



RADIO TEST REPORT

Test Report No. : 11217682S-A-R2

Applicant : PIONEER CORPORATION
Type of Equipment : Main Unit
Model No. : D171G
FCC ID : AJDK097
Test regulation : FCC Part 15 Subpart C: 2016
Test Result : Complied

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2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with the above regulation.
4. The test results in this report are traceable to the national or international standards.
5. The opinions and the interpretations to the result of the description in this report are outside scopes where UL Japan has been accredited.
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 11217682S-A-R1. 11217682S-A-R1 is replaced with this report.

Date of test: May 31 to June 8, 2016

Representative test engineer:

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Makoto Hosaka
Engineer
Consumer Technology Division

Approved by:

A. Hayashi

Akio Hayashi
Leader
Consumer Technology Division



- ☐ The testing in which "Non-accreditation" is displayed is outside the accreditation scopes in UL Japan.
☒ There is no testing item of "Non-accreditation".

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13-EM-F0429

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SECTION 1: Customer information

Company Name	:	PIONEER CORPORATION
Address	:	25-1, Yamada, Kawagoe-shi, Saitama-ken 350-8555, JAPAN
Telephone Number	:	+81-49-228-7787
Facsimile Number	:	+81-49-228-6493
Contact Person	:	Tomoyuki Tanaka

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

2.1 Identification of E.U.T.

Type of Equipment	:	Main Unit
Model No.	:	D171G
Serial No.	:	Refer to Section 4, Clause 4.2
Rating	:	DC 12.0 V
Receipt Date of Sample	:	April 6, 2016
Country of Mass-production	:	Japan
Condition of EUT	:	Production prototype (Not for Sale: This sample is equivalent to mass-produced items.)
Modification of EUT	:	No Modification by the test lab

2.2 Product Description

Model: D171G (referred to as the EUT in this report) is a Main Unit.

General Specification

Clock frequency(ies) in the system	:	Oscillator	(Module) 32.768 kHz, (System u-Com) 8 MHz
		Internal Communication	(Module) 195 MHz

Radio Specification

Radio Type	:	Transceiver
Frequency of Operation	:	2402 MHz - 2480 MHz
Modulation	:	GFSK, π /4DQPSK, 8DPSK
Power Supply (radio part input)	:	DC 3.3 V / 1.8 V
Antenna type	:	Pattern inverted F type
Antenna Gain	:	2.29 dBi (max)

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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

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	N/A*1)
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)		-	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	9.2 dB 9608.000 MHz, AV, Vert. Tx, Hopping Off, DH5 2402 MHz	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 does not have AC power ports.
*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)

The equipment provides the wireless transmitter with stable power supply (DC 3.3 V / 1.8 V). Instead of a new battery, DC power supply was used for the test. That does not affect the test result, therefore the EUT complies with the requirement.

FCC Part 15.203 Antenna requirement

The EUT has a unique coupling/antenna connector (U.FL). 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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Item	Frequency range	Uncertainty (+/-)			
		No. 1 SAC / SR	No. 2 SAC / SR	No. 3 SAC / SR	No. 4 SAC / SR
Conducted emission (AC Mains) LISN	150 kHz-30 MHz	2.1 dB	2.1 dB	2.6 dB	2.2 dB
Radiated emission (Measurement distance: 3 m)	9 kHz-30 MHz	2.7 dB	2.7 dB	3.1 dB	-
	30 MHz-300 MHz	4.4 dB	4.4 dB	4.6 dB	-
	300 MHz-1 GHz	5.6 dB	5.5 dB	5.3 dB	-
	1 GHz-13 GHz	5.2 dB	5.2 dB	5.2 dB	-
Radiated emission (Measurement distance: 1 m)	13 GHz-18 GHz	4.9 dB	4.9 dB	4.9 dB	-
	18 GHz-40 GHz	4.9 dB	4.9 dB	4.9 dB	-

SAC=Semi-Anechoic Chamber

SR= Shielded Room is applied besides radiated emission

Antenna terminal test	Uncertainty (+/-)
Power Measurement above 1 GHz (Average Detector)_SPM-06	0.76 dB
Power Measurement above 1 GHz (Peak Detector)_SPM-06	0.79 dB
Power Measurement above 1 GHz (Average Detector)_SPM-07	0.74 dB
Power Measurement above 1 GHz (Peak Detector)_SPM-07	1.08 dB
Spurious emission (Conducted) below 1GHz	1.5 dB
Spurious emission (Conducted) 1 GHz-3 GHz	1.7 dB
Spurious emission (Conducted) 3 GHz-18 GHz	2.4 dB
Spurious emission (Conducted) 18 GHz-26.5 GHz	2.5 dB
Spurious emission (Conducted) 26.5 GHz-40 GHz	2.5 dB
Bandwidth Measurement	0.66 %
Duty cycle and Time Measurement	0.012 %

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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JAB Accreditation No. RTL02610

Test site	IC Registration Number	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Maximum measurement distance
No.1 Semi-anechoic chamber	2973D-1	20.6 x 11.3 x 7.65	20.6 x 11.3	10m
No.2 Semi-anechoic chamber	2973D-2	20.6 x 11.3 x 7.65	20.6 x 11.3	10m
No.3 Semi-anechoic chamber	2973D-3	12.7 x 7.7 x 5.35	12.7 x 7.7	5m
No.4 Semi-anechoic chamber	-	8.1 x 5.1 x 3.55	8.1 x 5.1	-
No.1 Shielded room	-	6.8 x 4.1 x 2.7	6.8 x 4.1	-
No.2 Shielded room	-	6.8 x 4.1 x 2.7	6.8 x 4.1	-
No.3 Shielded room	-	6.3 x 4.7 x 2.7	6.3 x 4.7	-
No.4 Shielded room	-	4.4 x 4.7 x 2.7	4.4 x 4.7	-
No.5 Shielded room	-	7.8 x 6.4 x 2.7	7.8 x 6.4	-
No.6 Shielded room	-	7.8 x 6.4 x 2.7	7.8 x 6.4	-
No.8 shielded room	-	3.45 x 5.5 x 2.4	3.45 x 5.5	-
No.1 Measurement room	-	2.55 x 4.1 x 2.5	-	-

3.6 Test data, Test instruments, and Test set up

Refer to APPENDIX.

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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 (2 Mb/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: 0 dB (Fixed) Software: BT: B080 *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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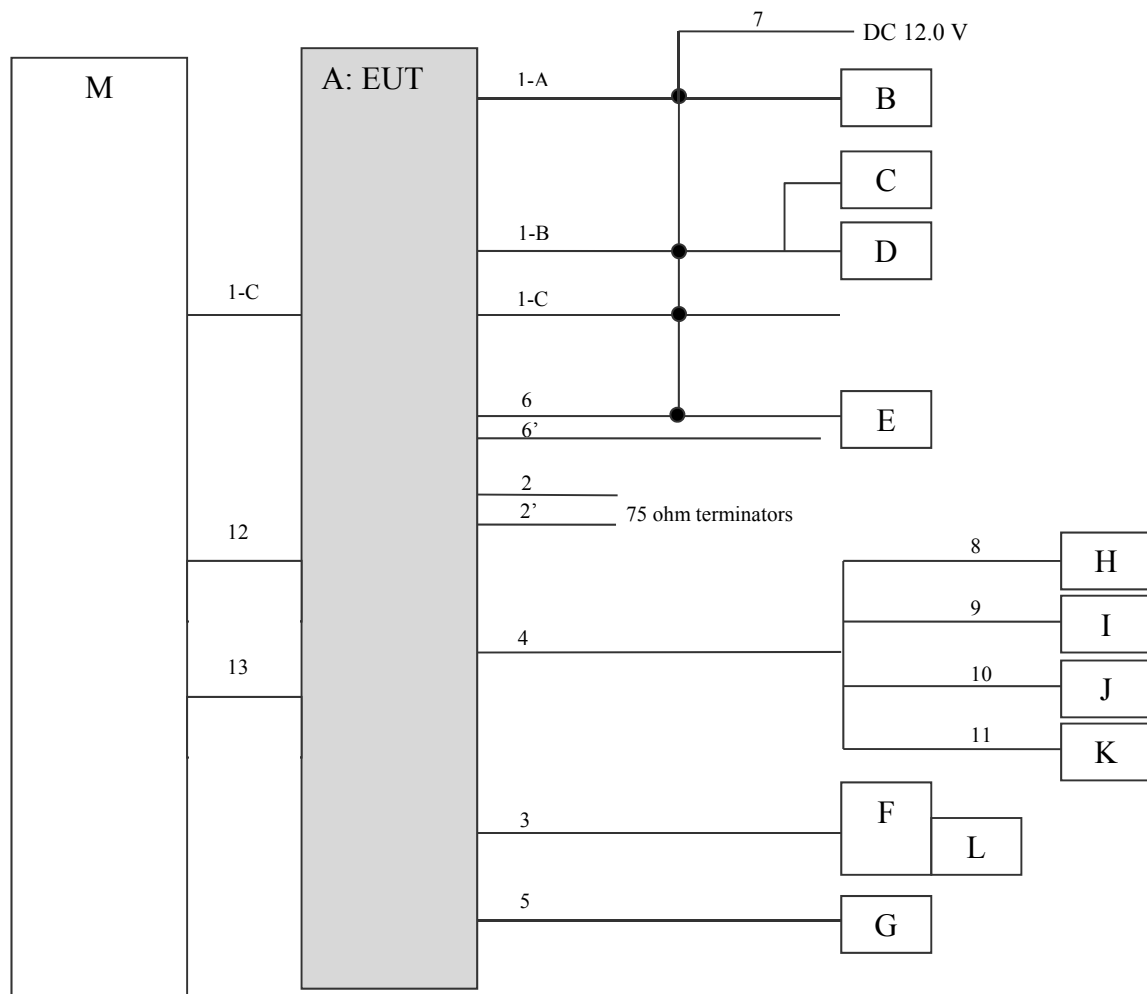
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4.2 Configuration and peripherals



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

* The testing was performed with DC 12.0 V only.

The voltage which the car battery mounted in the car outputs was selected as a test voltage according to the customer's request.

As the stable voltage (DC 3.3 V/ 1.8 V) is provided to RF module via the internal regulator, it does not influence on the test result.

Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	MAIN UNIT	D171G	PBPKTP0028CS *1) PBPKTP0053CS *2)	PIONEER	EUT
B	Steering SW	75E921LH/RH	-	-	-
C	Mic	-	-	-	-
D	Rear Camera	-	-	-	-
E	Air-con ECU	-	-	DENSO	-
F	USB	-	-	-	-
G	GPS Antenna	86860-71011	-	AISIN	-
H	Speaker	LV-002	S11014200775	L&V	-
I	Speaker	LV-002	S11014200775	L&V	-
J	Speaker	LV-002	S11014200773	L&V	-
K	Speaker	LV-002	S11014200773	L&V	-
L	USB Memory	-	-	-	-
M	Display	-	-	PIONEER	-

*1) Used for Antenna Terminal conducted test

*2) Used for Conducted Emission test and Radiated Emission test

List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1-A	Wire Harness Set	1.1	Unshielded	Unshielded	-
1-B	Wire Harness	1.1	Unshielded	Unshielded	-
1-C	Wire Harness	1.1	Unshielded	Unshielded	-
2, 2'	Radio antenna	3.0	Shielded	Shielded	-
3	USB connector	1.1	Shielded	Shielded	-
4	Speaker	1.1	Unshielded	Unshielded	-
5	GPS antenna connector	1.5	Shielded	Shielded	-
6, 6'	Wire Harness (Air-con ECU)	1.9	Unshielded	Unshielded	-
7	DC	3.0	Shielded	Unshielded	-
8	Speaker	1.9	Unshielded	Unshielded	-
9	Speaker	1.9	Unshielded	Unshielded	-
10	Speaker	1.9	Unshielded	Unshielded	-
11	Speaker	1.9	Unshielded	Unshielded	-
12	Flat cable	0.5	Unshielded	Unshielded	-
13	Flat cable	0.5	Unshielded	Unshielded	-

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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, 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 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 300 MHz	300 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 m*2) (1 GHz – 13 GHz), 1 m*3) (13 GHz – 26.5 GHz)		3 m*2) (1 GHz – 13 GHz), 1 m*3) (13 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: $20 \times \log(4.3 \text{ m}/3.0 \text{ m}) = 3.13 \text{ dB}$

*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 angle of 0 deg. to 30 deg. based on the product specification to see the position of maximum noise, and the test was made at the position (0 deg.) 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 *3)	-	Power Meter (Sensor: 50 MHz BW)
Carrier Frequency Separation	3 MHz	100 kHz	300 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) Peak hold was applied as Worst-case measurement.
 *2) In the frequency range below 30 MHz, RBW was narrowed to separate the noise contents. Then, wide-band noise near the limit was checked separately, however the noise was not detected as shown in the chart.
 *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

20dB Bandwidth and Carrier Frequency Separation

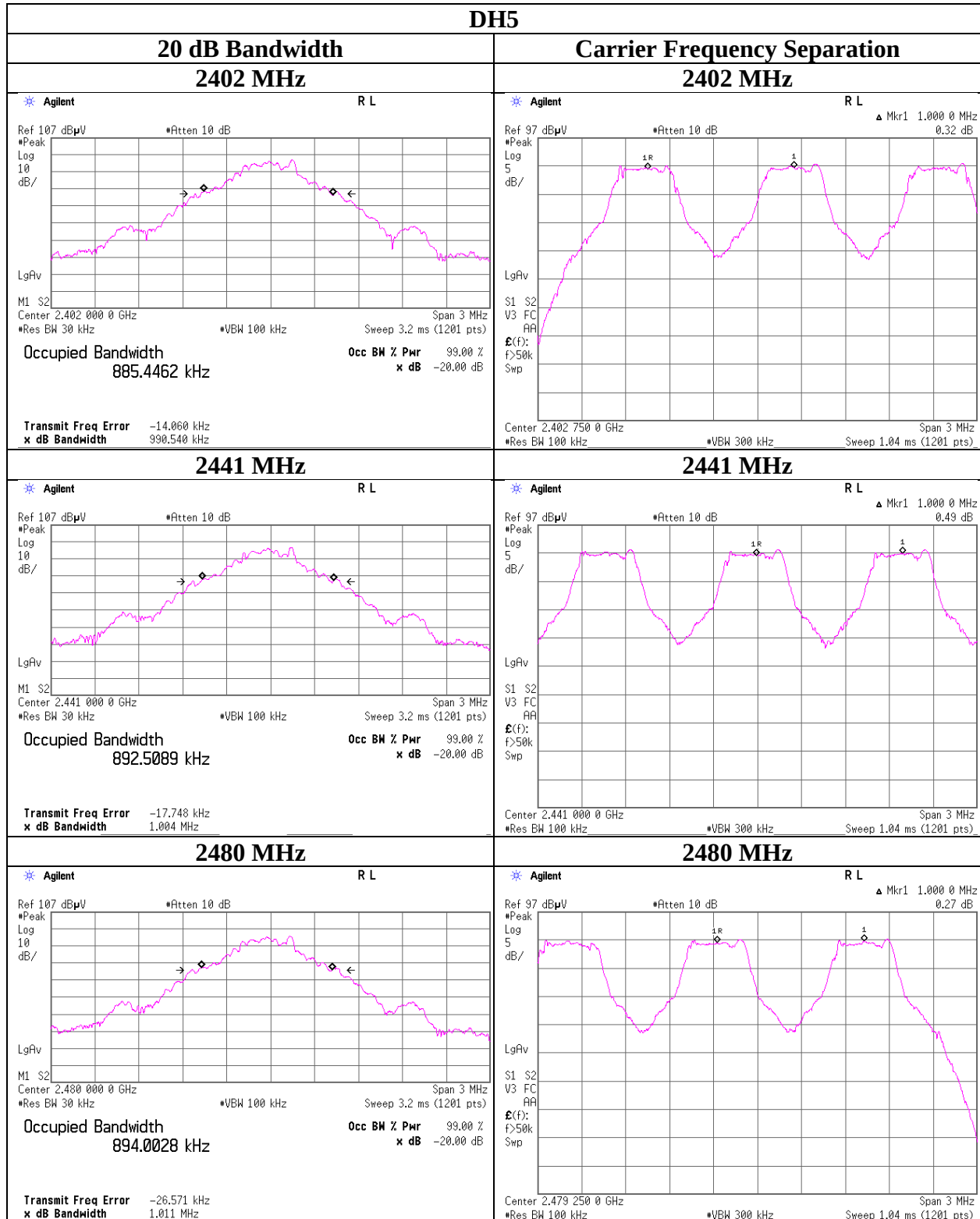
Test place	Shonan EMC Lab. No.5 Shielded Room
Report No.	11217682S-A-R2
Date	May 31, 2016
Temperature / Humidity	27 deg. C / 37 % RH
Engineer	Wataru Kojima
Mode	Tx, Hopping Off, DH5

