TEST REPORT

Wireless Pacific WH09SDC9PW5R
(QKGRDX-U2)
UHF Mobile Transceiver

tested for compliance with the

Code of Federal Regulations (CFR) 47

Part 90 –Private Land Mobile Services

for

T L Parker Ltd

This Test Report is issued with the authority of:

Andrew Cutler - General Manager

Prepared By:

Karen Miller - Office Administrator

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1. CLIENT INFORMATION

Company Name	T L Parker Ltd
Address	36 Sheffield Crescent
City	Christchurch 5
Country	New Zealand
Contact	Mr Gary Parker

2. DESCRIPTION OF TEST SAMPLE

Brand Name	Wireless Pacific
Model Number	WH09SDC9PW5R
Product	UHF Mobile Transceiver
Manufacturer	T L Parker Ltd
Country of Origin	New Zealand
Serial Number	326CCL1620
FCC ID	QKGRDX-U2

This device consists of a Motorola hand held UHF transceiver module and an interface unit, which allows the device to operate as a control station or be configured for mobile relay or mobile repeater operation.

The client advises that the internal circuitry has not been modified with the only change being the removal of the transceiver module from the handheld case.

The transceiver module is now contained within a metal casing that is completely sealed except for an antenna port and an engineering port that allows the transceiver module to interface with the interface unit.

3. SUMMARY OF TEST RESULTS

As the applicant is different from the original grant applicant and as the product has been modified by being removed from the hand held case, full testing has been carried out.

Testing was carried out in accordance with the test methods defined in 47 CFR Part 2. Listed below are the relevant Part 2 test methods and the limits defined in Part 90.

An assessment was carried out of the product that determined that the following tests should be carried out.

CLAUSE	TEST PERFORMED	RESULT
2.1041	Measurement procedures	Noted
2.1046	RF power output	Noted
90.205	Power and antenna height limits	Complies
2.1047	Modulation Characteristics	Noted
2.1047(a)	Low pass filter response	Complies
2.1047(b)	Modulation limiting characteristics	Complies
90.211(a)	Modulation characteristics	Complies
2.1049	Occupied bandwidth	Noted
2.202	Bandwidths	Noted
90.207	Types of emissions	Complies
90.209	Bandwidth limitations	Complies
90.210	Emission masks	Complies
2.1051	Spurious emissions at antenna terminals	Complies
2.1053	Field strength of spurious radiation	Complies
2.1055	Frequency stability	Noted
90.213	Frequency stability	Complies
90.214	Transient frequency behaviour	Complies
2.1057	Frequency spectrum to be investigated	Noted
15.111	Antenna conducted power measurement	Complies
1.1310	Radio frequency radiation exposure limits	Complies

4. TEST SAMPLE DESCRIPTION

The sample tested is a mobile transceiver with the following specifications:

Rated Transmitter Output Power

4.0 Watts (36.0 dBm)

Transmit frequency

Tests were carried on the following frequencies and emission types:

Chl	Frequency	Channel Spacing	Necessary Bandwidth	Emission Designator
1	450.0 MHz	25.0 kHz	16.0 kHz	F3E
2	450.0 MHz	12.5 kHz	11.0 kHz	F3E
3	481.0 MHz	25.0 kHz	16.0 kHz	F3E *
4	481.0 MHz	12.5 kHz	11.0 kHz	F3E +
5	512.0 MHz	25.0 kHz	16.0 kHz	F3E
6	512.0 MHz	12.5 kHz	11.0 kHz	F3E
7	512.0 MHz	25.0 kHz	20.0 kHz	F1E
8	512.0 MHz	12.5 kHz	8.0 kHz	F1E

* tested with Digital PL code 23 (low speed data)
+ tested with PTT id in MDC1200 (data at 300 baud/s)

Transmitter frequency range

450 – 520 MHz

FCC Bands

Part 90: 421 – 512 MHz

Power Supply

External 7.5 Vdc supply.

5. TEST CONDITIONS

Standard Temperature and Humidity

Temperature: +25°C ± 4° maintained.
Relative Humidity: 60% ± 10% observed.

Standard Test Power Source

Standard Test Voltage: 7.5 Vdc.

Extreme Temperature

High Temperature: + 50°C maintained.
Low Temperature: - 30 °C maintained.

Extreme Test Voltages

High Voltage: 8.6 Vdc
Low Voltage: 6.4 Vdc

6. ATTESTATION

The **Wireless Pacific WH09SDC9PW5R (QKGRDX-U2) UHF Mobile Transceiver** complies with the Code of Federal Regulations (CFR) 47 Part 90 – Private Land Mobile Services.

This report describes the tests and measurements performed for the purpose of determining compliance with the specification with the following conditions:

The client selected the test sample.

The report relates only to the sample tested.

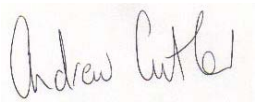
This report does not contain corrections or erasures.

Measurement uncertainties with statistical confidence intervals of 95% are shown below test results. Both Class A and Class B uncertainties have been accounted for, as well as influence uncertainties where appropriate.

In addition this equipment has been tested in accordance with the requirements contained in the appropriate Commission regulations.

To the best of my knowledge, these tests were performed using measurement procedures that are consistent with industry or Commission standards and demonstrate that the equipment complies with the appropriate standards.

I further certify that the necessary measurements were made by EMC Technologies NZ Ltd, 47 MacKelvie Street, Grey Lynn, Auckland, New Zealand.



Andrew Cutler
General Manager
EMC Technologies NZ Ltd

7. TEST RESULTS

RF power output

Measurements were carried out at the RF output terminals of the transmitter using a 30 dB power attenuator and a 50 Ω dummy load.

Measurements were carried out when the transmitter was not being modulated.

Measurements were made with the input voltage set to 7.5 Vdc.

RF power output (dBm)			
Frequency	**Channel Spacing**	**Rated**	**Measured**
450.000	25 kHz	36.0	36.2
481.000	25 kHz	36.0	36.1
512.000	25 kHz	36.0	36.0

Testing was carried out at maximum power output.

The output power of the transmitter is continuously variable from the value listed above (4 watts) to 20% – 25% of the value listed (0.8 watts – 1.0 watts).

Limits:
Clause 90.205(g) of Part 90 specifies that in the band 450 – 470 MHz the maximum allowable station effective radiated power (ERP) is dependent upon the station's antenna HAAT and the required service area.

Result: Complies

Measurement Uncertainty: *±0.5 dB*

Modulation Characteristics

This transmitter is capable of producing analogue speech and digital speech modulations.

The following graphs are attached:

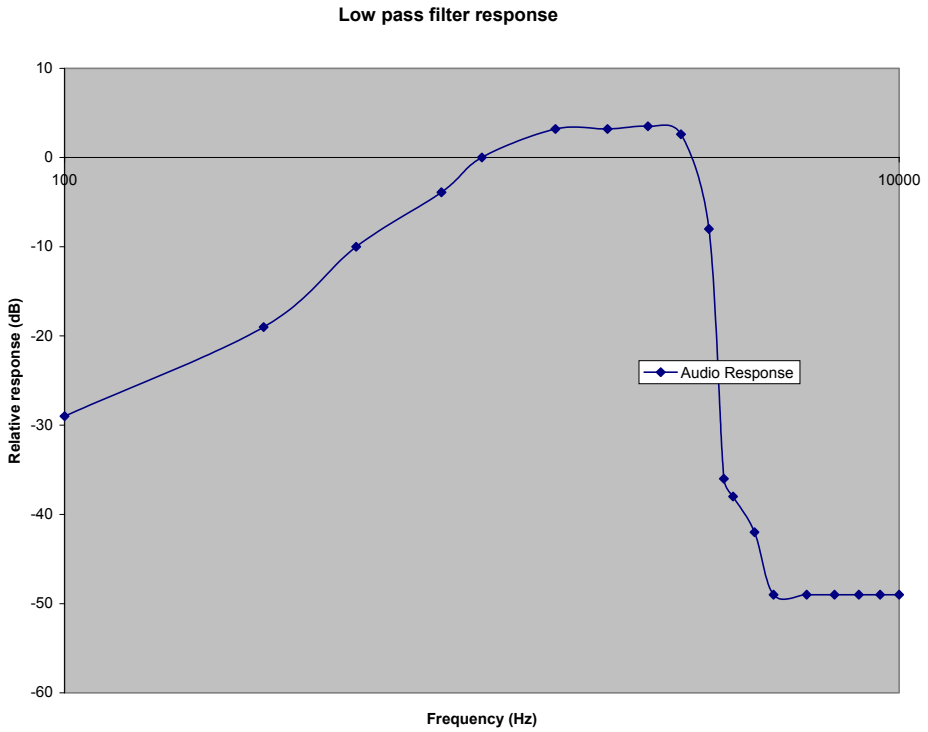
Analogue Speech

(a) Frequency response of the audio frequency low pass filter between 100 Hz and 5000 Hz.

