



# **RADIO TEST REPORT**

**Test Report No. : 33BE0216-HO-01-A-R1**

**Applicant** : Hosiden Corporation  
**Type of Equipment** : Bluetooth module  
**Model No.** : ARC0517  
**FCC ID** : VIYARC0517  
**Test regulation** : FCC Part 15 Subpart C: 2012  
**Test Result** : Complied

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2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with the above regulation.
4. The test results in this report are traceable to the national or international standards.
5. This test report must not be used by the customer to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.
6. This report is a revised version of 33BE0216-HO-01-A. 33BE0216-HO-01-A is replaced with this report.

**Date of test:** October 29 and November 20, 2012

**Representative test engineer:**

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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	:	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.	:	ARC0517
Serial No.	:	Refer to Section 4, Clause 4.2
Rating	:	DC 2.0 to DC 3.3V
Receipt Date of Sample	:	October 26, 2012
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	:	24MHz
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#### **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 1.2V
Antenna type	:	$\lambda/4$ Meander antenna (printed on the PWB)
Antenna Gain	:	-3.0dBi

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## SECTION 3: Test specification, procedures & results

### 3.1 Test Specification

Test Specification : FCC Part 15 Subpart C: 2012, final revised on August 13, 2012 and effective September 12, 2012

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: 2012, final revised on August 13, 2012.

### 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 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)		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)		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(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	5.3dB 7206.000MHz, Vertical, AV	Complied	Conducted/ Radiated
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.					

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

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

This EUT provides stable voltage (DC1.2V) 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 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)	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	4.3dB	5.0dB	5.1dB	4.9dB	5.8dB	4.4dB	4.3dB
No.2	4.3dB	5.2dB	5.1dB	5.0dB	5.7dB	4.3dB	4.2dB
No.3	4.6dB	5.0dB	5.1dB	5.0dB	5.7dB	4.5dB	4.2dB
No.4	4.8dB	5.2dB	5.0dB	5.0dB	5.7dB	5.2dB	4.2dB

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

Power meter (+dB)	
Below 1GHz	Above 1GHz
1.0dB	1.0dB

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	
1.0dB	1.1dB	2.7dB	3.2dB	3.3dB	1.5dB

#### **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	4.75 x 5.4 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 4.5 x 2.8m	2.0 x 2.0m	-
No.10 measurement room	-	-	2.6 x 2.8 x 2.5m	2.4 x 2.4m	-
No.11 measurement room	-	-	3.1 x 3.4 x 3.0m	2.4 x 3.4m	-

\* 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.

## **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 2441MHz 2480MHz
Carrier Frequency Separation	Tx (Hopping on) DH5	2402MHz 2441MHz 2480MHz
20dB Bandwidth	Tx (Hopping off) DH5	2402MHz 2441MHz 2480MHz
Number of Hopping Frequency	Tx (Hopping on) DH5	-
Dwell time	Tx (Hopping on), -DH1, DH3, DH5	-
Maximum Peak Output Power	Tx (Hopping off) DH5	2402MHz 2441MHz 2480MHz
Band Edge Compliance (Conducted)	Tx DH5 -Hopping on -Hopping off	2402MHz 2480MHz
99% Occupied Bandwidth	Tx DH5 -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)</p> <p>*EUT has the power settings by the software as follows;  Power settings: Tx_Power_Level: Specify Power Table Index  Transmit_Power_Table_Index: 0  Software: Broadcom BlueTool Version 1.4.5.4</p> <p>*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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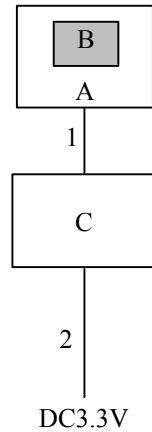
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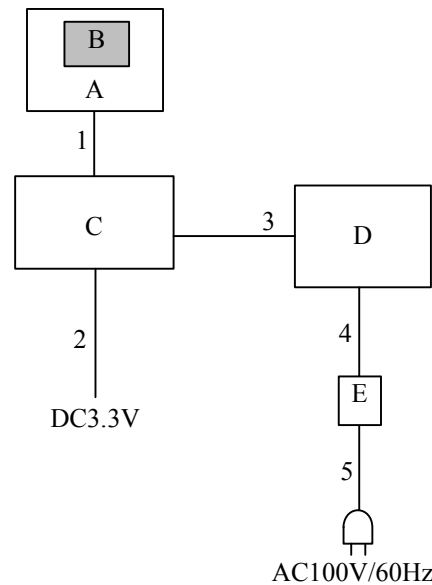
Facsimile : +81 596 24 8124

## 4.2 Configuration and peripherals

<for Radiated emission test only>



<for Antenna terminal conducted test only>



\* 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
A	3D active glasses	AN-3DG40	2	Hosiden Corporation	-
B	Bluetooth module	ARC0517	3	Hosiden Corporation	EUT
C	Interface Board	-	-	-	-
D	Laptop PC	T42	L316W54	IBM	-
E	AC Adapter	92P1020	11S92P1020Z1Z9 RM63A76X	IBM	-

### List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	Signal Cable	0.1	Unshielded	Unshielded	-
2	DC Cable	3.0	Unshielded	Unshielded	-
3	RS-232C Cable	2.3	Shielded	Shielded	-
4	DC Cable	1.8	Unshielded	Unshielded	-
5	AC Cable	0.8	Unshielded	Unshielded	-



## **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	Below 30MHz	30MHz to 300MHz	300MHz to 1GHz	Above 1GHz
Antenna Type	Loop	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)		3m (below 10GHz)

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

- 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-25GHz

**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	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	Spectrum Analyzer
Maximum Peak Output Power	-	-	-	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 Emission *1)	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	20MHz	100kHz	300kHz	Auto	Peak	Max Hold	Spectrum Analyzer

\*1) 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)

