



# **RADIO TEST REPORT**

**Test Report No. : 11045932H-R1**

**Applicant** : MITSUBISHI ELECTRIC CORPORATION SANDA WORKS

**Type of Equipment** : Display Audio

**Model No.** : NR-200

**FCC ID** : UJHNR200


**Test regulation** : FCC Part 15 Subpart C: 2015

**Test Result** : Complied


1. This test report shall not be reproduced in full or partial, without the written approval of UL Japan, Inc.
2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with the above regulation.
4. The test results in this report are traceable to the national or international standards.
5. This test report must not be used by the customer to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.
6. This test report covers Radio technical requirements. It does not cover administrative issues such as Manual or non-Radio test related Requirements. (if applicable)
7. This report is a revised version of 11045932H. 11045932H is replaced with this report.

**Date of test:** November 16 to 19, 2015

**Representative test engineer:**

  
Tsubasa Takayama  
Engineer  
Consumer Technology Division

**Approved by:**

  
Motoya Imura  
Engineer  
Consumer Technology Division



NVLAP LAB CODE: 200572-0

This laboratory is accredited by the NVLAP LAB CODE 200572-0, U.S.A. The tests reported herein have been performed in accordance with its terms of accreditation.  
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## **SECTION 1: Customer information**

Company Name	:	MITSUBISHI ELECTRIC CORPORATION SANDA WORKS
Address	:	2-3-33, Miwa, Sanda-city, Hyogo, 669-1513, Japan
Telephone Number	:	+81-79-559-3620
Facsimile Number	:	+81-79-559-3875
Contact Person	:	Keiichi Shiode

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

### **2.1 Identification of E.U.T.**

Type of Equipment	:	Display Audio
Model No.	:	NR-200
Serial No.	:	Refer to Clause 4.2
Rating	:	DC 12 V
Receipt Date of Sample	:	November 14, 2015
Country of Mass-production	:	China
Condition of EUT	:	Production prototype
		(Not for Sale: This sample is equivalent to mass-produced items.)
Modification of EUT	:	No Modification by the test lab

### **2.2 Product Description**

#### **General Specification**

Clock frequency(ies) in the system	:	480 MHz (Radio part 26 MHz)
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#### **Radio Specification**

##### **[Bluetooth (Ver. 4.1 with EDR function)]**

Radio Type	:	Transceiver
Frequency of Operation	:	2402 MHz - 2480 MHz
Modulation	:	FHSS
Power Supply (radio part input)	:	DC 3.3 V
Antenna type	:	Pattern Antenna
Antenna Gain	:	- 6.1 dBi

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## **SECTION 3: Test specification, procedures & results**

### **3.1 Test Specification**

Test Specification : FCC Part 15 Subpart C: 2015, final revised on November 23, 2015  
 \*Some parts are effective on and after December 17, 2015 or December 23, 2015. The revision does not affect the test specification applied to the EUT.

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 C63.4-2009 7. AC powerline conducted emission measurements	FCC: Section 15.207	N/A	N/A *1)	-
Carrier Frequency Separation	FCC: FCC Public Notice DA 00-705	FCC: Section15.247(a)(1)	See data.	Complied	Conducted
20dB Bandwidth	FCC: FCC Public Notice DA 00-705	FCC: Section15.247(a)(1)		Complied	Conducted
Number of Hopping Frequency	FCC: FCC Public Notice DA 00-705	FCC: Section15.247(a)(1)(iii)		Complied	Conducted
Dwell time	FCC: FCC Public Notice DA 00-705	FCC: Section15.247(a)(1)(iii)		Complied	Conducted
Maximum Peak Output Power	FCC: FCC Public Notice DA 00-705	FCC: Section15.247(a)(b)(1)		Complied	Conducted
Spurious Emission & Band Edge Compliance	FCC: FCC Public Notice DA 00-705	FCC: Section15.247(d)	5.3dB 3867.667MHz, AV, Hori.	Complied	Conducted/ Radiated (above 30MHz) *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).

#### **FCC 15.31 (e)**

The EUT provides stable voltage (DC3.3V) constantly to the wireless transmitter regardless of input voltage. 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**

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.

Test site (semi anechoic chamber)	Radiated emission Uncertainty (+/-)						
	Measurement distance: 3 m				1 m		0.5 m
	9 kHz - 30 MHz	30 MHz - 300 MHz	300 MHz - 1 GHz	1 GHz - 10 GHz	10 GHz - 18 GHz	18 GHz - 26.5 GHz	26.5 GHz - 40 GHz
No. 1	4.3 dB	5.1 dB	6.2 dB	5.5 dB	5.8 dB	5.8 dB	4.3 dB
No. 2	4.2 dB	5.1 dB	6.2 dB	5.4 dB	5.7 dB	5.9 dB	5.6 dB
No. 3	4.4 dB	5.1 dB	6.3 dB	5.2 dB	5.5 dB	5.8 dB	5.5 dB
No. 4	4.7 dB	5.3 dB	6.3 dB	5.3 dB	5.7 dB	5.9 dB	5.5 dB

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

#### Radiated emission test

The data listed in this report meets the limits unless the uncertainty is taken into consideration.

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### 3.5 Test Location

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	IC Registration Number	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Other rooms
No.1 semi-anechoic chamber	2973C-1	19.2 x 11.2 x 7.7m	7.0 x 6.0m	No.1 Power source room
No.2 semi-anechoic chamber	2973C-2	7.5 x 5.8 x 5.2m	4.0 x 4.0m	-
No.3 semi-anechoic chamber	2973C-3	12.0 x 8.5 x 5.9m	6.8 x 5.75m	No.3 Preparation room
No.3 shielded room	-	4.0 x 6.0 x 2.7m	N/A	-
No.4 semi-anechoic chamber	2973C-4	12.0 x 8.5 x 5.9m	6.8 x 5.75m	No.4 Preparation room
No.4 shielded room	-	4.0 x 6.0 x 2.7m	N/A	-
No.5 semi-anechoic chamber	-	6.0 x 6.0 x 3.9m	6.0 x 6.0m	-
No.6 shielded room	-	4.0 x 4.5 x 2.7m	4.0 x 4.5 m	-
No.6 measurement room	-	4.75 x 5.4 x 3.0m	4.75 x 4.15 m	-
No.7 shielded room	-	4.7 x 7.5 x 2.7m	4.7 x 7.5m	-
No.8 measurement room	-	3.1 x 5.0 x 2.7m	N/A	-
No.9 measurement room	-	8.0 x 4.6 x 2.8m	2.4 x 2.4m	-
No.11 measurement room	-	6.2 x 4.7 x 3.0m	4.8 x 4.6m	-

\* Size of vertical conducting plane (for Conducted Emission test) : 2.0 x 2.0m for No.1, No.2, No.3, and No.4 semi-anechoic chambers and No.3 and No.4 shielded rooms.

### 3.6 Test data, Test instruments, and Test set up

Refer to APPENDIX.

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

### **4.1 Operating Mode(s)**

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

Details of Operating Mode(s)

Test Item	Mode	Tested frequency
Spurious Emission (Conducted/Radiated)	Tx (Hopping off) DH5, 3DH5	2402MHz 2441MHz 2480MHz
Carrier Frequency Separation	Tx (Hopping on) DH5, 3DH5 Inquiry	2402MHz 2441MHz 2480MHz
20dB Bandwidth	Tx (Hopping off) DH5, 3DH5 Inquiry	2402MHz 2441MHz 2480MHz
Number of Hopping Frequency	Tx (Hopping on) DH5, 3DH5 Inquiry	-
Dwell time	Tx (Hopping on), -DH1, DH3, DH5 -3DH1, 3DH3, 3DH5 Inquiry	-
Maximum Peak Output Power	Tx (Hopping off) DH5, 2DH5, 3DH5 Inquiry	2402MHz 2441MHz 2480MHz
Band Edge Compliance (Conducted)	Tx DH5, 3DH5 -Hopping on -Hopping off	2402MHz 2480MHz
99% Occupied Bandwidth	Tx DH5, 3DH5 -Hopping on -Hopping off Inquiry	2402MHz 2441MHz 2480MHz
<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)</p> <p>*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.</p> <p>*EUT has the power settings by the software as follows; Power settings: BDR: Default EDR: Default Software: Blue test 3 *This setting of software is the worst case. Any conditions under the normal use do not exceed the condition of setting. In addition, end users cannot change the settings of the output power of the product.</p>		

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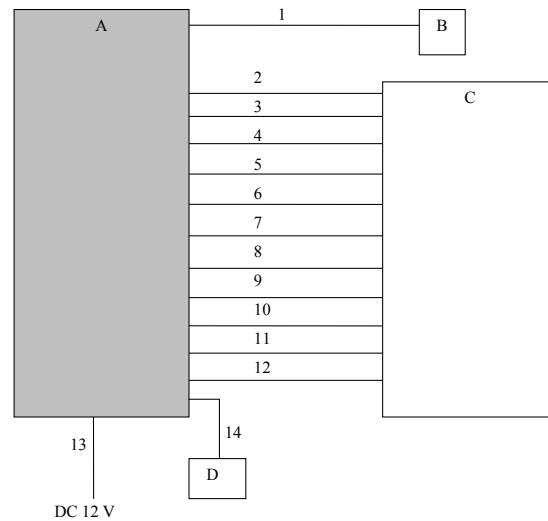
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## 4.2 Configuration and peripherals



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

### Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	EUT	NR-200	No1 *1) No2 *2)	mitsubishi electric corporation sanda works	EUT
B	USB Memory	JFV33	5086056854	Transcend	-
C	Termination Jig	-	-	mitsubishi electric corporation sanda works	-
D	Control PCB	-	-	mitsubishi electric corporation sanda works	-

\*1) Used for all tests except for Antenna terminal Conducted tests.

\*2) Used for Antenna terminal Conducted tests.

### List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	USB Cable	3.0	Shielded	Shielded	-
2	Speaker Cable	3.0	Unshielded	Unshielded	-
3	Signal Cable	3.0	Unshielded	Unshielded	-
4	Signal Cable	3.0	Unshielded	Unshielded	-
5	Signal Cable	3.0	Unshielded	Unshielded	-
6	Signal Cable	3.0	Unshielded	Unshielded	-
7	Signal Cable	3.0	Unshielded	Unshielded	-
8	Signal Cable	3.0	Unshielded	Unshielded	-
9	Signal Cable	3.0	Unshielded	Unshielded	-
10	Signal Cable	3.0	Unshielded	Unshielded	-
11	Signal Cable	3.0	Unshielded	Unshielded	-
12	Signal Cable	3.0	Unshielded	Unshielded	-
13	DC Cable	3.5	Unshielded	Unshielded	-
14	Control Cable	0.2	Unshielded	Unshielded	-

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## **SECTION 5: Radiated Spurious Emission**

### **Test Procedure**

EUT was placed on a urethane platform of nominal size, 1.0m by 1.5m, raised 0.8m above the conducting ground plane.

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

The height of the measuring antenna varied between 1 and 4m 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 (below 10 GHz), 1 m*2) (above 10 GHz),		3 m (below 10 GHz), 1 m*2) (above 10 GHz),

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

\*2) Distance Factor:  $20 \times \log(3.0 \text{ m} / 1.0 \text{ m}) = 9.5 \text{ dB}$

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

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

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

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## **SECTION 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	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. (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

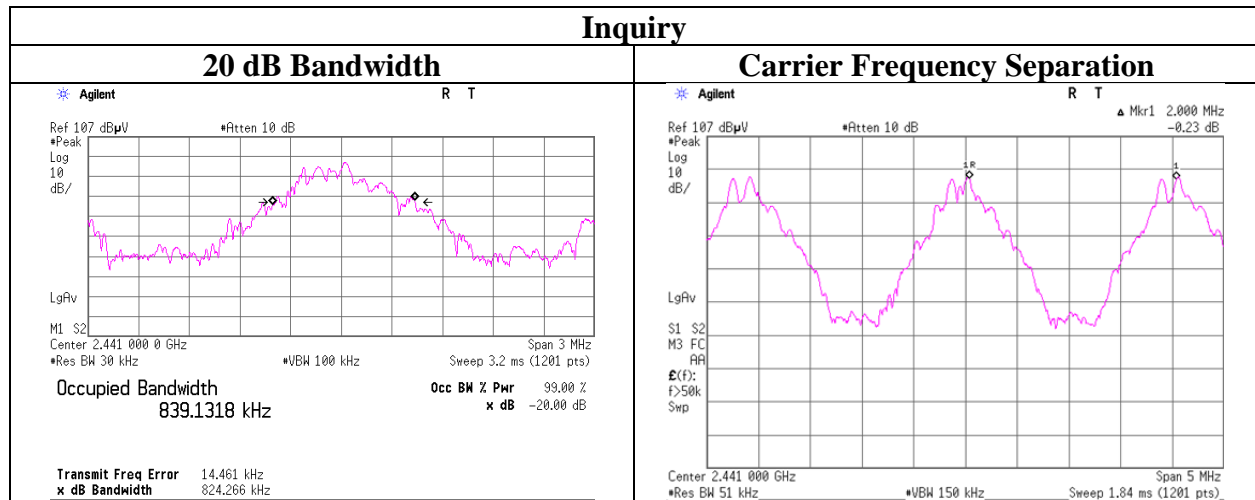
### 20dB Bandwidth and Carrier Frequency Separation

Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	11045932H
Date	11/19/2015
Temperature/ Humidity	21 deg. C / 43 % RH
Engineer	Tsubasa Takayama
Mode	Tx (Hopping on) DH5/3DH5/Inquiry

Mode	Freq. [MHz]	20dB Bandwidth [MHz]	Carrier Frequency Separation [MHz]	Limit for Carrier Frequency separation [MHz]
DH5	2402.0	0.980	1.000	$\geq 0.653$
DH5	2441.0	0.968	1.000	$\geq 0.645$
DH5	2480.0	1.003	1.000	$\geq 0.669$
3DH5	2402.0	1.282	1.000	$\geq 0.855$
3DH5	2441.0	1.291	1.000	$\geq 0.861$
3DH5	2480.0	1.284	1.000	$\geq 0.856$
Inquiry	2441.0	0.824	2.000	$\geq 0.550$

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

No limit applies to 20dB Bandwidth.



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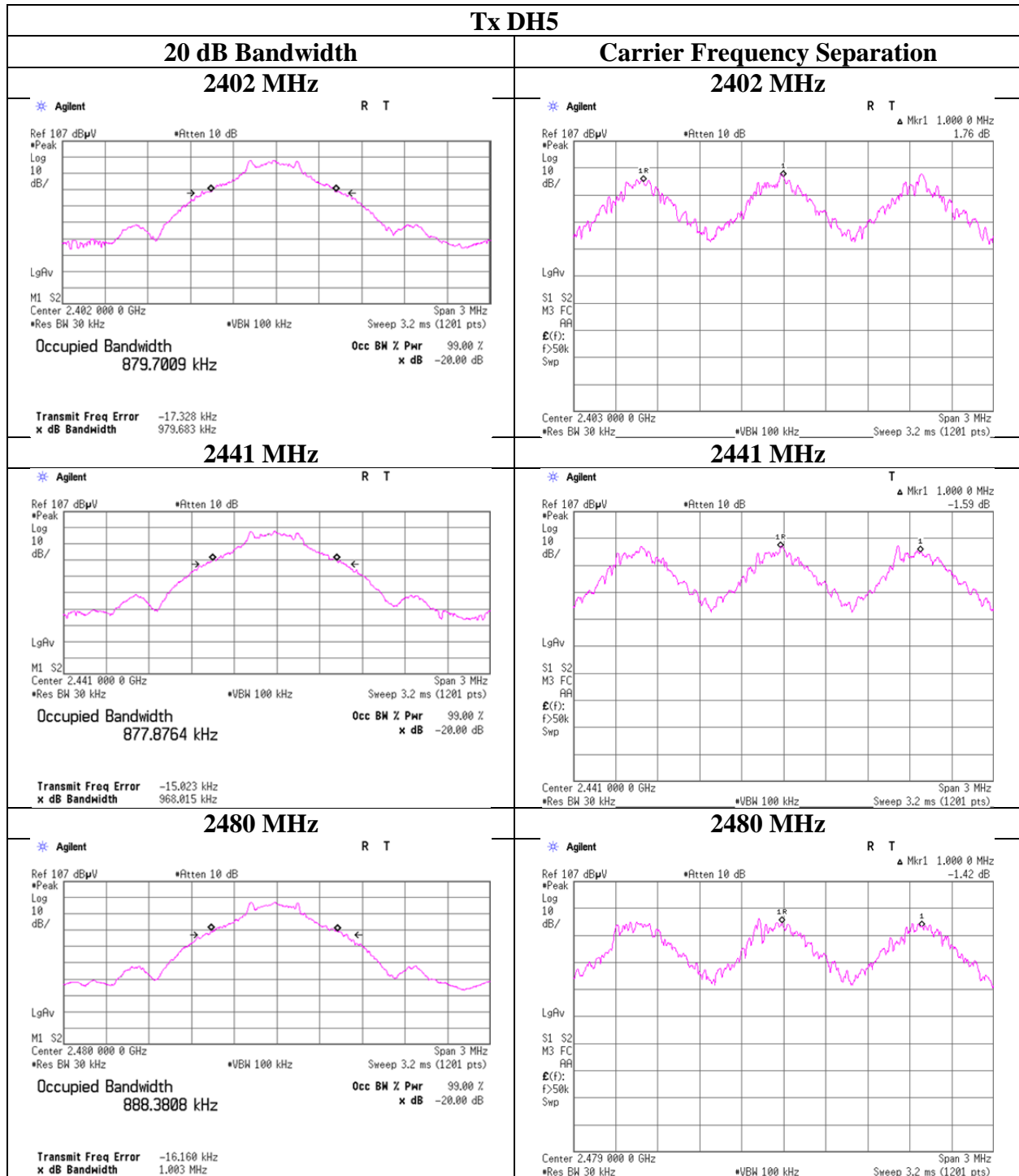
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## 20dB Bandwidth and Carrier Frequency Separation



