FCC submission (additional tests)

This report details the results of measurements made at McMurdo Ltd, to satisfy the relevant items listed in CFR47 section 80.1061b and 2.985-2.997. These items are not generally covered in the main RTCM test report.

Test equipment

1.	Spectrum analyser	Advantest R3371
2.	Frequency counter	Philips PM6680
3.	Temperature chamber	Montford BMC24
4.	Power meter	Hewlett Packard 437B + 8482B Power head
5.	Attenuator	N-type 50Ω in-line attenuator 30dB
6.	Thermometer	Comark 2001

Test Frequency

The unit under test was fitted with a 121.65MHz crystal to avoid interference.

121.5MHz homer --- Compliance with 80.1061b.

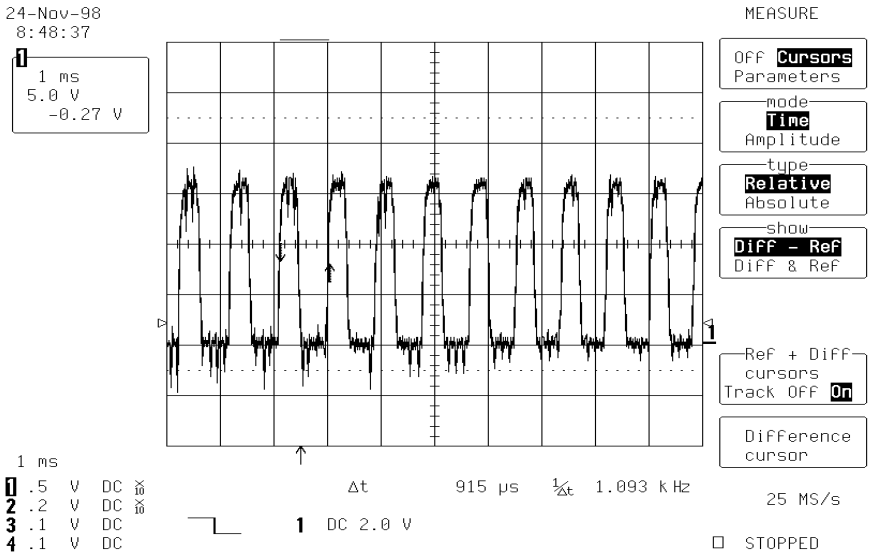
Modulation characteristics.

Testing was carried out in accordance with “Subpart N” the FCC procedure for testing Class A,B and S EPIRBS.

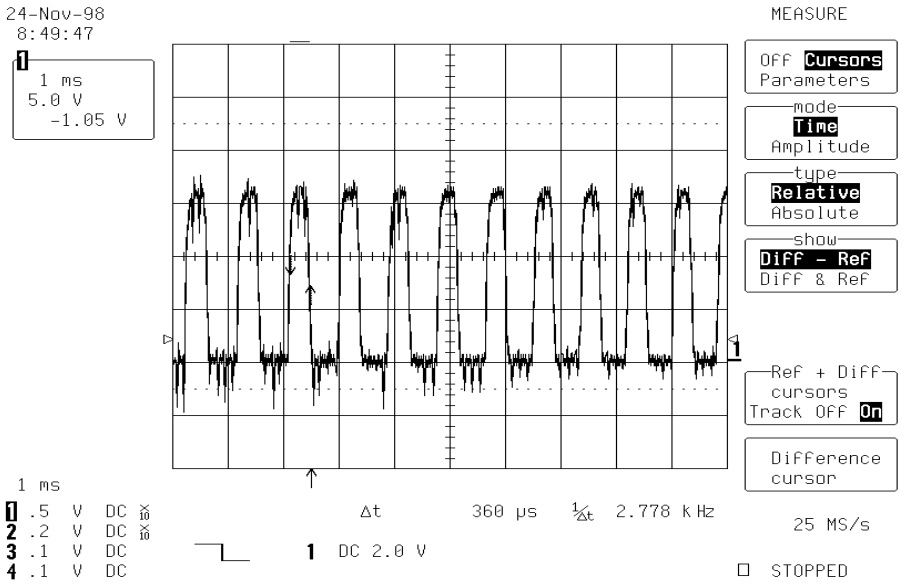
Characteristics	121.65MHz	Limit
Sweep Start Frequency	1307Hz	1600Hz
Sweep stop frequency	348Hz	300Hz
Sweep frequency range	959	>700
Sweep repetition	3.09Hz	2Hz-4Hz
Modulation factor	0.91	0.85-1.0
Modulation duty cycle	35%-41.8%	33%-55%

