

Emission Test Report
Standard: FCC Part 15 Subpart C / IC RSS-210
Class II Permissive Change

Document Number : FCC 19-0294-0

Model Number: WM3B2915ABG

measured with IBM ThinkPad X41 Tablet Series

FCC ID: ANO20040601CX2
IC: 349E-WM3B29AG

March 2, 2005

**Prepared :
EMC R&D Staff Engineer**

Takeshi Asano

Signature:



IBM Japan, Ltd.

**EMC Engineering
LAB-S59**

**1623-14, Shimotsuruma,
Yamato-shi Kanagawa-ken 242, Japan**

Phone: +81-46-215-4779

Fax: +81-46-273-7420

E-Mail: asano@jp.ibm.com

**Reviewed and Checked :
EMC R&D Advisory Engineer**

Toshiya Murota

Signature:



IBM Japan, Ltd.

**EMC Engineering
LAB-S59**

**1623-14, Shimotsuruma,
Yamato-shi Kanagawa-ken 242, Japan**

Phone: +81-46-215-6574

Fax: +81-46-273-7420

E-Mail: murota@jp.ibm.com

**Approved :
Manager, EMC Engineering
/ NVLAP signatory**

Akihisa Sakurai

Signature:



IBM Japan, Ltd.

**EMC Engineering
LAB-S59**

**1623-14, Shimotsuruma,
Yamato-shi Kanagawa-ken 242, Japan**

Phone: +81-46-215-2613

Fax: +81-46-273-7420

E-Mail: akihisa@jp.ibm.com

MEASUREMENT / TECHNICAL REPORT – Part 15 Subpart C (Intentional Radiator)

Model: WM3B2915ABG (802.11a/b/g Wireless LAN Adapter)
with
IBM ThinkPad X41 Tablet Series
(Machine Type: 1866, 1867, 1868, 1869)

FCC ID : ANO20040601CX2

March 2, 2005

This report concerns: (check one) Original Grant _____ Class I change _____ Class II change <u> ✓ </u>
Equipment type: <u>Wireless LAN device</u>
This report shall not be reproduced except in full, without the written permission of this test lab.
The measurement results contained in this report relate only to the item which was tested.
Measurement procedure used is ANSI C63.4-2003 unless otherwise specified.
Other test procedure: _____
The FCC has issued provisional acceptance of this test laboratory for Declaration of Conformity testing per letter dated 1997.
APPLICANT ANTI-DRUG ABUSE CERTIFICATION: By checking yes, the applicant certifies that, in the case of an individual applicant, he or she is not subject to a denial of federal benefits, that includes FCC benefits, pursuant to Section 5301 of the Anti-Drug Abuse of 1988, 21 U.S.C. 853(a), or, in the case of a non-individual applicant (e.g. corporation, partnership or other unincorporated association), no party to the application is subject to a denial of federal benefits, that includes FCC benefits, pursuant to that section. For the definition of a “party” for these purposes, see 47 CFR 1.2002(b). Yes or No
“Report shall not be reproduced except in full, without the written approval of the laboratory” “the report must not be used by the client to claim product endorsement by NVLAP or any agency of the US government”
Prepared by: Takeshi Asano IBM Japan Corporation, Yamato EMC Engineering LAB-S59, 1623-14, Shimotsuruma, Yamato-shi Kanagawa-ken 242-8502, Japan Tel: +81-46-215-4779 Fax: +81-46-273-7420

- Index -

A.	General Information	4
A.1	Test Methodology	4
A.2	Test Facility / NVLAP Accreditation.....	4
A.3	EUT details.....	5
B.	Summary of Test Results.....	6
C.	Operation Mode of EUT	7
D.	Antenna Information	8
E.	Justification.....	9
F.	Test Instruments.....	10
G.	Measurement Uncertainty	11
H.	Temperature and Humidity	11
I.	Related Submittal(s)/Grant(s)/Notes	11
1.	Conducted Transmit Output Power	12
1.1	Test Procedure	12
1.2	Measurement Results	13
1.3	Trace Data.....	16
2.	Restricted Bands Radiatio (1GHz – 40GHz)	23
2.1	Test Procedure	23
2.2	Test Instruments and Measurement Setup.....	23
2.3	Field Strength Calculation.....	25
2.4	Bandedge Measurement plots	26
2.5	Radiated Emission Measurement Results (above 1GHz).....	32
3.	Restricted Bands Radiation (30MHz – 1GHz)	40
3.1	Test Procedure	40
3.2	Test Instruments and Measurement Setup.....	40
3.3	Field Strength Calculation.....	41
3.4	Measurement Results	42
4.	AC Wireline Conducted Emissions (150KHz – 30MHz)	47
4.1	Test Procedure	47
4.2	Test Instruments and Measurement Setup.....	47
4.3	Powerline Voltage Calculation	48
4.4	Measurement Results	49

A. General Information

APPLICANT	: IBM Japan, Ltd.
TEST SITE	: IBM Japan, Ltd., Yamato Semi-anechoic chamber #1
TEST SITE ADDRESS	: 1623 – 14 Shimotsuruma, Yamato-shi, Kanagawa 242-8502 Japan Tel: +81-46-215-4779, Fax: +81-46-273-7420
REGULATION	: FCC Part 15 Subpart C Industry Canada RSS-210 (Issue No.5)
MODEL NUMBER (Advertising Name)	: WM3B2915ABG (Intel PRO/Wireless 2915 ABG Mini-PCI Adapter)
FCC ID IC Certification Number	: ANO20040601CX2 : 349E-WM3B29AG
SERIAL NUMBER	: Z9H949X09G
PHYSICAL CONDITION	: the applying card ; Production level, Host PC device; Preproduction
KIND OF EQUIPMENT	: Personal computer with IEEE802.11a, 11b & 11g Wireless LAN Mini-PCI Combo Card (Composite application)
TESTED DATE	: February 4, 10, 14, 16, 17, 18, 22, 23, 24, 25, 28 and March 1, 2005

A.1 Test Methodology

Both conducted and radiated testing were performed according to the procedures in ANSI C63.4-2003. Radiated testing was performed at an antenna to EUT distance of 3 meters.

A.2 Test Facility / NVLAP Accreditation

The semi-anechoic chamber #1 and measurement facility used to collect the data are located in Yamato Laboratory, IBM Japan.

- This facility has been fully described in a report dated September 1998, submitted to the FCC office, and accepted in a letter, dated Nov. 2, 1998(31040/SIT).

1. IBM Yamato EMC Engineering is recognized under the National Voluntary Laboratory Accreditation Program for satisfactory compliance with Criteria established in Title 15, Part 285 Code of Federal Regulations. (**NVLAP Lab code: 200198-0**, effective through June 30, 2005)

- These facilities are accepted by **Industry Canada** as number **IC 4221** for chamber #1 (expiry date: December 22, 2007), and as number **IC 4221-1** for chamber #2 (expiry date: February 16, 2007).

A.3 EUT details**Table A** EUT details

Model and S/N	FCC ID IC Certification Number	Description
WM3B2915ABG (s/n Z9H949X09G)	FCC ID: ANO20040601CX2 IC: 349E-WM3B29AG	Applying modular transmitter Built_in type IEEE802.11a/b/g Wireless LAN Mini-PCI card without antenna
ThinkPad X41 Tablet Series M/T 1866-17U (s/n AA-GH1DP)	N/A	IBM Tablet type PC with built_in antennas CPU: Intel® Pentium M Processor, 1.2 GHz
J07M067 (s/n 05S5ARM4SIT023)	FCC ID: ANO20040700HER IC: 349E-J07M067	Co-located built-in type Bluetooth modular transmitter device without antenna
P/N 02K6810	N/A	Universal AC adapter 56W, Unshielded power cord for ThinkPad X41 Tablet

B. Summary of Test Results

Table-B presents the list of the measurement items for DTS (Digital Transmissions System) devices under FCC Part 15 Subpart C and Industry Canada RSS-210 (Issue 5).

The section numbers of upper portion are showing FCC number, and the other (lower) ones are for IC.

Table-B List of the measurements

Section(s)	Test Items : Transmit mode (TX):		Condition	Result
15.247(a)(2) 6.2.2(o) *1	Bandwidth at 6 dB below	At least 500kHz. (*1: RSS-210 Issue5: Amendment)	Conducted	Pass
15.215(c) 5.9.1	Occupied BW (Bandwidth at 20 dB below)	20 dB bandwidth of the emission to be within the allocation band.		Pass
15.247(c) 6.2.2(o)(e1)	Out of Band Emissions	The radiated emission in any 100kHz of outband shall be at least 20dB below the highest inband spectral density.		Pass
15.247(b)(3) 6.2.2(o)(b)	Conducted Transmit Output Power	Shall not exceed 1.0 W.		Pass
15.247(d) 6.2.2(o)(b)	Transmitter power spectral Density	Shall not be greater than 8 dBm in any 3kHz band.		Pass
15.207 6.2.2(o)(e3) / 6.6	AC Wireline Conducted Emissions 150kHz – 30MHz	Class B: Freq.(MHz) QP(dBμV) Ave.(dBμV) 0.15 - 0.5 66 - 56 56 - 46 0.5 - 5 56 46 5 - 30 60 50		Pass
15.205 / 209 6.2.1 /6.2.2(o)(e3) /6.3	General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	Shall not exceed the limits specified in FCC 15.209 or RSS-210 Table3.	Radiated (30MHz-1GHz)	Pass
			Radiated (1– 25GHz)	Pass

	Test Items : Receive mode (RX):			
15.207 6.2.2(o)(e3) / 7.4	AC Wireline Conducted Emissions 150kHz – 30MHz	Class B: Freq.(MHz) QP(dBμV) Ave.(dBμV) 0.15 - 0.5 66 - 56 56 - 46 0.5 - 5 56 46 5 - 30 60 50	Conducted	Pass
15.205 / 209 6.2.1 /6.2.2(o)(e3) /7.3	General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	Shall not exceed the limits specified in FCC 15.209 or RSS-210 Table3.	Radiated (30MHz -1GHz)	Pass
			Radiated (1– 25GHz)	Pass

	Other requirements		Result
15.247(b)(4)(i) –	Antenna gain of the applying host device	Peak gain of the device : 1.82 dBi in 2.4GHz band, 0.84 dBi in 5.8GHz band	N/A
– 5.2	Supply Voltage	Main power source: Universal AC adapter 56W Mini-PCI PC bus to applying card : DC 3.3V ± 0.3V	N/A
15.203 6.2.2(o)(e2)	Unique antenna connector	The device employs a unique electronic connector so called Electronic Handshake . Refer to “Confidential_e-Handshake exhibit.	complies

C. Operation Mode of EUT

- All tests were performed using the “CRTU III, version 3.2.15.0000” test program provided by Intel Corporation. This tool supports the continuous or burst transmission mode for the testing purpose. The parameter GAIN of the test software was set to the Intel’s power specification shown in Table-C below.
- The following frequencies were chosen for the measurements of each 2.4GHz or 5.8GHz band.
 - 2412MHz (lowest), 2437MHz(middle), and 2462MHz (highest) for 2.4GHz band
 - 5745MHz (lowest), 5785MHz(middle), and 5825MHz (highest) for 5.8GHz band
- As for the RF receiving test, the middle channels (2437MHz or 5785MHz) were selected representatively.

Table-C Transmission mode of EUT

Note) The table shows the specification of **average** power for the applying device in ‘dBm’.

Operation Frequency [GHz]	Designed average output power (conducted) [dBm]										
	IEEE802.11b			IEEE802.11g							
	1/2M bps	5.5M bps	11M bps	6M bps	9M bps	12M bps	18M bps	24M bps	36M bps	48M bps	54M bps
2.412 (Ch. 1)	15	15	15	15	15	15	15	15	15	15	15
2.417 (Ch. 2)	15	15	15	15	15	15	15	15	15	15	15
2.422 (Ch. 3)	16	16	16	15	15	15	15	15	15	15	15
2.427 (Ch. 4)	17	17	17	15	15	15	15	15	15	15	15
2.432 (Ch. 5)	17	17	17	15	15	15	15	15	15	15	15
2.437 (Ch. 6)	17	17	17	15	15	15	15	15	15	15	15
2.442 (Ch. 7)	17	17	17	15	15	15	15	15	15	15	15
2.447 (Ch. 8)	17	17	17	15	15	15	15	15	15	15	15
2.452 (Ch. 9)	17	17	17	15	15	15	15	15	15	15	15
2.457 (Ch. 10)	17	17	17	15	15	15	15	15	15	15	15
2.462 (Ch. 11)	17	17	17	15	15	15	15	15	15	15	15
				IEEE802.11a							
5.745 (Ch.149)	N/A			17	17	17	17	17	17	17	17
				14	14	14	14	14	13	13	11
5.765 (Ch.153)				17	17	17	17	17	17	17	17
				14	14	14	14	14	13	13	11
5.785 (Ch.157)				17	17	17	17	17	17	17	17
				14	14	14	14	14	13	13	11
5.805 (Ch.161)				17	17	17	17	17	17	17	17
				14	14	14	14	14	13	13	11
5.825 (Ch.165)				17	17	17	17	17	17	17	17
				14	14	14	14	14	13	13	11

Note) The power values on 5.8GHz band are reduced by the driver for best performance according EVM (Error Vector Magnitude) factor.

4. The measurements were performed while EUT in both “Notebook” and “Tablet” operation modes.

“Notebook” operation mode



“Tablet” operation mode



D. Antenna Information

The Table-D indicates the applicable host antenna systems that are used for the applying modular transmitter.

Table-D EUT Information

*1: including cable loss, Omni directional

*2: Non-lead soldering antenna according to RoHS environmental direction (others are not applied yet or being withdrawn.)

[New antenna system in this Class II application]

IBM ThinkPad X41 Tablet Series	Antenna Designator	Manufacture	Antenna type	Cable type and length	Peak Gain ⁺¹		
					2.4GHz band	Notebook Tablet	-1.37 dBi -0.15 dBi
Main antenna	91P6908 ⁺²	Wistron NeWeb Corp. (R.O.C.)	Dual Band Meander Antenna	Coax 600 mm	5.8GHz band	Notebook Tablet	0.84 dBi -0.35 dBi
Auxiliary antenna	91P6909 ⁺²				2.4GHz band	Notebook Tablet	1.77 dBi 1.82 dBi
				Coax 550 mm	5.8GHz band	Notebook Tablet	-0.28 dBi 0.37 dBi

[Certified antenna systems]

Granted on 10/07/2004

IBM ThinkPad T40 Series		Antenna Designator	Manufacture	Antenna type	Cable type and length	Peak Gain ⁺¹	
LCD 14 inch Model	Main	62P4204	Foxconn Electronics Inc. (R.O.C.)	Dual Band Meander Antenna	Coax 745 mm	2.4GHz band	0.99 dBi
		91P6900 ⁺²				5.725-5.85GHz	-0.23 dBi
	Auxiliary	62P4203		Dual-Band Coupled Floating Element Meander Antenna	Coax 845 mm	2.4GHz band	-0.48 dBi
		91P6898 ⁺²				5.725-5.85GHz	-0.37 dBi
LCD 15 inch Model	Main	91P6841 ⁺²	Hitachi Cable Ltd. (Japan)	Dual Band Meander Antenna	coax 755mm	2.4GHz band	1.24 dBi
						5.725-5.85GHz	1.01 dBi
	Auxiliary	91P6840 ⁺²			coax 580mm	2.4GHz band	0.38 dBi
						5.725-5.85GHz	-0.23 dBi

Granted on 10/07/2004

IBM ThinkPad R50 Series		Antenna Designator	Manufacture	Antenna type	Cable type and length	Peak Gain ⁺¹	
LCD 14 inch Model	Main	91P6810	Hitachi Cable Ltd. (Japan)	Dual Band Meander Antenna	Coax 750 mm	2.4GHz band	1.52 dBi
	Auxiliary	91P6811			Coax 635 mm	5.725-5.85GHz	0.02 dBi
						2.4GHz band	1.84 dBi
						5.725-5.85GHz	0.19 dBi
LCD 15 inch Model	Main	91P6812			coax 775mm	2.4GHz band	1.18 dBi
	Auxiliary	91P6813				5.725-5.85GHz	1.78 dBi
						2.4GHz band	1.71 dBi
						5.725-5.85GHz	1.51 dBi

Granted on 12/17/2004

Started on 22/7/2004						
IBM ThinkPad X30 Series	Antenna Designator	Manufacture	Antenna type	Cable type and length	Peak Gain ⁺¹	
Main antenna	08K4083	Nissei Electric Co. Ltd. (Japan)	Dual Band Meander Antenna	Coax 394 mm	2.4GHz band	0.62 dBi
Auxiliary antenna	08K4084			5.725-5.85GHz	0.32 dBi	
				2.4GHz band	1.28 dBi	
				5.725-5.85GHz	-0.87dBi	

Granted on 12/17/2004

Granted On 12/17/2004						
IBM ThinkPad X40 Series	Antenna Designator	Manufacture	Antenna type	Cable type and length	Peak Gain ⁺¹	
Main antenna	13N5743	Nissei Electric Co. Ltd. (Japan)	Dual Band Meander Antenna	Coax 488 mm	2.4GHz band	0.39 dBi
Auxiliary antenna	13N5742			5.725-5.85GHz	1.74 dBi	
				Coax 449 mm	2.4GHz band	1.67 dBi
				5.725-5.85GHz	2.04 dBi	

E. Justification

The full testing results were already performed with the highest antenna gains (ThinkPad R50 Series in 2.4GHz, and ThinkPad X40 Series in 5.8GHz) as shown in the previous Table-D, then certified on October/07/2004 or December/17/2004.

The new antenna used for ThinkPad X41 Tablet PC is very similar meander type to the existing granted antenna systems and the gain of it does not exceed the certified values.

Therefore, the applying new antenna conforms with the FCC rule Part 15 Subpart C pursuant to the ET Docket 03-201; FCC 04-165, July 12/2004 and Federal Register / Vol. 69, No. 172, September 7/2004.

However, the new host PC (X41 Tablet) has the additional usage than the existing PC models. i.e. "Tablet" operation mode.

With the above back ground, this test report includes the following measurement items to prove the emissions conform to the limits for both notebook and tablet operation modes.

- Conducted power (note: There is no change on other conducted measurements, since no hardware nor electrical modification was made to the applying modular transmitter itself.)
- Restricted Bands Radiation
- AC Wireline Conducted Emissions

The tests were performed with the higher gain antenna in each operation mode as below.

IBM ThinkPad X41 Tablet Series		Peak Gain	
		2.4GHz band	5.8GHz band
Notebook operation mode	Main antenna	-1.37 dBi	0.84 dBi
	Auxiliary antenna	1.77 dBi	-0.28 dBi
Tablet operation mode	Main antenna	-0.15 dBi	-0.35 dBi
	Auxiliary antenna	1.82 dBi	0.37 dBi

F. Test Instruments

Table-F List of Measuring Instruments

Description	Model	Serial Number	Calibration Date	Calibration Interval
Computer	IBM 6868-30J	97-901X3	N/A	N/A
Computer	IBM 6589-13J	97-15613	N/A	N/A
Spectrum Analyzer (100Hz-1.5GHz)	HP 85680B	2732A03651	07/21/04	1 year
Spectrum Analyzer (100Hz-1.5GHz)	HP 85680B	2841A04254	08/25/04	1 year
Spectrum Analyzer (100Hz-1.5GHz)	HP 85680B	3019A05156	08/05/04	1 year
Spectrum Analyzer Display	HP 85662A	2648A15255	07/21/04	1 year
Spectrum Analyzer Display	HP 85662A	2816A16831	08/25/04	1 year
Spectrum Analyzer Display	HP 85662A	3026A19366	08/05/04	1 year
Quasi-Peak Adapter	HP 85650A	2521A00968	07/20/04	1 year
Quasi-Peak Adapter	HP 85650A	2811A01156	08/25/04	1 year
Quasi-Peak Adapter	HP 85650A	2811A01433	08/05/04	1 year
Amplifier (100KHz - 1.3GHz)				
- for 30-200MHz	MITEQ AM-3A	898433	04/23/04	1 year
- for 200-1000MHz	MITEQ AM-3A	898432	04/23/04	1 year
Amplifier (1GHz - 18GHz)	HP 8449B	3008A00582	06/01/04	1 year
Amplifier (18 – 40GHz)	Agilent 83051A	3950M00193	01/18/05	1 year
Spectrum Analyzer EMI Test Receiver	R&S ESI26	836119/003	05/10/04	1 year
Spectrum Analyzer	HP 8563E	3416A02248	09/10/04	1 year
Harmonic Mixer	Agilent 11970A	011269-001	08/04/04	1 year
Receiver (9kHz-30MHz)	R&S ESH3	891806/012	11/04/04	1 year
Receiver (20MHz-1.3GHz)	R&S ESVP	892111/026	11/04/04	1 year
Biconical Antenna (30-200MHz)	EMCO 3108	2536	04/23/04	1 year
Log-Periodic Antenna (200-1000MHz)	EMCO 3146	2849	04/23/04	1 year
Horn Antenna (1- 18GHz)	EMCO 3115	9903-5774	07/20/04	1 year
Horn Antenna (3.95- 5.85GHz)	EMCO 3160-5	1099	07/20/04	1 year
Horn Antenna (5.85- 8.20GHz)	EMCO 3160-6	9712-1044	07/20/04	1 year
Horn Antenna (8.20- 12.4GHz)	EMCO 3160-7	1156	07/20/04	1 year
Horn Antenna (12.4- 18GHz)	EMCO 3160-8	1143	07/20/04	1 year
Horn Antenna (18- 26.5GHz)	EMCO 3160-9	0004-1202	07/20/04	1 year
Horn Antenna (26.5- 40GHz)	EMCO 3160-10	1175	07/20/04	1 year
LISN	EMCO 3810/2NM	00022007	06/15/04	1 year
Switch/control unit	HP 3488A	2719A17226	N/A	N/A
		2719A17228	N/A	N/A
Plotter	HP 7550A	2631A33619	N/A	N/A
Coaxial cables (1 – 18GHz):	Length:			
- Horn Ant <=> RF Amp.	6 m	- EM206SCO	03/25/04	1 year
- RF Amp.<=>Spectrum Analyzer(<12GHz)	16m	- GEM0101	03/25/04	1 year
- RF Amp.<=>Spectrum Analyzer(>12GHz)	3m	- SF102-20166	04/08/04	1 year
Coaxial cables (18 – 40GHz):				
- Horn Ant <=> RF Amp.	3m	- SF102-20167	04/08/04	1 year
- RF Amp.<=>Spectrum Analyzer	1m	- SF102-21105	04/08/04	1 year

N-Coax cables:				
- Bi-coni Ant <=> 10m Cable	9 m	- EM103L01	04/23/04	1 year
- 10m Cable <=> Shield Panel	10 m	- EM103L02	04/23/04	1 year
- Shield Panel <=> RF Amp	7 m	- EM103L03	04/23/04	1 year
- RF Amp <=> Power Splitter	0.5m	- EM103L04	04/23/04	1 year
- Log-peri Ant <=> 10m Cable	9 m	- EM103H01	04/23/04	1 year
- 10m Cable <=> Shield Panel	10 m	- EM103H02	04/23/04	1 year
- Shield Panel <=> RF Amp	7 m	- EM103H03	04/23/04	1 year
- RF Amp <=> Power Splitter	0.5m	- EM103H04	04/23/04	1 year
Coax cables:				
- Power Splitter <=> SW/Con.unit (SW110)	1 m	- EM103L05	04/23/04	1 year
- Power Splitter <=> SW/Con.unit (SW300)	1 m	- EM103L06	04/23/04	1 year
- Power Splitter <=> SW/Con.unit (SW100)	1 m	- EM103H05	04/23/04	1 year
- Power Splitter <=> SW/Con.unit (SW301)	1 m	- EM103H06	04/23/04	1 year
- SW/Con.unit <=> Receiver (Input)	2 m	- EM1RCV	04/23/04	1 year
- SW/Con.unit <=> Spe Ana.(Signal In) for 30- 200MHz	2 m	- EM1SPL	04/23/04	1 year
- SW/Con.unit <=> Spe Ana.(Signal In) for 200-1000MHz	2 m	- EM1SPH	04/23/04	1 year

Notes. - The above equipment calibration is traceable to National standards.

