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EMC COMPLIANCE REPORT

In accordance with:
CFR47 FCC Part 15, Subpart C

EPREP Pty Ltd

GL950X

EPREP sample preparation workstation

REPORT: E1705-0915-3 Rev1
DATE: June, 2017

This report replaces the previously issued report E1705-0915-3. *Please refer to section 2 of this report for details of any previously issued reports.*



Certificate of Compliance

EMC Bayswater Test Report: E1705-0915-3 Rev1
Issue Date: June, 2017

Test Sample(s): EPREP sample preparation workstation
Model No: GL950X
Serial No: 1000101
Part No: 01-01000-01

Client Details: Mr. Mark Wardle
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Test Specification: CFR47 FCC Part 15, Subpart C

Results Summary: 15.209 - Maximum Fundamental Field Strength **Complied**
15.209 - Radiated Spurious Emissions **Complied**
15.207 - Conducted Emissions **Complied**

Test Date(s): 5th to 24th of May, 2017

**Test House
(Issued By)** EMC Bayswater Pty Ltd
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This is to certify that the necessary measurements were made by EMC Bayswater Pty Ltd, and that the EPREP Pty Ltd, GL950X EPREP sample preparation workstation (Serial No: 1000101), has been tested in accordance with requirements contained in the appropriate commission regulations.

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EMC Compliance Report *for* EPREP Pty Ltd

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1. Introduction

Electromagnetic Compatibility (EMC) tests were performed on a EPREP Pty Ltd, GL950X, EPREP sample preparation workstation in accordance with the requirements of Title 47 of the standard CFR47 FCC Part 15, Subpart C.

2. Test Report Revision History

E1705-0915-3 – Original EMC test report issued on 16/06/2017.

E1705-0914 Rev1 – Table 7, Frequency column heading was changed from “Frequency (MHz)” to “Frequency (kHz)”. Tables 16, 17 and 18, Frequency column heading was changed from “Frequency (kHz)” to “Frequency (MHz)”. The font size of the customer address was changed from ‘9pt’ to ‘10pt’ on page 2.

3. Report Information

EMC Bayswater Pty Ltd reports apply only to the specific samples tested under the stated test conditions. All samples tested were in good operating condition throughout the entire test program unless otherwise stated. EMC Bayswater Pty Ltd does not in any way guarantees the later performance of the product/equipment. It is the manufacturer's responsibility to ensure that additional production units of the tested model are manufactured with identical electrical and mechanical components. EMC Bayswater Pty Ltd shall have no liability for any deductions, inference or generalisations drawn by the clients or others from EMC Bayswater Pty Ltd issued reports. This report shall not be used to claim, constitute or imply product endorsement by EMC Bayswater Pty Ltd. This report shall not be reproduced except in full, without the written approval of EMC Bayswater Pty Ltd. This document may be altered or revised by EMC Bayswater Pty Ltd personnel only, and shall be noted in the revision section of the document. Any alteration of this document not carried out by EMC Bayswater Pty Ltd will constitute fraud and shall nullify the document.

4. Summary of Results

The EUT complied with applicable requirements of CFR47 FCC Part 15, Subpart C. Worst-case results are tabled as follows:

FCC sections	Test	Result
15.209	Maximum Fundamental Field Strength - RFID	Complied by at least 55.8dB
15.209	Radiated Emissions – RFID/Bluetooth	Complied by 2.1dB
15.207	AC Power line Conducted Emissions	Complied by 14.6dB

Table 1: Summary of test results - EPREP sample preparation workstation – RFID

Note: The RFID and Bluetooth transmitters were continuously operated in active mode during the testing.

5. Product Sample, Configuration & Modifications

5.1. EUT Description

The EUT (Equipment Under Test), as supplied by the client, is described as follows:

Product:	EPREP sample preparation workstation	
Model No:	GL950X	
Part No:	01-01000-01	
Serial No:	1000101	
Firmware:	M:= 2017050201, P:= 2017042601	
Software:	2017052501	
Dimensions:	695mm x 1370mm x 720mm (Length x Width x Height)	
Weight:	70kg	
EUT Type:	Table Top	
Power Specifications	24VDC via plug pack with 2 x 12VDC battery backup	
	Description:	AC/DC Switching Adaptor
	Manufacturer:	Mean Well
	Model:	GST220A24
	Serial:	EB69M91589
	Input:	100-240VAC, 50/60Hz, 4.0A
	Output:	24V ~9.2A, 221W Max
	Comment:	None
Orientation:	The EUT is typically used in one orientation only	

(Customer supplied product information)

RFID module:	Manufacturer:	Priority 1 Design
	Model:	RFIDRW-E-232
	Software:	None stated
	Firmware:	305
	FCC ID:	None
	IC ID:	None
Transmitter Specification:	Channel Type:	RFID
	Frequency range:	124kHz to 140kHz
	Channel:	Single channel
	Modulation	None Stated
	Antenna Type:	Coil Antenna 22mm
	Antenna Gain:	None stated
	Maximum power:	None stated
	Maximum payload	None stated
	Environment:	0°C to 85°C (Operating Temperature Range)
Comment:	Information are based on the datasheet provided by manufacturer (MAN-RFIDRW-E-232, Revision D, November 15, 2010)	

Bluetooth module:	Manufacturer:	Microchip Technology Inc
	Model:	RN-41
	FW:	None stated
	FCC ID:	T9JRN41-3
	IC ID:	6514A-RN413
	MAC ID:	000666869374
	Version:	2.1
Transmitter Specification:	Class:	1
	Frequency range:	2402MHz to 2480MHz
	Modulation	None stated
	Antenna Type:	Ceramic Chip
	Antenna Gain:	None stated
	Maximum power:	18.97dBm
	Maximum payload	None stated
Comment:	Environment:	-40°C to 85°C (Operating Temperature Range)
	Information are based on the datasheet provided by manufacturer (RN41/RN41N, DS50002280A, 2014)	

(Customer supplied product information)

(Refer to photographs in Appendix B for views of the EUT)

5.2. Product description

The EUT (Equipment Under Test) has been described by the customer as follows:

“The product will be used in laboratories for preparing various liquid samples for later analysis. It will never be used in the home.”

(Customer supplied product description information)

5.3. Support Equipment

Support Equipment: 1	Description:	Control tablet
	Manufacturer:	Microsoft
	Model:	Surface Pro
	Serial number:	071578764753

5.4. Product operating modes

The customer described the products normal operation modes as the following:

“Communication mode: Bluetooth / USB
All axis running, wash pump: on/off”

(Customer supplied product operating mode information)

5.5. Product operating mode for testing

As declared by the customer, the product operating mode for testing as follows:

“For specific RFID testing a “tool scan” should be performed. This move scans the tools continuously until the user aborts. The test software will periodically fail a read, this is due to the lack of error checking. It is not an instrument failure.”

The RFID and Bluetooth transmitters were continuously operated in active mode during the testing and the robotic arm operation was halted (activating “break” button in the laptop computer running “Project1” test software).

5.6. Configuration

The EUT was either configured by the customer or configured using the customer’s instructions:

The EUT was powered by a 24VDC via an external AC/DC PSU which in turn was connected to 120VAC, 60Hz mains supply. The EUT was configured to communicate by Bluetooth via a non conductive RF link with the support equipment Bluetooth device (Microsoft Surface Pro Tablet) for all testing. This was achieved by configuring the Bluetooth connection then connecting the USB communication cable. The USB port was physically terminated at Microsoft Surface Pro Tablet but not used for communication or operation. Three (3) of the RS232 ports were looped back with a 1.8m long cable. Digital IO ports were looped back with a 2m long cable. “Project1” test software was supplied by customer to initiate EUT operation testing in Tool scan mode but aborted the movement of robotic arm (the motors were not operated during testing).

