



Produkte
Products

Prüfbericht - Nr.: 14018170 001		Seite 1 von 39			
<i>Test Report No.:</i>		<i>Page 1 of 39</i>			
Auftraggeber: <i>Client:</i>	Convergence Systems Limited 12/F., Chung Nam Building 1 Lockhart Road Wan Chai Hong Kong				
Gegenstand der Prüfung: <i>Test item:</i>	EPC Class 1 Gen 2 UHF RFID Handheld Reader				
Bezeichnung: <i>Identification:</i>	CS101-2	Serien-Nr.: <i>Serial No.</i>	Engineering sample		
Wareneingangs-Nr.: <i>Receipt No.:</i>	071210020	Eingangsdatum: <i>Date of receipt:</i>	21.11.2007		
Prüfart: <i>Testing location:</i>	TÜV Rheinland Hong Kong Ltd. 9/F., Oriental News Building, No.7 Wang Tai Road, Kowloon Bay, Kowloon, Hong Kong. Hong Kong Productivity Council HKPC Building, 78 Tat Chee Avenue, Kowloon, Hong Kong				
Prüfgrundlage: <i>Test specification:</i>	FCC Part 15, Subpart B FCC Part 15, Subpart C				
Prüfergebnis: <i>Test Result:</i>	Der Prüfgegenstand entspricht oben genannter Prüfgrundlage(n). <i>The test item passed the test specification(s).</i>				
Prüflaboratorium: <i>Testing Laboratory:</i>	TÜV Rheinland Hong Kong Ltd.				
geprüft / tested by:	kontrolliert / reviewed by:				
22.2.2008	Derek Leung Project Manager		22.2.2008	Thomas Berns Manager	
Datum <i>Date</i>	Name/Stellung <i>Name/Position</i>	Unterschrift <i>Signature</i>	Datum <i>Date</i>	Name/Stellung <i>Name/Position</i>	Unterschrift <i>Signature</i>
Sonstiges / Other Aspects: FCCID:UB4CS101C1GEN2					
Abkürzungen:	P(ass) = entspricht Prüfgrundlage F(ail) = entspricht nicht Prüfgrundlage N/A = nicht anwendbar N/T = nicht getestet	Abbreviations:	P(ass) = passed F(ail) = failed N/A = not applicable N/T = not tested		
<p>Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens.</p> <p><i>This test report relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any safety mark on this or similar products.</i></p>					



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Appendix 1: Test Setup Photo

Appendix 2: EUT External Photo

Appendix 3: EUT Internal Photo

Appendix 4: FCCID Label and Label Location

Appendix 5: Block Diagram

Appendix 6: Specifications of EUT and antennas

Appendix 7: Schematic Diagrams

Appendix 8: Bill of Material

Appendix 9: User Manual

Appendix 10: Maximum Permissible Exposure Information

Appendix 11: Operational / Technical Description

List of Test and Measurement Instruments

Kind of Equipment	Manufacturer	Model	Serial Number	Calibration Due Date
Test Receiver	Rohde & Schwarz	ESU26	100050	6 Aug 2008
Biconical Antenna	Rohde & Schwarz	HK116	841489/015	8 Feb 2008
Log-periodic Antenna	Rohde & Schwarz	HL223	841516/017	3 Feb 2008
Active Loop Antenna	EMCO	6502	9107-2651	11 Dec 2007
Horn Antenna	EMCO	3116	2616	3 Jan 2008
Horn Antenna	EMCO	3115	9002-3347	3 Feb 2008
Spectrum Analyzer	Rohde & Schwarz	FSP30	1093.4495K30	12 Feb 2008

Test Result Summary

Clause	Test Item	Result
15.247(b)(3)	Conducted Peak RF Output Power Test - WiFi Transmission Mode	Pass
15.247(d)	Conducted Spurious RF Output Power Test - WiFi Transmission Mode	Pass
15.209	Radiated Spurious Emission Test - WiFi Transmission Mode	Pass
15.247(d)	Band-edge compliance - WiFi Transmission Mode	Pass
15.247(a)(2)	6dB Bandwidth Measurement - WiFi Transmission Mode	Pass
15.247(e)	Power Spectral Density Measurement - WiFi Transmission Mode	Pass
15.209	Radiated Spurious Emission Test - WiFi Transmission with RFID Transmission Mode	Pass
15.109	Radiated Spurious Emission Test - PC On Mode	Pass

General Product Information

Product Function and Intended Use

The equipment under test (EUT) CS101-2 RFID reader is an EPCglobal Class 1 Gen 2 handheld reader providing real-time tag processing for Class 1 (Read / Write) EPC- compliant tag. The RFID system RF output power is selectable from 15dBm to 30dBm and operates in 902 to 928MHz frequency band. The system contains WiFi 802.11 b/g connectivity. The testing of the RFID system are in report Detail specifications of the EUT refer to appendix 6.

Ratings and System Details

FCC ID	:	UB4CS101C1GEN2
Connectivity	:	WiFi, 802.11 b/g
Power supply	:	Lithium Polymer Rechargeable Battery (14.8 Volt)
Port(s)	:	(i) USB port (ii) RS232 port (iii) SD Card Slot

RFID System configuration:

Operating Frequency	:	902.75MHz to 927.25MHz
No. of channel	:	50 channels (channel 0 – 49)
Channel Spacing	:	500kHz
Antenna	:	Embedded Patch Antenna

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WiFi System Configuration:

Operating Frequency	:	2412MHz to 2462MHz
No. of channel	:	11 channels (channel 1 – 11)
Channel Spacing	:	5MHz
Antenna	:	Embedded Patch Antenna

WiFi maximum transmit power:

Data Rate (Mbps)	Modulation	WiFi Standard	Max. Transmit Power (dBm)
1	BPSK	802.11b	14 +2.0/-1.5
2	QPSK	802.11b	14 +2.0/-1.5
5.5	CCK	802.11b	14 +2.0/-1.5
6	OFDM	802.11g	12 +/- 1.5
9	OFDM	802.11g	12 +/- 1.5
11	CCK	802.11b	14 +2.0/-1.5
12	OFDM	802.11g	12 +/- 1.5
18	OFDM	802.11g	12 +/- 1.5
24	OFDM	802.11g	12 +/- 1.5
36	OFDM	802.11g	12 +/- 1.5
48	OFDM	802.11g	12 +/- 1.5
54	OFDM	802.11g	12 +/- 1.5

WiFi frequency channels:

Channel	MHz
1	2412.0
2	2417.0
3	2422.0
4	2427.0
5	2432.0
6	2437.0
7	2442.0
8	2447.0
9	2452.0
10	2457.0
11	2462.0

Operation Descriptions

The CS101-2 RFID reader hops among 50 channels (Ch.0 - 49) from 902.75MHz to 927.25MHz in 500kHz steps in operating mode according to a generated pseudo-random sequence. The time of occupancy on each frequency is 0.4 seconds maximum within a 20 seconds period.

Each CS101-2 reader hops among its 50 available channels according to an independently generated pseudo-random sequence. The reader maintains no capability to coordinate RF channel occupancy among separate units. Within each hop, the RFID reader may be sending command to the tag or receiving backscatter from the tag, alternating between them as required by the EPC Gen 2 protocol. When the reader is sending command to the tag, the reader is sending out modulated signal. When the reader is receiving backscatter from the tag, the reader is sending out continuous wave signal.

The RFID system supports six preset profiles of operational configurations. The details of the settings of each profile are shown in table:

Profile	Tari (µs)	Reader to Tag Forward Link	Pulse Width (µs)	Tag to Reader Link Frequency (kHz)	Tag to Reader Reverse Modulation
0	25.00	PR-ASK	12.50	120	Miller, M=4
1	12.50	DSB-ASK	6.25	160	Miller, M=2
2	25.00	PR-ASK	12.50	250	Miller, M=4
3	25.00	PR-ASK	12.50	300	Miller, M=4
4	6.25	DSB-ASK	3.13	400	FM0
5	25.00	PR-ASK	12.50	250	Miller, M=2

Glossary:

Tari: time interval of symbol 0

Forward Link: modulation method of reader to tag link

Pulse Width: time width of RF pulse at power below average power level

Link Frequency: data rate of tag to reader link

Reverse Modulation: Encoding method of the tag to reader link (either FM0 or Miller subcarrier)

Submitted Documents

The submitted documents are listed as follow:

- Schematic diagrams
- Block diagrams
- User manual
- FCC ID label and location diagram
- Specification of EUT
- Specification of antenna
- Bill of material

Related Submittal(s) Grants

This report is one of the two applications for certification of the EUT. This report contains the measurement results of the WiFi function. The testing report 14017634 001 contains the measurement results of the RFID function.

Test Set-up and Operation Mode

Principle of Configuration Selection

Emission: The tests were performed under test mode by Window CE software to select different transmit channels, transmit profiles and data rates.

Test Operation and Test Software

The radiated emission tests have been performed on the following modes:

- (i) WiFi transmission only;
- (ii) WiFi transmission with RFID transmission mode;
- (iii) PC mode (WiFi and RFID without transmission), bar-code scanner "On".

The conducted RF fundamental power and spurious emissions tests have been performed on the WiFi transmission mode.

Testing software was used to enable the continuous transmission on the EUT for the testing in this report.

Special Accessories and Auxiliary Equipment

The EUT was tested together with the following additional accessory:

- none

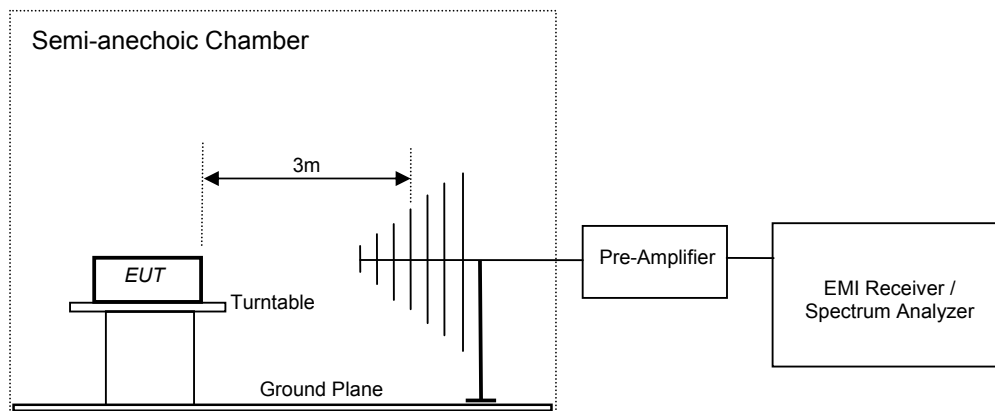
Countermeasures to achieve EMC Compliance

- none

Test Methodology

Radiated Emission Test

The radiated emission measurement was performed according to the procedures in ANSI C63.4-2003. The equipment under test (EUT) was placed at the middle of the 80 cm high turntable, and the EUT is 3 or 10 meters far from the measuring antenna. The turntable was rotated 360° for obtaining the maximum emission. The height of the measuring antennas was scanned between 1m and 4m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations. Repeat the measurement steps until the maximum emissions were obtained. The measurement above 1000MHz was performed by horn antenna. The measurement below 30MHz was performed by loop antenna, maximum emission was obtained by two antenna polarizations of loop faced and sided to the EUT. maximum emission was obtained by two antenna polarizations of loop faced and sided to the EUT.



