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TEST REPORT

Tait TBCB1X Receiver Only Base Station

tested to

47 Code of Federal Regulations

Part 15 - Radio Frequency Devices

Subpart A + B

for

Tait Ltd

A handwritten signature in black ink, appearing to read "Andrew Cutler", is written over a light blue grid background.

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

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1. STATEMENT OF COMPLIANCE

The **Tait TBCB1X Receiver Only Base Station** complies with FCC Part 15 Subparts A + B as a Class A device when the methods as described in ANSI C63.4 - 2003 are applied.

2. RESULTS SUMMARY

The results from testing carried out between September 19th and 20th 2013 are summarised in the following table:

Clause	Parameter	Result
15.101	Equipment authorisation requirement.	Certification required as the device would be categorised as a Receiver with an Ethernet Port.
15.103	Exempted devices.	Device is not exempt as it contains a receiver which contains a digital device.
15.107	Conducted Emissions 0.15 - 30 MHz	Complies with a 10.4 dB margin at 549.0 kHz (Average)
15.109	Radiated Emissions 30 - 2000 MHz	Complies with a 2.9 dB margin at 99.220 MHz (Vertical)
15.111	Antenna Terminal Disturbance 30 – 950 MHz	Complies. No specific receiver emissions observed.

3. INTRODUCTION

This report describes the tests and measurements performed for the purpose of determining compliance with the specification.

The client selected the test sample.

This report relates only to the sample tested.

This report contains no 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.

4. CLIENT INFORMATION

Company Name Tait Ltd
Address PO Box 1645
Christchurch
Country New Zealand
Contact Mr Marcus Ludwig

5. DESCRIPTION OF TEST SAMPLE

Brand Name Tait
Model Number TBCB1X
Product Code T01-01104-DAAA
Product Receiver Only Base Station
Manufacturer Tait Ltd
Country of Origin New Zealand
Serial Number Base station sub rack: 18186061
Receiver 1: 18186046
Receiver 2: 18186051
Power Supply: 18185655
FCC ID CASTCB1X

The device that was tested is a base station sub rack housing not less than two receiver only modules.

The 2 receiver modules tested were programmed to receive on 148 MHz and 174 MHz.

The receiver modules are capable of operating between 148 – 174 MHz and they use an IF of 16.9 MHz which is injected on the high side.

In addition the receiver has an Ethernet port which allows it to be connected to the outside world.

All other ports on the device are for installation and configuration purposes only.

6. SETUPS AND PROCEDURES

Standard

The sample was tested in accordance with 47 CFR Part 15 Subpart A and B.

Methods and Procedures

The following measurement methods and procedures have been applied:

- ANSI C63.4 – 2003

Section 15.101: Equipment authorisation requirement

Certification as detailed in Subpart J of Part 2 is required for this device as it would be classed as a Class A computer peripheral and a receiver.

Section 15.107: Conducted limits

Conducted emission testing has been carried out on the AC mains port of the device when it was powered at 115 Vac 60 Hz.

Conducted emission testing was carried out over the frequency range of 150 kHz to 30 MHz at the Laboratory's MacKelvie Street premises in a 2.4 m x 2.4 m x 2.4 m screened room.

Testing was carried out in accordance with section 15.107 using a measuring receiver and a 50 uH / 50 ohm artificial mains network which is also known as a line impedance stabilisation network (LISN).

Measurements on both the phase and neutral lines were made using either a Quasi Peak or an Average detector with a 9 kHz bandwidth.

The supplied conducted emission plot is a combined plot showing the worst case of the Peak, Quasi Peak and Average levels for both phase and neutral.

