TEST REPORT

of

FCC Part 15 Subpart B&C §15.247/RSS-210 Issue 7, RSS-Gen Issue 2
(Class II Permissive Change)

FCC ID/IC Certification: VQF-RT3090-1T1R/7542A-RT30901T1R

Equipment Under Test	:	11b/g/n 1T1R WALN Mini Card
Model Name	:	RT3090
Serial No.	:	N/A
Applicant	:	Ralink Technology Corporation
Manufacturer	:	Ralink Technology Corporation
Date of Test(s)	:	2009-09-10 ~ 2009-09-18
Date of Issue	:	2009-09-22

In the configuration tested, the EUT complied with the standards specified above.

Tested By: **Date** **2009-09-22**

Feel Jeong

Approved By **Date** **2009-09-22**

Charles Kim

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1. General Information

1.1. Testing Laboratory

SGS Testing Korea Co., Ltd.
- 705, Dongchun-Dong Sooji-Gu, Yongin-Shi, Kyungki-Do, South Korea.
www.electrolab.kr.sgs.com
Telephone : +82 +31 428 5700
FAX : +82 +31 427 2371

1.2. Details of Applicant

Applicant : Ralink Technology Corporation
Address : 5F., No.36. Taiyuan St., Jhubei City, Hsinchu County 302, Taiwan, R.O.C.
Contact Person : Daniel Kang
Phone No. : +886-3-5600868
Fax No. : +886-3-5600818

1.3. Description of EUT

Kind of Product	11b/g/n 1T1R WALN Mini Card
Model Name	RT3090
Serial Number	N/A
Power Supply	DC 3.3 V
WLAN Module FCC	VQF-RT3090-1T1R
WLAN Module IC	7542A-RT30901T1R
Frequency Range	2412 MHz ~ 2462 MHz (11b/g/n_20MHz BW) 2422 MHz ~ 2452 MHz(11n_40MHz BW)
Modulation Technique	11b : DSSS (CCK, BPSK, QPSK), 11g/n : OFDM (BPSK, QPSK, 16QAM, 64QAM)
Number of Channels	11b(11), 11g(11).11n_20 MHz BW(11), 11n_40 MHz BW(7)
Type of Antenna	Connector type(PCB antenna)

1.3-1. Description of Host

Kind of Product	Notebook PC
Model Name	LGX12
Serial Number	DMST090825-YKM02
Power Supply	AC 110 V(Battery : DC 10.8 V)

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1.4. Test Equipment List

EQUIPMENT	MANUFACTURER	MODEL	CAL DUE.
Signal Generator	Rohde & Schwarz	SMR40	Jan. 21, 2010
Spectrum Analyzer	Rohde & Schwarz	FSV30	Oct. 01, 2009
Attenuator	Agilent	8498A	Oct. 01, 2009
Preamplifier	H.P	8447F	Jul. 02, 2010
Preamplifier	Agilent	8449B	Apr. 01, 2010
High Pass Filter	Wainwright	WHK3.0/18G-10SS	Oct. 01, 2009
Test Receiver	R & S	ESVS10	Jan. 17, 2010
Bilog Antenna	Schwarzbeck Mess-Elektronik	VULB9163	Jul. 22, 2010
Horn Antenna	R & S	HF 906	Nov. 13, 2009
Horn Antenna	Schwarzbeck Mess-Elektronik	BBHA9170	Jun. 16, 2010
Anechoic Chamber	SY Corporation	L × W × H (9.6 m×6.4 m×6.6 m)	Jan. 31, 2010
Two-Line V-Network	R & S	ENV216	Jan. 07, 2010
Test Receiver	R & S	ESHS10	Jul. 13, 2010
Anechoic Chamber	SY Corporation	L x W x H (6.5 m x 3.5 m x 3.5 m)	N.C.R

▶ Support equipment

Description	Manufacturer	Model	Serial Number
LCD Monitor	Samsung Electronics	CR22KS	N843H1KP902165L
USB Keyboard	Microsoft	KU-0459	7691402003981
USB MOUSE	Microsoft	Basic Optical Mouse 1.0A USB/PS2 Compatible	N / A
MIC/HEADPHONE	Fusion FNC	FS-990	8809145212242
Wireless LAN Access Point	Texas Instruments	TNETWA622	8399

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1.5. Summary of Test Results

The EUT has been tested according to the following specifications:

APPLIED STANDARD:FCC Part15, RSS-210,RSS-Gen			
Section in FCC 15	**Section in RSS-210 RSS-Gen**	**Test Item**	**Result**
15.207	RSS-Gen 7.2.2	Transmitter AC Power Line Conducted Emission	Complied
15.107	RSS-Gen 7.2.2	Receiver AC Power Line Conducted Emission	Complied
15.247(b)(3)	A8.4	Maximum Peak Output Power	Complied
15.205(a) 15.209 15.247(d)	A8.5	Transmitter Radiated Spurious Emissions	Complied
15.109(a)	RSS-Gen 6	Receiver Radiated Spurious Emission	Complied

1.6 Test report revision

Revision	Report number	Description
0	F690501/RF-RTL003353	Initial
1	F690501/RF-RTL003353-1	Add description 802.11b/g/n 1T1R WLAN Mini Card

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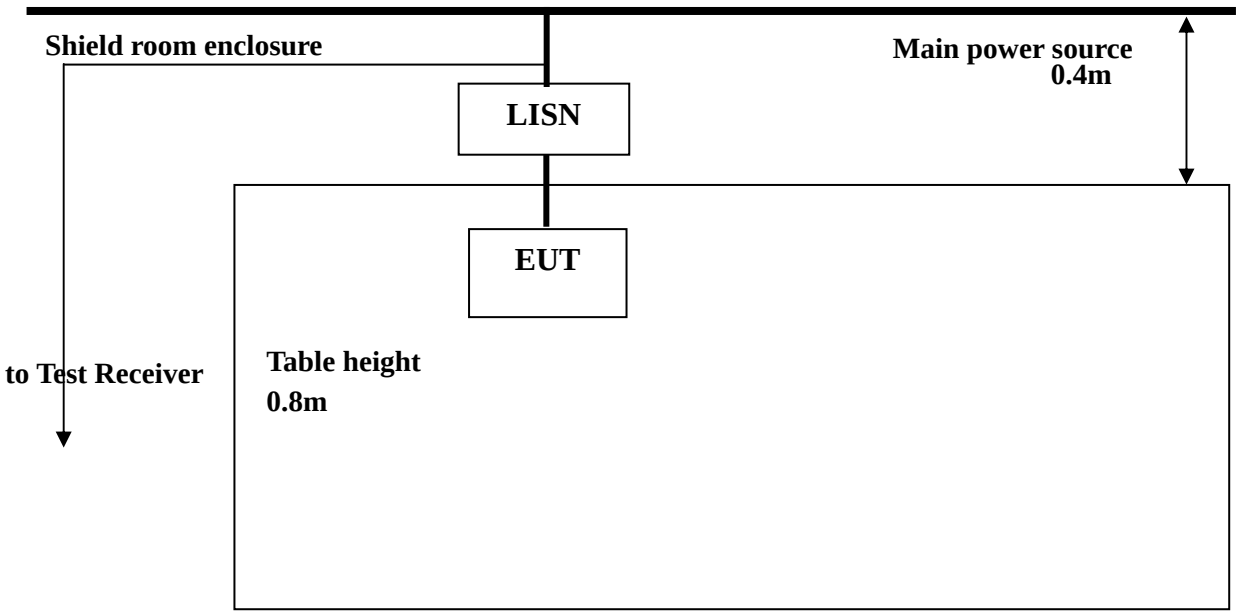
2. Transmitter AC Power Line Conducted Emission

2.1. Test Setup



2.2. Limit

According to §15.207(a) for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 uH/50 ohm line impedance stabilization network(LISN).
Compliance with the provision of this paragraph shall on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower applies at the boundary between the frequency ranges.

Frequency of Emission (MHz)	Conducted limit (dBμV)	
	Quasi-peak	Average
0.15 – 0.50	66-56*	56-46*
0.50 – 5.00	56	46
5.00 – 30.0	60	50

* Decreases with the logarithm of the frequency.

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2.3. Test Procedures

Radiated emissions from the EUT were measured according to the dictates of ANSI C63.4:2003

1. The test procedure is performed in a 6.5m × 3.6m× 3.6m (L×W×H) shielded room. The EUT along with its peripherals were placed on a 1.0m(W)× 1.5m(L) and 0.8m in height wooden table and the EUT was adjusted to maintain a 0.4 meter space from a vertical reference plane.
2. The EUT was connected to power mains through a line impedance stabilization network (LISN) which provides 50 ohm coupling impedance for measuring instrument and the chassis ground was bounded to the horizontal ground plane of shielded room.
3. All peripherals were connected to the second LISN and the chassis ground also bounded to the horizontal ground plane of shielded room.
4. The excess power cable between the EUT and the LISN was bundled. The power cables of peripherals were unbundled. All connecting cables of EUT and peripherals were moved to find the maximum emission.

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2.4. Test Results (Worst case configuration_DSSS:802.11b)

The following table shows the highest levels of conducted emissions on both phase of Hot and Neutral line.

Ambient temperature : 24 ℃
Relative humidity : 47 % R.H.

