TRANZEO
EMC LABS INC

EMC Test Report

TR-6600 Series

2.4 GHz Wireless Network Adapter
Tranzeo Wireless Technologies Inc.

Date: April 20, 2006

Report No.: 200406.1

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

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Revision History

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1.0 General Information

1.1 EUT Description

Product Name	Wireless Access Point
Company Name	Tranzeo Wireless Technologies Inc.
FCC ID	QRF-24QGFKT2U
Model No.	TR-6615; TR-6619 TR-6600
Frequency Range	2400-2483.5 MHz
Number of Channels	11
Transmit Rate	11Mbps maximum bit rate specification
Type of Modulation	Direct Sequence Spread Spectrum
Antenna Type	Integrated and external
Antenna Gain	2400-2483.5: 24 dBi MAX
Product Software	Tranzeo 2.4 GHz AP 2.10
Test Software	Bandwidth test software
Operator Channel Selection	By software
Power Adapter	Tranzeo Wireless Supplied SP48-181000
	Input: AC 120V 60Hz, 25.9 W
	Output: DC 18 V, 1000 mA
	Serial: 0504

Product samples tested:

Manufacturer	Model No.	Serial No.
Tranzeo Wireless	TR-6615	TR-6600-EUT1
Tranzeo Wireless	TR-6619	TR-6600-EUT2
Tranzeo Wireless	TR-6600	TR-6600-EUT3

Frequency of each channel:

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

The three products, TR-6615, TR-6619 and TR-6600, are a product family. They are functionally identical except for the following:

- The TR-6615 is fitted with a 15 dBi gain antenna.
- The TR-6619 is fitted with a 19 dBi gain antenna.
- The TR-6600 is fitted with a standard Type N antenna connector.

As an IEEE 802.11b compliant wireless bridge, this device includes a 2.4 GHz receive function and a 2.4 GHz digital modulation transmit function. The unit is fitted with an integrated antenna. 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 6 for digitally modulated devices.

1.2 Operational Description

The TR-6600 series is a wireless network bridge designed specifically for outdoor applications. The device provides a bridge between IEEE802.3 wired Ethernet LANs nd IEEE802.11a compliant wireless networks. It uses an external antenna coupled with a 802.11a transceiver to connect to remote wireless clients. The transceiver is connected to N-female and operates in the frequency band 2400-2483.5 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 or typically for broadband internet access.

The type of RF modulation is DSSS. The device can transmit data at a bit rate of 11 Mbps or a real-world data rate of approximately 4 Mbps. 64/128 bit Wired Equivalent Protection (WEP) algorithm is used for secure communications. The device's standard compliance ensures that it can communicate with any 802.11b network.

The firmware used with the device prevents the use of channels outside the 2400-2483.5 MHz band.

The TR-6600 series product (including the TR-6615, TR-6619 and TR-6600) is used exclusively in a professionally installed, fixed point-to-point environment.

1.3 EUT Testing Configuration

The three products, the TR-6615, TR-6619 and TR-6600, are a product family. Extensive prescanning for individual tests was performed to determine the worst case configuration. Data is presented for worst case measurements only.

The EUT is mounted to 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. For the Type N connector unit, the antenna is connected to the EUT via 1 m of coaxial shielded cable. The 2nd Ethernet port is populated with 1 m of cable.

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 a transmit rate of 4 Mbps is specified reflecting the worst case data rate of the unit.

1.4 EUT Modifications

No modifications were necessary for this unit to comply with FCC Part 15 and Industry Canada RSS-210 Issue 6.

1.5 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

1.6 Test Equipment

Manufacturer	Model	Description	Serial No.	Cal Due Date
Sunol Sciences	SM46C	Turntable	051204-2	N/R
Sunol Sciences	Custom	Mast Motor	TREML0001	N/R
Sunol Sciences	JB3	Antenna	A042004	05-May-06
Sunol Sciences	DRH-118	Antenna	A052804	02-Jun-06
FCC	FCC-LISN-50-25-2	LISN	105	02-Jun-06
Wavetek	8501	Power Meter	45-00218	27-Jul-06
Wavetek	17266	Power Detector	1509315	27-Jul-06
Hewlett Packard	11970A	Harmonic Mixer	2332A00886	N/R
Hewlett Packard	11975A	Amplifier	2517A00949	N/R
Rohde & Schwarz	FSP40	Spectrum Analyzer	100184	24-Aug-2006
Rohde & Schwarz	NRP	Power Meter	100055	02-Aug-2006
Rohde & Schwarz	ESCI	EMI Receiver	100123	15-May-2006

1.7 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
Cat 5 LAN	Populate 2nd Ethernet port	1 m

1.8 Test Results

The EUT complies with FCC Part 15, Subparts B and C, as well as Industry Canada RSS-210 Issue 6.

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

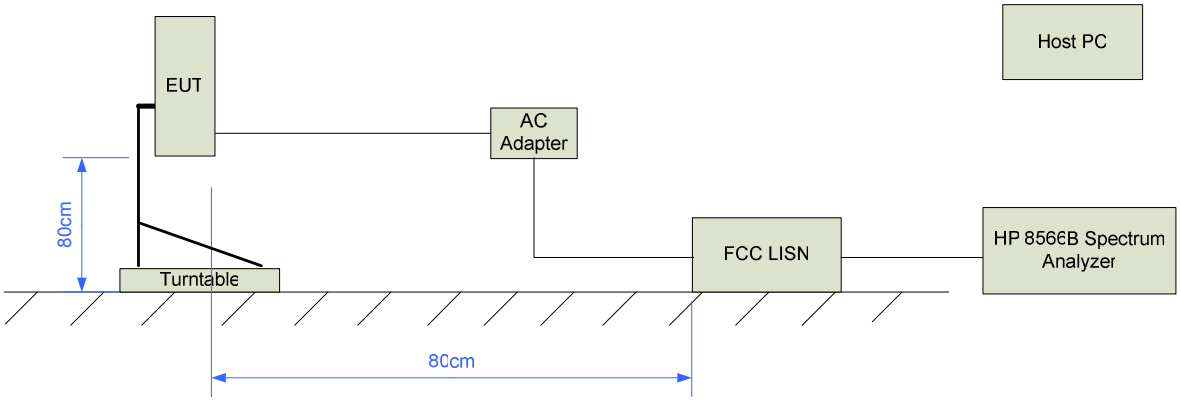
Frequency (MHz)	Maximum Level (dBuV) Quasi-Peak	Maximum Level (dBuV) Average
0.15-0.50	66-56 (Log Delta)	56-46 (Log Delta)
0.50-5.00	56	46
5.00-30.0	60	50

2.3 Test Setup

Both samples were scanned in all modes. Testing was performed over the frequency range of 0.15 MHz to 30 MHz. Only worst case data is shown below.

