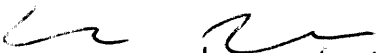
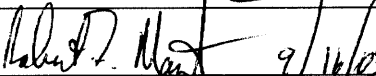


**FCC Part 15 Subparts B & C Report
(FCC § 15.249)
for
Media Group Wireless, LLC
on the
Media Group Wireless Audience Response Transceiver
Model: Media Group Transceiver**

Test Report #: 3046433

Project #: 3046433
Date of Test: August 15, September 2 & 15, 2003
Report Date: September 15, 2003

Total No of Pages Contained in this Report: 13

 9/16/03	Nicholas Abbondante, Test Engineer
 9/16/03	Robert F. Martin, Senior Technical Manager

All services undertaken are subject to the following general policy: Reports are submitted for exclusive use of the client to whom they are addressed. Their significance is subject to the adequacy and representative character of the samples and to the comprehensiveness of the tests, examinations or surveys made. This report shall not be reproduced except in full, without written consent of Intertek Testing Services, NA Inc. This report must not be used to claim product endorsement by NVLAP, NIST nor any other agency of the U.S. Government.

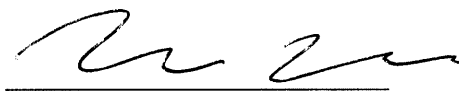
Table of Contents

1.0	Summary of Tests	3
2.0	General Description	4
2.1	Product Description	4
2.2	Test Facility	4
2.3	Test Equipment and Support Equipment	5
2.4	General Test Setup	6
2.5	Sample Calculation	7
3.0	Radiated Emissions	8
3.1	Test Procedure	8
3.2	Test Results	8
3.3	Configuration Photographs - Radiated Emissions	11
4.0	Line-Conducted Emissions	12
4.1	Test Procedure	12
4.2	Test Results	12
4.3	Configuration Photographs – Line-Conducted Emissions	13

1.0 Summary of Tests**Models: Media Group Transceiver**

FCC RULE	DESCRIPTION OF TEST	REPORT PAGE
FCC § 15.207	Line-Conducted Emissions	11
FCC § 15.209 FCC § 15.249	Radiated Emissions	7

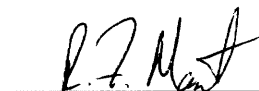
Test Engineer:



Nicholas Abbondante

Date: 9/16/03

Senior Technical Manager:



Robert F. Martin

Date: 9/16/03

2.0 General Description

2.1 Product Description

This transceiver sends control and timing packets for about 10 milliseconds every 1.5 seconds to a series of handheld transceivers. The handheld transceivers respond with a data packet in an assigned time slot if the user has entered data. The unit transmits at 917 to 925 MHz. The receiver is a single conversion superhet design. The receiver has dual diversity antennas. The transmitter has a separate antenna. Antenna connectors are type SMA but the unit is designed to be installed only by professional operators.

The EUT has been tested at the request of

Company Name: Media Group Wireless, LLC
2641 Washington Blvd., Suite 100
Ogden, UT 84401
Contact: Nichole W. Venz
Telephone: 801.621.2500 **Fax:** 801.621.4677

In summary, this report confirms that the EUT is compliant with the FCC Part 15, Subpart B, and FCC Part 15, Subpart C, 15.249 requirements when production units conform to the initial sample. Please address all questions and comments concerning this report to Nicholas Abbondante, Compliance Engineer.

2.2 Test Facility

Site 2C (Middle Site) is a 3m and 10m sheltered EMI measurement range located in a light commercial environment in Boxborough, Massachusetts. It meets the technical requirements of ANSI C63.4-1992 and CISPR 22:1993/EN 55022:1994 for radiated and conducted emission measurements. The shelter structure is entirely fiberglass and plastic, with outside dimensions of 33 ft x 57 ft. The structure resembles a quonset hut with a center ceiling height of 16.5 ft.

The testing floor is covered by a galvanized sheet metal groundplane that is earth-grounded via copper rods around the perimeter of the site. The joints between individual metal sheets are bridged with 2 inch wide metal strips to provide low RF impedance contact throughout. The sheets of metal are screwed in place with stainless steel, round-head screws every three inches. Site illumination and HVAC are provided from beneath the ground reference plane through flush entry ports, the port covers are electrically bonded to the ground plane.