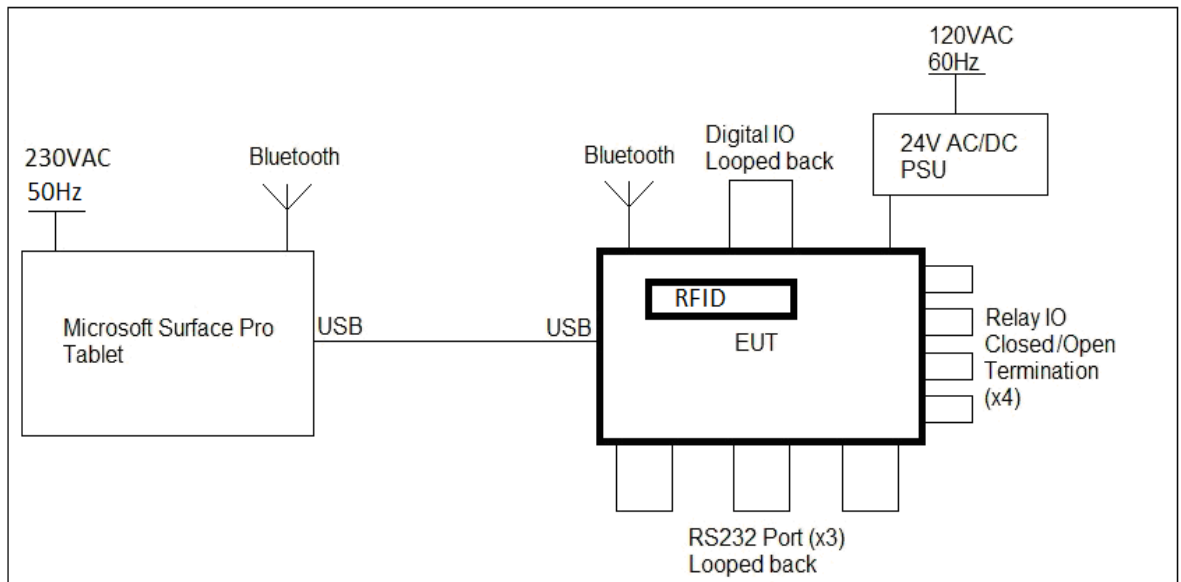


Table 2: Block diagram of EUT test configuration with Host

Additional radiated emissions measurements were performed with RFID module standalone. The module was supplied with 12VDC using a laboratory power supply. The customer supplied 3 separate loop antennas tuned to 124kHz, 134kHz and 140kHz for testing.

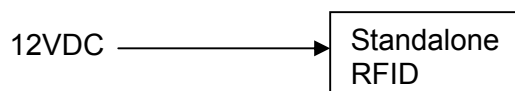


Table 3: Block diagram of test configuration – RFID module standalone

Port	Cable type	Length (m)	Cable Brand	Cable Model	Termination
24VDC PSU	4 core Non-shielded	1.0	Mean Well	GST220A24-R7B	EUT
AC Mains	3 core Non-shielded	2.0	Pirelli	N14108	Mains to 24VDC PSU
USB	4 core Shielded	2.0	CNC Tech	102-1030-BL-F0200	Microsoft Surface Pro
Relay IO - NO	2 core Non-shielded	2.0	Powertech	WH-3049	Open Termination
Relay IO - NO	2 core Non-shielded	2.0	Powertech	WH-3049	Closed Termination
Relay IO - NC	2 core Non-shielded	2.0	Powertech	WH-3049	Open Termination
Relay IO - NC	2 core Non-shielded	2.0	Powertech	WH-3049	Closed Termination
Digital IO	9 core Shielded	2.0	Electus	WC7534	Loop Back Termination
RS232 x 3	9 core Shielded	1.8	Digitech	WC7534	Loop Back Termination

Table 4: List of ports, loads and cable lengths used for testing

5.7. Modifications

The following modification was made by the customer to the EUT to comply with requirement of EN 61326-1: 2013, ETSI EN 301 489-1 V2.1.1 (2017-02), ETSI EN 301 489-3 V1.6.1 (2013-08) and ETSI EN 301 489-17 V3.1.1 (2017-02) for Electrostatic Discharge (ESD) testing.

- ❶ The enclosure side panel for inputs and outputs ports of the EUT was changed from a "Powder Coated" finish to "Stainless Steel" Side Panel.

(Refer to photograph 16 in Annex A for views of the modification)

Test report	Test	Modification
		❶
E1705-0915-1	Electromagnetic Radiation Disturbance	x
	Mains Terminal Disturbance Voltage	x
	Radiated Emissions	x
	Conducted Emissions	x
	Harmonic Current Emissions	x
	Voltage Change, Fluctuation and Flicker	x
	Electromagnetic Field (Radiated Electromagnetic Immunity)	x
	Conducted RF (Radio Frequency Continuous Conducted)	x
	Power Frequency Magnetic Field	x
	Burst/EFT	✓
	Surge	✓
	Voltage Dips and Interruptions	✓
	Electrostatic Discharge (ESD)	✓
E1705-0915-2	Radiated Emissions	x
	Conducted Emissions	x
E1705-0915-3	Maximum Fundamental Field Strength	x
	Radiated Spurious Emissions	x
	AC Power line Conducted Emissions	x
E1705-0915-4	Transmitter Maximum Fundamental Field strength	x
	Transmitter Unwanted emissions	x
	Transmitter Frequency Stability	x
	AC Power Line Conducted Emissions	x
E1705-0915-5	Operating Frequency Range	x
	Modulation bandwidth	x
	Transmitter H-field requirements	x
	Transmitter radiated spurious domain emission limits < 30 MHz	x
	Transmitter radiated spurious domain emission limits > 30 MHz	x
E1705-0915-6	Transmitter Maximum EIRP	x
	Transmitter Spurious emissions	x
	Operating Frequency (normal and extreme test conditions)	x

✓ = Modification fitted, x = Modification not fitted

Table 5: Summary of fitted modifications per test

EMC Bayswater takes no responsibility for any modifications made to the EUT specifically to achieve EMC compliance and hence these modifications may only be satisfactory for that purpose under the stated EUT test conditions. The customer must check that the proposed modifications meet all the product design, functional, safety or other compliance requirements. The customer elected not to re-test any of the previously completed tests (unless otherwise indicated in the table). EMC Bayswater takes no responsibility for any adverse EMC performance of the unrepeatable tests that may occur due to the modifications fitted.

6. Test Facility & Equipment

6.1. Test Facility

Radiated emissions measurements were taken in the indoor Open Area Test Site (iOATS) facility at EMC Bayswater Pty Ltd, located at 18/88 Merrindale Drive, Croydon South, Victoria, 3136, Australia.

Conducted Emissions measurements were taken in a standard shielded enclosure at EMC Bayswater Pty Ltd, located at 18/88 Merrindale Drive, Croydon South, Victoria, 3136, Australia.

EMC Bayswater Pty Ltd's FCC registration number is 419968.

6.2. Test Equipment

Refer to Appendix A for the measurement instrument list.

7. Referenced Standards

CFR47 FCC Part 15, Subpart C

CFR47 FCC Part 15, Subpart B

ANSI C63.10 - 2013

American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

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.

8. Maximum Fundamental Field Strength (FCC Part 15.209)

8.1. Test Procedure

Maximum field strength was measured 3 metres away from the EUT in the iOATS (indoor Open Area Test Site) facility, which is an ANSI C63.4 compliant semi-anechoic chamber with ground plane.

The EUT was placed on a polystyrene support at a height of 0.8m above the ground reference plane. The measuring antenna was located at a distance of 3m from the EUT. The spectrum analyser peak detector was set to MAX-HOLD and the range selected continuously scanned with 300Hz RBW and 1kHz VBW. The antenna height was fixed at 1 meter and the turntable slowly rotated. The EUT was also orientated in each of the X, Y and Z-axis, in-turn in order to find the worst-case emission arrangement.

Plots of the accumulated measurement data for X, Y and Z antenna orientations, including all transducer correction factors and other measuring system correction factors were produced using commercially available compliant software (as listed in the test equipment list of this report).

(Refer to photographs 1 to 4 in Annex C for views of the test configuration)

8.2. Limits

The EUT shall meet the limits in the following table:

Frequency Range (MHz)	Limits at 3m (dB μ V/m)
0.009 to 0.490	128.5 to 93.8
0.490 to 1.705	73.8 to 62.9
1.705 to 30.0	69.5
30.0 to 88	40.0
88.0 to 216.0	43.5
216.0 to 960.0	46.0
Above 960	54.0
NOTE: The lower limit shall apply at the transition frequency.	

Note 1: as per CFR FCC Part 15 section 15.209 (d) The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9kHz to 90kHz, 110kHz to 490kHz and above 1000MHz. Radiated emission limits in these three bands are based on measurements employing an average detector

Note 2: as per CFR FCC Part 15.35 (b) Unless otherwise specified, on any frequency or frequencies above 1000 MHz, the radiated emission limits are based on the use of measurement instrumentation employing an average detector function. Unless otherwise specified, measurements above 1000 MHz shall be performed using a minimum resolution bandwidth of 1 MHz. When average radiated emission measurements are specified in this part, including average emission measurements below 1000 MHz, there also is a limit on the peak level of the radio frequency emissions. Unless otherwise specified, e.g., see §§15.250, 15.252, 15.253(d), 15.255, 15.256, and 15.509 of this part, the limit on peak radio frequency emissions is 20 dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device, e.g., the total peak power level. Note that the use of a pulse desensitization correction factor may be needed to determine the total peak emission level. The instruction manual or application note for the measurement instrument should be consulted for determining pulse desensitization factors, as necessary.

Table 6: Limits for Radiated Emissions at distance of 3m – FCC Part 15.209 General limits

8.3. Test Results

Maximum Fundamental Field Strength measurements are tabulated below.

