EMC Technologies (NZ) Ltd

Test Report No **51205.2**
Report date: 23 January 2006

TEST REPORT

ELPRO P450H UHF Transceiver

tested to the

Code of Federal Regulations (CFR) 47

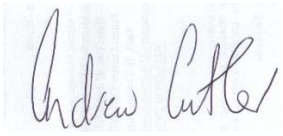
Part 90 –Private Land Mobile Services

Part 15 – Radio Frequency Device

for

ELPRO Technologies Pty Ltd

This Test Report is issued with the authority of:



Andrew Cutler - General Manager

All tests reported herein have been performed in accordance with the laboratory's scope of accreditation

EMC Technologies (NZ) Ltd

STREET ADDRESS - 47 MacKelvie Street, Grey Lynn, Auckland, New Zealand Telephone: +64 9 360 0862 Fax: +64 9 360 0861
POSTAL ADDRESS - PO Box 68 307, Newton, Auckland, New Zealand E-mail: aucklab@ihug.co.nz

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1. CLIENT INFORMATION

Company Name	ELPRO Technologies Pty Ltd
Address	9/12 Billabong Street
City	Stafford
State	Queensland 4053
Country	Australia
Contact	Mr John White

2. DESCRIPTION OF TEST SAMPLE

Brand Name	ELPRO
Model Number	P450H
Product	UHF Transceiver
Manufacturer	ELPRO Technologies Pty Ltd
Manufactured in	Australia
Serial Number	09052406, 08050038
FCC ID	Not yet determined

3. COMPLIANCE STATEMENT AND RESULT SUMMARY

The **ELPRO P450H UHF Transceiver** complies with the limits defined in 47CFR 15, 47 CFR Part 90 and 47 CFR Part 2 when tested in-accordance with the test methods described in 47 CFR Part 2.

CLAUSE	TEST PERFORMED	RESULT
2.1041	Measurement procedures	Noted
90.203	Certification required	Complies
2.1046	RF power output	Noted
90.205	Power and antenna height limits	Complies
2.1047	Modulation Characteristics	
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
2.1057	Frequency spectrum to be investigated	Noted
90.214	Transient frequency behaviour	Complies
15.111	Antenna conducted power measurement	Complies
1.1310	Radio frequency radiation exposure limits	Complies

4. TEST SAMPLE DESCRIPTION

The sample tested has the following specifications:

Rated Transmitter Output Power

5.0 Watts (37.0 dBm)

Transmitter frequency range

380 – 512 MHz

Test frequencies

Analogue speech testing has been carried out at 380 MHz and 512 MHz using 2 separate samples in order to show compliance with the FCC Part 90 band.

Data transmission tests have been made with the transmitter operating on 446 MHz only

FCC Bands

Part 90: 421 – 512 MHz

Channel Spacing

12.5 kHz

Emission Designators / Modes of operation

11k0F3E – Analogue speech
11k0F1D – Data at a rate of 9600 bps

Power Supply

External DC supply. Typically 13.8 Vdc

5. TEST CONDITIONS

Standard Temperature and Humidity

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

Standard Test Power Source

Standard Test Voltage: 13.8 Vdc.

Extreme Temperature

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

Extreme Test Voltages

High Voltage: 15.9 Vdc
Low Voltage: 11.7 Vdc

6. ATTESTATION

The **ELPRO P450H UHF Transceiver** complies with the Code of Federal Regulations (CFR) 47 Part 90 –Private Land Mobile Services and 47 Part 15 – Radio Frequency Devices.

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.

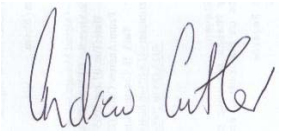
This report does not contain corrections or erasures.

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

Certification required

12.5 kHz channel bandwidth certification is sought for this transmitter under section 90.203(j)(2)(ii) as:
- certification has been sought after Feb 14th, 1997
- the equipment can operate with 12.5 kHz channel spacing
- the equipment can operate with a data rate of 9600 bps

Result: Complies.

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 when the transmitter was not being modulated at maximum power output.

Measurements were made with the input voltage set to 13.8 Vdc and when varied +/- 15% (11.7 Vdc – 15.9 Vdc).

Rated power: 5 watts (37.0 dBm)

Voltage supply			
Frequency (MHz)	**Low**	**Nominal**	**High**
380.000	36.5	36.8	36.9
512.000	36.2	36.7	36.7

Limits:
Clause 90.205(d) of Part 90 specifies that in the bands 421 – 430 MHz and 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.

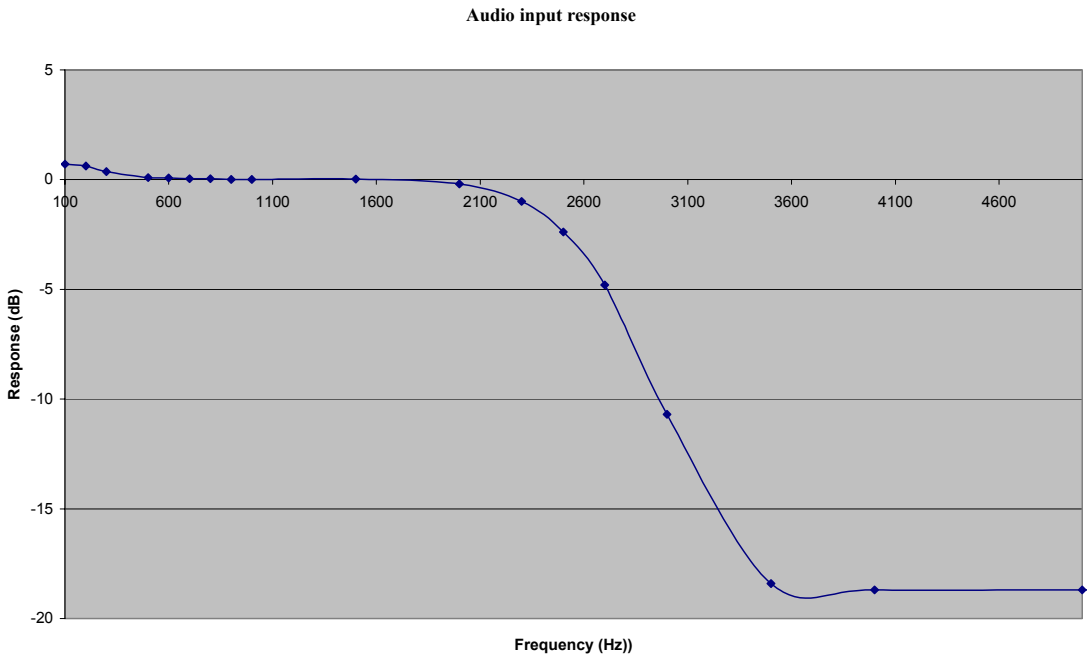
(a) Frequency response of the audio frequency low pass filter between 100 Hz and 15 kHz.

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

At 1 kHz an audio signal was applied at a level to produce 60% deviation 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 15000 Hz with the graph showing between 100 – 5000 Hz.