The unit was exercised using bandwidth test software at a rate of 4 Mbps representing the worst case data rate. Testing was performed using channels 1, 6 and 11. Only data from the worst case TR-6619 is shown below.

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

Frequency (MHz)	Corr Reading (dBµV)	Margin (dBµV)	Polarity	Reading type	Result
0.158	55.42	-10.14	Line	QP	PASS
0.170	54.80	-10.15	Line	QP	PASS
0.182	54.17	-10.21	Line	QP	PASS
0.190	53.82	-10.21	Line	QP	PASS
0.194	53.64	-10.22	Line	QP	PASS
0.206	52.82	-10.53	Line	QP	PASS
0.222	52.03	-10.71	Line	QP	PASS
0.234	51.57	-10.73	Line	QP	PASS
0.242	51.25	-10.77	Line	QP	PASS
0.278	49.65	-11.21	Line	QP	PASS
0.298	48.74	-11.54	Line	QP	PASS
0.326	47.72	-11.83	Line	QP	PASS
0.358	46.52	-12.24	Line	QP	PASS
0.394	45.29	-12.68	Line	QP	PASS
0.438	43.93	-13.16	Line	QP	PASS
0.486	41.59	-14.63	Line	QP	PASS
10.734	33.41	-16.58	Line	Average	PASS
11.334	38.02	-11.97	Line	Average	PASS
11.894	39.11	-10.88	Line	Average	PASS
24.002	38.87	-11.12	Line	Average	PASS

Note: All data points are corrected for insertion loss.

EUT – Neutral

Frequency (MHz)	Corr Reading (dBµV)	Margin (dBµV)	Polarity	Reading type	Result
0.170	55.93	-9.02	Neutral	QP	PASS
0.186	55.03	-9.17	Neutral	QP	PASS
0.194	54.64	-9.21	Neutral	QP	PASS
0.202	54.40	-9.12	Neutral	QP	PASS
0.210	54.02	-9.18	Neutral	QP	PASS
0.238	53.13	-9.03	Neutral	QP	PASS
0.258	52.55	-8.93	Neutral	QP	PASS
0.266	52.15	-9.08	Neutral	QP	PASS
0.290	51.37	-9.14	Neutral	QP	PASS
0.318	50.71	-9.03	Neutral	QP	PASS
0.362	49.53	-9.15	Neutral	QP	PASS
0.382	49.10	-9.13	Neutral	QP	PASS
0.406	48.51	-9.21	Neutral	QP	PASS
0.450	47.80	-9.07	Neutral	QP	PASS
0.486	47.17	-9.06	Neutral	QP	PASS
11.486	41.82	-8.17	Neutral	Average	PASS
11.634	41.33	-8.66	Neutral	Average	PASS
12.082	41.61	8.38	Neutral	Average	PASS
12.198	42.35	-7.64	Neutral	Average	PASS
24.002	42.09	-7.90	Neutral	Average	PASS

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 is 30 dBm (1 Watt).

3.3 Test Setup

This test is performed with a modified unit. The antenna is removed and the intentional transmitter fitted with a modified production cable. The only modification to the cable is the addition of an appropriate connector that allows a direct connection to measurement equipment. The output of the EUT is connected directly to the power meter through an attenuator. Prescans using standby (beaconing) mode and data transfer mode were performed. The worst case measurements from standby mode are shown below.

This test is performed on channels 1, 6 and 11.

3.3.1 Test Setup Block Diagram

3.4 Test Results

Maximum Power

Channel	Frequency (MHz)	Measurement (dBm)	Limit (dBm)	Result
1	2412	19.9	30	PASS
6	2437	25.2	30	PASS
11	2462	19.6	30	PASS

Power reduction for 24 dBi antenna

Channel	Frequency (MHz)	Measurement (dBm)	Limit (dBm)	Result
1	2412	19.5	24	PASS
6	2437	23.48	24	PASS
11	2462	19.4	24	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. |

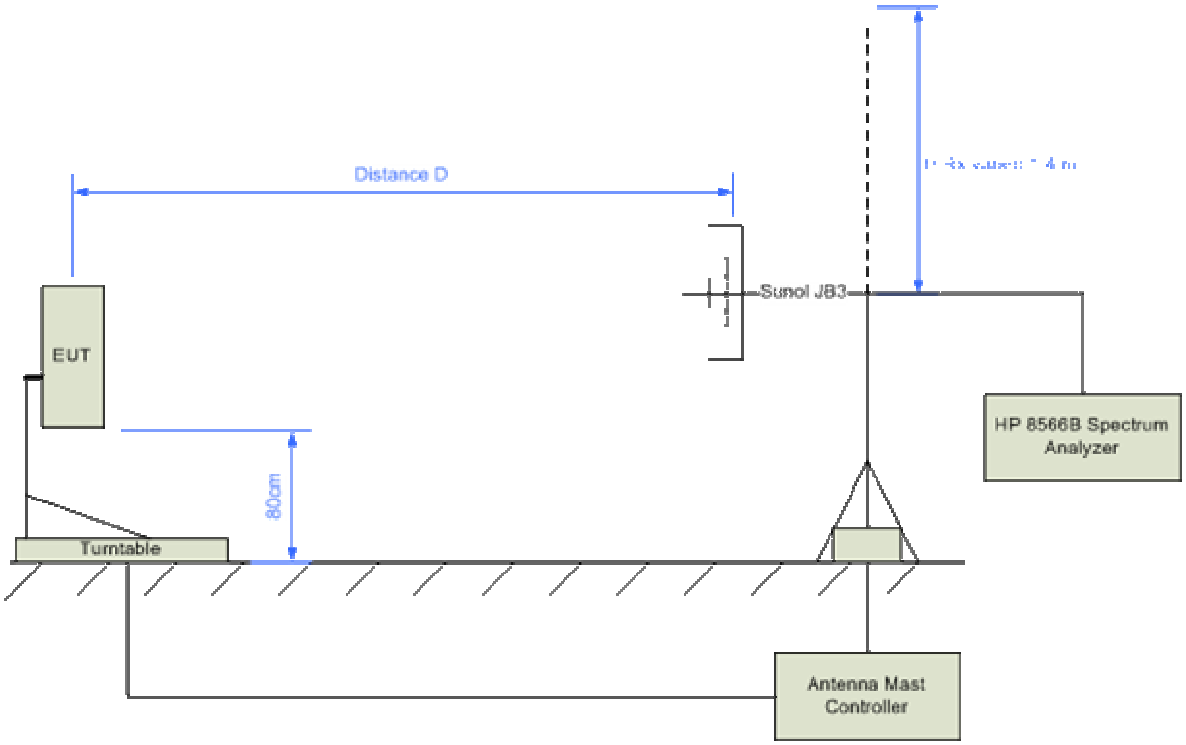
4.2 Test Limits

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

Both the TR-6615 and TR-6619 units were tested. The TR-6600 was tested with all antennas. Each unit was tested in both horizontal and vertical orientations. The EUT was exercised with bandwidth test software at a rate of 4 Mbps reflecting the worst case data-rate. Testing was performed on channels 1, 6 and 11. The TR-6619 was determined to be worst case. The 2nd Ethernet port is populated with 1 m of cable. Only worst case data is shown below.

