



# RADIO TEST REPORT

**Test Report No. : 10240262H-A-R1**

**Applicant** : Sony Computer Entertainment Inc.  
**Type of Equipment** : Wireless Controller  
**Model No.** : CUH-ZCT1U  
**FCC ID** : AK8CUHZCT1F1  
**Test regulation** : FCC Part 15 Subpart C: 2013  
**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 report is a revised version of 10240262H-A. 10240262H-A is replaced with this report.

**Date of test:** March 4 to 18, 2014

**Representative test engineer:**

*T. Shimada*

Takumi Shimada  
Engineer of WiSE Japan,  
UL Verification Service

**Approved by:**

*M. Nishiyama*

Masanori Nishiyama  
Manager of WiSE Japan,  
UL Verification Service



NVLAP LAB CODE: 200572-0

This laboratory is accredited by the NVLAP LAB CODE 200572-0, U.S.A. The tests reported herein have been performed in accordance with its terms of accreditation. \*As for the range of Accreditation in NVLAP, you may refer to the WEB address, <http://www.ul.com/japan/jpn/pages/services/emc/about/mark1/index.jsp#nvlap>

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13-EM-F0429



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## **SECTION 1: Customer information**

Company Name	Sony Computer Entertainment Inc.
Brand Name	SONY
Address	1-7-1 Konan, Minato-ku, Tokyo, 108-0075 Japan
Telephone Number	+81-3-6748-6333
Facsimile Number	+81-3-6748-6383
Contact Person	Kiyoto Sasaki

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

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

Type of Equipment	Wireless Controller
Model No	CUH-ZCT1U
Serial No	See Clause 4.2
Country of Manufacture	China
Receipt Date of Sample	March 3, 2014
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 No: CUH-ZCT1U is the Wireless Controller for game machine.

#### **Product Specification**

Maximum clock frequency in the system (except radio part)	96MHz
Operating Temperature	5-35 deg. C
Power Supply	DC5V (USB Bus Power)
Battery Supply	DC3.65V
Size	161.2 x 100.3 x 64.5 mm
Weight	210 g

#### **Radio Specification: Bluetooth (Ver. 2.1+EDR)**

Equipment Type	Transceiver
Frequency of Operation	2402-2480MHz
Type of Modulation	FHSS (GFSK, $\pi/4$ DQPSK, 8DPSK)
Bandwidth & Channel spacing	1MHz & 1MHz
Method of frequency generation	Crystal
Power Supply (inner)	DC3.2V
Antenna Type	IFA
Antenna Gain	1.0dBi max

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

### **3.1 Test Specification**

Test Specification : FCC Part 15 Subpart C: 2013, final revised on September 30, 2013 and effective October 30, 2013

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

\*The EUT complies with FCC Part 15 Subpart B: 2013, final revised on September 30, 2013 and effective October 30, 2013.

### **3.2 Procedures and results**

Item	Test Procedure	Specification	Worst Margin	Results	Remarks	
Conducted Emission	FCC: ANSI C63.4:2003 7. AC powerline conducted emission measurements IC: RSS-Gen 7.2.4	FCC: Section 15.207 ----- IC: RSS-Gen 7.2.4	[QP] 21.5dB, 0.15341MHz, L [AV] 20.4dB, 2.51071MHz, N	Complied	-	
Carrier Frequency Separation	FCC: FCC Public Notice DA 00-705 IC: -	FCC: Section15.247(a)(1) ----- IC: RSS-210 A8.1 (b)	See data.	Complied	Conducted	
20dB Bandwidth	FCC: FCC Public Notice DA 00-705 IC: -	FCC: Section15.247(a)(1) ----- IC: RSS-210 A8.1 (a)		-	Conducted	
Number of Hopping Frequency	FCC: FCC Public Notice DA 00-705 IC: -	FCC: Section15.247(a)(1)(iii) ----- IC: RSS-210 A8.1 (d)		Complied	Conducted	
Dwell time	FCC: FCC Public Notice DA 00-705 IC: -	FCC: Section15.247(a)(1)(iii) ----- IC: RSS-210 A8.1 (d)		Complied	Conducted	
Maximum Peak Output Power	FCC: FCC Public Notice DA 00-705 IC: RSS-Gen 4.8	FCC: Section15.247(a)(b)(1) ----- IC: RSS-210 A8.4 (2)		Complied	Conducted	
Spurious Emission & Band Edge Compliance	FCC: FCC Public Notice DA 00-705 IC: RSS-Gen 4.9	FCC: Section15.247(d) ----- IC: RSS-210 A8.5 RSS-Gen 6 and 7.2.3		6.3dB 9920.000MHz, Vertical, AV	Complied	Conducted/ Radiated

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

\* In case any questions arise about test procedure, ANSI C63.4: 2003 is also referred.

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**FCC 15.31 (e)**

This EUT provides stable voltage (DC3.2V) constantly to RF Part regardless of input voltage. Therefore, this EUT complies with the requirement.

**FCC Part 15.203 Antenna requirement**

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

**3.3 Addition to standard**

Item	Test Procedure	Specification	Worst margin	Results	Remarks
99% Occupied Bandwidth	IC: RSS-Gen 4.6.1	IC: RSS-Gen 4.6.1	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 room (semi-anechoic chamber)	Conducted emission (+dB)
	150kHz-30MHz
No.1	3.5dB
No.2	3.5dB
No.3	3.6dB
No.4	3.5dB

Test room (semi-anechoic chamber)	Radiated emission						
	(3m*)(+dB)				(1m*)(+dB)		(0.5m*)(+dB)
	9kHz -30MHz	30MHz -300MHz	300MHz -1GHz	1GHz -10GHz	10GHz -18GHz	18GHz -26.5GHz	26.5GHz -40GHz
No.1	4.0dB	5.1dB	5.0dB	5.1dB	6.0dB	4.9dB	4.3dB
No.2	3.9dB	5.2dB	5.0dB	4.9dB	5.9dB	4.7dB	4.2dB
No.3	4.3dB	5.1dB	5.2dB	5.2dB	6.0dB	4.8dB	4.2dB
No.4	4.6dB	5.2dB	5.0dB	5.2dB	6.0dB	5.7dB	4.2dB

\*3m/1m/0.5m = Measurement distance

Power meter (+dB)	
Below 1GHz	Above 1GHz
0.7dB	1.5dB

Antenna terminal conducted emission and Power density (+dB)			Antenna terminal conducted emission (+dB)		Channel power (±dB)
Below 1GHz	1GHz-3GHz	3GHz-18GHz	18GHz-26.5GHz	26.5GHz-40GHz	
1.5dB	1.7dB	2.8dB	2.8dB	2.9dB	2.6dB

Conducted Emission test

The data listed in this test report has enough margin, more than the site margin.

Radiated emission test(3m)

The data listed in this test report has enough margin, more than the site margin.

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### 3.5 Test Location

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	FCC Registration Number	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	313583	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	655103	2973C-2	7.5 x 5.8 x 5.2m	4.0 x 4.0m	-
No.3 semi-anechoic chamber	148738	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	134570	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 Data of EMI, Test instruments, and Test set up

Refer to APPENDIX.

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

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

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

#### Details of Operating Mode(s)

<b>Test Item</b>	<b>Mode</b>	<b>Tested frequency</b>
20dB Bandwidth Carrier Frequency Separation	Tx (Hopping on) 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
Spurious Emission (Conducted/Radiated)	Tx (Hopping off) DH5, 3DH5	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	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)  *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.  *EUT has the power settings by the software as follows;  Power settings: 4dBm  Software: BtUART v2.1.6  *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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## 4.2 Configuration and peripherals

**This page has been submitted for a separate exhibit.**

## **SECTION 5: Conducted Emission**

### **Test Procedure and conditions**

EUT was placed on a urethane platform of nominal size, 1.0m by 1.5m, raised 0.8m above the conducting ground plane. The rear of tabletop was located 40cm to the vertical conducting plane. The rear of EUT, including peripherals aligned and flushed with rear of tabletop. All other surfaces of tabletop were at least 80cm from any other grounded conducting surface. EUT was located 80cm from a Line Impedance Stabilization Network (LISN)/ Artificial mains Network (AMN) and excess AC cable was bundled in center.

I/O cables that were connected to the peripherals were bundled in center. They were folded back and forth forming a bundle 30cm to 40cm long and were hanged at a 40cm height to the ground plane. All unused 50ohm connectors of the LISN(AMN) were resistivity terminated in 50ohm when not connected to the measuring equipment.

The AC Mains Terminal Continuous disturbance Voltage has been measured with the EUT in a Semi Anechoic Chamber. The EUT was connected to a LISN (AMN).

An overview sweep with peak detection has been performed.

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

<b>Detector</b>	<b>: QP and CISPR AV</b>
<b>Measurement range</b>	<b>: 0.15-30MHz</b>
<b>Test data</b>	<b>: APPENDIX</b>
<b>Test result</b>	<b>: Pass</b>

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**SECTION 6: 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	30MHz to 300MHz	300MHz to 1GHz	Above 1GHz
Antenna Type	Biconical	Logperiodic	Horn

In any 100kHz 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 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on a radiated measurement.

**20dBc was applied to the frequency over the limit of FCC 15.209 / Table 5 of RSS-Gen 7.2.5 (IC) and outside the restricted band of FCC15.205 / Table 3 of RSS-Gen 7.2.2 (IC).**

Frequency	Below 1GHz	Above 1GHz		20dBc
Instrument used	Test Receiver	Spectrum Analyzer		Spectrum Analyzer
Detector	QP	PK	AV	PK
IF Bandwidth	BW 120kHz(T/R)	RBW: 1MHz VBW: 3MHz	RBW: 1MHz VBW: 10Hz *1)	RBW: 100kHz VBW: 300kHz (S/A)
Test Distance	3m	3m (below 10GHz), 1m *2) (above 10GHz)		3m (below 10GHz), 1m *2) (above 10GHz)

\*1) Although 00-705 accepts VBW=10Hz 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 carrier level and noise levels were confirmed at each position of X, Y and Z axes of EUT to see the position of maximum noise, and the test was made at the position that has the maximum noise.

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

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

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## **SECTION 7: Antenna Terminal Conducted Tests**

### **Test Procedure**

The tests were made with below setting connected to the antenna port.

Test	Span	RBW	VBW	Sweep time	Detector	Trace	Instrument used
20dB Bandwidth	3MHz	30kHz	100kHz	Auto	Peak	Max Hold	Spectrum Analyzer
99% Occupied Bandwidth	Enough width to display 20dB Bandwidth	1 to 3% of Span	Three times of RBW	Auto	Peak	Max Hold *1)	Spectrum Analyzer
Maximum Peak Output Power	-	-	-	Auto	Peak Average *3)	-	Power Meter (Sensor: 50MHz BW)
Carrier Frequency Separation	5MHz / 3MHz	100kHz/ 30kHz	300kHz/ 100kHz	Auto	Peak	Max Hold	Spectrum Analyzer
Number of Hopping Frequency	30MHz	300kHz	1MHz	Auto	Peak	Max Hold	Spectrum Analyzer
Dwell Time	Zero Span	100kHz, 1MHz	300kHz, 3MHz	As necessary capture the entire dwell time per hopping channel	Peak	Clear Write	Spectrum Analyzer
Conducted Spurious Emission *2)	9kHz to 150kHz	200Hz	620Hz	Auto	Peak	Max Hold	Spectrum Analyzer
	150kHz to 30MHz	9.1kHz	27kHz				
	30MHz to 25GHz (Less or equal to 5GHz)	100kHz	300kHz				
Conducted Spurious Emission Band Edge compliance	10MHz	100kHz	300kHz	Auto	Peak	Max Hold	Spectrum Analyzer

\*1) The measurement was performed with Max Hold since the duty cycle was not 100%.  
\*2) In the frequency range below 30MHz, RBW was narrowed to separate the noise contents. Then, wide-band noise near the limit was checked separately, however the noise was not detected as shown in the chart.(9kHz-150kHz:RBW=200Hz, 150kHz-30MHz:RBW=9.1kHz)  
\*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: Data of EMI test**

**Conducted Emission**

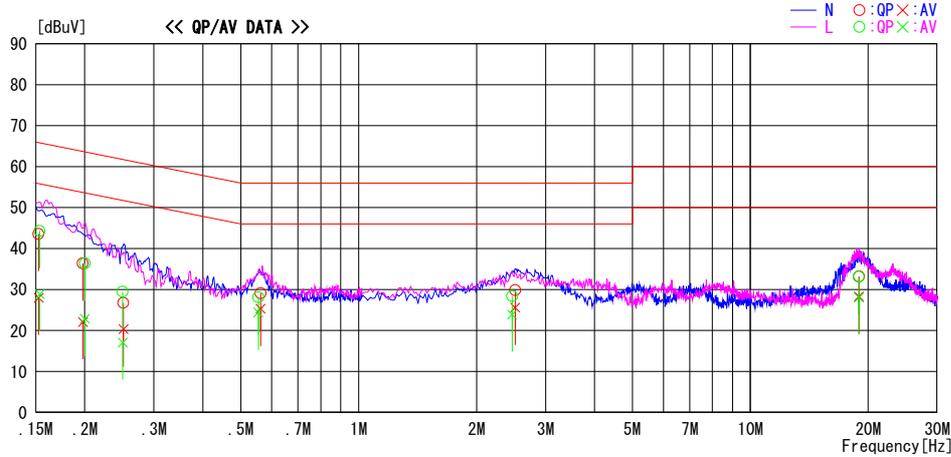
**DATA OF CONDUCTED EMISSION TEST**

UL Japan, Inc. Head Office EMC Lab. No.3 Semi Anechoic Chamber  
 Date : 2014/03/18

Report No. : 10240262H  
 Temp./Humi. : 23deg. C / 30% RH  
 Engineer : Takumi Shimada

Mode / Remarks : Tx DH5 2480MHz

LIMIT : FCC15.207 QP  
 FCC15.207 AV

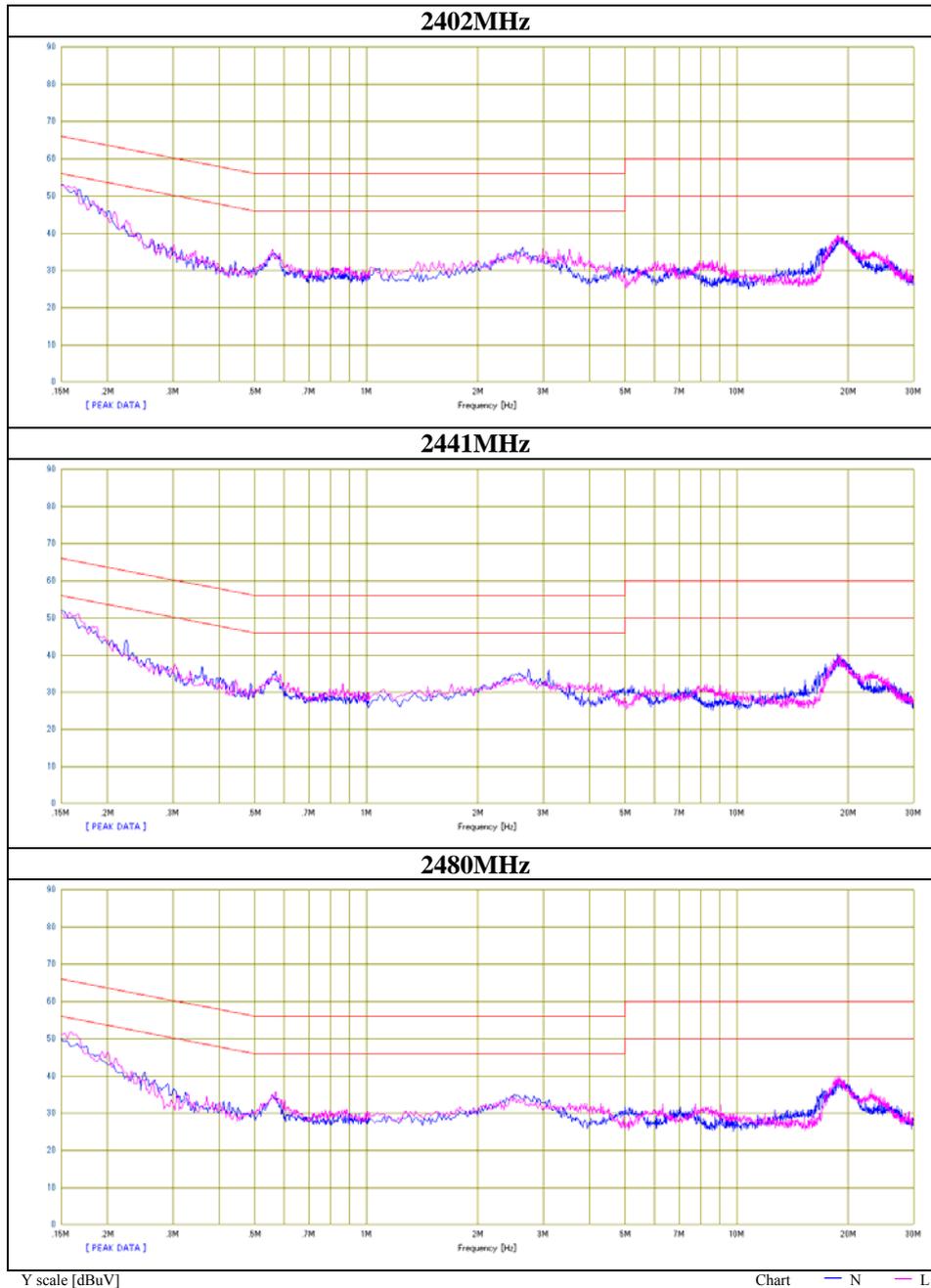


Frequency [MHz]	Reading Level		Corr. Factor [dB]	Results		Limit		Margin		Phase	Comment
	QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dB]	AV [dB]		
0.15235	30.4	14.8	13.2	43.6	28.0	65.9	55.9	22.3	27.9	N	
0.19775	23.2	8.9	13.2	36.4	22.1	63.7	53.7	27.3	31.6	N	
0.25100	13.4	7.0	13.3	26.7	20.3	61.7	51.7	35.0	31.4	N	
0.56184	15.8	12.0	13.3	29.1	25.3	56.0	46.0	26.9	20.7	N	
2.51071	16.3	12.1	13.5	29.8	25.6	56.0	46.0	26.2	20.4	N	
18.93380	18.5	13.6	14.7	33.2	28.3	60.0	50.0	26.8	21.7	N	
0.15341	31.1	15.7	13.2	44.3	28.9	65.8	55.8	21.5	26.9	L	
0.20007	23.1	9.6	13.3	36.4	22.9	63.6	53.6	27.2	30.7	L	
0.24976	16.2	3.8	13.3	29.5	17.1	61.8	51.8	32.3	34.7	L	
0.55469	14.8	11.1	13.3	28.1	24.4	56.0	46.0	27.9	21.6	L	
2.46464	14.9	10.4	13.5	28.4	23.9	56.0	46.0	27.6	22.1	L	
18.93072	18.4	13.4	14.7	33.1	28.1	60.0	50.0	26.9	21.9	L	

