



Test report No. : 10499187S-H  
Page : 1 of 57  
FCC ID : EW4DWMW314  
Issued date : November 19, 2014  
Revised date : November 21, 2014

# RADIO TEST REPORT

**Test Report No.: 10499187S-H**

**Applicant** : MITSUMI ELECTRIC CO., LTD.  
**Type of Equipment** : Wireless LAN + BT/BLE Module  
**Model No.** : DWM-W314  
**FCC ID** : EW4DWMW314  
**Test regulation** : FCC Part15 Subpart C: 2014  
**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 limits of the above regulation.
4. The test results in this test report are traceable to the national or international standards.
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6. The opinions and the interpretations to the result of the description in this report are outside scopes where UL Japan has been accredited.

**Date of test:**

October 20 to 30, 2014

**Representative test engineer:**

*S. Takano*

Shinichi Takano  
Engineer  
Consumer Technology Division

**Approved by :**

*T. Imamura*

Toyokazu Imamura  
Leader  
Consumer Technology Division



- The testing in which "Non-accreditation" is displayed is outside the accreditation scopes in UL Japan.  
 There is no testing item of "Non-accreditation".

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13-EM-F0429



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## **SECTION 1: Customer information**

Company Name : MITSUMI ELECTRIC CO., LTD.  
Address : 2-11-2, Tsurumaki, Tama-shi, Tokyo, 206-8567 JAPAN  
Telephone Number : +81-42-310-5801  
Facsimile Number : +81-42-310-5598  
Contact Person : Yuki Takakura

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

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

Type of equipment : Wireless LAN + BT/BLE Module  
Model No. : DWM-W314  
Serial No. : Refer to 4.2 in this report.  
Rating : DC3.3V  
Country of Mass-production : Philippines  
Condition of EUT : Engineering prototype  
(Not for Sale: This sample is equivalent to mass-produced items.)  
Modification of EUT : No modification by the test lab.  
Receipt Date of Sample : September 26, 2014

### **2.2 Product description**

Model: DWM-W314 (referred to as the EUT in this report) is Wireless LAN + BT/BLE Module.

Clock frequency(ies) in the system : 32.768kHz, 26MHz  
Antenna type : Monopole type chip antenna  
Antenna gain : -9.2dBi  
Antenna connector type : None (It exist the connector for only the tests of shipment.)  
Operation temperature range : -20 to +70 deg.C

#### <Bluetooth part>

Equipment type : Transceiver  
Frequency of operation : 2402-2480MHz  
Bandwidth / channel spacing : 79MHz / 1MHz (BDR/EDR) & 2MHz (Low Energy)  
Type of modulation : FHSS (GFSK,  $\pi/4$ -DQPSK, 8DPSK), DSSS (GFSK)  
ITU code : F1D, G1D

#### <Wireless LAN part>

Equipment type : Transceiver  
Frequency of operation : 2412-2462MHz  
Bandwidth / channel spacing : 20MHz / 5MHz  
Type of modulation : DSSS, OFDM  
ITU code : D1D, G1D

\* For Wireless LAN part and Bluetooth Low Energy part, refer to the test report: 10499187S-G.

#### FCC 15.31 (e) / 212

The Wireless LAN + BT/BLE Module has its own regulator.

The module is constantly provided voltage (DC1.8V) through the regulator regardless of input voltage. Therefore, this EUT complies with the requirement.

#### FCC 15.203 / 212

It is impossible for end users to replace the antenna, because it is soldered on the circuit board.

Therefore the equipment complies with the requirement of 15.203/212.

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

### **3.1 Test specification**

Test specification : FCC Part 15 Subpart C: 2014, final revised on August 15, 2014 and effective October 14, 2014  
Title : FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators  
Section 15.207 Conducted limits  
Section 15.209 Radiated emission limits, general requirements  
Section 15.247 Operation within the bands 902-928MHz, 2400-2483.5MHz, and 5725-5850MHz

### **3.2 Procedures & Results**

Item	Test Procedure	Specification	Remarks	Deviation	Worst Margin	Results	
Conducted emission	ANSI C63.4:2009 7. AC powerline conducted emission measurements	FCC 15.207	-	N/A	21.1dB Freq.: 0.47382MHz Detection: Quasi-Peak Phase: N Mode: Tx BDR 2441MHz	Complied	
Carrier frequency separation	FCC Public Notice DA 00-705 & ANSI C63.4:2009 13. Measurement of intentional radiators	FCC 15.247 (a)(1)	Conducted	N/A	*See data.	Complied	
20dB bandwidth	FCC Public Notice DA 00-705 & ANSI C63.4:2009 13. Measurement of intentional radiators	FCC 15.247 (a)(1)	Conducted	N/A		-	
Number of hopping frequency	FCC Public Notice DA 00-705 & ANSI C63.4:2009 13. Measurement of intentional radiators	FCC 15.247 (a)(1)(iii)	Conducted	N/A		Complied	
Dwell time	FCC Public Notice DA 00-705 & ANSI C63.4:2009 13. Measurement of intentional radiators	FCC 15.247 (a)(1)(iii)	Conducted	N/A		Complied	
Maximum peak output power	FCC Public Notice DA 00-705 & ANSI C63.4:2009 13. Measurement of intentional radiators	FCC 15.247 (b)(1)	Conducted	N/A		Complied	
Band edge compliance & Spurious emission	FCC Public Notice DA 00-705 & ANSI C63.4:2009 13. Measurement of intentional radiators	FCC 15.247 (d) 15.209	Conducted/ Radiated	N/A		2.6dB Freq.: 9920.000MHz Polarization: Vertical Detection: Average Mode: Tx BDR 2480MHz	Complied
Note: UL Japan's Work Procedures No. 13-EM-W0420 and 13-EM-W0422							

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### 3.3 Addition to standard

Item	Test Procedure	Specification	Remarks	Worst Margin	Results
Occupied Bandwidth (99%)	ANSI C63.4:2009 13. Measurement of intentional radiators, RSS-Gen 4.6.1	-	Conducted	-	-

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

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

### 3.4 Uncertainty

The following uncertainties have been calculated to provide a confidence level of 95% using a coverage factor k=2.

Item	Frequency range	No.1 SAC <sup>*1</sup> /SR <sup>*2</sup> (±)	No.2 SAC/SR (±)	No.3 SAC/SR (±)
<b>Conducted emission (AC Mains) LISN</b>	150kHz-30MHz	3.6 dB	3.4 dB	3.4 dB
<b>Radiated emission (Measurement distance: 3m)</b>	9kHz-30MHz	3.7 dB	3.5 dB	3.5 dB
	30MHz-300MHz	4.9 dB	4.9 dB	4.7 dB
	300MHz-1GHz	5.0 dB	5.0 dB	4.8 dB
	1GHz-15GHz	4.9 dB	4.9 dB	4.9 dB
<b>Radiated emission (Measurement distance: 1m)</b>	15GHz-18GHz	5.7 dB	5.7 dB	5.7 dB
	18GHz-40GHz	4.5 dB	4.3 dB	4.3 dB

\*1: SAC=Semi-Anechoic Chamber

\*2: SR= Shielded Room is applied besides radiated emission

#### Conducted emission test

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

#### Radiated emission test

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

#### Antenna port conducted test

Power measurement uncertainty above 1GHz for this test was: (±) 0.68dB

Spurious emission (Conducted) measurement (below 1GHz) uncertainty for this test was: (±) 1.5dB

Spurious emission (Conducted) measurement (1G-3GHz) uncertainty for this test was: (±) 1.7dB

Spurious emission (Conducted) measurement (3G-18GHz) uncertainty for this test was: (±) 2.4dB

Spurious emission (Conducted) measurement (18G-26.5GHz) uncertainty for this test was: (±) 2.5dB

Bandwidth Measurement uncertainty for this test was: (±) 0.66%

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### 3.5 Test location

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JAB Accreditation No. : RTL02610

	IC Registration No.	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Maximum measurement distance
<input type="checkbox"/> No.1 Semi-anechoic chamber	2973D-1	20.6 x 11.3 x 7.65	20.6 x 11.3	10m
<input type="checkbox"/> No.2 Semi-anechoic chamber	2973D-2	20.6 x 11.3 x 7.65	20.6 x 11.3	10m
<input checked="" type="checkbox"/> No.3 Semi-anechoic chamber	2973D-3	12.7 x 7.7 x 5.35	12.7 x 7.7	5m
<input type="checkbox"/> No.4 Semi-anechoic chamber	-	8.1 x 5.1 x 3.55	8.1 x 5.1	-
<input checked="" type="checkbox"/> No.1 Shielded room	-	6.8 x 4.1 x 2.7	6.8 x 4.1	-
<input type="checkbox"/> No.2 Shielded room	-	6.8 x 4.1 x 2.7	6.8 x 4.1	-
<input type="checkbox"/> No.3 Shielded room	-	6.3 x 4.7 x 2.7	6.3 x 4.7	-
<input type="checkbox"/> No.4 Shielded room	-	4.4 x 4.7 x 2.7	4.4 x 4.7	-
<input type="checkbox"/> No.5 Shielded room	-	7.8 x 6.4 x 2.7	7.8 x 6.4	-
<input checked="" type="checkbox"/> No.6 Shielded room	-	7.8 x 6.4 x 2.7	7.8 x 6.4	-
<input type="checkbox"/> No.7 Shielded room	-	2.76 x 3.76 x 2.4	2.76 x 3.76	-
<input type="checkbox"/> No.8 Shielded room	-	3.45 x 5.5 x 2.4	3.45 x 5.5	-
<input checked="" type="checkbox"/> No.1 Measurement room	-	2.55 x 4.1 x 2.5	2.55 x 4.1	-

### 3.6 Test setup, Data of test & Test instruments

Refer to APPENDIX 1 to 3.

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

### **4.1 Operating mode**

<b>Test item</b>	<b>Operating mode</b>	<b>Tested frequency</b>
Conducted emission	Transmitting (Tx) Hopping OFF (DH5 / 3-DH5), Payload: PRBS9	2402MHz, 2441MHz, 2480MHz
Carrier frequency separation	Transmitting (Tx) Hopping ON (DH5 / 3-DH5) / Inquiry, Payload: PRBS9	-
20dB bandwidth	Transmitting (Tx) Hopping OFF (DH5 / 3-DH5) / Inquiry, Payload: PRBS9	2402MHz, 2441MHz, 2480MHz
Number of hopping frequency	Transmitting (Tx) Hopping ON (DH5 / 3-DH5) / Inquiry, Payload: PRBS9	-
Dwell time	Transmitting (Tx) (Hopping ON), Payload: PRBS9 - DH1, - DH3, - DH5 - 3-DH1, - 3-DH3, - 3-DH5	-
	-Inquiry	
Maximum peak output power	Transmitting (Tx) Hopping OFF , Payload: PRBS9 - DH5, - 2-DH5, - 3-DH5	2402MHz, 2441MHz, 2480MHz
Band edge compliance & Spurious emission (Radiated)	Transmitting (Tx) (DH5 / 3-DH5), Payload: PRBS9 -Hopping OFF	Band edge compliance: 2402MHz, 2480MHz Spurious emission: 2402MHz, 2441MHz, 2480MHz
	(Conducted)	Spurious emission: 2402MHz, 2441MHz, 2480MHz
99% occupied bandwidth	Transmitting (Tx) (DH5 / 3-DH5), Payload: PRBS9 / Inquiry -Hopping ON -Hopping OFF	2402MHz, 2441MHz, 2480MHz

\*As a result of preliminary test, the formal test was performed with the above modes, which had the maximum payload (except Dwell time test).

\*Remarks: Test was not performed at AFH mode, because the decrease of number of channel (min: 20ch) at AFH mode does not affect the output power and bandwidth of the EUT.  
The carrier separation may be less than 20 dB bandwidth, therefore 125mW power limit was applied to it.

Software : driver1: sd87xx (for Wireless LAN) ver.14.66.33.p71  
: driver2: bt87xx (for Bluetooth) ver.14.66.33.p71  
: bridge tool: mfgbridge ver.0.1.0.26  
: DutApiBRIDGEETH8777.exe ver.14.2.33.p37  
Power Settings : 4dBm

We removed 2-DH mode (2 Mb/s EDR: pi/4DQPSK) except power measurement by using 3-DH mode (3 Mb/s EDR: 8DPSK) as a representative.

**Justification:** The system was configured in typical fashion (as customer would normally use it) for testing.

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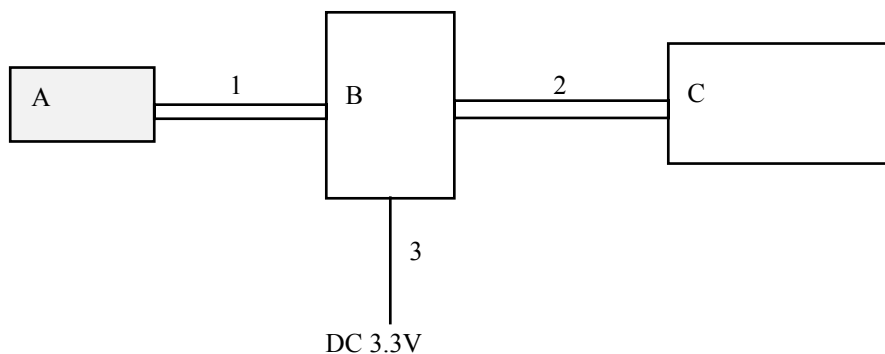
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## 4.2 Configuration and peripherals



\* Test data was taken under worse case conditions.

### Description of EUT and support equipment

No.	Item	Model number	Serial number	Manufacturer	Remark
A	Wireless LAN + BT/BLE Module Module	DWM-W314	2	MITSUMI	EUT
B	Jig	-	-	MITSUMI	-
C	Jig (SD card)	-	-	MITSUMI	-

### List of cable used

No.	Cable name	Length (m)	Shield		Remark
			Cable	Connector	
1	Signal	0.1	Unshielded	Unshielded	-
2	Signal	0.15	Unshielded	Unshielded	-
3	DC cable	1.3	Unshielded	Unshielded	-

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## **SECTION 5: Conducted emission**

### **5.1 Operating environment**

Test place : See test data (APPENDIX 1)  
Temperature : See test data (APPENDIX 1)  
Humidity : See test data (APPENDIX 1)

### **5.2 Test configuration**

EUT was placed on a platform of nominal size, 1m by 2.0m, raised 0.8m above the conducting ground plane. The table is made of Styrofoam and covered with polyvinyl chloride. That has very low permittivity. The rear of tabletop was located 40cm to the vertical conducting plane. The rear of peripheral was aligned and was 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 LISN.

Each EUT current-carrying power lead, except the ground (safety) lead, was individually connected through a LISN to the input power source. All unused 50ohm connectors of the LISN were resistively terminated in 50ohm when not connected to the measuring equipment.

Photographs of the set up are shown in APPENDIX 3.

### **5.3 Test conditions**

Frequency range : 0.15 - 30MHz  
EUT position : Table top

### **5.4 Test procedure**

The AC Mains Terminal Continuous disturbance Voltage had been measured with the EUT via DC power supply within a Shielded room. The EUT via DC power supply was connected to a Line Impedance Stabilization Network (LISN).

An overview sweep with peak detection has been performed.

The measurements had been performed with a quasi-peak detector and if required, a CISPR average detector.

The conducted emission measurements were made with the following detection of the test receiver.

Detection Type : Quasi-Peak/ CISPR Average  
IF Bandwidth : 9kHz

### **5.5 Results**

Summary of the test results : Pass  
Refer to APPENDIX 1

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## **SECTION 6: Carrier frequency separation**

### **Test procedure**

The carrier frequency separation was measured with a spectrum analyzer connected to the antenna port.

Summary of the test results: Pass  
Refer to APPENDIX 1.

## **SECTION 7: 20dB bandwidth & Occupied bandwidth (99%)**

### **Test procedure**

The bandwidth was measured with a spectrum analyzer connected to the antenna port.

Summary of the test results: Pass  
Refer to APPENDIX 1.

## **SECTION 8: Number of hopping frequency**

### **Test procedure**

The Number of Hopping Frequency was measured with a spectrum analyzer connected to the antenna port.

Summary of the test results: Pass  
Refer to APPENDIX 1.

## **SECTION 9: Dwell time**

### **Test procedure**

The Dwell time was measured with a spectrum analyzer connected to the antenna port.

Summary of the test results: Pass  
Refer to APPENDIX 1.

## **SECTION 10: Maximum peak output power**

### **Test procedure**

The Maximum Output Power was measured with a power meter connected to the antenna port.

Detection type: Peak / Average \*1)

Summary of the test results: Pass  
Refer to APPENDIX 1

\*1) Average detector was used only for Reference data.

## **SECTION 11: Spurious emissions (Antenna port conducted)**

### **Test procedure**

The Out of Band Emissions was measured with a spectrum analyzer connected to the antenna port.  
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. 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=10kHz)

Summary of the test results: Pass  
Refer to APPENDIX 1.

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## **SECTION 12: Radiated emission**

### **12.1 Operating environment**

Test room : See test data (APPENDIX 1)  
Temperature : See test data (APPENDIX 1)  
Humidity : See test data (APPENDIX 1)

### **12.2 Test configuration**

EUT was placed on a polystyrene platform of nominal size, 0.5m by 0.5m, raised 0.8m above the conducting ground plane. Photographs of the set up are shown in APPENDIX 3.

### **12.3 Test conditions**

Frequency range : 30MHz - 25GHz  
EUT position : Table top

### **12.4 Test procedure**

The Radiated Electric Field Strength intensity has been measured on a semi-anechoic chamber with a ground plane and at a distance of 3m (below 15GHz) / 1m (above 15GHz) (Refer to Figure 1). Measurements were performed with quasi-peak, peak and average detector. The measuring antenna height was varied between 1 and 4m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field intensity. The measurements were performed for both vertical and horizontal antenna polarization.

The radiated emission measurements were made with the following detection.

Frequency	30 - 1000MHz	1 - 25GHz		20dBc
Detection Type	: Quasi-Peak	Peak	Average *1)	Peak
IF Bandwidth	: 120kHz	RBW:1MHz VBW:3MHz	RBW:1MHz VBW:10Hz	RBW: 100kHz, VBW: 300kHz

\*1) When using Spectrum analyzer, the test was made with adjusting span to zero by using peak hold. Although 00-705 accepts VBW=10Hz for AV measurements, confirmed that superfluous smoothing was not performed.

The carrier levels and noise levels were confirmed at each position of X, Y and Z axes to see the position of maximum noise, and the test was made at the position that has the maximum noise.

Antenna polarization	Carrier	Spurious (Below 1GHz)	Spurious (1-15GHz)	Spurious (15-18GHz)	Spurious (18-25GHz)
Horizontal	X	Y	Y	Y	Y
Vertical	Z	Y	Y	Y	Y

\* The definition of each position is shown in a 'Pre-check of the worst position' in APPENDIX 3.