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**

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

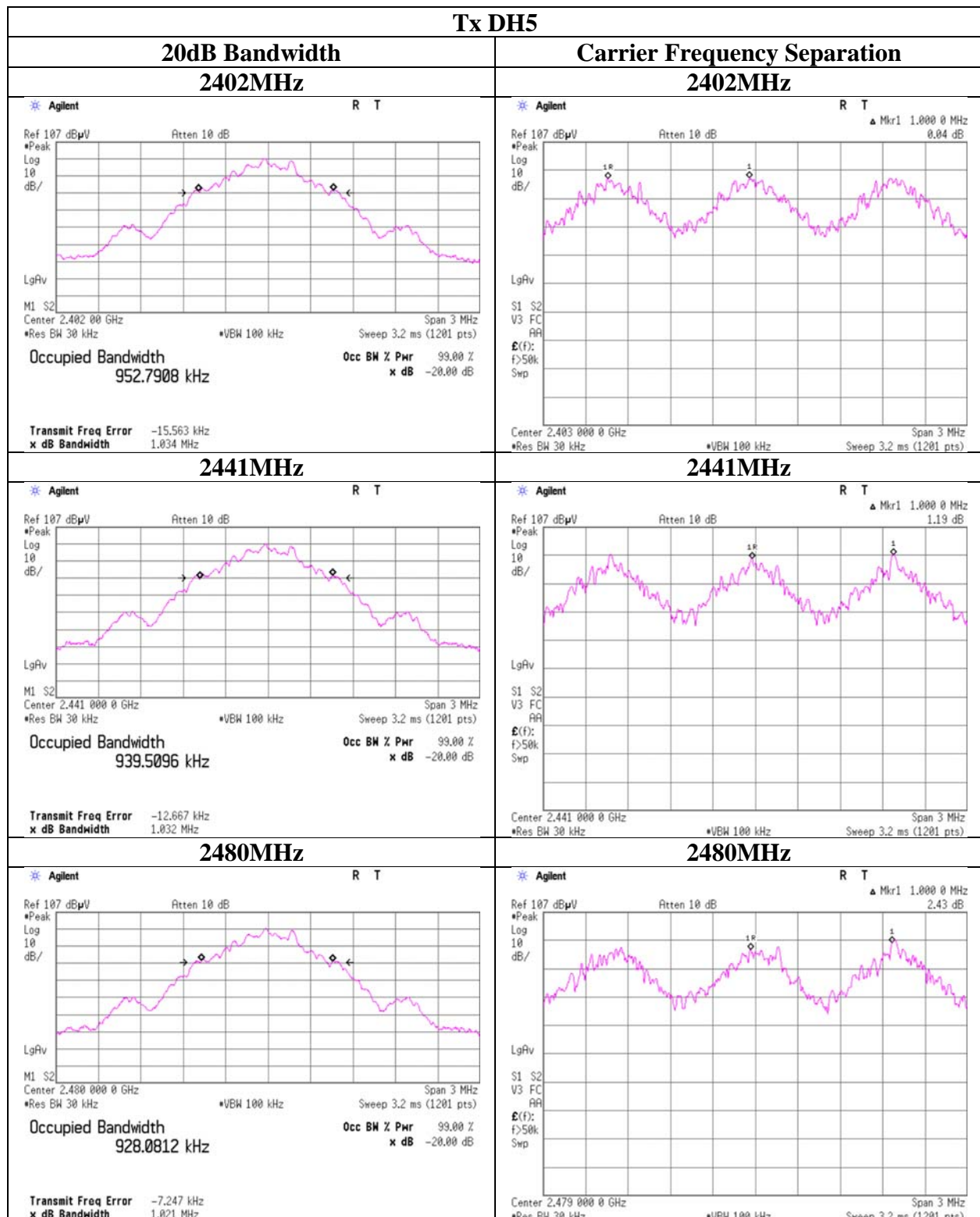
Test place                      Head Office EMC Lab. No.6 Measurement Room  
Report No.                    33BE0216-HO  
Date                            10/29/2012  
Temperature/ Humidity      21 deg.C/ 63% RH  
Engineer                      Keisuke Kawamura  
Mode                            Tx (Hopping on) DH5

Mode	Freq. [MHz]	20dB Bandwidth [MHz]	Carrier Frequency Separation [MHz]	Limit for Carrier Frequency separation [MHz]
DH5	2402.0	1.034	1.000	$\geq 0.689$
DH5	2441.0	1.032	1.000	$\geq 0.688$
DH5	2480.0	1.021	1.000	$\geq 0.681$

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

No limit applies to 20dB Bandwidth.

