



## EMC EMISSIONS - TEST REPORT (Full)

Test Report No. **BC300332-1** Issue Date: **Fri 19/Sep/2003**

Model / Serial No. **3MB4 / SN: 1**

Product Type **3M Headset intercom system**

Client **Inovonics Wireless Corporation**

Manufacturer **Inovonics Wireless Corporation**

License holder **Inovonics Wireless Corporation**

Address **315 CTC Boulevard**  
**Louisville, CO 80027**

Test Criteria Applied **FCC CFR47 Part 15 Class B**  
Test Result **PASS**

Test Project Number **BC300332-1** Title 47 CFR 15: RADIO FREQUENCY DEVICES

References  
Total Pages **29**  
Including  
Appendices:

*Todd Seeley*

Reviewed By : Todd Seeley

*Robert Cresswell*

Approved By : Robert Cresswell

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## D I R E C T O R Y

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### STATEMENT OF MEASUREMENT UNCERTAINTY

The data and results referenced in this document are true and accurate. The measurement uncertainty for Conducted Emissions in the frequency range of 150kHz – 30MHz is calculated to be  $\pm 2.30\text{dB}$  and for Radiated Emissions is calculated to be  $\pm 3.60\text{dB}$  in the frequency range of 30MHz – 200MHz and  $\pm 3.38\text{dB}$  in the frequency range of 200MHz – 1000MHz.

EUT Received Date: 18-Aug-2003

Testing Start Date: 18-Aug-2003

Testing End Date: 26-Aug-2003

The tests were performed according to following regulations:

1. FCC CFR47 Part 15.207
2. FCC CFR47 Part 15.209
3. FCC CFR47 Part 15.249

Emission Test Results:

**Conducted Emissions, Powerline - 15.207 PASS**

Test Result

Minimum limit margin       -2.10       dB at       0.450       MHz

Maximum limit exceeding                    dB at                    MHz

Remarks: \_\_\_\_\_

**Conducted Emissions, Data I/O (Ethernet, RJ11, etc.) - (Not Applicable)**

Test Result

Minimum limit margin                    dB at                    MHz

Maximum limit exceeding                    dB at                    MHz

Remarks: \_\_\_\_\_

**Radiated Emissions (Electric Field) - 15.209 PASS**

Test Result

Minimum limit margin       -1.90       dB at       401.02       MHz

Maximum limit exceeding                    dB at                    MHz

Remarks: \_\_\_\_\_

**Radiated Emissions (Electric Field) - 15.249(a) PASS**

Test Result

Minimum limit margin       -0.78       dB at       1842.98       MHz

Maximum limit exceeding                    dB at                    MHz

Remarks: \_\_\_\_\_

**Radiated Emissions (Electric Field) - 15.249(c) PASS**

Test Result

Minimum limit margin       -0.10dB       at       2923.37MHz      

Maximum limit exceeding                    dB at                    MHz

Remarks: \_\_\_\_\_

**Radiated Emissions (Electric Field) - 15.249(d) PASS**

**Test Result**

Minimum limit margin \_\_\_\_\_ dB at \_\_\_\_\_ MHz

Maximum limit exceeding \_\_\_\_\_ dB at \_\_\_\_\_ MHz

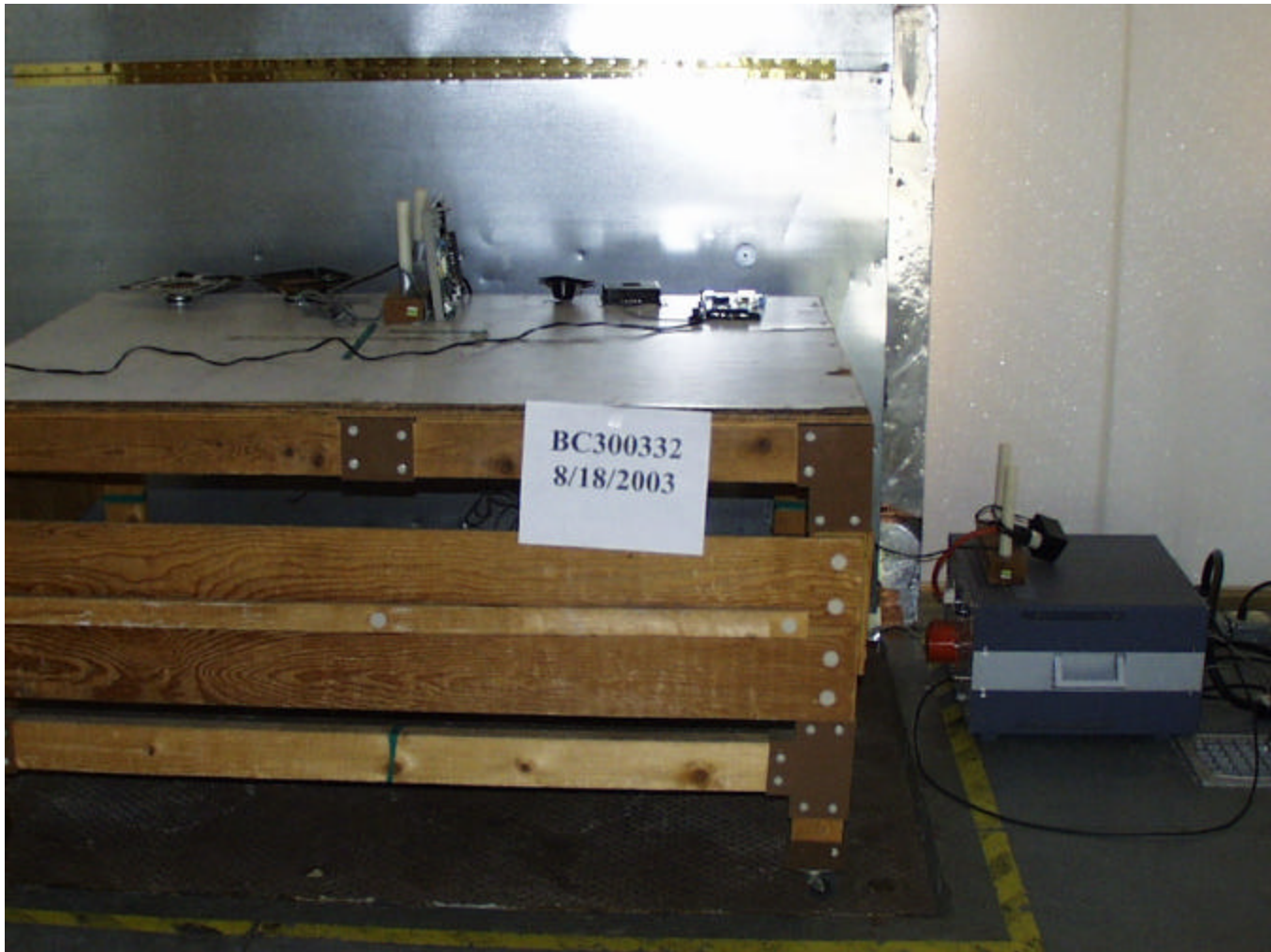
Remarks: CW mode was selected for the fact that it gives the worst case measurement.

**GENERAL REMARKS:**

Modifications required to pass: Added 2 solder beads to RF Faraday cage over RF circuitry & modified 2 caps.

Test Specification Deviations: Additions to or Exclusions from : None

Test-setup photo(s):  
Conducted Emissions



Test-setup photo(s):  
Conducted Emissions



Test-setup photo(s):  
Radiated Emissions



Test-setup photo(s):  
Radiated Emissions





**Appendix A**

Test Data Sheets  
and  
Test Equipment Used

# Conducted Electromagnetic Emissions

Test Report #: **BC300332 Run 01**  
 Test Method: **FCC 15.207**  
 EUT Model #: **3MB4**  
 EUT Serial #: **1**  
 Manufacturer: **Inovonics**  
 EUT Description: **3M Headset intercom system**  
 Notes: **3M base 4**

Test Area: **Pinewood Site 1 Cond**  
 Test Date: **18-Aug-2003**  
 EUT Power: **120 VAC / 60 Hz**

Temperature: **23.1** °C  
 Relative Humidity: **54** %  
 Air Pressure: **81** kPa  
 Page: **1** of **2**

Level Key	
Pk – Peak	Nb – Narrow Band
Qp – QuasiPeak	Bb – Broad Band
Av - Average	