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

Frequency (Mhz)	Meter (dBuV)	Limit (dBuV)	Margin (dB)	Type	Result
30.623	38.0	40.0	-2.0	QP	PASS
40.341	38.8	40.0	-1.2	QP	PASS
248.016	33.7	46.0	-12.3	QP	PASS
372.018	41.0	46.0	-5.0	QP	PASS
434.020	39.1	46.0	-6.9	QP	PASS
558.027	39.3	46.0	-6.7	QP	PASS
682.030	37.4	46.0	-8.6	QP	PASS
744.040	40.5	46.0	-5.5	QP	PASS
806.034	43.8	46.0	-2.2	QP	PASS

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

2400-2483.5 MHz limits:

- Harmonics and Spurious Emissions = 20 dBc
- Restricted Band Emissions = AVG 54 dBuV, PK 74dBuV

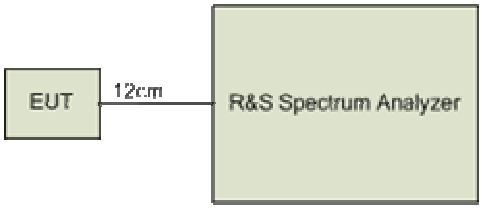
5.3 Test Setup – Spurious Emissions

This test is performed with a modified unit. The antenna is removed and the intentional transmitter fitted with a modified production cable. The only modification to the cable is the addition of an appropriate connector that allows a direct connection to measurement equipment. The output of the EUT is connected directly to the spectrum analyzer. The unit is exercised with bandwidth test software at a rate of 4 MBps reflecting the maximum possible transmit rate. This test is performed on channels 1, 6, and 11.

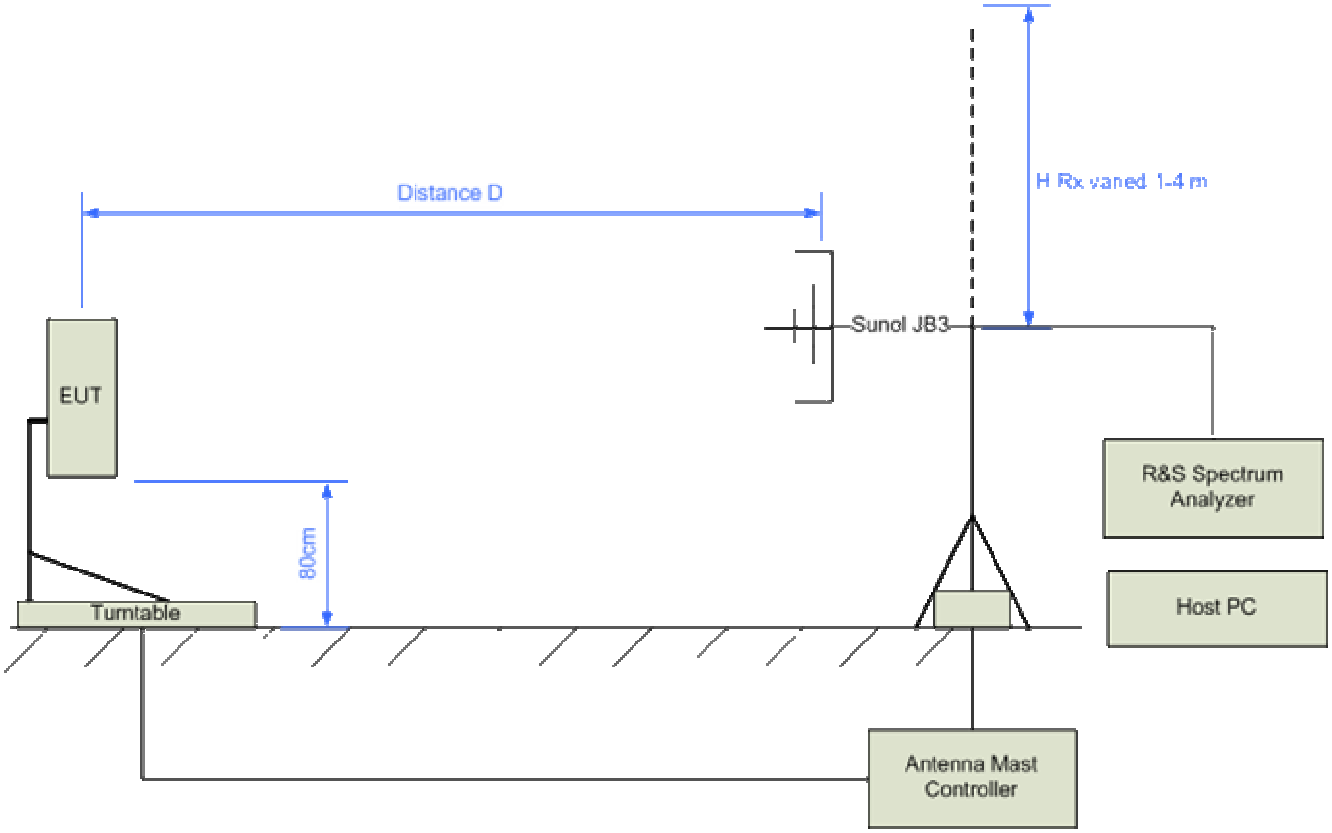
In addition to conducted measurements, extensive radiated pre-testing above 2 GHz is performed. The measurement antenna is scanned around all sides of the EUT to identify signals of interest. Additional measurements at an appropriate measurement distance are performed to ensure that emissions were at maximum. The TR-6600 with the 24 dBi antenna was determined to be worst case.

The antenna is connected to the EUT via 1 m of coaxial shielded cable.