This measurement was carried out using an audio signal generator and an audio modulation analyser.

At 1 kHz an audio signal was applied which was used as a 0 dB response reference.

The frequency of the input signal was then varied and the output response noted. This measurement was carried out from 100 Hz to 5000 Hz as required by Part 2.



Digital Modulation

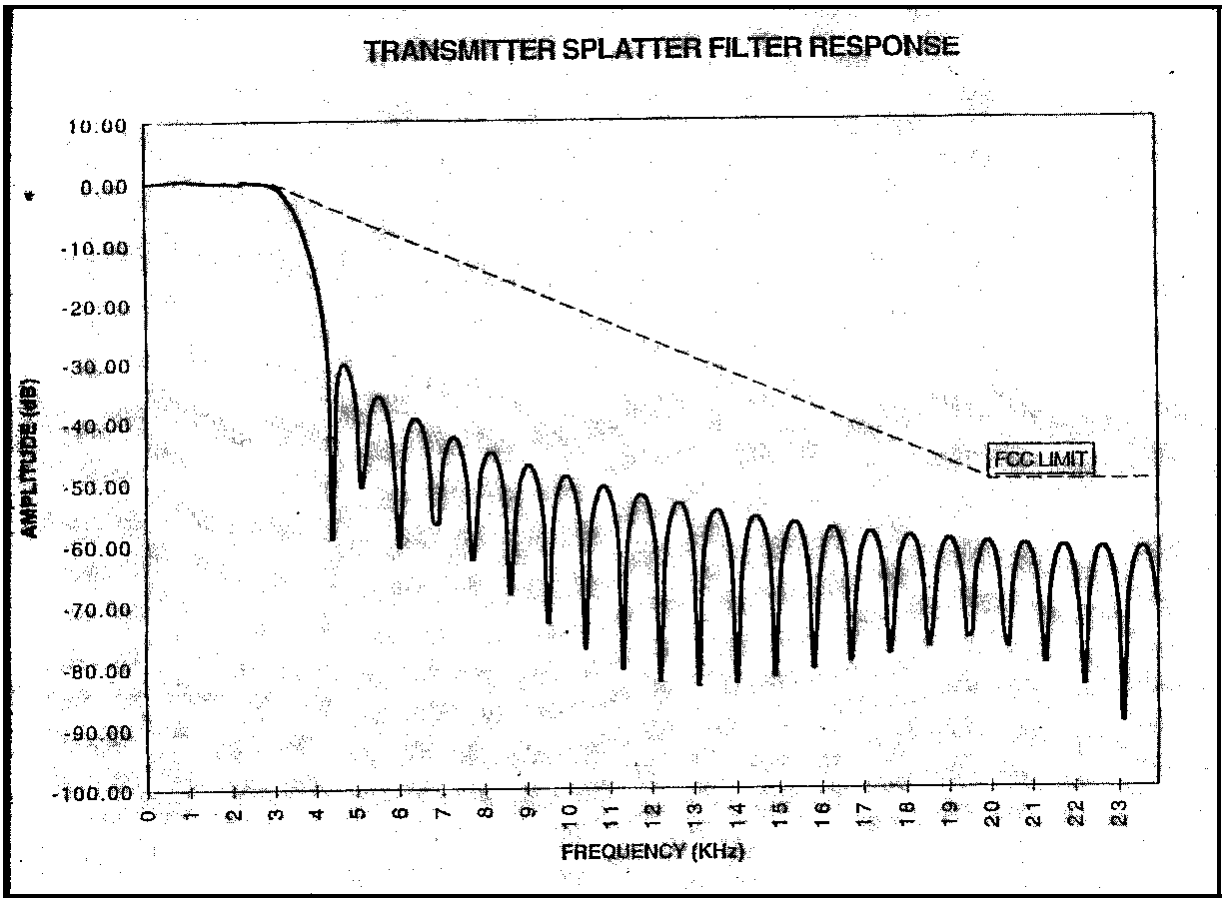
ASTRO modulation is a digital form of analogue frequency modulation.

All audio filtering is done by the digital signal processor.

Unlike analogue modulation, it is not possible at a radio level to measure the response of the post limiter low pass filter circuit as the filter output is a series of 1's and 0's.

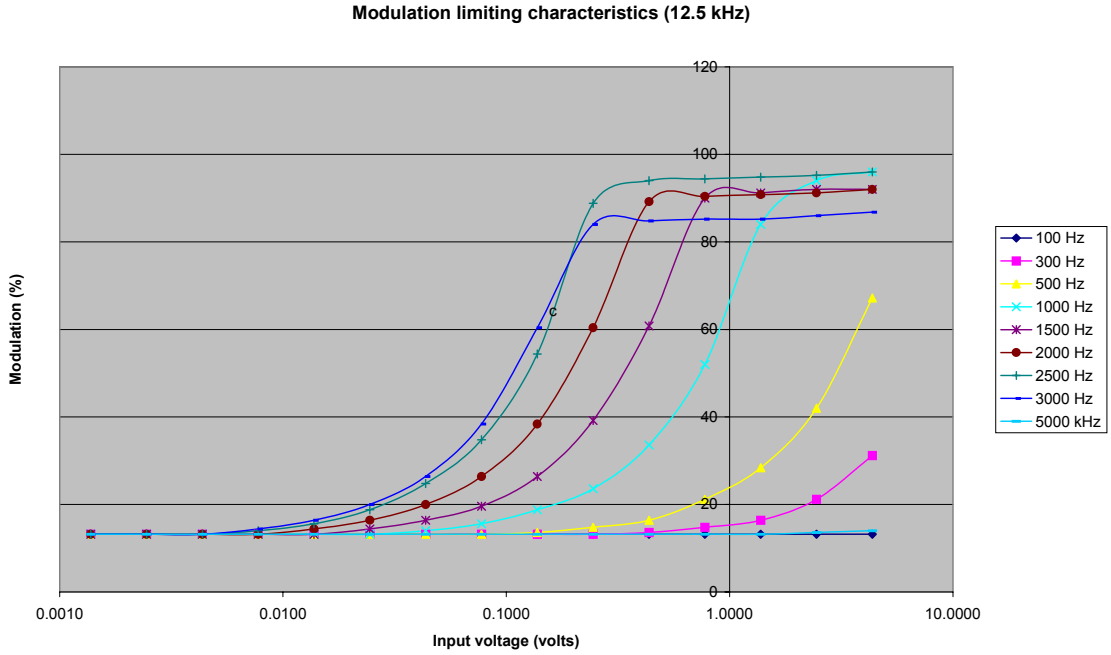
The post limiter filter is actually a splatter filter the response of which is shown below.

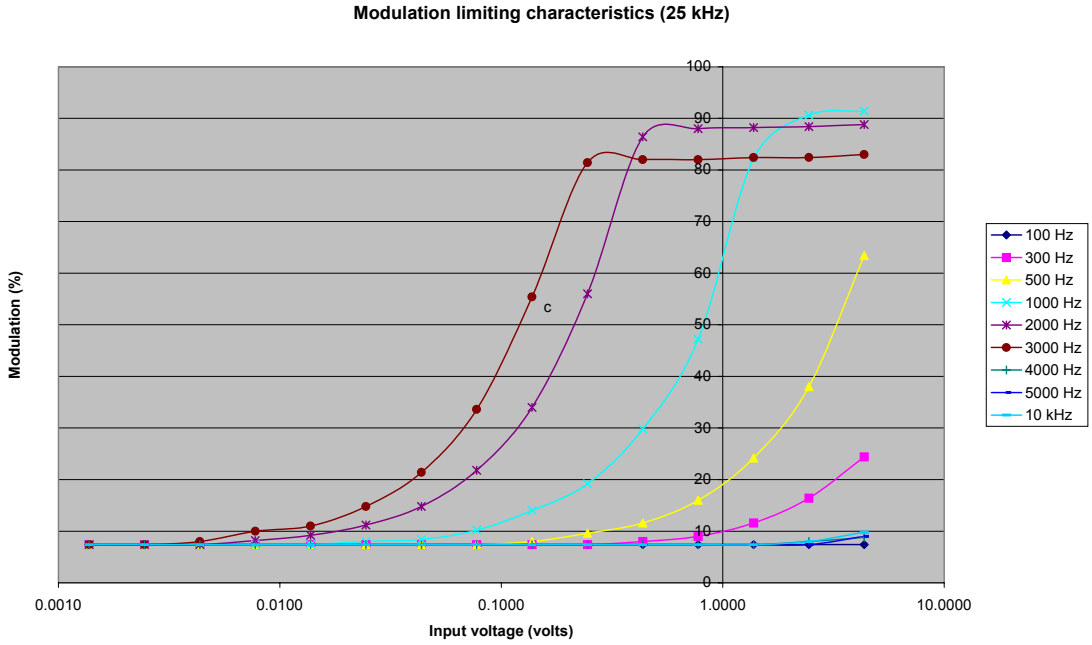
The client has supplied this filter response.