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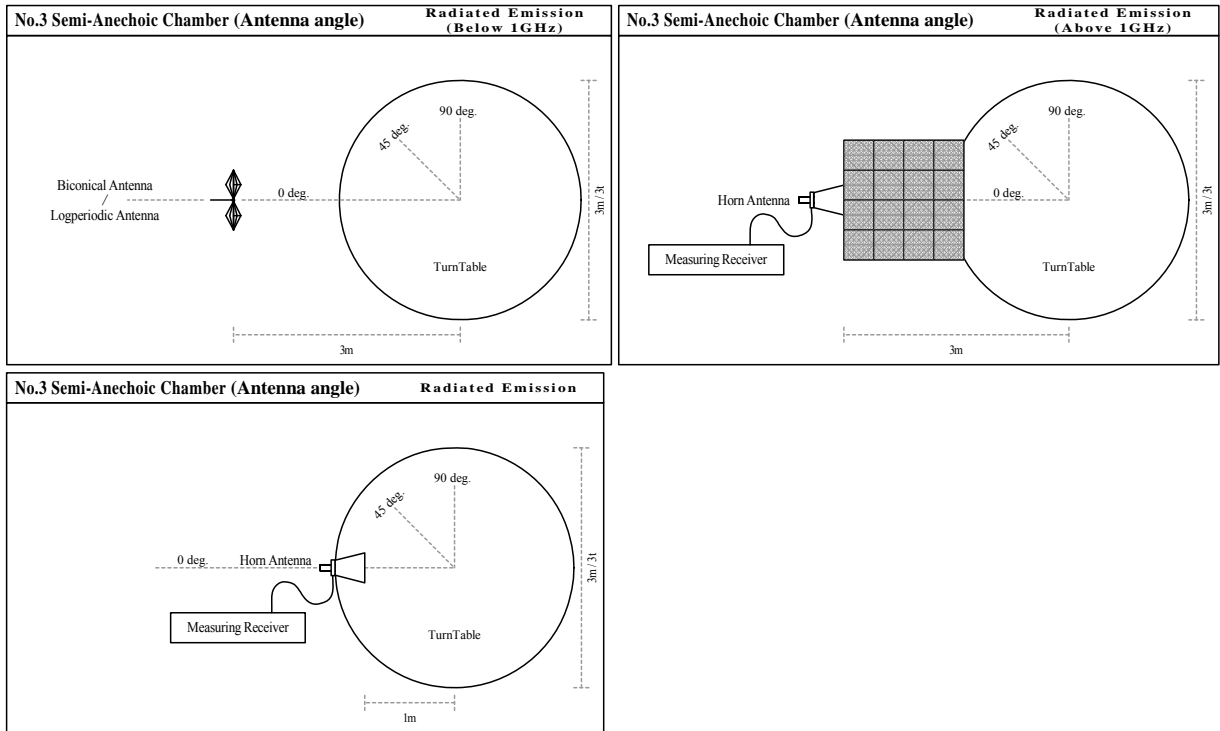
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**Figure 1. Antenna angle**



**12.5 Band edge**

Band edge level at 2390MHz and 2483.5MHz is below the limits of FCC 15.209 and band edge level at 2400MHz is below the 20dBc. Refer to the data.

**12.6 Results**

Summary of the test results:

Pass

\*No noise was detected above the 5<sup>th</sup> order harmonics.

Refer to APPENDIX 1.

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## **Contents of APPENDIXES**

### **APPENDIX 1: Data of Radio tests**

Conducted emission  
20dB bandwidth and Carrier frequency separation  
Number of hopping frequency  
Dwell time  
Maximum peak output power  
Radiated emission  
Spurious emission (Antenna port conducted)  
Occupied bandwidth

### **APPENDIX 2: Test instruments**

Test instruments

### **APPENDIX 3: Photographs of test setup**

Conducted emission  
Radiated emission  
Pre-check of the worst position

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**APPENDIX 1:Data of Radio tests**

**DATA OF CONDUCTED EMISSION TEST**

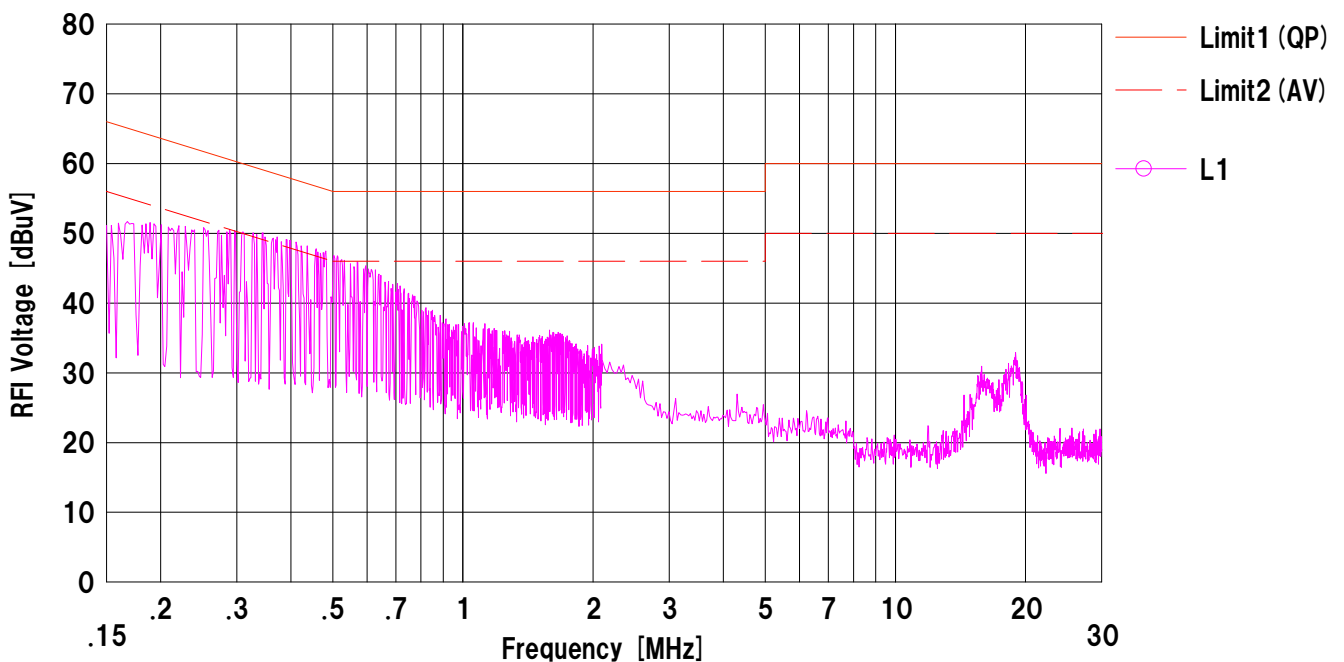
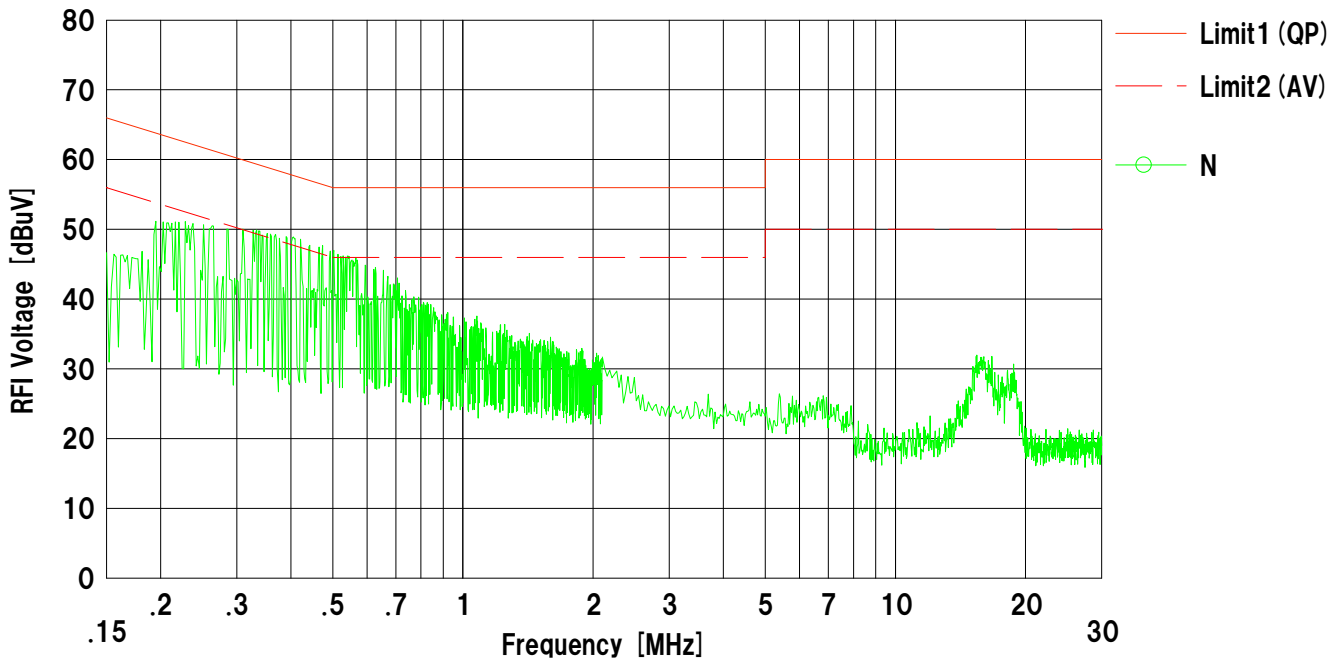
UL Japan,Inc. Shonan EMC Lab. No.1 Shielded Room  
Date : 2014/10/30

Company : MITSUMI ELECTRIC CO., LTD.  
Kind of EUT : Wireless LAN + BT/ BLE Module  
Model No. : DWM-W314  
Serial No. : 2  
Remarks : -

Mode : Tx BDR 2402MHz  
Order No. : 10499187S  
Power : DC 3.3V  
Temp./Humi. : 25deg.C / 43%RH

Limit1 : FCC 15C (15.207) QP  
Limit2 : FCC 15C (15.207) AV

Engineer : Shinichi Takano



Calculation:Result [dBuV] =Reading [dBuV] +C.Fac (LISN+Cable+ATT) [dB]  
LISN:SLS-01

# DATA OF CONDUCTED EMISSION TEST

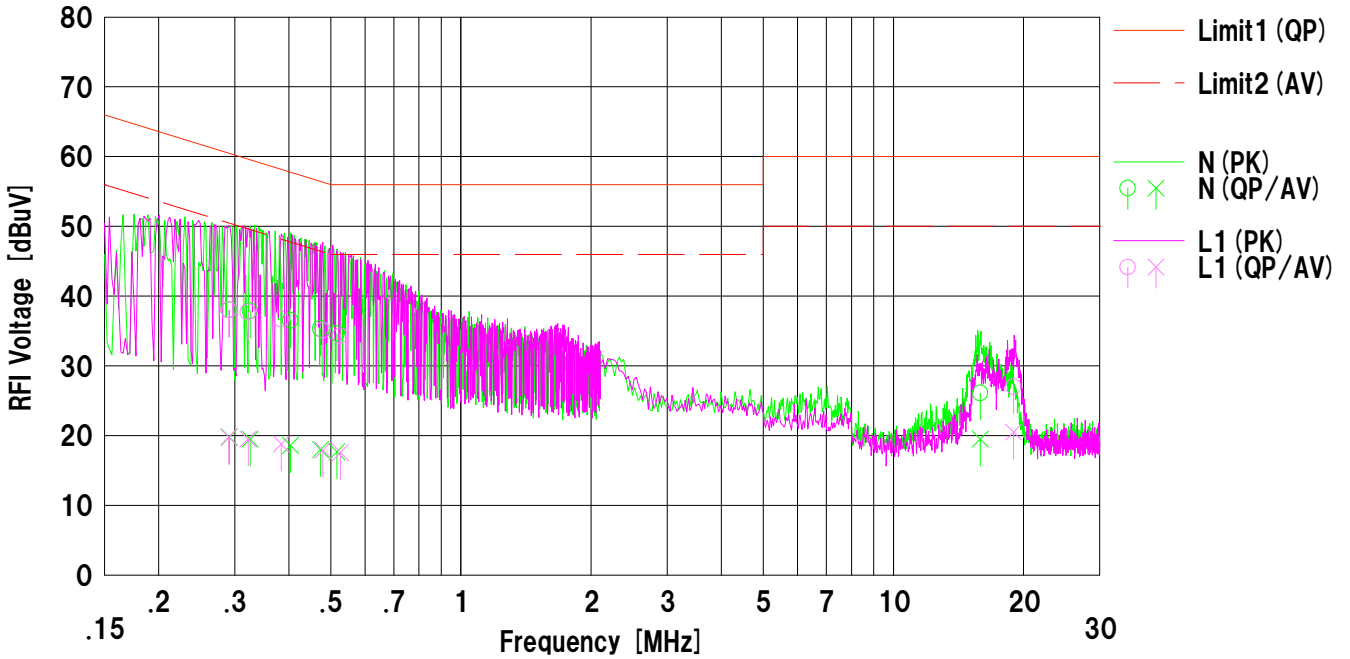
UL Japan, Inc. Shonan EMC Lab. No.1 Shielded Room  
Date : 2014/10/30

Company : MITSUMI ELECTRIC CO., LTD.  
Kind of EUT : Wireless LAN + BT/ BLE Module  
Model No. : DWM-W314  
Serial No. : 2  
Remarks : -

Mode : Tx BDR 2441MHz  
Order No. : 10499187S  
Power : DC 3.3V  
Temp./Humi. : 25deg.C / 43%RH

Limit1 : FCC 15C (15.207) QP  
Limit2 : FCC 15C (15.207) AV

Engineer : Shinichi Takano



No.	Freq. [MHz]	Reading		C.Fac [dB]	Results		Limit		Margin		Phase	Comment
		<QP> [dBuV]	<AV> [dBuV]		<QP> [dBuV]	<AV> [dBuV]	<QP> [dBuV]	<AV> [dBuV]	<QP> [dB]	<AV> [dB]		
1	0.29135	25.5	7.3	12.5	38.0	19.8	60.4	50.4	22.4	30.6	N	
2	0.32550	25.4	7.0	12.5	37.9	19.5	59.5	49.5	21.6	30.0	N	
3	0.40351	24.0	6.1	12.5	36.5	18.6	57.7	47.7	21.2	29.1	N	
4	0.47382	22.8	5.5	12.5	35.3	18.0	56.4	46.4	21.1	28.4	N	
5	0.51672	22.1	5.2	12.5	34.6	17.7	56.0	46.0	21.4	28.3	N	
6	15.88715	12.8	6.2	13.3	26.1	19.5	60.0	50.0	33.9	30.5	N	
7	0.29055	25.5	7.3	12.5	38.0	19.8	60.5	50.5	22.5	30.7	L1	
8	0.32215	25.2	7.0	12.5	37.7	19.5	59.6	49.6	21.9	30.1	L1	
9	0.38419	24.2	6.3	12.5	36.7	18.8	58.1	48.1	21.4	29.3	L1	
10	0.47947	22.6	5.4	12.5	35.1	17.9	56.3	46.3	21.2	28.4	L1	
11	0.52635	21.8	5.1	12.5	34.3	17.6	56.0	46.0	21.7	28.4	L1	
12	18.96965	13.5	7.0	13.5	27.0	20.5	60.0	50.0	33.0	29.5	L1	

Calculation: Result [dBuV] = Reading [dBuV] + C.Fac (LISN+Cable+ATT) [dB]  
LISN:SLS-01



# DATA OF CONDUCTED EMISSION TEST

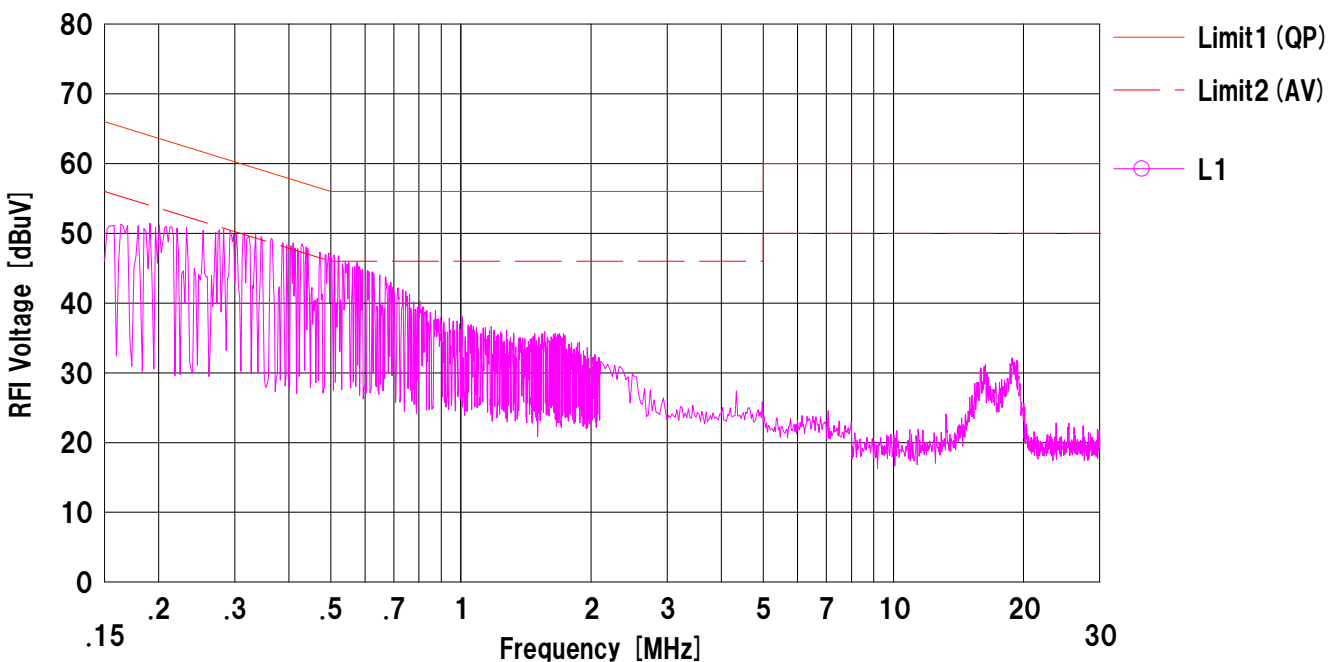
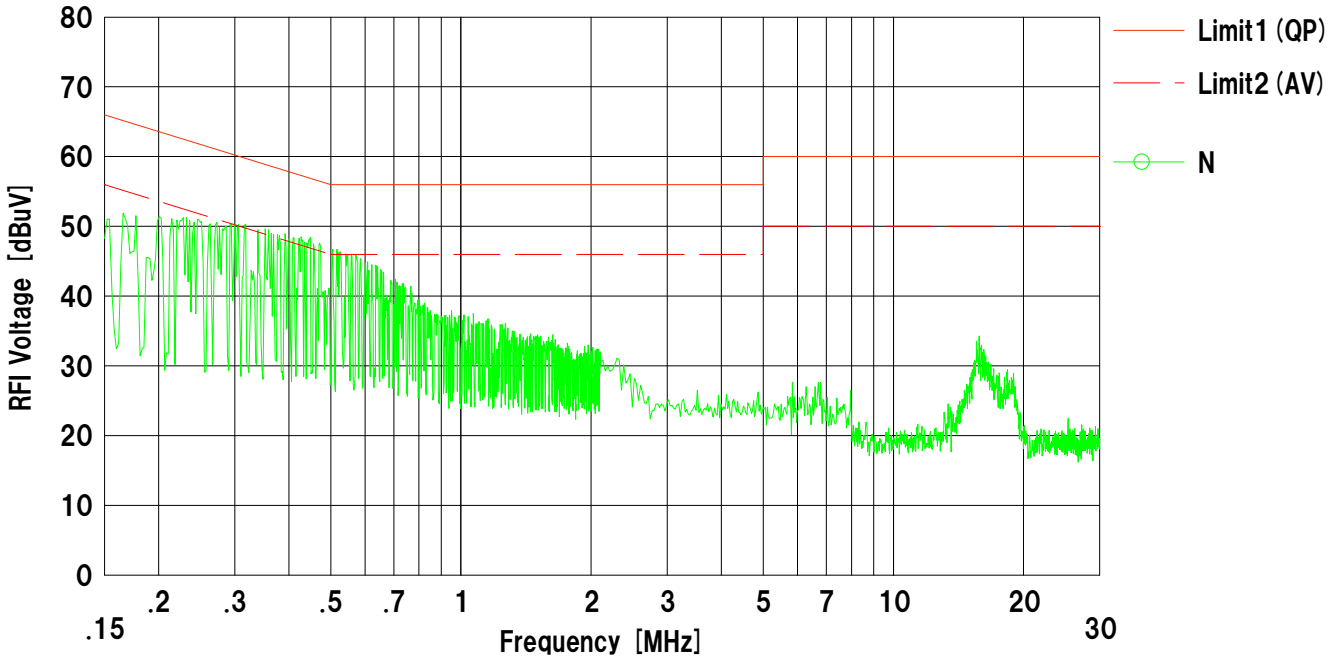
UL Japan, Inc. Shonan EMC Lab. No.1 Shielded Room  
Date : 2014/10/30

Company : MITSUMI ELECTRIC CO., LTD.  
Kind of EUT : Wireless LAN + BT/ BLE Module  
Model No. : DWM-W314  
Serial No. : 2  
Remarks : -

