



Test report No. : 10622710S-A
Page : 1 of 79
FCC ID : VPYLB1DR
Issued date : March 9, 2015
Revised date : April 9, 2015

RADIO TEST REPORT

Test Report No.: 10622710S-A

Applicant : **Murata Manufacturing Co., Ltd.**
Type of Equipment : **Communication Module**
Model No. : **Type1DR**
FCC ID : **VPYLB1DR**
Test regulation : **FCC Part15 Subpart C: 2015**
Test result : **Complied**

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Date of test:

January 28 to February 11, 2015

Representative test engineer:

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

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13-EM-F0429

Original Test Report No.: 10622710S-A

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SECTION 1: Customer information

Company Name : Murata Manufacturing Co., Ltd.
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Facsimile Number : +81-75-955-7096
Contact Person : Noriko Ueno

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

2.1 Identification of E.U.T.

Type of equipment : Communication Module
Model No. : Type1DR
Serial No. : Refer to 4.2 in this report.
Rating : 3.2(VBAT), 1.8(VDDXO), 1.8 or 3.3(VIO)
Country of Mass-production : China, Japan
Condition of EUT : Engineering prototype
(Not for Sale: This sample is equivalent to mass-produced items.)
Modification of EUT : No modification by the test lab.
Receipt Date of Sample : December 22, 2014

2.2 Product description

Model: Type1DR (referred to as the EUT in this report) is Communication Module.

Clock frequency(ies) in the system : 37.4MHz

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Radio Specification

Equipment type	: Transceiver
Frequency of operation	: 2.4GHz: 2402-2480MHz (Bluetooth BDR/EDR/Low Energy (LE)) 2412-2462MHz (IEEE 802.11b, 11g, 11n (HT20)) W52: 5180-5240MHz (IEEE 802.11a, 11n (HT20), 11ac (VHT20)) 5190-5230MHz (IEEE 802.11n (HT40), 11ac (VHT40)) 5210MHz (IEEE 802.11ac (VHT80)) W53: 5260-5320MHz (IEEE 802.11a, 11n (HT20), 11ac (VHT20)) 5270-5310MHz (IEEE 802.11n (HT40), 11ac (VHT40)) 5290MHz (IEEE 802.11ac (VHT80)) W56: 5500-5700MHz (IEEE 802.11a, 11n (HT20), 11ac (VHT20)) 5510-5670MHz (IEEE 802.11n (HT40), 11ac (VHT40)) 5530-5610MHz (IEEE 802.11ac (VHT80)) W58: 5745-5825MHz (IEEE 802.11a, 11n (HT20), 11ac (VHT20)) 5755-5795MHz (IEEE 802.11n (HT40), 11ac (VHT40)) 5775MHz(IEEE 802.11ac (VHT80))
Bandwidth	: 20MHz (IEEE 802.11a/b/g/n/ac), 40MHz (IEEE 802.11n/ac), 80MHz(IEEE 802.11ac) , 79MHz (Bluetooth BDR/EDR), 1MHz (Bluetooth LE)
Channel spacing	: 5MHz (Wi-Fi 2.4GHz), 20MHz/40MHz/80MHz (Wi-Fi 5GHz), 1MHz (Bluetooth BDR/EDR), 2MHz (Bluetooth LE)
Type of modulation	: DSSS (IEEE 802.11b), OFDM (IEEE 802.11a/g/n/ac), FHSS (Bluetooth BDR/EDR), GFSK (Bluetooth LE)
Antenna type	: [2.4GHz] Monopole antenna/Dipole antenna/Dual monopole antenna [5GHz] Monopole antenna/ Dual monopole antenna:
Antenna connector type	: spring
Antenna gain	: [2.4GHz] Monopole antenna:+0.91dBi [2.4GHz] Dipole antenna:-0.15dBi [2.4GHz] Dual monopole antenna:-1.1dBi [5GHz] Monopole antenna:+1.0dBi [5GHz] Dual monopole antenna:+0.28dBi
ITU code	: F1D, G1D (Bluetooth BDR/EDR), F1D (Bluetooth LE) D1D, G1D (IEEE802.11b/g/n/a/ac)
Operation temperature range	: -20 to +85 deg.C

* For Wireless LAN part and Bluetooth Low Energy part, refer to the test report: 10622710S-C and -E.

FCC 15.31 (e) / 212

The RF Module has its own regulator.

The RF Module is constantly provided voltage (DC 1.2, 1.35, 2.5 and 3.0V) through the regulator regardless of input voltage. Therefore, this EUT complies with the requirement of 15. 212.

FCC 15.203 / 212

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

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

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SECTION 3: Test specification, procedures & results

3.1 Test specification

Test specification : FCC Part 15 Subpart C: 2015, final revised on January 21, 2015

Title : FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators
Section 15.207 Conducted limits
Section 15.209 Radiated emission limits, general requirements
Section 15.247 Operation within the bands 902-928MHz, 2400-2483.5MHz,
and 5725-5850MHz

3.2 Procedures & Results

Item	Test Procedure	Specification	Remarks	Deviation	Worst Margin	Results
Conducted emission	ANSI C63.4:2009 7. AC powerline conducted emission measurements	FCC 15.207	-	N/A	21.1dB Detection: Average Phase: L1 Freq.: 24.89972 MHz Mode: DH5, Tx, 2441MHz (2.4GHz monopole) Freq.: 24.89416 MHz Mode: DH5, Tx, 2402MHz (2.4GHz Dipole) Freq.: 24.89381 MHz Mode: DH5, Tx, 2441MHz (2.4GHz Dipole) Freq.: 24.89436 MHz Mode: DH5, Tx, 2480MHz (2.4GHz Dipole) Freq.: 24.89483 MHz Mode: 3DH5, Tx, 2441MHz (2.4GHz 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

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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	*See data.	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	5.9dB Freq.: 4804.000MHz Polarization: Horizontal Detection: Average Mode: Tx EDR 2402MHz Dipole Antenna	Complied

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

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 6.6	-	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) LISN	150kHz-30MHz	3.6 dB	3.4 dB	3.4 dB
Radiated emission (Measurement distance: 3m)	9kHz-30MHz	3.7 dB	3.5 dB	3.5 dB
	30MHz-300MHz	4.9 dB	4.9 dB	4.7 dB
	300MHz-1GHz	5.0 dB	5.0 dB	4.8 dB
	1GHz-15GHz	4.9 dB	4.9 dB	4.9 dB
Radiated emission (Measurement distance: 1m)	15GHz-18GHz	5.7 dB	5.7 dB	5.7 dB
	18GHz-40GHz	4.5 dB	4.3 dB	4.3 dB

*1: SAC=Semi-Anechoic Chamber

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

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Conducted emission test

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

Radiated emission test

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

Antenna port conducted test

Power measurement uncertainty above 1GHz for this test was: ($\pm$) 0.68dB

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

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

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

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

Bandwidth Measurement uncertainty for this test was: ($\pm$) 0.66%

3.5 Test location

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JAB Accreditation No. : RTL02610

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

3.6 Test setup, Data of test & Test instruments

Refer to APPENDIX 1 to 3.

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

4.1 Operating mode

Test item	Operating mode	Tested frequency
Conducted emission	Transmitting (Tx) Hopping OFF (DH5 / 3-DH5), Payload: PRBS9 *Dipole antenna and Monopole antenna were used in all the modes.	2402MHz, 2441MHz, 2480MHz
	*Dual Monopole antenna (Simulcasting with WLAN 11n(HT20)) was used in BDR (2441MHz).	BDR: 2441MHz 11n HT20: 5260MHz
Carrier frequency separation	Transmitting (Tx) Hopping ON (DH5 / 3-DH5) / Inquiry, Payload: PRBS9	-
20dB bandwidth	Transmitting (Tx) Hopping OFF (DH5 / 3-DH5) / Inquiry, Payload: PRBS9	2402MHz, 2441MHz, 2480MHz
Number of hopping frequency	Transmitting (Tx) Hopping ON (DH5 / 3-DH5) / Inquiry, Payload: PRBS9	-
Dwell time	Transmitting (Tx) (Hopping ON), Payload: PRBS9 - DH1, - DH3, - DH5 - 3-DH1, - 3-DH3, - 3-DH5	-
	-Inquiry	
Maximum peak output power	Transmitting (Tx) Hopping OFF, Payload: PRBS9 - DH5, - 2-DH5, - 3-DH5	2402MHz, 2441MHz, 2480MHz
Band edge compliance & Spurious emission (Radiated)	Transmitting (Tx) (DH5 / 3-DH5), Payload: PRBS9 -Hopping OFF *Dipole antenna and Monopole antenna were used in Bandwidth 30MHz-25GHz. *Dual Monopole antenna was used only in Band edge.	Band edge compliance: 2402MHz, 2480MHz Spurious emission: 2402MHz, 2441MHz, 2480MHz
	*Dual Monopole antenna (Simulcasting with WLAN 11n(HT20)) was used in BDR (2441MHz) Bandwidth 30MHz-25GHz and BDR (2402/2480MHz) only Band edge.	BDR: 2402MHz, 2441MHz, 2480MHz 11n HT20: 5260MHz
(Conducted)	Transmitting (Tx) (DH5 / 3-DH5), Payload: PRBS9 -Hopping OFF	Spurious emission: 2402MHz, 2441MHz, 2480MHz
99% occupied bandwidth	Transmitting (Tx) (DH5 / 3-DH5), Payload: PRBS9 / Inquiry -Hopping ON / OFF	2402MHz, 2441MHz, 2480MHz

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

*Remarks: Test was not performed at AFH mode, because the decrease of number of channel (min: 20ch) at AFH mode does not affect the output power and bandwidth of the EUT.

The carrier separation may be less than 20 dB bandwidth, therefore 125mW power limit was applied to it.

Software : Broadcom BlueTool ver. 1.8.7.3

Power Settings : BDR:7dBm, EDR: 4dBm

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

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

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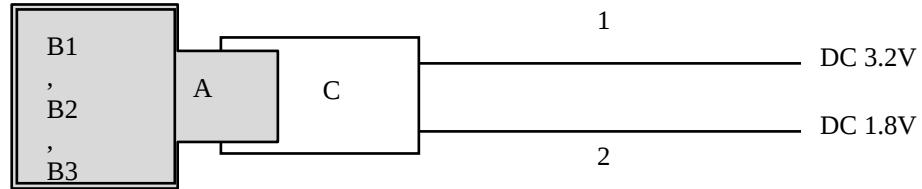
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4.2 Configuration and peripherals



* Test data was taken under worse case conditions.

Description of EUT and support equipment

No.	Item	Model number	Serial number	Manufacturer	FCC ID (Remarks)
A	Module	Type1DR	*1)	Murata Manufacturing Co., Ltd.	EUT
B1	Monopole antenna	2.4-Mono	-	Murata Manufacturing Co., Ltd.	EUT
B2	Dipole antenna	2.4-D1-1	-	Murata Manufacturing Co., Ltd.	EUT
B3	Dual monopole antenna	Dual-8	-	Murata Manufacturing Co., Ltd.	EUT
C	Jig	-	-	Murata Manufacturing Co., Ltd.	-

*1) BT_9: used for Radiated emission tests (monopole antenna) and Antenna terminal tests.

BT_21: used for Radiated emission tests (Dipole antenna)

BT_48: used for Radiated emission tests (Dual monopole antenna)

List of cables used

No.	Cable Name	Length (m)	Shield		Remark
			Cable	Connector	
1	DC cable	1.4	Unshielded	Unshielded	-
2	DC cable	1.1	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 peripheral was aligned and was flushed with rear of tabletop. All other surfaces of tabletop were at least 80cm from any other grounded conducting surface. EUT was located 80cm from LISN.

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

Photographs of the set up are shown in APPENDIX 3.

5.3 Test conditions

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

5.4 Test procedure

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

An overview sweep with peak detection has been performed.

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

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

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

5.5 Results

Summary of the test results : Pass
Refer to APPENDIX 1

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SECTION 6: Carrier frequency separation

Test procedure

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

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

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

Test procedure

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

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

SECTION 8: Number of hopping frequency

Test procedure

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

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

SECTION 9: Dwell time

Test procedure

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

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

SECTION 10: Maximum peak output power

Test procedure

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

Detection type: Peak / Average *1)

Summary of the test results: Pass
Refer to APPENDIX 1

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

SECTION 11: Spurious emissions (Antenna port conducted)

Test procedure

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

The radio frequency power that is produced by the intentional radiator confirmed 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on a radiated measurement.

In the frequency range below 30MHz, RBW was narrowed to separate the noise contents.

Then, wide-band noise near the limit was checked separately, however the noise was not detected as shown in the chart. (9kHz-150kHz:RBW=200Hz, 150kHz-30MHz:RBW=10kHz)

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

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SECTION 12: Radiated emission

12.1 Operating environment

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

12.2 Test configuration

EUT was placed on a platform of nominal size, 1m by 1.5m, raised 0.8m (Below 1GHz) and a polystyrene platform of nominal size, 0.5m by 0.5m, raised 0.8m (Above 1GHz) above the conducting ground plane. Photographs of the set up are shown in APPENDIX 3.

12.3 Test conditions

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

12.4 Test procedure

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

The radiated emission measurements were made with the following detection.

