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47 CFR PART 15, SUBPART B TEST REPORT

REPORT NUMBER: M2003018-9

TEST STANDARD: 47 CFR PART 15
RADIO FREQUENCY DEVICES

SUBPART B –
UNINTENTIONAL RADIATORS

CLIENT: SMART FOAL PTY LTD

DEVICE: SMART FOAL HOME

MODELS: BASE STATION: 2.0
REPEATER: 1.2
TRANSMITTER: 1.9

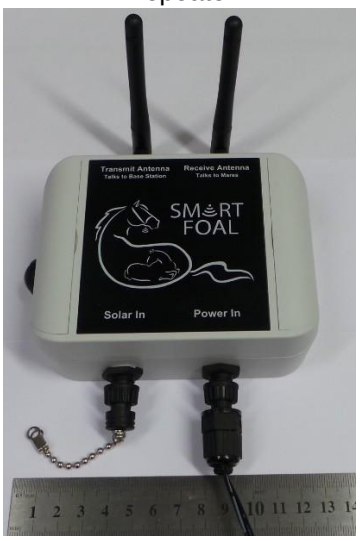
DATE OF ISSUE: 17 JUNE 2020

Equipment Under Test (EUT)

Base station

Transmitter

Repeater



REVISION TABLE

Version	Sec/Para Changed	Change Made	Date
1		Initial issue of document	17/06/2020

CONTENTS

47 CFR PART 15, SUBPART B

CERTIFICATE OF COMPLIANCE

Device:	Smart Foal Home
Model Numbers:	Base Station: 2.0 Repeater: 1.2 Transmitter: 1.9
Manufacturer:	Smart Foal Pty Ltd
Tested for:	Smart Foal Pty Ltd
Address:	40 Gard Road, Mount Cottrell, Vic 3024 Australia
Phone Number:	0404905084
Contact:	Aimee Nizette
Email:	aimee@smartfoal.com
Standard:	**47 CFR Part 15 –** Radio Frequency Devices **Subpart B –** Unintentional Radiators **ANSI C63.4: 2014** *American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz*
Result:	The Test Sample complied with the applicable FCC Part 15B requirements. Refer to Report M2003018-9 for full details
Test Dates:	27th – 28th April, 26th May 2020
Issue Date:	17 June 2020
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*

Test Engineers: Ian Paul Ng Bernie Blanco

Authorised Signatory: **Chris Zombolas**
Technical Director
EMC Technologies Pty Ltd

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47 CFR PART 15, SUBPART B

TEST REPORT

1 INTRODUCTION

This report details the results of ElectroMagnetic Interference (EMI) tests performed on the Smart Foal Home.

The measurements were made in accordance with:

Federal Communications Commission (FCC) regulations as detailed in Title 47 CFR, Part 15 Subpart B for a Class B device, unintentional radiator.

The results and technical details of the test sample are detailed in this report. The test sample was found to comply with the Class B limits for radiated emissions.

The test sample was provided by the Client. The results herein apply only to the test sample.

1.1 Test Facility

1.1.1 Company Overview

EMC Technologies Pty. Ltd. is an independently owned Australian company that is internationally accredited providing specialist Electromagnetic Compatibility (EMC), Electromagnetic Exposure (EME), Telecommunication and Electrical Safety testing and consultation services to all areas of the electrical and electronics industry. Comprehensive facilities in Melbourne, Sydney, and Auckland (NZ) are supported by over 40 technical specialists and administrative staff.

Measurements were performed at EMC Technologies' laboratory in Keilor Park, Victoria Australia.

EMC Technologies Pty Ltd has 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 Supplier's Declaration of Conformity (SDoC) and Certification under Parts 15 and 18 of the FCC Commission's rules – **Registration Number 494713 and Designation number AU0001.**

1.1.2 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 to ISO 17025. NATA is an ILAC member and has mutual recognition agreements with the National Voluntary Laboratory Accreditation Program (NVLAP) and the American Association for Laboratory Accreditation (A^2LA).

All testing in this report has been conducted in accordance with EMC Technologies' scope of NATA accreditation.

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

The scope also includes a large number of emissions, immunity, SAR, EMR and Safety standards.

1.2 Test Laboratory/Accreditations

Measurements were performed at EMC Technologies' laboratory in Keilor Park, Victoria Australia.

Table 1-1: Accreditations for Conformity Assessment

Country/Region	Body	
Australia/New Zealand	NATA	Accreditation Number: 5292
Europe	European Union	Notified Body Number: 0819
USA	FCC	Designation Number: AU0001
Canada	ISED Canada	Company Number: 3569B
Japan	VCCI	Company Number: 785
Taiwan	BSMI	Lab Code SL2-IN-E-5001R

1.3 Units of Measurements

Conducted Emissions

Measurements are reported in units of dB relative to one microvolt (dBμV).

Radiated Emissions

Measurements are reported in units of dB relative to one microvolt per metre (dBμV/m).

1.4 Test Equipment Calibration

Measurement instrumentation and transducers were calibrated in accordance with the applicable standards by a NATA accredited laboratory such as Keysight Technologies (Australia) Pty Ltd or the National Measurement Institute (NMI). All equipment calibration is traceable to Australia national standards at the National Measurements Institute. The reference antenna calibration was performed by National Measurement Institute (NMI) and the working antennas (biconilog and horn) calibrated by Keysight Technologies and EMC Technologies respectively. The complete list of test equipment used for the measurements, including calibration dates and traceability is contained in Appendix A

1.5 Test Configuration

Refer to Appendix B for photographs of the tested system.

2 TEST PROCEDURE

Emission measurements were performed in accordance with the procedures of ANSI C63.4: 2014. Radiated emissions tests were performed at a distance of 10 metres (30-1000MHz) and 3 metres (above 1 GHz) from the EUT.

2.1 Summary of Test Results

Test results and procedures were performed in accordance with the following Federal Communications Commission (FCC) standards/regulations:

FCC 15B

15.107	**Conducted Emissions:**	**0.15-30 MHz**	
	• **Base Station**		Complied Class B, margin of 20.5 dB
	• **Transmitter**		Complied Class B, margin of 20.4 dB
	• **Repeater**		Complied Class B, margin of 16.5 dB
15.109	**Radiated Emissions:**	**30-1000 MHz**	Complied Class B, margin of 7.3 dB
15.109	**Radiated Emissions:**	**Above 1 GHz**	Complied Class B, margin of 12.4 dB

The measurement procedure applied was in accordance with ANSI C63.4: 2014. The instrumentation conformed to the requirements of ANSI C63.2: 2016.

2.2 General Information

(Information supplied by the Client)

The Equipment Under Test (EUT) was identified as follows:

Manufacturer:	Smart Foal Pty Ltd	
Test Sample:	Smart Foal Home	
Model Numbers:	Base Station: 2.0 Repeater: 1.2 Transmitter: 1.9	
Microprocessor:	Atmega328pb	
Highest internal freq:	8 MHz	
Power Ratings:	Testing was performed with 2 external power supplies:	
Power Supply 1:	Base Station	
Model Number:	SMI5-5-V-I38	
Input Supply:	100-240V AC, 50/60 Hz, 0.2A	
Output Supply:	5V DC, 1A	
Power Supply 2:	Repeater	
Model Number:	SMI6B-12 090066	
Part Number:	SMI6B-9-4-P5	
Input Supply:	100-240V AC, 50/60 Hz, 0.2A	
Output Supply:	9V DC, 0.66A	
External ports:	DC Mains: 50cm, Coaxial: 2 x SMA	
Hardware version:	1.4	
Software version:	2.1	
Radio Transmitters:	CDE Byte E01-ML01SP4 Portable transceiver	Espressif Pte Ltd ESP-WROOM-02U Fixed transceiver
Type:	--	Wi-Fi
FCC ID:	FCC ID: 2ALPH-E01	2AC7Z-ESPWROOM02U
Operating Band:	2400~2525 MHz	2412-2462MHz
Number of channels:	40	11
Nominal power:	20 dBm	20 dBm
Modulation:	GFSK	802.11 b/g/n/e/i
Nominal bandwidth:	250 kHz < 1MHz	9MHz
Base Station:		
Antenna type:	DELTA7A/x/SMAM/S/S/11	DELTA7A/x/SMAM/S/S/11
Antenna gain:	1.5 dBi	1.5 dBi
Repeater		
Antenna type:	DELTA7A/x/SMAM/RP/S/11	---
Antenna gain:	1.5 dBi	
Transmitter		---
Antenna type:	FXP73 Flex PCB	
Antenna gain:	2.5 dBi	

2.3 Description supplied by Client

The tests sample was a foaling alarm kit to monitor mare movement. Includes base station, repeater and transmitter.

2.4 Test sample block diagrams

Base station block diagram

Removed for confidentiality

Repeater block diagram

Removed for confidentiality

Transmitter block diagram

Removed for confidentiality

2.5 Operating Conditions

Testing was performed in accordance with the requirements of FCC Part 15B and as per the client's requirements.

The base station and repeater were connected and powered at 120VAC 60Hz, (each powered via external plug pack) with the Wi-Fi transmitter connection established.

Testing was performed with the transmitter sending data to the base station and the base station uploading to the cloud (once every 2 seconds).

All device LEDs were monitored to determine the status of data transmission, i.e. transmitter flashing blue light to indicate transmission and base station radio light flashing to indicate receipt of data.

2.6 Modifications

No modifications were required to achieve compliance.

3 CONDUCTED EMISSIONS MEASUREMENTS

3.1 Test Procedure

The arrangement specified in ANSI C63.4: 2014 was adhered to for the conducted EMI measurements. The EUT was placed in the RF screened enclosure and a CISPR EMI Receiver as defined in ANSI C63.2: 2009 was used to perform the measurements.

