



RADIO TEST REPORT

Test Report No.: 10402743S-D-R1

Applicant : Anritsu Corporation
Type of Equipment : Network Master Flex
Model No. : MT1100A
FCC ID : OCS-MT1100A
Test regulation : FCC Part15 Subpart C: 2014
Test result : Complied

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2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with the limits of the above regulation.
4. The test results in this test report are traceable to the national or international standards.
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6. The opinions and the interpretations to the result of the description in this report are outside scopes where UL Japan has been accredited.
7. This report is a revised version of 10402743S-D. 10402743S-D is replaced with this report.

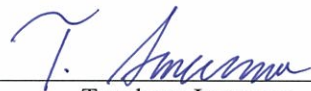
Date of test:

August 8 to September 3, 2014

Representative test engineer:


Hikaru Shirasawa
Engineer
Consumer Technology Division

Approved by :


Toyokazu Imamura
Leader
Consumer Technology Division



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

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13-EM-F0429

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SECTION 1: Customer information

Company Name : Anritsu Corporation
Address : 5-1-1 Onna, Atsugi-shi, Kanagawa, 243-8555 Japan
Telephone Number : +81-46-296-6669
Facsimile Number : +81-46-225-8380
Contact Person : Yasuyuki Oishi

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

2.1 Identification of E.U.T.

Type of Equipment : Network Master Flex
Model Number : MT1100A
Serial Number : Refer to Section 4.2
Rating : AC 100 - 240V, 50/60Hz
DC 16V/14.4V (Battery)
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 30, 2014
Modification of EUT : No modification by the test lab.

2.2 Product description

Model: MT1100A (referred to as the EUT in this report) is Network Master Flex.

Clock frequency(ies) in the system : 20 MHz, 200 MHz, 625 MHz

<Bluetooth part>

Equipment type : Transceiver
Frequency of operation : 2402-2480MHz
Bandwidth & channel spacing : 79MHz & 1MHz
Type of modulation : GFSK, $\pi/4$ DQPSK, 8DPSK
Antenna type : Dipole
Antenna gain : 3.0dBi
Antenna connector type : IPEX MHF Connector (U.FL compatible)
Operation temperature range : 0 to +40 deg.C.

<Wireless LAN part>

Equipment type : Transceiver
Frequency of operation : 2412-2462MHz
Bandwidth & channel spacing : 20MHz & 5MHz
Type of modulation : CCK, OFDM
Antenna type : Dipole
Antenna gain : 3.0dBi
Antenna connector type : IPEX MHF Connector (U.FL compatible)
Operation temperature range : 0 to +40 deg.C

* For Bluetooth part, refer to the test report: 10402743S-E-R1.

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FCC 15.31 (e)

The stable voltage (DC3.3V and DC1.8V) is provided constantly to RF part via regulator. Therefore, the EUT complies with the requirement.

FCC 15.203

It is impossible for end users to replace the antenna, because the antenna is mounted inside of the EUT. Therefore the EUT complies with the requirement.

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SECTION 3: Test specification, procedures & results**3.1 Test specification**

Test specification : FCC Part 15 Subpart C: 2014, final revised on May 1, 2014 and effective June 2, 2014
 Title : FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators
 Section 15.207 Conducted limits
 Section 15.209 Radiated emission limits, general requirements
 Section 15.247 Operation within the bands 902-928MHz, 2400-2483.5MHz,
 and 5725-5850MHz

3.2 Procedures & Results

Item	Test Procedure *1)	Specification	Remarks	Deviation	Worst Margin	Results
Conducted emission	ANSI C63.10:2009	FCC 15.207	-	N/A	1.3dB Freq.: 0.20434MHz Detection: Average Phase: N Mode: Tx 2412MHz, IEEE 802.11g	Complied
6dB bandwidth	ANSI C63.10:2009	FCC 15.247 (a)(2)	Conducted	N/A	* See data	Complied
Maximum peak output power	ANSI C63.10:2009	FCC 15.247 (b)(3)	Conducted	N/A		Complied
Out of band emission & Restricted band edges	ANSI C63.10:2009	FCC 15.109, 15.247 (d) & 15.209	Conducted / Radiated	N/A	1.6dB Freq.: 758.688MHz Polarization: Horizontal Detection: Quasi-Peak Mode: Tx 2412MHz, IEEE 802.11g	Complied
Power density	ANSI C63.10:2009	FCC 15.247 (e)	Conducted	N/A	* See data	Complied

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

*1) These tests were also referred to KDB 558074 v03 r02 (FCC), "Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247".

3.3 Addition to standard

Item	Test Procedure	Specification	Remarks	Worst Margin	Results
Occupied Bandwidth (99%)	ANSI C63.10:2009, 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.

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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	3.6 dB	3.5 dB
Radiated emission (Measurement distance: 3m)	9kHz-30MHz	3.7 dB	3.7 dB	3.6 dB
	30MHz-300MHz	4.8 dB	5.0 dB	4.8 dB
	300MHz-1GHz	5.0 dB	5.0 dB	4.8 dB
	1GHz-15GHz	4.9 dB	4.9 dB	4.9 dB
Radiated emission (Measurement distance: 1m)	15GHz-18GHz	5.7 dB	5.6 dB	5.6 dB
	18GHz-40GHz	5.2 dB	4.3 dB	4.3 dB

*1: SAC=Semi-Anechoic Chamber

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

Conducted emission test

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

Radiated emission test

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

Antenna port conducted test

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

	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.1 measurement room	-	2.55 x 4.1 x 2.5	-	-

3.6 Test setup, Test data & 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

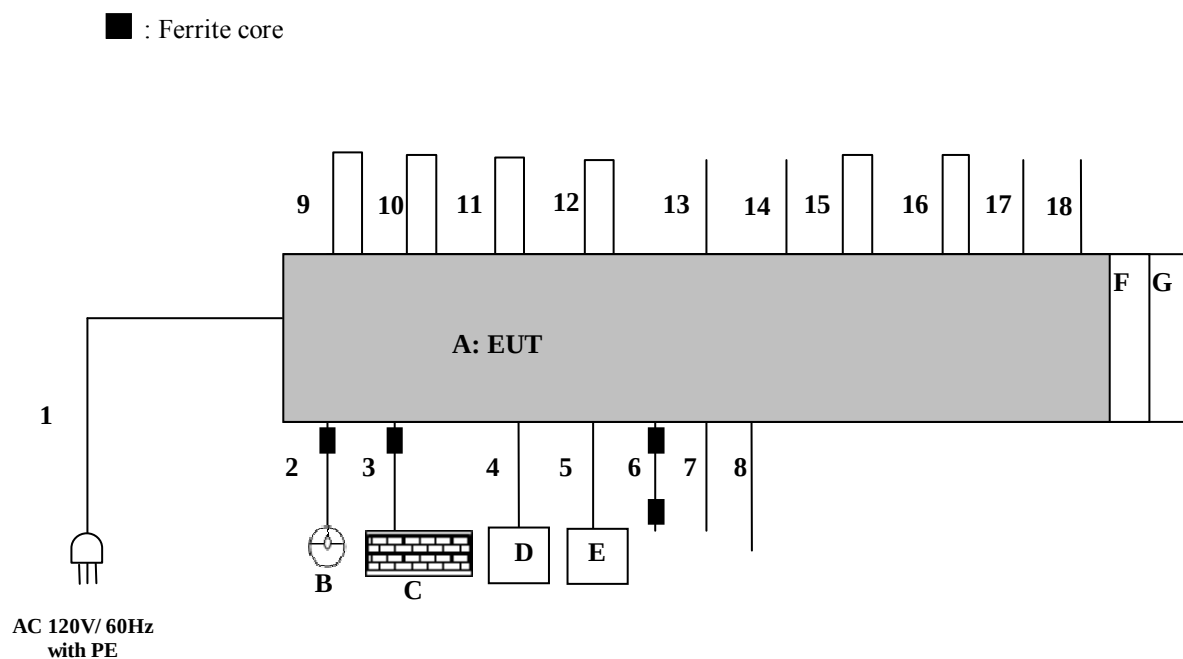
Test item	Mode	Tested frequency	Worst data mode *1)
Conducted emission Radiated emission (below 1GHz) *2)	Transmitting IEEE 802.11g	2412MHz	PN9, 48Mbps
Other items	Transmitting IEEE 802.11b	2412MHz, 2437MHz, 2462MHz	PN9, 2Mbps
	Transmitting IEEE 802.11g	2412MHz, 2437MHz, 2462MHz	PN9, 48Mbps
	Transmitting IEEE 802.11n (HT20)	2412MHz, 2437MHz, 2462MHz	PN9, MCS5
*1) The worst condition was determined based on the test result of Maximum Peak Output Power. *2) Test operating mode was determined as follows according to “Section 1 of 6 802.11 a/b/g/n testing- Managing Complex Regulatory Approvals - ”of TCB Council Workshop October 2009.			

Software : Tera Term version 4.80

Power setting : 12500

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

4.2 Configuration and peripherals



* Test data was taken under worse case conditions.

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Description of EUT and support equipment

No.	Item	Model number	Serial number	Manufacturer	Remark
A	Network Master Flex	MT1100A	Proto-17	Anritsu	EUT
B	Mouse	MSK-1113(B)	91705-523-8274115-11121	Microsoft	-
C	Keyboard	L100	CN0RH6576589076F04G5	DELL	-
D	Head Set	HL-108	-	DELTACO	-
E	GPS Receiver	GPS19xLVC	19S093144	GARMIN	-
F	10G Multirate Module	MU110010A	Proto-1	Anritsu	-
G	Battery and AC Power Supply Module	MU110001A	Proto-3	Anritsu	-

List of cable used

No.	Item	Length (m)	Shield	Remark
1	AC	2.6	Unshielded	-
2	USB(Mouse)	1.8	Shielded	-
3	USB(Keyboard)	2.1	Shielded	-
4	Audio (Head Set)	1.8	Shielded	-
5	AUX (GPS Receiver)	5.0	Shielded	-
6	USB mini	1.0	Shielded	-
7	Coaxial SMA (Reference clock output)	1.0	Shielded	-
8	Ethernet (Service interface)	2.0	Unshielded	Cat.5e
9	Port 1 Bantam (DS1: Tx-Rx)	1.9	Shielded	-
10	Port 1 Coaxial BNC (E1, E3, E4, DS3, STM-1-e, STS-3e: Tx-Rx)	2.1	Shielded	-
11	Port 2 Bantam (DS1: Tx-Rx)	1.9	Shielded	-
12	Port 2 Coaxial BNC (E1, E3, E4, DS3, STM-1-e, STS-3e: Tx-Rx)	2.1	Shielded	-
13	RJ48 (Port 1 E1 Balanced Tx/Rx)	2.0	Unshielded	-
14	RJ48 (Port 2 E1 Balanced Tx/Rx)	2.0	Unshielded	-
15	Ethernet (Port 1/2 Tx/Rx RJ45 Ethernet electrical)	3.0	Unshielded	Cat.5e
16	Optical Fiber (Port 1/2 Tx/Rx SFP/SFP+) (SDH/SONET/OTN/Ethernet optical)	2.0	Unshielded	-
17	Coaxial BNC (Unit Sync input)	2.0	Shielded	-
18	Coaxial BNC (Unit Sync output)	2.0	Shielded	-

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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 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: 6dB bandwidth & Occupied bandwidth (99%)

Test procedure

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

The test was measured based on Method 8.1 Option 1 and 8.2 Option 2 of KDB 558074 "Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247".

Summary of the test results: Pass
Refer to APPENDIX 1

SECTION 7: Maximum peak output power

Test procedure

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

The test was measured based on Method 9.1.2 PKPM1 of KDB 558074 "Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247".

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 8: Out of band 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

SECTION 9: Peak power density

Test procedure

The peak power density was measured with a spectrum analyzer connected to the antenna port.

Instrument used : Spectrum Analyzer
RBW / VBW : 3kHz / 9.1kHz

The test was measured based on Method 10.2 PKPSD of KDB 558074 "Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247".

Summary of the test results: Pass
Refer to APPENDIX 1

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SECTION 10: Radiated emission

10.1 Operating environment

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

10.2 Test configuration

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

Photographs of the set up are shown in APPENDIX 3.

10.3 Test conditions

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

10.4 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: 3MHz Detector: Linear Voltage Averaging	RBW: 100kHz VBW: 300kHz

*1) Average Power Measurement was measured based on 12.2.5 of KDB 558074 "Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247".

The carrier levels and noise levels were confirmed at each position of a, b, c and d to see the position of maximum noise, and the test was made at the position that has the maximum noise.

Antenna polarization	Carrier	Spurious (Below 1GHz)	Spurious (1-15GHz)	Spurious (15-18GHz)	Spurious (18-25GHz)
Horizontal	d	a	d	c	c
Vertical	d	a	d	c	c

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

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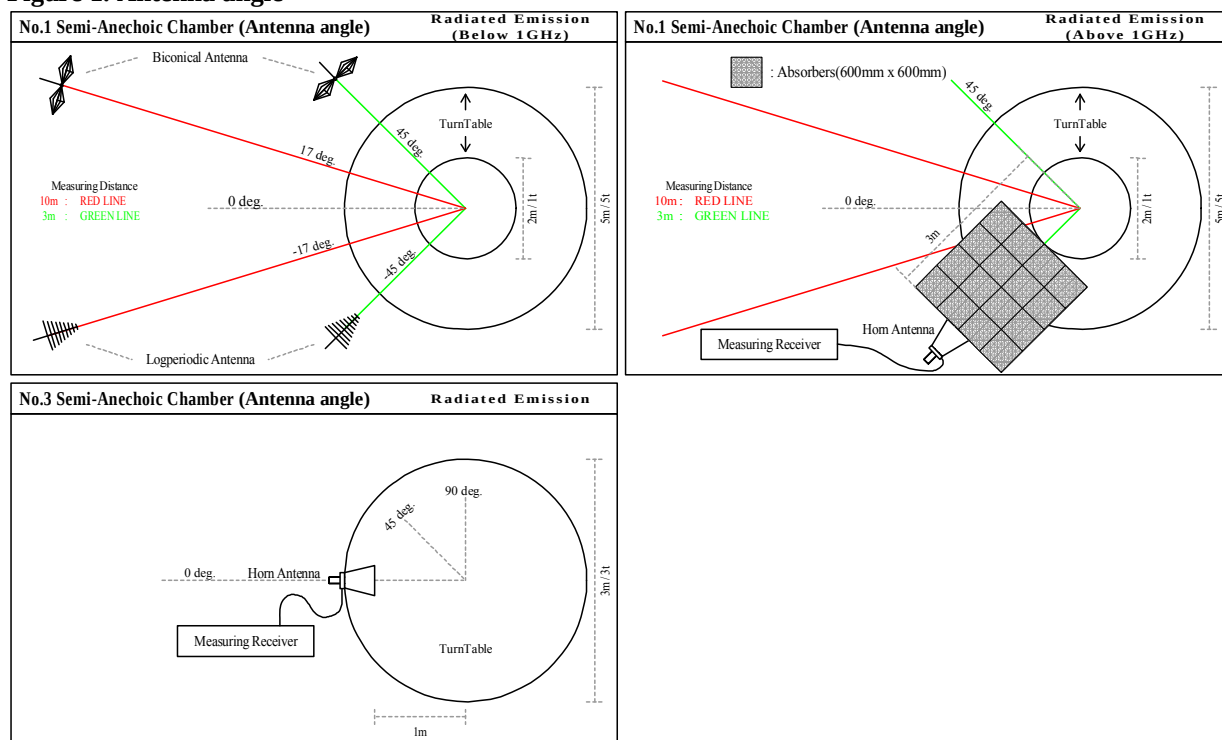
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Figure 1. Antenna angle



10.5 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.

10.6 Results

Summary of the test results : Pass
* No noise was detected above the 3rd order harmonics.

