



Test report No. : 10028551S-N
Page : 1 of 90
Issued date : August 5, 2013
Revised date : September 10, 2013
FCC ID : CWTUGZZF2


RADIO TEST REPORT


Test Report No.: 10028551S-N

Applicant : ALPS ELECTRIC CO., LTD.
Type of Equipment : BLUETOOTH™ Module
Model No. : UGZZF-2
FCC ID : CWTUGZZF2
Test regulation : FCC Part15 Subpart C: 2013
Test result : Complied

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Date of test: July 11 to 18, 2013

Tested by: 
Tatsuya Arai
Engineer of WiSE Japan,
UL Verification Service

Approved by : 
Go Ishiwata
Manager of WiSE Japan,
UL Verification Service



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13-EM-F0429

REVISION HISTORY

Original Test Report No.: 10028551S-N

Revision	Test report No.	Date	Page revised	Contents
- (Original)	10028551S-N	August 5, 2013	-	-
1	10028551S-N	September 4, 2013	4	Correction of radio specification (antenna connector type)
2	10028551S-N	September 10, 2013	4	Correction of supplied voltage

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SECTION 1: Customer information

Company Name : ALPS ELECTRIC CO., LTD.
Address : 6-3-36 Furukawa-nakazato, Osaki-shi, Miyagi-ken, 989-6181 Japan
Telephone Number : +81 229 24 6341
Facsimile Number : +81 229 24 7016
Contact Person : Yuji Ouchi

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

2.1 Identification of E.U.T.

Type of Equipment : BLUETOOTH™ Module
Model Number : UGZZF-2
Serial Number : 3
Rating : DC3.3V / 1.25V
Country of Mass-production : Japan
Condition of EUT : Production prototype
(Not for Sale: This sample is equivalent to mass-produced items.)
Receipt Date of Sample : July 6, 2013
Modification of EUT : No modification by the test lab.

2.2 Product description

Model: UGZZF-2 (referred to as the EUT in this report) is a BLUETOOTH™ Module.

Clock frequency(ies) in the system : 26MHz, 12.288MHz, 48MHz

<Radio part>

Equipment type : Transceiver
Frequency of operation : 2402-2480MHz
Bandwidth & channel spacing : 1MHz & 1MHz
Type of modulation : FHSS
Operation temperature range : -40 to +85 deg.C.
Antenna type & Antenna gain : Printed antenna ($\lambda/2$ Dipole), 2.6dBi max
Printed antenna ($\lambda/4$ PIFA), 2.8dBi max
Chip antenna (Monopole), 1.7dBi max
Printed antenna ($\lambda/4$ PIFA, Internal of module), 1.2dBi max
Antenna connector type : 60pin Connector, M/N: 60P3.0-JMCS-G-B-TF (N)

FCC 15.31 (e) / 212

The stable voltage (DC3.3V / 1.25V) is constantly provided to RF Module from the host device regardless of input voltage. Therefore, the EUT complies with the requirement.

FCC 15.203 / 212

The EUT has a unique coupling/antenna connector (60pin Connector, M/N: 60P3.0-JMCS-G-B-TF (N)). Therefore, the equipment complies with the antenna requirement.

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SECTION 3: Test specification, procedures & results

3.1 Test specification

Test specification : FCC Part 15 Subpart C: 2013, final revised on June 11, 2013 and effective July 11, 2013
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

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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	13.1dB Freq.: 0.55698MHz Detection: Quasi-Peak Phase: N Mode: Tx 2402MHz, DH5 Antenna: Dipole Freq.: 0.55711MHz Detection: Quasi-Peak Phase: N Mode: Tx 2402MHz, 3-DH5 Antenna: Dipole	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		6.1dB Freq.: 4960.000MHz Polarization: Vertical Detection: Average Mode: Tx 2480MHz, DH5 Antenna: Dipole
Note: UL Japan's Work Procedures No. 13-EM-W0420 and 13-EM-W0422						

Test data was obtained to compare the two models: UGZZF-1 and UGZZF-2, in which the same Bluetooth block is installed. (Refer to Comparison Sheet in page 81.) We have judged there is no difference and in the result, therefore the test data of UGZZF-1 is used for UGZZF-2.

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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 (±)
Conducted emission (AC Mains) AMN/LISN	150kHz-30MHz	3.6 dB	3.6 dB	3.5 dB
Radiated emission (Measurement distance: 3m)	9kHz-30MHz	3.7 dB	3.7 dB	3.6 dB
	30MHz-300MHz	4.9 dB	5.1 dB	4.9 dB
	300MHz-1GHz	5.0 dB	5.2 dB	4.9 dB
	1GHz-15GHz	4.8 dB	4.8 dB	4.9 dB
Radiated emission (Measurement distance: 1m)	15GHz-18GHz	5.6 dB	5.6 dB	5.6 dB
	18GHz-40GHz	4.6 dB	4.3 dB	4.4 dB

*1: SAC=Semi-Anechoic Chamber

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

Conducted emission

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

Radiated emission

The data listed in this test report has enough margins, more than 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: (±) 1.7dB

Spurious emission (Conducted) measurement (1G-3GHz) uncertainty for this test was: (±) 2.3dB

Spurious emission (Conducted) measurement (3G-18GHz) uncertainty for this test was: (±) 3.0dB

Spurious emission (Conducted) measurement (18G-26.5GHz) uncertainty for this test was: (±) 2.9dB

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
<input type="checkbox"/> No.1 semi-anechoic chamber	697847	2973D-1	20.6 x 11.3 x 7.65	20.6 x 11.3	10m
<input type="checkbox"/> No.2 semi-anechoic chamber	697847	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	697847	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 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 checked="" 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 checked="" type="checkbox"/> No.5 shielded room	-	-	7.8 x 6.4 x 2.7	7.8 x 6.4	-
<input type="checkbox"/> 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
Conducted emission	Transmitting Hopping OFF (DH5 / 3-DH5) Payload: PRBS9	2402MHz, 2441MHz, 2480MHz
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)	Transmitting (DH5 / 3-DH5), Payload: PRBS9 -Hopping ON -Hopping OFF	Band edge compliance: 2402MHz, 2480MHz
(Radiated)	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: CSR Blue Test3 Ver.2.5.0
(Power target: 0dBm)

Used antenna	Data of Conducted emission	Data of Radiated emission
Dipole antenna	Full operation mode	Full data
Other antennas	Transmitting, DH5, 2402MHz	Band edge Second order harmonics (worst point)

* There is 4-type of antenna. The carrier level was checked with each antenna, and full data was obtained with Dipole antenna, which output the highest power. For other antennas, the above data was obtained to show the compliance.

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

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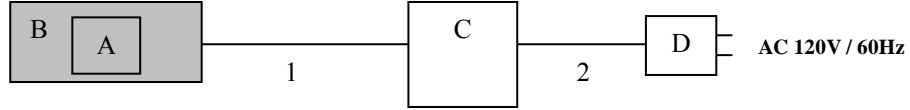
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4.2 Configuration and peripherals



* Test data was taken under worst case conditions.

Description of EUT and support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	BLUETOOTH™ Module	UGZZF-2	3	ALPS	EUT
B1	$\lambda/2$ Dipole Antenna	FZ164Z15-3	001	ALPS	EUT
B2	PIFA Antenna	FZ164Z15-2	001	ALPS	EUT
B3	Chip Antenna	FZ164Z15-1	001	TAIYO YUDEN	EUT
B4	Board for Internal Antenna	FZ164Z15-4	001	ALPS	EUT
C	Jig	-	-	ALPS	-
D	AC Adaptor	GF12-US0520	120704-54	GO FORWARD ENTERPRISE	-

List of cables used

No.	Cable	Length (m)	Shield-Cable	Shield-Connector	Remarks
1	Signal / DC	0.3	Unshielded	Unshielded	-
2	DC	1.5	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 1.5m, 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 EUT, including peripherals 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. Photographs of the setup 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 within a Shielded room. The EUT 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 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 11: 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 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 polyurethane platform of nominal size, 1m by 1.5m, raised 0.8m above the conducting ground plane. Photographs of the setup 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	Peak
IF Bandwidth	120kHz	RBW:1MHz VBW:3MHz	RBW:1MHz VBW:10Hz	RBW: 100kHz VBW: 300kHz

* 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 each position of X, Y and Z axes of EUT (Module and Antennas) to see the position of maximum noise, and the test was made at the position that has the maximum noise.

Worst case:

Subject	Antenna polarization	Carrier (Band edge)	Spurious			
			Below 1GHz	Above 1GHz		
				1-2.8GHz	2.8-15GHz	15-25GHz
Module and Dipole antenna	Horizontal	X	Y	Y	Y	Y
	Vertical	Z	Y	Z	Z	Z
Module and PIFA antenna	Horizontal	X	Y	Y	Y	Y
	Vertical	Y	Y	Y	Y	Y
Module and Chip antenna	Horizontal	X	Y	Y	Y	Y
	Vertical	Y	Y	Z	Z	Z
Module and Internal antenna	Horizontal	X	Y	Y	Y	Y
	Vertical	Y	Y	Z	Z	Z

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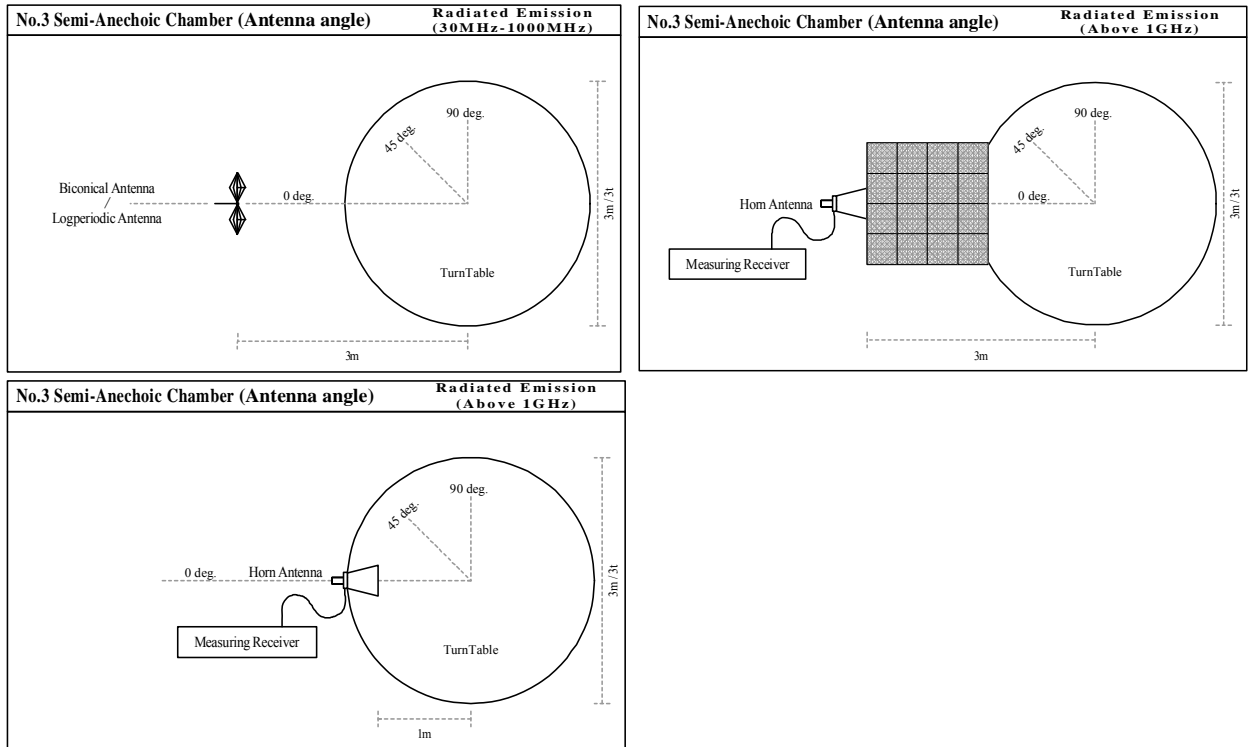
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Figure 1. Antenna angle



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 3rd order harmonics.

Refer to APPENDIX 1.

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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DATA OF CONDUCTED EMISSION TEST

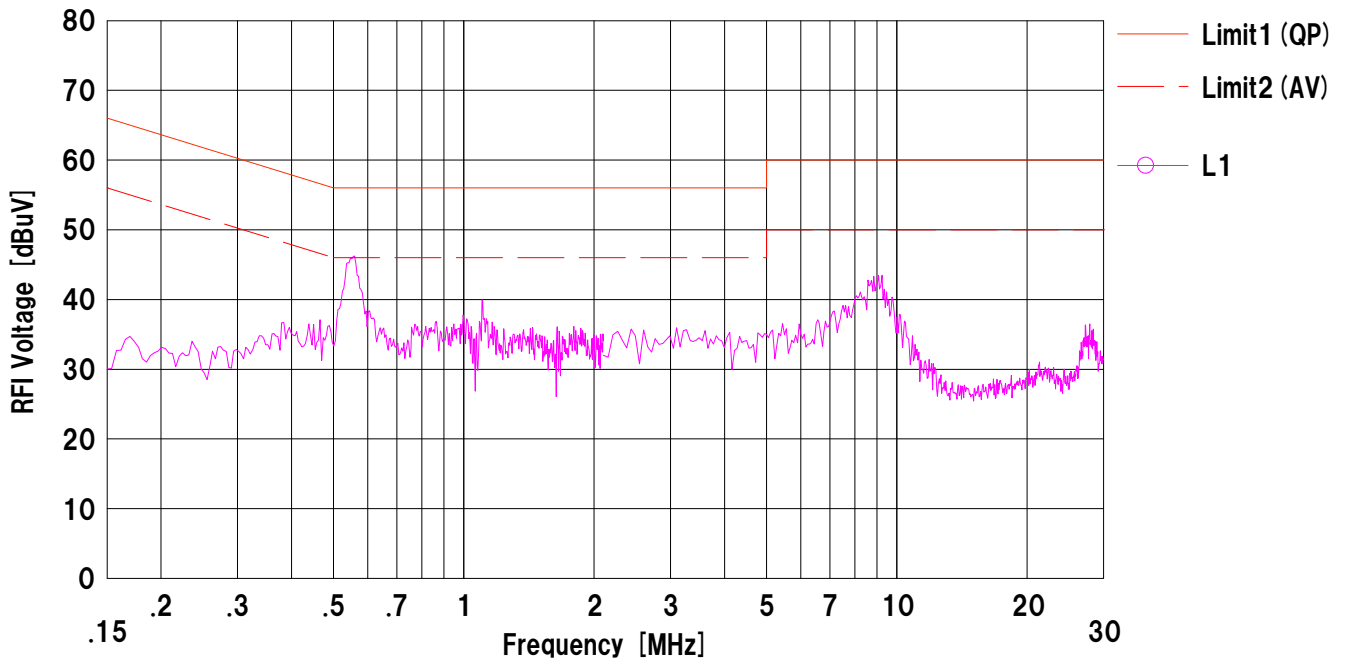
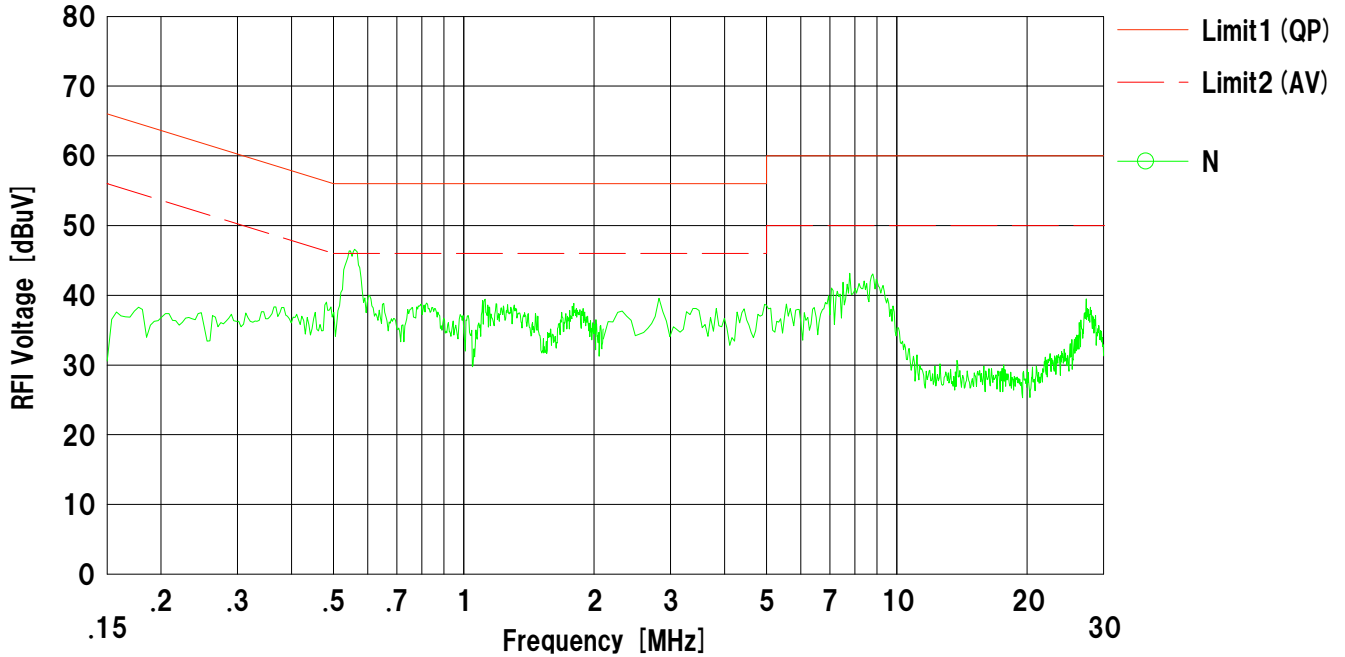
UL Japan, Inc. Shonan EMC Lab. No.3 Shielded Room
Date : 2013/07/15

Mode : Tx DH5 2402MHz
 Report No. : 10028551S
 Power : DC3.3V/1.25V (adapter:AC120V/60Hz)
 Temp./Humi. : 26deg.C / 43%RH

Remarks : Dipole Antenna

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

Engineer : Kenichi Adachi



Calculation:Result [dBuV] =Reading [dBuV] +C.Fac (LISN+Cable+ATT) [dB]
 LISN:SLS-02 with AC extention cable

DATA OF CONDUCTED EMISSION TEST

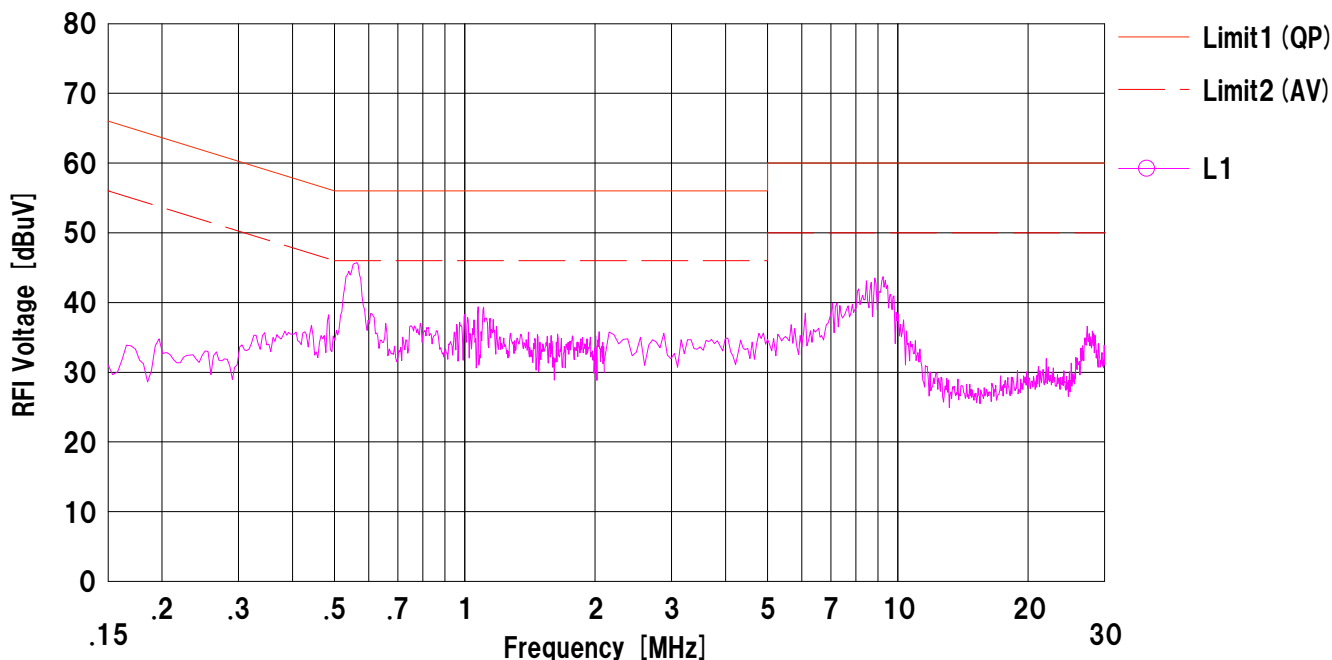
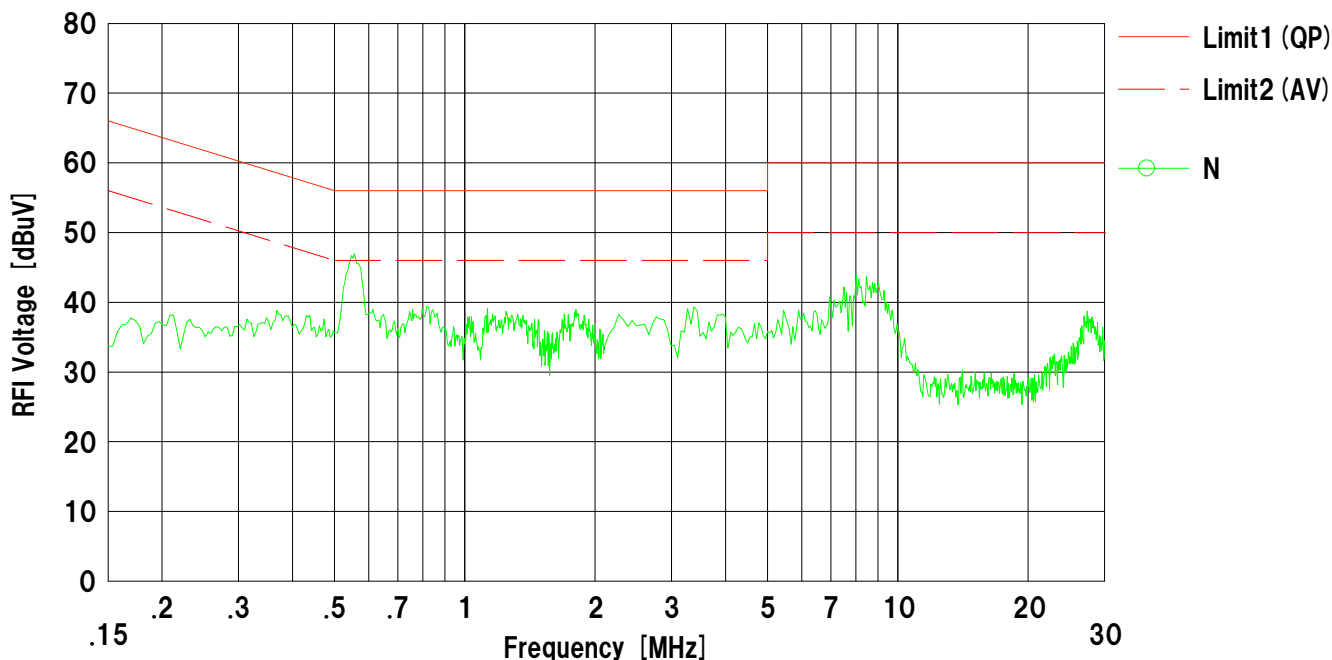
UL Japan, Inc. Shonan EMC Lab. No.3 Shielded Room
Date : 2013/07/15

Mode : Tx DH5 2441MHz
 Report No. : 10028551S
 Power : DC3.3V/1.25V (adapter:AC120V/60Hz)
 Temp./Humi. : 26deg.C / 43%RH

Remarks : Dipole Antenna

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

Engineer : Kenichi Adachi



Calculation:Result [dBuV] =Reading [dBuV] +C.Fac (LISN+Cable+ATT) [dB]
 LISN:SLS-02 with AC extention cable

DATA OF CONDUCTED EMISSION TEST

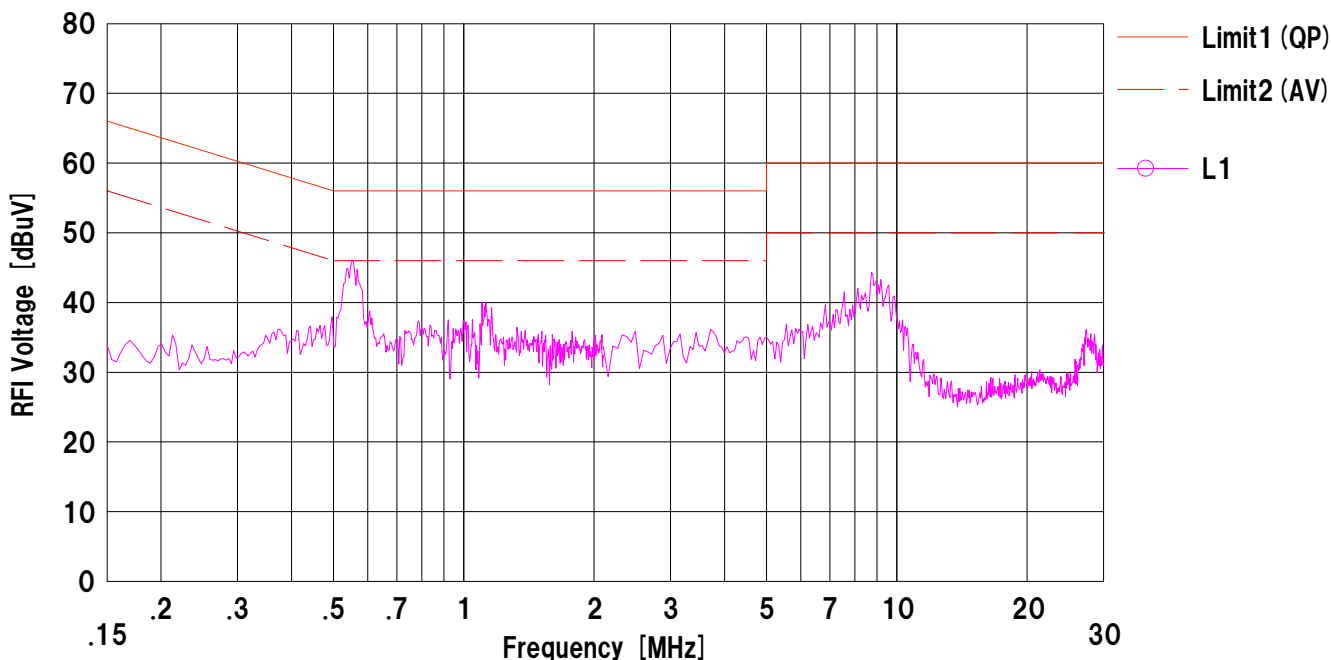
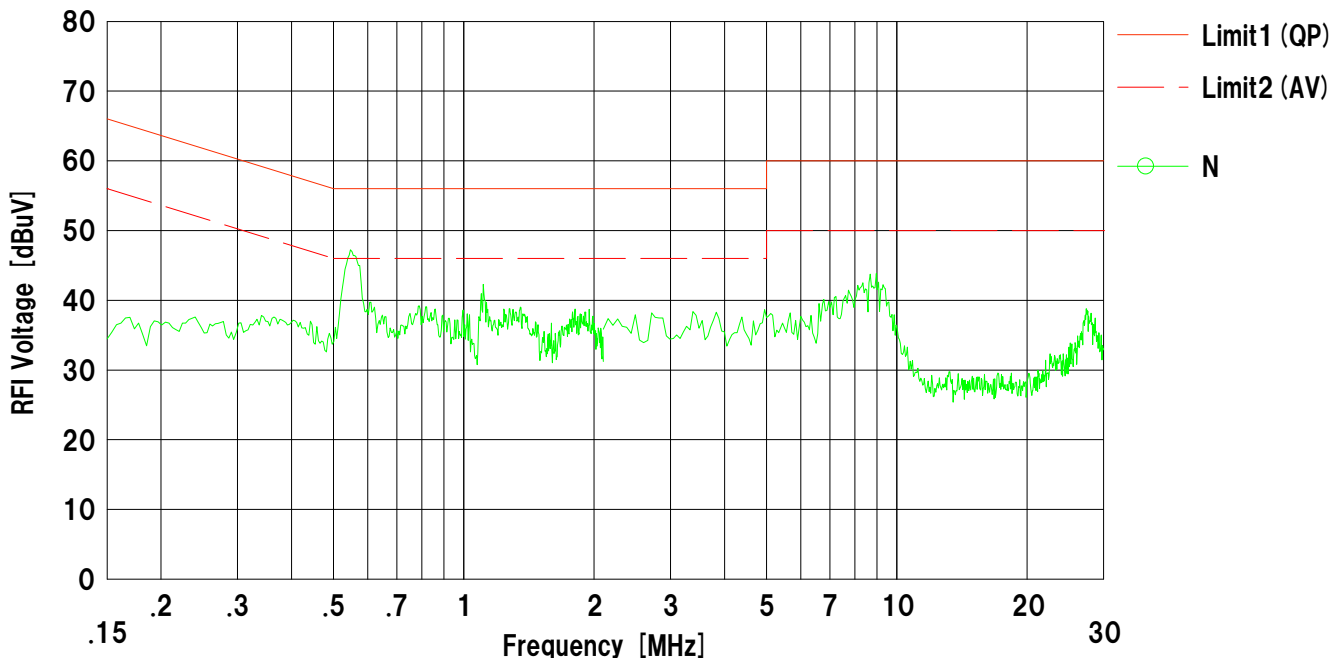
UL Japan, Inc. Shonan EMC Lab. No.3 Shielded Room
Date : 2013/07/15