Frequency range : 0.15 MHz – 30 MHz
Measured Bandwidth : 9 kHz

FREQ.	LEVEL(dBuV)		LINE	LIMIT(dBuV)		MARGIN(dB)	
(MHz)	Q-Peak	Average		Q-Peak	Average	Q-Peak	Average
0.15	51.10	31.20	H	66.00	56.00	14.90	24.80
0.17	46.40	25.30	H	64.96	54.96	18.56	29.66
0.20	40.60	20.50	H	63.61	53.61	23.01	33.11
11.84	28.50	21.50	H	60.00	50.00	31.50	28.50
12.59	35.20	29.60	H	60.00	50.00	24.80	20.40
13.13	33.20	28.50	H	60.00	50.00	26.80	21.50
0.15	45.50	28.50	N	66.00	56.00	20.50	27.50
0.17	42.40	26.40	N	64.96	54.96	22.56	28.56
0.20	37.20	22.50	N	63.61	53.61	26.41	31.11
11.84	28.90	20.20	N	60.00	50.00	31.10	29.80
12.59	31.80	25.50	N	60.00	50.00	28.20	24.50
13.13	30.10	24.30	N	60.00	50.00	29.90	25.70

Note ;
Line (H) : Hot
Line (N) : Neutral

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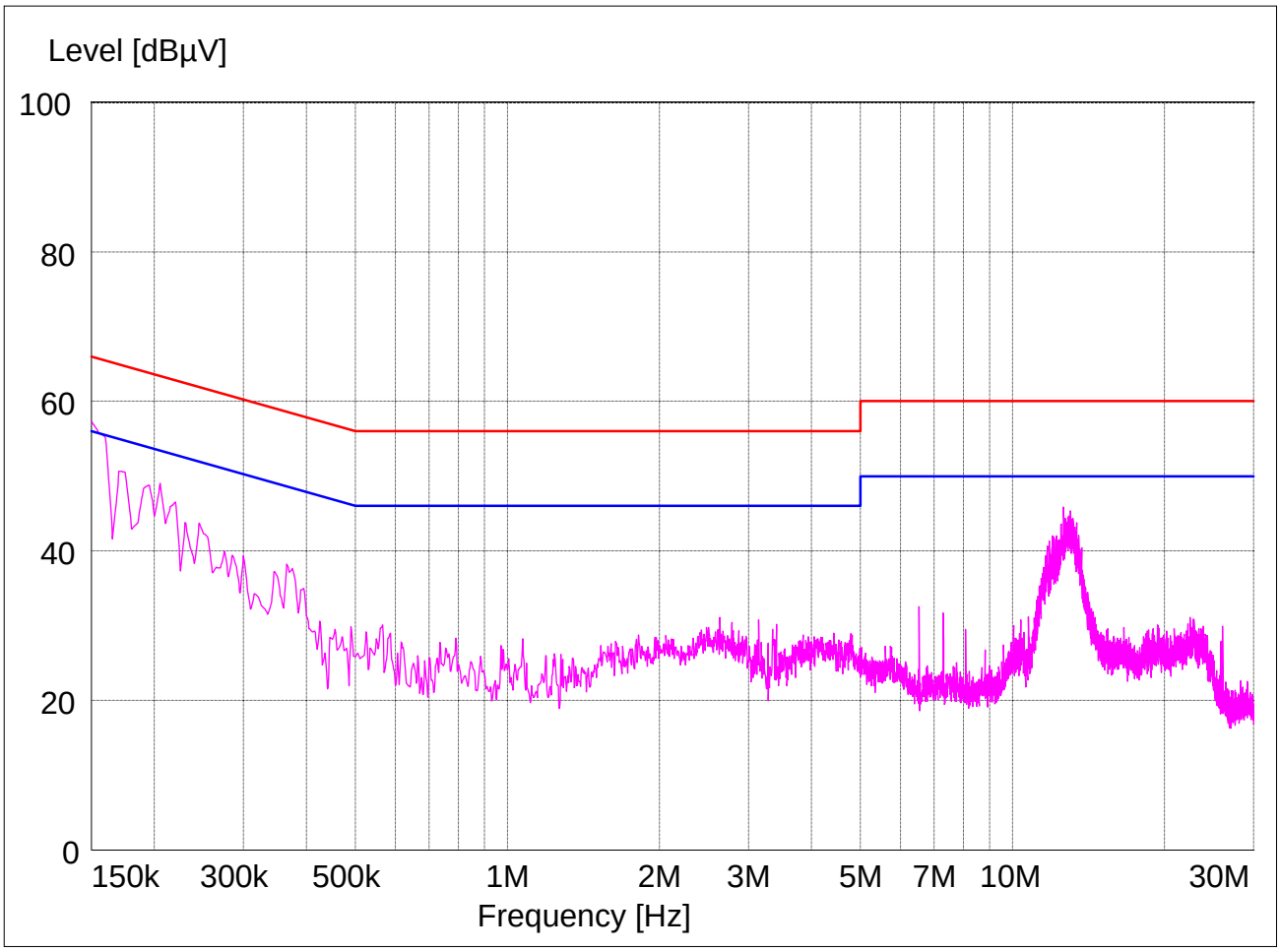
Plot of Conducted Power line

Test mode : (Hot)



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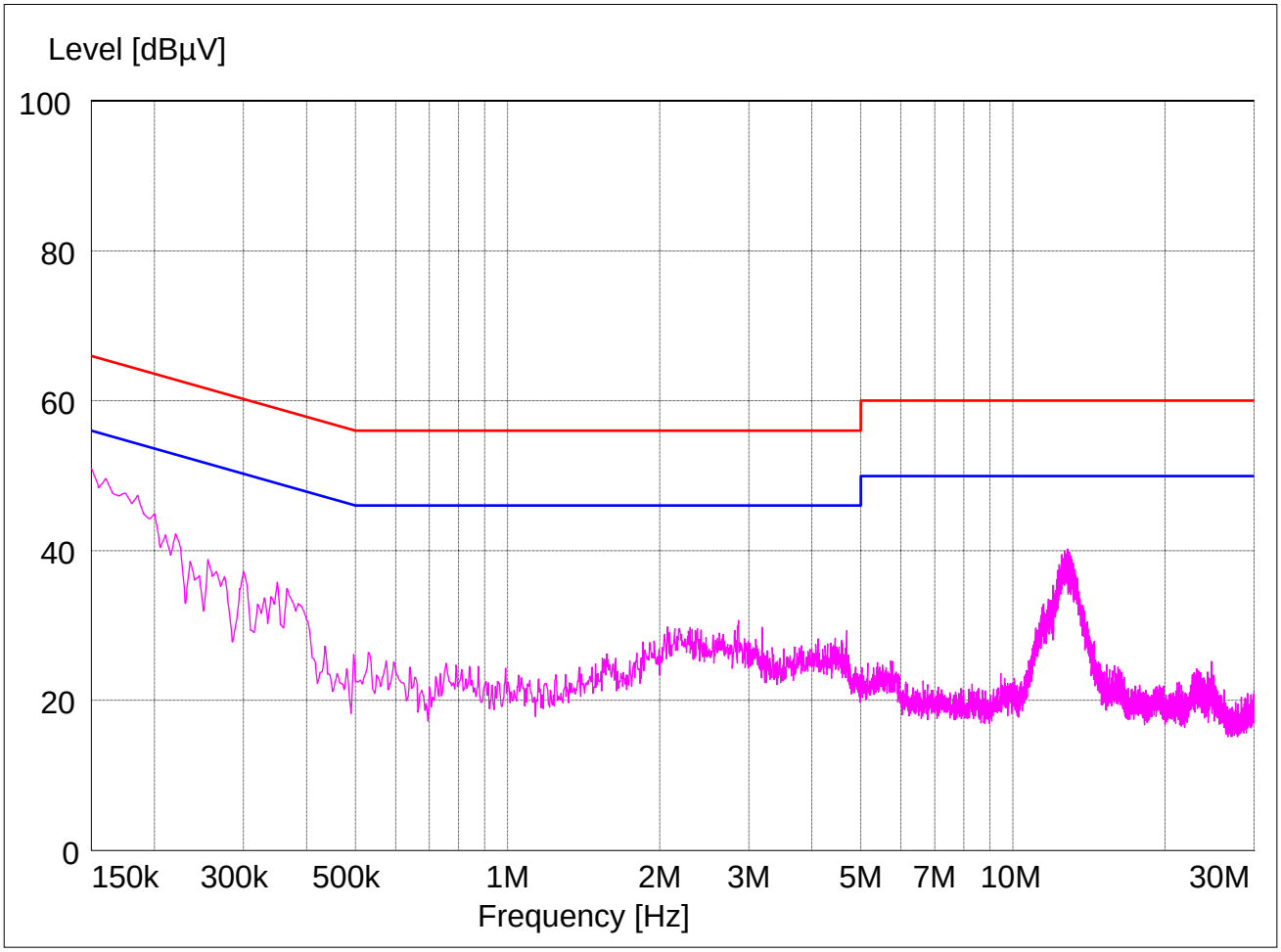
Test mode : (Neutral)



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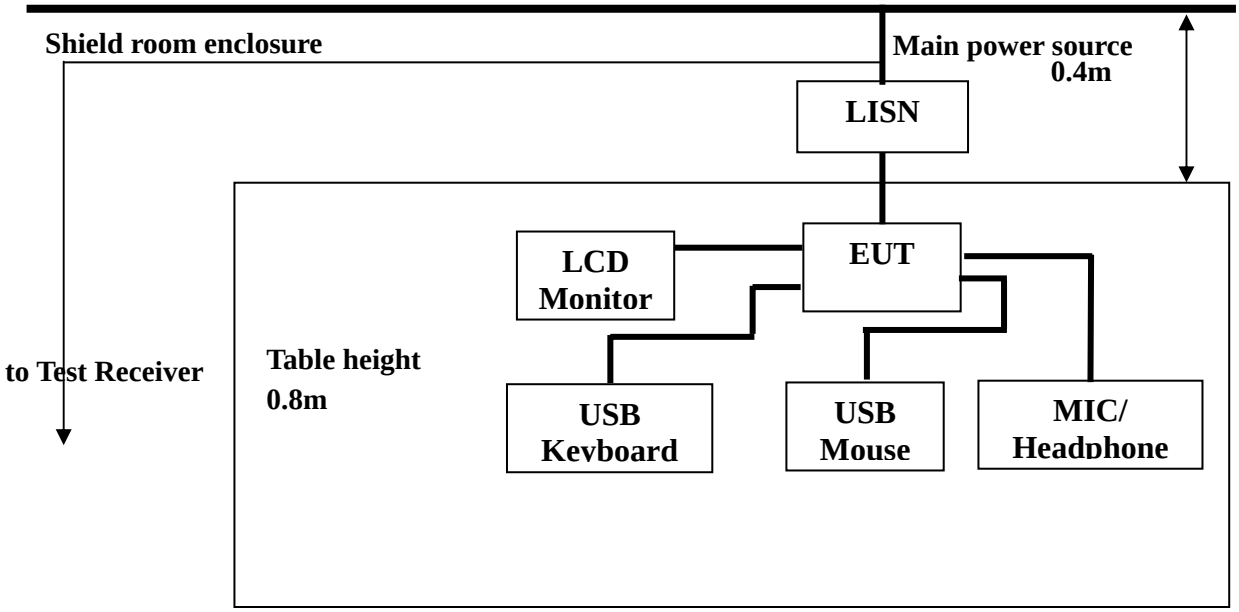
3. Receiver AC Power Line Conducted Emission

3.1. Test Setup



3.2. Limit

According to §15.107(a) Except for Class A digital devices, for equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the band edges.