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

## Conducted Emission

Test place	Head Office EMC Lab. No.3 Semi Anechoic Chamber
Report No.	10240262H
Date	03/18/2014
Temperature/ Humidity	23 deg. C / 30% RH
Engineer	Takumi Shimada
Mode	Tx DH5



## Conducted Emission

### DATA OF CONDUCTED EMISSION TEST

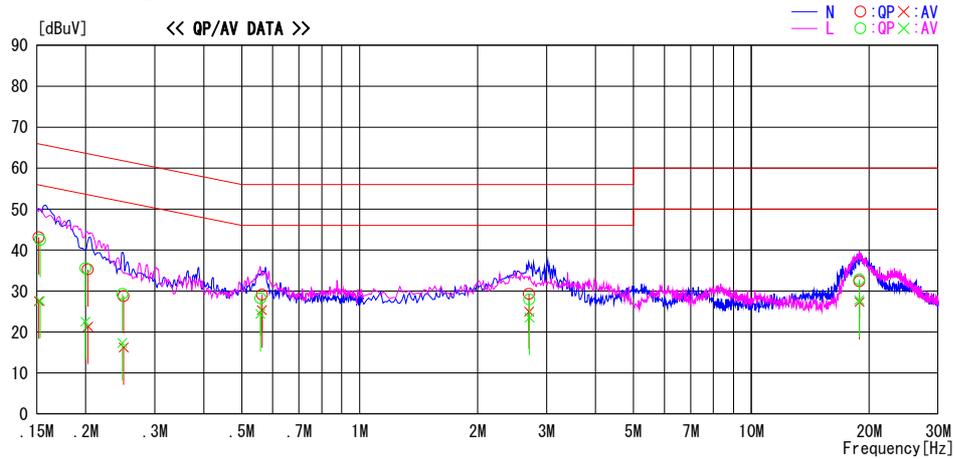
UL Japan, Inc. Head Office EMC Lab. No.3 Semi Anechoic Chamber  
 Date : 2014/03/18

Report No. : 10240262H

Temp./Humi. : 23deg. C / 30% RH  
 Engineer : Takumi Shimada

Mode / Remarks : Tx 3DH5 2480MHz

LIMIT : FCC15.207 QP  
 FCC15.207 AV

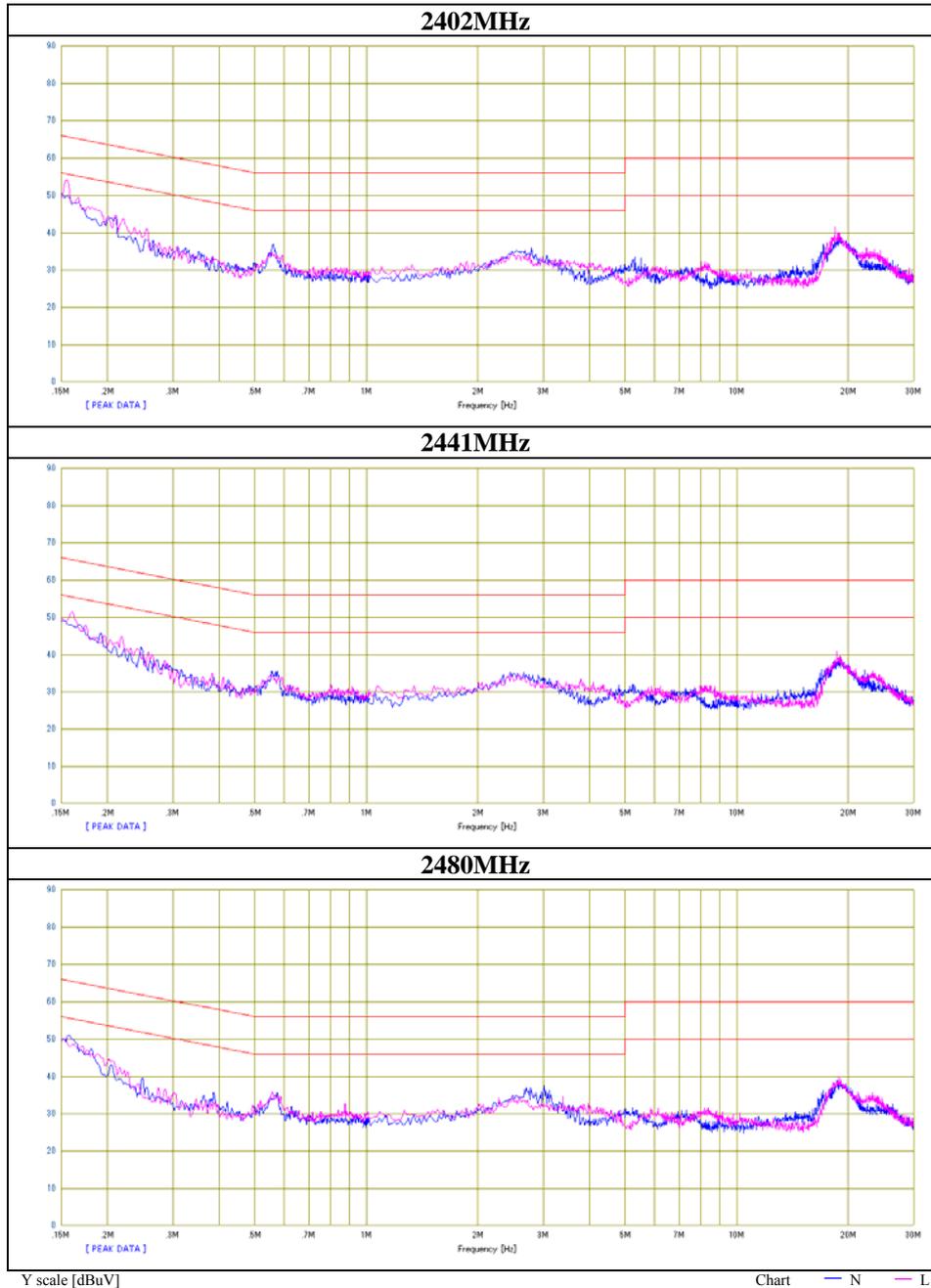


Frequency [MHz]	Reading Level		Corr. Factor [dB]	Results		Limit		Margin		Phase	Comment
	QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dB]	AV [dB]		
0.15166	29.9	14.3	13.2	43.1	27.5	65.9	55.9	22.8	28.4	N	
0.20264	22.0	8.0	13.3	35.3	21.3	63.5	53.5	28.2	32.2	N	
0.24982	15.4	2.9	13.3	28.7	16.2	61.8	51.8	33.1	35.6	N	
0.56301	15.8	12.0	13.3	29.1	25.3	56.0	46.0	26.9	20.7	N	
2.70848	15.8	11.5	13.5	29.3	25.0	56.0	46.0	26.7	21.0	N	
18.86885	17.7	12.6	14.7	32.4	27.3	60.0	50.0	27.6	22.7	N	
0.15283	29.3	14.4	13.2	42.5	27.6	65.8	55.8	23.3	28.2	L	
0.19967	22.4	9.3	13.2	35.6	22.5	63.6	53.6	28.0	31.1	L	
0.24781	16.0	4.0	13.3	29.3	17.3	61.8	51.8	32.5	34.5	L	
0.55841	14.9	11.1	13.3	28.2	24.4	56.0	46.0	27.8	21.6	L	
2.71482	14.4	10.0	13.5	27.9	23.5	56.0	46.0	28.1	22.5	L	
18.86848	18.1	13.1	14.7	32.8	27.8	60.0	50.0	27.2	22.2	L	

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

## Conducted Emission

Test place	Head Office EMC Lab. No.3 Semi Anechoic Chamber
Report No.	10240262H
Date	03/18/2014
Temperature/ Humidity	23 deg. C / 30% RH
Engineer	Takumi Shimada
Mode	Tx 3DH5

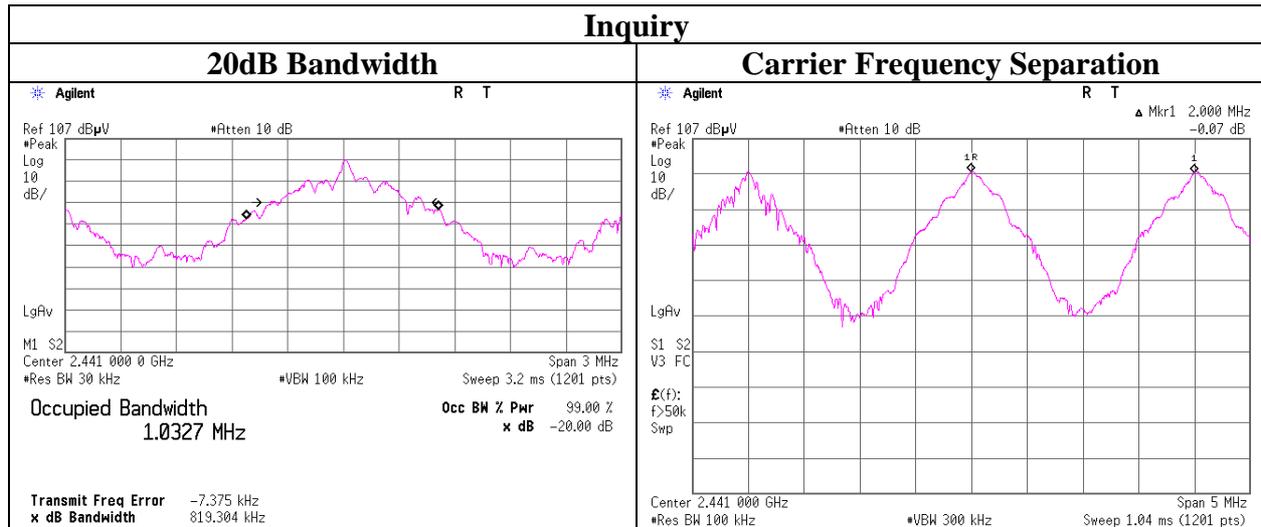


## 20dB Bandwidth and Carrier Frequency Separation

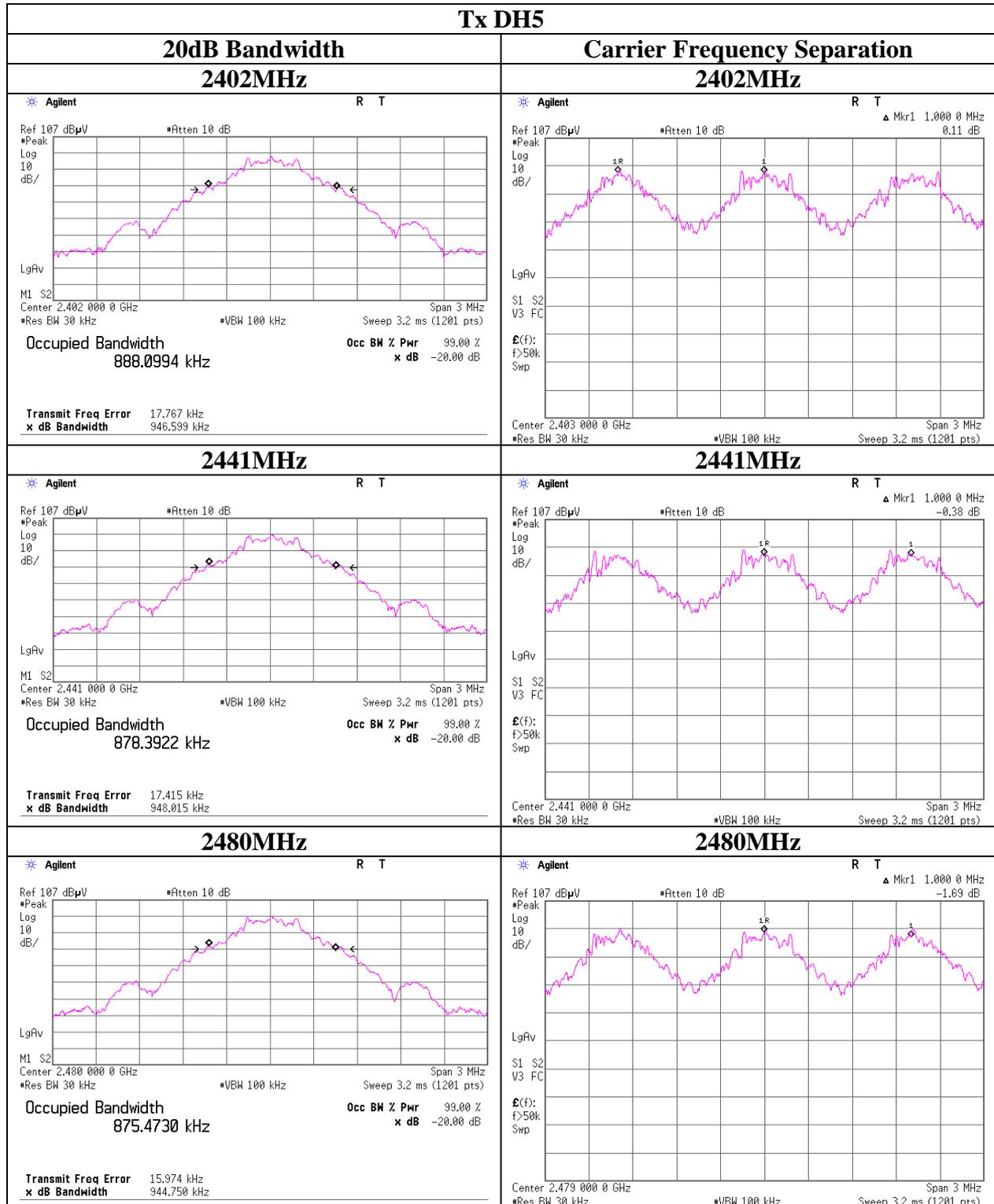
Test place	Head Office EMC Lab. No.11 Measurement Room
Report No.	10240262H
Date	03/04/2014
Temperature/ Humidity	24 deg. C / 40% RH
Engineer	Satofumi Matsuyama
Mode	Tx (Hopping on) DH5/3DH5/Inquiry

Mode	Freq. [MHz]	20dB Bandwidth [MHz]	Carrier Frequency Separation [MHz]	Limit for Carrier Frequency separation [MHz]
DH5	2402.0	0.947	1.000	$\geq 0.631$
DH5	2441.0	0.948	1.000	$\geq 0.632$
DH5	2480.0	0.945	1.000	$\geq 0.630$
3DH5	2402.0	1.289	1.000	$\geq 0.859$
3DH5	2441.0	1.288	1.000	$\geq 0.859$
3DH5	2480.0	1.297	1.000	$\geq 0.865$
Inquiry	2441.0	0.819	2.000	$\geq 0.546$

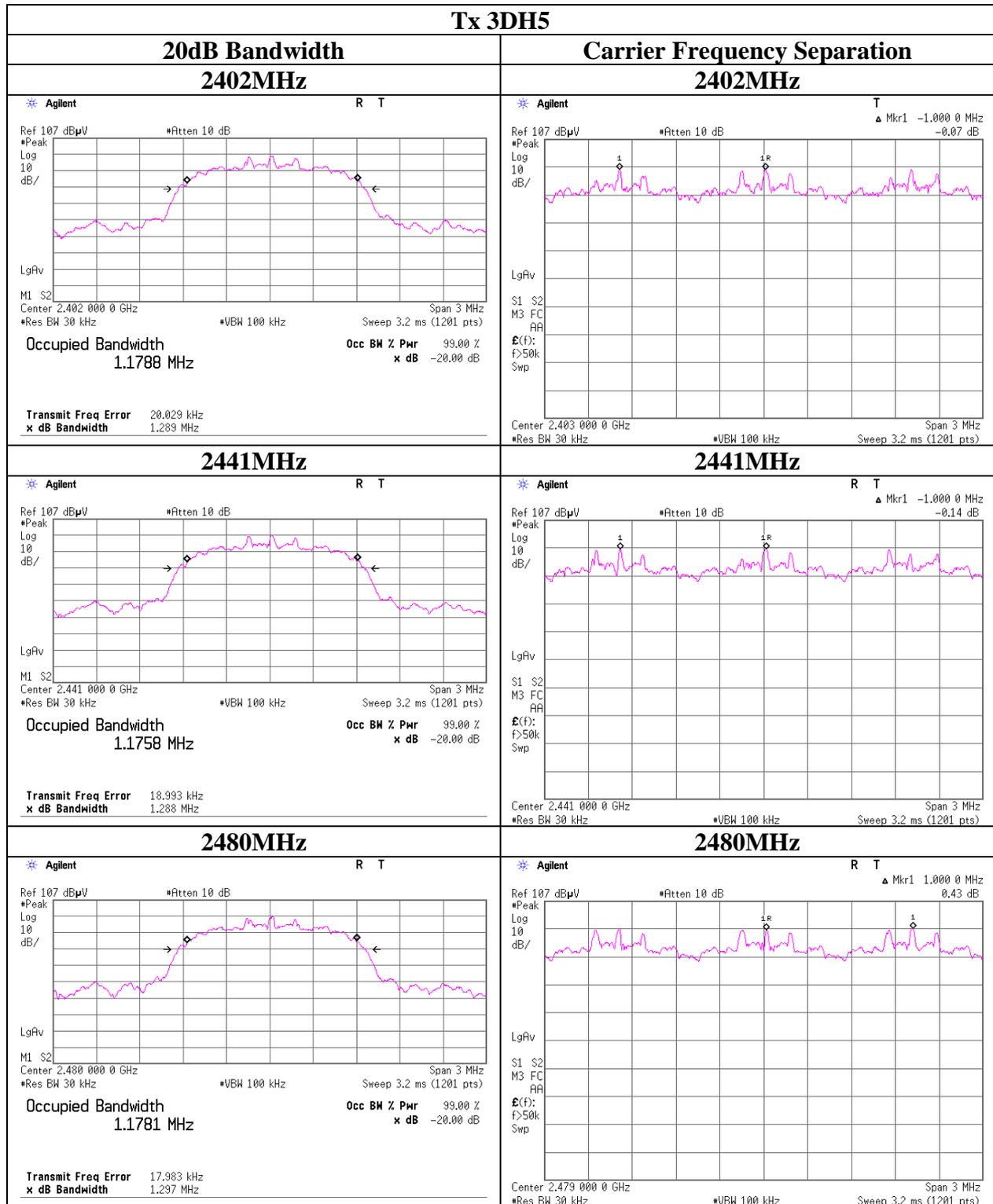
Limit: Two-thirds of 20dB Bandwidth or 25kHz (whichever is greater).  
 No limit applies to 20dB Bandwidth.