Mode : Tx BDR 2480MHz  
Order No. : 10499187S  
Power : DC 3.3V  
Temp./Humi. : 25deg.C / 43%RH

Limit1 : FCC 15C (15.207) QP  
Limit2 : FCC 15C (15.207) AV

Engineer : Shinichi Takano



Calculation: Result [dBuV] = Reading [dBuV] + C.Fac (LISN+Cable+ATT) [dB]  
LISN:SLS-01

# DATA OF CONDUCTED EMISSION TEST

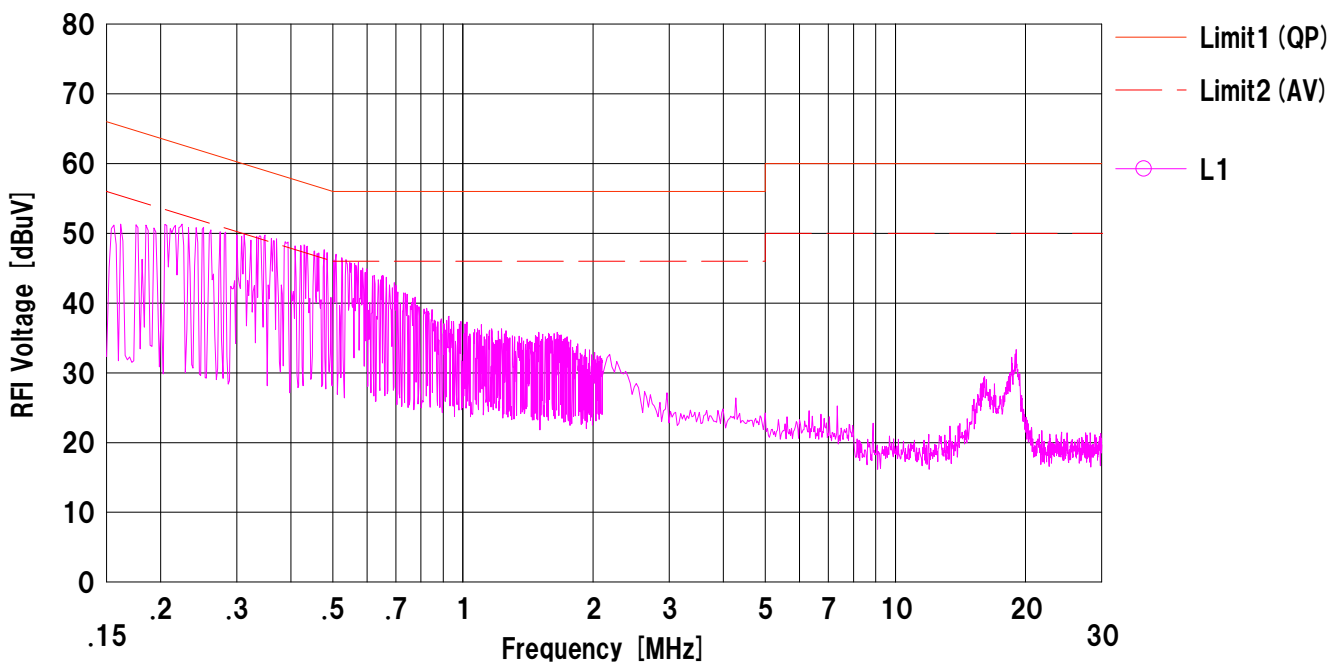
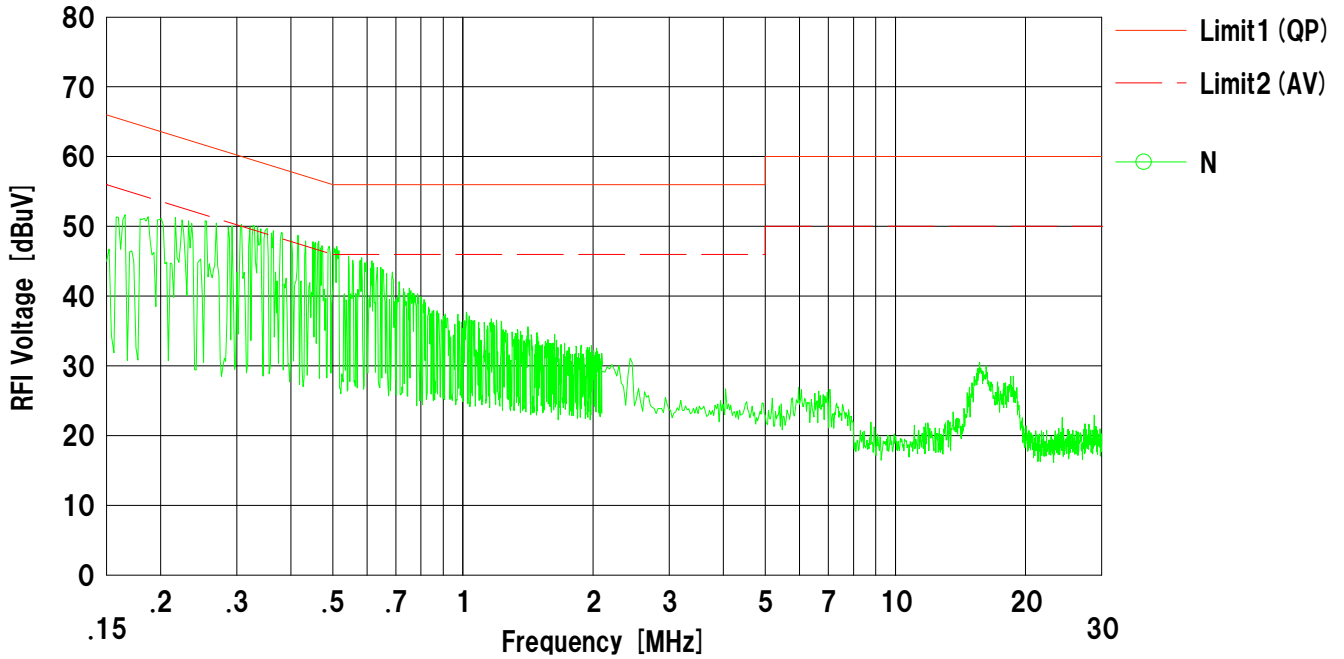
UL Japan, Inc. Shonan EMC Lab. No.1 Shielded Room  
Date : 2014/10/30

Company : MITSUMI ELECTRIC CO., LTD.  
Kind of EUT : Wireless LAN + BT/ BLE Module  
Model No. : DWM-W314  
Serial No. : 2  
Remarks : -

Mode : Tx EDR 2402MHz  
Order No. : 10499187S  
Power : DC 3.3V  
Temp./Humi. : 25deg.C / 43%RH

Limit1 : FCC 15C (15.207) QP  
Limit2 : FCC 15C (15.207) AV

Engineer : Shinichi Takano



Calculation: Result [dBuV] = Reading [dBuV] + C.Fac (LISN+Cable+ATT) [dB]  
LISN:SLS-01

# DATA OF CONDUCTED EMISSION TEST

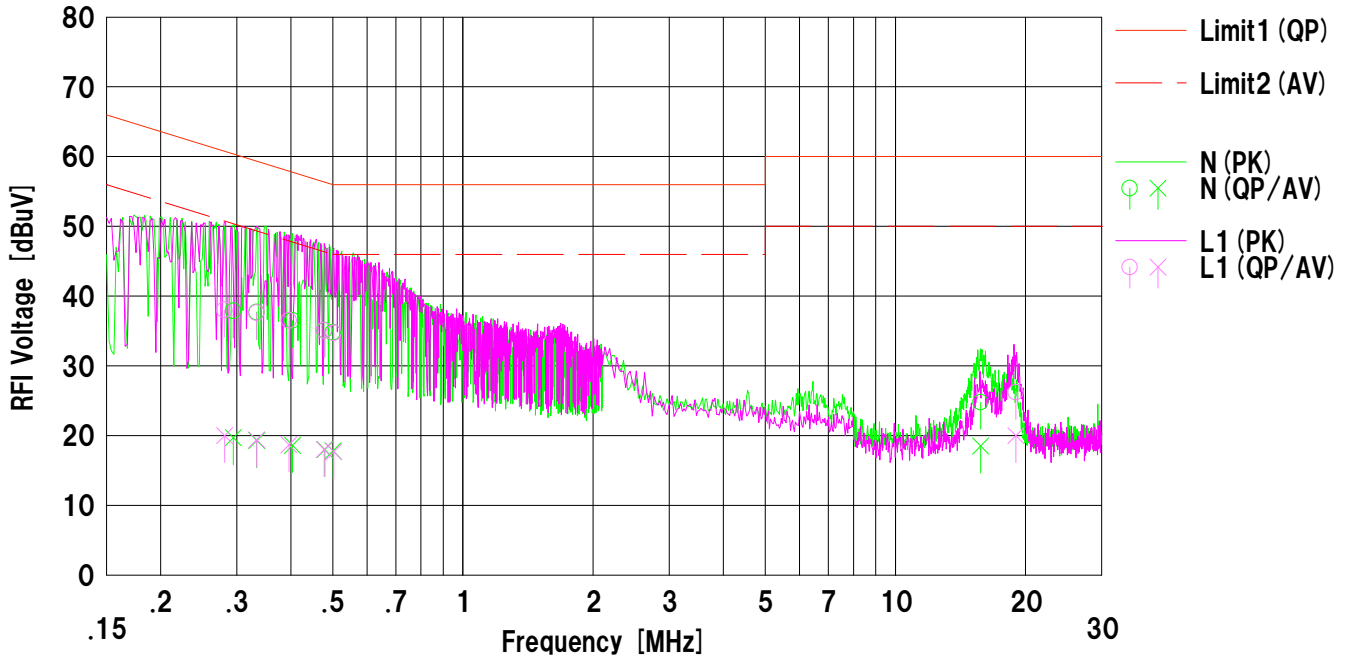
UL Japan, Inc. Shonan EMC Lab. No.1 Shielded Room  
Date : 2014/10/30

Company : MITSUMI ELECTRIC CO., LTD.  
Kind of EUT : Wireless LAN + BT/ BLE Module  
Model No. : DWM-W314  
Serial No. : 2  
Remarks : -

Mode : Tx EDR 2441MHz  
Order No. : 10499187S  
Power : DC 3.3V  
Temp./Humi. : 25deg.C / 43%RH

Limit1 : FCC 15C (15.207) QP  
Limit2 : FCC 15C (15.207) AV

Engineer : Shinichi Takano



No.	Freq. [MHz]	Reading		C.Fac [dB]	Results		Limit		Margin		Phase	Comment
		<QP> [dBuV]	<AV> [dBuV]		<QP> [dBuV]	<AV> [dBuV]	<QP> [dBuV]	<AV> [dBuV]	<QP> [dB]	<AV> [dB]		
1	0.29468	25.4	7.2	12.5	37.9	19.7	60.3	50.3	22.4	30.6	N	
2	0.33380	25.2	6.8	12.5	37.7	19.3	59.3	49.3	21.6	30.0	N	
3	0.40349	24.0	6.1	12.5	36.5	18.6	57.7	47.7	21.2	29.1	N	
4	0.47955	22.6	5.5	12.5	35.1	18.0	56.3	46.3	21.2	28.3	N	
5	0.50088	22.3	5.3	12.5	34.8	17.8	56.0	46.0	21.2	28.2	N	
6	15.75340	11.5	5.2	13.3	24.8	18.5	60.0	50.0	35.2	31.5	N	
7	0.28102	25.4	7.4	12.6	38.0	20.0	60.7	50.7	22.7	30.7	L1	
8	0.33337	25.1	6.9	12.5	37.6	19.4	59.3	49.3	21.7	29.9	L1	
9	0.39603	24.0	6.2	12.5	36.5	18.7	57.9	47.9	21.4	29.2	L1	
10	0.47769	22.6	5.5	12.5	35.1	18.0	56.3	46.3	21.2	28.3	L1	
11	0.50293	22.2	5.2	12.5	34.7	17.7	56.0	46.0	21.3	28.3	L1	
12	18.99667	12.7	6.5	13.5	26.2	20.0	60.0	50.0	33.8	30.0	L1	

Calculation: Result [dBuV] = Reading [dBuV] + C.Fac (LISN+Cable+ATT) [dB]  
LISN: SLS-01

# DATA OF CONDUCTED EMISSION TEST

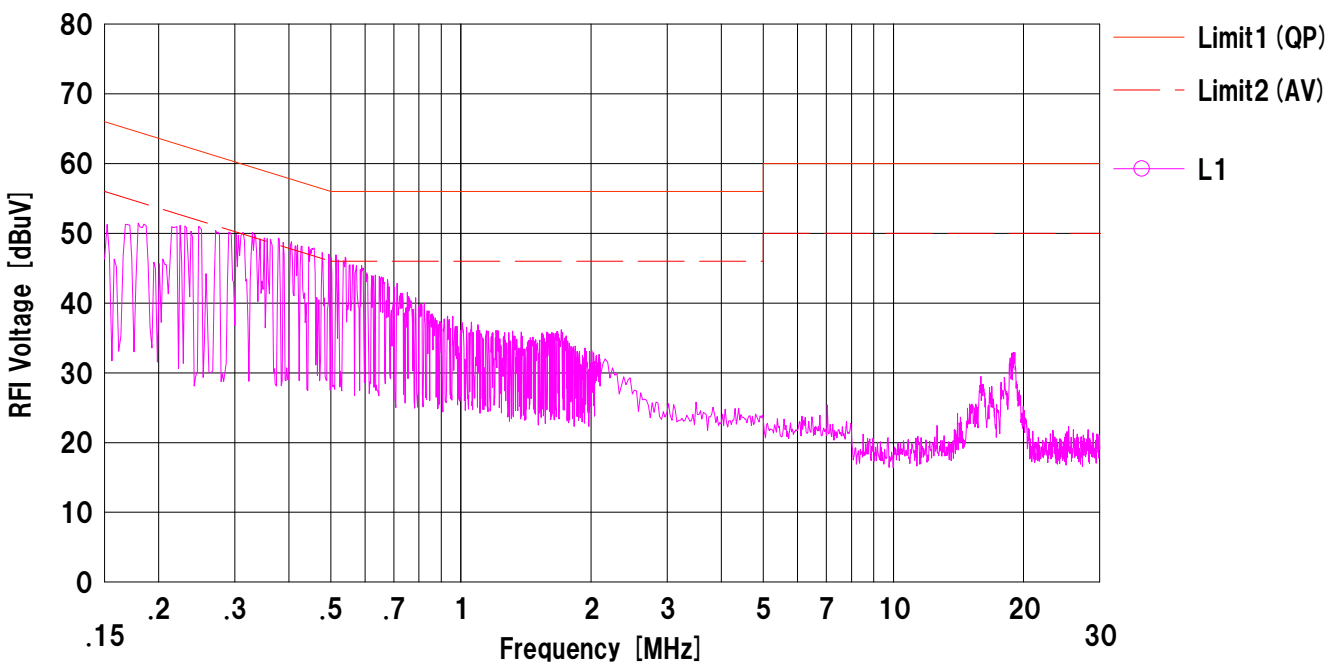
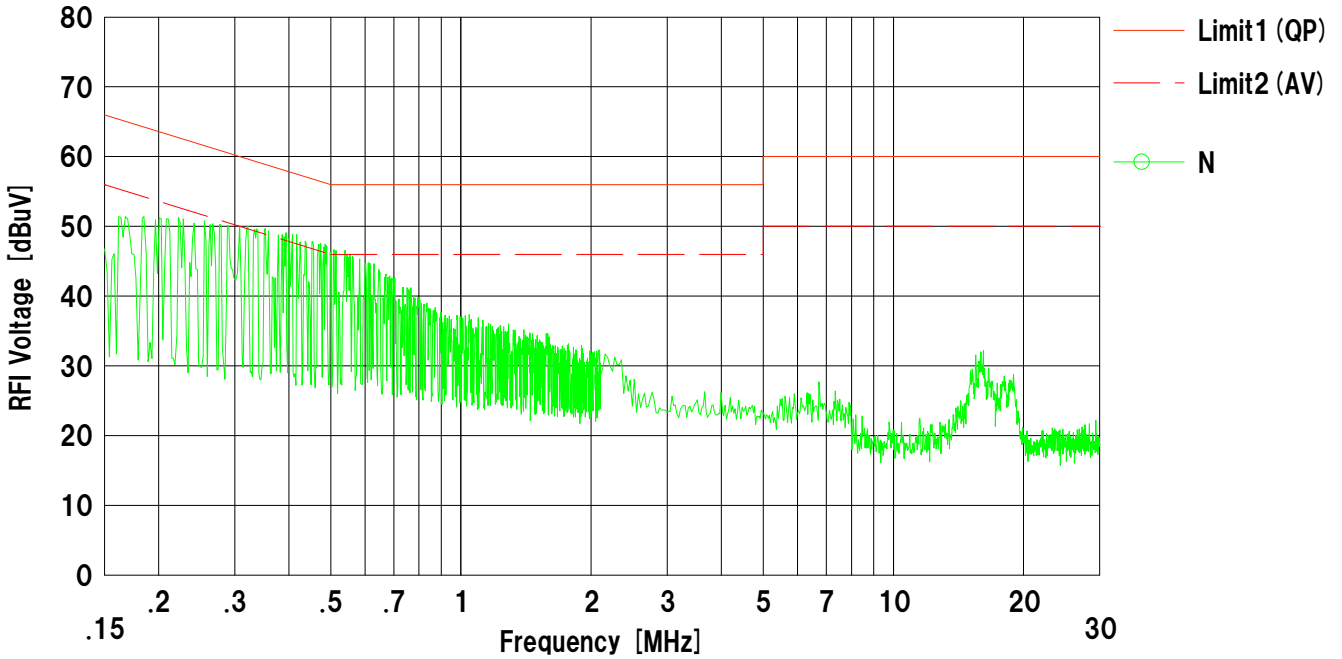
UL Japan, Inc. Shonan EMC Lab. No.1 Shielded Room  
Date : 2014/10/30

Company : MITSUMI ELECTRIC CO., LTD.  
Kind of EUT : Wireless LAN + BT/ BLE Module  
Model No. : DWM-W314  
Serial No. : 2  
Remarks : -

Mode : Tx EDR 2480MHz  
Order No. : 10499187S  
Power : DC 3.3V  
Temp./Humi. : 25deg.C / 43%RH

Limit1 : FCC 15C (15.207) QP  
Limit2 : FCC 15C (15.207) AV

Engineer : Shinichi Takano



Calculation: Result [dBuV] = Reading [dBuV] + C.Fac (LISN+Cable+ATT) [dB]  
LISN: SLS-01

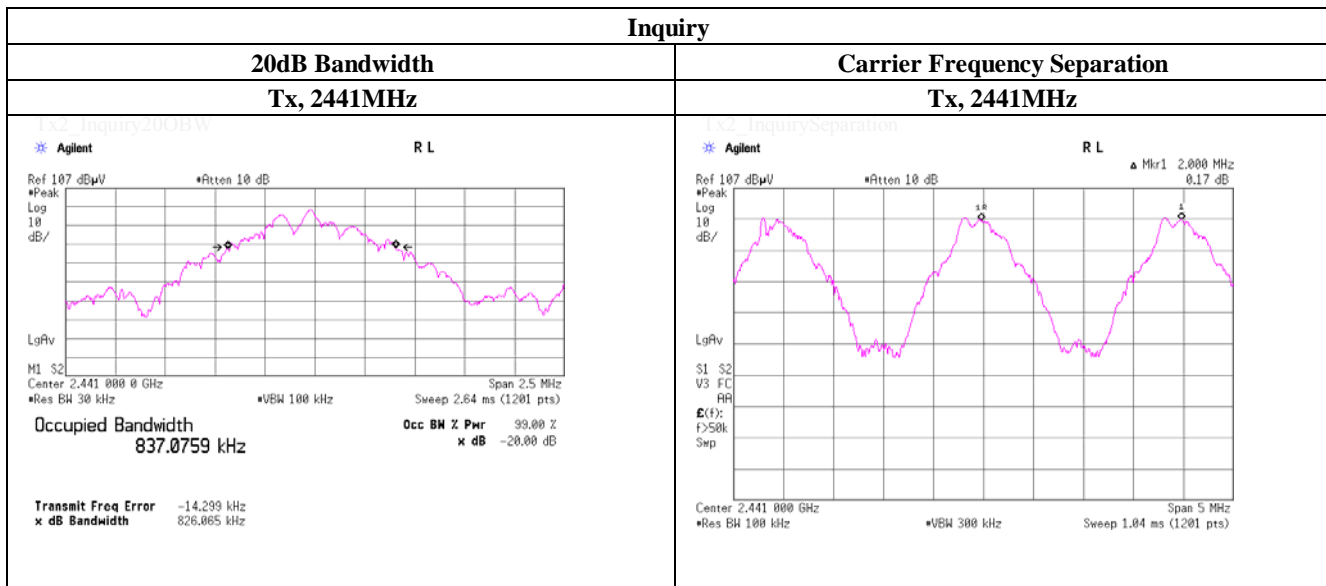
## 20dB Bandwidth and Carrier Frequency Separation

Test place	UL Japan, Inc. Shonan EMC Lab.	No.1 Measurement Room
Date	October 27, 2014	
Temperature / Humidity	24 deg.C , 62 %RH	
Engineer	Akio Hayashi	
Mode	Tx, Bluetooth, BDR, PN9	

Mode	Freq. [MHz]	20dB Bandwidth [MHz]	Carrier Frequency Separation [MHz]	Limit for Carrier Frequency Separation [MHz]
DH5	2402.0	0.962	1.000	>= 0.641
DH5	2441.0	0.961	1.000	>= 0.641
DH5	2480.0	0.964	1.000	>= 0.643
Inquiry	2441.0	0.826	2.000	>= 0.551

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

No limit applies to 20dB Bandwidth.



