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RADIO TEST REPORT

REPORT NUMBER: M2210018-1

**TEST STANDARD: FCC PART 15 SUBPART C
(SECTION § 15.209)**

CLIENT: BLUECHIIP LIMITED

**DEVICE: HANDHELD READER WITH
CRYOBOX TRACKER**

MODEL: BLU-668

FCC ID: 2ATNO-BRHRBB001

DATE OF ISSUE: 23 NOVEMBER 2022

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Accreditation No.5292

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TEST CERTIFICATE

Device: Handheld Reader with CryoBox Tracker
Model Number: BLU-668 (Handheld Reader)
BRAB-T1-001 (CryoBox Tracker)

FCC ID: 2ATNO-BRHRBB001

Manufacturer: Bluechiip Limited


Tested for: Bluechiip Limited
Address: 1 Dalmore Drive, Scoresby, Vic, 3179
Phone Number: +61 (0) 3 97639763
Contact: Scott Turner
Email: Scott.turner@bluechiip.com

Standard: FCC Part 15 – Radio Frequency Devices
Subpart C – Intentional Radiators
Section §15.209 Radiated emission limits; general requirements

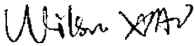
Result: The Test Sample complied with applicable requirements of FCC 47 CFR
Part 15 Part C.
Refer to Report M2210018-1 for full details

Test Date: 10 & 11 November 2021, 31 October 2022

Issue Date: 23 November 2022


Test Engineer: Ian Paul Ng

Attestation: *I hereby certify that the device(s) described herein were tested as described in this report and that the data included is that which was obtained during such testing.*


Authorised Signatory: Wilson Xiao
Lead Engineer - Radio
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RADIO TEST REPORT

1 TEST SUMMARY

Section	Clause	Result(s)
6.1	§15.203 Antenna Requirement	Complied
6.2	§15.209 (a) Radiated emission limits; general requirements	Complied
*FCC Waiver ID: DA 11-461 (Allows Bluechiip tracking system to transmit in the three restricted bands within the 1.5-4.2 MHz band: 2.1735-2.1095 MHz, 4.125-4.128 MHz and 4.17725-4.17775 MHz)		

2 TEST FACILITY

2.1 General

EMC Technologies Pty Ltd is accredited by the FCC as a test laboratory able to perform compliance testing for the public. EMC Technologies Pty Ltd has also been designated as a Conformity Assessment Body (CAB) by Australian Communications and Media Authority (ACMA) under the APECTEL MRA and is designated to perform compliance testing on equipment subject to Declaration of Conformity (DoC) and Certification under Parts 15 and 18 of the FCC Commission's rules – **Registration Number 494713 & Designation number AU0001.**

EMC Technologies Pty Ltd is also an ISED Canada recognized testing laboratory – **ISED company number: 9626A and CAB identifier number: AU0001.**

2.2 NATA Accreditation

NATA is the Australian National laboratory accreditation body and has accredited EMC Technologies to operate to the IEC/ISO17025 requirements. A major requirement for accreditation is the assessment of the company and its personnel as being technically competent in testing to the standards. This requires fully documented test procedures, continued calibration of all equipment to the National Standard at the National Measurements Institute (NMI) and an internal quality system similar to ISO 9002. NATA has mutual recognition agreements with the National Voluntary Laboratory Accreditation Program (NVLAP) and the American Association for Laboratory Accreditation (A²LA).

All testing in this report has been conducted in accordance with EMC Technologies' scope of NATA accreditation to ISO 17025 for both testing and calibration and ISO 17020 for Inspection – **Accreditation Number 5292.**

The current full scope of accreditation can be found on the NATA website: www.nata.com.au

3 TEST EQUIPMENT CALIBRATION

Measurement instrumentation and transducers were calibrated in accordance with the applicable standards by an independent NATA registered laboratory such as Agilent Technologies (Australia) Pty Ltd or the National Measurement Institute (NMI) or in-house. All equipment calibration is traceable to Australian national standards at the National Measurements Institute.

