



RADIO TEST REPORT

Test Report No. : 11328915H-B-R1

Applicant : FUJITSU TEN LIMITED
Type of Equipment : Car Navigation
Model No. : FT0091A
FCC ID : BABFT0091A
Test regulation : FCC Part 15 Subpart C: 2016
*Bluetooth part
Test Result : Complied

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2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with the above regulation.
4. The test results in this report are traceable to the national or international standards.
5. This test report must not be used by the customer to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.
6. This test report covers Radio technical requirements. It does not cover administrative issues such as Manual or non-Radio test related Requirements. (if applicable)
7. This report is a revised version of 11328915H-B. 11328915H-B is replaced with this report.

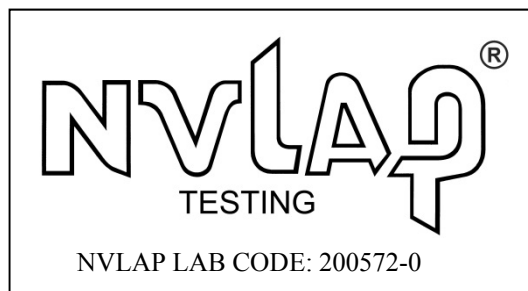
Date of test: July 27 to August 7, 2016

Representative test engineer:

Keisuke Kawamura
Engineer
Consumer Technology Division

Approved by:

Tsubasa Takayama
Engineer
Consumer Technology Division



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.
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13-EM-F0429

REVISION HISTORY

Original Test Report No.: 11328915H-B

Revision	Test report No.	Date	Page revised	Contents
- (Original)	11328915H-B	October 3, 2016	-	-
1	11328915H-B-R1	October 27, 2016	P10	Correction of Cable No.7 GPS Cable → Camera Cable

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SECTION 1: Customer information

Company Name : FUJITSU TEN LIMITED
Address : 2-28, Gosho-dori 1-Chome, Hyogo-ku, Kobe, 652-8510 JAPAN
Telephone Number : +81-78-682-2159
Facsimile Number : +81-78-671-7160
Contact Person : FUKII DAISUKE

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

2.1 Identification of E.U.T.

Type of Equipment : Car Navigation
Model No. : FT0091A
Serial No. : Refer to Section 4, Clause 4.2
Rating : DC 12 V
Receipt Date of Sample : July 12, 2016
Country of Mass-production : Mexico
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: FT0091A (referred to as the EUT in this report) is a Car Navigation.

Radio Specification

Radio Type : Transceiver
Power Supply (inner) : DC 3.3 V, DC 1.8 V
Clock frequency(ies) : 26 MHz

	IEEE802.11b	IEEE802.11g/n (20 M band)	IEEE802.11a/n (20 M band)	IEEE802.11n (40 M band)
Frequency of operation	2412 MHz - 2462 MHz	2412 MHz - 2462 MHz	5180 MHz - 5240 MHz 5260 MHz - 5320 MHz 5500 MHz - 5700 MHz 5745 MHz - 5825 MHz	5190 MHz - 5230 MHz 5270 MHz - 5310 MHz 5510 MHz - 5670 MHz 5755 MHz - 5795 MHz
Type of modulation	DSSS (CCK, DQPSK, DBPSK)	OFDM-CCK (64QAM, 16QAM, QPSK, BPSK)	OFDM (64QAM, 16QAM, QPSK, BPSK, 256QAM)	
Channel spacing	5MHz		20MHz	40MHz
Antenna type	Surface Mountable Dielectric Chip Antenna			
Antenna Connector type	-			
Antenna Gain	1.6 dBi (2.4 GHz Band), 0 dBi (5 GHz Band)			

	Bluetooth Ver.3.0 with EDR function *1)
Frequency of operation	2402 MHz - 2480 MHz
Type of modulation	BT: FHSS (GFSK, $\pi/4$ -DQPSK, 8-DPSK)
Channel spacing	BT: 1 MHz
Antenna type	Surface Mountable Dielectric Chip Antenna
Antenna Connector type	-
Antenna Gain	1.6 dBi

*1) This test report applies to Bluetooth Ver.3.0 with EDR function (2402 MHz - 2480 MHz).
(Wireless LAN and Bluetooth do not transmit simultaneously.)

SECTION 3: Test specification, procedures & results

3.1 Test Specification

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

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

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

3.2 Procedures and results

Item	Test Procedure	Specification	Worst Margin	Results	Remarks
Conducted Emission	FCC: ANSI C63.10-2013 6. Standard test methods IC: RSS-Gen 8.8	FCC: Section 15.207 IC: RSS-Gen 8.8	-	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)		Complied	Conducted
Number of Hopping Frequency	FCC: FCC Public Notice DA 00-705 IC: -	FCC: Section15.247(a)(1)(iii) IC: RSS-247 5.1 (4)		Complied	Conducted
Dwell time	FCC: FCC Public Notice DA 00-705 IC: -	FCC: Section15.247(a)(1)(iii) IC: RSS-247 5.1 (4)		Complied	Conducted
Maximum Peak Output Power	FCC: FCC Public Notice DA 00-705 IC: RSS-Gen 6.12	FCC: Section15.247(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	10.3 dB 147.983 MHz, QP, Horizontal	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.

*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, DC 1.8 V) constantly to RF Module regardless of input voltage. Therefore, this EUT complies with the requirement.

FCC Part 15.203 Antenna requirement

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

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3.3 Addition to standard

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

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

3.4 Uncertainty

EMI

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

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

Polarity	Radiated emission (Below 1GHz)			
	(3 m*) (+/-)		(10 m*) (+/-)	
	30 - 200 MHz	200 - 1000MHz	30 - 200 MHz	200 - 1000MHz
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 1GHz)				
(3 m*) (+/-)		(1 m*) (+/-)		(10 m*) (+/-)
1 - 6GHz	6 - 18GHz	10 - 26.5 GHz	26.5 - 40GHz	1 - 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.

3.5 Test Location

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

3.6 Test data, Test instruments, and Test set up

Refer to APPENDIX.

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

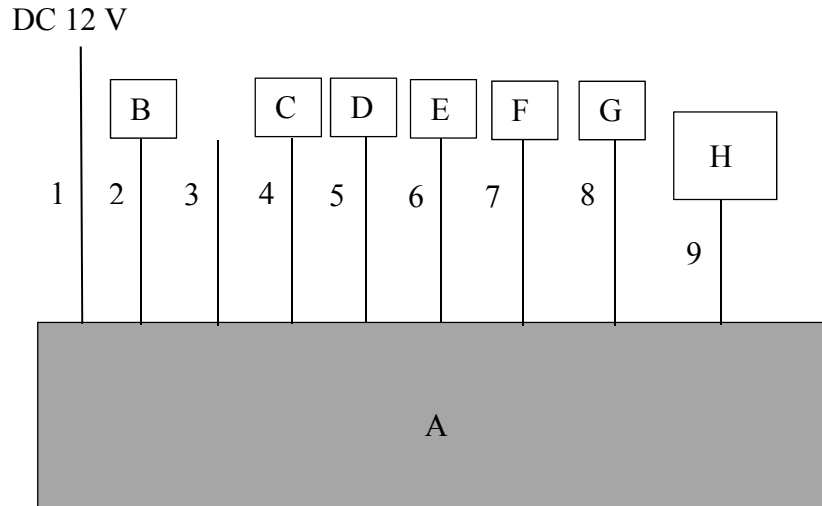
4.1 Operating Mode(s)

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

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 and Off) DH5, 3DH5	2402 MHz 2441 MHz 2480 MHz
20dB Bandwidth	Tx (Hopping On and 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
<p>*As a result of preliminary test, the formal test was performed with the above modes, which had the maximum payload length (except Dwell time test) *2DH mode (2Mb/s EDR: pi/4DQPSK) was excluded for other tests than power measurement by using 3DH mode (3 Mb/s EDR: 8DPSK) as a representative. * It is considered that the non-tested packet type (e.g. inquiry) can be omitted as it is complied with above all the test items based on Bluetooth Core specification. *EUT has the power settings by the software as follows; Power settings: BDR: OX07 EDR: OX07 Software: Ver.00.005 *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.</p>		

4.2 Configuration and peripherals



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

Description of EUT and support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	Car Navigation	FT0091A	No, 19 *1) No, 23 *2)	FUJITSU TEN LIMITED	EUT
B	Load resistance	-	-	-	-
C	USB	RUF2-JV4GSWH	121101	BUFFALO	-
D	USB	RUF2-JV4GSWH	121201	BUFFALO	-
E	MIC ASSY	W01B-5012-D210	0700700000853	TRANSTRON Inc.	-
F	Camera	39530-T5A-003	15	-	-
G	GPS	3985-TSA-E010-M1	25260094	yokowo	-
H	Jig board	-	-	-	-

*1) Used for Radiated Emission test

*2) Used for Antenna Terminal conducted test

List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	DC Cable	3.9	Unshielded	Unshielded	-
2	Signal Cable	0.7	Unshielded	Unshielded	-
3	Signal Cable	0.2	Unshielded	Unshielded	-
4	USB Cable	1.0	Shielded	Shielded	-
5	USB Cable	1.0	Shielded	Shielded	-
6	Signal Cable	0.5	Unshielded	Unshielded	-
7	Camera Cable	5.0	Shielded	Shielded	-
8	GPS Cable	0.5	Shielded	Shielded	-
9	FFC Cable	0.1	Unshielded	Unshielded	-

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SECTION 5: Radiated Spurious Emission

Test Procedure

[For below 1GHz]

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

[For above 1GHz]

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

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

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

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

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

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

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

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	4.4m*2) (1 GHz – 10 GHz), 1 m*3) (10 GHz – 26.5 GHz)		4.4 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: $20 \times \log(4.4 \text{ m}/3.0 \text{ m}) = 3.33 \text{ dB}$

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

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

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

Measurement range : 30 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: 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	1 MHz	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 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)

*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**

APPENDIX 1: Test data

20dB Bandwidth and Carrier Frequency Separation

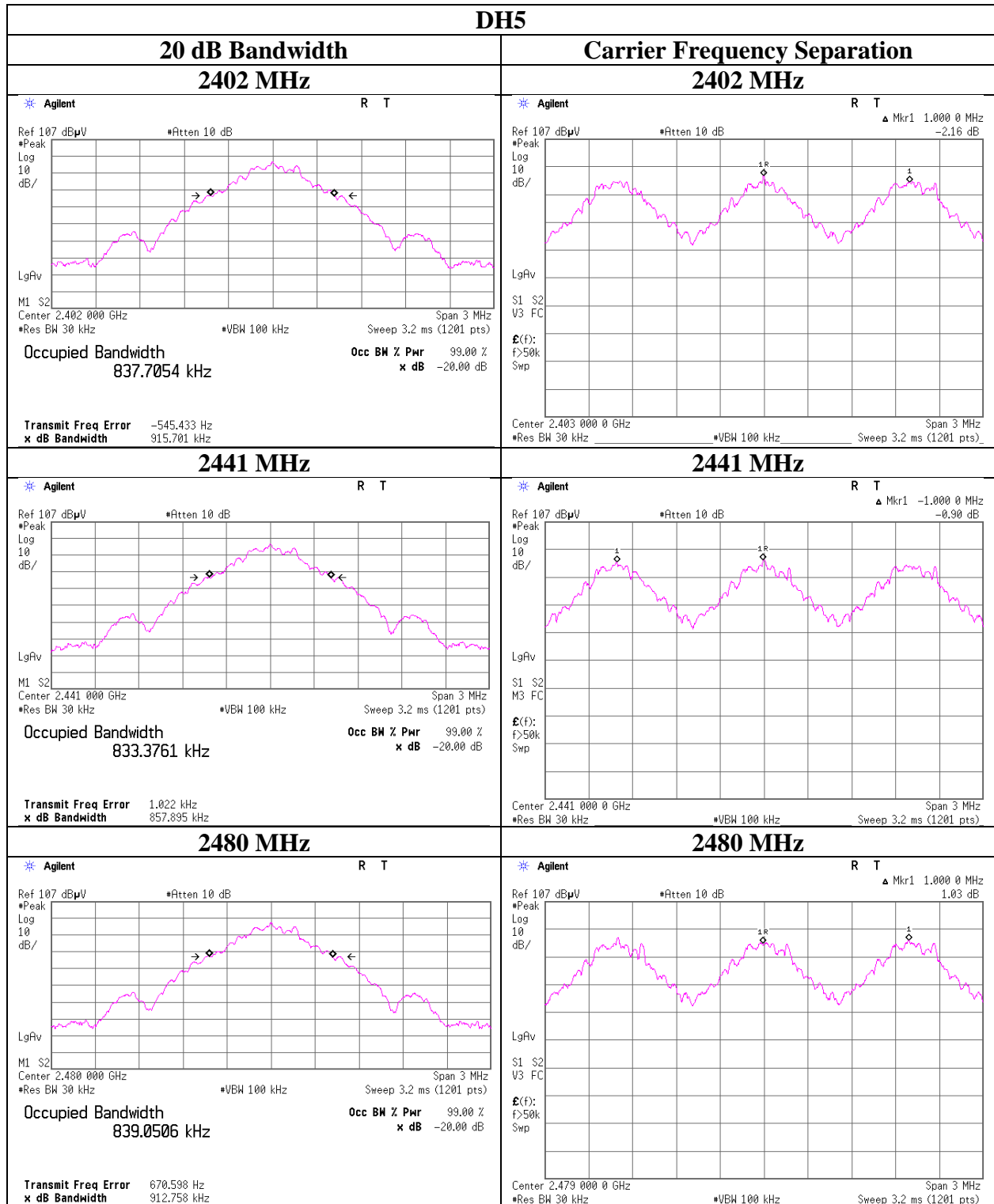
Test place Ise EMC Lab. No.7 Shielded Room
Report No. 11328915H
Date July 27, 2016
Temperature / Humidity 23 deg. C / 55 % RH
Engineer Tomohisa Nakagawa
Mode Tx, Hopping On and Off

Mode	Freq. [MHz]	20dB Bandwidth [MHz]	Carrier Frequency Separation [MHz]	Limit for Carrier Frequency separation [MHz]
DH5	2402.0	0.916	1.000	≥ 0.610
DH5	2441.0	0.858	1.000	≥ 0.572
DH5	2480.0	0.913	1.000	≥ 0.609
3DH5	2402.0	1.306	1.000	≥ 0.871
3DH5	2441.0	1.287	1.000	≥ 0.858
3DH5	2480.0	1.290	1.000	≥ 0.860

