Tranzeo EMC Labs Inc.
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Tranzeo Wireless Technologies Inc.
TR-49 Product Family
EMC Test Report

6 January 2006

Report Number: TRL060106.1

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Revision History

Table of Contents

1.0 General Information

1.1 EUT Description

Product Name	Wireless Network Adapter
Company Name	Tranzeo Wireless Technologies inc.
Model No.	TR-5a-NC; TR-5a-19C
Rated RF Output Power	Adjustable, 19 dBm MAX
Frequency Range	4950-4980 MHz
Number of Channels	7
Transmit Rate	54Mbps maximum bit rate specification
Type of Modulation	OFDM modulation
Antenna Type	External, N-female connector; Integrated Internal
Antenna Gain	19 dBi MAX
Product Software	Tranzeo build 99R
Test Software	bandwidth test software
Operator Channel Selection	By Software
Power Adapter	Sincho SP48-181000 Input: AC 110V 60Hz Output: DC 18 V, 1000 mA Serial: 0504

Product samples tested:

Manufacterer	Model No.	Serial No.
Tranzeo Wireless Technologies Inc.	TR-49-N	ENGR-001
Tranzeo Wireless Technologies Inc.	TR-49-19	ENGR-002

Channel List

190	4950 MHz
191	4955 MHz
192	4960 MHz
193	4965 MHz
194	4970 MHz
195	4975 MHz
196	4980 MHz

As an IEEE 802.11a compliant wireless bridge, this device includes a 4.9 Ghz Receive function and a 4.9 GHz digital modulation transmit function. The unit is fitted with an N-female connector to facilitate the use of an external antenna. The unit is also available 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 2, Part 15 and Part 90.

1.2 Operational Description

This information is contained in an attached document.

1.3 EUT Testing Configuration

The EUT was tested in the following modes:

1) Standby/Receive mode: In this mode the EUT beacons at the lowest possible rate while searching for a client with which to establish communication.

2) 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 27 megabits is specified reflecting the highest possible data rate of the unit.

1.4 EUT Modifications

No modifications were necessary for this unit to comply with FCC Part 2 and Part 90.

1.5 Overview of Test Results

FCC 2.1033(c)(3) USER'S MANUAL
The necessary information is contained in a separate document.

FCC 2.1033 (c)(4) TYPE OF EMISSIONS
FCC 90: 20M0X1D

FCC 2.1033 (c)(5) FREQUENCY RANGE
FCC 90: 4940-4990

FCC 2.1033 (c)(6) OPERATING POWER
19 dBm Conducted Output Power

FCC 2.1033 (c)(7) MAXIMUM POWER RATING
33 dBm Conducted Output Power

FCC 2.1033 (c)(8) DC VOLTAGES
The EUT has a maximum DC input voltage of 35 V DC

FCC 2.1033 (c)(9) TUNE-UP PROCEDURE
The necessary information is contained in a separate document.

FCC 2.1033(c)(10) SCHEMATICS AND CIRCUITRY DESCRIPTION
The necessary information is contained in a separate document.

FCC 2.1033(c)(11) LABEL AND PLACEMENT
The necessary information is contained in a separate document.

FCC 2.1033(c)(12) SUBMITTAL PHOTOS
The necessary information is contained in a separate document.

FCC 2.1033 (c)(13) MODULATION INFORMATION
The necessary information is contained in a separate document.

1.6 Test Facilities

Tranzeo EMC Labs
#2-11720 Stewart Cres.
Maple Ridge, BC Canada
V2X 9E7

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

FCC registration number: 960532
Industry Canada Number: 5238A

1.7 Test Equipment

Manufacturerer	Model	Description	Serial Number	Cal Due Date
Hewlett Packard	85650A	Quasi Peak Adapter	2043A00187	13-Aug-06
Hewlett Packard	8566B	Spectrum Analyzer	2637A04169	7-Feb-06
Hewlett Packard	85685A	Preselector	3010A1095	7-Feb-06
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
LR Technologies	SD-302	Environmental Chamber	8826	N/R

1.8 Test System Details

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

Manufacturer	Model	Description	S/N
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	50m
Cat 5 LAN	DC Block to Ethernet switch	2m

1.9 Test Results

The TR-49 product family complies with FCC Part 90.

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 30MHz 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

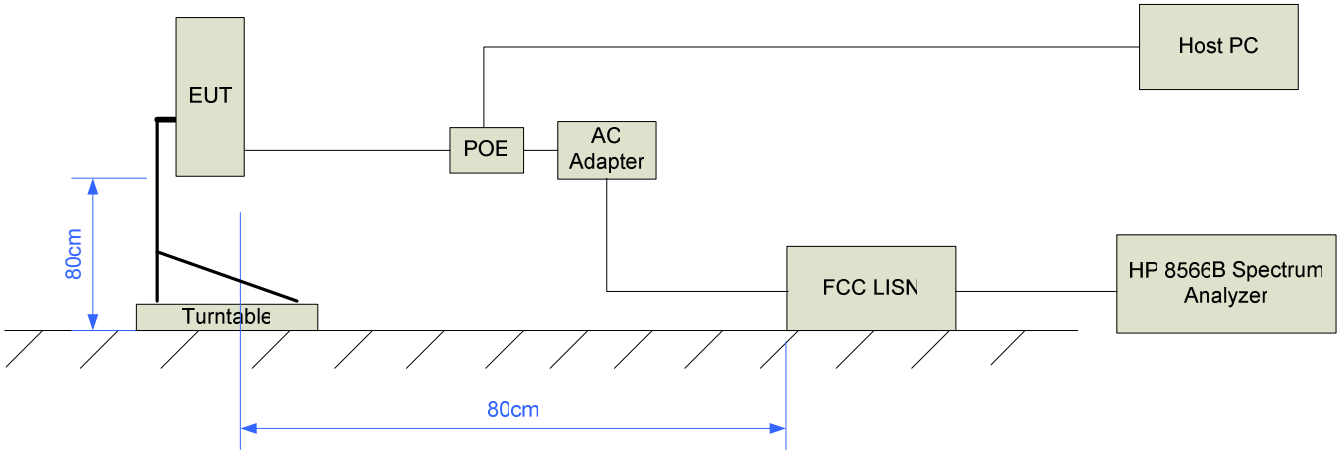
requency (MHz)	**Maximum Level (dBuV) Quasi-Peak**	**Maximum Level (dBuV) Average**
0.15-0.50	66-56 (Log Delta)	56-46 (Log Delta)
0.50-5.00	56	46
5.00-30.0	60	50

2.3 Test Setup

The EUT is excercised at a data rate of 27 Mbps representing the maximum possible data rate. Testing is performed while operating on the lowest, middle and highest channel.

Only worst case data is shown below.

2.3.1 Test Setup Block Diagram



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

2.4 Test Results

Line

Freq MHz	Meter dBµV	Factors	Corr	Spec	Margin	RType	Polar	Result
0.153	57.5	2	59.5	65.8	-6.3	Peak	Line	Pass
0.158	-0.4	2	1.6	55.6	-54	Ave	Line	Pass
0.164	-1	2	1	55.3	-54.3	Ave	Line	Pass
0.167	57	2	59	65.1	-6.1	Peak	Line	Pass
0.194	-1.4	2	0.6	53.9	-53.3	Ave	Line	Pass
0.195	56.9	2	58.9	63.8	-4.9	Peak	Line	Pass
0.267	55.7	2	57.7	61.2	-3.5	Peak	Line	Pass
0.270	3.7	2	5.7	51.1	-45.4	Ave	Line	Pass
0.460	54.3	2	56.3	56.7	-0.4	Peak	Line	Pass
0.468	-3.9	2	-1.9	46.6	-48.5	Ave	Line	Pass
0.470	46.7	2	48.7	56.5	-7.8	QP	Line	Pass
0.549	-60	2	-58	46	-104	Ave	Line	Pass
0.558	46.6	2	48.6	56	-7.4	QP	Line	Pass
0.584	45.8	2	47.8	56	-8.2	QP	Line	Pass
0.588	-4.9	2	-2.9	46	-48.9	Ave	Line	Pass
0.594	53.1	2	55.1	56	-0.9	Peak	Line	Pass