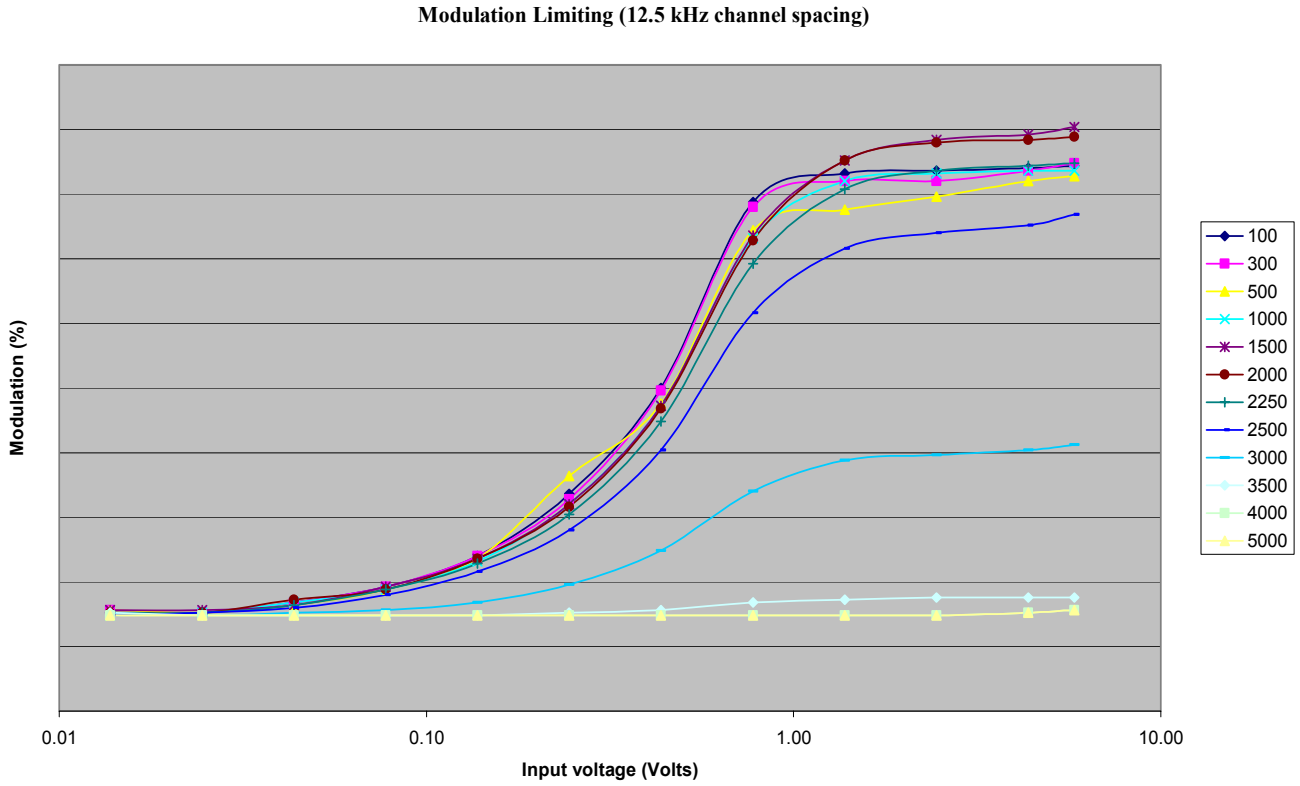


(b) A family of curves showing the percentage of modulation versus the modulation input voltage.

Measurements were made between 100 Hz to 5 kHz.

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 2.5 kHz deviation is 100% for 12.5 kHz channels.



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%.

Part 90.207 – Emission types:

The following emission types are used:

- F3E: Frequency modulation with analogue speech.
- F1D: Frequency shift keying for data transmission

Part 90.209 – Bandwidth limitations:

The authorised bandwidth is taken to be the necessary bandwidth.

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.

Result: Complies

Occupied Bandwidth

The spectrum mask is defined in:

Section 90.210 – 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 for the following emission mask measurements has been determined using a resolution bandwidth of 30 kHz with the transmitter not being modulated.

All measurements have been made with a 30 dB attenuator being placed between the transmitter and the spectrum analyser.

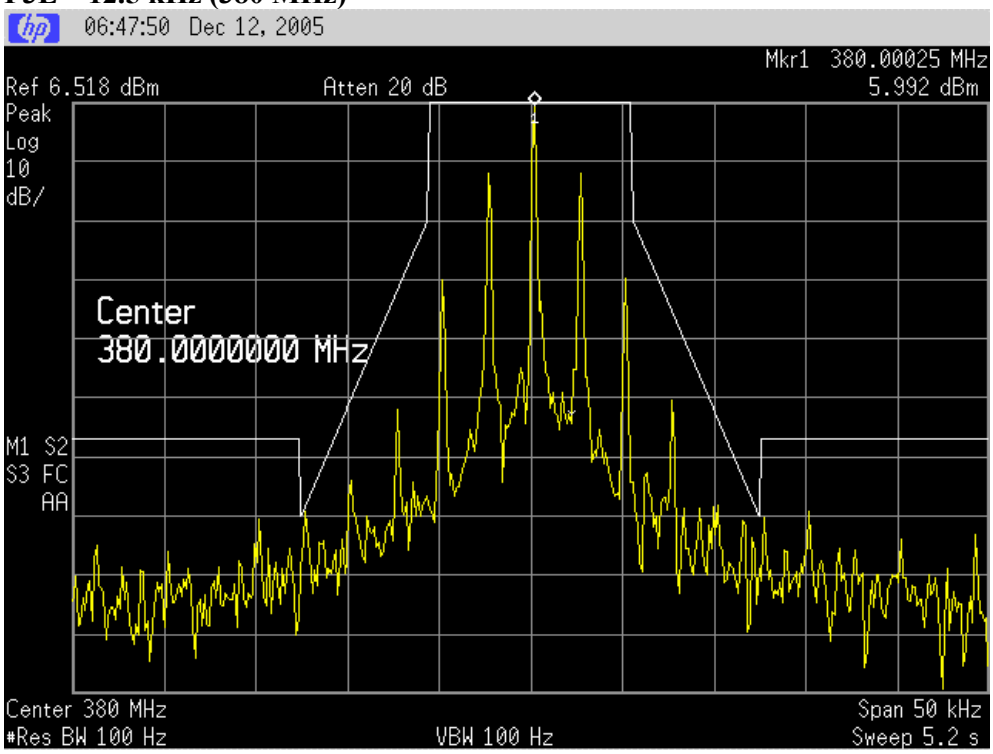
Measurements were made in peak hold with the transmitter operating on 380.000 MHz and 512.000 MHz

