



Test Report

Product Name	Road Warrior Rx
Model No.	ARWH2R
FCC ID	BJM-ARWH2R

Applicant	TATUNG CO.
Address	22, Chungshan N. Rd., 3rd Sec. Taipei, Taiwan, 104, R.O.C.

Date of Receipt	Dec. 25, 2007
Issued Date	Jan. 07, 2008
Report No.	07C368R-RFUSP06V01

The test results relate only to the samples tested.
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This report must not be used to claim product endorsement by NVLAP any agency of the U.S. Government

Test Report Certification

Issued Date: Jan. 07, 2008

Report No.: 07C368R-RFUSP06V01



Accredited by NIST (NVLAP)
NVLAP Lab Code: 200533-0

Product Name	Road Warrior Rx
Applicant	TATUNG CO.
Address	22, Chungshan N. Rd., 3rd Sec. Taipei, Taiwan, 104, R.O.C.
Manufacturer	TATUNG CO.
Model No.	ARWH2R
Rated Voltage	AC 120V/60Hz
Working Voltage	DC 3.7V (Battery)
Trade Name	Acoustic Research
Applicable Standard	FCC CFR Title 47 Part 15 Subpart C: 2006 CISPR 22: 2005 ANSI C63.4: 2003
Test Result	Complied



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Attachment 1: EUT Test Photographs

Attachment 2: EUT Detailed Photographs

1. GENERAL INFORMATION

1.1. EUT Description

Product Name	Road Warrior Rx
Trade Name	Acoustic Research
Model No.	ARWH2R
FCC ID	BJM-ARWH2R
Frequency Range	2405-2477MHz
Number of Channels	37
Channel Separation	2MHz
Type of Modulation	$\pi/4$ DQPSK (Differential Quadrature Phase Shift Keying)
Antenna Type	Soldered on PCB
Antenna Gain	Refer to the table "Antenna List"
Channel Control	Auto

Antenna List

No.	Manufacturer	Part No.	Peak Gain
1	Walsin	RFANT3216120A5T	2.12dBi for 2.4 GHz

Center Frequency of Each Channel:

Channel	Frequency	Channel	Frequency	Channel	Frequency
Channel 2:	2405 MHz	Channel 3:	2407 MHz	Channel 4:	2409 MHz
Channel 5:	2411 MHz	Channel 6:	2413 MHz	Channel 7:	2415 MHz
Channel 8:	2417 MHz	Channel 9:	2419 MHz	Channel 10:	2421 MHz
Channel 11:	2423 MHz	Channel 12:	2425 MHz	Channel 13:	2427 MHz
Channel 14:	2429 MHz	Channel 15:	2431 MHz	Channel 16:	2433 MHz
Channel 17:	2435 MHz	Channel 18:	2437 MHz	Channel 19:	2439 MHz
Channel 20:	2441 MHz	Channel 21:	2443 MHz	Channel 22:	2445 MHz
Channel 23:	2447 MHz	Channel 24:	2449 MHz	Channel 25:	2451 MHz
Channel 26:	2453 MHz	Channel 27:	2455 MHz	Channel 28:	2457 MHz
Channel 29:	2459 MHz	Channel 30:	2461 MHz	Channel 31:	2463 MHz
Channel 32:	2465 MHz	Channel 33:	2467 MHz	Channel 34:	2469 MHz
Channel 35:	2471 MHz	Channel 36:	2473 MHz	Channel 37:	2475 MHz
Channel 38:	2477 MHz				

Note:

The EUT is a Road Warrior Rx with a built-in 2.4GHz transceiver.

1. Regarding to the operation frequency, the lowest, middle and highest frequency are selected to perform the test.
2. These tests are conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15 Subpart C Paragraph 15.247 for spread spectrum devices.
3. The radiation measurements are performed in X, Y, Z axis positioning. Only the worst case is shown in the report.

1.2. Operational Description

The EUT is a PC USB Headset with a built-in 2.4GHz transceiver.

It uses the latest 2.4GHz wireless audio solution which can provide high quality wide-band audio and robust wireless audio transmission. Total numbers of channels supported by this device are 37 channels operating from 2405 to 2477MHz with 2MHz channel spacing.

This is a digital transmission system but not a FHSS since only one fixed channel is selected to transmit and receive data. This device uses the preset channel number to transmit and receives data and it will scan to select a fixed channel to transmit and receive data when no channel is preset.

The EUT built-in Avnera ICs (AV7102) are fully integrated single-chip wireless audio solutions, including a complete RF transceiver, Audio Fidelity Processing™ signal coding and processing, complete digital audio interfaces, and voltage regulation. The antenna type is Printed antenna and the modulation type is $\pi/4$ DQPSK (Differential Quadrature Phase Shift Keying).

SPDT TQS5200 is a T/R switch used to control the signal path. When transmitting data, it is switched to “transmit switch” which allows RF DQPSK modulation data sent from CPU AV7102 through PA TQP770001, BPF , T/R switch and then Antenna.

PA TQP770001 is a power amplifier used to amplify the modulation frequency range from 2405MHz to 2477MHz. BPF (Band pass Filter) is used for suppressing the harmonics including 2nd and 3rd harmonics which usually are generated after power amplifier.

When receiving data, the SPDT TQS5200 is controlled to be at “receive switch” which allows the data received from the air by the antenna directly to the single chip CPU AV7102 to be processed.

Test Mode	Mode 1: Transmitter
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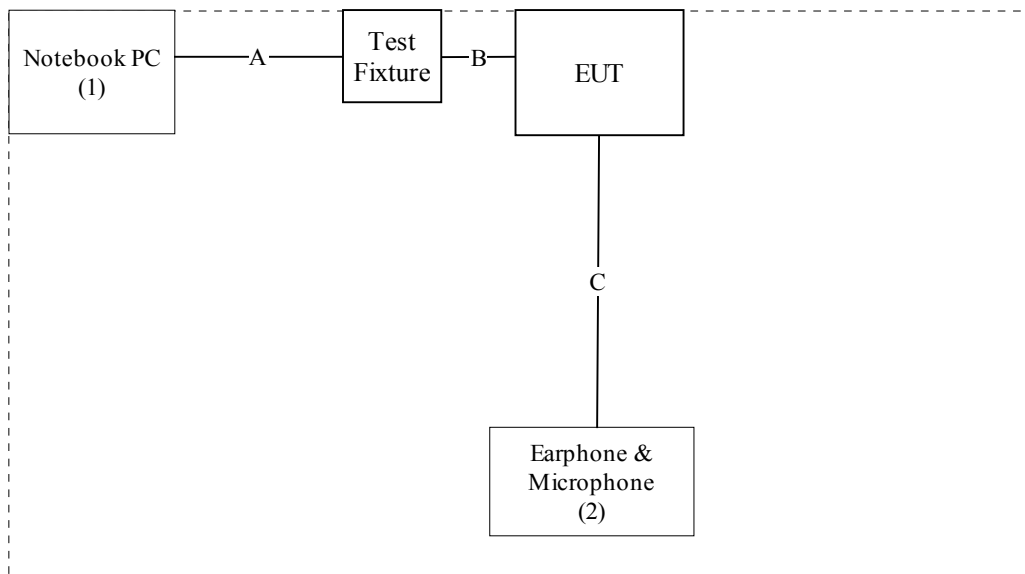
1.3. Tested System Details

The types for all equipment, plus descriptions of all cables used in the tested system (including inserted cards) are:

	Product	Manufacturer	Model No.	Serial No.	FCC ID	Power Cord
1.	Notebook PC	DELL	PPT	N/A	DoC	Non-Shielded, 0.8m
2.	Microphone & Earphone	PCHOME	N/A	N/A	N/A	N/A

	Signal Cable Type	Signal Cable Description
A.	USB Cable	Shielded, 1.5m
B.	Controller Cable	Non-Shielded, 0.2m
C.	Microphone & Earphone Cable	Non-Shielded, 1.8m

1.4. Configuration of Test System



1.5. EUT Exercise Software

- (1) Setup the EUT as shown in section 1.4.
- (2) Connect the EUT to a notebook via a controller cable.
- (3) Execute AWAflash.exe on the notebook.
- (4) Double-click “AV7101” and select RS-232 as a primary connection interface.
- (5) Setup the test channel.
- (6) Press “Apply” to start the continuous transmission.
- (7) Verify that the EUT works correctly.

