



RADIO TEST REPORT

Test Report No.: 10270516S-B

Applicant : Sony Corporation
Type of Equipment : AV Center
Model No. : XAV-68BT
FCC ID : AK8XAV68BT
Test regulation : FCC Part15 Subpart C: 2014
Test result : Complied

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Date of test: April 3 to May 12, 2014

Tested by:

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Engineer
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Approved by :

Toyokazu Imamura
Leader
Consumer Technology Division



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13-EM-F0429

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SECTION 1: Customer information

Company Name : Sony Corporation
Address : Sony City Osaki, 2-10-1 Osaki, Shinagawa-ku, Tokyo 141-8610 Japan
Telephone Number : +81 50 3750 7634
Facsimile Number : +81 50 3750 6574
Contact Person : Toshihiro Maeda

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

2.1 Identification of E.U.T.

Type of Equipment : AV Center
Model No. : XAV-68BT
Serial No. : ET00011
Rating : DC12V (car battery)
Country of Mass-production : China
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 : March 25, 2014

2.2 Product description

Model: XAV-68BT (referred to as the EUT in this report) is an AV Center.

Clock frequencies: 37.050MHz, 27.000MHz, 8.000MHz, 26MHz

<Bluetooth Radio part>

Equipment type : Transceiver
Frequency of operation : 2402-2480MHz
Type of modulation : FHSS
Antenna connector type : IX-20279-001E-01 (Cortec Technology Inc)
Antenna gain with cable loss : Peak: -0.17 dBi
ITU code : F1D, G1D
Operation temperature range : -20 to +60 deg.C.

FCC 15.31 (e)

The equipment provides the wireless transmitter with stable power supply (DC3.3V).
Instead of a new battery, DC power supply was used for the test. That does not affect the test result, therefore the EUT complies with the requirement.

FCC 15.203

The equipment and its antenna comply with the requirement since the antenna is built in the equipment and it cannot be replaced by end users.

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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 March 6, 2014 and effective April 7, 2014
Title : FCC 47CFR Part 15 Radio Frequency Device
Subpart B Unintentional Radiators

* The revision on March 6, 2014 does not affect the test specification applied to the EUT.

The EUT has been tested for compliance with FCC Part 15 Subpart B. Refer to the test report: 10270516S-A.

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 *1)	-	-
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	6.8 dB Freq.: 4960.000 MHz Polarization: Vertical Detection: Average Mode: Tx 2480MHz, DH5	Complied

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

*1) The test is not applicable since the EUT has no AC mains.

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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 ^{*1} /SR ^{*2} (±)	No.2 SAC/SR (±)	No.3 SAC/SR (±)
Radiated emission (Measurement distance: 3m)	9kHz-30MHz	3.7 dB	3.7 dB	3.6 dB
	30MHz-300MHz	4.8 dB	5.0 dB	4.8 dB
	300MHz-1GHz	5.0 dB	5.0 dB	4.8 dB
	1GHz-15GHz	4.9 dB	4.9 dB	4.9 dB
Radiated emission (Measurement distance: 1m)	15GHz-18GHz	5.7 dB	5.6 dB	5.6 dB
	18GHz-40GHz	5.2 dB	4.3 dB	4.3 dB

*1: SAC=Semi-Anechoic Chamber

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

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

Antenna port conducted test

Power measurement uncertainty above 1GHz for this test was: (±) 1.5dB

Spurious emission (Conducted) measurement (below 1GHz) uncertainty for this test was: (±) 1.6dB

Spurious emission (Conducted) measurement (1G-3GHz) uncertainty for this test was: (±) 1.4dB

Spurious emission (Conducted) measurement (3G-18GHz) uncertainty for this test was: (±) 2.8dB

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

Bandwidth measurement uncertainty for this test was: (±) 5.4%

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3.5 Test location

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JAB Accreditation No. : RTL02610

	FCC Registration No.	IC Registration No.	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Maximum measurement distance
☐ No.1 semi-anechoic chamber	697847	2973D-1	20.6 x 11.3 x 7.65	20.6 x 11.3	10m
☒ No.2 semi-anechoic chamber	697847	2973D-2	20.6 x 11.3 x 7.65	20.6 x 11.3	10m
☒ No.3 semi-anechoic chamber	697847	2973D-3	12.7 x 7.7 x 5.35	12.7 x 7.7	5m
☐ No.4 semi-anechoic chamber	-	-	8.1 x 5.1 x 3.55	8.1 x 5.1	-
☐ No.1 shielded room	-	-	6.8 x 4.1 x 2.7	6.8 x 4.1	-
☐ No.2 shielded room	-	-	6.8 x 4.1 x 2.7	6.8 x 4.1	-
☐ No.3 shielded room	-	-	6.3 x 4.7 x 2.7	6.3 x 4.7	-
☐ No.4 shielded room	-	-	4.4 x 4.7 x 2.7	4.4 x 4.7	-
☒ No.5 shielded room	-	-	7.8 x 6.4 x 2.7	7.8 x 6.4	-
☐ No.6 shielded room	-	-	7.8 x 6.4 x 2.7	7.8 x 6.4	-

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

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

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.

Software: BlueTest.exe ver.1.24.0.0
BtCli.exe ver.1.24 (for only Inquiry mode)

Power Settings: BDR = 255, 41
EDR = 255, 43

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

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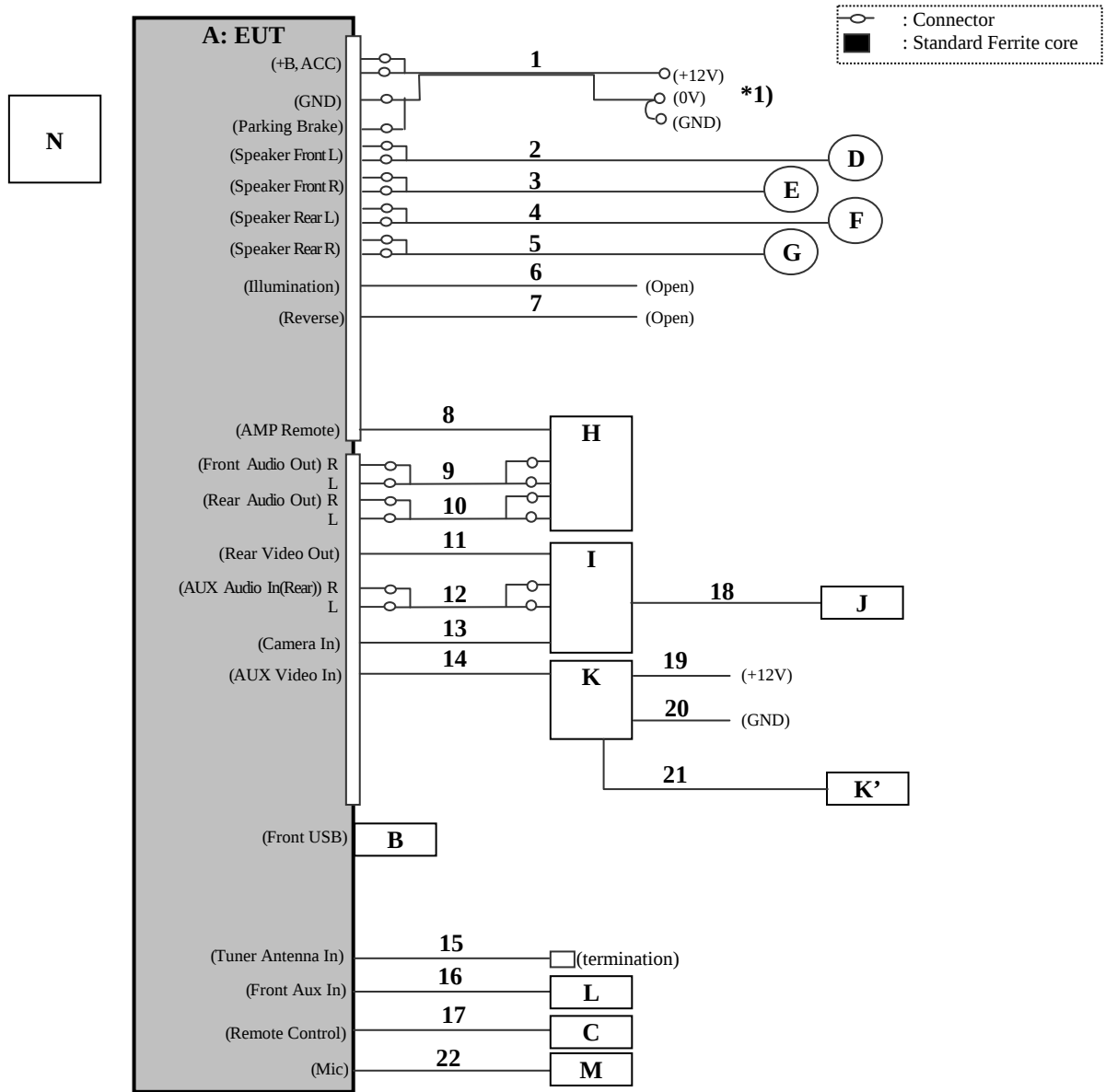
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4.2 Configuration and peripherals



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

* DC power supply (Model No.: PAN35-10A) was used for DC 12V input.

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Description of EUT and support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	AV Center	XAV-68BT	*1)	Sony	EUT
B	USB memory	SDK-USM4GL(B)	-	Sony	-
C	Wired Remote Controller	RM-X4S	-	Sony	-
D	Speaker 1	IS-10	-	Sony	-
E	Speaker 2	IS-10	-	Sony	-
F	Speaker 3	XS-GTF1625R	-	Sony	-
G	Speaker 4	XS-GTF1625R	-	Sony	-
H	Monaural Power Amplifier	XM-1S	1520145	Sony	-
I	Connection Box	XA-124	3509530	Sony	-
J	MOBILE MONITOR	XVM-F65	3509347	Sony	-
K K'	Camera unit	XA-800C	100114	Sony	-
L	Walkman	NW-A828	5072265	Sony	-
M	Mic	-	-	Sony	-
N	Remote commander	RM-X170	-	Sony	-

*1) ET00014: Antenna port conducted tests, ET00013: Radiated emission tests

List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	DC Power+Parking brake	0.15+3.0	Unshielded	Unshielded	-
2	Speaker (1)	0.15+2.6	Unshielded	Unshielded	-
3	Speaker (2)	0.15+2.6	Unshielded	Unshielded	-
4	Speaker (3)	0.15+2.0	Unshielded	Unshielded	-
5	Speaker (4)	0.15+2.0	Unshielded	Unshielded	-
6	Illumination	0.15+1.5	Unshielded	Unshielded	-
7	Reverse	0.15+1.5	Unshielded	Unshielded	-
8	AMP Remote	0.15+2.0	Unshielded	Unshielded	-
9	RCA (Front Audio Out)	5.2	Unshielded	Unshielded	-
10	RCA (Rear Audio Out)	5.2	Unshielded	Unshielded	-
11	RCA (VIDEO Out)	5.0	Unshielded	Unshielded	-
12	RCA (AUX1 Audio In)	1.2	Unshielded	Unshielded	-
13	RCA (Camera In)	3.0	Unshielded	Unshielded	-
14	RCA (AUX Video In)	5.9	Unshielded	Unshielded	-
15	Tuner Antenna In	3.0	Unshielded	Unshielded	-
16	Stereo mini(Front AUX)	3.0	Unshielded	Unshielded	-
17	REMOTE Control	2.0	Unshielded	Unshielded	-
18	Signal	3.0	Unshielded	Unshielded	-
19	DC Power (+)	1.0	Unshielded	Unshielded	-
20	DC Power (-)	1.0	Unshielded	Unshielded	-
21	Camera	3.0	Unshielded	Unshielded	-
22	Mic	3.5	Unshielded	Unshielded	-

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SECTION 5: 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 6: 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 7: 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 8: 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 9: Maximum peak output power

Test procedure

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

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

SECTION 10: Spurious emissions (Antenna port conducted)

Test procedure

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

In any 100kHz bandwidth outside the frequency 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.

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 11: Radiated emission

11.1 Operating environment

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

11.2 Test configuration

EUT was placed on a platform of nominal size, 1.0m 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 EUT, including its peripherals was aligned and flushed with rear of tabletop. I/O cables that were connected to the peripherals were bundled in center. They were folded back and for the forming a bundle 30cm to 40cm long and were hanged at a 40cm height to the ground plane. Photographs of the set up are shown in APPENDIX 3.

11.3 Test conditions

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

11.4 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	
Detection Type	: Quasi-Peak	Peak	* Average
IF Bandwidth	: 120kHz	RBW:1MHz	RBW:1MHz
		VBW:3MHz	VBW:10Hz

* 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 level and noise levels were confirmed at mounting angle of 0 to 45 deg. based on the product specification to see the position of maximum noise, and the test was made at the position that has the maximum noise.

Antenna polarization \ Test item	Carrier	Spurious emission (Below 1GHz)	Spurious emission (1-15GHz)	Spurious emission (Above 15GHz)
Horizontal	0 deg.	0 deg.	0 deg.	0 deg.
Vertical	0 deg.	0 deg..	0 deg.	0 deg.