Equipment Type	Make/Model/Serial Number	Last Cal. dd/mm/yyyy	Due Date dd/mm/yyyy	Cal. Interval
Chamber	Frankonia SAC-3-2 (R-144)	10/08/2020	10/08/2023	3 Year* ¹
	Frankonia SAC-10-2 (R-139)	01/11/2021	01/11/2024	3 Year* ¹
EMI Receiver	R&S ESW26 Sn: 101306 (R-143)	29/07/2022	29/07/2023	1 Year* ²
	R&S ESR7 Sn: 101804(R-142)	15/07/2022	15/07/2023	1 Year* ²
Antennas	SUNOL JB1 Sn. A012312 (A-363)	23/06/2020	23/06/2022	2 Year* ²
	EMCO 6502 Active Loop Antenna Sn. 9311-2801 (A-231)	07/12/2020	07/12/2022	2 Year* ²
Cables*³	Huber & Suhner Sucoflex 104A Sn: N/A (C-422)	23/11/2020	23/11/2021	1 Year* ¹
	Huber & Suhner Sucoflex 104A Sn: 507095 /4A (C-486)	23/11/2020	23/11/2021	1 Year* ¹
	Huber & Suhner Sucoflex 104A Sn: 507100/4A (C-478)	04/02/2022	04/02/2023	1 Year* ¹
	Huber & Suhner Sucoflex 104A Sn: 503061 (C-463)	04/02/2022	04/02/2023	1 Year* ¹

Note *1. Internal NATA calibration.

Note *2. External NATA / A2LA calibration.

Note *3. Cables are verified before measurements are taken.

4 MEASUREMENT UNCERTAINTY

EMC Technologies has evaluated the equipment and the methods used to perform the emissions testing. The estimated measurement uncertainties for emissions tests shown within this report are as follows:

Conducted Emissions: 9 kHz to 30 MHz ± 3.2 dB

Radiated Emissions:

9 kHz to 30 MHz	± 4.1 dB
30 MHz to 300 MHz	± 5.1 dB
300 MHz to 1000 MHz	± 4.7 dB
1 GHz to 18 GHz	± 4.6 Db

Peak Output Power: ± 1.5 dB

The above expanded uncertainties are based on standard uncertainties multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95%.

5 DEVICE DETAILS

(Information supplied by the Client)

The Handheld Reader scans Bluechiip-enabled Cryovials, CryoTags, and 1D and 2D barcodes.

5.1 EUT (Transmitter) Details

Radio:	RFID Transmitter
Operating Band:	1.3 – 4.5 MHz
No. of Channels:	80
Channel Bandwidth:	Approx. 30 kHz
Antenna:	Air coil antenna 4uH (CryoBox Tracker)
FCC Waiver ID:	DA 11-461 (Allows Bluechiip tracking system to transmit in the three restricted bands within the 1.5-4.2 MHz band: 2.1735-2.1095 MHz, 4.125-4.128 MHz and 4.17725-4.17775 MHz)

5.2 EUT (Host) Details

Device under Test:	Handheld Reader with CryoBox Tracker
Model Number:	BLU-668 (Handheld Reader) BRAB-T1-001 (CryoBox Tracker)
Power requirements:	Internal battery 7.2V (2xNCR18650B Li-Ion battery) Plug pack
Plug pack details:	Input: 100-240V AC, 50/60 Hz, 0.8A Output: 12V DC, 2.5A

5.3 Test Configuration

Testing was performed with the EUT set to transmit continuously at 10 times per second.

Note: The EUT transmitter could not be configured to transmit separately on the Low, Mid and High channels. The interrogator steps through 80 sub-bands of approximately 30 kHz each over the 1.3-4.5 MHz band.

Rear antennas were exercised.

5.4 Modifications

No modification was required to achieve compliance.

6 RESULTS

6.1 §15.203 Antenna Requirement

Both Front and Rear RFID antennas are placed internally within the Bluechiip Handheld Reader. The below antennas will only be installed by the manufacturer. The installation will preclude any unauthorised switching of antennas.