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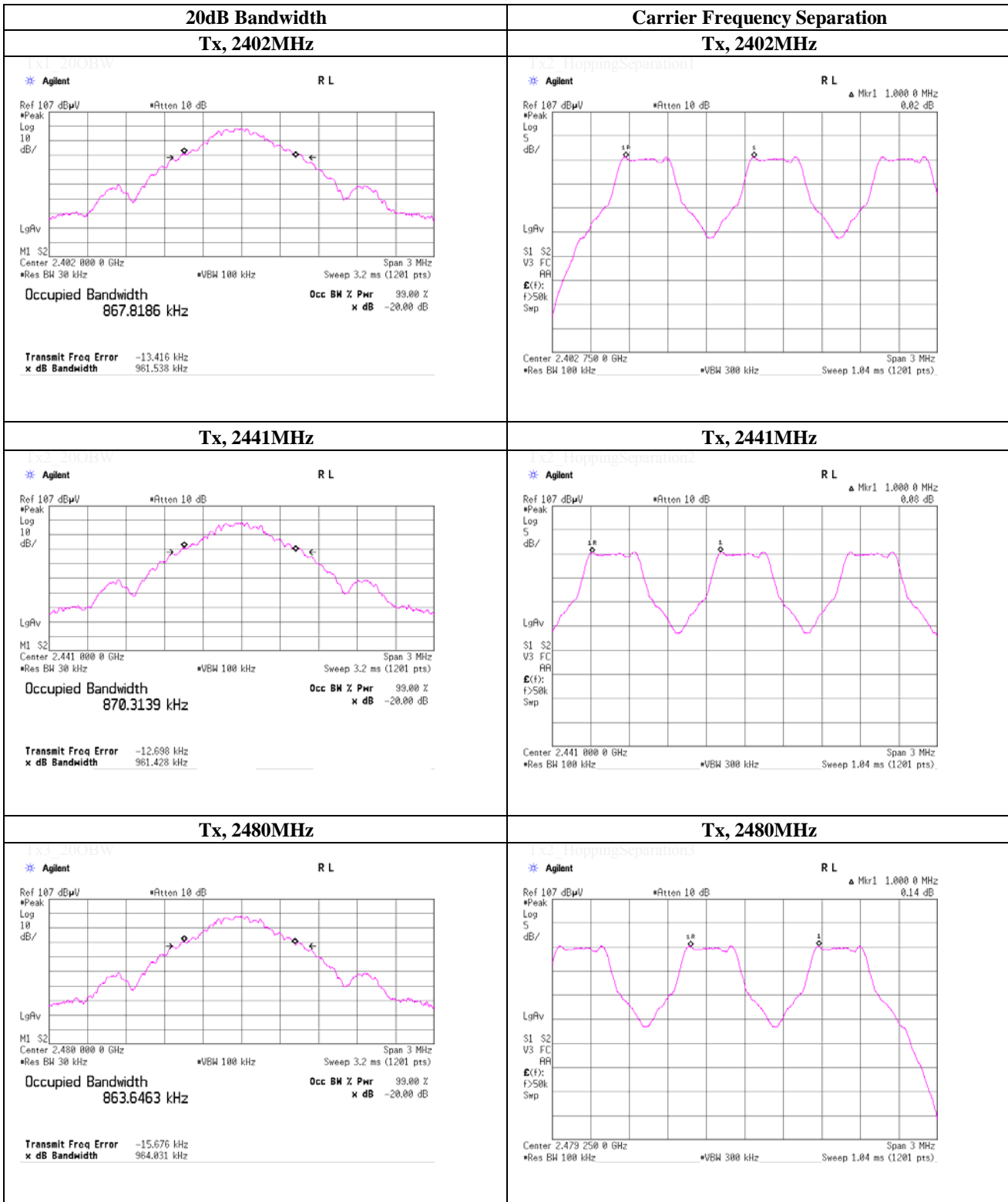
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN

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Facsimile : +81 463 50 6401

## 20dB Bandwidth and Carrier Frequency Separation

Tx, Bluetooth, BDR, PN9



**UL Japan, Inc.**

**Shonan EMC Lab.**

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Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

## 20dB Bandwidth and Carrier Frequency Separation

Test place                   UL Japan, Inc. Shonan EMC Lab.           No.1 Measurement Room  
 Date                         October 27, 2014  
 Temperature / Humidity   24 deg.C     , 62 %RH  
 Engineer                  Akio Hayashi  
 Mode                       Tx, Bluetooth, EDR, PN9

Mode	Freq. [MHz]	20dB Bandwidth [MHz]	Carrier Frequency Separation [MHz]	Limit for Carrier Frequency Separation [MHz]
3-DH5	2402.0	1.323	1.000	>= 0.882
3-DH5	2441.0	1.333	1.000	>= 0.889
3-DH5	2480.0	1.333	1.000	>= 0.889

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

No limit applies to 20dB Bandwidth.

**UL Japan, Inc.**

**Shonan EMC Lab.**

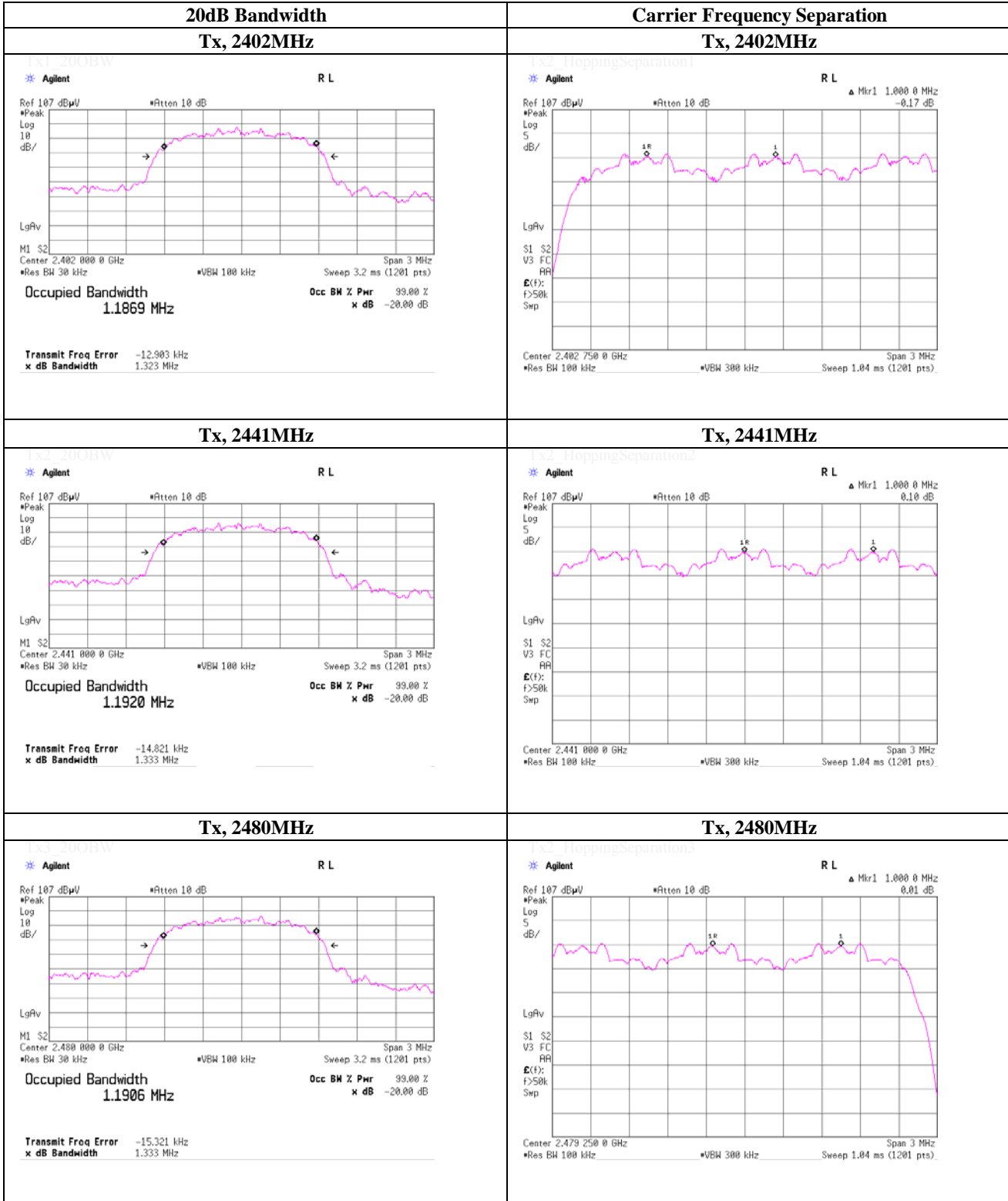
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN

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## 20dB Bandwidth and Carrier Frequency Separation

### Tx, Bluetooth, EDR, PN9



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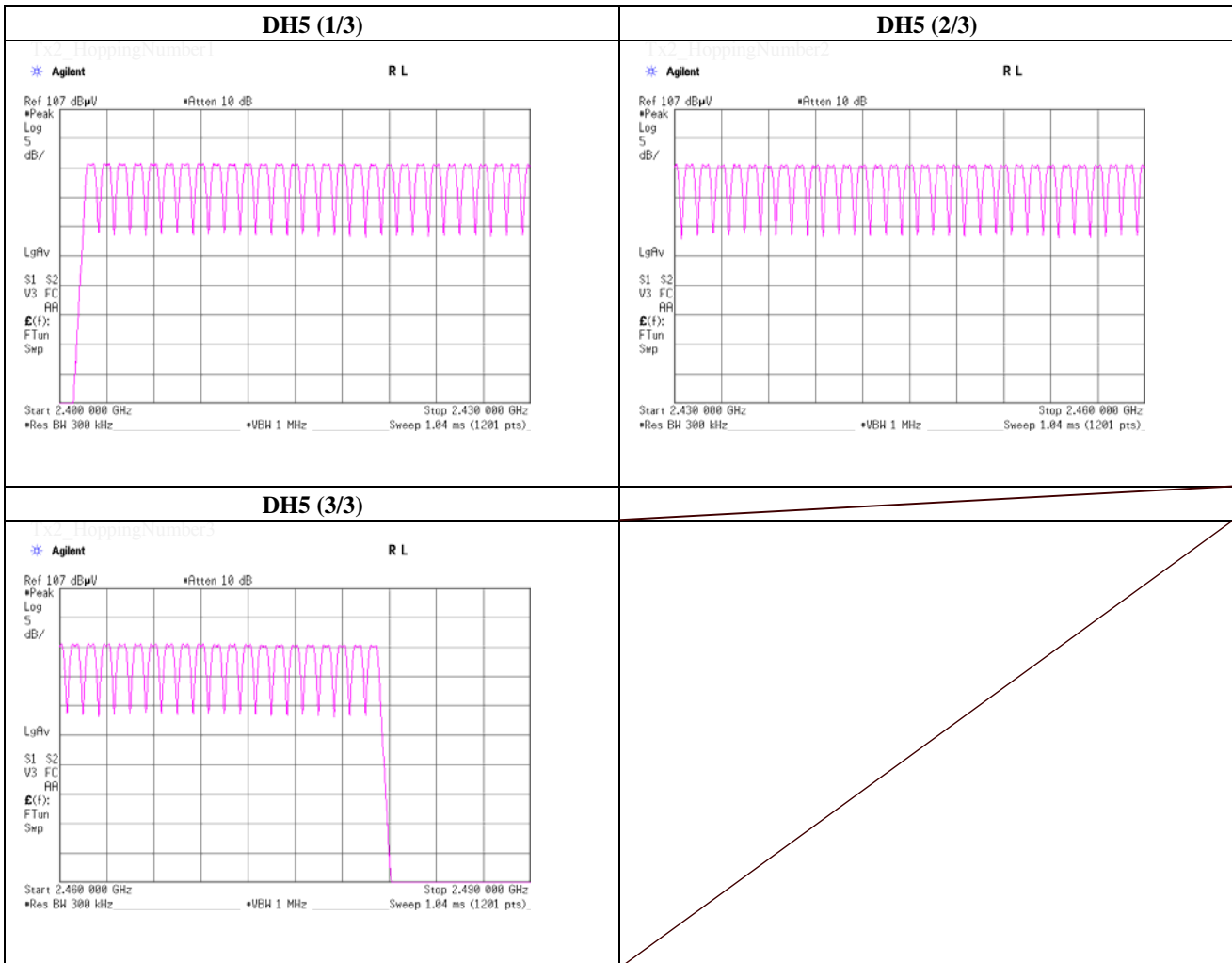


### Number of Hopping Frequency

Test place	UL Japan, Inc. Shonan EMC Lab.	No.1 Measurement Room
Date	October 27, 2014	
Temperature / Humidity	24 deg.C , 62 %RH	
Engineer	Akio Hayashi	
Mode	Tx, Bluetooth, BDR, PN9	

Mode	Number of Channel [times]	Limit [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.

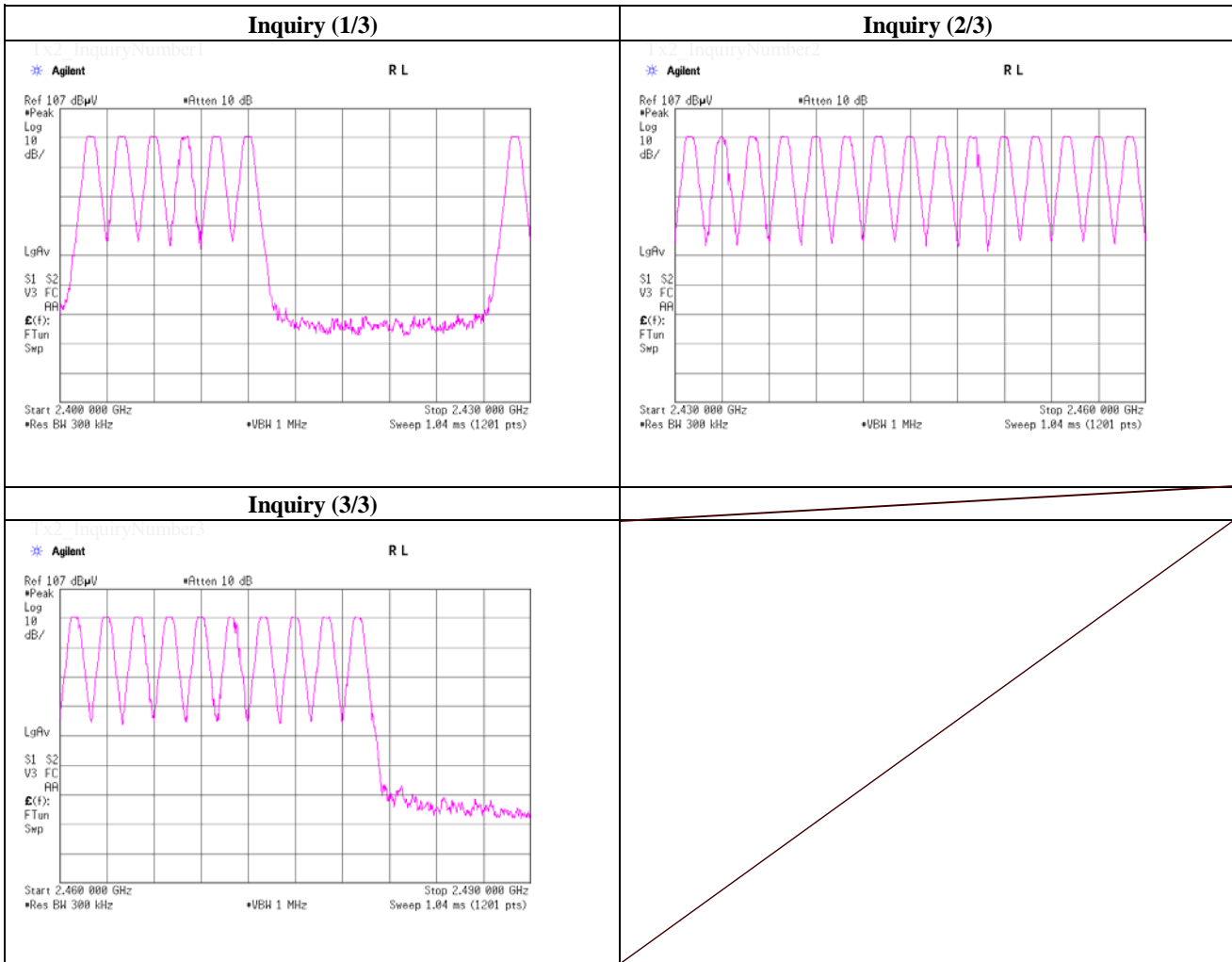


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### Number of Hopping Frequency

Test place	UL Japan, Inc. Shonan EMC Lab.	No.1 Measurement Room
Date	October 27, 2014	
Temperature / Humidity	24 deg.C , 62 %RH	
Engineer	Akio Hayashi	
Mode	Tx, Bluetooth, Inquiry	

Mode	Number of Channel [times]	Limit [times]
Inquiry	32	>= 15



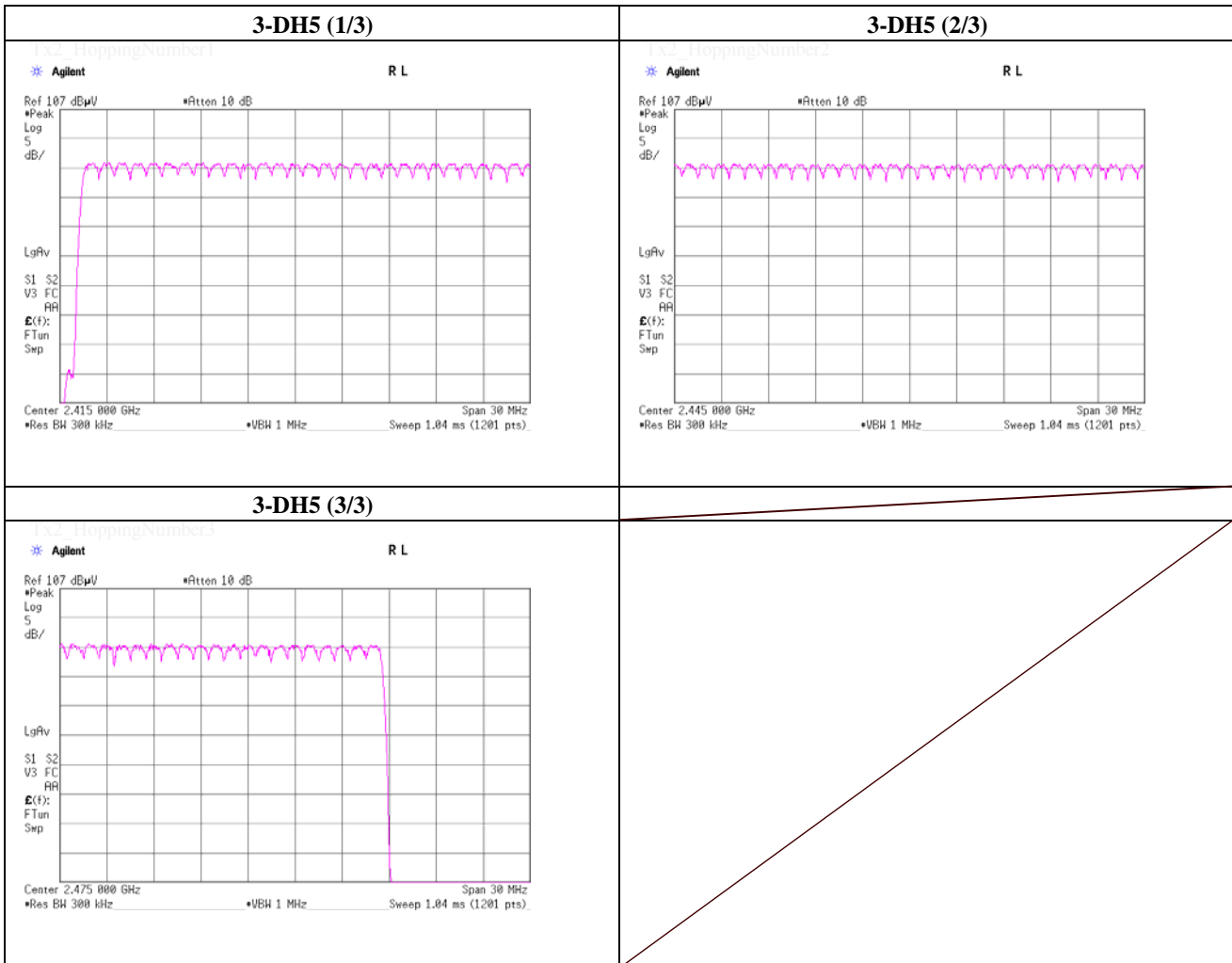
**UL Japan, Inc.**  
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 1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN  
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### Number of Hopping Frequency

Test place	UL Japan, Inc. Shonan EMC Lab.	No.1 Measurement Room
Date	October 27, 2014	
Temperature / Humidity	24 deg.C , 62 %RH	
Engineer	Akio Hayashi	
Mode	Tx, Bluetooth, EDR, PN9	

Mode	Number of Channel [times]	Limit [times]
3-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.



