

Test report No. Page

Issued date

: 10105410H-B : 1 of 33

FCC ID

: November 29, 2013 : VIYARC0557

# **RADIO TEST REPORT**

Test Report No.: 10105410H-B

**Applicant** 

**Hosiden Corporation** 

**Type of Equipment** 

Bluetooth module

Model No.

: ARC0557

**FCC ID** 

: VIYARC0557

**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.

Date of test:

November 19 and 23, 2013

Representative test engineer:

Takumi Shimada Engineer of WiSE Japan, UL Verification Service

Approved by:

Masanori Mishiyama 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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Head Office EMC Lab.

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Test report No. : 10105410H-B Page : 2 of 33

Issued date : November 29, 2013 FCC ID : VIYARC0557

# **REVISION HISTORY**

Original Test Report No.: 10105410H-B

Revision	Test report No.	Date	Page revised	Contents
- (Original)	10105410H-B	November 29, 2013	-	-

Test report No. Page

: 3 of 33

: 10105410H-B

: November 29, 2013 Issued date FCC ID : VIYARC0557

CONTENTS	PAGE
SECTION 1: Customer information	4
SECTION 2: Equipment under test (E.U.T.)	
SECTION 3: Test specification, procedures & results	
SECTION 4: Operation of E.U.T. during testing	
SECTION 5: Radiated Spurious Emission	
SECTION 6: Antenna Terminal Conducted Tests	
APPENDIX 1: Data of EMI test	12
20dB Bandwidth and Carrier Frequency Separation	12
Number of Hopping Frequency	
Dwell time	
Maximum Peak Output Power	
Radiated Spurious Emission	
Conducted Spurious Emission	
Conducted Emission Band Edge compliance	28
99%Occupied Bandwidth	
APPENDIX 2: Test instruments	
APPENDIX 3: Photographs of test setup	32
Radiated Spurious Emission	
Worst Case Position (Horizontal: X-axis/ Vertical: Z-axis)	33

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Test report No. : 10105410H-B Page : 4 of 33

Issued date : November 29, 2013 FCC ID : VIYARC0557

### **SECTION 1: Customer information**

Company Name : Hosiden Corporation

Address : 1-4-33, Kitakyuhoji, Yao, Osaka, 5810071, Japan

Telephone Number : +81-72-924-1195 Facsimile Number : +81-72-993-0724 Contact Person : Keiji Mine

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

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

Type of Equipment : Bluetooth module

Model No. : ARC0557

Serial No. : Refer to Section 4, Clause 4.2

Rating : DC 2.0 to DC 3.0V Receipt Date of Sample : November 14, 2013

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 : 16MHz

#### **Radio Specification**

#### [Bluetooth (Ver. 3.0 without EDR function)]

Radio Type : Transceiver
Frequency of Operation : 2402-2480MHz
Modulation : FHSS, GFSK
Power Supply (radio part input) : DC 1.8V

Antenna type :  $\lambda$ 4 meander antenna (printed on the PWB)

Antenna Gain : -3.0 dBi max

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Test report No. : 10105410H-B Page : 5 of 33

Issued date : November 29, 2013 FCC ID : VIYARC0557

### **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	N/A *1)	N/A	-
Carrier Frequency Separation	FCC: FCC Public Notice DA 00-705	FCC: Section15.247(a)(1) IC: RSS-210 A8.1 (b)		Complied	Conducted
20dB Bandwidth	FCC: FCC Public Notice DA 00-705	FCC: Section15.247(a)(1)  IC: RSS-210 A8.1 (a)		Complied	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)	See data.	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	10.6dB 2354.011MHz, AV, Vert.	Complied	Conducted/ Radiated

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

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<sup>\*1)</sup> 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.

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

Test report No. : 10105410H-B Page : 6 of 33

Issued date : November 29, 2013 FCC ID : VIYARC0557

#### FCC 15.31 (e)

This EUT provides stable voltage (DC1.8V) constantly to RF Module regardless of input voltage. Therefore, this EUT complies with the requirement.

#### FCC Part 15.203/212 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	IC: RSS-Gen 4.6.1	IC: RSS-Gen 4.6.1	N/A	-	Conducted
Bandwidth					

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	Radiated emission						
(semi-		(3m*)	( <u>+</u> dB)		(1m*)	)( <u>+</u> dB)	$(0.5\text{m}^*)(\pm dB)$
anechoic chamber)	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

<sup>\*3</sup>m/1m/0.5m = Measurement distance

Power meter ( <u>+</u> dB)			
Below 1GHz	Above 1GHz		
0.7dB	1.5dB		

Antenna terminal conducted emission			Antenna terminal	Channel power	
and	Power density (	<u>+</u> dB)	( <u>+</u> dB)		( <u>+</u> 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

### Radiated emission test(3m)

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

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Test report No. : 10105410H-B Page : 7 of 33

Issued date : November 29, 2013 FCC ID : VIYARC0557

#### 3.5 Test Location

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	FCC	IC Registration	Width x Depth x	Size of	Other
	Registration	Number	Height (m)	reference ground plane (m) /	rooms
	Number			horizontal conducting plane	
No.1 semi-anechoic	313583	2973C-1	19.2 x 11.2 x 7.7m	7.0 x 6.0m	No.1 Power
chamber					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	148738	2973C-3	12.0 x 8.5 x 5.9m	6.8 x 5.75m	No.3
chamber					Preparation
					room
No.3 shielded room	-	-	4.0 x 6.0 x 2.7m	N/A	-
No.4 semi-anechoic	134570	2973C-4	12.0 x 8.5 x 5.9m	6.8 x 5.75m	No.4
chamber					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	-	-	3.1 x 5.0 x 2.7m	N/A	-
No.9 measurement	-	-	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	2.4 x 3.4m	-

<sup>\*</sup> 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.