5.3.1 Test Setup Block Diagram – Conducted Measurements (Harmonics)

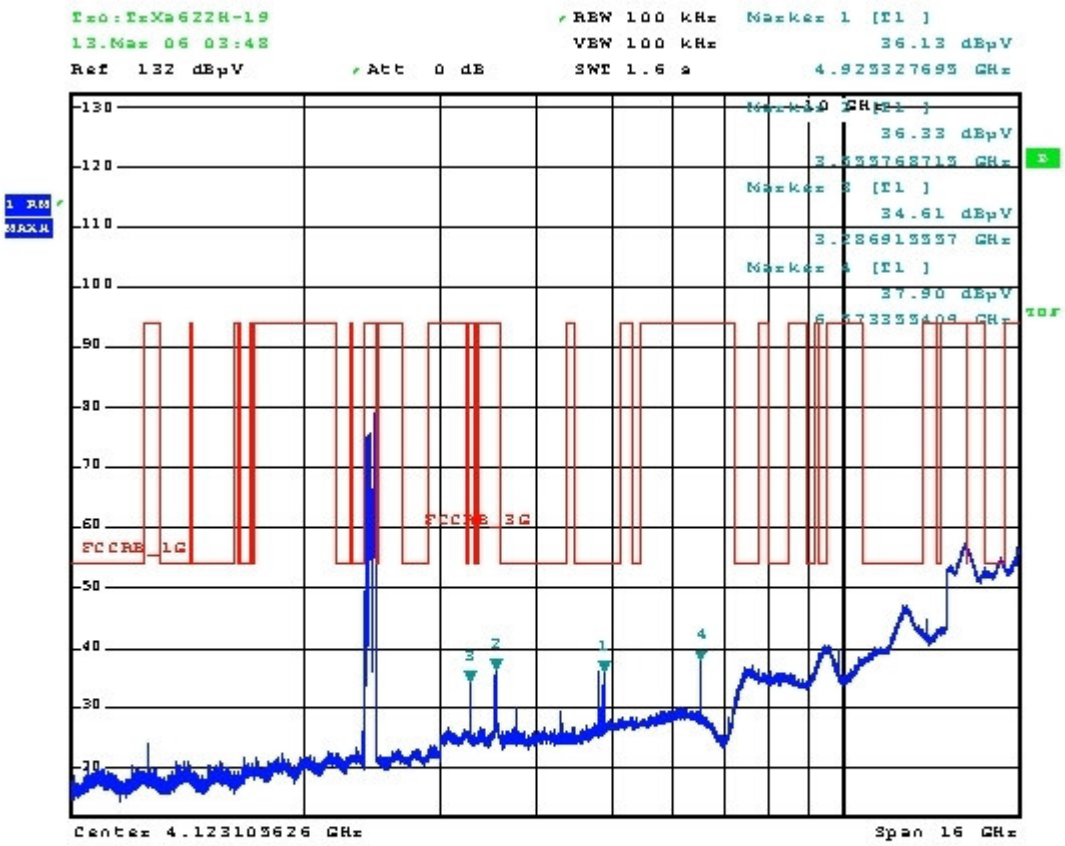


5.3.2 Test Setup Block Diagram – Radiated Measurements (Spurious)



5.4 Test Results

5.4.1 Test Results 15.247–Harmonics -20 dBc



Spurious and Harmonics (UnCorr FLTR) 2412 2437 2462M H V

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The above plot shows the worst case radiated output of the transmitter (all channels). All harmonics are at least -20 dBc.

5.4.2 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. Only worst case data is shown.

Frequency (Mhz)	Meter (dBuV)	Limit (dBuV)	Margin (dB)	Type	Result
4823.990	65.2	74.0	-8.8	Peak	PASS
4823.990	47.9	54.0	-6.1	Ave	PASS
7384.840	67.8	74.0	-6.2	Peak	PASS
7384.840	53.8	54.0	-0.2	Ave	PASS

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 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. 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

This test was performed radiated on all units and with all antennas. The TR-6600 with the 24 dBi grid antenna was found to be worst case. Only worst case measurements are shown below.

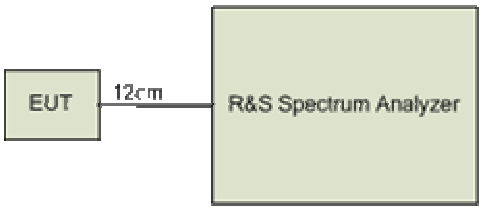
The EUT is exercised with bandwidth test software at a rate of 4 MBps reflecting the worst case transmit rate.

The antenna is connected to the EUT via 1 m of coaxial shielded cable.

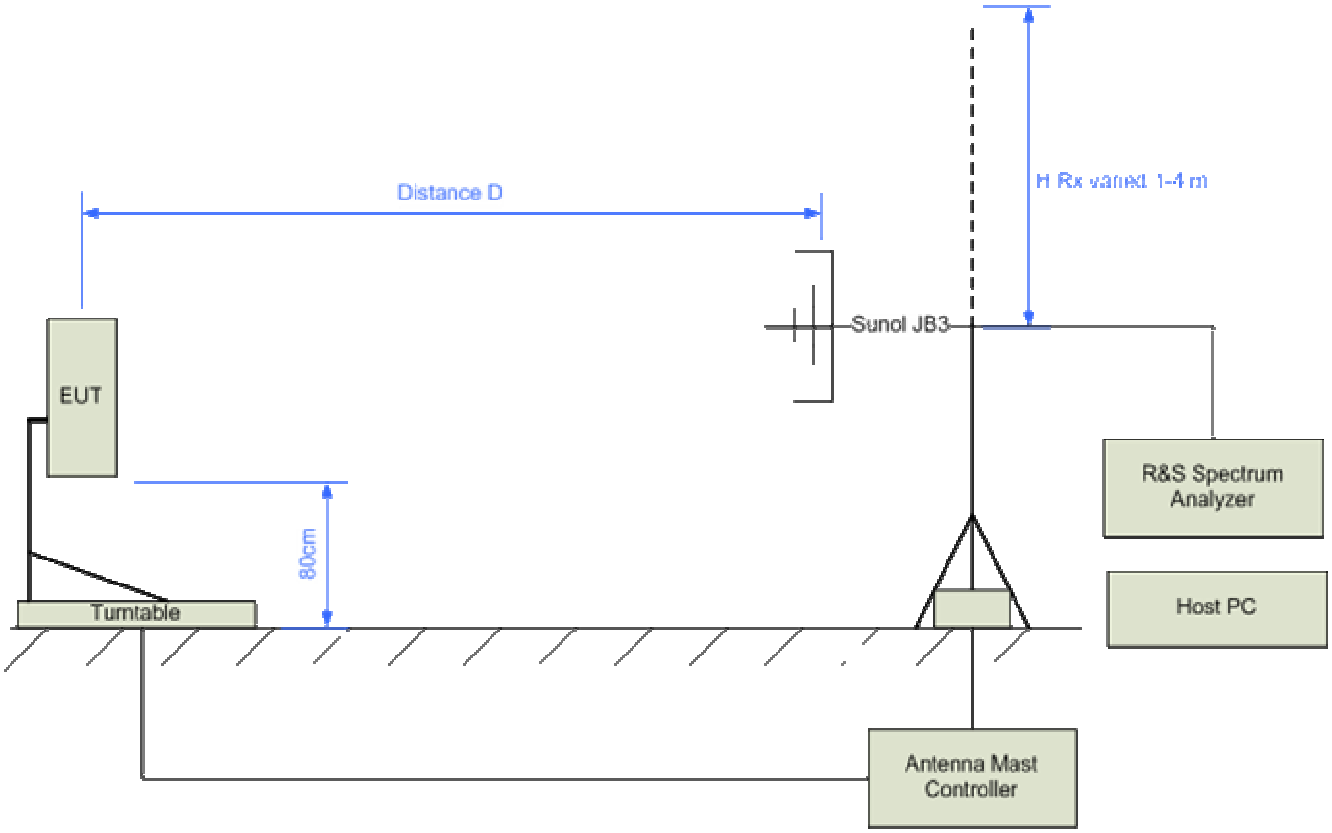
This test is performed on channels 1 and 11.