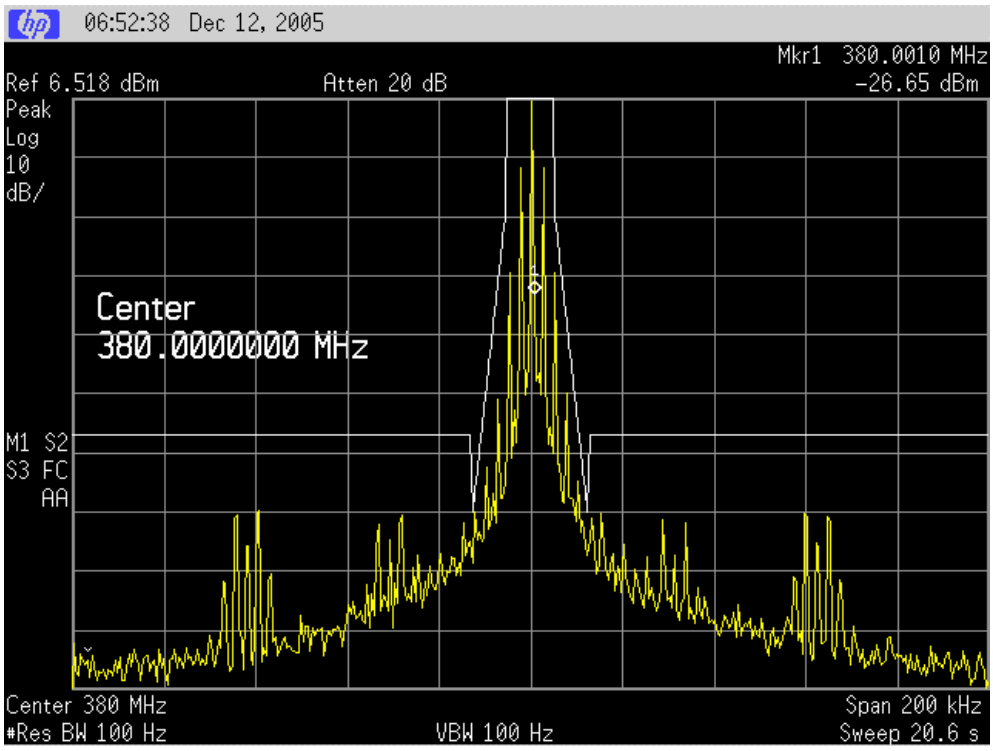
For speech transmissions a 2500 Hz tone, which was found to be the frequency of maximum response, was applied at a level 16 dB higher than that required to achieve 50% modulation.

For data modulation the transmitter was operated continuously.

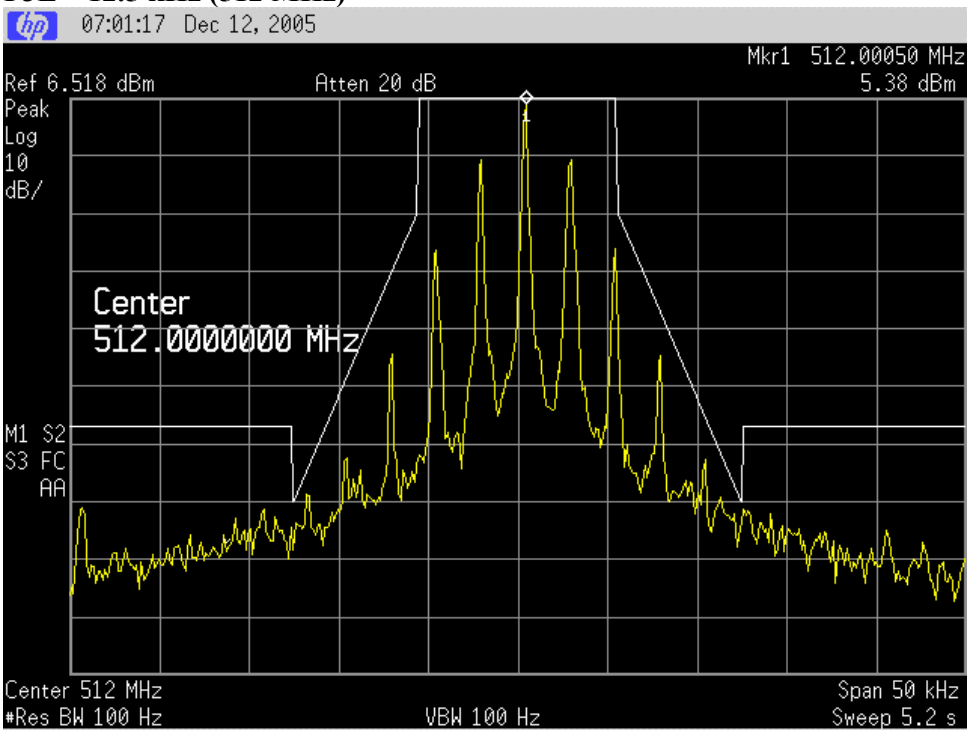
Result: Complies

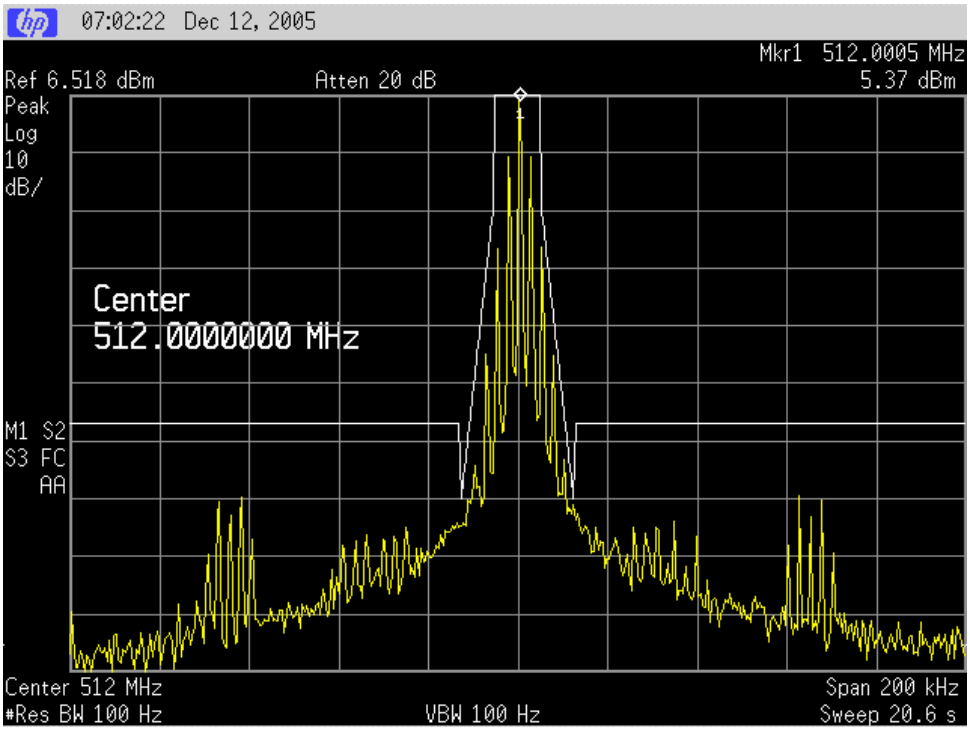
F3E – 12.5 kHz (380 MHz)