FREQ	LEVEL	CABLE / LISN / ATTEN	FINAL	TEST POINT	DELTA1 (dB)	DELTA2 (dB)
(MHz)	(dBuV)	(dB)	(dBuV)		FCC B	N/A
0.450	35.8 Qp	0.1 / 0.0 / -10.0	45.9	Line 1	-2.1	N/A
0.500	34.6 Qp	0.1 / 0.0 / -10.0	44.7	Line 1	-3.3	N/A
1.00	20.1 Qp	0.2 / 0.0 / -10.0	30.3	Line 1	-17.7	N/A
10.00	1.1 Qp	0.7 / 0.5 / -10.0	12.3	Line 1	-35.7	N/A
30.00	2.6 Qp	1.2 / 2.2 / -10.0	16.0	Line 1	-32.0	N/A
0.150	43.7 Qp	0.1 / 0.0 / -10.0	53.8	Line 1	N/A	N/A
0.170	43.1 Qp	0.1 / 0.0 / -10.0	53.2	Line 1	N/A	N/A
0.170	7.8 Av	0.1 / 0.0 / -10.0	17.9	Line 1	N/A	N/A
0.150	8.9 Av	0.1 / 0.0 / -10.0	19.0	Line 1	N/A	N/A
0.150	9.0 Av	0.1 / 0.0 / -10.0	19.1	Neutral	N/A	N/A
0.150	43.7 Qp	0.1 / 0.0 / -10.0	53.8	Neutral	N/A	N/A
0.170	43.0 Qp	0.1 / 0.0 / -10.0	53.1	Neutral	N/A	N/A
0.170	8.0 Av	0.1 / 0.0 / -10.0	18.1	Neutral	N/A	N/A
0.450	35.2 Qp	0.1 / 0.0 / -10.0	45.3	Neutral	-2.7	N/A
0.500	34.2 Qp	0.1 / 0.0 / -10.0	44.3	Neutral	-3.7	N/A
1.00	21.1 Qp	0.2 / 0.0 / -10.0	31.3	Neutral	-16.7	N/A
10.00	1.1 Qp	0.7 / 0.5 / -10.0	12.3	Neutral	-35.7	N/A
30.00	2.5 Qp	1.2 / 2.2 / -10.0	15.9	Neutral	-32.1	N/A

# Conducted Electromagnetic Emissions

Test Report #: BC300332 Run 01      Test Area: Pinewood Site 1 Cond  
 Test Method: FCC 15.207      Test Date: 18-Aug-2003  
 EUT Model #: 3MB4      EUT Power: 120 VAC / 60 Hz  
 EUT Serial #: 1  
 Manufacturer: Inovonics  
 EUT Description: 3M Headset intercom system  
 Notes: 3M base 4

Temperature: 23.1 °C  
 Relative Humidity: 54 %  
 Air Pressure: 81 kPa  
 Page: 2 of 2

Level Key	
Pk – Peak	Nb – Narrow Band
Qp – QuasiPeak	Bb – Broad Band
Av - Average	

FREQ	LEVEL	CABLE / LISN / ATTEN	FINAL	TEST POINT	DELTA1 (dB)	DELTA2 (dB)
(MHz)	(dBuV)	(dB)	(dBuV)		FCC B	N/A
<b>***** Measurement Summary *****</b>						
0.450	35.8 Qp	0.1 / 0.0 / -10.0	45.9	Line 1	-2.1	N/A
0.500	34.6 Qp	0.1 / 0.0 / -10.0	44.7	Line 1	-3.3	N/A
1.00	21.1 Qp	0.2 / 0.0 / -10.0	31.3	Neutral	-16.7	N/A
30.00	2.6 Qp	1.2 / 2.2 / -10.0	16.0	Line 1	-32.0	N/A
10.00	1.1 Qp	0.7 / 0.5 / -10.0	12.3	Neutral	-35.7	N/A
0.150	43.7 Qp	0.1 / 0.0 / -10.0	53.8	Neutral	N/A	N/A
0.170	8.0 Av	0.1 / 0.0 / -10.0	18.1	Neutral	N/A	N/A

# Radiated Electromagnetic Emissions

Test Report #: **BC300332 Run 02**  
 Test Method: FCC Part 15.209  
 EUT Model #: 3MB4  
 EUT Serial #: 1  
 Manufacturer: Inovonics  
 EUT Description: 3M Headset intercom system  
 Notes: 3M base 4

Test Area: Pinewood Site 1 (3m)  
 Test Date: 18-Aug-2003  
 EUT Power: 120 VAC / 60 Hz

Temperature: 23.4 °C  
 Relative Humidity: 56 %  
 Air Pressure: 81 kPa  
 Page: 1 of 7

Level Key	
Pk – Peak	Nb – Narrow Band
Qp – QuasiPeak	Bb – Broad Band
Av - Average	

FREQ	LEVEL	CABLE / ANT / PREAMP	FINAL	POL / HGT / AZ	DELTA1 (dB)	DELTA2 (dB)
(MHz)	(dBuV)	(dB) (dBm) (dB)	(dBuV/m)	(m) (DEG)	FCC B (< 1GHz)	N/A
Maximized.						
401.02	54.7 Qp	2.2 / 15.1 / 27.9	44.1	H / 1.0 / 163.0	-1.9	N/A
401.02	49.0 Qp	2.2 / 15.1 / 27.9	38.3	H / 1.5 / 163.0	-7.7	N/A
52.40	42.8 Qp	0.8 / 9.8 / 28.3	25.1	V / 1.0 / 0.0	-14.9	N/A
53.76	43.7 Qp	0.8 / 9.6 / 28.3	25.8	V / 1.0 / 0.0	-14.2	N/A
56.44	47.6 Qp	0.8 / 9.2 / 28.3	29.4	V / 1.0 / 0.0	-10.6	N/A
57.76	46.5 Qp	0.8 / 9.0 / 28.2	28.1	V / 1.0 / 0.0	-11.9	N/A
63.13	41.0 Qp	0.9 / 8.4 / 28.2	22.0	V / 1.0 / 0.0	-18.0	N/A
80.03	41.9 Qp	0.9 / 7.1 / 28.2	21.7	V / 1.0 / 0.0	-18.3	N/A
86.59	46.0 Qp	0.9 / 7.7 / 28.1	26.4	V / 1.0 / 0.0	-13.6	N/A
85.28	44.9 Qp	0.9 / 7.4 / 28.2	25.1	V / 1.0 / 0.0	-14.9	N/A
108.79	34.9 Qp	1.0 / 10.6 / 28.0	18.5	V / 1.0 / 0.0	-25.0	N/A
118.04	36.9 Qp	1.1 / 11.6 / 28.0	21.6	V / 1.0 / 0.0	-21.9	N/A
138.28	35.7 Qp	1.2 / 12.5 / 27.9	21.5	V / 1.0 / 0.0	-22.0	N/A
139.62	38.6 Qp	1.2 / 12.4 / 27.9	24.2	V / 1.0 / 0.0	-19.3	N/A
140.96	38.3 Qp	1.2 / 12.4 / 27.9	24.0	V / 1.0 / 0.0	-19.5	N/A
146.88	36.8 Qp	1.2 / 12.3 / 27.8	22.5	V / 1.0 / 0.0	-21.0	N/A
161.09	44.9 Qp	1.3 / 12.4 / 27.8	30.8	V / 1.0 / 0.0	-12.7	N/A
166.48	45.0 Qp	1.3 / 12.3 / 27.7	30.8	V / 1.0 / 0.0	-12.7	N/A
167.83	46.4 Qp	1.3 / 12.3 / 27.7	32.2	V / 1.0 / 0.0	-11.3	N/A
169.15	46.1 Qp	1.3 / 12.4 / 27.7	32.2	V / 1.0 / 0.0	-11.3	N/A
52.40	45.1 Qp	0.8 / 9.8 / 28.3	27.4	V / 1.0 / 90.0	-12.6	N/A
53.76	45.6 Qp	0.8 / 9.6 / 28.3	27.7	V / 1.0 / 90.0	-12.3	N/A
57.76	47.5 Qp	0.8 / 9.0 / 28.2	29.0	V / 1.0 / 90.0	-11.0	N/A
85.28	45.5 Qp	0.9 / 7.4 / 28.2	25.7	V / 1.0 / 90.0	-14.3	N/A
108.79	38.5 Qp	1.0 / 10.6 / 28.0	22.1	V / 1.0 / 90.0	-21.4	N/A
138.28	40.1 Qp	1.2 / 12.5 / 27.9	25.8	V / 1.0 / 90.0	-17.7	N/A
139.62	41.9 Qp	1.2 / 12.4 / 27.9	27.6	V / 1.0 / 90.0	-15.9	N/A
140.96	40.8 Qp	1.2 / 12.4 / 27.9	26.4	V / 1.0 / 90.0	-17.1	N/A
146.88	38.2 Qp	1.2 / 12.3 / 27.8	23.9	V / 1.0 / 90.0	-19.6	N/A
161.09	47.3 Qp	1.3 / 12.4 / 27.8	33.2	V / 1.0 / 90.0	-10.3	N/A
166.48	46.6 Qp	1.3 / 12.3 / 27.7	32.4	V / 1.0 / 90.0	-11.1	N/A
77.89	40.4 Qp	0.9 / 7.0 / 28.2	20.1	V / 1.0 / 90.0	-19.9	N/A
81.89	44.9 Qp	0.9 / 7.2 / 28.2	24.9	V / 1.0 / 90.0	-15.1	N/A

# Radiated Electromagnetic Emissions

Test Report #: **BC300332 Run 02**  
 Test Method: **FCC Part 15.209**  
 EUT Model #: **3MB4**  
 EUT Serial #: **1**  
 Manufacturer: **Inovonics**  
 EUT Description: **3M Headset intercom system**  
 Notes: **3M base 4**

