

 ESTECH Co., Ltd. Rm 1015, World Venture Center 11, 426-5 Gasan-dong, Guncheon-gu, Seoul, 158-803, Korea	   	Electromagnetic Interference Test Report
---	--	---

Test Report for IC & FCC

FCC ID:HD56500LP
IC:1693B-65E

Report Number		ESTF151001-003		
Applicant	Company name	Honeywell International Inc.		
	Address	700 Visions Drive, P.O.Box 208 Skaneateles Falls, NY, 13153-0208		
	Telephone	803-835-8190		
Product	Product name	Mobile Computer		
	Type name	Dolphin 6500	Brand name	Honeywell
	Model No.	Dolphin 6500,6500LP	Manufacturer	BG Electronic Co.
	Serial No.	NONE	Country of origin	CHINA
Test date	2009-12-07 ~ 2010-01-25		Date of issue	25-Jan-10
Testing location	ESTECH. Co., Ltd. 97-1 Hoiuk-Ri Majang-Myon, Icheon-city, KyungKi-Do, Korea			
Standard	FCC PART 15 2008 , ANSI C 63.4 2003 , RSS-210			
Measurement facility registration number		94696	IC Number	4475
Tested by	Engineer J.H.Kim  (Signature)			
Reviewed by	Engineering Manager J.M.Yang  (Signature)			
Abbreviation	OK, Pass = Passed, Fail = Failed, N/A = not applicable			

* Note

- BT + Wireless = HD56500LP
- Model name of the FCC is Dolphin 6500 and model name of the IC is 6500LP
- This test report is not permitted to copy partly without our permission
- This test result is dependent on only equipment to be used
- This test result based on a single evaluation of one sample of the above mentioned

Contents

1. Laboratory Information	3
2. Description of EUT	4
3. Test Standards	5
4. Measurement condition	6
5. 6dB Bandwidth Measurement	9
5.1 Test procedure	9
5.2 Test instruments and measurement setup	9
5.3 Measurement results	9
5.4 Trace data	11
6. Maximum Peak Output Power	15
6.1 Test procedure	15
6.2 Measurement results	15
7. Transmitter Power Spectral Density	16
7.1 Test procedure	16
7.2 Test instruments and measurement setup	16
7.3 Measurement results	16
7.4 Trace data	18
8. Band-Edge and Out of Band Emissions	22
8.1 Test procedure	22
8.2 Test instruments and measurement setup	22
8.3 Measurement results	22
8.4 Trace data of band-edge & out of emissioin	24
9. Measurement of radiated emission	32
9.1 Measurement equipment	32
9.2 Environmental conditions	32
9.3 Test data(802.11b)	33
9.4 Test data(802.11g)	37
9.5 Restricted Band Edges	41
9.6 Test data(Receiver mode)	49
10. Measurement of conducted emission	50
10.1 Measurement equipment	50
10.2 Environmental conditions	50
10.3 Test data(802.11b)	51
10.4 Test data(802.11g)	52
11. Photographs of test setup	53
11.1. Setup for Radiated Test : 30 ~ 1000 MHz	53
11.2. Setup for Conducted Test : 0.15 ~ 30 MHz	54
11.3. Photographs of EUT	55

Appendix 1. Spectral diagram

Appendix 2. Antenna Requirement

1. Laboratory Information

1.1 General

This EUT (Equipment Under Test) has been shown to be capable of compliance with the applicable technical standards and is tested in accordance with the measurement procedures as indicated in this report.

ESTECH Lab attests to accuracy of test data. All measurement reported herein were performed by ESTECH Co., Ltd.

ESTECH Lab assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

1.2 Test Lab.

Corporation Name : ESTECH Co., Ltd.

Head Office : Rm 1015, World Venture Center II, 426-5, Gasan-dong, Geumcheon-gu, Seoul, Korea
(Safety & Telecom. Test Lab)

EMC Test Lab : 97-1, Hoeok-ri, Majang-myun, Ichion-city, Kyonggi-do, South Korea

1.3 Official Qualification(s)

KCC : Granted Accreditation from Ministry of Information & Communication for EMC, Safety and Telecommunication

KOLAS : Accredited Lab By Korea Laboratory Accreditation Schema base on CENELEC requirements

FCC : Filed Laboratory at Federal Communications Commission

VCCI : Granted Accreditation from Voluntary Control Council for Interference from ITE

2. Description of EUT

2.1 Summary of Equipment Under Test

Product Name	: Mobile Computer
Model Number	: Dolphin 6500,6500LP
Modulation Type	: WLAN(DSSS, OFDM)
Transfer Rate	: up to 54Mbps
Number of Channel	: 802.11b and 802.11g:11
Channel Spacing	: 802.11b and 802.11g: 5MHz
Output Power	: 802.11b: 14.6 dBm, 802.11g: 12.4 dBm
Serial Number	: NONE
Manufacturer	: BG Electronic Co.
Country of origin	: CHINA
Rating	: Adapter :(100-240) V a.c. (50/60) Hz , 0.3A : DC input : 5 Vd.c. , 2.0 A
Receipt Date	: 2009-12-02
X-tal list(s)	: 13 MHz

2.2 General descriptions of EUT

This device fully compatible with the 802.11b standard to provide a wireless data rate of 11Mbps.
 This device fully compatible with the 802.11g standard to provide a wireless data rate of up to 54Mbps

For the detailed features, please refer to the manufacturer's specifications or User's Manual.

3. Test Standards

Test Standard : FCC PART 15 (2008) & RSS-210

This Standard sets out the regulations under which an intentional, unintentional, or incidental radiator may be operated without an individual license. It also contains the technical specifications, administrative requirements and other conditions relating

Test Method : ANSI C 63.4 (2003)

This standard sets forth uniform methods of measurement of radio-frequency (RF) signals and noise emitted from both unintentional and intentional emitters of RF energy in the frequency range 9 kHz to 40 GHz. Methods for the measurement of radiated and AC

Summary of Test Results

Applied Standard : 47 CFR Part 15 Subpart C & RSS 210 Part I and II					
Standard		Test Type	Result	Remark	Limit
15.207	RSS-Gen 7.2.2	AC Power Conducted Emission	Pass	Meet the requirement	
15.205 & 15.20	A8.5	Intentional Radiated Emission	Pass	Meet the requirement	
15.247(a)(2)	A8.2 (a)	Spectrum Bandwidth of a DSSS System	Pass	Meet the requirement	Min. 500kHz
15.247(b)	A8.4(4)	Maximum Peak output power	Pass	Meet the requirement	Max. 30dBm
15.247(c)	A8.5	Transmitter Radiated Emission	Pass	Meet the requirement	Table 15.209
15.247(e)	A8.2 (b)	Power Spectral Density	Pass	Meet the requirement	Max. 8dBm
15.247(c)	A8.5	Band Edge Measurement	Pass	Meet the requirement	20dB less
15.107	RSS-Gen 7.2.2	Receiver conducted Emission	N/A		
15.109	RSS-Gen 7.2.3.2	Receiver radiated emission	Pass	Meet the requirement	

4. Measurement Condition

4.1 EUT Operation(For 802.11b and 802.11g)

a. Channel

Ch.	Frequency	Ch.	Frequency
1	2412MHz	7	2442MHz
2	2417MHz	8	2447MHz
3	2422MHz	9	2452MHz
4	2427MHz	10	2457MHz
5	2432MHz	11	2462MHz
6	2437MHz		

b. Measurement Channel : WLAN: Low(2412MHz), Middle(2437Mhz),High(2462MHz)

c. Test Mode : Continuous Output, DSSS, OFDM

d. Test rate : the worst case of rate 802.11b(11Mbps), 802.11g(54Mbps)



ESTECH Co., Ltd.

Rm 1015, World Venture Center II,
426-5 Gasan-dong, Guncheon-gu,
Seoul, 158-803, Korea

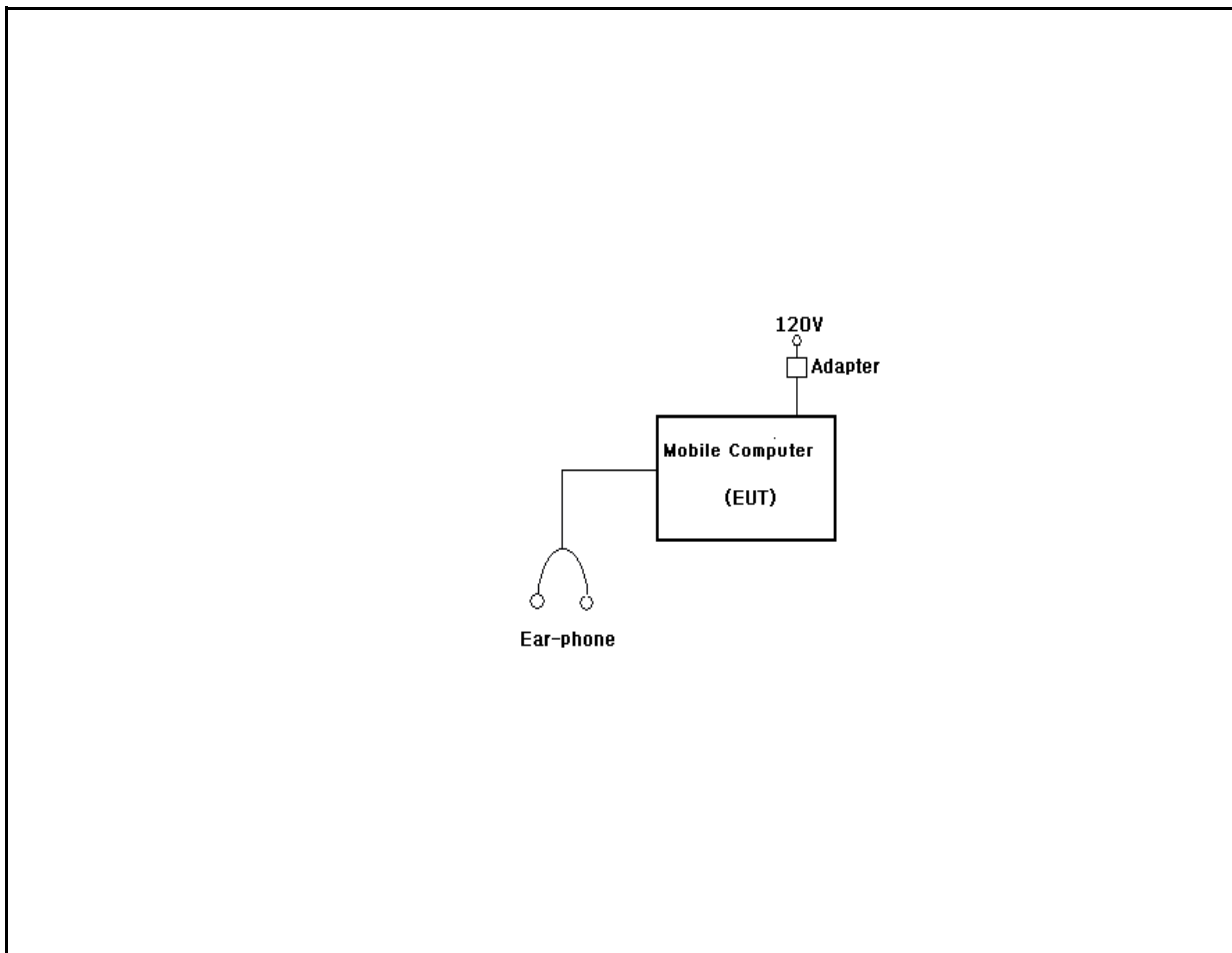


**Electromagnetic
Interference
Test Report**

4.2 EUT Operation.

- * The EUT was in the following operation mode during all testing
- * The operational conditions of the EUT was determined by the manufacturer according to the typical use of the EUT with respect to the expected highest level of emission
- * Execute a RF test program to enable EUT under transmission/receiving condition continuously at specific channel frequency.

4.3 Configuration and Peripherals



4.4 EUT and Support equipment

Equipment Name	Model Name	S/N	Manufacturer	Remark (FCC ID)
Mobile Computer	Dolphin 6500,6500LP	NONE	BG Electronic Co.	EUT
ADAPTER	PSC11R-050	P93801020A2	Phihong(Dongguan)Electronics Co.,Ltd	
Earphone	NONE	NONE	LG	

4.5 Cable Connecting

Start Equipment		End Equipment		Cable Standard		Remark
Name	I/O port	Name	I/O port	Length	Shielded	
Mobile Computer	Line	Earphone	Line	1.3	Unshielded	
Mobile Computer	Power	Adapter	—	2	Unshielded	

5. 6dB Bandwidth Measurement

5.1 Test procedure

The transmitter output was connected to the spectrum analyzer. The bandwidth of the fundamental frequency was measured by spectrum analyzer. The 6dB bandwidth is defined as the bandwidth at 6dB below from peak power point. The minimum of 6dB bandwidth measurement is 0.5MHz.

5.2 Test instruments and measurement setup

The spectrum analyzer is set to as following.

- . RBW= 30KHz
- . VBW= 300KHz
- . Span= 50MHz
- . Sweep= suitable duration based on the EUT specification.

6dB Bandwidth Test Instruments

Description	Model	Serial Number	Cal. Due Date
Spectrum Analyzer	E4407B	US42041281	2010-09-10
RF Cable	Length: 5cm	—	
-Spectrum Analyzer <=> EUT	Loss: 1.50dB	—	

5.3 Measurement results

EUT	Mobile Computer	MODEL	Dolphin 6500,6500LP
MODE	CCK	ENVIRONMENTAL CONDITION	25℃, 44%RH
INPUT POWER	5 Vdc		

(802.11b)

CHANNEL	Channel Frequency (MHz)	Bandwidth at 6dB below(MHz)	Minimum Limit (MHz)	PASS/FAIL
1	2412	9.94	0.5	PASS
6	2437	9.95	0.5	PASS
11	2462	9.13	0.5	PASS



ESTECH Co., Ltd.

Rm 1015, World Venture Center II,
426-5 Gasan-dong, Guncheon-gu,
Seoul, 158-803, Korea



Electromagnetic Interference Test Report

EUT	Mobile Computer	MODEL	Dolphin 6500,6500LP
MODE	OFDM	ENVIRONMENTAL CONDITION	25℃, 43%RH
INPUT POWER	5 Vdc		

(802.11g)

CHANNEL	Channel Frequency (MHz)	Bandwidth at 6dB below(MHz)	Minimum Limit (MHz)	PASS/FAIL
1	2412	16.51	0.5	PASS
6	2437	16.50	0.5	PASS
11	2462	16.52	0.5	PASS



ESTECH Co., Ltd.