6.3.1 Test Setup Block Diagram

Conducted Setup



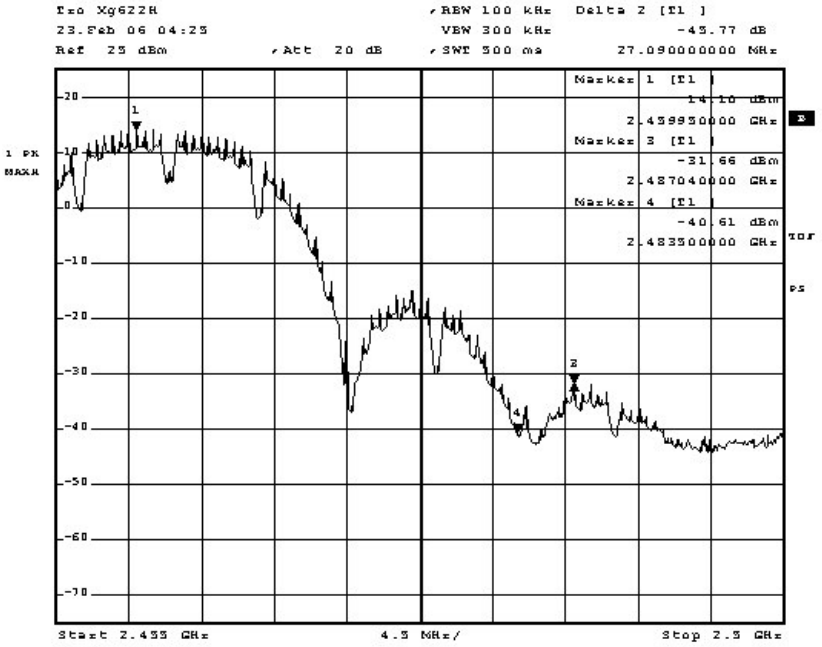
Radiated Setup

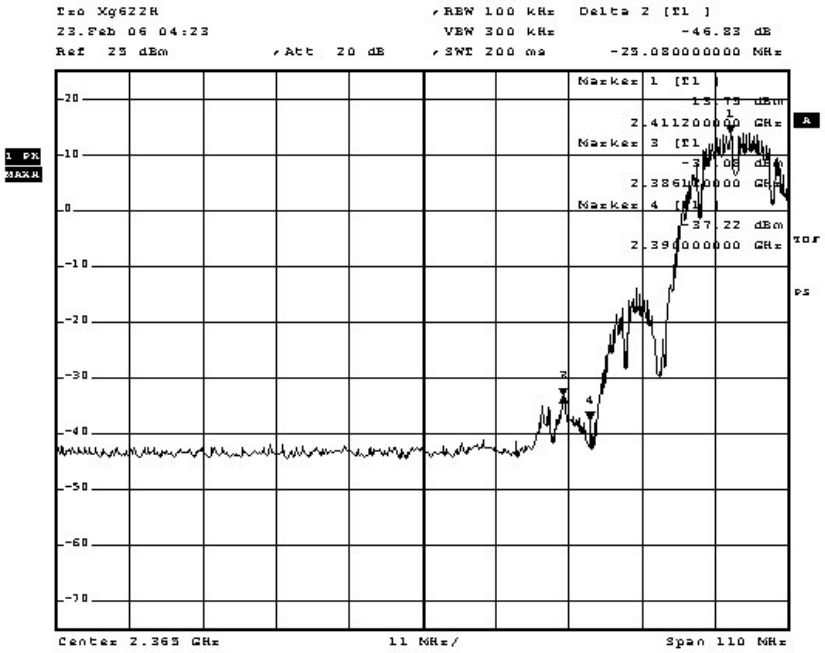


Radiated measurements are performed at a distance of 3 m.

6.4 Test Results

This measurement is performed using the peak-delta method. The conducted delta is measured using bandwidth settings of RBW, VBW = 100 KHz. This delta is then subtracted from the peak radiated power which is measured using settings of RBW, VBW = 1 MHz.





6.4.1 Test result, Channel 1

Hi Reading (dBm)	Lo Reading (dBm)	Delta (dB)	Peak Rdg RBW,VBW = 1 MHz (dBuV)	Low Rdg RBW,VBW = 1MHz (dBuV)	Limit (dBuV)	Margin	Result
14.10	-31.66	-45.77	117.83	72.06	74.0	-0.5	PASS

Average Value (dBuV)	Limit (dBuV)	Margin	Result
26.29	54.0	-14.5	PASS

6.4.2 Test result, Channel 11

Hi Reading (dBm)	Lo Reading (dBm)	Delta (dB)	Peak Rdg RBW,VBW = 1 MHz (dBuV)	Low Rdg RBW,VBW = 1MHz (dBuV)	Limit (dBuV)	Margin	Result
13.75	-33.08	-46.83	117.83	71.0	74.0	-1.0	PASS

Average Value (dBuV)	Limit (dBuV)	Margin	Result
24.17	54.0	-16.0	PASS

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

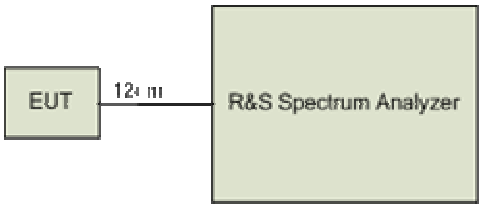
The minimum 6 dB bandwidth shall be at least 500 kHz.

7.3 Test Setup

This test is performed with a modified unit. The antenna is removed and the intentional transmitter was fitted with a modified production cable. The only modification to the cable is the addition of an appropriate connector that allows a direct connection to the measurement equipment. The output of the EUT is connected directly to the spectrum analyzer through an attenuator. The unit is exercised with bandwidth test software at a rate of 4 MBps reflecting the worst case transmit rate.

