

TEST REPORT

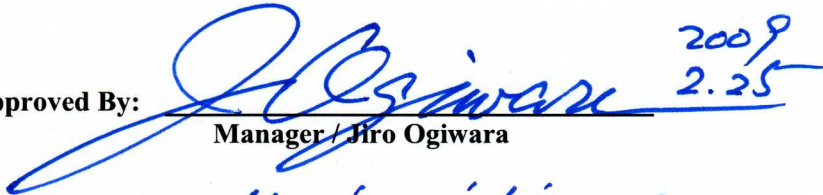
Test Report No.: 8228FC

Applicant : CANON INC.
EUT : Wireless LAN Module
Model No. : K30316
Serial No. : 00037A506F5C (Radiated and Conducted Emission Test)
00037A009002 (Conducted RF Test via Antenna Terminal)
FCC ID : AZDK30316
Issue Date : 25 February 2009
Date of Test : 17, 18 February 2009 (Radiated Emission Test)
19 February 2009 (Conducted Emission Test)
28-30 January 2009 (Conducted RF Test via Antenna Terminal)
Test Standard : FCC Part 15 Subpart C § 15.207, 15.247 (10-1-06 Edition)
PUBLIC NOTICE DA 00-1407
Procedure : ANSI C63.4-2003 PUBLIC NOTICE DA 00-705
Measurement of Digital Transmission System Operating
under § 15.247 (23 March 2005)
Test Results : PASS



NVLAP LAB CODE 200607-0

Approved By:

 2009.2.25
Manager / Jiro Ogiwara

Reviewed By:

 2009.2.25
Engineer / Yukihito Minegishi

 2009.2.25
/ Kentaro Fukuda

Tested By:

 2009.2.25
Engineer / Yukihito Minegishi

 2009.2.25
/ Tatsuro Sato

Table of Contents

Revised Record	3
1 Test Report	4
2 General Information	4
2.1 Applicant Information	4
2.2 Product Description	4
2.3 Summary of Test and Inspection Result	5
2.4 Test Methodology	6
2.5 Test Facility	6
3 System Test Configuration	7
3.1 Justification	7
3.2 Operating Modes	8
3.3 Configuration of Tested System	9
3.4 Test Instruments	12
3.5 Special Test Condition	12
3.6 Equipment Modifications	12
4 Antenna Requirement	13
5 AC Powerline Conducted Emission	14
5.1 Test Setup	14
5.2 Conducted Emission Calculation	15
5.3 Test Results	16
6 6dB Bandwidth	17
6.1 Test Setup	17
6.2 Test Results	17
7 Maximum Peak Output Power	19
7.1 Test Setup	19
7.2 Test Results	19
8 Band Edge Compliance	20
8.1 Test Setup	20
8.2 Test Results	20
9 Spurious RF Conducted Emission	22
9.1 Test Setup	22
9.2 Test Results	22
10 Radiated Emission	29
10.1 Test Setup	29
10.2 Radiated Emission Calculation	29
10.3 Test Results	30
11 Peak Power Spectral Density	47
11.1 Test Setup	47
11.2 Test Results	47
12 Photos of Tested EUT and Test Setup	49
Appendix 1: Certificate of Accreditation	50
Appendix 2: Test Instruments	51

Revised Record

Revised Record					
Number of Revised Time	Mark	Date	Person in Charge	Detail of Revision	Approved By
Initial	-	25 February 2009	Tatsuro Sato	-	Jiro Ogiwara

1 Test Report

- (1) This report summarizes the result of a single investigation and test result relate only to tested sample.
- (2) The report shall not be reproduced except in full without the written approval of the TAIYO YUDEN Co., Ltd.
- (3) This test report must not be used by the client to claim product endorsement by any government agency.
- (4) We hereby certify that no party to the applications authorized hereunder is subject to a denial of benefits, including FCC benefits, pursuant to Section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C 853(a).
- (5) The test results in this report are traceable to international standards.

2 General Information

2.1 Applicant Information

Company Name	CANON INC.
Address	451, Tsukagoshi 3-chome, Saiwai-ku, Kawasaki-shi, Kanagawa 212-8530, Japan

2.2 Product Description

EUT	Wireless LAN Module
Model No.	K30316
Serial No.	00037A506F5C (Radiated and Conducted Emission Test) 00037A009002 (Conducted RF Test via Antenna Terminal)
FCC ID	AZDK30316
Production Stage	Pre-Production
Type of Wide Band Modulation	IEEE 802.11b: DSSS, IEEE 802.11g: OFDM
Type of Modulation	DBPSK (1Mbps), DQPSK (2Mbps) and CCK (5.5/11Mbps) for 11b BPSK (6/9Mbps), QPSK (12/18Mbps), 16QAM (24/36Mbps) and 64QAM (48/54Mbps) for 11g
ITU Code	D1D, G1D
Power Supply	DC 3.6V
Operating Voltage Range	DC 3.4V Min. DC 4.0V Max.
Operating Temperature Range	-5°C Min. 55°CMax.
Weight	3.3g
Dimensions of EUT	W 24.3mm × L 30.0mm × H 4.3mm
Antenna Type	Mono-pole chip
Max Antenna Gain	2.0dBi
Operating Clocks	40MHz
Receipt Date of Tested Sample	27 January 2009 (Conducted RF Test via Antenna Terminal) 13 February 2009 (Radiated and Conducted Emission Test)

This is a Wireless LAN module which conforms to IEEE802.11b/g Standards and operates in the unlicensed ISM band at 2.4GHz.

2.3 Summary of Test and Inspection Result

No.	Item	Test Procedure	Specification	Remarks	Deviation	Worst Margin	Results
1	AC Powerline Conducted Emission	ANSI C63.4: 2003*	FCC 15.207	Conducted Emission Test	N/A	Quasi Peak: 18.3dB Average: 25.0dB Transmitting Mode: 2412MHz Type of Modulation: IEEE 802.11b (1Mbps) Frequency: 0.17295MHz Line Phase: L2	Pass
2	6dB Bandwidth		FCC 15.247(a)(2)	Conducted RF Test via Antenna Terminal	N/A	-	Pass
3	Maximum Peak Output Power		FCC 15.247(b)(3)		N/A	-	Pass
4	Band Edge Compliance		FCC 15.247(d)		N/A	-	Pass
5	Spurious RF Conducted Emission		FCC 15.247(d)		N/A	-	Pass
6	Radiated Emission		FCC 15.247(d)	Radiated Emission Test	N/A	Peak: 22.2dB Average: 12.9dB Transmitting Mode: 2462MHz Type of Modulation: IEEE 802.11b (1Mbps) Frequency: 7386.000MHz Axial Direction: XY-Plane Antenna Polarization: Vertical	Pass
7	Peak Power Spectral Density		FCC 15.247(e)	Conducted RF Test via Antenna Terminal	N/A	-	Pass

*: These tests were also referred to “Measurement of Digital Transmission Systems Operating under Section 15.247” (23 March 2005).

2.4 Test Methodology

Interference measurements were made in accordance with ANSI C63.4: 2003 Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.

2.5 Test Facility

TAIYO YUDEN CO., LTD. EMC Center
5607-2, Nakamuroda-machi, Takasaki-shi, Gunma, 370-3347, Japan.

1. FCC 47CFR, Part 15 Subpart C regulation test were performed on the shielded room, and radiated interference field strength test was performed on the 10 meter semi-anechoic chamber located at TAIYO YUDEN CO., LTD. EMC Center, 5607-2 Nakamuroda-machi, Takasaki-shi, Gunma, 370-3347 Japan.
2. This Laboratory is accredited under the National Voluntary Laboratory Accreditation Program (NVLAP) by United States Department of Commerce, National Institute of Standard and Technology (NIST) for satisfactory compliance with criteria established in Title 15, Part 285 Code of Federal Regulations.
3. These criteria encompass the requirements of ISO/IEC 17025:2005 and the relevant requirements of ISO 9002:1994 as suppliers of calibration or test results. Accreditation awarded for specific services, listed on the Scope of Accreditation for: Electromagnetic Compatibility and Telecommunications FCC. (NVLAP LAB CODE: 200607-0). Refer the certificate of the accreditation to Appendix 2.
4. This laboratory is listed by Federal Communications Commission, Equipment Authorization Division (Registration Number: 606514) and listed by Industry Canada (No.4389A-1).

3 System Test Configuration

3.1 Justification

1. Emission tests were performed with no deviation from the ANSI C63.4: 2003 and FCC 47CFR, Part 15, Section 15.247 regulation tests were performed with no deviation from the FCC Public Notice DA00-705 released March 30, 2000 and Public Notice DA00-1407 released June 26, 2000.
2. The system was configured for testing a typical fashion (as a customer would normally use it.).
3. Radiate testing in the range of 1 GHz to 25 GHz was investigated with the spectrum (peak detector function) under the FCC regulation section 15.209 (e) and 15.35 (b). Radiate testing in the range of 18GHz to 25GHz performed at an antenna to EUT distance of 1 meter. The level of any unwanted emissions from EUT did not exceed the level of the fundamental emission (Compliance with 15.209 (c)). And test result found to be compliance with FCC regulation section 15.209 (a) Radiated emission limits (500 micro-volts/meter). Data is presented for the “worst case” measurements, that EUT was normal operated.
4. Radiate testing in the range of 30 MHz to 1000 MHz was performed at an antenna to EUT distance of 3 meters under the 15.209 (e) and 15.31(f)(1).
5. Tests were performed with the representative channel operation as follows.
 - a. Lowest Frequency channel: 1ch 2412MHz
 - b. Middle Frequency channel: 6ch 2437MHz
 - c. Highest Frequency channel: 11ch 2462MHz

3.2 Operating Modes

Transmitting Mode

Type of Modulation	IEEE 802.11b: DBPSK (1Mbps)
	IEEE 802.11g: BPSK (6Mbps)
Representative Channel	1ch 2412MHz (Lowest Frequency Channel)
	6ch 2437MHz (Middle Frequency Channel)
	11ch 2462MHz (Highest Frequency Channel)

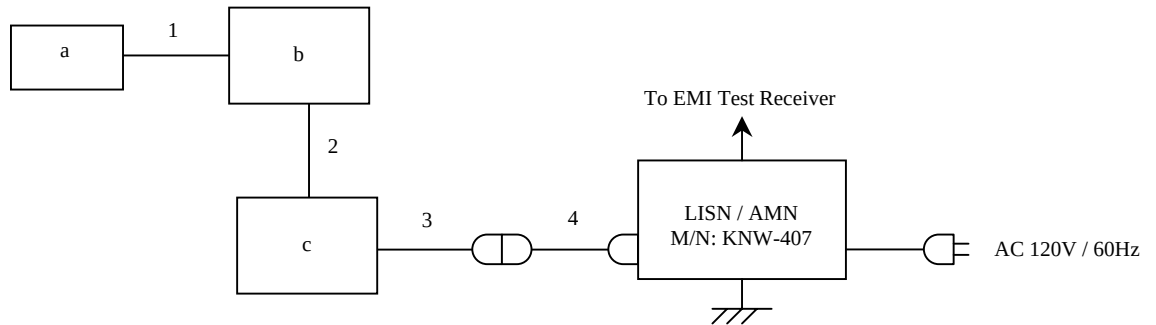
Remarks:

Software (Controller): DutApiUSB83xxP Ver.1.5.2.0 software supplied by Marvell Semiconductor, Inc. was used to set up to the wireless LAN operating mode.

3.3 Configuration of Tested System

(1) Conducted Emission Test

These numbers and the marks in the picture are corresponding to the numbers and the marks in tables shown.



List of EUT and Accessories

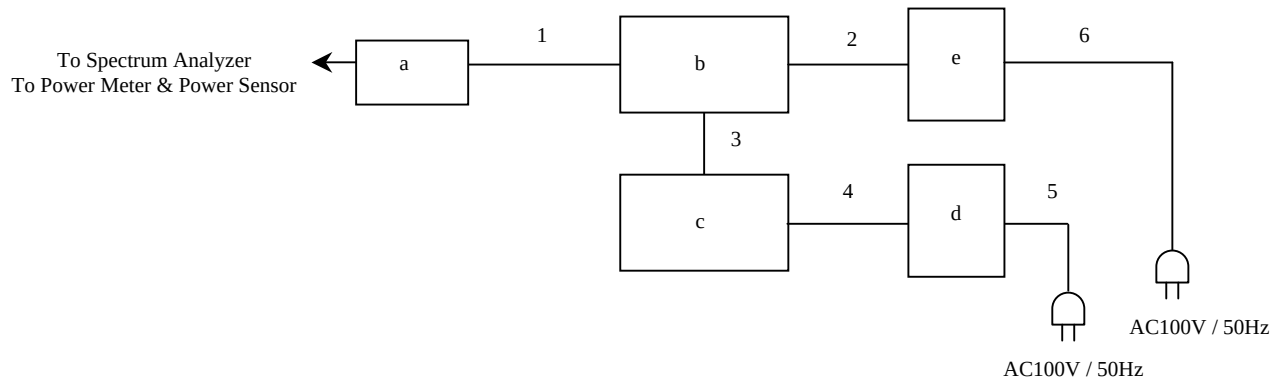
	Product Name	M/N	S/N	Manufacturer	EUT / Accessory	FCC ID / DoC
a	Wireless LAN Module	K30316	00037A506F5C	TAIYO YUDEN CO., LTD.	EUT	AZDK30316
b	WIRELESS LAN JIG-CARD	-	2	TAIYO YUDEN CO., LTD.	Accessory	-
c	Multifunction Printer	PIXUS MP620	1	CANON INC.	Accessory	-

Interface Cables

	Cable Type	M/N	Shielded	Ferrite Core	Material of Connector	Length	Treatment for the Extra Length
1	Flat Cable	-	No	No	Plastic	0.30m	-
2	DC Cable	-	No	No	Plastic	0.80m	-
3	AC Cable	-	No	No	Plastic	1.80m	Fold back and forth in the center
4	Extender Cable for AC Cable	-	No	No	Plastic	3.12m	Fold back and forth in the center

(2) Conducted RF Test via Antenna Terminal

These numbers and the marks in the picture are corresponding to the numbers and the marks in tables shown.
Power Supply of EUT: DC3.6V from Regulated DC Power Supply “e”.