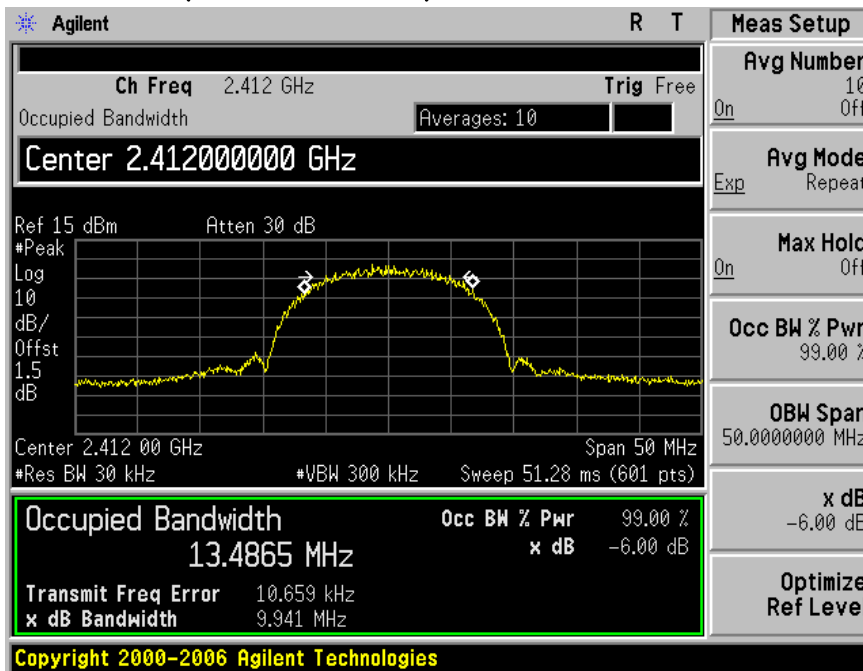
Rm 1015, World Venture Center II,
426-5 Gasan-dong, Guncheon-gu,
Seoul, 158-803, Korea



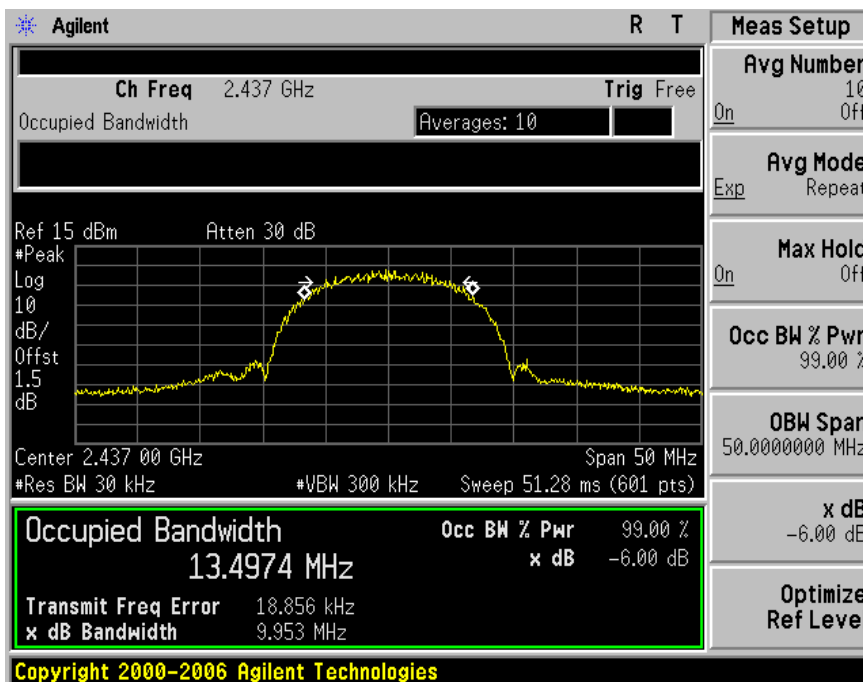
**Electromagnetic
Interference
Test Report**

5.4 Trace data

CCK (802.11b-1ch)



CCK (802.11b-6ch)





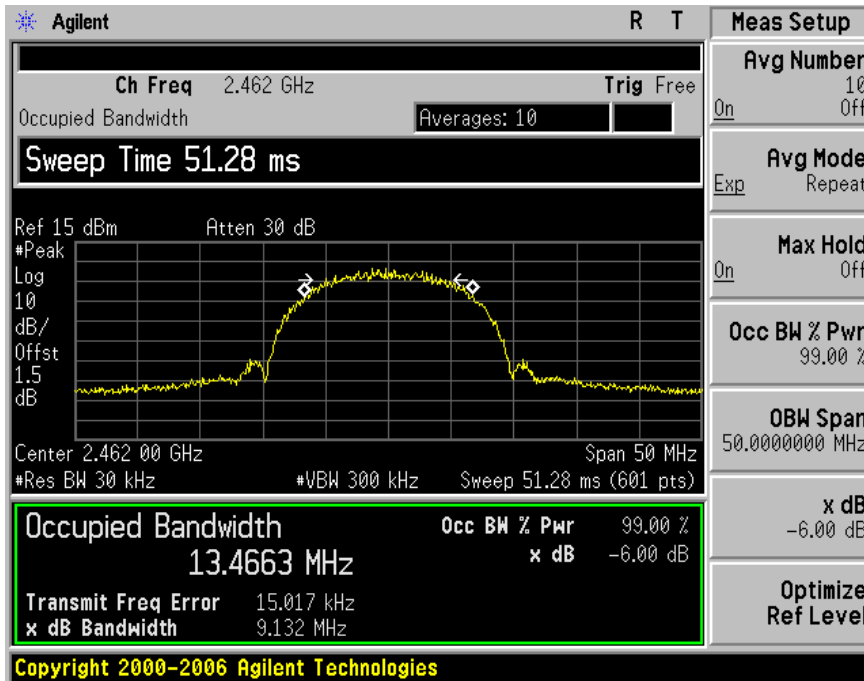
ESTECH Co., Ltd.

Rm 1015, World Venture Center II,
426-5 Gasan-dong, Guncheon-gu,
Seoul, 158-803, Korea



Electromagnetic Interference Test Report

CCK (802.11b-11ch)





ESTECH Co., Ltd.

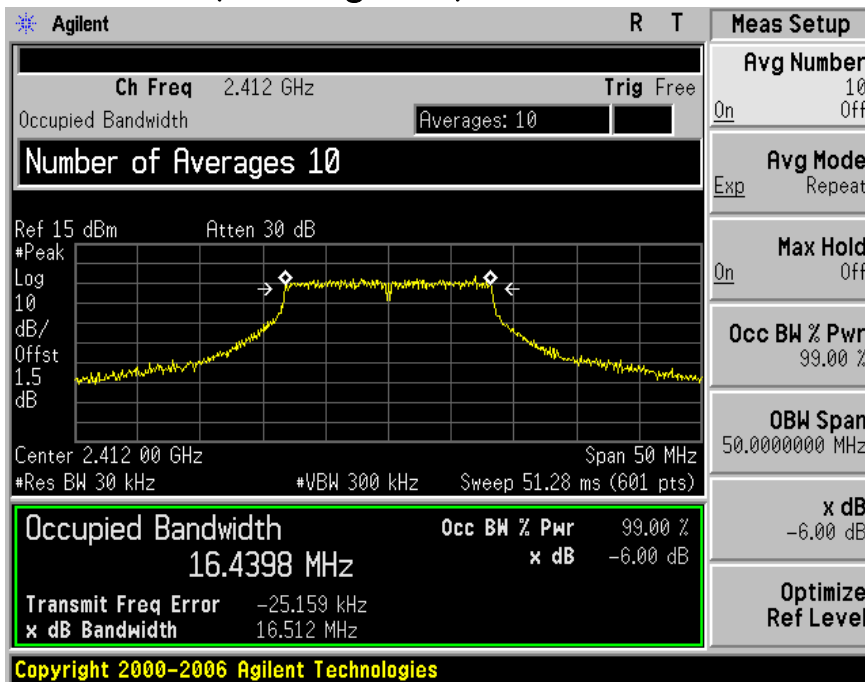
Rm 1015, World Venture Center II,
426-5 Gasan-dong, Guncheon-gu,
Seoul, 158-803, Korea



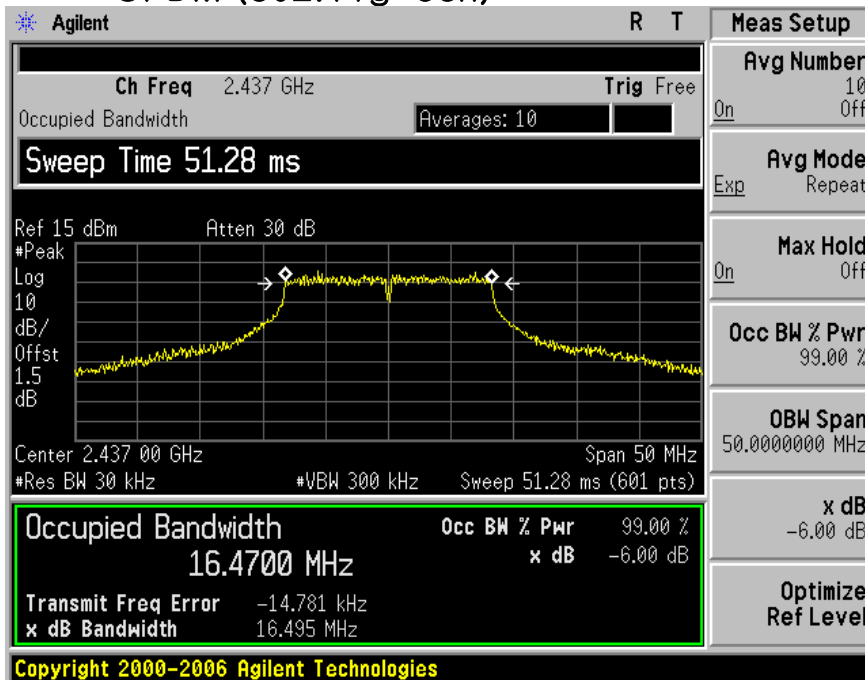
**Electromagnetic
Interference
Test Report**

5.4 Trace data

OFDM (802.11g-1ch)



OFDM (802.11g-6ch)





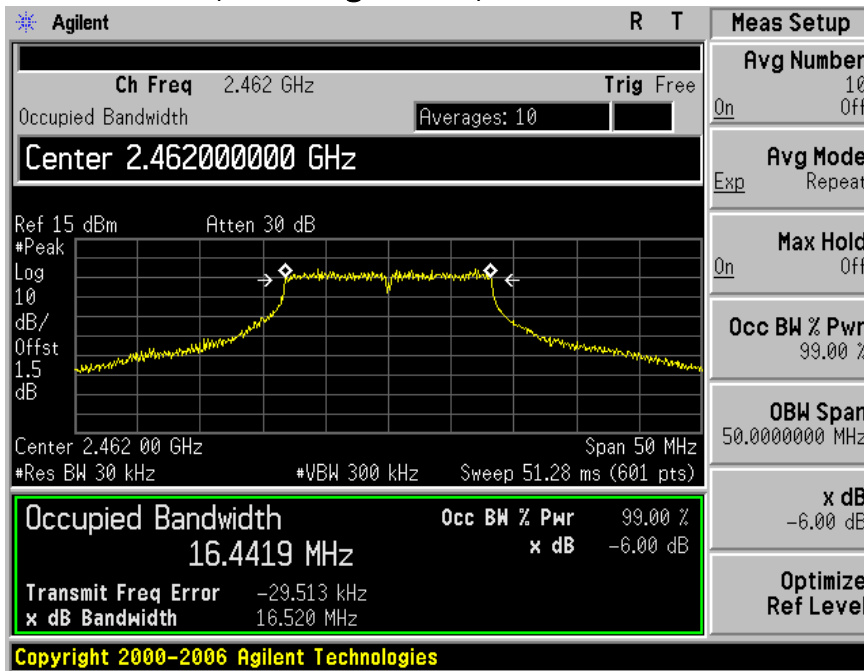
ESTECH Co., Ltd.

Rm 1015, World Venture Center II,
426-5 Gasan-dong, Guncheon-gu,
Seoul, 158-803, Korea



Electromagnetic Interference Test Report

OFDM (802.11g-11ch)



6. MAXIMUM PEAK OUTPUT POWER

6.1 Test procedure

The transmitter antenna terminal is connected to the input of a RF power sensor. Measurement is made while EUT is operating in transmission mode at the appropriate center frequency. The maximum peak output power measurement is 30dBm.

Maximum Peak Output Power Test Instruments

Description	Model	Serial Number	Cal. Due Date
Power Meter	NRVS	849622/045	2010-02-11
Power Sensor	NRV-251	325948/013	2010-02-11
RF Cable:	Length: 5cm	—	
-Spectrum Analyzer <=> EUT	Loss: 1.5 dB	—	

6.2 Measurement results

EUT	Mobile Computer	MODEL	Dolphin 6500,6500LP
MODE	CCK	ENVIRONMENTAL CONDITION	25℃, 43%RH
INPUT POWER	5 Vdc		

CHANNEL	Channel Frequency (MHz)	Peak Power Output(dBm)		Limit[1W] (dBm)	PASS/FAIL
		(dBm)	(W)		
1	2412	14.4	0.027	30.0	PASS
6	2437	14.2	0.026	30.0	PASS
11	2462	14.6	0.029	30.0	PASS

(802.11g)

EUT	Mobile Computer	MODEL	Dolphin 6500,6500LP
MODE	OFDM	ENVIRONMENTAL CONDITION	25℃, 43%RH
INPUT POWER	5 Vdc		

CHANNEL	Channel Frequency (MHz)	Peak Power Output(dBm)		Limit[1W] (dBm)	PASS/FAIL
		(dBm)	(W)		
1	2412	12.4	0.017	30.0	PASS
6	2437	12.3	0.017	30.0	PASS
11	2462	12.2	0.017	30.0	PASS

7. Transmitter power spectral density

7.1 Test procedure

The peak power density was measured with a spectrum analyzer connected to the antenna terminal, while EUT is operating in transmission mode at the appropriate center frequency. The maximum of power spectral density measurement is 8dBm.

7.2 Test instruments and measurement setup

The spectrum analyzer is set to as following.

- . RBW= 3KHz
- . VBW= 30KHz
- . Span= 1.5MHz
- . Sweep= 500 seconds (It is allowed to be longer than span/3kHz.)

The peak power density Test Instruments

Description	Model	Serial Number	Cal. Due Date
Spectrum Analyzer	E4407B	US42041281	2010-09-10
RF Cable	Length: 5cm	—	
-Spectrum Analyzer <=> EUT	Loss: 1.5dB	—	

7.3 Measurement results

EUT	Mobile Computer	MODEL	Dolphin 6500,6500LP	
MODE	CCK	ENVIRONMENTAL CONDITION	25℃, 43%RH	
INPUT POWER	5 Vdc			

CHANNEL	Channel Frequency (MHz)	RF Power Spectral Density (dBm)	Maximum Limit (dBm)	PASS/FAIL
1	2412	-7.83	8.0	PASS
6	2437	-8.57	8.0	PASS
11	2462	-12.95	8.0	PASS



ESTECH Co., Ltd.

Rm 1015, World Venture Center II,
426-5 Gasan-dong, Guncheon-gu,
Seoul, 158-803, Korea



**Electromagnetic
Interference
Test Report**

EUT	Mobile Computer	MODEL	Dolphin 6500,6500LP
MODE	OFDM	ENVIRONMENTAL CONDITION	25℃, 43%RH
INPUT POWER	5 Vdc		

CHANNEL	Channel Frequency (MHz)	RF Power Spectral Density (dBm)	Maximum Limit (dBm)	PASS/FAIL
1	2412	-12.47	8.0	PASS
6	2437	-11.81	8.0	PASS
11	2462	-11.77	8.0	PASS



ESTECH Co., Ltd.

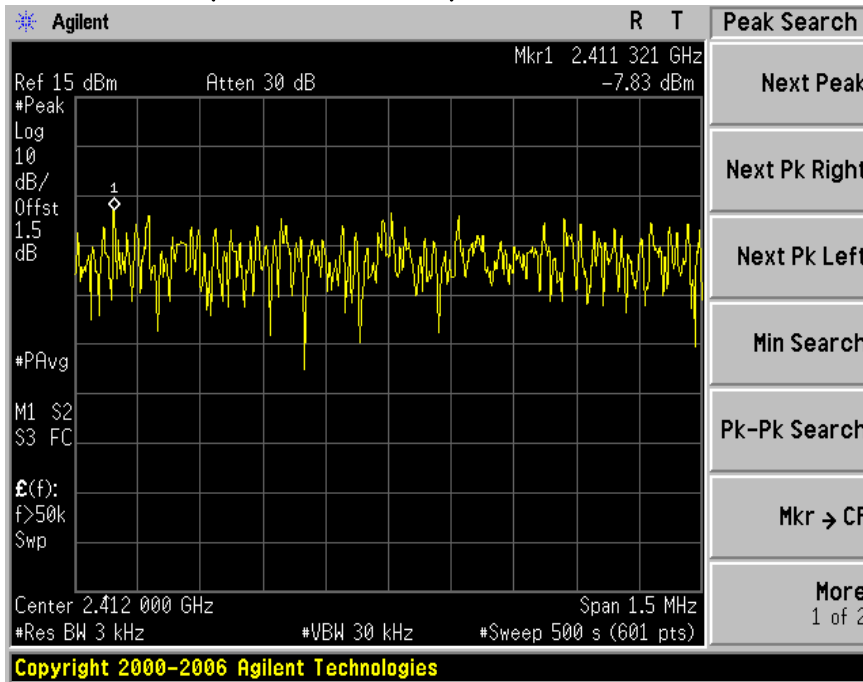
Rm 1015, World Venture Center II,
426-5 Gasan-dong, Guncheon-gu,
Seoul, 158-803, Korea



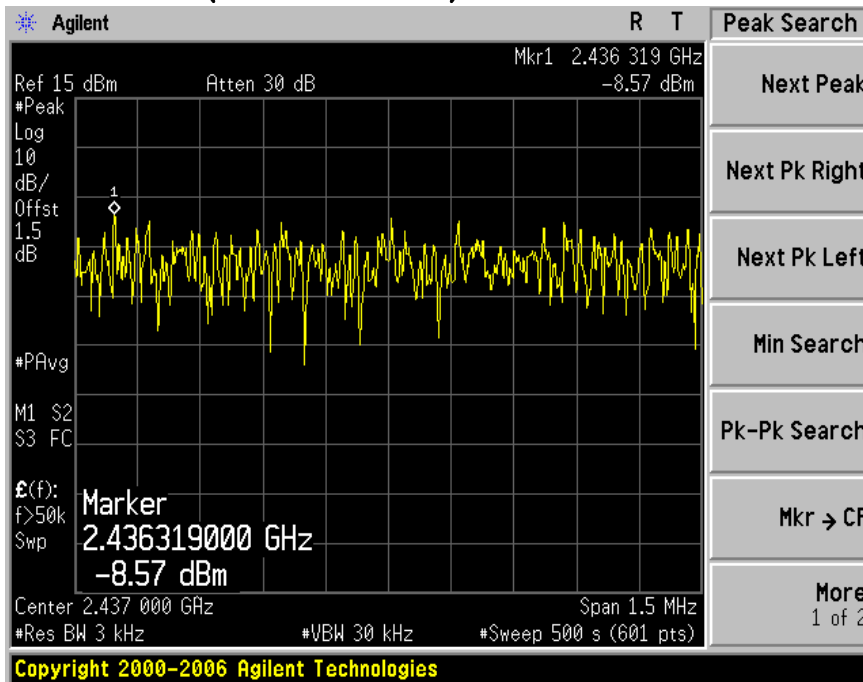
**Electromagnetic
Interference
Test Report**