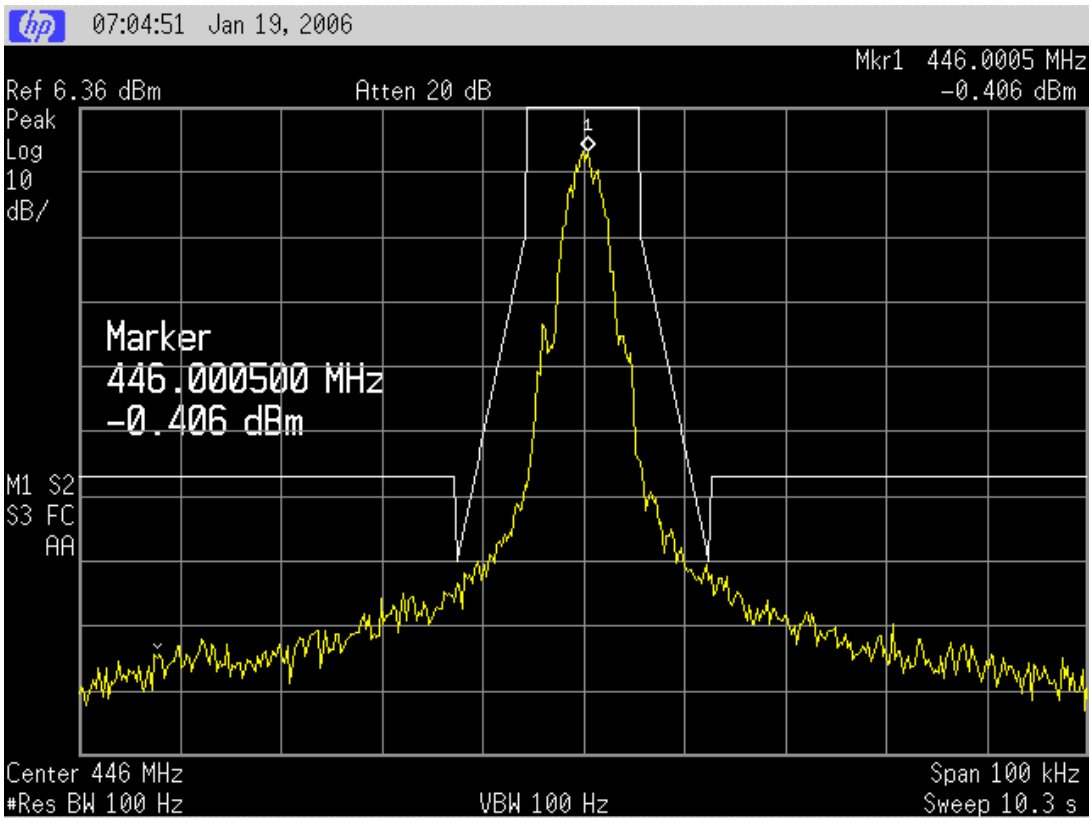


F3E – 12.5 kHz (512 MHz)





F1D – 12.5 kHz data (446 MHz)



Transmitter spurious emissions at the antenna terminals

Frequency: 380.000 MHz

Spurious emission (MHz)	Emission level (dBm)	Limit (dBm)
760.000	-38.0	-20.0
1140.000	-37.2	-20.0
1520.000	-46.3	-20.0
1900.000	Less than -60dBm	-20.0
2280.000	Less than -60dBm	-20.0
2660.000	Less than -60dBm	-20.0
3040.000	Less than -60dBm	-20.0
3420.000	Less than -60dBm	-20.0
3800.000	Less than -60dBm	-20.0

Frequency: 512.000 MHz

Spurious emission (MHz)	Emission level (dBm)	Limit (dBm)
1024.000	-37.5	-20.0
1536.000	-54.5	-20.0
2048.000	-59.9	-20.0
2560.000	Less than -60dBm	-20.0
3072.000	-40.3	-20.0
3584.000	-53.6	-20.0
4096.000	-53.0	-20.0
4608.000	Less than -60dBm	-20.0
1024.000	-37.5	-20.0

Limit:
Part 90.210(d) 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.

A rated power of 5.0 watts gives a limit of –20 dBm.

Some 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

Frequency: 380.000 MHz

Frequency (MHz)	Emission Level (dBm)	Limit (dBm)
335.000	-79.3	-57.0
1340.000	-61.5	-57.0
2680.00	-68.2	-57.0
3015.000	-77.5	-57.0
3350.000	-75.3	-57.0
3685.000	-78.1	-57.0

Frequency: 512.000 MHz

Frequency (MHz)	Emission Level (dBm)	Limit (dBm)
467.000	-78.1	-57.0
1401.000	-69.3	-57.0
1868.000	-75.4	-57.0
2335.000	-71.1	-57.0
2802.000	-71.4	-57.0
3269.000	-71.3	-57.0
3736.000	-85.1	-57.0

All other emissions observed less than –90.0 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 (–57.0 dBm).

Result: Complies

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

Field strength of the transmitter spurious emissions

Stand by mode

Frequency (MHz)	Level (dBuV/m)	Power (dBm)	Limit (dBm)	Polarity	Margin (dB)
54.850	9.5	-87.9	-20.0	Vertical	67.9
56.020	10.3	-87.1	-20.0	Vertical	67.1
57.800	9.0	-88.4	-20.0	Vertical	68.4
58.170	9.5	-87.9	-20.0	Vertical	67.9
58.550	9.2	-88.2	-20.0	Vertical	68.2
59.100	9.4	-88.0	-20.0	Vertical	68.0
59.500	9.8	-87.6	-20.0	Vertical	67.6
59.900	10.0	-87.4	-20.0	Vertical	67.4
60.300	10.2	-87.2	-20.0	Vertical	67.2
136.100	21.4	-76.0	-20.0	Vertical	56.0
136.350	21.8	-75.6	-20.0	Vertical	55.6
136.610	22.4	-75.0	-20.0	Vertical	55.0
136.870	22.4	-75.0	-20.0	Vertical	55.0
137.130	22.2	-75.2	-20.0	Vertical	55.2
137.400	23.0	-74.4	-20.0	Vertical	54.4
137.650	21.5	-75.9	-20.0	Vertical	55.9
140.000	21.5	-75.9	-20.0	Vertical	55.9
141.050	23.0	-74.4	-20.0	Vertical	54.4
141.570	23.1	-74.3	-20.0	Vertical	54.3
141.830	23.0	-74.4	-20.0	Vertical	54.4
142.080	22.9	-74.5	-20.0	Vertical	54.5
142.090	23.0	-74.4	-20.0	Vertical	54.4
142.350	23.0	-74.4	-20.0	Vertical	54.4
143.400	22.0	-75.4	-20.0	Vertical	55.4
143.650	21.8	-75.6	-20.0	Vertical	55.6
152.040	19.5	-77.9	-20.0	Vertical	57.9

