TRANZEO
EMC LABS INC

EMC Test Report

FCCID: QRF-BNYKH900A

900 MHz Wireless Outdoor AP/Router/Bridge

Tranzeo Wireless Technologies Inc.

Testing body:	Tranzeo EMC Labs Inc. 19473 Fraser Way, Pitt Meadows, BC, Canada V3Y 2V4
Client:	Tranzeo Wireless Technologies Inc. 19473 Fraser Way, Pitt Meadows, BC, Canada V3Y 2V4

The test results indicated in this report refer exclusively to the equipment under test specified below. It is not permitted to transfer the results to other systems or configurations.

Order number: 71

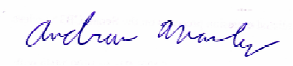
Type of test: Testing of electromagnetic disturbances characteristics

Date the EUT was received: January 6th, 2008

Date of test: January 7th, 2008 to January 15th, 2008

Report No.: 020209.1

Pitt Meadows, 2 February, 2009



EMC Manager: Andrew Marles EMC Engineer: Bruce Balston

Revision History

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1.0 General Information

1.1 EUT Description

Product Name	Wireless Outdoor AP/Router/Bridge
Company Name	Tranzeo Wireless Technologies Inc.
FCC ID	QRF-BNYKH900A
Model No.	EL-900
Radio	IEEE 802.11 b/g
Transmit Power	+25dBm mean, +29dBm peak
Frequency Range	908 - 923MHz
Number of Channels	7
Transmit Rate	Maximum bit rate - 14.7 Mbps for b mode and 27.6 Mbps for g mode
Type of Modulation	900 MHz: DSSS, OFDM
Antenna Type	External
Product Software Revision	ENROUTETAI_20081107_04_01_0256
Test Software	Bandwidth test software
Power Adapter	Model: PA1024-3DU
	Input: 100-240V ~50-60 Hz
	Output: 18V 1.1A 20W Max

Product samples tested:

Manufacturer	Model No.	Serial No.
Tranzeo Wireless	EL-900	EL-900-ENGR1

Frequency of each channel:

20MHz BW		10MHz BW		5MHz BW	
Channel	Frequency	Channel	Frequency	Channel	Frequency
Channel 1	915	Channel 1	910	Channel 1	908
		Channel 2	920	Channel 2	913
				Channel 3	918
				Channel 4	923

The EL-900 is fitted with standard type N connector for use with an external antenna. This device operates over the frequency range of 908-923 MHz.

As a wireless bridge, this device includes a 900 MHz receive function as well as a 900 MHz digital modulation transmit function. There are no user serviceable parts inside the unit. It is factory sealed in a one-time use manner and inaccessible to the end user.

The tests were performed on production sample models to demonstrate compliance with FCC Part 15, Subpart B, and Subpart C, as well as Industry Canada RSS-210 Issue 7 for digitally modulated devices.

1.2 Operational Description

The device is a wireless network bridge designed specifically for outdoor applications. The device provides a bridge between IEEE802.3 wired Ethernet LANs and IEEE 802.11b/g compliant wireless networks. It uses an external antenna coupled with an 802.11b/g transceiver to connect to remote wireless clients. The transceiver operates in the frequency band 902-928 MHz. The device transmits digital network data. The unit is mounted externally in fixed point-to-point installations. It is mounted on the exterior of a building typically for broadband internet access.

The type of RF modulation is DSSS and OFDM both used at 900 MHz. The device can transmit data at a bit rate of 11 Mbps in DSSS mode and 54 Mbps in OFDM mode or a real-world data rate of approximately 14 and 27 Mbps respectively. The WEP/WPA/WPA2 algorithms are used for secure communications. The device's standard compliance ensures that it can communicate with any 802.11b/g network.

The firmware used with the device prevents the use of channels outside the specified frequency bands.

The product is used exclusively in a professionally installed, fixed point-to-point environment.

1.3 EUT Testing Configuration

The EL-900 unit fitted with external antennas was tested.

The EUT was mounted on a custom non-metallic stand to ease polarization changes and to best represent a typical user installation. The EUT was connected to the host PC so that it could be cycled through the various test modes and channels.
The EUT was tested in the following modes:

- **Standby/Receive mode:** In this mode the EUT beacons at the lowest possible rate while searching for a client with which to establish communication.
- **Data transfer mode:** In this mode the EUT is exercised with commercially available bandwidth test software. A link is established between two PCs through the unit and an access point and data is transmitted at the highest possible rate.
- **Beaconing Mode:** In this mode the EUT is set to transmit network configuration beacons at the highest possible rate.

1.4 EUT Antennas

The EUT was tested with the following external antennas:

Tranzeo Part Number	Antenna Type
TR-OD900-12	Omni
TR-900H-120-12	Horizontal Sector
TR-900V-120-13	Vertical Sector

1.5 EUT Modifications

No modifications were necessary for this unit to comply with FCC Part 15 and Industry Canada RSS-210 Issue 7.

1.6 Test Facilities

Tranzeo EMC Labs
19473 Fraser Way
Pitt Meadows, BC V3Y 2V4
Canada

Phone: (604) 460-6002
Fax: (604) 460-6005

FCC registration number: 960532
Industry Canada Number: 5238A

1.7 Test Equipment

Manufacturer	Model	Description	Serial Number	Cal Due Date
Rohde & Schwarz	ESU 40	EMI Test Reciever	10011	29-Mar-09
Rohde & Schwarz	SMJ 100A	Vector Signal Generator	100645	12-Mar-09
ETS-Lindgren	2165	Turntable	00043883	N/R
ETS-Lindgren	2175	Mast Motor	00077487	N/R
Sunol Sciences	JB3	Antenna	A042004	05-May-09
Sunol Sciences	DRH-118	Antenna	A052804	02-Jun-09
Com-Power	LI-115	LISN	241037	30-Jan-09
Agilent	8648C	Signal Generator	3623A03622	14-Feb-09
ETS Lindgren	2090	Multi-Device Controller	00058942	07-Dec-09

1.8 Test System Details

The following auxiliary equipment and cables were used for performing the tests:

Manufacturer	Model	Description	Serial No.
Soyo	PW-930S	Laptop PC	6188
Pheenet	SW-05P	5 port switch	C0104260954
Tranzeo	POE-1	DC injection unit	n/a

Signal Cable Type	Signal Cable Description	Length
Cat 5 LAN	EUT to DC injection unit	50 m
Cat 5 LAN	DC Block to Ethernet switch	2 m

1.9 Test Results

The EUT complies with FCC Part 15, Subparts B and C, as well as Industry Canada RSS-210 Issue 7.

2.0 Conducted Emissions

2.1 Test Standard

FCC Part 15, Subpart C, Section 15.207a.

| a) Except as shown in Paragraphs (b) and (c) of this section, 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 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 boundary between the frequency ranges. |

2.2 Test Limits

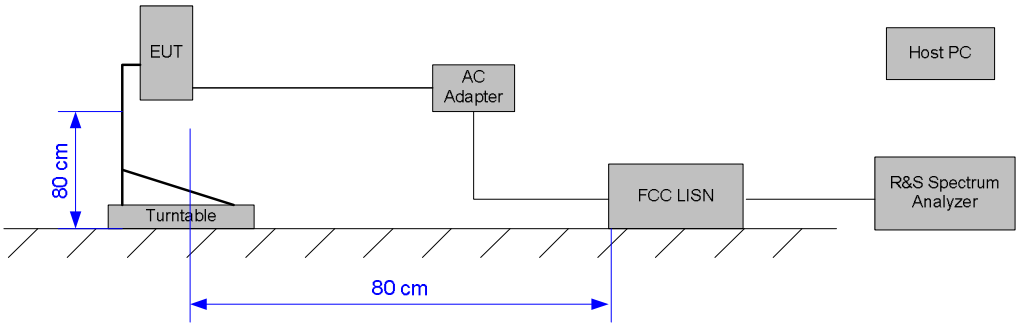
Frequency (MHz)	Maximum Level (dBuV) Quasi-Peak	Maximum Level (dBuV) Average
0.15-0.50	66-56 (Log Delta)	56-46 (Log Delta)
0.50-5.00	56	46
5.00-30.0	60	50

2.3 Test Setup

The EUT was exercised using bandwidth test software at the highest possible data rate. Testing was performed on low, middle and high channels for each channel bandwidth configuration. All modulation types were tested. Only worst case data is shown below.

Note: For testing purposes only, to ensure worst case performance in all testing configurations, the radio is configured to transmit at the maximum possible RF power.

2.3.1 Test Setup Block Diagram

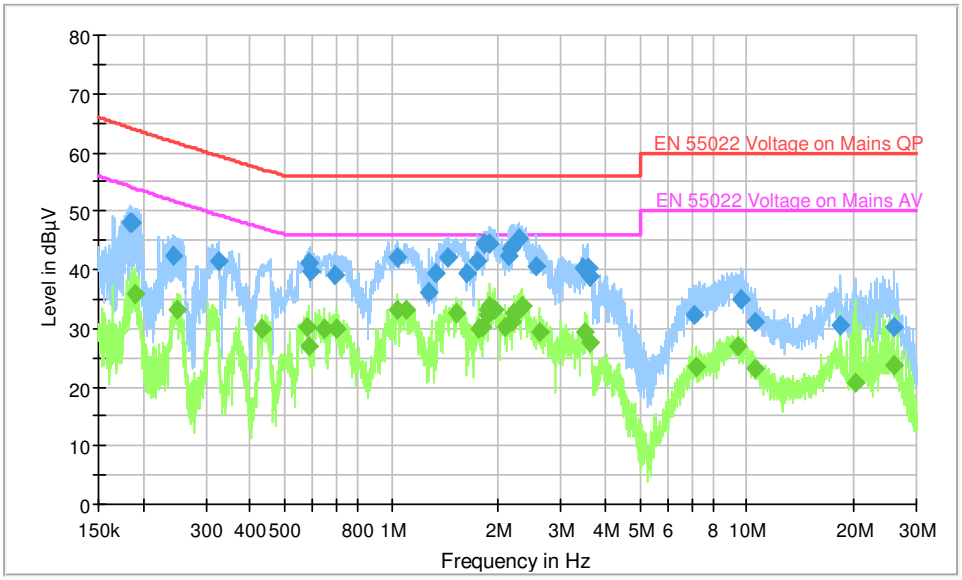


Note: The unused LISN terminal is terminated with a 50 ohms terminator.

