Test Report for FCC

FCC ID:SS4MT3XX

Report Number		ESTF151303-008		
Applicant	Company name	Bluebird Soft Inc.		
	Address	SEI Tower 13,14, 467-14, Dogok-dong Gangnam-gu, Seoul, South Korea.		
	Telephone	82-70-7730-8239		
Product	Product name	PDA		
	Model No.	MT3XX	Manufacturer	Bluebird Soft Inc.
	Serial No.	NONE	Country of origin	KOREA
Test date	2013-03-18 ~ 2013-03-24		Date of issue	25-Mar-13
Testing location	ESTECH. Co., Ltd. 97-1 Hoiuk-Ri Majang-Myon, Icheon-city, KyungKi-Do, Korea			
Standard	FCC PART 15 (2010) , ANSI C 63.4 2003 , KDB 558074			
Result		Complied		
Measurement facility registration number		915135		
Tested by	Engineer H.K.Lee	(Signature)		
Reviewed by	Engineering Manager J.M.Yang	(Signature)		

* Note

- 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

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.

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 (WLAN)

Transfer Rate	: up to 72.2 Mbps
Number of Channel	: 11 ch
PEAK Output Power	: 802.11b: 0.041 Watts, 802.11g: 0.091 Watts ,802.11n: 0.068 Watts
Power Rating	: DC 7.4V Battery, AC-DC Adaptor : Input : AC100~240V 50~60Hz, Output : 9V, 3.0A
Receipt Date	14-Mar-13
X-tal list(s) or Frequencies generated	: The highest operating frequency is 2462 MHz(WLAN)

2.2 General descriptions of EUT

Products	WLAN/Bluetooth/NFC
Model Name	MT3XX
Power	Battery 7.4 V
Frequency Range	802.11b/g/n : 2 412 MHz ~ 2 462 MHz
Modulation Type	802.11b:DSSS/CCK 802.11g/n(HT20):OFDM
Antenna Specification	2.4 GHz Band MAX. Peak gain:2.4 dBi

3. Test Standards

Test Standard : FCC PART 15 (2010)

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 to the marketing of Part 15 devices.

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 power-line conducted radio noise are covered and may be applied to any such equipment unless otherwise specified by individual equipment requirements. These methods cover measurement of certain decides that deliberately radiate energy, such as intentional emitters, but does not cover licensed transmitters. This standard is not intended for certification/approval of avionic equipment or for industrial, scientific, and medical (ISM) equipment These method apply to the measurement of individual units or systems comprised of multiple units

Summary of Test Results

Applied Satandard : 47 CFR Part 15 Subpart C				remark
Standard	Test Type	Result	Remark	Limit
15.207	AC Power Conducted Emission	Pass	Meet the requirement	
15.205 & 15.209	Intentional Radiated Emission	Pass	Meet the requirement	
15.247(a)(2)	Spectrum Bandwidth of a DSSS System , 99 % Bandwidth	Pass	Meet the requirement	Min. 500 kHz
15.247(b)	Maximum Peak ouput power	Pass	Meet the requirement	Max. 30 dBm
15.247(c)	Transmitter Radiated Emission	Pass	Meet the requirement	Table 15.209
15.247(d)	Power Spectral Density	Pass	Meet the requirement	Max. 8 dBm
15.247(d)	Band Edge Measurement	Pass	Meet the requirement	20 dB less
15.107	Receiver conducted Emission	Pass	Meet the requirement	
15.109	Receiver radiated emission	Pass	Meet the requirement	

4. Measurement Condition

4.1 EUT Operation(For 802.11b and 802.11g and 802.11n)

a. Channel

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

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

c. Test Mode : Continuous Output, DSSS, OFDM

d. Test rate : the worst case of rate 802.11b(1 Mbps), 802.11g(6 Mbps),802.11n(MCS0)

For detail information, please refer to SAR test report(page 38).

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 hightest level of emission

* Execute a RF test program to enable EUT under transmission/receiving condition continuously at specific channel frequency.

* Highest frequency of the EUT is above 1 GHz, the measurement shall be made up to 10 times the highest frequency or 40 GHz,

4.3 Configuration and Peripherals

Test setup for WLAN

4.4 EUT and Support equipment

Equipment Name	Model Name	S/N	Manufacturer	Remark (FCC ID)
PDA	MT3XX	NONE	Bluebird Soft Inc.	
Adapter	PSAC30U-090	NONE	Phihong Electroncs Co., Ltd.	

4.5 Cable Connecting

Start Equipment		End Equipment		Cable Standard		Remark
Name	I/O port	Name	I/O port	Length	Shielded	
PDA	Power	Adapter	-	1.5	Unshielded	

5. 6dB Bandwidth Measurement

5.1 Test procedure

558074 D01 DTS Meas Guidance v02 Option 2 :The automatic bandwidth measurement capability of a spectrum analyzer may be employed using the X dB bandwidth mode with X set to 6 dB, if it implements the functionality described above. When using this capability, care should be taken to ensure that the bandwidth measurement is not influenced by any intermediate power nulls in the fundamental emission that may be ≥ 6 dB.

5.2 Test instruments and measurement setup

The spectrum analyzer is set to as following.

. RBW= 180 kHz

. VBW= 1.8 MHz

. Span= 40 MHz

. Sweep= suitable duration based on the EUT specification.

6 dB Bandwidth Test Instruments

Description	Model	Serial Number	Cal. Due Date
Spectrum Analyzer	E4440A	US41421291	2014-01-27
RF Cable	Length: 6 cm	-	
-Spectrum Analyzer <=> EUT	Loss: 1dB	-	

5.3 Measurement results

EUT	PDA	MODEL	MT3XX
MODE	DSSS	ENVIRONMENTAL CONDITION	24.3 ℃, 46.6 % R.H.
INPUT POWER	7.4 Vd.c.		

(802.11b)

Channel Frequency (MHz)	99 % Bandwidth(MHz)	Bandwidth at 6dB below(MHz)	Minimum Limit (MHz)	PASS/FAIL
2412	12.61	8.74	0.5	PASS
2437	12.56	8.22	0.5	PASS
2462	12.60	7.85	0.5	PASS

EUT	PDA	MODEL	MT3XX
MODE	OFDM	ENVIRONMENTAL CONDITION	24.3 ℃, 46.6 % R.H.
INPUT POWER	7.4 Vd.c.		

(802.11g)

Channel Frequency (MHz)	99 % Bandwidth(MHz)	Bandwidth at 6dB below(MHz)	Minimum Limit (MHz)	PASS/FAIL
2412	16.34	14.01	0.5	PASS
2437	16.33	15.44	0.5	PASS
2462	16.38	16.04	0.5	PASS

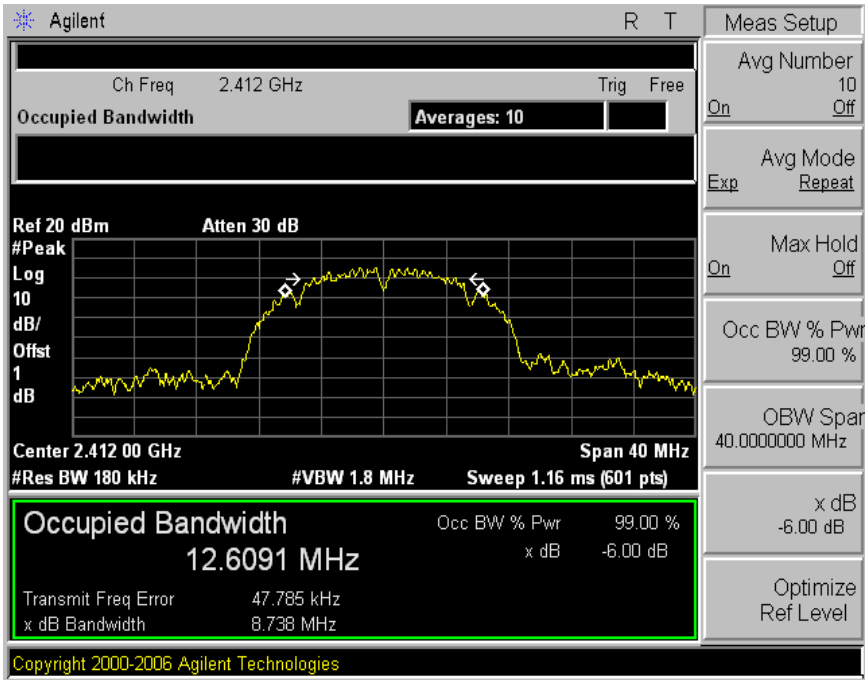
EUT	PDA	MODEL	MT3XX
MODE	OFDM	ENVIRONMENTAL CONDITION	24.3 ℃, 46.6 % R.H.
INPUT POWER	7.4 Vd.c.		

(802.11n)

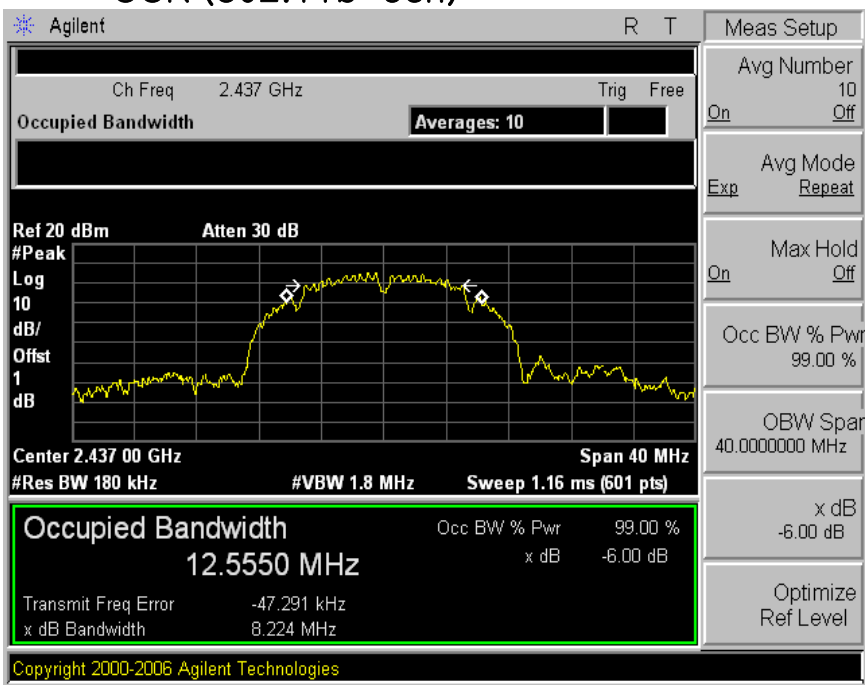
Channel Frequency (MHz)	99 % Bandwidth(MHz)	Bandwidth at 6dB below(MHz)	Minimum Limit (MHz)	PASS/FAIL
2412	17.56	16.73	0.5	PASS
2437	17.57	16.30	0.5	PASS
2462	17.50	15.44	0.5	PASS

5.4 Trace data

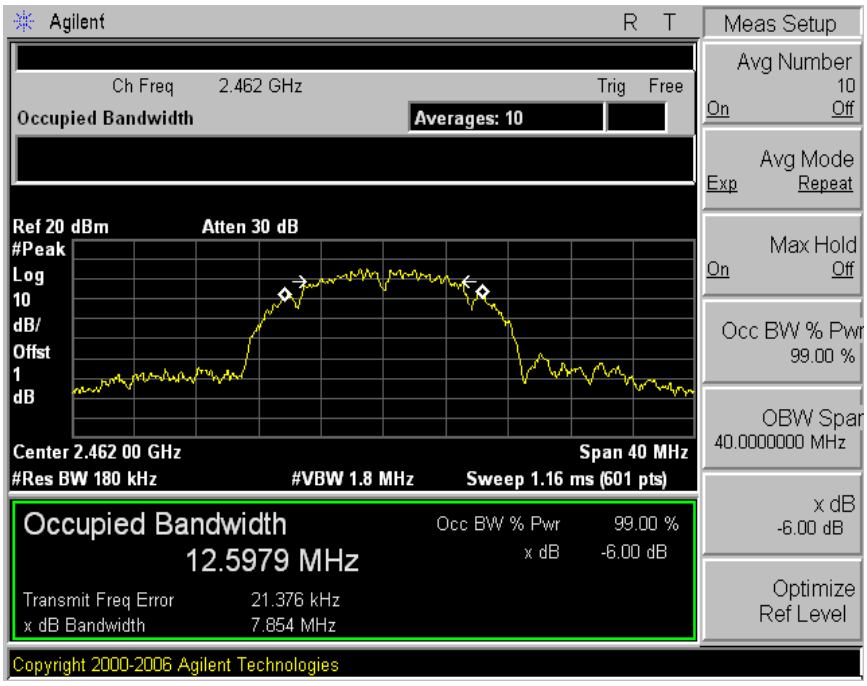
CCK (802.11b-1ch)



CCK (802.11b-6ch)

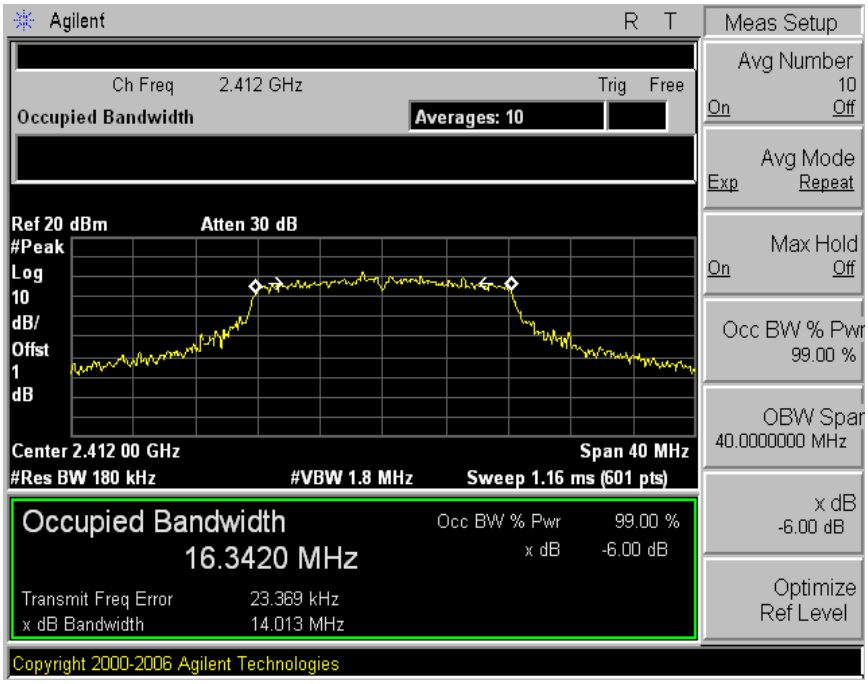


CCK (802.11b-11ch)

