Elliott

Emissions Test Data

Client:	Metricom	Date:	8/10/99	Test Engr:	Chris Byleckie
Product:	WCS Rack	File:	T33175	Proj. Engr:	Chris Byleckie
Objective	Final Qualification	Site:	SVOATS #2	Contact:	David Waitt
Spec:	FCC Part 27	Distance:	10 m	Approved:	

Power measurements were done with a spectrum analyzer
EUT Rated Average Power: 42 Watts
EUT Rated Peak Power: 45 Watts

Run #1: Maximized radiated emissions, 30-2000 MHz
Measurements done at 3m, all measured with RBW=1MHz, VBW=10Hz
System on but not transmitting
The only external cables were the AC line cables. Emission levels were not affected by maximizing these cables

Frequency	Level	Pol	ERP	Rel.Level	Detector	Limit	Margin	Azimuth	Height	
MHz	dBuV/m	v/h	dBm	dBc	Pk/Avg	dBc	dB	degrees	meters	
30.000	45.6	v	-51.9	98.1	Avg	86.2	-11.9	-	1.0	Note 1
60.000	42.0	v	-55.5	101.7	Avg	86.2	-15.5	-	1.3	
95.998	30.2	v	-67.3	113.5	Avg	86.2	-27.3	-	1.0	Note 2
192.000	37.8	v	-59.7	105.9	Avg	86.2	-19.7	-	1.0	
72.000	40.0	v	-57.5	103.7	Avg	86.2	-17.5	-	1.0	
216.000	42.0	v	-55.5	101.7	Avg	86.2	-15.5	-	1.6	
200.000	46.1	v	-51.4	97.6	Avg	86.2	-11.4	-	1.0	
120.000	37.6	h	-59.9	106.1	Avg	86.2	-19.9	-	1.6	
200.000	46.5	h	-51.0	97.2	Avg	86.2	-11.0	-	4.0	Note 2
312.000	45.0	v	-52.5	98.7	Avg	86.2	-12.5	-	1.0	
560.310	43.9	v	-53.6	99.8	Avg	86.2	-13.6	-	1.0	Note 2
319.983	38.5	h	-59.0	105.2	Avg	86.2	-19.0	-	1.0	Note 3
312.000	49.3	h	-48.2	94.4	Avg	86.2	-8.2	-	2.4	
336.000	44.5	h	-53.0	99.2	Avg	86.2	-13.0	-	1.0	
432.000	42.3	h	-55.2	101.4	Avg	86.2	-15.2	-	1.0	
1210.000	37.7	v	-59.8	106.0	Avg	86.2	-19.8	-	1.0	

Note 1:	Broadband Noise
Note 2:	Signal Substitution
Note 3:	Signal + ambient

Elliott

Emissions Test Data

Client:	Metricom	Date:	8/10/99	Test Engr:	Chris Byleckie
Product:	WCS Rack	File:	T33175	Proj. Engr:	Chris Byleckie
Objective	Final Qualification	Site:	SVOATS #2	Contact:	David Waitt
Spec:	FCC Part 27	Distance:	10 m	Approved:	

Run #2: Radiated emissions, 2000 - 24,000 MHz

3m, all measured with RBW=1MHz, VBW=10Hz
Fundamental frequency = 2316.48 Mhz
Full system, 3 radios transmitting.
No preamp was used in the measurement system

Frequency	Level	Pol	ERP	Rel.Level	Detector	Limit	Margin	Azimuth	Height	
MHz	dBuV/m	v/h	dBm	dBc	Pk/Avg	dBc	dB	degrees	meters	
2316.48	86.2	v	-11.3	57.5	Avg	No Spec	No Spec	-	-	
4632.96	76.7	v	-20.7	67.0	Avg	86.2	19.3	-	-	Note 1

Note 1:	a quick look at the other harmonics showed the 3rd and 4th were probably out of spec also.