Frequency: 380.000 MHz **Power:** 5 watts

Frequency (MHz)	Level (dBuV/m)	Power (dBm)	Limit (dBm)	Polarity	Margin (dB)
760.000	44.1	-53.3	-20.0	Horizontal	33.3
760.000	46.3	-51.1	-20.0	Vertical	31.1
1140.000	45.9	-51.5	-20.0	Horizontal	31.5
1140.000	53.7	-43.7	-20.0	Vertical	23.7
1520.000	-	-	-20.0	Horizontal	-
1520.000	49.1	-48.3	-20.0	Vertical	28.3
1900.000	-	-	-20.0	Horizontal	-
1900.000	-	-	-20.0	Vertical	-
2280.000	-	-	-20.0	Horizontal	-
2280.000	-	-	-20.0	Vertical	-
2660.000	-	-	-20.0	Horizontal	-
2660.000	-	-	-20.0	Vertical	-
3040.000	-	-	-20.0	Horizontal	-
3040.000	-	-	-20.0	Vertical	-
3420.000	-	-	-20.0	Horizontal	-
3420.000	-	-	-20.0	Vertical	-
3800.000	-	-	-20.0	Horizontal	-
3800.000	-	-	-20.0	Vertical	-

Frequency: 512.000 MHz **Power:** 5 watts

Frequency (MHz)	Level (dBuV/m)	Power (dBm)	Limit (dBm)	Polarity	Margin (dB)
1024.000	40.5	-56.9	-20.0	Horizontal	36.9
1024.000	35.6	-61.8	-20.0	Vertical	41.8
1536.000	46.9	-50.5	-20.0	Horizontal	30.5
1536.000	41.3	-56.1	-20.0	Vertical	36.1
2048.000	44.0	-53.4	-20.0	Horizontal	33.4
2048.000	41.0	-56.4	-20.0	Vertical	36.4
2560.000	45.3	-52.1	-20.0	Horizontal	32.1
2560.000	44.2	-53.2	-20.0	Vertical	33.2
3072.000	-	-	-20.0	Horizontal	-
3072.000	-	-	-20.0	Vertical	-
3584.000	-	-	-20.0	Horizontal	-
3584.000	-	-	-20.0	Vertical	-
4096.000	-	-	-20.0	Horizontal	-
4096.000	-	-	-20.0	Vertical	-
4608.000	-	-	-20.0	Horizontal	-
4608.000	-	-	-20.0	Vertical	-
5120.000	-	-	-20.0	Horizontal	-
5120.000	-	-	-20.0	Vertical	-

In transmit mode 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.

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

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

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 February 17^{th} , 2004.

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

The rated power of 5 watts gives a limit of –20 dBm.

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 (13.8 Vdc).

Nominal Frequency: 380.000 MHz

Frequency Error (Hz)			
Voltage Temp.	**11.7 Vdc**	**13.8 Vdc**	**15.9 Vdc**
+50°C	+17.0	+19.0	+16.0
+40°C	+7.0	+7.0	+7.0
+30°C	-20.0	-19.0	-19.0
+20°C	-51.0	-55.0	-55.0
+10°C	-41.0	-43.0	-43.0
0°C	-105.0	-103.0	-103.0
-10°C	-49.0	-50.0	-47.0
-20°C	-77.0	-68.0	-70.0
-30°C	+11.0	+19.0	+7.0

Nominal Frequency: 512.000 MHz

Frequency Error (Hz)			
Voltage Temp.	**11.7 Vdc**	**13.8 Vdc**	**15.9 Vdc**
+50°C	-115.0	-105.0	-110.0
+40°C	-39.0	-35.0	-27.0
+30°C	+48.0	+49.0	+49.0
+20°C	+76.0	+75.0	+75.0
+10°C	+115.0	+117.0	+115.0
0°C	+61.0	+61.0	+61.0
-10°C	+35.0	+35.0	+35.0
-20°C	+181.0	+181.0	+179.0
-30°C	+605.0	+599.0	+595.0

Part 90.213 states that base / fixed transmitters operating between 421 – 512 MHz with 12.5 kHz channelling are required to have a frequency tolerance of 1.5 ppm.

At 380.0 MHz the limit will be - 1.5 ppm = 1.5 x 380 = 570 Hz.

At 512.0 MHz the limit will be - 1.5 ppm = 1.5 x 512 = 768 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 380.000 and 512.000 MHz using the method described in TIA-603 and EN 300-086.

In summary this method calls for the use of an external signal generator tuned to the transmitter frequency with an output level 0.1 % (-30 dB) of the level from the transmitter with a 1 kHz tone with a frequency deviation of 12.5 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 that is AC coupled to the oscilloscope that produces a display on the screen.

The result of the change in the ratio 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.

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	> 3 kHz	> 6 kHz

Limits:

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

Result: Complies

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

12.5 kHz transmitter turn on (380.000 MHz)

Green Trace = 1 kHz tone with FM deviation of 12.5 kHz.

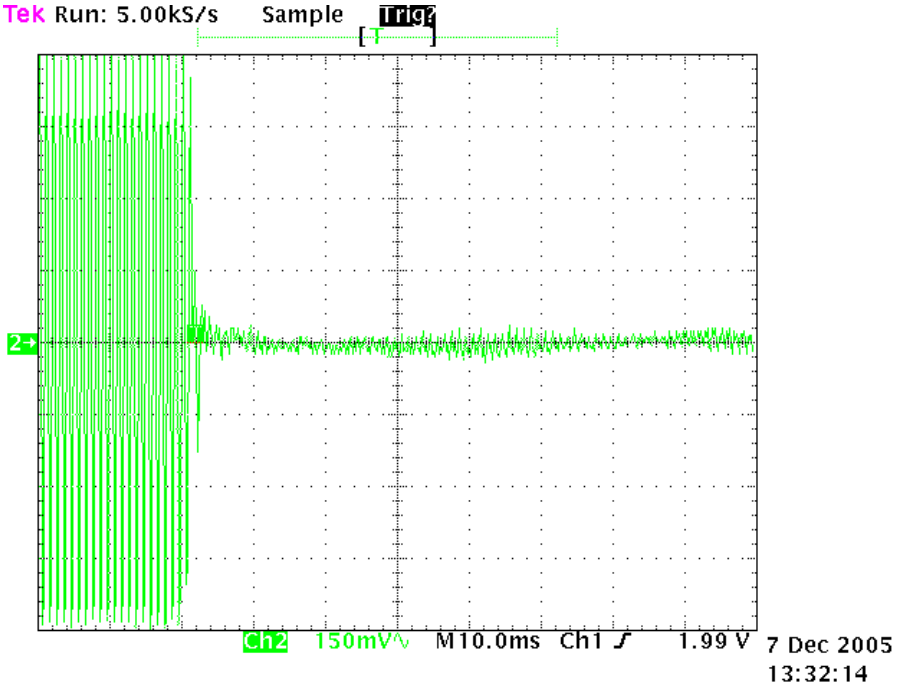
Green trace has been maximised to give full screen indication of +/- 12.5 kHz.
Therefore each Y axis division = 3.125 kHz per division.
The X axis has been set to a sweep rate of 10 mS/division.

Triggering has been set to occur 2 divisions from the left hand edge (20 mS).

*t*on occurs at 20 mS.

*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.

Small transient responses can be observed during *t*1 and *t*2.