Refer to APPENDIX 1

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Contents of APPENDIXES

APPENDIX 1: Data of Radio tests

Conducted emission
6dB bandwidth
Maximum peak output power
Radiated emission
Spurious emission (Antenna port conducted)
Peak power density
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

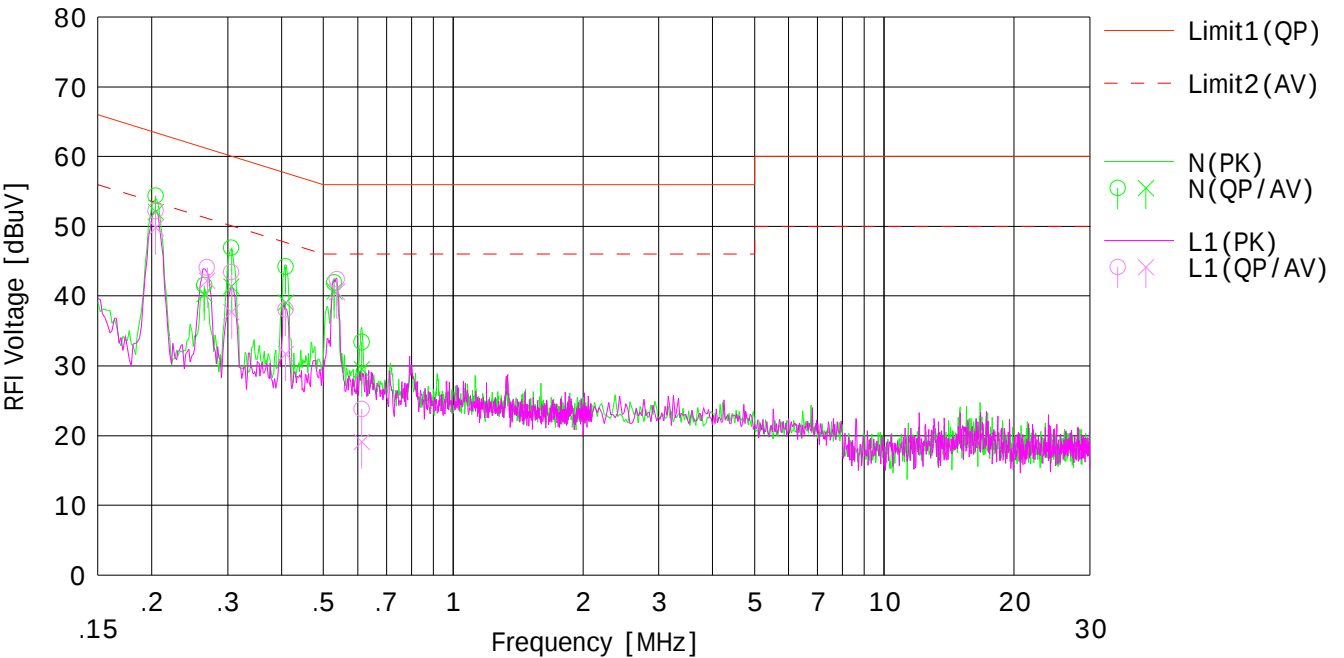
UL Japan,Inc. Shonan EMC Lab. No.1 Shielded Room
Date : 2014/08/29

Company : Anritsu Corporation
Kind of EUT : Network Master Flex
Model No. : MT1100A
Serial No. : Proto - 17
Remarks : -

Mode : Tx 11g 2412MHz
Order No. : 10402743S
Power : AC120V / 60Hz
Temp./Humi. : 24deg.C / 59%RH

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

Engineer : Takahiro Suzuki

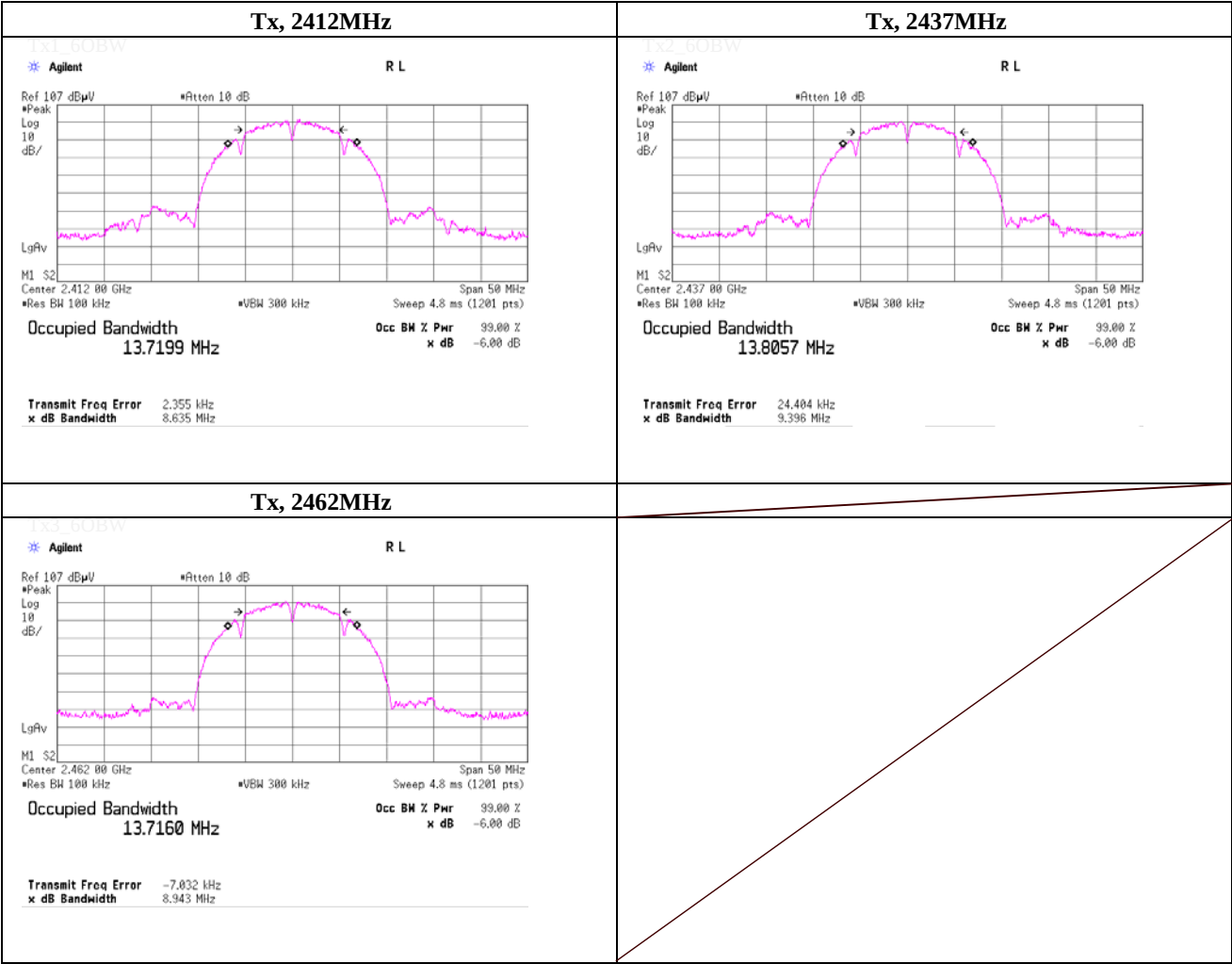


No.	Freq. [MHz]	Reading		C.Fac	Results		Limit		Margin		Phase	Comment
		<QP> [dBuV]	<AV> [dBuV]		<QP> [dBuV]	<AV> [dBuV]	<QP> [dBuV]	<AV> [dBuV]	<QP> [dB]	<AV> [dB]		
1	0.20434	41.8	39.5	12.6	54.4	52.1	63.4	53.4	9.0	1.3	N	
2	0.26477	28.9	27.7	12.6	41.5	40.3	61.2	51.2	19.7	10.9	N	
3	0.30593	34.4	28.9	12.5	46.9	41.4	60.0	50.0	13.1	8.6	N	
4	0.40884	31.7	26.6	12.5	44.2	39.1	57.6	47.6	13.4	8.5	N	
5	0.53003	29.4	28.2	12.5	41.9	40.7	56.0	46.0	14.1	5.3	N	
6	0.61351	20.9	17.0	12.5	33.4	29.5	56.0	46.0	22.6	16.5	N	
7	0.20434	39.6	37.2	12.6	52.2	49.8	63.4	53.4	11.2	3.6	L1	
8	0.26885	31.5	29.6	12.6	44.1	42.2	61.1	51.1	17.0	8.9	L1	
9	0.30593	30.9	25.2	12.5	43.4	37.7	60.0	50.0	16.6	12.3	L1	
10	0.40884	25.6	19.2	12.5	38.1	31.7	57.6	47.6	19.5	15.9	L1	
11	0.53789	29.9	28.1	12.5	42.4	40.6	56.0	46.0	13.6	5.4	L1	
12	0.61351	11.3	6.6	12.5	23.8	19.1	56.0	46.0	32.2	26.9	L1	

-6dB Bandwidth

Test place	UL Japan, Inc. Shonan EMC Lab.	No.2 Measurement Room
Date	August 13, 2014	
Temperature / Humidity	26deg.C , 60%RH	
Engineer	Hikaru Shirasawa	
Mode	Tx, IEEE802.11b, PN9, worst Preamble mode Short, worst data mode 2Mbps	

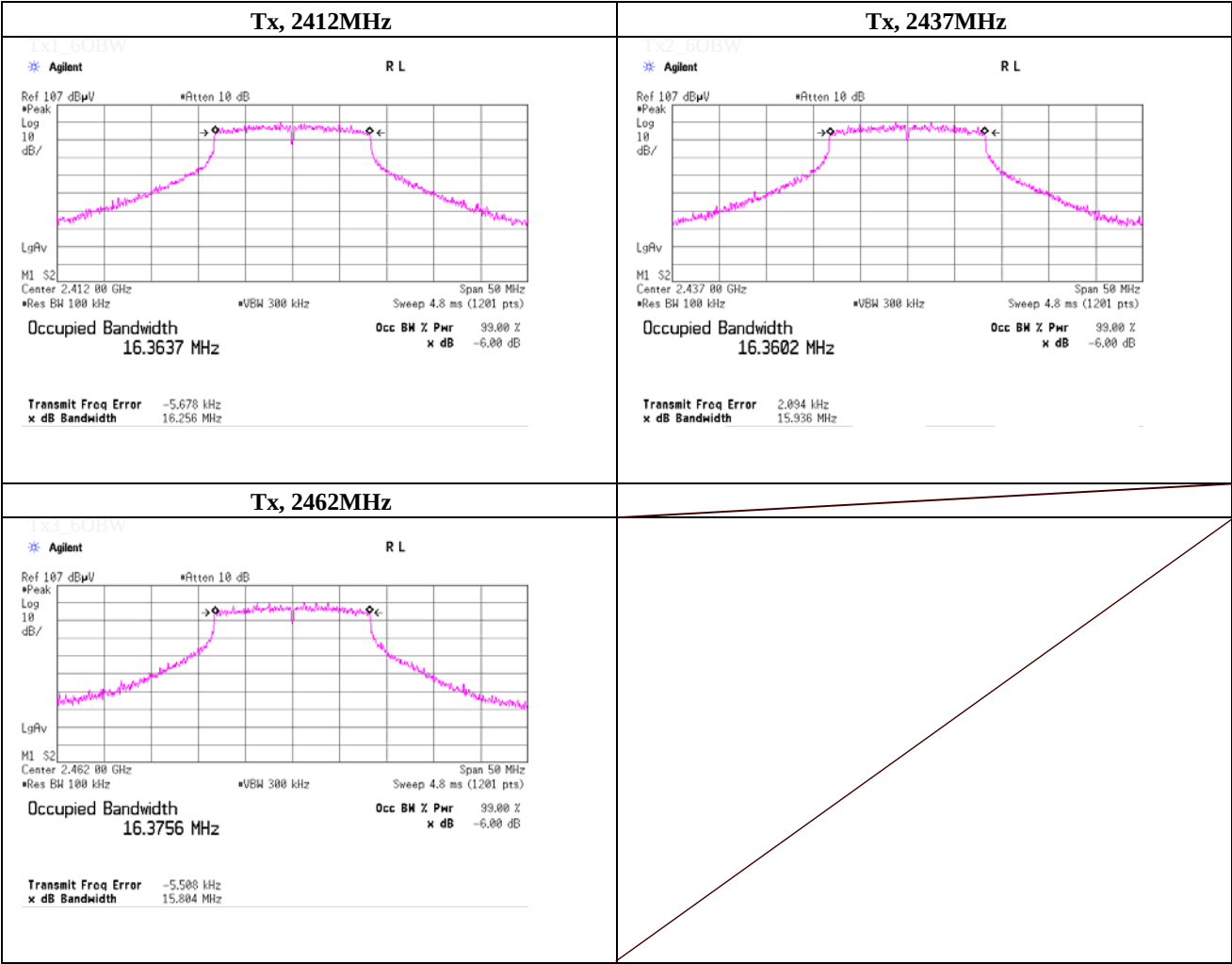
Freq. [MHz]	-6dB Bandwidth [MHz]	Limit [MHz]
2412.0000	8.635	> 0.500
2437.0000	9.396	> 0.500
2462.0000	8.943	> 0.500



-6dB Bandwidth

Test place	UL Japan, Inc. Shonan EMC Lab.	No.2 Measurement Room
Date	August 13, 2014	
Temperature / Humidity	26deg.C , 60%RH	
Engineer	Hikaru Shirasawa	
Mode	Tx, IEEE802.11g, PN9, worst data mode 48Mbps	

Freq. [MHz]	-6dB Bandwidth [MHz]	Limit [MHz]
2412.0000	16.256	> 0.500
2437.0000	15.936	> 0.500
2462.0000	15.804	> 0.500



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Maximum Peak Conducted Output Power

(PKPM1)

Test place UL Japan, Inc. Shonan EMC Lab. No.2 Measurement Room
 Date August 8, 2014
 Temperature / Humidity 23deg.C , 67%RH
 Engineer Hikaru Shirasawa
 Mode Tx, IEEE802.11b, PN9, worst preamble mode : Short worst data mode : 2 Mbps

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

Ch	Freq. [MHz]	P/M (Peak) Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result		Limit		Margin [dB]
					[dBm]	[mW]	[dBm]	[mW]	
Low	2412.0	2.37	1.56	9.90	13.83	24.15	30.00	1000	16.17
Mid	2437.0	2.04	1.56	9.90	13.50	22.39	30.00	1000	16.50
High	2462.0	1.88	1.56	9.90	13.34	21.58	30.00	1000	16.66

Sample Calculation:

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

[Pre check]

Preamble mode	Data rate [Mbps]	Freq. [MHz]	P/M (Peak) Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result		Limit		Margin [dB]
						[dBm]	[mW]	[dBm]	[mW]	
Long	1	2437.0	1.71	1.56	9.90	13.17	20.75	30.00	1000	16.83
	2	2437.0	1.82	1.56	9.90	13.28	21.28	30.00	1000	16.72
	5.5	2437.0	1.44	1.56	9.90	12.90	19.50	30.00	1000	17.10
	11	2437.0	1.53	1.56	9.90	12.99	19.91	30.00	1000	17.01

Preamble mode	Data rate [Mbps]	Freq. [MHz]	P/M (Peak) Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result		Limit		Margin [dB]
						[dBm]	[mW]	[dBm]	[mW]	
Short	1	2437.0	1.92	1.56	9.90	13.38	21.78	30.00	1000	16.62
	2	2437.0	2.04	1.56	9.90	13.50	22.39	30.00	1000	16.50
	5.5	2437.0	1.59	1.56	9.90	13.05	20.18	30.00	1000	16.95
	11	2437.0	1.53	1.56	9.90	12.99	19.91	30.00	1000	17.01

Worst

Sample Calculation:

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

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Maximum Conducted Output Power
(AVGPM)

Test place UL Japan, Inc. Shonan EMC Lab. No.1 Measurement Room
Date August 8, 2014
Temperature / Humidity 23deg.C , 67%RH
Engineer Hikaru Shirasawa
Mode Tx, IEEE802.11b, PN9, worst antenna : Short worst data mode : 2 Mbps

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

Ch	Freq. [MHz]	P/M (AV) Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Duty Factor [dB]	Result		Limit		Margin [dB]
						[dBm]	[mW]	[dBm]	[mW]	
Low	2412.0	-0.89	1.56	9.90	0.93	11.50	14.13	30.00	1000	18.50
Mid	2437.0	-1.17	1.56	9.90	0.93	11.22	13.24	30.00	1000	18.78
High	2462.0	-1.51	1.56	9.90	0.93	10.88	12.25	30.00	1000	19.12

Sample Calculation:
Result = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss + Duty Factor
E.I.R.P = Result + Antenna Gain

[Pre check]
Antenna Long

	Data rate [Mbps]	Freq. [MHz]	P/M (AV) Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Duty Factor [dB]	Result		Limit		Margin [dB]
							[dBm]	[mW]	[dBm]	[mW]	
Long	1	2437.0	-1.02	1.56	9.90	0.49	10.93	12.39	30.00	1000	19.07
Long	2	2437.0	-1.38	1.56	9.90	0.92	11.00	12.59	30.00	1000	19.00
Long	5.5	2437.0	-2.62	1.56	9.90	2.11	10.95	12.45	30.00	1000	19.05
Long	11	2437.0	-3.76	1.56	9.90	3.38	11.08	12.82	30.00	1000	18.92

Antenna Short

	Data rate [Mbps]	Freq. [MHz]	P/M (AV) Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Duty Factor [dB]	Result		Limit		Margin [dB]
							[dBm]	[mW]	[dBm]	[mW]	
Short	1	2437.0	-0.84	1.56	9.90	0.49	11.11	12.91	30.00	1000	18.89
Short	2	2437.0	-1.17	1.56	9.90	0.93	11.22	13.24	30.00	1000	18.78
Short	5.5	2437.0	-2.51	1.56	9.90	2.16	11.11	12.91	30.00	1000	18.89
Short	11	2437.0	-3.91	1.56	9.90	3.52	11.07	12.79	30.00	1000	18.93

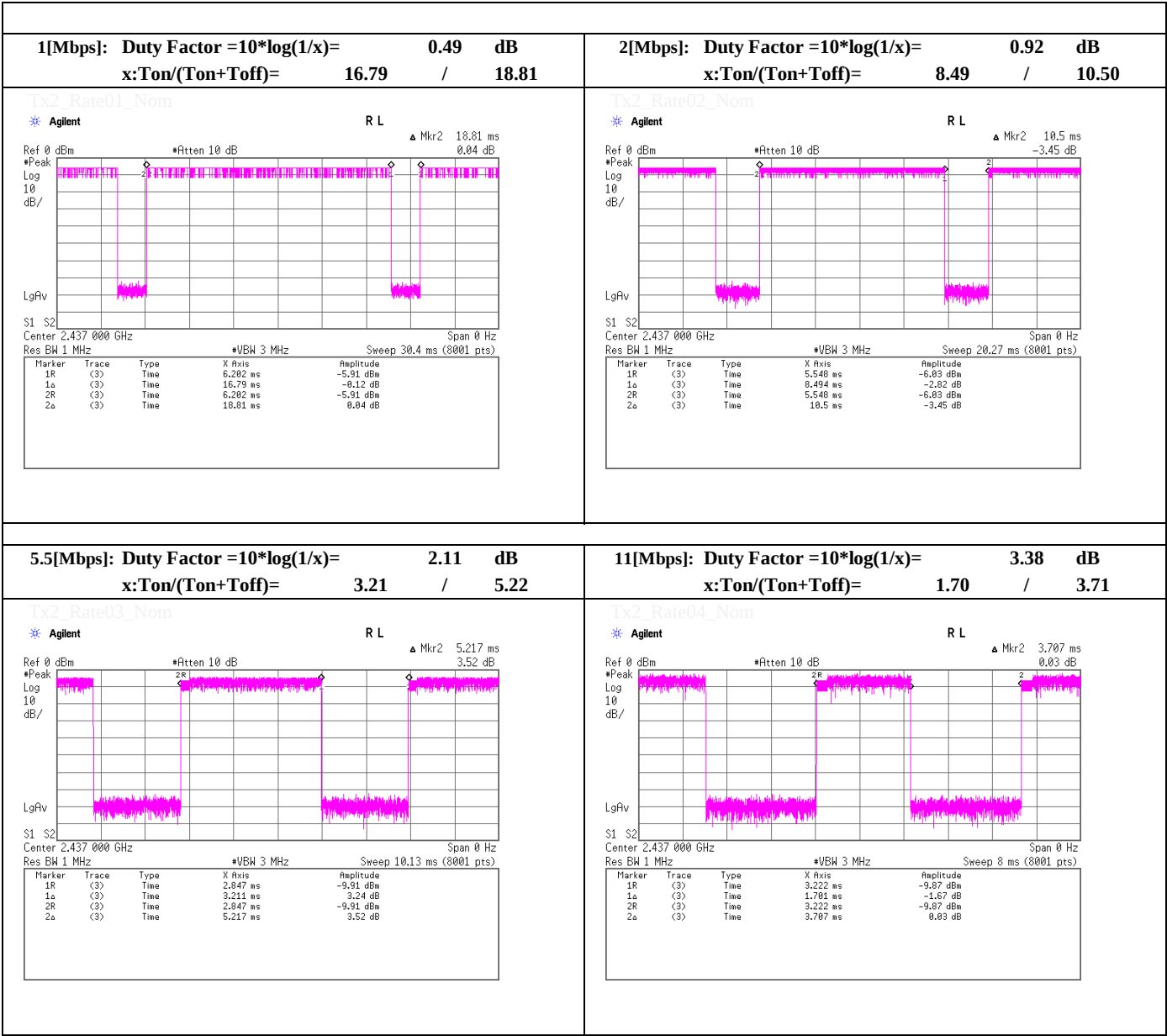
Worst

Sample Calculation:
Result = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss + Duty Factor