Frequency of Emission (MHz)	Conducted limit (dBμV)	
	Quasi-peak	Average
0.15 – 0.50	66-56*	56-46*
0.50 – 5.00	56	46
5.00 – 30.0	60	50

* Decreases with the logarithm of the frequency.

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3.3. Test Procedures- Same as clause 2.3.

3.4. Test Results

The following table shows the highest levels of conducted emissions on both phase of Hot and Neutral line;
Addition,

Ambient temperature : 24 ℃
Relative humidity : 47 % R.H.

Frequency range : 0.15 MHz – 30 MHz
Measured Bandwidth : 9 kHz

FREQ.	LEVEL(dBuV)		LINE	LIMIT(dBuV)		MARGIN(dB)	
(MHz)	Q-Peak	Average		Q-Peak	Average	Q-Peak	Average
0.16	44.20	25.40	H	65.46	55.46	21.26	30.06
0.18	41.20	21.30	H	64.49	54.49	23.29	33.19
0.36	29.70	19.30	H	58.73	48.73	29.03	29.43
10.99	22.40	16.40	H	60.00	50.00	37.60	33.60
12.32	32.50	26.50	H	60.00	50.00	27.50	23.50
12.95	16.30	13.20	H	60.00	50.00	43.70	36.80
0.16	44.20	26.50	N	65.46	55.46	21.26	28.96
0.18	42.60	24.10	N	64.49	54.49	21.89	30.39
0.36	28.50	18.70	N	58.73	48.73	30.23	30.03
10.99	22.50	16.50	N	60.00	50.00	37.50	33.50
12.32	31.90	22.50	N	60.00	50.00	28.10	27.50
12.95	35.60	28.20	N	60.00	50.00	24.40	21.80

Note ;
Line (H) : Hot
Line (N) : Neutral

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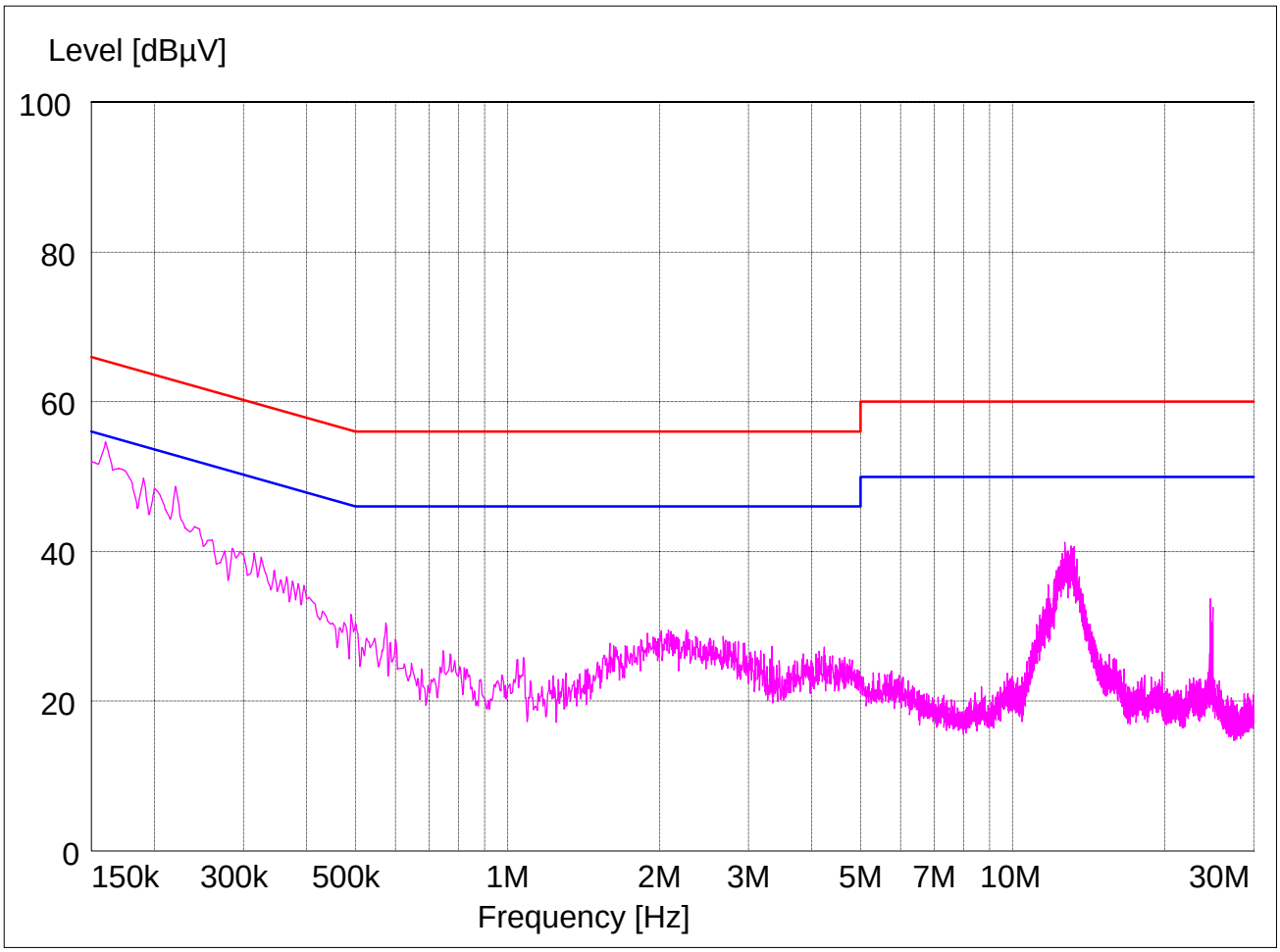
Plot of Conducted Power line

Test mode : (Hot)



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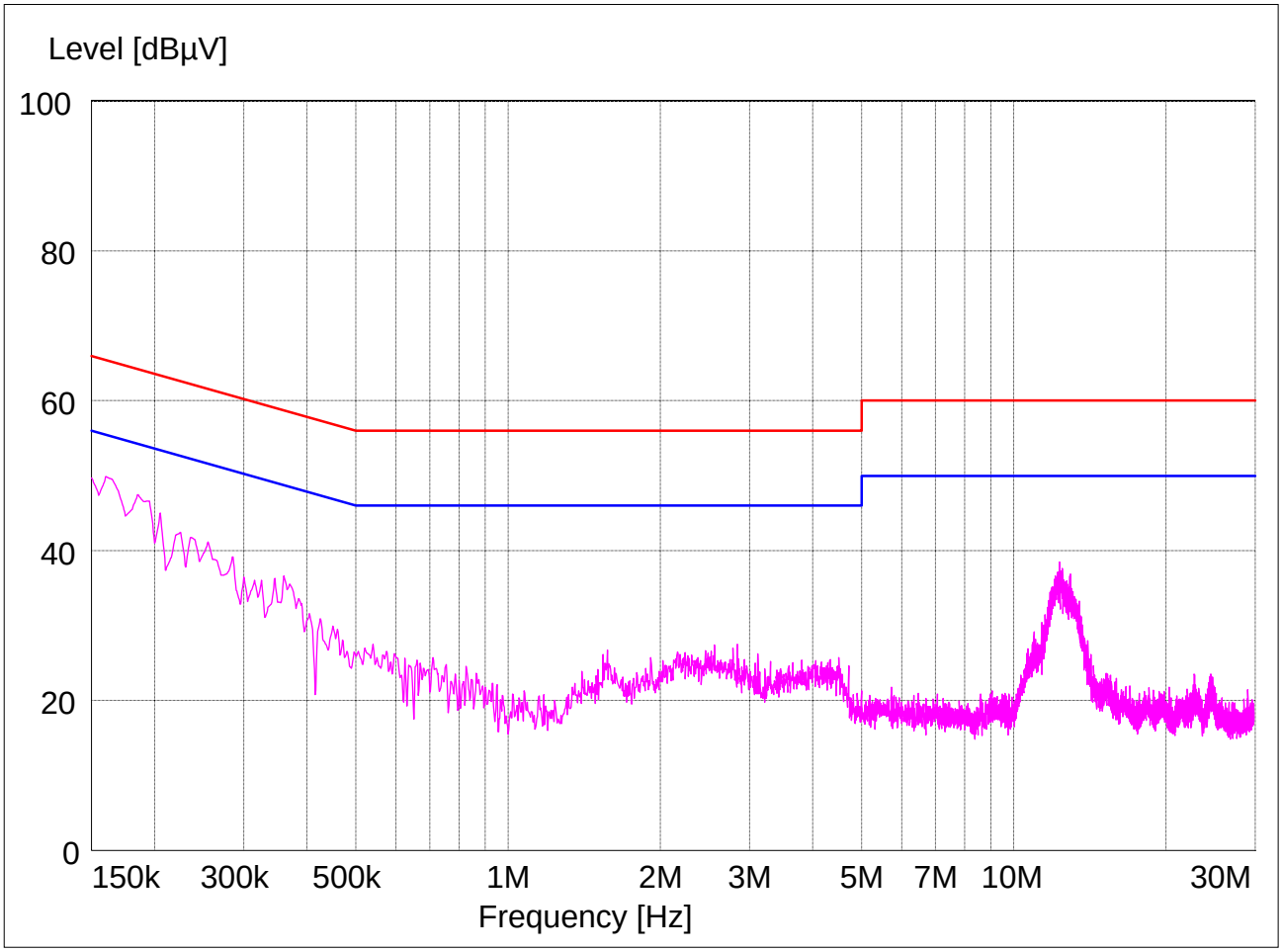
Test mode : (Neutral)



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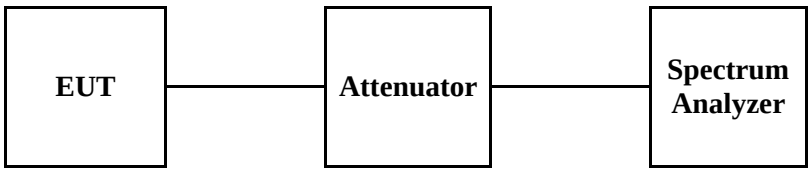
4. Maximum Peak Output Power Measurement

4.1. Test Setup



4.2. Limit

According to §15.247(b)(3), for systems using digital modulation in the 902 ~ 928 MHz, 2400 ~2483.5 MHz, and 5725 ~ 5850 MHz band: 1 Watt. As an alternative to a peak power measurement, compliance with the one watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antenna elements. The average must not include any intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.
According to §15.247(b)(4), the conducted output power limit specified in paragraph(b) of this section is based on the use of antenna with directional gains that do not exceed 6 dBi. Except as shown in paragraph(c) of this section, if transmitting antenna of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraph (b)(1), (b)(2), and (b)(3) of this section , as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6dBi.