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

Test report No. : 10105410H-B Page : 8 of 33

Issued date : November 29, 2013 FCC ID : VIYARC0557

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

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

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

Details of Operating Mode(s)

Test Item	Mode	Tested frequency
Spurious Emission (Conducted/Radiated),	Tx (Hopping off) DH5	2402MHz
20dB Bandwidth,		2441MHz
Maximum Peak Output Power		2480MHz
Carrier Frequency Separation	Tx (Hopping on) DH5	2402MHz
		2441MHz
		2480MHz
Number of Hopping Frequency	Tx (Hopping on) DH5	-
Dwell time	Tx (Hopping on),	-
	-DH1, DH3, DH5	
Band Edge Compliance	Tx DH5	2402MHz
(Conducted)	-Hopping on	2480MHz
	-Hopping off	
99% Occupied Bandwidth	Tx DH5	2402MHz
	-Hopping on	2441MHz
	-Hopping off	2480MHz

<sup>\*</sup>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)

Power settings: 58

Software: Airoha AB1100 Family LAB Test Tool-Version 1.4.1.0

Any conditions under the normal use do not exceed the condition of setting.

In addition, end users cannot change the settings of the output power of the product.

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<sup>\*</sup>EUT has the power settings by the software as follows;

<sup>\*</sup>This setting of software is the worst case.

Test report No. : 10105410H-B Page : 9 of 33

Issued date : November 29, 2013 FCC ID : VIYARC0557

### 4.2 Configuration and peripherals



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

**Description of EUT** 

No.	Item	Model number	Serial number	Manufacturer	Remarks
Α	3D active glasses	AN-3DG40	2	Hosiden Corporation	-
В	Bluetooth module	ARC0557	1 for AT 4 for RE	Hosiden Corporation	EUT

RE: Radiated Spurious Emission test AT: Antenna Terminal Conducted tests

List of cables used

No.	Name	Length (m)	Shi	eld	Remarks
			Cable	Connector	
1	DC Cable	2.0	Unshielded	Unshielded	-

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

Test report No. : 10105410H-B Page : 10 of 33

Issued date : November 29, 2013 FCC ID : VIYARC0557

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

#### **Test Procedure**

EUT was placed on a urethane platform of nominal size, 0.5m by 1.0m, 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).

iic i con ictea baila oi	Reced band of 1 CC15:205 / Table 5 of Rbb Gen / 222 (1C).									
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)							

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

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

Measurement range : 30M-25GHz
Test data : APPENDIX
Test result : Pass

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

<sup>-</sup> 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.

Test report No. : 10105410H-B Page : 11 of 33

Issued date : November 29, 2013 FCC ID : VIYARC0557

### **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	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	-	-	1	Auto	Peak	=	Power Meter (Sensor: 50MHz BW)
Carrier Frequency Separation	3MHz	30kHz	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	Max Hold	Spectrum Analyzer
Conducted Spurious	9kHz to 150kHz	200Hz	620Hz	Auto	Peak	Max Hold	Spectrum Analyzer
Emission *2)	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

<sup>\*1)</sup> The measurement was performed with Max Hold since the duty cycle was not 100%.

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

Test data : APPENDIX

Test result : Pass

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<sup>\*2)</sup> 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 low enough as shown in the chart.(9kHz-150kHz:RBW=200Hz, 150kHz-30MHz:RBW=9.1kHz).

Test report No. : 10105410H-B Page : 12 of 33

Issued date : November 29, 2013 FCC ID : VIYARC0557

### **APPENDIX 1: Data of EMI test**

### **20dB Bandwidth and Carrier Frequency Separation**

Test place Head Office EMC Lab. No.11 Measurement Room

 Report No.
 10105410H

 Date
 11/23/2013

 Temperature/ Humidity
 25 deg. C / 54% RH

Engineer Takumi Shimada
Mode Tx (Hopping on) DH5

Mode	Freq.	20dB Bandwidth	Carrier Frequency	Limit for Carrier
			Separation	Frequency separation
	[MHz]	[MHz]	[MHz]	[MHz]
DH5	2402.0	0.941	1.000	>= 0.627
DH5	2441.0	0.942	1.000	>= 0.628
DH5	2480.0	0.943	1.000	>= 0.629

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

No limit applies to 20dB Bandwidth.