Test Area: **Pinewood Site 1 (3m)**  
 Test Date: **18-Aug-2003**  
 EUT Power: **120 VAC / 60 Hz**

Temperature: **23.4** °C  
 Relative Humidity: **56** %  
 Air Pressure: **81** kPa  
 Page: **2** of **7**

Level Key	
Pk – Peak	Nb – Narrow Band
Qp – QuasiPeak	Bb – Broad Band
Av - Average	

FREQ (MHz)	LEVEL (dBuV)	CABLE / ANT / PREAMP (dB) (dBm) (dB)	FINAL (dBuV/m)	POL / HGT / AZ (m) (DEG)	DELTA1 (dB) FCC B (< 1GHz)	DELTA2 (dB) N/A
84.59	46.4 Qp	0.9 / 7.4 / 28.2	26.5	V / 1.0 / 90.0	-13.5	N/A
85.93	46.8 Qp	0.9 / 7.5 / 28.1	27.1	V / 1.0 / 90.0	-12.9	N/A
110.08	41.5 Qp	1.0 / 10.7 / 28.0	25.2	V / 1.0 / 90.0	-18.3	N/A
163.73	48.8 Qp	1.3 / 12.4 / 27.8	34.7	V / 1.0 / 90.0	-8.8	N/A
165.08	49.1 Qp	1.3 / 12.4 / 27.7	35.0	V / 1.0 / 90.0	-8.5	N/A
173.12	39.4 Qp	1.3 / 12.4 / 27.7	25.4	V / 1.0 / 90.0	-18.1	N/A
57.76	47.8 Qp	0.8 / 9.0 / 28.2	29.4	V / 1.0 / 180.0	-10.6	N/A
80.03	42.4 Qp	0.9 / 7.1 / 28.2	22.2	V / 1.0 / 180.0	-17.8	N/A
85.28	46.1 Qp	0.9 / 7.4 / 28.2	26.3	V / 1.0 / 180.0	-13.7	N/A
86.59	46.6 Qp	0.9 / 7.7 / 28.1	27.0	V / 1.0 / 180.0	-13.0	N/A
83.95	45.0 Qp	0.9 / 7.4 / 28.2	25.2	V / 1.0 / 180.0	-14.8	N/A
80.03	43.0 Qp	0.9 / 7.1 / 28.2	22.8	V / 1.0 / 270.0	-17.2	N/A
83.95	45.1 Qp	0.9 / 7.4 / 28.2	25.2	V / 1.0 / 270.0	-14.8	N/A
The following were maximized between 30 and 200 MHz.						
57.76	48.1 Qp	0.8 / 9.0 / 28.2	29.7	V / 1.0 / 217.0	-10.3	N/A
163.69	48.9 Qp	1.3 / 12.4 / 27.8	34.8	V / 1.0 / 217.0	-8.7	N/A
165.04	49.1 Qp	1.3 / 12.4 / 27.7	35.1	V / 1.0 / 217.0	-8.4	N/A
Cables were maximized.						
138.28	39.6 Qp	1.2 / 12.5 / 27.9	25.4	H / 1.0 / 0.0	-18.1	N/A
111.46	37.0 Qp	1.1 / 10.9 / 28.0	20.9	H / 1.6 / 0.0	-22.6	N/A
111.46	36.8 Qp	1.1 / 10.9 / 28.0	20.7	H / 1.6 / 90.0	-22.8	N/A
138.28	41.5 Qp	1.2 / 12.5 / 27.9	27.2	H / 1.6 / 90.0	-16.3	N/A
139.62	43.4 Qp	1.2 / 12.4 / 27.9	29.0	H / 1.6 / 90.0	-14.5	N/A
140.96	41.0 Qp	1.2 / 12.4 / 27.9	26.6	H / 1.6 / 90.0	-16.9	N/A
128.84	39.4 Qp	1.1 / 12.4 / 27.9	25.0	H / 1.0 / 90.0	-18.5	N/A
No higher emissions found: 180Deg, Horizontal.						

# Radiated Electromagnetic Emissions

Test Report #: **BC300332 Run 02**  
 Test Method: **FCC Part 15.209**  
 EUT Model #: **3MB4**  
 EUT Serial #: **1**  
 Manufacturer: **Inovonics**  
 EUT Description: **3M Headset intercom system**  
 Notes: **3M base 4**

Test Area: **Pinewood Site 1 (3m)**  
 Test Date: **18-Aug-2003**  
 EUT Power: **120 VAC / 60 Hz**

Temperature: **23.4** °C  
 Relative Humidity: **56** %  
 Air Pressure: **81** kPa  
 Page: **3** of **7**

Level Key	
Pk – Peak	Nb – Narrow Band
Qp – QuasiPeak	Bb – Broad Band
Av - Average	

FREQ	LEVEL	CABLE / ANT / PREAMP	FINAL	POL / HGT / AZ	DELTA1 (dB)	DELTA2 (dB)
(MHz)	(dBuV)	(dB) (dBm) (dB)	(dBuV/m)	(m) (DEG)	FCC B (< 1GHz)	N/A
No higher emissions found: 270Deg, Horizontal.						
The following were maximized between 30 and 200 MHz.						
139.53	45.4 Qp	1.2 / 12.4 / 27.9	31.0	H / 1.4 / 108.0	-12.5	N/A
226.79	30.8 Qp	1.6 / 10.7 / 27.4	15.7	V / 1.0 / 0.0	-30.3	N/A
229.19	31.4 Qp	1.6 / 10.8 / 27.3	16.5	V / 1.0 / 0.0	-29.5	N/A
286.47	33.2 Qp	1.9 / 13.5 / 27.1	21.5	V / 1.0 / 0.0	-24.5	N/A
315.11	31.2 Qp	2.0 / 15.6 / 27.2	21.6	V / 1.0 / 0.0	-24.4	N/A
329.43	32.1 Qp	2.0 / 14.4 / 27.3	21.2	V / 1.0 / 0.0	-24.8	N/A
343.75	44.1 Qp	2.0 / 14.6 / 27.4	33.4	V / 1.0 / 0.0	-12.6	N/A
358.08	31.9 Qp	2.1 / 14.4 / 27.5	20.9	V / 1.0 / 0.0	-25.1	N/A
372.39	36.2 Qp	2.1 / 14.7 / 27.6	25.4	V / 1.0 / 0.0	-20.6	N/A
401.04	40.1 Qp	2.2 / 15.1 / 27.9	29.5	V / 1.0 / 0.0	-16.5	N/A
458.31	41.9 Qp	2.3 / 16.5 / 28.3	32.4	V / 1.0 / 0.0	-13.6	N/A
472.63	33.2 Qp	2.3 / 17.1 / 28.3	24.3	V / 1.0 / 0.0	-21.7	N/A
515.60	42.6 Qp	2.4 / 18.1 / 28.4	34.6	V / 1.0 / 0.0	-11.4	N/A
544.25	38.6 Qp	2.4 / 18.0 / 28.5	30.5	V / 1.0 / 0.0	-15.5	N/A
558.56	38.5 Qp	2.4 / 17.9 / 28.5	30.3	V / 1.0 / 0.0	-15.7	N/A
572.87	47.7 Qp	2.4 / 18.2 / 28.4	39.8	V / 1.0 / 0.0	-6.2	N/A
587.19	40.5 Qp	2.4 / 18.0 / 28.4	32.5	V / 1.0 / 0.0	-13.5	N/A
601.50	42.1 Qp	2.4 / 18.4 / 28.5	34.4	V / 1.0 / 0.0	-11.6	N/A
615.83	33.9 Qp	2.4 / 18.4 / 28.5	26.2	V / 1.0 / 0.0	-19.8	N/A
630.15	41.5 Qp	2.4 / 19.4 / 28.3	34.9	V / 1.0 / 0.0	-11.1	N/A
644.46	36.7 Qp	2.4 / 20.1 / 28.2	30.9	V / 1.0 / 0.0	-15.1	N/A
701.76	32.4 Qp	2.4 / 21.2 / 28.1	27.8	V / 1.0 / 0.0	-18.2	N/A
974.98	40.0 Qp	2.5 / 23.4 / 27.7	38.2	V / 1.0 / 0.0	-15.8	N/A
226.79	32.9 Qp	1.6 / 10.7 / 27.4	17.8	V / 1.0 / 90.0	-28.2	N/A
229.19	34.0 Qp	1.6 / 10.8 / 27.3	19.1	V / 1.0 / 90.0	-26.9	N/A
343.75	44.4 Qp	2.0 / 14.6 / 27.4	33.7	V / 1.0 / 90.0	-12.3	N/A
358.08	36.2 Qp	2.1 / 14.4 / 27.5	25.3	V / 1.0 / 90.0	-20.7	N/A
372.39	36.9 Qp	2.1 / 14.7 / 27.6	26.1	V / 1.0 / 90.0	-19.9	N/A
544.25	40.8 Qp	2.4 / 18.0 / 28.5	32.7	V / 1.0 / 90.0	-13.3	N/A