## 20dB Bandwidth and Carrier Frequency Separation



### 20dB Bandwidth and Carrier Frequency Separation

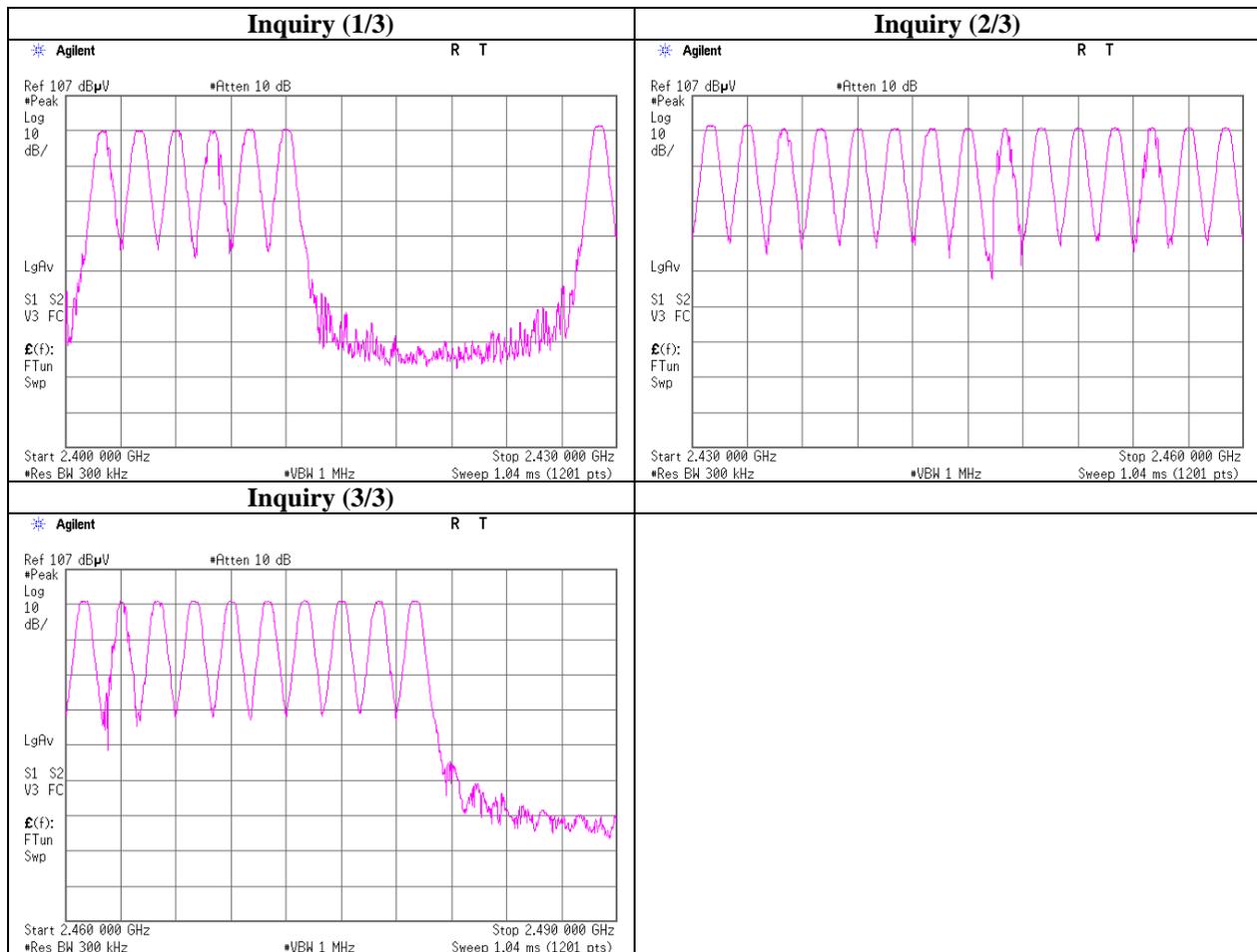


## Number of Hopping Frequency

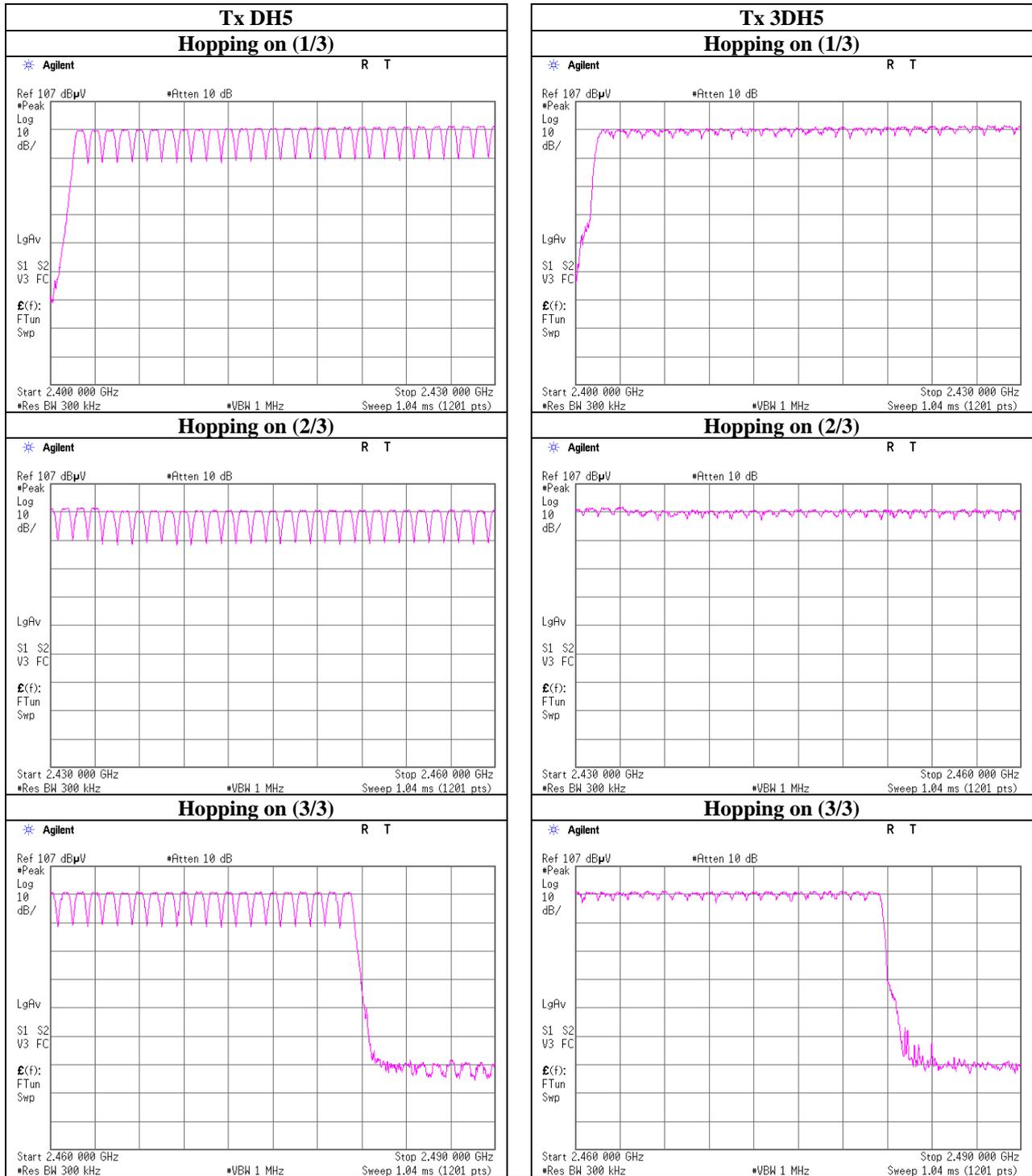
Test place	Head Office EMC Lab. No.11 Measurement Room
Report No.	10240262H
Date	03/04/2014
Temperature/ Humidity	24 deg. C / 40% RH
Engineer	Satofumi Matsuyama
Mode	Tx (Hopping on) DH5/3DH5/Inquiry

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.



## Number of Hopping Frequency



### Dwell time

Test place Head Office EMC Lab. No.11 Measurement Room  
Report No. 10240262H  
Date 03/04/2014  
Temperature/ Humidity 24 deg. C / 40% RH  
Engineer Satofumi Matsuyama  
Mode Tx (Hopping on) DH5/3DH5/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	48.6 times / 5 sec. x	31.6 sec. =	308 times	0.402	124
DH3	27.0 times / 5 sec. x	31.6 sec. =	171 times	1.661	284
DH5	17.2 times / 5 sec. x	31.6 sec. =	109 times	2.914	318
3DH1	48.2 times / 5 sec. x	31.6 sec. =	305 times	0.411	125
3DH3	24.6 times / 5 sec. x	31.6 sec. =	156 times	1.664	260
3DH5	16.2 times / 5 sec. x	31.6 sec. =	103 times	2.917	300
Inquiry	100.0 times / 1 sec. x	12.8 sec. =	1280 times	0.103	132

Sample Calculation

Result = Number of transmission x Length of transmission time

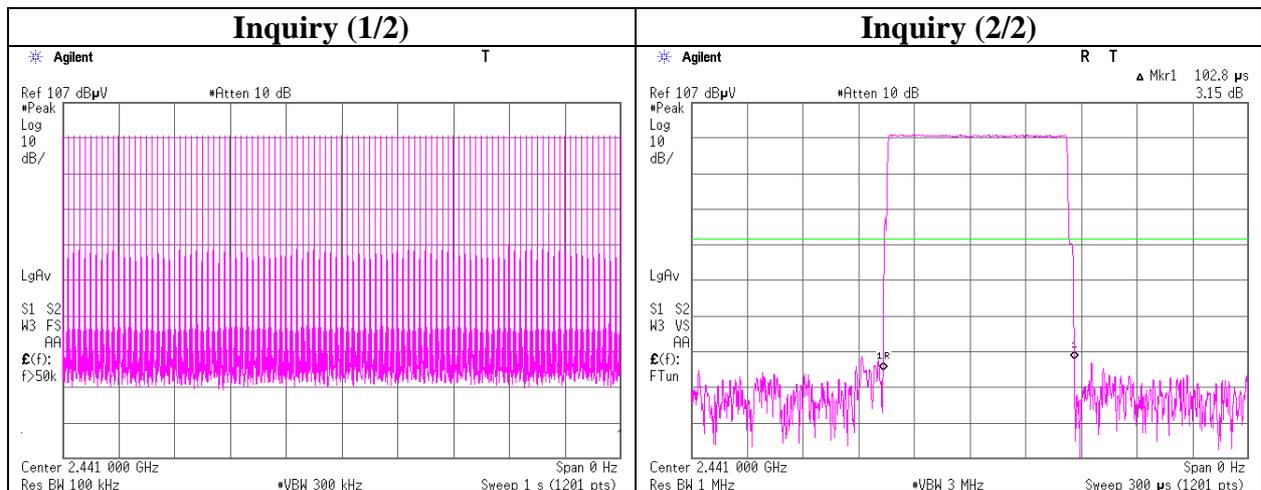
\*Average data of 5 tests.(except Inquiry)

Mode	Sampling [times]					Average [times]
	1	2	3	4	5	
DH1	50	47	47	49	50	48.6
DH3	30	25	27	27	26	27
DH5	18	15	16	19	18	17.2
3DH1	48	49	49	45	50	48.2
3DH3	23	25	24	27	24	24.6
3DH5	14	16	16	15	20	16.2

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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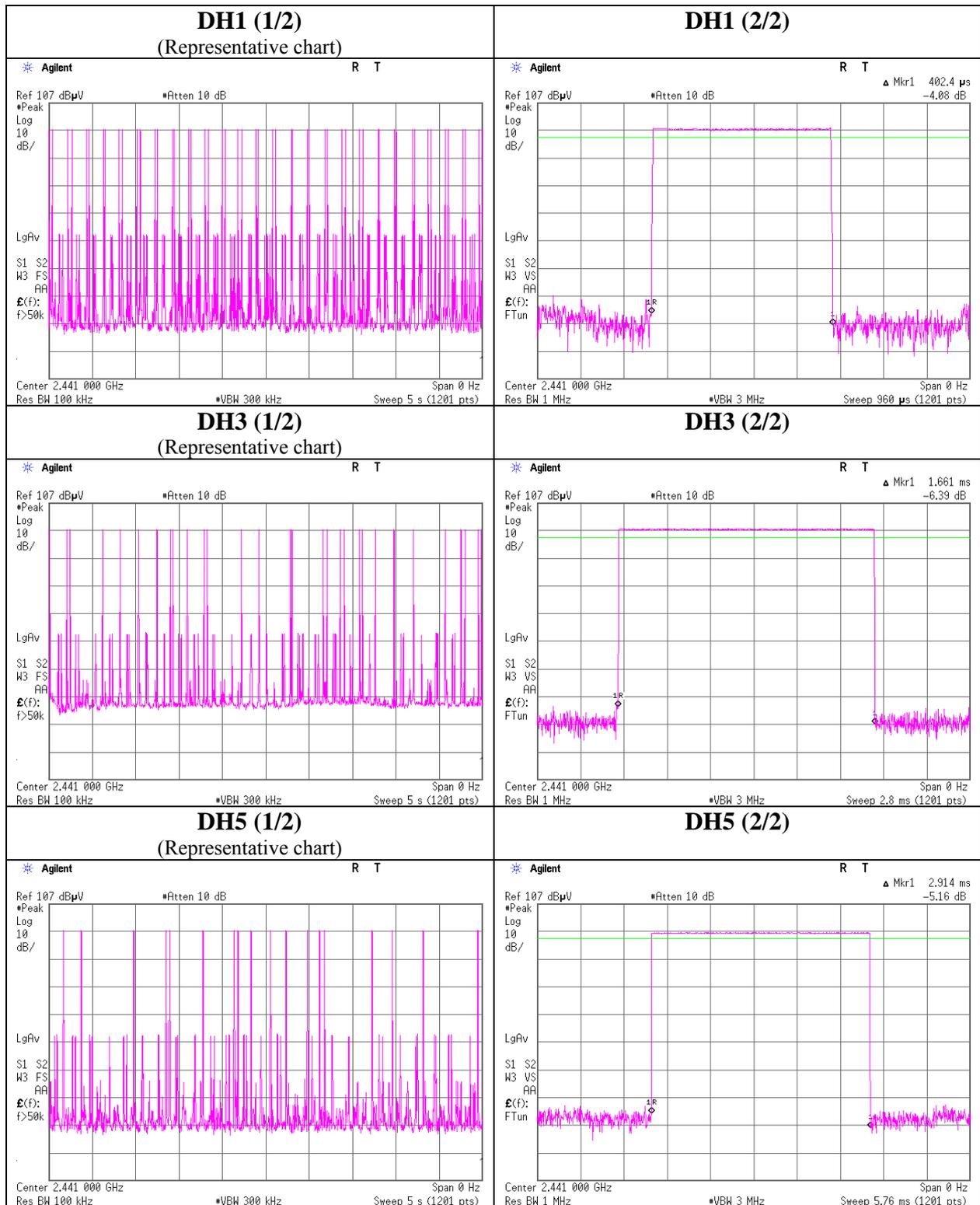
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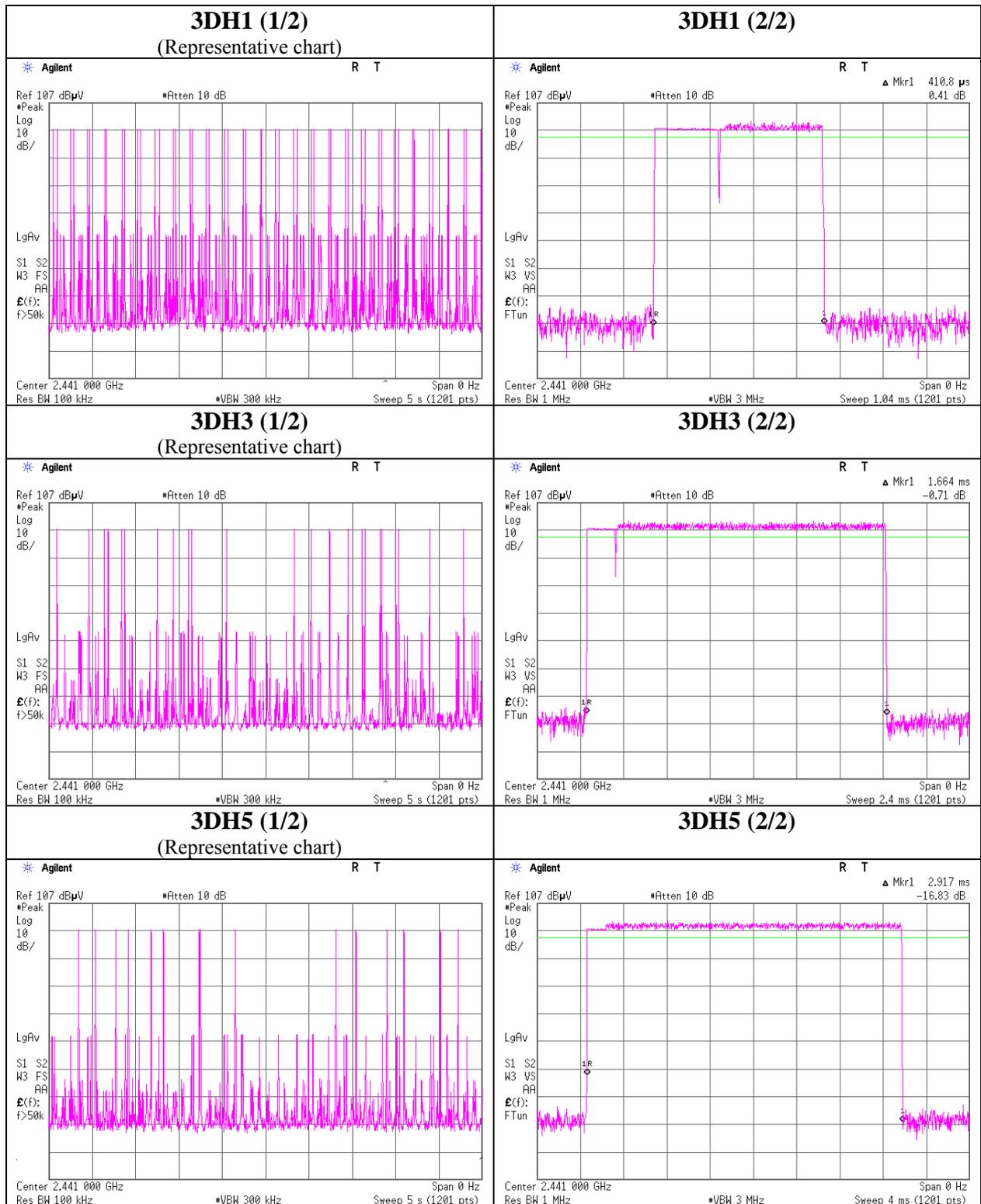
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**Dwell time**