(Refer to graphs in Appendix C.1)

EPREP sample preparation workstation (RFID with host)

Antenna Orientation	Frequency (kHz)	Result Peak (dB μ V/m)	Limit Average (dB μ V/m)	Delta limit (dB)
X	130.767	49.5	105.3	-55.8*
Y	130.686	46.4	105.3	-58.9
Z	130.742	43.9	105.3	-61.4

*Worst-case emissions

Note: Peak measurements were below the Average limit (110kHz to 490kHz band), therefore average measurements were not performed and measured peak values were compared with average limit (worst-case) to determine the compliance.

Table 7: Maximum Fundamental Field Strength - EPREP sample preparation workstation – RFID

Additional testing of standalone RFID module

RFID Module with 134kHz coil antenna – standalone

(Refer to graphs in Appendix D.1)

Antenna Orientation	EUT Orientation	Frequency (kHz)	Result Peak (dB μ V/m)	Limit Average (dB μ V/m)	Delta limit (dB)
X	X	134.675	76.0	105.0	-29.0*
	Y	134.685	76.0	105.0	-29.0*
	Z	134.665	66.8	105.0	-38.2
Y	X	134.705	72.5	105.0	-32.5
	Y	134.705	72.5	105.0	-32.5
	Z	134.675	52.5	105.0	-52.5
Z	X	134.655	68.9	105.0	-36.1
	Y	134.675	68.9	105.0	-36.1
	Z	134.655	67.9	105.0	-37.1

*Worst-case emissions

Note: Peak measurements were below the Average limit (110kHz to 490kHz band), therefore average measurements were not performed and measured peak values were compared with average limit (worst-case) to determine the compliance.

Table 8: Maximum Fundamental Field Strength – RFID module standalone - 134kHz

RFID Module with 124kHz coil antenna – standalone

(Refer to graphs in Appendix E.1)

Antenna Orientation	EUT Orientation	Frequency (kHz)	Result Peak (dB μ V/m)	Limit Average (dB μ V/m)	Delta limit (dB)
X	X	124.038	75.8	105.7	-29.9
	Y	124.039	72.4	105.7	-33.3
	Z	124.038	67.7	105.7	-38.0
Y	X	124.038	76.1	105.7	-29.6*
	Y	124.029	71.2	105.7	-34.5
	Z	124.038	67.1	105.7	-38.6
Z	X	124.029	67.1	105.7	-38.6
	Y	124.038	52.7	105.7	-53.0
	Z	124.029	66.9	105.7	-38.8

**Worst-case emission*

Note: Peak measurements were below the Average limit (110kHz to 490kHz band), therefore average measurements were not performed and measured peak values were compared with average limit (worst-case) to determine the compliance.

Table 9: Maximum Fundamental Field Strength - RFID module standalone - 124kHz

RFID Module with 140kHz coil antenna – standalone

(Refer to graphs in Appendix F.1)

Antenna Orientation	EUT Orientation	Frequency (kHz)	Result Peak (dB μ V/m)	Limit Average (dB μ V/m)	Delta limit (dB)
X	X	140.663	75.5	104.6	-29.1*
	Y	140.635	75.3	104.6	-29.3
	Z	140.635	66.5	104.6	-38.1
Y	X	140.654	72.0	104.6	-32.6
	Y	140.635	71.8	104.6	-32.8
	Z	140.635	52.4	104.6	-52.2
Z	X	140.635	67.8	104.6	-36.8
	Y	140.625	67.9	104.6	-36.7
	Z	140.625	67.7	104.6	-36.9

**Worst-case emission*

Note: Peak measurements were below the Average limit (110kHz to 490kHz band), therefore average measurements were not performed and measured peak values were compared with average limit (worst-case) to determine the compliance.

Table 10: Maximum Fundamental Field Strength - RFID module standalone - 140kHz

The measurement uncertainty was calculated at ± 4.3 dB for measurements between 9kHz and 30MHz. The reported uncertainty is an expanded uncertainty calculated using a coverage factor of $k=2$ which gives a level of confidence of approximately 95%.

Climatic Conditions	
Temperature:	19 to 21°C
Humidity:	43 to 47%

Table 11: Climatic conditions

Comments: The maximum Fundamental Field Strength measurements were below the permissible Spurious and general intentional radiator limits, Peak emissions were below the applicable limits.

Assessment: The EUT complied with the Radiated Emissions requirements of CFR47 FCC Part 15, Subpart C Section 15.209.

9. Radiated Spurious Emissions – FCC Part 15.209

9.1. Test Procedure

The Radiated Emissions were performed in accordance with the ANSI C63.10 - 2013.

Radiated Emissions were measured 3 metres (from 9kHz to 1GHz) away from the EUT in the iOATS (indoor Open Area Test Site) facility, which is an ANSI C63.4 compliant semi-anechoic chamber with ground plane. The EUT was placed on a non-conductive support at a height of 0.8m above the ground plane.

In the frequency range of 9kHz to 30MHz, an Active loop antenna was used. For X, Y and Z antenna polarizations, the peak detector was set to MAX-HOLD and the range selected continuously scanned. The measuring antenna was positioned at 1m fixed height and the turntable slowly rotated. The peak preview measurements were performed with a resolution bandwidth of 200Hz (9kHz to 150kHz), 9kHz (150kHz to 30MHz) and a video bandwidth of 30kHz. Peak emissions that exceeded the limit or were close to the applicable limit were investigated further. The frequency of each emissions was then accurately determined. Each emission of interest was then in-turn maximised by using the turntable to rotate the EUT through 360 degrees to find the worst-case emission arrangement. Quasi peak measurements were then performed using a measuring time of no less than 15 seconds. The final quasi-peak measurements were performed using a receiver bandwidth of 6dB and a resolution bandwidth of 200 Hz (9kHz to 150kHz) and 9kHz (150kHz to 30MHz).

In the frequency range of 30MHz to 1GHz, a Biconilog antenna was used. For both horizontal and vertical antenna polarizations, the peak detector was set to MAX-HOLD and the range selected continuously scanned. The measuring antenna was positioned at 4 different fixed height positions and the turntable slowly rotated. The peak preview measurements were performed with a resolution bandwidth of 120kHz and a video bandwidth of 300kHz. Peak emissions that exceeded the limit or were close to the applicable limit were investigated further. The frequency of each emissions was then accurately determined. Each emission of interest was then in-turn maximised by using the turntable to rotate the EUT through 360 degrees and varying the height of the antenna between 1 and 4 metres to find the worst-case emission arrangement. Quasi peak measurements were then performed using a measuring time of no less than 15 seconds. The final quasi-peak measurements were performed using a receiver bandwidth of 6dB and a resolution bandwidth of 120kHz.

In the frequency range 1GHz to 18GHz a Horn antenna was used and an area of 3m x 3m was covered between the antenna and the EUT using RF absorbing material with a rated attenuation more than 20dB over the frequency range. The height of the horn antenna was varied using the antenna bore-sighting technique and the turntable slowly rotated to maximise the emissions. For both horizontal and vertical antenna polarizations, the Peak and Average preview measurements were performed with a resolution bandwidth of 1MHz and a video bandwidth of 3MHz. Peak and average emissions that exceeded the applicable limit or were close to the applicable limit were investigated further. Each emission of interest was then in-turn maximised by using the turntable to rotate the EUT through 360 degrees and the antenna height varied (if applicable, using the antenna bore-sighting technique) to find the worst-case emission arrangement. Peak and CISPR Average measurements were then performed using a measuring time of 1 second with a number of repetitions to ensure a minimum observation time of 15 seconds, the maximum emission level in the observed duration

was recorded as the final result. The final peak and CISPR Average measurements were performed using a receiver bandwidth of 6dB and a resolution bandwidth of 1MHz. Peak and Average measurements were performed at spot frequencies where the peak or average emission was close to, or exceeded the applicable limit line with the EUT rotation and antenna height varied (if applicable, using the antenna bore-sighting technique) to produce the highest emission.

Horn	Frequency (GHz)	Degrees	Measuring Distance (m)	Illumination (m)	Measuring Distance (m)	Illumination (m)
EMCO 3115	1 to 2	55.00	3	3.12	1	1.04
	2 to 4	50.00	3	2.80	1	0.93
	4 to 6	34.00	3	1.83	1	0.61
AH SAS-584	6 to 8	30.00	3	1.61	1	0.54
AH SAS-585	8 to 12	30.00	3	1.61	1	0.54
AH SAS-586	12 to 18	30.00	3	1.61	1	0.54
AH SAS 587	18 to 26.5	30.00	3	1.61	1	0.54
AH SAS 588	26.5 to 40	31.00	3	1.66	1	0.55

Table 1: Worst case Maximum size of measuring envelope for Horn antennas

In the frequency range 18GHz to 25GHz a Horn antenna was used and an area of 1m x 3m was covered between the antenna and the EUT using RF absorbing material with a rated attenuation more than 20dB over the frequency range. The height of the horn antenna and position was varied depending upon the EUT dimensions to ensure complete illumination of the EUT and the turntable slowly rotated to maximise the emissions. For both horizontal and vertical antenna polarizations, the Peak and Average preview measurements were performed with a resolution bandwidth of 1 MHz and a video bandwidth of 3 MHz. Peak and average emissions that exceeded the applicable limit or were close to the applicable limit were investigated further. Each emission of interest was then in-turn maximised by using the turntable to rotate the EUT through 360 degrees and the antenna height varied (if applicable) to find the worst-case emission arrangement. Peak and CISPR Average measurements were then performed using a measuring time of 1 second with a number of repetitions to ensure a minimum observation time of 15 seconds, the maximum emission level in the observed duration was recorded as the final result. The final peak and CISPR Average measurements were performed using a receiver bandwidth of 6dB and a resolution bandwidth of 1MHz.