1.6. Test Facility

Ambient conditions in the laboratory:

Items	Required (IEC 68-1)	Actual
Temperature (°C)	15-35	20-35
Humidity (%RH)	25-75	50-65
Barometric pressure (mbar)	860-1060	950-1000

Site Description: File on
 Federal Communications Commission
 FCC Engineering Laboratory
 7435 Oakland Mills Road
 Columbia, MD 21046
 Reference 31040/SIT1300F2



Accreditation on NVLAP
 NVLAP Lab Code: 200533-0



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FCC Accreditation Number: TW1014



2. Conducted Emission

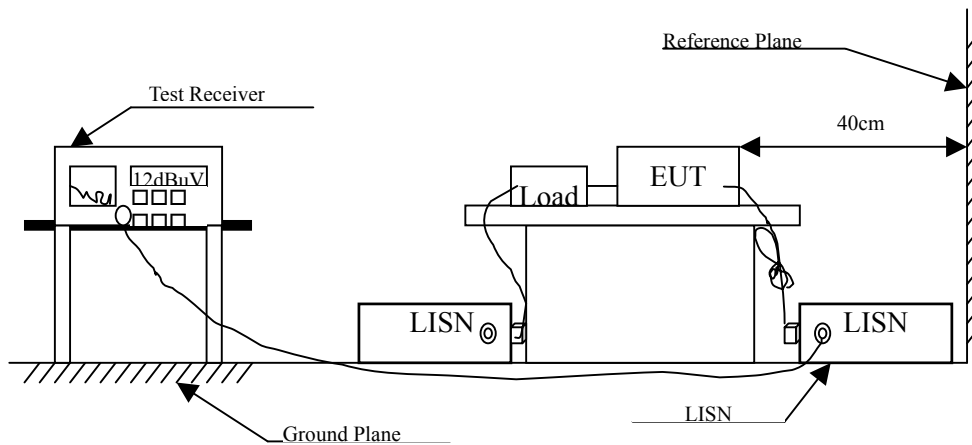
2.1. Test Equipment

The following test equipment are used during the conducted emission test:

Item	Instrument	Manufacturer	Type No./Serial No	Last Cal.	Remark
1	Test Receiver	R & S	ESCS 30/825442/014	Feb., 2007	
2	L.I.S.N.	R & S	ESH3-Z5/825562/002	Feb., 2007	EUT
3	L.I.S.N.	R & S	ENV4200/848411/010	Feb., 2007	Peripherals
4	Pulse Limiter	R & S	ESH3-Z2/100410	July, 2007	
5	No.1 Shielded Room			N/A	

Note: All instruments are calibrated every one year.

2.2. Test Setup



2.3. Limits

FCC Part 15 Subpart C Paragraph 15.207 (dBuV) Limit		
Frequency MHz	Limits	
	QP	AV
0.15 - 0.50	66-56 ^(註)	56-46 ^(註)
0.50-5.0	56	46
5.0 - 30	60	50

2.4. Test Procedure

The EUT and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm /50uH coupling impedance with 50ohm termination. (Please refers to the block diagram of the test setup and photographs.)

Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4: 2003 on conducted measurement.

Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.

The EUT was setup to ANSI C63.4, 2003; tested to DTS test procedure of Oct 2002 KDB558074 for compliance to FCC 47CFR 15.247 requirements.

2.5. Uncertainty

± 2.26 dB

2.6. Test Result of Conducted Emission

Product : Road Warrior Rx
 Test Item : Conducted Emission Test
 Power Line : Line 1
 Test Mode : Mode 1: Transmitter (2441MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV	Margin dB	Limit dBuV
LINE 1					
Quasi-Peak					
0.170	0.621	47.610	48.231	-17.198	65.429
0.224	0.478	41.420	41.898	-21.988	63.886
1.017	0.320	33.130	33.450	-22.550	56.000
1.810	0.340	40.410	40.750	-15.250	56.000
3.451	0.380	44.710	45.090	-10.910	56.000
10.138	0.600	24.500	25.100	-34.900	60.000
Average					
0.170	0.621	40.360	40.981	-14.448	55.429
0.224	0.478	34.690	35.168	-18.718	53.886
1.017	0.320	28.810	29.130	-16.870	46.000
1.810	0.340	34.310	34.650	-11.350	46.000
3.451	0.380	32.740	33.120	-12.880	46.000
10.138	0.600	11.220	11.820	-38.180	50.000

Note:

1. All Reading Levels are Quasi-Peak and average value.
2. "■" means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

Product : Road Warrior Rx
 Test Item : Conducted Emission Test
 Power Line : Line 2
 Test Mode : Mode 1: Transmitter (2441MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV	Margin dB	Limit dBuV
LINE 2					
Quasi-Peak					
0.170	0.300	45.980	46.280	-19.149	65.429
0.224	0.300	41.310	41.610	-22.276	63.886
0.677	0.310	35.710	36.020	-19.980	56.000
1.978	0.350	37.660	38.010	-17.990	56.000
3.560	0.390	43.790	44.180	-11.820	56.000
16.615	0.900	24.950	25.850	-34.150	60.000
Average					
0.170	0.300	38.310	38.610	-16.819	55.429
0.224	0.300	37.400	37.700	-16.186	53.886
0.677	0.310	26.690	27.000	-19.000	46.000
1.978	0.350	30.350	30.700	-15.300	46.000
3.560	0.390	33.520	33.910	-12.090	46.000
16.615	0.900	18.340	19.240	-30.760	50.000

Note:

1. All Reading Levels are Quasi-Peak and average value.
2. "■" means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

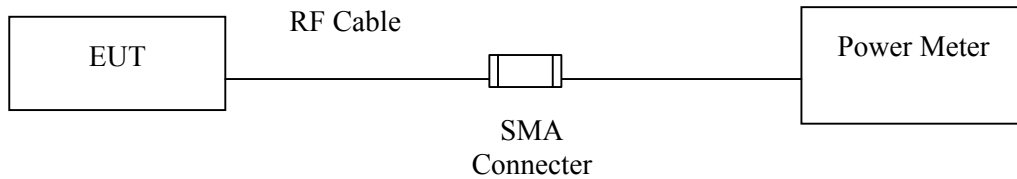
3. Peak Power Output

3.1. Test Equipment

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X	Power Meter	Anritsu	ML2495A/6K00003357	May, 2007
X	Power Sensor	Anritsu	MA2491A/034457	May, 2007

Note: 1. All equipments are calibrated every one year.
 2. Test instruments marked by "X" are used to measure the final test results.

3.2. Test Setup



3.3. Limit

According to FCC Section 15.247(b)(3). The maximum peak power shall be less 1Watt.

3.4. Test Procedure

Set the RBW greater than 6 dB bandwidth of the emission or use a peak power meter.
 The EUT was setup to ANSI C63.4, 2003; tested to DTS test procedure of Oct 2002 KDB558074 for compliance to FCC 47CFR 15.247 requirements.

3.5. Uncertainty

± 1.27 dB

3.6. Test Result of Peak Power Output

Product : Road Warrior Rx
Test Item : Peak Power Output
Test Site : CTR1
Test Mode : Mode 1: Transmitter

Channel No.	Frequency (MHz)	Channel Power (dBm)	Required Limit	Result
2	2405.00	-4.46	1Watt= 30 dBm	Pass
20	2441.00	-4.84	1Watt= 30 dBm	Pass
38	2477.00	-5.63	1Watt= 30 dBm	Pass

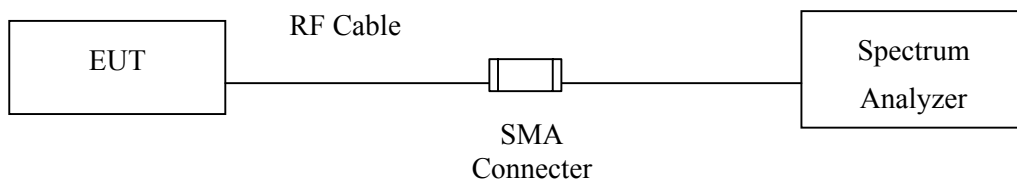
4. RF Antenna Conducted Test

4.1. Test Equipment

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X	Spectrum Analyzer	HP	E4407B / US39440758	June, 2007

- Note:
1. All equipments are calibrated every one year.
 2. The test instruments Marked “X” are used to measure the final test results.

4.2. Test Setup



4.3. Limits

According to FCC Section 15.247(d). In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or 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, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

4.4. Test Procedure

The EUT was setup to ANSI C63.4, 2003; tested to DTS test procedure of Oct 2002 KDB558074 for compliance to FCC 47CFR 15.247 requirements.

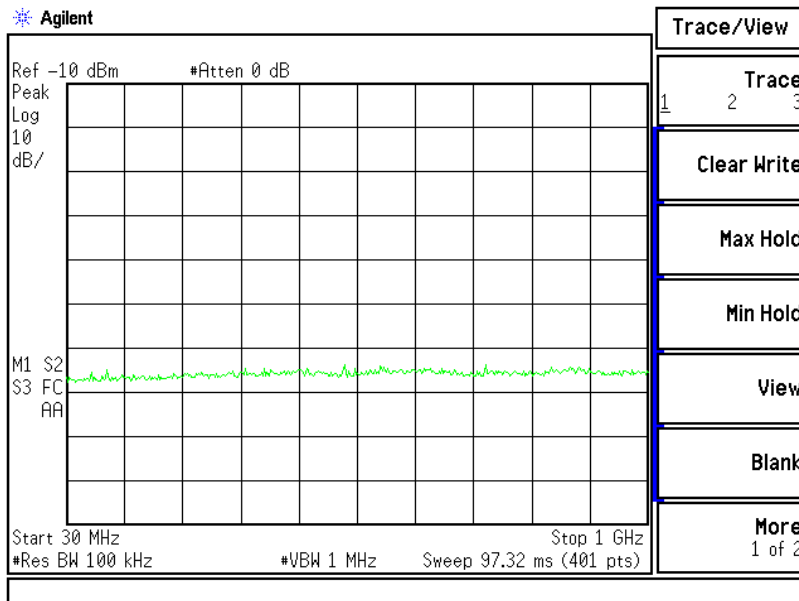
4.5. Uncertainty

± 150Hz

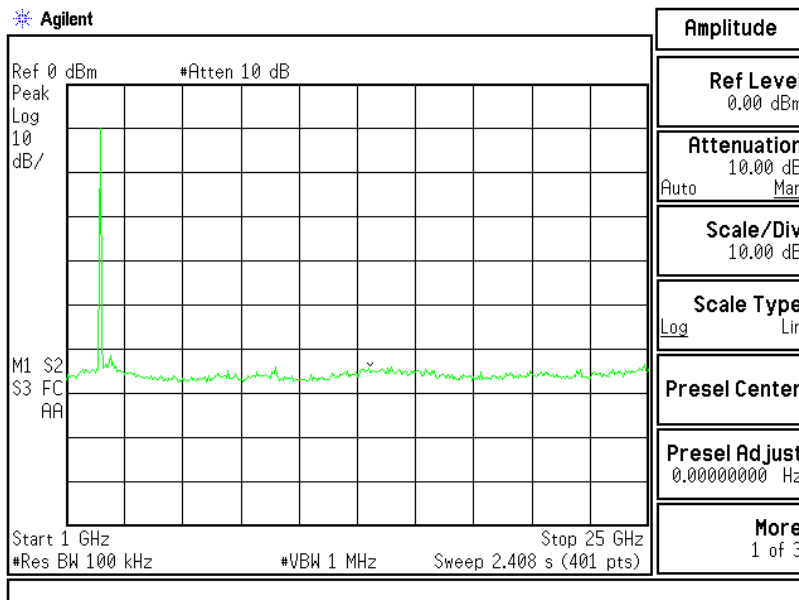
4.6. Test Result of RF Antenna Conducted Test