**List of EUT and Accessories**

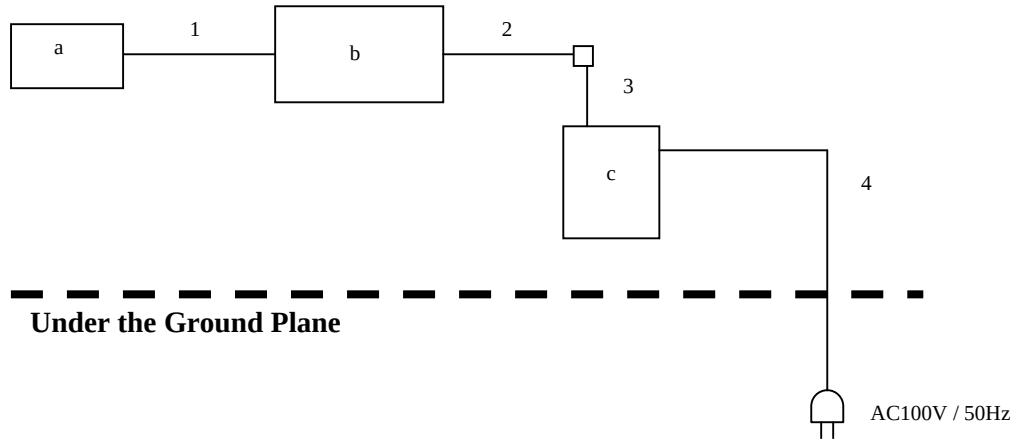
	Product Name	M/N	S/N	Manufacturer	EUT / Accessory	FCC ID / DoC
a	Wireless LAN Module	K30316	00037A009002	TAIYO YUDEN CO., LTD.	EUT	AZDK30316
b	WIRELESS LAN JIG-CARD	-	3	TAIYO YUDEN CO., LTD.	Accessory	-
c	Note PC	PP04S	W1708A01	DELL	Accessory	-
d	AC Adapter for Note PC	PA-1650-05D	5U092	DELL	Accessory	-
e	Regulated DC Power Supply	PMC18-3A	LK000371	KIKUSUI	Accessory	-

Interface Cables

	Cable Type	M/N	Shielded	Ferrite Core	Material of Connector	Length	Notes
1	Flat Cable	-	No	No	Plastic	0.30m	-
2	DC Cable	-	No	No	-	0.80m	-
3	USB Cable	-	Yes	No	Metal	1.86m	-
4	DC Cable	-	No	Yes	Plastic	1.85m	-
5	AC Cable	-	No	No	Plastic	0.93m	-
6	AC Cable	-	No	No	Plastic	2.44m	-

(3) Radiated Emission Test

These numbers and the marks in the picture are corresponding to the numbers and the marks in tables shown.
Power Supply of EUT: DC 3.6V from Regulated DC Power Supply “c”.

**List of EUT and Accessories**

	Product Name	M/N	S/N	Manufacturer	EUT / Accessory	FCC ID / DoC
a	Wireless LAN Module	K30316	00037A506F5C	TAIYO YUDEN CO., LTD.	EUT	AZDK30316
b	WIRELESS LAN JIG-CARD	-	3	TAIYO YUDEN CO., LTD.	Accessory	-
c	Regulated DC Power Supply	PMC18-5A	NE001553	KIKUSUI	Accessory	-

Interface Cables

	Cable Type	M/N	Shielded	Ferrite Core	Material of Connector	Length	Notes
1	Flat Cable	-	No	No	Plastic	0.30m	-
2	DC Cable	-	No	No	-	0.80m	-
3	DC Cable	-	No	No	-	0.50m	-
4	AC Cable	-	No	No	Plastic	2.40m	-

3.4 Test Instruments

About test instruments for all tests, please refer to appendix 2.

3.5 Special Test Condition

Nothing.

3.6 Equipment Modifications

No modification has been carried out by TAIYO YUDEN CO., LTD. EMC Center.

4 Antenna Requirement

The EUT provides a permanently attached antenna and it was found to be compliant with FCC regulation section 15.203.

Antenna Type	Mono-pole chip
Antenna Gain	2.0dBi

5 AC Powerline Conducted Emission

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations.

5.1 Test Setup

Conducted emission measurements were performed from 150kHz to 30 MHz.

The test setup was made according to ANSI STD C63.4: 2003 clause 7 in the Shielded room.

The rear of non-conductive wooden table top was placed 0.4 m from a vertical metal reference plane that one of the wall.

Rears of the peripherals were all aligned and flush with rear of non-conductive wooden tabletop.

The height of this table was 0.8 m and 1.5 m wide x 1.0 m deep size.

The spacing between the each equipment was 10 cm.

Connection of the PC connected EUT USB Adaptor to the Artificial Mains Network (AMN)/ Line Impedance Stabilization Network (LISN) was required.

The distance between the closet surface of the EUT and the closet surface of the AMN (LISN) was 0.8 m.

Connection of the all other equipment to the second AMN (LISN) was required. The distance between the peripherals and the closet surface of the second AMN (LISN) was minimum 0.8 m.

The second artificial mains network is terminated with 50ohm terminator.

Where a mains flexible cord is provided by the manufacture this is 2.0 m long and excess cable was folded back and forth as far as possible to 0.8 m so as to form a bundle not exceeding 0.4 m in length.

Interconnecting cables of table top equipment that hang closer than 0.4 m to the floor ground plane were folded back and forth forming a bundle 30 to 40 cm long, hanging approximately in the middle between ground plane and table.

The measurement has been conducted with both L1 (Neutral) and L2 (Line) power supply polarization.

The maximum voltage emission was verified with the cable routing and the location of the peripherals.

The highest voltage emission has been recorded.

For further description of the configuration refer to separate document named "Test Setup Photos (8228FC)".

Test Receiver Setting:

150kHz~30MHz:

Detector Mode	Quasi-Peak and Average
Bandwidth	10kHz

5.2 Conducted Emission Calculation

The basic equation with a sample calculation is as follows:

$$\begin{aligned} \text{c.f.} &= \text{CF} + \text{AL} \\ \text{CE} &= \text{RA} + \text{c.f.} \end{aligned}$$

Where	c.f.	:	Correction Factor [dB]
	CE	:	Conducted Emission (Emission Level - Result) [dBuV]
	RA	:	Receiver Amplitude (Reading Level) [dBuV]
	CF	:	Cable Attenuation Loss [dB]
	AL	:	Attenuator Loss [dB]

Assume a receiver reading of 40.8 dBuV is obtained.
The Factor of 3.4dB is added, giving a terminal voltage of 44.2 dBuV. The 44.2 dBuV value was mathematically converted to its corresponding level in uV.

$$\text{CE} = 40.8 + 3.4 = 44.2 \text{ dBuV}$$

$$\text{Level in uV} = \text{Common Antilogarithm: } 10^{(44.2 \text{ dBuV})/20} = 162.2 \text{ uV}$$

5.3 Test Results

Product	: Wireless LAN Module	Model	: K30316
Serial No.	: 00037A506F5C	Test Standard	: FCC Part15 Subpart C §15.207
Power Supply	: AC 120V / 60Hz	Temp. / Humid.	: 20.5°C / 28.7%
Operator	: Tatsuro Sato		
Remark	: Transmitting Mode IEEE 802.11b (1Mbps)		

AC Powerline Conducted Emission: Lch (2412MHz)

Frequency [MHz]	Line Phase	Reading [dB(uV)] QP / AV		Factor [dB]	Level [dB(uV)] QP / AV		Limit [dB(uV)] QP / AV		Margin [dB] QP / AV		Remark
0.150	L1	42.4	13.1	3.4	45.8	16.5	66.0	56.0	20.2	39.5	
0.150	L2	42.4	13.2	3.4	45.8	16.6	66.0	56.0	20.2	39.4	
0.1721	L1	42.8	24.9	3.4	46.2	28.3	64.9	54.9	18.7	26.6	
0.17295	L2	43.1	26.4	3.4	46.5	29.8	64.8	54.8	18.3	25.0	
0.23075	L1	38.6	21.8	3.3	41.9	25.1	62.4	52.4	20.5	27.3	
0.23126	L2	39.2	26.3	3.3	42.5	29.6	62.4	52.4	19.9	22.8	

AC Powerline Conducted Emission: Mch (2437MHz)

Frequency [MHz]	Line Phase	Reading [dB(uV)] QP / AV		Factor [dB]	Level [dB(uV)] QP / AV		Limit [dB(uV)] QP / AV		Margin [dB] QP / AV		Remark
0.150	L1	42.3	12.5	3.4	45.7	15.9	66.0	56.0	20.3	40.1	
0.150	L2	42.4	12.6	3.4	45.8	16.0	66.0	56.0	20.2	40.0	
0.17147	L1	41.8	24.2	3.4	45.2	27.6	64.9	54.9	19.7	27.3	
0.1718	L2	42.1	25.7	3.4	45.5	29.1	64.9	54.9	19.4	25.8	
0.22996	L1	37.8	21.5	3.3	41.1	24.8	62.5	52.5	21.4	27.7	
0.2302	L2	38.1	25.9	3.3	41.4	29.2	62.4	52.4	21.0	23.2	

AC Powerline Conducted Emission: Hch (2462MHz)

Frequency [MHz]	Line Phase	Reading [dB(uV)] QP / AV		Factor [dB]	Level [dB(uV)] QP / AV		Limit [dB(uV)] QP / AV		Margin [dB] QP / AV		Remark
0.150	L1	42.6	13.1	3.4	46.0	16.5	66.0	56.0	20.0	39.5	
0.150	L2	42.1	12.7	3.4	45.5	16.1	66.0	56.0	20.5	39.9	
0.17217	L2	41.8	25.6	3.4	45.2	29.0	64.9	54.9	19.7	25.9	
0.17232	L1	41.8	24.1	3.4	45.2	27.5	64.8	54.8	19.6	27.3	
0.22979	L2	38.0	25.9	3.3	41.3	29.2	62.5	52.5	21.2	23.3	
0.23004	L1	37.5	21.2	3.3	40.8	24.5	62.4	52.4	21.6	27.9	

6 6dB Bandwidth

6.1 Test Setup

The spectrum analyzer was connected to the transmitter output port through the RF cable.

Spectrum Analyzer Setting:

Detector Mode	Peak
RBW	100kHz
VBW	300kHz
Span	20MHz
Sweep Time	Auto

6.2 Test Results

Serial No. : 00037A009002
 Power : DC 3.60V
 Mode : Transmitting Mode (1ch, 6ch, 11ch)
 IEEE 802.11b: DBPSK (1Mbps)
 IEEE 802.11g: BPSK (6Mbps)
 Temp. / Humid. : 25.0°C / 48.6 % (28 January 2009)
 25.3°C / 49.6 % (29 January 2009)
 Regulation : FCC Part15 C §15.247 (a)(2)