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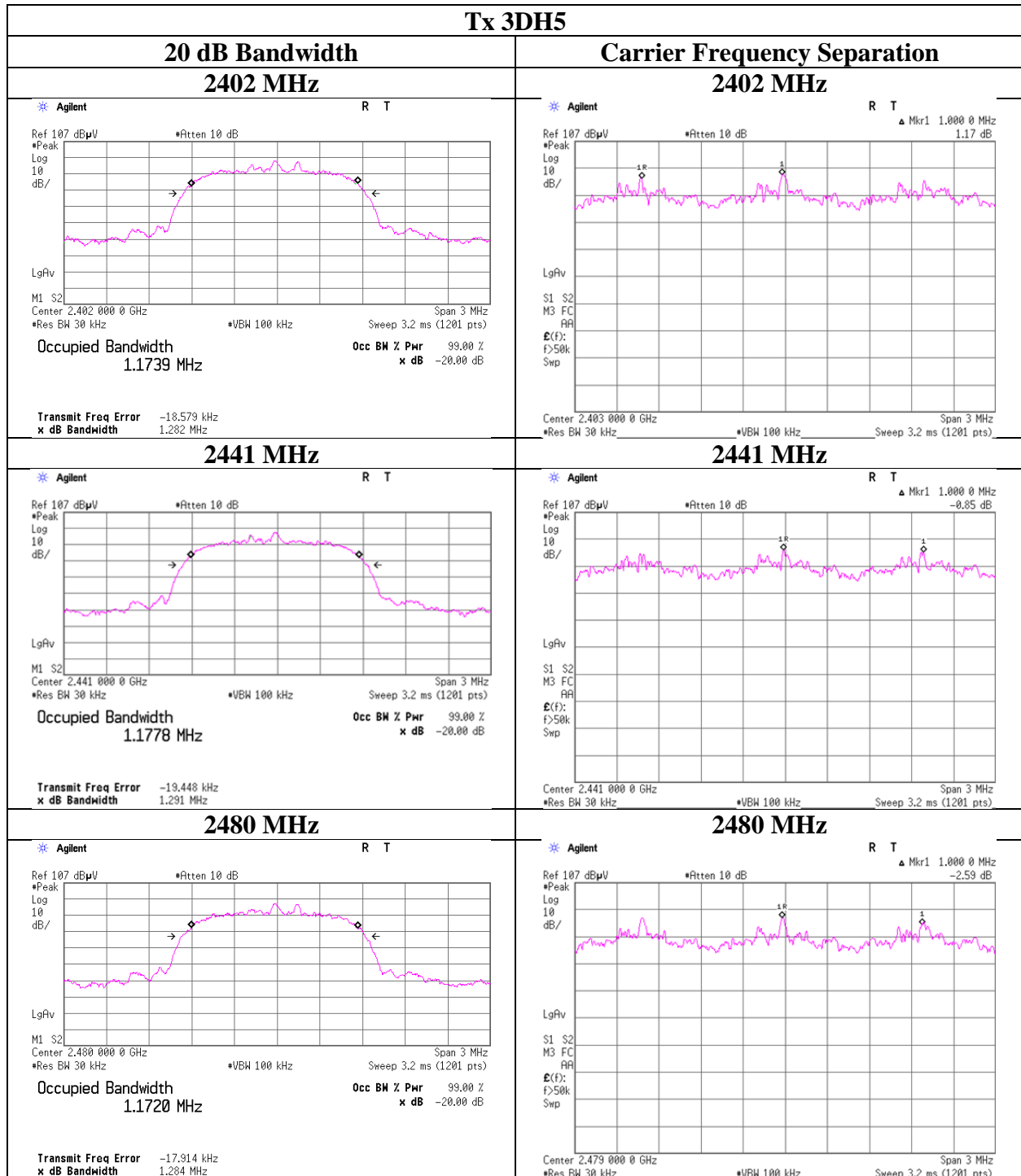
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## 20dB Bandwidth and Carrier Frequency Separation



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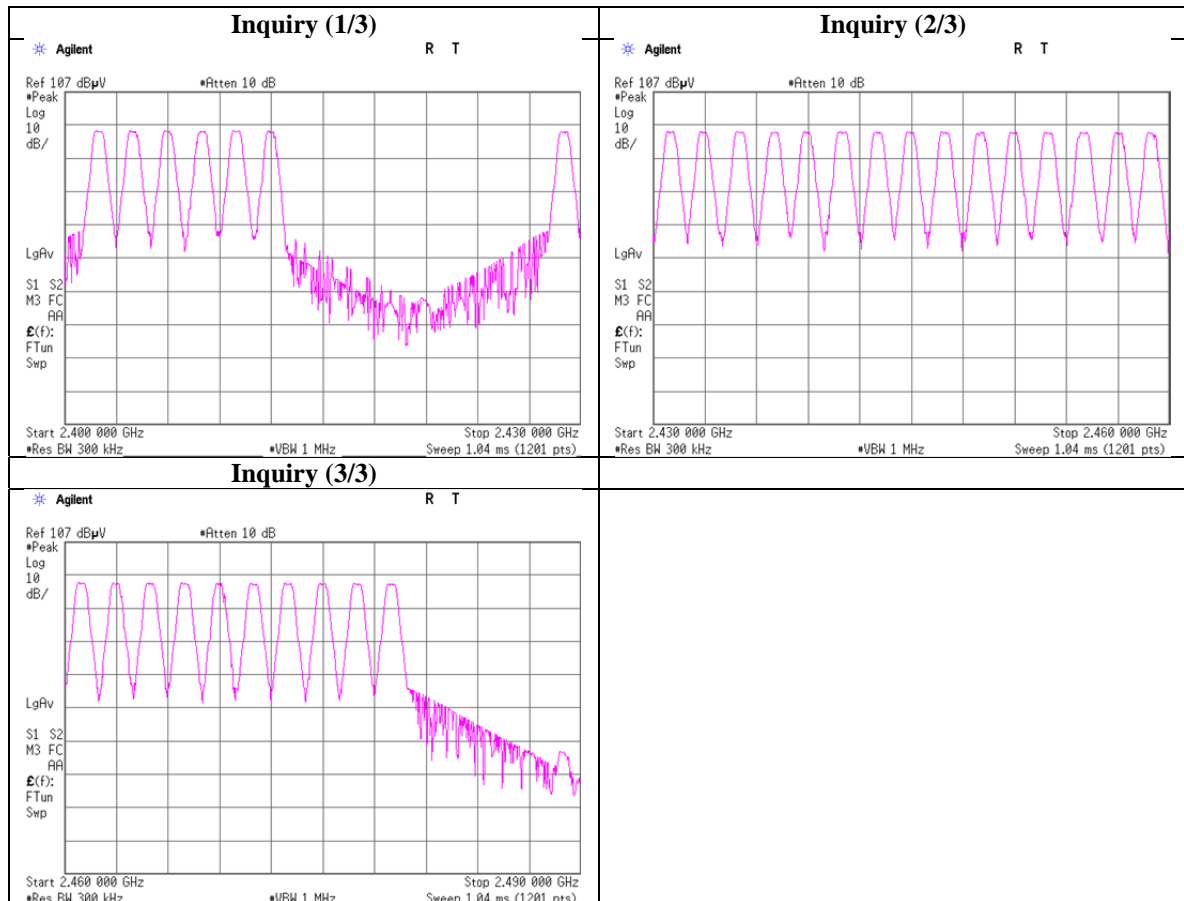
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## Number of Hopping Frequency

Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	11045932H
Date	11/19/2015
Temperature/ Humidity	21 deg. C / 43 % RH
Engineer	Tsubasa Takayama
Mode	Tx (Hopping on) DH5/3DH5/Inquiry

Mode	Number of channel [times]	Limit [times]
DH5	79	>= 15
3DH5	79	>= 15
Inquiry	32	>= 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.



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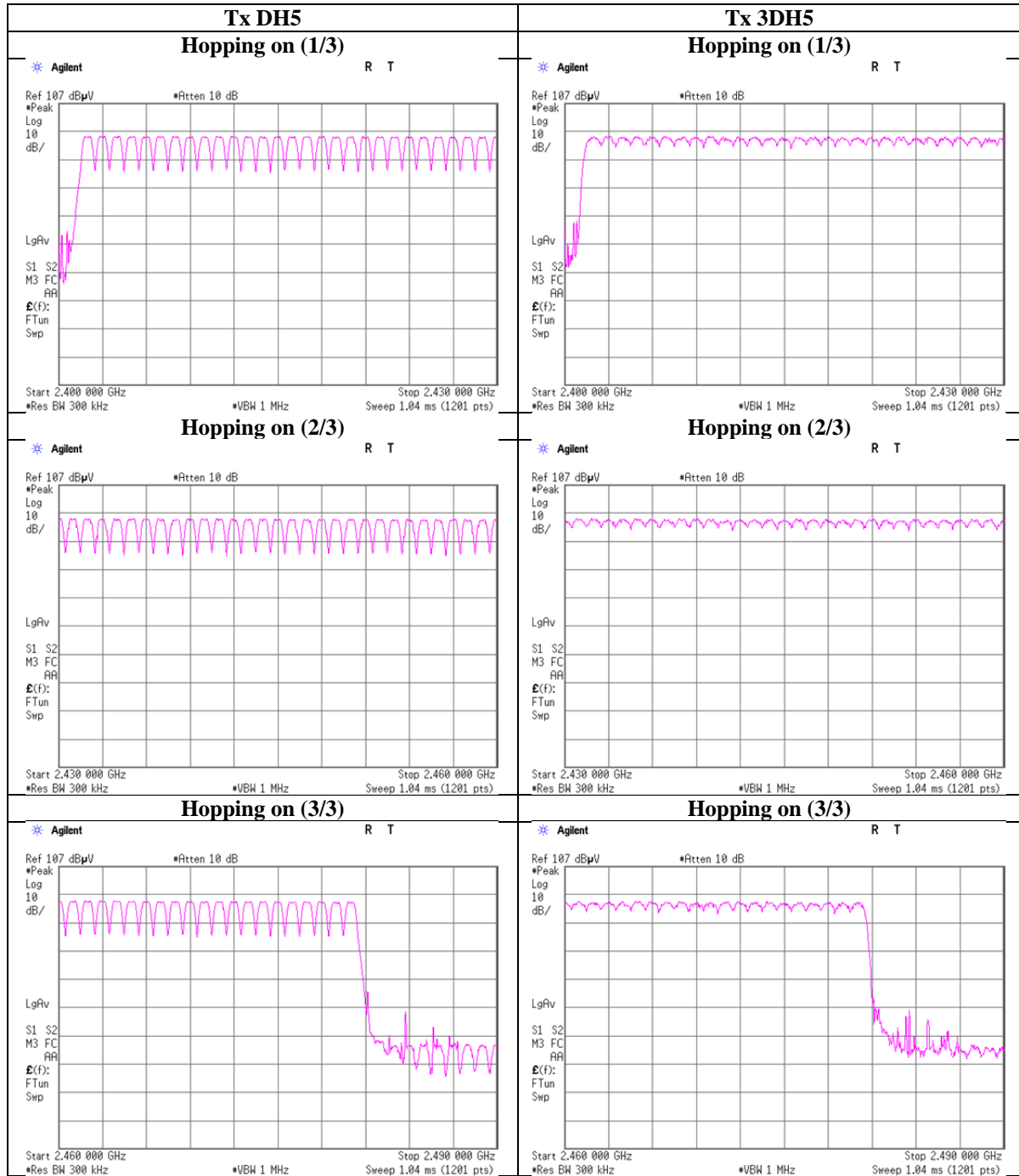
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## Number of Hopping Frequency



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## Dwell time

Test place : Ise EMC Lab. No.6 Measurement Room  
Report No. : 11045932H  
Date : 11/19/2015  
Temperature/ Humidity : 21 deg. C / 43 % RH  
Engineer : Tsubasa Takayama  
Mode : Tx (Hopping on) DH1 - 5/3DH1 - 5/Inquiry

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 time [msec]	Result [msec]	Limit [msec]
DH1	50.6 times	/	5 sec.	x	31.6 sec. = 320 times	0.468	150
DH3	30.2 times	/	5 sec.	x	31.6 sec. = 191 times	1.724	329
DH5	19.6 times	/	5 sec.	x	31.6 sec. = 124 times	2.973	369
3DH1	51.0 times	/	5 sec.	x	31.6 sec. = 323 times	0.460	149
3DH3	24.8 times	/	5 sec.	x	31.6 sec. = 157 times	1.717	270
3DH5	20.8 times	/	5 sec.	x	31.6 sec. = 132 times	2.973	392
Inquiry	100.0 times	/	1 sec.	x	12.8 sec. = 1280 times	0.150	192

Sample Calculation

Result = Number of transmission x Length of transmission time

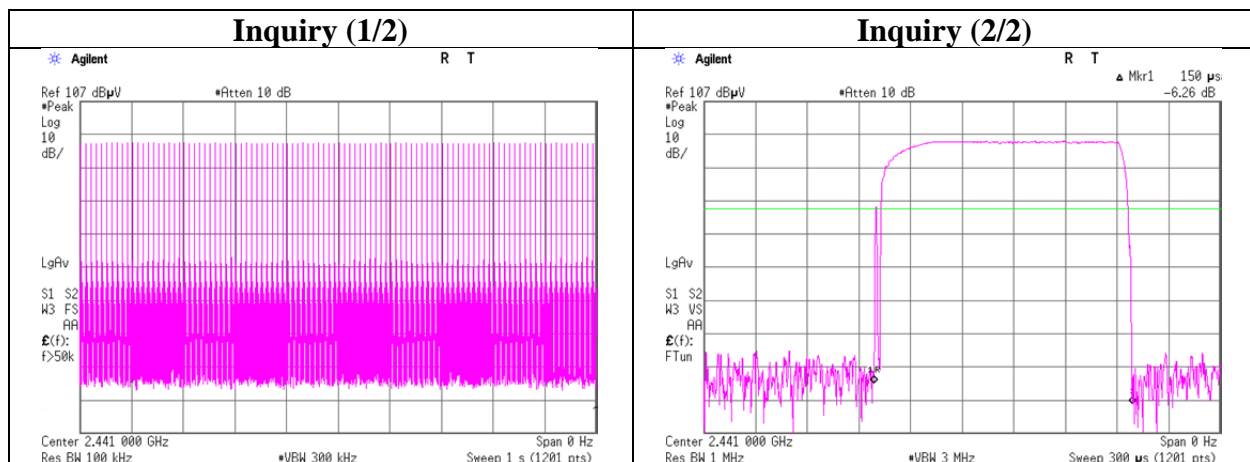
\*Average data of 5 tests.(except Inquiry)

Mode	Sampling [times]					Average [times]
	1	2	3	4	5	
DH1	51	50	50	51	51	50.6
DH3	30	31	30	30	30	30.2
DH5	20	20	19	20	19	19.6
3DH1	51	51	51	51	51	51.0
3DH3	24	25	25	25	25	24.8
3DH5	21	21	21	20	21	20.8

Sample Calculation

Average= Summation(Sampling 1 to 5) / 5

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



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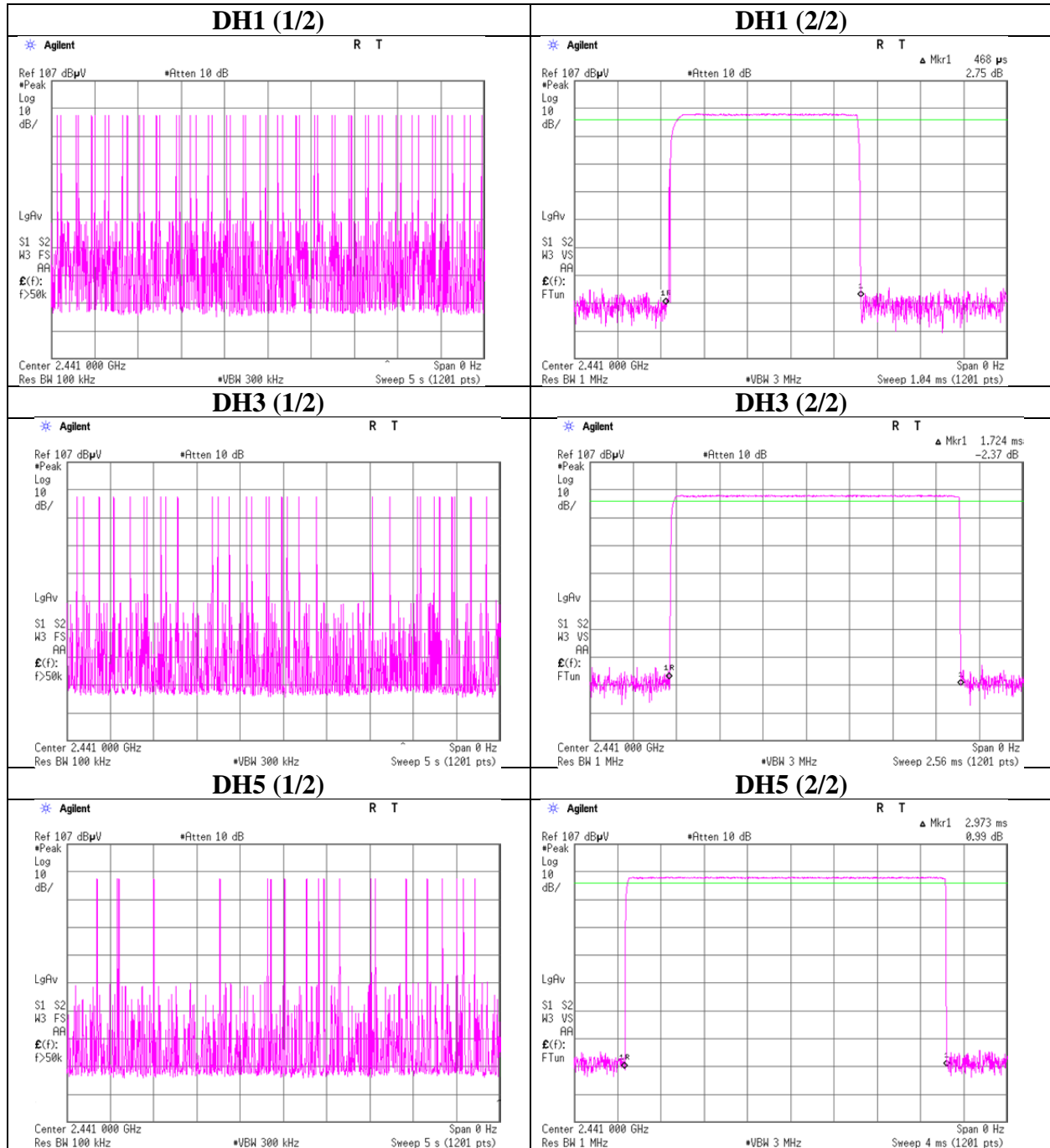
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## Dwell time