4.3. Test Procedure

1. Place the EUT on the table and set it in the transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set the Spectrum analyzer as RBW = 1 MHz, VBW = 3 MHz, Span = Auto, Channel BW = 99%.

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4.4. Test Results

Ambient temperature : 21 ℃
Relative humidity : 48 % R.H.

IEEE 802.11b

Channel	Frequency (MHz)	Output power (dBm)	Limit (dBm)	Margin (dB)
Low	2412	19.04	30	10.96
Middle	2437	20.85		9.15
High	2462	19.74		10.26

IEEE 802.11g

Channel	Frequency (MHz)	Output power (dBm)	Limit (dBm)	Margin (dB)
Low	2412	17.55	30	12.45
Middle	2437	19.30		10.70
High	2462	19.13		10.87

IEEE 802.11n_MCS0 20 MHz

Channel	Frequency (MHz)	Output power (dBm)	Limit (dBm)	Margin (dB)
Low	2412	19.98	30	10.02
Middle	2437	19.76		10.24
High	2462	19.54		10.46

IEEE 802.11n_MCS0 40 MHz

Channel	Frequency (MHz)	Output power (dBm)	Limit (dBm)	Margin (dB)
Low	2422	17.97	30	12.03
Middle	2437	18.73		11.27
High	2452	18.39		11.61

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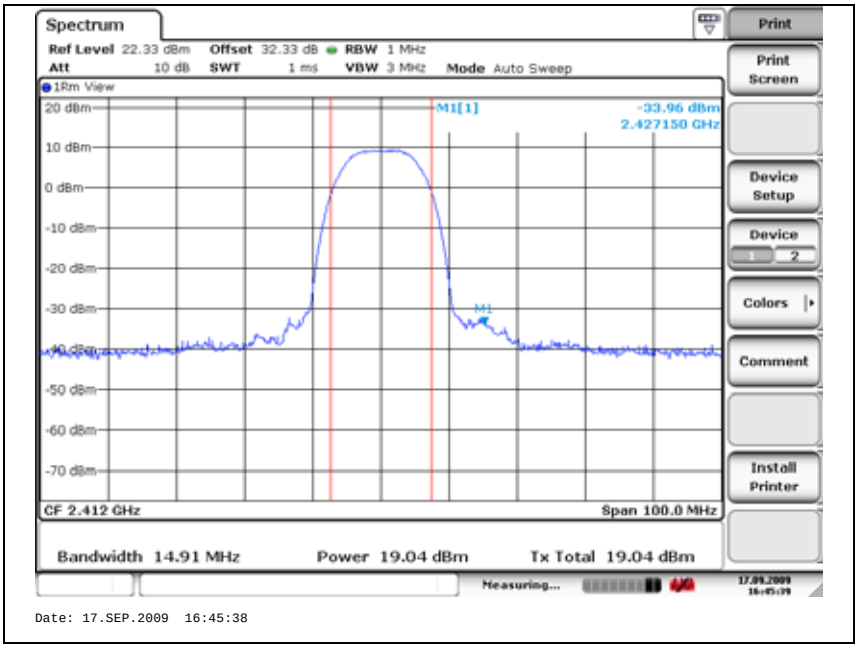
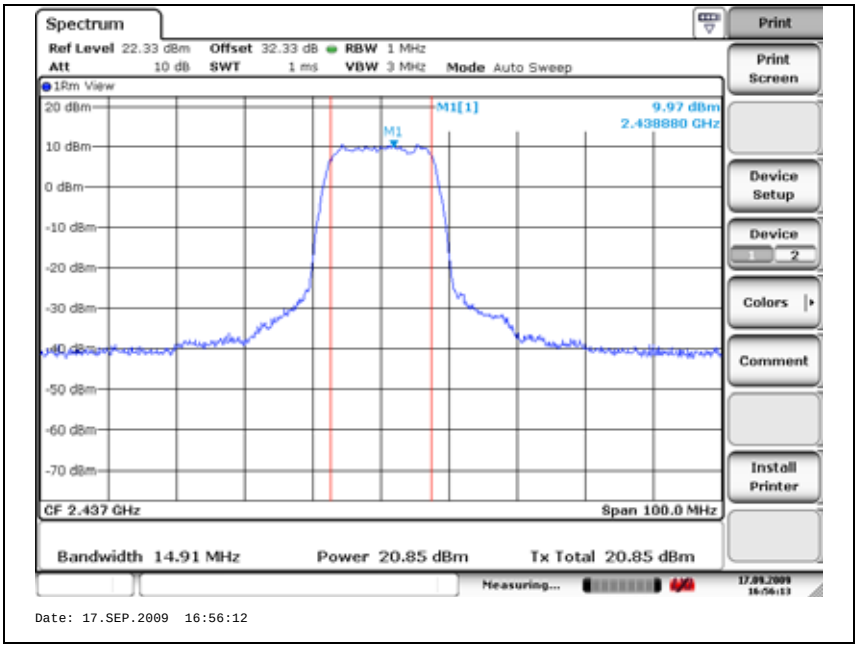
IEEE 802.11b

Low Channel



Middle Channel



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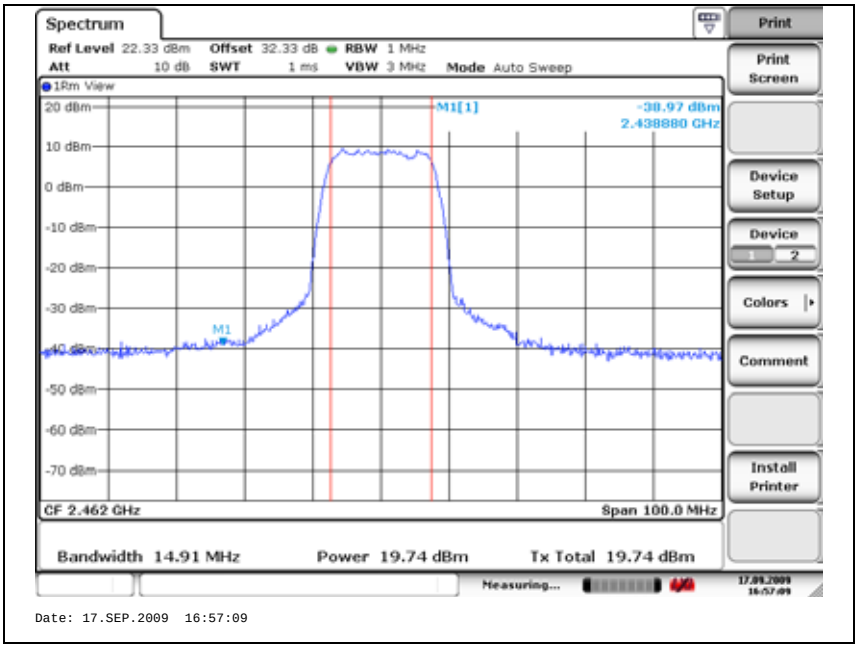
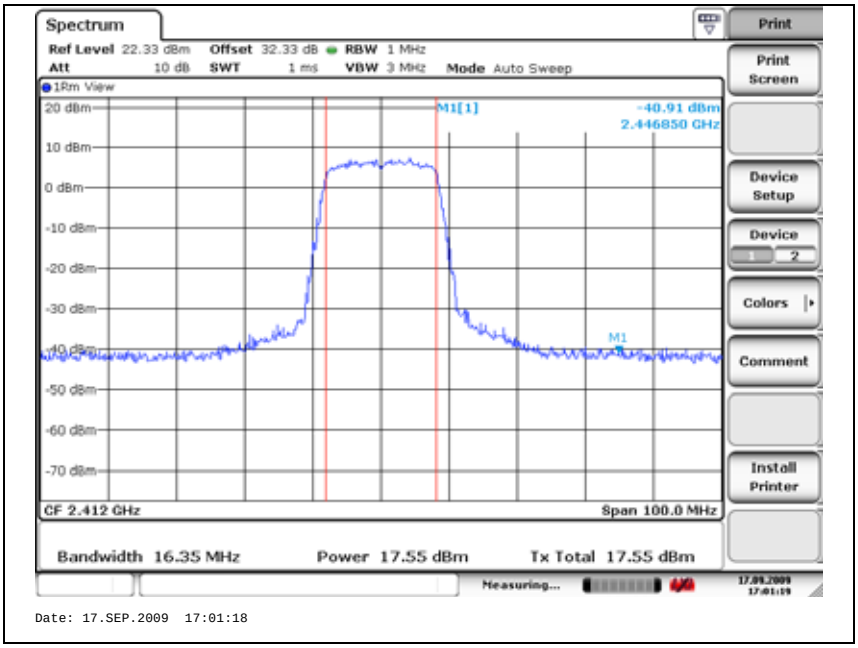
High Channel