7.4 Trace data

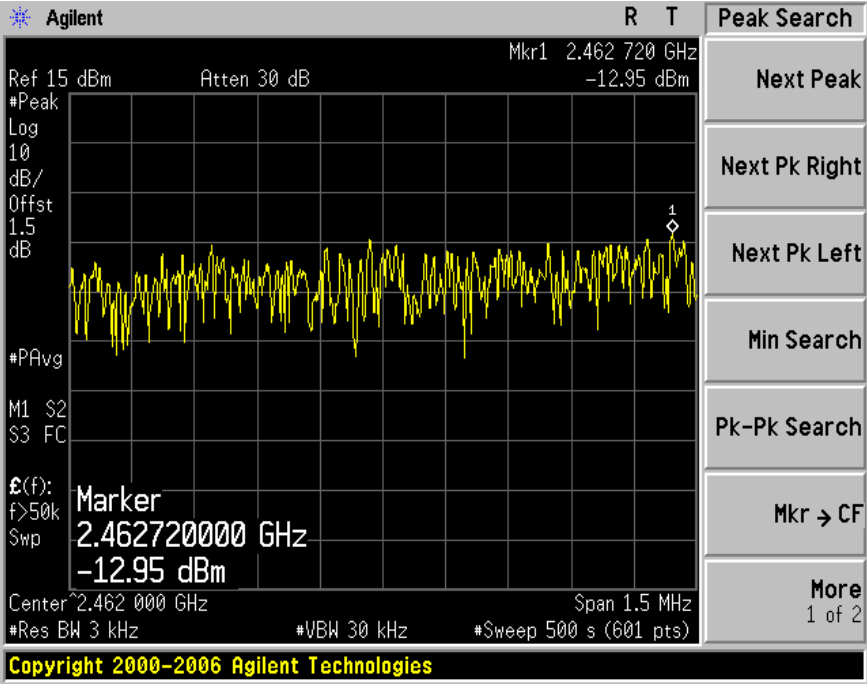
CCK (802.11b-1ch)



CCK (802.11b-6ch)



CCK (802.11b-11ch)





ESTECH Co., Ltd.

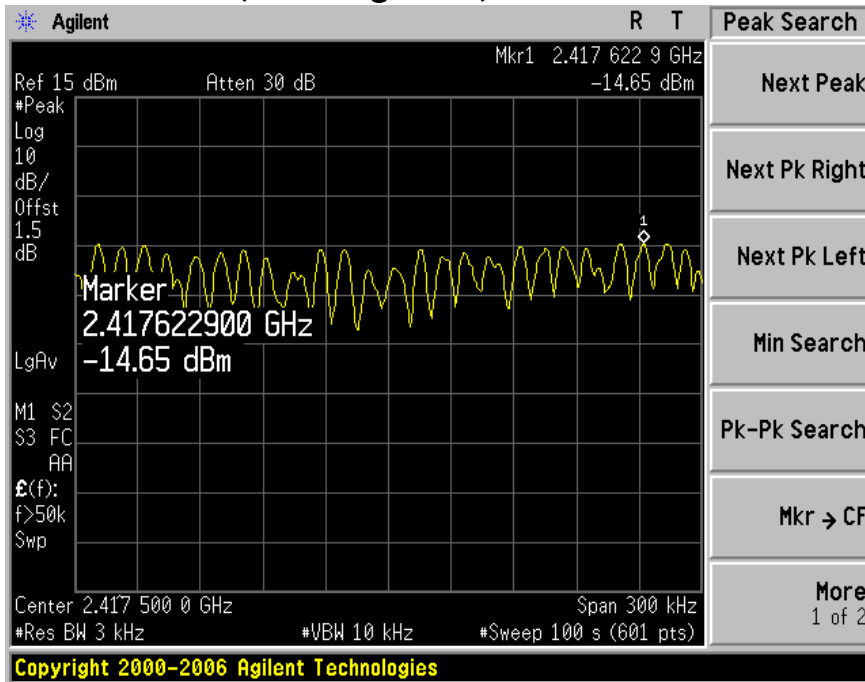
Rm 1015, World Venture Center II,
426-5 Gasan-dong, Guncheon-gu,
Seoul, 158-803, Korea



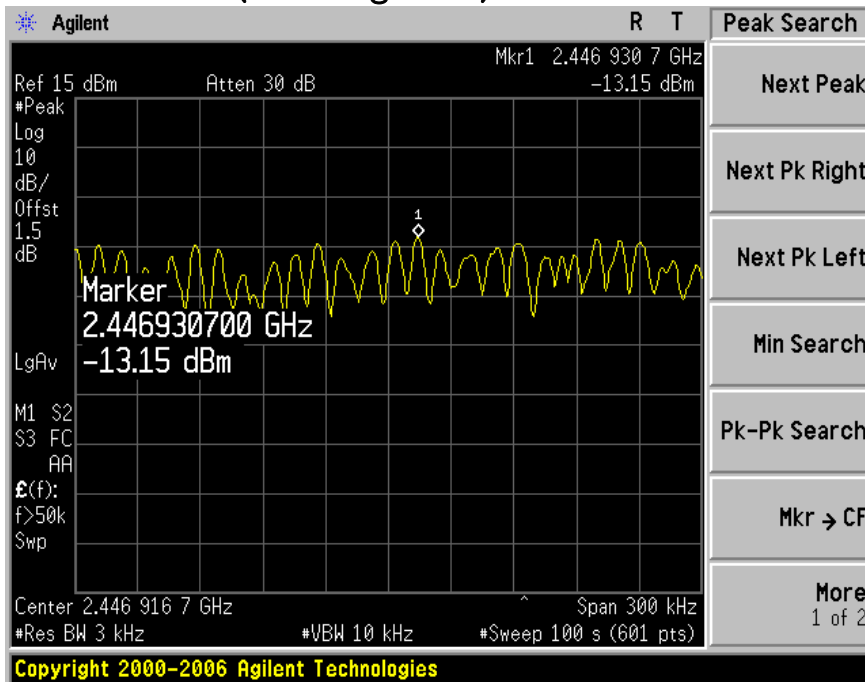
**Electromagnetic
Interference
Test Report**

7.4 Trace data

OFDM (802.11g-1ch)



OFDM (802.11g-6ch)





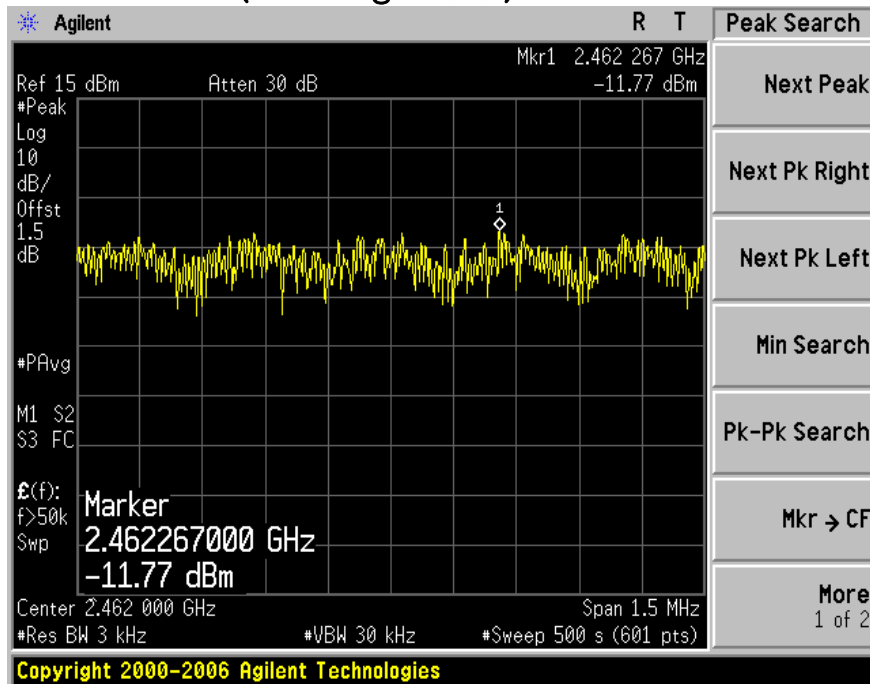
ESTECH Co., Ltd.

Rm 1015, World Venture Center II,
426-5 Gasan-dong, Guncheon-gu,
Seoul, 158-803, Korea



Electromagnetic Interference Test Report

OFDM (802.11g-11ch)



8. band-edge and out of band emissions.

8.1 Test procedure

The radio frequency power at 20dB down from the highest inband power level is measured with a spectrum analyzer connected to the antenna terminal, while EUT is operating in transmission mode at the appropriate center frequency. The band edge&out of band emission shall be at least 20dB below of the highest inband power level.

8.2 Test instruments and measurement setup

The spectrum analyzer is set to as following.

- . RBW= 100KHz
- . VBW= 100KHz
- . Span= suitable frequency span
- . Sweep= suitable duration based on the EUT specification.

Band Edge&Out of Emission Test Instruments

Description	Model	Serial Number	Cal. Due Date
Spectrum Analyzer	E4407B	US42041281	2010-09-10
RF Cable	Length: 5cm		—
-Spectrum Analyzer <=> EUT	Loss: 1.50dB		—

8.3 Measurement results of band-edge & out of emission

EUT	Mobile Computer	MODEL	Dolphin 6500,6500LP
MODE	CCK	ENVIRONMENTAL CONDITION	23℃, 43%RH
INPUT POWER	5 Vdc		

CHANNEL	Channel Frequency (MHz)	Measurement Frequency (MHz)	Peak Level at 20dB below(dBm)	Limit (MHz)
1	2412	2398.5	-46.43	Below 20dB from peak power level to band edge
11	2462	2500.5	-52.73	Below 20dB from peak power level to band edge



ESTECH Co., Ltd.

Rm 1015, World Venture Center II,
426-5 Gasan-dong, Guncheon-gu,
Seoul, 158-803, Korea

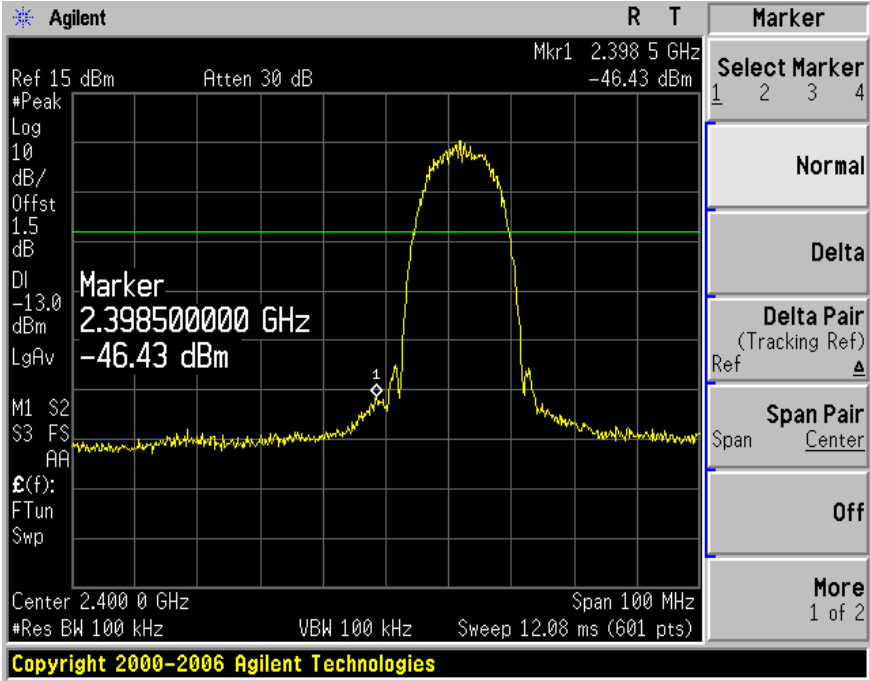


**Electromagnetic
Interference
Test Report**

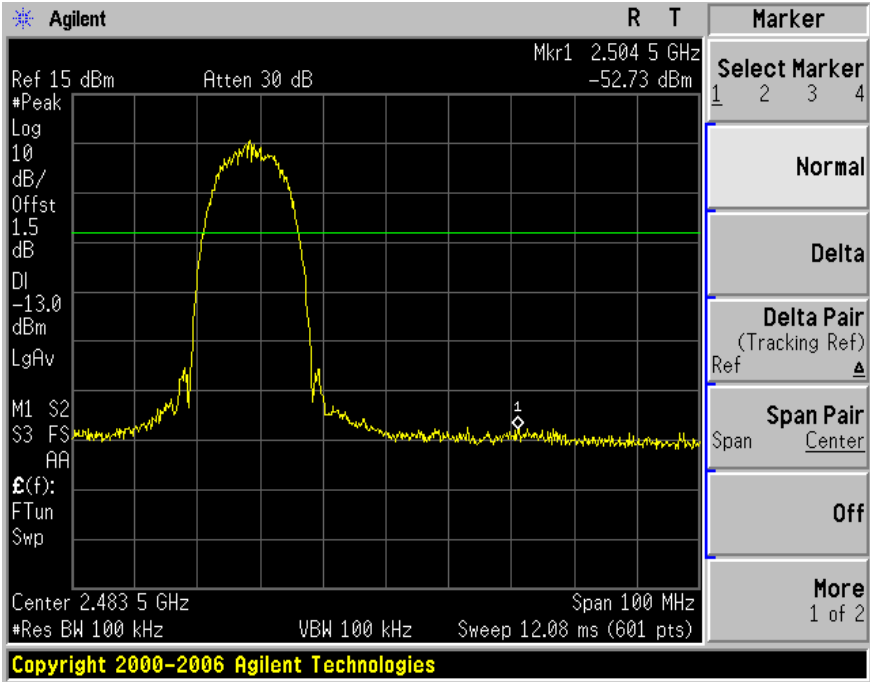
EUT	Mobile Computer	MODEL	Dolphin 6500,6500LP
MODE	OFDM	ENVIRONMENTAL CONDITION	24 °C , 43%RH
INPUT POWER	5 Vdc		

CHANNEL	Channel Frequency (MHz)	Measurement Frequency (MHz)	Peak Level at 20dB below(dBm)	Limit (MHz)
1	2412	2400.0	-31.74	Below 20dB from peak power level to band edge
11	2462	2484.3	-46.50	Below 20dB from peak power level to band edge

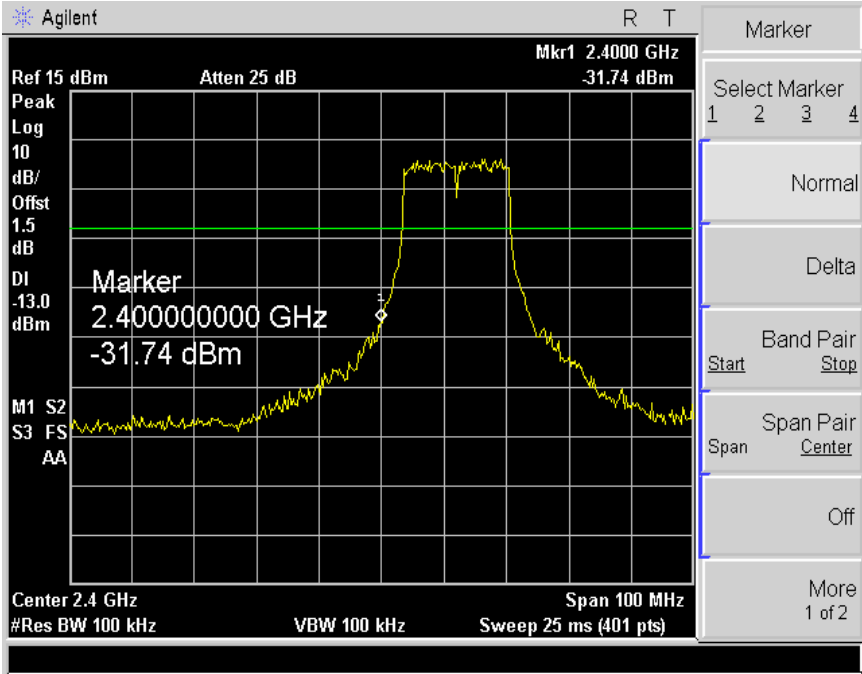
8.4 Trace data of band-edge & Out of Emission CCK (802.11b-1ch)



