

EMC Technologies (NZ) Ltd

Test Report No 30413.1
Report date: 17 April 2003

TEST REPORT

Tait
T837-26-1021 / T839-20-0000
Paging Transmitter
(Exciter / Power Amplifier)

tested to

47 Code of Federal Regulations

Part 22 – Public Mobile Services

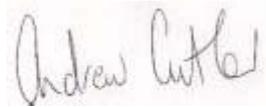
Part 90 – Private Land Mobile Service

Part 15 - Radio Frequency Devices

for

Tait Electronics Ltd

This Test Report is issued with the authority of:



Andrew Cutler - General Manager

Prepared By:



Karen Miller - Office Administrator



EMC Technologies (NZ) Ltd

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1. STATEMENT OF COMPLIANCE

The **Tait T837-26-1021 / T839-20-0000 Paging Transmitter (Exciter / Power Amplifier)** complies with:

- FCC Part 15 Section 15.107 when tested in accordance with ANSI C63.4 – 1992
- FCC Part 22 Section 22.359 when tested in accordance with FCC Part 2 Section 2.1053
- FCC Part 90 Section 90.210 when tested in accordance with FCC Part 2 Section 2.1053

2. RESULTS SUMMARY

The results from testing are summarised in the following table:

Section	Result
15.107(f) – Conducted limits	Complies with a 0.78 dB margin at 172.5 kHz (Average).
22..359 and 90.210 when tested to 2.1053 – Radiated spurious emissions	Complies with a 21.0 dB margin at 304.000 MHz (Horizontal) when transmitting on 152.030 MHz.

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3. CLIENT INFORMATION

Company Name	Tait Electronics Ltd
Address	PO Box 1645
City	Christchurch
Country	New Zealand
Contact	Mr Des Fox

4. DESCRIPTION OF TEST SAMPLE

Brand Name	Tait
Model Number	T837-26-1021 / T839-20-0000
Product	Paging Transmitter (Exciter / Power Amplifier)
Manufacturer	Tait Electronics Ltd
Country of Origin	New Zealand
Serial Number	13076857 / 13076924
FCC ID	CASTEL0064

Also tested with this transmitter were the following items:

- Tait T808-10 Power Supply. Sn# 115762
- Tait T801-20-000 High Stability Oscillator. Sn# 703305

All items were housed in the:

- Tait T800-28-0000 19" rack. Sn# 13060220

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5. TEST SAMPLE SPECIFICATIONS

The sample tested is a base station paging transmitter that is powered from the 110 Vac mains that can have the option of an external high stability reference oscillator.

Transmit frequency

152.030 MHz

FCC Bands

Part 90: 150 - 174 MHz

Power Supply

110 Vac from the mains supply

Power Output

100 watts

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6. ATTESTATION

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.

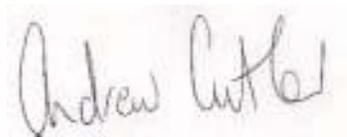
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Measurement uncertainties with statistical confidence intervals of 95% are shown below test results. Both Class A and Class B uncertainties have been accounted for, as well as influence uncertainties where appropriate.

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

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7. TEST RESULTS

Conducted Emissions

Conducted emissions testing was carried out over the frequency range of 150 kHz to 30 MHz.

Testing for conducted emissions was carried out at the laboratory's MacKelvie Street premises in a screened room.

The device was placed 0.8 m away from the closest edge of the artificial mains terminal network on the emissions test table which is 1 m x 1.5 m, and is 0.8 m above the screened room floor which acts as the horizontal ground plane and is 0.6 m away from the screened room wall, which acts as the vertical ground plane.

The device was powered at 110 V AC from the mains supply.

Measurements were made using a Quasi-Peak detector with a 10 kHz bandwidth.

Testing was carried out in transmit and stand by modes and with and without the High Stability Oscillator operating.