**Dwell time**



### Maximum Peak Output Power

Test place : Head Office EMC Lab. No.11 Measurement Room  
 Report No. : 10240262H  
 Date : 03/04/2014  
 Temperature/ Humidity : 24 deg. C / 40% RH  
 Engineer : Satofumi Matsuyama  
 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	2402.0	-9.88	0.80	10.08	1.00	1.26	20.97	125	19.97
DH5	2441.0	-9.18	0.80	10.08	1.70	1.48	20.97	125	19.27
DH5	2480.0	-8.86	0.80	10.08	2.02	1.59	20.97	125	18.95
2DH5	2402.0	-7.60	0.80	10.08	3.28	2.13	20.97	125	17.69
2DH5	2441.0	-6.73	0.80	10.08	4.15	2.60	20.97	125	16.82
2DH5	2480.0	-6.35	0.80	10.08	4.53	2.84	20.97	125	16.44
3DH5	2402.0	-7.10	0.80	10.08	3.78	2.39	20.97	125	17.19
3DH5	2441.0	-6.25	0.80	10.08	4.63	2.90	20.97	125	16.34
3DH5	2480.0	-5.82	0.80	10.08	5.06	3.21	20.97	125	15.91
Inquiry	2441.0	-9.49	0.80	10.08	1.39	1.38	20.97	125	19.58

Sample Calculation:

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

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 : Head Office EMC Lab. No.11 Measurement Room  
 Report No. : 10240262H  
 Date : 03/04/2014  
 Temperature/ Humidity : 24 deg. C / 40% RH  
 Engineer : Satofumi Matsuyama  
 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	2402.0	-11.37	0.80	10.08	-0.49	0.89	20.97	125	21.46
DH5	2441.0	-10.88	0.80	10.08	0.00	1.00	20.97	125	20.97
DH5	2480.0	-10.30	0.80	10.08	0.58	1.14	20.97	125	20.39
2DH5	2402.0	-11.16	0.80	10.08	-0.28	0.94	20.97	125	21.25
2DH5	2441.0	-10.29	0.80	10.08	0.59	1.15	20.97	125	20.38
2DH5	2480.0	-9.91	0.80	10.08	0.97	1.25	20.97	125	20.00
3DH5	2402.0	-11.10	0.80	10.08	-0.22	0.95	20.97	125	21.19
3DH5	2441.0	-10.27	0.80	10.08	0.61	1.15	20.97	125	20.36
3DH5	2480.0	-9.90	0.80	10.08	0.98	1.25	20.97	125	19.99
Inquiry	2441.0	-18.33	0.80	10.08	-7.45	0.18	20.97	125	28.42

Sample Calculation:

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

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## Radiated Spurious Emission

Test place	Head Office EMC Lab. No.3 Semi Anechoic Chamber
Report No.	10240262H
Date	03/17/2014
Temperature/ Humidity	22 deg. C / 33% RH
Engineer	Tomohisa Nakagawa
Mode	Tx, DH5 2402MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	45.732	QP	24.3	12.4	7.3	32.1	11.9	40.0	28.1	
Hori	89.533	QP	40.9	8.0	7.9	32.2	24.6	43.5	18.9	
Hori	119.998	QP	35.1	13.0	8.3	32.1	24.3	43.5	19.2	
Hori	190.984	QP	34.8	16.4	9.0	32.1	28.1	43.5	15.4	
Hori	257.093	QP	38.7	17.7	9.5	32.0	33.9	46.0	12.1	
Hori	456.004	QP	25.8	17.9	10.9	32.0	22.6	46.0	23.4	
Hori	2390.000	PK	45.9	28.2	3.1	32.4	44.8	73.9	29.2	
Hori	4804.000	PK	44.3	30.5	5.3	31.4	48.7	73.9	25.3	
Hori	7206.000	PK	42.1	35.8	6.7	32.3	52.3	73.9	21.6	
Hori	9608.000	PK	43.1	39.0	7.3	33.0	56.4	73.9	17.5	
Hori	2390.000	AV	30.6	28.2	3.1	32.4	29.5	53.9	24.4	
Hori	4804.000	AV	32.8	30.5	5.3	31.4	37.2	53.9	16.7	
Hori	7206.000	AV	29.0	35.8	6.7	32.3	39.2	53.9	14.7	
Hori	9608.000	AV	30.2	39.0	7.3	33.0	43.5	53.9	10.4	
Vert	46.762	QP	37.8	12.0	7.3	32.1	25.0	40.0	15.0	
Vert	83.536	QP	42.0	7.0	7.8	32.2	24.6	40.0	15.4	
Vert	120.001	QP	40.5	13.0	8.3	32.1	29.7	43.5	13.8	
Vert	184.576	QP	33.1	16.2	8.9	32.1	26.1	43.5	17.4	
Vert	256.138	QP	37.6	17.6	9.5	32.1	32.6	46.0	13.4	
Vert	456.004	QP	26.4	17.9	10.9	32.0	23.2	46.0	22.8	
Vert	2390.000	PK	45.3	28.2	3.1	32.4	44.2	73.9	29.7	
Vert	4804.000	PK	42.9	30.5	5.3	31.4	47.3	73.9	26.6	
Vert	7206.000	PK	43.0	35.8	6.7	32.3	53.2	73.9	20.7	
Vert	9608.000	PK	42.6	39.0	7.3	33.0	55.9	73.9	18.0	
Vert	2390.000	AV	28.9	28.2	3.1	32.4	27.8	53.9	26.1	
Vert	4804.000	AV	30.9	30.5	5.3	31.4	35.3	53.9	18.7	
Vert	7206.000	AV	29.1	35.8	6.7	32.3	39.3	53.9	14.6	
Vert	9608.000	AV	30.2	39.0	7.3	33.0	43.5	53.9	10.4	

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).

Distance factor:      10GHz-26.5GHz      20log(3.0m/1.0m)= 9.5dB  
                                 26.5GHz-40GHz      20log(3.0m/0.5m)=15.6dB

## Radiated Spurious Emission

Test place : Head Office EMC Lab. No.3 Semi Anechoic Chamber  
 Report No. : 10240262H  
 Date : 03/17/2014  
 Temperature/ Humidity : 22 deg. C / 33% RH  
 Engineer : Tomohisa Nakagawa  
 Mode : Tx, DH5 2402MHz

**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	99.1	28.2	3.1	32.4	98.0	-	-	Carrier
Hori	2400.000	PK	45.4	28.2	3.1	32.4	44.3	78.0	33.7	
Vert	2402.000	PK	95.0	28.2	3.1	32.4	93.9	-	-	Carrier
Vert	2400.000	PK	40.5	28.2	3.1	32.4	39.4	73.9	34.5	

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

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## Radiated Spurious Emission

Test place                    Head Office EMC Lab. No.3 Semi Anechoic Chamber  
Report No.                    10240262H  
Date                            03/17/2014  
Temperature/ Humidity      22 deg. C / 33% RH  
Engineer                      Tomohisa Nakagawa  
Mode                            Tx, DH5 2441MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	46.650	QP	22.8	12.1	7.3	32.1	10.1	40.0	29.9	
Hori	83.567	QP	40.7	7.0	7.8	32.2	23.3	40.0	16.7	
Hori	120.450	QP	35.4	13.0	8.3	32.1	24.6	43.5	18.9	
Hori	187.049	QP	30.1	16.3	9.0	32.1	23.3	43.5	20.2	
Hori	257.249	QP	37.8	17.7	9.5	32.0	33.0	46.0	13.0	
Hori	456.005	QP	25.6	17.9	10.9	32.0	22.4	46.0	23.6	
Hori	4882.000	PK	42.5	30.6	5.3	31.4	47.0	73.9	26.9	
Hori	7323.000	PK	42.1	36.0	6.8	32.4	52.5	73.9	21.4	
Hori	9764.000	PK	43.2	39.4	7.3	33.0	56.9	73.9	17.0	
Hori	4882.000	AV	29.7	30.6	5.3	31.4	34.2	53.9	19.7	
Hori	7323.000	AV	29.3	36.0	6.8	32.4	39.7	53.9	14.2	
Hori	9764.000	AV	32.4	39.4	7.3	33.0	46.1	53.9	7.8	
Vert	46.751	QP	37.6	12.0	7.3	32.1	24.8	40.0	15.2	
Vert	83.551	QP	42.1	7.0	7.8	32.2	24.7	40.0	15.3	
Vert	120.018	QP	40.4	13.0	8.3	32.1	29.6	43.5	13.9	
Vert	186.149	QP	32.8	16.3	8.9	32.1	25.9	43.5	17.6	
Vert	256.249	QP	37.2	17.6	9.5	32.1	32.2	46.0	13.8	
Vert	456.005	QP	26.5	17.9	10.9	32.0	23.3	46.0	22.7	
Vert	4882.000	PK	41.0	30.6	5.3	31.4	45.5	73.9	28.4	
Vert	7323.000	PK	42.1	36.0	6.8	32.4	52.5	73.9	21.4	
Vert	9764.000	PK	43.0	39.4	7.3	33.0	56.7	73.9	17.2	
Vert	4882.000	AV	32.4	30.6	5.3	31.4	36.9	53.9	17.0	
Vert	7323.000	AV	29.2	36.0	6.8	32.4	39.6	53.9	14.3	
Vert	9764.000	AV	31.9	39.4	7.3	33.0	45.6	53.9	8.3	

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).

Distance factor:      10GHz-26.5GHz    20log(3.0m/1.0m)= 9.5dB  
                             26.5GHz-40GHz    20log(3.0m/0.5m)=15.6dB

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## Radiated Spurious Emission

Test place                   Head Office EMC Lab. No.3 Semi Anechoic Chamber  
Report No.                   10240262H  
Date                           03/17/2014  
Temperature/ Humidity     22 deg. C / 33% RH  
Engineer                    Tomohisa Nakagawa  
Mode                         Tx, DH5 2480MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	46.650	QP	23.7	12.1	7.3	32.1	11.0	40.0	29.0	
Hori	87.544	QP	41.7	7.7	7.9	32.2	25.1	40.0	14.9	
Hori	120.007	QP	35.2	13.0	8.3	32.1	24.4	43.5	19.1	
Hori	184.429	QP	34.8	16.2	8.9	32.1	27.8	43.5	15.7	
Hori	256.165	QP	39.8	17.6	9.5	32.1	34.8	46.0	11.2	
Hori	456.005	QP	25.5	17.9	10.9	32.0	22.3	46.0	23.7	
Hori	2483.500	PK	48.2	28.4	3.1	32.3	47.4	73.9	26.5	
Hori	4960.000	PK	42.0	30.7	5.4	31.4	46.7	73.9	27.2	
Hori	7440.000	PK	42.0	36.2	6.7	32.4	52.5	73.9	21.4	
Hori	9920.000	PK	43.3	39.8	7.4	33.1	57.4	73.9	16.5	
Hori	2483.500	AV	31.3	28.4	3.1	32.3	30.5	53.9	23.4	
Hori	4960.000	AV	29.2	30.7	5.4	31.4	33.9	53.9	20.0	
Hori	7440.000	AV	29.2	36.2	6.7	32.4	39.7	53.9	14.2	
Hori	9920.000	AV	33.3	39.8	7.4	33.1	47.4	53.9	6.5	
Vert	46.759	QP	37.8	12.0	7.3	32.1	25.0	40.0	15.0	
Vert	83.536	QP	42.1	7.0	7.8	32.2	24.7	40.0	15.3	
Vert	120.006	QP	40.6	13.0	8.3	32.1	29.8	43.5	13.7	
Vert	185.186	QP	33.5	16.2	8.9	32.1	26.5	43.5	17.0	
Vert	256.349	QP	37.0	17.6	9.5	32.1	32.0	46.0	14.0	
Vert	456.005	QP	26.7	17.9	10.9	32.0	23.5	46.0	22.5	
Vert	2483.500	PK	48.4	28.4	3.1	32.3	47.6	73.9	26.3	
Vert	4960.000	PK	41.2	30.7	5.4	31.4	45.9	73.9	28.0	
Vert	7440.000	PK	42.0	36.2	6.7	32.4	52.5	73.9	21.4	
Vert	9920.000	PK	43.4	39.8	7.4	33.1	57.5	73.9	16.4	
Vert	2483.500	AV	31.1	28.4	3.1	32.3	30.3	53.9	23.6	
Vert	4960.000	AV	28.4	30.7	5.4	31.4	33.1	53.9	20.8	
Vert	7440.000	AV	29.2	36.2	6.7	32.4	39.7	53.9	14.2	
Vert	9920.000	AV	33.5	39.8	7.4	33.1	47.6	53.9	6.3	

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).

Distance factor:     10GHz-26.5GHz   20log(3.0m/1.0m)= 9.5dB  
                          26.5GHz-40GHz   20log(3.0m/0.5m)=15.6dB

**UL Japan, Inc.**

**Head Office EMC Lab.**

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## Radiated Spurious Emission

Test place : Head Office EMC Lab. No.3 Semi Anechoic Chamber  
 Report No. : 10240262H  
 Date : 03/17/2014  
 Temperature/ Humidity : 22 deg. C / 33% RH  
 Engineer : Tomohisa Nakagawa  
 Mode : Tx, 3DH5 2402MHz

**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	95.9	28.2	3.1	32.4	94.8	-	-	Carrier
Hori	2400.000	PK	42.1	28.2	3.1	32.4	41.0	74.8	33.8	
Vert	2402.000	PK	96.3	28.2	3.1	32.4	95.2	-	-	Carrier
Vert	2400.000	PK	41.9	28.2	3.1	32.4	40.8	75.2	34.4	

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

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Facsimile : +81 596 24 8124

## Radiated Spurious Emission

Test place : Head Office EMC Lab. No.3 Semi Anechoic Chamber  
Report No. : 10240262H  
Date : 03/17/2014  
Temperature/ Humidity : 22 deg. C / 33% RH  
Engineer : Tomohisa Nakagawa  
Mode : Tx, 3DH5 2441MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	45.750	QP	23.5	12.4	7.3	32.1	11.1	40.0	28.9	
Hori	87.559	QP	41.8	7.7	7.9	32.2	25.2	40.0	14.8	
Hori	120.012	QP	35.2	13.0	8.3	32.1	24.4	43.5	19.1	
Hori	190.487	QP	34.5	16.4	9.0	32.1	27.8	43.5	15.7	
Hori	257.160	QP	39.5	17.7	9.5	32.0	34.7	46.0	11.3	
Hori	456.005	QP	25.4	17.9	10.9	32.0	22.2	46.0	23.8	
Hori	4882.000	PK	43.9	30.6	5.3	31.4	48.4	73.9	25.5	
Hori	7323.000	PK	43.4	36.0	6.8	32.4	53.7	73.9	20.2	
Hori	9764.000	PK	43.5	39.4	7.1	33.0	57.0	73.9	16.9	
Hori	4882.000	AV	32.9	30.6	5.3	31.4	37.4	53.9	16.5	
Hori	7323.000	AV	29.3	36.0	6.8	32.4	39.6	53.9	14.3	
Hori	9764.000	AV	31.5	39.4	7.1	33.0	45.0	53.9	8.9	
Vert	46.735	QP	37.8	12.0	7.3	32.1	25.0	40.0	15.0	
Vert	83.528	QP	41.5	7.0	7.8	32.2	24.1	40.0	15.9	
Vert	120.000	QP	40.6	13.0	8.3	32.1	29.8	43.5	13.7	
Vert	189.749	QP	33.1	16.3	9.0	32.1	26.3	43.5	17.2	
Vert	254.999	QP	36.9	17.5	9.5	32.1	31.8	46.0	14.2	
Vert	456.005	QP	27.3	17.9	10.9	32.0	24.1	46.0	21.9	
Vert	4882.000	PK	43.1	30.6	5.3	31.4	47.6	73.9	26.3	
Vert	7323.000	PK	41.6	36.0	6.8	32.4	51.9	73.9	22.0	
Vert	9764.000	PK	42.7	39.4	7.1	33.0	56.2	73.9	17.7	
Vert	4882.000	AV	31.3	30.6	5.3	31.4	35.8	53.9	18.1	
Vert	7323.000	AV	29.3	36.0	6.8	32.4	39.6	53.9	14.3	
Vert	9764.000	AV	30.8	39.4	7.1	33.0	44.3	53.9	9.6	

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).

Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB  
26.5GHz-40GHz 20log(3.0m/0.5m)=15.6dB

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Facsimile : +81 596 24 8124

## Radiated Spurious Emission

Test place Head Office EMC Lab. No.3 Semi Anechoic Chamber  
Report No. 10240262H  
Date 03/17/2014  
Temperature/ Humidity 22 deg. C / 33% RH  
Engineer Tomohisa Nakagawa  
Mode Tx, 3DH5 2480MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	45.750	QP	22.8	12.4	7.3	32.1	10.4	40.0	29.6	
Hori	87.545	QP	40.7	7.7	7.9	32.2	24.1	40.0	15.9	
Hori	119.550	QP	33.1	12.9	8.3	32.1	22.2	43.5	21.3	
Hori	188.849	QP	34.6	16.3	9.0	32.1	27.8	43.5	15.7	
Hori	257.139	QP	39.0	17.7	9.5	32.0	34.2	46.0	11.8	
Hori	456.003	QP	25.3	17.9	10.9	32.0	22.1	46.0	23.9	
Hori	2483.500	PK	51.6	28.4	3.1	32.3	50.8	73.9	23.1	
Hori	4960.000	PK	42.3	30.7	5.4	31.4	47.0	73.9	26.9	
Hori	7440.000	PK	42.2	36.2	6.7	32.4	52.7	73.9	21.2	
Hori	9920.000	PK	43.7	39.8	7.4	33.1	57.8	73.9	16.1	
Hori	2483.500	AV	33.2	28.4	3.1	32.3	32.4	53.9	21.5	
Hori	4960.000	AV	30.1	30.7	5.4	31.4	34.8	53.9	19.1	
Hori	7440.000	AV	29.3	36.2	6.7	32.4	39.8	53.9	14.1	
Hori	9920.000	AV	32.4	39.8	7.4	33.1	46.5	53.9	7.4	
Vert	46.756	QP	38.0	12.0	7.3	32.1	25.2	40.0	14.8	
Vert	83.535	QP	42.3	7.0	7.8	32.2	24.9	40.0	15.1	
Vert	119.293	QP	40.8	12.9	8.3	32.1	29.9	43.5	13.6	
Vert	185.189	QP	33.2	16.2	8.9	32.1	26.2	43.5	17.3	
Vert	256.249	QP	36.9	17.6	9.5	32.1	31.9	46.0	14.1	
Vert	456.003	QP	27.1	17.9	10.9	32.0	23.9	46.0	22.1	
Vert	2483.500	PK	48.1	28.4	3.1	32.3	47.3	73.9	26.6	
Vert	4960.000	PK	42.7	30.7	5.4	31.4	47.4	73.9	26.5	
Vert	7440.000	PK	42.3	36.2	6.7	32.4	52.8	73.9	21.1	
Vert	9920.000	PK	43.8	39.8	7.4	33.1	57.9	73.9	16.0	
Vert	2483.500	AV	31.0	28.4	3.1	32.3	30.2	53.9	23.7	
Vert	4960.000	AV	29.2	30.7	5.4	31.4	33.9	53.9	20.0	
Vert	7440.000	AV	29.3	36.2	6.7	32.4	39.8	53.9	14.1	
Vert	9920.000	AV	31.9	39.8	7.4	33.1	46.0	53.9	7.9	

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).

Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB  
26.5GHz-40GHz 20log(3.0m/0.5m)=15.6dB

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**Head Office EMC Lab.**

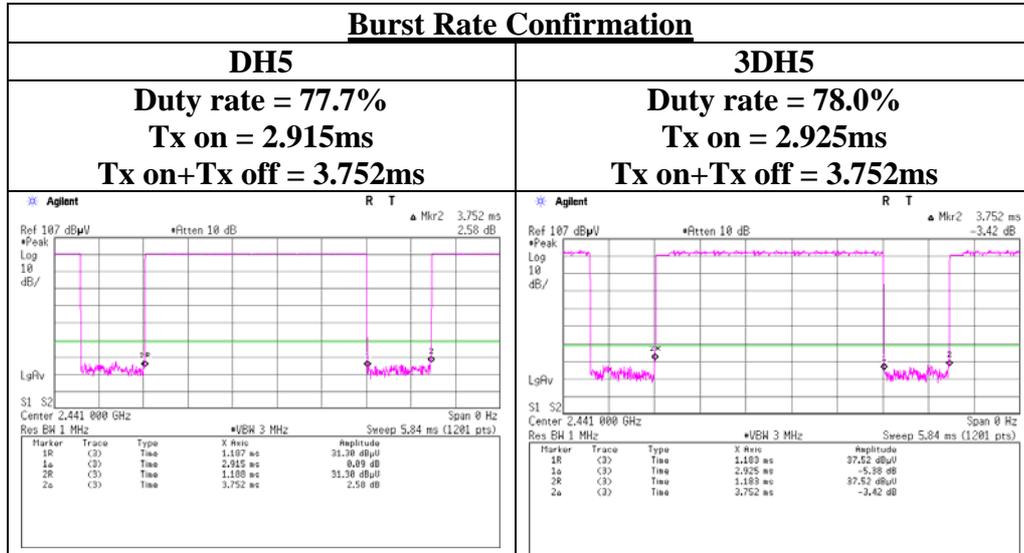
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

### Burst Rate Confirmation

Test place	Head Office EMC Lab. No.11 Measurement Room
Report No.	10240262H
Date	03/04/2014
Temperature/ Humidity	24 deg. C / 40% RH
Engineer	Satofumi Matsuyama
Mode	Tx (Hopping off) DH5



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**Head Office EMC Lab.**

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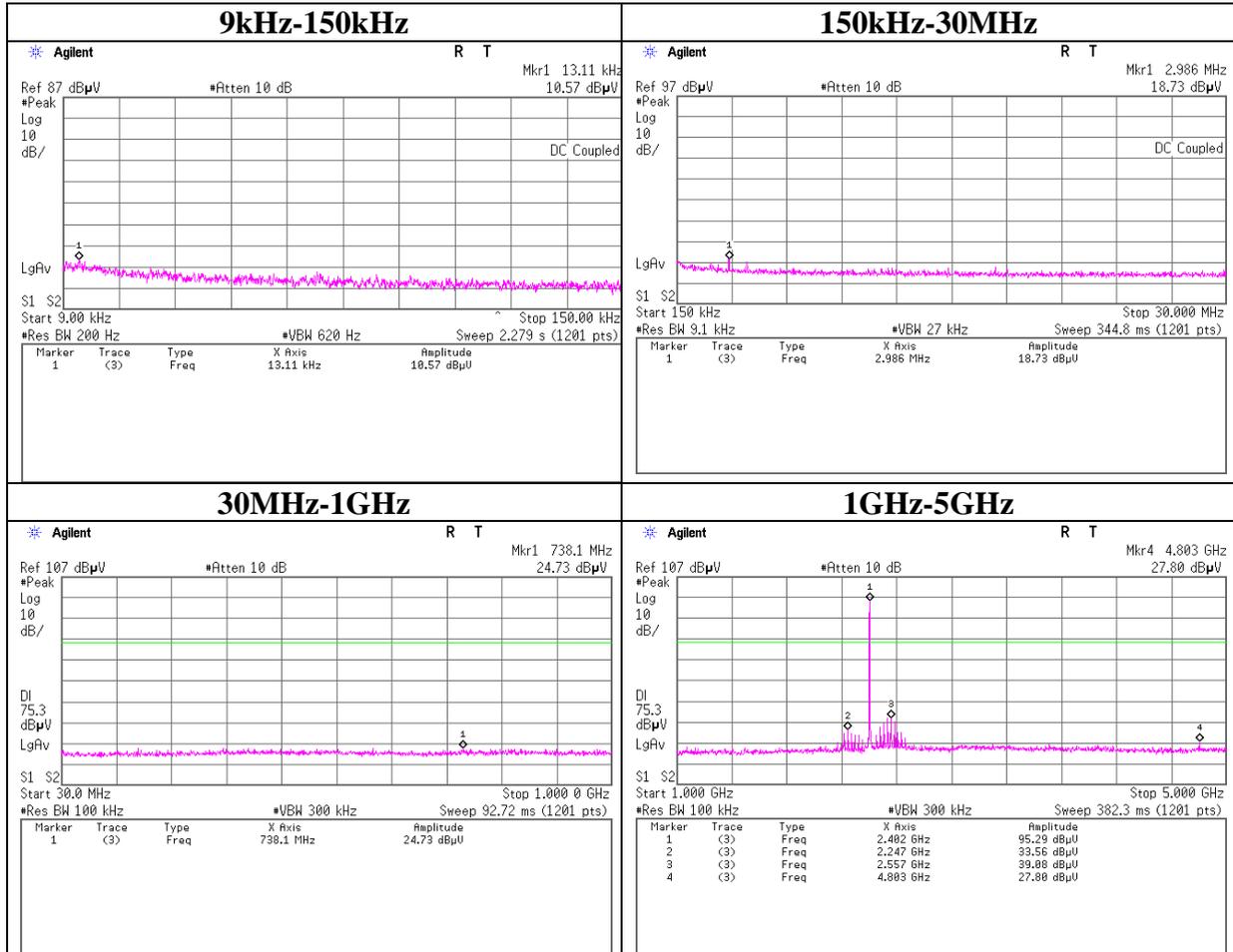
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

## Conducted Spurious Emission

Test place	Head Office EMC Lab. No.11 Measurement Room
Report No.	10240262H
Date	03/04/2014
Temperature/ Humidity	24 deg. C / 40% RH
Engineer	Satofumi Matsuyama
Mode	Tx (Hopping off) DH5

### Tx DH5 2402MHz



**UL Japan, Inc.**

**Head Office EMC Lab.**

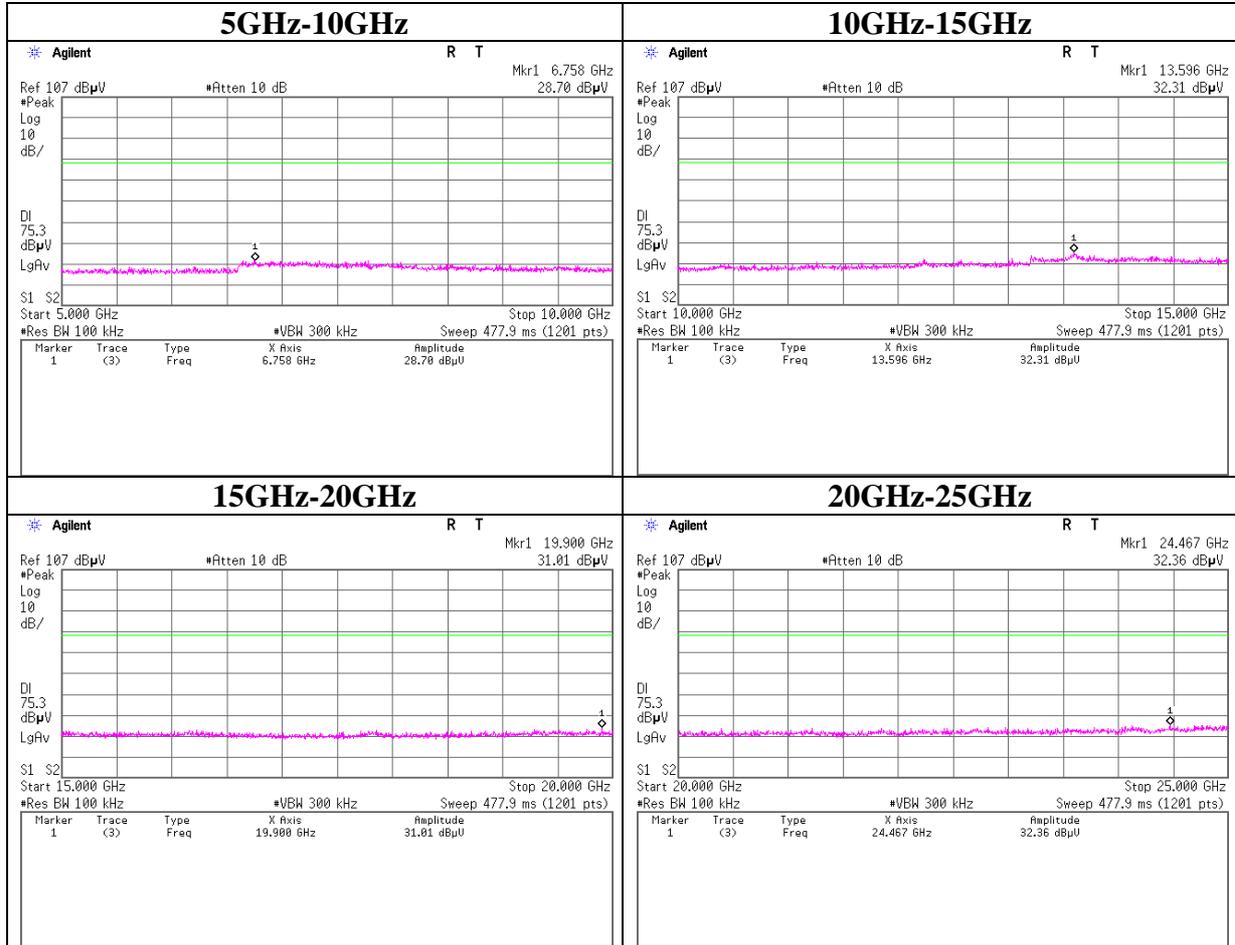
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

## Conducted Spurious Emission

### Tx DH5 2402MHz



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**Head Office EMC Lab.**

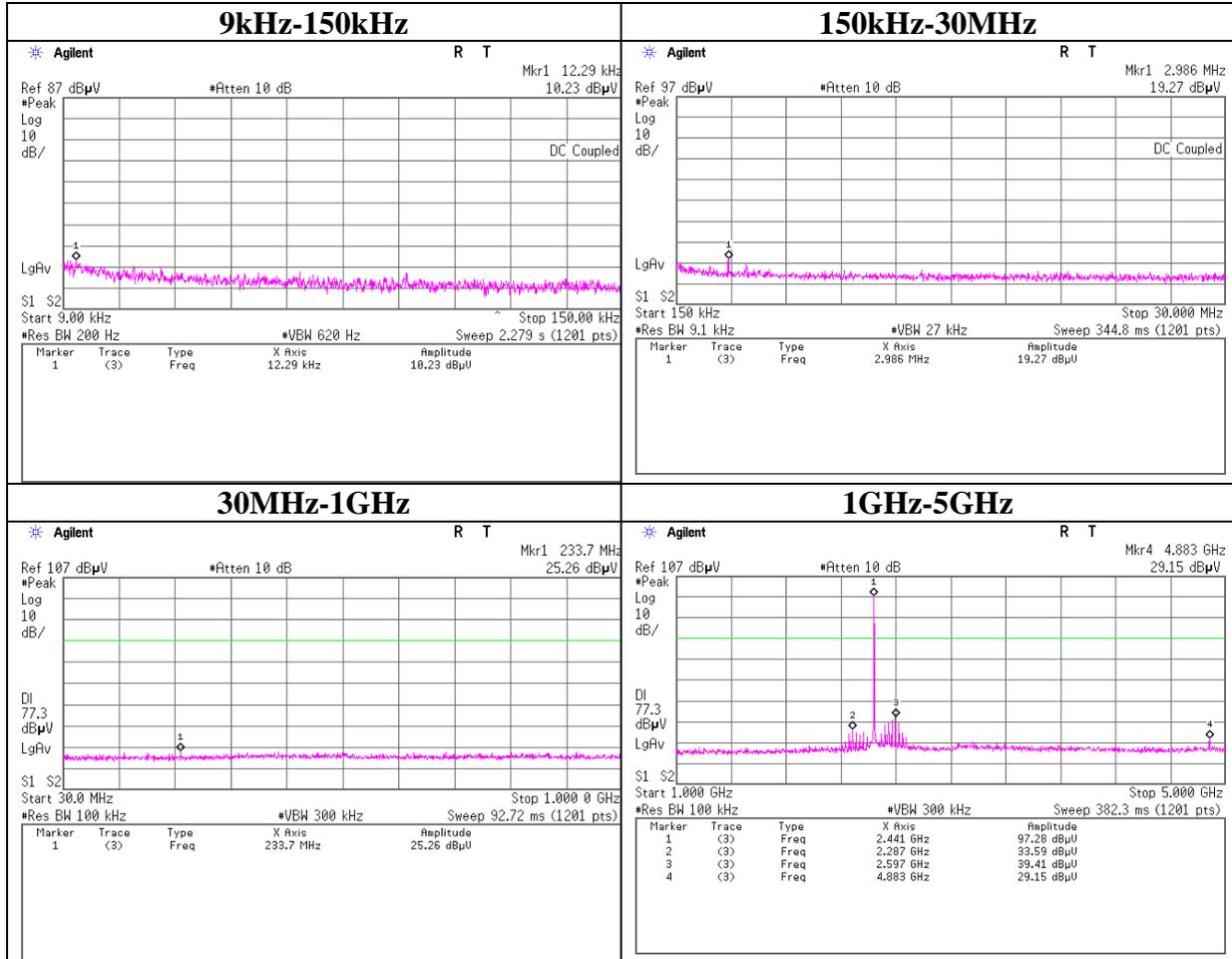
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

