.6 Measurement Room
Report No. : 11629248H
Date : March 1, 2017
Temperature / Humidity : 21 deg. C / 34 % RH
Engineer : Tomoki Matsui
Mode : Tx 3DH5

Hopping On



Hopping Off



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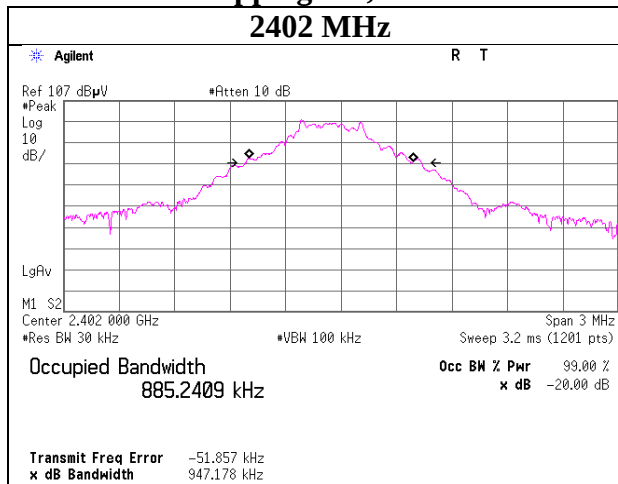
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

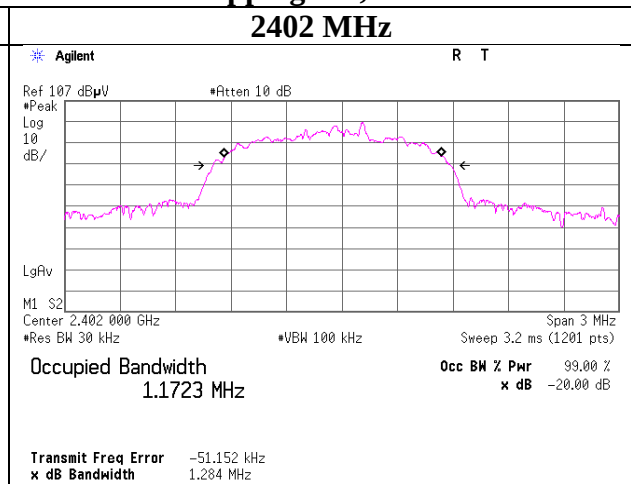
99% Occupied Bandwidth

Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	11629248H
Date	March 1, 2017
Temperature / Humidity	21 deg. C / 34 % RH
Engineer	Tomoki Matsui
Mode	Tx Hopping Off