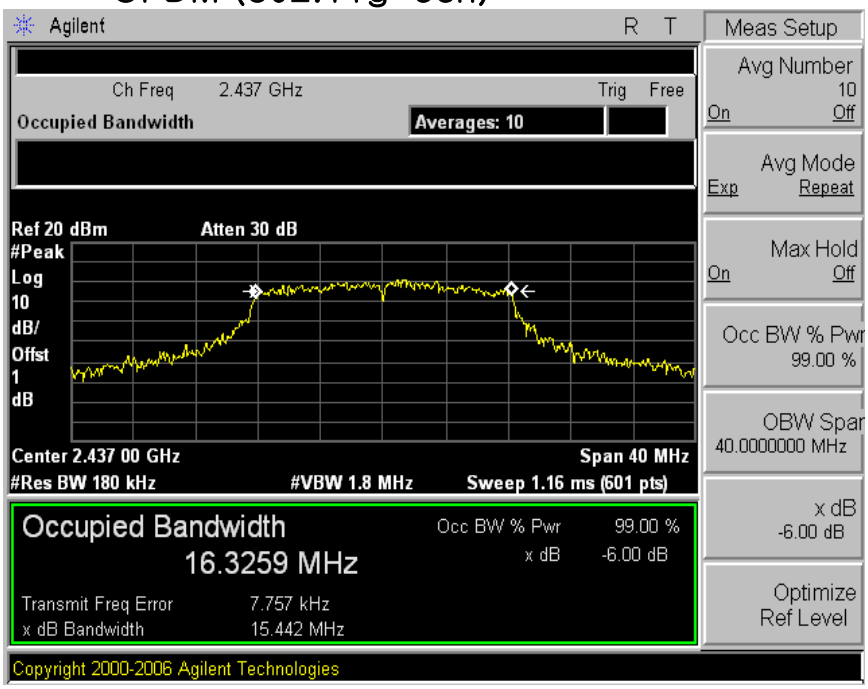


5.4 Trace data

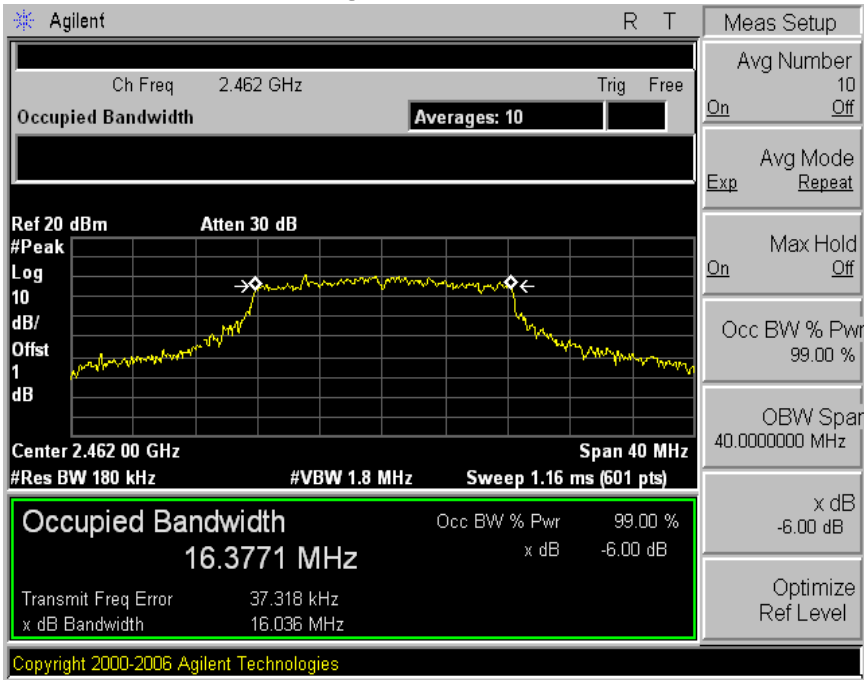
OFDM (802.11g-1ch)



OFDM (802.11g-6ch)

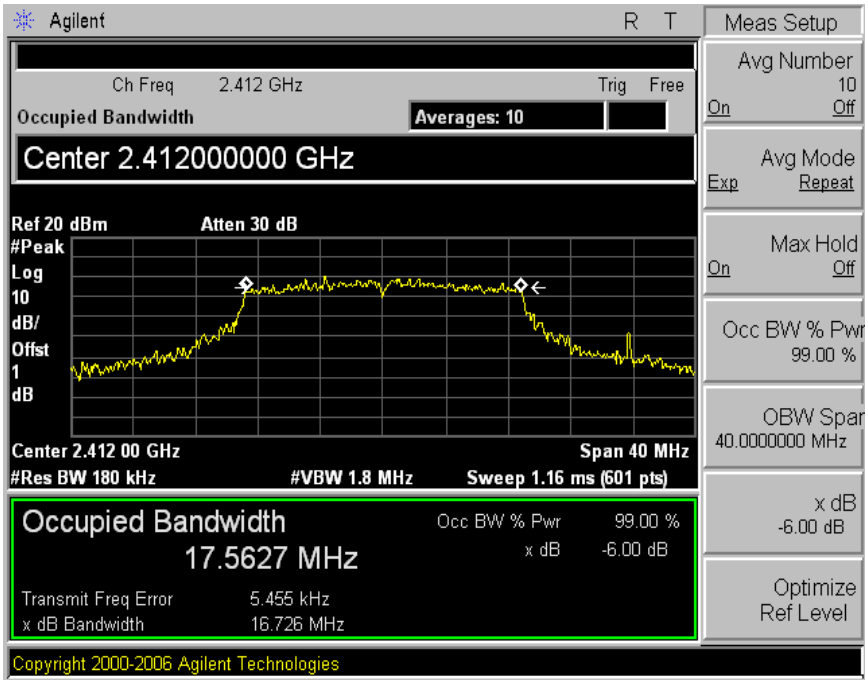


OFDM (802.11g-11ch)

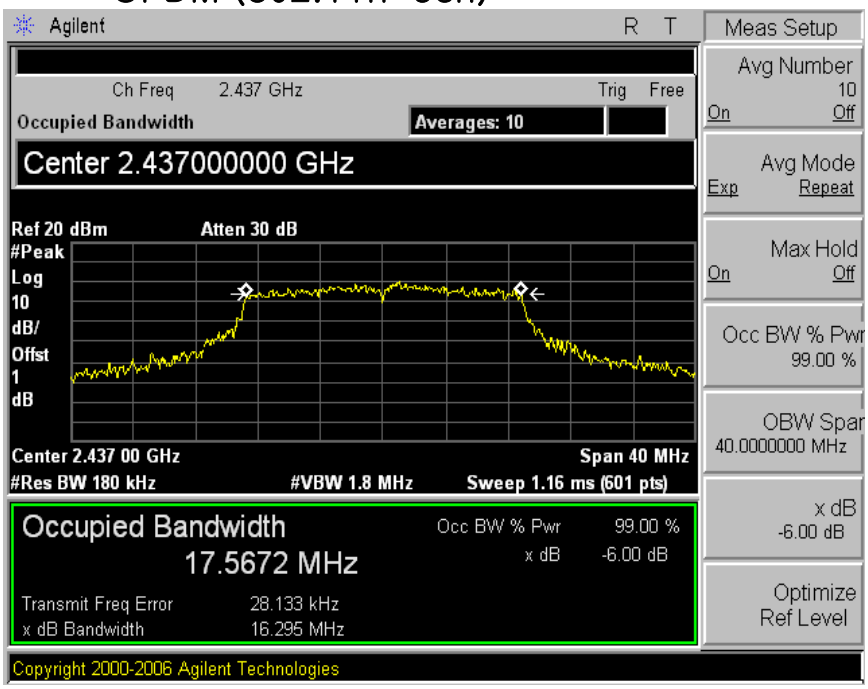


5.4 Trace data

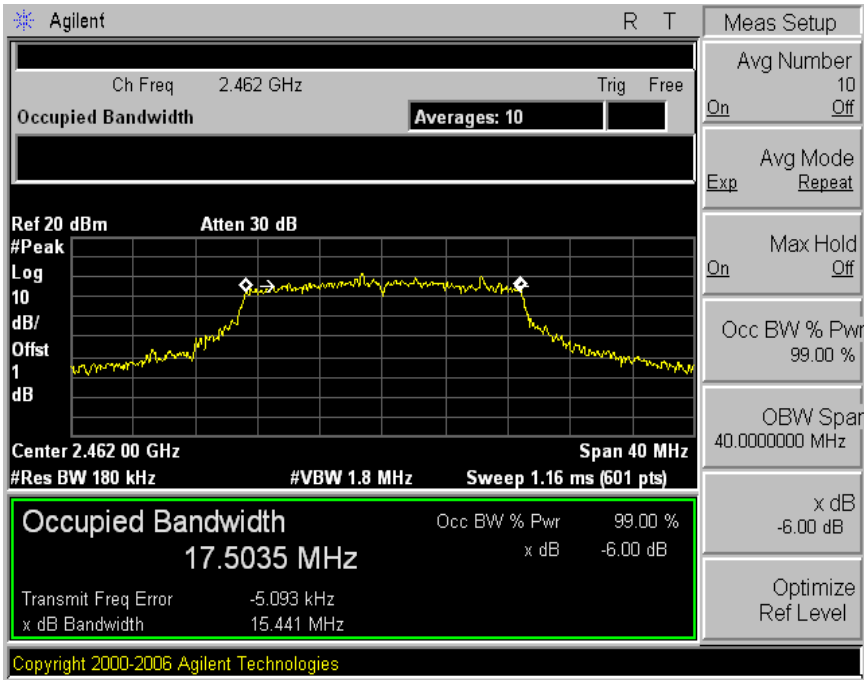
OFDM (802.11n-1ch)



OFDM (802.11n-6ch)



OFDM (802.11n-11ch)



6. MAXIMUM PEAK OUTPUT POWER

6.1 Test procedure

558074 D01 DTS Meas Guidance v02 8.1.2 Option 2 and 8.2.1 Option 1
8.1.2 Option 2 This procedure should only be used when the maximum available RBW of the spectrum/signal analyzer is less than the DTS bandwidth.
1. Set the RBW = maximum available (at least 1 MHz).
2. Set the VBW = 3 x RBW or maximum available setting (must be ≥ RBW).
3. Set the span to fully encompass the DTS bandwidth.
4. Detector = peak.
5. Sweep time = auto couple.
6. Trace mode = max hold.
7. Allow trace to fully stabilize.
8. Use the spectrum analyzer's band/channel power measurement function with the band limits set equal to the DTS bandwidth edges (for some analyzers, this may require a manual override to ensure use of peak detector). If the spectrum analyzer does not have a band power function, sum the spectrum levels (in linear power units) at intervals equal to the RBW extending across the DTS channel bandwidth.

Maximum Peak Output Power Test Instruments

Description	Model	Serial Number	Cal. Due Date
Spectrum Analyzer	E4440A	US41421291	2014-01-27
RF Cable	Length: 6 cm	-	
-Spectrum Analyzer <=> EUT	Loss: 1 dB	-	

6.2 Measurement results

EUT	PDA	MODEL	MT3XX
MODE	DSSS	ENVIRONMENTAL CONDITION	24.6 ℃, 43.9 % R.H.
INPUT POWER	7.4 Vd.c.		

(802.11b)

CHANNEL	Channel Frequency (MHz)	Conducted Power Output(dBm)		Limit[1W] (dBm)	PASS/FAIL
		(dBm)	(W)		
1	2412	16.07	0.040	30.0	PASS
6	2437	16.12	0.041	30.0	PASS
11	2462	15.99	0.040	30.0	PASS

(802.11g)

EUT	PDA	MODEL	MT3XX
MODE	OFDM	ENVIRONMENTAL CONDITION	24.6 ℃, 43.9 % R.H.
INPUT POWER	7.4 Vd.c.		

CHANNEL	Channel Frequency (MHz)	Conducted Power Output(dBm)		Limit[1W] (dBm)	PASS/FAIL
		(dBm)	(W)		
1	2412	18.96	0.079	30.0	PASS
6	2437	19.57	0.091	30.0	PASS
11	2462	19.41	0.087	30.0	PASS

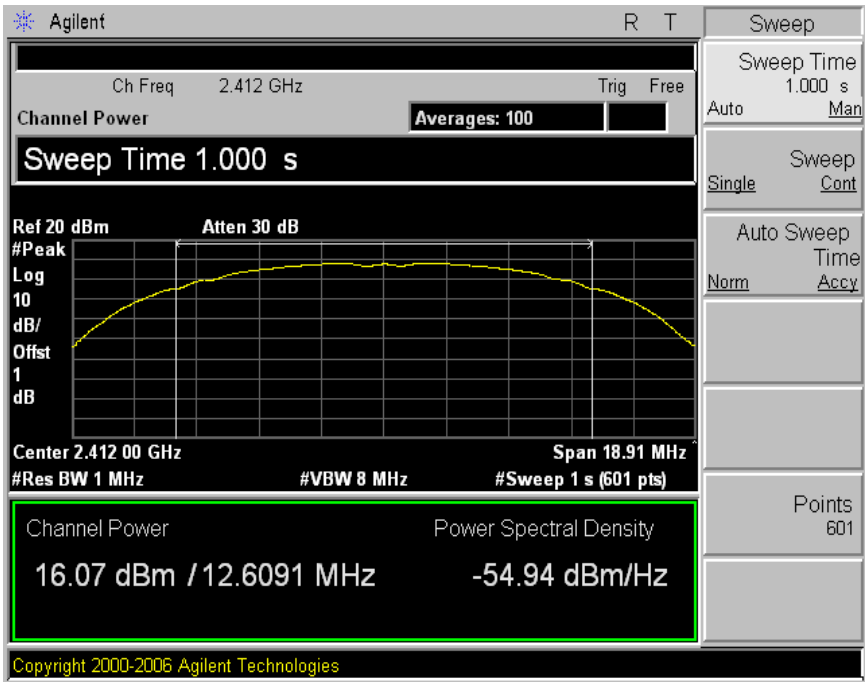
(802.11n)

EUT	PDA	MODEL	MT3XX
MODE	OFDM	ENVIRONMENTAL CONDITION	24.6 ℃, 43.9 % R.H.
INPUT POWER	7.4 Vd.c.		