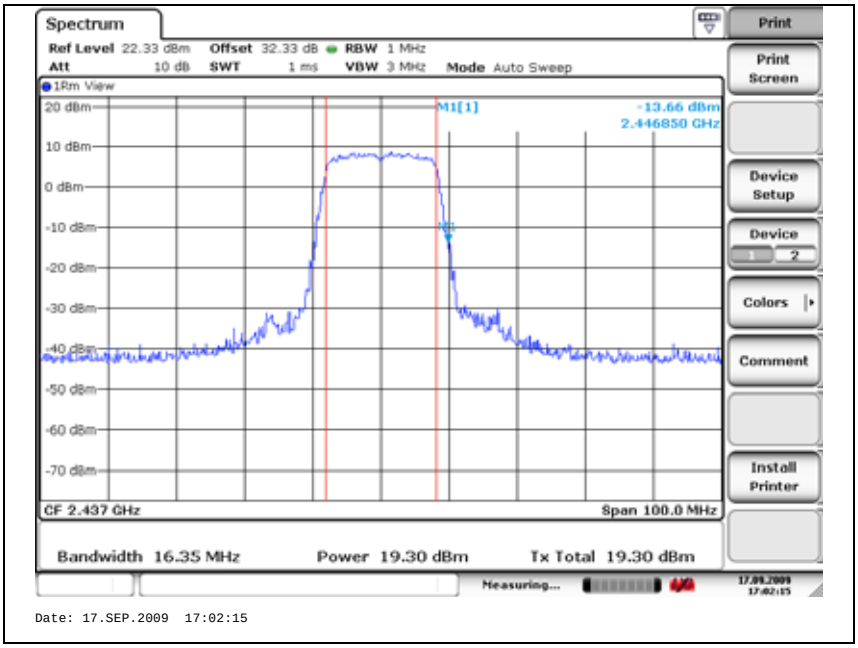


IEEE 802.11g

Low Channel



Middle Channel



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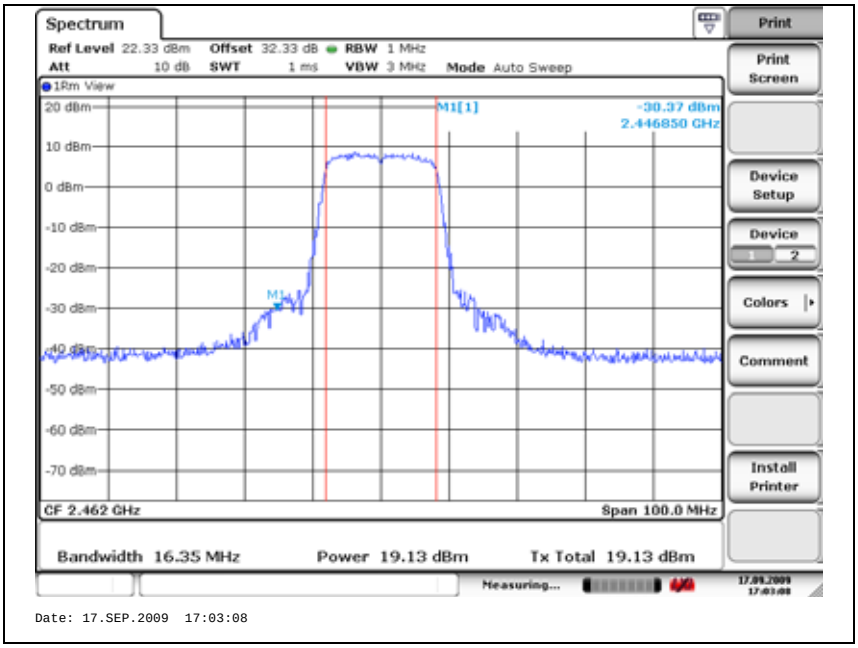
High Channel



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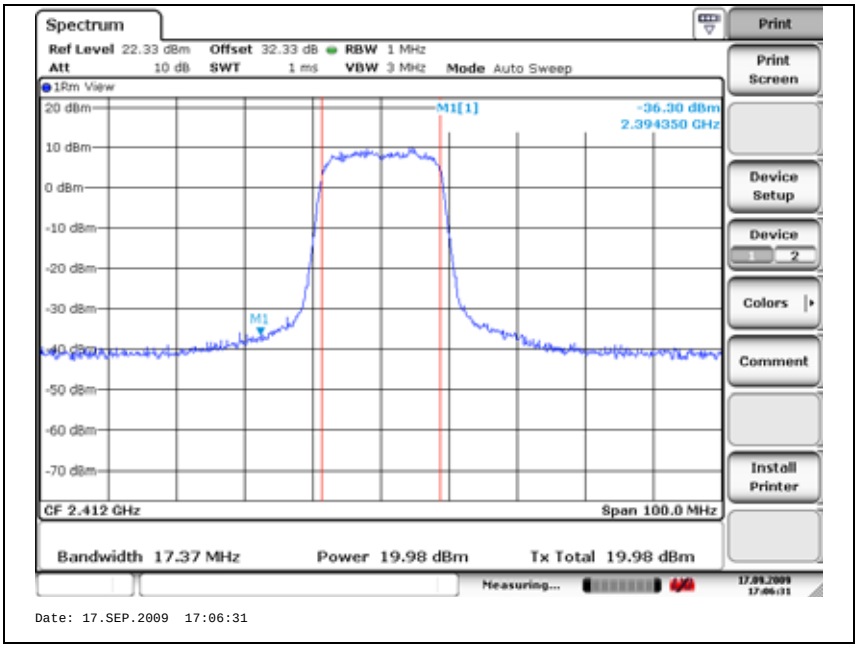
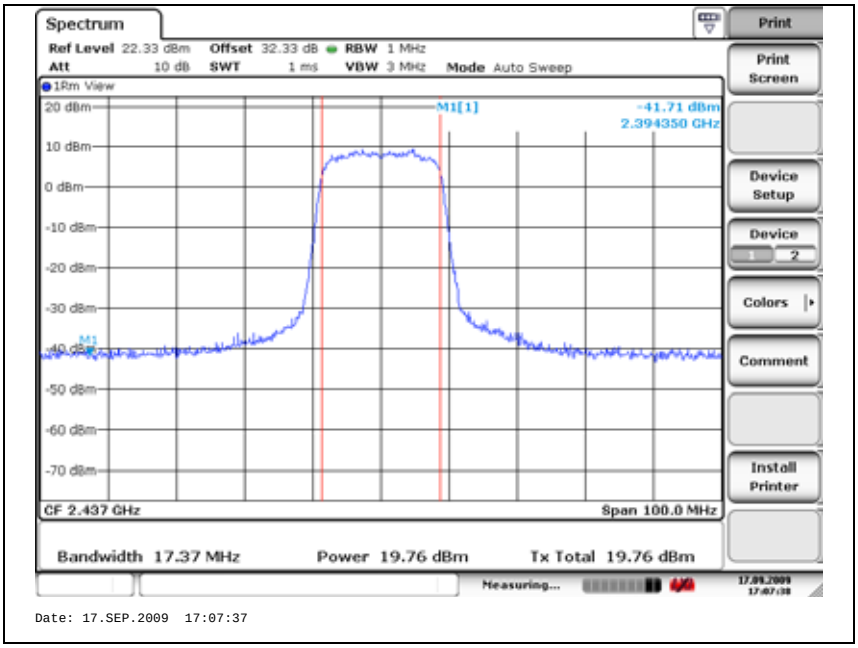
IEEE 802.11n MCS0 20 MHz

Low Channel



Middle Channel



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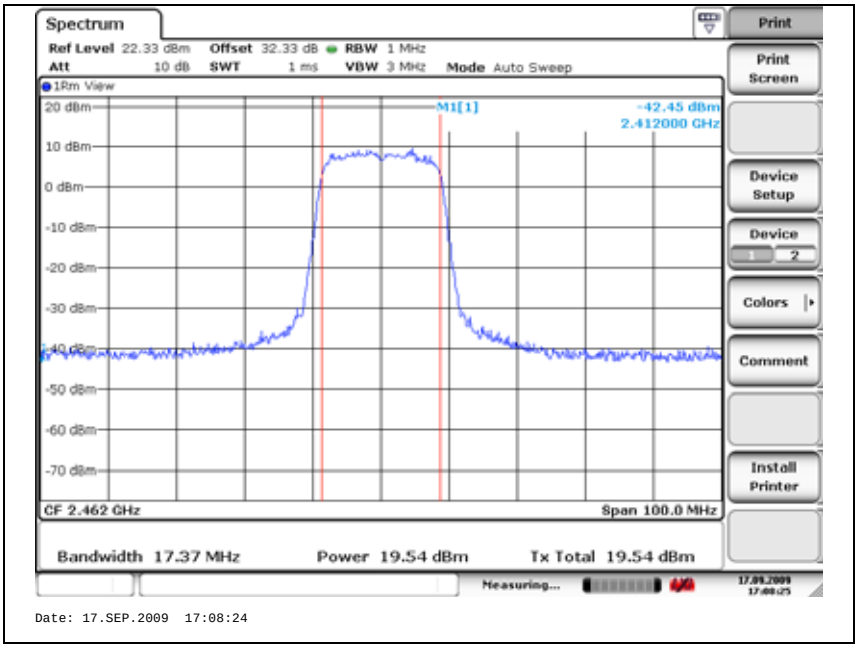
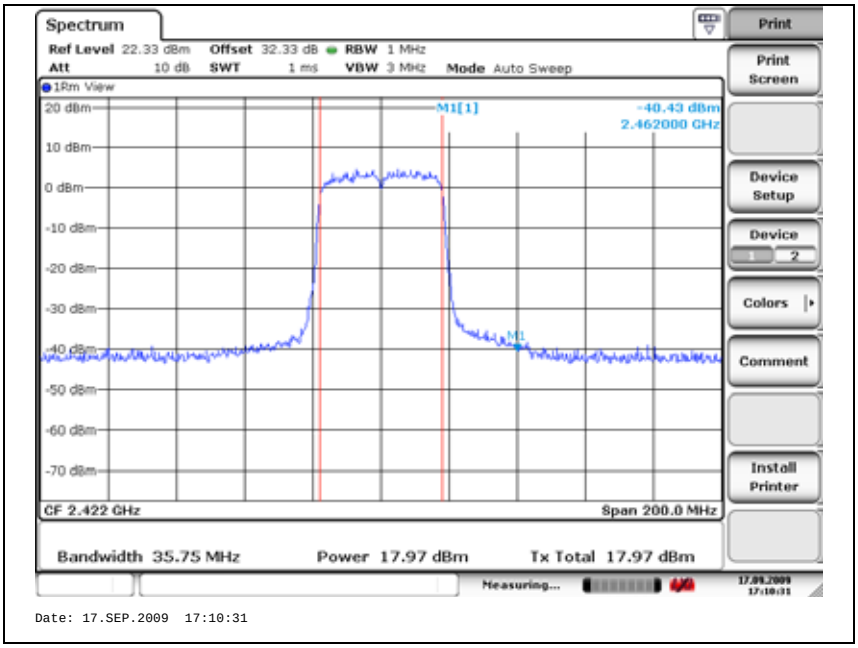
High Channel