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Duty Factor Calculation chart for Maximum Conducted Output Power



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Duty Factor Calculation chart for Maximum Conducted Output Power



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(PKPM1)

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

Sample Calculation:

[Pre check]

Worst[illegible]

Sample Calculation:

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Maximum Conducted Output Power
(AVGPM)

Test place UL Japan, Inc. Shonan EMC Lab. No.1 Measurement Room
Date August 8, 2014
Temperature / Humidity 23deg.C , 67%RH
Engineer Hikaru Shirasawa
Mode Tx, IEEE802.11g, PN9, worst data mode : 48 Mbps

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

Ch	Freq. [MHz]	P/M (AV) Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Duty Factor [dB]	Result		Limit		Margin [dB]
						[dBm]	[mW]	[dBm]	[mW]	
Low	2412.0	-4.53	1.56	9.90	5.84	12.77	18.92	30.00	1000	17.23
Mid	2437.0	-4.82	1.56	9.90	5.84	12.48	17.70	30.00	1000	17.52
High	2462.0	-4.79	1.56	9.90	5.84	12.51	17.82	30.00	1000	17.49

Sample Calculation:
Result = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss + Duty Factor
E.I.R.P = Result + Antenna Gain

[Pre check]

	Data rate [Mbps]	Freq. [MHz]	P/M (AV) Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Duty Factor [dB]	Result		Limit		Margin [dB]
							[dBm]	[mW]	[dBm]	[mW]	
	6	2437.0	-1.88	1.56	9.90	1.35	10.93	12.39	30.00	1000	19.07
	9	2437.0	-2.38	1.56	9.90	1.89	10.97	12.50	30.00	1000	19.03
	12	2437.0	-2.84	1.56	9.90	2.37	10.99	12.56	30.00	1000	19.01
	18	2437.0	-3.67	1.56	9.90	3.19	10.98	12.53	30.00	1000	19.02
	24	2437.0	-4.44	1.56	9.90	3.88	10.90	12.30	30.00	1000	19.10
	36	2437.0	-5.47	1.56	9.90	4.97	10.96	12.47	30.00	1000	19.04
	48	2437.0	-4.82	1.56	9.90	5.84	12.48	17.70	30.00	1000	17.52
	54	2437.0	-5.23	1.56	9.90	6.21	12.44	17.54	30.00	1000	17.56

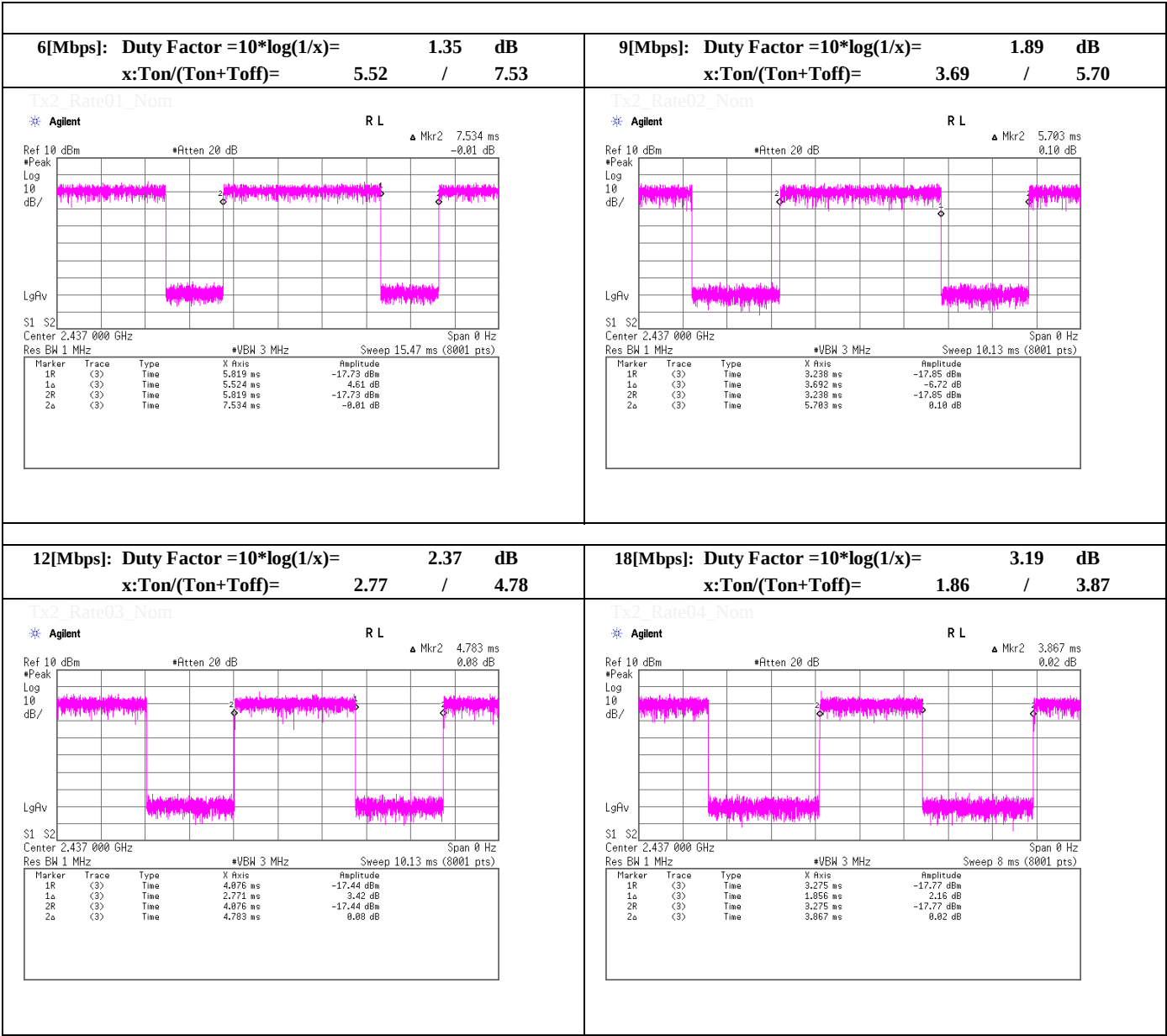
Worst

Sample Calculation:
Result = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss + Duty Factor

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Duty Factor Calculation chart for Maximum Conducted Output Power



UL Japan, Inc.

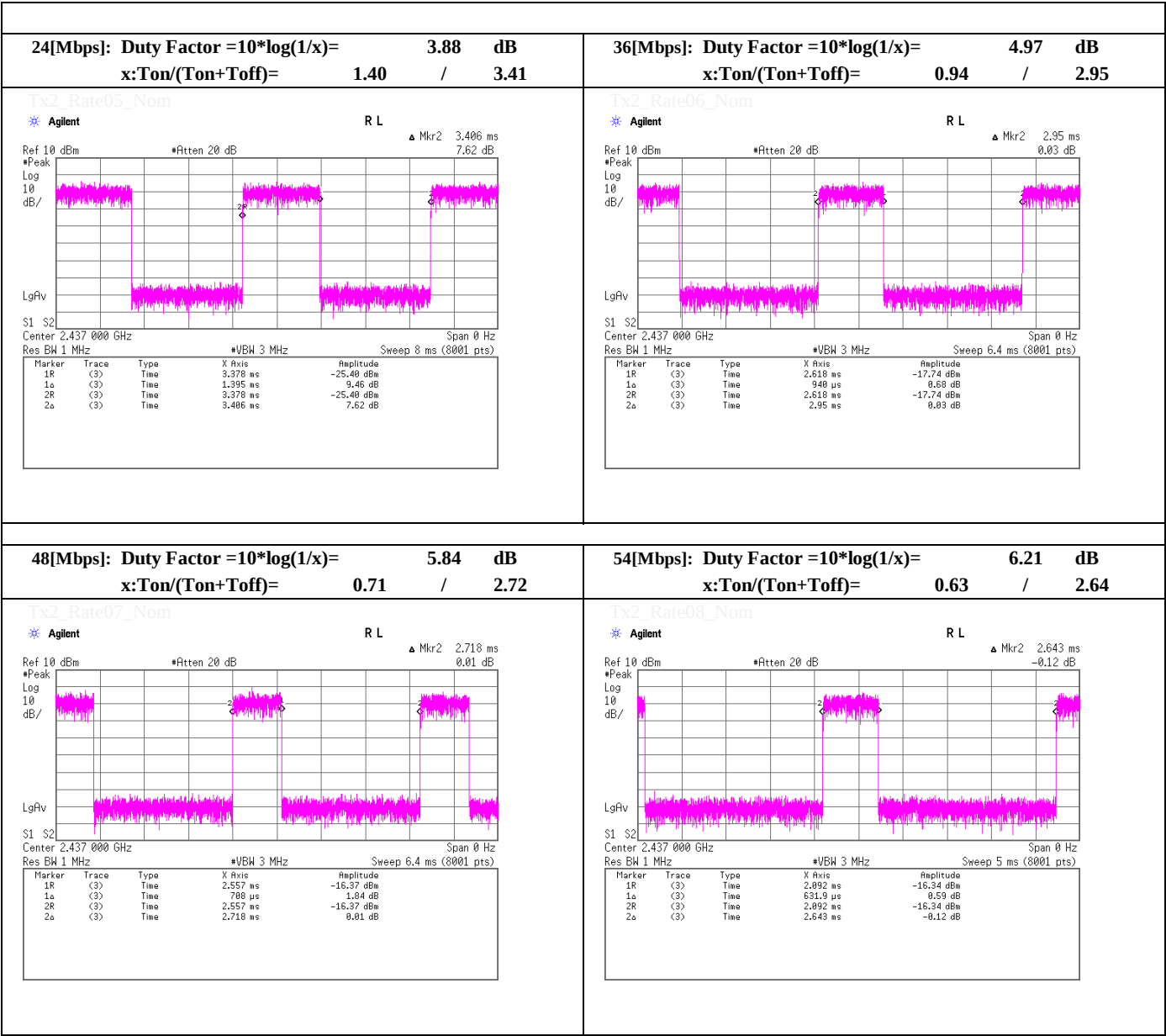
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Duty Factor Calculation chart for Maximum Conducted Output Power



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Maximum Peak Conducted Output Power
(PKPM1)

Test place UL Japan, Inc. Shonan EMC Lab. No.2 Measurement Room
Date August 8, 2014
Temperature / Humidity 23deg.C , 67%RH
Engineer Hikaru Shirasawa
Mode Tx, IEEE802.11n(HT20), PN9, worst preamble : Mixed worst data mode : 5 (MCS)

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

Ch	Freq. [MHz]	P/M (Peak) Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result		Limit		Margin [dB]
					[dBm]	[mW]	[dBm]	[mW]	
Low	2412.0	12.07	1.56	9.90	23.53	225.42	30.00	1000	6.47
Mid	2437.0	11.37	1.56	9.90	22.83	191.87	30.00	1000	7.17
High	2462.0	11.10	1.56	9.90	22.56	180.30	30.00	1000	7.44

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

[Pre check]

Preamble mode	Mode (MCS)	Freq. [MHz]	P/M (Peak) Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result		Limit		Margin [dB]
						[dBm]	[mW]	[dBm]	[mW]	
Mixed	0	2437.0	10.67	1.56	9.90	22.13	163.31	30.00	1000	7.87
	1	2437.0	10.50	1.56	9.90	21.96	157.04	30.00	1000	8.04
	2	2437.0	10.38	1.56	9.90	21.84	152.76	30.00	1000	8.16
	3	2437.0	10.26	1.56	9.90	21.72	148.59	30.00	1000	8.28
	4	2437.0	10.28	1.56	9.90	21.74	149.28	30.00	1000	8.26
	5	2437.0	11.37	1.56	9.90	22.83	191.87	30.00	1000	7.17
	6	2437.0	11.25	1.56	9.90	22.71	186.64	30.00	1000	7.29
	7	2437.0	9.19	1.56	9.90	20.65	116.14	30.00	1000	9.35

Worst

Preamble mode	Mode (MCS)	Freq. [MHz]	P/M (Peak) Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result		Limit		Margin [dB]
						[dBm]	[mW]	[dBm]	[mW]	
Grenfield	0	2437.0	10.61	1.56	9.90	22.07	161.06	30.00	1000	7.93
	1	2437.0	10.43	1.56	9.90	21.89	154.53	30.00	1000	8.11
	2	2437.0	10.53	1.56	9.90	21.99	158.12	30.00	1000	8.01
	3	2437.0	10.25	1.56	9.90	21.71	148.25	30.00	1000	8.29
	4	2437.0	10.10	1.56	9.90	21.56	143.22	30.00	1000	8.44
	5	2437.0	11.23	1.56	9.90	22.69	185.78	30.00	1000	7.31
	6	2437.0	11.24	1.56	9.90	22.70	186.21	30.00	1000	7.30
	7	2437.0	9.12	1.56	9.90	20.58	114.29	30.00	1000	9.42

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

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Maximum Conducted Output Power
(AVGPM)

Test place UL Japan, Inc. Shonan EMC Lab. No.1 Measurement Room
Date August 8, 2014
Temperature / Humidity 23deg.C , 67%RH
Engineer Hikaru Shirasawa
Mode Tx, IEEE802.11n(HT20), PN9, worst antenna : Grennfield worst data mode : 6 (MCS)

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

Ch	Freq. [MHz]	P/M (AV) Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Duty Factor [dB]	Result		Limit		Margin [dB]
						[dBm]	[mW]	[dBm]	[mW]	
Low	2412.0	-4.45	1.56	9.90	5.83	12.84	19.23	30.00	1000	17.16
Mid	2437.0	-4.84	1.56	9.90	5.83	12.45	17.58	30.00	1000	17.55
High	2462.0	-4.83	1.56	9.90	5.83	12.46	17.62	30.00	1000	17.54

Sample Calculation:
Result = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss + Duty Factor
E.I.R.P = Result + Antenna Gain

[Pre check]
Antenna Mixed

	Mode (MCS)	Freq. [MHz]	P/M (AV) Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Duty Factor [dB]	Result		Limit		Margin [dB]
							[dBm]	[mW]	[dBm]	[mW]	
Mixed	0	2437.0	-1.87	1.56	9.90	1.21	10.80	12.02	30.00	1000	19.20
Mixed	1	2437.0	-2.83	1.56	9.90	2.15	10.78	11.97	30.00	1000	19.22
Mixed	2	2437.0	-3.61	1.56	9.90	2.92	10.77	11.94	30.00	1000	19.23
Mixed	3	2437.0	-4.18	1.56	9.90	3.56	10.84	12.13	30.00	1000	19.16
Mixed	4	2437.0	-5.22	1.56	9.90	4.60	10.84	12.13	30.00	1000	19.16
Mixed	5	2437.0	-4.63	1.56	9.90	5.41	12.24	16.75	30.00	1000	17.76
Mixed	6	2437.0	-4.95	1.56	9.90	5.83	12.34	17.14	30.00	1000	17.66
Mixed	7	2437.0	-8.01	1.56	9.90	6.09	9.54	8.99	30.00	1000	20.46

Antenna Grennfield

	Mode (MCS)	Freq. [MHz]	P/M (AV) Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Duty Factor [dB]	Result		Limit		Margin [dB]
							[dBm]	[mW]	[dBm]	[mW]	
Grennfield	0	2437.0	-1.72	1.56	9.90	1.21	10.95	12.45	30.00	1000	19.05
Grennfield	1	2437.0	-2.66	1.56	9.90	2.15	10.95	12.45	30.00	1000	19.05
Grennfield	2	2437.0	-3.43	1.56	9.90	2.92	10.95	12.45	30.00	1000	19.05
Grennfield	3	2437.0	-4.08	1.56	9.90	3.56	10.94	12.42	30.00	1000	19.06
Grennfield	4	2437.0	-5.13	1.56	9.90	4.60	10.93	12.39	30.00	1000	19.07
Grennfield	5	2437.0	-4.44	1.56	9.90	5.41	12.43	17.50	30.00	1000	17.57
Grennfield	6	2437.0	-4.84	1.56	9.90	5.83	12.45	17.58	30.00	1000	17.55
Grennfield	7	2437.0	-7.86	1.56	9.90	6.09	9.69	9.31	30.00	1000	20.31

