



Date: September 10, 2003

Subject: Continuation and completion of Response to Correspondence # 25596

From: David Masucci

To: Joe Dichoso

FCC ID: Q5ZQUPID2003

This memorandum is a completion of the partial response dated August 22, 2003, to your FCC Correspondence Letter, Reference # 25596. This memorandum will provide responses to questions numbered 5, 9, and 10 of the original reference letter.

The data in the following paragraphs was taken per the guidelines in Appendix F of the Part 15 rules. All scans were performed at 3 meters in an anechoic (outdoor) environment. All measurements are above 1 GHz and were taken with an EMCO Model 3115 1-18 GHz Double-Ridged Waveguide Horn antenna. Data was recorded manually from an HP 8592 Spectrum Analyzer. The data was then entered into an Excel spreadsheet that performed the calculations as defined in the most recent FCC correspondence # 25677. The spreadsheet also performs the conversion to EIRP, and provides the final result in dBm. A separate spreadsheet is provided for each RMS average measurement described below.

5) Emissions levels in the GPS bands were measured using the method described in Appendix F of the Part 15 Rules. First the analyzer was set to a peak detect mode, and the span was set to observe the entire GPS band from 960 to 1610 MHz. A photo is attached. The area of highest emissions was noted. The analyzer was then set as follows: RBW = 1 MHz, VBW = 1 MHz, sweep 15mS (fastest available), detector = sampled, span = 0 Hz. The analyzer was configured for single sweep operation. The frequency was set to the highest peak at 1.2192 GHz. A single sweep was initiated, and then a peak search was performed. That value was recorded as sample #1. The "next peak" button was pressed and the level recorded for each successive sample, until the 10 highest samples were recorded. A second single sweep was performed, and then 10 more samples starting from the highest were again recorded. This process was repeated until there was a total of 10 sweeps completed, each with 10 samples recorded. For the GPS band, the measured RMS Average value was -54.89 dBm EIRP. Please note this number is in compliance with the current Part 15 UWB limits for the GPS band.

The same process was repeated for the upper band from 1610 to 1990 MHz. The analyzer was set to a peak detect mode, and the span was set to observe the entire band. In this case the highest emission was centered at 1.9862 GHz. For this band, the measured RMS Average value was -55.17 dBm EIRP. Please note this number is in compliance with the current Part 15 UWB limits for this band.

9) We have reviewed the data presented in the EMC report for peak level. Figure 14 shown on page 20 is from a scan taken at the NTS test Facility. The scan is of the main lobe of the QUPID transmitter. It was taken with a peak

detector, and a resolution/video bandwidth of 1 MHz. The peak reading is 100dBuV/m at a measurement distance of 3 meters. This plot is corrected for measurement distance, cable loss, and antenna gain. To convert dBuV/m to dBm, we use the following formula: $100\text{dBuV} + 20\text{Log}(3) - 104.8 = +4.7 \text{ dBm}$. Conversion from the 1 MHz bandwidth to a 50 MHz bandwidth we use the FCC mandated 20Log of the bandwidth ratio, which yields a correction of +34dB. $+4.7 \text{ dBm} + 34 \text{ dB} = +38.7 \text{ dBm}$. This process is reflected in the table 9 results on page 23 of the report. This measurement is as defined in Appendix F, measurement procedure #6. This data corresponds with the value quoted in the waiver requests.

10) RMS Average levels for the main lobe of UWB emissions were measured using the method described in Appendix F of the Part 15 Rules. First the analyzer was set to a peak detect mode, and the span was set to observe the band from 2 to 2.9 GHz. It is in this band that the peak of the emissions occurs. A photo is attached. The area of highest emissions was noted as 2.38 GHz. The analyzer was then set as follows: RBW = 1 MHz, VBW = 1 MHz, sweep 15mS (fastest available), detector = sampled, span = 0 Hz. The analyzer was configured for single sweep operation. The frequency was set to 2.3864 GHz. A single sweep was initiated, and then a peak search was performed. That value was recorded as sample #1. The "next peak" button was pressed and the level recorded for each successive sample, until the 10 highest samples were recorded. A second single sweep was performed, and then 10 more samples starting from the highest were again recorded. This process was repeated until there was a total of 10 sweeps completed, each with 10 samples recorded. The measured RMS Average value was -27.48 dBm EIRP.