Plots of the accumulated measurement data for both horizontal and vertical antenna polarizations, including all transducer and other measuring system correction factors were produced using commercially available compliant software (as listed in the test equipment list of this report).

(Refer to photographs 1 to 7 in Annex C for views of the test configuration)

9.2. Limits

As per section 15.209 (Radiated emissions, general requirements) the EUT is required to meet the limits that permit the highest field strength of the two sections in the following table:

Frequency Range (MHz)	Limits at 3m (dB μ V/m)
0.009 to 0.490	128.5 to 93.8
0.490 to 1.705	73.8 to 62.9
1.705 to 30.0	69.5
30.0 to 88	40.0
88.0 to 216.0	43.5
216.0 to 960.0	46.0
Above 960	54.0
NOTE: The lower limit shall apply at the transition frequency.	

Note 1: as per CFR FCC Part 15 section 15.209 (d) The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector

Note 2: as per CFR FCC Part 15.35 (b) Unless otherwise specified, on any frequency or frequencies above 1000 MHz, the radiated emission limits are based on the use of measurement instrumentation employing an average detector function. Unless otherwise specified, measurements above 1000 MHz shall be performed using a minimum resolution bandwidth of 1 MHz. When average radiated emission measurements are specified in this part, including average emission measurements below 1000 MHz, there also is a limit on the peak level of the radio frequency emissions. Unless otherwise specified, e.g., see §§15.250, 15.252, 15.253(d), 15.255, 15.256, and 15.509 through 15.519 of this part, the limit on peak radio frequency emissions is 20 dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device, e.g., the total peak power level. Note that the use of a pulse desensitization correction factor may be needed to determine the total peak emission level. The instruction manual or application note for the measurement instrument should be consulted for determining pulse desensitization factors, as necessary.

Table 12: Limits for Radiated Spurious Emissions at distance of 3m

9.3. Test Results

Radiated Emissions measurements are tabulated below. For below 1GHz measurements, Quasi-peak measurements were performed at spot frequencies where the peak emission was close to, or exceeded the applicable limit line. For above 1GHz measurements, Peak or CISPR Average measurements were performed at spot frequencies where the peak or average emission was close to, or exceeded the applicable limit line.

(Refer to graphs in Appendix C.2)

EPREP sample preparation workstation (RFID/Bluetooth with host)

Antenna Orientation	Frequency (MHz)	Result peak (dB μ V/m)	Limit Quasi-peak/Average (dB μ V/m)	Delta limit (dB)
X	0.172	59.7	102.9	-43.2
	0.390	50.7	95.8	-45.1
	0.524	48.8	73.2	-24.4*
	18.435	24.6	69.5	-44.9
	19.530	22.7	69.5	-46.8
	27.794	27.4	69.5	-42.1
Y	16.488	27.0	69.5	-42.5
	18.123	31.0	69.5	-38.5
	18.311	31.9	69.5	-37.6
	18.793	30.6	69.5	-38.9
	24.055	24.6	69.5	-44.9
	28.295	24.8	69.5	-44.7
Z	0.166	61.3	103.2	-41.9
	0.499	47.9	73.6	-25.7
	0.720	45.1	70.5	-25.4
	18.451	24.3	69.5	-45.2
	21.481	22.9	69.5	-46.6
	27.269	28.5	69.5	-41.0

**Worst-case emission*

Table 13: Radiated Spurious Emissions – 9kHz to 30MHz

Antenna polarisation	Frequency (MHz)	Result Quasi-peak (dB μ V/m)	Limit Quasi-peak (dB μ V/m)	Delta limit (dB)
Horizontal	60.652	32.2	40.0	-7.8
	79.664	33.5	40.0	-6.5
	99.210	37.7	43.5	-5.8
	110.268	39.7	43.5	-3.8 ⁺
	111.286	39.6	43.5	-4.0 ⁺
	455.976	39.2	46.0	-6.8
Vertical	39.603	35.3	40.0	-4.7
	39.894	37.0	40.0	-3.0**
	40.137	35.2	40.0	-4.8
	60.507	30.9	40.0	-9.1
	77.773	30.6	40.0	-9.4
	87.812	29.5	40.0	-10.5
	111.626	36.7	43.5	-6.8
	320.030	36.7	46.0	-9.3
	455.976	38.0	46.0	-8.0

**Worst-case emission, *refer to measurement uncertainty statement*

Table 14: Radiated Spurious Emissions – 30MHz to 1GHz

Antenna polarisation	Peak Measurements				Average Measurements			
	Frequency (MHz)	Result (dB μ V/m)	Limit (dB μ V/m)	Delta Limit (dB)	Frequency (MHz)	Result (dB μ V/m)	Limit (dB μ V/m)	Delta Limit (dB)
Horizontal	1614.380	43.0	74.0	-31.0	1614.380	38.4	54.0	-25.8
	1626.080	41.7	74.0	-32.3	1626.080	36.6	54.0	-26.0
	4843.680	53.4	74.0	-20.6	4843.680	51.7	54.0	-2.3
	7379.920	47.0	74.0	-27.0	7379.920	45.7	54.0	-8.3
	9656.200	48.7	74.0	-25.3	9656.200	47.1	54.0	-6.9
	9684.280	55.2	74.0	-18.8	9684.280	51.9	54.0	-2.1 ⁺
	9858.880	50.7	74.0	-23.3	9858.880	47.7	54.0	-6.3
	9920.440	52.8	74.0	-21.2	9920.440	47.8	54.0	-6.2
	12206.320	46.8	74.0	-27.2	12206.320	42.7	54.0	-11.3
	14639.380	52.3	74.0	-21.7	14640.940	50.1	54.0	-3.9 ⁺
Vertical	1621.660	43.3	74.0	-30.7	1619.060	37.7	54.0	-16.3
	1631.020	42.8	74.0	-31.2	1623.740	37.5	54.0	-16.5
	4844.160	52.9	74.0	-21.1	4844.160	51.2	54.0	-2.8 ⁺
	7259.440	52.5	74.0	-21.5	7259.440	51.2	54.0	-2.8 ⁺
	7437.520	44.6	74.0	-29.4	7437.440	41.4	54.0	-12.6
	9260.520	49.6	74.0	-24.4	9660.160	43.6	54.0	-10.4
	9739.360	50.2	74.0	-23.8	9739.360	44.8	54.0	-9.2
	12104.560	47.6	74.0	-26.4	12106.000	43.1	54.0	-10.9
	14568.400	50.6	74.0	-23.4	14568.400	47.8	54.0	-6.2

^{*}Worst-case emission, ⁺refer to measurement uncertainty statement

Table 15: Radiated Spurious Emissions – 1GHz to 25GHz

Additional testing of standalone RFID module worst-case test results

RFID Module with 134kHz coil antenna – standalone

(Refer to graphs in Appendix D.2)

Antenna Orientation	EUT Orientation	Frequency (MHz)	Result Peak (dB μ V/m)	Limit Quasi-peak/ Average (dB μ V/m)	Delta limit (dB)
X	X	21.811	19.3	69.5	-50.2
		28.551	22.5	69.5	-47.0
		28.836	22.6	69.5	-46.9
		29.071	22.3	69.5	-47.2
		29.351	21.6	69.5	-47.9
		29.633	21.2	69.5	-48.3

^{*}Worst-case emission

Table 16: Radiated Spurious Emissions – 9kHz to 30MHz

RFID Module with 124kHz coil antenna – standalone

(Refer to graphs in Appendix E.2)

Antenna Orientation	EUT Orientation	Frequency (MHz)	Result Peak (dB μ V/m)	Limit Quasi-peak/Average (dB μ V/m)	Delta limit (dB)
Y	X	23.470	19.5	69.5	-50.0
		26.516	19.8	69.5	-49.7
		27.750	19.9	69.5	-49.6
		29.484	19.8	69.5	-49.7
		29.734	20.2	69.5	-49.3
		29.981	20.7	69.5	-48.8*

**Worst-case emission*

Table 17: Radiated Spurious Emissions – 9kHz to 30MHz

RFID Module with 140kHz coil antenna – standalone

(Refer to graphs in Appendix F.2)

Antenna Orientation	EUT Orientation	Frequency (MHz)	Result Peak (dB μ V/m)	Limit Quasi-peak/Average (dB μ V/m)	Delta limit (dB)
X	X	26.163	18.4	69.5	-51.1
		28.430	18.2	69.5	-51.3
		28.983	18.7	69.5	-50.8
		29.257	19.4	69.5	-50.1
		29.531	20.4	69.5	-49.1*
		29.827	20.0	69.5	-49.5

**Worst-case emission*

Table 18: Radiated Spurious Emissions – 9kHz to 30MHz

The measurement uncertainty was calculated at ± 4.3 dB for 9kHz to 30MHz measurements, ± 4.7 dB for 30MHz to 1GHz measurements and ± 5.3 dB for measurements above 1GHz. The reported uncertainty is an expanded uncertainty calculated using a coverage factor of $k=2$ which gives a level of confidence of approximately 95%.