(b) A family of curves showing the percentage of modulation versus the modulation input voltage.

Analogue Modulation





Measurements were made between 100 Hz to 5 kHz and 10 kHz where channel spacings of 12.5 and 25 kHz are utilised.

At each frequency the input voltage was slowly increased with the resulting frequency deviation of the transmitter being recorded.

This deviation was then converted to a modulation percentage where 5 kHz deviation is 100% for 25 kHz channels and 2.5 kHz deviation is 100% for 12.5 kHz channels.

Digital Modulation

ASTRO systems use a digital form of analogue frequency modulation. Once the voice modulation has been processed to form a 9.6 Kbps binary data stream, the modulator uses the bites to shift the frequency of a RF carrier between discrete values. This process is called compatible 4-level FM (C4FM) that allows a large amount of information to be placed on a RF carrier without needing a wide bandwidth.

ASTRO systems use C4FM where the RF carrier is shifted between 4 frequencies.

This allows an ASTRO system to send 2 bits of information by doing only one thing, shifting the carrier frequency, and hence sending twice as much information in a given amount of time.

ASTRO systems use the following scheme:

- Bits 01 Shift to centre frequency + 1.8 kHz
- Bits 00 Shift to centre frequency + 0.6 kHz
- Bits 10 Shift to centre frequency – 0.6 kHz
- Bits 11 Shift to centre frequency – 1.8 kHz

Limit:
Part 90.211 – Modulation requirements states the transmitter must meet the emission requirements of 90.210. Refer to the Occupied Bandwidth measurements in this report.

Result: Complies

Measurement Uncertainty: ±1%.

Occupied Bandwidth

The spectrum masks are defined in:

Section 90.210(b) – Mask B has been applied as the transmitter can operate in the band 421 – 512 MHz using an authorised bandwidth of 16 kHz as per Section 90.209(b)(5).

Section 90.210(d) – Mask D has been applied as the transmitter can operate in the band 421 – 512 MHz using an authorised bandwidth of 11.25 kHz as per Section 90.209(b)(5).

The reference level the following emission mask measurements has been determined using a resolution bandwidth of 30 kHz with the transmitter not being modulated.

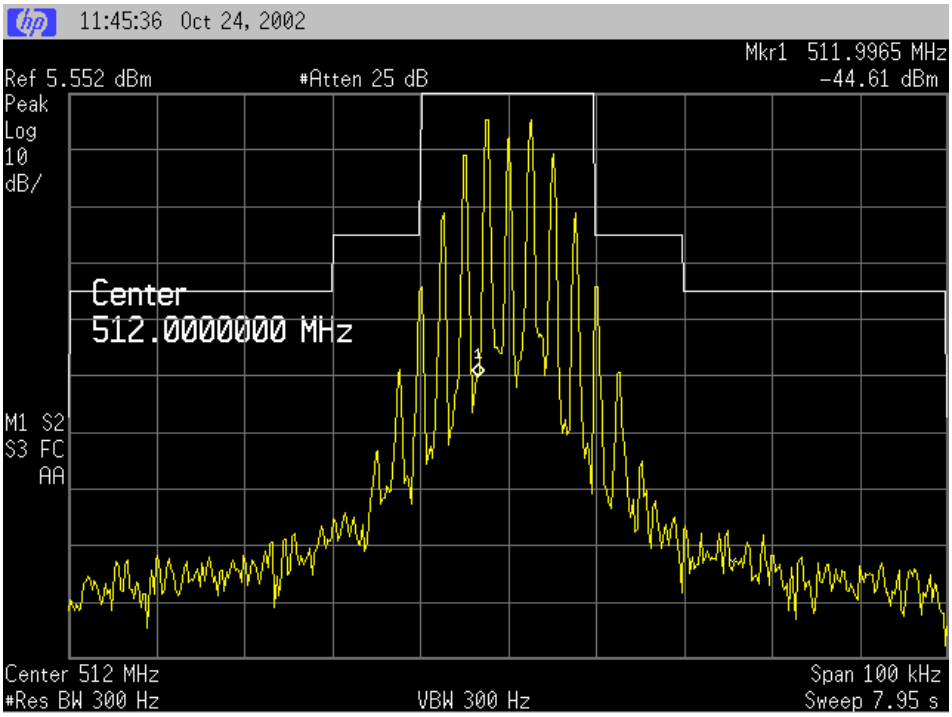
Frequency modulation measurements were carried out with a 2500 Hz modulating frequency applied at a level 16 dB higher than the level required to achieve 50% modulation (1.25 or 2.5 kHz deviation) at the frequency of maximum response.

Additional measurements have been made when the following signalling information has been sent when using standard frequency modulation was applied as described in the previous paragraph:

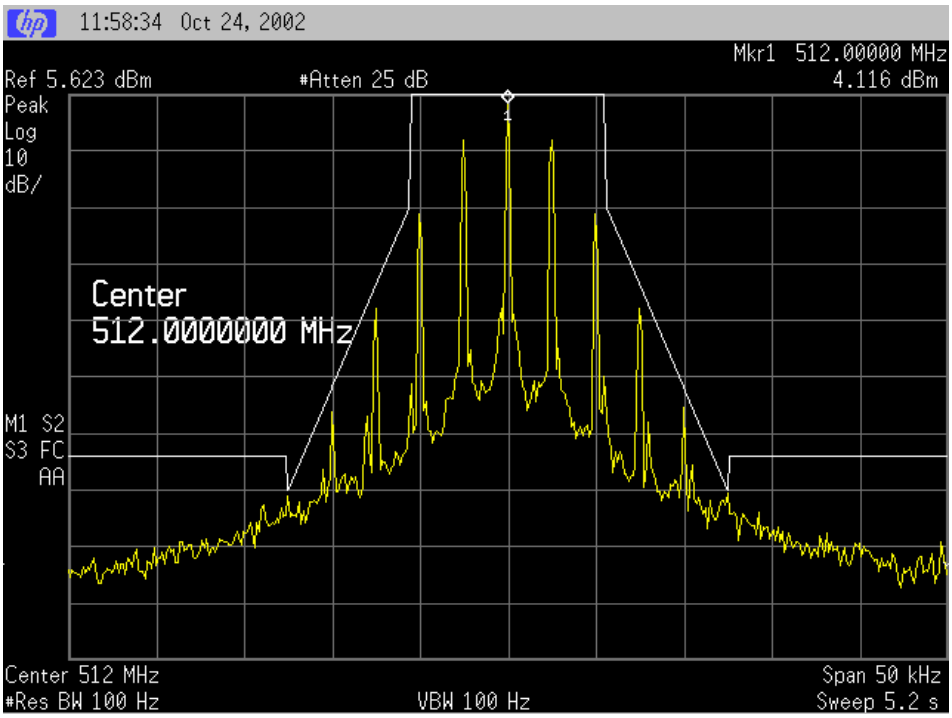
- low speed data with Digital PL (DPL) code 23. This is a Motorola expression for CTCSS and is a low speed FFSK data stream using the audio frequency band below 300 Hz.

- data at 300 baud/s with PTT id in MDC1200. This is a Motorola proprietary protocol using a 1200 baud FFSK data stream for signally and selective calling purposes.

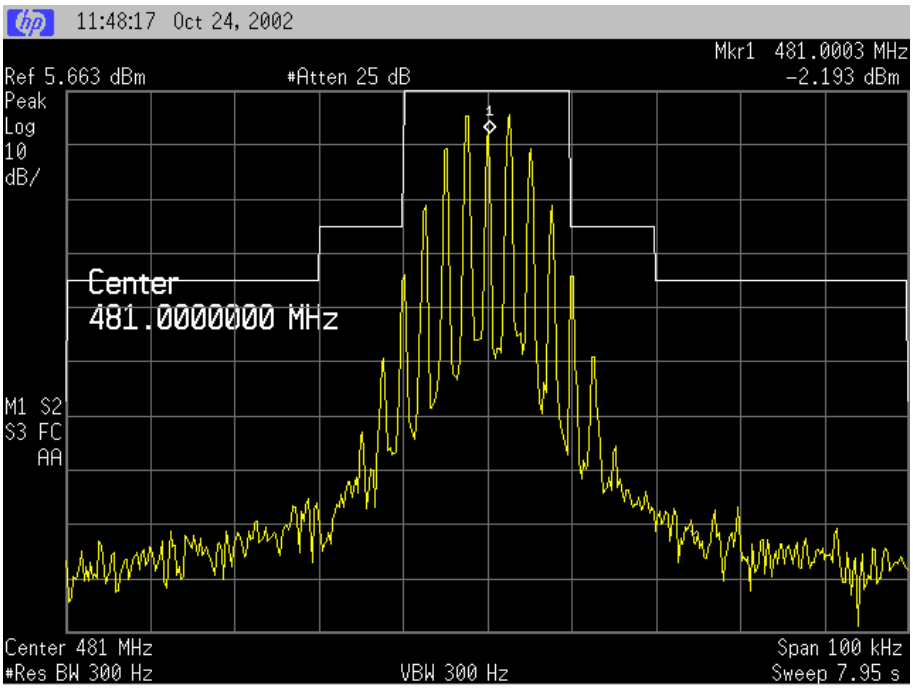
Mask B - Frequency modulation with 25 kHz channel spacing