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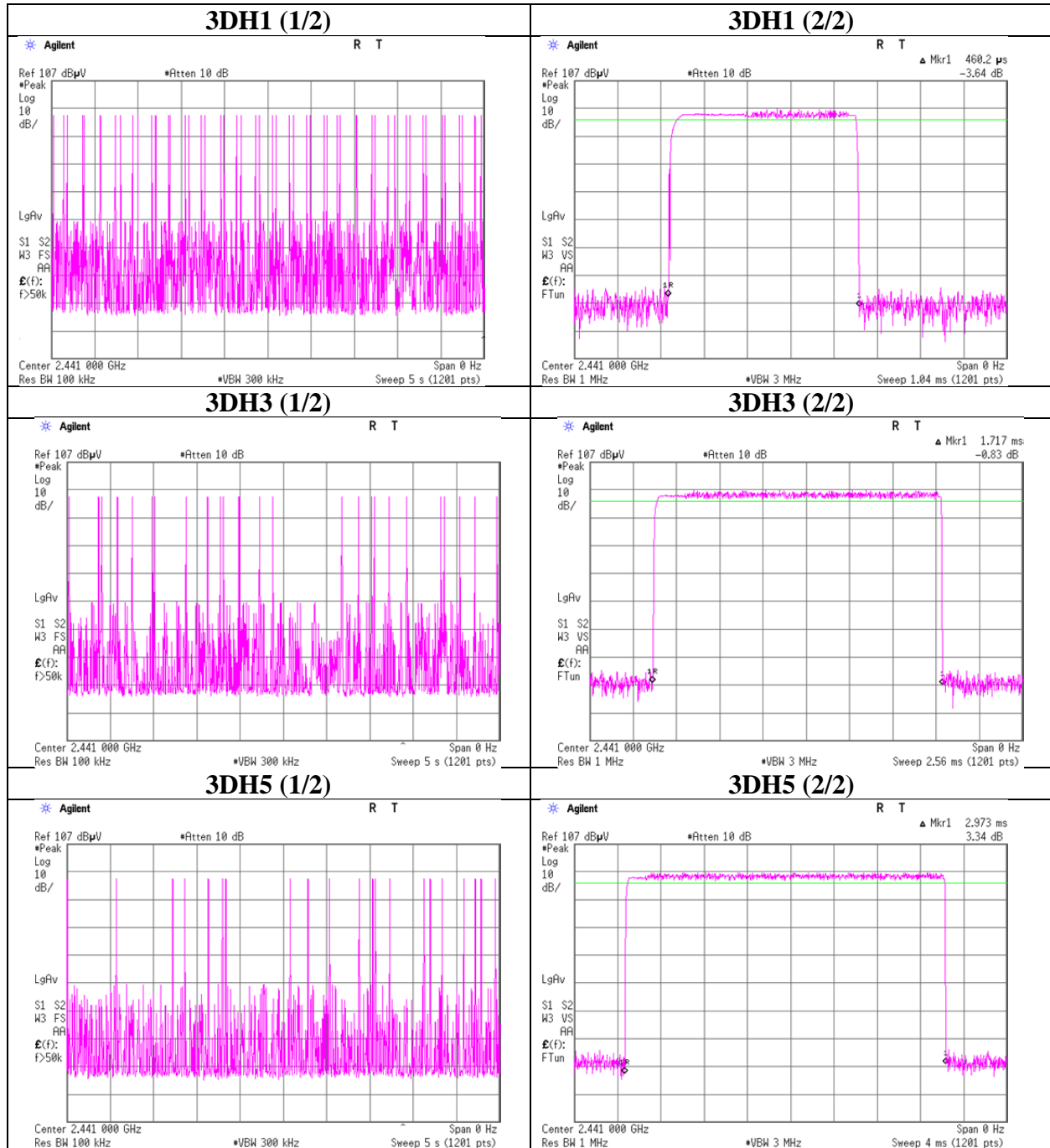
**Ise EMC Lab.**

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## Dwell time



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## Maximum Peak Output Power

Test place : Ise EMC Lab. No.6 Measurement Room  
Report No. : 11045932H  
Date : 11/19/2015  
Temperature/ Humidity : 21 deg. C / 43 % RH  
Engineer : Tsubasa Takayama  
Mode : Tx (Hopping off) DH5/2DH5/3DH5/Inquiry

Mode	Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result		Limit		Margin [dB]
					[dBm]	[mW]	[dBm]	[mW]	
DH5	2402	-11.19	1.94	10.02	0.77	1.19	20.96	125	20.19
DH5	2441	-11.47	1.95	10.02	0.50	1.12	20.96	125	20.46
DH5	2480	-11.99	1.96	10.02	-0.01	1.00	20.96	125	20.97
2DH5	2402	-9.47	1.94	10.02	2.49	1.77	20.96	125	18.47
2DH5	2441	-9.76	1.95	10.02	2.21	1.66	20.96	125	18.75
2DH5	2480	-10.35	1.96	10.02	1.63	1.45	20.96	125	19.33
3DH5	2402	-9.01	1.94	10.02	2.95	1.97	20.96	125	18.01
3DH5	2441	-9.36	1.95	10.02	2.61	1.82	20.96	125	18.35
3DH5	2480	-9.83	1.96	10.02	2.15	1.64	20.96	125	18.81
Inquiry	2441	-9.87	1.95	10.02	2.10	1.62	20.96	125	18.86

Sample Calculation:

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

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

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

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**Average Output Power**  
**(Reference data for SAR testing)**

Test place : Ise EMC Lab. No.6 Measurement Room  
Report No. : 11045932H  
Date : 11/19/2015  
Temperature/ Humidity : 21 deg. C / 43 % RH  
Engineer : Tsubasa Takayama  
Mode : Tx (Hopping off) DH5/2DH5/3DH5

Mode	Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Antenna Gain [dBi]	Result (Cond.)		Result (e.i.r.p)	
						[dBm]	[mW]	[dBm]	[mW]
DH5	2402	-12.62	1.94	10.02	-6.10	-0.66	0.86	-6.76	0.21
DH5	2441	-12.87	1.95	10.02	-6.10	-0.90	0.81	-7.00	0.20
DH5	2480	-13.46	1.96	10.02	-6.10	-1.48	0.71	-7.58	0.17
2DH5	2402	-13.13	1.94	10.02	-6.10	-1.17	0.76	-7.27	0.19
2DH5	2441	-13.39	1.95	10.02	-6.10	-1.42	0.72	-7.52	0.18
2DH5	2480	-14.16	1.96	10.02	-6.10	-2.18	0.61	-8.28	0.15
3DH5	2402	-13.12	1.94	10.02	-6.10	-1.16	0.77	-7.26	0.19
3DH5	2441	-13.38	1.95	10.02	-6.10	-1.41	0.72	-7.51	0.18
3DH5	2480	-14.00	1.96	10.02	-6.10	-2.02	0.63	-8.12	0.15

Sample Calculation:

Result(Cond.) = Reading + Cable Loss (including the Cable(s) customer supplied) + Atten.Loss

Result(e.i.r.p.) = Reading + Cable Loss (including the Cable(s) customer supplied) + Atten.Loss + Antenna Gain

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## Radiated Spurious Emission

Test place : Ise EMC Lab. No.2 Semi Anechoic Chamber  
Report No. : 11045932H  
Date : 11/17/2015 Day : 11/17/2015 Night : 11/17/2015 Day  
Temperature/ Humidity : 24 deg. C / 46 % RH : 24 deg. C / 46 % RH : 24 deg. C / 46 % RH  
Engineer : Tsubasa Takayama : Hiroyuki Furutaka : Tsubasa Takayama  
Mode : (1-10 GHz) : (Above 10 GHz) : (below 10 GHz)  
Tx, DH5 2402 MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	96.000	QP	32.3	9.1	7.4	28.2	20.6	43.5	22.9	
Hori	156.000	QP	29.7	15.2	7.9	27.9	24.9	43.5	18.6	
Hori	331.338	QP	42.1	15.3	9.0	27.7	38.7	46.0	7.3	
Hori	403.556	QP	35.6	17.1	9.4	28.2	33.9	46.0	12.1	
Hori	423.234	QP	33.4	17.3	9.5	28.3	31.9	46.0	14.1	
Hori	426.706	QP	36.7	17.3	9.5	28.3	35.2	46.0	10.8	
Hori	853.404	QP	27.5	22.1	11.1	27.6	33.1	46.0	12.9	
Hori	931.172	QP	26.5	22.7	11.4	27.2	33.4	46.0	12.6	
Hori	2375.880	PK	48.8	29.3	2.5	35.0	45.6	73.9	28.3	
Hori	2390.000	PK	49.0	29.3	2.5	35.0	45.8	73.9	28.1	
Hori	2400.000	PK	-	-	-	-	-	-	-	See 20dBc Data Sheet
Hori	3867.510	PK	49.9	30.7	4.7	34.0	51.3	73.9	22.6	
Hori	4804.000	PK	41.0	32.7	5.1	34.2	44.6	73.9	29.3	
Hori	7206.000	PK	43.9	36.8	6.1	34.1	52.7	73.9	21.2	
Hori	9608.000	PK	43.0	38.9	7.0	34.7	54.2	73.9	19.8	Noise floor
Hori	2375.880	AV	38.9	29.3	2.5	35.0	35.7	53.9	18.3	
Hori	2390.000	AV	32.4	29.3	2.5	35.0	29.2	53.9	24.7	
Hori	3867.510	AV	46.6	30.7	4.7	34.0	48.0	53.9	5.9	
Hori	4804.000	AV	30.2	32.7	5.1	34.2	33.8	53.9	20.1	
Hori	7206.000	AV	33.3	36.8	6.1	34.1	42.1	53.9	11.8	
Hori	9608.000	AV	30.4	38.9	7.0	34.7	41.6	53.9	12.3	Noise floor
Vert	52.000	QP	30.5	9.6	7.0	28.5	18.6	40.0	21.4	
Vert	96.000	QP	31.3	9.1	7.4	28.2	19.6	43.5	23.9	
Vert	116.380	QP	29.4	11.8	7.6	28.1	20.7	43.5	22.8	
Vert	426.704	QP	31.7	17.3	9.5	28.3	30.2	46.0	15.8	
Vert	775.820	QP	26.0	21.6	10.8	27.9	30.5	46.0	15.5	
Vert	931.172	QP	26.7	22.7	11.4	27.2	33.6	46.0	12.4	
Vert	2375.880	PK	46.5	29.3	2.5	35.0	43.3	73.9	30.6	
Vert	2390.000	PK	47.5	29.3	2.5	35.0	44.3	73.9	29.6	
Vert	2400.000	PK	-	-	-	-	-	-	-	See 20dBc Data Sheet
Vert	3867.510	PK	50.7	30.7	4.7	34.0	52.1	73.9	21.8	
Vert	4804.000	PK	42.9	32.7	5.1	34.2	46.5	73.9	27.4	
Vert	7206.000	PK	44.0	36.8	6.1	34.1	52.8	73.9	21.1	
Vert	9608.000	PK	43.6	38.9	7.0	34.7	54.8	73.9	19.1	Noise floor
Vert	2375.880	AV	36.6	29.3	2.5	35.0	33.4	53.9	20.5	
Vert	2390.000	AV	32.1	29.3	2.5	35.0	28.9	53.9	25.0	
Vert	3867.510	AV	45.9	30.7	4.7	34.0	47.3	53.9	6.6	
Vert	4804.000	AV	30.4	32.7	5.1	34.2	34.0	53.9	20.0	
Vert	7206.000	AV	32.9	36.8	6.1	34.1	41.7	53.9	12.2	
Vert	9608.000	AV	30.5	38.9	7.0	34.7	41.7	53.9	12.2	Noise floor

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

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

\*The 10th harmonic was not seen so the result was its base noise level.

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

### 20dBc Data Sheet

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hor	2402.000	PK	96.1	29.3	2.5	35.0	92.9	-	-	Carrier
Hor	2400.000	PK	54.1	29.3	2.5	35.0	50.9	72.9	22.0	
Ver	2402.000	PK	94.4	29.3	2.5	35.0	91.2	-	-	Carrier
Ver	2400.000	PK	52.1	29.3	2.5	35.0	48.9	71.2	22.3	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

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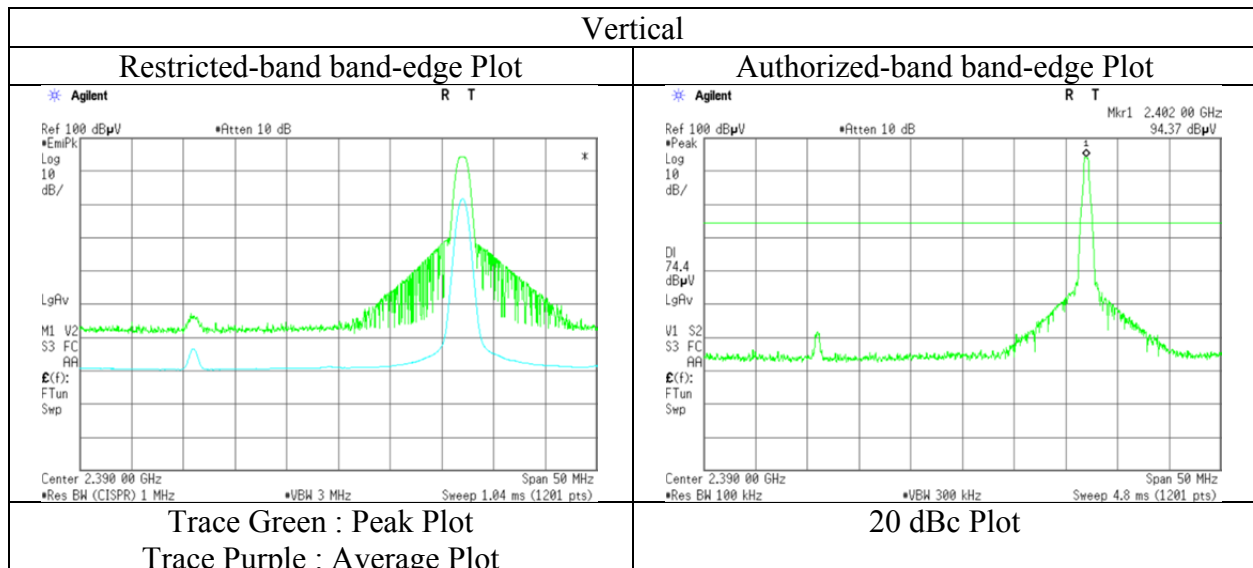
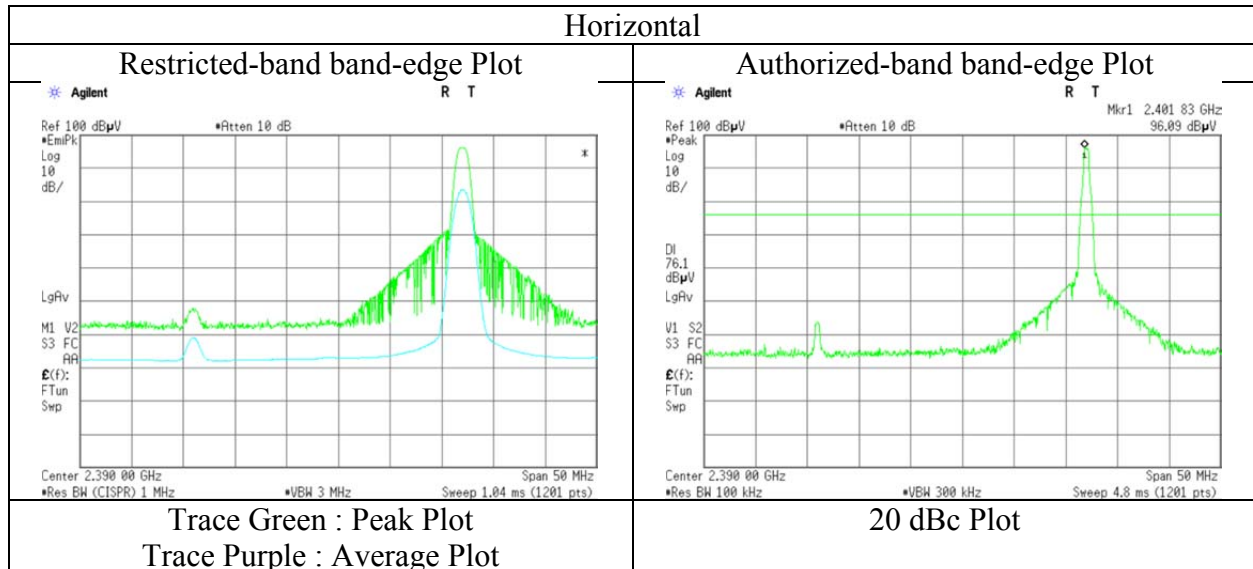
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## Radiated Spurious Emission (Reference Plot for band-edge)

Test place	Ise EMC Lab. No.2 Semi Anechoic Chamber
Report No.	11045932H
Date	11/17/2015 Day
Temperature/ Humidity	24 deg. C / 46 % RH
Engineer	Tsubasa Takayama
	(1-10 GHz)
Mode	Tx, DH5 2402 MHz



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

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## Radiated Spurious Emission

Test place Ise EMC Lab. No.2 Semi Anechoic Chamber  
Report No. 11045932H  
Date 11/16/2015 Night 11/16/2015 Night 11/17/2015 Night  
Temperature/ Humidity 24 deg. C / 46 % RH 24 deg. C / 46 % RH 23 deg. C / 50 % RH  
Engineer Hiroyuki Furutaka Hiroyuki Furutaka Hiroyuki Furutaka  
(1-10 GHz) (Above 10 GHz) (Below 10 GHz)  
Mode Tx, DH5 2441 MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	96.000	QP	45.3	9.1	7.4	28.2	33.6	43.5	9.9	
Hori	156.000	QP	32.7	15.2	7.9	27.9	27.9	43.5	15.6	
Hori	329.440	QP	37.4	15.2	9.0	27.6	34.0	46.0	12.0	
Hori	387.915	QP	36.0	16.8	9.4	28.1	34.1	46.0	11.9	
Hori	403.538	QP	37.6	17.1	9.4	28.2	35.9	46.0	10.1	
Hori	426.708	QP	38.9	17.3	9.5	28.3	37.4	46.0	8.6	
Hori	3867.667	PK	50.7	30.7	4.7	34.0	52.1	73.9	21.8	
Hori	4882.000	PK	42.3	32.8	5.1	34.2	46.0	73.9	27.9	
Hori	7323.000	PK	44.7	36.8	6.3	34.1	53.7	73.9	20.2	
Hori	9764.000	PK	43.2	39.0	6.9	34.7	54.4	73.9	19.5	Floor Noise
Hori	3867.667	AV	47.2	30.7	4.7	34.0	48.6	53.9	5.3	
Hori	4882.000	AV	30.3	32.8	5.1	34.2	34.0	53.9	19.9	
Hori	7323.000	AV	34.3	36.8	6.3	34.1	43.3	53.9	10.6	
Hori	9764.000	AV	31.0	39.0	6.9	34.7	42.2	53.9	11.7	Floor Noise
Vert	96.000	QP	39.4	9.1	7.4	28.2	27.7	43.5	15.8	
Vert	156.004	QP	30.2	15.2	7.9	27.9	25.4	43.5	18.1	
Vert	208.000	QP	30.2	16.6	8.2	27.6	27.4	43.5	16.1	
Vert	325.321	QP	31.8	15.1	9.0	27.6	28.3	46.0	17.7	
Vert	403.539	QP	34.8	17.1	9.4	28.2	33.1	46.0	12.9	
Vert	969.786	QP	30.7	23.1	11.5	27.1	38.2	53.9	15.7	
Vert	3867.679	PK	49.4	30.7	4.7	34.0	50.8	73.9	23.1	
Vert	4882.000	PK	42.8	32.8	5.1	34.2	46.5	73.9	27.4	
Vert	7323.000	PK	45.2	36.8	6.3	34.1	54.2	73.9	19.7	
Vert	9764.000	PK	43.6	39.0	6.9	34.7	54.8	73.9	19.1	Floor Noise
Vert	3867.679	AV	45.1	30.7	4.7	34.0	46.5	53.9	7.4	
Vert	4882.000	AV	30.3	32.8	5.1	34.2	34.0	53.9	19.9	
Vert	7323.000	AV	33.5	36.8	6.3	34.1	42.5	53.9	11.4	
Vert	9764.000	AV	30.8	39.0	6.9	34.7	42.0	53.9	11.9	Floor Noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

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

\*The 10th harmonic was not seen so the result was its base noise level.