Climatic Conditions	
Temperature:	19 to 21°C
Humidity:	43 to 47%

Table 19: Climatic conditions

Calculation: The above results are based upon the following calculation:

$$E = V_{QP/PK/AV} + AF - G_{Amp} + L_C$$

Where:

$$\begin{aligned} E &= \text{E-field in dB}\mu\text{V/m} \\ V_{QP/PK/AV} &= \text{Measured Voltage (Quasi Peak, Peak or Average) in dB}\mu\text{V} \\ AF &= \text{Antenna Factor in dB(/m)} \\ L_C &= \text{Cable and attenuator Loss in dB} \\ G_{Amp} &= \text{Pre Amplifier Voltage Gain in dB} \end{aligned}$$

Example calculation:

$$\begin{aligned} E &= V_{PK} + AF - G_{Amp} + L_C \\ E &= 30\text{dB}\mu\text{V} + 12\text{dB/m} - 0\text{dB} + 2.3\text{dB} \\ E &= 44.3 \text{ dB}\mu\text{V/m} \end{aligned}$$

Comments: All Spurious Emissions measurements were below the permissible Spurious and general intentional radiator limits for the Average/Quasi peak detector and the peak detector emissions were below the peak limit.

Assessment: The EUT complied with the Radiated Spurious Emissions requirements of CFR47 FCC Part 15, Subpart C 15.209

10. Conducted Emissions – FCC Part 15.207

10.1. Test Procedure

The Conducted Emissions was performed in accordance with the section 6.2 of ANSI C63.10 - 2013.

The EUT was positioned 0.4m from the vertical ground reference plane (chamber wall) and 0.8m above a horizontal ground reference plane (chamber floor) with the mains cable connected to the power port of a LISN, located 0.8 metres away. The measuring port of the LISN was connected to the measuring receiver. In order to avoid unwanted ambient signals, power to the LISN was supplied via power line filters fitted to the shielded enclosure wall.

The mains flexible cord provided by the manufacturer is required to be 1m long for these measurements. If the manufacturer supplies a non-removable power lead, in excess of 1m, the cable in excess of 1m is folded at the centre into a bundle no longer than 0.4m in length.

Preview scan measurements were performed using a peak and an average detector of the EMI receiver with a resolution bandwidth of 9kHz. The scan measurements frequency step size of the EMI receiver was set to less than half of the resolution bandwidth. The final quasi-peak and CISPR average measurements were performed at spot frequencies where the preview peak or average emission was close to, or exceeded the applicable limit line with a receiver bandwidth of 6dB and a resolution bandwidth of 9kHz. The final measurements were performed using a measuring time of no less than 15 seconds.

Both the active and neutral lines were measured, in turn. Plots of the accumulated measurement data for both active and neutral terminals, including all transducer and other measuring system correction factors were produced using commercially available compliant software (as listed in the test equipment list of this report).

(Refer to photograph 8 in Annex C for a view of the test configuration)

10.2. Limits

The EUT shall meet the limits in the following table:

Frequency Range (MHz)	Limits (dB μ V)	
	Quasi-Peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.5 to 5	56	46
5 to 30	60	50

NOTE 1 The lower limit shall apply at the transition frequencies.
NOTE 2 The limit decreases linearly with the logarithm of the frequency in the range 0,15 MHz to 0,50 MHz.

Table 20: Limits for Conducted Emissions at the mains ports

10.3. Test Results

Conducted Emissions measurements are tabulated below. Quasi-peak or CISPR Average measurements were performed at spot frequencies where the peak or average emission was close to, or exceeded the applicable limit line.

(Refer to graphs in Appendix C.3)

Quasi - Peak Measurements				Average Measurements			
Frequency (MHz)	Result (dB μ V)	Limit (dB μ V)	Delta Limit (dB)	Frequency (MHz)	Result (dB μ V)	Limit (dB μ V)	Delta Limit (dB)
0.150	42.6	66.0	-23.4	0.170	36.2	55.0	-18.8
0.166	40.4	65.2	-24.8	0.174	34.2	54.8	-20.6
0.338	39.0	59.3	-20.3	0.334	29.1	49.4	-20.3
0.362	38.7	58.7	-20.0	0.358	29.3	48.8	-19.5
0.574	35.6	56.0	-20.4	0.630	25.4	46.0	-20.6
1.510	34.1	56.0	-21.9	1.556	26.0	46.0	-20.0
1.880	33.6	56.0	-22.4	1.864	26.2	46.0	-19.8
2.500	35.8	56.0	-20.2	2.524	26.9	46.0	-19.1
3.910	34.8	56.0	-21.2	3.988	26.1	46.0	-19.9
6.810	40.3	60.0	-19.7	6.796	32.7	50.0	-17.3
9.990	42.2	60.0	-17.8	10.196	34.4	50.0	-15.6
11.700	43.1	60.0	-16.9	11.676	35.3	50.0	-14.7
14.300	43.7	60.0	-16.3	14.592	35.4	50.0	-14.6*
14.600	43.9	60.0	-16.1	15.080	35.4	50.0	-14.6*
15.100	43.6	60.0	-16.4	15.564	35.4	50.0	-14.6*
20.500	40.7	60.0	-19.3	19.464	31.5	50.0	-18.5
24.400	44.1	60.0	-15.9	24.364	33.7	50.0	-16.3
24.900	43.8	60.0	-16.2	24.844	33.6	50.0	-16.4
25.300	45.0	60.0	-15.0*	25.340	33.3	50.0	-16.7
26.800	39.9	60.0	-20.2	29.264	30.5	50.0	-19.5

* Worst-case emissions

Table 21: Conducted Emissions – Active Line – RFID/Bluetooth TX mode

Quasi - Peak Measurements				Average Measurements			
Frequency (MHz)	Result (dBμV)	Limit (dBμV)	Delta Limit (dB)	Frequency (MHz)	Result (dBμV)	Limit (dBμV)	Delta Limit (dB)
0.150	45.3	66.0	-20.7	0.174	33.7	54.8	-21.1
0.174	40.5	64.8	-24.3	0.230	23.8	52.4	-28.6
0.318	36.0	59.8	-23.8	0.350	27.7	49.0	-21.3
0.402	38.4	57.8	-19.4*	0.470	22.4	46.5	-24.1
0.470	32.9	56.5	-23.6	0.514	25.8	46.0	-20.2
1.128	30.3	56.0	-25.7	1.132	21.3	46.0	-24.7
1.544	32.4	56.0	-23.6	1.516	26.2	46.0	-19.8
1.836	34.9	56.0	-21.1	1.856	26.1	46.0	-19.9
3.016	34.4	56.0	-21.6	3.496	26.9	46.0	-19.1
4.700	35.3	56.0	-20.7	4.872	28.5	46.0	-17.5*
6.616	37.5	60.0	-22.5	6.616	30.4	50.0	-19.6
9.820	36.5	60.0	-23.5	10.024	28.4	50.0	-21.6
14.600	37.4	60.0	-22.6	14.896	28.9	50.0	-21.1
14.868	38.0	60.0	-22.0	15.328	29.9	50.0	-20.1
15.084	38.4	60.0	-21.6	15.816	30.9	50.0	-19.1
15.172	38.8	60.0	-21.2	16.100	31.6	50.0	-18.4
15.768	39.1	60.0	-20.9	16.332	30.9	50.0	-19.1
16.148	39.2	60.0	-20.8	17.344	28.8	50.0	-21.2
17.724	37.1	60.0	-22.9	17.844	29.1	50.0	-20.9
25.180	34.2	60.0	-25.8	24.664	24.4	50.0	-25.6

**Worst-case emissions*

Table 22: Conducted Emissions – Neutral Line – RFID/Bluetooth TX mode

The measurement uncertainty was calculated at ± 2.9 dB. The reported uncertainty is an expanded uncertainty calculated using a coverage factor of $k=2$ which gives a level of confidence of approximately 95%.