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## Dwell Time

Test place                    UL Japan, Inc. Shonan EMC Lab.                    No.1 Measurement Room  
 Date                            October 27, 2014  
 Temperature / Humidity    24 deg.C        , 62 %RH  
 Engineer                     Akio Hayashi  
 Mode                          Tx, Bluetooth, BDR, PN9

Mode	Number of transmission in a 31.6 (79 Hopping x 0.4) / 12.8 (32 Hopping x 0.4) second period	Length of transmission time [msec]	Result [msec]	Limit [msec]
DH1	50.0 / 5.0 sec. x 31.6 sec. = 316 times	0.400	126	400
DH3	25.6 / 5.0 sec. x 31.6 sec. = 162 times	1.657	268	400
DH5	18.8 / 5.0 sec. x 31.6 sec. = 119 times	2.906	346	400
Inquiry	101.0 / 1.0 sec. x 12.8 sec. = 1293 times	0.107	139	400

Sample Calculation

Result = Number of transmission x Length of transmission time

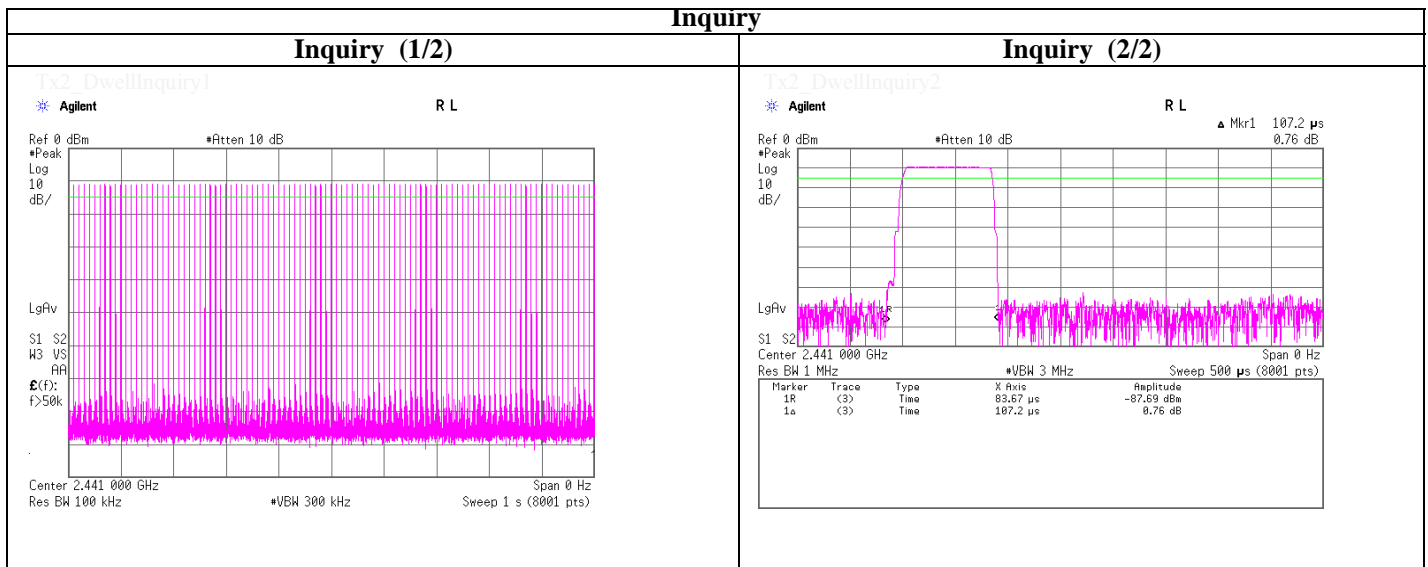
\*Average data of 5 tests.(except Inquiry)

Mode	Sampling [times]					Average [times]
	1	2	3	4	5	
DH1	49	49	51	50	51	50.0
DH3	29	25	24	25	25	25.6
DH5	18	19	17	23	17	18.8

Sample Calculation

Average= Summation(Sampling 1 to 5) / 5

\* This device complies with the Bluetooth protocol for FHSS operation, employing a pseudo random channel selection and hopping rate to ensure that the occupancy time in  $N \times 0.4s$ , where  $N$  is the number of channels being used in the hopping sequence ( $20 \leq N \leq 79$ ), is always less than 0.4s regardless of packet size (DH1, DH3 or DH5). This is confirmed in the test report for  $N=79$ .



**UL Japan, Inc.**

**Shonan EMC Lab.**

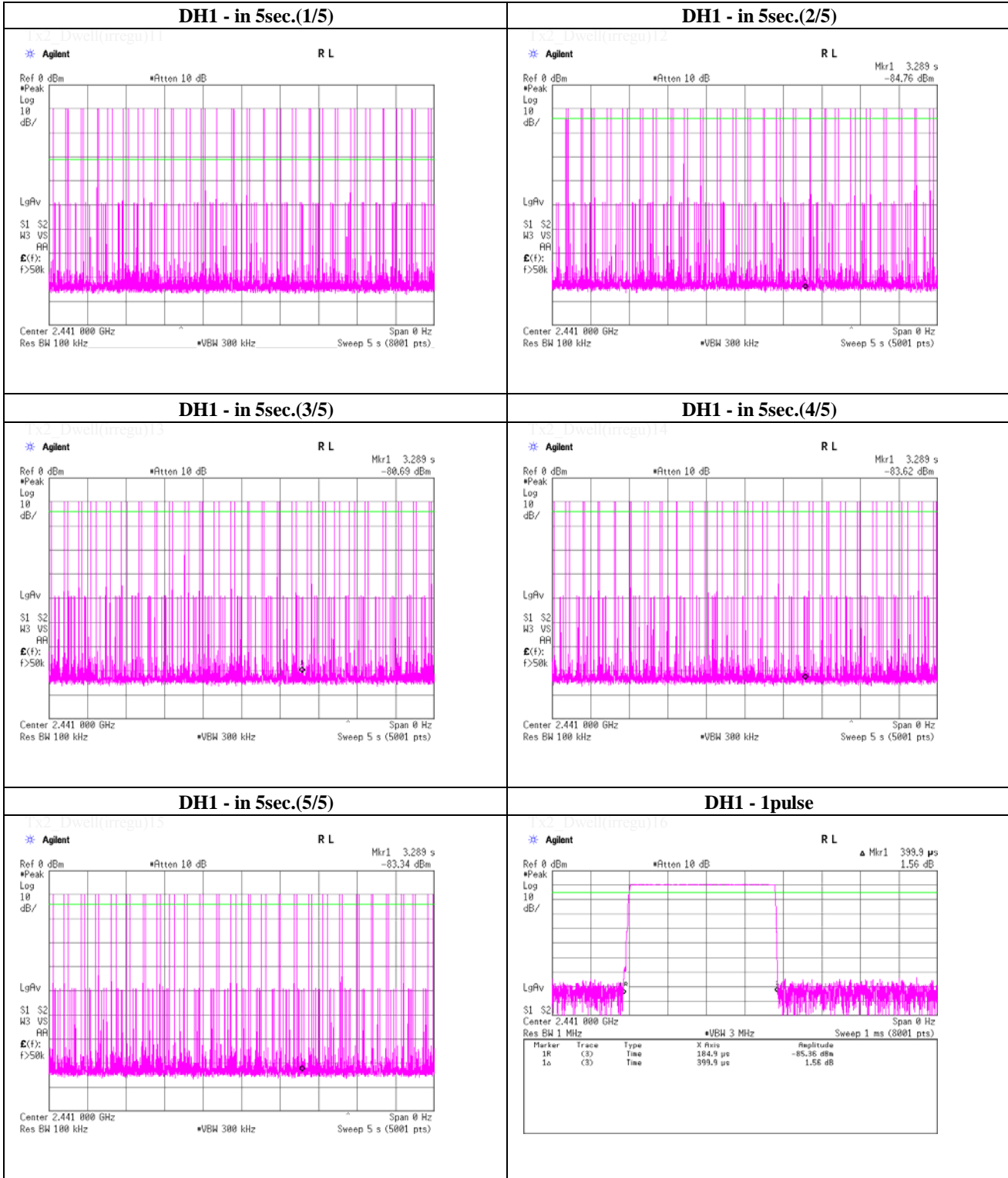
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN

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## Dwell time

Tx, Bluetooth, BDR, PN9



**UL Japan, Inc.**

**Shonan EMC Lab.**

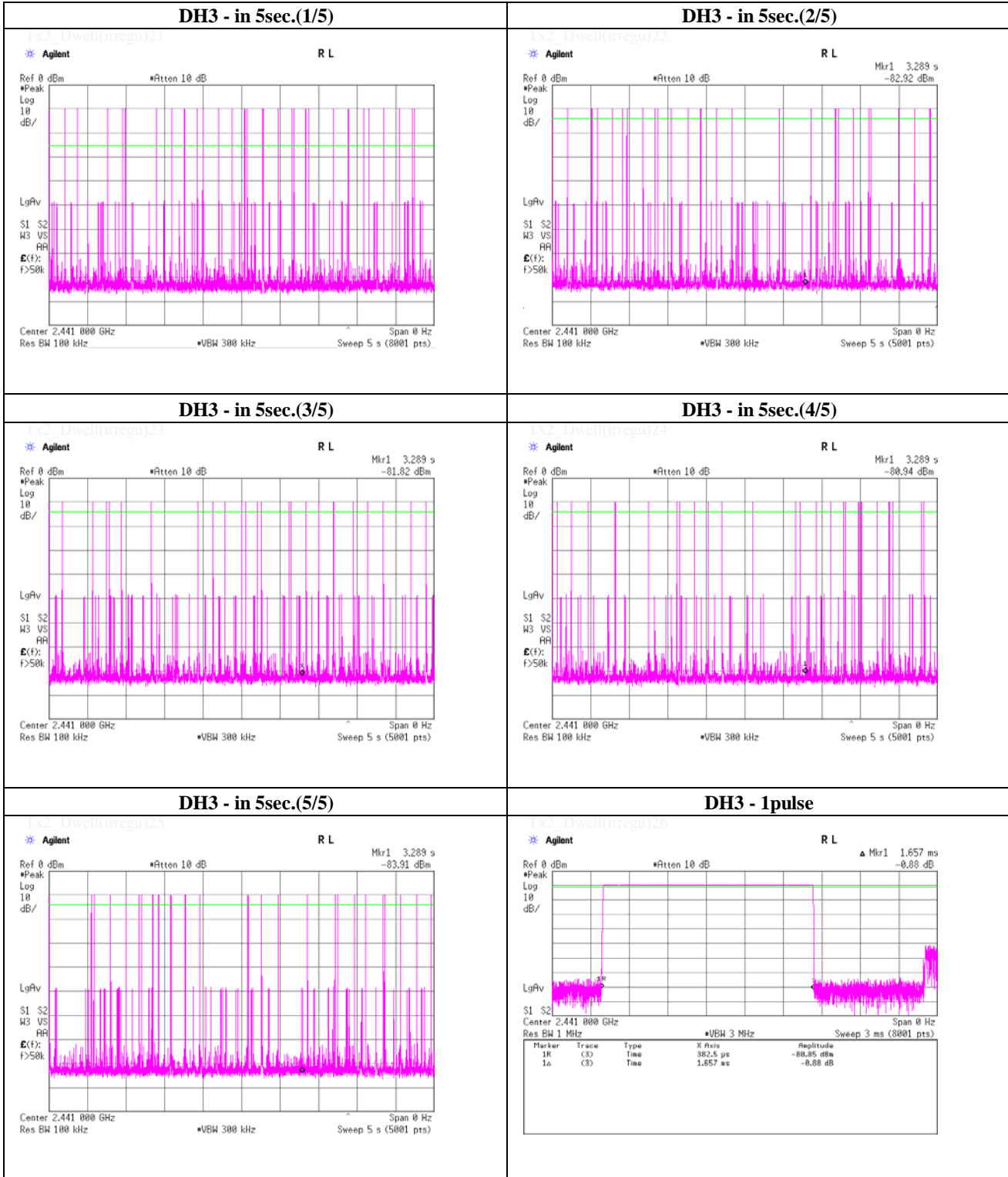
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN

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## Dwell time

Tx, Bluetooth, BDR, PN9



**UL Japan, Inc.**

**Shonan EMC Lab.**

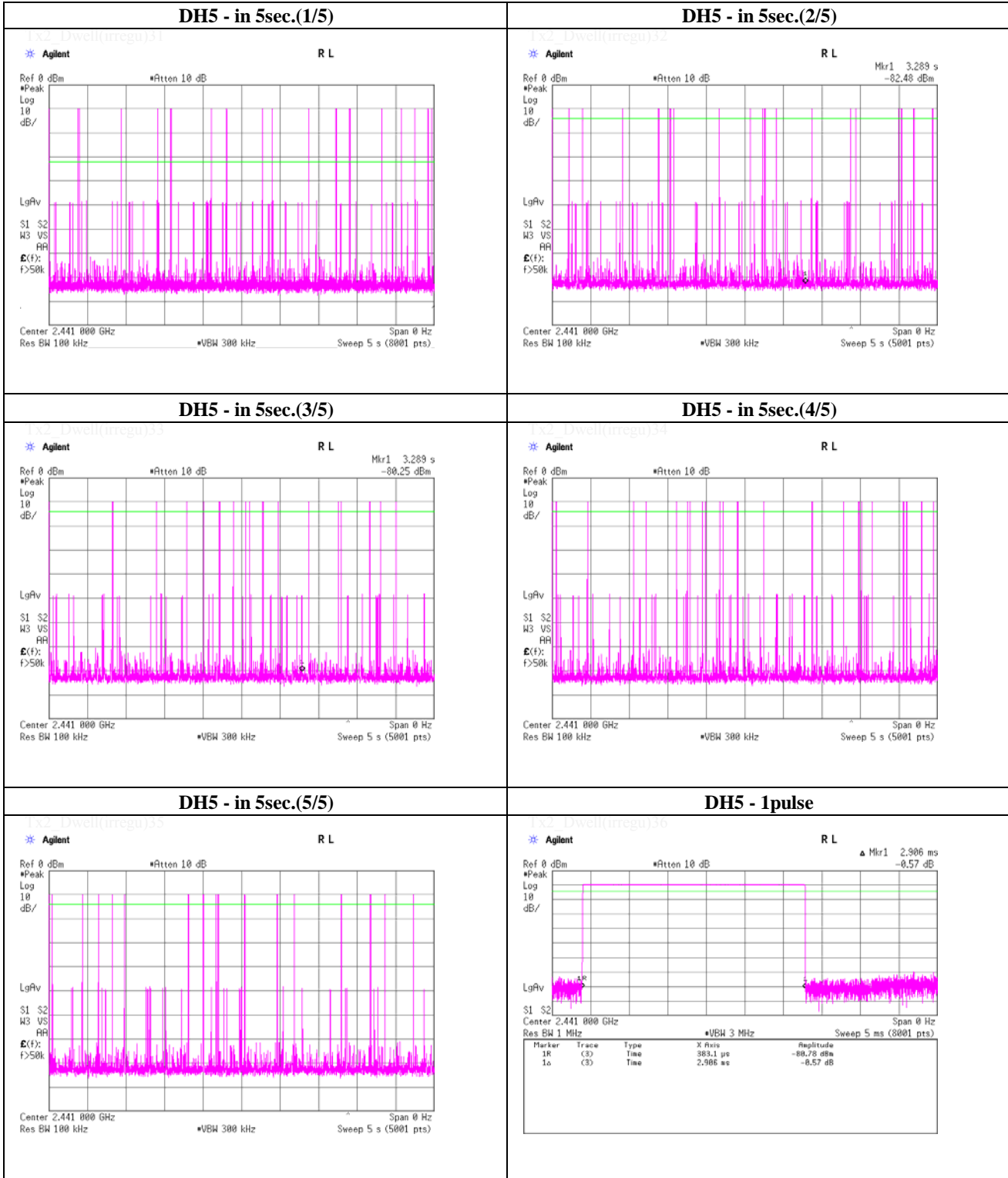
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN

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## Dwell time

Tx, Bluetooth, BDR, PN9



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Facsimile : +81 463 50 6401

## Dwell Time

Test place                    UL Japan, Inc. Shonan EMC Lab.                    No.1 Measurement Room  
 Date                            October 27, 2014  
 Temperature / Humidity    24 deg.C    , 62 %RH  
 Engineer                      Akio Hayashi  
 Mode                            Tx, Bluetooth, EDR, PN9

Mode	Number of transmission in a 31.6 (79 Hopping x 0.4) second	Length of transmission time [msec]	Result [msec]	Limit [msec]
3-DH1	49.6 / 5.0 sec. x 31.6 sec. = 314 times	0.405	127	400
3-DH3	27.0 / 5.0 sec. x 31.6 sec. = 171 times	1.648	282	400
3-DH5	17.8 / 5.0 sec. x 31.6 sec. = 113 times	2.897	327	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	
3-DH1	49	47	51	51	50	49.6
3-DH3	27	31	27	28	22	27.0
3-DH5	21	22	20	13	13	17.8

Sample Calculation

Average= Summation(Sampling 1 to 5) / 5

\* This device complies with the Bluetooth protocol for FHSS operation, employing a pseudo random channel selection and hopping rate to ensure that the occupancy time in  $N \times 0.4s$ , where  $N$  is the number of channels being used in the hopping sequence ( $20 \leq N \leq 79$ ), is always less than 0.4s regardless of packet size (3-DH1, 3-DH3 or 3-DH5). This is confirmed in the test report for  $N=79$ .