The RFID module incorporates the following antennas:

Antenna: Air coil antenna 4uH

Antenna port to antenna connection: N/A. Antenna is soldered on PCB.

6.2 §15.209 Radiated emission limits; general requirements

6.2.1 Test procedure

Radiated emissions measurements were performed in a semi-anechoic chamber compliant with ANSI C63.4: 2014.

The test frequency range was sub-divided into smaller bands with the defined resolution bandwidths to permit reliable display and identification of emissions.

Frequency range [MHz]	Measurement Bandwidth [kHz]	Measurement Distance [m]	Antenna
0.009 to 0.150	0.2	3	0.6 metre loop antenna
0.150 to 30	9	3	
30 to 1000	120	3	Biconilog hybrid
1000 to 18 000	1000	3	Standard gain or broadband horn
18 000 to 40 000	1000	1	

EUT was set at 0.8 m for measurements below 1000 MHz and 1.5m for above 1000 MHz.

The sample was slowly rotated with the spectrum analyser set to Max-Hold. This was performed for at least two antenna heights. When an emission was located, it was positively identified and its maximum level found by rotating the automated turntable and by varying the antenna height. For below 1000 MHz the emissions were measured with a Quasi-Peak detector, and for above 1000 MHz the emissions were measured with Peak and Average detectors.

The measurement data for each frequency range was corrected for cable losses, antenna factors and preamplifier gain. This process was performed for both horizontal and vertical polarisations of the measurement antenna.

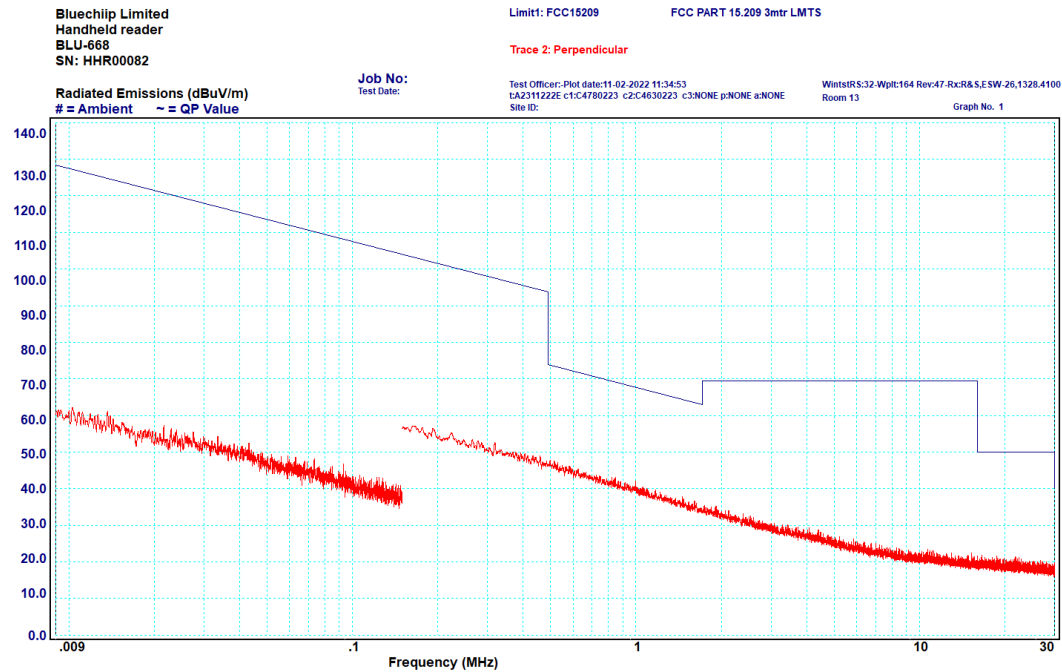
6.2.2 Limits

The limit applied is in accordance to the radiated emission limits defined in §15.209.