## Conducted Spurious Emission

### Tx DH5 2441MHz



**UL Japan, Inc.**

**Head Office EMC Lab.**

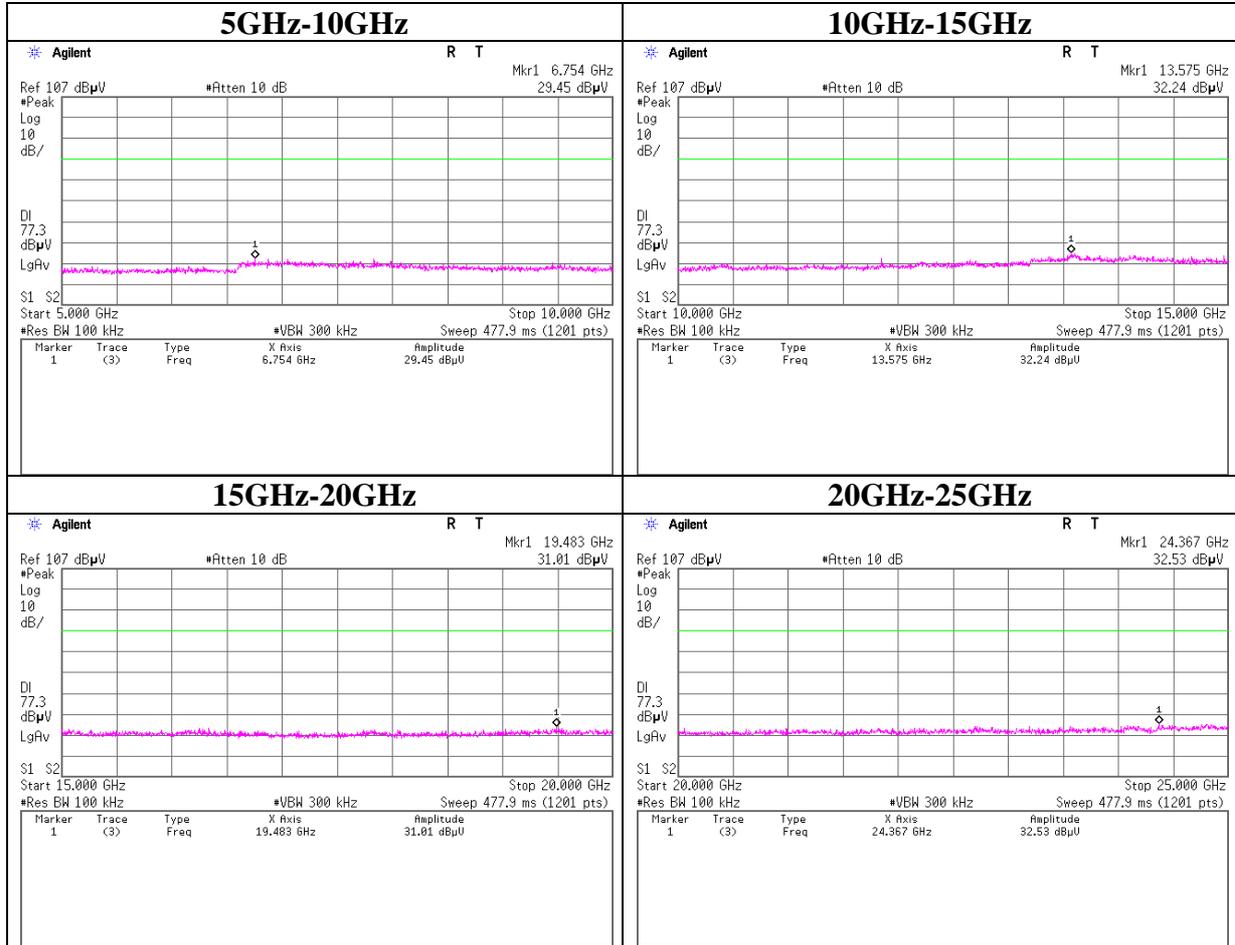
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

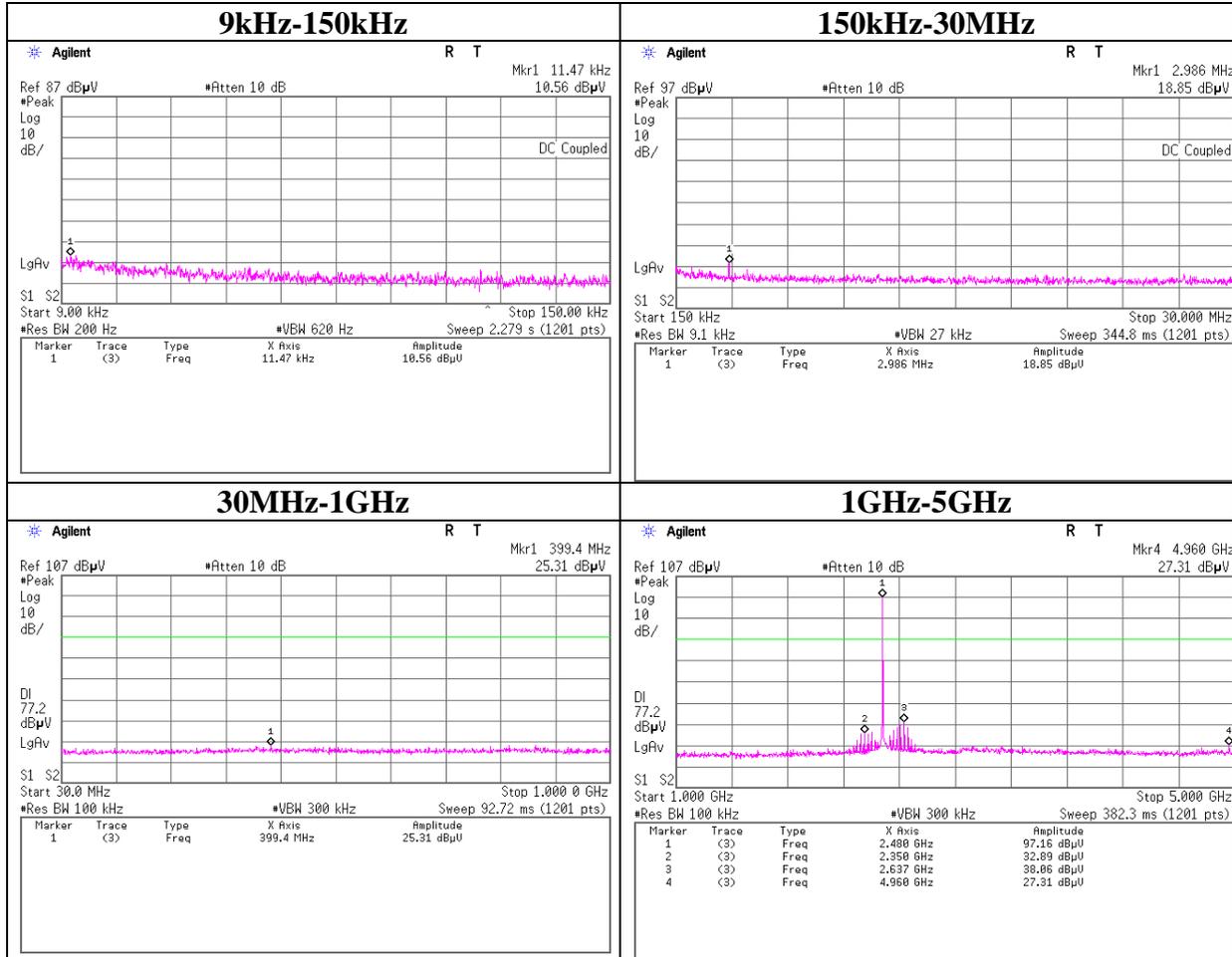
## Conducted Spurious Emission

### Tx DH5 2441MHz



## Conducted Spurious Emission

### Tx DH5 2480MHz



**UL Japan, Inc.**

**Head Office EMC Lab.**

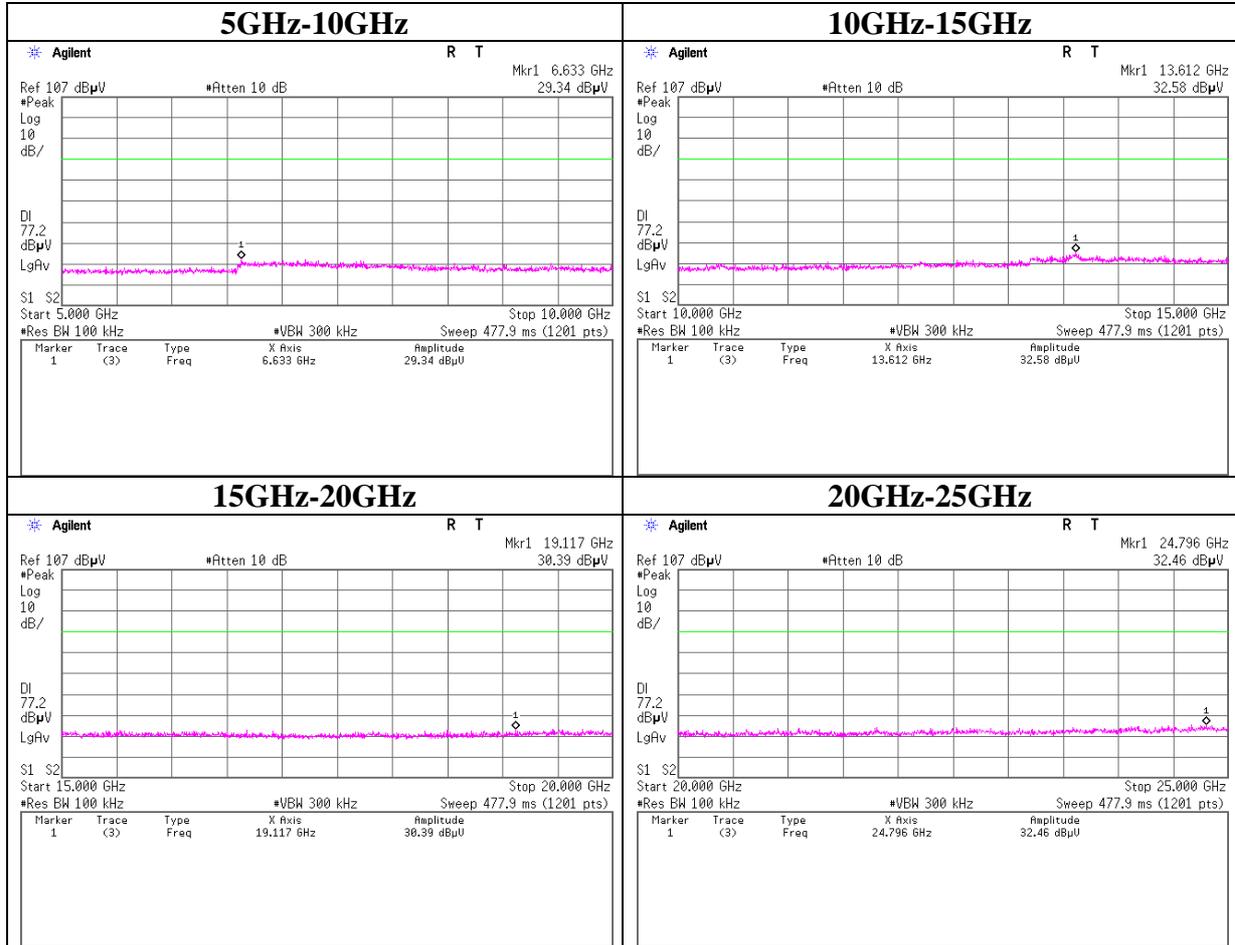
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

## Conducted Spurious Emission

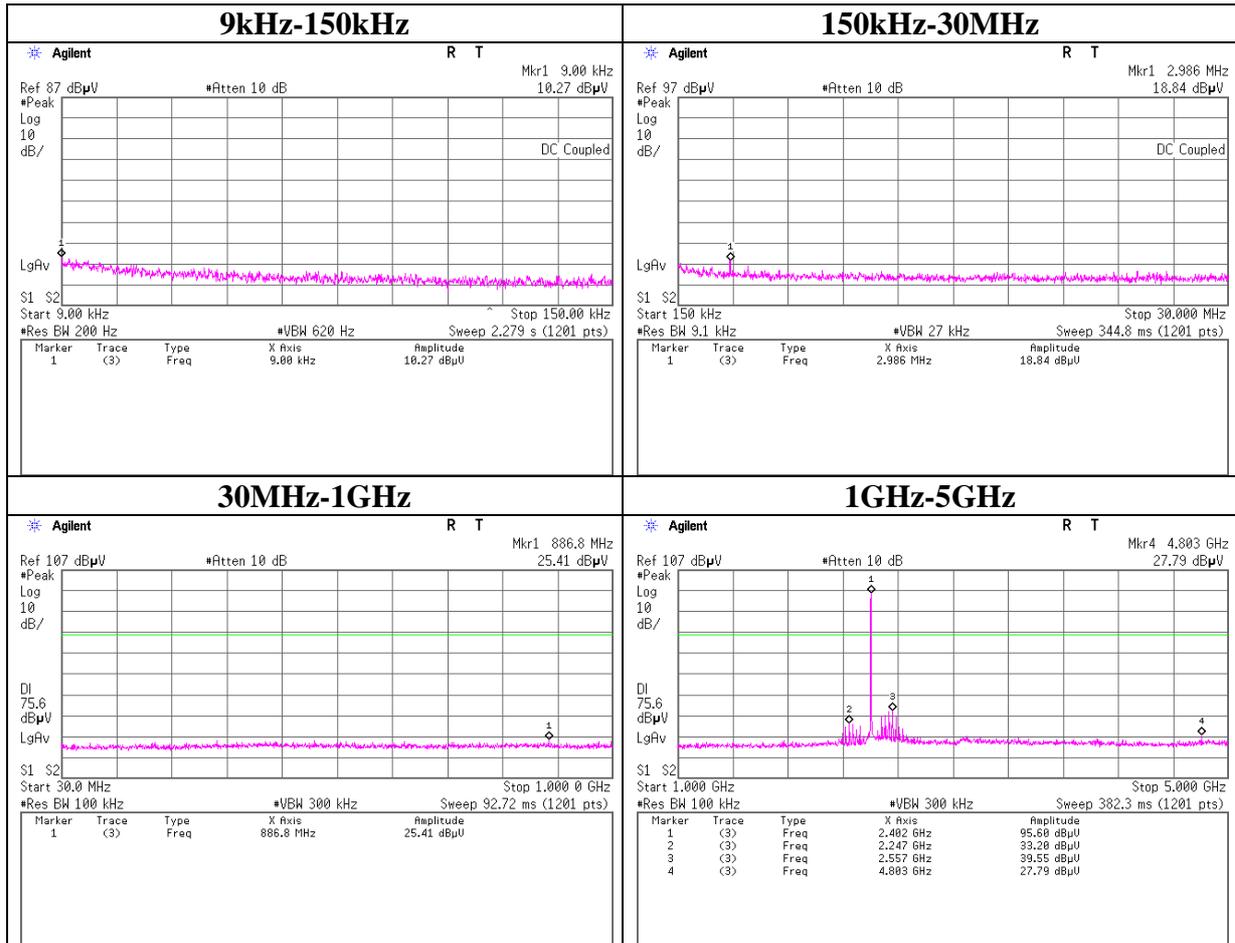
### Tx DH5 2480MHz



## Conducted Spurious Emission

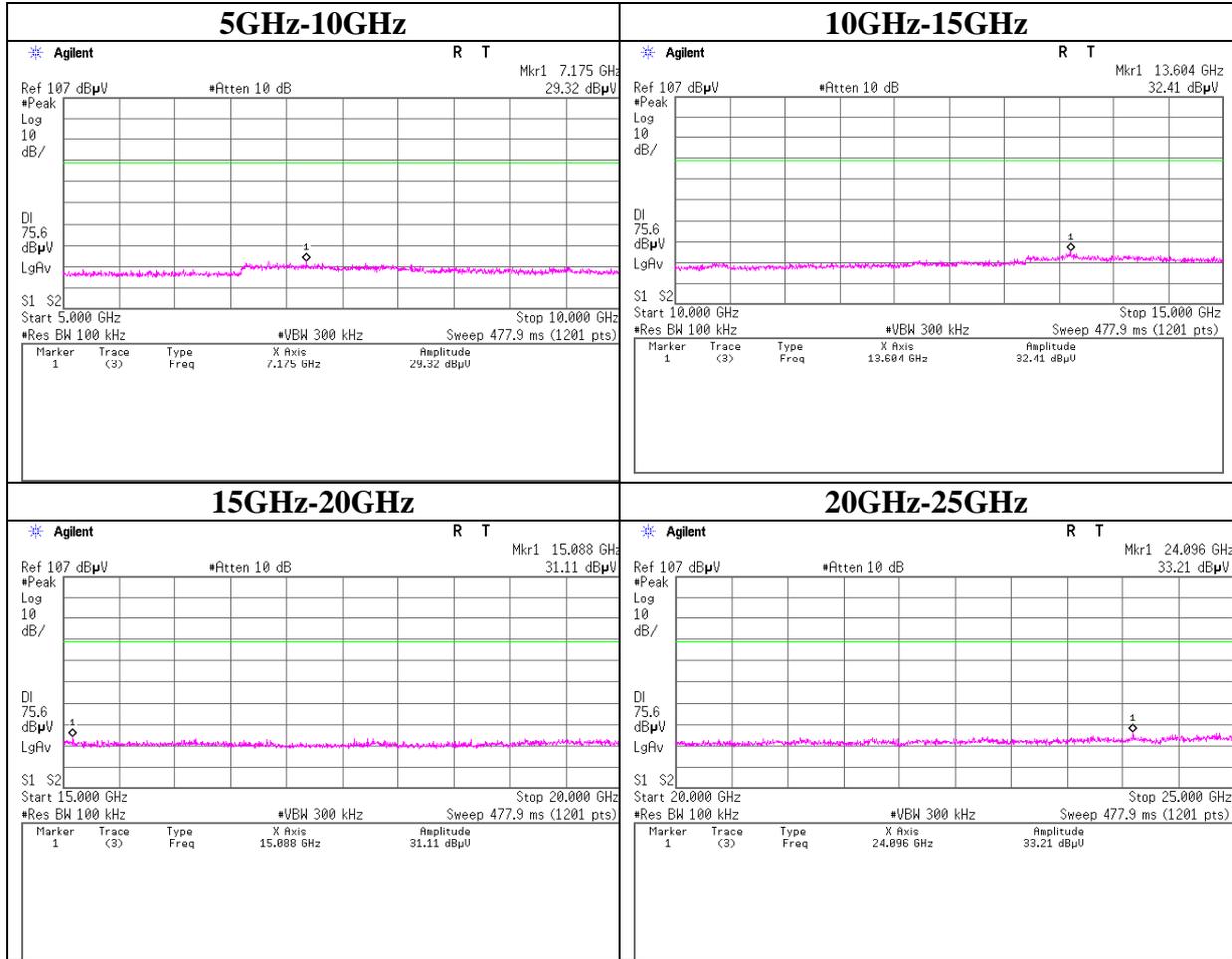
Test place	Head Office EMC Lab. No.11 Measurement Room
Report No.	10240262H
Date	03/04/2014
Temperature/ Humidity	24 deg. C / 40% RH
Engineer	Satofumi Matsuyama
Mode	Tx (Hopping off) 3DH5