# Radiated Electromagnetic Emissions

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 Manufacturer: **Inovonics**  
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 Notes: **3M base 4**

Test Area: **Pinewood Site 1 (3m)**  
 Test Date: **18-Aug-2003**  
 EUT Power: **120 VAC / 60 Hz**

Temperature: **23.4** °C  
 Relative Humidity: **56** %  
 Air Pressure: **81** kPa  
 Page: **4** of **7**

Level Key	
Pk – Peak	Nb – Narrow Band
Qp – QuasiPeak	Bb – Broad Band
Av - Average	

FREQ (MHz)	LEVEL (dBuV)	CABLE / ANT / PREAMP (dB) (dBm) (dB)	FINAL (dBuV/m)	POL / HGT / AZ (m) (DEG)	DELTA1 (dB) FCC B (< 1GHz)	DELTA2 (dB) N/A
615.83	34.4 Qp	2.4 / 18.4 / 28.5	26.7	V / 1.0 / 90.0	-19.3	N/A
630.15	41.8 Qp	2.4 / 19.4 / 28.3	35.2	V / 1.0 / 90.0	-10.8	N/A
974.98	46.6 Qp	2.5 / 23.4 / 27.7	44.8	V / 1.0 / 90.0	-9.2	N/A
429.66	32.4 Qp	2.2 / 15.8 / 28.1	22.3	V / 1.0 / 90.0	-23.7	N/A
529.91	34.4 Qp	2.4 / 17.8 / 28.4	26.1	V / 1.0 / 90.0	-19.9	N/A
977.85	38.7 Qp	2.5 / 23.5 / 27.8	36.9	V / 1.0 / 90.0	-17.1	N/A
229.19	35.4 Qp	1.6 / 10.8 / 27.3	20.4	V / 1.0 / 180.0	-25.6	N/A
358.08	37.1 Qp	2.1 / 14.4 / 27.5	26.2	V / 1.0 / 180.0	-19.8	N/A
372.39	37.5 Qp	2.1 / 14.7 / 27.6	26.7	V / 1.0 / 180.0	-19.3	N/A
429.66	34.2 Qp	2.2 / 15.8 / 28.1	24.1	V / 1.0 / 180.0	-21.9	N/A
436.14	30.3 Qp	2.2 / 16.1 / 28.1	20.5	V / 1.0 / 180.0	-25.5	N/A
458.31	43.8 Qp	2.3 / 16.5 / 28.3	34.3	V / 1.0 / 270.0	-11.7	N/A
472.63	36.3 Qp	2.3 / 17.1 / 28.3	27.4	V / 1.0 / 270.0	-18.6	N/A
515.60	45.9 Qp	2.4 / 18.1 / 28.4	38.0	V / 1.0 / 270.0	-8.0	N/A
529.91	39.0 Qp	2.4 / 17.8 / 28.4	30.7	V / 1.0 / 270.0	-15.3	N/A
544.25	42.8 Qp	2.4 / 18.0 / 28.5	34.6	V / 1.0 / 270.0	-11.4	N/A
558.56	40.1 Qp	2.4 / 17.9 / 28.5	31.9	V / 1.0 / 270.0	-14.1	N/A
572.87	47.9 Qp	2.4 / 18.2 / 28.4	40.0	V / 1.0 / 270.0	-6.0	N/A
587.19	40.2 Qp	2.4 / 18.0 / 28.4	32.3	V / 1.0 / 270.0	-13.7	N/A
615.83	35.1 Qp	2.4 / 18.4 / 28.5	27.4	V / 1.0 / 270.0	-18.6	N/A

The following were maximized between 200 and 1000 MHz.

974.98	46.8 Qp	2.5 / 23.4 / 27.7	44.9	V / 1.0 / 95.0	-9.1	N/A
572.87	48.0 Qp	2.4 / 18.2 / 28.4	40.1	V / 1.0 / 275.0	-5.9	N/A
515.60	46.6 Qp	2.4 / 18.1 / 28.4	38.7	V / 1.0 / 302.0	-7.3	N/A

Cables were maximized.

229.19	33.9 Qp	1.6 / 10.8 / 27.3	18.9	H / 1.6 / 0.0	-27.1	N/A
329.43	32.0 Qp	2.0 / 14.4 / 27.3	21.2	H / 1.0 / 0.0	-24.8	N/A
286.47	33.5 Qp	1.9 / 13.5 / 27.1	21.7	H / 1.0 / 0.0	-24.3	N/A

# Radiated Electromagnetic Emissions

Test Report #: **BC300332 Run 02**  
 Test Method: **FCC Part 15.209**  
 EUT Model #: **3MB4**  
 EUT Serial #: **1**  
 Manufacturer: **Inovonics**  
 EUT Description: **3M Headset intercom system**  
 Notes: **3M base 4**

Test Area: **Pinewood Site 1 (3m)**  
 Test Date: **18-Aug-2003**  
 EUT Power: **120 VAC / 60 Hz**

Temperature: **23.4** °C  
 Relative Humidity: **56** %  
 Air Pressure: **81** kPa  
 Page: **5** of **7**

Level Key	
Pk – Peak	Nb – Narrow Band
Qp – QuasiPeak	Bb – Broad Band
Av - Average	

FREQ (MHz)	LEVEL (dBuV)	CABLE / ANT / PREAMP (dB) (dB/m) (dB)	FINAL (dBuV/m)	POL / HGT / AZ (m) (DEG)	DELTA1 (dB) FCC B (< 1GHz)	DELTA2 (dB) N/A
286.47	39.0 Qp	1.9 / 13.5 / 27.1	27.2	H / 1.0 / 90.0	-18.8	N/A
329.43	31.9 Qp	2.0 / 14.4 / 27.3	21.1	H / 1.0 / 90.0	-24.9	N/A
343.75	42.0 Qp	2.0 / 14.6 / 27.4	31.2	H / 1.0 / 90.0	-14.8	N/A
358.08	36.8 Qp	2.1 / 14.4 / 27.5	25.8	H / 1.0 / 90.0	-20.2	N/A
372.39	41.4 Qp	2.1 / 14.7 / 27.6	30.6	H / 1.0 / 90.0	-15.4	N/A
401.02	39.9 Qp	2.2 / 15.1 / 27.9	29.2	H / 1.0 / 90.0	-16.8	N/A
974.98	40.0 Qp	2.5 / 23.4 / 27.7	38.2	H / 1.0 / 90.0	-15.8	N/A
977.85	33.5 Qp	2.5 / 23.5 / 27.8	31.7	H / 1.0 / 90.0	-22.3	N/A
231.90	33.5 Qp	1.6 / 10.8 / 27.3	18.6	H / 1.0 / 90.0	-27.4	N/A
386.70	36.8 Qp	2.1 / 15.3 / 27.8	26.4	H / 1.0 / 90.0	-19.6	N/A
315.11	34.1 Qp	2.0 / 15.6 / 27.2	24.5	H / 1.0 / 180.0	-21.5	N/A
343.75	43.6 Qp	2.0 / 14.6 / 27.4	32.8	H / 1.0 / 180.0	-13.2	N/A
458.31	41.1 Qp	2.3 / 16.5 / 28.3	31.6	H / 1.0 / 180.0	-14.4	N/A
974.98	48.9 Qp	2.5 / 23.4 / 27.7	47.0	H / 1.6 / 180.0	-7.0	N/A
401.02	44.6 Qp	2.2 / 15.1 / 27.9	33.9	H / 1.6 / 180.0	-12.1	N/A
229.19	36.0 Qp	1.6 / 10.8 / 27.3	21.0	H / 1.6 / 270.0	-25.0	N/A
701.76	33.6 Qp	2.4 / 21.2 / 28.1	29.1	H / 1.0 / 270.0	-16.9	N/A
358.08	39.1 Qp	2.1 / 14.4 / 27.5	28.1	H / 1.0 / 270.0	-17.9	N/A
343.75	46.2 Qp	2.0 / 14.6 / 27.4	35.5	H / 1.0 / 270.0	-10.5	N/A
329.43	32.5 Qp	2.0 / 14.4 / 27.3	21.7	H / 1.0 / 270.0	-24.3	N/A
286.47	38.9 Qp	1.9 / 13.5 / 27.1	27.1	H / 1.0 / 270.0	-18.9	N/A
231.90	33.7 Qp	1.6 / 10.8 / 27.3	18.8	H / 1.0 / 270.0	-27.2	N/A
229.19	36.3 Qp	1.6 / 10.8 / 27.3	21.3	H / 1.0 / 270.0	-24.7	N/A
The following were maximized between 200 and 1000 MHz.						
343.75	46.5 Qp	2.0 / 14.6 / 27.4	35.7	H / 1.0 / 160.0	-10.3	N/A
974.98	51.6 Qp	2.5 / 23.4 / 27.7	49.8	H / 1.6 / 200.0	-4.2	N/A