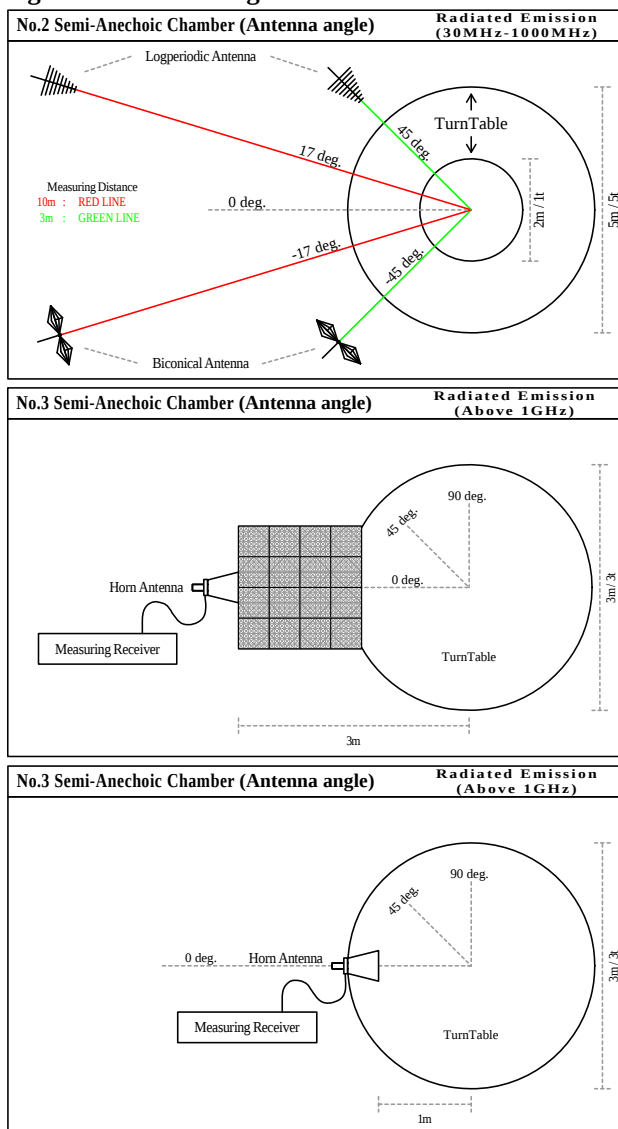
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Figure 1. Antenna angle

11.5 Band edge

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

11.6 Results

Summary of the test results: Pass *No noise was detected above the 5th order harmonics.

Refer to APPENDIX 1.

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Contents of APPENDIXES

APPENDIX 1: Data of Radio tests

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

Radiated emission

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APPENDIX 1: Data of Radio tests

20dB Bandwidth and Carrier Frequency Separation

Test place

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No.5 Shielded Room

Date

April 3, 2014

Temperature / Humidity

25 deg.C , 38 %RH

Engineer

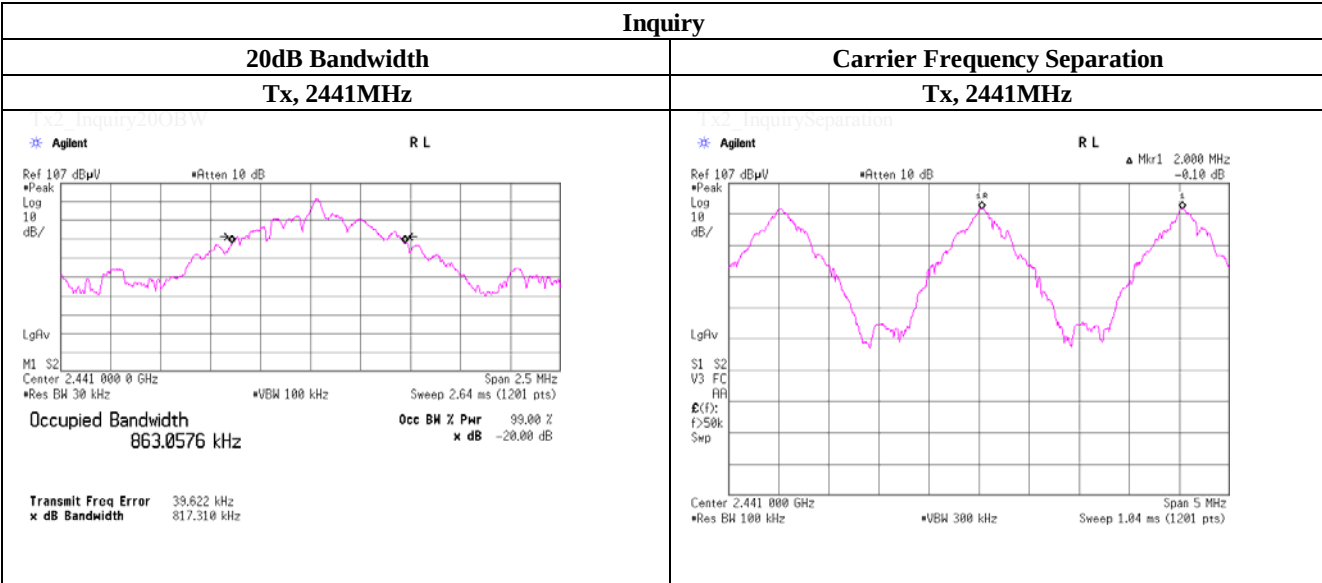
Makoto Hosaka

Mode

Tx, Bluetooth, BDR, PRBS9

Mode	Freq.	20dB	Carrier	Limit for
	[MHz]	Bandwidth	Frequency	Carrier
		[MHz]	Separation	Frequency
			[MHz]	Separation
				[MHz]
DH5	2402.0	0.929	1.000	>= 0.619
DH5	2441.0	0.933	1.000	>= 0.622
DH5	2480.0	0.932	1.000	>= 0.621
Inquiry	2441.0	0.817	2.000	>= 0.545

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



20dB Bandwidth and Carrier Frequency Separation

Tx, Bluetooth, BDR, PRBS9

20dB Bandwidth Tx, 2402MHz	Carrier Frequency Separation Tx, 2402MHz
Agilent R L Ref 107 dBμV *Atten 10 dB Peak Log 10 dB/ LgA/V M1 S2 Center 2,402 000 0 GHz Span 3 MHz *Res BW 30 kHz *VBW 100 kHz Sweep 3.2 ms (1201 pts) Occupied Bandwidth 856.8544 kHz Occ BW % Pwr 99.00 % x dB -20.00 dB Transmit Freq Error 34.755 kHz x dB Bandwidth 928.886 kHz	Agilent R L Ref 107 dBμV *Atten 10 dB Peak Log 5 dB/ LgA/V M1 S2 S1 S2 V3 FC AR Center 2,402 750 0 GHz Span 3 MHz *Res BW 100 kHz *VBW 300 kHz Sweep 1.04 ms (1201 pts) Carrier Freq Separation 1.000 MHz -0.06 dB
Agilent R L Ref 107 dBμV *Atten 10 dB Peak Log 10 dB/ LgA/V M1 S2 Center 2,441 000 0 GHz Span 3 MHz *Res BW 30 kHz *VBW 100 kHz Sweep 3.2 ms (1201 pts) Occupied Bandwidth 860.4409 kHz Occ BW % Pwr 99.00 % x dB -20.00 dB Transmit Freq Error 36.361 kHz x dB Bandwidth 933.255 kHz	Agilent R L Ref 107 dBμV *Atten 10 dB Peak Log 5 dB/ LgA/V M1 S2 S1 S2 V3 FC AR Center 2,441 000 0 GHz Span 3 MHz *Res BW 100 kHz *VBW 300 kHz Sweep 1.04 ms (1201 pts) Carrier Freq Separation 1.000 MHz 0.01 dB
Agilent R L Ref 107 dBμV *Atten 10 dB Peak Log 10 dB/ LgA/V M1 S2 Center 2,480 000 0 GHz Span 3 MHz *Res BW 30 kHz *VBW 100 kHz Sweep 3.2 ms (1201 pts) Occupied Bandwidth 862.7618 kHz Occ BW % Pwr 99.00 % x dB -20.00 dB Transmit Freq Error 37.113 kHz x dB Bandwidth 932.250 kHz	Agilent R L Ref 107 dBμV *Atten 10 dB Peak Log 5 dB/ LgA/V M1 S2 S1 S2 V3 FC AR Center 2,479 250 0 GHz Span 3 MHz *Res BW 100 kHz *VBW 300 kHz Sweep 1.04 ms (1201 pts) Carrier Freq Separation 1.000 MHz -0.02 dB

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20dB Bandwidth and Carrier Frequency Separation

Test place UL Japan, Inc. Shonan EMC Lab. No.5 Shielded Room
Date April 3, 2014
Temperature / Humidity 25 deg.C , 38 %RH
Engineer Makoto Hosaka
Mode Tx, Bluetooth, EDR, PRBS9

Mode	Freq. [MHz]	20dB Bandwidth [MHz]	Carrier Frequency Separation [MHz]	Limit for Carrier Frequency Separation [MHz]
3-DH5	2402.0	1.277	1.000	>= 0.852
3-DH5	2441.0	1.270	1.000	>= 0.846
3-DH5	2480.0	1.256	1.000	>= 0.838

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

No limit applies to 20dB Bandwidth.

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20dB Bandwidth and Carrier Frequency Separation

Tx, Bluetooth, EDR, PRBS9

20dB Bandwidth	Carrier Frequency Separation
Tx, 2402MHz	Tx, 2402MHz
Tx2_20DBW Agilent RL Ref 107 dBμV Peak Log 10 dB/ LgAiv M1 S2 Center 2.402 000 0 GHz Res BW 30 kHz VBW 100 kHz Sweep 3.2 ms (1201 pts) Span 3 MHz Occupied Bandwidth 1.1790 MHz Transmit Freq Error 40.315 kHz x dB Bandwidth 1.277 MHz Occ BW % Pwr 99.00 % x dB -20.00 dB	Tx2_HoppingSeparation2 Agilent RL Ref 107 dBμV Peak Log 5 dB/ LgAiv S1 S2 V3 FC RA Δ(f): >50k Swp Center 2.402 750 0 GHz Res BW 100 kHz VBW 300 kHz Sweep 1.04 ms (1201 pts) Span 3 MHz Mkr1 1.000 0 MHz -0.00 dB
Tx, 2441MHz	Tx, 2441MHz
Tx2_20DBW Agilent RL Ref 107 dBμV Peak Log 10 dB/ LgAiv M1 S2 Center 2.441 000 0 GHz Res BW 30 kHz VBW 100 kHz Sweep 3.2 ms (1201 pts) Span 3 MHz Occupied Bandwidth 1.1787 MHz Transmit Freq Error 34.289 kHz x dB Bandwidth 1.270 MHz Occ BW % Pwr 99.00 % x dB -20.00 dB	Tx2_HoppingSeparation2 Agilent RL Ref 107 dBμV Peak Log 5 dB/ LgAiv S1 S2 V3 FC RA Δ(f): >50k Swp Center 2.441 000 0 GHz Res BW 100 kHz VBW 300 kHz Sweep 1.04 ms (1201 pts) Span 3 MHz Mkr1 1.000 0 MHz -0.03 dB
Tx, 2480MHz	Tx, 2480MHz
Tx3_20DBW Agilent RL Ref 107 dBμV Peak Log 10 dB/ LgAiv M1 S2 Center 2.480 000 0 GHz Res BW 30 kHz VBW 100 kHz Sweep 3.2 ms (1201 pts) Span 3 MHz Occupied Bandwidth 1.1800 MHz Transmit Freq Error 34.776 kHz x dB Bandwidth 1.256 MHz Occ BW % Pwr 99.00 % x dB -20.00 dB	Tx2_HoppingSeparation3 Agilent RL Ref 107 dBμV Peak Log 5 dB/ LgAiv S1 S2 V3 FC RA Δ(f): >50k Swp Center 2.479 250 0 GHz Res BW 100 kHz VBW 300 kHz Sweep 1.04 ms (1201 pts) Span 3 MHz Mkr1 1.000 0 MHz -0.01 dB

Number of Hopping Frequency

Test place

UL Japan, Inc. Shonan EMC Lab.