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

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

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

[Monopole antenna]

Antenna polarization	Spurious (30-1000MHz)	Carrier	Spurious (1-2.8GHz)	Spurious (2.8-15GHz)	Spurious (15-18GHz)	Spurious (18-26.5GHz)
Horizontal	Z	X	X	X	X	X
Vertical	Z	Z	Z	Z	X	X

[Dipole antenna]

Antenna polarization	Spurious (30-1000MHz)	Carrier	Spurious (1-2.8GHz)	Spurious (2.8-15GHz)	Spurious (15-18GHz)	Spurious (18-26.5GHz)
Horizontal	X	Y	Y	Y	X	X
Vertical	X	Y	Y	Y	X	X

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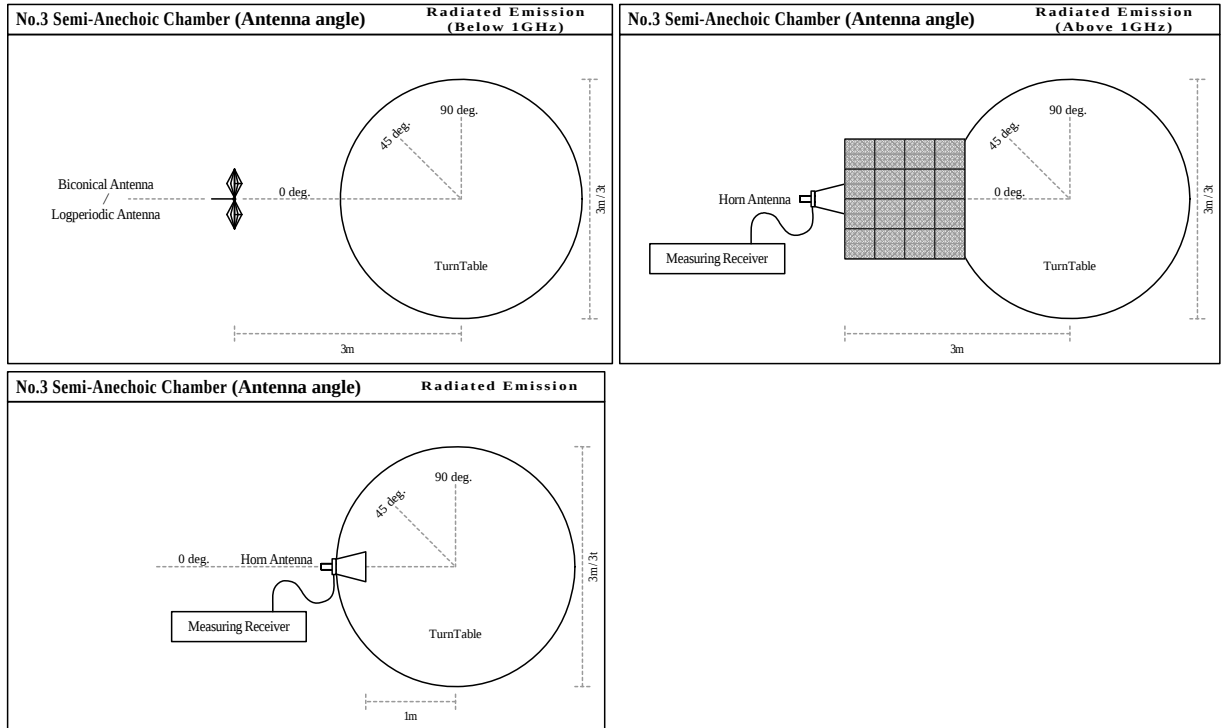
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[Dual monopole antenna]

Antenna polarization	Spurious (30-1000MHz)	Carrier	Spurious (1-2.8GHz)	Spurious (2.8-15GHz)	Spurious (15-18GHz)	Spurious (18-26.5GHz)
Horizontal	Z	Y	Y	Y	X	X
Vertical	X	Y	Y	Z	X	X

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 5th order harmonics.

Refer to APPENDIX 1.

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Contents of APPENDIXES

APPENDIX 1: Data of Radio tests

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

APPENDIX 2: Test instruments

Test instruments

APPENDIX 3: Photographs of test setup

Conducted emission
Radiated emission
Pre-check of the worst position

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DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Shonan EMC Lab. No.3 Shielded Room
Date : 2015/02/11

Company : Murata Manufacturing Co., Ltd.

Kind of EUT : Communication Module

Model No. : Type1DR

Serial No. : 9 (2.4GHz monopole)

Remarks : -

Mode : DH5, Tx, 2402MHz

Order No. : 10622710S

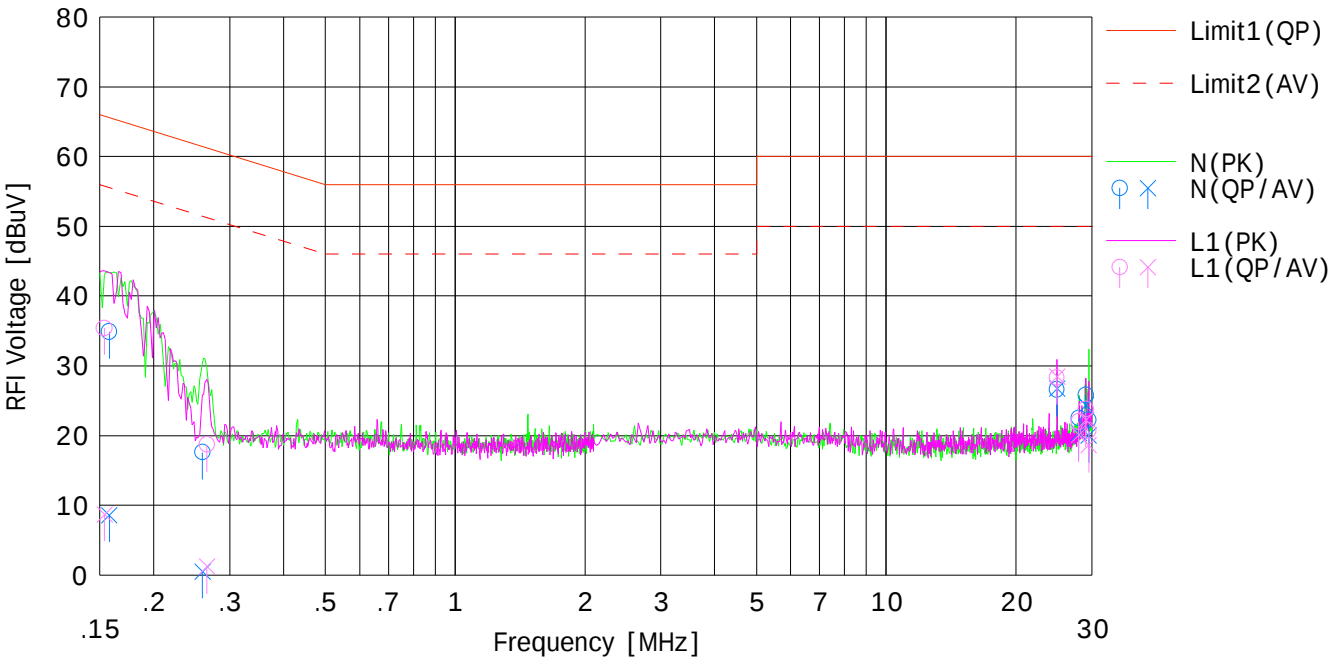
Power : DC 3.2V / 1.8V

Temp. / Humi. : 22deg.C / 25%RH

Limit1 : FCC 15C(15.207) QP

Limit2 : FCC 15C(15.207) AV

Engineer : Yosuke Ishikawa



No.	Freq. [MHz]	Reading		C.Fac	Results		Limit		Margin		Phase	Comment
		<QP>	<AV>		<QP>	<AV>	<QP>	<AV>	<QP>	<AV>		
		[dBuV]	[dBuV]		[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]		
1	0.15781	22.4	-3.9	12.5	34.9	8.6	65.5	55.5	30.6	46.9	N	
2	0.25936	5.1	-12.0	12.5	17.6	0.5	61.4	51.4	43.8	50.9	N	
3	24.90067	13.1	13.2	13.5	26.6	26.7	60.0	50.0	33.4	23.3	N	
4	28.01114	8.9	6.8	13.6	22.5	20.4	60.0	50.0	37.5	29.6	N	
5	29.05038	12.1	10.6	13.7	25.8	24.3	60.0	50.0	34.2	25.7	N	
6	29.49714	8.5	6.3	13.7	22.2	20.0	60.0	50.0	37.8	30.0	N	
7	0.15360	22.9	-3.8	12.5	35.4	8.7	65.8	55.8	30.4	47.1	L1	
8	0.26586	6.2	-11.3	12.5	18.7	1.2	61.2	51.2	42.5	50.0	L1	
9	24.89864	14.8	15.0	13.5	28.3	28.5	60.0	50.0	31.7	21.5	L1	
10	28.01110	8.4	6.5	13.6	22.0	20.1	60.0	50.0	38.0	29.9	L1	
11	29.05017	10.1	8.5	13.7	23.8	22.2	60.0	50.0	36.2	27.8	L1	
12	29.49738	7.0	4.9	13.7	20.7	18.6	60.0	50.0	39.3	31.4	L1	

DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Shonan EMC Lab. No.3 Shielded Room

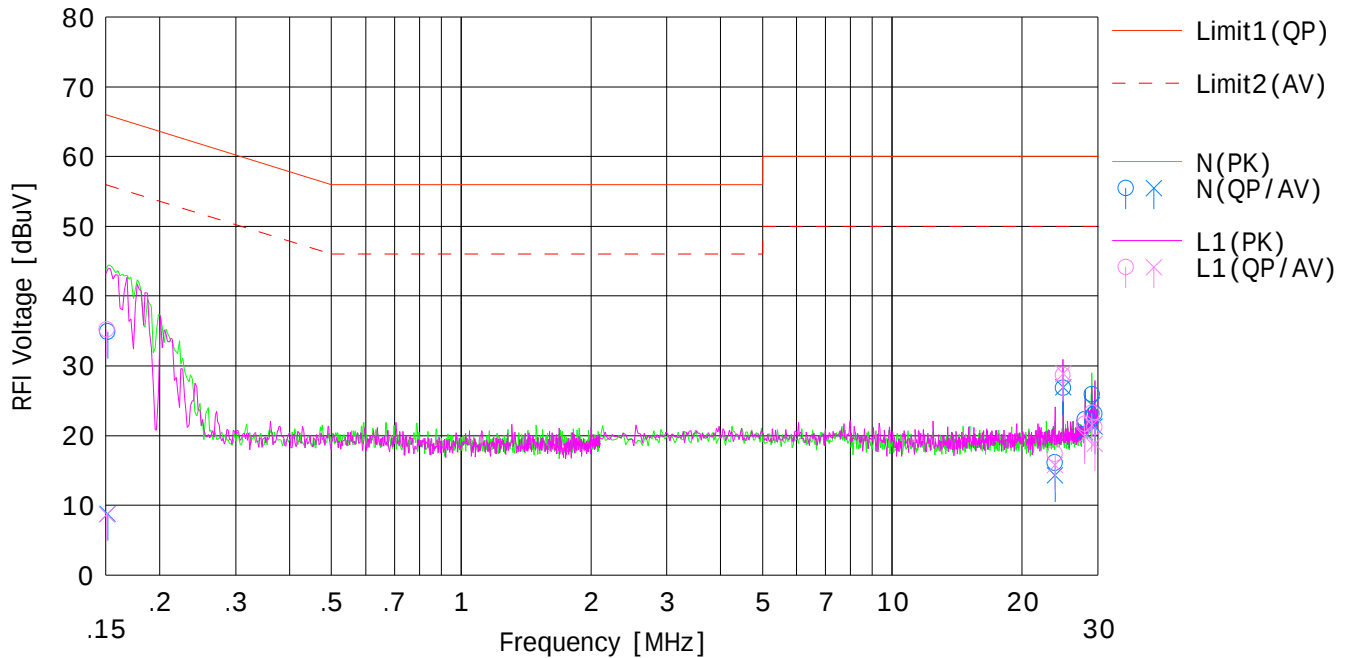
Date : 2015/02/11

Company : Murata Manufacturing Co., Ltd.
 Kind of EUT : Communication Module
 Model No. : Type1DR
 Serial No. : 9 (2.4GHz monopole)
 Remarks : -

Mode : DH5, Tx, 2441MHz
 Order No. : 10622710S
 Power : DC 3.2V / 1.8V
 Temp./Humi. : 22deg.C / 25%RH

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

Engineer : Yosuke Ishikawa



No.	Freq. [MHz]	Reading		C.Fac	Results		Limit		Margin		Phase	Comment
		<QP> [dBuV]	<AV> [dBuV]		<QP> [dBuV]	<AV> [dBuV]	<QP> [dBuV]	<AV> [dBuV]	<QP> [dB]	<AV> [dB]		
1	0.15145	22.4	-3.7	12.5	34.9	8.8	65.9	55.9	31.0	47.1	N	
2	23.86150	2.6	0.8	13.5	16.1	14.3	60.0	50.0	43.9	35.7	N	
3	24.91270	13.3	13.4	13.5	26.8	26.9	60.0	50.0	33.2	23.1	N	
4	28.01145	8.7	6.9	13.6	22.3	20.5	60.0	50.0	37.7	29.5	N	
5	29.04914	12.2	10.6	13.7	25.9	24.3	60.0	50.0	34.1	25.7	N	
6	29.49874	9.4	7.6	13.7	23.1	21.3	60.0	50.0	36.9	28.7	N	
7	0.15069	22.7	-3.8	12.5	35.2	8.7	65.9	55.9	30.7	47.2	L1	
8	23.86109	3.9	2.3	13.5	17.4	15.8	60.0	50.0	42.6	34.2	L1	
9	24.89972	15.2	15.4	13.5	28.7	28.9	60.0	50.0	31.3	21.1	L1	
10	28.01069	8.1	6.2	13.6	21.7	19.8	60.0	50.0	38.3	30.2	L1	
11	29.04789	9.5	7.8	13.7	23.2	21.5	60.0	50.0	36.8	28.5	L1	
12	29.49471	7.5	5.1	13.7	21.2	18.8	60.0	50.0	38.8	31.2	L1	

Calculation: Result [dBuV] = Reading [dBuV] + C.Fac (LISN + Cable + ATT) [dB]
 LISN: SLS-05