12.5 kHz transmitter turn off (380.000 MHz)

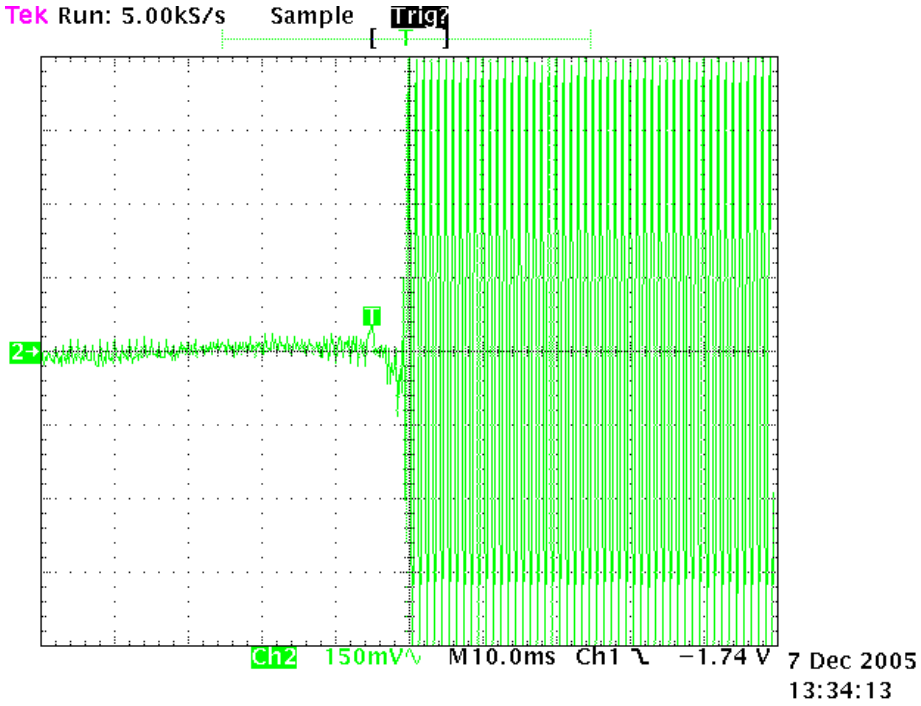
Green Trace = 1 kHz tone with FM deviation of 12.5 kHz.

Green trace has been maximised to give full screen indication of +/- 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..

Small transient responses can be observed just before *t*off.



12.5 kHz transmitter turn on (512.000 MHz)

Green Trace = 1 kHz tone with FM deviation of 12.5 kHz.

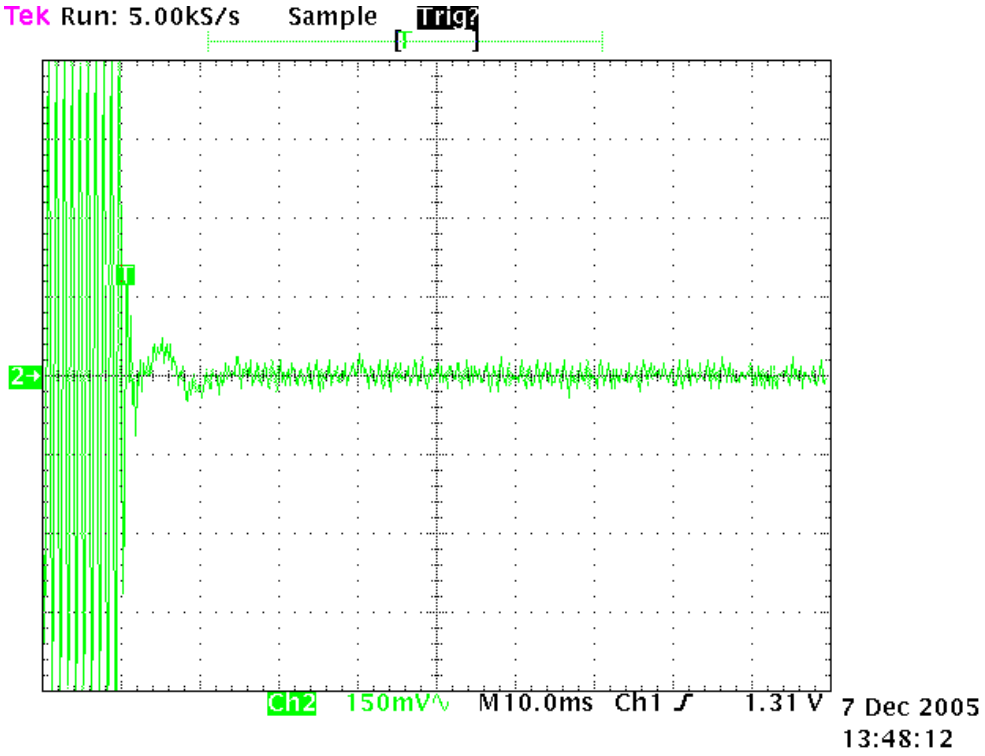
Green trace has been maximised to give full screen indication of +/- 12.5 kHz.
Therefore each Y axis division = 3.125 kHz per division.
The X axis has been set to a sweep rate of 10 mS/division.

Triggering has been set to occur 2 divisions from the left hand edge (20 mS).

*t*on occurs at 20 mS.

*t*1 occurs between 1.0 and 2.0 divisions from the left hand edge.
t2 occurs between 2.0 and 7.0 divisions from the left hand edge.

No transient responses can be observed during *t*1 and *t*2.



12.5 kHz transmitter turn off (512.000 MHz)

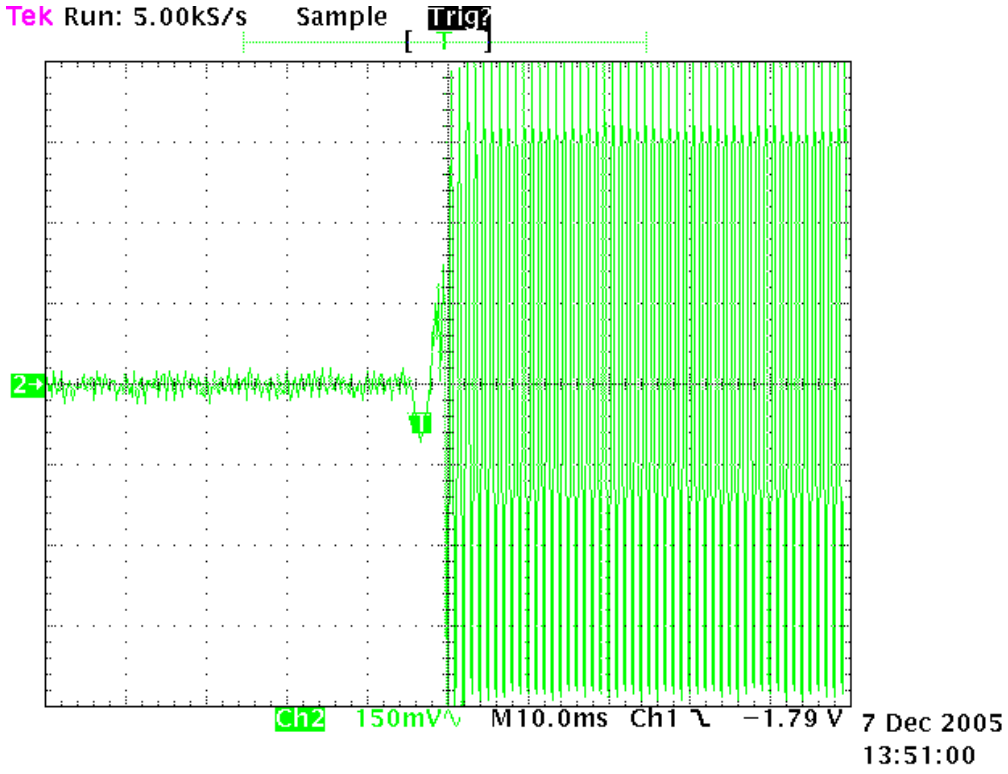
Green Trace = 1 kHz tone with FM deviation of 12.5 kHz.