Measurement uncertainty with a confidence interval of 95% is:

- Mains terminal tests (0.15 - 30 MHz) \pm 2.2 dB

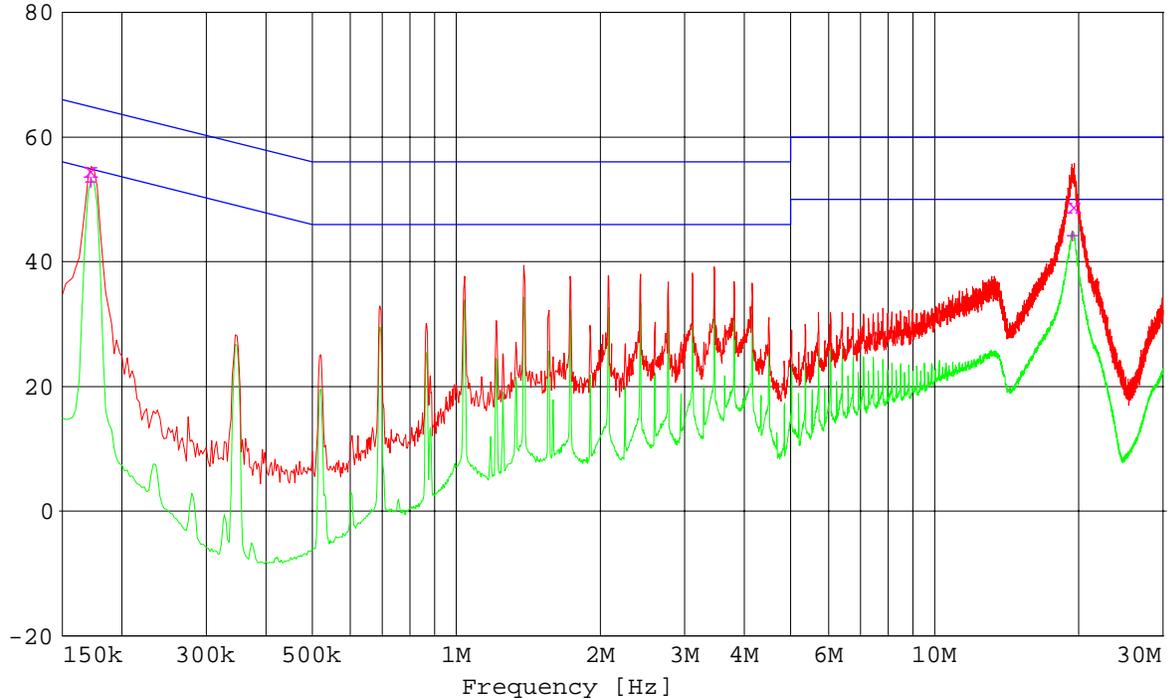
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Conducted Emissions Test

Comments:	<i>Device tested in standby mode. High stability oscillator not installed.</i>
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Level [dB μ V]



Peak -----	Average -----	Quasi Peak X	Average +
------------	---------------	--------------	-----------

Quasi-Peak Measurements

Frequency MHz	Level dB μ V	Limit dB μ V	Margin dB	Exceed	Phase	Rechecks dB μ V
0.172500	54.74	64.84	10.10		N	
19.560000	48.89	60.00	11.11		L1	

Average Measurements

Frequency MHz	Level dB μ V	Limit dB μ V	Margin dB	Exceed	Phase	Rechecks dB μ V
0.172500	52.98	54.84	1.86		N	52.7
19.405000	44.35	50.00	5.65		N	44.3