Neutral

Freq MHz	Meter dBµV	Factors	Corr	Spec	Margin	RType	Polar	Result
0.156	54.3	2.0	56.3	65.7	-9.4	QP	Neutral	Pass
0.167	53.4	2.0	55.4	65.1	-9.7	QP	Neutral	Pass
0.167	19.4	2.0	21.4	55.1	-33.7	Ave	Neutral	Pass
0.171	19.0	2.0	21.0	54.9	-33.9	Ave	Neutral	Pass
0.186	20.8	2.0	22.8	54.2	-31.4	Ave	Neutral	Pass
0.186	52.7	2.0	54.7	64.2	-9.5	QP	Neutral	Pass
0.187	52.6	2.0	54.6	64.2	-9.6	QP	Neutral	Pass
0.201	19.9	2.0	21.9	53.6	-31.7	Ave	Neutral	Pass
0.262	47.9	2.0	49.9	61.4	-11.5	QP	Neutral	Pass
0.276	10.6	2.0	12.6	50.9	-38.3	Ave	Neutral	Pass
0.454	44.2	2.0	46.2	56.8	-10.6	QP	Neutral	Pass
0.465	5.9	2.0	7.9	46.6	-38.7	Ave	Neutral	Pass
0.551	14.3	2.0	16.3	46.0	-29.7	Ave	Neutral	Pass
0.559	43.5	2.0	45.5	56.0	-10.5	QP	Neutral	Pass
0.594	41.6	2.0	43.6	56.0	-12.4	QP	Neutral	Pass
0.599	1.2	2.0	3.2	46.0	-42.8	Ave	Neutral	Pass

3.0 RF Output Power

3.1 Test Standard

The transmitting power of stations operating in the 4940–4990 MHz band must not exceed the maximum limits in this section.

(a) The peak transmit power should not exceed:

Channel bandwidth (MHz)	Low power peak transmitter power (dBm)	High power peak transmitter power (dBm)
1	7	20
5	14	27
10	17	30
15	18.8	31.8
20	20	33

High power devices are also limited to a peak power spectral density of 21 dBm per one MHz. High power devices using channel bandwidths other than those listed above are permitted; however, they are limited to a peak power spectral density of 21 dBm/MHz. If transmitting antennas of directional gain greater than 9 dBi are used, both the peak transmit power and the peak power spectral density should be reduced by the amount in decibels that the directional gain of the antenna exceeds 9 dBi. However, high power point-to-point or point-to-multipoint operation (both fixed and temporary-fixed rapid deployment) may employ transmitting antennas with directional gain up to 26 dBi without any corresponding reduction in the transmitter power or spectral density. Corresponding reduction in the peak transmit power and peak power spectral density should be the amount in decibels that the directional gain of the antenna exceeds 26 dBi.

3.2 Test Limits

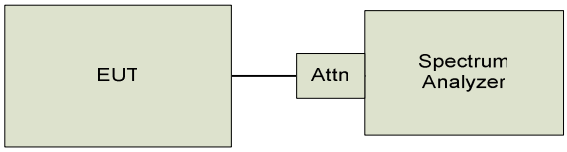
The integrated unit uses a 19 dBi antenna. Since the device is used only in a point-to-point application, the maximum antenna gain before power reduction is 26 dBi Both units use a channel bandwidth of 20 Mhz. Therefore, for either unit, the maximum conducted output power is 33 dBm. The maximum power spectral density is 21 dBm/MHz.

3.3 Test Setup

The output of the EUT is connected to the spectrum analyzer using suitable attenuation. The EUT is excercised at a data rate of 27 Mbps representing the maximum possible data rate.

Output power is measured using the channel power measurement feature of the spectrum analyzer. Power spectral density is measured by using a 1 MHz RBW and peak hold.

3.3.1 Test Setup Block Diagram



3.4 Test Results

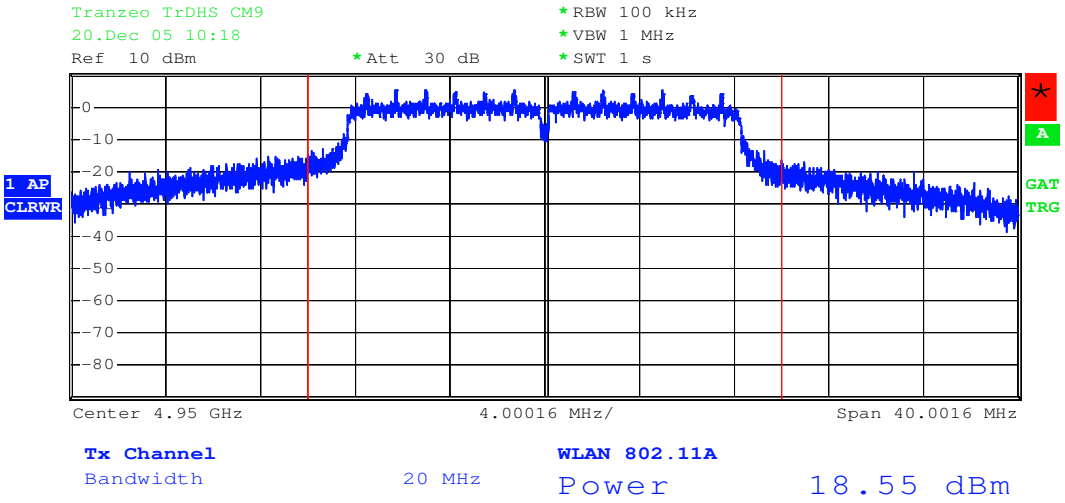
Output Power

	Reading (dBm)	Limit (dBm)	Margin (dB)	Result
4950 MHz	18.55	33	-14.45	PASS
4965 MHz	18.27	33	-14.73	PASS
4980 MHz	18.41	33	-14.59	PASS