2.4 Test Results

2.4.1 Test Data

EUT – Line-b Mode (Ch Freq: 913MHz)



Quasi-peak detector

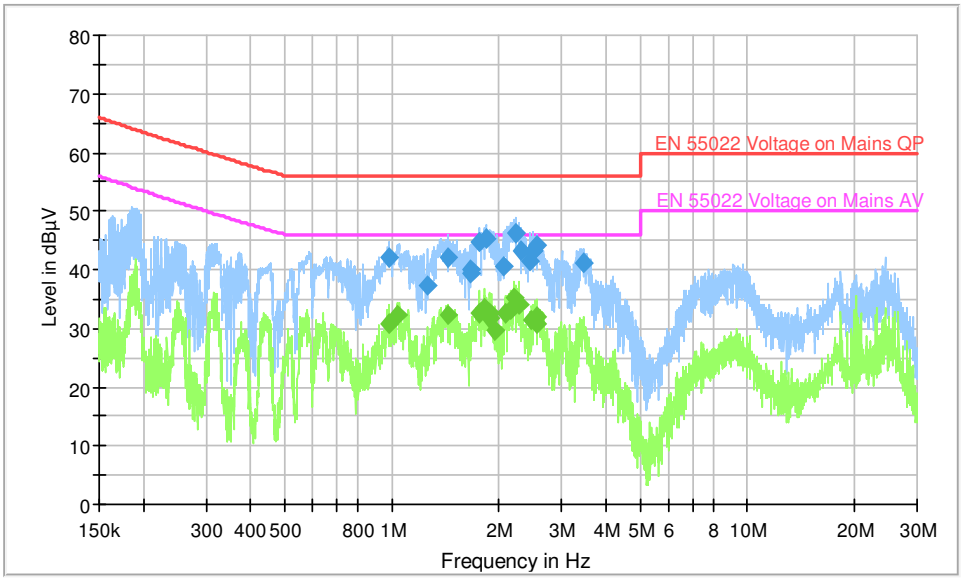
Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.182826	47.9	1000.00	9.000	On	L1	0.5	16.3	64.2
0.184847	48.1	1000.00	9.000	On	L1	0.5	16.0	64.1
0.185959	48.1	1000.00	9.000	On	L1	0.5	16.0	64.1
0.243081	42.4	1000.00	9.000	On	L1	0.6	19.4	61.8
0.325463	41.5	1000.00	9.000	On	L1	0.6	17.9	59.4
0.587545	41.3	1000.00	9.000	On	L1	0.7	14.7	56.0
0.589309	39.7	1000.00	9.000	On	L1	0.7	16.3	56.0
0.695665	39.2	1000.00	9.000	On	L1	0.7	16.8	56.0
1.042801	42.2	1000.00	9.000	On	L1	0.7	13.8	56.0
1.272281	36.0	1000.00	9.000	On	L1	0.6	20.0	56.0
1.337479	39.5	1000.00	9.000	On	L1	0.6	16.5	56.0
1.438714	42.0	1000.00	9.000	On	L1	0.6	14.0	56.0
1.631805	39.4	1000.00	9.000	On	L1	0.6	16.6	56.0
1.751813	41.6	1000.00	9.000	On	L1	0.6	14.4	56.0
1.828745	44.6	1000.00	9.000	On	L1	0.6	11.4	56.0
...	...	...	...	...	...	...	...	...

Average Detector

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.190474	35.9	1000.00	9.000	On	L1	0.5	18.0	53.9
0.250230	33.0	1000.00	9.000	On	L1	0.6	18.5	51.5
0.432294	29.9	1000.00	9.000	On	L1	0.7	17.2	47.1
0.577646	30.2	1000.00	9.000	On	L1	0.7	15.8	46.0
0.587545	27.1	1000.00	9.000	On	L1	0.7	18.9	46.0
0.644134	29.9	1000.00	9.000	On	L1	0.7	16.1	46.0
0.701250	29.9	1000.00	9.000	On	L1	0.7	16.1	46.0
1.033463	33.3	1000.00	9.000	On	L1	0.7	12.7	46.0
1.096239	33.1	1000.00	9.000	On	L1	0.7	12.9	46.0
1.515467	32.7	1000.00	9.000	On	L1	0.6	13.4	46.0
1.760590	30.0	1000.00	9.000	On	L1	0.6	16.0	46.0
1.799732	30.3	1000.00	9.000	On	L1	0.6	15.7	46.0
1.863805	32.4	1000.00	9.000	On	L1	0.6	13.6	46.0
1.869402	33.3	1000.00	9.000	On	L1	0.6	12.7	46.0
1.884410	33.8	1000.00	9.000	On	L1	0.6	12.2	46.0
...	...	...	...	...	...	...	...	...

Note: All data points are corrected for insertion loss.

EUT – Neutral-G Mode (Ch Freq: 923MHz)



Quasi-peak detector

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.984068	42.0	1000.00	9.000	On	L1	0.7	14.0	56.0
1.262148	37.4	1000.00	9.000	On	L1	0.6	18.6	56.0
1.443035	42.0	1000.00	9.000	On	L1	0.6	14.0	56.0
1.658111	40.1	1000.00	9.000	On	L1	0.6	15.9	56.0
1.663090	39.3	1000.00	9.000	On	L1	0.6	16.7	56.0
1.769410	44.6	1000.00	9.000	On	L1	0.6	11.4	56.0
1.834237	45.2	1000.00	9.000	On	L1	0.6	10.8	56.0
2.055607	40.7	1000.00	9.000	On	L1	0.6	15.3	56.0
2.222277	46.3	1000.00	9.000	On	L1	0.6	9.7	56.0
2.319869	43.1	1000.00	9.000	On	L1	0.6	12.9	56.0
2.443631	41.5	1000.00	9.000	On	L1	0.6	14.5	56.0
2.492970	43.2	1000.00	9.000	On	L1	0.6	12.8	56.0
2.507966	43.4	1000.00	9.000	On	L1	0.6	12.6	56.0
2.556048	44.1	1000.00	9.000	On	L1	0.6	11.9	56.0
3.467071	41.2	1000.00	9.000	On	L1	0.5	14.8	56.0

Average detector

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.984068	30.8	1000.00	9.000	On	L1	0.7	15.2	46.0
1.043844	32.4	1000.00	9.000	On	L1	0.7	13.6	46.0
1.435841	32.3	1000.00	9.000	On	L1	0.6	13.7	46.0
1.769410	32.7	1000.00	9.000	On	L1	0.6	13.3	46.0
1.821448	33.5	1000.00	9.000	On	L1	0.6	12.5	46.0
1.876891	31.7	1000.00	9.000	On	L1	0.6	14.3	46.0
1.893851	32.6	1000.00	9.000	On	L1	0.6	13.4	46.0
1.939830	29.8	1000.00	9.000	On	L1	0.6	16.2	46.0
2.082491	32.5	1000.00	9.000	On	L1	0.6	13.5	46.0
2.165271	33.2	1000.00	9.000	On	L1	0.6	12.8	46.0
2.204579	35.4	1000.00	9.000	On	L1	0.6	10.6	46.0
2.273956	34.0	1000.00	9.000	On	L1	0.6	12.0	46.0
2.483023	31.3	1000.00	9.000	On	L1	0.6	14.7	46.0
2.556048	31.9	1000.00	9.000	On	L1	0.6	14.1	46.0
2.563724	30.7	1000.00	9.000	On	L1	0.6	15.3	46.0

Note: All data points are corrected for insertion loss.

3.0 Peak Power Output

3.1 Test Standard

FCC CFR47, Part 15, Subpart B 15.247b.

| *(b) The maximum peak conducted output power of the intentional radiator shall not exceed the following:*

(3) For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 watt. As an alternative to a peak power measurement, compliance with the 1 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 antennas and antenna elements. The average must not include any time 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.

(4) The conducted output power limit specified in Paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in Paragraph (c) of this section, if transmitting antennas 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 Paragraphs (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 6 dBi.

(c) Operation with directional antenna gains greater than 6 dBi.

(1) Fixed point-to-point operation:

(iii) Fixed, point-to-point operation, as used in Paragraphs (c)(4)(i) and (c)(4)(ii) of this section, excludes the use of point-to-multipoint systems, omnidirectional applications, and multiple co-located intentional radiators transmitting the same information. The operator of the spread spectrum or digitally modulated intentional radiator or, if the equipment is professionally installed, the installer is responsible for ensuring that the system is used exclusively for fixed, point-to-point operations. The instruction manual furnished with the intentional radiator shall contain language in the installation instructions informing the operator and the installer of this responsibility. |

3.2 Test Limits

The maximum conducted output power shall not exceed 30 dBm.

3.3 Test Setup

This test is performed conducted. The measurement equipment is connected directly to the antenna port of the EUT.

The test is performed at low, middle and high channels using both OFDM and DSSS modulations in 20 MHz, 10MHz and 5MHz bandwidths.

Power is measured using the channel power measurement feature of the spectrum analyzer.