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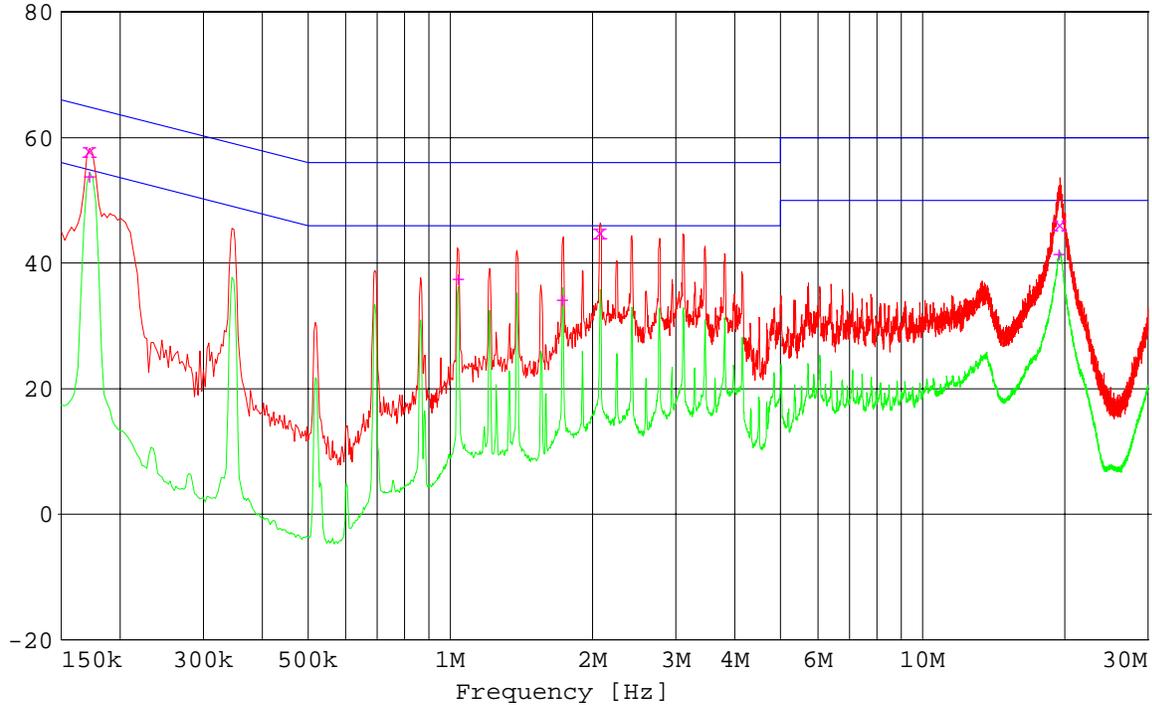
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Conducted Emissions Test

Comments:	<i>Device tested transmitting continuously. High stability oscillator not installed.</i>
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Level [dB μ V]



Peak -----	Average -----	Quasi Peak X	Average +
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Quasi-Peak Measurements

Frequency MHz	Level dB μ V	Limit dB μ V	Margin dB	Exceed	Phase	Rechecks dB μ V
0.172500	57.94	64.84	6.90		L1	57.4
2.075000	45.01	56.00	10.99		L1	
19.515000	46.19	60.00	13.81		L1	

Average Measurements

Frequency MHz	Level dB μ V	Limit dB μ V	Margin dB	Exceed	Phase	Rechecks dB μ V
0.172500	53.83	54.84	1.01		N	54.0
1.040000	37.62	46.00	8.38		L1	
1.730000	34.29	46.00	11.71		N	
19.495000	41.53	50.00	8.47		N	