Mode : Tx DH5 2480MHz
 Report No. : 10028551S
 Power : DC3.3V/1.25V (adapter:AC120V/60Hz)
 Temp./Humi. : 26deg.C / 43%RH

Remarks : Dipole Antenna

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

Engineer : Kenichi Adachi



Calculation:Result [dBuV] =Reading [dBuV] +C.Fac (LISN+Cable+ATT) [dB]
 LISN:SLS-02 with AC extention cable

DATA OF CONDUCTED EMISSION TEST

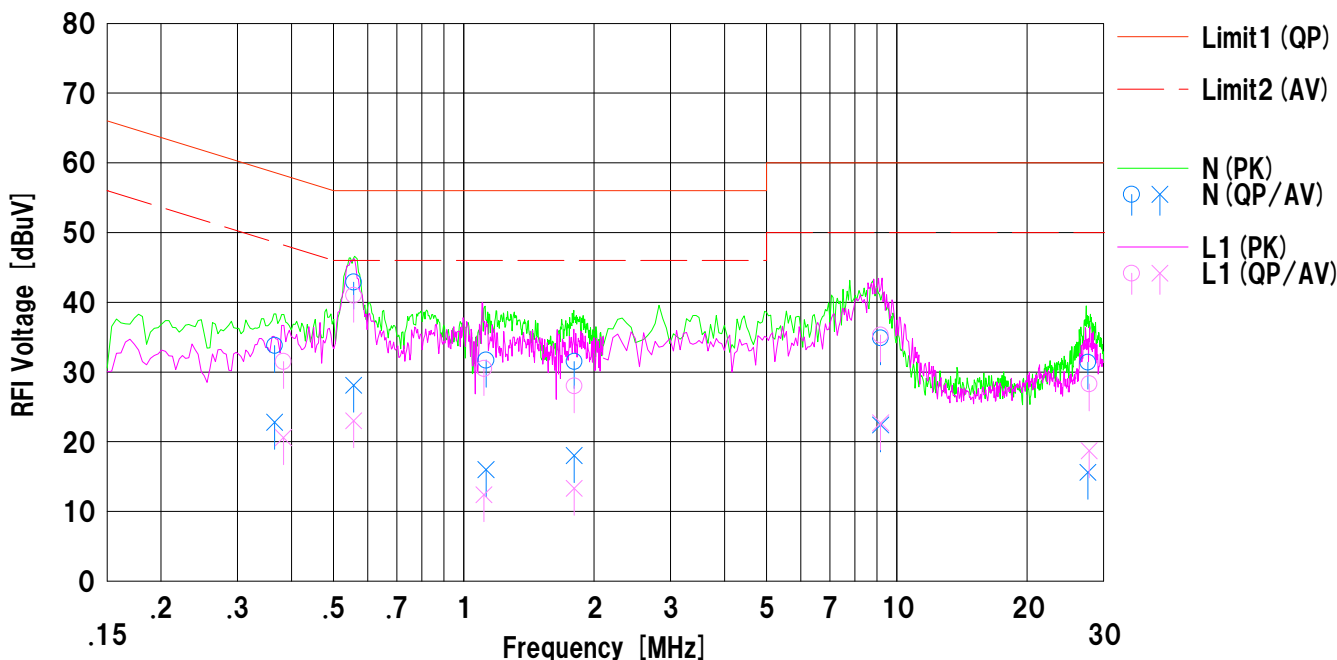
UL Japan, Inc. Shonan EMC Lab. No.3 Shielded Room
Date : 2013/07/15

Mode : Tx DH5 2402MHz
 Report No. : 10028551S
 Power : DC3.3V/1.25V (adapter:AC120V/60Hz)
 Temp./Humi. : 26deg.C / 43%RH

Remarks : Dipole Antenna

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

Engineer : Kenichi Adachi



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	0.36590	20.9	9.9	12.9	33.8	22.8	58.5	48.5	24.7	25.7	N	
2	0.55698	30.0	15.2	12.9	42.9	28.1	56.0	46.0	13.1	17.9	N	
3	1.12559	18.8	3.1	12.9	31.7	16.0	56.0	46.0	24.3	30.0	N	
4	1.79986	18.5	5.0	13.0	31.5	18.0	56.0	46.0	24.5	28.0	N	
5	9.17248	21.0	8.5	13.9	34.9	22.4	60.0	50.0	25.1	27.6	N	
6	27.60957	16.1	0.3	15.3	31.4	15.6	60.0	50.0	28.6	34.4	N	
7	0.38339	18.6	7.7	12.9	31.5	20.6	58.2	48.2	26.7	27.6	L1	
8	0.55698	28.1	10.1	12.9	41.0	23.0	56.0	46.0	15.0	23.0	L1	
9	1.11359	17.6	-0.5	12.9	30.5	12.4	56.0	46.0	25.5	33.6	L1	
10	1.79986	15.0	0.3	13.0	28.0	13.3	56.0	46.0	28.0	32.7	L1	
11	9.17248	21.4	8.8	13.9	35.3	22.7	60.0	50.0	24.7	27.3	L1	
12	27.79856	13.0	3.4	15.3	28.3	18.7	60.0	50.0	31.7	31.3	L1	

Calculation: Result [dBuV] = Reading [dBuV] + C.Fac (LISN+Cable+ATT) [dB]
 LISN:SLS-02 with AC extension cable

DATA OF CONDUCTED EMISSION TEST

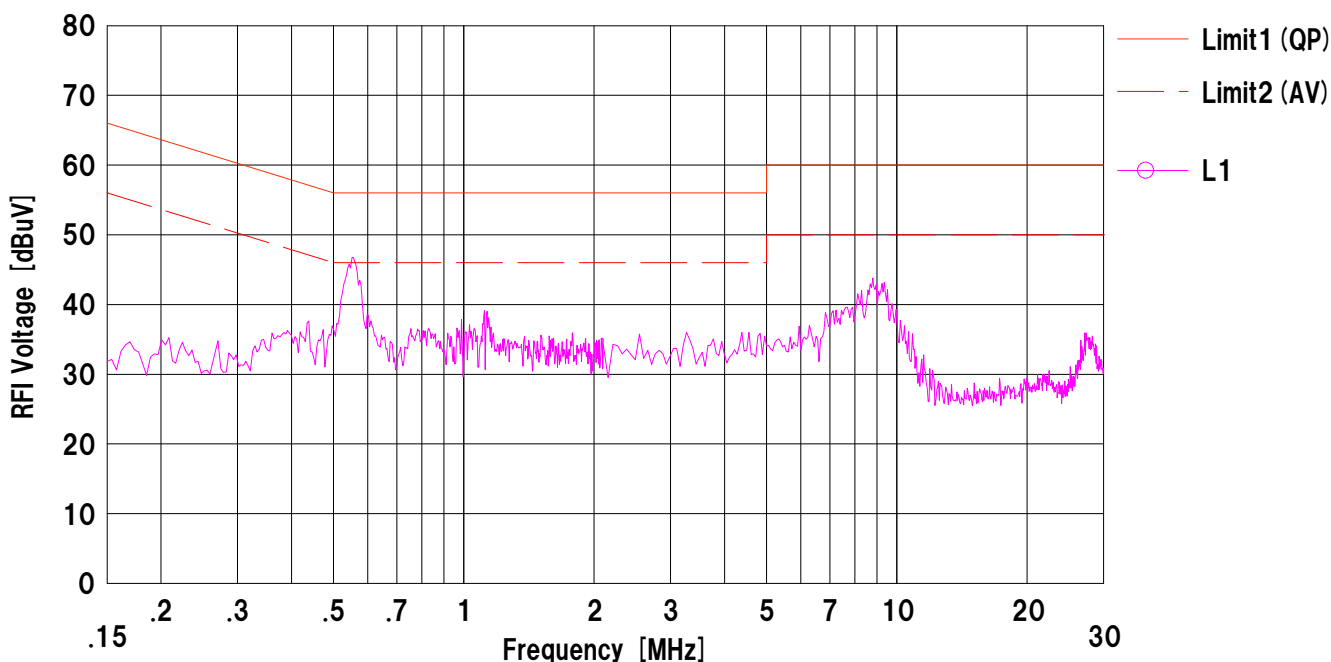
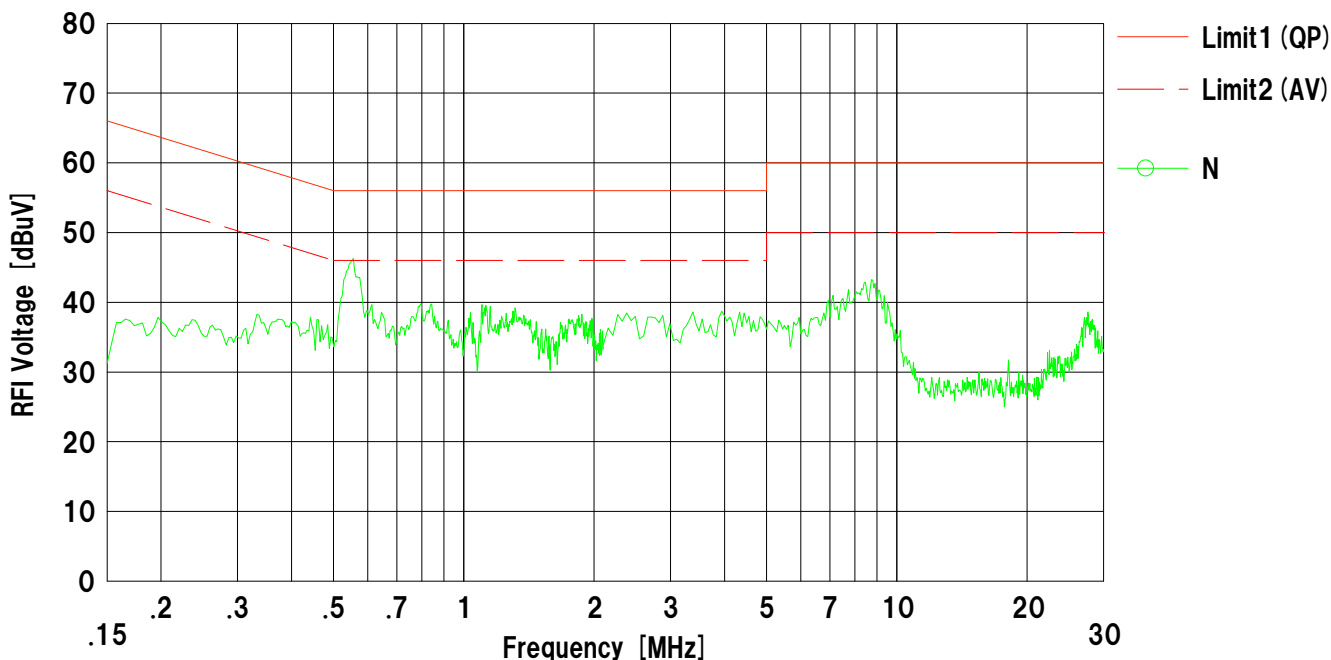
UL Japan, Inc. Shonan EMC Lab. No.3 Shielded Room
Date : 2013/07/15

Mode : Tx 3-DH5 2402MHz
 Report No. : 10028551S
 Power : DC3.3V/1.25V (adapter:AC120V/60Hz)
 Temp./Humi. : 26deg.C / 43%RH

Remarks : Dipole Antenna

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

Engineer : Kenichi Adachi



Calculation:Result [dBuV] =Reading [dBuV] +C.Fac (LISN+Cable+ATT) [dB]
 LISN:SLS-02 with AC extention cable

DATA OF CONDUCTED EMISSION TEST

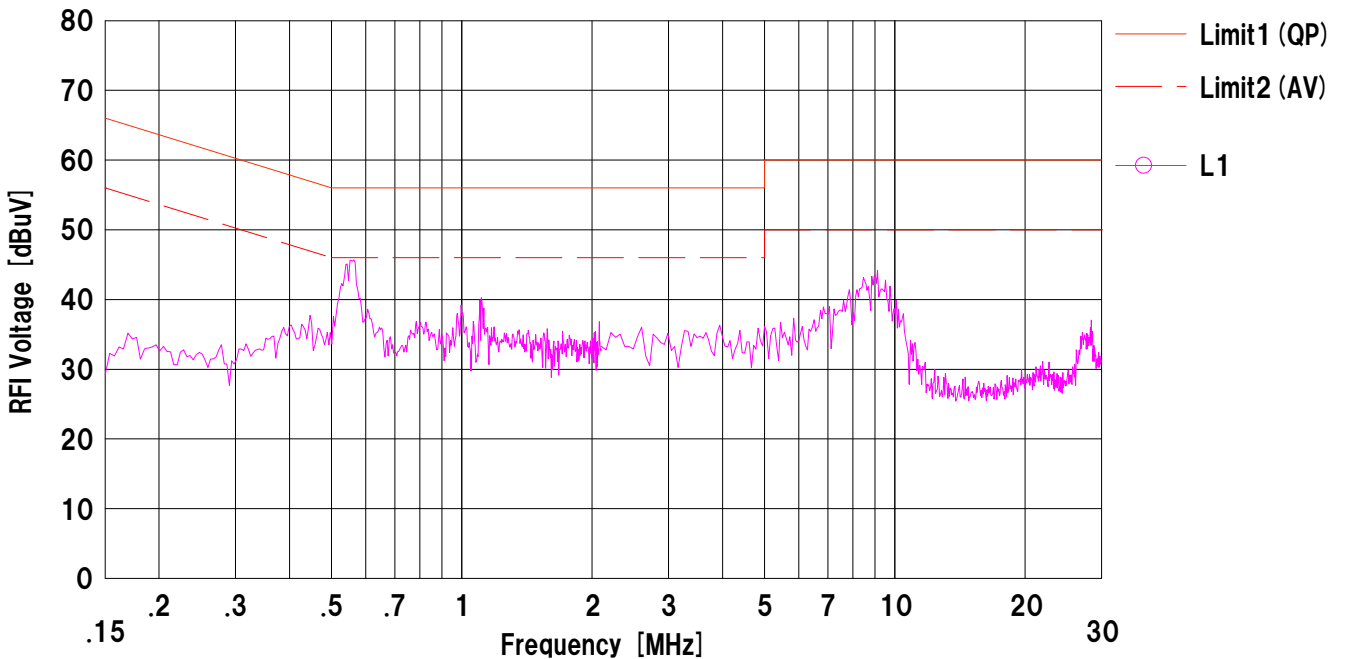
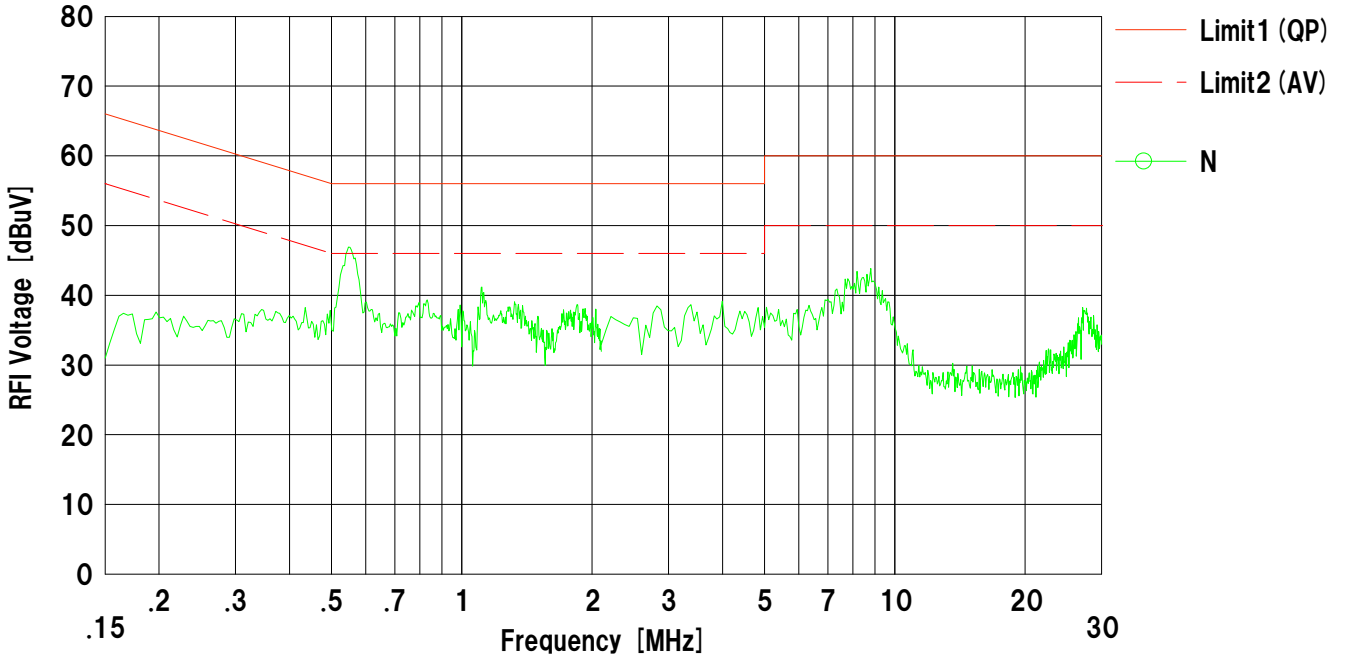
UL Japan, Inc. Shonan EMC Lab. No.3 Shielded Room
Date : 2013/07/15

Mode : Tx 3-DH5 2441MHz
 Report No. : 10028551S
 Power : DC3.3V/1.25V (adapter:AC120V/60Hz)
 Temp./Humi. : 26deg.C / 43%RH

Remarks : Dipole Antenna

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

Engineer : Kenichi Adachi



Calculation:Result [dBuV] =Reading [dBuV] +C.Fac (LISN+Cable+ATT) [dB]
 LISN:SLS-02 with AC extention cable

DATA OF CONDUCTED EMISSION TEST

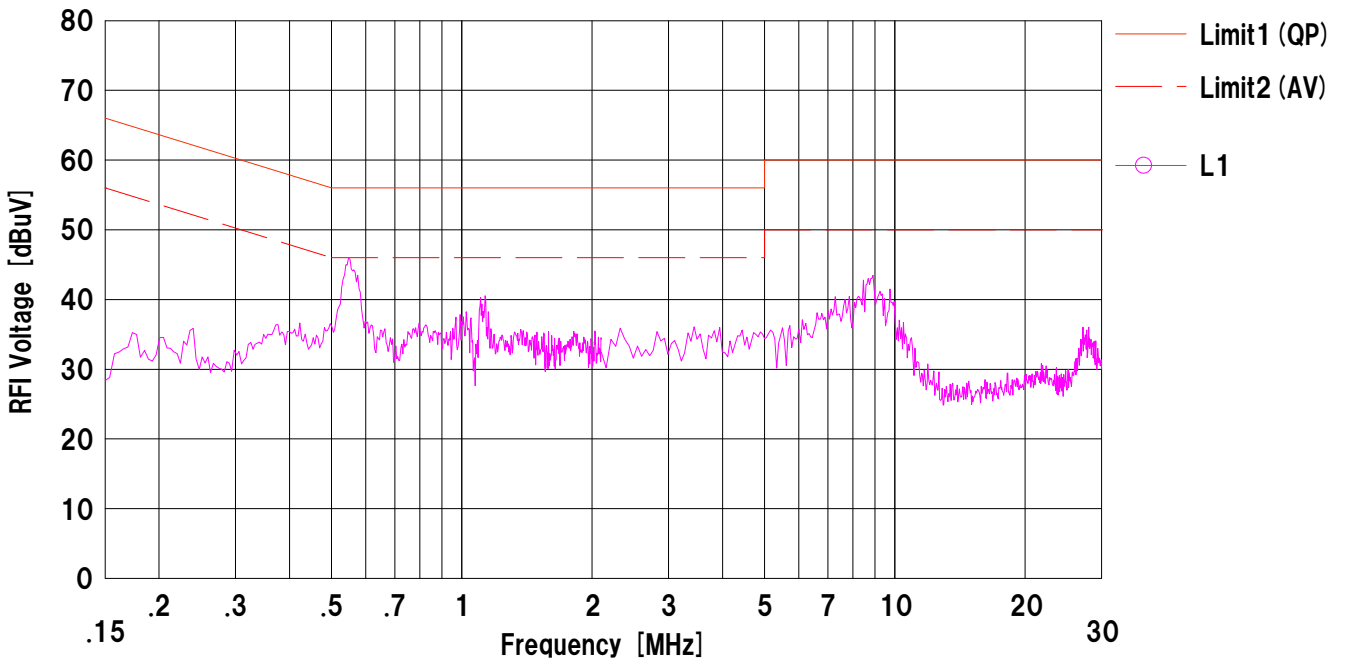
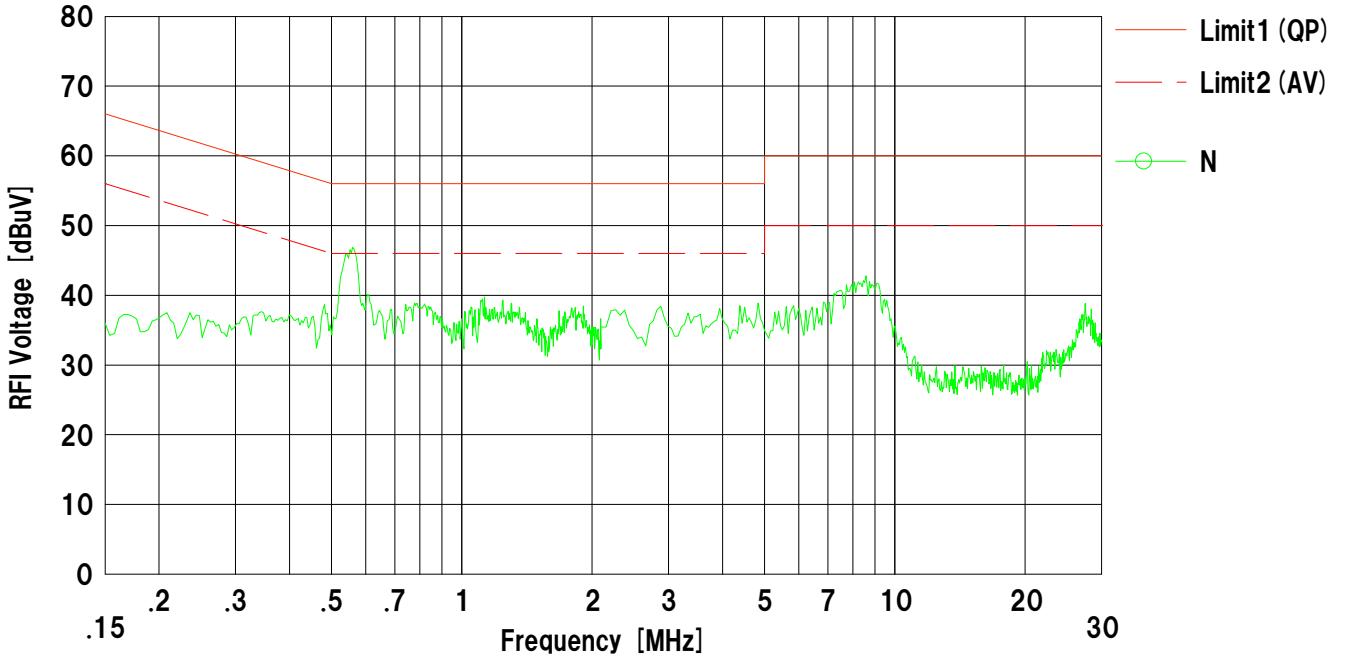
UL Japan, Inc. Shonan EMC Lab. No.3 Shielded Room
Date : 2013/07/15

Mode : Tx 3-DH5 2480MHz
 Report No. : 10028551S
 Power : DC3.3V/1.25V (adapter:AC120V/60Hz)
 Temp./Humi. : 26deg.C / 43%RH

Remarks : Dipole Antenna

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

Engineer : Kenichi Adachi



Calculation:Result [dBuV] =Reading [dBuV] +C.Fac (LISN+Cable+ATT) [dB]
 LISN:SLS-02 with AC extention cable

DATA OF CONDUCTED EMISSION TEST

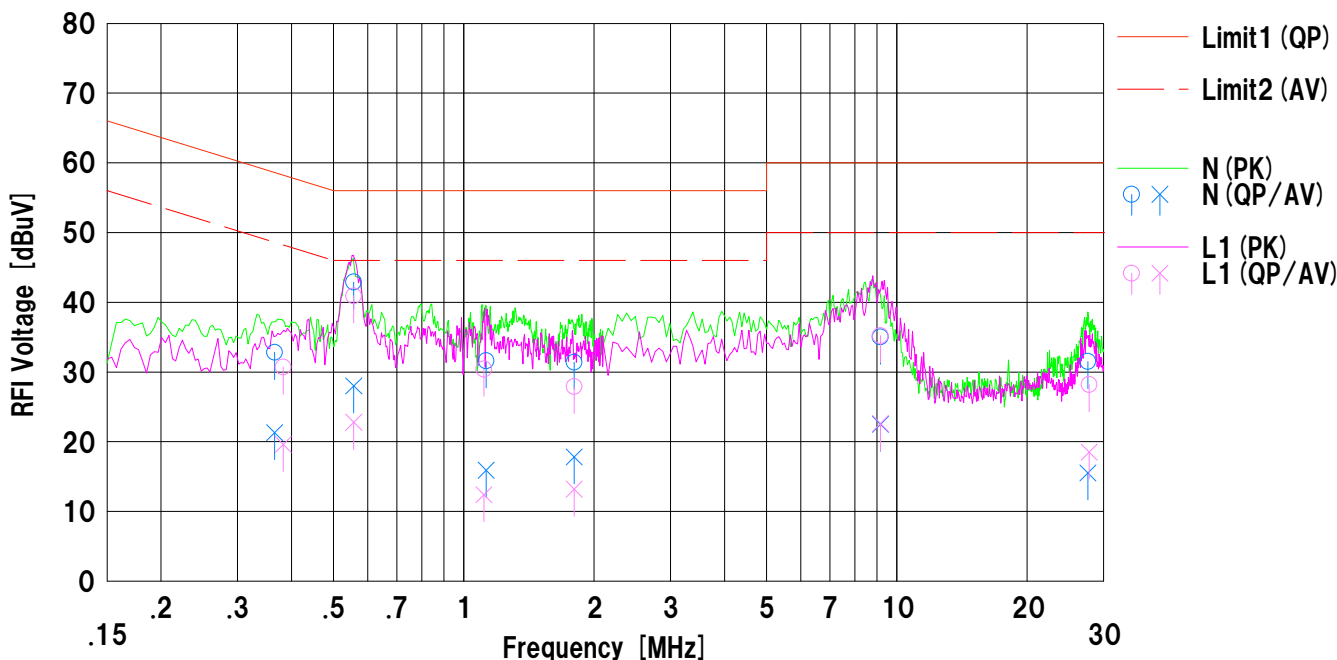
UL Japan, Inc. Shonan EMC Lab. No.3 Shielded Room
Date : 2013/07/15

Mode : Tx 3-DH5 2402MHz
 Report No. : 10028551S
 Power : DC3.3V/1.25V (adapter:AC120V/60Hz)
 Temp./Humi. : 26deg.C / 43%RH

Remarks : Dipole Antenna

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

Engineer : Kenichi Adachi



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	0.36582	19.9	8.4	12.9	32.8	21.3	58.5	48.5	25.7	27.2	N	
2	0.55711	30.0	15.1	12.9	42.9	28.0	56.0	46.0	13.1	18.0	N	
3	1.12659	18.7	3.0	12.9	31.6	15.9	56.0	46.0	24.4	30.1	N	
4	1.79893	18.4	4.8	13.0	31.4	17.8	56.0	46.0	24.6	28.2	N	
5	9.16894	21.1	8.6	13.9	35.0	22.5	60.0	50.0	25.0	27.5	N	
6	27.60976	16.2	0.2	15.3	31.5	15.5	60.0	50.0	28.5	34.5	N	
7	0.38260	17.8	6.7	12.9	30.7	19.6	58.2	48.2	27.5	28.6	L1	
8	0.55711	28.0	9.9	12.9	40.9	22.8	56.0	46.0	15.1	23.2	L1	
9	1.11412	17.5	-0.5	12.9	30.4	12.4	56.0	46.0	25.6	33.6	L1	
10	1.79893	14.9	0.2	13.0	27.9	13.2	56.0	46.0	28.1	32.8	L1	
11	9.16894	21.3	8.7	13.9	35.2	22.6	60.0	50.0	24.8	27.4	L1	
12	27.79865	12.9	3.2	15.3	28.2	18.5	60.0	50.0	31.8	31.5	L1	