Product : Road Warrior Rx
 Test Item : RF Antenna Conducted Test
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter (2405MHz)

Figure Channel 2: 30-1GHz

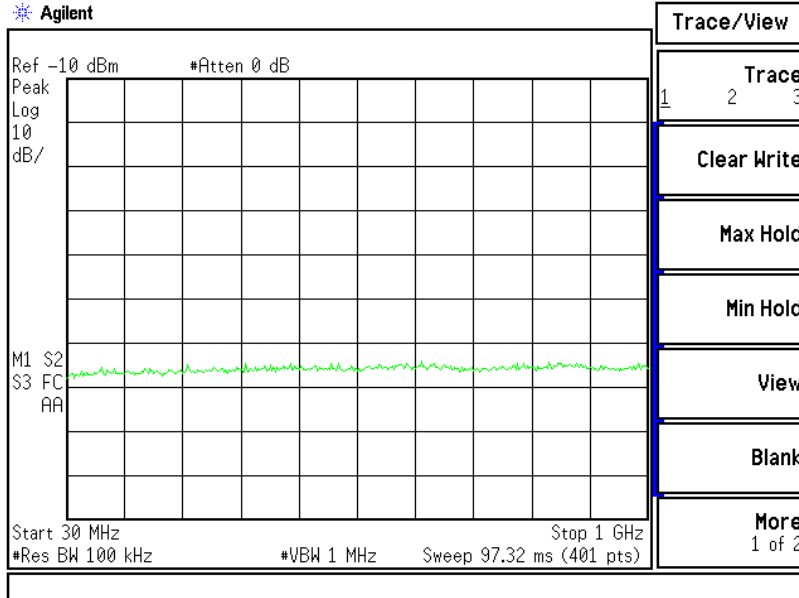


1-25GHz

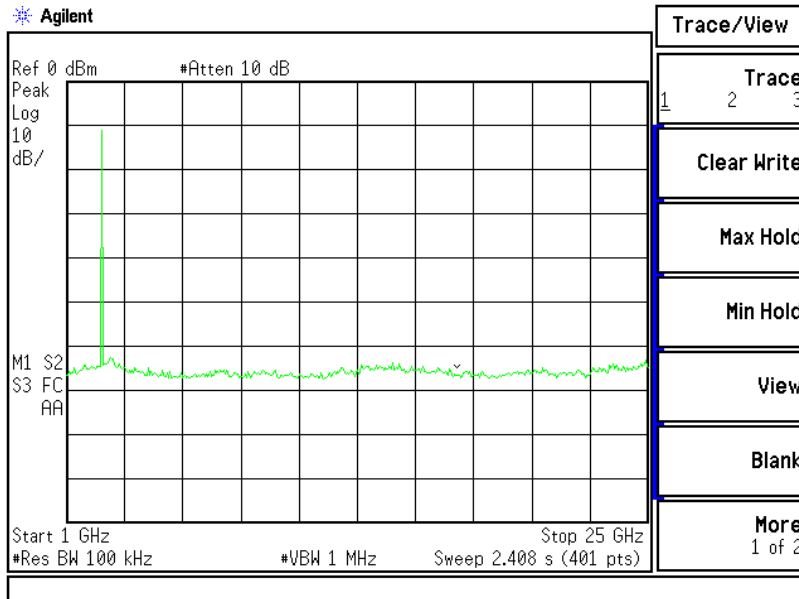


Product : Road Warrior RX
 Test Item : Occupied Bandwidth Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter (2441MHz)

Figure Channel 20: 30-1GHz

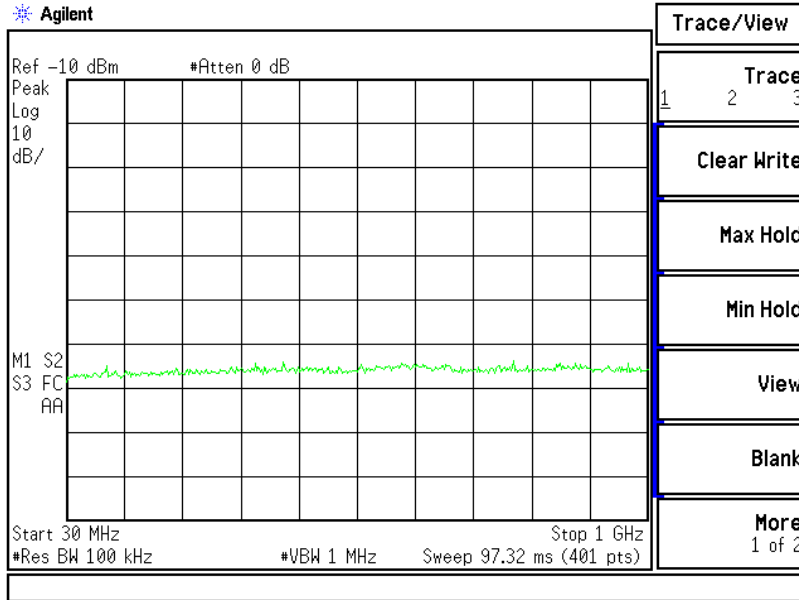


1-25GHz

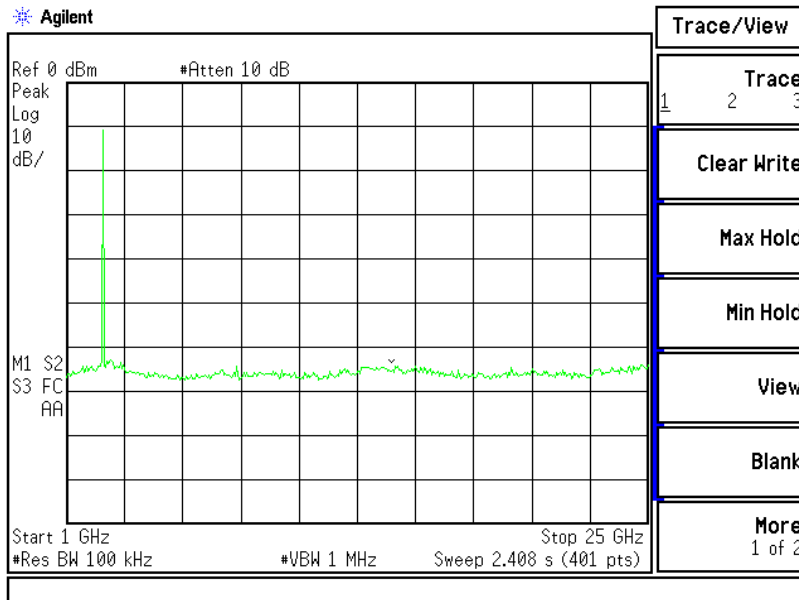


Product : Road Warrior Rx
 Test Item : Occupied Bandwidth Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter (2477MHz)