No.5 Shielded Room

Date

April 3, 2014

Temperature / Humidity

25 deg.C , 38 %RH

Engineer

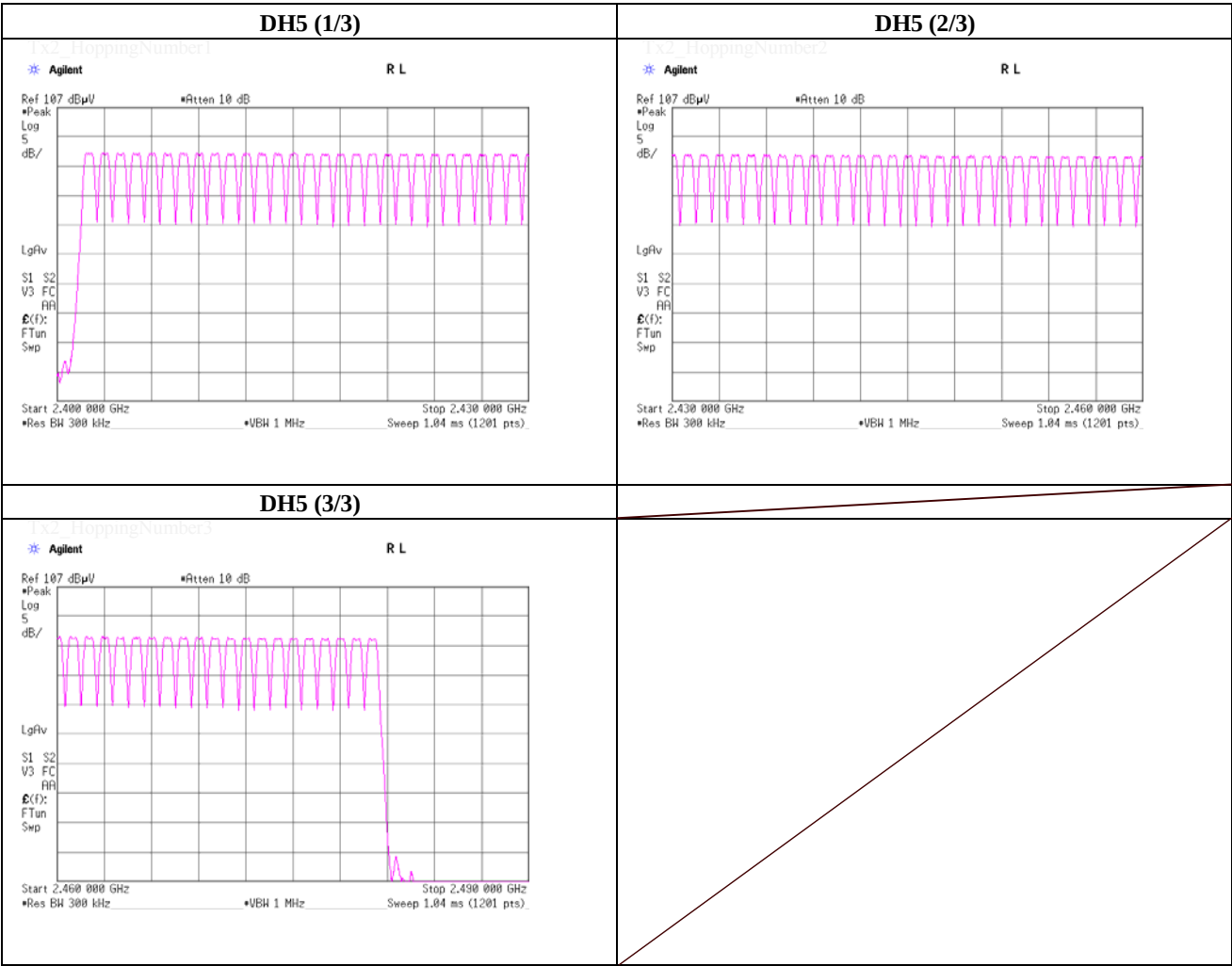
Makoto Hosaka

Mode

Tx, Bluetooth, BDR, PRBS9

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.



Number of Hopping Frequency

Test place

Date

Temperature / Humidity

Engineer

Mode

UL Japan, Inc. Shonan EMC Lab.

April 3, 2014

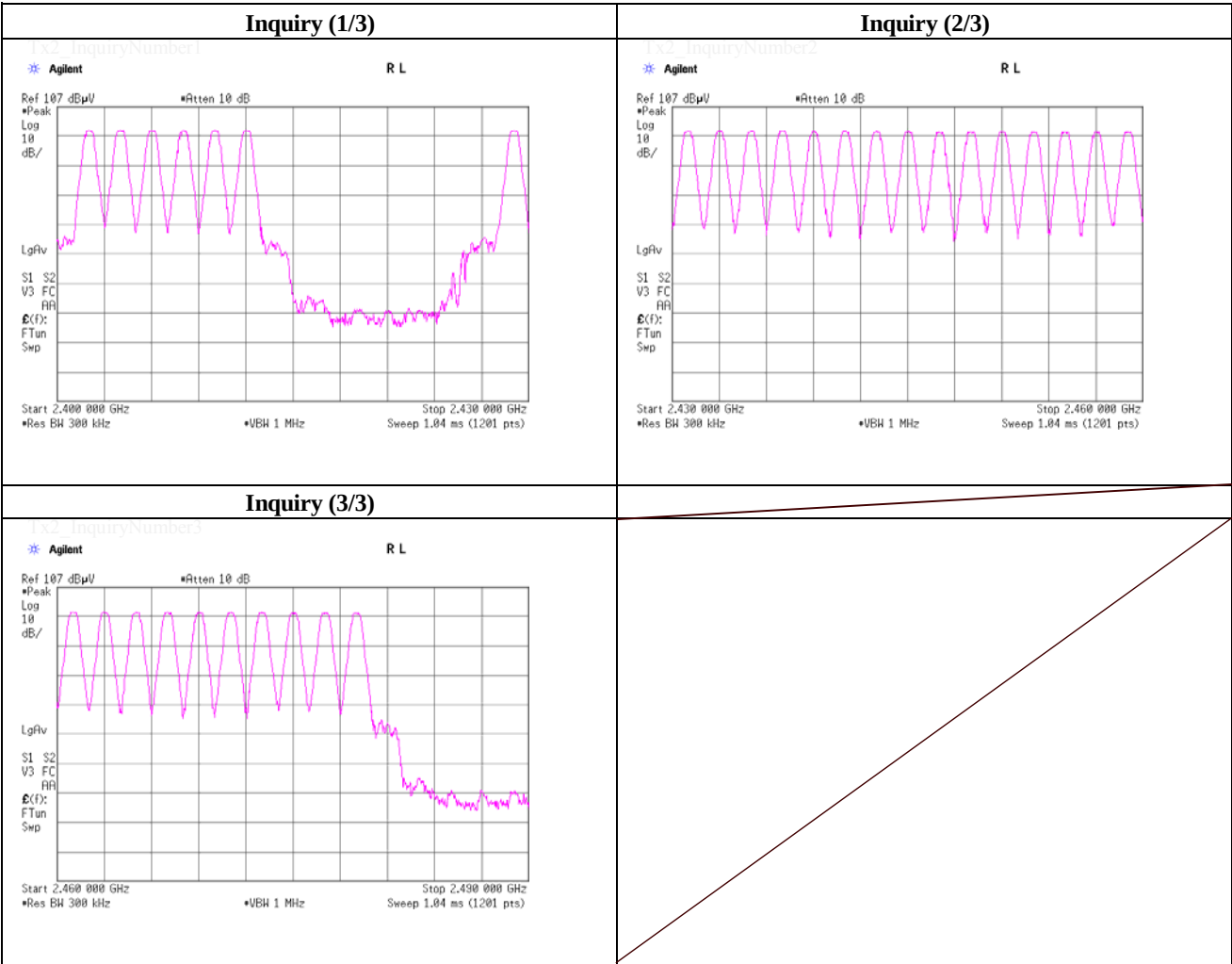
25 deg.C , 38 %RH

Makoto Hosaka

Tx, Bluetooth, Inquiry

No.5 Shielded Room

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



Number of Hopping Frequency

Test place

UL Japan, Inc. Shonan EMC Lab.

No.5 Shielded Room

Date

April 3, 2014

Temperature / Humidity

25 deg.C , 38 %RH

Engineer

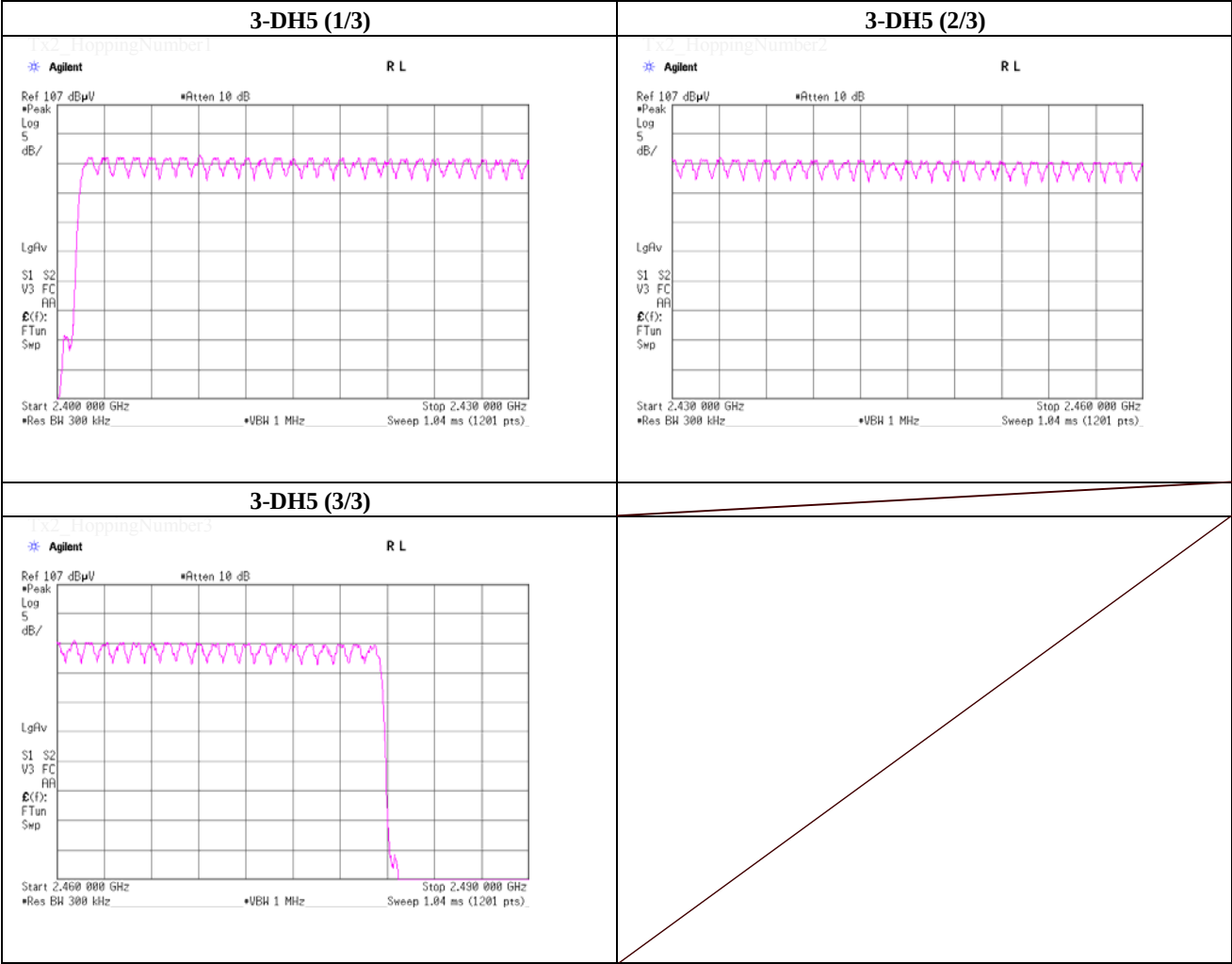
Makoto Hosaka

Mode

Tx, Bluetooth, EDR, PRBS9

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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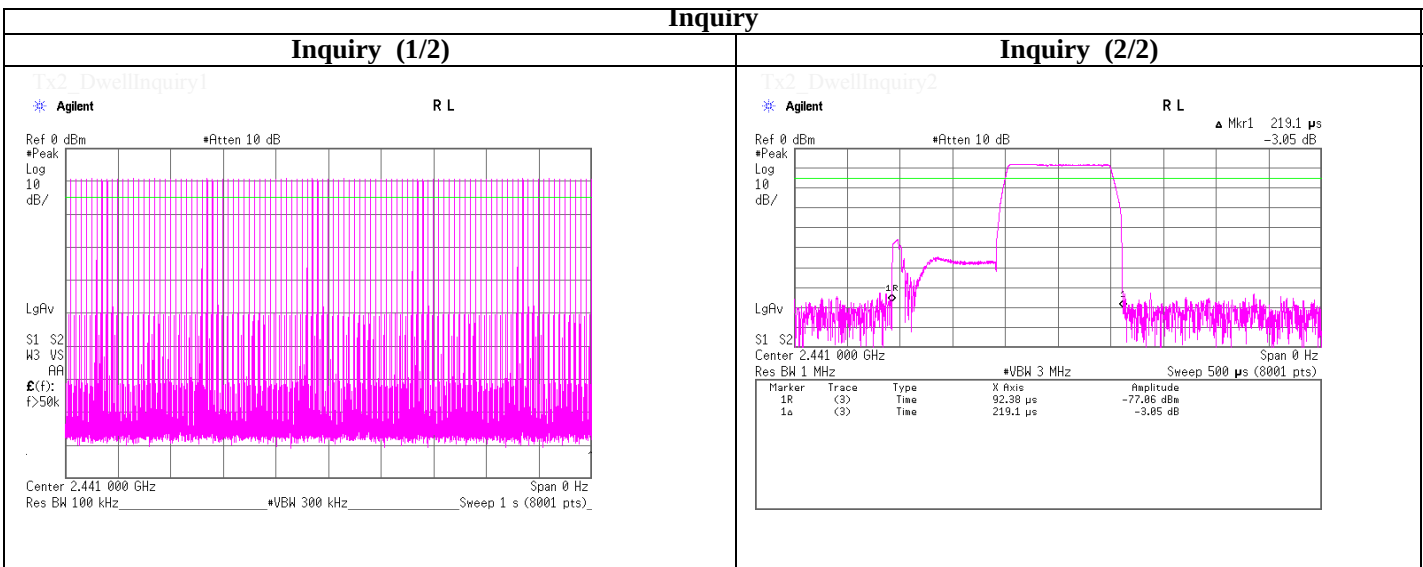
Test place	UL Japan, Inc. Shonan EMC Lab.	No.5 Shielded Room
Date	April 3, 2014	
Temperature / Humidity	25 deg.C , 38 %RH	
Engineer	Makoto Hosaka	
Mode	Tx, Bluetooth, BDR, PRBS9	

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 / 5.0 sec. x 31.6 sec. = 323 times	0.418	135	400
DH3	26.0 / 5.0 sec. x 31.6 sec. = 165 times	1.675	276	400
DH5	17.0 / 5.0 sec. x 31.6 sec. = 108 times	2.923	316	400
Inquiry	101.0 / 1.0 sec. x 12.8 sec. = 1293 times	0.219	283	400

Sample Calculation

$$\text{Result} = \text{Number of transmission} \times \text{Length of transmission time}$$

* 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 $N=79$.