TEST RESULTS

WiFi Transmission Mode

Conducted Peak RF Output Power Test

Section 15.247(b)(3)

RESULT:**Pass**

Test Specification	:	FCC Part 15 Section 15.31
Test Method	:	ANSI C63.4-2003
Measurement BW	:	100kHz
Detector	:	Peak
Supply voltage	:	14.8V battery
Limit	:	For system using digital modulation in 2400-2483.5MHz: 1 Watt (30dBm).

Test Method:



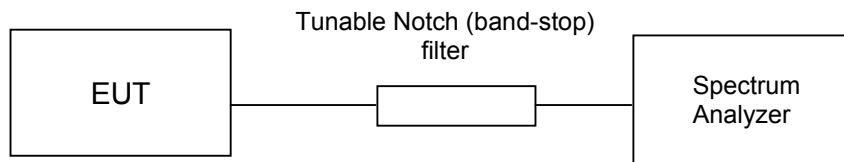
Test Result:

WiFi - Tx Channel	WiFi - Tx (MHz)	Data Rate (Mbps)	Output Power (dBm)	Limit (dBm)	Margin (dB)
1	2412.0	1	9.0	30	-21.0
		2	9.1	30	-20.9
		5.5	9.4	30	-20.7
		6	8.8	30	-21.2
		9	10.0	30	-20.0
		11	11.5	30	-18.5
		12	10.9	30	-19.1
		18	9.5	30	-20.5
		24	10.0	30	-20.0
		36	10.4	30	-19.6
		48	10.3	30	-19.7
		54	10.6	30	-19.4
6	2437.0	1	7.7	30	-22.3
		2	8.3	30	-21.7
		5.5	9.3	30	-20.7
		6	7.2	30	-22.8
		9	8.8	30	-21.2
		11	10.9	30	-19.1
		12	10.6	30	-19.4
		18	9.5	30	-20.5
		24	9.3	30	-20.7
		36	9.0	30	-21.0
		48	9.1	30	-20.9
		54	8.9	30	-21.1
11	2462.0	1	6.6	30	-23.4
		2	8.1	30	-21.9
		5.5	9.3	30	-20.7
		6	6.5	30	-23.5
		9	7.8	30	-22.2
		11	9.6	30	-20.4
		12	8.6	30	-21.4
		18	7.7	30	-22.3
		24	7.9	30	-22.1
		36	8.5	30	-21.5
		48	7.5	30	-22.5
		54	7.9	30	-22.1

Conducted Spurious RF Output Power Test
Section 15.247(d)
RESULT:
Pass

Test Specification : FCC Part 15 Section 15.31
 Test Method : ANSI C63.4-2003
 Detector Function : Peak
 Supply Voltage : 14.8 Volt battery
 Measuring Frequency Range : 30kHz – 25GHz(Up to 10th harmonic of the highest fundamental frequency)
 Measurement bandwidth (RBW): Below 1GHz: 100kHz, above 1GHz: 1MHz
 Requirement : At least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limit.

Test Method:



Test Result:

WiFi - Tx Channel	WiFi - Tx Frequency (MHz)	Data Rate (Mbps)	Spurious Emission (MHz)	Emission Level (dBm)	Limit (dBm)
1	2412.0	1	*	<-50	-4.0
		2	*	<-50	-4.0
		11	*	<-50	-4.0
		54	*	<-50	-6.5
6	2437.0	1	*	<-50	-4.0
		2	*	<-50	-4.0
		11	*	<-50	-4.0
		54	*	<-50	-6.5
11	2462.0	1	*	<-50	-4.0
		2	*	<-50	-4.0
		11	*	<-50	-4.0
		54	*	<-50	-6.5

* All emissions are below -50dBm.

Radiated Spurious Emission Test**Section 15.209****RESULT:****Pass**

Test Specification	:	FCC Part 15 Section 15.205, 15.209 & 15.247(d)
Test Method	:	ANSI C63.4-2003
Measurement Location	:	Semi Anechoic Chamber
Supply Voltage	:	14.8V battery
Measuring Frequency Range	:	9kHz (covered the lowest internal oscillator frequency of 32.768kHz) – 25GHz(Up to 10 th harmonic of the highest fundamental frequency)
Measurement Distance	:	10m for frequency <30MHz, 3m for frequency >30MHz.
Detector	:	QP for frequency below 1GHz, Average for frequency above 1GHz
Requirement	:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. Attenuation below the general limits specified in Sections 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a).

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Test Result:

WiFi - Tx Channel	WiFi - Tx Frequency (MHz)	Data Rate (Mbps)	Antenna Polarisation	Spurious Emission (MHz)	Emission Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)
2	2417.0	1	V	106.577	34.7	#	#
				113.239	35.1	43.52	-8.4
				119.900	35.1	43.52	-8.4
				214.751	28.1	#	#
				266.444	33.1	46.0	-12.9
				466.277	34.4	#	#
				599.499	35.2	#	#
			799.334	40.3	#	#	
			H	799.334	40.5	#	#
4	2427.0	2	V	113.239	35.2	43.52	-8.3
				119.900	35.4	43.52	-8.1
				126.560	32.7	43.52	-10.8
				213.156	29.1	#	#
				266.444	33.1	46.0	-12.9
				466.278	33.4	#	#
				599.500	36.5	#	#
			799.340	40.2	#	#	
			H	799.334	40.4	#	#
7	2442.0	11	V	106.577	35.0	#	#
				113.239	35.6	43.52	-7.9
				119.900	35.6	43.52	-7.9
				215.519	29.5	#	#
				266.444	33.1	46.0	-12.9
				466.277	33.0	#	#
				599.500	36.1	#	#
			799.332	40.2	#	#	
			H	799.334	40.4	#	#
9	2452.0	54	V	106.577	35.1	#	#
				113.239	35.5	43.52	-8.0
				119.900	35.7	43.52	-7.8
				213.156	29.1	#	#
				599.501	36.1	#	#
			799.332	40.4	#	#	
			H	*	*	*	*

Spurious emissions that do not fall into the restricted band of Section 15.205.

* All emissions are at least 20dB below the limits.

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Limit of section 15.209:

Frequency of Emission (MHz)	Field Strength ($\mu\text{V/m}$)	Field Strength ($\text{dB}\mu\text{V/m}$)	Measurement Distance (m)
0.009-0.490	2400/F(kHz)	-	300
0.490-1.705	24000/F(kHz)	-	30
1.705-30	30	29.5*	30
30-88	100	40.0	3
88-216	150	43.52	3
216-960	200	46.0	3
Above 960	500	53.98	3

*The limit shows in the table above of frequency range 1.705MHz – 30MHz is correspond to $(29.5+9.5)=39.0\text{dB}\mu\text{V/m}$ at 10 meters measuring distance.

The emission limits show in the above table are based on measurement employing a CISPR quasi-peak detector and above 1000MHz are based on the measurement employing an average detector.

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Band-edge Compliance

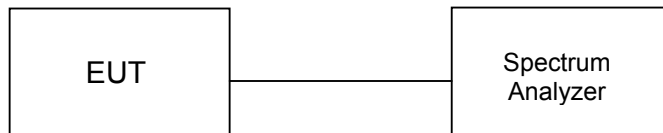
Section 15.247(d)

RESULT:

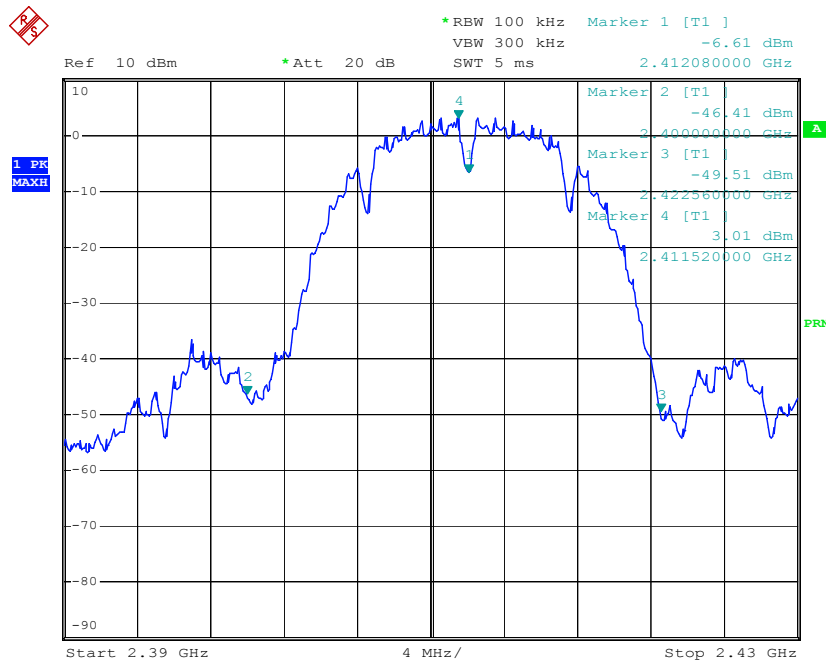
Pass

Test Specification : FCC Part 15 Section 15.247 (d)
 Test Method : ANSI C63.4-2003
 Measurement BW : 100kHz
 Detector : Peak
 Supply voltage : 14.8V battery
 Requirement : In any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.