## 20dB Bandwidth and Carrier Frequency Separation



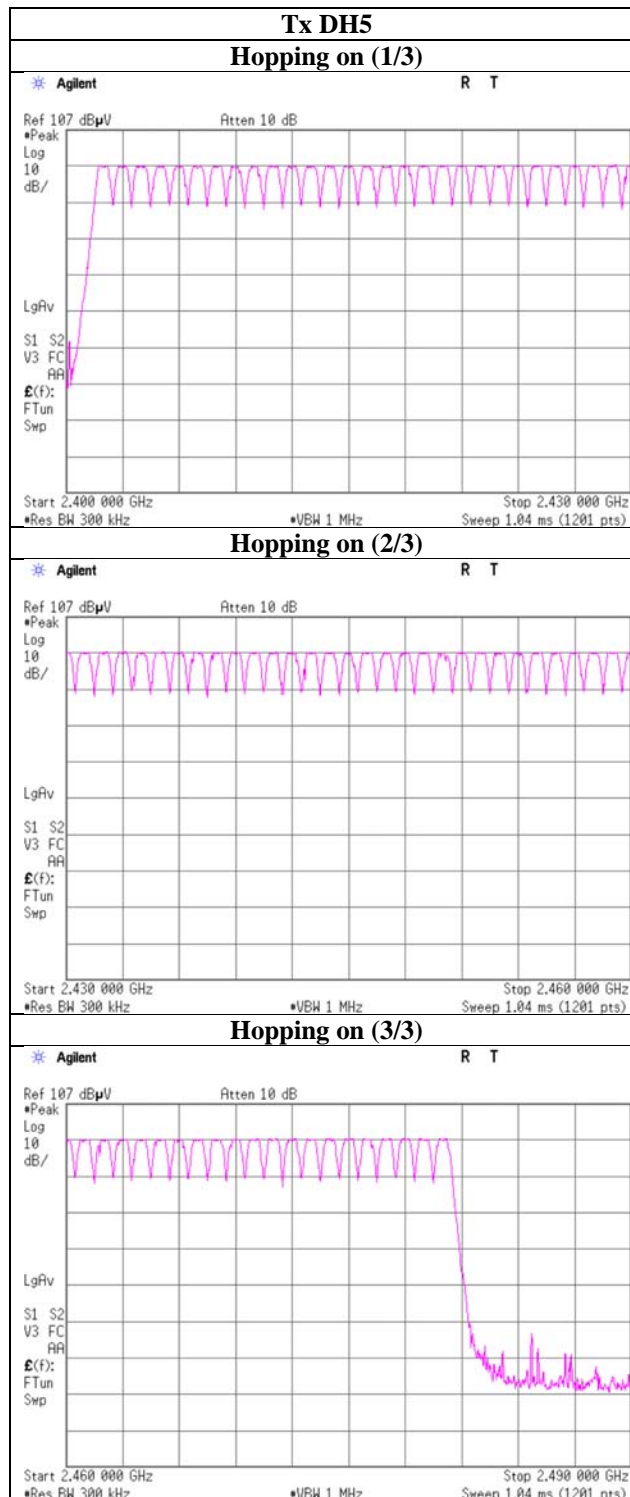
### **Number of Hopping Frequency**

Test place Head Office EMC Lab. No.6 Measurement Room  
Report No. 33BE0216-HO  
Date 10/29/2012  
Temperature/ Humidity 21 deg.C/ 63% RH  
Engineer Keisuke Kawamura  
Mode Tx (Hopping on) DH5

Mode	Number of channel [times]	Limit [times]
DH5	79	$\geq 15$

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.6 Measurement Room  
Report No. 33BE0216-HO  
Date 10/29/2012  
Temperature/ Humidity 21 deg.C/ 63% RH  
Engineer Keisuke Kawamura  
Mode Tx (Hopping on) DH5

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	51.0 times / 5 sec. x 31.6 sec. = 323 times	0.446	144	400
DH3	30.4 times / 5 sec. x 31.6 sec. = 193 times	1.704	329	400
DH5	21.0 times / 5 sec. x 31.6 sec. = 133 times	2.954	393	400

Sample Calculation

Result = Number of transmission x Length of transmission time

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

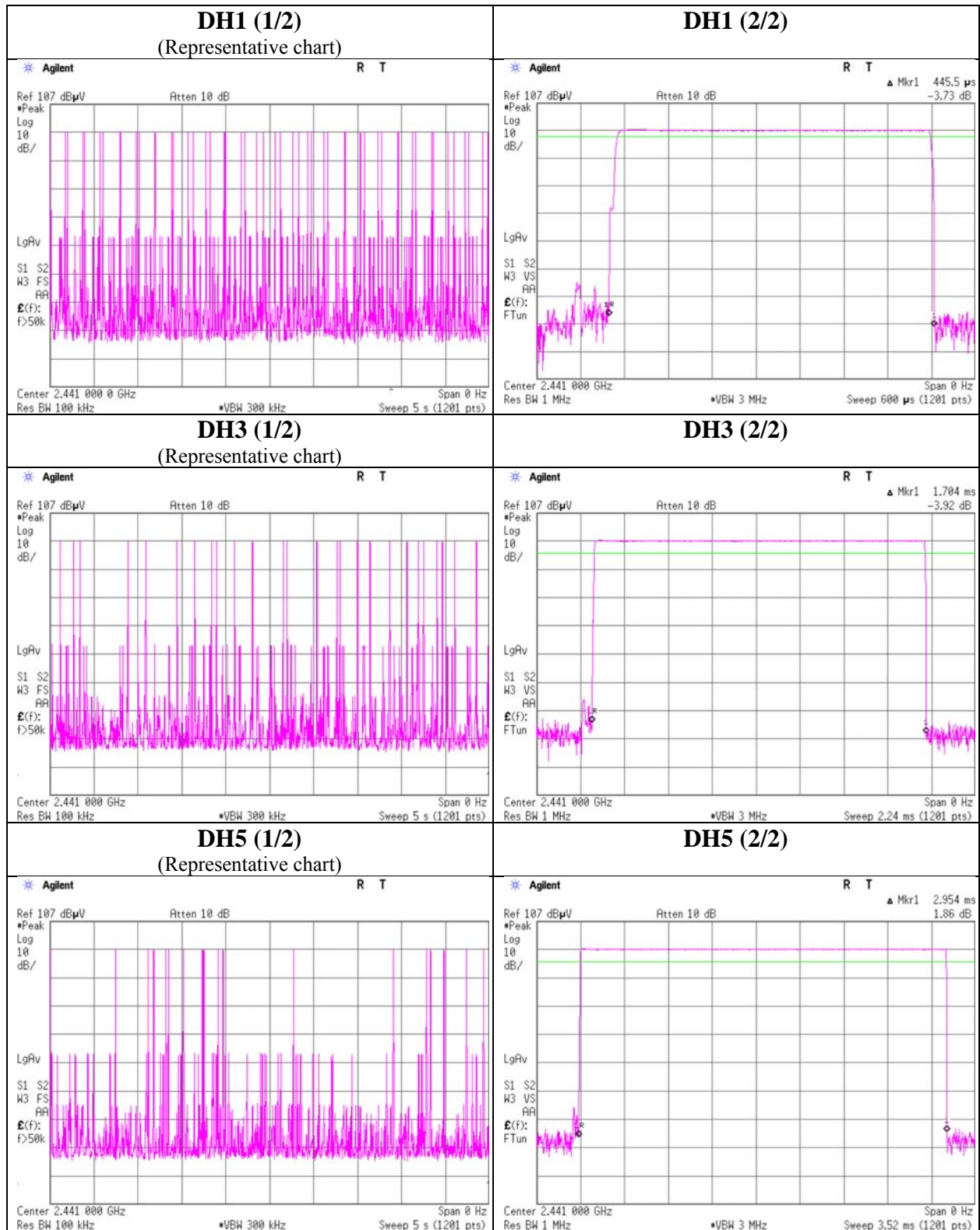
Mode	Sampling [times]					Average [times]
	1	2	3	4	5	
DH1	52	51	52	50	50	51
DH3	31	29	30	31	31	30.4
DH5	23	19	22	20	21	21