- HP: Hewlett Packard, R&S: Rohde & Schwarz

G. Measurement Uncertainty

Uncertainties of the both, the Yamato EMI radiated test facilities (EMI chambers, #1 and #2) and the Yamato EMI conducted test facility are derived with the NIS 81 "Treatment of uncertainty in EMC measurements" 1994.

Estimated site uncertainty values are as follows.

EMI chamber #1 : 4.39dB

EMI chamber #2 : 4.40dB

EMI conducted measurement system : 2.4dB

Detail should be referred to "Treatment of Uncertainty, Calculations and Policy" report, document number TCR 10-0015.

H. Temperature and Humidity

The temperature is controlled within range of 17° to 28°

The relative humidity is controlled within range of 40% to 70%.

I. Related Submittal(s)/Grant(s)/Notes

During the applying modular device stops RF transmission, the host unit with full peripheral devices including the applying modular device is classified as an unintentional radiator, Digital Device under the FCC Part 15 Subpart B or the Industry Canada Class B Emission Compliance (ICES-003), and subject to DoC.

1. Conducted Transmit Output Power

[FCC 15.247(b)(3), RSS-210 6.2.2(o)(b)]

1.1 Test Procedure

The test was performed with two different measurement methods as follows.

1. Conducted peak power measurement method to confirm the consistency with the original granted values.
2. Conducted mean power measurement method in accordance with the ET Docket 03–201; FCC 04–165, July 12/2004 and Federal Register / Vol. 69, No. 172, September 7/2004 to confirm the consistency with the measurement result in SAR test report.

A spectrum analyzer was connected to the antenna terminal, while EUT was operating in continuous transmission mode at the appropriate center frequencies.

The both tests were performed with the spectrum analyzer in accordance with the Method #3 of the FCC Public Notice, DA 02-2138, August/30/2002.

However, the spectrum analyzer setting for each peak or mean power measurement was different as follows.

RBW: peak power = 1MHz,

mean power = 30kHz ($\geq 1/T$, where T is transmission pulse duration. See Plot 1-0 and 1-1)

VBW =RBV or more

Span = 50MHz encompassing the entire 26dB emission bandwidth of the transmission signal,

Mode = sample detector,

Trigger = free run

The band power measurement function was used to measure the conducted transmission output power for each transmission mode. The analyzer computed each power by integrating the spectrum across the 26 dB emission bandwidth.

Table 1-1: Test instruments of spectrum analyzer method

Description	Model	Serial Number
Spectrum Analyzer EMI Test Receiver	R&S ESI26	836119/003
Coax cables: - Spectrum Analyzer <=> EUT	Length: Loss: 110 cm 2.4GHz 1.3 dB 5.8GHz 2.3 dB	

Notes: - R&S: Rohde & Schwarz

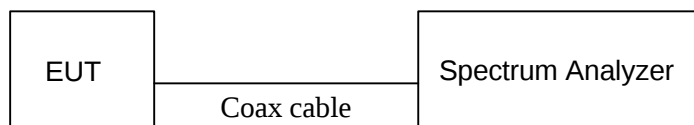


Figure 1-1 : Measurement setup of spectrum analyzer method

1.2 Measurement Results

Test Date: February 4, 10, 14, 22 and 23, 2005

1.2.1 Peak conducted power measurement results

() means the deviation of the results from the original grant.

	2.4GHz DSSS mode	2.4GHz OFDM mode	5.8GHz OFDM mode
measurement results of the Original grant	22.08dBm	21.31dBm	24.22dBm
measurement results in this Class II application	21.99dBm (-0.09dB)	21.27dBm (-0.04dB)	24.21dBm (-0.01dB)

Table 1-2 2.4GHz DSSS Tx mode

Measured Frequency (MHz)	Tx Rate (Mb/s)	Analyzer reading (dBm)	Trace number	Cable Loss (dB)	Results (dBm)	Limit		Margin to limit (dBm)
						FCC (dBm)	IC (dBm)	
2412	1	16.12	omitted	1.3	17.42	30	30	12.58
	5.5	18.14	omitted	1.3	19.44	30	30	10.56
	11	19.24	omitted	1.3	20.54	30	30	9.46
2437	1	17.41	omitted	1.3	18.71	30	30	11.29
	5.5	19.51	omitted	1.3	20.81	30	30	9.19
	11	20.69	Plot 1-2b	1.3	21.99	30	30	8.01
2462	1	17.39	omitted	1.3	18.69	30	30	11.31
	5.5	19.40	omitted	1.3	20.70	30	30	9.30
	11	20.50	omitted	1.3	21.80	30	30	8.20

Table 1-3 2.4GHz OFDM Tx mode

Measured Frequency (MHz)	Tx Rate (Mb/s)	Analyzer reading (dBm)	Trace number	Cable Loss (dB)	Results (dBm)	Limit		Margin to limit (dBm)
						FCC (dBm)	IC (dBm)	
2412	6	19.97	Plot 1-3b	1.3	21.27	30	30	8.73
	9	19.87	omitted	1.3	21.17	30	30	8.83
	18	19.73	omitted	1.3	21.03	30	30	8.97
	24	19.85	omitted	1.3	21.15	30	30	8.85
	54	19.90	omitted	1.3	21.20	30	30	8.80
2437	6	19.19	omitted	1.3	20.49	30	30	9.51
	9	18.94	omitted	1.3	20.24	30	30	9.76
	18	18.99	omitted	1.3	20.29	30	30	9.71
	24	19.10	omitted	1.3	20.40	30	30	9.60
	54	19.14	omitted	1.3	20.44	30	30	9.56
2462	6	19.85	omitted	1.3	21.15	30	30	8.85
	9	19.69	omitted	1.3	20.99	30	30	9.01
	18	19.72	omitted	1.3	21.02	30	30	8.98
	24	19.79	omitted	1.3	21.09	30	30	8.91
	54	19.81	omitted	1.3	21.11	30	30	8.89

Table 1-4 5.8GHz OFDM Tx mode

Measured Frequency (MHz)	Tx Rate (Mb/s)	Analyzer reading (dBm)	Trace number	Cable Loss (dB)	Results (dBm)	Limit		Margin to limit (dBm)
						FCC (dBm)	IC (dBm)	
5745	6	21.91	Plot 1-4b	2.3	24.21	30	30	5.79
	9	21.86	omitted	2.3	24.16	30	30	5.84
	18	21.73	omitted	2.3	24.03	30	30	5.97
	24	21.84	omitted	2.3	24.14	30	30	5.86
	54	20.43	omitted	2.3	22.73	30	30	7.27
5785	6	21.91	omitted	2.3	24.21	30	30	5.79
	9	21.85	omitted	2.3	24.15	30	30	5.85
	18	21.72	omitted	2.3	24.02	30	30	5.98
	24	21.81	omitted	2.3	24.11	30	30	5.89
	54	20.30	omitted	2.3	22.60	30	30	7.40
5825	6	21.77	omitted	2.3	24.07	30	30	5.93
	9	21.73	omitted	2.3	24.03	30	30	5.97
	18	21.71	omitted	2.3	24.01	30	30	5.99
	24	21.76	omitted	2.3	24.06	30	30	5.94
	54	20.00	omitted	2.3	22.30	30	30	7.70

1.2.2 Mean conducted power measurement results (reference only)

() means the difference of the results between the Class II and SAR report.

	2.4GHz DSSS mode	2.4GHz OFDM mode	5.8GHz OFDM mode
measurement results in this Class II application	17.59dBm (-0.28B)	14.64dBm (+0.01dB)	18.00dBm(-0.04dB)
measurement results in the separate SAR report	17.87dBm	14.63dBm	18.04dBm

Table 1-5 2.4GHz DSSS mode

Measured Frequency (MHz)	Tx Rate (Mb/s)	Analyzer reading (dBm)	Trace number	Cable Loss (dB)	Results (dBm)	Limit		Margin to limit (dBm)
						FCC (dBm)	IC (dBm)	
2412	1	13.92	omitted	1.3	15.22	30	30	14.78
	5.5	14.92	omitted	1.3	16.22	30	30	13.78
	11	14.49	omitted	1.3	15.79	30	30	14.21
2437	1	14.69	omitted	1.3	15.99	30	30	14.01
	5.5	16.29	Plot 1-5b	1.3	17.59	30	30	12.41
	11	15.51	omitted	1.3	16.81	30	30	13.19
2462	1	15.12	omitted	1.3	16.42	30	30	13.58
	5.5	16.18	omitted	1.3	17.48	30	30	12.52
	11	15.49	omitted	1.3	16.79	30	30	13.21

Table 1-6 2.4GHz OFDM mode

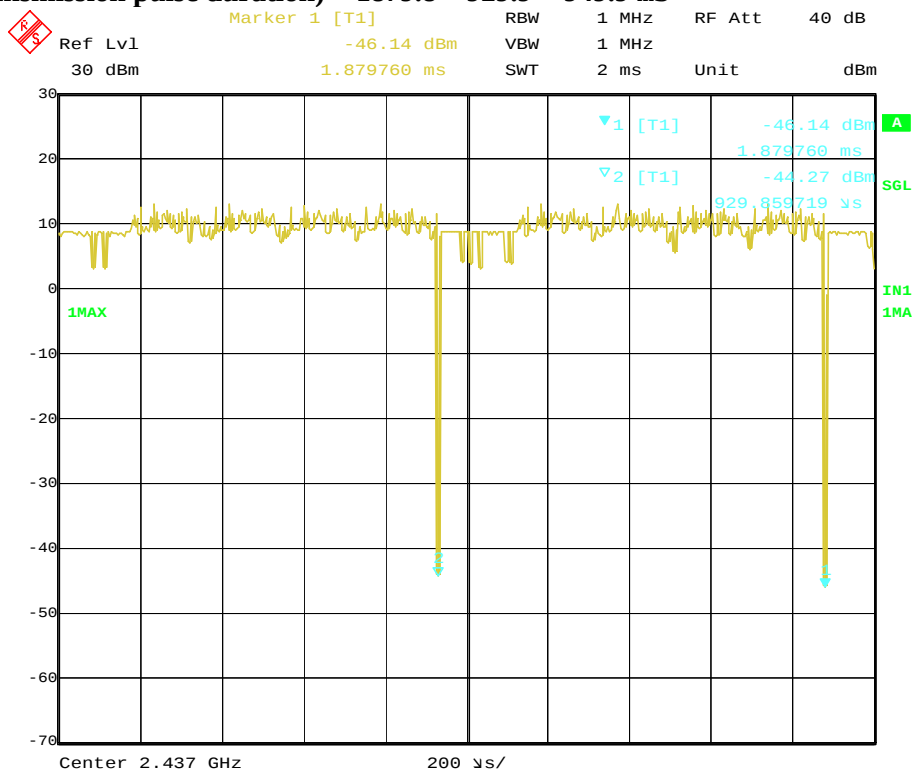
Measured Frequency (MHz)	Tx Rate (Mb/s)	Analyzer reading (dBm)	Trace number	Cable Loss (dB)	Results (dBm)	Limit		Margin to limit (dBm)
						FCC (dBm)	IC (dBm)	
2412	6	13.33	omitted	1.3	14.63	30	30	15.37
	9	12.91	omitted	1.3	14.21	30	30	15.79
	18	12.89	omitted	1.3	14.19	30	30	15.81
	24	13.34	Plot 1-6b	1.3	14.64	30	30	15.36
	54	13.15	omitted	1.3	14.45	30	30	15.55
2437	6	12.14	omitted	1.3	13.44	30	30	16.56
	9	11.98	omitted	1.3	13.28	30	30	16.72
	18	11.86	omitted	1.3	13.16	30	30	16.84
	24	12.34	omitted	1.3	13.64	30	30	16.36
	54	12.21	omitted	1.3	13.51	30	30	16.49
2462	6	13.31	omitted	1.3	14.61	30	30	15.39
	9	13.28	omitted	1.3	14.58	30	30	15.42
	18	12.94	omitted	1.3	14.24	30	30	15.76
	24	13.32	omitted	1.3	14.62	30	30	15.38
	54	13.20	omitted	1.3	14.50	30	30	15.50

Table 1-7 5.8GHz OFDM mode

Measured Frequency (MHz)	Tx Rate (Mb/s)	Analyzer reading (dBm)	Trace number	Cable Loss (dB)	Results (dBm)	Limit		Margin to limit (dBm)
						FCC (dBm)	IC (dBm)	
5745	6	15.70	Plot 1-7b	2.3	18.00	30	30	12.00
	9	15.68	omitted	2.3	17.98	30	30	12.02
	18	15.16	omitted	2.3	17.46	30	30	12.54
	24	15.54	omitted	2.3	17.84	30	30	12.16
	54	13.71	omitted	2.3	16.01	30	30	13.99
5785	6	15.68	omitted	2.3	17.98	30	30	12.02
	9	15.52	omitted	2.3	17.82	30	30	12.18
	18	15.08	omitted	2.3	17.38	30	30	12.62
	24	15.47	omitted	2.3	17.77	30	30	12.23
	54	12.92	omitted	2.3	15.22	30	30	14.78
5825	6	15.57	omitted	2.3	17.87	30	30	12.13
	9	15.52	omitted	2.3	17.82	30	30	12.18
	18	15.26	omitted	2.3	17.56	30	30	12.44
	24	15.45	omitted	2.3	17.75	30	30	12.25
	54	12.93	omitted	2.3	15.23	30	30	14.77

1.3 Trace Data

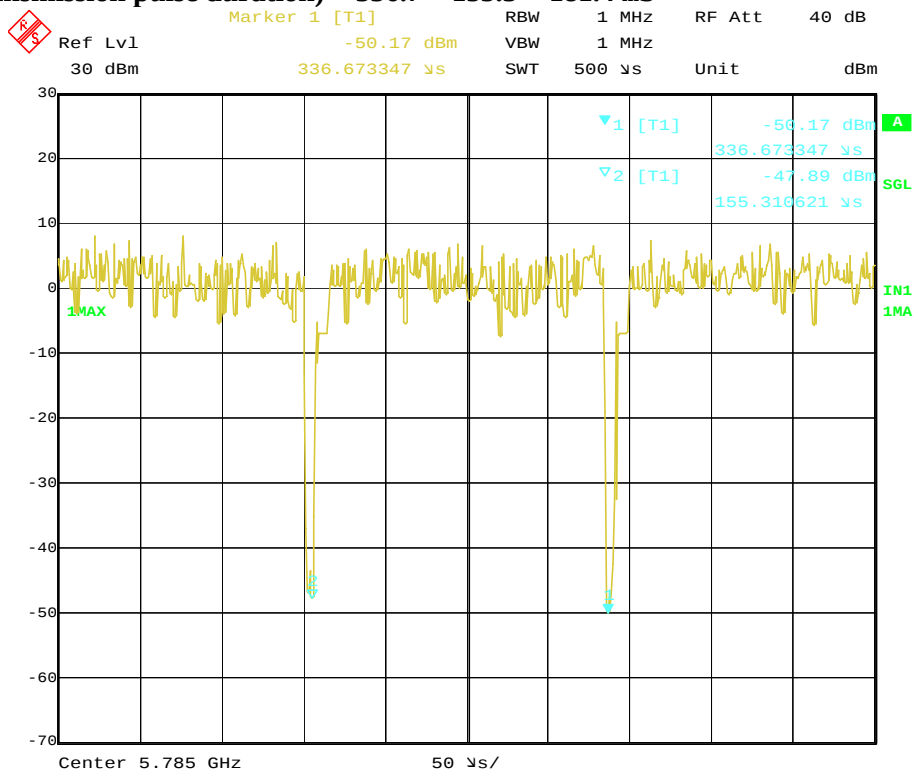
T (transmission pulse duration) = 1879.8 – 929.9 = 949.9 mS



Date: 4.FEB.2005 14:47:39

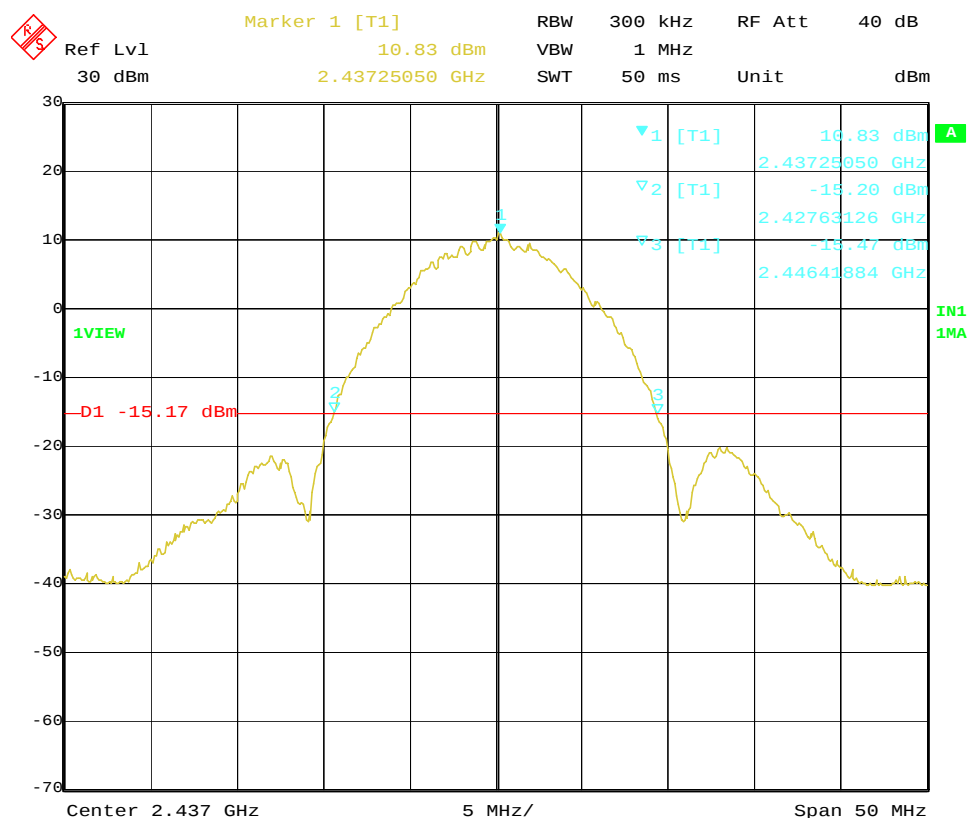
Plot 1-0 Transmission Pulse Duration of DSSS Tx mode