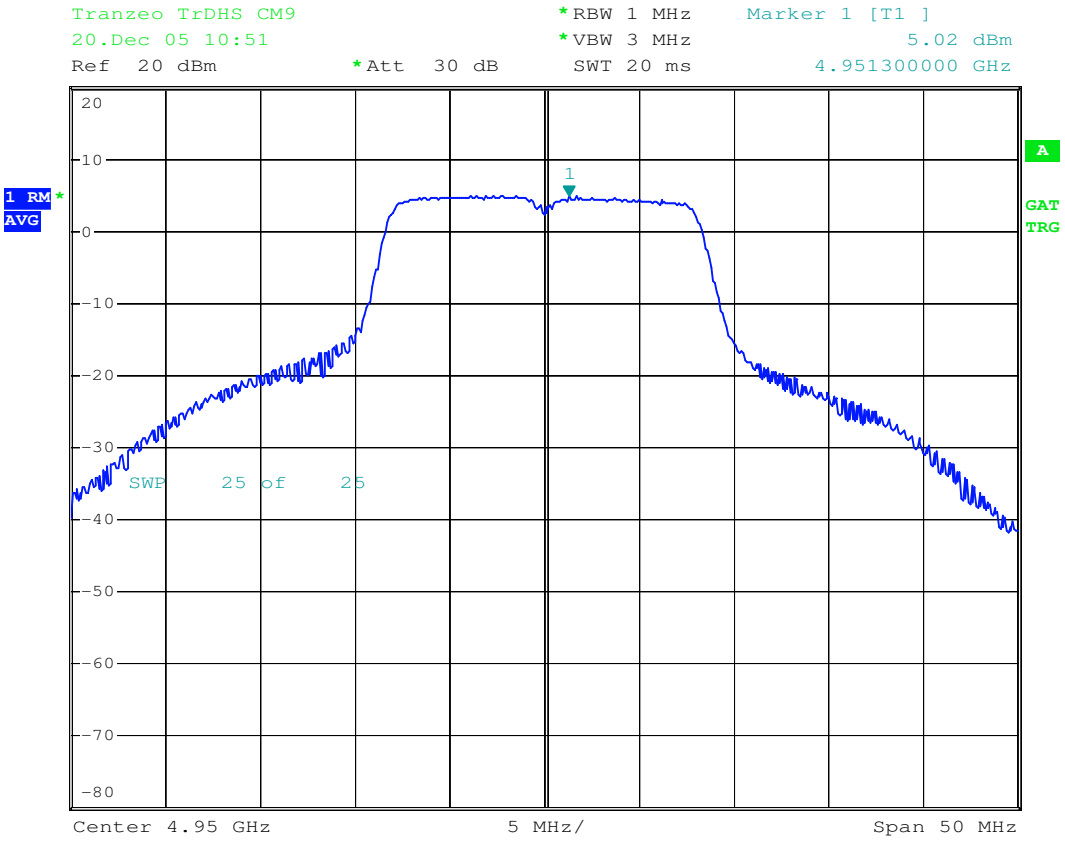
Power spectral density

	Reading (dBm)	Limit (dBm/MHz)	Margin (dB)	Result
4950 MHz	5.02	21	-15.98	PASS
4965 MHz	4.84	21	-16.16	PASS
4980 MHz	4.90	21	-16.10	PASS

Output Power, Worst Case



PSD, Worst Case



4.0 Field Strength of Spurious Emissions

4.1 Test Standard

FCC 90.210

(m) *Emission Mask M.* For high power transmitters (greater that 20 dBm) operating in the 4940–4990 MHz frequency band, the power spectral density of the emissions must be attenuated below the output power of the transmitter as follows:

(1) On any frequency removed from the assigned frequency between 0–45% of the authorized bandwidth (BW): 0 dB.

(2) On any frequency removed from the assigned frequency between 45–50% of the authorized bandwidth: 568 log (% of (BW)/45) dB.

(3) On any frequency removed from the assigned frequency between 50–55% of the authorized bandwidth: 26 + 145 log (% of BW/50) dB.

(4) On any frequency removed from the assigned frequency between 55–100% of the authorized bandwidth: 32 + 31 log (% of (BW)/55) dB.

(5) On any frequency removed from the assigned frequency between 100–150% of the authorized bandwidth: 40 + 57 log (% of (BW)/100) dB.

(6) On any frequency removed from the assigned frequency between above 150% of the authorized bandwidth: 50 dB or 55 + 10 log (P) dB, whichever is the lesser attenuation.

4.2 Test Limits

67 dBuV out of band radiated emissions limit (3m).

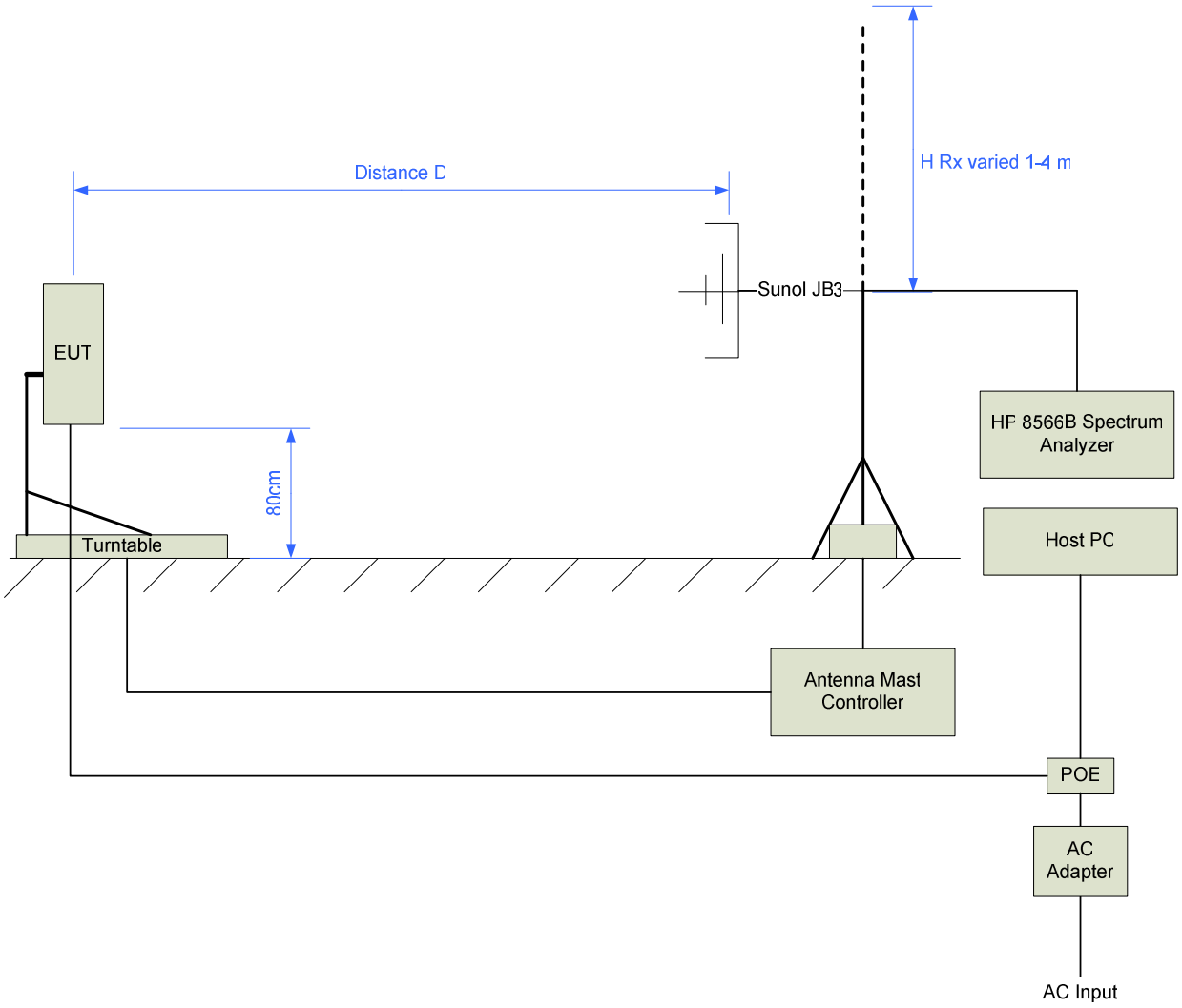
4.3 Test Setup

Each unit was prescanned in both orientations and at in all frequency bands. The EUT was exercised with bandwidth test software at a rate of 27 Mbps reflecting the worst case data-rate. The EUT was rotated 360 degrees and the receive antenna swept from 1m to 4m to determine the maximum emissions level.

Pretesting at a 1m measurement distance was performed above 1 GHz. The antenna was scanned around all sides of the EUT. Frequencies of interest were identified and final measurements performed at a 3m measurement distance.

Measurements above 1 GHz were taken with RBW, VBW = 1 MHz.