Sample Calculation

Average= Summation(Sampling 1 to 5) / 5

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

## Dwell time





### Maximum Peak Output Power

Test place Head Office EMC Lab. No.6 Measurement Room  
Report No. 33BE0216-HO  
Date 10/29/2012  
Temperature/ Humidity 21 deg.C/ 63% RH  
Engineer Keisuke Kawamura  
Mode Tx (Hopping off) DH5

Mode	Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result		Limit		Margin [dB]
					[dBm]	[mW]	[dBm]	[mW]	
DH5	2402.0	-9.69	2.13	10.00	2.44	1.75	20.96	125	18.52
DH5	2441.0	-9.56	2.13	10.00	2.57	1.81	20.96	125	18.39
DH5	2480.0	-9.41	2.14	10.00	2.73	1.87	20.96	125	18.23

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.

## Radiated Spurious Emission

Test place Head Office EMC Lab. No.4 Semi Anechoic Chamber  
Report No. 33BE0216-HO-01  
Date 11/20/2012  
Temperature/ Humidity 23 deg.C/ 42% RH  
Engineer Hiroshi Kukita  
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	49.148	QP	24.0	11.4	7.4	32.1	10.7	40.0	29.3	
Hori	62.789	QP	23.8	7.6	7.6	32.1	6.9	40.0	33.1	
Hori	102.368	QP	22.8	10.5	8.1	32.0	9.4	43.5	34.1	
Hori	133.844	QP	22.4	14.1	8.5	32.0	13.0	43.5	30.5	
Hori	168.149	QP	27.7	15.7	8.7	32.0	20.1	43.5	23.4	
Hori	189.749	QP	25.5	16.4	8.9	31.9	18.9	43.5	24.6	
Hori	2390.000	PK	50.1	27.5	2.4	32.3	47.7	73.9	26.2	
Hori	4804.000	PK	48.0	31.3	4.9	31.5	52.7	73.9	21.2	
Hori	7206.000	PK	48.1	35.8	5.9	32.5	57.3	73.9	16.6	
Hori	9608.000	PK	42.0	38.3	6.8	32.9	54.2	73.9	19.7	NS
Hori	2390.000	AV	30.1	27.5	2.4	32.3	27.7	53.9	26.2	
Hori	4804.000	AV	41.0	31.3	4.9	31.5	45.7	53.9	8.2	
Hori	7206.000	AV	39.0	35.8	5.9	32.5	48.2	53.9	5.7	
Hori	9608.000	AV	30.3	38.3	6.8	32.9	42.5	53.9	11.4	NS
Vert	49.180	QP	26.0	11.4	7.4	32.1	12.7	40.0	27.3	
Vert	65.300	QP	31.5	7.3	7.6	32.1	14.3	40.0	25.7	
Vert	102.550	QP	27.0	10.6	8.1	32.0	13.7	43.5	29.8	
Vert	133.380	QP	25.9	14.1	8.5	32.0	16.5	43.5	27.0	
Vert	169.460	QP	27.2	15.7	8.7	32.0	19.6	43.5	23.9	
Vert	188.680	QP	26.6	16.4	8.8	31.9	19.9	43.5	23.6	
Vert	2390.000	PK	49.7	27.5	2.4	32.3	47.3	73.9	26.6	
Vert	4804.000	PK	45.2	31.3	4.9	31.5	49.9	73.9	24.0	
Vert	7206.000	PK	48.0	35.8	5.9	32.5	57.2	73.9	16.7	
Vert	9608.000	PK	41.9	38.3	6.8	32.9	54.1	73.9	19.8	NS
Vert	2390.000	AV	30.1	27.5	2.4	32.3	27.7	53.9	26.2	
Vert	4804.000	AV	37.3	31.3	4.9	31.5	42.0	53.9	11.9	
Vert	7206.000	AV	39.4	35.8	5.9	32.5	48.6	53.9	5.3	
Vert	9608.000	AV	30.2	38.3	6.8	32.9	42.4	53.9	11.5	NS

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).

NS:Non Singal

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

### 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	97.8	27.5	2.4	32.3	95.4	-	-	Carrier
Hori	2400.000	PK	51.2	27.5	2.4	32.3	48.8	75.4	26.6	
Vert	2402.000	PK	97.4	27.5	2.4	32.3	95.0	-	-	Carrier
Vert	2400.000	PK	53.0	27.5	2.4	32.3	50.6	75.0	24.4	