Tx2\_DwellInquiry1

Tx2\_DwellInquiry2

**UL Japan, Inc.**

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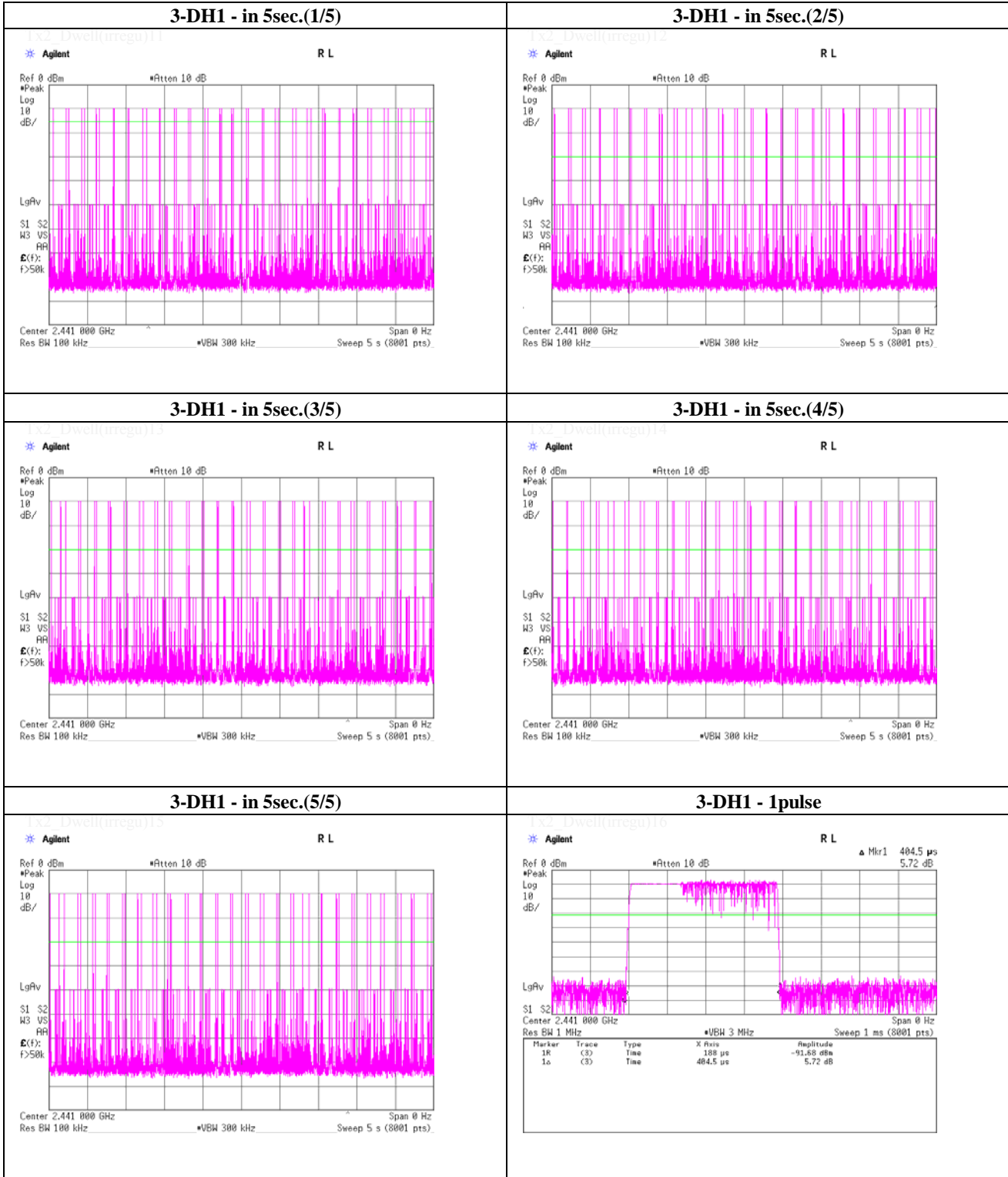
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## Dwell time

### Tx, Bluetooth, EDR, PN9



**UL Japan, Inc.**

**Shonan EMC Lab.**

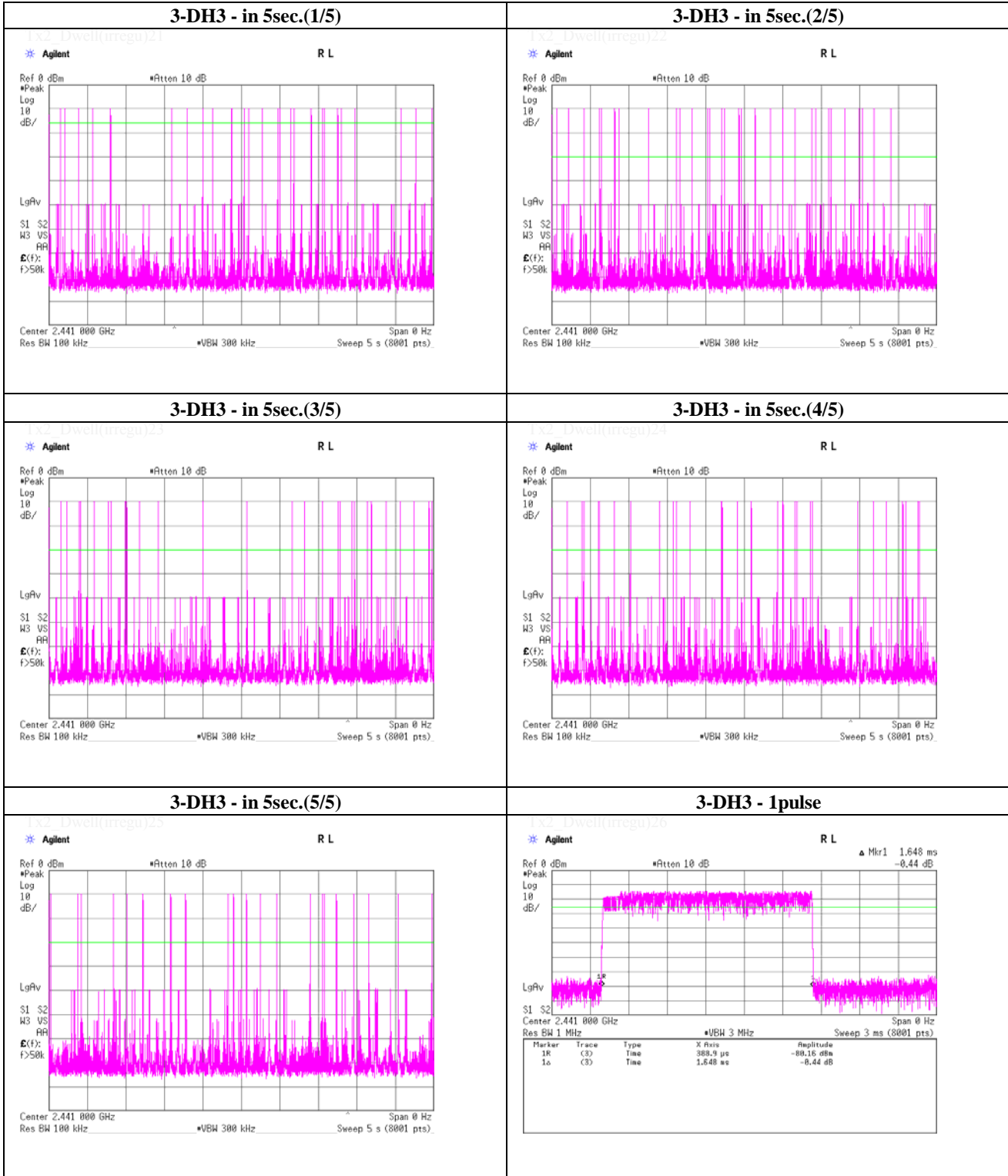
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN

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## Dwell time

**Tx, Bluetooth, EDR, PN9**



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**Shonan EMC Lab.**

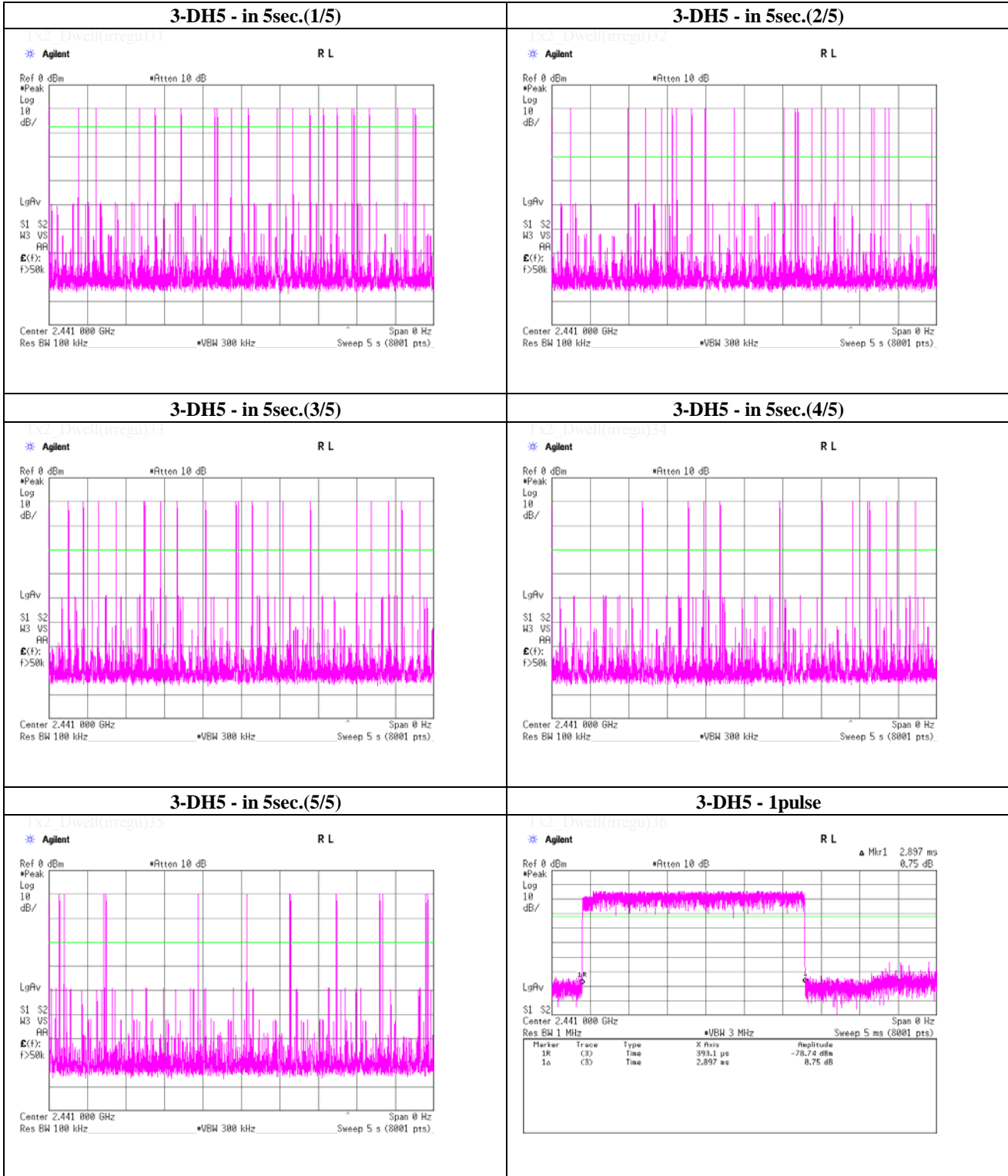
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## Dwell time

### Tx, Bluetooth, EDR, PN9



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## Maximum Peak Conducted Output Power

Test place                   UL Japan, Inc. Shonan EMC Lab.      No.6 Shielded Room  
 Date                         October 23, 2014  
 Temperature / Humidity    25 deg.C   , 47 %RH  
 Engineer                  Akio Hayashi  
 Mode                        Tx, Bluetooth

(\* P/M: Power Meter with power sensor)

	Freq. [MHz]	P/M (Peak) Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result		Limit		Margin [dB]
					[dBm]	[mW]	[dBm]	[mW]	
DH5	2402.0	1.02	2.19	0.00	3.21	2.09	20.97	125	17.76
DH5	2441.0	0.86	2.20	0.00	3.06	2.02	20.97	125	17.91
DH5	2480.0	0.59	2.21	0.00	2.80	1.91	20.97	125	18.17
2-DH5	2402.0	3.34	2.19	0.00	5.53	3.57	20.97	125	15.44
2-DH5	2441.0	3.17	2.20	0.00	5.37	3.44	20.97	125	15.60
2-DH5	2480.0	2.90	2.21	0.00	5.11	3.24	20.97	125	15.86
3-DH5	2402.0	3.88	2.19	0.00	6.07	4.05	20.97	125	14.90
3-DH5	2441.0	3.73	2.20	0.00	5.93	3.92	20.97	125	15.04
3-DH5	2480.0	3.43	2.21	0.00	5.64	3.66	20.97	125	15.33

Sample Calculation:

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

**UL Japan, Inc.**  
**Shonan EMC Lab.**

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN

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Facsimile    : +81 463 50 6401

## Maximum Average Conducted Output Power (Reference)

Test place                   UL Japan, Inc. Shonan EMC Lab.      No.6 Shielded Room  
 Date                         October 23, 2014  
 Temperature / Humidity    25 deg.C    , 47 %RH  
 Engineer                  Akio Hayashi  
 Mode                        Tx, Bluetooth

(\* P/M: Power Meter with power sensor, AV: Average)

	Freq.	P/M (AV) Reading	Cable Loss	Atten. Loss	Result	
	[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]
DH5	2402.0	0.78	2.19	0.00	2.97	1.98
DH5	2441.0	0.61	2.20	0.00	2.81	1.91
DH5	2480.0	0.36	2.21	0.00	2.57	1.81
2-DH5	2402.0	0.78	2.19	0.00	2.97	1.98
2-DH5	2441.0	0.57	2.20	0.00	2.77	1.89
2-DH5	2480.0	0.24	2.21	0.00	2.45	1.76
3-DH5	2402.0	0.78	2.19	0.00	2.97	1.98
3-DH5	2441.0	0.57	2.20	0.00	2.77	1.89
3-DH5	2480.0	0.25	2.21	0.00	2.46	1.76

Sample Calculation:

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

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## Radiated Emission

Test place No.3 Semi Anechoic Chamber  
 Date October 20, 2014      October 21, 2014      October 22, 2014  
 Temperature / Humidity 25 deg.C, 49 %RH      26 deg.C, 50 %RH      24 deg.C, 55 %RH  
 Engineer Kenichi Adachi      Hikaru Shirasawa      Akio Hayashi  
 Mode Tx, 2402 MHz  
 Tx, Bluetooth, BDR

(\* PK: Peak, AV: Average, QP: Quasi-Peak)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	240.000	QP	30.5	16.9	8.1	32.0	23.5	46.0	22.5	150	85	
Hori.	319.997	QP	38.1	14.3	8.5	32.0	28.9	46.0	17.1	100	83	
Hori.	400.003	QP	38.7	16.3	8.8	32.0	31.8	46.0	14.2	100	111	
Hori.	640.000	QP	32.2	19.0	9.7	32.0	28.9	46.0	17.1	138	234	
Hori.	2390.000	PK	51.3	26.4	14.6	41.1	51.2	73.9	22.7	100	220	
Hori.	4804.000	PK	47.0	30.6	7.5	39.8	45.3	73.9	28.6	115	148	
Hori.	7206.000	PK	64.4	36.6	8.6	40.2	69.4	73.9	4.5	148	296	
Hori.	9608.000	PK	48.7	38.5	9.6	40.1	56.7	73.9	17.2	114	22	
Hori.	12010.000	PK	45.4	39.5	10.7	39.6	56.0	73.9	17.9	100	0	
Hori.	2390.000	AV	35.5	26.4	14.6	41.1	35.4	53.9	18.5	100	220	
Hori.	4804.000	AV	35.8	30.6	7.5	39.8	34.1	53.9	19.8	115	148	
Hori.	9608.000	AV	36.9	38.5	9.6	40.1	44.9	53.9	9.0	114	22	
Hori.	12010.000	AV	33.4	39.5	10.7	39.6	44.0	53.9	9.9	100	0	
Vert.	160.002	QP	32.2	14.8	7.7	32.1	22.6	43.5	20.9	100	115	
Vert.	180.000	QP	27.4	16.0	7.7	32.1	19.0	43.5	24.5	100	189	
Vert.	239.998	QP	29.9	16.9	8.1	32.0	22.9	46.0	23.1	104	247	
Vert.	400.005	QP	38.0	16.3	8.8	32.0	31.1	46.0	14.9	100	185	
Vert.	2390.000	PK	47.8	26.4	14.6	41.1	47.7	73.9	26.2	100	36	
Vert.	4804.000	PK	46.7	30.6	7.5	39.8	45.0	73.9	28.9	100	257	
Vert.	7206.000	PK	60.4	36.6	8.6	40.2	65.4	73.9	8.5	100	300	
Vert.	9608.000	PK	48.5	38.5	9.6	40.1	56.5	73.9	17.4	100	303	
Vert.	12010.000	PK	45.5	39.5	10.7	39.6	56.1	73.9	17.8	100	0	
Vert.	2390.000	AV	35.4	26.4	14.6	41.1	35.3	53.9	18.6	100	36	
Vert.	4804.000	AV	34.9	30.6	7.5	39.8	33.2	53.9	20.7	100	257	
Vert.	9608.000	AV	36.8	38.5	9.6	40.1	44.8	53.9	9.1	100	303	
Vert.	12010.000	AV	33.5	39.5	10.7	39.6	44.1	53.9	9.8	100	0	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18GHz)-Distance factor(above 15GHz)) - Gain(Amplifier)

Distance factor : 15GHz -40GHz : 20log(3.0m/1.0m)= 9.5dB

**Dwell time factor relaxation**

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Dwell Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	7206.000	AV	58.9	36.6	8.6	40.2	-24.7	39.2	53.9	14.7	
Vert.	7206.000	AV	54.6	36.6	8.6	40.2	-24.7	34.9	53.9	19.0	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18GHz)-Distance factor(above 15GHz)) - Gain(Amplifier) + Dwell(time)factor

Distance factor : 15GHz -40GHz : 20log(3.0m/1.0m)= 9.5dB

**20dBc Data Sheet (RBW 100kHz, VBW 300kHz)**

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2402.000	PK	96.0	26.4	14.6	41.1	95.9	-	-	Carrier
Hori.	2400.000	PK	57.4	26.4	14.6	41.1	57.3	75.9	18.6	
Vert.	2402.000	PK	93.8	26.4	14.6	41.1	93.7	-	-	Carrier
Vert.	2400.000	PK	54.8	26.4	14.6	41.1	54.7	73.7	19.0	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18GHz)-Distance factor(above 15GHz)) - Gain(Amplifier)

Distance factor : 15GHz -40GHz : 20log(3.0m/1.0m)= 9.5dB

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## Radiated Emission

Test place            No.3 Semi Anechoic Chamber  
Date                    October 20, 2014                    October 21, 2014                    October 22, 2014  
Temperature / Humidity    25 deg.C, 49 %RH                    26 deg.C, 50 %RH                    24 deg.C, 55 %RH  
Engineer                Kenichi Adachi                        Hikaru Shirasawa                    Akio Hayashi  
Mode                    Tx,                    2441 MHz  
                              Tx, Bluetooth, BDR

