



RADIO TEST REPORT

Test Report No. : 33AE0059-HO-01-A-R1

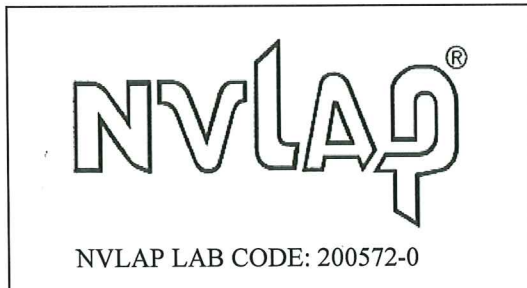
Applicant : Murata Manufacturing Co., Ltd.
Type of Equipment : Communication Module
Model No. : Type VX
FCC ID : VPYLBVX532
Test regulation : FCC Part 15 Subpart C: 2012
Test Result : Complied

1. This test report shall not be reproduced in full or partial, without the written approval of UL Japan, Inc.
2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with the above regulation.
4. The test results in this report are traceable to the national or international standards.
5. This test report must not be used by the customer to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.
6. This report is a revised version of 33AE0059-HO-01-A. 33AE0059-HO-01-A is replaced with this report.

Date of test: October 1 to 5, 2012

Representative test engineer: *S. Matsuyama*
Satofumi Matsuyama
Engineer of WiSE Japan,
UL Verification Service

Approved by: *M. Nishiyama*
Masanori Nishiyama
Manager of WiSE Japan,
UL Verification Service



This laboratory is accredited by the NVLAP LAB CODE 200572-0, U.S.A. The tests reported herein have been performed in accordance with its terms of accreditation. *As for the range of Accreditation in NVLAP, you may refer to the WEB address, <http://www.ul.com/japan/jpn/pages/services/emc/about/mark1/index.jsp#nvlap>

CONTENTS	PAGE
SECTION 1: Customer information.....	3
SECTION 2: Equipment under test (E.U.T.).....	3
SECTION 3: Test specification, procedures & results.....	4
SECTION 4: Operation of E.U.T. during testing.....	8
SECTION 5: Conducted Emission.....	10
SECTION 6: Radiated Spurious Emission	11
SECTION 7: Antenna Terminal Conducted Tests.....	13
APPENDIX 1: Data of EMI test.....	14
6dB Bandwidth.....	22
Maximum Peak Output Power	28
Average Output Power	34
Radiated Spurious Emission.....	36
Conducted Spurious Emission.....	57
Conducted Emission Band Edge compliance.....	75
99% Occupied Bandwidth.....	101
APPENDIX 2: Test instruments	105
APPENDIX 3: Photographs of test setup	107
Conducted Emission.....	107
Radiated Spurious Emission.....	108
Worst Case Position	109

SECTION 1: Customer information

Company Name : Murata Manufacturing Co., Ltd.
Address : 10-1, Higashikotari 1-chome, Nagaokakyo-shi, Kyoto 617-8555 Japan
Telephone Number : +81-75-955-6735
Facsimile Number : +81-75-955-6634
Contact Person : TAKAHARU KAWAKATSU

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

2.1 Identification of E.U.T.

Type of Equipment : Communication Module
Model No. : Type VX
Serial No. : Refer to Section 4, Clause 4.2
Rating : DC 2.85V / DC 3.4V
Receipt Date of Sample : September 29, 2012
Country of Mass-production : China
Condition of EUT : Engineering prototype
(Not for Sale: This sample is equivalent to mass-produced items.)
Modification of EUT : No Modification by the test lab

2.2 Product Description

General Specification

The EUT is Communication Module which is installed in Digital camera and Movie Camera.
It has two output power settings: Low power for Digital Camera and High power for Movie Camera.
Tests in this report have been performed with both setting of output power.

Specification of WLAN (IEEE802.11b/g/n)

Type of radio	Wireless LAN (IEEE802.11b/g)	Wireless LAN (IEEE802.11n) 2.4G Band SISO (20M Band)
Equipment Type	Transceiver	
Frequency of Operation	2412MHz - 2462MHz	
Bandwidth & Channel spacing	Bandwidth : 20MHz Ch spacing : 5MHz	
Type of Modulation	11b: DSSS 11g: OFDM	OFDM
Antenna Type	High Power: Pattern Antenna Low Power: FPC Antenna	
Antenna Gain	High Power: -3.7dBi Low Power: -4.5 dBi	
Power Supply (inner)	DC 2.85V / DC 3.4V	
Operating temperature range	-20 to +55 deg. C.	

UL Japan, Inc.

Head Office EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification : FCC Part 15 Subpart C: 2012, final revised on August 13, 2012 and effective September 12, 2012

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

3.2 Procedures and results

Item	Test Procedure	Specification	Worst margin	Results	Remarks
Conducted Emission	FCC: ANSI C63.4:2003 7. AC powerline Conducted Emission measurements ----- IC: RSS-Gen 7.2.4	FCC: Section 15.207 ----- IC: RSS-Gen 7.2.4	[Low Power] QP 19.1dB, 0.15000MHz, L AV 27.8dB, 24.93727MHz, L [High Power] QP 18.2dB, 0.15166MHz, L AV 24.5dB, 24.93734MHz, N	Complied	-
6dB Bandwidth	FCC: "Guidance on Measurement of Digital Transmission Systems Operating under Section15.247" ----- IC: RSS-Gen 4.6.2	FCC: Section 15.247(a)(2) ----- IC: RSS-210 A8.2(a)	See data.	Complied	Conducted
Maximum Peak Output Power	FCC: "Guidance on Measurement of Digital Transmission Systems Operating under Section15.247" ----- IC: RSS-Gen 4.8	FCC: Section 15.247(b)(3) ----- IC: RSS-210 A8.4(4)		Complied	Conducted
Power Density	FCC: "Guidance on Measurement of Digital Transmission Systems Operating under Section15.247" ----- IC: -	FCC: Section 15.247 (e) ----- IC: RSS-210 A8.2(b)		Complied	Conducted
Spurious Emission Restricted Band Edges	FCC: "Guidance on Measurement of Digital Transmission Systems Operating under Section15.247" ----- IC: RSS-Gen 4.9	FCC: Section15.247(d) ----- IC: RSS-210 A8.5 RSS-Gen 7.2.3	[Low Power] 9.6dB 299.282MHz, QP, Vertical [High Power] 6.7dB 2390.000MHz, AV, Horizontal	Complied	Conducted/ Radiated

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

* In case any questions arise about test procedure, ANSI C63.4: 2003 is also referred.

FCC 15.31 (e)

[DC3.4V]

The worst case was confirmed with the measurement of minimum voltage (DC3.2V) and maximum voltage (DC4.8V), as a result, there was no difference in two results. Therefore, the measurement was performed with typical voltage: DC3.4V, and the EUT complies with the requirement.

[DC 2.85V]

The worst case was confirmed with the measurement of minimum voltage (DC2.7V) and maximum voltage (DC3.3V), as a result, there was no difference in two results. Therefore, the measurement was performed with typical voltage: DC2.85V, and the EUT complies with the requirement.

FCC Part 15.203/212 Antenna requirement

It is impossible for end users to replace the antenna, because it is soldered on the circuit board. Therefore, the equipment complies with the antenna requirement of Section 15.203/212.

3.3 Addition to standard

Item	Test Procedure	Specification	Worst margin	Results	Remarks
99% Occupied Bandwidth	IC: RSS-Gen 4.6.1	IC: RSS-Gen 4.6.1	N/A	-	Conducted

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

UL Japan, Inc.

Head Office EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

3.4 Uncertainty

EMI

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

Test room (semi-anechoic chamber)	Conducted emission (+dB)
	150kHz-30MHz
No.1	3.5dB
No.2	3.6dB
No.3	3.6dB
No.4	3.6dB

Test room (semi-anechoic chamber)	Radiated emission						
	(3m*)(+dB)				(1m*)(+dB)		(0.5m*)(+dB)
	9kHz -30MHz	30MHz -300MHz	300MHz -1GHz	1GHz -10GHz	10GHz -18GHz	18GHz -26.5GHz	26.5GHz -40GHz
No.1	4.3dB	5.0dB	5.1dB	4.9dB	5.8dB	4.4dB	4.3dB
No.2	4.3dB	5.2dB	5.1dB	5.0dB	5.7dB	4.3dB	4.2dB
No.3	4.6dB	5.0dB	5.1dB	5.0dB	5.7dB	4.5dB	4.2dB
No.4	4.8dB	5.2dB	5.0dB	5.0dB	5.7dB	5.2dB	4.2dB

*3m/1m/0.5m = Measurement distance

Power meter (+dB)	
Below 1GHz	Above 1GHz
1.0dB	1.0dB

Antenna terminal conducted emission and Power density (+dB)			Antenna terminal conducted emission (+dB)		Channel power (+dB)
Below 1GHz	1GHz-3GHz	3GHz-18GHz	18GHz-26.5GHz	26.5GHz-40GHz	
1.0dB	1.1dB	2.7dB	3.2dB	3.3dB	1.5dB

Conducted Emission test

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

Radiated emission test(3m)

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

UL Japan, Inc.

Head Office EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

3.5 Test Location

UL Japan, Inc. Head Office EMC Lab. *NVLAP Lab. code: 200572-0
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN
Telephone : +81 596 24 8116 Facsimile : +81 596 24 8124

	FCC Registration Number	IC Registration Number	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Other rooms
No.1 semi-anechoic chamber	313583	2973C-1	19.2 x 11.2 x 7.7m	7.0 x 6.0m	No.1 Power source room
No.2 semi-anechoic chamber	655103	2973C-2	7.5 x 5.8 x 5.2m	4.0 x 4.0m	-
No.3 semi-anechoic chamber	148738	2973C-3	12.0 x 8.5 x 5.9m	6.8 x 5.75m	No.3 Preparation room
No.3 shielded room	-	-	4.0 x 6.0 x 2.7m	N/A	-
No.4 semi-anechoic chamber	134570	2973C-4	12.0 x 8.5 x 5.9m	6.8 x 5.75m	No.4 Preparation room
No.4 shielded room	-	-	4.0 x 6.0 x 2.7m	N/A	-
No.5 semi-anechoic chamber	-	-	6.0 x 6.0 x 3.9m	6.0 x 6.0m	-
No.6 shielded room	-	-	4.0 x 4.5 x 2.7m	4.75 x 5.4 m	-
No.6 measurement room	-	-	4.75 x 5.4 x 3.0m	4.75 x 4.15 m	-
No.7 shielded room	-	-	4.7 x 7.5 x 2.7m	4.7 x 7.5m	-
No.8 measurement room	-	-	3.1 x 5.0 x 2.7m	N/A	-
No.9 measurement room	-	-	8.0 x 4.5 x 2.8m	2.0 x 2.0m	-
No.10 measurement room	-	-	2.6 x 2.8 x 2.5m	2.4 x 2.4m	-
No.11 measurement room	-	-	3.1 x 3.4 x 3.0m	2.4 x 3.4m	-

* Size of vertical conducting plane (for Conducted Emission test) : 2.0 x 2.0m for No.1, No.2, No.3, and No.4 semi-anechoic chambers and No.3 and No.4 shielded rooms.

3.6 Data of EMI, Test instruments, and Test set up

Refer to APPENDIX.

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

4.1 Operating Mode(s)

Mode	Remarks*
IEEE 802.11b (11b)	5.5Mbps, PN9
IEEE 802.11g (11g)	6Mbps, PN9
IEEE 802.11n SISO 20MHz BW (11n-20)	MCS 0, PN9
*The worst condition was determined based on the test result of Maximum Peak Output Power (Mid Channel)	
*Power of the EUT was set by the software as follows; Power settings: [Low power] 5dBm [High power] 9dBm Software: version=5.90.153 *This setting of software is the worst case. Any conditions under the normal use do not exceed the condition of setting. In addition, end users cannot change the settings of the output power of the product.	

*The details of Operating mode(s)

Test Item	Operating Mode	Tested frequency
Conducted Emission	11b Tx	2412MHz
6dB Bandwidth	11g Tx	2437MHz
Maximum Peak Output Power	11n-20 Tx	2462MHz
Spurious Emission		
Power Density		
99% Occupied Bandwidth		

UL Japan, Inc.

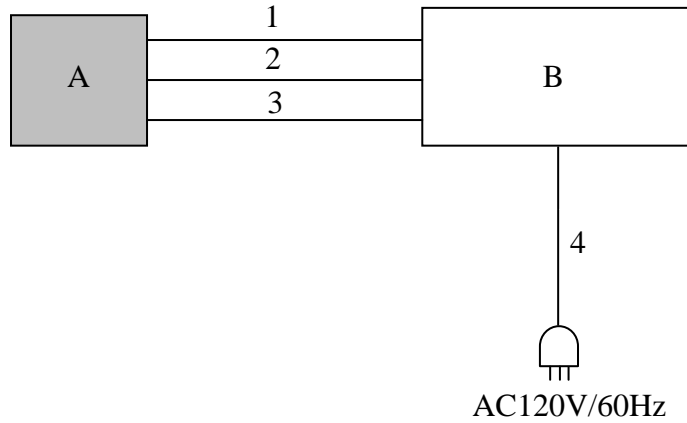
Head Office EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

4.2 Configuration and peripherals



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

Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	Communication Module	Type VX	[Low Power] 3	Murata Manufacturing Co., Ltd.	EUT
			[High Power] 1 *1) 2 *2)		
B	DC Power supply	PW8-3ATP	09067054	JVC KENWOOD	-

*1) Used for Antenna Terminal conducted test

*2) Used for Conducted Emission test and Radiated Emission test

List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	DC Cable	0.9	Unshielded	Unshielded	-
2	DC Cable	1.2	Unshielded	Unshielded	-
3	DC Cable	1.2	Unshielded	Unshielded	-
4	AC Cable	2.2	Unshielded	Unshielded	-

UL Japan, Inc.

Head Office EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

SECTION 5: Conducted Emission

Test Procedure and conditions

EUT was placed on a urethane platform of nominal size, 1.0m by 1.5m, raised 0.8m above the conducting ground plane. The rear of tabletop was located 40cm to the vertical conducting plane. The rear of EUT, including peripherals aligned and 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 a Line Impedance Stabilization Network (LISN)/ Artificial mains Network (AMN) and excess AC cable was bundled in center.

For the tests on EUT with other peripherals (as a whole system)

I/O cables that were connected to the peripherals were bundled in center. They were folded back and forth forming a bundle 30cm to 40cm long and were hanged at a 40cm height to the ground plane. All unused 50ohm connectors of the LISN(AMN) were resistivity terminated in 50ohm when not connected to the measuring equipment.

The AC Mains Terminal Continuous disturbance Voltage has been measured with the EUT in a Semi Anechoic Chamber. The EUT was connected to a LISN (AMN).

An overview sweep with peak detection has been performed.

The test results and limit are rounded off to one decimal place, so some differences might be observed.

Detector	: QP and AV
Measurement range	: 0.15-30MHz
Test data	: APPENDIX
Test result	: Pass

UL Japan, Inc.

Head Office EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

SECTION 6: Radiated Spurious Emission

Test Procedure

[Below 30MHz]

Frequency: From 9kHz to 30MHz at distance 3m

The EUT was rotated a full revolution in order to obtain the maximum value of the electric field intensity.

The measurements were performed for vertical polarization (antenna angle: 0, 45, 90, and 135 deg.) and horizontal polarization.

*Refer to Figure 1 about Direction of the Loop Antenna.

[Above 30MHz]

It was measured based on "2. Radiated emission test" of "Guidance on Measurement of Digital Transmission Systems Operating under Section 15.247 (issued on March 23, 2005.)".

EUT was placed on a urethane platform of nominal size, 0.5m by 1.0m, raised 0.8m above the conducting ground plane.

The Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with a ground plane.

The height of the measuring antenna varied between 1 and 4m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field strength.

The measurements were performed for both vertical and horizontal antenna polarization with the Test Receiver, or the Spectrum Analyzer.

The measurements were made with the following detector function of the test receiver and the Spectrum analyzer (in linear mode).

The test was made with the detector (RBW/VBW) in the following table.

When using Spectrum analyzer, the test was made with adjusting span to zero by using peak hold.

Test Antennas are used as below;

Frequency	Below 30MHz	30MHz to 300MHz	300MHz to 1GHz	Above 1GHz
Antenna Type	Loop	Biconical	Logperiodic	Horn

In any 100kHz bandwidth outside the restricted band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator confirmed 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on a radiated measurement.

20dBc was applied to the frequency over the limit of FCC 15.209 / Table 5 of RSS-Gen 7.2.5(IC) and outside the restricted band of FCC 15.205 / Table 3 of RSS-Gen 7.2.2 (IC).

Frequency	Below 1GHz	Above 1GHz		20dBc
Instrument used	Test Receiver	Spectrum Analyzer		Spectrum Analyzer
Detector	QP	PK	AV	PK
IF Bandwidth	BW 120kHz(T/R) BW 9kHz(T/R) *3)	RBW: 1MHz VBW: 3MHz	RBW: 1MHz VBW: 10Hz *1)	RBW: 100kHz VBW: 300kHz (S/A)
Test Distance	3m	3m (below 10GHz), 1m*2) (above 10GHz)		3m (below 10GHz), 1m*2) (above 10GHz),

*1) The test was performed with VBW 10Hz since the EUT had no intervals during which the transmitter was off (see Appendix).

*2) Distance Factor: $20 \times \log(3.0\text{m}/1.0\text{m}) = 9.5\text{dB}$

*3) From 490kHz – 30MHz

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

The test results and limit are rounded off to one decimal place, so some differences might be observed.

Measurement range : 30M-26.5GHz
Test data : APPENDIX
Test result : Pass

UL Japan, Inc.

Head Office EMC Lab.

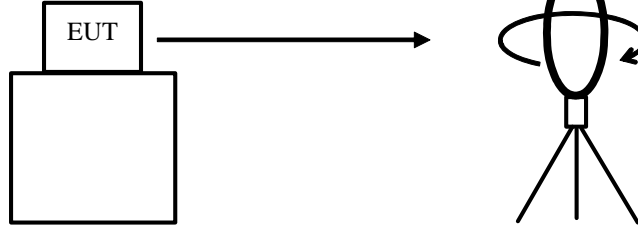
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

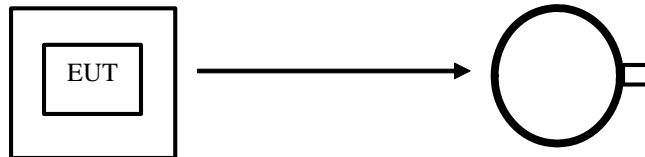
Facsimile : +81 596 24 8124

Figure 1: Direction of the Loop Antenna

Side View (Vertical)

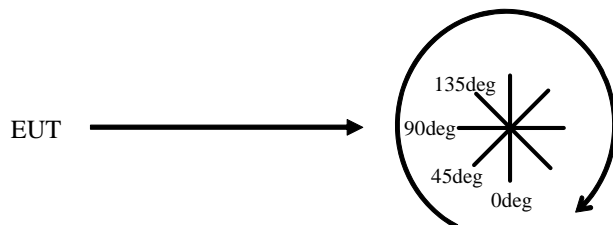


.....
Top View (Horizontal)



Antenna was not rotated.

.....
Top View (Vertical)



Front side: 0 deg.
Forward direction: clockwise

SECTION 7: Antenna Terminal Conducted Tests

Test Procedure

The tests were made with below setting connected to the antenna port.

Test	Span	RBW	VBW	Sweep time	Detector	Trace	Instrument used
6dB Bandwidth	20MHz	100kHz	300kHz	Auto	Peak	Max Hold	Spectrum Analyzer
99% Occupied Bandwidth	Enough width to display 20dB Bandwidth	1 to 3% of Span	Three times of RBW	Auto	Peak	Max Hold	Spectrum Analyzer
Maximum Peak Output Power	-	-	-	Auto	Peak/ Average *1)	-	Power Meter (Sensor: 50MHz BW)
Peak Power Density	18MHz 20MHz	30kHz	100kHz	600sec 667sec	Peak	Max Hold	Spectrum Analyzer *2) *3)
Conducted Spurious Emission *4)	9kHz to 150kHz	200Hz	620Hz	Auto	Peak	Max Hold	Spectrum Analyzer
	150kHz to 30MHz	9.1kHz	27kHz				
	30MHz to 25GHz (Less or equal to 5GHz)	100kHz	300kHz				

*1) Testing using an average detector was performed in order to confirm that the output power of the EUT met the exclusion limits stated in FCC Part 2 Section 2.1093 and FCC radio frequency (RF) Exposure Guidelines in Supplement C to OET 65 and the EUT was exempt from RF exposure SAR evaluation.

*2) PSD Option 1 of "Guidance on Measurement of Digital Transmission Systems Operating under Section 15.247 (issued on March 23, 2005)".

*3) The test was not performed at RBW:3kHz however the measurement is to be performed with RBW:3kHz in the regulation, because the measurement value with RBW:3kHz is less than the value of RBW:30kHz and the test data met the limit with RBW:30kHz.

*4) 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 low enough as shown in the chart.(9kHz-150kHz:RBW=200Hz, 150kHz-30MHz:RBW=9.1kHz).

The test results and limit are rounded off to two decimals place, so some differences might be observed.

Test data : APPENDIX
Test result : Pass

APPENDIX 1: Data of EMI test

Conducted emission
Low power

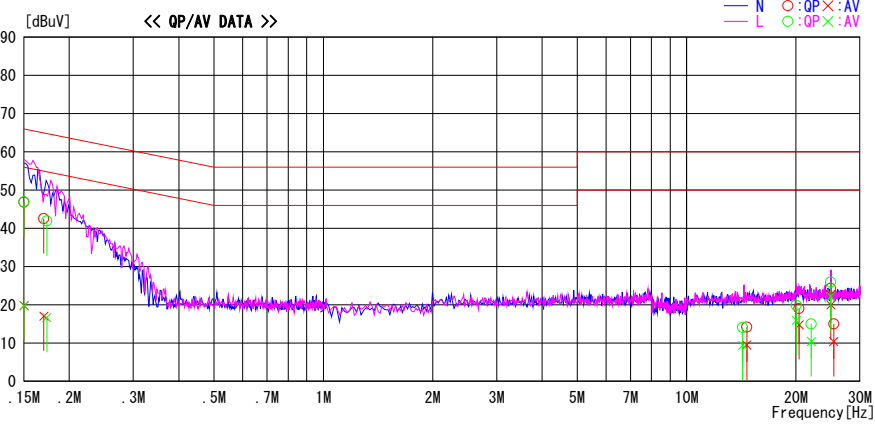
DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Head Office EMC Lab. No.2 Semi Anechoic Chamber
Date : 2012/10/04

Temp./Humi. : 23deg. C / 52% RH
Engineer : Tomohisa Nakagawa

Mode / Remarks : Tx 11g 2412MHz 6Mbps

LIMIT : FCC15.207 QP
FCC15.207 AV



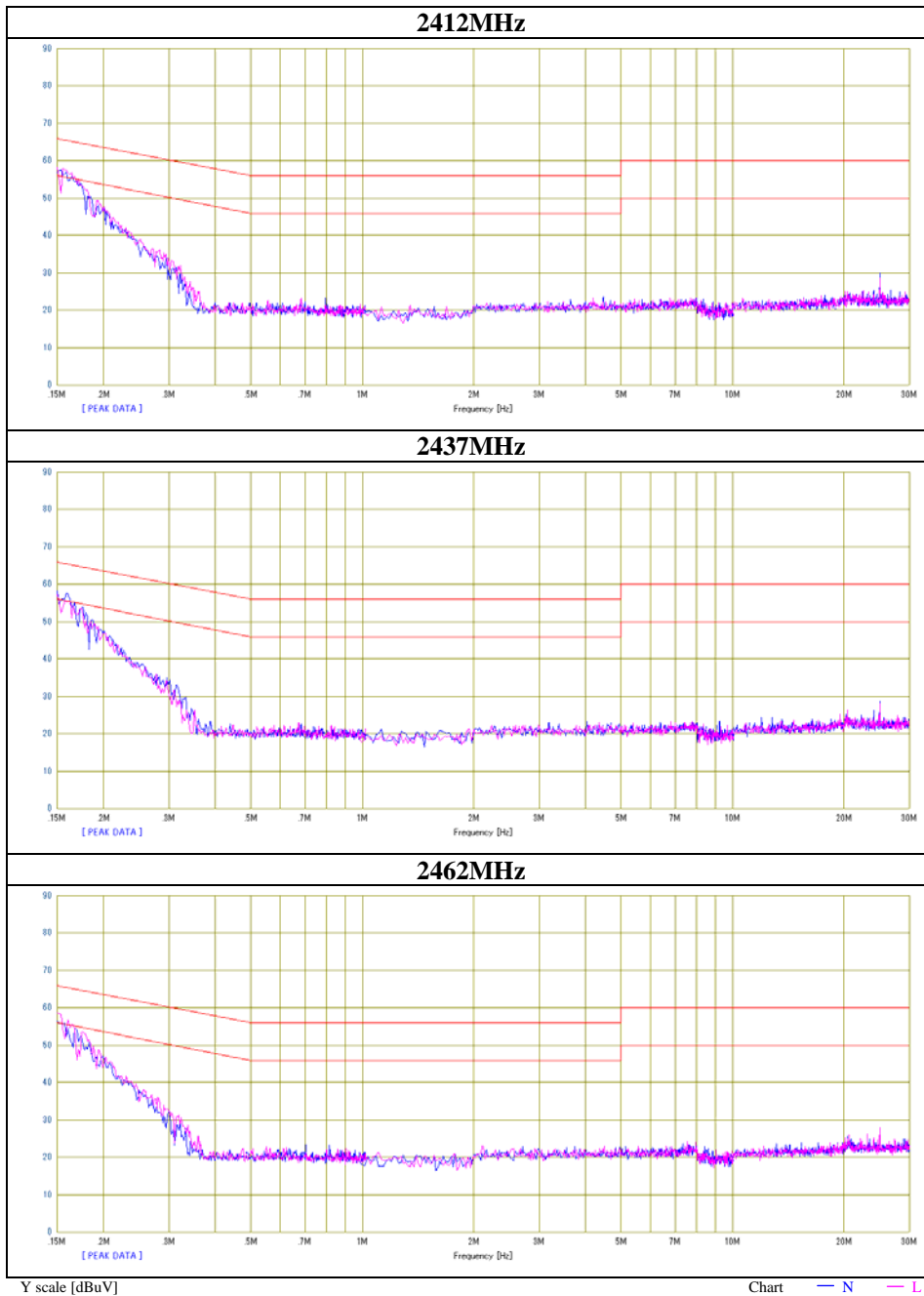
Frequency [MHz]	Reading Level		Corr. Factor [dB]	Results		Limit		Margin		Phase	Comment
	QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dB]	AV [dB]		
0.15000	33.6	6.6	13.2	46.8	19.8	66.0	56.0	19.2	36.2	N	
0.17014	29.4	3.9	13.2	42.6	17.1	65.0	55.0	22.4	37.9	N	
14.63032	-0.6	-5.3	14.8	14.2	9.5	60.0	50.0	45.8	40.5	N	
20.40415	3.9	-0.3	15.1	19.0	14.8	60.0	50.0	41.0	35.2	N	
24.94024	9.0	4.7	15.3	24.3	20.0	60.0	50.0	35.7	30.0	N	
25.39200	-0.3	-4.9	15.3	15.0	10.4	60.0	50.0	45.0	39.6	N	
0.15000	33.7	6.6	13.2	46.9	19.8	66.0	56.0	19.1	36.2	L	
0.17342	28.7	3.5	13.2	41.9	16.7	64.8	54.8	22.9	38.1	L	
14.26852	-0.7	-5.4	14.8	14.1	9.4	60.0	50.0	45.9	40.6	L	
20.03975	4.8	0.9	15.1	19.9	16.0	60.0	50.0	40.1	34.0	L	
22.03974	-0.2	-4.8	15.2	15.0	10.4	60.0	50.0	45.0	39.6	L	
24.93727	10.6	6.9	15.3	25.9	22.2	60.0	50.0	34.1	27.8	L	

CHART: WITH FACTOR, Peak hold data. CALCULATION: RESULT=READING+C. F (LISN LOSS+ATT LOSS +CABLE LOSS)
Except for the above table : adequate margin data below the limits.

Conducted Emission

Low power

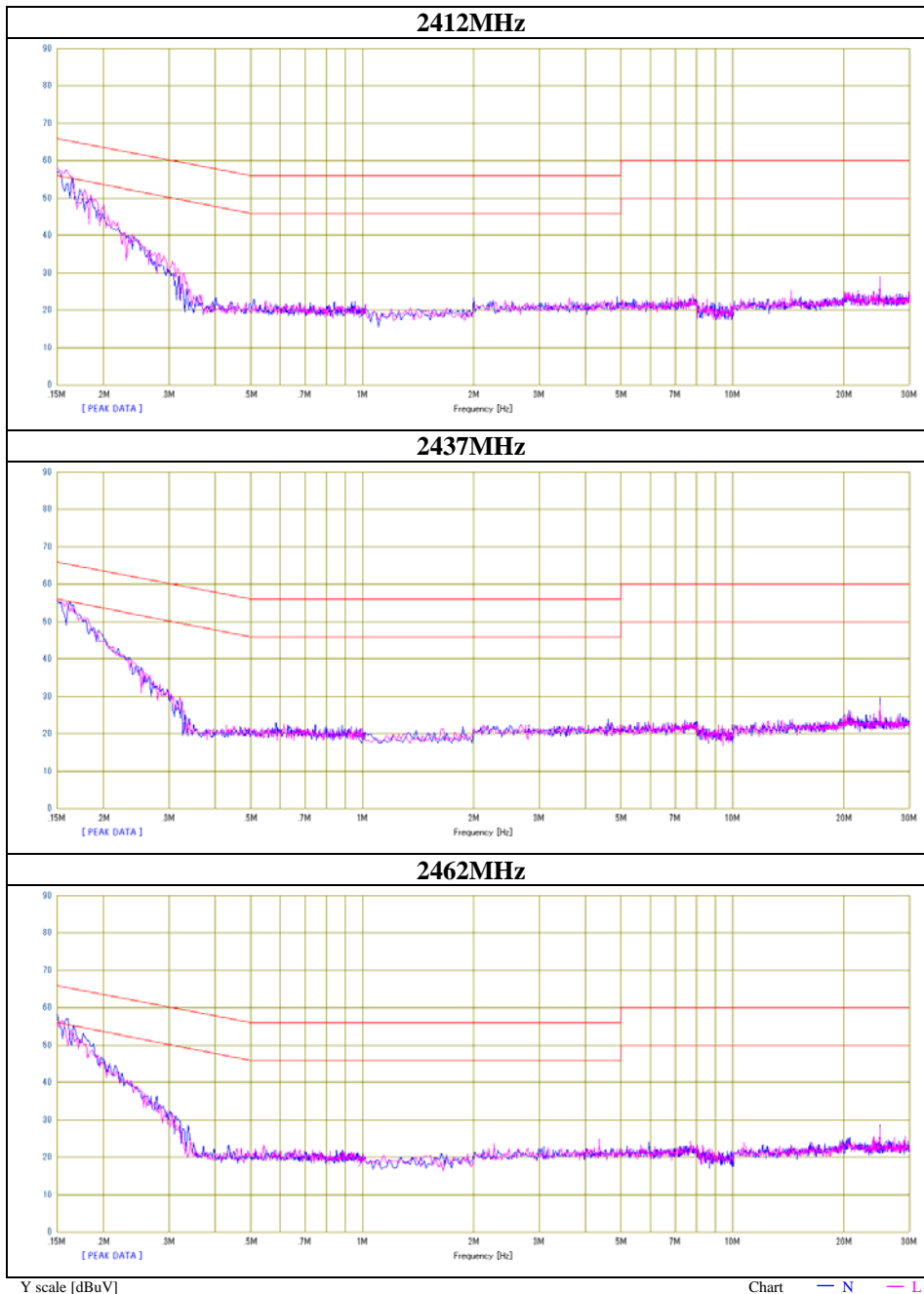
Test place	Head Office EMC Lab. No.2 Semi Anechoic Chamber
Report No.	33AE0059-HO-01
Date	10/03/2012
Temperature/ Humidity	23 deg.C / 652%
Engineer	Tomohisa Nakagawa
Mode	11b Tx



Conducted Emission

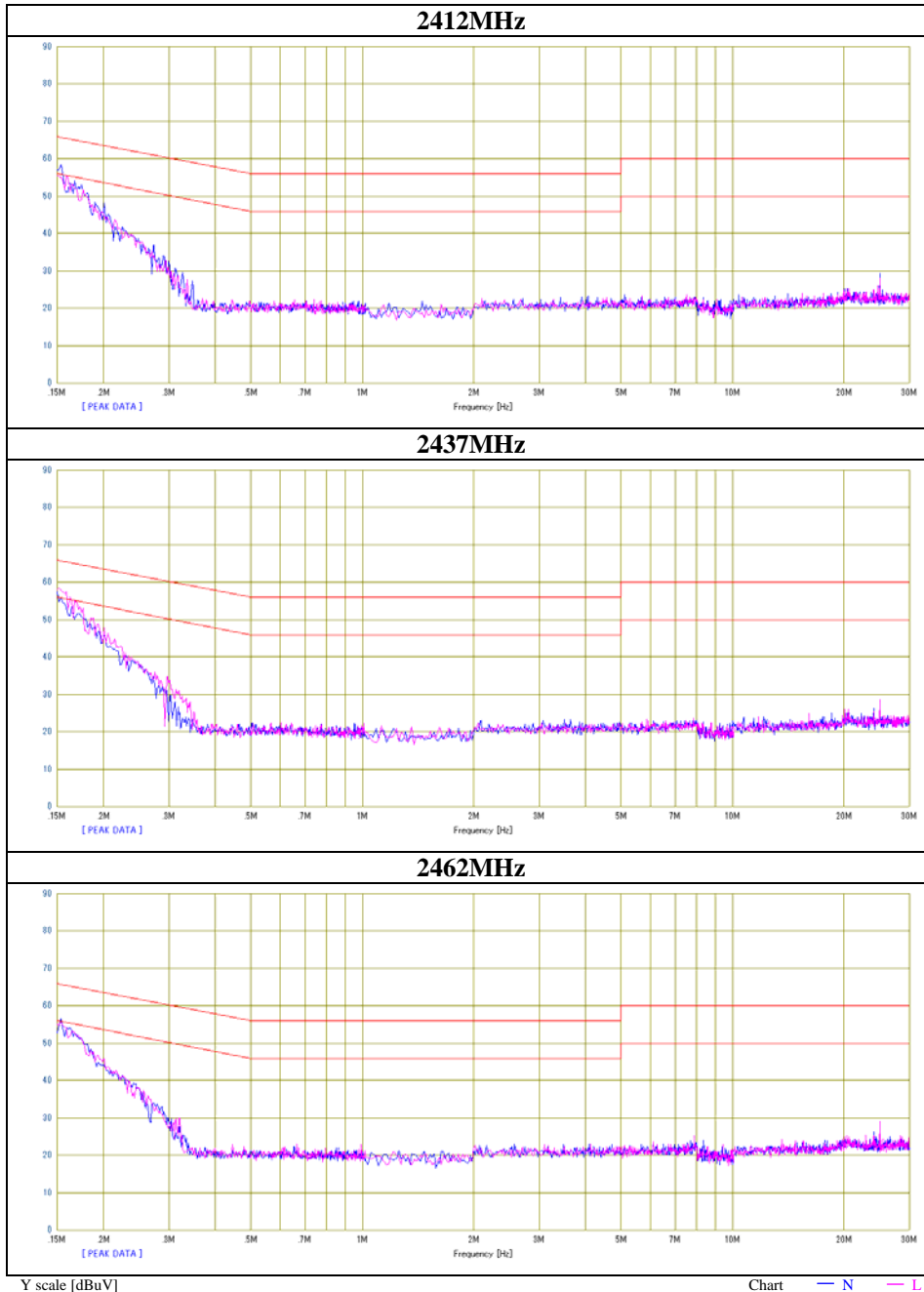
Low power

Test place	Head Office EMC Lab. No.2 Semi Anechoic Chamber
Report No.	33AE0059-HO-01
Date	10/03/2012
Temperature/ Humidity	23 deg.C / 652%
Engineer	Tomohisa Nakagawa
Mode	11g Tx



Conducted Emission Low power

Test place	Head Office EMC Lab. No.2 Semi Anechoic Chamber
Report No.	33AE0059-HO-01
Date	10/03/2012
Temperature/ Humidity	23 deg.C./ 652%
Engineer	Tomohisa Nakagawa
Mode	11n Tx



Conducted Emission High Power

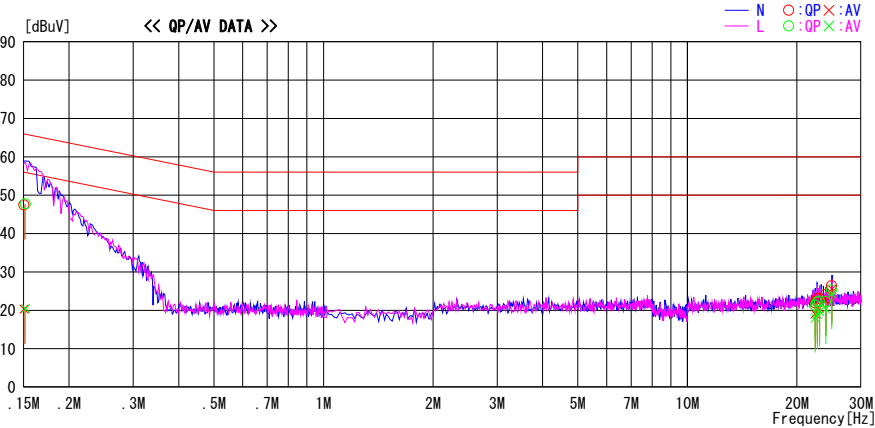
DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Head Office EMC Lab. No.2 Semi Anechoic Chamber
Date : 2012/10/03