T (transmission pulse duration) = 336.7 – 155.3 = 181.4 mS

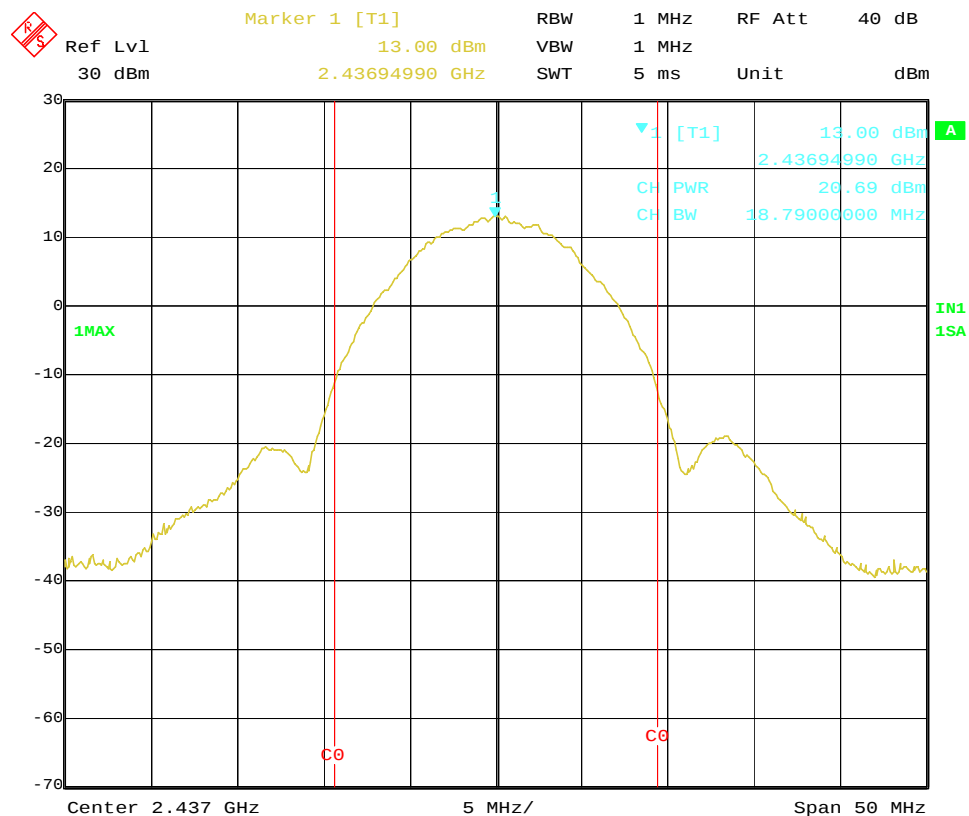


Date: 22.FEB.2005 17:22:00

Plot 1-1 Transmission Pulse Duration of OFDM Tx mode

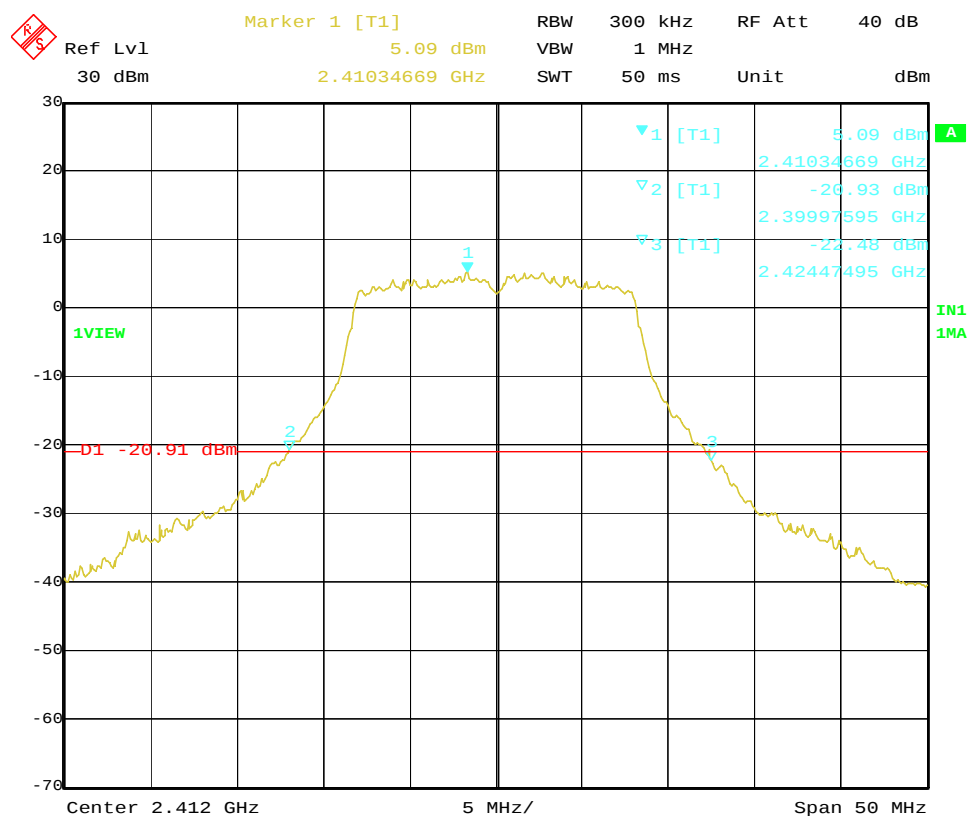


Date: 4.FEB.2005 14:30:09

Plot 1-2a. 26dB Bandwidth of 2437MHz (DSSS, 11Mbps)

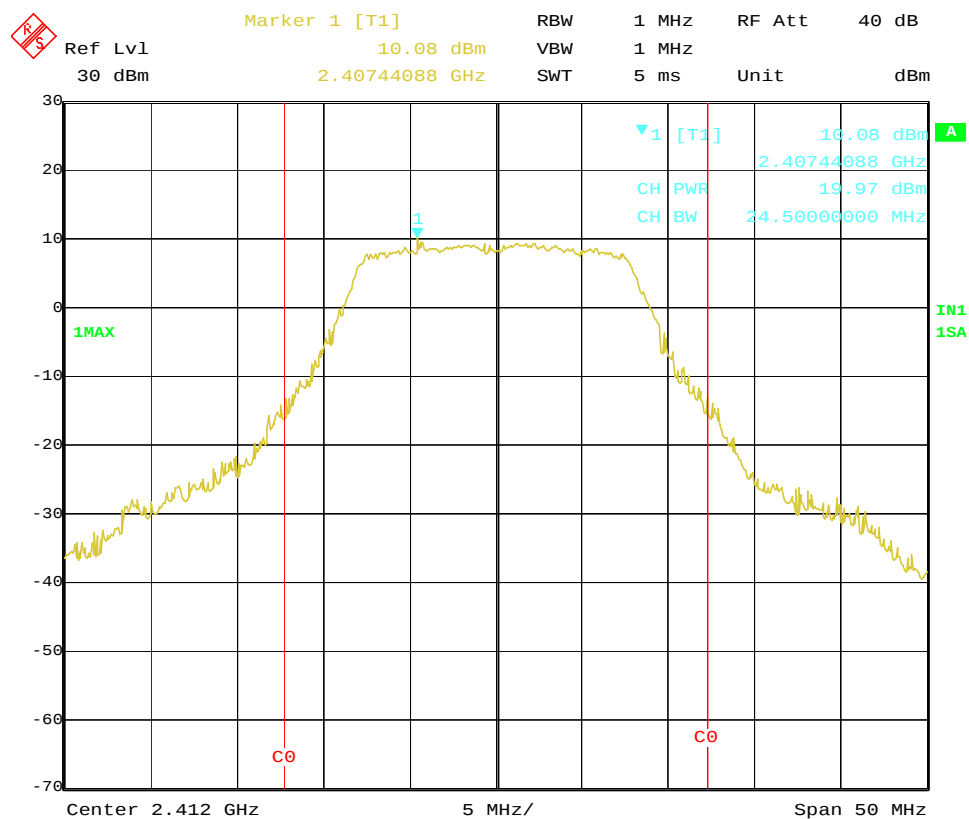
Date: 4.FEB.2005 17:01:04

Plot 1-2b. Conducted Peak Output Power of 2437MHz (DSSS, 11Mbps, peak power)



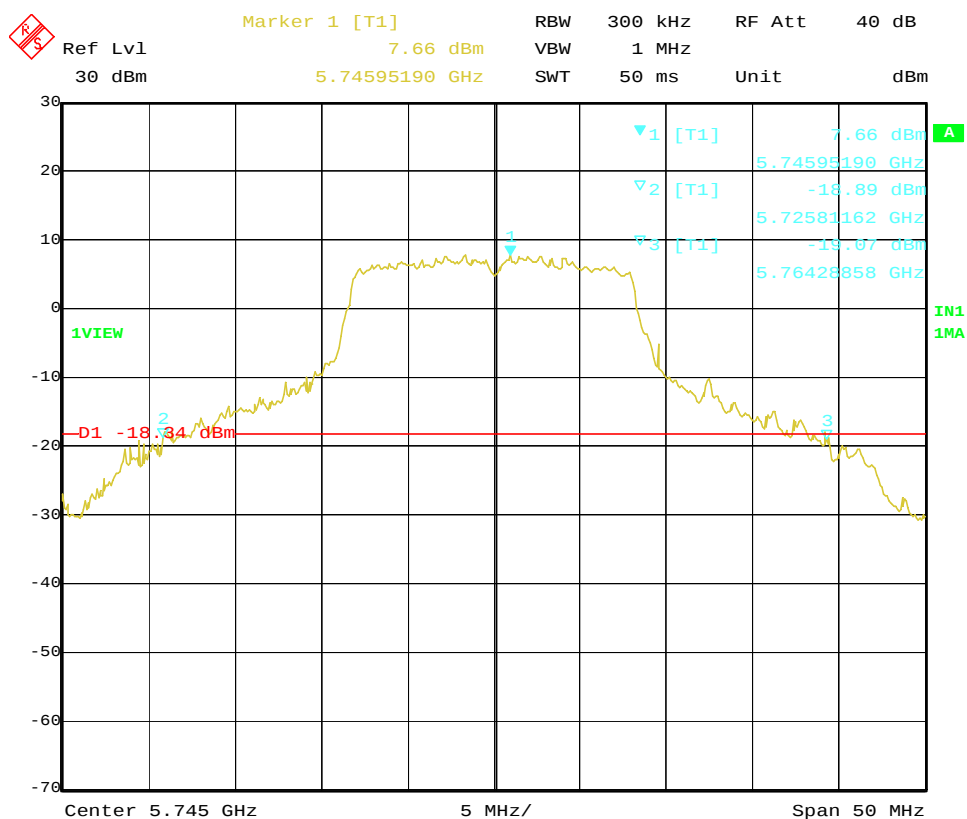
Date: 4.FEB.2005 14:57:44

Plot 1-3a. 26dB Bandwidth of 2412MHz (OFDM, 6Mbps)

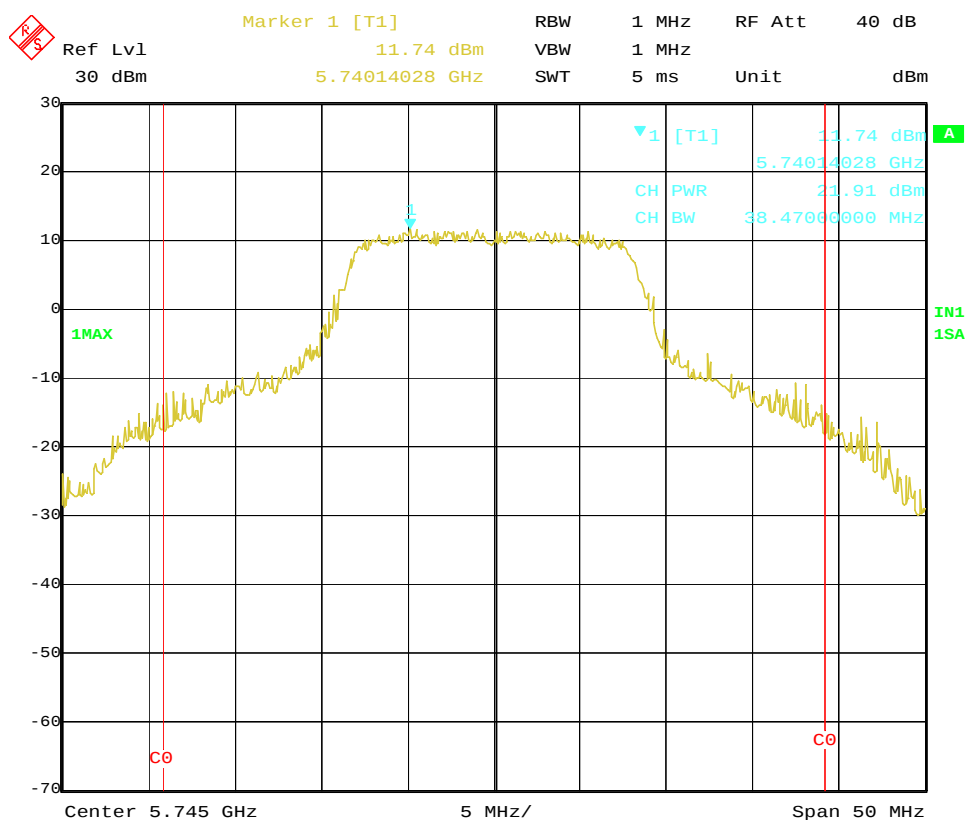


Date: 10.FEB.2005 13:42:49

Plot 1-3b. Conducted Peak Output Power of 2412MHz (OFDM, 6Mbps, peak power)

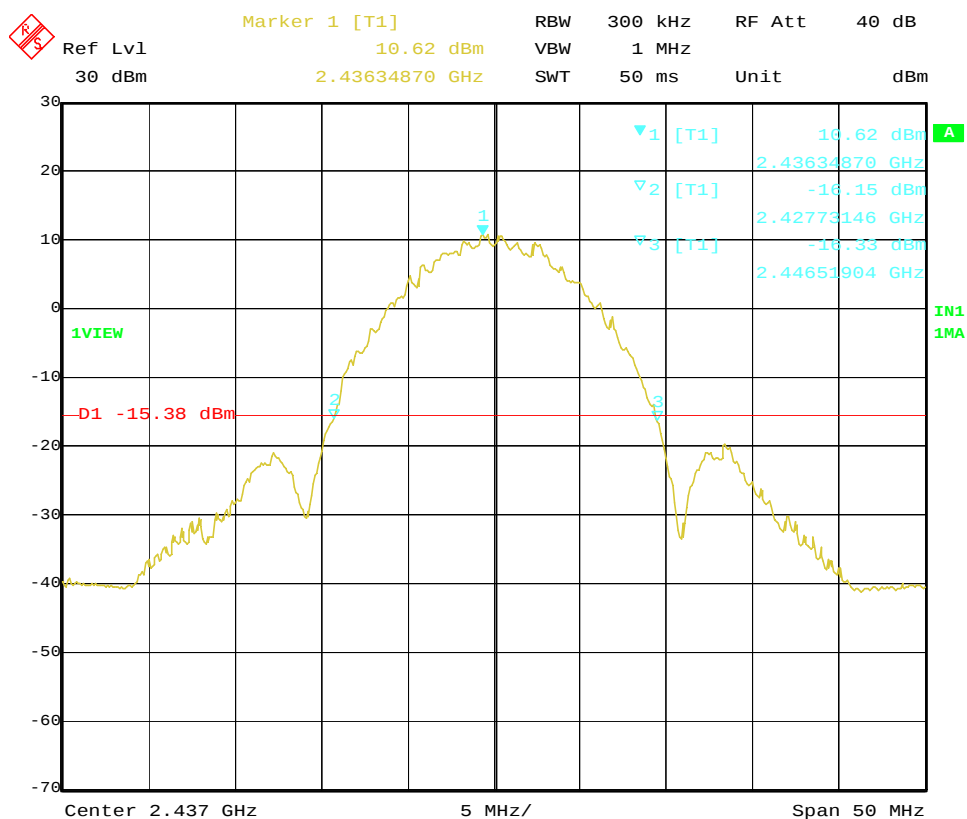


Date: 22.FEB.2005 17:26:25

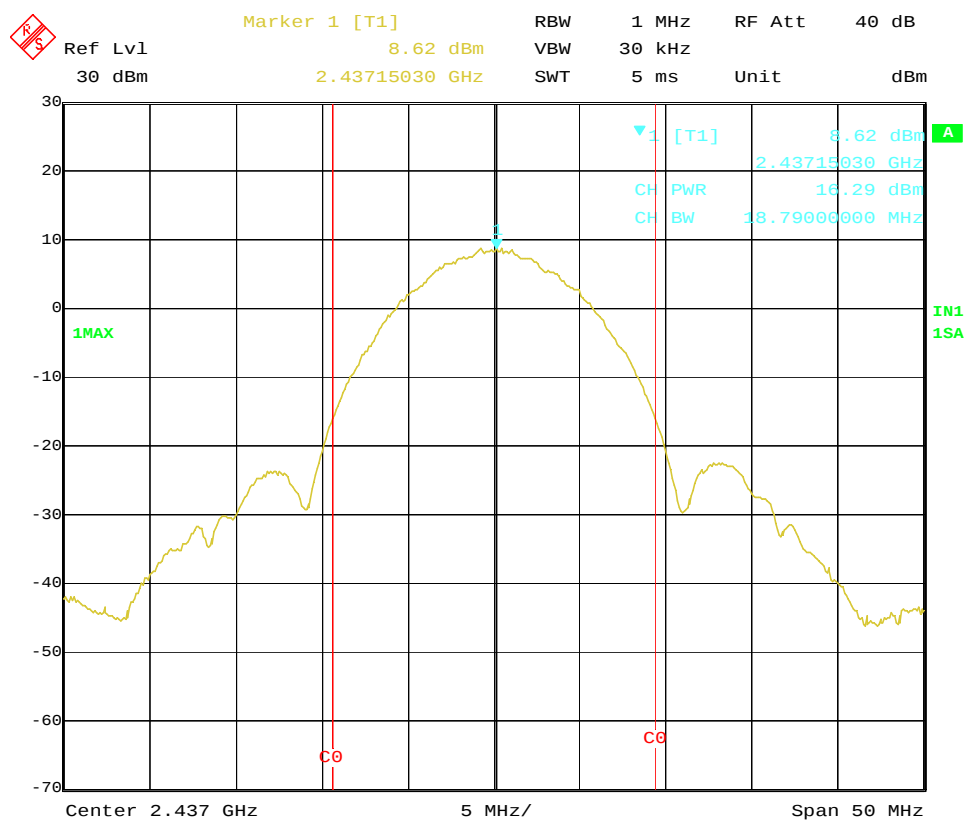
Plot 1-4a. 26dB Bandwidth of 5745MHz (OFDM, 6Mbps)

Date: 22.FEB.2005 19:30:12

Plot 1-4b. Conducted Peak Output Power of 5745MHz (OFDM, 6Mbps, **peak power**)

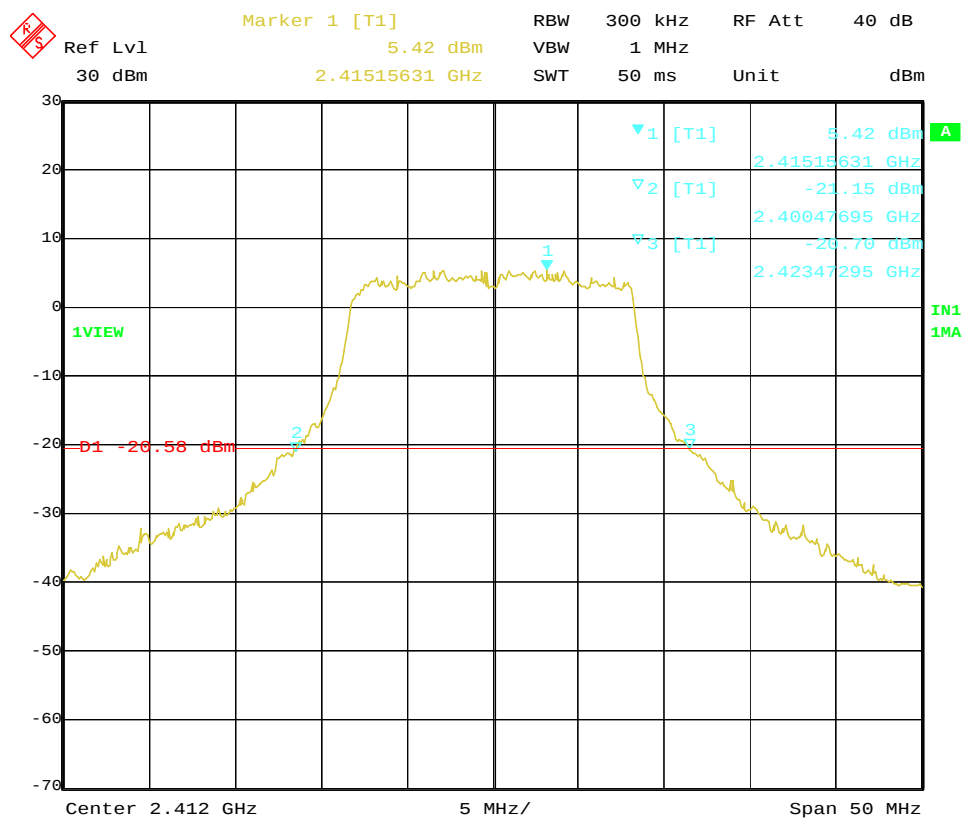


Date: 4.FEB.2005 14:26:49

Plot 1-5a. 26dB Bandwidth of 2437MHz (DSSS, 5.5Mbps)

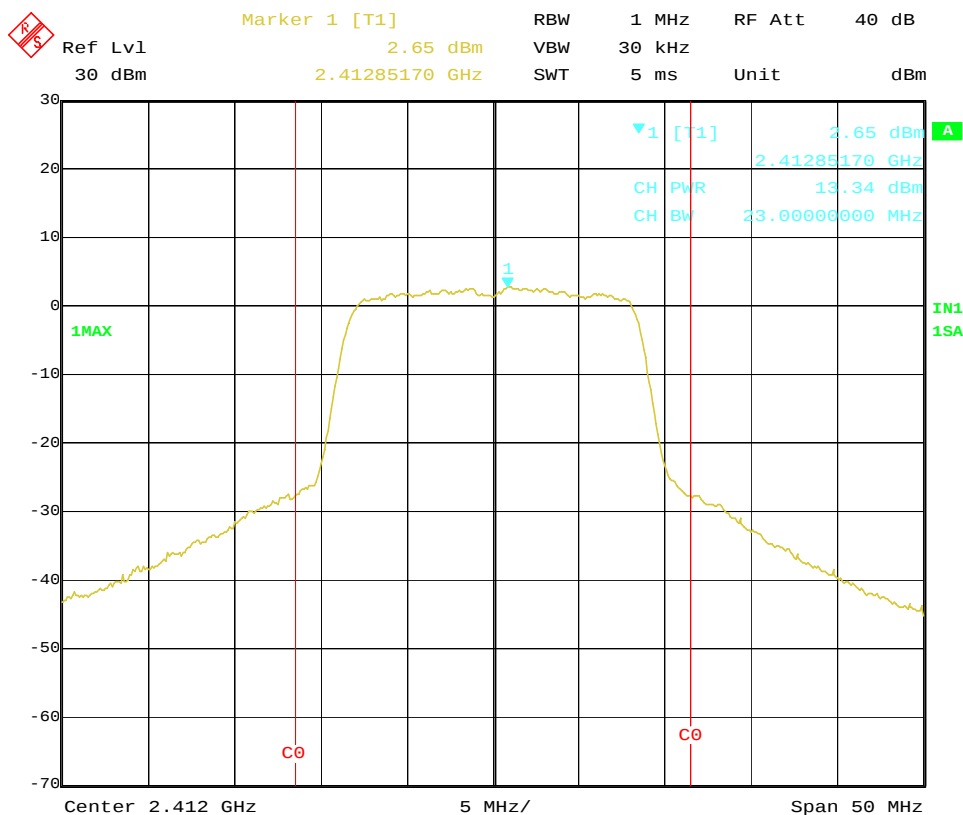
Date: 4.FEB.2005 21:56:05

Plot 1-5b. Conducted Peak Output Power of 2437MHz (DSSS, 5.5Mbps, mean power)