Mode	Freq. [MHz]	20dB Bandwidth [MHz]	Carrier Frequency Separation [MHz]	Limit for Carrier Frequency separation [MHz]
DH5	2402.0	0.991	1.000	≥ 0.660
DH5	2441.0	1.004	1.000	≥ 0.669
DH5	2480.0	1.011	1.000	≥ 0.674
3DH5	2402.0	1.315	1.000	≥ 0.877
3DH5	2441.0	1.322	1.000	≥ 0.882
3DH5	2480.0	1.314	1.000	≥ 0.876

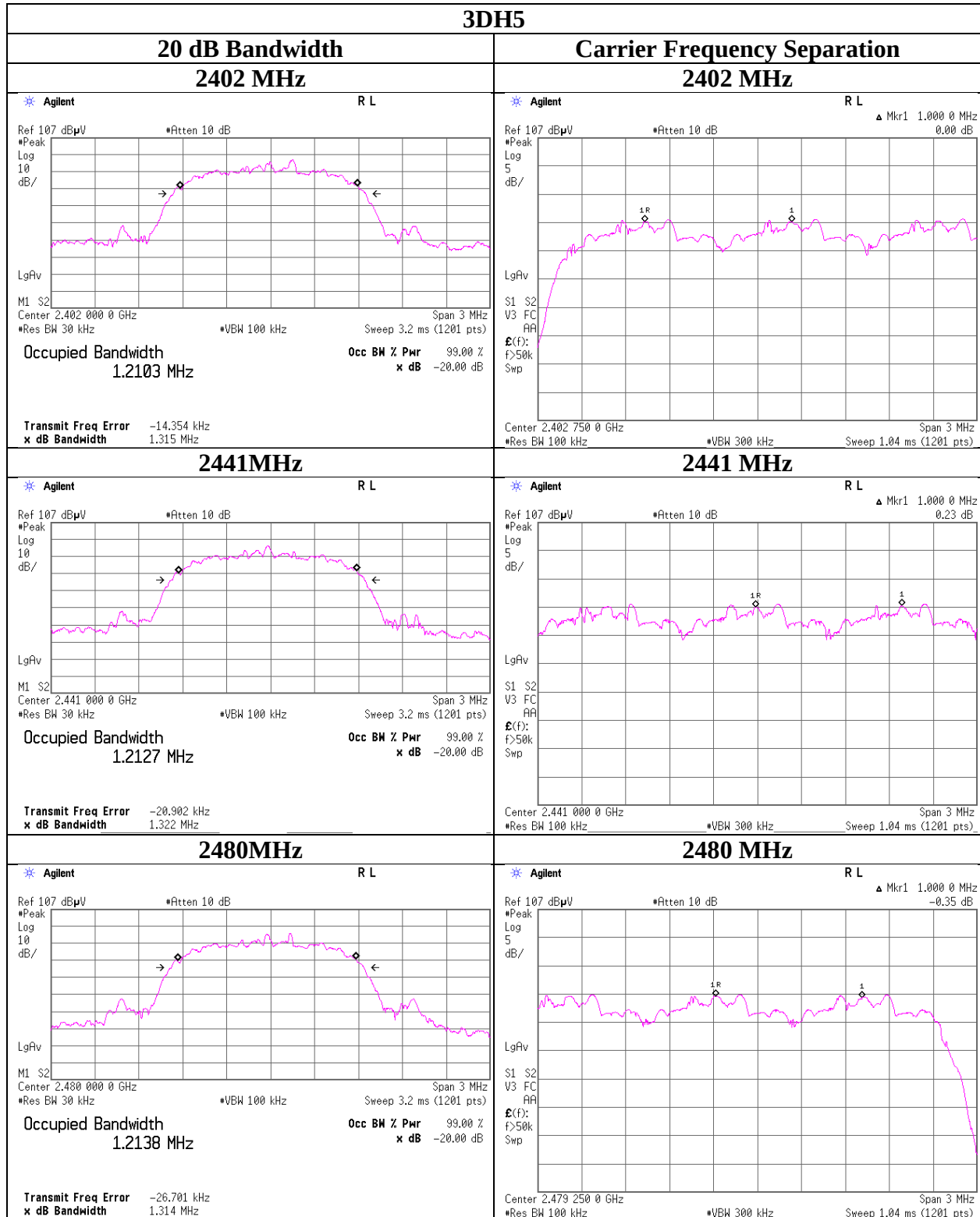
Limit: Two-thirds of 20dB Bandwidth or 25kHz (whichever is greater).

No limit applies to 20dB Bandwidth.

20dB Bandwidth and Carrier Frequency Separation



20dB Bandwidth and Carrier Frequency Separation



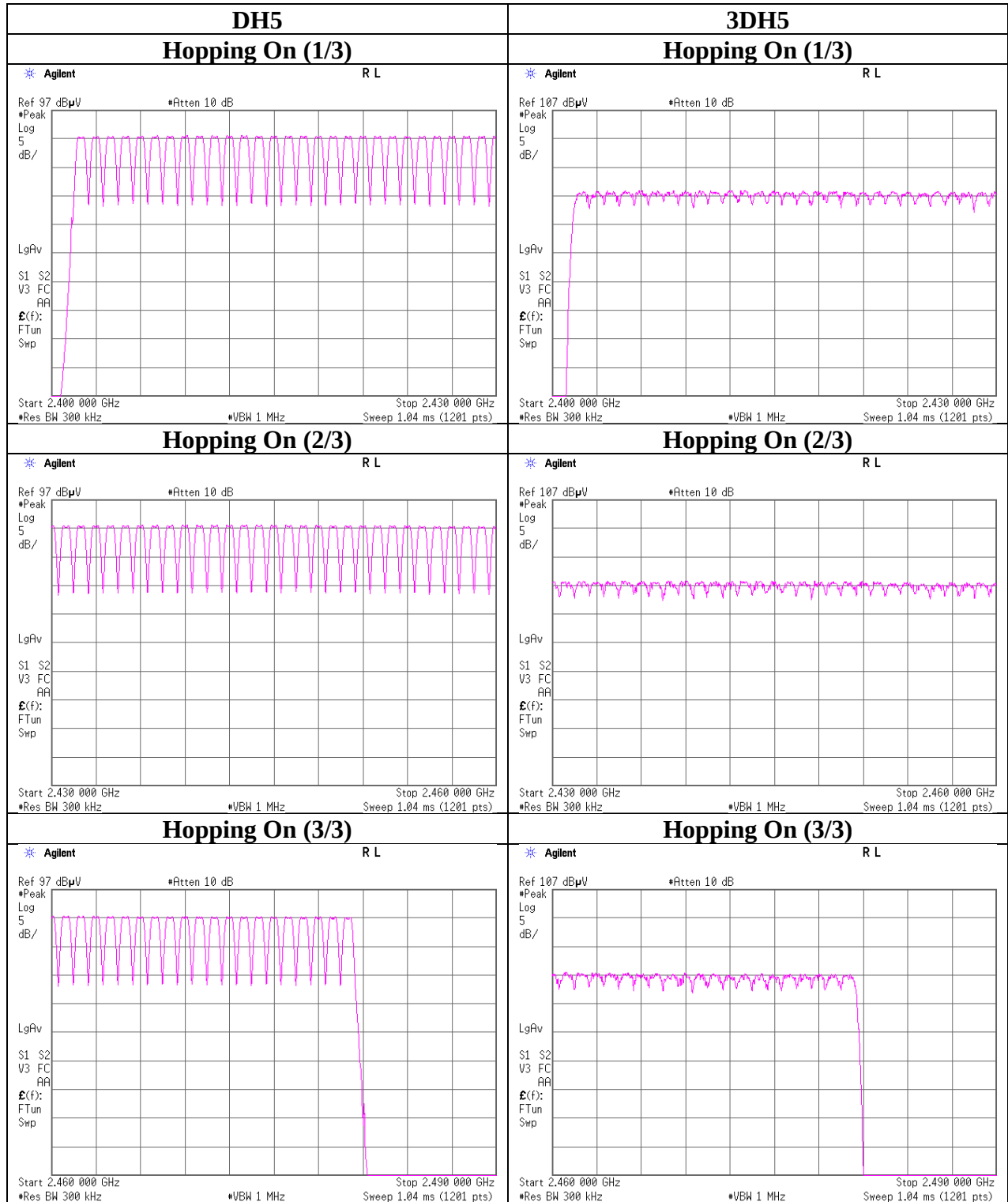
Number of Hopping Frequency

Test place Shonan EMC Lab. No.5 Shielded Room
Report No. 11217682S-A-R2
Date May 31, 2016
Temperature / Humidity 27 deg. C / 37 % RH
Engineer Wataru Kojima
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 Shonan EMC Lab. No.5 Shielded Room
Report No. 11217682S-A-R2
Date May 31, 2016
Temperature / Humidity 27 deg. C / 37 % RH
Engineer Wataru Kojima
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	49.0 times	/	5 sec.	x 31.6 sec. = 310 times	0.419	130	400
DH3	28.6 times	/	5 sec.	x 31.6 sec. = 181 times	1.676	303	400
DH5	19.4 times	/	5 sec.	x 31.6 sec. = 123 times	2.927	360	400
3DH1	49.8 times	/	5 sec.	x 31.6 sec. = 315 times	0.426	134	400
3DH3	26.8 times	/	5 sec.	x 31.6 sec. = 170 times	1.677	285	400
3DH5	20.4 times	/	5 sec.	x 31.6 sec. = 129 times	2.928	378	400

Sample Calculation

Result = Number of transmission x Length of transmission

*Average data of 5 tests.(except Inquiry)

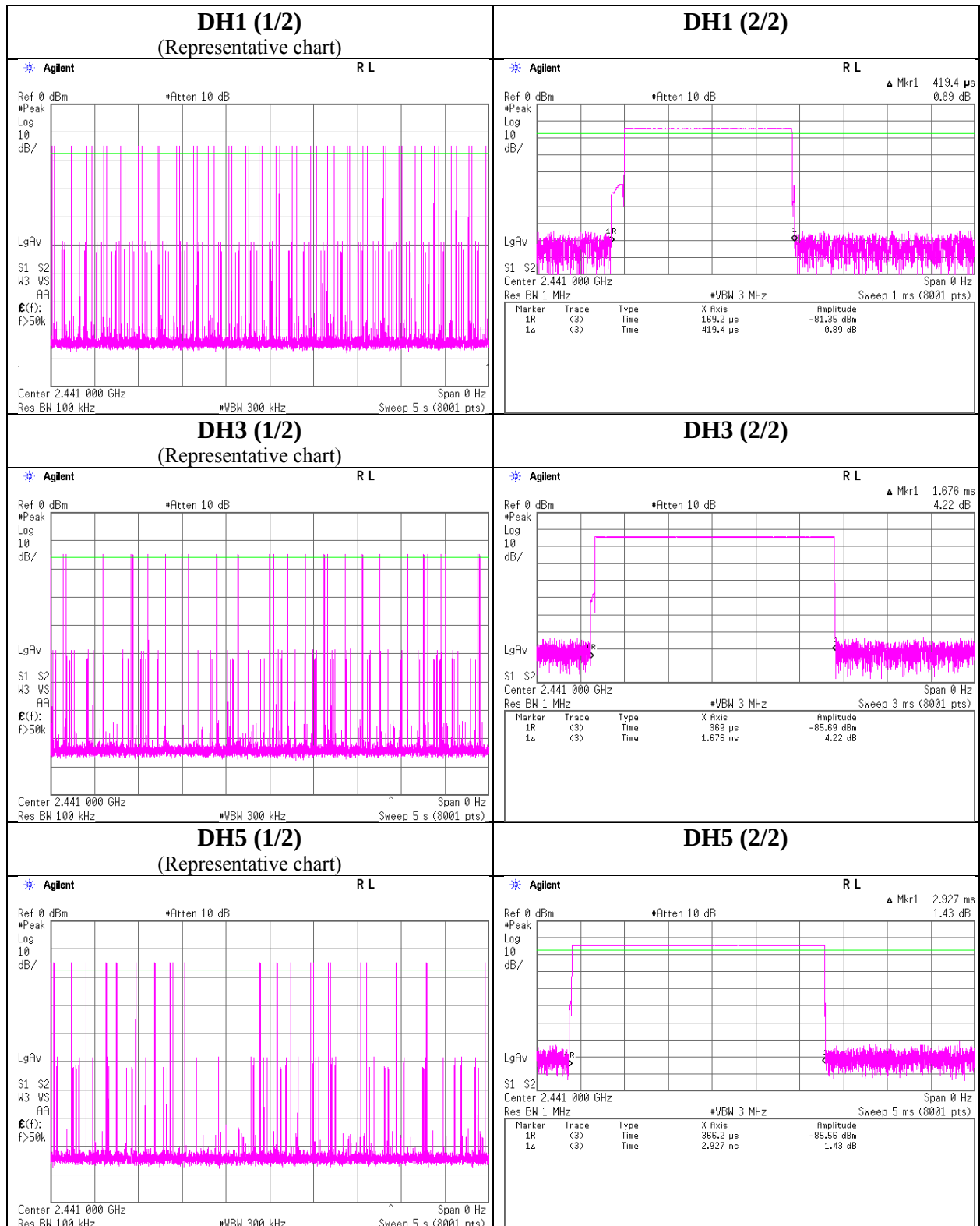
Mode	Sampling [times]					Average [times]
	1	2	3	4	5	
DH1	47	51	48	49	50	49
DH3	29	30	27	26	31	28.6
DH5	22	18	16	20	21	19.4
3DH1	51	49	50	50	49	49.8
3DH3	27	28	25	26	28	26.8
3DH5	22	25	19	15	21	20.4