The Class A conducted limits have been applied

Result: Complies

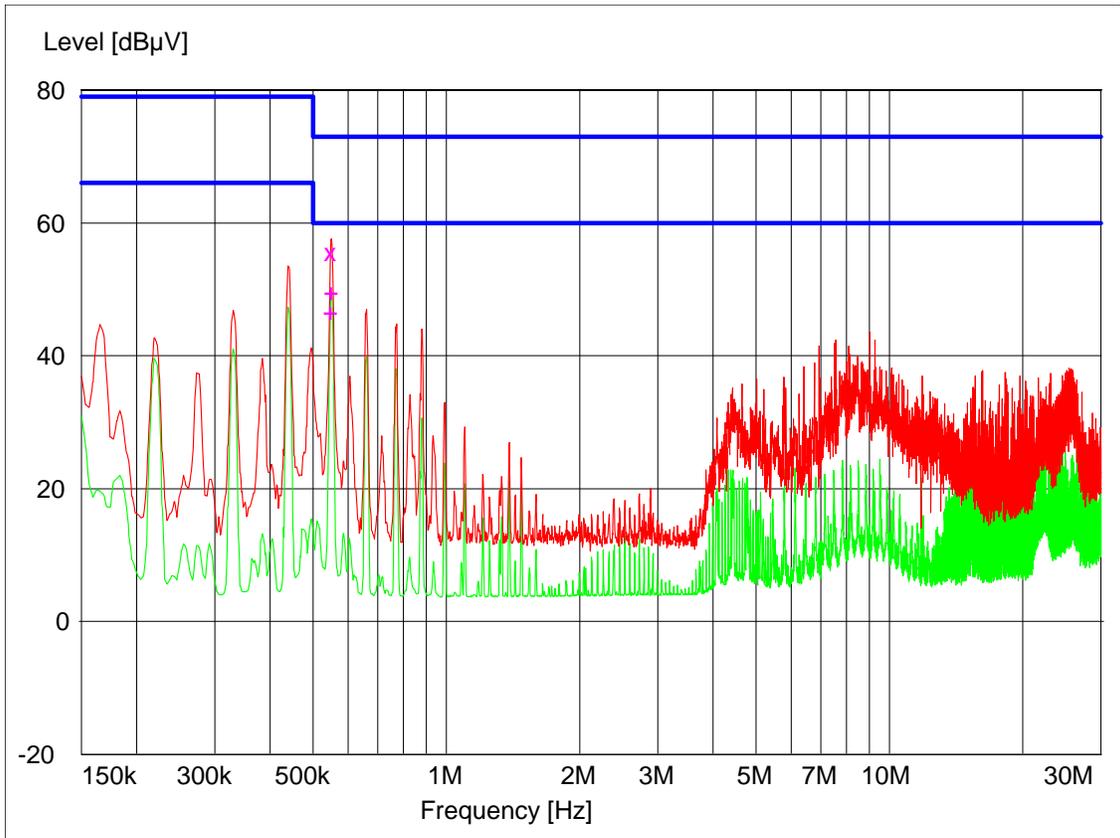
Measurement uncertainty with a confidence interval of 95% is:

Conducted emissions tests (0.15 - 30 MHz) ± 2.2 dB

Conducted Emissions – AC Input Power Port

Setup: Device tested when powered at 115 Vac 60 Hz in receive mode with the two antenna ports terminated with 50 ohms terminations and with a laptop computer attached to the Ethernet port.

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



Final Quasi-Peak Measurements

Frequency MHz	Level dBµV	Limit dBµV	Margin dB	Phase	Rechecks dBµV
0.549000	55.60	73.0	17.4	L1	

Final Average Measurements

Frequency MHz	Level dBµV	Limit dBµV	Margin dB	Phase	Rechecks dBµV
0.546000	46.60	60.0	13.4	L1	
0.549000	49.60	60.0	10.4	L1	

Section 15.109 – Radiated emissions

Radiated emission testing was carried out over the frequency range of 30 to 2000 MHz as the client has declared that the highest frequency in use is the local oscillator on 190.9 MHz when the receiver is tuned to 174.0 MHz.

This frequency is greater than 108 MHz but less than 500 MHz hence 2000 MHz is the highest test frequency.

Testing was carried out at the laboratory's open area test site - located at 670 Kawakawa Orere Rd, RD3, Papakura, New Zealand.

This site conforms to the requirements of CISPR 16 and ANSI C63.4 - 2003.

Before testing was carried out, a receiver Self Test and Internal Calibration was undertaken along with a check of all connecting cables and programmed antenna factors.

The device was placed on the test tabletop, 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 10 metre horizontal distance from the boundary of the devices under test with the Class A limits being applied.

Testing is carried out by manually scanning between 30 and 2000 MHz in 100 kHz steps while aurally and visually monitoring for emissions.

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 using a Quasi Peak detector with a bandwidth of 120 kHz below 1000 MHz.

Between 1000 – 2000 MHz an average detector and a peak detector were used which both had a bandwidth of 1 MHz.

During the test, a number of ambient emissions are identified (list of which can be provided upon request).

The emission level is determined in field strength by taking the following into consideration:
Level (dB μ V/m) = Receiver Reading (dB μ V) + Antenna Factor (dB/m) + Coax Loss (dB)

Radiated Emissions 30 – 2000 MHz

Device tested when placed in the centre of the test table.

The antenna ports were terminated using 2 x 50 ohm resistive terminations

The Ethernet port was attached to a laptop computer which displayed the login page

The receiver was powered at 115 Vac 60 Hz.