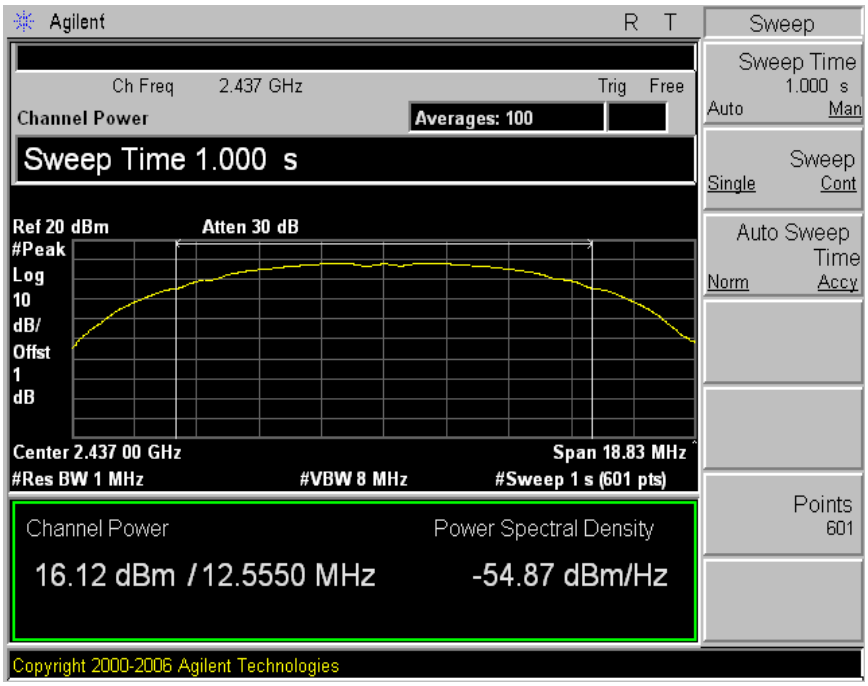
CHANNEL	Channel Frequency (MHz)	Conducted Power Output(dBm)		Limit[1W] (dBm)	PASS/FAIL
		(dBm)	(W)		
1	2412	18.09	0.064	30.0	PASS
6	2437	18.35	0.068	30.0	PASS
11	2462	18.25	0.067	30.0	PASS

6.3 Trace data

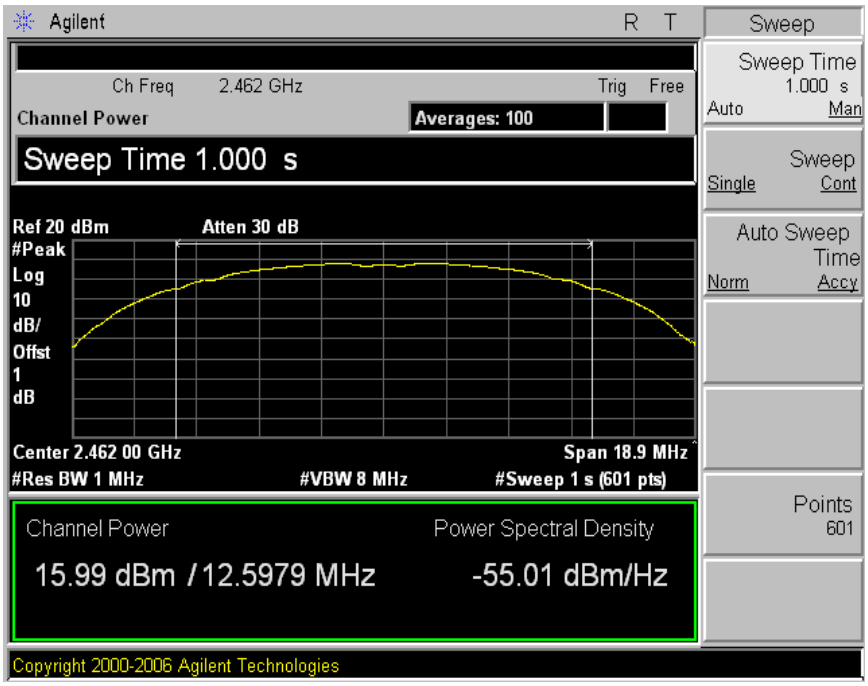
CCK (802.11b-1ch)



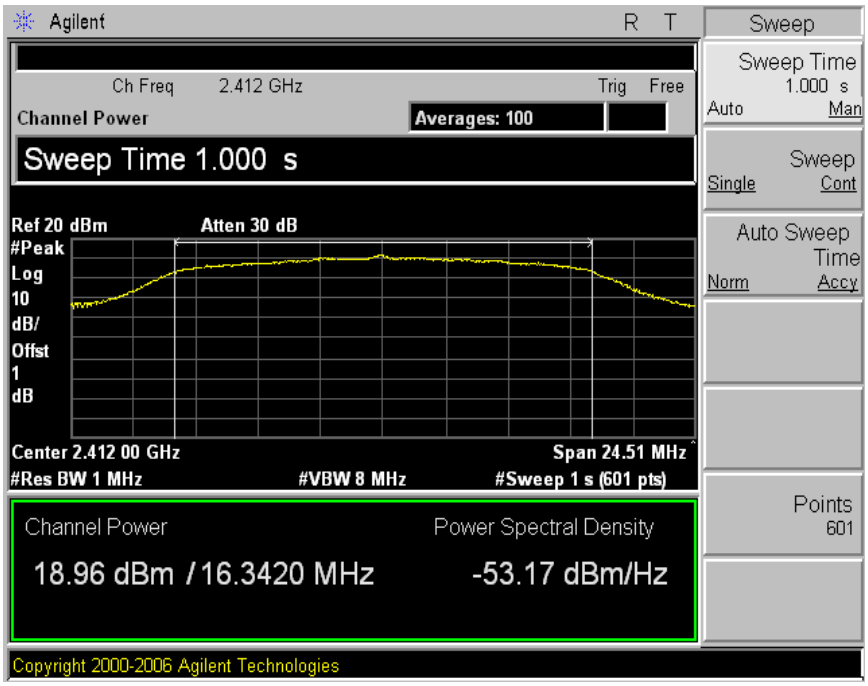
CCK (802.11b-6ch)



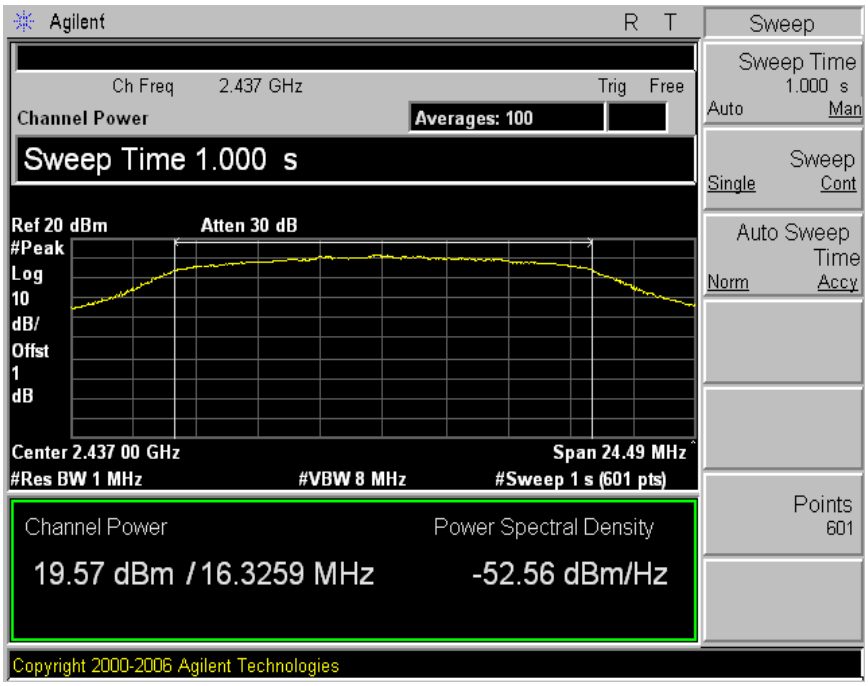
CCK (802.11b-11ch)



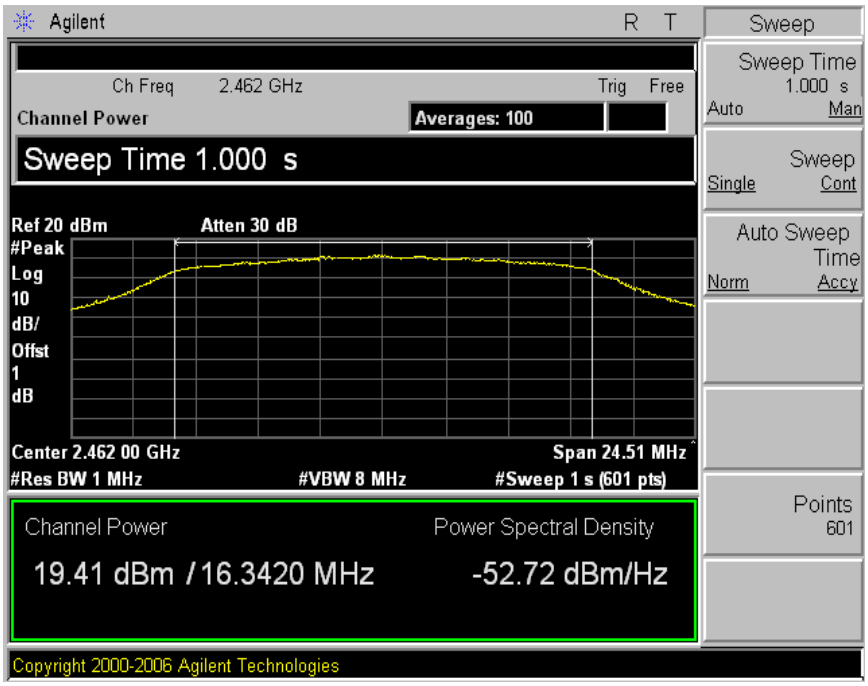
OFDM (802.11g-1ch)



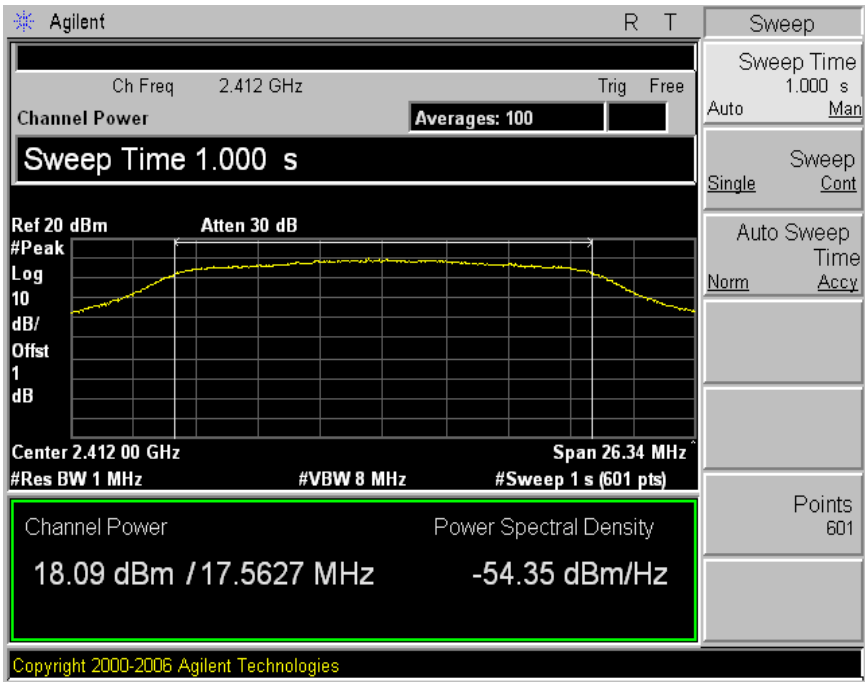
OFDM (802.11g-6ch)



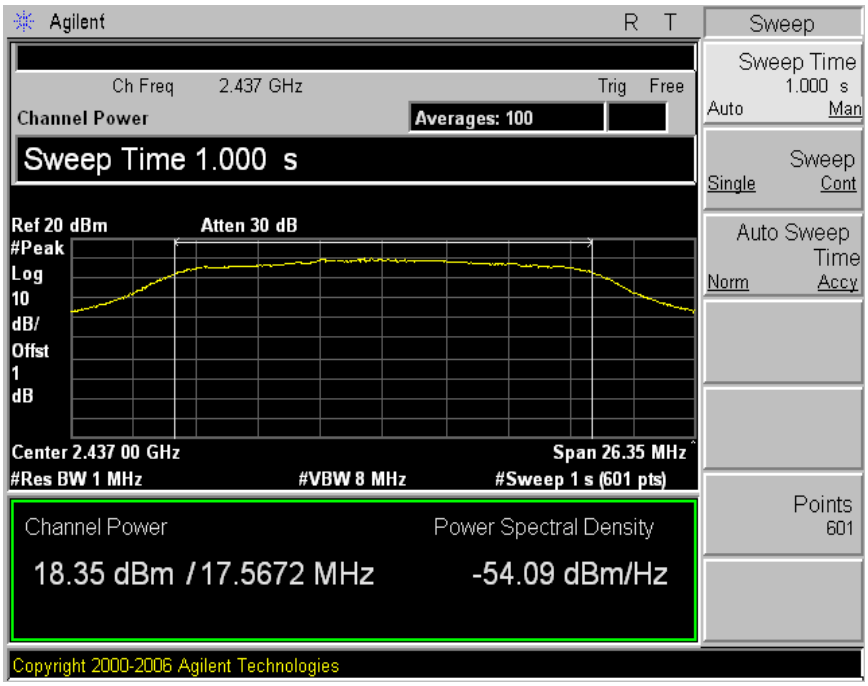
OFDM (802.11g-11ch)



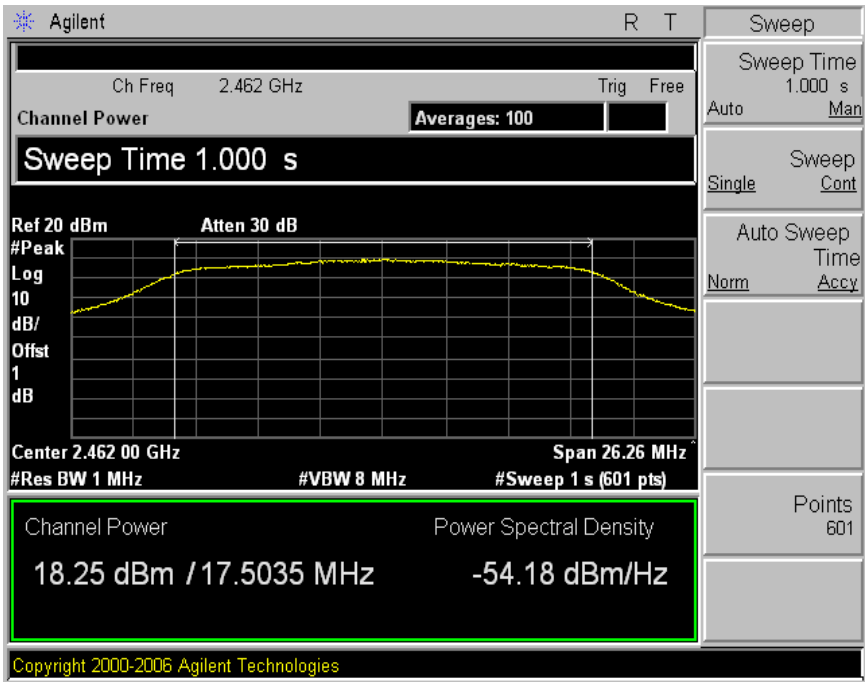
OFDM (802.11n-1ch)



OFDM (802.11n-6ch)



OFDM (802.11n-11ch)



7. Transmitter power spectral density

7.1 Test procedure

558074 D01 DTS Meas Guidance v02 9.1 Option 1: This procedure must be used if maximum peak conducted output power was used to demonstrate compliance to the fundamental output power limit, and is optional if the maximum (average) conducted output power was used to demonstrate compliance.

7.2 Test instruments and measurement setup

The spectrum analyzer is set to as following.

. RBW= 3 kHz

. VBW= 9.1 KHz

. Span= 1.5 X DTS channel bandwidth

. Detector= peak

The peak power density Test Instruments

Description	Model	Serial Number	Cal. Due Date
Spectrum Analyzer	E4440A	US41421291	2014-01-27
-Spectrum Analyzer <=> EUT	Loss: 1 dB	-	

7.3 Measurement results

802.11b

EUT	PDA	MODEL	MT3XX
MODE	DSSS	ENVIRONMENTAL CONDITION	23.4 ℃, 43.9 % R.H.
INPUT POWER	7.4 Vd.c.		

CHANNEL	Channel Frequency (MHz)	Measured Power Spectral Density (dBm)	Maximum Permissible Power Density (dBm/3kHz)	Margin
1	2412	-7.19	8.0	15.19
6	2437	-7.85	8.0	15.85
11	2462	-8.07	8.0	16.07

802.11g

EUT	PDA	MODEL	MT3XX
MODE	OFDM	ENVIRONMENTAL CONDITION	23.4 ℃, 43.9 % R.H.
INPUT POWER	7.4 Vd.c.		