Plots 1&2 shown below are to determine the duty cycle at 1KHz.

1.

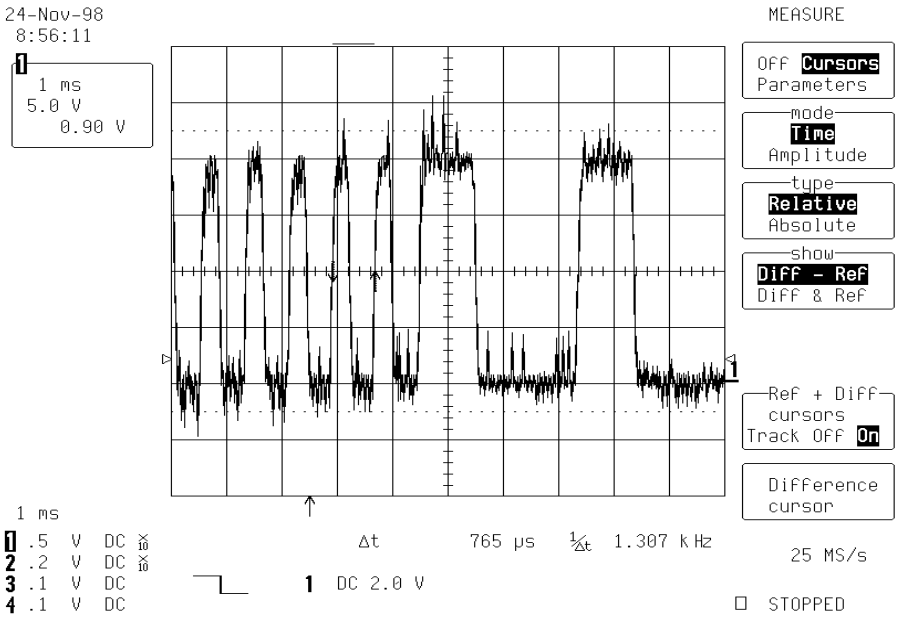


2.