A flush metal turntable with 12 ft. diameter and 5000 lb. load capacity is provided for floor-standing equipment. A wooden table 80 cm high is used for table-top equipment. The turntable is electrically connected to the ground plane with three copper straps. The straps are connected to the turntable at the center of it with ground braid. The copper strap is directly connected to the groundplane at the edges of the turntable. The turntable is located on the south end of the structure and the antennas are mounted 3 and 10 meters away to the north. The antenna mast is non-conductive with remote control of antenna height and polarization. The antenna height is adjustable from 1 to 4 meters.

All final radiated emission measurements are performed with the testing personnel and measurement equipment located below the ground reference plane. The site has a full basement underneath the turntable where support equipment may be remotely located. Operation of the antenna, turntable and equipment under test is controlled by remote controls that manipulate the antenna height and polarization and with a turntable control. Test personnel are located below the ellipse when measurements are performed, however the site maintains the ability of having personnel manipulate cables while monitoring test equipment. Ambient radiated emissions are 6 dB or more below

Media Group Wireless, LLC
Models: Media Group Transceiver

Date of Test: August 15, September 2 & 15, 2003

the relevant FCC emission limits.

AC mains power is brought to the equipment under test through a power line filter, to remove ambient conducted noise. 50 Hz (240 VAC single phase), 60 Hz power (120 VAC single phase, 208 VAC three phase), and 60 Hz (480 VAC three phase) are available. Conducted emission measurements are performed with a Line Impedance Stabilization Network (LISN) or Artificial Mains Network (AMN) bonded to the ground reference plane. A removable vertical groundplane (2 meter X 2 meter area) is used for line-conducted measurements for table top equipment. The vertical groundplane is electrically connected to the reference groundplane.

2.3 Test Equipment and Support Equipment

The following equipment was used to make measurements for emissions testing:

Description	Manufacturer	Model	Serial #	Cal Due
ANTENNA	EMCO	3142	9711-1223	11/05/2003
EMI Receiver Set	Hewlett Packard	8542E	3520A00125	12/05/2003
RF FILTER	Hewlett Packard	85420E	3427A00126	12/05/2003
Spectrum Analyzer	Rohde & Schwarz	FSEK30	100255	05/26/2004
Hi Frequency Cable 40Ghz	Megaphase	TM40 K1K1 197	CBL027	11/13/2003
Hi Frequency Cable 40Ghz	Megaphase	TM40 K1K1 80	CBL030	11/13/2003
HORN ANTENNA	EMCO	3115	9512-4632	10/31/2003
Lisn, 50uH, .01-50Mhz, 24A	Solar Electronics	8012-50-R-24-BNC	8379114	09/18/2003
CABLE, BNC/BNC	Alpha	RG58B/U	CBL310E	01/08/2004
Attenuator, 20dB	Mini Circuits	20dB, 50 ohm	DS24	01/07/2004
Digital 4 Line Barometer	Mannix	0ABA116	BAR2	07/09/2004

Cables:

QTY	Description	Shield Description	Hood Description	Length (m)
1	AC Mains	None	Plastic	2

Support Equipment:

Description	Manufacturer	Model	Serial #
None			

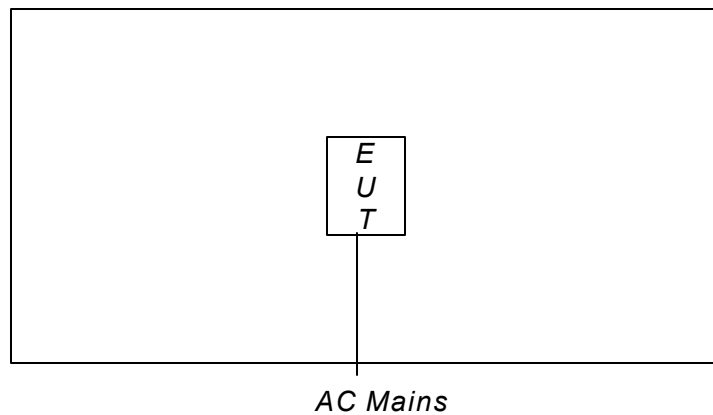
2.4 General Test Setup

Description of how the EUT was exercised during test

The EUT was activated from nominal AC power and activated via software. During testing the EUT transmitted repetitively using its 10 ms on time and 1.5 second transmission gap. During the 1.49 seconds that the transmitter was off, the receiver was activated. This is the typical EUT duty cycle. Both the transmitter and receiver of each device were active during testing, in a manner similar to actual operation.

System Block Diagram

The diagram below details the interconnection of the EUT with the support equipment. Please note that equipment on the rear of the table was centered along the back edge. Equipment on the front of the turntable was centered along the front edge. All peripherals were separated by 10cm.



Justification

The system was configured for testing in a typical fashion (as a customer would normally use it), and in the confines as outlined in ANSI C63.4 (1992).

For maximizing emissions, the system was rotated through 360°, the antenna height was varied from 1 meter to 4 meters above the ground plane, and the antenna polarization was changed. This step by step procedure for maximizing emissions led to the data reported.

The transmitter was configured for testing in a typical fashion (as a customer would normally use it). The device emissions were maximized through its placement in the three orthogonal axes.

2.5 Sample Calculation

The following is how net field strength readings were determined:

$$NF = RF + AF + CF + PF + DF$$

Where,

NF = Net Reading in dB μ V/m

RF = Reading from receiver in dB μ V

AF = Antenna Correction Factor in dB(1/m)

CF = Cable Correction Factor in dB

AVF = Duty Cycle Correction Factor in dB

DF = Distance Factor in dB (using 20 dB/decade)

To convert from dB μ V/m to μ V/m or mV/m the following was used:

$$UF = 10^{(NF / 20)}$$

Where,

UF = Net Reading in μ V/m

Example:

$$NF = NF = RF + AF + CF + AVF + DF = 62.9 + 13.7 + 2.1 + (-10.0) + 0.0 = 68.7 \text{ dB}\mu\text{V/m}$$

$$UF = 10^{(68.7 \text{ dB}\mu\text{V} / 20)} = 2722.7 \mu\text{V/m}$$

Media Group Wireless, LLC
Models: Media Group Transceiver

Date of Test: August 15, September 2 & 15, 2003

3.0 Radiated Emissions

FCC § 15.209, FCC § 15.249

3.1 Test Procedure

Radiated emissions from the complete system under test are measured on an open field test site, calibrated under ANSI C63.4. The EUT is rotated around its vertical axis and the measurement antenna height is varied from 1 to 4 meters above the reference ground plane in order to find the direction of the maximum emission at each relevant frequency. The EUT is investigated in three orthogonal axes by mounting it on a cardboard box if the EUT geometry precludes such manipulation. The frequency range investigated is from 30 MHz to the tenth harmonic of the fundamental frequency. A quasi-peak detector was used below 1 GHz, and average as well as peak detectors were used above 1 GHz. A band plot shows the high and low channels in band. A quasi-peak detector was used for measurement of the fundamental.

Requirement: The FCC states that the fundamental field strength must not exceed 50,000 uV/m (94 dBuV/m) between 902-928 MHz. The fundamental must be within the 902-928 MHz band. Harmonics must not exceed 500 uV/m (54 dBuV/m). Spurious emissions must be attenuated by 50 dB below the fundamental or must not exceed the general limits of FCC § 15.209 shown in the table below. Limits are specified as measured at a distance of 3 meters from the EUT. Receiver spurious emissions (Non-fundamental and non-harmonic emissions) must not exceed the limits of FCC § 15.209.