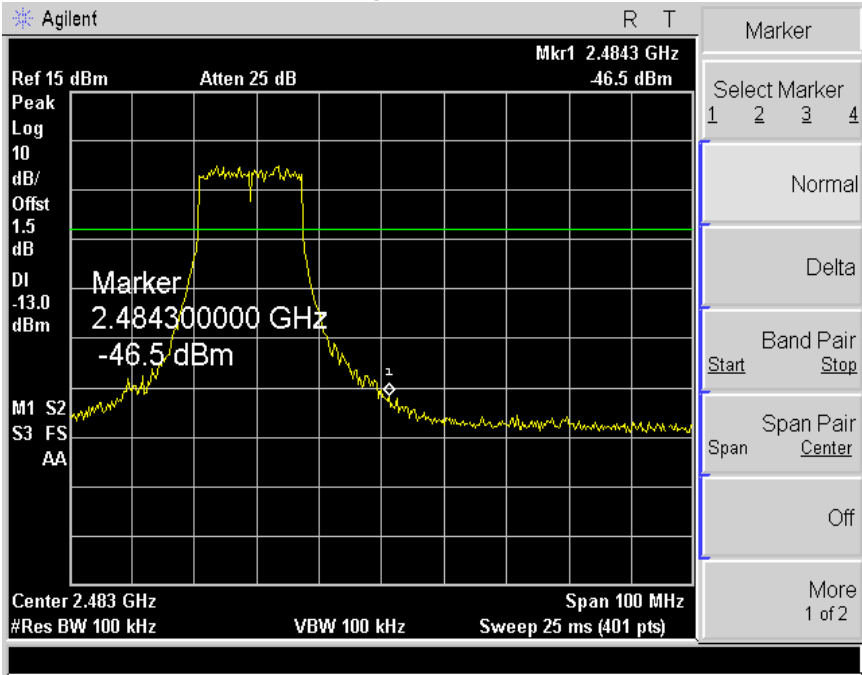
CCK (802.11b-11ch)

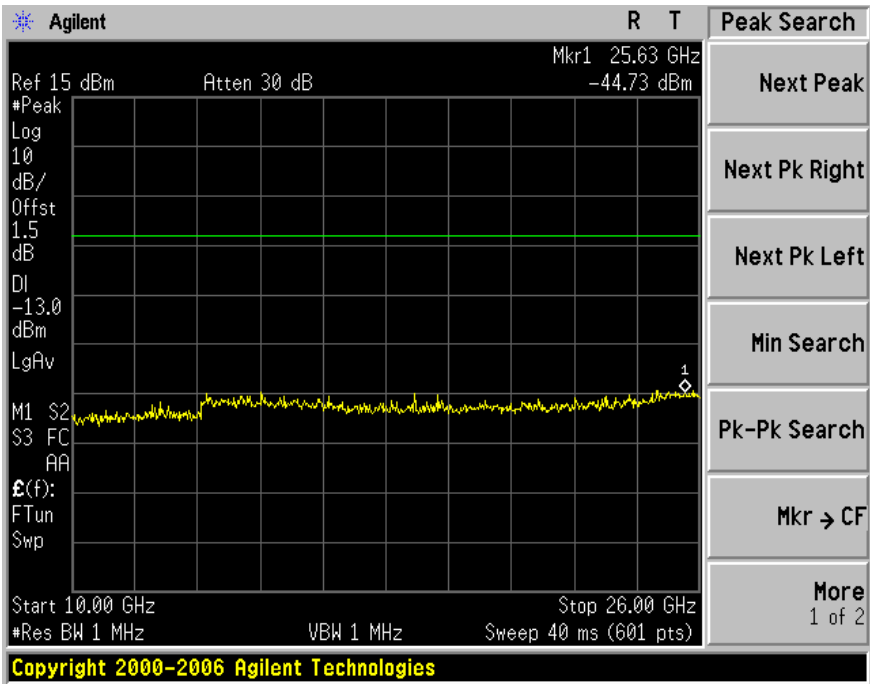
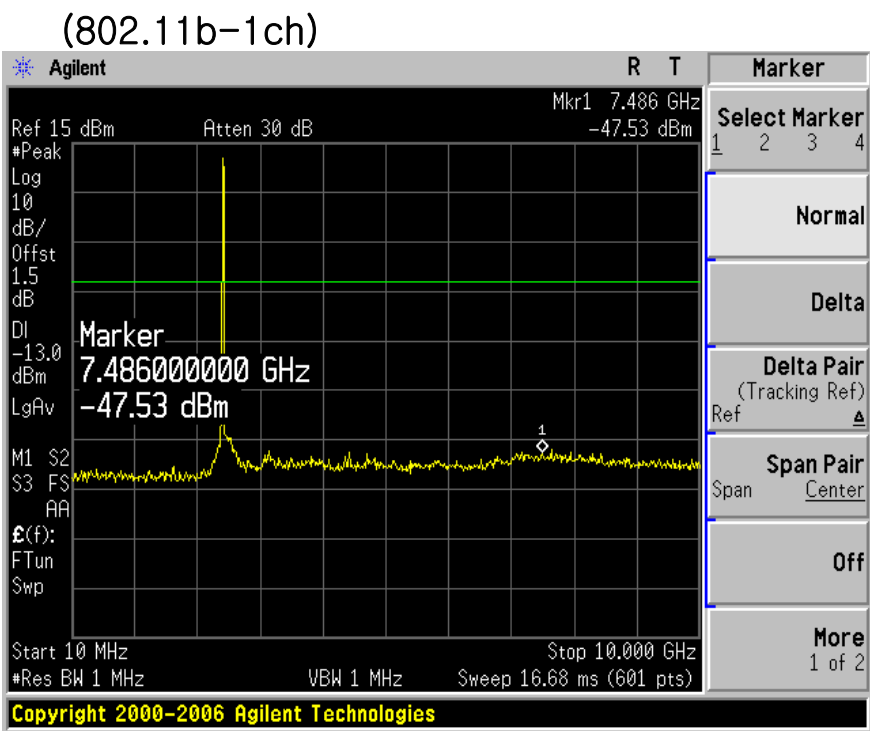


OFDM (802.11g-1ch)

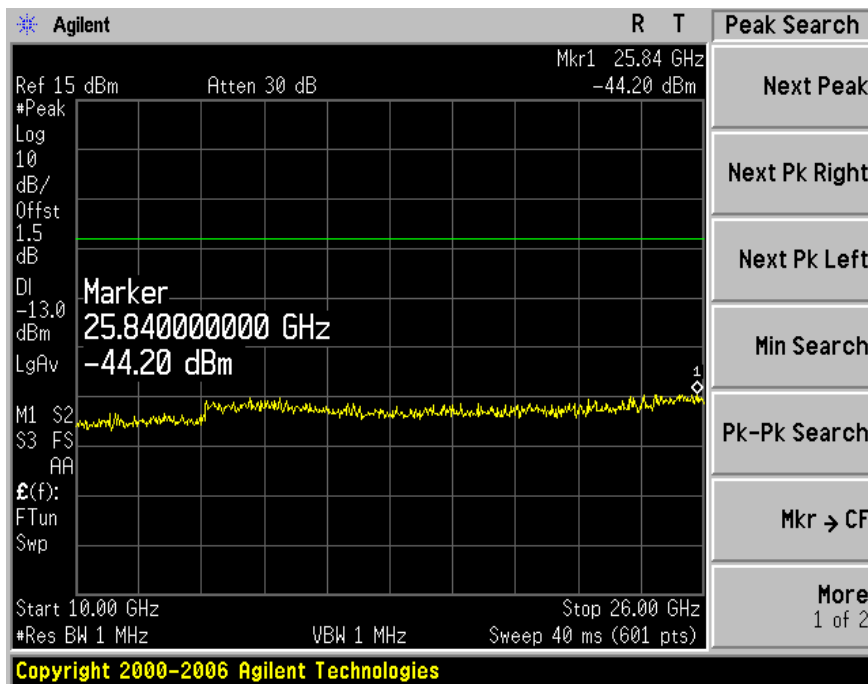
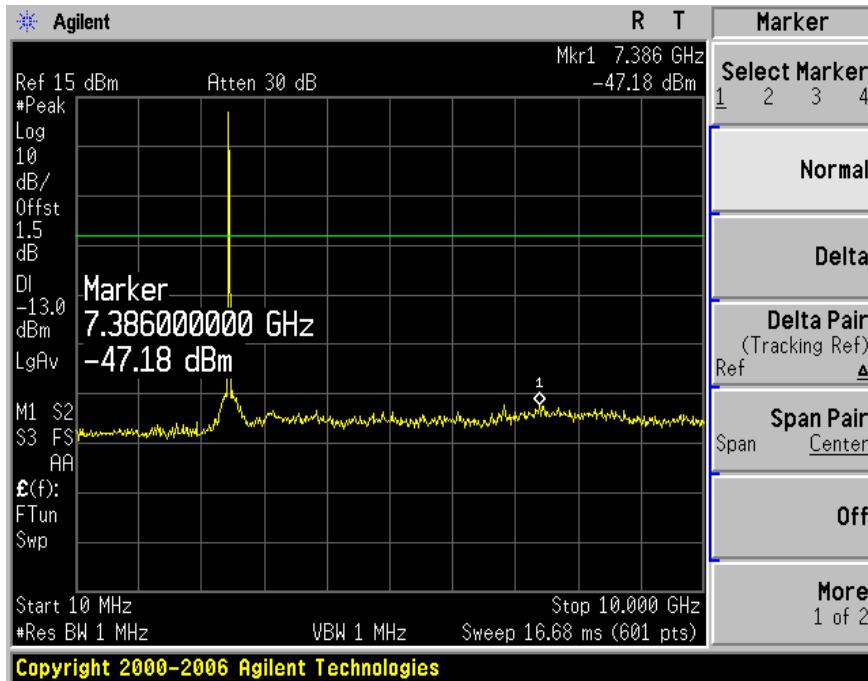


OFDM (802.11g-11ch)

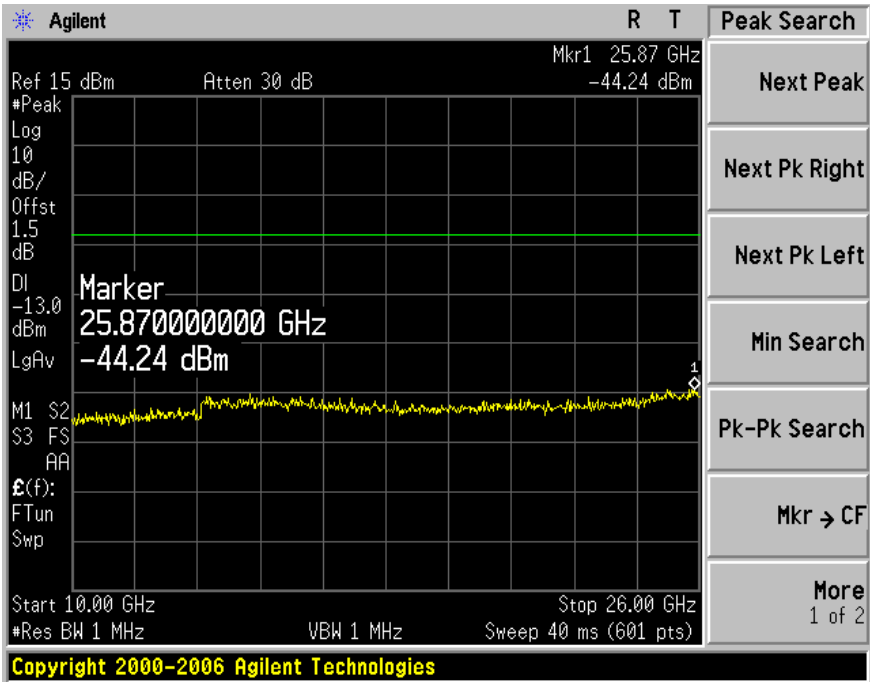
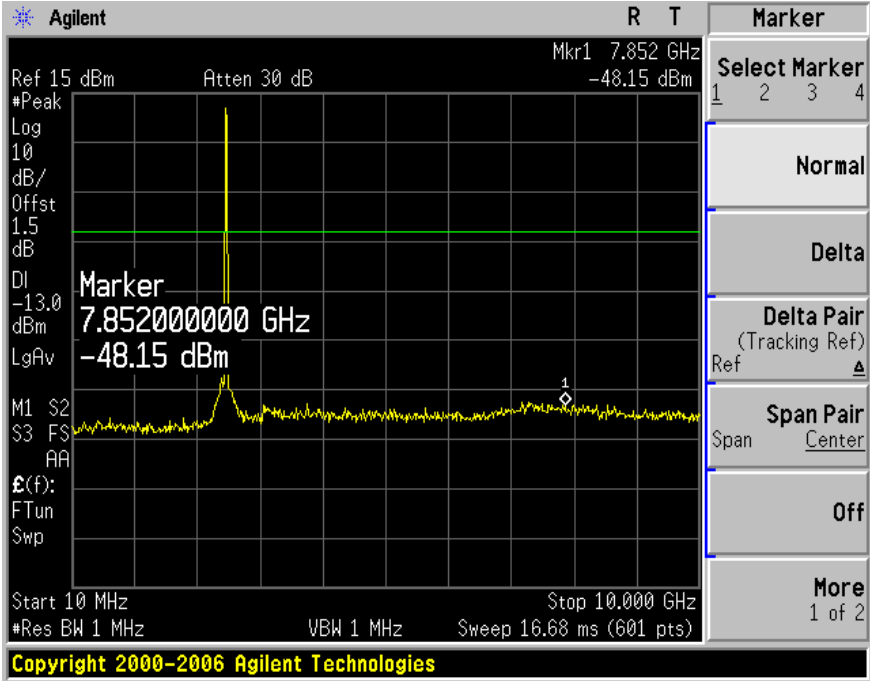




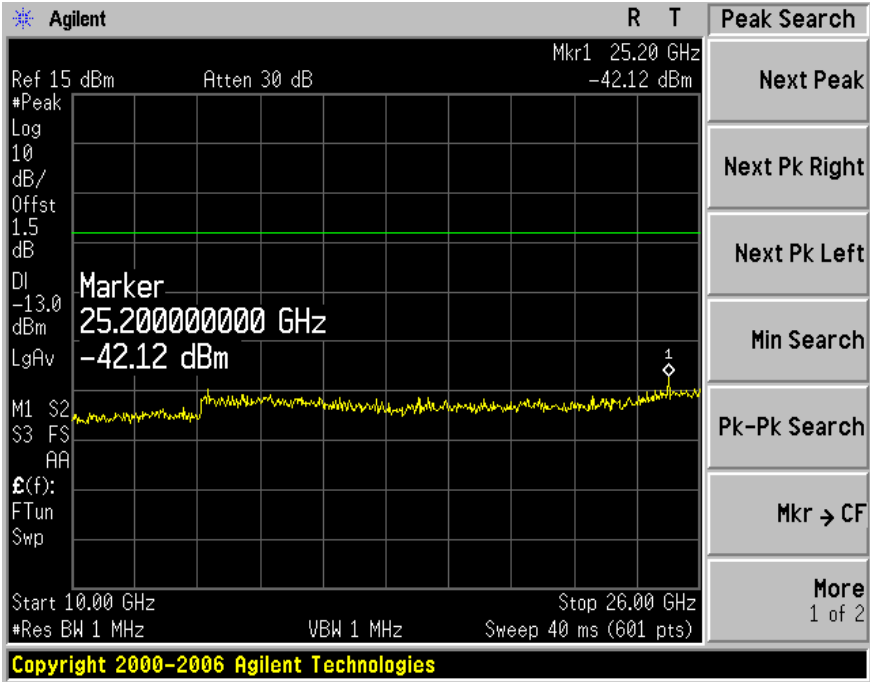
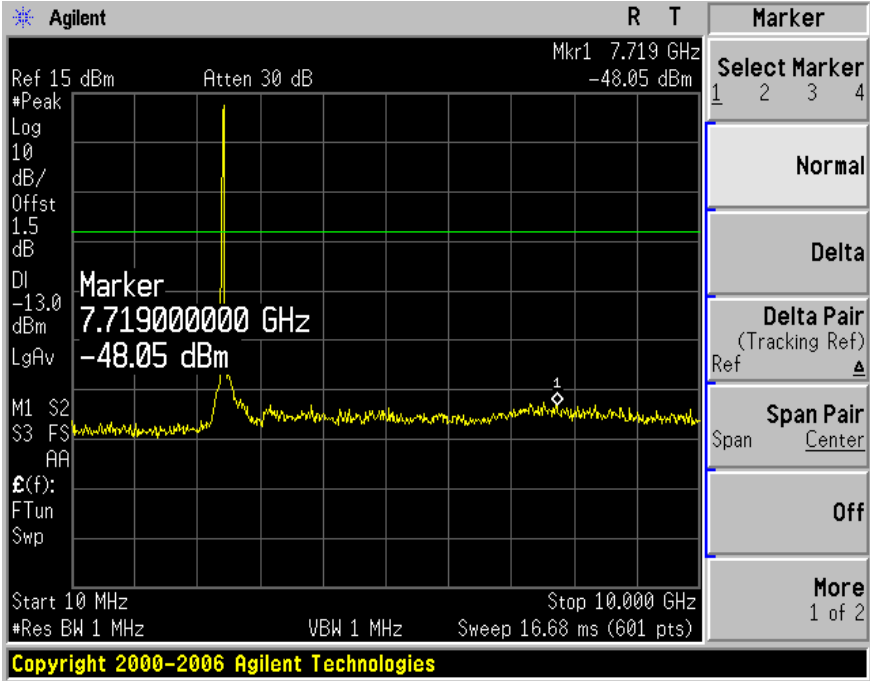
CCK (802.11b-6ch)