The EMI Receiver was operated under program control using the Max-Hold function and automatic frequency scanning, measurement and data logging techniques. The specified 0.15 MHz to 30 MHz frequency range was sub-divided into sub-ranges to ensure that all short duration peaks were captured.

3.2 Peak Maximising Procedure

The various operating modes of the system were investigated. For each of the sub-ranges, the EMI receiver was set to continuous scan with the Peak detector set to Max-Hold mode. The Quasi-Peak detector and the Average detector were then invoked to measure the actual Quasi-Peak and Average level of the most significant peaks, which were detected.

3.3 Calculation of Voltage Levels

The voltage levels were automatically measured in software and compared to the test limit. The method of calculation was as follows:

$$V_{EMI} = V_{Rx} + L$$

Where: V_{EMI} = The Measured EMI voltage in dBµV to be compared to the limit.

V_{Rx} = The Voltage in dBµV read directly at the EMI receiver.

L = The insertion loss in dB of the LISN, cables and transient Limiter.

3.4 Plotting of Conducted Emission Measurement Data

The measurement data pertaining to each frequency sub-range were concatenated to form a single graph of (peak) amplitude versus frequency. This was performed for both Active and Neutral lines and the composite graph was subsequently plotted. A list of the highest relevant peaks and the respective Quasi-Peak and Average values were also plotted on the graph.

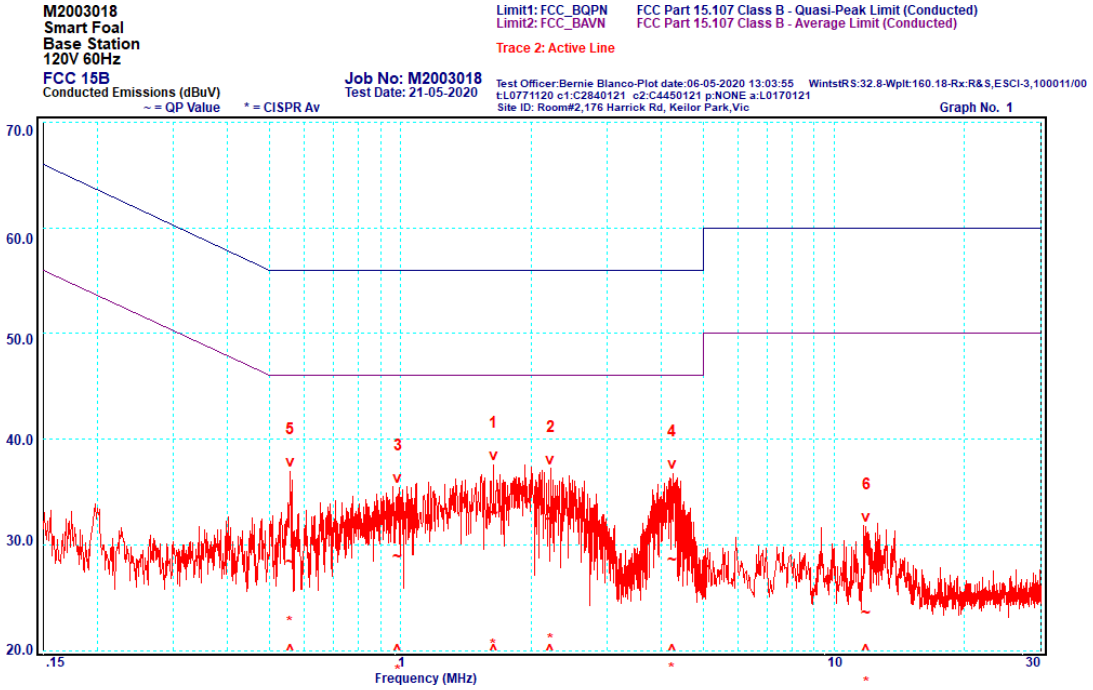
3.5 Test Results

3.5.1 AC Mains power ports – Base Station

3.5.1.1 Test Climatic Conditions

Shielded Room Temperature: 16°C
Relative Humidity: 53%

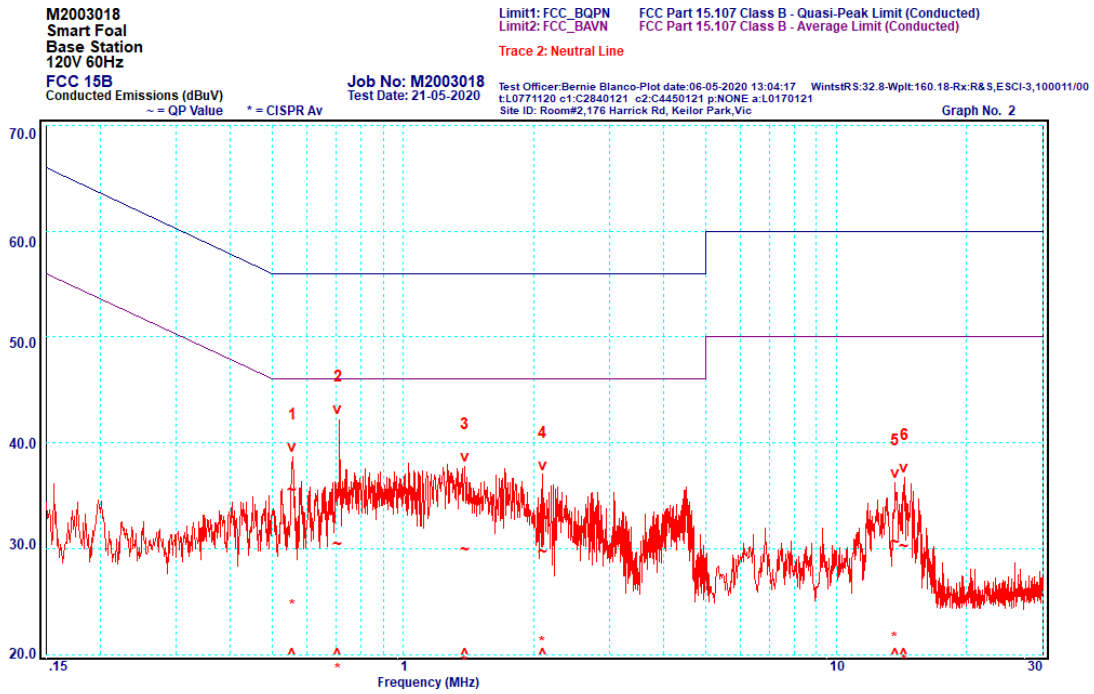
3.5.1.2 Test Results



Graph 3-1: Active Line (0.15 MHz to 30 MHz)

Table 3-1: Active Line (0.15 MHz to 30 MHz)

Peak	Frequency [MHz]	Line	Quasi-Peak			Average		
			Level [dBµV]	Limit [dBµV]	Margin [dB]	Level [dBµV]	Limit [dBµV]	Margin [dB]
1	1.643	Active	33.0	56.0	-23.0	20.5	46.0	-25.5
2	2.222	Active	32.4	56.0	-23.6	21.0	46.0	-25.0
3	0.987	Active	28.9	56.0	-27.1	18.0	46.0	-28.0
4	4.231	Active	28.5	56.0	-27.5	18.2	46.0	-27.8
5	0.558	Active	28.3	56.0	-27.7	22.6	46.0	-23.4
6	11.87	Active	23.5	60.0	-36.5	16.9	50.0	-33.1



Graph 3-2: Neutral Line (0.15 MHz to 30 MHz)

Table 3-2: Neutral Line (0.15 MHz to 30 MHz)

Peak	Frequency [MHz]	Line	Quasi-Peak			Average		
			Level [dBµV]	Limit [dBµV]	Margin [dB]	Level [dBµV]	Limit [dBµV]	Margin [dB]
1	**0.556**	**Neutral**	**35.5**	**56.0**	**-20.5**	**24.6**	**46.0**	**-21.4**
2	0.708	Neutral	30.4	56.0	-25.6	18.5	46.0	-27.5
3	1.389	Neutral	29.9	56.0	-26.1	19.2	46.0	-26.8
4	2.103	Neutral	29.7	56.0	-26.3	21.1	46.0	-24.9
5	13.69	Neutral	30.6	60.0	-29.4	21.5	50.0	-28.5
6	14.36	Neutral	30.2	60.0	-29.8	19.3	50.0	-30.7

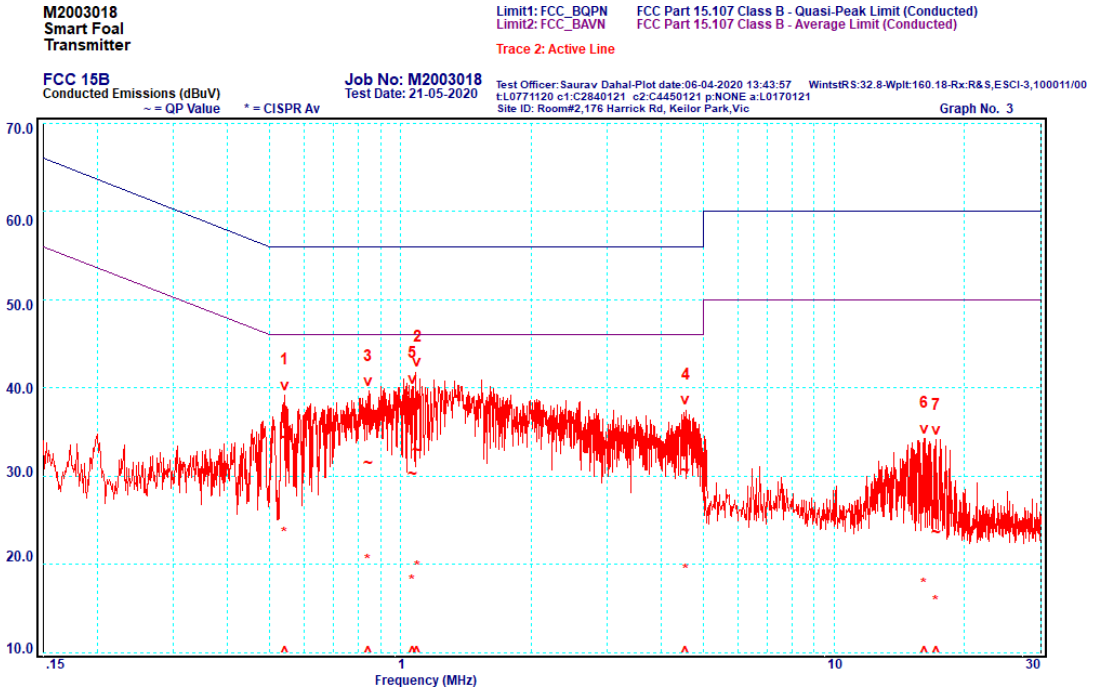
The worst case conducted EMI occurred at 0.556 MHz (Neutral Line) and complied with the Class B quasi peak and average limits by margins of 20.5 dB and 21.4 dB respectively. Refer to Graph 3-1 and Graph 3-2.