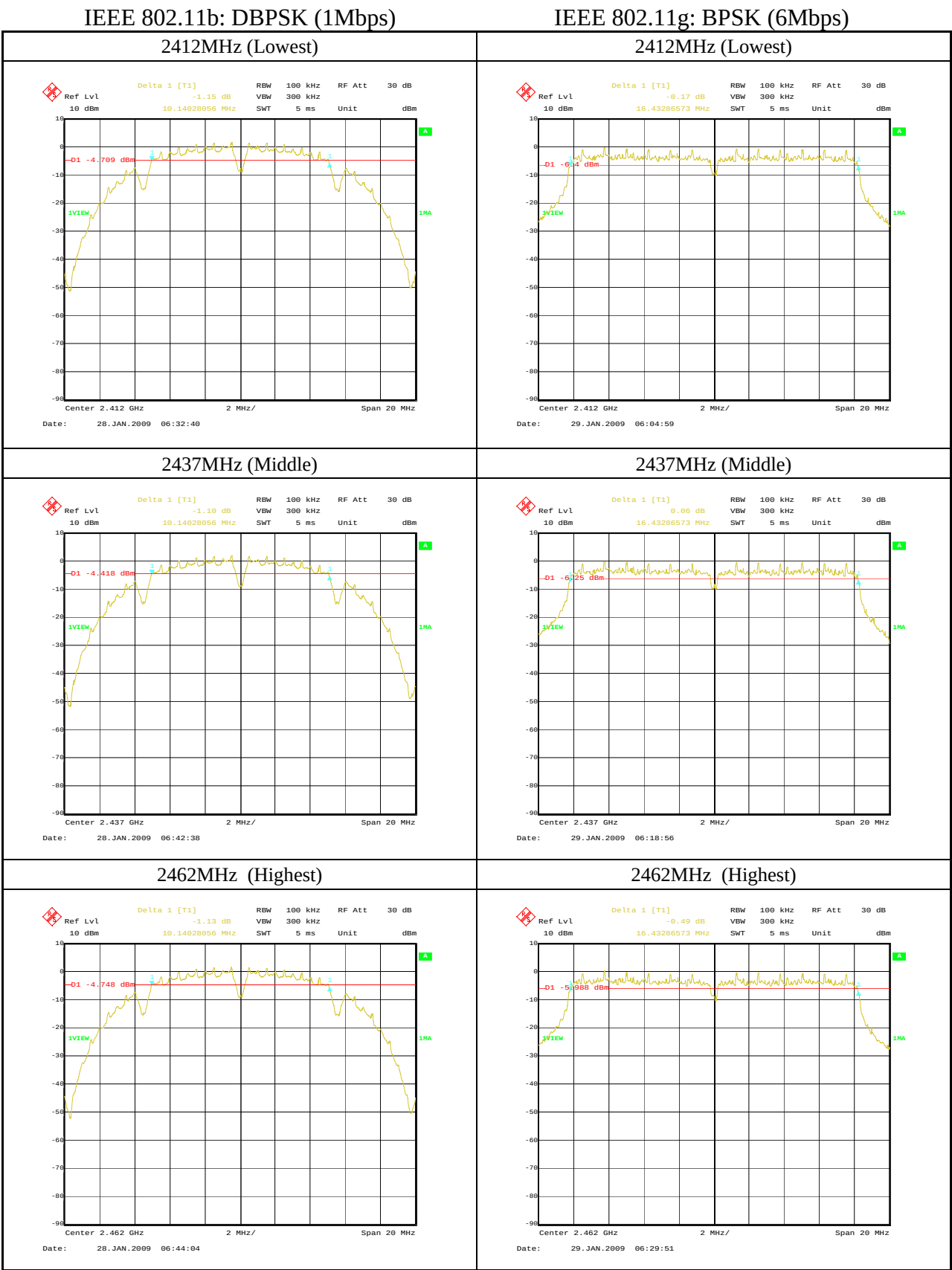
Channel	Frequency [MHz]	6dB Bandwidth [MHz]	Limit [MHz]
IEEE 802.11b: DBPSK (1Mbps) *1			
1ch (Lowest)	2412	10.14	>=0.5
6ch (Middle)	2437	10.14	>=0.5
11ch (Highest)	2462	10.14	>=0.5
IEEE 802.11g: BPSK (6Mbps)*2			
1ch (Lowest)	2412	16.43	>=0.5
6ch (Middle)	2437	16.43	>=0.5
11ch (Highest)	2462	16.43	>=0.5

*1: Tested date is 28 January 2009.

*2: Tested date is 29 January 2009.

The spectrum data are attached next page. Display line indicates the 6dB offset below highest level. It shows compliance with the requirement in part 15.247(a)(2).

Data of 6dB Bandwidth



7 Maximum Peak Output Power

7.1 Test Setup

The peak power meter was connected to the transmitter output port through the RF cable.

7.2 Test Results

Serial No. : 00037A009002
 Power : DC 3.60V
 Mode : Transmitting Mode (1ch, 6ch, 11ch)
 IEEE 802.11b: DBPSK (1Mbps)
 IEEE 802.11g: BPSK (6Mbps)
 Temp. / Humid. : 25.0°C / 48.6 % (28 January 2009)
 25.3°C / 49.6 % (29 January 2009)
 Regulation : FCC Part15 C §15.247 (b)(3)

Channel	Frequency [MHz]	Reading [dBm]	Cable Loss1 [dB]	Cable Loss2 [dB]	Result		Limit	
					[dBm]	[mW]	[dBm]	[mW]
IEEE 802.11b: DBPSK (1Mbps) *1								
1ch (Lowest)	2412	15.00	0.65	0.30	15.95	39.36	<30.0	<1000
6ch (Middle)	2437	14.78	0.64	0.30	15.72	37.33	<30.0	<1000
11ch (Highest)	2462	14.85	0.62	0.30	15.77	37.76	<30.0	<1000
IEEE 802.11g: BPSK (6Mbps) *2								
1ch (Lowest)	2412	20.46	0.65	0.30	21.41	138.36	<30.0	<1000
6ch (Middle)	2437	20.14	0.64	0.30	21.08	128.23	<30.0	<1000
11ch (Highest)	2462	20.32	0.62	0.30	21.24	133.05	<30.0	<1000

*1: Tested date is 28 January 2009.

*2: Tested date is 29 January 2009.

Result = Reading + Cable Loss1 + Cable Loss2

Note: Cable Loss1: RF Cable

Cable Loss2: Conversion cable used for connecting to SMA type

8 Band Edge Compliance

8.1 Test Setup

The spectrum analyzer was connected to the transmitter output port through the RF cable.

Spectrum Analyzer Setting:

Detector Mode	Peak
RBW	100kHz
VBW	300kHz
Span	100MHz
Sweep Time	Auto

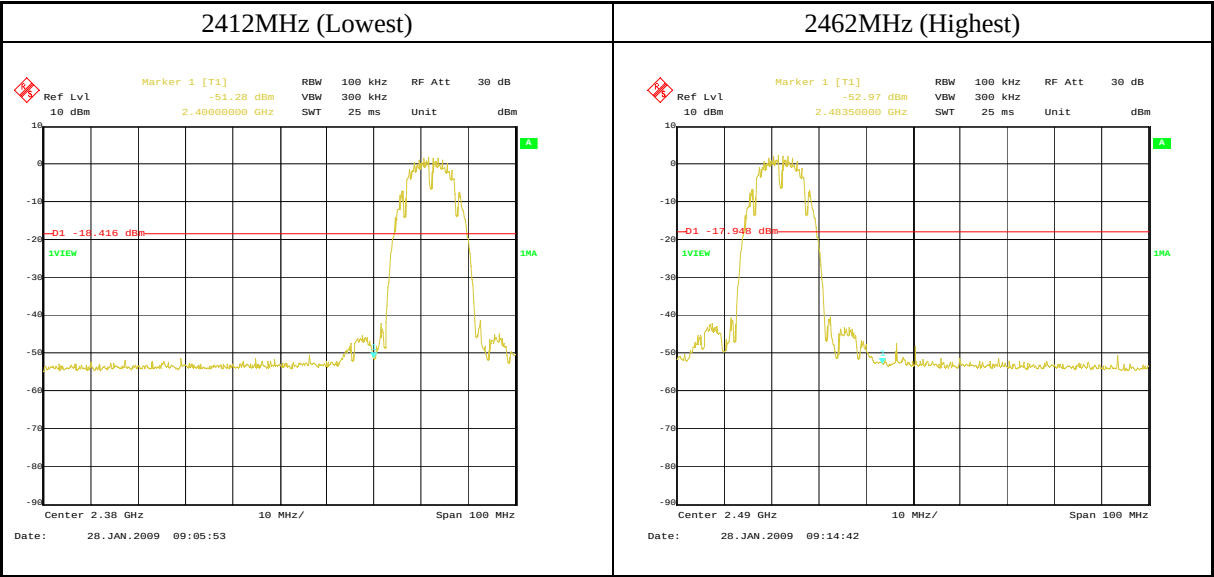
8.2 Test Results

Serial No.	:	00037A009002
Power	:	DC 3.60V
Mode	:	Transmitting Mode (1ch, 11ch) IEEE 802.11b: DBPSK (1Mbps) IEEE 802.11g: BPSK (6Mbps)
Temp. / Humid.	:	25.0°C / 48.6 % (28 January 2009) 25.3°C / 49.6 % (29 January 2009)
Regulation	:	FCC Part15 C §15.247 (d)

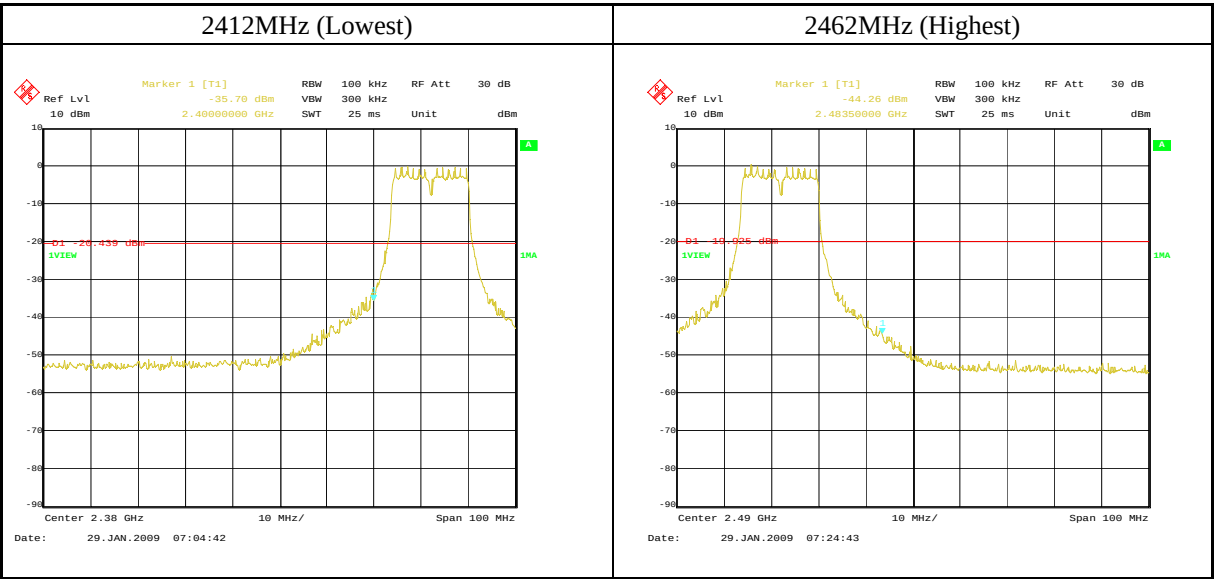
The spectrum data are attached next page. Display line indicates the 20dB offset below highest level. It shows compliance with the requirement in part 15.247(d).

Data of Band Edge Compliance

(1) IEEE 802.11b: DBPSK (1Mbps)
Tested date is 28 January 2009.



(2) IEEE 802.11g: BPSK (6Mbps)
Tested date is 29 January 2009.



9 Spurious RF Conducted Emission

9.1 Test Setup

The spectrum analyzer was connected to the transmitter output port through the RF cable.

Spectrum Analyzer Setting:

Detector Mode	Peak
RBW	100kHz
VBW	300kHz
Sweep Time	Auto

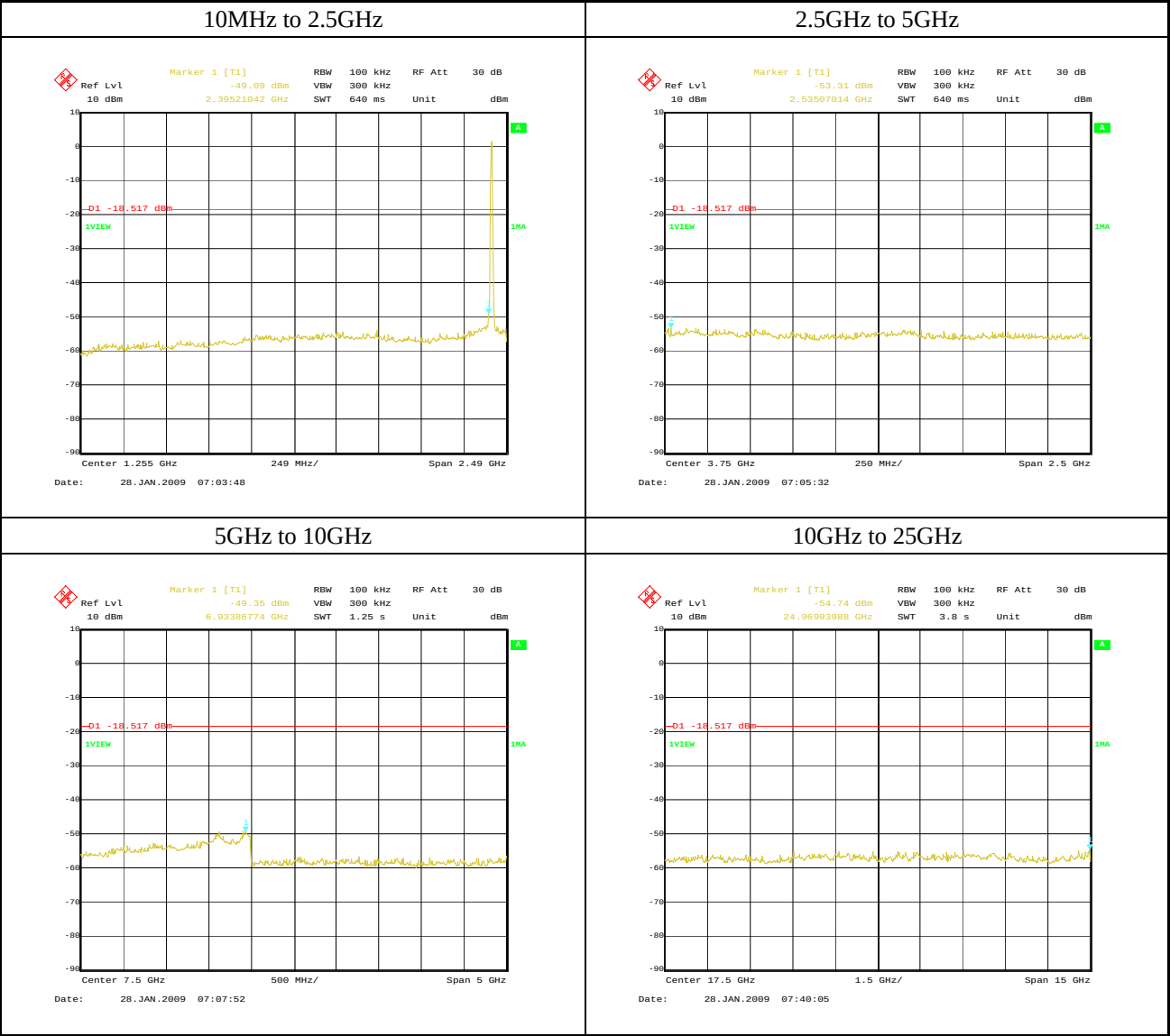
9.2 Test Results

Serial No.	:	00037A009002
Power	:	DC 3.60V
Mode	:	Transmitting Mode (1ch, 6ch, 11ch) IEEE 802.11b: DBPSK (1Mbps) IEEE 802.11g: BPSK (6Mbps)
Temp. / Humid.	:	25.0°C / 48.6 % (28 January 2009) 25.3°C / 49.6 % (29 January 2009) 24.8°C / 53.3 % (30 January 2009)
Regulation	:	FCC Part15 C §15.247 (d)