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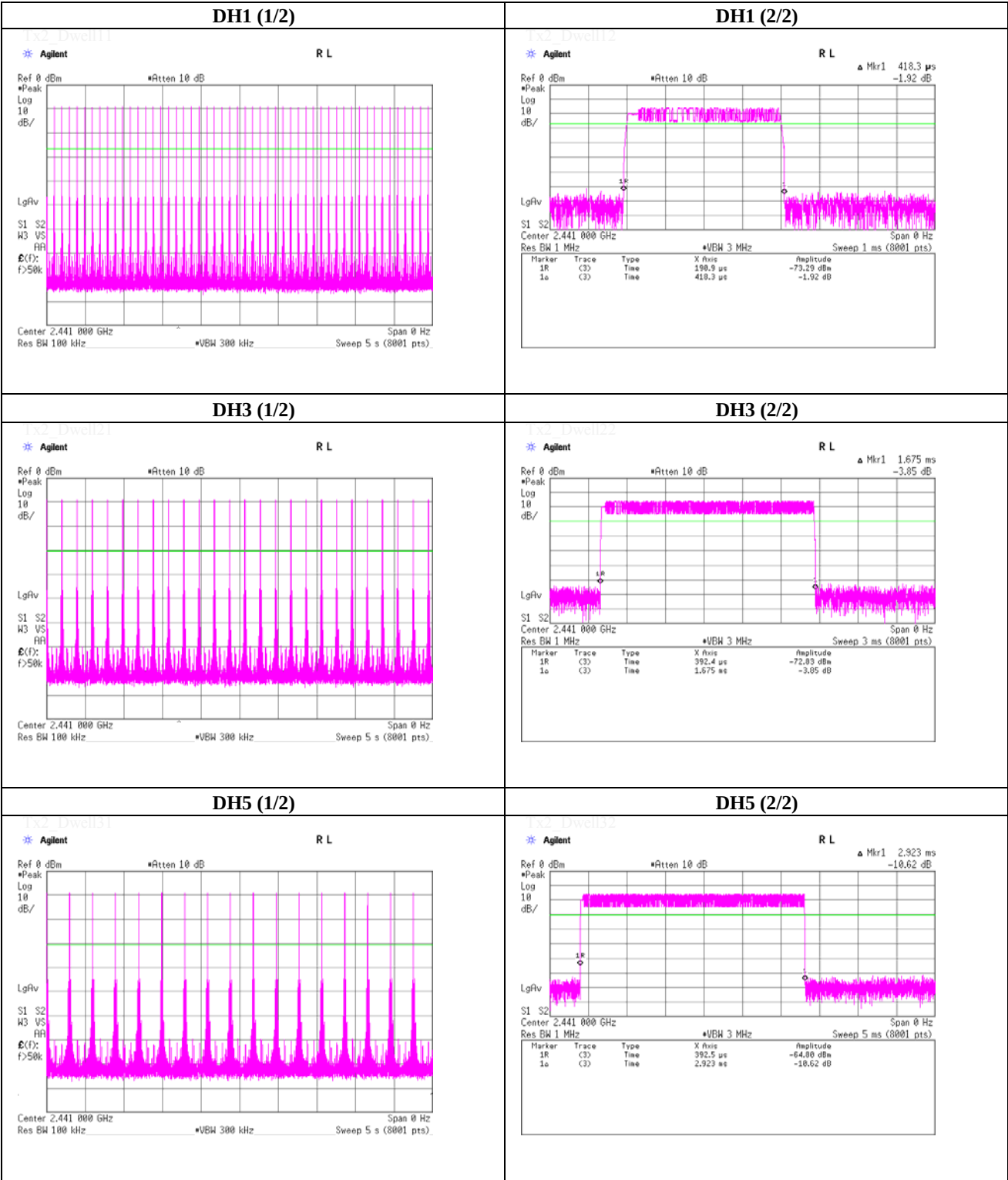
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Dwell time

Tx, Bluetooth, BDR, PRBS9



Dwell Time

Test place UL Japan, Inc. Shonan EMC Lab. No.5 Shielded Room
 Date April 3, 2014
 Temperature / Humidity 25 deg.C , 38 %RH
 Engineer Makoto Hosaka
 Mode Tx, Bluetooth, EDR, PRBS9

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	51.0	/ 5.0 sec.	x 31.6 sec. = 323 times	0.433	140	400
3-DH3	26.0	/ 5.0 sec.	x 31.6 sec. = 165 times	1.683	278	400
3-DH5	17.0	/ 5.0 sec.	x 31.6 sec. = 108 times	2.934	317	400

Sample Calculation

Result = Number of transmission x Length of transmission time

* 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 $N=79$.

UL Japan, Inc.

Shonan EMC Lab.

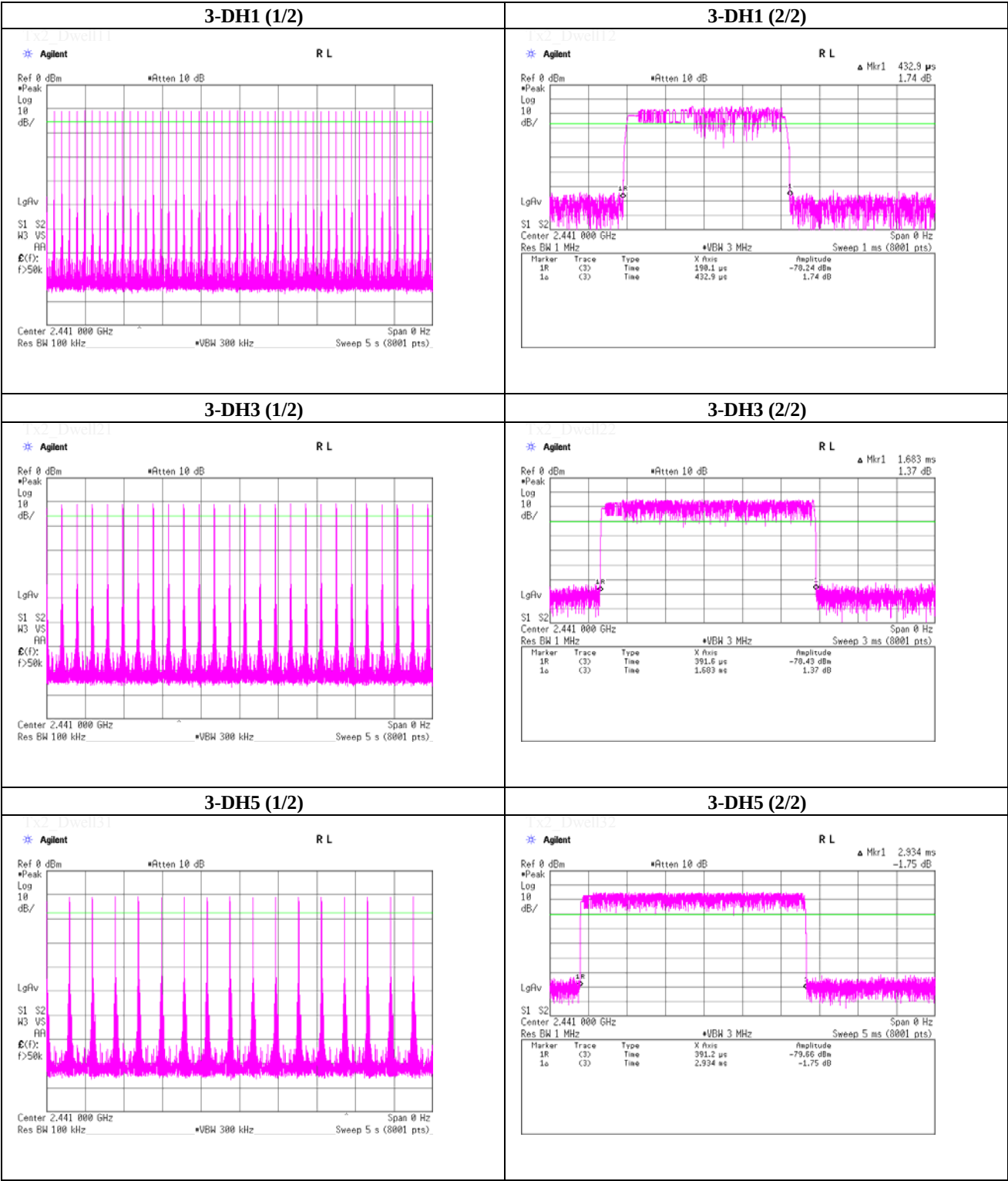
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Dwell time

Tx, Bluetooth, EDR, PRBS9



Maximum Peak Conducted Output Power (Conducted)

Test place UL Japan, Inc. Shonan EMC Lab. No.5 Shielded Room
 Date May 12, 2014
 Temperature / Humidity 23 deg.C , 43 %RH
 Engineer Makoto Hosaka
 Mode Tx, Bluetooth

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

	Freq.	P/M (Peak) Reading	Cable Loss	Atten. Loss	Result		Limit		Margin
	[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dBm]	[mW]	[dB]
DH5	2402.0	-9.90	0.74	10.02	0.86	1.22	20.97	125	20.11
DH5	2441.0	-10.10	0.75	10.03	0.68	1.17	20.97	125	20.29
DH5	2480.0	-10.56	0.76	10.04	0.24	1.06	20.97	125	20.73
2-DH5	2402.0	-9.43	0.74	10.02	1.33	1.36	20.97	125	19.64
2-DH5	2441.0	-9.76	0.75	10.03	1.02	1.26	20.97	125	19.95
2-DH5	2480.0	-10.37	0.76	10.04	0.43	1.10	20.97	125	20.54
3-DH5	2402.0	-9.42	0.74	10.02	1.34	1.36	20.97	125	19.63
3-DH5	2441.0	-9.76	0.75	10.03	1.02	1.26	20.97	125	19.95
3-DH5	2480.0	-10.37	0.76	10.04	0.43	1.10	20.97	125	20.54

Sample Calculation:

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

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Radiated Emission

Test place No.2 and No.3 Semi Anechoic Chamber
 Date April 4, 2014 April 16, 2014 April 16, 2014
 Temperature / Humidity 22 deg.C, 44 %RH 24 deg.C, 33 %RH 23 deg.C, 37 %RH
 Engineer Wataru Kojima Wataru Kojima Takahiro Suzuki
 Mode Tx, 2402 MHz
 Tx, Bluetooth, BDR, PRBS9

(* 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.	135.011	QP	43.0	14.1	8.4	31.8	33.7	43.5	9.8	234	223	
Hori.	809.999	QP	31.3	21.0	9.8	31.3	30.8	46.0	15.2	157	281	
Hori.	1602.098	PK	46.9	25.8	13.7	40.9	45.5	73.9	28.4	100	210	
Hori.	2390.000	PK	45.7	26.8	14.7	41.1	46.1	73.9	27.8	229	334	
Hori.	2400.000	PK	56.1	26.8	14.7	41.1	56.5	73.9	17.4	229	334	
Hori.	4804.000	PK	54.2	30.9	7.9	41.2	51.8	73.9	22.1	141	302	
Hori.	7206.000	PK	45.8	37.1	9.1	41.0	51.0	73.9	22.9	146	90	
Hori.	9608.000	PK	47.1	38.6	10.2	38.9	57.0	73.9	16.9	202	21	
Hori.	12010.000	PK	41.2	39.6	11.2	39.1	52.9	73.9	21.0	100	0	
Hori.	1602.098	AV	38.6	25.8	13.7	40.9	37.2	53.9	16.7	100	210	
Hori.	2390.000	AV	33.0	26.8	14.7	41.1	33.4	53.9	20.5	229	334	
Hori.	2400.000	AV	46.3	26.8	14.7	41.1	46.7	53.9	7.2	229	334	
Hori.	4804.000	AV	44.9	30.9	7.9	41.2	42.5	53.9	11.4	141	302	
Hori.	7206.000	AV	33.8	37.1	9.1	41.0	39.0	53.9	14.9	146	90	
Hori.	9608.000	AV	36.4	38.6	10.2	38.9	46.3	53.9	7.6	202	21	
Hori.	12010.000	AV	29.3	39.6	11.2	39.1	41.0	53.9	12.9	100	0	
Vert.	138.786	QP	35.7	14.4	8.6	31.8	26.9	43.5	16.6	100	202	
Vert.	809.996	QP	34.1	21.0	9.8	31.3	33.6	46.0	12.4	100	43	
Vert.	836.997	QP	27.8	21.4	9.9	31.2	27.9	46.0	18.1	101	46	
Vert.	852.155	QP	27.7	21.6	10.0	31.1	28.2	46.0	17.8	100	67	
Vert.	1602.035	PK	49.2	25.8	13.7	40.9	47.8	73.9	26.1	100	61	
Vert.	2390.000	PK	45.4	26.8	14.7	41.1	45.8	73.9	28.1	153	193	
Vert.	2400.000	PK	44.8	26.8	14.7	41.1	45.2	73.9	28.7	153	193	
Vert.	4804.000	PK	50.3	30.9	7.9	41.2	47.9	73.9	26.0	100	353	
Vert.	7206.000	PK	46.1	37.1	9.1	41.0	51.3	73.9	22.6	100	11	
Vert.	9608.000	PK	44.7	38.6	10.2	38.9	54.6	73.9	19.3	100	10	
Vert.	12010.000	PK	42.5	39.6	11.2	39.1	54.2	73.9	19.7	100	0	
Vert.	1602.035	AV	42.5	25.8	13.7	40.9	41.1	53.9	12.8	100	61	
Vert.	2390.000	AV	33.1	26.8	14.7	41.1	33.5	53.9	20.4	153	193	
Vert.	2400.000	AV	40.5	26.8	14.7	41.1	40.9	53.9	13.0	153	193	
Vert.	4804.000	AV	40.8	30.9	7.9	41.2	38.4	53.9	15.5	100	353	
Vert.	7206.000	AV	34.2	37.1	9.1	41.0	39.4	53.9	14.5	100	11	
Vert.	9608.000	AV	32.8	38.6	10.2	38.9	42.7	53.9	11.2	100	10	
Vert.	12010.000	AV	29.3	39.6	11.2	39.1	41.0	53.9	12.9	100	0	