Figure Channel 38: 30-1GHz



1-25GHz



5. Radiated Emission

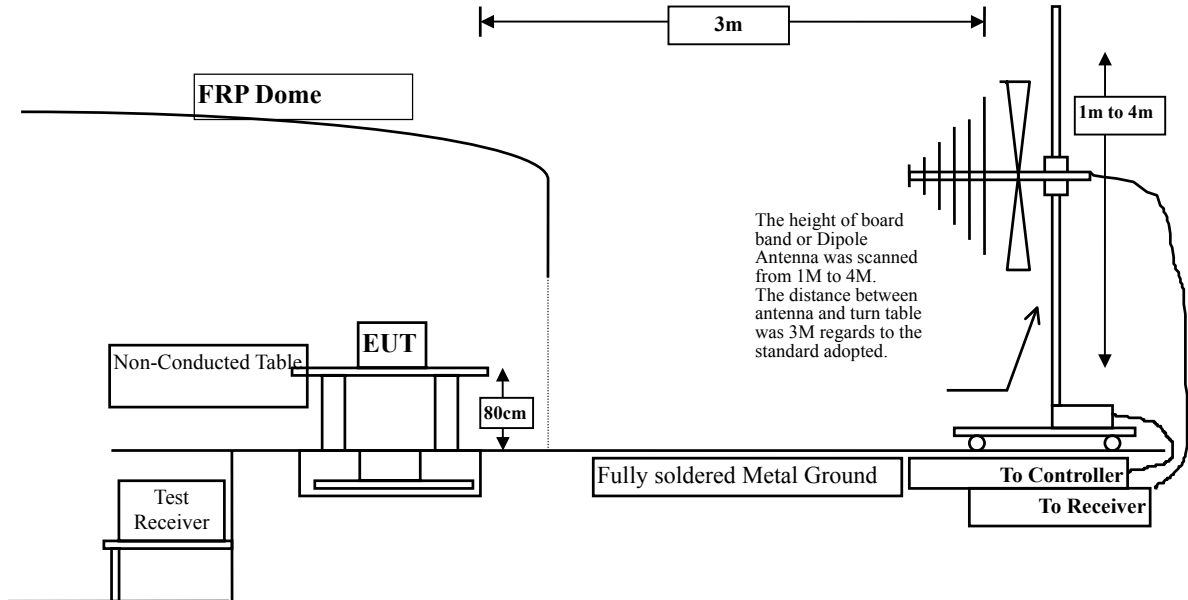
5.1. Test Equipment

Test Site		Equipment	Manufacturer	Model No./Serial No.	Last Cal.
☒ Site # 3	X	Test Receiver	R & S	ESI 26 / 838786/004	May, 2007
	X	Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2007
	X	Bilog Antenna	SCHAFFNER	CBL6112B / 2697	May, 2007
	X	Horn Antenna	Schwarzbeck	BBHA9120D / 305, 306	July, 2007
	X	Horn Antenna	Schwarzbeck	BBHA9170 / 208, 209	July, 2007
	X	Pre-Amplifier	QTK	QTK-AMP-01 / 0001	July, 2007
	X	Pre-Amplifier	QTK	QTK-AMP-03 / 0003	May, 2007
	X	Pre-Amplifier	HP	8449B / 3008A01123	July, 2007

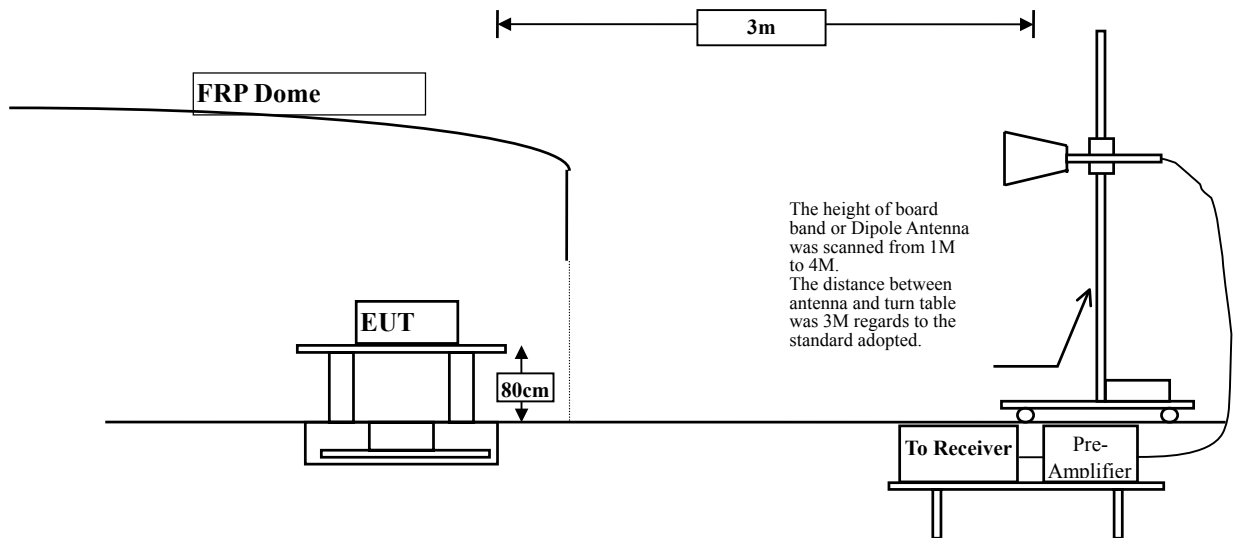
- Note:
1. All equipments are calibrated every one year.
 2. Test equipments marked by "X" are used to measure the final test results.

5.2. Test Setup

Below 1GHz



Above 1GHz



5.3. Limits

➤ General Radiated Emission Limits

Attenuation below the general limits specified in FCC 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in FCC 15.205(a), must also comply in FCC 15.209(a) (see FCC 15.205(c)).

FCC Part 15 Subpart C Paragraph 15.209 Limits		
Frequency MHz	uV/m @3m	dBuV/m@3m
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

- Remarks:
1. RF Voltage (dBuV) = 20 log RF Voltage (uV)
 2. In the Above Table, the tighter limit applies at the band edges.
 3. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

5.4. Test Procedure

The EUT and its simulators are placed on a turn table which is 0.8 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level.

Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C63.4: 2003 on radiated measurement.

The additional latch filter below 1GHz was used to measure the level of harmonics radiated emission during field strength of harmonics measurement.

The bandwidth below 1GHz setting on the field strength meter is 120 kHz, above 1GHz are 1 MHz.

The frequency range from 30MHz to 10th harmonics is checked.

The EUT was setup to ANSI C63.4, 2003; tested to DTS test procedure of Oct 2002 KDB558074 for compliance to FCC 47CFR 15.247 requirements.

5.5. Uncertainty

± 3.9 dB above 1GHz

± 3.8 dB below 1GHz

5.6. Test Result of Radiated Emission

Product : Road Warrior Rx
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter (2405MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Peak Detector:					
4808.000	-0.210	46.410	46.200	-27.800	74.000
7215.000	3.233	52.450	55.682	-18.318	74.000
9620.000	5.722	42.710	48.431	-25.569	74.000
Average Detector:					
7215.000	3.233	42.610	45.842	-8.158	54.000
Vertical					
Peak Detector:					
4810.000	-0.214	49.220	49.007	-24.993	74.000
7215.000	3.233	49.730	52.962	-21.038	74.000
9620.000	5.722	42.120	47.841	-26.159	74.000
Average Detector:					
--					

Note:

1. The reading levels below 1GHz and above 1GHz are quasi-peak values and peak/average values, respectively.
2. Receiver setting (Peak Detector) : RBW:1MHz; VBW:1MHz; Span:100MHz ◦
3. Receiver setting (AVG Detector) : RBW:1MHz; VBW:30Hz; Span:20MHz ◦
4. Emission Level = Reading Level + Correct Factor.
5. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

Product : Road Warrior Rx
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter (2441 MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Peak Detector:					
4882.000	-0.276	46.350	46.074	-27.926	74.000
7323.000	3.330	53.910	57.239	-16.761	74.000
9764.000	6.262	41.820	48.083	-25.917	74.000
Average Detector:					
7323.000	3.330	44.100	47.429	-6.571	54.000
Vertical					
Peak Detector:					
4882.000	-0.276	46.160	45.884	-28.116	74.000
7323.000	3.330	53.800	57.129	-16.871	74.000
9764.000	6.262	41.990	48.253	-25.747	74.000
Average Detector:					
7323.000	3.330	46.200	49.529	-4.471	54.000

Note:

1. The reading levels below 1GHz and above 1GHz are quasi-peak values and peak/average values, respectively.
2. Receiver setting (Peak Detector) : RBW:1MHz; VBW:1MHz; Span:100MHz °
3. Receiver setting (AVG Detector) : RBW:1MHz; VBW:30Hz; Span:20MHz °
4. Emission Level = Reading Level + Correct Factor.
5. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

Product : Road Warrior Rx
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter (2477 MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Peak Detector:					
4954.000	0.513	45.940	46.453	-27.547	74.000
7431.000	3.877	48.010	51.887	-22.113	74.000
9908.000	6.488	40.650	47.139	-26.861	74.000
Average Detector:					
--					
Vertical					
Peak Detector:					
4954.000	0.513	45.800	46.313	-27.687	74.000
7431.000	3.877	49.450	53.327	-20.673	74.000
9908.000	6.488	41.290	47.779	-26.221	74.000
Average Detector:					
--					

Note:

1. The reading levels below 1GHz and above 1GHz are quasi-peak values and peak/average values, respectively.
2. Receiver setting (Peak Detector) : RBW:1MHz; VBW:1MHz; Span:100MHz °
3. Receiver setting (AVG Detector) : RBW:1MHz; VBW:30Hz; Span:20MHz °
4. Emission Level = Reading Level + Correct Factor.
5. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

Product : Road Warrior Rx
 Test Item : General Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter (2441MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
288.020	13.476	24.698	38.174	-7.826	46.000
336.520	14.414	24.750	39.164	-6.836	46.000
383.080	15.831	21.935	37.766	-8.234	46.000
447.100	18.249	18.109	36.358	-9.642	46.000
623.640	20.810	16.088	36.898	-9.102	46.000
720.640	20.923	15.101	36.024	-9.976	46.000
Vertical					
175.500	9.773	25.985	35.758	-7.742	43.500
208.480	10.061	25.359	35.420	-8.080	43.500
299.660	13.749	21.205	34.954	-11.046	46.000
336.520	14.364	21.257	35.621	-10.379	46.000
623.640	21.210	14.429	35.639	-10.361	46.000
815.700	21.536	10.565	32.101	-13.899	46.000

Note:

1. The reading levels below 1GHz are quasi-peak values.
2. "■" means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.
4. The radiated emissions below 1GHz of the lowest, middle, highest frequency are pretested. Only the worst case is shown on the report.