# Radiated Electromagnetic Emissions

Test Report #: BC300332 Run 02      Test Area: Pinewood Site 1 (3m)  
 Test Method: FCC Part 15.209      Test Date: 18-Aug-2003  
 EUT Model #: 3MB4      EUT Power: 120 VAC / 60 Hz  
 EUT Serial #: 1  
 Manufacturer: Inovonics  
 EUT Description: 3M Headset intercom system  
 Notes: 3M base 4

Temperature: 23.4 °C  
 Relative Humidity: 56 %  
 Air Pressure: 81 kPa  
 Page: 6 of 7

Level Key	
Pk – Peak	Nb – Narrow Band
Qp – QuasiPeak	Bb – Broad Band
Av - Average	

FREQ	LEVEL	CABLE / ANT / PREAMP	FINAL	POL / HGT / AZ	DELTA1 (dB)	DELTA2 (dB)
(MHz)	(dBuV)	(dB) (dBm) (dB)	(dBuV/m)	(m) (DEG)	FCC B (< 1GHz)	N/A
<b>***** Measurement Summary *****</b>						
401.02	54.7 Qp	2.2 / 15.1 / 27.9	44.1	H / 1.0 / 163.0	-1.9	N/A
974.98	51.6 Qp	2.5 / 23.4 / 27.7	49.8	H / 1.6 / 200.0	-4.2	N/A
572.87	48.0 Qp	2.4 / 18.2 / 28.4	40.1	V / 1.0 / 275.0	-5.9	N/A
515.60	46.6 Qp	2.4 / 18.1 / 28.4	38.7	V / 1.0 / 302.0	-7.3	N/A
165.04	49.1 Qp	1.3 / 12.4 / 27.7	35.1	V / 1.0 / 217.0	-8.4	N/A
163.69	48.9 Qp	1.3 / 12.4 / 27.8	34.8	V / 1.0 / 217.0	-8.7	N/A
57.76	48.1 Qp	0.8 / 9.0 / 28.2	29.7	V / 1.0 / 217.0	-10.3	N/A
161.09	47.3 Qp	1.3 / 12.4 / 27.8	33.2	V / 1.0 / 90.0	-10.3	N/A
343.75	46.5 Qp	2.0 / 14.6 / 27.4	35.7	H / 1.0 / 160.0	-10.3	N/A
56.44	47.6 Qp	0.8 / 9.2 / 28.3	29.4	V / 1.0 / 0.0	-10.6	N/A
630.15	41.8 Qp	2.4 / 19.4 / 28.3	35.2	V / 1.0 / 90.0	-10.8	N/A
166.48	46.6 Qp	1.3 / 12.3 / 27.7	32.4	V / 1.0 / 90.0	-11.1	N/A
167.83	46.4 Qp	1.3 / 12.3 / 27.7	32.2	V / 1.0 / 0.0	-11.3	N/A
169.15	46.1 Qp	1.3 / 12.4 / 27.7	32.2	V / 1.0 / 0.0	-11.3	N/A
544.25	42.8 Qp	2.4 / 18.0 / 28.5	34.6	V / 1.0 / 270.0	-11.4	N/A
601.50	42.1 Qp	2.4 / 18.4 / 28.5	34.4	V / 1.0 / 0.0	-11.6	N/A
458.31	43.8 Qp	2.3 / 16.5 / 28.3	34.3	V / 1.0 / 270.0	-11.7	N/A
53.76	45.6 Qp	0.8 / 9.6 / 28.3	27.7	V / 1.0 / 90.0	-12.3	N/A
139.53	45.4 Qp	1.2 / 12.4 / 27.9	31.0	H / 1.4 / 108.0	-12.5	N/A
52.40	45.1 Qp	0.8 / 9.8 / 28.3	27.4	V / 1.0 / 90.0	-12.6	N/A
85.93	46.8 Qp	0.9 / 7.5 / 28.1	27.1	V / 1.0 / 90.0	-12.9	N/A
86.59	46.6 Qp	0.9 / 7.7 / 28.1	27.0	V / 1.0 / 180.0	-13.0	N/A
84.59	46.4 Qp	0.9 / 7.4 / 28.2	26.5	V / 1.0 / 90.0	-13.5	N/A
587.19	40.5 Qp	2.4 / 18.0 / 28.4	32.5	V / 1.0 / 0.0	-13.5	N/A
85.28	46.1 Qp	0.9 / 7.4 / 28.2	26.3	V / 1.0 / 180.0	-13.7	N/A
558.56	40.1 Qp	2.4 / 17.9 / 28.5	31.9	V / 1.0 / 270.0	-14.1	N/A
139.62	43.4 Qp	1.2 / 12.4 / 27.9	29.0	H / 1.6 / 90.0	-14.5	N/A
83.95	45.1 Qp	0.9 / 7.4 / 28.2	25.2	V / 1.0 / 270.0	-14.8	N/A
81.89	44.9 Qp	0.9 / 7.2 / 28.2	24.9	V / 1.0 / 90.0	-15.1	N/A
644.46	36.7 Qp	2.4 / 20.1 / 28.2	30.9	V / 1.0 / 0.0	-15.1	N/A
529.91	39.0 Qp	2.4 / 17.8 / 28.4	30.7	V / 1.0 / 270.0	-15.3	N/A
372.39	41.4 Qp	2.1 / 14.7 / 27.6	30.6	H / 1.0 / 90.0	-15.4	N/A
138.28	41.5 Qp	1.2 / 12.5 / 27.9	27.2	H / 1.6 / 90.0	-16.3	N/A
140.96	41.0 Qp	1.2 / 12.4 / 27.9	26.6	H / 1.6 / 90.0	-16.9	N/A

# Radiated Electromagnetic Emissions

Test Report #: **BC300332 Run 02**  
 Test Method: **FCC Part 15.209**  
 EUT Model #: **3MB4**  
 EUT Serial #: **1**  
 Manufacturer: **Inovonics**  
 EUT Description: **3M Headset intercom system**  
 Notes: **3M base 4**

Test Area: **Pinewood Site 1 (3m)**  
 Test Date: **18-Aug-2003**  
 EUT Power: **120 VAC / 60 Hz**

Temperature: **23.4** °C  
 Relative Humidity: **56** %  
 Air Pressure: **81** kPa  
 Page: **7** of **7**

Level Key	
Pk – Peak	Nb – Narrow Band
Qp – QuasiPeak	Bb – Broad Band
Av - Average	

FREQ	LEVEL	CABLE / ANT / PREAMP	FINAL	POL / HGT / AZ	DELTA1 (dB)	DELTA2 (dB)
(MHz)	(dBuV)	(dB) (dB/m) (dB)	(dBuV/m)	(m) (DEG)	FCC B (< 1GHz)	N/A
701.76	33.6 Qp	2.4 / 21.2 / 28.1	29.1	H / 1.0 / 270.0	-16.9	N/A
977.85	38.7 Qp	2.5 / 23.5 / 27.8	36.9	V / 1.0 / 90.0	-17.1	N/A
80.03	43.0 Qp	0.9 / 7.1 / 28.2	22.8	V / 1.0 / 270.0	-17.2	N/A
358.08	39.1 Qp	2.1 / 14.4 / 27.5	28.1	H / 1.0 / 270.0	-17.9	N/A
63.13	41.0 Qp	0.9 / 8.4 / 28.2	22.0	V / 1.0 / 0.0	-18.0	N/A
173.12	39.4 Qp	1.3 / 12.4 / 27.7	25.4	V / 1.0 / 90.0	-18.1	N/A
110.08	41.5 Qp	1.0 / 10.7 / 28.0	25.2	V / 1.0 / 90.0	-18.3	N/A
128.84	39.4 Qp	1.1 / 12.4 / 27.9	25.0	H / 1.0 / 90.0	-18.5	N/A
472.63	36.3 Qp	2.3 / 17.1 / 28.3	27.4	V / 1.0 / 270.0	-18.6	N/A
615.83	35.1 Qp	2.4 / 18.4 / 28.5	27.4	V / 1.0 / 270.0	-18.6	N/A
286.47	39.0 Qp	1.9 / 13.5 / 27.1	27.2	H / 1.0 / 90.0	-18.8	N/A
146.88	38.2 Qp	1.2 / 12.3 / 27.8	23.9	V / 1.0 / 90.0	-19.6	N/A
386.70	36.8 Qp	2.1 / 15.3 / 27.8	26.4	H / 1.0 / 90.0	-19.6	N/A
77.89	40.4 Qp	0.9 / 7.0 / 28.2	20.1	V / 1.0 / 90.0	-19.9	N/A
108.79	38.5 Qp	1.0 / 10.6 / 28.0	22.1	V / 1.0 / 90.0	-21.4	N/A
315.11	34.1 Qp	2.0 / 15.6 / 27.2	24.5	H / 1.0 / 180.0	-21.5	N/A
118.04	36.9 Qp	1.1 / 11.6 / 28.0	21.6	V / 1.0 / 0.0	-21.9	N/A
429.66	34.2 Qp	2.2 / 15.8 / 28.1	24.1	V / 1.0 / 180.0	-21.9	N/A
111.46	37.0 Qp	1.1 / 10.9 / 28.0	20.9	H / 1.6 / 0.0	-22.6	N/A
329.43	32.5 Qp	2.0 / 14.4 / 27.3	21.7	H / 1.0 / 270.0	-24.3	N/A
229.19	36.3 Qp	1.6 / 10.8 / 27.3	21.3	H / 1.0 / 270.0	-24.7	N/A
436.14	30.3 Qp	2.2 / 16.1 / 28.1	20.5	V / 1.0 / 180.0	-25.5	N/A
231.90	33.7 Qp	1.6 / 10.8 / 27.3	18.8	H / 1.0 / 270.0	-27.2	N/A
226.79	32.9 Qp	1.6 / 10.7 / 27.4	17.8	V / 1.0 / 90.0	-28.2	N/A