Frequency Range (MHz)	Field Strength (dBm V/m)	Measurement Distance (m)
30-88	40.0	3
88-216	43.5	3
216-960	46.0	3
Above 960	54.0	3

3.2 Test Results

Fundamental

Radiated Emissions / Interference

Company: Media Group Wireless, LLC Model #: Media Group Transceiver
 Engineer: Nicholas Abbondante Location: Site 2 Serial #: Eng01
 Project #: 3046433 Pressure: 29.97inHg Receiver: HP 8542E
 Date: 08/15/03 Temp: 22c Antenna: LOG2 11-5-03 V10.ant LOG2 11-5-03 H10.ant
 Standard: FCC Part 15 Subpart B Humidity: 64% PreAmp: None
 Class: B Group: None Cable(s): 2C, 10MPRIME_9-19-03.cbl None
 Limit Distance: 3 meters Test Distance: 10 meters
 Voltage/Frequency: 120V / 60 Hz Frequency Range: 902-928 MHz

Ant. Pol. (V/H)	Frequency MHz	Reading dB(uV)	Antenna Factor dB(1/m)	Cable Loss dB	Pre-amp Factor dB	Distance Factor dB	Net dB(uV/m)	Limit dB(uV/m)	Margin dB
V	916.987	51.9	23.9	6.2	0.0	-10.5	92.5	94.0	-1.5
V	920.979	51.6	23.9	6.2	0.0	-10.5	92.2	94.0	-1.8
V	924.992	51.8	23.9	6.2	0.0	-10.5	92.4	94.0	-1.6

+ - Note that the emission falls within the range of measurement uncertainty for radiated emissions, which is +/- 4 dB.

Media Group Wireless, LLC
Models: Media Group Transceiver

Date of Test: August 15, September 2 & 15, 2003

Radiated Emissions / Interference

Company: Media Group Wireless, LLC Model #: Media Group Transceiver
Engineer: Nicholas Abbondante Location: Site 2 Serial #: Eng01
Project #: 3046433 Pressure: 29.97inHg Receiver: HP 8542E
Date: 08/15/03 Temp: 22c Antenna: LOG2 11-5-03 V10.ant LOG2 11-5-03 H10.ant
Standard: FCC Part 15 Subpart B Humidity: 64% PreAmp: None
Class: B Group: None Cable(s): 2C, 10MPRIME_9-19-03.cbl None
Limit Distance: 3 meters Test Distance: 10 meters
Voltage/Frequency: 120V / 60 Hz Frequency Range: 30 MHz - 1 GHz

Ant. Pol. (V/H)	Frequency MHz	Reading dB(uV)	Antenna Factor dB(1/m)	Cable Loss dB	Pre-amp Factor dB	Distance Factor dB	Net dB(uV/m)	Limit dB(uV/m)	Margin dB
V	85.170	7.2	7.1	1.7	0.0	-10.5	26.5	40.0	-13.5
V	129.200	1.7	6.7	2.0	0.0	-10.5	20.8	43.5	-22.7
V	344.400	15.2	15.2	3.4	0.0	-10.5	44.2	46.0	-1.8
V	423.000	10.5	16.7	3.8	0.0	-10.5	41.5	46.0	-4.5
V	711.200	-4.0	21.6	5.2	0.0	-10.5	33.3	46.0	-12.7
V	921.000	4.5	23.9	6.2	0.0	-10.5	45.1	46.0	-0.9
V	959.600	-3.0	23.9	6.3	0.0	-10.5	37.7	46.0	-8.3

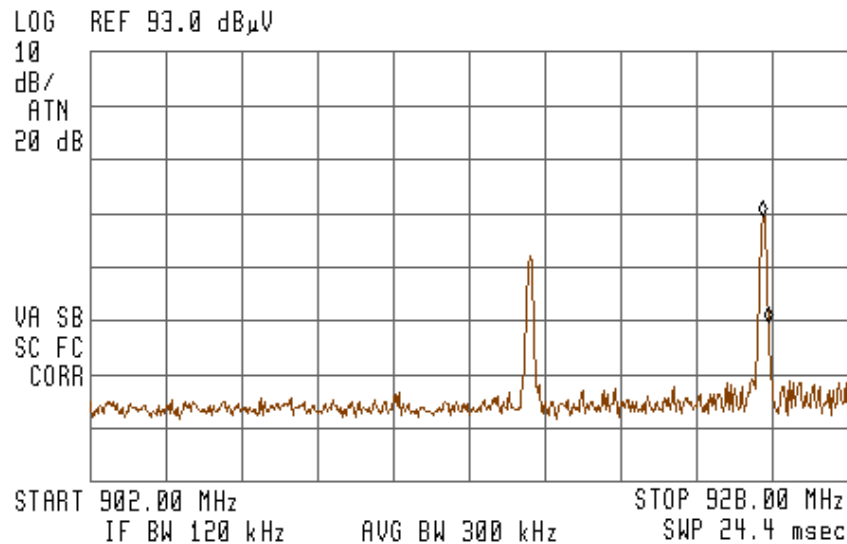
+ - Note that the emission falls within the range of measurement uncertainty for radiated emissions, which is +/- 4 dB.