Result = Reading + Ant.Fac. + Loss (Cable+Attenuator+Filter-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.2 and No.3 Semi Anechoic Chamber
 Date April 4, 2014 April 16, 2014 April 16, 2014
 Temperature / Humidity 22 deg.C, 44 %RH 24 deg.C, 33 %RH 23 deg.C, 37 %RH
 Engineer Wataru Kojima Wataru Kojima Takahiro Suzuki
 Mode Tx, 2441 MHz
 Tx, Bluetooth, BDR, PRBS9

(* 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.	134.998	QP	41.4	14.1	8.4	31.8	32.1	43.5	11.4	241	226	
Hori.	138.849	QP	36.5	14.4	8.6	31.8	27.7	43.5	15.8	228	20	
Hori.	432.003	QP	36.5	16.6	8.2	31.7	29.6	46.0	16.4	115	183	
Hori.	626.014	QP	26.9	19.3	9.0	31.7	23.5	46.0	22.5	100	231	
Hori.	1626.713	PK	47.2	25.9	13.7	41.0	45.8	73.9	28.1	202	57	
Hori.	4882.000	PK	51.0	31.4	7.9	41.1	49.2	73.9	24.7	104	269	
Hori.	7323.000	PK	45.8	37.2	9.1	41.1	51.0	73.9	22.9	100	29	
Hori.	9764.000	PK	45.6	38.8	10.1	38.8	55.7	73.9	18.2	197	20	
Hori.	12205.000	PK	42.4	39.6	11.3	39.1	54.2	73.9	19.7	100	0	
Hori.	1626.713	AV	38.7	25.9	13.7	41.0	37.3	53.9	16.6	202	57	
Hori.	4882.000	AV	44.3	31.4	7.9	41.1	42.5	53.9	11.4	104	269	
Hori.	7323.000	AV	34.0	37.2	9.1	41.1	39.2	53.9	14.7	100	29	
Hori.	9764.000	AV	33.9	38.8	10.1	38.8	44.0	53.9	9.9	197	20	
Hori.	12205.000	AV	29.2	39.6	11.3	39.1	41.0	53.9	12.9	100	0	
Vert.	134.998	QP	36.7	14.1	8.4	31.8	27.4	43.5	16.1	100	188	
Vert.	736.498	QP	28.8	20.5	9.5	31.5	27.3	46.0	18.7	100	36	
Vert.	760.249	QP	27.8	20.7	9.6	31.5	26.6	46.0	19.4	100	72	
Vert.	809.996	QP	33.9	21.0	9.8	31.3	33.4	46.0	12.6	100	46	
Vert.	1626.713	PK	48.2	25.9	13.7	41.0	46.8	73.9	27.1	100	63	
Vert.	4882.000	PK	52.8	31.4	7.9	41.1	51.0	73.9	22.9	171	192	
Vert.	7323.000	PK	45.9	37.2	9.1	41.1	51.1	73.9	22.8	100	0	
Vert.	9764.000	PK	46.2	38.8	10.1	38.8	56.3	73.9	17.6	100	4	
Vert.	12205.000	PK	43.0	39.6	11.3	39.1	54.8	73.9	19.1	100	0	
Vert.	1626.713	AV	39.5	25.9	13.7	41.0	38.1	53.9	15.8	100	63	
Vert.	4882.000	AV	47.1	31.4	7.9	41.1	45.3	53.9	8.6	171	192	
Vert.	7323.000	AV	34.0	37.2	9.1	41.1	39.2	53.9	14.7	100	0	
Vert.	9764.000	AV	32.9	38.8	10.1	38.8	43.0	53.9	10.9	100	4	
Vert.	12205.000	AV	30.7	39.6	11.3	39.1	42.5	53.9	11.4	100	0	

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

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

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Test place No.2 and No.3 Semi Anechoic Chamber
 Date April 4, 2014 April 16, 2014 April 16, 2014
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 Engineer Wataru Kojima Wataru Kojima Takahiro Suzuki
 Mode Tx, 2480 MHz
 Tx, Bluetooth, BDR, PRBS9

(* 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.	135.004	QP	41.6	14.1	8.4	31.8	32.3	43.5	11.2	245	226	
Hori.	138.836	QP	36.9	14.4	8.6	31.8	28.1	43.5	15.4	230	222	
Hori.	604.844	QP	30.1	19.1	9.0	31.6	26.6	46.0	19.4	100	235	
Hori.	1652.666	PK	46.7	25.9	13.8	41.0	45.4	73.9	28.5	100	187	
Hori.	2483.500	PK	49.3	26.9	14.8	41.0	50.0	73.9	23.9	206	337	
Hori.	4960.000	PK	52.2	31.8	7.8	41.1	50.7	73.9	23.2	128	63	
Hori.	7440.000	PK	46.5	37.4	9.3	41.1	52.1	73.9	21.8	100	0	
Hori.	9920.000	PK	45.3	38.9	10.1	38.8	55.5	73.9	18.4	202	16	
Hori.	12400.000	PK	41.5	39.7	11.4	39.1	53.5	73.9	20.4	100	0	
Hori.	1652.666	AV	40.1	25.9	13.8	41.0	38.8	53.9	15.1	100	187	
Hori.	2483.500	AV	36.0	26.9	14.8	41.0	36.7	53.9	17.2	206	337	
Hori.	4960.000	AV	46.0	31.8	7.8	41.1	44.5	53.9	9.4	128	63	
Hori.	7440.000	AV	34.3	37.4	9.3	41.1	39.9	53.9	14.0	100	0	
Hori.	9920.000	AV	35.0	38.9	10.1	38.8	45.2	53.9	8.7	202	16	
Hori.	12400.000	AV	30.2	39.7	11.4	39.1	42.2	53.9	11.7	100	0	
Vert.	138.836	QP	35.6	14.4	8.6	31.8	26.8	43.5	16.7	100	119	
Vert.	809.997	QP	34.0	21.0	9.8	31.3	33.5	46.0	12.5	100	46	
Vert.	855.105	QP	26.6	21.6	10.0	31.1	27.1	46.0	18.9	100	29	
Vert.	900.039	QP	26.9	22.3	10.2	30.9	28.5	46.0	17.5	100	85	
Vert.	1652.704	PK	47.3	25.9	13.8	41.0	46.0	73.9	27.9	100	54	
Vert.	2483.500	PK	44.9	26.9	14.8	41.0	45.6	73.9	28.3	100	320	
Vert.	4960.000	PK	53.8	31.8	7.8	41.1	52.3	73.9	21.6	100	0	
Vert.	7440.000	PK	45.0	37.4	9.3	41.1	50.6	73.9	23.3	100	0	
Vert.	9920.000	PK	43.4	38.9	10.1	38.8	53.6	73.9	20.3	190	9	
Vert.	12400.000	PK	41.4	39.7	11.4	39.1	53.4	73.9	20.5	100	0	
Vert.	1652.704	AV	40.6	25.9	13.8	41.0	39.3	53.9	14.6	100	54	
Vert.	2483.500	AV	33.0	26.9	14.8	41.0	33.7	53.9	20.2	100	320	
Vert.	4960.000	AV	48.6	31.8	7.8	41.1	47.1	53.9	6.8	100	0	
Vert.	7440.000	AV	33.3	37.4	9.3	41.1	38.9	53.9	15.0	100	0	
Vert.	9920.000	AV	30.5	38.9	10.1	38.8	40.7	53.9	13.2	190	9	
Vert.	12400.000	AV	30.2	39.7	11.4	39.1	42.2	53.9	11.7	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

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Radiated Emission

Test place	No.2 and No.3 Semi Anechoic Chamber		
Date	April 4, 2014	April 16, 2014	April 16, 2014
Temperature / Humidity	22 deg.C, 44 %RH	24 deg.C, 33 %RH	23 deg.C, 37 %RH
Engineer	Wataru Kojima	Wataru Kojima	Takahiro Suzuki
Mode	Tx, 2402 MHz		
	Tx, Bluetooth, EDR, PRBS9		

(* 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.	135.000	QP	41.4	14.1	8.4	31.8	32.1	43.5	11.4	244	235	
Hori.	138.690	QP	37.8	14.4	8.6	31.8	29.0	43.5	14.5	263	57	
Hori.	616.934	QP	30.1	19.2	9.0	31.6	26.7	46.0	19.3	100	261	
Hori.	1602.017	PK	47.3	25.8	13.7	40.9	45.9	73.9	28.0	100	209	
Hori.	2390.000	PK	45.1	26.8	14.7	41.1	45.5	73.9	28.4	100	336	
Hori.	2400.000	PK	56.4	26.8	14.7	41.1	56.8	73.9	17.1	100	336	
Hori.	4804.000	PK	50.8	30.9	7.9	41.2	48.4	73.9	25.5	125	304	
Hori.	7206.000	PK	45.5	37.1	9.1	41.0	50.7	73.9	23.2	100	0	
Hori.	9608.000	PK	44.9	38.6	10.2	38.9	54.8	73.9	19.1	100	0	
Hori.	12010.000	PK	41.0	39.6	11.2	39.1	52.7	73.9	21.2	100	0	
Hori.	1602.017	AV	37.4	25.8	13.7	40.9	36.0	53.9	17.9	100	209	
Hori.	2390.000	AV	33.2	26.8	14.7	41.1	33.6	53.9	20.3	100	336	
Hori.	2400.000	AV	41.0	26.8	14.7	41.1	41.4	53.9	12.5	100	336	
Hori.	4804.000	AV	33.6	30.9	7.9	41.2	31.2	53.9	22.7	125	304	
Hori.	7206.000	AV	34.0	37.1	9.1	41.0	39.2	53.9	14.7	100	0	
Hori.	9608.000	AV	32.4	38.6	10.2	38.9	42.3	53.9	11.6	100	0	
Hori.	12010.000	AV	29.4	39.6	11.2	39.1	41.1	53.9	12.8	100	0	
Vert.	131.322	QP	35.0	13.8	8.4	31.8	25.4	43.5	18.1	100	92	
Vert.	134.985	QP	37.1	14.1	8.4	31.8	27.8	43.5	15.7	100	190	
Vert.	730.330	QP	27.7	20.5	9.5	31.5	26.2	46.0	19.8	100	43	
Vert.	809.989	QP	33.7	21.0	9.8	31.3	33.2	46.0	12.8	100	51	
Vert.	852.158	QP	27.5	21.6	10.0	31.1	28.0	46.0	18.0	100	58	
Vert.	1602.017	PK	48.9	25.8	13.7	40.9	47.5	73.9	26.4	100	63	
Vert.	2390.000	PK	45.6	26.8	14.7	41.1	46.0	73.9	27.9	154	83	
Vert.	2400.000	PK	51.3	26.8	14.7	41.1	51.7	73.9	22.2	154	83	
Vert.	4804.000	PK	45.7	30.9	7.9	41.2	43.3	73.9	30.6	100	0	
Vert.	7206.000	PK	46.4	37.1	9.1	41.0	51.6	73.9	22.3	100	0	
Vert.	9608.000	PK	44.2	38.6	10.2	38.9	54.1	73.9	19.8	100	0	
Vert.	12010.000	PK	42.0	39.6	11.2	39.1	53.7	73.9	20.2	100	0	
Vert.	1602.017	AV	41.6	25.8	13.7	40.9	40.2	53.9	13.7	100	63	
Vert.	2390.000	AV	33.1	26.8	14.7	41.1	33.5	53.9	20.4	154	83	
Vert.	2400.000	AV	36.5	26.8	14.7	41.1	36.9	53.9	17.0	154	83	
Vert.	4804.000	AV	33.4	30.9	7.9	41.2	31.0	53.9	22.9	100	0	
Vert.	7206.000	AV	34.1	37.1	9.1	41.0	39.3	53.9	14.6	100	0	
Vert.	9608.000	AV	32.3	38.6	10.2	38.9	42.2	53.9	11.7	100	0	
Vert.	12010.000	AV	29.5	39.6	11.2	39.1	41.2	53.9	12.7	100	0	

Result = Reading + Ant.Fac. + Loss (Cable+Attenuator+Filter-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.2 and No.3 Semi Anechoic Chamber
 Date April 4, 2014 April 16, 2014 April 16, 2014
 Temperature / Humidity 22 deg.C, 44 %RH 24 deg.C, 33 %RH 23 deg.C, 37 %RH
 Engineer Wataru Kojima Wataru Kojima Takahiro Suzuki
 Mode Tx, 2441 MHz
 Tx, Bluetooth, EDR, PRBS9