Calculation:Result [dBuV] =Reading [dBuV] +C.Fac (LISN+Cable+ATT) [dB]
 LISN:SLS-02 with AC extention cable

DATA OF CONDUCTED EMISSION TEST

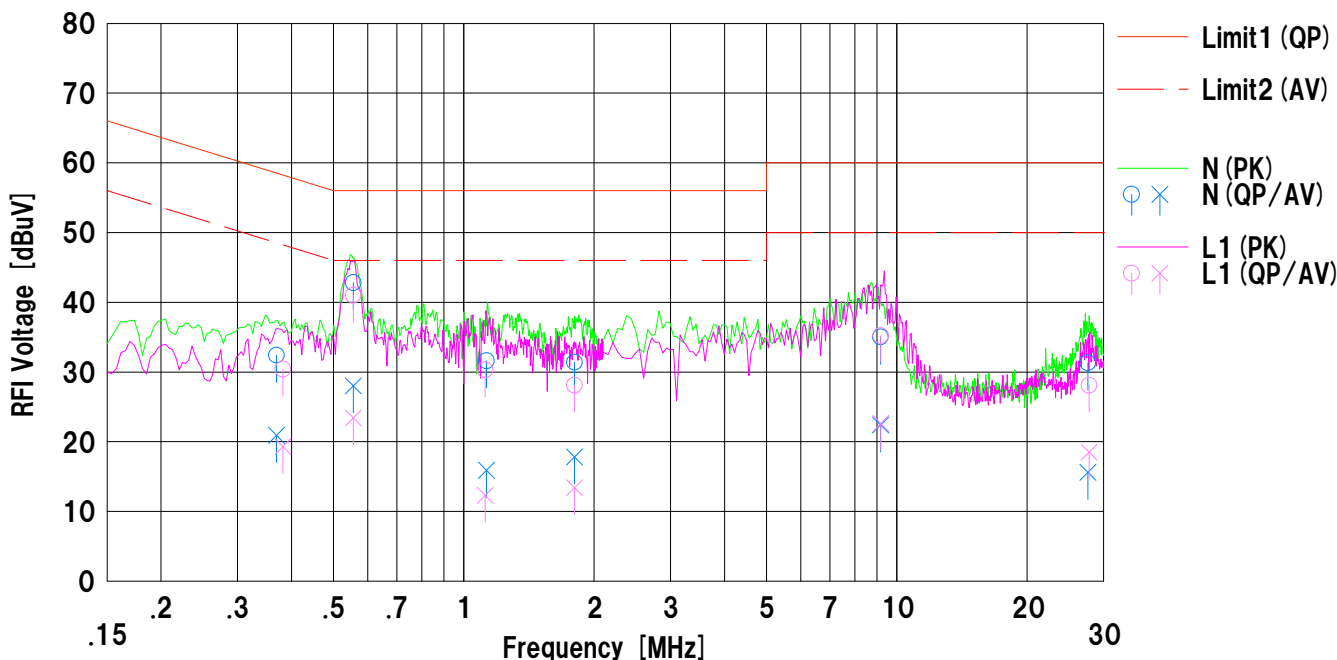
UL Japan, Inc. Shonan EMC Lab. No.3 Shielded Room
Date : 2013/07/15

Mode : Tx DH5 2402MHz
 Report No. : 10028551S
 Power : DC3.3V/1.25V (adapter:AC120V/60Hz)
 Temp./Humi. : 26deg.C / 43%RH

Remarks : PIFA Antenna

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

Engineer : Kenichi Adachi



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	0.36958	19.5	8.0	12.9	32.4	20.9	58.5	48.5	26.1	27.6	N	
2	0.55570	29.9	15.1	12.9	42.8	28.0	56.0	46.0	13.2	18.0	N	
3	1.12873	18.7	3.0	12.9	31.6	15.9	56.0	46.0	24.4	30.1	N	
4	1.80232	18.4	4.8	13.0	31.4	17.8	56.0	46.0	24.6	28.2	N	
5	9.17224	21.1	8.5	13.9	35.0	22.4	60.0	50.0	25.0	27.6	N	
6	27.61128	16.0	0.3	15.3	31.3	15.6	60.0	50.0	28.7	34.4	N	
7	0.38239	17.5	6.4	12.9	30.4	19.3	58.2	48.2	27.8	28.9	L1	
8	0.55570	28.1	10.5	12.9	41.0	23.4	56.0	46.0	15.0	22.6	L1	
9	1.11984	17.4	-0.6	12.9	30.3	12.3	56.0	46.0	25.7	33.7	L1	
10	1.80244	15.1	0.4	13.0	28.1	13.4	56.0	46.0	27.9	32.6	L1	
11	9.17983	21.3	8.7	13.9	35.2	22.6	60.0	50.0	24.8	27.4	L1	
12	27.79734	12.8	3.2	15.3	28.1	18.5	60.0	50.0	31.9	31.5	L1	

Calculation:Result [dBuV] =Reading [dBuV] +C.Fac (LISN+Cable+ATT) [dB]
 LISN:SLS-02 with AC extention cable

DATA OF CONDUCTED EMISSION TEST

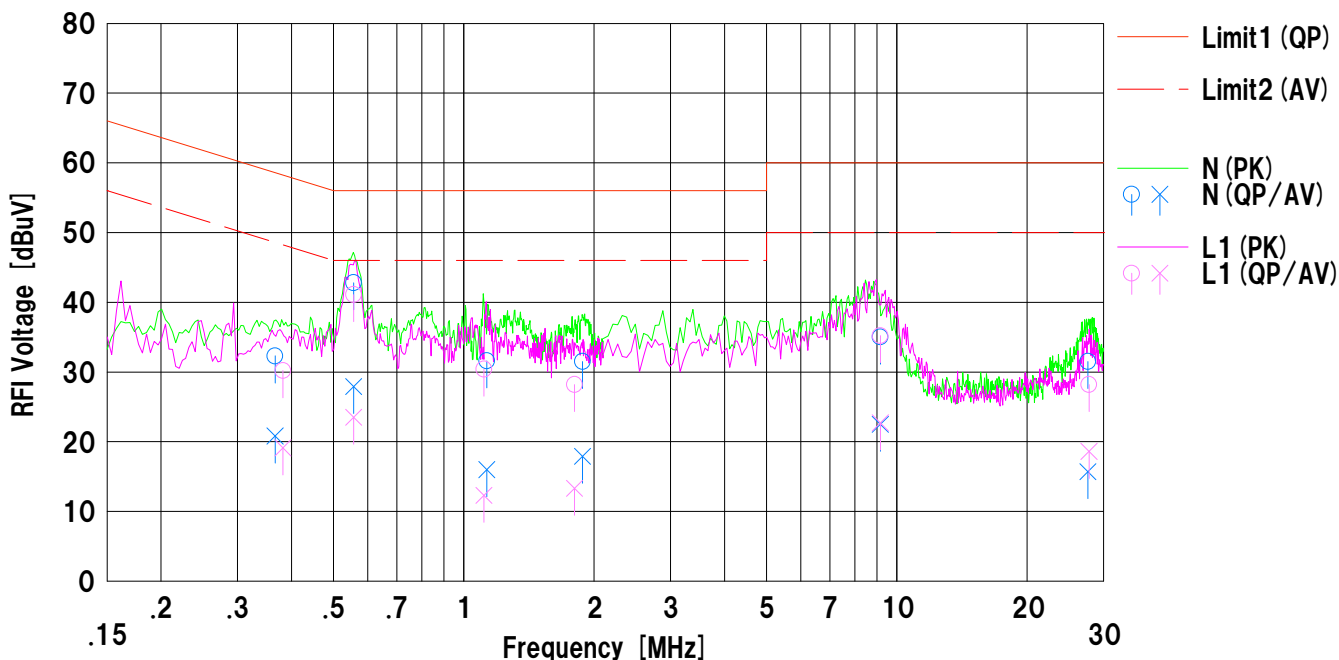
UL Japan, Inc. Shonan EMC Lab. No.3 Shielded Room
Date : 2013/07/15

Mode : Tx DH5 2402MHz
 Report No. : 10028551S
 Power : DC3.3V/1.25V (adapter:AC120V/60Hz)
 Temp./Humi. : 26deg.C / 43%RH

Remarks : Chip Antenna

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

Engineer : Kenichi Adachi



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	0.36665	19.4	7.9	12.9	32.3	20.8	58.5	48.5	26.2	27.7	N	
2	0.55635	29.9	15.0	12.9	42.8	27.9	56.0	46.0	13.2	18.1	N	
3	1.12983	18.7	3.1	12.9	31.6	16.0	56.0	46.0	24.4	30.0	N	
4	1.88133	18.5	4.9	13.0	31.5	17.9	56.0	46.0	24.5	28.1	N	
5	9.15889	21.1	8.6	13.9	35.0	22.5	60.0	50.0	25.0	27.5	N	
6	27.61133	16.2	0.4	15.3	31.5	15.7	60.0	50.0	28.5	34.3	N	
7	0.38242	17.3	6.2	12.9	30.2	19.1	58.2	48.2	28.0	29.1	L1	
8	0.55635	28.2	10.6	12.9	41.1	23.5	56.0	46.0	14.9	22.5	L1	
9	1.11385	17.5	-0.6	12.9	30.4	12.3	56.0	46.0	25.6	33.7	L1	
10	1.80189	15.2	0.3	13.0	28.2	13.3	56.0	46.0	27.8	32.7	L1	
11	9.15889	21.3	8.8	13.9	35.2	22.7	60.0	50.0	24.8	27.3	L1	
12	27.78738	12.9	3.3	15.3	28.2	18.6	60.0	50.0	31.8	31.4	L1	

Calculation:Result [dBuV] =Reading [dBuV] +C.Fac (LISN+Cable+ATT) [dB]
 LISN:SLS-02 with AC extention cable

DATA OF CONDUCTED EMISSION TEST

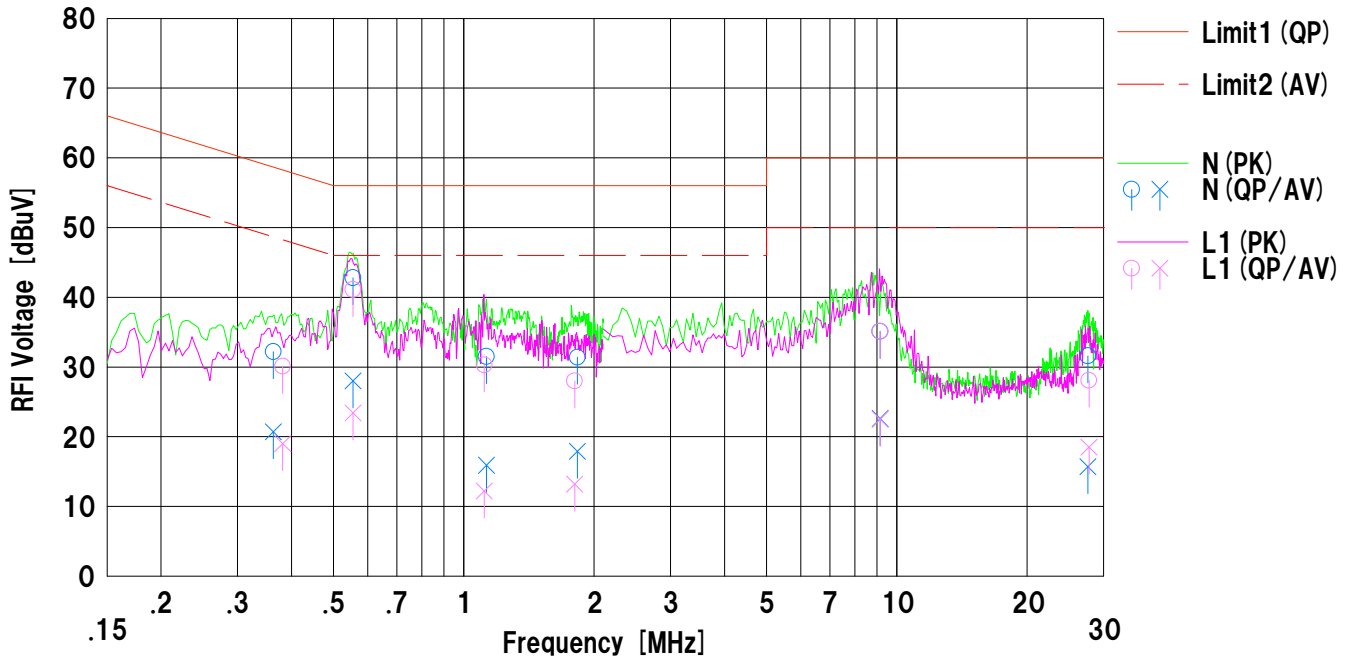
UL Japan, Inc. Shonan EMC Lab. No.3 Shielded Room
Date : 2013/07/15

Mode : Tx DH5 2402MHz
 Report No. : 10028551S
 Power : DC3.3V/1.25V (adapter:AC120V/60Hz)
 Temp./Humi. : 26deg.C / 43%RH

Remarks : Internal Antenna

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

Engineer : Kenichi Adachi



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	0.36325	19.3	7.8	12.9	32.2	20.7	58.6	48.6	26.4	27.9	N	
2	0.55490	29.9	15.1	12.9	42.8	28.0	56.0	46.0	13.2	18.0	N	
3	1.12793	18.6	3.0	12.9	31.5	15.9	56.0	46.0	24.5	30.1	N	
4	1.82983	18.4	4.9	13.0	31.4	17.9	56.0	46.0	24.6	28.1	N	
5	9.14896	21.2	8.7	13.9	35.1	22.6	60.0	50.0	24.9	27.4	N	
6	27.61130	16.3	0.4	15.3	31.6	15.7	60.0	50.0	28.4	34.3	N	
7	0.38178	17.2	6.1	12.9	30.1	19.0	58.2	48.2	28.1	29.2	L1	
8	0.55490	28.2	10.5	12.9	41.1	23.4	56.0	46.0	14.9	22.6	L1	
9	1.11494	17.4	-0.7	12.9	30.3	12.2	56.0	46.0	25.7	33.8	L1	
10	1.80385	15.0	0.2	13.0	28.0	13.2	56.0	46.0	28.0	32.8	L1	
11	9.14896	21.2	8.6	13.9	35.1	22.5	60.0	50.0	24.9	27.5	L1	
12	27.77895	12.8	3.2	15.3	28.1	18.5	60.0	50.0	31.9	31.5	L1	

Calculation: Result [dBuV] = Reading [dBuV] + C.Fac (LISN+Cable+ATT) [dB]
 LISN:SLS-02 with AC extension cable

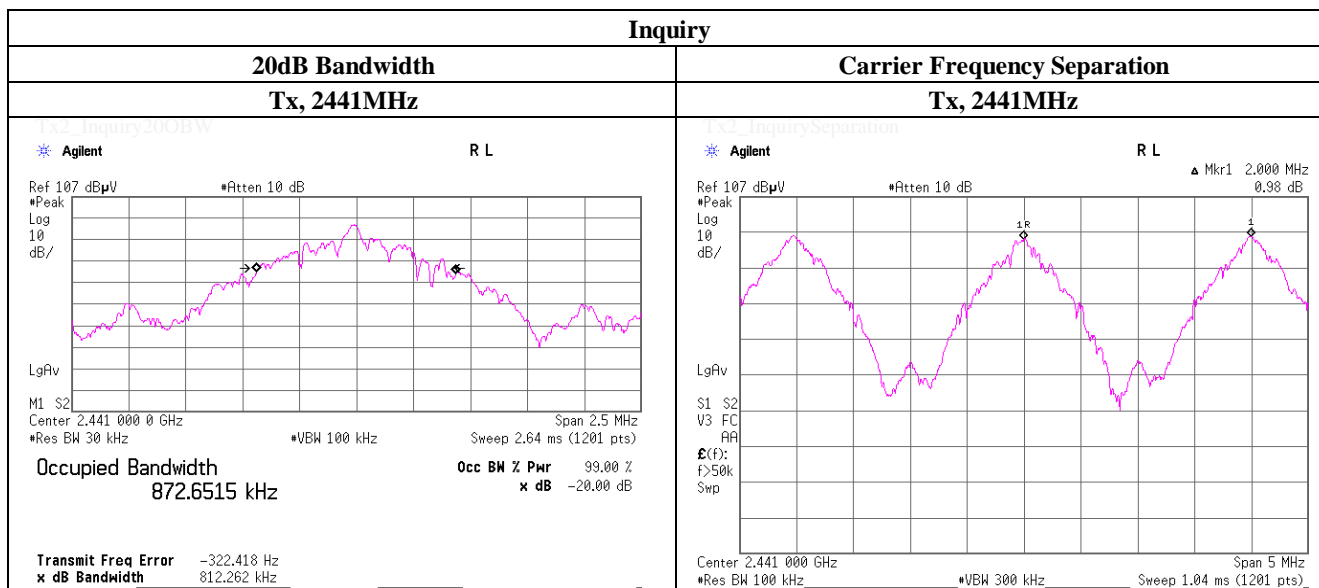
20dB Bandwidth and Carrier Frequency Separation

Test place	UL Japan, Inc. Shonan EMC Lab.	No.5 Shielded Room
Date	July 18, 2013	
Temperature / Humidity	27 deg.C , 57 %RH	
Engineer	Kenichi Adachi	
Mode	Tx, Bluetooth, BDR, PRBS9	

Mode	Freq. [MHz]	20dB Bandwidth [MHz]	Carrier Frequency Separation [MHz]	Limit for Carrier Frequency Separation [MHz]
DH5	2402.0	0.958	0.995	>= 0.638
DH5	2441.0	0.959	1.000	>= 0.640
DH5	2480.0	0.958	1.008	>= 0.638
Inquiry	2441.0	0.812	2.000	>= 0.542

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

No limit applies to 20dB Bandwidth.



UL Japan, Inc.

Shonan EMC Lab.

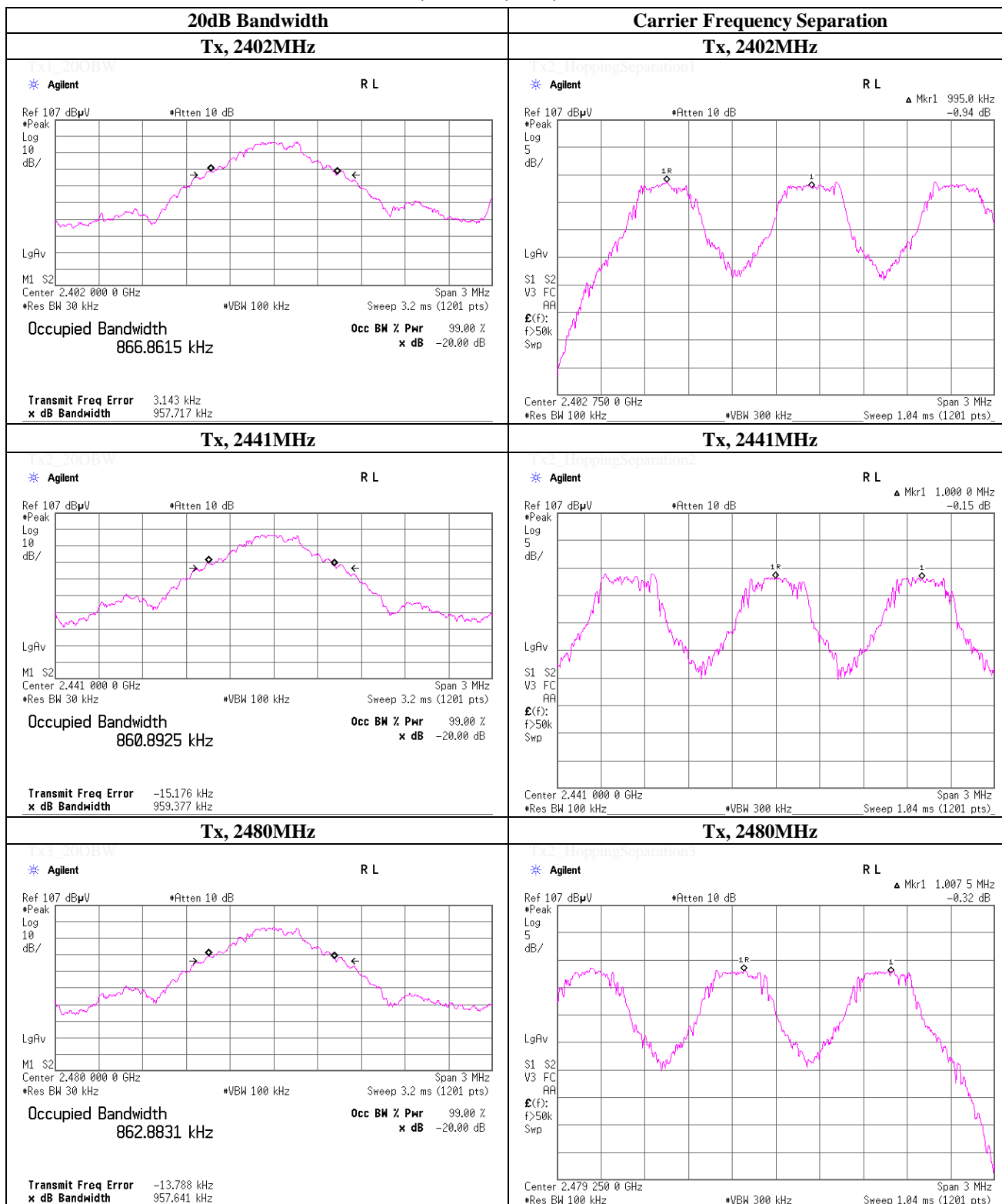
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

20dB Bandwidth and Carrier Frequency Separation

Tx, Bluetooth, BDR, PRBS9



UL Japan, Inc.

Shonan EMC Lab.

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

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.5 Shielded Room
Date July 18, 2013
Temperature / Humidity 27 deg.C , 57 %RH
Engineer Kenichi Adachi
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	1.267	1.000	>= 0.844
3-DH5	2441.0	1.266	1.000	>= 0.844
3-DH5	2480.0	1.280	0.998	>= 0.853

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

No limit applies to 20dB Bandwidth.

UL Japan, Inc.

Shonan EMC Lab.

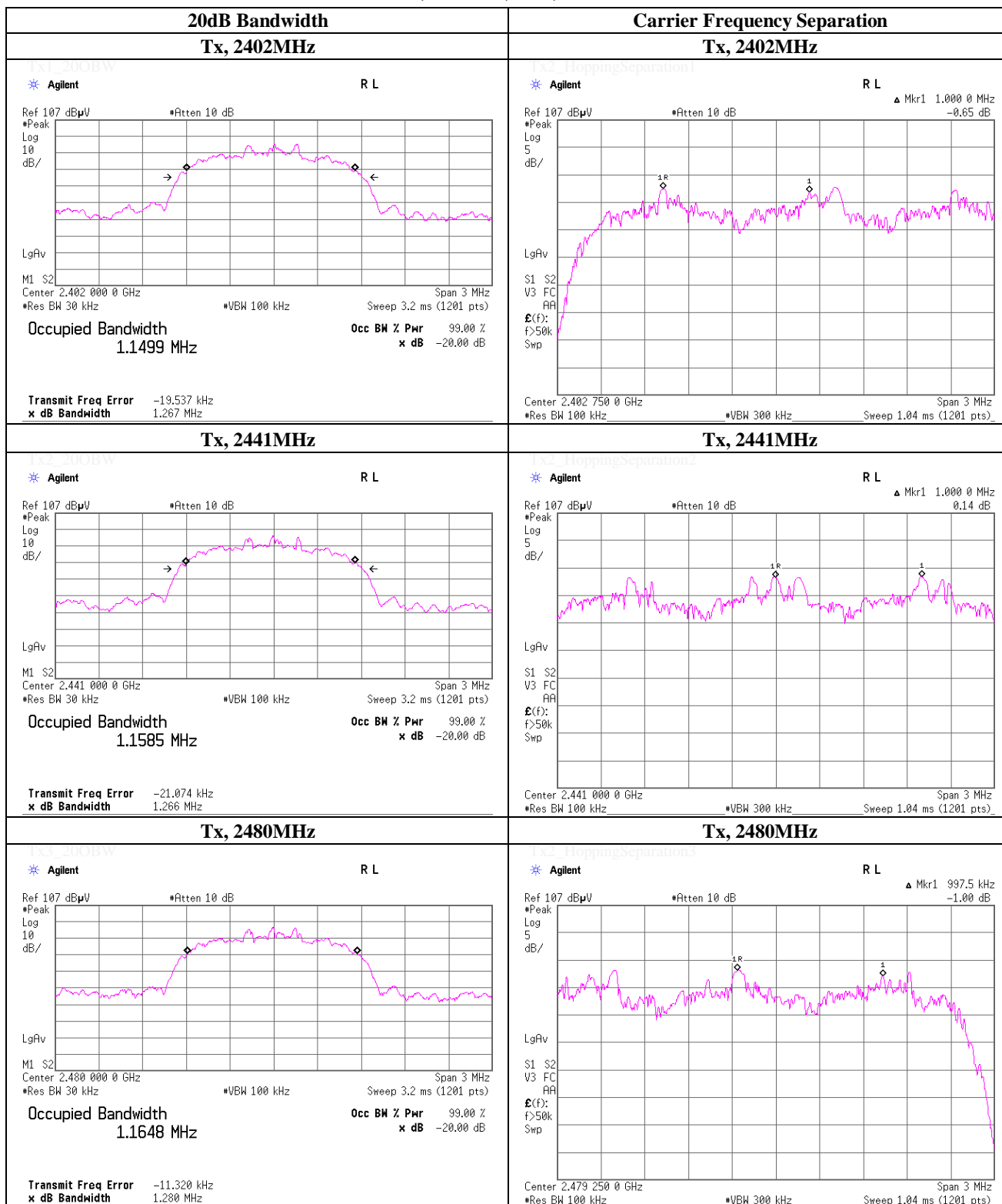
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

20dB Bandwidth and Carrier Frequency Separation

Tx, Bluetooth, EDR, PRBS9



UL Japan, Inc.

Shonan EMC Lab.

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

Telephone : +81 463 50 6400

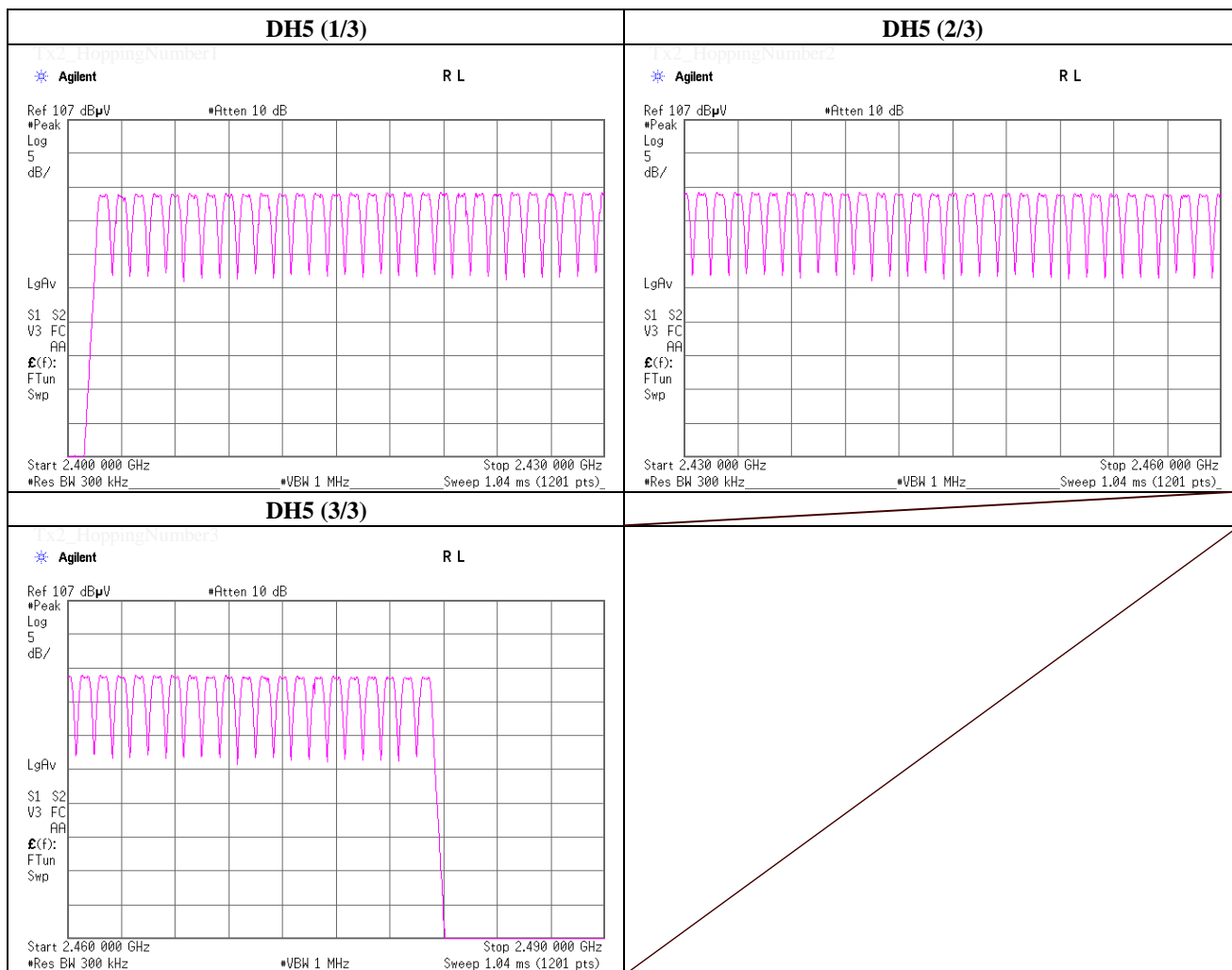
Facsimile : +81 463 50 6401

Number of Hopping Frequency

Test place	UL Japan, Inc. Shonan EMC Lab.	No.5 Shielded Room
Date	July 18, 2013	
Temperature / Humidity	27 deg.C , 57 %RH	
Engineer	Kenichi Adachi	
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.