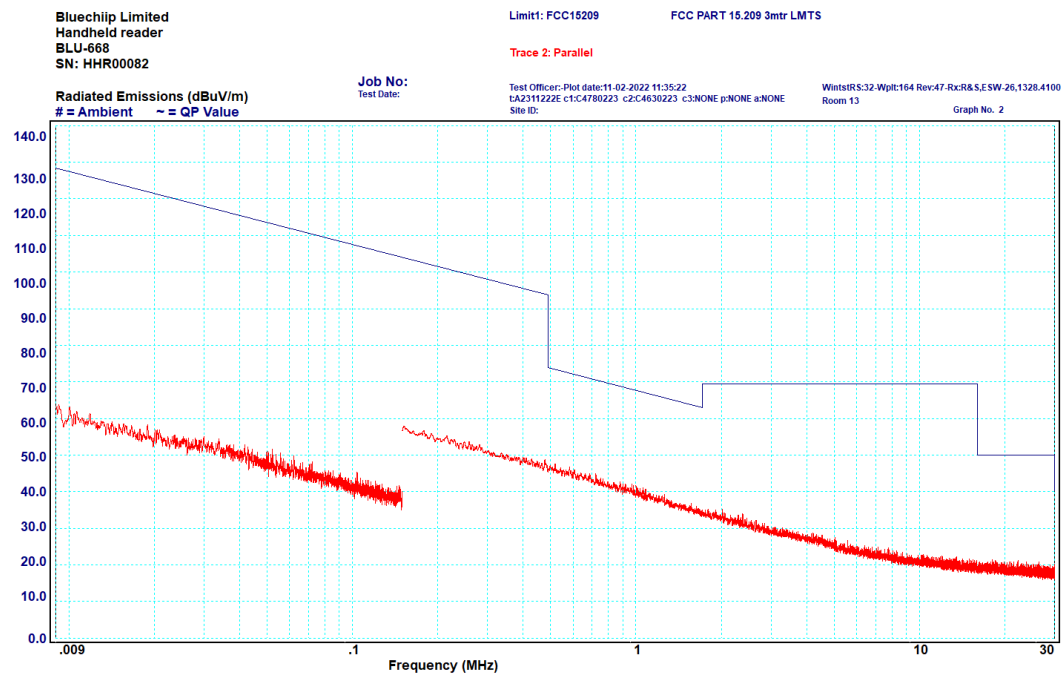
6.2.3 Results: Frequency Band: 9 kHz – 30 MHz

All spurious emissions measured in the frequency band 9 kHz – 30 MHz complied with the requirements of §15.209. The emissions were more than 10 dB below the limit.

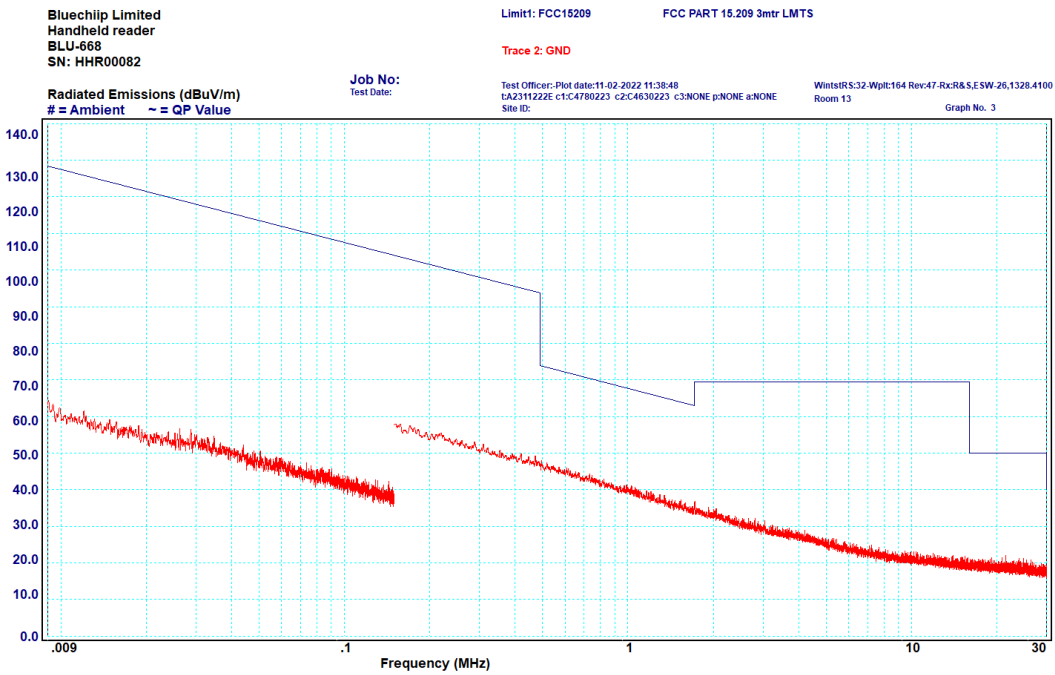
Note: At a measurement distance of 3 metres, all Bluechiip fundamental transmissions were below the noise floor of the EMI receiver.