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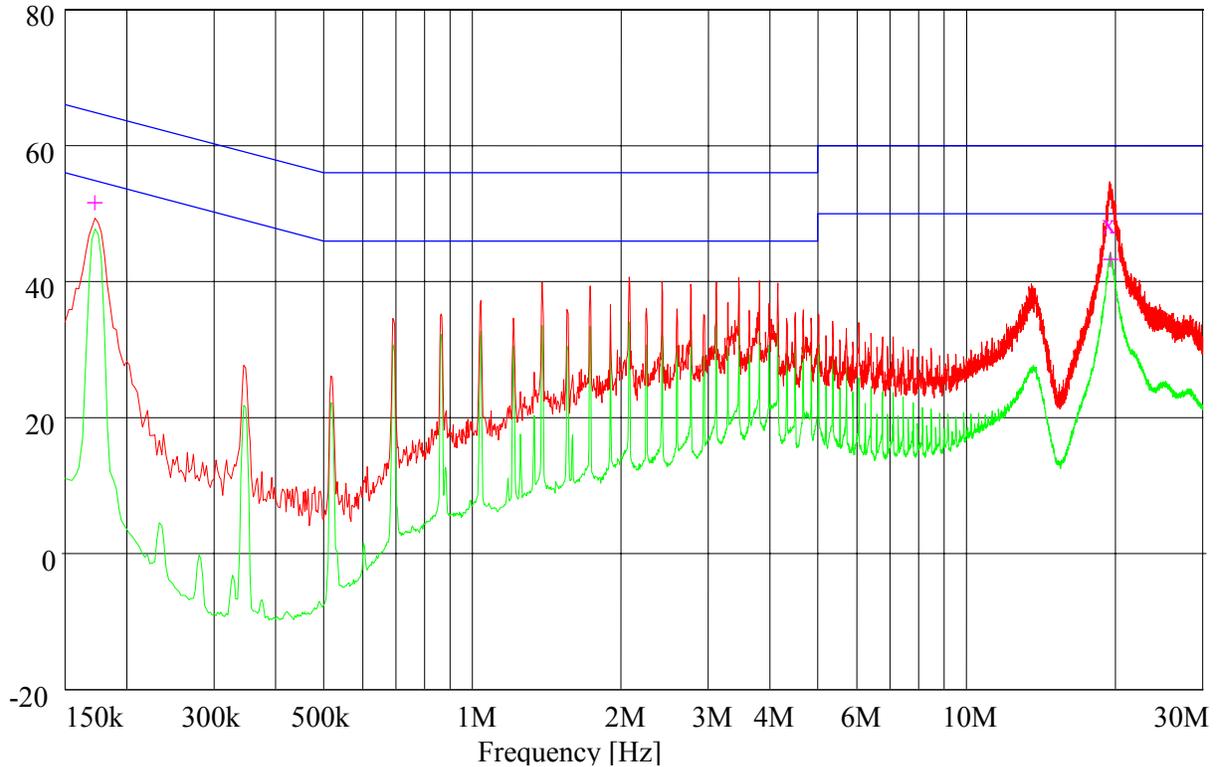
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Conducted Emissions Test

Comments:	<i>Device tested in standby. High stability oscillator installed.</i>
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Level [dB μ V]



Peak -----	Average -----	Quasi Peak X	Average +
------------	---------------	--------------	-----------

Quasi-Peak Measurements

Frequency MHz	Level dB μ V	Limit dB μ V	Margin dB	Exceed	Phase	Rechecks dB μ V
19.450000	49.50	60.00	10.50		N	49.4

Average Measurements

Frequency MHz	Level dB μ V	Limit dB μ V	Margin dB	Exceed	Phase	Rechecks dB μ V
0.172500	52.56	54.84	2.28		N	52.7
19.530000	44.24	50.00	5.76		N	