CHANNEL	Channel Frequency (MHz)	Measured Power Spectral Density (dBm)	Maximum Permissible Power Density (dBm/3kHz)	Margin
1	2412	-12.17	8.0	20.17
6	2437	-12.66	8.0	20.66
11	2462	-11.32	8.0	19.32

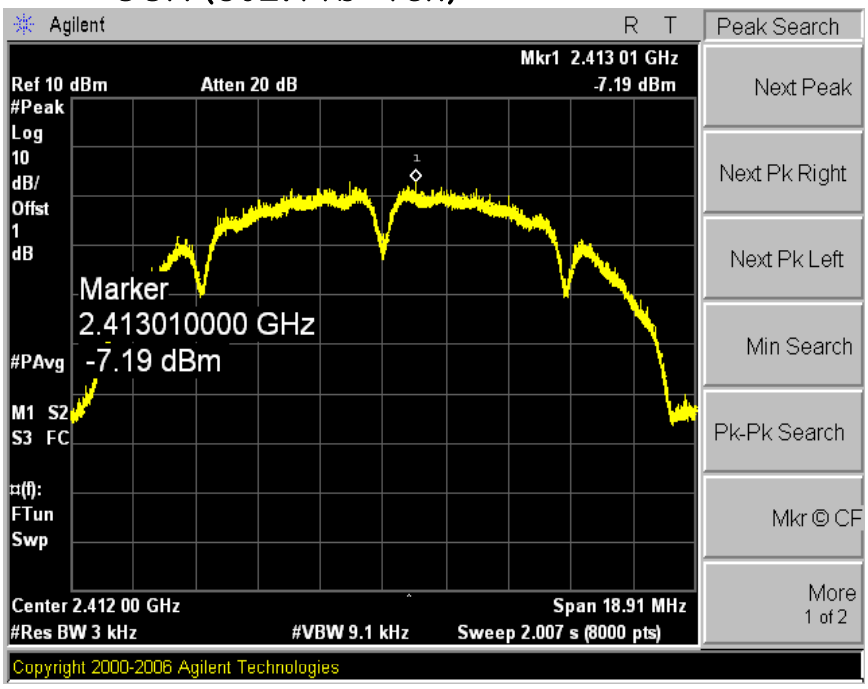
802.11n

EUT	PDA	MODEL	MT3XX
MODE	OFDM	ENVIRONMENTAL CONDITION	23.4 ℃, 43.9 % R.H.
INPUT POWER	7.4 Vd.c.		

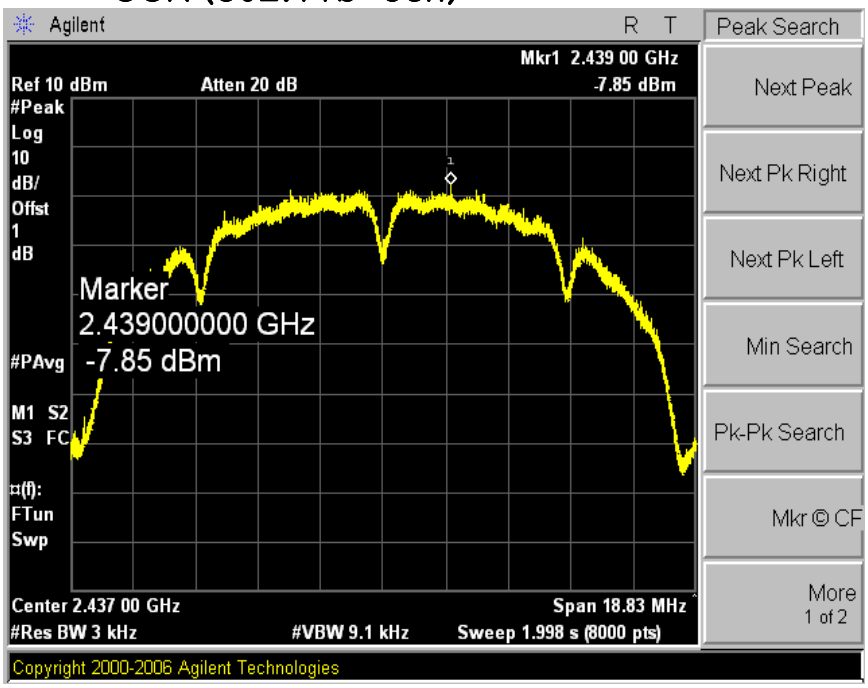
CHANNEL	Channel Frequency (MHz)	Measured Power Spectral Density (dBm)	Maximum Permissible Power Density (dBm/3kHz)	Margin
1	2412	-13.88	8.0	21.88
6	2437	-12.93	8.0	20.93
11	2462	-12.84	8.0	20.84

7.4 Trace data

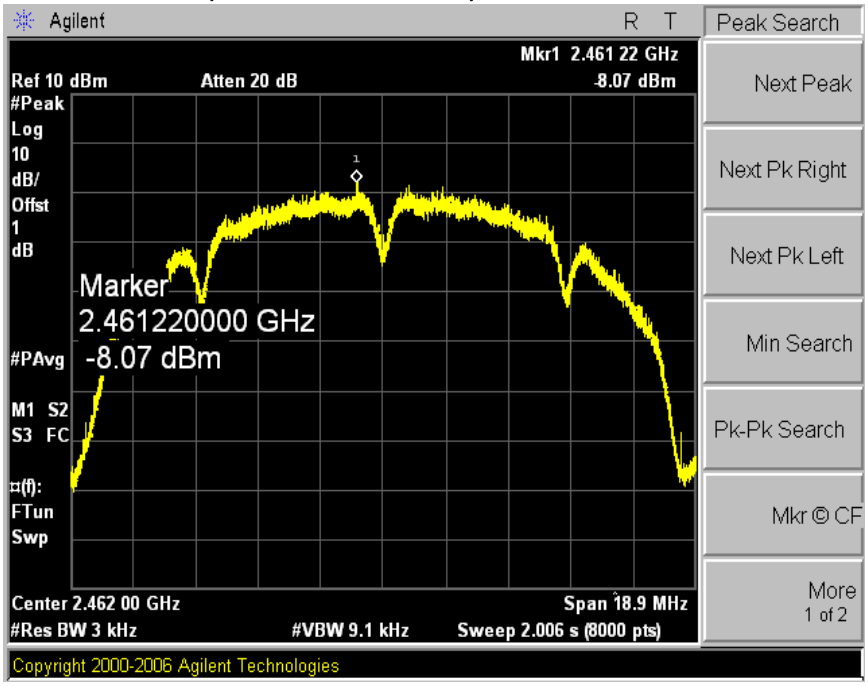
CCK (802.11b-1ch)



CCK (802.11b-6ch)

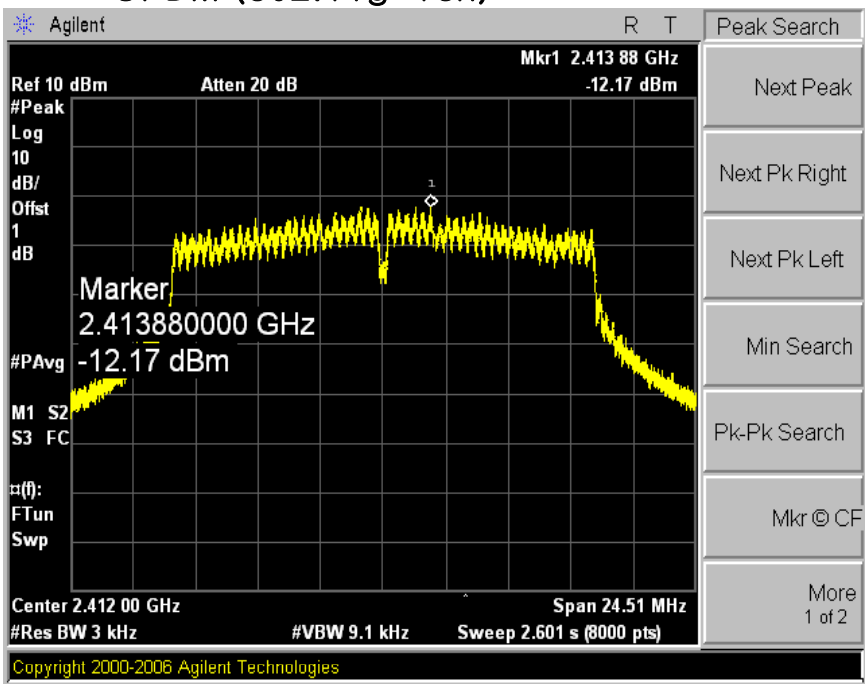


CCK (802.11b-11ch)

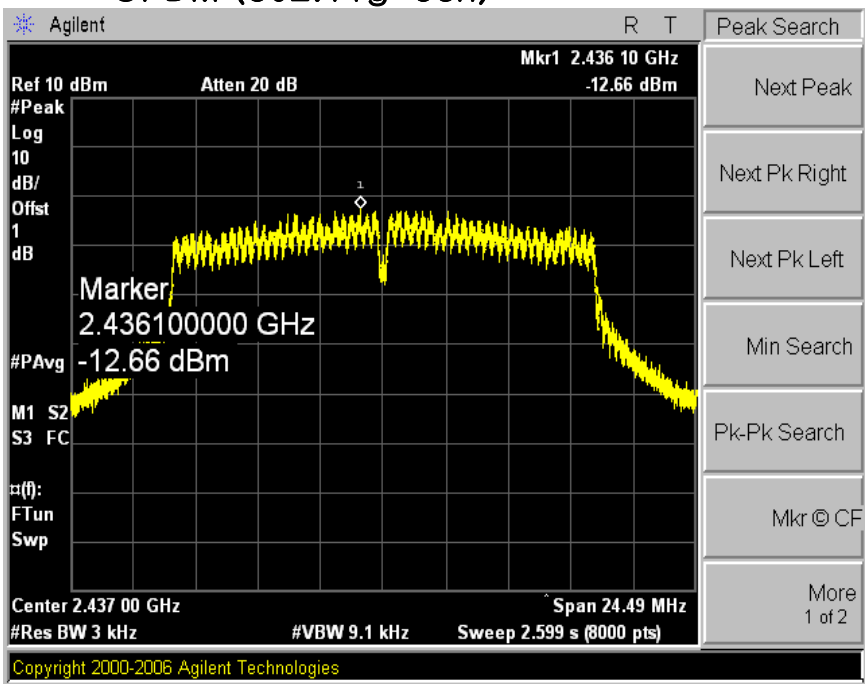


7.4 Trace data

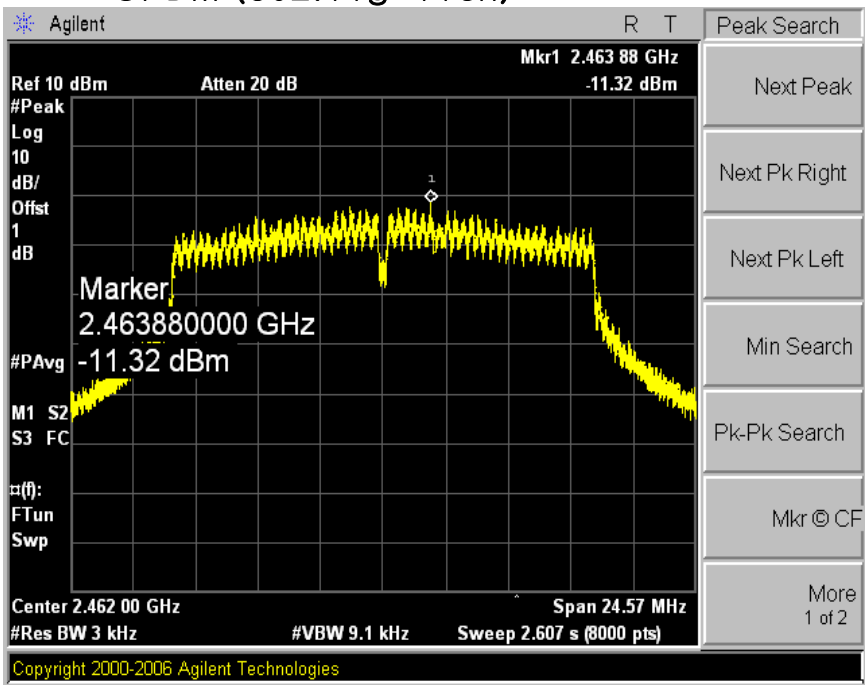
OFDM (802.11g-1ch)



OFDM (802.11g-6ch)

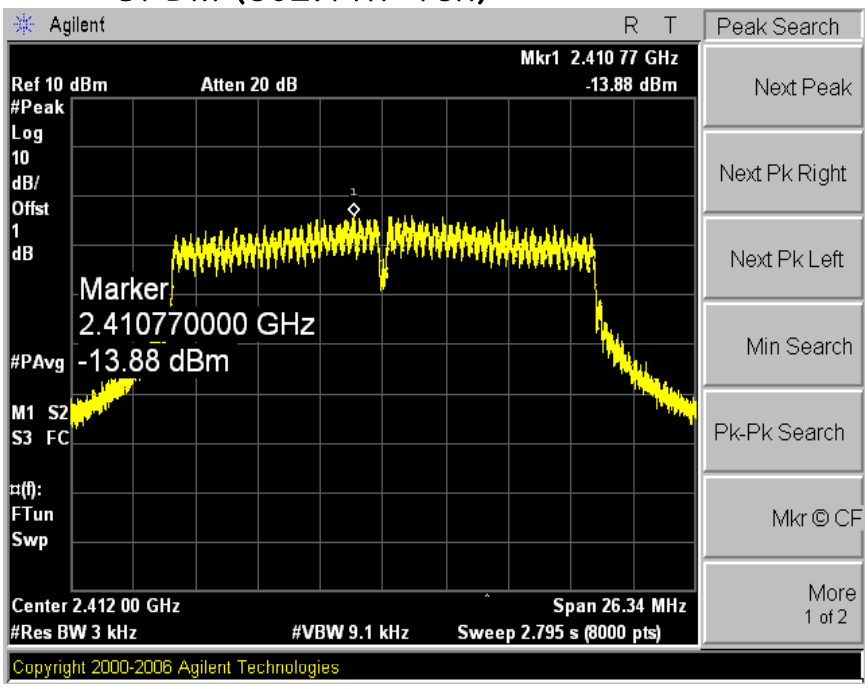


OFDM (802.11g-11ch)