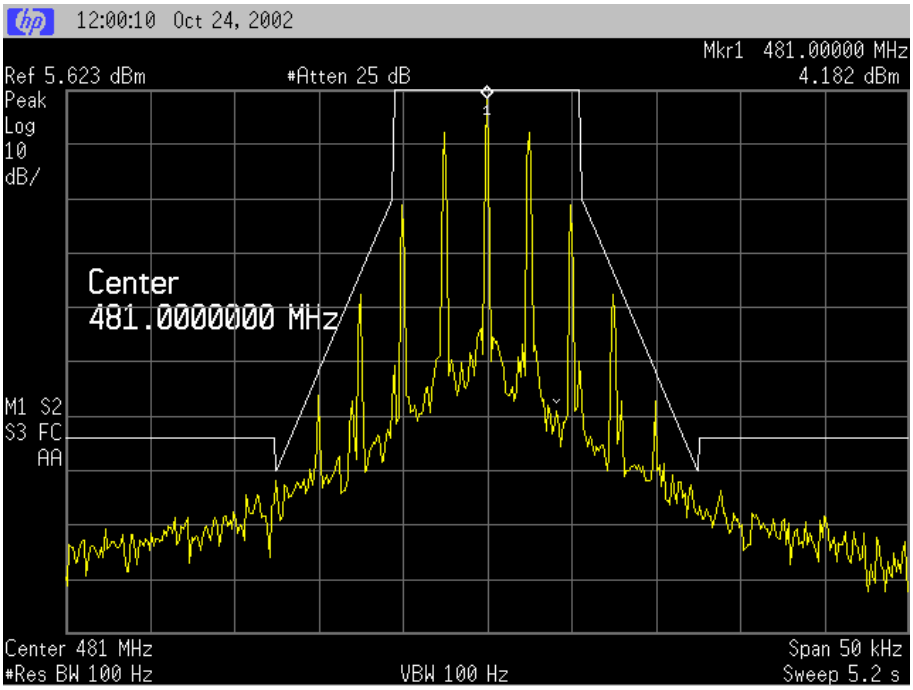
Mask D - Frequency modulation with 12.5 kHz channel spacing



Mask B - Frequency modulation with 25 kHz channel spacing-low speed data with digital PL code 23



Mask D - Frequency modulation with 12.5 kHz channel spacing-data at 300 baud/s with PTT id in MDC 1200



ASTRO / APCO25 digital modulation measurements were carried out with a 2500 Hz modulating frequency applied at a level 16 dB higher than the level required to achieve 50% modulation when making frequency modulation measurements.

The reference level following the emission mask measurements has been determined using a resolution bandwidth of 30 kHz with the transmitter not being modulated.

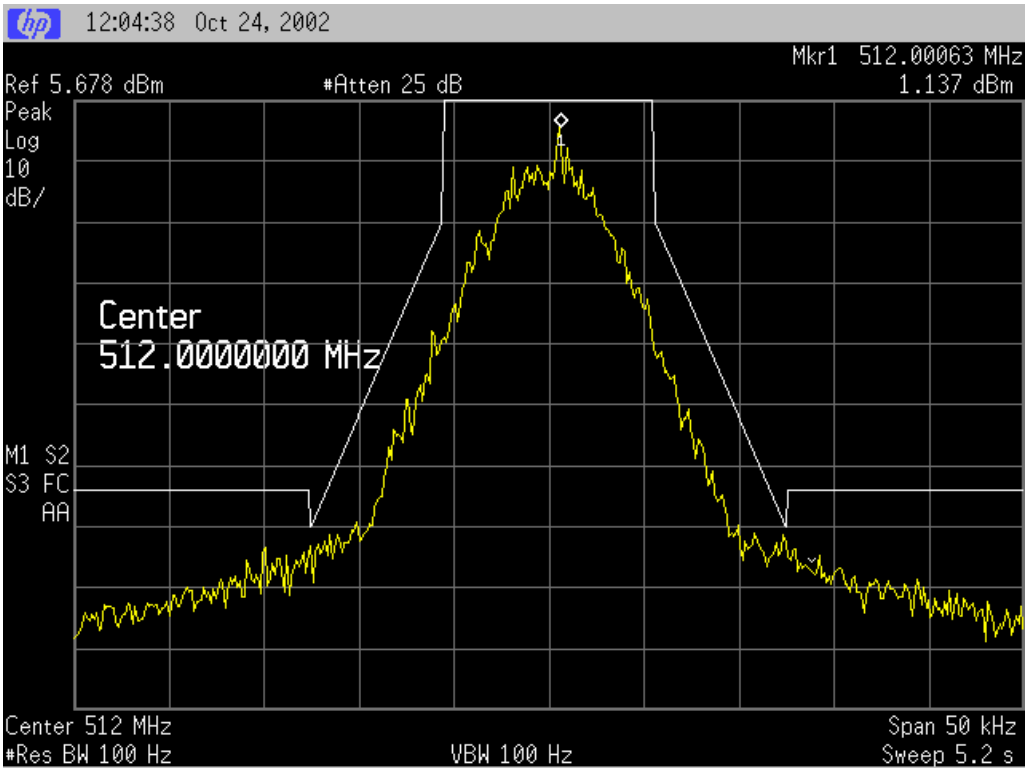
Measurements were made in peak hold mode.

It was observed that a variation in modulation frequency and or level appeared to make no difference to the output emission spectra.

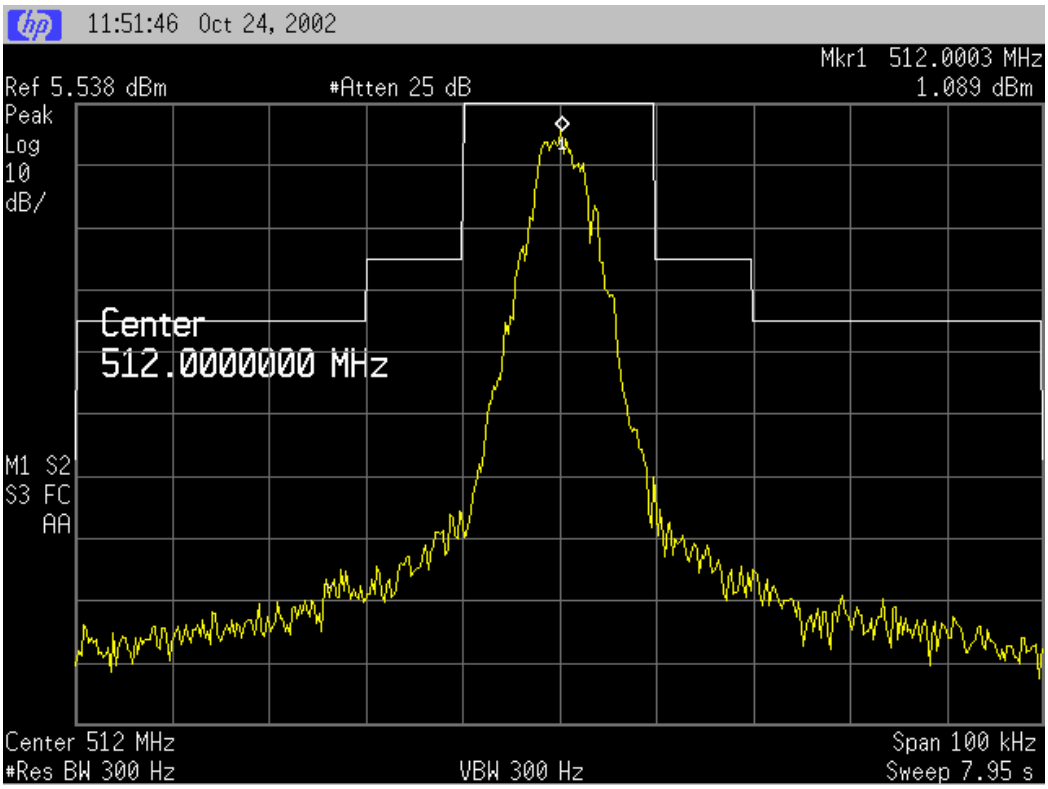
It can also be seen that there is no difference in the emission spectra of the 25 kHz and the 12.5 kHz channel step ASTRO / APCO25 Digital Signals.