4.3.1 Test Setup Block Diagram

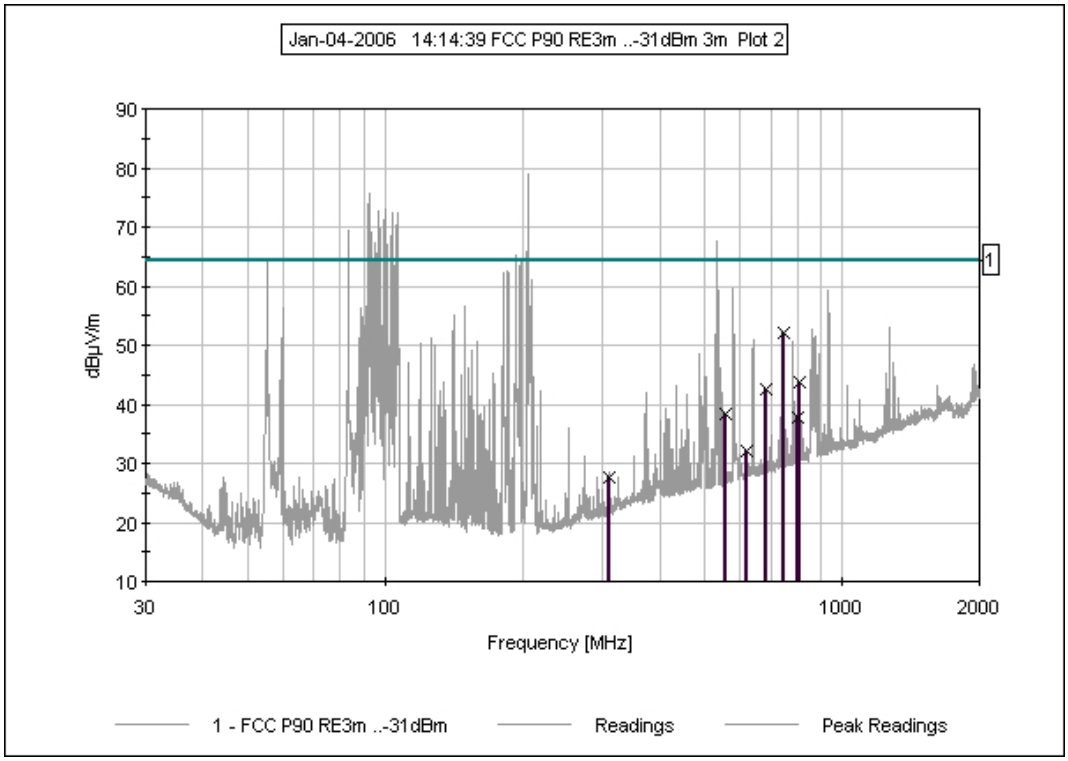


Note: Measurements below 1 GHz were performed with the Sunol JB3 antenna. Measurements above 1 GHz were performed with the Com-Power AHA-118 antenna. The measurement distance was 3m

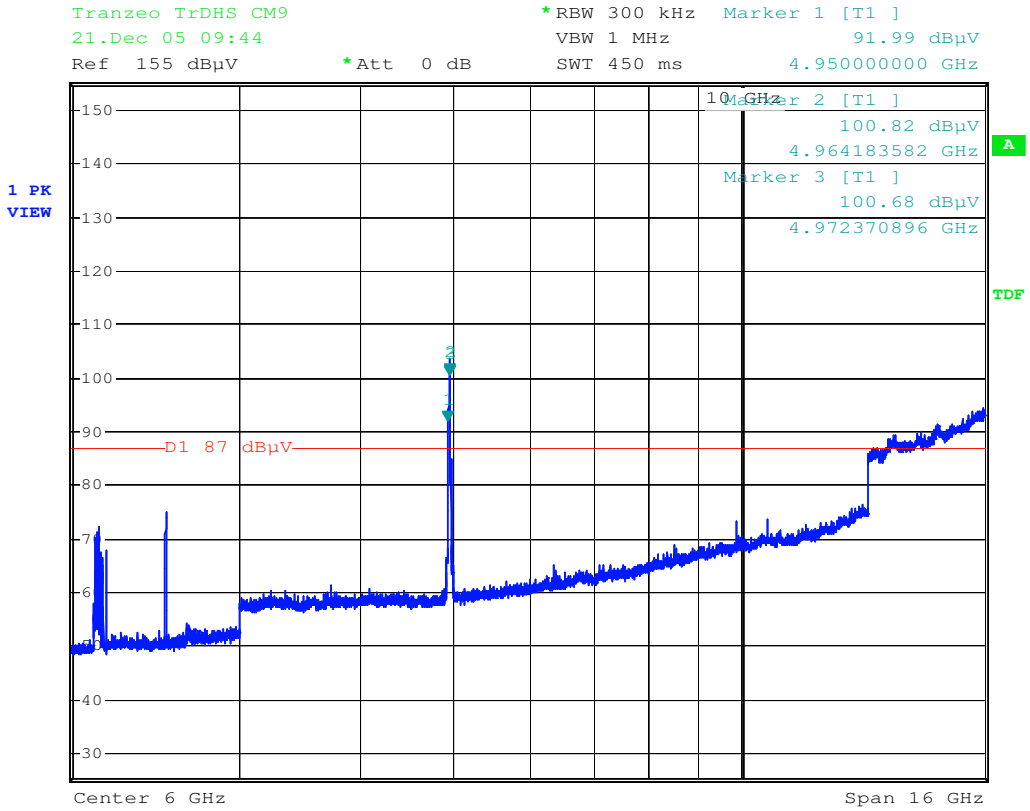
4.4 Test Results

Freq MHz	Meter dBµV	Factors	Corr	Spec	Margin	RType	Polar	Dist	Result
310.100	11.4	16.1	27.5	64.3	-36.8	Peak	Vert	3m	Pass
558.000	17.1	21.3	38.4	64.3	-25.9	Peak	Vert	3m	Pass
620.500	10.0	22.2	32.2	64.3	-32.1	Peak	Vert	3m	Pass
682.500	19.3	23.2	42.5	64.3	-21.8	Peak	Vert	3m	Pass
744.000	28.0	24.1	52.1	64.3	-12.2	Peak	Horiz	3m	Pass
800.000	13.0	24.7	37.7	64.3	-26.6	Peak	Vert	3m	Pass
806.000	18.9	24.9	43.8	64.3	-20.5	Peak	Vert	3m	Pass

3m measurement distance



1m Measurement distance



Note: In the above plots, only emissions associated with the EUT are marked.

5.0 Transmitter Conducted Harmonic and Spurious Emissions

5.1 Test Standard

FCC 90.210

(m) *Emission Mask M.* For high power transmitters (greater that 20 dBm) operating in the 4940–4990 MHz frequency band, the power spectral density of the emissions must be attenuated below the output power of the transmitter as follows:

(1) On any frequency removed from the assigned frequency between 0–45% of the authorized bandwidth (BW): 0 dB.

(2) On any frequency removed from the assigned frequency between 45–50% of the authorized bandwidth: 568 log (% of (BW)/45) dB.

(3) On any frequency removed from the assigned frequency between 50–55% of the authorized bandwidth: 26 + 145 log (% of BW/50) dB.

(4) On any frequency removed from the assigned frequency between 55–100% of the authorized bandwidth: 32 + 31 log (% of (BW)/55) dB.

(5) On any frequency removed from the assigned frequency between 100–150% of the authorized bandwidth: 40 + 57 log (% of (BW)/100) dB.

(6) On any frequency removed from the assigned frequency between above 150% of the authorized bandwidth: 50 dB or 55 + 10 log (P) dB, whichever is the lesser attenuation.

5.2 Test Limits

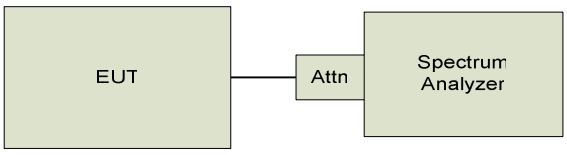
-31 dBm conducted spurious emission limit.