Climatic Conditions	
Temperature:	16 to 17°C
Humidity:	59%

Table 23: Climatic conditions

Calculation: The above results are based upon the following calculation:

$$V = V_{QP/AV} + VLISN + L_C + L_T$$

Where:

V = Corrected Voltage Amplitude in dB μ V

$V_{QP/AV}$ = Measured Voltage (Quasi Peak or Average) in dB μ V

$VLISN$ = Line Impedance Stabilization Network Factor in dB

L_C = Cable/attenuator Loss in dB

L_T = Transient Protection Network Loss in dB

Example calculation:

$$V = V_{QP} + VLISN + L_C + L_T$$

$$V = 15 \text{ dB}\mu\text{V} + 10.1\text{dB} + 11.5\text{dB} + 10.1\text{dB}$$

$$V = 46.7 \text{ dB}\mu\text{V}$$

Comments: Conducted Emissions measurements were below the specified limit.

Assessment: The EUT complied with the Conducted Emissions requirements of CFR47 FCC Part 15, Subpart C.

11. Conclusion

The EPREP Pty Ltd, GL950X, EPREP sample preparation workstation complied with the applicable requirements of CFR47 FCC Part 15, Subpart C sections 15.207 and 15.209.

Appendix A – Test Equipment

Inv	Equipment	Make	Model No	Serial No	Calibration	
					Due	Type
Radiated Disturbance (Radiated Emissions) 9kHz to 30MHz						
0024	Loop Antenna	EMCO	6502	2620	May-18	I
0818	ANALYSER, EMI Receiver	Rohde & Schwarz	ESIB 40	100295	Sep-17	E
0932	CONTROLLER, Position	Sunol Sciences	SC104V-3	081006-1	N/A	V
0933	TURNTABLE	Sunol Sciences	SM46C	081006-2	N/A	V
1143	CABLE, Coax, Sucoflex 104PA	Huber + Suhner	84287041	SN MY058/4PA	Jan-18	I
1144	CABLE, Coax, Sucoflex 104PA	Huber + Suhner	84279564	SN MY055/4PA	Jan-18	I
1155	Hygrometer, Temp, Humidity	DigiTech	QM7312	-	Jun-17	I
0666	ENCLOSURE, Semi-Anechoic, No 1	RFI Industries	S800 iOATS	1229	Jul-17	I
SW007	EMC Measurement Software	Rohde & Schwarz	EMC 32	Version 8.53.0	N/A	V
Radiated Disturbance (Radiated Emissions) 30MHz to 1GHz						
0818	ANALYSER, EMI Receiver	Rohde & Schwarz	ESIB 40	100295	Sep-17	E
1217	ANALYSER, EMI Receiver	Rohde & Schwarz	ESU40	100182	Mar-18	E
0932	CONTROLLER, Position	Sunol Sciences	SC104V-3	081006-1	N/A	V
0933	TURNTABLE	Sunol Sciences	SM46C	081006-2	N/A	V
0934	MAST, Antenna	Sunol Sciences	TLT2	081006-5	N/A	V
0935	ANTENNA, Biconilog	Sunol Sciences	JB5	A07116	Jan-19	E
0718	ATTENUATOR, 6dB	JFW	50FPE-006	-	Jan-20	I
1143	CABLE, Coax, Sucoflex 104PA	Huber + Suhner	84287041	SN MY058/4PA	Jan-18	I
1144	CABLE, Coax, Sucoflex 104PA	Huber + Suhner	84279564	SN MY055/4PA	Jan-18	I
1155	Hygrometer, Temp, Humidity	DigiTech	QM7312	-	Jun-17	I
0666	ENCLOSURE, Semi-Anechoic, No 1	RFI Industries	S800 iOATS	1229	Jul-17	I
SW007	EMC Measurement Software	Rohde & Schwarz	EMC 32	Version 8.53.0	N/A	V

V: Verification of operation against an internal reference

I: Internal calibration against a traceable standard

E: External calibration by a NATA or MRA equivalent endorsed facility

N/A: Not Applicable

Inv	Equipment	Make	Model No	Serial No	Calibration	
					Due	Type
Radiated Disturbance (Radiated Emissions) 1GHz to 25GHz						
1217	ANALYSER, EMI Receiver	Rohde & Schwarz	ESU40	100182	Mar-18	E
0933	TURNTABLE	Sunol Sciences	SM46C	081006-2	N/A	V
0934	MAST, Antenna	Sunol Sciences	TLT2	081006-5	N/A	V
1143	CABLE, Coax, Sucoflex 104PA	Huber + Suhner	84287041	SN MY058/4PA	Jan-18	I
1144	CABLE, Coax, Sucoflex 104PA	Huber + Suhner	84279564	SN MY055/4PA	Jan-18	I
1146	CABLE, Coax, Sucoflex 104PA	Huber + Suhner	84287043	SN MY054/4PA	Jan-18	I
0559	PRE-AMP, Microwave, 18GHz	Miteq	AFS8	605305	Nov-17	I
1064	PRE-AMP, Microwave, 26GHz	Miteq	AFS33	1696371	Jan-18	V
0633	ANTENNA, Double Ridge Horn	EMCO	3115	9712-5369	Aug-18	I
1193	Standard Gain Horn Antenna - 5.85GHz to 8.2GHz	A.H. Systems, inc	SAS-584	186	Feb-18	E
1194	Standard Gain Horn Antenna - 8.2GHz to 12.4GHz	A.H. Systems, inc	SAS-585	224	Feb-18	E
1195	Standard Gain Horn Antenna - 12.4GHz to 18.0GHz	A.H. Systems, inc	SAS-586	195	Feb-18	E
1196	Standard Gain Horn Antenna - 18.0GHz to 26.5GHz	A.H. Systems, inc	SAS-587	181	Feb-18	E
1197	Standard Gain Horn Antenna - 26.5GHz to 40.0GHz	A.H. Systems, inc	SAS-588	163	Feb-18	E
1155	Hygrometer, Temp, Humidity	DigiTech	QM7312	-	Jun-17	I
0666	ENCLOSURE, Semi-Anechoic, No 1	RFI Industries	S800 iOATS	1229	Jul-17	I
SW007	EMC Measurement Software	Rohde & Schwarz	EMC 32	Version 8.53.0	N/A	N/A
Conducted Emissions						
0954	ANALYSER, EMI Receiver	Rohde+Schwarz	ESCI 3	100196	Jun-17	E
0047	LISN, Single Phase, 50uH/50 Ohm	EMCO	3850/2	9010-1005	Jan-19	E
0048	LISN, Single Phase, 50uH/50 Ohm	EMCO	3850/2	9105-1006	Dec-17	E
0722	ATTENUATOR, 10dB	JFW	50FPE-010	722	Oct-18	I
1148	CABLE, Coax, Sucoflex 104PA	Huber + Suhner	84287047	SN MY059/4PA	Jan-18	I
1149	CABLE, Coax, Sucoflex 104PA	Huber + Suhner	84287049	SN MY053/4PA	Jan-18	I
0358	LIMITER, Transient, 9k-200M	Hewlett Packard	11947A	3107A01832	May-17	I
1154	HYGROMETER, Temp, Humidity	DigiTech	QM7312	-	Jun-17	I
1130	Generator, Variable speed drive controller	Yaskawa electric mfg. Co., Ltd	CIMR-H5.5G2-10		-	V
1131	Generator, AC Drive unit and AC generator	Mecc Alte Apa	CT 3-SB/2	658519	-	V
0441	ENCLOSURE, Shielded, No 5	RFI Industries	TC800-20	933	-	V
SW007	EMC Measurement Software	Rohde & Schwarz	EMC 32	Version 6.30.10	N/A	N/A

V: Verification of operation against an internal reference
I: Internal calibration against a traceable standard
E: External calibration by a NATA or MRA equivalent endorsed facility
N/A: Not Applicable