6. Band Edge

6.1. Test Equipment

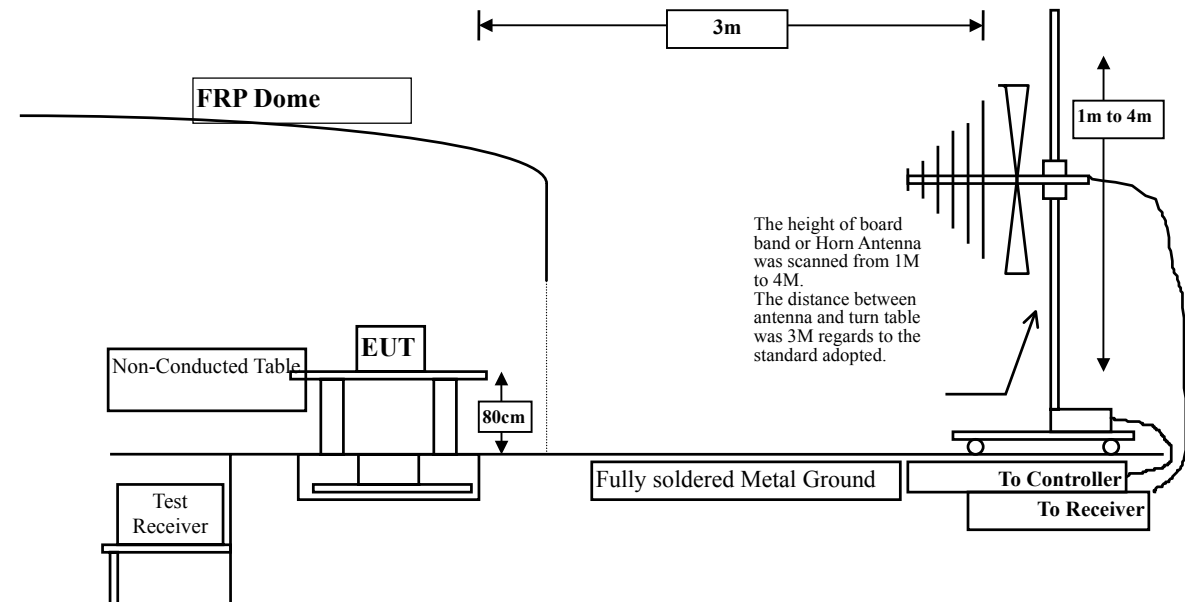
Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X Test Receiver	R & S	ESI 26 / 838786/004	May, 2007
X Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2007
X Bilog Antenna	SCHAFFNER	CBL6112B / 2697	May, 2007
X Horn Antenna	Schwarzbeck	BBHA9120D / 305, 306	July, 2007
X Horn Antenna	Schwarzbeck	BBHA9170 / 208, 209	July, 2007
X Pre-Amplifier	QTK	QTK-AMP-01 / 0001	July, 2007
X Pre-Amplifier	QTK	QTK-AMP-03 / 0003	May, 2007
X Pre-Amplifier	HP	8449B / 3008A01123	July, 2007

OATS No.3

- Note:
1. All equipments are calibrated every one year.
 2. The test equipments marked by “X” are used to measure the final test results.

6.2. Test Setup

RF Radiated Measurement:



6.3. Limit

Attenuation below the general limits specified in FCC 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in FCC 15.205(a), must also comply in FCC 15.209(a) (see FCC 15.205(c)).

FCC Part 15 Subpart C Paragraph 15.209 Limits		
Frequency MHz	uV/m @3m	dBuV/m@3m
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

Remarks:

1. RF Voltage (dBuV) = 20 log RF Voltage (uV)
2. In the Above Table, the tighter limit applies at the band edges.
3. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

6.4. Test Procedure

The EUT and its simulators are placed on a turn table which is 0.8 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level.

Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C63.4:2003 on radiated measurement.

The bandwidth below 1GHz setting on the field strength meter is 120 kHz, above 1GHz are 1 MHz. The EUT was setup to ANSI C63.4, 2003; tested to DTS test procedure of Oct 2002 KDB558074 for compliance to FCC 47CFR 15.247 requirements

6.5. Uncertainty

Conducted is ± 1 MHz

Radiated is ± 3.9 dB

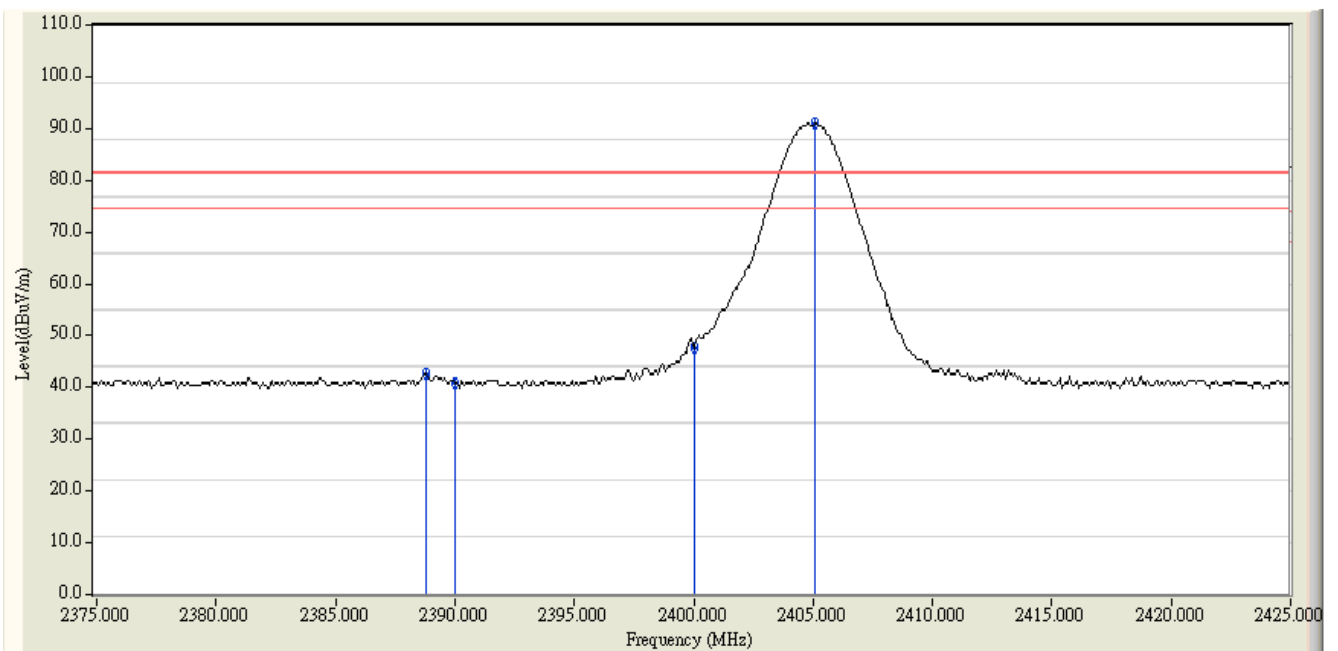
6.6. Test Result of Band Edge

Product : Road Warrior Rx
 Test Item : Band Edge Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter

RF Radiated Measurement (Horizontal):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
2 (Peak)	2388.800	-6.772	45.420	38.648	74.00	54.00	Pass
2 (Peak)	2390.000	-6.769	43.793	37.025	74.00	54.00	Pass
2 (Peak)	2400.000	-6.730	50.197	43.467	74.00	54.00	Pass
2 (Peak)	2405.100	-6.716	89.446	82.730	74.00	54.00	Pass

Figure Channel 2: Horizontal (Peak)



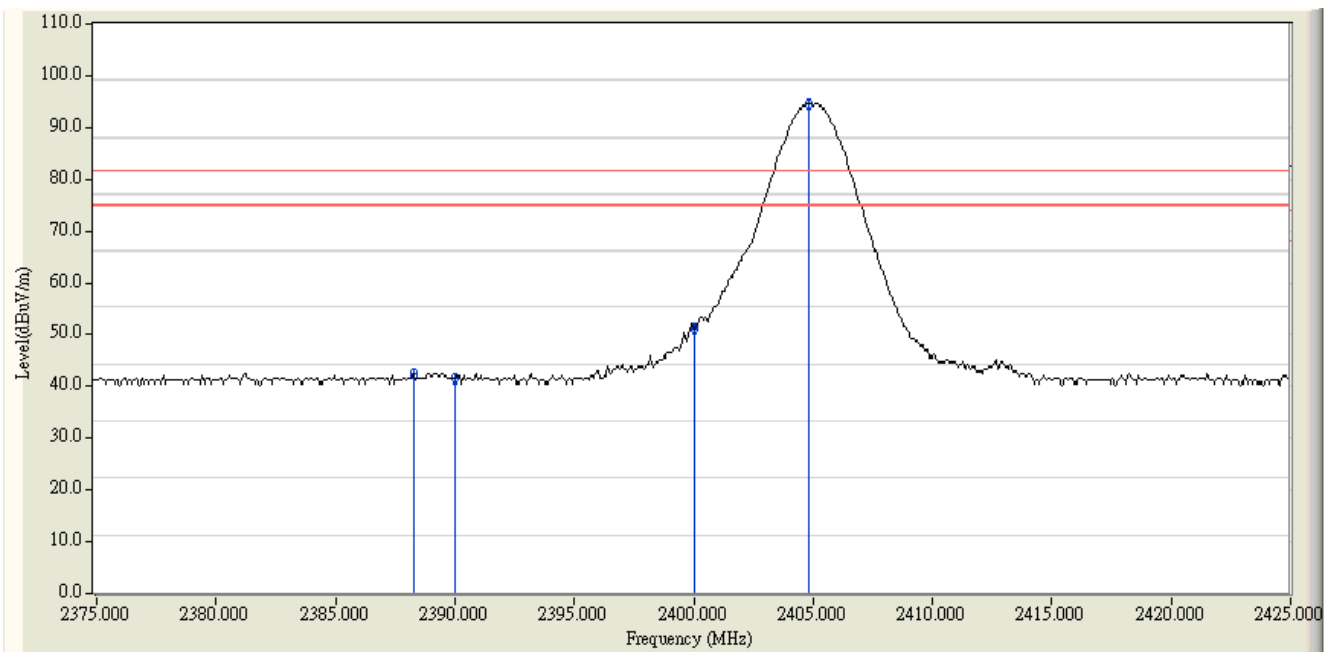
Note: RBW=1MHz, VBW=1MHz, Sweep=500ms

Product : Road Warrior Rx
 Test Item : Band Edge Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter