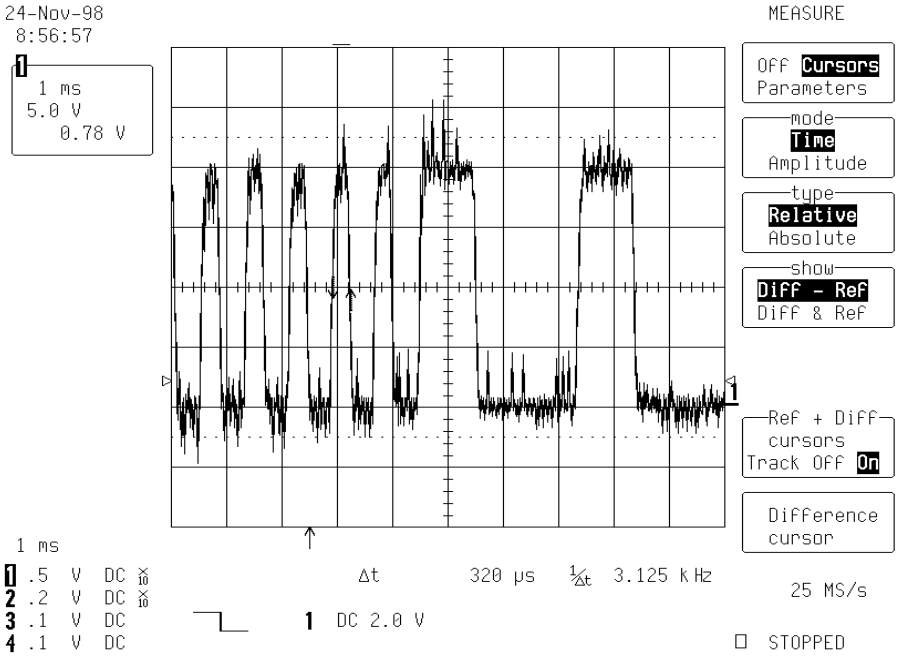


Plots 3&4 below to determine the duty cycle at 1.3KHz.

3.

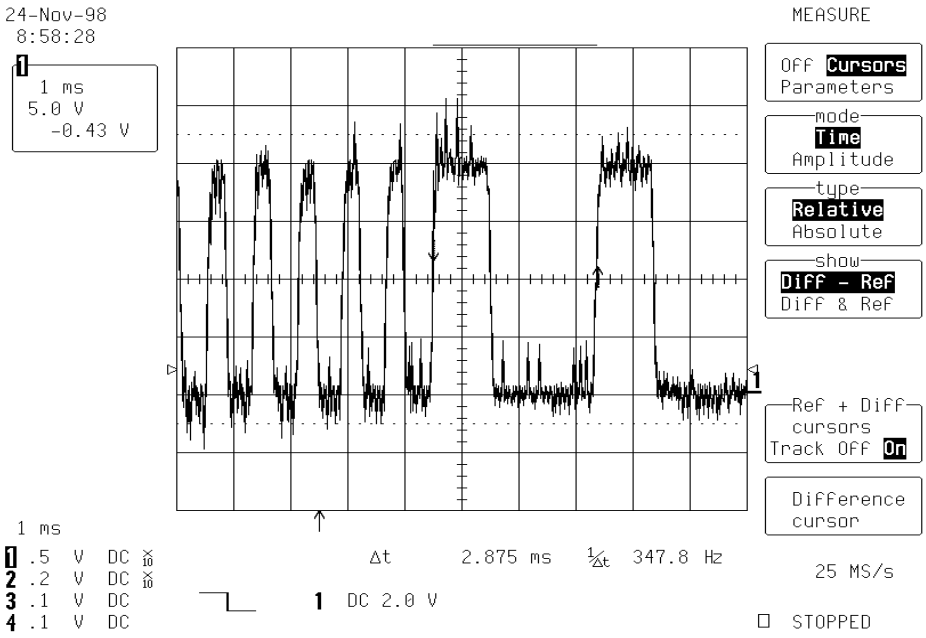


4.