3.3.1 Test Setup Block Diagram

3.4 Test Results

Mode DSSS/ Channel BW = 5MHz			
Frequency(MHz)	**Measurement(dBm)**	**Limit**	**Result**
908	24.97	30	PASS
913	25.06	30	PASS
923	23.75	30	PASS

Mode DSSS/ Channel BW = 10MHz			
Frequency(MHz)	**Measurement(dBm)**	**Limit**	**Result**
910	20.05	30	PASS
920	18.33	30	PASS

Mode OFDM/ Channel BW = 5MHz			
Frequency(MHz)	**Measurement(dBm)**	**Limit**	**Result**
908	26.66	30	PASS
913	26.26	30	PASS
923	25.43	30	PASS

Mode OFDM/ Channel BW = 10MHz			
Frequency(MHz)	**Measurement(dBm)**	**Limit**	**Result**
910	27.07	30	PASS
920	25.95	30	PASS

Channel BW = 20MHz				
Frequency(MHz)	**Mode**	**Measurement(dBm)**	**Limit**	**Result**
915	DSSS	27.24	30	PASS
	OFDM	27.69	30	PASS

4.0 Radiated Emissions, General Requirements

4.1 Test Standard

FCC Part 15, Subpart C, Section 15.209, Radiated Emission Limits, General Requirements.

| *(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)	Field Strength (Microvolts/Meter)	Measurement Distance (Meters)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
30 - 88	100 **	3
88 - 216	150 **	3
216 - 960	200 **	3
Above 960	500	3

*** Except as provided in Paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., Sections 15.231 and 15.241.*

(b) In the emission table above, the tighter limit applies at the band edges.

(c) The level of any unwanted emissions from an intentional radiator operating under these general provisions shall not exceed the level of the fundamental emission. For intentional radiators which operate under the provisions of other sections within this part and which are required to reduce their unwanted emissions to the limits specified in this table, the limits in this table are based on the frequency of the unwanted emission and not the fundamental frequency. However, the level of any unwanted emissions shall not exceed the level of the fundamental frequency.

(d) The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector. |

4.2 Test Limits

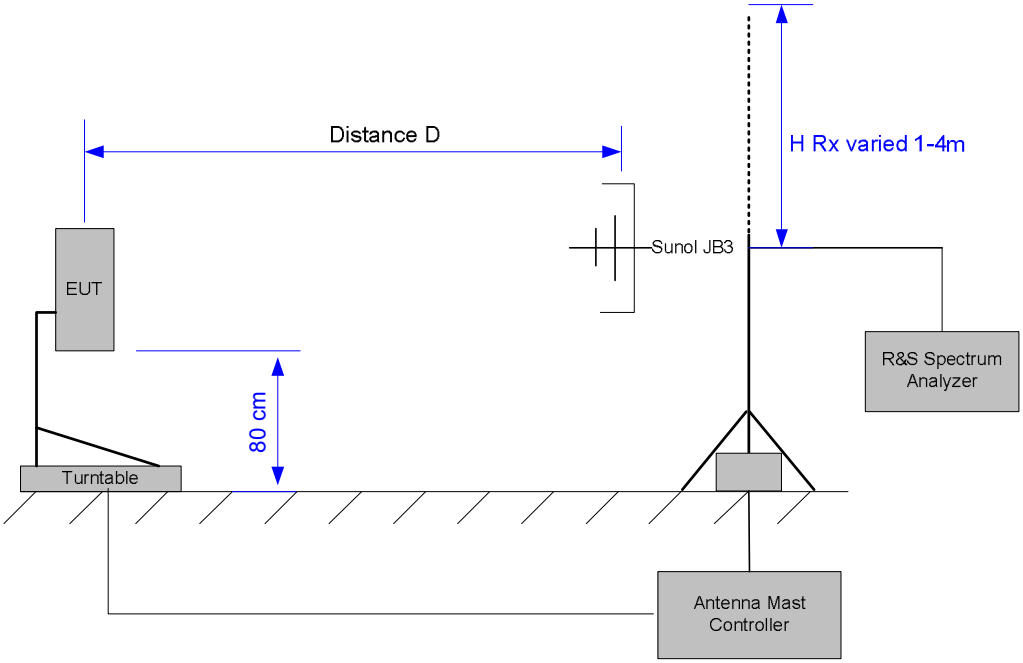
Frequency (MHz)	Maximum Field Strength (uV/m @ 3M	Maximum Field Strength (dBuV/m @ 3m)
30-88	100	40.0
88-216	150	43.5
216-960	200	46.0
960-1000	500	54.0

4.3 Test Setup

The EUT was exercised using beaconing mode at the highest possible transmit rate. Testing was performed on low, middle and high channels in 20 MHz, 10MHz and 5MHz bandwidths for both DSSS and OFDM modes. Only worst case data is shown below.

Note: For testing purposes only, to ensure worst case performance in all testing configurations, the radio is configured to transmit at the maximum possible RF power.

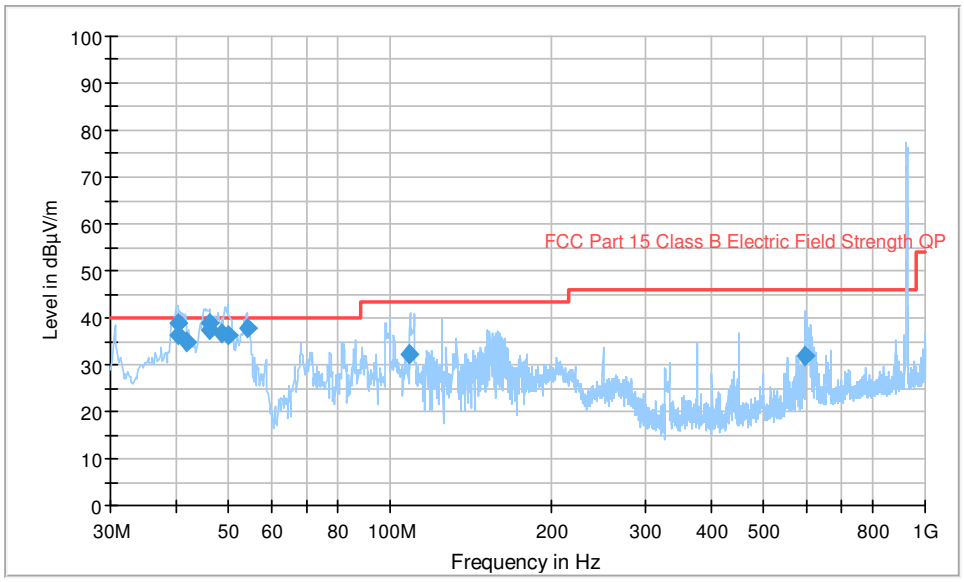
4.3.1 Test Setup Block Diagram



Note: Measurements below 1 GHz were performed with the Sunol JB3 antenna with a measurement distance of 3 m. Compliance above 1 GHz is covered in Section 5.0.

4.4 Test Results

4.4.1 12 dBi Horizontal Sector antenna – 923 MHz



Quasi-peak detector

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
45.789440	39.0	1000.00	120.000	100.0	V	45.0	10.3	1.00	40.00
40.098560	38.8	1000.00	120.000	145.0	V	45.0	13.7	1.20	40.00
53.956640	37.7	1000.00	120.000	100.0	V	2.0	7.9	2.30	40.00
46.107520	37.3	1000.00	120.000	100.0	V	45.0	10.1	2.70	40.00
48.431920	36.8	1000.00	120.000	100.0	V	262.0	9.1	3.20	40.00
49.942080	36.3	1000.00	120.000	100.0	V	2.0	8.7	3.70	40.00
40.163600	36.1	1000.00	120.000	145.0	V	283.0	13.6	3.90	40.00
41.540800	35.0	1000.00	120.000	100.0	V	45.0	12.8	5.00	40.00
108.766720	32.1	1000.00	120.000	100.0	V	242.0	13.1	11.40	43.50
598.994400	31.9	1000.00	120.000	100.0	V	23.0	20.3	14.10	46.00

Note: All data points are corrected for insertion loss.

5.0 Harmonic and Spurious Emissions

5.1 Test Standard

FCC CFR 47, Part 15, Subpart B 15.247d.

| *(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 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) (see Section 15.205(c)).* |

5.2 Test Limits

902-928 MHz limits:

- Fundamental Limit = 30 dBm
- Harmonics and Spurious Emissions = 30 dBc
- Restricted Band Emissions = AVG 54 dBuV, PK 74dBuV

5.3 Test Setup – Spurious Emissions

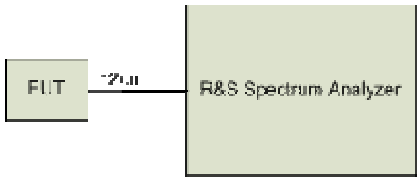
Both radiated and conducted measurements are made on the EUT to ensure compliance with the required emission levels. Conducted scans are used to determine compliance with the 30 dBc limit for emissions outside of the operational frequency band.

In addition to conducted measurements, extensive radiated testing above 1 GHz is performed. The measurement antenna is scanned around all sides of the EUT to identify signals of interest. Additional measurements at an appropriate measurement distance are performed to ensure that emissions were at maximum.

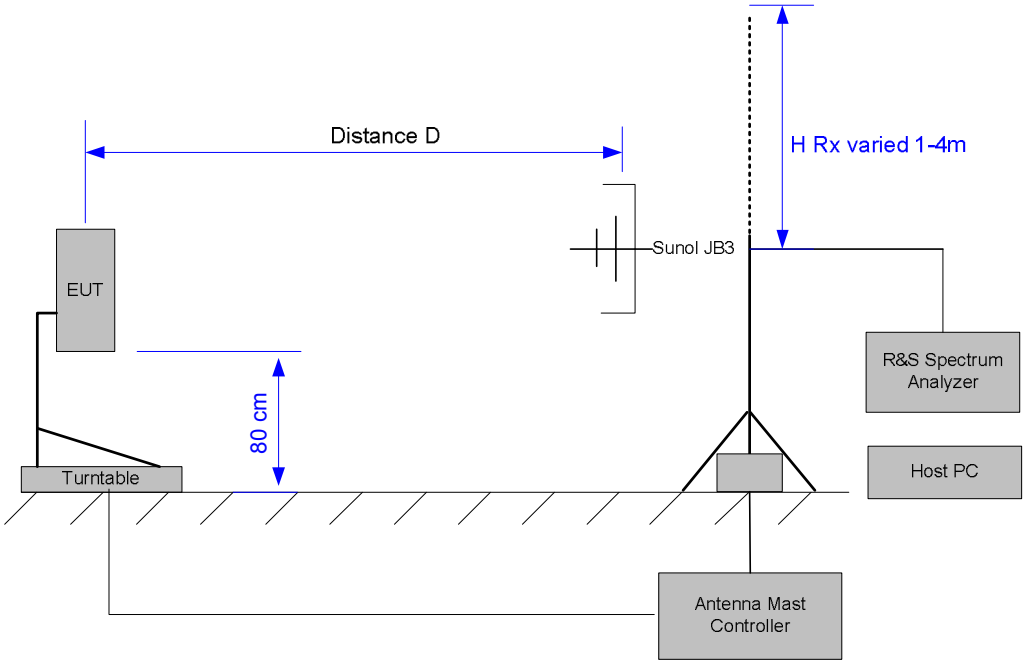
The EL-900was tested with its integrated antenna. The EUT was exercised at the highest possible transmit rate. Testing was performed on low, middle and high channels in 20 MHz, 10MHz and 5MHz bandwidths for both DSSS and OFDM modes.