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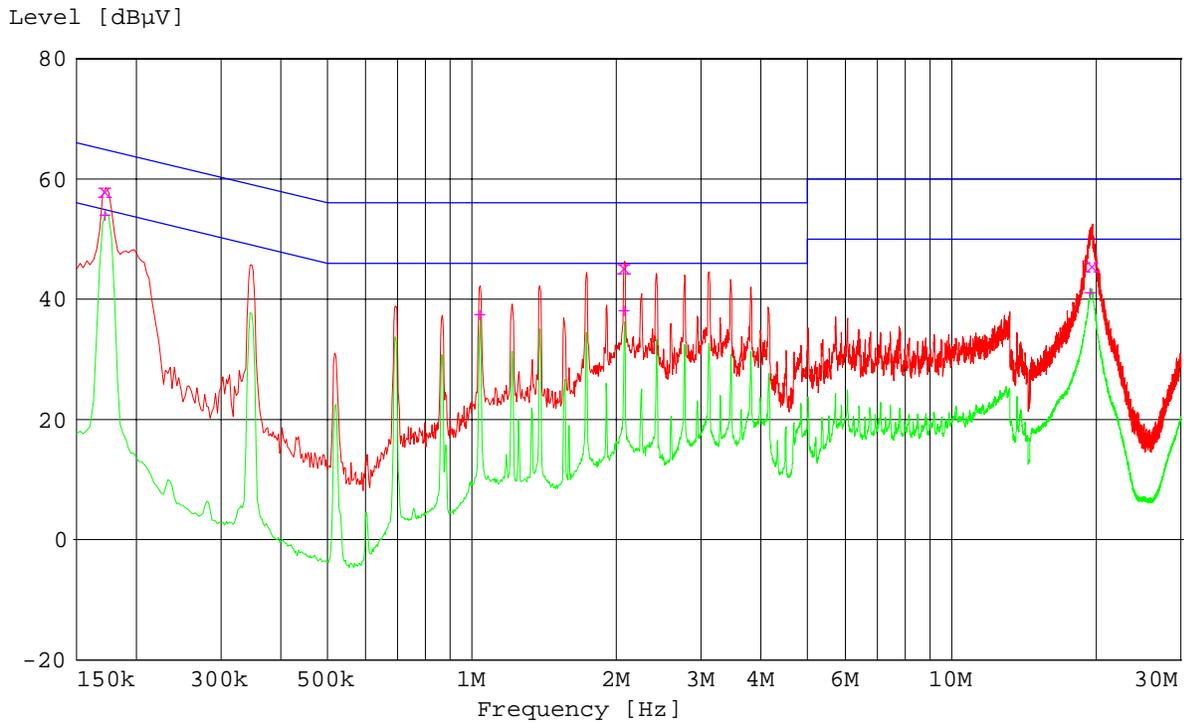
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Conducted Emissions Test

Comments:	<i>Device tested transmitting continuously when powered at 110 Vac.</i>
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Peak -----	Average -----	Quasi Peak X	Average +
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Quasi-Peak Measurements

Frequency MHz	Level dBµV	Limit dBµV	Margin dB	Exceed	Phase	Rechecks dBµV
0.172500	58.06	64.84	6.78		L1	58.2
2.080000	45.41	56.00	10.59		L1	
19.620000	45.70	60.00	14.30		L1	

Average Measurements

Frequency MHz	Level dBµV	Limit dBµV	Margin dB	Exceed	Phase	Rechecks dBµV
0.172500	54.06	54.84	0.78		N	54.1
1.040000	37.56	46.00	8.44		L1	
2.080000	38.15	46.00	7.85		L1	
19.495000	41.15	50.00	8.85		N	

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Field strength of transmitter spurious emissions at antenna terminals

Frequency: 152.030 MHz

Harmonic Emissions

Emission frequency (MHz)	Level (dBuV/m)	Power (dBm)	Limit (dBm)	Polarity	Margin (dB)
304.0	52.1	-41.0	-20.0	Horizontal	21.0
304.0	55.3	-38.0	-20.0	Vertical	18.0
456.0	30.1	-65.1	-20.0	Horizontal	45.1
456.0	32.5	-62.7	-20.0	Vertical	42.7
608.0	34.1	-61.1	-20.0	Horizontal	41.1
608.0	30.4	-64.8	-20.0	Vertical	44.8
760.0	32.8	-62.4	-20.0	Horizontal	42.4
760.0	30.0	-65.2	-20.0	Vertical	45.2
912.0	32.9	-62.3	-20.0	Horizontal	42.3
912.0	35.1	-60.1	-20.0	Vertical	40.1
1064.0	29.2	-66.0	-20.0	Horizontal	46.0
1064.0	30.5	-64.7	-20.0	Vertical	44.7
1216.0	28.1	-67.1	-20.0	Horizontal	47.1
1216.0	29.1	-66.1	-20.0	Vertical	46.1
1368.0	32.1	-63.1	-20.0	Horizontal	43.1
1368.0	29.6	-65.6	-20.0	Vertical	45.6
1520.0	31.5	-63.7	-20.0	Horizontal	43.7
1520.0	32.0	-63.2	-20.0	Vertical	43.2