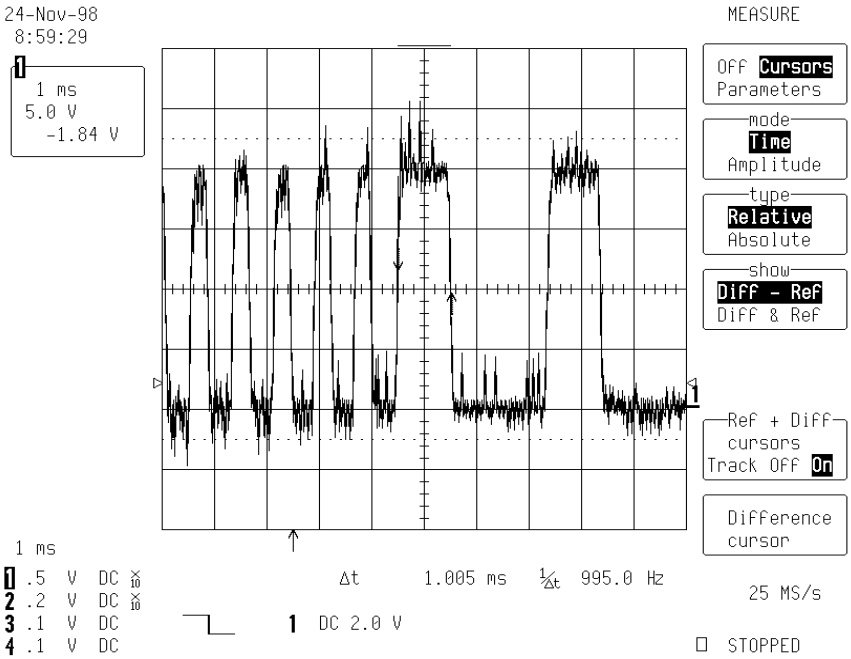


Plots 5&6 below to determine the duty-cycle at 348Hz.

5.



6.



Signal Enhancement

The mean power correction for duty cycle made use of the highest duty cycle as this gave the worst results for carrier content.

Characteristic	121.65MHz
Highest duty cycle	41.83%
10log (Duty) factor	-3.785
Total mean power	18.422dBm
Carrier power	10.225dBm
dBc-dBt	-4.411
Carrier content	36.21%

Compliance with 2.985 : RF power output

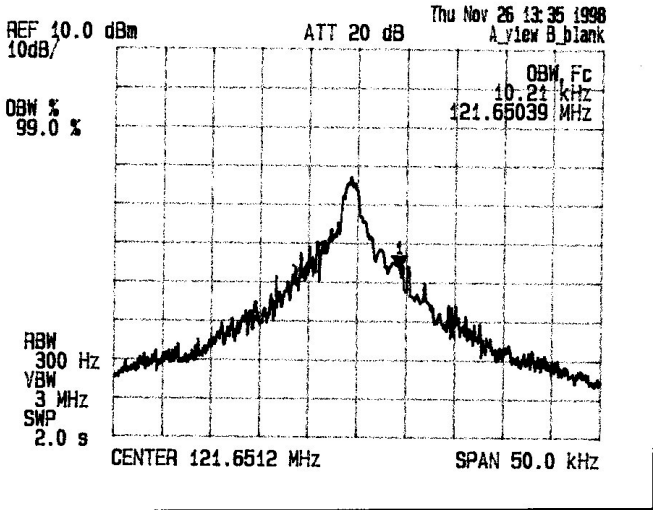
The Hewlett Packard 437B power meter was to measure the RF power at both frequencies…
Power at 121.65MHz = 19.5dBm
Power at 406.025MHz = 36.81 dB

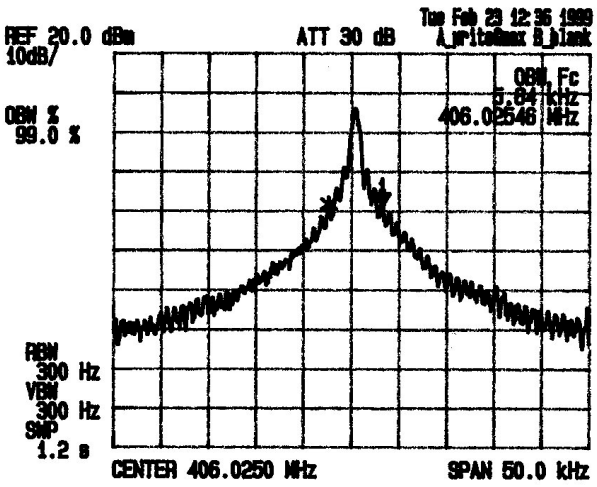
Compliance with 2.987 : Modulation characteristics

Refer to the RTCM report, reference DERA/SS/WI/RTCM/R-TT7/98-1.0.
The report covers both the 406.025MHz and 121.5MHz modulation.

Compliance with 2.989 : Occupied bandwidth.

The spectrum analyser's built in maths function was used for measurement. The power limit being set to 99% as required by FCC rules. The analyser settings for the 121.65MHz and 406.025MHz frequencies are shown on the plots below.