3.5.2 AC Mains power ports – Transmitter

3.5.2.1 Test Climatic Conditions

Shielded Room Temperature: 20.5°C
Relative Humidity: 46%

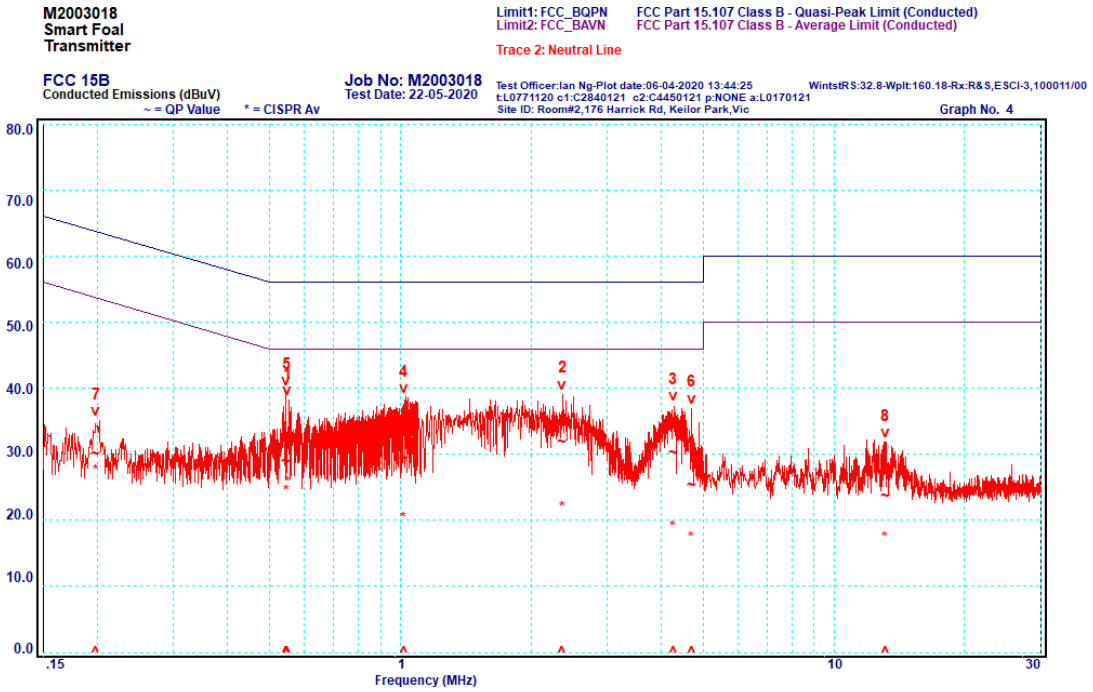
3.5.2.2 Test Results



Graph 3-3: Active Line (0.15 MHz to 30 MHz)

Table 3-3: Active Line (0.15 MHz to 30 MHz)

Peak	Frequency [MHz]	Line	Quasi-Peak			Average		
			Level [dBµV]	Limit [dBµV]	Margin [dB]	Level [dBµV]	Limit [dBµV]	Margin [dB]
1	0.542	Active	34.3	56.0	-21.7	23.5	46.0	-22.5
2	1.095	Active	33.0	56.0	-23.0	19.6	46.0	-26.4
3	0.842	Active	31.4	56.0	-24.6	20.4	46.0	-25.6
4	4.550	Active	30.6	56.0	-25.4	19.3	46.0	-26.7
5	1.067	Active	30.1	56.0	-25.9	18.1	46.0	-27.9
6	16.15	Active	27.9	60.0	-32.1	17.7	50.0	-32.3
7	17.22	Active	23.6	60.0	-36.4	15.7	50.0	-34.3



Graph 3-4: Neutral Line (0.15 MHz to 30 MHz)

Table 3-4: Neutral Line (0.15 MHz to 30 MHz)

Peak	Frequency [MHz]	Line	Quasi-Peak			Average		
			Level [dBµV]	Limit [dBµV]	Margin [dB]	Level [dBµV]	Limit [dBµV]	Margin [dB]
1	**0.550**	**Neutral**	**31.9**	**56.0**	**-24.1**	**25.6**	**46.0**	**-20.4**
2	2.364	Neutral	31.8	56.0	-24.2	21.8	46.0	-24.2
3	4.263	Neutral	30.2	56.0	-25.8	18.9	46.0	-27.1
4	1.020	Neutral	29.4	56.0	-26.6	20.2	46.0	-25.8
5	0.546	Neutral	28.9	56.0	-27.1	24.3	46.0	-21.7
6	4.695	Neutral	25.4	56.0	-30.6	17.2	46.0	-28.8
7	0.199	Neutral	30.0	63.7	-33.7	27.4	53.7	-26.3
8	13.15	Neutral	23.7	60.0	-36.3	17.2	50.0	-32.8

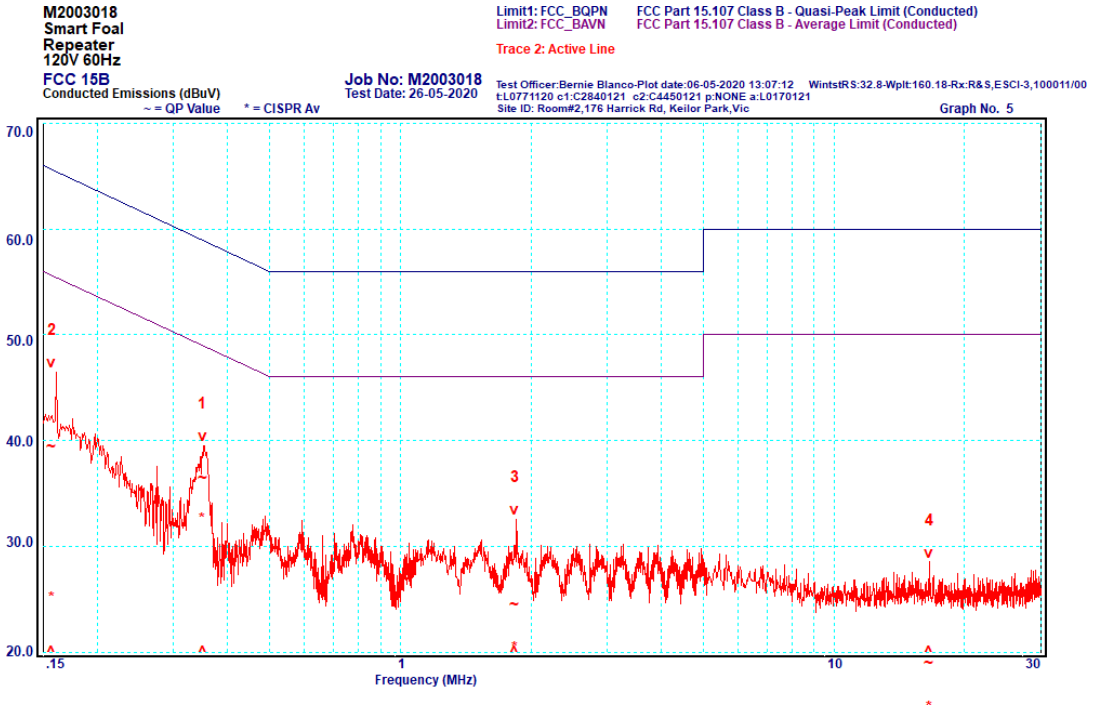
The worst case conducted EMI occurred at 0.550 MHz (Neutral Line) and complied with the Class B quasi peak and average limits by margins of 24.1 dB and 20.4 dB respectively. Refer to Graph 3-3 and Graph 3-4.