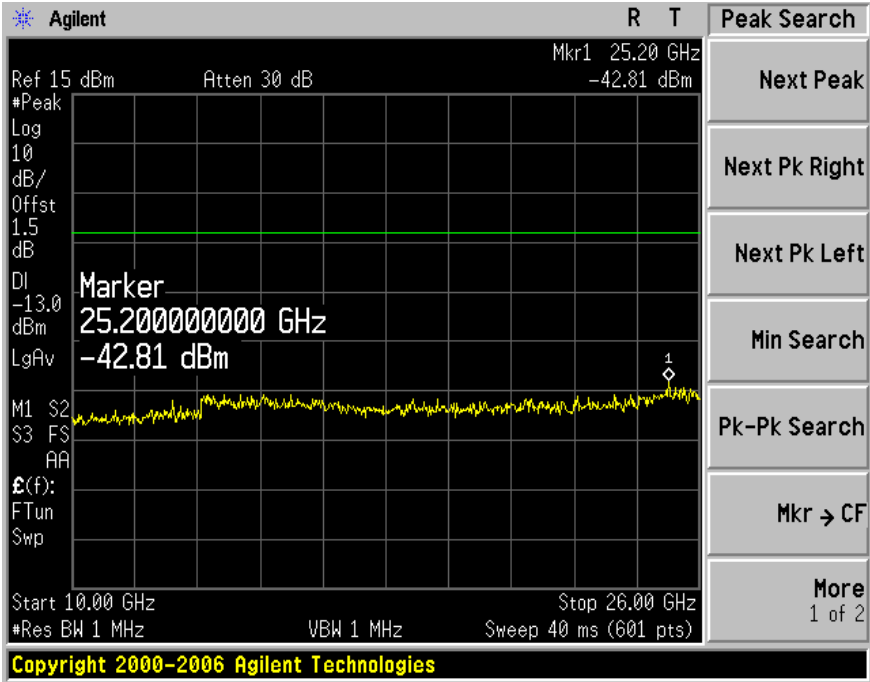
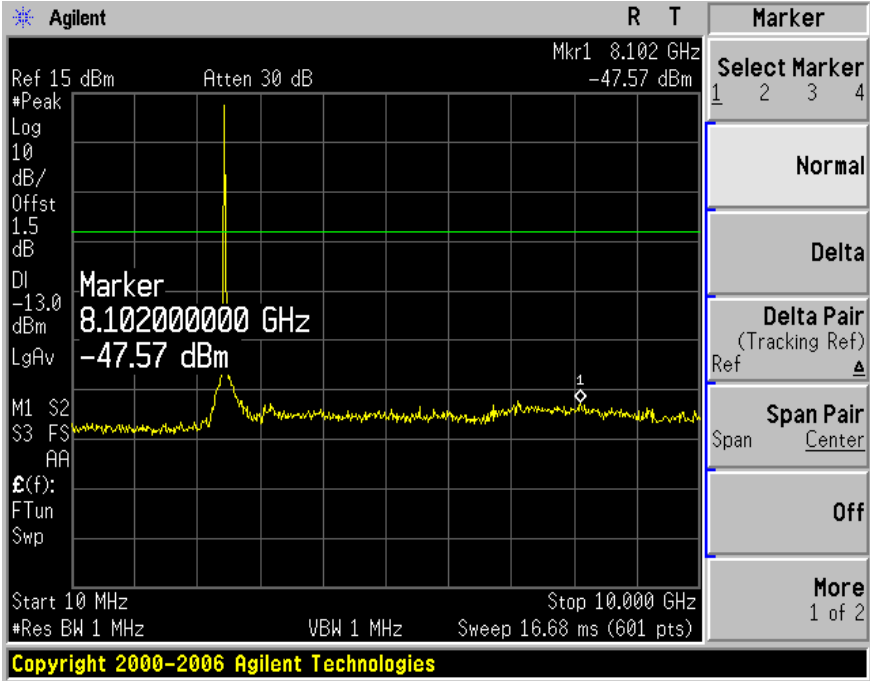
CCK (802.11b-11ch)



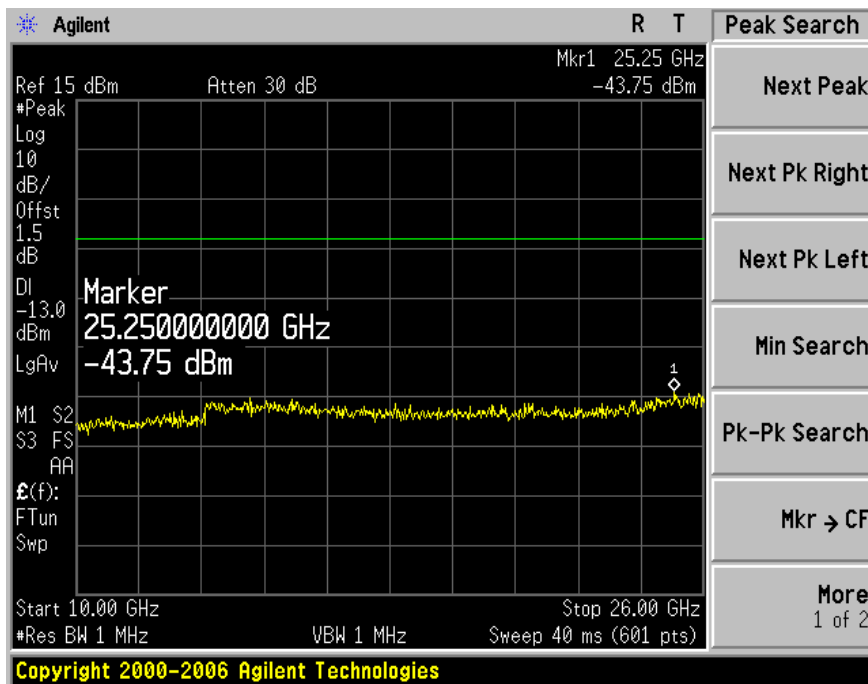
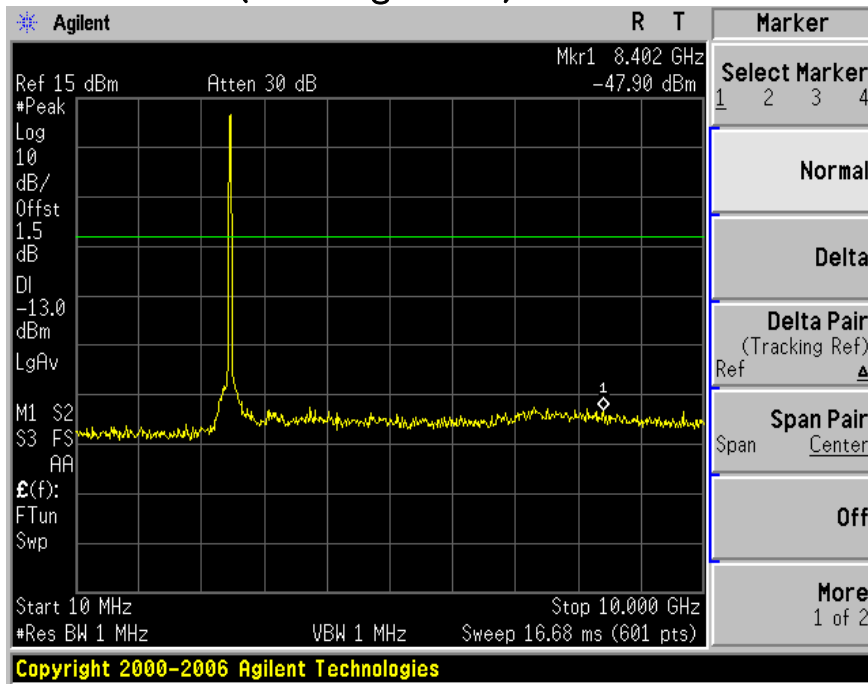
OFDM (802.11g-1ch)



OFDM (802.11g-6ch)



OFDM (802.11g-11ch)



9. Measurement of radiated disturbance

Above 30 MHz Electric Field strength was measured in accordance with FCC Part 15 (2008) & RSS-210. The test setup was made according to ANSI C 63.4 (2003) on an open test site, which allows a 3m distance measurement. The EUT was placed in the center of wooden turntable. The height of this table was 0.8m. The measurement was conducted with both horizontal and vertical antenna polarization. The turntable has fully rotated. For further description of the configuration refer to the picture of the test setup.

9.1 Measurement equipments

Equipment Name	Type	Manufacturer	Serial No.	Next Calibration date
TEST Receiver	ESVS10	Rohde & Schwarz	838562/002	2010. 1. 29
Spectrum Analyzer	R3273	ADVANTEST	110600592	2010. 6. 04
LogBicon Antenna	VULB 9160	Schwarzbeck	3142	2010. 5. 13
Amplifier	8447F	HP	2805A02972	2010. 6. 24
PREAMPLIFIER	8449B	HP	3008A00581	2010. 3. 06
Horn Antenna	BBHA 9120 D	Schwarzbeck	352	2010. 6. 17
Turn Table	2087	EMCO	2129	–
Antenna Mast	2070-01	EMCO	9702-203	–
ANT Mast Controller	2090	EMCO	1535	–
Turn Table Controller	2090	EMCO	1535	–

9.2 Environmental Condition

Test Place : Open site(3m)
 (11b) Temperature : 5 °C
 (11b) Humidity : 68 %
 (11g) Temperature : 4 °C
 (11g) Humidity : 69 %
 (Rx) Temperature : 6 °C
 (Rx) Humidity : 65 %

9.3 Test Data for wireless LAN(802.11b-CH6)

Test Date : 22-Jan-10

Measurement Distance : 3 m

Frequency (MHz)	Reading (dB μ V)	Position (V/H)	Height (m)	Correction Factor		Result Value		
				Ant Factor (dB)	Cable (dB)	Limit (dB μ V/m)	Result (dB μ V/m)	Margin (dB)
32.87	16.50	H	2.8	11.15	0.9	40.0	28.55	-11.45
96.07	17.50	V	1.0	8.75	1.5	43.5	27.75	-15.75
141.44	13.80	V	1.0	12.77	2.0	43.5	28.57	-14.93
494.00	20.80	V	1.1	17.03	4.7	46.0	42.53	-3.47
545.98	14.10	V	1.0	18.13	5.2	46.0	37.40	-8.60
649.99	11.80	V	1.0	20.06	6.0	46.0	37.90	-8.10
701.98	12.50	V	1.0	20.58	6.3	46.0	39.42	-6.58
753.98	11.50	V	1.3	21.81	6.7	46.0	40.04	-5.96
805.98	12.10	V	1.3	22.14	7.0	46.0	41.21	-4.79
Remark	H : Horizontal, V : Vertical *Checked in all 3 axis and the maximum measured data were reported. *CL = Cable Loss-Amplifier Gain(In case of above1000Mhz) *CL = Cable Loss(In case of below1000Mhz) *The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120KHz for Quasi-peak detection at frequency below 1GHz. *The resolution bandwidth and video bandwidth of spectrum analyzer is 1MHz and 10Hz for average detection at frequency above 1GHz.							

9.3-1 Test Data for wireless LAN

Test Date : 22-Jan-10

Measurement Distance : 3 m

Frequency (MHz)	Reading (dB μ V)	Position (V/H)	Height (m)	Correction Factor		Result Value		
				Ant Factor (dB)	Cable (dB)	Limit (dB μ V/m)	Result (dB μ V/m)	Margin (dB)
PEAK(RBW:1Mhz VBW:1MHz)								
2413.4	81.46	H	1.6	27.61	4.5	*OB	113.57	–
4823.9	50.09	H	1.5	31.30	–28.8	74.0	52.55	–21.45
2413.4	76.94	V	1.5	27.61	4.5	*OB	109.05	–
4823.9	45.74	V	1.5	31.30	–28.8	74.0	48.20	–25.80
AV(RBW:1Mhz VBW:10Hz)								
2413.4	73.06	H	1.1	27.61	4.5	*OB	105.17	–
4823.9	35.70	H	1.0	31.30	–28.8	54.0	38.16	–15.84
2413.4	68.26	V	1.0	27.61	4.5	*OB	100.37	–
4823.9	30.72	V	1.0	31.30	–28.8	54.0	33.18	–20.82
Remark	H : Horizontal, V : Vertical TEST MODE : 802.11b – CH1(2412MHz) *The TX signal isn't detected from 3th harmonics. *OB = Operating band *Checked in all 3 axis and the maximum measured data were reported. *CL = Cable Loss–Amplifier Gain(In case of above1000Mhz) *CL = Cable Loss(In case of below1000Mhz) *The resolution bandwidth and video bandwidth of spectrum analyzer is 1MHz and 10Hz for average detection at frequency above 1GHz.							

9.3-2 Test Data for wireless LAN

Test Date : 22-Jan-10

Measurement Distance : 3 m

Frequency (MHz)	Reading (dB μ V)	Position (V/H)	Height (m)	Correction Factor		Result Value		
				Ant Factor (dB)	Cable (dB)	Limit (dB μ V/m)	Result (dB μ V/m)	Margin (dB)
PEAK(RBW:1Mhz VBW:1MHz)								
2438.38	79.14	H	1.4	27.60	4.5	*OB	111.24	–
4873.87	44.93	H	1.4	31.37	–28.7	74.0	47.61	–26.39
2438.38	73.87	V	1.9	27.60	4.5	*OB	105.97	–
4873.87	43.84	V	1.6	31.37	–28.7	74.0	46.52	–27.48
AV(RBW:1Mhz VBW:10Hz)								
2438.38	69.89	H	1.4	27.60	4.5	*OB	101.99	–
4873.87	31.94	H	1.4	31.37	–28.7	54.0	34.62	–19.38
2438.38	65.64	V	1.6	27.60	4.5	*OB	97.74	–
4873.87	30.74	V	1.9	31.37	–28.7	54.0	33.42	–20.58
Remark	H : Horizontal, V : Vertical TEST MODE : 802.11b – CH6(2437MHz) *The TX signal isn't detected from 3th harmonics. *OB = Operating band *Checked in all 3 axis and the maximum measured data were reported. *CL = Cable Loss–Amplifier Gain(In case of above1000Mhz) *CL = Cable Loss(In case of below1000Mhz) *The resolution bandwidth and video bandwidth of spectrum analyzer is 1MHz and 10Hz for average detection at frequency above 1GHz.							

9.3-3 Test Data for wireless LAN

Test Date : 22-Jan-10

Measurement Distance : 3 m

Frequency (MHz)	Reading (dB μ V)	Position (V/H)	Height (m)	Correction Factor		Result Value		
				Ant Factor (dB)	Cable (dB)	Limit (dB μ V/m)	Result (dB μ V/m)	Margin (dB)
PEAK(RBW:1Mhz VBW:1MHz)								
2463.33	78.73	H	1.2	27.59	4.5	*OB	110.82	–
4924	43.24	H	1.4	31.44	–28.6	74.0	46.10	–27.90
2463.33	73.57	V	1.3	27.59	4.5	*OB	105.66	–
4924	42.15	V	1.4	31.44	–28.6	74.0	45.01	–28.99
AV(RBW:1Mhz VBW:10Hz)								
2463.33	70.41	H	1.2	27.59	4.5	*OB	102.50	–
4924	30.91	H	1.4	31.44	–28.6	54.0	33.77	–20.23
2463.33	65.28	V	1.3	27.59	4.5	*OB	97.37	–
4924	29.84	V	1.4	31.44	–28.6	54.0	32.70	–21.30
Remark	H : Horizontal, V : Vertical TEST MODE : 802.11b – CH11(2462MHz) *The TX signal isn't detected from 3th harmonics. *OB = Operating band *Checked in all 3 axis and the maximum measured data were reported. *CL = Cable Loss–Amplifier Gain(In case of above1000Mhz) *CL = Cable Loss(In case of below1000Mhz) *The resolution bandwidth and video bandwidth of spectrum analyzer is 1MHz and 10Hz for average detection at frequency above 1GHz.							