Temp./Humi. : 24deg. C / 54% RH
 Engineer : Satofumi Matsuyama

Mode / Remarks : Tx 11g 2412MHz 6Mbps

LIMIT : FCC15.207 QP
FCC15.207 AV

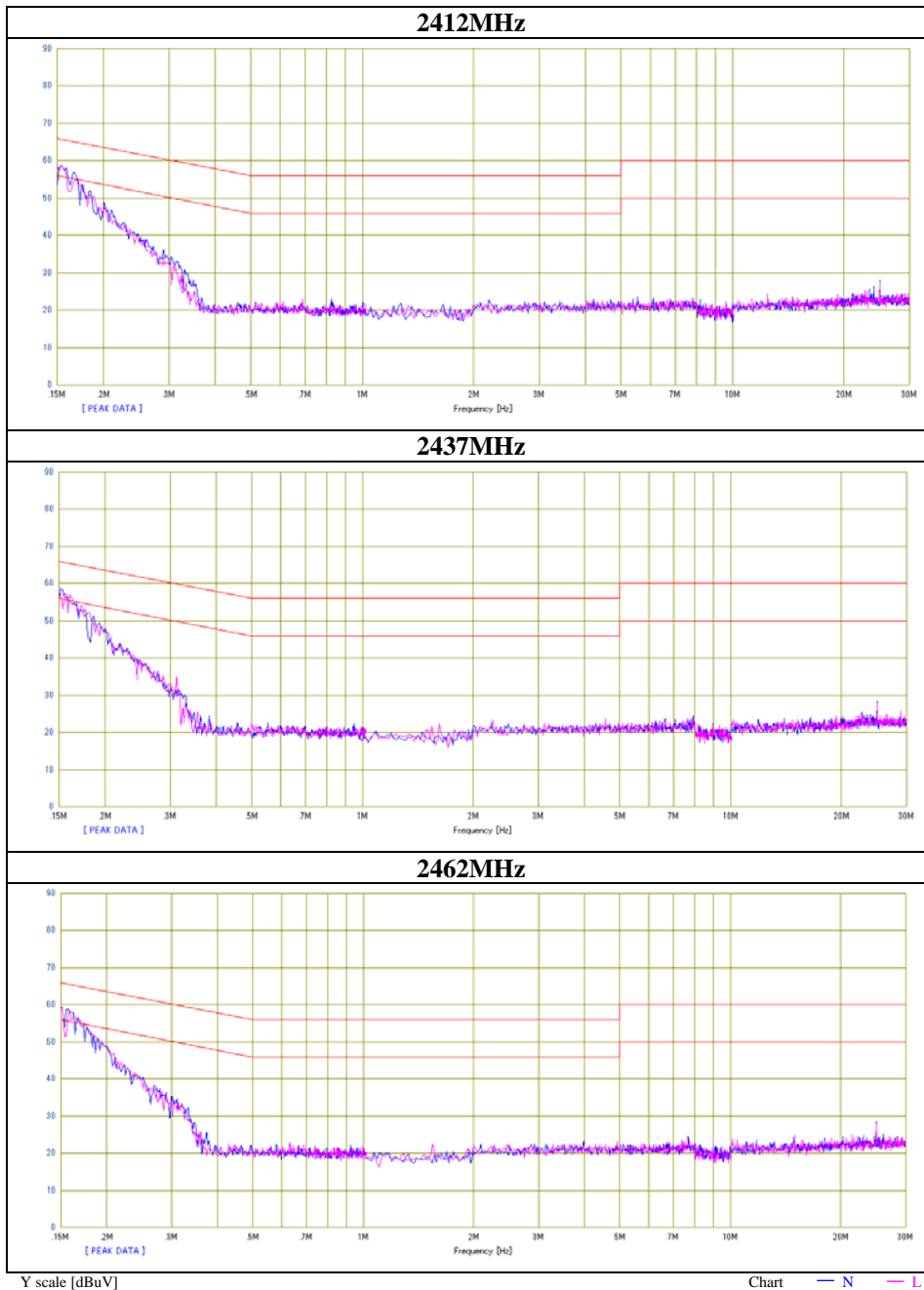


Frequency [MHz]	Reading Level		Corr. Factor [dB]	Results		Limit		Margin		Phase	Comment
	QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dB]	AV [dB]		
0.15043	34.3	7.1	13.2	47.5	20.3	66.0	56.0	18.5	35.7	N	
22.45141	6.7	3.9	15.2	21.9	19.1	60.0	50.0	38.1	30.9	N	
22.74875	7.8	5.3	15.2	23.0	20.5	60.0	50.0	37.0	29.5	N	
23.04520	7.9	5.4	15.2	23.1	20.6	60.0	50.0	36.9	29.4	N	
24.00004	8.9	7.3	15.2	24.1	22.5	60.0	50.0	35.9	27.5	N	
24.93734	11.1	10.2	15.3	26.4	25.5	60.0	50.0	33.6	24.5	N	
0.15166	34.5	7.2	13.2	47.7	20.4	65.9	55.9	18.2	35.5	L	
22.45072	6.1	2.9	15.2	21.3	18.1	60.0	50.0	38.7	31.9	L	
22.75160	7.0	3.8	15.2	22.2	19.0	60.0	50.0	37.8	31.0	L	
23.04026	7.2	4.5	15.2	22.4	19.7	60.0	50.0	37.6	30.3	L	
23.99990	7.1	5.1	15.2	22.3	20.3	60.0	50.0	37.7	29.7	L	
24.93774	10.0	8.9	15.3	25.3	24.2	60.0	50.0	34.7	25.8	L	

CHART: WITH FACTOR, Peak hold data. CALCULATION: RESULT=READING+C. F (LISN LOSS+ATT LOSS +CABLE LOSS)
 Except for the above table : adequate margin data below the limits.

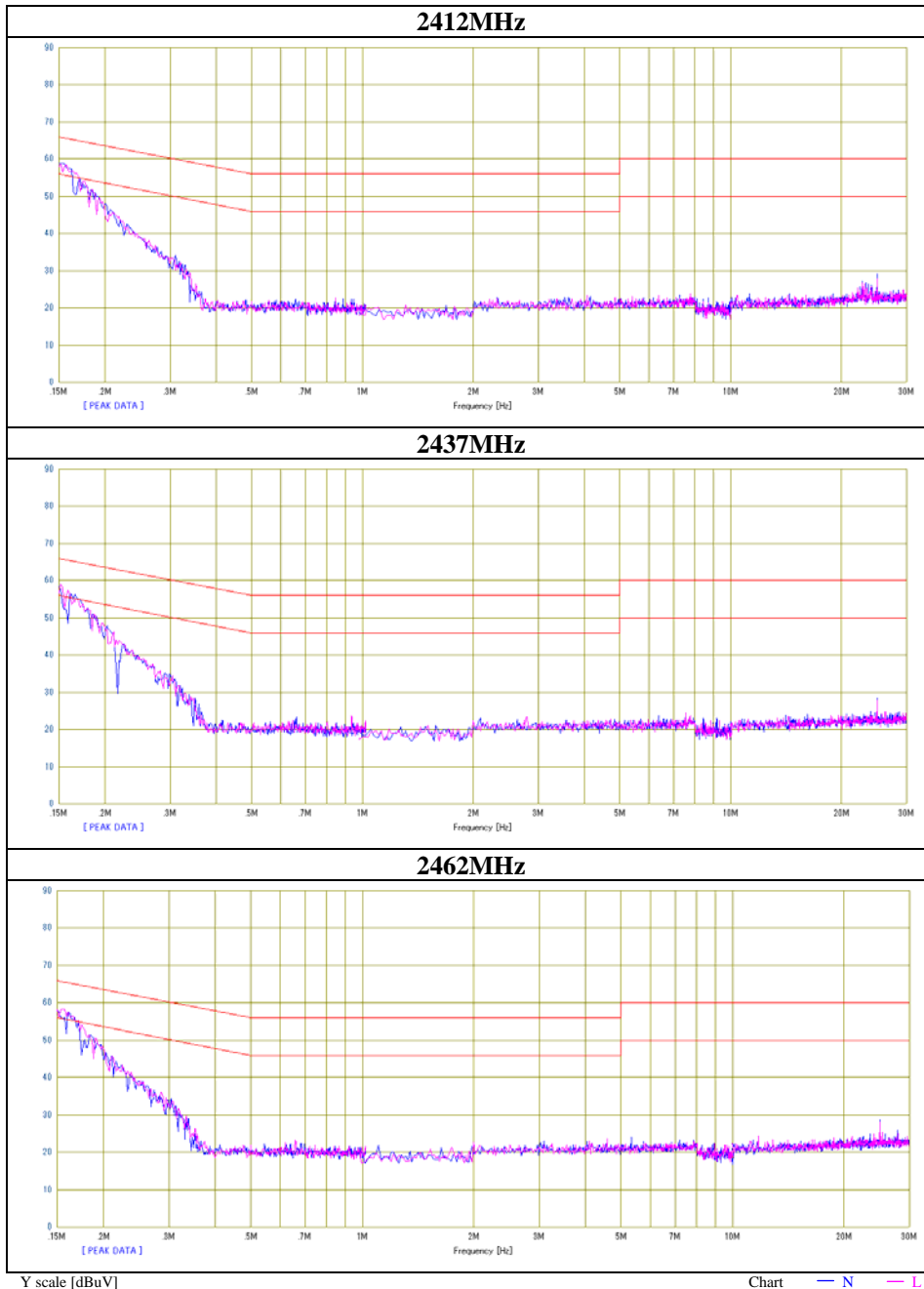
Conducted Emission High Power

Test place	Head Office EMC Lab. No.2 Semi Anechoic Chamber
Report No.	33AE0059-HO-01
Date	10/03/2012
Temperature/ Humidity	24 deg.C./ 54% RH
Engineer	Satofumi Matsuyama
Mode	11b Tx



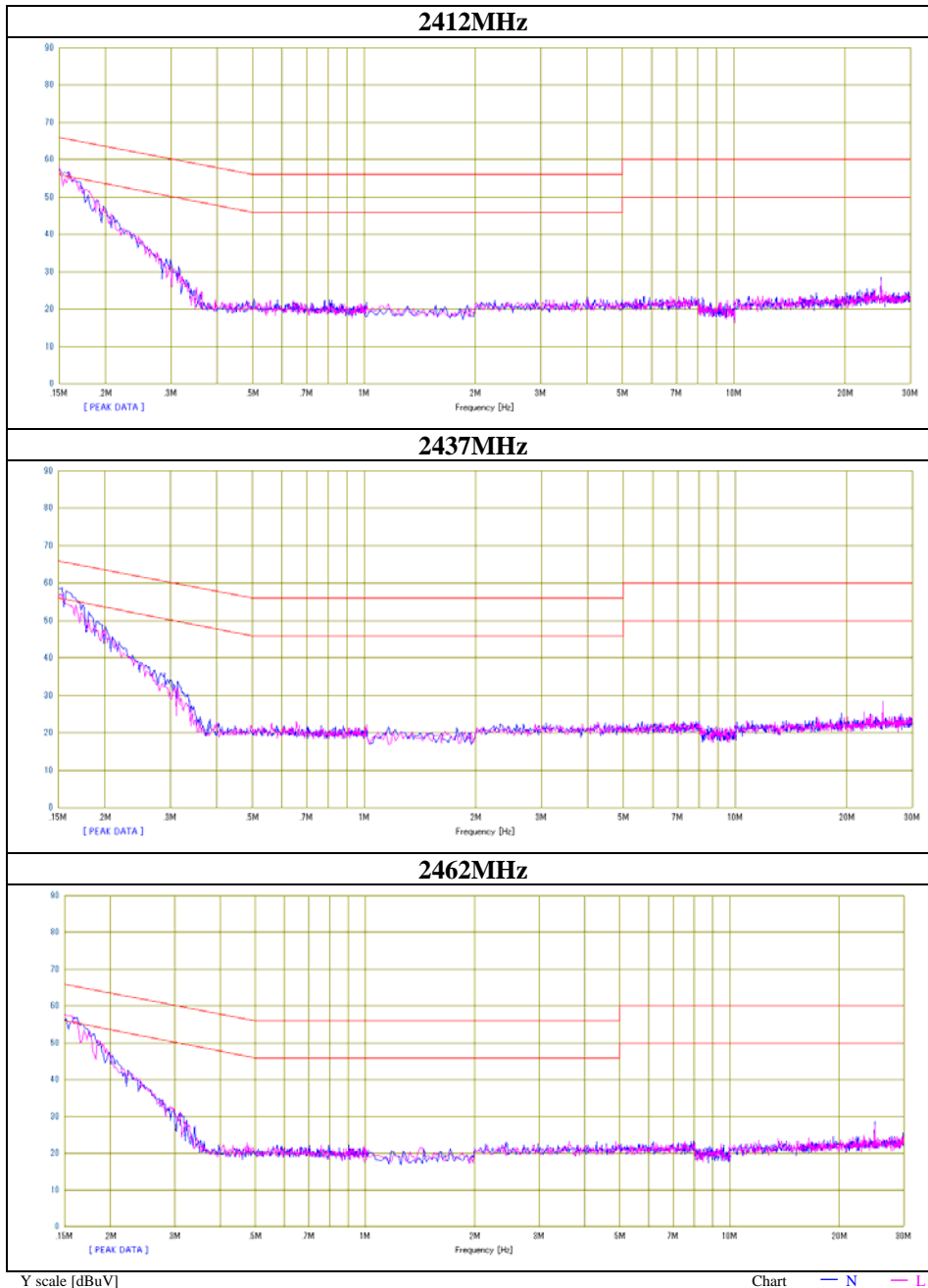
Conducted Emission High Power

Test place	Head Office EMC Lab. No.2 Semi Anechoic Chamber
Report No.	33AE0059-HO-01
Date	10/03/2012
Temperature/ Humidity	24 deg.C./ 54% RH
Engineer	Satofumi Matsuyama
Mode	11g Tx



Conducted Emission High Power

Test place	Head Office EMC Lab. No.2 Semi Anechoic Chamber
Report No.	33AE0059-HO-01
Date	10/03/2012
Temperature/ Humidity	24 deg.C./ 54% RH
Engineer	Satofumi Matsuyama
Mode	11n20 Tx



6dB Bandwidth

Low power

Test place Head Office EMC Lab. No.7 Shielded Room
Report No. 33AE0059-HO-01
Date 10/01/2012
Temperature/ Humidity 24 deg. C / 60% RH
Engineer Takumi Shimada
Mode Tx

11b

Frequency [MHz]	6dB Bandwidth [MHz]	Limit [kHz]
2412	7.398	>500
2437	7.003	>500
2462	7.478	>500

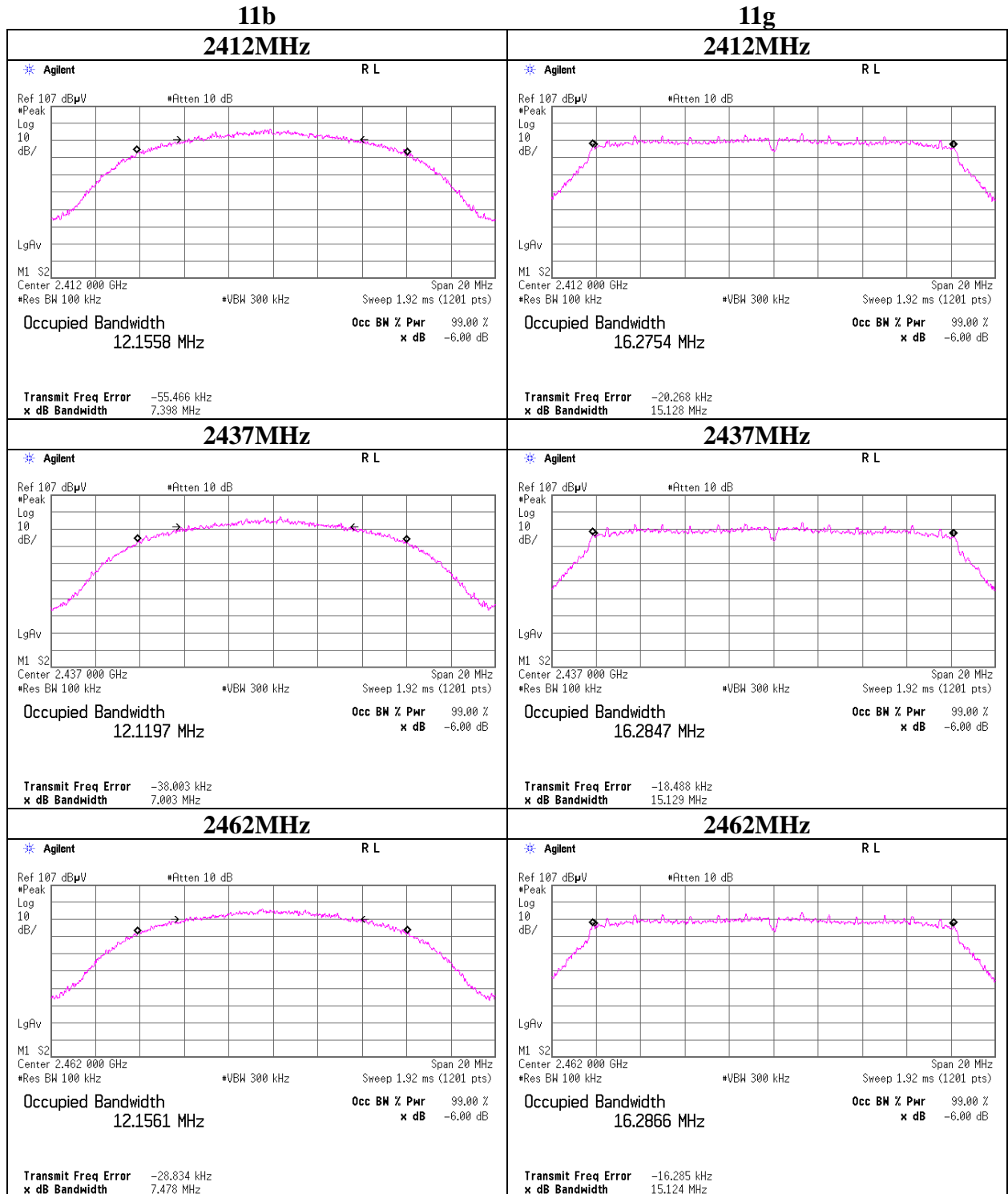
11g

Frequency [MHz]	6dB Bandwidth [MHz]	Limit [kHz]
2412	15.128	>500
2437	15.129	>500
2462	15.124	>500

11n-20

Frequency [MHz]	6dB Bandwidth [MHz]	Limit [kHz]
2412	15.201	>500
2437	15.118	>500
2462	15.101	>500

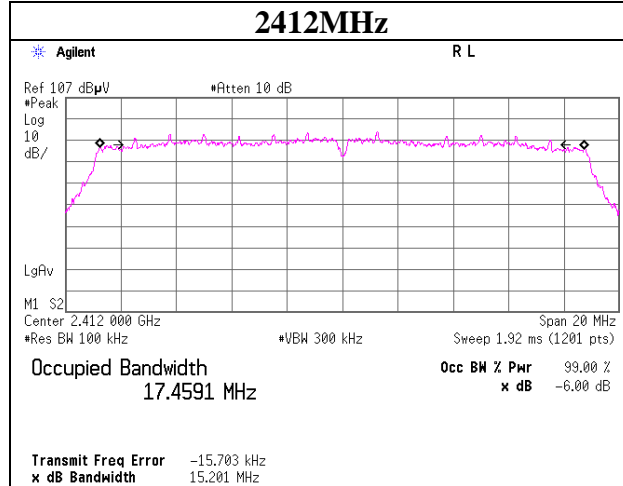
6dB Bandwidth
Low power



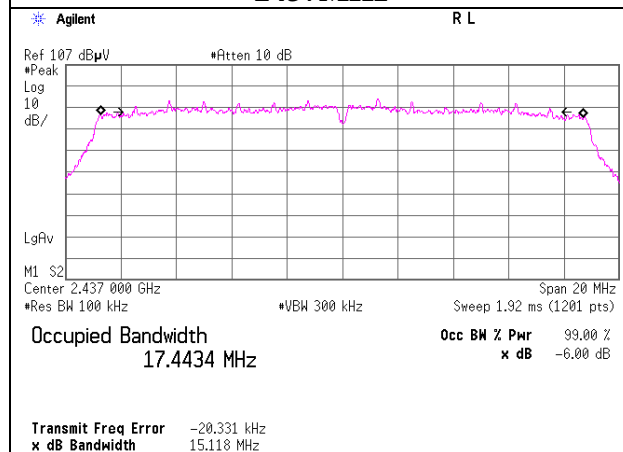
6dB Bandwidth
 Low power

11n-20

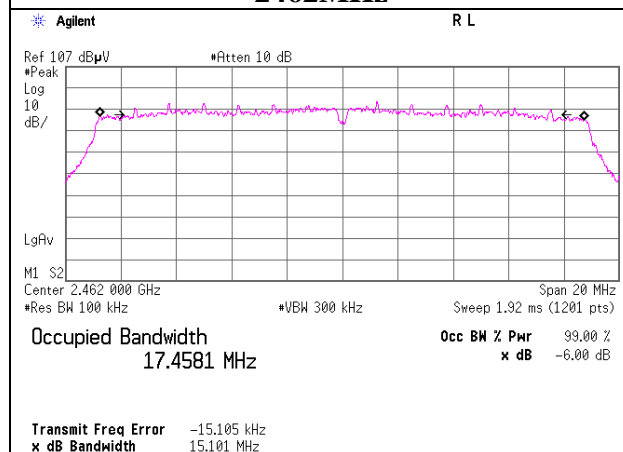
2412MHz



2437MHz



2462MHz



6dB Bandwidth
High power

Test place	Head Office EMC Lab. No.7 Shielded Room
Report No.	33AE0059-HO-01
Date	10/01/2012
Temperature/ Humidity	24 deg. C / 60% RH
Engineer	Takayuki Shimada
Mode	11b/g/n-20 Tx

11b

Frequency [MHz]	6dB Bandwidth [MHz]	Limit [kHz]
2412	6.930	>500
2437	8.048	>500
2462	8.666	>500

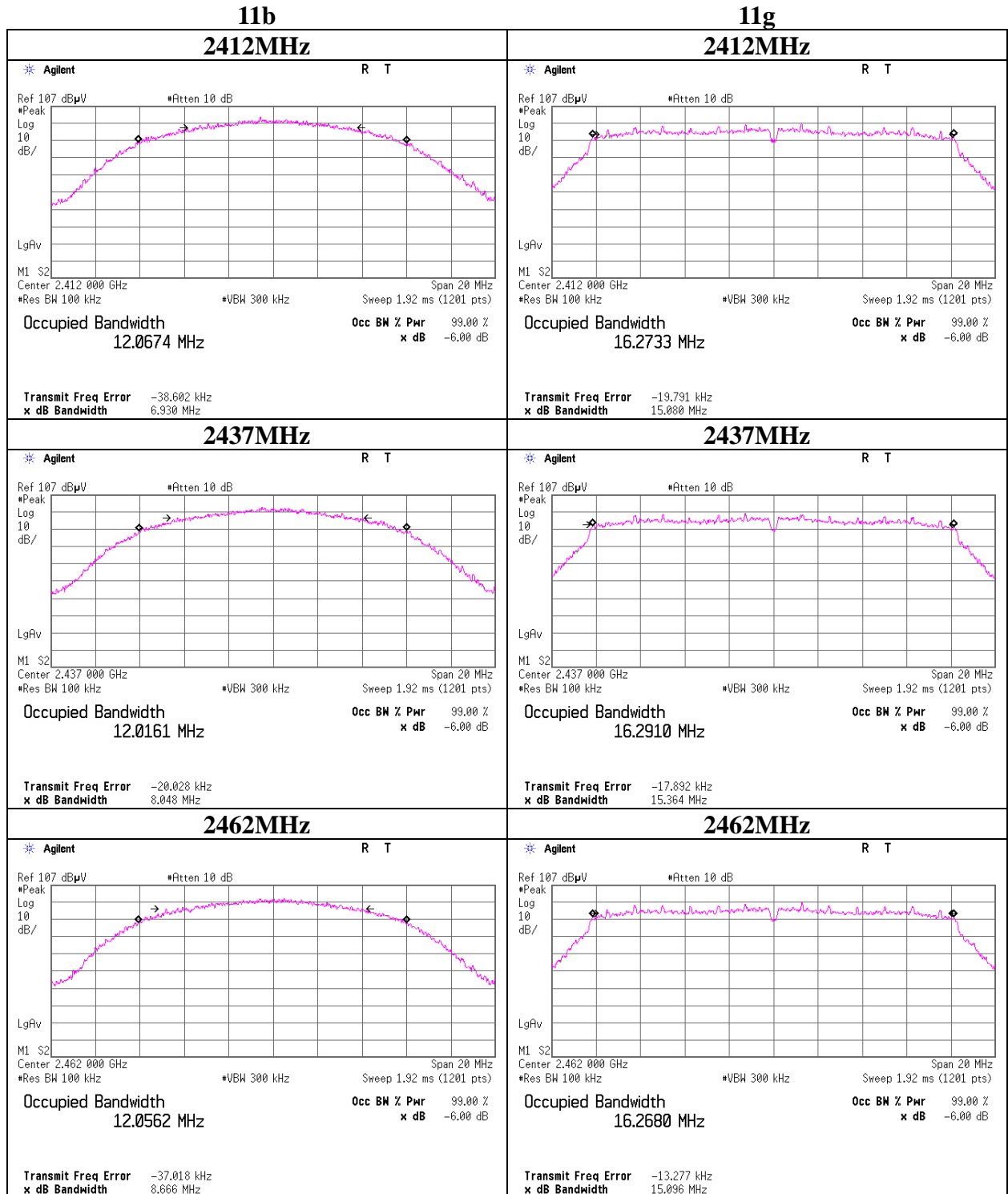
11g

Frequency [MHz]	6dB Bandwidth [MHz]	Limit [kHz]
2412	15.080	>500
2437	15.364	>500
2462	15.096	>500

11n-20

Frequency [MHz]	6dB Bandwidth [MHz]	Limit [kHz]
2412	15.118	>500
2437	15.427	>500
2462	15.110	>500

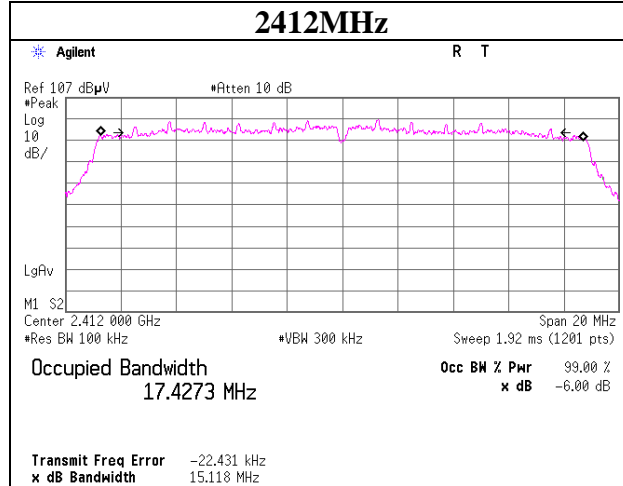
6dB Bandwidth
High power



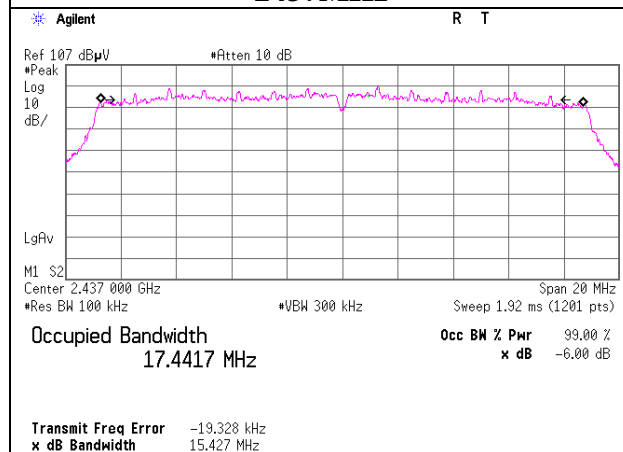
6dB Bandwidth
High power

11n-20

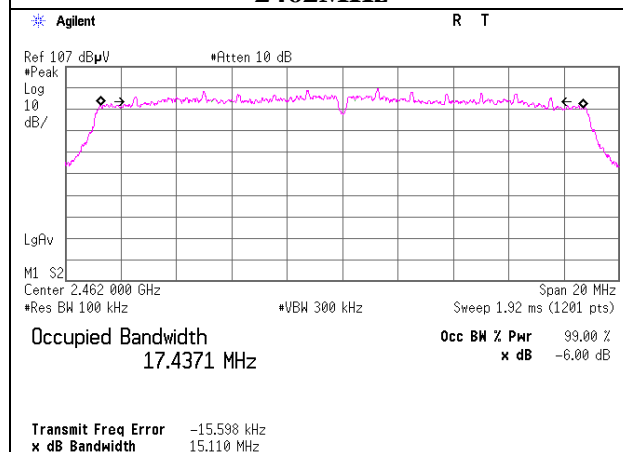
2412MHz



2437MHz



2462MHz



Radiated Spurious Emission
Low power

Test place Head Office EMC Lab. No.2 Semi Anechoic Chamber
Report No. 33AE0059-HO-01
Date 10/04/2012 10/05/2012
Temperature/ Humidity 23 deg.C./ 57% 20 deg.C./ 60%
Engineer Satofumi Matsuyama Satofumi Matsuyama
(1-10GHz) (Above 10GHz)
Mode 11b Tx 2412MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2252.473	PK	53.0	27.4	2.3	34.9	47.8	73.9	26.1	
Hori	2319.942	PK	54.7	27.4	2.3	34.9	49.5	73.9	24.4	
Hori	2390.000	PK	53.9	27.4	2.4	34.8	48.9	73.9	25.0	
Hori	2490.998	PK	43.7	27.5	2.4	34.8	38.8	73.9	35.1	
Hori	4824.000	PK	42.6	31.3	4.3	34.0	44.1	73.9	29.8	
Hori	7236.000	PK	42.1	35.9	4.9	34.2	48.6	73.9	25.3	
Hori	9648.000	PK	43.0	38.8	5.7	34.7	52.7	73.9	21.2	
Hori	10853.980	PK	45.8	40.1	-3.7	34.0	48.2	73.9	25.7	
Hori	2252.473	AV	43.4	27.4	2.3	34.9	38.2	53.9	15.7	
Hori	2319.942	AV	47.4	27.4	2.3	34.9	42.2	53.9	11.7	
Hori	2390.000	AV	40.8	27.4	2.4	34.8	35.8	53.9	18.1	
Hori	2490.998	AV	32.7	27.5	2.4	34.8	27.8	53.9	26.1	
Hori	4824.000	AV	31.1	31.3	4.3	34.0	32.7	53.9	21.2	
Hori	7236.000	AV	31.7	35.9	4.9	34.2	38.3	53.9	15.6	
Hori	9648.000	AV	31.6	38.8	5.7	34.7	41.4	53.9	12.5	
Hori	10853.980	AV	38.1	40.1	-3.7	34.0	40.5	53.9	13.4	
Vert	2252.181	PK	50.6	27.4	2.3	34.9	45.4	73.9	28.5	
Vert	2319.997	PK	53.2	27.4	2.3	34.9	48.0	73.9	25.9	
Vert	2331.991	PK	54.6	27.4	2.3	34.9	49.4	73.9	24.5	
Vert	2390.000	PK	53.6	27.4	2.4	34.8	48.6	73.9	25.3	
Vert	2490.040	PK	46.2	27.5	2.4	34.8	41.3	73.9	32.6	
Vert	4824.000	PK	42.0	31.3	4.3	34.0	43.7	73.9	30.2	
Vert	7236.000	PK	42.6	35.9	4.9	34.2	49.3	73.9	24.6	
Vert	9648.000	PK	42.8	38.8	5.7	34.7	52.7	73.9	21.2	
Vert	10853.970	PK	46.4	40.1	-3.7	34.0	48.8	73.9	25.1	
Vert	2252.181	AV	41.0	27.4	2.3	34.9	35.8	53.9	18.1	
Vert	2319.997	AV	45.8	27.4	2.3	34.9	40.6	53.9	13.3	
Vert	2331.991	AV	42.8	27.4	2.3	34.9	37.6	53.9	16.3	
Vert	2390.000	AV	40.5	27.4	2.4	34.8	35.5	53.9	18.4	
Vert	2490.040	AV	34.1	27.5	2.4	34.8	29.2	53.9	24.7	
Vert	4824.000	AV	31.1	31.3	4.3	34.0	32.7	53.9	21.2	
Vert	7236.000	AV	31.7	35.9	4.9	34.2	38.3	53.9	15.6	
Vert	9648.000	AV	31.6	38.8	5.7	34.7	41.4	53.9	12.5	
Vert	10853.970	AV	35.0	40.1	-3.7	34.0	37.4	53.9	16.5	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Ampli)
*Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).

Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB

20dBc Data Sheet

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2412.000	PK	103.5	27.5	2.4	34.8	98.6	-	-	Carrier
Hori	2400.000	PK	49.9	27.5	2.4	34.8	45.0	78.6	33.6	
Vert	2412.000	PK	101.5	27.5	2.4	34.8	96.6	-	-	Carrier
Vert	2400.000	PK	49.3	27.5	2.4	34.8	44.4	76.6	32.2	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

Radiated Spurious Emission
Low power

Test place Head Office EMC Lab. No.2 Semi Anechoic Chamber
Report No. 33AE0059-HO-01
Date 10/04/2012 10/05/2012
Temperature/ Humidity 23 deg.C./ 57% 20 deg.C./ 60%
Engineer Satofumi Matsuyama Satofumi Matsuyama
(1-10GHz) (Above 10GHz)
Mode 11b Tx 2437MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2277.317	PK	56.3	27.4	2.3	34.9	51.1	73.9	22.8	
Hori	2319.996	PK	55.5	27.4	2.3	34.9	50.3	73.9	23.6	
Hori	2357.020	PK	49.8	27.4	2.3	34.9	44.6	73.9	29.3	
Hori	3655.502	PK	46.8	29.7	3.0	34.1	45.4	73.9	28.5	
Hori	4874.000	PK	42.7	31.4	4.2	34.0	44.3	73.9	29.6	
Hori	7311.000	PK	42.8	36.0	4.9	34.2	49.5	73.9	24.4	
Hori	9748.000	PK	42.2	38.9	5.7	34.7	52.1	73.9	21.8	
Hori	10966.440	PK	44.4	40.2	-4.2	33.9	46.5	73.9	27.4	
Hori	2277.317	AV	46.0	27.4	2.3	34.9	40.8	53.9	13.1	
Hori	2319.996	AV	48.1	27.4	2.3	34.9	42.9	53.9	11.0	
Hori	2357.020	AV	37.9	27.4	2.3	34.9	32.7	53.9	21.2	
Hori	3655.502	AV	39.9	29.7	3.0	34.1	38.5	53.9	15.4	
Hori	4874.000	AV	31.0	31.4	4.2	34.0	32.6	53.9	21.3	
Hori	7311.000	AV	31.2	36.0	4.9	34.2	37.9	53.9	16.0	
Hori	9748.000	AV	31.5	38.9	5.7	34.7	41.4	53.9	12.5	
Hori	10966.440	AV	38.4	40.2	-4.2	33.9	40.5	53.9	13.4	
Vert	2277.675	PK	53.1	27.4	2.3	34.9	47.9	73.9	26.0	
Vert	2320.083	PK	53.6	27.4	2.3	34.9	48.4	73.9	25.5	
Vert	2356.997	PK	55.1	27.4	2.3	34.9	49.9	73.9	24.0	
Vert	3655.575	PK	46.7	29.7	3.0	34.1	45.3	73.9	28.6	
Vert	4874.000	PK	43.0	31.4	4.2	34.0	44.6	73.9	29.3	
Vert	7311.000	PK	42.8	36.0	4.9	34.2	49.5	73.9	24.4	
Vert	9748.000	PK	43.0	38.9	5.7	34.7	52.9	73.9	21.0	
Vert	10966.480	PK	45.1	40.2	-4.2	33.9	47.2	73.9	26.7	
Vert	2277.675	AV	42.9	27.4	2.3	34.9	37.7	53.9	16.2	
Vert	2320.083	AV	45.7	27.4	2.3	34.9	40.5	53.9	13.4	
Vert	2356.997	AV	42.1	27.4	2.3	34.9	36.9	53.9	17.0	
Vert	3655.575	AV	39.7	29.7	3.0	34.1	38.3	53.9	15.6	
Vert	4874.000	AV	31.0	31.4	4.2	34.0	32.6	53.9	21.3	
Vert	7311.000	AV	31.2	36.0	4.9	34.2	37.9	53.9	16.0	
Vert	9748.000	AV	31.5	38.9	5.7	34.7	41.4	53.9	12.5	
Vert	10966.480	AV	36.0	40.2	-4.2	33.9	38.1	53.9	15.8	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amp)
*Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).

Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB

Radiated Spurious Emission
Low power

Test place Head Office EMC Lab. No.2 and 3 Semi Anechoic Chamber
Report No. 33AE0059-HO-01
Date 10/04/2012 10/05/2012
Temperature/ Humidity 23 deg.C./ 57% 20 deg.C./ 60%
Engineer Satofumi Matsuyama Satofumi Matsuyama
(1-10GHz) (Above 10GHz, Below 1GHz)
Mode 11g Tx 2412MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	112.229	QP	29.9	11.9	8.3	32.3	17.8	43.5	25.7	
Hori	159.251	QP	26.2	15.3	8.8	32.2	18.1	43.5	25.4	
Hori	286.810	QP	32.8	19.2	9.9	32.1	29.8	46.0	16.2	
Hori	299.283	QP	37.0	19.8	10.0	32.1	34.7	46.0	11.3	
Hori	311.751	QP	37.4	14.7	10.1	32.1	30.1	46.0	15.9	
Hori	324.220	QP	35.8	15.2	10.1	32.1	29.0	46.0	17.0	
Hori	2319.877	PK	56.1	27.4	2.3	34.9	50.9	73.9	23.0	
Hori	2390.000	PK	60.1	27.4	2.4	34.8	55.1	73.9	18.8	
Hori	3617.915	PK	45.7	29.6	3.0	34.1	44.2	73.9	29.7	
Hori	4824.000	PK	42.6	31.3	4.3	34.0	44.2	73.9	29.7	
Hori	7236.000	PK	42.3	35.9	4.9	34.2	48.9	73.9	25.0	
Hori	9648.000	PK	42.7	38.8	5.7	34.7	52.5	73.9	21.4	
Hori	10853.990	PK	46.1	40.1	-3.7	34.0	48.5	73.9	25.4	
Hori	2319.877	AV	47.3	27.4	2.3	34.9	42.1	53.9	11.8	
Hori	2390.000	AV	46.0	27.4	2.4	34.8	41.0	53.9	12.9	
Hori	3617.915	AV	37.6	29.6	3.0	34.1	36.1	53.9	17.8	
Hori	4824.000	AV	31.0	31.3	4.3	34.0	32.6	53.9	21.3	
Hori	7236.000	AV	31.2	35.9	4.9	34.2	37.8	53.9	16.1	
Hori	9648.000	AV	31.6	38.8	5.7	34.7	41.4	53.9	12.5	
Hori	10853.990	AV	38.1	40.1	-3.7	34.0	40.5	53.9	13.4	
Vert	112.243	QP	31.0	11.9	8.3	32.3	18.9	43.5	24.6	
Vert	159.731	QP	31.0	15.3	8.8	32.2	22.9	43.5	20.6	
Vert	286.808	QP	36.4	19.2	9.9	32.1	33.4	46.0	12.6	
Vert	299.282	QP	38.7	19.8	10.0	32.1	36.4	46.0	9.6	
Vert	311.754	QP	37.9	14.7	10.1	32.1	30.6	46.0	15.4	
Vert	323.848	QP	38.7	15.2	10.1	32.1	31.9	46.0	14.1	
Vert	2319.973	PK	51.0	27.4	2.3	34.9	45.8	73.9	28.1	
Vert	2390.000	PK	55.4	27.4	2.4	34.8	50.4	73.9	23.5	
Vert	3619.000	PK	46.7	29.6	3.0	34.1	45.2	73.9	28.7	
Vert	4824.000	PK	43.2	31.3	4.3	34.0	44.8	73.9	29.1	
Vert	7236.000	PK	42.5	35.9	4.9	34.2	49.1	73.9	24.8	
Vert	9648.000	PK	42.7	38.8	5.7	34.7	52.5	73.9	21.4	
Vert	10853.990	PK	45.7	40.1	-3.7	34.0	48.1	73.9	25.8	
Vert	2319.973	AV	42.2	27.4	2.3	34.9	37.0	53.9	16.9	
Vert	2390.000	AV	42.0	27.4	2.4	34.8	37.0	53.9	16.9	
Vert	3619.000	AV	40.2	29.6	3.0	34.1	38.7	53.9	15.2	
Vert	4824.000	AV	31.0	31.3	4.3	34.0	32.6	53.9	21.3	
Vert	7236.000	AV	31.2	35.9	4.9	34.2	37.8	53.9	16.1	
Vert	9648.000	AV	31.6	38.8	5.7	34.7	41.4	53.9	12.5	
Vert	10853.990	AV	36.3	40.1	-3.7	34.0	38.7	53.9	15.2	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Ampli

*Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).

Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB

Radiated Spurious Emission

Low power 20dBc Data Sheet

Test place : Head Office EMC Lab. No.2 Semi Anechoic Chamber
Report No. : 33AE0059-HO-01
Date : 10/04/2012
Temperature/ Humidity : 23 deg.C./ 57%
Engineer : Satofumi Matsuyama

Mode : 11g Tx 2412MHz

20dBc Data Sheet

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2412.000	PK	98.2	27.5	2.4	34.8	93.3	-	-	Carrier
Hori	2400.000	PK	57.0	27.5	2.4	34.8	52.1	73.3	21.2	
Vert	2412.000	PK	95.6	27.5	2.4	34.8	90.7	-	-	Carrier
Vert	2400.000	PK	53.3	27.5	2.4	34.8	48.4	70.7	22.3	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

Radiated Spurious Emission
Low power

Test place Head Office EMC Lab. No.2 Semi Anechoic Chamber
Report No. 33AE0059-HO-01
Date 10/04/2012 10/05/2012
Temperature/ Humidity 23 deg.C./ 57% 20 deg.C./ 60%
Engineer Satofumi Matsuyama Satofumi Matsuyama
(1-10GHz) (Above 10GHz)
Mode 11g Tx 2437MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2319.890	PK	55.4	27.4	2.3	34.9	50.2	73.9	23.7	
Hori	3655.466	PK	47.0	29.7	3.0	34.1	45.6	73.9	28.3	
Hori	4874.000	PK	41.9	31.4	4.2	34.0	43.5	73.9	30.4	
Hori	7311.000	PK	42.0	36.0	4.9	34.2	48.7	73.9	25.2	
Hori	9748.000	PK	42.6	38.9	5.7	34.7	52.5	73.9	21.4	
Hori	10966.510	PK	46.8	40.2	-3.7	33.9	49.4	73.9	24.5	
Hori	2319.890	AV	47.7	27.4	2.3	34.9	42.5	53.9	11.4	
Hori	3655.466	AV	39.2	29.7	3.0	34.1	37.8	53.9	16.1	
Hori	4874.000	AV	31.0	31.4	4.2	34.0	32.6	53.9	21.3	
Hori	7311.000	AV	31.1	36.0	4.9	34.2	37.8	53.9	16.1	
Hori	9748.000	AV	31.5	38.9	5.7	34.7	41.4	53.9	12.5	
Hori	10966.510	AV	37.9	40.2	-3.7	33.9	40.5	53.9	13.4	
Vert	2319.973	PK	51.6	27.4	2.3	34.9	46.4	73.9	27.5	
Vert	3655.307	PK	47.1	29.7	3.0	34.1	45.7	73.9	28.2	
Vert	4874.000	PK	43.5	31.4	4.2	34.0	45.1	73.9	28.8	
Vert	7311.000	PK	42.6	36.0	4.9	34.2	49.3	73.9	24.6	
Vert	9748.000	PK	42.1	38.9	5.7	34.7	52.0	73.9	21.9	
Vert	10966.530	PK	45.8	40.2	-3.7	33.9	48.4	73.9	25.5	
Vert	2319.973	AV	42.6	27.4	2.3	34.9	37.4	53.9	16.5	
Vert	3655.307	AV	40.2	29.7	3.0	34.1	38.8	53.9	15.1	
Vert	4874.000	AV	31.0	31.4	4.2	34.0	32.6	53.9	21.3	
Vert	7311.000	AV	31.2	36.0	4.9	34.2	37.9	53.9	16.0	
Vert	9748.000	AV	31.5	38.9	5.7	34.7	41.4	53.9	12.5	
Vert	10966.530	AV	36.1	40.2	-3.7	33.9	38.7	53.9	15.2	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Ampli
*Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).

Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB

Radiated Spurious Emission
Low power

Test place : Head Office EMC Lab. No.2 Semi Anechoic Chamber
Report No. : 33AE0059-HO-01
Date : 10/05/2012
Temperature/ Humidity : 20 deg.C./ 60%
Engineer : Satofumi Matsuyama
(1-10GHz)
Mode : 11n20 Tx 2412MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2390.000	PK	54.9	27.4	2.4	34.8	49.9	73.9	24.0	
Hori	2390.000	AV	39.4	27.4	2.4	34.8	34.4	53.9	19.5	
Vert	2390.000	PK	63.5	27.4	2.4	34.8	58.5	73.9	15.4	
Vert	2390.000	AV	46.7	27.4	2.4	34.8	41.7	53.9	12.2	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)
*Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).

Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB

20dBc Data Sheet

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2412.000	PK	93.5	27.5	2.4	34.8	88.6	-	-	Carrier
Hori	2400.000	PK	51.0	27.5	2.4	34.8	46.1	68.6	22.5	
Vert	2412.000	PK	98.5	27.5	2.4	34.8	93.6	-	-	Carrier
Vert	2400.000	PK	59.9	27.5	2.4	34.8	55.0	73.6	18.6	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

Radiated Spurious Emission
Low power

Test place Head Office EMC Lab. No.2 Semi Anechoic Chamber
Report No. 33AE0059-HO-01
Date 10/05/2012
Temperature/ Humidity 20 deg.C./ 60%
Engineer Satofumi Matsuyama
 (1-10GHz)
Mode 11n20 Tx 2462MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2483.500	PK	58.8	27.5	2.4	34.8	53.9	73.9	20.0	
Hori	2483.500	AV	45.9	27.5	2.4	34.8	41.0	53.9	12.9	
Vert	2483.500	PK	56.1	27.5	2.4	34.8	51.2	73.9	22.7	
Vert	2483.500	AV	43.0	27.5	2.4	34.8	38.1	53.9	15.9	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

*Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).

Distance factor: 10GHz-26.5GHz $20\log(3.0m/1.0m) = 9.5dB$

Radiated Spurious Emission

Low power

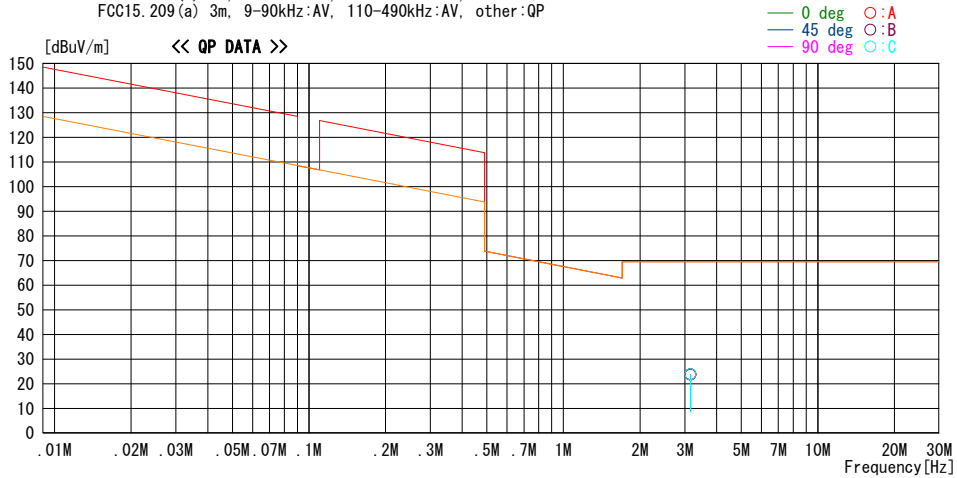
DATA OF RADIATED EMISSION TEST

UL Japan, Inc. Head Office EMC Lab. No.3 Semi Anechoic Chamber
 Date : 2012/10/05

Temp./ Humi. : 20deg. C / 60% RH
 Engineer : Satofumi Matsuyama

Mode / Remarks : Tx 11n20 2462MHz MCS0, Worst-axis(X-axis)

LIMIT : FCC15.209(a) 3m, 9-90kHz:PK, 110-490kHz:PK, other:QP
 FCC15.209(a) 3m, 9-90kHz:AV, 110-490kHz:AV, other:QP



Freq. [MHz]	Reading [dBuV]	DET	Ant. Fac [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Antenna [deg]	Table	Comment
										[deg]	
3.16000	30.3	QP	19.6	6.2	32.3	23.8	69.5	45.7	0	A	0 NoSignalDetect
3.16000	30.2	QP	19.6	6.2	32.3	23.7	69.5	45.8	45	B	0 NoSignalDetect
3.16000	30.3	QP	19.6	6.2	32.3	23.8	69.5	45.7	90	C	0 NoSignalDetect
3.16000	30.3	QP	19.6	6.2	32.3	23.8	69.5	45.7	135	B	0 NoSignalDetect

CHART: WITH FACTOR, ANT TYPE: LOOP Except for the data below: adequate margin data below the limits.
 CALCULATION: RESULT = READING + ANT FACTOR + LOSS(CABLE + ATTEN.) - GAIN(AMP.)

Radiated Spurious Emission
High power

Test place : Head Office EMC Lab. No.2 Semi Anechoic Chamber
Report No. : 33AE0059-HO-01
Date : 10/03/2012
Temperature/ Humidity : 24 deg.C./ 54%
Engineer : Satofumi Matsuyama
(1-26.5GHz)
Mode : 11b Tx 2412MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2332.007	PK	61.3	27.4	2.3	34.9	56.1	73.9	17.8	
Hori	2360.097	PK	57.3	27.4	2.3	34.9	52.1	73.9	21.8	
Hori	2390.000	PK	56.3	27.4	2.4	34.8	51.3	73.9	22.6	
Hori	4824.000	PK	42.5	31.3	4.3	34.0	44.1	73.9	29.8	
Hori	7236.000	PK	42.0	35.9	4.9	34.2	48.6	73.9	25.3	
Hori	9648.000	PK	42.9	38.8	5.7	34.7	52.7	73.9	21.2	
Hori	2332.007	AV	48.5	27.4	2.3	34.9	43.3	53.9	10.6	
Hori	2360.097	AV	48.3	27.4	2.3	34.9	43.1	53.9	10.8	
Hori	2390.000	AV	43.2	27.4	2.4	34.8	38.2	53.9	15.7	
Hori	4824.000	AV	31.1	31.3	4.3	34.0	32.7	53.9	21.2	
Hori	7236.000	AV	31.7	35.9	4.9	34.2	38.3	53.9	15.6	
Hori	9648.000	AV	31.6	38.8	5.7	34.7	41.4	53.9	12.5	
Vert	2331.947	PK	59.7	27.4	2.3	34.9	54.5	73.9	19.4	
Vert	2359.890	PK	56.4	27.4	2.3	34.9	51.2	73.9	22.7	
Vert	2390.000	PK	54.8	27.4	2.4	34.8	49.8	73.9	24.1	
Vert	4824.000	PK	42.1	31.3	4.3	34.0	43.7	73.9	30.2	
Vert	7236.000	PK	42.7	35.9	4.9	34.2	49.3	73.9	24.6	
Vert	9648.000	PK	42.9	38.8	5.7	34.7	52.7	73.9	21.2	
Vert	2331.947	AV	48.2	27.4	2.3	34.9	43.0	53.9	10.9	
Vert	2359.890	AV	47.8	27.4	2.3	34.9	42.6	53.9	11.3	
Vert	2390.000	AV	42.5	27.4	2.4	34.8	37.5	53.9	16.4	
Vert	4824.000	AV	31.1	31.3	4.3	34.0	32.7	53.9	21.2	
Vert	7236.000	AV	31.7	35.9	4.9	34.2	38.3	53.9	15.6	
Vert	9648.000	AV	31.6	38.8	5.7	34.7	41.4	53.9	12.5	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Ampli

*Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).

Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB

20dBc Data Sheet

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2412.000	PK	104.4	27.5	2.4	34.8	99.5	-	-	Carrier
Hori	2400.000	PK	53.9	27.5	2.4	34.8	49.0	79.5	30.5	
Vert	2412.000	PK	104.7	27.5	2.4	34.8	99.8	-	-	Carrier
Vert	2400.000	PK	53.6	27.5	2.4	34.8	48.7	79.8	31.1	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

Radiated Spurious Emission
High power

Test place : Head Office EMC Lab. No.2 Semi Anechoic Chamber
Report No. : 33AE0059-HO-01
Date : 10/03/2012
Temperature/ Humidity : 24 deg.C./ 54%
Engineer : Satofumi Matsuyama
(1-26.5GHz)
Mode : 11b Tx 2437MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2356.913	PK	58.6	27.4	2.3	34.9	53.4	73.9	20.5	
Hori	2385.050	PK	56.2	27.4	2.4	34.8	51.2	73.9	22.7	
Hori	4874.000	PK	42.7	31.4	4.2	34.0	44.3	73.9	29.6	
Hori	7311.000	PK	42.8	36.0	4.9	34.2	49.5	73.9	24.4	
Hori	9748.000	PK	42.2	38.9	5.7	34.7	52.1	73.9	21.8	
Hori	2356.913	AV	46.9	27.4	2.3	34.9	41.7	53.9	12.2	
Hori	2385.050	AV	46.7	27.4	2.4	34.8	41.7	53.9	12.2	
Hori	4874.000	AV	31.0	31.4	4.2	34.0	32.6	53.9	21.3	
Hori	7311.000	AV	31.2	36.0	4.9	34.2	37.9	53.9	16.0	
Hori	9748.000	AV	31.5	38.9	5.7	34.7	41.4	53.9	12.5	
Vert	2357.018	PK	58.7	27.4	2.3	34.9	53.5	73.9	20.4	
Vert	2384.950	PK	56.2	27.4	2.4	34.8	51.2	73.9	22.7	
Vert	4874.000	PK	43.0	31.4	4.2	34.0	44.6	73.9	29.3	
Vert	7311.000	PK	42.8	36.0	4.9	34.2	49.5	73.9	24.4	
Vert	9748.000	PK	43.0	38.9	5.7	34.7	52.9	73.9	21.0	
Vert	2357.018	AV	46.7	27.4	2.3	34.9	41.5	53.9	12.4	
Vert	2384.950	AV	47.2	27.4	2.4	34.8	42.2	53.9	11.7	
Vert	4874.000	AV	31.0	31.4	4.2	34.0	32.6	53.9	21.3	
Vert	7311.000	AV	31.2	36.0	4.9	34.2	37.9	53.9	16.0	
Vert	9748.000	AV	31.5	38.9	5.7	34.7	41.4	53.9	12.5	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Ampr)

*Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).

Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB

Radiated Spurious Emission
High power

Test place : Head Office EMC Lab. No.2 Semi Anechoic Chamber
Report No. : 33AE0059-HO-01
Date : 10/03/2012
Temperature/ Humidity : 24 deg.C./ 54%
Engineer : Satofumi Matsuyama
(1-26.5GHz)
Mode : 11b Tx 2462MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2302.172	PK	58.1	27.4	2.3	34.9	52.9	73.9	21.0	
Hori	2483.500	PK	52.2	27.5	2.4	34.8	47.3	73.9	26.6	
Hori	4924.000	PK	42.8	31.5	4.2	34.0	44.5	73.9	29.4	
Hori	7386.000	PK	42.4	36.1	5.0	34.3	49.2	73.9	24.7	
Hori	9848.000	PK	42.7	39.1	5.8	34.7	52.9	73.9	21.0	
Hori	2302.172	AV	49.2	27.4	2.3	34.9	44.0	53.9	9.9	
Hori	2483.500	AV	39.9	27.5	2.4	34.8	35.0	53.9	18.9	
Hori	4924.000	AV	31.2	31.5	4.2	34.0	32.9	53.9	21.0	
Hori	7386.000	AV	31.2	36.1	5.0	34.3	38.0	53.9	15.9	
Hori	9848.000	AV	31.7	39.1	5.8	34.7	41.9	53.9	12.0	
Vert	2301.970	PK	57.6	27.4	2.3	34.9	52.4	73.9	21.5	
Vert	2483.500	PK	51.7	27.5	2.4	34.8	46.8	73.9	27.1	
Vert	4924.000	PK	42.7	31.5	4.2	34.0	44.4	73.9	29.5	
Vert	7386.000	PK	41.7	36.1	5.0	34.3	48.5	73.9	25.4	
Vert	9848.000	PK	42.2	39.1	5.8	34.7	52.4	73.9	21.5	
Vert	2301.970	AV	48.6	27.4	2.3	34.9	43.4	53.9	10.5	
Vert	2483.500	AV	39.1	27.5	2.4	34.8	34.2	53.9	19.7	
Vert	4924.000	AV	31.2	31.5	4.2	34.0	32.9	53.9	21.0	
Vert	7386.000	AV	31.2	36.1	5.0	34.3	38.0	53.9	15.9	
Vert	9848.000	AV	31.8	39.1	5.8	34.7	42.0	53.9	11.9	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Ampli

*Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).

Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB

Radiated Spurious Emission
High power

Test place Head Office EMC Lab. No.2 Semi Anechoic Chamber
Report No. 33AE0059-HO-01
Date 10/02/2012 10/03/2012
Temperature/ Humidity 23 deg.C./ 54% 24 deg.C./ 54%
Engineer Tomohisa Nakagawa Satofumi Matsuyama
(1-10GHz) (Below 1GHz,Above 10GHz)
Mode 11g Tx 2412MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	87.293	QP	28.1	7.2	7.4	28.4	14.3	40.0	25.7	
Hori	112.237	QP	30.0	11.5	7.6	28.3	20.8	43.5	22.7	
Hori	274.348	QP	33.3	18.2	8.7	27.6	32.6	46.0	13.4	
Hori	311.756	QP	32.0	14.8	8.9	27.7	28.0	46.0	18.0	
Hori	324.229	QP	29.1	15.2	9.0	27.8	25.5	46.0	20.5	
Hori	386.576	QP	31.3	17.0	9.3	28.3	29.3	46.0	16.7	
Hori	2382.000	PK	63.9	27.4	2.4	34.8	58.9	73.9	15.0	
Hori	2390.000	PK	67.5	27.4	2.4	34.8	62.5	73.9	11.4	
Hori	4824.000	PK	42.6	31.3	4.3	34.0	44.2	73.9	29.7	
Hori	7236.000	PK	42.3	35.9	4.9	34.2	48.9	73.9	25.0	
Hori	9648.000	PK	42.7	38.8	5.7	34.7	52.5	73.9	21.4	
Hori	2382.000	AV	45.3	27.4	2.4	34.8	40.3	53.9	13.6	
Hori	2390.000	AV	50.8	27.4	2.4	34.8	45.8	53.9	8.1	
Hori	4824.000	AV	31.0	31.3	4.3	34.0	32.6	53.9	21.3	
Hori	7236.000	AV	31.2	35.9	4.9	34.2	37.8	53.9	16.1	
Hori	9648.000	AV	31.6	38.8	5.7	34.7	41.4	53.9	12.5	
Vert	87.291	QP	33.5	7.2	7.4	28.4	19.7	40.0	20.3	
Vert	112.236	QP	33.8	11.5	7.6	28.3	24.6	43.5	18.9	
Vert	274.350	QP	31.8	18.2	8.7	27.6	31.1	46.0	14.9	
Vert	311.754	QP	38.7	14.8	8.9	27.7	34.7	46.0	11.3	
Vert	324.227	QP	34.2	15.2	9.0	27.8	30.6	46.0	15.4	
Vert	386.578	QP	32.6	17.0	9.3	28.3	30.6	46.0	15.4	
Vert	2382.000	PK	63.7	27.4	2.4	34.8	58.7	73.9	15.2	
Vert	2390.000	PK	69.2	27.4	2.4	34.8	64.2	73.9	9.7	
Vert	4824.000	PK	43.2	31.3	4.3	34.0	44.8	73.9	29.1	
Vert	7236.000	PK	42.5	35.9	4.9	34.2	49.1	73.9	24.8	
Vert	9648.000	PK	42.7	38.8	5.7	34.7	52.5	73.9	21.4	
Vert	2382.000	AV	44.6	27.4	2.4	34.8	39.6	53.9	14.3	
Vert	2390.000	AV	50.6	27.4	2.4	34.8	45.6	53.9	8.3	
Vert	4824.000	AV	31.0	31.3	4.3	34.0	32.6	53.9	21.3	
Vert	7236.000	AV	31.2	35.9	4.9	34.2	37.8	53.9	16.1	
Vert	9648.000	AV	31.6	38.8	5.7	34.7	41.4	53.9	12.5	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Ampli)
*Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).

Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB

20dBc Data Sheet

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2412.000	PK	102.0	27.5	2.4	34.8	97.1	-	-	Carrier
Hori	2400.000	PK	63.3	27.5	2.4	34.8	58.4	77.1	18.7	
Vert	2412.000	PK	100.3	27.5	2.4	34.8	95.4	-	-	Carrier
Vert	2400.000	PK	63.1	27.5	2.4	34.8	58.2	75.4	17.2	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

Radiated Spurious Emission
High power

Test place Head Office EMC Lab. No.2 Semi Anechoic Chamber
Report No. 33AE0059-HO-01
Date 10/03/2012 10/03/2012
Temperature/ Humidity 23 deg.C./ 54% 24 deg.C./ 54%
Engineer Tomohisa Nakagawa Satofumi Matsuyama
(1-10GHz) (Above 10GHz)
Mode 11g Tx 2462MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2307.000	PK	53.2	27.4	2.3	34.9	48.0	73.9	25.9	
Hori	2483.500	PK	62.7	27.5	2.4	34.8	57.8	73.9	16.1	
Hori	4924.000	PK	41.6	31.5	4.2	34.0	43.3	73.9	30.6	
Hori	7386.000	PK	42.4	36.1	5.0	34.3	49.2	73.9	24.7	
Hori	9848.000	PK	42.4	39.1	5.8	34.7	52.6	73.9	21.3	
Hori	2307.000	AV	43.4	27.4	2.3	34.9	38.2	53.9	15.7	
Hori	2483.500	AV	47.2	27.5	2.4	34.8	42.3	53.9	11.6	
Hori	4924.000	AV	31.0	31.5	4.2	34.0	32.7	53.9	21.2	
Hori	7386.000	AV	31.2	36.1	5.0	34.3	38.0	53.9	15.9	
Hori	9848.000	AV	31.7	39.1	5.8	34.7	41.9	53.9	12.0	
Vert	2307.000	PK	53.2	27.4	2.3	34.9	48.0	73.9	25.9	
Vert	2483.500	PK	60.6	27.5	2.4	34.8	55.7	73.9	18.2	
Vert	4924.000	PK	41.6	31.5	4.2	34.0	43.3	73.9	30.6	
Vert	7386.000	PK	43.0	36.1	5.0	34.3	49.8	73.9	24.1	
Vert	9848.000	PK	42.5	39.1	5.8	34.7	52.7	73.9	21.2	
Vert	2307.000	AV	42.0	27.4	2.3	34.9	36.8	53.9	17.1	
Vert	2483.500	AV	43.7	27.5	2.4	34.8	38.8	53.9	15.1	
Vert	4924.000	AV	31.1	31.5	4.2	34.0	32.8	53.9	21.1	
Vert	7386.000	AV	31.2	36.1	5.0	34.3	38.0	53.9	15.9	
Vert	9848.000	AV	31.7	39.1	5.8	34.7	41.9	53.9	12.0	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Ampli

*Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).

Distance factor: 10GHz-26.5GHz $20\log(3.0\text{m}/1.0\text{m})= 9.5\text{dB}$

Radiated Spurious Emission
High power

Test place : Head Office EMC Lab. No.2 Semi Anechoic Chamber
Report No. : 33AE0059-HO-01
Date : 10/03/2012
Temperature/ Humidity : 23 deg.C./ 54%
Engineer : Tomohisa Nakagawa
(1-10GHz)
Mode : 11n 2412MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2382.000	PK	56.2	27.4	2.4	34.8	51.2	73.9	22.7	
Hori	2390.000	PK	68.5	27.4	2.4	34.8	63.5	73.9	10.4	
Hori	2382.000	AV	37.7	27.4	2.4	34.8	32.7	53.9	21.2	
Hori	2390.000	AV	52.2	27.4	2.4	34.8	47.2	53.9	6.7	
Vert	2382.000	PK	65.2	27.4	2.4	34.8	60.2	73.9	13.7	
Vert	2390.000	PK	69.7	27.4	2.4	34.8	64.7	73.9	9.2	
Vert	2382.000	AV	45.2	27.4	2.4	34.8	40.2	53.9	13.7	
Vert	2390.000	AV	50.9	27.4	2.4	34.8	45.9	53.9	8.1	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

*Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).

Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB
26.5GHz-40GHz 20log(3.0m/0.5m)=15.6dB

20dBc Data Sheet

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2412.000	PK	100.2	27.5	2.4	34.8	95.3	-	-	Carrier
Hori	2400.000	PK	63.2	27.5	2.4	34.8	58.3	75.3	17.0	
Vert	2412.000	PK	100.8	27.5	2.4	34.8	95.9	-	-	Carrier
Vert	2400.000	PK	62.2	27.5	2.4	34.8	57.3	75.9	18.6	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

Radiated Spurious Emission
High power

Test place : Head Office EMC Lab. No.2 Semi Anechoic Chamber
Report No. : 33AE0059-HO-01
Date : 10/03/2012
Temperature/ Humidity : 23 deg.C./ 54%
Engineer : Tomohisa Nakagawa
(1-10GHz)
Mode : 11n 2462MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2300.000	PK	51.4	27.4	2.3	34.9	46.2	73.9	27.7	
Hori	2483.500	PK	69.6	27.5	2.4	34.8	64.7	73.9	9.2	
Hori	2300.000	AV	38.3	27.4	2.3	34.9	33.1	53.9	20.8	
Hori	2483.500	AV	49.0	27.5	2.4	34.8	44.1	53.9	9.8	
Vert	2300.000	PK	54.7	27.4	2.3	34.9	49.5	73.9	24.4	
Vert	2483.500	PK	67.1	27.5	2.4	34.8	62.2	73.9	11.7	
Vert	2300.000	AV	40.8	27.4	2.3	34.9	35.6	53.9	18.3	
Vert	2483.500	AV	46.2	27.5	2.4	34.8	41.3	53.9	12.6	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Ampriifier)

*Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).

Distance factor: 10GHz-26.5GHz $20\log(3.0m/1.0m)= 9.5dB$
 26.5GHz-40GHz $20\log(3.0m/0.5m)=15.6dB$

Radiated Spurious Emission
High power

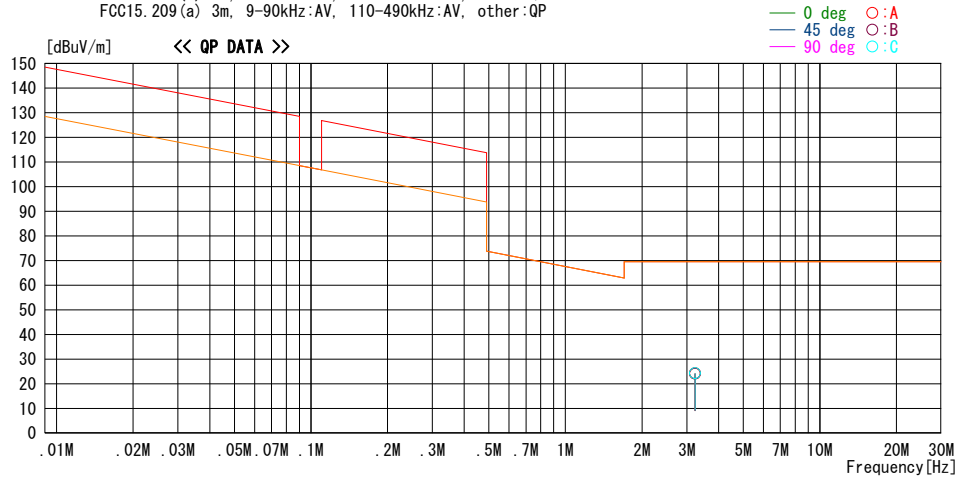
DATA OF RADIATED EMISSION TEST

UL Japan, Inc. Head Office EMC Lab. No. 2 Semi Anechoic Chamber
Date : 2012/10/03

Temp./ Humi. : 24deg. C / 54% RH
Engineer : Satofumi Matsuyama

Mode / Remarks : Tx 11n20 2462MHz MCS0, Worst-axis(X-axis)

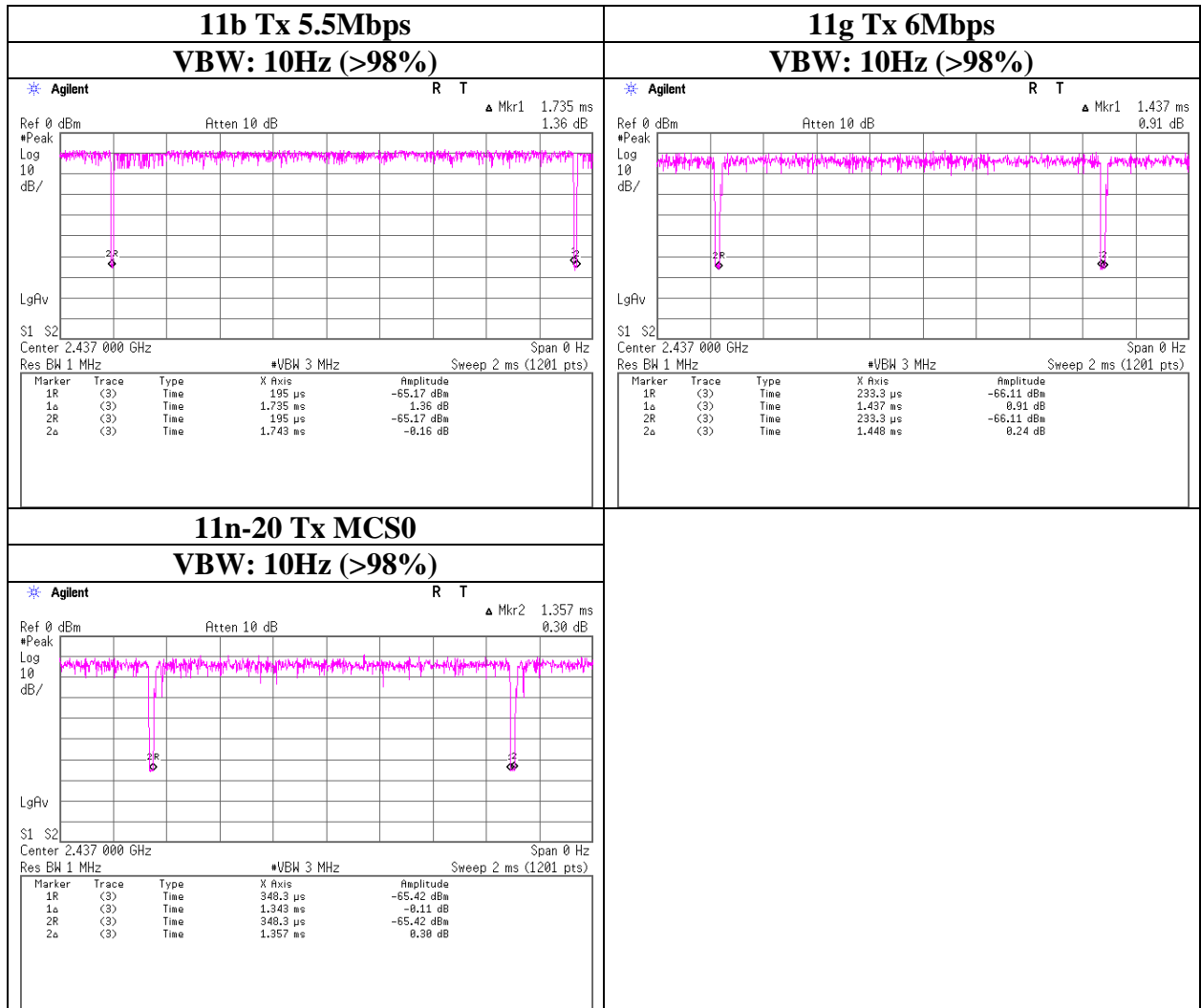
LIMIT : FCC15.209(a) 3m, 9-90kHz:PK, 110-490kHz:PK, other:QP
FCC15.209(a) 3m, 9-90kHz:AV, 110-490kHz:AV, other:QP



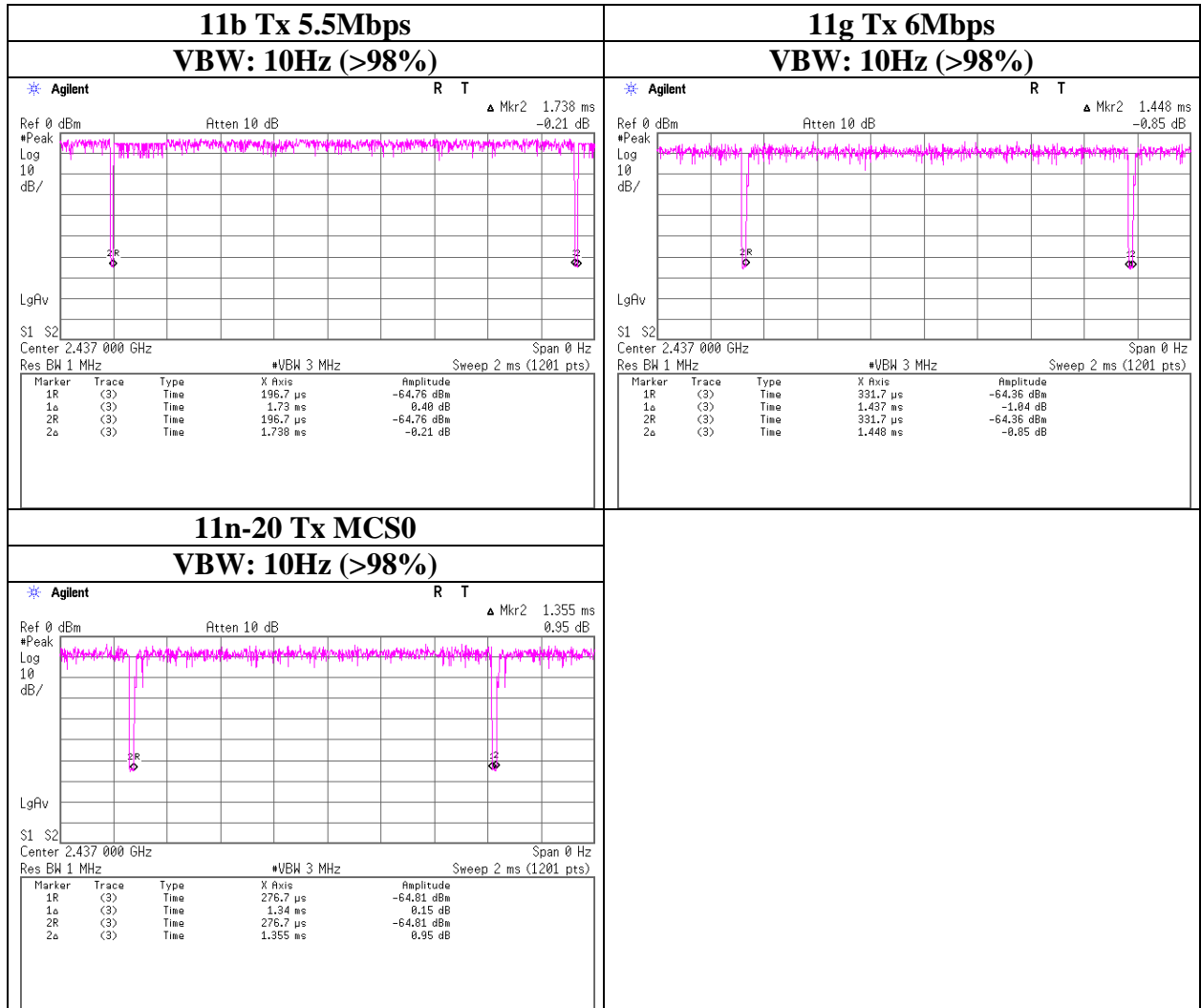
Freq. [MHz]	Reading [dBuV]	DET	Ant. Fac [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Antenna [deg]	Table	Comment
										[deg]	
3.23400	30.5	QP	19.6	6.4	32.3	24.2	69.5	45.3	0	A	0 NoSignalDetect
3.23400	30.4	QP	19.6	6.4	32.3	24.1	69.5	45.4	45	B	0 NoSignalDetect
3.23400	30.5	QP	19.6	6.4	32.3	24.2	69.5	45.3	90	C	0 NoSignalDetect
3.23400	30.4	QP	19.6	6.4	32.3	24.1	69.5	45.4	135	A	0 NoSignalDetect

CHART: WITH FACTOR, ANT TYPE: LOOP Except for the data below: adequate margin data below the limits.
CALCULATION: RESULT = READING + ANT FACTOR + LOSS(CABLE + ATTEN.) - GAIN(AMP.)