RF Radiated Measurement (Vertical):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
2 (Peak)	2388.300	-6.773	45.237	38.464	74.00	54.00	Pass
2 (Peak)	2390.000	-6.769	44.075	37.307	74.00	54.00	Pass
2 (Peak)	2400.000	-6.730	53.185	46.455	74.00	54.00	Pass
2 (Peak)	2404.800	-6.716	92.491	85.775	74.00	54.00	Pass

Figure Channel 2: Vertical (Peak)



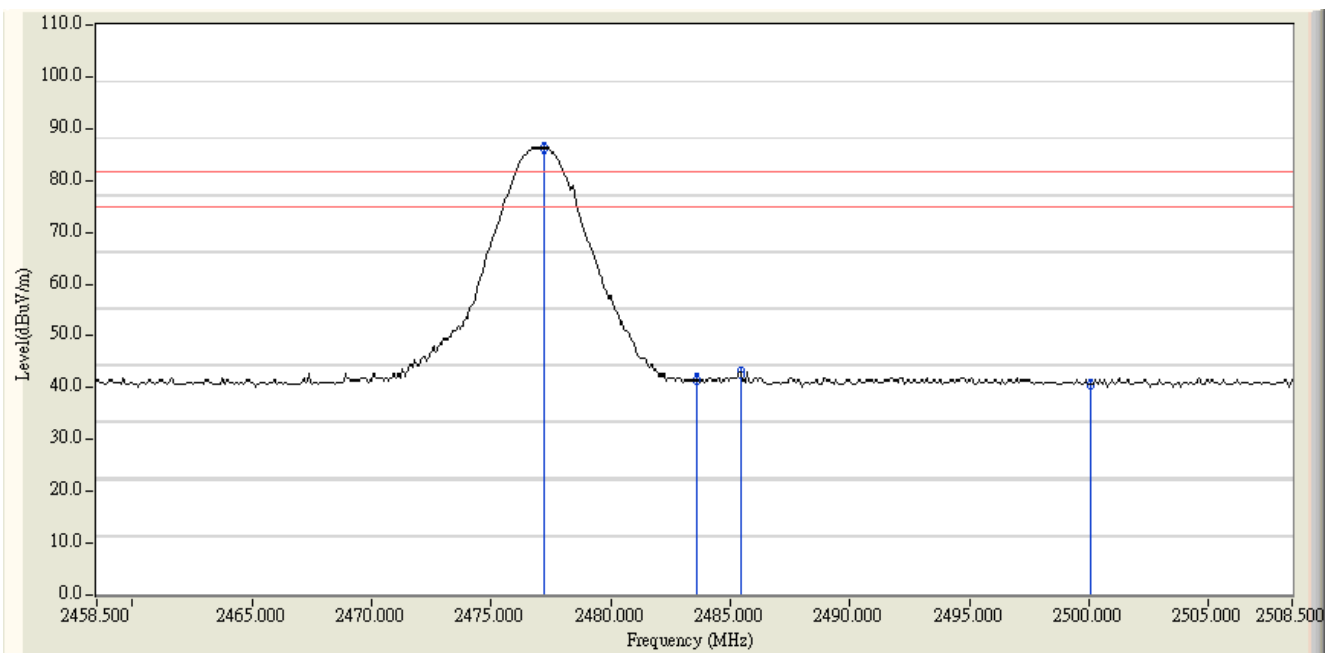
Note: RBW=1MHz, VBW=1MHz, Sweep=500ms

Product : Road Warrior Rx
 Test Item : Band Edge Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter

RF Radiated Measurement (Horizontal):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
38(Peak)	2477.100	-6.488	84.913	78.424	74.00	54.00	Pass
38(Peak)	2483.500	-6.469	43.771	37.303	74.00	54.00	Pass
38(Peak)	2485.300	-6.465	45.050	38.584	74.00	54.00	Pass
38(Peak)	2500.000	-6.437	43.099	36.662	74.00	54.00	Pass

Figure Channel 38: Horizontal (Peak)



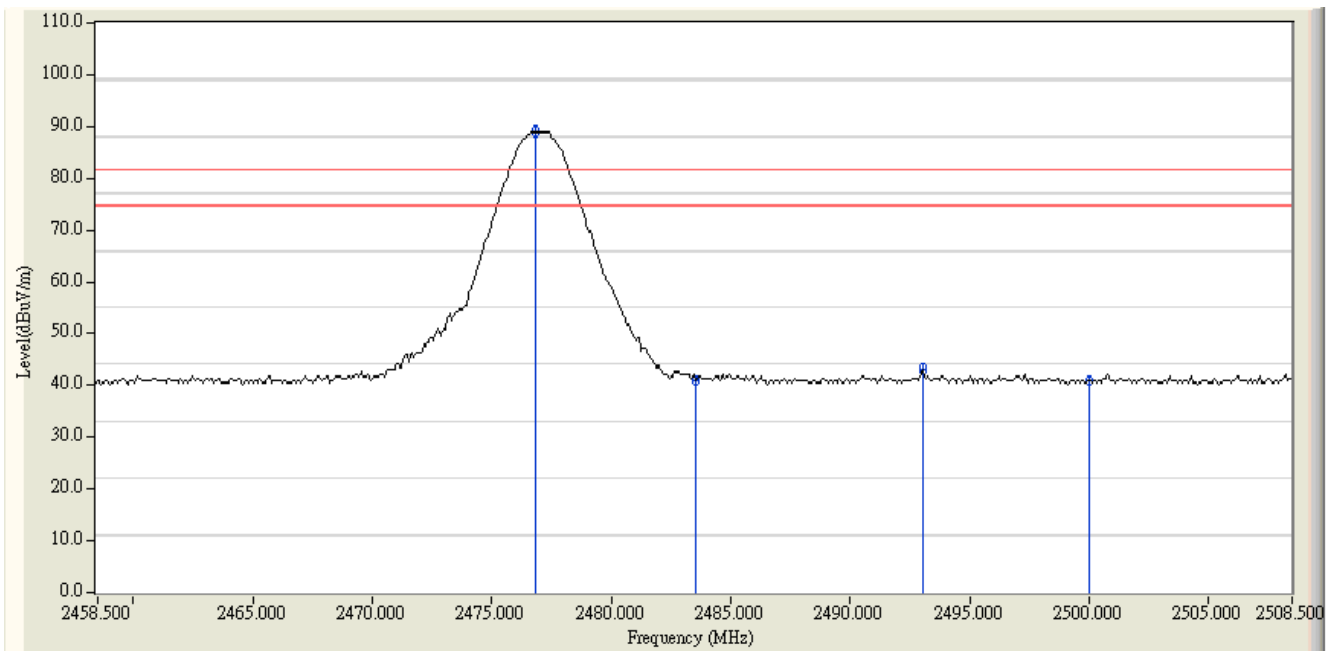
Note: RBW=1MHz, VBW=1MHz, Sweep=500ms

Product : Road Warrior Rx
 Test Item : Band Edge Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter

RF Radiated Measurement (Vertical):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBUV)	Emission Level (dBUV/m)	Peak Limit (dBUV/m)	Average Limit (dBUV/m)	Result
38(Peak)	2476.800	-6.489	87.443	80.954	74.00	54.00	Pass
38(Peak)	2483.500	-6.469	43.720	37.252	74.00	54.00	Pass
38(Peak))	2493.000	-6.454	45.467	39.014	74.00	54.00	Pass
38(Peak))	2500.000	-6.437	43.728	37.291	74.00	54.00	Pass

Figure Channel 38: Vertical (Peak)



Note: RBW=1MHz, VBW=1MHz, Sweep=500ms

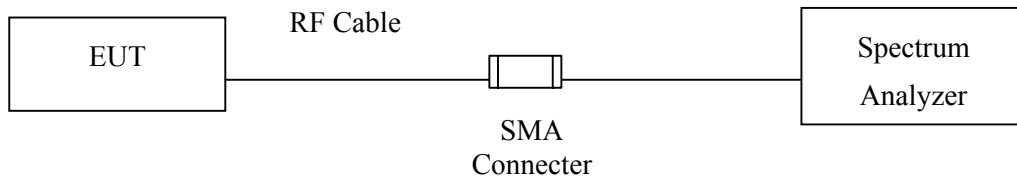
7. Occupied Bandwidth

7.1. Test Equipment

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X	Spectrum Analyzer	HP	E4407B / US39440758	June, 2007

- Note:
1. All equipments are calibrated every one year.
 2. The test instruments Marked “X” are used to measure the final test results.

7.2. Test Setup



7.3. Limits

According to FCC Section 15.247(a)(2). The 6 dB bandwidth must be greater than 500 kHz.