Note: For testing purposes only, to ensure worst case performance in all configurations, the radio is configured to transmit at the maximum possible RF power.

5.3.1 Test Setup Block Diagram – Conducted Measurements (Harmonics)

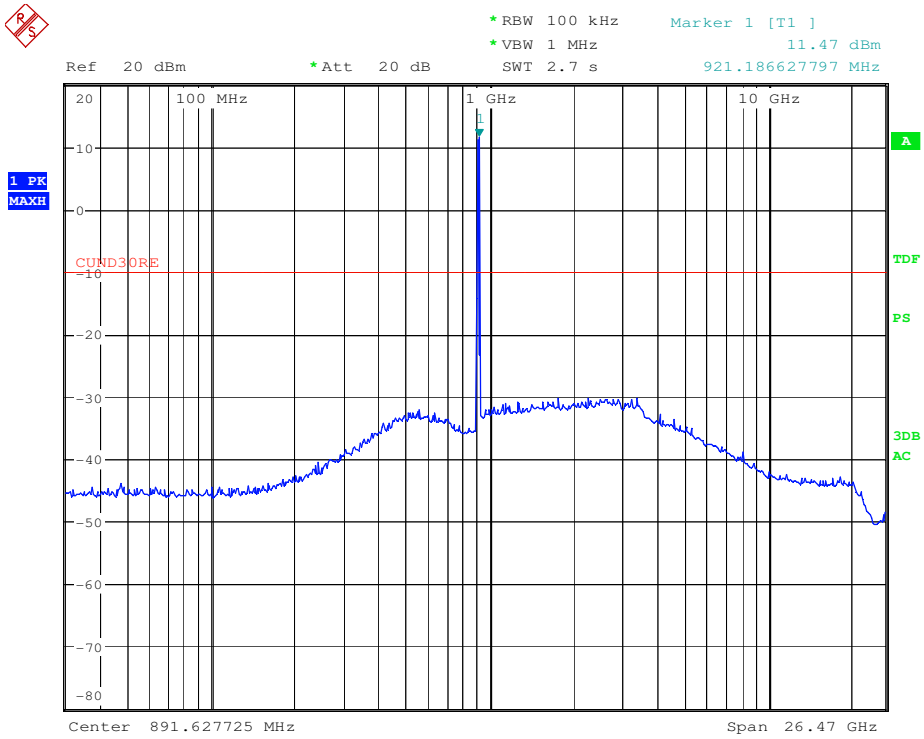


5.3.2 Test Setup Block Diagram – Radiated Measurements (Spurious)



5.4 Test Results

5.4.1 Test Results 15.247–Harmonics -30 dBc B mode



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5.4.2 Test Results 15.247–Harmonics -30 dBc G mode

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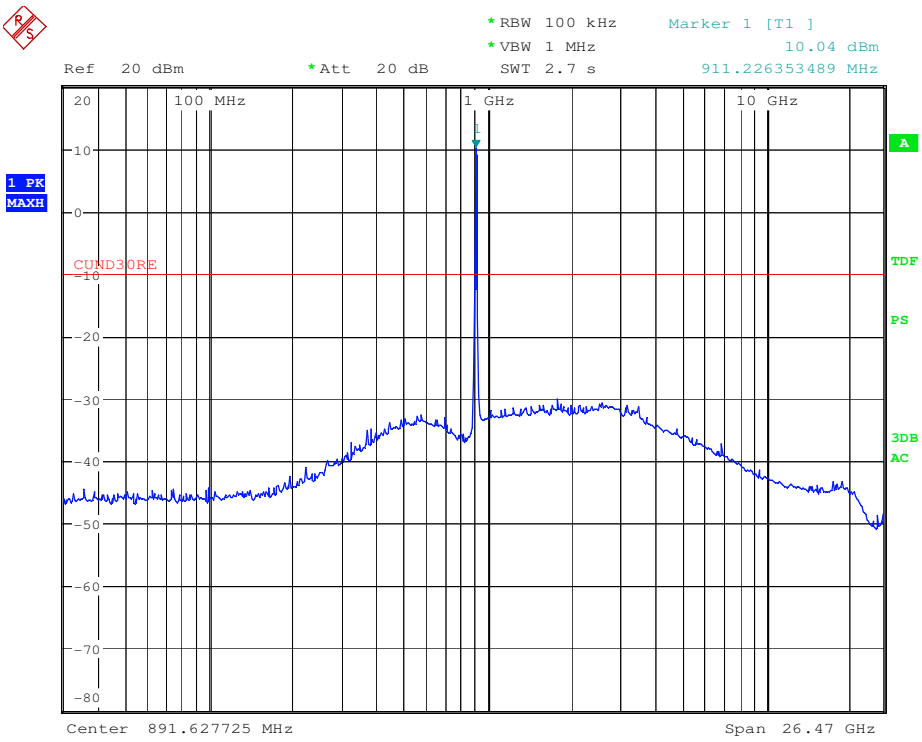

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The above plots show the conducted output of the transmitter. There are no conducted harmonics within the 30 dBc limit.

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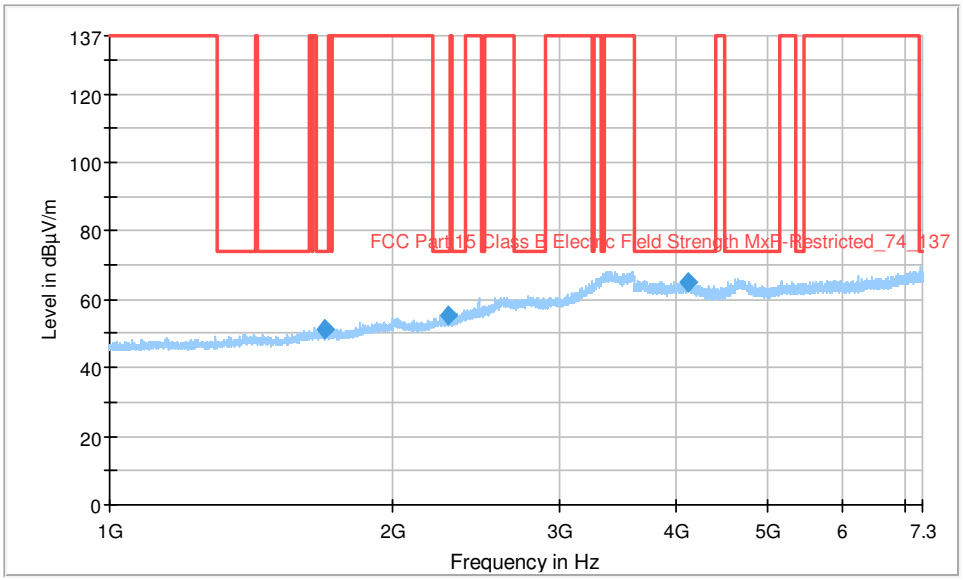
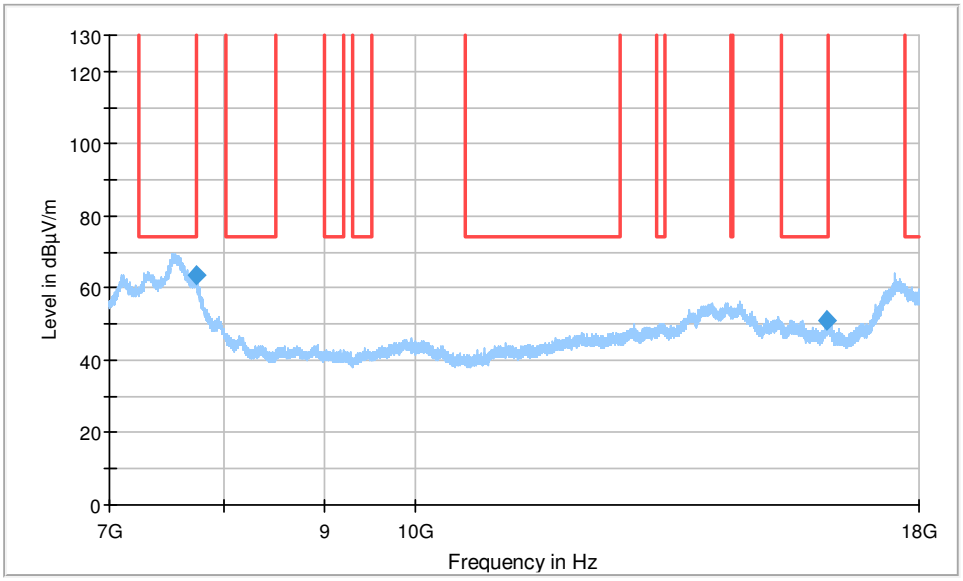
5.4.3 Test Results 15.247– Restricted Bands (Spurious Emissions)

The following data is taken from frequencies identified during radiated pre-testing at 1 m. Data presented below was taken at a measurement distance of 3 m. Data is presented for the worst case configuration, being 5 MHz bandwidth in OFDM mode at channel 4 (923 MHz).