3.5.3 AC Mains power ports – Repeater

3.5.3.1 Test Climatic Conditions

Shielded Room Temperature: 20.5°C
Relative Humidity: 46%

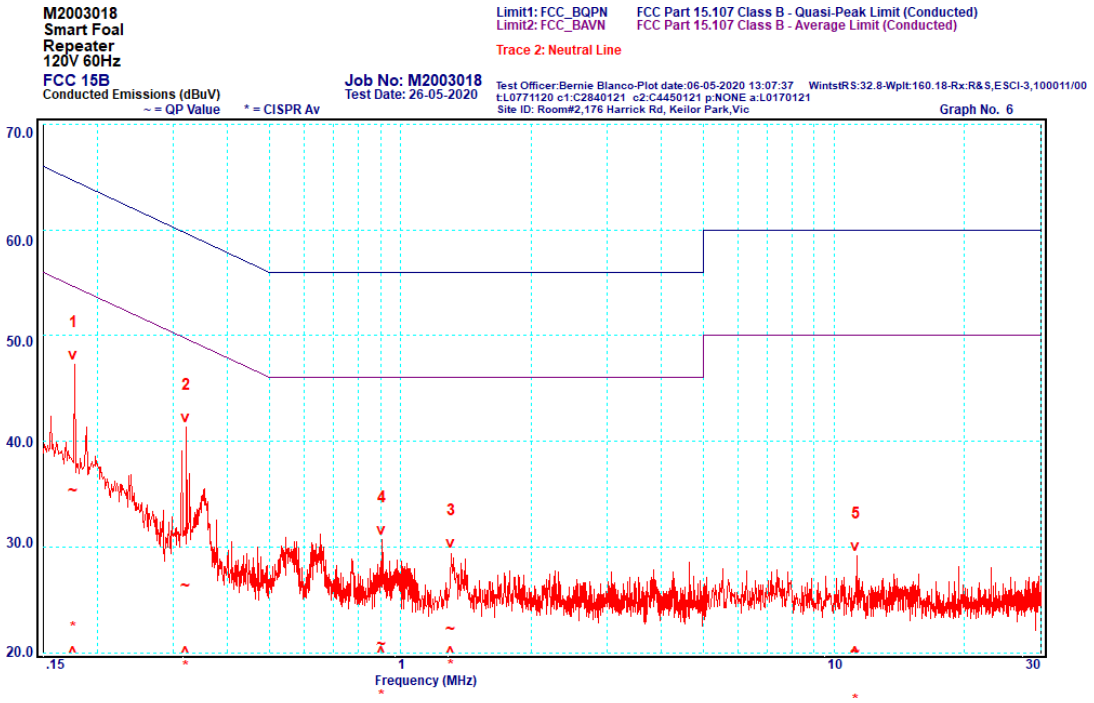
3.5.3.2 Test Results



Graph 3-5: Active Line (0.15 MHz to 30 MHz)

Table 3-5: Active Line (0.15 MHz to 30 MHz)

Peak	Frequency [MHz]	Line	Quasi-Peak			Average		
			Level [dBµV]	Limit [dBµV]	Margin [dB]	Level [dBµV]	Limit [dBµV]	Margin [dB]
1	**0.350**	**Active**	**36.4**	**59.0**	**-22.6**	**32.5**	**49.0**	**-16.5**
2	0.157	Active	39.4	65.6	-26.2	25.1	55.6	-30.5
3	1.835	Active	24.4	56.0	-31.6	20.4	46.0	-25.6
4	16.57	Active	18.9	60.0	-41.1	14.7	50.0	-35.3



Graph 3-6: Neutral Line (0.15 MHz to 30 MHz)

Table 3-6: Neutral Line (0.15 MHz to 30 MHz)

Peak	Frequency [MHz]	Line	Quasi-Peak			Average		
			Level [dBµV]	Limit [dBµV]	Margin [dB]	Level [dBµV]	Limit [dBµV]	Margin [dB]
1	0.176	Neutral	35.2	64.7	-29.5	22.3	54.7	-32.4
2	0.320	Neutral	26.3	59.7	-33.4	18.6	49.7	-31.1
3	1.309	Neutral	22.2	56.0	-33.8	18.7	46.0	-27.3
4	0.905	Neutral	20.8	56.0	-35.2	15.9	46.0	-30.1
5	11.20	Neutral	20.0	60.0	-40.0	15.4	50.0	-34.6

The worst case conducted EMI occurred at 0.350 MHz (Active Line) and complied with the Class B quasi peak and average limits by margins of 22.6 dB and 16.5 dB respectively. Refer to Graph 3-5 and Graph 3-6.

4 RADIATED EMISSIONS MEASUREMENTS

4.1 Test Procedure

The EUT was set up on the table top (placed on turntable) of total height 80 cm above the ground plane, and operated as described in section 2 of this report. The EMI Receiver was operated under software control via the PC Controller through the IEEE.488 Interface Bus Card Adaptor. The test frequency range was sub-divided into smaller bands with sufficient frequency resolution to permit reliable display and identification of possible EMI peaks while also permitting fast frequency scan times. A calibrated Biconilog antenna was used for measurements between 30 MHz and 1000 MHz. A calibrated double-ridged horn antenna was used for measurements over 1000 MHz.

Testing was performed at a distance of 10 metres for the frequency range 30 to 1000 MHz and 3 metres for above 1 GHz.

The measurement of emissions between 30 - 1000 MHz was measured with the resolution bandwidth of 120 kHz and the video bandwidth of 300 kHz.

The measurement of emissions above 1000 MHz was measured with the resolution bandwidth of 1000 kHz and the video bandwidth of 10 Hz for average measurements. The video bandwidth of 1000 kHz was used for peak measurements.

The receiver bandwidth was set to 6 dB.

The EUT was slowly rotated with the Peak Detector set to Max-Hold. This was performed for two antenna heights. Each significant peak was then investigated and maximised with the Quasi-Peak detector. The measurement data for each frequency range was automatically corrected by the software for cable losses, antenna factors and preamplifier gain and all data was then stored on disk in sequential data files. This process was performed for both horizontal and vertical antenna polarisations.

4.2 Plotting of Measurement Data for Radiated Emissions

The stored measurement data was combined to form a single graph which comprised of all the frequency sub-ranges. The accumulated EMI (EUT ON) was plotted as the Red trace.

The highest recorded EMI signals are shown on the Peaks List on the bottom right side of the graph. For radiated EMI, each numbered peak is listed as a frequency, peak field strength, quasi-peak field strength and the margin relative to the limit in dB. A negative margin is the deviation of the recorded value below the limit.

4.3 Calculation of Field Strength

The field strength was calculated automatically by the software using all the pre-stored calibration data. The method of calculation is shown below:

$$E = V + AF - G + L$$

Where:

E = Radiated Field Strength in dBµV/m.

V = EMI Receiver Voltage in dBµV. (measured value)

AF = Antenna Factor in dB(m^{-1}). (stored as a data array of factor versus frequency)

G = Preamplifier Gain in dB. (stored as a data array of gain versus frequency)

L = Cable insertion loss in dB. (stored as a data array of insertion loss versus frequency)

Example Field Strength Calculation

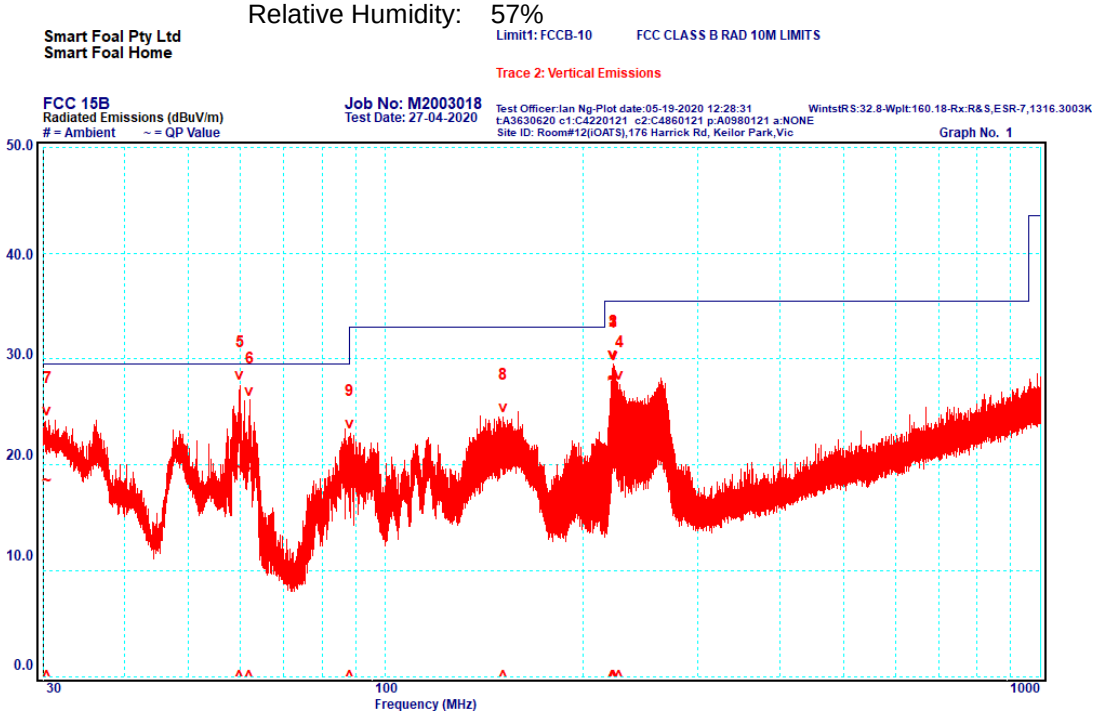
Assuming a receiver reading of 34.0 dBμV is obtained at 90 MHz, the Antenna Factor at that frequency is 9.2 dB. The cable loss is 1.9 dB while the preamplifier gain is 20.0 dB. The resulting Field Strength is therefore as follows:

34.0 + 9.2 + 1.9 - 20.0 = 25.1 dBμV/m

4.3.1 Test Results 30 – 1000 MHz

4.3.1.1 Test Climatic Conditions

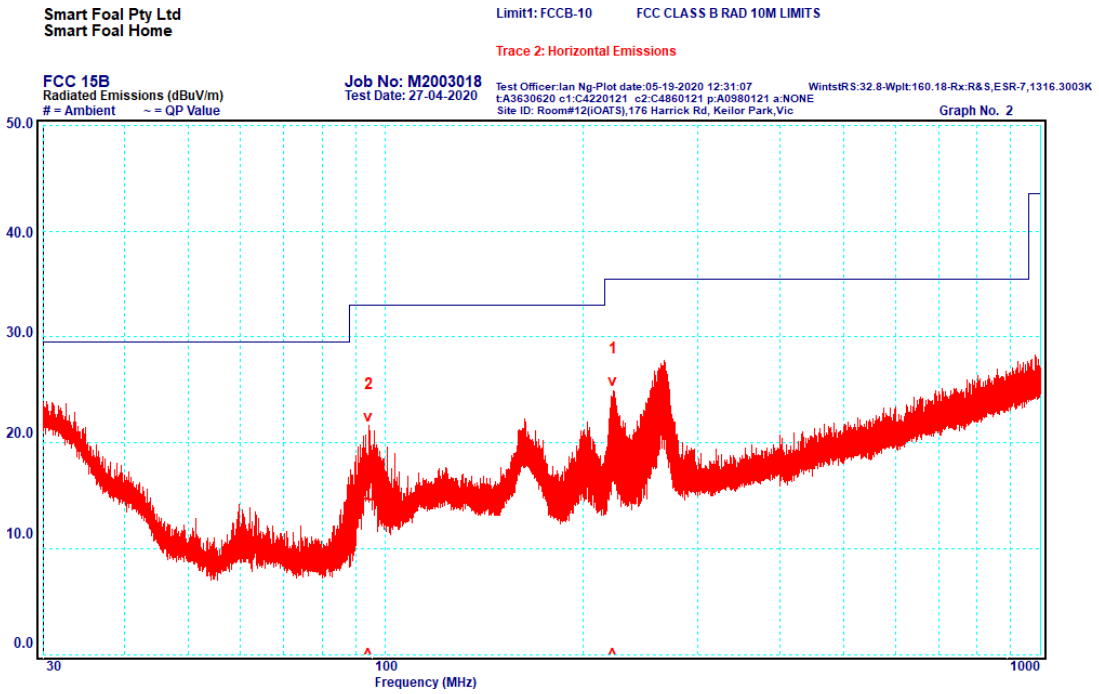
Shielded Room Temperature: 17.1°C
Relative Humidity: 57%



Graph 4-1: Vertical Polarisation (30 MHz to 1 GHz)

Table 4-1: Vertical Polarisation (30 MHz to 1 GHz)

Peak	Frequency [MHz]	Polarisation	Quasi Peak		
			Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]
1	**222.99**	**Vertical**	**28.2**	**35.5**	**-7.3**
2	222.43	Vertical	28.2	35.5	-7.3
3	222.37	Vertical	28.0	35.5	-7.5
4	227.66	Vertical	25.9	35.5	-9.6
5	59.92	Vertical	19.7	29.5	-9.8
6	62.00	Vertical	19.6	29.5	-9.9
7	30.49	Vertical	18.5	29.5	-11.0
8	151.36	Vertical	20.4	33.0	-12.6
9	88.12	Vertical	19.8	33.0	-13.2



Graph 4-2: Horizontal Polarisation (30 MHz to 1 GHz)

Table 4-2: Horizontal Polarisation (30 MHz to 1 GHz)

Peak	Frequency [MHz]	Polarisation	Quasi Peak		
			Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]
1	222.45	Horizontal	20.1	35.5	-15.4
2	94.28	Horizontal	14.6	33.0	-18.4

The worst case radiated EMI occurred at 222.99 MHz (Vertical polarity) and complied with the Class B quasi peak limit by a margin of 7.3 dB. Refer to Graph 4-1 and Graph 4-2.

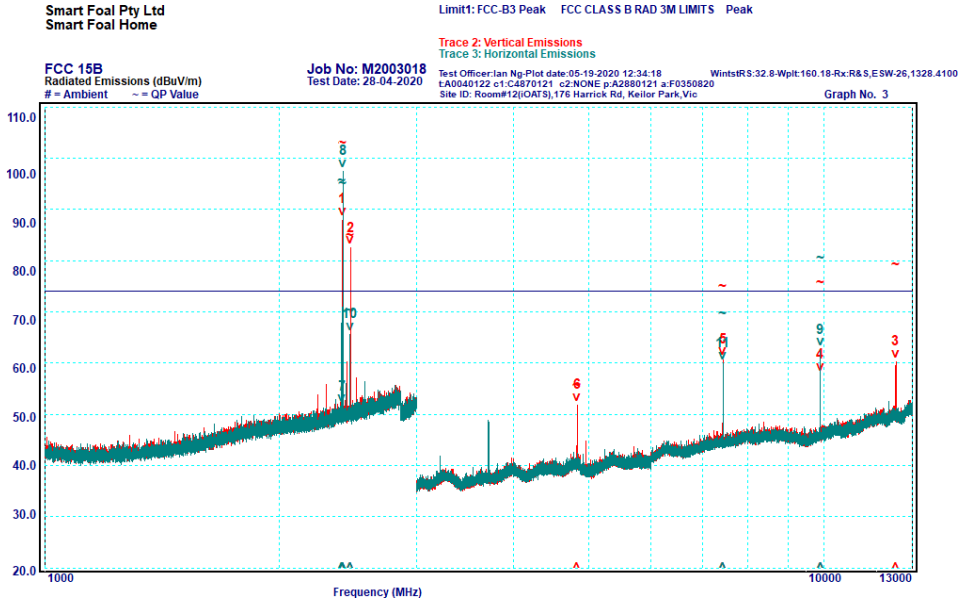
4.3.2 Test Results Above 1 GHz Results

4.3.2.1 Test Climatic Conditions

Shielded Room Temperature: 16.1°C
Relative Humidity: 56%

Testing was performed to 13 GHz at a distance of 3 metres. Both peak and average measurements were recorded. The highest measurements are listed below.

Peak Measurements:



Graph 4-3: Vertical and Horizontal Polarisation (Peak, 1GHz to 13 GHz)

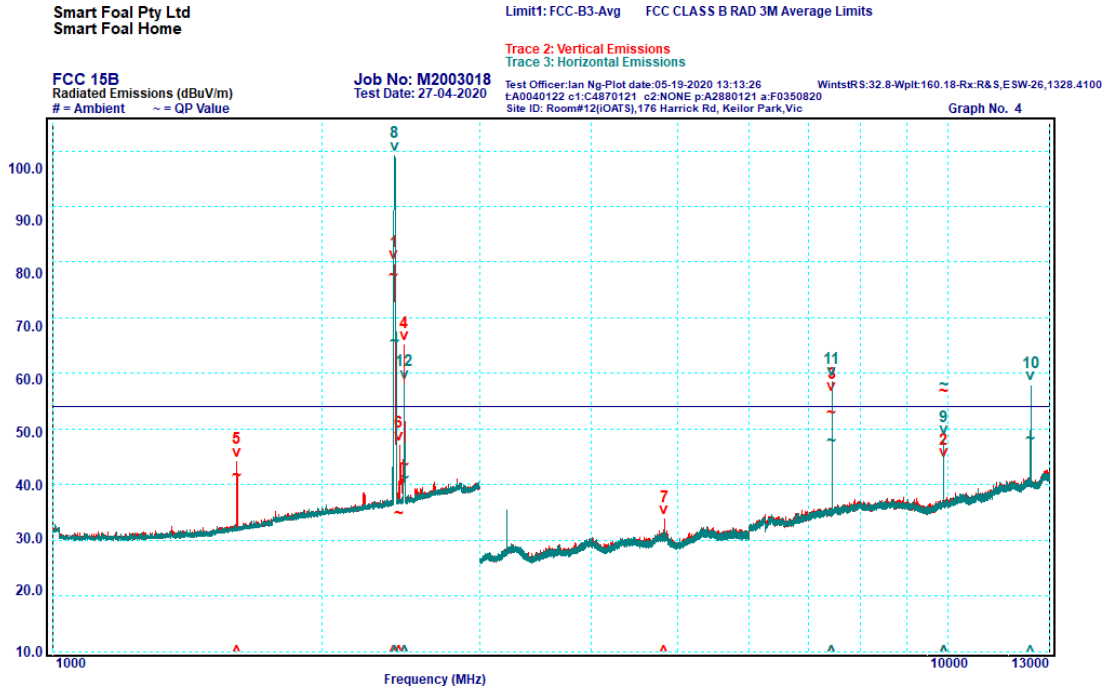
Table 4-3: Vertical and Horizontal Polarisation (Peak, 1 GHz to 13 GHz)

Peak	Frequency [MHz]	Polarisation	Peak		
			Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]
1	2413.66	Vertical	--	--	Note
2	2470.64	Vertical	--	--	Note
3	12379.30	Vertical	--	--	Note
4	9903.14	Vertical	--	--	Note
5	7428.28	Vertical	--	--	Note
6	4824.00	Vertical	--	--	Note
7	2407.00	Horizontal	--	--	Note
8	2414.26	Horizontal	--	--	Note
9	9904.43	Horizontal	--	--	Note
10	2467.04	Horizontal	--	--	Note
11	7427.89	Horizontal	--	--	Note

Note: Peak is EUT intentional radiator measurement and is therefore excluded from the unintentional radiator emission results.

All emissions complied with the Class B peak limit by a margin of >10 dB. Refer to Graph 4-3.

Average Measurements:



Graph 4-4: Vertical and Horizontal Polarisation (Average, 1 GHz to 13 GHz)

Table 4-4: Vertical and Horizontal Polarisation (Average, 1 GHz to 13 GHz)

Peak	Frequency [MHz]	Polarisation	Average		
			Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]
1	2410.00	Vertical	--	--	Note
2	9903.84	Vertical	--	--	Note
3	7427.59	Vertical	--	--	Note
4	2474.24	Vertical	--	--	Note
5	**1607.93**	**Vertical**	**41.6**	**54.0**	**-12.4**
6	2440.45	Vertical	--	--	Note
7	4823.70	Vertical	--	--	Note
8	2412.46	Horizontal	--	--	Note
9	9903.51	Horizontal	--	--	Note
10	12380.40	Horizontal	--	--	Note
11	7427.26	Horizontal	--	--	Note
12	2474.24	Horizontal	--	--	Note

The worst case radiated EMI occurred at 1607.93 MHz and complied with the Class B average limit by a margin of 12.4 dB. Refer to Graph 4-4.