9.4 Test Data for wireless LAN

Test Date : 22-Jan-10

Measurement Distance : 3 m

Frequency (MHz)	Reading (dB μ V)	Position (V/H)	Height (m)	Correction Factor		Result Value		
				Ant Factor (dB)	Cable (dB)	Limit (dB μ V/m)	Result (dB μ V/m)	Margin (dB)
33.01	16.90	V	1.0	11.14	0.9	40.0	28.94	-11.06
78.02	18.10	V	1.0	8.47	1.4	40.0	27.92	-12.08
142.00	12.50	V	1.1	12.77	2.0	43.5	27.26	-16.24
494.00	20.50	V	1.2	17.03	4.7	46.0	42.23	-3.77
545.97	14.20	V	1.0	18.13	5.2	46.0	37.50	-8.50
649.98	10.90	V	1.0	20.06	6.0	46.0	37.00	-9.00
702.00	13.10	V	1.1	20.58	6.3	46.0	40.02	-5.98
754.00	11.60	V	1.2	21.81	6.7	46.0	40.14	-5.86
806.01	12.50	V	1.3	22.14	7.0	46.0	41.61	-4.39
Remark	H : Horizontal, V : Vertical TEST MODE : 802.11g *Checked in all 3 axis and the maximum measured data were reported. *CL = Cable Loss-Amplifier Gain(In case of above1000Mhz) *CL = Cable Loss(In case of below1000Mhz) *The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120KHz for Quasi-peak detection at frequency below 1GHz. *The resolution bandwidth and video bandwidth of spectrum analyzer is 1MHz and 10Hz for average detection at frequency above 1GHz.							

9.4-1 Test Data for wireless LAN

Test Date : 22-Jan-10

Measurement Distance : 3 m

Frequency (MHz)	Reading (dB μ V)	Position (V/H)	Height (m)	Correction Factor		Result Value		
				Ant Factor (dB)	Cable (dB)	Limit (dB μ V/m)	Result (dB μ V/m)	Margin (dB)
PEAK(RBW:1Mhz VBW:1MHz)								
2418.8	76.38	H	1.3	27.61	4.5	*OB	108.49	–
4823.4	48.04	H	1.0	31.30	–28.8	74.0	50.50	–23.50
2418.8	76.00	V	1.6	27.61	4.5	*OB	108.11	–
4823.4	45.12	V	1.2	31.30	–28.8	74.0	47.58	–26.42
AV(RBW:1Mhz VBW:10Hz)								
2418.8	65.79	H	1.3	27.61	4.5	*OB	97.90	–
4823.4	33.60	H	1.0	31.30	–28.8	54.0	36.06	–17.94
2418.8	64.45	V	1.6	27.61	4.5	*OB	96.56	–
4823.4	31.12	V	1.2	31.30	–28.8	54.0	33.58	–20.42
Remark	H : Horizontal, V : Vertical TEST MODE : 802.11g – CH1(2412MHz) *The TX signal isn't detected from 3th harmonics. *OB = Operating band *Checked in all 3 axis and the maximum measured data were reported. *CL = Cable Loss–Amplifier Gain(In case of above1000Mhz) *CL = Cable Loss(In case of below1000Mhz) *The resolution bandwidth and video bandwidth of spectrum analyzer is 1MHz and 10Hz for average detection at frequency above 1GHz.							

9.4-2 Test Data for wireless LAN

Test Date : 22-Jan-10

Measurement Distance : 3 m

Frequency (MHz)	Reading (dB μ V)	Position (V/H)	Height (m)	Correction Factor		Result Value		
				Ant Factor (dB)	Cable (dB)	Limit (dB μ V/m)	Result (dB μ V/m)	Margin (dB)
PEAK(RBW:1Mhz VBW:1MHz)								
2431.4	78.28	H	1.2	27.61	4.5	*OB	110.39	–
4873.4	46.90	H	1.2	31.37	–28.7	74.0	49.58	–24.42
2431.4	73.77	V	1.0	27.61	4.5	*OB	105.88	–
4873.4	44.04	V	1.3	31.37	–28.7	74.0	46.72	–27.28
AV(RBW:1Mhz VBW:10Hz)								
2431.4	67.40	H	1.2	27.61	4.5	*OB	99.51	–
4873.4	31.01	H	1.2	31.37	–28.7	54.0	33.69	–20.31
2431.4	63.12	V	1.0	27.61	4.5	*OB	95.23	–
4873.4	30.01	V	1.3	31.37	–28.7	54.0	32.69	–21.31
Remark	H : Horizontal, V : Vertical TEST MODE : 802.11g – CH6(2437MHz) *The TX signal isn't detected from 3th harmonics. *OB = Operating band *Checked in all 3 axis and the maximum measured data were reported. *CL = Cable Loss–Amplifier Gain(In case of above1000Mhz) *CL = Cable Loss(In case of below1000Mhz) *The resolution bandwidth and video bandwidth of spectrum analyzer is 1MHz and 10Hz for average detection at frequency above 1GHz.							

9.4-3 Test Data for wireless LAN

Test Date : 22-Jan-10

Measurement Distance : 3 m

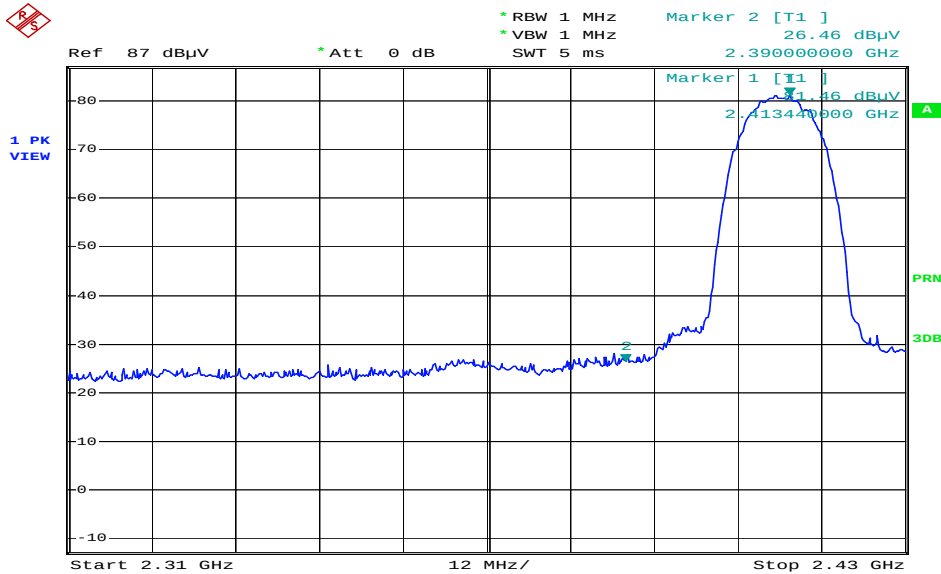
Frequency (MHz)	Reading (dB μ V)	Position (V/H)	Height (m)	Correction Factor		Result Value		
				Ant Factor (dB)	Cable (dB)	Limit (dB μ V/m)	Result (dB μ V/m)	Margin (dB)
PEAK(RBW:1Mhz VBW:1MHz)								
2468.7	77.47	H	1.3	27.59	4.5	*OB	109.56	–
4924	45.60	H	1.0	31.44	–28.6	74.0	48.46	–25.54
2468.7	76.34	V	1.1	27.59	4.5	*OB	108.43	–
4924	45.42	V	1.0	31.44	–28.6	74.0	48.28	–25.72
AV(RBW:1Mhz VBW:10Hz)								
2468.7	65.10	H	1.3	27.59	4.5	*OB	97.19	–
4924	30.95	H	1.0	31.44	–28.6	54.0	33.81	–20.19
2468.7	65.92	V	1.1	27.59	4.5	*OB	98.01	–
4924	30.01	V	1.0	31.44	–28.6	54.0	32.87	–21.13
Remark	H : Horizontal, V : Vertical TEST MODE : 802.11g – CH11(2462MHz) *The TX signal isn't detected from 3th harmonics. *OB = Operating band *Checked in all 3 axis and the maximum measured data were reported. *CL = Cable Loss–Amplifier Gain(In case of above1000Mhz) *CL = Cable Loss(In case of below1000Mhz) *The resolution bandwidth and video bandwidth of spectrum analyzer is 1MHz and 10Hz for average detection at frequency above 1GHz.							

9.5-1 Restricted Band Edges for 802.11b

Band Edges(CH Low)

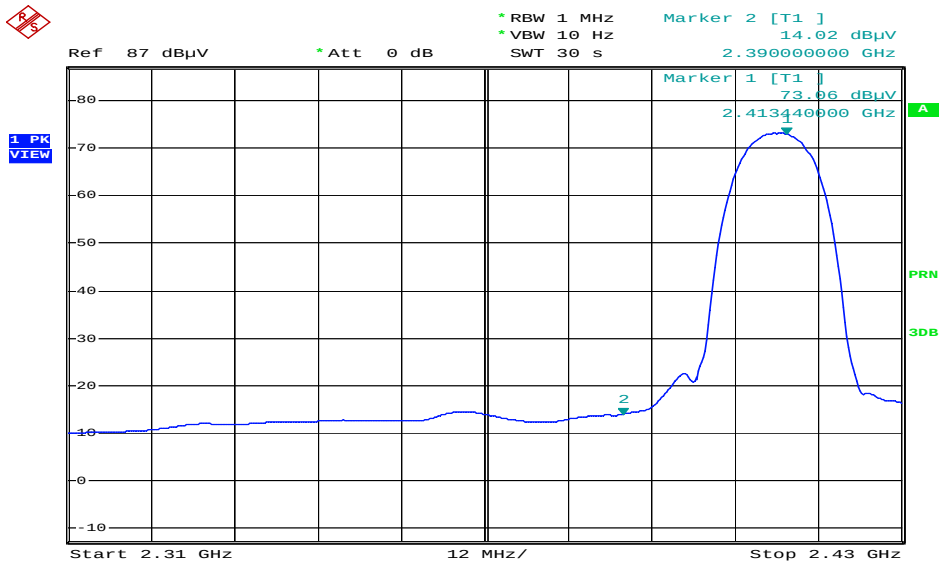
Detector mode:Peak

Polarity:Horizontal



Detector mode:Average

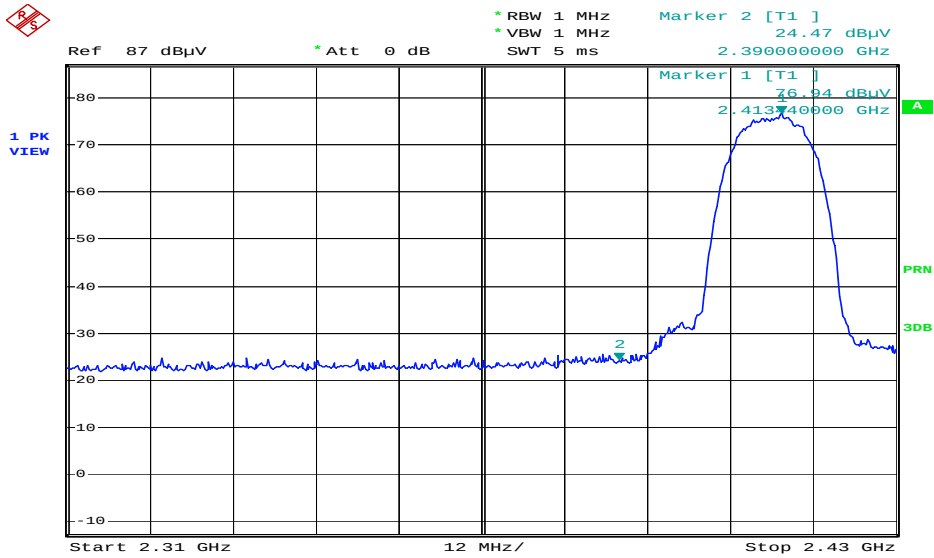
Polarity:Horizontal



Band Edges(CH Low)

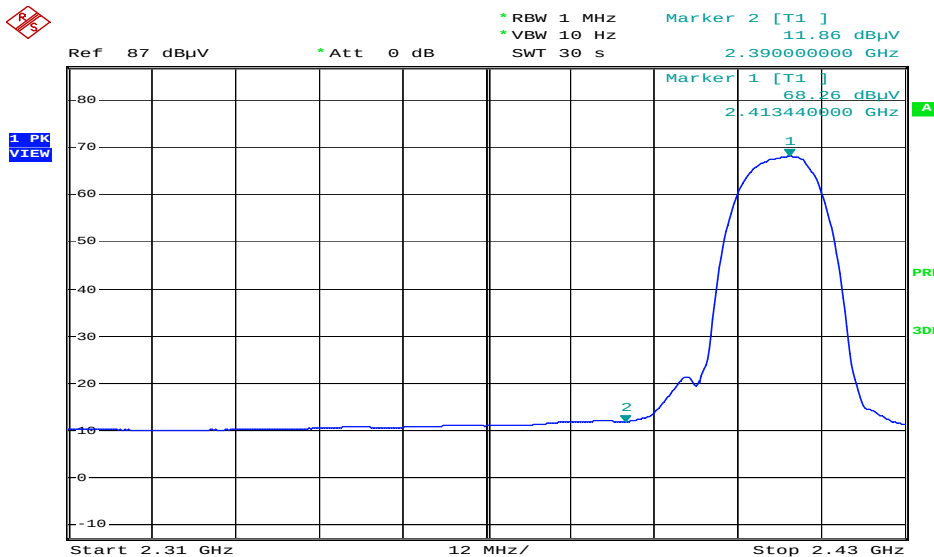
Detector mode:Peak

Polarity:Vertical



Detector mode:Average

Polarity:Vertical





ESTECH Co., Ltd.

Rm 1015, World Venture Center II,
426-5 Gasan-dong, Guncheon-gu,
Seoul, 158-803, Korea

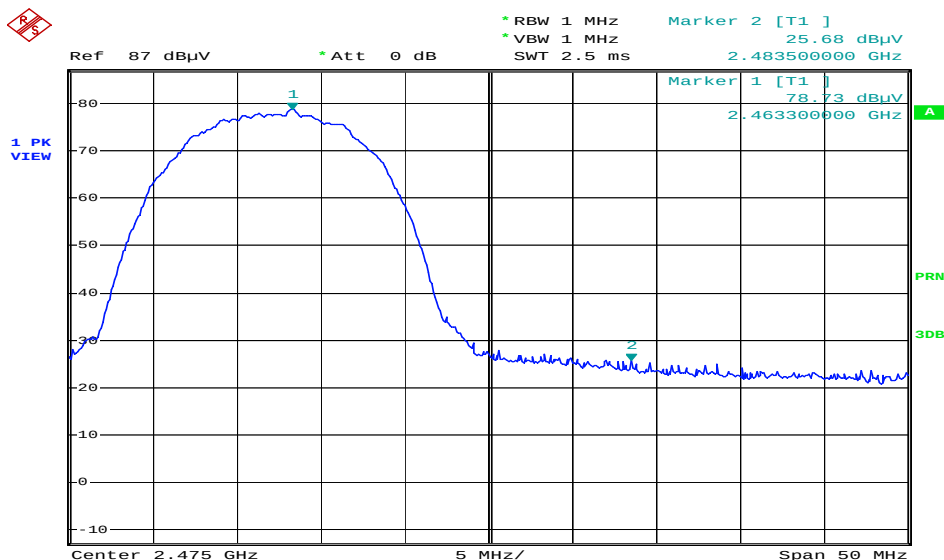


Electromagnetic Interference Test Report

Band Edges(CH High)