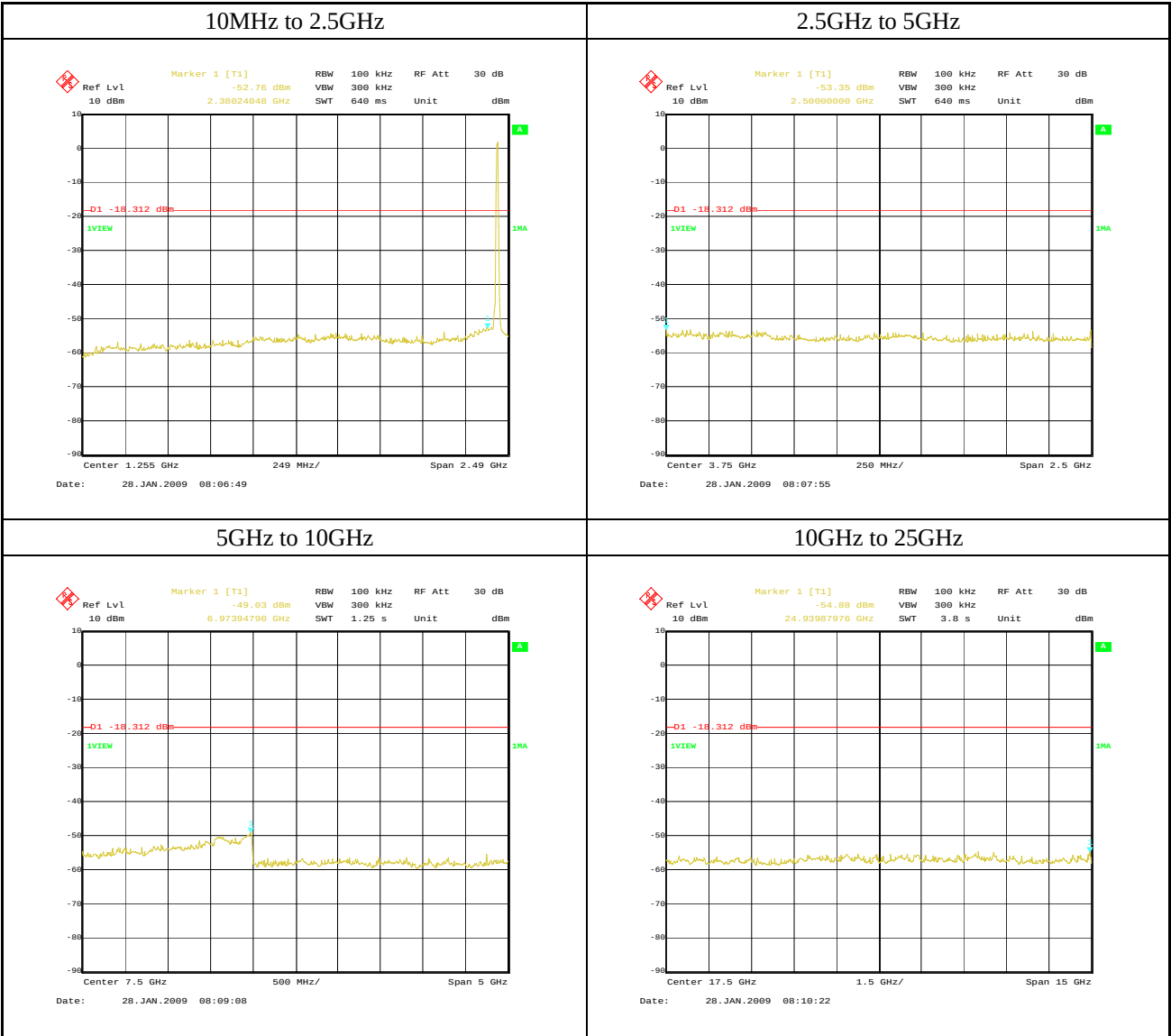
The spectrum data are attached next page. Display line indicates the 20dB offset below highest level.
It shows compliance with the requirement in part 15.247(d).

Data of Spurious Conducted Emission

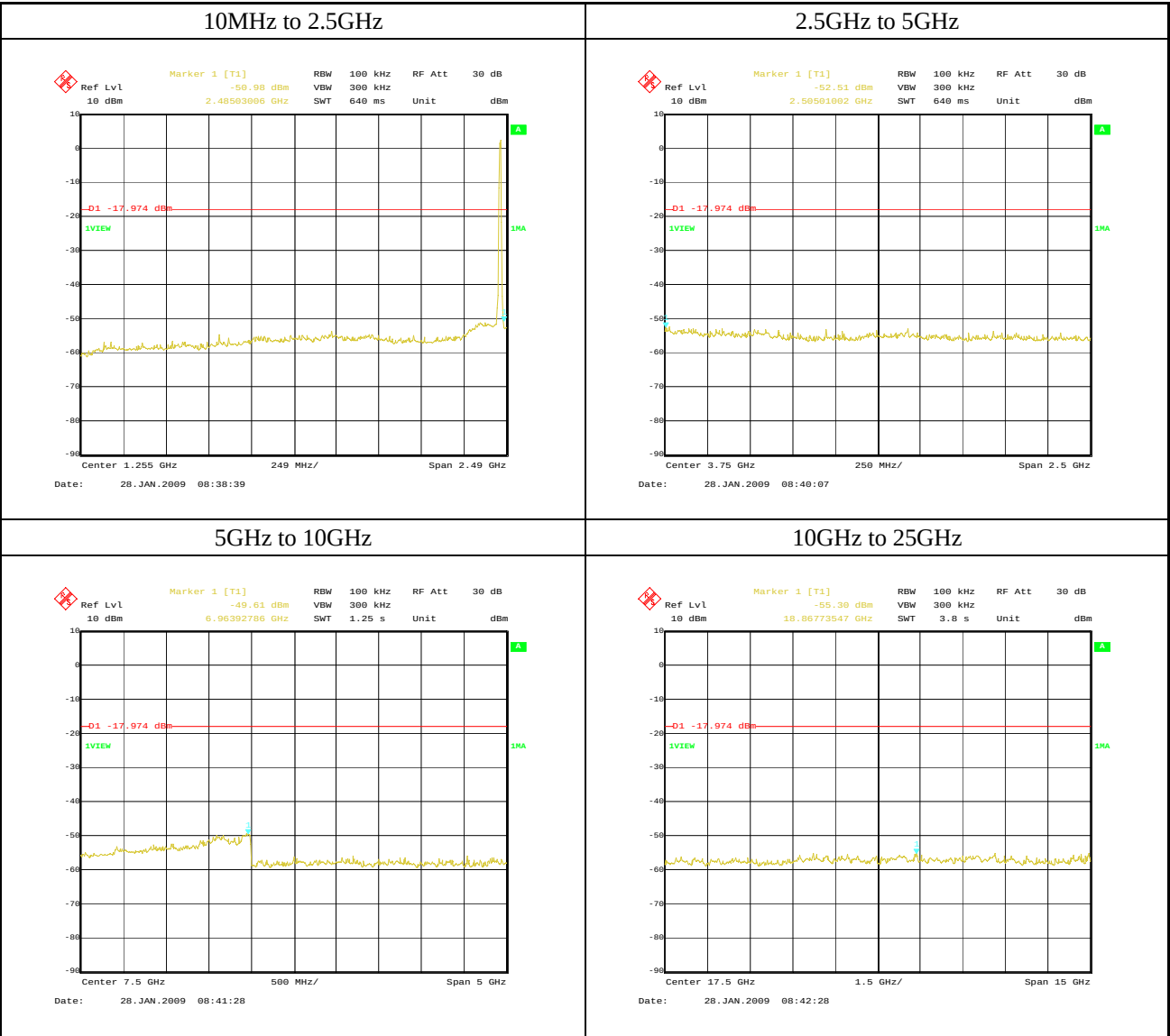
(1) IEEE 802.11b: DBPSK (1Mbps): 2412MHz
Tested date is 28 January 2009.



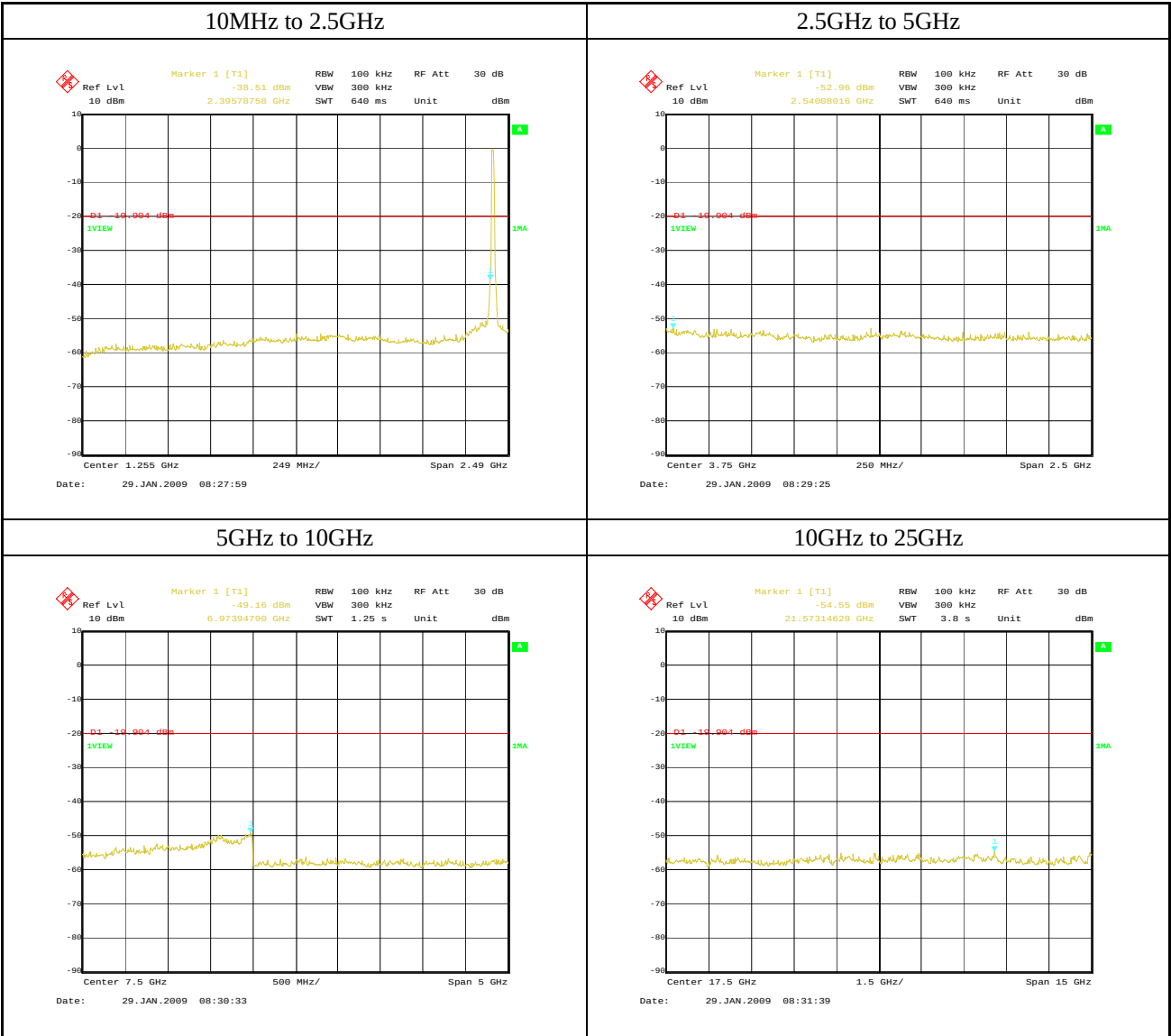
(2) IEEE 802.11b: DBPSK (1Mbps): 2437MHz
Tested date is 28 January 2009.