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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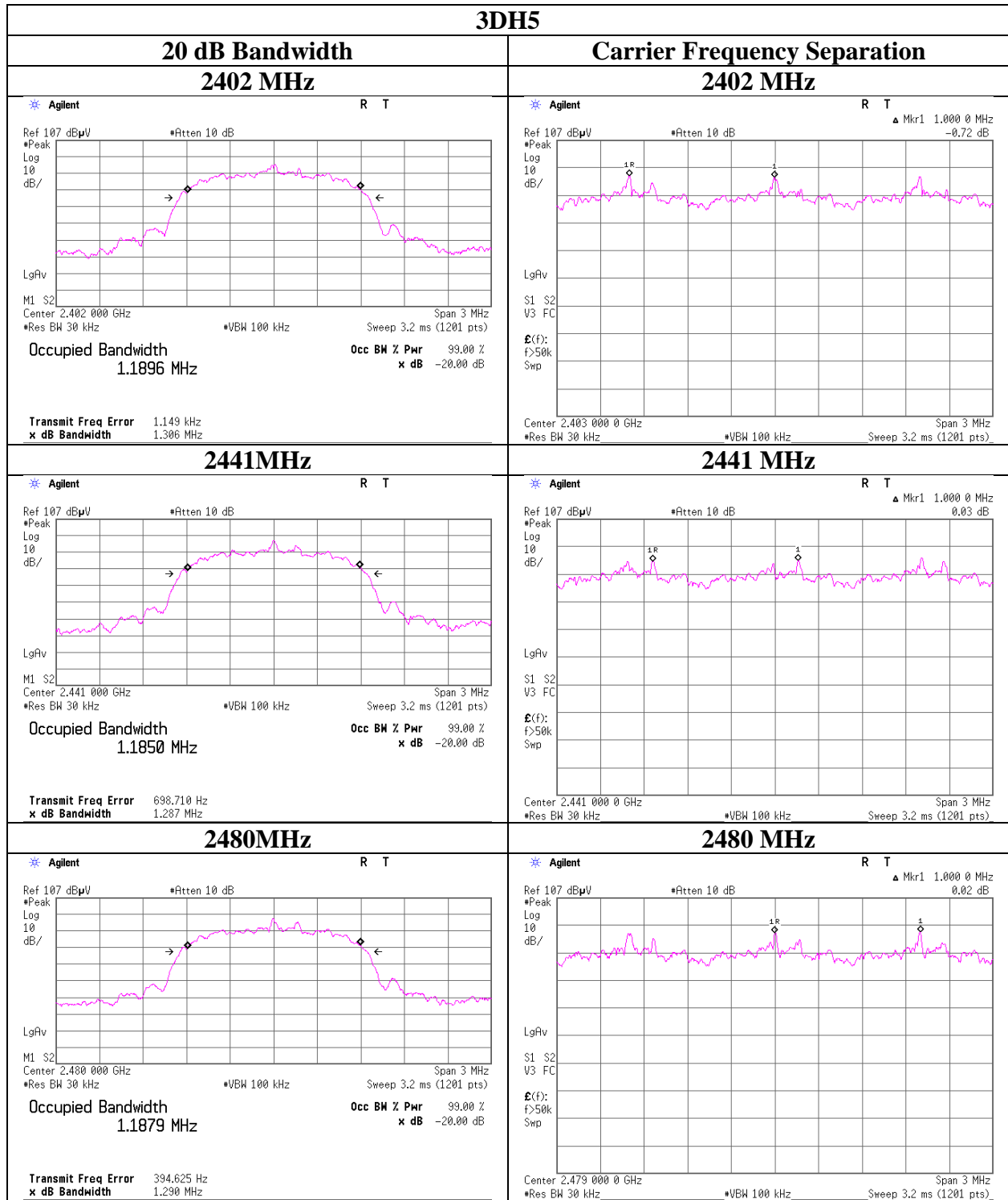
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20dB Bandwidth and Carrier Frequency Separation



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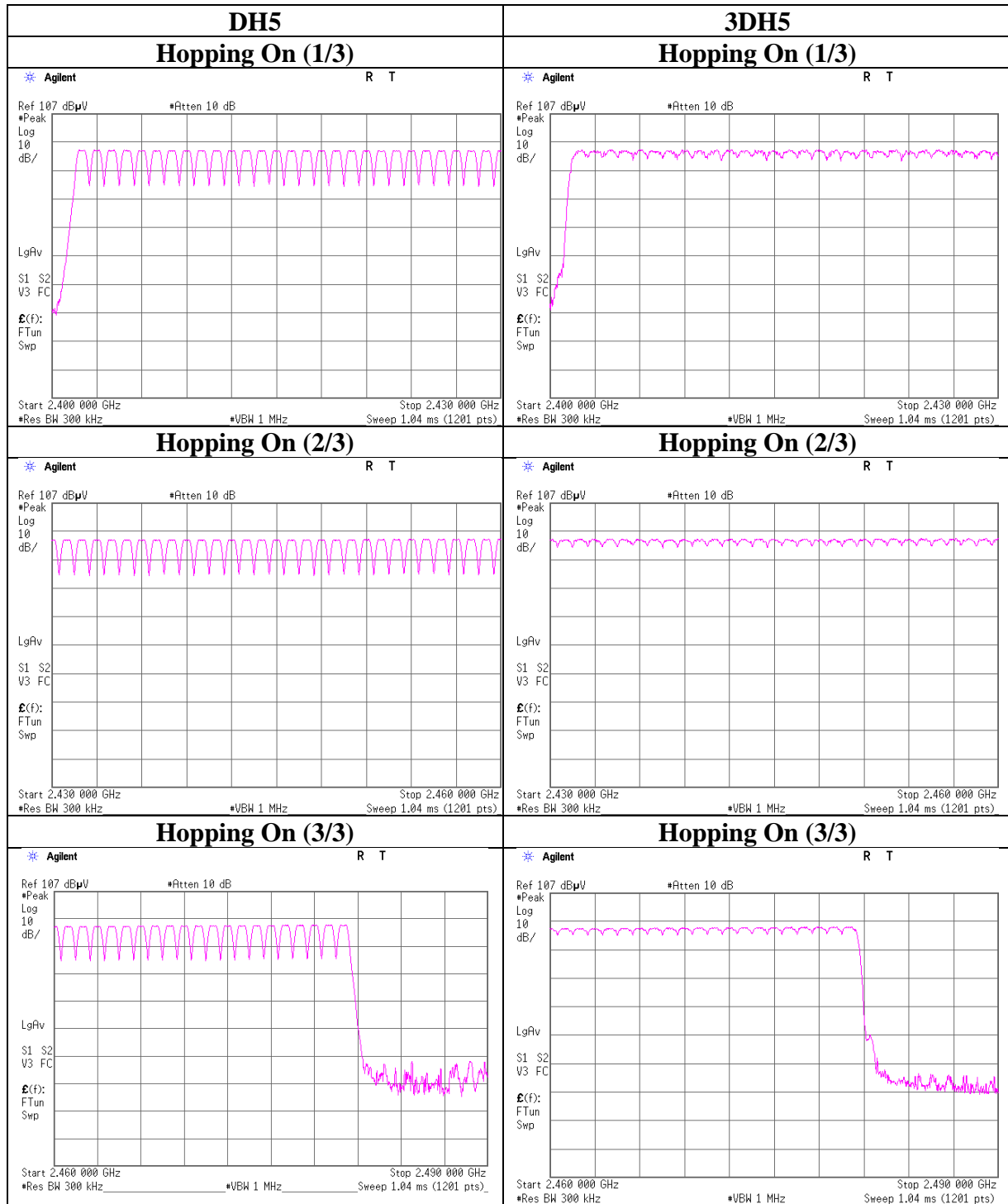
Number of Hopping Frequency

Test place Ise EMC Lab. No.7 Shielded Room
Report No. 11328915H
Date July 27, 2016
Temperature / Humidity 23 deg. C / 55 % RH
Engineer Tomohisa Nakagawa
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.7 Shielded Room
Report No.	11328915H
Date	July 27, 2016
Temperature / Humidity	23 deg. C / 55 % RH
Engineer	Tomohisa Nakagawa
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	30.8 times / 5 sec. x 31.6 sec. = 195 times	0.421	82	400
DH3	24.2 times / 5 sec. x 31.6 sec. = 153 times	1.678	257	400
DH5	14.2 times / 5 sec. x 31.6 sec. = 90 times	2.296	207	400
3DH1	51.0 times / 5 sec. x 31.6 sec. = 323 times	0.431	139	400
3DH3	25.6 times / 5 sec. x 31.6 sec. = 162 times	1.678	272	400
3DH5	17.4 times / 5 sec. x 31.6 sec. = 110 times	2.934	323	400

Sample Calculation

Result = Number of transmission x Length of transmission

*Average data of 5 tests.(except Inquiry)

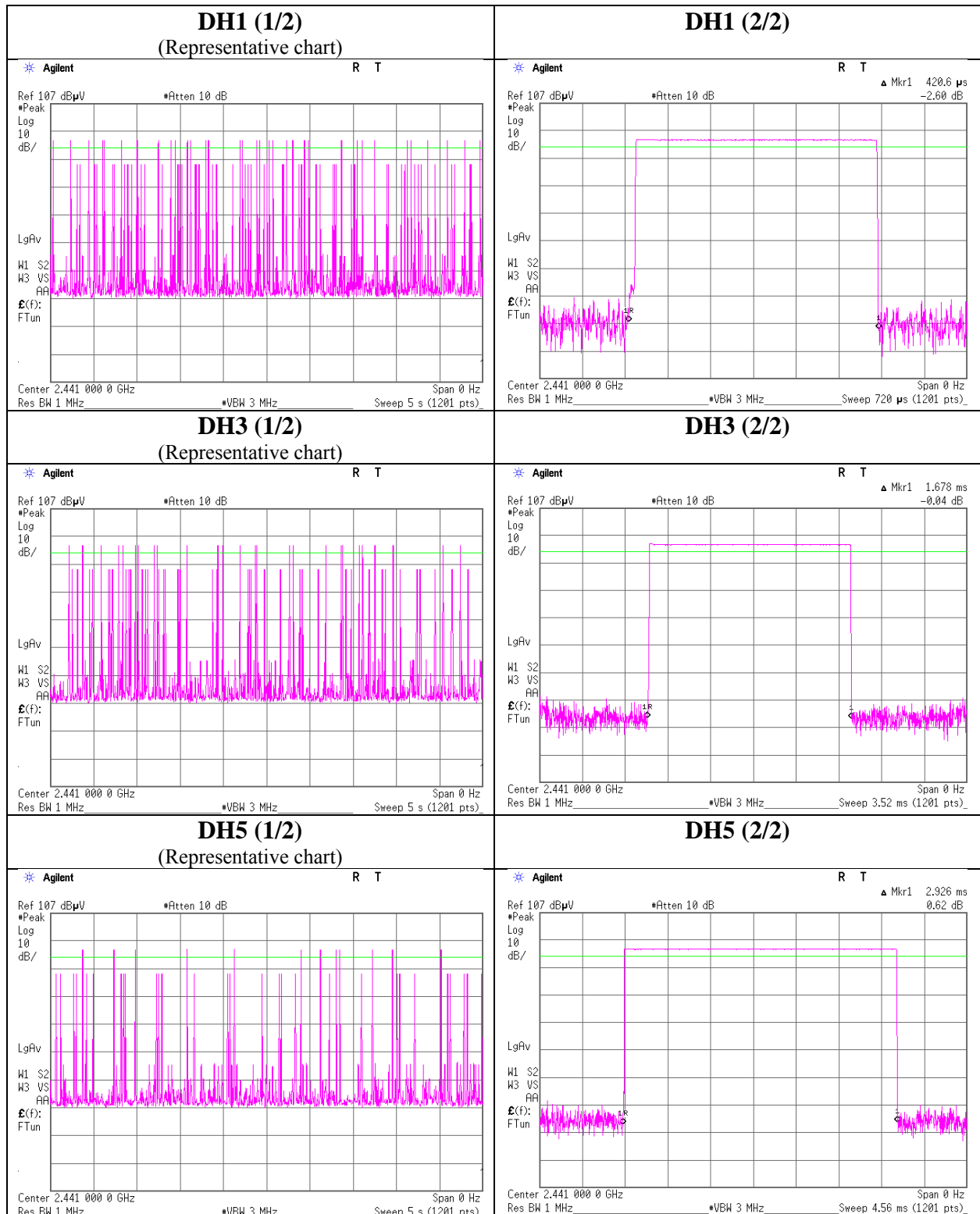
Mode	Sampling [times]					Average [times]
	1	2	3	4	5	
DH1	34	30	31	32	27	30.8
DH3	26	23	26	23	23	24.2
DH5	12	18	13	15	13	14.2
3DH1	51	50	50	52	52	51
3DH3	27	27	25	23	26	25.6
3DH5	21	11	21	13	21	17.4

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



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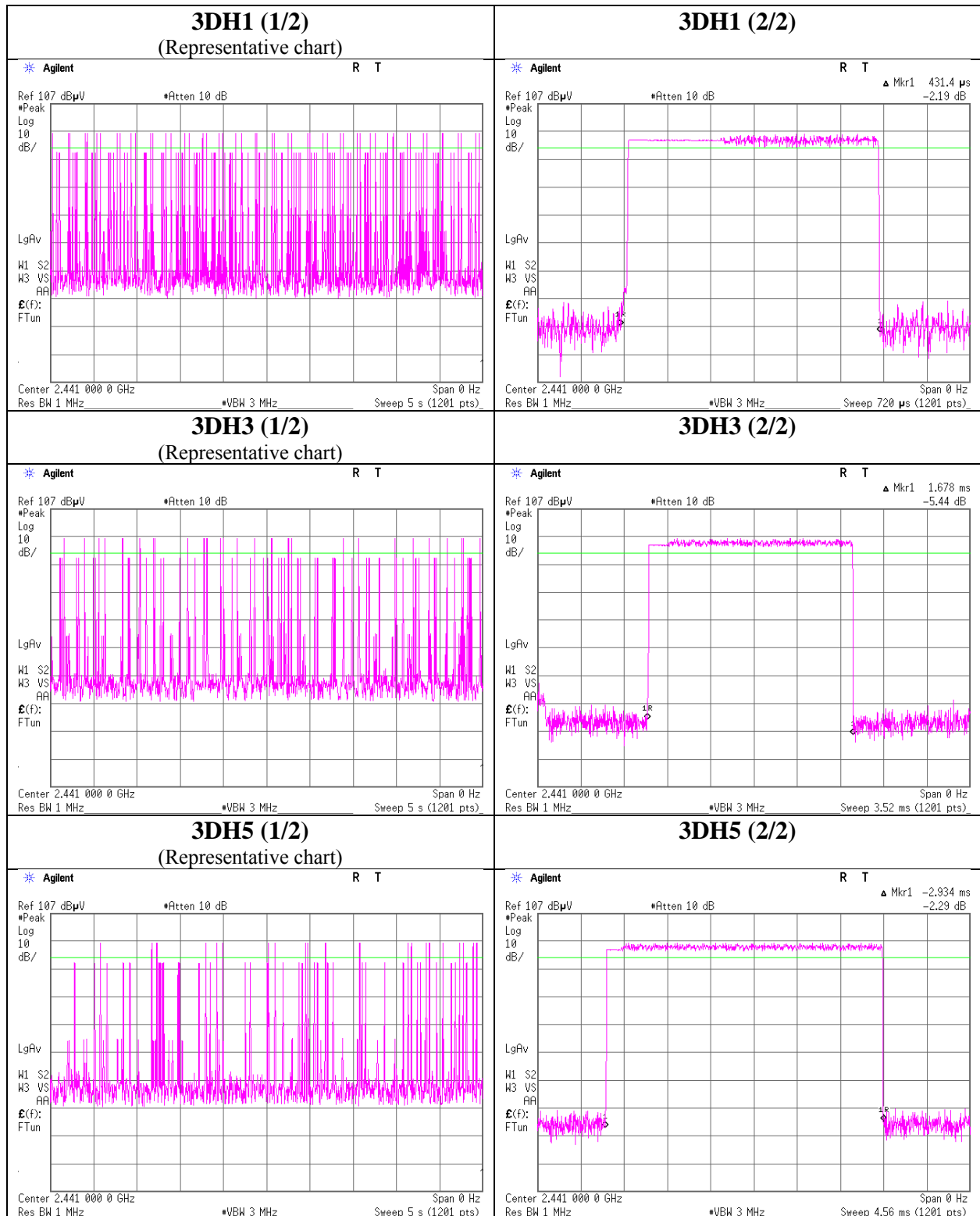
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Dwell time



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Maximum Peak Output Power

Test place : Ise EMC Lab. No.7 Shielded Room
Report No. : 11328915H
Date : July 27, 2016
Temperature / Humidity : 23 deg. C / 55 % RH
Engineer : Tomohisa Nakagawa
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	-12.45	1.40	9.70	-1.35	0.73	20.96	125	22.31
DH5	2441.0	-12.55	1.40	9.70	-1.45	0.72	20.96	125	22.41
DH5	2480.0	-11.85	1.41	9.70	-0.75	0.84	20.96	125	21.71
2DH5	2402.0	-10.01	1.40	9.70	1.09	1.28	20.96	125	19.87
2DH5	2441.0	-10.15	1.40	9.70	0.95	1.24	20.96	125	20.01
2DH5	2480.0	-9.51	1.41	9.70	1.59	1.44	20.96	125	19.37
3DH5	2402.0	-9.60	1.40	9.70	1.50	1.41	20.96	125	19.46
3DH5	2441.0	-9.71	1.40	9.70	1.39	1.38	20.96	125	19.57
3DH5	2480.0	-9.04	1.41	9.70	2.06	1.61	20.96	125	18.90

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.