7.4. Test Procedure

The EUT was setup to ANSI C63.4, 2003; tested to DTS test procedure of Oct 2002 KDB558074 for compliance to FCC 47CFR 15.247 requirements

7.5. Uncertainty

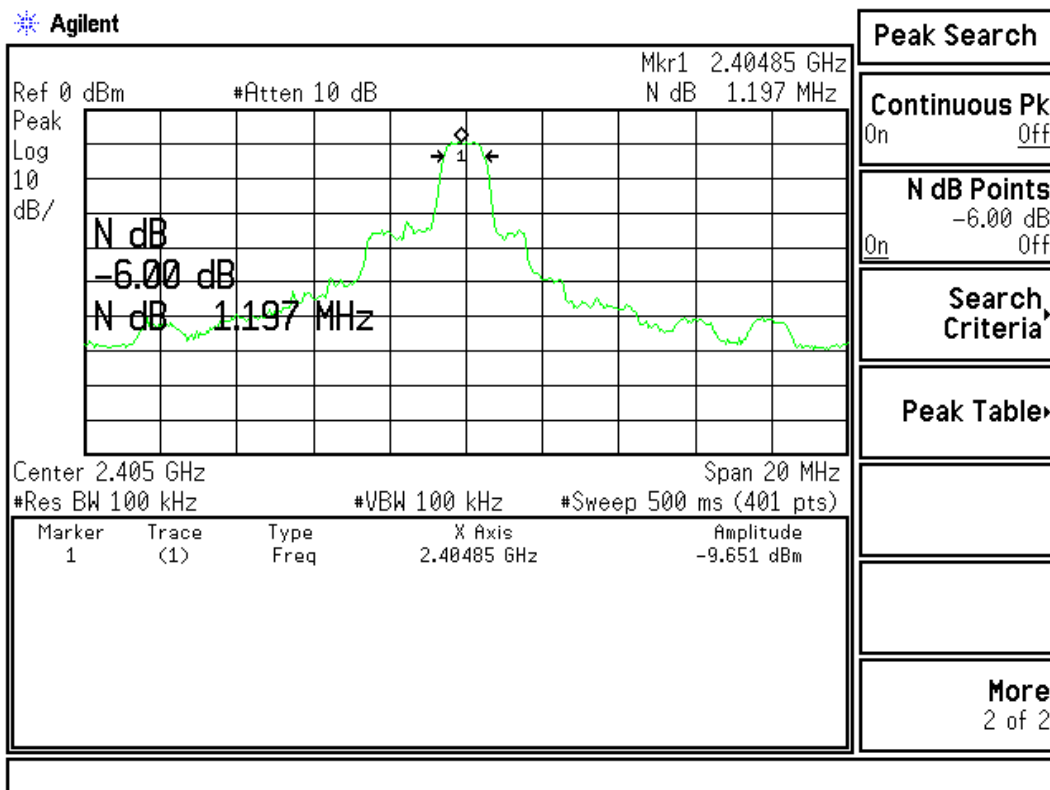
± 150Hz

7.6. Test Result of Occupied Bandwidth

Product : Road Warrior Rx
 Test Item : Occupied Bandwidth Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter (2405MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
2	2405.00	1197	>500	Pass

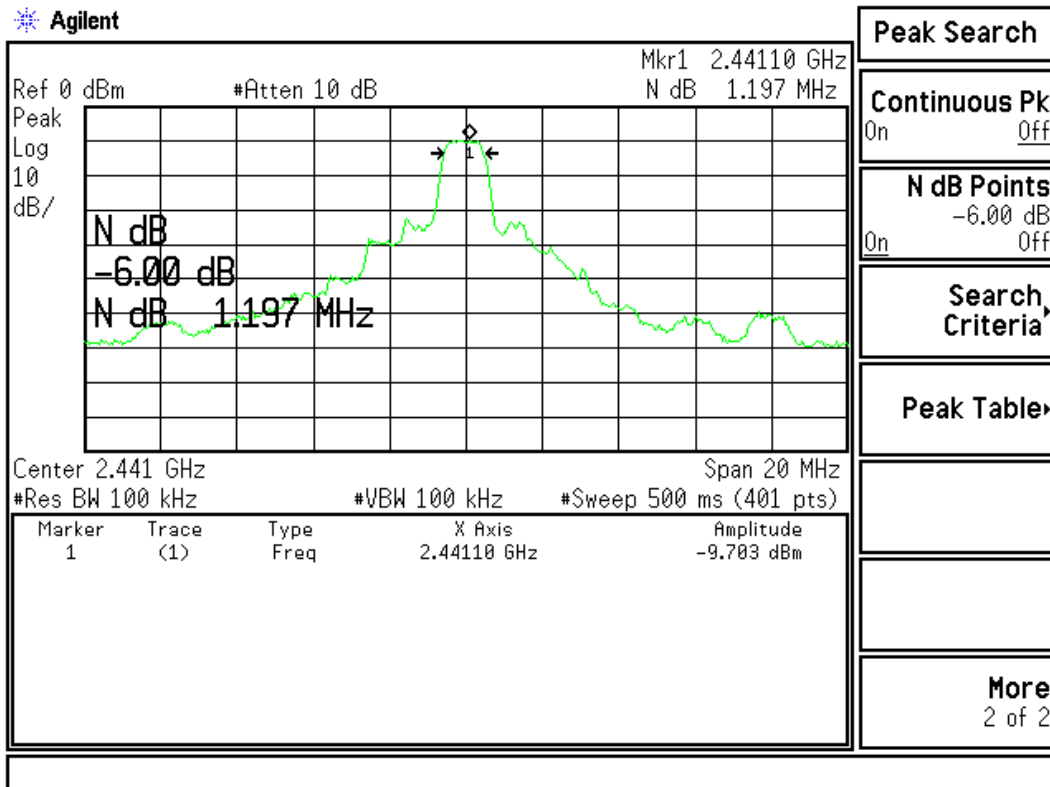
Figure Channel 2:



Product : Road Warrior Rx
 Test Item : Occupied Bandwidth Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter (2441MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
20	2441.00	1197	>500	Pass

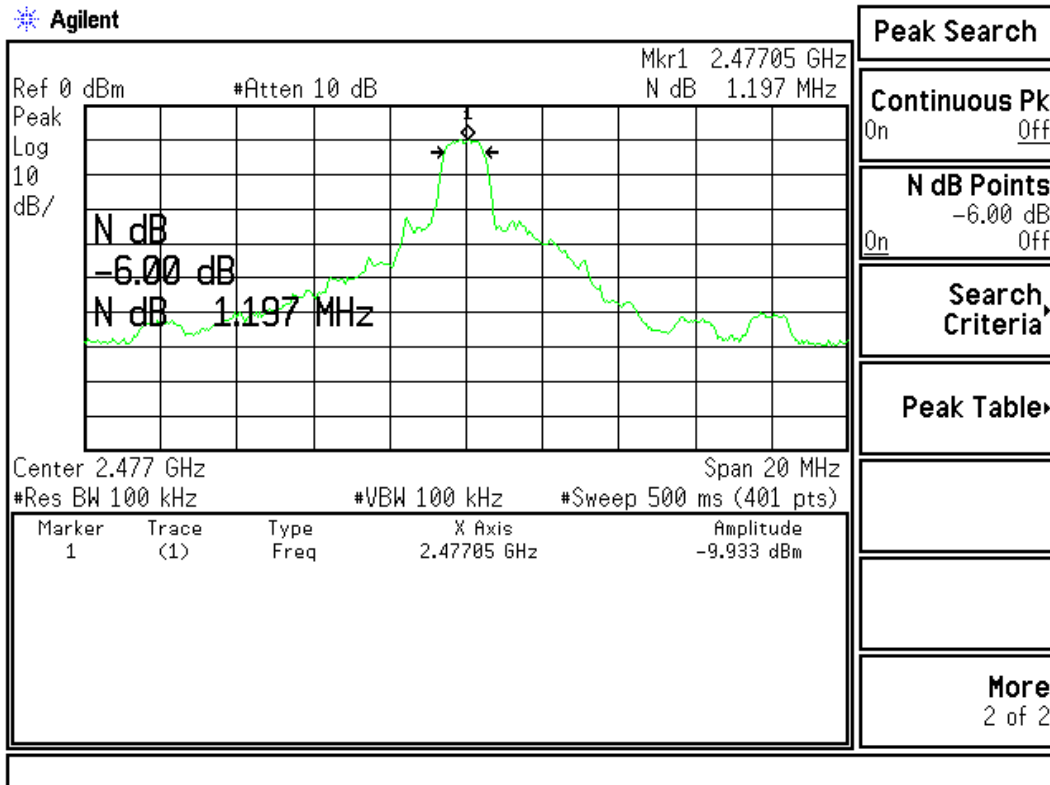
Figure Channel 20



Product : Road Warrior Rx
 Test Item : Occupied Bandwidth Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter (2477MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
38	2477.00	1197	>500	Pass

Figure Channel 38



8. Power Density

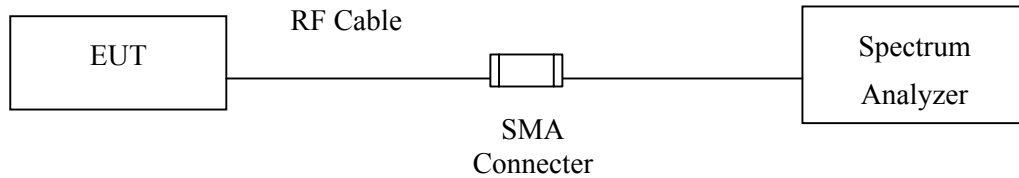
8.1. Test Equipment

The following test equipments are used during the radiated emission tests:

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X	Spectrum Analyzer	HP	E4407B / US39440758	June, 2007

- Note:
1. All equipments are calibrated every one year.
 2. The test instruments marked by “X” are used to measure the final test results.