DATA OF CONDUCTED EMISSION TEST

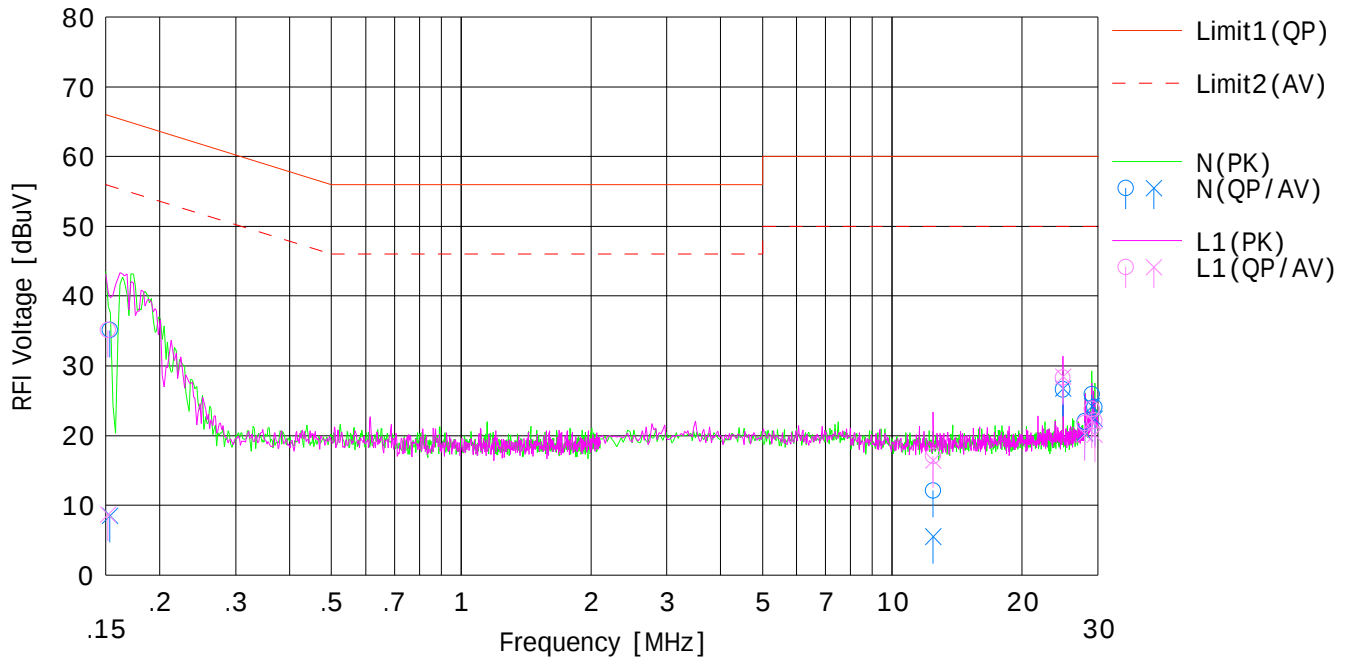
UL Japan, Inc. Shonan EMC Lab. No.3 Shielded Room
Date : 2015/02/11

Company : Murata Manufacturing Co., Ltd.
Kind of EUT : Communication Module
Model No. : Type1DR
Serial No. : 9 (2.4GHz monopole)
Remarks : -

Mode : DH5, Tx, 2480MHz
Order No. : 10622710S
Power : DC 3.2V / 1.8V
Temp./Humi. : 22deg.C / 25%RH

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

Engineer : Yosuke Ishikawa



No.	Freq. [MHz]	Reading		C.Fac	Results		Limit		Margin		Phase	Comment
		<QP> [dBuV]	<AV> [dBuV]		<QP> [dBuV]	<AV> [dBuV]	<QP> [dBuV]	<AV> [dBuV]	<QP> [dB]	<AV> [dB]		
1	0.15321	22.6	-4.0	12.5	35.1	8.5	65.8	55.8	30.7	47.3	N	
2	12.44930	-0.9	-7.5	13.0	12.1	5.5	60.0	50.0	47.9	44.5	N	
3	24.89852	13.1	13.2	13.5	26.6	26.7	60.0	50.0	33.4	23.3	N	
4	28.01209	8.4	6.8	13.6	22.0	20.4	60.0	50.0	38.0	29.6	N	
5	29.04852	12.2	10.5	13.7	25.9	24.2	60.0	50.0	34.1	25.8	N	
6	29.49655	10.4	8.7	13.7	24.1	22.4	60.0	50.0	35.9	27.6	N	
7	0.15158	22.6	-3.8	12.5	35.1	8.7	65.9	55.9	30.8	47.2	L1	
8	12.44991	4.1	3.4	13.0	17.1	16.4	60.0	50.0	42.9	33.6	L1	
9	24.89810	14.8	15.0	13.5	28.3	28.5	60.0	50.0	31.7	21.5	L1	
10	28.01104	8.2	6.6	13.6	21.8	20.2	60.0	50.0	38.2	29.8	L1	
11	29.04858	10.1	8.4	13.7	23.8	22.1	60.0	50.0	36.2	27.9	L1	
12	29.49603	8.4	6.4	13.7	22.1	20.1	60.0	50.0	37.9	29.9	L1	

Calculation: Result [dBuV] = Reading [dBuV] + C.Fac (LISN + Cable + ATT) [dB]
LISN: SLS-05

DATA OF CONDUCTED EMISSION TEST

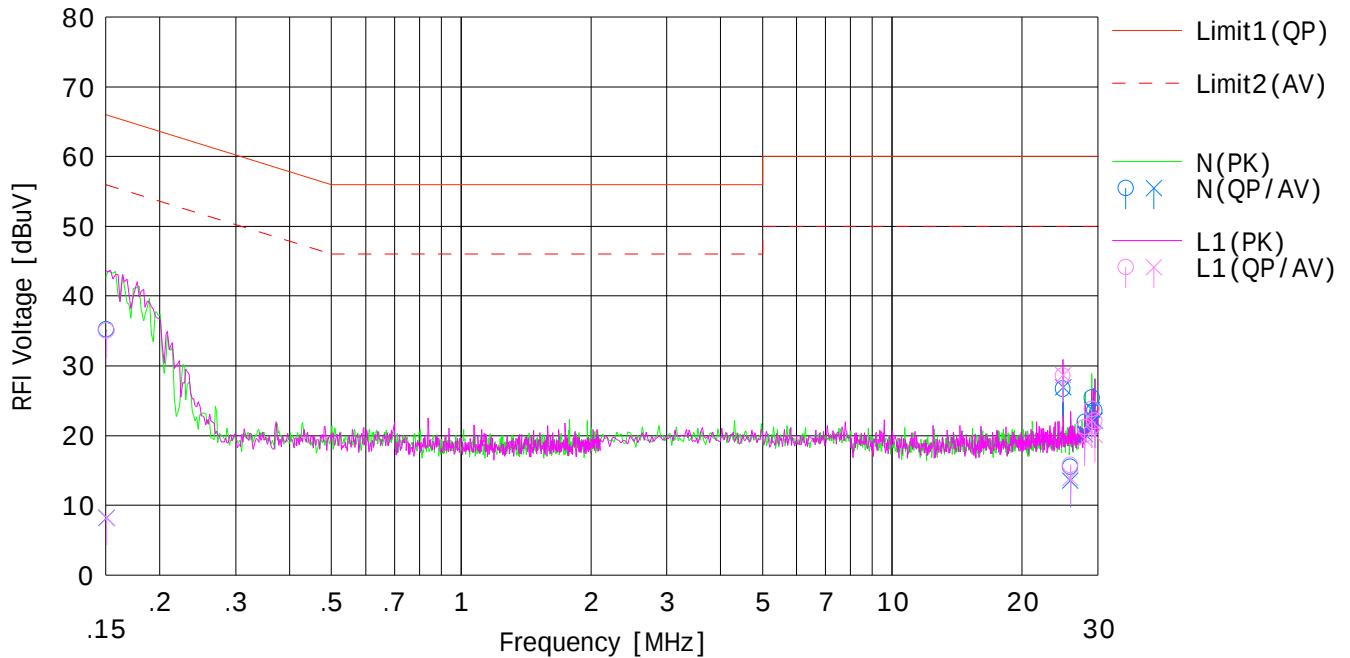
UL Japan, Inc. Shonan EMC Lab. No.3 Shielded Room
Date : 2015/02/11

Company : Murata Manufacturing Co., Ltd.
Kind of EUT : Communication Module
Model No. : Type1DR
Serial No. : 9 (2.4GHz monopole)
Remarks : -

Mode : 3DH5, Tx, 2402MHz
Order No. : 10622710S
Power : DC 3.2V / 1.8V
Temp./Humi. : 22deg.C / 25%RH

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

Engineer : Yosuke Ishikawa



No.	Freq. [MHz]	Reading		C.Fac	Results		Limit		Margin		Phase	Comment
		<QP> [dBuV]	<AV> [dBuV]		<QP> [dBuV]	<AV> [dBuV]	<QP> [dBuV]	<AV> [dBuV]	<QP> [dB]	<AV> [dB]		
1	0.15046	22.7	-4.3	12.5	35.2	8.2	65.9	55.9	30.7	47.7	N	
2	24.89880	13.2	13.4	13.5	26.7	26.9	60.0	50.0	33.3	23.1	N	
3	25.93667	2.0	0.1	13.5	15.5	13.6	60.0	50.0	44.5	36.4	N	
4	28.01046	8.3	6.6	13.6	21.9	20.2	60.0	50.0	38.1	29.8	N	
5	29.04726	11.7	10.0	13.7	25.4	23.7	60.0	50.0	34.6	26.3	N	
6	29.49623	9.9	8.4	13.7	23.6	22.1	60.0	50.0	36.4	27.9	N	
7	0.15058	22.5	-4.3	12.5	35.0	8.2	65.9	55.9	30.9	47.7	L1	
8	24.89952	15.1	15.2	13.5	28.6	28.7	60.0	50.0	31.4	21.3	L1	
9	25.93724	2.3	0.4	13.5	15.8	13.9	60.0	50.0	44.2	36.1	L1	
10	28.00988	7.6	5.9	13.6	21.2	19.5	60.0	50.0	38.8	30.5	L1	
11	29.04865	10.1	8.4	13.7	23.8	22.1	60.0	50.0	36.2	27.9	L1	
12	29.49571	8.4	6.4	13.7	22.1	20.1	60.0	50.0	37.9	29.9	L1	

Calculation: Result [dBuV] = Reading [dBuV] + C.Fac (LISN+Cable+ATT) [dB]
LISN: SLS-05

DATA OF CONDUCTED EMISSION TEST

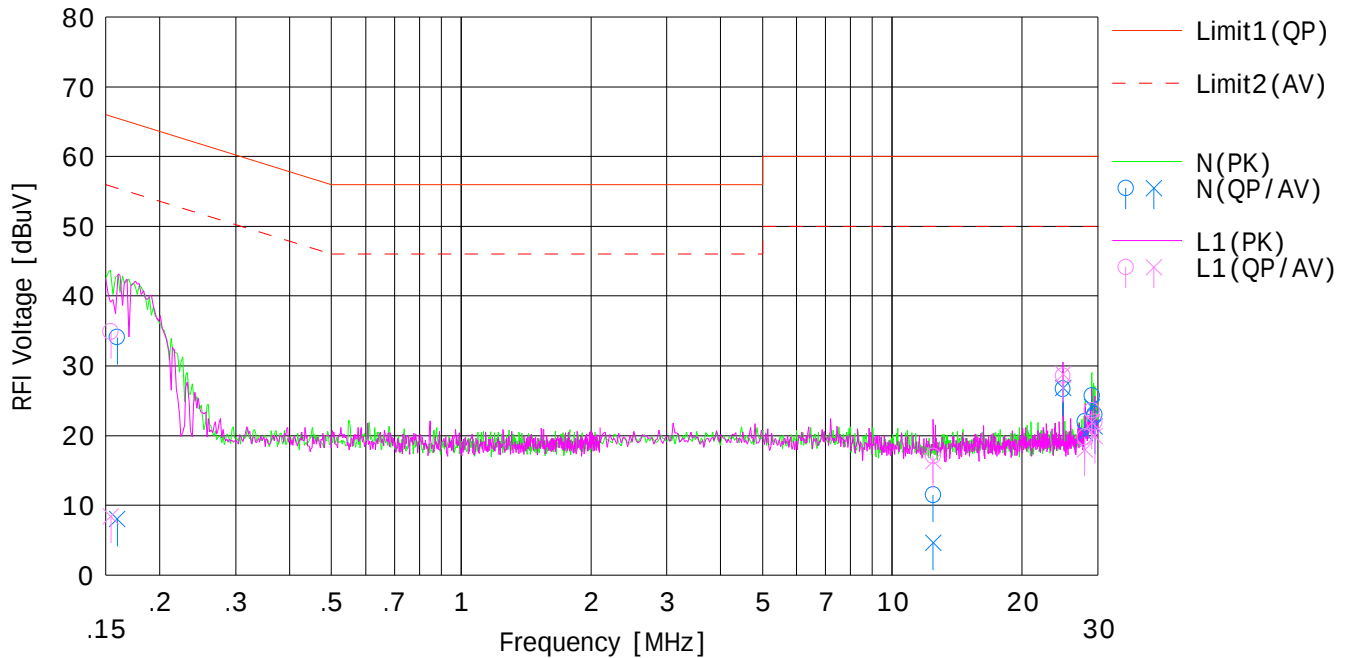
UL Japan, Inc. Shonan EMC Lab. No.3 Shielded Room
Date : 2015/02/11

Company : Murata Manufacturing Co., Ltd.
Kind of EUT : Communication Module
Model No. : Type1DR
Serial No. : 9 (2.4GHz monopole)
Remarks : -

Mode : 3DH5, Tx, 2441MHz
Order No. : 10622710S
Power : DC 3.2V / 1.8V
Temp./Humi. : 22deg.C / 25%RH