Sample Calculation

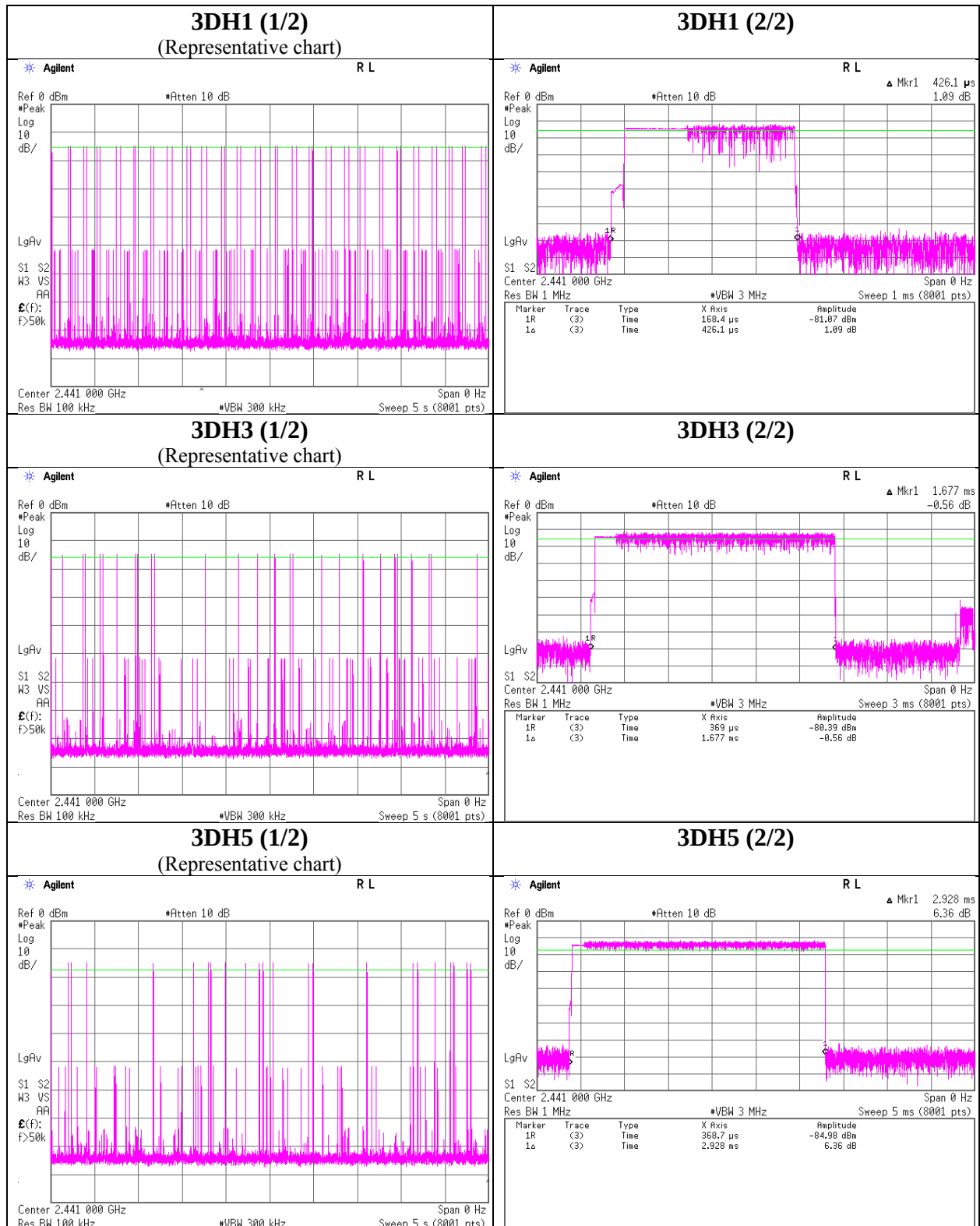
Average = Summation (Sampling 1 to 5) / 5

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 $N = 79$.

Dwell time



Dwell time



Maximum Peak Output Power

Test place	Shonan EMC Lab. No.5 Shielded Room
Report No.	11217682S-A-R2
Date	May 31, 2016
Temperature / Humidity	27 deg. C / 37 % RH
Engineer	Wataru Kojima
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	-11.80	2.10	9.67	-0.03	0.99	20.96	125	20.99
DH5	2441.0	-11.98	2.07	9.67	-0.24	0.95	20.96	125	21.20
DH5	2480.0	-12.69	2.09	9.67	-0.93	0.81	20.96	125	21.89
2DH5	2402.0	-9.50	2.10	9.67	2.27	1.69	20.96	125	18.69
2DH5	2441.0	-9.67	2.07	9.67	2.07	1.61	20.96	125	18.89
2DH5	2480.0	-10.53	2.09	9.67	1.23	1.33	20.96	125	19.73
3DH5	2402.0	-9.20	2.10	9.67	2.57	1.81	20.96	125	18.39
3DH5	2441.0	-9.46	2.07	9.67	2.28	1.69	20.96	125	18.68
3DH5	2480.0	-10.28	2.09	9.67	1.48	1.41	20.96	125	19.48

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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13-EM-F0429

Average Output Power
(Reference data for RF Exposure)

Test place : Shonan EMC Lab. No.5 Shielded Room
Report No. : 11217682S-A-R2
Date : May 31, 2016
Temperature / Humidity : 27 deg. C / 37 % RH
Engineer : Wataru Kojima
Mode : Tx, Hopping Off

Mode	Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Frame power)		Duty factor [dB]	Result (Burst power)	
					[dBm]	[mW]		[dBm]	[mW]
DH5	2402.0	-13.48	2.10	9.67	-1.71	0.67	1.08	-0.63	0.86
DH5	2441.0	-13.66	2.07	9.67	-1.92	0.64	1.08	-0.84	0.82
DH5	2480.0	-14.51	2.09	9.67	-2.75	0.53	1.08	-1.67	0.68
2DH5	2402.0	-13.38	2.10	9.67	-1.61	0.69	1.07	-0.54	0.88
2DH5	2441.0	-13.69	2.07	9.67	-1.95	0.64	1.07	-0.88	0.82
2DH5	2480.0	-14.66	2.09	9.67	-2.90	0.51	1.07	-1.83	0.66
3DH5	2402.0	-13.38	2.10	9.67	-1.61	0.69	1.07	-0.54	0.88
3DH5	2441.0	-13.70	2.07	9.67	-1.96	0.64	1.07	-0.89	0.81
3DH5	2480.0	-14.47	2.09	9.67	-2.71	0.54	1.07	-1.64	0.69

Sample Calculation:

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

Result (Burst power) = Frame power + Duty factor

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

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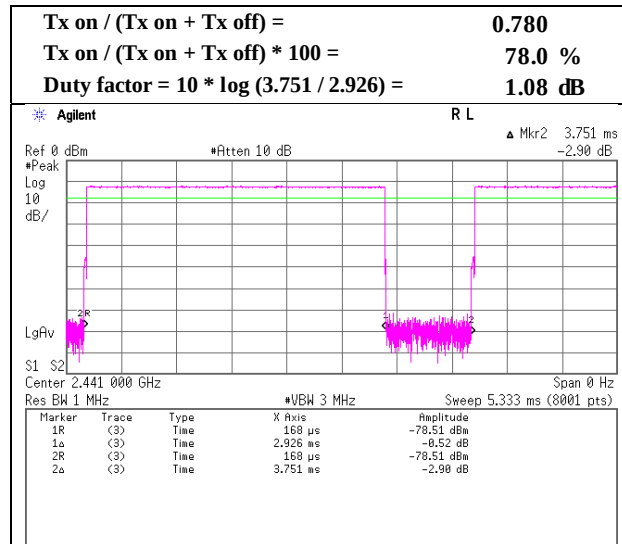
Facsimile : +81 463 50 6401

13-EM-F0429

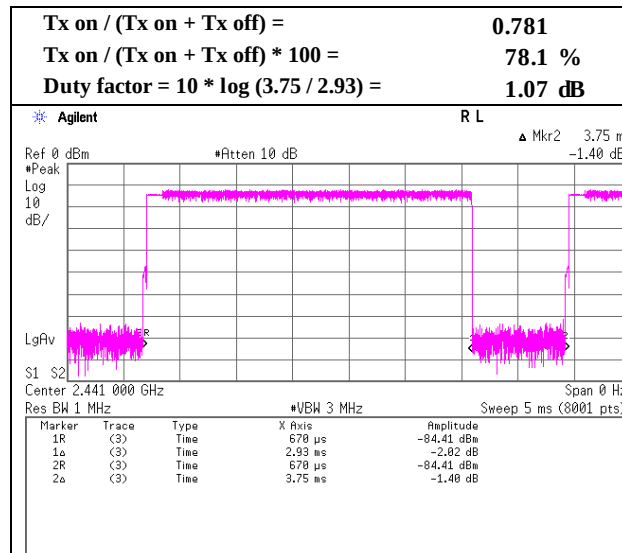
Burst Rate Confirmation

Test place : Shonan EMC Lab. No.5 Shielded Room
Report No. : 11217682S-A-R2
Date : May 31, 2016
Temperature / Humidity : 27 deg. C / 37 % RH
Engineer : Wataru Kojima
Mode : Tx, Hopping Off

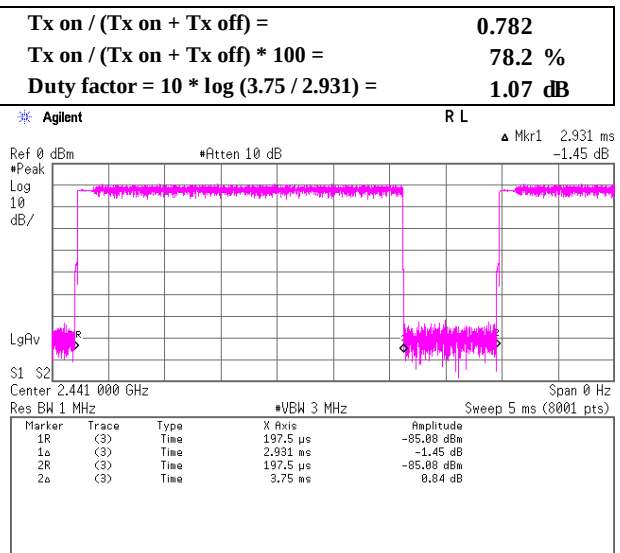
DH5



2DH5



3DH5



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13-EM-F0429

Radiated Spurious Emission

Test place : Shonan EMC Lab. No.3 Semi Anechoic Chamber
Report No. : 11217682S-A-R2
Date : June 7, 2016 June 8, 2016
Temperature / Humidity : 23 deg. C / 47 % RH 22 deg. C / 54 % RH
Engineer : Makoto Hosaka Wataru Kojima
(30-1000MHz, (1-13GHz, 13-18GHz)
18-26.5GHz)
Mode : Tx, Hopping Off, DH5 2402 MHz

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	148.028	QP	32.1	14.5	7.8	32.1	0.0	22.3	43.5	21.2	220	127	
Hori.	185.035	QP	33.6	16.0	8.0	32.1	0.0	25.5	43.5	18.0	246	228	
Hori.	259.049	QP	32.5	17.5	8.5	32.0	0.0	26.5	46.0	19.5	133	244	
Hori.	333.062	QP	31.7	14.6	8.9	31.9	0.0	23.3	46.0	22.7	100	240	
Hori.	370.068	QP	31.2	15.4	9.0	31.9	0.0	23.7	46.0	22.3	100	244	
Hori.	2390.000	PK	46.0	27.8	13.8	41.0	3.1	49.7	73.9	24.2	147	76	
Hori.	4804.000	PK	46.9	31.4	5.8	39.6	3.1	47.6	73.9	26.3	150	0	
Hori.	7206.000	PK	46.2	36.9	7.1	40.1	3.1	53.2	73.9	20.7	150	0	
Hori.	9608.000	PK	45.5	38.5	8.1	39.6	3.1	55.6	73.9	18.3	150	0	
Hori.	2390.000	AV	33.9	27.8	13.8	41.0	3.1	37.6	53.9	16.3	147	76	
Hori.	4804.000	AV	35.5	31.4	5.8	39.6	3.1	36.2	53.9	17.7	150	0	
Hori.	7206.000	AV	35.3	36.9	7.1	40.1	3.1	42.3	53.9	11.6	150	0	
Hori.	9608.000	AV	33.9	38.5	8.1	39.6	3.1	44.0	53.9	9.9	150	0	
Vert.	37.007	QP	30.0	15.0	6.8	32.2	0.0	19.6	40.0	20.4	100	175	
Vert.	111.021	QP	32.6	11.3	7.5	32.1	0.0	19.3	43.5	24.2	100	262	
Vert.	148.028	QP	32.6	14.5	7.8	32.1	0.0	22.8	43.5	20.7	100	42	
Vert.	180.014	QP	30.0	15.9	8.0	32.1	0.0	21.8	43.5	21.7	100	179	
Vert.	185.035	QP	33.1	16.0	8.0	32.1	0.0	25.0	43.5	18.5	100	10	
Vert.	618.236	QP	21.6	19.2	10.1	31.9	0.0	19.0	46.0	27.0	100	182	
Vert.	2390.000	PK	45.9	27.8	13.8	41.0	3.1	49.6	73.9	24.3	181	315	
Vert.	4804.000	PK	47.0	31.4	5.8	39.6	3.1	47.7	73.9	26.2	150	0	
Vert.	7206.000	PK	46.6	36.9	7.1	40.1	3.1	53.6	73.9	20.3	150	0	
Vert.	9608.000	PK	45.9	38.5	8.1	39.6	3.1	56.0	73.9	17.9	150	0	
Vert.	2390.000	AV	33.8	27.8	13.8	41.0	3.1	37.5	53.9	16.4	181	315	
Vert.	4804.000	AV	35.5	31.4	5.8	39.6	3.1	36.2	53.9	17.7	150	0	
Vert.	7206.000	AV	35.3	36.9	7.1	40.1	3.1	42.3	53.9	11.6	150	0	
Vert.	9608.000	AV	34.6	38.5	8.1	39.6	3.1	44.7	53.9	9.2	150	0	

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

Distance factor : 1 GHz - 13 GHz : 20log (4.3 m / 3.0 m) = 3.13 dB

13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.5 dB

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

20 dBc Data Sheet (RBW 100 kHz, VBW 300 kHz)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2402.000	PK	85.4	27.8	13.8	41.0	3.1	89.1	-	-	Carrier
Hori.	2400.000	PK	36.8	27.8	13.8	41.0	3.1	40.5	69.1	28.6	
Vert.	2402.000	PK	86.7	27.8	13.8	41.0	3.1	90.4	-	-	Carrier
Vert.	2400.000	PK	36.8	27.8	13.8	41.0	3.1	40.5	70.4	29.9	