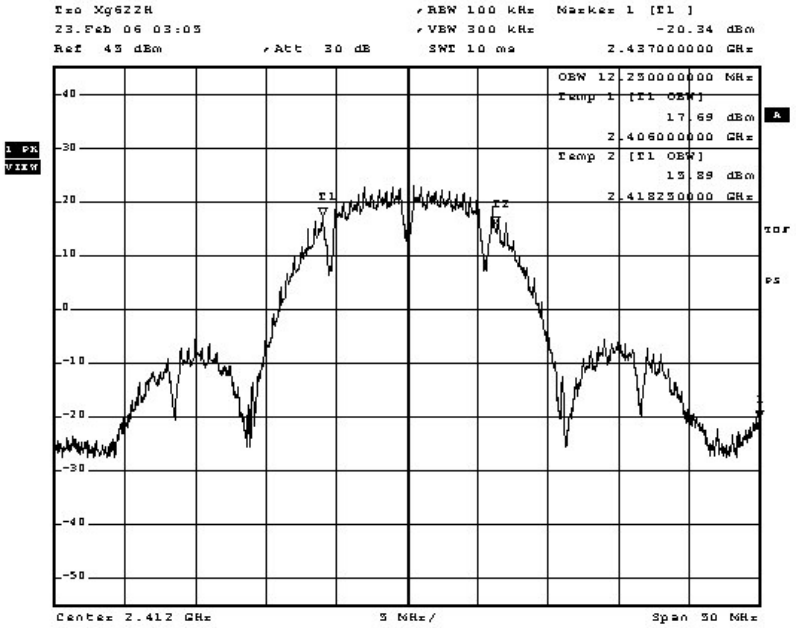
This test was performed on channels 1, 6 and 11.

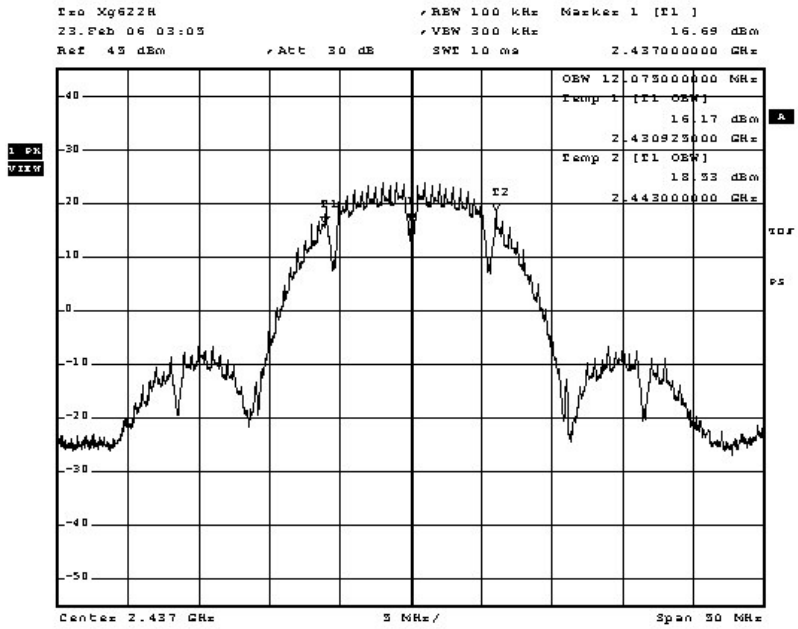
7.3.1 Test Setup Block Diagram

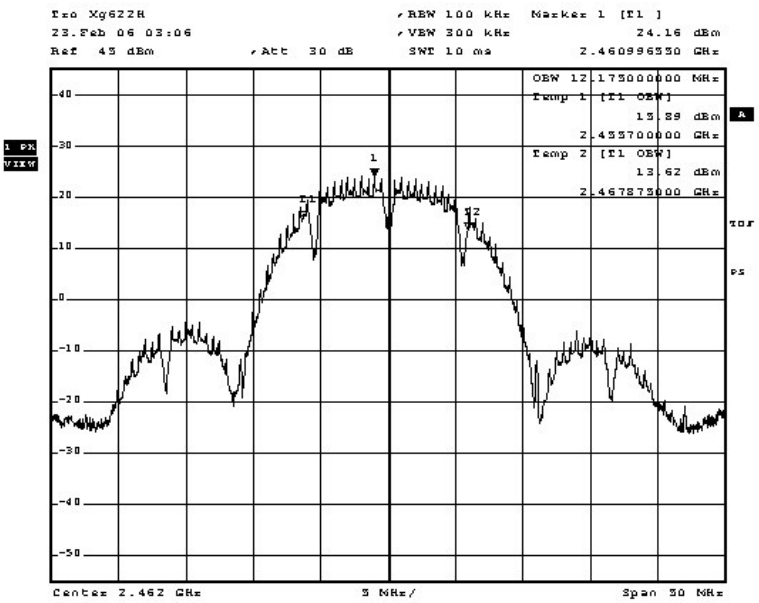


7.4 Test Results

6 dB Occupied Bandwidth







	Occupied Bandwidth (MHz)	Result
Ch 1	12.250	PASS
Ch 6	12.075	PASS
Ch 11	12.175	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

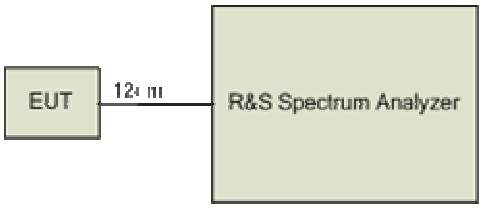
The transmitted power density shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

8.3 Test Setup

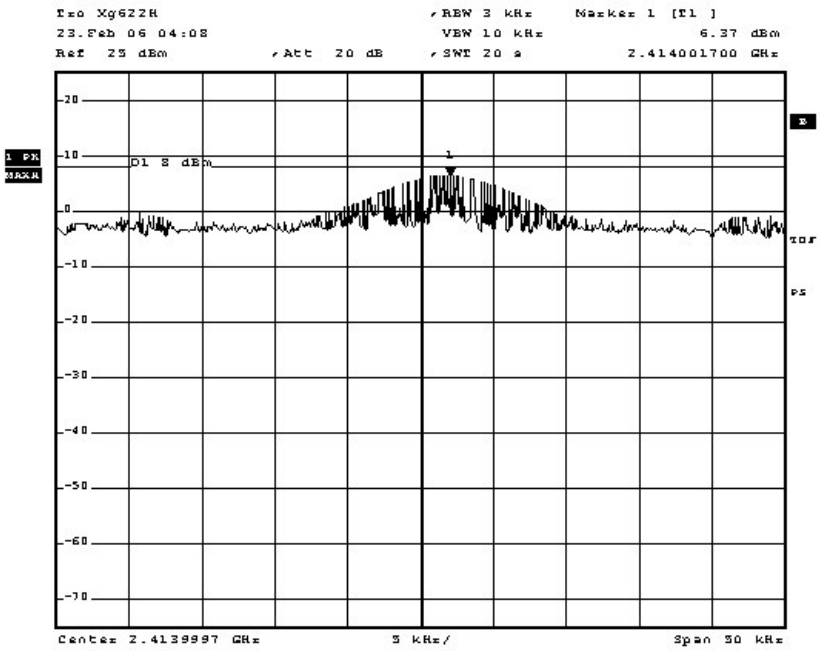
This test is performed with a modified unit. The antenna is removed and the intentional transmitter fitted with a modified production cable. The only modification to the cable is the addition of an appropriate connector that allows a direct connection to measurement equipment. The unit is exercised with bandwidth test software at a rate of 4 MBps reflecting the worst case transmit rate.