The receivers were tuned to 148 and 174 MHz respectively and the IF is 16.9 MHz high side

Frequency (MHz)	Vertical (dB μ V/m)	Horizontal (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Antenna	Detector
31.398	22.3		39.1	16.8	Vertical	QP
50.457	35.1	28.2	39.1	4.0	Vertical	QP
51.038	34.3		39.1	4.8	Vertical	QP
51.735	33.8		39.1	5.3	Vertical	QP
53.478	32.1		39.1	7.0	Vertical	QP
53.940	36.1	27.1	39.1	3.0	Vertical	QP
69.114	25.3		39.1	13.8	Vertical	QP
102.620	26.5		43.5	17.0	Vertical	QP
106.698	37.8	30.5	43.5	5.7	Vertical	QP
107.318	37.1		43.5	6.4	Vertical	QP
108.792	37.1		43.5	6.4	Vertical	QP
110.651	35.4		43.5	8.1	Vertical	QP
111.578	33.3		43.5	10.2	Vertical	QP
163.930		27.8	43.5	15.7	Horizontal	QP
655.232		33.3	46.4	13.1	Horizontal	QP
750.000		30.6	46.4	15.8	Horizontal	QP

No specific receiver emissions were detected.

Result: Complies.

Measurement uncertainty with a confidence interval of 95% is:

- Free radiation tests (30 MHz – 2000 MHz) \pm 4.1 dB

Section 15.111 – Antenna Terminal Disturbance

Testing was carried out at the receiver antenna terminal.

A spectrum analyser was directly connected to the antenna port using a 50 ohm coaxial cable.

The receiver uses an IF of 16.9 MHz with the local oscillator being tuned operate on the high side of the receive frequency.

As the the receiver can operate over the range of 148 – 174 MHz the receiver modules were individually tuned to 148 MHz and 174 MHz.

Measurements were attempted over the range of 30 MHz – 2000 MHz with special attention paid at 164.9 MHz and the various harmonics of this frequency and 190.9 MHz and the various harmonics of this frequency.

No specific receiver emissions were detected within at least a 20 dB margin over the observed frequency range

A limit of -57 dBm or 2 uW was applied

Result: Complies.

Measurement uncertainty with a confidence interval of 95% is:

- Antenna conducted emission tests (30 MHz – 2000 MHz) ± 2.8 dB

7. TEST EQUIPMENT USED

Instrument	Manufacturer	Model	Serial No	Asset Ref	Cal Due
Aerial Controller	EMCO	1090	9112-1062	RFS 3710	N/a
Aerial Mast	EMCO	1070-1	9203-1661	RFS 3708	N/a
Biconical Antenna	Schwarzbeck	BBA 9106	-	RFS 3613	17 Jan 2014
Receiver	R & S	ESIB-40	100171	R-27-1	20 Oct 2013
Receiver	R & S	ESHS 10	828404/005	RFS 3728	22 Aug 2014
Spectrum Analyser	Hewlett Packard	E7405A	US39150142	3776	26 Feb 2015
Log Periodic	Schwarzbeck	VUSLP 9111	9111-228	3785	30 Jan 2015
Horn Antenna	EMCO	3115	9511-4629	E1526	21 Feb 2014
Mains Network	R & S	ESH2-Z5	881362/034	3628	29 Jul 2014
Variac	General Radio	1592	-	RFS 3690	N/a
Turntable	EMCO	1080-1-2.1	9109-1578	RFS 3709	N/a
VHF Balun	Schwarzbeck	VHA 9103	-	RFS 3613	30 Jan 2014

8. ACCREDITATIONS

Testing was carried out in accordance with EMC Technologies Ltd registration with the Federal Communications Commission as a listed facility, registration number: 90838, which was last updated in July 2013.

All testing was carried out in accordance with the terms of EMC Technologies (NZ) Ltd International Accreditation New Zealand (IANZ) Accreditation to NZS/ISO/IEC 17025, 2005.

All measurement equipment has been calibrated in accordance with the terms of the EMC Technologies (NZ) Ltd International Accreditation New Zealand (IANZ) Accreditation to NZS/ISO/IEC 17025, 2005

International Accreditation New Zealand has Mutual Recognition Arrangements for testing and calibration with various accreditation bodies in a number of economies.

This includes NATA (Australia), UKAS (UK), SANAS (South Africa), NVLAP (USA), A2LA (USA), SWEDAC (Sweden). Further details can be supplied on request.