This is because ASTRO signals only require a channel spacing of 12.5 kHz to operate.

Mask D – ASTRO / APCO25 Digital Modulation with 12.5 kHz channel spacing



Mask B – ASTRO / APCO25 Digital Modulation with 25 kHz channel spacing



Part 90.207 – Emission types:

The following emission types are used:

- F3E: Frequency modulation with analogue speech
- F1E: Frequency modulation with digital speech (ASTRO/APCO25)

Part 90.209 – Bandwidth limitations:

The necessary authorised bandwidth is taken to be the necessary bandwidth.

Using the formulas contained in Part 2.202 the necessary bandwidth calculation for the 25 kHz channel step emission is:

$B_n = 2 \times D + 2 \times M$
Where D = maximum deviation: 5.0 kHz
Where M = maximum modulation frequency: 3 kHz
$B_n =$ 16 kHz

This is confirmed in the emission designation, 16k0F3E, declared by the client.

Using the formulas contained in Part 2.202 the necessary bandwidth calculation for the 12.5 kHz channel step emission is:

$B_n = 2 \times D + 2 \times M$
Where D = maximum deviation: 2.5 kHz
Where M = maximum modulation frequency: 3 kHz
$B_n =$ 11 kHz

This is confirmed in the emission designation, 11k0F3E, declared by the client.

Using the tables in Part 2.202 – a bandwidth for the F1E emissions could not be determined easily.

Measurements of the authorised / occupied bandwidth at the 99% power level have been carried out.

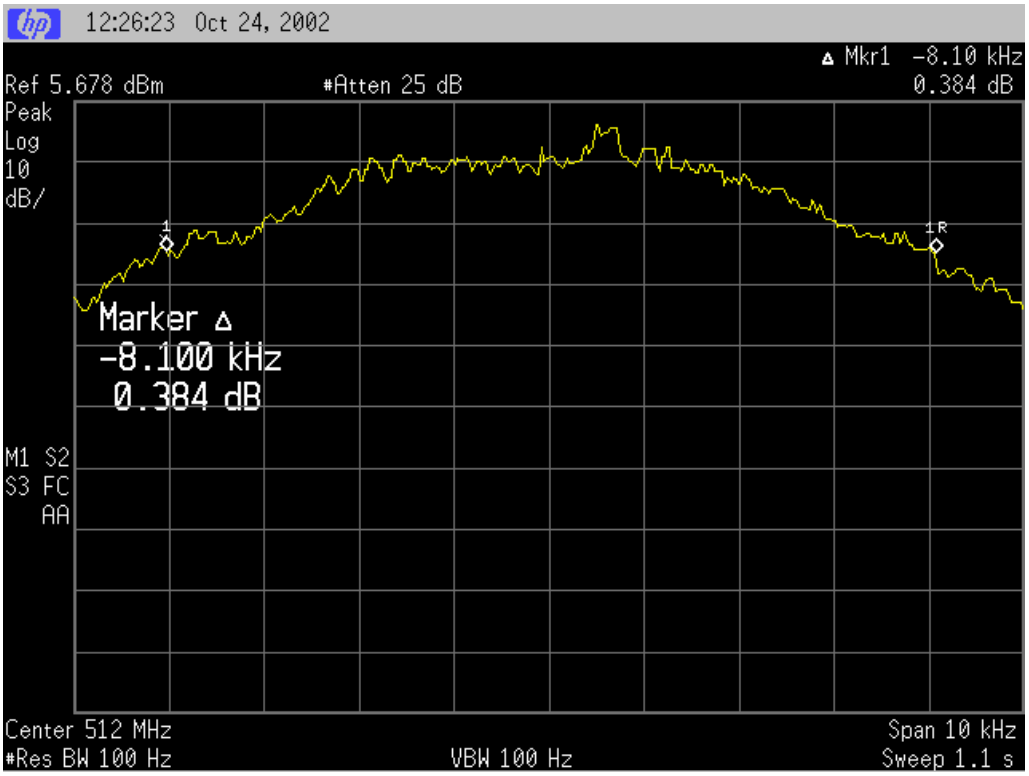
This was carried out at the –23 dB points with the spectrum analyser in peak hold mode.

Plots of these measurements are attached.

A bandwidth of 8.1 kHz has been recorded.

This is confirmed in the emission designation, 8k10F1E, as declared by the client.

Authorised / Occupied bandwidth for ASTRO / APCO25 Digital Modulation



Result: Complies

Transmitter spurious emissions at antenna terminals

Frequency: 481.000 MHz

Measured Spurious Emission		
Spurious emission (MHz)	**Emission level (dBm)**	**Limit (dBm)**
962.000	-57.7	-20.0
1443.000	-51.3	-20.0
1924.000	-64.0	-20.0
2405.000	Less than-70.0	-20.0
2886.000	-68.3	-20.0
3367.000	Less than-70.0	-20.0
3848.000	Less than-70.0	-20.0
4329.000	Less than-70.0	-20.0
4810.000	Less than-70.0	-20.0

Limit:
Part 90.210(b) Mask D, (3) on any frequency removed from the centre of the authorised bandwidth by a displacement frequency of more than 12.5 kHz shall be attenuated by at least 50 + 10 log (P) or 70 dB whichever is the lesser attenuation.

The spurious emission limit defined by Mask D has been applied as this transmitter can operate using channel spacings of 12.5 kHz.

Part 2.1051 states that emissions greater than 20 dB below the limit need not be specified.

Part 2.1057 states that the spectrum should be investigated up to the 10^{th} harmonic if the transmitter operates below 10 GHz.

The rated power of 4 watts gives a limit of –20 dBm.

Emissions less that –40 dBm have been reported for completeness.

No measurements were made above the 10^{th} harmonic.

Result: Complies

Measurement Uncertainty: *±3.3 dB*

Receiver Spurious emissions at antenna terminals

Receive frequency: 481.0 MHz

Intermediate frequency: 73.35 MHz

Measured Spurious Emission		
Spurious emission (MHz)	**Emission level (dBm)**	**Limit (dBm)**
407.650	-81.4	-57.0
815.300	-76.1	-57.0
1630.600	-92.0	-57.0

All other emissions observed less than –100.0 dBm.

Limit:
In accordance with CFR 47 Part 15, section 15.111 the power of any emission at the antenna terminal should not exceed 2 nW.

This gives a limit of –57.0 dBm.

Result: Complies

***Measurement Uncertainty*:** *±3.3 dB*

Field strength of transmitter spurious emissions at antenna terminals

Frequency: 450.000 MHz

Transmit frequency (MHz)	Level (dBuV/m)	Power (dBm)	Limit (dBm)	Margin (dB)	Polarity
900.0	30.3	-56.9	-20.0	36.9	Horizontal
900.0	29.0	-66.2	-20.0	46.2	Vertical
1350.0	36.0	-59.2	-20.0	39.2	Horizontal
1350.0	33.3	-21.6	-20.0	1.6	Vertical
1800.0	32.0	-63.2	-20.0	43.2	Horizontal
1800.0	37.3	-57.9	-20.0	37.9	Vertical
2250.0	37.1	-58.1	-20.0	38.1	Horizontal
2250.0	43.0	-52.2	-20.0	32.2	Vertical
2700.0	-	-	-20.0	-	Horizontal
2700.0	-	-	-20.0	-	Vertical
3150.0	-	-	-20.0	-	Horizontal
3150.0	-	-	-20.0	-	Vertical
3600.0	-	-	-20.0	-	Horizontal
3600.0	-	-	-20.0	-	Vertical
4050.0	-	-	-20.0	-	Horizontal
4050.0	-	-	-20.0	-	Vertical
4500.0	-	-	-20.0	-	Horizontal
4500.0	-	-	-20.0	-	Vertical

Device was tested on an open area test site at a distance of 3 metres.

Testing was carried out at EMC Technologies NZ Ltd Open Area Test Site, which is located at Driving Creek, Orere Point, Auckland. Details of this site have been filed with the Commission, Registration Number: 90838, which was last updated on March 20th, 2002.

The transmitter was tested while transmitting continuously while attached to a dummy load.

The power level of each emission was determined by replacing the transmitter with a dipole antenna that was connected to a signal generator. The signal generator output level was increased until the same field strength level was observed at each emission frequency.

The level recorded is the signal generator output level in dBm less any gains / losses due to the coax cable and the dipole antenna.

Limit:
All spurious emissions are to be attenuated by at least 50 + 10 log (P).

The rated power of 4 watts gives a limit of –20 dBm.

No measurements were made above the 10th harmonic.

Result: Complies

Measurement Uncertainty: *±4.1 dB*

Field strength of receiver spurious emissions at antenna terminals

Frequency: 450.000 MHz

Intermediate frequency: 73.35 MHz

Transmit frequency (MHz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Polarity
376.650	15.0	46.0	31.0	Horizontal

Device was tested on an open area test site at a distance of 3 metres.