Average Output Power
(Reference data for RF Exposure)

Test place : Ise EMC Lab. No.7 Shielded Room
Report No. : 11328915H
Date : July 27, 2016
Temperature / Humidity : 23 deg. C / 55 % RH
Engineer : Tomohisa Nakagawa
Mode : Tx, Hopping Off

Mode	Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Time average)		Duty factor [dB]	Result (Burst power average)	
					[dBm]	[mW]		[dBm]	[mW]
DH5	2402.0	-13.88	1.40	9.70	-2.78	0.53	1.10	-1.68	0.68
DH5	2441.0	-14.00	1.40	9.70	-2.90	0.51	1.10	-1.80	0.66
DH5	2480.0	-13.35	1.41	9.70	-2.25	0.60	1.10	-1.15	0.77
2DH5	2402.0	-13.84	1.40	9.70	-2.74	0.53	1.10	-1.64	0.69
2DH5	2441.0	-13.93	1.40	9.70	-2.83	0.52	1.10	-1.73	0.67
2DH5	2480.0	-13.24	1.41	9.70	-2.14	0.61	1.10	-1.04	0.79
3DH5	2402.0	-13.87	1.40	9.70	-2.77	0.53	1.09	-1.68	0.68
3DH5	2441.0	-13.95	1.40	9.70	-2.85	0.52	1.09	-1.76	0.67
3DH5	2480.0	-13.32	1.41	9.70	-2.22	0.60	1.09	-1.13	0.77

Sample Calculation:

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

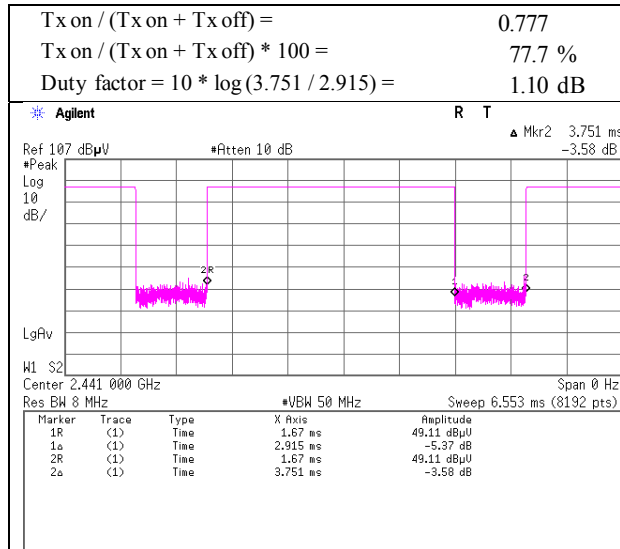
Result (Burst power average) = Time average + Duty factor

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

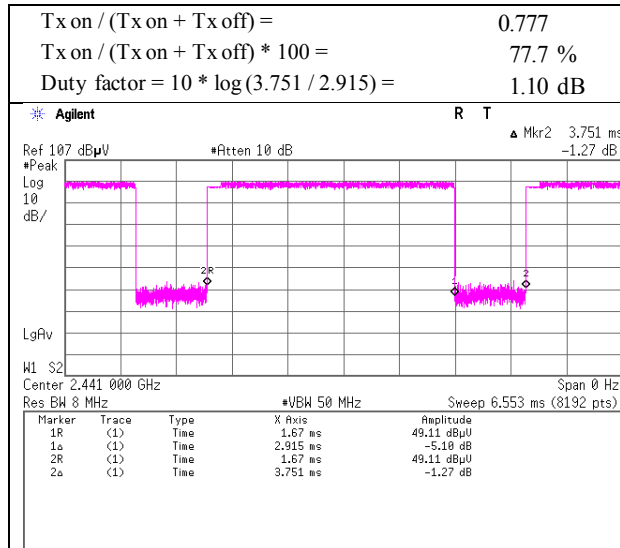
Burst Rate Confirmation

Test place	Ise EMC Lab. No.7 Shielded Room
Report No.	11328915H
Date	July 27, 2016
Temperature / Humidity	23 deg. C / 55 % RH
Engineer	Tomohisa Nakagawa
Mode	Tx, Hopping Off

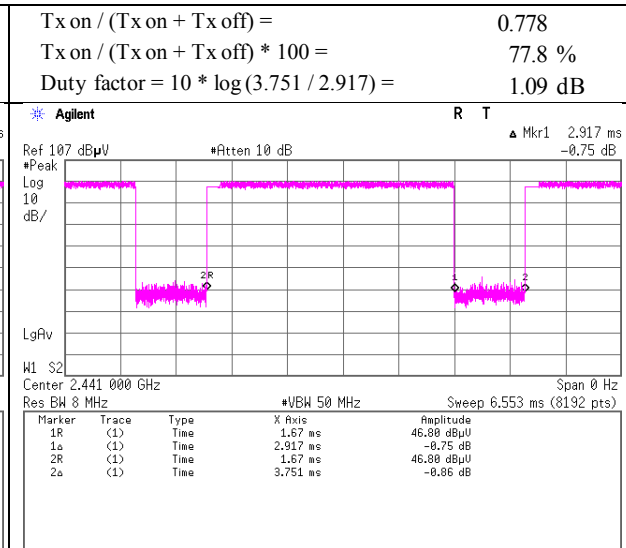
DH5



2DH5



3DH5



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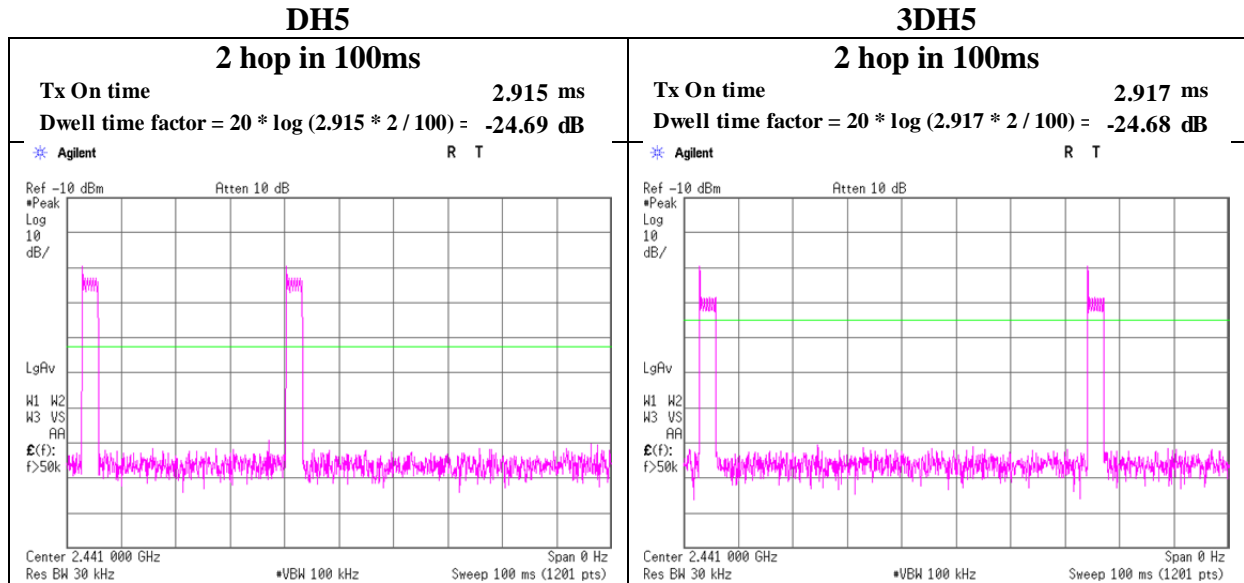
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Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

Dwell time factor

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber
Report No.	11328915H
Date	July 29, 2016
Temperature / Humidity	24 deg. C / 62 % RH
Engineer	Tomoki Matsui
Mode	Tx, Hopping On



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Telephone : +81 596 24 8999

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Radiated Spurious Emission

Test place : Ise EMC Lab. No.4 and No.2 Semi Anechoic Chamber
Report No. : 11328915H
Date : July 29, 2016 August 3, 2016 August 7, 2016
Temperature / Humidity : 24 deg. C / 62 % RH 20 deg. C / 59 % RH 20 deg. C / 61 % RH
Engineer : Tomoki Matsui Keisuke Kawamura Keisuke Kawamura
(1 GHz - 10 GHz) (Above 10GHz) (Below 1GHz)
Mode : Tx, Hopping Off, DH5 2402 MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	35.111	QP	23.5	15.6	6.8	28.5	-	17.4	40.0	22.6	
Hori	147.983	QP	38.7	14.7	7.8	28.0	-	33.2	43.5	10.3	
Hori	156.002	QP	31.9	15.2	7.8	27.9	-	27.0	43.5	16.5	
Hori	164.017	QP	33.9	15.5	7.9	27.9	-	29.4	43.5	14.1	
Hori	325.121	QP	33.6	14.1	9.0	27.6	-	29.1	46.0	16.9	
Hori	397.368	QP	33.0	15.5	9.4	28.2	-	29.7	46.0	16.3	
Hori	2390.000	PK	41.0	27.9	6.5	32.1	-	43.3	73.9	30.6	
Hori	4804.000	PK	40.0	32.8	8.8	31.3	-	50.3	73.9	23.6	Floor noise
Hori	7206.000	PK	46.3	36.8	9.9	32.6	-	60.4	73.9	13.5	
Hori	9608.000	PK	43.1	38.1	10.7	32.6	-	59.3	73.9	14.6	Floor noise
Hori	2390.000	AV	28.6	27.9	6.5	32.1	-	30.9	53.9	23.0	
Hori	4804.000	AV	27.3	32.8	8.8	31.3	-	37.6	53.9	16.3	Floor noise
Hori	9608.000	AV	30.4	38.1	10.7	32.6	-	46.6	53.9	7.3	Floor noise
Vert	577.995	QP	30.6	18.6	10.0	28.5	-	30.7	46.0	15.3	
Vert	650.246	QP	31.2	19.3	10.2	28.2	-	32.5	46.0	13.5	
Vert	722.491	QP	30.4	20.0	10.5	28.0	-	32.9	46.0	13.1	
Vert	794.748	QP	30.3	20.7	10.8	27.9	-	33.9	46.0	12.1	
Vert	866.997	QP	27.3	21.5	11.0	27.5	-	32.3	46.0	13.7	
Vert	939.247	QP	27.1	22.1	11.2	27.2	-	33.2	46.0	12.8	
Vert	2390.000	PK	40.8	27.9	6.5	32.1	-	43.1	73.9	30.8	
Vert	4804.000	PK	39.9	32.8	8.8	31.3	-	50.2	73.9	23.7	Floor noise
Vert	7206.000	PK	48.6	36.8	9.9	32.6	-	62.7	73.9	11.2	
Vert	9608.000	PK	43.1	38.1	10.7	32.6	-	59.3	73.9	14.6	Floor noise
Vert	2390.000	AV	28.5	27.9	6.5	32.1	-	30.8	53.9	23.1	
Vert	4804.000	AV	27.4	32.8	8.8	31.3	-	37.7	53.9	16.2	Floor noise
Vert	9608.000	AV	30.6	38.1	10.7	32.6	-	46.8	53.9	7.1	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(4.4 m / 3.0 m) = 3.33 dB
10 GHz - 26.5 GHz 20log(1.0 m / 3.0 m) = -9.5 dB

20dBc Data Sheet

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2402.000	PK	86.4	28.0	6.5	32.1	88.8	-	-	Carrier
Hori	2400.000	PK	34.5	28.0	6.5	32.1	36.9	68.8	31.9	
Vert	2402.000	PK	82.2	28.0	6.5	32.1	84.6	-	-	Carrier
Vert	2400.000	PK	34.3	28.0	6.5	32.1	36.7	64.6	27.9	

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

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	7206.000	AV	37.1	36.8	9.9	32.6	-24.6	26.6	53.9	27.3	*
Vert	7206.000	AV	40.3	36.8	9.9	32.6	-24.6	29.8	53.9	24.1	*

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

*Above noise was synchronized with carrier frequency.