Test Method:

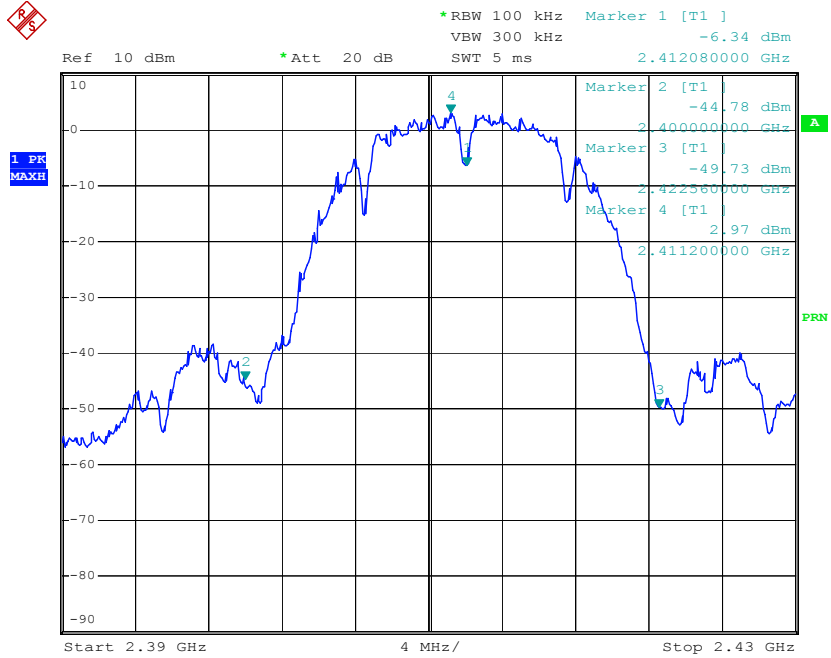


Test Result:



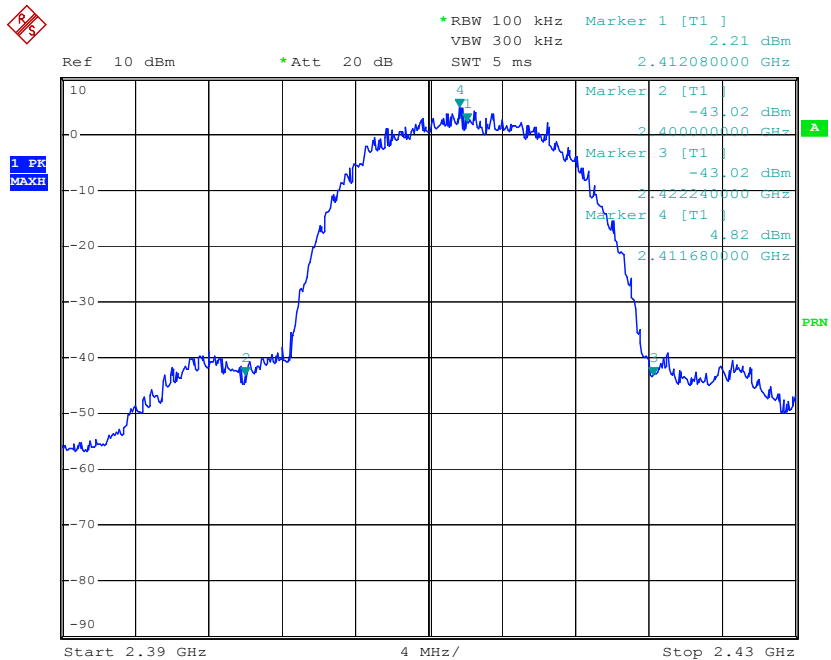
Date: 15.DEC.2007 18:35:03

Band edge measurement - Channel: 1, Data rate: 1Mbps



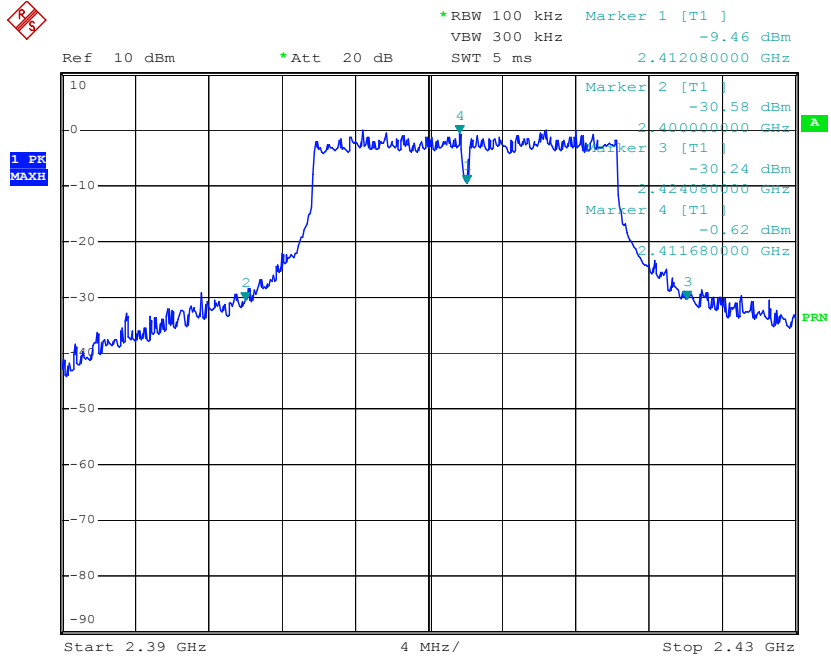
Date: 15.DEC.2007 18:36:44

Band edge measurement - Channel: 1, Data rate: 2Mbps



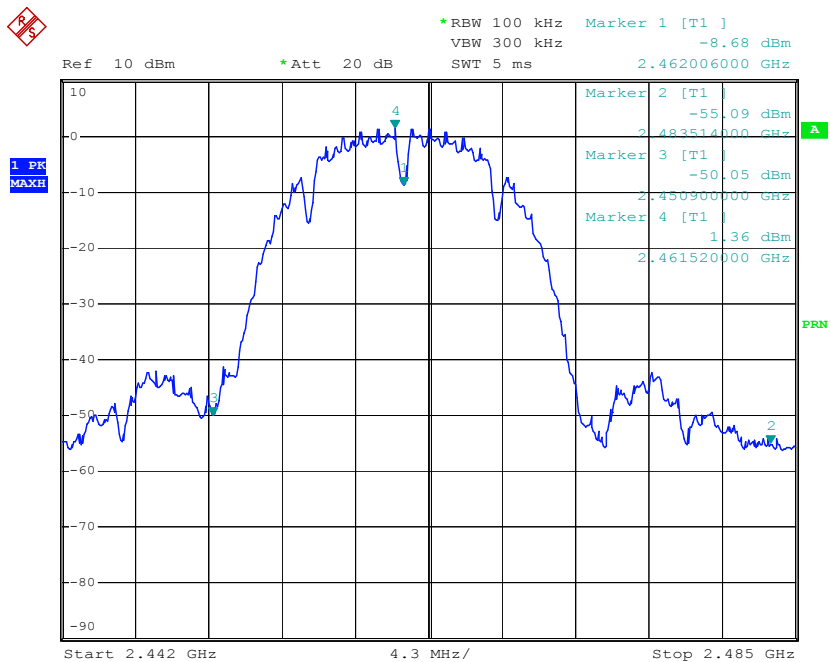
Date: 15.DEC.2007 18:37:59

Band edge measurement - Channel: 1, Data rate: 11Mbps



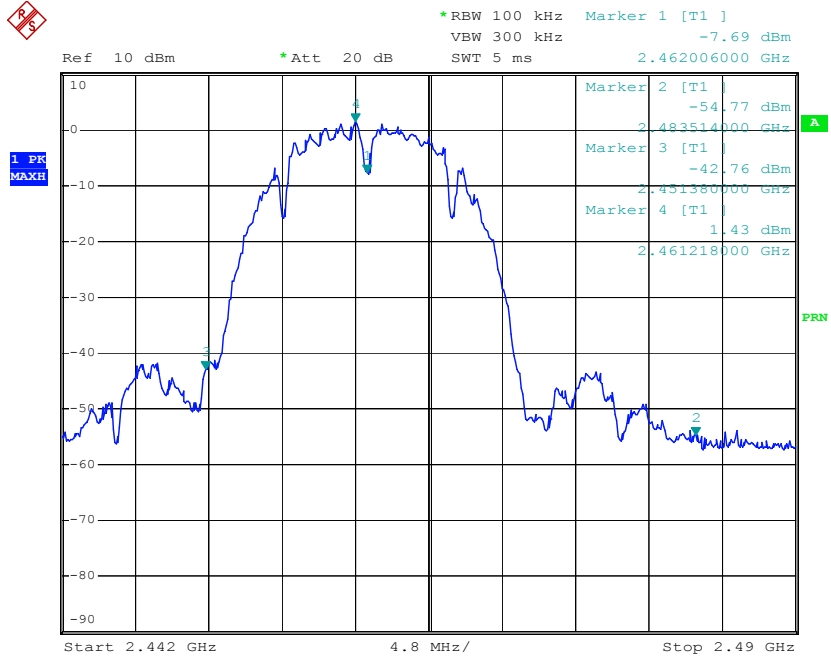
Date: 15.DEC.2007 18:40:56

Band edge measurement - Channel: 1, Data rate: 54Mbps



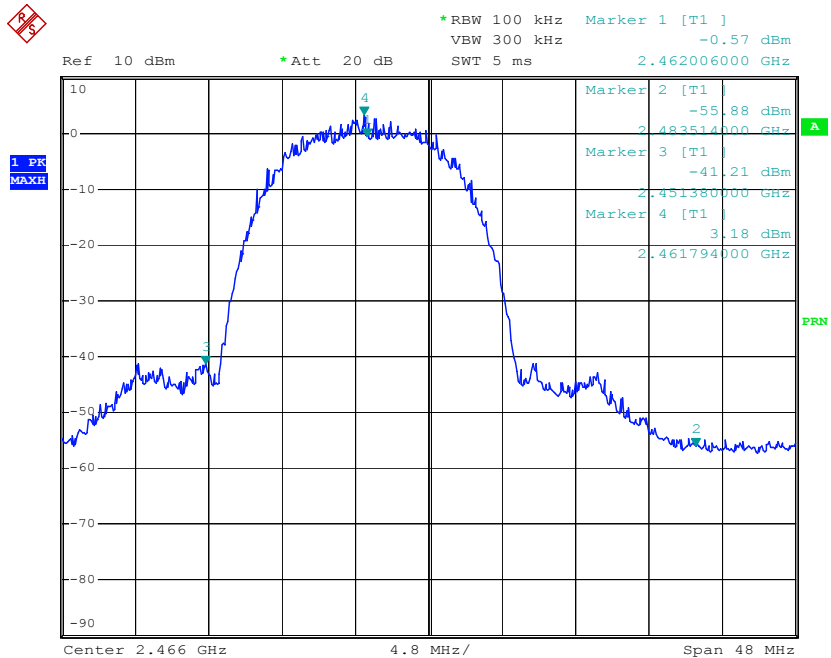
Date: 15.DEC.2007 18:43:49

Band edge measurement - Channel: 11, Data rate: 1Mbps



Date: 15.DEC.2007 18:51:11

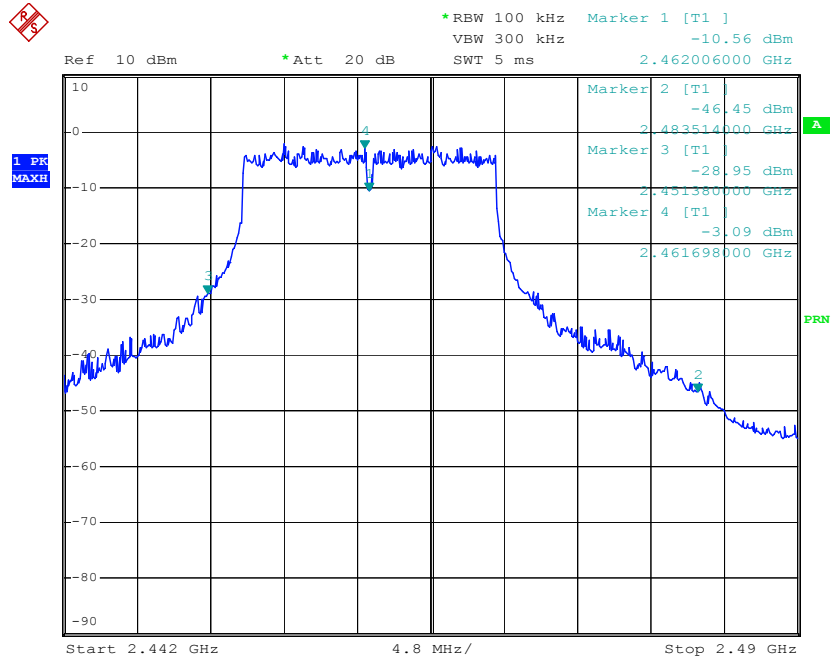
Band edge measurement - Channel: 11, Data rate: 2Mbps