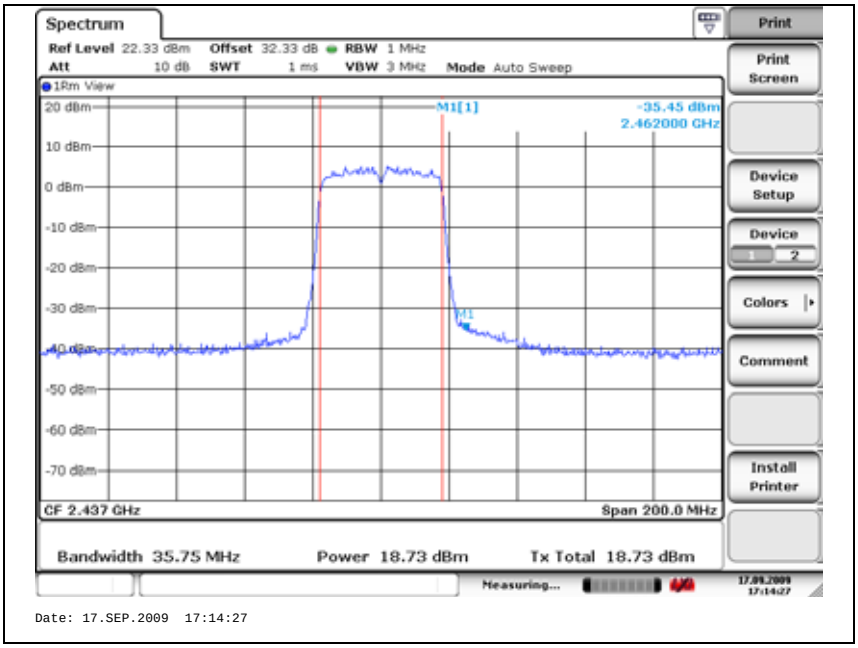


IEEE 802.11n MCS0 40 MHz

Low Channel



Middle Channel



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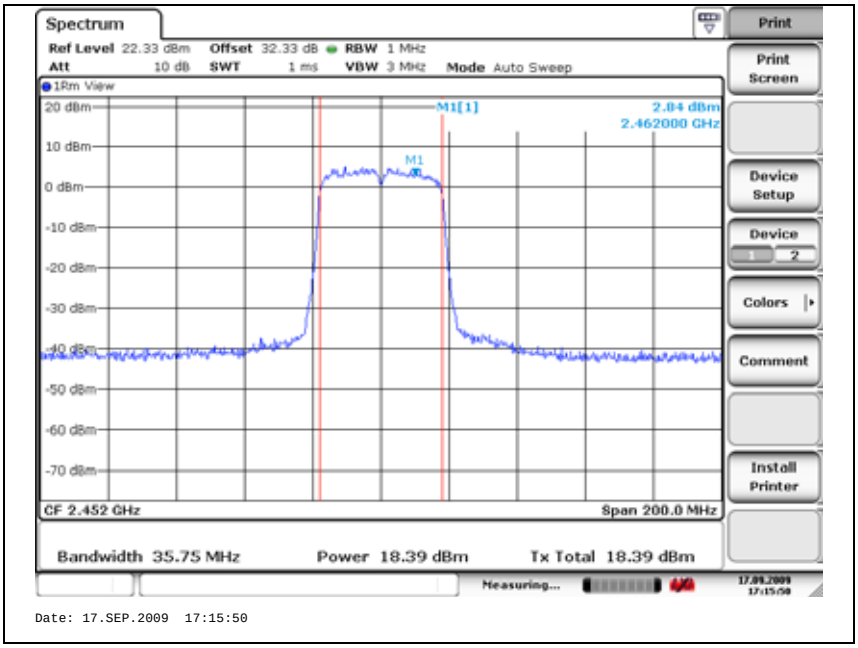
SGS Testing Korea Co., Ltd.

www.electrolab.kr.sgs.com

High Channel

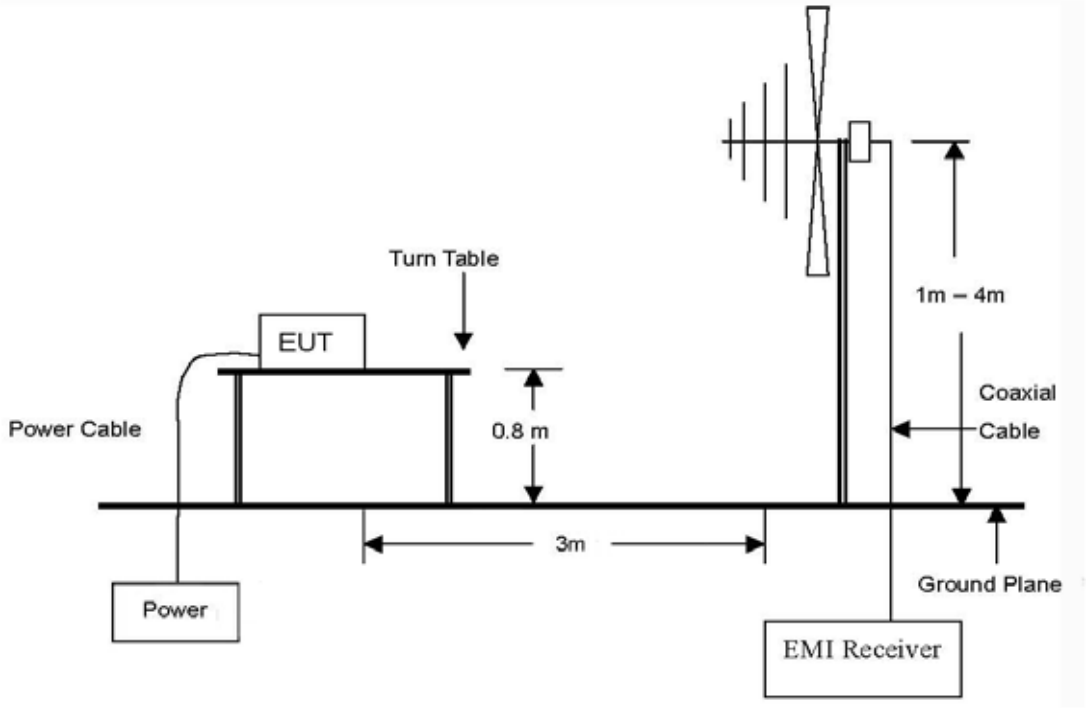


5. Transmitter Radiated Spurious Emissions

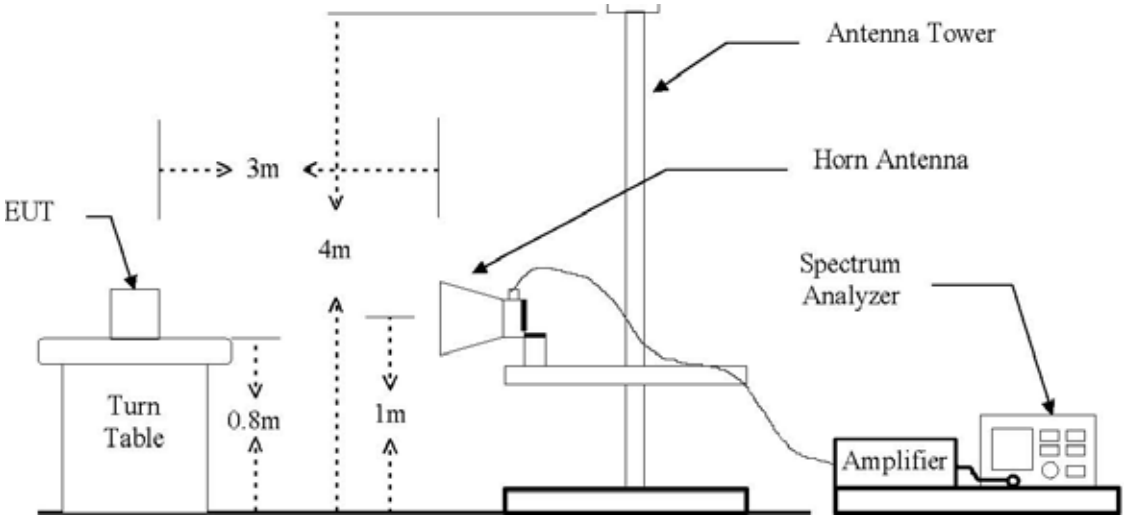
5.1. Test Setup

5.1.1. Transmitter Radiated Spurious Emissions

The diagram below shows the test setup that is utilized to make the measurements for emission from 30 MHz to 1 GHz Emissions.



The diagram below shows the test setup that is utilized to make the measurements for emission from 1 GHz to 24 GHz Emissions.



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5.2. Limit

According to §15.247(d), 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. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval , as permitted under paragraph(b)(3) of this section , the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in section §15.209(a) is not required. In addition, radiated emission which in the restricted band, as define in section §15.205(a), must also comply the radiated emission limits specified in section §15.209(a) (see section §15.205(c))

According to § 15.209(a), Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table：

Frequency (MHz)	Distance (Meters)	Field Strength (dBμV/m)	Field Strength (μV/m)
30 - 88	3	40.0	100
88 – 216	3	43.5	150
216 – 960	3	46.0	200
Above 960	3	54.0	500

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5.3. Test Procedures

Radiated emissions from the EUT were measured according to the dictates of ANSI C63.4:2003

5.3.1. Test Procedures for Radiated Spurious Emissions

1. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter anechoic chamber test site. The table was rotated 360 degrees to determine the position of the highest radiation.
2. During performing radiated emission below 1 GHz, the EUT was set 3 meters away from the interference receiving antenna, which was mounted on the top of a variable-height antenna tower. During performing radiated emission above 1 GHz, the EUT was set 3 meter away from the interference-receiving antenna.
3. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the table was turned from 0 degrees to 360 degrees to find the maximum reading.
5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
6. If the emission level of the EUT in peak mode was 10 dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10 dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

NOTE ;

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Peak detection (PK) or Quasi-peak detection (QP) at frequency below 1 GHz.
2. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1MHz for Peak detection and frequency above 1 GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 10 Hz for Average detection (AV) at frequency above 1 GHz.