Additional data included below:

- 1) Excel spreadsheet with In-band RMS avg. data
- 2) Excel spreadsheet with GPS band RMS avg. data
- 3) Excel spreadsheet with 1610 to 1990 MHz RMS avg. data
- 4) Spectrum analyzer photo of in-band sweep for (1) above
- 5) Spectrum analyzer photo of 960 to 1610MHz sweep for (2) above
- 6) Spectrum analyzer photo of 1610 to 1990 MHz sweep for (3) above

APPENDIX F RMS AVERAGE / 10 SWEEPS / 10 SAMPLES / INBAND

**Centered at 2.38GHz
10 dB Attenuator**

Sweep 1	Sweep 2	Sweep 3	Sweep 4	Sweep 5	
7.03E-08	4.71E-07	6.70E-07	3.80E-08	5.91E-07	
3.46E-10	6.90E-08	6.90E-09	5.00E-09	8.60E-09	
1.04E-10	5.30E-08	4.30E-09	3.80E-09	7.70E-11	
1.03E-10	3.80E-09	1.50E-09	3.20E-09	7.60E-11	9.33164E-08 W RMS Avg
1.01E-10	6.81E-10	9.20E-11	2.89E-10	7.40E-11	At the Antenna
9.60E-11	5.77E-10	8.70E-11	1.66E-10	6.80E-11	
9.00E-11	1.04E-10	8.00E-11	9.80E-11	6.70E-11	-70.30 dBm RMS Avg
8.70E-11	7.60E-11	7.90E-11	9.20E-11	6.60E-11	At the Antenna
8.00E-11	7.60E-11	7.80E-11	8.70E-11	6.60E-11	
7.30E-11	7.00E-11	7.80E-11	8.20E-11	6.40E-11	-27.48 dBm RMS Avg
					EIRP
2.223E-08 watts RMS	1.515E-07 watts RMS	2.119E-07 watts RMS	1.222E-08 watts RMS	1.87E-07 watts RMS	

Sweep 6	Sweep 7	Sweep 8	Sweep 9	Sweep 10
6.11E-07	3.10E-09	4.87E-07	1.17E-10	1.43E-10
3.25E-10	1.10E-09	9.80E-11	1.08E-10	1.11E-10
1.33E-10	1.97E-10	8.30E-11	1.03E-10	9.30E-11
9.70E-11	1.04E-10	7.60E-11	9.10E-11	8.70E-11
7.90E-11	1.04E-10	7.30E-11	8.40E-11	8.30E-11
7.70E-11	9.00E-11	7.10E-11	8.20E-11	8.00E-11
7.00E-11	9.00E-11	6.60E-11	7.90E-11	7.80E-11
7.00E-11	8.40E-11	6.20E-11	7.30E-11	7.70E-11
6.60E-11	8.30E-11	5.90E-11	7.00E-11	7.20E-11
6.50E-11	8.00E-11	5.90E-11	6.90E-11	6.70E-11
1.932E-07 watts RMS	1.045E-09 watts RMS	1.54E-07 watts RMS	8.902E-11 watts RMS	9.16E-11 watts RMS

1) Excel spreadsheet with In-band RMS avg. data

APPENDIX F RMS AVERAGE / 10 SWEEPS / 10 SAMPLES / GPS LOW

**Centered at 1.2192GHz
10 dB Attenuator**

Sweep 1	Sweep 2	Sweep 3	Sweep 4	Sweep 5
1.80E-09	3.11E-10	7.70E-11	1.90E-09	1.30E-10
1.34E-10	1.57E-10	6.50E-11	6.00E-11	8.80E-11
8.30E-11	5.60E-11	5.40E-11	5.50E-11	8.40E-11
7.80E-11	4.70E-11	4.50E-11	5.20E-11	6.00E-11
7.40E-11	4.70E-11	4.50E-11	4.80E-11	5.30E-11
7.00E-11	4.40E-11	4.30E-11	4.70E-11	4.10E-11
6.90E-11	4.20E-11	4.00E-11	4.50E-11	3.90E-11
6.80E-11	4.00E-11	3.90E-11	4.50E-11	3.90E-11
6.80E-11	4.00E-11	3.90E-11	4.40E-11	3.90E-11
6.60E-11	4.00E-11	3.80E-11	4.00E-11	3.60E-11
5.744E-10 watts RMS	1.172E-10 watts RMS	5.005E-11 watts RMS	6.026E-10 watts RMS	6.76E-11 watts RMS