Graph 6-1: Spurious Emissions, 9 kHz – 30 MHz, Perpendicular



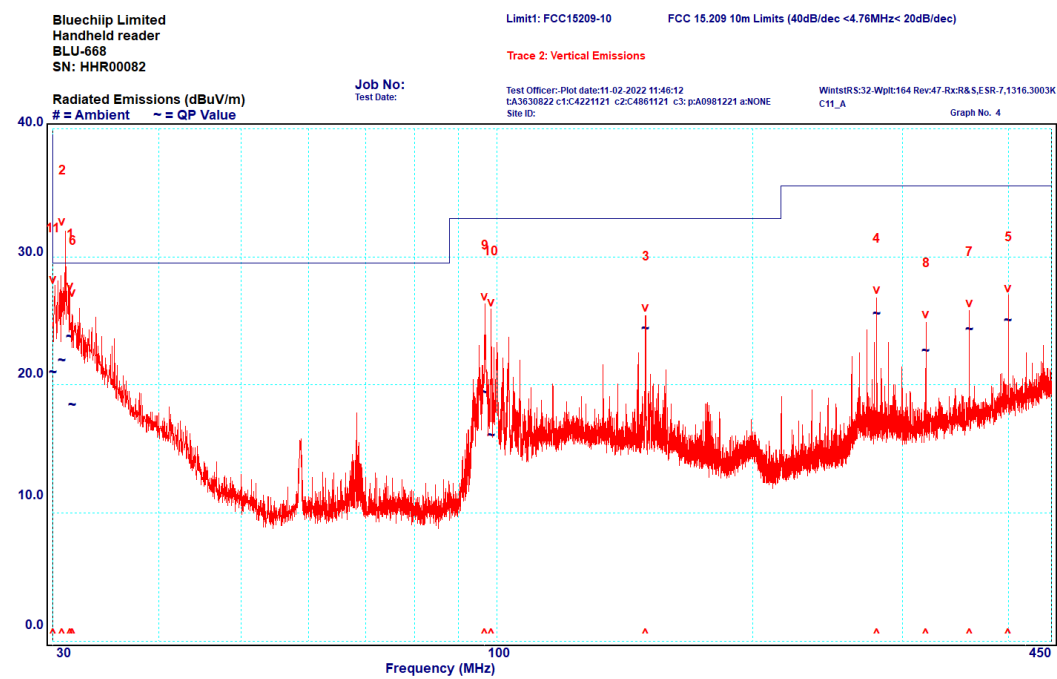
Graph 6-2: Spurious Emissions, 9 kHz – 30 MHz, Parallel