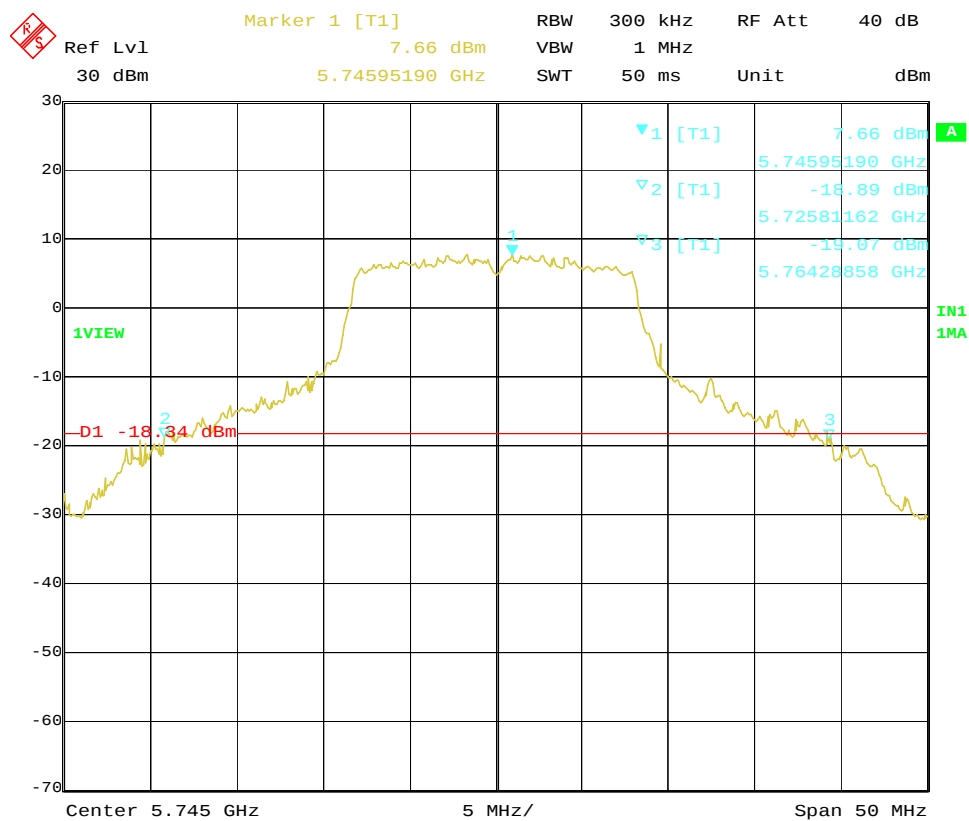
Date: 4.FEB.2005 15:07:34

Plot 1-6a. 26dB Bandwidth of 2412MHz (OFDM, 24Mbps)



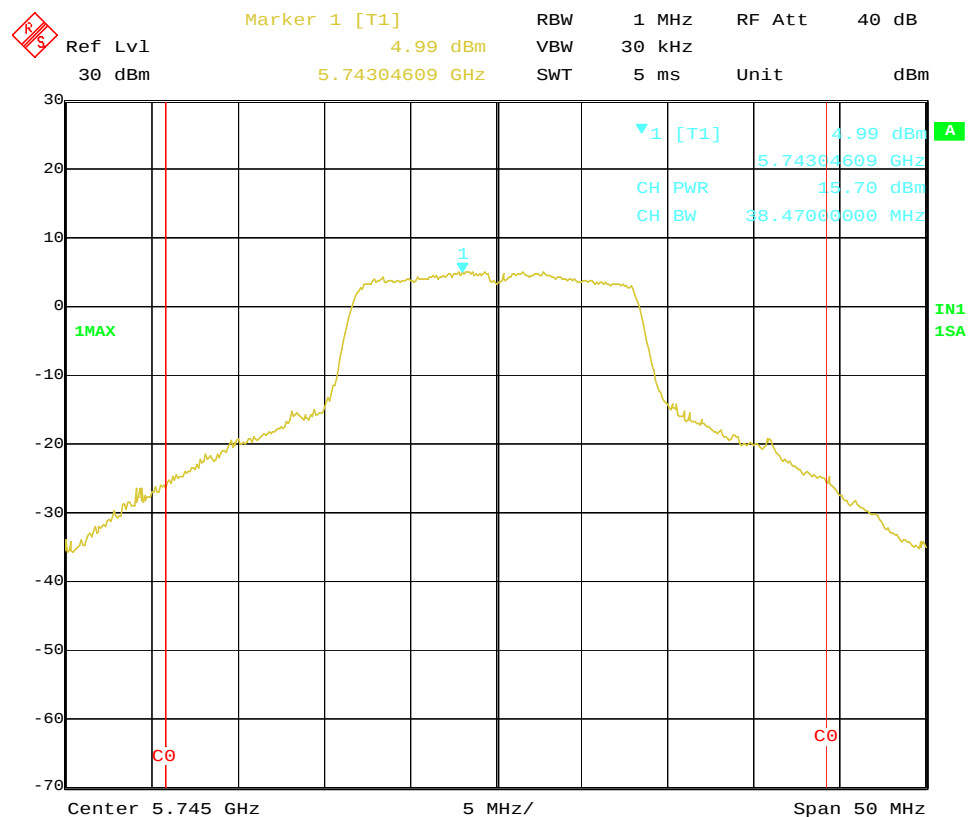
Date: 10.FEB.2005 20:09:30

Plot 1-6b. Conducted Peak Output Power of 2412MHz (OFDM, 24Mbps, mean power)



Date: 22.FEB.2005 17:26:25

Plot 1-7a. 26dB Bandwidth of 5745MHz (OFDM, 6Mbps)



Date: 22.FEB.2005 19:37:50

Plot 1-7b. Conducted Peak Output Power of 5745MHz (OFDM, 6Mbps, mean power)

2. Restricted Bands Radiatio (1GHz – 40GHz)

[FCC 15.205 / 209, RSS-210 6.3 / 7.3]

2.1 Test Procedure

Radiated emissions were measured in the frequency range with 1 GHz to 40GHz in transmitting mode and 1 GHz to 25GHz in receiving mode. All tests were performed in the semi-anechoic chamber at a 3-meter distance (except for the frequency range with 18 GHz to 40 GHz where test distance was reduced to 1 meter) on both horizontal and vertical polarities. The antenna was also scanned in height. The emissions are recorded with a spectrum analyzer in peak hold mode. The identified emissions are further maximized as a function of cable manipulation, azimuth, and antenna height. The emissions closest to the limits are measured in the peak mode with the tuned spectrum analyzer using resolution bandwidth of 1MHz / video bandwidth of 1MHz, and the average setting mode with the tuned spectrum analyzer using resolution bandwidth of 1MHz / video bandwidth of 100Hz or 10Hz. The highest emissions relative to the limit are listed.

2.2 Test Instruments and Measurement Setup

Table 2-1 Radiated Emission Test Instrumentation (1GHz – 40GHz)

Description	Model	Serial Number
Spectrum Analyzer EMI Test Receiver	R&S ESI26	836119/003
Spectrum Analyzer	HP 8563E	3416A02248
Harmonic Mixer (26.5 – 40GHz)	Agilent 11970A	011269-001
Amplifier (1 - 18GHz)	HP 8449B	3008A00582
Amplifier (18 – 40GHz)	Agilent 83051A	3950M00193
Horn Antenna (1 - 18GHz)	EMCO 3115	9903-5774
Horn Antenna (3.95 – 5.85GHz)	EMCO 3160-5	1099
Horn Antenna (5.85 – 8.2GHz)	EMCO 3160-6	9712-1044
Horn Antenna (8.2 – 12.4GHz)	EMCO 3160-7	1156
Horn Antenna (12.4 – 18GHz)	EMCO 3160-8	1143
Horn Antenna (18 - 26.5GHz)	EMCO 3160-9	0004-1202
Horn Antenna (26.5 - 40GHz)	EMCO 3160-10	1175
Coaxial cables: - Horn Ant <=> RF Amp. (1-18GHz) - RF Amp.<=>Spectrum Analyzer (1-12.4GHz) - RF Amp.<=>Spectrum Analyzer (12.4-18GHz) - Horn Ant <=> RF Amp. (18-40GHz) - RF Amp.<=>Spectrum Analyzer (18-40GHz)	Length: 6 m 16 m 3m 3m 1m	- EM206SCO - GEM0101 - SF102-20166 - SF102-20167 - SF102-21105

Notes: HP: Hewlett Packard, R&S: Rohde & Schwarz

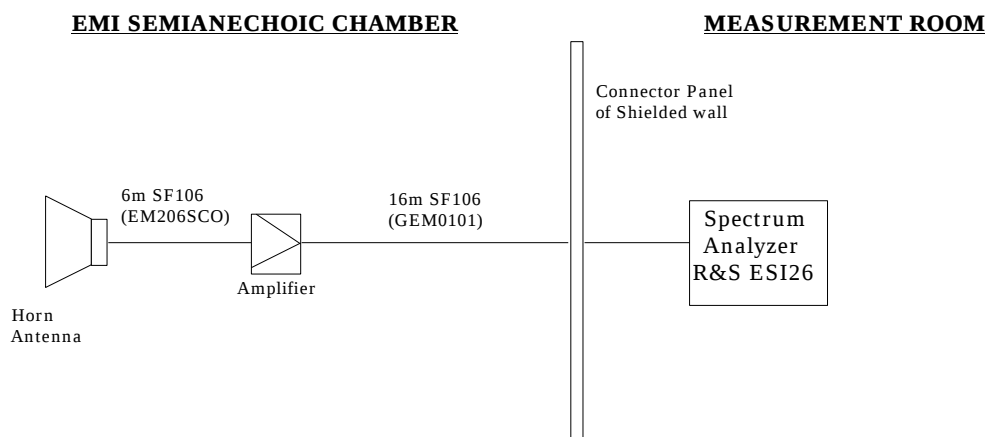


Figure 2-1. Cables for Radiated Emission Test (1 – 12.4 GHz)

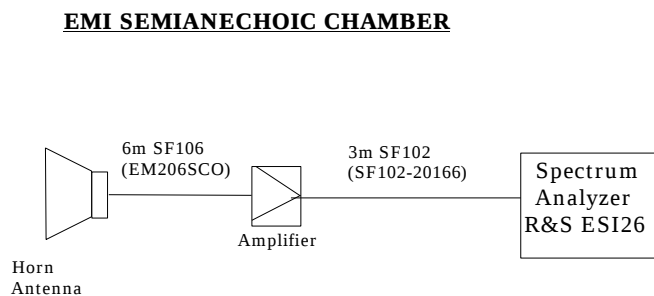


Figure 2-2. Cables for Radiated Emission Test (12.4 - 18GHz)

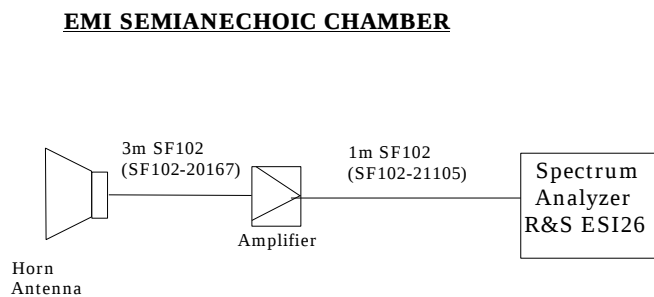


Figure 2-3. Cables for Radiated Emission Test (18 – 26.5GHz)

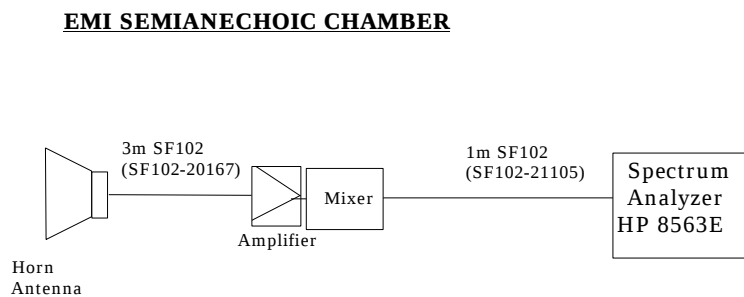


Figure 2-4. Cables for Radiated Emission Test (26.5 - 40GHz)

2.3 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Loss, and subtracting Amplifier Gain from the measured reading. All factors are included in the reported data.

$$FS = R + AF + CORR - FO$$

where:

FS = Field Strength

R = Measured Spectrum analyzer Input Amplitude

AF = Antenna Factor

CORR = Correction Factor = CL-AG

CL = Cable Loss

AG = Amplifier Gain

FO = Distance Falloff Factor

For example:

Given a Spectrum Analyzer input reading of 51.5 dBμV; Antenna Factor of 8.5 dB/m; Cable Loss of 1.3 dB; Falloff Factor of 0 dB; and an Amplifier Gain of 26 dB. The Field Strength of the measured emission is:

$$FS = 51.5 + 8.5 + 1.3 - 26 - 0.0 = 35.6 \text{ dB}\mu\text{V/m}$$

Conversions between dBμV/m (or dBμV) and μV/m (or μV) are done as :

$$\text{Level(dB}\mu\text{V/m)} = 20 \times \text{Log} (\text{Level}(\mu\text{V/m}))$$

$$40 \text{ dB}\mu\text{V/m} = 100 \mu\text{V/m}$$

$$48 \text{ dB}\mu\text{V/m} = 250 \mu\text{V/m}$$

2.4 Bandedge Measurement plots

The test was performed with the co-located Bluetooth device (FCC ID: ANO20040700HER) in active and transmitting simultaneously.

Test Date: February 16, 2005

Table 2-2 Notebook operation mode in 2.4GHz band

D: DSSS mode O: OFDM mode

Ch.	Tx rate (Mb/s)	Frequency (GHz)	Polarity (H/V)	Reading (dBμV) (peak)	Rading (dBμV) (average)	Antenna Factor (dB/m)	Corr. Facto r (dB)	Falloff Factor (dB)	Field Strength (dBμV/m) (peak)	Margin to Limit (dB) (peak)	Field Strength (dBμV/m) (average)	Margin to Limit (dB) (average)
1	D: 1	2.387	H	52.2	42.8	28.2	-29.2	0.0	51.2	22.8	41.8	12.2
	5.5	2.388	H	52.4	41.3	28.2	-29.2	0.0	51.4	22.6	40.3	13.7
	11	2.388	H	53.4	42.1	28.2	-29.2	0.0	52.4	21.6	41.1	12.9
	O: 6	2.390	H	63.4	47.8	28.2	-29.2	0.0	62.4	11.6	46.8	7.2
	9	2.390	H	65.2	47.6	28.2	-29.2	0.0	64.2	9.8	46.6	7.4
	18	2.390	H	62.5	46.9	28.2	-29.2	0.0	61.5	12.5	45.9	8.1
	24	2.390	H	63.8	47.1	28.2	-29.2	0.0	62.8	11.2	46.1	7.9
	54	2.390	H	65.2	46.5	28.2	-29.2	0.0	64.2	9.8	45.5	8.5
11	D: 1	2.489	V	54.0	45.9	28.4	-29.1	0.0	53.3	20.7	45.2	8.8
	5.5	2.487	H	53.9	42.1	28.4	-29.1	0.0	53.2	20.8	41.4	12.6
	11	2.487	V	54.6	44.5	28.4	-29.1	0.0	53.9	20.1	43.8	10.2
	O: 6	2.484	V	61.4	45.5	28.4	-29.1	0.0	60.7	13.3	44.8	9.2
	9	2.484	V	61.5	45.3	28.4	-29.1	0.0	60.8	13.2	44.6	9.4
	18	2.484	V	61.8	45.5	28.4	-29.1	0.0	61.1	12.9	44.8	9.2
	24	2.484	V	58.6	45.2	28.4	-29.1	0.0	57.9	16.1	44.5	9.5
	54	2.484	V	60.2	44.9	28.4	-29.1	0.0	59.5	14.5	44.2	9.8

Note) These is no measurement result for 5.8GHz OFDM transmission mode thanks to no restricted band near 5.8GHz band.

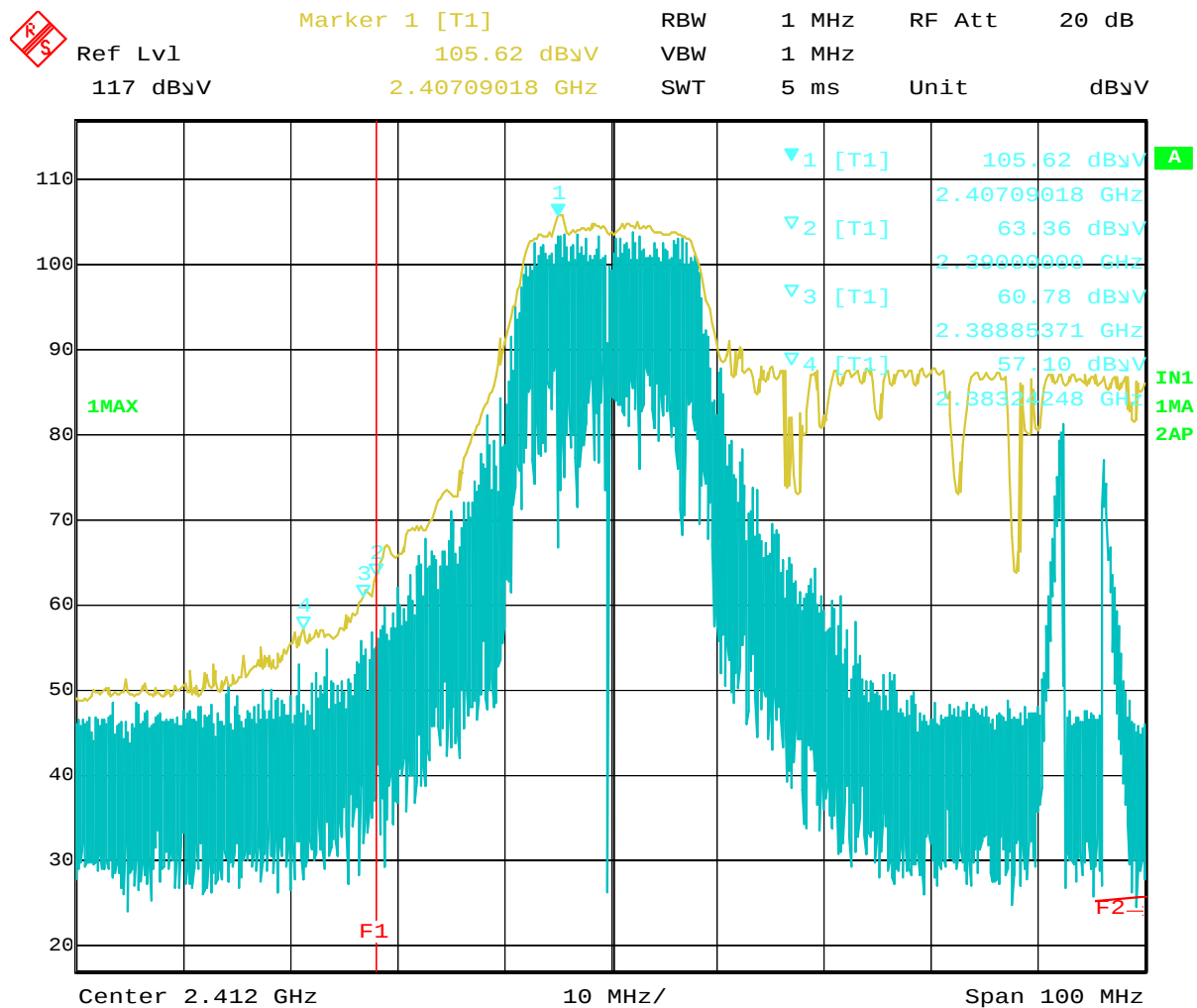
Table 2-3 Tablet operation mode in 2.4GHz band

D: DSSS mode O: OFDM mode

Ch.	Tx rate (Mb/s)	Frequency (GHz)	Polarity (H/V)	Reading (dBμV) (<i>peak</i>)	Rading (dBμV) (<i>average</i>)	Antenna Factor (dB/m)	Corr. Facto r (dB)	Falloff Factor (dB)	Field Strength (dBμV/m) (<i>peak</i>)	Margin to Limit (dB) (<i>peak</i>)	Field Strength (dBμV/m) (<i>average</i>)	Margin to Limit (dB) (<i>average</i>)
1	D: 1	2.387	V	53.7	45.0	28.2	-29.2	0.0	52.7	21.3	44.0	10.0
	5.5	2.389	V	53.8	42.4	28.2	-29.2	0.0	52.8	21.2	41.4	12.6
	11	2.388	V	54.2	44.0	28.2	-29.2	0.0	53.2	20.8	43.0	11.0
	O: 6	2.390	V	65.2	49.2	28.2	-29.2	0.0	64.2	9.8	48.2	5.8
	9	2.390	V	66.5	49.1	28.2	-29.2	0.0	65.5	8.5	48.1	5.9
	18	2.390	V	63.6	48.8	28.2	-29.2	0.0	62.6	11.4	47.8	6.2
	24	2.390	V	65.2	48.8	28.2	-29.2	0.0	64.2	9.8	47.8	6.2
	54	2.390	V	67.0	48.1	28.2	-29.2	0.0	66.0	8.0	47.1	6.9
11	D: 1	2.489	V	57.9	50.8	28.4	-29.1	0.0	57.2	16.8	50.1	3.9
	5.5	2.487	V	57.8	45.5	28.4	-29.1	0.0	57.1	16.9	44.8	9.2
	11	2.487	V	58.8	48.2	28.4	-29.1	0.0	58.1	15.9	47.5	6.5
	O: 6	2.484	V	66.7	49.6	28.4	-29.1	0.0	66.0	8.0	48.9	5.1
	9	2.484	V	67.1	49.3	28.4	-29.1	0.0	66.4	7.6	48.6	5.4
	18	2.484	V	66.4	49.5	28.4	-29.1	0.0	65.7	8.3	48.8	5.2
	24	2.484	V	62.6	49.1	28.4	-29.1	0.0	61.9	12.1	48.4	5.6
	54	2.484	V	64.7	48.5	28.4	-29.1	0.0	64.0	10.0	47.8	6.2

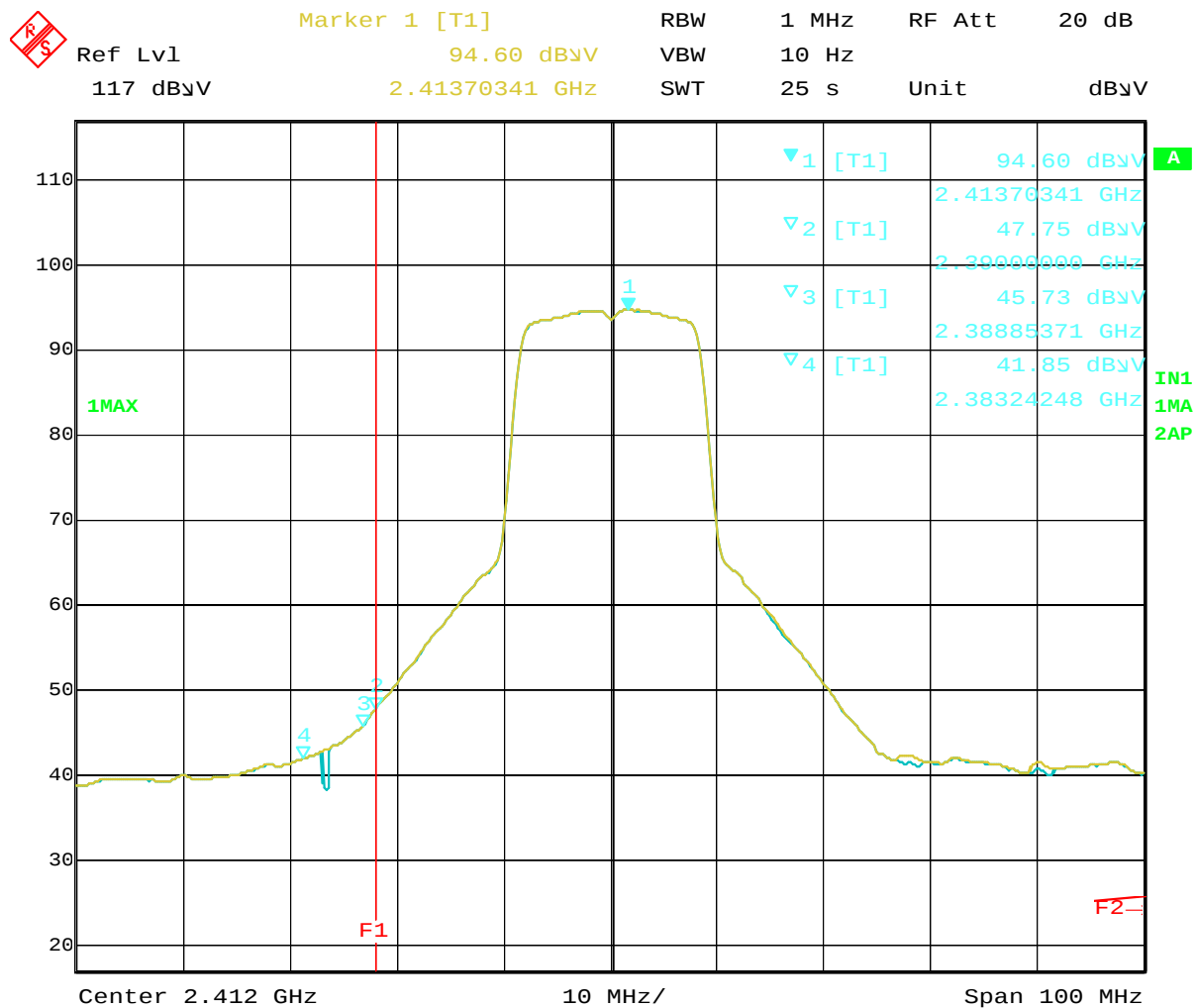
Note) These is no measurement result for 5.8GHz OFDM transmission mode thanks to no restricted band near 5.8GHz band.