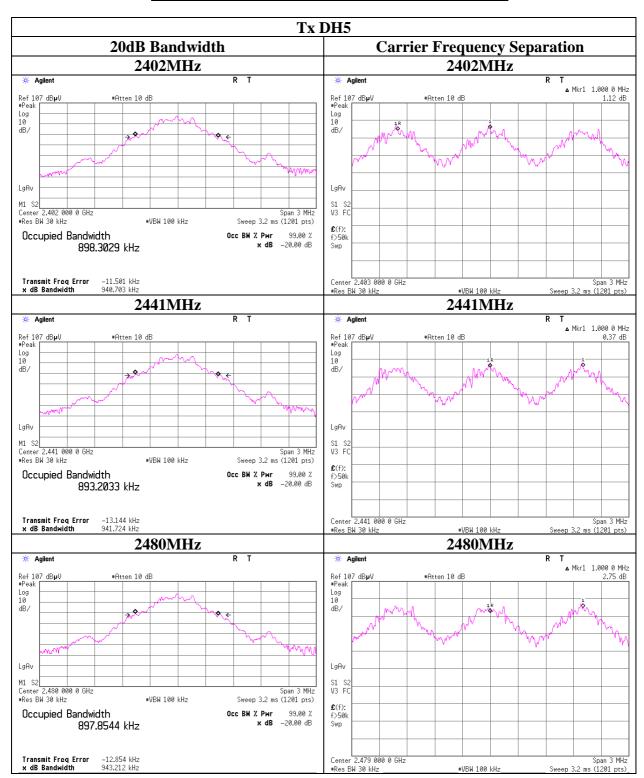
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Test report No. : 10105410H-B
Page : 13 of 33

Legged data : Newport and 20

Issued date : November 29, 2013 FCC ID : VIYARC0557

### **20dB Bandwidth and Carrier Frequency Separation**



# UL Japan, Inc.

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

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

Test report No. : 10105410H-B Page : 14 of 33

Issued date : November 29, 2013 FCC ID : VIYARC0557

### **Number of Hopping Frequency**

Test place Head Office EMC Lab. No.11 Measurement Room

Report No. 10105410H
Date 11/23/2013
Temperature/ Humidity 25 deg. C / 54% RH
Engineer Takumi Shimada
Mode Tx (Hopping on) DH5

Mode	Number of channel	Limit
	[times]	[times]
DH5	79	>= 15

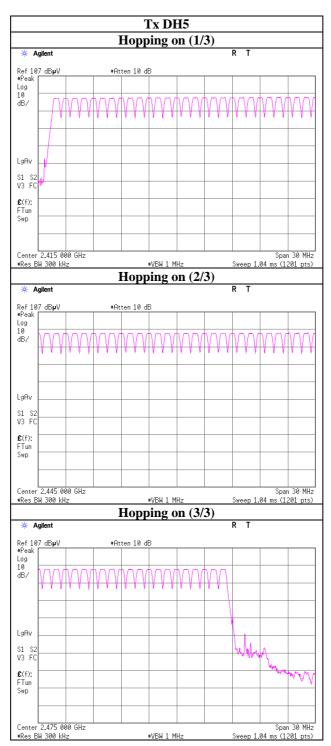
Test was not performed at AFH mode whose number of hopping channel is 20 channels because this Bluetooth radio is in compliance of Bluetooth Specification.

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

Test report No. : 10105410H-B Page : 15 of 33

Issued date : November 29, 2013 FCC ID : VIYARC0557

### **Number of Hopping Frequency**



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

Test report No. : 10105410H-B Page : 16 of 33

Issued date : November 29, 2013 FCC ID : VIYARC0557

#### **Dwell time**

Test place Head Office EMC Lab. No.11 Measurement Room

Report No. 10105410H Date 11/23/2013

Temperature/ Humidity
Engineer
Takumi Shimada
Mode
Tx (Hopping on) DH5

Mode		Number of t	ransmission	Length of	Result	Limit	
		in a 31.6(79 H	(lopping x 0.4)	transmission time			
	/ 12	.8(32 Hopping	x 0.4)second period	[msec]	[msec]	[msec]	
DH1	51.0 times /	5 sec. x	31.6 sec. =	323 times	0.440	142	400
DH3	26.0 times /	5 sec. x	31.6 sec. =	1.701	281	400	
DH5	16.0 times /	5 sec. x	31.6 sec. =	2.957	302	400	

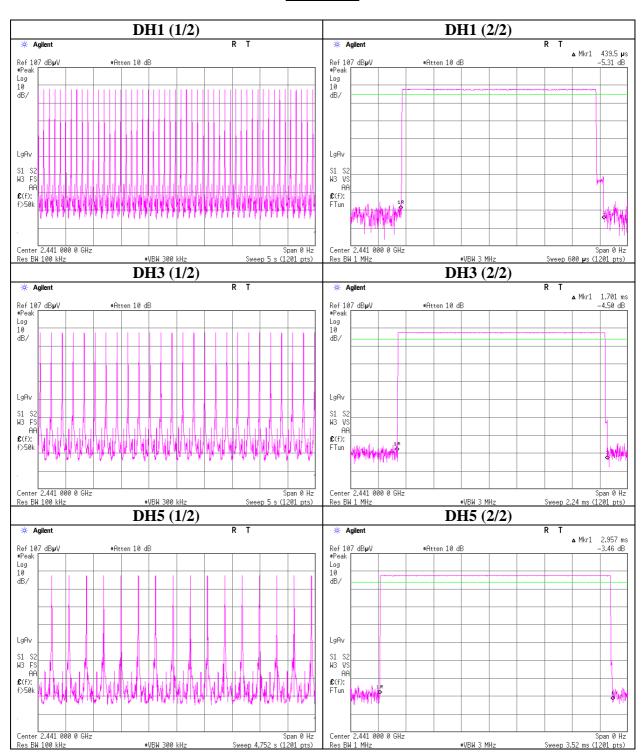
This device complies with the Bluetooth protocol for FHSS operation, employing a pseudo random channel selection and hopping rate to ensure that the occupancy time in N x 0.4s, where N is the number of channels being used in the hopping sequence ( $20 \le N \le 79$ ), is always less than 0.4s regardless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