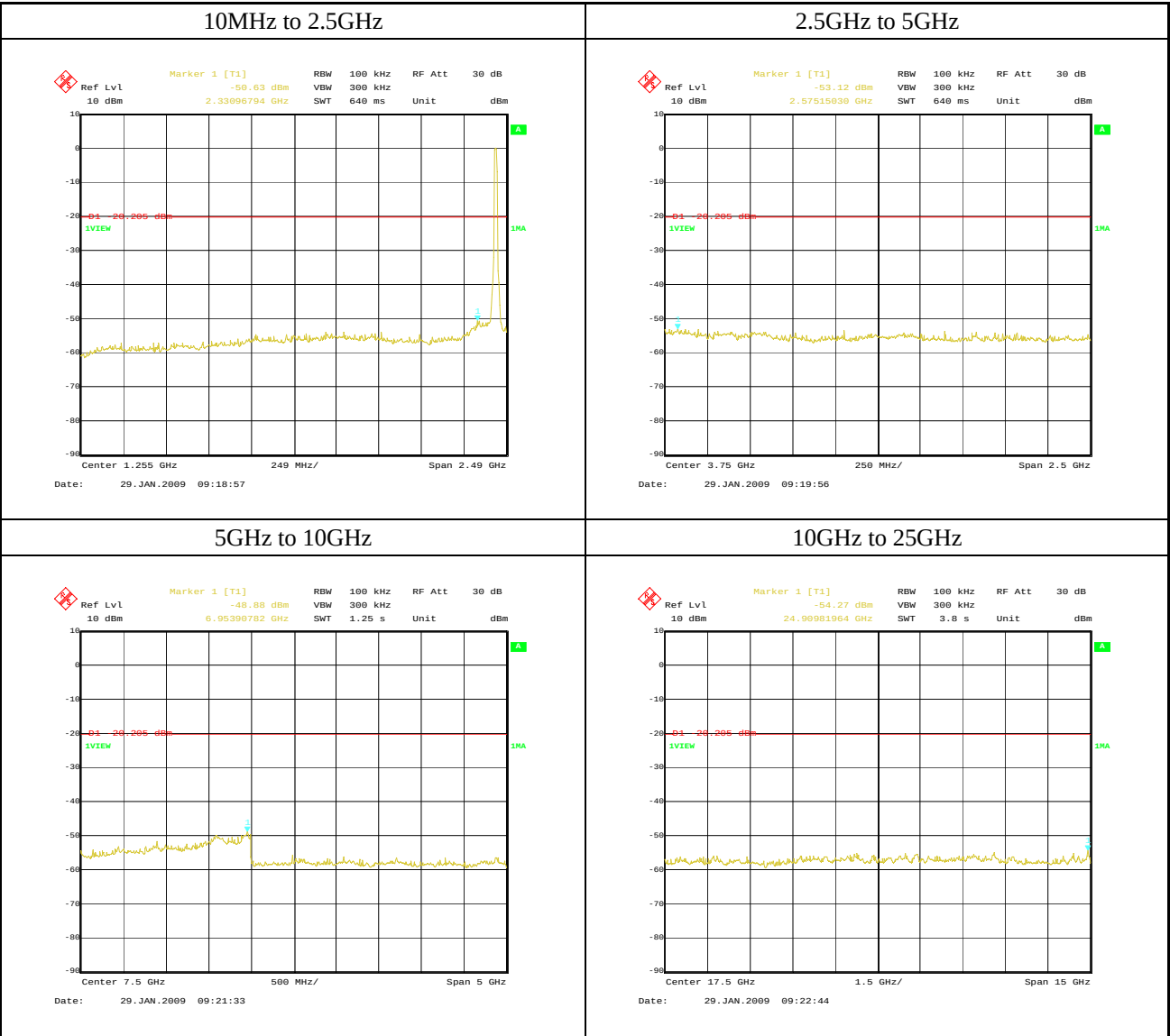
(3) IEEE 802.11b: DBPSK (1Mbps): 2462MHz
Tested date is 28 January 2009.



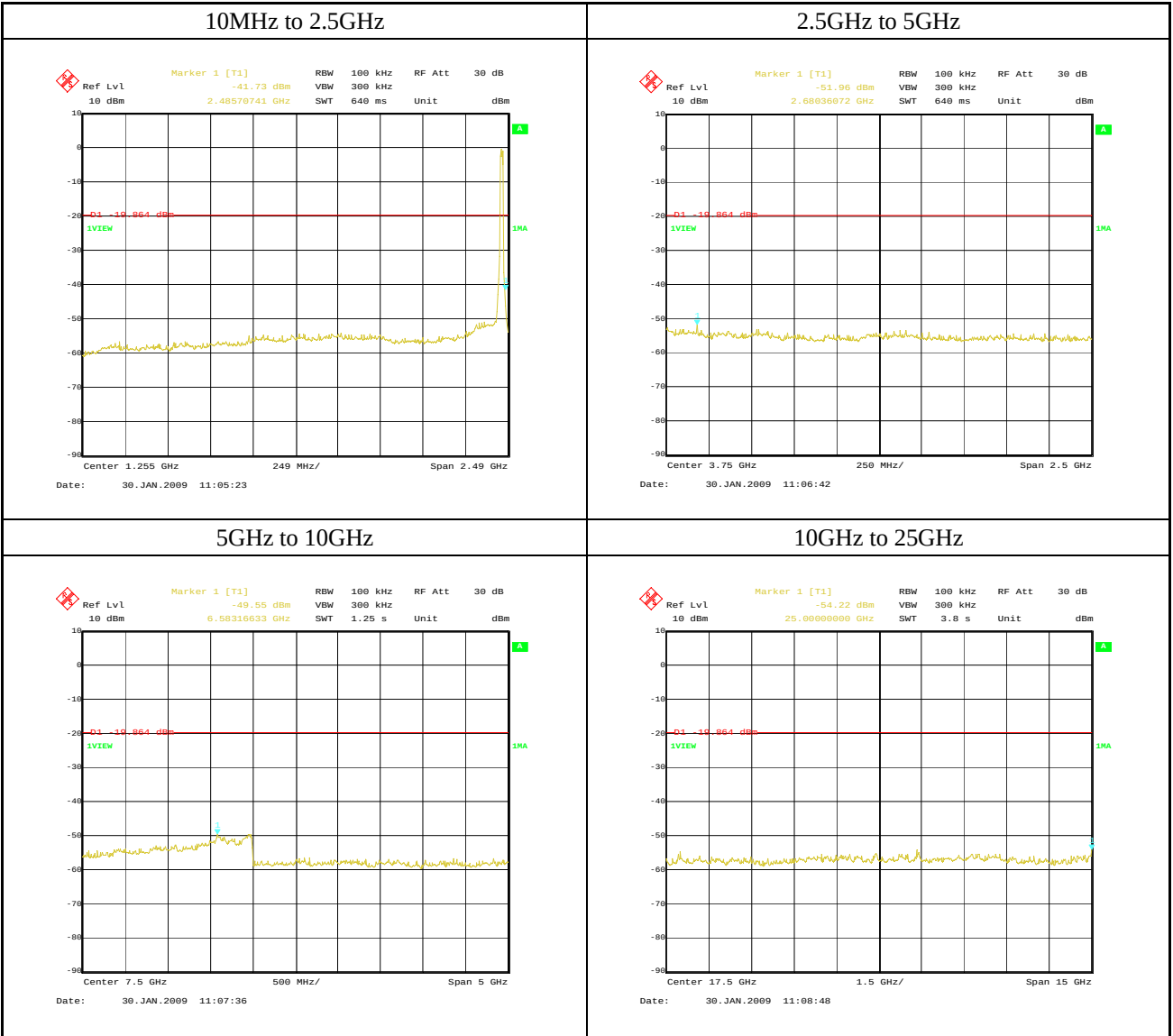
(4) IEEE 802.11g: BPSK (6Mbps): 2412MHz
Tested date is 29 January 2009.



(5) IEEE 802.11g: BPSK (6Mbps): 2437MHz
Tested date is 29 January 2009.



(6) IEEE 802.11g: BPSK (6Mbps): 2462MHz
Tested date is 30 January 2009.



10 Radiated Emission

10.1 Test Setup

The test setup was made according to ANSI STD C63.4: 2003 clause 8 on the 10-meter semi-anechoic chamber, which allows a 3 or 1 m distance measurement.
 EUT was placed on non-conductive table (foam polystyrene).
 The height of this table was 0.8 m.
 The measurement has been conducted with both horizontal and vertical antenna polarization.
 The turntable has been fully rotated. The highest radiation of the equipment has been recorded.
 For further description of the configuration refer to separate document named "Test Setup Photos (8228FC)".

Distance between equipment and antenna : 3m (30MHz to 18GHz)
 1m (18GHz to 25GHz)

Test Receiver Setting:

30~1000MHz:

Detector Mode	Quasi-Peak
Bandwidth	120kHz

Spectrum Analyzer Setting:

1~25GHz:

Detector Mode	Peak and Average
Bandwidth	Peak: RBW: 1MHz, VBW: 1MHz
	Average: RBW: 1MHz, VBW: 10Hz

10.2 Radiated Emission Calculation

The field strength is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain (if any) from the measured reading.
 The basic equation with a sample calculation is as follows:

$$\begin{aligned} \text{c.f.} &= \text{AF} + \text{CF} + \text{AL} - \text{AG} - \text{DF} \\ \text{RE} &= \text{RA} + \text{c.f.} \end{aligned}$$

Where

c.f.	:	Correction Factor [dB(1/m)]
RE	:	Radiated Emission (Emission Level - Result) [dB(uV/m)]
RA	:	Receiver Amplitude (Reading Level) [dBuV]
AF	:	Antenna Factor [dB(1/m)]
CF	:	Cable Attenuation Loss [dB]
AG	:	Amplifier Gain [dB]
AL	:	Attenuator Loss [dB]
DF	:	Distance Factor
		Distance between equipment and antenna: 3m = 0 [dB]
		Distance between equipment and antenna: 1m = 9.5 [dB]

Assume a receiver reading of 36.5 dBuV is obtained.
 The Correction Factor of -2.0 dB/m is added, giving a Radiated Emission of 34.5 dBuV/m.
 The 34.5 dBuV/m value was mathematically converted to its corresponding level in uV/m.

$$\text{RE} = 36.5 + (-2.0) = 34.5 \text{ dBuV/m}$$

$$\text{Level in uV/m} = \text{Common Antilogarithm: } 10^{(34.5/20)} = 53.1 \text{ uV/m}$$

10.3 Test Results

Product	: Wireless LAN Module	Model	: K30316
Serial No.	: 00037A506F5C	Test Standard	: FCC Part15 Subpart C §15.247(d)
Power Supply	: DC 3.6V	Temp. / Humid.	: 21.1°C / 25.0%
Operator	: Tatsuro Sato		
Remark	: Transmitting Mode IEEE 802.11b (1Mbps)		

Radiated Emission: Lch (2412MHz)

Axial Direction: XY-Plane

Below 1GHz

Frequency [MHz]	Pol. [H / V]	Reading [dB(uV)] QP / AV / PK			Factor [dB/m]	Level [dB(uV/m)] QP / AV / PK			Limit [dB(uV/m)]	Margin [dB] QP / AV / PK			Remark
250.000	H	19.7			-9.1	10.6			46.0	35.4			Floor Noise
400.000	H	20.1			-4.8	15.3			46.0	30.7			Floor Noise

Above 1GHz

Frequency [MHz]	Pol. [H / V]	Reading [dB(uV)] QP / AV / PK			Factor [dB/m]	Level [dB(uV/m)] QP / AV / PK			Limit [dB(uV/m)]	Margin [dB] QP / AV / PK			Remark
4824.000	H			44.2	2.8			47.0	74.0			27.0	
4824.000	H		33.0		2.8		35.8		54.0		18.2		
4824.000	V			44.0	2.8			46.8	74.0			27.2	
4824.000	V		32.1		2.8		34.9		54.0		19.1		
7236.000	H			43.4	4.4			47.8	74.0			26.2	* Floor Noise
7236.000	H		31.3		4.4		35.7		54.0		18.3		* Floor Noise
7236.000	V			44.8	4.4			49.2	74.0			24.8	*
7236.000	V		32.8		4.4		37.2		54.0		16.8		*
9648.000	H			42.9	7.2			50.1	74.0			23.9	* Floor Noise
9648.000	H		31.0		7.2		38.2		54.0		15.8		* Floor Noise
9648.000	V			44.0	7.2			51.2	74.0			22.8	*
9648.000	V		32.6		7.2		39.8		54.0		14.2		*
12060.000	H			45.0	8.5			53.5	74.0			20.5	Floor Noise
12060.000	H		32.9		8.5		41.4		54.0		12.6		Floor Noise

Note: * = Out of Restricted Band.

This frequency is out of the restricted bands, so radiated emission limits specified in Section 15.209 does not apply.

15.247(d):

Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

Axial Direction: YZ-Plane**Below 1GHz**

Frequency [MHz]	Pol. [H / V]	Reading [dB(uV)] QP / AV / PK			Factor [dB/m]	Level [dB(uV/m)] QP / AV / PK			Limit [dB(uV/m)]	Margin [dB] QP / AV / PK			Remark
250.000	H	19.7			-9.1	10.6			46.0	35.4			Floor Noise
400.000	H	20.1			-4.8	15.3			46.0	30.7			Floor Noise

Above 1GHz

Frequency [MHz]	Pol. [H / V]	Reading [dB(uV)] QP / AV / PK			Factor [dB/m]	Level [dB(uV/m)] QP / AV / PK			Limit [dB(uV/m)]	Margin [dB] QP / AV / PK			Remark
4824.000	H			44.2	2.8			47.0	74.0			27.0	
4824.000	H		33.4		2.8		36.2		54.0		17.8		
4824.000	V			44.5	2.8			47.3	74.0			26.7	
4824.000	V		33.8		2.8		36.6		54.0		17.4		
7236.000	H			43.4	4.4			47.8	74.0			26.2	* Floor Noise
7236.000	H		31.3		4.4		35.7		54.0		18.3		* Floor Noise
7236.000	V			43.8	4.4			48.2	74.0			25.8	*
7236.000	V		32.3		4.4		36.7		54.0		17.3		*
9648.000	H			44.2	7.2			51.4	74.0			22.6	*
9648.000	H		32.5		7.2		39.7		54.0		14.3		*
9648.000	V			44.9	7.2			52.1	74.0			21.9	*
9648.000	V		32.7		7.2		39.9		54.0		14.1		*
12060.000	H			45.0	8.5			53.5	74.0			20.5	Floor Noise
12060.000	H		32.9		8.5		41.4		54.0		12.6		Floor Noise

Note: * = Out of Restricted Band.