Green trace has been maximised to give full screen indication of +/- 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 response can be observed just before *t*off.



Radio Frequency Hazard Information

As per Section 1.1310 and Section 2.1091 certification of this transmitter is sought using the General Public / Uncontrolled exposure limits as detailed in OST/OET Bulletin Number 65 as a power of 5 watts is to be used in a base / fixed environment.

In addition calculations have been made using the Occupational / Controlled Exposure limits as it is possible that this transmitter could be used during the course of employment.

In accordance with Section 1.1310 the following Maximum Permissible Exposure (MPE) power density limits have been applied:

- Occupational / Controlled Exposure of 1.20 mW/cm^2 (f/300 = 380 MHz / 300)

- General Population / Uncontrolled exposure of 0.25 mW/cm^2 (f/1500 = 380 MHz / 1500)

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

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

Controlled	**Uncontrolled**
E = 1.20 mW/cm^2 = $E^2/3770$	E = 0.25 mW/cm^2 = $E^2/3770$
E= $\sqrt{}$1.20*3770	E= $\sqrt{}$0.25*3770
E = 67.2 V/m	E = 30.7 V/m

The rated maximum transmitter power = 5 watts.

Transmitter operated using a quarter wave whip antenna with a gain of 2.15 dBi (1.64).

The transmitter is a push to talk device that would typically be used with a duty cycle of 50% in a 6 minute period or a 30 minute period.

Controlled	**Uncontrolled**
d = $\sqrt{}$ (30 * P * G*DC) / E	
d = $\sqrt{}$ (30 * 5.0 * 1.64 * 0.5) / 67.2	d = $\sqrt{}$ (30 * 5.0 * 1.64 * 0.5) / 30.7
d = 0.165 metres or 16.5 cm	d = 0.361 metres or 36.1 cm

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 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

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 last updated on February 17th, 2004.

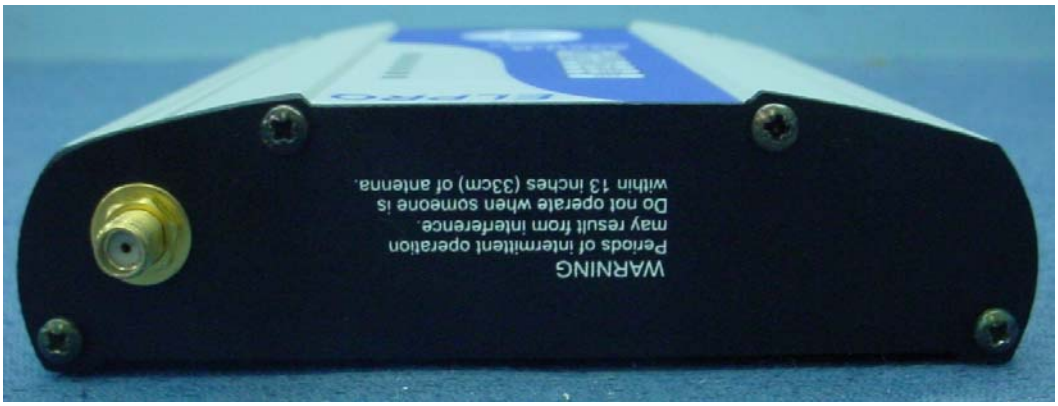
All testing has been carried out in accordance with the terms of EMC Technologies (NZ) Ltd's International Accreditation New Zealand (IANZ) Accreditation to ISO/IEC 17025.

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.

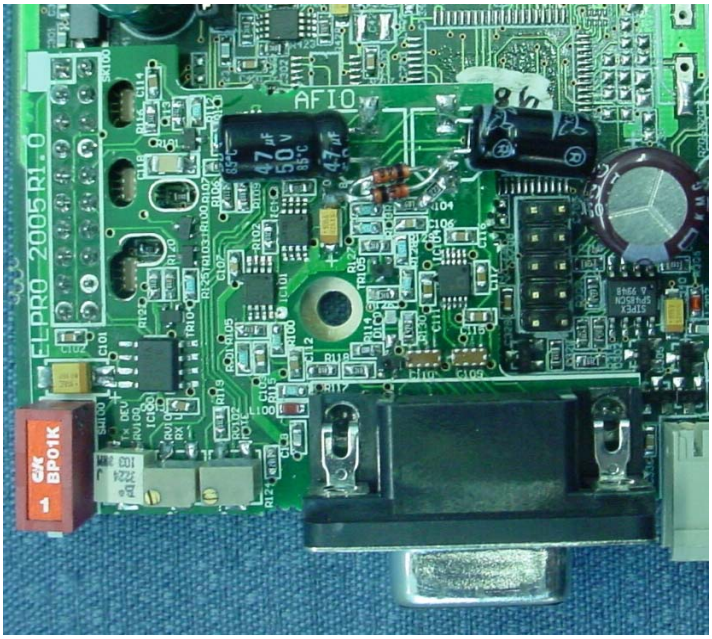
International Accreditation New Zealand has Mutual Recognition Arrangements for testing and calibration with 46 accreditation bodies in 34 economies. This includes NATA (Australia), UKAS (UK), SANAS (South Africa), NVLAP (USA), A2LA (USA), SWEDAC (Sweden). Further details can be supplied on request.