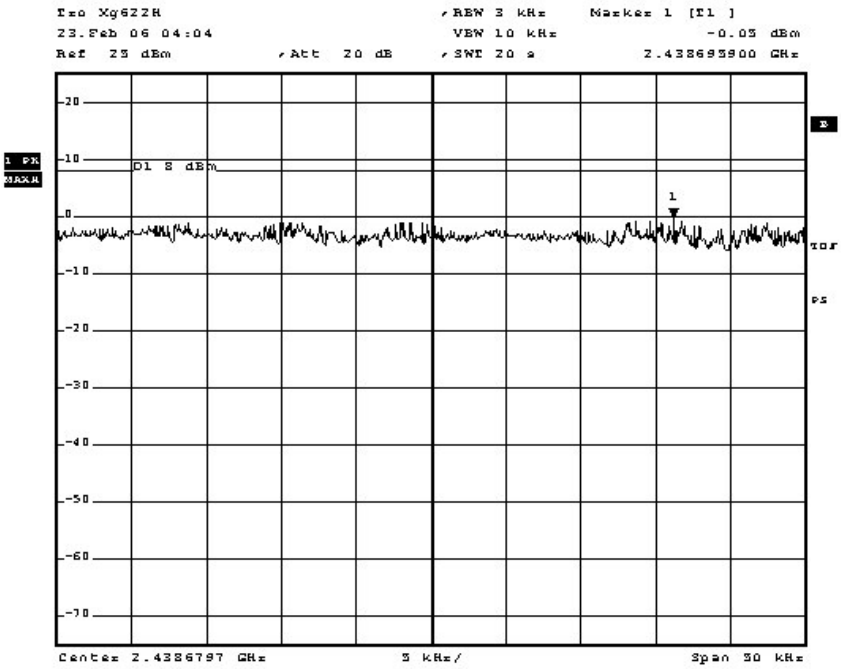
This test was performed on channels 1, 6 and 11.

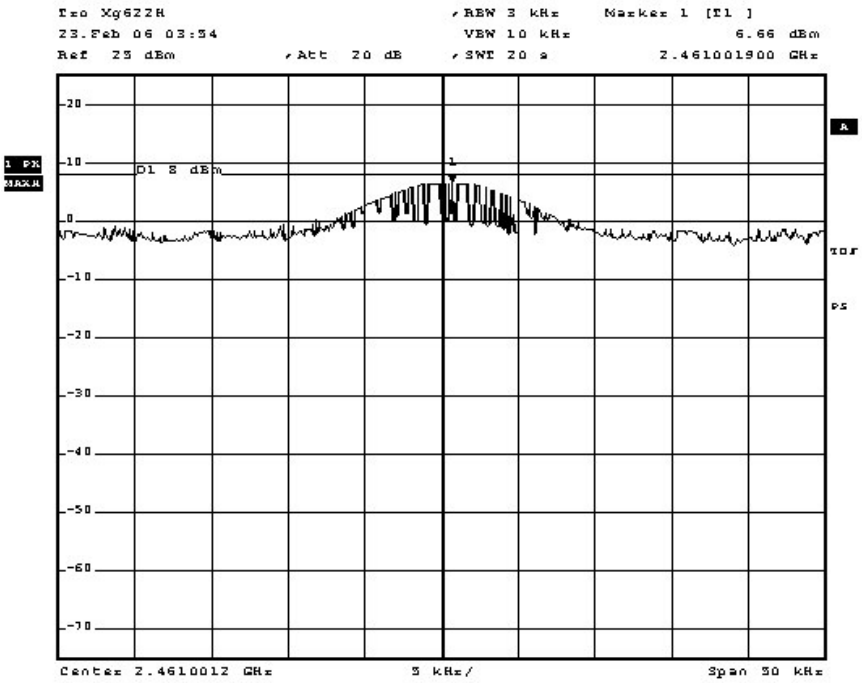
8.3.1 Test Setup Block Diagram



8.4 Test Results 15.247







Frequency (MHz)	Measurement (dBm)	Limit (dBm)	Result
2414.0	6.37	+8	PASS
2438.7	-0.05	+8	PASS
2461.0	6.66	+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

Maximum EIRP is obtained with the 24 dBi grid antenna. When used with this antenna the output of the radio is reduced to a maximum of 24 dBm as part of the hardware installation.

9.2 RF exposure evaluation distance calculation

EUT with 24 dBi antenna

Channel	Freq (MHz)	Output Power to Antenna (dBm)	Antenna Gain (dBi)	r (cm)
6	2437	23.48	24	67