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

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## Radiated Spurious Emission

Test place Ise EMC Lab. No.2 Semi Anechoic Chamber  
Report No. 11045932H  
Date 11/16/2015 Night 11/16/2015 Night 11/17/2015 Night  
Temperature/ Humidity 24 deg. C / 46 % RH 24 deg. C / 46 % RH 23 deg. C / 50 % RH  
Engineer Hiroyuki Furutaka Hiroyuki Furutaka Hiroyuki Furutaka  
(1-10 GHz) (Above 10 GHz) (Below 10 GHz)  
Mode Tx, DH5 2480 MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	96.000	QP	45.2	9.1	7.4	28.2	33.5	43.5	10.0	
Hori	156.000	QP	33.2	15.2	7.9	27.9	28.4	43.5	15.1	
Hori	329.439	QP	37.6	15.2	9.0	27.6	34.2	46.0	11.8	
Hori	387.915	QP	35.9	16.8	9.4	28.1	34.0	46.0	12.0	
Hori	403.538	QP	37.8	17.1	9.4	28.2	36.1	46.0	9.9	
Hori	426.705	QP	38.6	17.3	9.5	28.3	37.1	46.0	8.9	
Hori	2483.500	PK	63.1	29.3	2.6	34.9	60.1	73.9	13.8	
Hori	3867.585	PK	49.6	30.7	4.7	34.0	51.0	73.9	22.9	
Hori	4960.000	PK	42.7	33.0	5.2	34.3	46.6	73.9	27.4	
Hori	7440.000	PK	43.5	36.8	6.4	34.2	52.5	73.9	21.4	
Hori	9920.000	PK	43.6	39.0	6.9	34.7	54.8	73.9	19.1	Floor Noise
Hori	2483.500	AV	35.1	29.3	2.6	34.9	32.1	53.9	21.8	
Hori	3867.585	AV	45.1	30.7	4.7	34.0	46.5	53.9	7.4	
Hori	4960.000	AV	30.7	33.0	5.2	34.3	34.6	53.9	19.3	
Hori	7440.000	AV	31.1	36.8	6.4	34.2	40.1	53.9	13.8	
Hori	9920.000	AV	31.4	39.0	6.9	34.7	42.6	53.9	11.3	Floor Noise
Vert	96.000	QP	39.5	9.1	7.4	28.2	27.8	43.5	15.7	
Vert	156.004	QP	30.4	15.2	7.9	27.9	25.6	43.5	17.9	
Vert	208.000	QP	30.0	16.6	8.2	27.6	27.2	43.5	16.3	
Vert	325.326	QP	31.6	15.1	9.0	27.6	28.1	46.0	17.9	
Vert	403.541	QP	35.0	17.1	9.4	28.2	33.3	46.0	12.7	
Vert	969.787	QP	31.0	23.1	11.5	27.1	38.5	53.9	15.4	
Vert	2483.500	PK	63.1	29.3	2.6	34.9	60.1	73.9	13.8	
Vert	3867.679	PK	49.1	30.7	4.7	34.0	50.5	73.9	23.4	
Vert	4960.000	PK	42.4	33.0	5.2	34.3	46.3	73.9	27.6	
Vert	7440.000	PK	44.9	36.8	6.4	34.2	53.9	73.9	20.0	
Vert	9920.000	PK	43.4	39.0	6.9	34.7	54.6	73.9	19.3	Floor Noise
Vert	2483.500	AV	35.1	29.3	2.6	34.9	32.1	53.9	21.8	
Vert	3867.679	AV	45.1	30.7	4.7	34.0	46.5	53.9	7.4	
Vert	4960.000	AV	30.1	33.0	5.2	34.3	34.0	53.9	19.9	
Vert	7440.000	AV	33.6	36.8	6.4	34.2	42.6	53.9	11.3	
Vert	9920.000	AV	31.2	39.0	6.9	34.7	42.4	53.9	11.5	Floor Noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

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

\*The 10th harmonic was not seen so the result was its base noise level.

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

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## Radiated Spurious Emission

Test place Ise EMC Lab. No.2 Semi Anechoic Chamber  
Report No. 11045932H  
Date 11/16/2015 Night 11/16/2015 Night 11/17/2015 Night  
Temperature/ Humidity 24 deg. C / 46 % RH 24 deg. C / 46 % RH 23 deg. C / 50 % RH  
Engineer Hiroyuki Furutaka Hiroyuki Furutaka Hiroyuki Furutaka  
(1-10 GHz) (Above 10 GHz) (Below 10 GHz)  
Mode Tx, 3DH5 2402 MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	96.000	QP	45.4	9.1	7.4	28.2	33.7	43.5	9.8	
Hori	156.000	QP	32.2	15.2	7.9	27.9	27.4	43.5	16.1	
Hori	329.441	QP	37.4	15.2	9.0	27.6	34.0	46.0	12.0	
Hori	387.915	QP	36.0	16.8	9.4	28.1	34.1	46.0	11.9	
Hori	403.540	QP	37.6	17.1	9.4	28.2	35.9	46.0	10.1	
Hori	426.708	QP	38.7	17.3	9.5	28.3	37.2	46.0	8.8	
Hori	2376.097	PK	47.2	29.3	2.5	35.0	44.0	73.9	29.9	
Hori	2390.000	PK	44.5	29.3	2.5	35.0	41.3	73.9	32.6	
Hori	2400.000	PK	-	-	-	-	-	-	-	See 20dBc Data Sheet
Hori	3867.453	PK	49.9	30.7	4.7	34.0	51.3	73.9	22.6	
Hori	4804.000	PK	43.2	32.7	5.1	34.2	46.8	73.9	27.1	
Hori	7206.000	PK	43.2	36.8	6.1	34.1	52.0	73.9	21.9	
Hori	9608.000	PK	43.4	38.9	7.0	34.7	54.6	73.9	19.3	Floor Noise
Hori	2376.097	AV	36.0	29.3	2.5	35.0	32.8	53.9	21.1	
Hori	2390.000	AV	31.8	29.3	2.5	35.0	28.6	53.9	25.3	
Hori	3867.453	AV	45.5	30.7	4.7	34.0	46.9	53.9	7.0	
Hori	4804.000	AV	30.2	32.7	5.1	34.2	33.8	53.9	20.1	
Hori	7206.000	AV	31.8	36.8	6.1	34.1	40.6	53.9	13.3	
Hori	9608.000	AV	30.9	38.9	7.0	34.7	42.1	53.9	11.8	Floor Noise
Vert	96.000	QP	39.0	9.1	7.4	28.2	27.3	43.5	16.2	
Vert	156.000	QP	29.7	15.2	7.9	27.9	24.9	43.5	18.6	
Vert	208.000	QP	30.4	16.6	8.2	27.6	27.6	43.5	15.9	
Vert	325.331	QP	31.6	15.1	9.0	27.6	28.1	46.0	17.9	
Vert	403.550	QP	34.0	17.1	9.4	28.2	32.3	46.0	13.7	
Vert	969.786	QP	30.7	23.1	11.5	27.1	38.2	53.9	15.7	
Vert	2376.030	PK	46.2	29.3	2.5	35.0	43.0	73.9	30.9	
Vert	2390.000	PK	44.3	29.3	2.5	35.0	41.1	73.9	32.8	
Vert	2400.000	PK	-	-	-	-	-	-	-	See 20dBc Data Sheet
Vert	3867.560	PK	49.2	30.7	4.7	34.0	50.6	73.9	23.3	
Vert	4804.000	PK	43.1	32.7	5.1	34.2	46.7	73.9	27.2	
Vert	7206.000	PK	43.9	36.8	6.1	34.1	52.7	73.9	21.2	
Vert	9608.000	PK	43.4	38.9	7.0	34.7	54.6	73.9	19.3	Floor Noise
Vert	2376.030	AV	35.1	29.3	2.5	35.0	31.9	53.9	22.0	
Vert	2390.000	AV	31.9	29.3	2.5	35.0	28.7	53.9	25.2	
Vert	3867.560	AV	44.7	30.7	4.7	34.0	46.1	53.9	7.8	
Vert	4804.000	AV	30.3	32.7	5.1	34.2	33.9	53.9	20.0	
Vert	7206.000	AV	32.6	36.8	6.1	34.1	41.4	53.9	12.5	
Vert	9608.000	AV	31.0	38.9	7.0	34.7	42.2	53.9	11.7	Floor Noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

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

\*The 10th harmonic was not seen so the result was its base noise level.

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

### 20dBc Data Sheet

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2402.000	PK	92.8	29.3	2.5	35.0	89.6	-	-	Carrier
Hori	2400.000	PK	50.7	29.3	2.5	35.0	47.5	69.6	22.1	
Vert	2402.000	PK	93.3	29.3	2.5	35.0	90.1	-	-	Carrier
Vert	2400.000	PK	51.1	29.3	2.5	35.0	47.9	70.1	22.2	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

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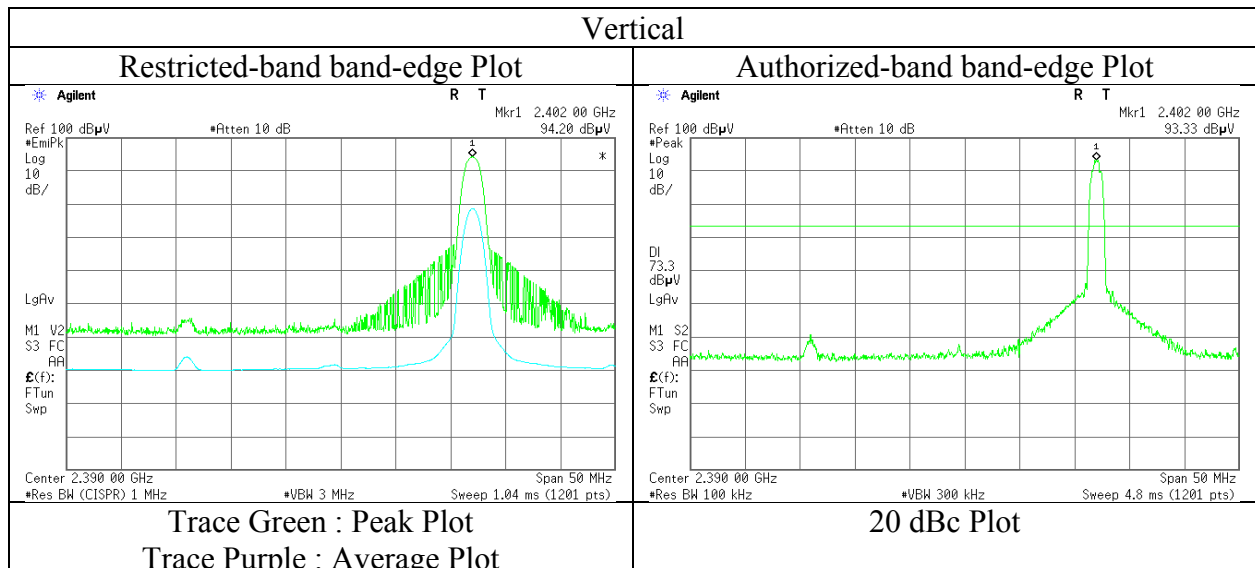
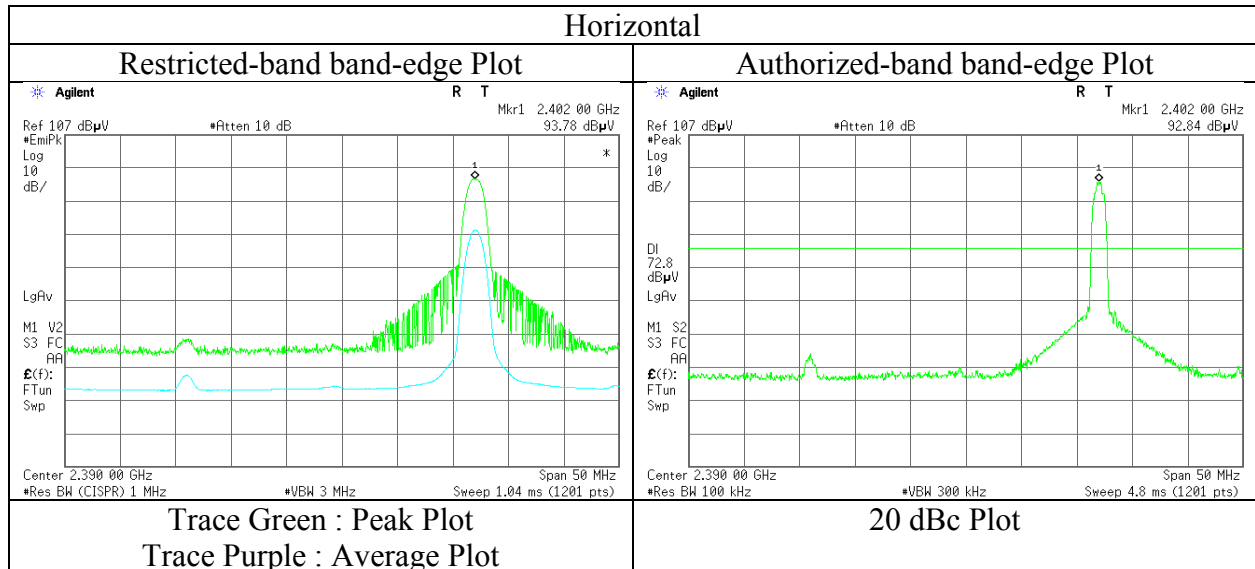
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## Radiated Spurious Emission (Reference Plot for band-edge)

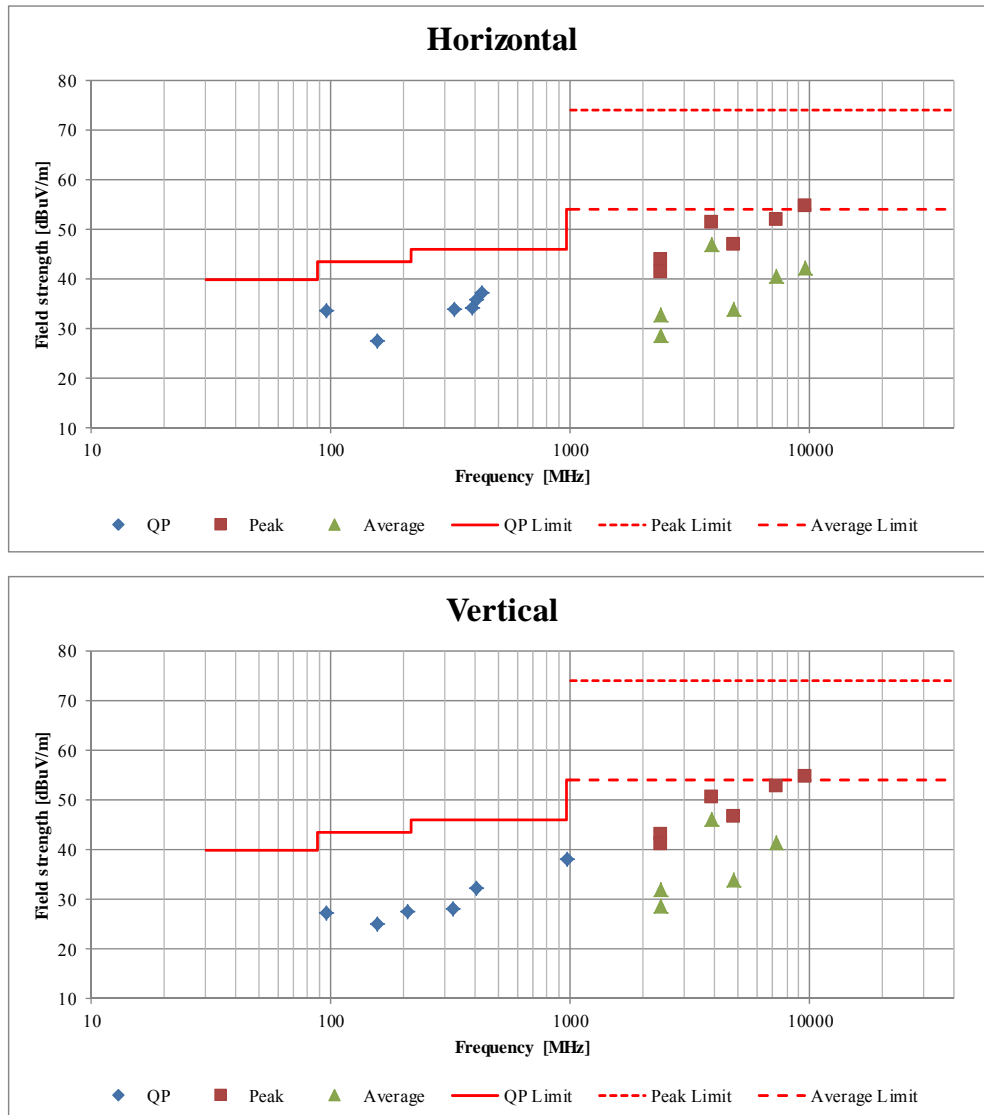
Test place	Ise EMC Lab. No.2 Semi Anechoic Chamber
Report No.	11045932H
Date	11/16/2015 Night
Temperature/ Humidity	24 deg. C / 46 % RH
Engineer	Hiroyuki Furutaka
	(1-10 GHz)
Mode	Tx, 3DH5 2402 MHz



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

## Radiated Spurious Emission (Plot data, Worst case)

Test place	Ise EMC Lab. No.2 Semi Anechoic Chamber		
Report No.	11045932H		
Date	11/16/2015 Night	11/16/2015 Night	11/17/2015 Night
Temperature/ Humidity	24 deg. C / 46 % RH	24 deg. C / 46 % RH	23 deg. C / 50 % RH
Engineer	Hiroyuki Furutaka	Hiroyuki Furutaka	Hiroyuki Furutaka
	(1-10 GHz)	(Above 10 GHz)	(Below 10 GHz)
Mode	Tx, 3DH5 2402 MHz		



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

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## Radiated Spurious Emission

Test place : Ise EMC Lab. No.2 Semi Anechoic Chamber  
Report No. : 11045932H  
Date : 11/16/2015 Night  
Temperature/ Humidity : 24 deg. C / 46 % RH  
Engineer : Hiroyuki Furutaka  
Mode : Tx, 3DH5 2441 MHz

11/16/2015 Night  
24 deg. C / 46 % RH  
Hiroyuki Furutaka  
(Above 10 GHz)

11/17/2015 Night  
23 deg. C / 50 % RH  
Hiroyuki Furutaka  
(Below 10 GHz)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	96.000	QP	45.3	9.1	7.4	28.2	33.6	43.5	9.9	
Hori	156.000	QP	32.7	15.2	7.9	27.9	27.9	43.5	15.6	
Hori	329.440	QP	37.4	15.2	9.0	27.6	34.0	46.0	12.0	
Hori	387.915	QP	36.0	16.8	9.4	28.1	34.1	46.0	11.9	
Hori	403.538	QP	37.6	17.1	9.4	28.2	35.9	46.0	10.1	
Hori	426.708	QP	38.9	17.3	9.5	28.3	37.4	46.0	8.6	
Hori	3867.879	PK	49.5	30.7	4.7	34.0	50.9	73.9	23.0	
Hori	4882.000	PK	42.4	32.8	5.1	34.2	46.1	73.9	27.8	
Hori	7323.000	PK	42.6	36.8	6.3	34.1	51.6	73.9	22.3	
Hori	9764.000	PK	43.1	39.0	6.9	34.7	54.3	73.9	19.6	Floor Noise
Hori	3867.879	AV	45.7	30.7	4.7	34.0	47.1	53.9	6.8	
Hori	4882.000	AV	30.4	32.8	5.1	34.2	34.1	53.9	19.8	
Hori	7323.000	AV	32.2	36.8	6.3	34.1	41.2	53.9	12.7	
Hori	9764.000	AV	31.2	39.0	6.9	34.7	42.4	53.9	11.5	Floor Noise
Vert	96.000	QP	39.4	9.1	7.4	28.2	27.7	43.5	15.8	
Vert	156.004	QP	30.2	15.2	7.9	27.9	25.4	43.5	18.1	
Vert	208.000	QP	30.2	16.6	8.2	27.6	27.4	43.5	16.1	
Vert	325.321	QP	31.8	15.1	9.0	27.6	28.3	46.0	17.7	
Vert	403.539	QP	34.8	17.1	9.4	28.2	33.1	46.0	12.9	
Vert	969.786	QP	30.7	23.1	11.5	27.1	38.2	53.9	15.7	
Vert	3867.655	PK	49.5	30.7	4.7	34.0	50.9	73.9	23.0	
Vert	4882.000	PK	42.8	32.8	5.1	34.2	46.5	73.9	27.4	
Vert	7323.000	PK	44.5	36.8	6.3	34.1	53.5	73.9	20.4	
Vert	9764.000	PK	42.9	39.0	6.9	34.7	54.1	73.9	19.8	Floor Noise
Vert	3867.655	AV	44.2	30.7	4.7	34.0	45.6	53.9	8.3	
Vert	4882.000	AV	30.3	32.8	5.1	34.2	34.0	53.9	19.9	
Vert	7323.000	AV	33.4	36.8	6.3	34.1	42.4	53.9	11.5	
Vert	9764.000	AV	31.0	39.0	6.9	34.7	42.2	53.9	11.7	Floor Noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

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

\*The 10th harmonic was not seen so the result was its base noise level.