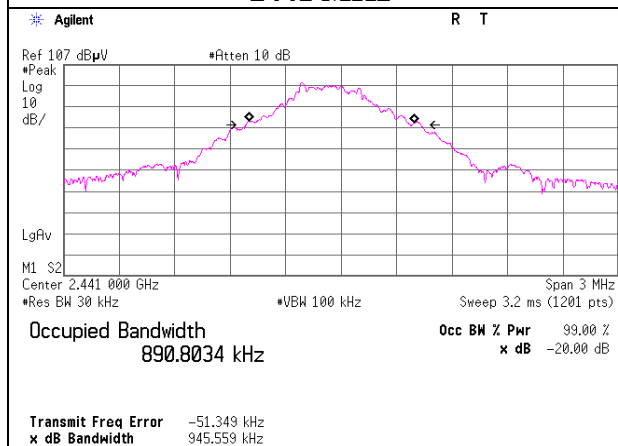
Hopping Off, DH5



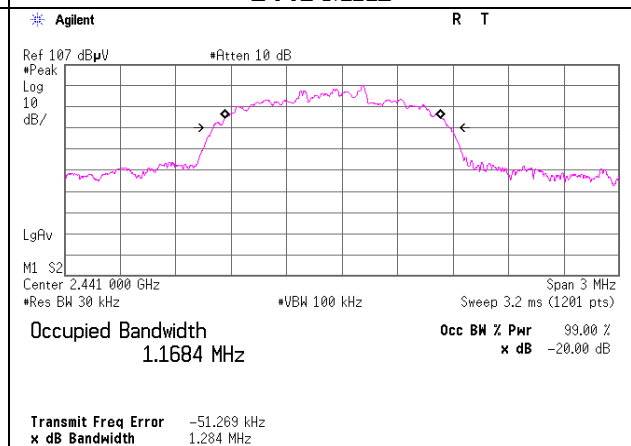
Hopping Off, 3DH5



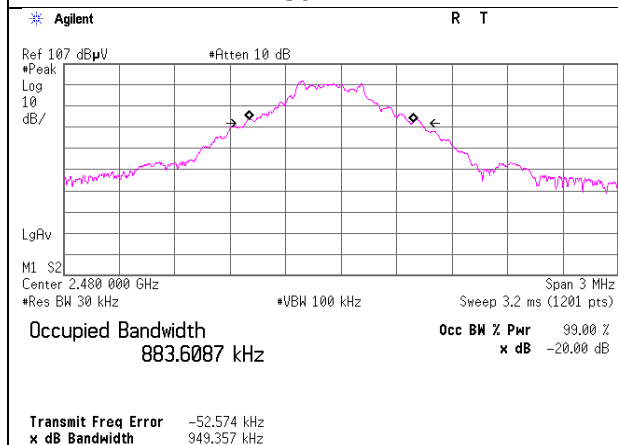
2441 MHz



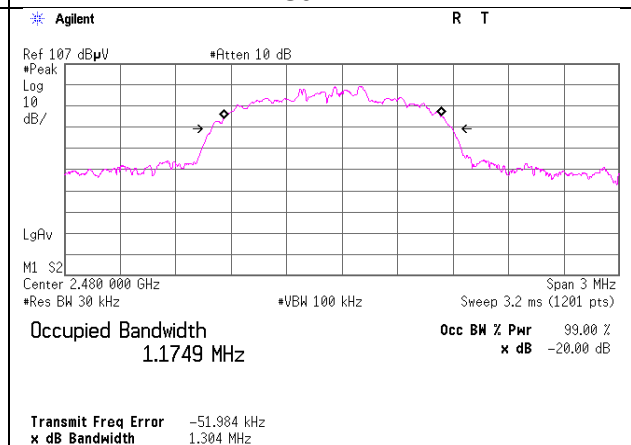
2441 MHz



2480 MHz



2480 MHz



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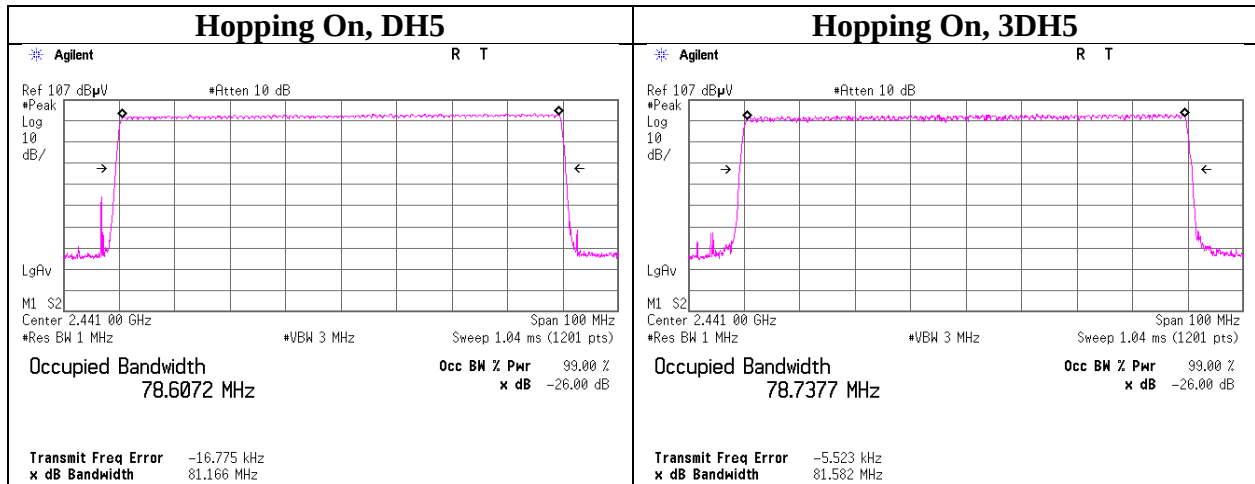
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Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

99% Occupied Bandwidth

Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	11629248H
Date	March 1, 2017
Temperature / Humidity	21 deg. C / 34 % RH
Engineer	Tomoki Matsui
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-02	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-06902	RE	2016/08/02 * 12
MOS-22	Thermo-Hygrometer	Custom	CTH-201	0003	RE	2016/12/13 * 12
MJM-14	Measure	KOMELON	KMC-36	-	RE	-
COTS-MEMI	EMI measurement program	TSJ	TEPTO-DV	-	RE	-
MRENT-126	Spectrum Analyzer	KEYSIGHT	E4440A	MY46185516	RE	2016/07/01 * 12
MHA-21	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	9120D-557	RE	2016/09/28 * 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
MHA-02	Horn Antenna 18-26.5GHz	EMCO	3160-09	1265	RE	2017/02/24 * 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
MAEC-03	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	RE	2016/10/20 * 12
MOS-13	Thermo-Hygrometer	Custom	CTH-180	1301	RE	2017/01/20 * 12
MJM-16	Measure	KOMELON	KMC-36	-	RE	-
MSA-10	Spectrum Analyzer	Agilent	E4448A	MY46180655	RE	2016/08/17 * 12
MTR-08	Test Receiver	Rohde & Schwarz	ESCI	100767	RE	2016/09/15 * 12
MBA-03	Biconical Antenna	Schwarzbeck	BBA9106	1915	RE	2016/10/15 * 12
MLA-22	Logperiodic Antenna(200-1000MHz)	Schwarzbeck	VUSLP9111B	911B-191	RE	2017/01/26 * 12
MCC-51	Coaxial cable	UL Japan	-	-	RE	2016/07/26 * 12
MAT-98	Attenuator	KEYSIGHT	8491A	MY52462349	RE	2016/12/05 * 12
MPA-13	Pre Amplifier	SONOMA INSTRUMENT	310	260834	RE	2016/03/24 * 12
MMM-08	DIGITAL HiTESTER	Hioki	3805	051201197	RE	2017/01/19 * 12
MSA-14	Spectrum Analyzer	Agilent	E4440A	MY48250080	AT	2016/10/14 * 12
MAT-22	Attenuator(10dB) 1-18GHz	Orient Microwave	BX10-0476-00	-	AT	2016/03/18 * 12
MPM-13	Power Meter	Anritsu	ML2495A	0824014	AT	2016/11/02 * 12
MPSE-18	Power sensor	Anritsu	MA2411B	0738174	AT	2016/11/02 * 12
MOS-14	Thermo-Hygrometer	Custom	CTH-201	1401	AT	2017/01/20 * 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: RE: Radiated Emission test
AT: Antenna Terminal Conducted test**

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