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

## Radiated Spurious Emission

Test place : Head Office EMC Lab. No.4 Semi Anechoic Chamber  
Report No. : 33BE0216-HO-01  
Date : 11/20/2012  
Temperature/ Humidity : 23 deg.C/ 42% RH  
Engineer : Hiroshi Kukita  
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	49.153	QP	24.1	11.4	7.4	32.1	10.8	40.0	29.2	
Hori	63.750	QP	24.2	7.5	7.6	32.1	7.2	40.0	32.8	
Hori	102.355	QP	23.0	10.5	8.1	32.0	9.6	43.5	33.9	
Hori	133.765	QP	22.6	14.1	8.5	32.0	13.2	43.5	30.3	
Hori	168.132	QP	27.9	15.7	8.7	32.0	20.3	43.5	23.2	
Hori	189.752	QP	25.8	16.4	8.9	31.9	19.2	43.5	24.3	
Hori	4882.000	PK	49.3	31.5	5.0	31.5	54.3	73.9	19.6	
Hori	7323.000	PK	45.2	35.8	5.9	32.5	54.4	73.9	19.5	
Hori	9764.000	PK	42.6	38.4	7.1	32.9	55.2	73.9	18.7	NS
Hori	4882.000	AV	42.6	31.5	5.0	31.5	47.6	53.9	6.3	
Hori	7323.000	AV	35.0	35.8	5.9	32.5	44.2	53.9	9.7	
Hori	9764.000	AV	30.6	38.4	7.1	32.9	43.2	53.9	10.7	NS
Vert	49.350	QP	27.0	11.3	7.4	32.1	13.6	40.0	26.4	
Vert	64.200	QP	32.0	7.4	7.6	32.1	14.9	40.0	25.1	
Vert	102.566	QP	27.0	10.6	8.1	32.0	13.7	43.5	29.8	
Vert	133.381	QP	25.5	14.1	8.5	32.0	16.1	43.5	27.4	
Vert	169.451	QP	27.7	15.7	8.7	32.0	20.1	43.5	23.4	
Vert	188.688	QP	26.2	16.4	8.8	31.9	19.5	43.5	24.0	
Vert	4882.000	PK	46.3	31.5	5.0	31.5	51.3	73.9	22.6	
Vert	7323.000	PK	44.0	35.8	5.9	32.5	53.2	73.9	20.7	
Vert	9764.000	PK	42.5	38.4	7.1	32.9	55.1	73.9	18.8	NS
Vert	4882.000	AV	38.9	31.5	5.0	31.5	43.9	53.9	10.0	
Vert	7323.000	AV	37.1	35.8	5.9	32.5	46.3	53.9	7.6	
Vert	9764.000	AV	30.6	38.4	7.1	32.9	43.2	53.9	10.7	NS

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).

NS:Non Singal

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.4 Semi Anechoic Chamber  
Report No. : 33BE0216-HO-01  
Date : 11/20/2012  
Temperature/ Humidity : 23 deg.C/ 42% RH  
Engineer : Hiroshi Kukita  
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	50.250	QP	25.0	11.0	7.4	32.1	11.3	40.0	28.7	
Hori	63.311	QP	23.9	7.5	7.6	32.1	6.9	40.0	33.1	
Hori	104.700	QP	23.0	10.9	8.2	32.0	10.1	43.5	33.4	
Hori	133.816	QP	22.8	14.1	8.5	32.0	13.4	43.5	30.1	
Hori	167.699	QP	28.0	15.7	8.7	32.0	20.4	43.5	23.1	
Hori	188.849	QP	26.2	16.4	8.8	31.9	19.5	43.5	24.0	
Hori	2483.500	PK	55.0	27.5	2.4	32.2	52.7	73.9	21.2	
Hori	4960.000	PK	48.5	31.8	5.0	31.5	53.8	73.9	20.1	
Hori	7440.000	PK	45.0	35.9	6.0	32.6	54.3	73.9	19.6	
Hori	9920.000	PK	42.0	38.6	7.1	33.0	54.7	73.9	19.2	NS
Hori	2483.500	AV	31.5	27.5	2.4	32.2	29.2	53.9	24.7	
Hori	4960.000	AV	42.7	31.8	5.0	31.5	48.0	53.9	5.9	
Hori	7440.000	AV	33.0	35.9	6.0	32.6	42.3	53.9	11.6	
Hori	9920.000	AV	30.4	38.6	7.1	33.0	43.1	53.9	10.8	NS
Vert	49.350	QP	26.3	11.3	7.4	32.1	12.9	40.0	27.1	
Vert	64.298	QP	33.5	7.4	7.6	32.1	16.4	40.0	23.6	
Vert	102.523	QP	27.1	10.6	8.1	32.0	13.8	43.5	29.7	
Vert	133.338	QP	26.0	14.1	8.5	32.0	16.6	43.5	26.9	
Vert	169.473	QP	27.7	15.7	8.7	32.0	20.1	43.5	23.4	
Vert	188.667	QP	27.0	16.4	8.8	31.9	20.3	43.5	23.2	
Vert	2483.500	PK	53.1	27.5	2.4	32.2	50.8	73.9	23.1	
Vert	4960.000	PK	45.2	31.8	5.0	31.5	50.5	73.9	23.4	
Vert	7440.000	PK	45.9	35.9	6.0	32.6	55.2	73.9	18.7	
Vert	9920.000	PK	42.1	38.6	7.1	33.0	54.8	73.9	19.1	NS
Vert	2483.500	AV	31.3	27.5	2.4	32.2	29.0	53.9	24.9	
Vert	4960.000	AV	37.0	31.8	5.0	31.5	42.3	53.9	11.6	
Vert	7440.000	AV	34.0	35.9	6.0	32.6	43.3	53.9	10.6	
Vert	9920.000	AV	30.5	38.6	7.1	33.0	43.2	53.9	10.7	NS

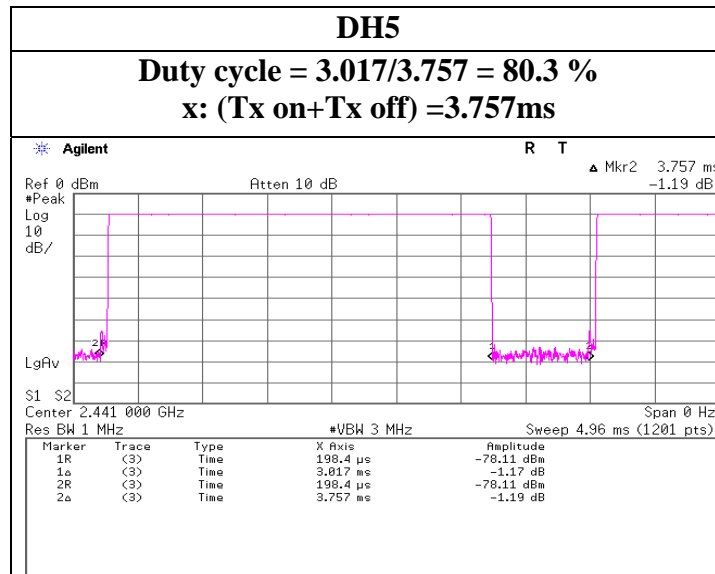
Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