5.3 Test Setup

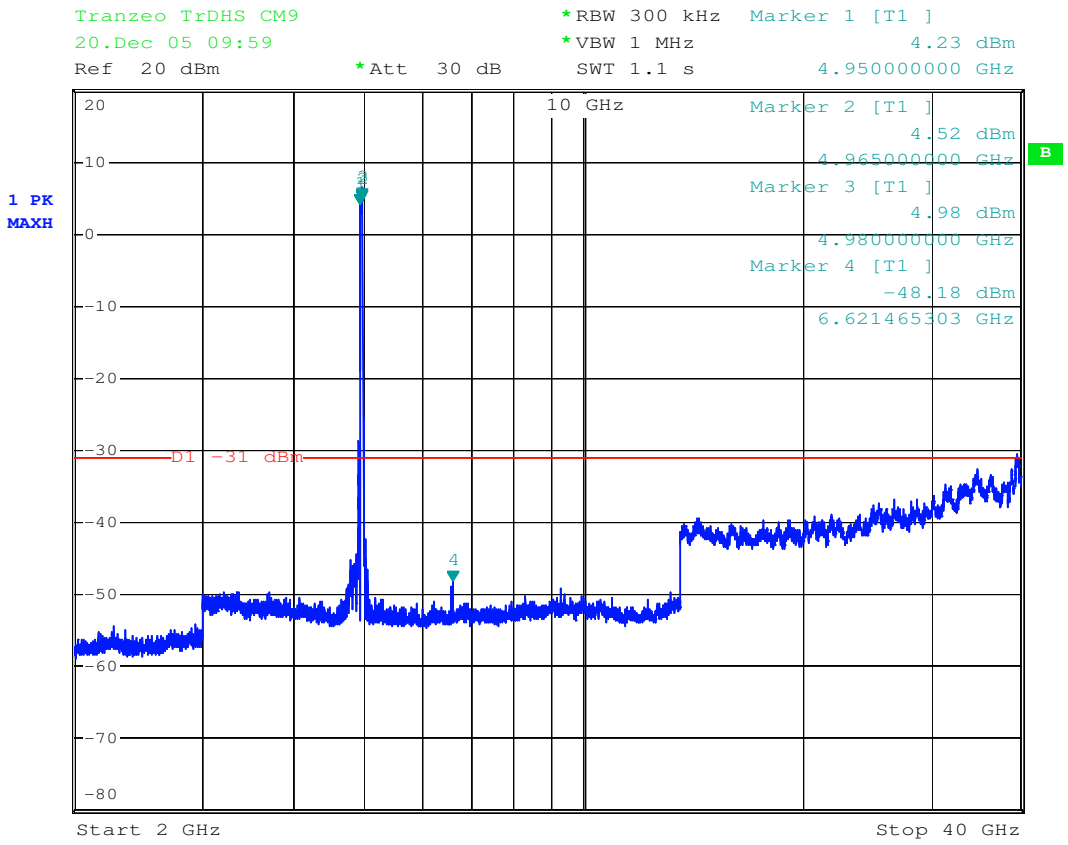
The EUT is excercised at a data rate of 27 Mbps representing the maximum possible data rate. Testing is performed while operating on the lowest, middle and highest channel.

The output of the EUT is connected to the spectrum analyzer using suitable attenuation.

5.3.1 Test Setup Block Diagram – Conducted Measurements (Harmonics)



5.4 Test Results



Pol	Freq (MHz)	Peak Meas TXM (dBm)	Limit (dBm)	Margin (dB)	Result
Cond	6621.465	-48.2	-31.0	17.2	PASS

6.0 Emission Masks

6.1 Test Standard

FCC 90.210

(m) *Emission Mask M.* For high power transmitters (greater that 20 dBm) operating in the 4940–4990 MHz frequency band, the power spectral density of the emissions must be attenuated below the output power of the transmitter as follows:

(1) On any frequency removed from the assigned frequency between 0–45% of the authorized bandwidth (BW): 0 dB.

(2) On any frequency removed from the assigned frequency between 45–50% of the authorized bandwidth: 568 log (% of (BW)/45) dB.

(3) On any frequency removed from the assigned frequency between 50–55% of the authorized bandwidth: 26 + 145 log (% of BW/50) dB.

(4) On any frequency removed from the assigned frequency between 55–100% of the authorized bandwidth: 32 + 31 log (% of (BW)/55) dB.

(5) On any frequency removed from the assigned frequency between 100–150% of the authorized bandwidth: 40 + 57 log (% of (BW)/100) dB.

(6) On any frequency removed from the assigned frequency between above 150% of the authorized bandwidth: 50 dB or 55 + 10 log (P) dB, whichever is the lesser attenuation.

6.2 Test Limits

FCC Part 90.210 Emission Mask M

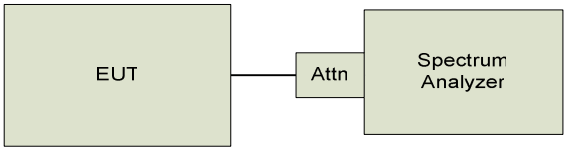
6.3 Test Setup

The output of the EUT is connected to the spectrum analyzer using suitable attenuation.

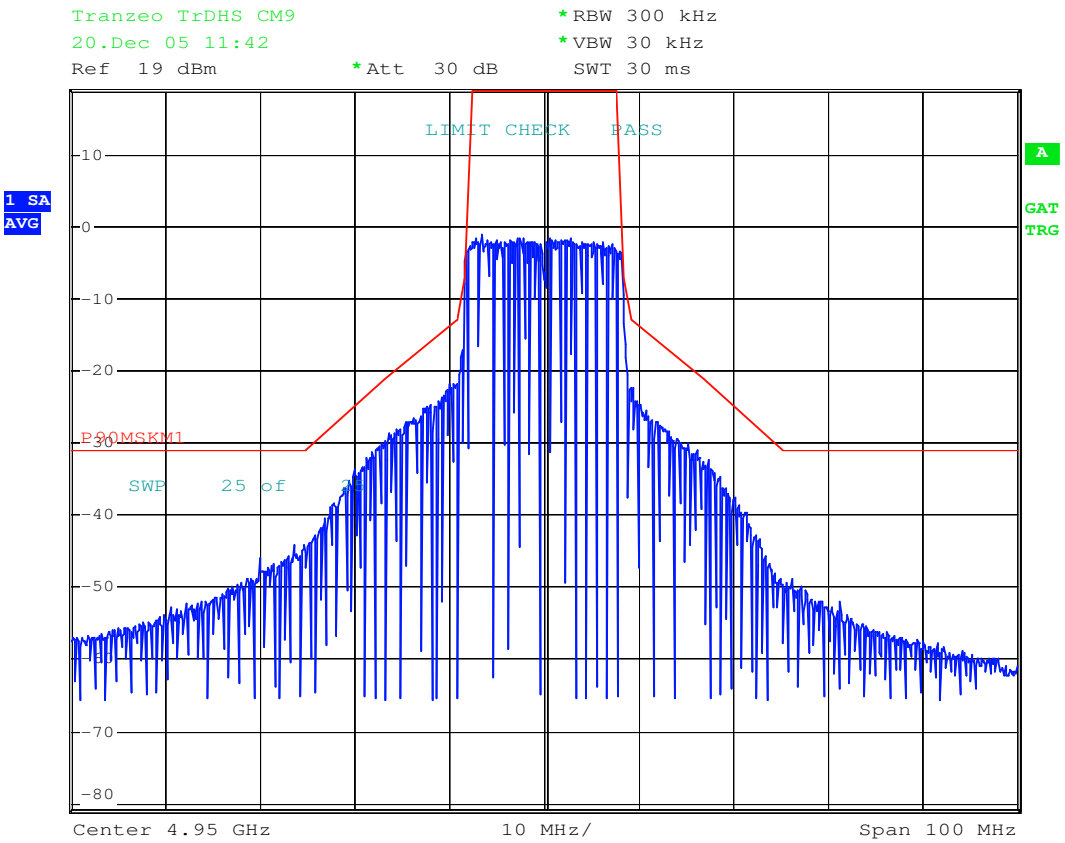
The EUT is exercised at a data rate of 27 Mbps representing the maximum possible data rate. Testing is performed while operating on the lowest, middle and highest channel.