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

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## Radiated Spurious Emission

Test place	Ise EMC Lab. No.2 Semi Anechoic Chamber		
Report No.	11045932H		
Date	11/16/2015 Night	11/16/2015 Night	11/17/2015 Night
Temperature/ Humidity	24 deg. C / 46 % RH	24 deg. C / 46 % RH	23 deg. C / 50 % RH
Engineer	Hiroyuki Furutaka	Hiroyuki Furutaka	Hiroyuki Furutaka
	(1-10 GHz)	(Above 10 GHz)	(Below 10 GHz)
Mode	Tx, 3DH5 2480 MHz		

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	96.000	QP	45.7	9.1	7.4	28.2	34.0	43.5	9.5	
Hori	156.000	QP	32.4	15.2	7.9	27.9	27.6	43.5	15.9	
Hori	331.241	QP	37.6	15.3	9.0	27.7	34.2	46.0	11.8	
Hori	387.614	QP	35.8	16.8	9.4	28.1	33.9	46.0	12.1	
Hori	403.532	QP	38.3	17.1	9.4	28.2	36.6	46.0	9.4	
Hori	426.710	QP	38.8	17.3	9.5	28.3	37.3	46.0	8.7	
Hori	2483.500	PK	62.9	29.3	2.6	34.9	59.9	73.9	14.0	
Hori	2505.783	PK	46.7	29.3	2.6	34.9	43.7	73.9	30.2	
Hori	3867.580	PK	49.4	30.7	4.7	34.0	50.8	73.9	23.1	
Hori	4960.000	PK	42.1	33.0	5.2	34.3	46.0	73.9	27.9	
Hori	7440.000	PK	42.9	36.8	6.4	34.2	51.9	73.9	22.0	
Hori	9920.000	PK	43.7	39.0	6.9	34.7	54.9	73.9	19.0	Floor Noise
Hori	2483.500	AV	35.2	29.3	2.6	34.9	32.2	53.9	21.7	
Hori	2505.783	AV	35.7	29.3	2.6	34.9	32.7	53.9	21.2	
Hori	3867.580	AV	45.5	30.7	4.7	34.0	46.9	53.9	7.0	
Hori	4960.000	AV	30.0	33.0	5.2	34.3	33.9	53.9	20.0	
Hori	7440.000	AV	31.9	36.8	6.4	34.2	40.9	53.9	13.0	
Hori	9920.000	AV	31.0	39.0	6.9	34.7	42.2	53.9	11.7	Floor Noise
Vert	96.000	QP	39.9	9.1	7.4	28.2	28.2	43.5	15.3	
Vert	156.000	QP	29.3	15.2	7.9	27.9	24.5	43.5	19.0	
Vert	208.001	QP	30.3	16.6	8.2	27.6	27.5	43.5	16.0	
Vert	324.588	QP	31.9	15.1	9.0	27.6	28.4	46.0	17.6	
Vert	403.538	QP	34.4	17.1	9.4	28.2	32.7	46.0	13.3	
Vert	969.765	QP	28.9	23.1	11.5	27.1	36.4	53.9	17.5	
Vert	2483.500	PK	61.3	29.3	2.6	34.9	58.3	73.9	15.6	
Vert	2505.778	PK	45.4	29.3	2.6	34.9	42.4	73.9	31.5	
Vert	3867.560	PK	49.2	30.7	4.7	34.0	50.6	73.9	23.3	
Vert	4960.000	PK	42.6	33.0	5.2	34.3	46.5	73.9	27.4	
Vert	7440.000	PK	43.2	36.8	6.4	34.2	52.2	73.9	21.7	
Vert	9920.000	PK	43.7	39.0	6.9	34.7	54.9	73.9	19.0	Floor Noise
Vert	2483.500	AV	34.2	29.3	2.6	34.9	31.2	53.9	22.7	
Vert	2505.778	AV	34.3	29.3	2.6	34.9	31.3	53.9	22.6	
Vert	3867.560	AV	44.8	30.7	4.7	34.0	46.2	53.9	7.7	
Vert	4960.000	AV	30.2	33.0	5.2	34.3	34.1	53.9	19.8	
Vert	7440.000	AV	32.1	36.8	6.4	34.2	41.1	53.9	12.8	
Vert	9920.000	AV	31.3	39.0	6.9	34.7	42.5	53.9	11.4	Floor Noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

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

\*The 10th harmonic was not seen so the result was its base noise level.

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

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Duty Cycle

Test place

Report No.

Date

Temperature/ Humidity

Engineer

Mode

Ise EMC Lab. No.6 Measurement Room

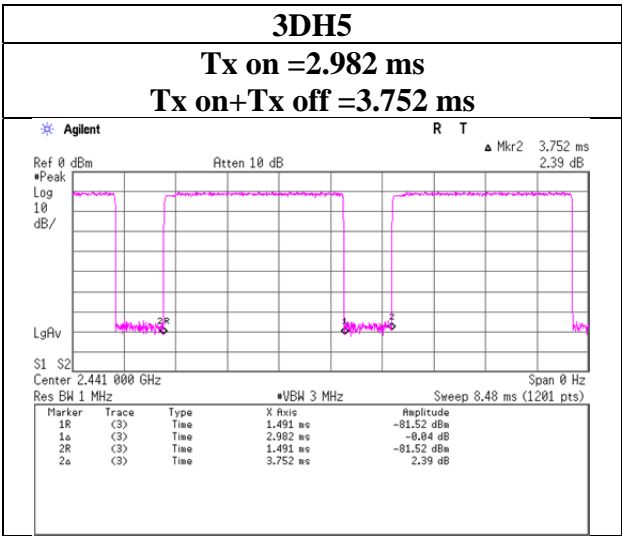
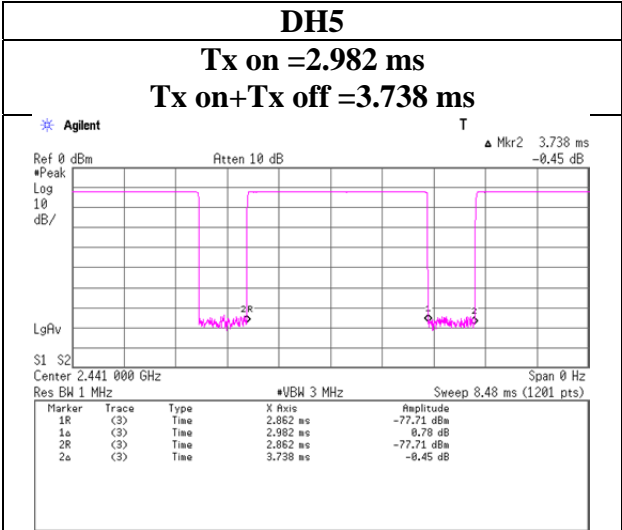
11045932H

11/19/2015

21 deg. C / 43 % RH

Tsubasa Takayama

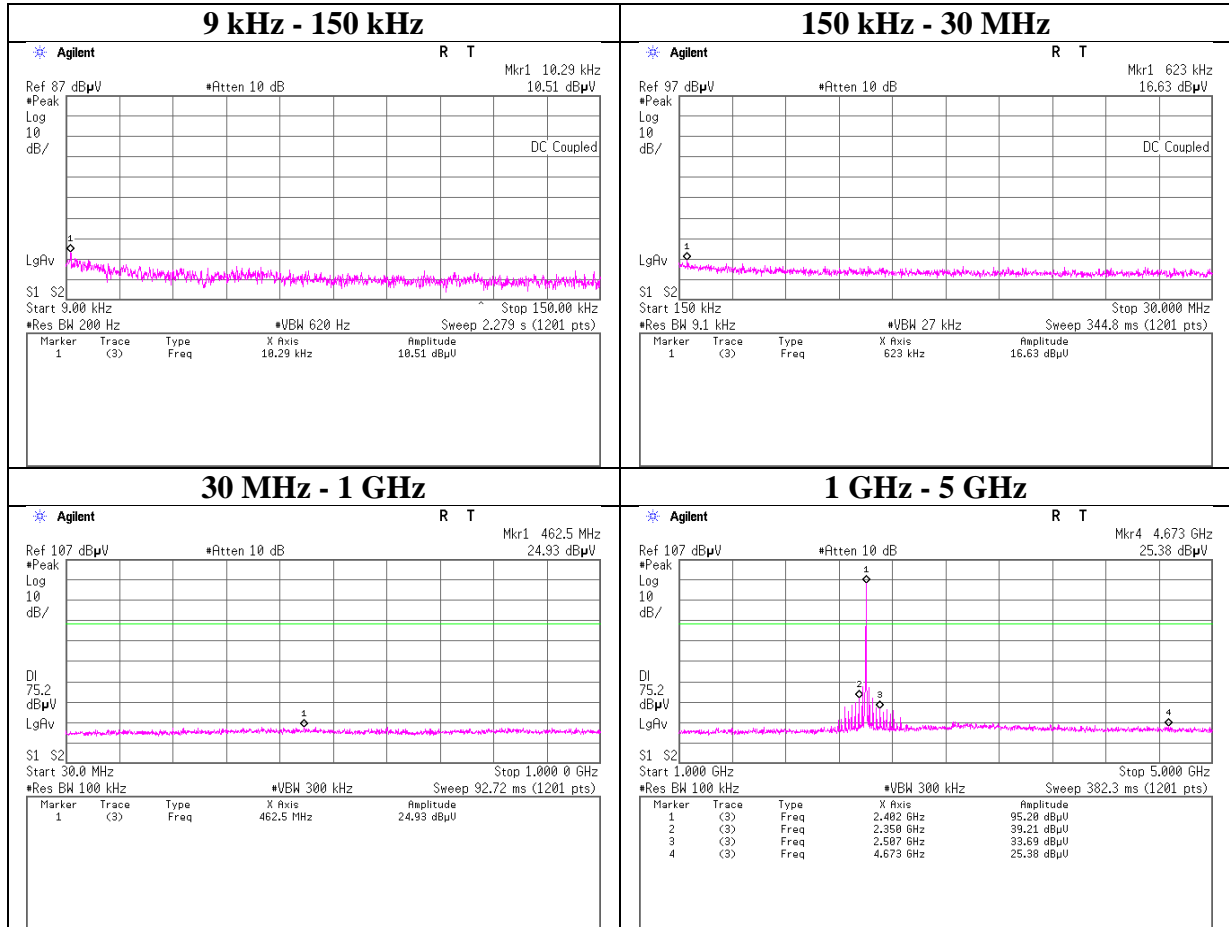
Tx (Hopping off) DH5/3DH5



## Conducted Spurious Emission

Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	11045932H
Date	11/19/2015
Temperature/ Humidity	21 deg. C / 43 % RH
Engineer	Tsubasa Takayama
Mode	Tx (Hopping off) DH5

### Tx DH5 2402 MHz



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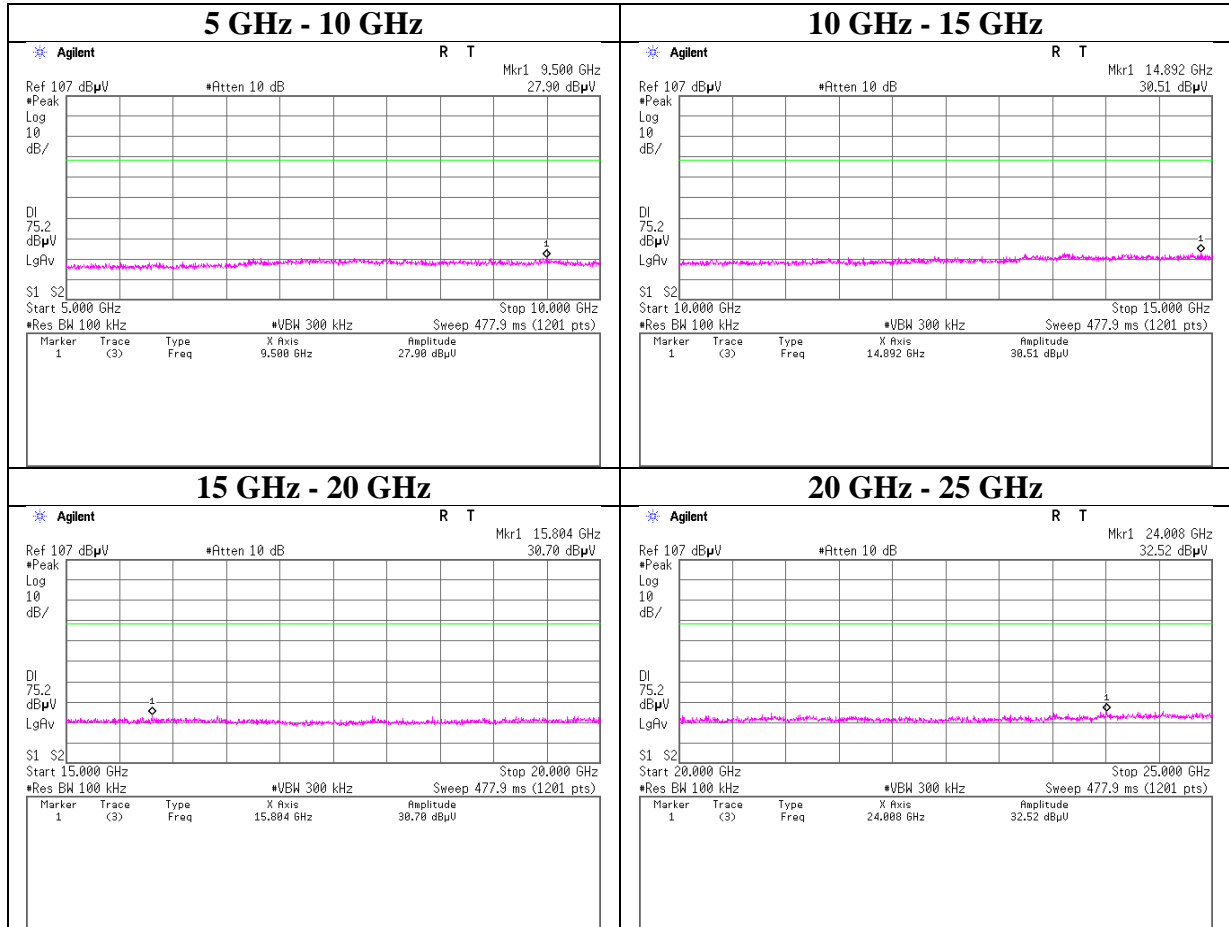
Facsimile : +81 596 24 8124



## Conducted Spurious Emission

Test place : Ise EMC Lab. No.6 Measurement Room  
Report No. : 11045932H  
Date : 11/19/2015  
Temperature/ Humidity : 21 deg. C / 43 % RH  
Engineer : Tsubasa Takayama  
Mode : Tx (Hopping off) DH5

### Tx DH5 2402 MHz



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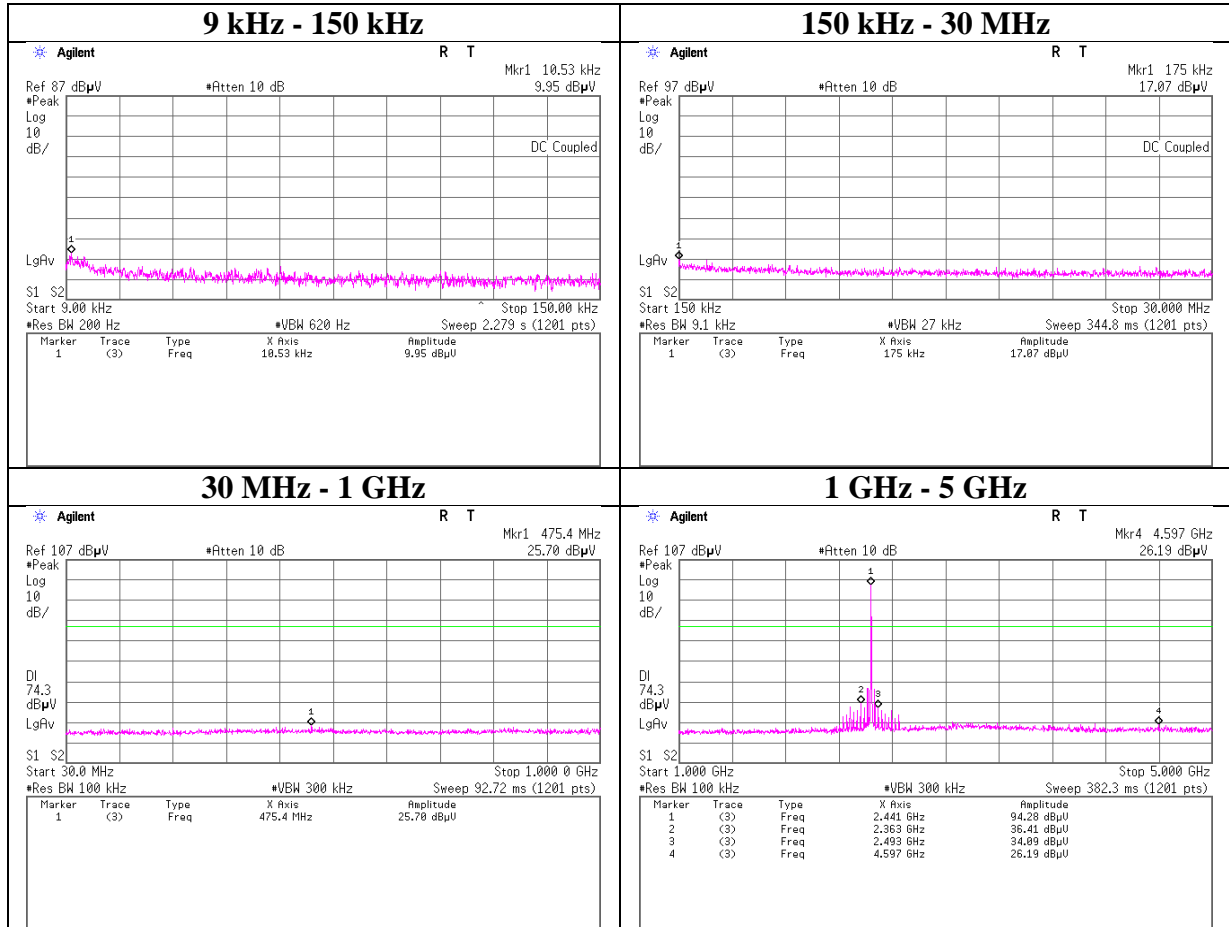
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