(* 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.	135.002	QP	41.8	14.1	8.4	31.8	32.5	43.5	11.0	244	231	
Hori.	138.838	QP	37.7	14.4	8.6	31.8	28.9	43.5	14.6	233	56	
Hori.	620.969	QP	33.4	19.3	9.0	31.6	30.1	46.0	15.9	100	237	
Hori.	1626.708	PK	48.5	25.9	13.7	41.0	47.1	73.9	26.8	100	209	
Hori.	4882.000	PK	46.6	31.4	7.9	41.1	44.8	73.9	29.1	100	223	
Hori.	7323.000	PK	47.2	37.2	9.1	41.1	52.4	73.9	21.5	100	0	
Hori.	9764.000	PK	45.4	38.8	10.1	38.8	55.5	73.9	18.4	100	0	
Hori.	12205.000	PK	42.5	39.6	11.3	39.1	54.3	73.9	19.6	100	0	
Hori.	1626.708	AV	40.5	25.9	13.7	41.0	39.1	53.9	14.8	100	209	
Hori.	4882.000	AV	35.2	31.4	7.9	41.1	33.4	53.9	20.5	100	223	
Hori.	7323.000	AV	34.0	37.2	9.1	41.1	39.2	53.9	14.7	100	0	
Hori.	9764.000	AV	32.8	38.8	10.1	38.8	42.9	53.9	11.0	100	0	
Hori.	12205.000	AV	30.7	39.6	11.3	39.1	42.5	53.9	11.4	100	0	
Vert.	131.398	QP	34.9	13.9	8.4	31.8	25.4	43.5	18.1	100	103	
Vert.	138.838	QP	35.5	14.4	8.6	31.8	26.7	43.5	16.8	100	124	
Vert.	762.797	QP	29.0	20.7	9.6	31.5	27.8	46.0	18.2	100	60	
Vert.	809.996	QP	33.5	21.0	9.8	31.3	33.0	46.0	13.0	100	38	
Vert.	824.473	QP	25.6	21.2	9.9	31.3	25.4	46.0	20.6	100	38	
Vert.	853.707	QP	26.4	21.6	10.0	31.1	26.9	46.0	19.1	100	68	
Vert.	1626.708	PK	48.0	25.9	13.7	41.0	46.6	73.9	27.3	100	0	
Vert.	4882.000	PK	47.6	31.4	7.9	41.1	45.8	73.9	28.1	100	193	
Vert.	7323.000	PK	44.3	37.2	9.1	41.1	49.5	73.9	24.4	100	0	
Vert.	9764.000	PK	45.6	38.8	10.1	38.8	55.7	73.9	18.2	100	0	
Vert.	12205.000	PK	45.2	39.6	11.3	39.1	57.0	73.9	16.9	100	0	
Vert.	1626.708	AV	40.8	25.9	13.7	41.0	39.4	53.9	14.5	100	0	
Vert.	4882.000	AV	36.2	31.4	7.9	41.1	34.4	53.9	19.5	100	193	
Vert.	7323.000	AV	34.0	37.2	9.1	41.1	39.2	53.9	14.7	100	0	
Vert.	9764.000	AV	32.3	38.8	10.1	38.8	42.4	53.9	11.5	100	0	
Vert.	12205.000	AV	30.8	39.6	11.3	39.1	42.6	53.9	11.3	100	0	

Result = Reading + Ant.Fac. + Loss (Cable+Attenuator+Filter-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.2 and No.3 Semi Anechoic Chamber
 Date April 4, 2014 April 16, 2014 April 16, 2014
 Temperature / Humidity 22 deg.C, 44 %RH 24 deg.C, 33 %RH 23 deg.C, 37 %RH
 Engineer Wataru Kojima Wataru Kojima Takahiro Suzuki
 Mode Tx, 2480 MHz
 Tx, Bluetooth, EDR, PRBS9

(* 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.	134.999	QP	41.9	14.1	8.4	31.8	32.6	43.5	10.9	245	229	
Hori.	138.860	QP	37.6	14.4	8.6	31.8	28.8	43.5	14.7	229	222	
Hori.	610.229	QP	32.3	19.1	9.0	31.6	28.8	46.0	17.2	100	178	
Hori.	1652.683	PK	48.1	25.9	13.8	41.0	46.8	73.9	27.1	100	184	
Hori.	2483.500	PK	49.1	26.9	14.8	41.0	49.8	73.9	24.1	207	342	
Hori.	4960.000	PK	47.5	31.8	7.8	41.1	46.0	73.9	27.9	100	219	
Hori.	7440.000	PK	46.1	37.4	9.3	41.1	51.7	73.9	22.2	100	0	
Hori.	9920.000	PK	42.3	38.9	10.1	38.8	52.5	73.9	21.4	100	0	
Hori.	12400.000	PK	41.8	39.7	11.4	39.1	53.8	73.9	20.1	100	0	
Hori.	1652.683	AV	40.6	25.9	13.8	41.0	39.3	53.9	14.6	100	184	
Hori.	2483.500	AV	35.4	26.9	14.8	41.0	36.1	53.9	17.8	207	342	
Hori.	4960.000	AV	34.9	31.8	7.8	41.1	33.4	53.9	20.5	100	219	
Hori.	7440.000	AV	34.3	37.4	9.3	41.1	39.9	53.9	14.0	100	0	
Hori.	9920.000	AV	33.1	38.9	10.1	38.8	43.3	53.9	10.6	100	0	
Hori.	12400.000	AV	30.0	39.7	11.4	39.1	42.0	53.9	11.9	100	0	
Vert.	131.355	QP	35.3	13.9	8.4	31.8	25.8	43.5	17.7	100	95	
Vert.	809.998	QP	33.8	21.0	9.8	31.3	33.3	46.0	12.7	100	51	
Vert.	854.049	QP	26.6	21.6	10.0	31.1	27.1	46.0	18.9	100	96	
Vert.	900.033	QP	27.0	22.3	10.2	30.9	28.6	46.0	17.4	100	70	
Vert.	1652.683	PK	49.0	25.9	13.8	41.0	47.7	73.9	26.2	100	55	
Vert.	2483.500	PK	45.4	26.9	14.8	41.0	46.1	73.9	27.8	100	318	
Vert.	4960.000	PK	48.5	31.8	7.8	41.1	47.0	73.9	26.9	100	160	
Vert.	7440.000	PK	46.0	37.4	9.3	41.1	51.6	73.9	22.3	100	0	
Vert.	9920.000	PK	44.7	38.9	10.1	38.8	54.9	73.9	19.0	100	0	
Vert.	12400.000	PK	41.2	39.7	11.4	39.1	53.2	73.9	20.7	100	0	
Vert.	1652.683	AV	41.5	25.9	13.8	41.0	40.2	53.9	13.7	100	55	
Vert.	2483.500	AV	33.3	26.9	14.8	41.0	34.0	53.9	19.9	100	318	
Vert.	4960.000	AV	37.2	31.8	7.8	41.1	35.7	53.9	18.2	100	160	
Vert.	7440.000	AV	34.2	37.4	9.3	41.1	39.8	53.9	14.1	100	0	
Vert.	9920.000	AV	32.6	38.9	10.1	38.8	42.8	53.9	11.1	100	0	
Vert.	12400.000	AV	30.0	39.7	11.4	39.1	42.0	53.9	11.9	100	0	

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

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

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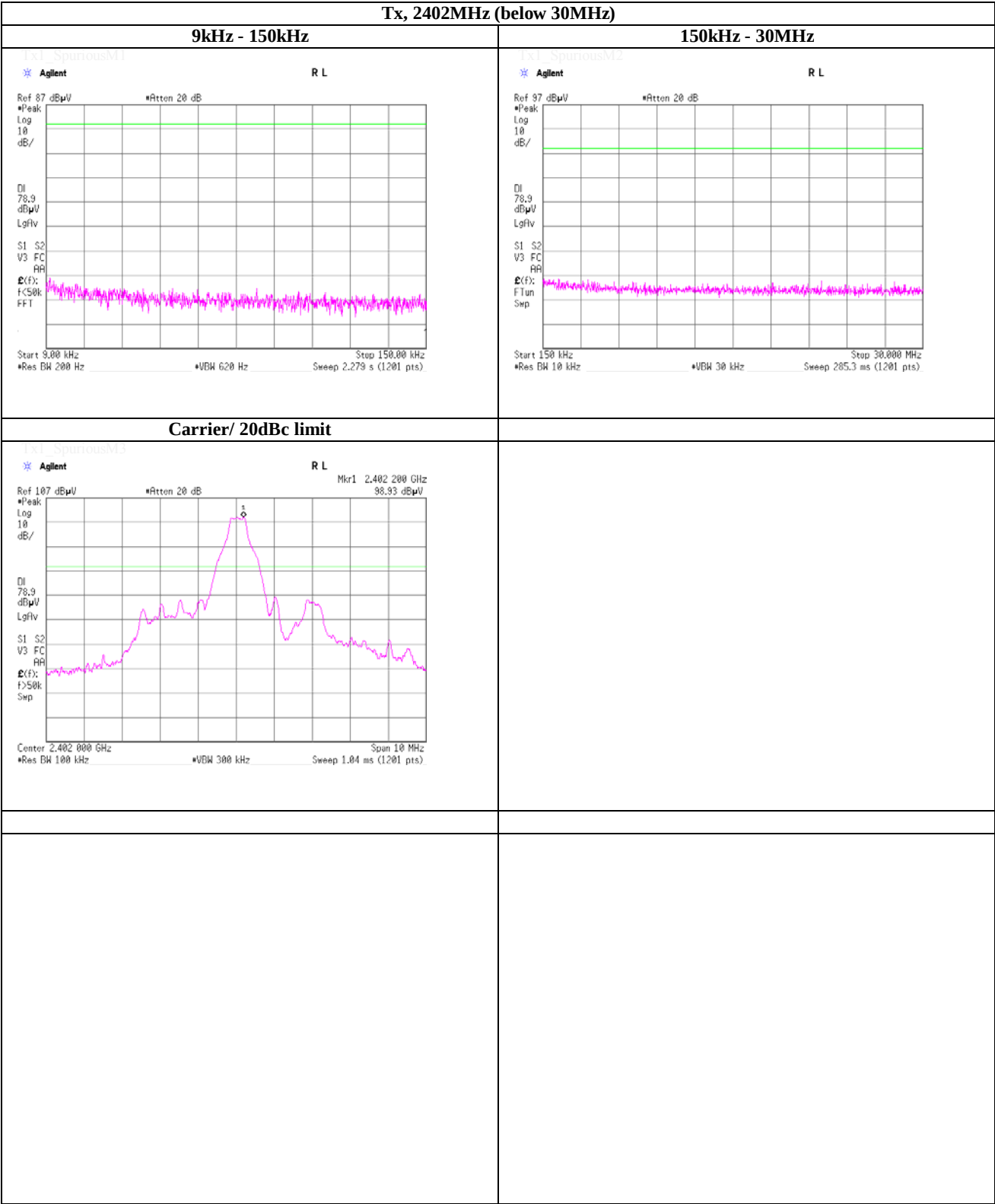
Facsimile : +81 463 50 6401

Test place UL Japan, Inc. Shonan EMC Lab. No.5 Shielded Room
Date April 3, 2014
Temperature / Humidity 25 deg.C , 38 %RH
Engineer Makoto Hosaka

Spurious emission (Conducted)

Tx, Bluetooth, BDR, PRBS9

Tx, 2402MHz (below 30MHz)



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Test place

UL Japan, Inc. Shonan EMC Lab. No.5 Shielded Room

Date

April 3, 2014

Temperature / Humidity

25 deg.C , 38 %RH

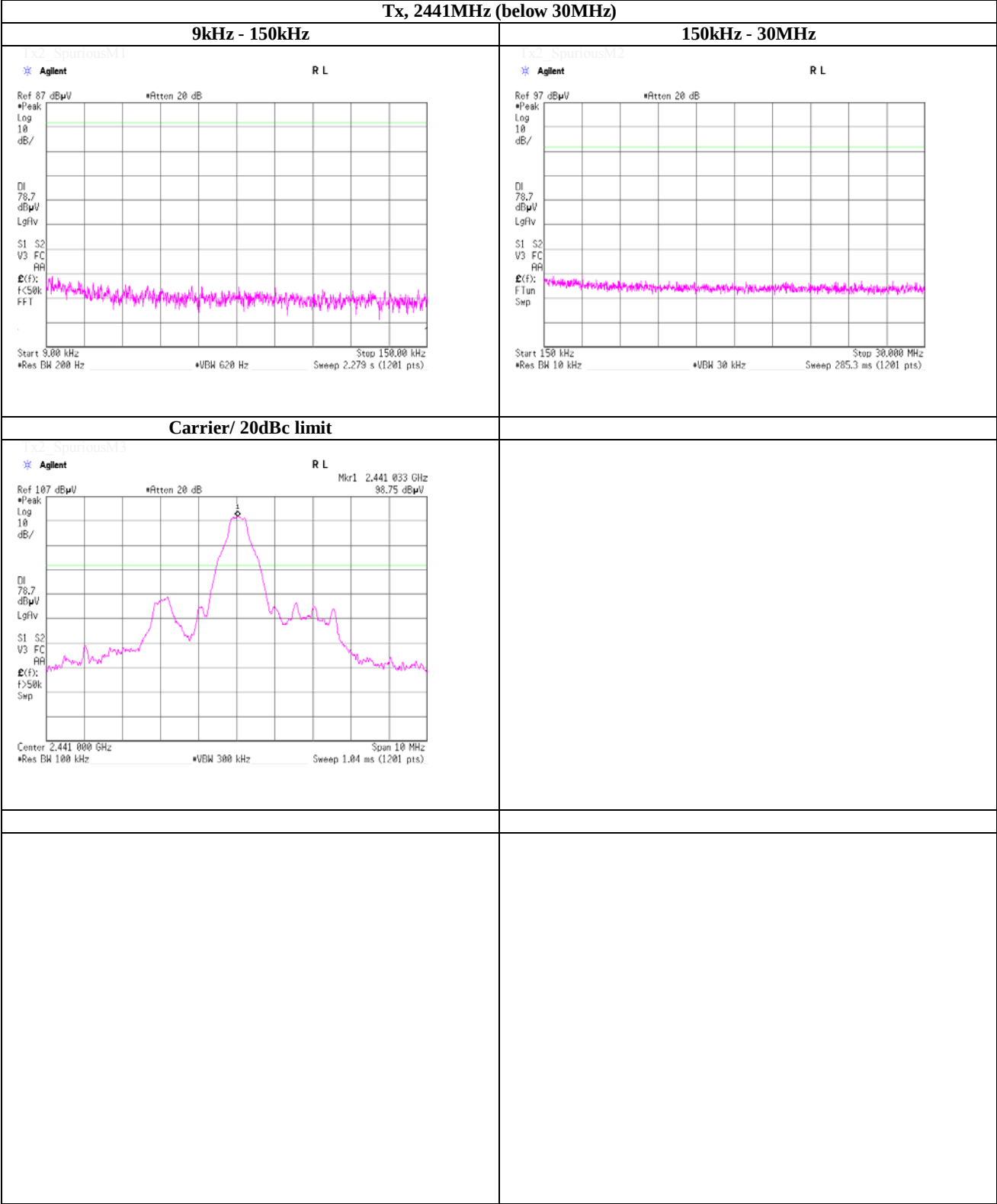
Engineer

Makoto Hosaka

Spurious emission (Conducted)