(\* PK: Peak, AV: Average, QP: Quasi-Peak)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	180.001	QP	22.0	16.0	7.6	32.1	13.5	43.5	30.0	147	328	
Hori.	320.000	QP	30.3	14.3	8.5	32.0	21.1	46.0	24.9	103	247	
Hori.	360.001	QP	31.2	15.3	8.7	32.0	23.2	46.0	22.8	100	267	
Hori.	400.000	QP	35.1	16.3	8.8	32.0	28.2	46.0	17.8	100	107	
Hori.	4882.000	PK	47.3	30.9	7.5	39.7	46.0	73.9	27.9	112	153	
Hori.	7323.000	PK	60.4	36.8	8.6	40.3	65.5	73.9	8.4	153	291	
Hori.	9764.000	PK	48.6	38.6	9.6	40.0	56.8	73.9	17.1	113	26	
Hori.	12205.000	PK	46.7	39.4	10.8	39.8	57.1	73.9	16.8	100	31	
Hori.	4882.000	AV	35.9	30.9	7.5	39.7	34.6	53.9	19.3	112	153	
Hori.	9764.000	AV	36.8	38.6	9.6	40.0	45.0	53.9	8.9	113	26	
Hori.	12205.000	AV	35.0	39.4	10.8	39.8	45.4	53.9	8.5	100	31	
Vert.	160.000	QP	25.5	14.8	7.7	32.1	15.9	43.5	27.6	100	198	
Vert.	240.000	QP	27.2	16.9	8.1	32.0	20.2	46.0	25.8	100	235	
Vert.	400.000	QP	33.8	16.3	8.8	32.0	26.9	46.0	19.1	100	149	
Vert.	4882.000	PK	47.0	30.9	7.5	39.7	45.7	73.9	28.2	100	263	
Vert.	7323.000	PK	58.0	36.8	8.6	40.3	63.1	73.9	10.8	100	303	
Vert.	9764.000	PK	50.5	38.6	9.6	40.0	58.7	73.9	15.2	100	298	
Vert.	12205.000	PK	46.4	39.4	10.8	39.8	56.8	73.9	17.1	100	317	
Vert.	4882.000	AV	35.1	30.9	7.5	39.7	33.8	53.9	20.1	100	263	
Vert.	9764.000	AV	38.6	38.6	9.6	40.0	46.8	53.9	<b>7.1</b>	100	298	
Vert.	12205.000	AV	34.7	39.4	10.8	39.8	45.1	53.9	8.8	100	317	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18GHz)-Distance factor(above 15GHz)) - Gain(Amplifier)

Distance factor : 15GHz -40GHz : 20log(3.0m/1.0m)= 9.5dB

**Dwell time factor relaxation**

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Dwell Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	7323.000	AV	54.2	36.8	8.6	40.3	-24.7	34.6	53.9	<b>19.3</b>	
Vert.	7323.000	AV	51.6	36.8	8.6	40.3	-24.7	32.0	53.9	21.9	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18GHz)-Distance factor(above 15GHz)) - Gain(Amplifier) + Dwell(time)factor

Distance factor : 15GHz -40GHz : 20log(3.0m/1.0m)= 9.5dB

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## Radiated Emission

Test place            No.3 Semi Anechoic Chamber  
Date                    October 20, 2014                    October 21, 2014                    October 22, 2014  
Temperature / Humidity    25 deg.C, 49 %RH                    26 deg.C, 50 %RH                    24 deg.C, 55 %RH  
Engineer                Kenichi Adachi                        Hikaru Shirasawa                    Akio Hayashi  
Mode                    Tx,                    2480 MHz  
                              Tx, Bluetooth, BDR

(\* PK: Peak, AV: Average, QP: Quasi-Peak)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	240.000	QP	28.5	16.9	8.1	32.0	21.5	46.0	24.5	136	100	
Hori.	320.000	QP	33.0	14.3	8.5	32.0	23.8	46.0	22.2	100	76	
Hori.	360.001	QP	31.0	15.3	8.7	32.0	23.0	46.0	23.0	100	123	
Hori.	400.000	QP	34.4	16.3	8.8	32.0	27.5	46.0	18.5	100	256	
Hori.	640.000	QP	25.6	19.0	9.7	32.0	22.3	46.0	23.7	100	245	
Hori.	2483.500	PK	66.0	26.6	14.7	41.1	66.2	73.9	7.7	100	224	
Hori.	4960.000	PK	47.2	31.2	7.5	39.6	46.3	73.9	27.6	112	146	
Hori.	7440.000	PK	58.9	37.0	8.8	40.4	64.3	73.9	9.6	144	302	
Hori.	9920.000	PK	49.2	38.6	9.6	39.9	57.5	73.9	16.4	111	27	
Hori.	12400.000	PK	47.8	39.3	10.9	40.0	58.0	73.9	15.9	110	32	
Hori.	2483.500	AV	35.7	26.6	14.7	41.1	35.9	53.9	18.0	100	224	
Hori.	4960.000	AV	35.9	31.2	7.5	39.6	35.0	53.9	18.9	112	146	
Hori.	9920.000	AV	37.8	38.6	9.6	39.9	46.1	53.9	7.8	111	27	
Hori.	12400.000	AV	35.9	39.3	10.9	40.0	46.1	53.9	7.8	110	32	
Vert.	160.000	QP	24.0	14.8	7.7	32.1	14.4	43.5	29.1	100	-1	
Vert.	400.000	QP	33.9	16.3	8.8	32.0	27.0	46.0	19.0	100	198	
Vert.	2483.500	PK	64.1	26.6	14.7	41.1	64.3	73.9	9.6	100	34	
Vert.	4960.000	PK	47.0	31.2	7.5	39.6	46.1	73.9	27.8	100	266	
Vert.	7440.000	PK	54.7	37.0	8.8	40.4	60.1	73.9	13.8	100	302	
Vert.	9920.000	PK	51.9	38.6	9.6	39.9	60.2	73.9	13.7	100	299	
Vert.	12400.000	PK	47.6	39.3	10.9	40.0	57.8	73.9	16.1	100	311	
Vert.	2483.500	AV	35.6	26.6	14.7	41.1	35.8	53.9	18.1	100	34	
Vert.	4960.000	AV	35.1	31.2	7.5	39.6	34.2	53.9	19.7	100	266	
Vert.	9920.000	AV	43.0	38.6	9.6	39.9	51.3	53.9	2.6	100	299	
Vert.	12400.000	AV	35.7	39.3	10.9	40.0	45.9	53.9	8.0	100	311	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18GHz)-Distance factor(above 15GHz)) - Gain(Amplifier)

Distance factor : 15GHz -40GHz : 20log(3.0m/1.0m)= 9.5dB

**Dwell time factor relaxation**

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Dwell Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	7440.000	AV	52.3	37.0	8.8	40.4	-24.7	33.0	53.9	20.9	
Vert.	7440.000	AV	47.1	37.0	8.8	40.4	-24.7	27.8	53.9	26.1	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18GHz)-Distance factor(above 15GHz)) - Gain(Amplifier) + Dwell(time)factor

Distance factor : 15GHz -40GHz : 20log(3.0m/1.0m)= 9.5dB

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## Radiated Emission

Test place            No.3 Semi Anechoic Chamber  
 Date                    October 20, 2014                    October 21, 2014                    October 22, 2014  
 Temperature / Humidity    25 deg.C, 49 %RH                    26 deg.C, 50 %RH                    24 deg.C, 55 %RH  
 Engineer                Kenichi Adachi                        Hikaru Shirasawa                    Akio Hayashi  
 Mode                    Tx,                    2402 MHz  
                               Tx, Bluetooth, EDR

(\* PK: Peak, AV: Average, QP: Quasi-Peak)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	180.000	QP	22.5	16.0	7.7	32.1	14.1	43.5	29.4	149	360	
Hori.	240.000	QP	27.5	16.9	8.1	32.0	20.5	46.0	25.5	150	80	
Hori.	320.000	QP	32.1	14.3	8.5	32.0	22.9	46.0	23.1	100	66	
Hori.	360.000	QP	30.9	15.3	8.7	32.0	22.9	46.0	23.1	100	254	
Hori.	400.000	QP	36.2	16.3	8.8	32.0	29.3	46.0	16.7	100	311	
Hori.	2390.000	PK	50.5	26.4	14.6	41.1	50.4	73.9	23.5	100	225	
Hori.	4804.000	PK	47.0	30.6	7.5	39.8	45.3	73.9	28.6	113	144	
Hori.	7206.000	PK	62.9	36.6	8.6	40.2	67.9	73.9	<b>6.0</b>	152	294	
Hori.	9608.000	PK	48.0	38.5	9.6	40.1	56.0	73.9	17.9	112	21	
Hori.	12010.000	PK	35.8	39.5	10.7	39.6	46.4	73.9	27.5	100	36	
Hori.	2390.000	AV	35.6	26.4	14.6	41.1	35.5	53.9	18.4	100	225	
Hori.	4804.000	AV	35.6	30.6	7.5	39.8	33.9	53.9	20.0	113	144	
Hori.	9608.000	AV	36.4	38.5	9.6	40.1	44.4	53.9	9.5	112	21	
Hori.	12010.000	AV	33.8	39.5	10.7	39.6	44.4	53.9	9.5	100	36	
Vert.	160.000	QP	27.6	14.8	7.7	32.1	18.0	43.5	25.5	100	67	
Vert.	400.000	QP	33.5	16.3	8.8	32.0	26.6	46.0	19.4	100	185	
Vert.	2390.000	PK	49.1	26.4	14.6	41.1	49.0	73.9	24.9	100	34	
Vert.	4804.000	PK	46.8	30.6	7.5	39.8	45.1	73.9	28.8	100	261	
Vert.	7206.000	PK	59.1	36.6	8.6	40.2	64.1	73.9	9.8	100	293	
Vert.	9608.000	PK	48.2	38.5	9.6	40.1	56.2	73.9	17.7	100	306	
Vert.	12010.000	PK	35.7	39.5	10.7	39.6	46.3	73.9	27.6	100	315	
Vert.	2390.000	AV	35.5	26.4	14.6	41.1	35.4	53.9	18.5	100	34	
Vert.	4804.000	AV	35.0	30.6	7.5	39.8	33.3	53.9	20.6	100	261	
Vert.	9608.000	AV	36.6	38.5	9.6	40.1	44.6	53.9	9.3	100	306	
Vert.	12010.000	AV	33.7	39.5	10.7	39.6	44.3	53.9	9.6	100	315	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18GHz)-Distance factor(above 15GHz)) - Gain(Amplifier)

Distance factor : 15GHz -40GHz : 20log(3.0m/1.0m)= 9.5dB

**Dwell time factor relaxation**

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Dwell Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	7206.000	AV	53.1	36.6	8.6	40.2	-24.7	33.4	53.9	<b>20.5</b>	
Vert.	7206.000	AV	49.4	36.6	8.6	40.2	-24.7	29.7	53.9	24.2	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18GHz)-Distance factor(above 15GHz)) - Gain(Amplifier) + Dwell(time)factor

Distance factor : 15GHz -40GHz : 20log(3.0m/1.0m)= 9.5dB

**20dBc Data Sheet (RBW 100kHz, VBW 300kHz)**

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2402.000	PK	95.6	26.4	14.6	41.1	95.5	-	-	Carrier
Hori.	2400.000	PK	55.7	26.4	14.6	41.1	55.6	75.5	19.9	
Vert.	2402.000	PK	92.0	26.4	14.6	41.1	91.9	-	-	Carrier
Vert.	2400.000	PK	52.0	26.4	14.6	41.1	51.9	71.9	20.0	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18GHz)-Distance factor(above 15GHz)) - Gain(Amplifier)

Distance factor : 15GHz -40GHz : 20log(3.0m/1.0m)= 9.5dB

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Test place            No.3 Semi Anechoic Chamber  
Date                    October 20, 2014                    October 21, 2014                    October 22, 2014  
Temperature / Humidity    25 deg.C, 49 %RH                    26 deg.C, 50 %RH                    24 deg.C, 55 %RH  
Engineer                Kenichi Adachi                        Hikaru Shirasawa                    Akio Hayashi  
Mode                    Tx,                    2441 MHz  
                              Tx, Bluetooth, EDR

(\* PK: Peak, AV: Average, QP: Quasi-Peak)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	180.000	QP	22.5	16.0	7.6	32.1	14.0	43.5	29.5	100	360	
Hori.	240.000	QP	31.1	16.9	8.1	32.0	24.1	46.0	21.9	100	69	
Hori.	320.000	QP	28.3	14.3	8.5	32.0	19.1	46.0	26.9	100	71	
Hori.	360.000	QP	27.3	15.3	8.7	32.0	19.3	46.0	26.7	100	242	
Hori.	400.000	QP	35.8	16.3	8.8	32.0	28.9	46.0	17.1	100	305	
Hori.	4882.000	PK	47.4	30.9	7.5	39.7	46.1	73.9	27.8	114	155	
Hori.	7323.000	PK	60.0	36.8	8.6	40.3	65.1	73.9	8.8	150	290	
Hori.	9764.000	PK	48.9	38.6	9.6	40.0	57.1	73.9	16.8	112	27	
Hori.	12205.000	PK	46.5	39.4	10.8	39.8	56.9	73.9	17.0	100	33	
Hori.	4882.000	AV	35.8	30.9	7.5	39.7	34.5	53.9	19.4	114	155	
Hori.	9764.000	AV	36.9	38.6	9.6	40.0	45.1	53.9	8.8	112	27	
Hori.	12205.000	AV	34.8	39.4	10.8	39.8	45.2	53.9	8.7	100	33	
Vert.	160.000	QP	28.8	14.8	7.7	32.1	19.2	43.5	24.3	100	136	
Vert.	400.000	QP	33.0	16.3	8.8	32.0	26.1	46.0	19.9	100	179	
Vert.	4882.000	PK	47.0	30.9	7.5	39.7	45.7	73.9	28.2	100	266	
Vert.	7323.000	PK	57.7	36.8	8.6	40.3	62.8	73.9	11.1	100	301	
Vert.	9764.000	PK	50.6	38.6	9.6	40.0	58.8	73.9	15.1	100	296	
Vert.	12205.000	PK	46.3	39.4	10.8	39.8	56.7	73.9	17.2	100	309	
Vert.	4882.000	AV	35.0	30.9	7.5	39.7	33.7	53.9	20.2	100	266	
Vert.	9764.000	AV	38.6	38.6	9.6	40.0	46.8	53.9	<b>7.1</b>	100	296	
Vert.	12205.000	AV	34.6	39.4	10.8	39.8	45.0	53.9	8.9	100	309	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18GHz)-Distance factor(above 15GHz)) - Gain(Amplifier)

Distance factor : 15GHz -40GHz : 20log(3.0m/1.0m)= 9.5dB

**Dwell time factor relaxation**

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Dwell Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	7323.000	AV	53.9	36.8	8.6	40.3	-24.7	34.3	53.9	<b>19.6</b>	
Vert.	7323.000	AV	51.3	36.8	8.6	40.3	-24.7	31.7	53.9	22.2	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18GHz)-Distance factor(above 15GHz)) - Gain(Amplifier) + Dwell(time)factor

Distance factor : 15GHz -40GHz : 20log(3.0m/1.0m)= 9.5dB

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## Radiated Emission

Test place            No.3 Semi Anechoic Chamber  
 Date                    October 20, 2014                    October 21, 2014                    October 22, 2014  
 Temperature / Humidity 25 deg.C, 49 %RH                    26 deg.C, 50 %RH                    24 deg.C, 55 %RH  
 Engineer                Kenichi Adachi                        Hikaru Shirasawa                    Akio Hayashi  
 Mode                    Tx,                    2480 MHz  
                               Tx, Bluetooth, EDR

(\* PK: Peak, AV: Average, QP: Quasi-Peak)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	240.000	QP	31.0	16.9	8.1	32.0	24.0	46.0	22.0	146	138	
Hori.	320.000	QP	31.4	14.3	8.5	32.0	22.2	46.0	23.8	100	95	
Hori.	360.000	QP	30.2	15.3	8.7	32.0	22.2	46.0	23.8	100	227	
Hori.	400.000	QP	31.7	16.3	8.8	32.0	24.8	46.0	21.2	100	291	
Hori.	640.000	QP	24.7	19.0	9.7	32.0	21.4	46.0	24.6	147	235	
Hori.	2483.500	PK	59.6	26.6	14.7	41.1	59.8	73.9	14.1	100	223	
Hori.	4960.000	PK	47.2	31.2	7.5	39.6	46.3	73.9	27.6	111	152	
Hori.	7440.000	PK	60.2	37.0	8.8	40.4	65.6	73.9	8.3	142	304	
Hori.	9920.000	PK	50.4	38.6	9.6	39.9	58.7	73.9	15.2	109	23	
Hori.	12400.000	PK	47.6	39.3	10.9	40.0	57.8	73.9	16.1	100	22	
Hori.	2483.500	AV	35.7	26.6	14.7	41.1	35.9	53.9	18.0	100	223	
Hori.	4960.000	AV	35.8	31.2	7.5	39.6	34.9	53.9	19.0	111	152	
Hori.	7440.000	AV	39.8	37.0	8.8	40.4	45.2	53.9	8.7	142	304	
Hori.	9920.000	AV	38.5	38.6	9.6	39.9	46.8	53.9	7.1	109	23	
Hori.	12400.000	AV	35.9	39.3	10.9	40.0	46.1	53.9	7.8	100	22	
Vert.	160.000	QP	27.4	14.8	7.7	32.1	17.8	43.5	25.7	100	141	
Vert.	240.000	QP	33.1	16.9	8.1	32.0	26.1	46.0	19.9	100	257	
Vert.	400.000	QP	31.3	16.3	8.8	32.0	24.4	46.0	21.6	100	174	
Vert.	2480.000	PK	59.0	26.6	14.7	41.1	59.2	73.9	14.7	100	33	
Vert.	4960.000	PK	46.9	31.2	7.5	39.6	46.0	73.9	27.9	100	262	
Vert.	7440.000	PK	58.1	37.0	8.8	40.4	63.5	73.9	10.4	100	292	
Vert.	9920.000	PK	49.4	38.6	9.6	39.9	57.7	73.9	16.2	100	303	
Vert.	12400.000	PK	47.4	39.3	10.9	40.0	57.6	73.9	16.3	100	310	
Vert.	2480.000	AV	35.6	26.6	14.7	41.1	35.8	53.9	18.1	100	33	
Vert.	4960.000	AV	34.7	31.2	7.5	39.6	33.8	53.9	20.1	100	262	
Vert.	7440.000	AV	38.7	37.0	8.8	40.4	44.1	53.9	9.8	100	292	
Vert.	9920.000	AV	37.7	38.6	9.6	39.9	46.0	53.9	7.9	100	303	
Vert.	12400.000	AV	35.8	39.3	10.9	40.0	46.0	53.9	7.9	100	310	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18GHz)-Distance factor(above 15GHz)) - Gain(Amplifier)  
 Distance factor : 15GHz -40GHz : 20log(3.0m/1.0m)= 9.5dB

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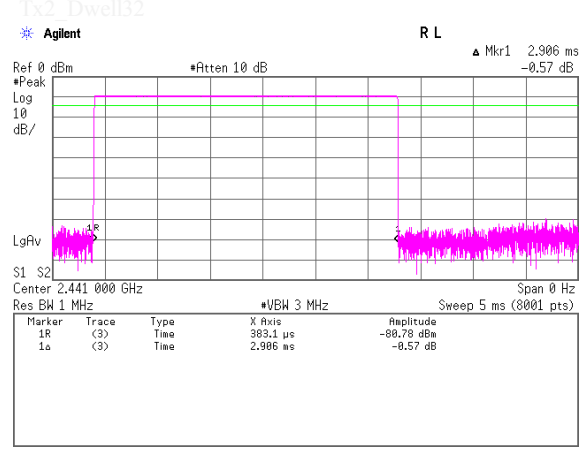
Facsimile : +81 463 50 6401

Test place           UL Japan, Inc. Shonan EMC Lab.    No.1 Measurement Room  
 Date                 October 27, 2014  
 Temperature / Humidity   24 deg.C     , 62 %RH  
 Engineer            Akio Hayashi