1.69538E-10 W RMS Avg
At the Antenna

-97.71 dBm RMS Avg
At the Antenna

**-54.89 dBm RMS Avg
EIRP**

Sweep 6	Sweep 7	Sweep 8	Sweep 9	Sweep 10
7.60E-11	2.58E-10	7.00E-11	5.40E-11	4.60E-11
7.10E-11	6.20E-11	6.80E-11	5.30E-11	4.50E-11
5.90E-11	4.80E-11	6.10E-11	5.10E-11	4.20E-11
5.60E-11	4.70E-11	5.00E-11	5.00E-11	4.10E-11
4.80E-11	4.70E-11	4.90E-11	4.80E-11	4.10E-11
4.40E-11	4.30E-11	4.90E-11	4.40E-11	4.00E-11
4.40E-11	4.10E-11	4.30E-11	4.00E-11	3.90E-11
4.10E-11	4.10E-11	3.90E-11	3.90E-11	3.70E-11
3.80E-11	4.10E-11	3.90E-11	3.90E-11	3.50E-11
3.50E-11	4.00E-11	3.90E-11	3.80E-11	3.40E-11
5.288E-11 watts RMS	9.253E-11 watts RMS	5.192E-11 watts RMS	4.599E-11 watts RMS	4.02E-11 watts RMS

2) Excel spreadsheet with GPS band RMS avg. data

APPENDIX F RMS AVERAGE / 10 SWEEPS / 10 SAMPLES / 1610 to 1990 MHz

**Centered at 1.9862 GHz
10 dB Attenuator**

Sweep 1	Sweep 2	Sweep 3	Sweep 4	Sweep 5	
8.57E-10	7.00E-11	2.10E-09	7.70E-11	2.37E-10	
1.09E-10	6.20E-11	7.30E-11	7.00E-11	6.60E-11	
5.80E-11	5.20E-11	7.00E-11	6.10E-11	6.10E-11	
5.60E-11	5.20E-11	6.90E-11	5.40E-11	5.90E-11	
5.20E-11	5.10E-11	6.80E-11	5.40E-11	5.50E-11	
5.00E-11	4.90E-11	6.30E-11	5.20E-11	5.20E-11	
5.00E-11	4.90E-11	5.80E-11	4.80E-11	5.20E-11	
4.70E-11	4.80E-11	5.60E-11	4.80E-11	4.80E-11	
4.60E-11	4.70E-11	5.50E-11	4.70E-11	4.80E-11	
4.50E-11	4.30E-11	5.30E-11	4.60E-11	4.50E-11	
2.769E-10 watts RMS	5.284E-11 watts RMS	6.668E-10 watts RMS	5.659E-11 watts RMS	9.1E-11 watts RMS	