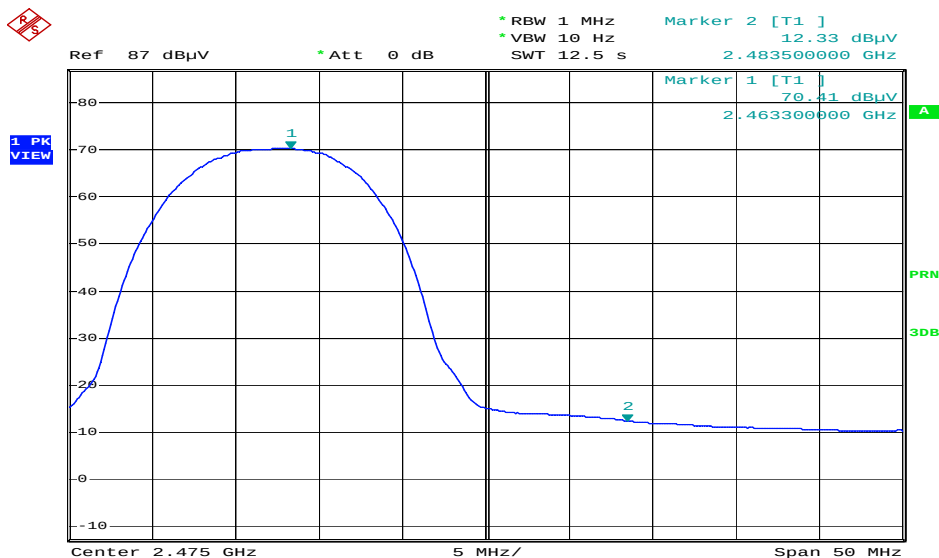
Detector mode:Peak

Polarity:Horizontal



Detector mode:Average

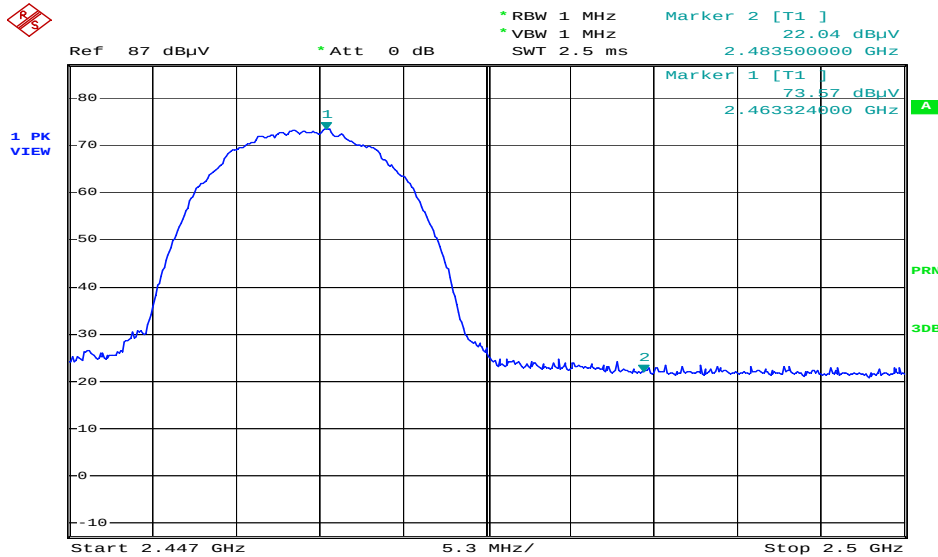
Polarity:Horizontal



Band Edges(CH High)

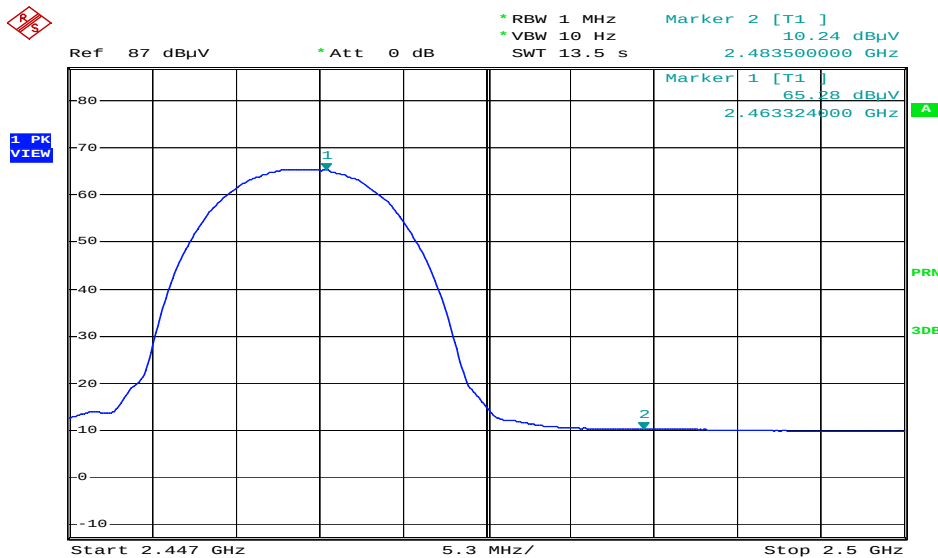
Detector mode:Peak

Polarity:Vertical



Detector mode:Average

Polarity:Vertical

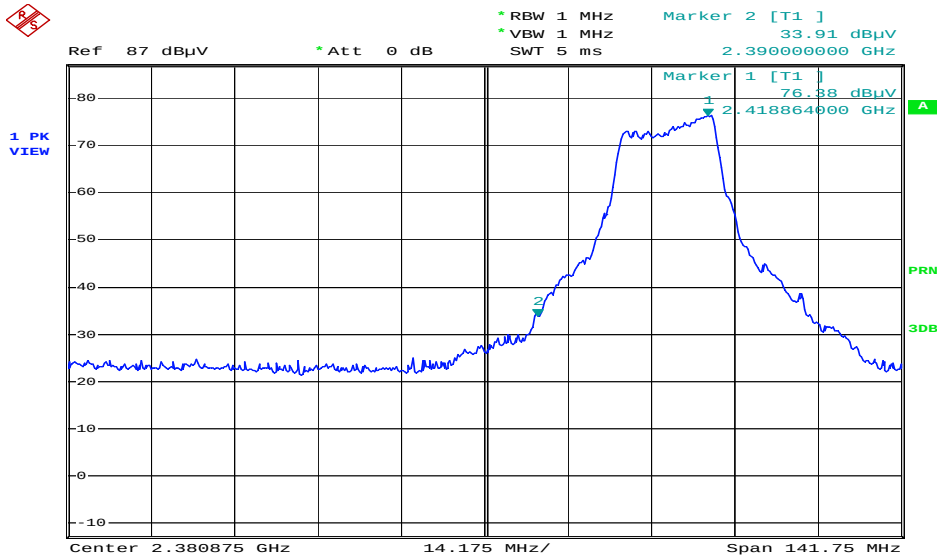


9.5-2 Restricted Band Edges for 802.11g

Band Edges(CH Low)

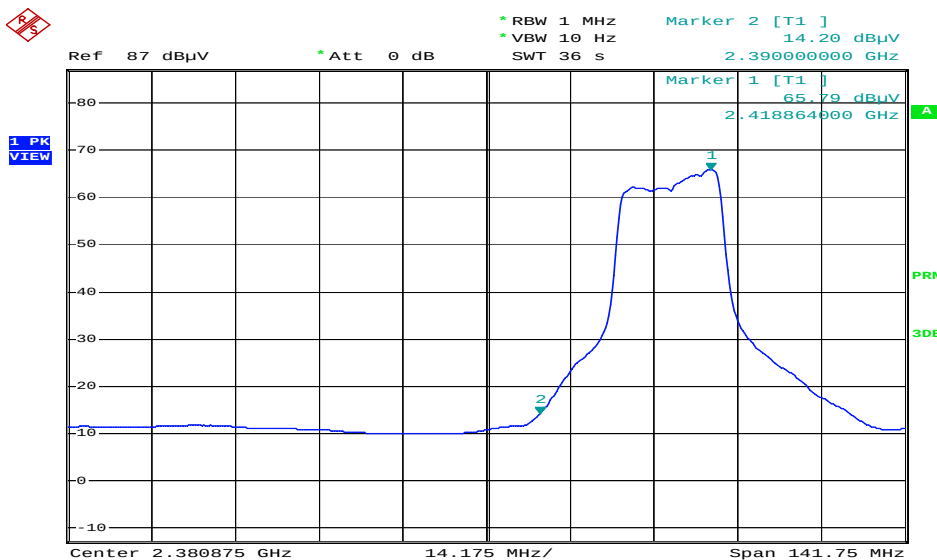
Detector mode:Peak

Polarity:Horizontal



Detector mode:Average

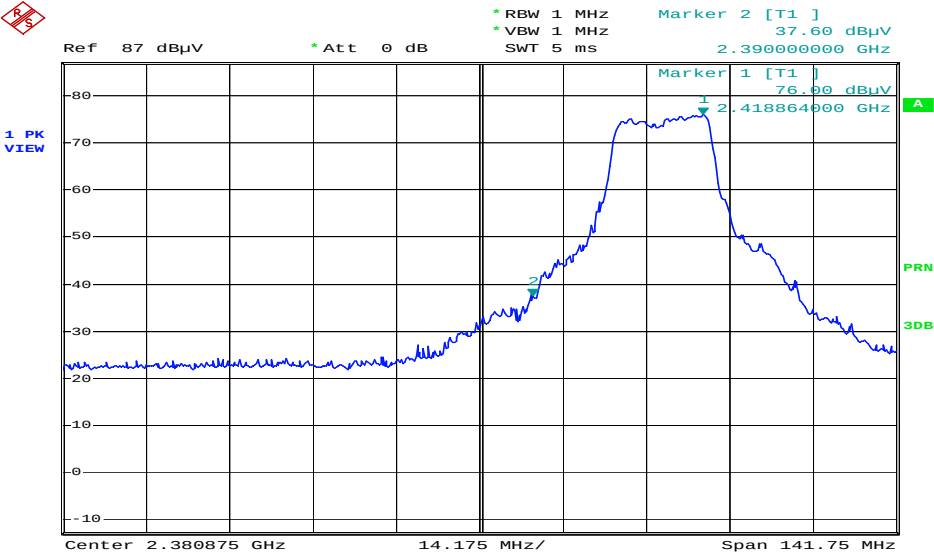
Polarity:Horizontal



Band Edges(CH Low)

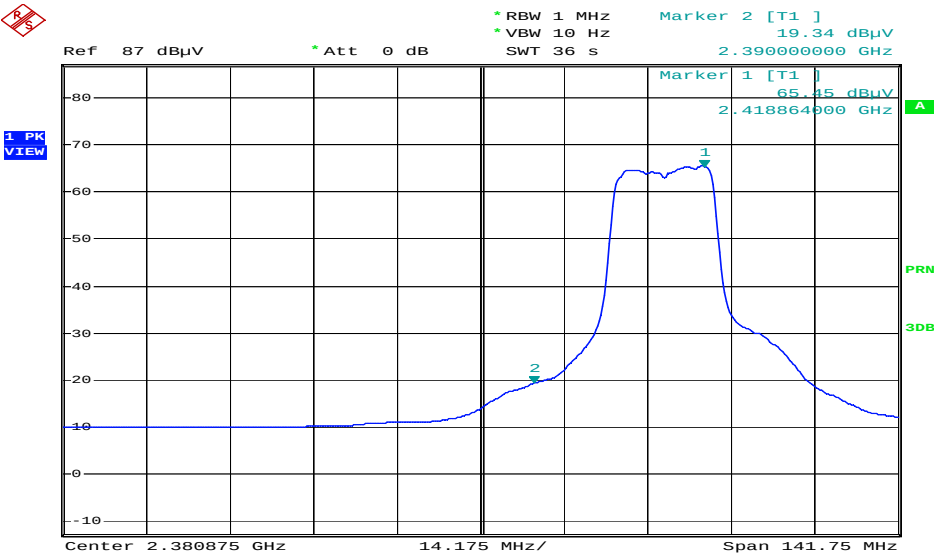
Detector mode:Peak

Polarity:Vertical



Detector mode:Average

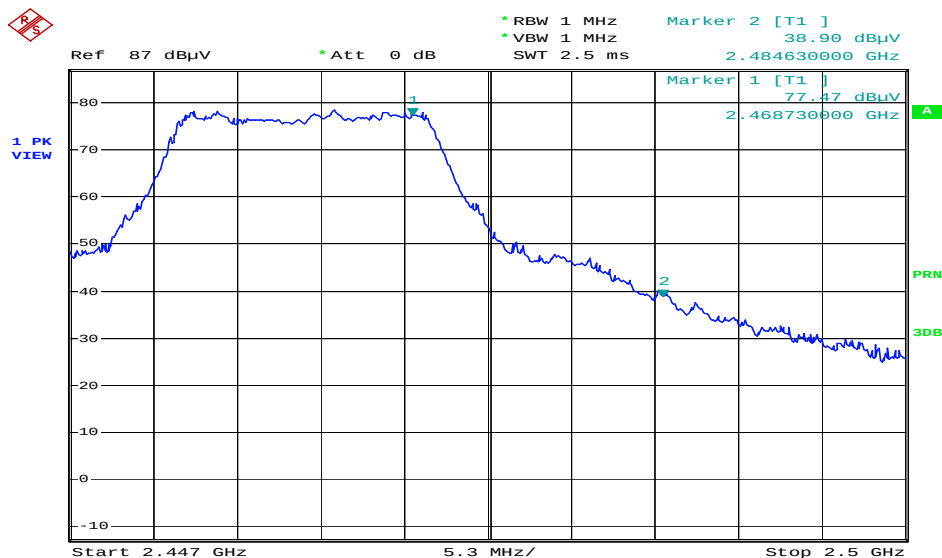
Polarity:Vertical



Band Edges(CH High)

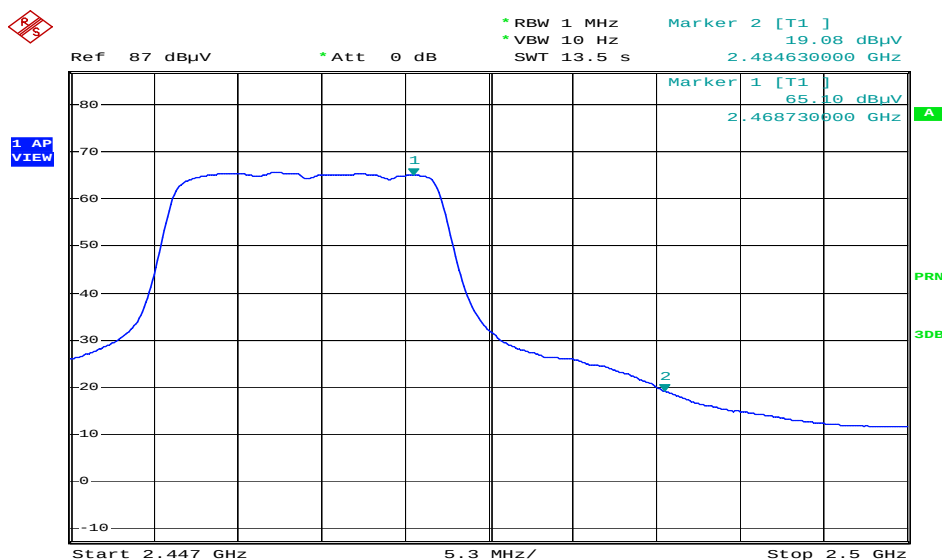
Detector mode:Peak

Polarity:Horizontal



Detector mode:Average

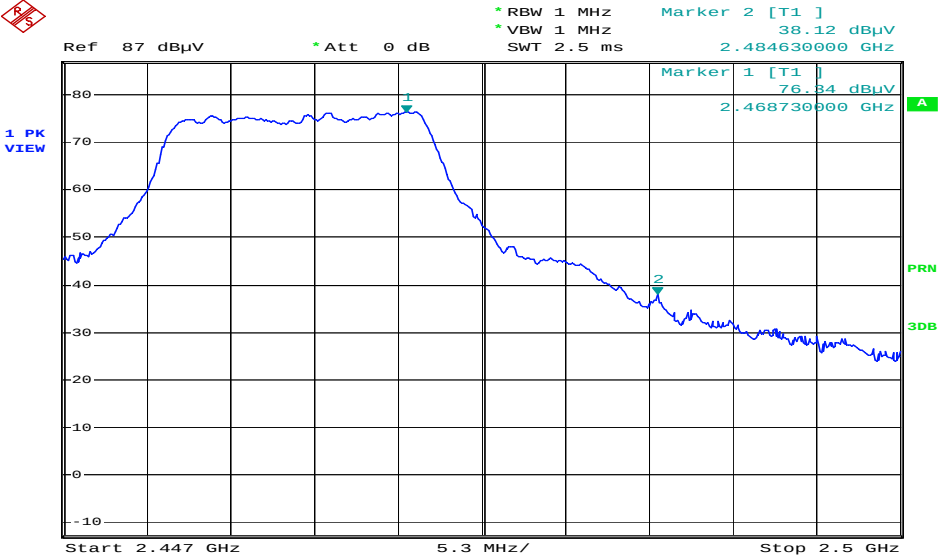
Polarity:Horizontal



Band Edges(CH High)

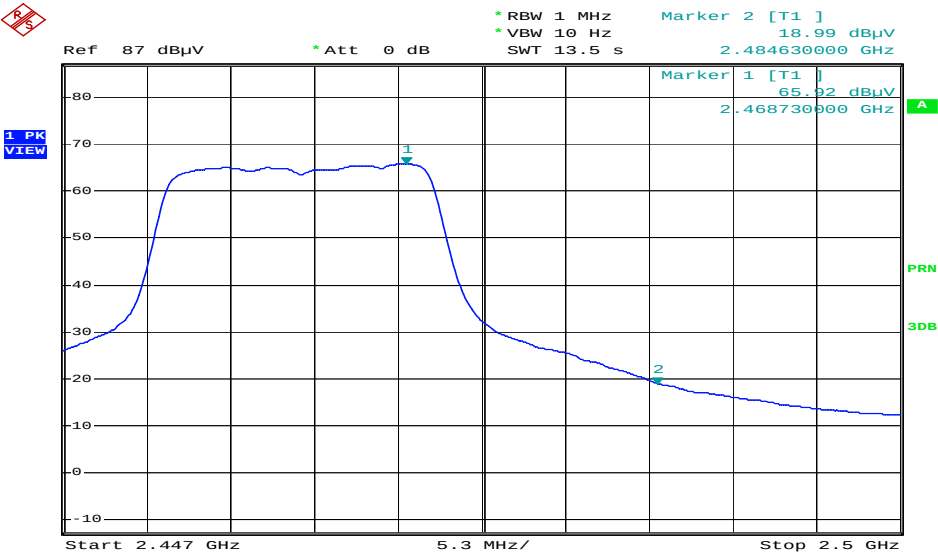
Detector mode:Peak

Polarity:Vertical



Detector mode:Average

Polarity:Vertical



9.6 Test Data for Receiver mode

Test Date : 22-Jan-09

Measurement Distance : 3 m

Frequency (MHz)	Reading (dB μ V)	Position (V/H)	Height (m)	Correction Factor		Result Value		
				Ant Factor (dB)	Cable (dB)	Limit (dB μ V/m)	Result (dB μ V/m)	Margin (dB)
32.60	10.50	V	1.0	11.16	0.9	40.0	22.56	-17.44
39.96	11.10	V	1.0	11.68	1.0	40.0	23.73	-16.27
74.94	12.50	V	1.0	8.97	1.3	40.0	22.80	-17.20
80.00	12.10	V	1.0	8.15	1.4	40.0	21.62	-18.38
493.98	18.50	V	1.0	17.03	4.7	46.0	40.23	-5.77
545.98	15.60	V	1.0	18.13	5.2	46.0	38.90	-7.10
805.97	9.50	V	1.2	22.14	7.0	46.0	38.61	-7.39
Remark	H : Horizontal, V : Vertical *Checked in all 3 axis and the maximum measured data were reported. *CL = Cable Loss-Amplifier Gain(In case of above1000Mhz) *CL = Cable Loss(In case of below1000Mhz) *The resolution bandwidth and v							

10. Measurement of conducted disturbance

The continuous disturbance voltage of AC Mains in the frequency from 0.15 to 30 MHz was measured in accordance to FCC Part 15 (2008) & RSS-210. The test setup was made according to ANSI C 63.4 (2003) in a shielded. The EUT was placed on a non-conductive table at least 80 above the ground plan. A grounded vertical reference plane was positioned in a distance of 40cm from the EUT. The distance from the EUT to other metal surfaces was at least 0.8m. The EUT was only earthen by its power cord through the line impedance stabilizing network. The power cord has been bundled to a length of 1.0m.. The test receiver with Quasi Peak detector complies with CISPR 16.