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

Test report No. : 10105410H-B Page : 17 of 33

Issued date : November 29, 2013 FCC ID : VIYARC0557

### **Dwell time**



### UL Japan, Inc. Head Office EMC Lab.

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

Test report No. : 10105410H-B Page : 18 of 33

Issued date : November 29, 2013 FCC ID : VIYARC0557

#### **Maximum Peak Output Power**

Test place Head Office EMC Lab. No.11 Measurement Room

Report No. 10105410H
Date 11/23/2013
Temperature/ Humidity 25 deg. C / 54% RH
Engineer Takumi Shimada
Mode Tx (Hopping off) DH5

Mode	Freq.	Reading	Cable	Atten.	Result		Limit		Margin
			Loss						
	[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dBm]	[mW]	[dB]
DH5	2402.0	-12.58	2.56	9.97	-0.05	0.99	20.96	125	21.01
DH5	2441.0	-12.14	2.57	9.97	0.40	1.10	20.96	125	20.56
DH5	2480.0	-12.17	2.58	9.97	0.38	1.09	20.96	125	20.58

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.

However, the limit level 125mW of AFH mode was used for the test.

### <u>Average Output Power</u> (Reference data for SAR testing)

Test place Head Office EMC Lab. No.11 Measurement Room

Report No. 10105410H
Date 11/23/2013
Temperature/ Humidity 25 deg. C / 54% RH
Engineer Takumi Shimada
Mode Tx (Hopping on) DH5

Mode	Freq.	Reading	Cable	Atten.	Result	
			Loss			
	[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]
DH5	2402.0	-14.11	2.56	9.97	-1.58	0.70
DH5	2441.0	-13.66	2.57	9.97	-1.12	0.77
DH5	2480.0	-13.65	2.58	9.97	-1.10	0.78

Sample Calculation:

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

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

Test report No. : 10105410H-B Page : 19 of 33

Issued date : November 29, 2013 FCC ID : VIYARC0557

### **Radiated Spurious Emission**

Test place Head Office EMC Lab. No.2 Semi Anechoic Chamber

Report No. 10105410H

Date 11/19/2013 11/19/2013
Temperature/ Humidity 24deg.C / 48% RH
Engineer Keisuke Kawamura Katsunori Okai
Below 1GHz Above 1GHz

Mode Tx, DH5 2402MHz

Polarity	Frequency	Detector	Reading	Ant.Fac.	Loss	Gain	Result	Limit	Margin	Remark
	[MHz]		[dBuV]	[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
Hori	67.811	QP	22.8	6.8	7.2	28.6	8.2	40.0	31.8	
Hori	167.999	QP	29.3	15.6	8.0	28.1	24.8	43.5	18.7	
Hori	216.001	QP	32.2	16.8	8.3	27.8	29.5	46.0	16.5	
Hori	287.995	QP	31.0	19.0	8.7	27.7	31.0	46.0	15.0	
Hori	383.999	QP	31.0	16.8	9.2	28.2	28.8	46.0	17.2	
Hori	504.005	QP	31.6	18.2	9.8	28.8	30.8	46.0	15.2	
Hori	2354.014	PK	53.3	26.8	2.6	35.7	47.0	73.9	26.9	
Hori	2390.000	PK	47.7	26.8	2.6	35.7	41.4	73.9	32.5	
Hori	4804.000	PK	47.9	30.6	4.4	34.9	48.0	73.9	25.9	
Hori	7206.000	PK	42.9	35.5	5.3	34.9	48.8	73.9	25.1	
Hori	9608.000	PK	43.1	38.2	6.1	35.4	52.0	73.9	21.9	
Hori	2354.014	AV	47.6	26.8	2.6	35.7	41.3	53.9	12.6	
Hori	2390.000	AV	36.9	26.8	2.6	35.7	30.6	53.9	23.3	
Hori	4804.000	AV	42.0	30.6	4.4	34.9	42.1	53.9	11.8	
Hori	7206.000	AV	31.0	35.5	5.3	34.9	36.9	53.9	17.0	
Hori	9608.000	AV	30.9	38.2	6.1	35.4	39.8	53.9	14.1	
Vert	65.871	QP	32.3	7.0	7.2	28.6	17.9	40.0	22.1	
Vert	167.999	QP	30.9	15.6	8.0	28.1	26.4	43.5	17.1	
Vert	216.001	QP	30.9	16.8	8.3	27.8	28.2	46.0	17.8	
Vert	287.995	QP	30.6	19.0	8.7	27.7	30.6	46.0	15.4	
Vert	383.999	QP	34.3	16.8	9.2	28.2	32.1	46.0	13.9	
Vert	504.005	QP	30.2	18.2	9.8	28.8	29.4	46.0	16.6	
Vert	2354.011	PK	55.1	26.8	2.6	35.7	48.8	73.9	25.1	
Vert	2390.000	PK	48.9	26.8	2.6	35.7	42.6	73.9	31.3	
Vert	4804.000	PK	48.1	30.6	4.4	34.9	48.2	73.9	25.7	
Vert	7206.000	PK	43.2	35.5	5.3	34.9	49.1	73.9	24.8	
Vert	9608.000	PK	43.3	38.2	6.1	35.4	52.2	73.9	21.7	
Vert	2354.011	AV	49.6	26.8	2.6	35.7	43.3	53.9	10.6	
Vert	2390.000	AV	38.4	26.8	2.6	35.7	32.1	53.9	21.8	
Vert	4804.000	AV	41.8	30.6	4.4	34.9	41.9	53.9	12.0	
Vert	7206.000	AV	31.0	35.5	5.3	34.9	36.9	53.9	17.0	
Vert	9608.000	AV	31.0	38.2	6.1	35.4	39.9	53.9	14.0	