Burst rate confirmation
Low power

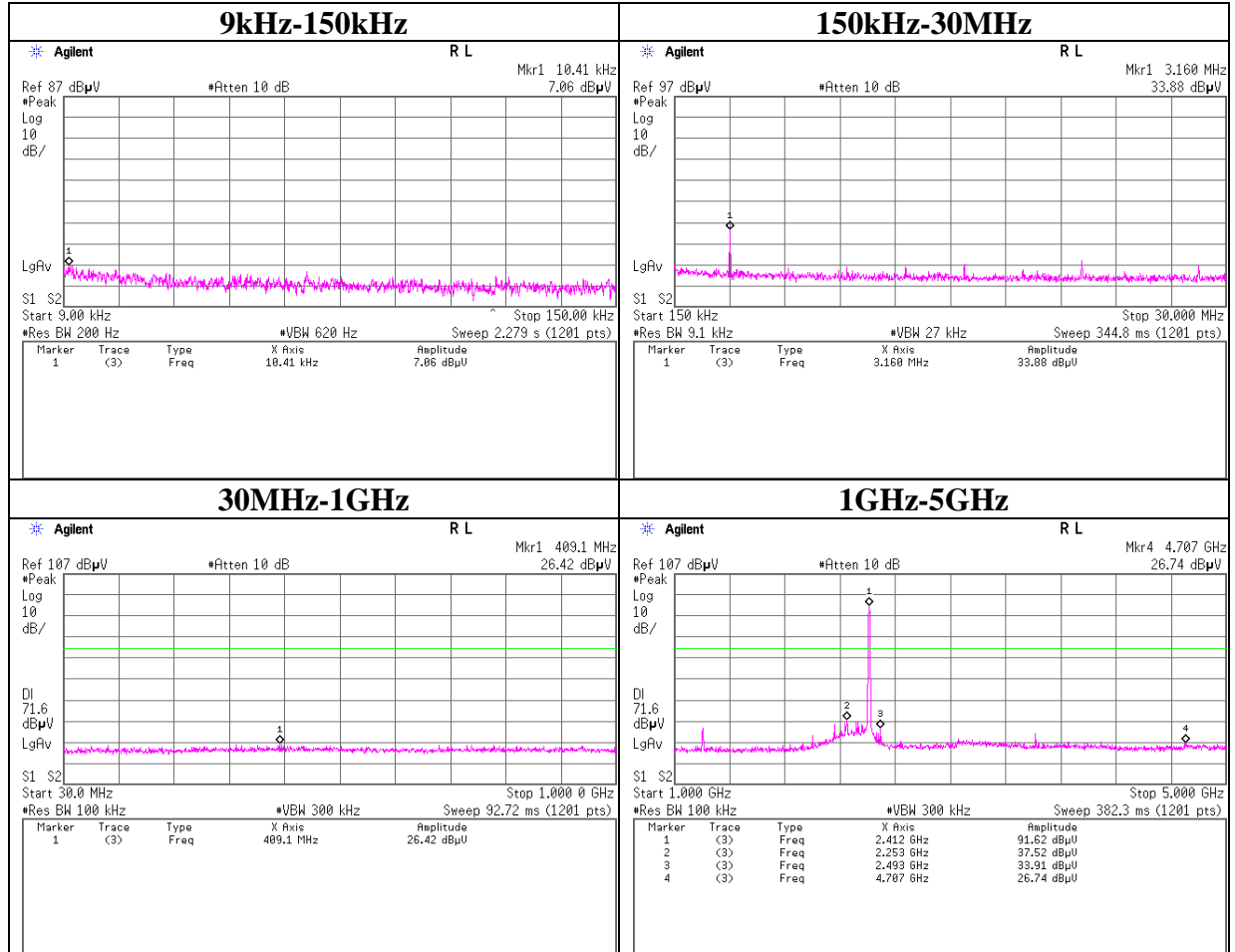


Burst rate confirmation
High power



Conducted Spurious Emission
Low power

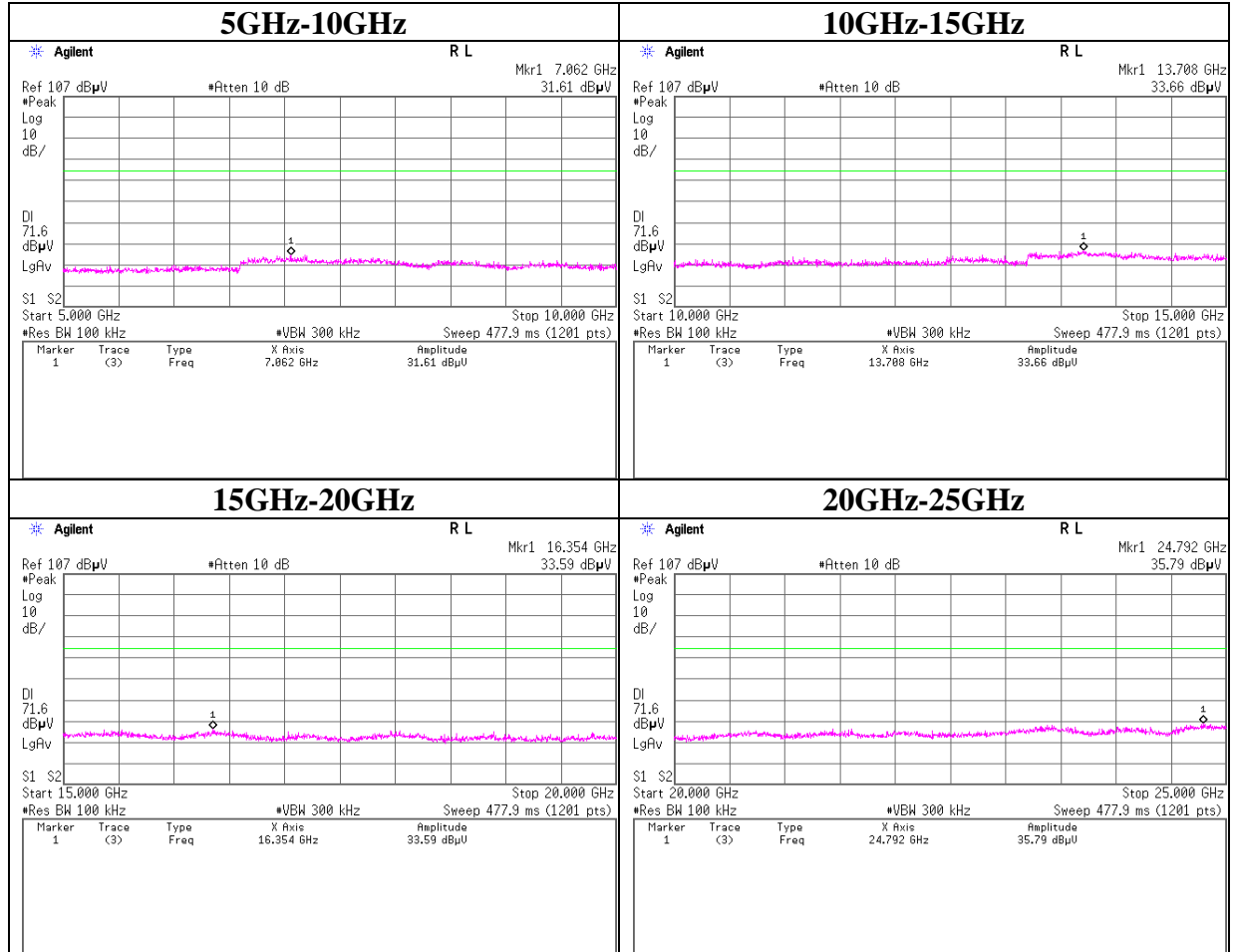
11b Tx 2412MHz



*For 150kHz – 30MHz, no noise was found at radiated emission test at a distance of 3m.

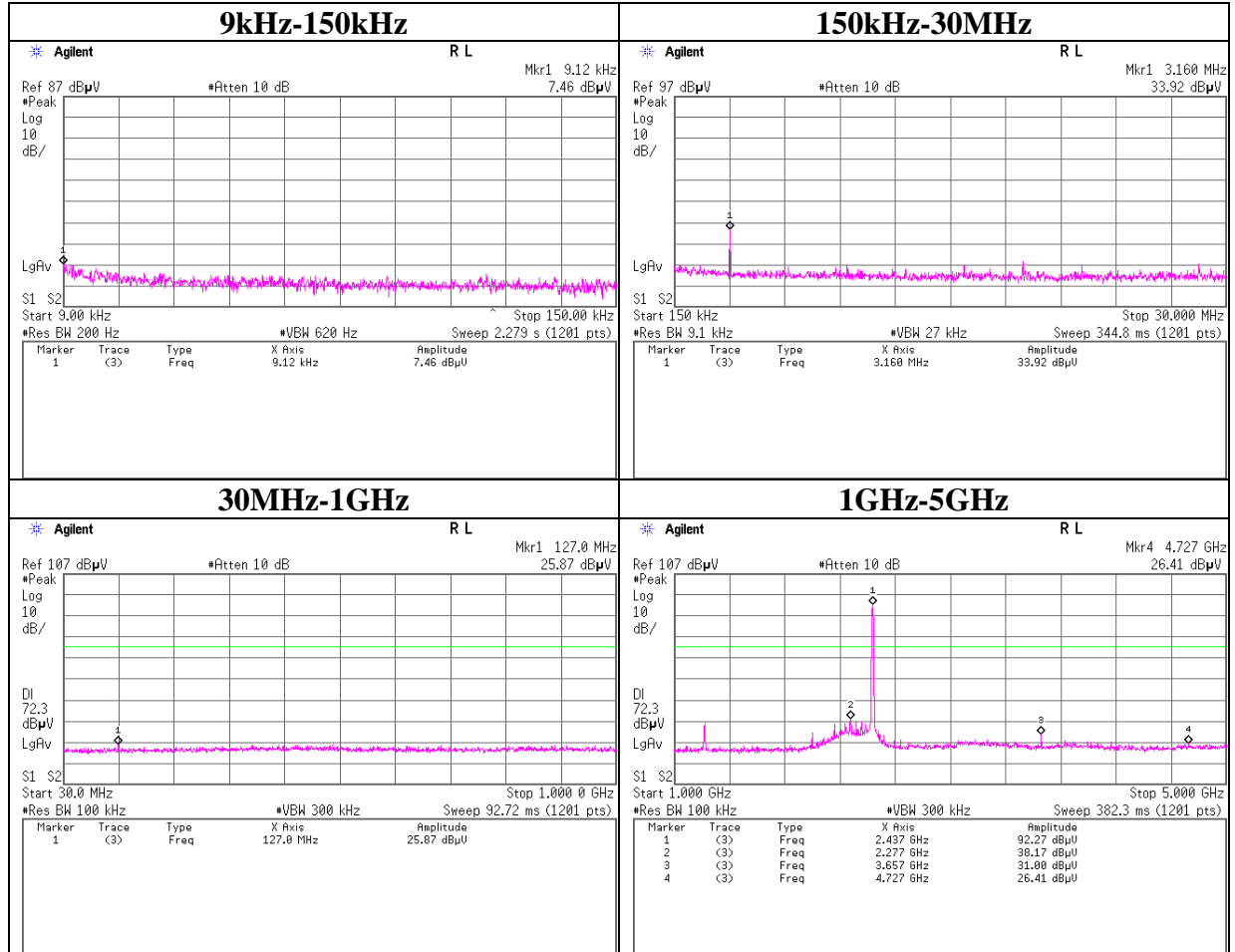
Conducted Spurious Emission
Low power

11b Tx 2412MHz



Conducted Spurious Emission
Low power

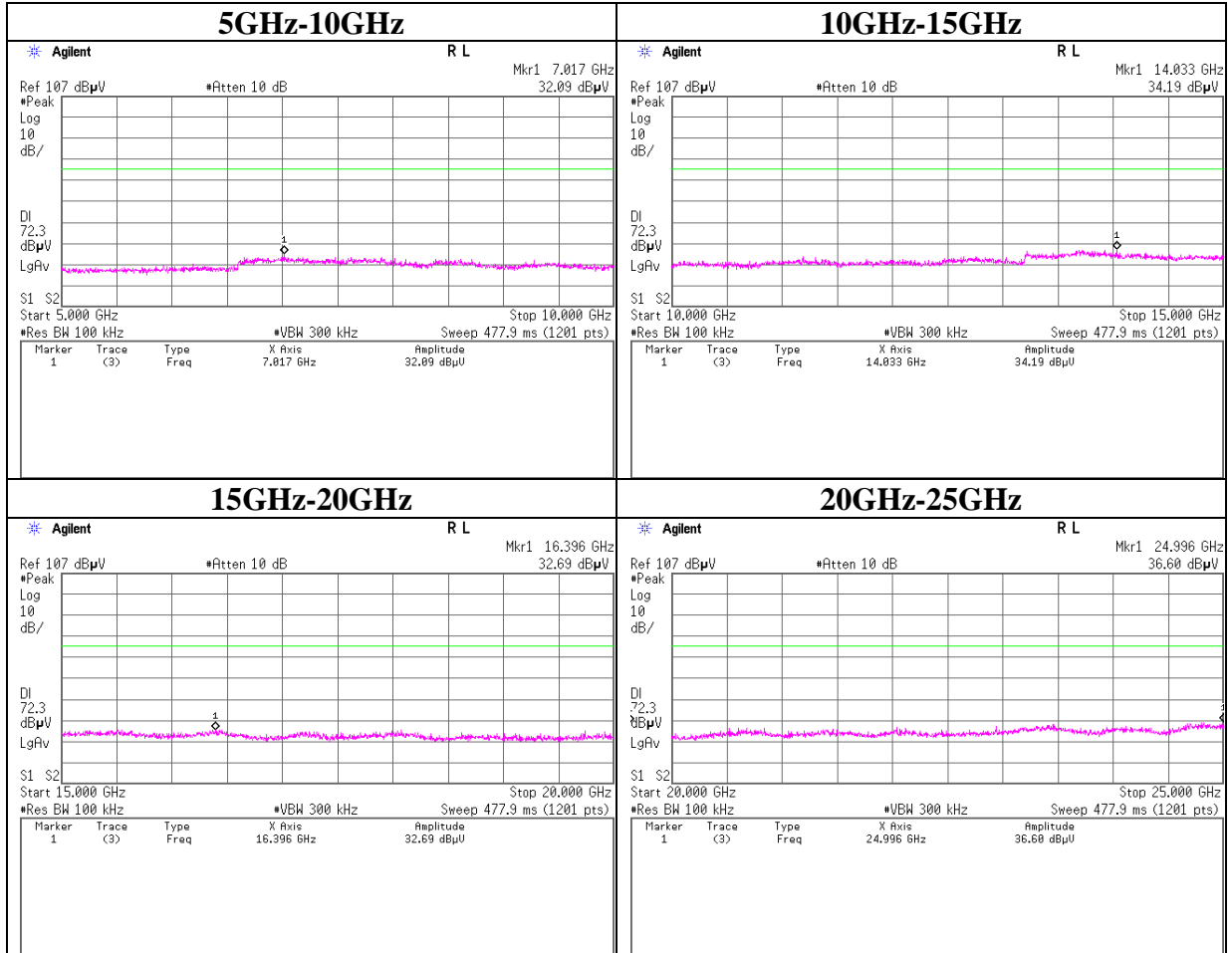
11b Tx 2437MHz



*For 150kHz – 30MHz, no noise was found at radiated emission test at a distance of 3m.

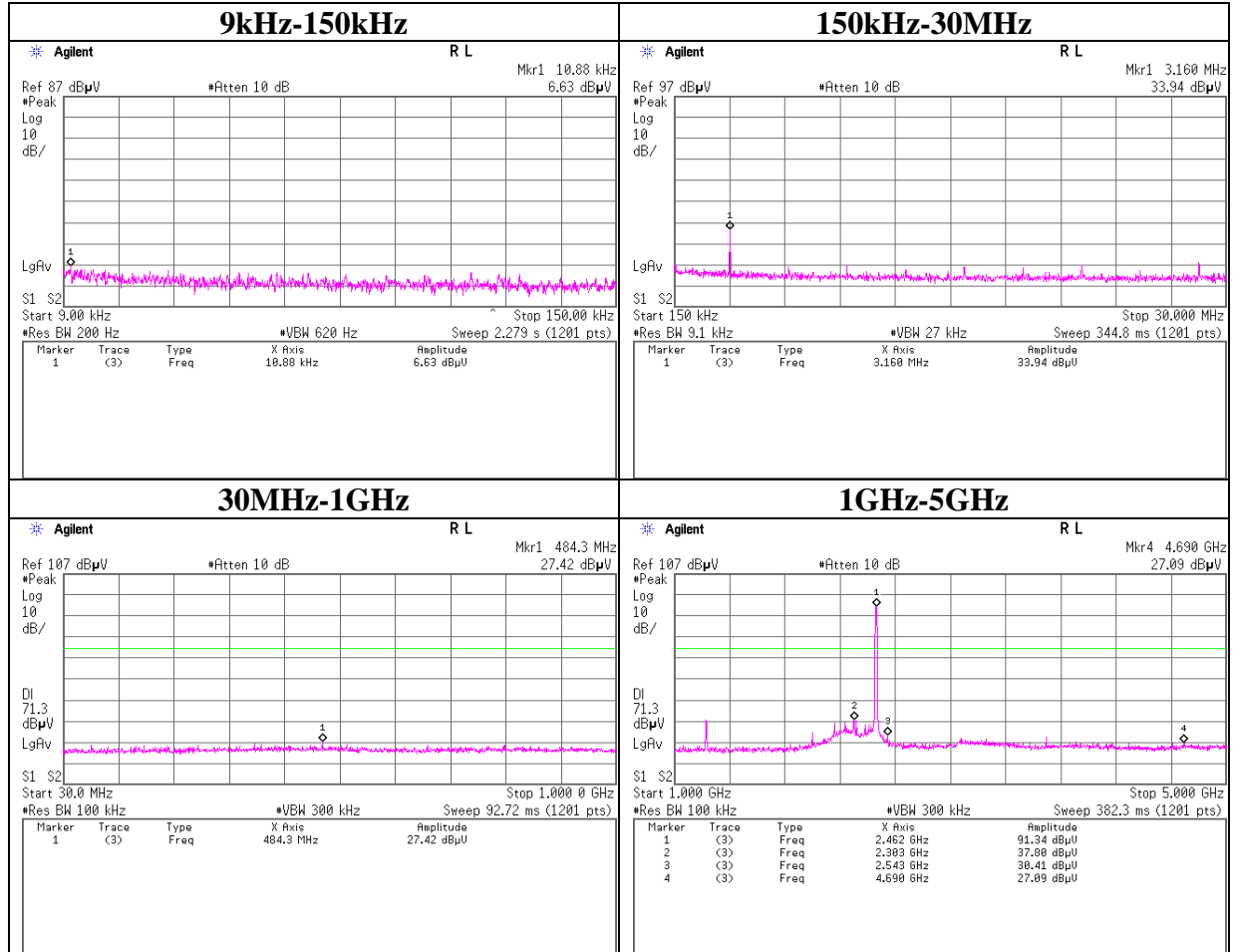
Conducted Spurious Emission
Low power

11b Tx 2437MHz



Conducted Spurious Emission
Low power

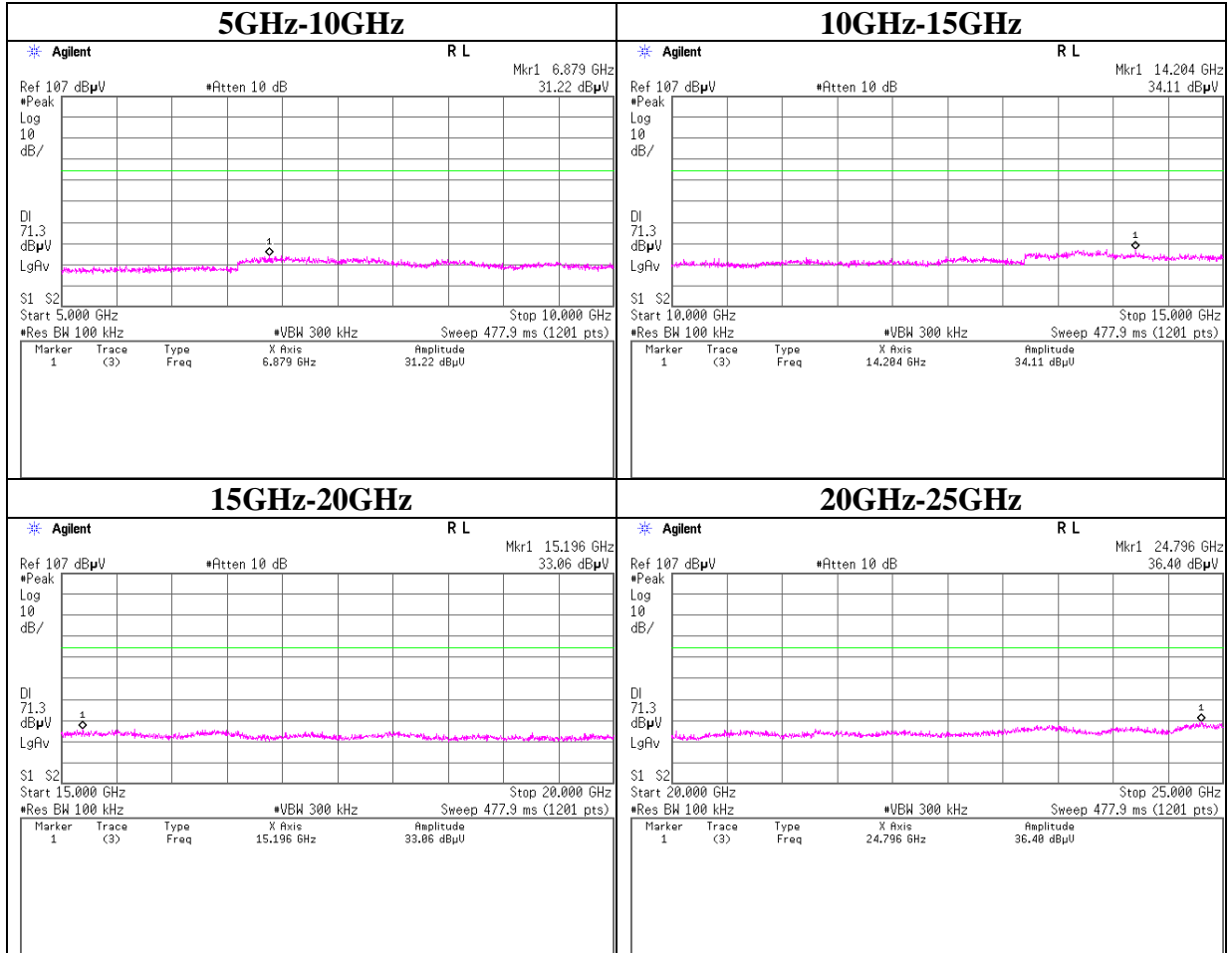
11b Tx 2462MHz



*For 150kHz – 30MHz, no noise was found at radiated emission test at a distance of 3m.

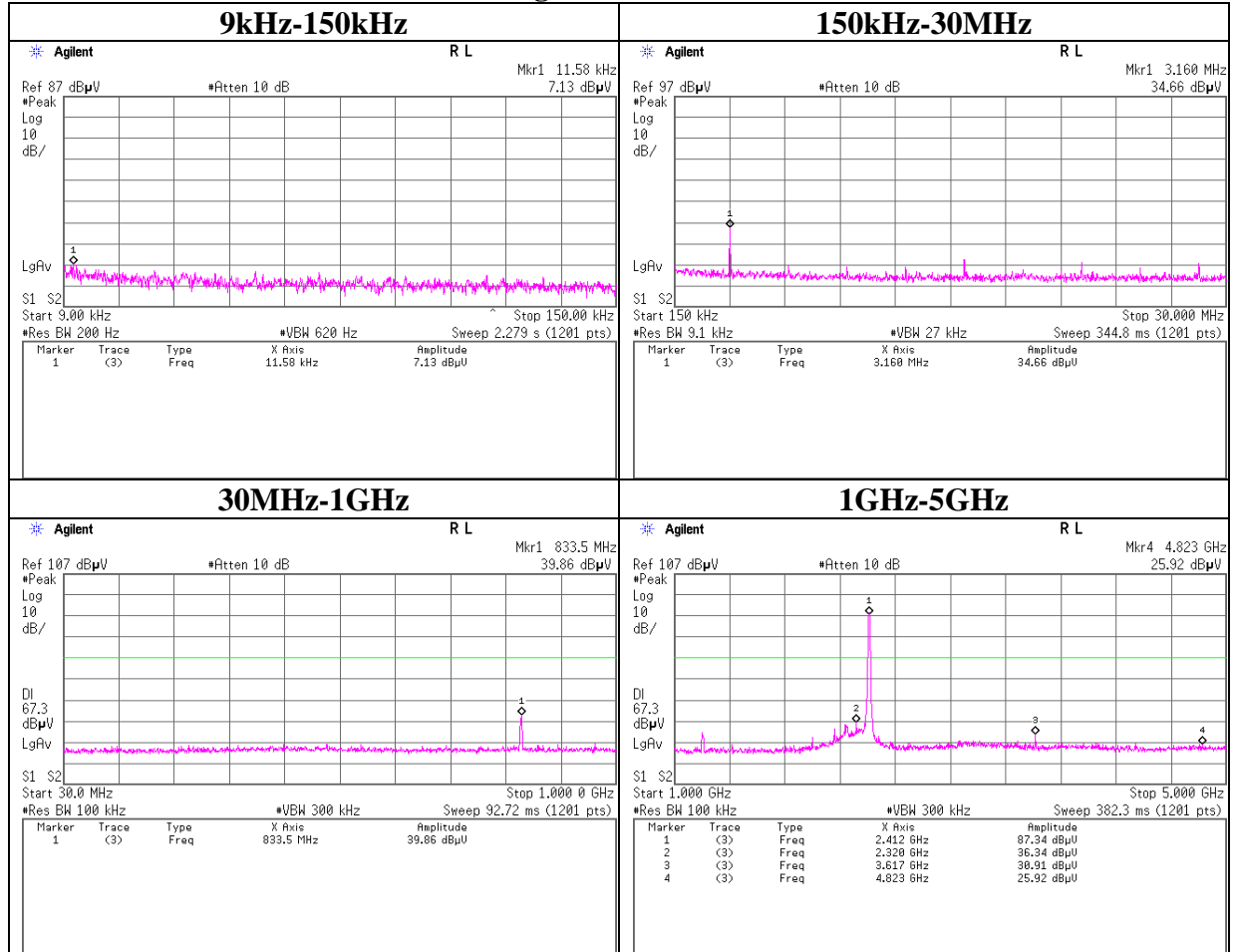
Conducted Spurious Emission
Low power

11b Tx 2462MHz



Conducted Spurious Emission
Low power

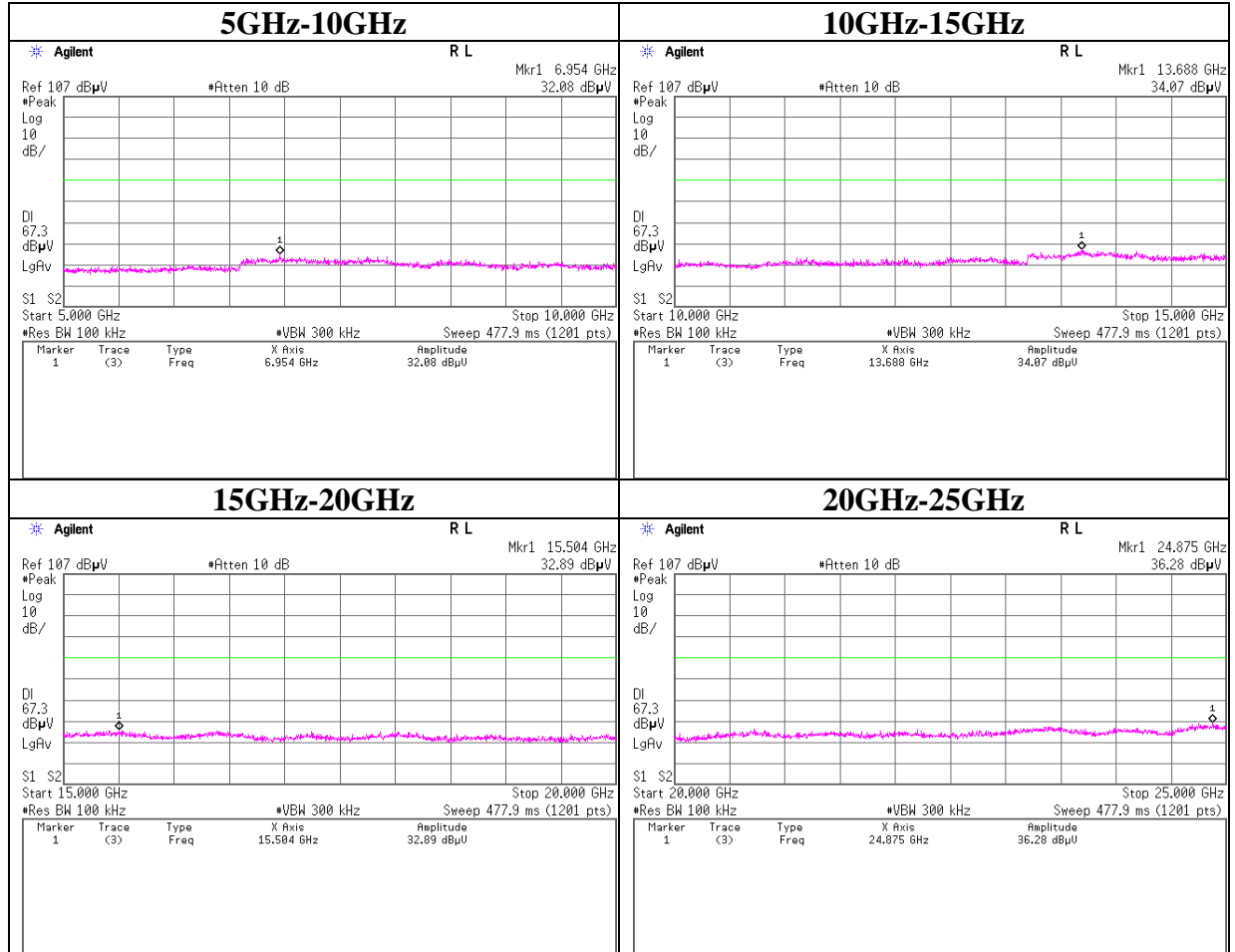
11g Tx 2412MHz



*For 150kHz – 30MHz, no noise was found at radiated emission test at a distance of 3m.

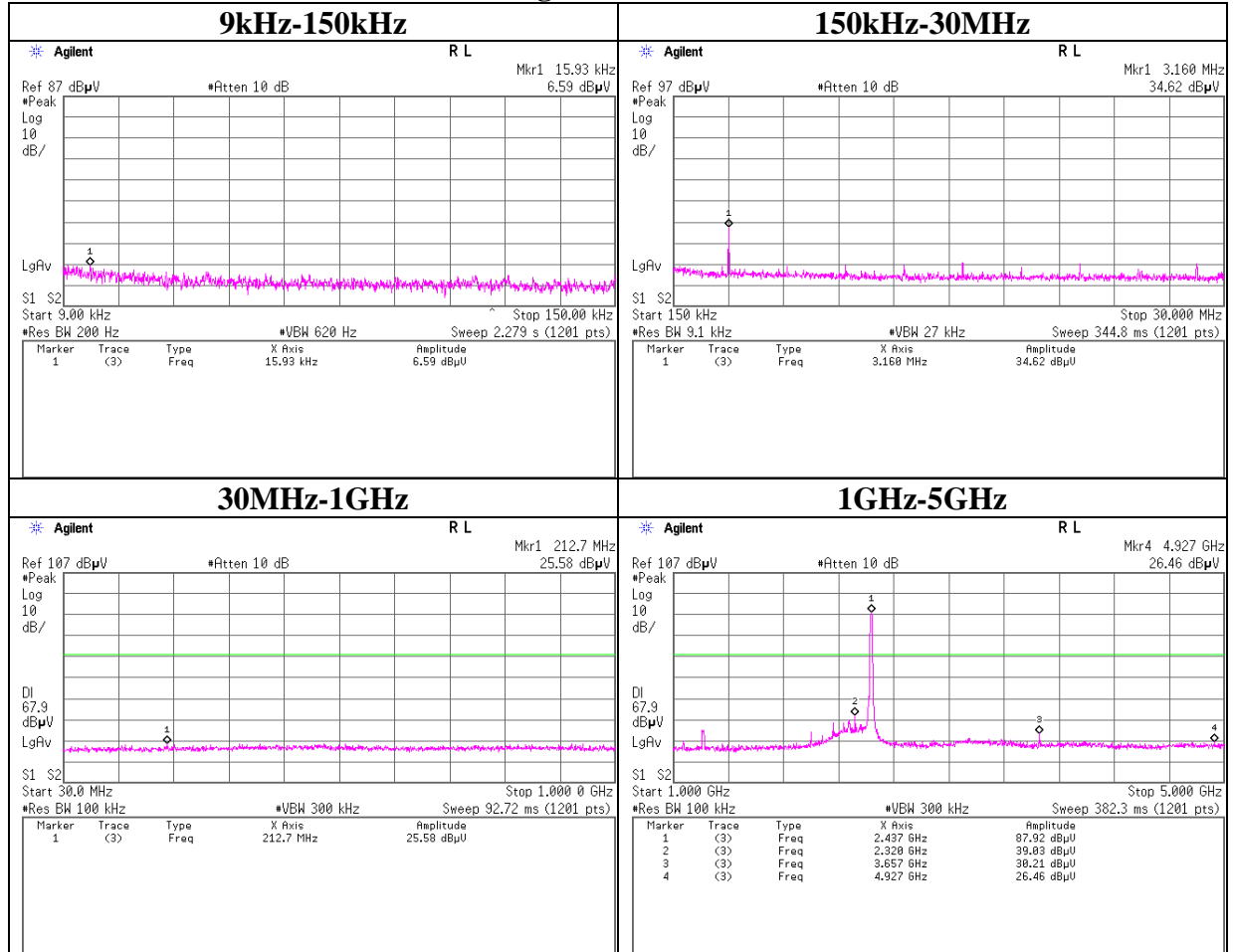
Conducted Spurious Emission
Low power

Tx 2412MHz



Conducted Spurious Emission
Low power

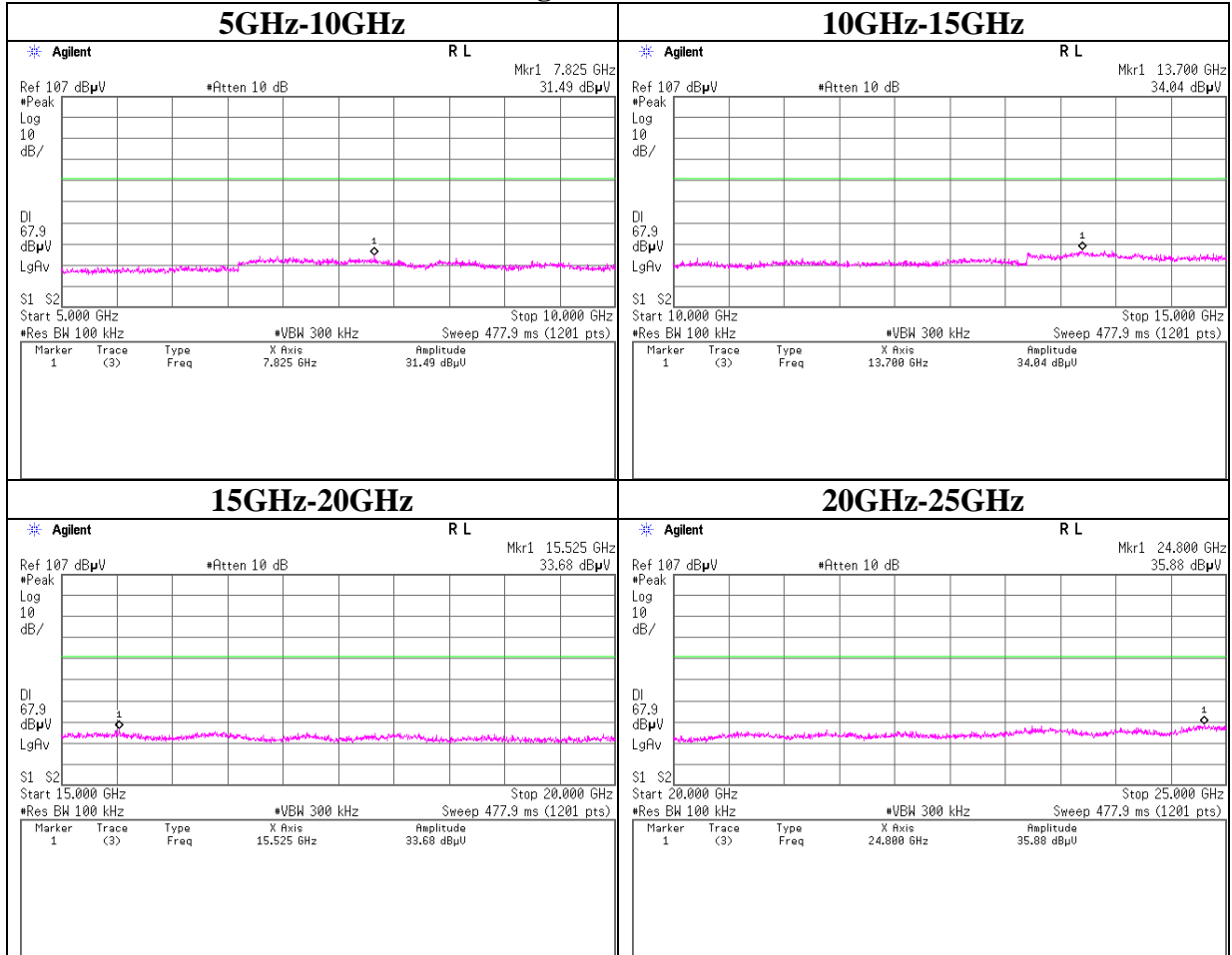
11g Tx 2437MHz



*For 150kHz – 30MHz, no noise was found at radiated emission test at a distance of 3m.