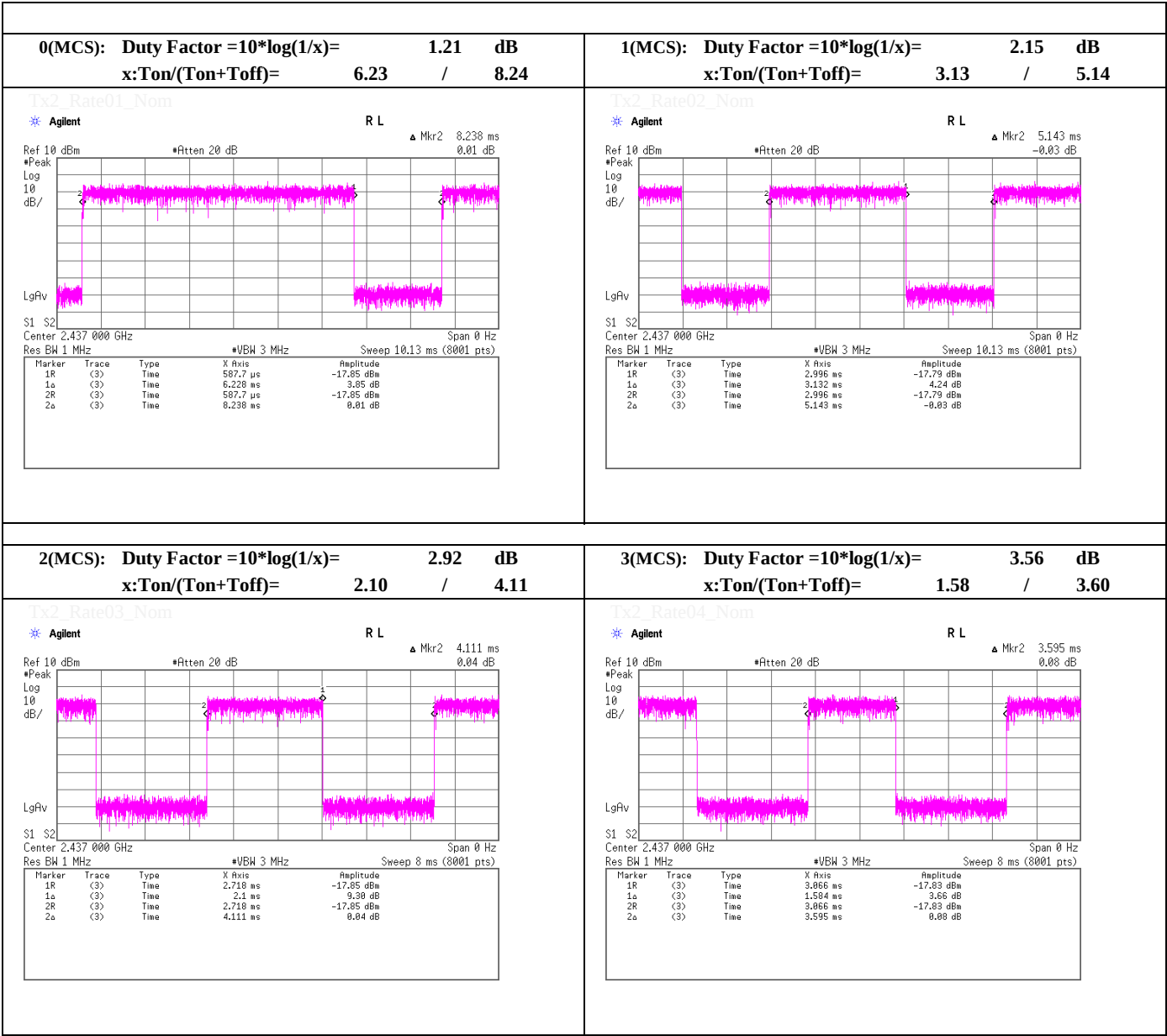
Worst

Sample Calculation:
Result = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss + Duty Factor

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Duty Factor Calculation chart for Maximum Conducted Output Power



UL Japan, Inc.

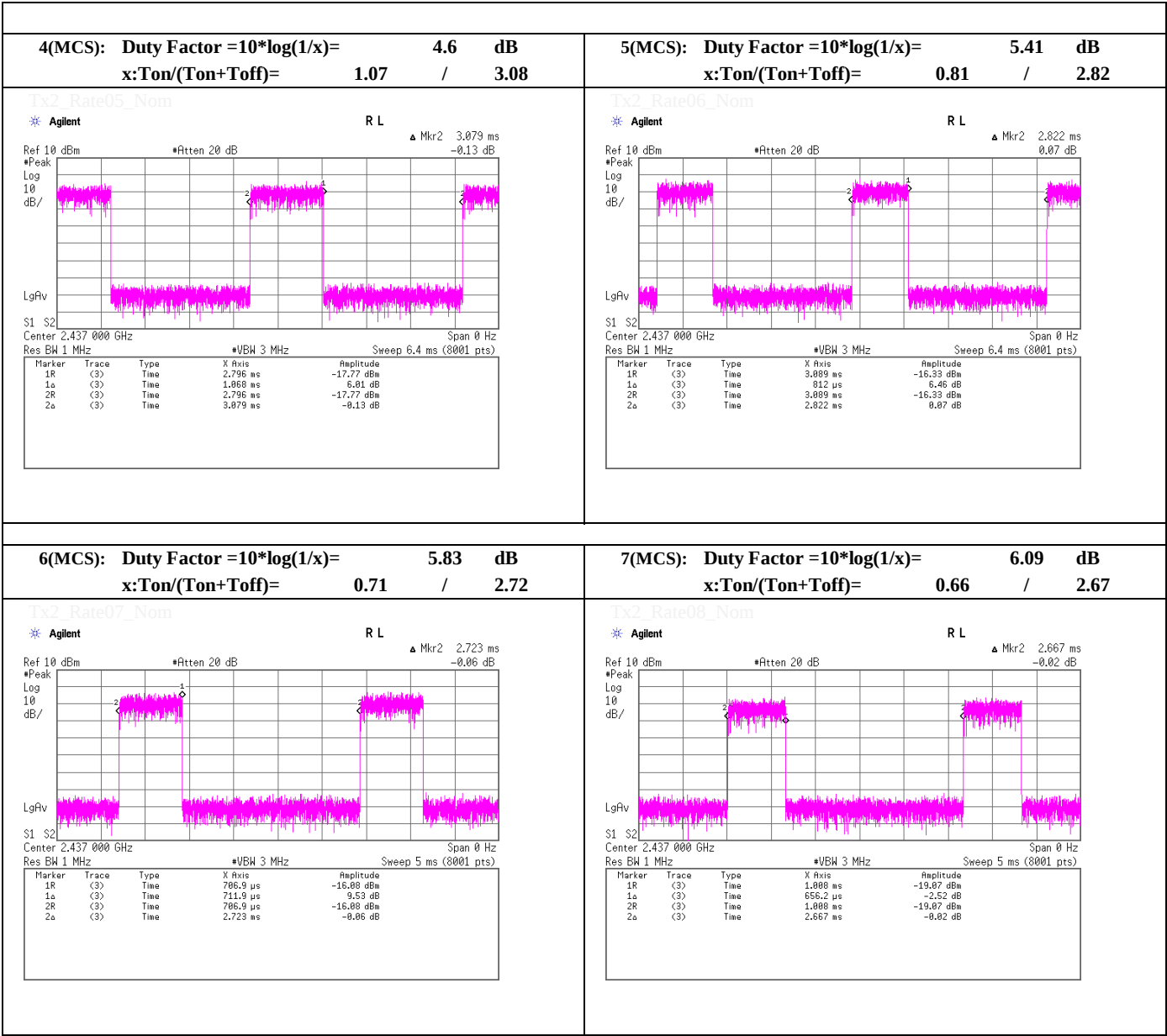
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Duty Factor Calculation chart for Maximum Conducted Output Power



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Radiated Emission

Test place	No.1 Semi Anechoic Chamber	No.3 Semi Anechoic Chamber
Date	September 2, 2014	September 3, 2014
Temperature / Humidity	24 deg.C, 65 %RH	25 deg.C, 56 %RH
Engineer	Makoto Hosaka	Kenichi Adachi
Mode	Tx, 2412 MHz	
	Tx, IEEE802.11b, PN9	

(* 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.	1749.968	PK	50.7	24.8	13.7	41.0	48.2	73.9	25.7	100	0	
Hori.	2390.000	PK	45.3	25.9	14.6	40.9	44.9	73.9	29.0	151	134	
Hori.	4824.000	PK	45.2	30.6	7.5	41.7	41.6	73.9	32.3	100	0	floor noise
Hori.	7236.000	PK	45.0	36.2	8.6	41.5	48.3	73.9	25.6	100	0	floor noise
Hori.	1749.968	AV	46.0	24.8	13.7	41.0	43.5	53.9	10.4	100	0	*2
Hori.	2390.000	AV	36.0	25.9	14.6	40.9	35.6	53.9	18.3	151	134	*1
Vert.	1749.968	PK	50.8	24.8	13.7	41.0	48.3	73.9	25.6	139	88	
Vert.	2390.000	PK	46.0	25.9	14.6	40.9	45.6	73.9	28.3	183	54	
Vert.	4824.000	PK	45.3	30.6	7.5	41.7	41.7	73.9	32.2	100	0	floor noise
Vert.	7236.000	PK	44.5	36.2	8.6	41.5	47.8	73.9	26.1	100	0	floor noise
Vert.	1749.968	AV	45.9	24.8	13.7	41.0	43.4	53.9	10.5	139	88	*2
Vert.	2390.000	AV	36.1	25.9	14.6	40.9	35.7	53.9	18.2	183	54	*1

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

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

*1) Out of Band emission (Leakage Power)

*2) Continuous wave (no pulse emission)

Average measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	4824.000	AV	36.4	30.6	7.5	41.7	1.9	34.7	53.9	19.2	floor noise
Hori.	7236.000	AV	35.4	36.2	8.6	41.5	1.9	40.6	53.9	13.3	floor noise
Vert.	4824.000	AV	36.4	30.6	7.5	41.7	1.9	34.7	53.9	19.2	floor noise
Vert.	7236.000	AV	35.6	36.2	8.6	41.5	1.9	40.8	53.9	13.1	floor noise

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

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

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2412.000	PK	85.1	26.0	14.6	40.9	84.8	-	-	
Hori.	2397.660	PK	42.0	25.9	14.6	40.9	41.6	64.8	23.2	
Hori.	2400.000	PK	39.1	26.0	14.6	40.9	38.8	64.8	26.0	
Vert.	2412.000	PK	81.1	26.0	14.6	40.9	80.8	-	-	
Vert.	2397.660	PK	39.3	25.9	14.6	40.9	38.9	60.8	21.9	
Vert.	2400.000	PK	38.1	26.0	14.6	40.9	37.8	60.8	23.0	

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

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

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Radiated Emission

Test place

No.1 Semi Anechoic Chamber

No.3 Semi Anechoic Chamber

Date

September 2, 2014

September 3, 2014

Temperature / Humidity

24 deg.C, 65 %RH

25 deg.C, 56 %RH

Engineer

Makoto Hosaka

Kenichi Adachi

Mode

Tx, 2437 MHz

Tx, IEEE802.11b, PN9

(* 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.	1749.997	PK	50.1	24.8	13.7	41.0	47.6	73.9	26.3	100	89	
Hori.	4874.000	PK	47.4	30.8	7.5	41.6	44.1	73.9	29.8	100	0	floor noise
Hori.	7311.000	PK	45.5	36.3	8.6	41.5	48.9	73.9	25.0	100	0	floor noise
Hori.	1749.997	AV	44.8	24.8	13.7	41.0	42.3	53.9	11.6	100	89	*2
Vert.	1749.997	PK	50.9	24.8	13.7	41.0	48.4	73.9	25.5	134	89	
Vert.	4874.000	PK	45.1	30.8	7.5	41.6	41.8	73.9	32.1	100	0	floor noise
Vert.	7311.000	PK	44.8	36.3	8.6	41.5	48.2	73.9	25.7	100	0	floor noise
Vert.	1749.997	AV	46.8	24.8	13.7	41.0	44.3	53.9	9.6	134	89	*2

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

- *1) Out of Band emission (Leakage Power)
- *2) Continuous wave (no pulse emission)

Average measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	4874.000	AV	36.3	30.8	7.5	41.6	1.9	34.9	53.9	19.0	floor noise
Hori.	7311.000	AV	36.2	36.3	8.6	41.5	1.9	41.5	53.9	12.4	floor noise
Vert.	4874.000	AV	36.2	30.8	7.5	41.6	1.9	34.8	53.9	19.1	floor noise
Vert.	7311.000	AV	36.2	36.3	8.6	41.5	1.9	41.5	53.9	12.4	floor noise

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

Radiated Emission

Test place	No.1 Semi Anechoic Chamber	No.3 Semi Anechoic Chamber
Date	September 2, 2014	September 3, 2014
Temperature / Humidity	24 deg.C, 65 %RH	25 deg.C, 56 %RH
Engineer	Makoto Hosaka	Kenichi Adachi
Mode	Tx, 2462 MHz	
	Tx, IEEE802.11b, PN9	

(* 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.	1750.000	PK	50.2	24.8	13.9	41.0	47.9	73.9	26.0	100	92	
Hori.	2483.500	PK	44.9	26.1	14.7	40.9	44.8	73.9	29.1	100	0	
Hori.	4924.000	PK	44.9	31.0	7.5	41.5	41.9	73.9	32.0	100	0	floor noise
Hori.	7386.000	PK	45.0	36.4	8.8	41.4	48.8	73.9	25.1	100	0	floor noise
Hori.	1750.000	AV	44.9	24.8	13.9	41.0	42.6	53.9	11.3	100	92	*2
Hori.	2483.500	AV	36.3	26.1	14.7	40.9	36.2	53.9	17.7	100	0	*1
Vert.	1750.000	PK	51.1	24.8	13.9	41.0	48.8	73.9	25.1	121	85	
Vert.	2483.500	PK	45.3	26.1	14.7	40.9	45.2	73.9	28.7	177	51	
Vert.	4924.000	PK	45.2	31.0	7.5	41.5	42.2	73.9	31.7	100	0	floor noise
Vert.	7386.000	PK	44.9	36.4	8.8	41.4	48.7	73.9	25.2	100	0	floor noise
Vert.	1750.000	AV	45.6	24.8	13.9	41.0	43.3	53.9	10.6	121	85	*2
Vert.	2483.500	AV	35.8	26.1	14.7	40.9	35.7	53.9	18.2	177	51	*1

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

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

*1) Out of Band emission (Leakage Power)

*2) Continuous wave (no pulse emission)

Average measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	4924.000	AV	36.2	31.0	7.5	41.5	1.9	35.1	53.9	18.8	floor noise
Hori.	7386.000	AV	36.4	36.4	8.8	41.4	1.9	42.1	53.9	11.8	floor noise
Vert.	4924.000	AV	36.5	31.0	7.5	41.5	1.9	35.4	53.9	18.5	floor noise
Vert.	7386.000	AV	36.1	36.4	8.8	41.4	1.9	41.8	53.9	12.1	floor noise

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

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

Radiated Emission

Test place	No.1 Semi Anechoic Chamber	No.1 Semi Anechoic Chamber	No.3 Semi Anechoic Chamber
Date	August 26, 2014	September 2, 2014	September 3, 2014
Temperature / Humidity	24 deg.C, 58 %RH	24 deg.C, 65 %RH	25 deg.C, 56 %RH
Engineer	Takahiro Suzuki	Makoto Hosaka	Kenichi Adachi
Mode	Tx, 2412 MHz Tx, IEEE802.11g, PN9		

(* 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.	319.616	QP	44.7	14.3	6.7	31.8	33.9	46.0	12.1	100	354	
Hori.	678.827	QP	40.8	19.4	8.6	32.1	36.7	46.0	9.3	112	197	
Hori.	758.688	QP	47.3	20.1	9.0	32.0	44.4	46.0	1.6	123	12	
Hori.	798.608	QP	42.9	20.5	9.2	31.9	40.7	46.0	5.3	124	95	
Hori.	878.476	QP	43.6	21.2	9.6	31.5	42.9	46.0	3.1	108	355	
Hori.	918.396	QP	43.2	21.5	9.7	31.3	43.1	46.0	2.9	100	55	
Hori.	1750.000	PK	49.2	24.8	13.9	41.0	46.9	73.9	27.0	100	91	
Hori.	2390.000	PK	51.8	25.9	14.6	40.9	51.4	73.9	22.5	100	134	
Hori.	4824.000	PK	45.2	30.6	7.5	41.7	41.6	73.9	32.3	100	0	floor noise
Hori.	7236.000	PK	44.7	36.2	8.6	41.5	48.0	73.9	25.9	100	0	floor noise
Hori.	1750.000	AV	44.5	24.8	13.9	41.0	42.2	53.9	11.7	100	91	*2
Hori.	2390.000	AV	37.1	25.9	14.6	40.9	36.7	53.9	17.2	100	134	*1
Vert.	678.819	QP	42.6	19.4	8.6	32.1	38.5	46.0	7.5	113	20	
Vert.	758.681	QP	43.0	20.1	9.0	32.0	40.1	46.0	5.9	100	259	
Vert.	1750.000	PK	49.8	24.8	13.9	41.0	47.5	73.9	26.4	100	84	
Vert.	2390.000	PK	49.1	25.9	14.6	40.9	48.7	73.9	25.2	172	51	
Vert.	4824.000	PK	45.0	30.6	7.5	41.7	41.4	73.9	32.5	100	0	floor noise
Vert.	7236.000	PK	44.1	36.2	8.6	41.5	47.4	73.9	26.5	100	0	floor noise
Vert.	1750.000	AV	44.6	24.8	13.9	41.0	42.3	53.9	11.6	100	84	*2
Vert.	2390.000	AV	36.8	25.9	14.6	40.9	36.4	53.9	17.5	172	51	*1

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

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

*1) Out of Band emission (Leakage Power)

*2) Continuous wave (no pulse emission)

Average measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	4824.000	AV	36.3	30.6	7.5	41.7	11.7	44.4	53.9	9.5	floor noise
Hori.	7236.000	AV	35.2	36.2	8.6	41.5	11.7	50.2	53.9	3.7	floor noise
Vert.	4824.000	AV	36.4	30.6	7.5	41.7	11.7	44.5	53.9	9.4	floor noise
Vert.	7236.000	AV	35.2	36.2	8.6	41.5	11.7	50.2	53.9	3.7	floor noise

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

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

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2412.000	PK	84.4	26.0	14.6	40.9	84.1	-	-	
Hori.	2400.000	PK	53.1	26.0	14.6	40.9	52.8	64.1	11.3	
Vert.	2412.000	PK	80.8	26.0	14.6	40.9	80.5	-	-	
Vert.	2400.000	PK	49.7	26.0	14.6	40.9	49.4	60.5	11.1	

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

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

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Radiated Emission

Test place	No.1 Semi Anechoic Chamber	No.3 Semi Anechoic Chamber
Date	September 2, 2014	September 3, 2014
Temperature / Humidity	24 deg.C, 65 %RH	25 deg.C, 56 %RH
Engineer	Makoto Hosaka	Kenichi Adachi
Mode	Tx, 2437 MHz	
	Tx, IEEE802.11g, PN9	