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

Engineer : Yosuke Ishikawa



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	0.15933	21.6	-4.5	12.5	34.1	8.0	65.4	55.4	31.3	47.4	N	
2	12.44780	-1.5	-8.4	13.0	11.5	4.6	60.0	50.0	48.5	45.4	N	
3	24.89916	13.2	13.3	13.5	26.7	26.8	60.0	50.0	33.3	23.2	N	
4	28.01080	8.4	6.8	13.6	22.0	20.4	60.0	50.0	38.0	29.6	N	
5	29.04916	12.0	10.4	13.7	25.7	24.1	60.0	50.0	34.3	25.9	N	
6	29.49845	9.3	7.6	13.7	23.0	21.3	60.0	50.0	37.0	28.7	N	
7	0.15390	22.4	-4.1	12.5	34.9	8.4	65.7	55.7	30.8	47.3	L1	
8	12.44991	4.1	3.3	13.0	17.1	16.3	60.0	50.0	42.9	33.7	L1	
9	24.89840	15.1	15.3	13.5	28.6	28.6	60.0	50.0	31.4	21.2	L1	
10	28.00846	6.2	4.4	13.6	19.8	18.0	60.0	50.0	40.2	32.0	L1	
11	29.04923	9.9	8.2	13.7	23.6	21.9	60.0	50.0	36.4	28.1	L1	
12	29.49527	8.2	6.2	13.7	21.9	19.9	60.0	50.0	38.1	30.1	L1	

Calculation: Result [dBuV] = Reading [dBuV] + C.Fac (LISN + Cable + ATT) [dB]
LISN: SLS-05

DATA OF CONDUCTED EMISSION TEST

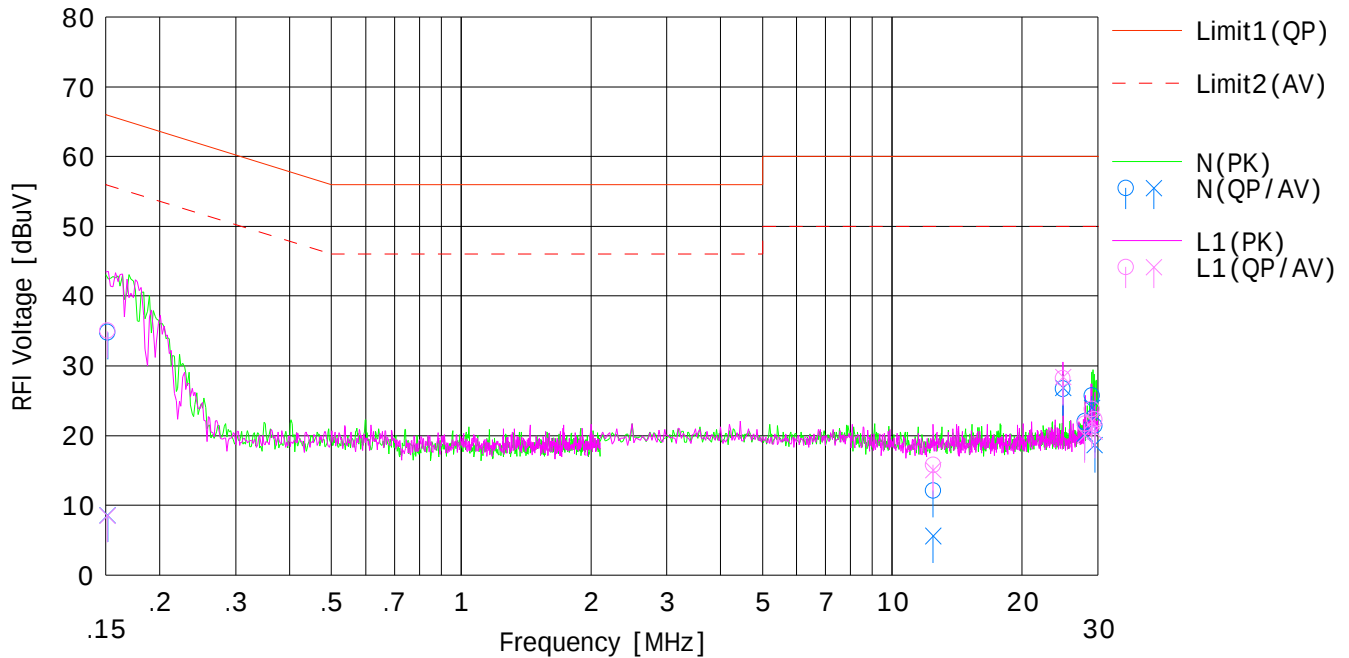
UL Japan, Inc. Shonan EMC Lab. No.3 Shielded Room
Date : 2015/02/11

Company : Murata Manufacturing Co., Ltd.
Kind of EUT : Communication Module
Model No. : Type1DR
Serial No. : 9 (2.4GHz monopole)
Remarks : -

Mode : 3DH5, Tx, 2480MHz
Order No. : 10622710S
Power : DC 3.2V / 1.8V
Temp./Humi. : 22deg.C / 25%RH

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

Engineer : Yosuke Ishikawa



No.	Freq. [MHz]	Reading		C.Fac	Results		Limit		Margin		Phase	Comment
		<QP> [dBuV]	<AV> [dBuV]		<QP> [dBuV]	<AV> [dBuV]	<QP> [dBuV]	<AV> [dBuV]	<QP> [dB]	<AV> [dB]		
1	0.15140	22.3	-3.9	12.5	34.8	8.6	65.9	55.9	31.1	47.3	N	
2	12.44941	-0.9	-7.4	13.0	12.1	5.6	60.0	50.0	47.9	44.4	N	
3	24.89854	13.2	13.3	13.5	26.7	26.8	60.0	50.0	33.3	23.2	N	
4	28.01114	8.4	6.7	13.6	22.0	20.3	60.0	50.0	38.0	29.7	N	
5	29.04742	12.0	10.3	13.7	25.7	24.0	60.0	50.0	34.3	26.0	N	
6	29.49319	7.7	4.9	13.7	21.4	18.6	60.0	50.0	38.6	31.4	N	
7	0.15110	22.5	-4.0	12.5	35.0	8.5	65.9	55.9	30.9	47.4	L1	
8	12.45144	2.8	2.0	13.0	15.8	15.0	60.0	50.0	44.2	35.0	L1	
9	24.89746	14.7	14.9	13.5	28.2	28.4	60.0	50.0	31.8	21.6	L1	
10	28.01086	8.1	6.4	13.6	21.7	20.0	60.0	50.0	38.3	30.0	L1	
11	29.04815	10.1	8.3	13.7	23.8	22.0	60.0	50.0	36.2	28.0	L1	
12	29.49669	8.6	6.9	13.7	22.3	20.6	60.0	50.0	37.7	29.4	L1	

Calculation: Result [dBuV] = Reading [dBuV] + C.Fac (LISN + Cable + ATT) [dB]
LISN: SLS-05

DATA OF CONDUCTED EMISSION TEST

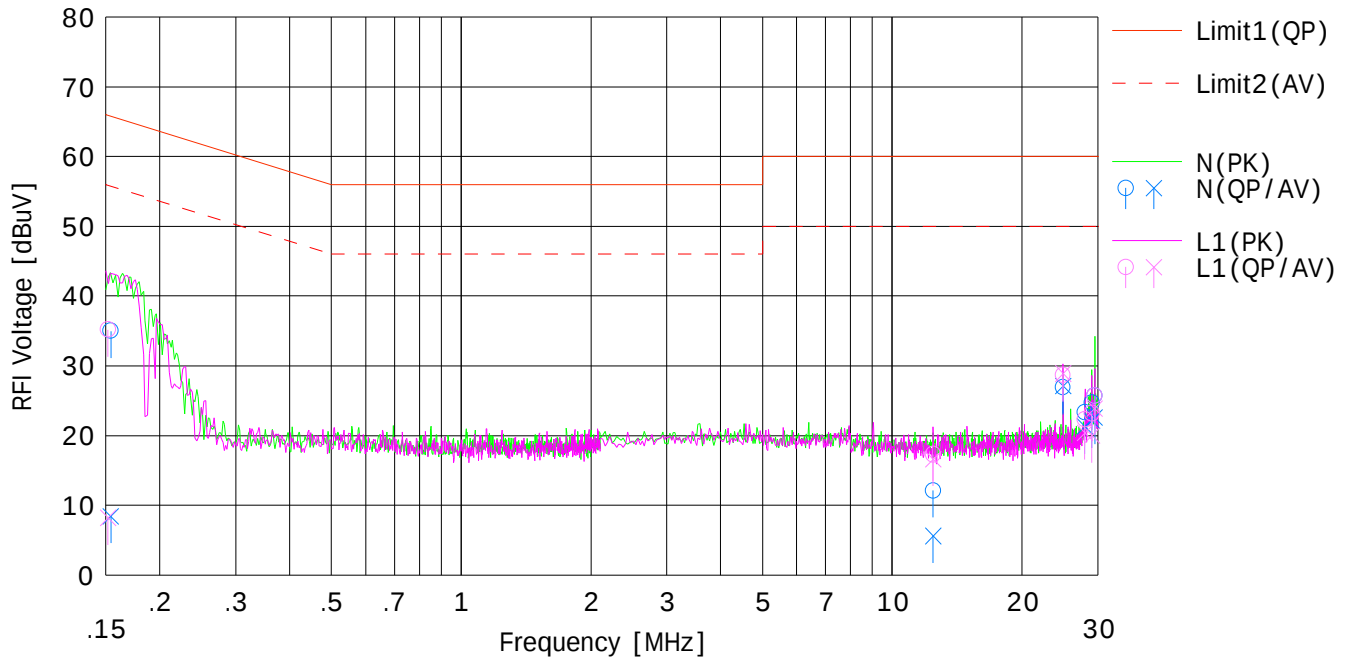
UL Japan, Inc. Shonan EMC Lab. No.3 Shielded Room
Date : 2015/02/11

Company : Murata Manufacturing Co., Ltd.
Kind of EUT : Communication Module
Model No. : Type1DR
Serial No. : 21 (2.4GHz Dipole)
Remarks : -

Mode : DH5, Tx, 2402MHz
Order No. : 10622710S
Power : DC 3.2V / 1.8V
Temp./Humi. : 23deg.C / 34%RH

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

Engineer : Yosuke Ishikawa



No.	Freq. [MHz]	Reading		C.Fac	Results		Limit		Margin		Phase	Comment
		<QP> [dBuV]	<AV> [dBuV]		<QP> [dBuV]	<AV> [dBuV]	<QP> [dBuV]	<AV> [dBuV]	<QP> [dB]	<AV> [dB]		
1	0.15403	22.5	-4.1	12.5	35.0	8.4	65.7	55.7	30.7	47.3	N	
2	12.44788	-0.9	-7.4	13.0	12.1	5.6	60.0	50.0	47.9	44.4	N	
3	24.89400	13.4	13.6	13.5	26.9	27.1	60.0	50.0	33.1	22.9	N	
4	28.00554	9.7	7.7	13.6	23.3	21.3	60.0	50.0	36.7	28.7	N	
5	29.04068	11.0	8.4	13.7	24.7	22.1	60.0	50.0	35.3	27.9	N	
6	29.49333	12.0	8.9	13.7	25.7	22.6	60.0	50.0	34.3	27.4	N	
7	0.15155	22.7	-4.3	12.5	35.2	8.2	65.9	55.9	30.7	47.7	L1	
8	12.44680	4.3	3.6	13.0	17.3	16.6	60.0	50.0	42.7	33.4	L1	
9	24.89416	15.2	15.4	13.5	28.7	28.9	60.0	50.0	31.3	21.1	L1	
10	28.00452	8.7	6.8	13.6	22.3	20.4	60.0	50.0	37.7	29.6	L1	
11	29.04534	9.5	6.3	13.7	23.2	20.0	60.0	50.0	36.8	30.0	L1	
12	29.49741	12.0	10.2	13.7	25.7	23.9	60.0	50.0	34.3	26.1	L1	

Calculation: Result [dBuV] = Reading [dBuV] + C.Fac (LISN+Cable+ATT) [dB]
LISN: SLS-05

DATA OF CONDUCTED EMISSION TEST

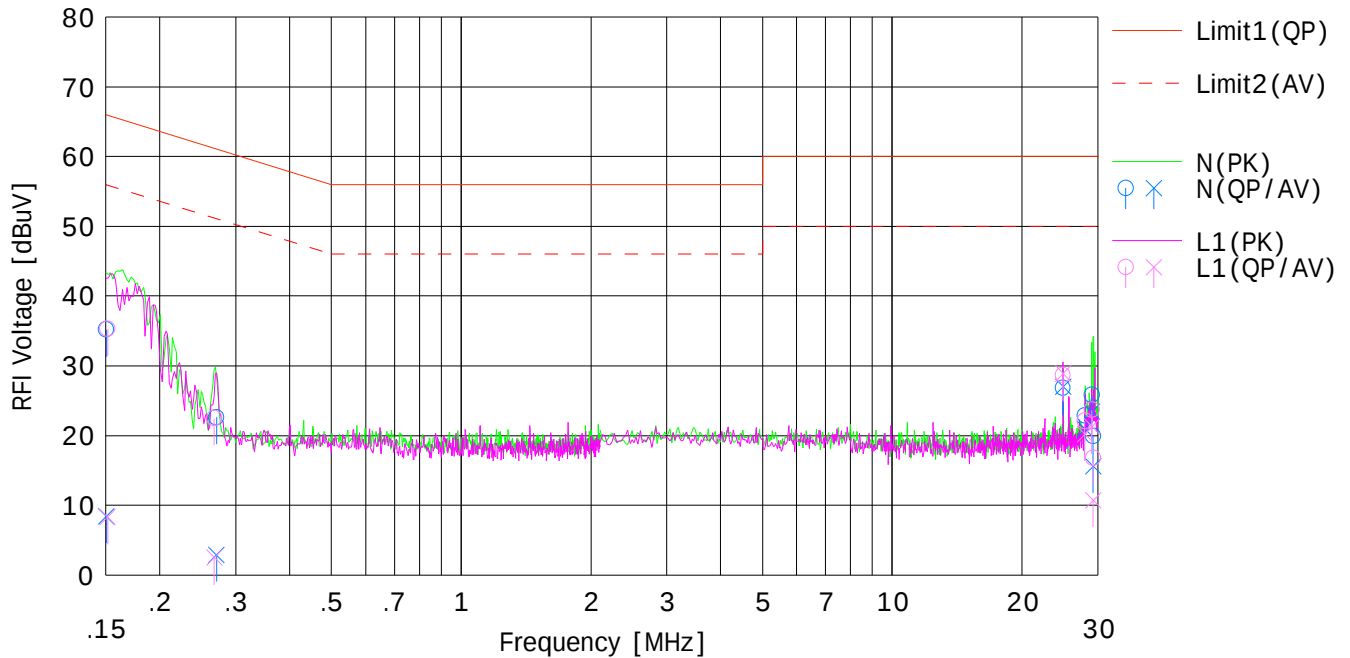
UL Japan, Inc. Shonan EMC Lab. No.3 Shielded Room
Date : 2015/02/11