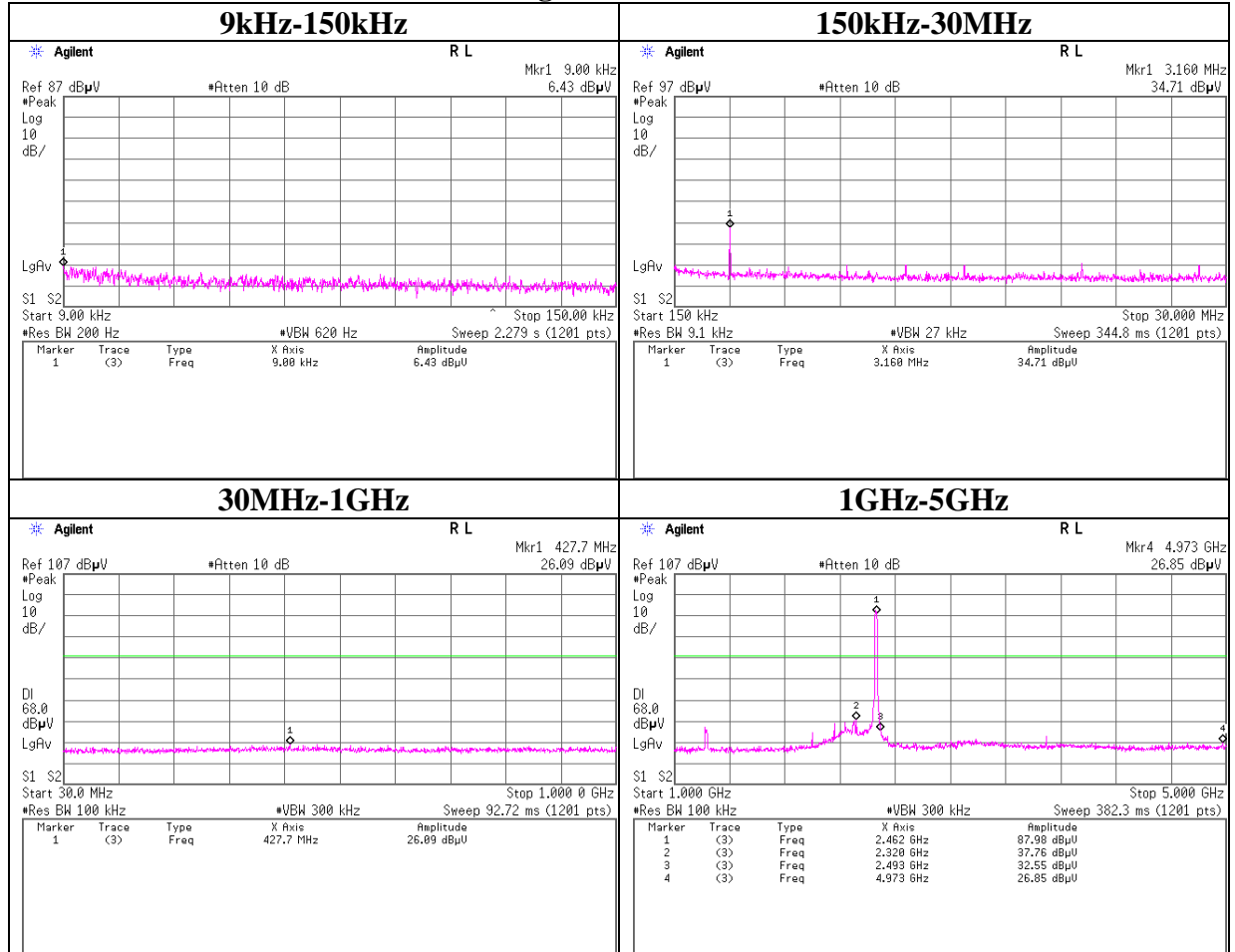
Conducted Spurious Emission
Low power

11g Tx 2437MHz



Conducted Spurious Emission
Low power

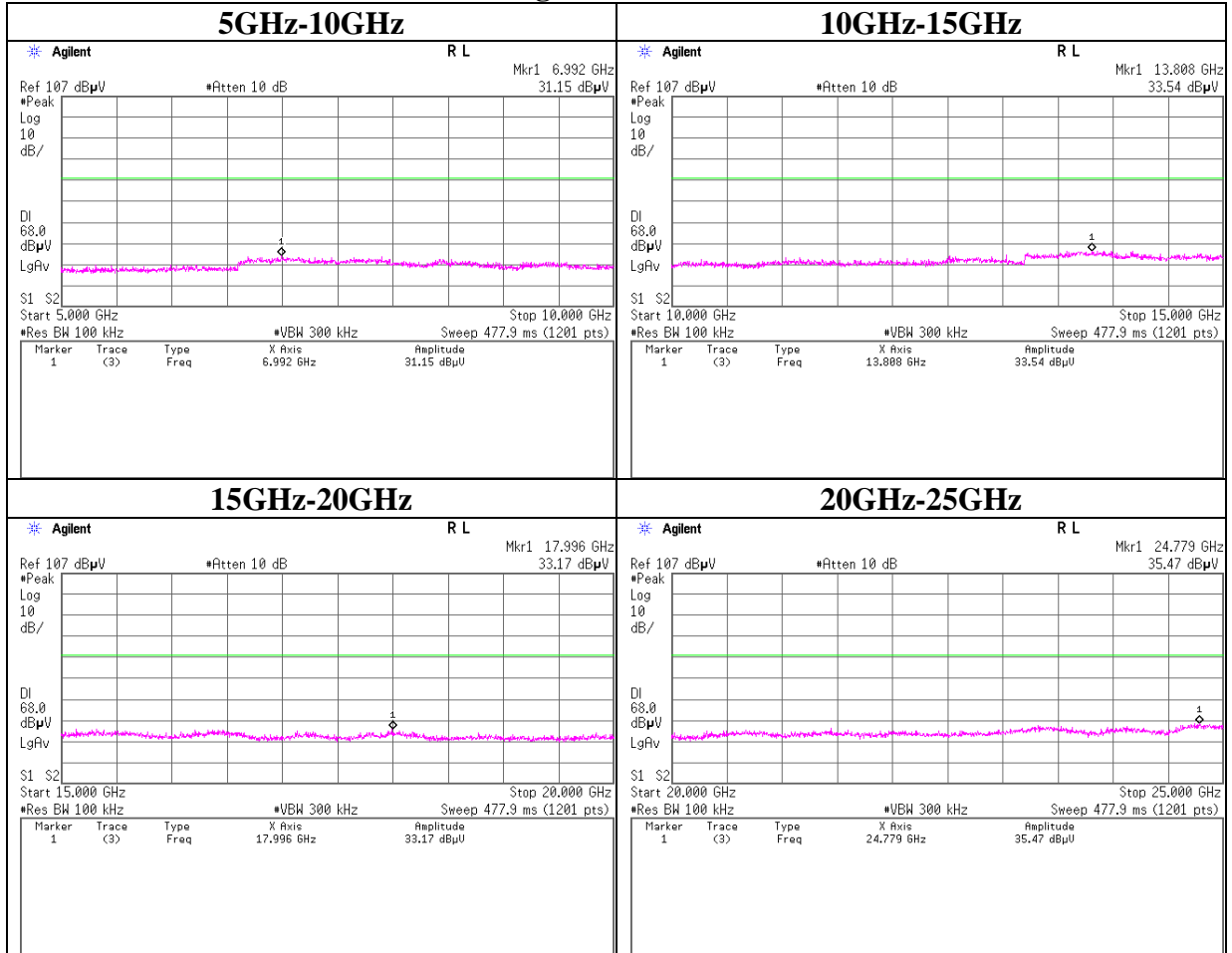
11g Tx 2462MHz



*For 150kHz – 30MHz, no noise was found at radiated emission test at a distance of 3m.

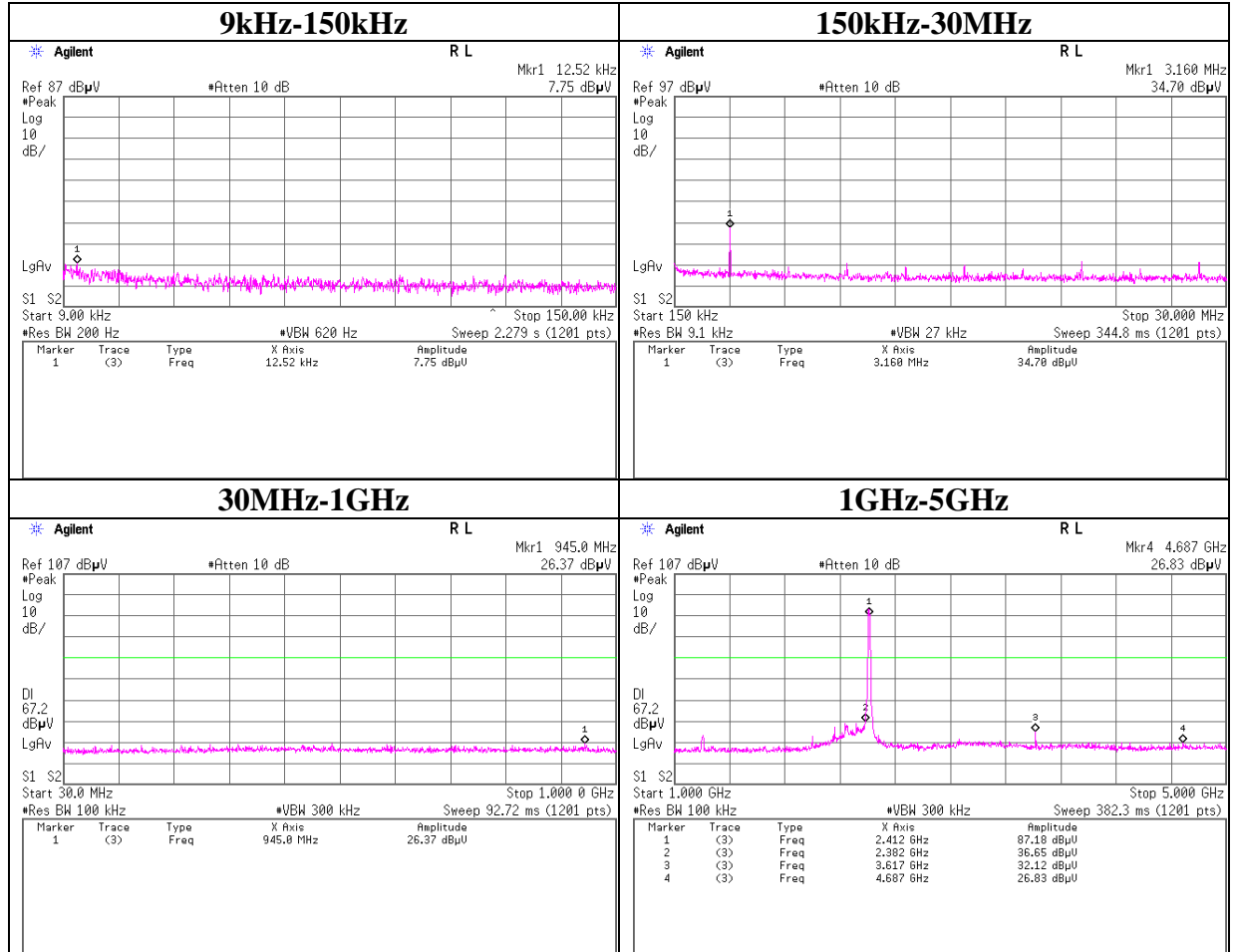
Conducted Spurious Emission
Low power

11g Tx 2462MHz



Conducted Spurious Emission
Low power

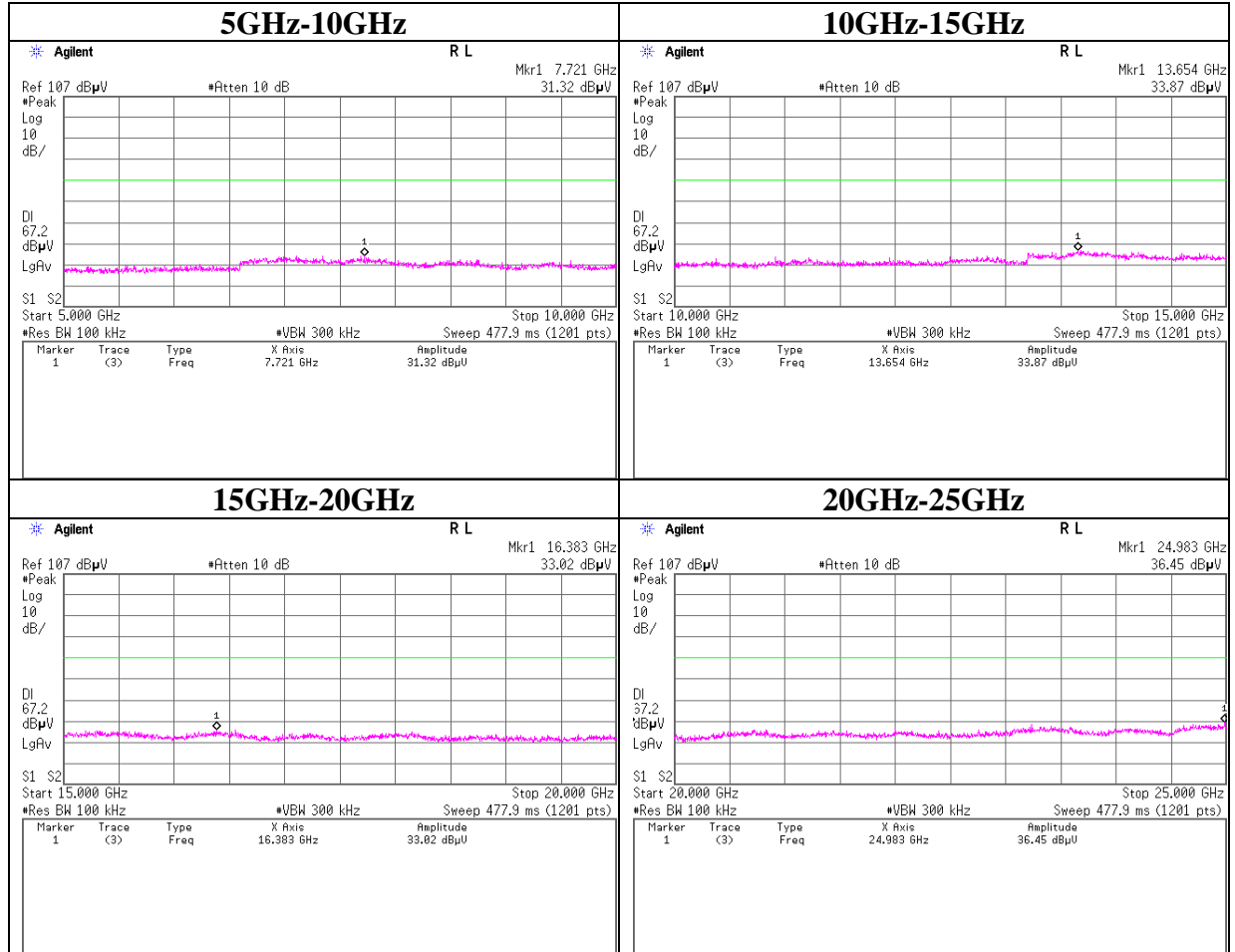
11n-20 Tx 2412MHz



*For 150kHz – 30MHz, no noise was found at radiated emission test at a distance of 3m.

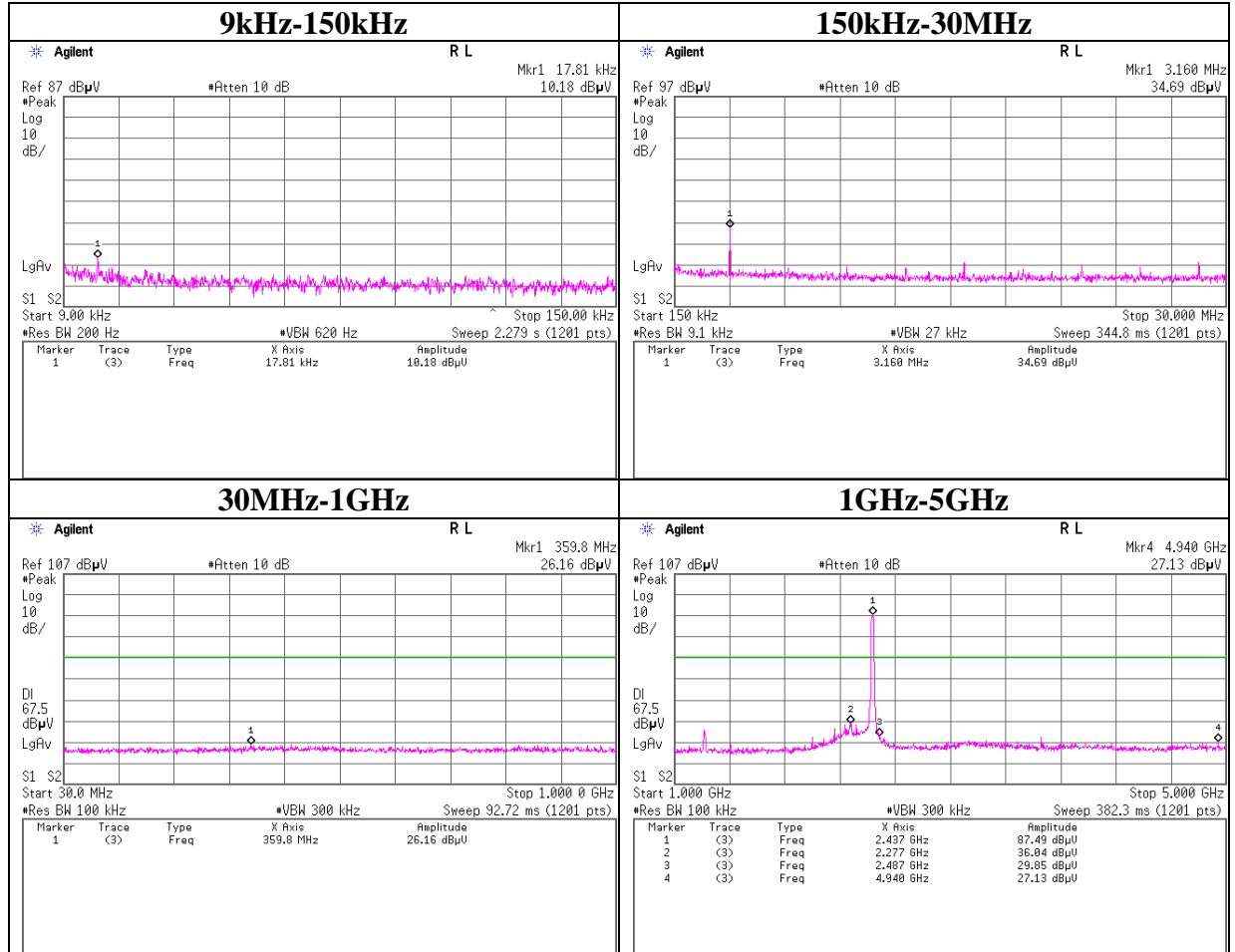
Conducted Spurious Emission
Low power

11n-20 Tx 2412MHz



Conducted Spurious Emission
Low power

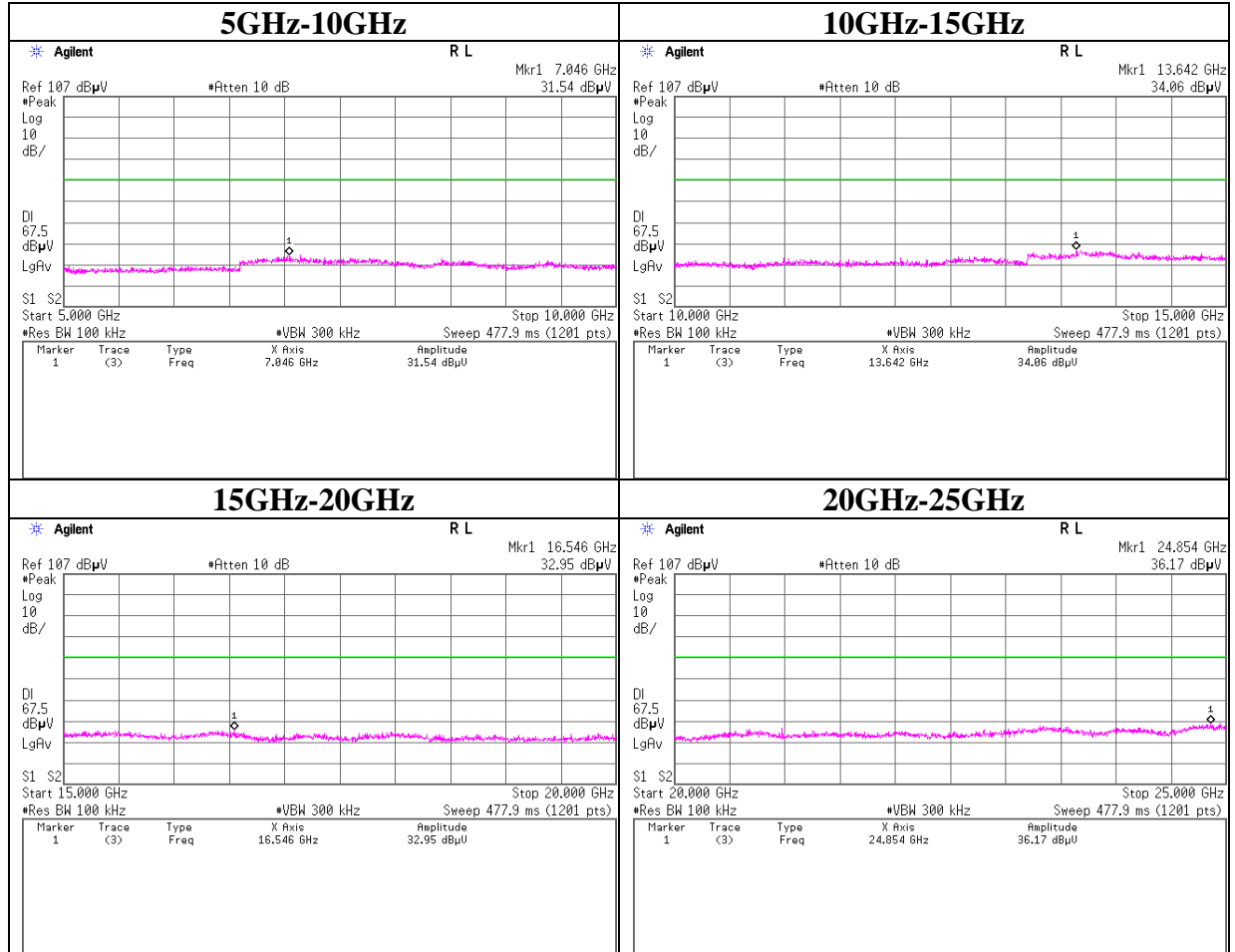
11n-20Tx 2437MHz



*For 150kHz – 30MHz, no noise was found at radiated emission test at a distance of 3m.

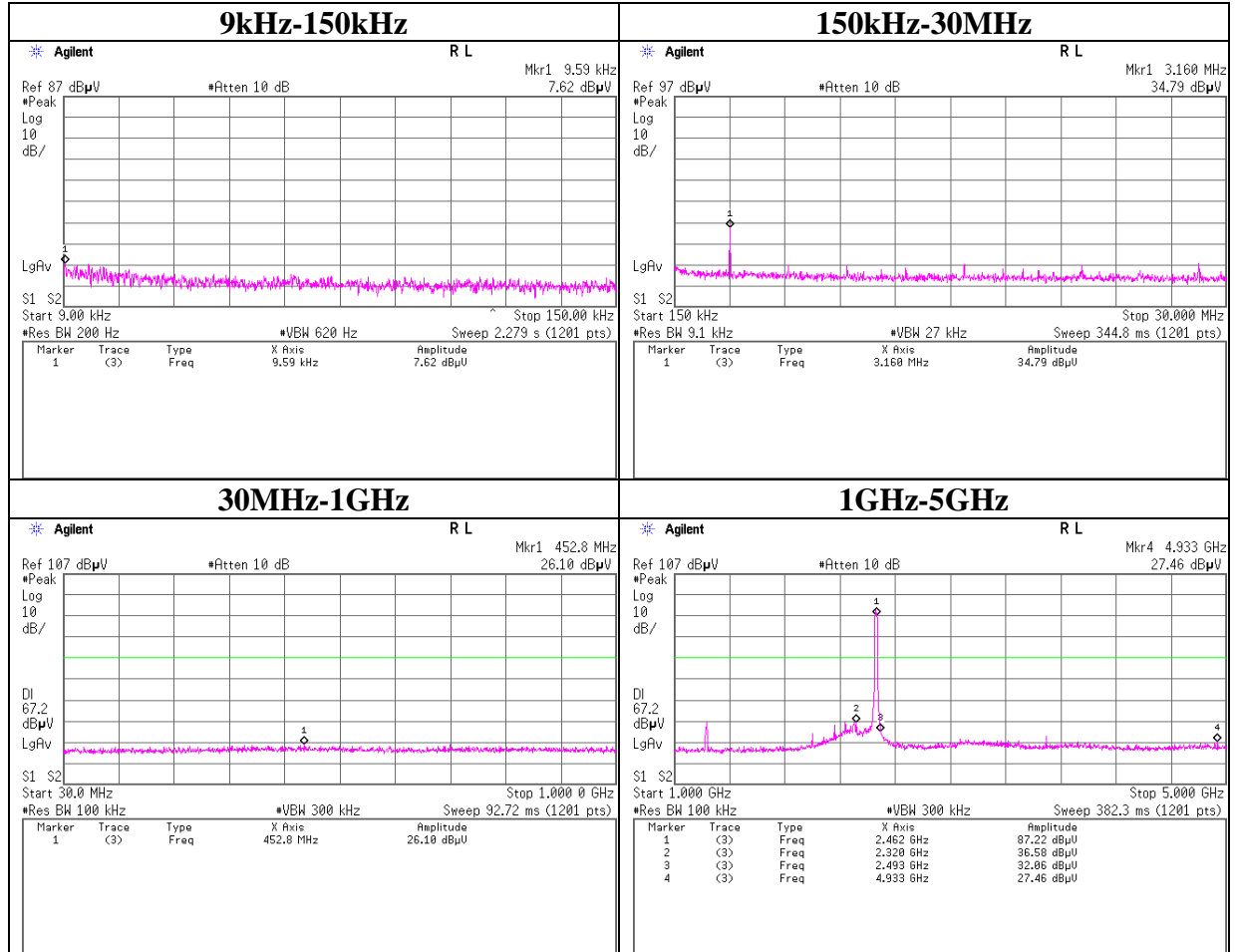
Conducted Spurious Emission
Low power

11n-20 Tx 2437MHz



Conducted Spurious Emission
Low power

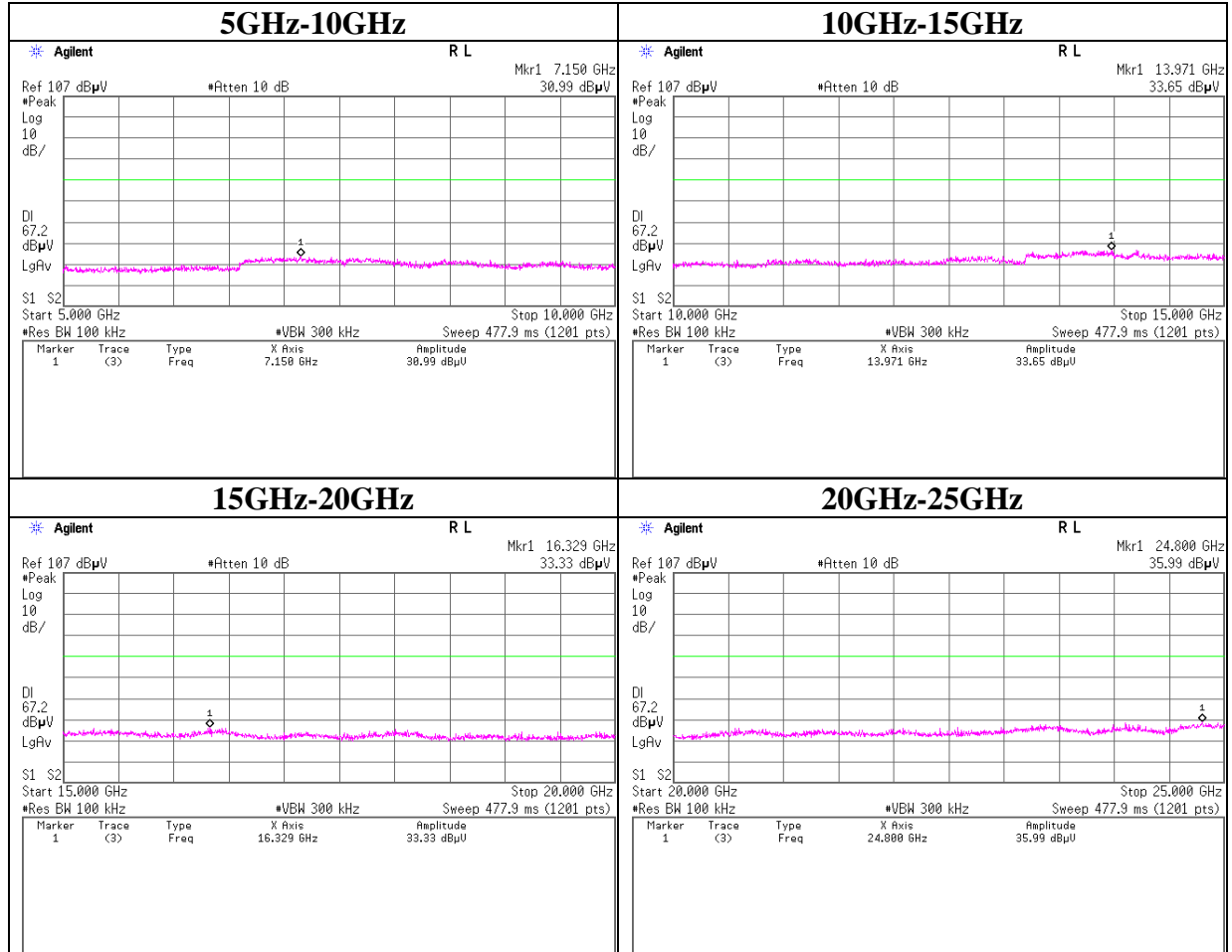
11n-20 Tx 2462MHz



*For 150kHz – 30MHz, no noise was found at radiated emission test at a distance of 3m.