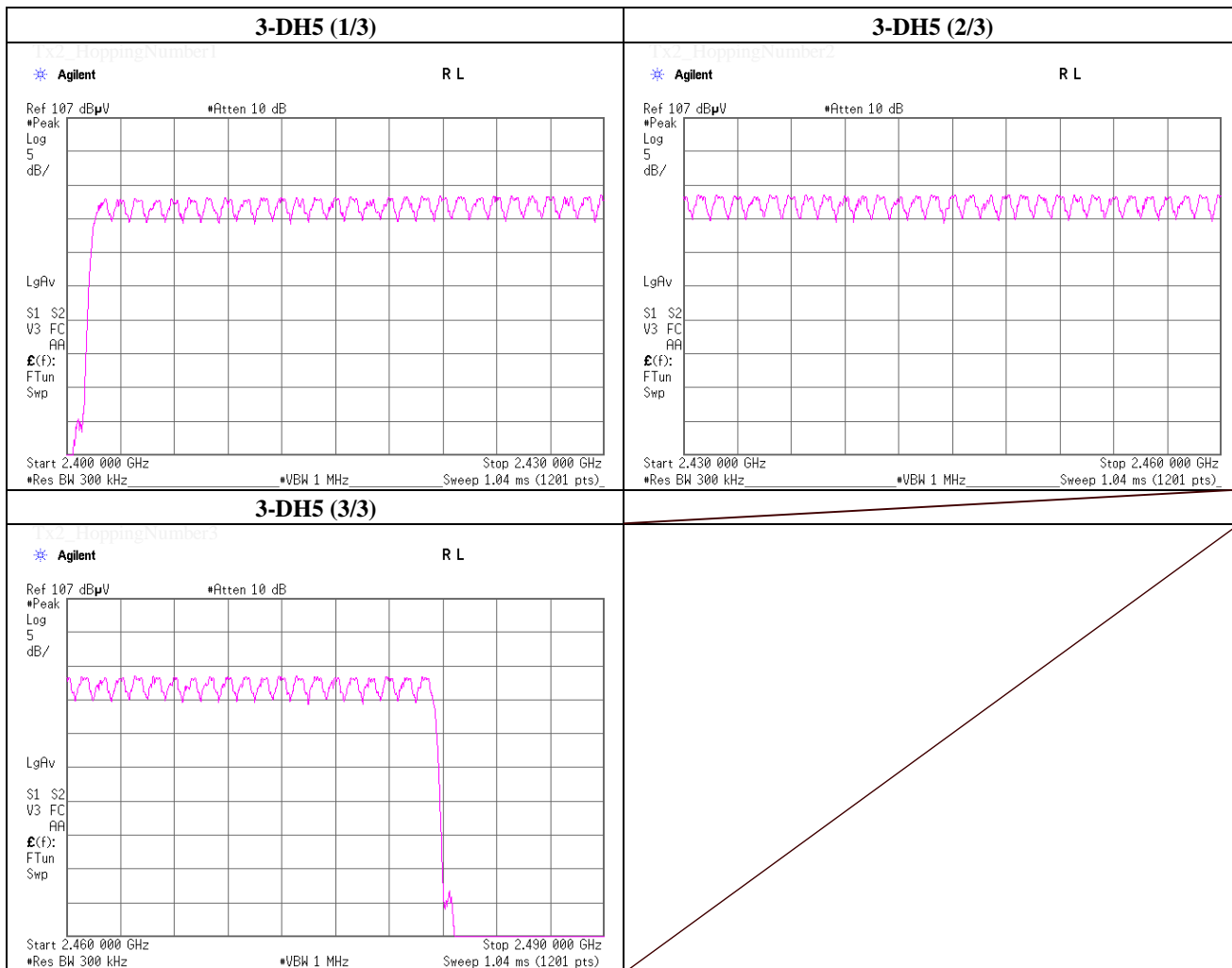
UL Japan, Inc.
Shonan EMC Lab.
 1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN
 Telephone : +81 463 50 6400
 Facsimile : +81 463 50 6401

Number of Hopping Frequency

Test place	UL Japan, Inc. Shonan EMC Lab.	No.5 Shielded Room
Date	July 18, 2013	
Temperature / Humidity	27 deg.C , 57 %RH	
Engineer	Kenichi Adachi	
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.

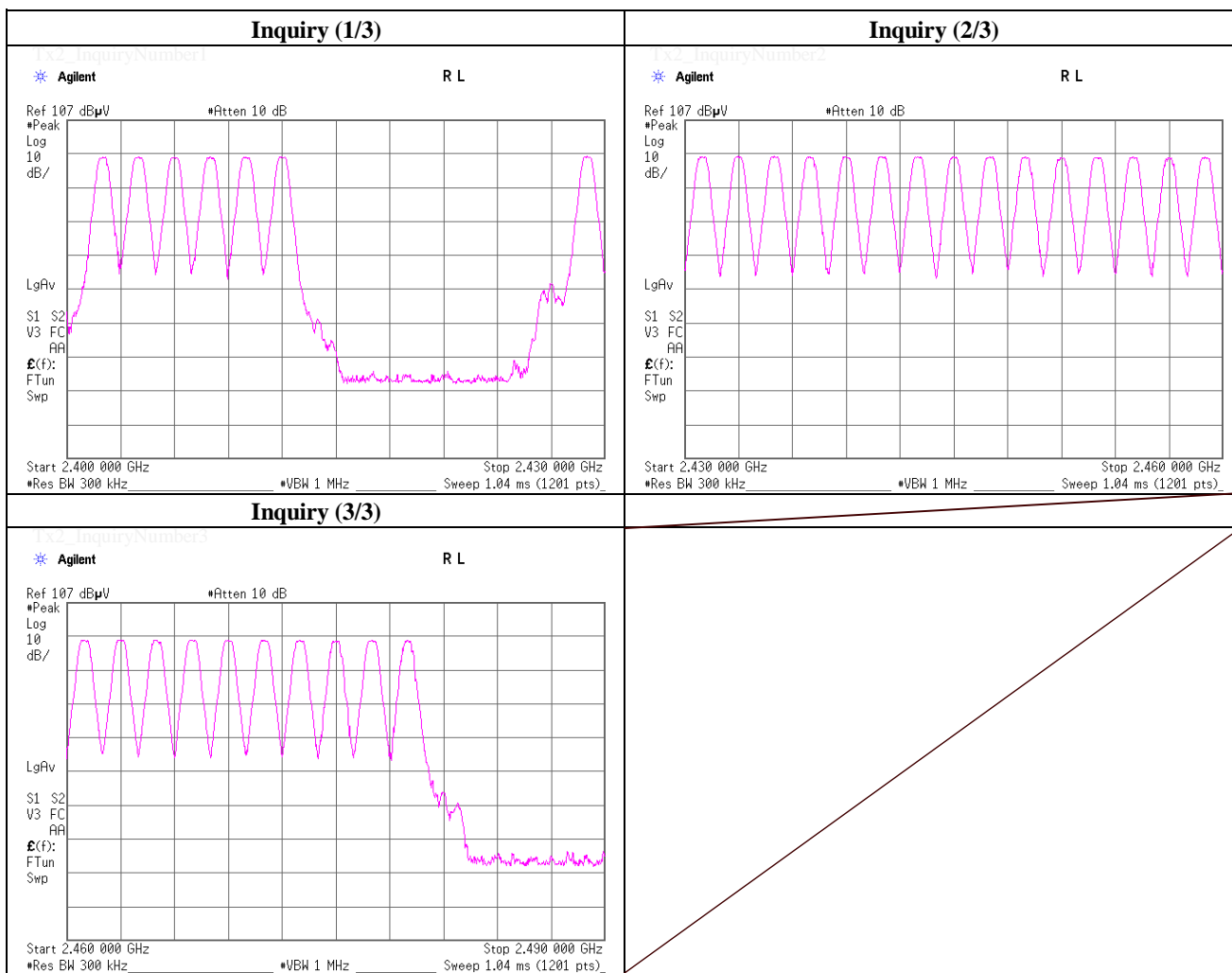


UL Japan, Inc.
Shonan EMC Lab.
 1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN
 Telephone : +81 463 50 6400
 Facsimile : +81 463 50 6401

Number of Hopping Frequency

Test place	UL Japan, Inc. Shonan EMC Lab.	No.5 Shielded Room
Date	July 18, 2013	
Temperature / Humidity	27 deg.C , 57 %RH	
Engineer	Kenichi Adachi	
Mode	Tx, Bluetooth, Inquiry	

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



UL Japan, Inc.
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 Facsimile : +81 463 50 6401

Dwell Time

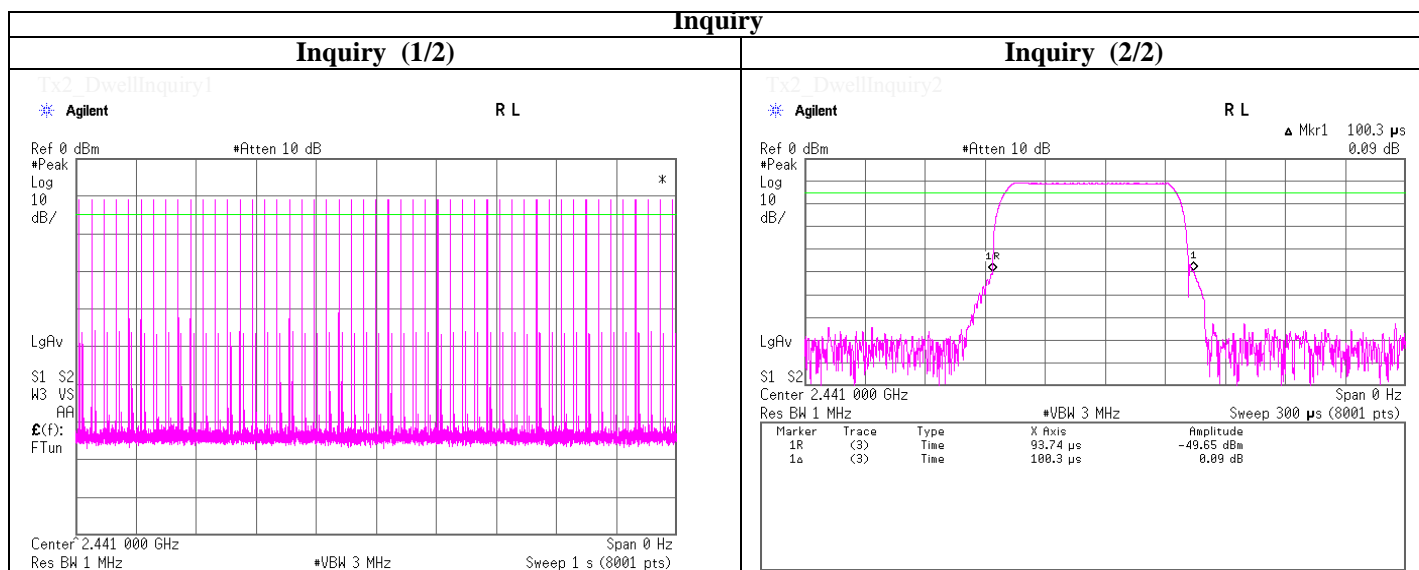
Test place UL Japan, Inc. Shonan EMC Lab. No.5 Shielded Room
 Date July 18, 2013
 Temperature / Humidity 27 deg.C , 57 %RH
 Engineer Kenichi Adachi
 Mode Tx, Bluetooth, BDR, PRBS9

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	0.400	129	400
DH3	26.0 / 5.0 sec. x 31.6 sec. = 165 times	1.657	273	400
DH5	17.0 / 5.0 sec. x 31.6 sec. = 108 times	2.901	313	400
Inquiry	100.0 / 1.0 sec. x 12.8 sec. = 1280 times	0.100	128	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 (DH1, DH3 or DH5). This is confirmed in the test report for $N=79$.



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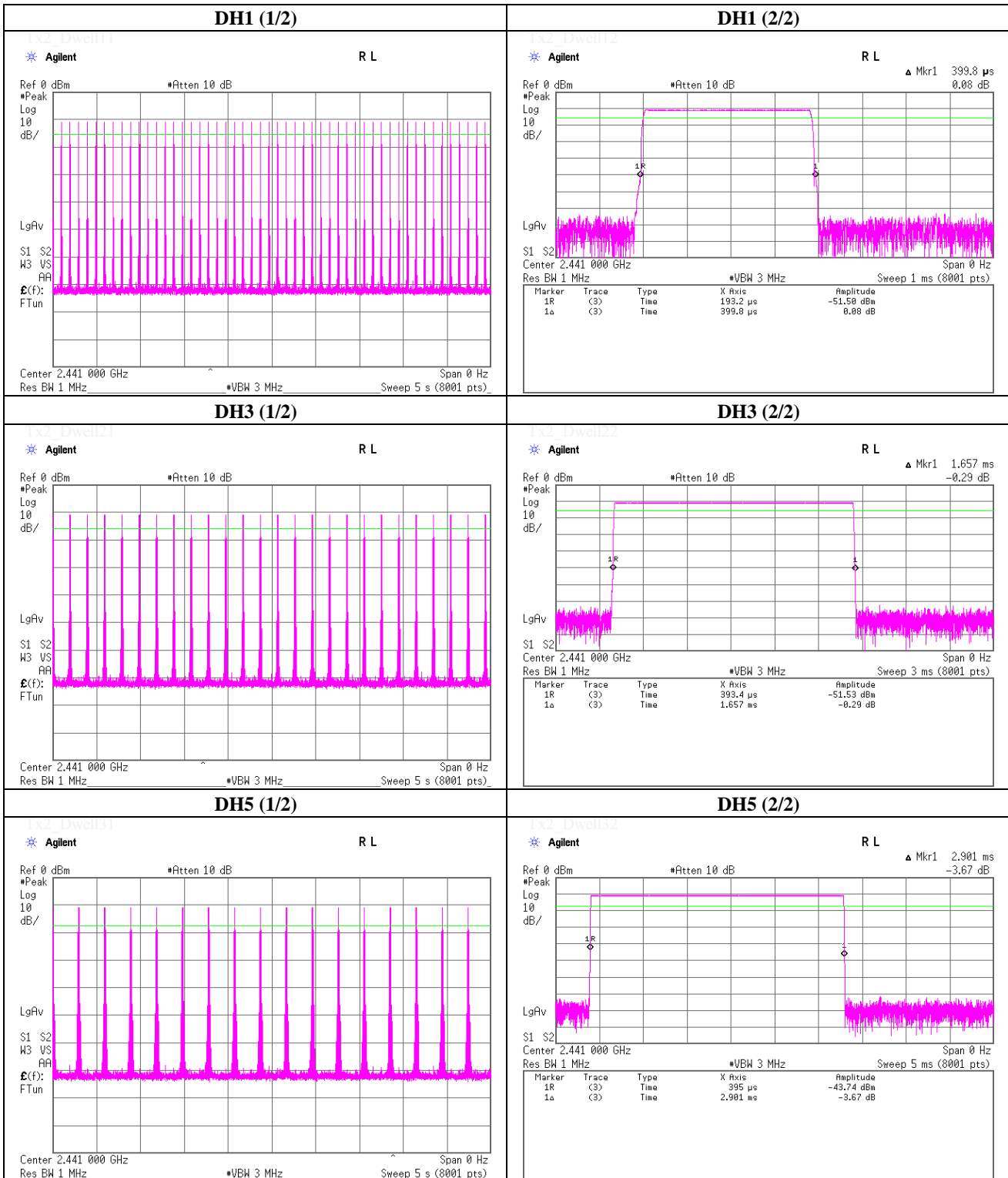
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Dwell time

Tx, Bluetooth, BDR, PRBS9



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Dwell Time

Test place UL Japan, Inc. Shonan EMC Lab. No.5 Shielded Room
Date July 18, 2013
Temperature / Humidity 27 deg.C , 57 %RH
Engineer Kenichi Adachi
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	0.416	134	400
3-DH3	26.0 / 5.0 sec. x 31.6 sec. = 165 times	1.667	275	400
3-DH5	17.0 / 5.0 sec. x 31.6 sec. = 108 times	2.917	315	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.

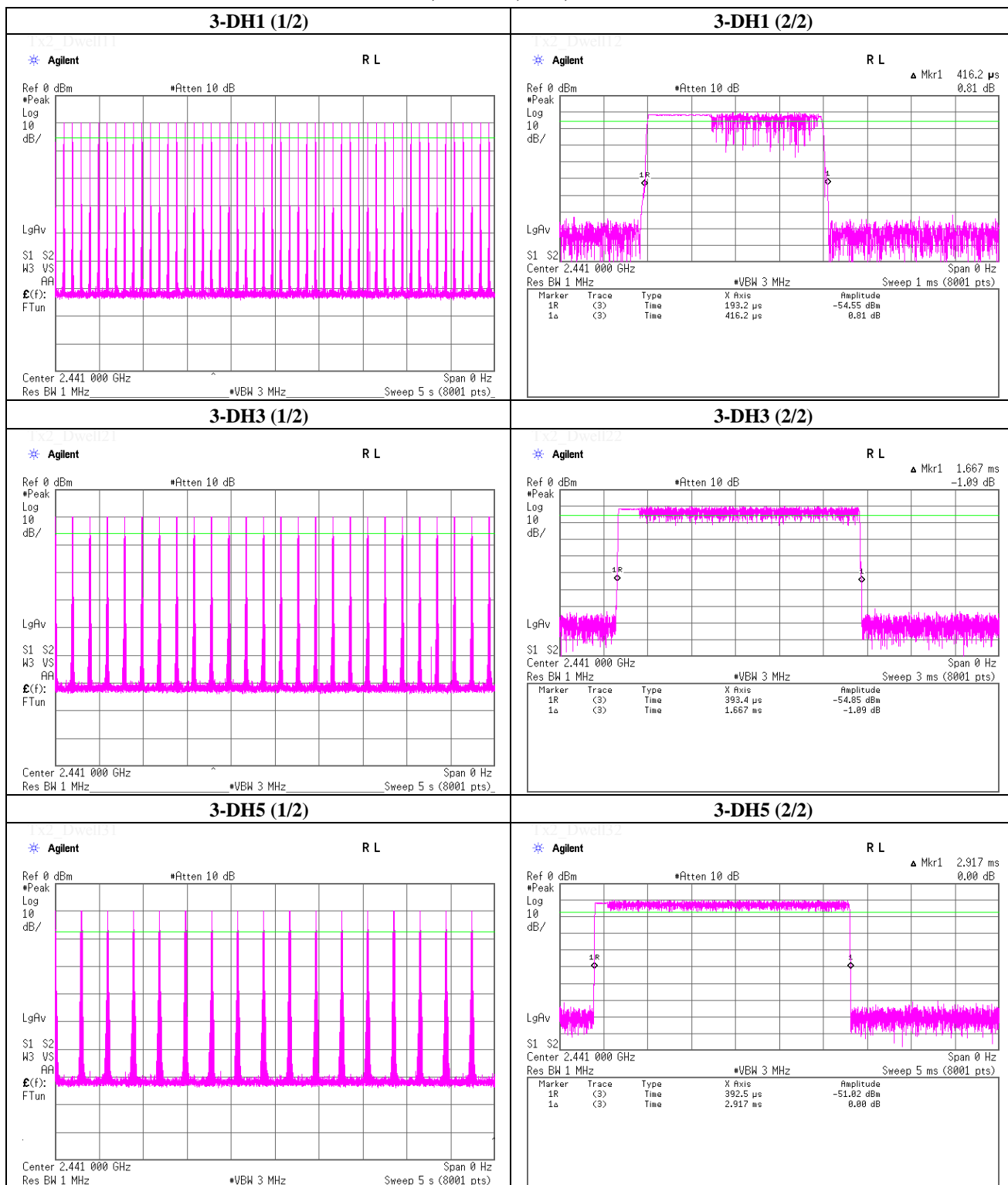
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Dwell time

Tx, Bluetooth, EDR, PRBS9



UL Japan, Inc.

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Maximum Peak Conducted Output Power (Conducted)

Test place UL Japan, Inc. Shonan EMC Lab. No.5 Shielded Room
 Date July 18, 2013
 Temperature / Humidity 27 deg.C , 57 %RH
 Engineer Kenichi Adachi
 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	-10.65	1.54	9.62	0.51	1.12	20.97	125	20.46
DH5	2441.0	-10.46	1.51	9.63	0.68	1.17	20.97	125	20.29
DH5	2480.0	-10.95	1.52	9.63	0.20	1.05	20.97	125	20.77
2-DH5	2402.0	-10.16	1.54	9.62	1.00	1.26	20.97	125	19.97
2-DH5	2441.0	-9.69	1.51	9.63	1.45	1.40	20.97	125	19.52
2-DH5	2480.0	-9.91	1.52	9.63	1.24	1.33	20.97	125	19.73
3-DH5	2402.0	-9.79	1.54	9.62	1.37	1.37	20.97	125	19.60
3-DH5	2441.0	-9.24	1.51	9.63	1.90	1.55	20.97	125	19.07
3-DH5	2480.0	-9.42	1.52	9.63	1.73	1.49	20.97	125	19.24

Sample Calculation:

Result = Reading + Cable Loss + Atten. Loss

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Radiated Emission

Test place	No.3 Semi Anechoic Chamber			
Date	July 11, 2013	July 12, 2013	July 14, 2013	July 15, 2013
Temperature / Humidity	25deg.C / 53%RH	24deg.C / 68%RH	24deg.C / 43%RH	25deg.C / 59%RH
Engineer	Tatsuya Arai	Tatsuya Arai	Tadaomi Yamano	Kenichi Adachi
Mode	Tx, 2402 MHz Bluetooth, DH5, PRBS9, Antenna: Dipole			

(* 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.	216.002	QP	34.7	16.6	8.0	32.0	27.3	46.0	18.7	150	277	
Hori.	2390.000	PK	44.6	27.4	14.7	41.4	45.3	73.9	28.6	100	354	
Hori.	2558.706	PK	48.1	27.7	15.0	41.4	49.4	73.9	24.5	100	23	
Hori.	4804.000	PK	53.8	31.1	7.5	41.2	51.2	73.9	22.7	100	137	
Hori.	7206.000	PK	46.1	36.6	9.1	41.4	50.4	73.9	23.5	100	0	
Hori.	9608.000	PK	44.2	38.5	10.2	38.9	54.0	73.9	19.9	100	0	
Hori.	2390.000	AV	34.4	27.4	14.7	41.4	35.1	53.9	18.8	100	354	
Hori.	2558.706	AV	39.4	27.7	15.0	41.4	40.7	53.9	13.2	100	23	
Hori.	4804.000	AV	47.5	31.1	7.5	41.2	44.9	53.9	9.0	100	137	
Hori.	7206.000	AV	35.4	36.6	9.1	41.4	39.7	53.9	14.2	100	0	
Hori.	9608.000	AV	31.0	38.5	10.2	38.9	40.8	53.9	13.1	100	0	
Vert.	30.143	QP	27.1	17.9	6.4	32.2	19.2	40.0	20.8	100	70	
Vert.	87.257	QP	36.4	7.7	7.5	32.1	19.5	40.0	20.5	100	345	
Vert.	216.002	QP	33.3	16.6	8.0	32.0	25.9	46.0	20.1	100	8	
Vert.	2390.000	PK	43.4	27.4	14.7	41.4	44.1	73.9	29.8	100	129	
Vert.	2558.706	PK	48.2	27.7	15.0	41.4	49.5	73.9	24.4	100	152	
Vert.	4804.000	PK	53.6	31.1	7.5	41.2	51.0	73.9	22.9	100	165	
Vert.	7206.000	PK	45.8	36.6	9.1	41.4	50.1	73.9	23.8	100	0	
Vert.	9608.000	PK	44.3	38.5	10.2	38.9	54.1	73.9	19.8	100	0	
Vert.	2390.000	AV	34.4	27.4	14.7	41.4	35.1	53.9	18.8	100	129	
Vert.	2558.706	AV	39.9	27.7	15.0	41.4	41.2	53.9	12.7	100	152	
Vert.	4804.000	AV	48.7	31.1	7.5	41.2	46.1	53.9	7.8	100	165	
Vert.	7206.000	AV	35.6	36.6	9.1	41.4	39.9	53.9	14.0	100	0	
Vert.	9608.000	AV	31.2	38.5	10.2	38.9	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

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]	Height [cm]	Angle [deg]	Remark
Hori.	2402.000	PK	96.4	27.4	14.7	41.4	97.1	-	-	100	354	Carrier
Hori.	2400.000	PK	50.1	27.4	14.7	41.4	50.8	77.1	26.3	100	354	
Vert.	2402.000	PK	97.5	27.4	14.7	41.4	98.2	-	-	100	129	Carrier
Vert.	2400.000	PK	51.7	27.4	14.7	41.4	52.4	78.2	25.8	100	129	

Result = Reading + Ant.Fac. + Loss(Cable+Attenuator+Filter) - Gain(Amplifier)

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Radiated Emission

Test place	No.3 Semi Anechoic Chamber			
Date	July 11, 2013	July 12, 2013	July 14, 2013	July 15, 2013
Temperature / Humidity	25deg.C / 53%RH	24deg.C / 68%RH	24deg.C / 43%RH	25deg.C / 59%RH
Engineer	Tatsuya Arai	Tatsuya Arai	Tadaomi Yamano	Kenichi Adachi
Mode	Tx, 2441 MHz Bluetooth, DH5, PRBS9, Antenna: Dipole			

(* 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.	216.004	QP	35.1	16.6	8.0	32.0	27.7	46.0	18.3	149	274	
Hori.	4882.000	PK	53.3	31.3	7.5	41.1	51.0	73.9	22.9	100	23	
Hori.	7323.000	PK	46.4	36.6	9.0	41.4	50.6	73.9	23.3	100	0	
Hori.	9764.000	PK	43.5	38.7	10.1	38.9	53.4	73.9	20.5	100	0	
Hori.	4882.000	AV	46.5	31.3	7.5	41.1	44.2	53.9	9.7	100	23	
Hori.	7323.000	AV	35.6	36.6	9.0	41.4	39.8	53.9	14.1	100	0	
Hori.	9764.000	AV	33.2	38.7	10.1	38.9	43.1	53.9	10.8	100	0	
Vert.	30.098	QP	26.9	17.9	6.4	32.2	19.0	40.0	21.0	100	85	
Vert.	87.890	QP	36.7	7.8	7.5	32.1	19.9	40.0	20.1	100	207	
Vert.	216.004	QP	33.4	16.6	8.0	32.0	26.0	46.0	20.0	100	24	
Vert.	4882.000	PK	54.3	31.3	7.5	41.1	52.0	73.9	21.9	100	178	
Vert.	7323.000	PK	46.9	36.6	9.0	41.4	51.1	73.9	22.8	100	0	
Vert.	9764.000	PK	43.4	38.7	10.1	38.9	53.3	73.9	20.6	100	0	
Vert.	4882.000	AV	48.4	31.3	7.5	41.1	46.1	53.9	7.8	100	178	
Vert.	7323.000	AV	35.5	36.6	9.0	41.4	39.7	53.9	14.2	100	0	
Vert.	9764.000	AV	31.8	38.7	10.1	38.9	41.7	53.9	12.2	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.3 Semi Anechoic Chamber			
Date	July 11, 2013	July 12, 2013	July 14, 2013	July 15, 2013
Temperature / Humidity	25deg.C / 53%RH	24deg.C / 68%RH	24deg.C / 43%RH	25deg.C / 59%RH
Engineer	Tatsuya Arai	Tatsuya Arai	Tadaomi Yamano	Kenichi Adachi
Mode	Tx, 2480 MHz Bluetooth, DH5, PRBS9, Antenna: Dipole			