Company : Murata Manufacturing Co., Ltd.
Kind of EUT : Communication Module
Model No. : Type1DR
Serial No. : 21 (2.4GHz Dipole)
Remarks : -

Mode : DH5, Tx, 2441MHz
Order No. : 10622710S
Power : DC 3.2V / 1.8V
Temp. / Humi. : 23deg.C / 34%RH

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

Engineer : Yosuke Ishikawa



No.	Freq. [MHz]	Reading		C.Fac	Results		Limit		Margin		Phase	Comment
		<QP> [dBuV]	<AV> [dBuV]		<QP> [dBuV]	<AV> [dBuV]	<QP> [dBuV]	<AV> [dBuV]	<QP> [dB]	<AV> [dB]		
1	0.15035	22.7	-4.1	12.5	35.2	8.4	65.9	55.9	30.7	47.5	N	
2	0.27070	10.1	-9.6	12.5	22.6	2.9	61.0	51.0	38.4	48.1	N	
3	24.89448	13.3	13.5	13.5	26.8	27.0	60.0	50.0	33.2	23.0	N	
4	28.00448	9.3	7.3	13.6	22.9	20.9	60.0	50.0	37.1	29.1	N	
5	29.04263	12.1	9.7	13.7	25.8	23.4	60.0	50.0	34.2	26.6	N	
6	29.25810	6.2	1.9	13.7	19.9	15.6	60.0	50.0	40.1	34.4	N	
7	0.15140	22.8	-4.2	12.5	35.3	8.3	65.9	55.9	30.6	47.6	L1	
8	0.26764	10.0	-10.0	12.5	22.5	2.5	61.1	51.1	38.6	48.6	L1	
9	24.89381	15.2	15.4	13.5	28.7	28.9	60.0	50.0	31.3	21.1	L1	
10	28.00723	8.5	6.6	13.6	22.1	20.2	60.0	50.0	37.9	29.8	L1	
11	29.04282	10.0	7.6	13.7	23.7	21.3	60.0	50.0	36.3	28.7	L1	
12	29.27703	3.1	-3.0	13.7	16.8	10.7	60.0	50.0	43.2	39.3	L1	

Calculation: Result [dBuV] = Reading [dBuV] + C.Fac (LISN + Cable + ATT) [dB]
LISN: SLS-05

DATA OF CONDUCTED EMISSION TEST

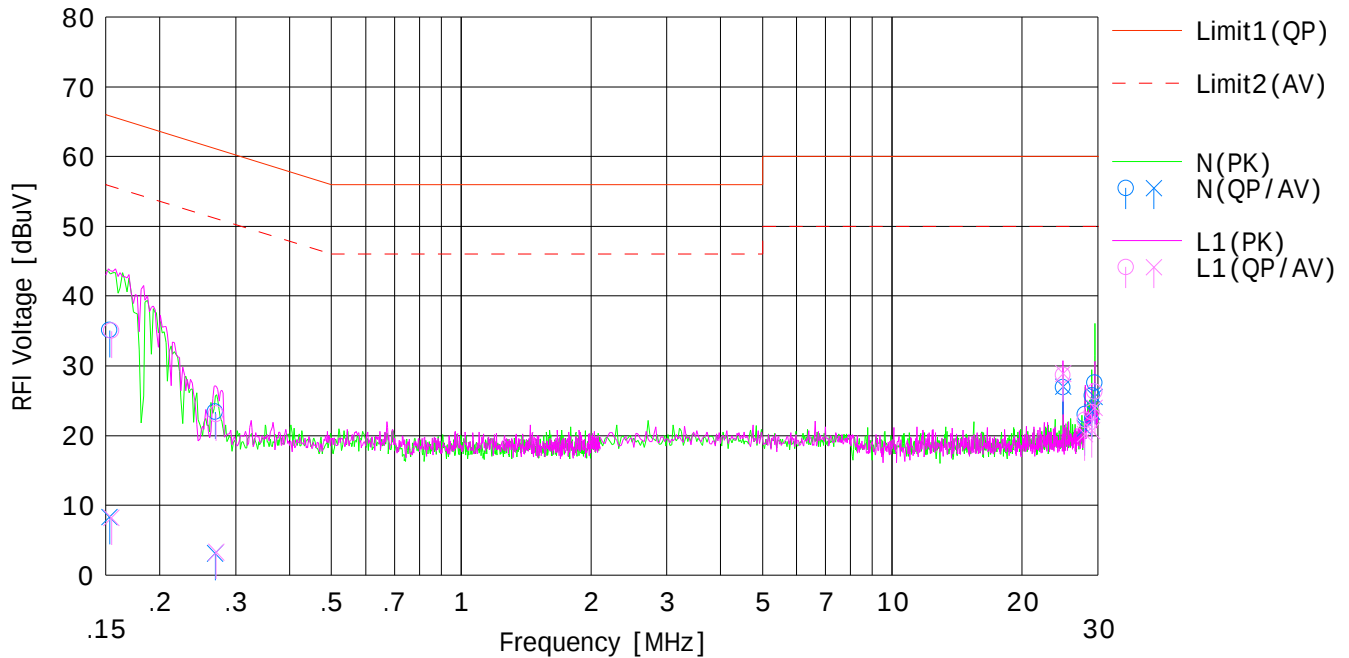
UL Japan, Inc. Shonan EMC Lab. No.3 Shielded Room
Date : 2015/02/11

Company : Murata Manufacturing Co., Ltd.
Kind of EUT : Communication Module
Model No. : Type1DR
Serial No. : 21 (2.4GHz Dipole)
Remarks : -

Mode : DH5, Tx, 2480MHz
Order No. : 10622710S
Power : DC 3.2V / 1.8V
Temp./Humi. : 23deg.C / 34%RH

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

Engineer : Yosuke Ishikawa



No.	Freq. [MHz]	Reading		C.Fac	Results		Limit		Margin		Phase	Comment
		<QP> [dBuV]	<AV> [dBuV]		<QP> [dBuV]	<AV> [dBuV]	<QP> [dBuV]	<AV> [dBuV]	<QP> [dB]	<AV> [dB]		
1	0.15284	22.6	-4.2	12.5	35.1	8.3	65.8	55.8	30.7	47.5	N	
2	0.26912	10.9	-9.4	12.5	23.4	3.1	61.1	51.1	37.7	48.0	N	
3	24.89428	13.4	13.5	13.5	26.9	27.0	60.0	50.0	33.1	23.0	N	
4	28.00477	9.4	7.4	13.6	23.0	21.0	60.0	50.0	37.0	29.0	N	
5	29.04270	12.0	9.7	13.7	25.7	23.4	60.0	50.0	34.3	26.6	N	
6	29.49651	13.9	11.8	13.7	27.6	25.5	60.0	50.0	32.4	24.5	N	
7	0.15458	22.5	-4.3	12.5	35.0	8.2	65.7	55.7	30.7	47.5	L1	
8	0.27002	10.6	-9.2	12.5	23.1	3.3	61.1	51.1	38.0	47.8	L1	
9	24.89436	15.2	15.4	13.5	28.7	28.9	60.0	50.0	31.3	21.1	L1	
10	28.00405	8.6	6.6	13.6	22.2	20.2	60.0	50.0	37.8	29.8	L1	
11	29.04426	9.6	7.0	13.7	23.3	20.7	60.0	50.0	36.7	29.3	L1	
12	29.49565	12.6	10.3	13.7	26.3	24.0	60.0	50.0	33.7	26.0	L1	

Calculation: Result [dBuV] = Reading [dBuV] + C.Fac (LISN + Cable + ATT) [dB]
LISN: SLS-05

DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Shonan EMC Lab. No.3 Shielded Room

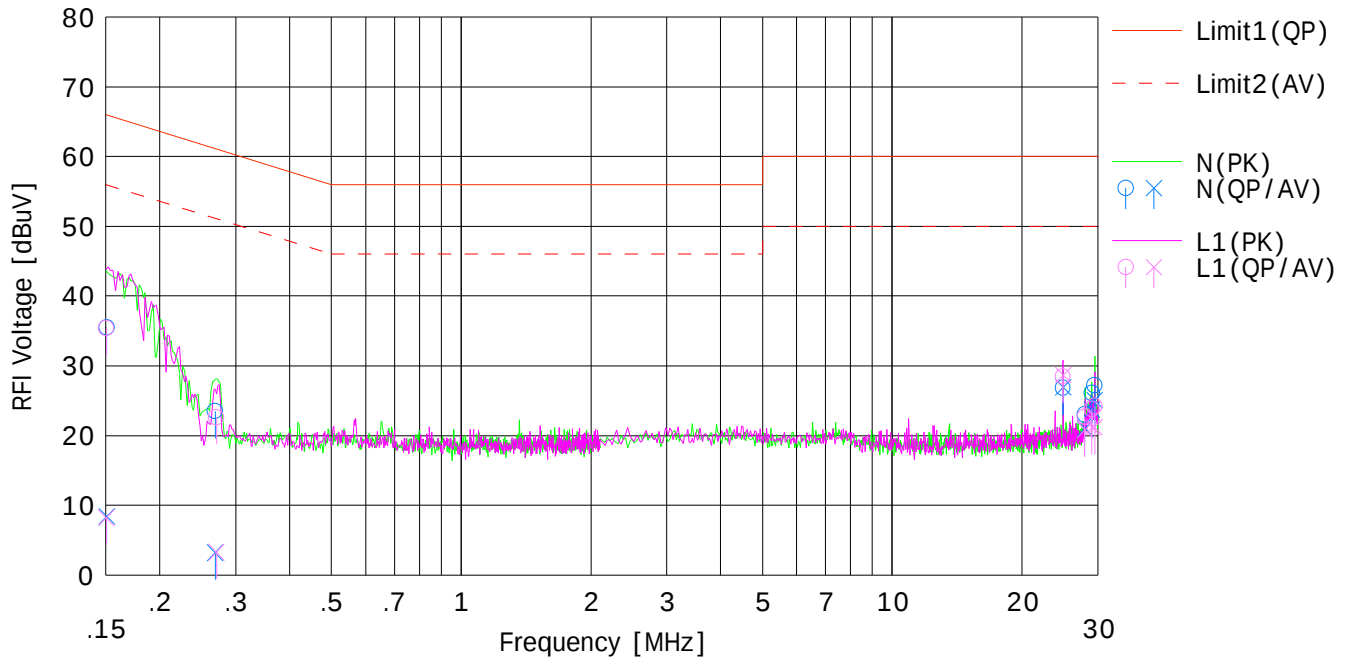
Date : 2015/02/11

Company : Murata Manufacturing Co., Ltd.
 Kind of EUT : Communication Module
 Model No. : Type1DR
 Serial No. : 21 (2.4GHz Dipole)
 Remarks : -

Mode : 3DH5, Tx, 2402MHz
 Order No. : 10622710S
 Power : DC 3.2V / 1.8V
 Temp./Humi. : 23deg.C / 34%RH

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

Engineer : Yosuke Ishikawa



No.	Freq. [MHz]	Reading		C.Fac	Results		Limit		Margin		Phase	Comment
		<QP> [dBuV]	<AV> [dBuV]		<QP> [dBuV]	<AV> [dBuV]	<QP> [dBuV]	<AV> [dBuV]	<QP> [dB]	<AV> [dB]		
1	0.15069	23.0	-4.1	12.5	35.5	8.4	65.9	55.9	30.4	47.5	N	
2	0.26873	11.0	-9.3	12.5	23.5	3.2	61.1	51.1	37.6	47.9	N	
3	24.89490	13.3	13.4	13.5	26.8	26.9	60.0	50.0	33.2	23.1	N	
4	28.00536	9.4	7.4	13.6	23.0	21.0	60.0	50.0	37.0	29.0	N	
5	29.04297	12.4	10.0	13.7	26.1	23.7	60.0	50.0	33.9	26.3	N	
6	29.49604	13.5	11.4	13.7	27.2	25.1	60.0	50.0	32.8	24.9	N	
7	0.15038	22.9	-4.3	12.5	35.4	8.2	65.9	55.9	30.5	47.7	L1	
8	0.27076	10.1	-9.2	12.5	22.6	3.3	61.0	51.0	38.4	47.7	L1	
9	24.89511	15.0	15.2	13.5	28.5	28.7	60.0	50.0	31.5	21.3	L1	
10	28.00641	9.1	7.2	13.6	22.7	20.8	60.0	50.0	37.3	29.2	L1	
11	29.05381	10.1	7.5	13.7	23.8	21.2	60.0	50.0	36.2	28.8	L1	
12	29.49370	10.5	7.5	13.7	24.2	21.2	60.0	50.0	35.8	28.8	L1	

Calculation: Result [dBuV] = Reading [dBuV] + C.Fac (LISN+Cable+ATT) [dB]
 LISN: SLS-05