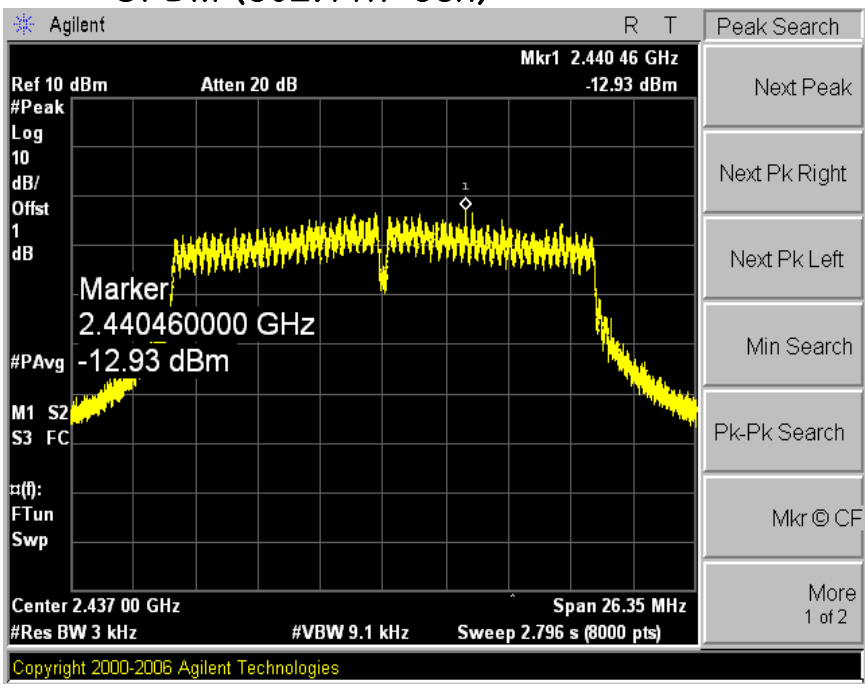


7.4 Trace data

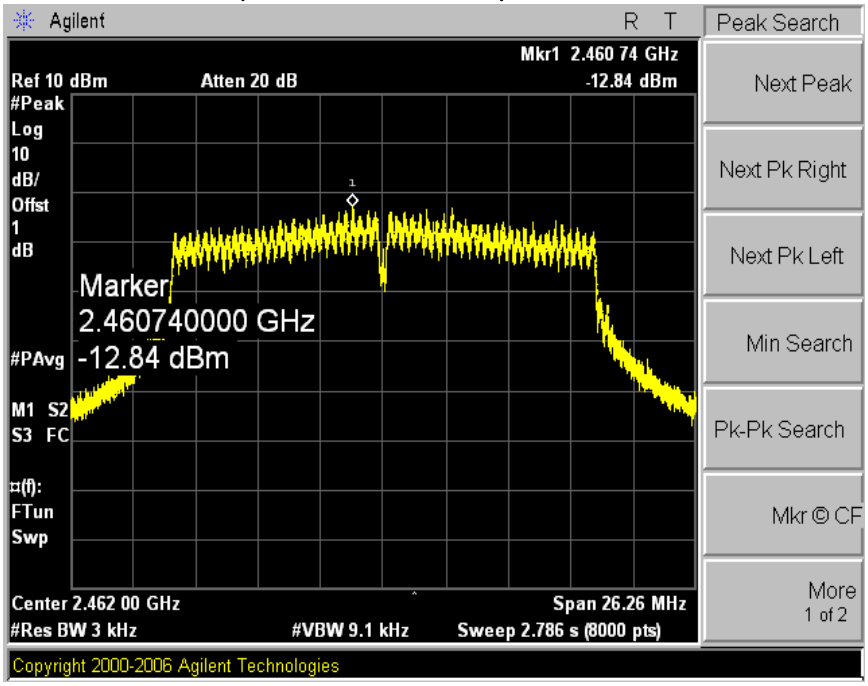
OFDM (802.11n-1ch)



OFDM (802.11n-6ch)



OFDM (802.11n-11ch)



8. band-edge and out of band emissions.

8.1 Test procedure

Per the guidance of KDB 558074, section 10.1.2, Establish the reference level by using the peak PSD procedure from Section 9.1 to measure the PSD level in any 100 kHz bandwidth (i.e., set RBW = 100 kHz and VBW ≥ 300 kHz) within the DTS channel bandwidth (the channel found to contain the maximum PSD level can be used to establish the reference level).

8.2 Test instruments and measurement setup

The spectrum analyzer is set to as following.

. RBW= 100KHz

. VBW= 300KHz

. 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	E4440A	US41421291	2014-01-27
Signal Analyzer	FSV	100939	2014-01-25
RF Cable	Length: 6 cm		-
-Spectrum Analyzer <=> EUT	Loss: 1 dB		-

8.3 Measurement results of band-edge & out of emission

802.11b

EUT	PDA	MODEL	MT3XX
MODE	DSSS	ENVIRONMENTAL CONDITION	23.3 ℃, 43.5 % R.H.
INPUT POWER	7.4 Vd.c.		

CHANNEL	Channel Frequency (MHz)	limit	PASS/FAIL
1	2412	20dBc	PASS
11	2462	20dBc	PASS

802.11g

EUT	PDA	MODEL	MT3XX
MODE	OFDM	ENVIRONMENTAL CONDITION	23.3 ℃, 43.5 % R.H.
INPUT POWER	7.4 Vd.c.		

CHANNEL	Channel Frequency (MHz)	limit	PASS/FAIL
1	2412	20dBc	PASS
11	2462	20dBc	PASS

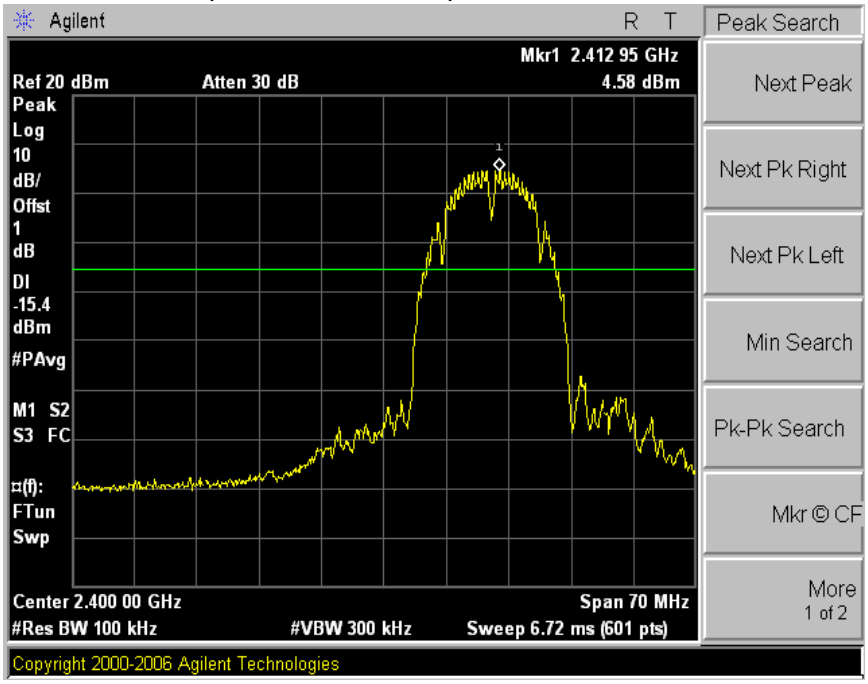
802.11n

EUT	PDA	MODEL	MT3XX
MODE	OFDM	ENVIRONMENTAL CONDITION	23.3 ℃, 43.5 % R.H.
INPUT POWER	7.4 Vd.c.		

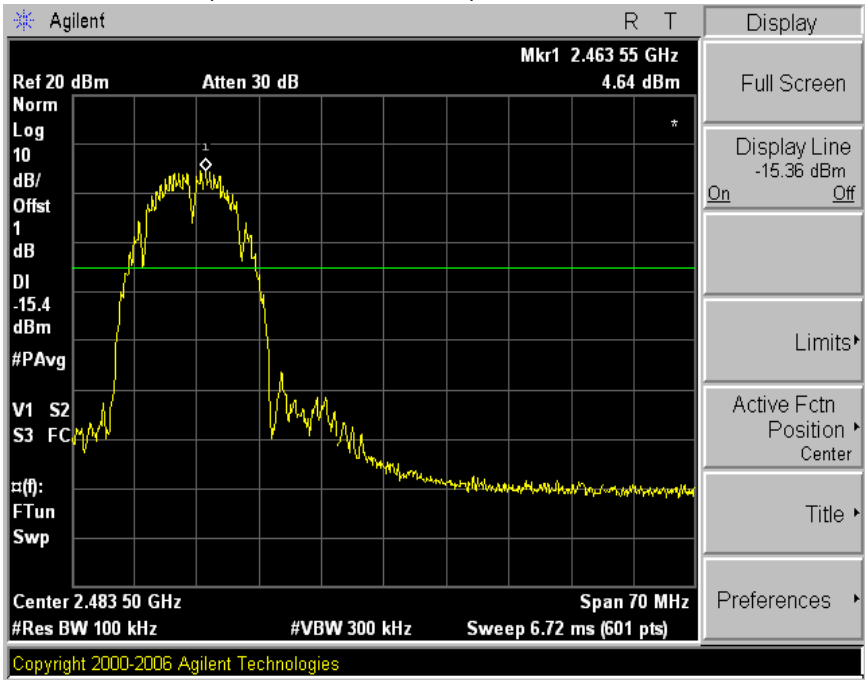
CHANNEL	Channel Frequency (MHz)	limit	PASS/FAIL
1	2412	20dBc	PASS
11	2462	20dBc	PASS

8.4 Trace data of band-edge & Out of Emission

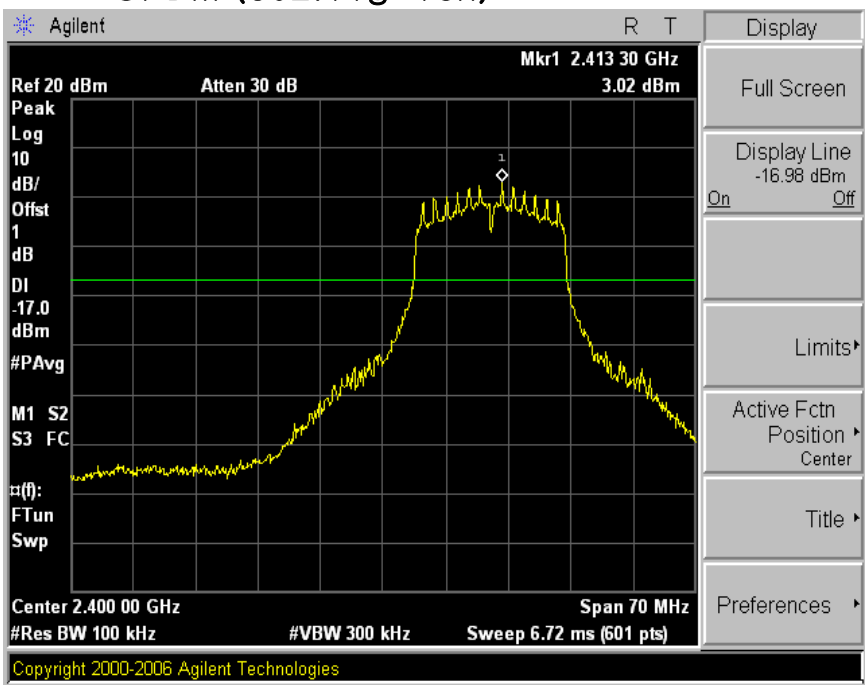
CCK (802.11b-1ch)



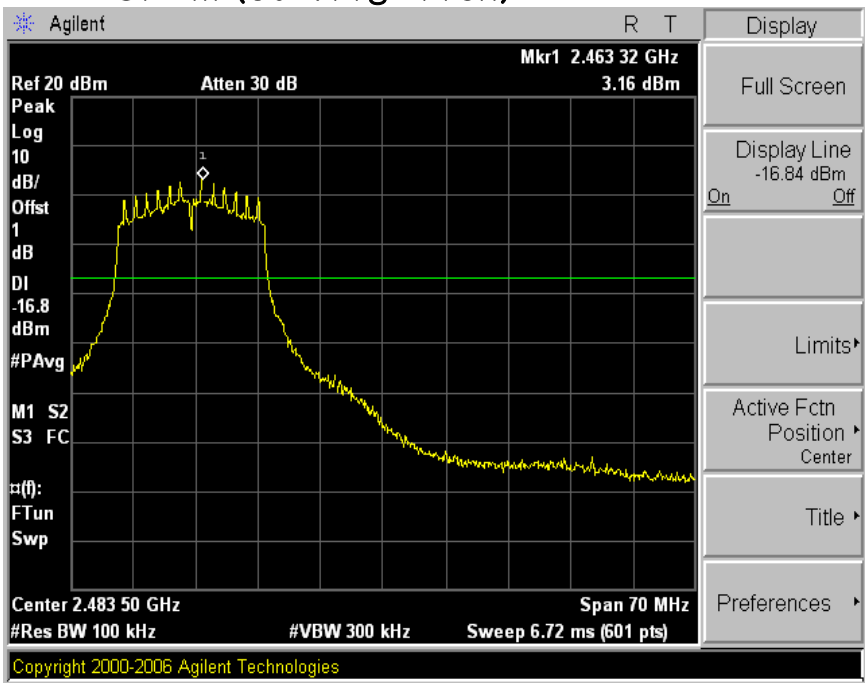
CCK (802.11b-11ch)



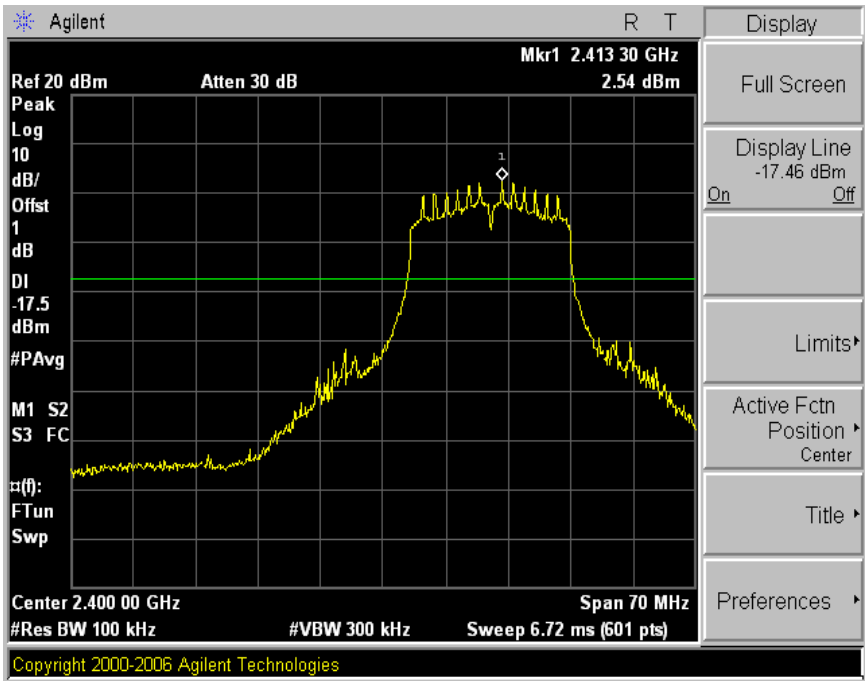
OFDM (802.11g-1ch)



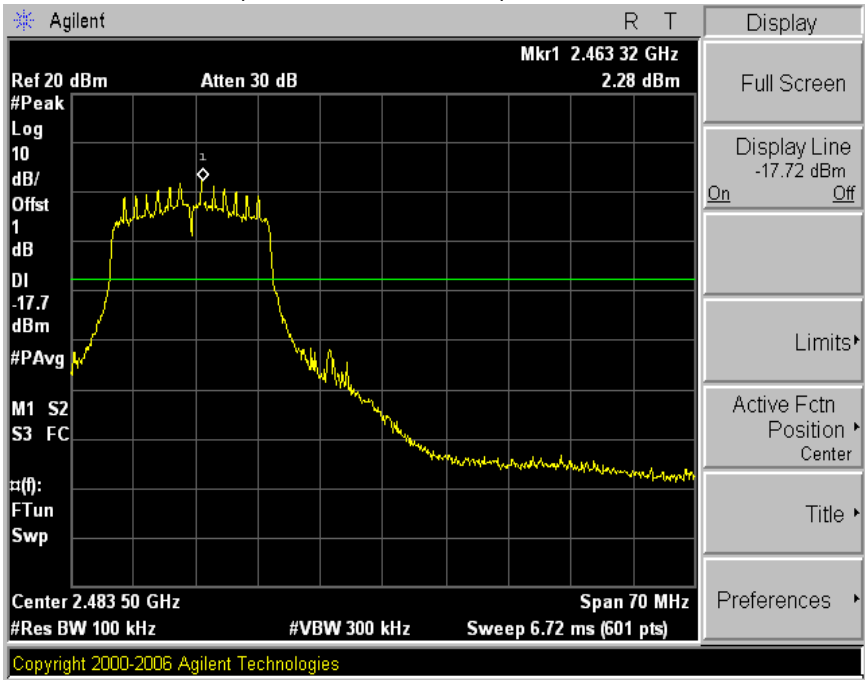
OFDM (802.11g-11ch)