Testing was carried out at EMC Technologies NZ Ltd Open Area Test Site which is located at Driving Creek, Orere Point, Auckland. Details of this site have been filed with the Commission, Registration Number: 90838, which was last updated on March 20th, 2002.

The transceiver was tested operating in stand by / receive mode with a 50 Ω dummy load attached to the output.

No measurements were made above the 10th harmonic of the receiver local oscillator frequency.

Result: Complies

Measurement Uncertainty: *±4.1 dB*

Frequency Stability

Frequency stability measurements were between - 30 °C and + 50°C in 10°C increments.

At each temperature the transmitter was given a period of 30 minutes to stabilise. The transmitter was then turned on and the frequency error measured after a period of 1 minute.

Measurements were made with the supply varied between 115% and 85% of the nominal supply voltage (7.5 Vdc).

Nominal Frequency: 450.0000 MHz

Voltage / Temp.	Frequency Error (Hz) 6.4 Vdc	7.5 Vdc	8.6 Vdc
+50°C	-204.0	-170.0	-170.0
+40°C	-160.0	-125.0	-140.0
+30°C	-190.0	-145.0	-155.0
+20°C	-140.0	-125.0	-130.0
+10°C	-40.0	-20.0	-25.0
0°C	+10.0	+15.0	+23.0
-10°C	-25.0	-10.0	+10.0
-20°C	+50.0	+65.0	+65.0
-30°C	+50.0	+55.0	+70.0

Limit:
Part 90.213 states that base station transmitters operating between 421 – 512 MHz are required to have frequency tolerance of 2.5 ppm.

This transmitter operates on 450.0 MHz. 2.5 ppm = 2.5 x 450 = 1125 Hz.

Result: Complies

Measurement Uncertainty: ±30 Hz

Transient Frequency Behaviour

Transient frequency behaviour measurements are applicable to wide band and narrow band transmitters operating in the frequency band 421 – 512 MHz.

Measurements were carried out at 512 MHz using the method described in EN 300-086.

In summary this method calls for the use of an external signal generator tuned to 512 MHz with an output level 0.1 % (-30 dB) of the level from the transmitter with a 1 kHz tone with a frequency deviation of either 12.5 or 25.0 kHz being applied to the input of a modulation analyser along with the output from the transmitter.

The modulation analyser produces an amplitude difference signal and a frequency difference signal, which are applied to the input of a storage oscilloscope.

The unmodulated transmitter is then keyed which produces a trigger pulse and a picture on the oscilloscope.

The result of the change in the ration of power between the test signal from the signal generator and the transmitter output will produce 2 separate sides on the oscilloscope picture. One will show the 1000 Hz test modulation and the other will be the frequency difference of the transmitter versus time.

12.5 kHz:

Measured Transient Deviation		
Period t_1 (ms)	period t_2 (ms)	period t_3 (ms)
10.0	25.0	10.0
Frequency Difference from the Nominal Frequency (kHz)		
- 3 kHz	nil	nil

25.0 kHz:

Measured Transient Deviation		
Period t_1 (ms)	period t_2 (ms)	period t_3 (ms)
10.0	25.0	10.0
Frequency Difference from the Nominal Frequency (kHz)		
- 6 kHz	nil	nil

Limits:
The maximum frequency difference:

Channel Spacing (kHz)	Transmitter Period t_1 (kHz)	Transmitter Period t_2 (kHz)	Transmitter Period t_3 (kHz)
12.5	± 12.5	± 6.25	± 12.5
25.0	± 25.0	± 12.5	± 25.0

Result: Complies

Measurement Uncertainty: *Frequency difference ±1.6 kHz*
Time period ±1 ms

12.5 kHz transmitter turn on

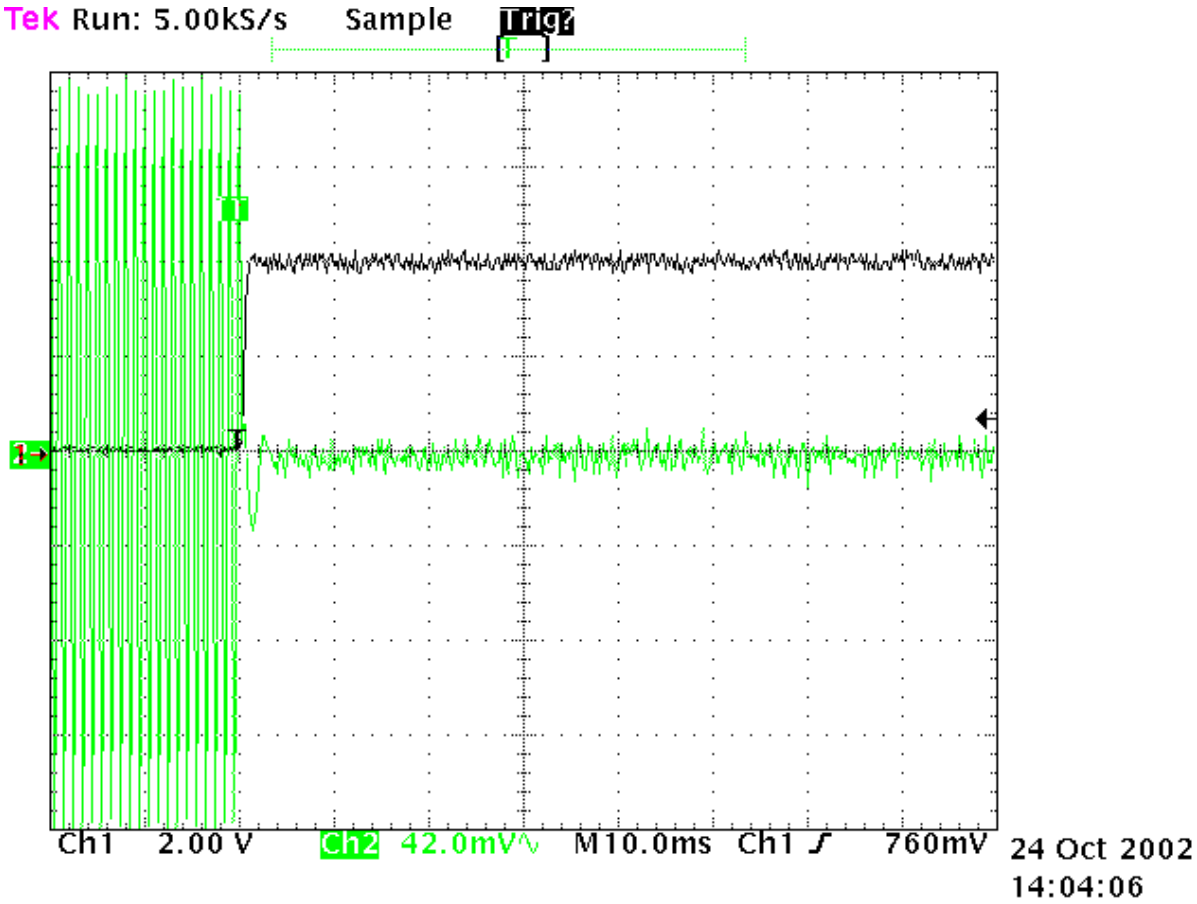
Green Trace = 1 kHz tone with FM deviation of 12.5 kHz.
Black trace = transmitter amplitude response.

Green trace has been maximised to give full screen indication of a ±12.5 kHz.
Therefore each Y axis division = 3.125 kHz per division.
The X axis has been set to a sweep rate of 10 mS/division.

Triggering has been set to occur 2 divisions from the left hand edge (20 mS).
This is position *t*on.

*t*1 occurs between 2.0 and 3.0 divisions from the left hand edge.
t2 occurs between 3.0 and 5.5 divisions from the left hand edge.

A small transient response can be observed just after *t*on.



12.5 kHz transmitter turn off

Green Trace = 1 kHz tone with FM deviation of 12.5 kHz.
Black trace = transmitter amplitude response.