5 COMPLIANCE STATEMENT

The Smart Foal Home, Model Numbers: Base Station: 2.0, Repeater: 1.2, Transmitter: 1.9, tested on behalf of Smart Foal Pty Ltd complied with the applicable EMI requirements of the 47 CR Part 15 Subpart B Rules for a Class B device (unintentional radiator).

6 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

Mains Port

9 kHz to 30 MHz	±3.2 dB

Radiated Emissions

30MHz to 300MHz	±5.1 dB
300MHz to 1000MHz	±4.7 dB
1GHz to 18GHz	±4.6 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%.

Application of measurement uncertainty for this report:

The referenced uncertainty standard specifies that determination of compliance shall be based on measurements without taking into account measurement uncertainty. However, the measurement uncertainty shall appear in the test report.

APPENDIX A -TEST EQUIPMENT

Manufacturer	Model Number	Serial Number	Asset Number	Description	Cal Date	Cal Due
Frankonia	Room 12 SAC-10-2	--	R-139	Room 12 10 m ALSE	03/10/2020	03/10/2021
EMCO	3115	8908-3282	A-004	Antenna Horn DRW 1-18 GHz	16/01/2019	16/01/2022
Radio Technology	PRA1G2-35B	626	A-098	1kHz to 2GHz - RF Pre-Amplifier	17/07/2019	17/07/2020
EMCT	3mBNCYellow	C284-3m	C-284	3m Cable	02/01/2020	02/01/2021
Electronic Development Sales	SG18-B3015	1	A-288	Pre Amplifier	07/01/2020	07/01/2021
Sunar	JB6	A012312	A-363	Antenna Biconilog	05/06/2018	05/06/2020
EMCT	P1to10mSR	_	C-422	Room 12 Inbuilt cable Panel 1 to 10m SR + C458	03/01/2020	03/01/2021
EMCT	3mBNC	C445-3m	C-445	BNC CABLE, 3m	02/01/2020	02/01/2021
Huber & Suhner	SUCOFLEX 104A/11N	507095 /4A	C-486	Sucoflex 104A/11N 8m cable - DC - 18GHz	02/01/2020	02/01/2021
Huber & Suhner	SUCOFLEX 104A/11N	507097 /4A	C-487	Cable Room 12 3m to panel	02/01/2020	02/01/2021
Micro-Tronics	HPM50111	G234	F-035	RF High Pass Filter	23/08/2019	23/08/2020
Hewlett Packard	11947A	3107A02888	L-017	LIMITER TRANSIENT	09/07/2019	09/07/2020
Rohde & Schwarz	ESCI	100011	R-028	EMC Receiver	02/07/2019	02/07/2020
Rhode & Schwarz	ESR7	101804	R-142	7 GHz Receiver	06/08/2019	06/08/2020
Rhode & Schwarz	ESW26	101306	R-143	EMC Receiver	31/05/2019	31/05/2021