1.5897E-10 W RMS Avg
At the Antenna

-97.99 dBm RMS Avg
At the Antenna

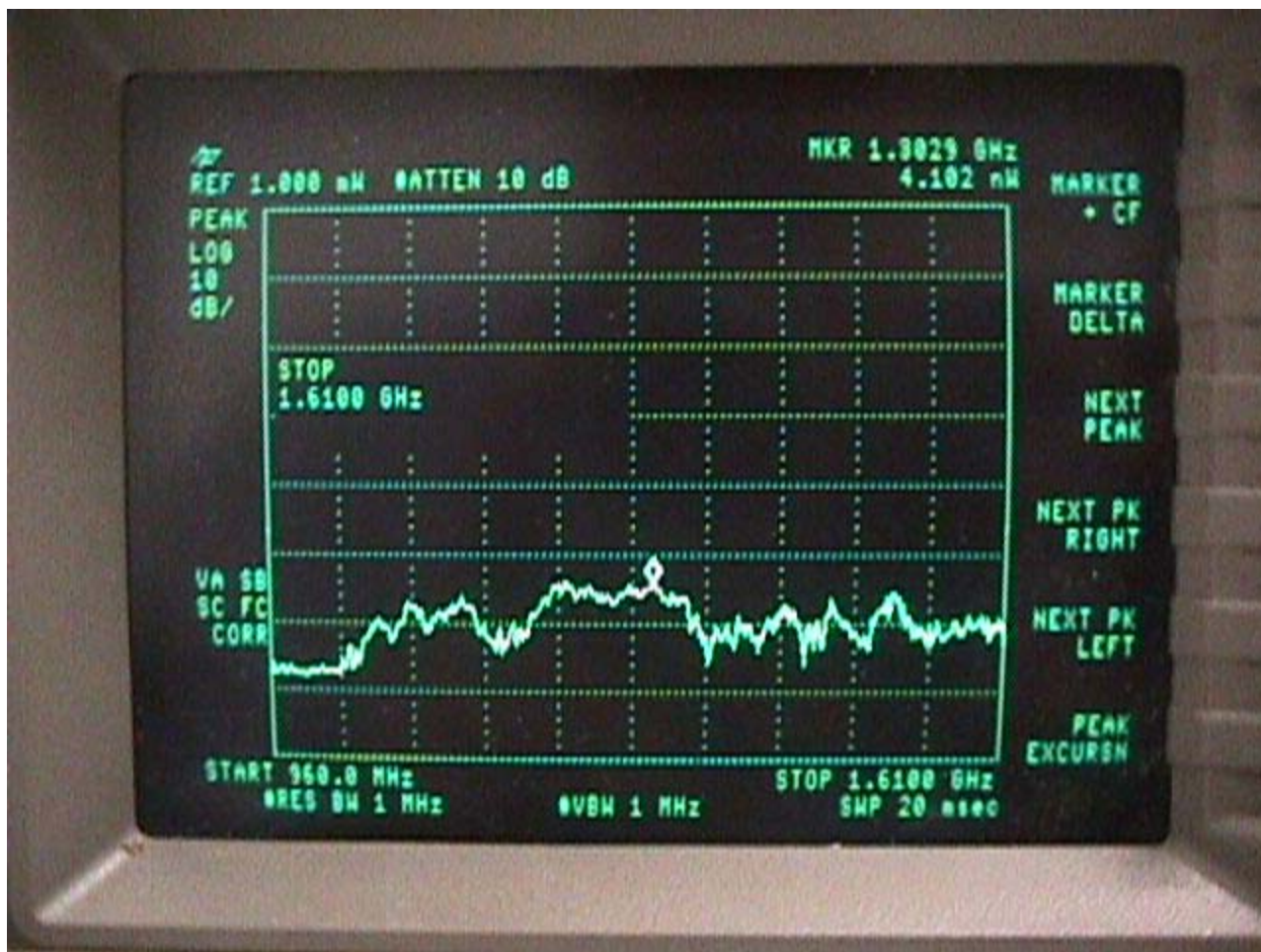
**-55.17 dBm RMS Avg
EIRP**

Sweep 6	Sweep 7	Sweep 8	Sweep 9	Sweep 10	
2.99E-10	4.37E-10	9.50E-11	1.16E-10	6.50E-11	
1.44E-10	8.70E-11	7.40E-11	7.10E-11	6.40E-11	
8.80E-11	6.40E-11	6.40E-11	7.00E-11	6.20E-11	
6.60E-11	6.30E-11	6.30E-11	6.20E-11	6.00E-11	
4.70E-11	6.20E-11	5.30E-11	5.50E-11	5.90E-11	
4.50E-11	5.50E-11	4.80E-11	5.30E-11	5.80E-11	
3.70E-11	5.00E-11	4.70E-11	5.30E-11	5.60E-11	
3.70E-11	4.90E-11	4.60E-11	4.30E-11	5.20E-11	
3.70E-11	4.90E-11	4.50E-11	4.00E-11	5.00E-11	
3.70E-11	4.70E-11	4.50E-11	3.90E-11	4.50E-11	
1.149E-10 watts RMS	1.493E-10 watts RMS	6.004E-11 watts RMS	6.392E-11 watts RMS	5.74E-11 watts RMS	