## Conducted Spurious Emission

Test place : Ise EMC Lab. No.6 Measurement Room  
Report No. : 11045932H  
Date : 11/19/2015  
Temperature/ Humidity : 21 deg. C / 43 % RH  
Engineer : Tsubasa Takayama  
Mode : Tx (Hopping off) DH5

### Tx DH5 2441 MHz



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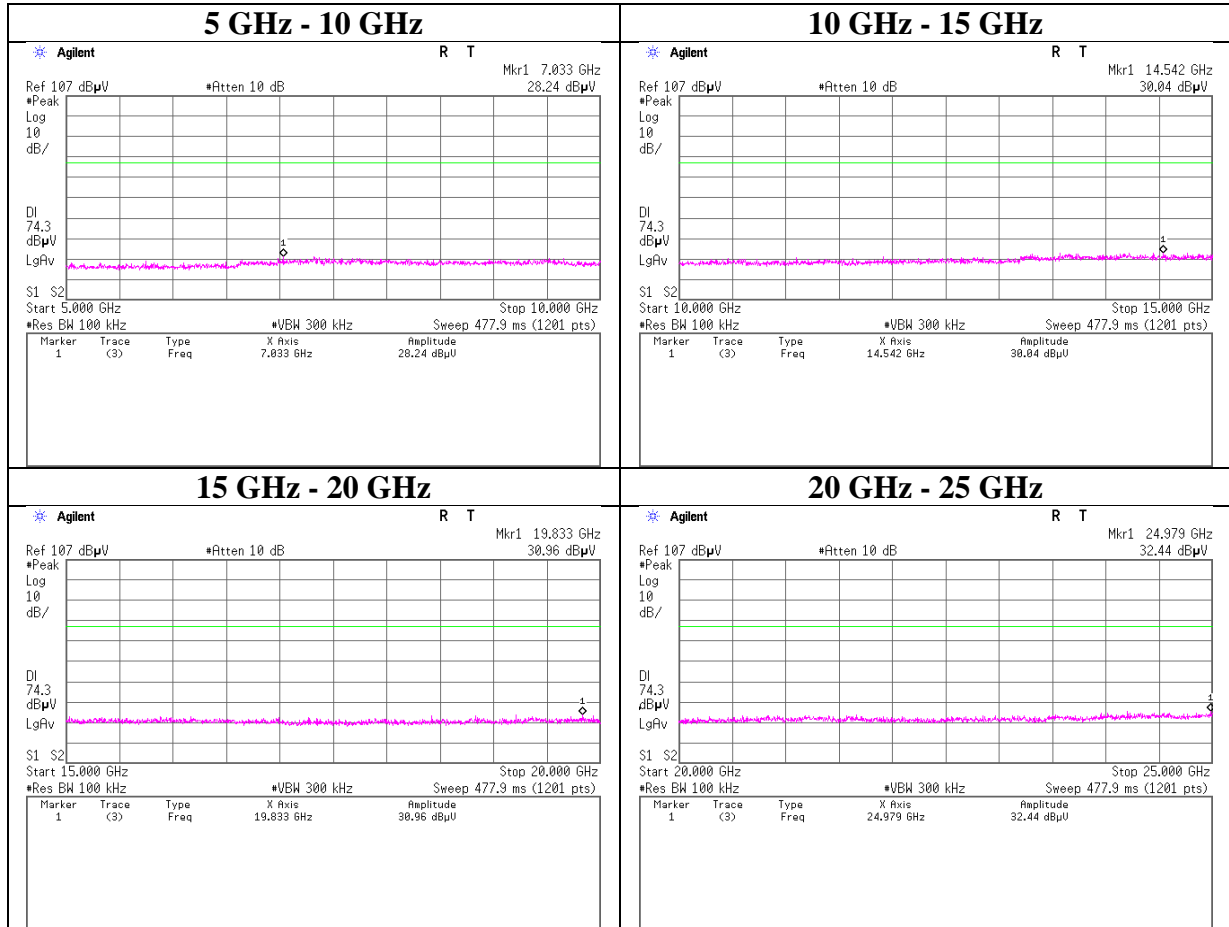
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

### Conducted Spurious Emission

Test place : Ise EMC Lab. No.6 Measurement Room  
Report No. : 11045932H  
Date : 11/19/2015  
Temperature/ Humidity : 21 deg. C / 43 % RH  
Engineer : Tsubasa Takayama  
Mode : Tx (Hopping off) DH5

#### **Tx DH5 2441 MHz**



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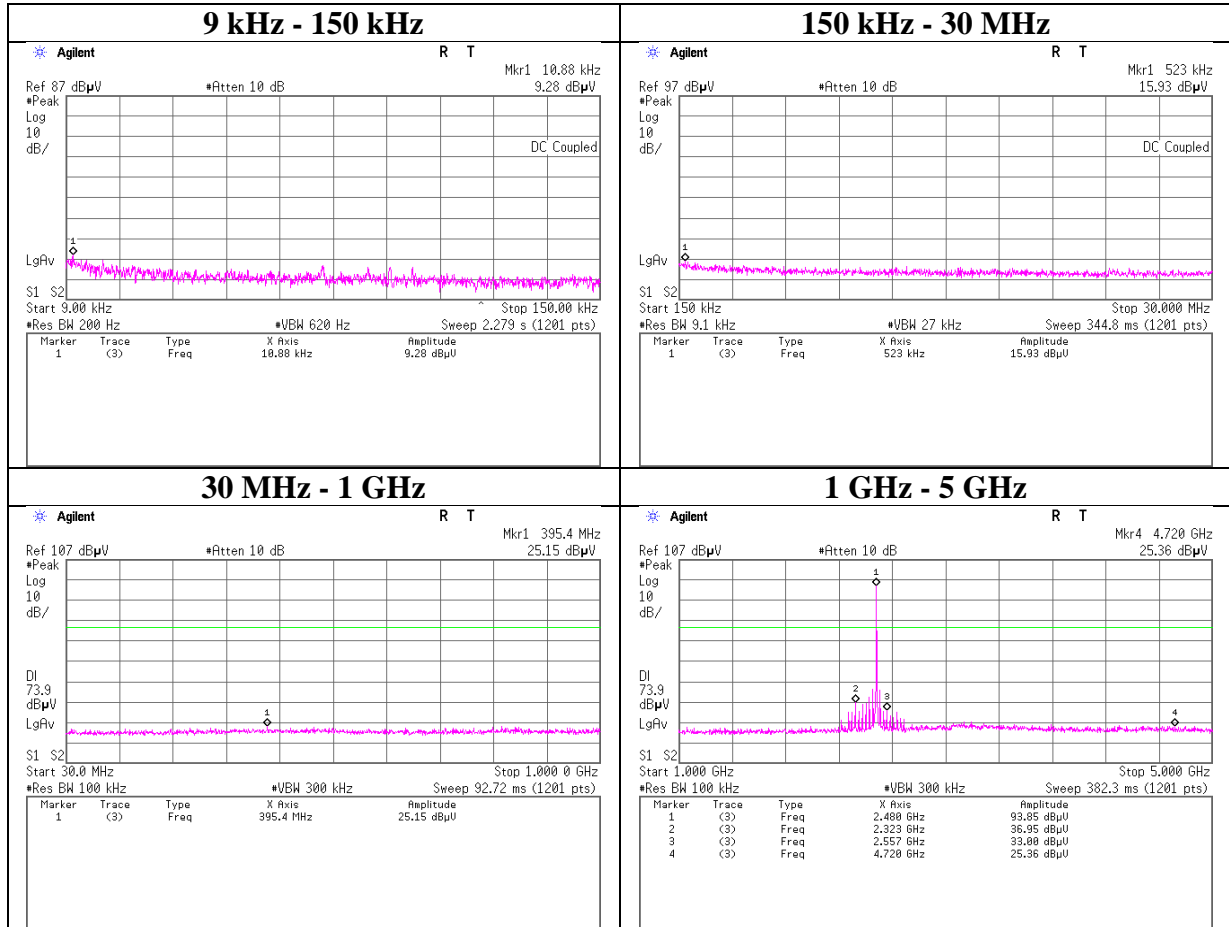
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

## Conducted Spurious Emission

Test place : Ise EMC Lab. No.6 Measurement Room  
Report No. : 11045932H  
Date : 11/19/2015  
Temperature/ Humidity : 21 deg. C / 43 % RH  
Engineer : Tsubasa Takayama  
Mode : Tx (Hopping off) DH5

### Tx DH5 2480 MHz



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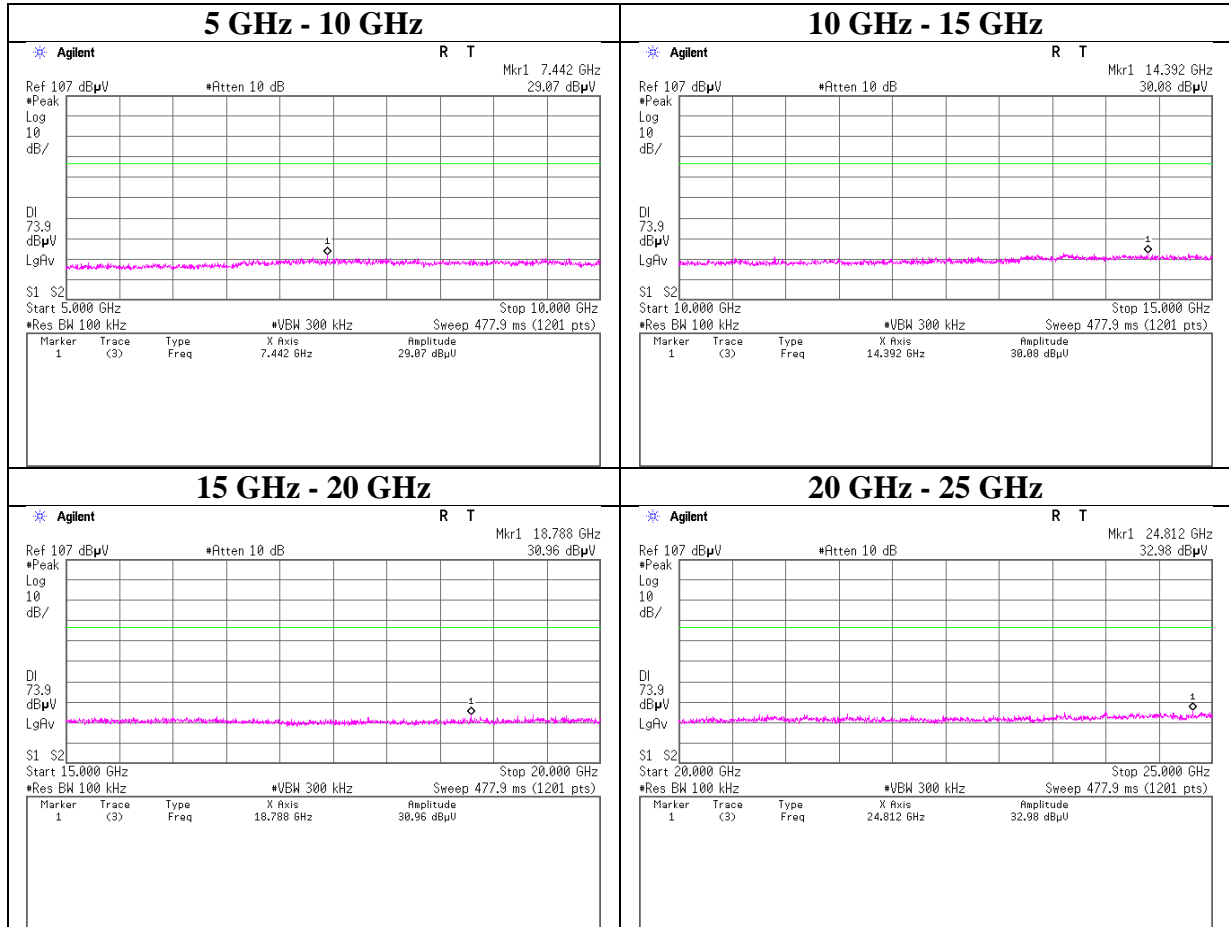
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

## Conducted Spurious Emission

Test place : Ise EMC Lab. No.6 Measurement Room  
Report No. : 11045932H  
Date : 11/19/2015  
Temperature/ Humidity : 21 deg. C / 43 % RH  
Engineer : Tsubasa Takayama  
Mode : Tx (Hopping off) DH5

### Tx DH5 2480 MHz



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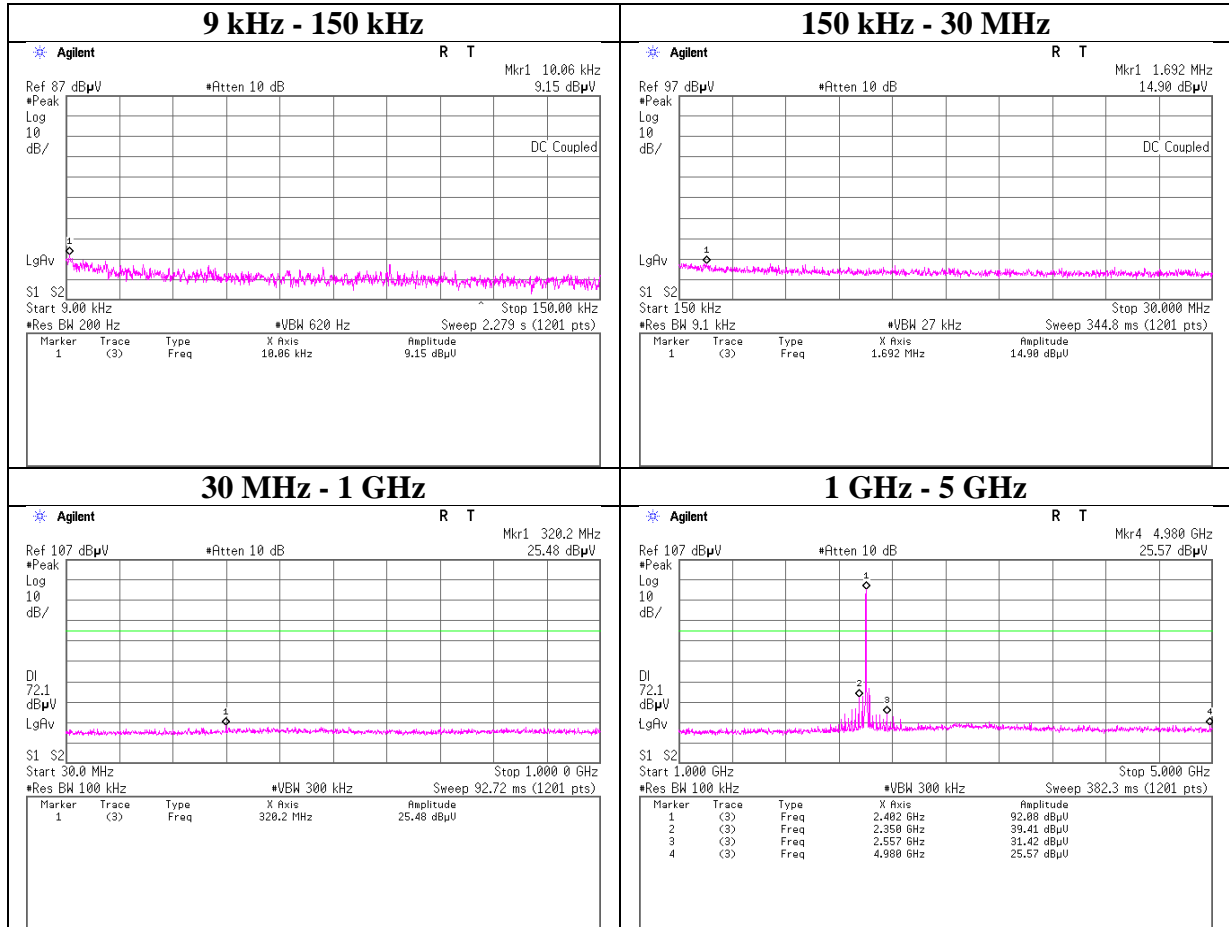
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

## Conducted Spurious Emission

Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	11045932H
Date	11/19/2015
Temperature/ Humidity	21 deg. C / 43 % RH
Engineer	Tsubasa Takayama
Mode	Tx (Hopping off) 3DH5

### Tx 3DH5 2402 MHz



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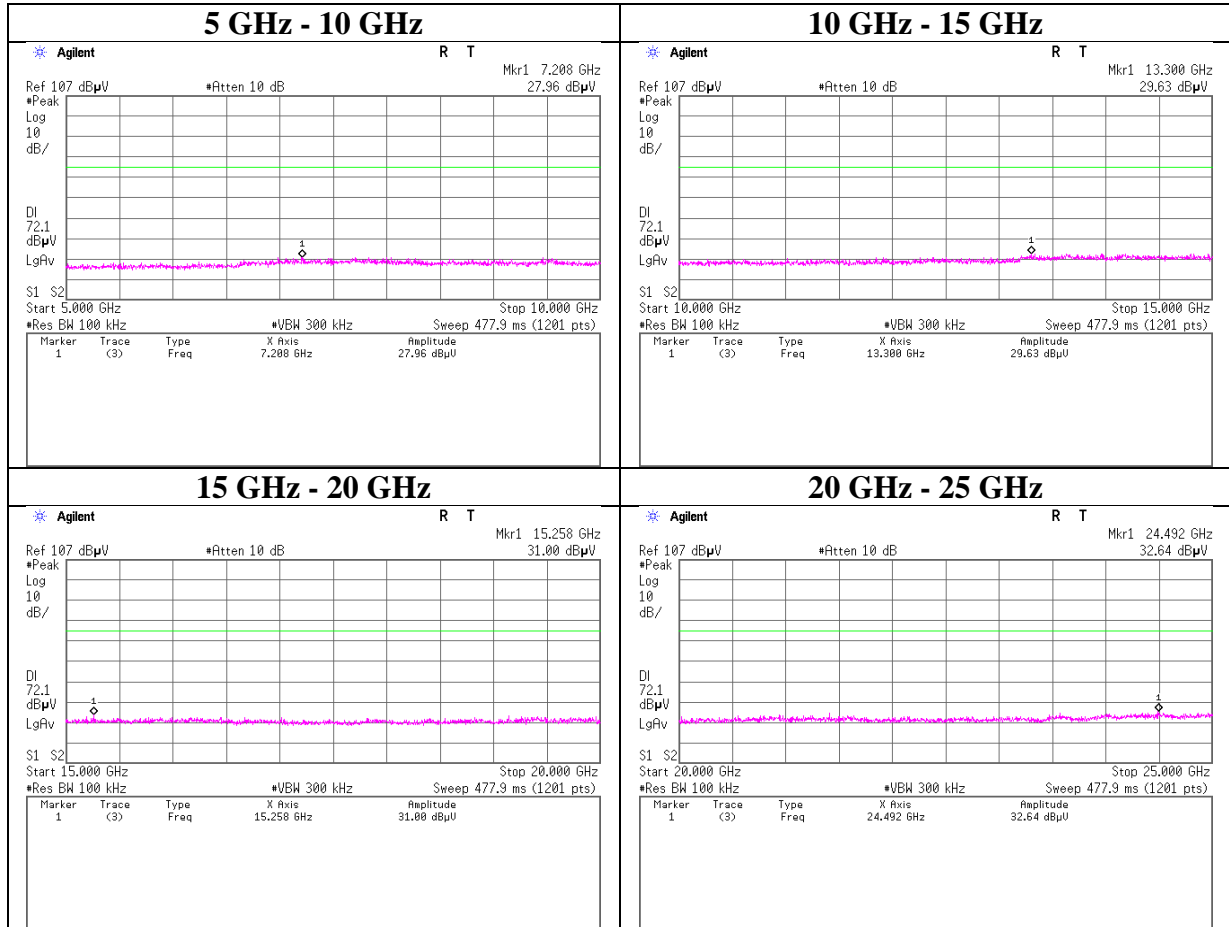
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

## Conducted Spurious Emission

Test place : Ise EMC Lab. No.6 Measurement Room  
Report No. : 11045932H  
Date : 11/19/2015  
Temperature/ Humidity : 21 deg. C / 43 % RH  
Engineer : Tsubasa Takayama  
Mode : Tx (Hopping off) 3DH5

### Tx 3DH5 2402 MHz



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Ise EMC Lab.