Distance factor: 1 GHz - 10 GHz 20log(4.4 m / 3.0 m) = 3.33 dB
10 GHz - 26.5 GHz 20log(1.0 m / 3.0 m) = -9.5dB

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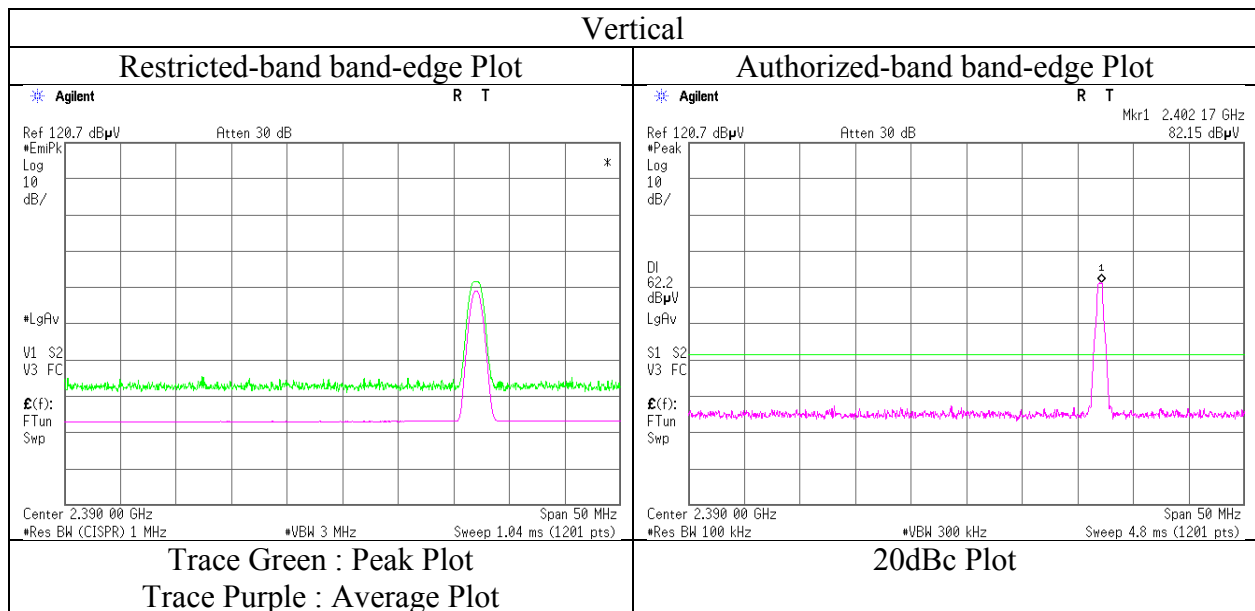
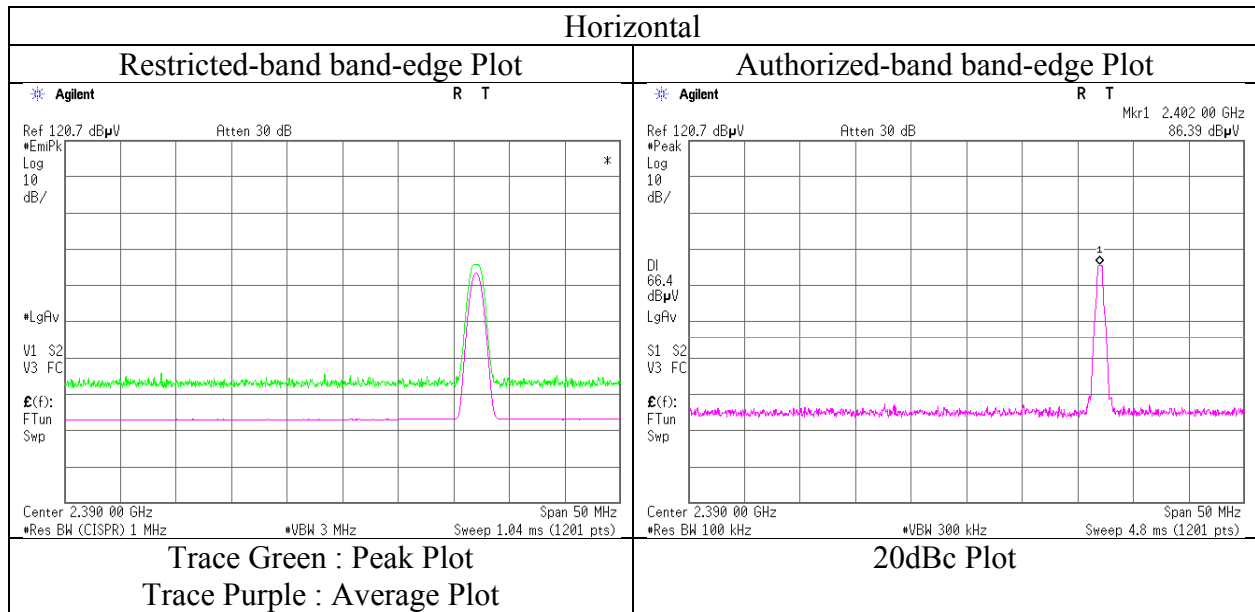
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Radiated Spurious Emission (Reference Plot for band-edge)

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber
Report No.	11328915H
Date	July 29, 2016
Temperature / Humidity	24 deg. C / 62 % RH
Engineer	Tomoki Matsui
Mode	Tx, Hopping Off, DH5 2402 MHz



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

Radiated Spurious Emission

Test place	Ise EMC Lab. No.4 and No.2 Semi Anechoic Chamber		
Report No.	11328915H		
Date	July 29, 2016	August 3, 2016	August 7, 2016
Temperature / Humidity	24 deg. C / 62 % RH	20 deg. C / 59 % RH	20 deg. C / 61 % RH
Engineer	Tomoki Matsui	Keisuke Kawamura	Keisuke Kawamura
	(1 GHz - 10 GHz)	(Above 10GHz)	(Below 1GHz)
Mode	Tx, Hopping Off, DH5 2441 MHz		

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	35.111	QP	23.5	15.6	6.8	28.5	-	17.4	40.0	22.6	
Hori	147.983	QP	38.1	14.7	7.8	28.0	-	32.6	43.5	10.9	
Hori	156.002	QP	36.3	15.2	7.8	27.9	-	31.4	43.5	12.1	
Hori	164.017	QP	33.5	15.5	7.9	27.9	-	29.0	43.5	14.5	
Hori	325.121	QP	32.9	14.1	9.0	27.6	-	28.4	46.0	17.6	
Hori	397.368	QP	32.8	15.5	9.4	28.2	-	29.5	46.0	16.5	
Hori	4882.000	PK	39.7	33.1	8.8	31.3	-	50.3	73.9	23.6	Floor noise
Hori	7323.000	PK	46.4	36.8	9.9	32.6	-	60.5	73.9	13.4	
Hori	9764.000	PK	42.5	38.2	10.8	32.7	-	58.8	73.9	15.1	Floor noise
Hori	4882.000	AV	27.7	33.1	8.8	31.3	-	38.3	53.9	15.6	Floor noise
Hori	9764.000	AV	30.2	38.2	10.8	32.7	-	46.5	53.9	7.4	Floor noise
Vert	577.995	QP	29.9	18.6	10.0	28.5	-	30.0	46.0	16.0	
Vert	650.246	QP	30.9	19.3	10.2	28.2	-	32.2	46.0	13.8	
Vert	722.491	QP	30.6	20.0	10.5	28.0	-	33.1	46.0	12.9	
Vert	794.748	QP	30.4	20.7	10.8	27.9	-	34.0	46.0	12.0	
Vert	866.997	QP	27.2	21.5	11.0	27.5	-	32.2	46.0	13.8	
Vert	939.247	QP	27.1	22.1	11.2	27.2	-	33.2	46.0	12.8	
Vert	4882.000	PK	39.7	33.1	8.8	31.3	-	50.3	73.9	23.6	Floor noise
Vert	7323.000	PK	48.2	36.8	9.9	32.6	-	62.3	73.9	11.6	
Vert	9764.000	PK	42.7	38.2	10.8	32.7	-	59.0	73.9	14.9	Floor noise
Vert	4882.000	AV	27.8	33.1	8.8	31.3	-	38.4	53.9	15.5	Floor noise
Vert	9764.000	AV	30.2	38.2	10.8	32.7	-	46.5	53.9	7.4	Floor noise

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

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

Distance factor: 1 GHz - 10 GHz $20\log(4.4 \text{ m} / 3.0 \text{ m}) = 3.33 \text{ dB}$
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	7323.000	AV	38.3	36.8	9.9	32.6	-24.6	27.8	53.9	26.1	*
Vert	7323.000	AV	41.1	36.8	9.9	32.6	-24.6	30.6	53.9	23.3	*

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 $20\log(4.4 \text{ m} / 3.0 \text{ m}) = 3.33 \text{ dB}$
10 GHz - 26.5 GHz $20\log(1.0 \text{ m} / 3.0 \text{ m}) = -9.5 \text{ dB}$

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Radiated Spurious Emission

Test place : Ise EMC Lab. No.4 and No.2 Semi Anechoic Chamber
Report No. : 11328915H
Date : July 29, 2016 August 3, 2016 August 7, 2016
Temperature / Humidity : 24 deg. C / 62 % RH 20 deg. C / 59 % RH 20 deg. C / 61 % RH
Engineer : Tomoki Matsui Keisuke Kawamura Keisuke Kawamura
 (1 GHz - 10 GHz) (Above 10GHz) (Below 1GHz)
Mode : Tx, Hopping Off, DH5 2480 MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	35.111	QP	23.5	15.6	6.8	28.5	-	17.4	40.0	22.6	
Hori	147.983	QP	38.5	14.7	7.8	28.0	-	33.0	43.5	10.5	
Hori	156.002	QP	37.5	15.2	7.8	27.9	-	32.6	43.5	10.9	
Hori	164.017	QP	33.8	15.5	7.9	27.9	-	29.3	43.5	14.2	
Hori	288.997	QP	25.4	13.3	8.7	27.4	-	20.0	46.0	26.0	
Hori	325.121	QP	33.7	14.1	9.0	27.6	-	29.2	46.0	16.8	
Hori	2483.500	PK	43.5	28.1	6.6	32.1	-	46.1	73.9	27.8	
Hori	4960.000	PK	40.7	33.4	8.9	31.2	-	51.8	73.9	22.1	Floor noise
Hori	7440.000	PK	47.2	36.8	9.9	32.7	-	61.2	73.9	12.7	
Hori	9920.000	PK	42.3	38.3	10.9	32.8	-	58.7	73.9	15.2	Floor noise
Hori	2483.500	AV	29.7	28.1	6.6	32.1	-	32.3	53.9	21.6	
Hori	4960.000	AV	27.6	33.4	8.9	31.2	-	38.7	53.9	15.2	Floor noise
Hori	9920.000	AV	30.1	38.3	10.9	32.8	-	46.5	53.9	7.4	Floor noise
Vert	577.995	QP	31.0	18.6	10.0	28.5	-	31.1	46.0	14.9	
Vert	650.246	QP	31.2	19.3	10.2	28.2	-	32.5	46.0	13.5	
Vert	722.491	QP	30.1	20.0	10.5	28.0	-	32.6	46.0	13.4	
Vert	794.748	QP	28.5	20.7	10.8	27.9	-	32.1	46.0	13.9	
Vert	866.997	QP	27.6	21.5	11.0	27.5	-	32.6	46.0	13.4	
Vert	939.247	QP	27.3	22.1	11.2	27.2	-	33.4	46.0	12.6	
Vert	2483.500	PK	41.9	28.1	6.6	32.1	-	44.5	73.9	29.4	
Vert	4960.000	PK	40.9	33.4	8.9	31.2	-	52.0	73.9	21.9	Floor noise
Vert	7440.000	PK	48.3	36.8	9.9	32.7	-	62.3	73.9	11.6	
Vert	9920.000	PK	42.3	38.3	10.9	32.8	-	58.7	73.9	15.2	Floor noise
Vert	2483.500	AV	29.1	28.1	6.6	32.1	-	31.7	53.9	22.2	
Vert	4960.000	AV	27.6	33.4	8.9	31.2	-	38.7	53.9	15.2	Floor noise
Vert	9920.000	AV	30.0	38.3	10.9	32.8	-	46.4	53.9	7.5	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 (4.4 m / 3.0 m) = 3.33 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	7440.000	AV	39.9	36.8	9.9	32.7	-24.6	29.3	53.9	24.6	*
Vert	7440.000	AV	40.7	36.8	9.9	32.7	-24.6	30.1	53.9	23.8	*

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

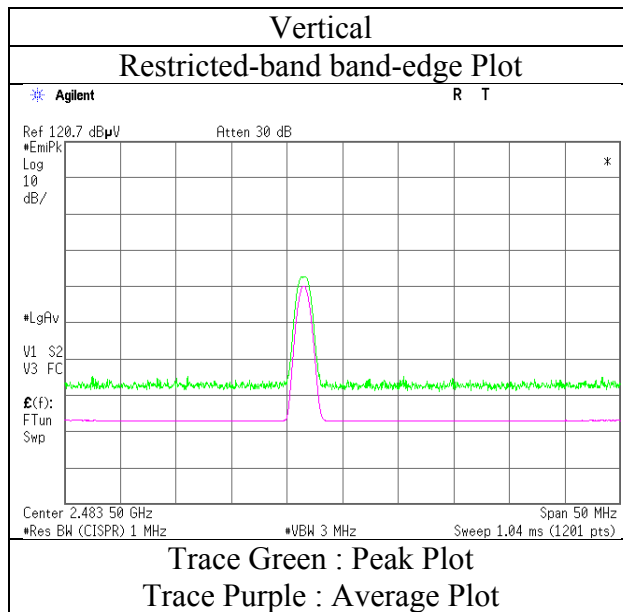
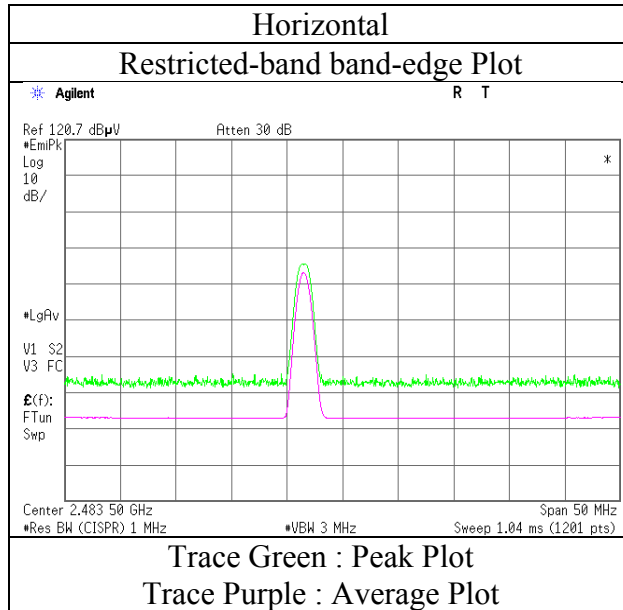
- Gain(Amplifier) + Dwell time factor (Refer to dwell time data sheet)

*Above noise was synchronized with carrier frequency.