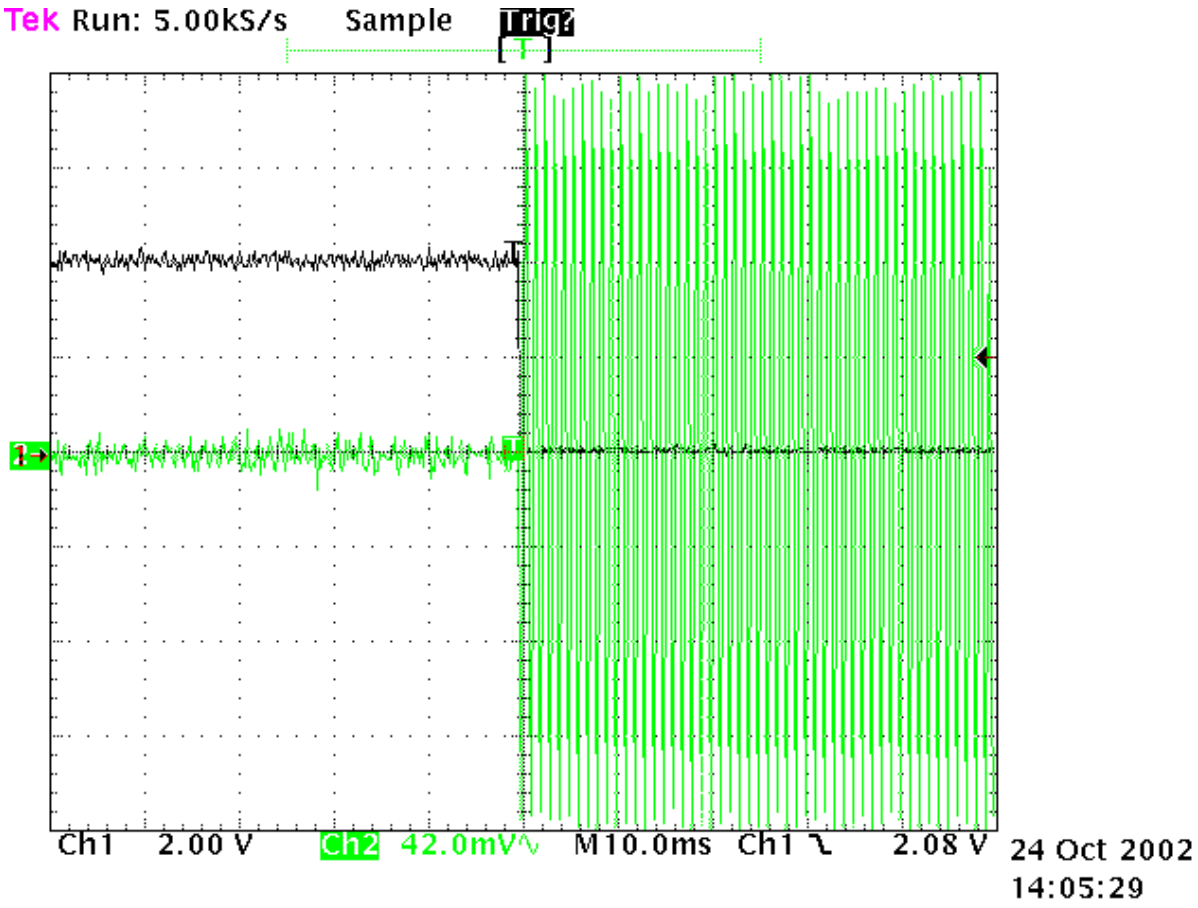
Green trace has been maximised to give full screen indication of a ± 12.5 kHz.
Therefore each Y axis division = 3.125 kHz per division.
The X axis has been set to a sweep rate of 10 mS/division.

The display of the 1 kHz signal rising has been positioned 5 divisions from the left hand edge (50 mS).

This is position *t*off.

*t*3 occurs between 4.0 and 5.0 divisions from the left hand edge.

No transient responses can be observed before toff.



25 kHz transmitter turn on

Green Trace = 1 kHz tone with FM deviation of 25 kHz.
Black trace = transmitter amplitude response.

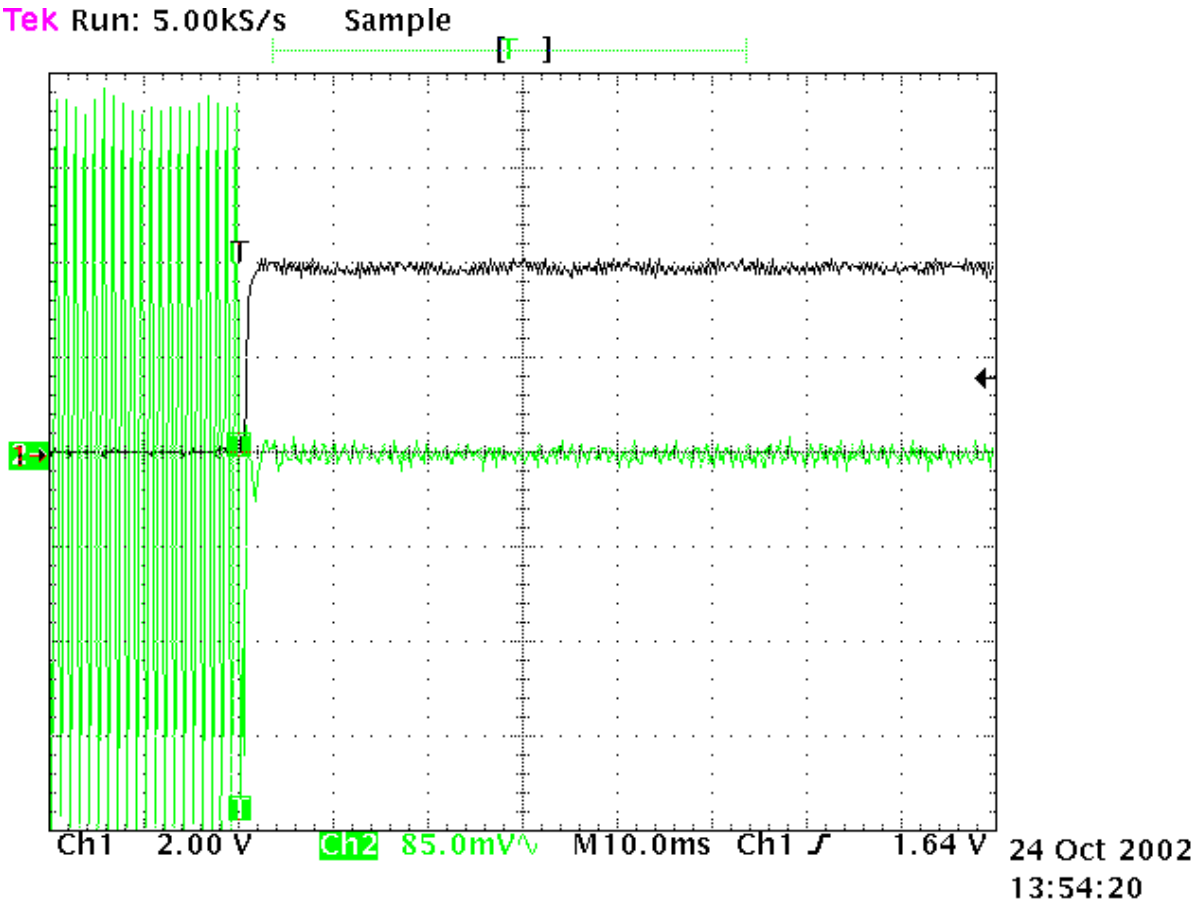
Green trace has been maximised to give full screen indication of a ± 25 kHz.
Therefore each Y axis division = 6.25 kHz per division.
The X axis has been set to a sweep rate of 10 mS/division.

Triggering has been set to occur 3 divisions from the left hand edge (30 mS).

*t*on occurs 2 divisions from the left of the display (20 mS).

*t*1 occurs between 2 and 3 divisions from the left hand edge.
t2 occurs between 3 and 5.5 divisions from the left hand edge.

A small transient response can be observed just after *t*on.



25 kHz transmitter turn off

Green Trace = 1 kHz tone with FM deviation of 25 kHz.
Black trace = transmitter amplitude response.