Date: 15.DEC.2007 19:02:15

Band edge measurement - Channel: 11, Data rate: 11Mbps

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Date: 15.DEC.2007 19:00:59

Band edge measurement - Channel: 11, Data rate: 54Mbps

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Bandwidth Measurement

Section 15.247(a)(2)

RESULT:

Pass

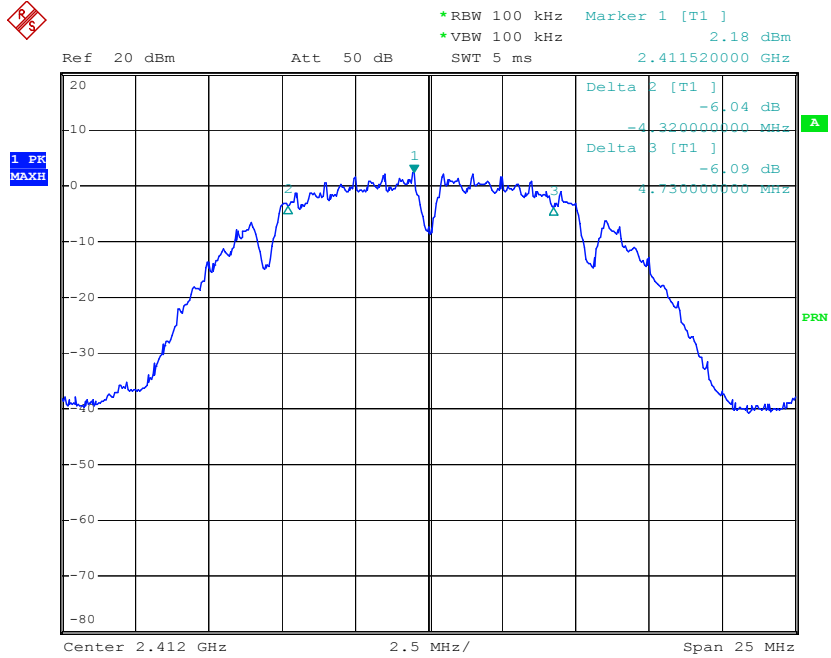
Test Specification : FCC Part 15 Section 15.247 (a) (2)
 Test Method : ANSI C63.4-2003
 Measurement RBW : 100kHz
 Detector : Peak
 Supply voltage : 14.8V battery
 Requirement : For system of using digital modulation techniques, the minimum 6dB bandwidth shall be at least 500kHz.

Test Method:



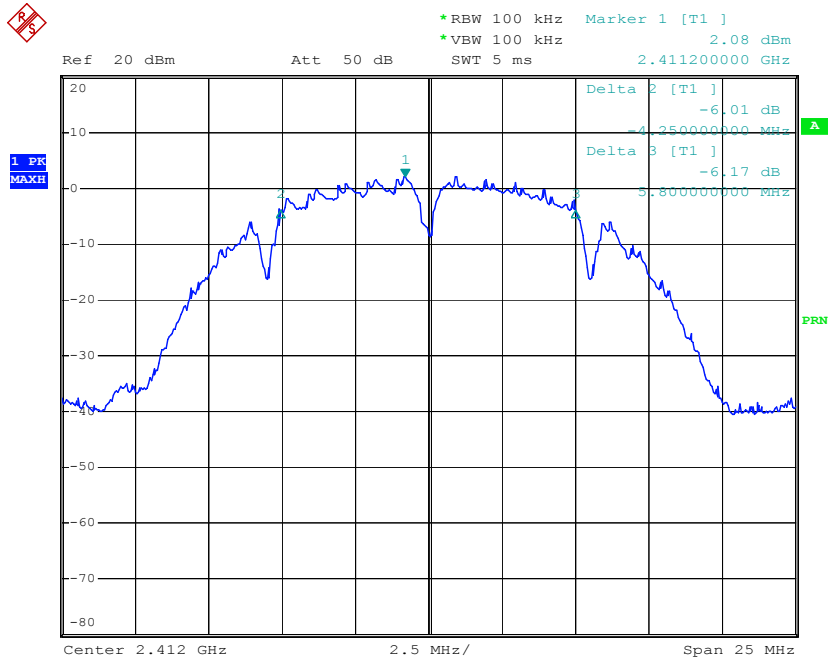
Test result:

Channel	Data Rate (Mbps)	6dB Bandwidth(MHz)
1	1	9.05
	2	10.05
	11	8.25
	54	16.60
6	1	9.45
	2	9.30
	11	8.20
	54	16.65
11	1	8.65
	2	9.00
	11	9.00
	54	16.60



Date: 9.DEC.2007 12:26:07

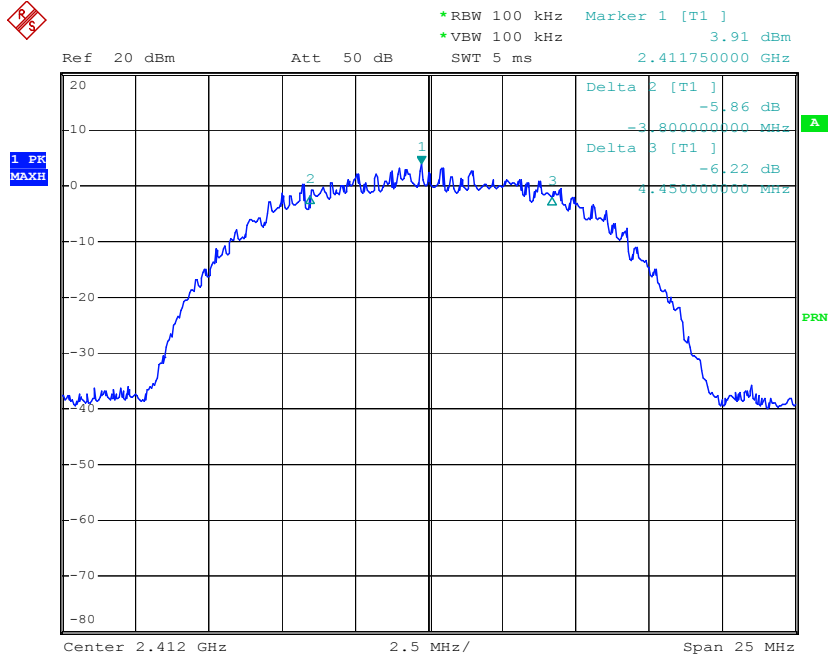
Bandwidth Measurement - Channel 1, Data rate: 1 Mbps



Date: 9.DEC.2007 12:30:02

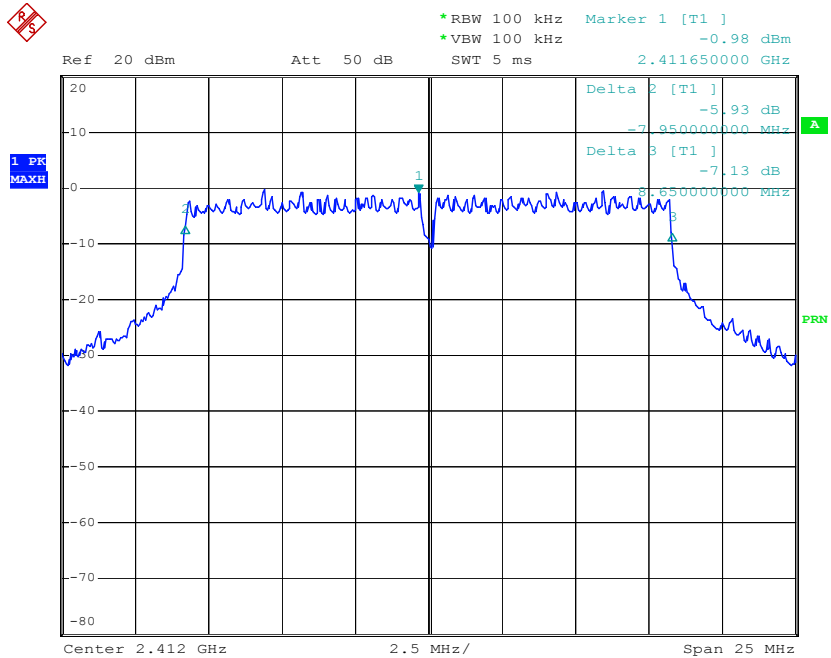
Bandwidth Measurement - Channel 1, Data rate: 2 Mbps

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Date: 9.DEC.2007 12:34:08

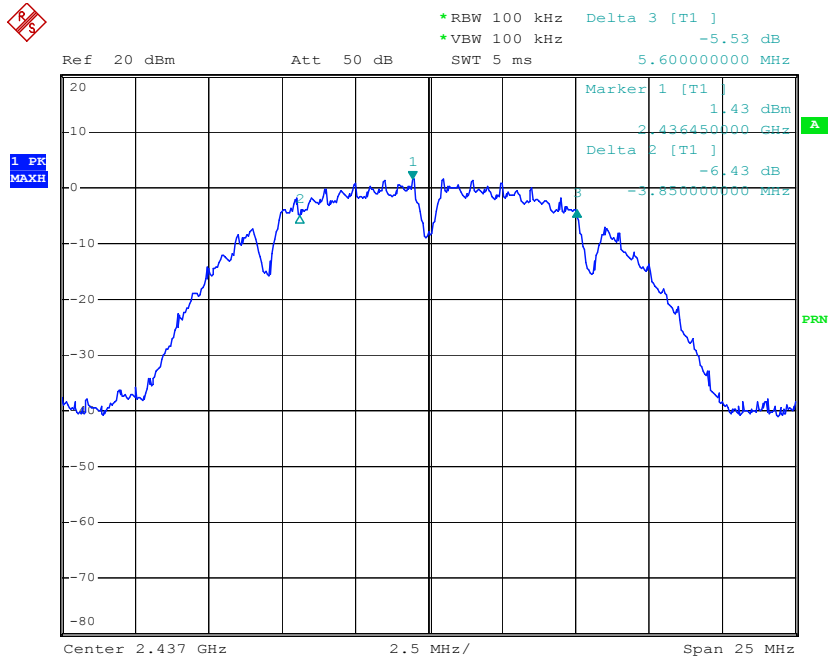
Bandwidth Measurement - Channel 1, Data rate: 11 Mbps