Note) The traces hereafter are the worst cases in each Table 2-2 or Table 2-3.



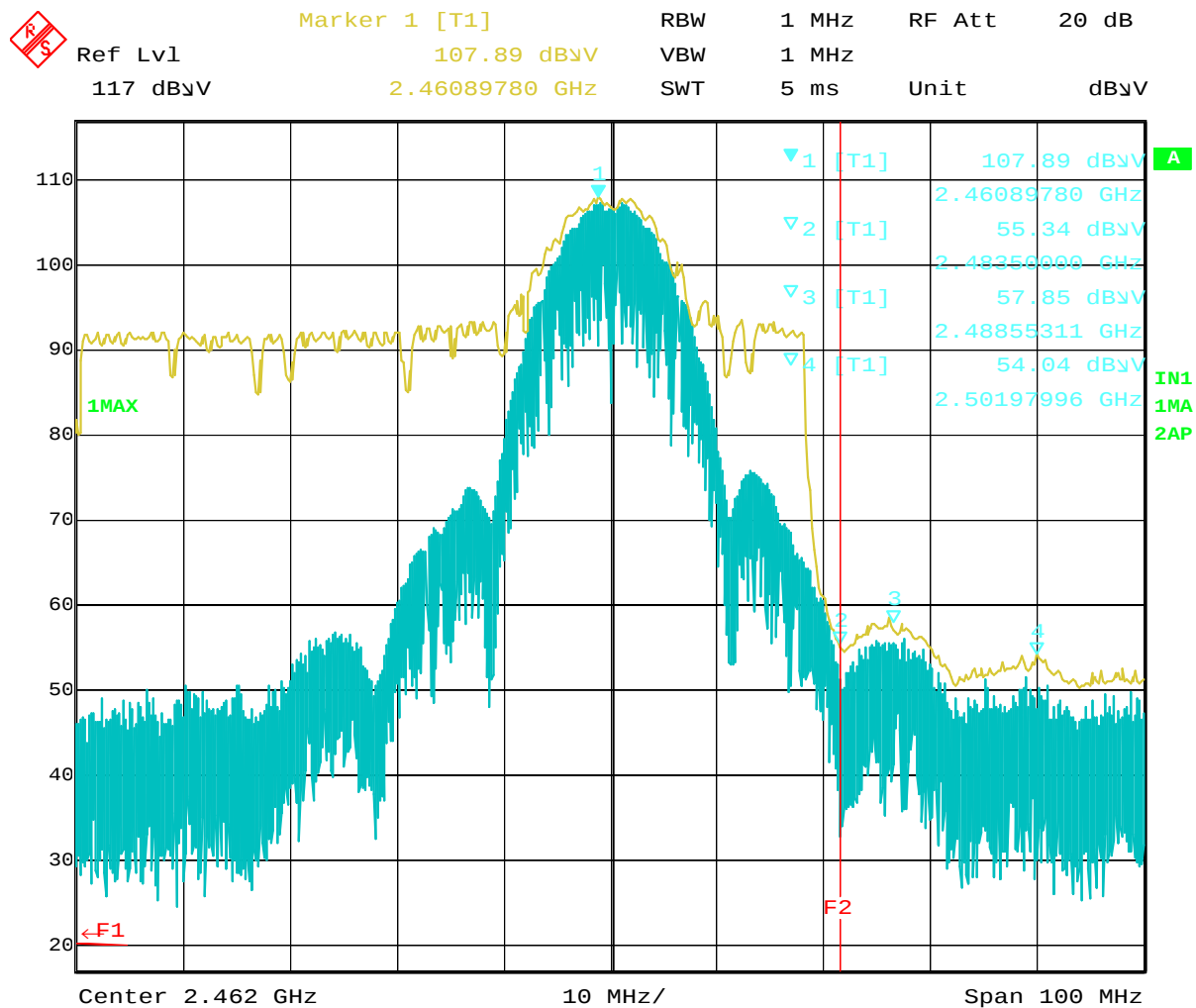
Date: 16.FEB.2005 15:44:29

Plot-2-1 Ch.1 2412MHz TX, OFDM 6Mbps (Peak) in Notebook operation mode



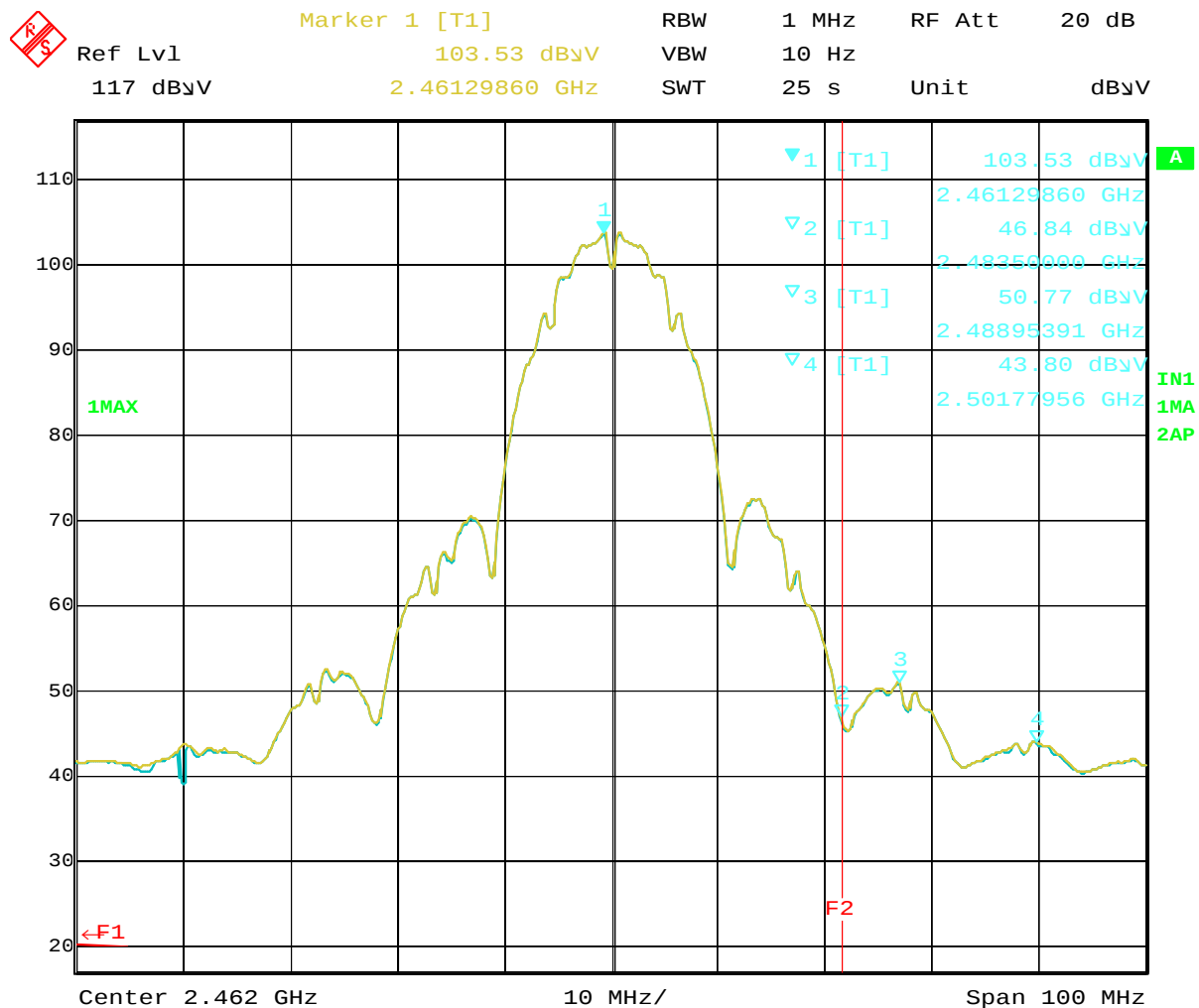
Date: 16.FEB.2005 15:45:43

Plot 2-2 Ch.1 2412MHz TX, OFDM 6Mbps (Average) in Notebook operation mode



Date: 16.FEB.2005 17:39:56

Plot 2-3 Ch.11 2462MHz TX, DSSS 1Mbps (Peak) in Tablet operation mode



Date: 16.FEB.2005 17:41:39

Plot 2-4 Ch.11 2462MHz TX, DSSS 1Mbps (Average) in Tablet operation mode

2.5 Radiated Emission Measurement Results (above 1GHz)

The EUT was found to comply to the limits of FCC Part 15 Subpart C and RSS-210 with a margin of 3.9 dB. The measurement was done for the frequency range of 1 GHz to 40GHz in TX mode and 1 GHz to 25GHz in RX mode.

Test Date: February 16, 17, 18, 24 and 25, 2005

2.5.1 EUT in 2.4GHz Notebook operation mode

The representative worst case in previous Table-2-2 was selected and tested with the co-located Bluetooth device (FCC ID: [ANO20040700HER](#)) in active and transmitting simultaneously.

*Note1: OB means “operation band” (2400-2483.5MHz); in this case limit is 1W (measured conducted with power meter)

*Note2: NR means “Non-Restricted band” (just reference only for EU compliance)

Table 2-4. Ch.1 (2412MHz) OFDM 6Mbps **TX** mode

Frequency (GHz)	Polarity (H/V)	Measured (dBμV) (peak)	Measured (dBμV) (average)	Antenna Factor (dB/m)	Corr. Factor (dB)	Falloff Factor (dB)	Field Strength (dBμV/m)	FCC Limit (dBμV/m)	Margin to limit (dB)	Field Strength (dBμV/m)	FCC Limit (dBμV/m)	Margin to limit (dB)
							(peak)			(average)		
Inband 2.407 bandedge	H	105.6	94.6	28.3	-29.1	0.0	104.8	OB*1	-	93.8	OB*1	-
2.383	H	57.1	41.9	28.2	-29.2	0.0	56.1	74.0	17.9	40.9	54.0	13.1
2.389	H	60.8	45.7	28.2	-29.2	0.0	59.8	74.0	14.2	44.7	54.0	9.3
2.390	H	63.4	47.8	28.2	-29.2	0.0	62.4	74.0	11.6	46.8	54.0	7.2
1.098	V	50.8	-	24.4	-31.5	0.0	43.7	74.0	30.3	-	54.0	-
1.199	V	53.0	-	25.2	-31.3	0.0	46.9	74.0	27.1	-	54.0	-
1.234	V	47.2	-	25.1	-31.1	0.0	41.2	74.0	32.8	-	54.0	-
1.596	V	59.6	39.7	25.6	-30.3	0.0	54.9	74.0	19.1	35.0	54.0	19.0
1.815	V	43.5	30.4	26.9	-29.9	0.0	40.5	NR*2	-	27.4	NR*2	-
2.313	H	50.4	-	28.0	-29.3	0.0	49.1	74.0	24.9	-	54.0	-
4.832	V	55.6	26.8	27.0	-26.5	0.0	56.1	74.0	17.9	27.3	54.0	26.7
4.913	V	59.3	26.1	27.0	-26.4	0.0	59.9	74.0	14.1	26.7	54.0	27.3
4.936	V	60.8	26.3	27.1	-26.4	0.0	61.5	74.0	12.5	27.0	54.0	27.0
4.949	V	61.4	26.2	27.1	-26.4	0.0	62.1	74.0	11.9	26.9	54.0	27.1
5.210	V	38.8	25.7	27.1	-26.1	0.0	39.8	NR*2	-	26.7	NR*2	-
7.275	H	38.8	-	29.9	-24.6	0.0	44.1	74.0	29.9	-	54.0	-

Table 2-5. Ch.6 (2437MHz) OFDM 6Mbps TX mode

Frequency (GHz)	Polarity (H/V)	Measured (dBμV) (peak)	Measured (dBμV) (average)	Antenna Factor (dB/m)	Corr. Factor (dB)	Falloff Factor (dB)	Field Strength (dBμV/m)	FCC Limit (dBμV/m)	Margin to limit (dB)	Field Strength (dBμV/m)	FCC Limit (dBμV/m)	Margin to limit (dB)
							(peak)			(average)		
Inband 2.432 bandedge	H	104.9	94.3	28.4	-29.2	0.0	104.1	OB*1	-	93.5	OB*1	-
2.390	H	50.1	-	28.2	-29.2	0.0	49.1	74.0	24.9	-	54.0	-
2.484	H	50.9	-	28.4	-29.1	0.0	50.2	74.0	23.8	-	54.0	-
2.489	H	50.8	-	28.4	-29.1	0.0	50.1	74.0	23.9	-	54.0	-
1.098	V	50.2	-	24.4	-31.5	0.0	43.1	74.0	30.9	-	54.0	-
1.197	V	54.1	-	25.2	-31.3	0.0	48.0	74.0	26.0	-	54.0	-
1.232	V	48.0	-	25.1	-31.1	0.0	42.0	74.0	32.0	-	54.0	-
1.596	V	58.5	-	25.6	-30.3	0.0	53.8	74.0	20.2	-	54.0	-
1.817	H	43.5	29.7	26.9	-29.9	0.0	40.5	NR*2	-	26.7	NR*2	-
2.336	H	50.7	-	28.1	-29.3	0.0	49.5	74.0	24.5	-	54.0	-
2.372	H	49.6	-	28.2	-29.2	0.0	48.6	74.0	25.4	-	54.0	-
2.383	H	49.1	-	28.2	-29.2	0.0	48.1	74.0	25.9	-	54.0	-
2.387	H	49.1	-	28.2	-29.2	0.0	48.1	74.0	25.9	-	54.0	-
4.837	V	56.4	26.2	27.0	-26.5	0.0	56.9	74.0	17.1	26.7	54.0	27.3
4.906	V	58.2	26.2	27.0	-26.6	0.0	58.6	74.0	15.4	26.6	54.0	27.4
4.933	V	59.9	26.0	27.1	-26.4	0.0	60.6	74.0	13.4	26.7	54.0	27.3
4.949	V	61.8	26.3	27.1	-26.4	0.0	62.5	74.0	11.5	27.0	54.0	27.0
5.194	V	38.9	25.9	27.1	-26.1	0.0	39.9	NR*2	-	26.9	NR*2	-
7.276	H	39.4	-	29.9	-24.6	0.0	44.7	74.0	29.3	-	54.0	-

Table 2-6. Ch.11 (2462MHz) OFDM 6Mbps TX mode

Frequency (GHz)	Polarity (H/V)	Measured (dBμV) (peak)	Measured (dBμV) (average)	Antenna Factor (dB/m)	Corr. Factor (dB)	Falloff Factor (dB)	Field Strength (dBμV/m)	FCC Limit (dBμV/m)	Margin to limit (dB)	Field Strength (dBμV/m)	FCC Limit (dBμV/m)	Margin to limit (dB)
							(peak)			(average)		
Inband 2.457 bandedge	V	104.4	93.6	28.4	-29.2	0.0	103.6	OB*1	-	92.8	OB*1	-
2.484	V	61.4	45.5	28.4	-29.1	0.0	60.7	74.0	13.3	44.8	54.0	9.2
2.486	V	57.1	43.5	28.4	-29.1	0.0	56.4	74.0	17.6	42.8	54.0	11.2
2.496	V	54.6	-	28.4	-29.1	0.0	53.9	74.0	20.1	-	54.0	-
1.098	V	49.0	-	24.4	-31.5	0.0	41.9	74.0	32.1	-	54.0	-
1.197	V	52.7	-	25.2	-31.3	0.0	46.6	74.0	27.4	-	54.0	-
1.232	V	48.0	-	25.1	-31.1	0.0	42.0	74.0	32.0	-	54.0	-
1.595	V	59.2	39.6	25.6	-30.3	0.0	54.5	74.0	19.5	34.9	54.0	19.1
1.823	V	42.8	29.8	26.9	-29.9	0.0	39.8	NR*2	-	26.8	NR*2	-
2.288	H	49.0	-	27.8	-29.3	0.0	47.5	74.0	26.5	-	54.0	-
2.361	H	50.2	-	28.1	-29.2	0.0	49.1	74.0	24.9	-	54.0	-
2.380	H	49.1	-	28.2	-29.2	0.0	48.1	74.0	25.9	-	54.0	-
2.387	H	48.9	-	28.2	-29.2	0.0	47.9	74.0	26.1	-	54.0	-
4.853	V	56.6	26.2	27.0	-26.6	0.0	57.0	74.0	17.0	26.6	54.0	27.4
4.899	V	57.7	26.2	27.0	-26.6	0.0	58.1	74.0	15.9	26.6	54.0	27.4
4.917	V	58.3	26.2	27.0	-26.4	0.0	58.9	74.0	15.1	26.8	54.0	27.2
4.949	V	59.1	26.2	27.1	-26.4	0.0	59.8	74.0	14.2	26.9	54.0	27.1
5.222	V	39.4	25.8	27.1	-26.0	0.0	40.5	NR*2	-	26.9	NR*2	-
7.388	H	38.1	-	29.8	-24.5	0.0	43.4	74.0	30.6	-	54.0	-

Table 2-7. Ch.6 (2437MHz) OFDM RX mode

Frequency (GHz)	Polarity (H/V)	Measured (dBμV) (peak)	Measured (dBμV) (average)	Antenna Factor (dB/m)	Corr. Factor (dB)	Falloff Factor (dB)	Field Strength (dBμV/m)	FCC Limit (dBμV/m)	Margin to limit (dB)	Field Strength (dBμV/m)	FCC Limit (dBμV/m)	Margin to limit (dB)
							(peak)			(average)		
1.090	V	49.5	-	24.5	-31.5	0.0	42.5	74.0	31.5	-	54.0	-
1.197	V	53.8	-	25.2	-31.3	0.0	47.7	74.0	26.3	-	54.0	-
1.232	V	47.9	-	25.1	-31.1	0.0	41.9	74.0	32.1	-	54.0	-
1.596	V	59.4	39.2	25.6	-30.3	0.0	54.7	74.0	19.3	34.5	54.0	19.5
1.816	H	42.6	29.7	26.9	-29.9	0.0	39.6	NR*2	-	26.7	NR*2	-
1.879	V	42.5	29.8	27.5	-29.7	0.0	40.3	NR*2	-	27.6	NR*2	-
5.173	H	38.7	25.7	27.2	-26.1	0.0	39.8	NR*2	-	26.8	NR*2	-
5.299	V	38.7	25.8	27.1	-25.9	0.0	39.9	NR*2	-	27.0	NR*2	-

2.5.2 EUT in 5.8GHz Notebook operation mode

The representative worst case of conducted peak transmission power in previous Table 1-4 was selected and tested with the co-located Bluetooth device (FCC ID: [ANO20040700HER](#)) in active and transmitting simultaneously.