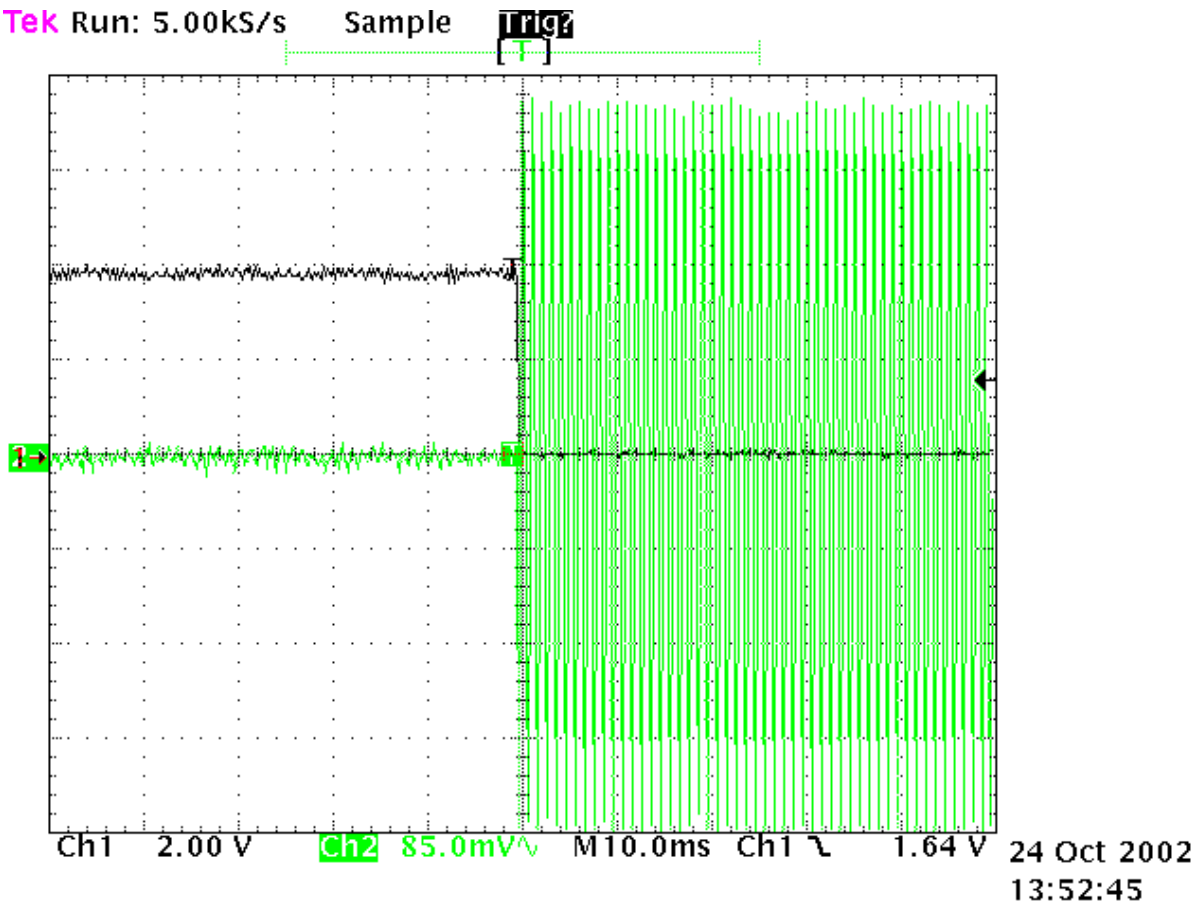
Green trace has been maximised to give full screen indication of a ± 25 kHz.
Therefore each Y axis division = 6.25 kHz per division.
The X axis has been set to a sweep rate of 10 mS/division.

The display of the 1 kHz signal rising has been positioned 5 divisions from the left hand edge (50 mS).

This is position *t*off.

*t*3 occurs between 4.5 and 5.0 divisions from the left hand edge.

No transient response can be observed before *t*off.



Radio Frequency Hazard Information

As per Section 1.1310 mobile transmitters are required to be operated in a manner that ensures that the public is not exposed to RF energy levels in accordance with OST/OET Bulletin Number 65.

In accordance with this section and also Section 2.1091, this device has been classified as a mobile device whereby a distance of 20 cm can normally be maintained between the user and the device.

In accordance with Section 1.1310 the Maximum Permissible Exposure (MPE) limit for the Occupational / Controlled Exposure of 1.5 (f/300 = 450 MHz/300) has been applied.

This mobile transceiver will typically be used at emergency incidents requiring temporary extended range communications.

The maximum distance from the antenna at which the MPE is met or exceeded is calculated from the equation relating field strength in V/m, transmit power in watts, transmit antenna gain and separation distance in metres:

$E, V/m = (\sqrt{(30 * P * G)}) / d$

MPE Power density $(mW/m^2) = E^2/3770$

E for MPE: $= E^2/3770$

$E = \sqrt{1.5*3770}$

$E = 75.1$ V/m

The maximum transmitter power = 4 watts.

Typically this mobile transceiver would be used with a whip type of antenna with a gain of 1.5 in conjunction with push to talk devices that would lead to a duty cycle of 50%.

$d = \sqrt{(30 * P * G)} / E$

$= \sqrt{(30 * 4 * 1.5)} / 75.1$

= 0.178 metres or 17.8 cm

The duty cycle has not been taken into consideration. A typical duty cycle of 50% would further reduce this distance to 9.5 cm.

The above calculations therefore show that this device meets the MPE requirement for mobile devices falling below the 20 cm clearance required.

Result: Complies

8. TEST EQUIPMENT USED

Instrument	Manufacturer	Model	Serial #	Asset
Aerial Controller	EMCO	1090	9112-1062	RFS 3710
Aerial Mast	EMCO	1070-1	9203-1661	RFS 3708
Attenuator 10 dB	Hewlett Packard	HP8491A	24838	E1329
Attenuator 20 dB	Weinschel	49-20-43	GC-104	E1308
Audio Analyzer	Hewlett Packard	8903A	2216A01713	E1146
Biconical Antenna	Schwarzbeck	BBA 9106		RFS 3612
Frequency Counter	Hewlett Packard	HP 5342A	1916A01713	E1224
Level generator	Anritsu	MG443B	M61689	E1143
Log Periodic Antenna	Schwarzbeck	UHALP 9107		RFS 3702
Measurement Receiver	Rohde & Schwarz	ESCS 30	839873/1	
Modulation Analyzer	Rohde & Schwarz	FMA	837807/020	E1552
Modulation Analyzer	Hewlett Packard	8901B	2608A00782	E1090
Oscilloscope	Tektronics	745A	B010643	1569
Power Attenuator	Weinschel	49-20-43	GC104	E1308
Power Supply	Hewlett Packard	6032A	2743A-02859	E1069
RF Power Meter	Hewlett Packard	HP 436A	2512A22439	E1198
Rubidium Oscillator	Ball Efratom	FRS – C	4287	E1053
Selective Level Meter	Anritsu	ML422C	M35386	E1140
Signal Generator	Rohde & Schwarz	SMHU.58	838923/028	E1493
Spectrum Analyzer	Hewlett Packard	E7405A	US39150142	3776
Thermal chamber	Contherm	M180F	86025	E1129
Thermometer	DSIR	RT200	035	E1049
Turntable	EMCO	1080-1-2.1	9109-1578	RFS 3709
DC Power Supply	Harrison	6296A	-	E1266

9. ACCREDITATIONS

Testing was carried out in accordance with EMC Technologies NZ Ltd registration with the Federal Communications Commission as a listed facility, Registration Number: 90838, which was updated on March 20th, 2002.

All testing has been carried out in accordance with the terms of EMC Technologies (NZ) Ltd's International Accreditation New Zealand (IANZ) Accreditation to ISO/IEC 17025.

All measurement equipment has been calibrated in accordance with the terms of EMC Technologies (NZ) Ltd's International Accreditation New Zealand (IANZ) Accreditation to ISO/IEC 17025.

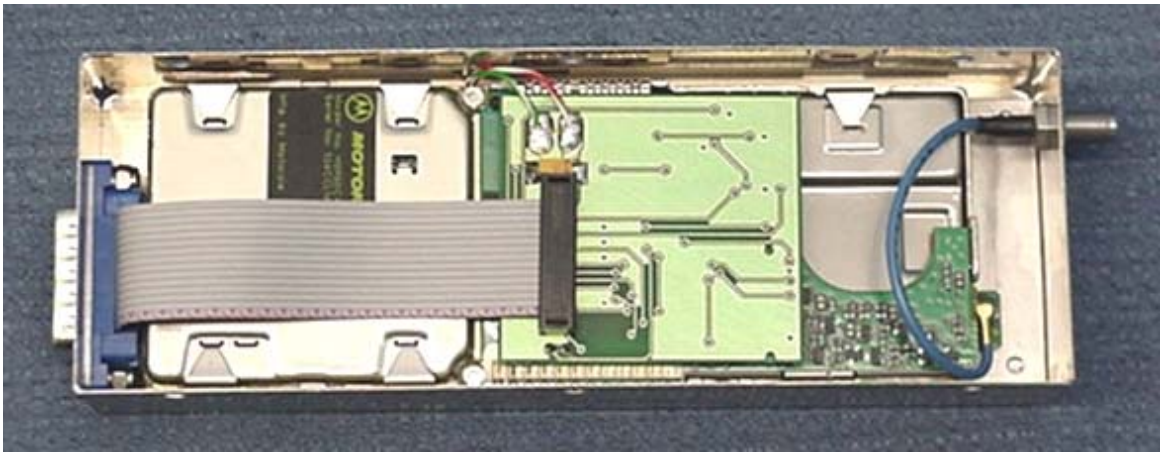
International Accreditation New Zealand has Mutual Recognition Arrangements for testing and calibration with 46 accreditation bodies in 34 economies. This includes NATA (Australia), UKAS (UK), SANAS (South Africa), NVLAP (USA), A2LA (USA), SWEDAC (Sweden). Further details can be supplied on request.

10. PHOTOGRAPH (S)

Label

Device tested

Internal view



Radiated emission test set up