* - Receiver Spurious Emission, not Fundamental

Band Plot

14:27:07 SEP 02, 2003

ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKR Δ -200 kHz
20.00 dB



Media Group Wireless, LLC
Models: Media Group Transceiver

Date of Test: August 15, September 2 & 15, 2003

Harmonics and High Frequency Spurious Emissions

Average Radiated Emissions / Interference

Company: Media Group Wireless, LLC Model #: Media Group Transceiver
 Engineer: Nicholas Abbondante Location: Site 2 Serial #: Eng01
 Project #: 3046433 Pressure: 29.97inHg Receiver: Rohde & Schwarz FSEK30
 Date: 08/15/03 Temp: 22c Antenna: HORN1 10-31-03 V3.ant HORN1 10-31-03 H3.ant
 Standard: FCC Part 15 Subpart B Humidity: 64% PreAmp: PRE8 9-27-03.amp
 Class: B Group: None Cable(s): CBL030 11-13-03.cbl CBL027 11-13-03.cbl
 Limit Distance: 3 meters Test Distance: 3 meters
 Voltage/Frequency: 120V / 60 Hz Frequency Range: 1 GHz - 10 GHz

Ant. Pol. (V/H)	Frequency MHz	Reading dB(uV)	Antenna Factor dB(1/m)	Cable Loss dB	Pre-amp Factor dB	Distance Factor dB	Net dB(uV/m)	Limit dB(uV/m)	Margin dB
V	1834.000	26.1	28.3	4.0	22.3	0.0	36.1	54.0	-17.9
V	1850.000	26.8	28.3	4.0	22.3	0.0	36.8	54.0	-17.1
V	2751.000	28.2	30.7	5.0	22.3	0.0	41.6	54.0	-12.4
V	2775.000	29.1	30.8	5.0	22.3	0.0	42.5	54.0	-11.4
V	3668.000	26.0	33.0	5.8	22.7	0.0	42.1	54.0	-11.8
V	3700.000	26.3	33.1	5.9	22.7	0.0	42.6	54.0	-11.4
V	4585.000	26.6	34.0	6.7	23.2	0.0	44.1	54.0	-9.9
V	4625.000	26.6	34.1	6.8	23.2	0.0	44.2	54.0	-9.8

Peak Radiated Emissions / Interference

Company: Media Group Wireless, LLC Model #: Media Group Transceiver
 Engineer: Nicholas Abbondante Location: Site 2 Serial #: Eng01
 Project #: 3046433 Pressure: 29.85inHg Receiver: Rohde & Schwarz FSK30
 Date: 09/15/03 Temp: 21c Antenna: HORN1 10-31-03 V3.ant HORN1 10-31-03 H3.ant
 Standard: FCC Part 15 Subpart B Humidity: 71% PreAmp: PRE8 9-27-03.amp
 Class: B Group: None Cable(s): CBL030 11-13-03.cbl CBL027 11-13-03.cbl
 Limit Distance: 3 meters Test Distance: 3 meters
 Voltage/Frequency: 120V / 60 Hz Frequency Range: 1 GHz - 10 GHz