Tx, Bluetooth, BDR, PRBS9

Tx, 2441MHz (below 30MHz)



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Test place

UL Japan, Inc. Shonan EMC Lab. No.5 Shielded Room

Date

April 3, 2014

Temperature / Humidity

25 deg.C , 38 %RH

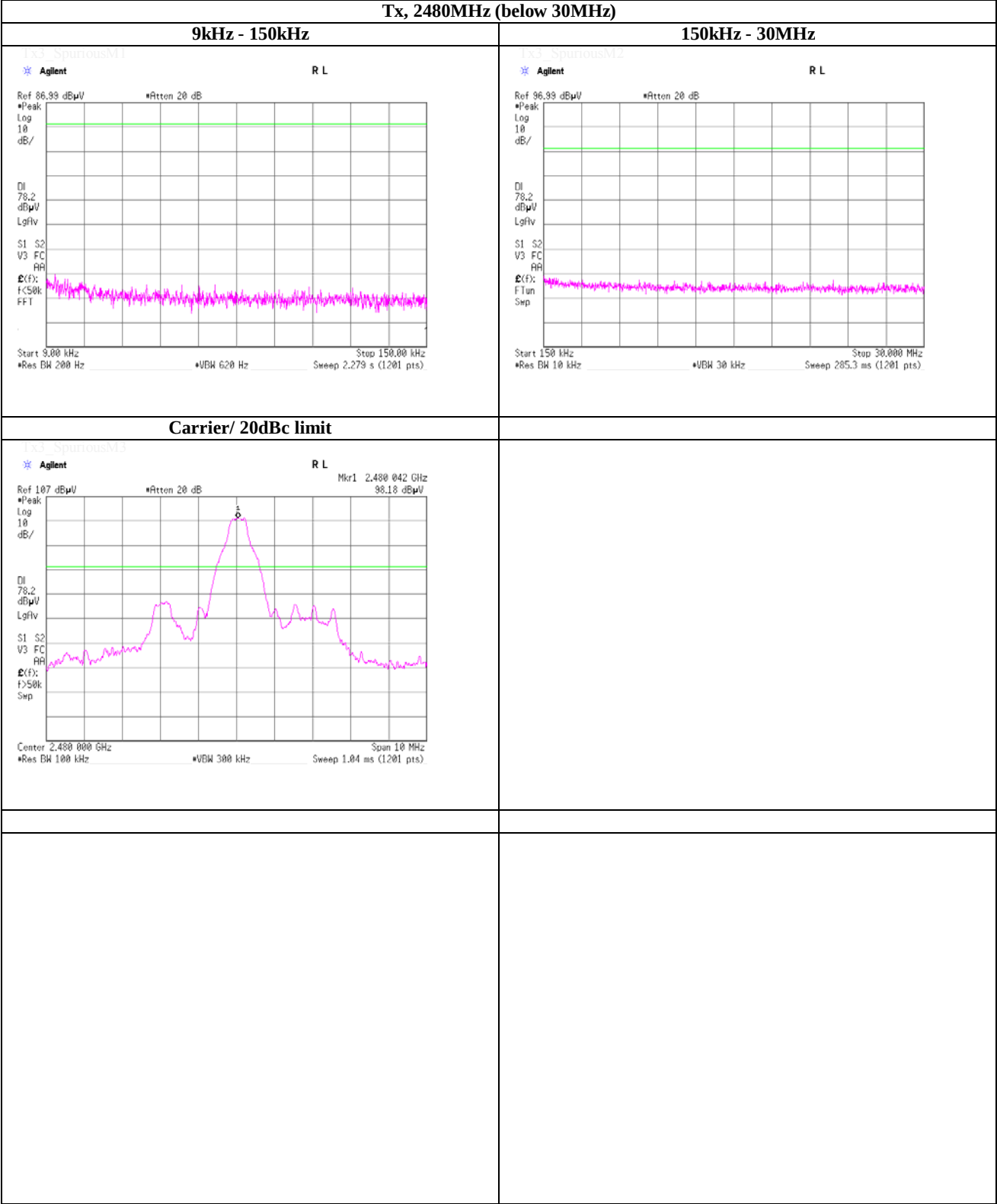
Engineer

Makoto Hosaka

Spurious emission (Conducted)

Tx, Bluetooth, BDR, PRBS9

Tx, 2480MHz (below 30MHz)



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Test place

UL Japan, Inc. Shonan EMC Lab.

No.5 Shielded Room

Date

April 3, 2014

Temperature / Humidity

25 deg.C , 38 %RH

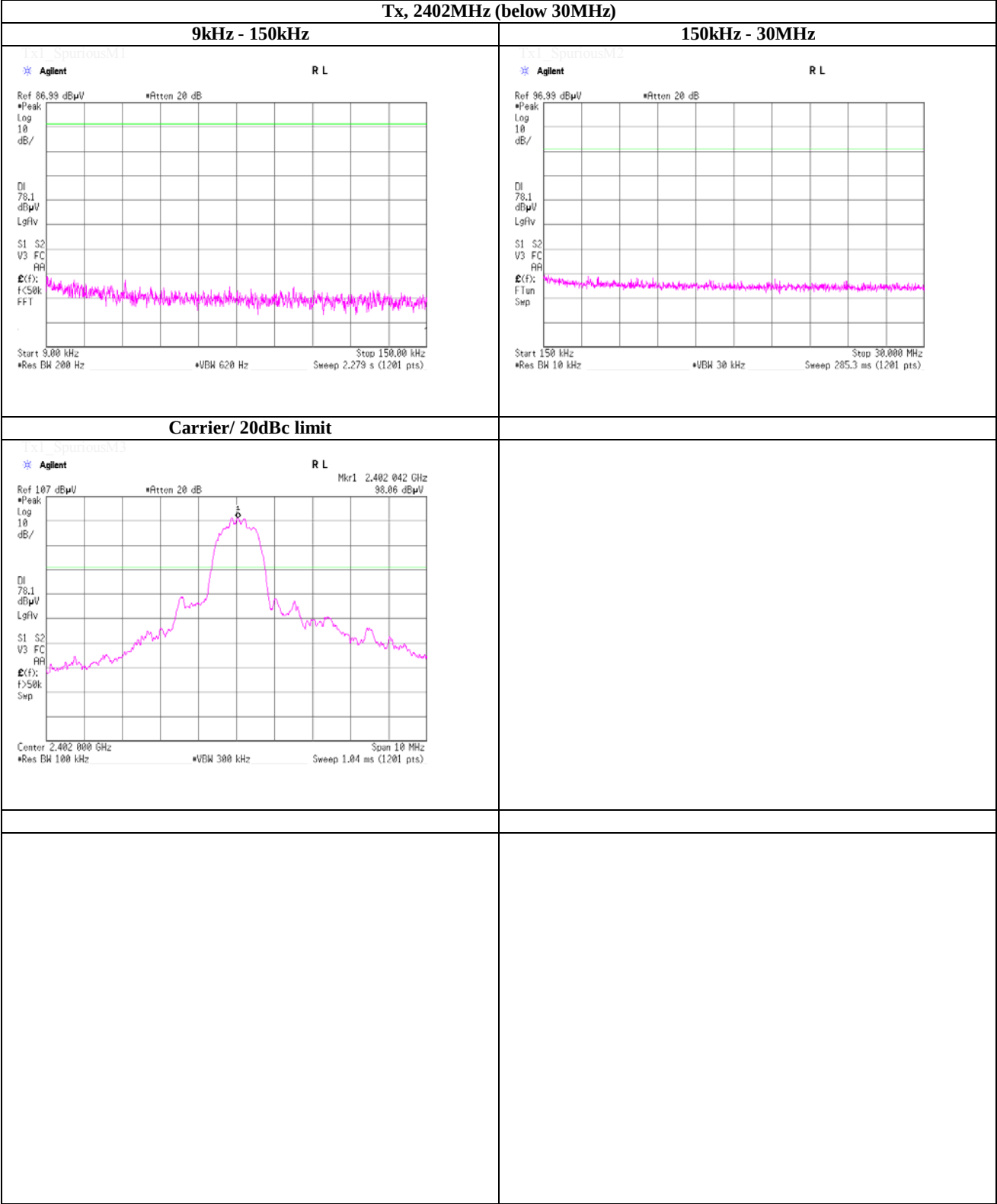
Engineer

Makoto Hosaka

Spurious emission (Conducted)

Tx, Bluetooth, EDR, PRBS9

Tx, 2402MHz (below 30MHz)



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Test place

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No.5 Shielded Room

Date

April 3, 2014

Temperature / Humidity

25 deg.C , 38 %RH

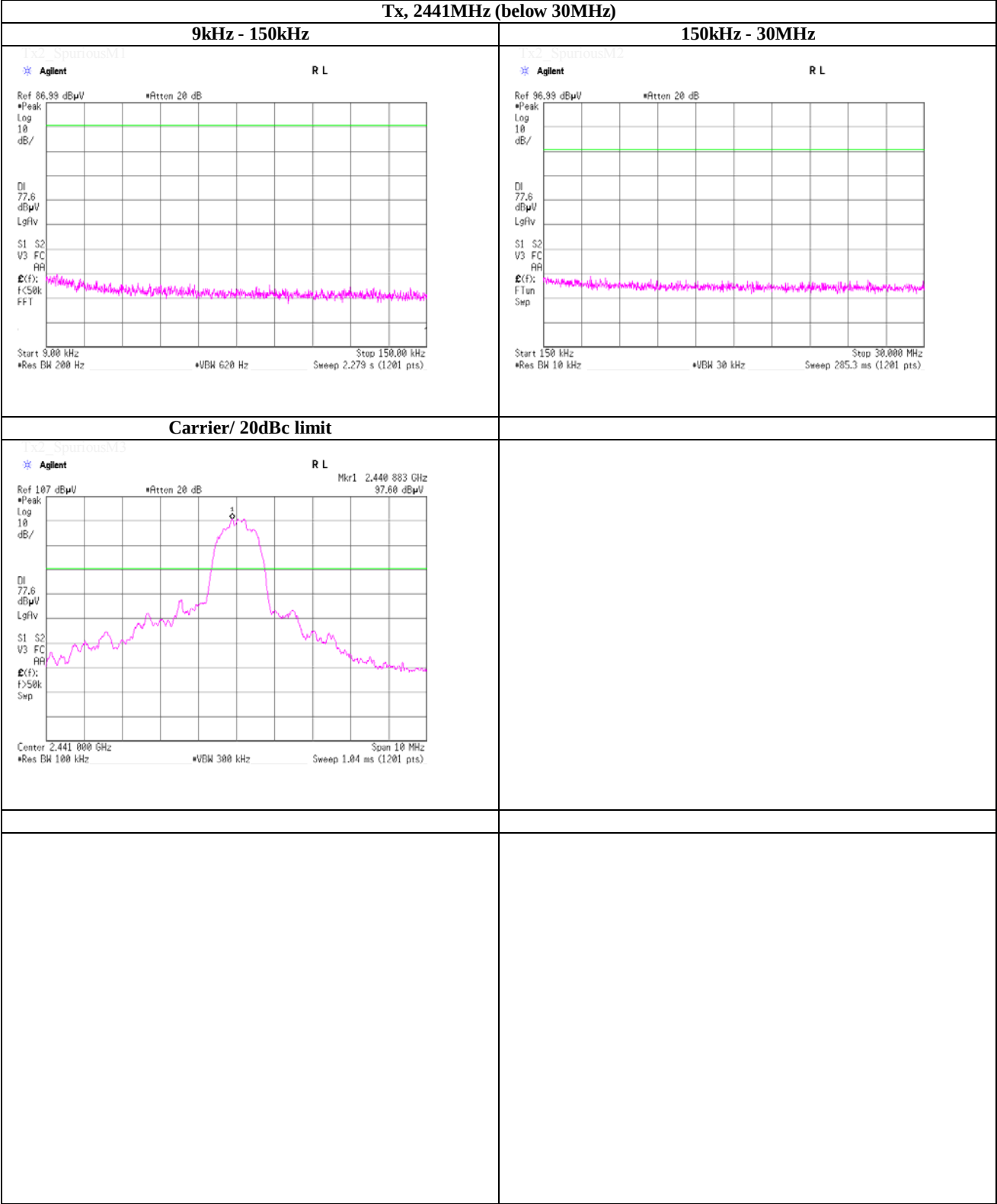
Engineer

Makoto Hosaka

Spurious emission (Conducted)

Tx, Bluetooth, EDR, PRBS9

Tx, 2441MHz (below 30MHz)