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

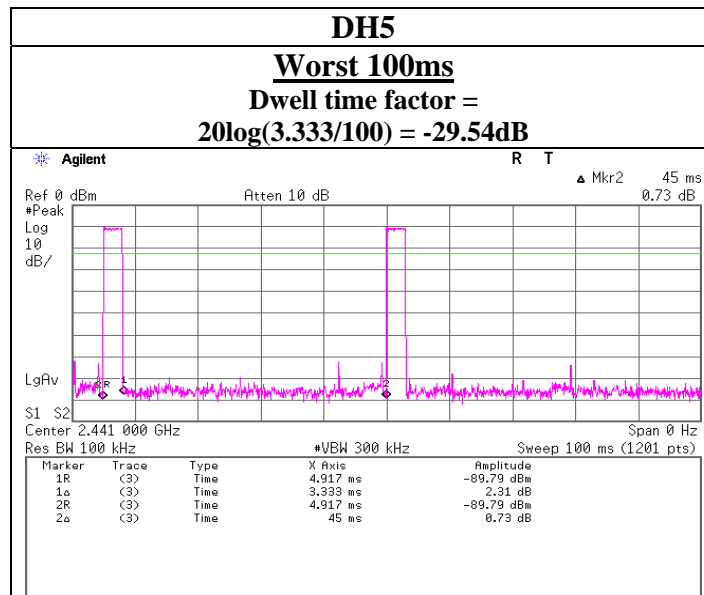
NS:Non Singal

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

### VBW (AV) Calculation

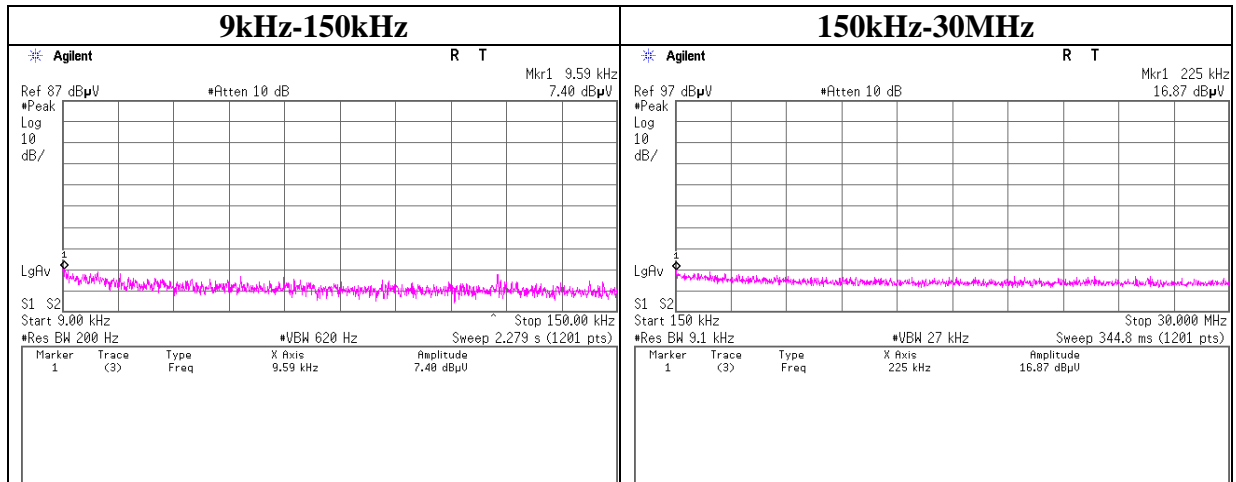


### Dwell time factor

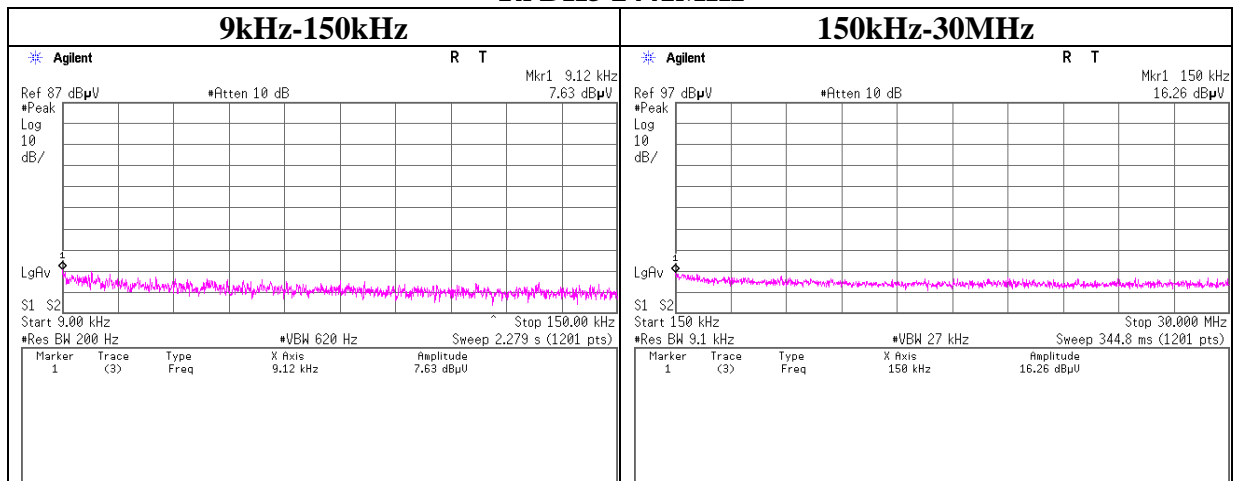


## Conducted Spurious Emission

### Tx DH5 2402MHz

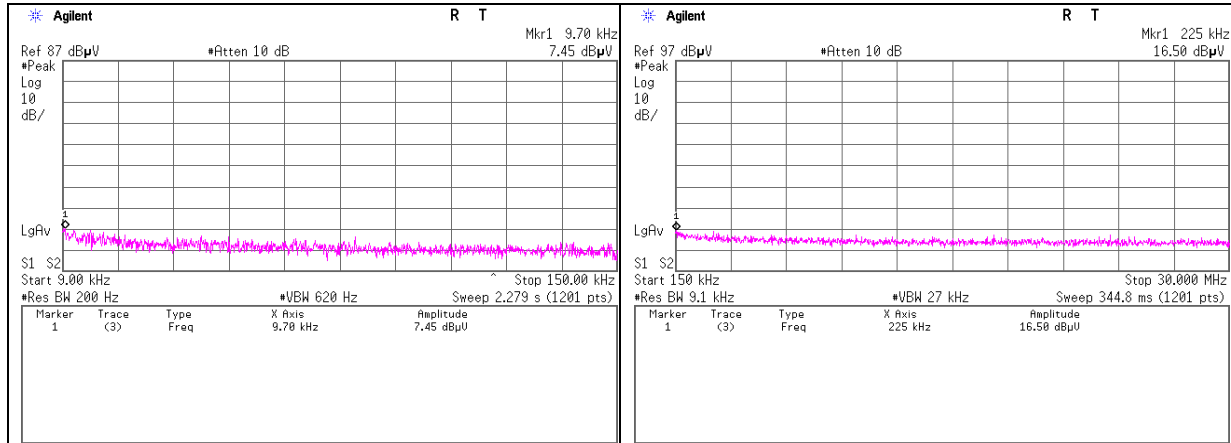


### Tx DH5 2441MHz



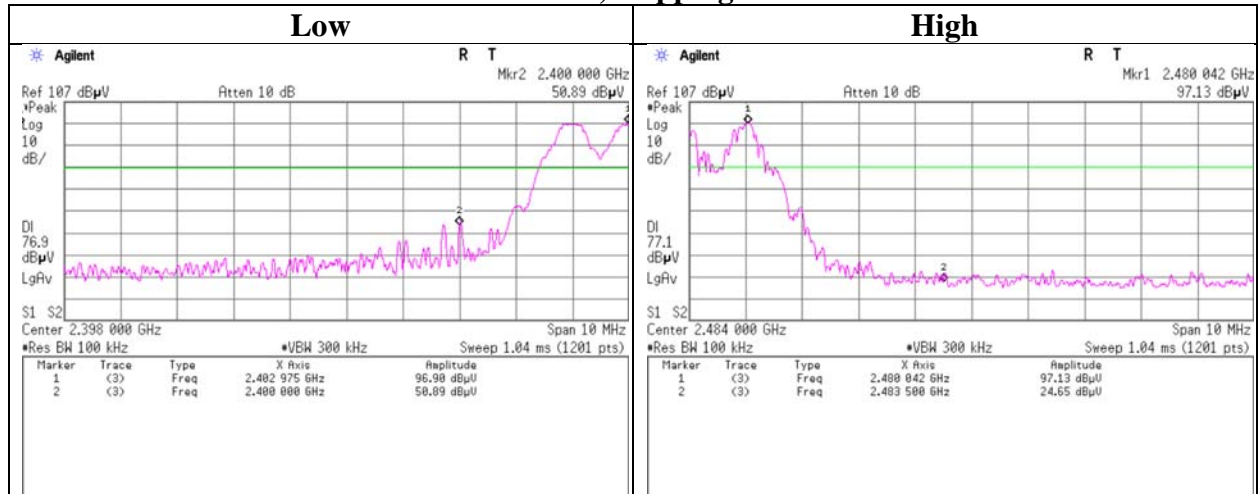
### Tx DH5 2480MHz



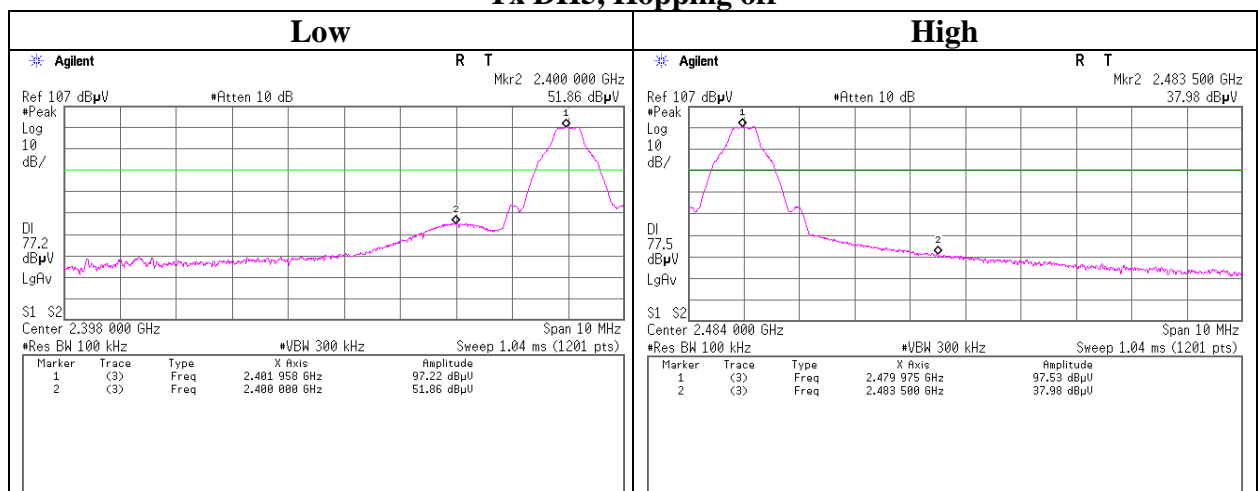


### Conducted Emission Band Edge compliance

### Tx DH5, Hopping on



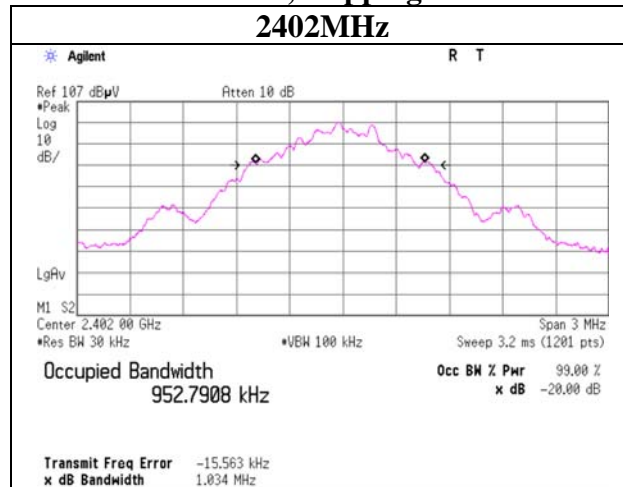
### Tx DH5, Hopping off



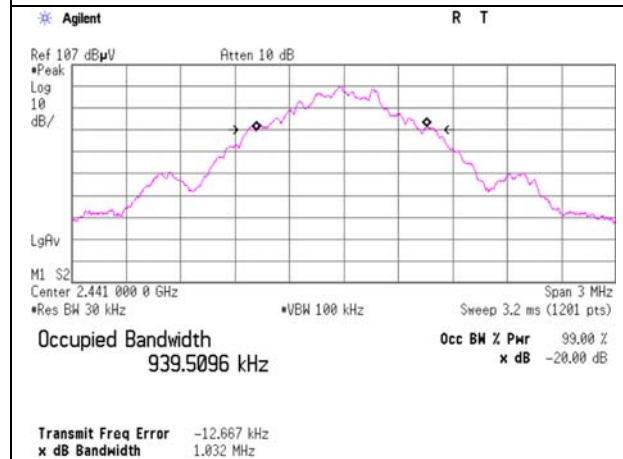
## 99%Occupied Bandwidth

### **Tx DH5, Hopping off**

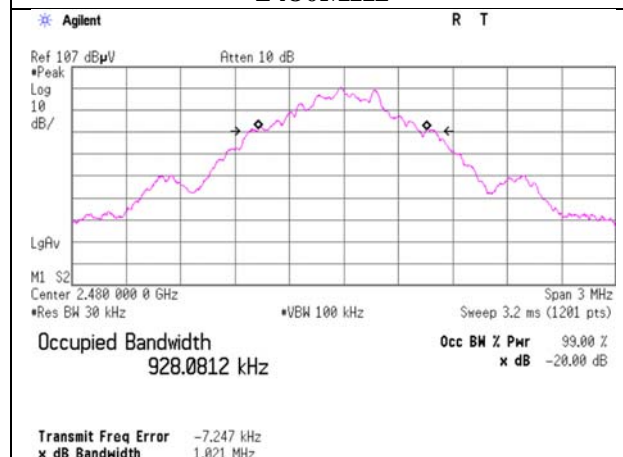
**2402MHz**



**2441MHz**

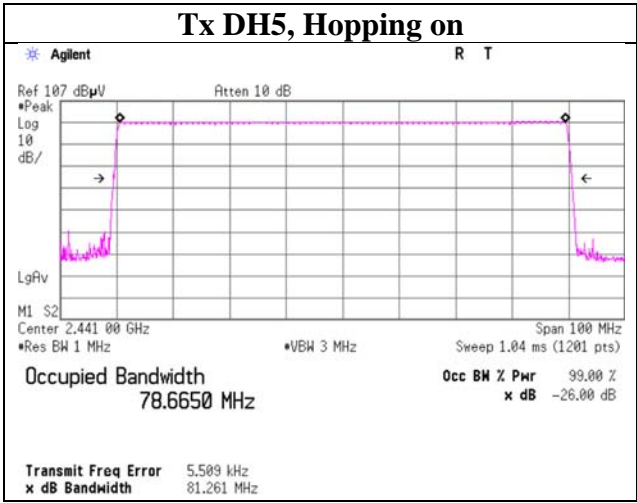