APPENDIX B - DEVICE IDENTIFICATION PHOTOGRAPHS

Test Sample Identification

Base Station

Transmitter

Test Sample Identification

Repeater

Test Sample Identification

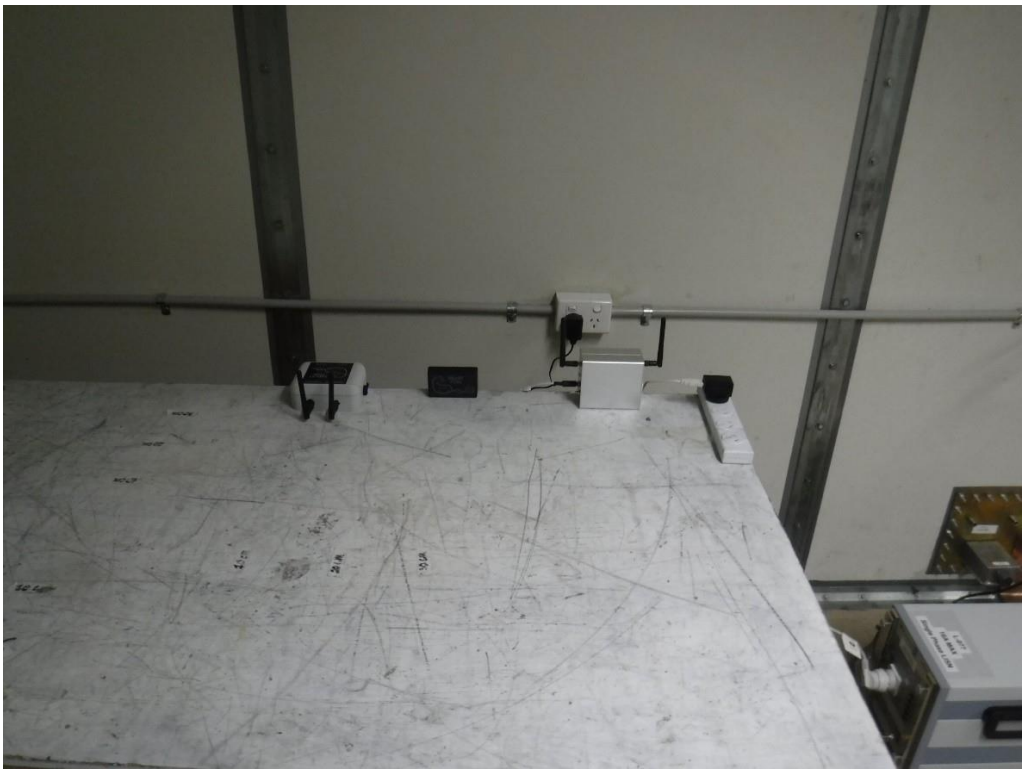
Base station / Transmitter power supply

Repeater power supply

APPENDIX C -TEST SETUP PHOTOGRAPHS

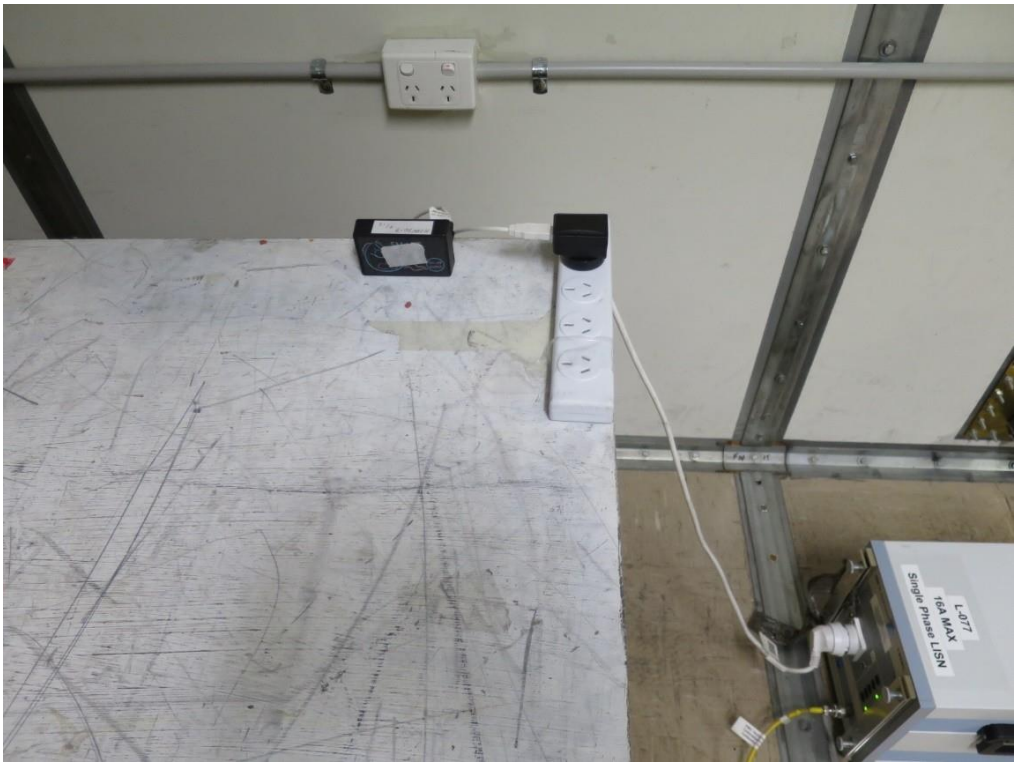
Conducted Emissions

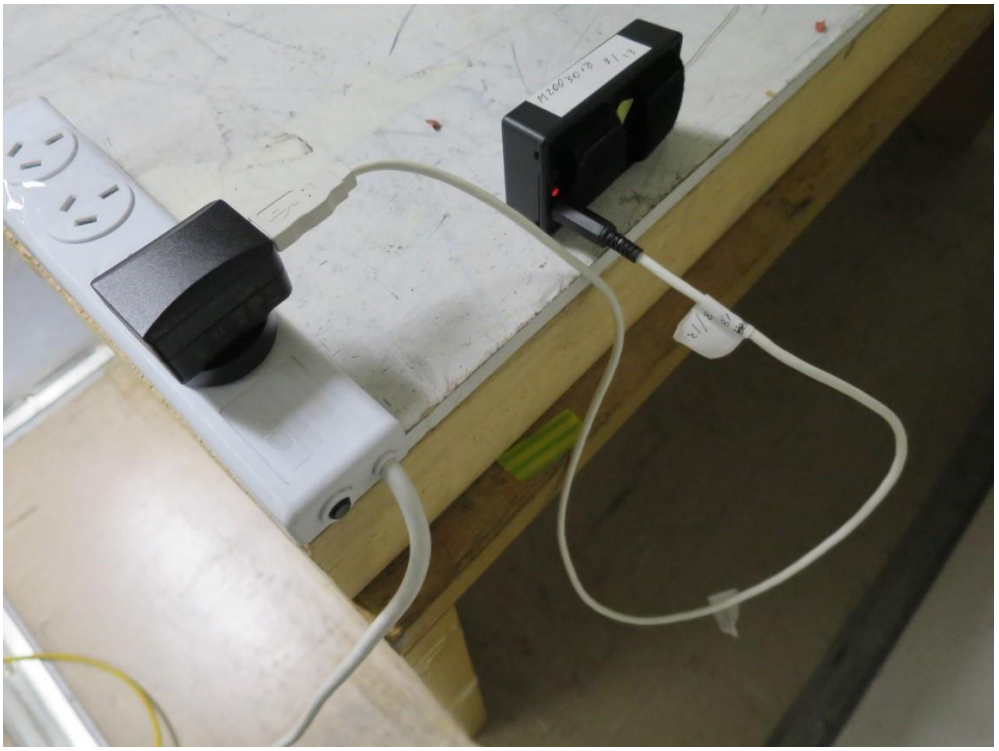
Base Station



Conducted Emissions

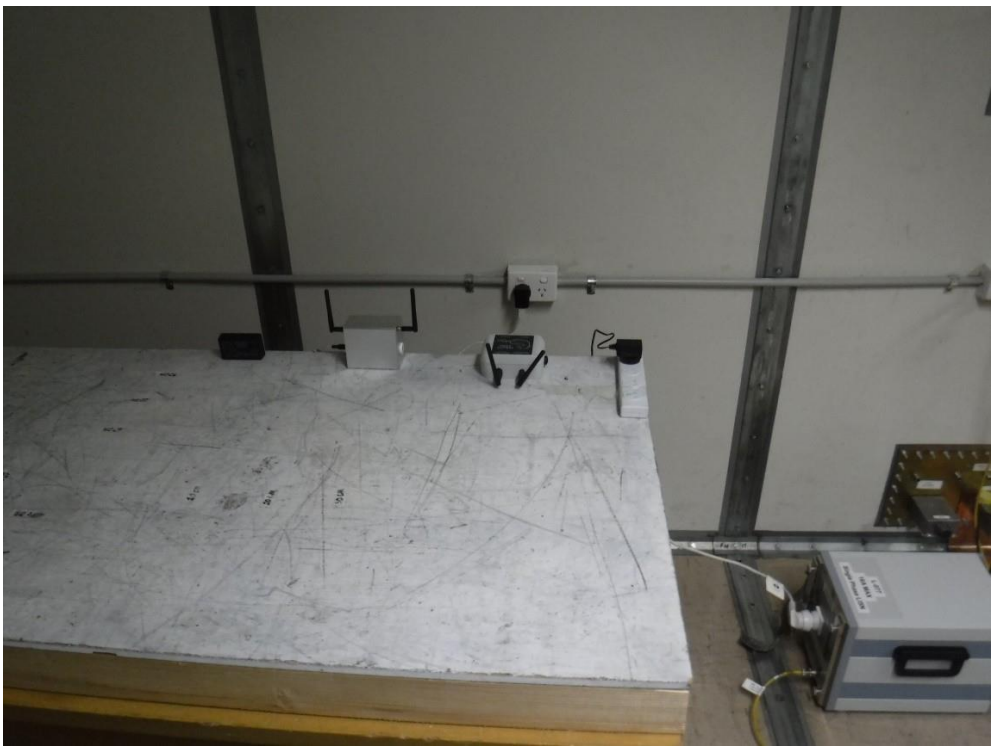
Transmitter (charging)