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5.4. Test Results

Ambient temperature : 21 ℃
Relative humidity : 50 % R.H.

5.4.1. Spurious Radiated Emission (Worst case configuration_DSSS:802.11b)

The frequency spectrum from 30 MHz to 1000 MHz was investigated. Emission levels are not reported much lower than the limits by over 30 dB. All reading values are quasi-peak values.

Radiated Emissions			Ant	Correction Factors		Total	FCC Limit	
Frequency (MHz)	Reading (dBuV)	Detect Mode	Pol.	AF (dB/m)	Amp+CL (dB)	Actual (dBuV/m)	Limit (dBuV/m)	Margin (dB)
95.8759	44.74	Q.P.	H	11.64	-27.12	29.26	43.52	14.26
143.8790	36.32	Q.P.	H	7.57	-26.71	17.18	43.52	26.34
287.6190	43.89	Q.P.	H	13.14	-25.68	31.35	46.02	14.67
336.4948	43.63	Q.P.	H	14.39	-25.79	32.23	46.02	13.79
359.6126	44.15	Q.P.	H	14.90	-25.90	33.15	46.02	12.87
Above 400.0000	Not detected	-	-	-	-	-	-	-

Remark:

1. All spurious emission at channels are almost the same below 1 GHz, so that the channel was chosen at representative in final test.
2. "*" means the restricted band.
3. Actual = Reading + AF + Amp+CL

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5.4.2. Spurious Radiated Emission

The frequency spectrum above 1000 MHz was investigated. Emission levels are not reported much lower than the limits by over 30 dB.

DSSS : 802.11b
Low Channel (2412 MHz)

Radiated Emissions			Ant	Correction Factors		Total	FCC Limit	
Frequency (MHz)	Reading (dBuV)	Detect Mode	Pol.	AF (dB/m)	CL (dB)	Actual (dBuV/m)	Limit (dBuV/m)	Margin (dB)
*2390.000	27.02	Peak	V	28.05	4.84	59.91	74.00	14.09
*2390.000	15.27	Average	V	28.05	4.84	48.16	54.00	5.84

Radiated Emissions			Ant	Correction Factors		Total	FCC Limit	
Frequency (MHz)	Reading (dBuV)	Detect Mode	Pol.	AF (dB/m)	Amp Gain+CL (dB)	Actual (dBuV/m)	Limit (dBuV/m)	Margin (dB)
4824.23	43.18	Peak	V	33.01	-27.79	48.40	74.00	25.60
Above 4900.00	Not detected	-	-	-	-	-	-	-

Middle Channel (2437 MHz)

Radiated Emissions			Ant	Correction Factors		Total	FCC Limit	
Frequency (MHz)	Reading (dBuV)	Detect Mode	Pol.	AF (dB/m)	Amp Gain+CL (dB)	Actual (dBuV/m)	Limit (dBuV/m)	Margin (dB)
4874.75	44.39	Peak	V	33.15	-27.62	49.92	74.00	24.08
Above 4900.00	Not detected	-	-	-	-	-	-	-

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High Channel (2462 MHz)

Radiated Emissions			Ant	Correction Factors		Total	FCC Limit	
Frequency (MHz)	Reading (dBuV)	Detect Mode	Pol.	AF (dB/m)	CL (dB)	Actual (dBuV/m)	Limit (dBuV/m)	Margin (dB)
*2483.500	26.94	Peak	V	28.18	5.34	60.46	74.00	13.56
*2483.500	14.24	Average	V	28.18	5.34	47.76	54.00	6.24

Radiated Emissions			Ant	Correction Factors		Total	FCC Limit	
Frequency (MHz)	Reading (dBuV)	Detect Mode	Pol.	AF (dB/m)	Amp Gain+CL (dB)	Actual (dBuV/m)	Limit (dBuV/m)	Margin (dB)
4924.00	43.79	Peak	V	33.29	-27.38	49.70	74.00	24.30
Above 5000.00	Not detected	-	-	-	-	-	-	-

OFDM : 802.11g
Low Channel (2412 MHz)

Radiated Emissions			Ant	Correction Factors		Total	FCC Limit	
Frequency (MHz)	Reading (dBuV)	Detect Mode	Pol.	AF (dB/m)	CL (dB)	Actual (dBuV/m)	Limit (dBuV/m)	Margin (dB)
*2390.000	26.75	Peak	V	28.05	4.84	59.64	74.00	14.36
*2390.000	15.12	Average	V	28.05	4.84	48.01	54.00	5.99

Radiated Emissions			Ant	Correction Factors		Total	FCC Limit	
Frequency (MHz)	Reading (dBuV)	Detect Mode	Pol.	AF (dB/m)	Amp Gain+CL (dB)	Actual (dBuV/m)	Limit (dBuV/m)	Margin (dB)
4827.13	44.95	Peak	V	33.02	-27.79	50.18	74.00	23.82
Above 4900.00	Not detected	-	-	-	-	-	-	-

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Middle Channel (2437 MHz)

Radiated Emissions			Ant	Correction Factors		Total	FCC Limit	
Frequency (MHz)	Reading (dBuV)	Detect Mode	Pol.	AF (dB/m)	Amp Gain+CL (dB)	Actual (dBuV/m)	Limit (dBuV/m)	Margin (dB)
4874.00	44.63	Peak	V	33.15	-27.62	50.16	74.00	23.84
Above 4900.00	Not detected	-	-	-	-	-	-	-

High Channel (2462 MHz)

Radiated Emissions			Ant	Correction Factors		Total	FCC Limit	
Frequency (MHz)	Reading (dBuV)	Detect Mode	Pol.	AF (dB/m)	CL (dB)	Actual (dBuV/m)	Limit (dBuV/m)	Margin (dB)
*2483.500	26.54	Peak	V	28.18	4.78	59.50	74.00	14.50
*2483.500	14.01	Average	V	28.18	4.78	46.97	54.00	7.03

Radiated Emissions			Ant	Correction Factors		Total	FCC Limit	
Frequency (MHz)	Reading (dBuV)	Detect Mode	Pol.	AF (dB/m)	Amp Gain+CL (dB)	Actual (dBuV/m)	Limit (dBuV/m)	Margin (dB)
4924.00	44.57	Peak	V	33.29	-27.38	50.48	74.00	23.52
Above 5000.00	Not detected	-	-	-	-	-	-	-

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DSSS : 802.11n_MCS0 20 MHz
Low Channel (2412 MHz)

Radiated Emissions			Ant	Correction Factors		Total	FCC Limit	
Frequency (MHz)	Reading (dBuV)	Detect Mode	Pol.	AF (dB/m)	CL (dB)	Actual (dBuV/m)	Limit (dBuV/m)	Margin (dB)
*2390.000	26.84	Peak	V	28.05	4.84	59.73	74.00	14.27
*2390.000	15.20	Average	V	28.05	4.84	48.09	54.00	5.91

Radiated Emissions			Ant	Correction Factors		Total	FCC Limit	
Frequency (MHz)	Reading (dBuV)	Detect Mode	Pol.	AF (dB/m)	Amp Gain+CL (dB)	Actual (dBuV/m)	Limit (dBuV/m)	Margin (dB)
4824.23	44.84	Peak	V	33.01	-27.79	50.06	74.00	23.94
Above 4900.00	Not detected	-	-	-	-	-	-	-

Middle Channel (2437 MHz)

Radiated Emissions			Ant	Correction Factors		Total	FCC Limit	
Frequency (MHz)	Reading (dBuV)	Detect Mode	Pol.	AF (dB/m)	Amp Gain+CL (dB)	Actual (dBuV/m)	Limit (dBuV/m)	Margin (dB)
4874.75	44.47	Peak	V	33.15	-27.62	50.00	74.00	24.00
Above 4900.00	Not detected	-	-	-	-	-	-	-

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High Channel (2462 MHz)

Radiated Emissions			Ant	Correction Factors		Total	FCC Limit	
Frequency (MHz)	Reading (dBuV)	Detect Mode	Pol.	AF (dB/m)	CL (dB)	Actual (dBuV/m)	Limit (dBuV/m)	Margin (dB)
*2483.500	26.74	Peak	V	28.18	4.78	59.70	74.00	14.30
*2483.500	14.15	Average	V	28.18	4.78	47.11	54.00	6.89

Radiated Emissions			Ant	Correction Factors		Total	FCC Limit	
Frequency (MHz)	Reading (dBuV)	Detect Mode	Pol.	AF (dB/m)	Amp Gain+CL (dB)	Actual (dBuV/m)	Limit (dBuV/m)	Margin (dB)
4924.00	43.98	Peak	V	33.29	-27.38	49.89	74.00	24.11
Above 5000.00	Not detected	-	-	-	-	-	-	-

OFDM : 802.11n_MCS0 40 MHz

Low Channel (2422 MHz)

Radiated Emissions			Ant	Correction Factors		Total	FCC Limit	
Frequency (MHz)	Reading (dBuV)	Detect Mode	Pol.	AF (dB/m)	CL (dB)	Actual (dBuV/m)	Limit (dBuV/m)	Margin (dB)
*2390.000	28.16	Peak	V	28.05	4.84	61.05	74.00	12.95
*2390.000	15.75	Average	V	28.05	4.84	48.64	54.00	5.36

Radiated Emissions			Ant	Correction Factors		Total	FCC Limit	
Frequency (MHz)	Reading (dBuV)	Detect Mode	Pol.	AF (dB/m)	Amp Gain+CL (dB)	Actual (dBuV/m)	Limit (dBuV/m)	Margin (dB)
4844.00	44.54	Peak	V	33.02	-27.80	49.76	74.00	24.24
Above 4900.00	Not detected	-	-	-	-	-	-	-

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Middle Channel (2437 MHz)