Peak detector

Frequency (MHz)	MaxPeak (dBµV/m)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
4106.80000	65.2	1000.000	171.0	V	120.0	37.7	8.8	74.0
2290.80000	55.2	1000.000	169.0	V	30.0	31.5	18.8	74.0
1694.00000	51.2	1000.000	168.0	V	30.0	28.4	22.8	74.0



Peak detector

Frequency (MHz)	MaxPeak (dBµV/m)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
7742.000000	63.6	1000.000	150.0	V	270.0	26.0	10.4	74.0
16174.40000	51.2	1000.000	150.0	V	0.0	19.2	22.8	74.0

6.0 Band Edge

6.1 Test Standard

FCC CFR 47, Part 15, Subpart B 15.247d.

| (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 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) (see Section 15.205(c)). |

6.2 Test Limits

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 30 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. Attenuation below the general limits specified in Section 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). (See Section 15.205(c).)

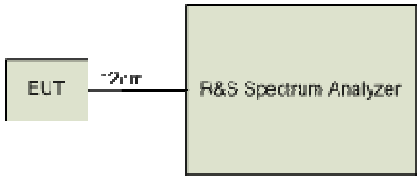
6.3 Test Setup

Conducted measurements are made on the EUT to ensure compliance with the required emission levels.

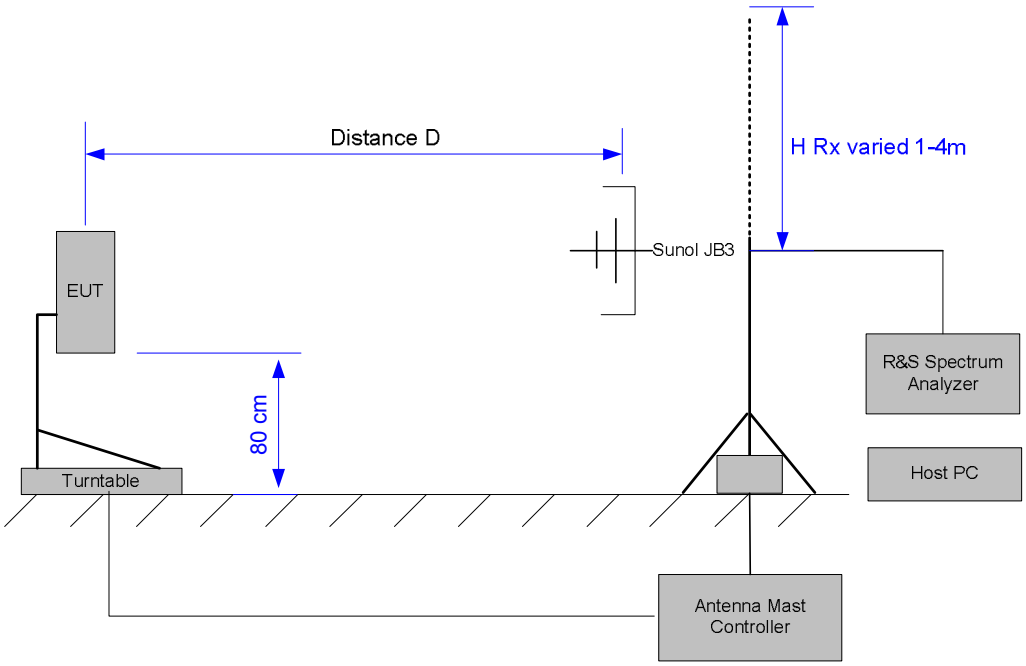
The test is performed at low and high channels. Compliance in the 902-928 MHz band is established through conducted measurements. Data is presented for the integrated 11 dBi antenna.

Please note that in the following plots the EUT is not transmitting on two channels simultaneously.

6.3.1 Test Setup Block Diagram – Conducted Measurements)

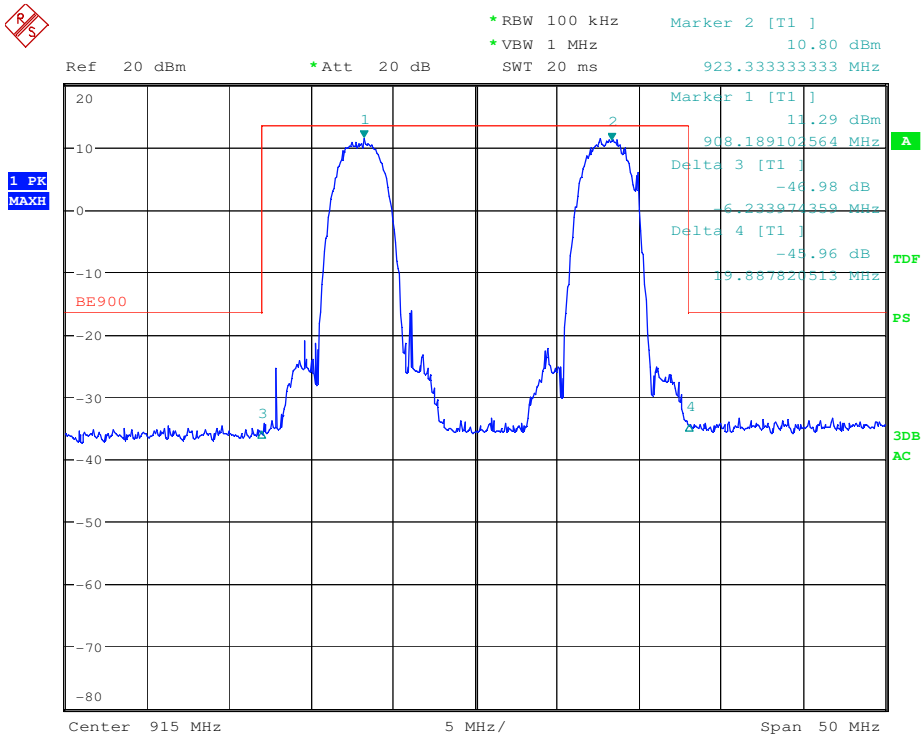


6.3.2 Test Setup Block Diagram – Radiated Measurements



6.4 Test Results, 902-928 MHz, Conducted Measurements

6.4.1 5MHz Bandwidth, DSSS



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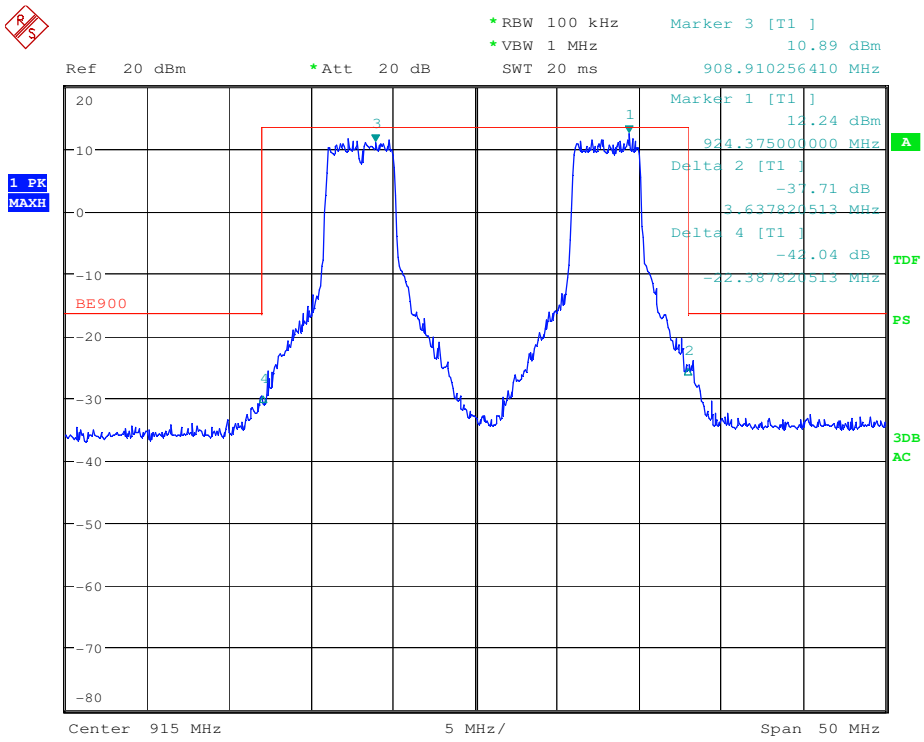
6.4.2 5MHz Bandwidth, OFDM



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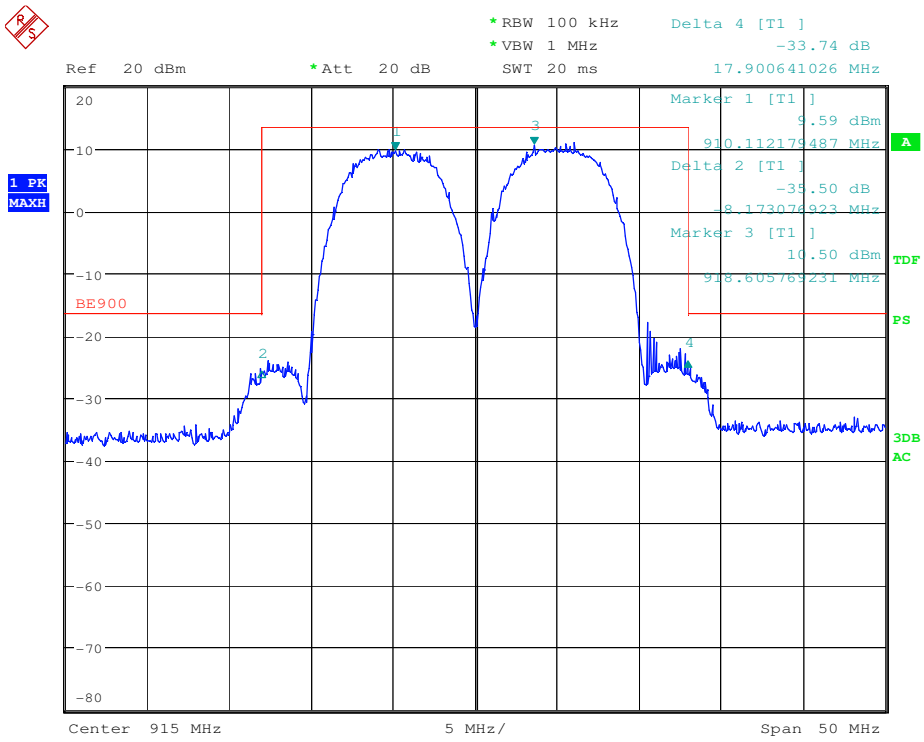
6.4.3 10MHz Bandwidth, DSSS