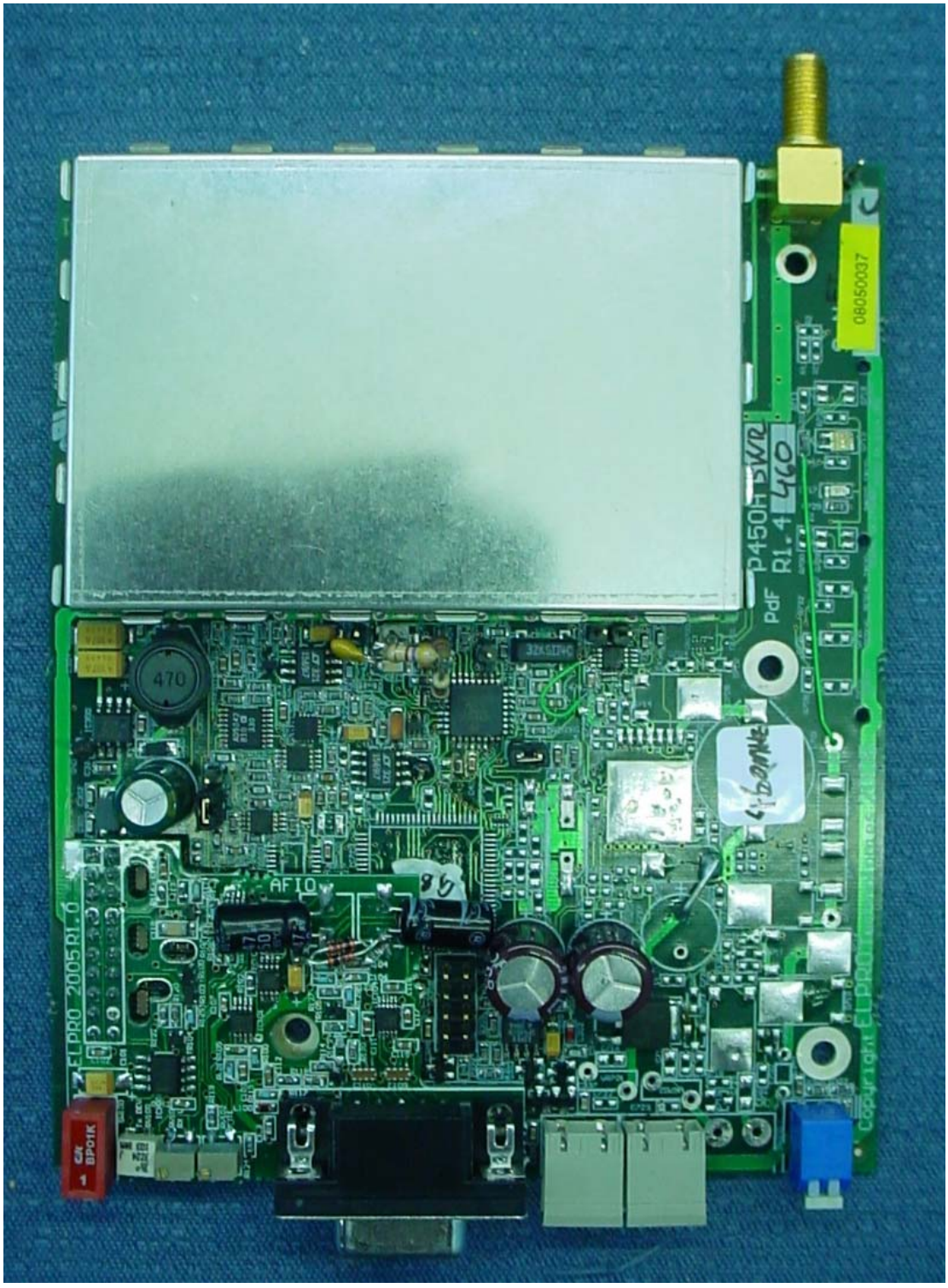
10. PHOTOGRAPH (S)

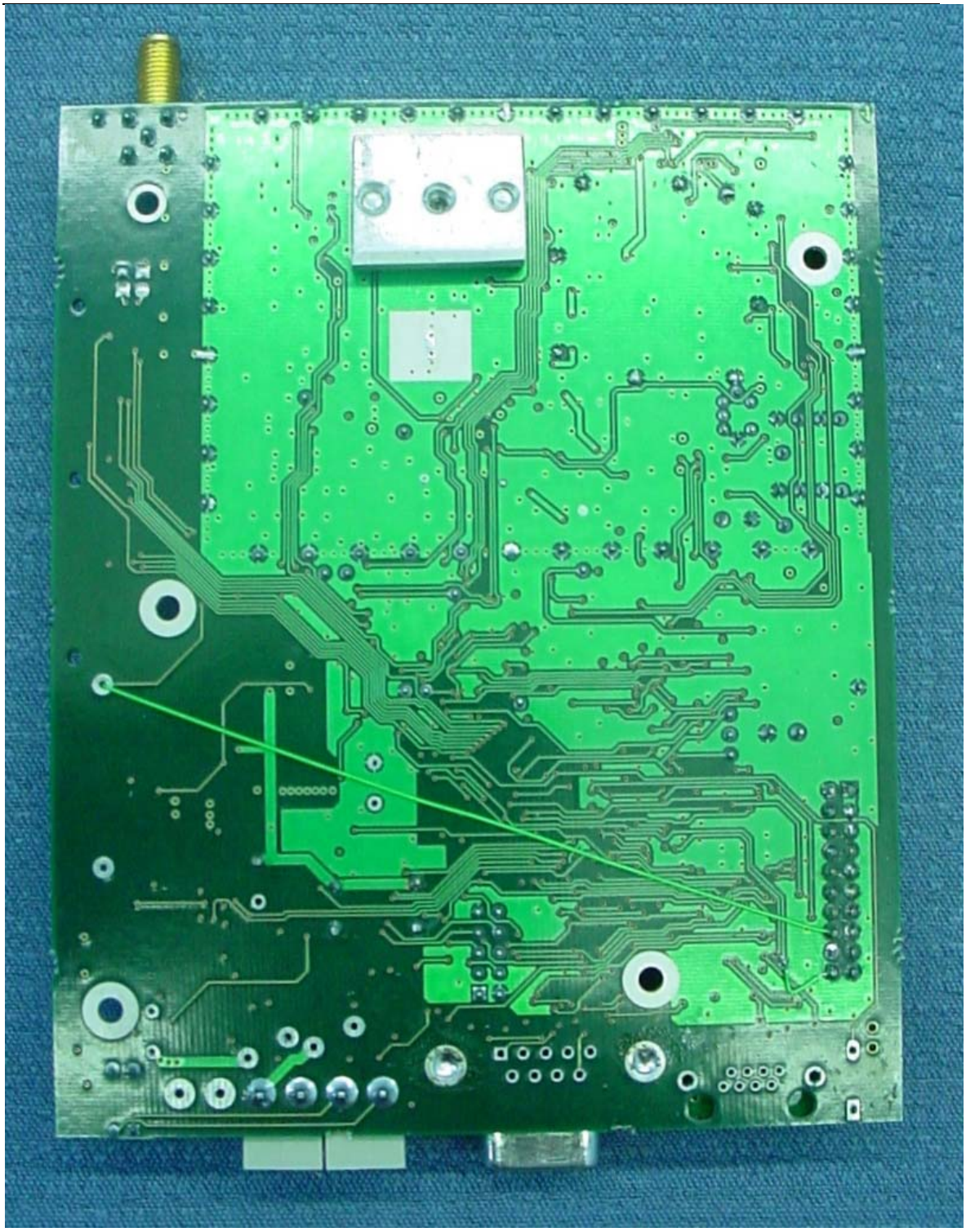
External views



Internal photos with shields attached







Internal photos with the shields removed

Radiated emissions test set up