### Tx 3DH5 2402MHz



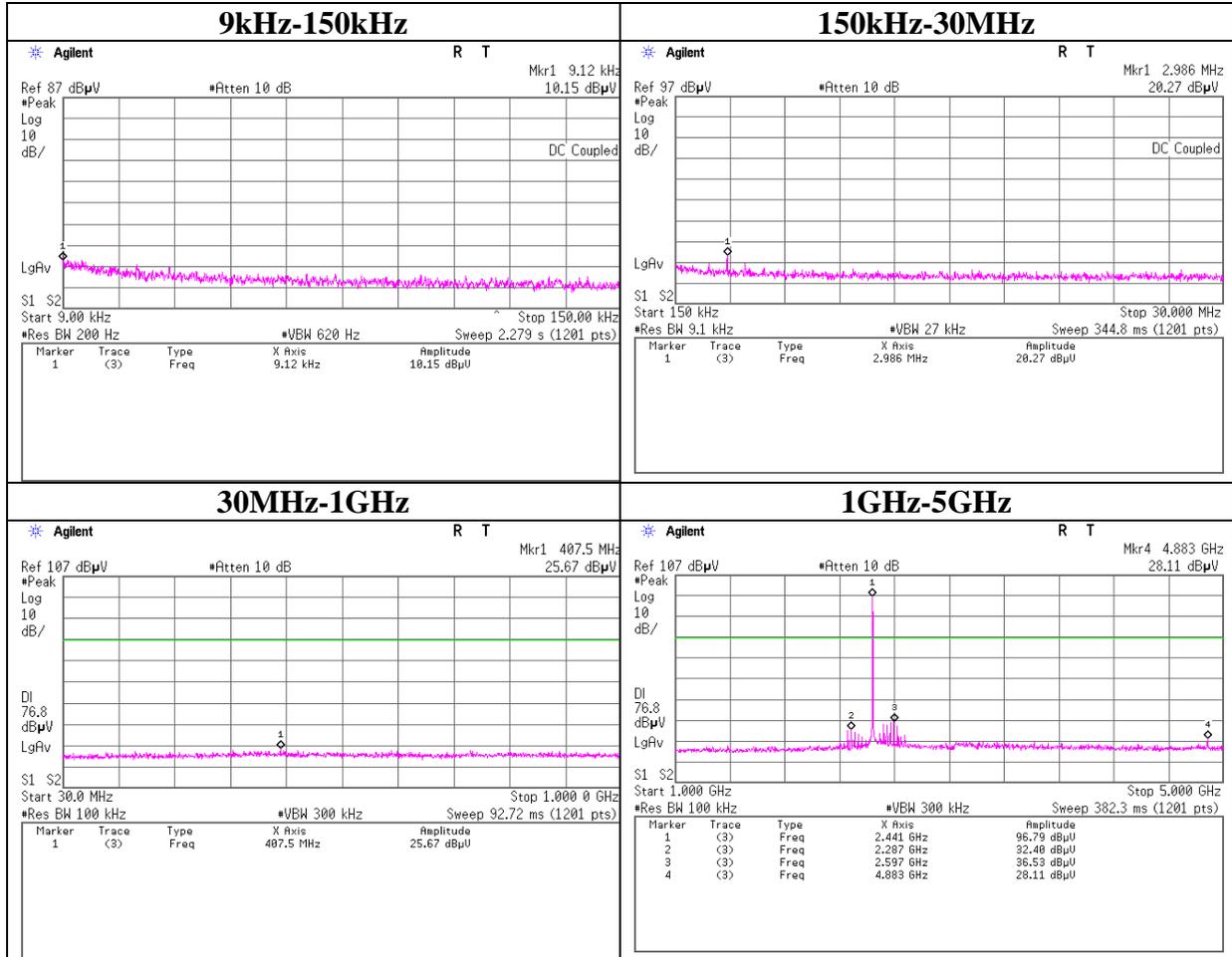
## Conducted Spurious Emission

### Tx 3DH5 2402MHz



## Conducted Spurious Emission

### Tx 3DH5 2441MHz



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**Head Office EMC Lab.**

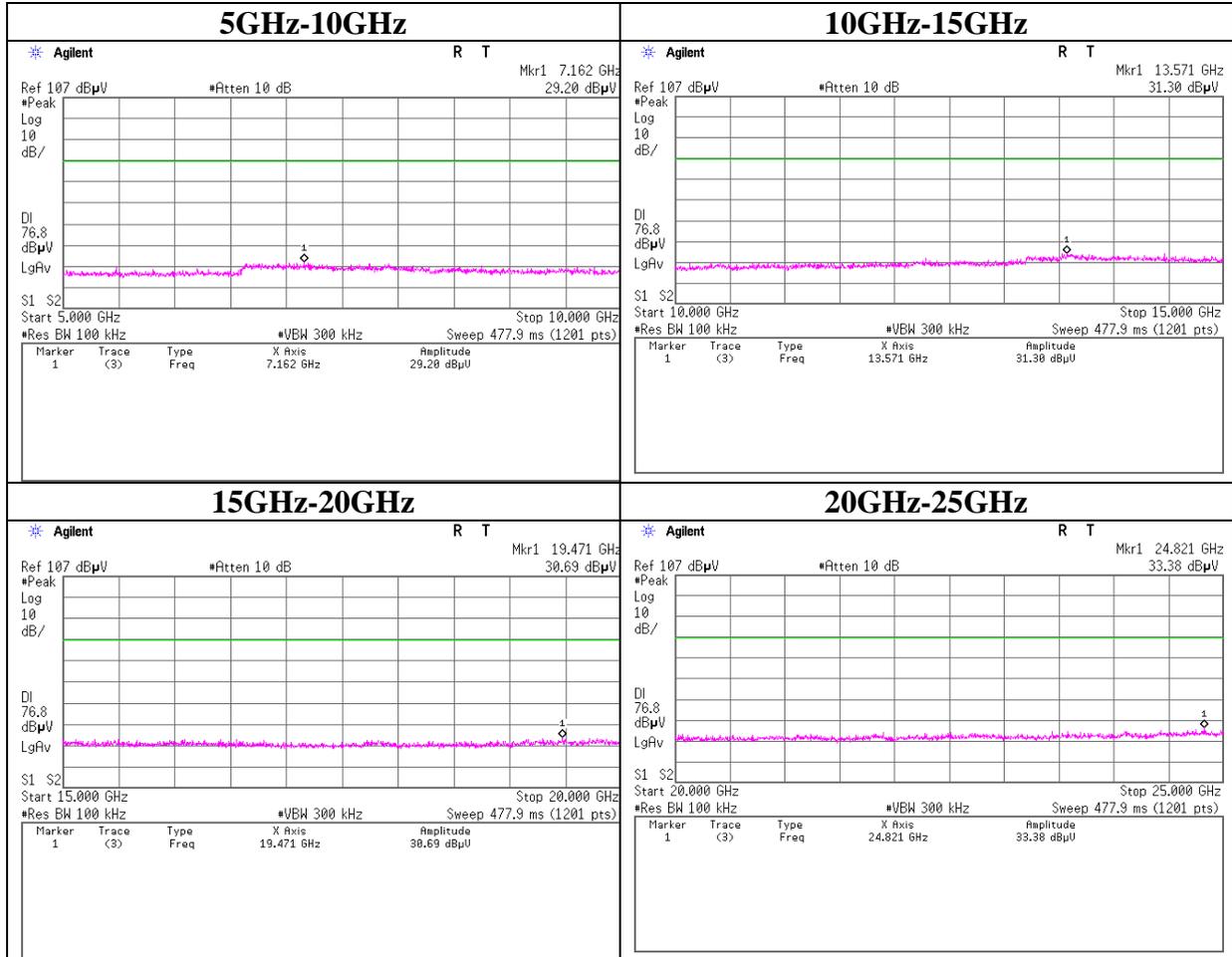
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8999

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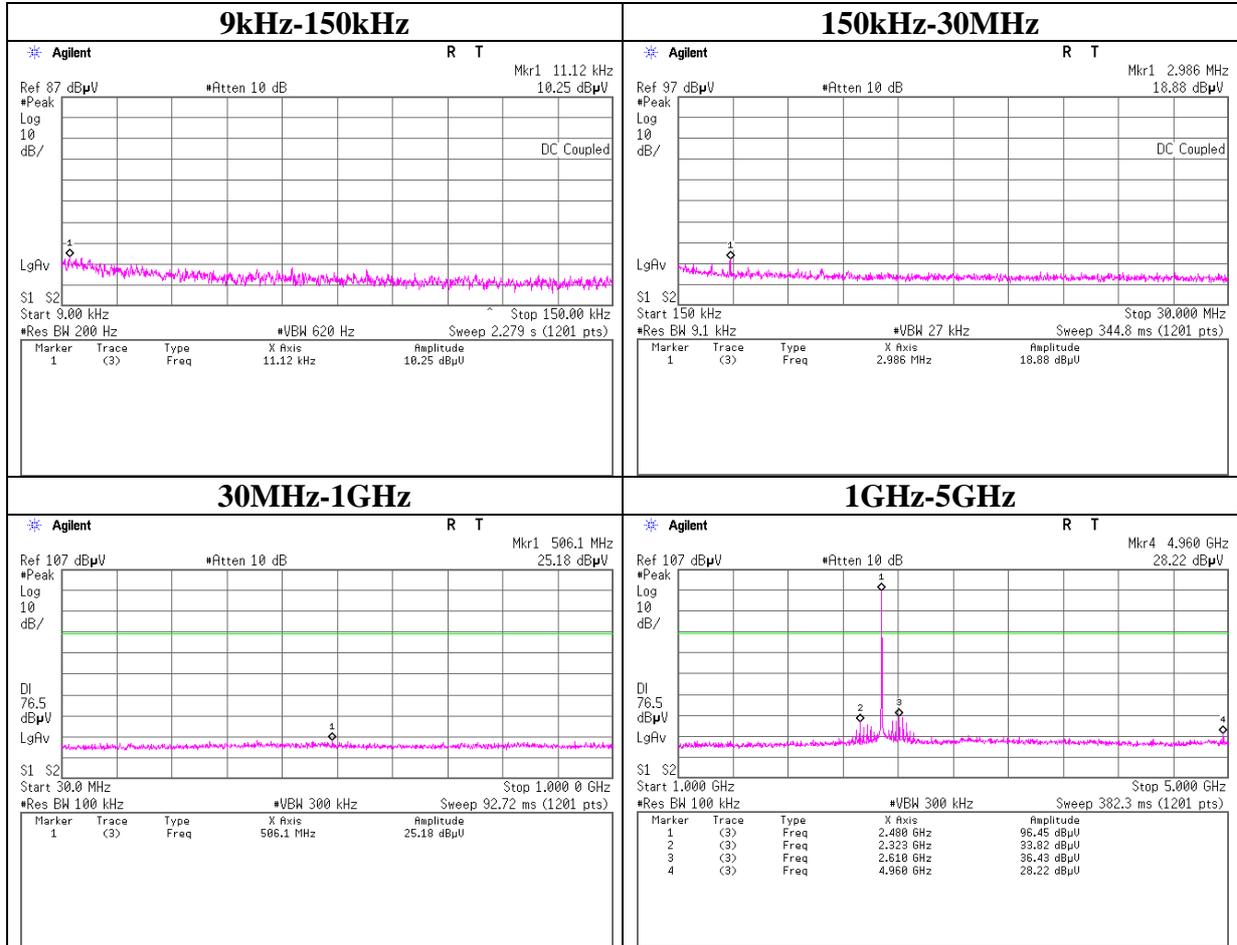
## Conducted Spurious Emission

### Tx 3DH5 2441MHz



## Conducted Spurious Emission

### Tx 3DH5 2480MHz



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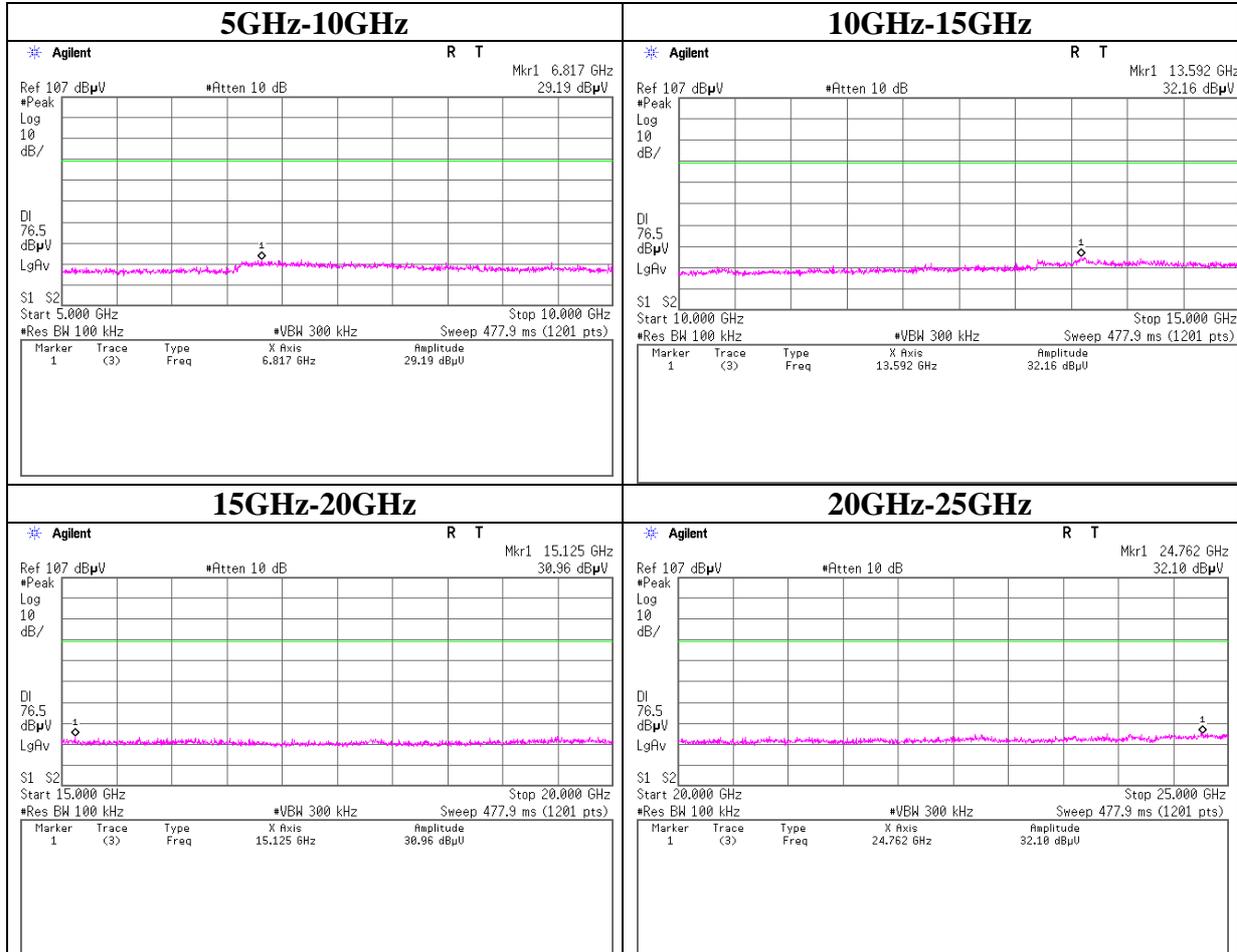
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

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## Conducted Spurious Emission

### Tx 3DH5 2480MHz



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**Head Office EMC Lab.**

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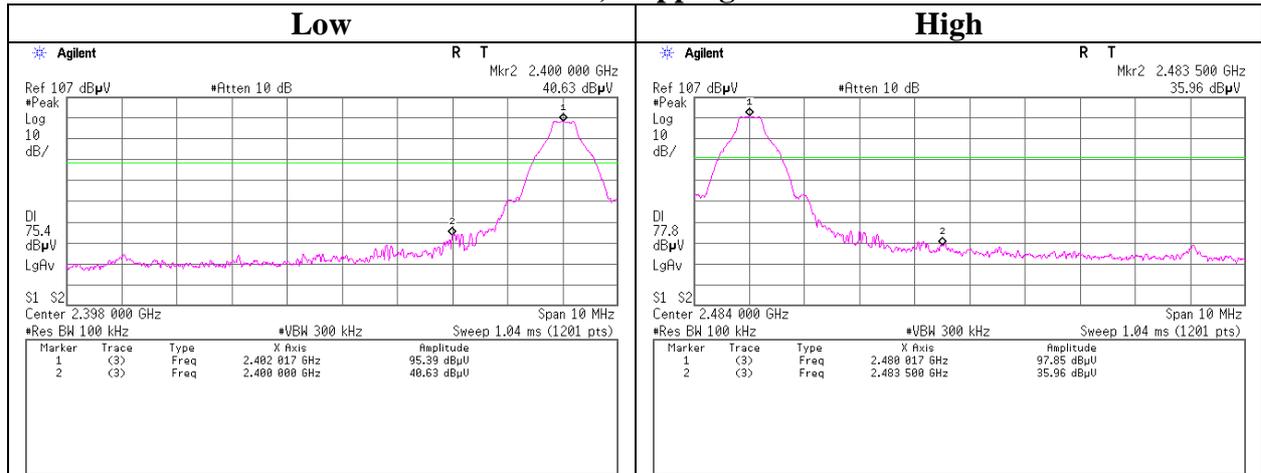
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

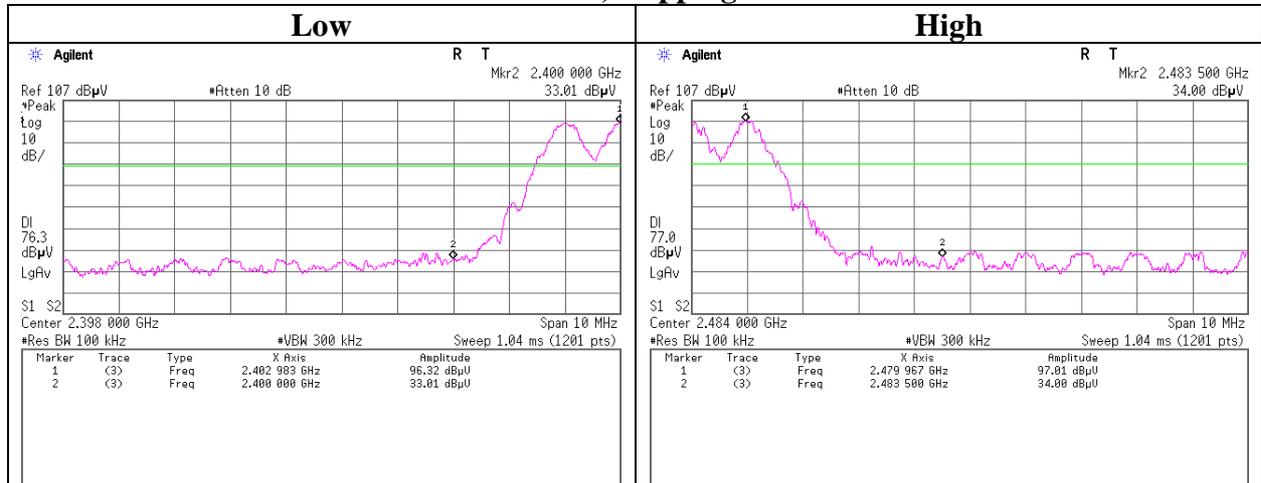
### Conducted Emission Band Edge compliance

