

# EMC Technologies (NZ) Ltd

Test Report No 20118 FCC

Report date: 17 April 2002

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## **Section 15.247 (c) - Out of band emissions – Radiated Emissions**

Measurements were carried out in frequency hopping mode MHz and in single frequency mode for each antenna (a colinear antenna and a yagi antenna) at 902.875, 915.375 and 927.125 MHz.

Radiated emission measurements were required in the restricted frequency bands as per Section 15.205 with the limits as per Section 15.209.

Only emissions observed in the restricted bands have been reported.

Observations were made while the device was operating in single frequency and frequency hopping mode.

Below 1000 MHz the worst case emission levels were observed when the device was operating in frequency hopping mode.

Above 1 GHz the worst case emission levels were observed when the device was operating in single frequency mode.

The device was placed on the test table top which was a total of 0.8 m above the test site ground plane.

Measurements of the radiated field were made with the antenna located at a 3 m horizontal distance from the boundary of the device under test.

Measurements below 1000 MHz were made using an quasi peak detector with a bandwidth of 120 kHz.

Measurements above 1000 MHz were made using an average detector with a bandwidth of 1.0 MHz.

The device was powered at 110 Vac.

Emission levels were determined when each of the supplied antennas were attached.

When an emission is located, it is positively identified and its maximum level is found by rotating the automated turntable, and by varying the antenna height with an automated antenna tower.

The emission is measured in both vertical and horizontal antenna polarisations.

The emission level is determined in field strength by taking the following into consideration:

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$$\text{Level (dB}\mu\text{V/m)} = \text{Receiver Reading (dB}\mu\text{V)} + \text{Antenna Factor (dB)} + \text{Coax Loss (dB)}$$

## **Results:**

General emissions while operating in spread spectrum mode with the co linear whip antenna attached.

Frequency MHz	Level		Recheck dBuV/m	Limit dBuV/m	Margin dBuV	Result	Worst Case Antenna
	Vertical dBuV/m	Horizontal dBuV/m					
73.730	19.5			40.0	-20.5	Pass	Vertical
109.100	18.1			43.5	-25.4	Pass	Vertical
110.660	19.7			43.5	-23.8	Pass	Vertical
114.798	19.1			43.5	-24.4	Pass	Vertical
116.165	18.0			43.5	-25.5	Pass	Vertical
122.885		17.0		43.5	-26.5	Pass	Horizontal
132.820	19.5			43.5	-24.0	Pass	Vertical
149.968	21.6	18.1		43.5	-21.9	Pass	Vertical
240.035	28.6	36.7	36.7	46.0	-9.3	Pass	Horizontal
245.773	24.1	26.9		46.0	-19.1	Pass	Horizontal
251.918	34.3	33.6	34.3	46.0	-11.7	Pass	Vertical
258.060		29.9		46.0	-16.1	Pass	Horizontal
264.035		23.2		46.0	-22.8	Pass	Horizontal
280.018	23.5			46.0	-22.5	Pass	Vertical
325.650	19.6	22.5		46.0	-23.5	Pass	Horizontal
399.380	18.3	19.0		46.0	-27.0	Pass	Horizontal
408.058	23.6			46.0	-22.4	Pass	Vertical

Result: Complies

Measurement uncertainty with a confidence interval of 95% is:

- Free radiation tests (30 – 10,000 MHz) ± 4.1 dB

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## SG900-6 collinear antenna with the CC20/900 kit

Transmit frequency: 902.875 MHz

Frequency MHz	Level		Recheck dBuV/m	Limit dBuV/m	Margin dBuV	Result	Worst Case Antenna
	Vertical dBuV/m	Horizontal dBuV/m					
2708.620	53.3	46.2	53.0	54.0	-0.7	Uncert	Vertical
3611.500	44.6	-		54.0	-9.6	Pass	Vertical
4514.375	-	-		54.0	-	Pass	Vertical
5417.250	52.2	47.8		54.0	-1.8	Uncert	Vertical
8125.875	46.0	38.7		54.0	-8.0	Pass	Vertical
9028.750	-	-		54.0	-	Pass	Vertical

Transmit frequency: 915.375 MHz

Frequency MHz	Level		Recheck dBuV/m	Limit dBuV/m	Margin dBuV	Result	Worst Case Antenna
	Vertical dBuV/m	Horizontal dBuV/m					
2746.125	50.5	45.7		54.0	-3.5	Uncert	Vertical
3661.500	34.3	-		54.0	-19.7	Pass	Vertical
4576.875	30.1	-		54.0	-23.9	Pass	Vertical
7323.000	-	-		54.0	-	Pass	Vertical
8238.375	39.9	-		54.0	-14.1	Pass	Vertical

Transmit frequency: 927.125 MHz

Frequency MHz	Level		Recheck dBuV/m	Limit dBuV/m	Margin dBuV	Result	Worst Case Antenna
	Vertical dBuV/m	Horizontal dBuV/m					
2781.375	49.7	-		54.0	-4.3	Pass	Vertical
3708.500	40.3	-		54.0	-13.7	Pass	Vertical
4635.625	45.2	41.9		54.0	-9.8	Pass	Vertical
7417.000	52.2	-		54.0	-1.8	Uncert	Vertical

Result:

Complies when using the SG900-6 collinear antenna with the CC20/900 kit with measurements falling within the window of uncertainty for this test method.

Measurement uncertainty with a confidence interval of 95% is:

- Free radiation tests (30 – 10,000 MHz) ± 4.1 dB

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## YU6/900 6 element yagi with CC20/900 kit

Transmit frequency: 902.875 MHz

Frequency MHz	Level		Recheck dBuV/m	Limit dBuV/m	Margin dBuV	Result	Worst Case Antenna
	Vertical dBuV/m	Horizontal dBuV/m					
2708.620	40.2	50.8		54.0	-3.2	Uncert	Horizontal
3611.500	35.3	-		54.0	-18.7	Pass	Vertical
4514.375	-	-		54.0	-	Pass	Vertical
5417.250	41.8	39.8		54.0	-12.2	Pass	Vertical
8125.875	47.3	43.8		54.0	-6.7	Pass	Vertical
9028.750	-	-		54.0	-	Pass	Vertical

Transmit frequency: 915.375 MHz

Frequency MHz	Level		Recheck dBuV/m	Limit dBuV/m	Margin dBuV	Result	Worst Case Antenna
	Vertical dBuV/m	Horizontal dBuV/m					
2746.125	45.3	42.2		54.0	-8.7	Pass	Vertical
3661.500	35.3	-		54.0	-18.7	Pass	Vertical
4576.875	23.5	-		54.0	-30.5	Pass	Vertical
7323.000	-	-		54.0	-	Pass	Vertical
8238.375	33.7	37.8		54.0	-16.2	Pass	Horizontal

Transmit frequency: 927.125 MHz

Frequency MHz	Level		Recheck dBuV/m	Limit dBuV/m	Margin dBuV	Result	Worst Case Antenna
	Vertical dBuV/m	Horizontal dBuV/m					
2781.375	31.6	45.6		54.0	-8.4	Pass	Horizontal
3708.500	22.7	-		54.0	-31.3	Pass	Vertical
4635.625	30.2	31.4		54.0	-22.6	Pass	Horizontal
7417.000	42.0	33.0		54.0	-12.0	Pass	Vertical

Result:

Complies when using the YU6/900 6 element yagi with CC20/900 kit with measurements falling within the window of uncertainty for this test method.

Measurement uncertainty with a confidence interval of 95% is:

- Free radiation tests (30 – 10,000 MHz) ± 4.1 dB