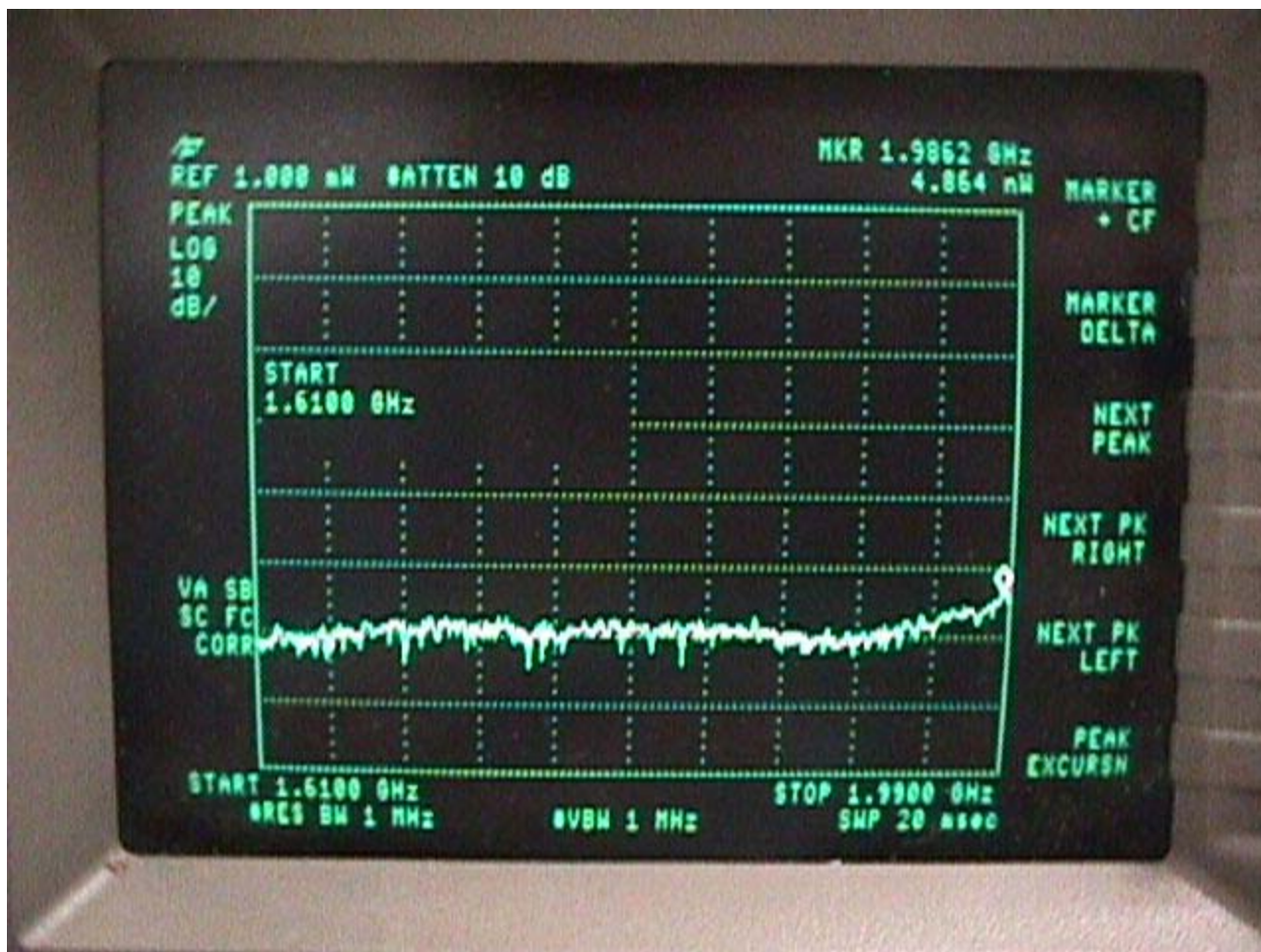
3) Excel spreadsheet with 1610 to 1990 MHz RMS avg. data



4) Spectrum analyzer photo of in-band sweep for (1) above



5) Spectrum analyzer photo of 960 to 1610MHz sweep for (2) above



6) Spectrum analyzer photo of 1610 to 1990 MHz sweep for (3) above