## Dwell time factor Calculation chart

### Dwell time factor Calculation

#### Tx, Bluetooth, BDR, PN9

Worst 100ms Dwell time factor = $20\log((2.906 \times 2)/100) = -24.71\text{dB}$	1cycle On time : 2.906ms															
<p>ON time of some channel during 100ms: Twice                      This is the worst case in hopping sequence of Bluetooth.</p>	 <p style="font-size: small;">                         Agilent R L                          Ref 0 dBm #Atten 10 dB Mkr1 2.906 ms -0.57 dB                          #Peak Log 10 dB/                          LgRv 1R                          S1 S2                          Center 2.441 000 GHz Span 0 Hz                          Res BW 1 MHz #VBW 3 MHz Sweep 5 ms (8001 pts)  <table border="1" style="font-size: x-small; width: 100%;"> <thead> <tr> <th>Marker</th> <th>Trace</th> <th>Type</th> <th>X Axis</th> <th>Amplitude</th> </tr> </thead> <tbody> <tr> <td>1R</td> <td>(3)</td> <td>Time</td> <td>383.1 μs</td> <td>-80.78 dBm</td> </tr> <tr> <td>1a</td> <td>(3)</td> <td>Time</td> <td>2.906 ms</td> <td>-0.57 dB</td> </tr> </tbody> </table> </p>	Marker	Trace	Type	X Axis	Amplitude	1R	(3)	Time	383.1 μs	-80.78 dBm	1a	(3)	Time	2.906 ms	-0.57 dB
Marker	Trace	Type	X Axis	Amplitude												
1R	(3)	Time	383.1 μs	-80.78 dBm												
1a	(3)	Time	2.906 ms	-0.57 dB												

### VBW (Average) setting

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

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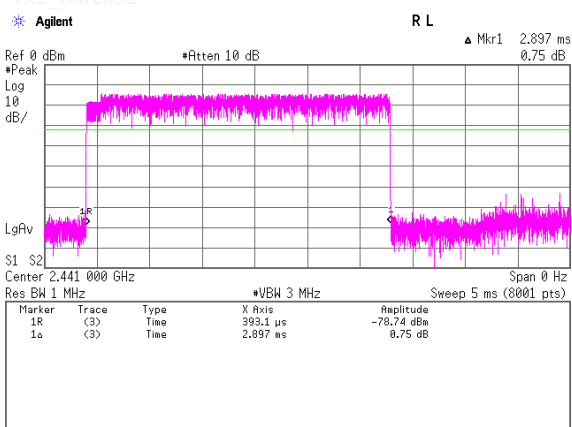
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Test place           UL Japan, Inc. Shonan EMC Lab.    No.1 Measurement Room  
 Date                October 27, 2014  
 Temperature / Humidity  24 deg.C   , 62 %RH  
 Engineer            Akio Hayashi

## Dwell time factor Calculation chart

### Dwell time factor Calculation

#### Tx, Bluetooth, EDR, PN9

Worst 100ms Dwell time factor = $20\log((2.898 \times 2)/100) = -24.74\text{dB}$	1cycle On time : 2.898ms															
<p>ON time of some channel during 100ms: Twice                      This is the worst case in hopping sequence of Bluetooth.</p>	 <p style="font-size: small;">                         Agilent R L                          Ref 0 dBm #Atten 10 dB Mkr1 2.897 ms 0.75 dB                          Log 10 dB/                          LgRv                          S1 S2                          Center 2.441 000 GHz Span 0 Hz                          Res BW 1 MHz #VBW 3 MHz Sweep 5 ms (8001 pts)  <table border="1" style="font-size: x-small; width: 100%;"> <thead> <tr> <th>Marker</th> <th>Trace</th> <th>Type</th> <th>X Axis</th> <th>Amplitude</th> </tr> </thead> <tbody> <tr> <td>1R</td> <td>(3)</td> <td>Time</td> <td>393.1 μs</td> <td>-78.74 dBm</td> </tr> <tr> <td>1a</td> <td>(3)</td> <td>Time</td> <td>2.897 ms</td> <td>0.75 dB</td> </tr> </tbody> </table> </p>	Marker	Trace	Type	X Axis	Amplitude	1R	(3)	Time	393.1 μs	-78.74 dBm	1a	(3)	Time	2.897 ms	0.75 dB
Marker	Trace	Type	X Axis	Amplitude												
1R	(3)	Time	393.1 μs	-78.74 dBm												
1a	(3)	Time	2.897 ms	0.75 dB												

### VBW (Average) setting

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

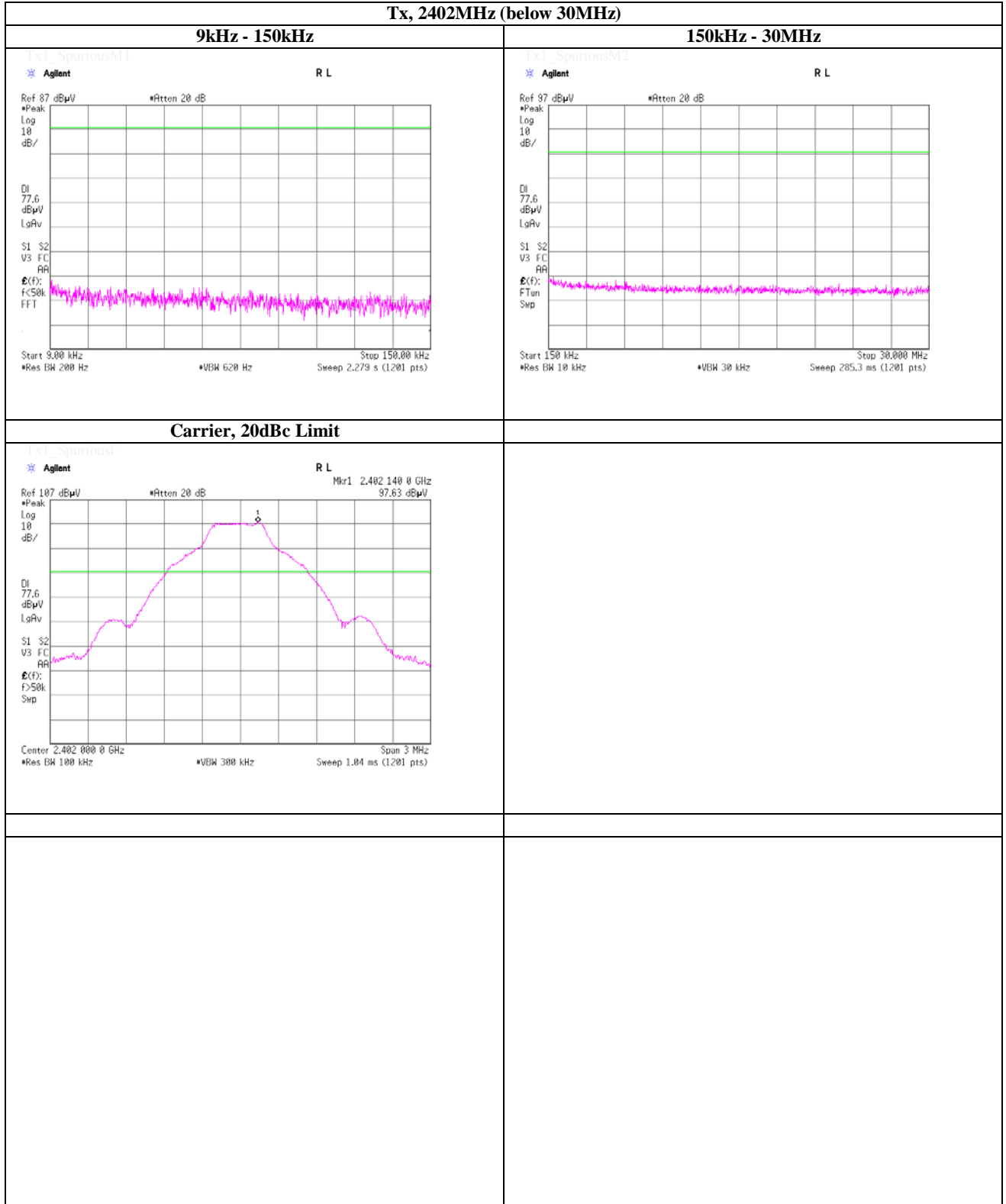
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Test place UL Japan, Inc. Shonan EMC Lab. No.1 Measurement Room  
 Date October 27, 2014  
 Temperature / Humidity 24 deg.C , 62 %RH  
 Engineer Akio Hayashi

### Spurious emission (Conducted)

**Tx, Bluetooth, BDR, PN9**

**Tx, 2402MHz (below 30MHz)**



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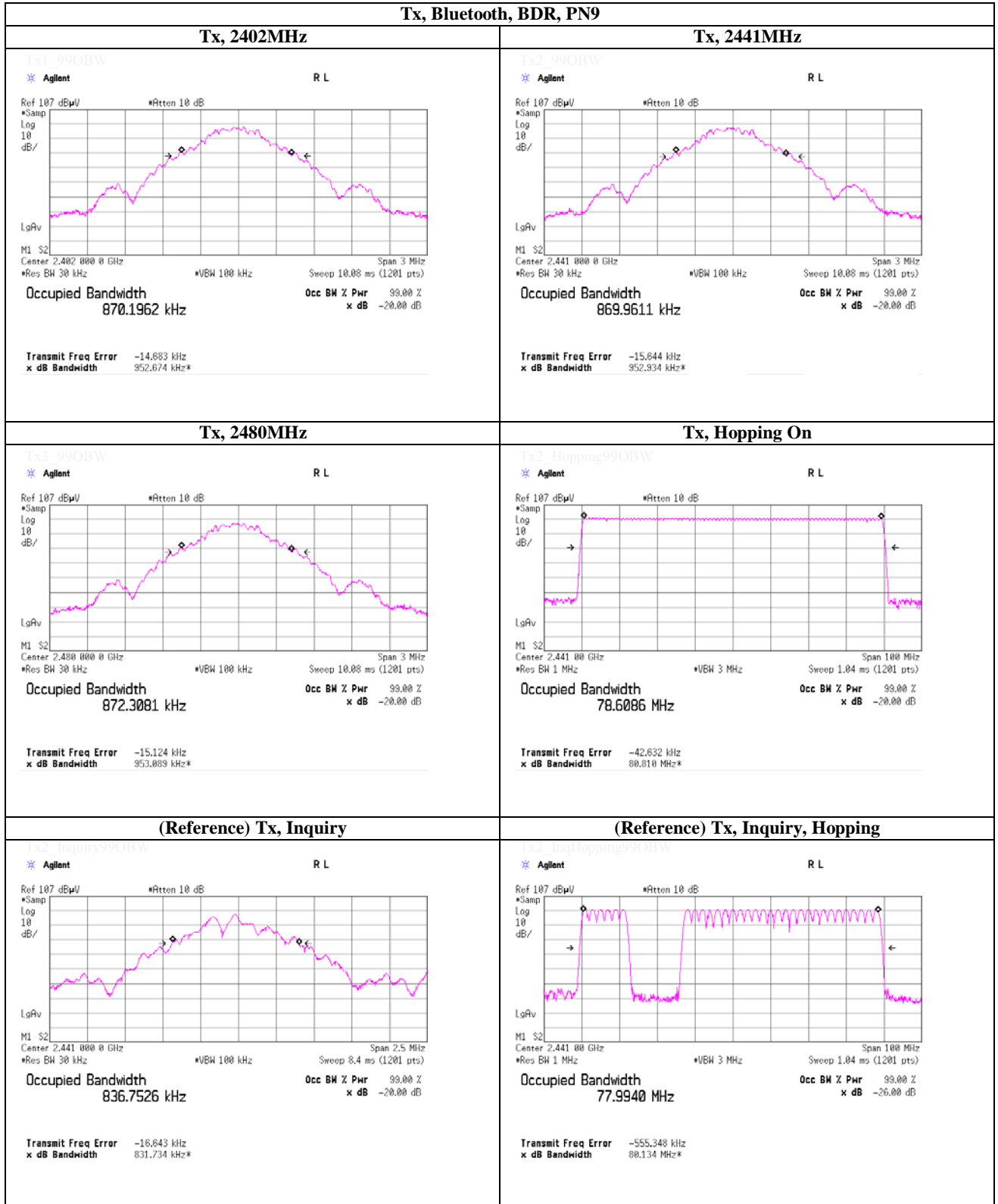






Test place UL Japan, Inc. Shonan EMC Lab. No.1 Measurement Room  
 Date October 27, 2014  
 Temperature / Humidity 24 deg.C , 62 %RH  
 Engineer Akio Hayashi

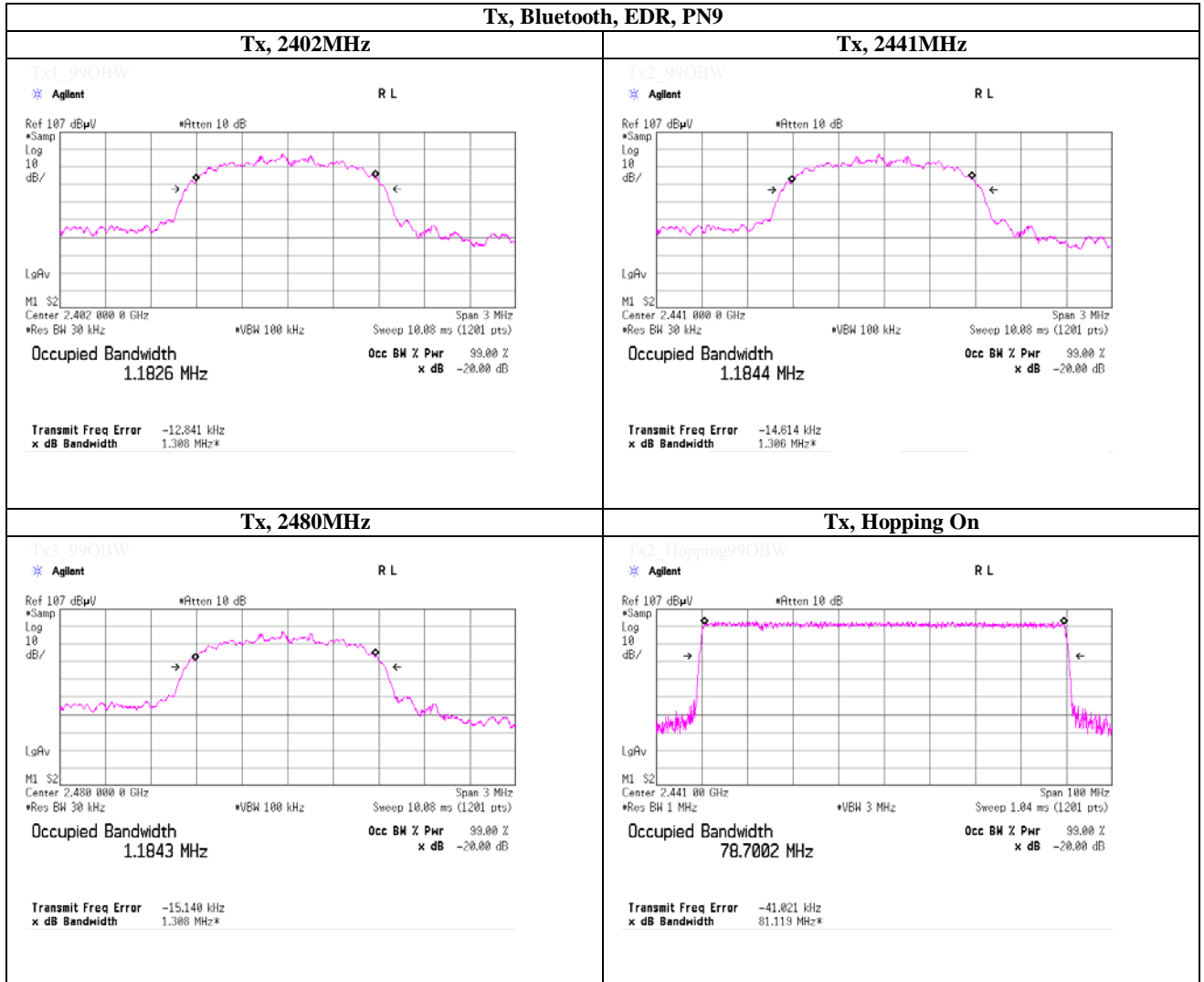
### 99% Occupied Bandwidth



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Test place UL Japan, Inc. Shonan EMC Lab. No.1 Measurement Room  
 Date October 27, 2014  
 Temperature / Humidity 24 deg.C , 62 %RH  
 Engineer Akio Hayashi

### 99% Occupied Bandwidth



Tx2\_Inquiry99OBW

Tx2\_InqHopping99OBW

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## APPENDIX 2 Test Instruments

### EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
SAEC-03(NSA)	Semi-Anechoic Chamber	TDK	SAEC-03(NSA)	3	RE	2014/07/14 * 12
SHA-03	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-739	RE	2014/08/12 * 12
SCC-G04	Coaxial Cable	Junkosha	J12J102207-00	JUN-12-14-018	RE	2014/06/24 * 12
SAT10-06	Attenuator	Agilent	8493C-010	74865	RE	2013/11/22 * 12
SFL-02	Highpass Filter	MICRO-TRONICS	HPM50111	051	RE	2013/11/22 * 12
SAF-06	Pre Amplifier	TOYO Corporation	TPA0118-36	1440491	RE	2014/05/23 * 12
SCC-G23	Coaxial Cable	Suhner	SUCOFLEX 104	297342/4	RE	2014/05/15 * 12
SSA-01	Spectrum Analyzer	Agilent	N9010A-526	MY48031482	RE	2014/04/07 * 12
SSA-02	Spectrum Analyzer	Agilent	E4448A	MY48250106	RE	2014/03/17 * 12
SOS-05	Humidity Indicator	A&D	AD-5681	4062518	RE	2014/10/30 * 12
SJM-15	Measure	ASKUL	-	-	RE	-
COTS-SEMI-1	EMI Software	TSJ	TEPTO-DV(RE,CE,RF,MF)	-	RE,CE	-
SHA-04	Horn Antenna	ETS LINDGREN	3160-09	LM3640	RE	2014/03/15 * 12
SAF-08	Pre Amplifier	TOYO Corporation	HAP18-26W	00000019	RE	2014/03/14 * 12
SCC-G15	Coaxial Cable	Suhner	SUCOFLEX 102	32703/2	RE	2014/03/13 * 12
SAF-03	Pre Amplifier	SONOMA	310N	290213	RE	2014/02/14 * 12
SAT6-06	Attenuator	JFW	50HF-006N	-	RE	2014/02/17 * 12
SBA-03	Biconical Antenna	Schwarzbeck	BBA9106	91032666	RE	2014/10/18 * 12
SCC-C1/C2/C3/C4/C5/C10/SRSE-03	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141PE/NS4906	-/0901-271(RF Selector)	RE	2014/04/25 * 12
SLA-03	Logperiodic Antenna	Schwarzbeck	UHALP9108A	UHALP 9108-A0901	RE	2014/10/18 * 12
STR-06	Test Receiver	Rohde & Schwarz	ESCI	101259	RE	2014/03/04 * 12
SPM-07	Power Meter	Agilent	8990B	MY5100272	AT	2014/04/04 * 12
SPSS-04	Power sensor	Agilent	N1923A	MY5326009	AT	2014/04/04 * 12
SOS-10	Humidity Indicator	A&D	AD-5681	4064561	AT	2014/10/30 * 12
SSA-02	Spectrum Analyzer	Agilent	E4448A	MY48250106	AT	2014/03/17 * 12
SCC-G13	Coaxial Cable	Suhner	SUCOFLEX 102	31599/2	AT	2014/03/14 * 12
SAT10-10	Attenuator	Weinschel Corp.	54A-10	37584	AT	2014/04/22 * 12
SOS-13	Humidity Indicator	Custom	CTH-202	Q.C.17	AT	2014/04/22 * 12
SCC-A12/A13/SRSE-01	Coaxial Cable&RF Selector	Suhner/Suhner/TOYO	RG223U/141PE/NS4906	-/0901-269(RF Selector)	CE	2014/04/25 * 12
SLS-01	LISN	Rohde & Schwarz	ENV216	100511	CE	2014/02/14 * 12
SAT3-06	Attenuator	JFW	50HF-003N	-	CE	2014/02/17 * 12
SOS-02	Humidity Indicator	A&D	AD-5681	4063343	CE	2014/03/07 * 12
STR-01	Test Receiver	Rohde & Schwarz	ESU40	100093	CE	2013/11/20 * 12
SJM-13	Measure	ASKUL	-	-	CE	-

The expiration date of the calibration is the end of the expired month .  
As for some calibrations performed after the tested dates , those test equipment have been controlled by means of an unbroken chains of calibrations .

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

Test Item :

CE: Conducted emission ,

RE: Radiated emission ,

AT: Antenna terminal conducted tests