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

Distance factor : 1 GHz - 13 GHz : 20log (4.3 m / 3.0 m) = 3.13 dB

13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.5 dB

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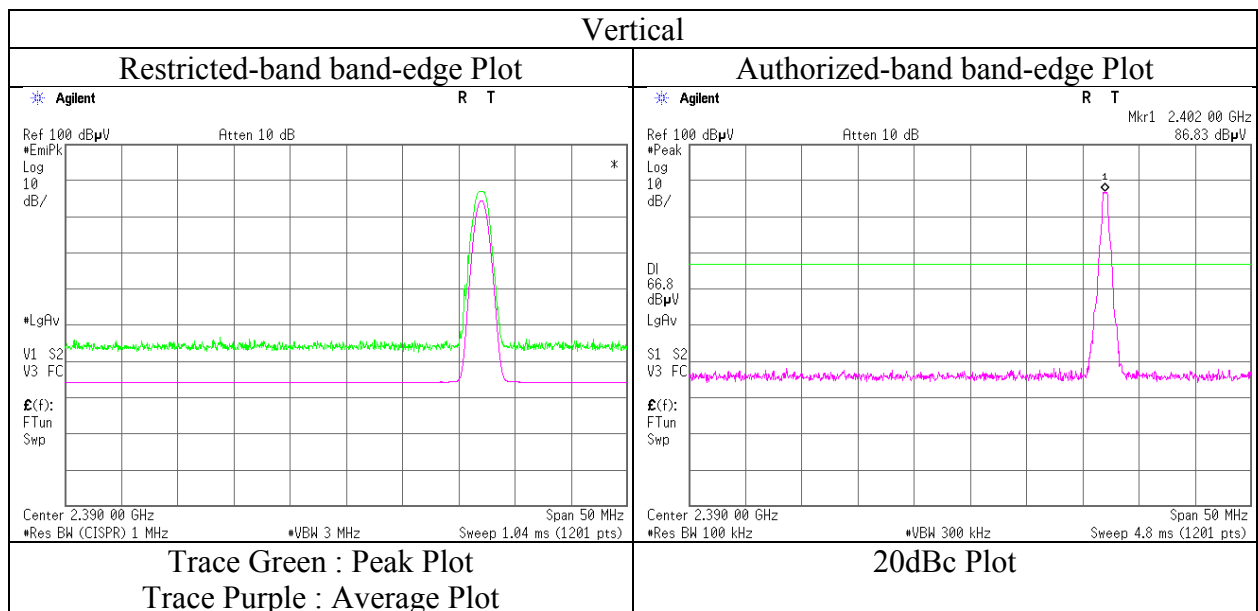
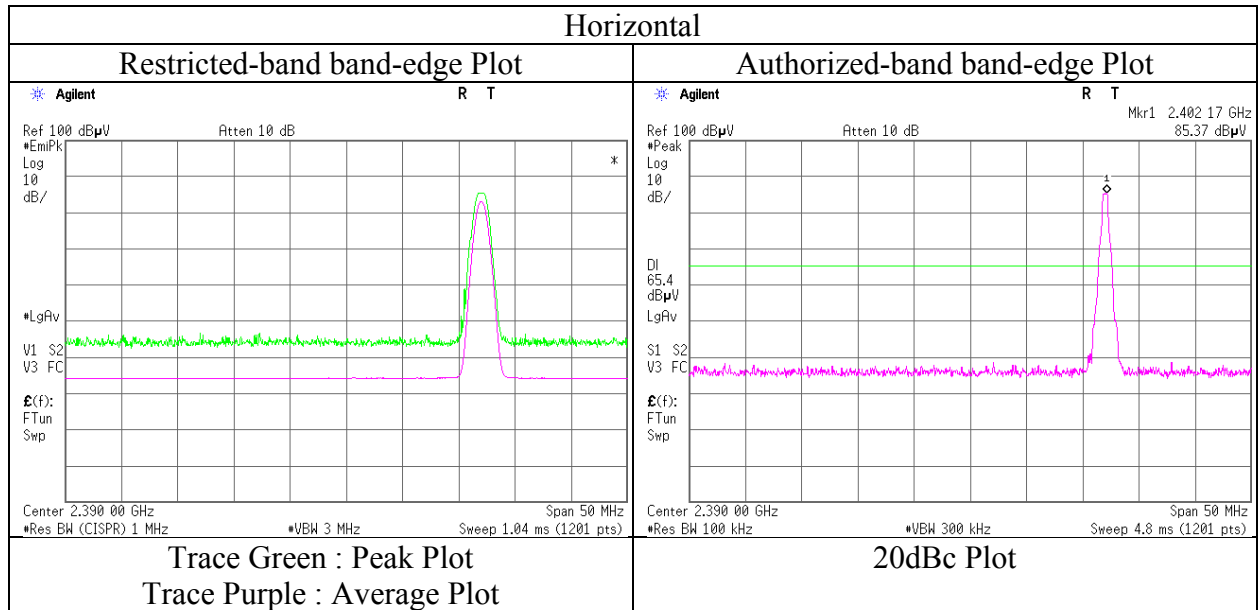
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13-EM-F0429

Radiated Spurious Emission (Reference Plot for band-edge)

Test place	Shonan EMC Lab. No.3 Semi Anechoic Chamber
Report No.	11217682S-A-R2
Date	June 8, 2016
Temperature / Humidity	22 deg. C / 54 % RH
Engineer	Wataru Kojima (1-13GHz)
Mode	Tx, Hopping Off, DH5 2402 MHz



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

Radiated Spurious Emission

Test place : Shonan EMC Lab. No.3 Semi Anechoic Chamber
Report No. : 11217682S-A-R2
Date : June 7, 2016 June 8, 2016
Temperature / Humidity : 23 deg. C / 47 % RH 22 deg. C / 54 % RH
Engineer : Makoto Hosaka Wataru Kojima
(1-13GHz, 13-18GHz) (30-1000MHz, 18-26.5GHz)
Mode : Tx, Hopping Off, DH5 2441 MHz

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	127.997	QP	30.6	13.2	7.6	32.1	0.0	19.3	43.5	24.2	262	78	
Hori.	147.996	QP	31.3	14.5	7.8	32.1	0.0	21.5	43.5	22.0	222	120	
Hori.	185.003	QP	32.8	16.0	8.0	32.1	0.0	24.7	43.5	18.8	254	242	
Hori.	259.048	QP	33.5	17.5	8.5	32.0	0.0	27.5	46.0	18.5	183	122	
Hori.	333.062	QP	30.4	14.6	8.9	31.9	0.0	22.0	46.0	24.0	100	252	
Hori.	370.069	QP	33.8	15.4	9.0	31.9	0.0	26.3	46.0	19.7	162	79	
Hori.	4882.000	PK	46.3	31.7	5.9	39.5	3.1	47.5	73.9	26.4	150	0	
Hori.	7323.000	PK	46.0	36.9	7.2	40.2	3.1	53.0	73.9	20.9	150	0	
Hori.	9764.000	PK	45.6	38.5	8.1	39.5	3.1	55.8	73.9	18.1	150	0	
Hori.	4882.000	AV	35.2	31.7	5.9	39.5	3.1	36.4	53.9	17.5	150	0	
Hori.	7323.000	AV	33.5	36.9	7.2	40.2	3.1	40.5	53.9	13.4	150	0	
Hori.	9764.000	AV	32.1	38.5	8.1	39.5	3.1	42.3	53.9	11.6	150	0	
Vert.	37.007	QP	30.0	15.0	6.8	32.2	0.0	19.6	40.0	20.4	100	152	
Vert.	111.022	QP	32.5	11.3	7.5	32.1	0.0	19.2	43.5	24.3	100	270	
Vert.	148.028	QP	32.8	14.5	7.8	32.1	0.0	23.0	43.5	20.5	100	24	
Vert.	180.006	QP	30.1	15.9	8.0	32.1	0.0	21.9	43.5	21.6	100	178	
Vert.	185.034	QP	33.1	16.0	8.0	32.1	0.0	25.0	43.5	18.5	100	14	
Vert.	4882.000	PK	46.4	31.7	5.9	39.5	3.1	47.6	73.9	26.3	150	0	
Vert.	7323.000	PK	45.7	36.9	7.2	40.2	3.1	52.7	73.9	21.2	150	0	
Vert.	9764.000	PK	44.5	38.5	8.1	39.5	3.1	54.7	73.9	19.2	150	0	
Vert.	4882.000	AV	33.8	31.7	5.9	39.5	3.1	35.0	53.9	18.9	150	0	
Vert.	7323.000	AV	33.5	36.9	7.2	40.2	3.1	40.5	53.9	13.4	150	0	
Vert.	9764.000	AV	32.1	38.5	8.1	39.5	3.1	42.3	53.9	11.6	150	0	

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

Distance factor : 1 GHz - 13 GHz : $20\log(4.3\text{ m} / 3.0\text{ m}) = 3.13\text{ dB}$

13 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

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

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13-EM-F0429

Radiated Spurious Emission

Test place : Shonan EMC Lab. No.3 Semi Anechoic Chamber
Report No. : 11217682S-A-R2
Date : June 7, 2016 June 8, 2016
Temperature / Humidity : 23 deg. C / 47 % RH 22 deg. C / 54 % RH
Engineer : Makoto Hosaka Wataru Kojima
(1-13GHz, 13-18GHz) (30-1000MHz, 18-26.5GHz)
Mode : Tx, Hopping Off, DH5 2480 MHz

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	138.776	QP	30.9	14.0	7.7	32.1	0.0	20.5	43.5	23.0	342	94	
Hori.	148.028	QP	32.2	14.5	7.8	32.1	0.0	22.4	43.5	21.1	218	103	
Hori.	185.034	QP	33.8	16.0	8.0	32.1	0.0	25.7	43.5	17.8	256	239	
Hori.	259.048	QP	33.9	17.5	8.5	32.0	0.0	27.9	46.0	18.1	139	117	
Hori.	333.062	QP	32.4	14.6	8.9	31.9	0.0	24.0	46.0	22.0	111	245	
Hori.	370.069	QP	32.0	15.4	9.0	31.9	0.0	24.5	46.0	21.5	150	71	
Hori.	2483.500	PK	45.9	27.9	13.9	41.0	3.1	49.8	73.9	24.1	234	300	
Hori.	4960.000	PK	46.7	32.0	5.9	39.4	3.1	48.3	73.9	25.6	150	0	
Hori.	7440.000	PK	46.4	37.0	7.3	40.4	3.1	53.4	73.9	20.5	150	0	
Hori.	9920.000	PK	44.4	38.4	8.2	39.4	3.1	54.7	73.9	19.2	150	0	
Hori.	2483.500	AV	32.3	27.9	13.9	41.0	3.1	36.2	53.9	17.7	234	300	
Hori.	4960.000	AV	34.6	32.0	5.9	39.4	3.1	36.2	53.9	17.7	150	0	
Hori.	7440.000	AV	34.1	37.0	7.3	40.4	3.1	41.1	53.9	12.8	150	0	
Hori.	9920.000	AV	32.3	38.4	8.2	39.4	3.1	42.6	53.9	11.3	150	0	
Vert.	37.007	QP	30.1	15.0	6.8	32.2	0.0	19.7	40.0	20.3	100	164	
Vert.	74.014	QP	33.6	5.9	7.2	32.2	0.0	14.5	40.0	25.5	167	217	
Vert.	111.021	QP	32.9	11.3	7.5	32.1	0.0	19.6	43.5	23.9	100	272	
Vert.	148.028	QP	32.4	14.5	7.8	32.1	0.0	22.6	43.5	20.9	100	33	
Vert.	180.014	QP	30.3	15.9	8.0	32.1	0.0	22.1	43.5	21.4	100	173	
Vert.	185.035	QP	32.9	16.0	8.0	32.1	0.0	24.8	43.5	18.7	100	14	
Vert.	2483.500	PK	45.4	27.9	13.9	41.0	3.1	49.3	73.9	24.6	173	314	
Vert.	4960.000	PK	46.4	32.0	5.9	39.4	3.1	48.0	73.9	25.9	150	0	
Vert.	7440.000	PK	46.7	37.0	7.3	40.4	3.1	53.7	73.9	20.2	150	0	
Vert.	9920.000	PK	44.5	38.4	8.2	39.4	3.1	54.8	73.9	19.1	150	0	
Vert.	2483.500	AV	33.8	27.9	13.9	41.0	3.1	37.7	53.9	16.2	173	314	
Vert.	4960.000	AV	34.6	32.0	5.9	39.4	3.1	36.2	53.9	17.7	150	0	
Vert.	7440.000	AV	34.0	37.0	7.3	40.4	3.1	41.0	53.9	12.9	150	0	
Vert.	9920.000	AV	32.2	38.4	8.2	39.4	3.1	42.5	53.9	11.4	150	0	

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

Distance factor : 1 GHz - 13 GHz : $20\log(4.3\text{ m} / 3.0\text{ m}) = 3.13\text{ dB}$

13 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

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

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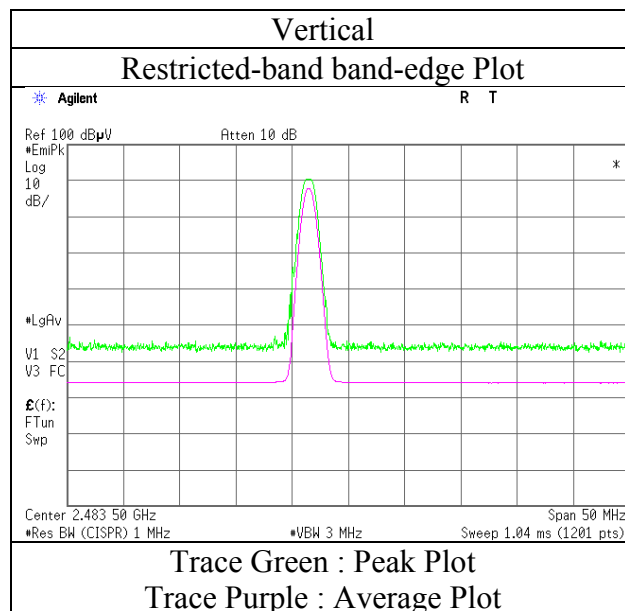
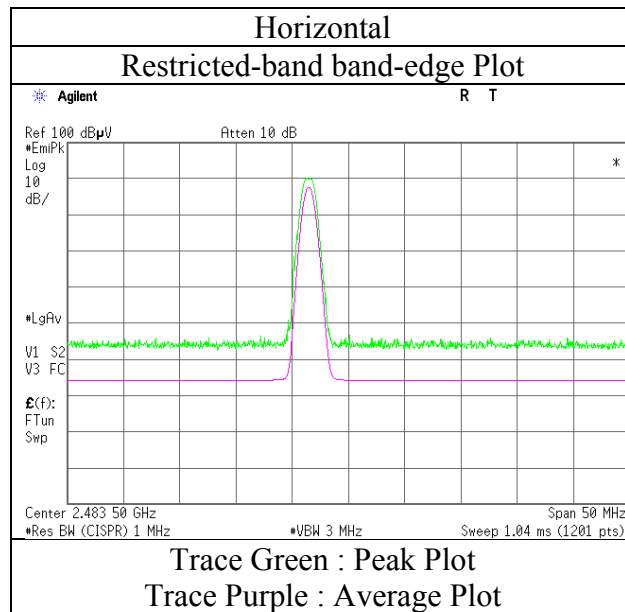
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13-EM-F0429

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

Test place : Shonan EMC Lab. No.3 Semi Anechoic Chamber
Report No. : 11217682S-A-R2
Date : June 8, 2016
Temperature / Humidity : 22 deg. C / 54 % RH
Engineer : Wataru Kojima
(1-13GHz)
Mode : Tx, Hopping Off, DH5 2480 MHz



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

Radiated Spurious Emission

Test place : Shonan EMC Lab. No.3 Semi Anechoic Chamber
Report No. : 11217682S-A-R2
Date : June 7, 2016 June 8, 2016
Temperature / Humidity : 23 deg. C / 47 % RH 22 deg. C / 54 % RH
Engineer : Makoto Hosaka Wataru Kojima
(1-13GHz, 13-18GHz) (30-1000MHz, 18-26.5GHz)
Mode : Tx, Hopping Off, 3DH5 2402 MHz