Date: 9.DEC.2007 12:36:34

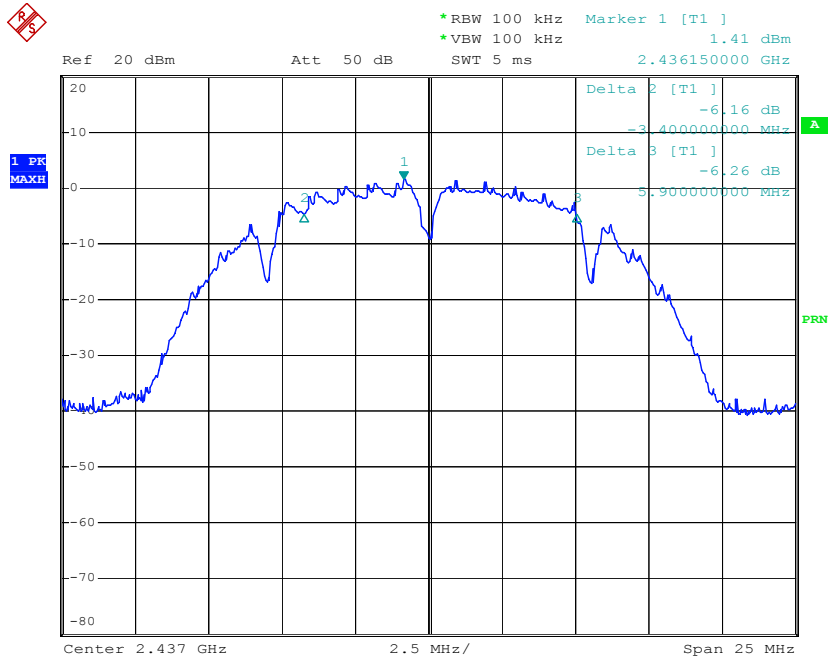
Bandwidth Measurement - Channel: 1, Data rate: 54 Mbps

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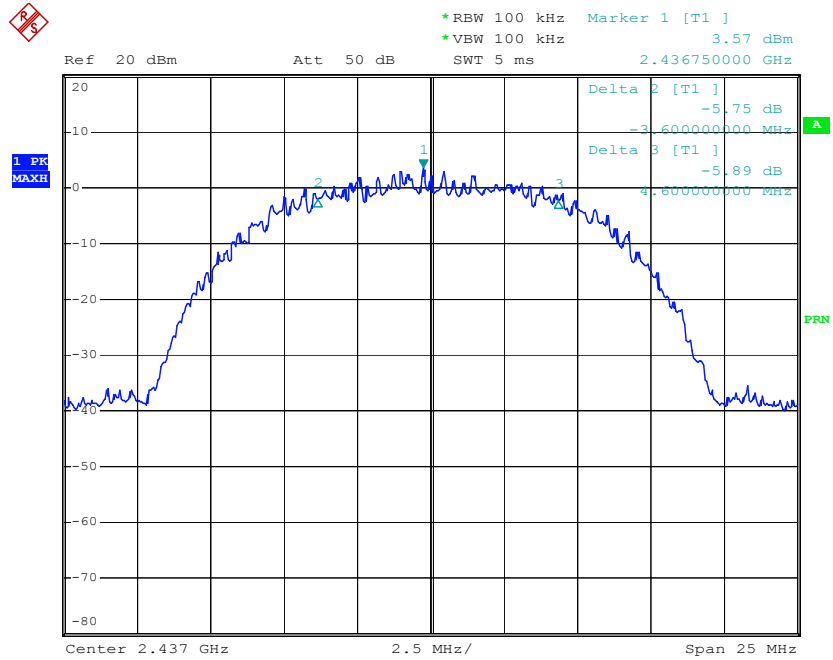
Date: 9.DEC.2007 12:38:40

Bandwidth Measurement - Channel: 6, Data rate: 1 Mbps



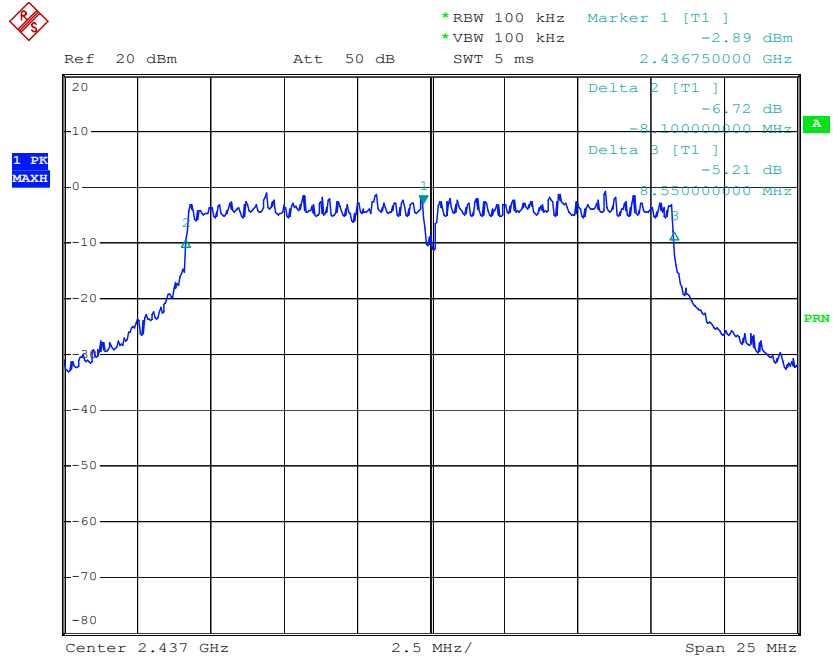
Date: 9.DEC.2007 12:48:51

Bandwidth Measurement - Channel: 6, Data rate: 2 Mbps



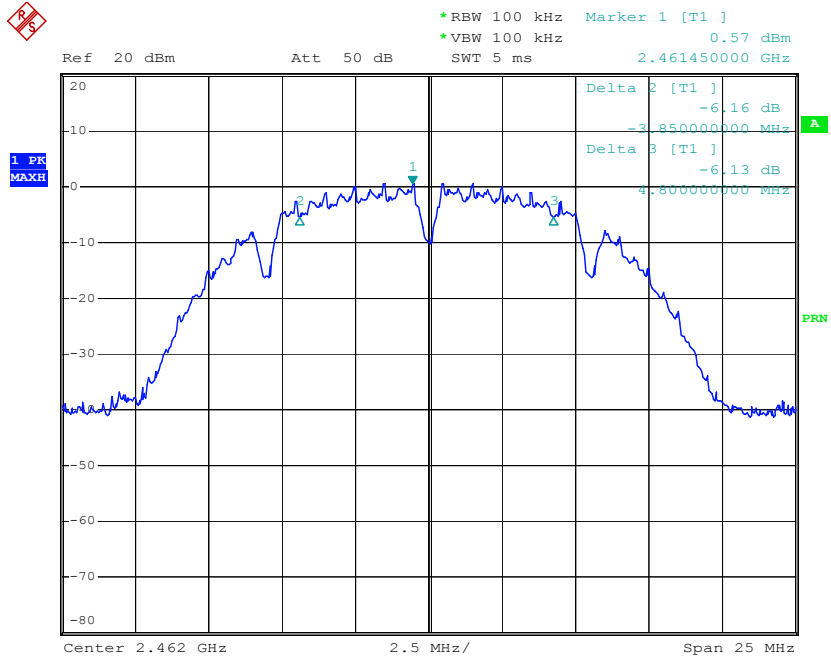
Date: 9.DEC.2007 12:50:53

Bandwidth Measurement - Channel: 6, Data rate: 11 Mbps



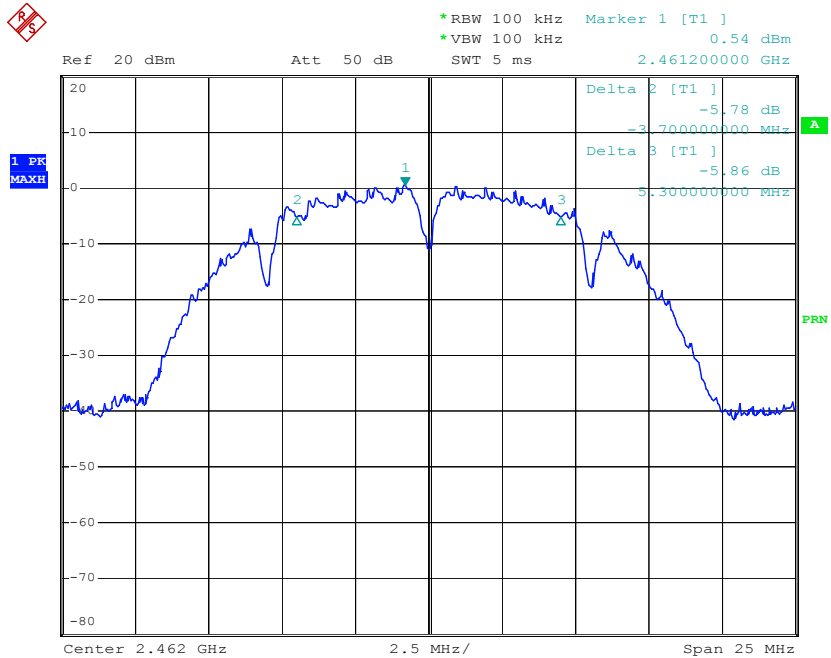
Date: 9.DEC.2007 12:52:45

Bandwidth Measurement - Channel: 6, Data rate: 54 Mbps



Date: 9.DEC.2007 12:54:22

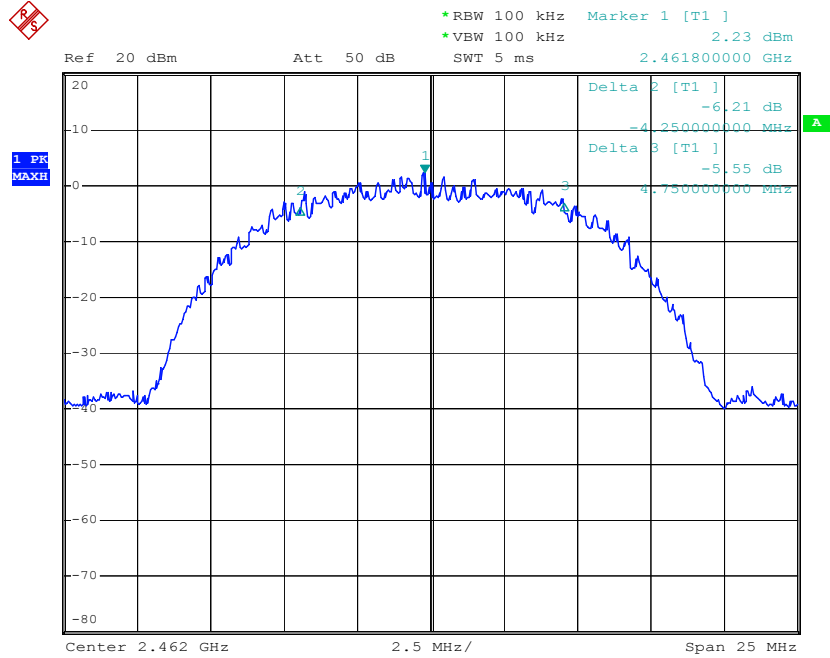
Bandwidth Measurement - Channel: 11, Data rate: 1 Mbps