DATA OF CONDUCTED EMISSION TEST

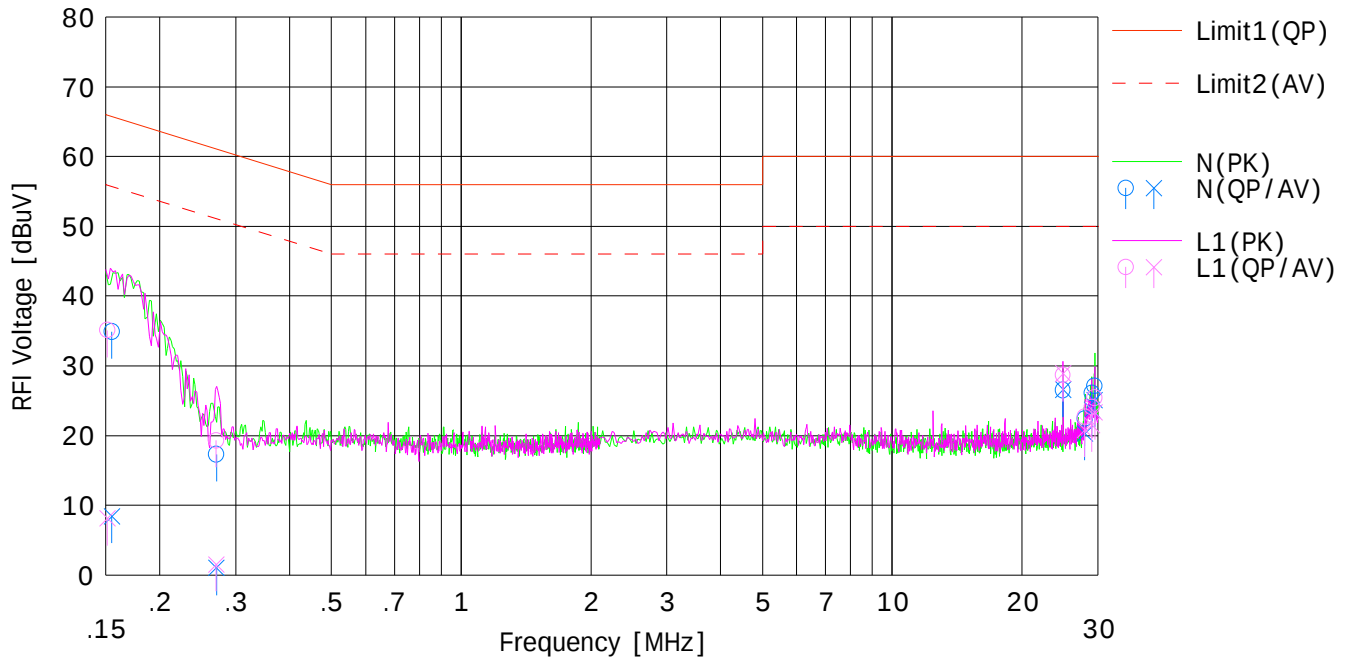
UL Japan, Inc. Shonan EMC Lab. No.3 Shielded Room
Date : 2015/02/11

Company : Murata Manufacturing Co., Ltd.
Kind of EUT : Communication Module
Model No. : Type1DR
Serial No. : 21 (2.4GHz Dipole)
Remarks : -

Mode : 3DH5, Tx, 2441MHz
Order No. : 10622710S
Power : DC 3.2V / 1.8V
Temp./Humi. : 23deg.C / 34%RH

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

Engineer : Yosuke Ishikawa



No.	Freq. [MHz]	Reading		C.Fac	Results		Limit		Margin		Phase	Comment
		<QP> [dBuV]	<AV> [dBuV]		<QP> [dBuV]	<AV> [dBuV]	<QP> [dBuV]	<AV> [dBuV]	<QP> [dB]	<AV> [dB]		
1	0.15467	22.4	-4.1	12.5	34.9	8.4	65.7	55.7	30.8	47.3	N	
2	0.27075	4.8	-11.5	12.5	17.3	1.0	61.0	51.0	43.7	50.0	N	
3	24.89589	13.0	13.1	13.5	26.5	26.6	60.0	50.0	33.5	23.4	N	
4	28.00506	8.8	6.7	13.6	22.4	20.3	60.0	50.0	37.6	29.7	N	
5	29.04484	12.4	10.0	13.7	26.1	23.7	60.0	50.0	33.9	26.3	N	
6	29.49670	13.4	11.4	13.7	27.1	25.1	60.0	50.0	32.9	24.9	N	
7	0.15101	22.6	-4.4	12.5	35.1	8.1	65.9	55.9	30.8	47.8	L1	
8	0.27037	6.8	-11.0	12.5	19.3	1.5	61.1	51.1	41.8	49.6	L1	
9	24.89483	15.2	15.4	13.5	28.7	28.9	60.0	50.0	31.3	21.1	L1	
10	28.00689	9.1	7.2	13.6	22.7	20.8	60.0	50.0	37.3	29.2	L1	
11	29.04369	10.4	7.8	13.7	24.1	21.5	60.0	50.0	35.9	28.5	L1	
12	29.49559	11.7	9.6	13.7	25.4	23.3	60.0	50.0	34.6	26.7	L1	

Calculation: Result [dBuV] = Reading [dBuV] + C.Fac (LISN + Cable + ATT) [dB]
LISN: SLS-05

DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Shonan EMC Lab. No.3 Shielded Room

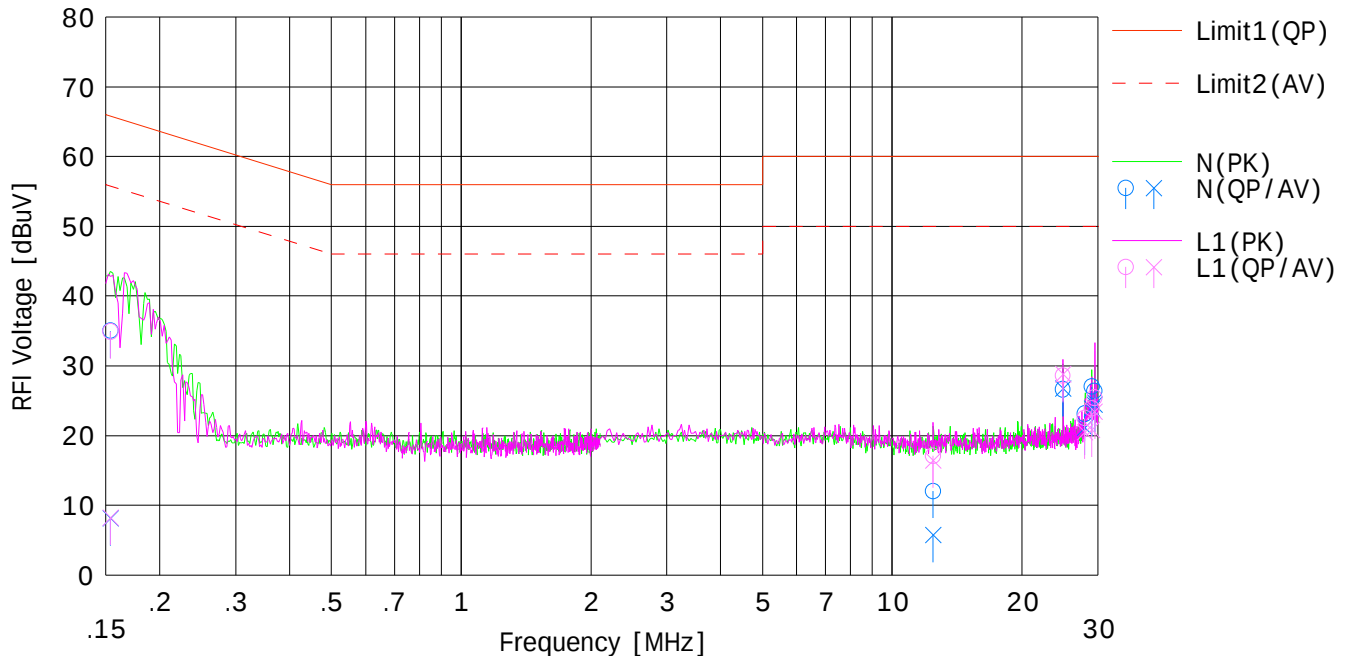
Date : 2015/02/11

Company : Murata Manufacturing Co., Ltd.
 Kind of EUT : Communication Module
 Model No. : Type1DR
 Serial No. : 21 (2.4GHz Dipole)
 Remarks : -

Mode : 3DH5, Tx, 2480MHz
 Order No. : 10622710S
 Power : DC 3.2V / 1.8V
 Temp./Humi. : 23deg.C / 34%RH

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

Engineer : Yosuke Ishikawa



No.	Freq. [MHz]	Reading		C.Fac	Results		Limit		Margin		Phase	Comment
		<QP> [dBuV]	<AV> [dBuV]		<QP> [dBuV]	<AV> [dBuV]	<QP> [dBuV]	<AV> [dBuV]	<QP> [dB]	<AV> [dB]		
1	0.15378	22.5	-4.4	12.5	35.0	8.1	65.7	55.7	30.7	47.6	N	
2	12.44699	-1.0	-7.3	13.0	12.0	5.7	60.0	50.0	48.0	44.3	N	
3	24.89608	13.1	13.2	13.5	26.6	26.7	60.0	50.0	33.4	23.3	N	
4	28.00728	9.5	7.5	13.6	23.1	21.1	60.0	50.0	36.9	28.9	N	
5	29.04419	13.3	10.2	13.7	27.0	23.9	60.0	50.0	33.0	26.1	N	
6	29.52627	12.7	10.7	13.7	26.4	24.4	60.0	50.0	33.6	25.6	N	
7	0.15378	22.4	-4.3	12.5	34.9	8.2	65.7	55.7	30.8	47.5	L1	
8	12.44879	4.1	3.4	13.0	17.1	16.4	60.0	50.0	42.9	33.6	L1	
9	24.89491	15.1	15.3	13.5	28.6	28.6	60.0	50.0	31.4	21.2	L1	
10	28.00625	8.9	6.9	13.6	22.5	20.5	60.0	50.0	37.5	29.5	L1	
11	29.04280	10.2	7.1	13.7	23.9	20.8	60.0	50.0	36.1	29.2	L1	
12	29.49586	11.7	9.7	13.7	25.4	23.4	60.0	50.0	34.6	26.6	L1	

Calculation: Result [dBuV] = Reading [dBuV] + C.Fac (LISN+Cable+ATT) [dB]
 LISN: SLS-05

DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Shonan EMC Lab. No.3 Shielded Room

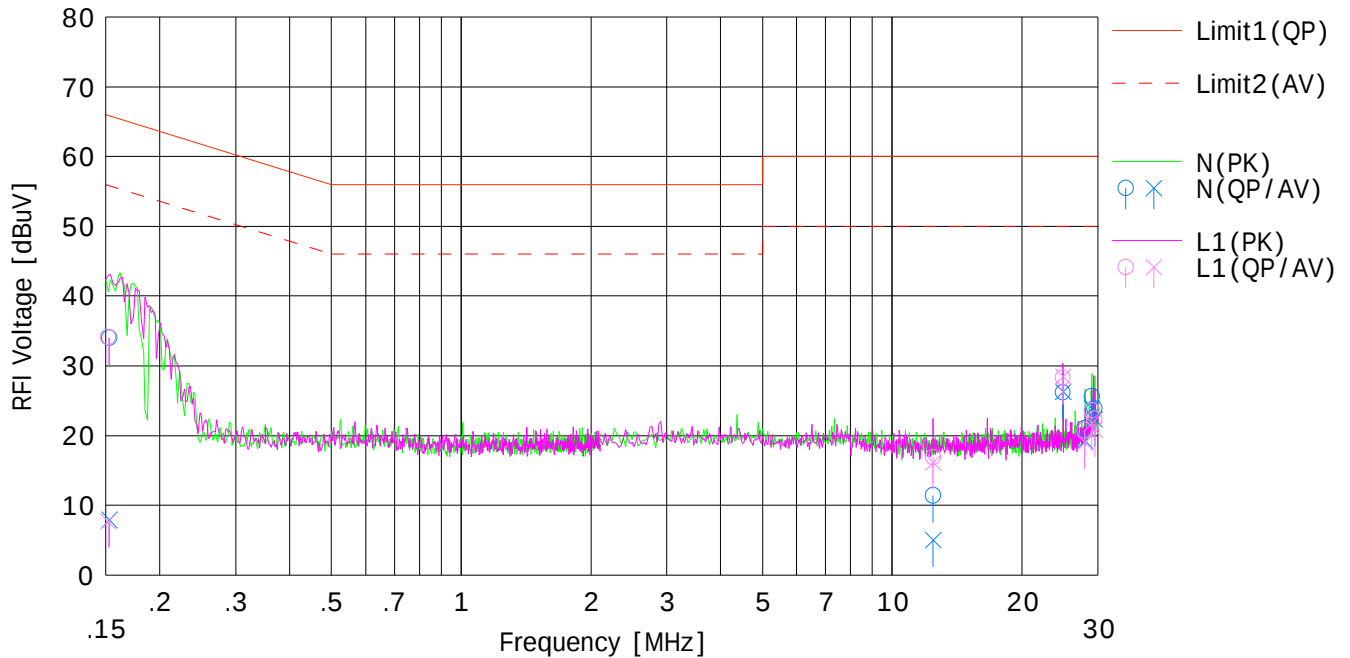
Date : 2015/02/11

Company : Murata Manufacturing Co., Ltd.
 Kind of EUT : Communication Module
 Model No. : Type1DR
 Serial No. : 48 (2.4GHz Dual)
 Remarks : with IEEE802.11n(HT20), Tx, 5260MHz

Mode : DH5, Tx, 2441MHz
 Order No. : 10622710S
 Power : DC 3.2V / 1.8V
 Temp./Humi. : 22deg.C / 25%RH

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

Engineer : Yosuke Ishikawa



No.	Freq. [MHz]	Reading		C.Fac	Results		Limit		Margin		Phase	Comment
		<QP> [dBuV]	<AV> [dBuV]		<QP> [dBuV]	<AV> [dBuV]	<QP> [dBuV]	<AV> [dBuV]	<QP> [dB]	<AV> [dB]		
1	0.15271	21.5	-4.6	12.5	34.0	7.9	65.8	55.8	31.8	47.9	N	
2	12.45041	-1.6	-8.0	13.0	11.4	5.0	60.0	50.0	48.6	45.0	N	
3	24.89796	12.7	12.8	13.5	26.2	26.3	60.0	50.0	33.8	23.7	N	
4	28.00995	7.4	5.7	13.6	21.0	19.3	60.0	50.0	39.0	30.7	N	
5	29.04612	11.9	10.2	13.7	25.6	23.9	60.0	50.0	34.4	26.1	N	
6	29.49606	10.2	8.6	13.7	23.9	22.3	60.0	50.0	36.1	27.7	N	
7	0.15183	21.6	-4.8	12.5	34.1	7.7	65.8	55.8	31.7	48.1	L1	
8	12.44990	3.9	3.1	13.0	16.9	16.1	60.0	50.0	43.1	33.9	L1	
9	24.89765	14.8	15.0	13.5	28.3	28.5	60.0	50.0	31.7	21.5	L1	
10	28.01038	7.1	5.4	13.6	20.7	19.0	60.0	50.0	39.3	31.0	L1	
11	29.04626	9.9	8.1	13.7	23.6	21.8	60.0	50.0	36.4	28.2	L1	
12	29.49754	8.7	7.1	13.7	22.4	20.8	60.0	50.0	37.6	29.2	L1	

Calculation: Result [dBuV] = Reading [dBuV] + C.Fac (LISN+Cable+ATT) [dB]
 LISN: SLS-05

20dB Bandwidth and Carrier Frequency Separation

Test place

UL Japan, Inc. Shonan EMC Lab.