(* 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.	1750.000	PK	49.4	24.8	13.9	41.0	47.1	73.9	26.8	100	92	
Hori.	4874.000	PK	45.0	30.8	7.5	41.6	41.7	73.9	32.2	100	0	floor noise
Hori.	7311.000	PK	45.6	36.3	8.6	41.5	49.0	73.9	24.9	100	0	floor noise
Hori.	1750.000	AV	44.7	24.8	13.9	41.0	42.4	53.9	11.5	100	92	*2
Vert.	1750.000	PK	50.0	24.8	13.9	41.0	47.7	73.9	26.2	134	86	
Vert.	4874.000	PK	44.6	30.8	7.5	41.6	41.3	73.9	32.6	100	0	floor noise
Vert.	7311.000	PK	45.0	36.3	8.6	41.5	48.4	73.9	25.5	100	0	floor noise
Vert.	1750.000	AV	45.0	24.8	13.9	41.0	42.7	53.9	11.2	134	86	*2

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

Distance factor : 15GHz -40GHz : $20\log(3.0\text{m}/1.0\text{m}) = 9.5\text{dB}$

*1) Out of Band emission (Leakage Power)

*2) Continuous wave (no pulse emission)

Average measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	4874.000	AV	36.3	30.8	7.5	41.6	11.7	44.7	53.9	9.2	floor noise
Hori.	7311.000	AV	36.0	36.3	8.6	41.5	11.7	51.1	53.9	2.8	floor noise
Vert.	4874.000	AV	36.2	30.8	7.5	41.6	11.7	44.6	53.9	9.3	floor noise
Vert.	7311.000	AV	36.1	36.3	8.6	41.5	11.7	51.2	53.9	2.7	floor noise

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

Distance factor : 15GHz -40GHz : $20\log(3.0\text{m}/1.0\text{m}) = 9.5\text{dB}$

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Radiated Emission

Test place	No.1 Semi Anechoic Chamber	No.3 Semi Anechoic Chamber
Date	September 2, 2014	September 3, 2014
Temperature / Humidity	24 deg.C, 65 %RH	25 deg.C, 56 %RH
Engineer	Makoto Hosaka	Kenichi Adachi
Mode	Tx, 2462 MHz	
	Tx, IEEE802.11g, PN9	

(* 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.	1750.000	PK	49.0	24.8	13.9	41.0	46.7	73.9	27.2	100	88	
Hori.	2483.500	PK	54.1	26.1	14.7	40.9	54.0	73.9	19.9	118	129	
Hori.	4924.000	PK	45.3	31.0	7.5	41.5	42.3	73.9	31.6	100	0	floor noise
Hori.	7386.000	PK	45.1	36.4	8.8	41.4	48.9	73.9	25.0	100	0	floor noise
Hori.	1750.000	AV	44.5	24.8	13.9	41.0	42.2	53.9	11.7	100	88	*2
Hori.	2483.500	AV	37.2	26.1	14.7	40.9	37.1	53.9	16.8	118	129	*1
Vert.	1750.000	PK	50.0	24.8	13.9	41.0	47.7	73.9	26.2	131	86	
Vert.	2483.500	PK	50.2	26.1	14.7	40.9	50.1	73.9	23.8	162	50	
Vert.	4924.000	PK	45.8	31.0	7.5	41.5	42.8	73.9	31.1	100	0	floor noise
Vert.	7386.000	PK	44.4	36.4	8.8	41.4	48.2	73.9	25.7	100	0	floor noise
Vert.	1750.000	AV	45.1	24.8	13.9	41.0	42.8	53.9	11.1	131	86	*2
Vert.	2483.500	AV	36.6	26.1	14.7	40.9	36.5	53.9	17.4	162	50	*1

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

Distance factor : 15GHz -40GHz : $20\log(3.0\text{m}/1.0\text{m}) = 9.5\text{dB}$

*1) Out of Band emission (Leakage Power)

*2) Continuous wave (no pulse emission)

Average measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	4924.000	AV	36.2	31.0	7.5	41.5	11.7	44.9	53.9	9.0	floor noise
Hori.	7386.000	AV	36.2	36.4	8.8	41.4	11.7	51.7	53.9	2.2	floor noise
Vert.	4924.000	AV	35.9	31.0	7.5	41.5	11.7	44.6	53.9	9.3	floor noise
Vert.	7386.000	AV	36.3	36.4	8.8	41.4	11.7	51.8	53.9	2.1	floor noise

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

Distance factor : 15GHz -40GHz : $20\log(3.0\text{m}/1.0\text{m}) = 9.5\text{dB}$ **UL Japan, Inc.****Shonan EMC Lab.**

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Radiated Emission

Test place

No.1 Semi Anechoic Chamber

No.3 Semi Anechoic Chamber

Date

September 2, 2014

September 3, 2014

Temperature / Humidity

24 deg.C, 65 %RH

25 deg.C, 56 %RH

Engineer

Makoto Hosaka

Kenichi Adachi

Mode

Tx, 2412 MHz

Tx, IEEE802.11n(HT20), PN9

(* 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.	1750.000	PK	49.6	24.8	13.9	41.0	47.3	73.9	26.6	100	91	
Hori.	2390.000	PK	50.0	25.9	14.6	40.9	49.6	73.9	24.3	100	139	
Hori.	4824.000	PK	45.7	30.6	7.5	41.7	42.1	73.9	31.8	100	0	floor noise
Hori.	7236.000	PK	43.8	36.2	8.6	41.5	47.1	73.9	26.8	100	0	floor noise
Hori.	1750.000	AV	44.3	24.8	13.9	41.0	42.0	53.9	11.9	100	91	*2
Hori.	2390.000	AV	37.0	25.9	14.6	40.9	36.6	53.9	17.3	100	139	*1
Vert.	1750.000	PK	50.6	24.8	13.9	41.0	48.3	73.9	25.6	126	88	
Vert.	2390.000	PK	48.5	25.9	14.6	40.9	48.1	73.9	25.8	171	51	
Vert.	4824.000	PK	45.4	30.6	7.5	41.7	41.8	73.9	32.1	100	0	floor noise
Vert.	7236.000	PK	44.7	36.2	8.6	41.5	48.0	73.9	25.9	100	0	floor noise
Vert.	1750.000	AV	46.0	24.8	13.9	41.0	43.7	53.9	10.2	126	88	*2
Vert.	2390.000	AV	36.6	25.9	14.6	40.9	36.2	53.9	17.7	171	51	*1

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

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

*1) Out of Band emission (Leakage Power)

*2) Continuous wave (no pulse emission)

Average measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	4824.000	AV	36.4	30.6	7.5	41.7	10.8	43.6	53.9	10.3	floor noise
Hori.	7236.000	AV	35.3	36.2	8.6	41.5	10.8	49.4	53.9	4.5	floor noise
Vert.	4824.000	AV	36.4	30.6	7.5	41.7	10.8	43.6	53.9	10.3	floor noise
Vert.	7236.000	AV	35.6	36.2	8.6	41.5	10.8	49.7	53.9	4.2	floor noise

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

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

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2412.000	PK	84.0	26.0	14.6	40.9	83.7	-	-	
Hori.	2400.000	PK	53.4	26.0	14.6	40.9	53.1	63.7	10.6	
Vert.	2412.000	PK	80.3	26.0	14.6	40.9	80.0	-	-	
Vert.	2400.000	PK	50.4	26.0	14.6	40.9	50.1	60.0	9.9	

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

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

Radiated Emission

Test place

No.1 Semi Anechoic Chamber

No.3 Semi Anechoic Chamber

Date

September 2, 2014

September 3, 2014

Temperature / Humidity

24 deg.C, 65 %RH

25 deg.C, 56 %RH

Engineer

Makoto Hosaka

Kenichi Adachi

Mode

Tx, 2437 MHz

Tx, IEEE802.11n(HT20), PN9

(* 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.	1750.000	PK	50.2	24.8	13.9	41.0	47.9	73.9	26.0	100	91	
Hori.	4874.000	PK	45.0	30.8	7.5	41.6	41.7	73.9	32.2	100	0	floor noise
Hori.	7311.000	PK	44.5	36.3	8.6	41.5	47.9	73.9	26.0	100	0	floor noise
Hori.	1750.000	AV	44.7	24.8	13.9	41.0	42.4	53.9	11.5	100	91	*2
Vert.	1750.000	PK	50.2	24.8	13.9	41.0	47.9	73.9	26.0	124	87	
Vert.	4874.000	PK	45.8	30.8	7.5	41.6	42.5	73.9	31.4	100	0	floor noise
Vert.	7311.000	PK	44.9	36.3	8.6	41.5	48.3	73.9	25.6	100	0	floor noise
Vert.	1750.000	AV	45.6	24.8	13.9	41.0	43.3	53.9	10.6	124	87	*2

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

*1) Out of Band emission (Leakage Power)
*2) Continuous wave (no pulse emission)

Average measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	4874.000	AV	36.4	30.8	7.5	41.6	10.8	43.9	53.9	10.0	floor noise
Hori.	7311.000	AV	36.0	36.3	8.6	41.5	10.8	50.2	53.9	3.7	floor noise
Vert.	4874.000	AV	36.1	30.8	7.5	41.6	10.8	43.6	53.9	10.3	floor noise
Vert.	7311.000	AV	35.9	36.3	8.6	41.5	10.8	50.1	53.9	3.8	floor noise

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

Radiated Emission

Test place

No.1 Semi Anechoic Chamber

No.3 Semi Anechoic Chamber

Date

September 2, 2014

September 3, 2014

Temperature / Humidity

24 deg.C, 65 %RH

25 deg.C, 56 %RH

Engineer

Makoto Hosaka

Kenichi Adachi

Mode

Tx, 2462 MHz

Tx, IEEE802.11n(HT20), PN9

(* 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.	1750.000	PK	49.2	24.8	13.9	41.0	46.9	73.9	27.0	100	91	
Hori.	2483.500	PK	54.8	26.1	14.7	40.9	54.7	73.9	19.2	115	132	
Hori.	4924.000	PK	45.6	31.0	7.5	41.5	42.6	73.9	31.3	100	0	floor noise
Hori.	7386.000	PK	45.5	36.4	8.8	41.4	49.3	73.9	24.6	100	0	floor noise
Hori.	1750.000	AV	44.6	24.8	13.9	41.0	42.3	53.9	11.6	100	91	*2
Hori.	2483.500	AV	37.5	26.1	14.7	40.9	37.4	53.9	16.5	115	132	*1
Vert.	1750.000	PK	50.4	24.8	13.9	41.0	48.1	73.9	25.8	126	88	
Vert.	2483.500	PK	50.8	26.1	14.7	40.9	50.7	73.9	23.2	162	51	
Vert.	4924.000	PK	45.8	31.0	7.5	41.5	42.8	73.9	31.1	100	0	floor noise
Vert.	7386.000	PK	44.7	36.4	8.8	41.4	48.5	73.9	25.4	100	0	floor noise
Vert.	1750.000	AV	45.6	24.8	13.9	41.0	43.3	53.9	10.6	126	88	*2
Vert.	2483.500	AV	36.5	26.1	14.7	40.9	36.4	53.9	17.5	162	51	*1

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

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

*1) Out of Band emission (Leakage Power)

*2) Continuous wave (no pulse emission)

Average measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	4924.000	AV	36.0	31.0	7.5	41.5	10.8	43.8	53.9	10.1	floor noise
Hori.	7386.000	AV	36.1	36.4	8.8	41.4	10.8	50.7	53.9	3.2	floor noise
Vert.	4924.000	AV	36.1	31.0	7.5	41.5	10.8	43.9	53.9	10.0	floor noise
Vert.	7386.000	AV	35.9	36.4	8.8	41.4	10.8	50.5	53.9	3.4	floor noise

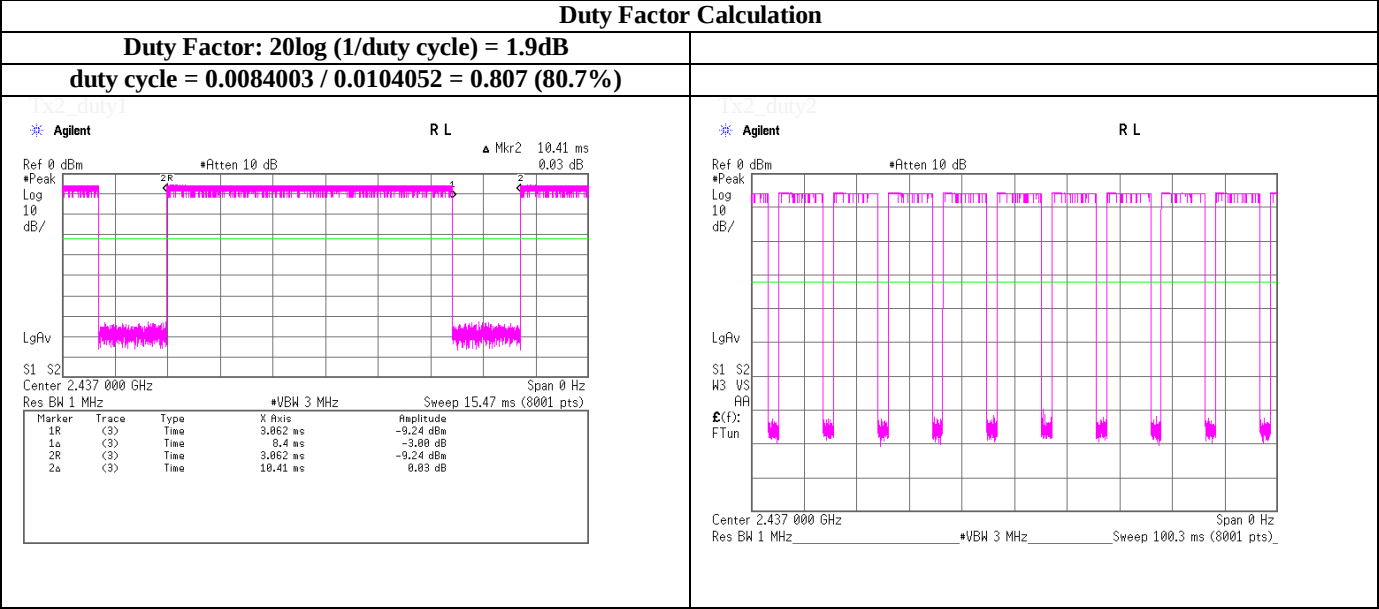
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18GHz)-Distance factor(above 15GHz)) - Gain(Amplifier) + Duty factor

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

Test place UL Japan, Inc. Shonan EMC Lab. No.2 Measurement Room
Date August 13, 2014
Temperature / Humidity 26deg.C , 60%RH
Engineer Hikaru Shirasawa

Burst rate confirmation

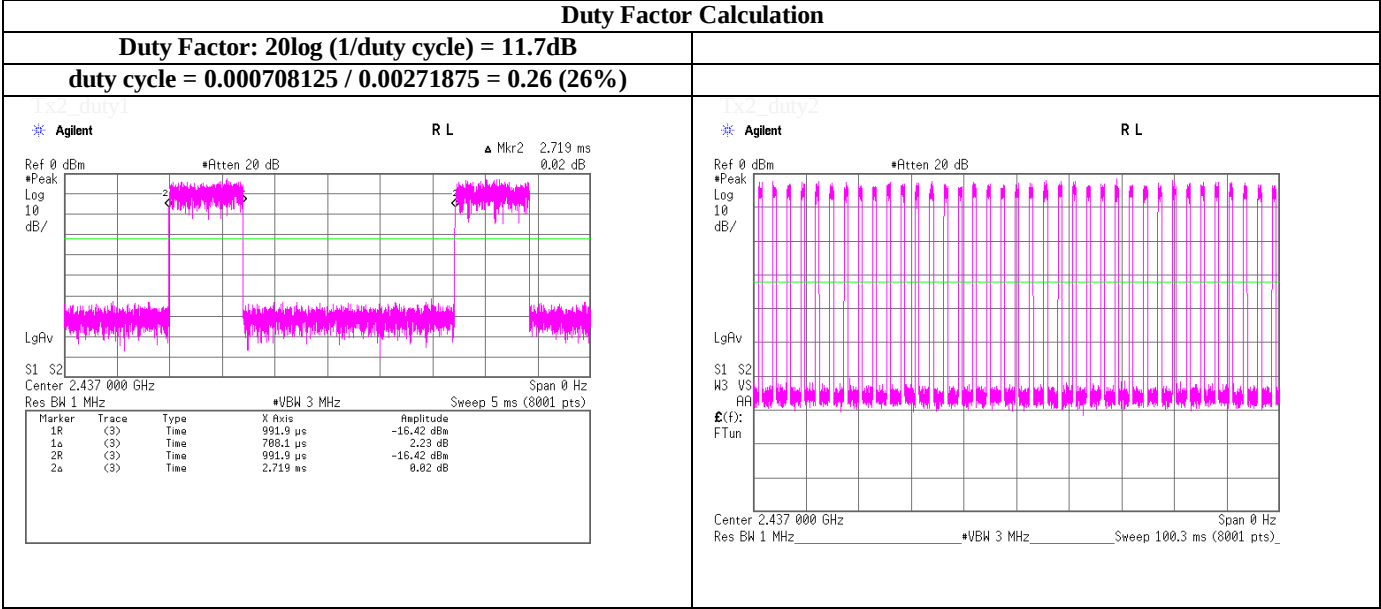
Tx, IEEE802.11b, PN9, worst Preamble mode Short, worst data mode 2Mbps



Test place UL Japan, Inc. Shonan EMC Lab. No.2 Measurement Room
Date August 13, 2014
Temperature / Humidity 26deg.C , 60%RH
Engineer Hikaru Shirasawa