(* 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.	216.004	QP	34.3	16.6	8.0	32.0	26.9	46.0	19.1	151	276	
Hori.	2324.870	PK	48.9	27.3	14.6	41.4	49.4	73.9	24.5	100	324	
Hori.	2483.500	PK	47.3	27.5	14.8	41.4	48.2	73.9	25.7	100	2	
Hori.	4960.000	PK	53.1	31.6	7.5	41.0	51.2	73.9	22.7	126	224	
Hori.	7440.000	PK	46.1	36.7	9.0	41.5	50.3	73.9	23.6	100	0	
Hori.	9920.000	PK	42.6	39.0	10.0	38.9	52.7	73.9	21.2	100	0	
Hori.	2324.870	AV	39.8	27.3	14.6	41.4	40.3	53.9	13.6	100	324	
Hori.	2483.500	AV	36.7	27.5	14.8	41.4	37.6	53.9	16.3	100	2	
Hori.	4960.000	AV	47.1	31.6	7.5	41.0	45.2	53.9	8.7	126	224	
Hori.	7440.000	AV	35.4	36.7	9.0	41.5	39.6	53.9	14.3	100	0	
Hori.	9920.000	AV	32.2	39.0	10.0	38.9	42.3	53.9	11.6	100	0	
Vert.	30.031	QP	27.0	17.9	6.4	32.2	19.1	40.0	20.9	100	85	
Vert.	87.773	QP	36.9	7.8	7.5	32.1	20.1	40.0	19.9	121	285	
Vert.	216.004	QP	32.9	16.6	8.0	32.0	25.5	46.0	20.5	100	13	
Vert.	2324.870	PK	48.4	27.3	14.6	41.4	48.9	73.9	25.0	100	127	
Vert.	2483.500	PK	46.7	27.5	14.8	41.4	47.6	73.9	26.3	113	46	
Vert.	4960.000	PK	54.9	31.6	7.5	41.0	53.0	73.9	20.9	100	183	
Vert.	7440.000	PK	46.2	36.7	9.0	41.5	50.4	73.9	23.5	100	0	
Vert.	9920.000	PK	42.7	39.0	10.0	38.9	52.8	73.9	21.1	100	0	
Vert.	2324.870	AV	39.9	27.3	14.6	41.4	40.4	53.9	13.5	100	127	
Vert.	2483.500	AV	36.8	27.5	14.8	41.4	37.7	53.9	16.2	113	46	
Vert.	4960.000	AV	49.7	31.6	7.5	41.0	47.8	53.9	6.1	100	183	
Vert.	7440.000	AV	35.5	36.7	9.0	41.5	39.7	53.9	14.2	100	0	
Vert.	9920.000	AV	32.2	39.0	10.0	38.9	42.3	53.9	11.6	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.3 Semi Anechoic Chamber
 Date July 11, 2013 July 12, 2013 July 14, 2013 July 15, 2013
 Temperature / Humidity 25deg.C / 53%RH 24deg.C / 68%RH 24deg.C / 43%RH 25deg.C / 59%RH
 Engineer Tatsuya Arai Tatsuya Arai Tadaomi Yamano Kenichi Adachi
 Mode Tx, 2402 MHz
 Bluetooth, 3-DH5, PRBS9, Antenna: Dipole

(* 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.	216.004	QP	34.7	16.6	8.0	32.0	27.3	46.0	18.7	151	273	
Hori.	2390.000	PK	45.2	27.4	14.7	41.4	45.9	73.9	28.0	100	358	
Hori.	2558.994	PK	48.3	27.7	15.0	41.4	49.6	73.9	24.3	100	34	
Hori.	4804.000	PK	52.6	31.1	7.5	41.2	50.0	73.9	23.9	100	126	
Hori.	7206.000	PK	46.5	36.6	9.1	41.4	50.8	73.9	23.1	100	0	
Hori.	9608.000	PK	44.0	38.5	10.2	38.9	53.8	73.9	20.1	100	0	
Hori.	2390.000	AV	34.5	27.4	14.7	41.4	35.2	53.9	18.7	100	358	
Hori.	2558.994	AV	37.3	27.7	15.0	41.4	38.6	53.9	15.3	100	34	
Hori.	4804.000	AV	43.3	31.1	7.5	41.2	40.7	53.9	13.2	100	126	
Hori.	7206.000	AV	34.4	36.6	9.1	41.4	38.7	53.9	15.2	100	0	
Hori.	9608.000	AV	31.2	38.5	10.2	38.9	41.0	53.9	12.9	100	0	
Vert.	30.541	QP	27.5	17.8	6.4	32.2	19.5	40.0	20.5	100	107	
Vert.	87.828	QP	37.2	7.8	7.5	32.1	20.4	40.0	19.6	120	279	
Vert.	216.004	QP	33.4	16.6	8.0	32.0	26.0	46.0	20.0	100	15	
Vert.	2390.000	PK	45.2	27.4	14.7	41.4	45.9	73.9	28.0	100	93	
Vert.	2558.994	PK	46.4	27.7	15.0	41.4	47.7	73.9	26.2	100	35	
Vert.	4804.000	PK	53.2	31.1	7.5	41.2	50.6	73.9	23.3	100	176	
Vert.	7206.000	PK	46.2	36.6	9.1	41.4	50.5	73.9	23.4	100	0	
Vert.	9608.000	PK	43.1	38.5	10.2	38.9	52.9	73.9	21.0	100	0	
Vert.	2390.000	AV	34.5	27.4	14.7	41.4	35.2	53.9	18.7	100	93	
Vert.	2558.994	AV	38.6	27.7	15.0	41.4	39.9	53.9	14.0	100	35	
Vert.	4804.000	AV	46.2	31.1	7.5	41.2	43.6	53.9	10.3	100	176	
Vert.	7206.000	AV	35.4	36.6	9.1	41.4	39.7	53.9	14.2	100	0	
Vert.	9608.000	AV	31.9	38.5	10.2	38.9	41.7	53.9	12.2	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

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]	Height [cm]	Angle [deg]	Remark
Hori.	2402.000	PK	95.6	27.4	14.7	41.4	96.3	-	-	100	358	Carrier
Hori.	2400.000	PK	45.9	27.4	14.7	41.4	46.6	76.3	29.7	100	358	
Vert.	2402.000	PK	96.5	27.4	14.7	41.4	97.2	-	-	100	93	Carrier
Vert.	2400.000	PK	47.2	27.4	14.7	41.4	47.9	77.2	29.3	100	93	

Result = Reading + Ant.Fac. + Loss(Cable+Attenuator+Filter) - Gain(Amplifier)

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Radiated Emission

Test place	No.3 Semi Anechoic Chamber			
Date	July 11, 2013	July 12, 2013	July 14, 2013	July 15, 2013
Temperature / Humidity	25deg.C / 53%RH	24deg.C / 68%RH	24deg.C / 43%RH	25deg.C / 59%RH
Engineer	Tatsuya Arai	Tatsuya Arai	Tadaomi Yamano	Kenichi Adachi
Mode	Tx, 2441 MHz Bluetooth, 3-DH5, PRBS9, Antenna: Dipole			

(* 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.	216.004	QP	34.9	16.6	8.0	32.0	27.5	46.0	18.5	151	277	
Hori.	4882.000	PK	53.2	31.3	7.5	41.1	50.9	73.9	23.0	100	161	
Hori.	7323.000	PK	46.1	36.6	9.0	41.4	50.3	73.9	23.6	100	0	
Hori.	9764.000	PK	43.7	38.7	10.1	38.9	53.6	73.9	20.3	100	0	
Hori.	4882.000	AV	44.7	31.3	7.5	41.1	42.4	53.9	11.5	100	161	
Hori.	7323.000	AV	35.2	36.6	9.0	41.4	39.4	53.9	14.5	100	0	
Hori.	9764.000	AV	33.0	38.7	10.1	38.9	42.9	53.9	11.0	100	0	
Vert.	30.146	QP	27.3	17.9	6.4	32.2	19.4	40.0	20.6	100	133	
Vert.	87.922	QP	37.2	7.8	7.5	32.1	20.4	40.0	19.6	120	281	
Vert.	216.004	QP	33.6	16.6	8.0	32.0	26.2	46.0	19.8	100	17	
Vert.	4882.000	PK	54.1	31.3	7.5	41.1	51.8	73.9	22.1	100	143	
Vert.	7323.000	PK	46.5	36.6	9.0	41.4	50.7	73.9	23.2	100	0	
Vert.	9764.000	PK	43.5	38.7	10.1	38.9	53.4	73.9	20.5	100	0	
Vert.	4882.000	AV	45.4	31.3	7.5	41.1	43.1	53.9	10.8	100	143	
Vert.	7323.000	AV	35.7	36.6	9.0	41.4	39.9	53.9	14.0	100	0	
Vert.	9764.000	AV	32.4	38.7	10.1	38.9	42.3	53.9	11.6	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.3 Semi Anechoic Chamber		
Date	July 11, 2013	July 12, 2013	July 14, 2013
Temperature / Humidity	25deg.C / 53%RH	24deg.C / 68%RH	24deg.C / 43%RH
Engineer	Tatsuya Arai	Tatsuya Arai	Tadaomi Yamano
Mode	Tx, 2480 MHz		
	Bluetooth, 3-DH5, PRBS9, Antenna: Dipole		

(* 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.	216.004	QP	36.2	16.6	8.0	32.0	28.8	46.0	17.2	153	272	
Hori.	2483.500	PK	49.2	27.5	14.8	41.4	50.1	73.9	23.8	100	2	
Hori.	4960.000	PK	54.3	31.6	7.5	41.0	52.4	73.9	21.5	100	228	
Hori.	7440.000	PK	47.5	36.7	9.0	41.5	51.7	73.9	22.2	100	0	
Hori.	9920.000	PK	45.0	39.0	10.0	38.9	55.1	73.9	18.8	100	0	
Hori.	2483.500	AV	37.6	27.5	14.8	41.4	38.5	53.9	15.4	100	2	
Hori.	4960.000	AV	45.8	31.6	7.5	41.0	43.9	53.9	10.0	100	228	
Hori.	7440.000	AV	35.2	36.7	9.0	41.5	39.4	53.9	14.5	100	0	
Hori.	9920.000	AV	33.8	39.0	10.0	38.9	43.9	53.9	10.0	100	0	
Vert.	31.676	QP	27.6	17.3	6.5	32.2	19.2	40.0	20.8	100	165	
Vert.	87.927	QP	36.9	7.8	7.5	32.1	20.1	40.0	19.9	100	245	
Vert.	216.006	QP	34.5	16.6	8.0	32.0	27.1	46.0	18.9	100	20	
Vert.	2483.500	PK	48.9	27.5	14.8	41.4	49.8	73.9	24.1	100	161	
Vert.	4960.000	PK	55.6	31.6	7.5	41.0	53.7	73.9	20.2	100	180	
Vert.	7440.000	PK	47.2	36.7	9.0	41.5	51.4	73.9	22.5	100	0	
Vert.	9920.000	PK	44.2	39.0	10.0	38.9	54.3	73.9	19.6	100	0	
Vert.	2483.500	AV	36.8	27.5	14.8	41.4	37.7	53.9	16.2	100	161	
Vert.	4960.000	AV	47.6	31.6	7.5	41.0	45.7	53.9	8.2	100	180	
Vert.	7440.000	AV	35.4	36.7	9.0	41.5	39.6	53.9	14.3	100	0	
Vert.	9920.000	AV	33.2	39.0	10.0	38.9	43.3	53.9	10.6	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.3 Semi Anechoic Chamber			
Date	July 11, 2013	July 12, 2013	July 14, 2013	July 15, 2013
Temperature / Humidity	25deg.C / 53%RH	24deg.C / 68%RH	24deg.C / 43%RH	25deg.C / 59%RH
Engineer	Tatsuya Arai	Tatsuya Arai	Tadaomi Yamano	Kenichi Adachi
Mode	Tx, 2402 MHz			
	Bluetooth, DH5, PRBS9, Antenna: PIFA			

(* 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.	216.004	QP	35.8	16.6	8.0	32.0	28.4	46.0	17.6	150	275	
Hori.	2390.000	PK	42.8	27.4	14.7	41.4	43.5	73.9	30.4	100	128	
Hori.	2558.000	PK	47.9	27.7	15.0	41.4	49.2	73.9	24.7	100	12	
Hori.	4804.000	PK	52.5	31.1	7.5	41.2	49.9	73.9	24.0	100	185	
Hori.	2390.000	AV	34.5	27.4	14.7	41.4	35.2	53.9	18.7	100	128	
Hori.	2558.000	AV	37.0	27.7	15.0	41.4	38.3	53.9	15.6	100	12	
Hori.	4804.000	AV	46.3	31.1	7.5	41.2	43.7	53.9	10.2	100	185	
Vert.	30.550	QP	27.2	17.8	6.4	32.2	19.2	40.0	20.8	100	111	
Vert.	87.298	QP	36.5	7.7	7.5	32.1	19.6	40.0	20.4	116	265	
Vert.	216.004	QP	34.9	16.6	8.0	32.0	27.5	46.0	18.5	100	19	
Vert.	2390.000	PK	43.1	27.4	14.7	41.4	43.8	73.9	30.1	100	179	
Vert.	2558.000	PK	47.2	27.7	15.0	41.4	48.5	73.9	25.4	100	23	
Vert.	4804.000	PK	48.9	31.1	7.5	41.2	46.3	73.9	27.6	100	292	
Vert.	2390.000	AV	34.6	27.4	14.7	41.4	35.3	53.9	18.6	100	179	
Vert.	2558.000	AV	38.8	27.7	15.0	41.4	40.1	53.9	13.8	100	23	
Vert.	4804.000	AV	40.0	31.1	7.5	41.2	37.4	53.9	16.5	100	292	

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

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]	Height [cm]	Angle [deg]	Remark
Hori.	2402.000	PK	94.0	27.4	14.7	41.4	94.7	-	-	100	128	Carrier
Hori.	2400.000	PK	48.0	27.4	14.7	41.4	48.7	74.7	26.0	100	128	
Vert.	2402.000	PK	95.3	27.4	14.7	41.4	96.0	-	-	100	179	Carrier
Vert.	2400.000	PK	48.3	27.4	14.7	41.4	49.0	76.0	27.0	100	179	

Result = Reading + Ant.Fac. + Loss(Cable+Attenuator+Filter) - Gain(Amplifier)

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Radiated Emission

Test place	No.3 Semi Anechoic Chamber			
Date	July 11, 2013	July 12, 2013	July 14, 2013	July 15, 2013
Temperature / Humidity	25deg.C / 53%RH	24deg.C / 68%RH	24deg.C / 43%RH	25deg.C / 59%RH
Engineer	Tatsuya Arai	Tatsuya Arai	Tadaomi Yamano	Kenichi Adachi
Mode	Tx, 2441 MHz Bluetooth, DH5, PRBS9, Antenna: PIFA			

(* 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.	4882.000	PK	52.3	31.3	7.5	41.1	50.0	73.9	23.9	100	136	
Hori.	4882.000	AV	46.5	31.3	7.5	41.1	44.2	53.9	9.7	100	136	
Vert.	4882.000	PK	49.8	31.3	7.5	41.1	47.5	73.9	26.4	100	231	
Vert.	4882.000	AV	42.5	31.3	7.5	41.1	40.2	53.9	13.7	100	231	

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.3 Semi Anechoic Chamber		
Date	July 11, 2013	July 12, 2013	July 14, 2013
Temperature / Humidity	25deg.C / 53%RH	24deg.C / 68%RH	24deg.C / 43%RH
Engineer	Tatsuya Arai	Tatsuya Arai	Tadaomi Yamano
Mode	Tx, 2480 MHz		
	Bluetooth, DH5, PRBS9, Antenna: PIFA		

(* 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.	2324.870	PK	47.2	27.3	14.6	41.4	47.7	73.9	26.2	100	134	
Hori.	2483.500	PK	44.2	27.5	14.8	41.4	45.1	73.9	28.8	100	34	
Hori.	4960.000	PK	52.2	31.6	7.5	41.0	50.3	73.9	23.6	100	227	
Hori.	2324.870	AV	37.3	27.3	14.6	41.4	37.8	53.9	16.1	100	134	
Hori.	2483.500	AV	35.4	27.5	14.8	41.4	36.3	53.9	17.6	100	34	
Hori.	4960.000	AV	45.5	31.6	7.5	41.0	43.6	53.9	10.3	100	227	
Vert.	2324.870	PK	48.7	27.3	14.6	41.4	49.2	73.9	24.7	100	33	
Vert.	2483.500	PK	45.7	27.5	14.8	41.4	46.6	73.9	27.3	100	357	
Vert.	4960.000	PK	51.3	31.6	7.5	41.0	49.4	73.9	24.5	100	34	
Vert.	2324.870	AV	38.6	27.3	14.6	41.4	39.1	53.9	14.8	100	33	
Vert.	2483.500	AV	36.8	27.5	14.8	41.4	37.7	53.9	16.2	100	357	
Vert.	4960.000	AV	44.3	31.6	7.5	41.0	42.4	53.9	11.5	100	34	

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.3 Semi Anechoic Chamber			
Date	July 11, 2013	July 12, 2013	July 14, 2013	July 15, 2013
Temperature / Humidity	25deg.C / 53%RH	24deg.C / 68%RH	24deg.C / 43%RH	25deg.C / 59%RH
Engineer	Tatsuya Arai	Tatsuya Arai	Tadaomi Yamano	Kenichi Adachi
Mode	Tx, 2402 MHz Bluetooth, 3-DH5, PRBS9, Antenna: PIFA			

(* 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.	2390.000	PK	42.3	27.4	14.7	41.4	43.0	73.9	30.9	100	41	
Hori.	2558.000	PK	45.2	27.7	15.0	41.4	46.5	73.9	27.4	100	23	
Hori.	4804.000	PK	51.9	31.1	7.5	41.2	49.3	73.9	24.6	100	178	
Hori.	2390.000	AV	34.5	27.4	14.7	41.4	35.2	53.9	18.7	100	41	
Hori.	2558.000	AV	36.1	27.7	15.0	41.4	37.4	53.9	16.5	100	23	
Hori.	4804.000	AV	44.3	31.1	7.5	41.2	41.7	53.9	12.2	100	178	
Vert.	2390.000	PK	44.5	27.4	14.7	41.4	45.2	73.9	28.7	100	203	
Vert.	2558.000	PK	47.0	27.7	15.0	41.4	48.3	73.9	25.6	100	43	
Vert.	4804.000	PK	49.4	31.1	7.5	41.2	46.8	73.9	27.1	100	162	
Vert.	2390.000	AV	34.5	27.4	14.7	41.4	35.2	53.9	18.7	100	203	
Vert.	2558.000	AV	37.7	27.7	15.0	41.4	39.0	53.9	14.9	100	43	
Vert.	4804.000	AV	39.4	31.1	7.5	41.2	36.8	53.9	17.1	100	162	

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

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]	Height [cm]	Angle [deg]	Remark
Hori.	2402.000	PK	94.1	27.4	14.7	41.4	94.8	-	-	100	41	Carrier
Hori.	2400.000	PK	45.3	27.4	14.7	41.4	46.0	74.8	28.8	100	41	
Vert.	2402.000	PK	94.5	27.4	14.7	41.4	95.2	-	-	100	203	Carrier
Vert.	2400.000	PK	46.2	27.4	14.7	41.4	46.9	75.2	28.3	100	203	

Result = Reading + Ant.Fac. + Loss(Cable+Attenuator+Filter) - Gain(Amplifier)

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Radiated Emission

Test place	No.3 Semi Anechoic Chamber		
Date	July 11, 2013	July 12, 2013	July 14, 2013
Temperature / Humidity	25deg.C / 53%RH	24deg.C / 68%RH	24deg.C / 43%RH
Engineer	Tatsuya Arai	Tatsuya Arai	Tadaomi Yamano
Mode	Tx, 2441 MHz		
	Bluetooth, 3-DH5, PRBS9, Antenna: PIFA		

(* 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.	4882.000	PK	52.2	31.3	7.5	41.1	49.9	73.9	24.0	100	214	
Hori.	4882.000	AV	44.5	31.3	7.5	41.1	42.2	53.9	11.7	100	214	
Vert.	4882.000	PK	49.8	31.3	7.5	41.1	47.5	73.9	26.4	100	348	
Vert.	4882.000	AV	41.0	31.3	7.5	41.1	38.7	53.9	15.2	100	348	

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.3 Semi Anechoic Chamber			
Date	July 11, 2013	July 12, 2013	July 14, 2013	July 15, 2013
Temperature / Humidity	25deg.C / 53%RH	24deg.C / 68%RH	24deg.C / 43%RH	25deg.C / 59%RH
Engineer	Tatsuya Arai	Tatsuya Arai	Tadaomi Yamano	Kenichi Adachi
Mode	Tx, 2480 MHz Bluetooth, 3-DH5, PRBS9, Antenna: PIFA			

(* 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.	2324.870	PK	48.0	27.3	14.6	41.4	48.5	73.9	25.4	100	121	
Hori.	2483.500	PK	45.2	27.5	14.8	41.4	46.1	73.9	27.8	100	21	
Hori.	4960.000	PK	52.1	31.6	7.5	41.0	50.2	73.9	23.7	100	321	
Hori.	2324.870	AV	37.2	27.3	14.6	41.4	37.7	53.9	16.2	100	121	
Hori.	2483.500	AV	34.9	27.5	14.8	41.4	35.8	53.9	18.1	100	21	
Hori.	4960.000	AV	45.2	31.6	7.5	41.0	43.3	53.9	10.6	100	321	
Vert.	2324.870	PK	49.2	27.3	14.6	41.4	49.7	73.9	24.2	100	45	
Vert.	2483.500	PK	46.0	27.5	14.8	41.4	46.9	73.9	27.0	100	53	
Vert.	4960.000	PK	52.5	31.6	7.5	41.0	50.6	73.9	23.3	100	209	
Vert.	2324.870	AV	38.9	27.3	14.6	41.4	39.4	53.9	14.5	100	45	
Vert.	2483.500	AV	37.3	27.5	14.8	41.4	38.2	53.9	15.7	100	53	
Vert.	4960.000	AV	44.2	31.6	7.5	41.0	42.3	53.9	11.6	100	209	

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.3 Semi Anechoic Chamber
 Date July 11, 2013 July 12, 2013 July 14, 2013 July 15, 2013
 Temperature / Humidity 25deg.C / 53%RH 24deg.C / 68%RH 24deg.C / 43%RH 25deg.C / 59%RH
 Engineer Tatsuya Arai Tatsuya Arai Tadaomi Yamano Kenichi Adachi
 Mode Tx, 2402 MHz
 Bluetooth, DH5, PRBS9, Antenna: Chip

(* 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.	216.004	QP	37.2	16.6	8.0	32.0	29.8	46.0	16.2	150	342	
Hori.	2390.000	PK	44.2	27.4	14.7	41.4	44.9	73.9	29.0	100	243	
Hori.	2558.000	PK	47.6	27.7	15.0	41.4	48.9	73.9	25.0	100	187	
Hori.	4804.000	PK	53.4	31.1	7.5	41.2	50.8	73.9	23.1	100	142	
Hori.	2390.000	AV	34.6	27.4	14.7	41.4	35.3	53.9	18.6	100	243	
Hori.	2558.000	AV	40.3	27.7	15.0	41.4	41.6	53.9	12.3	100	187	
Hori.	4804.000	AV	46.5	31.1	7.5	41.2	43.9	53.9	10.0	100	142	
Vert.	31.606	QP	27.7	17.4	6.5	32.2	19.4	40.0	20.6	100	153	
Vert.	87.555	QP	36.9	7.8	7.5	32.1	20.1	40.0	19.9	115	259	
Vert.	216.004	QP	33.5	16.6	8.0	32.0	26.1	46.0	19.9	100	14	
Vert.	2390.000	PK	44.2	27.4	14.7	41.4	44.9	73.9	29.0	100	234	
Vert.	2558.000	PK	47.3	27.7	15.0	41.4	48.6	73.9	25.3	100	354	
Vert.	4804.000	PK	53.8	31.1	7.5	41.2	51.2	73.9	22.7	100	164	
Vert.	2390.000	AV	34.6	27.4	14.7	41.4	35.3	53.9	18.6	100	234	
Vert.	2558.000	AV	39.1	27.7	15.0	41.4	40.4	53.9	13.5	100	354	
Vert.	4804.000	AV	47.7	31.1	7.5	41.2	45.1	53.9	8.8	100	164	

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

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]	Height [cm]	Angle [deg]	Remark
Hori.	2402.000	PK	93.7	27.4	14.7	41.4	94.4	-	-	100	243	Carrier
Hori.	2400.000	PK	48.0	27.4	14.7	41.4	48.7	74.4	25.7	100	243	
Vert.	2402.000	PK	95.4	27.4	14.7	41.4	96.1	-	-	100	234	Carrier
Vert.	2400.000	PK	48.7	27.4	14.7	41.4	49.4	76.1	26.7	100	234	

Result = Reading + Ant.Fac. + Loss(Cable+Attenuator+Filter) - Gain(Amplifier)

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Radiated Emission

Test place	No.3 Semi Anechoic Chamber			
Date	July 11, 2013	July 12, 2013	July 14, 2013	July 15, 2013
Temperature / Humidity	25deg.C / 53%RH	24deg.C / 68%RH	24deg.C / 43%RH	25deg.C / 59%RH
Engineer	Tatsuya Arai	Tatsuya Arai	Tadaomi Yamano	Kenichi Adachi
Mode	Tx, 2441 MHz Bluetooth, DH5, PRBS9, Antenna: Chip			

(* 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.	4882.000	PK	52.8	31.3	7.5	41.1	50.5	73.9	23.4	100	167	
Hori.	4882.000	AV	45.9	31.3	7.5	41.1	43.6	53.9	10.3	100	167	
Vert.	4882.000	PK	55.3	31.3	7.5	41.1	53.0	73.9	20.9	100	222	
Vert.	4882.000	AV	49.3	31.3	7.5	41.1	47.0	53.9	6.9	100	222	

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.3 Semi Anechoic Chamber		
Date	July 11, 2013	July 12, 2013	July 14, 2013
Temperature / Humidity	25deg.C / 53%RH	24deg.C / 68%RH	24deg.C / 43%RH
Engineer	Tatsuya Arai	Tatsuya Arai	Tadaomi Yamano
Mode	Tx, 2480 MHz		
	Bluetooth, DH5, PRBS9, Antenna: Chip		

(* 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.	2324.870	PK	47.8	27.3	14.6	41.4	48.3	73.9	25.6	100	53	
Hori.	2483.500	PK	45.7	27.5	14.8	41.4	46.6	73.9	27.3	100	60	
Hori.	4960.000	PK	52.3	31.6	7.5	41.0	50.4	73.9	23.5	100	224	
Hori.	2324.870	AV	39.7	27.3	14.6	41.4	40.2	53.9	13.7	100	53	
Hori.	2483.500	AV	36.5	27.5	14.8	41.4	37.4	53.9	16.5	100	60	
Hori.	4960.000	AV	45.7	31.6	7.5	41.0	43.8	53.9	10.1	100	224	
Vert.	2324.870	PK	47.5	27.3	14.6	41.4	48.0	73.9	25.9	100	204	
Vert.	2483.500	PK	46.9	27.5	14.8	41.4	47.8	73.9	26.1	100	181	
Vert.	4960.000	PK	51.6	31.6	7.5	41.0	49.7	73.9	24.2	100	161	
Vert.	2324.870	AV	39.2	27.3	14.6	41.4	39.7	53.9	14.2	100	204	
Vert.	2483.500	AV	36.6	27.5	14.8	41.4	37.5	53.9	16.4	100	181	
Vert.	4960.000	AV	46.6	31.6	7.5	41.0	44.7	53.9	9.2	100	161	

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.3 Semi Anechoic Chamber			
Date	July 11, 2013	July 12, 2013	July 14, 2013	July 15, 2013
Temperature / Humidity	25deg.C / 53%RH	24deg.C / 68%RH	24deg.C / 43%RH	25deg.C / 59%RH
Engineer	Tatsuya Arai	Tatsuya Arai	Tadaomi Yamano	Kenichi Adachi
Mode	Tx, 2402 MHz			
	Bluetooth, 3-DH5, PRBS9, Antenna: Chip			

(* 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.	2390.000	PK	44.6	27.4	14.7	41.4	45.3	73.9	28.6	100	72	
Hori.	2558.000	PK	47.2	27.7	15.0	41.4	48.5	73.9	25.4	100	61	
Hori.	4804.000	PK	52.5	31.1	7.5	41.2	49.9	73.9	24.0	100	124	
Hori.	2390.000	AV	34.5	27.4	14.7	41.4	35.2	53.9	18.7	100	72	
Hori.	2558.000	AV	39.2	27.7	15.0	41.4	40.5	53.9	13.4	100	61	
Hori.	4804.000	AV	43.5	31.1	7.5	41.2	40.9	53.9	13.0	100	124	
Vert.	2390.000	PK	44.3	27.4	14.7	41.4	45.0	73.9	28.9	100	357	
Vert.	2558.000	PK	47.7	27.7	15.0	41.4	49.0	73.9	24.9	100	351	
Vert.	4804.000	PK	53.1	31.1	7.5	41.2	50.5	73.9	23.4	100	179	
Vert.	2390.000	AV	34.5	27.4	14.7	41.4	35.2	53.9	18.7	100	357	
Vert.	2558.000	AV	38.4	27.7	15.0	41.4	39.7	53.9	14.2	100	351	
Vert.	4804.000	AV	44.2	31.1	7.5	41.2	41.6	53.9	12.3	100	179	

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

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]	Height [cm]	Angle [deg]	Remark
Hori.	2402.000	PK	93.9	27.4	14.7	41.4	94.6	-	-	100	72	Carrier
Hori.	2400.000	PK	44.3	27.4	14.7	41.4	45.0	74.6	29.6	100	72	
Vert.	2402.000	PK	93.6	27.4	14.7	41.4	94.3	-	-	100	357	Carrier
Vert.	2400.000	PK	44.4	27.4	14.7	41.4	45.1	74.3	29.2	100	357	