Distance factor: 1 GHz - 10 GHz 20log (4.4 m / 3.0 m) = 3.33 dB
 10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5dB

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber
Report No.	11328915H
Date	July 29, 2016
Temperature / Humidity	24 deg. C / 62 % RH
Engineer	Tomoki Matsui
Mode	Tx, Hopping Off, DH5 2480 MHz



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

Radiated Spurious Emission

Test place Ise EMC Lab. No.4 and No.2 Semi Anechoic Chamber
 Report No. 11328915H
 Date July 29, 2016 August 3, 2016 August 7, 2016
 Temperature / Humidity 24 deg. C / 62 % RH 20 deg. C / 59 % RH 20 deg. C / 61 % RH
 Engineer Tomoki Matsui Keisuke Kawamura Keisuke Kawamura
 (1 GHz - 10 GHz) (Above 10GHz) (Below 1GHz)
 Mode Tx, Hopping Off, 3DH5 2402 MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	35.111	QP	23.5	15.6	6.8	28.5	-	17.4	40.0	22.6	
Hori	147.983	QP	38.5	14.7	7.8	28.0	-	33.0	43.5	10.5	
Hori	156.002	QP	37.5	15.2	7.8	27.9	-	32.6	43.5	10.9	
Hori	164.017	QP	33.8	15.5	7.9	27.9	-	29.3	43.5	14.2	
Hori	288.997	QP	25.4	13.3	8.7	27.4	-	20.0	46.0	26.0	
Hori	325.121	QP	33.7	14.1	9.0	27.6	-	29.2	46.0	16.8	
Hori	2390.000	PK	40.9	27.9	6.5	32.1	-	43.2	73.9	30.7	
Hori	4804.000	PK	40.0	32.8	8.8	31.3	-	50.3	73.9	23.6	Floor noise
Hori	7206.000	PK	46.5	36.8	9.9	32.6	-	60.6	73.9	13.3	
Hori	9608.000	PK	43.1	38.1	10.7	32.6	-	59.3	73.9	14.6	Floor noise
Hori	2390.000	AV	29.0	27.9	6.5	32.1	-	31.3	53.9	22.6	
Hori	4804.000	AV	27.3	32.8	8.8	31.3	-	37.6	53.9	16.3	Floor noise
Hori	9608.000	AV	30.4	38.1	10.7	32.6	-	46.6	53.9	7.3	Floor noise
Vert	577.995	QP	31.0	18.6	10.0	28.5	-	31.1	46.0	14.9	
Vert	650.246	QP	31.2	19.3	10.2	28.2	-	32.5	46.0	13.5	
Vert	722.491	QP	30.1	20.0	10.5	28.0	-	32.6	46.0	13.4	
Vert	794.748	QP	28.5	20.7	10.8	27.9	-	32.1	46.0	13.9	
Vert	866.997	QP	27.6	21.5	11.0	27.5	-	32.6	46.0	13.4	
Vert	939.247	QP	27.3	22.1	11.2	27.2	-	33.4	46.0	12.6	
Vert	2390.000	PK	40.8	27.9	6.5	32.1	-	43.1	73.9	30.8	
Vert	4804.000	PK	39.9	32.8	8.8	31.3	-	50.2	73.9	23.7	Floor noise
Vert	7206.000	PK	49.0	36.8	9.9	32.6	-	63.1	73.9	10.8	
Vert	9608.000	PK	43.1	38.1	10.7	32.6	-	59.3	73.9	14.6	Floor noise
Vert	2390.000	AV	28.6	27.9	6.5	32.1	-	30.9	53.9	23.0	
Vert	4804.000	AV	27.4	32.8	8.8	31.3	-	37.7	53.9	16.2	Floor noise
Vert	9608.000	AV	30.6	38.1	10.7	32.6	-	46.8	53.9	7.1	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 (4.4 m / 3.0 m) = 3.33 dB
 10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB

20dBc Data Sheet

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2402.000	PK	87.1	28.0	6.5	32.1	89.5	-	-	Carrier
Hori	2400.000	PK	35.2	28.0	6.5	32.1	37.6	69.5	31.9	
Vert	2402.000	PK	82.3	28.0	6.5	32.1	84.7	-	-	Carrier
Vert	2400.000	PK	34.0	28.0	6.5	32.1	36.4	64.7	28.3	

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

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	7206.000	AV	36.5	36.8	9.9	32.6	-24.6	26.0	53.9	27.9	*
Vert	7206.000	AV	39.9	36.8	9.9	32.6	-24.6	29.4	53.9	24.5	*

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 (4.4 m / 3.0 m) = 3.33 dB
 10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5dB

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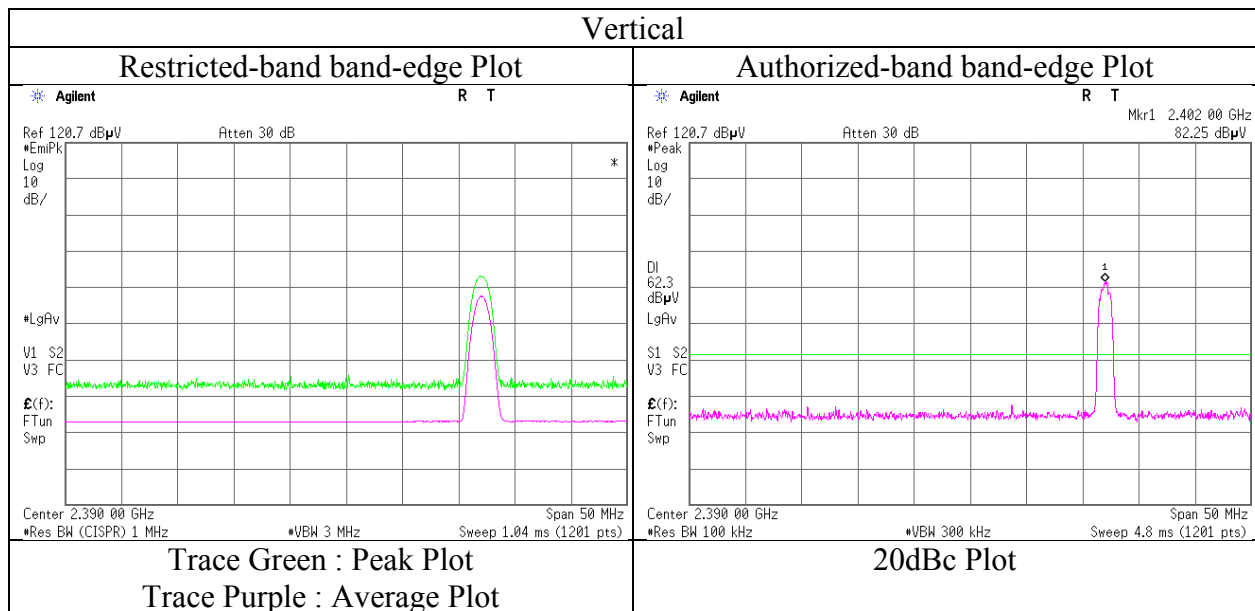
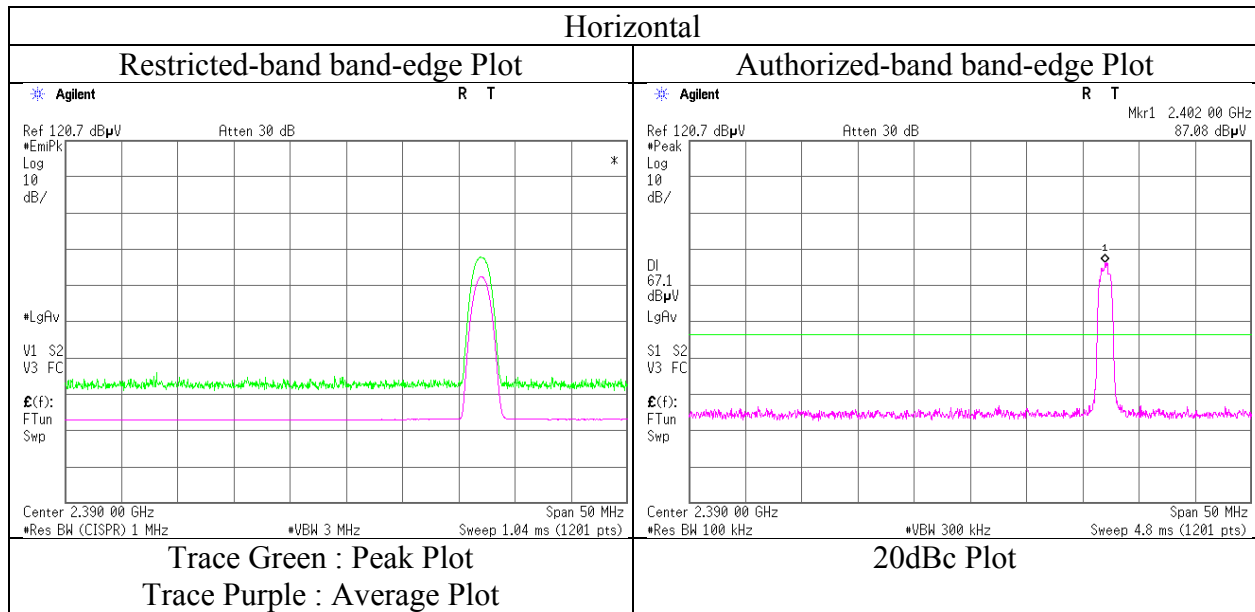
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Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

Radiated Spurious Emission (Reference Plot for band-edge)

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber
Report No.	11328915H
Date	July 29, 2016
Temperature / Humidity	24 deg. C / 62 % RH
Engineer	Tomoki Matsui
Mode	Tx, Hopping Off, 3DH5 2402 MHz



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

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Radiated Spurious Emission

Test place : Ise EMC Lab. No.4 and No.2 Semi Anechoic Chamber
 Report No. : 11328915H
 Date : July 29, 2016 August 3, 2016 August 7, 2016
 Temperature / Humidity : 24 deg. C / 62 % RH 20 deg. C / 59 % RH 20 deg. C / 61 % RH
 Engineer : Tomoki Matsui Keisuke Kawamura Keisuke Kawamura
 (1 GHz - 10 GHz) (Above 10GHz) (Below 1GHz)
 Mode : Tx, Hopping Off, 3DH5 2441 MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	35.111	QP	23.5	15.6	6.8	28.5	-	17.4	40.0	22.6	
Hori	147.983	QP	36.1	14.7	7.8	28.0	-	30.6	43.5	12.9	
Hori	156.002	QP	36.8	15.2	7.8	27.9	-	31.9	43.5	11.6	
Hori	164.017	QP	33.6	15.5	7.9	27.9	-	29.1	43.5	14.4	
Hori	325.121	QP	32.9	14.1	9.0	27.6	-	28.4	46.0	17.6	
Hori	397.368	QP	32.3	15.5	9.4	28.2	-	29.0	46.0	17.0	
Hori	4882.000	PK	39.7	33.1	8.8	31.3	-	50.3	73.9	23.6	Floor noise
Hori	7323.000	PK	46.7	36.8	9.9	32.6	-	60.8	73.9	13.1	
Hori	9764.000	PK	42.5	38.2	10.8	32.7	-	58.8	73.9	15.1	Floor noise
Hori	4882.000	AV	27.7	33.1	8.8	31.3	-	38.3	53.9	15.6	Floor noise
Hori	9764.000	AV	30.2	38.2	10.8	32.7	-	46.5	53.9	7.4	Floor noise
Vert	577.995	QP	30.7	18.6	10.0	28.5	-	30.8	46.0	15.2	
Vert	650.246	QP	31.0	19.3	10.2	28.2	-	32.3	46.0	13.7	
Vert	722.491	QP	30.5	20.0	10.5	28.0	-	33.0	46.0	13.0	
Vert	794.748	QP	30.2	20.7	10.8	27.9	-	33.8	46.0	12.2	
Vert	866.997	QP	27.1	21.5	11.0	27.5	-	32.1	46.0	13.9	
Vert	939.247	QP	27.1	22.1	11.2	27.2	-	33.2	46.0	12.8	
Vert	4882.000	PK	39.7	33.1	8.8	31.3	-	50.3	73.9	23.6	Floor noise
Vert	7323.000	PK	48.9	36.8	9.9	32.6	-	63.0	73.9	10.9	
Vert	9764.000	PK	42.7	38.2	10.8	32.7	-	59.0	73.9	14.9	Floor noise
Vert	4882.000	AV	27.8	33.1	8.8	31.3	-	38.4	53.9	15.5	Floor noise
Vert	9764.000	AV	30.2	38.2	10.8	32.7	-	46.5	53.9	7.4	Floor noise

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

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

Distance factor: 1 GHz - 10 GHz $20\log(4.4\text{ m} / 3.0\text{ m}) = 3.33\text{ dB}$
 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	7323.000	AV	37.2	36.8	9.9	32.6	-24.6	26.7	53.9	27.2	*
Vert	7323.000	AV	39.9	36.8	9.9	32.6	-24.6	29.4	53.9	24.5	*

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 $20\log(4.4\text{ m} / 3.0\text{ m}) = 3.33\text{ dB}$
 10 GHz - 26.5 GHz $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

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Ise EMC Lab.

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Facsimile : +81 596 24 8124

Radiated Spurious Emission

Test place : Ise EMC Lab. No.4 and No.2 Semi Anechoic Chamber
Report No. : 11328915H
Date : July 29, 2016 August 3, 2016 August 7, 2016
Temperature / Humidity : 24 deg. C / 62 % RH 20 deg. C / 59 % RH 20 deg. C / 61 % RH
Engineer : Tomoki Matsui Keisuke Kawamura Keisuke Kawamura
 (1 GHz - 10 GHz) (Above 10GHz) (Below 1GHz)
Mode : Tx, Hopping Off, 3DH5 2480 MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	35.111	QP	23.5	15.6	6.8	28.5	-	17.4	40.0	22.6	
Hori	147.983	QP	38.7	14.7	7.8	28.0	-	33.2	43.5	10.3	
Hori	156.002	QP	31.9	15.2	7.8	27.9	-	27.0	43.5	16.5	
Hori	164.017	QP	33.9	15.5	7.9	27.9	-	29.4	43.5	14.1	
Hori	325.121	QP	33.6	14.1	9.0	27.6	-	29.1	46.0	16.9	
Hori	397.368	QP	33.0	15.5	9.4	28.2	-	29.7	46.0	16.3	
Hori	2483.500	PK	43.0	28.1	6.6	32.1	-	45.6	73.9	28.3	
Hori	4960.000	PK	40.7	33.4	8.9	31.2	-	51.8	73.9	22.1	Floor noise
Hori	7440.000	PK	47.0	36.8	9.9	32.7	-	61.0	73.9	12.9	
Hori	9920.000	PK	42.3	38.3	10.9	32.8	-	58.7	73.9	15.2	Floor noise
Hori	2483.500	AV	30.1	28.1	6.6	32.1	-	32.7	53.9	21.2	
Hori	4960.000	AV	27.6	33.4	8.9	31.2	-	38.7	53.9	15.2	Floor noise
Hori	9920.000	AV	30.1	38.3	10.9	32.8	-	46.5	53.9	7.4	Floor noise
Vert	577.995	QP	30.6	18.6	10.0	28.5	-	30.7	46.0	15.3	
Vert	650.246	QP	31.2	19.3	10.2	28.2	-	32.5	46.0	13.5	
Vert	722.491	QP	30.4	20.0	10.5	28.0	-	32.9	46.0	13.1	
Vert	794.748	QP	30.3	20.7	10.8	27.9	-	33.9	46.0	12.1	
Vert	866.997	QP	27.3	21.5	11.0	27.5	-	32.3	46.0	13.7	
Vert	939.247	QP	27.1	22.1	11.2	27.2	-	33.2	46.0	12.8	
Vert	2483.500	PK	43.2	28.1	6.6	32.1	-	45.8	73.9	28.1	
Vert	4960.000	PK	40.9	33.4	8.9	31.2	-	52.0	73.9	21.9	Floor noise
Vert	7440.000	PK	47.9	36.8	9.9	32.7	-	61.9	73.9	12.0	
Vert	9920.000	PK	42.3	38.3	10.9	32.8	-	58.7	73.9	15.2	Floor noise
Vert	2483.500	AV	30.3	28.1	6.6	32.1	-	32.9	53.9	21.0	
Vert	4960.000	AV	27.6	33.4	8.9	31.2	-	38.7	53.9	15.2	Floor noise
Vert	9920.000	AV	30.0	38.3	10.9	32.8	-	46.4	53.9	7.5	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 (4.4 m / 3.0 m) = 3.33 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	7440.000	AV	37.8	36.8	9.9	32.7	-24.6	27.2	53.9	26.7	*
Vert	7440.000	AV	38.5	36.8	9.9	32.7	-24.6	27.9	53.9	26.0	*