Burst rate confirmation

Tx, IEEE802.11g, PN9, worst data mode 48Mbps

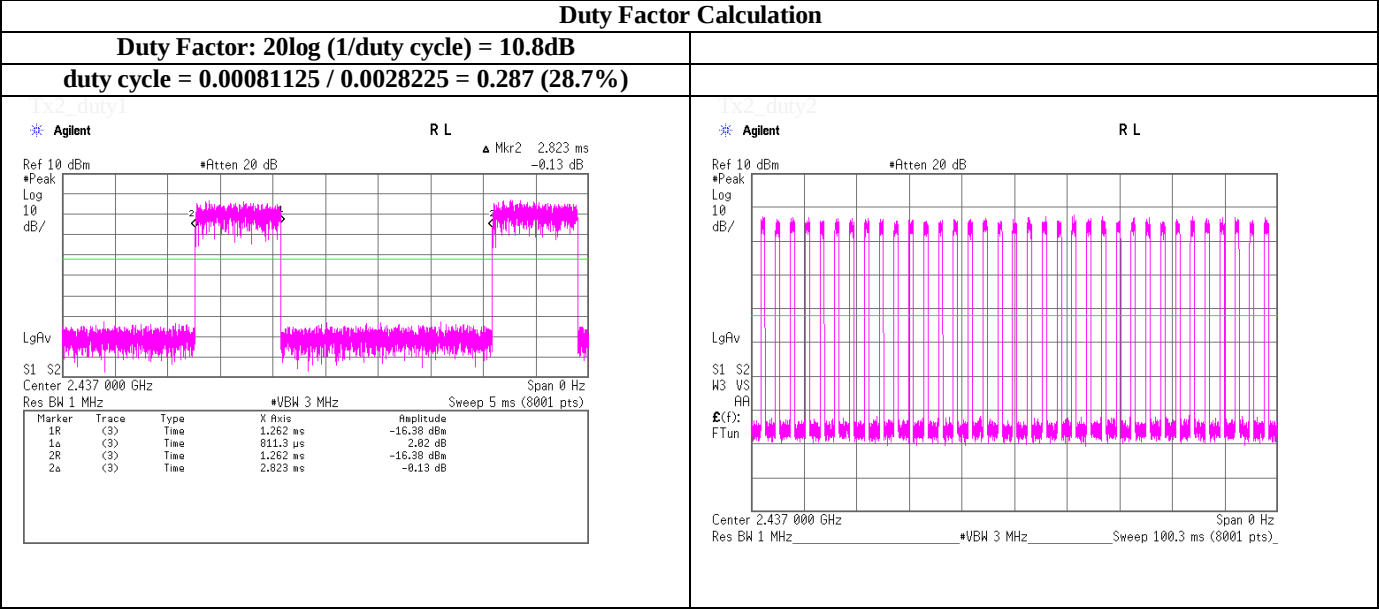


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Test place UL Japan, Inc. Shonan EMC Lab. No.2 Measurement Room
Date August 13, 2014
Temperature / Humidity 26deg.C , 60%RH
Engineer Hikaru Shirasawa

Burst rate confirmation

Tx, IEEE802.11n(HT20), PN9, worst preamble port Mixed, worst data mode 5(MCS)



Tx, IEEE802.11b, PN9, worst Preamble mode Short, worst data mode 2Mbps

Tx, 2412MHz (below 30MHz)	
9kHz - 150kHz Ref 87 dBμV #Peak Log 10 dB/ Di 78.1 dBμV LgAv S1 S2 V3 FC RA E(f): f<50k FFT Start 9.00 kHz #Res BW 200 Hz #VBW 620 Hz Sweep 2.279 s (1201 pts)	150kHz - 30MHz Ref 97 dBμV #Peak Log 10 dB/ Di 78.1 dBμV LgAv S1 S2 V3 FC RA E(f): FTun Swp Start 150 kHz #Res BW 10 kHz #VBW 30 kHz Sweep 285.3 ms (1201 pts)
Carrier, 20dBc Limit Ref 107 dBμV #Peak Log 10 dB/ Di 78.1 dBμV LgAv S1 S2 V3 FC RA E(f): FTun Swp Center 2.412 000 GHz #Res BW 100 kHz #VBW 300 kHz Sweep 2.88 ms (1201 pts)	

Test place

UL Japan, Inc. Shonan EMC Lab. No.2 Measurement Room

Date

August 13, 2014

Temperature / Humidity

26deg.C , 60%RH

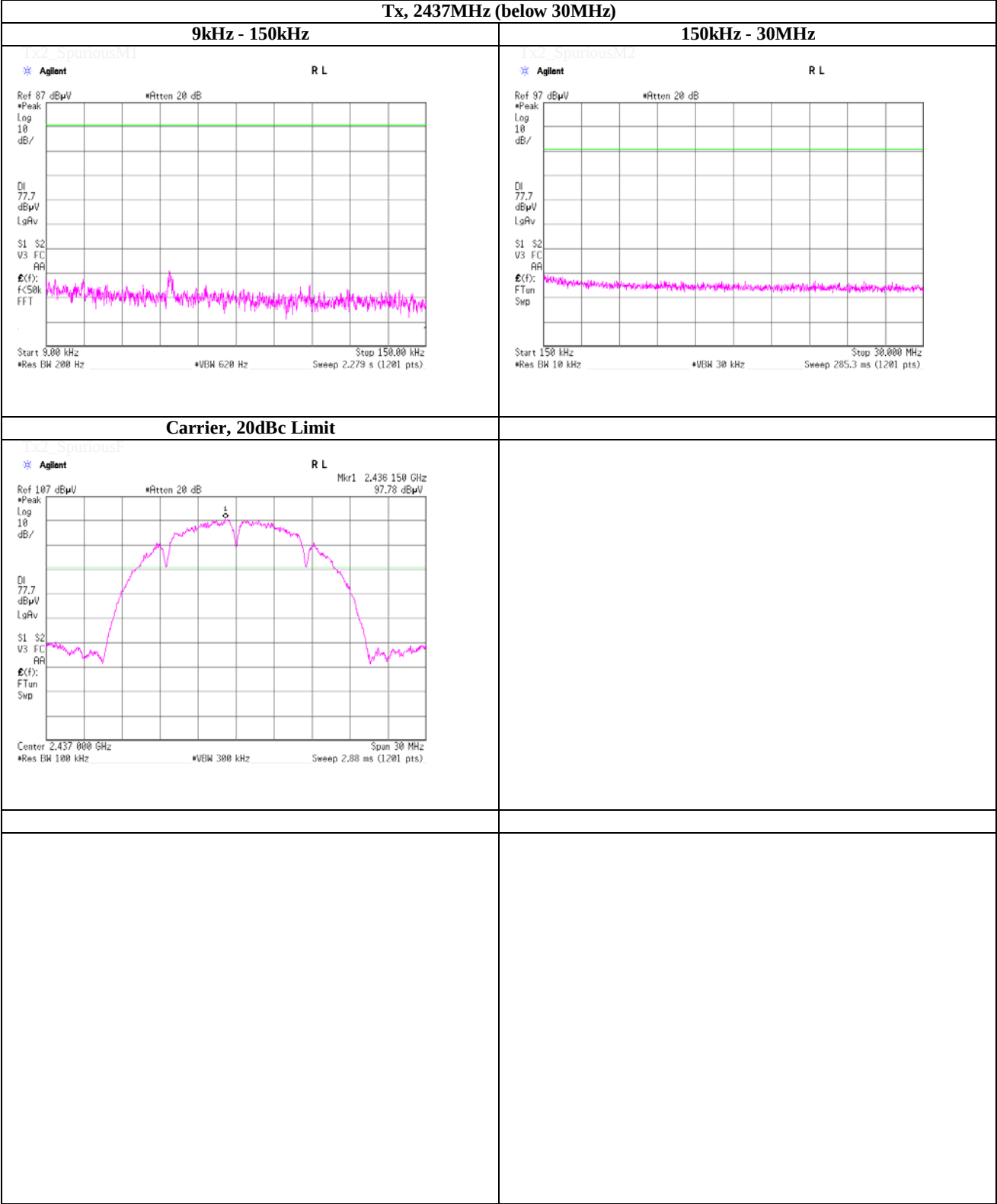
Engineer

Hikaru Shirasawa

Spurious emission (Conducted)

Tx, IEEE802.11b, PN9, worst Preamble mode Short, worst data mode 2Mbps

Tx, 2437MHz (below 30MHz)



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Test place

UL Japan, Inc. Shonan EMC Lab. No.2 Measurement Room

Date

August 13, 2014

Temperature / Humidity

26deg.C , 60%RH

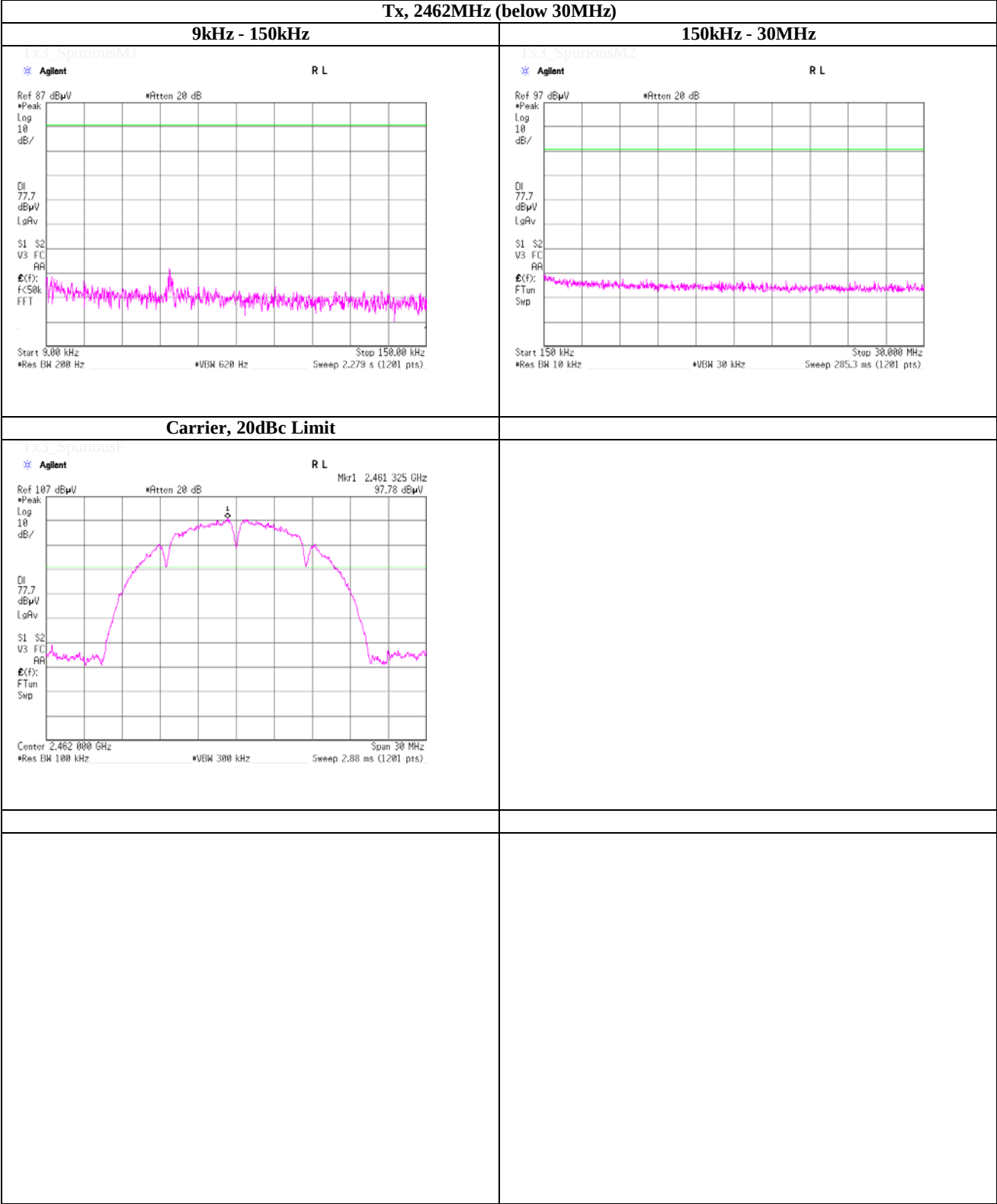
Engineer

Hikaru Shirasawa

Spurious emission (Conducted)

Tx, IEEE802.11b, PN9, worst Preamble mode Short, worst data mode 2Mbps

Tx, 2462MHz (below 30MHz)



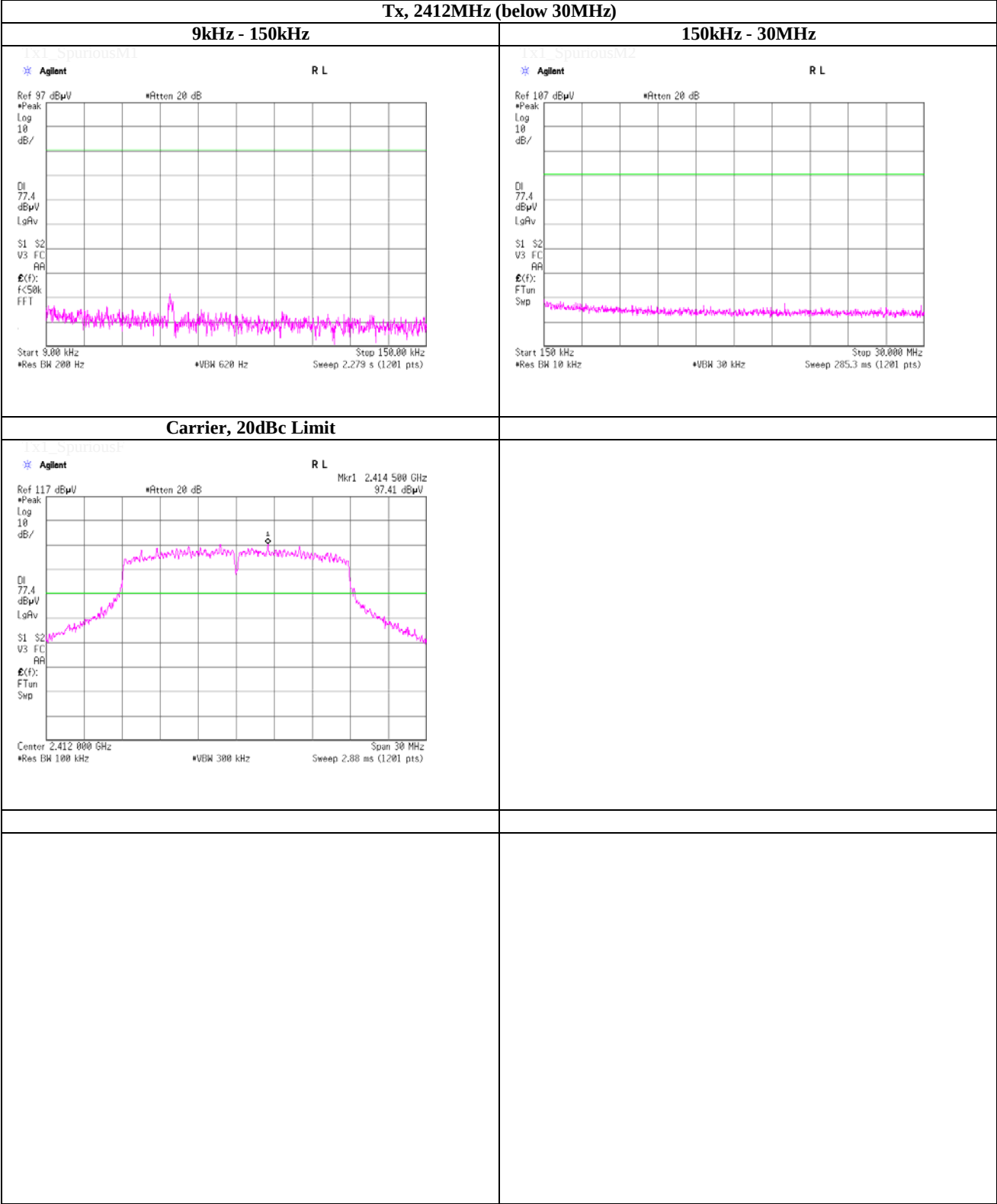
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Telephone : +81 463 50 6400
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Test place UL Japan, Inc. Shonan EMC Lab. No.2 Measurement Room
Date August 13, 2014
Temperature / Humidity 26deg.C , 60%RH
Engineer Hikaru Shirasawa

Spurious emission (Conducted)

Tx, IEEE802.11n(HT20), PN9, worst preamble port Mixed, worst data mode 5(MCS)

Tx, 2412MHz (below 30MHz)

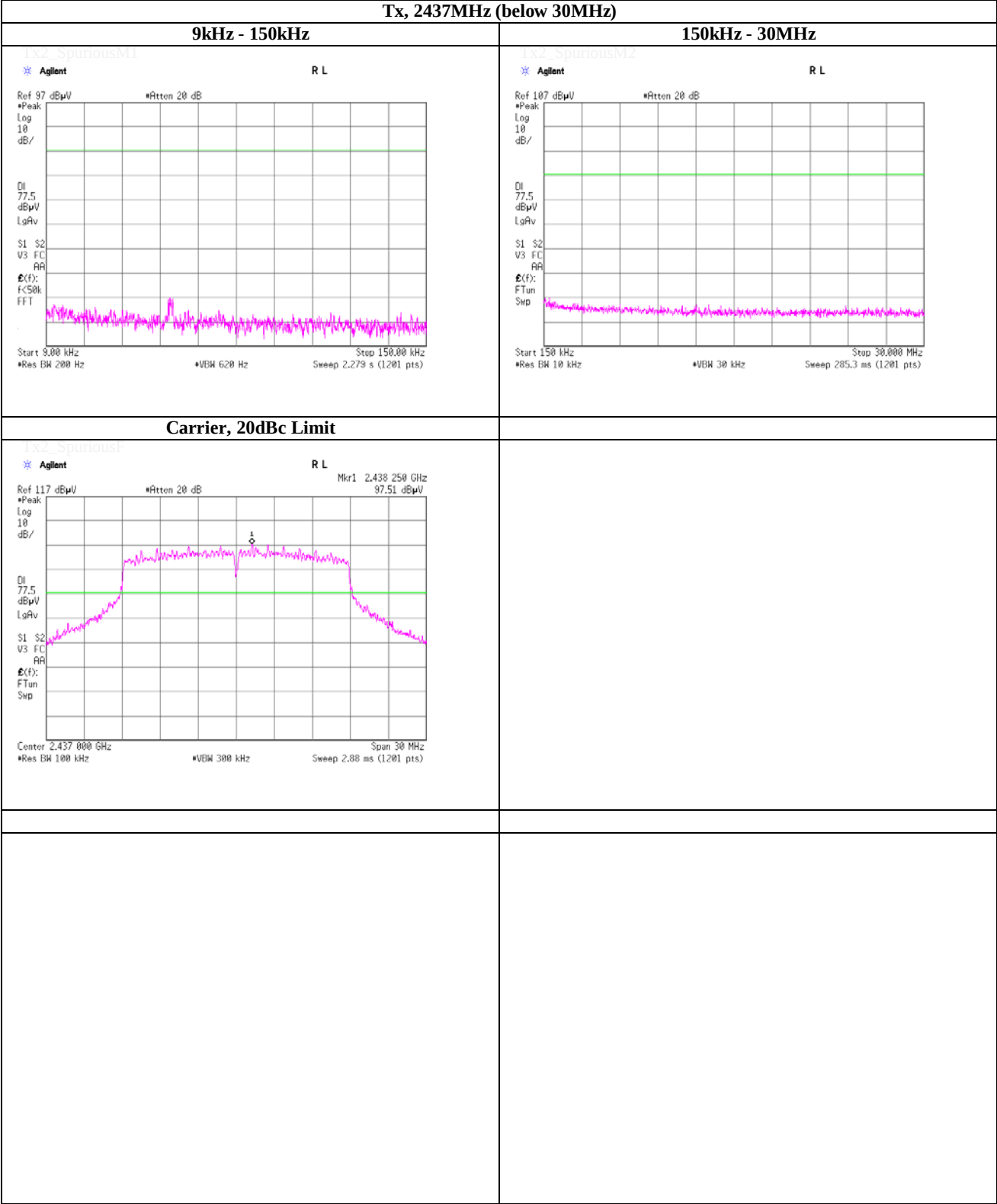


Test place UL Japan, Inc. Shonan EMC Lab. No.2 Measurement Room
Date August 13, 2014
Temperature / Humidity 26deg.C , 60%RH
Engineer Hikaru Shirasawa