# Radiated Electromagnetic Emissions

Test Report #: **BC300332 Run 1**  
 Test Method: FCC CFR47 15.249(a)  
 EUT Model #: 3MB4  
 EUT Serial #: 1  
 Manufacturer: Inovonics  
 EUT Description: 3M Headset intercom system  
 Notes: 3M base 4

Test Area: Pinewood Site 1 (3m)  
 Test Date: 18-Aug-2003  
 EUT Power: 120 VAC / 60 Hz

Temperature: 23.4 °C  
 Relative Humidity: 56 %  
 Air Pressure: 81 kPa  
 Page: 1 of 3

Level Key	
Pk – Peak	Nb – Narrow Band
Qp – QuasiPeak	Bb – Broad Band
Av - Average	

FREQ	LEVEL	CABLE / ANT / PREAMP	FINAL	POL / HGT / AZ	DELTA1 (dB)	DELTA2 (dB)
(MHz)	(dBuV)	(dB) (dBm) (dB)	(dBuV)	(m) (DEG)	15.249(a)	N/A
EUT flat on the table.						
921.52	61.8 Pk	2.5 / 23.0 / 0.0	87.3	V / 1.0 / 167.0	-6.68	N/A
921.52	60.5 Pk	2.5 / 23.0 / 0.0	86.0	H / 1.1 / 310.0	-7.98	N/A
EUT standing on its side.						
921.52	64.2 Pk	2.5 / 23.0 / 0.0	89.8	H / 1.1 / 127.0	-4.18	N/A
921.52	62.2 Pk	2.5 / 23.0 / 0.0	87.7	V / 1.2 / 239.0	-6.28	N/A
Determined Worst Case of EUT is standing on its Side						
R49 changed from 330 ohms to 220 ohms. (Changed to Increase Power to Antenna)						
Mid Channel.						
921.52	66.3 Pk	2.5 / 23.0 / 0.0	91.9	V / 1.2 / 169.0	-2.08	N/A
921.52	66.2 Pk	2.5 / 23.0 / 0.0	91.7	H / 1.0 / 146.0	-2.28	N/A
Low Channel.						
920.32	66.3 Pk	2.5 / 23.1 / 0.0	91.9	H / 1.0 / 151.0	-2.08	N/A
920.32	66.4 Pk	2.5 / 23.1 / 0.0	92.0	V / 1.2 / 169.0	-1.98	N/A
High Channel.						
924.87	65.4 Pk	2.5 / 23.1 / 0.0	91.0	V / 1.2 / 169.0	-2.98	N/A
924.87	65.5 Pk	2.5 / 23.1 / 0.0	91.1	H / 1.2 / 129.0	-2.88	N/A
High Channel Harmonics						
1849.70	56.4 Av	4.4 / 27.9 / 37.8	50.8	V / 1.0 / 64.0	-3.18	N/A
2774.51	45.4 Av	4.4 / 29.8 / 36.7	42.8	V / 1.0 / 62.0	-11.18	N/A
3699.34	37.1 Av	5.2 / 32.2 / 37.0	37.5	V / 1.0 / 62.0	-16.48	N/A
4624.14	55.0 Av	5.3 / 33.3 / 38.9	54.7	V / 1.3 / 74.0	0.72	N/A
Changed C93 and C94 from 4.7pF to 2.7pF.						
4624.14	51.6 Av	5.3 / 33.3 / 38.9	51.3	V / 1.3 / 74.0	-2.68	N/A
5548.96	35.5 Av	6.5 / 34.7 / 37.7	39.1	V / 1.0 / 97.0	-14.88	N/A
6473.66	34.1 Av	8.6 / 35.5 / 40.3	37.9	V / 1.0 / 0.0	-16.08	N/A

# Radiated Electromagnetic Emissions

Test Report #: **BC300332 Run 1**  
 Test Method: **FCC CFR47 15.249(a)**  
 EUT Model #: **3MB4**  
 EUT Serial #: **1**  
 Manufacturer: **Inovonics**  
 EUT Description: **3M Headset intercom system**  
 Notes: **3M base 4**

Test Area: **Pinewood Site 1 (3m)**  
 Test Date: **18-Aug-2003**  
 EUT Power: **120 VAC / 60 Hz**

Temperature: **23.4** °C  
 Relative Humidity: **56** %  
 Air Pressure: **81** kPa  
 Page: **2** of 3

Level Key	
Pk – Peak	Nb – Narrow Band
Qp – QuasiPeak	Bb – Broad Band
Av - Average	

FREQ (MHz)	LEVEL (dBuV)	CABLE / ANT / PREAMP (dB) (dBm) (dB)	FINAL (dBuV)	POL / HGT / AZ (m) (DEG)	DELTA1 (dB) 15.249(a)	DELTA2 (dB) N/A
7398.51	34.9 Av	8.2 / 36.7 / 40.0	39.7	V / 1.0 / 0.0	-14.28	N/A
8323.39	43.2 Av	8.9 / 38.0 / 46.0	44.2	V / 1.0 / 0.0	-9.78	N/A
9248.27	43.9 Av	8.3 / 38.8 / 48.1	42.9	V / 1.0 / 0.0	-11.08	N/A
Rechecked after mod.						
1849.70	56.6 Av	4.4 / 27.9 / 37.8	51.1	V / 1.0 / 0.0	-2.88	N/A
2774.51	50.1 Av	4.4 / 29.8 / 36.7	47.5	V / 1.0 / 0.0	-6.48	N/A
3699.34	48.5 Av	5.2 / 32.2 / 37.0	48.8	V / 1.2 / 73.0	-5.18	N/A
No re evaluation of the Fundamental Frequencies was completed for the fact that the knee of the harmonic filter was increased due to this modification to the device under test. By raising the knee of the harmonic filter, there is no change to the RF circuitry in the fundamental range.						
1849.70	58.0 Av	4.4 / 27.9 / 37.8	52.4	H / 1.0 / 146.0	-1.58	N/A
2774.51	50.1 Av	4.4 / 29.8 / 36.7	47.5	H / 1.3 / 197.0	-6.48	N/A
3699.34	44.1 Av	5.2 / 32.2 / 37.0	44.4	H / 1.0 / 132.0	-9.58	N/A
4624.14	49.7 Av	5.3 / 33.3 / 38.9	49.4	H / 1.7 / 147.0	-4.58	N/A
5548.96	36.1 Av	6.5 / 34.7 / 37.7	39.7	H / 1.5 / 153.0	-14.28	N/A
6473.66	36.7 Av	8.6 / 35.5 / 40.3	40.5	H / 1.6 / 98.0	-13.48	N/A
7398.47	39.4 Av	8.2 / 36.7 / 40.0	44.2	H / 1.7 / 112.0	-9.78	N/A
8323.39	43.2 Av	8.9 / 38.0 / 46.0	44.2	H / 1.0 / 0.0	-9.78	N/A
9248.27	43.9 Av	8.3 / 38.8 / 48.1	42.9	H / 1.0 / 0.0	-11.08	N/A
Mid Channel.						
1842.98	58.8 Av	4.3 / 27.8 / 37.7	53.2	H / 1.0 / 136.0	-0.78	N/A
2764.43	50.1 Av	4.4 / 29.8 / 37.1	47.1	H / 1.6 / 105.0	-6.88	N/A
3685.89	49.8 Av	5.2 / 32.2 / 37.5	49.7	H / 2.0 / 81.0	-4.28	N/A
5528.80	43.6 Av	6.5 / 34.7 / 37.7	47.2	H / 1.5 / 45.0	-6.78	N/A
4607.34	47.8 Av	5.3 / 33.3 / 38.9	47.4	H / 1.7 / 45.0	-6.58	N/A
6450.15	36.0 Av	8.6 / 35.4 / 40.2	39.9	H / 1.5 / 61.0	-14.08	N/A
7371.61	39.3 Av	8.3 / 36.7 / 40.2	44.1	H / 1.7 / 95.0	-9.88	N/A
8293.51	43.4 Av	8.9 / 38.1 / 45.9	44.5	H / 1.7 / 95.0	-9.48	N/A
9214.51	44.1 Av	8.3 / 38.8 / 48.1	43.2	H / 1.7 / 95.0	-10.78	N/A
9214.51	44.0 Av	8.3 / 38.8 / 48.1	43.0	V / 1.0 / 0.0	-10.98	N/A
8293.51	43.1 Av	8.9 / 38.1 / 45.9	44.2	V / 1.0 / 0.0	-9.78	N/A
7371.61	37.4 Av	8.3 / 36.7 / 40.2	42.2	V / 1.0 / 75.0	-11.78	N/A