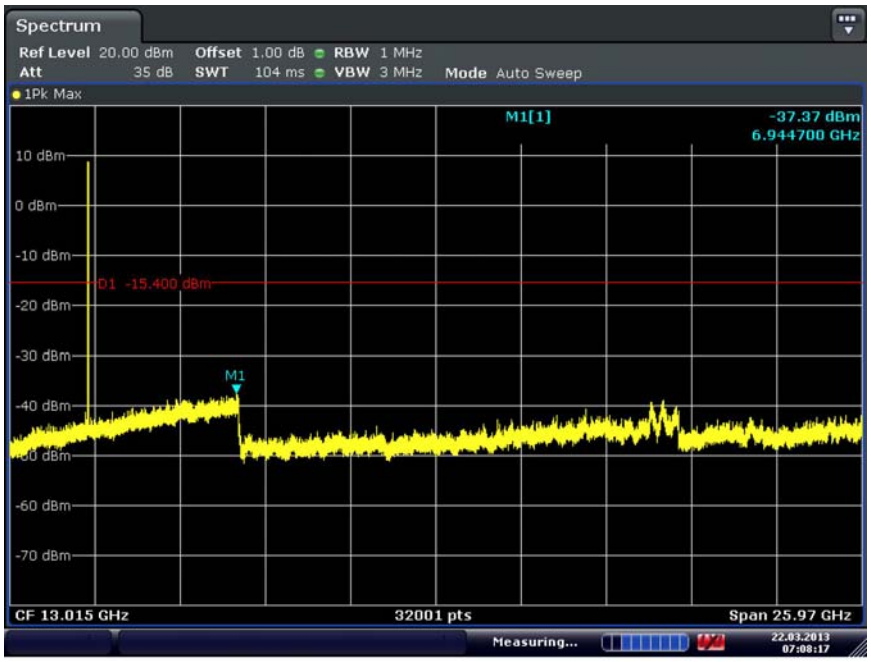
OFDM (802.11n-1ch)



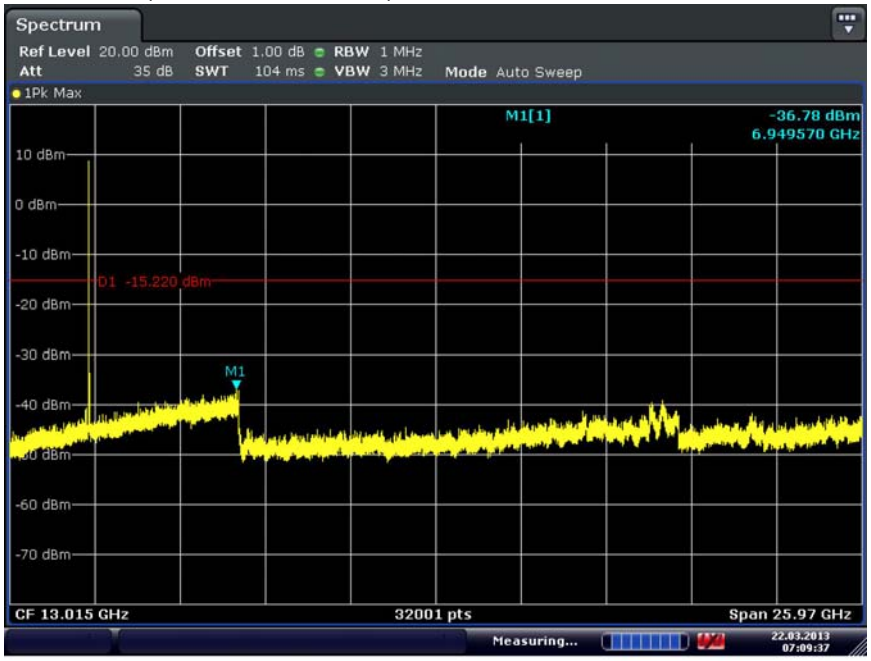
OFDM (802.11n-11ch)



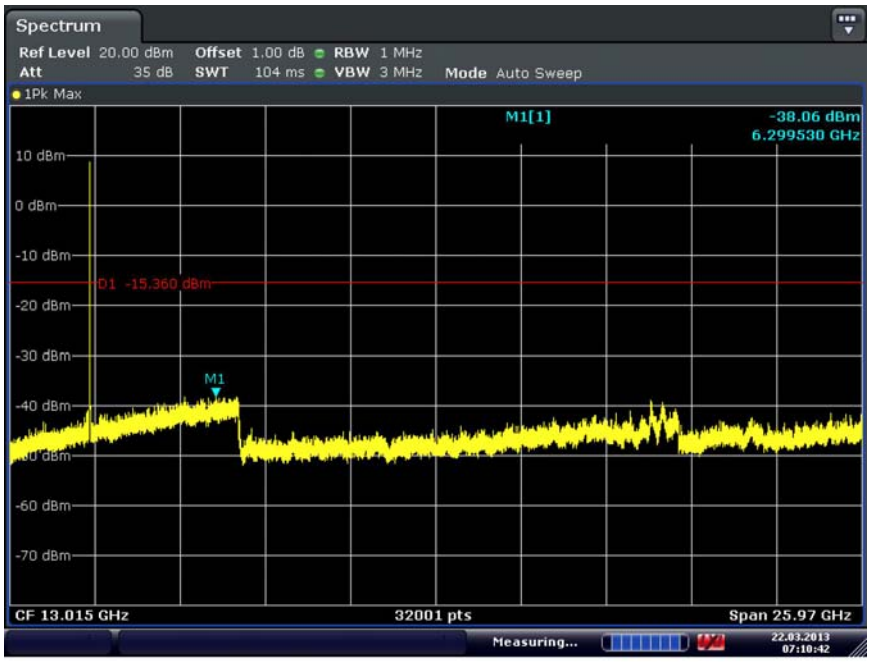
CCK (802.11b-1ch)



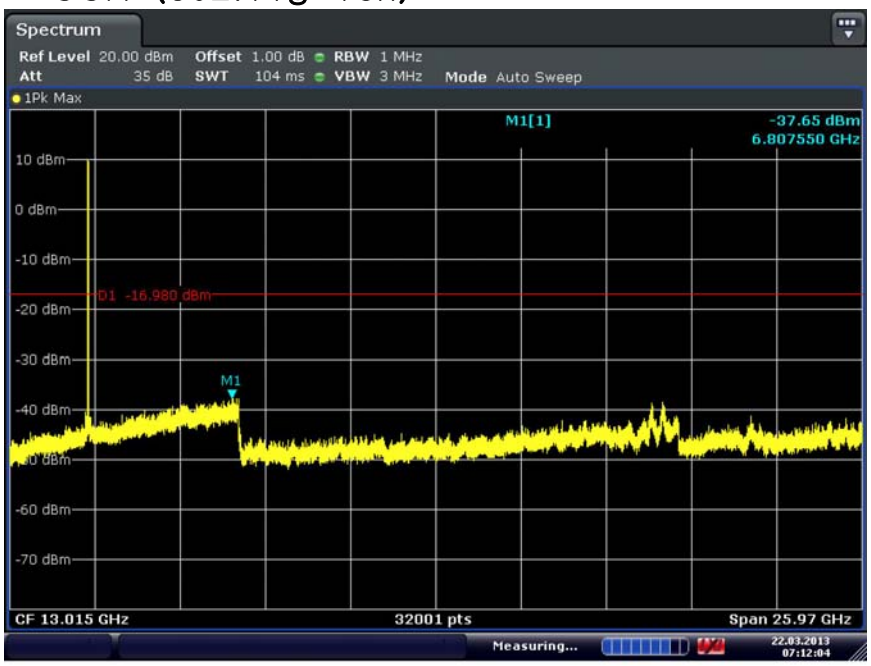
CCK (802.11b-6ch)



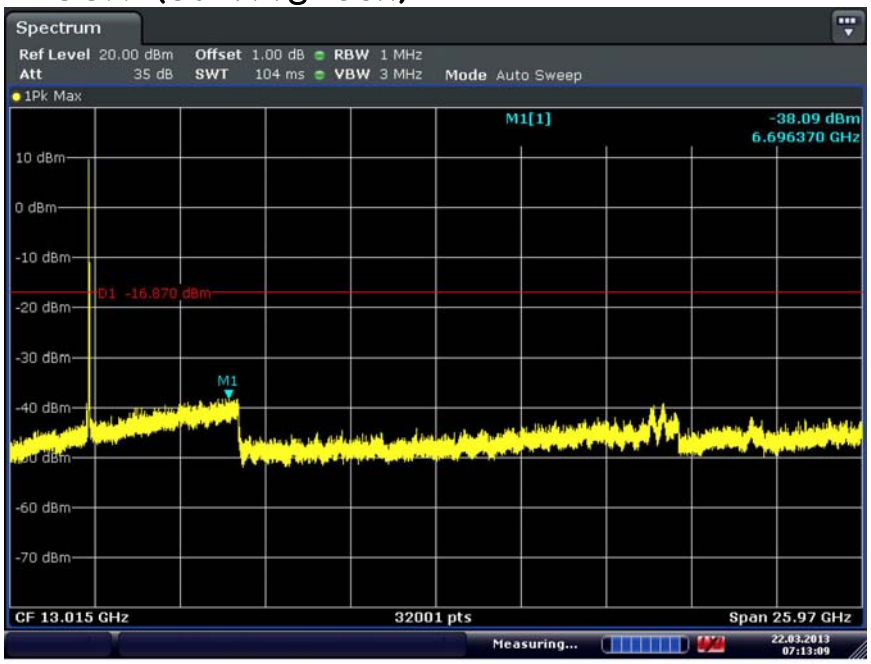
CCK (802.11b-11ch)



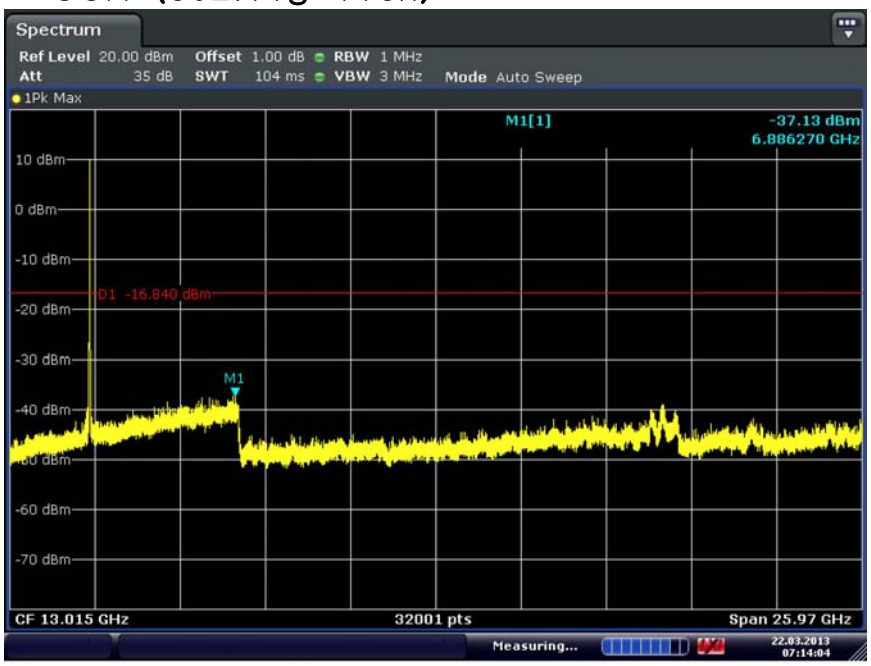
CCK (802.11g-1ch)



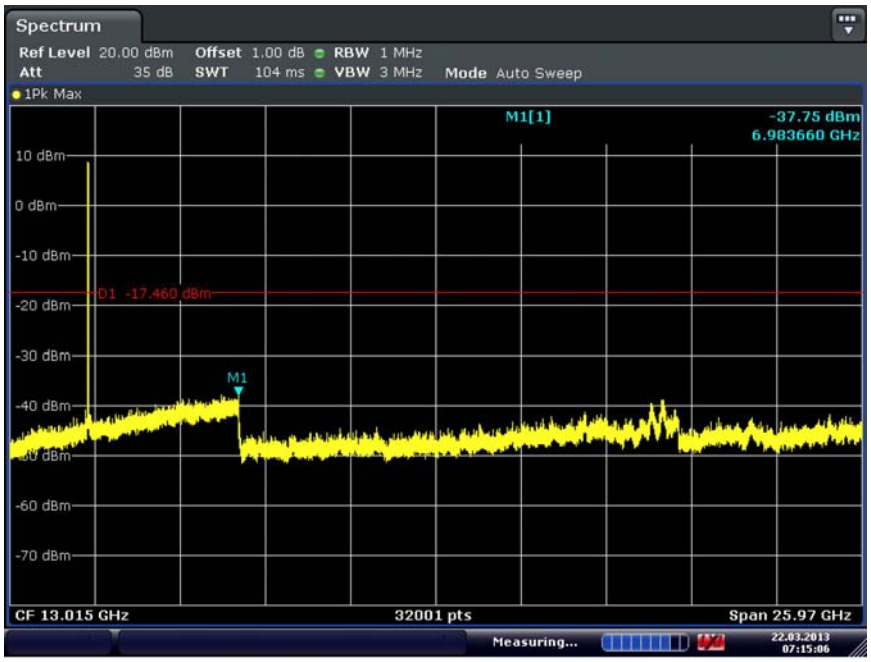
CCK (802.11g-6ch)



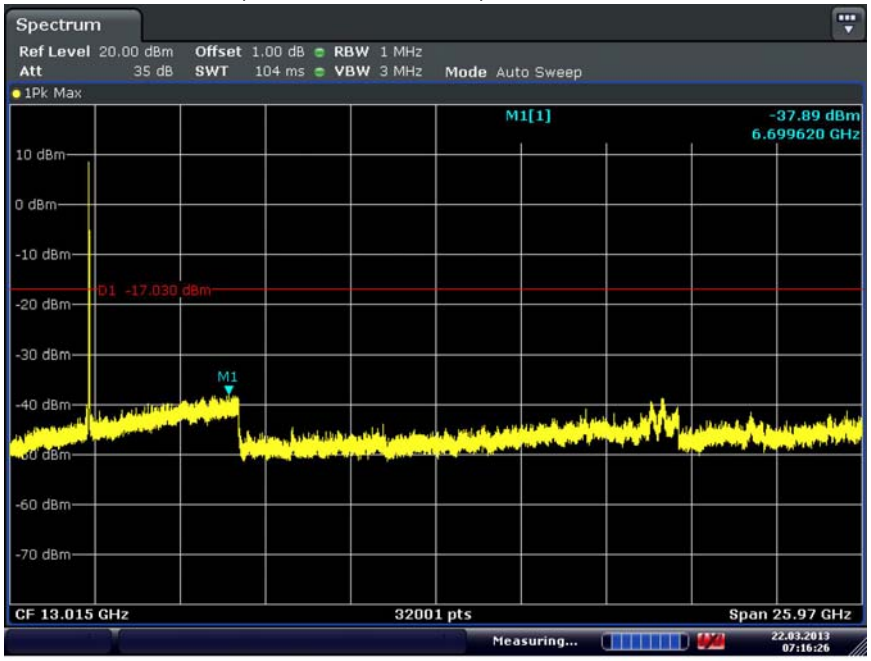
CCK (802.11g-11ch)