**2480MHz**





99% Occupied Bandwidth



## **APPENDIX 2: Test instruments**

### **EMI test equipment**

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MOS-14	Thermo-Hygrometer	Custom	CTH-201	-	AT	2012/02/06 * 12
MSA-10	Spectrum Analyzer	Agilent	E4448A	MY46180655	AT/RE	2012/02/03 * 12
MPM-12	Power Meter	Anritsu	ML2495A	0825002	AT	2012/06/01 * 12
MPSE-17	Power sensor	Anritsu	MA2411B	0738285	AT	2012/06/01 * 12
MAT-22	Attenuator(10dB) 1-18GHz	Orient Microwave	BX10-0476-00	-	AT	2012/03/27 * 12
MCC-144	Microwave Cable	Junkosha	MWX221	1207S407	AT	2012/08/03 * 12
MAEC-04	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	RE	2012/02/29 * 12
MOS-15	Thermo-Hygrometer	Custom	CTH-180	-	RE	2012/02/06 * 12
MJM-07	Measure	PROMART	SEN1955	-	RE	-
COTS-MEMI	EMI measurement program	TSJ	TEPTO-DV	-	RE	-
MTR-07	Test Receiver	Rohde & Schwarz	ESCI	100635	RE	2012/04/05 * 12
MBA-05	Biconical Antenna	Schwarzbeck	BBA9106	1302	RE	2011/11/16 * 12
MLA-08	Logperiodic Antenna	Schwarzbeck	UKLP9140-A	N/A	RE	2011/11/16 * 12
MCC-50	Coaxial Cable	UL Japan	-	-	RE	2012/06/01 * 12
AT-38	Attenuator	Anritsu	MP721B	6200961025	RE	2011/12/08 * 12
MPA-14	Pre Amplifier	SONOMA INSTRUMENT	310	260833	RE	2012/03/05 * 12
MHA-21	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	9120D-557	RE	2012/08/17 * 12
MCC-141	Microwave Cable	Junkosha	MWX221	1203S212(1m) / 1204S062(5m)	RE	2012/04/23 * 12
MPA-12	MicroWave System Amplifier	Agilent	83017A	MY39500780	RE	2012/03/28 * 12
MHA-17	Horn Antenna 15-40GHz	Schwarzbeck	BBHA9170	BBHA9170307	RE	2012/06/27 * 12
MHF-06	High Pass Filter 3.5-24GHz	TOKIMEC	TF323DCA	601	RE	2012/05/30 * 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**

**UL Japan, Inc.**

**Head Office EMC Lab.**

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