This frequency is out of the restricted bands, so radiated emission limits specified in Section 15.209 does not apply.

15.247(d):

Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

Axial Direction: ZX-Plane**Below 1GHz**

Frequency [MHz]	Pol. [H / V]	Reading [dB(uV)] QP / AV / PK			Factor [dB/m]	Level [dB(uV/m)] QP / AV / PK			Limit [dB(uV/m)]	Margin [dB] QP / AV / PK			Remark
250.000	H	19.7			-9.1	10.6			46.0	35.4			Floor Noise
400.000	H	20.1			-4.8	15.3			46.0	30.7			Floor Noise

Above 1GHz

Frequency [MHz]	Pol. [H / V]	Reading [dB(uV)] QP / AV / PK			Factor [dB/m]	Level [dB(uV/m)] QP / AV / PK			Limit [dB(uV/m)]	Margin [dB] QP / AV / PK			Remark
4824.000	H			43.3	2.8			46.1	74.0			27.9	
4824.000	H		32.6		2.8		35.4		54.0		18.6		
4824.000	V			45.6	2.8			48.4	74.0			25.6	
4824.000	V		34.7		2.8		37.5		54.0		16.5		
7236.000	H			45.5	4.4			49.9	74.0			24.1	*
7236.000	H		32.9		4.4		37.3		54.0		16.7		*
7236.000	V			44.5	4.4			48.9	74.0			25.1	*
7236.000	V		32.1		4.4		36.5		54.0		17.5		*
9648.000	H			45.8	7.2			53.0	74.0			21.0	*
9648.000	H		34.2		7.2		41.4		54.0		12.6		*
9648.000	V			45.9	7.2			53.1	74.0			20.9	*
9648.000	V		35.9		7.2		43.1		54.0		10.9		*
12060.000	H			45.0	8.5			53.5	74.0			20.5	Floor Noise
12060.000	H		32.9		8.5		41.4		54.0		12.6		Floor Noise

Note: * = Out of Restricted Band.

This frequency is out of the restricted bands, so radiated emission limits specified in Section 15.209 does not apply.

15.247(d):

Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

Radiated Emission: Mch (2437MHz)Axial Direction: XY-Plane

Below 1GHz

Frequency [MHz]	Pol. [H / V]	Reading [dB(uV)] QP / AV / PK			Factor [dB/m]	Level [dB(uV/m)] QP / AV / PK			Limit [dB(uV/m)]	Margin [dB] QP / AV / PK			Remark
250.000	H	19.7			-9.1	10.6			46.0	35.4			Floor Noise
400.000	H	20.1			-4.8	15.3			46.0	30.7			Floor Noise

Above 1GHz

Frequency [MHz]	Pol. [H / V]	Reading [dB(uV)] QP / AV / PK			Factor [dB/m]	Level [dB(uV/m)] QP / AV / PK			Limit [dB(uV/m)]	Margin [dB] QP / AV / PK			Remark
4874.000	H			45.9	3.0			48.9	74.0			25.1	
4874.000	H		35.7		3.0		38.7		54.0		15.3		
4874.000	V			45.5	3.0			48.5	74.0			25.5	
4874.000	V		35.4		3.0		38.4		54.0		15.6		
7311.000	H			44.8	4.5			49.3	74.0			24.7	
7311.000	H		32.4		4.5		36.9		54.0		17.1		
7311.000	V			45.8	4.5			50.3	74.0			23.7	
7311.000	V		33.5		4.5		38.0		54.0		16.0		
9748.000	H			42.9	7.3			50.2	74.0			23.8	*
9748.000	H		31.5		7.3		38.8		54.0		15.2		*
9748.000	V			45.2	7.3			52.5	74.0			21.5	*
9748.000	V		34.2		7.3		41.5		54.0		12.5		*
12185.000	H			43.8	8.8			52.6	74.0			21.4	Floor Noise
12185.000	H		31.9		8.8		40.7		54.0		13.3		Floor Noise

Note: * = Out of Restricted Band.

This frequency is out of the restricted bands, so radiated emission limits specified in Section 15.209 does not apply.

15.247(d):

Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

Axial Direction: YZ-Plane**Below 1GHz**

Frequency [MHz]	Pol. [H / V]	Reading [dB(uV)] QP / AV / PK			Factor [dB/m]	Level [dB(uV/m)] QP / AV / PK			Limit [dB(uV/m)]	Margin [dB] QP / AV / PK			Remark
250.000	H	19.7			-9.1	10.6			46.0	35.4			Floor Noise
400.000	H	20.1			-4.8	15.3			46.0	30.7			Floor Noise

Above 1GHz

Frequency [MHz]	Pol. [H / V]	Reading [dB(uV)] QP / AV / PK			Factor [dB/m]	Level [dB(uV/m)] QP / AV / PK			Limit [dB(uV/m)]	Margin [dB] QP / AV / PK			Remark
4874.000	H			44.7	3.0			47.7	74.0			26.3	
4874.000	H		34.6		3.0		37.6		54.0		16.4		
4874.000	V			46.0	3.0			49.0	74.0			25.0	
4874.000	V		35.7		3.0		38.7		54.0		15.3		
7311.000	H			43.2	4.5			47.7	74.0			26.3	Floor Noise
7311.000	H		31.7		4.5		36.2		54.0		17.8		Floor Noise
7311.000	V			44.8	4.5			49.3	74.0			24.7	
7311.000	V		33.3		4.5		37.8		54.0		16.2		
9748.000	H			43.9	7.3			51.2	74.0			22.8	*
9748.000	H		33.4		7.3		40.7		54.0		13.3		*
9748.000	V			44.7	7.3			52.0	74.0			22.0	*
9748.000	V		33.3		7.3		40.6		54.0		13.4		*
12185.000	H			43.8	8.8			52.6	74.0			21.4	Floor Noise
12185.000	H		31.9		8.8		40.7		54.0		13.3		Floor Noise

Note: * = Out of Restricted Band.

This frequency is out of the restricted bands, so radiated emission limits specified in Section 15.209 does not apply.

15.247(d):

Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

Axial Direction: ZX-Plane**Below 1GHz**

Frequency [MHz]	Pol. [H / V]	Reading [dB(uV)] QP / AV / PK			Factor [dB/m]	Level [dB(uV/m)] QP / AV / PK			Limit [dB(uV/m)]	Margin [dB] QP / AV / PK			Remark
250.000	H	19.7			-9.1	10.6			46.0	35.4			Floor Noise
400.000	H	20.1			-4.8	15.3			46.0	30.7			Floor Noise

Above 1GHz

Frequency [MHz]	Pol. [H / V]	Reading [dB(uV)] QP / AV / PK			Factor [dB/m]	Level [dB(uV/m)] QP / AV / PK			Limit [dB(uV/m)]	Margin [dB] QP / AV / PK			Remark
4874.000	H			44.0	3.0			47.0	74.0			27.0	
4874.000	H		33.5		3.0		36.5		54.0		17.5		
4874.000	V			45.2	3.0			48.2	74.0			25.8	
4874.000	V		36.1		3.0		39.1		54.0		14.9		
7311.000	H			45.5	4.5			50.0	74.0			24.0	
7311.000	H		32.8		4.5		37.3		54.0		16.7		
7311.000	V			44.5	4.5			49.0	74.0			25.0	
7311.000	V		32.3		4.5		36.8		54.0		17.2		
9748.000	H			44.1	7.3			51.4	74.0			22.6	*
9748.000	H		32.2		7.3		39.5		54.0		14.5		*
9748.000	V			44.3	7.3			51.6	74.0			22.4	*
9748.000	V		33.2		7.3		40.5		54.0		13.5		*
12185.000	H			43.8	8.8			52.6	74.0			21.4	Floor Noise
12185.000	H		31.9		8.8		40.7		54.0		13.3		Floor Noise

Note: * = Out of Restricted Band.

This frequency is out of the restricted bands, so radiated emission limits specified in Section 15.209 does not apply.

15.247(d):

Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

Radiated Emission: Hch (2462MHz)Axial Direction: XY-Plane

Below 1GHz

Frequency [MHz]	Pol. [H / V]	Reading [dB(uV)] QP / AV / PK			Factor [dB/m]	Level [dB(uV/m)] QP / AV / PK			Limit [dB(uV/m)]	Margin [dB] QP / AV / PK			Remark
250.000	H	19.7			-9.1	10.6			46.0	35.4			Floor Noise
400.000	H	20.1			-4.8	15.3			46.0	30.7			Floor Noise

Above 1GHz

Frequency [MHz]	Pol. [H / V]	Reading [dB(uV)] QP / AV / PK			Factor [dB/m]	Level [dB(uV/m)] QP / AV / PK			Limit [dB(uV/m)]	Margin [dB] QP / AV / PK			Remark
4924.000	H			45.0	3.2			48.2	74.0			25.8	
4924.000	H		33.8		3.2		37.0		54.0		17.0		
4924.000	V			46.6	3.2			49.8	74.0			24.2	
4924.000	V		36.0		3.2		39.2		54.0		14.8		
7386.000	H			45.9	4.6			50.5	74.0			23.5	
7386.000	H		33.3		4.6		37.9		54.0		16.1		
7386.000	V			47.2	4.6			51.8	74.0			22.2	
7386.000	V		36.5		4.6		41.1		54.0		12.9		
9848.000	H			44.8	7.4			52.2	74.0			21.8	*
9848.000	H		33.8		7.4		41.2		54.0		12.8		*
9848.000	V			47.2	7.4			54.6	74.0			19.4	*
9848.000	V		38.3		7.4		45.7		54.0		8.3		*
12310.000	H			44.0	8.6			52.6	74.0			21.4	Floor Noise
12310.000	H		31.6		8.6		40.2		54.0		13.8		Floor Noise

Note: * = Out of Restricted Band.

This frequency is out of the restricted bands, so radiated emission limits specified in Section 15.209 does not apply.

15.247(d):

Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

Axial Direction: YZ-Plane**Below 1GHz**

Frequency [MHz]	Pol. [H / V]	Reading [dB(uV)] QP / AV / PK			Factor [dB/m]	Level [dB(uV/m)] QP / AV / PK			Limit [dB(uV/m)]	Margin [dB] QP / AV / PK			Remark
250.000	H	19.7			-9.1	10.6			46.0	35.4			Floor Noise
400.000	H	20.1			-4.8	15.3			46.0	30.7			Floor Noise

Above 1GHz

Frequency [MHz]	Pol. [H / V]	Reading [dB(uV)] QP / AV / PK			Factor [dB/m]	Level [dB(uV/m)] QP / AV / PK			Limit [dB(uV/m)]	Margin [dB] QP / AV / PK			Remark
4924.000	H			46.8	3.2			50.0	74.0			24.0	
4924.000	H		36.3		3.2		39.5		54.0		14.5		
4924.000	V			46.4	3.2			49.6	74.0			24.4	
4924.000	V		36.1		3.2		39.3		54.0		14.7		
7386.000	V			47.3	4.6			51.9	74.0			22.1	
7386.000	V		36.3		4.6		40.9		54.0		13.1		
7386.000	H			45.1	4.6			49.7	74.0			24.3	
7386.000	H		33.1		4.6		37.7		54.0		16.3		
9848.000	H			45.4	7.4			52.8	74.0			21.2	*
9848.000	H		35.7		7.4		43.1		54.0		10.9		*
9848.000	V			46.5	7.4			53.9	74.0			20.1	*
9848.000	V		36.2		7.4		43.6		54.0		10.4		*
12310.000	H			44.0	8.6			52.6	74.0			21.4	Floor Noise
12310.000	H		31.6		8.6		40.2		54.0		13.8		Floor Noise

Note: * = Out of Restricted Band.

This frequency is out of the restricted bands, so radiated emission limits specified in Section 15.209 does not apply.

15.247(d):

Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

Axial Direction: ZX-Plane**Below 1GHz**

Frequency [MHz]	Pol. [H / V]	Reading [dB(uV)] QP / AV / PK			Factor [dB/m]	Level [dB(uV/m)] QP / AV / PK			Limit [dB(uV/m)]	Margin [dB] QP / AV / PK			Remark
250.000	H	19.7			-9.1	10.6			46.0	35.4			Floor Noise
400.000	H	20.1			-4.8	15.3			46.0	30.7			Floor Noise

Above 1GHz

Frequency [MHz]	Pol. [H / V]	Reading [dB(uV)] QP / AV / PK			Factor [dB/m]	Level [dB(uV/m)] QP / AV / PK			Limit [dB(uV/m)]	Margin [dB] QP / AV / PK			Remark
4924.000	H			45.6	3.2			48.8	74.0			25.2	
4924.000	H		35.2		3.2		38.4		54.0		15.6		
4924.000	V			46.4	3.2			49.6	74.0			24.4	
4924.000	V		36.9		3.2		40.1		54.0		13.9		
7386.000	H			45.9	4.6			50.5	74.0			23.5	
7386.000	H		35.0		4.6		39.6		54.0		14.4		
7386.000	V			45.4	4.6			50.0	74.0			24.0	
7386.000	V		34.1		4.6		38.7		54.0		15.3		
9848.000	H			45.9	7.4			53.3	74.0			20.7	*
9848.000	H		36.5		7.4		43.9		54.0		10.1		*
9848.000	V			46.0	7.4			53.4	74.0			20.6	*
9848.000	V		36.3		7.4		43.7		54.0		10.3		*
12310.000	H			44.0	8.6			52.6	74.0			21.4	Floor Noise
12310.000	H		31.6		8.6		40.2		54.0		13.8		Floor Noise

Note: * = Out of Restricted Band.