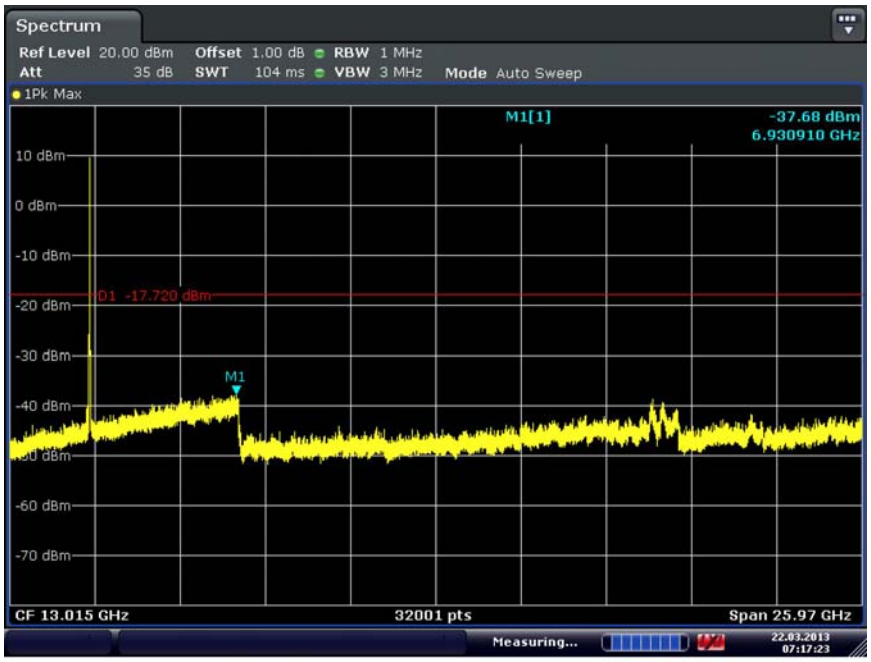
OFDM (802.11n-1ch)



OFDM (802.11n-6ch)



OFDM (802.11n-11ch)



9. Measurement of radiated disturbance

Above 30 MHz Electric Field strength was measured in accordance with FCC Part 15 (2010) The test setup was made according to ANSI C 63.4 (2003) & KDB 558074 on an semi-anechoic chamber, which allows a 3 m distance measurement. The EUT was placed in the center of wooden turntable. The height of this table was 0.8 m. 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	ESCI7	ROHDE & SCHWARZ	1166.5950.07	27-Jan-14
Logbicon Antenna	VULB 9168	SCHWARZBECK	9168-193	22-May-13
Turn Table	DT3000-2t	Innco System GmbH	N/A	-
Antenna Mast	MA4000-EP	Innco System GmbH	N/A	-
Antenna Master & Turn table controller	CO2000-P	Innco System GmbH	CO2000/641 /28051111/L	-
TEST Receiver	ESPI7	ROHDE & SCHWARZ	100185	26-Jan-14
PREAMPLIFIER	8449B	AGILENT	3008A00595	27-Jan-14
Horn Antenna	BBHA9120D	SCHWARZBECK	352	15-May-13
Spectrum Analyzer	R3273	ADVANTEST	110600592	25-Jan-14
Pyramidal Horn Antenna	3160-09-01	ETS-LINDGREN	102642	22-Oct-13
Turn Table	DT1500-S	Innco System GmbH	N/A	-
Antenna Mast	MA4000-EP	Innco System GmbH	N/A	-
Antenna Master & Turn table controller	C02000-P	Innco System GmbH	CO2000/642 /28051111/L	-

9.2 Environmental Condition

Below 1 GHz -Test Place : 10 m Semi-anechoic chamber

Wireless LAN 802.11b Mode (worst case)
Temperature (°C) : 22.9 ℃
Humidity (% R.H.) : 48.4 % R.H.

Above 1 GHz-Test Place : 3 m Semi-anechoic chamber

Wireless LAN 802.11b Mode
Temperature (°C) : 23.4 ℃
Humidity (% R.H.) : 47.5 % R.H.

Wireless LAN 802.11g Mode
Temperature (°C) : 23.1 ℃
Humidity (% R.H.) : 46.8 % R.H.

Wireless LAN 802.11n Mode
Temperature (°C) : 23.6 ℃
Humidity (% R.H.) : 47.4 % R.H.

9.3 Test Data for wireless LAN (802.11b) (worst case)

Test Date : 22-Mar-13 Measurement Distance : 3 m

Frequency (MHz)	Reading (dBμV)	Position (V/H)	Height (m)	Correction Factor		Result Value		
				Ant Factor (dB)	Cable (dB)	Limit (dBμV/m)	Result (dBμV/m)	Margin (dB)
68.30	18.76	V	1.0	11.19	1.20	40.00	31.15	-8.85
144.00	18.32	V	1.0	12.02	1.90	43.50	32.24	-11.26
192.00	24.73	V	1.0	9.87	2.10	43.50	36.70	-6.80
264.00	21.90	H	1.0	11.74	2.44	46.00	36.08	-9.92
288.00	19.53	H	2.0	12.69	2.58	46.00	34.80	-11.20
480.00	14.61	V	1.0	17.28	3.40	46.00	35.29	-10.71

Remark	H : Horizontal, V : Vertical TEST MODE : 802.11b-CH6(2437 MHz) *Checked in all 3 axis and the maximum measured data were reported.(worst case at Z axis) *CL = Cable Loss(In case of below1000 MHz) *The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 KHz for Quasi-peak detection at frequency below 1 GHz.

9.3-1 Test Data for wireless LAN

Test Date : 23-Mar-13 Measurement Distance : 3 m

Frequency (MHz)	Reading (dBμV)	Position (V/H)	Height (m)	Correction Factor		Duty Cycle Correction(dB)	Result Value		
				Ant Factor (dB)	Cable (dB)		Limit (dBμV/m)	Result (dBμV/m)	Margin (dB)
PEAK(RBW: 1 MHz VBW: 3 MHz)									
2389.9	26.14	H	2.2	26.69	5.0	0	74.0	57.83	-16.17
2389.9	26.03	V	1.3	26.69	5.0	0	74.0	57.72	-16.28
4824	44.61	H	1.4	31.40	-24.0	0	74.0	52.01	-21.99
4824	45.23	V	1.1	31.40	-24.0	0	74.0	52.63	-21.37
AV(RBW: 1 MHz VBW: 3 MHz)									
2389.9	13.53	H	2.2	26.69	5.0	0	54.0	45.22	-8.78
2389.9	13.56	V	1.3	26.69	5.0	0	54.0	45.25	-8.75
4824.05	32.54	H	1.4	31.40	-24.0	0	54.0	39.94	-14.06
4824.05	33.01	V	1.1	31.40	-24.0	0	54.0	40.41	-13.59

Remark

H : Horizontal, V : Vertical TEST MODE : 802.11b-CH1(2412 MHz)

*The TX signal isn't detected from 3th harmonics.
*Checked in all 3 axis and the maximum measured data were reported.(worst case at Z axis)
*Multiple of CL = Cable Loss-Amplifier Gain(In case of above1000 MHz)
*Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain
FYI : Duty Cycle Correction Factor
a. Duty cycle = Ontime/(On time+Off time) = 8.45 / (8.45+0.03) = 99.66 %
b. Duty Cycle Correction = 20log (1 / Duty cycle) dB = 0 dB
c.There did not apply of duty cycle factor for average value.

9.3-2 Test Data for wireless LAN

Test Date : 23-Mar-13 Measurement Distance : 3 m

Frequency (MHz)	Reading (dBμV)	Position (V/H)	Height (m)	Correction Factor		Duty Cycle Correction(dB)	Result Value		
				Ant Factor (dB)	Cable (dB)		Limit (dBμV/m)	Result (dBμV/m)	Margin (dB)
PEAK(RBW: 1 MHz VBW: 3 MHz)									
4874	46.75	H	1.2	31.48	-24.0	0	74.0	54.27	-19.73
4874	46.97	V	1.0	31.48	-24.0	0	74.0	54.49	-19.51
AV(RBW: 1 MHz VBW: 3 MHz)									
4874	33.39	H	1.2	31.48	-24.0	0	54.0	40.91	-13.09
4874	33.43	V	1.0	31.48	-24.0	0	54.0	40.95	-13.05

Remark

H : Horizontal, V : Vertical TEST MODE : 802.11b-CH6(2437 MHz)

*The TX signal isn't detected from 3th harmonics.
*Checked in all 3 axis and the maximum measured data were reported.(worst case at Z axis)
*Multiple of CL = Cable Loss-Amplifier Gain(In case of above1000 MHz)
*Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain
FYI : Duty Cycle Correction Factor
a. Duty cycle = Ontime/(On time+Off time) = 8.45 / (8.45+0.03) = 99.66 %
b. Duty Cycle Correction = 20log (1 / Duty cycle) dB = 0 dB
c.There did not apply of duty cycle factor for average value.

9.3-3 Test Data for wireless LAN

Test Date : 23-Mar-13 Measurement Distance : 3 m

Frequency (MHz)	Reading (dBμV)	Position (V/H)	Height (m)	Correction Factor		Duty Cycle Correction(dB)	Result Value		
				Ant Factor (dB)	Cable (dB)		Limit (dBμV/m)	Result (dBμV/m)	Margin (dB)
PEAK(RBW: 1 MHz VBW: 3 MHz)									
2483.8	27.47	H	1.1	26.98	5.0	0	74.0	59.45	-14.55
2483.8	34.55	V	1.6	26.98	5.0	0	74.0	66.53	-7.47
4923.9	46.11	H	1.1	31.57	-23.9	0	74.0	53.76	-20.24
4923.9	45.67	V	1.6	31.57	-23.9	0	74.0	53.32	-20.68
AV(RBW: 1 MHz VBW: 3 MHz)									
2483.5	14.71	H	1.1	26.98	5.0	0	54.0	46.69	-7.31
2483.5	17.20	V	1.6	26.98	5.0	0	54.0	49.18	-4.82
4923.9	36.75	H	1.1	31.57	-23.9	0	54.0	44.40	-9.60
4923.9	36.20	V	1.6	31.57	-23.9	0	54.0	43.85	-10.15

Remark	
	H : Horizontal, V : Vertical TEST MODE : 802.11b-CH11(2462 MHz) *The TX signal isn't detected from 3th harmonics. *Checked in all 3 axis and the maximum measured data were reported.(worst case at Z axis) *Multiple of CL = Cable Loss-Amplifier Gain(In case of above1000 MHz) *Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain FYI : Duty Cycle Correction Factor a. Duty cycle = Ontime/(On time+Off time) = 8.45 / (8.45+0.03) = 99.66 % b. Duty Cycle Correction = 20log (1 / Duty cycle) dB = 0 dB c.There did not apply of duty cycle factor for average value.

9.4-1 Test Data for wireless LAN

Test Date : 23-Mar-13 Measurement Distance : 3 m

Frequency (MHz)	Reading (dBμV)	Position (V/H)	Height (m)	Correction Factor		Duty Cycle Correction(dB)	Result Value		
				Ant Factor (dB)	Cable (dB)		Limit (dBμV/m)	Result (dBμV/m)	Margin (dB)
PEAK(RBW: 1 MHz VBW: 3 MHz)									
2389.9	32.08	H	2.1	26.69	5.0	0	74.0	63.77	-10.23
2389.9	31.87	V	1.3	26.69	5.0	0	74.0	63.56	-10.44
4824.05	45.77	H	1.2	31.40	-24.0	0	74.0	53.17	-20.83
4824.06	45.67	V	1.2	31.40	-24.0	0	74.0	53.07	-20.93
AV(RBW: 1 MHz VBW: 3 MHz)									
2389.9	14.83	H	2.1	26.69	5.0	0.18	54.0	46.70	-7.30
2389.9	14.86	V	1.3	26.69	5.0	0.18	54.0	46.73	-7.27
4824.05	35.12	H	1.2	31.40	-24.0	0.18	54.0	42.70	-11.30
4824.06	35.33	V	1.2	31.40	-24.0	0.18	54.0	42.91	-11.09

Remark

H : Horizontal, V : Vertical TEST MODE : 802.11g-CH1(2412 MHz)
*The TX signal isn't detected from 3th harmonics.
*Checked in all 3 axis and the maximum measured data were reported.(worst case at Z axis)
*Multiple of CL = Cable Loss-Amplifier Gain(In case of above1000 MHz)
*Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain
FYI : Duty Cycle Correction Factor
a. Duty cycle = Ontime/(On time+Off time) = 1.413 / (1.413+0.03) = 97.92 %
b. Duty Cycle Correction = 20log (1 / Duty cycle) dB = 0.18 dB

9.4-2 Test Data for wireless LAN

Test Date : 23-Mar-13 Measurement Distance : 3 m

Frequency (MHz)	Reading (dBμV)	Position (V/H)	Height (m)	Correction Factor		Duty Cycle Correction(dB)	Result Value		
				Ant Factor (dB)	Cable (dB)		Limit (dBμV/m)	Result (dBμV/m)	Margin (dB)
PEAK(RBW: 1 MHz VBW: 3 MHz)									
4873.96	47.54	H	1.8	31.48	-24.0	0	74.0	55.06	-18.94
4873.96	48.39	V	1.3	31.48	-24.0	0	74.0	55.91	-18.09
AV(RBW: 1 MHz VBW: 3 MHz)									
4873.96	38.92	H	1.1	31.48	-24.0	0.18	54.0	46.62	-7.38
4874.05	40.19	V	1.2	31.48	-24.0	0.18	54.0	47.89	-6.11

Remark	H : Horizontal, V : Vertical TEST MODE : 802.11g-CH6(2437 MHz) *The TX signal isn't detected from 3th harmonics. *Checked in all 3 axis and the maximum measured data were reported.(worst case at Z axis) *Multiple of CL = Cable Loss-Amplifier Gain(In case of above1000 MHz) *Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain FYI : Duty Cycle Correction Factor a. Duty cycle = Ontime/(On time+Off time) = 1.413 / (1.413+0.03) = 97.92 % b. Duty Cycle Correction = 20log (1 / Duty cycle) dB = 0.18 dB

9.4-3 Test Data for wireless LAN

Test Date : 23-Mar-13 Measurement Distance : 3 m

Frequency (MHz)	Reading (dBμV)	Position (V/H)	Height (m)	Correction Factor		Duty Cycle Correction(dB)	Result Value		
				Ant Factor (dB)	Cable (dB)		Limit (dBμV/m)	Result (dBμV/m)	Margin (dB)
PEAK(RBW: 1 MHz VBW: 3 MHz)									
2483.56	32.75	H	2.1	26.98	5.0	0	74.0	64.73	-9.27
2483.56	35.35	V	1.2	26.98	5.0	0	74.0	67.33	-6.67
4924.1	46.12	H	1.1	31.57	-23.9	0	74.0	53.77	-20.23
4924.1	46.34	V	1.2	31.57	-23.9	0	74.0	53.99	-20.01
AV(RBW: 1 MHz VBW: 3 MHz)									
2483.56	16.60	H	2.1	26.98	5.0	0.18	54.0	48.76	-5.24
2483.56	17.82	V	1.2	26.98	5.0	0.18	54.0	49.98	-4.02
4924.1	36.54	H	1.1	31.57	-23.9	0.18	54.0	44.37	-9.63
4923.8	37.12	V	1.2	31.57	-23.9	0.18	54.0	44.95	-9.05