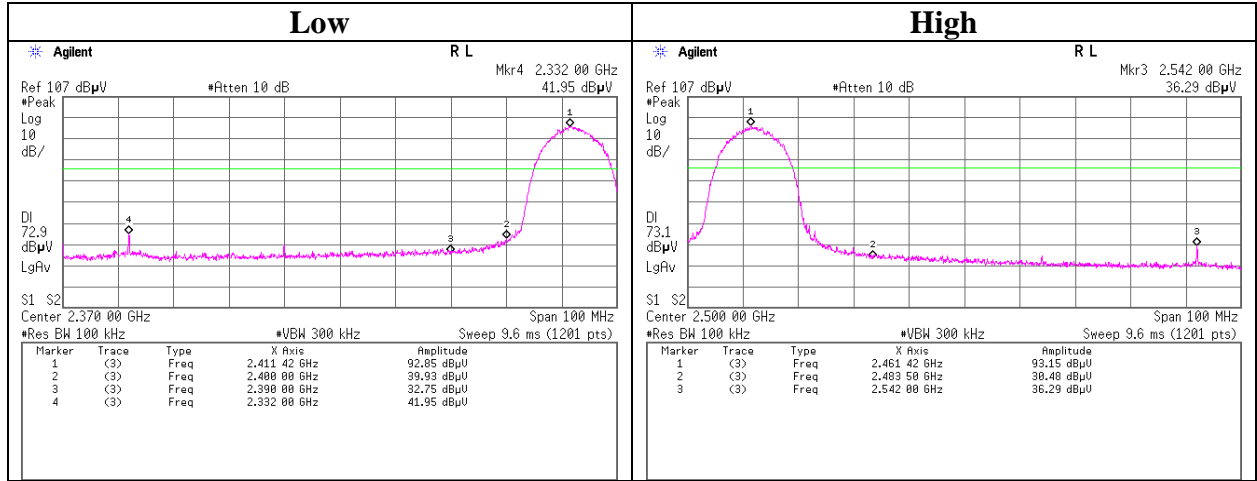
Conducted Spurious Emission
Low power

11n-20 Tx 2462MHz

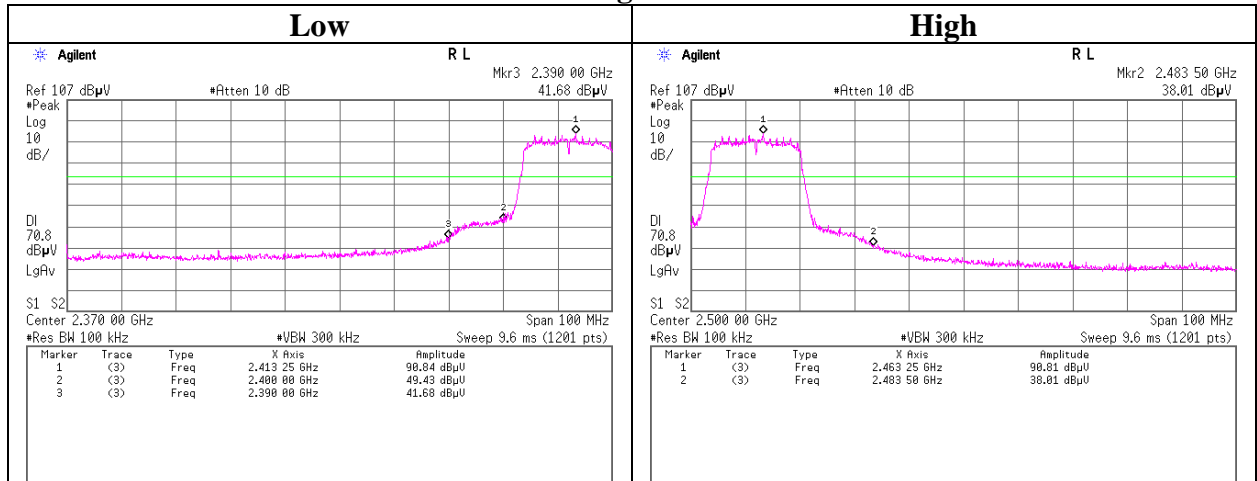


Conducted Emission Band Edge compliance

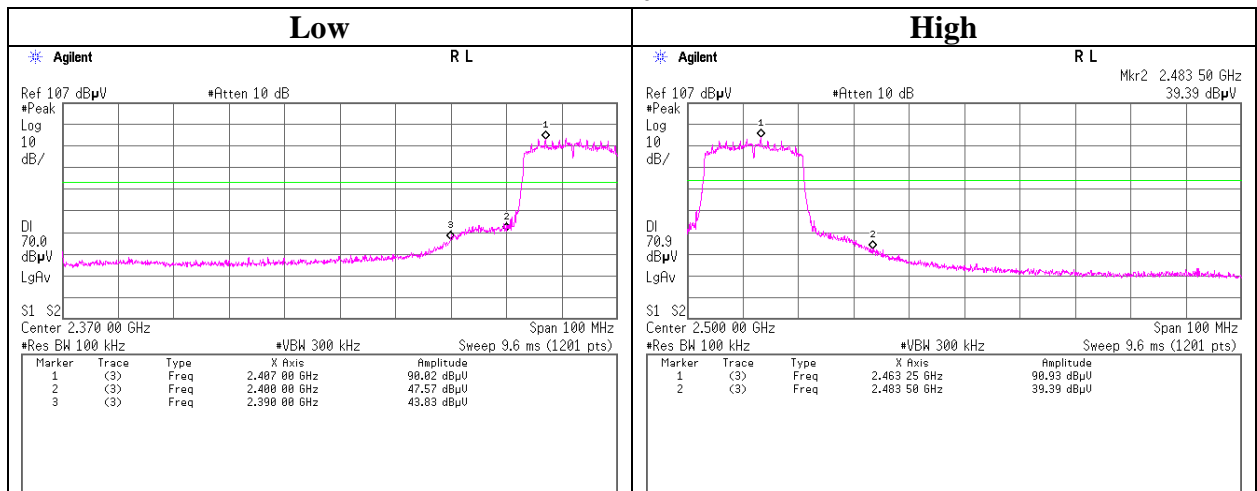
Low power 11b Tx



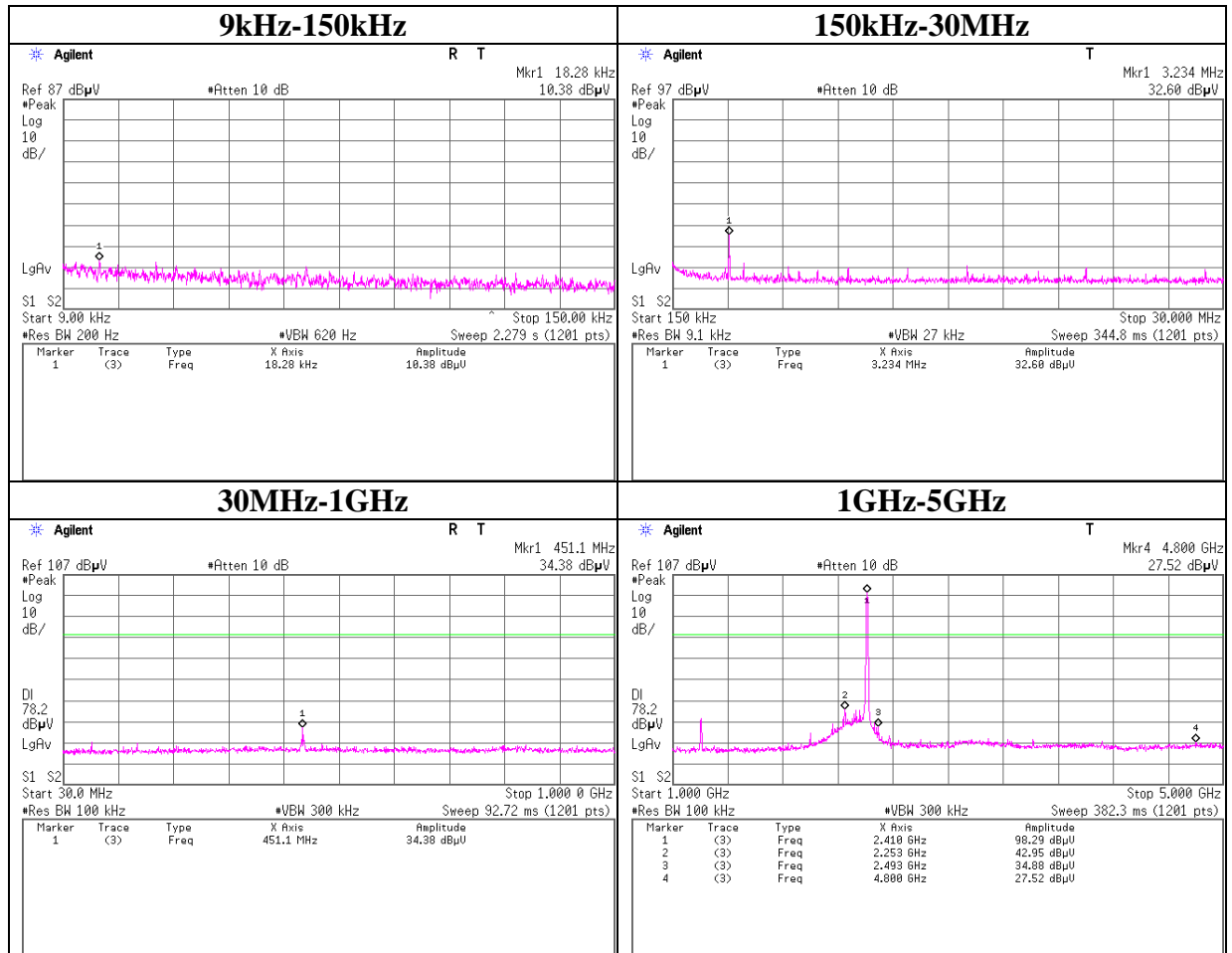
11g Tx



11n-20 Tx



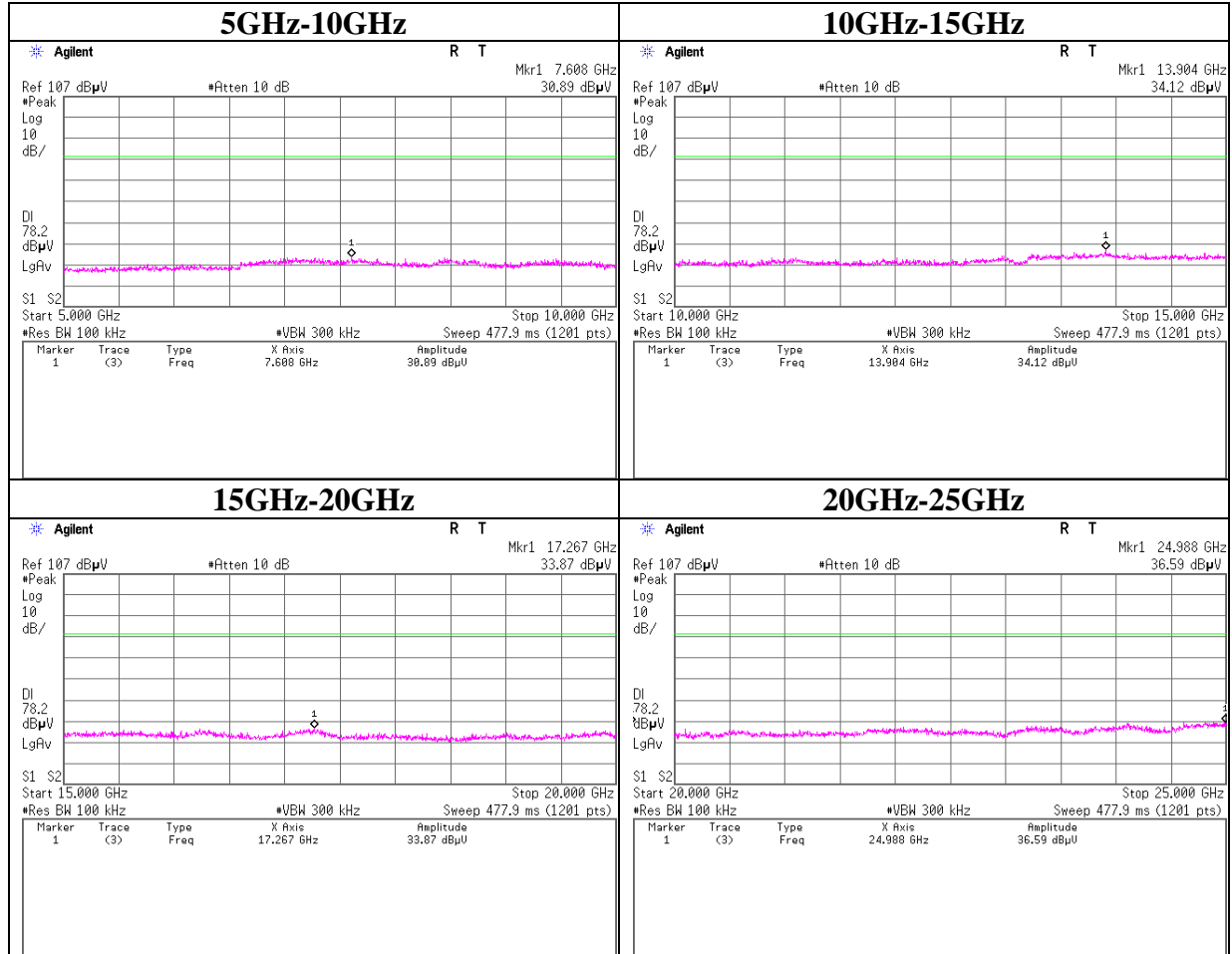
Conducted Spurious Emission
High power
11b Tx 2412MHz



*For 150kHz – 30MHz, no noise was found at radiated emission test at a distance of 3m.

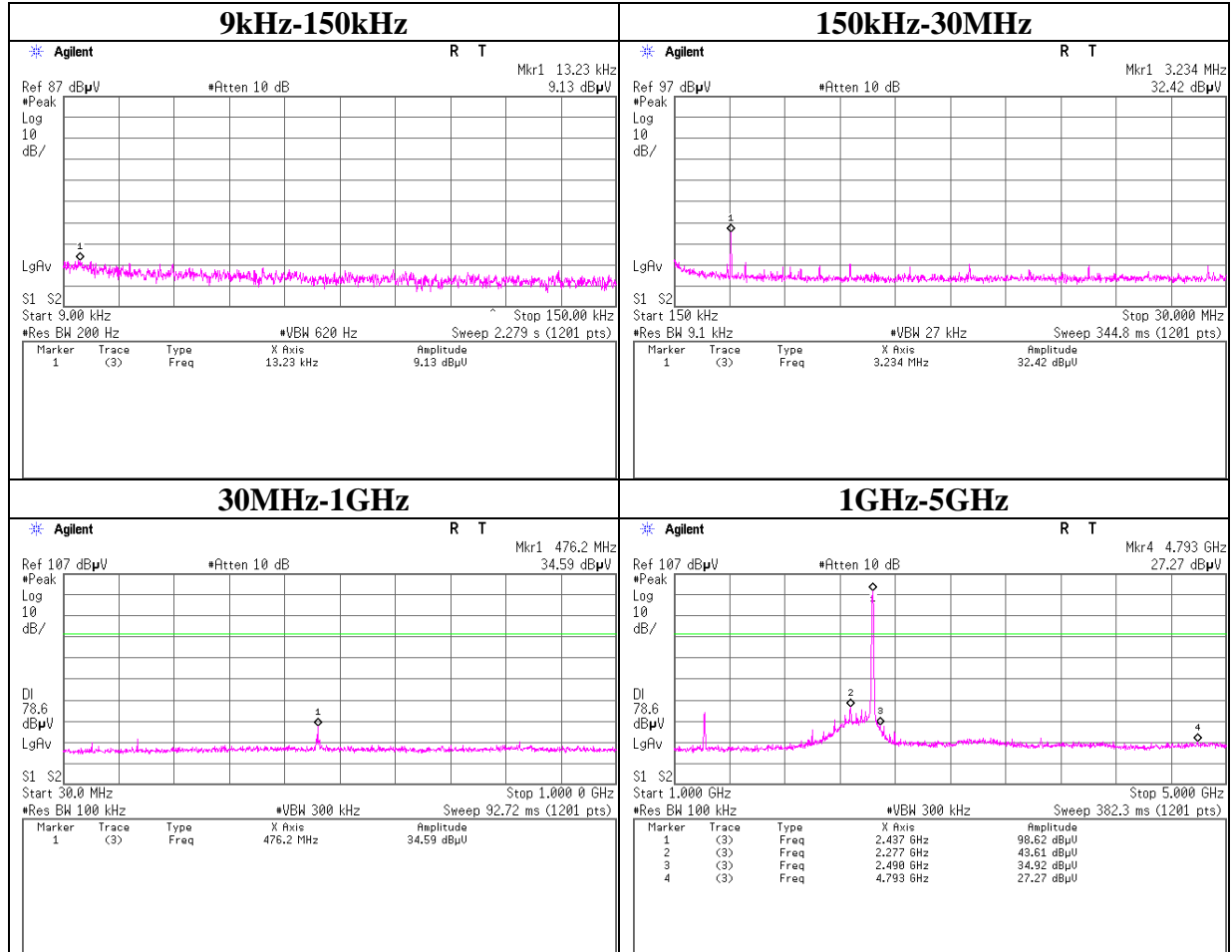
Conducted Spurious Emission
High power

11b Tx 2412MHz



Conducted Spurious Emission
High power

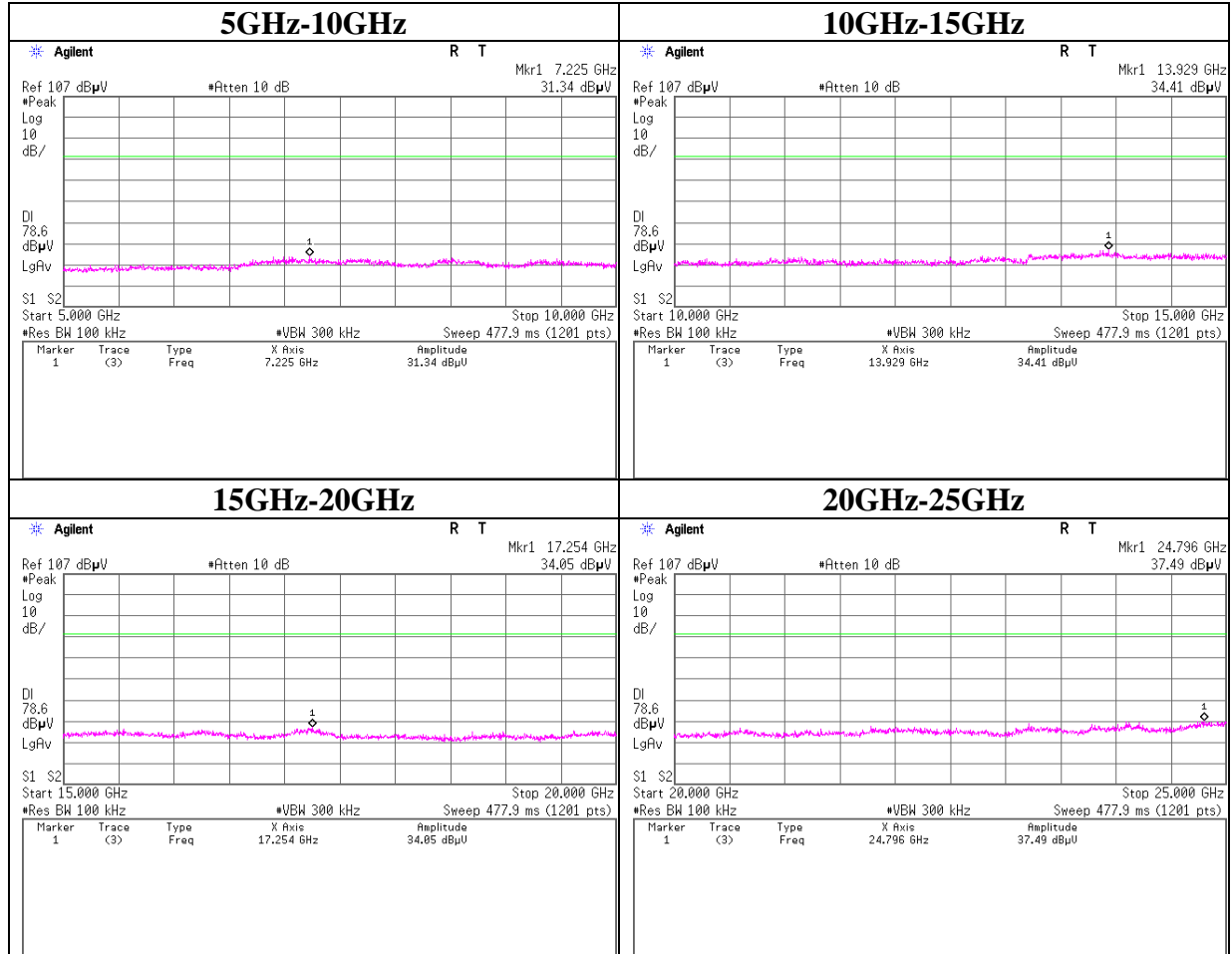
11b Tx 2437MHz



*For 150kHz – 30MHz, no noise was found at radiated emission test at a distance of 3m.

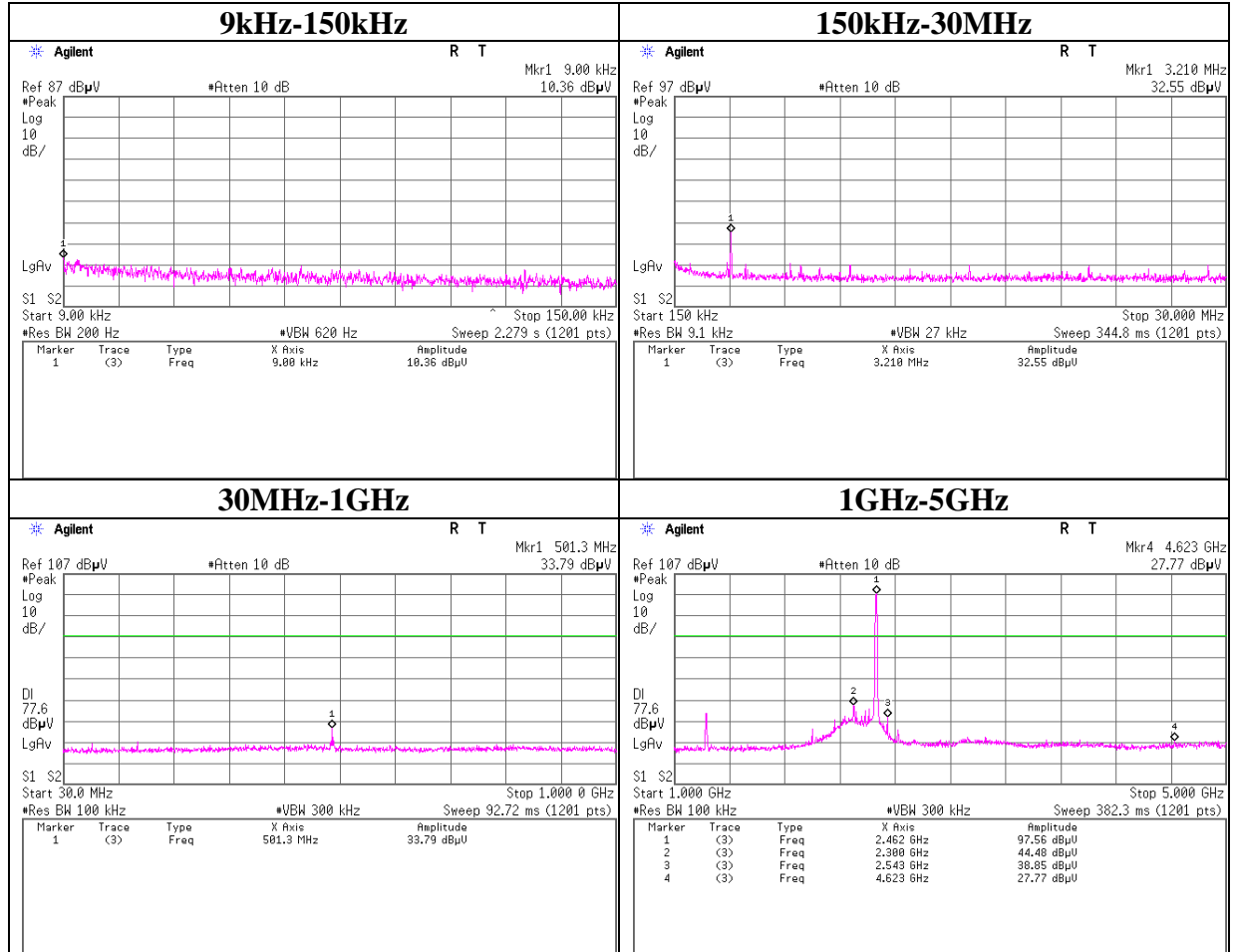
Conducted Spurious Emission
High power

11b Tx 2437MHz



Conducted Spurious Emission
High power

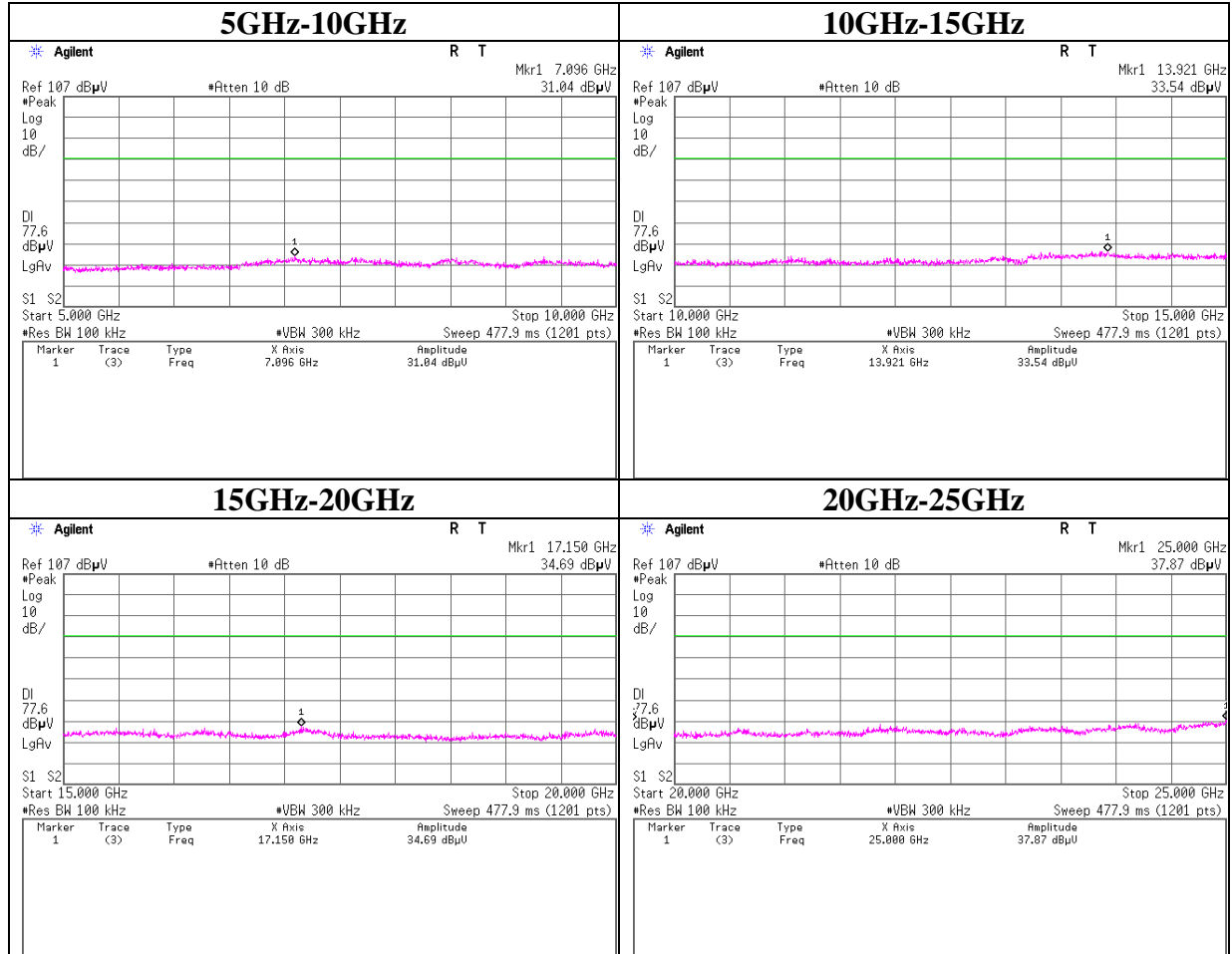
11b Tx 2462MHz



*For 150kHz – 30MHz, no noise was found at radiated emission test at a distance of 3m.

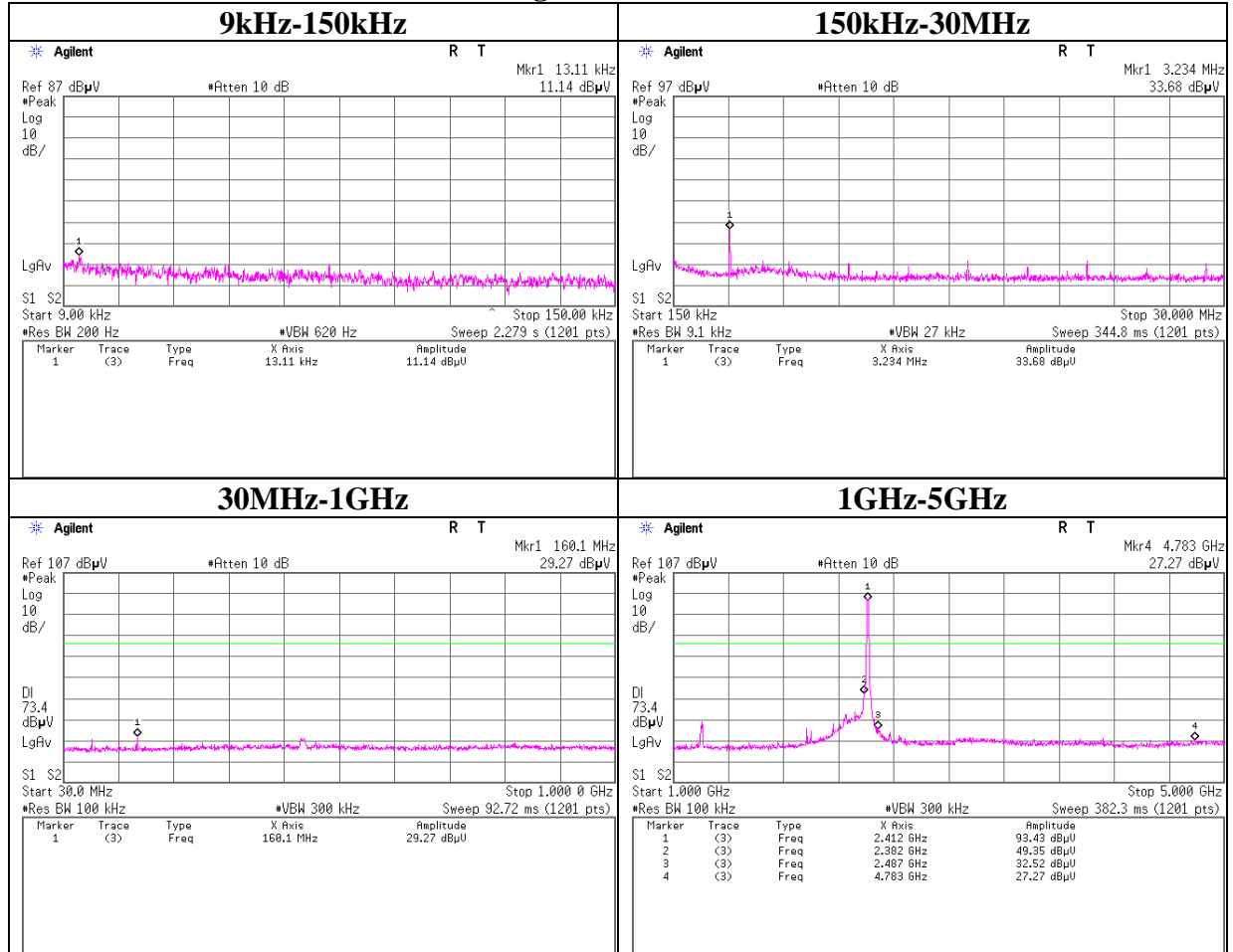
Conducted Spurious Emission
High power

11b Tx 2462MHz



Conducted Spurious Emission
High power

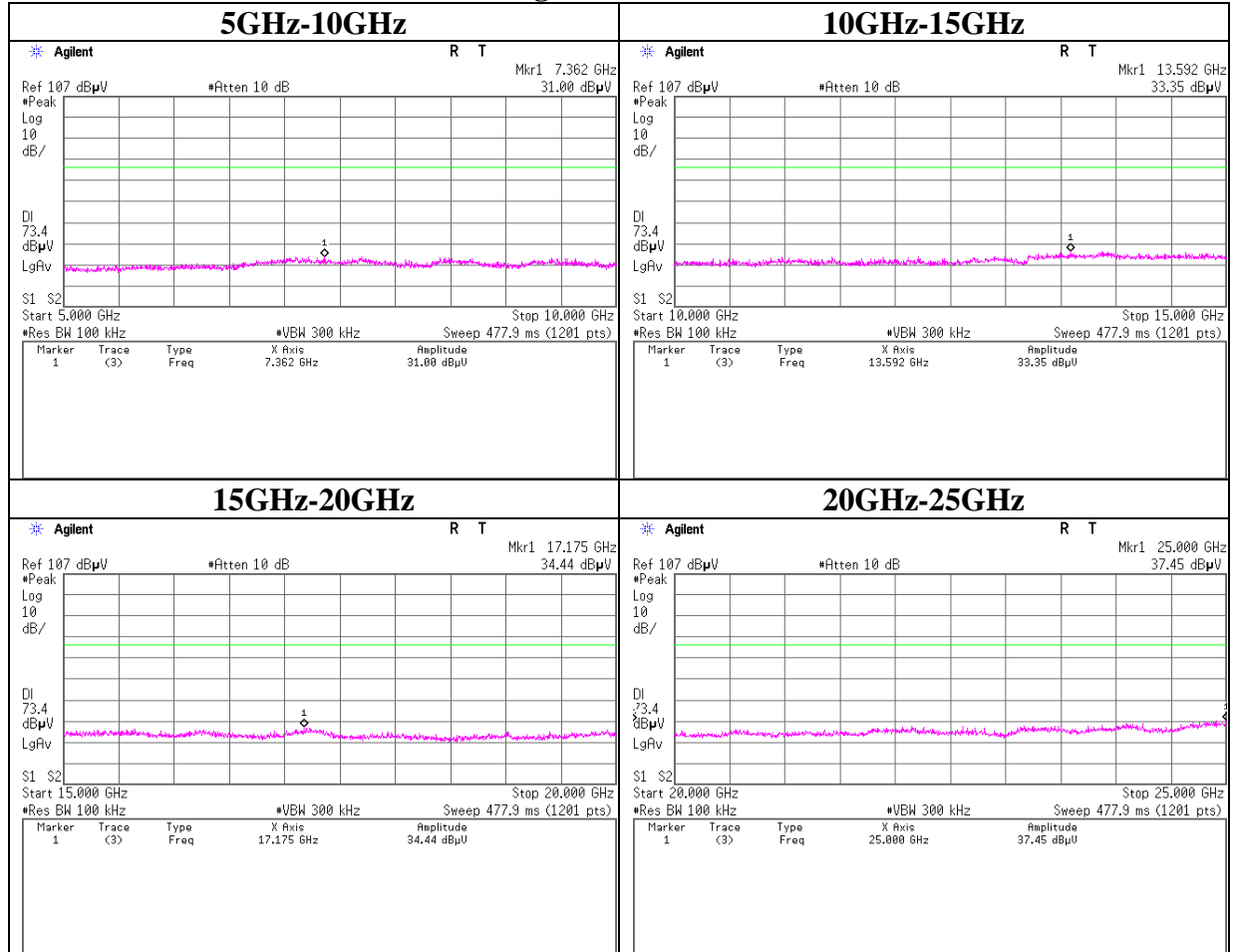
11g Tx 2412MHz



*For 150kHz – 30MHz, no noise was found at radiated emission test at a distance of 3m.

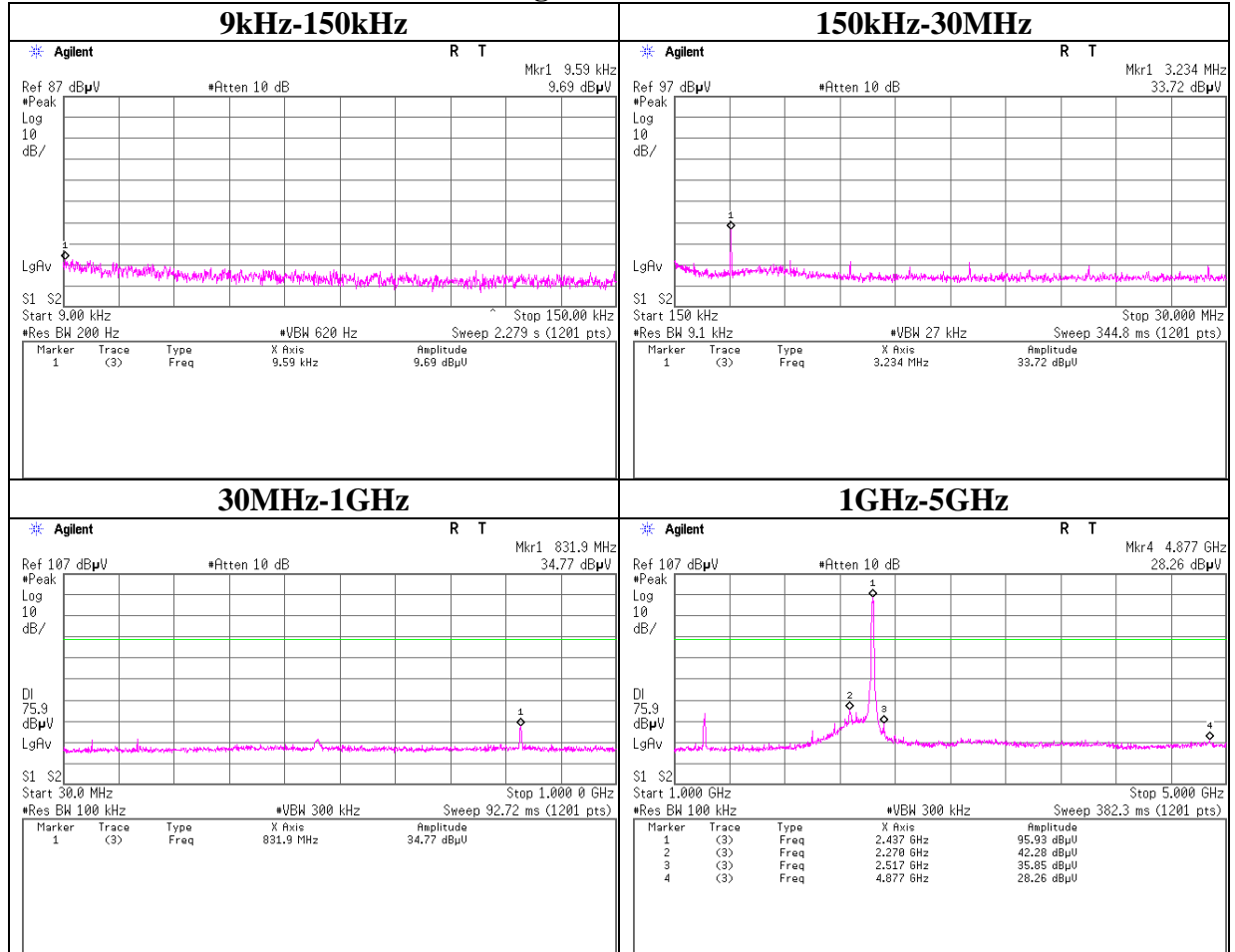
Conducted Spurious Emission
High power

11g Tx 2412MHz



Conducted Spurious Emission
High power

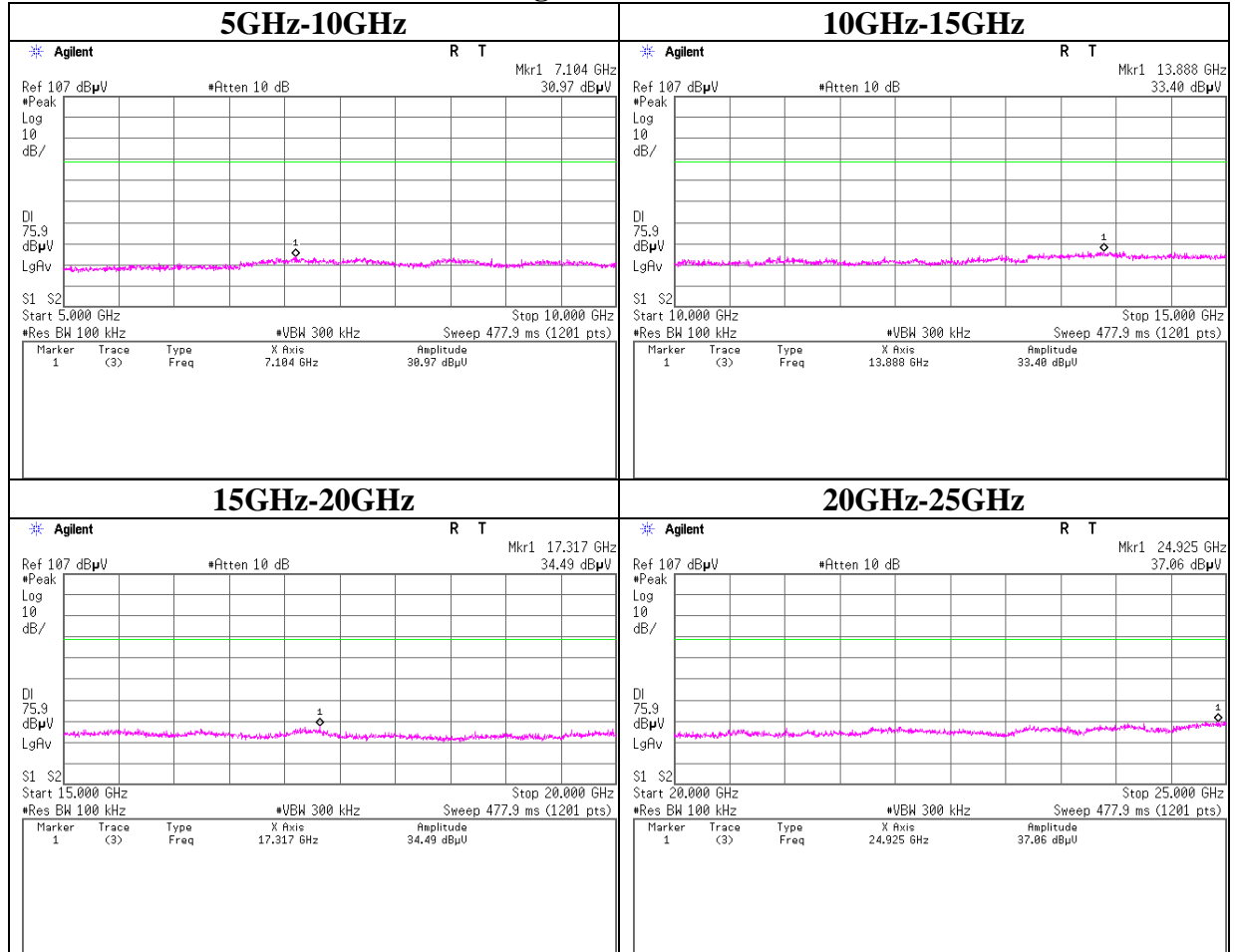
11g Tx 2437MHz



*For 150kHz – 30MHz, no noise was found at radiated emission test at a distance of 3m.