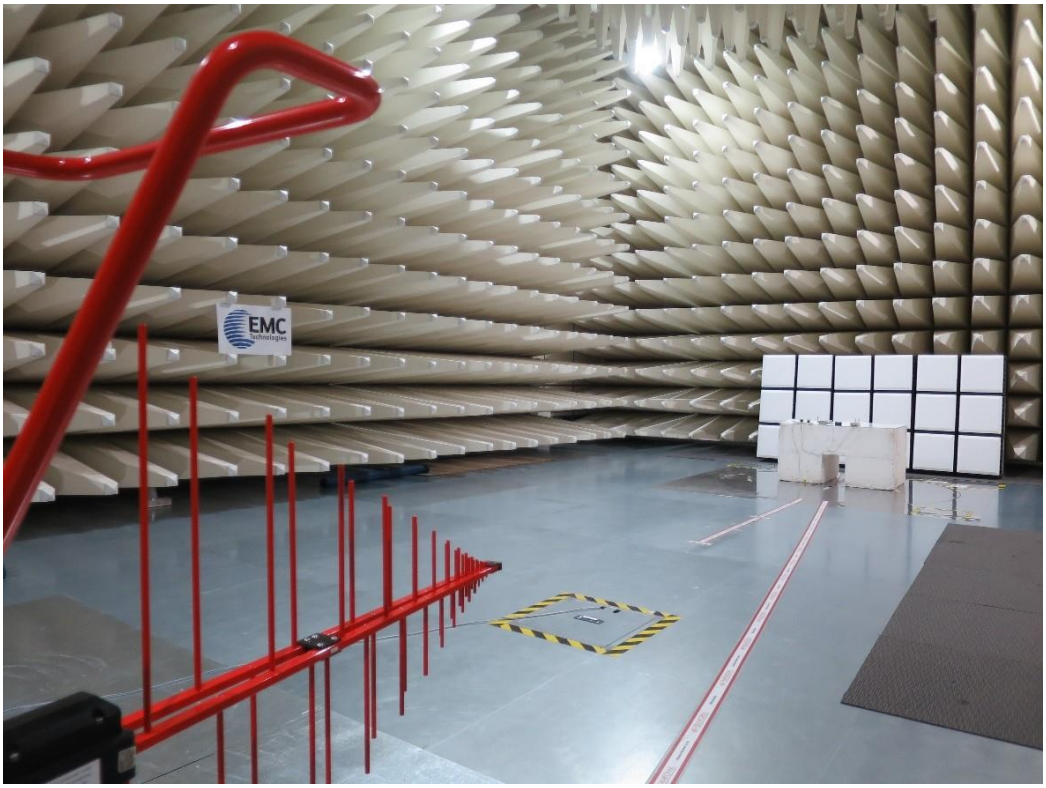


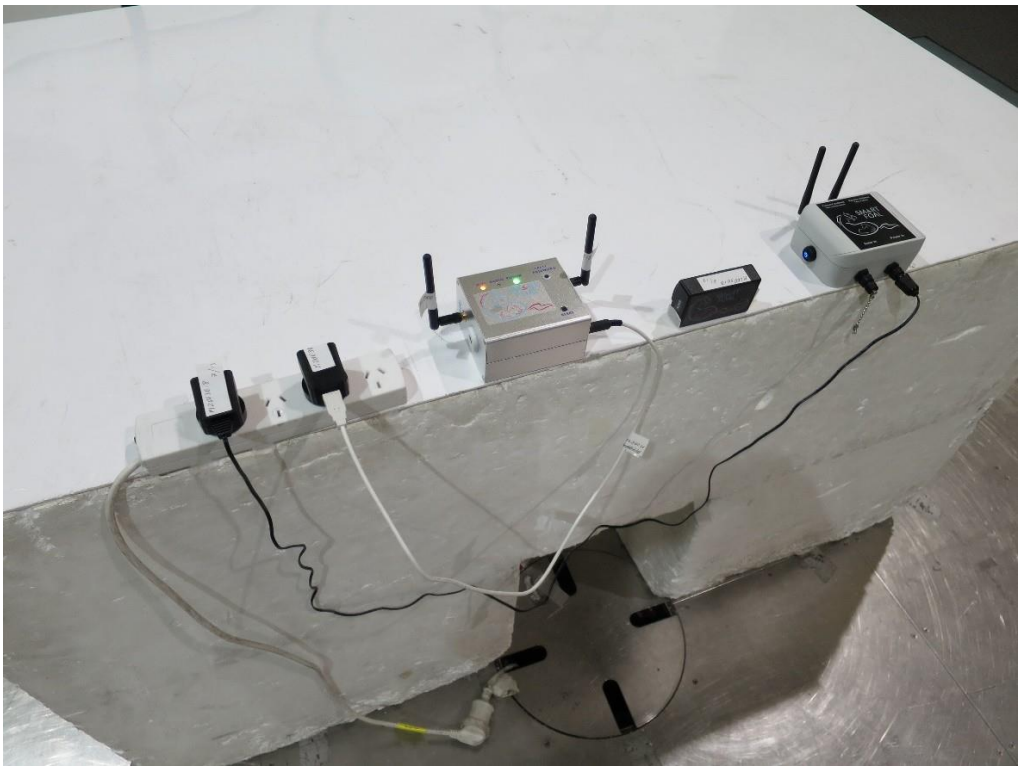
Conducted Emissions

Repeater

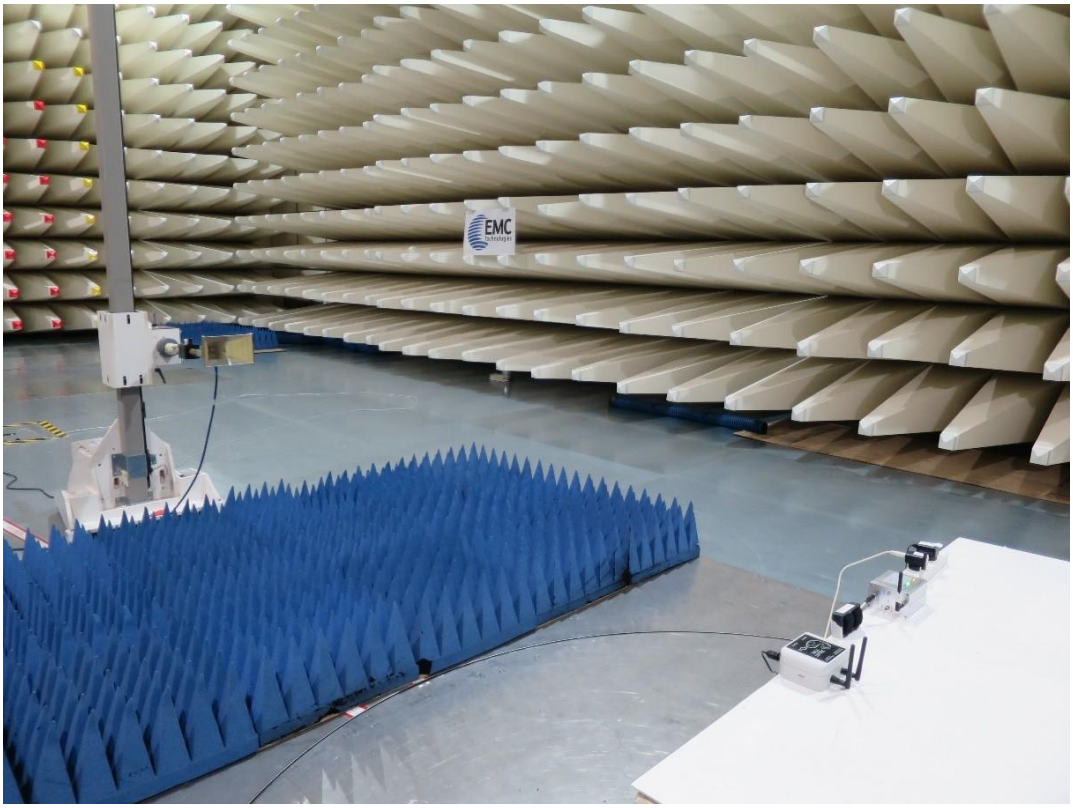


Radiated Emissions (below 1 GHz)





Radiated Emissions (above 1 GHz)



APPENDIX D – LABELLING AND USER INFORMATION REQUIREMENTS

The following information is believed to be true and accurate, however we advise that the current FCC rules/regulations be consulted. EMC Technologies accepts no responsibility for any consequences arising from the use of the following information. It is the manufacturer's/suppliers' responsibility to ensure that all applicable FCC Rules are identified and adhered to.

If other parts of the FCC Rules apply, there may be requirements for additional or different forms of labelling and user information.

FCC REQUIREMENTS (Summarised)

§2.1074 Identification.

(a) Devices subject only to Supplier's Declaration of Conformity shall be uniquely identified by the party responsible for marketing or importing the equipment within the United States. However, the identification shall not be of a format which could be confused with the FCC Identifier required on certified equipment. The responsible party shall maintain adequate identification records to facilitate positive identification for each device.

(b) Devices subject to authorization under Supplier's Declaration of Conformity may be labelled with the following logo on a voluntary basis as a visual indication that the product complies with the applicable FCC requirements. The use of the logo on the device does not alleviate the requirement to provide the compliance information required by §2.1077.

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[82 FR 50829, Nov. 2, 2017]

§2.1077 Compliance information.

(a) If a product must be tested and authorized under Supplier's Declaration of Conformity, a compliance information statement shall be supplied with the product at the time of marketing or importation, containing the following information:

(1) Identification of the product, *e.g.,* name and model number;

(2) A compliance statement as applicable, *e.g.,* for devices subject to part 15 of this chapter as specified in §15.19(a)(3) of this chapter, that the product complies with the rules;

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

NB: Where a device is constructed in two or more sections connected by wires and marketed together, the statement specified under paragraph (a) of this section is required to be affixed only to the main control unit.

When the device is so small or for such use that it is impracticable to label it with the statement specified under paragraph (a) of this section in a font that is four-point or larger, and the device does not have a display that can show electronic labelling, then the information required by this paragraph shall be placed in the user manual and must also either be placed on the device packaging or on a removable label attached to the device.

(3) The identification, by name, address and telephone number or Internet contact information, of the responsible party, as defined in §2.909. The responsible party for Supplier's Declaration of Conformity must be located within the United States.

(b) If a product is assembled from modular components (*e.g.,* enclosures, power supplies and CPU boards) that, by themselves, are authorized under a Supplier's Declaration of Conformity and/or a grant of certification, and the assembled product is also subject to authorization

under Supplier's Declaration of Conformity but, in accordance with the applicable regulations, does not require additional testing, the product shall be supplied, at the time of marketing or importation, with a compliance information statement containing the following information:

(1) Identification of the assembled product, *e.g.,* name and model number.

(2) Identification of the modular components used in the assembly. A modular component authorized under Supplier's Declaration of Conformity shall be identified as specified in paragraph (a)(1) of this section. A modular component authorized under a grant of certification shall be identified by name and model number (if applicable) along with the FCC Identifier number.

e.g. Contains FCC ID: XXX-XXXX

(3) A statement that the product complies with part 15 of this chapter.

(4) The identification, by name, address and telephone number or Internet contact information, of the responsible party who assembled the product from modular components, as defined in §2.909. The responsible party for Supplier's Declaration of Conformity must be located within the United States.

(5) Copies of the compliance information statements for each modular component used in the system that is authorized under Supplier's Declaration of Conformity.

(c) The compliance information statement shall be included in the user's manual or as a separate sheet. In cases where the manual is provided only in a form other than paper, such as on a computer disk or over the Internet, the information required by this section may be included in the manual in that alternative form, provided the user can reasonably be expected to have the capability to access information in that form. The information may be provided electronically as permitted in §2.935.

[82 FR 50829, Nov. 2, 2017]

§2.938 Retention of records.

(a) For equipment subject to the equipment authorization procedures in this part, the responsible party shall maintain the records listed as follows:

(1) A record of the original design drawings and specifications and all changes that have been made that may affect compliance with the standards and the requirements of §2.931.

(2) A record of the procedures used for production inspection and testing to ensure conformance with the standards and the requirements of §2.931.

(3) A record of the test results that demonstrate compliance with the appropriate regulations in this chapter.

(b) For equipment subject to Supplier's Declaration of Conformity, the responsible party shall, in addition to the requirements in paragraph (a) of this section, maintain a record of the measurements made on an appropriate test site that demonstrates compliance with the applicable regulations in this chapter. The record shall:

(1) Indicate the actual date all testing was performed;

(2) State the name of the test laboratory, company, or individual performing the testing. The Commission may request additional information regarding the test site, the test equipment or the qualifications of the company or individual performing the tests;

(3) Contain a description of how the device was actually tested, identifying the measurement procedure and test equipment that was used;

(4) Contain a description of the equipment under test (EUT) and support equipment connected to, or installed within, the EUT;

(5) Identify the EUT and support equipment by trade name and model number and, if appropriate, by FCC Identifier and serial number;

(6) Indicate the types and lengths of connecting cables used and how they were arranged or moved during testing;

(7) Contain at least two drawings or photographs showing the test set-up for the highest line conducted emission and showing the test set-up for the highest radiated emission. These drawings or photographs must show enough detail to confirm other information contained in the test report. Any photographs used must clearly show the test configuration used;

(8) List all modifications, if any, made to the EUT by the testing company or individual to achieve compliance with the regulations in this chapter;

(9) Include all of the data required to show compliance with the appropriate regulations in this chapter;

(10) Contain, on the test report, the signature of the individual responsible for testing the product along with the name and signature of an official of the responsible party, as designated in §2.909; and

(11) A copy of the compliance information, as described in §2.1077, required to be provided with the equipment.

(c) The provisions of paragraph (a) of this section shall also apply to a manufacturer of equipment produced under an agreement with the original responsible party. The retention of the records by the manufacturer under these circumstances shall satisfy the grantee's responsibility under paragraph (a) of this section.

(d) For equipment subject to more than one equipment authorization procedure, the responsible party must retain the records required under all applicable provisions of this section.

(e) For equipment subject to rules that include a transition period, the records must indicate the particular transition provisions that were in effect when the equipment was determined to be compliant.

(f) For equipment subject to certification, records shall be retained for a one year period after the marketing of the associated equipment has been permanently discontinued, or until the conclusion of an investigation or a proceeding if the responsible party (or, under paragraph (c) of this section, the manufacturer) is officially notified that an investigation or any other administrative proceeding involving its equipment has been instituted. For all other records kept pursuant to this section, a two-year period shall apply.

(g) If radio frequency equipment is modified by any party other than the original responsible party, and that party is not working under the authorization of the original responsible party, the party performing the modifications is not required to obtain the original design drawings specified in paragraph (a)(1) of this section. However, the party performing the modifications must maintain records showing the changes made to the equipment along with the records required in paragraph (a)(3) of this section. A new equipment authorization may also be required.

[82 FR 50827, Nov. 2, 2017]

Part 15 additional requirements:

FCC 15.21 Modification warning

The users manual or instruction manual for an intentional or unintentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment. In cases where the manual is provided only in a form other than paper, such as on a computer disk or over the Internet, the information required by this section may be included in the manual in

that alternative form, provided the user can reasonably be expected to have the capability to access information in that form.

15.105 Information to user

For a Class A digital device or peripheral, the instructions shall include the following or similar statement, placed in a prominent location in the text of the manual:

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

For a Class B digital device or peripheral, the instructions shall include the following or similar statement, placed in a prominent location in the text of the manual:

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

—Reorient or relocate the receiving antenna.

—Increase the separation between the equipment and receiver.

—Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

—Consult the dealer or an experienced radio/TV technician for help.