Radiated Emissions			Ant	Correction Factors		Total	FCC Limit	
Frequency (MHz)	Reading (dBuV)	Detect Mode	Pol.	AF (dB/m)	Amp Gain+CL (dB)	Actual (dBuV/m)	Limit (dBuV/m)	Margin (dB)
4874.00	44.41	Peak	V	33.15	-27.62	49.94	74.00	24.06
Above 4900.00	Not detected	-	-	-	-	-	-	-

High Channel (2452 MHz)

Radiated Emissions			Ant	Correction Factors		Total	FCC Limit	
Frequency (MHz)	Reading (dBuV)	Detect Mode	Pol.	AF (dB/m)	CL (dB)	Actual (dBuV/m)	Limit (dBuV/m)	Margin (dB)
*2483.500	27.45	Peak	V	28.18	4.78	60.41	74.00	13.59
*2483.500	14.84	Average	V	28.18	4.78	47.80	54.00	6.20

Radiated Emissions			Ant	Correction Factors		Total	FCC Limit	
Frequency (MHz)	Reading (dBuV)	Detect Mode	Pol.	AF (dB/m)	Amp Gain+CL (dB)	Actual (dBuV/m)	Limit (dBuV/m)	Margin (dB)
4904.00	44.85	Peak	V	33.29	-27.42	50.72	74.00	23.28
Above 5000.00	Not detected	-	-	-	-	-	-	-

Remarks ;

1. “*” means the restricted band.
2. Measuring frequencies from 1 GHz to the 10^{th} harmonic of highest fundamental Frequency.
3. Radiated emissions measured in frequency above 1000 MHz were made with an instrument using peak/average detector mode.
4. Average test would be performed if the peak result were greater than the average limit.
5. Actual = Reading + AF + Amp Gain + CL

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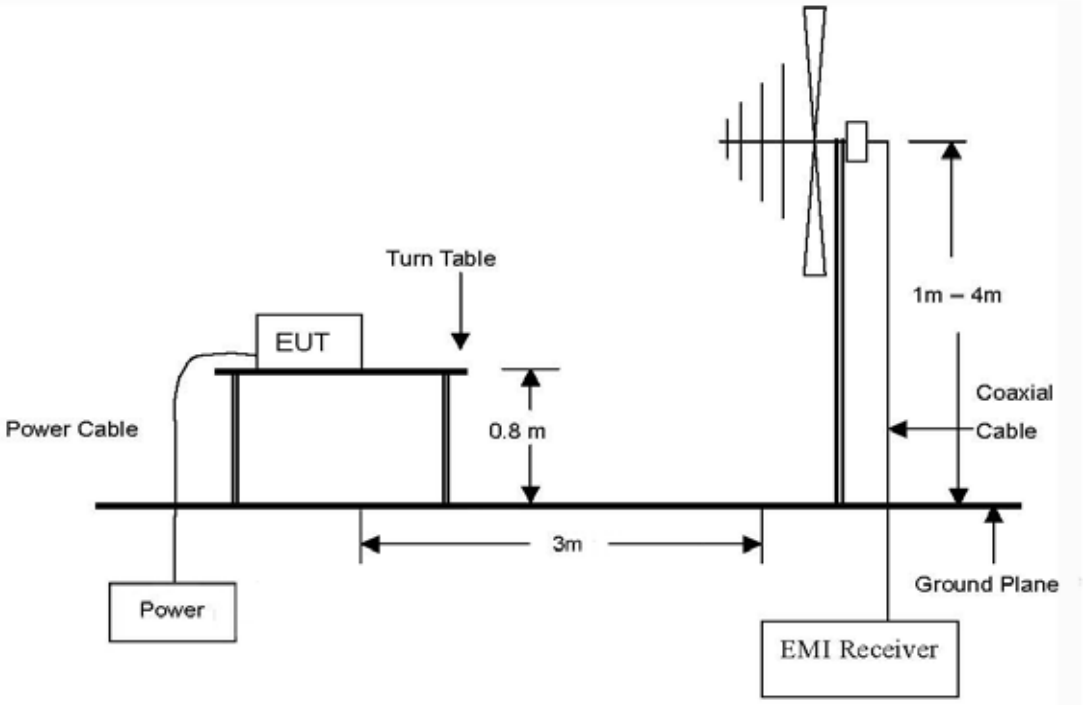
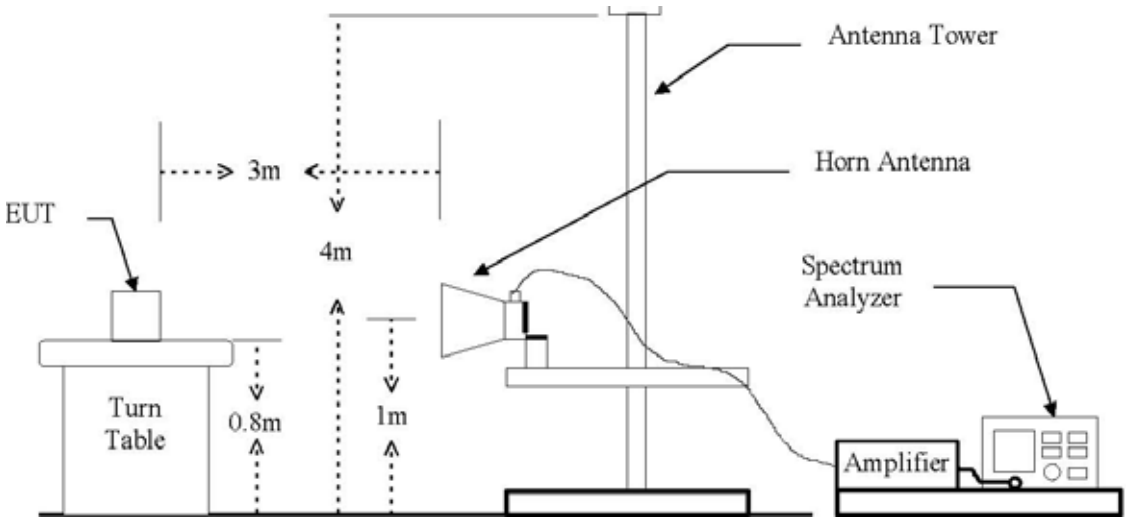
6. Receiver radiated spurious emissions

6.1. Setup

The diagram below shows the test setup that is utilized to make the measurements for emission from 30 MHz to 1 GHz Emissions.



The diagram below shows the test setup that is utilized to make the measurements for emission from 1 GHz to 24 GHz Emissions.



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6.2. Limit

According to §15.109(a), Except for Class A digital devices, the field strength of radiated emission from unintentional radiator at a distance of 3 m shall not exceed the following values:

Frequency (MHz)	Distance (Meters)	Radiated (dBμV/m)	Radiated (μV/m)
30 - 88	3	40.0	100
88 – 216	3	43.5	150
216 – 960	3	46.0	200
Above 960	3	54.0	500

6.3. Test procedures

Same as clause 5.3.

6.3.1. Test procedures for radiated spurious emissions

Same as clause 5.3.1.

▣ *Note*

1. *The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Peak detection (PK) or Quasi-peak detection (QP) at frequency below 1 GHz.*
2. *The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1MHz for Peak detection and frequency above 1 GHz.*
3. *The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 10 Hz for Average detection (AV) at frequency above 1 GHz.*

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6.4. Test results

Ambient temperature : 23 ℃
Relative humidity : 46 % R.H.

6.4.1. Spurious radiated emission for below 1 GHz

Radiated Emissions			Ant	Correction Factors		Total	Limit	
Frequency (MHz)	Reading (dBuV)	Detect Mode	Pol.	AF (dB/m)	Amp Gain+CL (dB)	Actual (dBuV/m)	Limit (dBuV/m)	Margin (dB)
417.4369	22.87	Q.P.	V	16.02	-26.26	12.63	46.02	33.39
746.6717	37.88	Q.P.	V	20.90	-25.98	32.80	46.02	13.22
852.6300	36.32	Q.P.	V	21.70	-25.61	32.41	46.02	13.61
942.4000	40.89	Q.P.	V	22.42	-25.03	38.28	46.02	7.74
950.0210	42.13	Q.P.	V	22.41	-24.98	39.56	46.02	6.46
Above 960.0000	Not detected	-	-	-	-	-	-	-

☑ *Remark:*

1. *Measuring frequencies from 30 MHz to the 1GHz.*
2. *All spurious emission at low, middle and high channel are almost the same below 1 GHz, so the spurious emission test result of the high channel was chosen as representative in finial test.*
3. *Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made an instrument Using peak/quasi-peak detector mode.*
4. *Quasi-peak test would be performed if the peak result were greater than the quasi-peak limit or as required by the applicant.*

The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This test report cannot be reproduced, except in full, without prior written permission of the Company.

6.4.2. Spurious radiated emission for above 1 GHz

Radiated Emissions			Ant	Correction Factors		Total	Limit	
Frequency (MHz)	Reading (dBuV)	Detect Mode	Pol.	AF (dB/m)	Amp Gain+CL (dB)	Actual (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1048.15	54.95	Peak	V	24.11	-30.00	49.06	74.00	24.94
1125.85	55.21	Peak	V	24.28	-30.47	49.02	74.00	24.98
1150.14	57.01	Peak	V	24.33	-30.78	50.56	74.00	23.44
1308.45	57.41	Peak	V	24.68	-31.47	50.62	74.00	23.38
1348.20	53.18	Peak	H	24.77	-32.04	45.91	74.00	28.09
1443.96	55.78	Peak	V	24.98	-31.99	48.77	74.00	25.23
1788.14	53.00	Peak	H	26.48	-30.63	48.85	74.00	25.15
1865.45	56.96	Peak	V	26.85	-30.51	53.30	74.00	20.70
1865.96	51.24	Peak	H	26.86	-30.51	47.59	74.00	26.41
Above 1900.00	Not detected	-	-	-	-	-	-	-

☑ *Remarks*

1. *All spurious emission at low, middle and high channel are almost the same above 1 GHz, so the spurious emission test result of the high channel was chosen as representative in finial test.*
2. *Measuring frequencies from 1 GHz to the 10^{th} harmonic of highest fundamental Frequency.*
3. *Radiated emissions measured in frequency above 1000 MHz were made with an instrument using peak/average detector mode.*
4. *Average test would be performed if the peak result were greater than the average limit.*

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