This frequency is out of the restricted bands, so radiated emission limits specified in Section 15.209 does not apply.

15.247(d):

Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

Product	: Wireless LAN Module	Model	: K30316
Serial No.	: 00037A506F5C	Test Standard	: FCC Part15 Subpart C §15.247(d)
Power Supply	: DC 3.6V	Temp. / Humid.	: 21.1°C / 25.0%
Operator	: Tatsuro Sato		
Remark	: Transmitting Mode		
	IEEE 802.11g (6Mbps)		

Radiated Emission: Lch (2412MHz)**Axial Direction: XY-Plane****Below 1GHz**

Frequency [MHz]	Pol. [H / V]	Reading [dB(uV)] QP / AV / PK			Factor [dB/m]	Level [dB(uV/m)] QP / AV / PK			Limit [dB(uV/m)]	Margin [dB] QP / AV / PK			Remark
250.000	H	19.7			-9.1	10.6			46.0	35.4			Floor Noise
400.000	H	20.1			-4.8	15.3			46.0	30.7			Floor Noise

Above 1GHz

Frequency [MHz]	Pol. [H / V]	Reading [dB(uV)] QP / AV / PK			Factor [dB/m]	Level [dB(uV/m)] QP / AV / PK			Limit [dB(uV/m)]	Margin [dB] QP / AV / PK			Remark
4824.000	H			43.4	2.8			46.2	74.0			27.8	Floor Noise
4824.000	H		31.1		2.8		33.9		54.0		20.1		Floor Noise
7236.000	H			43.4	4.4			47.8	74.0			26.2	* Floor Noise
7236.000	H		31.4		4.4		35.8		54.0		18.2		* Floor Noise
9648.000	H			44.4	7.2			51.6	74.0			22.4	* Floor Noise
9648.000	H		31.5		7.2		38.7		54.0		15.3		* Floor Noise
12060.000	H			44.9	8.5			53.4	74.0			20.6	Floor Noise
12060.000	H		32.8		8.5		41.3		54.0		12.7		Floor Noise

Note: * = Out of Restricted Band.

This frequency is out of the restricted bands, so radiated emission limits specified in Section 15.209 does not apply.

15.247(d):

Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

Axial Direction: YZ-Plane**Below 1GHz**

Frequency [MHz]	Pol. [H / V]	Reading [dB(uV)] QP / AV / PK			Factor [dB/m]	Level [dB(uV/m)] QP / AV / PK			Limit [dB(uV/m)]	Margin [dB] QP / AV / PK			Remark
250.000	H	19.7			-9.1	10.6			46.0	35.4			Floor Noise
400.000	H	20.1			-4.8	15.3			46.0	30.7			Floor Noise

Above 1GHz

Frequency [MHz]	Pol. [H / V]	Reading [dB(uV)] QP / AV / PK			Factor [dB/m]	Level [dB(uV/m)] QP / AV / PK			Limit [dB(uV/m)]	Margin [dB] QP / AV / PK			Remark
4824.000	H			43.4	2.8			46.2	74.0			27.8	Floor Noise
4824.000	H		31.1		2.8		33.9		54.0		20.1		Floor Noise
7236.000	H			43.4	4.4			47.8	74.0			26.2	* Floor Noise
7236.000	H		31.4		4.4		35.8		54.0		18.2		* Floor Noise
9648.000	H			44.4	7.2			51.6	74.0			22.4	* Floor Noise
9648.000	H		31.5		7.2		38.7		54.0		15.3		* Floor Noise
12060.000	H			44.9	8.5			53.4	74.0			20.6	Floor Noise
12060.000	H		32.8		8.5		41.3		54.0		12.7		Floor Noise

Note: * = Out of Restricted Band.

This frequency is out of the restricted bands, so radiated emission limits specified in Section 15.209 does not apply.

15.247(d):

Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

Axial Direction: ZX-Plane**Below 1GHz**

Frequency [MHz]	Pol. [H / V]	Reading [dB(uV)] QP / AV / PK			Factor [dB/m]	Level [dB(uV/m)] QP / AV / PK			Limit [dB(uV/m)]	Margin [dB] QP / AV / PK			Remark
250.000	H	19.7			-9.1	10.6			46.0	35.4			Floor Noise
400.000	H	20.1			-4.8	15.3			46.0	30.7			Floor Noise

Above 1GHz

Frequency [MHz]	Pol. [H / V]	Reading [dB(uV)] QP / AV / PK			Factor [dB/m]	Level [dB(uV/m)] QP / AV / PK			Limit [dB(uV/m)]	Margin [dB] QP / AV / PK			Remark
4824.000	H			43.4	2.8			46.2	74.0			27.8	Floor Noise
4824.000	H		31.1		2.8		33.9		54.0		20.1		Floor Noise
7236.000	H			43.4	4.4			47.8	74.0			26.2	* Floor Noise
7236.000	H		31.4		4.4		35.8		54.0		18.2		* Floor Noise
9648.000	H			44.4	7.2			51.6	74.0			22.4	* Floor Noise
9648.000	H		31.5		7.2		38.7		54.0		15.3		* Floor Noise
12060.000	H			44.9	8.5			53.4	74.0			20.6	Floor Noise
12060.000	H		32.8		8.5		41.3		54.0		12.7		Floor Noise

Note: * = Out of Restricted Band.

This frequency is out of the restricted bands, so radiated emission limits specified in Section 15.209 does not apply.

15.247(d):

Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

Radiated Emission: Mch (2437MHz)Axial Direction: XY-Plane

Below 1GHz

Frequency [MHz]	Pol. [H / V]	Reading [dB(uV)] QP / AV / PK			Factor [dB/m]	Level [dB(uV/m)] QP / AV / PK			Limit [dB(uV/m)]	Margin [dB] QP / AV / PK			Remark
250.000	H	19.7			-9.1	10.6			46.0	35.4			Floor Noise
400.000	H	20.1			-4.8	15.3			46.0	30.7			Floor Noise

Above 1GHz

Frequency [MHz]	Pol. [H / V]	Reading [dB(uV)] QP / AV / PK			Factor [dB/m]	Level [dB(uV/m)] QP / AV / PK			Limit [dB(uV/m)]	Margin [dB] QP / AV / PK			Remark
4874.000	H			43.5	3.0			46.5	74.0			27.5	Floor Noise
4874.000	H		30.9		3.0		33.9		54.0		20.1		Floor Noise
7311.000	H			43.4	4.5			47.9	74.0			26.1	Floor Noise
7311.000	H		31.4		4.5		35.9		54.0		18.1		Floor Noise
7311.000	V			45.9	4.5			50.4	74.0			23.6	
7311.000	V		32.7		4.5		37.2		54.0		16.8		
9748.000	H			42.9	7.3			50.2	74.0			23.8	* Floor Noise
9748.000	H		30.5		7.3		37.8		54.0		16.2		* Floor Noise
12185.000	H			43.4	8.8			52.2	74.0			21.8	Floor Noise
12185.000	H		31.8		8.8		40.6		54.0		13.4		Floor Noise

Note: * = Out of Restricted Band.

This frequency is out of the restricted bands, so radiated emission limits specified in Section 15.209 does not apply.

15.247(d):

Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

Axial Direction: YZ-Plane**Below 1GHz**

Frequency [MHz]	Pol. [H / V]	Reading [dB(uV)] QP / AV / PK			Factor [dB/m]	Level [dB(uV/m)] QP / AV / PK			Limit [dB(uV/m)]	Margin [dB] QP / AV / PK			Remark
250.000	H	19.7			-9.1	10.6			46.0	35.4			Floor Noise
400.000	H	20.1			-4.8	15.3			46.0	30.7			Floor Noise

Above 1GHz

Frequency [MHz]	Pol. [H / V]	Reading [dB(uV)] QP / AV / PK			Factor [dB/m]	Level [dB(uV/m)] QP / AV / PK			Limit [dB(uV/m)]	Margin [dB] QP / AV / PK			Remark
4874.000	H			43.5	3.0			46.5	74.0			27.5	Floor Noise
4874.000	H		30.9		3.0		33.9		54.0		20.1		Floor Noise
7311.000	H			43.4	4.5			47.9	74.0			26.1	Floor Noise
7311.000	H		31.4		4.5		35.9		54.0		18.1		Floor Noise
7311.000	V			46.1	4.5			50.6	74.0			23.4	
7311.000	V		32.5		4.5		37.0		54.0		17.0		
9748.000	H			42.9	7.3			50.2	74.0			23.8	* Floor Noise
9748.000	H		30.5		7.3		37.8		54.0		16.2		* Floor Noise
12185.000	H			43.4	8.8			52.2	74.0			21.8	Floor Noise
12185.000	H		31.8		8.8		40.6		54.0		13.4		Floor Noise

Note: * = Out of Restricted Band.

This frequency is out of the restricted bands, so radiated emission limits specified in Section 15.209 does not apply.

15.247(d):

Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

Axial Direction: ZX-Plane**Below 1GHz**

Frequency [MHz]	Pol. [H / V]	Reading [dB(uV)] QP / AV / PK			Factor [dB/m]	Level [dB(uV/m)] QP / AV / PK			Limit [dB(uV/m)]	Margin [dB] QP / AV / PK			Remark
250.000	H	19.7			-9.1	10.6			46.0	35.4			Floor Noise
400.000	H	20.1			-4.8	15.3			46.0	30.7			Floor Noise

Above 1GHz

Frequency [MHz]	Pol. [H / V]	Reading [dB(uV)] QP / AV / PK			Factor [dB/m]	Level [dB(uV/m)] QP / AV / PK			Limit [dB(uV/m)]	Margin [dB] QP / AV / PK			Remark
4874.000	H			43.5	3.0			46.5	74.0			27.5	Floor Noise
4874.000	H		30.9		3.0		33.9		54.0		20.1		Floor Noise
7311.000	H			43.4	4.5			47.9	74.0			26.1	Floor Noise
7311.000	H		31.4		4.5		35.9		54.0		18.1		Floor Noise
9748.000	H			42.9	7.3			50.2	74.0			23.8	* Floor Noise
9748.000	H		30.5		7.3		37.8		54.0		16.2		* Floor Noise
12185.000	H			43.4	8.8			52.2	74.0			21.8	Floor Noise
12185.000	H		31.8		8.8		40.6		54.0		13.4		Floor Noise

Note: * = Out of Restricted Band.

This frequency is out of the restricted bands, so radiated emission limits specified in Section 15.209 does not apply.

15.247(d):

Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

Radiated Emission: Hch (2462MHz)Axial Direction: XY-Plane

Below 1GHz

Frequency [MHz]	Pol. [H / V]	Reading [dB(uV)] QP / AV / PK			Factor [dB/m]	Level [dB(uV/m)] QP / AV / PK			Limit [dB(uV/m)]	Margin [dB] QP / AV / PK			Remark
250.000	H	19.7			-9.1	10.6			46.0	35.4			Floor Noise
400.000	H	20.1			-4.8	15.3			46.0	30.7			Floor Noise

Above 1GHz

Frequency [MHz]	Pol. [H / V]	Reading [dB(uV)] QP / AV / PK			Factor [dB/m]	Level [dB(uV/m)] QP / AV / PK			Limit [dB(uV/m)]	Margin [dB] QP / AV / PK			Remark
4924.000	H			43.3	3.2			46.5	74.0			27.5	Floor Noise
4924.000	H		31.0		3.2		34.2		54.0		19.8		Floor Noise
7386.000	H			45.7	4.6			50.3	74.0			23.7	Floor Noise
7386.000	H		32.9		4.6		37.5		54.0		16.5		Floor Noise
7386.000	V			50.0	4.6			54.6	74.0			19.4	
7386.000	V		34.6		4.6		39.2		54.0		14.8		
9848.000	H			42.8	7.4			50.2	74.0			23.8	* Floor Noise
9848.000	H		30.8		7.4		38.2		54.0		15.8		* Floor Noise
9848.000	V			44.8	7.4			52.2	74.0			21.8	*
9848.000	V		32.6		7.4		40.0		54.0		14.0		*
12310.000	H			43.7	8.6			52.3	74.0			21.7	Floor Noise
12310.000	H		31.5		8.6		40.1		54.0		13.9		Floor Noise

Note: * = Out of Restricted Band.

This frequency is out of the restricted bands, so radiated emission limits specified in Section 15.209 does not apply.

15.247(d):

Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

Axial Direction: YZ-Plane**Below 1GHz**

Frequency [MHz]	Pol. [H / V]	Reading [dB(uV)] QP / AV / PK			Factor [dB/m]	Level [dB(uV/m)] QP / AV / PK			Limit [dB(uV/m)]	Margin [dB] QP / AV / PK			Remark
250.000	H	19.7			-9.1	10.6			46.0	35.4			Floor Noise
400.000	H	20.1			-4.8	15.3			46.0	30.7			Floor Noise

Above 1GHz

Frequency [MHz]	Pol. [H / V]	Reading [dB(uV)] QP / AV / PK			Factor [dB/m]	Level [dB(uV/m)] QP / AV / PK			Limit [dB(uV/m)]	Margin [dB] QP / AV / PK			Remark
4924.000	H			43.3	3.2			46.5	74.0			27.5	Floor Noise
4924.000	H		31.0		3.2		34.2		54.0		19.8		Floor Noise
7386.000	H			45.7	4.6			50.3	74.0			23.7	Floor Noise
7386.000	H		32.9		4.6		37.5		54.0		16.5		Floor Noise
7386.000	V			50.3	4.6			54.9	74.0			19.1	
7386.000	V		34.7		4.6		39.3		54.0		14.7		
9848.000	H			42.8	7.4			50.2	74.0			23.8	* Floor Noise
9848.000	H		30.8		7.4		38.2		54.0		15.8		* Floor Noise
9848.000	V			45.5	7.4			52.9	74.0			21.1	*
9848.000	V		32.2		7.4		39.6		54.0		14.4		*
12310.000	H			43.7	8.6			52.3	74.0			21.7	Floor Noise
12310.000	H		31.5		8.6		40.1		54.0		13.9		Floor Noise

Note: * = Out of Restricted Band.