Date: 9.DEC.2007 12:55:46

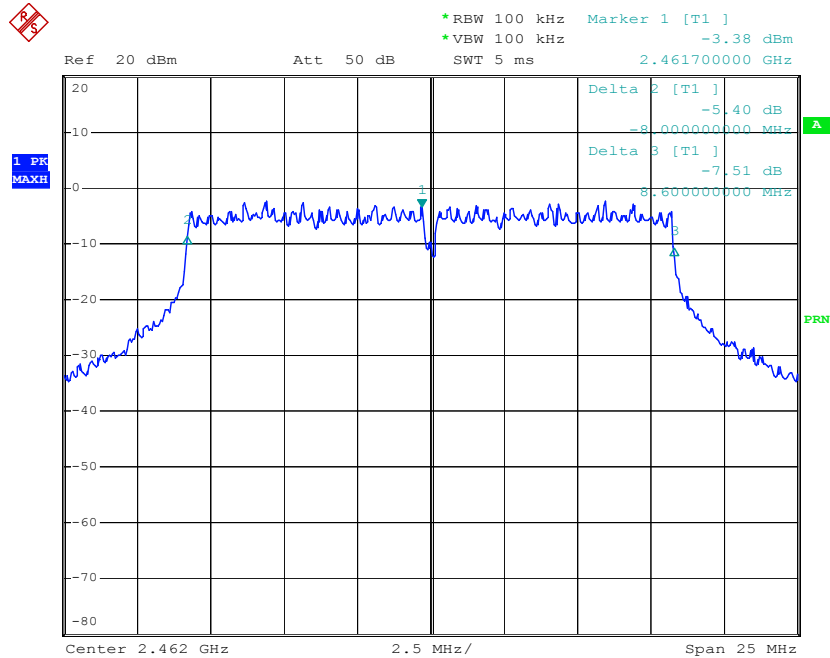
Bandwidth Measurement - Channel: 11, Data rate: 2 Mbps

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Date: 9.DEC.2007 12:58:49

Bandwidth Measurement - Channel: 11, Data rate: 11 Mbps



Date: 9.DEC.2007 13:01:10

Bandwidth Measurement - Channel: 11, Data rate: 54 Mbps

Power Spectral Density Measurement
Section 15.247(e)
RESULT:
Pass

Test Specification : FCC Part 15 Section 15.247(e)
 Test Method : ANSI C63.4-2003
 Measurement Bandwidth (RBW): 3kHz
 Detector : Peak
 Supply voltage : 14.8V battery
 Requirement : For digitally modulated system, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3kHz band during any time interval of continuous transmission.

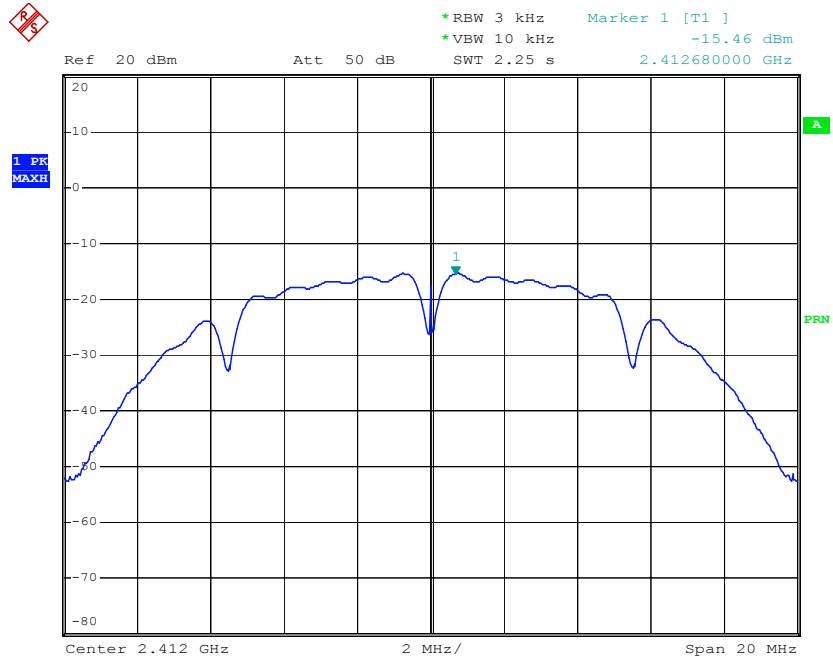
Test Method:



Test Result:

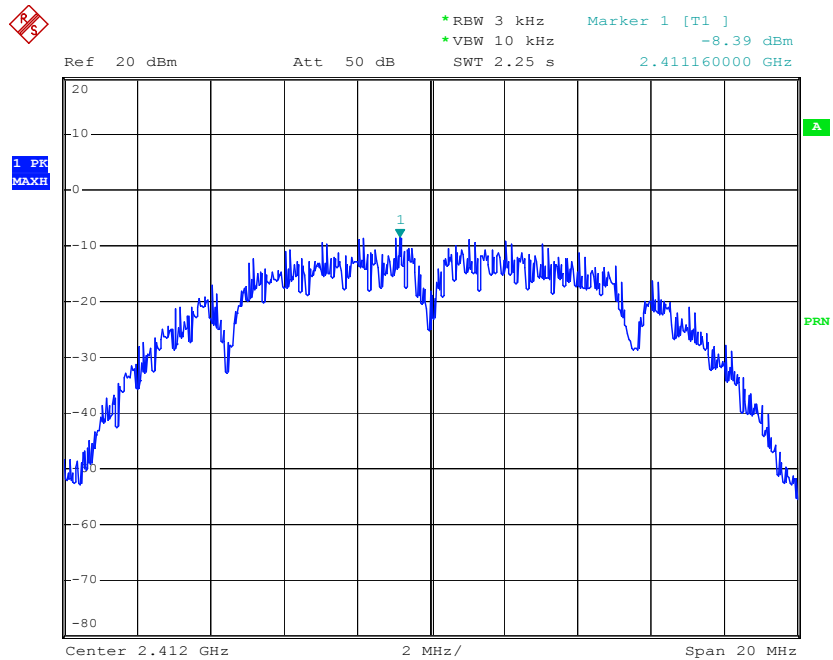
WiFi - Tx Channel	WiFi - Tx Frequency (MHz)	Data Rate (Mbps)	Reading of Spectrum Analyzer (dBm)	Cable loss (dB)	Result (dBm)	Limit (dBm)	Margin (dB)
1	2412.0	1	-15.5	1.0	-14.5	8.0	-22.5
		2	-8.4	1.0	-7.4	8.0	-15.4
		11	-9.0	1.0	-8.0	8.0	-16.0
		54	-14.3	1.0	-13.3	8.0	-21.3
6	2437.0	1	-15.9	1.1	-14.8	8.0	-22.8
		2	-9.6	1.1	-8.5	8.0	-16.5
		11	-10.3	1.1	-9.2	8.0	-17.2
		54	-14.9	1.1	-13.8	8.0	-21.8
11	2462.0	1	-17.2	1.1	-16.1	8.0	-24.1
		2	-9.7	1.1	-8.6	8.0	-16.6
		11	-11.4	1.1	-10.3	8.0	-18.3
		54	-15.9	1.1	-14.8	8.0	-22.8

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Date: 9.DEC.2007 13:12:39

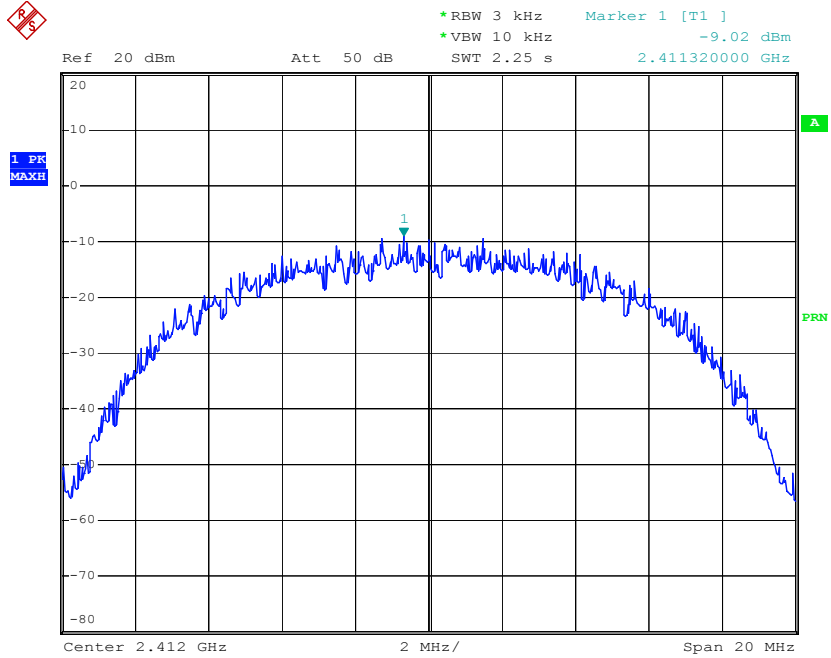
Power Spectral Density Measurement - Channel: 1, Data rate: 1 Mbps



Date: 9.DEC.2007 13:13:45

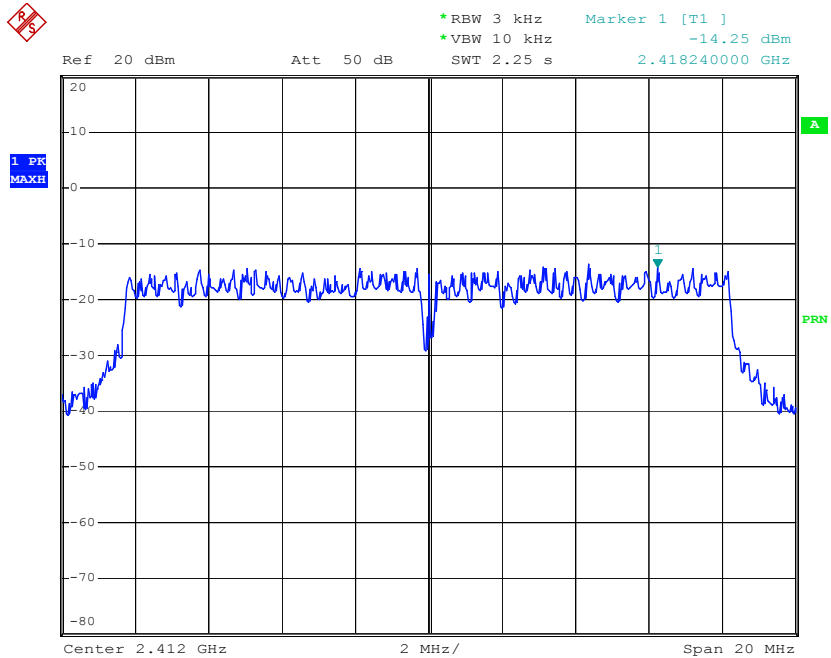
Power Spectral Density Measurement - Channel: 1, Data rate: 2 Mbps