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	148.029	QP	30.6	14.5	7.8	32.1	0.0	20.8	43.5	22.7	300	96	
Hori.	185.034	QP	32.3	16.0	8.0	32.1	0.0	24.2	43.5	19.3	248	130	
Hori.	259.049	QP	34.1	17.5	8.5	32.0	0.0	28.1	46.0	17.9	135	127	
Hori.	333.062	QP	31.4	14.6	8.9	31.9	0.0	23.0	46.0	23.0	100	230	
Hori.	370.076	QP	28.8	15.4	9.0	31.9	0.0	21.3	46.0	24.7	150	77	
Hori.	479.999	QP	28.2	17.1	9.5	31.9	0.0	22.9	46.0	23.1	126	206	
Hori.	2390.000	PK	45.9	27.8	13.8	41.0	3.1	49.6	73.9	24.3	149	66	
Hori.	4804.000	PK	46.9	31.4	5.8	39.6	3.1	47.6	73.9	26.3	150	0	
Hori.	7206.000	PK	47.4	36.9	7.1	40.1	3.1	54.4	73.9	19.5	150	0	
Hori.	9608.000	PK	46.9	38.5	8.1	39.6	3.1	57.0	73.9	16.9	150	0	
Hori.	2390.000	AV	32.4	27.8	13.8	41.0	3.1	36.1	53.9	17.8	149	66	
Hori.	4804.000	AV	34.9	31.4	5.8	39.6	3.1	35.6	53.9	18.3	150	0	
Hori.	7206.000	AV	34.8	36.9	7.1	40.1	3.1	41.8	53.9	12.1	150	0	
Hori.	9608.000	AV	34.1	38.5	8.1	39.6	3.1	44.2	53.9	9.7	150	0	
Vert.	37.007	QP	31.9	15.0	6.8	32.2	0.0	21.5	40.0	18.5	100	114	
Vert.	111.021	QP	34.5	11.3	7.5	32.1	0.0	21.2	43.5	22.3	100	275	
Vert.	148.027	QP	30.2	14.5	7.8	32.1	0.0	20.4	43.5	23.1	100	31	
Vert.	180.004	QP	30.1	15.9	8.0	32.1	0.0	21.9	43.5	21.6	100	170	
Vert.	185.035	QP	33.1	16.0	8.0	32.1	0.0	25.0	43.5	18.5	100	6	
Vert.	2390.000	PK	47.5	27.8	13.8	41.0	3.1	51.2	73.9	22.7	145	304	
Vert.	4804.000	PK	46.2	31.4	5.8	39.6	3.1	46.9	73.9	27.0	150	0	
Vert.	7206.000	PK	46.7	36.9	7.1	40.1	3.1	53.7	73.9	20.2	150	0	
Vert.	9608.000	PK	46.0	38.5	8.1	39.6	3.1	56.1	73.9	17.8	150	0	
Vert.	2390.000	AV	35.1	27.8	13.8	41.0	3.1	38.8	53.9	15.1	145	304	
Vert.	4804.000	AV	34.9	31.4	5.8	39.6	3.1	35.6	53.9	18.3	150	0	
Vert.	7206.000	AV	34.9	36.9	7.1	40.1	3.1	41.9	53.9	12.0	150	0	
Vert.	9608.000	AV	34.1	38.5	8.1	39.6	3.1	44.2	53.9	9.7	150	0	

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

Distance factor : 1 GHz - 13 GHz : 20log(4.3 m / 3.0 m) = 3.13 dB

13 GHz - 40 GHz : 20log(1.0 m / 3.0 m) = -9.5 dB

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

20 dBc Data Sheet (RBW 100 kHz, VBW 300 kHz)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2402.000	PK	87.1	27.8	13.8	41.0	3.1	90.8	-	-	Carrier
Hori.	2400.000	PK	37.5	27.8	13.8	41.0	3.1	41.2	70.8	29.6	
Vert.	2402.000	PK	86.4	27.8	13.8	41.0	3.1	90.1	-	-	Carrier
Vert.	2400.000	PK	37.8	27.8	13.8	41.0	3.1	41.5	70.1	28.6	

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

Distance factor : 1 GHz - 13 GHz : 20log(4.3 m / 3.0 m) = 3.13 dB

13 GHz - 40 GHz : 20log(1.0 m / 3.0 m) = -9.5 dB

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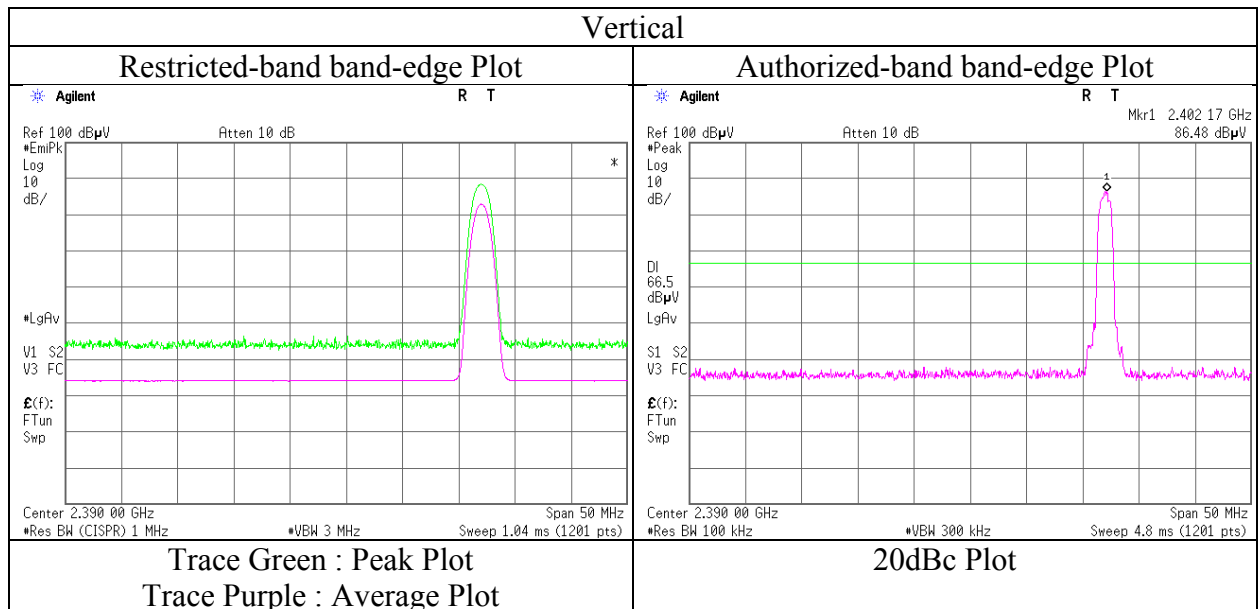
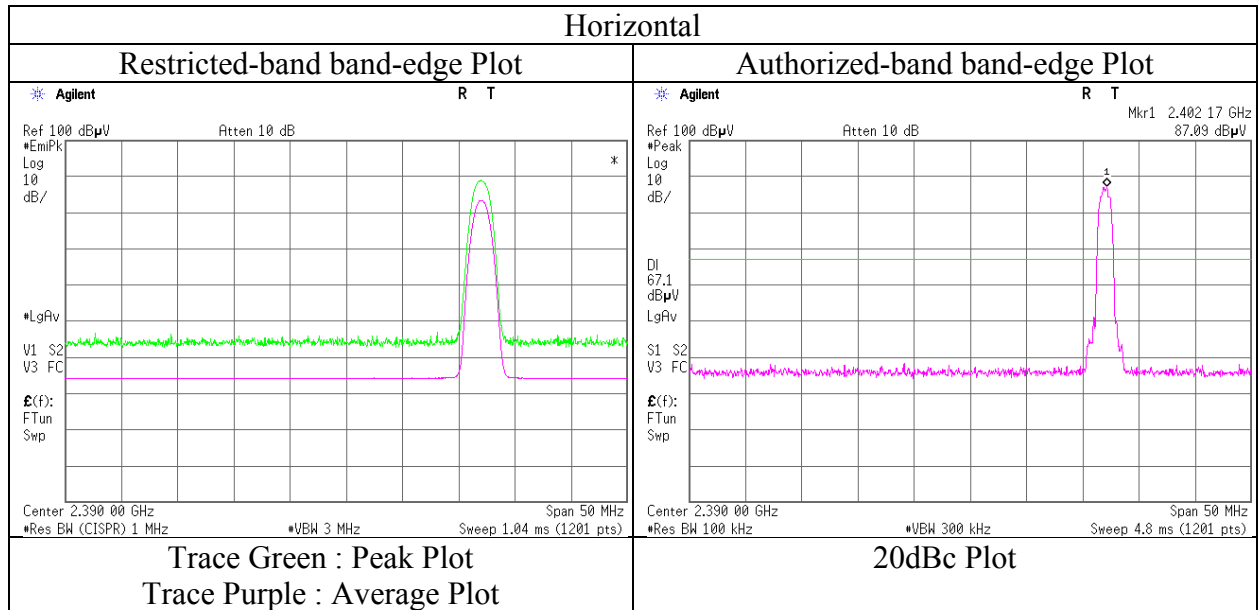
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Facsimile : +81 463 50 6401

13-EM-F0429

Radiated Spurious Emission (Reference Plot for band-edge)

Test place	Shonan EMC Lab. No.3 Semi Anechoic Chamber
Report No.	11217682S-A-R2
Date	June 8, 2016
Temperature / Humidity	22 deg. C / 54 % RH
Engineer	Wataru Kojima (1-13GHz)
Mode	Tx, Hopping Off, 3DH5 2402 MHz



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

Radiated Spurious Emission

Test place : Shonan EMC Lab. No.3 Semi Anechoic Chamber
Report No. : 11217682S-A-R2
Date : June 7, 2016 June 8, 2016
Temperature / Humidity : 23 deg. C / 47 % RH 22 deg. C / 54 % RH
Engineer : Makoto Hosaka Wataru Kojima
(1-13GHz, 13-18GHz) (30-1000MHz, 18-26.5GHz)
Mode : Tx, Hopping Off, 3DH5 2441 MHz

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	120.275	QP	33.4	12.6	7.6	32.1	0.0	21.5	43.5	22.0	295	91	
Hori.	138.764	QP	32.2	14.0	7.7	32.1	0.0	21.8	43.5	21.7	334	88	
Hori.	185.034	QP	33.1	16.0	8.0	32.1	0.0	25.0	43.5	18.5	247	232	
Hori.	259.048	QP	33.4	17.5	8.5	32.0	0.0	27.4	46.0	18.6	129	121	
Hori.	333.063	QP	30.9	14.6	8.9	31.9	0.0	22.5	46.0	23.5	163	48	
Hori.	370.070	QP	31.3	15.4	9.0	31.9	0.0	23.8	46.0	22.2	146	64	
Hori.	4882.000	PK	47.4	31.7	5.9	39.5	3.1	48.6	73.9	25.3	150	0	
Hori.	7323.000	PK	46.1	36.9	7.2	40.2	3.1	53.1	73.9	20.8	150	0	
Hori.	9764.000	PK	45.2	38.5	8.1	39.5	3.1	55.4	73.9	18.5	150	0	
Hori.	4882.000	AV	34.7	31.7	5.9	39.5	3.1	35.9	53.9	18.0	150	0	
Hori.	7323.000	AV	34.5	36.9	7.2	40.2	3.1	41.5	53.9	12.4	150	0	
Hori.	9764.000	AV	33.0	38.5	8.1	39.5	3.1	43.2	53.9	10.7	150	0	
Vert.	30.539	QP	22.9	16.8	6.8	32.2	0.0	14.3	40.0	25.7	100	-1	
Vert.	37.008	QP	35.2	15.0	6.8	32.2	0.0	24.8	40.0	15.2	100	108	
Vert.	111.020	QP	34.5	11.3	7.5	32.1	0.0	21.2	43.5	22.3	100	239	
Vert.	185.036	QP	31.6	16.0	8.0	32.1	0.0	23.5	43.5	20.0	100	360	
Vert.	4882.000	PK	47.3	31.7	5.9	39.5	3.1	48.5	73.9	25.4	150	0	
Vert.	7323.000	PK	45.8	36.9	7.2	40.2	3.1	52.8	73.9	21.1	150	0	
Vert.	9764.000	PK	45.0	38.5	8.1	39.5	3.1	55.2	73.9	18.7	150	0	
Vert.	4882.000	AV	34.7	31.7	5.9	39.5	3.1	35.9	53.9	18.0	150	0	
Vert.	7323.000	AV	34.3	36.9	7.2	40.2	3.1	41.3	53.9	12.6	150	0	
Vert.	9764.000	AV	33.1	38.5	8.1	39.5	3.1	43.3	53.9	10.6	150	0	

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

Distance factor : 1 GHz - 13 GHz : $20\log(4.3\text{ m} / 3.0\text{ m}) = 3.13\text{ dB}$

13 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

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

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13-EM-F0429

Radiated Spurious Emission

Test place : Shonan EMC Lab. No.3 Semi Anechoic Chamber
Report No. : 11217682S-A-R2
Date : June 7, 2016 June 8, 2016
Temperature / Humidity : 23 deg. C / 47 % RH 22 deg. C / 54 % RH
Engineer : Makoto Hosaka Wataru Kojima
(1-13GHz, 13-18GHz) (30-1000MHz, 18-26.5GHz)
Mode : Tx, Hopping Off, 3DH5 2480 MHz

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	127.997	QP	30.2	13.2	7.6	32.1	0.0	18.9	43.5	24.6	333	67	
Hori.	138.776	QP	30.7	14.0	7.7	32.1	0.0	20.3	43.5	23.2	222	124	
Hori.	148.028	QP	32.4	14.5	7.8	32.1	0.0	22.6	43.5	20.9	224	92	
Hori.	185.035	QP	33.6	16.0	8.0	32.1	0.0	25.5	43.5	18.0	248	233	
Hori.	259.047	QP	33.7	17.5	8.5	32.0	0.0	27.7	46.0	18.3	131	123	
Hori.	333.062	QP	31.5	14.6	8.9	31.9	0.0	23.1	46.0	22.9	158	49	
Hori.	370.069	QP	31.0	15.4	9.0	31.9	0.0	23.5	46.0	22.5	163	69	
Hori.	2483.500	PK	46.6	27.9	13.9	41.0	3.1	50.5	73.9	23.4	140	307	
Hori.	4960.000	PK	46.4	32.0	5.9	39.4	3.1	48.0	73.9	25.9	150	0	
Hori.	7440.000	PK	46.1	37.0	7.3	40.4	3.1	53.1	73.9	20.8	150	0	
Hori.	9920.000	PK	43.7	38.4	8.2	39.4	3.1	54.0	73.9	19.9	150	0	
Hori.	2483.500	AV	32.2	27.9	13.9	41.0	3.1	36.1	53.9	17.8	140	307	
Hori.	4960.000	AV	34.6	32.0	5.9	39.4	3.1	36.2	53.9	17.7	150	0	
Hori.	7440.000	AV	34.0	37.0	7.3	40.4	3.1	41.0	53.9	12.9	150	0	
Hori.	9920.000	AV	32.2	38.4	8.2	39.4	3.1	42.5	53.9	11.4	150	0	
Vert.	37.007	QP	29.6	15.0	6.8	32.2	0.0	19.2	40.0	20.8	100	187	
Vert.	111.021	QP	31.1	11.3	7.5	32.1	0.0	17.8	43.5	25.7	100	104	
Vert.	148.028	QP	32.0	14.5	7.8	32.1	0.0	22.2	43.5	21.3	100	27	
Vert.	185.034	QP	32.7	16.0	8.0	32.1	0.0	24.6	43.5	18.9	100	7	
Vert.	2483.500	PK	45.3	27.9	13.9	41.0	3.1	49.2	73.9	24.7	162	316	
Vert.	4960.000	PK	46.9	32.0	5.9	39.4	3.1	48.5	73.9	25.4	150	0	
Vert.	7440.000	PK	45.8	37.0	7.3	40.4	3.1	52.8	73.9	21.1	150	0	
Vert.	9920.000	PK	44.3	38.4	8.2	39.4	3.1	54.6	73.9	19.3	150	0	
Vert.	2483.500	AV	33.8	27.9	13.9	41.0	3.1	37.7	53.9	16.2	162	316	
Vert.	4960.000	AV	34.5	32.0	5.9	39.4	3.1	36.1	53.9	17.8	150	0	
Vert.	7440.000	AV	34.0	37.0	7.3	40.4	3.1	41.0	53.9	12.9	150	0	
Vert.	9920.000	AV	32.2	38.4	8.2	39.4	3.1	42.5	53.9	11.4	150	0	