*Note: OB means “operation band” (5725-5850MHz); in this case limit is 1W (measured conducted with power meter)

Table 2-8 Ch.149 (5745MHz) OFDM 6Mbps TX mode

Frequency (GHz)	Polarity (H/V)	Measured (dBμV) (peak)	Measured (dBμV) (average)	Antenna Factor (dB/m)	Corr. Factor (dB)	Falloff Factor (dB)	Field Strength (dBμV/m)	FCC Limit (dBμV/m)	Margin to limit (dB)	Field Strength (dBμV/m)	FCC Limit (dBμV/m)	Margin to limit (dB)
							(peak)			(average)		
Inband 5.744	H	100.4	90.6	34.0	-25.6	0.0	108.8	OB*	-	99.0	OB*	-
1.082	V	48.5	-	24.5	-31.5	0.0	41.5	74.0	32.5	-	54.0	-
1.196	V	55.2	-	25.2	-31.3	0.0	49.1	74.0	24.9	-	54.0	-
1.397	V	47.7	-	25.8	-30.7	0.0	42.8	74.0	31.2	-	54.0	-
1.597	V	57.0	-	25.6	-30.3	0.0	52.3	74.0	21.7	-	54.0	-
4.822	V	56.5	28.2	27.1	-26.6	0.0	57.0	74.0	17.0	28.7	54.0	25.3
4.878	V	57.0	29.6	27.0	-26.6	0.0	57.4	74.0	16.6	30.0	54.0	24.0
4.944	V	59.9	29.4	27.1	-26.4	0.0	60.6	74.0	13.4	30.1	54.0	23.9
4.953	V	62.1	29.3	27.1	-26.6	0.0	62.6	74.0	11.4	29.8	54.0	24.2
5.395	H	48.1	35.9	33.9	-25.6	0.0	56.4	74.0	17.6	44.2	54.0	9.8
7.275	V	39.2	-	29.9	-24.6	0.0	44.5	74.0	29.5	-	54.0	-
7.663	H	42.7	-	30.0	-24.3	0.0	48.4	74.0	25.6	-	54.0	-
11.497	H	42.2	27.0	33.5	-20.2	0.0	55.5	74.0	18.5	40.3	54.0	13.7

Table 2-9 Ch.157 (5785MHz) OFDM 6Mbps **TX** mode

Frequency (GHz)	Polarity (H/V)	Measured (dBμV) (peak)	Measured (dBμV) (average)	Antenna Factor (dB/m)	Corr. Factor (dB)	Falloff Factor (dB)	Field Strength (dBμV/m)	FCC Limit (dBμV/m)	Margin to limit (dB)	Field Strength (dBμV/m)	FCC Limit (dBμV/m)	Margin to limit (dB)
							(peak)			(average)		
Inband												
5.780	H	100.0	89.8	34.0	-25.5	0.0	108.5	OB*	-	98.3	OB*	-
1.098	V	49.8	-	24.4	-31.5	0.0	42.7	74.0	31.3	-	54.0	-
1.198	V	53.9	-	25.2	-31.3	0.0	47.8	74.0	26.2	-	54.0	-
1.399	V	47.7	-	25.8	-30.7	0.0	42.8	74.0	31.2	-	54.0	-
1.597	V	57.2	-	25.6	-30.3	0.0	52.5	74.0	21.5	-	54.0	-
4.806	V	55.1	27.4	27.1	-26.7	0.0	55.5	74.0	18.5	27.8	54.0	26.2
4.890	V	57.0	29.5	27.0	-26.6	0.0	57.4	74.0	16.6	29.9	54.0	24.1
4.942	V	62.1	29.3	27.1	-26.4	0.0	62.8	74.0	11.2	30.0	54.0	24.0
4.957	V	61.5	28.7	27.1	-26.6	0.0	62.0	74.0	12.0	29.2	54.0	24.8
5.423	H	49.8	36.7	34.1	-25.6	0.0	58.3	74.0	15.7	45.2	54.0	8.8
7.271	V	39.7	-	29.9	-24.6	0.0	45.0	74.0	29.0	-	54.0	-
7.715	H	44.7	-	30.0	-24.2	0.0	50.5	74.0	23.5	-	54.0	-
11.561	H	40.8	27.3	33.5	-19.5	0.0	54.8	74.0	19.2	41.3	54.0	12.7

Table 2-10 Ch.165 (5825MHz) OFDM 6Mbps **TX** mode

Frequency (GHz)	Polarity (H/V)	Measured (dBμV) (peak)	Measured (dBμV) (average)	Antenna Factor (dB/m)	Corr. Factor (dB)	Falloff Factor (dB)	Field Strength (dBμV/m)	FCC Limit (dBμV/m)	Margin to limit (dB)	Field Strength (dBμV/m)	FCC Limit (dBμV/m)	Margin to limit (dB)
							(peak)			(average)		
Inband												
5.820	H	100.5	90.4	34.0	-25.6	0.0	108.9	OB*	-	98.8	OB*	-
1.102	V	47.2	-	24.4	-31.5	0.0	40.1	74.0	33.9	-	54.0	-
1.198	V	55.4	-	25.2	-31.3	0.0	49.3	74.0	24.7	-	54.0	-
1.447	V	47.8	-	25.1	-30.6	0.0	42.3	74.0	31.7	-	54.0	-
1.595	V	57.6	-	25.6	-30.3	0.0	52.9	74.0	21.1	-	54.0	-
4.806	V	56.2	27.5	27.1	-26.7	0.0	56.6	74.0	17.4	27.9	54.0	26.1
4.890	V	58.6	29.6	27.0	-26.6	0.0	59.0	74.0	15.0	30.0	54.0	24.0
4.936	V	60.4	28.6	27.1	-26.4	0.0	61.1	74.0	12.9	29.3	54.0	24.7
4.951	V	62.2	29.0	27.1	-26.6	0.0	62.7	74.0	11.3	29.5	54.0	24.5
5.360	H	50.8	37.8	33.9	-25.6	0.0	59.1	74.0	14.9	46.1	54.0	7.9
7.275	H	39.3	-	29.9	-24.6	0.0	44.6	74.0	29.4	-	54.0	-
7.303	H	39.4	-	29.9	-24.4	0.0	44.9	74.0	29.1	-	54.0	-
11.651	V	36.6	-	33.6	-20.0	0.0	50.2	74.0	23.8	-	54.0	-

Table 2-11 Ch.157 (5785MHz) OFDM **RX** mode

Frequency (GHz)	Polarity (H/V)	Measured (dBμV) (peak)	Measured (dBμV) (average)	Antenna Factor (dB/m)	Corr. Factor (dB)	Falloff Factor (dB)	Field Strength (dBμV/m)	FCC Limit (dBμV/m)	Margin to limit (dB)	Field Strength (dBμV/m)	FCC Limit (dBμV/m)	Margin to limit (dB)
							(peak)			(average)		
1.098	V	46.4	-	24.4	-31.5	0.0	39.3	74.0	34.7	-	54.0	-
1.196	V	53.7	-	25.2	-31.3	0.0	47.6	74.0	26.4	-	54.0	-
1.473	V	49.4	-	25.3	-30.5	0.0	44.2	74.0	29.8	-	54.0	-
1.597	V	59.5	34.4	25.6	-30.3	0.0	54.8	74.0	19.2	29.7	54.0	24.3

2.5.3 EUT in 2.4GHz Tablet operation mode

The representative worst case in previous Table-2-3 was selected and tested with the co-located Bluetooth device (FCC ID: [ANO20040700HER](#)) in active and transmitting simultaneously.

*Note1: OB means “operation band” (2400-2483.5MHz); in this case limit is 1W (measured conducted with power meter)

*Note2: NR means “Non-Restricted band” (just reference only for EU compliance)

Table 2-12 Ch.1 (2412MHz) DSSS 1Mbps TX mode

Frequency (GHz)	Polarity (H/V)	Measured (dBμV) (peak)	Measured (dBμV) (average)	Antenna Factor (dB/m)	Corr. Factor (dB)	Falloff Factor (dB)	Field Strength (dBμV/m)	FCC Limit (dBμV/m)	Margin to limit (dB)	Field Strength (dBμV/m)	FCC Limit (dBμV/m)	Margin to limit (dB)
							(peak)			(average)		
Inband												
2.413	V	106.5	101.8	28.3	-29.1	0.0	105.7	OB*1	-	101.0	OB*1	-
bandedge												
2.384	V	52.8	-	28.2	-29.2	0.0	51.8	74.0	22.2	-	54.0	-
2.386	V	53.7	-	28.2	-29.2	0.0	52.7	74.0	21.3	-	54.0	-
2.390	V	52.6	-	28.2	-29.2	0.0	51.6	74.0	22.4	-	54.0	-
1.103	V	49.6	-	24.4	-31.5	0.0	42.5	74.0	31.5	-	54.0	-
1.197	V	55.9	-	25.2	-31.3	0.0	49.8	74.0	24.2	-	54.0	-
1.232	V	48.5	-	25.1	-31.1	0.0	42.5	74.0	31.5	-	54.0	-
1.595	V	59.3	38.8	25.6	-30.3	0.0	54.6	74.0	19.4	34.1	54.0	19.9
1.889	H	43.7	29.4	27.5	-29.7	0.0	41.5	NR*2	-	27.2	NR*2	-
2.313	V	49.3	-	28.0	-29.3	0.0	48.0	74.0	26.0	-	54.0	-
2.358	V	48.3	-	28.1	-29.2	0.0	47.2	74.0	26.8	-	54.0	-
2.371	V	50.2	-	28.2	-29.2	0.0	49.2	74.0	24.8	-	54.0	-
4.816	H	49.3	-	27.1	-26.6	0.0	49.8	74.0	24.2	-	54.0	-
4.885	H	50.0	-	27.0	-26.6	0.0	50.4	74.0	23.6	-	54.0	-
4.933	H	54.3	26.0	27.1	-26.4	0.0	55.0	74.0	19.0	26.7	54.0	27.3
4.959	H	55.6	26.1	27.1	-26.6	0.0	56.1	74.0	17.9	26.6	54.0	27.4
5.178	H	38.4	25.9	27.2	-26.1	0.0	39.5	NR*2	-	27.0	NR*2	-
7.307	V	38.6	-	29.9	-24.4	0.0	44.1	74.0	29.9	-	54.0	-

Table 2-13 Ch.6 (2437MHz) DSSS 1Mbps **TX** mode

Frequency (GHz)	Polarity (H/V)	Measured (dBμV) (peak)	Measured (dBμV) (average)	Antenna Factor (dB/m)	Corr. Factor (dB)	Falloff Factor (dB)	Field Strength (dBμV/m)	FCC Limit (dBμV/m)	Margin to limit (dB)	Field Strength (dBμV/m)	FCC Limit (dBμV/m)	Margin to limit (dB)
							(peak)			(average)		
Inband												
2.436	V	108.3	103.8	28.4	-29.2	0.0	107.5	OB*1	-	103.0	OB*1	-
bandedge												
2.388	V	51.3	-	28.2	-29.2	0.0	50.3	74.0	23.7	-	54.0	-
2.484	V	52.3	-	28.4	-29.1	0.0	51.6	74.0	22.4	-	54.0	-
2.488	V	52.4	-	28.4	-29.1	0.0	51.7	74.0	22.3	-	54.0	-
1.104	V	49.0	-	24.4	-31.5	0.0	41.9	74.0	32.1	-	54.0	-
1.196	V	53.9	-	25.2	-31.3	0.0	47.8	74.0	26.2	-	54.0	-
1.232	V	47.7	-	25.1	-31.1	0.0	41.7	74.0	32.3	-	54.0	-
1.595	V	56.4	-	25.6	-30.3	0.0	51.7	74.0	22.3	-	54.0	-
1.832	H	43.0	29.3	27.4	-29.9	0.0	40.5	NR*2	-	26.8	NR*2	-
2.337	H	49.8	-	28.1	-29.3	0.0	48.6	74.0	25.4	-	54.0	-
2.358	H	49.9	-	28.1	-29.2	0.0	48.8	74.0	25.2	-	54.0	-
2.380	H	48.5	-	28.2	-29.2	0.0	47.5	74.0	26.5	-	54.0	-
2.385	H	49.6	-	28.2	-29.2	0.0	48.6	74.0	25.4	-	54.0	-
4.839	H	49.7	-	27.0	-26.5	0.0	50.2	74.0	23.8	-	54.0	-
4.885	H	51.4	-	27.0	-26.6	0.0	51.8	74.0	22.2	-	54.0	-
4.901	H	50.4	-	27.0	-26.6	0.0	50.8	74.0	23.2	-	54.0	-
4.945	H	55.5	26.0	27.1	-26.4	0.0	56.2	74.0	17.8	26.7	54.0	27.3
5.161	V	38.3	26.0	27.2	-26.0	0.0	39.5	NR*2	-	27.2	NR*2	-
7.315	V	36.8	-	29.8	-24.4	0.0	42.2	74.0	31.8	-	54.0	-

Table 2-14 Ch.11 (2462MHz) DSSS 1Mbps **TX** mode

Frequency (GHz)	Polarity (H/V)	Measured (dBμV) (peak)	Measured (dBμV) (average)	Antenna Factor (dB/m)	Corr. Factor (dB)	Falloff Factor (dB)	Field Strength (dBμV/m)	FCC Limit (dBμV/m)	Margin to limit (dB)	Field Strength (dBμV/m)	FCC Limit (dBμV/m)	Margin to limit (dB)
							(peak)			(average)		
Inband												
2.461	V	107.9	103.5	28.4	-29.2	0.0	107.1	OB*1	-	102.7	OB*1	-
bandedge												
2.484	V	55.3	46.8	28.4	-29.1	0.0	54.6	74.0	19.4	46.1	54.0	7.9
2.489	V	57.9	50.8	28.4	-29.1	0.0	57.2	74.0	16.8	50.1	54.0	3.9
2.502	V	54.0	-	28.4	-29.1	0.0	53.3	74.0	20.7	-	54.0	-
1.096	V	50.1	-	24.4	-31.5	0.0	43.0	74.0	31.0	-	54.0	-
1.197	V	55.8	-	25.2	-31.3	0.0	49.7	74.0	24.3	-	54.0	-
1.232	V	49.4	-	25.1	-31.1	0.0	43.4	74.0	30.6	-	54.0	-
1.596	V	56.6	-	25.6	-30.3	0.0	51.9	74.0	22.1	-	54.0	-
1.879	V	44.1	29.6	27.5	-29.9	0.0	41.7	NR*2	-	27.2	NR*2	-
2.286	H	48.3	-	27.8	-29.3	0.0	46.8	74.0	27.2	-	54.0	-
2.361	H	50.5	-	28.1	-29.2	0.0	49.4	74.0	24.6	-	54.0	-
2.380	H	49.0	-	28.2	-29.2	0.0	48.0	74.0	26.0	-	54.0	-
2.386	H	48.6	-	28.2	-29.2	0.0	47.6	74.0	26.4	-	54.0	-
4.860	H	47.6	-	27.0	-26.6	0.0	48.0	74.0	26.0	-	54.0	-
4.890	H	50.3	-	27.0	-26.6	0.0	50.7	74.0	23.3	-	54.0	-
4.924	H	53.2	-	27.0	-26.4	0.0	53.8	74.0	20.2	-	54.0	-
4.945	H	55.9	26.1	27.1	-26.4	0.0	56.6	74.0	17.4	26.8	54.0	27.2
5.284	H	39.2	25.7	27.1	-25.9	0.0	40.4	NR*2	-	26.9	NR*2	-
7.384	V	38.7	-	29.8	-24.5	0.0	44.0	74.0	30.0	-	54.0	-

Table 2-15 Ch.6 (2437MHz) DSSS **RX** mode

Frequency (GHz)	Polarity (H/V)	Measured (dBμV) (peak)	Measured (dBμV) (average)	Antenna Factor (dB/m)	Corr. Factor (dB)	Falloff Factor (dB)	Field Strength (dBμV/m)	FCC Limit (dBμV/m)	Margin to limit (dB)	Field Strength (dBμV/m)	FCC Limit (dBμV/m)	Margin to limit (dB)
							(peak)			(average)		
1.096	V	48.2	-	24.5	-31.5	0.0	41.2	74.0	32.8	-	54.0	-
1.196	V	56.1	-	25.2	-31.3	0.0	50.0	74.0	24.0	-	54.0	-
1.232	V	47.5	-	25.1	-31.1	0.0	41.5	74.0	32.5	-	54.0	-
1.593	V	58.7	39.0	25.6	-30.3	0.0	54.0	74.0	20.0	34.3	54.0	19.7
1.818	H	42.8	29.4	26.9	-29.9	0.0	39.8	NR*2	-	26.4	NR*2	-
1.899	V	44.6	29.6	27.6	-29.7	0.0	42.5	NR*2	-	27.5	NR*2	-
5.198	H	38.8	25.9	27.1	-26.1	0.0	39.8	NR*2	-	26.9	NR*2	-
5.287	H	38.0	25.8	27.1	-25.9	0.0	39.2	NR*2	-	27.0	NR*2	-

2.5.4 EUT in 5.8GHz Tablet operation mode

The representative worst case of conducted peak transmission power in previous Table 1-4 was selected and tested with the co-located Bluetooth device (FCC ID: [ANO20040700HER](#)) in active and transmitting simultaneously.

*Note: OB means “operation band” (5725-5850MHz); in this case limit is 1W (measured conducted with power meter)

Table 2-16 Ch.149 (5745MHz) OFDM 6Mbps **TX** mode

Frequency (GHz)	Polarity (H/V)	Measured (dBμV) (peak)	Measured (dBμV) (average)	Antenna Factor (dB/m)	Corr. Factor (dB)	Falloff Factor (dB)	Field Strength (dBμV/m)	FCC Limit (dBμV/m)	Margin to limit (dB)	Field Strength (dBμV/m)	FCC Limit (dBμV/m)	Margin to limit (dB)
							(peak)			(average)		
Inband 5.743	V	100.3	90.3	34.0	-25.6	0.0	108.7	OB*	-	98.7	OB*	-
1.098	V	48.0	-	24.4	-31.5	0.0	40.9	74.0	33.1	-	54.0	-
1.198	V	56.9	-	25.2	-31.3	0.0	50.8	74.0	23.2	-	54.0	-
1.497	V	46.9	-	25.5	-30.5	0.0	41.9	74.0	32.1	-	54.0	-
1.597	V	55.6	-	25.6	-30.3	0.0	50.9	74.0	23.1	-	54.0	-
4.822	H	49.8	-	27.1	-26.6	0.0	50.3	74.0	23.7	-	54.0	-
4.906	H	52.3	-	27.0	-26.6	0.0	52.7	74.0	21.3	-	54.0	-
4.924	H	53.7	28.4	27.0	-26.4	0.0	54.3	74.0	19.7	29.0	54.0	25.0
4.955	H	57.2	29.1	27.1	-26.6	0.0	57.7	74.0	16.3	29.6	54.0	24.4
5.458	V	44.6	-	34.2	-25.7	0.0	53.1	74.0	20.9	-	54.0	-
7.663	V	39.3	-	30.0	-24.3	0.0	45.0	74.0	29.0	-	54.0	-
11.493	V	35.5	-	33.5	-20.2	0.0	48.8	74.0	25.2	-	54.0	-

Table 2-17 Ch.157 (5785MHz) OFDM 6Mbps **TX** mode

Frequency (GHz)	Polarity (H/V)	Measured (dBμV) (peak)	Measured (dBμV) (average)	Antenna Factor (dB/m)	Corr. Factor (dB)	Falloff Factor (dB)	Field Strength (dBμV/m)	FCC Limit (dBμV/m)	Margin to limit (dB)	Field Strength (dBμV/m)	FCC Limit (dBμV/m)	Margin to limit (dB)
							(peak)			(average)		
Inband 5.780	H	98.4	88.0	34.0	-25.5	0.0	106.9	OB*	-	96.5	OB*	-
1.086	V	47.0	-	24.5	-31.5	0.0	40.0	74.0	34.0	-	54.0	-
1.198	V	53.9	-	25.2	-31.3	0.0	47.8	74.0	26.2	-	54.0	-
1.507	V	47.6	-	25.5	-30.5	0.0	42.6	74.0	31.4	-	54.0	-
1.597	V	55.5	-	25.6	-30.3	0.0	50.8	74.0	23.2	-	54.0	-
4.816	H	49.2	-	27.1	-26.6	0.0	49.7	74.0	24.3	-	54.0	-
4.908	H	51.5	-	27.0	-26.6	0.0	51.9	74.0	22.1	-	54.0	-
4.934	H	54.8	28.7	27.1	-26.4	0.0	55.5	74.0	18.5	29.4	54.0	24.6
4.955	H	55.3	29.1	27.1	-26.6	0.0	55.8	74.0	18.2	29.6	54.0	24.4
5.444	H	43.0	-	34.2	-25.7	0.0	51.5	74.0	22.5	-	54.0	-
7.715	V	40.4	-	30.0	-24.2	0.0	46.2	74.0	27.8	-	54.0	-
11.575	H	35.9	-	33.5	-19.7	0.0	49.7	74.0	24.3	-	54.0	-

Table 2-18 Ch.165 (5825MHz) OFDM 6Mbps **TX** mode

Frequency (GHz)	Polarity (H/V)	Measured (dBμV) (peak)	Measured (dBμV) (average)	Antenna Factor (dB/m)	Corr. Factor (dB)	Falloff Factor (dB)	Field Strength (dBμV/m)	FCC Limit (dBμV/m)	Margin to limit (dB)	Field Strength (dBμV/m)	FCC Limit (dBμV/m)	Margin to limit (dB)
							(peak)			(average)		
Inband 5.820	H	98.4	87.9	34.0	-25.6	0.0	106.8	OB*	-	96.3	OB*	-
1.036	V	50.8	-	24.6	-31.8	0.0	43.6	74.0	30.4	-	54.0	-
1.196	V	54.5	-	25.2	-31.3	0.0	48.4	74.0	25.6	-	54.0	-
1.469	V	49.0	-	25.1	-30.6	0.0	43.5	74.0	30.5	-	54.0	-
1.597	V	57.1	-	25.6	-30.3	0.0	52.4	74.0	21.6	-	54.0	-
4.818	H	49.6	-	27.1	-26.6	0.0	50.1	74.0	23.9	-	54.0	-
4.898	H	51.7	-	27.0	-26.6	0.0	52.1	74.0	21.9	-	54.0	-
4.948	H	56.2	29.4	27.1	-26.4	0.0	56.9	74.0	17.1	30.1	54.0	23.9
4.963	H	55.1	29.3	27.1	-26.6	0.0	55.6	74.0	18.4	29.8	54.0	24.2
5.353	V	45.9	33.0	33.9	-25.6	0.0	54.2	74.0	19.8	41.3	54.0	12.7
7.587	H	38.4	-	29.9	-24.4	0.0	43.9	74.0	30.1	-	54.0	-
11.653	V	35.0	-	33.6	-20.0	0.0	48.6	74.0	25.4	-	54.0	-

Table 2-19 Ch.157 (5785MHz) OFDM **RX** mode

Frequency (GHz)	Polarity (H/V)	Measured (dBμV) (peak)	Measured (dBμV) (average)	Antenna Factor (dB/m)	Corr. Factor (dB)	Falloff Factor (dB)	Field Strength (dBμV/m)	FCC Limit (dBμV/m)	Margin to limit (dB)	Field Strength (dBμV/m)	FCC Limit (dBμV/m)	Margin to limit (dB)
							(peak)			(average)		
1.020	V	50.3	-	24.3	-31.9	0.0	42.7	74.0	31.3	-	54.0	-
1.198	V	55.4	-	25.2	-31.3	0.0	49.3	74.0	24.7	-	54.0	-
1.399	V	46.5	-	25.8	-30.7	0.0	41.6	74.0	32.4	-	54.0	-
1.595	V	57.2	-	25.6	-30.3	0.0	52.5	74.0	21.5	-	54.0	-

3. Restricted Bands Radiation (30MHz – 1GHz)

[FCC 15.205 / 209, RSS-210 6.3 / 7.3]

3.1 Test Procedure

Preliminary radiated emissions are measured in the semi-anechoic chamber at a 3 meter distance on every azimuth in both horizontal and vertical polarity. The antennas are also scanned in height. The emissions are recorded with a spectrum analyzer in peak hold mode. The identified emissions are further maximized by a cable manipulation. Emissions closest to the limits are measured in the quasi-peak mode with the tuned receiver using a bandwidth of 120kHz. The highest emissions relative to the limit are listed.