Other emissions observed

Emission frequency (MHz)	Level (dBuV/m)	Power (dBm)	Limit (dBm)	Polarity	Margin (dB)
30.000	34.1	-61.1	-20.0	Vertical	41.1
38.000	30.1	-65.1	-20.0	Vertical	45.1
44.000	36.8	-58.4	-20.0	Vertical	38.4
57.000	36.0	-59.2	-20.0	Vertical	39.2
75.000	50.2	-45.0	-20.0	Vertical	25.0
75.000	39.6	-55.6	-20.0	Horizontal	35.6
80.000	49.0	-46.2	-20.0	Vertical	26.2
80.000	36.6	-58.6	-20.0	Vertical	38.6
85.000	43.2	-52.0	-20.0	Vertical	32.0

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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 with a resistive dummy load attached to the antenna terminal.

Testing was carried out in stand by and transmitting continuously mode, with and without the High Stability Oscillator inserted.

No significant affects were noted when the High Stability Oscillator was inserted.

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 $50 + 10 \log (P)$.

This gives a limit of -20 dBm.

No measurements were made above the 10th harmonic.

Result: Complies

Measurement Uncertainty: ± 4.1 dB

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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
Turntable	EMCO	1080-1-2.1	9109-1578	RFS 3709
Biconical Antenna	Schwarzbeck	BBA 9106	-	RFS 3612
Log Periodic Antenna	Schwarzbeck	UHALP 9107	-	RFS 3702
UHF Dipole Antenna	Schwarzbeck	UHA 9105	-	RFS 3679
Horn Antenna	EMCO	3115	9511-4629	E1526
Horn Antenna	Electrometrics	RGA-60	6234	E1494
Coax Cable	Sucoflex	104PA	2736/4PA	-
Signal Generator	Rohde & Schwarz	SMHU.58	838923/028	E1493
Measurement Receiver	Rohde & Schwarz	ESCS 30	839873/1	
Measurement Receiver	Rohde & Schwarz	ESHS 10	828404/005	RFS 3728
Spectrum Analyzer	Hewlett Packard	E7405A	US39150142	3776
Modulation Analyzer	Hewlett Packard	8901B	2608A00782	E1090
Thermal chamber	Contherm	M180F	86025	E1129
Thermometer	DSIR	RT200	035	E1049
Artificial Mains Network	Rhode & Schwarz	ESH 2-Z5	881362/034	RFS 3628
Variac	General Radio	1592	-	RFS 3690

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.

The tests were carried out in accordance with the terms of EMC Technologies (NZ) Ltd's International Accreditation New Zealand (IANZ) Accreditation to NZS/ISO/IEC 17025: 1999.

All measurement equipment has been calibrated in accordance with the terms of EMC Technologies (NZ) Ltd's International Accreditation New Zealand (IANZ) Accreditation to NZS/ISO/IEC 17025: 1999.

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.

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10. PHOTOGRAPH(S)

Device Under Test

Labels: High Stability Oscillator

Power Amplifier

Exciter



Front view of device under test



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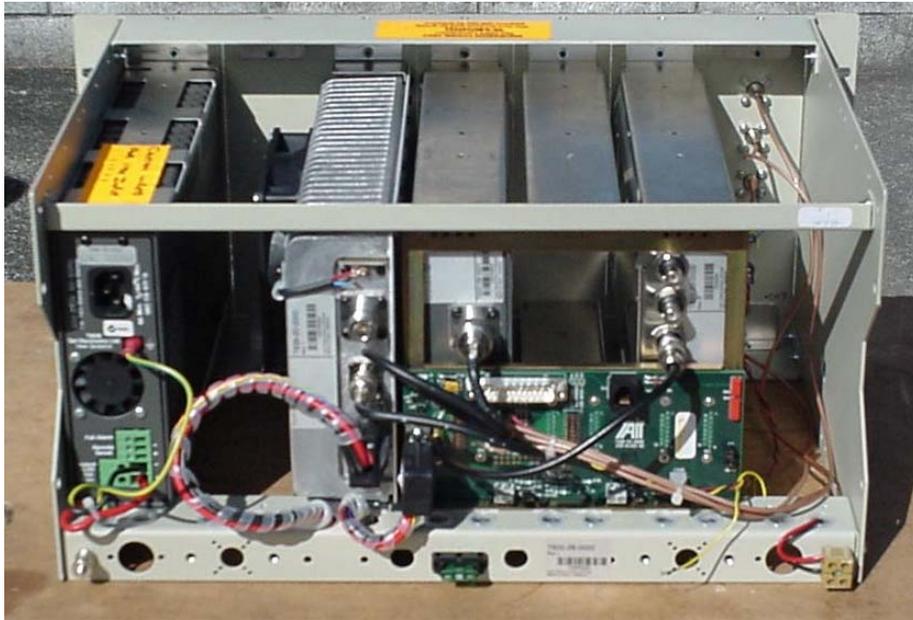
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Rear view of device. High stability oscillator connected.