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

Distance factor : 1 GHz - 13 GHz : $20\log(4.3\text{ m} / 3.0\text{ m}) = 3.13\text{ dB}$

13 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

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

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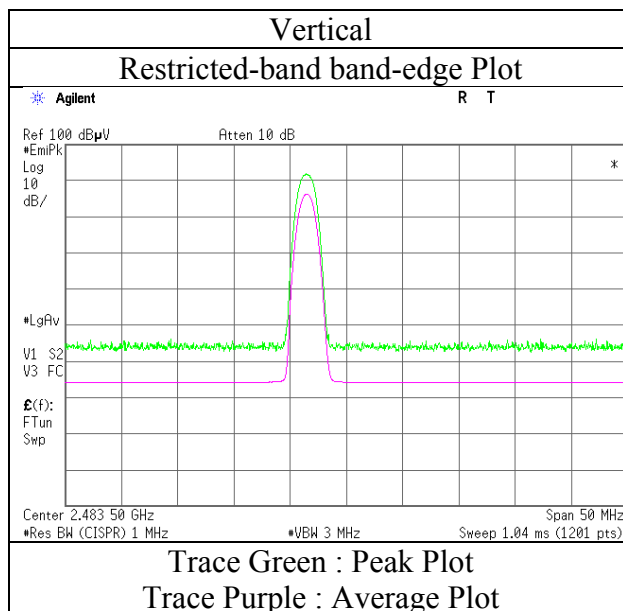
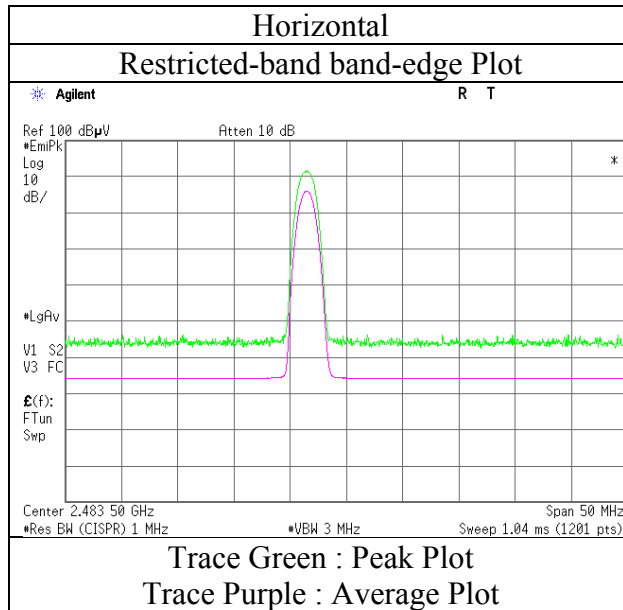
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Radiated Spurious Emission **(Reference Plot for band-edge)**

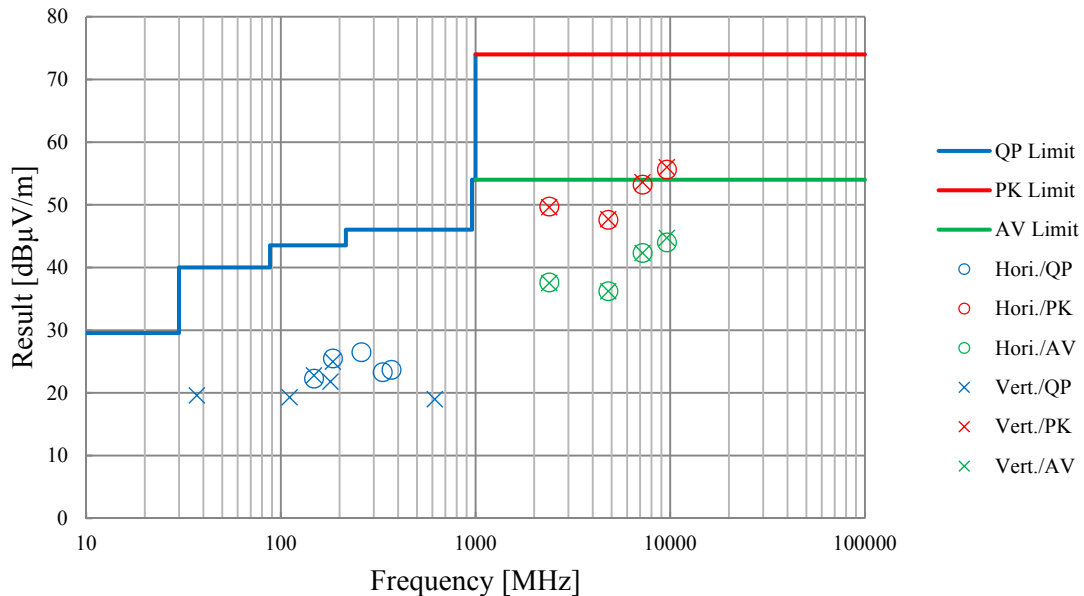
Test place : Shonan EMC Lab. No.3 Semi Anechoic Chamber
Report No. : 11217682S-A-R2
Date : June 8, 2016
Temperature / Humidity : 22 deg. C / 54 % RH
Engineer : Wataru Kojima
(1-13GHz)
Mode : Tx, Hopping Off, 3DH5 2480 MHz



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

Radiated Spurious Emission
(Plot data, Worst case)

Test place	Shonan EMC Lab. No.3 Semi Anechoic Chamber	
Report No.	11217682S-A-R2	
Date	June 7, 2016	June 8, 2016
Temperature / Humidity	23 deg. C / 47 % RH	22 deg. C / 54 % RH
Engineer	Makoto Hosaka	Wataru Kojima
	(1-13GHz, 13-18GHz)	(30-1000MHz, 18-26.5GHz)
Mode	Tx, Hopping Off, 3DH5 2402 MHz	



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

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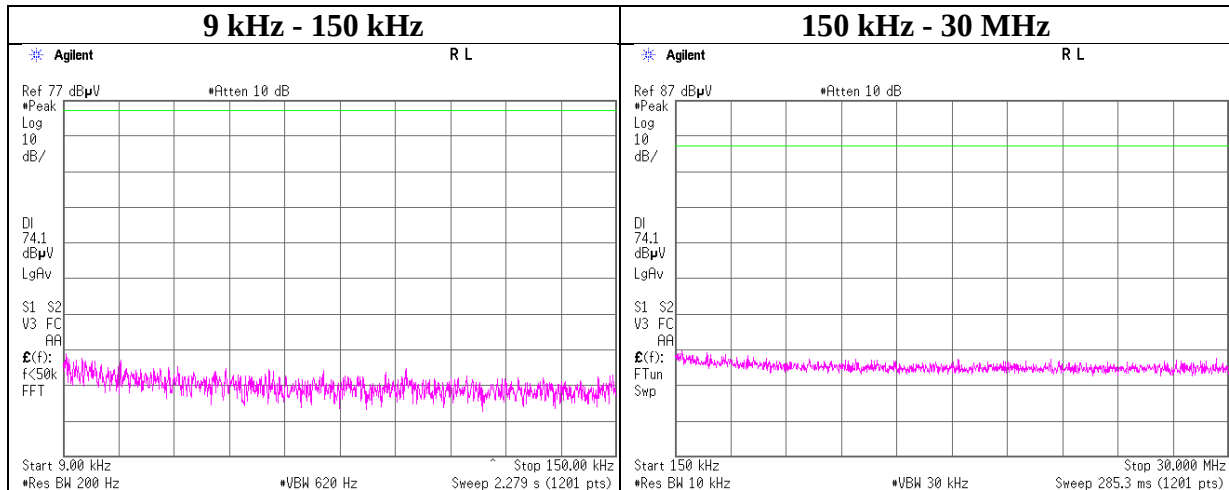
Facsimile : +81 463 50 6401

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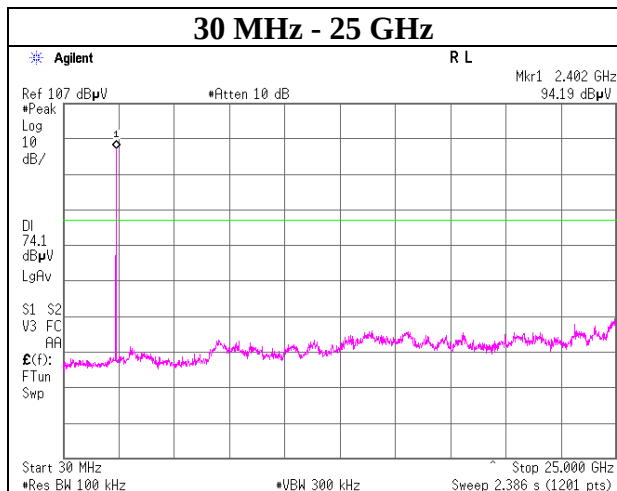
Conducted Spurious Emission

Test place : Shonan EMC Lab. No.5 Shielded Room
Report No. : 11217682S-A-R2
Date : May 31, 2016
Temperature / Humidity : 27 deg. C / 37 % RH
Engineer : Wataru Kojima
Mode : Tx, Hopping Off, DH5

2402 MHz



30 MHz - 25 GHz



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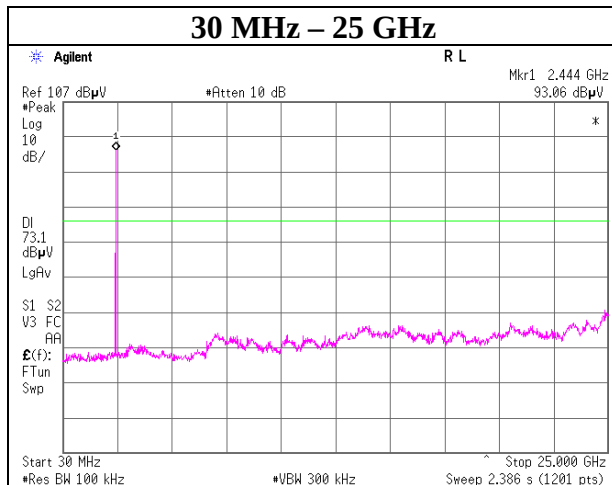
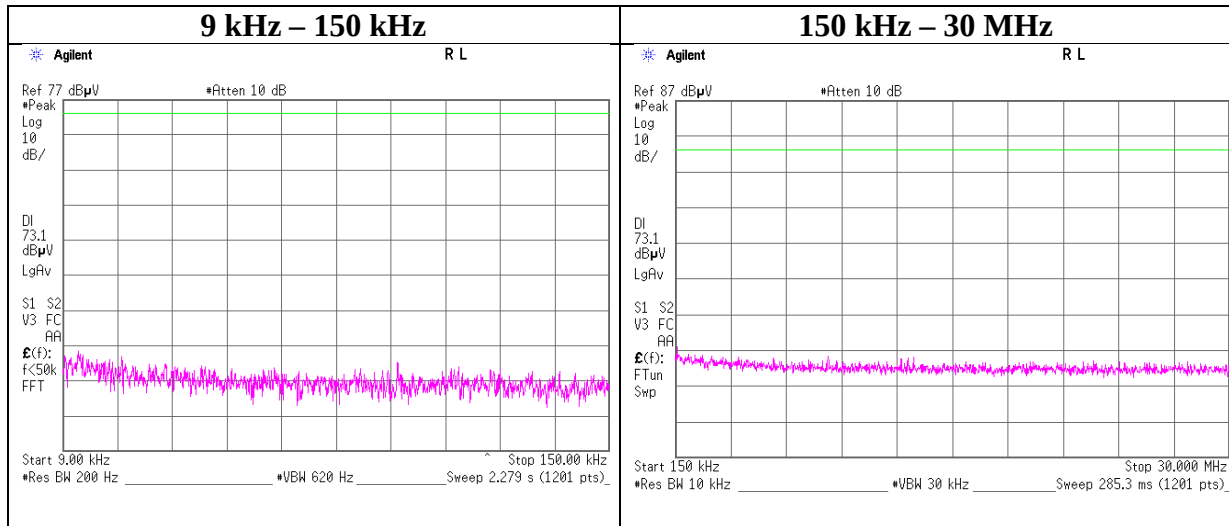
Facsimile : +81 463 50 6401

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Conducted Spurious Emission

Test place	Shonan EMC Lab. No.5 Shielded Room
Report No.	11217682S-A-R2
Date	May 31, 2016
Temperature / Humidity	27 deg. C / 37 % RH
Engineer	Wataru Kojima
Mode	Tx, Hopping Off, DH5

2441 MHz



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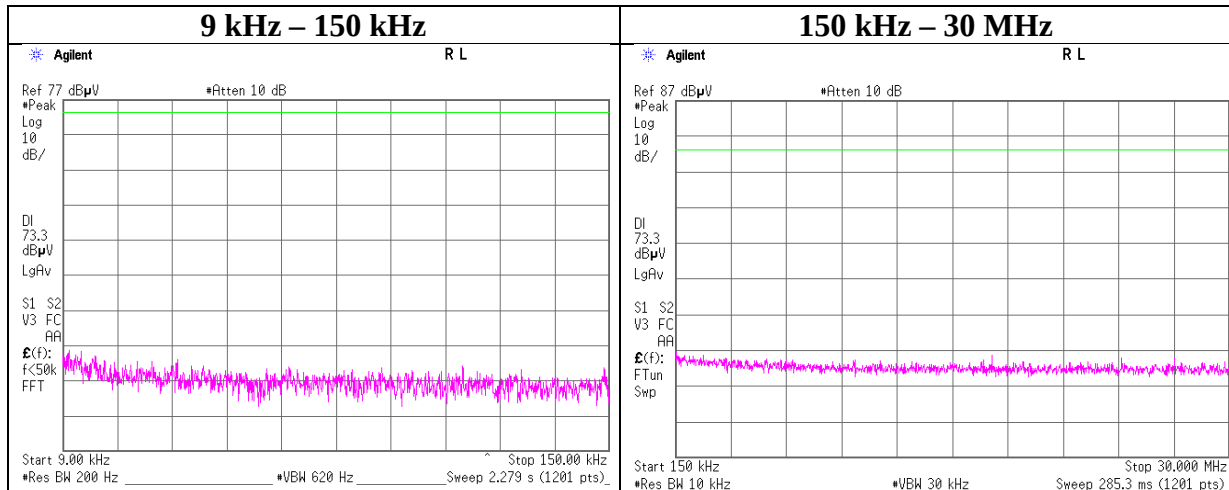
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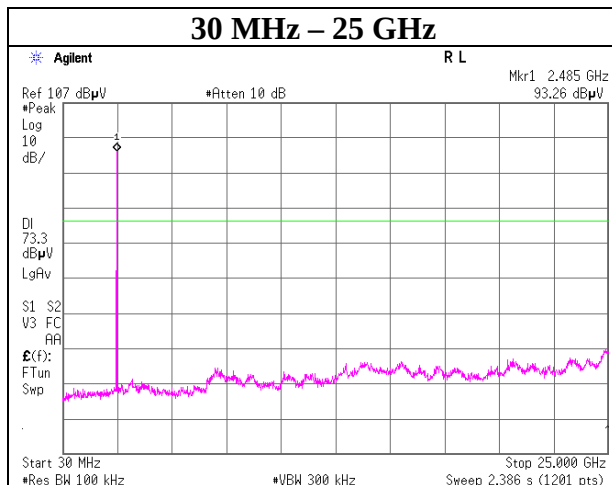
Conducted Spurious Emission