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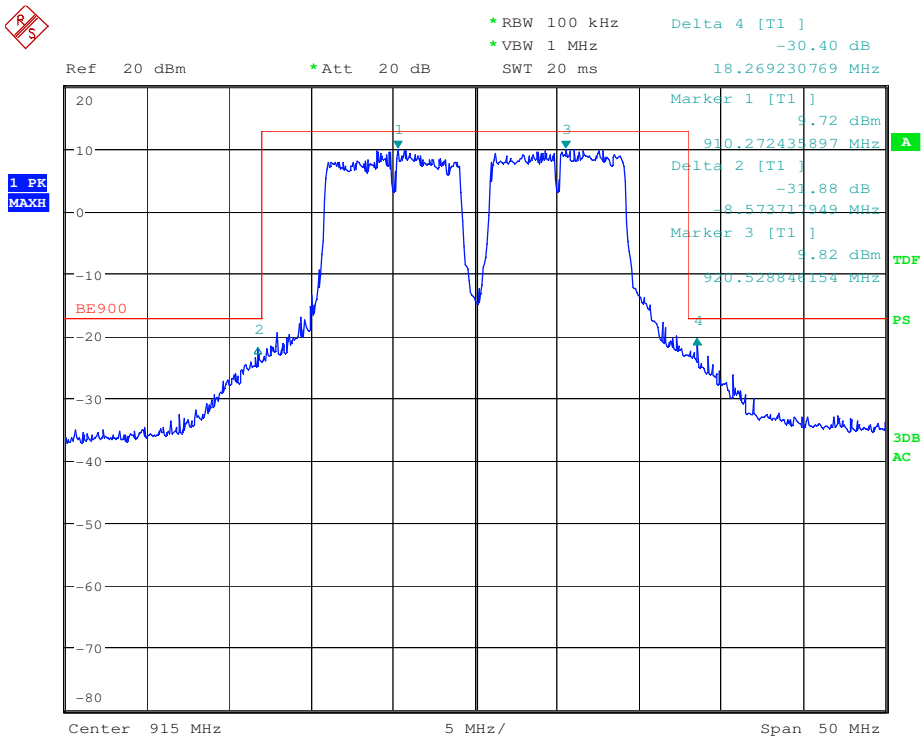
6.4.4 10MHz Bandwidth, OFDM



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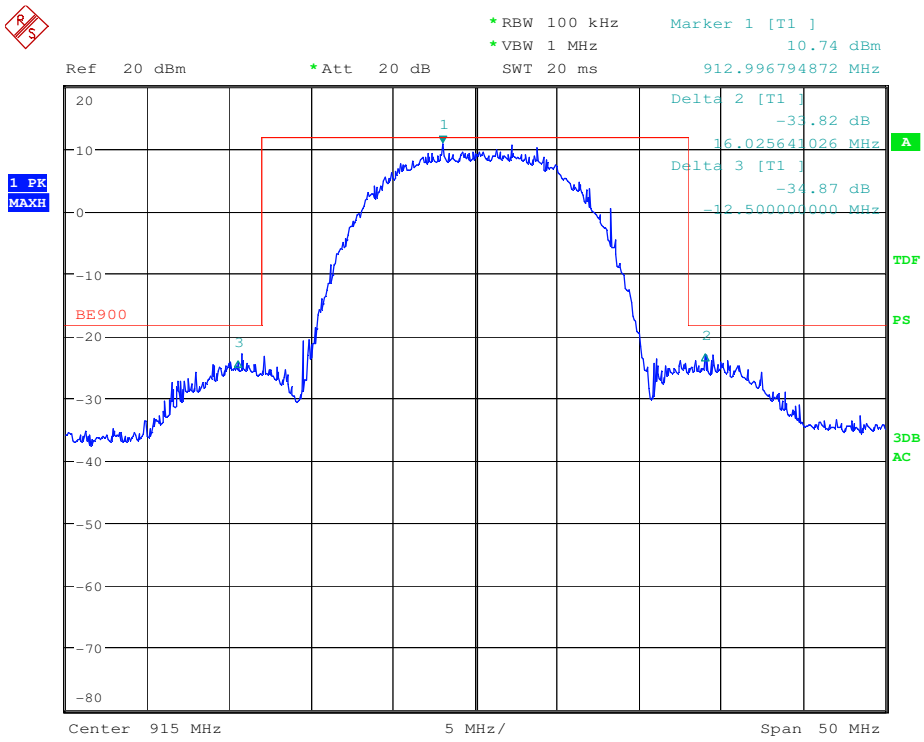
6.4.5 20MHz Bandwidth, DSSS



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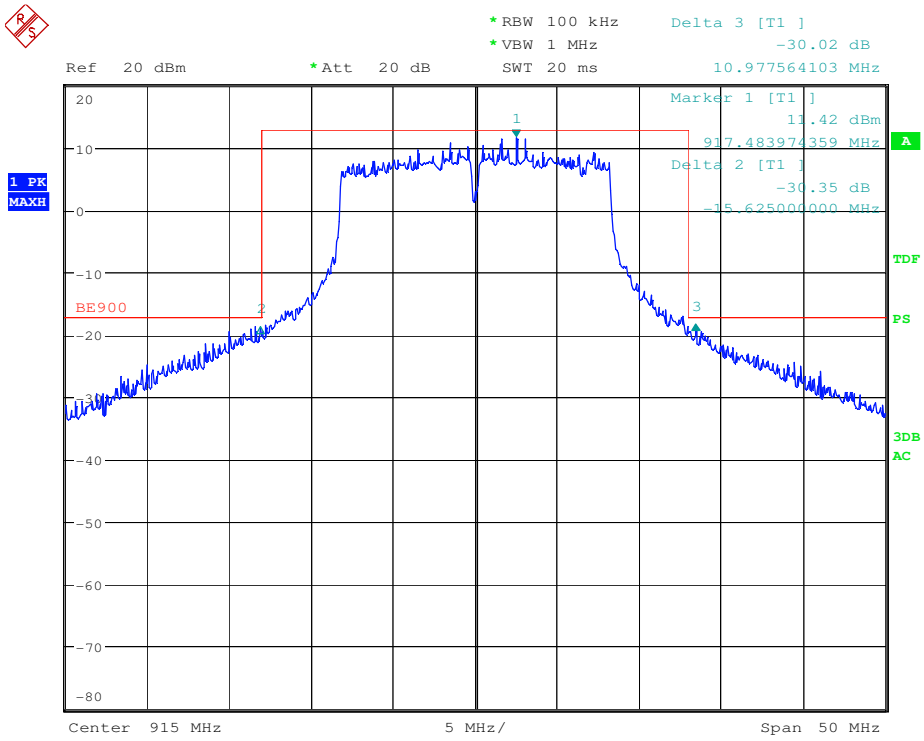
6.4.6 20MHz Bandwidth, OFDM



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All emissions outside the 902-928 MHz frequency band are attenuated by at least 30 dB.

7.0 Occupied Bandwidth

7.1 Test Standard

FCC CFR47, Part 15, Subpart B 15.247a.

| *(a) Operation under the provisions of this section is limited to frequency hopping and digitally modulated intentional radiators that comply with the following provisions:*

(2) Systems using digital modulation techniques may operate in the 902 - 928 MHz, 2400 - 2483.5 MHz, and 5725 - 5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz. |

7.2 Test Limits

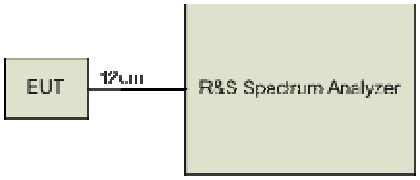
The minimum 6 dB bandwidth shall be at least 500 kHz.

7.3 Test Setup

This test is performed conducted. The measurement equipment is connected directly to the antenna port of the EUT.

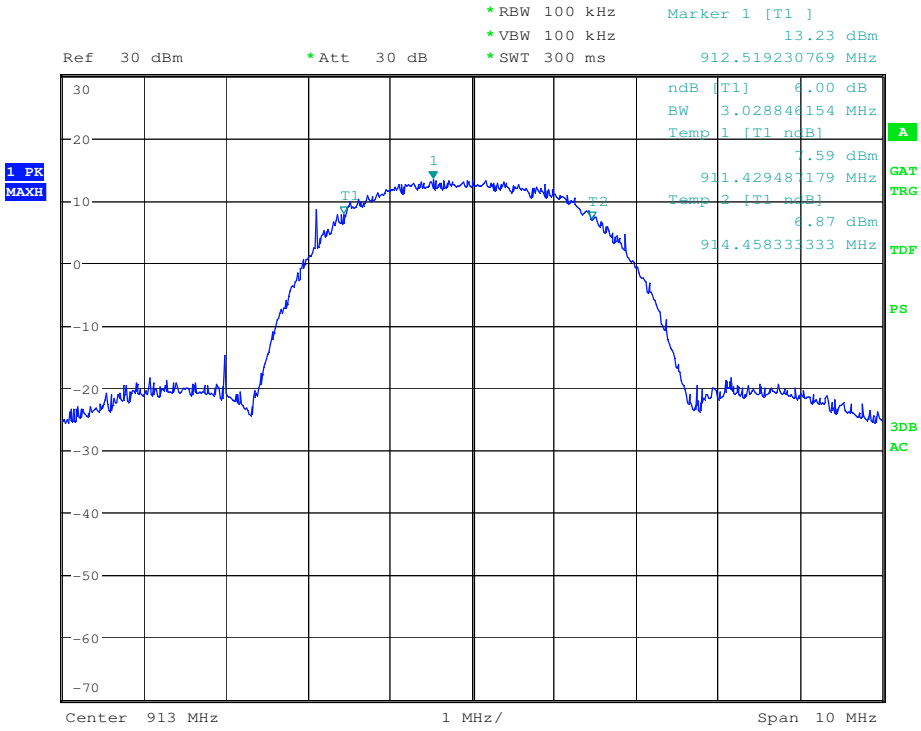
The test is performed at low, middle and high channels using both OFDM and DSSS modulations in 20 MHz, 10MHz and 5MHz bandwidths.