3.2 Test Instruments and Measurement Setup

Table 3-1 Radiated Emission Test Instrumentation

Description	Model	Serial Number
Computer	IBM 6868-30J	97-901X3
Spectrum Analyzer (100Hz-1.5GHz) for 30-200MHz	HP 85680B	2732A03651
Spectrum Analyzer Display for 30-200MHz	HP 85662A	2648A15255
Quasi-Peak Adapter for 30-200MHz	HP 85650A	2521A00968
Spectrum Analyzer (100Hz-1.5GHz) for 200-1000MHz	HP 85680B	2841A04254
Spectrum Analyzer Display for 200-1000MHz	HP 85662A	2816A16831
Quasi-Peak Adapter for 200-1000MHz	HP 85650A	2811A01156
Amplifier (100KHz-1.3GHz)		
- for 30-200MHz	MITEQ AM-3A	898433
- for 200-1000MHz	MITEQ AM-3A	898432
Biconical Antenna (30-200MHz)	EMCO 3108	2536
Log-Periodic Antenna (200-1000MHz)	EMCO 3146	2849
Receiver (20MHz-1.3GHz)	R&S ESVP	892111/026
Switch/control unit	HP 3488A	2719A17226
N-Coax cables:	Length:	
- Bi-coni Ant <=> 10m Cable	9 m	- EM103L01
- 10m Cable <=> Shield Panel	10 m	- EM103L02
- Shield Panel <=> RF Amp	7 m	- EM103L03
- RF Amp <=> Power Splitter	0.5m	- EM103L04
- Log-peri Ant <=> 10m Cable	9 m	- EM103H01
- 10m Cable <=> Shield Panel	10 m	- EM103H02
- Shield Panel <=> RF Amp	7 m	- EM103H03
- RF Amp <=> Power Splitter	0.5m	- EM103H04
Coax cables:		
- Power Splitter <=> SW/Con.unit (SW110)	1 m	- EM103L05
- Power Splitter <=> SW/Con.unit (SW300)	1 m	- EM103L06
- Power Splitter <=> SW/Con.unit (SW100)	1 m	- EM103H05
- Power Splitter <=> SW/Con.unit (SW301)	1 m	- EM103H06
- SW/Con.unit <=> Receiver (Input)	2 m	- EM1RCV
- SW/Con.unit <=> Spe Ana.(Signal In) for 30- 200MHz	2 m	- EM1SPL
- SW/Con.unit <=> Spe Ana.(Signal In) for 200-1000MHz	2 m	- EM1SPH

Notes: HP: Hewlett Packard, R&S: Rohde & Schwarz

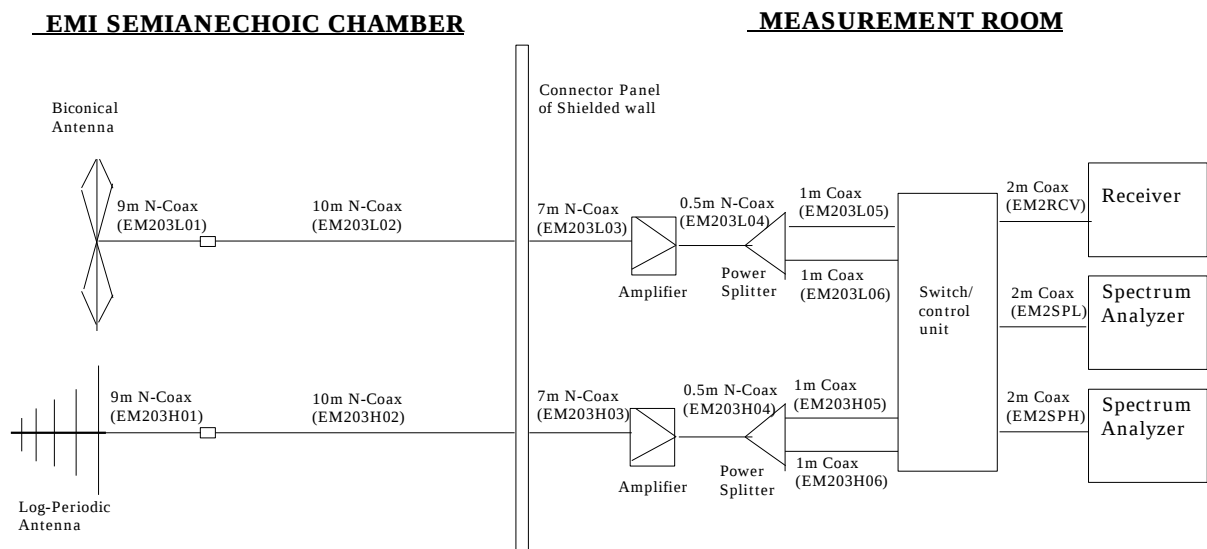


Figure 3 Cables for Radiated Emission Test

3.3 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Loss, and subtracting Amplifier Gain from the measured reading. In this test facility, the Antenna Factor, Cable Loss, and Amplifier Gains are loaded into the Rohde & Schwarz Receiver and the corrected field strength can be read directly on the receiver. All factors are included in the reported data.

$$FS = R + AF + CORR$$

where:

FS	=	Field Strength
R	=	Measured Receiver Input Amplitude
AF	=	Antenna Factor
CORR	=	Correction Factor = CL - AG
CL	=	Cable Loss
AG	=	Amplifier Gain

For example:

Given a Receiver input reading of 51.5dBμV; Antenna Factor of 8.5dB/m; Cable Loss of 1.3dB; and an Amplifier Gain of 26dB. The Field Strength of the measured emission is:

$$FS = 51.5 + 8.5 + 1.3 - 26.0 = 35.3\text{dB}\mu\text{V/m}$$

Conversion between dBμV/m (or dBμV) and μV/m (or μV) are done as:

$$\text{Level(dB}\mu\text{V/m)} = 20 \times \text{Log(Level(}\mu\text{V/m))}$$

$$40\text{dB}\mu\text{V/m} = 100\mu\text{V/m}$$

$$48\text{dB}\mu\text{V/m} = 250\mu\text{V/m}$$

3.4 Measurement Results

The same worst cases selected for the previous Chapter 2 were tested with the co-located Bluetooth device (FCC ID: [ANO20040700HER](#)) in active and transmitting simultaneously.

The EUT was found to comply to the limits of FCC Part 15 Subpart C and RSS-210 with a margin of 7.1dB at 30MHz - 1000MHz band.

The 6 highest emissions relative to the limits are reported.

Test Date: February 17 and March 1, 2005

3.4.1 EUT in 2.4GHz Notebook operation mode

Table 3-2. Ch.1 (2412MHz) OFDM 6Mbps **TX** mode

Frequency (MHz)	Polarity (H/V)	Measured (dBμV)	Antenna Factor (dB/m)	Corr. Factor (dB)	Field Strength (dBμV/m)	Limit (dBμV/m)	Margin to limit (dB)	Field Strength (μV/m)	Limit (μV/m)
61.769	V	51.9	9.1	-28.6	32.4	40.0	7.6	41.7	100
78.435	H	51.6	7.8	-28.5	30.9	40.0	9.1	35.1	100
226.885	H	42.6	10.5	-24.5	28.6	46.0	17.4	26.9	200
453.953	V	32.2	16.5	-21.6	27.1	46.0	18.9	22.6	200
509.997	V	31.0	18.6	-20.5	29.1	46.0	16.9	28.5	200
798.881	H	34.5	21.1	-18.5	37.1	46.0	8.9	71.6	200

Table 3-3. Ch.6 (2437MHz) OFDM 6Mbps **TX** mode

Frequency (MHz)	Polarity (H/V)	Measured (dBμV)	Antenna Factor (dB/m)	Corr. Factor (dB)	Field Strength (dBμV/m)	Limit (dBμV/m)	Margin to limit (dB)	Field Strength (μV/m)	Limit (μV/m)
60.000	V	51.7	9.3	-28.7	32.3	40.0	7.7	41.2	100
78.320	V	52.0	7.8	-28.5	31.3	40.0	8.7	36.7	100
227.009	H	41.3	10.5	-24.5	27.3	46.0	18.7	23.2	200
259.273	H	41.8	12.0	-24.2	29.6	46.0	16.4	30.2	200
509.998	V	30.8	18.6	-20.5	28.9	46.0	17.1	27.9	200
798.177	H	34.4	21.1	-18.4	37.1	46.0	8.9	71.6	200

Table 3-4. Ch.11 (2462MHz) OFDM 6Mbps **TX** mode

Frequency (MHz)	Polarity (H/V)	Measured (dBμV)	Antenna Factor (dB/m)	Corr. Factor (dB)	Field Strength (dBμV/m)	Limit (dBμV/m)	Margin to limit (dB)	Field Strength (μV/m)	Limit (μV/m)
60.000	V	51.6	9.3	-28.7	32.2	40.0	7.8	40.7	100
78.318	V	51.7	7.8	-28.5	31.0	40.0	9.0	35.5	100
227.009	H	41.6	10.5	-24.5	27.6	46.0	18.4	24.0	200
258.000	H	39.7	12.0	-23.9	27.8	46.0	18.2	24.5	200
509.997	V	31.2	18.6	-20.5	29.3	46.0	16.7	29.2	200
799.090	H	34.8	21.1	-18.5	37.4	46.0	8.6	74.1	200

Table 3-5. Ch.6 (2437MHz) OFDM **RX** mode

Frequency (MHz)	Polarity (H/V)	Measured (dBμV)	Antenna Factor (dB/m)	Corr. Factor (dB)	Field Strength (dBμV/m)	Limit (dBμV/m)	Margin to limit (dB)	Field Strength (μV/m)	Limit (μV/m)
60.000	V	50.9	9.3	-28.7	31.5	40.0	8.5	37.6	100
78.428	V	52.4	7.8	-28.5	31.7	40.0	8.3	38.5	100
227.008	H	41.5	10.5	-24.5	27.5	46.0	18.5	23.7	200
257.998	H	39.0	12.0	-23.9	27.1	46.0	18.9	22.6	200
509.999	V	31.2	18.6	-20.5	29.3	46.0	16.7	29.2	200
798.536	H	34.8	21.1	-18.5	37.4	46.0	8.6	74.1	200

3.4.2 EUT in 5.8GHz Notebook operation mode

Table 3-6. Ch.149 (5745MHz) OFDM 6Mbps **TX** mode

Frequency (MHz)	Polarity (H/V)	Measured (dBμV)	Antenna Factor (dB/m)	Corr. Factor (dB)	Field Strength (dBμV/m)	Limit (dBμV/m)	Margin to limit (dB)	Field Strength (μV/m)	Limit (μV/m)
61.727	V	52.4	9.1	-28.6	32.9	40.0	7.1	44.2	100
173.999	H	40.9	12.6	-26.9	26.6	43.5	16.9	21.4	150
226.790	V	40.8	10.5	-24.5	26.8	46.0	19.2	21.9	200
270.000	V	40.9	12.5	-23.9	29.5	46.0	16.5	29.9	200
453.558	V	32.2	16.5	-21.3	27.4	46.0	18.6	23.4	200
797.679	H	33.6	21.1	-18.4	36.3	46.0	9.7	65.3	200

Table 3-7. Ch.157 (5785MHz) OFDM 6Mbps **TX** mode

Frequency (MHz)	Polarity (H/V)	Measured (dBμV)	Antenna Factor (dB/m)	Corr. Factor (dB)	Field Strength (dBμV/m)	Limit (dBμV/m)	Margin to limit (dB)	Field Strength (μV/m)	Limit (μV/m)
62.086	V	51.3	9.1	-28.6	31.8	40.0	8.2	38.9	100
174.000	V	40.7	12.6	-26.9	26.4	43.5	17.1	20.9	150
258.000	H	41.6	12.0	-23.9	29.7	46.0	16.3	30.5	200
269.998	H	42.3	12.5	-23.9	30.9	46.0	15.1	35.1	200
453.759	V	32.3	16.5	-21.6	27.2	46.0	18.8	22.9	200
797.826	H	33.9	21.1	-18.4	36.6	46.0	9.4	67.6	200

Table 3-8. Ch.165 (5825MHz) OFDM 6Mbps **TX** mode

Frequency (MHz)	Polarity (H/V)	Measured (dBμV)	Antenna Factor (dB/m)	Corr. Factor (dB)	Field Strength (dBμV/m)	Limit (dBμV/m)	Margin to limit (dB)	Field Strength (μV/m)	Limit (μV/m)
61.483	V	49.0	9.1	-28.6	29.5	40.0	10.5	29.9	100
174.000	H	39.3	12.6	-26.9	25.0	43.5	18.5	17.8	150
226.884	H	41.2	10.5	-24.5	27.2	46.0	18.8	22.9	200
258.000	H	41.2	12.0	-23.9	29.3	46.0	16.7	29.2	200
269.998	H	42.7	12.5	-23.9	31.3	46.0	14.7	36.7	200
797.895	H	31.5	21.1	-18.4	34.2	46.0	11.8	51.3	200

Table 3-9. Ch.157 (5785MHz) OFDM **RX** mode

Frequency (MHz)	Polarity (H/V)	Measured (dBμV)	Antenna Factor (dB/m)	Corr. Factor (dB)	Field Strength (dBμV/m)	Limit (dBμV/m)	Margin to limit (dB)	Field Strength (μV/m)	Limit (μV/m)
61.870	V	48.1	9.1	-28.5	28.7	40.0	11.3	27.2	100
174.000	H	41.1	12.6	-26.9	26.8	43.5	16.7	21.9	150
257.999	H	41.6	12.0	-23.9	29.7	46.0	16.3	30.5	200
270.000	H	43.2	12.5	-23.9	31.8	46.0	14.2	38.9	200
509.999	V	29.9	18.6	-20.5	28.0	46.0	18.0	25.1	200
797.737	H	34.4	21.1	-18.4	37.1	46.0	8.9	71.6	200

3.4.3 EUT in 2.4GHz Tablet operation mode

Table 3-10. Ch.1 (2412MHz) DSSS 1Mbps **TX** mode

Frequency (MHz)	Polarity (H/V)	Measured (dBμV)	Antenna Factor (dB/m)	Corr. Factor (dB)	Field Strength (dBμV/m)	Limit (dBμV/m)	Margin to limit (dB)	Field Strength (μV/m)	Limit (μV/m)
61.504	V	51.0	9.1	-28.6	31.5	40.0	8.5	37.6	100
79.340	V	47.4	7.7	-28.4	26.7	40.0	13.3	21.6	100
498.787	H	28.0	17.8	-20.8	25.0	46.0	21.0	17.8	200
565.770	H	24.8	18.2	-20.2	22.8	46.0	23.2	13.8	200
631.636	H	28.9	19.1	-19.4	28.6	46.0	17.4	26.9	200
798.010	H	32.1	21.1	-18.4	34.8	46.0	11.2	55.0	200

Table 3-11. Ch.6 (2437MHz) DSSS 1Mbps **TX** mode

Frequency (MHz)	Polarity (H/V)	Measured (dBμV)	Antenna Factor (dB/m)	Corr. Factor (dB)	Field Strength (dBμV/m)	Limit (dBμV/m)	Margin to limit (dB)	Field Strength (μV/m)	Limit (μV/m)
61.410	V	51.0	9.1	-28.5	31.6	40.0	8.4	38.0	100
79.032	V	49.4	7.7	-28.4	28.7	40.0	11.3	27.2	100
498.812	H	27.6	17.8	-20.8	24.6	46.0	21.4	17.0	200
565.013	V	25.5	18.2	-20.1	23.6	46.0	22.4	15.1	200
632.386	H	27.9	19.2	-19.5	27.6	46.0	18.4	24.0	200
797.890	H	32.4	21.1	-18.4	35.1	46.0	10.9	56.9	200

Table 3-12. Ch.11 (2462MHz) DSSS 1Mbps **TX** mode

Frequency (MHz)	Polarity (H/V)	Measured (dBμV)	Antenna Factor (dB/m)	Corr. Factor (dB)	Field Strength (dBμV/m)	Limit (dBμV/m)	Margin to limit (dB)	Field Strength (μV/m)	Limit (μV/m)
61.391	V	50.8	9.1	-28.5	31.4	40.0	8.6	37.2	100
79.340	V	49.6	7.7	-28.4	28.9	40.0	11.1	27.9	100
453.595	V	27.6	16.5	-21.3	22.8	46.0	23.2	13.8	200
498.813	H	26.8	17.8	-20.8	23.8	46.0	22.2	15.5	200
632.189	H	25.8	19.2	-19.5	25.5	46.0	20.5	18.8	200
797.848	H	31.4	21.1	-18.4	34.1	46.0	11.9	50.7	200

Table 3-13. Ch.6 (2437MHz) DSSS **RX** mode

Frequency (MHz)	Polarity (H/V)	Measured (dBμV)	Antenna Factor (dB/m)	Corr. Factor (dB)	Field Strength (dBμV/m)	Limit (dBμV/m)	Margin to limit (dB)	Field Strength (μV/m)	Limit (μV/m)
61.834	V	51.6	9.1	-28.5	32.2	40.0	7.8	40.7	100
79.340	V	49.7	7.7	-28.4	29.0	40.0	11.0	28.2	100
498.971	H	27.5	17.8	-20.8	24.5	46.0	21.5	16.8	200
565.381	H	26.6	18.2	-20.1	24.7	46.0	21.3	17.2	200
632.124	H	26.3	19.2	-19.5	26.0	46.0	20.0	20.0	200
797.389	H	31.0	21.1	-18.7	33.4	46.0	12.6	46.8	200

3.4.4 EUT in 5.8GHz Tablet operation mode

Table 3-14. Ch.149 (5745MHz) OFDM 6Mbps **TX** mode

Frequency (MHz)	Polarity (H/V)	Measured (dBμV)	Antenna Factor (dB/m)	Corr. Factor (dB)	Field Strength (dBμV/m)	Limit (dBμV/m)	Margin to limit (dB)	Field Strength (μV/m)	Limit (μV/m)
61.778	V	51.7	9.1	-28.6	32.2	40.0	7.8	40.7	100
167.999	V	40.8	12.4	-27.1	26.1	43.5	17.4	20.2	150
173.998	V	37.9	12.6	-26.9	23.6	43.5	19.9	15.1	150
564.914	V	26.1	18.2	-20.1	24.2	46.0	21.8	16.2	200
599.998	H	28.5	18.7	-19.8	27.4	46.0	18.6	23.4	200
797.830	H	32.2	21.1	-18.4	34.9	46.0	11.1	55.6	200

Table 3-15. Ch.157 (5785MHz) OFDM 6Mbps **TX** mode

Frequency (MHz)	Polarity (H/V)	Measured (dBμV)	Antenna Factor (dB/m)	Corr. Factor (dB)	Field Strength (dBμV/m)	Limit (dBμV/m)	Margin to limit (dB)	Field Strength (μV/m)	Limit (μV/m)
62.021	V	51.6	9.1	-28.6	32.1	40.0	7.9	40.3	100
132.000	V	37.7	12.0	-27.5	22.2	43.5	21.3	12.9	150
167.999	V	40.6	12.4	-27.1	25.9	43.5	17.6	19.7	150
173.999	V	37.8	12.6	-26.9	23.5	43.5	20.0	15.0	150
599.997	H	31.4	18.7	-19.8	30.3	46.0	15.7	32.7	200
798.737	H	31.1	21.1	-18.5	33.7	46.0	12.3	48.4	200

Table 3-16. Ch.165 (5825MHz) OFDM 6Mbps **TX** mode

Frequency (MHz)	Polarity (H/V)	Measured (dBμV)	Antenna Factor (dB/m)	Corr. Factor (dB)	Field Strength (dBμV/m)	Limit (dBμV/m)	Margin to limit (dB)	Field Strength (μV/m)	Limit (μV/m)
61.327	V	51.7	9.1	-28.5	32.3	40.0	7.7	41.2	100
168.000	V	40.6	12.4	-27.1	25.9	43.5	17.6	19.7	150
498.756	H	28.2	17.8	-20.8	25.2	46.0	20.8	18.2	200
565.251	V	27.9	18.2	-20.1	26.0	46.0	20.0	20.0	200
599.998	H	28.9	18.7	-19.8	27.8	46.0	18.2	24.5	200
797.782	H	31.7	21.1	-18.4	34.4	46.0	11.6	52.5	200

Table 3-17. Ch.157 (5785MHz) OFDM **RX** mode

Frequency (MHz)	Polarity (H/V)	Measured (dBμV)	Antenna Factor (dB/m)	Corr. Factor (dB)	Field Strength (dBμV/m)	Limit (dBμV/m)	Margin to limit (dB)	Field Strength (μV/m)	Limit (μV/m)
61.008	V	51.5	9.1	-28.7	31.9	40.0	8.1	39.4	100
167.999	V	39.4	12.4	-27.1	24.7	43.5	18.8	17.2	150
498.765	H	27.4	17.8	-20.8	24.4	46.0	21.6	16.6	200
565.536	V	25.6	18.2	-20.1	23.7	46.0	22.3	15.3	200
630.995	H	26.8	19.1	-19.6	26.3	46.0	19.7	20.7	200
798.064	H	31.2	21.1	-18.4	33.9	46.0	12.1	49.5	200

4. AC Wireline Conducted Emissions (150KHz – 30MHz)

[FCC 15.207, RSS-210 6.6 / 7.4]

4.1 Test Procedure

The conducted emissions are measured in the IBM shielded room with a spectrum analyzer in peak hold. Emissions closest to the limit are measured in the quasi-peak mode (QP) with the tuned receiver using a bandwidth of 9kHz. The emissions are maximized further by cable manipulation. The highest emissions relative to the limit are listed.