# Radiated Electromagnetic Emissions

Test Report #: **BC300332 Run 1**  
 Test Method: **FCC CFR47 15.249(a)**  
 EUT Model #: **3MB4**  
 EUT Serial #: **1**  
 Manufacturer: **Inovonics**  
 EUT Description: **3M Headset intercom system**  
 Notes: **3M base 4**

Test Area: **Pinewood Site 1 (3m)**  
 Test Date: **18-Aug-2003**  
 EUT Power: **120 VAC / 60 Hz**

Temperature: **23.4** °C  
 Relative Humidity: **56** %  
 Air Pressure: **81** kPa  
 Page: **3** of **3**

Level Key	
Pk – Peak	Nb – Narrow Band
Qp – QuasiPeak	Bb – Broad Band
Av - Average	

FREQ (MHz)	LEVEL (dBuV)	CABLE / ANT / PREAMP (dB) (dBm) (dB)	FINAL (dBuV)	POL / HGT / AZ (m) (DEG)	DELTA1 (dB) 15.249(a)	DELTA2 (dB) N/A
6450.15	36.4 Av	8.6 / 35.4 / 40.2	40.2	V / 1.0 / 114.0	-13.78	N/A
5528.80	38.1 Av	6.5 / 34.7 / 37.7	41.6	V / 1.1 / 72.0	-12.38	N/A
4607.34	45.9 Av	5.3 / 33.3 / 38.9	45.5	V / 1.3 / 137.0	-8.48	N/A
3685.89	48.8 Av	5.2 / 32.2 / 37.5	48.7	V / 1.3 / 111.0	-5.28	N/A
2764.43	47.2 Av	4.4 / 29.8 / 37.1	44.3	V / 1.3 / 0.0	-9.68	N/A
1842.98	51.8 Av	4.3 / 27.8 / 37.7	46.2	V / 1.6 / 97.0	-7.78	N/A
Low Channel.						
1840.57	50.0 Av	4.3 / 27.8 / 37.9	44.2	V / 2.0 / 0.0	-9.78	N/A
2760.82	51.3 Av	4.4 / 29.8 / 37.0	48.4	V / 1.6 / 71.0	-5.58	N/A
3681.08	49.6 Av	5.2 / 32.2 / 37.6	49.4	V / 1.6 / 74.0	-4.58	N/A
4601.33	45.6 Av	5.3 / 33.3 / 38.9	45.1	V / 1.7 / 55.0	-8.88	N/A
5521.58	38.2 Av	6.5 / 34.7 / 37.7	41.7	V / 1.4 / 82.0	-12.28	N/A
6441.78	39.5 Av	8.6 / 35.4 / 40.1	43.4	V / 1.5 / 82.0	-10.58	N/A
7362.02	37.5 Av	8.3 / 36.7 / 40.2	42.3	V / 1.5 / 82.0	-11.68	N/A
8282.27	43.4 Av	8.9 / 38.1 / 45.9	44.4	V / 1.0 / 0.0	-9.58	N/A
9202.52	44.2 Av	8.3 / 38.7 / 48.0	43.2	V / 1.0 / 0.0	-10.78	N/A
9202.52	44.3 Av	8.3 / 38.7 / 48.0	43.3	H / 1.0 / 0.0	-10.68	N/A
8282.27	43.2 Av	8.9 / 38.1 / 45.9	44.3	H / 1.0 / 0.0	-9.68	N/A
7362.02	40.1 Av	8.3 / 36.7 / 40.2	44.9	H / 1.8 / 90.0	-9.08	N/A
6441.76	38.1 Av	8.6 / 35.4 / 40.1	42.0	H / 1.5 / 101.0	-11.98	N/A
5521.58	43.8 Av	6.5 / 34.7 / 37.7	47.2	H / 1.5 / 43.0	-6.78	N/A
4601.33	45.2 Av	5.3 / 33.3 / 38.9	44.8	H / 1.7 / 83.0	-9.18	N/A
3681.08	49.1 Av	5.2 / 32.2 / 37.6	48.9	H / 2.1 / 83.0	-5.08	N/A
2760.82	51.2 Av	4.4 / 29.8 / 37.0	48.3	H / 2.3 / 15.0	-5.68	N/A
1840.57	55.7 Av	4.3 / 27.8 / 37.9	50.0	H / 2.3 / 127.0	-3.98	N/A

# Radiated Electromagnetic Emissions

Test Report #: **BC300332 Run 1**  
 Test Method: **FCC CFR47 15.249(c)**  
 EUT Model #: **3MB4**  
 EUT Serial #: **1**  
 Manufacturer: **Inovonics**  
 EUT Description: **3M Headset intercom system**  
 Notes: **3M base 4**

Test Area: **Pinewood Site 1 (3m)**  
 Test Date: **18-Aug-2003**  
 EUT Power: **120 VAC / 60 Hz**

Temperature: **23.4** °C  
 Relative Humidity: **56** %  
 Air Pressure: **81** kPa  
 Page: **1** of **1**

Level Key	
Pk – Peak	Nb – Narrow Band
Qp – QuasiPeak	Bb – Broad Band
Av - Average	

FREQ	LEVEL	CABLE / ANT / PREAMP	FINAL	POL / HGT / AZ	DELTA1 (dB)	DELTA2 (dB)
(MHz)	(dBuV)	(dB) (dB/m) (dB)	(dBuV)	(m) (DEG)	15.249(c)/15.209	N/A
2923.37	59.0 Av	4.1 / 30.2 / 37.0	56.2	H / 1.5 / 136.0	2.22	N/A
Changed R49 from 220 to 330 ohms.						
2923.38	58.9 Av	4.1 / 30.2 / 37.0	56.1	H / 1.5 / 136.0	2.12	N/A
Disconnected the antenna.						
2923.38	58.5 Av	4.1 / 30.2 / 37.0	55.7	H / 1.5 / 136.0	1.72	N/A
Added a bypass cap to the power supply.						
2923.38	58.9 Av	4.1 / 30.2 / 37.0	56.1	H / 1.5 / 37.0	2.12	N/A
2923.38	58.8 Av	4.1 / 30.2 / 37.0	56.0	H / 1.5 / 37.0	2.02	N/A
2923.38	57.9 Av	4.1 / 30.2 / 37.0	55.1	H / 1.5 / 45.0	1.12	N/A
Different ground for cap.						
2923.38	56.6 Av	4.1 / 30.2 / 37.0	53.8	H / 1.5 / 45.0	-0.18	N/A
Removed L12						
2923.38	57.0 Av	4.1 / 30.2 / 37.0	54.2	H / 1.5 / 45.0	0.22	N/A
Grounded the shield.						
2923.33	56.9 Av	4.1 / 30.2 / 37.0	54.1	H / 1.5 / 45.0	0.12	N/A
Reversed all modifications except for the R49 Modification to increase output power at the fundamental and added two solder beads to the can.						
2923.37	56.7 Av	4.1 / 30.2 / 37.0	53.9	H / 1.6 / 101.0	-0.1	N/A
In accordance to 15.249(c), frequency falling out of the ranges listed in 15.249(a) except for harmonics shall be attenuated by 50dB from the carrier or meet the requirements of 15.209 whichever is the lesser attenuation. This emission is created by the receiver LO and meets the requirements of 15.209.						

# Project Report

Begin Date: 8/26/2003

Technician Mike Spataro

Project: BC300332

Capital Asset ID	Manufacturer	Model #	Serial #	Description	Test Performed	Cal Date	Cal Due
192	RHODE & SCHWARZ	ESH2-Z5	830364/002	LISN 50 ohm/50uH 3 line (1kHz - 30 MHz)	C Conducted Emissions	3/4/2003	3/4/2004
198	Hewlett-Packard	11947A	3107A01984	Transient Limiter	C Conducted Emissions	9/18/2002	9/18/2003
199	RHODE & SCHWARZ	ESH3	872318/036	Low Frequency Receiver (9 kHz - 30 MHz)	C Conducted Emissions	10/31/2002	10/31/2003
106	TENSOR	4105	2020	Ridged Guide Antenna 1-18GHz	R Radiated Emissions	7/11/2003	7/11/2004
138	EMC TEST SYSTEMS	3109	3142	Biconical Antenna 30-3000MHz	R Radiated Emissions	9/30/2002	9/30/2003
202	Avantek	AWT-18037	1002	RF Pre-Amplifier (8-18 GHz)	R Radiated Emissions	4/23/2003	4/23/2004
203	Avantek	AFT97-8434-10F	1007	RF Pre-Amplifier (4-8 GHz)	R Radiated Emissions	4/23/2003	4/23/2004
209	Hewlett-Packard	85662A	2403A08749	Display Section	R Radiated Emissions	10/21/2002	10/21/2003
210	Hewlett-Packard	8566B	2410A00154	Spectrum Analyzer (dc-22 GHz)	R Radiated Emissions	10/21/2002	10/21/2003
211	Hewlett-Packard	85650A	2043A00256	Quasi Peak Adapter (set 1)	R Radiated Emissions	9/17/2003	9/17/2004
213	Mini-Circuits Lab	ZHL-42	N052792-2	Amplifier	R Radiated Emissions	6/20/2003	6/20/2004
217	EMCO	3146	9203-3376	Log Periodic Antenna	R Radiated Emissions	9/11/2002	9/11/2003
248	Hewlett-Packard	8447F	3113A05545	9 kHz- 1.3GHz Pre Amp	R Radiated Emissions	6/5/2003	6/5/2004

**Appendix B**

Test Plan  
and  
Constructional Data Form  
**To be supplied by Customer**



Appendix C

Measurement Protocol

And

Test Procedures



## MEASUREMENT PROTOCOL

### GENERAL INFORMATION

#### Test Methodology

Conducted and radiated emission testing is performed according to the procedures in ANSI C63.4 & CNS13438.