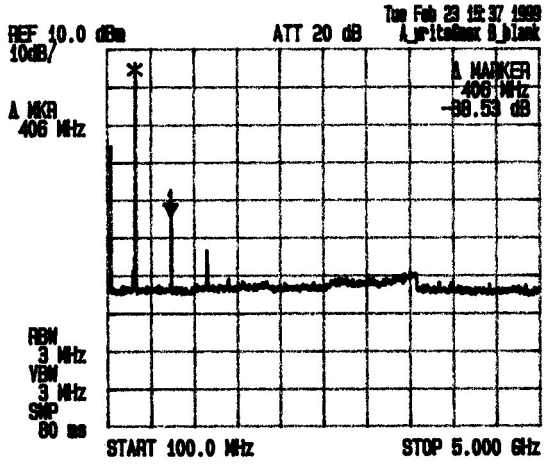




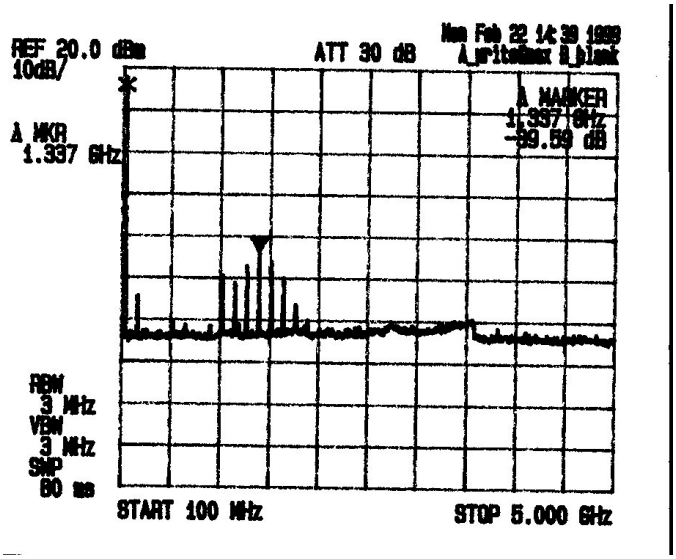
Characteristic	121.65MHz	406.025MHz
Occupied bandwidth	10.21KHz	5.64KHz

Compliance to 2.991 : Spurious emissions at antenna terminals

Below shows the emission spectrum for the 406.025MHz transmission. It can be clearly seen that the only spurious are harmonics of 406.025MHz which are more than 38dB below the wanted signal.



The plot overleaf shows the spectrum for the 121.5MHz transmission. It can be clearly seen that the only spurious are harmonics of 121.5MHz, which are more than 39dB below the wanted signal. These are of course significantly attenuated by the antenna characteristics.



Compliance with 2.993 : Field strength of spurious radiation.

Please refer to the DERA EMC test report (DERA/SSW1/R/EMC/TT – 07/98/1.0) attached to this submission.

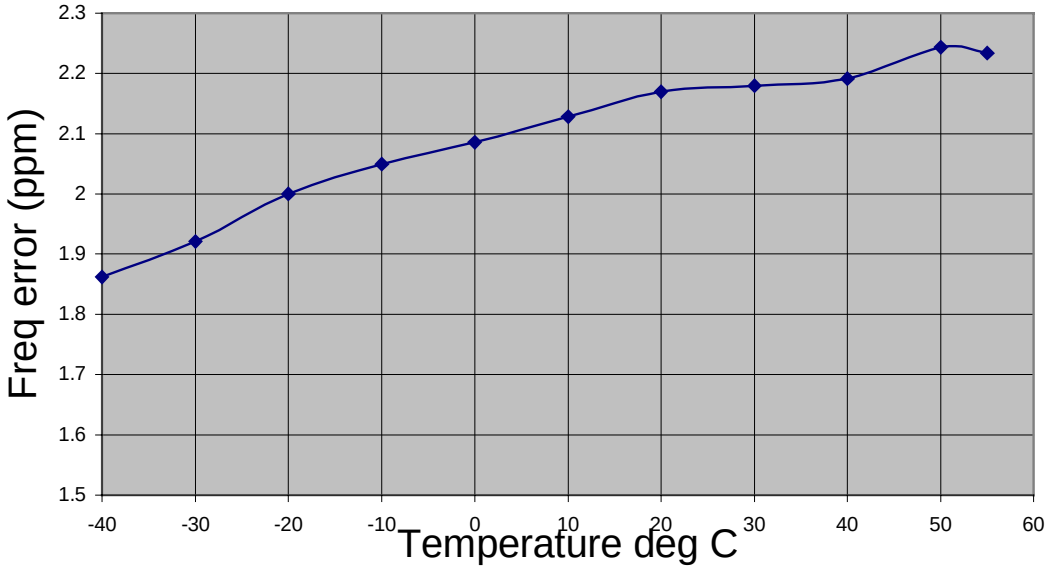
Compliance 2.995 : Frequency stability.