No.5 Shielded Room

Date

February 9, 2015

Temperature / Humidity

24 deg.C , 43 %RH

Engineer

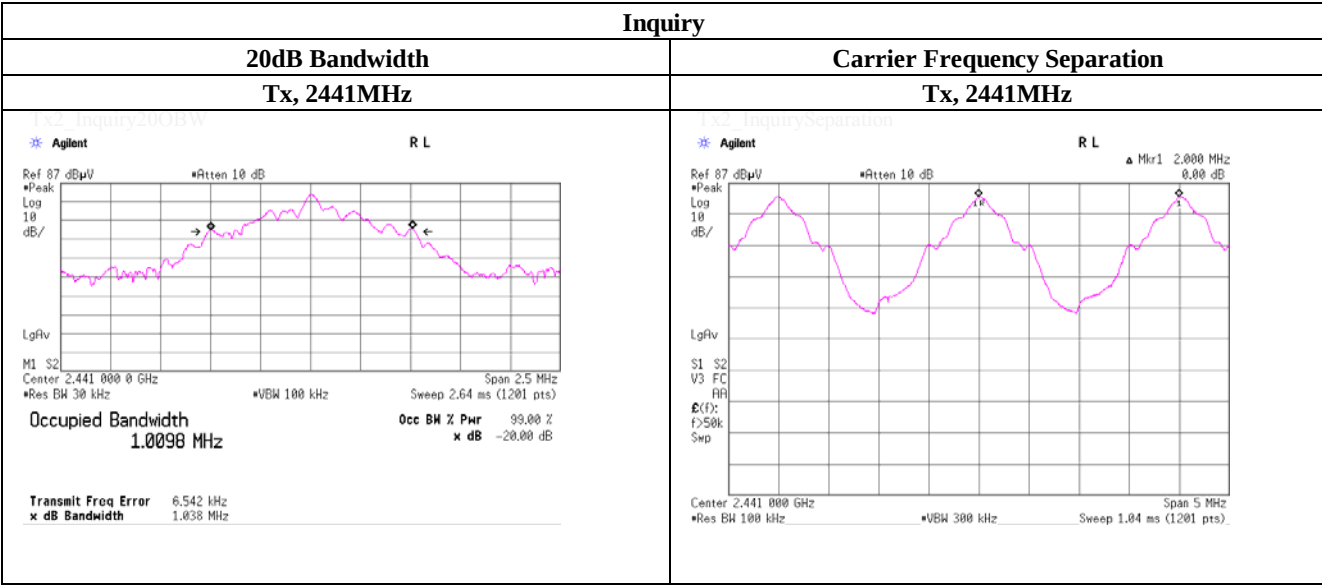
Tatsuya Arai

Mode

Tx, Bluetooth, BDR, PRBS9

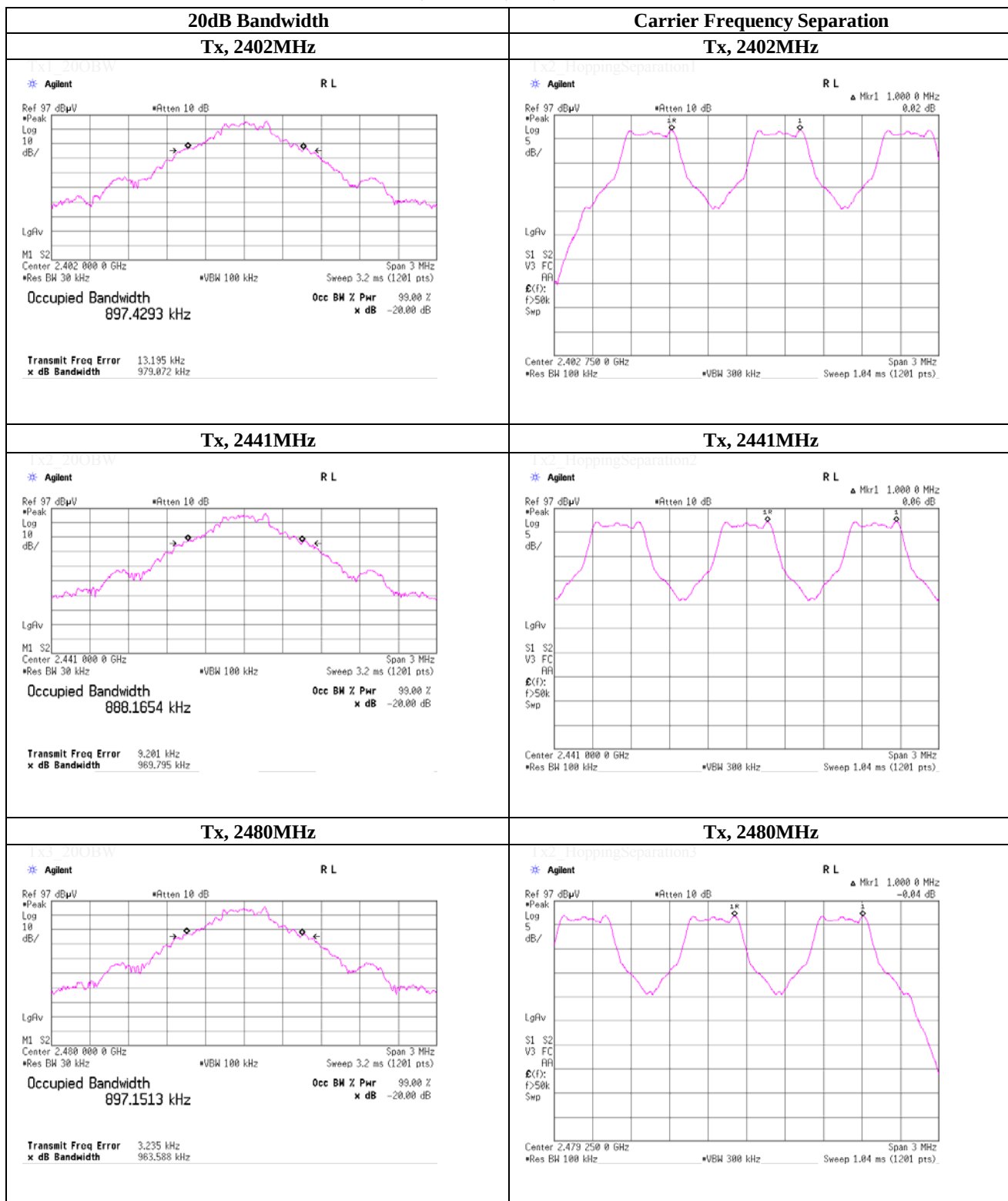
Mode	Freq. [MHz]	20dB Bandwidth [MHz]	Carrier Frequency Separation [MHz]	Limit for Carrier Frequency Separation [MHz]
DH5	2402.0	0.979	1.000	>= 0.653
DH5	2441.0	0.970	1.000	>= 0.647
DH5	2480.0	0.964	1.000	>= 0.642
Inquiry	2441.0	1.038	2.000	>= 0.692

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



20dB Bandwidth and Carrier Frequency Separation

Tx, Bluetooth, BDR, PRBS9

**UL Japan, Inc.**

Shonan EMC Lab.

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Telephone : +81 463 50 6400

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Number of Hopping Frequency

Test place

UL Japan, Inc. Shonan EMC Lab.

No.5 Shielded Room

Date

February 9, 2015

Temperature / Humidity

24 deg.C , 43 %RH

Engineer

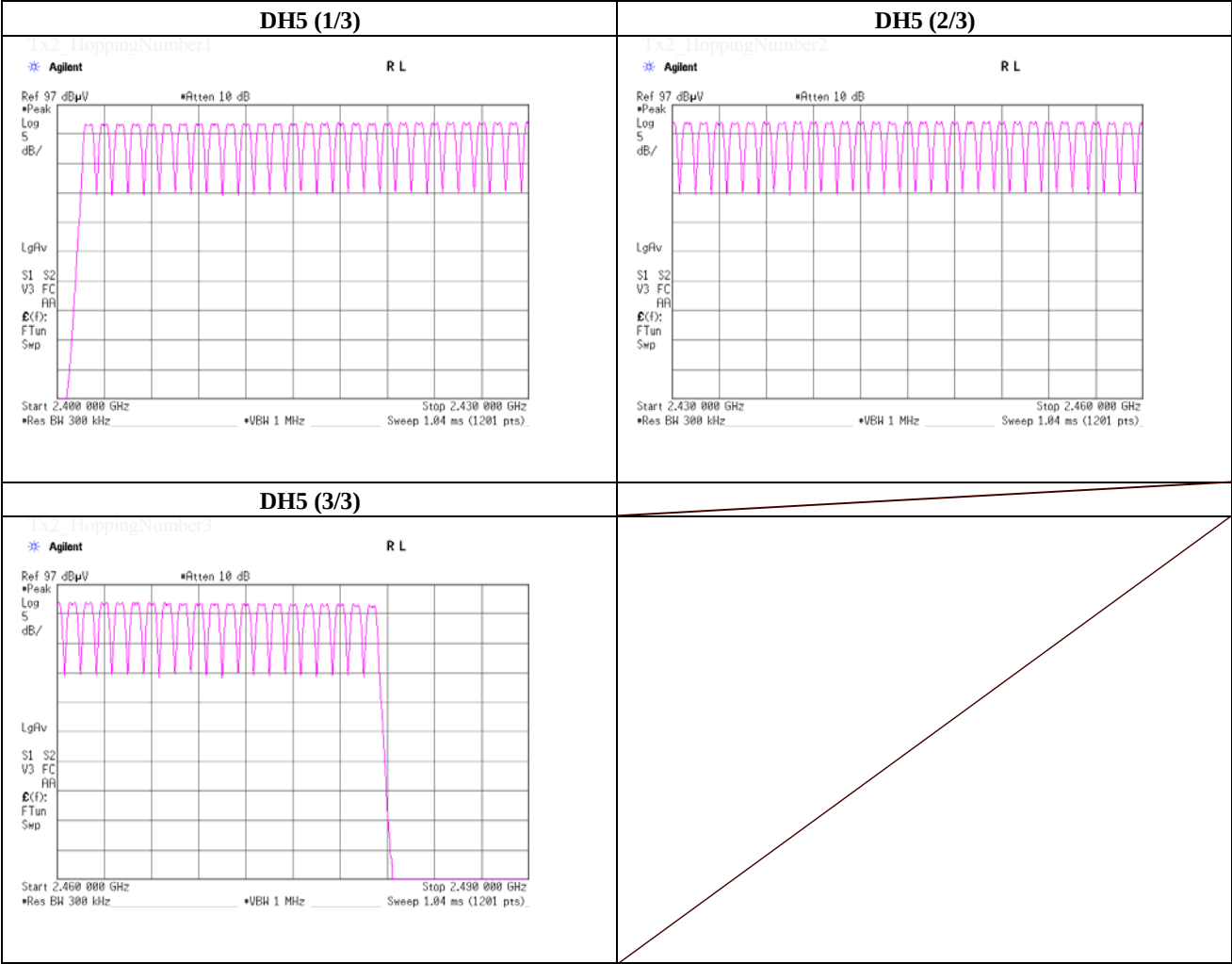
Tatsuya Arai

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.



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Number of Hopping Frequency

Test place

UL Japan, Inc. Shonan EMC Lab.