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

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

#### 20dBc Data Sheet

200DC Du	20tible Data Silect											
Polarity	Frequency	Detector	Reading	Ant	Loss	Gain	Result	Limit	Margin	Remark		
				Factor								
	[MHz]		[dBuV]	[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]			
Hori	2402.000	PK	102.7	26.8	2.6	35.7	96.4	-	-	Carrier		
Hori	2400.000	PK	57.8	26.8	2.6	35.7	51.5	76.4	24.9			
Vert	2402.000	PK	103.6	26.8	2.6	35.7	97.3	-	-	Carrier		
Vert	2400.000	PK	59.9	26.8	2.6	35.7	53.6	77.3	23.7			

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

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

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

Test report No. : 10105410H-B Page : 20 of 33

Issued date : November 29, 2013 FCC ID : VIYARC0557

### **Radiated Spurious Emission**

Test place Head Office EMC Lab. No.2 Semi Anechoic Chamber

Report No. 10105410H

Date11/19/201311/19/2013Temperature/ Humidity24deg.C / 48% RH24deg.C / 48% RHEngineerKeisuke KawamuraKatsunori Okai

Below 1GHz Above 1GHz

Mode Tx, DH5 2441MHz

Polarity	Frequency	Detector	Reading	Ant.Fac.	Loss	Gain	Result	Limit	Margin	Remark
-	[MHz]		[dBuV]	[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
Hori	67.811	QP	22.8	6.8	7.2	28.6	8.2	40.0	31.8	
Hori	167.999	QP	29.3	15.6	8.0	28.1	24.8	43.5	18.7	
Hori	216.001	QP	32.2	16.8	8.3	27.8	29.5	46.0	16.5	
Hori	287.995	QP	31.0	19.0	8.7	27.7	31.0	46.0	15.0	
Hori	383.999	QP	31.0	16.8	9.2	28.2	28.8	46.0	17.2	
Hori	504.005	QP	31.6	18.2	9.8	28.8	30.8	46.0	15.2	
Hori	2393.003	PK	54.3	26.8	2.6	35.7	48.0	73.9	25.9	
Hori	4882.000	PK	47.8	30.9	4.4	34.9	48.2	73.9	25.7	
Hori	7323.000	PK	42.9	35.7	5.3	34.9	49.0	73.9	24.9	
Hori	9764.000	PK	42.4	38.4	6.1	35.4	51.5	73.9	22.4	
Hori	2393.003	AV	49.5	26.8	2.6	35.7	43.2	53.9	10.7	
Hori	4882.000	AV	41.7	30.9	4.4	34.9	42.1	53.9	11.8	
Hori	7323.000	AV	30.9	35.7	5.3	34.9	37.0	53.9	16.9	
Hori	9764.000	AV	30.8	38.4	6.1	35.4	39.9	53.9	14.0	
Vert	65.871	QP	32.3	7.0	7.2	28.6	17.9	40.0	22.1	
Vert	167.999	QP	30.9	15.6	8.0	28.1	26.4	43.5	17.1	
Vert	216.001	QP	30.9	16.8	8.3	27.8	28.2	46.0	17.8	
Vert	287.995	QP	30.6	19.0	8.7	27.7	30.6	46.0	15.4	
Vert	383.999	QP	34.2	16.8	9.2	28.2	32.0	46.0	14.0	
Vert	504.005	QP	30.2	18.2	9.8	28.8	29.4	46.0	16.6	
Vert	2393.001	PK	53.0	26.8	2.6	35.7	46.7	73.9	27.2	
Vert	4882.000	PK	47.4	30.9	4.4	34.9	47.8	73.9	26.1	
Vert	7323.000	PK	42.6	35.7	5.3	34.9	48.7	73.9	25.2	
Vert	9764.000	PK	42.6	38.4	6.1	35.4	51.7	73.9	22.2	
Vert	2393.001	AV	48.0	26.8	2.6	35.7	41.7	53.9	12.2	
Vert	4882.000	AV	41.1	30.9	4.4	34.9	41.5	53.9	12.4	
Vert	7323.000	AV	30.9	35.7	5.3	34.9	37.0	53.9	16.9	
Vert	9764.000	AV	30.8	38.4	6.1	35.4	39.9	53.9	14.0	

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

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

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

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

Test report No. : 10105410H-B Page : 21 of 33

Issued date : November 29, 2013 FCC ID : VIYARC0557

### **Radiated Spurious Emission**

Test place Head Office EMC Lab. No.2 Semi Anechoic Chamber

Report No. 10105410H

Date11/19/201311/19/2013Temperature/ Humidity24deg.C / 48% RH24deg.C / 48% RHEngineerKeisuke KawamuraKatsunori Okai