#### Justification

The Equipment Under Test (EUT) is configured in a typical user arrangement in accordance with the manufacturer's instructions. A cable is connected to each available port and either terminated with a peripheral into its characteristic impedance or left unterminated. When appropriate, the cables are manually manipulated with respect to each other to obtain maximum emissions from the unit.

#### CONDUCTED EMISSIONS

The final level, expressed in dB $\mu$ V, is arrived at by taking the reading directly from the EMI receiver. This level is compared directly to the applicable limit.

To convert between dB $\mu$ V and  $\mu$ V, the following conversions apply:

- $\text{dB}\mu\text{V} = 20(\log \mu\text{V})$
- $\mu\text{V} = \text{Inverse log}(\text{dB}\mu\text{V}/20)$

#### RADIATED EMISSIONS

The final level, expressed in dB $\mu$ V/m, is arrived at by taking the reading from the spectrum analyzer (Level dB $\mu$ V) and adding the antenna correction factor and cable loss factor (Factor dB) to it. This result then has the applicable limit subtracted from it to provide the Delta which gives the tabular data as shown in the data sheets in Attachment B. The amplifier gain is automatically accounted for by using an analyzer offset.

*Example: At a Test Frequency of 30 MHz, with a peak reading on the spectrum analyzer or measuring receiver of 14 dB $\mu$ V:*

Measured Level		Transducer & Cable Loss factor		Corrected Reading	Specification Limit		Corrected Reading		Delta Specification
(dB $\mu$ V)	+	(dB)	=	(dB $\mu$ V/m)	(dB $\mu$ V/m)	-	(dB $\mu$ V/m)	=	
<b>14.0</b>		<b>14.9</b>		<b>28.9</b>	<b>40.0</b>		<b>28.9</b>		<b>-11.1</b>

## DETAILS OF TEST PROCEDURES

### *General Standard Information*

The test methods used comply with ANSI C63.4-1992 - "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz."

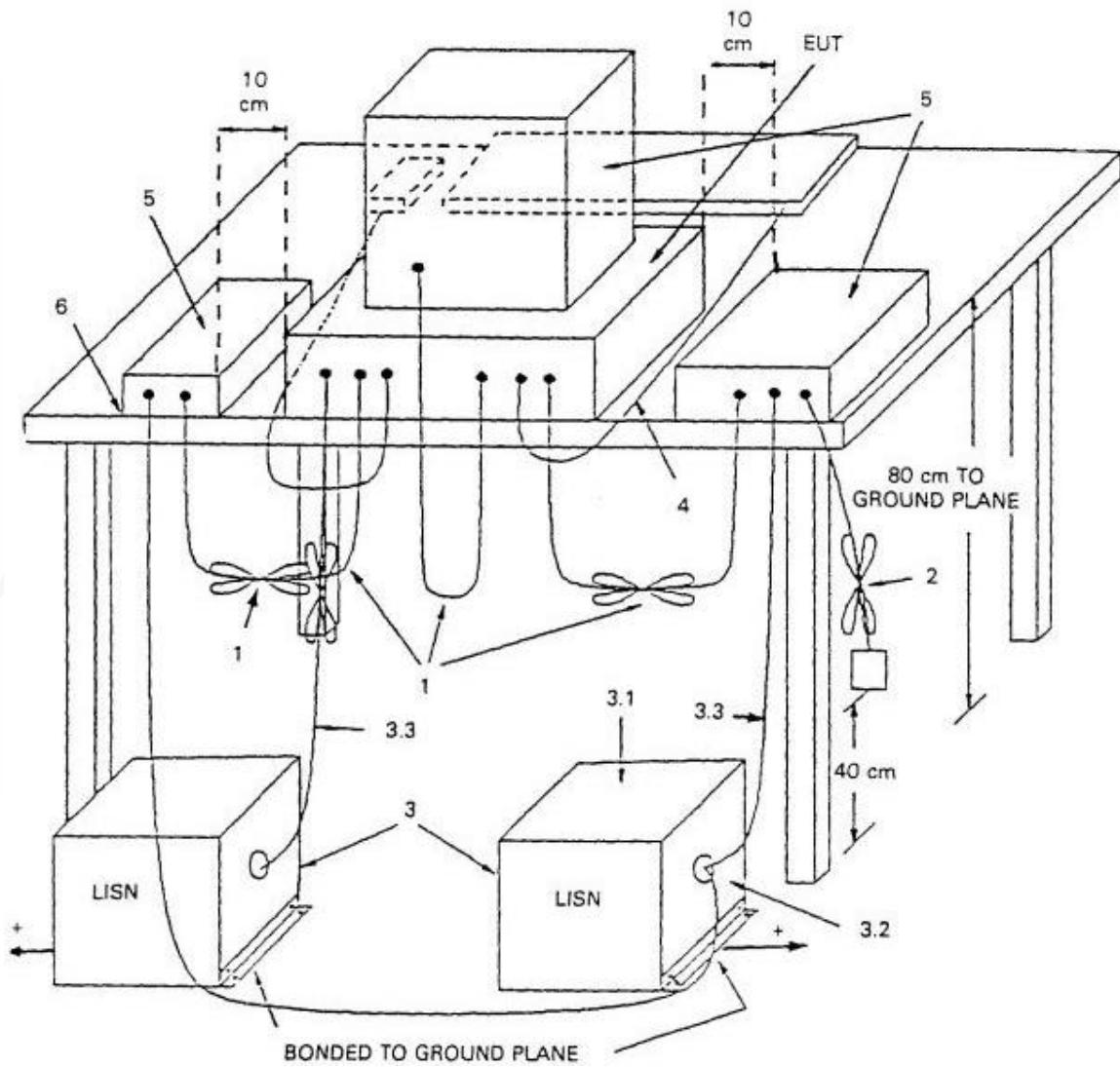
### **Conducted Emissions**

Conducted emissions on the 50 Hz and/or 60 Hz power interface of the EUT are measured in the frequency range of 150 kHz to 30 MHz. The measurements are performed using a receiver, which has CISPR characteristic bandwidth and quasi-peak detection, and a Line Impedance Stabilization Network (LISN), with 50  $\Omega$ /50  $\mu$ H (CISPR 16) characteristics. Table top equipment is placed on a non-conducting table 80 centimeters above the floor and is positioned 40 centimeters from the vertical ground plane (wall) of the screen room. In some cases, a pre-scan using a spectrum analyzer is initially performed on the units comprising the system under test to locate the highest emissions. If the minimum passing margin appears to be less than 20 dB with a peak mode measurement, the emissions are re-measured using a tuned receiver or spectrum analyzer with quasi-peak and average detection and recorded on the data sheets.

### **Radiated Emissions**

Radiated emissions from the EUT are measured in the frequency range of 30 to 22GHz using a spectrum analyzer and appropriate broadband linearly polarized antennas. Measurements between 30 MHz and 1000 MHz are made with 120 kHz/6 dB bandwidth and quasi-peak detection and measurements above 1000 MHz are made with a 1 MHz/6 dB bandwidth and peak detection. Table top equipment is placed on a 1.0 X 1.5 meter non-conducting table 80 centimeters above the ground plane. Floor standing equipment is placed directly on the turntable/ground plane. Interface cables that are closer than 40 centimeters to the ground plane are bundled in the center in a serpentine fashion so they are at least 40 centimeters from the ground plane. Cables to simulators/testers (if used in this test) are routed through the center of the table and to a screen room located outside the test area. The antenna is positioned 3, 10 or 30 meters horizontally from the EUT. To locate maximum emissions from the test sample the antenna is varied in height from 1 to 4 meters, measurement scans are made with both horizontal and vertical antenna polarizations and the EUT are rotated 360 degrees.

**Conducted Emissions Diagram:**



**Radiated Emissions Diagram:**