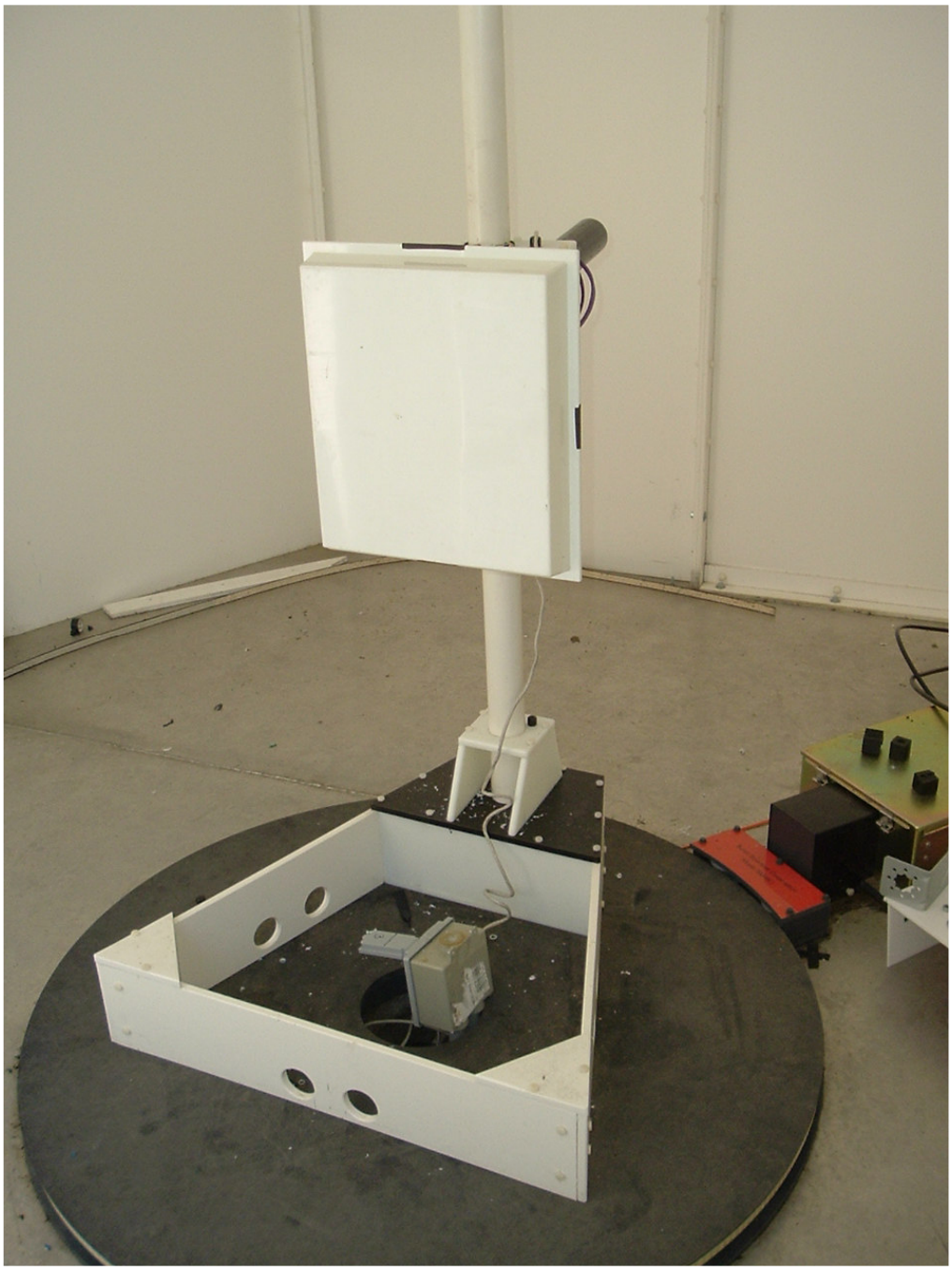
As shown above, the minimum distance where the MPE limit is reached is 67 cm for the EUT.

10.0 Test Photos

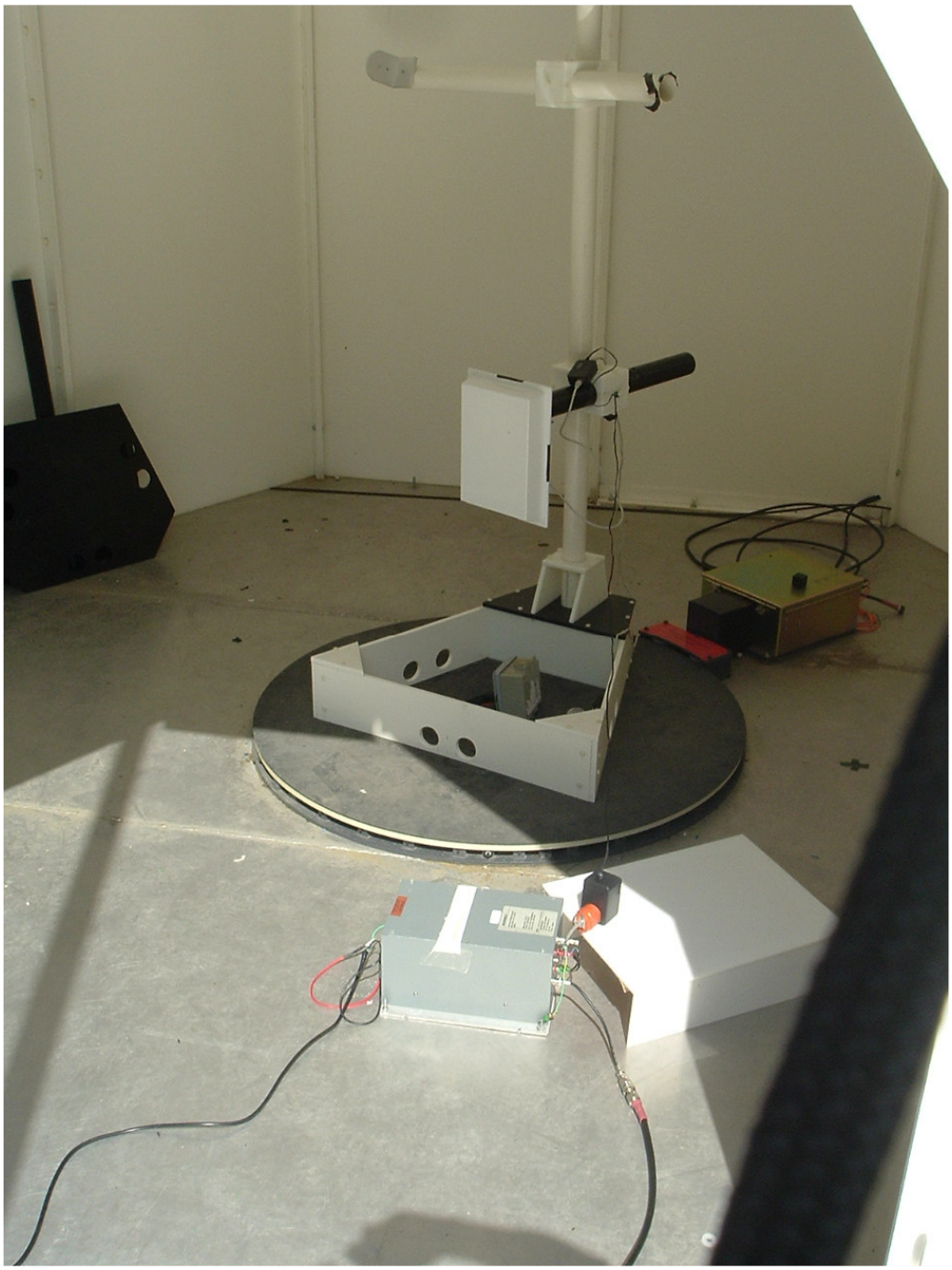
Radiated Emissions Test Setup – 12 dBi Dipole.

Radiated Emissions Test Setup – 17 dBi Sector.

Radiated Emissions Test Setup – 24 dBi Grid.



Radiated Emissions Test Setup Integrated antenna.



Conducted Emissions Test Setup.