Test place : Shonan EMC Lab. No.5 Shielded Room
Report No. : 11217682S-A-R2
Date : May 31, 2016
Temperature / Humidity : 27 deg. C / 37 % RH
Engineer : Wataru Kojima
Mode : Tx, Hopping Off, DH5

2480 MHz



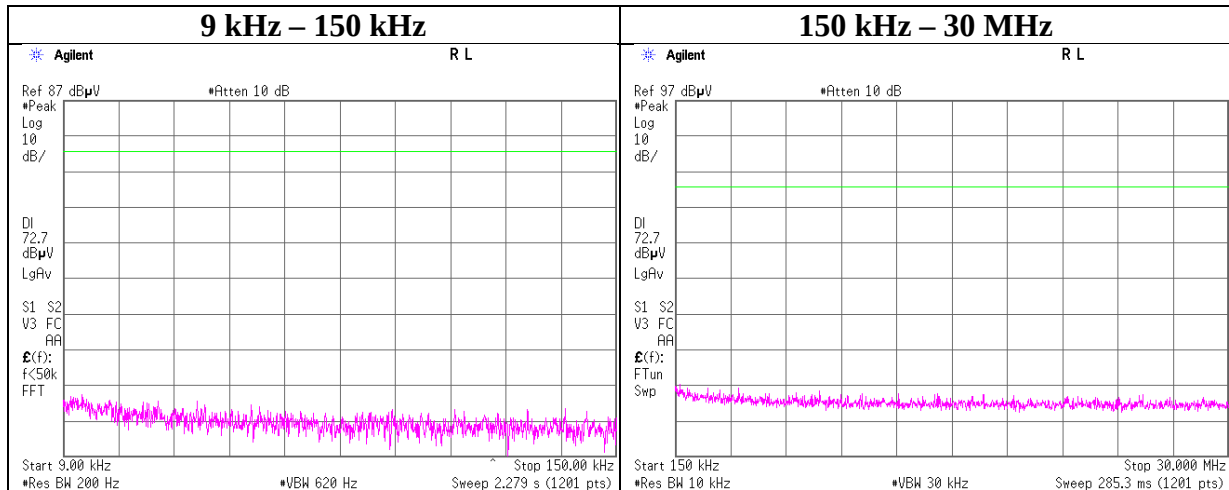
30 MHz – 25 GHz



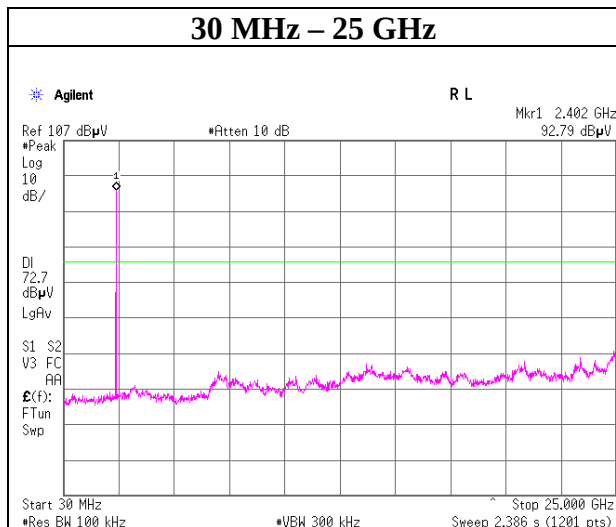
Conducted Spurious Emission

Test place : Shonan EMC Lab. No.5 Shielded Room
Report No. : 11217682S-A-R2
Date : May 31, 2016
Temperature / Humidity : 27 deg. C / 37 % RH
Engineer : Wataru Kojima
Mode : Tx, Hopping Off, 3DH5

2402 MHz



30 MHz – 25 GHz



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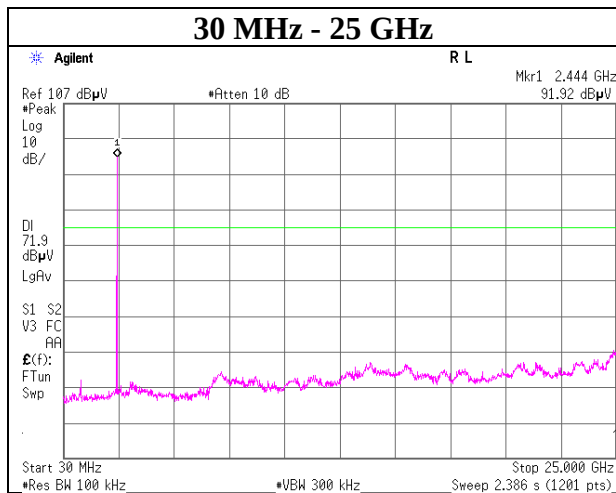
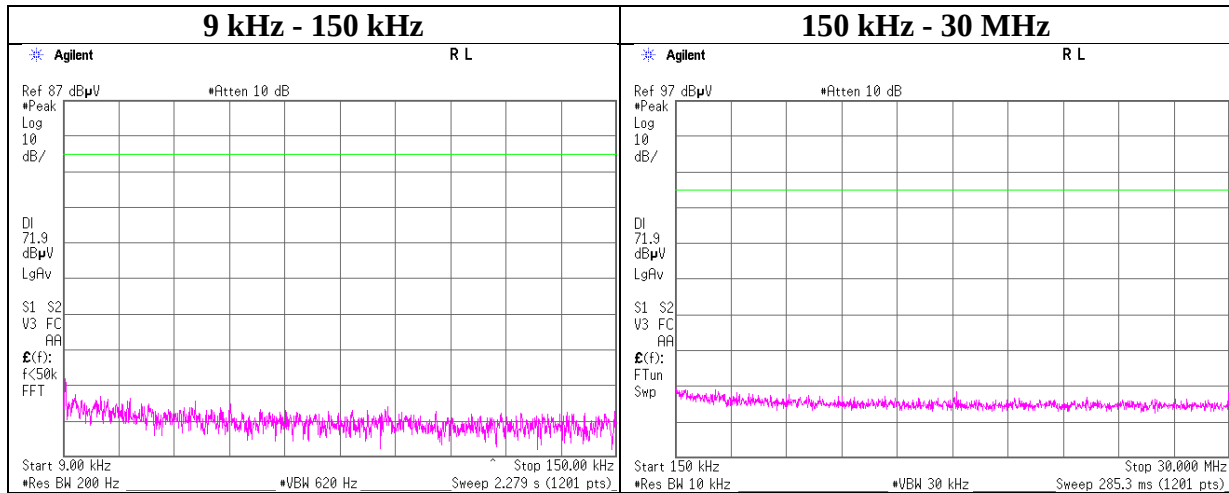
Facsimile : +81 463 50 6401

13-EM-F0429

Conducted Spurious Emission

Test place : Shonan EMC Lab. No.5 Shielded Room
Report No. : 11217682S-A-R2
Date : May 31, 2016
Temperature / Humidity : 27 deg. C / 37 % RH
Engineer : Wataru Kojima
Mode : Tx, Hopping Off, 3DH5

2441 MHz



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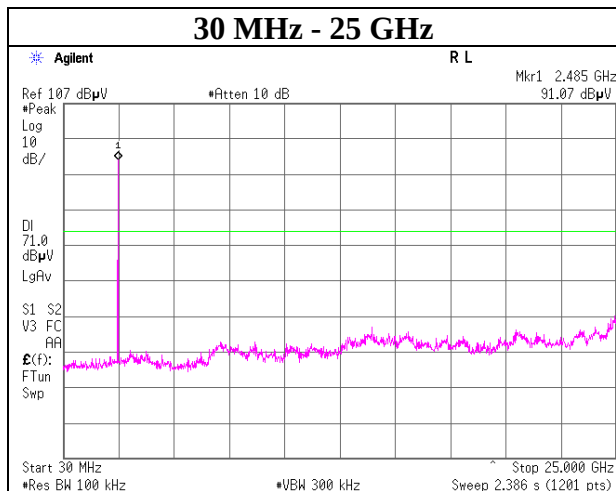
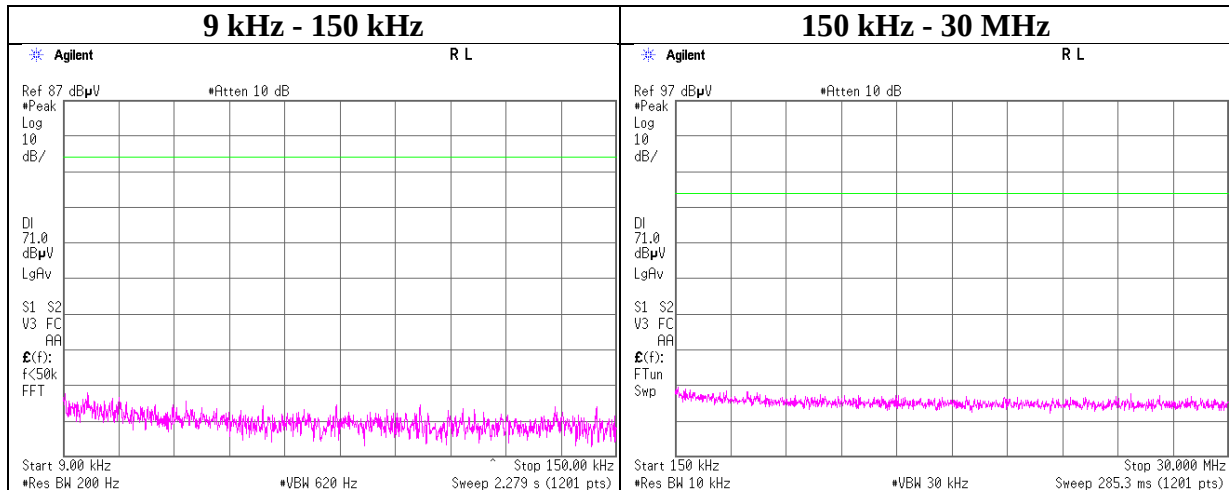
Facsimile : +81 463 50 6401

13-EM-F0429

Conducted Spurious Emission

Test place : Shonan EMC Lab. No.5 Shielded Room
Report No. : 11217682S-A-R2
Date : May 31, 2016
Temperature / Humidity : 27 deg. C / 37 % RH
Engineer : Wataru Kojima
Mode : Tx, Hopping Off, 3DH5

2480 MHz



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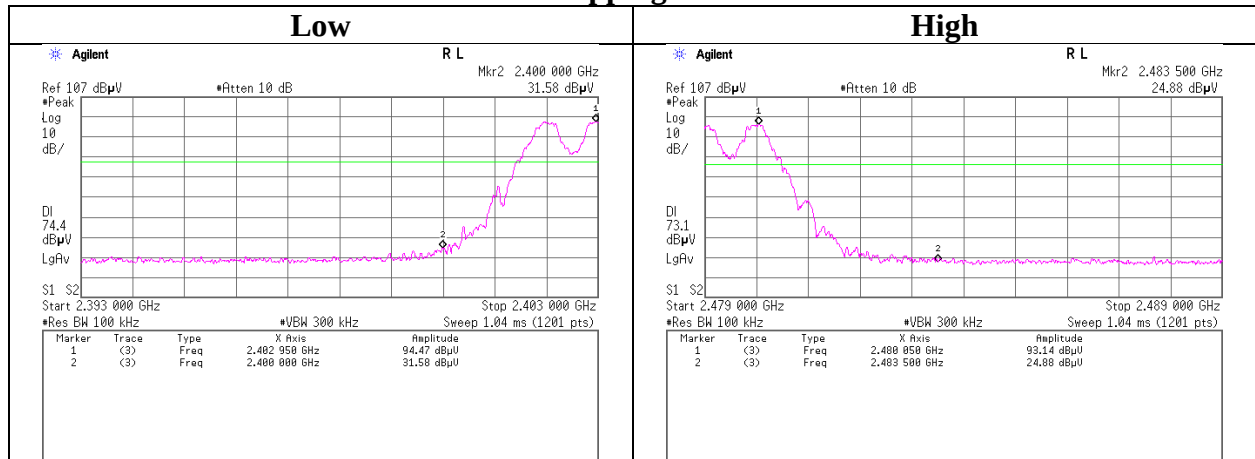
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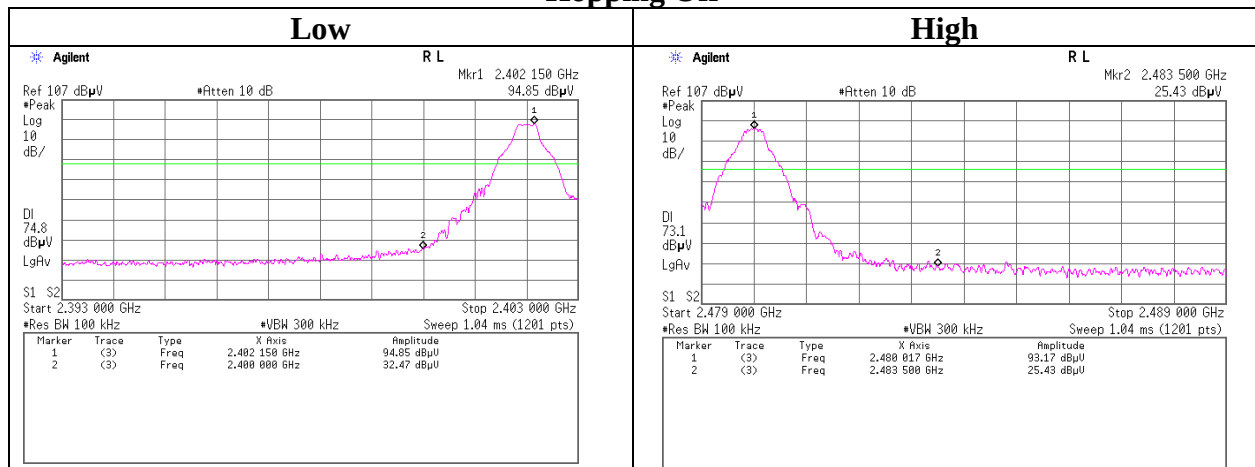
Conducted Emission Band Edge compliance

Test place : Shonan EMC Lab. No.5 Shielded Room
Report No. : 11217682S-A-R2
Date : May 31, 2016
Temperature / Humidity : 27 deg. C / 37 % RH
Engineer : Wataru Kojima
Mode : Tx DH5

Hopping On



Hopping Off



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Shonan EMC Lab.