Test place	Head Office EMC Lab. No.11 Measurement Room
Report No.	10240262H
Date	03/04/2014
Temperature/ Humidity	24 deg. C / 40% RH
Engineer	Satofumi Matsuyama
Mode	Tx (Hopping on/off) DH5/3DH5

#### Tx DH5, Hopping off

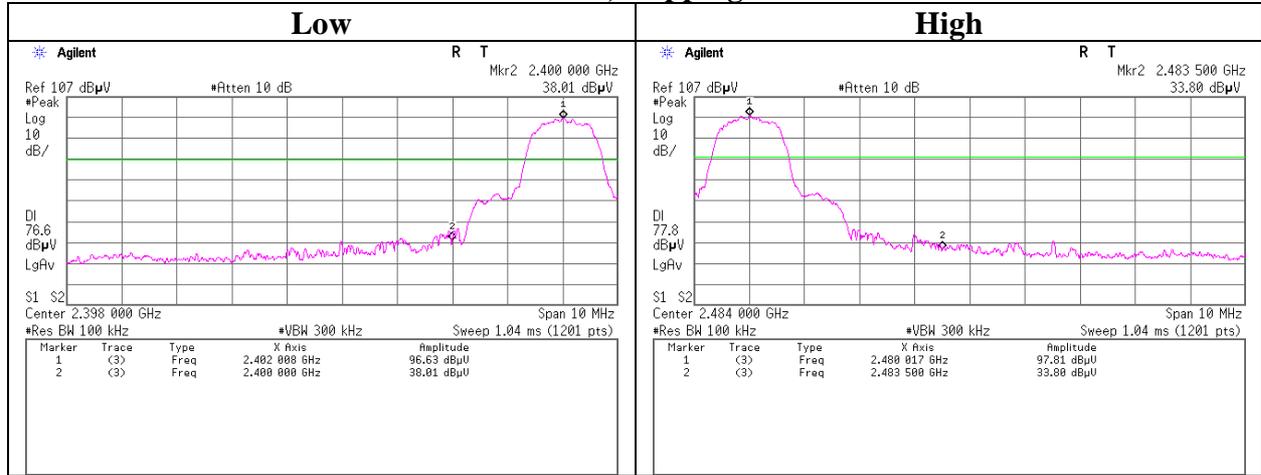


#### Tx DH5, Hopping on

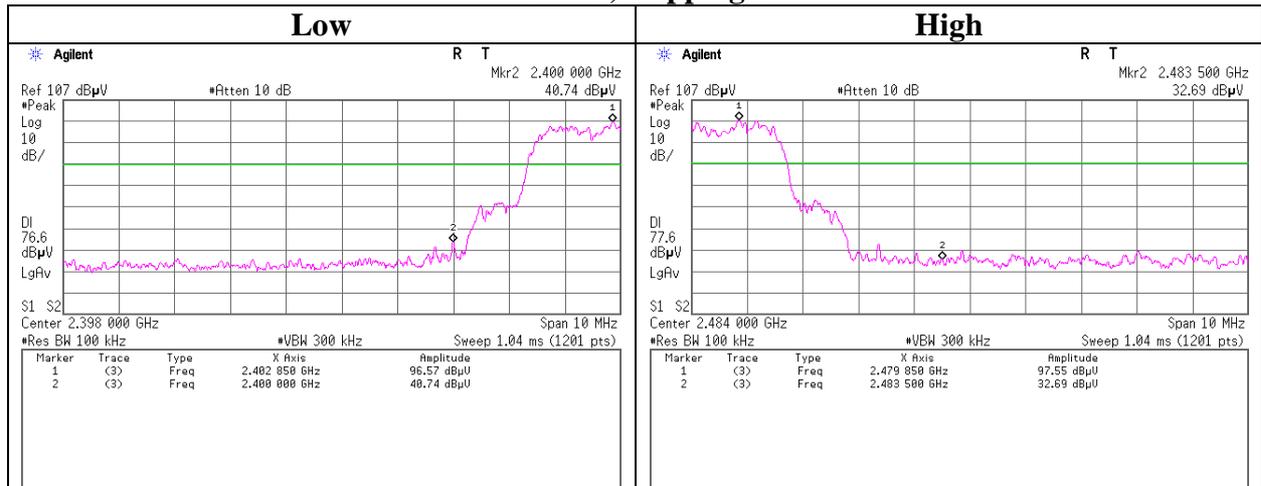


## Conducted Emission Band Edge compliance

### Tx 3DH5, Hopping off



### Tx 3DH5, Hopping on



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**Head Office EMC Lab.**

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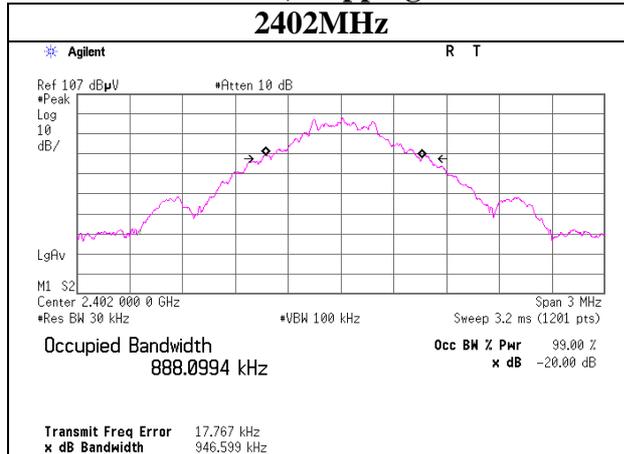
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

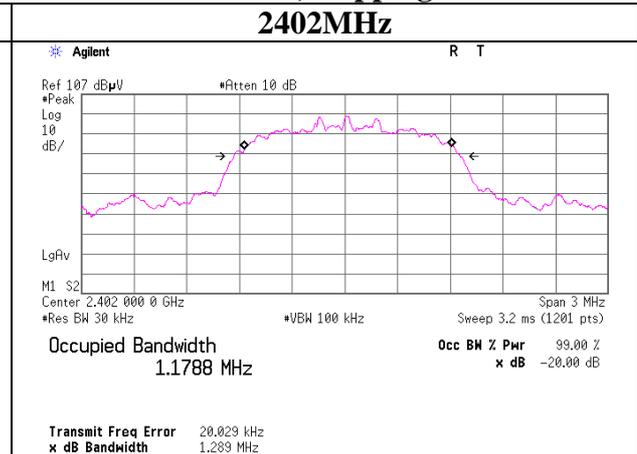
## 99% Occupied Bandwidth

Test place	Head Office EMC Lab. No.11 Measurement Room
Report No.	10240262H
Date	03/04/2014
Temperature/ Humidity	24 deg. C / 40% RH
Engineer	Satofumi Matsuyama
Mode	Tx (Hopping off) DH5/3DH5

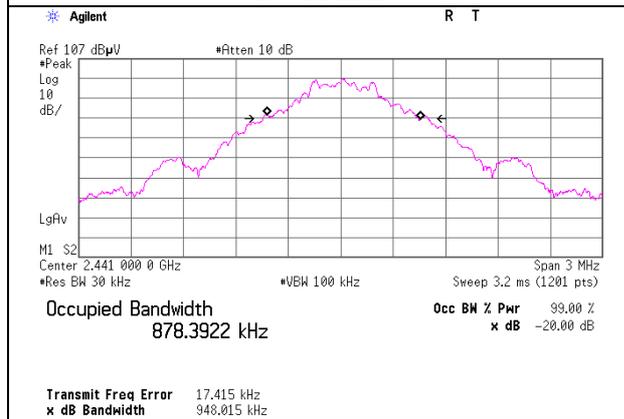
### Tx DH5, Hopping off



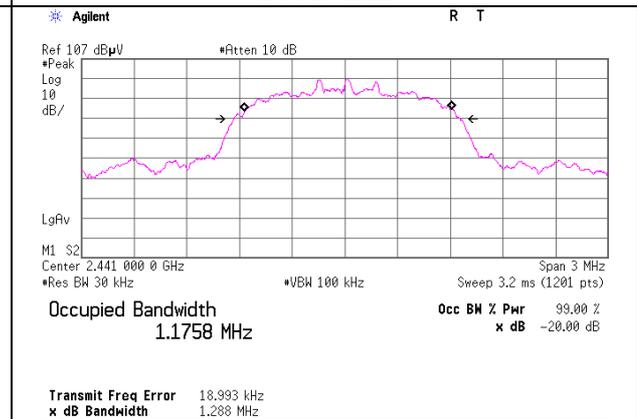
### Tx 3DH5, Hopping off



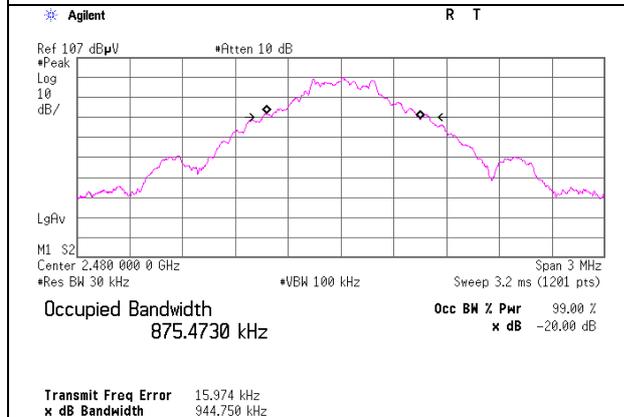
### 2441MHz



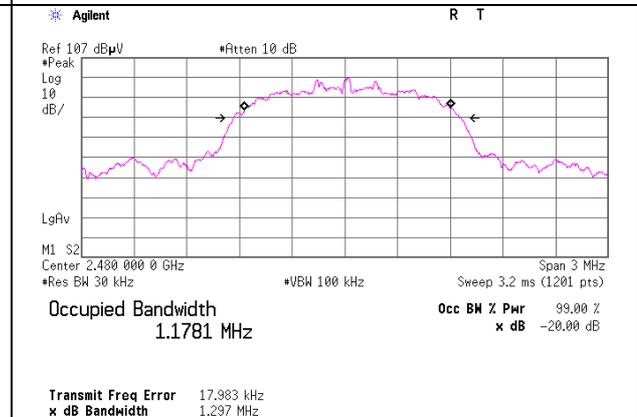
### 2441MHz



### 2480MHz

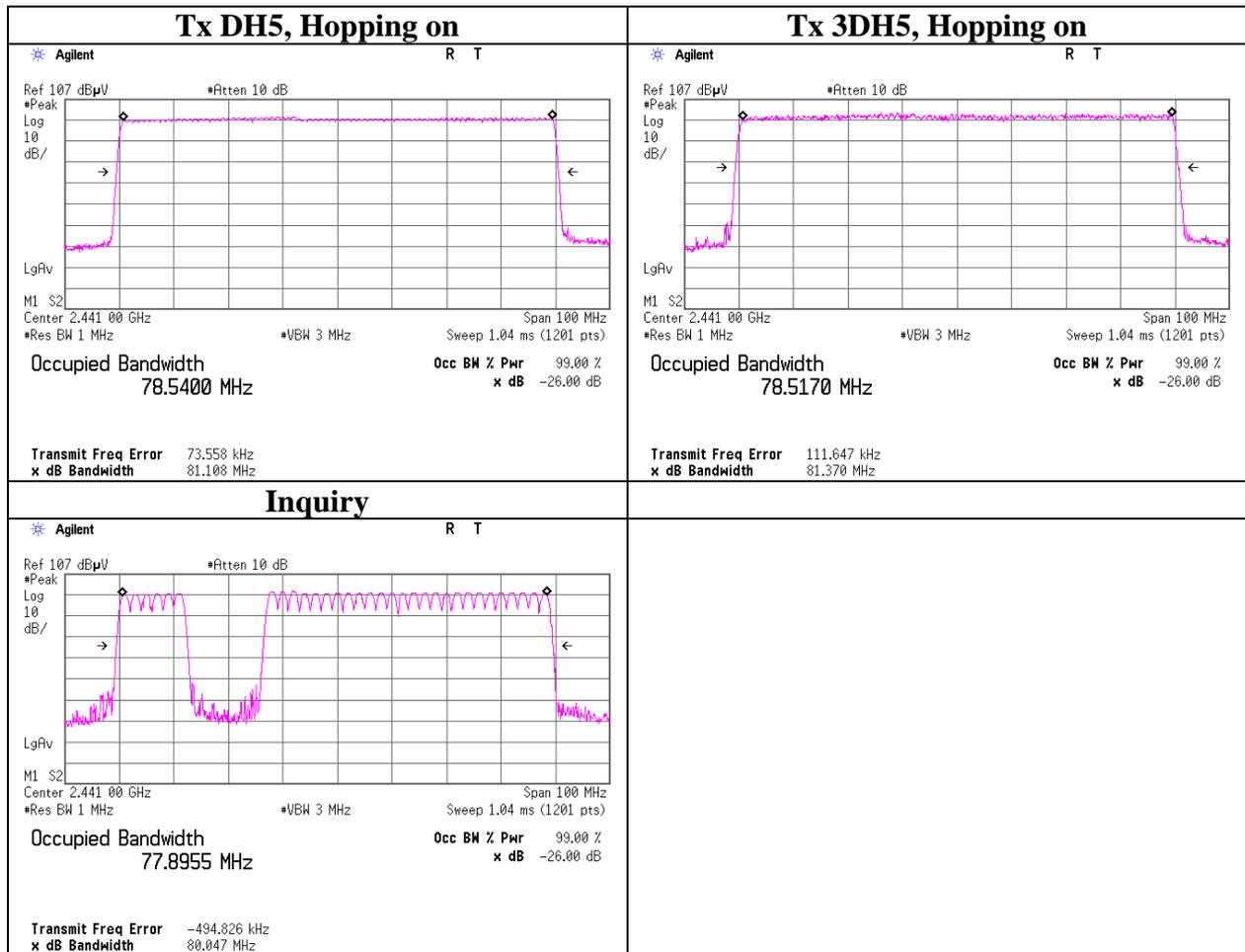


### 2480MHz



### 99% Occupied Bandwidth

Test place	Head Office EMC Lab. No.11 Measurement Room
Report No.	10240262H
Date	03/04/2014
Temperature/ Humidity	24 deg. C / 40% RH
Engineer	Satofumi Matsuyama
Mode	Tx (Hopping on) DH5/3DH5/Inquiry



## **APPENDIX 2: Test instruments**

### **EMI test equipment**

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MRENT-114	Spectrum Analyzer	Agilent	E4440A	MY46187105	AT/RE/CE	2013/11/11 * 12
MPM-09	Power Meter	Anritsu	ML2495A	6K00003348	AT	2013/10/21 * 12
MPSE-12	Power sensor	Anritsu	MA2411B	011598	AT	2013/10/21 * 12
MAT-20	Attenuator(10dB)(above 1GHz)	HIROSE ELECTRIC CO.,LTD.	AT-110	-	AT	2014/01/29 * 12
MOS-19	Thermo-Hygrometer	Custom	CTH-201	0001	AT	2013/12/17 * 12
MOTS-MATM	Antenna Terminal Measurement Software	UL Japan	-	-	AT	-
MAEC-03	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	RE/CE	2014/02/27 * 12
MOS-13	Thermo-Hygrometer	Custom	CTH-180	1301	RE/CE	2014/02/20 * 12
MJM-16	Measure	KOMELON	KMC-36	-	RE/CE	-
COTS-MEMI	EMI measurement program	TSJ	TEPTO-DV	-	RE/CE	-
MTR-08	Test Receiver	Rohde & Schwarz	ESCI	100767	RE/CE	2013/08/20 * 12
MBA-03	Biconical Antenna	Schwarzbeck	BBA9106	1915	RE	2013/10/13 * 12
MLA-03	Logperiodic Antenna	Schwarzbeck	USLP9143	174	RE	2013/10/13 * 12
MCC-51	Coaxial cable	UL Japan	-	-	RE	2013/07/23 * 12
MAT-70	Attenuator(6dB)	Agilent	8491A-006	MY52460153	RE	2013/04/05 * 12
MPA-13	Pre Amplifier	SONOMA INSTRUMENT	310	260834	RE	2014/03/14 * 12
MHA-20	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	258	RE	2013/05/17 * 12
MCC-133	Microwave Cable	HUBER+SUHNER	SUCOFLEX104	336164/4(1m) / 340640(5m)	RE	2013/09/27 * 12
MPA-11	MicroWave System Amplifier	Agilent	83017A	MY39500779	RE	2013/03/12 * 12
MHA-16	Horn Antenna 15-40GHz	Schwarzbeck	BBHA9170	BBHA917030 6	RE	2013/05/17 * 12
MHF-25	High Pass Filter 3.5-18.0GHz	UL Japan	HPF SELECTOR	001	RE	2013/09/01 * 12
MLS-06	LISN(AMN)	Schwarzbeck	NSLK8127	8127363	CE(EUT)	2014/01/27 * 12
MTA-31	Terminator	TME	CT-01	-	CE	2014/01/20 * 12
MCC-112	Coaxial cable	Fujikura/Suhner/TSJ	5D-2W(10m)/SFM141(3m)/sucoform141-PE(1m)/421-010(1.5m)/RFM-E321(Switcher)	-/00640	CE	2013/07/23 * 12
MAT-66	Attenuator(13dB)	JFW Industries, Inc.	50FP-013H2 N	-	CE	2014/01/29 * 12

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

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

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

### **UL Japan, Inc.**

#### **Head Office EMC Lab.**

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