4.2 Test Instruments and Measurement Setup

Table 4-1. Conducted Emission Test Instrumentation

Description	Model	Serial Number
Computer	IBM 6589-13J	97-15613
Spectrum Analyzer (100Hz-1.5GHz)	HP 85680B	3019A05156
Spectrum Analyzer Display	HP 85662A	3026A19366
Quasi-Peak Adapter	HP 85650A	2811A01433
Receiver (9kHz-30MHz)	R&S ESH3	891806/012
LISN	EMCO 3810/2NM	00022007
Switch/control unit	HP 3488A	2719A17228
Plotter	HP 7550A	2631A33619
Coax cables: - Lisen-L <=> SW/Con.unit (SW100) - Lisen-N <=> SW/Con.unit (SW101) - SW/Con.unit <=> RCVR (Input) - SW/Con.unit<=> Spe Ana.(Signal In)	Length: 4 m 4 m 1 m 1 m	- EMIC-L - EMIC-N - EMIC-R - EMIC-S

Notes: - HP: Hewlett Packard, R&S: Rohde & Schwarz

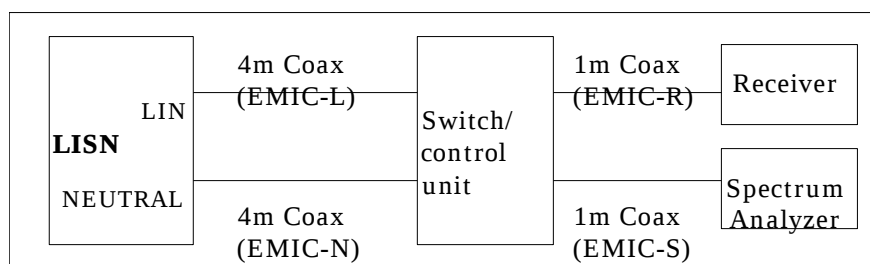


Figure 4. Cables for Conducted Emission Test

4.3 Powerline Voltage Calculation

The powerline voltage is calculated by adding insertion losses of LISN, Cable, Switch control unit and Pulse limiter to the measured reading. All factors are included in the reported data.

$$PV = R + CORR$$

where:

PV = Powerline Voltage (dBμV)

R = Measured Receiver Input Amplitude (dBμV)

CORR = Correction Factor (dB) = LL+CL+SWL+PLL

LL = Insertion loss of LISN (dB)

CL = Insertion loss of Cable (dB)

SWL = Insertion loss of Switch control unit (dB)

PLL = Insertion loss of Pulse Limiter (dB)

Given a Receiver input reading of 50.0 dBμV, LISN loss of 0.6 dB, Cable loss of 0.1dB, Switch control unit loss of 0.1dB and Pulse limiter loss of 0.2dB. The Powerline Voltage of the measured emission is:

$$CORR = 0.6 + 0.1 + 0.1 + 0.2 = 1.0 \text{ (dB)}$$

$$PV = 50.0 + 1.0 = 51.0 \text{ (dBμV)}$$

4.4 Measurement Results

The same worst cases selected for the previous Chapter 2 were tested with the co-located Bluetooth device (FCC ID: [ANO20040700HER](#)) in active and transmitting simultaneously.

The EUT was found to comply to the limits of FCC Part 15 Subpart C and RSS-210 with a margin of 10.1dB. The 6 highest emissions relative to the limits are reported.

Test Date: February 28, 2005

4.4.1 EUT in 2.4GHz Notebook operation mode

Table 4-2. Ch.1 (2412MHz) OFDM 6Mbps **TX** mode

Frq. (MHz)	QP			AV			CISPR22 QP Limit (dBμV)	Margin to limit (dB)	CISPR22 AV Limit (dBμV)	Margin to limit (dB)	Phase
	Measured Reading (dBμV)	Corr. Factor (dB)	Powerline Voltage (dBμV)	Measured Reading (dBμV)	Corr. Factor (dB)	Powerline Voltage (dBμV)					
0.1921	51.8	0.5	52.3	43.3	0.5	43.8	63.9	11.6	53.9	10.1	Line
0.2556	42.8	0.6	43.4	35.0	0.6	35.6	61.6	18.2	51.6	16.0	Neutral
0.3189	37.9	0.6	38.5	29.6	0.6	30.2	59.7	21.2	49.7	19.5	Neutral
0.4453	34.4	0.6	35.0	31.2	0.6	31.8	57.0	22.0	47.0	15.2	Neutral
0.5109	32.1	0.6	32.7	27.0	0.6	27.6	56.0	23.3	46.0	18.4	Line
0.5684	30.3	0.6	30.9	28.1	0.6	28.7	56.0	25.1	46.0	17.3	Neutral

Table 4-3. Ch.6 (2437MHz) OFDM 6Mbps **TX** mode

Frq. (MHz)	QP			AV			CISPR22 QP Limit (dBμV)	Margin to limit (dB)	CISPR22 AV Limit (dBμV)	Margin to limit (dB)	Phase
	Measured Reading (dBμV)	Corr. Factor (dB)	Powerline Voltage (dBμV)	Measured Reading (dBμV)	Corr. Factor (dB)	Powerline Voltage (dBμV)					
0.1935	48.7	0.5	49.2	40.3	0.5	40.8	63.9	14.7	53.9	13.1	Line
0.2526	42.4	0.6	43.0	35.3	0.6	35.9	61.7	18.7	51.7	15.8	Neutral
0.3800	31.2	0.6	31.8	24.4	0.6	25.0	58.3	26.5	48.3	23.3	Neutral
0.4458	34.0	0.6	34.6	30.8	0.6	31.4	57.0	22.4	47.0	15.6	Neutral
0.5080	30.7	0.6	31.3	27.3	0.6	27.9	56.0	24.7	46.0	18.1	Neutral
0.5731	29.6	0.6	30.2	27.2	0.6	27.8	56.0	25.8	46.0	18.2	Neutral

Table 4-4. Ch.11 (2462MHz) OFDM 6Mbps **TX** mode

Frq. (MHz)	QP			AV			CISPR22 QP Limit (dBμV)	Margin to limit (dB)	CISPR22 AV Limit (dBμV)	Margin to limit (dB)	Phase
	Measured Reading (dBμV)	Corr. Factor (dB)	Powerline Voltage (dBμV)	Measured Reading (dBμV)	Corr. Factor (dB)	Powerline Voltage (dBμV)					
0.1917	49.7	0.5	50.2	41.5	0.5	42.0	64.0	13.8	54.0	12.0	Line
0.3194	35.0	0.6	35.6	27.7	0.6	28.3	59.7	24.1	49.7	21.4	Neutral
0.4464	33.5	0.6	34.1	30.3	0.6	30.9	56.9	22.8	46.9	16.0	Neutral
0.5110	28.4	0.6	29.0	22.3	0.6	22.9	56.0	27.0	46.0	23.1	Line
0.5716	30.6	0.6	31.2	28.5	0.6	29.1	56.0	24.8	46.0	16.9	Neutral
1.9014	24.3	0.7	25.0	21.0	0.7	21.7	56.0	31.0	46.0	24.3	Neutral

Table 4-5. Ch.6 (2437MHz) OFDM RX mode

Frq. (MHz)	QP			AV			CISPR22 QP Limit (dBμV)	Margin to limit (dB)	CISPR22 AV Limit (dBμV)	Margin to limit (dB)	Phase
	Measured Reading (dBμV)	Corr. Factor (dB)	Powerline Voltage (dBμV)	Measured Reading (dBμV)	Corr. Factor (dB)	Powerline Voltage (dBμV)					
0.1929	47.7	0.5	48.2	39.3	0.5	39.8	63.9	15.7	53.9	14.1	Line
0.3201	32.7	0.6	33.3	25.1	0.6	25.7	59.7	26.4	49.7	24.0	Neutral
0.4465	31.8	0.6	32.4	28.7	0.6	29.3	56.9	24.5	46.9	17.6	Neutral
0.5063	30.4	0.6	31.0	27.9	0.6	28.5	56.0	25.0	46.0	17.5	Neutral
0.5705	32.1	0.6	32.7	29.5	0.6	30.1	56.0	23.3	46.0	15.9	Neutral
1.8957	25.5	0.7	26.2	22.6	0.7	23.3	56.0	29.8	46.0	22.7	Neutral

4.4.2 EUT in 5.8GHz Notebook operation mode

Table 4-6. Ch.149 (5745MHz) OFDM 6Mbps TX mode

Frq. (MHz)	QP			AV			CISPR22 QP Limit (dBμV)	Margin to limit (dB)	CISPR22 AV Limit (dBμV)	Margin to limit (dB)	Phase
	Measured Reading (dBμV)	Corr. Factor (dB)	Powerline Voltage (dBμV)	Measured Reading (dBμV)	Corr. Factor (dB)	Powerline Voltage (dBμV)					
0.1929	48.0	0.5	48.5	39.6	0.5	40.1	63.9	15.4	53.9	13.8	Line
0.2562	39.7	0.6	40.3	32.4	0.6	33.0	61.6	21.3	51.6	18.6	Neutral
0.3199	33.9	0.6	34.5	26.4	0.6	27.0	59.7	25.2	49.7	22.7	Neutral
0.4453	34.4	0.6	35.0	32.0	0.6	32.6	57.0	22.0	47.0	14.4	Neutral
0.5074	31.4	0.6	32.0	28.2	0.6	28.8	56.0	24.0	46.0	17.2	Neutral
0.5710	32.5	0.6	33.1	29.6	0.6	30.2	56.0	22.9	46.0	15.8	Neutral

Table 4-7. Ch.157 (5785MHz) OFDM 6Mbps TX mode

Frq. (MHz)	QP			AV			CISPR22 QP Limit (dBμV)	Margin to limit (dB)	CISPR22 AV Limit (dBμV)	Margin to limit (dB)	Phase
	Measured Reading (dBμV)	Corr. Factor (dB)	Powerline Voltage (dBμV)	Measured Reading (dBμV)	Corr. Factor (dB)	Powerline Voltage (dBμV)					
0.1929	48.1	0.5	48.6	39.6	0.5	40.1	63.9	15.3	53.9	13.8	Line
0.2567	39.1	0.6	39.7	31.6	0.6	32.2	61.5	21.8	51.5	19.3	Neutral
0.3195	34.2	0.6	34.8	26.8	0.6	27.4	59.7	24.9	49.7	22.3	Neutral
0.4473	31.9	0.6	32.5	28.8	0.6	29.4	56.9	24.4	46.9	17.5	Neutral
0.5079	31.3	0.6	31.9	27.9	0.6	28.5	56.0	24.1	46.0	17.5	Neutral
0.5719	31.2	0.6	31.8	28.9	0.6	29.5	56.0	24.2	46.0	16.5	Neutral

Table 4-8. Ch.165 (5825MHz) OFDM 6Mbps TX mode

Frq. (MHz)	QP			AV			CISPR22 QP Limit (dBμV)	Margin to limit (dB)	CISPR22 AV Limit (dBμV)	Margin to limit (dB)	Phase
	Measured Reading (dBμV)	Corr. Factor (dB)	Powerline Voltage (dBμV)	Measured Reading (dBμV)	Corr. Factor (dB)	Powerline Voltage (dBμV)					
0.1951	41.1	0.5	41.6	31.6	0.5	32.1	63.8	22.2	53.8	21.7	Line
0.2582	35.0	0.6	35.6	25.2	0.6	25.8	61.5	25.9	51.5	25.7	Neutral
0.3830	29.1	0.6	29.7	22.2	0.6	22.8	58.2	28.5	48.2	25.4	Neutral
0.4453	35.1	0.6	35.7	31.8	0.6	32.4	57.0	21.3	47.0	14.6	Neutral
0.5089	31.5	0.6	32.1	27.3	0.6	27.9	56.0	23.9	46.0	18.1	Neutral
0.5706	32.6	0.6	33.2	29.8	0.6	30.4	56.0	22.8	46.0	15.6	Neutral

Table 4-9. Ch.157 (5785MHz) OFDM RX mode

Frq. (MHz)	QP			AV			CISPR22 QP Limit (dBμV)	Margin to limit (dB)	CISPR22 AV Limit (dBμV)	Margin to limit (dB)	Phase
	Measured Reading (dBμV)	Corr. Factor (dB)	Powerline Voltage (dBμV)	Measured Reading (dBμV)	Corr. Factor (dB)	Powerline Voltage (dBμV)					
0.1932	46.6	0.5	47.1	38.4	0.5	38.9	63.9	16.8	53.9	15.0	Line
0.2567	36.9	0.6	37.5	30.8	0.6	31.4	61.5	24.0	51.5	20.1	Line
0.3158	35.9	0.6	36.5	28.6	0.6	29.2	59.8	23.3	49.8	20.6	Neutral
0.4447	35.3	0.6	35.9	32.0	0.6	32.6	57.0	21.1	47.0	14.4	Neutral
0.5067	32.1	0.6	32.7	28.9	0.6	29.5	56.0	23.3	46.0	16.5	Line
0.5701	33.2	0.6	33.8	30.3	0.6	30.9	56.0	22.2	46.0	15.1	Neutral

4.4.3 EUT in 2.4GHz Tablet operation mode

Table 4-10. Ch.1 (2412MHz) DSSS 1Mbps TX mode

Frq. (MHz)	QP			AV			CISPR22 QP Limit (dBμV)	Margin to limit (dB)	CISPR22 AV Limit (dBμV)	Margin to limit (dB)	Phase
	Measured Reading (dBμV)	Corr. Factor (dB)	Powerline Voltage (dBμV)	Measured Reading (dBμV)	Corr. Factor (dB)	Powerline Voltage (dBμV)					
0.1931	47.8	0.5	48.3	39.5	0.5	40.0	63.9	15.6	53.9	13.9	Line
0.2560	39.2	0.6	39.8	31.8	0.6	32.4	61.6	21.8	51.6	19.2	Neutral
0.3174	35.2	0.6	35.8	27.7	0.6	28.3	59.8	24.0	49.8	21.5	Neutral
0.4444	34.6	0.6	35.2	31.6	0.6	32.2	57.0	21.8	47.0	14.8	Neutral
0.5078	30.2	0.6	30.8	26.9	0.6	27.5	56.0	25.2	46.0	18.5	Neutral
0.5667	30.3	0.6	30.9	28.2	0.6	28.8	56.0	25.1	46.0	17.2	Neutral

Table 4-11. Ch.6 (2437MHz) DSSS 1Mbps TX mode

Frq. (MHz)	QP			AV			CISPR22 QP Limit (dBμV)	Margin to limit (dB)	CISPR22 AV Limit (dBμV)	Margin to limit (dB)	Phase
	Measured Reading (dBμV)	Corr. Factor (dB)	Powerline Voltage (dBμV)	Measured Reading (dBμV)	Corr. Factor (dB)	Powerline Voltage (dBμV)					
0.1913	49.2	0.5	49.7	40.9	0.5	41.4	64.0	14.3	54.0	12.6	Line
0.2561	39.0	0.6	39.6	31.7	0.6	32.3	61.6	22.0	51.6	19.3	Neutral
0.3193	34.2	0.6	34.8	26.8	0.6	27.4	59.7	24.9	49.7	22.3	Neutral
0.4450	34.3	0.6	34.9	31.2	0.6	31.8	57.0	22.1	47.0	15.2	Neutral
0.5056	31.0	0.6	31.6	28.1	0.6	28.7	56.0	24.4	46.0	17.3	Neutral
0.5713	30.7	0.6	31.3	29.2	0.6	29.8	56.0	24.7	46.0	16.2	Neutral

Table 4-12. Ch.11 (2462MHz) DSSS 1Mbps TX mode

Frq. (MHz)	QP			AV			CISPR22 QP Limit (dBμV)	Margin to limit (dB)	CISPR22 AV Limit (dBμV)	Margin to limit (dB)	Phase
	Measured Reading (dBμV)	Corr. Factor (dB)	Powerline Voltage (dBμV)	Measured Reading (dBμV)	Corr. Factor (dB)	Powerline Voltage (dBμV)					
0.1933	47.1	0.5	47.6	38.9	0.5	39.4	63.9	16.3	53.9	14.5	Line
0.2554	39.6	0.6	40.2	32.4	0.6	33.0	61.6	21.4	51.6	18.6	Neutral
0.3170	35.6	0.6	36.2	28.2	0.6	28.8	59.8	23.6	49.8	21.0	Neutral
0.4452	34.2	0.6	34.8	31.0	0.6	31.6	57.0	22.2	47.0	15.4	Neutral
0.5099	29.1	0.6	29.7	24.5	0.6	25.1	56.0	26.3	46.0	20.9	Neutral
0.5701	31.7	0.6	32.3	29.2	0.6	29.8	56.0	23.7	46.0	16.2	Neutral

Table 4-13. Ch.6 (2437MHz) DSSS RX mode

Frq. (MHz)	QP			AV			CISPR22 QP Limit (dBµV)	Margin to limit (dB)	CISPR22 AV Limit (dBµV)	Margin to limit (dB)	Phase
	Measured Reading (dBµV)	Corr. Factor (dB)	Powerline Voltage (dBµV)	Measured Reading (dBµV)	Corr. Factor (dB)	Powerline Voltage (dBµV)					
0.1930	47.2	0.5	47.7	38.9	0.5	39.4	63.9	16.2	53.9	14.5	Line
0.2561	37.8	0.6	38.4	31.6	0.6	32.2	61.6	23.2	51.6	19.4	Line
0.4451	33.7	0.6	34.3	30.5	0.6	31.1	57.0	22.7	47.0	15.9	Neutral
0.5078	30.1	0.6	30.7	26.9	0.6	27.5	56.0	25.3	46.0	18.5	Neutral
0.5709	30.8	0.6	31.4	29.1	0.6	29.7	56.0	24.6	46.0	16.3	Neutral
1.8945	25.0	0.7	25.7	22.1	0.7	22.8	56.0	30.3	46.0	23.2	Neutral

4.4.4 EUT in 5.8GHz Tablet operation mode

Table 4-14. Ch.149 (5745MHz) OFDM 6Mbps TX mode

Frq. (MHz)	QP			AV			CISPR22 QP Limit (dBµV)	Margin to limit (dB)	CISPR22 AV Limit (dBµV)	Margin to limit (dB)	Phase
	Measured Reading (dBµV)	Corr. Factor (dB)	Powerline Voltage (dBµV)	Measured Reading (dBµV)	Corr. Factor (dB)	Powerline Voltage (dBµV)					
0.1930	48.2	0.5	48.7	39.4	0.5	39.9	63.9	15.2	53.9	14.0	Line
0.3192	34.1	0.6	34.7	26.3	0.6	26.9	59.7	25.0	49.7	22.8	Neutral
0.3821	28.5	0.6	29.1	22.4	0.6	23.0	58.2	29.1	48.2	25.2	Line
0.4449	34.5	0.6	35.1	31.4	0.6	32.0	57.0	21.9	47.0	15.0	Neutral
0.5096	29.2	0.6	29.8	25.4	0.6	26.0	56.0	26.2	46.0	20.0	Neutral
0.5720	30.0	0.6	30.6	27.8	0.6	28.4	56.0	25.4	46.0	17.6	Neutral

Table 4-15. Ch.157 (5785MHz) OFDM 6Mbps TX mode

Frq. (MHz)	QP			AV			CISPR22 QP Limit (dBµV)	Margin to limit (dB)	CISPR22 AV Limit (dBµV)	Margin to limit (dB)	Phase
	Measured Reading (dBµV)	Corr. Factor (dB)	Powerline Voltage (dBµV)	Measured Reading (dBµV)	Corr. Factor (dB)	Powerline Voltage (dBµV)					
0.1934	46.9	0.5	47.4	38.6	0.5	39.1	63.9	16.5	53.9	14.8	Line
0.2525	40.4	0.6	41.0	33.4	0.6	34.0	61.7	20.7	51.7	17.7	Neutral
0.3198	33.2	0.6	33.8	25.5	0.6	26.1	59.7	25.9	49.7	23.6	Neutral
0.4454	34.1	0.6	34.7	31.1	0.6	31.7	57.0	22.3	47.0	15.3	Neutral
0.5093	29.4	0.6	30.0	25.8	0.6	26.4	56.0	26.0	46.0	19.6	Neutral
0.5695	30.4	0.6	31.0	28.7	0.6	29.3	56.0	25.0	46.0	16.7	Neutral

Table 4-16. Ch.165 (5825MHz) OFDM 6Mbps TX mode

Frq. (MHz)	QP			AV			CISPR22 QP Limit (dBµV)	Margin to limit (dB)	CISPR22 AV Limit (dBµV)	Margin to limit (dB)	Phase
	Measured Reading (dBµV)	Corr. Factor (dB)	Powerline Voltage (dBµV)	Measured Reading (dBµV)	Corr. Factor (dB)	Powerline Voltage (dBµV)					
0.1930	47.4	0.5	47.9	38.8	0.5	39.3	63.9	16.0	53.9	14.6	Line
0.2551	39.8	0.6	40.4	32.6	0.6	33.2	61.6	21.2	51.6	18.4	Neutral
0.3182	35.0	0.6	35.6	27.4	0.6	28.0	59.8	24.2	49.8	21.8	Neutral
0.4480	27.8	0.6	28.4	22.6	0.6	23.2	56.9	28.5	46.9	23.7	Neutral
0.5070	30.5	0.6	31.1	27.3	0.6	27.9	56.0	24.9	46.0	18.1	Neutral
0.5688	31.8	0.6	32.4	29.1	0.6	29.7	56.0	23.6	46.0	16.3	Neutral

Table 4-17. Ch.157 (5785MHz) OFDM **RX** mode

Frq. (MHz)	QP			AV			CISPR22 QP Limit (dBµV)	Margin to limit (dB)	CISPR22 AV Limit (dBµV)	Margin to limit (dB)	Phase
	Measured Reading (dBµV)	Corr. Factor (dB)	Powerline Voltage (dBµV)	Measured Reading (dBµV)	Corr. Factor (dB)	Powerline Voltage (dBµV)					
0.2567	35.4	0.6	36.0	28.0	0.6	28.6	61.5	25.5	51.5	22.9	Line
0.3196	31.8	0.6	32.4	23.4	0.6	24.0	59.7	27.3	49.7	25.7	Neutral
0.3809	28.6	0.6	29.2	22.4	0.6	23.0	58.3	29.1	48.3	25.3	Neutral
0.5027	33.0	0.6	33.6	29.6	0.6	30.2	56.0	22.4	46.0	15.8	Neutral
0.5670	31.5	0.6	32.1	29.1	0.6	29.7	56.0	23.9	46.0	16.3	Neutral
1.9550	26.0	0.7	26.7	24.0	0.7	24.7	56.0	29.3	46.0	21.3	Neutral