6.3.1 Test Setup Block Diagram

Conducted Setup

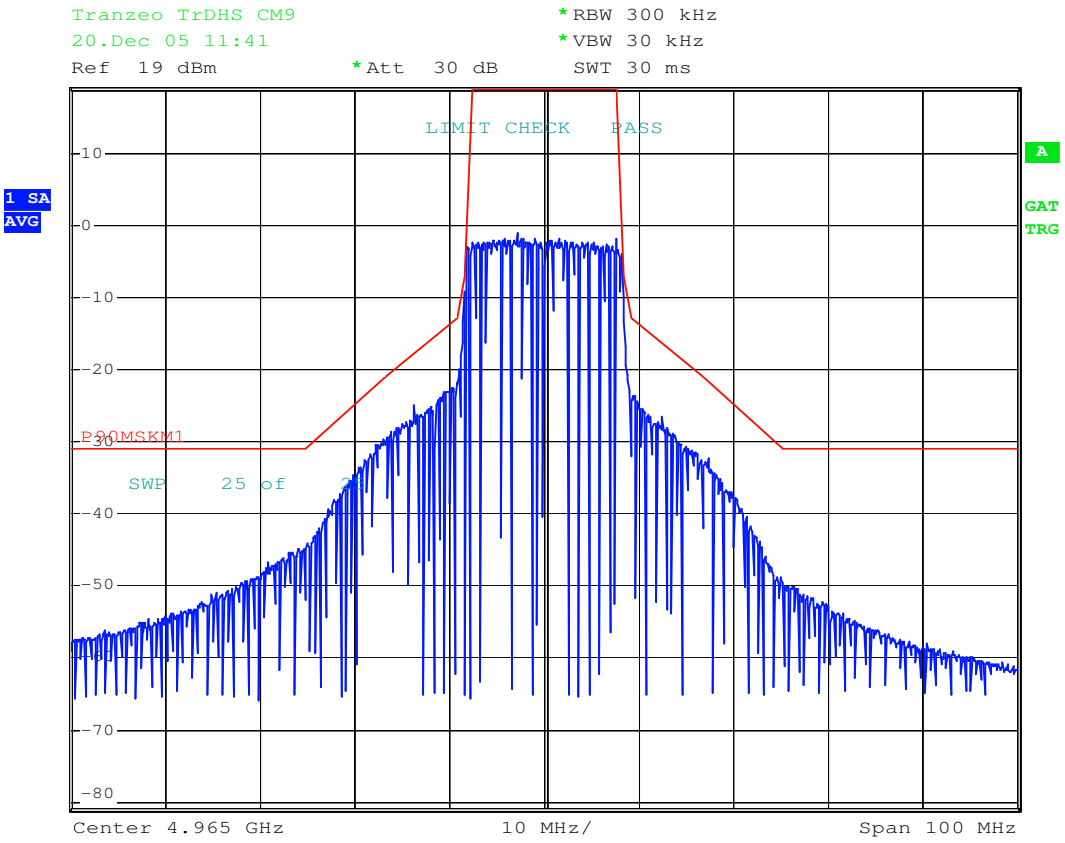


6.4 Test Results



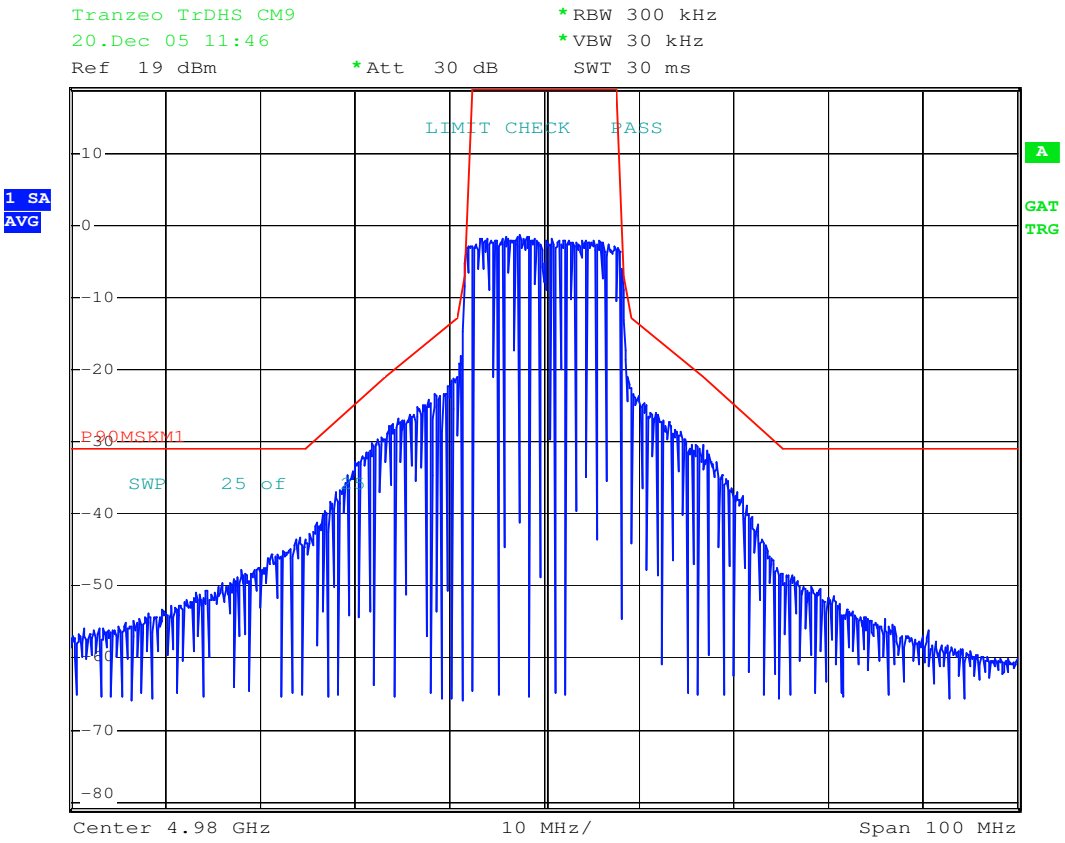
FCC CE Occupied Bandwidth Mask M 4950

Date: 20.DEC.2005 11:42:46



FCC CE Occupied Bandwidth Mask M 4965

Date: 20.DEC.2005 11:41:23



FCC CE Occupied Bandwidth Mask M 4980

Date: 20.DEC.2005 11:46:47

7.0 Frequency Stability

7.1 Test Standard

(a) Unless noted elsewhere, transmitters used in the services governed by this part must have a minimum frequency stability as specified in the following table.

Minimum Frequency Stability
[Parts per million (ppm)]

Frequency range (MHz)	Fixed and base stations	Mobile stations: Over 2 watts output power	Mobile stations: 2 watts or less output power
Below 25	1,2,3 100	100	200
25-50	20	20	50
72-76	5	.....	50
150-174	5,11 5	\6\ 5	4,6 50
216-220	1.0	.....	1.0
220-222 \12\	0.1	1.5	1.5
421-512	7,11,14 2.5	\8\ 5	\8\ 5
806-809	\14\ 1.0	1.5	1.5
809-824	\14\ 1.5	2.5	2.5
851-854	1.0	1.5	1.5
854-869	1.5	2.5	2.5
896-901	14 0.1	1.5	1.5
902-928	2.5	2.5	2.5
902-928 \13\	2.5	2.5	2.5
929-930	1.5	.....	.....
935-940	0.1	1.5	1.5
1427-1435	\9\ 300	300	300
Above 2450 \10\	.....	.....	.....

7.2 Test Limits

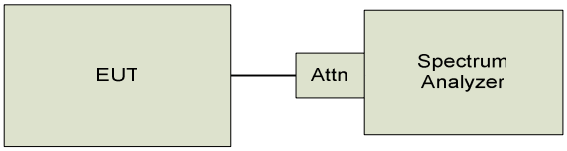
The frequency drift of the transmitter is recorded. A worst case limit of 1.5 ppm is used for the test.

7.3 Test Setup

The EUT is exercised at a data rate of 27 Mbps representing the maximum possible data rate. Testing is performed while operating at the center frequency of the band.

The EUT is tested over both voltage and temperature variations. Voltage variation is over the manufacturer's specified operating range.