Appendix B – Photographs

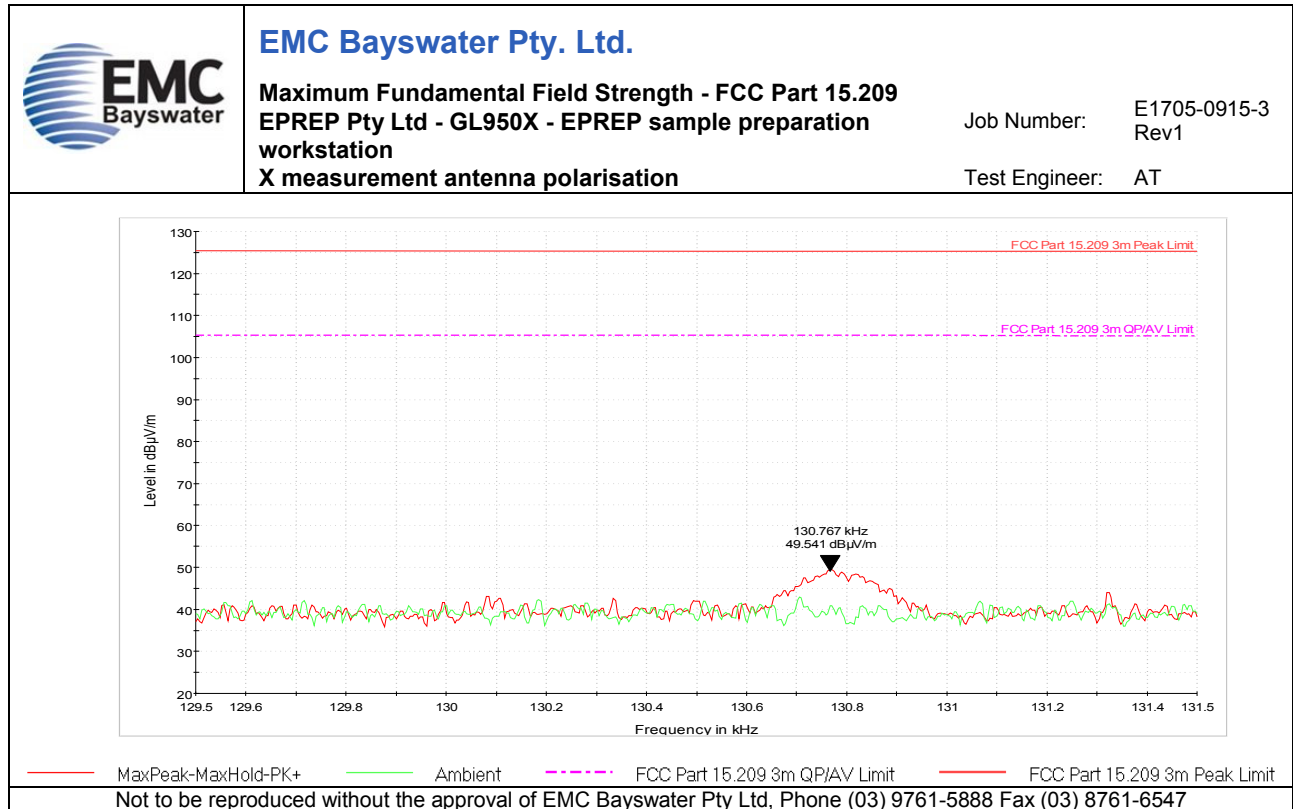
Annex	Number	Photograph Description
A	1	EUT – External views
A	2	
A	3	
A	4	
A	5	
A	6	
A	7	
A	8	
A	9	
A	10	
A	11	EUT – External AC/DC power adapter
A	12	
A	13	EUT – Tool rack (with RFID tags)
A	14	
A	15	EUT – RFID tag
A	16	EUT – Modification
A	17	AE – Customer supplied Microsoft Surface Pro tablet
A	18	
B	1	EUT – Internal views
B	2	
B	3	
B	4	
B	5	
B	6	
B	7	
B	8	
B	9	
B	10	
B	11	
B	12	
B	13	
B	14	
B	15	
B	16	
B	17	
B	18	
B	19	
B	20	
B	21	

Annex	Number	Photograph Description
B	22	EUT – RFID module
B	23	EUT – Robotic arm upper RFID antenna
B	24	EUT – Robotic arm lower RFID antenna
B	25	EUT – Bluetooth module
C	1	Radiated measurements – EUT Orientation
C	2	Radiated measurements – 9kHz to 30MHz – X Antenna orientation
C	3	Radiated measurements – 9kHz to 30MHz – Y Antenna orientation
C	4	Radiated measurements – 9kHz to 30MHz – Z Antenna orientation
C	5	Radiated measurements – 30MHz to 1000MHz
C	6	Radiated measurements – 1GHz to 18GHz
C	7	Radiated measurements – 18GHz to 25GHz
C	8	AC power port Conducted measurements
C	9	Radiated measurements – RFID Standalone – X EUT Orientation
C	10	Radiated measurements – RFID Standalone – Y EUT Orientation
C	11	Radiated measurements – RFID Standalone – Z EUT Orientation
C	12	Radiated measurements – RFID Standalone – 9kHz to 30MHz – X Antenna orientation
C	13	Radiated measurements – RFID Standalone – 9kHz to 30MHz – Y Antenna orientation
C	14	Radiated measurements – RFID Standalone – 9kHz to 30MHz – Z Antenna orientation

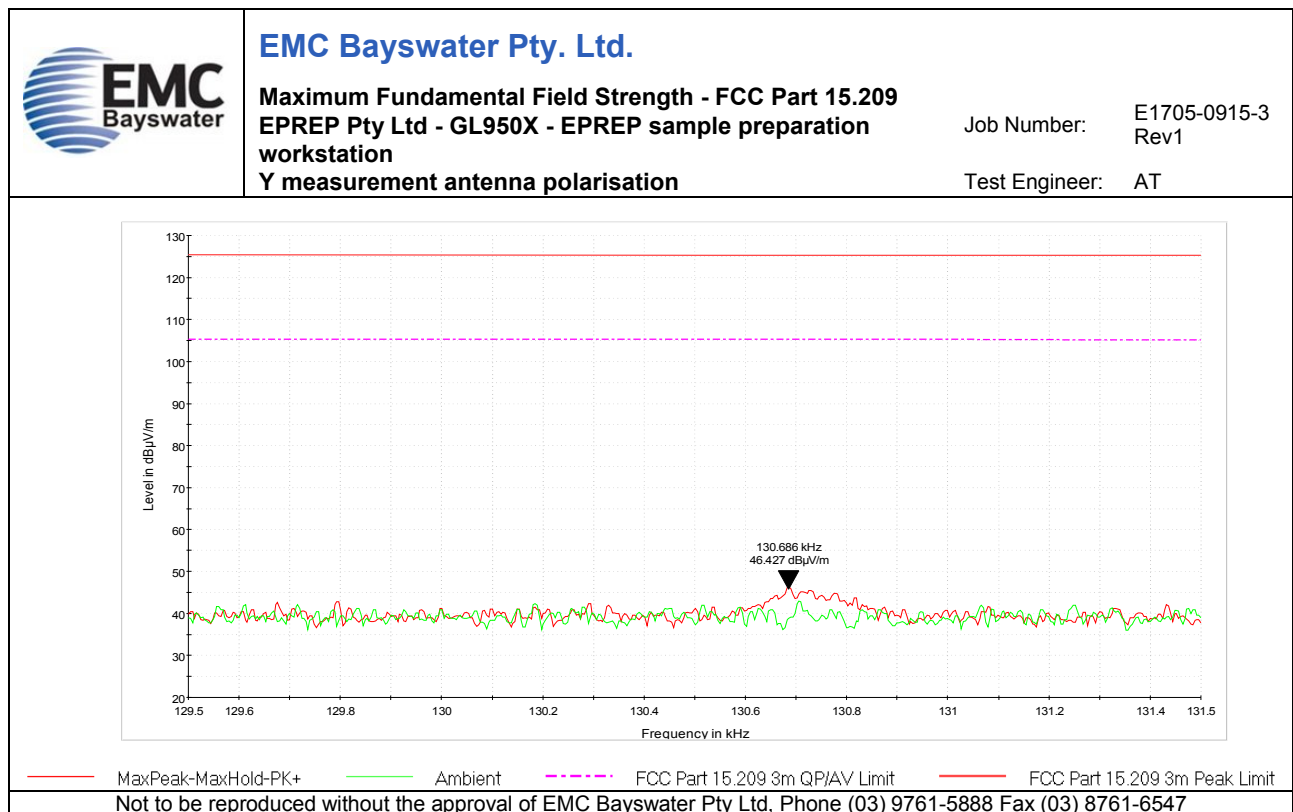
EUT Internal Photographs	-	EMC Bayswater Test Report E1705-0915-3 Annex A
EUT External Photographs	-	EMC Bayswater Test Report E1705-0915-3 Annex B
Test set-up & EUT Orientations Photographs	-	EMC Bayswater Test Report E1705-0915-3 Annex C

Appendix C – Measurement Graphs -- EPREP sample preparation workstation**Appendix C.1 - Maximum Fundamental Field Strength - RFID**

No.	Test	Graph Description
1	Maximum Fundamental Field Strength	X measurement antenna polarisation
2		Y measurement antenna polarisation
3		Z measurement antenna polarisation