7.3.1 Test Setup Block Diagram



7.4 Test Results, 6 dB Occupied Bandwidth

7.4.1 DSSS – 5MHz



Date: 7.JAN.2009 15:02:05

DSSS – 10MHz

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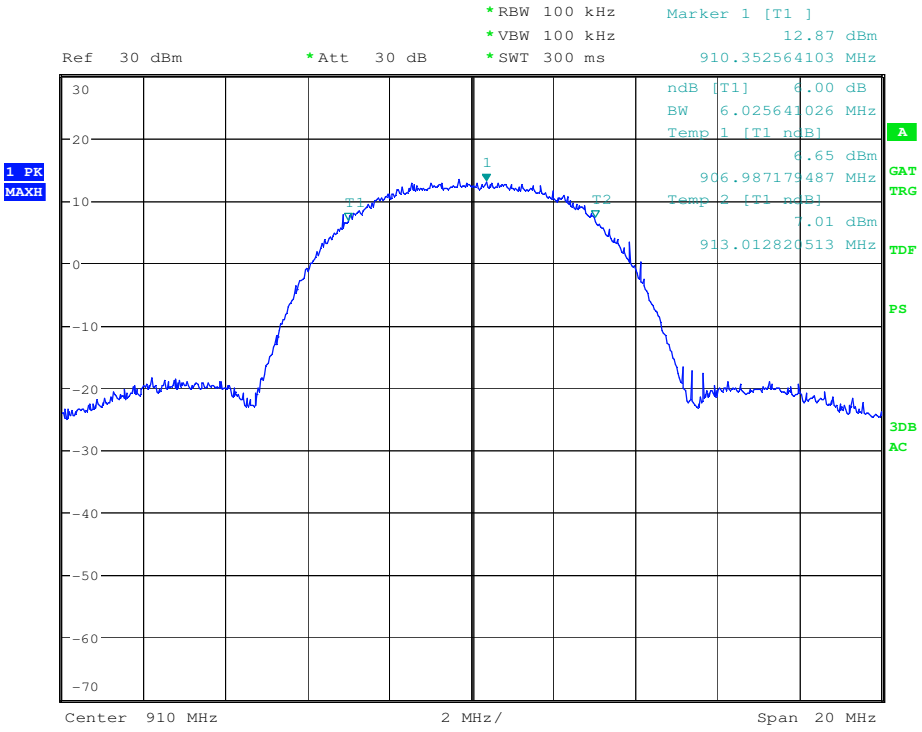

Date: 7.JAN.2009 14:53:51

DSSS – 20MHz

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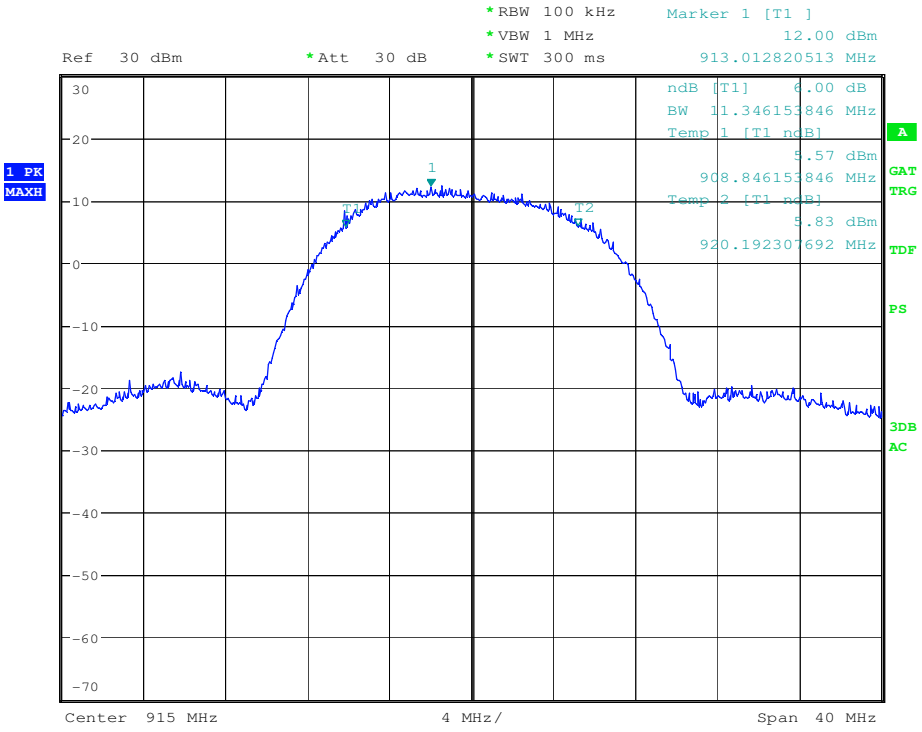

7.4.2 OFDM – 5MHz

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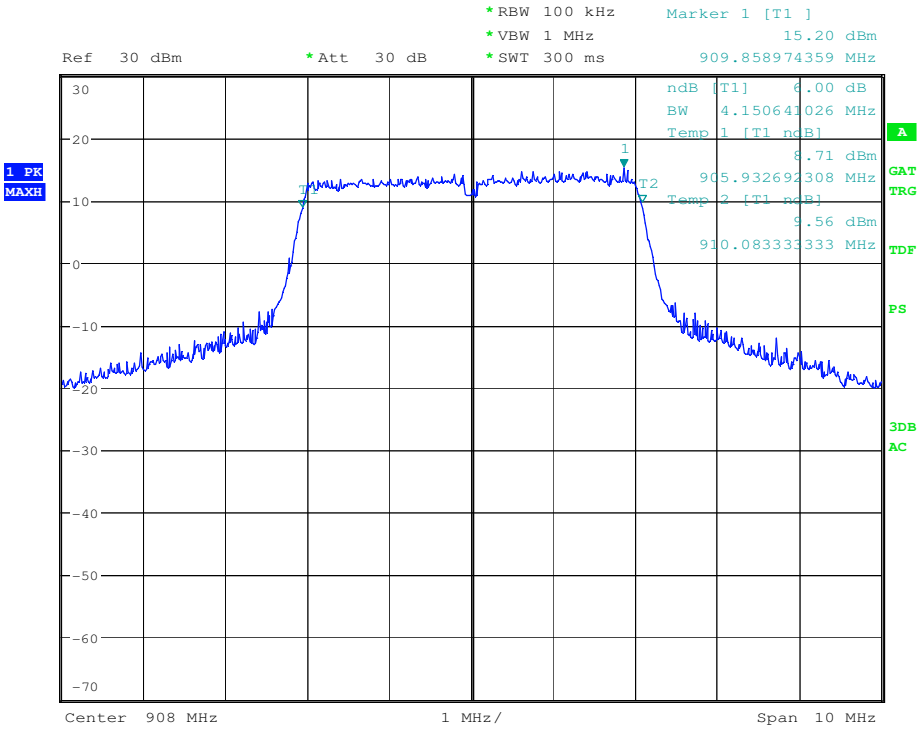

Date: 7.JAN.2009 14:35:36

OFDM – 10MHz

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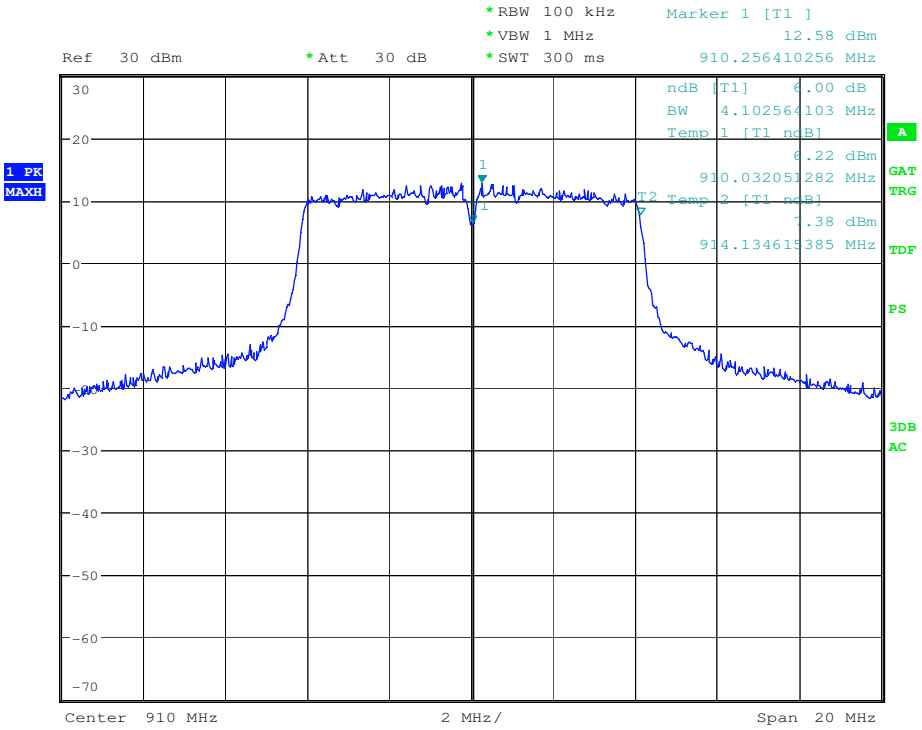