7.3.1 Test Setup Block Diagram



7.4 Test Results

V	Temp C	Freq (MHz)	F1 (MHz)	F2 (MHz)	(F1+F2)/2 (MHz)	Deviation (kHz)	ppm Limit (kHz)	Drift (ppm)
nom	-30	4965	4956.700000	4973.287500	4964.993750	9.375	7	1.89
nom	-20	4965	4956.687500	4973.293750	4964.990625	6.250	7	1.26
nom	-10	4965	4956.681250	4973.300000	4964.990625	6.250	7	1.26
nom	0	4965	4956.632500	4973.306250	4964.969375	-15.000	7	-3.02
nom	10	4965	4956.675000	4973.300000	4964.987500	3.125	7	0.63
nom	20	4965	4956.631250	4973.337500	4964.984375	0.000	7	0.00
nom	30	4965	4956.625000	4973.338125	4964.981563	-2.812	7	-0.57
nom	40	4965	4956.631250	4973.343750	4964.987500	3.125	7	0.63
nom	50	4965	4956.612500	4973.387500	4965.000000	15.625	7	3.15

Vin (DC)	Temp C	Freq (MHz)	F1 (MHz)	F2 (MHz)	(F1+F2)/2 (MHz)	Drift (kHz)	ppm Limit (kHz)	Drift (ppm)
8	20	4965	4956.637500	4973.337500	4964.987500	3.125	7	0.63
12	20	4965	4956.631250	4973.343750	4964.987500	3.125	7	0.63
16	20	4965	4956.625000	4973.343750	4964.984375	0.000	7	0.00
24	20	4965	4956.625000	4973.343750	4964.984375	0.000	7	0.00
28	20	4965	4956.631250	4973.337500	4964.984375	0.000	7	0.00
32	20	4965	4956.631250	4973.337500	4964.984375	0.000	7	0.00
36	20	4965	4956.632500	4973.337250	4964.984875	0.500	7	0.10

8.0 99% Occupied Bandwidth

8.1 Test Standard

FCC 90.210

(m) *Emission Mask M.* For high power transmitters (greater that 20 dBm) operating in the 4940–4990 MHz frequency band, the power spectral density of the emissions must be attenuated below the output power of the transmitter as follows:

(1) On any frequency removed from the assigned frequency between 0–45% of the authorized bandwidth (BW): 0 dB.

(2) On any frequency removed from the assigned frequency between 45–50% of the authorized bandwidth: 568 log (% of (BW)/45) dB.

(3) On any frequency removed from the assigned frequency between 50–55% of the authorized bandwidth: 26 + 145 log (% of BW/50) dB.

(4) On any frequency removed from the assigned frequency between 55–100% of the authorized bandwidth: 32 + 31 log (% of (BW)/55) dB.

(5) On any frequency removed from the assigned frequency between 100–150% of the authorized bandwidth: 40 + 57 log (% of (BW)/100) dB.

(6) On any frequency removed from the assigned frequency between above 150% of the authorized bandwidth: 50 dB or 55 + 10 log (P) dB, whichever is the lesser attenuation.

8.2 Test Limits

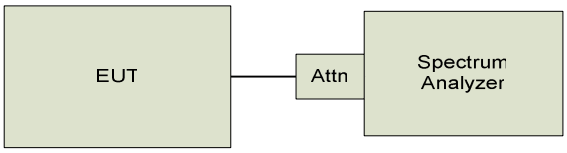
The occupied bandwidth determines the parameters of the emission mask.

8.3 Test Setup

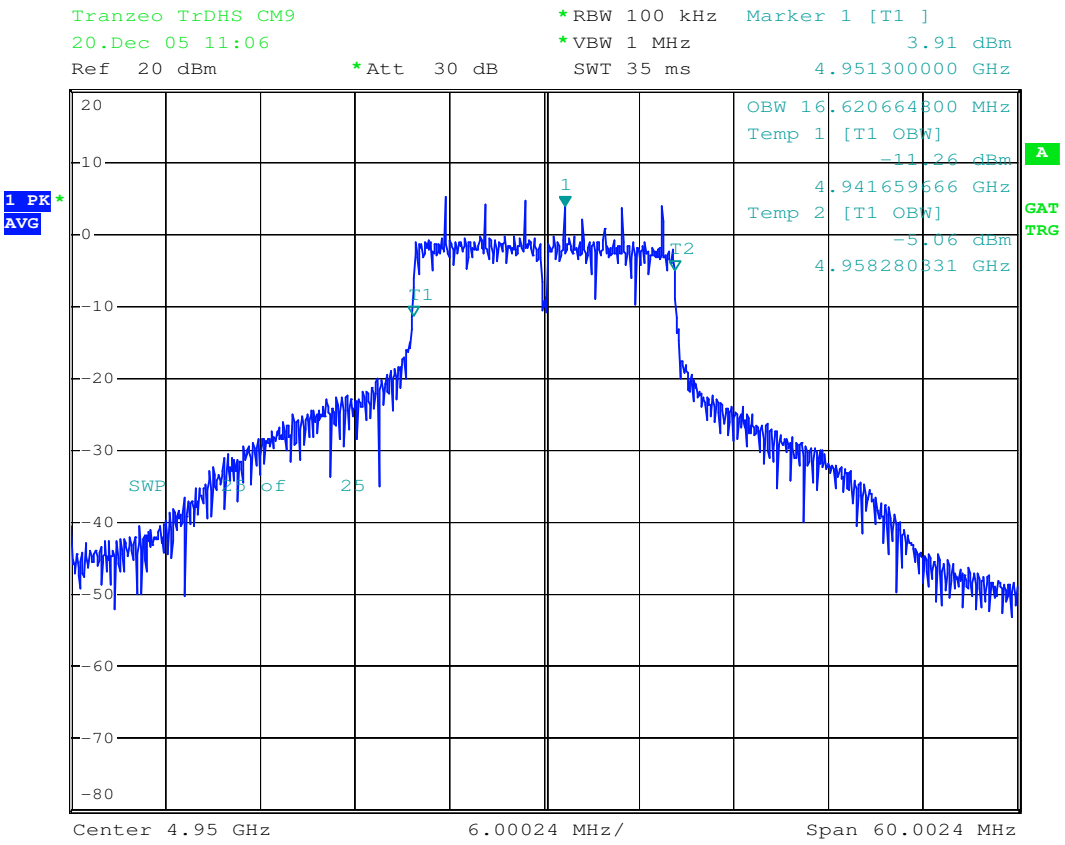
The EUT is exercised at a data rate of 27 Mbps representing the maximum possible data rate.

The occupied bandwidth is measured using the N dB down function of the spectrum analyzer.