Result = Reading + Ant.Fac. + Loss(Cable+Attenuator+Filter) - Gain(Amplifier)

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Radiated Emission

Test place	No.3 Semi Anechoic Chamber			
Date	July 11, 2013	July 12, 2013	July 14, 2013	July 15, 2013
Temperature / Humidity	25deg.C / 53%RH	24deg.C / 68%RH	24deg.C / 43%RH	25deg.C / 59%RH
Engineer	Tatsuya Arai	Tatsuya Arai	Tadaomi Yamano	Kenichi Adachi
Mode	Tx, 2441 MHz Bluetooth, 3-DH5, PRBS9, Antenna: Chip			

(* 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.	4882.000	PK	54.2	31.3	7.5	41.1	51.9	73.9	22.0	100	154	
Hori.	4882.000	AV	46.6	31.3	7.5	41.1	44.3	53.9	9.6	100	154	
Vert.	4882.000	PK	55.2	31.3	7.5	41.1	52.9	73.9	21.0	100	170	
Vert.	4882.000	AV	48.3	31.3	7.5	41.1	46.0	53.9	7.9	100	170	

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.3 Semi Anechoic Chamber		
Date	July 11, 2013	July 12, 2013	July 14, 2013
Temperature / Humidity	25deg.C / 53%RH	24deg.C / 68%RH	24deg.C / 43%RH
Engineer	Tatsuya Arai	Tatsuya Arai	Tadaomi Yamano
Mode	Tx, 2480 MHz		
	Bluetooth, 3-DH5, PRBS9, Antenna: Chip		

(* 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.	2324.870	PK	47.5	27.3	14.6	41.4	48.0	73.9	25.9	100	67	
Hori.	2483.500	PK	48.3	27.5	14.8	41.4	49.2	73.9	24.7	100	66	
Hori.	4960.000	PK	51.0	31.6	7.5	41.0	49.1	73.9	24.8	100	187	
Hori.	2324.870	AV	39.3	27.3	14.6	41.4	39.8	53.9	14.1	100	67	
Hori.	2483.500	AV	36.3	27.5	14.8	41.4	37.2	53.9	16.7	100	66	
Hori.	4960.000	AV	44.1	31.6	7.5	41.0	42.2	53.9	11.7	100	187	
Vert.	2324.870	PK	47.1	27.3	14.6	41.4	47.6	73.9	26.3	100	357	
Vert.	2483.500	PK	48.9	27.5	14.8	41.4	49.8	73.9	24.1	100	185	
Vert.	4960.000	PK	48.7	31.6	7.5	41.0	46.8	73.9	27.1	100	158	
Vert.	2324.870	AV	36.8	27.3	14.6	41.4	37.3	53.9	16.6	100	357	
Vert.	2483.500	AV	37.0	27.5	14.8	41.4	37.9	53.9	16.0	100	185	
Vert.	4960.000	AV	46.7	31.6	7.5	41.0	44.8	53.9	9.1	100	158	

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.3 Semi Anechoic Chamber			
Date	July 11, 2013	July 12, 2013	July 14, 2013	July 15, 2013
Temperature / Humidity	25deg.C / 53%RH	24deg.C / 68%RH	24deg.C / 43%RH	25deg.C / 59%RH
Engineer	Tatsuya Arai	Tatsuya Arai	Tadaomi Yamano	Kenichi Adachi
Mode	Tx, 2402 MHz			
	Bluetooth, DH5, PRBS9, Antenna: Internal			

(* 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.	216.004	QP	36.9	16.6	8.0	32.0	29.5	46.0	16.5	148	271	
Hori.	2390.000	PK	44.5	27.4	14.7	41.4	45.2	73.9	28.7	100	66	
Hori.	2558.000	PK	47.1	27.7	15.0	41.4	48.4	73.9	25.5	100	61	
Hori.	4804.000	PK	52.2	31.1	7.5	41.2	49.6	73.9	24.3	100	143	
Hori.	2390.000	AV	34.4	27.4	14.7	41.4	35.1	53.9	18.8	100	66	
Hori.	2558.000	AV	40.2	27.7	15.0	41.4	41.5	53.9	12.4	100	61	
Hori.	4804.000	AV	44.5	31.1	7.5	41.2	41.9	53.9	12.0	100	143	
Vert.	30.041	QP	26.8	17.9	6.4	32.2	18.9	40.0	21.1	100	114	
Vert.	86.711	QP	36.5	7.6	7.5	32.1	19.5	40.0	20.5	112	287	
Vert.	216.004	QP	35.3	16.6	8.0	32.0	27.9	46.0	18.1	100	15	
Vert.	2390.000	PK	44.2	27.4	14.7	41.4	44.9	73.9	29.0	100	22	
Vert.	2558.000	PK	47.4	27.7	15.0	41.4	48.7	73.9	25.2	100	343	
Vert.	4804.000	PK	52.1	31.1	7.5	41.2	49.5	73.9	24.4	100	146	
Vert.	2390.000	AV	34.2	27.4	14.7	41.4	34.9	53.9	19.0	100	22	
Vert.	2558.000	AV	38.3	27.7	15.0	41.4	39.6	53.9	14.3	100	343	
Vert.	4804.000	AV	45.3	31.1	7.5	41.2	42.7	53.9	11.2	100	146	

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

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]	Height [cm]	Angle [deg]	Remark
Hori.	2402.000	PK	93.4	27.4	14.7	41.4	94.1	-	-	100	66	Carrier
Hori.	2400.000	PK	45.3	27.4	14.7	41.4	46.0	74.1	28.1	100	66	
Vert.	2402.000	PK	92.2	27.4	14.7	41.4	92.9	-	-	100	22	Carrier
Vert.	2400.000	PK	41.2	27.4	14.7	41.4	41.9	72.9	31.0	100	22	

Result = Reading + Ant.Fac. + Loss(Cable+Attenuator+Filter) - Gain(Amplifier)

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Radiated Emission

Test place	No.3 Semi Anechoic Chamber			
Date	July 11, 2013	July 12, 2013	July 14, 2013	July 15, 2013
Temperature / Humidity	25deg.C / 53%RH	24deg.C / 68%RH	24deg.C / 43%RH	25deg.C / 59%RH
Engineer	Tatsuya Arai	Tatsuya Arai	Tadaomi Yamano	Kenichi Adachi
Mode	Tx, 2441 MHz Bluetooth, DH5, PRBS9, Antenna: Internal			

(* 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.	4882.000	PK	52.3	31.3	7.5	41.1	50.0	73.9	23.9	100	247	
Hori.	4882.000	AV	47.6	31.3	7.5	41.1	45.3	53.9	8.6	100	247	
Vert.	4882.000	PK	52.1	31.3	7.5	41.1	49.8	73.9	24.1	100	134	
Vert.	4882.000	AV	47.8	31.3	7.5	41.1	45.5	53.9	8.4	100	134	

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.3 Semi Anechoic Chamber			
Date	July 11, 2013	July 12, 2013	July 14, 2013	July 15, 2013
Temperature / Humidity	25deg.C / 53%RH	24deg.C / 68%RH	24deg.C / 43%RH	25deg.C / 59%RH
Engineer	Tatsuya Arai	Tatsuya Arai	Tadaomi Yamano	Kenichi Adachi
Mode	Tx, 2480 MHz Bluetooth, DH5, PRBS9, Antenna: Internal			

(* 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.	2324.870	PK	46.5	27.3	14.6	41.4	47.0	73.9	26.9	100	25	
Hori.	2483.500	PK	45.6	27.5	14.8	41.4	46.5	73.9	27.4	100	50	
Hori.	4960.000	PK	52.5	31.6	7.5	41.0	50.6	73.9	23.3	100	243	
Hori.	2324.870	AV	37.2	27.3	14.6	41.4	37.7	53.9	16.2	100	25	
Hori.	2483.500	AV	35.4	27.5	14.8	41.4	36.3	53.9	17.6	100	50	
Hori.	4960.000	AV	47.2	31.6	7.5	41.0	45.3	53.9	8.6	100	243	
Vert.	2324.870	PK	47.2	27.3	14.6	41.4	47.7	73.9	26.2	100	256	
Vert.	2483.500	PK	44.9	27.5	14.8	41.4	45.8	73.9	28.1	100	33	
Vert.	4960.000	PK	53.2	31.6	7.5	41.0	51.3	73.9	22.6	100	165	
Vert.	2324.870	AV	36.5	27.3	14.6	41.4	37.0	53.9	16.9	100	256	
Vert.	2483.500	AV	35.4	27.5	14.8	41.4	36.3	53.9	17.6	100	33	
Vert.	4960.000	AV	47.8	31.6	7.5	41.0	45.9	53.9	8.0	100	165	

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.3 Semi Anechoic Chamber
 Date July 11, 2013 July 12, 2013 July 14, 2013 July 15, 2013
 Temperature / Humidity 25deg.C / 53%RH 24deg.C / 68%RH 24deg.C / 43%RH 25deg.C / 59%RH
 Engineer Tatsuya Arai Tatsuya Arai Tadaomi Yamano Kenichi Adachi
 Mode Tx, 2402 MHz
 Bluetooth, 3-DH5, PRBS9, Antenna: Internal

(* 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.	2390.000	PK	44.2	27.4	14.7	41.4	44.9	73.9	29.0	100	52	
Hori.	2558.000	PK	47.7	27.7	15.0	41.4	49.0	73.9	24.9	100	76	
Hori.	4804.000	PK	51.2	31.1	7.5	41.2	48.6	73.9	25.3	100	213	
Hori.	2390.000	AV	34.7	27.4	14.7	41.4	35.4	53.9	18.5	100	52	
Hori.	2558.000	AV	40.4	27.7	15.0	41.4	41.7	53.9	12.2	100	76	
Hori.	4804.000	AV	43.5	31.1	7.5	41.2	40.9	53.9	13.0	100	213	
Vert.	2390.000	PK	44.6	27.4	14.7	41.4	45.3	73.9	28.6	100	98	
Vert.	2558.000	PK	47.6	27.7	15.0	41.4	48.9	73.9	25.0	100	332	
Vert.	4804.000	PK	52.1	31.1	7.5	41.2	49.5	73.9	24.4	100	165	
Vert.	2390.000	AV	34.9	27.4	14.7	41.4	35.6	53.9	18.3	100	98	
Vert.	2558.000	AV	38.6	27.7	15.0	41.4	39.9	53.9	14.0	100	332	
Vert.	4804.000	AV	43.9	31.1	7.5	41.2	41.3	53.9	12.6	100	165	

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

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]	Height [cm]	Angle [deg]	Remark
Hori.	2402.000	PK	92.4	27.4	14.7	41.4	93.1	-	-	100	52	Carrier
Hori.	2400.000	PK	43.6	27.4	14.7	41.4	44.3	73.1	28.8	100	52	
Vert.	2402.000	PK	91.4	27.4	14.7	41.4	92.1	-	-	100	98	Carrier
Vert.	2400.000	PK	42.9	27.4	14.7	41.4	43.6	72.1	28.5	100	98	

Result = Reading + Ant.Fac. + Loss(Cable+Attenuator+Filter) - Gain(Amplifier)

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Radiated Emission

Test place	No.3 Semi Anechoic Chamber			
Date	July 11, 2013	July 12, 2013	July 14, 2013	July 15, 2013
Temperature / Humidity	25deg.C / 53%RH	24deg.C / 68%RH	24deg.C / 43%RH	25deg.C / 59%RH
Engineer	Tatsuya Arai	Tatsuya Arai	Tadaomi Yamano	Kenichi Adachi
Mode	Tx, 2441 MHz Bluetooth, 3-DH5, PRBS9, Antenna: Internal			

(* 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.	4882.000	PK	52.1	31.3	7.5	41.1	49.8	73.9	24.1	100	226	
Hori.	4882.000	AV	47.3	31.3	7.5	41.1	45.0	53.9	8.9	100	226	
Vert.	4882.000	PK	52.4	31.3	7.5	41.1	50.1	73.9	23.8	100	146	
Vert.	4882.000	AV	47.4	31.3	7.5	41.1	45.1	53.9	8.8	100	146	

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.3 Semi Anechoic Chamber		
Date	July 11, 2013	July 12, 2013	July 14, 2013
Temperature / Humidity	25deg.C / 53%RH	24deg.C / 68%RH	24deg.C / 43%RH
Engineer	Tatsuya Arai	Tatsuya Arai	Tadaomi Yamano
Mode	Tx, 2480 MHz		
	Bluetooth, 3-DH5, PRBS9, Antenna: Internal		

(* 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.	2324.870	PK	46.2	27.3	14.6	41.4	46.7	73.9	27.2	100	44	
Hori.	2483.500	PK	45.2	27.5	14.8	41.4	46.1	73.9	27.8	100	58	
Hori.	4960.000	PK	51.7	31.6	7.5	41.0	49.8	73.9	24.1	100	222	
Hori.	2324.870	AV	37.0	27.3	14.6	41.4	37.5	53.9	16.4	100	44	
Hori.	2483.500	AV	35.8	27.5	14.8	41.4	36.7	53.9	17.2	100	58	
Hori.	4960.000	AV	46.5	31.6	7.5	41.0	44.6	53.9	9.3	100	222	
Vert.	2324.870	PK	47.1	27.3	14.6	41.4	47.6	73.9	26.3	100	212	
Vert.	2483.500	PK	43.9	27.5	14.8	41.4	44.8	73.9	29.1	100	69	
Vert.	4960.000	PK	52.4	31.6	7.5	41.0	50.5	73.9	23.4	100	143	
Vert.	2324.870	AV	36.0	27.3	14.6	41.4	36.5	53.9	17.4	100	212	
Vert.	2483.500	AV	34.7	27.5	14.8	41.4	35.6	53.9	18.3	100	69	
Vert.	4960.000	AV	47.0	31.6	7.5	41.0	45.1	53.9	8.8	100	143	

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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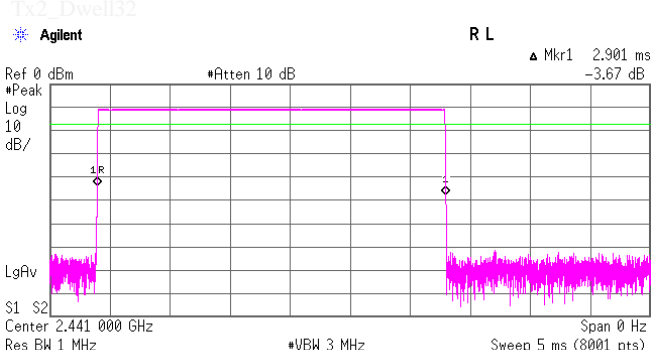
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Dwell time factor Calculation chart

Dwell time factor Calculation

Tx, Bluetooth, BDR, PRBS9

Worst 100ms Dwell time factor = $20\log((2.901 \times 2)/100) = -24.73\text{dB}$	1cycle On time : 2.901ms															
<p><small>1x2_duty2</small></p> <p>ON time of some channel during 100ms: Twice This is the worst case in hopping sequence of Bluetooth.</p>	<p><small>1x2_Dwell32</small></p>  <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <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>395 μs</td> <td>-43.74 dBm</td> </tr> <tr> <td>1a</td> <td>(3)</td> <td>Time</td> <td>2.901 ms</td> <td>-3.67 dB</td> </tr> </tbody> </table>	Marker	Trace	Type	X Axis	Amplitude	1R	(3)	Time	395 μ s	-43.74 dBm	1a	(3)	Time	2.901 ms	-3.67 dB
Marker	Trace	Type	X Axis	Amplitude												
1R	(3)	Time	395 μ s	-43.74 dBm												
1a	(3)	Time	2.901 ms	-3.67 dB												

VBW (Average) setting

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

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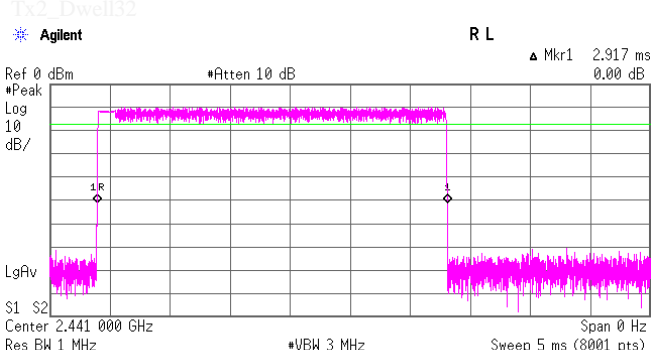
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Dwell time factor Calculation chart

Dwell time factor Calculation

Tx, Bluetooth, EDR, PRBS9

Worst 100ms Dwell time factor = $20\log((2.917 \times 2)/100) = -24.68\text{dB}$	1cycle On time : 2.917ms															
<p><small>1x2_duty2</small></p> <p>ON time of some channel during 100ms: Twice This is the worst case in hopping sequence of Bluetooth.</p>	<p><small>1x2_Dwell32</small></p>  <p style="text-align: right;">R L ▲ Mkr1 2.917 ms</p> <p>Ref 0 dBm #Atten 10 dB ▲ Mkr1 0.00 dB</p> <p>#Peak</p> <p>Log 10 dB/</p> <p>LgAv</p> <p>S1 S2</p> <p>Center 2.441 000 GHz Span 0 Hz</p> <p>Res BW 1 MHz #VBW 3 MHz Sweep 5 ms (8001 pts)</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <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>392.5 μs</td> <td>-51.02 dBm</td> </tr> <tr> <td>1a</td> <td>(3)</td> <td>Time</td> <td>2.917 ms</td> <td>0.00 dB</td> </tr> </tbody> </table>	Marker	Trace	Type	X Axis	Amplitude	1R	(3)	Time	392.5 μs	-51.02 dBm	1a	(3)	Time	2.917 ms	0.00 dB
Marker	Trace	Type	X Axis	Amplitude												
1R	(3)	Time	392.5 μs	-51.02 dBm												
1a	(3)	Time	2.917 ms	0.00 dB												

VBW (Average) setting

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

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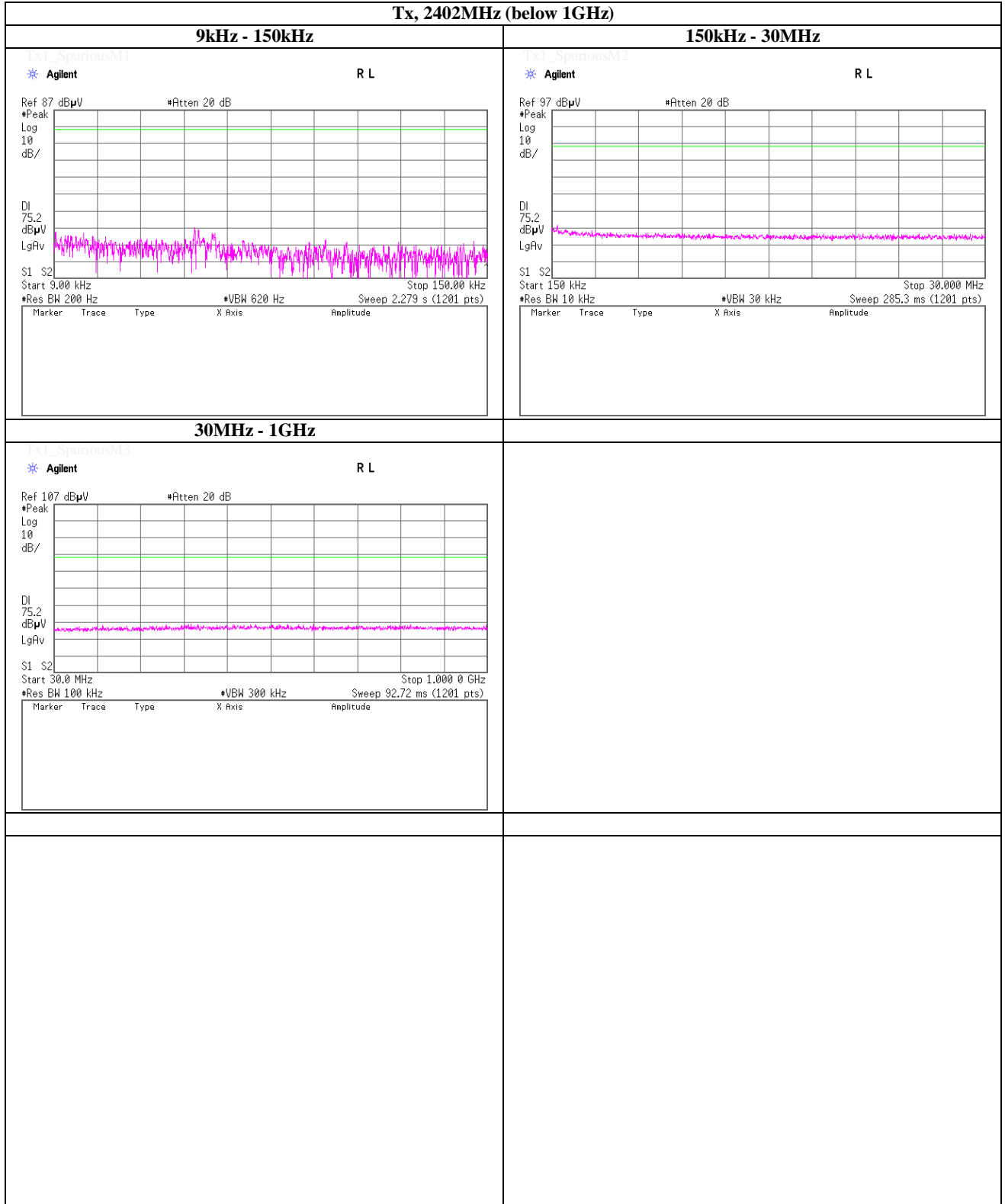
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Spurious emission (Conducted)

Tx, Bluetooth, BDR, PRBS9

Tx, 2402MHz (below 1GHz)



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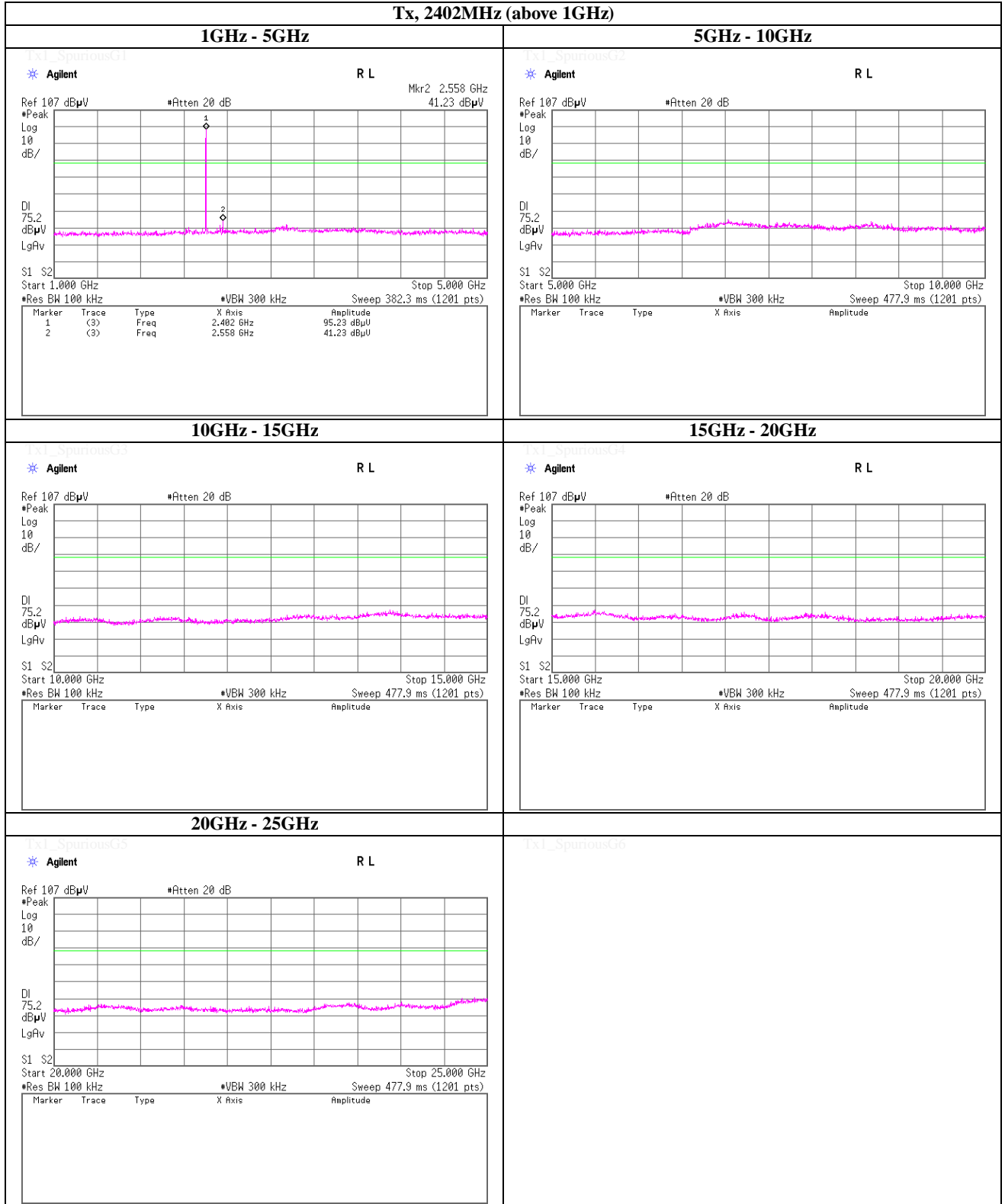
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Spurious emission (Conducted)

Tx, Bluetooth, BDR, PRBS9

Tx, 2402MHz (above 1GHz)



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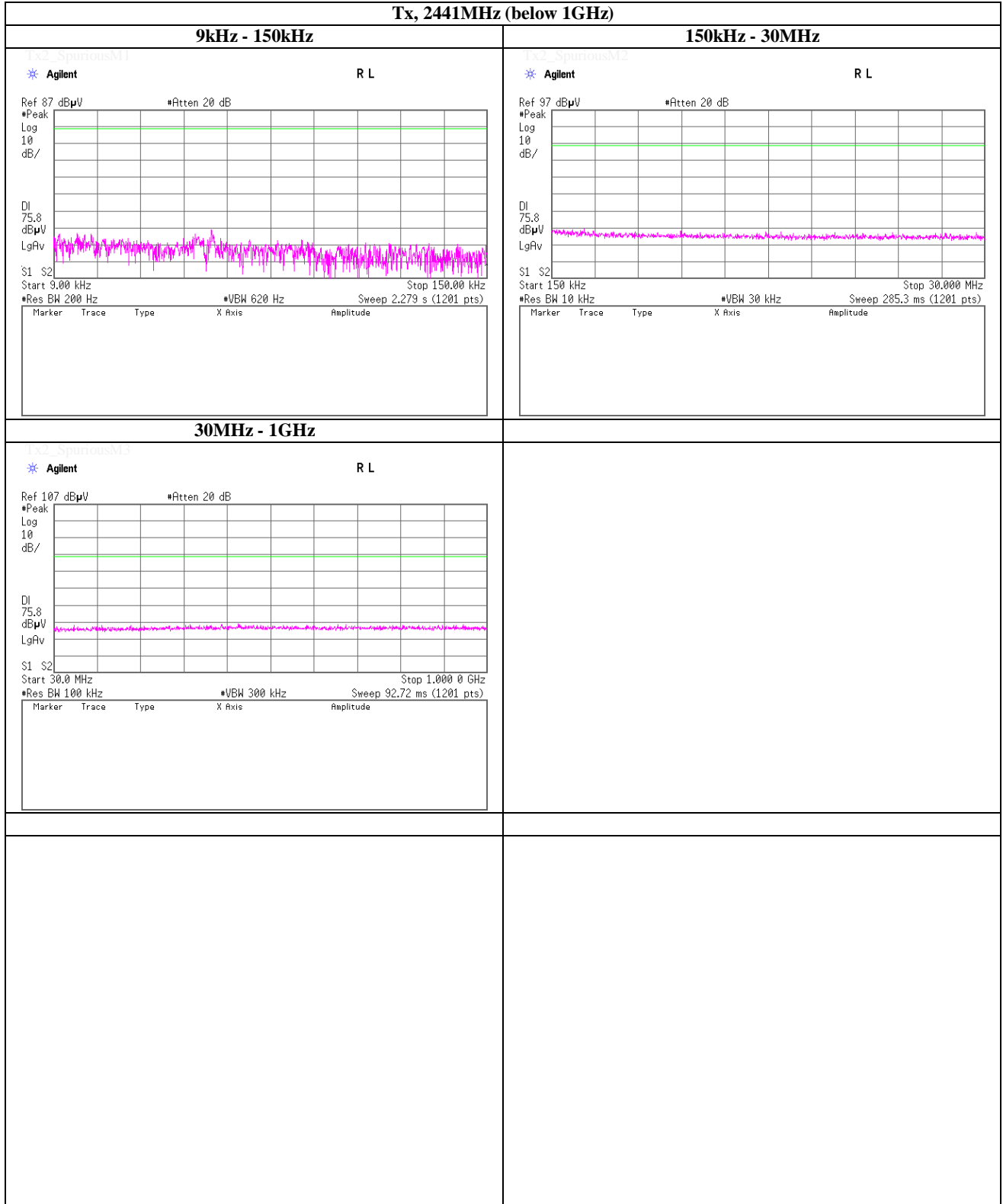
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Facsimile : +81 463 50 6401