Frequency vs. temperature
Conducted as per FCC procedure. New battery fitted. Soak time 1 hour per step.

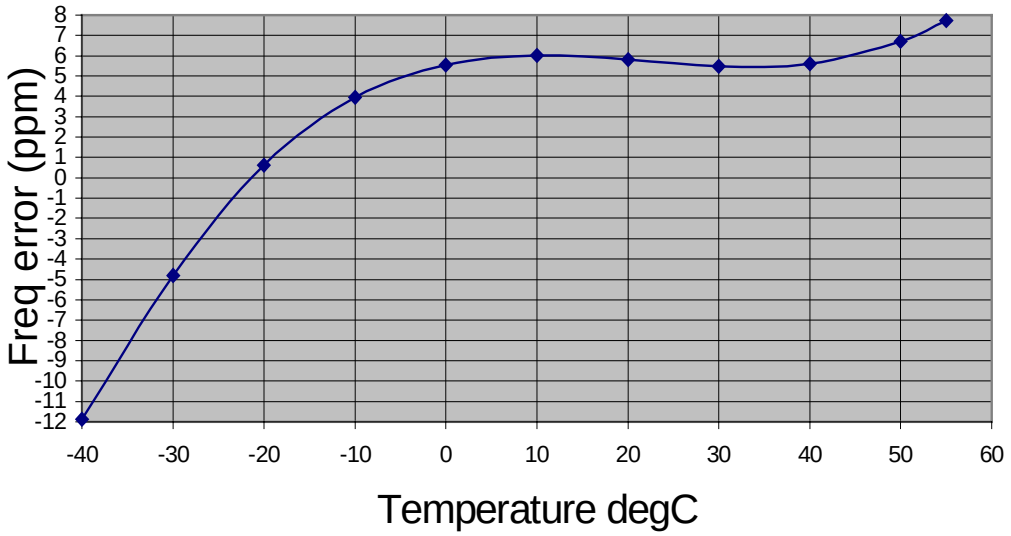
Characteristic	121.65MHz	406.025MHz	Limit
Initial freq accuracy	+5.1 ppm	+2.16 ppm	+/-50ppm
Freq. accuracy over temp	+7.2/-11.9 ppm	+1.86/+2.23 ppm	+/-50 ppm

Temp (°C)	Freq. (MHz)	Error (ppm)	Freq. (MHz)	Error (ppm)
-40	121.648556	-11.9	406.025756	1.86
-30	121.649415	-4.81	406.025780	1.92
-20	121.650075	0.62	406.025812	2.00
-10	121.650481	3.96	406.025832	2.05
0	121.650675	5.56	406.025847	2.09
10	121.650733	6.03	406.025864	2.13
20	121.650707	5.82	406.025881	2.17
30	121.650655	5.47	406.025885	2.18
40	121.650681	5.61	406.025890	2.19
50	121.650815	6.71	406.025911	2.24
55	121.650938	7.72	406.025907	2.23

406 MHz



121.65 MHz



Compliance with 2.997 : Frequency spectrum to be investigated.

Please refer to DERA EMC test report attached.