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

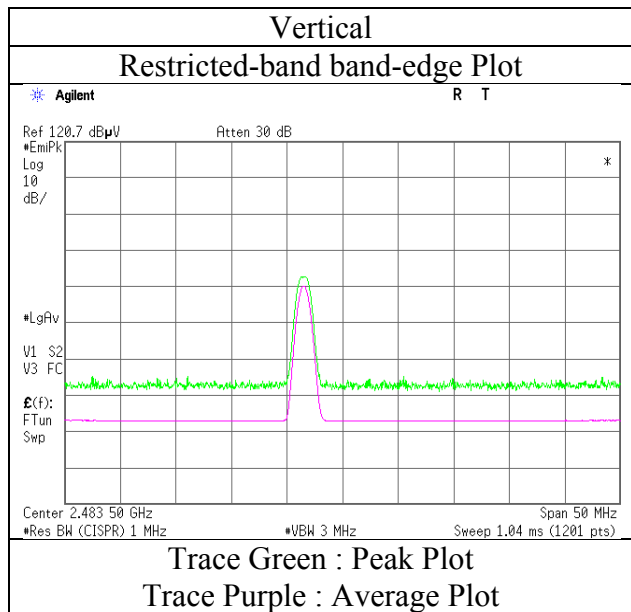
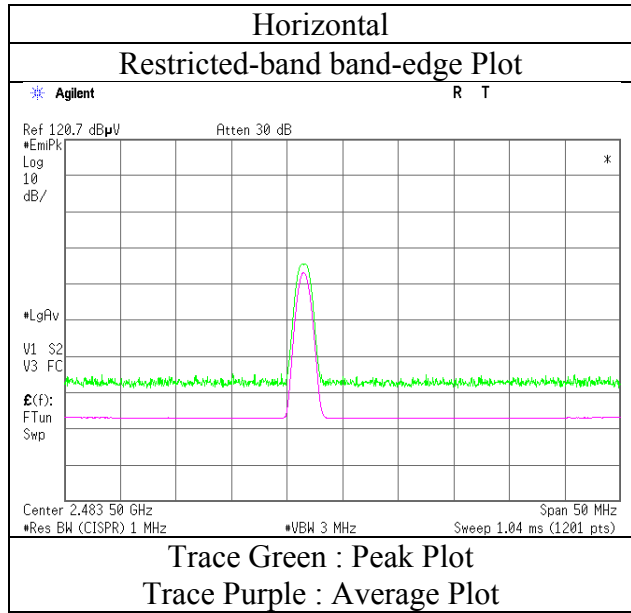
- Gain(Amplifier) + Dwell time factor (Refer to dwell time data sheet)

*Above noise was synchronized with carrier frequency.

Distance factor: 1 GHz - 10 GHz 20log (4.4 m / 3.0 m) = 3.33 dB
 10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5dB

Radiated Spurious Emission
(Reference Plot for band-edge)

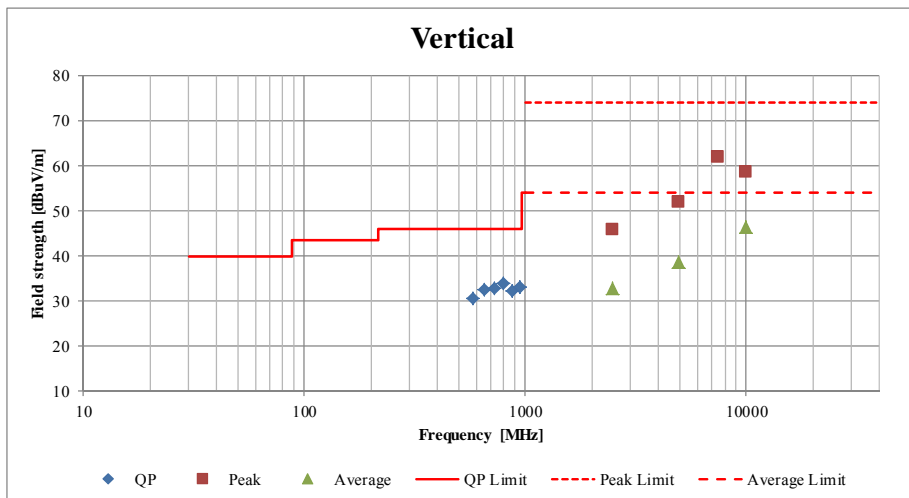
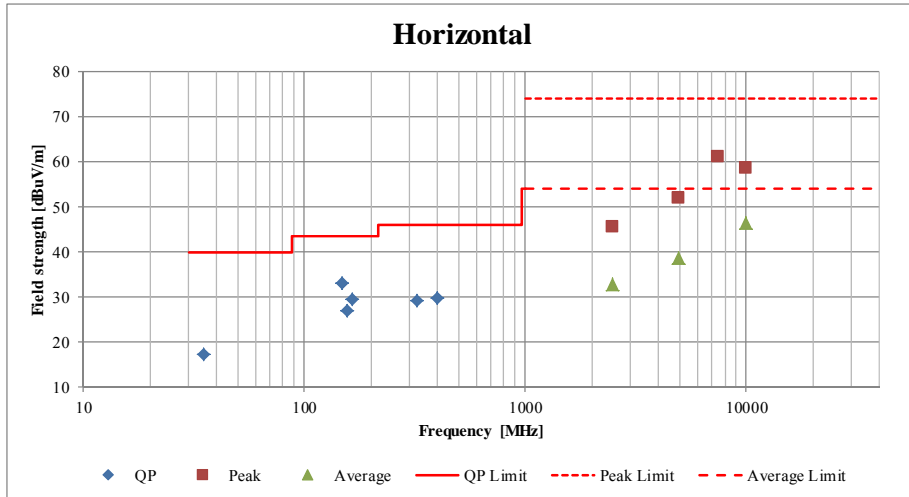
Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber
Report No.	11328915H
Date	July 29, 2016
Temperature / Humidity	24 deg. C / 62 % RH
Engineer	Tomoki Matsui
Mode	Tx, Hopping Off, 3DH5 2480 MHz



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

Radiated Spurious Emission
(Plot data, Worst case)

Test place	Ise EMC Lab. No.4 and No.2 Semi Anechoic Chamber		
Report No.	11328915H		
Date	July 29, 2016	August 3, 2016	August 7, 2016
Temperature / Humidity	24 deg. C / 62 % RH	20 deg. C / 59 % RH	20 deg. C / 61 % RH
Engineer	Tomoki Matsui	Keisuke Kawamura	Keisuke Kawamura
	(1 GHz - 10 GHz)	(Above 10GHz)	(Below 1GHz)
Mode	Tx, Hopping Off, 3DH5 2480 MHz		

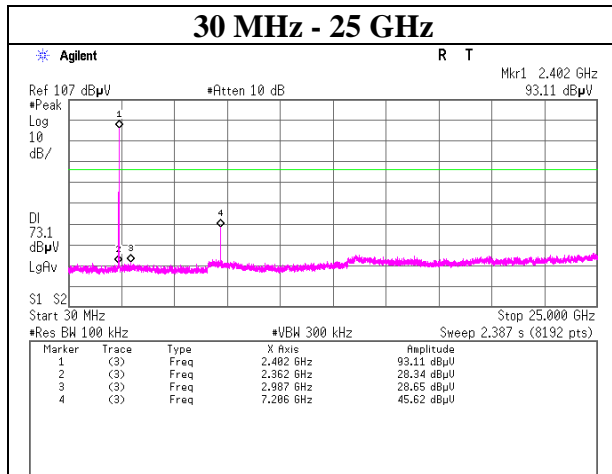
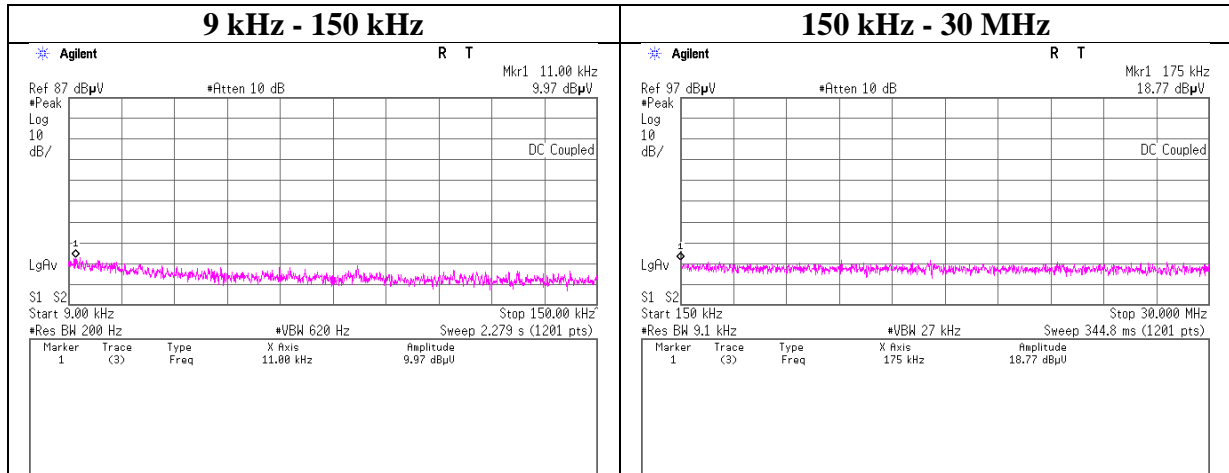


*These plots data contains sufficient number to show the trend of characteristic features for EUT.

Conducted Spurious Emission

Test place	Ise EMC Lab. No.7 Shielded Room
Report No.	11328915H
Date	July 27, 2016
Temperature / Humidity	23 deg. C / 55 % RH
Engineer	Tomohisa Nakagawa
Mode	Tx, Hopping Off, DH5

2402 MHz



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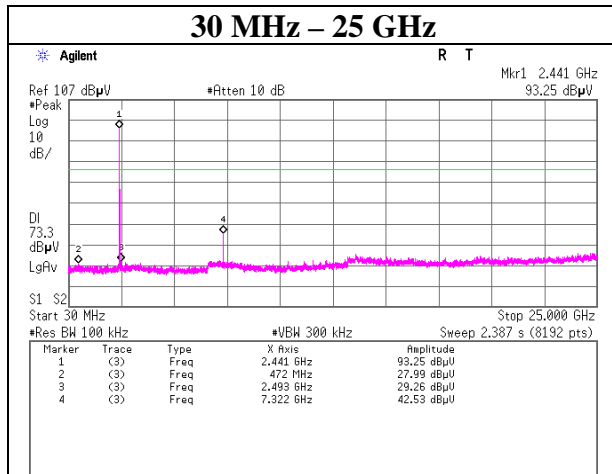
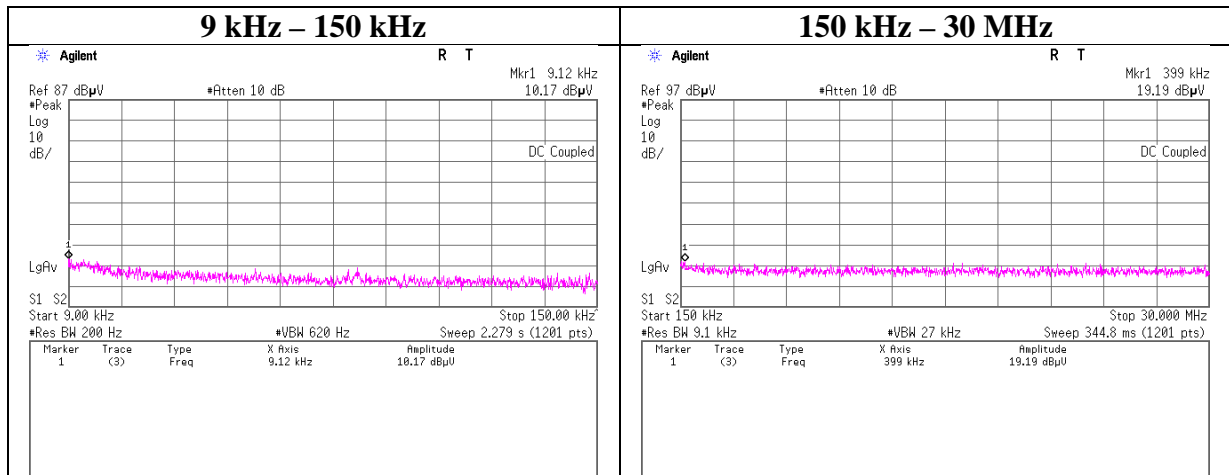
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

Conducted Spurious Emission

Test place	Ise EMC Lab. No.7 Shielded Room
Report No.	11328915H
Date	July 27, 2016
Temperature / Humidity	23 deg. C / 55 % RH
Engineer	Tomohisa Nakagawa
Mode	Tx, Hopping Off, DH5

2441 MHz



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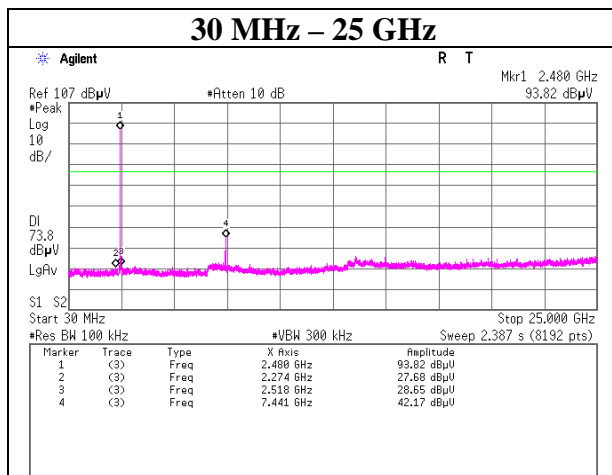
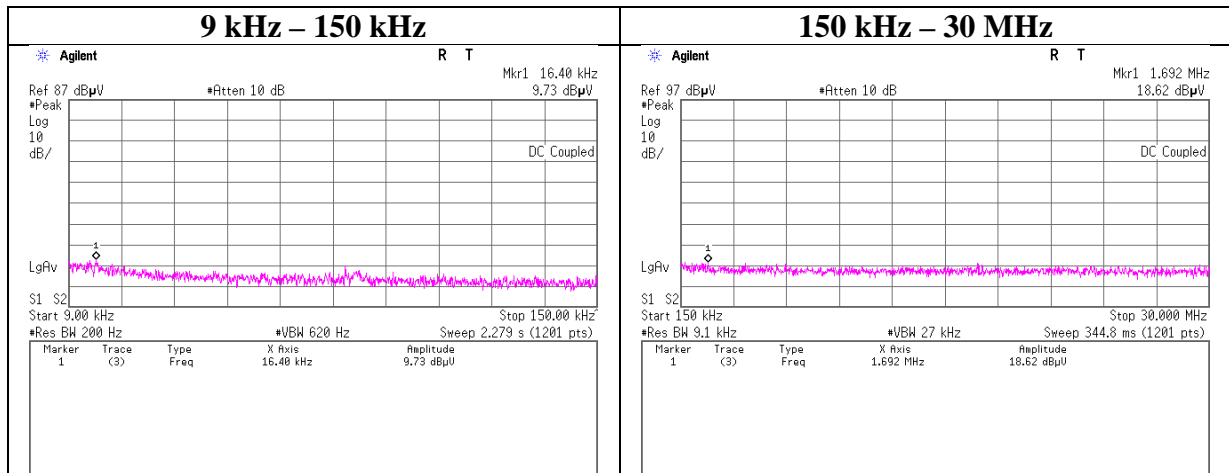
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