Spurious emission (Conducted)

Tx, Bluetooth, BDR, PRBS9

Tx, 2441MHz (below 1GHz)



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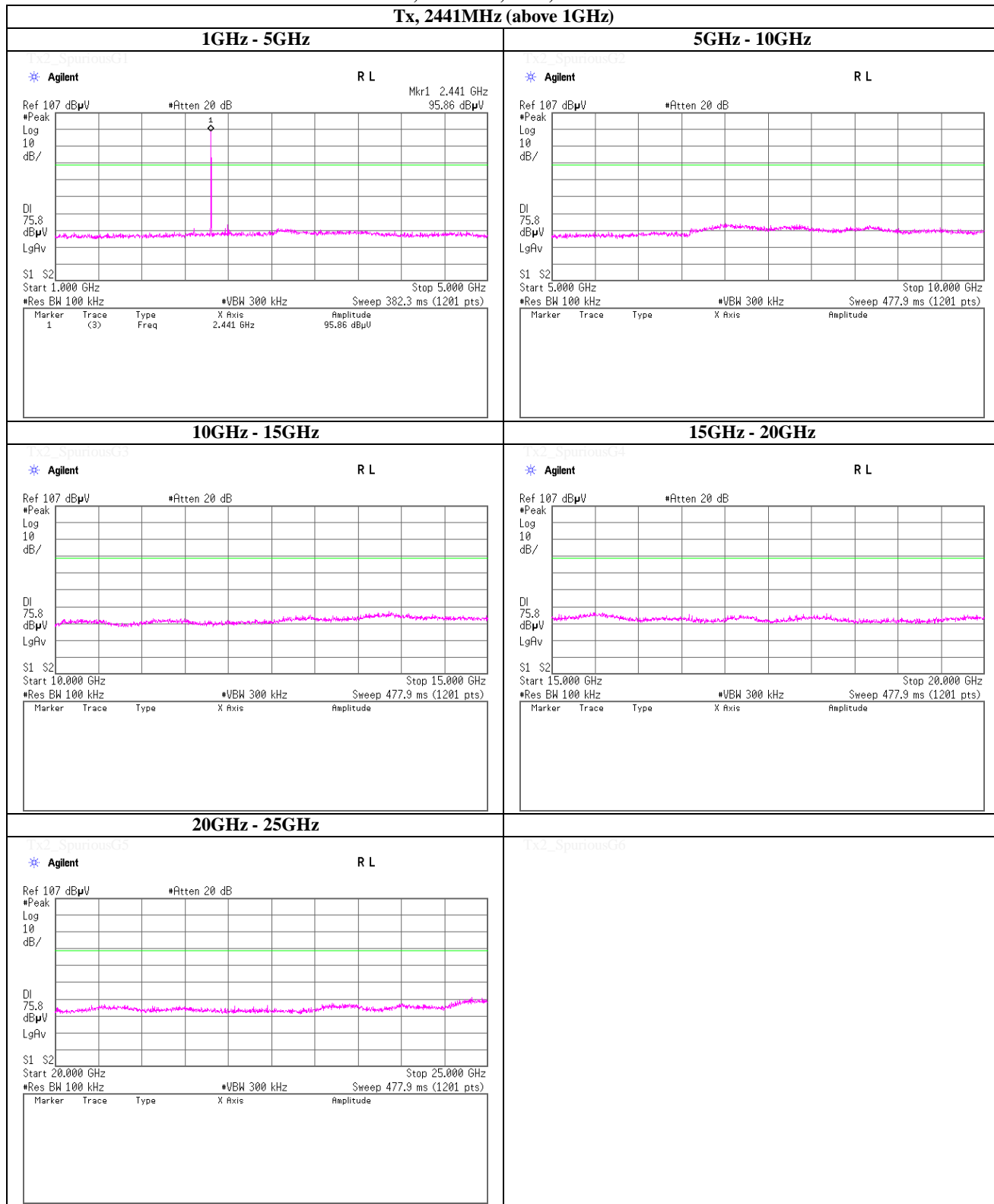
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Spurious emission (Conducted)

Tx, Bluetooth, BDR, PRBS9

Tx, 2441MHz (above 1GHz)



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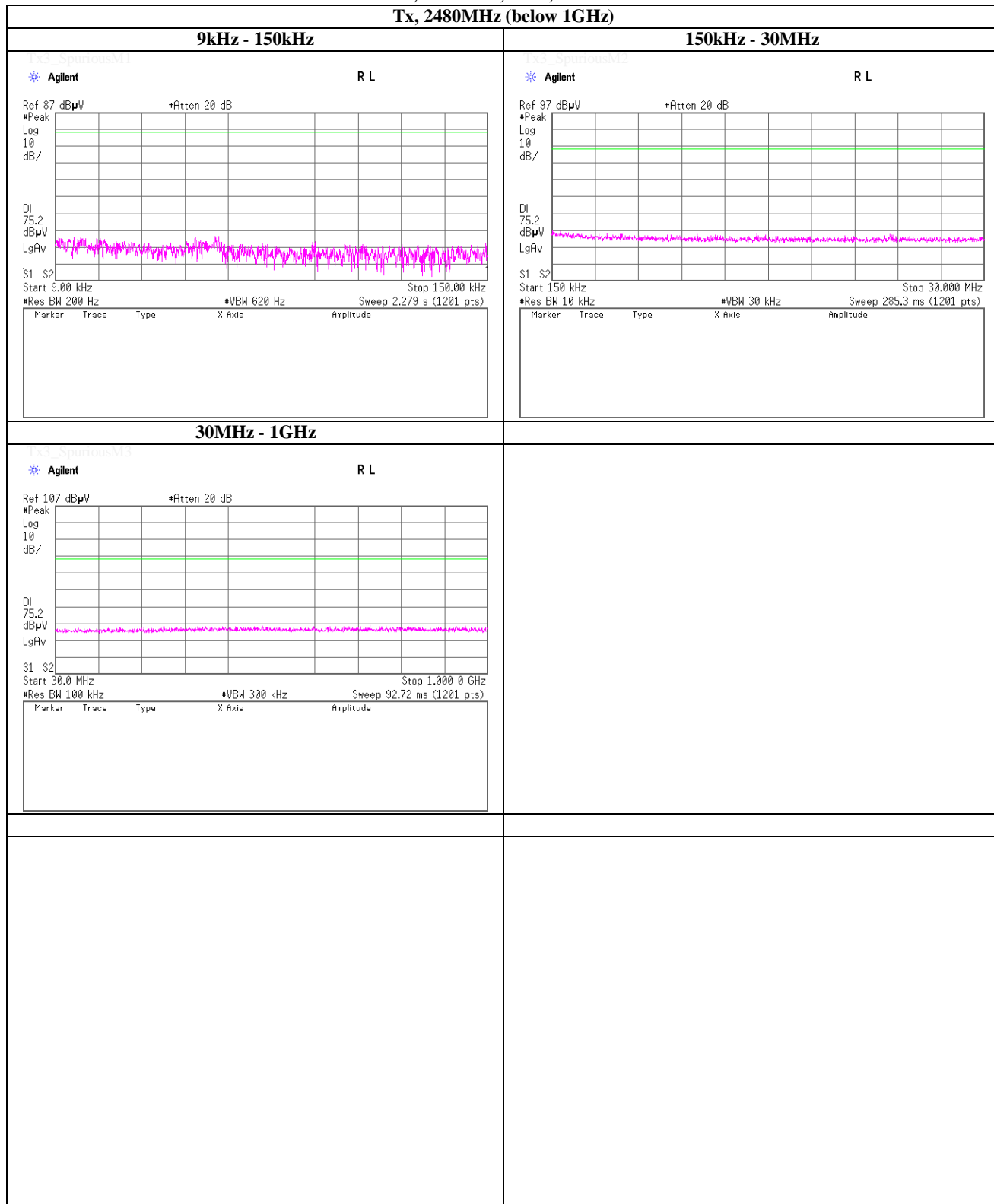
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Facsimile : +81 463 50 6401

Spurious emission (Conducted)

Tx, Bluetooth, BDR, PRBS9

Tx, 2480MHz (below 1GHz)

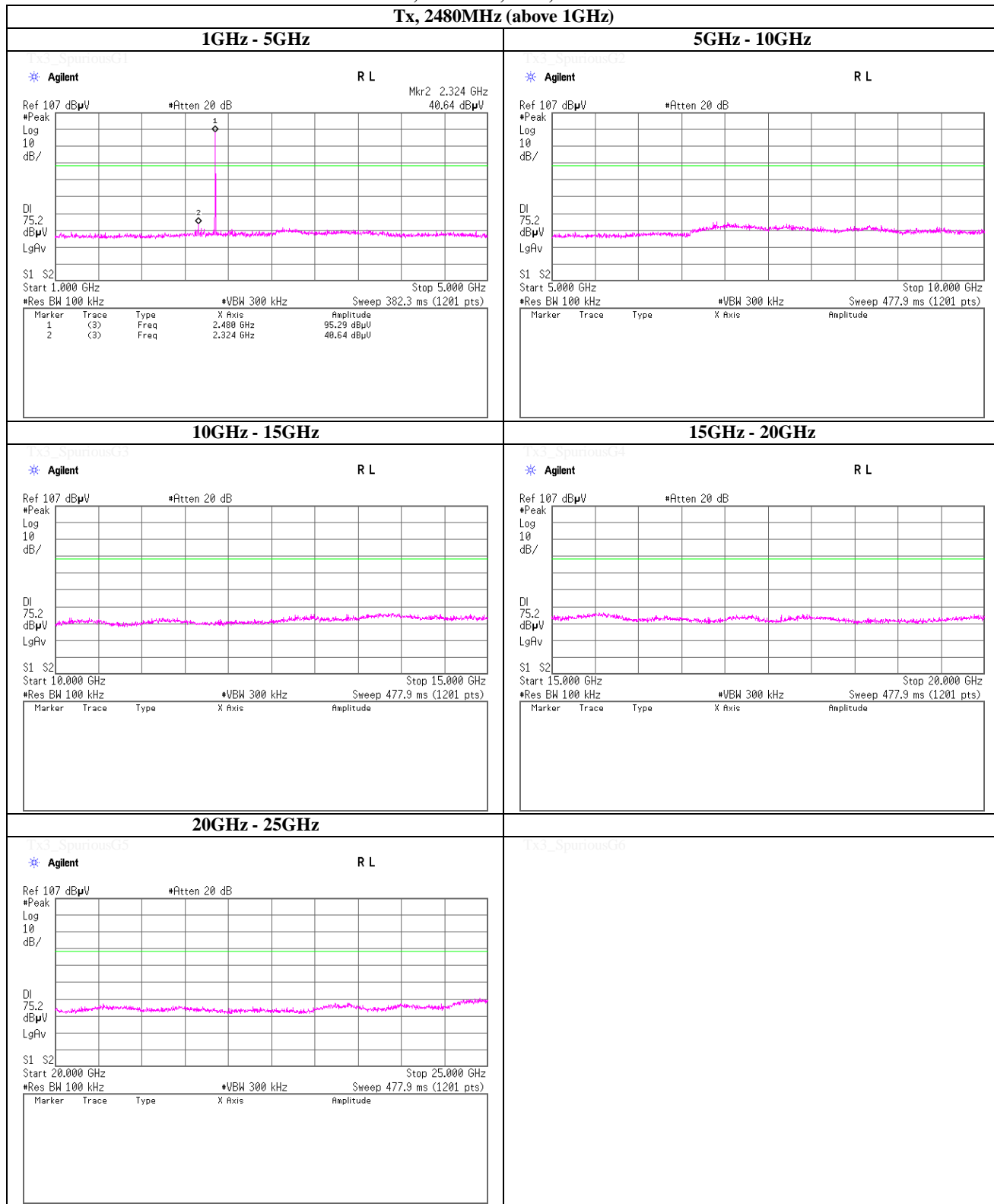


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Spurious emission (Conducted)

Tx, Bluetooth, BDR, PRBS9

Tx, 2480MHz (above 1GHz)



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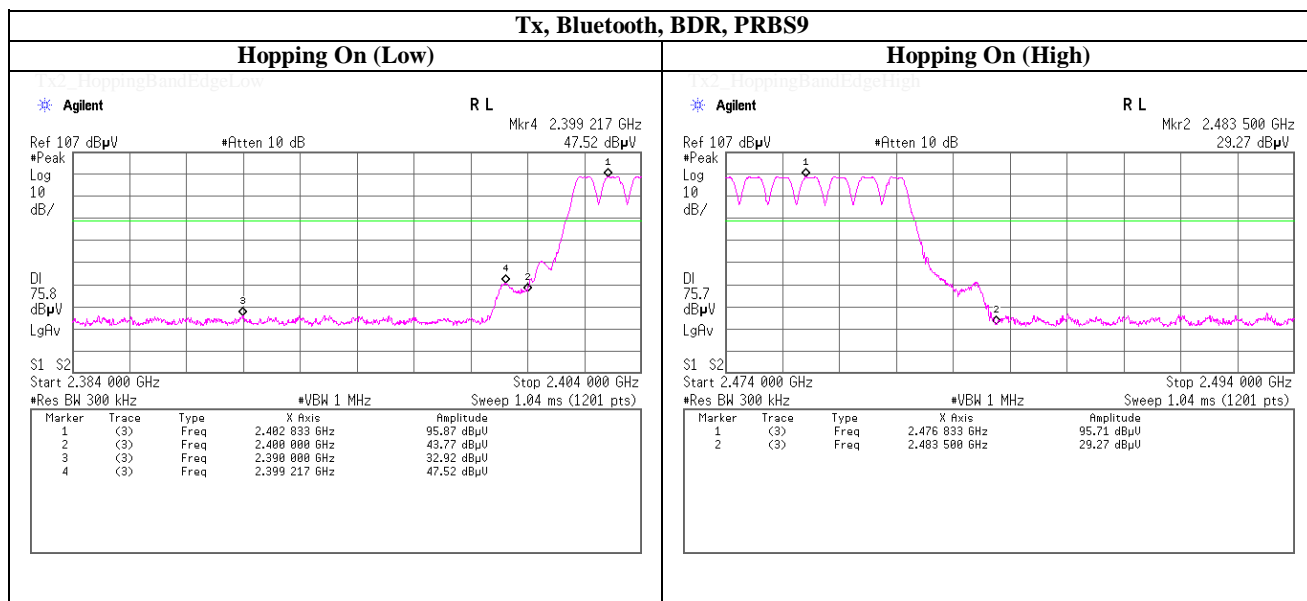
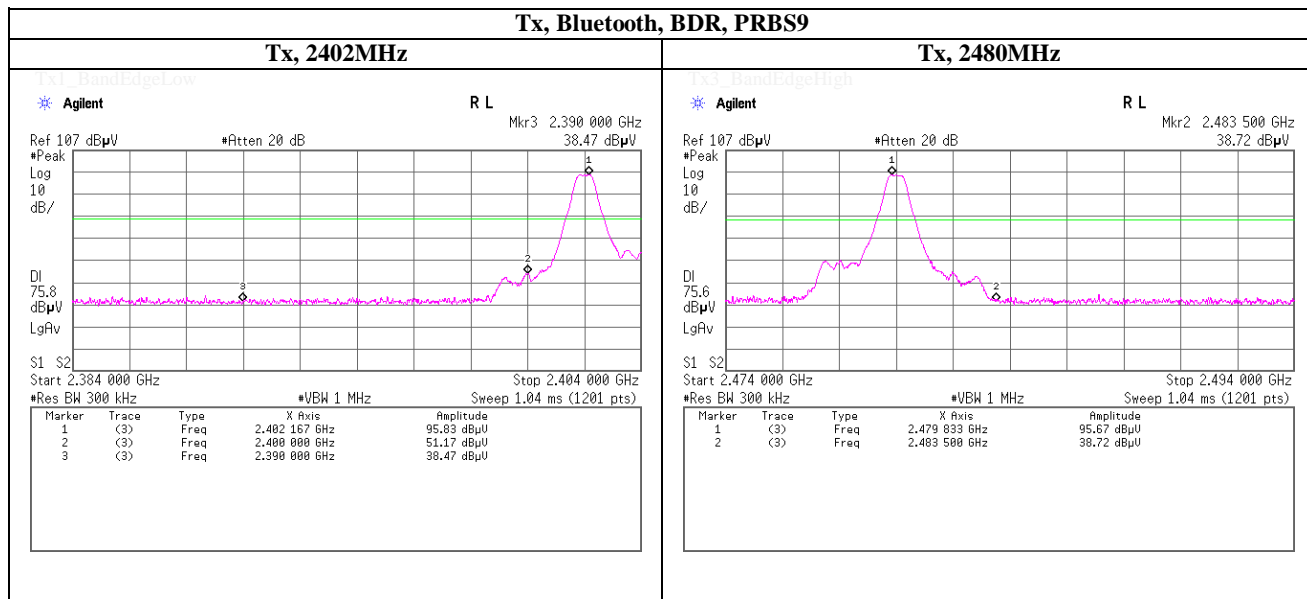
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Spurious emission (Conducted)

Band Edge compliance



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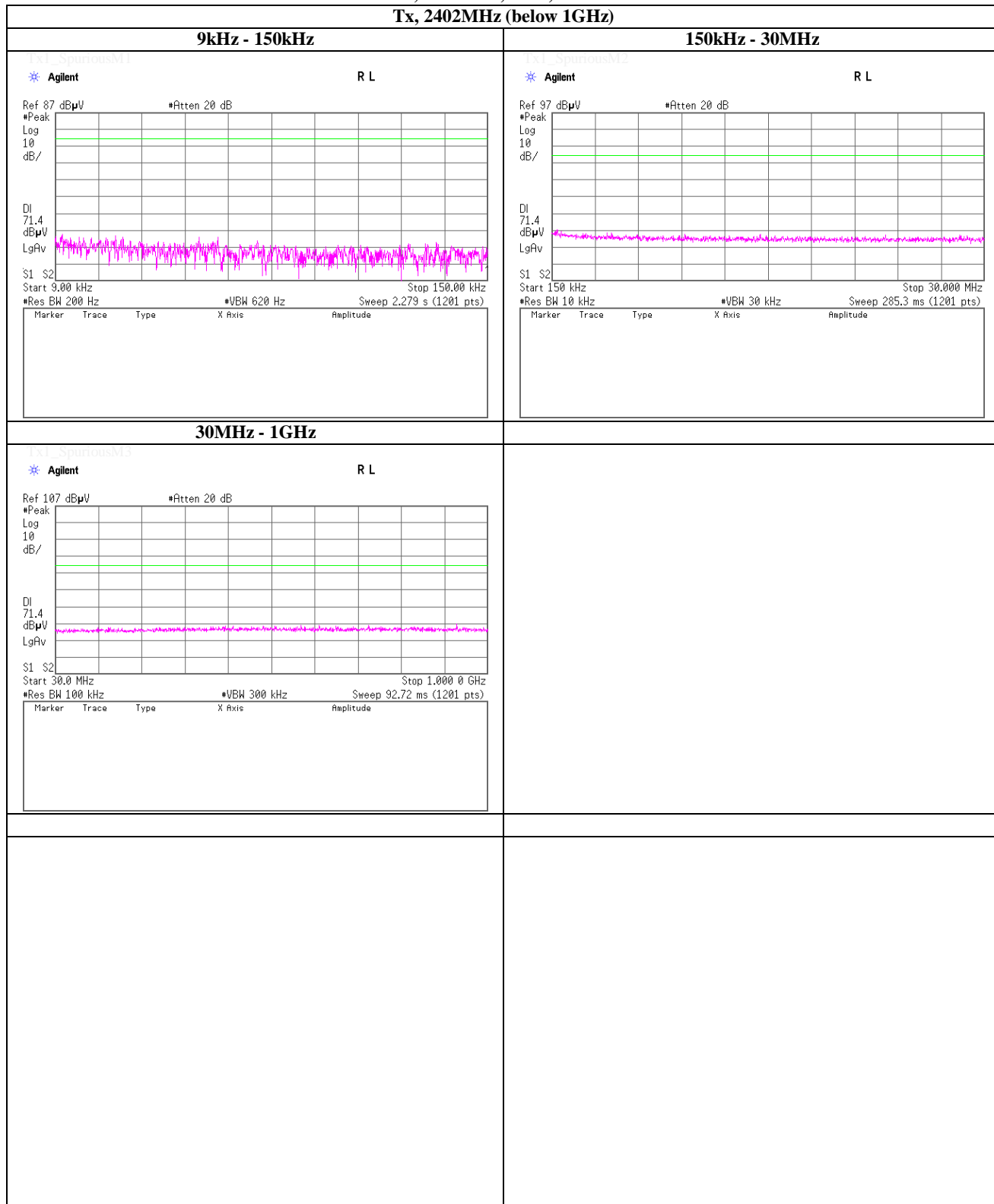
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Facsimile : +81 463 50 6401

Spurious emission (Conducted)

Tx, Bluetooth, EDR, PRBS9

Tx, 2402MHz (below 1GHz)



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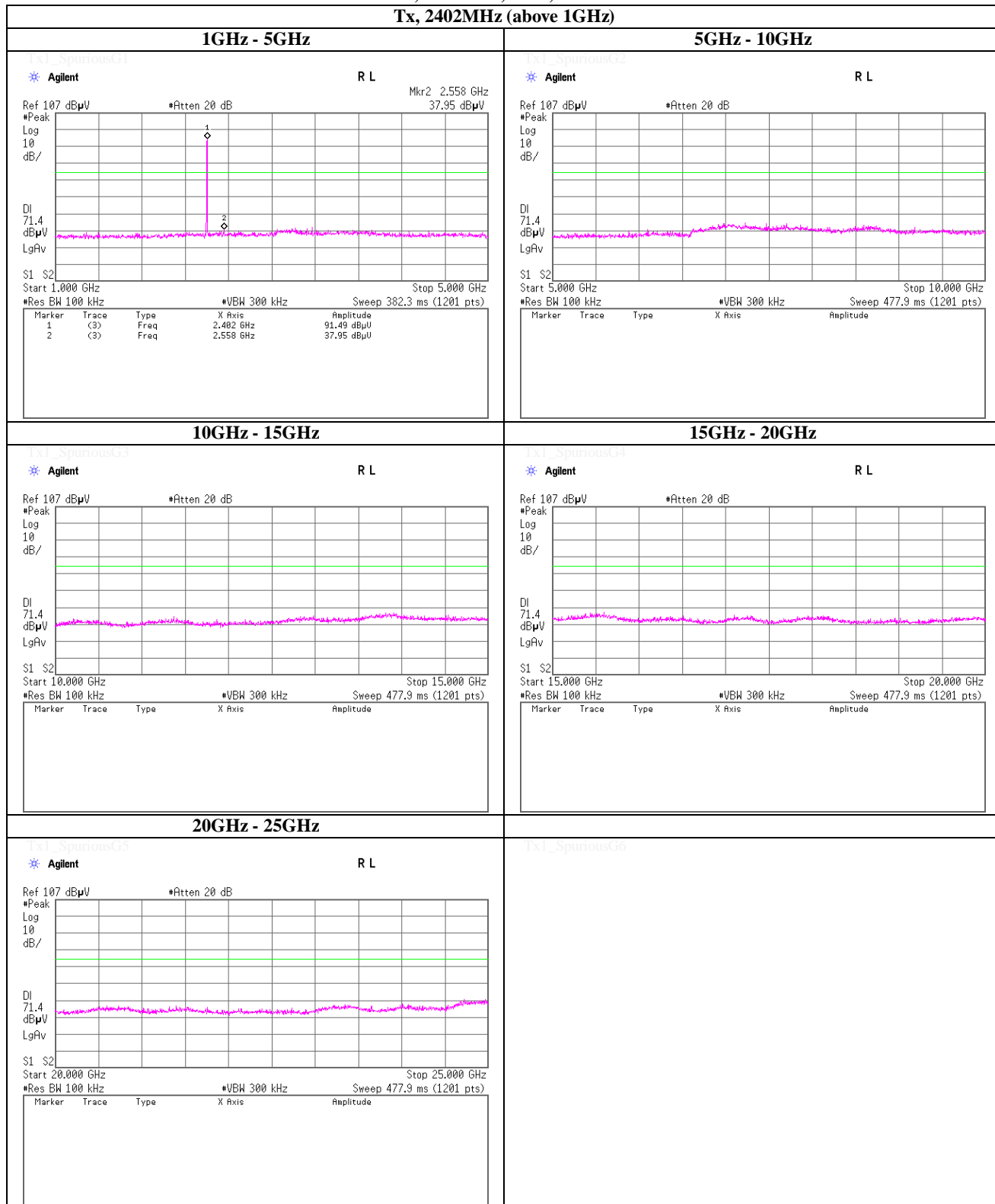
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Facsimile : +81 463 50 6401

Spurious emission (Conducted)

Tx, Bluetooth, EDR, PRBS9

Tx, 2402MHz (above 1GHz)



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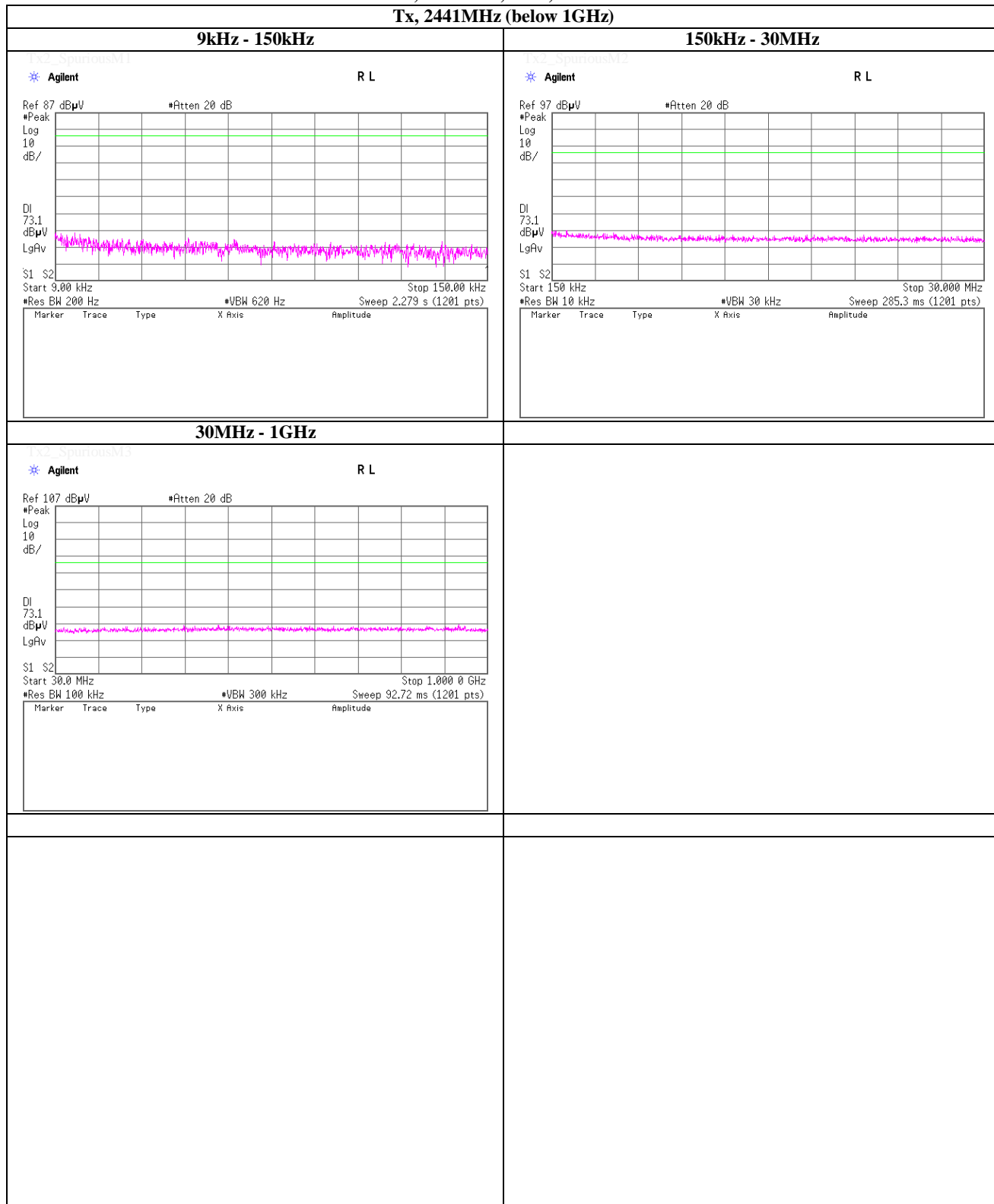
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Spurious emission (Conducted)

Tx, Bluetooth, EDR, PRBS9

Tx, 2441MHz (below 1GHz)