This frequency is out of the restricted bands, so radiated emission limits specified in Section 15.209 does not apply.

15.247(d):

Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

Axial Direction: ZX-Plane**Below 1GHz**

Frequency [MHz]	Pol. [H / V]	Reading [dB(uV)] QP / AV / PK			Factor [dB/m]	Level [dB(uV/m)] QP / AV / PK			Limit [dB(uV/m)]	Margin [dB] QP / AV / PK			Remark
250.000	H	19.7			-9.1	10.6			46.0	35.4			Floor Noise
400.000	H	20.1			-4.8	15.3			46.0	30.7			Floor Noise

Above 1GHz

Frequency [MHz]	Pol. [H / V]	Reading [dB(uV)] QP / AV / PK			Factor [dB/m]	Level [dB(uV/m)] QP / AV / PK			Limit [dB(uV/m)]	Margin [dB] QP / AV / PK			Remark
4924.000	H			43.3	3.2			46.5	74.0			27.5	Floor Noise
4924.000	H		31.0		3.2		34.2		54.0		19.8		Floor Noise
7386.000	H			45.7	4.6			50.3	74.0			23.7	Floor Noise
7386.000	H		32.9		4.6		37.5		54.0		16.5		Floor Noise
9848.000	H			42.8	7.4			50.2	74.0			23.8	* Floor Noise
9848.000	H		30.8		7.4		38.2		54.0		15.8		* Floor Noise
12310.000	H			43.7	8.6			52.3	74.0			21.7	Floor Noise
12310.000	H		31.5		8.6		40.1		54.0		13.9		Floor Noise

Note: * = Out of Restricted Band.

This frequency is out of the restricted bands, so radiated emission limits specified in Section 15.209 does not apply.

15.247(d):

Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

11 Peak Power Spectral Density

11.1 Test Setup

The test is performed in accordance with FCC Document "Measurement of Transmission Systems Operating under section 15.247". PSD Option1 is used.

The spectrum analyzer was connected to the transmitter output port through the RF cable.

Spectrum Analyzer Setting:

Detector Mode	Peak
RBW	3kHz
VBW	10kHz
Span	1.5MHz
Sweep Time	500s

11.2 Test Results

Serial No. : 00037A009002
 Power : DC 3.60V
 Mode : Transmitting Mode (1ch, 6ch, 11ch)
 IEEE 802.11b: DBPSK (1Mbps)
 IEEE 802.11g: BPSK (6Mbps)
 Temp. / Humid. : 25.0°C / 48.6 % (28 January 2009)
 25.3°C / 49.6 % (29 January 2009)
 24.8°C / 53.3 % (30 January 2009)
 Regulation : FCC Part15 C §15.247 (e)

Channel	Frequency [MHz]	Reading [dBm]	Cable Loss1 [dB]	Cable Loss2 [dB]	Result [dBm]	Limit [dBm/3kHz]
IEEE 802.11b: DBPSK (1Mbps)						
1ch (Lowest) *1	2412	3.10	0.65	0.30	4.05	<=8
6ch (Middle) *1	2437	2.90	0.64	0.30	3.84	<=8
11ch (Highest) *1	2462	3.60	0.62	0.30	4.52	<=8
IEEE 802.11g: BPSK (6Mbps)						
1ch (Lowest) *2	2412	-15.38	0.65	0.30	-14.43	<=8
6ch (Middle) *2	2437	-14.84	0.64	0.30	-13.90	<=8
11ch (Highest) *3	2462	-14.39	0.62	0.30	-13.47	<=8

*1: Tested date is 28 January 2009.

*2: Tested date is 29 January 2009.

*3: Tested date is 30 January 2009.

Result = Reading + Cable Loss

Note: Cable Loss1: RF Cable

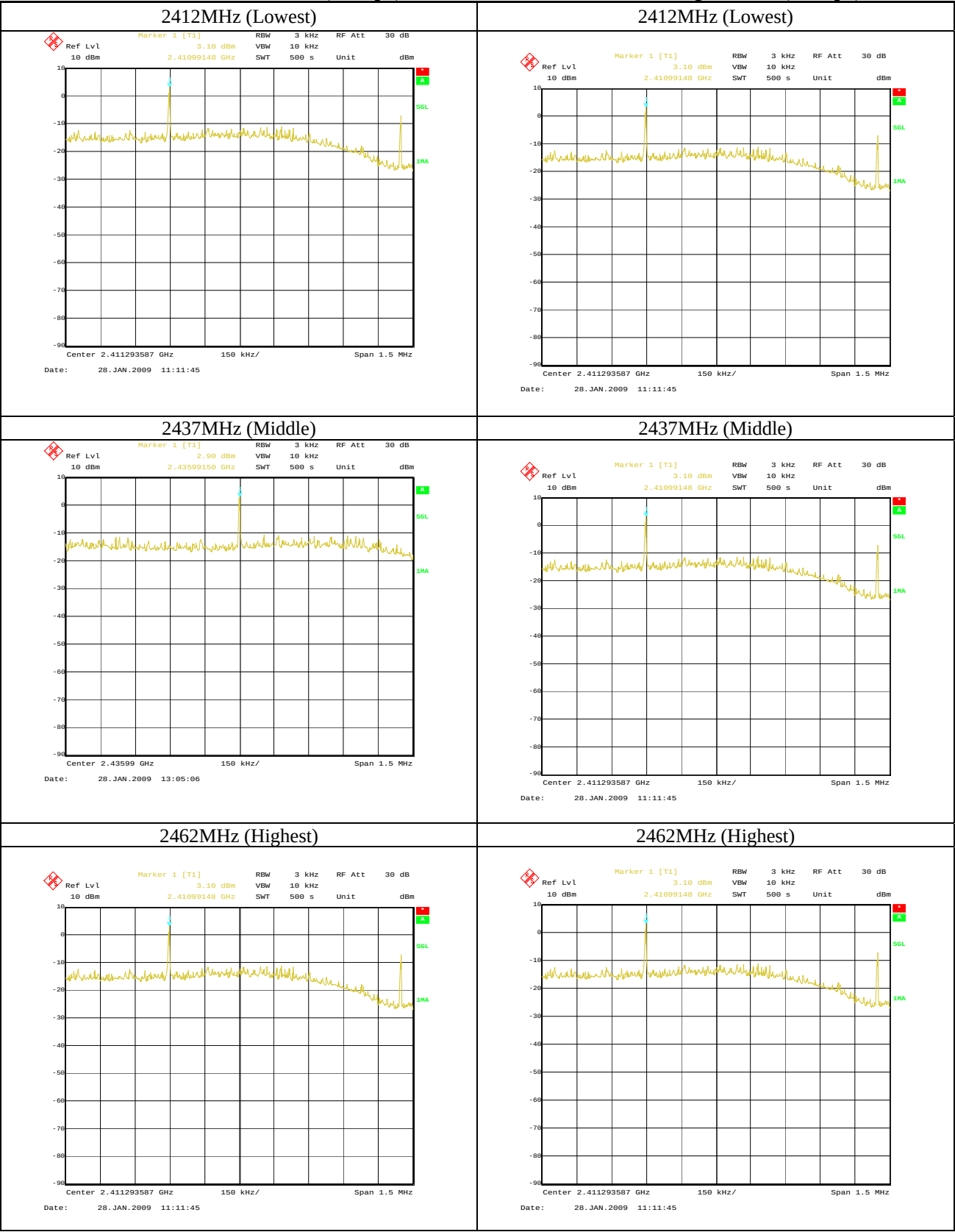
Cable Loss2: Conversion cable used for connecting to SMA type

The spectrum data are attached next page.

Data of Peak Power Spectral Density

IEEE 802.11b: DBPSK (1Mbps)

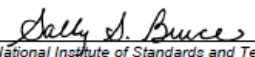
IEEE 802.11g: BPSK (6Mbps)



12 Photos of Tested EUT and Test Setup

Setup photo with EUT has been submitted as separate document named “Test Setup Photos (8228FC)”.

Appendix 1: Certificate of Accreditation

United States Department of Commerce National Institute of Standards and Technology		
		
Certificate of Accreditation to ISO/IEC 17025:2005		
NVLAP LAB CODE: 200607-0		
Taiyo Yuden Co., Ltd. EMC Center		
Takasaki-shi Gunma 370-3347		
JAPAN		
<i>is accredited by the National Voluntary Laboratory Accreditation Program for specific services, listed on the Scope of Accreditation, for:</i>		
ELECTROMAGNETIC COMPATIBILITY AND TELECOMMUNICATIONS		
<i>This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communique dated 18 June 2005).</i>		
2008-10-01 through 2009-09-30 <i>Effective dates</i>		 For the National Institute of Standards and Technology

Appendix 2: Test Instruments

1. Conducted Emission Test

Instrument	Manufacturer	Model No.	Serial No.	Calibration Date (Interval (year))	
Shielded Room	TDK Co., Ltd	DA-06912	-	-	●
EMI Test Receiver	Rohde & Schwarz	ESHS 10	100005	17 July 2008 (1)	●
Spectrum Analyzer	Agilent Technologies	8563E	3416A02230	2 September 2008 (1)	●
AMN / LISN	KYORITSU ELECTRICAL WORK	KNW-407	8-680-1	18 December 2008 (1)	●
		KNW-242	8-818-8		○
Cable	SUHNER	RG223	CE-1	1 August 2008 (1)	●
		RG223	CE-2		●
		RG214	CE-3		●
Attenuator	KYORITSU	KPD-602	5K325		●
RF Selector	TDK Co., Ltd	NS4900	0302-009		●
Hygro Thermograph	SEKONIC	ST-200	HD01-000797	4 September 2008 (1)	●
Software	TOYO Corporation	EP5/CE Ver.2.0	0208085	-	●

2. Conducted RF Test via Antenna Terminal

Instrument	Manufacturer	Model No.	Serial No.	Calibration Date (Interval (year))	
Spectrum Analyzer	Rohde & Schwarz	FSIQ26	840061/0004	22 February 2008 (1)	●
	Agilent Technologies	E4446A	US42070181	21 October 2008 (1)	○
Power Meter	Agilent Technologies	N1911A	MY45100612	18 February 2008 (1)	●
Power Sensor	Agilent Technologies	N1922A	MY45240439	18 February 2008 (1)	●
RF Cable	SUHNER	SUCOFLEX 104	RF2-2	1 July 2008 (1)	●
		SUCOFLEX 104E	RF3-3	1 July 2008 (1)	○
Power Divider	Aeroflex / Inmet	6005-03	RF-8	1 July 2008 (1)	○
Multi Meter	Advantest	R6451A	67840312	11 December 2008 (1)	●
	Agilent Technologies	34401A	MY41038383	25 June 2008 (1)	○
Hygro Thermograph	SEKONIC	ST-200	HD01-000797	4 September 2008 (1)	●

Note:

●: Applied by measurement.

○: Not applied by measurement.

3. Radiated Emission Test

Instrument	Manufacturer	Model No.	Serial No.	Calibration Date (Interval (year))	
10m Anechoic Chamber	TDK Co., Ltd.	DA-06912	-	2 February 2009 (1)	●
EMI Test Receiver	Rohde & Schwarz	ESCS 30	100148	18 July 2008 (1)	●
Spectrum Analyzer	Agilent Technologies	E4407B	MY44221019	28 April 2008 (1)	●
		E4446A	US42070181	21 October 2008 (1)	●
Amplifier	Agilent Technologies	83017A	3950M00169	31 July 2008 (1)	●
		8447D	2944A06812	11 September 2008 (1)	●
RF Selector	TDK Co., Ltd	NS4900	0302-010		●
Tunable Filter	TOYO Corporation	NF-49BT	No.1	31 July 2008 (1)	●
RF Filter	Microtronics	BRM50702-01	020		●
RF Cable	SUHNER	RG214	RG1	11 September 2008 (1)	●
			RG3		●
			RG5		●
			RG7		●
			RG8		●
	HP	HP8120-4782	163 9232	11 September 2008 (1)	●
	SUHNER	SUCOFLEX 106	SU1	31 July 2008 (1)	●
		SUCOFLEX 103	SU5		●
		SUCOFLEX 103	SU6		●
	HP	85381C	No.3		●
Attenuator	KYORITSU	KPD-602	220142	11 September 2008 (1)	●
Antenna	Schwarzbeck	BBA9106	No.3	18 December 2008 (1)	○
		UHALP9108-A	0160		○
		VULB9160	3179		●
		VHA9103	No.3 (+D3-1, 2)		○
		UHA9105	No.3		○
	EMCO	3115	9403-4232	3 February 2009 (1)	●
		3116	9311-2227		●
Digital Multi Meter	Agilent Technologies	34401A	MY41038383	25 June 2008 (1)	●
Hygro Thermograph	SEKONIC	ST-200	HD01-000797	4 September 2008 (1)	●
Software	TOYO Corporation	EP5/RE Ver.3.7.0	0208086	-	●

Note:

●: Applied by measurement.

○: Not applied by measurement.