Ant. Pol. (V/H)	Frequency MHz	Reading dB(uV)	Antenna Factor dB(1/m)	Cable Loss dB	Pre-amp Factor dB	Distance Factor dB	Net dB(uV/m)	Limit dB(uV/m)	Margin dB
V	1834.000	56.0	28.3	4.0	22.3	0.0	66.0	74.0	-8.0
V	1850.000	55.4	28.3	4.0	22.3	0.0	65.4	74.0	-8.6
V	2751.000	46.4	30.7	5.0	22.3	0.0	59.8	74.0	-14.2
V	2775.000	45.3	30.8	5.0	22.3	0.0	58.7	74.0	-15.3
V	3668.000	30.8	33.0	5.8	22.7	0.0	46.9	74.0	-27.1
V	3700.000	31.1	33.1	5.9	22.7	0.0	47.4	74.0	-26.6
V	4585.000	32.1	34.0	6.7	23.2	0.0	49.6	74.0	-24.4
V	4625.000	34.3	34.1	6.8	23.2	0.0	51.9	74.0	-22.1

3.3 Configuration Photographs - Radiated Emissions



Media Group Wireless, LLC
Models: Media Group Transceiver

Date of Test: August 15, September 2 & 15, 2003

4.0 Line-Conducted Emissions

FCC § 15.207

4.1 Test Procedure

Conducted emissions are measured in the frequency range of 150 kHz to 30 MHz on AC power lines. Floor-standing equipment is placed on a conductive ground plane. Interference voltages are measured with a LISN connected to a spectrum analyzer or receiver. Tabletop equipment is placed 40 cm from a vertical ground plane on a non-conductive table with a height of 80 cm over the conductive groundplane. A quasi-peak as well as average detector was.

Requirement: Line-conducted emissions must not exceed the CISPR 22 limits.

Frequency (MHz)	Class B Limit dB(μV)	
	Quasi-Peak	Average
0.150 – 0.5	66 – 56*	56 – 46*
0.5– 5	56	46
5– 30	60	50

*-Decreases linearly with the logarithm of the frequency

4.2 Test Results

Conducted Emissions / Interference

Company: Media Group Wireless, LLC Model #: Media Group Transceiver
 Engineer: Nicholas Abbondante Location: Site 2 Serial #: Eng01
 Project #: 3046433 Pressure: 29.85inHg Receiver: HP 8542E
 Date: 09/15/03 Temp: 21c Cable: CBL10MS3 1-7-04.cbl
 Standard: FCC Part 15B/CISPR 22 Humidity: 71% LISN 1, 2: LISN3 [1] 9-18-03.lsn LISN3 [2] 9-18-03.lsn
 Class: B Group: 1 LISN 3, N: None None
 Preamp: None Attenuator: DS24 1-7-04.att
 Voltage/Frequency: 120V / 60 Hz Frequency Range: 150 kHz - 30 MHz
 Net is the sum of worst-case lsn, cable, & attenuator losses, preamp gain, and initial reading

Frequency MHz	Reading Line 1 dB(μV)	Reading Line 2 dB(μV)	Reading Line 3 dB(μV)	Reading Neutral dB(μV)	Quasi-Peak		
					Net dB(μV)	Limit dB(μV)	Margin dB
0.226	25.9	26.5			48.2	62.6	-14.4
0.452	8.2	8.5			29.6	56.8	-27.2
1.551	2.0	1.6			22.8	56.0	-33.2
11.560	-2.0	7.3			28.5	60.0	-31.5
17.630	2.6	5.1			26.7	60.0	-33.3
18.930	14.2	13.0			35.7	60.0	-24.3

Frequency MHz	Reading Line 1 dB(μV)	Reading Line 2 dB(μV)	Reading Line 3 dB(μV)	Reading Neutral dB(μV)	Average		
					Net dB(μV)	Limit dB(μV)	Margin dB
0.226	24.2	25.3			47.0	52.6	-5.6
0.452	6.2	7.2			28.3	46.8	-18.5
1.551	-2.2	-2.9			20.5	46.0	-25.5
11.560	-7.6	4.3			25.5	50.0	-24.5
17.630	-0.8	3.1			24.7	50.0	-25.3
18.930	13.3	11.2			34.8	50.0	-15.2

4.3 Configuration Photographs – Line-Conducted Emissions