Spurious emission (Conducted)

Tx, IEEE802.11n(HT20), PN9, worst preamble port Mixed, worst data mode 5(MCS)

Tx, 2437MHz (below 30MHz)

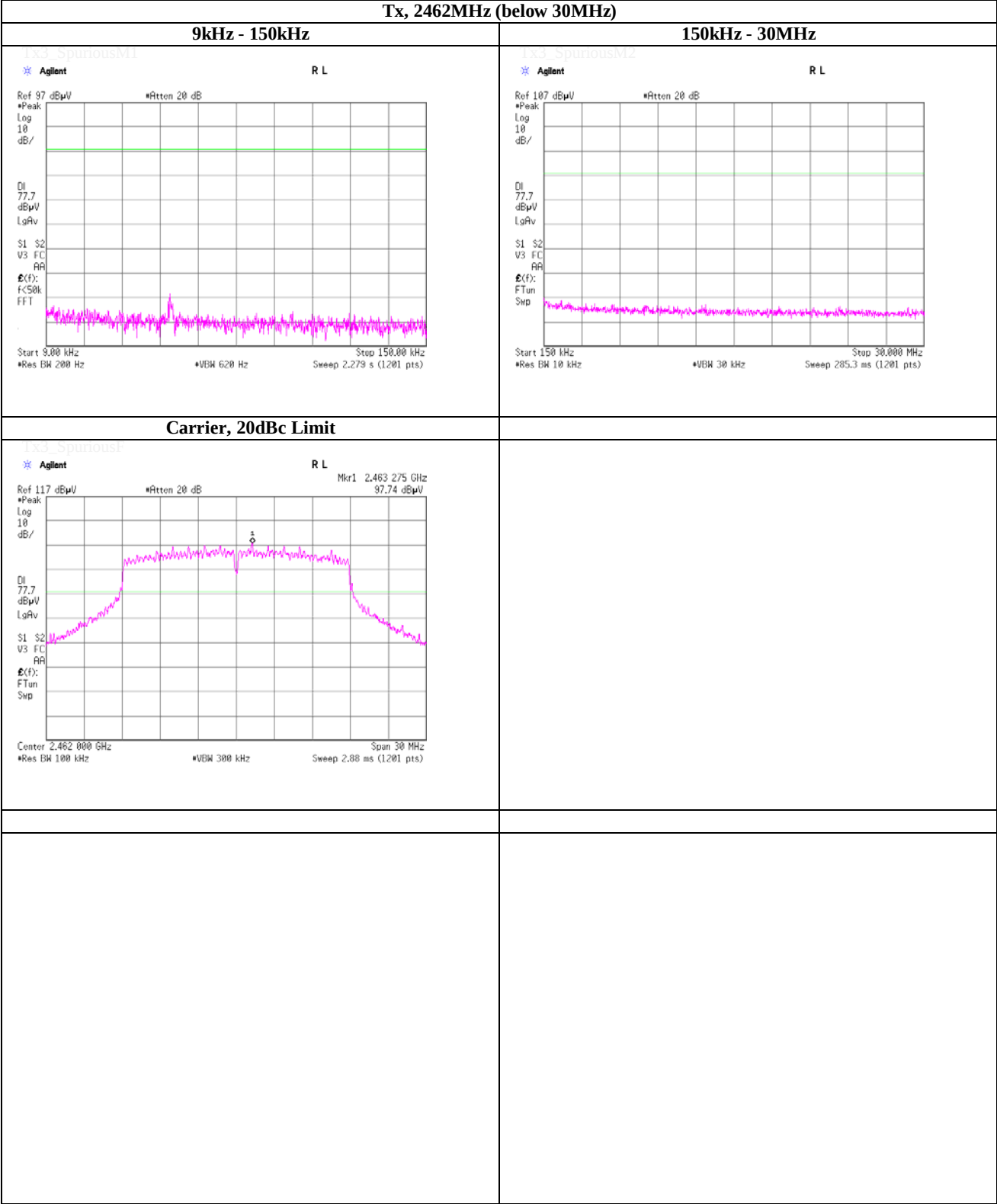


Test place UL Japan, Inc. Shonan EMC Lab. No.2 Measurement Room
Date August 13, 2014
Temperature / Humidity 26deg.C , 60%RH
Engineer Hikaru Shirasawa

Spurious emission (Conducted)

Tx, IEEE802.11n(HT20), PN9, worst preamble port Mixed, worst data mode 5(MCS)

Tx, 2462MHz (below 30MHz)



Maximum Power Spectral Density
(PKPSD)

Test place

UL Japan, Inc. Shonan EMC Lab.

No.2 Measurement Room

Date

August 13, 2014

Temperature / Humidity

26deg.C , 60%RH

Engineer

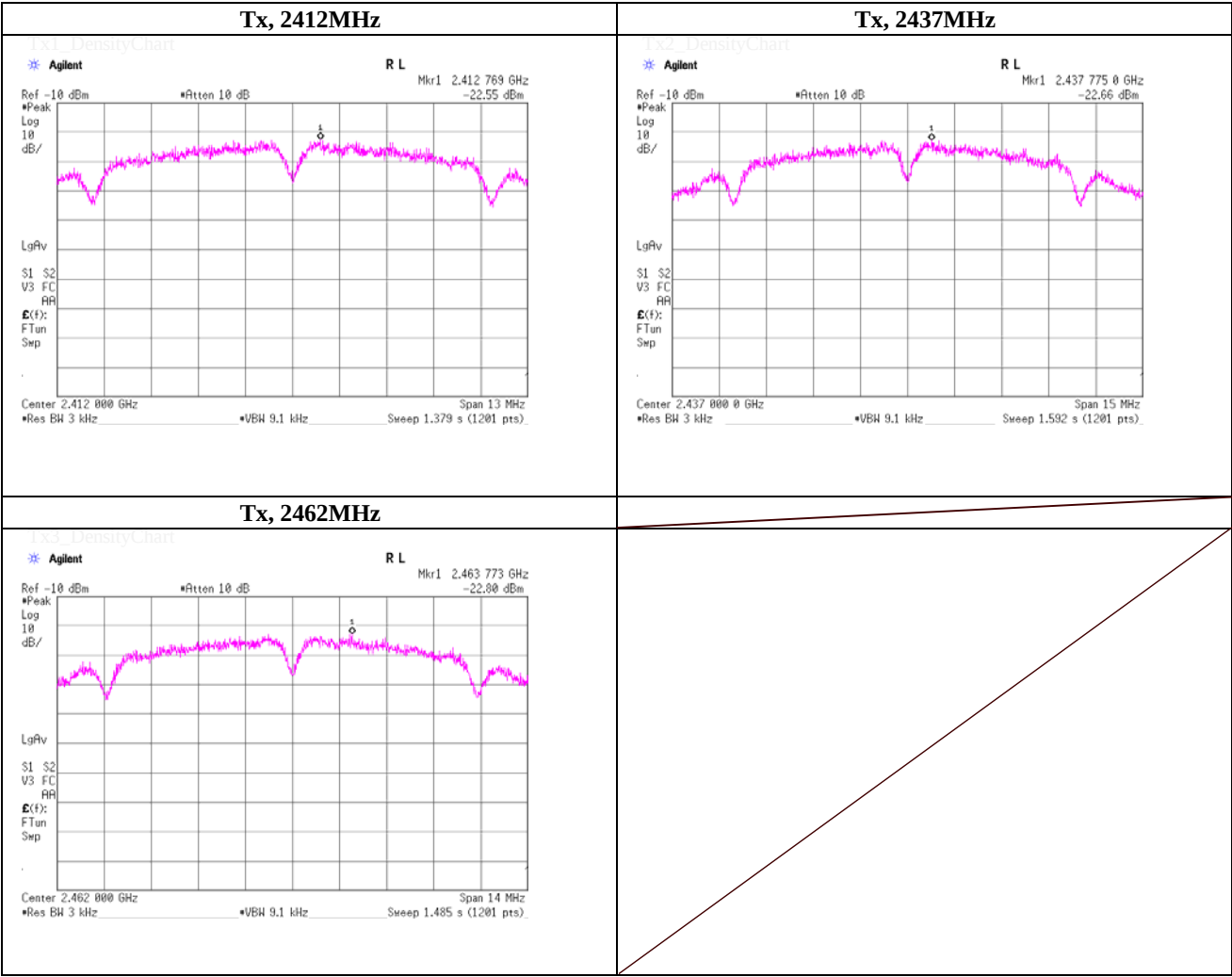
Hikaru Shirasawa

Mode

Tx, IEEE802.11b, PN9, worst Preamble mode Short, worst data mode 2Mbps

Ch. Freq.	Freq. Reading	Reading	Cable Loss	Atten.	Result	Limit	Margin
[MHz]	[MHz]	[dBm]	[dB]	[dB]	[dBm]	[dBm]	[dB]
2412.0000	2412.77	-22.55	1.56	9.90	-11.09	8.00	19.09
2437.0000	2437.78	-22.66	1.56	9.90	-11.20	8.00	19.20
2462.0000	2463.77	-22.80	1.56	9.90	-11.34	8.00	19.34

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

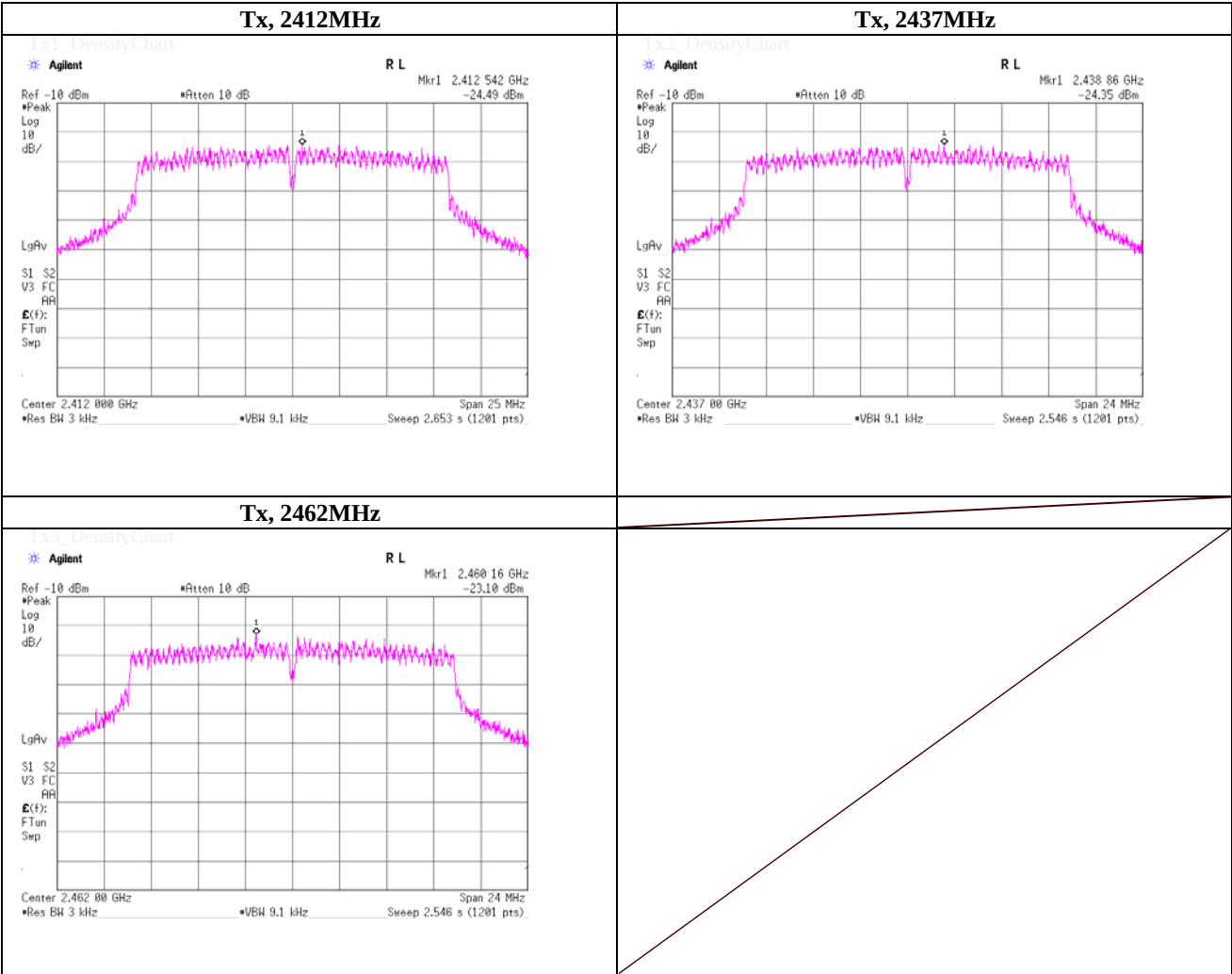


Maximum Power Spectral Density
(PKPSD)

Test place	UL Japan, Inc. Shonan EMC Lab.	No.2 Measurement Room
Date	August 13, 2014	
Temperature / Humidity	26deg.C , 60%RH	
Engineer	Hikaru Shirasawa	
Mode	Tx, IEEE802.11g, PN9, worst data mode 48Mbps	

Ch. Freq.	Freq. Reading	Reading	Cable Loss	Atten.	Result	Limit	Margin
[MHz]	[MHz]	[dBm]	[dB]	[dB]	[dBm]	[dBm]	[dB]
2412.0000	2412.54	-24.49	1.56	9.90	-13.03	8.00	21.03
2437.0000	2438.86	-24.35	1.56	9.90	-12.89	8.00	20.89
2462.0000	2460.16	-23.10	1.56	9.90	-11.64	8.00	19.64

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



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Maximum Power Spectral Density
(PKPSD)

Test place

UL Japan, Inc. Shonan EMC Lab.

No.2 Measurement Room

Date

August 13, 2014

Temperature / Humidity

26deg.C , 60%RH

Engineer

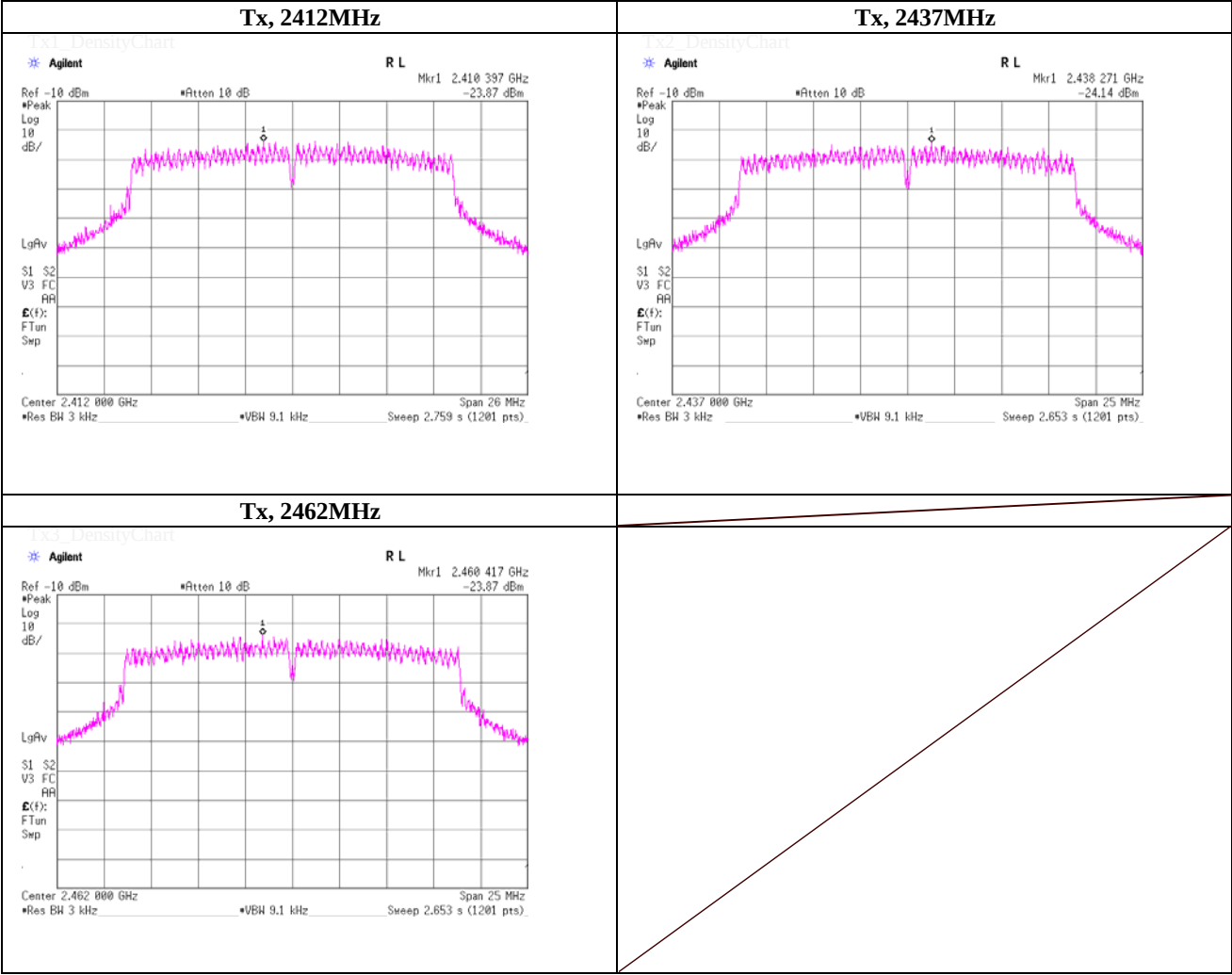
Hikaru Shirasawa

Mode

Tx, IEEE802.11n(HT20), PN9, worst preamble port Mixed, worst data mode 5(MCS)