9. PHOTOGRAPHS

External views of base station sub rack containing receiver only test samples



Power supply module



Receiver modules x 2



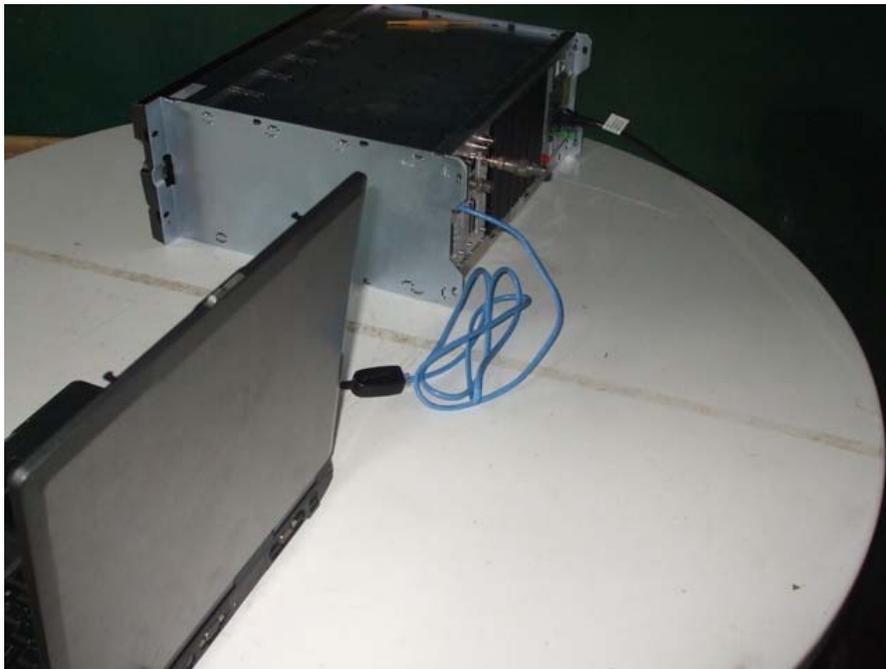
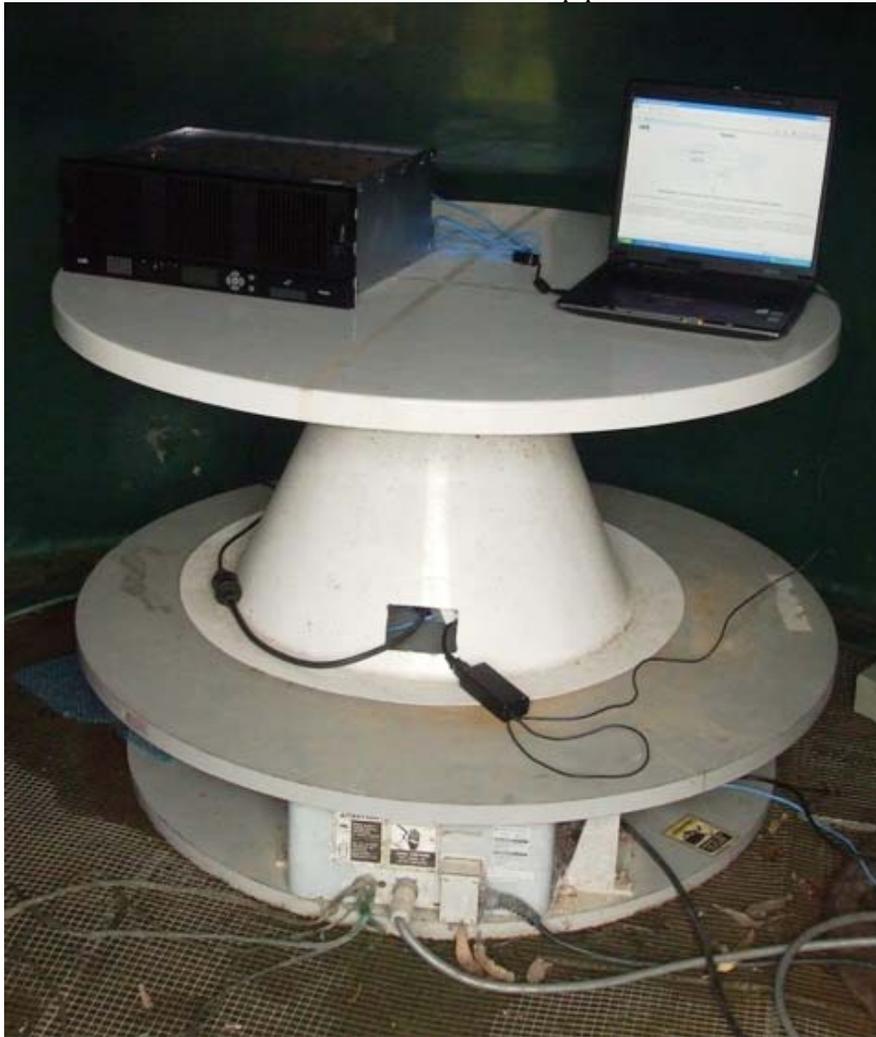
Receiver modules rear up close



Receiver labels



Radiated emissions test setup photos





Conducted emissions test set up