High stability oscillator disconnected.



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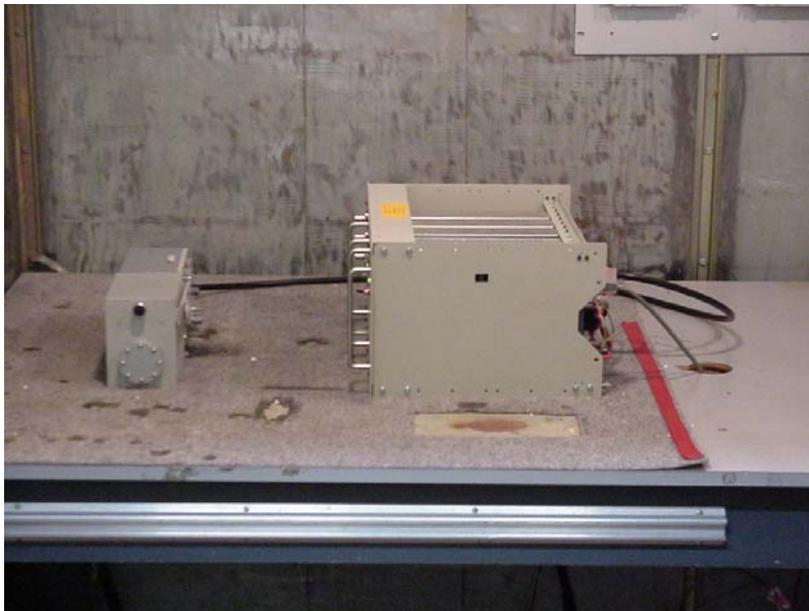
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Conducted Emissions Test Setup



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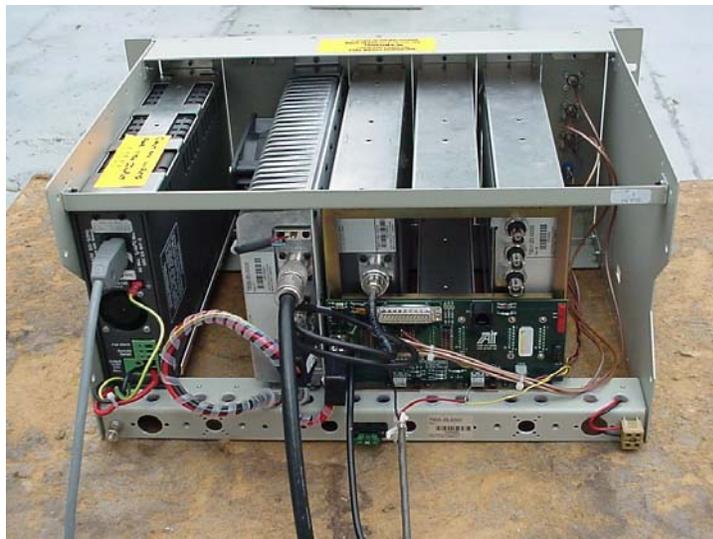
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Radiated Emissions Test Set Up



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