Run #3: Radiated emissions, 2000 - 24,000 MHz

3m, all measured with RBW=1MHz, VBW=10Hz
Fundamental frequency = 2316.48 Mhz
Full system, 3 radios transmitting.
No preamp was used in the measurement system

Frequency	Level	Pol	ERP	Rel.Level	Detector	Limit	Margin	Azimuth	Height	
MHz	dBuV/m	v/h	dBm	dBc	Pk/Avg	dBc	dB	degrees	meters	
2316.48	95.7	v	-1.8	48.0	Avg	No Spec	No Spec	-	-	
4632.96	79.5	v	-18.0	64.2	Avg	86.2	22.1	-	-	

Run #4: Radiated emissions, 2000 - 24,000 MHz

3m, all measured with RBW=1MHz, VBW=10Hz
Fundamental frequency = 2316.48 Mhz
One radio, PA, filter transmitting. RF coax to 50 db Pad.
No preamp was used in the measurement system

Frequency	Level	Pol	ERP	Rel.Level	Detector	Limit	Margin	Azimuth	Height	
MHz	dBuV/m	v/h	dBm	dBc	Pk/Avg	dBc	dB	degrees	meters	
2316.48	86.2	v	-11.3	57.5	Avg	No Spec	No Spec	-	-	
4632.96	76.7	v	-20.7	67.0	Avg	86.2	19.3	-	-	

Elliott

Emissions Test Data

Client:	Metricom	Date:	8/10/99	Test Engr:	Chris Byleckie
Product:	WCS Rack	File:	T33175	Proj. Engr:	Chris Byleckie
Objective	Final Qualification	Site:	SVOATS #2	Contact:	David Waitt
Spec:	FCC Part 27	Distance:	10 m	Approved:	

Run #5: Radiated emissions, 2000 - 24,000 MHz

3m, all measured with RBW=1MHz, VBW=10Hz

Fundamental frequency = 2316.48 Mhz

One radio, PA. No filter. 50 dB pad connected to PA via .5m coax cable

No preamp was used in the measurement system

Frequency	Level	Pol	ERP	Rel.Level	Detector	Limit	Margin	Azimuth	Height	
MHz	dBuV/m	v/h	dBm	dBc	Pk/Avg	dBc	dB	degrees	meters	
2316.48	85.8	v	-11.6	57.9	Avg	No Spec	No Spec	-	-	
4632.96	77.2	v	-20.3	66.5	Avg	86.2	19.7	-	-	

Run #6: Radiated emissions, 2000 - 24,000 MHz

3m, all measured with RBW=1MHz, VBW=10Hz

Fundamental frequency = 2316.48 Mhz

Same as Run #4 except the 50dB pad was connected directly to the PA output.

No preamp was used in the measurement system

Frequency	Level	Pol	ERP	Rel.Level	Detector	Limit	Margin	Azimuth	Height	
MHz	dBuV/m	v/h	dBm	dBc	Pk/Avg	dBc	dB	degrees	meters	
2316.48	85.8	v	-11.6	57.9	Avg	No Spec	No Spec	-	-	
4632.96	76.1	v	-21.4	67.6	Avg	86.2	18.6	-	-	

Run #7: Radiated emissions, 2000 - 24,000 MHz

3m, all measured with RBW=1MHz, VBW=10Hz

Fundamental frequency = 2316.48 Mhz

Radio only. Radio output was terminated in 30dB pad and a 50 ohm load

The preamp was used in the measurement system.

Frequency	Level	Pol	ERP	Rel.Level	Detector	Limit	Margin	Azimuth	Height	
MHz	dBuV/m	v/h	dBm	dBc	Pk/Avg	dBc	dB	degrees	meters	
2316.48	45.8	v	-51.7	97.9	Avg	No Spec	No Spec	-	-	
4632.96	17.0	v	-80.5	126.7	Avg	86.2	-40.5	-	-	

Run #8: Conducted measurements to verify radio / PA / filter chain performance.

2nd harmonic was suppressed approx. 50 dB out of the PA.

2nd harmonic was suppressed approx. 65 dB with the addition of the filter at the PA output

Run #9: Troubleshooting

Near field probing was done to try and isolate the 2nd harmonic leakage. The signal was strong all around the enclosure, inside and out.

The maximum signal level was found to be at the front on the power amp, where a ribbon cable was running betweeen the two sections of the PA.