10.1 Measurement equipments

Equipment Name	Type	Manufacturer	Serial No.	Next Calibration date
LISN	ESH3-Z5	Schwarzbeck	838979/010	2010. 2. 21
LISN	NNLA8120A	Schwarzbeck	8120161	2010. 2. 21
TEST Receiver	ESPI7	Rohde & Schwarz	100185	2010. 8. 25
Pulse Limiter	ESH3Z2	Rohde & Schwarz	NONE	2010. 9. 9

10.2 Environmental Condition

Test Place : Shield Room

(11b) Temperature : 23 °C

(11b) Humidity : 43 %

(11g) Temperature : 23 °C

(11g) Humidity : 42 %

10.3 Test Data for wireless LAN

Test Date : 21-Jan-10

Frequency (MHz)	Correction Factor		Line (H/N)	Quasi-peak Value			Average Value		
	Lisn (dB)	Cable (dB)		Limit (dB μ V)	Reading (dB μ V)	Result (dB μ V)	Limit (dB μ V)	Reading (dB μ V)	Result (dB)
0.20	0.09	0.2	H	63.69	39.35	39.67	53.69	25.70	26.02
0.40	0.10	0.3	H	57.81	37.97	38.36	47.81	23.64	24.03
0.41	0.10	0.3	N	57.75	36.53	36.92	47.75	22.53	22.92
0.47	0.10	0.3	N	56.60	35.92	36.36	46.60	23.50	23.94
0.53	0.10	0.4	H	56.00	38.80	39.27	46.00	27.19	27.66
0.94	0.11	0.5	H	56.00	29.88	30.47	46.00	16.89	17.48
1.38	0.12	0.5	N	56.00	25.22	25.82	46.00	14.89	15.49
7.22	0.31	0.8	N	60.00	27.37	28.45	50.00	18.91	19.99
8.19	0.33	0.8	H	60.00	28.35	29.49	50.00	18.49	19.63
Remark	H : Hot Line, N : Neutral Line TEST MODE : 802.11b - CH 6(2437MHz)								

10.4 Test Data for wireless LAN

Test Date : 21-Jan-10

Frequency (MHz)	Correction Factor		Line (H/N)	Quasi-peak Value			Average Value		
	Lisn (dB)	Cable (dB)		Limit (dB μ V)	Reading (dB μ V)	Result (dB μ V)	Limit (dB μ V)	Reading (dB μ V)	Result (dB)
0.46	0.10	0.3	N	56.66	36.11	36.54	46.66	22.81	23.24
0.20	0.09	0.2	H	63.69	39.35	39.67	53.69	25.70	26.02
0.40	0.10	0.3	H	57.81	37.97	38.36	47.81	23.64	24.03
0.53	0.10	0.4	H	56.00	38.80	39.27	46.00	27.19	27.66
1.62	0.13	0.5	H	56.00	34.86	35.44	46.00	17.92	18.50
8.19	0.33	0.8	H	60.00	28.35	29.49	50.00	18.49	19.63
11.70	0.47	0.9	H	60.00	25.36	26.75	50.00	17.13	18.52
Remark	H : Hot Line, N : Neutral Line TEST MODE : 802.11g - CH 6 (2437MHz)								



ESTECH Co., Ltd.

Rm 1015, World Venture Center II,
426-5 Gasan-dong, Guncheon-gu,
Seoul, 158-803, Korea



**Electromagnetic
Interference
Test Report**

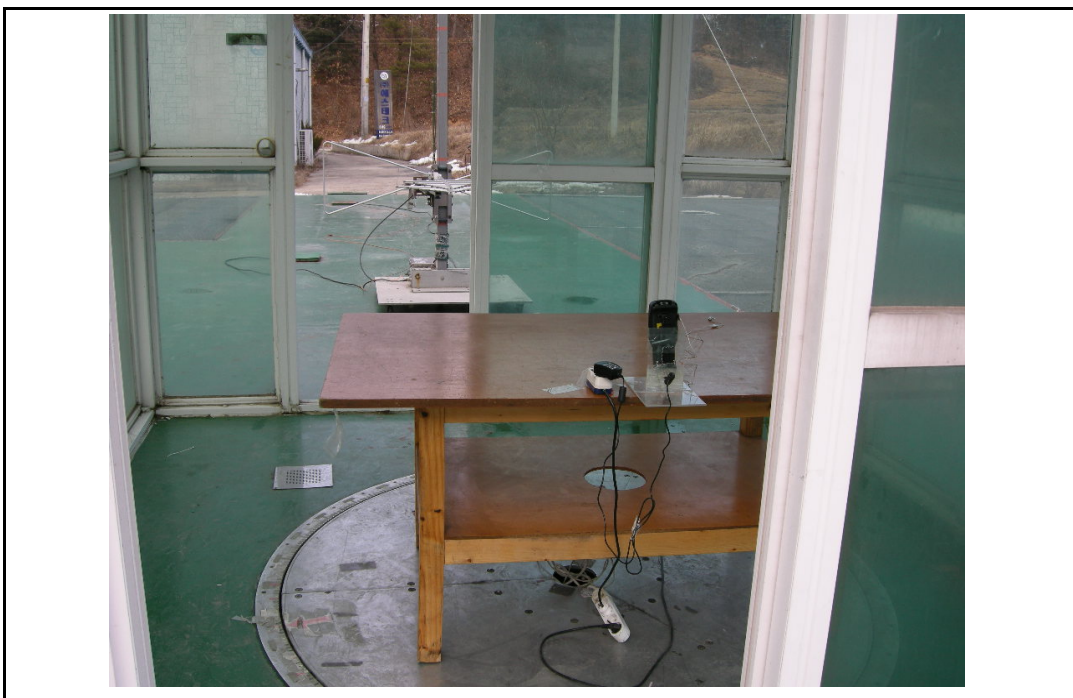
11. Photographs of test setup

11.1. Setup for Radiated Test : 30 ~ 1000 MHz

[Front]



[Rear]



11.2. Setup for Conducted Test : 0.15 ~ 30 MHz

[Front]



[Rear]





ESTECH Co., Ltd.

Rm 1015, World Venture Center II,
426-5 Gasan-dong, Guncheon-gu,
Seoul, 158-803, Korea



**Electromagnetic
Interference
Test Report**

11.3. Photographs of EUT

[Front]



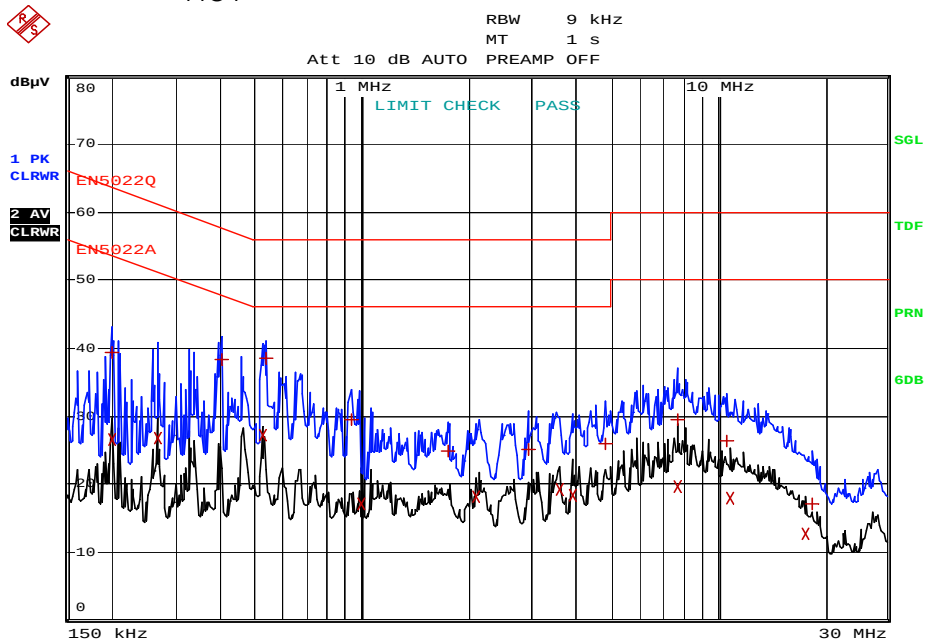
[Rear]



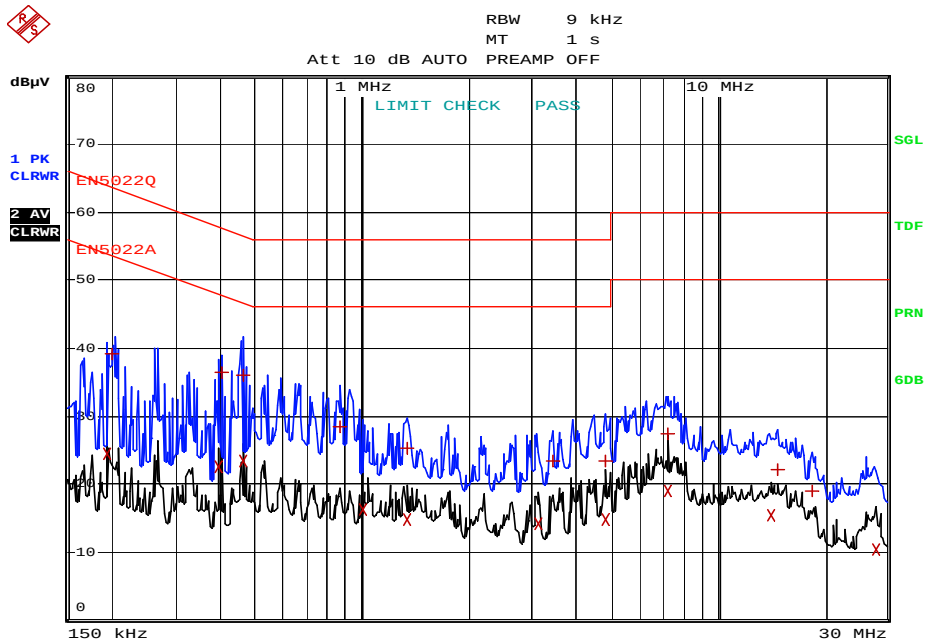
Appendix 1. Spectral diagram for Wireless LAN

802.11b – CH 6

*HOT



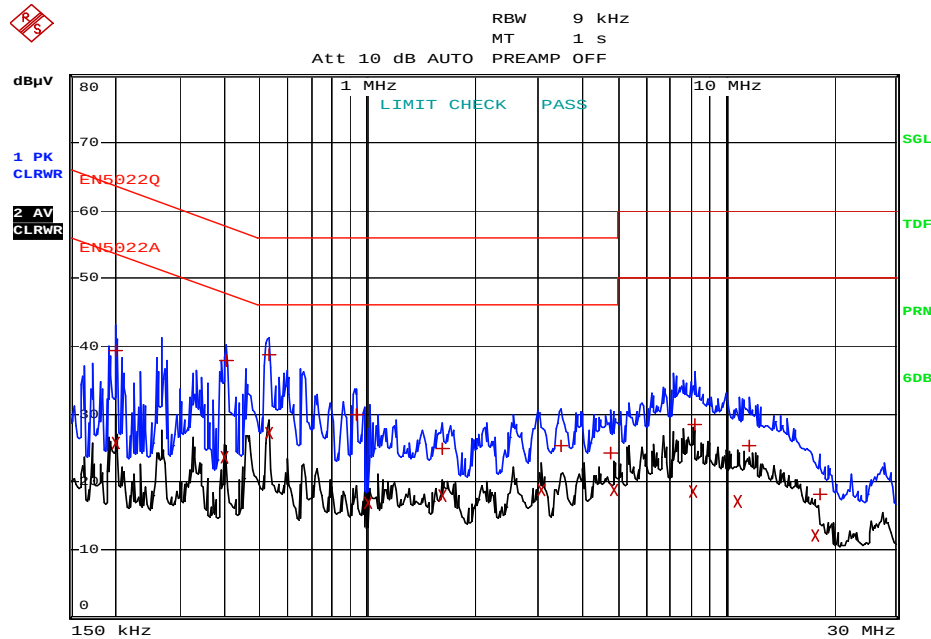
*NEUTRAL



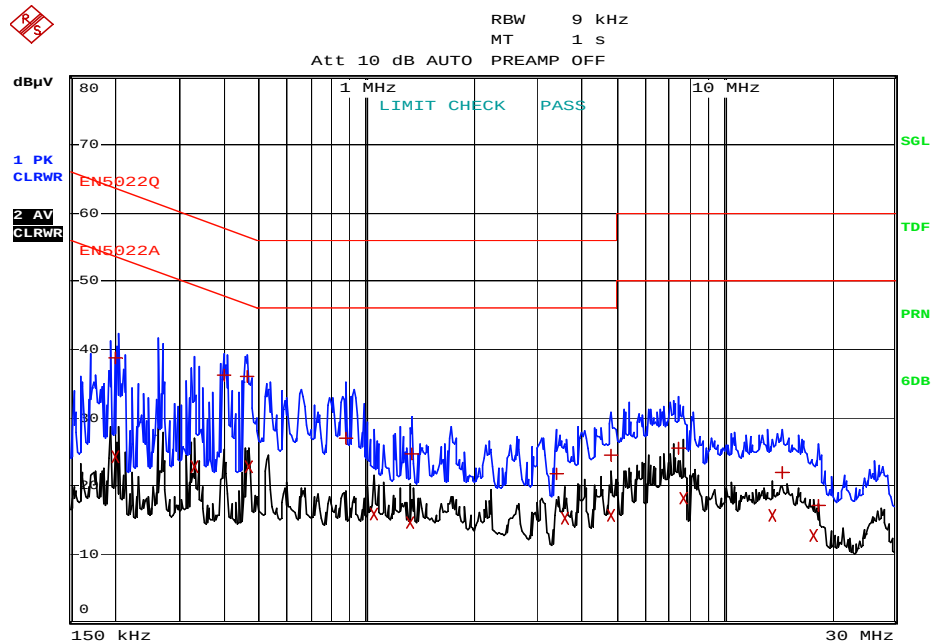
Appendix 1. Spectral diagram for Wireless LAN

802.11g – CH 6

*HOT



*NEUTRAL



Appendix 2. Antenna Requirement

1. Antenna Requirement

1.1 Standard Applicable

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

And according to FCC 47 CFR Section 15.24

1.2 Antenna Connected Construction

The antenna types used in this product are Intergrated Sandwich antenna . The maximum Gain of this antenna is 0.39 dBi.