Graph 6-3: Spurious Emissions, 9 kHz – 30 MHz, Ground

6.2.4 Results: Frequency Band: 30 – 450 MHz

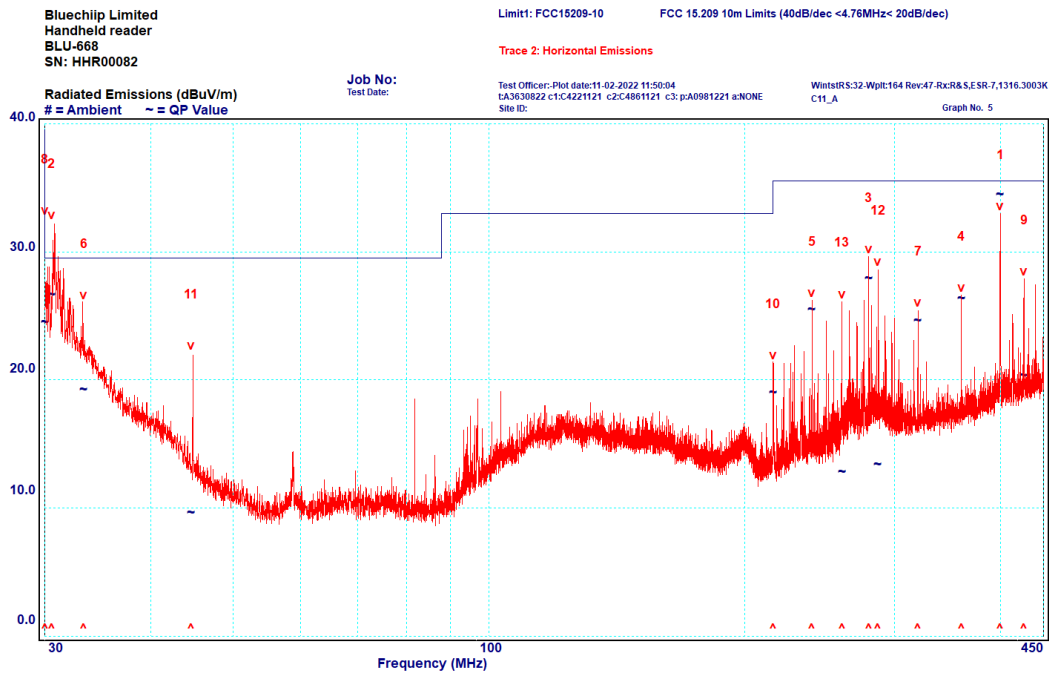
All spurious emissions measured in the frequency band 30 MHz to 450 MHz complied with the requirements of §15.209 (a).



Graph 6-4: Spurious Emissions, 30 – 450 MHz, Vertical

Table 6-1: Spurious Emissions, 30 – 450 MHz, Vertical

Peak	Polarisation	Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Delta Limit (dB)
1	31.46	Vertical	24.2	29.5	-5.3
2	30.79	Vertical	22.4	29.5	-7.1
3	149.63	Vertical	24.9	33	-8.1
4	280	Vertical	26.1	35.5	-9.4
5	400	Vertical	25.5	35.5	-10
6	31.65	Vertical	18.9	29.5	-10.6
7	360	Vertical	24.8	35.5	-10.7
8	319.98	Vertical	23.1	35.5	-12.4
9	96.75	Vertical	19.9	33	-13.1
10	98.43	Vertical	16.5	33	-16.5
11	30	Vertical	21.5	39.5	-18



Graph 6-5: Spurious Emissions, 30 – 450 MHz, Horizontal

Table 6-2: Spurious Emissions, 30 – 450 MHz, Horizontal

Peak	Polarisation	Frequency (MHz)	Level (dBuV/m)	Limit (dBuV/m)	Delta Limit (dB)
1	400	Horizontal	35	35.5	-0.5
2	30.57	Horizontal	27.2	29.5	-2.3
3	280	Horizontal	28.4	35.5	-7.1
4	360	Horizontal	26.8	35.5	-8.7
5	240	Horizontal	26	35.5	-9.5
6	33.34	Horizontal	19.8	29.5	-9.7
7	320	Horizontal	25.1	35.5	-10.4
8	30	Horizontal	25	39.5	-14.5
9	426.68	Horizontal	20.8	35.5	-14.7
10	216.12	Horizontal	19.5	35.5	-16
11	44.59	Horizontal	10.1	29.5	-19.4
12	287.2	Horizontal	13.9	35.5	-21.6
13	260.54	Horizontal	13.3	35.5	-22.2

END OF REPORT