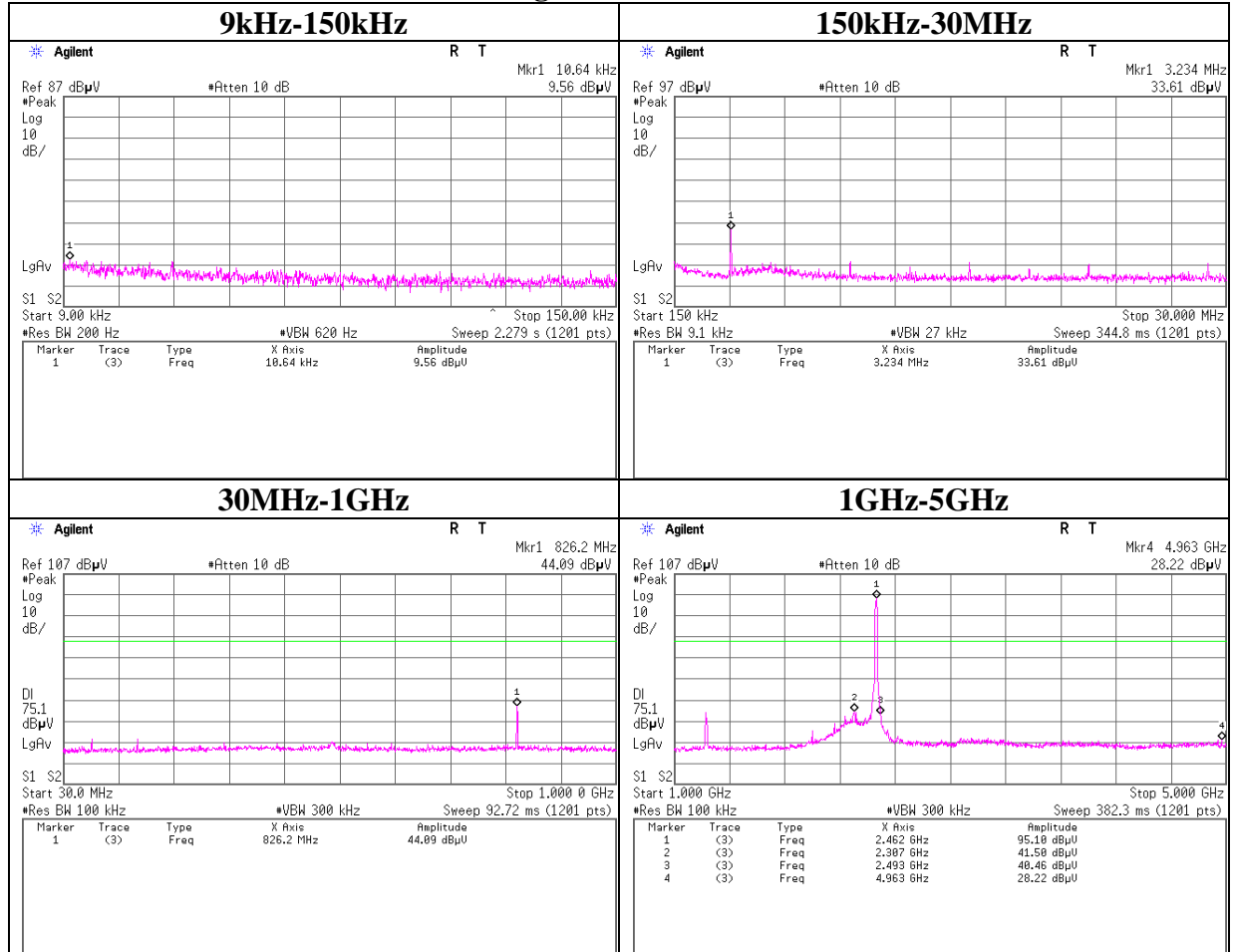
Conducted Spurious Emission
High power

11g Tx 2437MHz



Conducted Spurious Emission
High power

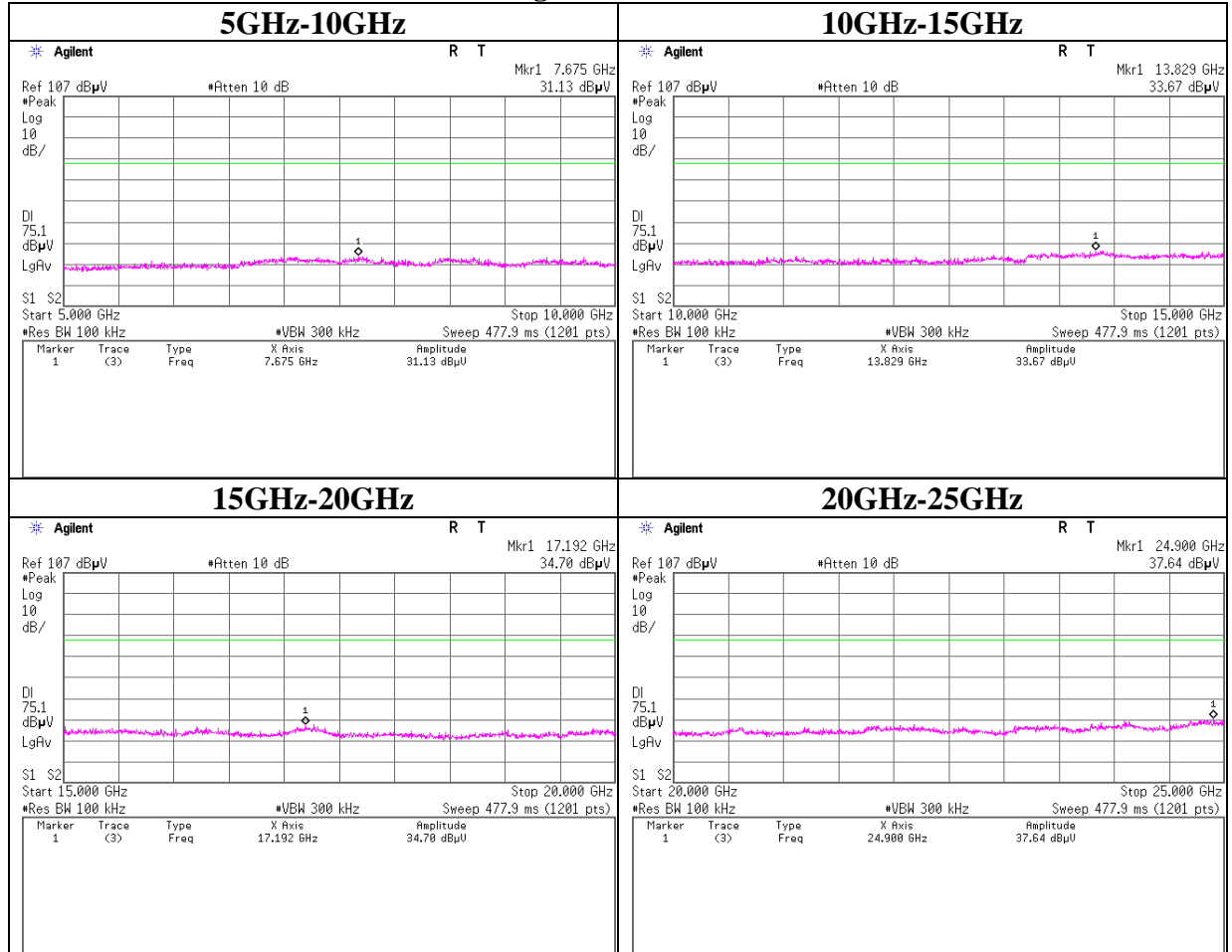
11g Tx 2462MHz



*For 150kHz – 30MHz, no noise was found at radiated emission test at a distance of 3m.

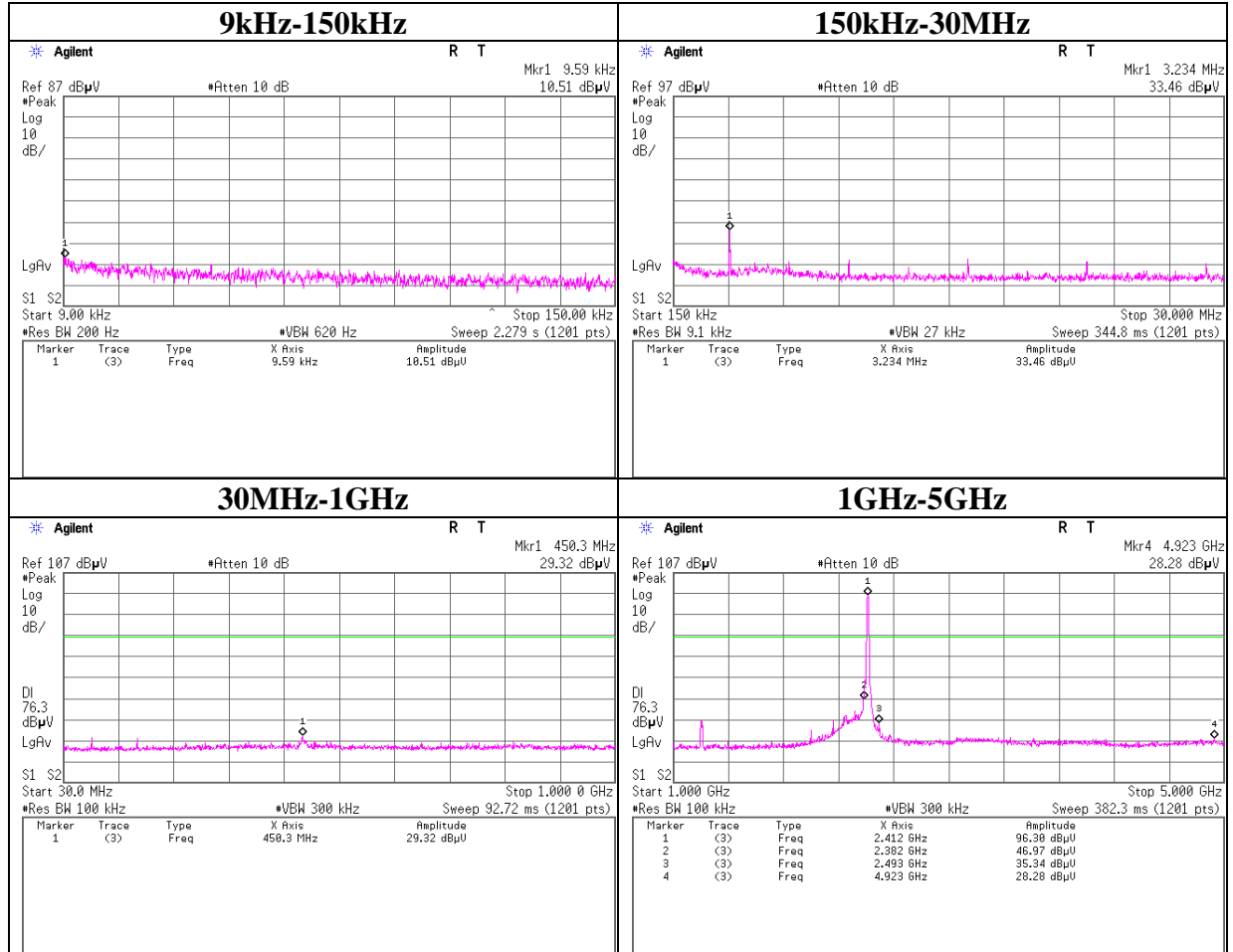
Conducted Spurious Emission
High power

11g Tx 2462MHz



Conducted Spurious Emission
High power

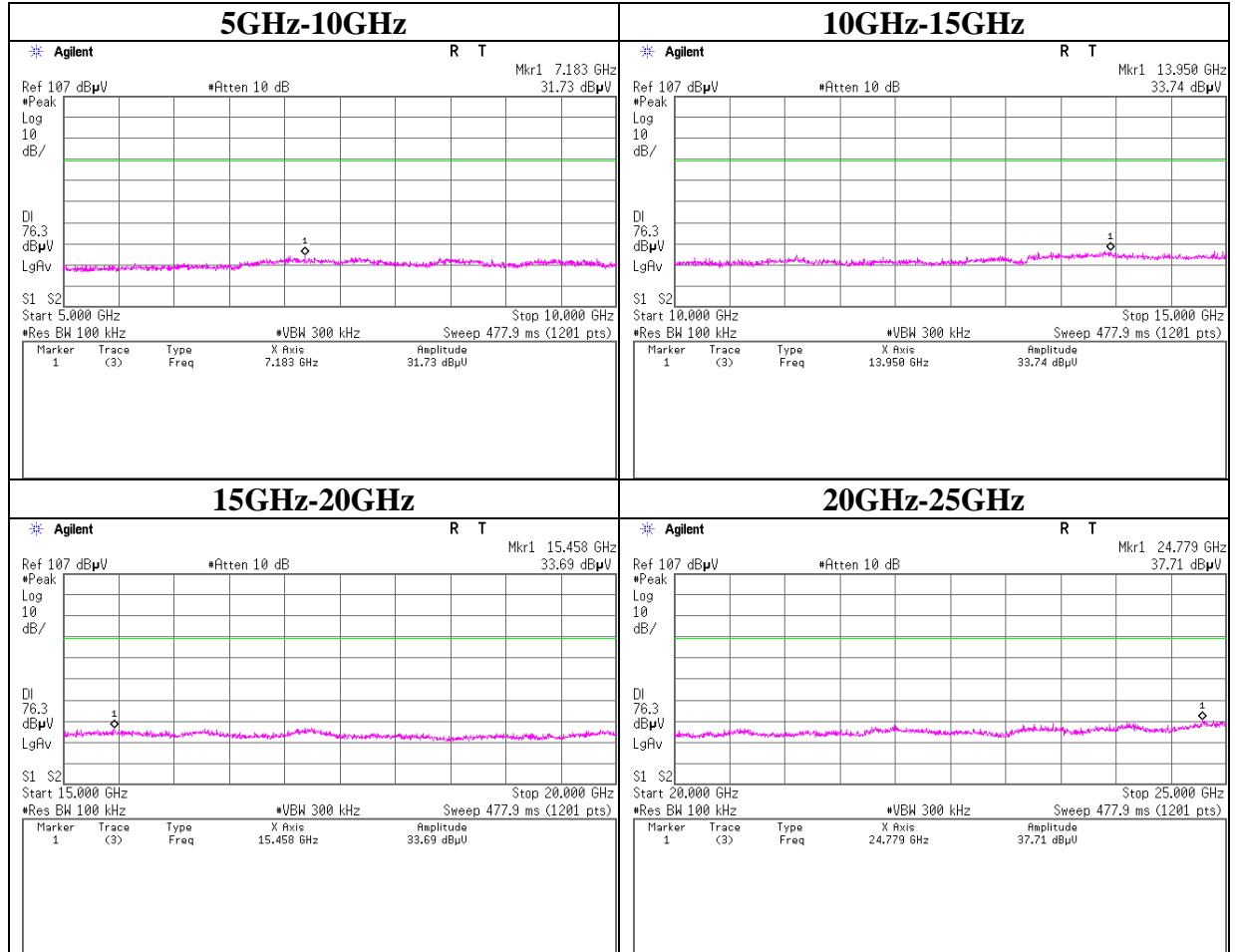
11n-20 Tx 2412MHz



*For 150kHz – 30MHz, no noise was found at radiated emission test at a distance of 3m.

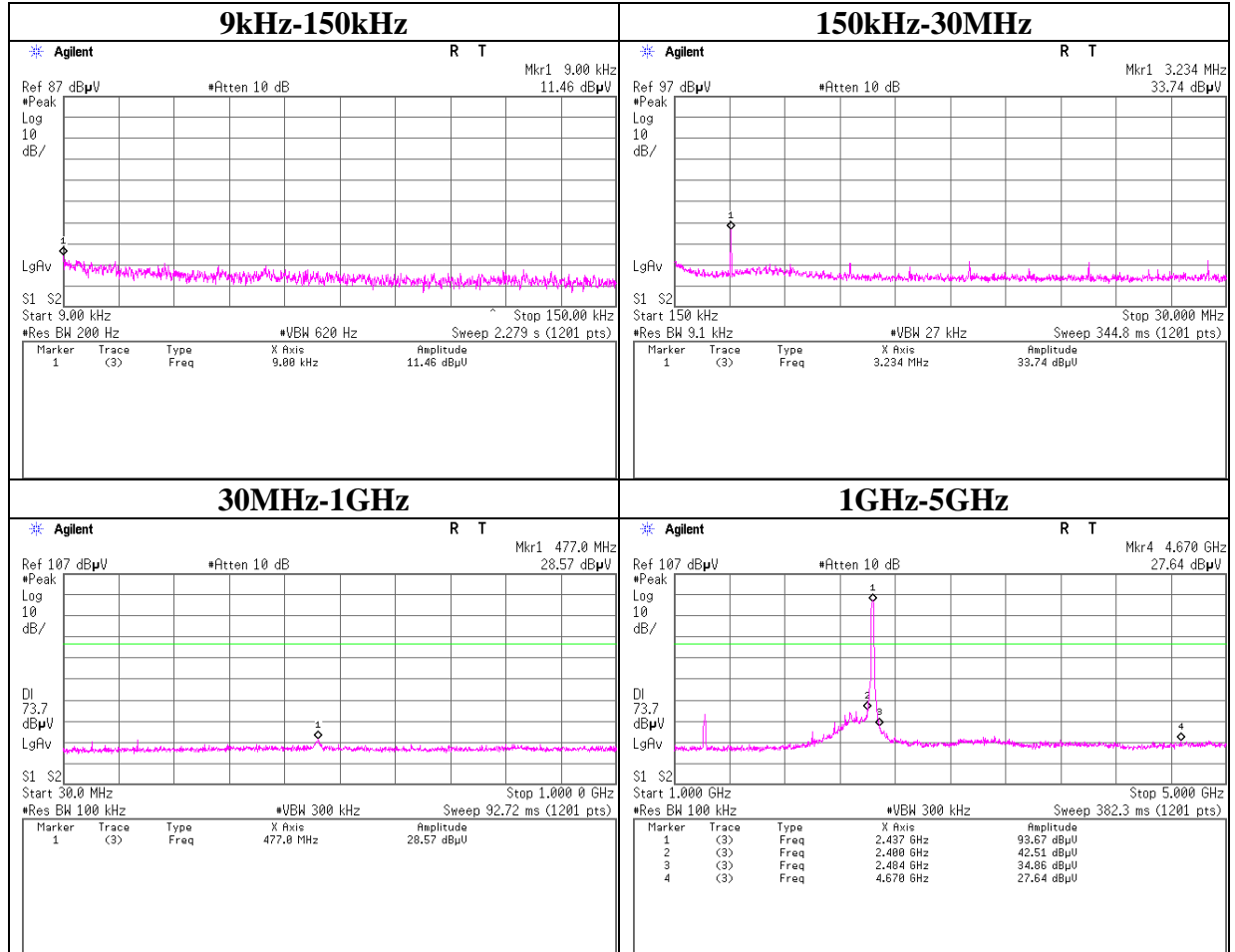
Conducted Spurious Emission
High power

11n-20 Tx 2412MHz



Conducted Spurious Emission
High power

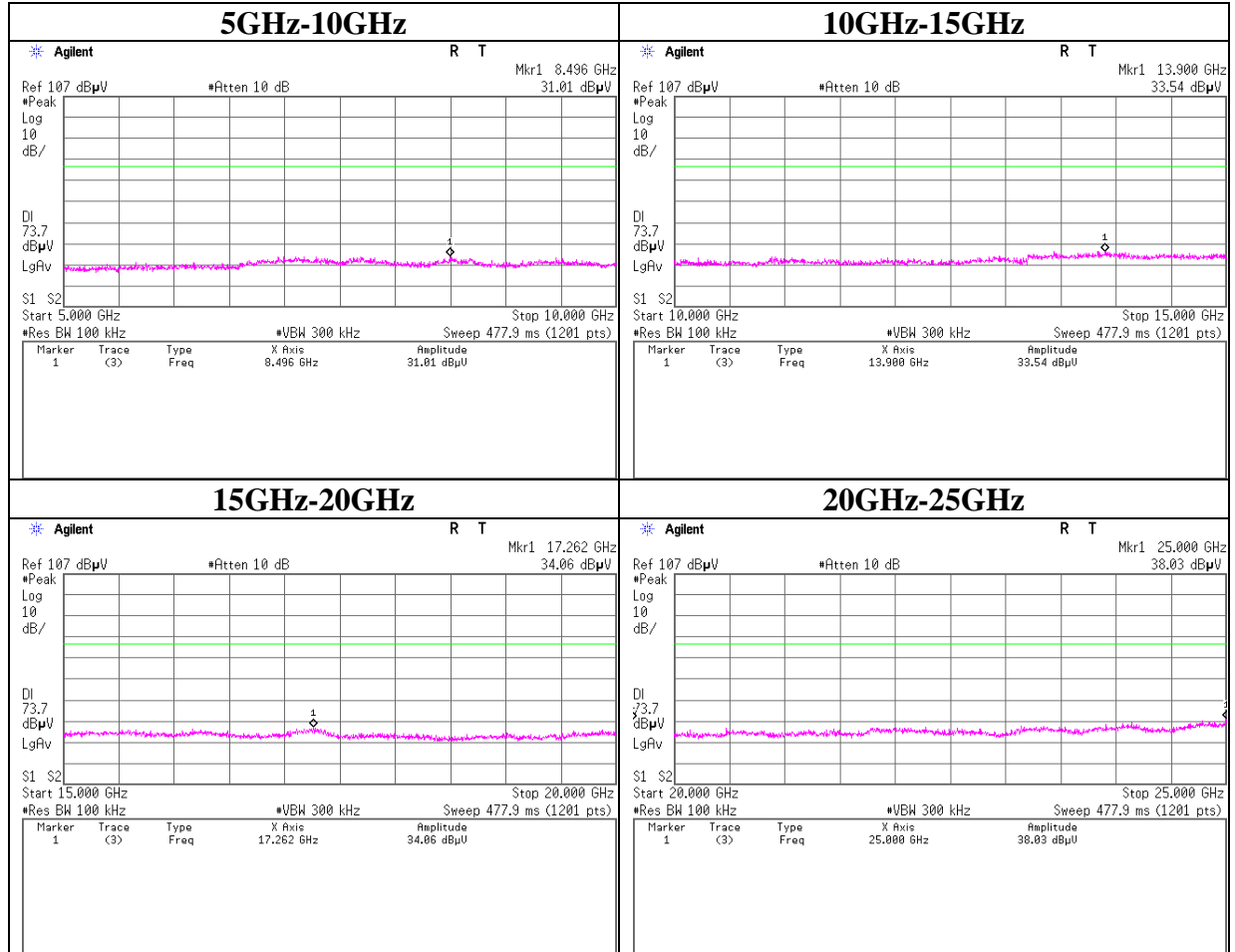
11n-20 Tx 2437MHz



*For 150kHz – 30MHz, no noise was found at radiated emission test at a distance of 3m.

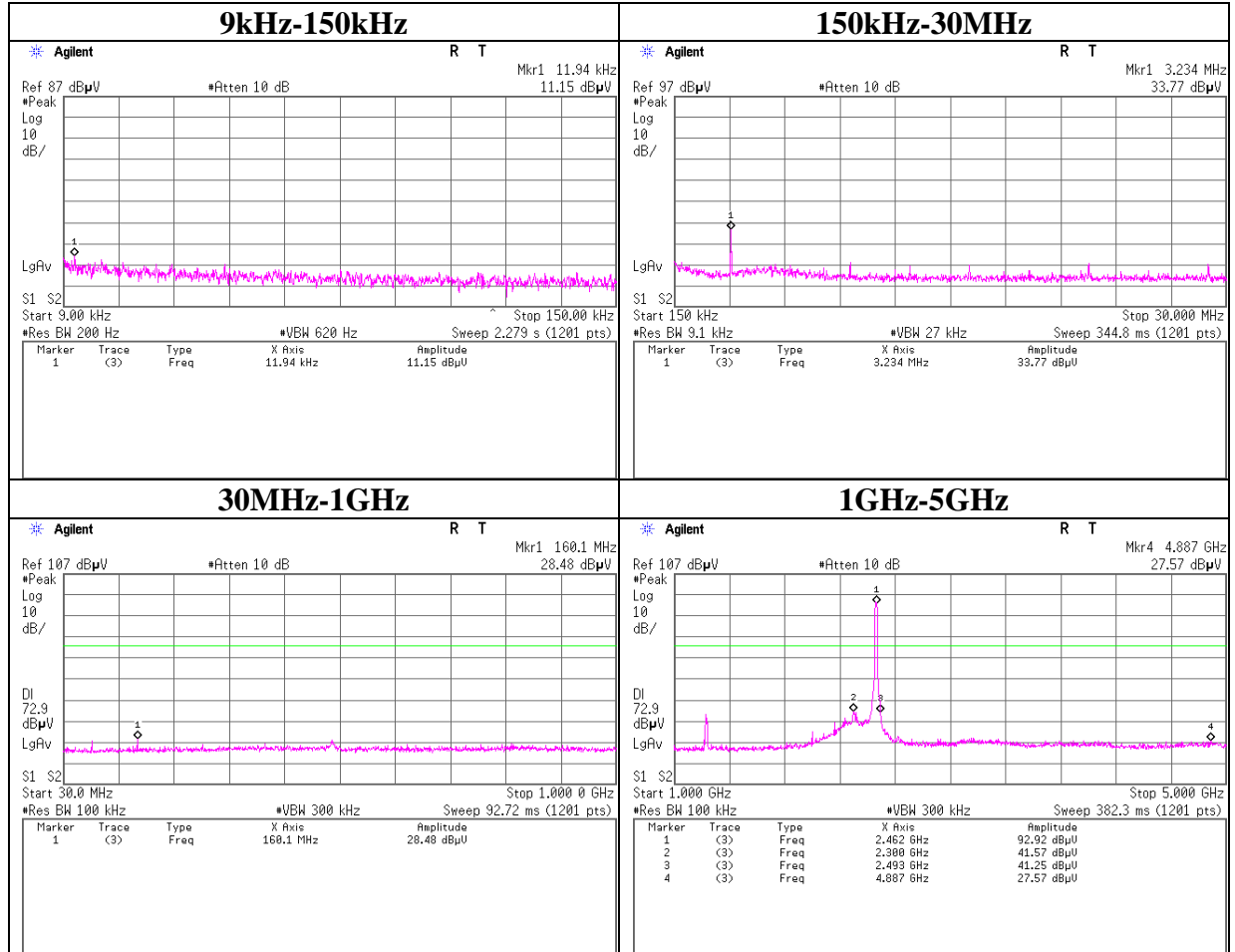
Conducted Spurious Emission
High power

11n-20 Tx 2437MHz



Conducted Spurious Emission
High power

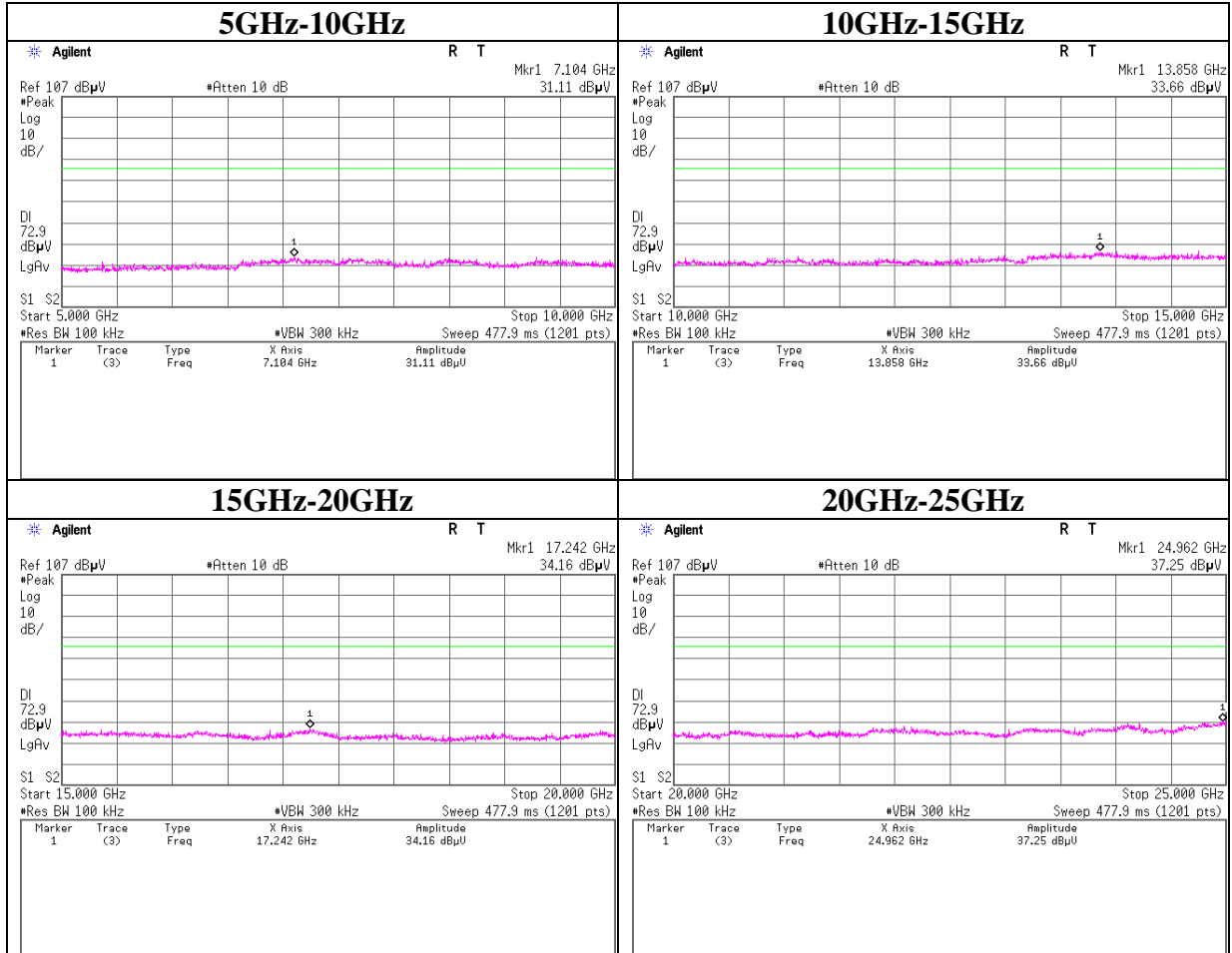
11n-20 Tx 2462MHz



*For 150kHz – 30MHz, no noise was found at radiated emission test at a distance of 3m.