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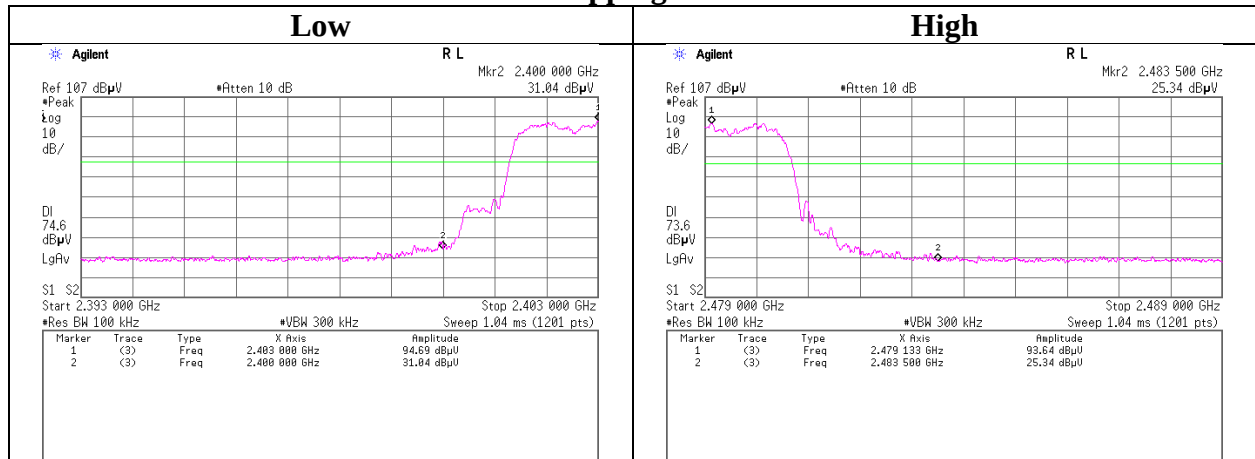
Facsimile : +81 463 50 6401

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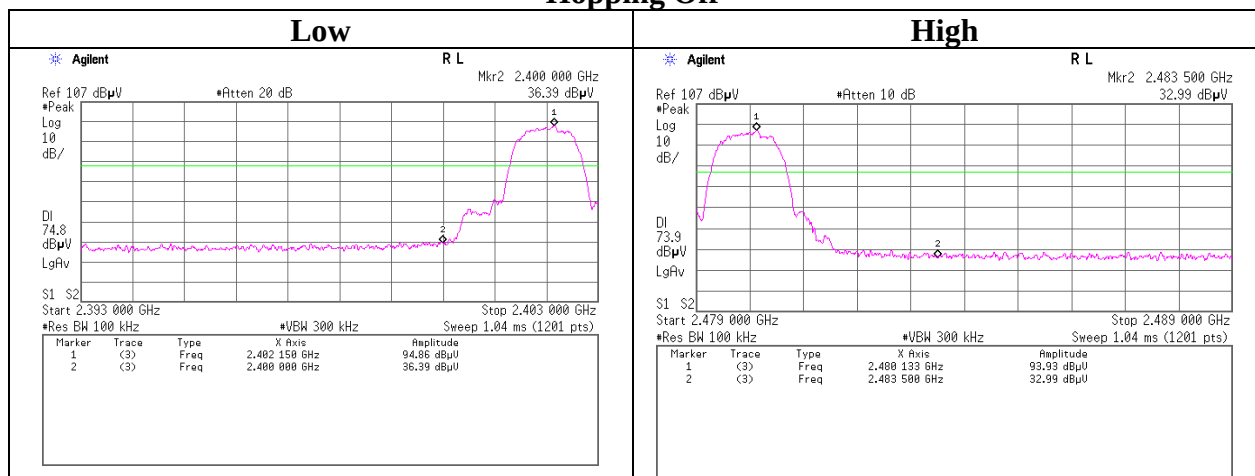
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Date May 31, 2016
Temperature / Humidity 27 deg. C / 37 % RH
Engineer Wataru Kojima
Mode Tx 3DH5

Hopping On



Hopping Off

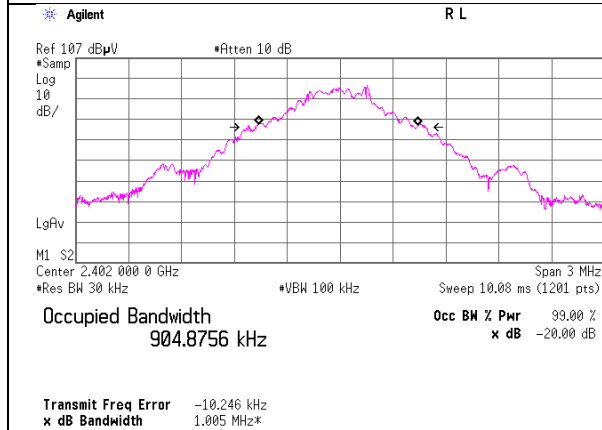


99%Occupied Bandwidth

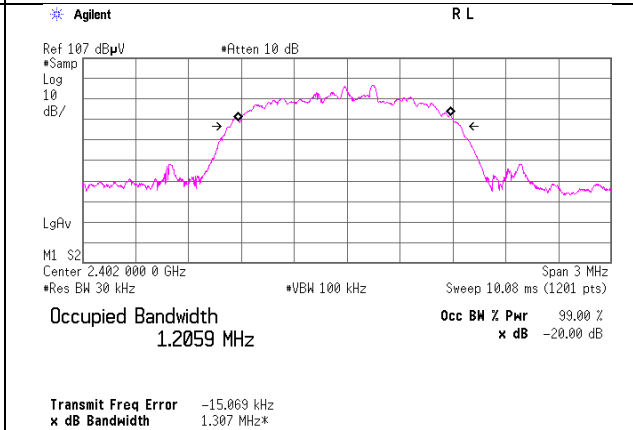
Test place
Report No.
Date
Temperature / Humidity
Engineer
Mode

Shonan EMC Lab. No.5 Shielded Room
11217682S-A-R2
May 31, 2016
27 deg. C / 37 % RH
Wataru Kojima
Tx Hopping Off

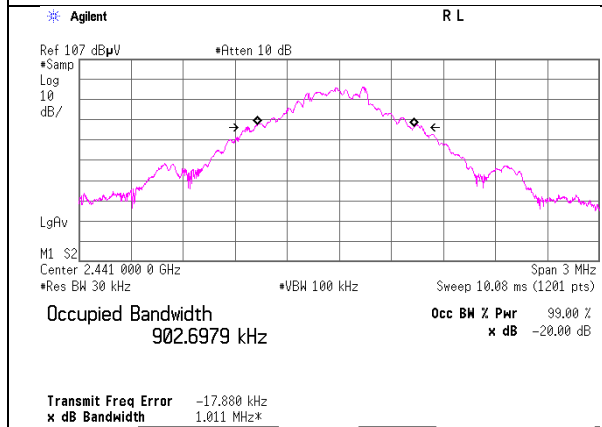
Hopping Off, DH5 2402 MHz



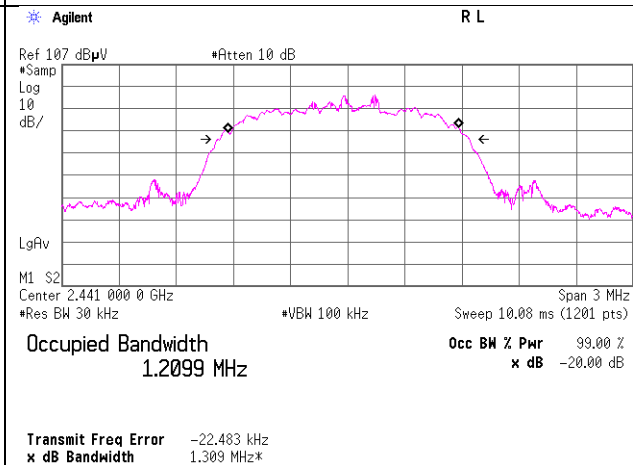
Hopping Off, 3DH5 2402 MHz



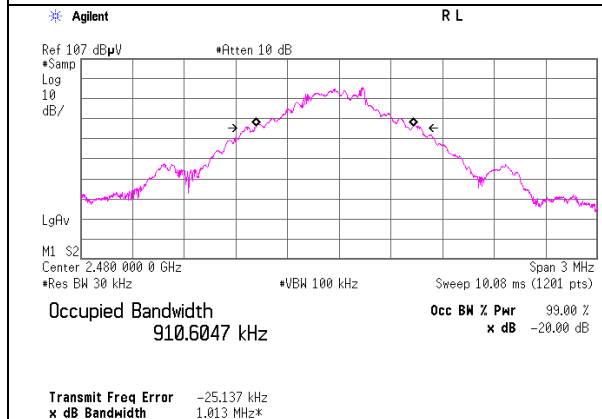
2441 MHz



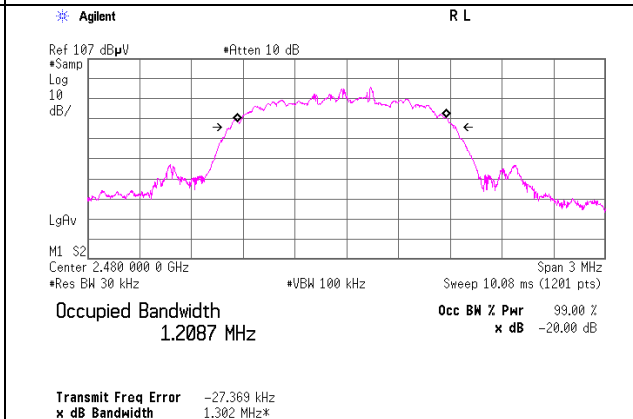
2441 MHz



2480 MHz



2480 MHz



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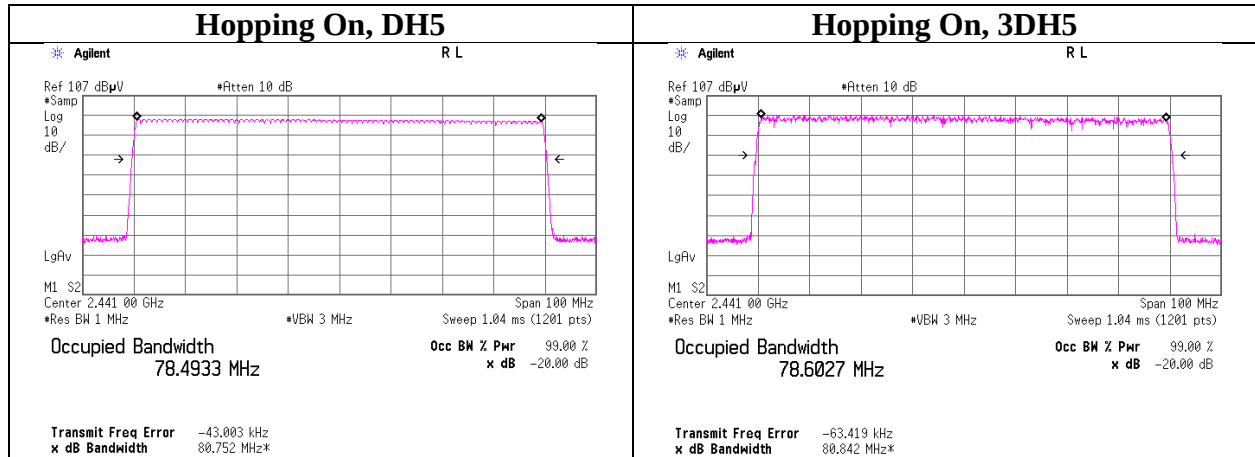
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99% Occupied Bandwidth

Test place	Shonan EMC Lab. No.5 Shielded Room
Report No.	11217682S-A-R2
Date	May 31, 2016
Temperature / Humidity	27 deg. C / 37 % RH
Engineer	Wataru Kojima
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)
SPM-07	Power Meter	Agilent	8990B	MY5100272	AT	2016/04/04 * 12
SPSS-04	Power sensor	Agilent	N1923A	MY5326009	AT	2016/04/04 * 12
KSA-08	Spectrum Analyzer	Agilent	E4446A	MY46180525	AT	2016/03/28 * 12
SAT10-09	Attenuator	Weinschel Corp.	54A-10	W5692	AT	2015/11/04 * 12
SCC-G14	Coaxial Cable	Suhner	SUCOFLEX 102	31600/2	AT	2016/03/23 * 12
SOS-10	Humidity Indicator	A&D	AD-5681	4064561	AT	2015/10/22 * 12
STS-06	Digital Hitester	Hioki	3805-50	080997830	AT	2016/03/22 * 12
SAEC-03(NSA)	Semi-Anechoic Chamber	TDK	SAEC-03(NSA)	3	RE	2015/07/16 * 12
SBA-03	Biconical Antenna	Schwarzbeck	BBA9106	91032666	RE	2015/10/11 * 12
SLA-03	Logperiodic Antenna	Schwarzbeck	UHALP9108A	UHALP 9108-A 0901	RE	2015/10/11 * 12
SAT6-08	Attenuator	HIROSE ELECTRIC CO.,LTD.	AT-406(40)	-	RE	2015/08/31 * 12
SCC-C1/C2/C3/ C4/C5/C10/SRS E-03	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/ Suhner/Suhner/Suhner/T OYO	8D2W/12DSFA/141 PE/141PE/141PE/14 1PE/NS4906	-/0901-271(RF Selector)	RE	2016/04/22 * 12
SAF-03	Pre Amplifier	SONOMA	310N	290213	RE	2016/02/25 * 12
STR-06	Test Receiver	Rohde & Schwarz	ESCI	101259	RE	2016/03/28 * 12
COTS-SEMI-1	EMI Software	TSJ	TEPTO-DV(RE,CE, RFI,MF)	-	RE	-
SOS-05	Humidity Indicator	A&D	AD-5681	4062518	RE	2015/10/22 * 12
SJM-15	Measure	ASKUL	-	-	RE	-
STS-03	Digital Hitester	Hioki	3805-50	080997823	RE	2015/11/18 * 12
SSA-01	Spectrum Analyzer	Agilent	N9010A-526	MY48031482	RE	2016/04/28 * 12
SCC-G15	Coaxial Cable	Suhner	SUCOFLEX 102	32703/2	RE	2016/03/08 * 12
SCC-G33	Coaxial Cable	Junkosha	MWX241-01000K MSKMS	-	RE	2016/04/18 * 12
SHA-04	Horn Antenna	ETS LINDGREN	3160-09	LM3640	RE	2016/03/15 * 12
SAF-08	Pre Amplifier	TOYO Corporation	HAP18-26W	00000019	RE	2016/03/23 * 12
SAF-04	Pre Amplifier	TOYO Corporation	TPA0118-36	1440489	RE	2016/03/22 * 12
SCC-G04	Coaxial Cable	Junkosha	J12J102207-00	JUN-12-14-018	RE	2015/06/08 * 12
SCC-G23	Coaxial Cable	Suhner	SUCOFLEX 104	297342/4	RE	2016/05/11 * 12
SHA-03	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-739	RE	2015/08/11 * 12
SSA-02	Spectrum Analyzer	Agilent	E4448A	MY48250106	RE	2016/03/23 * 12
SAEC-03(SVSW R)	Semi-Anechoic Chamber	TDK	SAEC-03(SVSWR)	3	RE	2015/08/28 * 12
SAT10-05	Attenuator(above1GHz)	Agilent	8493C-010	74864	RE	2015/11/04 * 12
SFL-18	Highpass Filter	MICRO-TRONICS	HPM50111	119	RE	2016/04/18 * 12

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

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

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

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

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