Below 1GHz Above 1GHz

Mode Tx, DH5 2480MHz

Polarity	Frequency	Detector	Reading	Ant.Fac.	Loss	Gain	Result	Limit	Margin	Remark
	[MHz]		[dBuV]	[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
Hori	67.811	QP	22.8	6.8	7.2	28.6	8.2	40.0	31.8	
Hori	167.999	QP	29.3	15.6	8.0	28.1	24.8	43.5	18.7	
Hori	216.001	QP	32.2	16.8	8.3	27.8	29.5	46.0	16.5	
Hori	287.995	QP	31.0	19.0	8.7	27.7	31.0	46.0	15.0	
Hori	383.999	QP	31.0	16.8	9.2	28.2	28.8	46.0	17.2	
Hori	504.005	QP	31.6	18.2	9.8	28.8	30.8	46.0	15.2	
Hori	2483.500	PK	61.3	26.7	2.7	35.7	55.0	73.9	18.9	
Hori	4960.000	PK	45.5	31.1	4.5	34.9	46.2	73.9	27.7	
Hori	7440.000	PK	42.8	35.9	5.4	34.9	49.2	73.9	24.7	
Hori	9920.000	PK	43.0	38.7	6.2	35.4	52.5	73.9	21.4	
Hori	2483.500	AV	45.9	26.7	2.7	35.7	39.6	53.9	14.3	
Hori	4960.000	AV	37.3	31.1	4.5	34.9	38.0	53.9	15.9	
Hori	7440.000	AV	31.1	35.9	5.4	34.9	37.5	53.9	16.4	
Hori	9920.000	AV	31.2	38.7	6.2	35.4	40.7	53.9	13.2	
Vert	65.871	QP	32.3	7.0	7.2	28.6	17.9	40.0	22.1	
Vert	167.999	QP	30.9	15.6	8.0	28.1	26.4	43.5	17.1	
Vert	216.001	QP	30.9	16.8	8.3	27.8	28.2	46.0	17.8	
Vert	287.995	QP	30.6	19.0	8.7	27.7	30.6	46.0	15.4	
Vert	383.999	QP	34.0	16.8	9.2	28.2	31.8	46.0	14.2	
Vert	504.005	QP	30.2	18.2	9.8	28.8	29.4	46.0	16.6	
Vert	2483.500	PK	63.6	26.7	2.7	35.7	57.3	73.9	16.6	
Vert	4960.000	PK	46.9	31.1	4.5	34.9	47.6	73.9	26.3	
Vert	7440.000	PK	42.9	35.9	5.4	34.9	49.3	73.9	24.6	
Vert	9920.000	PK	43.2	38.7	6.2	35.4	52.7	73.9	21.2	
Vert	2483.500	AV	47.7	26.7	2.7	35.7	41.4	53.9	12.5	
Vert	4960.000	AV	39.4	31.1	4.5	34.9	40.1	53.9	13.8	
Vert	7440.000	AV	30.9	35.9	5.4	34.9	37.3	53.9	16.6	
Vert	9920.000	AV	31.2	38.7	6.2	35.4	40.7	53.9	13.2	

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

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

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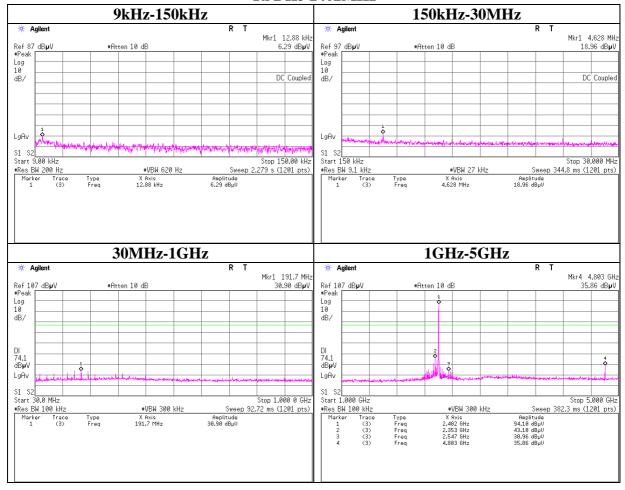
<sup>\*</sup>Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).

Test report No. : 10105410H-B Page : 22 of 33

Issued date : November 29, 2013 FCC ID : VIYARC0557

### **Conducted Spurious Emission**

### Tx DH5 2402MHz



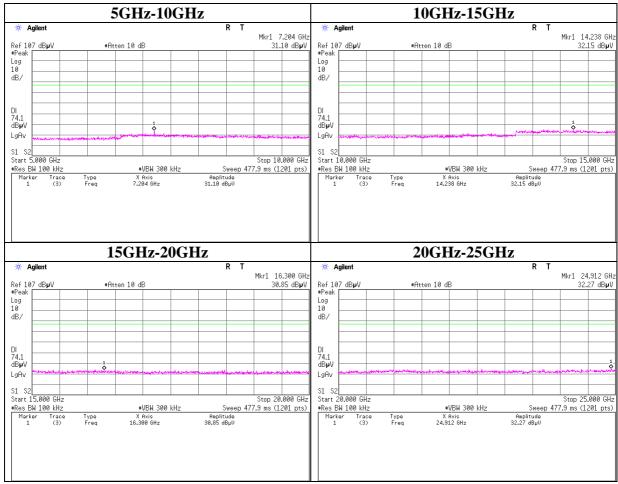
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Test report No. : 10105410H-B Page : 23 of 33