No.5 Shielded Room

Date

February 9, 2015

Temperature / Humidity

24 deg.C , 43 %RH

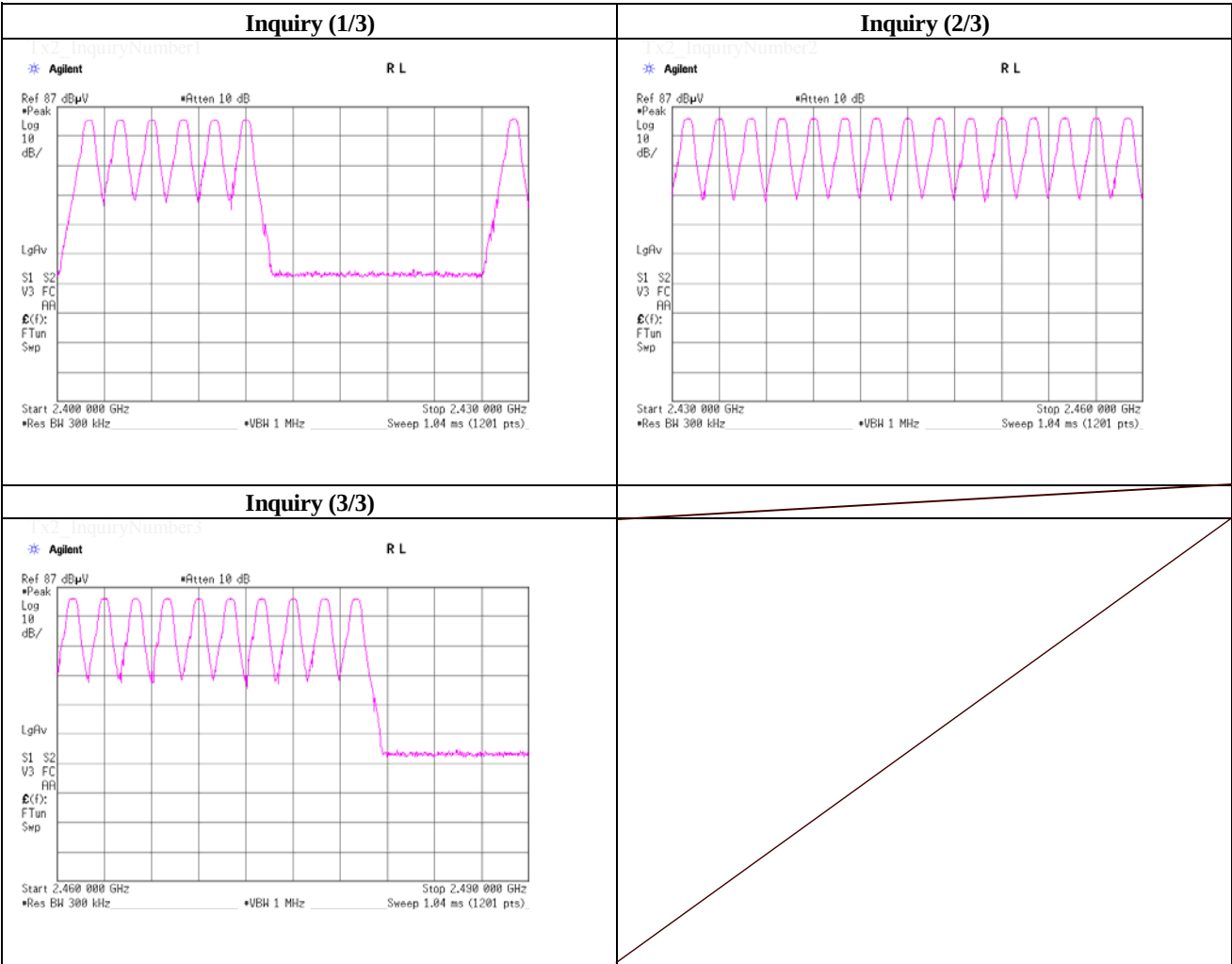
Engineer

Tatsuya Arai

Mode

Tx, Bluetooth, Inquiry

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



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20dB Bandwidth and Carrier Frequency Separation

Test place UL Japan, Inc. Shonan EMC Lab. No.5 Shielded Room
Date February 9, 2015
Temperature / Humidity 24 deg.C , 43 %RH
Engineer Tatsuya Arai
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	1.322	1.000	>= 0.881
3-DH5	2441.0	1.329	1.000	>= 0.886
3-DH5	2480.0	1.317	1.000	>= 0.878

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

UL Japan, Inc.

Shonan EMC Lab.

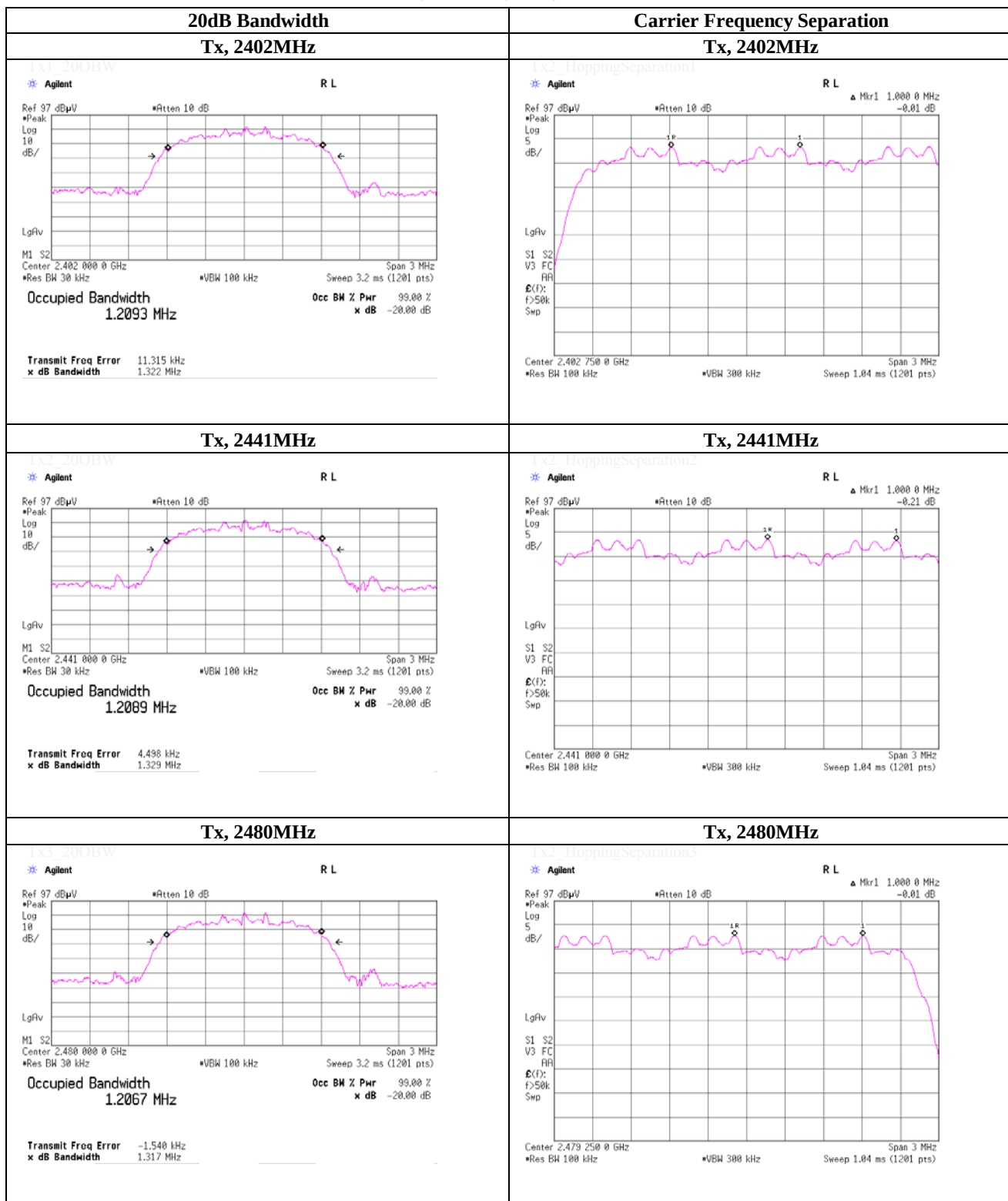
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN

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

February 9, 2015

Temperature / Humidity

24 deg.C , 43 %RH

Engineer

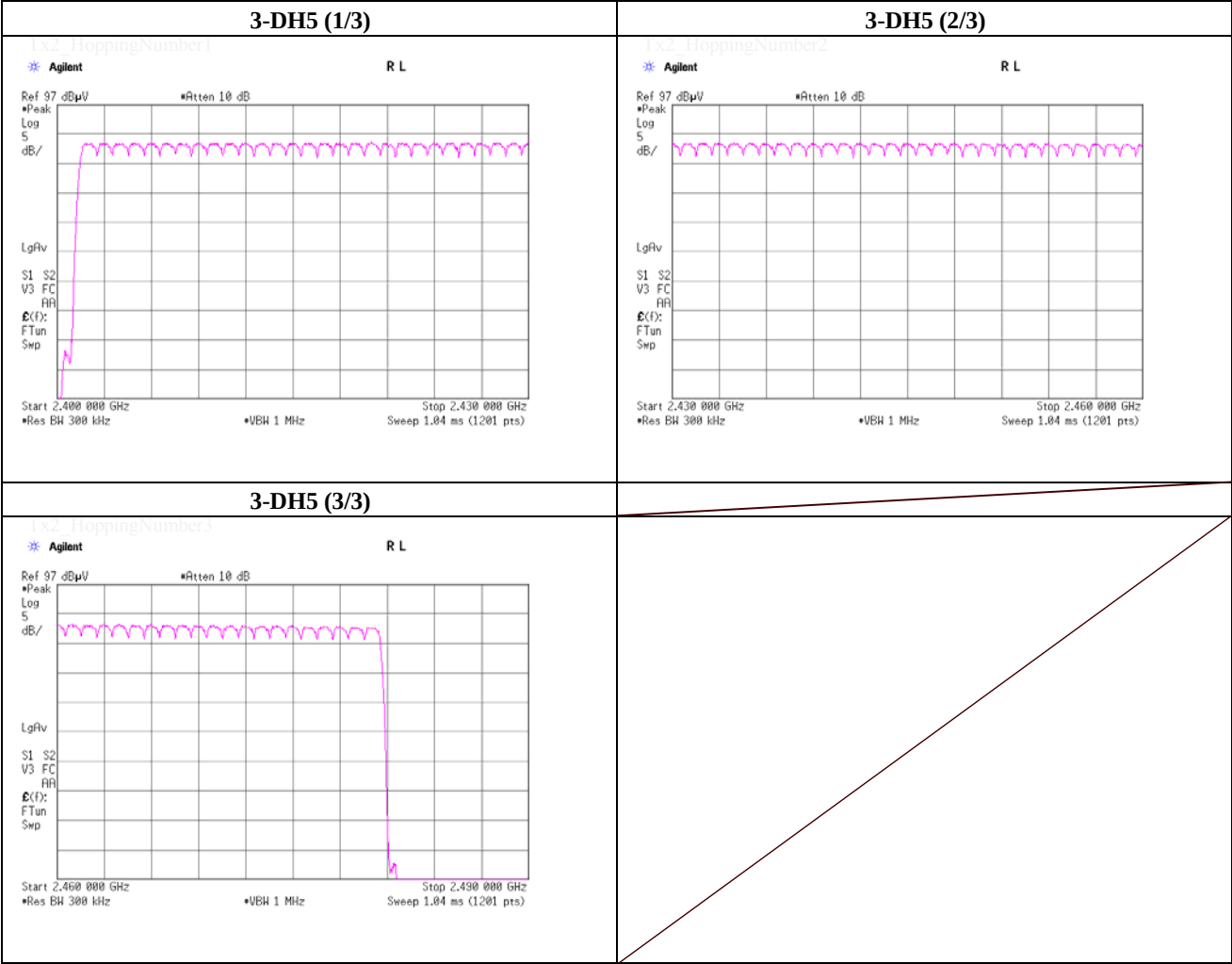
Tatsuya Arai

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.

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Dwell Time

Test place UL Japan, Inc. Shonan EMC Lab. No.5 Shielded Room
 Date February 9, 2015
 Temperature / Humidity 24 deg.C , 43 %RH
 Engineer Tatsuya Arai
 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	50.4	/ 5.0 sec. x 31.6 sec. = 319 times	0.423	135	400
DH3	26.0	/ 5.0 sec. x 31.6 sec. = 165 times	1.679	277	400
DH5	16.0	/ 5.0 sec. x 31.6 sec. = 102 times	2.932	299	400
Inquiry	100.0	/ 1.0 sec. x 12.8 sec. = 1280 times	0.122	156	400

Sample Calculation

Result = Number of transmission x Length of transmission time

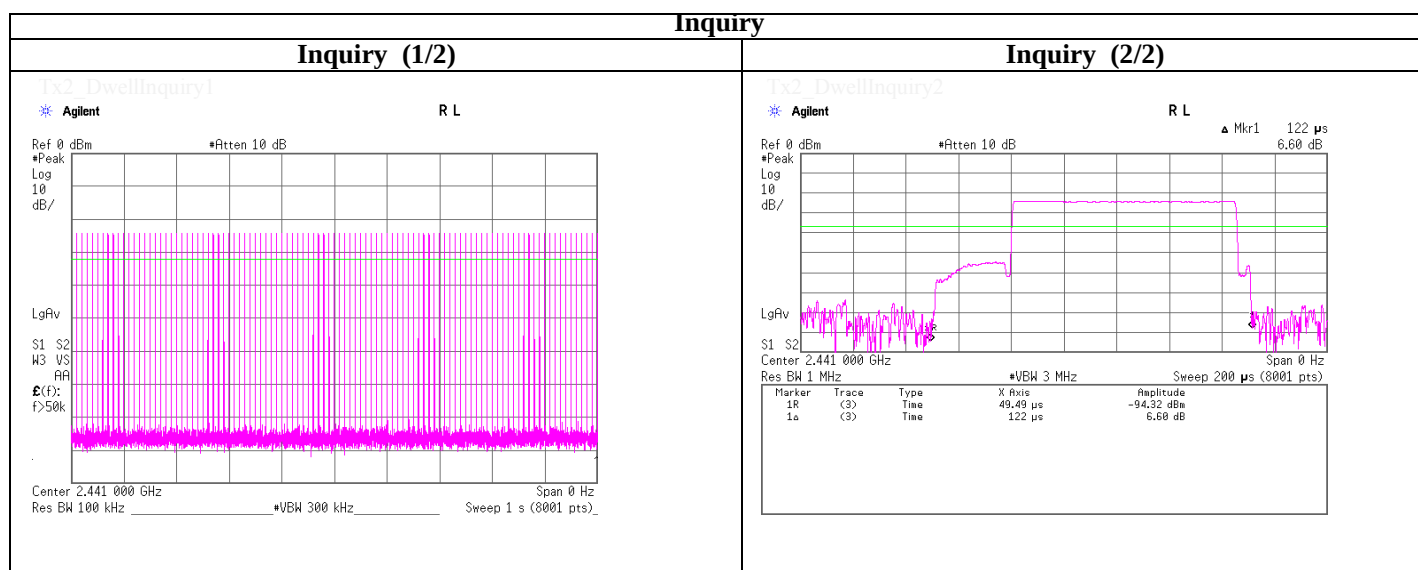
*Average data of 5 tests.(except Inquiry)

Mode	Sampling [times]					Average [times]
	1	2	3	4	5	
DH1	50	50	51	51	50	50.4
DH3	25	30	25	27	23	26.0
DH5	16	21	14	11	18	16.0
Inquiry	100	100	100	100	100	100.0

Sample Calculation

Average= Summation(Sampling 1 to 5) / 5

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



UL Japan, Inc.

Shonan EMC Lab.

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Dwell time

Tx, Bluetooth, BDR, PRBS9