8.2. Test Setup



8.3. Limits

According to FCC Section 15.247(e). The transmitted power density averaged over any 1 second interval shall not be greater +8dBm in any 3kHz bandwidth.

8.4. Test Procedure

The EUT was setup to ANSI C63.4, 2003; tested to DTS test procedure of Oct 2002 KDB558074 for compliance to FCC 47CFR 15.247 requirements

8.5. Uncertainty

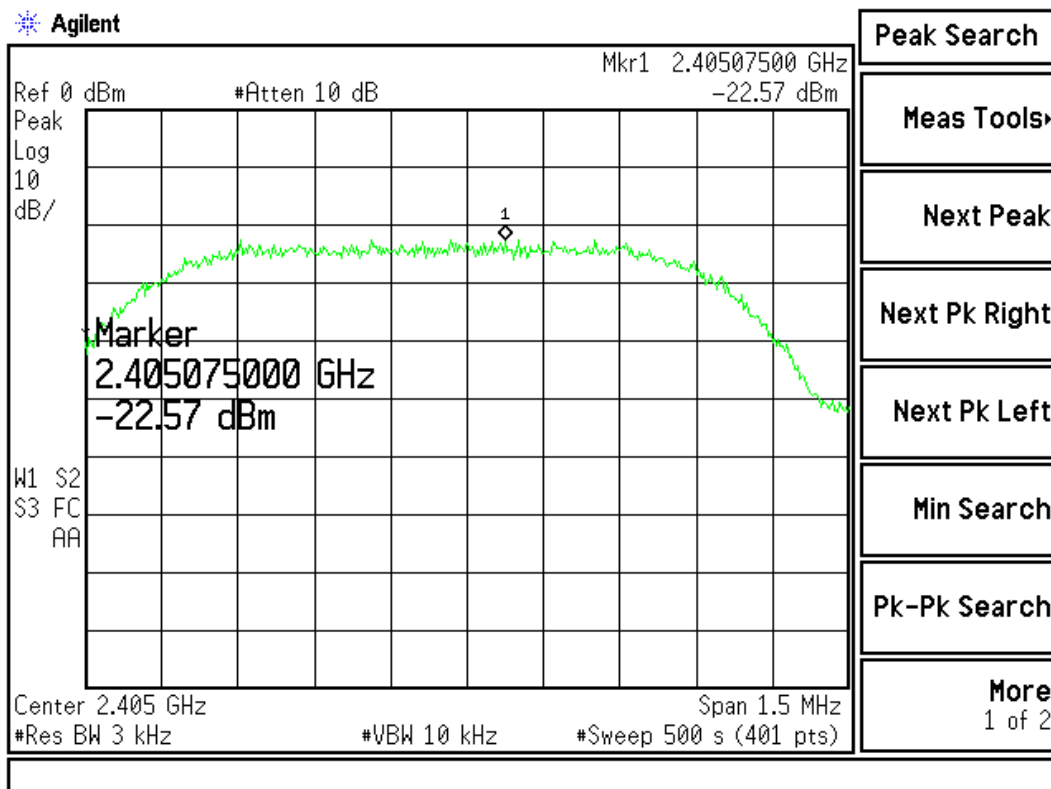
± 1.27 dB

8.6. Test Result of Power Density

Product : Road Warrior Rx
 Test Item : Power Density Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter (2405MHz)

Channel No.	Frequency (MHz)	Measure Level (dBm)	Limit (dBm)	Result
2	2405.00	-22.57	< 8dBm	Pass

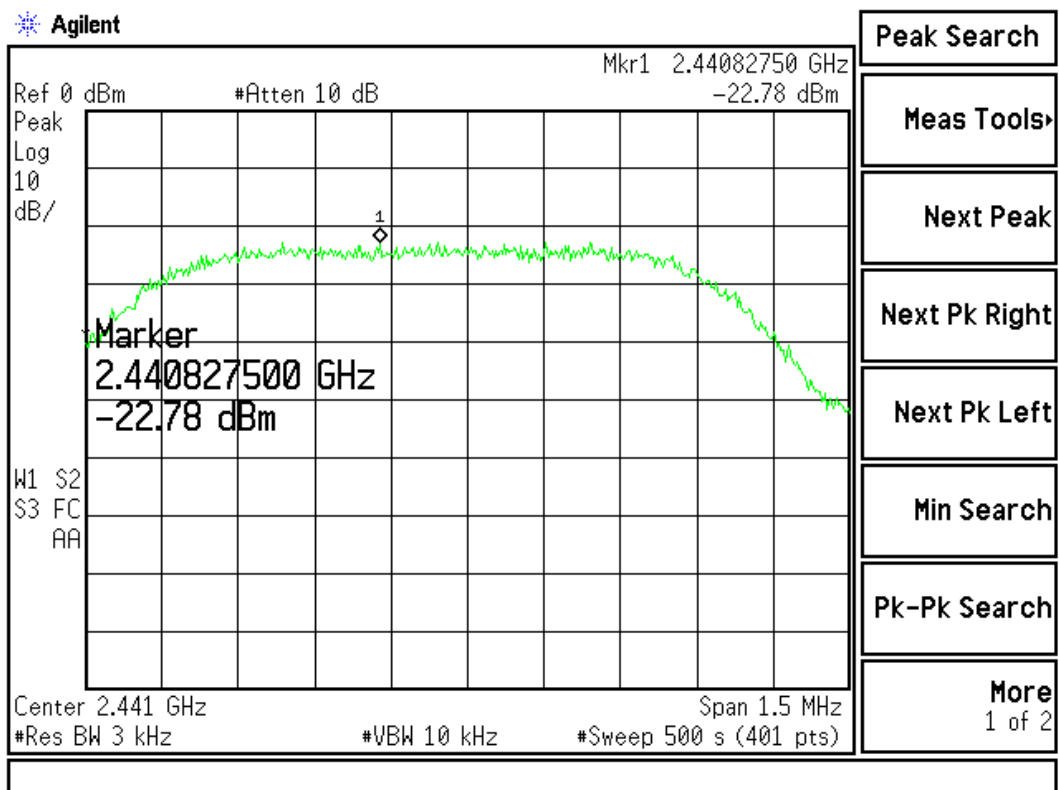
Figure Channel 2:



Product : Road Warrior Rx
 Test Item : Power Density Data
 Test Site : No.3OATS
 Test Mode : Mode 1: Transmitter (2441MHz)

Channel No.	Frequency (MHz)	Measurement Level (dBm)	Required Limit (dBm)	Result
20	2441.000	-22.78	< 8dBm	Pass

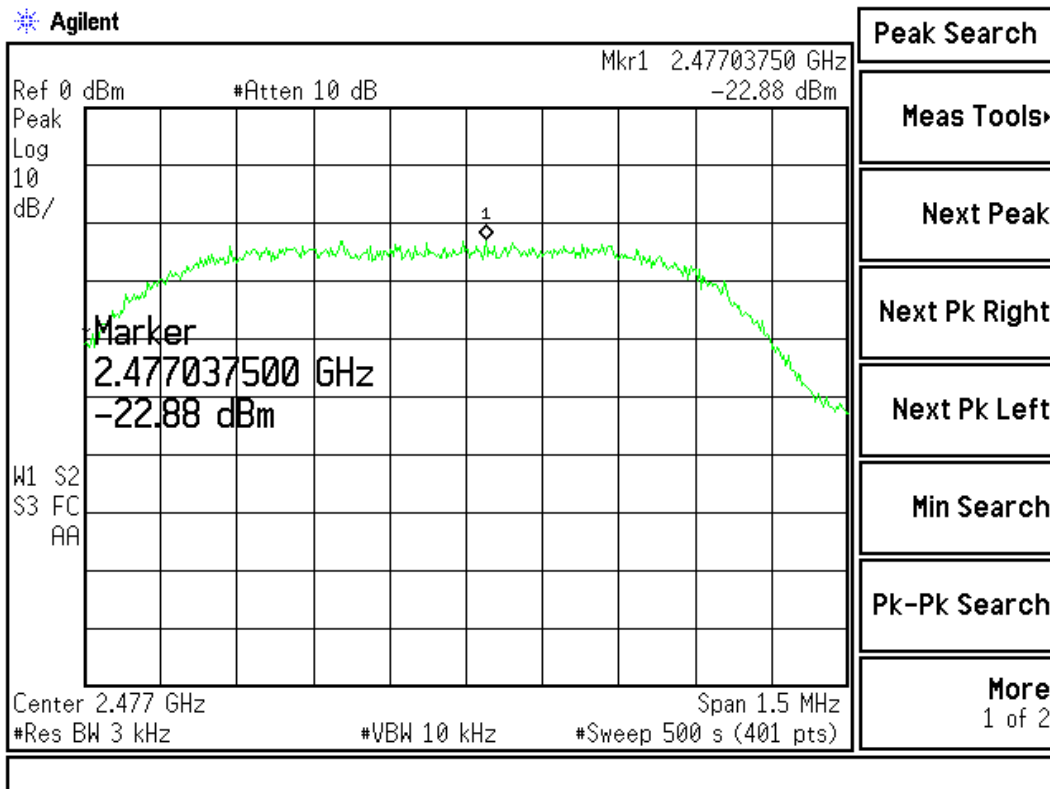
Figure Channel 20



Product : Road Warrior Rx
 Test Item : Power Density Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter (2478MHz)

Channel No.	Frequency (MHz)	Measurement Level (dBm)	Required Limit (dBm)	Result
38	247700	-22.88	< 8dBm	Pass

Figure Channel 38



9. EMI Reduction Method During Compliance Testing

No modification was made during testing.