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Date: 9.DEC.2007 13:14:44

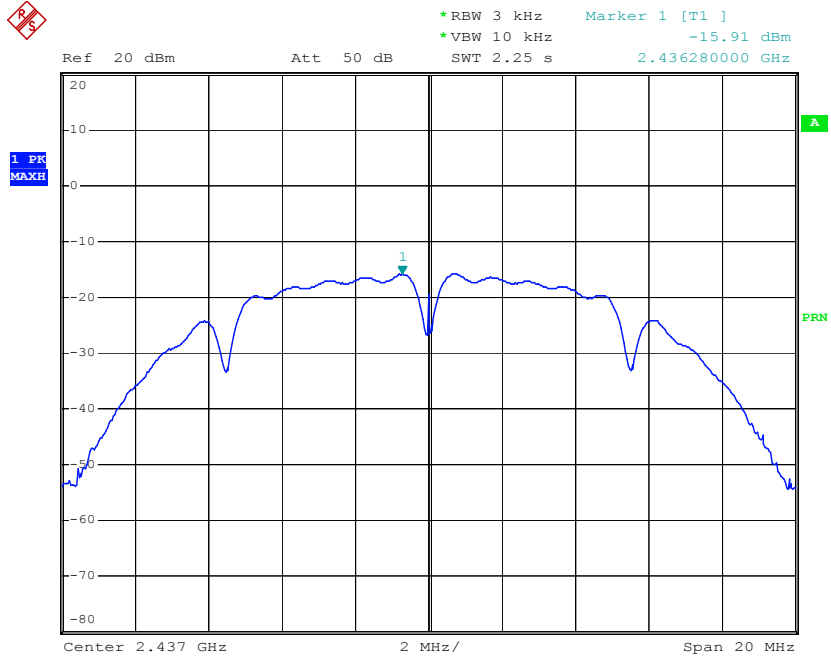
Power Spectral Density Measurement - Channel: 1, Data rate: 11 Mbps



Date: 9.DEC.2007 13:16:15

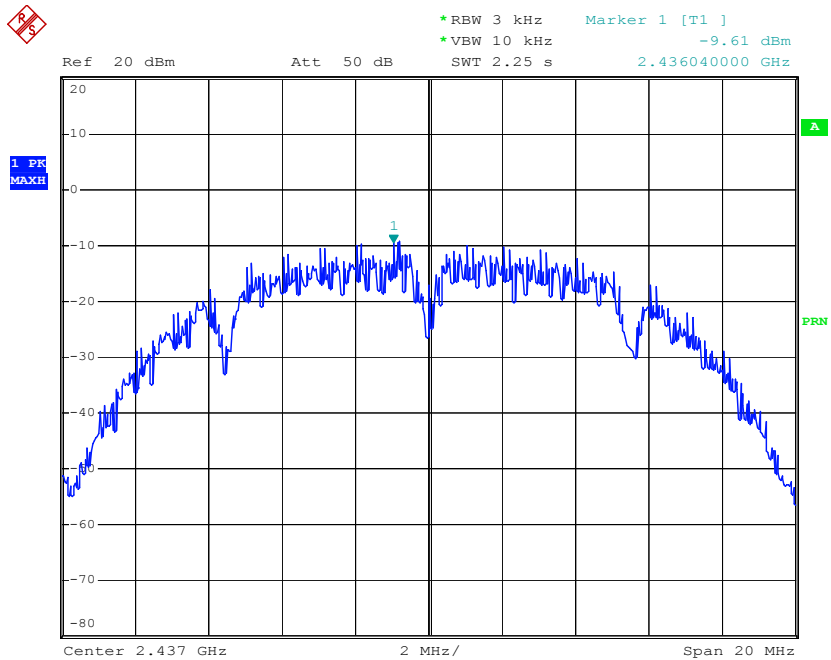
Power Spectral Density Measurement - Channel: 1, Data rate: 54 Mbps

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Date: 9.DEC.2007 13:17:22

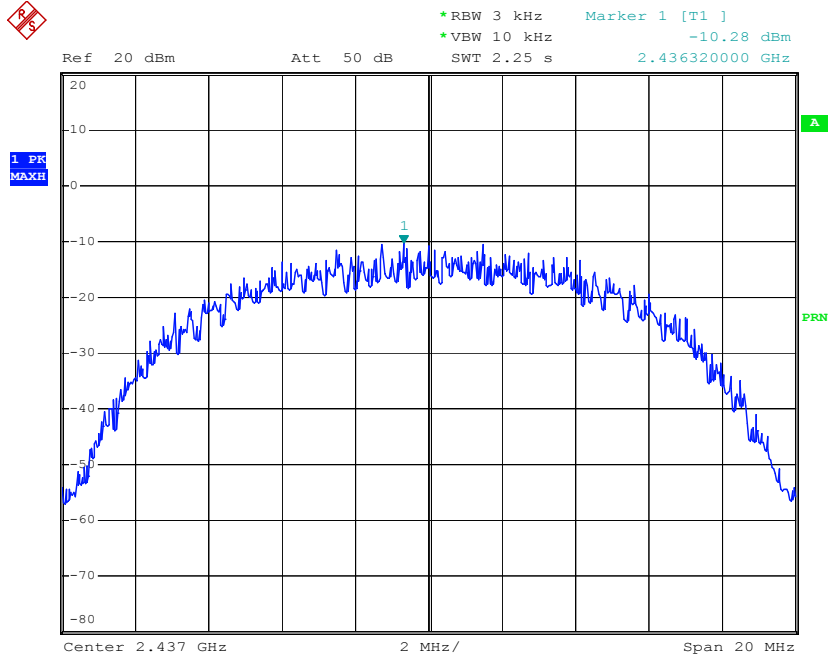
Power Spectral Density Measurement - Channel: 6, Data rate: 1 Mbps



Date: 9.DEC.2007 13:18:21

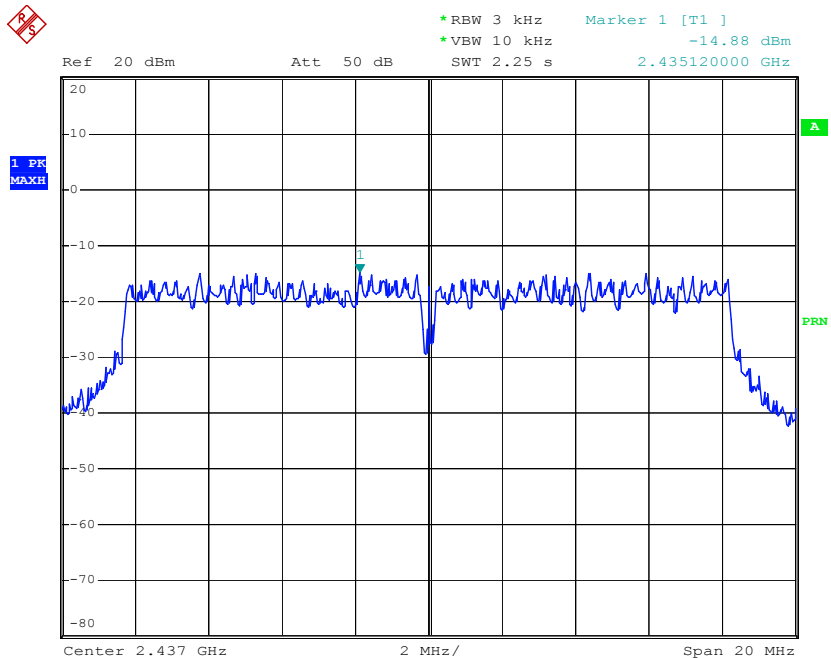
Power Spectral Density Measurement - Channel: 6, Data rate: 2 Mbps

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Date: 9.DEC.2007 13:19:19

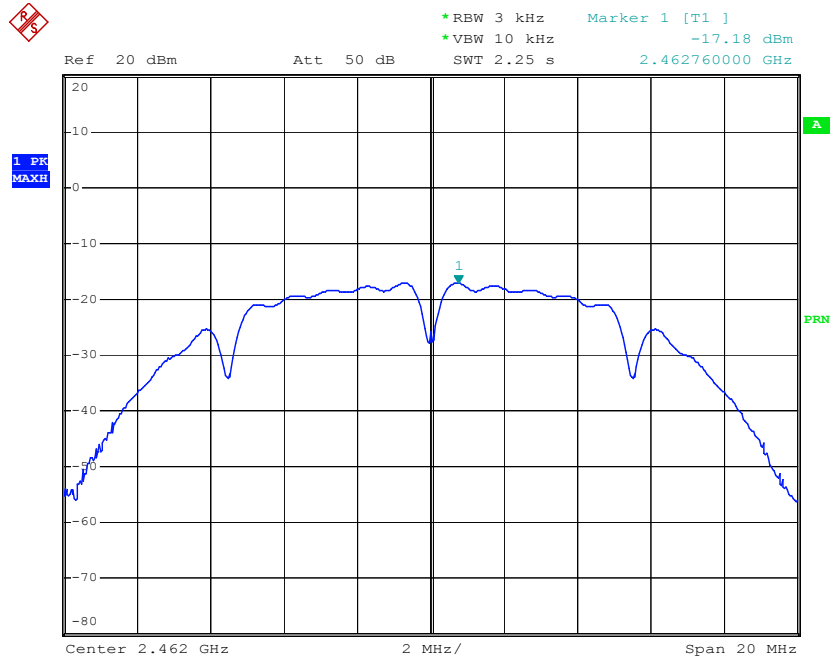
Power Spectral Density Measurement - Channel: 6, Data rate: 11 Mbps



Date: 9.DEC.2007 13:20:20

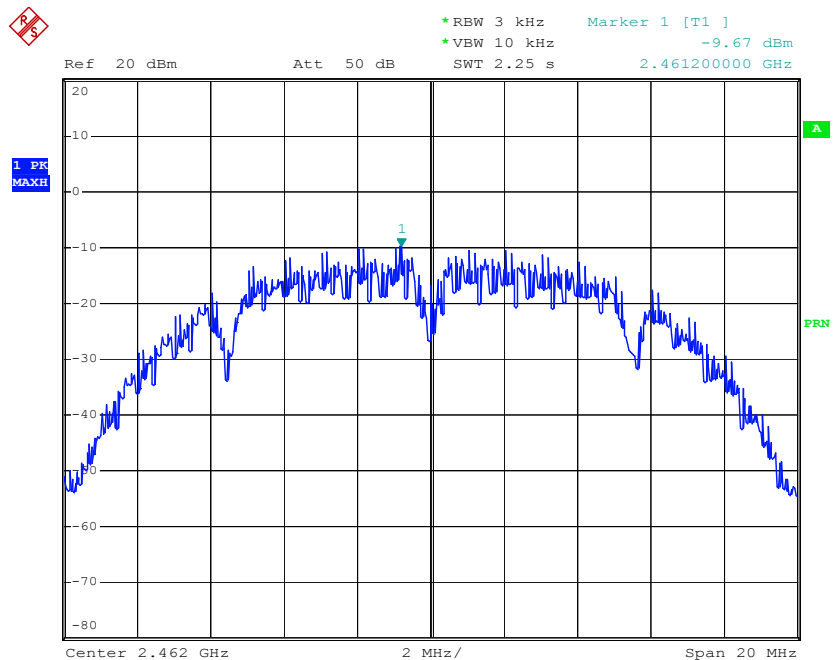
Power Spectral Density Measurement - Channel: 6, Data rate: 54 Mbps