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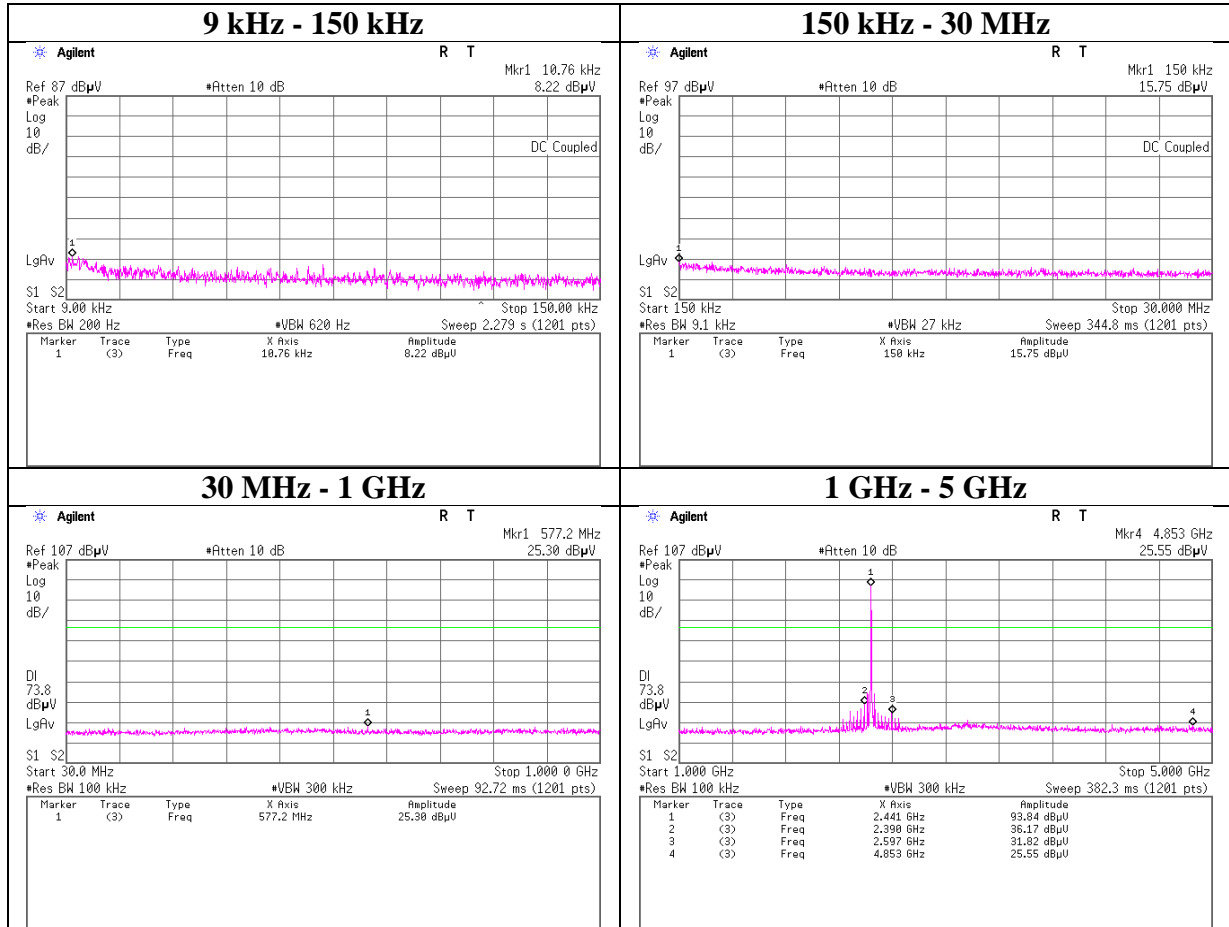
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

## Conducted Spurious Emission

Test place : Ise EMC Lab. No.6 Measurement Room  
Report No. : 11045932H  
Date : 11/19/2015  
Temperature/ Humidity : 21 deg. C / 43 % RH  
Engineer : Tsubasa Takayama  
Mode : Tx (Hopping off) 3DH5

### Tx 3DH5 2441 MHz



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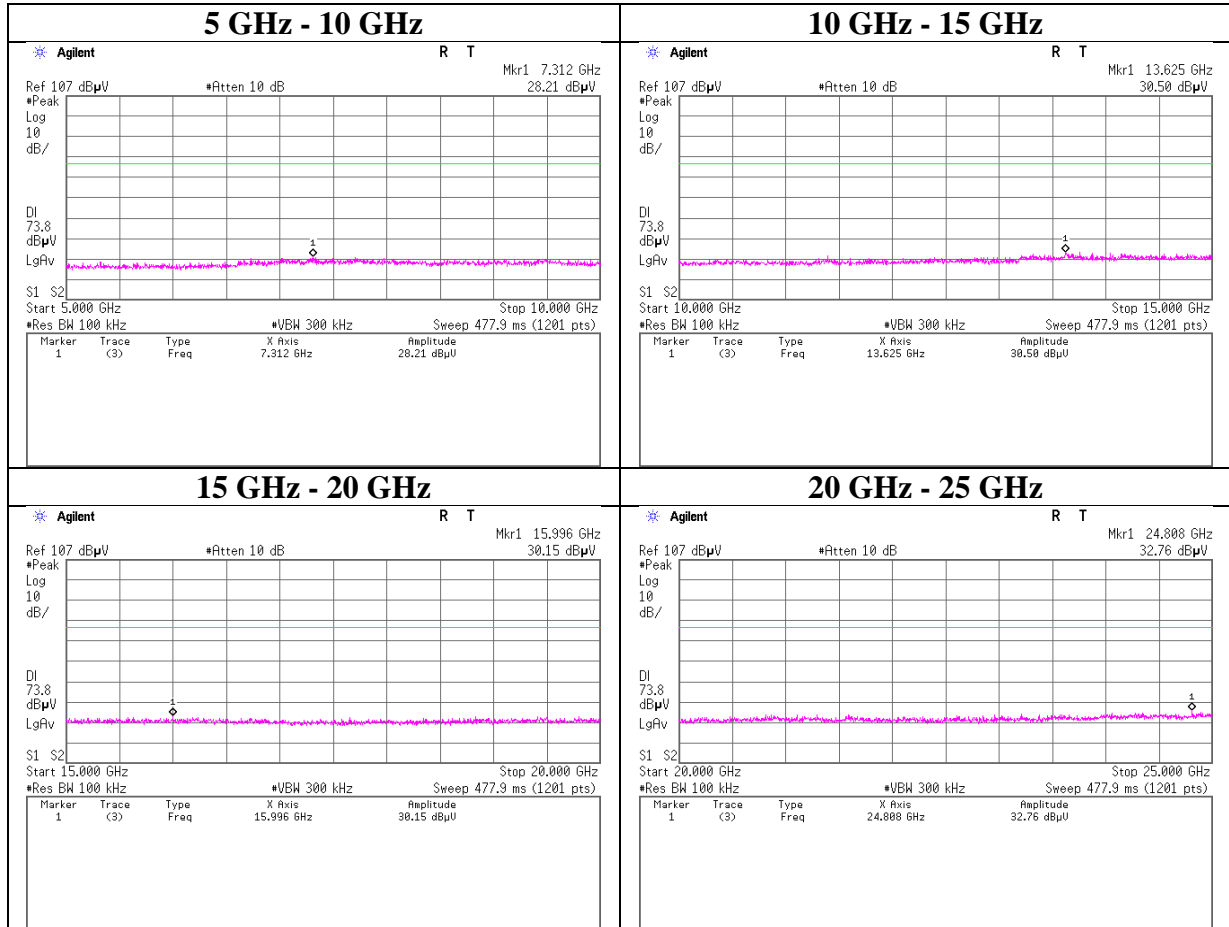
Facsimile : +81 596 24 8124



## Conducted Spurious Emission

Test place : Ise EMC Lab. No.6 Measurement Room  
Report No. : 11045932H  
Date : 11/19/2015  
Temperature/ Humidity : 21 deg. C / 43 % RH  
Engineer : Tsubasa Takayama  
Mode : Tx (Hopping off) 3DH5

### Tx 3DH5 2441 MHz



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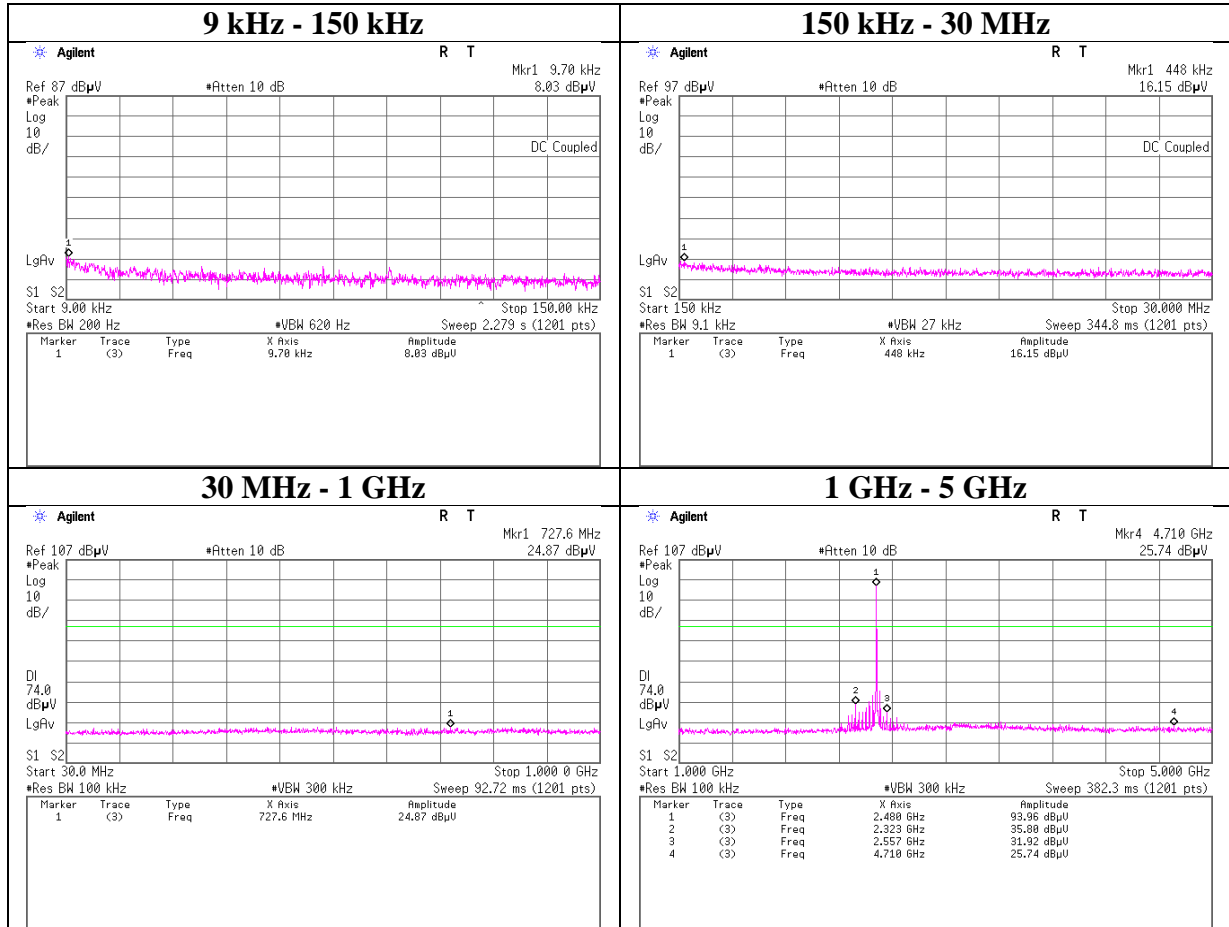
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

## Conducted Spurious Emission

Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	11045932H
Date	11/19/2015
Temperature/ Humidity	21 deg. C / 43 % RH
Engineer	Tsubasa Takayama
Mode	Tx (Hopping off) 3DH5

### Tx 3DH5 2480 MHz



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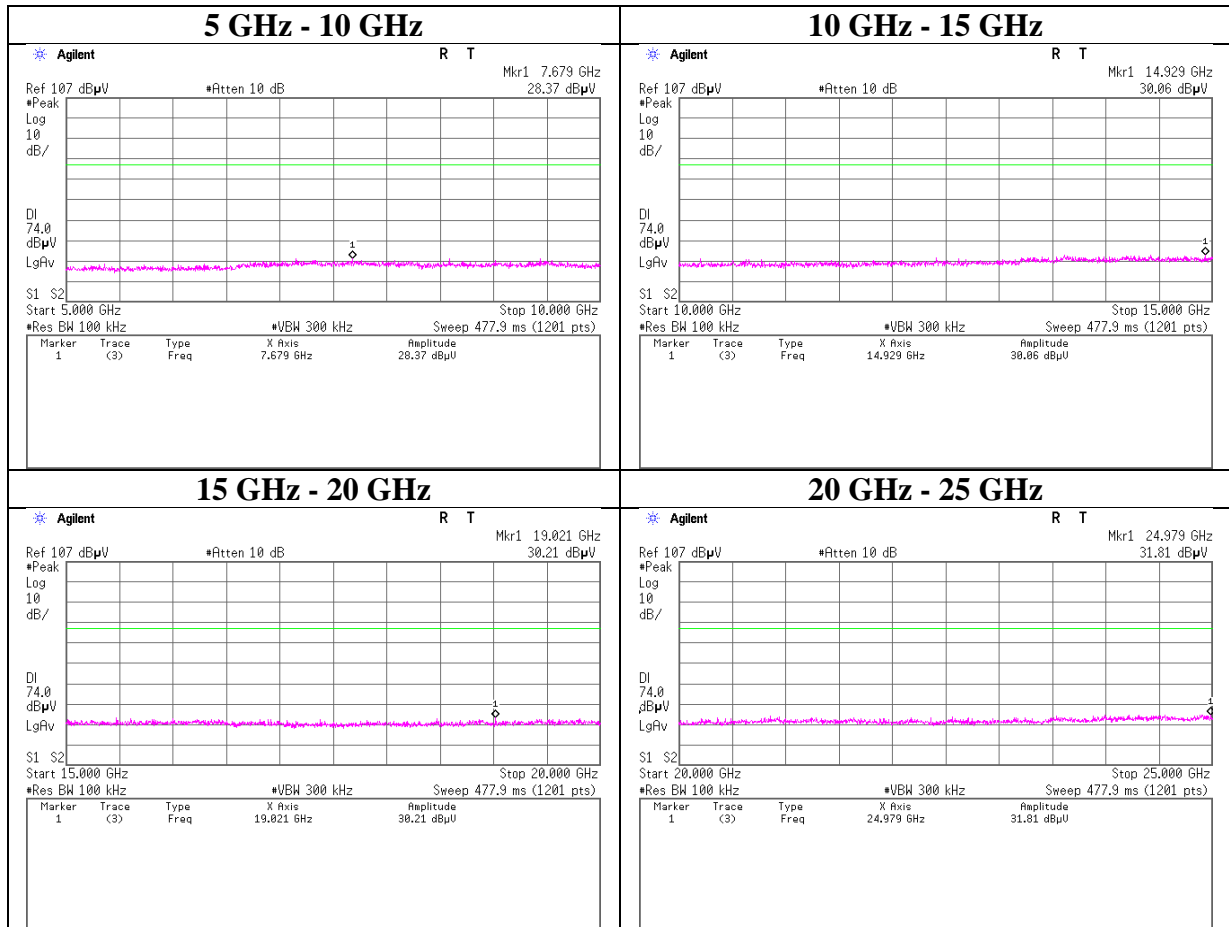
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

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Test place : Ise EMC Lab. No.6 Measurement Room  
Report No. : 11045932H  
Date : 11/19/2015  
Temperature/ Humidity : 21 deg. C / 43 % RH  
Engineer : Tsubasa Takayama  
Mode : Tx (Hopping off) 3DH5

### Tx 3DH5 2480 MHz



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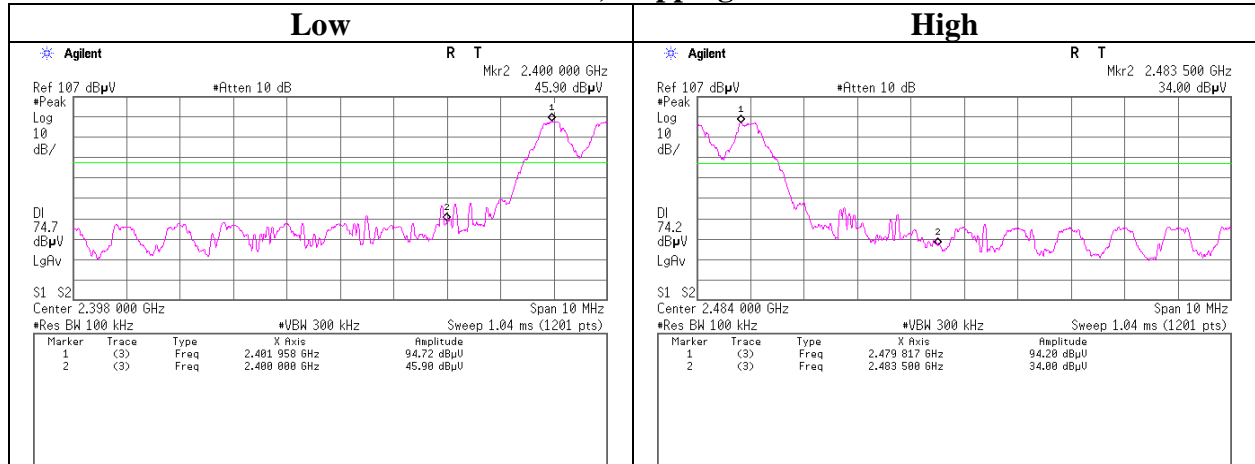
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