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Temperature / Humidity

25 deg.C , 38 %RH

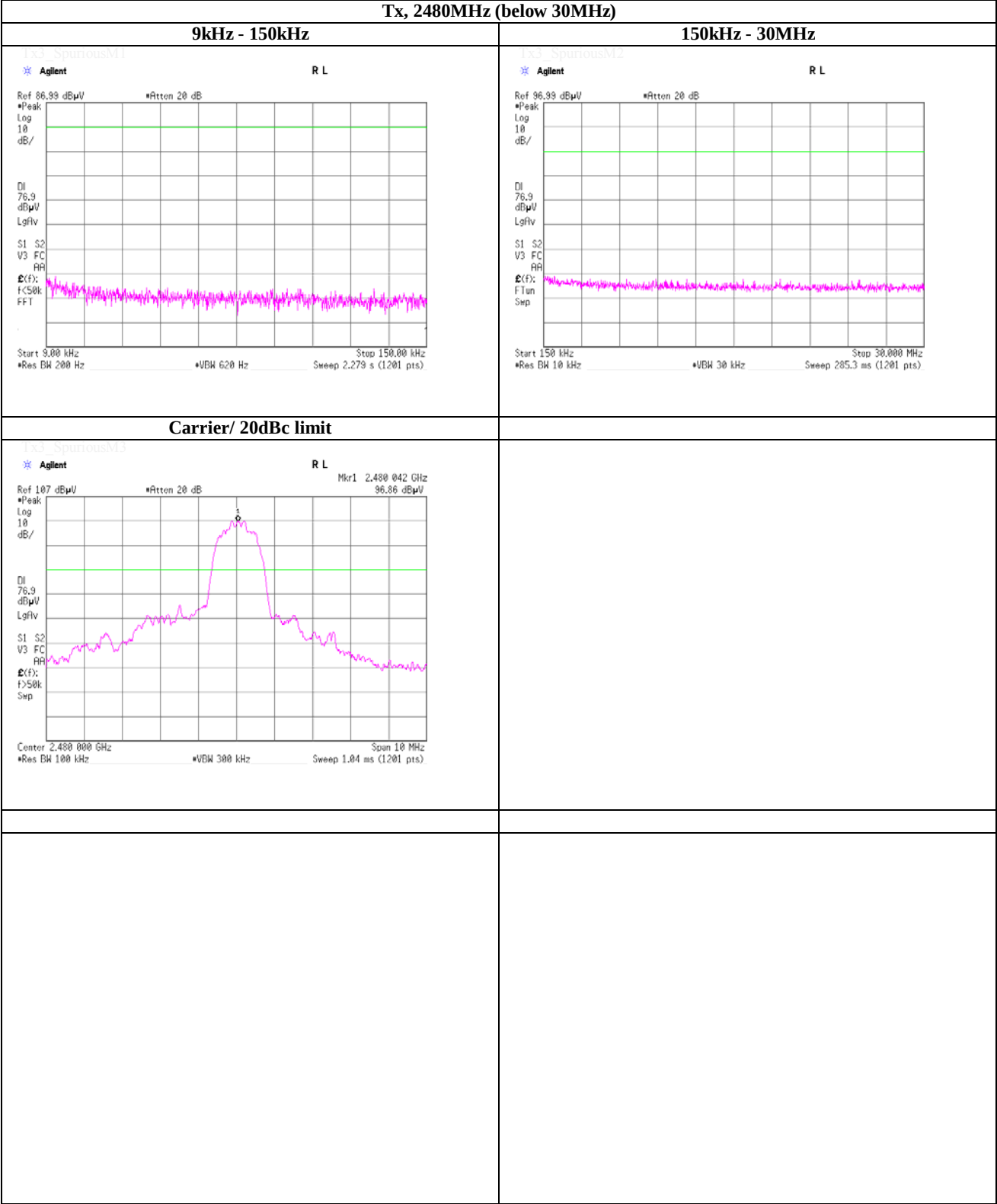
Engineer

Makoto Hosaka

Spurious emission (Conducted)

Tx, Bluetooth, EDR, PRBS9

Tx, 2480MHz (below 30MHz)



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No.5 Shielded Room

Date

April 3, 2014

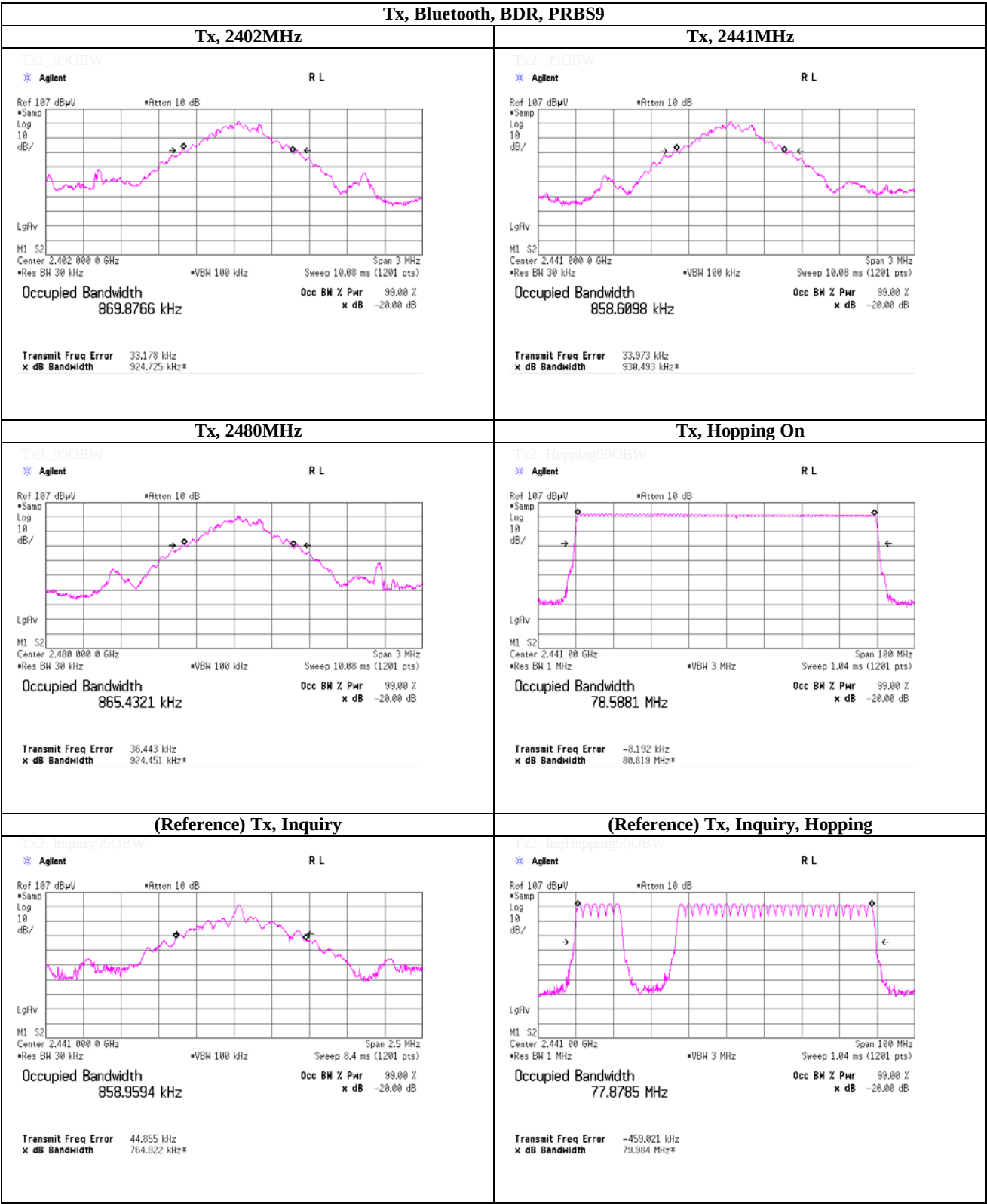
Temperature / Humidity

25 deg.C , 38 %RH

Engineer

Makoto Hosaka

99% Occupied Bandwidth



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Test place

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Date

April 3, 2014

Temperature / Humidity

25 deg.C , 38 %RH

Engineer

Makoto Hosaka

99% Occupied Bandwidth

Tx, Bluetooth, EDR, PRBS9	
Tx, 2402MHz	Tx, 2441MHz
Tx1_99OBW Agilent R L Ref 107 dBμV •Samp Log 10 dB/ Lgflv M1 S2 Center 2.402 000 0 GHz •Res BW 30 kHz •VBW 100 kHz Sweep 10.00 ms (1201 pts) Span 3 MHz Occupied Bandwidth 1.1819 MHz Transmit Freq Error 40.075 kHz x dB Bandwidth 1.253 MHz* Occ BW % Pwr 99.00 % x dB -20.00 dB	Tx2_99OBW Agilent R L Ref 107 dBμV •Samp Log 10 dB/ Lgflv M1 S2 Center 2.441 000 0 GHz •Res BW 30 kHz •VBW 100 kHz Sweep 10.00 ms (1201 pts) Span 3 MHz Occupied Bandwidth 1.1763 MHz Transmit Freq Error 33.492 kHz x dB Bandwidth 1.254 MHz* Occ BW % Pwr 99.00 % x dB -20.00 dB
Tx, 2480MHz	Tx, Hopping On
Tx3_99OBW Agilent R L Ref 107 dBμV •Samp Log 10 dB/ Lgflv M1 S2 Center 2.480 000 0 GHz •Res BW 30 kHz •VBW 100 kHz Sweep 10.00 ms (1201 pts) Span 3 MHz Occupied Bandwidth 1.1745 MHz Transmit Freq Error 34.041 kHz x dB Bandwidth 1.252 MHz* Occ BW % Pwr 99.00 % x dB -20.00 dB	Tx2_Hopping99OBW Agilent R L Ref 107 dBμV •Samp Log 10 dB/ Lgflv M1 S2 Center 2.441 00 GHz •Res BW 1 MHz •VBW 3 MHz Sweep 1.04 ms (1201 pts) Span 100 MHz Occupied Bandwidth 78.6537 MHz Transmit Freq Error -33.753 kHz x dB Bandwidth 80.369 MHz* Occ BW % Pwr 99.00 % x dB -20.00 dB
Tx2_Inquiry99OBW	Tx2_InqHopping99OBW

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APPENDIX 3 Test Instruments

EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
SPM-06	Power Meter	Anritsu	ML2495A	0850009	AT	2014/04/08 * 12
SPSS-03	Power sensor	Anritsu	MA2411B	0917063	AT	2014/04/08 * 12
KSA-08	Spectrum Analyzer	Agilent	E4446A	MY46180525	AT	2014/03/04 * 12
SAT10-11	Attenuator	Weinschel Corp.	54A-10	37588	AT	2014/04/22 * 12
SCC-G11	Coaxial Cable	Suhner	SUCOFLEX 102	31595/2	AT	2014/03/13 * 12
SOS-09	Humidity Indicator	A&D	AD-5681	4061484	AT	2014/03/07 * 12
SAF-02	Pre Amplifier	SONOMA	310N	290212	RE	2014/02/17 * 12
SAT6-02	Attenuator	JFW	50HF-006N	-	RE	2014/02/17 * 12
KAT3-11	Attenuator	JFW IND. INC.	50HF-003N	-	RE	2013/08/19 * 12
SBA-02	Biconical Antenna	Schwarzbeck	BBA9106	91032665	RE	2013/11/24 * 12
SCC-B1/B3/B5/B7/B8/B13/SRSE-02	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141PE/NS4906	-/0901-270(RF Selector)	RE	2014/04/25 * 12
SCC-B2/B4/B6/B7/B8/B13/SRSE-02	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141PE/NS4906	-/0901-270(RF Selector)	RE	2014/04/25 * 12
SLA-02	Logperiodic Antenna	Schwarzbeck	UHALP9108A	UHALP 9108-A 0893	RE	2013/11/24 * 12
SOS-03	Humidity Indicator	A&D	AD-5681	4063325	RE	2014/02/21 * 12
STR-07	Test Receiver	Rohde & Schwarz	ESU26	100484	RE	2014/02/18 * 12
SJM-02	Measure	KOMELON	KMC-36	-	RE	-
SAEC-02(NSA)	Semi-Anechoic Chamber	TDK	SAEC-02(NSA)	2	RE	2013/07/06 * 12
COTS-SEMI-I	EMI Software	TSJ	TEPTO-DV(RE,CE,RF,LF)	-	RE	-
SAEC-03(NSA)	Semi-Anechoic Chamber	TDK	SAEC-03(NSA)	3	RE	2013/07/09 * 12
SAF-06	Pre Amplifier	TOYO Corporation	TPA0118-36	1440491	RE	2013/07/22 * 12
SCC-G03	Coaxial Cable	Suhner	SUCOFLEX 104A	46499/4A	RE	2013/04/11 * 12
SCC-G23	Coaxial Cable	Suhner	SUCOFLEX 104	297342/4	RE	2013/05/22 * 12
SHA-03	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-739	RE	2013/08/19 * 12
SOS-05	Humidity Indicator	A&D	AD-5681	4062518	RE	2014/02/21 * 12
SSA-01	Spectrum Analyzer	Agilent	N9010A-526	MY48031482	RE	2014/04/07 * 12
SJM-11	Measure	PROMART	SEN1935	-	RE	-
SFL-02	Highpass Filter	MICRO-TRONICS	HPM50111	051		2013/11/22 * 12
SAT10-05	Attenuator(above1GHz)	Agilent	8493C-010	74864	AT	2013/11/22 * 12
SCC-G15	Coaxial Cable	Suhner	SUCOFLEX 102	32703/2	RE	2014/03/13 * 12
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

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 :

RE: Radiated emission,

AT: Antenna terminal conducted test