Date: 7.JAN.2009 14:38:03

OFDM – 20MHz

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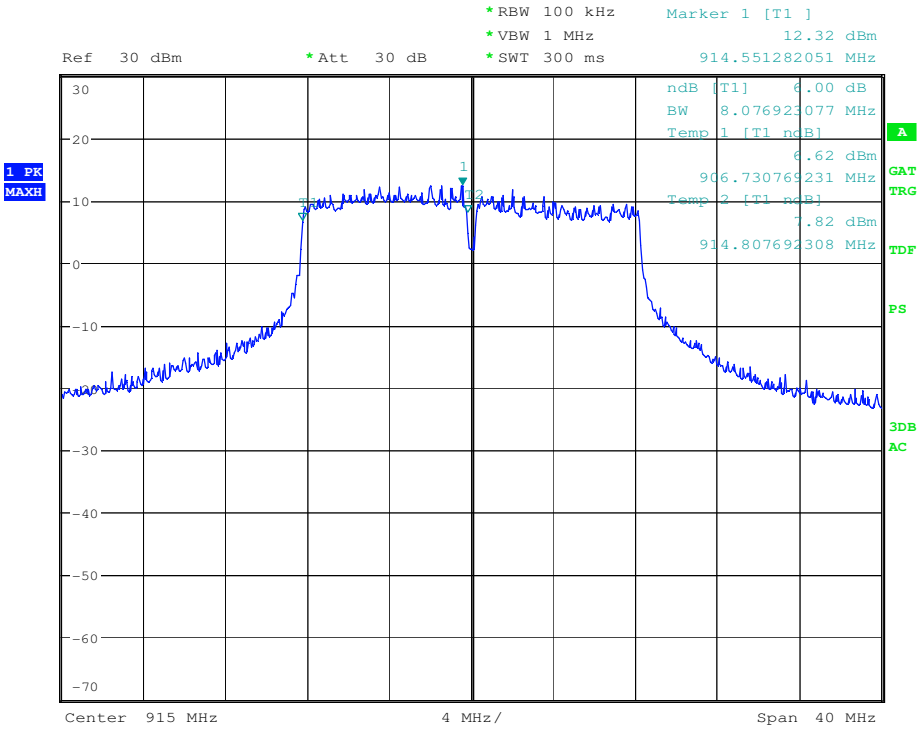


Date: 7.JAN.2009 14:44:12

Data Table – Occupied Bandwidth

Mode DSSS/ Channel BW = 5MHz			
Frequency(MHz)	**Occupied Bandwidth(MHz)**	**Limit**	**Result**
908	3.06	0.5	PASS
913	3.03	0.5	PASS
923	3.03	0.5	PASS

Mode DSSS/ Channel BW = 10MHz			
Frequency(MHz)	**Occupied Bandwidth(MHz)**	**Limit**	**Result**
910	6.03	0.5	PASS
920	6.35	0.5	PASS

Mode OFDM/ Channel BW = 5MHz			
Frequency(MHz)	**Occupied Bandwidth(MHz)**	**Limit**	**Result**
908	4.15	0.5	PASS
913	4.15	0.5	PASS
923	4.16	0.5	PASS

Mode OFDM/ Channel BW = 10MHz			
Frequency(MHz)	**Occupied Bandwidth(MHz)**	**Limit**	**Result**
910	4.10	0.5	PASS
920	4.16	0.5	PASS

Channel BW = 20MHz				
Frequency(MHz)	**Mode**	**Occupied Bandwidth(MHz)**	**Limit**	**Result**
915	DSSS	11.35	0.5	PASS
	OFDM	8.08	0.5	PASS

8.0 Power Spectral Density

8.1 Test Standard

FCC CFR 47, Part 15, Subpart B 15.247e.

| *(e) For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of Paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.* |

8.2 Test Limits

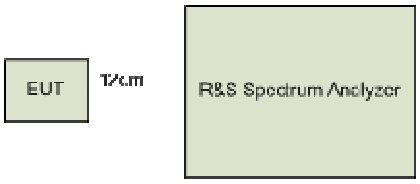
The transmitted power density shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

8.3 Test Setup

This test is performed conducted. The measurement equipment is connected directly to the antenna port of the EUT.

The test is performed at low, middle and high channels using both OFDM and DSSS modulations in 20 MHz, 10MHz and 5MHz bandwidths.

8.3.1 Test Setup Block Diagram



8.4 Test Results 15.247

Data Table – Power Spectral Density

Frequency(MHz)	DHSS PSD in 3 KHz (dBm)	Limit	Result
908	0.49	8	PASS
913	-0.31	8	PASS
923	1.10	8	PASS

Frequency(MHz)	DHSS PSD in 3 KHz (dBm)	Limit	Result
910	-0.72	8	PASS
920	-4.12	8	PASS

Frequency(MHz)	OFDM PSD in 3 KHz (dBm)	Limit	Result
908	-0.02	8	PASS
913	-0.46	8	PASS
923	-1.27	8	PASS

Frequency(MHz)	OFDM PSD in 3 KHz (dBm)	Limit	Result
910	-2.45	8	PASS
920	-3.07	8	PASS

Frequency(MHz)	Mode	PSD in 3 KHz (dBm)	Limit	Result
915	DSSS	-2.69	8	PASS
	OFDM	-2.95	8	PASS

9.0 RF Exposure Evaluation

FCC 1.1310 states the criteria listed in the table below shall be used to evaluate the environmental impact of human exposure to radiofrequency (RF) radiation as specified in Section 1.1307(b), except in the case of portable devices which shall be evaluated according to the provisions of Section 2.1093 of this chapter. Further information on evaluating compliance with these limits can be found in the FCC's OST/OET Bulletin Number 65, "Evaluating Compliance with FCC-Specified Guidelines for Human Exposure to Radiofrequency Radiation".

Frequency Range (MHZ)	Electric Field Strength (V/m)	Magnetic Field Strength (A/M)	Power Density (mW/cm^2)	Average Time
(A) Limits for Occupational/Control Exposures				
300-1500	--	--	F/300	6
1500-100,000	--	--	5	6
(B) Limits for General Population/Uncontrolled Exposures				
300-1500	--	--	F/1500	6
1500-100,000	--	--	1	30

9.1 EUT Operating Condition

The maximum antenna gain is 13 dBi.

9.2 RF exposure evaluation distance calculation

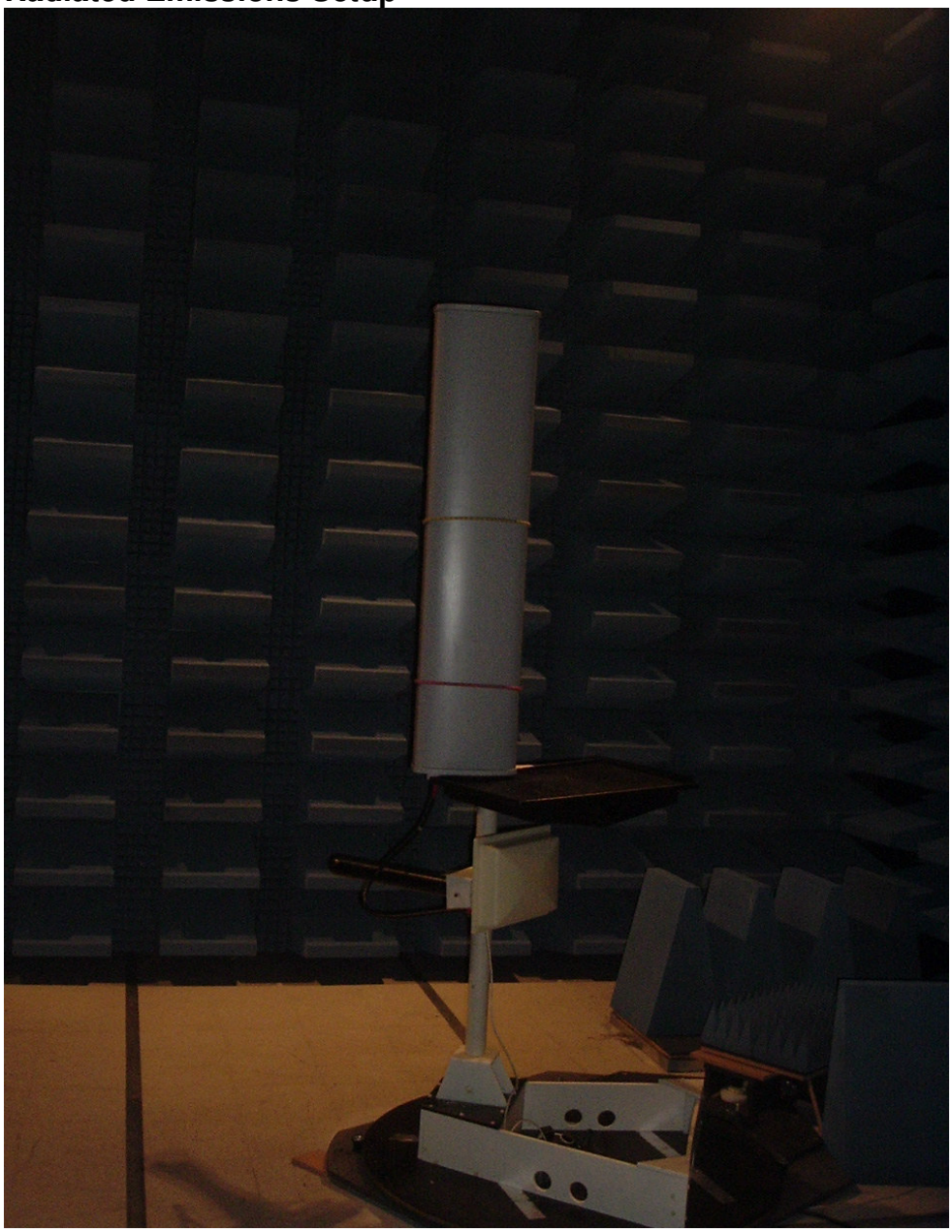
EUT with 13 dBi antenna

Freq (MHz)	Output Power to Antenna (dBm)	Antenna Gain (dBi)	r (cm)
908	26.66	13	34.8
910	27.07	13	36.5
913	26.26	13	33.2
915	27.69	13	39.1
920	25.95	13	31.9
923	25.43	13	30

As shown above, the minimum distance where the MPE limit is reached is 39.1 cm for the EUT.

10.0 Test Photos

Radiated Emissions Setup



Conducted Emissions Setup

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