Conducted Spurious Emission

Test place	Ise EMC Lab. No.7 Shielded Room
Report No.	11328915H
Date	July 27, 2016
Temperature / Humidity	23 deg. C / 55 % RH
Engineer	Tomohisa Nakagawa
Mode	Tx, Hopping Off, DH5

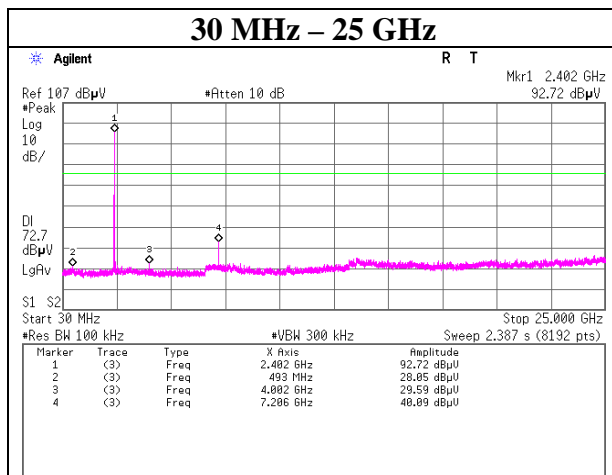
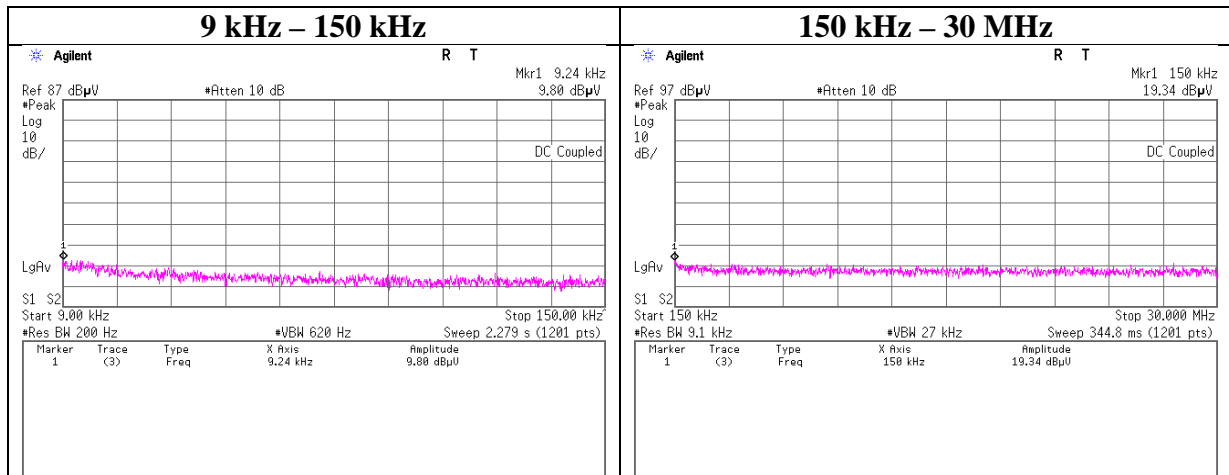
2480 MHz



Conducted Spurious Emission

Test place	Ise EMC Lab. No.7 Shielded Room
Report No.	11328915H
Date	July 27, 2016
Temperature / Humidity	23 deg. C / 55 % RH
Engineer	Tomohisa Nakagawa
Mode	Tx, Hopping Off, 3DH5

2402 MHz



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Ise EMC Lab.

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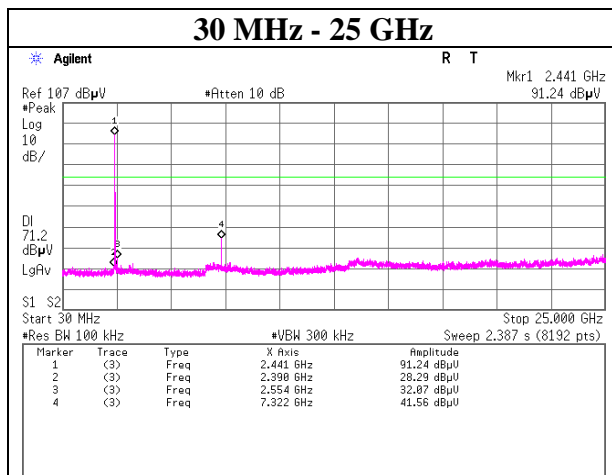
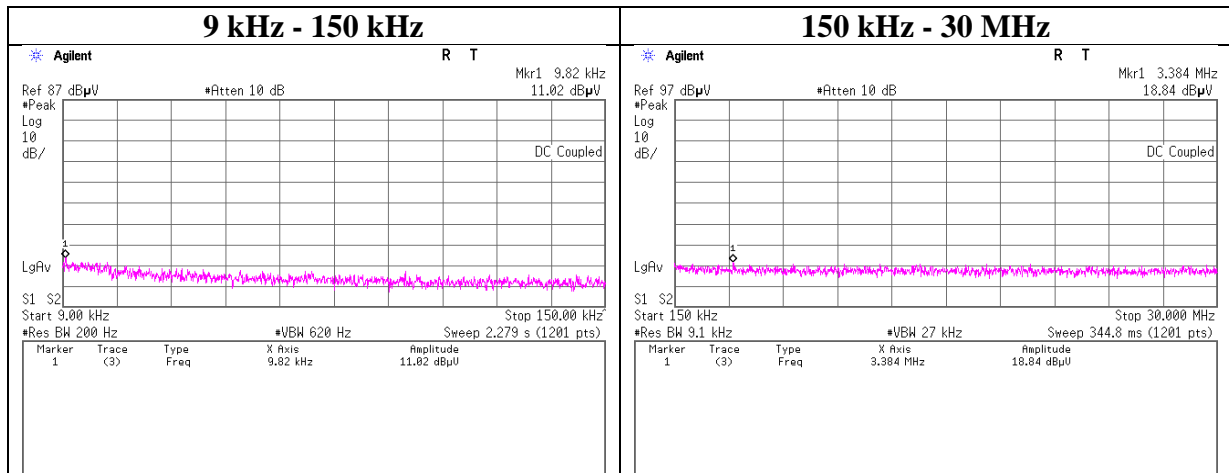
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

Conducted Spurious Emission

Test place	Ise EMC Lab. No.7 Shielded Room
Report No.	11328915H
Date	July 27, 2016
Temperature / Humidity	23 deg. C / 55 % RH
Engineer	Tomohisa Nakagawa
Mode	Tx, Hopping Off, 3DH5

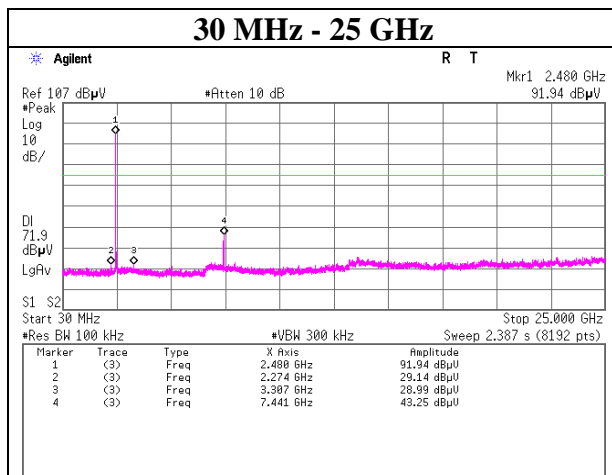
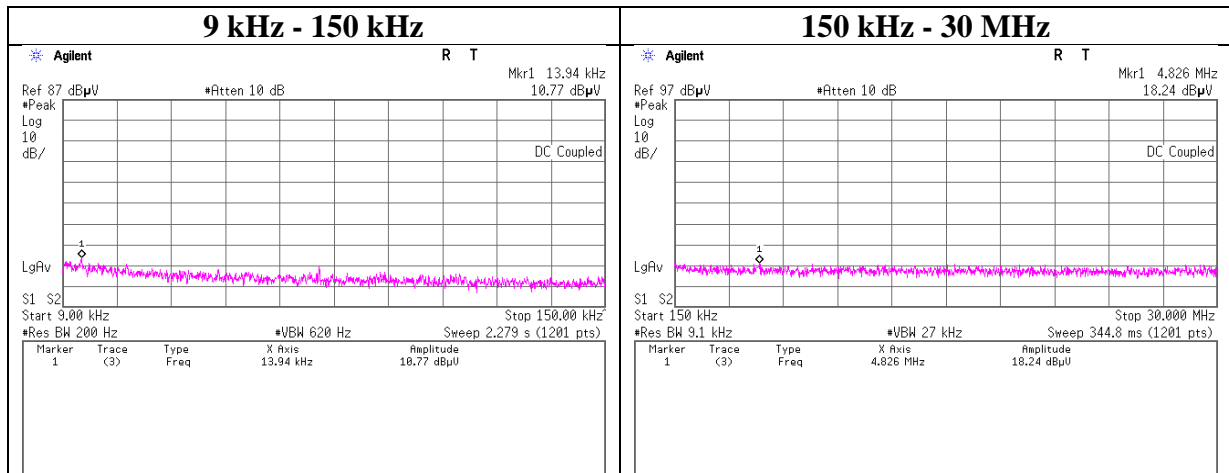
2441 MHz



Conducted Spurious Emission

Test place	Ise EMC Lab. No.7 Shielded Room
Report No.	11328915H
Date	July 27, 2016
Temperature / Humidity	23 deg. C / 55 % RH
Engineer	Tomohisa Nakagawa
Mode	Tx, Hopping Off, 3DH5

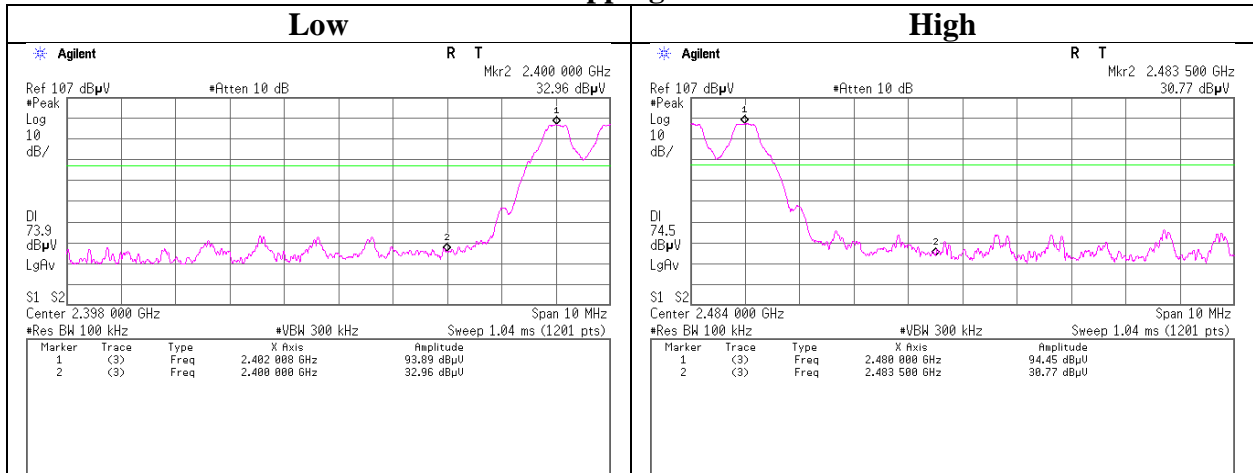
2480 MHz



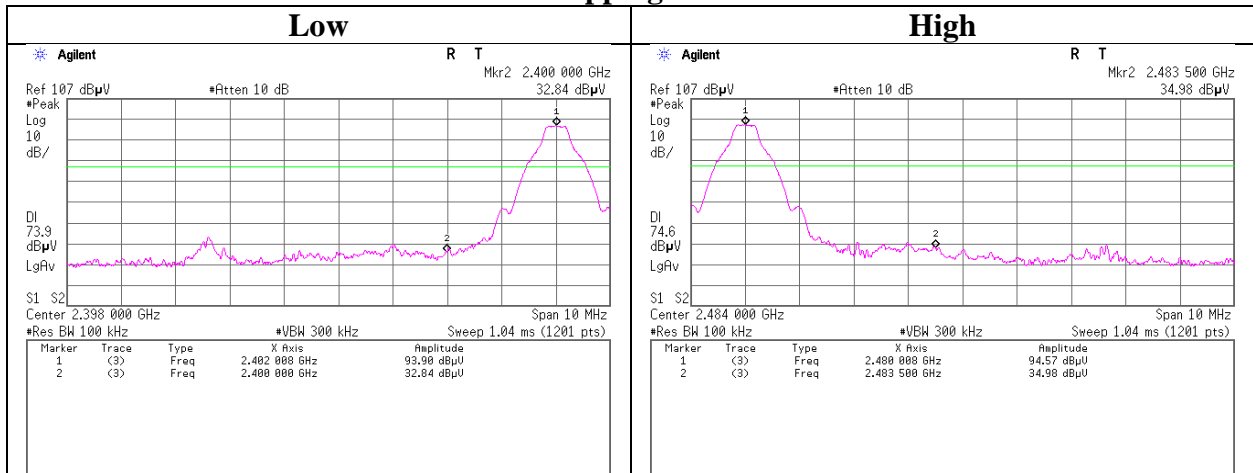
Conducted Emission Band Edge compliance

Test place	Ise EMC Lab. No.7 Semi Anechoic Chamber
Report No.	11328915H
Date	July 27, 2016
Temperature / Humidity	23 deg. C / 55 % RH
Engineer	Tomohisa Nakagawa
Mode	Tx DH5

Hopping On



Hopping Off



UL Japan, Inc.

Ise EMC Lab.