Remark

H : Horizontal, V : Vertical TEST MODE : 802.11g-CH11(2462 MHz)

*The TX signal isn't detected from 3th harmonics.
*Checked in all 3 axis and the maximum measured data were reported.(worst case at Z axis)
*Multiple of CL = Cable Loss-Amplifier Gain(In case of above1000 MHz)
*Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain
FYI : Duty Cycle Correction Factor
a. Duty cycle = Ontime/(On time+Off time) = 1.413 / (1.413+0.03) = 97.92 %
b. Duty Cycle Correction = 20log (1 / Duty cycle) dB = 0.18 dB

9.5-1 Test Data for wireless LAN

Test Date : 23-Mar-13 Measurement Distance : 3 m

Frequency (MHz)	Reading (dBμV)	Position (V/H)	Height (m)	Correction Factor		Duty Cycle Correction(dB)	Result Value		
				Ant Factor (dB)	Cable (dB)		Limit (dBμV/m)	Result (dBμV/m)	Margin (dB)
PEAK(RBW: 1 MHz VBW: 3 MHz)									
2389.7	25.72	H	1.2	26.69	5.0	0	74.0	57.41	-16.59
2389.6	28.27	V	1.8	26.69	5.0	0	74.0	59.96	-14.04
4824.01	45.78	H	1.7	31.40	-24.0	0	74.0	53.18	-20.82
4823.98	45.97	V	1.1	31.40	-24.0	0	74.0	53.37	-20.63
AV(RBW: 1 MHz VBW: 3 MHz)									
2389.7	14.36	H	1.2	26.69	5.0	0	54.0	46.05	-7.95
2389.6	15.65	V	1.8	26.69	5.0	0	54.0	47.34	-6.66
4824.01	33.75	H	1.7	31.40	-24.0	0	54.0	41.15	-12.85
4823.98	33.77	V	1.1	31.40	-24.0	0	54.0	41.17	-12.83

Remark	H : Horizontal, V : Vertical TEST MODE : 802.11n-CH1(2412 MHz) *The TX signal isn't detected from 3th harmonics. *Checked in all 3 axis and the maximum measured data were reported.(worst case at Z axis) *Multiple of CL = Cable Loss-Amplifier Gain(In case of above1000 MHz) *Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain FYI : Duty Cycle Correction Factor a. Duty cycle = Ontime/(On time+Off time) = 1.327 / (1.327+0.03) = 98.03 % b. Duty Cycle Correction = 20log (1 / Duty cycle) dB = 0 dB c.There did not apply of duty cycle factor for average value.

9.5-2 Test Data for wireless LAN

Test Date : 23-Mar-13 Measurement Distance : 3 m

Frequency (MHz)	Reading (dBμV)	Position (V/H)	Height (m)	Correction Factor		Duty Cycle Correction(dB)	Result Value		
				Ant Factor (dB)	Cable (dB)		Limit (dBμV/m)	Result (dBμV/m)	Margin (dB)
PEAK(RBW: 1 MHz VBW: 3 MHz)									
4874.08	45.85	H	1.1	31.48	-24.0	0	74.0	53.37	-20.63
4874.08	48.07	V	1.2	31.48	-24.0	0	74.0	55.59	-18.41
AV(RBW: 1 MHz VBW: 3 MHz)									
4874.08	34.27	H	1.1	31.48	-24.0	0	54.0	41.79	-12.21
4873.7	35.30	V	1.2	31.48	-24.0	0	54.0	42.82	-11.18

Remark	H : Horizontal, V : Vertical TEST MODE : 802.11n-CH6(2437 MHz) *The TX signal isn't detected from 3th harmonics. *Checked in all 3 axis and the maximum measured data were reported.(worst case at Z axis) *Multiple of CL = Cable Loss-Amplifier Gain(In case of above1000 MHz) *Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain FYI : Duty Cycle Correction Factor a. Duty cycle = Ontime/(On time+Off time) = 1.327 / (1.327+0.03) = 98.03 % b. Duty Cycle Correction = 20log (1 / Duty cycle) dB = 0 dB c.There did not apply of duty cycle factor for average value.

9.5-3 Test Data for wireless LAN

Test Date : 23-Mar-13 Measurement Distance : 3 m

Frequency (MHz)	Reading (dBμV)	Position (V/H)	Height (m)	Correction Factor		Duty Cycle Correction(dB)	Result Value		
				Ant Factor (dB)	Cable (dB)		Limit (dBμV/m)	Result (dBμV/m)	Margin (dB)
PEAK(RBW: 1 MHz VBW: 3 MHz)									
2483.6	28.38	H	1.1	26.98	5.0	0	74.0	60.36	-13.64
2483.6	33.06	V	1.2	26.98	5.0	0	74.0	65.04	-8.96
4924.1	45.87	H	1.1	31.57	-23.9	0	74.0	53.52	-20.48
4924.1	46.65	V	1.2	31.57	-23.9	0	74.0	54.30	-19.70
AV(RBW: 1 MHz VBW: 3 MHz)									
2483.6	16.04	H	1.1	26.98	5.0	0	54.0	48.02	-5.98
2483.6	18.00	V	1.2	26.98	5.0	0	54.0	49.98	-4.02
4923.9	34.64	H	1.1	31.57	-23.9	0	54.0	42.29	-11.71
4924.1	34.66	V	1.2	31.57	-23.9	0	54.0	42.31	-11.69

Remark	H : Horizontal, V : Vertical TEST MODE : 802.11n-CH11(2462 MHz) *The TX signal isn't detected from 3th harmonics. *Checked in all 3 axis and the maximum measured data were reported.(worst case at Z axis) *Multiple of CL = Cable Loss-Amplifier Gain(In case of above1000 MHz) *Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain FYI : Duty Cycle Correction Factor a. Duty cycle = Ontime/(On time+Off time) = 1.327 / (1.327+0.03) = 98.03 % b. Duty Cycle Correction = 20log (1 / Duty cycle) dB = 0 dB c.There did not apply of duty cycle factor for average value.

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 (2010). 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 0.8 m above the ground plan. A grounded vertical reference plane was positioned in a distance of 0.4 m from the EUT. The distance from the EUT to other metal surfaces was at least 0.8 m. 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 1.0 m.. The test receiver with Quasi Peak detector complies with CISPR 16.

10.1 Measurement equipments

Equipment Name	Type	Manufacturer	Serial No.	Next Calibration date
TEST Receiver	ESHS 30	Rohde & Schwarz	828765/002	26-Jan-14
LISN	ESH3-Z5	Rohde & Schwarz	838979/010	27-Jan-14
Pulse Limiter	ESH3Z2	Rohde & Schwarz	NONE	26-Jan-14

10.2 Environmental Condition

Test Place : Shielded Room

Wireless LAN 802.11b Mode (worst case)

Temperature (°C) : 22.2 ℃

Humidity (% R.H.) : 50.4 % R.H.

10.3 Test Data for wireless LAN (802.11b)

Test Date : 21-Mar-13

Frequency (MHz)	Correction Factor		Line (H/N)	Quasi-peak Value			Average Value		
	Lisn (dB)	Cable (dB)		Limit (dBμV)	Reading (dBμV)	Result (dBμV)	Limit (dBμV)	Reading (dBμV)	Result (dB)
0.16	0.13	0.17	H	65.62	45.13	45.44	55.62	29.82	30.13
0.18	0.13	0.17	H	64.63	42.29	42.59	54.63	27.79	28.09
0.19	0.13	0.16	H	63.95	41.63	41.92	53.95	28.97	29.26
0.20	0.13	0.16	H	63.82	41.43	41.72	53.82	28.90	29.19
0.21	0.13	0.16	H	63.21	40.90	41.19	53.21	30.01	30.30
0.49	0.12	0.18	N	56.17	41.65	41.95	46.17	33.54	33.84
Remark	H : Hot Line, N : Neutral Line TEST MODE : 802.11b - CH 6(2437 MHz)								

Appendix 1. Special diagram for Wireless LAN

802.11b - CH 6

*HOT

ES TECH

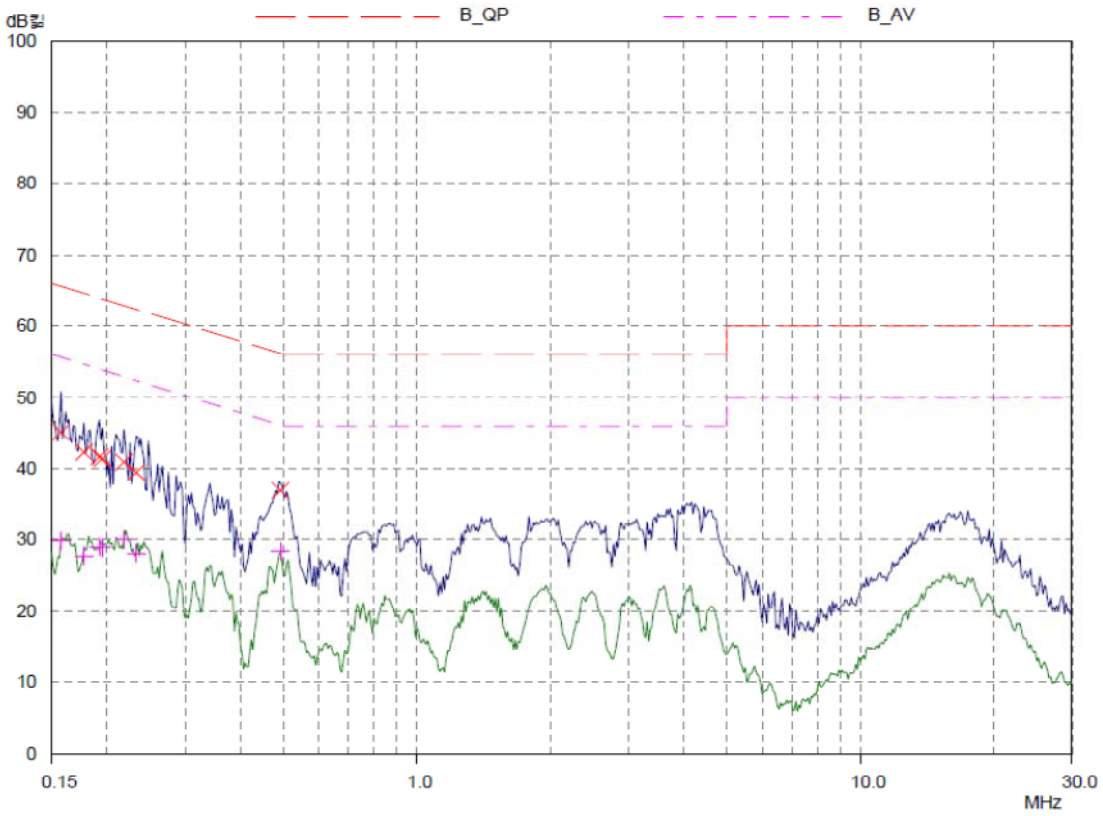
HOT LINE

21 Mar 2013 11:44

EUT:	MT3XX
Manuf:	
Op Cond:	120 V
Operator:	Enginner H.K.Lee
Test Spec:	CLASS B
Comment:	WLAN 801.11b-CH6
Result File:	00371b_h.dat : Bluebird Soft Inc.
Scan Settings	(1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
150kHz	30MHz	0.8%	10kHz	PK+AV	10msec	Auto	OFF	60dB

Final Measurement:	Detectors:	X QP / + AV
	Meas Time:	1sec
	Subranges:	25
	Acc Margin:	0 dB



Special diagram for Wireless LAN

802.11b - CH 6

*NEUTRAL

ES TECH

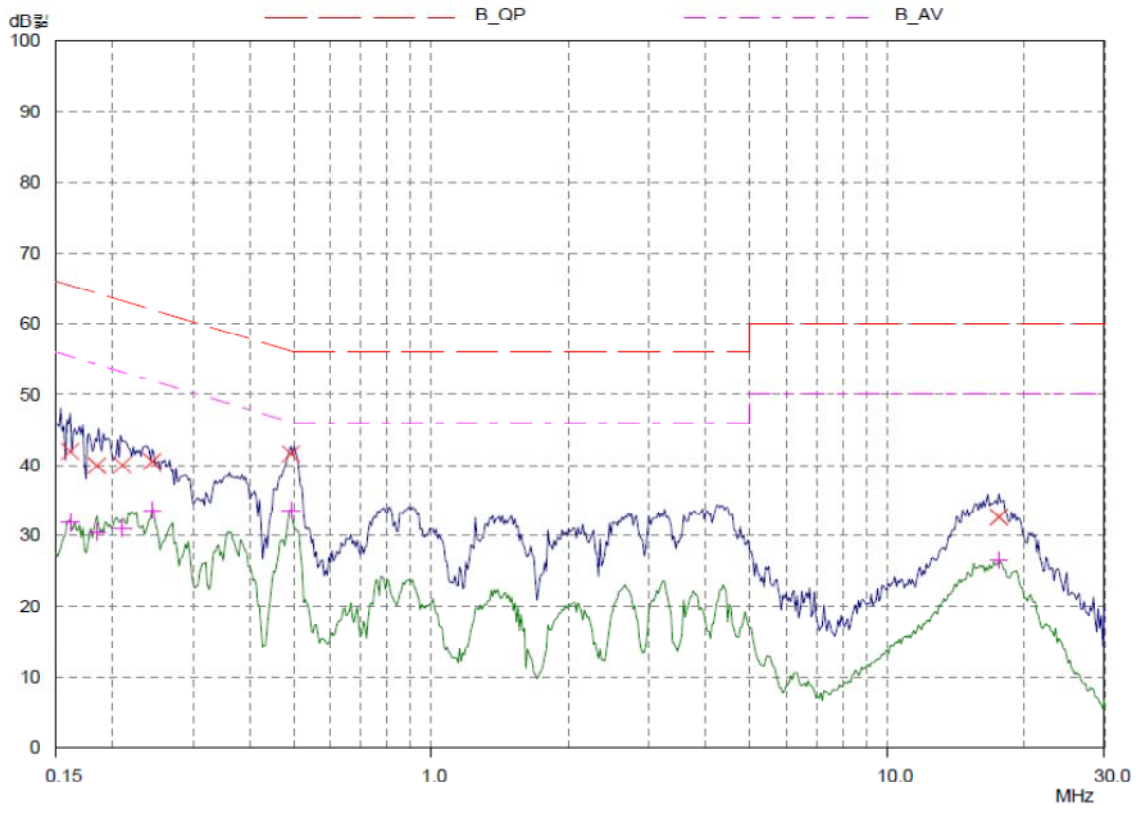
21 Mar 2013 11:51

NEUTRAL LINE

EUT:	MT3XX
Manuf:	
Op Cond:	120 V
Operator:	Enginner H.K.Lee
Test Spec:	CLASS B
Comment:	WLAN 802.11b- CH6
Result File:	00371b_n.dat : Bluebird Soft Inc.
Scan Settings	(1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
150kHz	30MHz	0.8%	10kHz	PK+AV	10msec	Auto	OFF	60dB

Final Measurement:	Detectors:	X QP / + AV
	Meas Time:	1sec
	Subranges:	25
	Acc Margin:	0 dB



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 2.4 dBi.