Issued date : November 29, 2013 FCC ID : VIYARC0557

### **Conducted Spurious Emission**

### Tx DH5 2402MHz



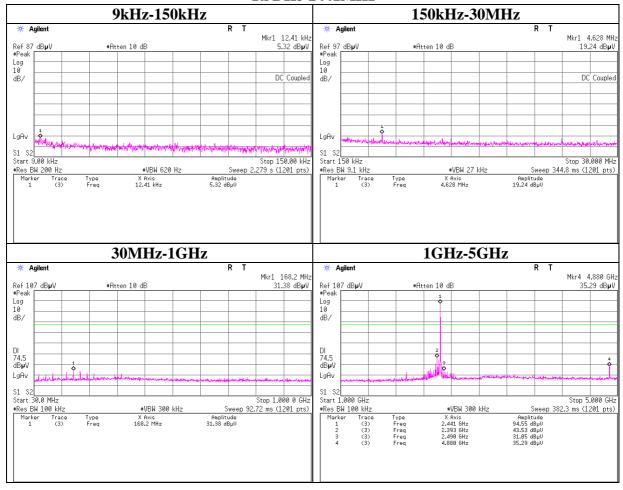
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Test report No. : 10105410H-B Page : 24 of 33

Issued date : November 29, 2013 FCC ID : VIYARC0557

### **Conducted Spurious Emission**

### **Tx DH5 2441MHz**



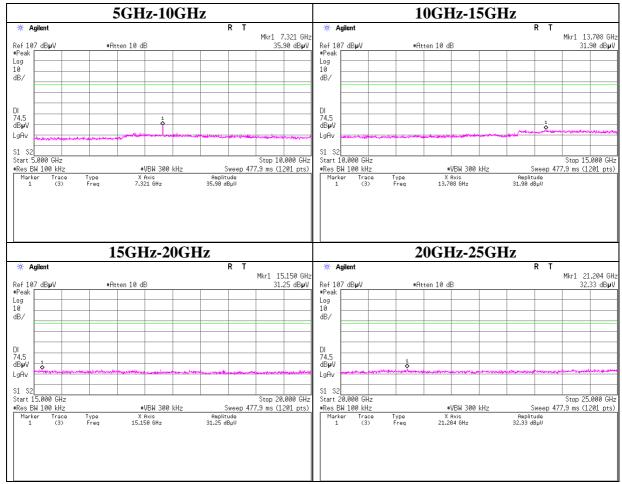
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Test report No. : 10105410H-B Page : 25 of 33

Issued date : November 29, 2013 FCC ID : VIYARC0557

### **Conducted Spurious Emission**

### **Tx DH5 2441MHz**



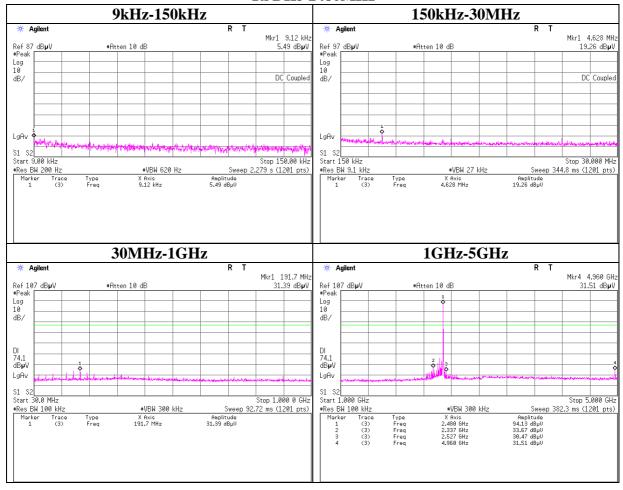
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Test report No. : 10105410H-B Page : 26 of 33

Issued date : November 29, 2013 FCC ID : VIYARC0557

### **Conducted Spurious Emission**

### **Tx DH5 2480MHz**



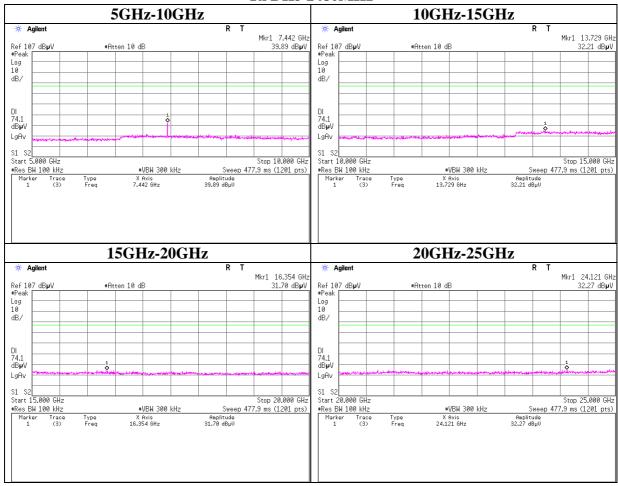
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Test report No. : 10105410H-B Page : 27 of 33