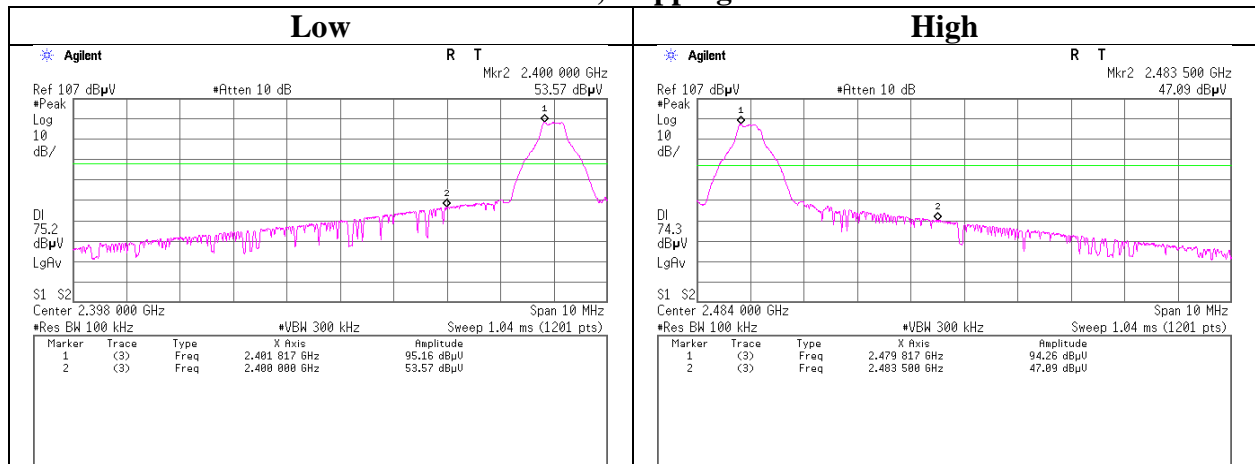
## Conducted Emission Band Edge compliance

Test place : Ise EMC Lab. No.6 Measurement Room  
Report No. : 11045932H  
Date : 11/19/2015  
Temperature/ Humidity : 21 deg. C / 43 % RH  
Engineer : Tsubasa Takayama  
Mode : Tx (Hopping on/off) DH5

### Tx DH5, Hopping on



### Tx DH5, Hopping off



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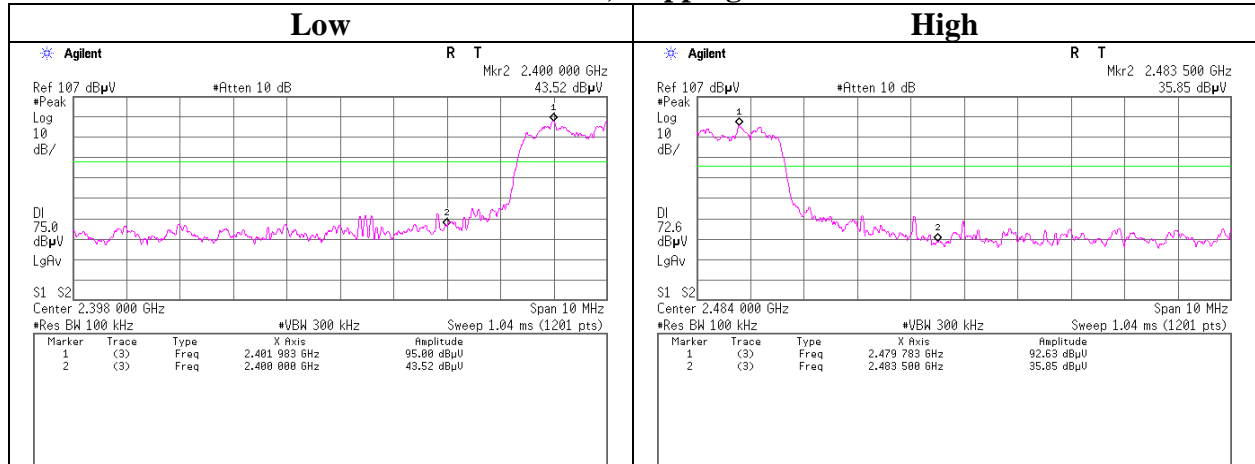
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

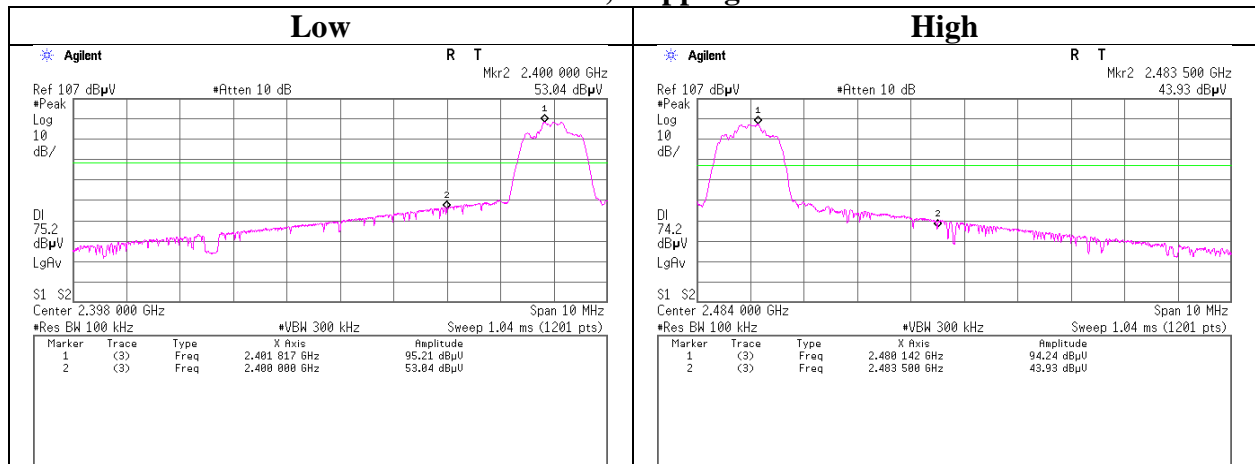
## Conducted Emission Band Edge compliance

Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	11045932H
Date	11/19/2015
Temperature/ Humidity	21 deg. C / 43 % RH
Engineer	Tsubasa Takayama
Mode	Tx (Hopping on/off) 3DH5

### Tx 3DH5, Hopping on



### Tx 3DH5, Hopping off

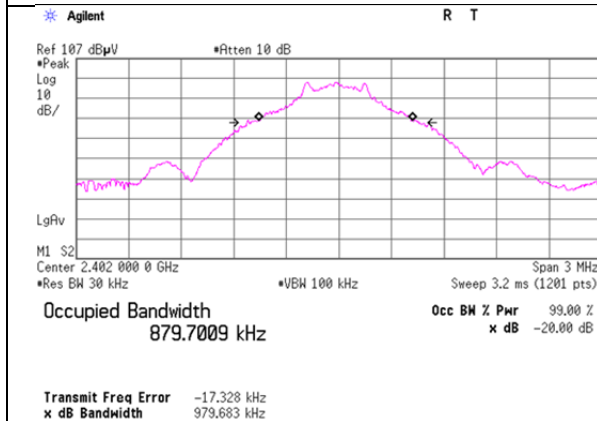


## 99%Occupied Bandwidth

Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	11045932H
Date	11/19/2015
Temperature/ Humidity	21 deg. C / 43 % RH
Engineer	Tsubasa Takayama
Mode	Tx (Hopping off) DH5/3DH5

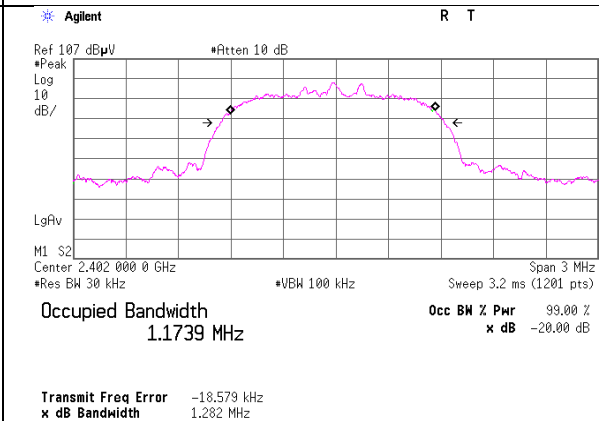
### Tx DH5, Hopping off

#### 2402 MHz

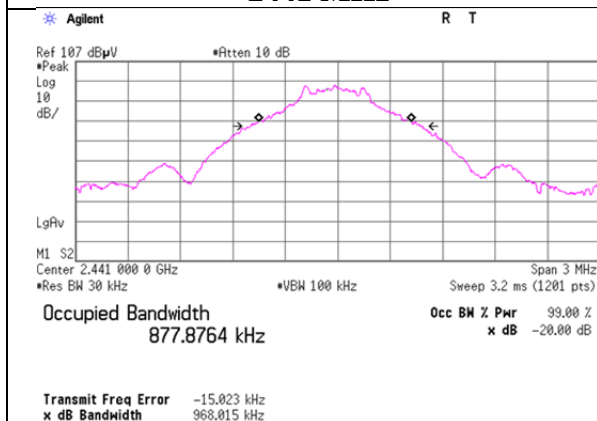


### Tx 3DH5, Hopping off

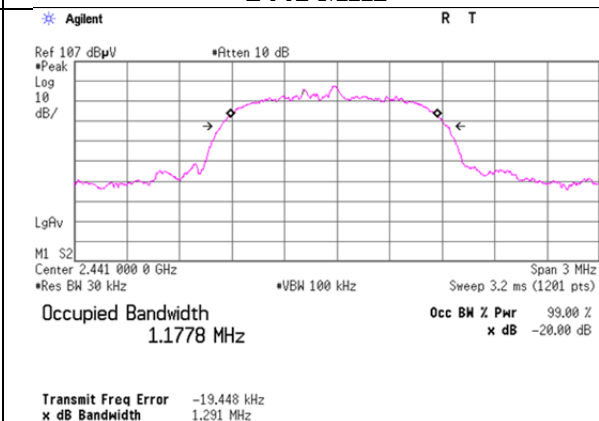
#### 2402 MHz



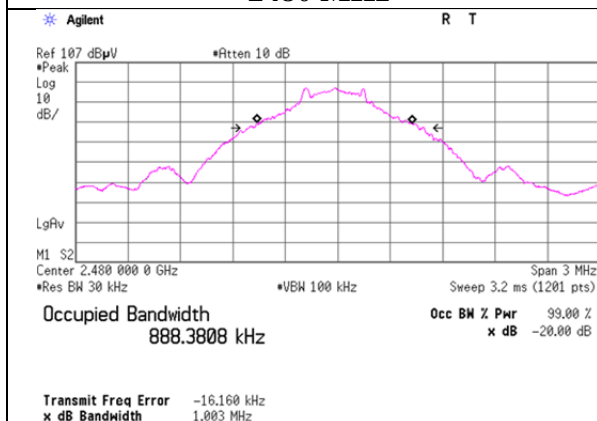
#### 2441 MHz



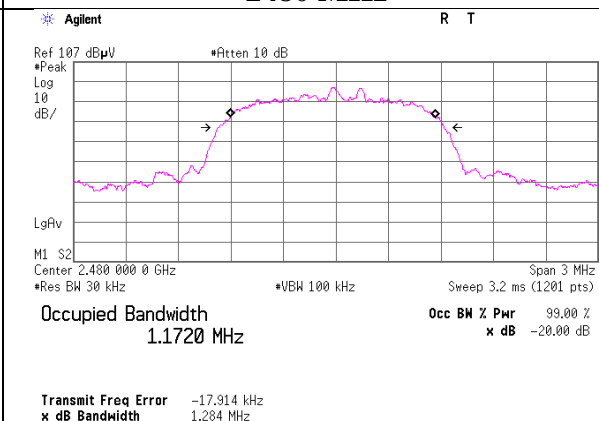
#### 2441 MHz



#### 2480 MHz



#### 2480 MHz



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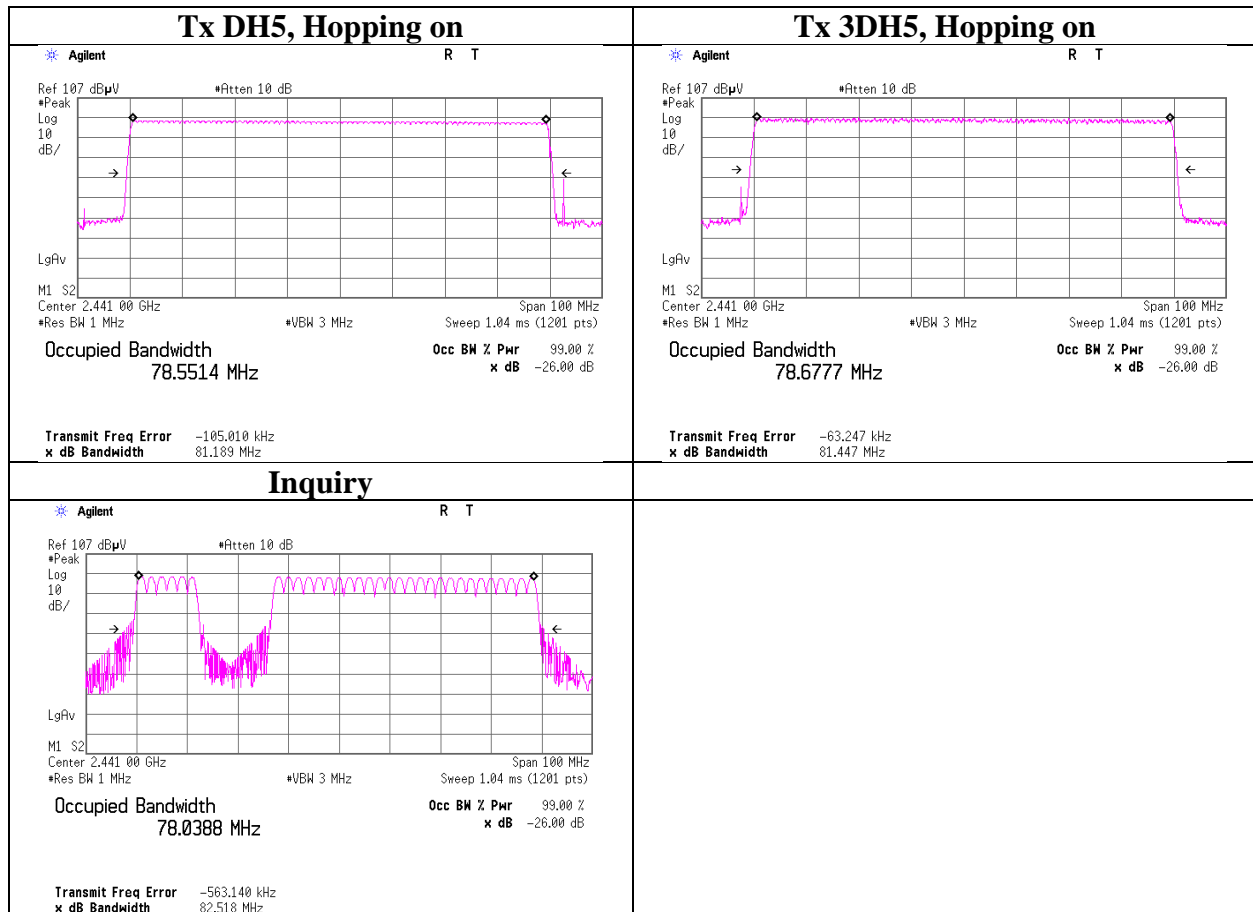
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## 99% Occupied Bandwidth

Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	11045932H
Date	11/19/2015
Temperature/ Humidity	21 deg. C / 43 % RH
Engineer	Tsubasa Takayama
Mode	Tx (Hopping on) DH5/3DH5/Inquiry



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## APPENDIX 2: Test instruments

### EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MAEC-02	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-06902	RE	2015/07/01 * 12
MOS-22	Thermo-Hygrometer	Custom	CTH-201	0003	RE	2015/01/13 * 12
MJM-14	Measure	KOMELON	KMC-36	-	RE	-
COTS-MEMI	EMI measurement program	TSJ	TEPTO-DV	-	RE	-
MSA-16	Spectrum Analyzer	Agilent	E4440A	MY46186390	RE	2015/02/16 * 12
MHA-06	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	254	RE	2015/02/05 * 12
MCC-168	Microwave Cable	Junkosha	MWX221	1408S016(1m) / 1409S492(5m)	RE	2015/09/24 * 12
MPA-10	Pre Amplifier	Agilent	8449B	3008A02142	RE	2015/01/28 * 12
MHA-02	Horn Antenna 18-26.5GHz	EMCO	3160-09	1265	RE	2015/02/05 * 12
MMM-01	Digital Tester	Fluke	FLUKE 26-3	78030611	RE	2015/08/19 * 12
MHF-18	High Pass Filter 3.5-18.0GHz	TOKIMEC	TF323DCA	7002	RE	2015/09/15 * 12
MCC-176	Microwave Cable	Junkosha	MMX221-00500DMSDMS	1502S303	RE	2015/03/27 * 12
MSA-13	Spectrum Analyzer	Agilent	E4440A	MY46185823	RE	2015/06/02 * 12
MTR-01	Test Receiver	Rohde & Schwarz	ES140	100084	RE	2014/11/10 * 12
MBA-02	Biconical Antenna	Schwarzbeck	BBA9106	VHA91032008	RE	2015/10/11 * 12
MLA-02	Logperiodic Antenna	Schwarzbeck	USLP9143	201	RE	2015/10/11 * 12
MCC-12	Coaxial Cable	Fujikura/Agilent	-	-	RE	2015/02/06 * 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
MTR-03	Test Receiver	Rohde & Schwarz	ESCI	100300	RE	2015/06/08 * 12
MCC-144	Microwave Cable	Junkosha	MWX221	1207S407	AT	2015/08/06 * 12
MAT-22	Attenuator(10dB) 1-18GHz	Orient Microwave	BX10-0476-00	-	AT	2015/03/18 * 12
MRENT-126	Spectrum Analyzer	KEYSIGHT	E4440A	MY46185516	AT	2015/07/31 * 12
MOS-14	Thermo-Hygrometer	Custom	CTH-201	1401	AT	2015/01/13 * 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

AT: Antenna Terminal Conducted test

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