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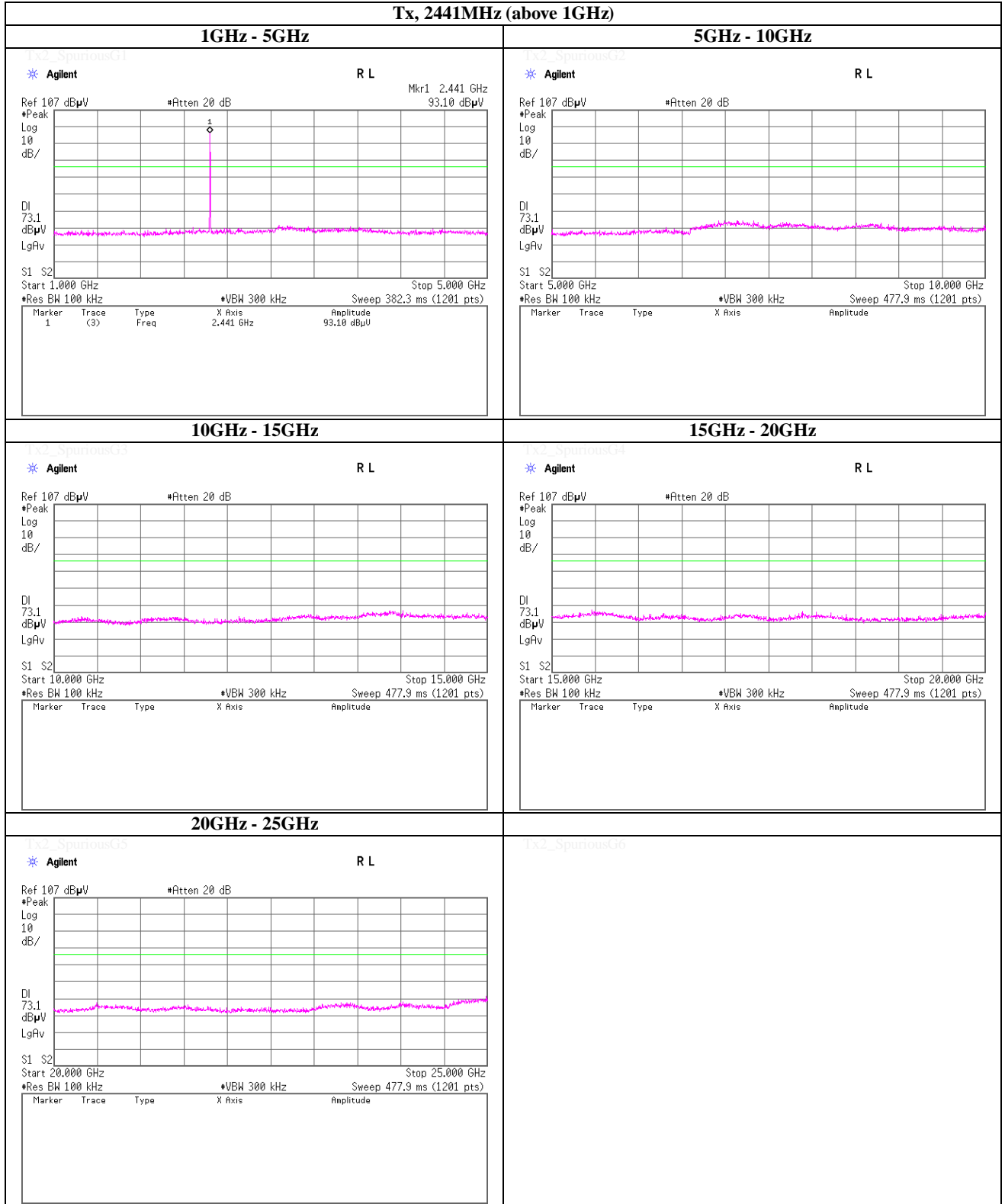
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Spurious emission (Conducted)

Tx, Bluetooth, EDR, PRBS9

Tx, 2441MHz (above 1GHz)



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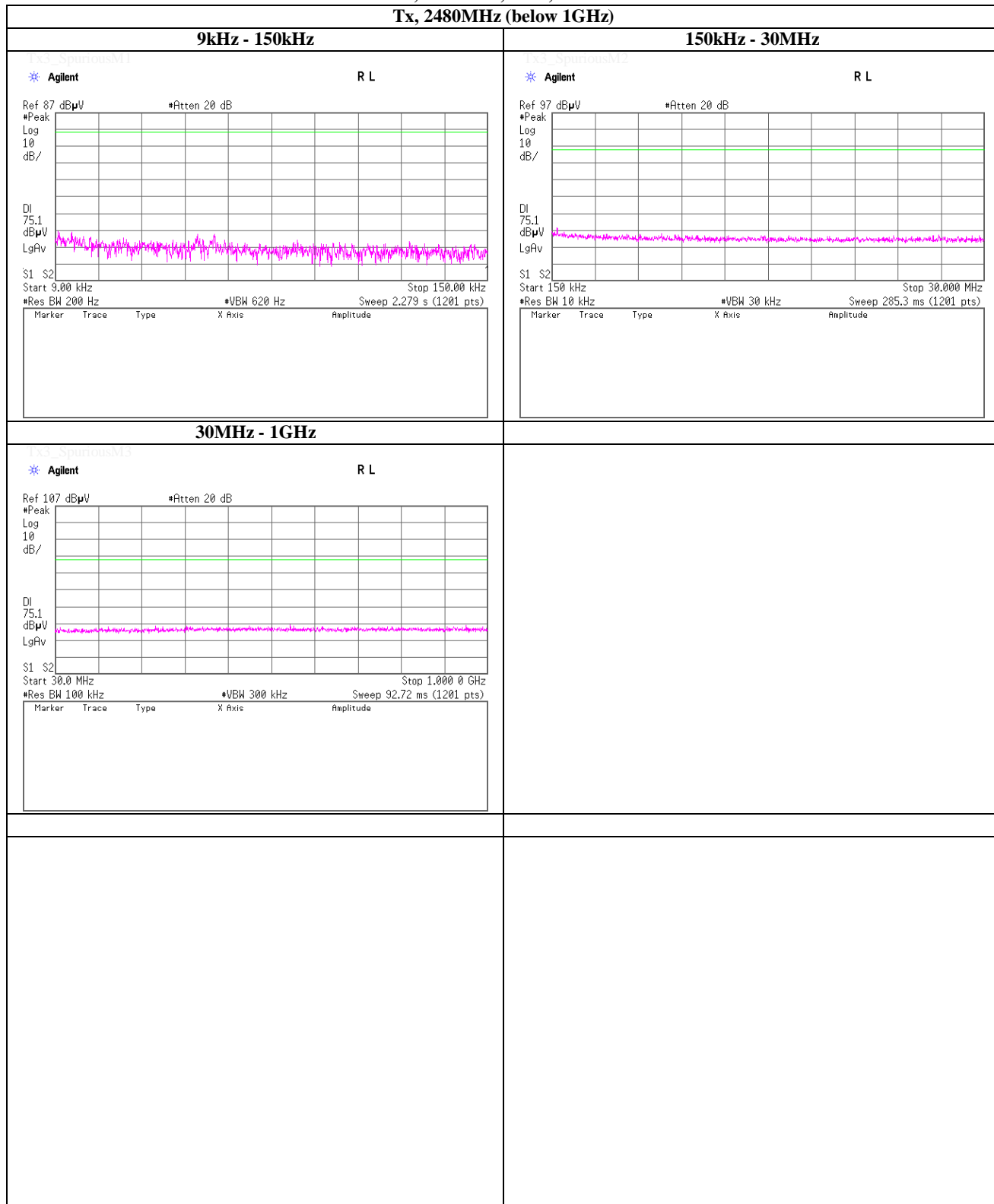
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Facsimile : +81 463 50 6401

Spurious emission (Conducted)

Tx, Bluetooth, EDR, PRBS9

Tx, 2480MHz (below 1GHz)



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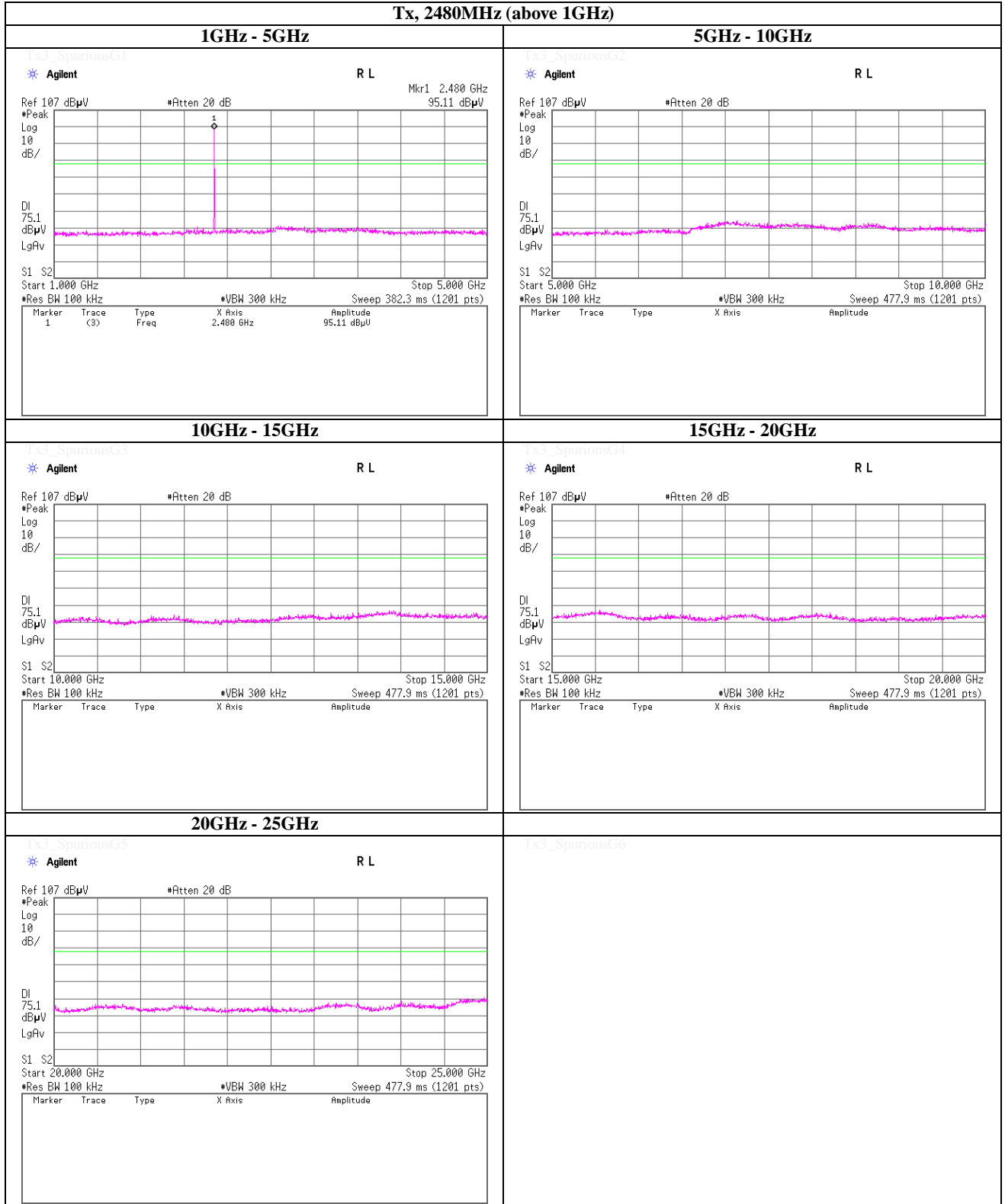
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Spurious emission (Conducted)

Tx, Bluetooth, EDR, PRBS9

Tx, 2480MHz (above 1GHz)



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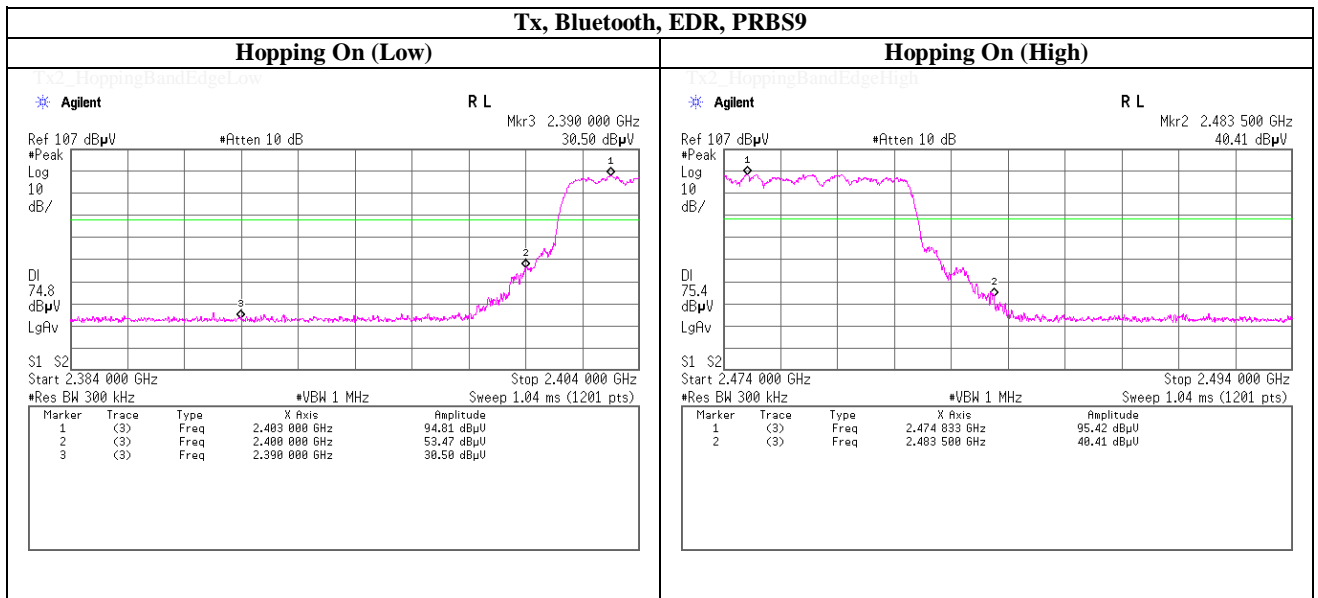
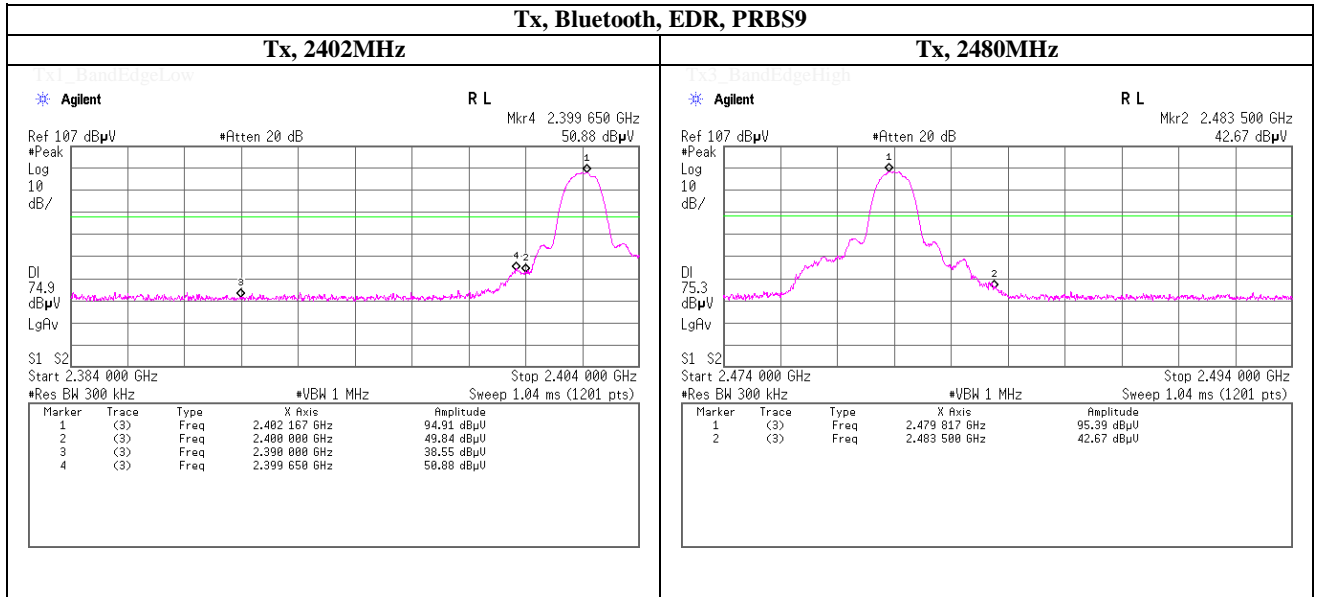
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Spurious emission (Conducted)

Band Edge compliance



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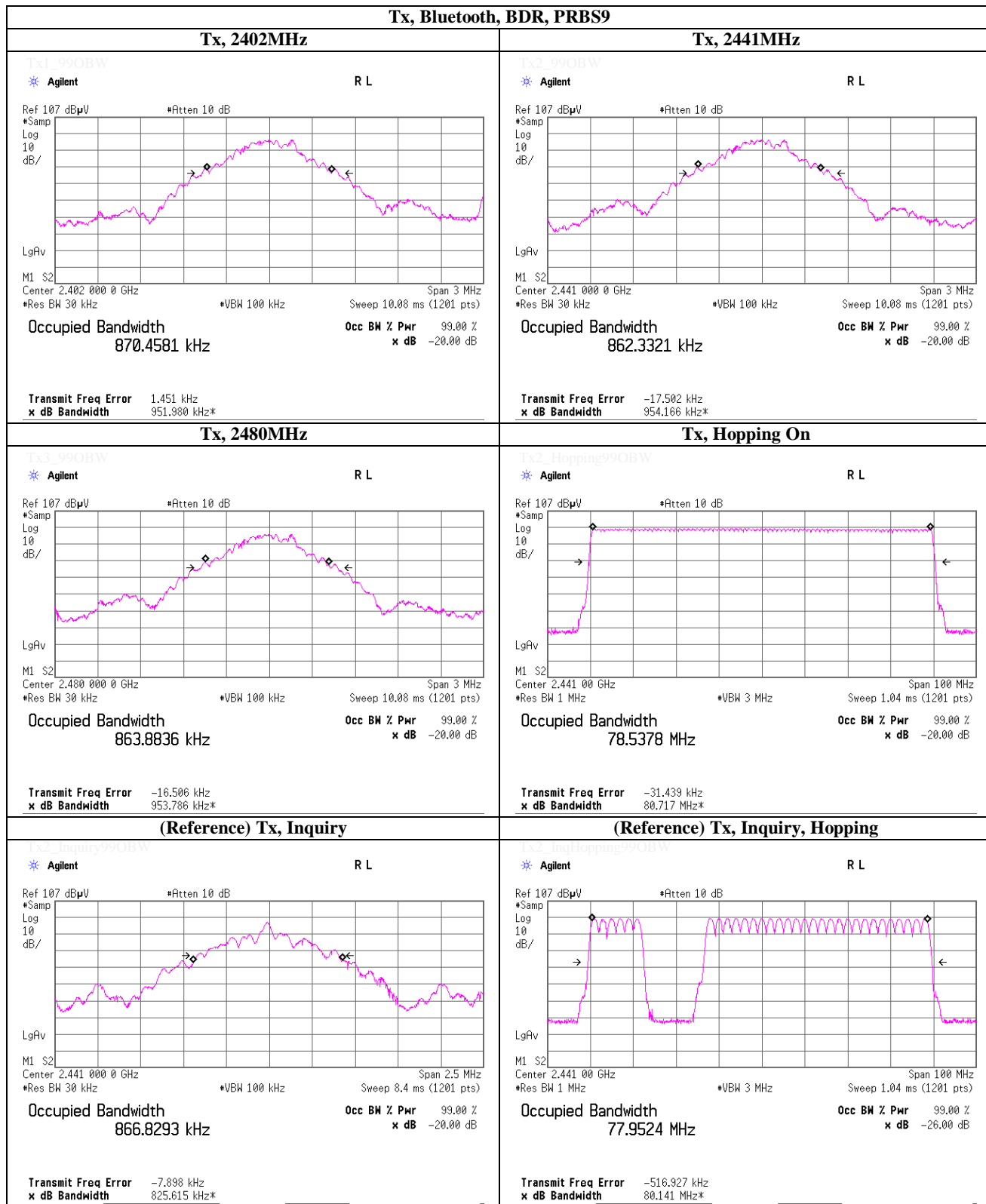
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99% Occupied Bandwidth



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99% Occupied Bandwidth

Tx, Bluetooth, EDR, PRBS9	
Tx, 2402MHz	Tx, 2441MHz
<p style="text-align: center;">Tx1_99OBW</p> <p style="text-align: center;">* Agilent R L</p> <p style="text-align: center;">Occupied Bandwidth 1.1510 MHz</p> <p>Transmit Freq Error -20.157 kHz x dB Bandwidth 1.256 MHz*</p>	<p style="text-align: center;">Tx1_99OBW</p> <p style="text-align: center;">* Agilent R L</p> <p style="text-align: center;">Occupied Bandwidth 1.1523 MHz</p> <p>Transmit Freq Error -21.569 kHz x dB Bandwidth 1.258 MHz*</p>
<p style="text-align: center;">Tx3_99OBW</p> <p style="text-align: center;">* Agilent R L</p> <p style="text-align: center;">Occupied Bandwidth 1.1587 MHz</p> <p>Transmit Freq Error -13.449 kHz x dB Bandwidth 1.268 MHz*</p>	<p style="text-align: center;">Tx2_Hopping99OBW</p> <p style="text-align: center;">* Agilent R L</p> <p style="text-align: center;">Occupied Bandwidth 78.6272 MHz</p> <p>Transmit Freq Error 10.488 kHz x dB Bandwidth 81.013 MHz*</p>
<p style="text-align: center;">Tx2_Inquiry99OBW</p>	<p style="text-align: center;">Tx2_InqHopping99OBW</p>

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Comparison Sheet of UGZZF-1 and UGZZF-2

Test place UL Japan, Inc. Shonan EMC Lab. No.3, No.5 Shielded Room and No.3 Anechoic Chamber
 Date July 11 to 15, 2013
 Engineer Kenichi Adachi, Tatsuya Arai
 Mode Tx, Bluetooth

Maximum Peak Conducted Output Power (Conducted)

	Freq. [MHz]	UGZZF-1 Result		UGZZF-2 Result	
		[dBm]	[mW]	[dBm]	[mW]
DH5	2402.0	0.51	1.12	0.24	1.06
DH5	2441.0	0.68	1.17	0.60	1.15
DH5	2480.0	0.20	1.05	0.16	1.04
2-DH5	2402.0	1.00	1.26	0.75	1.19
2-DH5	2441.0	1.45	1.40	1.33	1.36
2-DH5	2480.0	1.24	1.33	1.22	1.32
3-DH5	2402.0	1.37	1.37	1.11	1.29
3-DH5	2441.0	1.90	1.55	1.69	1.48
3-DH5	2480.0	1.73	1.49	1.69	1.48

Radiated Emission

	Tx. Freq. [MHz]	Freq. [MHz]	UGZZF-1 Result				UGZZF-2 Result				
			Peak		Average		Peak		Average		
			Hor [dBuV/m]	Ver [dBuV/m]	Hor [dBuV/m]	Ver [dBuV/m]	Hor [dBuV/m]	Ver [dBuV/m]	Hor [dBuV/m]	Ver [dBuV/m]	
DH5	2402.0	2390.00	45.30	44.10	35.10	35.10	45.40	44.40	35.80	35.50	
		2400.00	50.80	52.40	-	-	50.50	51.70	-	-	
		4804.00	51.20	51.00	44.90	46.10	51.40	50.80	44.70	45.40	
	2441.0	4881.00	51.00	52.00	44.20	46.10	50.70	51.50	44.60	45.70	
		2480.0	2483.50	48.20	47.60	37.60	37.70	48.10	48.00	37.20	37.10
			4960.00	51.20	53.00	45.20	47.80	51.10	52.60	44.80	47.40
3-DH5	2402.0	2390.00	45.90	45.90	35.20	35.20	45.60	44.90	36.00	35.90	
		2400.00	46.60	47.90	-	-	47.20	47.50	-	-	
		4804.00	50.00	50.60	40.70	43.60	50.00	49.50	40.50	44.70	
	2441.0	4881.00	50.90	51.80	42.40	43.10	50.80	51.30	42.80	43.50	
		2480.0	2483.50	50.10	49.80	38.50	37.70	50.50	49.90	37.50	37.80
			4960.00	52.40	53.70	43.90	45.70	51.50	53.40	45.00	47.30

Conducted Emission

	Tx. Freq. [MHz]	Freq. [MHz]	UGZZF-1 Result		UGZZF-2 Result		
			QP [dBuV/m]	AV [dBuV/m]	Freq. [MHz]	QP [dBuV/m]	AV [dBuV/m]
DH5	2402.0	0.55698	42.90	28.10	0.55648	42.90	28.10

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APPENDIX 2 Test Instruments

EMI test equipment (1/2)

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
SPM-06	Power Meter	Anritsu	ML2495A	0850009	AT	2013/04/09 * 12
SPSS-03	Power sensor	Anritsu	MA2411B	0917063	AT	2013/04/09 * 12
SSA-03	Spectrum Analyzer	Agilent	E4448A	MY48250152	AT	2013/01/08 * 12
SAT10-09	Attenuator	Weinschel Corp.	54A-10	W5692	AT	2012/11/15 * 12
SCC-G12	Coaxial Cable	Suhner	SUCOFLEX 102	30790/2	AT	2013/03/16 * 12
SCC-H1	Microwave cable	Hirose Electric	U.FL-2LP-066J1-A-(200)	-	AT	Pre Check
SOS-09	Humidity Indicator	A&D	AD-5681	4061484	AT	2013/03/07 * 12
SAEC-01(NSA)	Semi-Anechoic Chamber	TDK	SAEC-01(NSA)	1	RE	2013/07/03 * 12
SAF-04	Pre Amplifier	TOYO Corporation	TPA0118-36	1440489	RE	2013/03/19 * 12
SCC-G01	Coaxial Cable	Suhner	SUCOFLEX 104A	46497/4A	RE	2013/04/09 * 12
SCC-G21	Coaxial Cable	Suhner	SUCOFLEX 104	296169/4	RE	2013/05/22 * 12
SHA-01	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-725	RE	2012/08/20 * 12
SOS-01	Humidity Indicator	A&D	AD-5681	4062555	RE	2013/02/27 * 12
KSA-08	Spectrum Analyzer	Agilent	E4446A	MY46180525	RE	2013/03/04 * 12
SJM-08	Measure	PROMART	SEN1935	-	RE	-
COTS-SEMI-1	EMI Software	TSJ	TEPTO-DV(RE,CE,RFI,MF)	-	RE, CE	-
SAT20-01	Attenuator(above1GHz)	Agilent	8493C-020	74889	RE	2012/12/18 * 12
SFL-02	Highpass Filter	MICRO-TRONICS	HPM50111	051	RE	2012/12/18 * 12
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	2012/07/18 * 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	2012/08/17 * 12
SOS-05	Humidity Indicator	A&D	AD-5681	4062518	RE	2013/02/27 * 12
SSA-02	Spectrum Analyzer	Agilent	E4448A	MY48250106	RE	2013/03/28 * 12
SJM-11	Measure	PROMART	SEN1935	-	RE, CE	-
SAT10-06	Attenuator	Agilent	8493C-010	74865	RE	2012/12/18 * 12
SHA-04	Horn Antenna	ETS LINDGREN	3160-09	LM3640	RE	2013/03/14 * 12
SAF-08	Pre Amplifier	TOYO Corporation	HAP18-26W	00000019	RE	2013/03/19 * 12
SCC-G15	Coaxial Cable	Suhner	SUCOFLEX 102	32703/2	RE	2013/03/16 * 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 :

CE: Conducted emission ,

RE: Radiated emission ,

AT: Antenna terminal conducted tests ,

APPENDIX 2 Test Instruments

EMI test equipment (2/2)

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
SAF-03	Pre Amplifier	SONOMA	310N	290213	RE	2013/02/12 * 12
SAT6-06	Attenuator	JFW	50HF-006N	-	RE	2013/02/12 * 12
SBA-03	Biconical Antenna	Schwarzbeck	BBA9106	91032666	RE	2012/10/08 * 12
SCC-C1/C2/C3/C4/C5/C10/SRSE-03	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141PE/NS4906	-/0901-271(RF Selector)	RE	2013/04/03 * 12
SLA-03	Logperiodic Antenna	Schwarzbeck	UHALP9108A	UHALP 9108-A 0901	RE	2012/10/08 * 12
STR-06	Test Receiver	Rohde & Schwarz	ESCI	101259	RE, CE	2013/02/27 * 12
SCC-C9/C10/SRSE-03	Coaxial Cable&RF Selector	Suhner/Suhner/TOYO	RG223U/141PE/NS4906	-/0901-271(RF Selector)	CE	2013/04/03 * 12
SAT3-05	Attenuator	JFW	50HF-003N	-	CE	2013/02/12 * 12
SLS-02	LISN	Rohde & Schwarz	ENV216	100512	CE	2013/02/21 * 12
SOS-06	Humidity Indicator	A&D	AD-5681	4062118	CE	2013/03/07 * 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 :

- CE: Conducted emission ,
- RE: Radiated emission ,
- AT: Antenna terminal conducted tests ,