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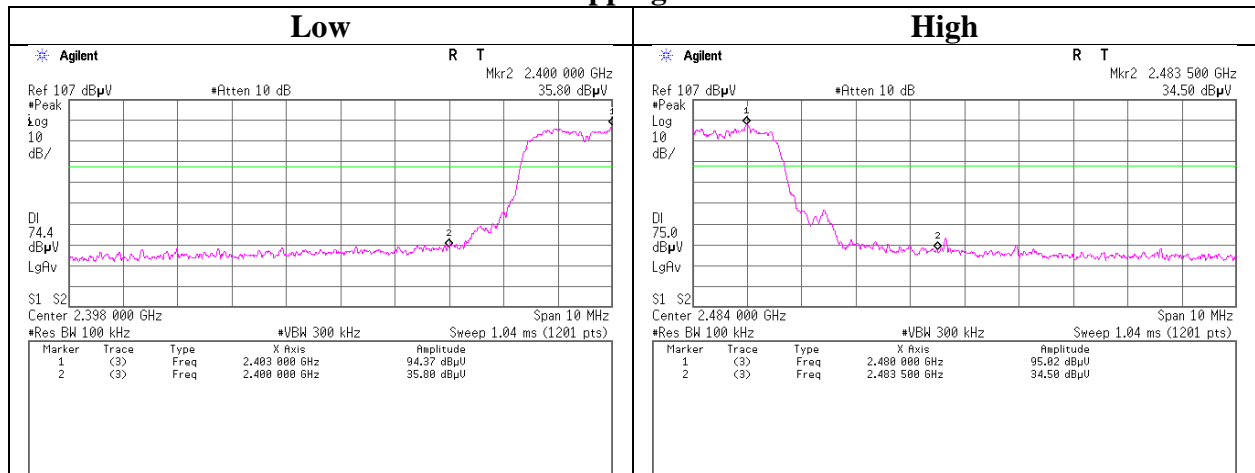
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

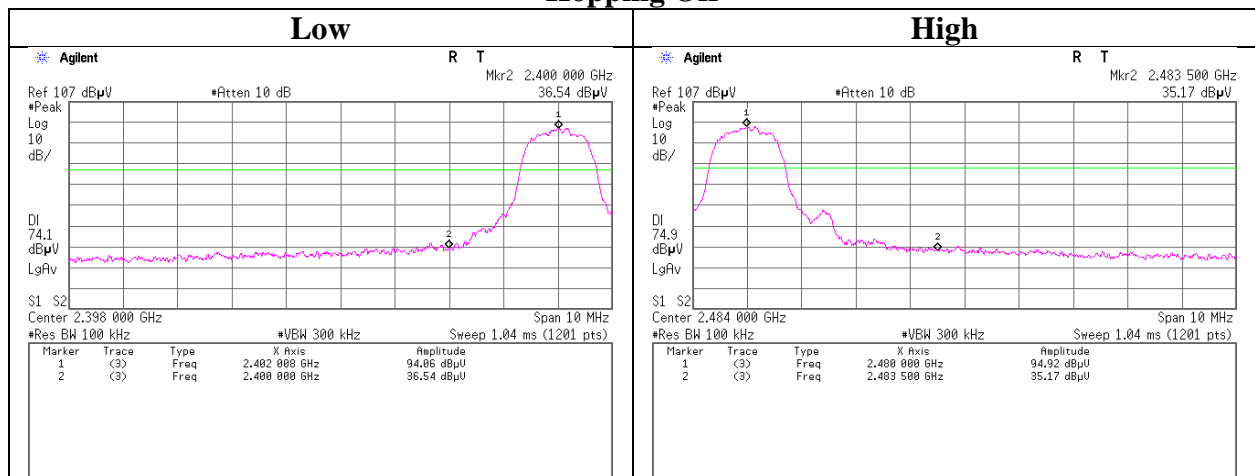
Conducted Emission Band Edge compliance

Test place	Ise EMC Lab. No.7 Shielded Room
Report No.	11328915H
Date	July 27, 2016
Temperature / Humidity	23 deg. C / 55 % RH
Engineer	Tomohisa Nakagawa
Mode	Tx 3DH5

Hopping On



Hopping Off



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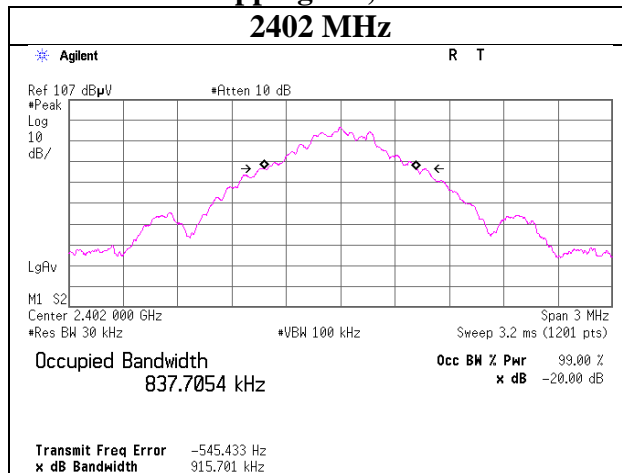
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

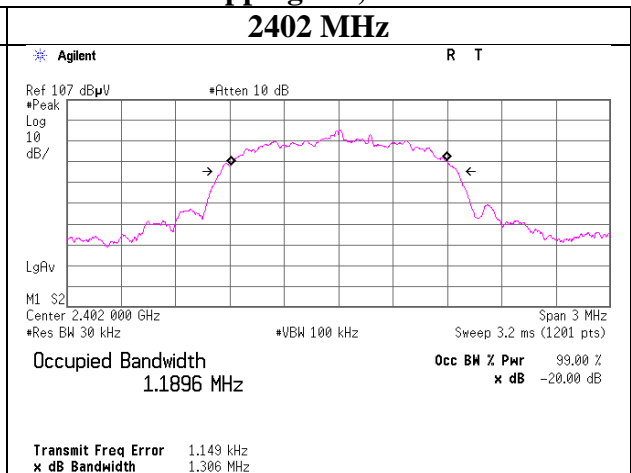
99% Occupied Bandwidth

Test place	Ise EMC Lab. No.7 Shielded Room
Report No.	11328915H
Date	July 27, 2016
Temperature / Humidity	23 deg. C / 55 % RH
Engineer	Tomohisa Nakagawa
Mode	Tx Hopping Off

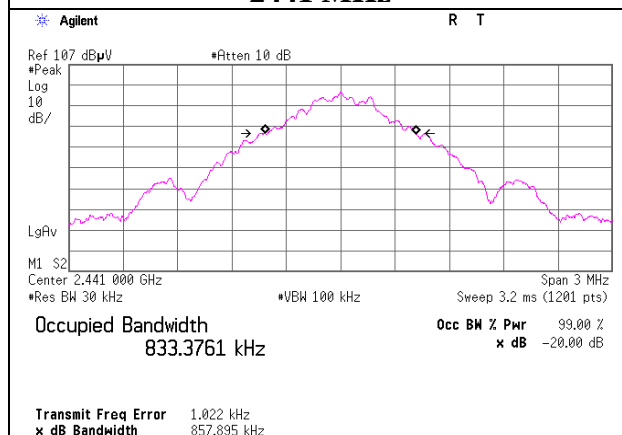
Hopping Off, DH5



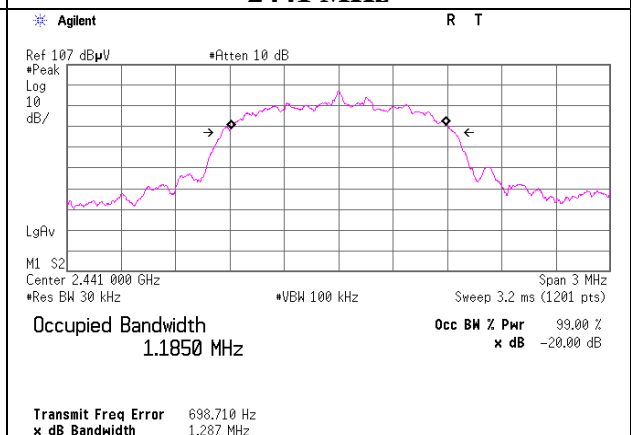
Hopping Off, 3DH5



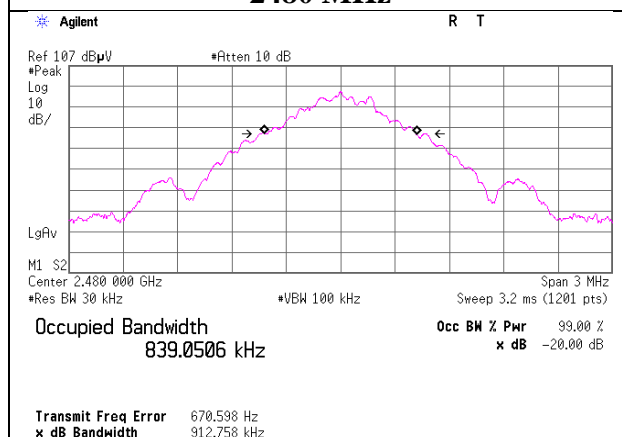
2441 MHz



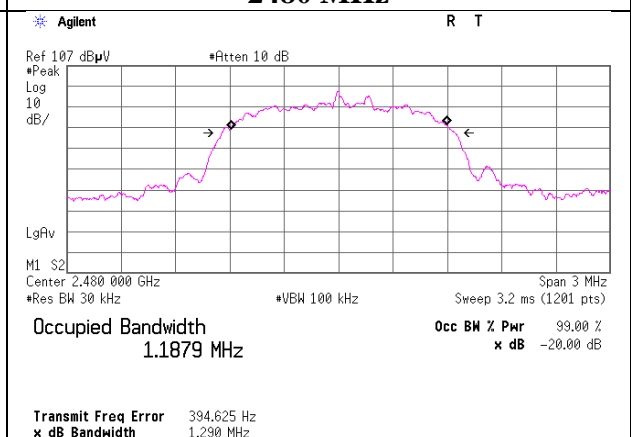
2441 MHz



2480 MHz



2480 MHz



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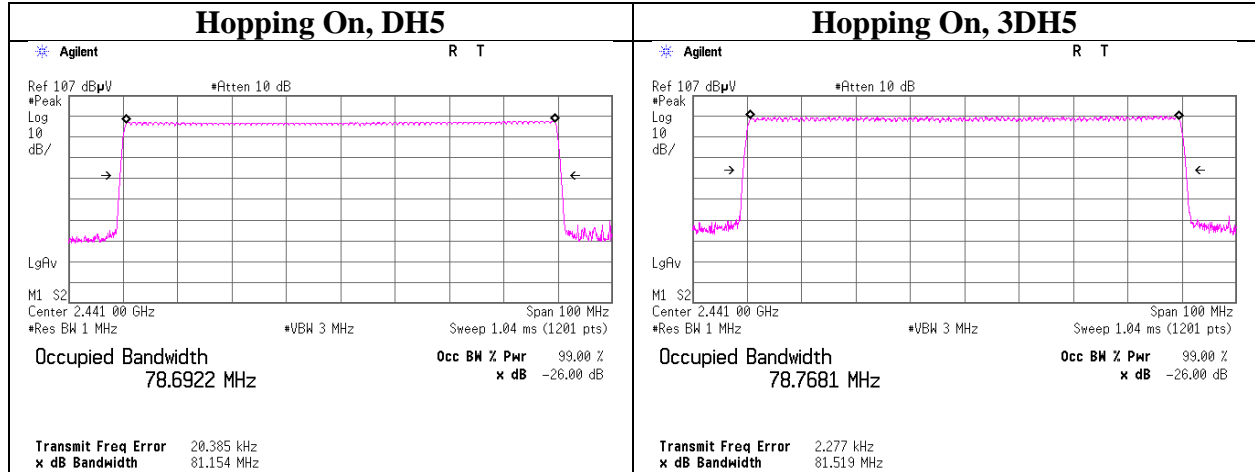
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99% Occupied Bandwidth

Test place	Ise EMC Lab. No.7 Shielded Room
Report No.	11328915H
Date	July 27, 2016
Temperature / Humidity	23 deg. C / 55 % RH
Engineer	Tomohisa Nakagawa
Mode	Tx Hopping On



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APPENDIX 2: Test instruments

Test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MOS-34	Thermo-Hygrometer	Custom	CTH-201	3401	AT	2016/01/21 * 12
MPM-09	Power Meter	Anritsu	ML2495A	6K00003348	AT	2015/10/19 * 12
MPSE-12	Power sensor	Anritsu	MA2411B	011598	AT	2015/10/19 * 12
MCC-96	Microwave Cable	Suhner	SUCOFLEX102	30817/2	AT	2016/05/09 * 12
MAT-88	Attenuator	Weinschel Associates	WA56-10	56100304	AT	2016/06/15 * 12
MSA-15	Spectrum Analyzer	Agilent	E4440A	MY46187105	AT	2015/11/11 * 12
MMM-16	DIGITAL HiTESTER	Hioki	3805	070900532	AT	2016/01/13 * 12
MAEC-04	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	RE	2015/10/02 * 12
MOS-15	Thermo-Hygrometer	Custom	CTH-180	1501	RE	2016/01/21 * 12
MJM-26	Measure	KOMELON	KMC-36	-	RE	-
COTS-MEMI	EMI measurement program	TSJ	TEPTO-DV	-	RE	-
MSA-04	Spectrum Analyzer	Agilent	E4448A	US44300523	RE	2015/11/06 * 12
MHA-21	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	9120D-557	RE	2015/08/10 * 12
MCC-141	Microwave Cable	Junkosha	MWX221	1305S002R(1m) / 1405S146(5m)	RE	2016/06/21 * 12
MPA-12	MicroWave System Amplifier	Agilent	83017A	00650	RE	2015/10/01 * 12
MMM-10	DIGITAL HiTESTER	Hioki	3805	051201148	RE	2016/01/18 * 12
MHF-26	High Pass Filter 3.5-18.0GHz	UL Japan	HPF SELECTOR	002	RE	2015/09/17 * 12
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	2016/01/21 * 12
MJM-14	Measure	KOMELON	KMC-36	-	RE	-
MSA-13	Spectrum Analyzer	Agilent	E4440A	MY46185823	RE	2016/06/17 * 12
MHA-06	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	254	RE	2016/02/29 * 12
MCC-165	Microwave Cable	Junkosha	MWX221	1203S213(1m) / 1311S166(5m)	RE	2015/11/10 * 12
MPA-10	Pre Amplifier	Agilent	8449B	3008A02142	RE	2016/01/19 * 12
MHA-02	Horn Antenna 18-26.5GHz	EMCO	3160-09	1265	RE	2016/02/29 * 12
MMM-01	Digital Tester	Fluke	FLUKE 26-3	78030611	RE	2015/08/19 * 12
MTR-03	Test Receiver	Rohde & Schwarz	ESCI	100300	RE	2015/10/11 * 12
MBA-03	Biconical Antenna	Schwarzbeck	BBA9106	1915	RE	2015/10/11 * 12
MLA-21	Logperiodic Antenna(200-1000MHz)	Schwarzbeck	VUSLP9111B	911B-190	RE	2016/01/30 * 12
MCC-12	Coaxial Cable	Fujikura/Agilent	-	-	RE	2016/02/08 * 12
MAT-07	Attenuator(6dB)	Weinschel Corp	2	BK7970	RE	2015/11/10 * 12
MPA-09	Pre Amplifier	Agilent	8447D	2944A10845	RE	2015/09/04 * 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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