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Date: 9.DEC.2007 13:21:38

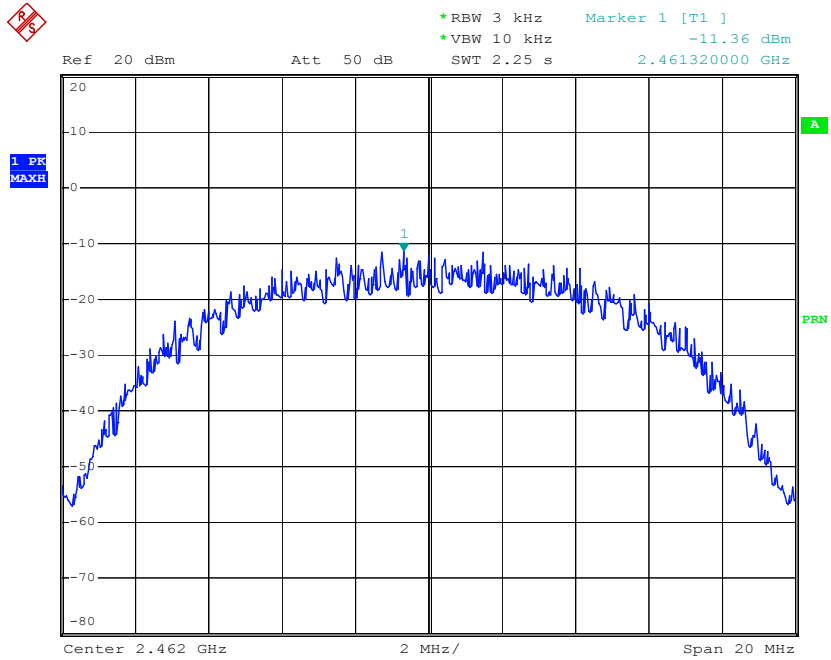
Power Spectral Density Measurement - Channel: 11, Data rate: 1 Mbps



Date: 9.DEC.2007 13:22:30

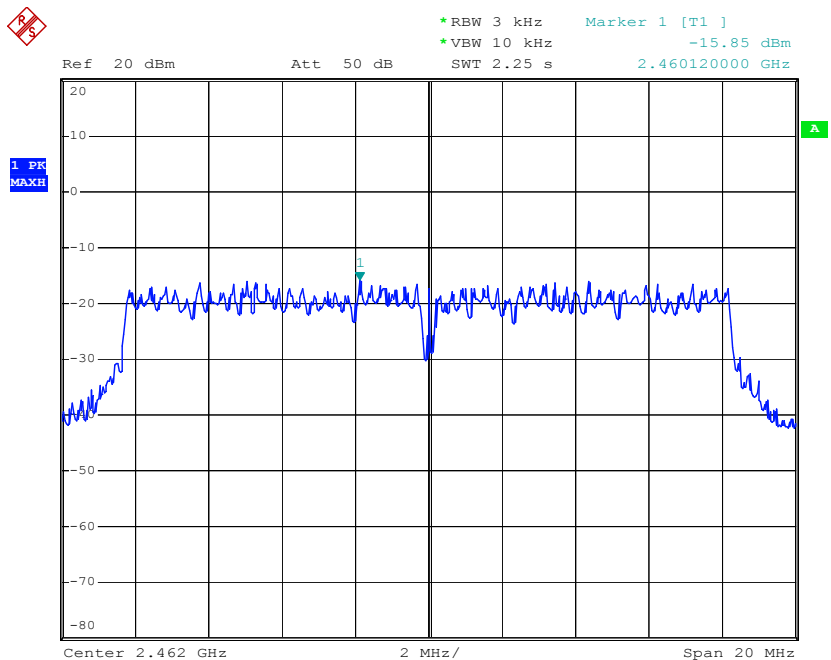
Power Spectral Density Measurement - Channel: 11, Data rate: 2 Mbps

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Date: 9.DEC.2007 13:23:21

Power Spectral Density Measurement - Channel: 11, Data rate: 11 Mbps



Date: 9.DEC.2007 13:24:20

Power Spectral Density Measurement - Channel: 11, Data rate: 54 Mbps

WiFi Transmission with RFID Transmission Mode
Radiated Spurious Emission Test
Section 15.209
RESULT:
Pass

Test Specification : FCC Part 15 Section 15.205, 15.209 & 15.247(d)
 Test Method : ANSI C63.4-2003
 Measurement Location : Semi Anechoic Chamber
 Supply Voltage : 14.8V battery
 Measuring Frequency Range : 9kHz (Covered the lowest internal oscillator frequency of 32.768kHz) – 25GHz (Up to 10th harmonic of the highest fundamental frequency)
 Measurement Distance : 10m for frequency <30MHz, 3m for frequency >30MHz.
 Detector : QP for frequency below 1GHz, Average for frequency above 1GHz
 Requirement : In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. Attenuation below the general limits specified in Sections 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a).

Test result:

RFID Channel	RFID Tx Profile	WiFi Tx Channel	Wifi Data Rate (Mbps)	Antenna Polarisation	Spurious Emission (MHz)	Emission Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)
0	0	1	11	V	73.256	30.6	43.52	-12.9
					179.849	38.9	#	#
					199.833	42.3	#	#
					206.494	40.1	#	#
					532.888	36.2	#	#
					599.500	35.1	#	#
					1598.600	47.6	53.98	-6.4
				1805.400	45.6	#	#	
				3610.000	48.5	53.98	-5.5	
				0	4	6	54	H
1805.400	46.9	#	#					
3616.900	43.3	53.98	-10.7					
V	73.257	31.1	43.52					-12.4
	179.849	39.3	#					#
	199.833	42.8	#	#				
0	4	6	54	V	206.494	40.2	#	#
					532.888	36.2	#	#
					599.499	35.2	#	#
				1598.000	48.0	53.98	-6.0	
				3611.000	49.7	53.98	-4.3	
				H	1598.000	48.3	53.98	-5.7
2813.000	35.1	53.98	-18.9					
3611.000	43.2	53.98	-10.8					

RFID Channel	RFID Tx Profile	WiFi Channel	Wifi Data Rate (Mbps)	Antenna Polarisation	Spurious Emission (MHz)	Emission Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)				
25	1	11	1	V	73.256	32.2	43.52	-11.3				
					179.849	40.3	#	#				
					199.833	42.6	#	#				
					206.509	39.9	#	#				
					532.888	36.2	#	#				
					599.499	35.4	#	#				
					1598.800	45.6	53.98	-8.4				
				1830.400	45.2	#	#					
				3661.000	51.0	53.98	-3.0					
				H	1598.900	47.0	53.98	-7.0				
					1830.400	48.5	#	#				
					2799.200	33.7	53.98	-20.3				
					3660.900	44.4	53.98	-9.6				
25	4	6	54	V	73.272	31.7	43.52	-11.8				
					179.849	40.1	#	#				
					199.833	42.8	#	#				
					206.479	40.2	#	#				
					532.888	36.4	#	#				
					599.499	35.7	#	#				
					1598.469	42.5	53.98	-11.5				
				1830.521	46.0	#	#					
				H	1598.585	47.9	53.98	-6.1				
					1830.521	47.8	#	#				
					2794.030	33.7	53.98	-20.3				
				49	4	6	54	V	73.256	30.9	43.52	-12.6
									179.849	39.1	#	#
199.833	42.8	#	#									
206.494	40.1	#	#									
532.888	36.3	#	#									
599.500	35.0	#	#									
1598.000	47.6	53.98	-6.4									
1854.000	48.4	#	#									
3708.000	49.4	53.98	-4.6									
H	1598.000	47.8	53.98					-6.2				
	1854.000	49.7	#					#				
	2805.000	34.4	53.98					-19.6				
49	5	6	2					V	3708.000	43.0	53.98	-11.0
				179.849	39.0	#	#					
				199.833	42.9	#	#					
				306.494	40.0	#	#					
				532.888	36.1	#	#					
				599.500	35.0	#	#					
				1598.900	46.9	53.98	-7.1					
				1854.500	48.6	#	#					
				3708.900	50.7	53.98	-3.3					
				H	1598.500	47.4	53.98	-6.6				
					1854.400	49.1	#	#				
					2793.500	34.1	53.98	-19.9				
									3709.100	43.7	53.98	-10.3

Spurious emissions that do not fall into the restricted band of Section 15.205.

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Limit of section 15.209:

Frequency of Emission (MHz)	Field Strength ($\mu\text{V/m}$)	Field Strength ($\text{dB}\mu\text{V/m}$)	Measurement Distance (m)
0.009-0.490	2400/F(kHz)	-	300
0.490-1.705	24000/F(kHz)	-	30
1.705-30	30	29.5*	30
30-88	100	40.0	3
88-216	150	43.52	3
216-960	200	46.0	3
Above 960	500	53.98	3

*The limit shows in the table above of frequency range 1.705MHz – 30MHz is correspond to $(29.5+9.5)=39.0\text{dB}\mu\text{V/m}$ at 10 meters measuring distance.

The emission limits show in the above table are based on measurement employing a CISPR quasi-peak detector and above 1000MHz are based on the measurement employing an average detector.

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PC Mode

Radiated Spurious Emission Test

Section 15.109(a)

RESULT:

Pass

Test Specification : FCC Part 15 Section 15.109
 Test Method : ANSI C63.4-2003
 Measurement Location : Semi Anechoic Chamber
 Supply Voltage : 14.8V battery
 Measuring Frequency Range : 30MHz– 2GHz
 Measuring Distance : 3m
 Detector : QP for frequency below 1GHz, Average for frequency above 1GHz

Test Result:

Antenna Polarisation	Spurious Emission (MHz)	Emission Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)
V	106.577	36.1	43.52	-7.4
	113.239	36.3	43.52	-7.2
	119.900	36.4	43.52	-7.1
	213.156	30.1	43.52	-13.4
	266.444	33.2	46.0	-12.8
	466.277	35.7	46.0	-10.3
	599.500	37.3	46.0	-8.7
	799.334	40.1	46.0	-5.9
H	799.334	40.5	46.0	-5.5

Limit of section 15.109:

Frequency of Emission (MHz)	Field Strength (µV/m)	Field Strength (dBµV/m)
30-88	100	40.0
88-216	150	43.52
216-960	200	46.0
Above 960	500	53.98