Conducted Spurious Emission
High power

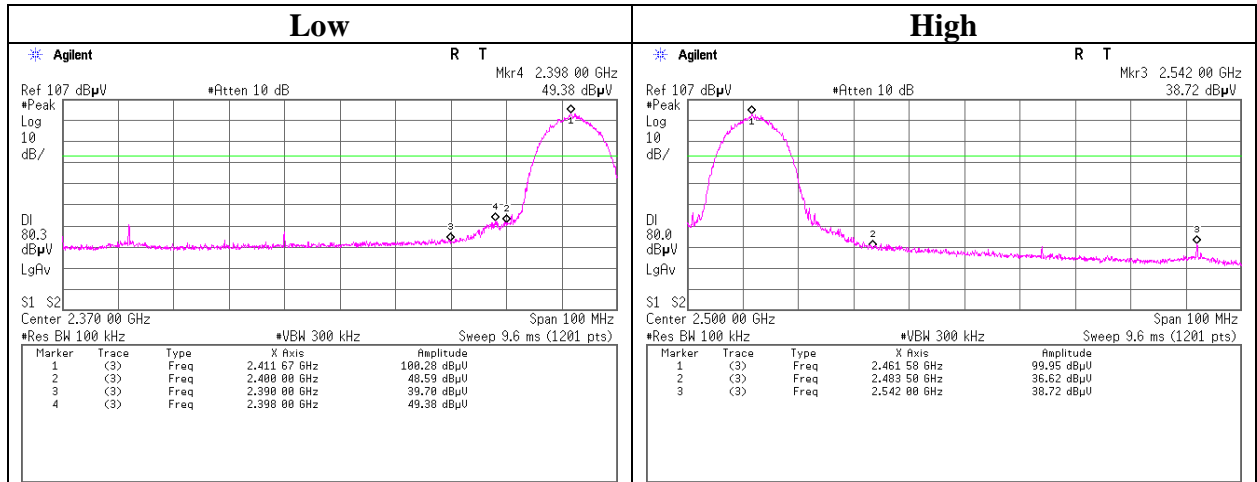
11n-20 Tx 2462MHz



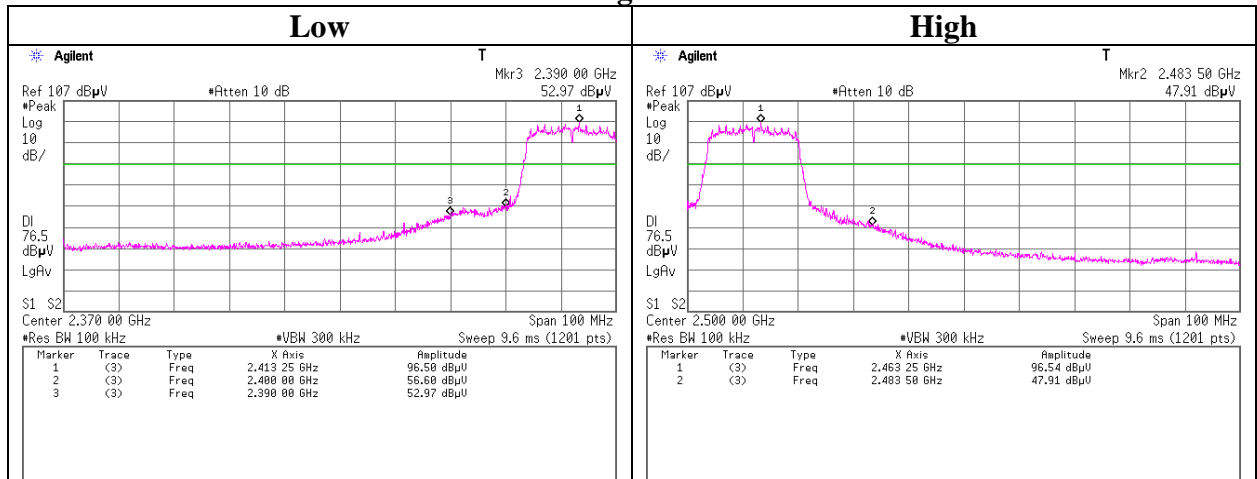
Conducted Emission Band Edge compliance

High power

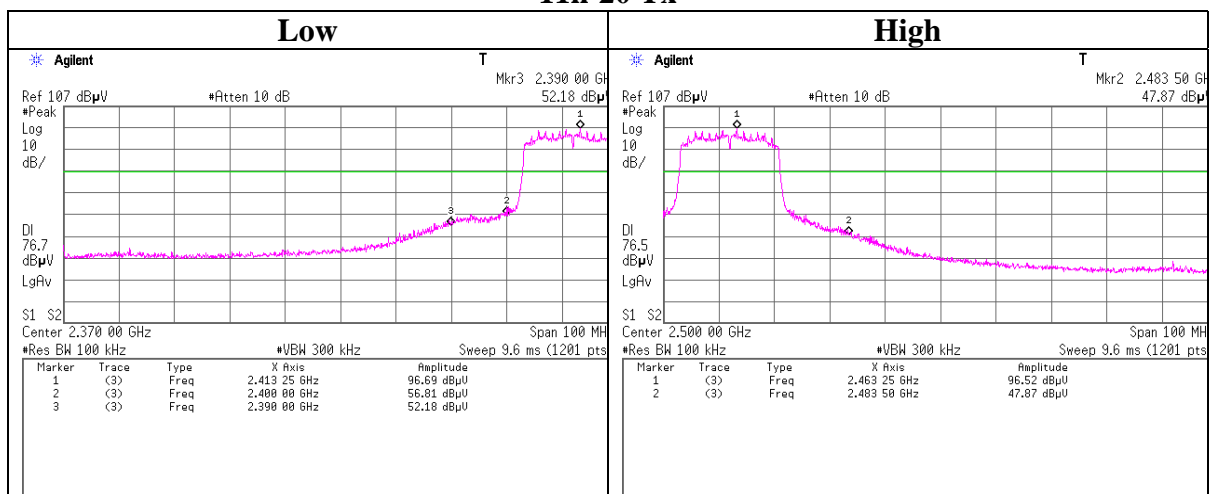
11b Tx



11g Tx



11n-20 Tx



Power Density
Low power

Test place Head Office EMC Lab. No.7 Shielded Room
Report No. 33AE0059-HO-01
Date 10/01/2012
Temperature/ Humidity 24 deg. C / 60% RH
Engineer Takumi Shimada
Mode 11b Tx, 11g Tx, 11n-20 Tx

11b

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
2412.00	-17.77	1.63	9.95	-6.19	8.00	14.19
2437.00	-17.84	1.64	9.95	-6.25	8.00	14.25
2462.00	-17.92	1.65	9.95	-6.32	8.00	14.32

11g

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
2412.00	-19.89	1.63	9.95	-8.31	8.00	16.31
2437.00	-19.92	1.64	9.95	-8.33	8.00	16.33
2462.00	-19.97	1.65	9.95	-8.37	8.00	16.37

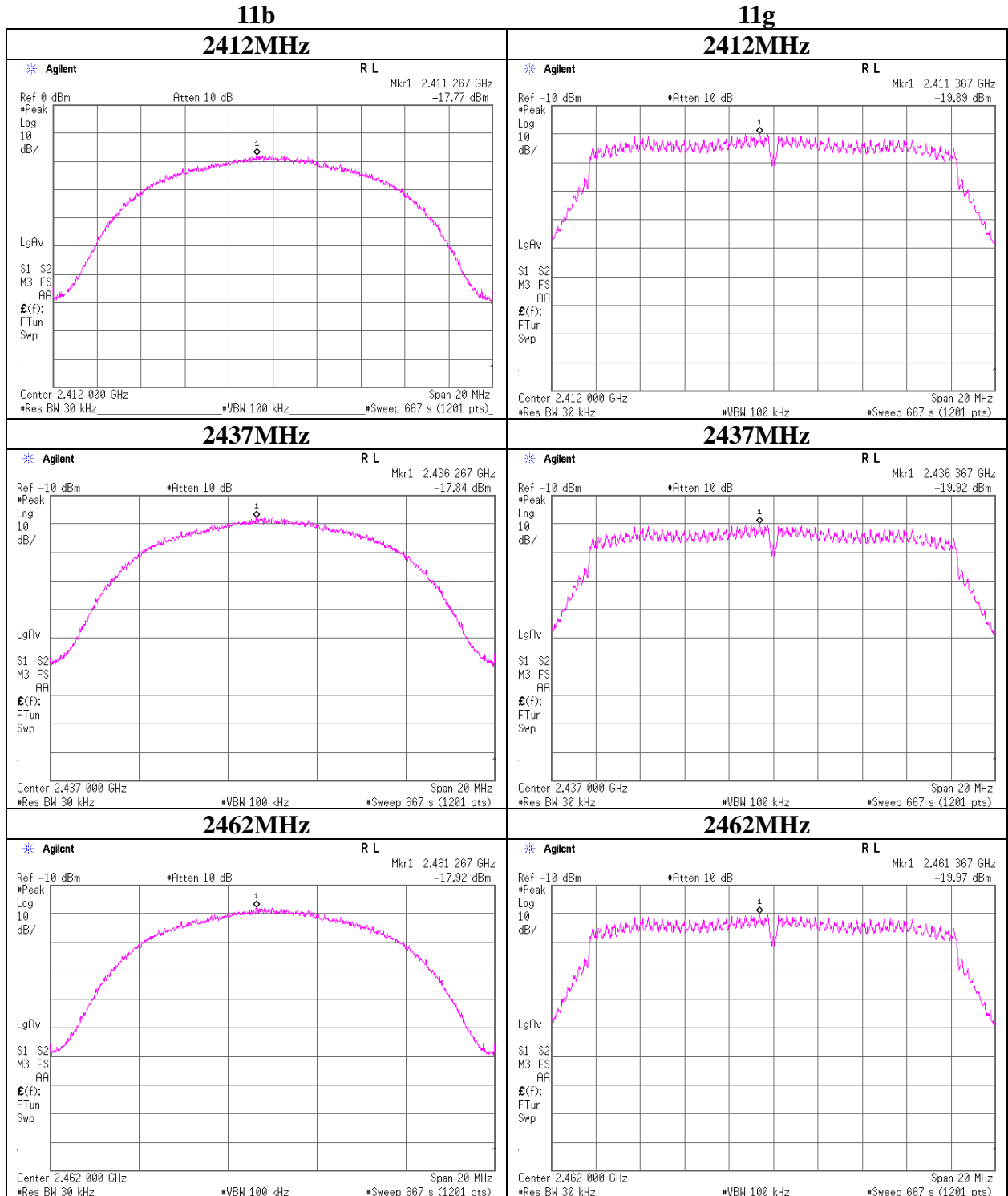
11n-20

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
2412.00	-20.20	1.63	9.95	-8.62	8.00	16.62
2437.00	-20.30	1.64	9.95	-8.71	8.00	16.71
2462.00	-20.44	1.65	9.95	-8.84	8.00	16.84

Sample Calculation:

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

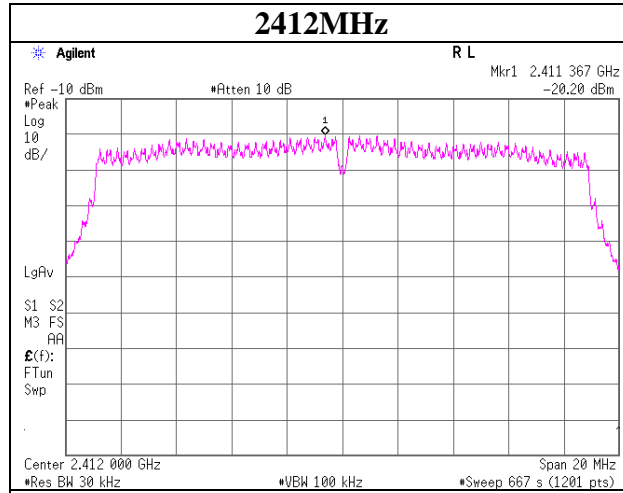
Power Density
Low power



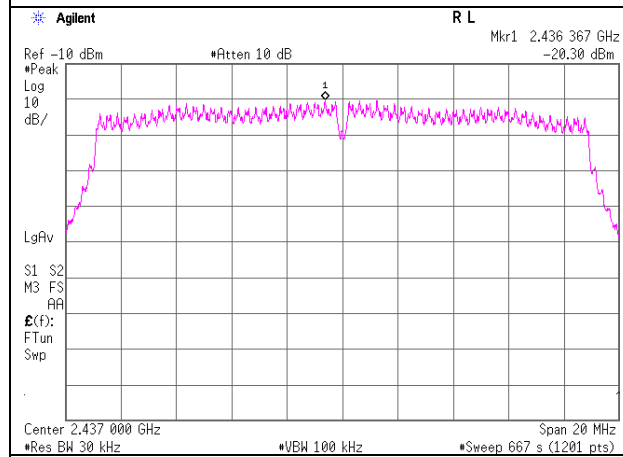
Power Density
Low power

11n-20

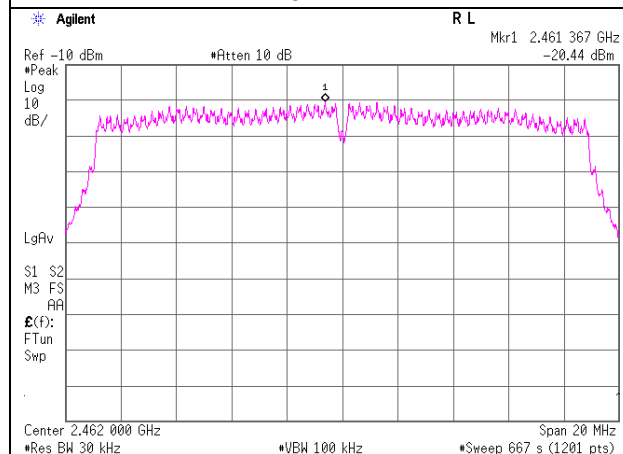
2412MHz



2437MHz



2462MHz



Power Density
High power

Test place Head Office EMC Lab. No.7 Shielded Room
Report No. 33AE0059-HO-01
Date 10/03/2012
Temperature/ Humidity 24 deg. C / 56% RH
Engineer Tomohisa Nakagawa
Mode 11b/g/n-20 Tx

11b

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
2412.00	-13.01	1.23	10.08	-1.70	8.00	9.70
2437.00	-13.08	1.23	10.08	-1.77	8.00	9.77
2462.00	-13.24	1.23	10.09	-1.92	8.00	9.92

11g

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
2412.00	-15.52	1.23	10.08	-4.21	8.00	12.21
2437.00	-15.58	1.23	10.08	-4.27	8.00	12.27
2462.00	-15.83	1.23	10.09	-4.51	8.00	12.51

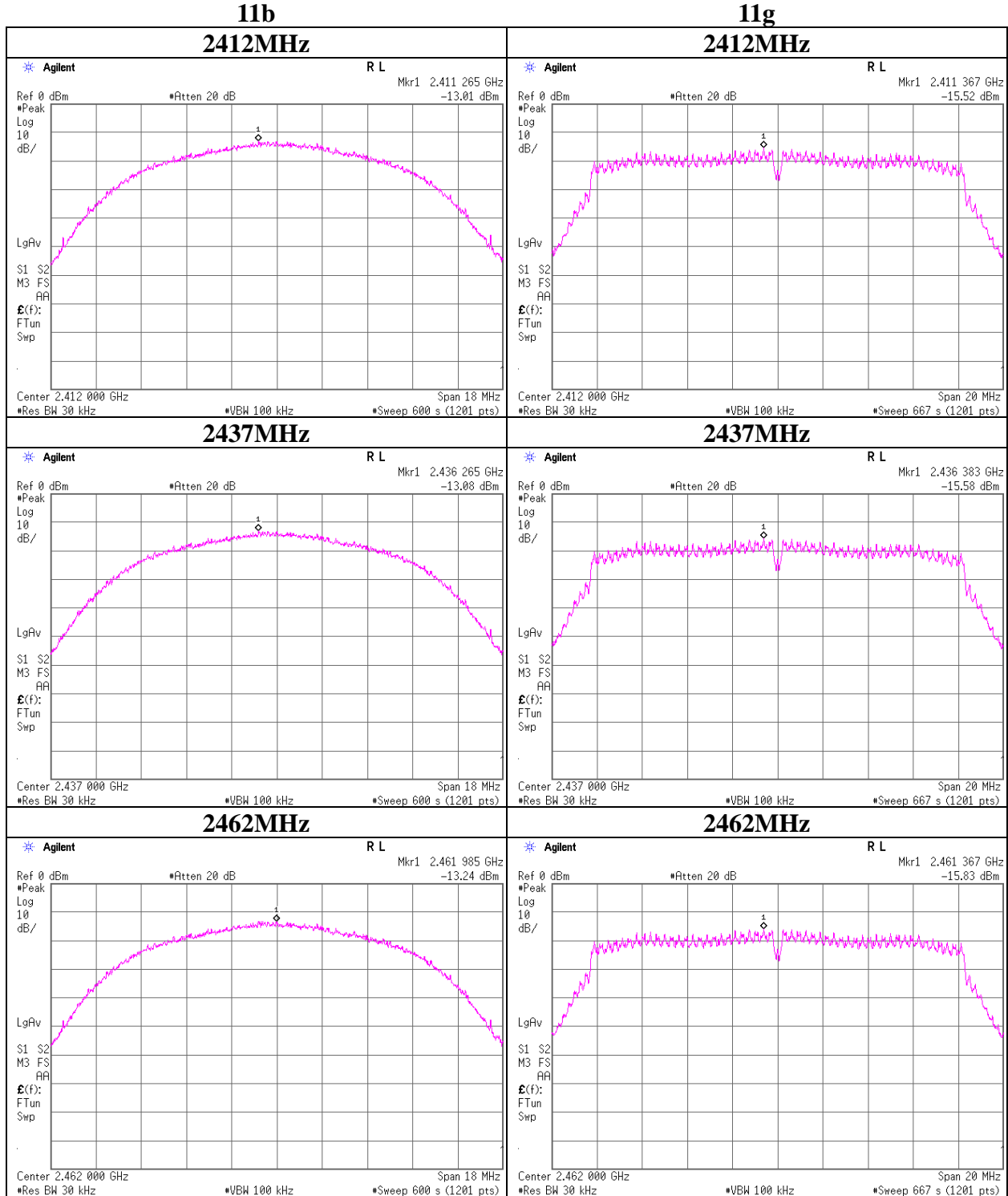
11n-20

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
2412.00	-15.83	1.23	10.08	-4.52	8.00	12.52
2437.00	-15.81	1.23	10.08	-4.50	8.00	12.50
2462.00	-15.82	1.23	10.09	-4.50	8.00	12.50

Sample Calculation:

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

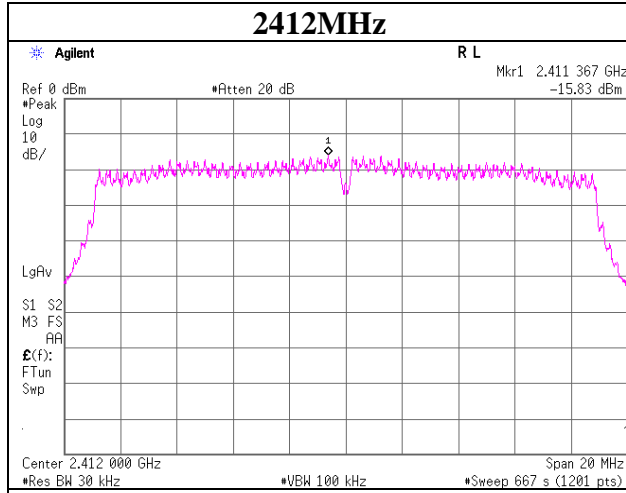
Power Density
High power



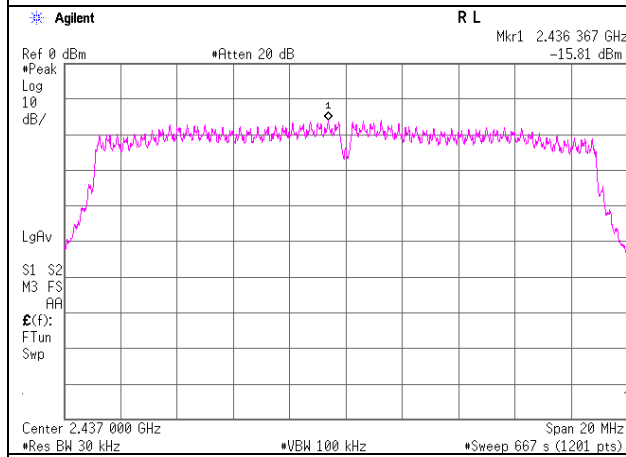
Power Density
High power

11n-20

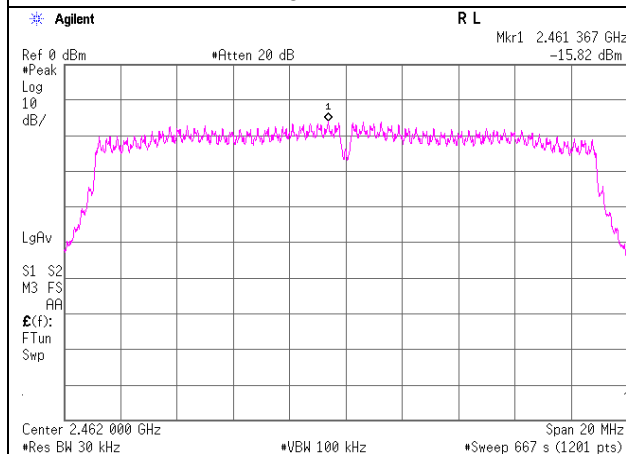
2412MHz



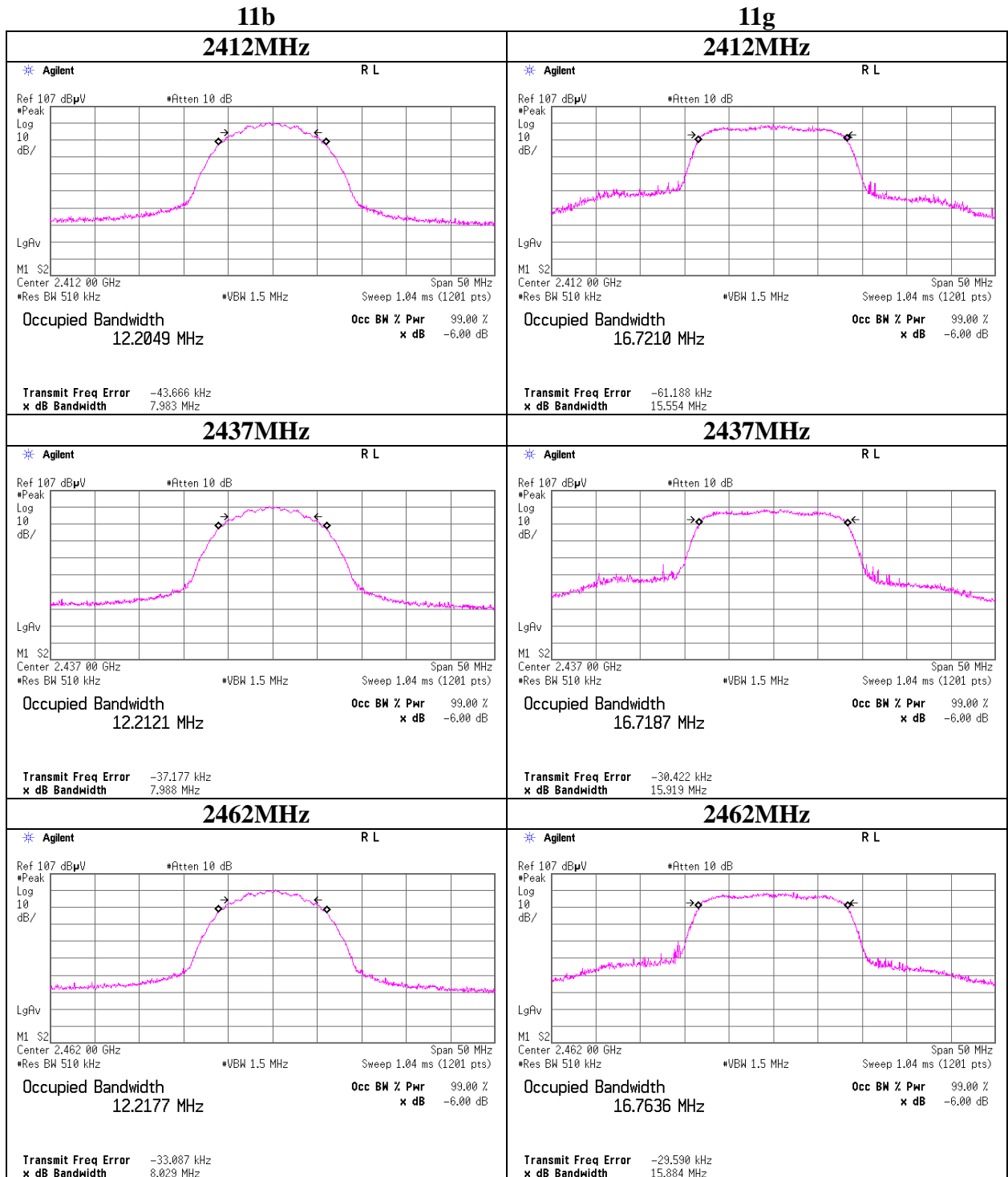
2437MHz



2462MHz

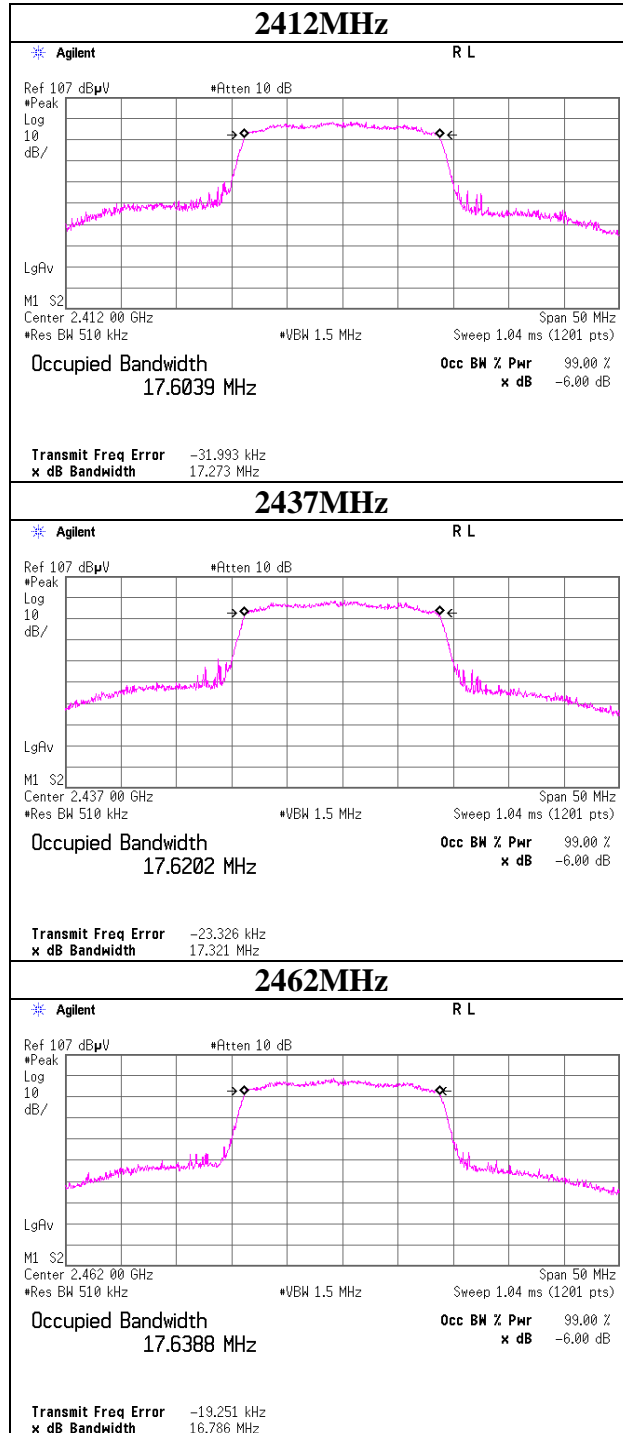


99% Occupied Bandwidth
Low power

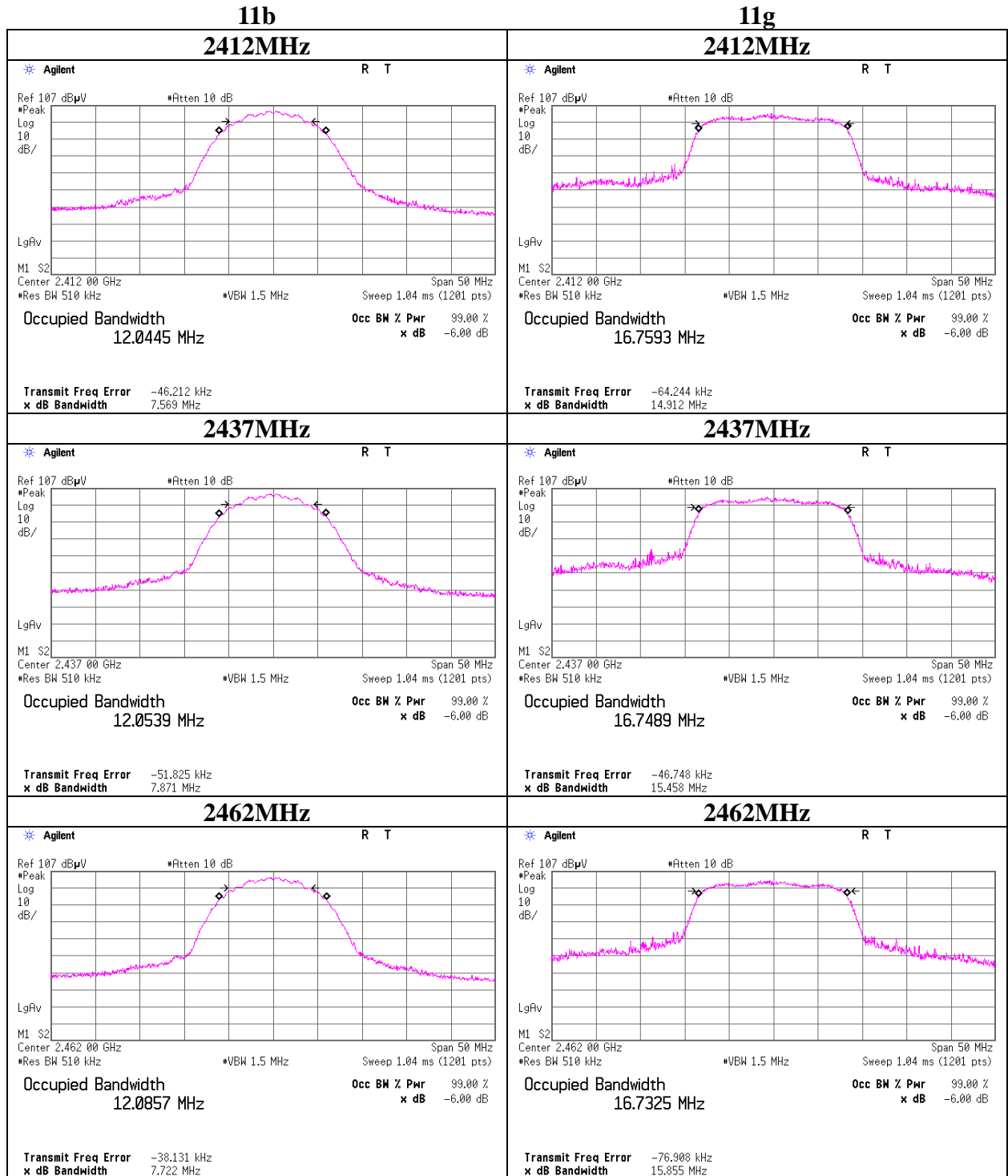


99% Occupied Bandwidth
Low power

11n-20



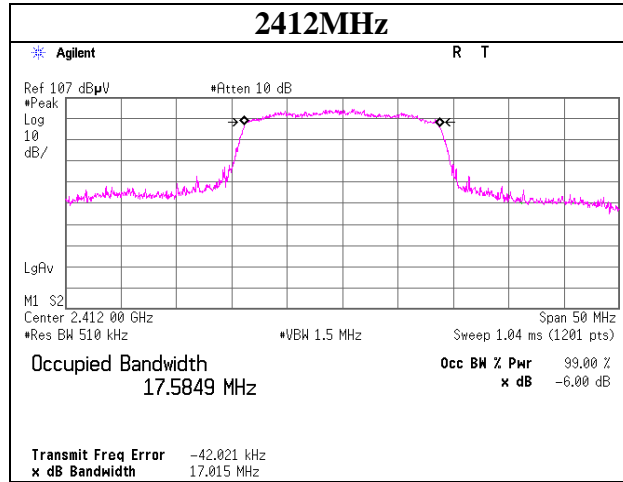
99% Occupied Bandwidth
High power



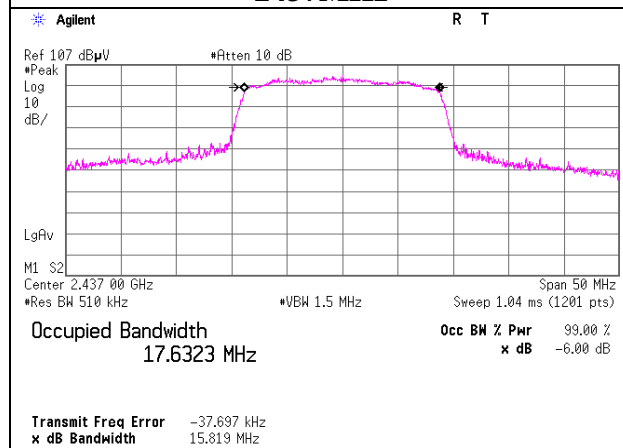
99% Occupied Bandwidth
High power

11n-20

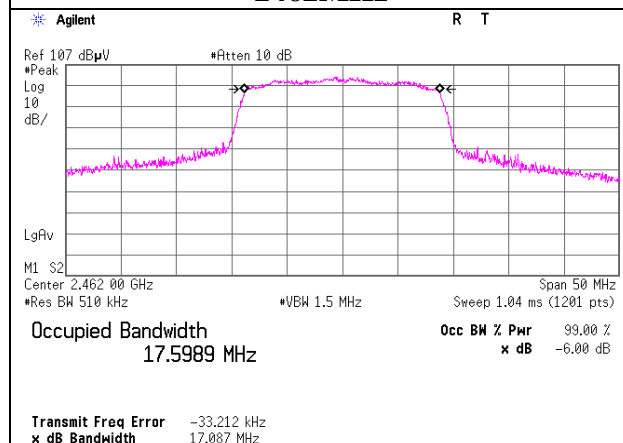
2412MHz



2437MHz



2462MHz



APPENDIX 2: Test instruments

EMI test equipment (for Test with Low power setting)

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MAEC-02	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-06902	CE/RE	2012/06/29 * 12
MOS-22	Thermo-Hygrometer	Custom	CTH-201	0003	CE/RE	2012/02/06 * 12
MJM-14	Measure	KOMELON	KMC-36	-	CE/RE	-
COTS-MEMI	EMI measurement program	TSJ	TEPTO-DV	-	CE/RE	-
MRENT-95	Spectrum Analyzer	Agilent	E4440A	MY46185823	CE/RE	2012/06/19 * 12
MTR-03	Test Receiver	Rohde & Schwarz	ESCI	100300	CE	2012/04/03 * 12
MLS-07	LISN(AMN)	Schwarzbeck	NSLK8127	8127364	CE	2012/02/09 * 12
MCC-13	Coaxial Cable	Fujikura	3D-2W(12m)/ 5D-2W(5m)/ 5D-2W(0.8m)/ 5D-2W(1m)	-	CE/RE	2012/02/16 * 12
MAT-65	Attenuator(13dB)	JFW Industries, Inc.	50FP-013H2 N	-	CE	2012/01/28 * 12
MHA-06	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	254	RE	2012/02/22 * 12
MPA-10	Pre Amplifier	Agilent	8449B	3008A02142	RE	2012/01/25 * 12
MCC-132	Microwave Cable	HUBER+SUHNER	SUCOFLEX104	336161/4(1m) / 340639(5m)	RE	2012/09/05 * 12
MHF-06	High Pass Filter 3.5-24GHz	TOKIMEC	TF323DCA	601	RE	2012/05/30 * 12
MHA-02	Horn Antenna 18-26.5GHz	EMCO	3160-09	1265	RE	2012/02/22 * 12
MAEC-03	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	RE	2012/02/24 * 12
MOS-13	Thermo-Hygrometer	Custom	CTH-180	-	RE	2012/02/06 * 12
MJM-15	Measure	KOMELON	KMC-36	-	RE	-
MTR-08	Test Receiver	Rohde & Schwarz	ESCI	100767	RE	2012/08/23 * 12
MBA-03	Biconical Antenna	Schwarzbeck	BBA9106	1915	RE	2011/10/15 * 12
MLA-03	Logperiodic Antenna	Schwarzbeck	USLP9143	174	RE	2011/10/15 * 12
MCC-51	Coaxial cable	UL Japan	-	-	RE	2012/07/12 * 12
MAT-09	Attenuator(6dB)	Weinschel Corp	2	BK7973	RE	2011/11/02 * 12
MPA-13	Pre Amplifier	SONOMA INSTRUMENT	310	260834	RE	2012/03/16 * 12
MLPA-01	Loop Antenna	Rohde & Schwarz	HFH2-Z2	100017	RE	2011/10/19 * 12
MCC-112	Coaxial cable	Fujikura/Suhner/TSJ	5D-2W(10m)/ SFM141(3m)/ sucoform141-PE(1m)/ 421-010(1.5m)/ RFM-E321(Switcher)	-/00640	RE	2012/07/12 * 12
MCC-143	Coaxial Cable	UL Japan	-	-	RE	2012/07/27 * 12
MOS-04	Digital Humidity Indicator	N.T	NT-1800	MOS04	AT	2012/02/06 * 12
MSA-10	Spectrum Analyzer	Agilent	E4448A	MY44020357	AT	2011/11/23 * 12
MPM-13	Power Meter	Anritsu	ML2495A	0825002	AT	2012/06/01 * 12
MPSE-18	Power sensor	Anritsu	MA2411B	0738285	AT	2012/06/01 * 12
MAT-24	Attenuator(10dB)(above 1GHz)	HIROSE ELECTRIC CO.,LTD.	AT-110	-	AT	2012/01/12 * 12
MCC-66	Microwave Cable	Junkosha	MWX221	1207S407	AT	2012/08/03 * 12

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

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

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

Test Item: CE: Conducted Emission

RE: Radiated Emission

AT: Antenna Terminal Conducted test

UL Japan, Inc.

Head Office EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

EMI test equipment (for Test with High power setting)

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MAEC-02	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-06902	RE	2012/06/29 * 12
MOS-22	Thermo-Hygrometer	Custom	CTH-201	0003	RE	2012/02/06 * 12
MJM-14	Measure	KOMELON	KMC-36	-	RE	-
COTS-MEMI	EMI measurement program	TSJ	TEPTO-DV	-	RE	-
MRENT-95	Spectrum Analyzer	Agilent	E4440A	MY46185823	RE	2012/06/19 * 12
MHA-06	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	254	RE	2012/02/22 * 12
MPA-10	Pre Amplifier	Agilent	8449B	3008A02142	RE	2012/01/25 * 12
MCC-132	Microwave Cable	HUBER+SUHNER	SUCOFLEX104	336161/4(1m) / 340639(5m)	RE	2012/09/05 * 12
MHF-06	High Pass Filter 3.5-24GHz	TOKIMEC	TF323DCA	601	RE	2012/05/30 * 12
MBA-02	Biconical Antenna	Schwarzbeck	BBA9106	VHA91032008	RE	2011/10/23 * 12
MLA-02	Logperiodic Antenna	Schwarzbeck	USLP9143	201	RE	2011/10/23 * 12
MPA-09	Pre Amplifier	Agilent	8447D	2944A10845	RE	2012/09/11 * 12
MAT-07	Attenuator(6dB)	Weinschel Corp	2	BK7970	RE	2011/11/02 * 12
MLPA-01	Loop Antenna	Rohde & Schwarz	HFH2-Z2	100017	RE	2011/10/19 * 12
MPA-13	Pre Amplifier	SONOMA INSTRUMENT	310	260834	RE	2012/03/16 * 12
MCC-12	Coaxial Cable	Fujikura/Agilent	-	-	RE	2012/02/16 * 12
MCC-13	Coaxial Cable	Fujikura	3D-2W(12m)/ 5D-2W(5m)/ 5D-2W(0.8m)/ 5D-2W(1m)	-	RE / CE	2012/02/16 * 12
MLS-07	LISN(AMN)	Schwarzbeck	NSLK8127	8127364	CE	2012/02/09 * 12
MAT-65	Attenuator(13dB)	JFW Industries, Inc.	50FP-013H2 N	-	CE	2012/01/28 * 12
MTR-03	Test Receiver	Rohde & Schwarz	ESCI	100300	RE / CE	2012/04/03 * 12
MHA-16	Horn Antenna 15-40GHz	Schwarzbeck	BBHA9170	BBHA9170306	RE	2012/05/21 * 12
MCC-143	Coaxial Cable	UL Japan	-	-	RE	2012/07/27 * 12
MOS-04	Digital Humidity Indicator	N.T	NT-1800	MOS04	RE	2012/02/06 * 12
MSA-03	Spectrum Analyzer	Agilent	E4448A	MY44020357	RE	2011/11/23 * 12
MPM-12	Power Meter	Anritsu	ML2495A	0825002	RE	2012/06/01 * 12
MPSE-17	Power sensor	Anritsu	MA2411B	0738285	RE	2012/06/01 * 12
MAT-20	Attenuator(10dB) (above 1GHz)	HIROSE ELECTRIC CO.,LTD.	AT-110	-	RE	2012/01/12 * 12
MCC-144	Microwave Cable	Junkosha	MWX221	1207S407	RE	2012/08/03 * 12
MOS-04	Digital Humidity Indicator	N.T	NT-1800	MOS04	AT	2012/02/06 * 12
MSA-03	Spectrum Analyzer	Agilent	E4448A	MY44020357	AT	2011/11/23 * 12
MPM-12	Power Meter	Anritsu	ML2495A	0825002	AT	2012/06/01 * 12
MPSE-17	Power sensor	Anritsu	MA2411B	0738285	AT	2012/06/01 * 12
MAT-20	Attenuator(10dB)(above 1GHz)	HIROSE ELECTRIC CO.,LTD.	AT-110	-	AT	2012/01/12 * 12
MCC-144	Microwave Cable	Junkosha	MWX221	1207S407	AT	2012/08/03 * 12

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

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

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

Test Item: CE: Conducted Emission
RE: Radiated Emission
AT: Antenna Terminal Conducted test

UL Japan, Inc.
Head Office EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN
Telephone : +81 596 24 8116
Facsimile : +81 596 24 8124