8.3.1 Test Setup Block Diagram



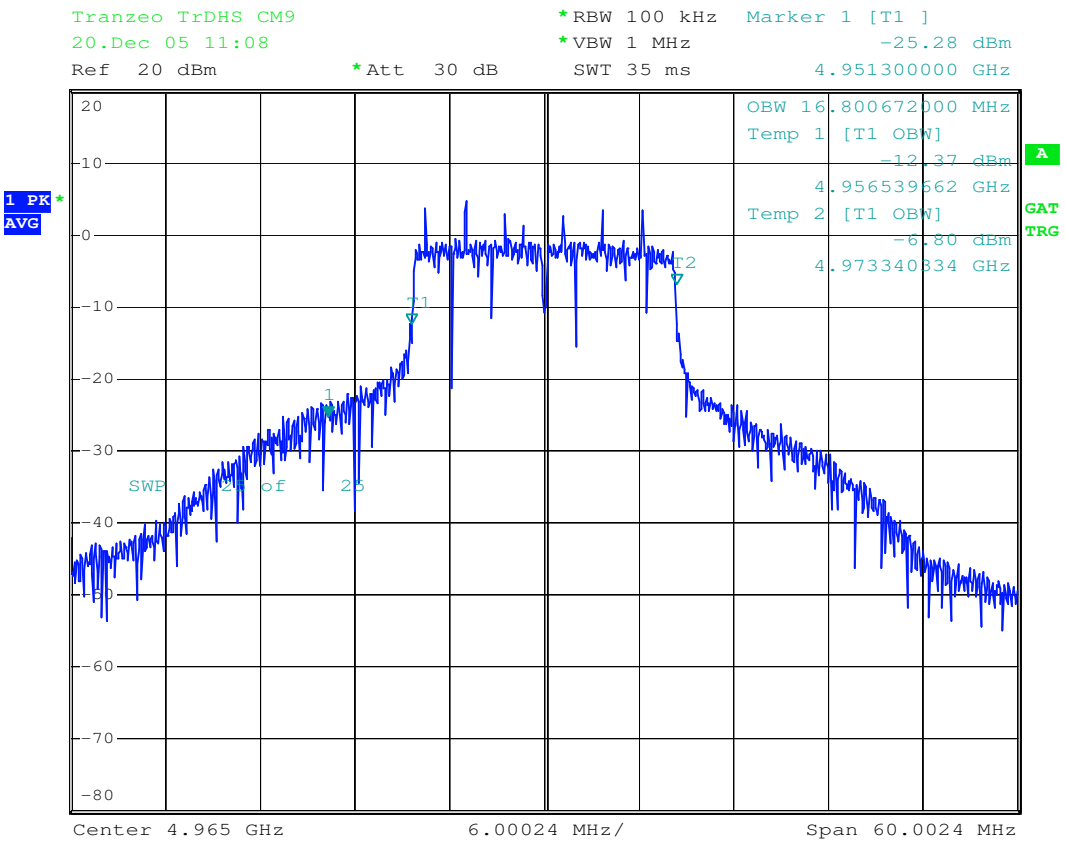
8.4 Test Results



FCC CE OCC BW 99% 4950

Date: 20.DEC.2005 11:06:56

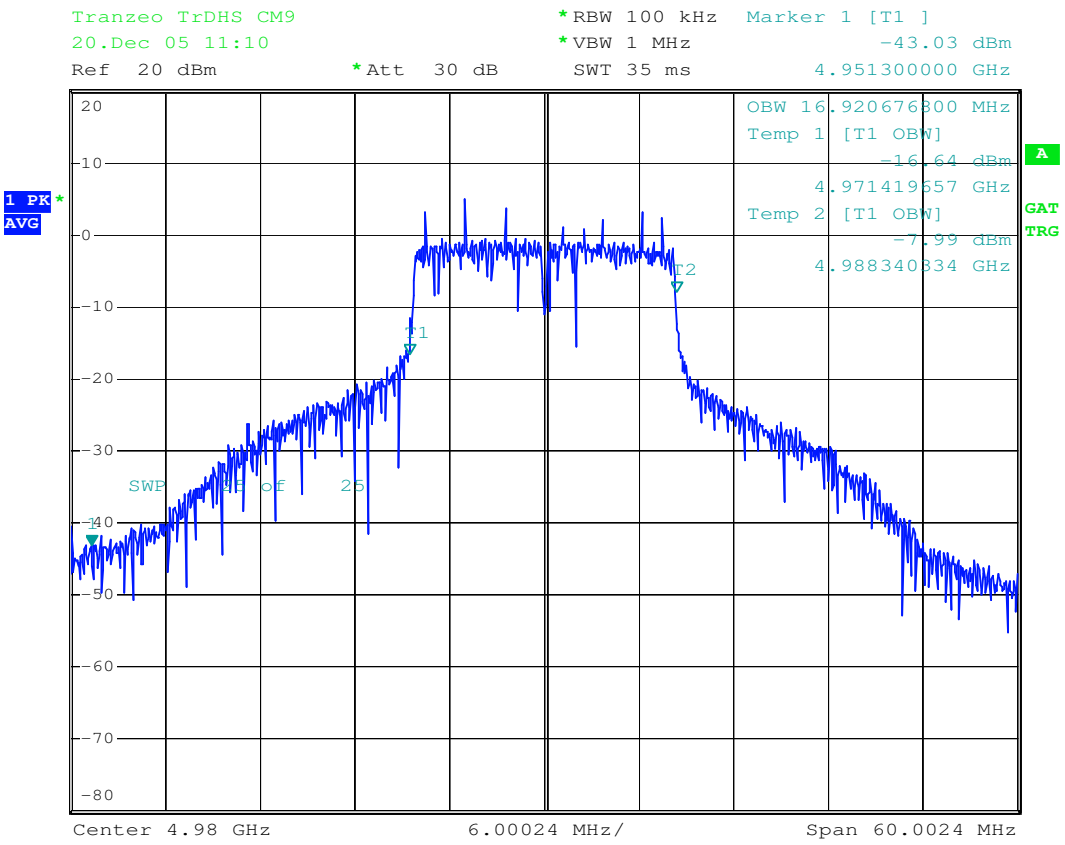
4950 MHz Occupied Bandwidth: 16.621 MHz



FCC CE OCC BW 99% 4965

Date: 20.DEC.2005 11:08:26

4965 MHz Occupied Bandwidth: 16.801 MHz



FCC CE OCC BW 99% 4980

Date: 20.DEC.2005 11:10:56

4980 MHz Occupied Bandwidth: 16.921 MHz

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 Sec. 1.1307(b), except in the case of portable devices which shall be evaluated according to the provisions of Sec. 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 Friis Formula

Friis transmission formula: $Pd = (P_{out}*G)/(4* \pi*r^2)$ Where

Pd = power density in mW/cm^2
P_{out} = output power to antenna in mW.
G = gain of antenna in the direction of interest relative to an isotropic radiator.
R = the distance between the observation point and the center of the radiator in cm.

Pd is the limit of MPE, $1mW/cm^2$. If we know the maximum gain of the antenna and the total power input to the antenna we can calculate the distance r where the MPE limit is reached.

9.2 EUT Operating Condition

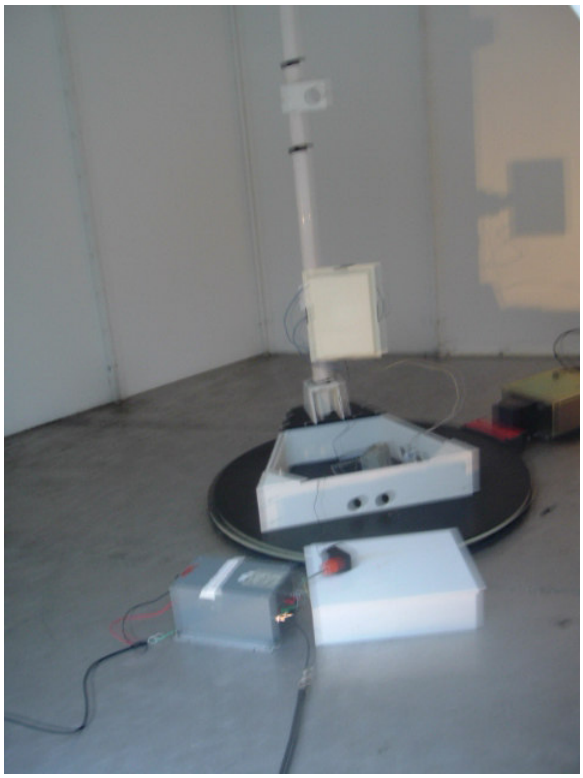
The maximum output power of the EUT is 19 dBm as tested and specified by the manufacturer. An antenna gain of 19 dBi is assumed as used in the integrated unit.

9.3 RF exposure evaluation distance calculation

Freq (MHz)	Output Power to Antenna (dBm)	Antenna Gain (dBi)	r (cm)
4950	19	19	23
4980	19	19	23

As shown above, the minimum distance where the MPE limit is reached is **23 cm** for this EUT

10.0 Test Photos



Conducted emissions test setup

Radiated emissions test setup