Issued date : November 29, 2013 FCC ID : VIYARC0557

### **Conducted Spurious Emission**

### **Tx DH5 2480MHz**



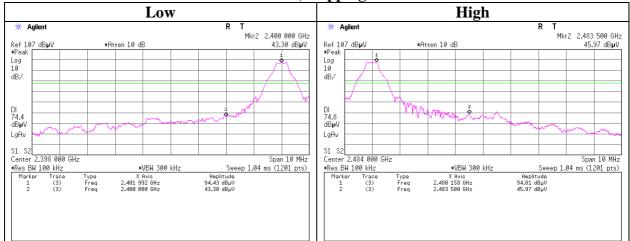
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Test report No. : 10105410H-B Page : 28 of 33

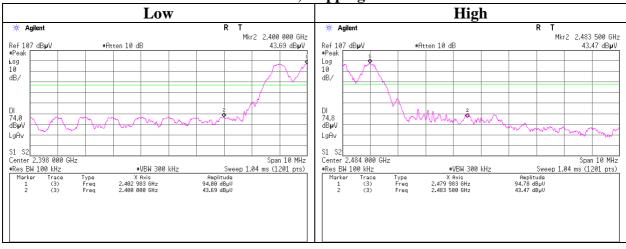
Issued date : November 29, 2013 FCC ID : VIYARC0557

### **Conducted Emission Band Edge compliance**

Tx DH5, Hopping off



Tx DH5, Hopping on



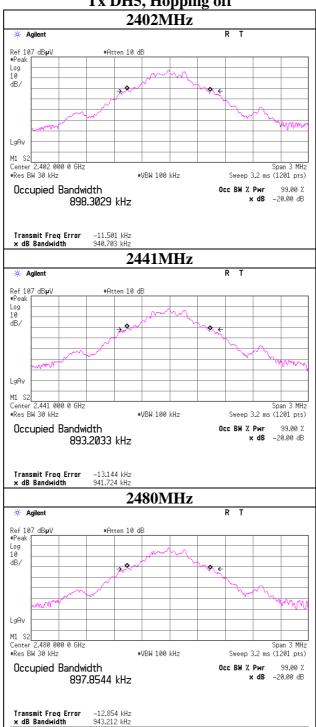
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

: 10105410H-B Test report No. Page : 29 of 33

**Issued date** : November 29, 2013 FCC ID : VIYARC0557

### 99%Occupied Bandwidth





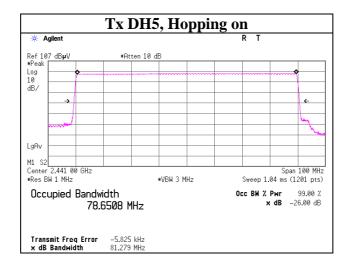
### UL Japan, Inc. **Head Office EMC Lab.**

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

Test report No. : 10105410H-B Page : 30 of 33

Issued date : November 29, 2013 FCC ID : VIYARC0557

## 99%Occupied Bandwidth



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

Test report No. : 10105410H-B Page : 31 of 33

Issued date : November 29, 2013 FCC ID : VIYARC0557

### **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	2013/06/30 * 12
MOS-22	Thermo-Hygrometer	Custom	CTH-201	0003	RE	2013/02/26 * 12
MJM-14	Measure	KOMELON	KMC-36	-	RE	-
COTS-MEMI	EMI measurement program	TSJ	TEPTO-DV	-	RE	-
MSA-03	Spectrum Analyzer	Agilent	E4448A	MY44020357	RE	2013/11/15 * 12
MTR-03	Test Receiver	Rohde & Schwarz	ESCI	100300	RE	2013/06/11 * 12
MBA-02	Biconical Antenna	Schwarzbeck	BBA9106	VHA91032008	RE	2013/10/13 * 12
MLA-02	Logperiodic Antenna	Schwarzbeck	USLP9143	201	RE	2013/10/13 * 12
MCC-12	Coaxial Cable	Fujikura/Agilent	_	-	RE	2013/02/06 * 12
MAT-07	Attenuator(6dB)	Weinschel Corp	2	BK7970	RE	2012/11/06 * 12
MPA-09	Pre Amplifier	Agilent	8447D	2944A10845	RE	2013/09/12 * 12
MRENT-112	Spectrum Analyzer	Agilent	E4440A	MY48250080	RE	2013/10/04 * 12
MHA-06	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	254	RE	2013/02/15 * 12
MPA-10	Pre Amplifier	Agilent	8449B	3008A02142	RE	2013/01/10 * 12
MHA-02	Horn Antenna 18- 26.5GHz	EMCO	3160-09	1265	RE	2013/02/15 * 12
MCC-141	Microwave Cable	Junkosha	MWX221	1305S002R(1m)	RE	2013/05/28 * 12
				/ 1204S062(5m)		
MHF-06	High Pass Filter 3.5- 24GHz	TOKIMEC	TF323DCA	601	RE	2013/05/30 * 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
MRENT-112	Spectrum Analyzer	Agilent	E4440A	MY48250080	AT	2013/10/04 * 12
MCC-137	Microwave cable	HUBER+SUHNER	SUCOFLEX 102	37954/2	AT	2013/10/18 * 12
MAT-24	Attenuator(10dB)(above Agilent 1GHz)		8493C	71389	AT	2013/06/05 * 12
MOS-19	Thermo-Hygrometer	Custom	CTH-201	0001	AT	2012/12/25 * 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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