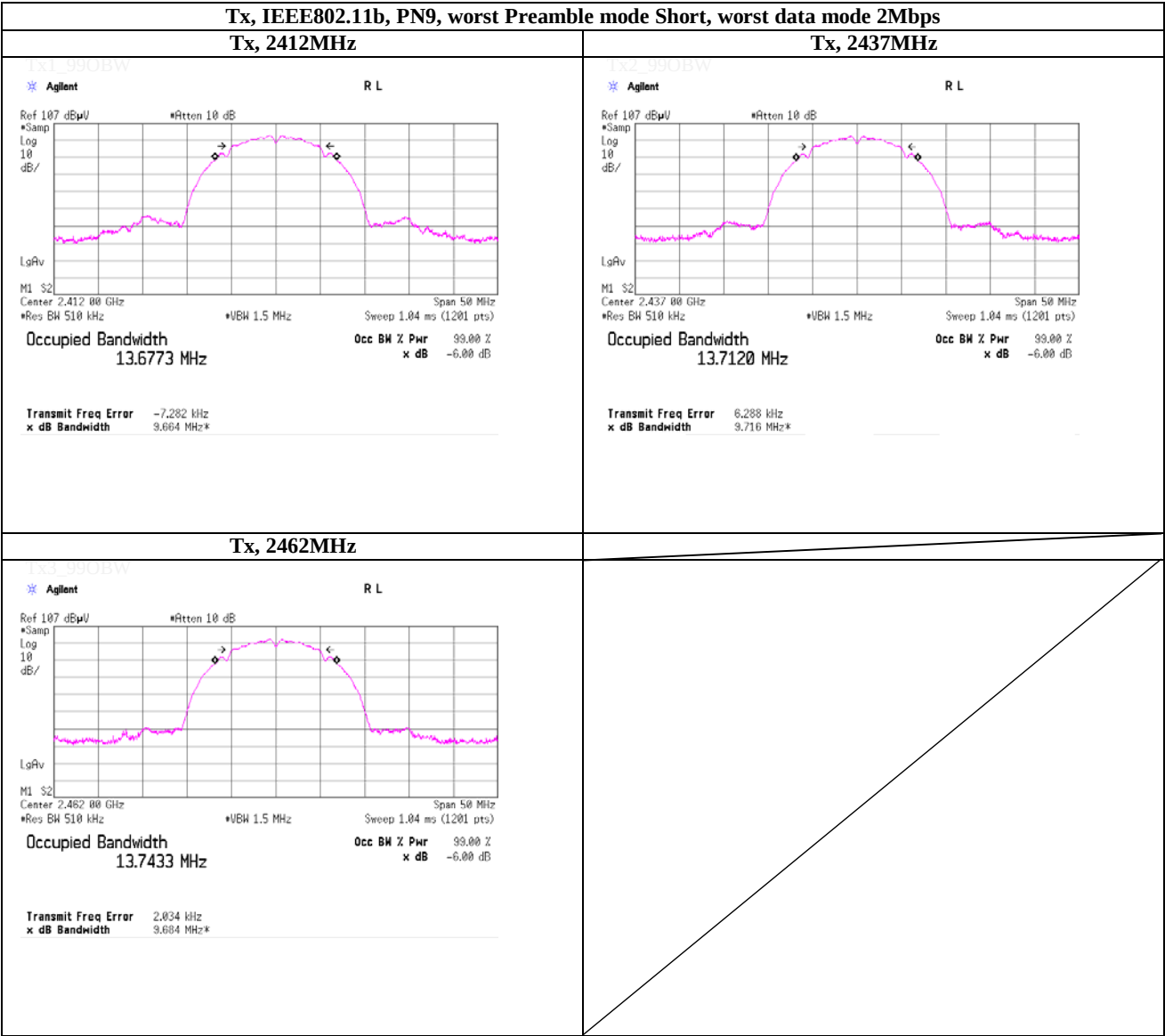
Ch. Freq. [MHz]	Freq. Reading [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
2412.0000	2410.40	-23.87	1.56	9.90	-12.41	8.00	20.41
2437.0000	2438.27	-24.14	1.56	9.90	-12.68	8.00	20.68
2462.0000	2460.42	-23.87	1.56	9.90	-12.41	8.00	20.41

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



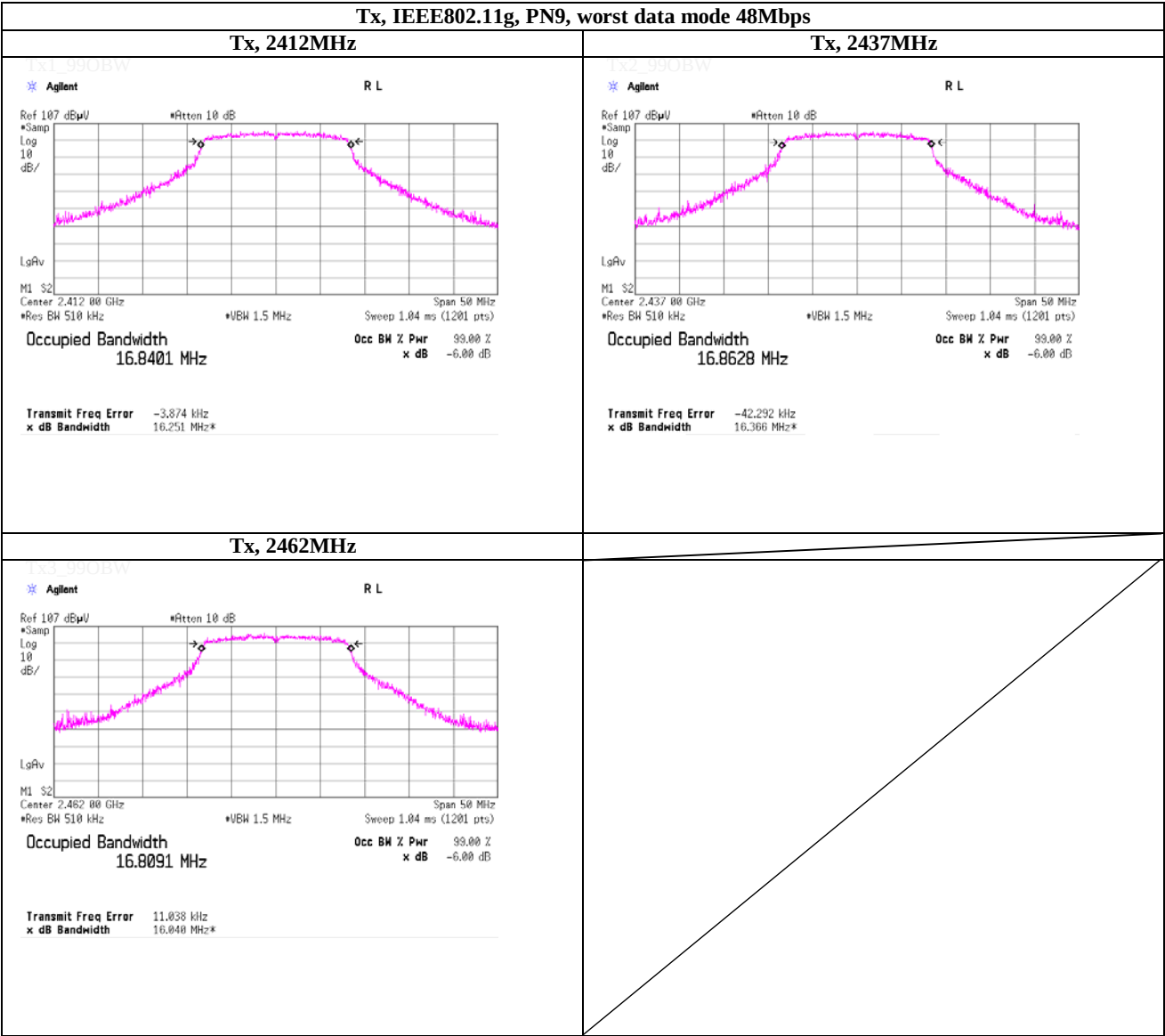
Test place UL Japan, Inc. Shonan EMC Lab. No.2 Measurement Room
Date August 13, 2014
Temperature / Humidity 26deg.C , 60%RH
Engineer Hikaru Shirasawa

99% Occupied Bandwidth



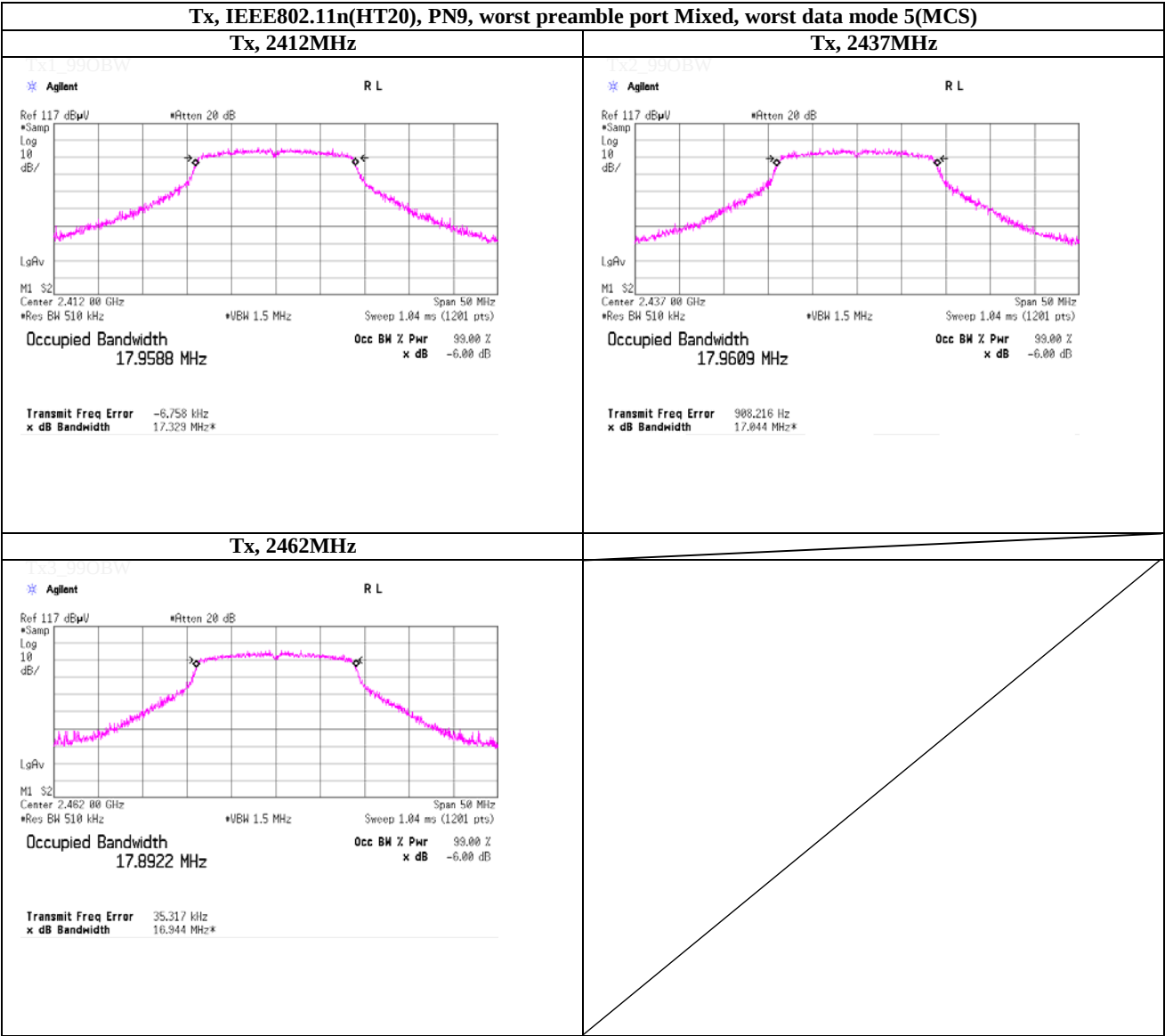
Test place UL Japan, Inc. Shonan EMC Lab. No.2 Measurement Room
Date August 13, 2014
Temperature / Humidity 26deg.C , 60%RH
Engineer Hikaru Shirasawa

99% Occupied Bandwidth



Test place UL Japan, Inc. Shonan EMC Lab. No.2 Measurement Room
Date August 13, 2014
Temperature / Humidity 26deg.C , 60%RH
Engineer Hikaru Shirasawa

99% Occupied Bandwidth



APPENDIX 2

Test Instruments

EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
SSA-02	Spectrum Analyzer	Agilent	E4448A	MY48250106	AT	2014/03/17 * 12
SPM-06	Power Meter	Anritsu	ML2495A	0850009	AT	2014/04/08 * 12
SPSS-03	Power sensor	Anritsu	MA2411B	0917063	AT	2014/04/08 * 12
SAT10-10	Attenuator	Weinschel Corp.	54A-10	37584	AT	2014/04/22 * 12
SCC-G12	Coaxial Cable	Suhner	SUCOFLEX 102	30790/2	AT	2014/03/13 * 12
SOS-13	Humidity Indicator	Custom	CTH-202	Q.C.17	AT	2014/04/22 * 12
SAF-01	Pre Amplifier	SONOMA	310N	290211	RE	2014/02/17 * 12
KAT6-04	Attenuator	INMET	18N-6dB	-	RE	2013/12/26 * 12
KAT3-09	Attenuator	JFW IND. INC.	50HF-003N	-	RE	2014/08/27 * 12
SBA-01	Biconical Antenna	Schwarzbeck	BBA9106	91032664	RE	2013/10/13 * 12
SCC-A1/A3/A5/A7/A8/A13/SRSE-01	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141PE/NS4906	-/0901-269(RF Selector)	RE	2014/04/25 * 12
SCC-A2/A4/A6/A7/A8/A13/SRSE-01	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141PE/NS4906	-/0901-269(RF Selector)	RE	2014/04/25 * 12
SLA-01	Logperiodic Antenna	Schwarzbeck	UHALP9108A	UHALP 9108-A 0888	RE	2013/10/26 * 12
SOS-01	Humidity Indicator	A&D	AD-5681	4062555	RE	2014/02/21 * 12
STR-01	Test Receiver	Rohde & Schwarz	ESU40	100093	RE,CE	2013/11/20 * 12
SJM-13	Measure	ASKUL	-	-	RE,CE	-
SAEC-01(NSA)	Semi-Anechoic Chamber	TDK	SAEC-01(NSA)	1	RE	2014/07/09 * 12
COTS-SEMI-1	EMI Software	TSJ	TEPTO-DV(RE,CE, RFLMF)	-	RE,CE	-
SCC-A12/A13/SRSE-01	Coaxial Cable&RF Selector	Suhner/Suhner/TOYO	RG223U/141PE/NS4906	-/0901-269(RF Selector)	CE	2014/04/25 * 12
SLS-01	LISN	Rohde & Schwarz	ENV216	100511	CE	2014/02/14 * 12
SAT3-06	Attenuator	JFW	50HF-003N	-	CE	2014/02/17 * 12
SOS-02	Humidity Indicator	A&D	AD-5681	4063343	CE	2014/03/07 * 12
SAF-04	Pre Amplifier	TOYO Corporation	TPA0118-36	1440489	RE	2014/03/14 * 12
SCC-G01	Coaxial Cable	Suhner	SUCOFLEX 104A	46497/4A	RE	2014/04/22 * 12
SCC-G21	Coaxial Cable	Suhner	SUCOFLEX 104	296169/4	RE	2014/05/15 * 12
SHA-01	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-725	RE	2014/08/12 * 12
SAT10-05	Attenuator(above1GHz)	Agilent	8493C-010	74864	RE	2013/11/22 * 12
SFL-02	Highpass Filter	MICRO-TRONICS	HPM50111	051	RE	2013/11/22 * 12
SSA-03	Spectrum Analyzer	Agilent	E4448A	MY48250152	RE	2014/02/03 * 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

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
SAEC-03(NSA)	Semi-Anechoic Chamber	TDK	SAEC-03(NSA)	3	RE	2014/07/14 * 12
SHA-03	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-739	RE	2014/08/12 * 12
SCC-G04	Coaxial Cable	Junkosha	J12J102207-00	JUN-12-14-018	RE	2014/06/24 * 12
SAF-06	Pre Amplifier	TOYO Corporation	TPA0118-36	1440491	RE	2014/05/23 * 12
SCC-G23	Coaxial Cable	Suhner	SUCOFLEX 104	297342/4	RE	2014/05/15 * 12
SSA-01	Spectrum Analyzer	Agilent	N9010A-526	MY48031482	RE	2014/04/07 * 12
SOS-05	Humidity Indicator	A&D	AD-5681	4062518	RE	2014/02/21 * 12
SJM-15	Measure	ASKUL	-	-	RE	-
SHA-05	Horn Antenna	ETS LINDGREN	3160-09	LM4210	RE	2014/03/15 * 12
SAF-09	Pre Amplifier	TOYO Corporation	HAP18-26W	00000018	RE	2014/05/15 * 12
SCC-G18	Coaxial Cable	Suhner	SUCOFLEX 104A	46292/4A	RE	2014/03/14 * 12

The expiration date of the calibration is the end of the expired month .

As for some calibrations performed after the tested dates , those test equipment have been controlled by means of an unbroken chains of calibrations .

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

Test Item :

CE: Conducted emission ,

RE: Radiated emission ,

AT: Antenna terminal conducted tests ,