Graph 1



Graph 2

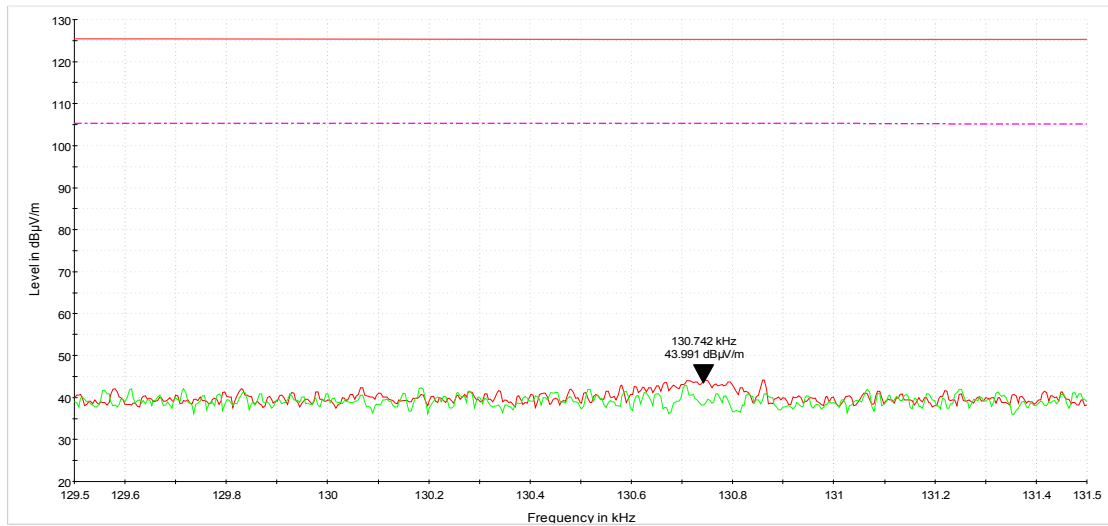


EMC Bayswater Pty. Ltd.

Maximum Fundamental Field Strength - FCC Part 15.209
EPREP Pty Ltd - GL950X - EPREP sample preparation
workstation
Z measurement antenna polarisation

Job Number: E1705-0915-3
Rev1

Test Engineer: AT



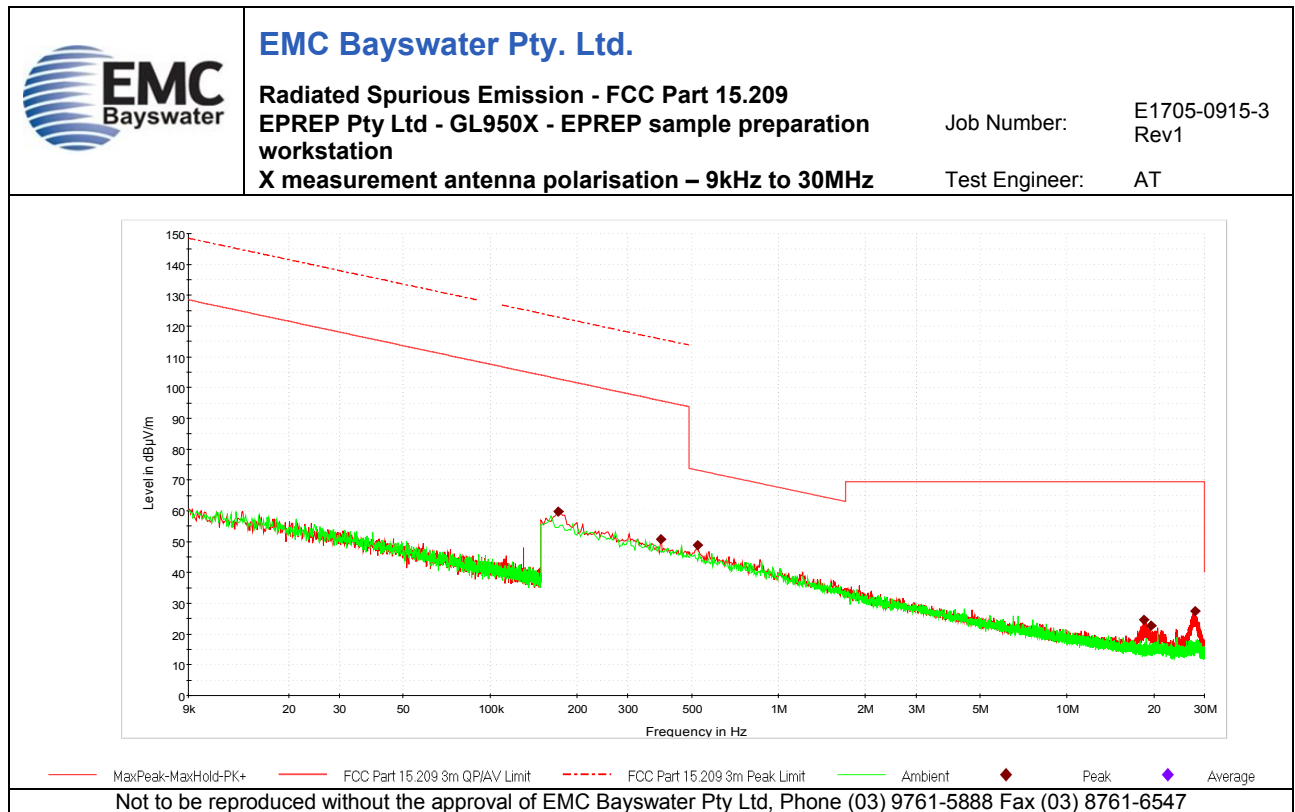
MaxPeak-MaxHold-PK+ Ambient FCC Part 15.209 3m QP/AV Limit FCC Part 15.209 3m Peak Limit

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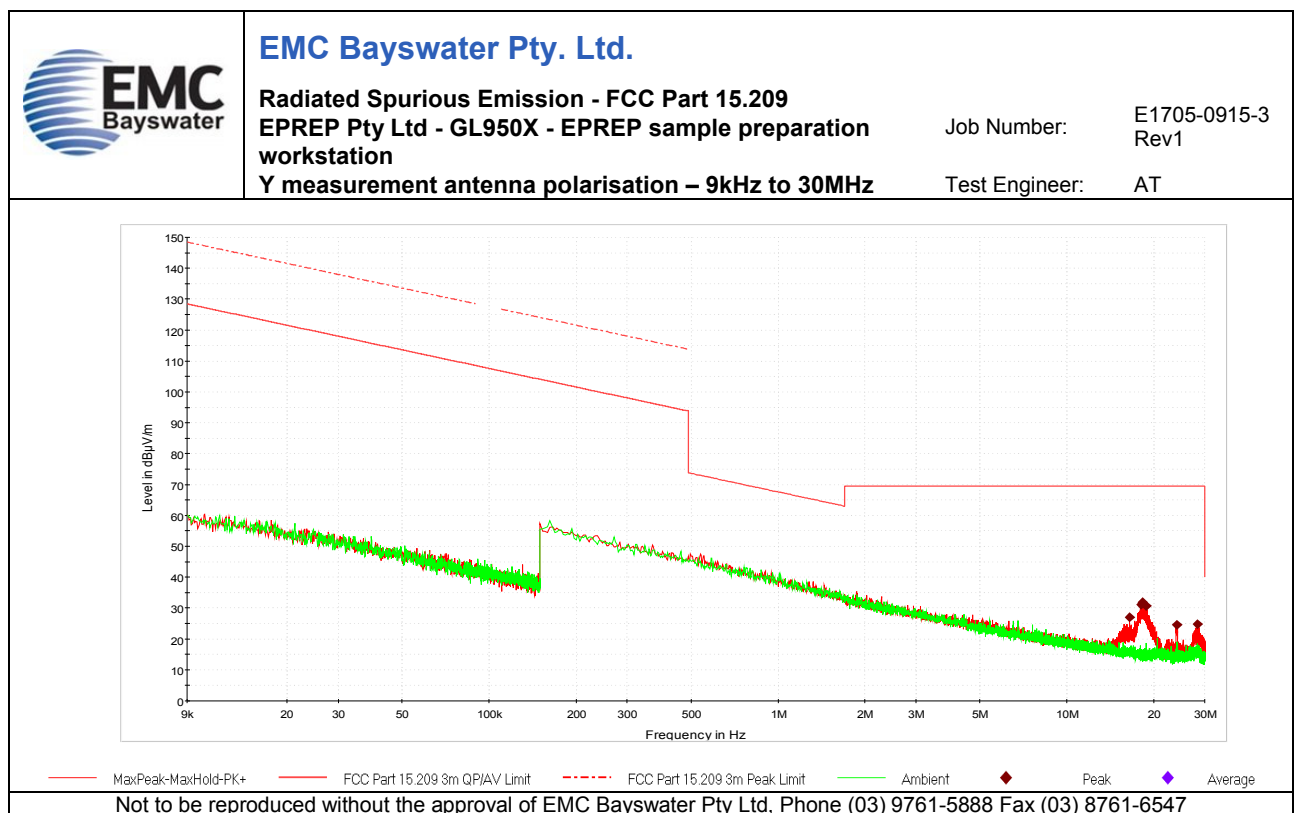
Graph 3

Appendix C.2 – Radiated Spurious Emissions - EPREP sample preparation workstation

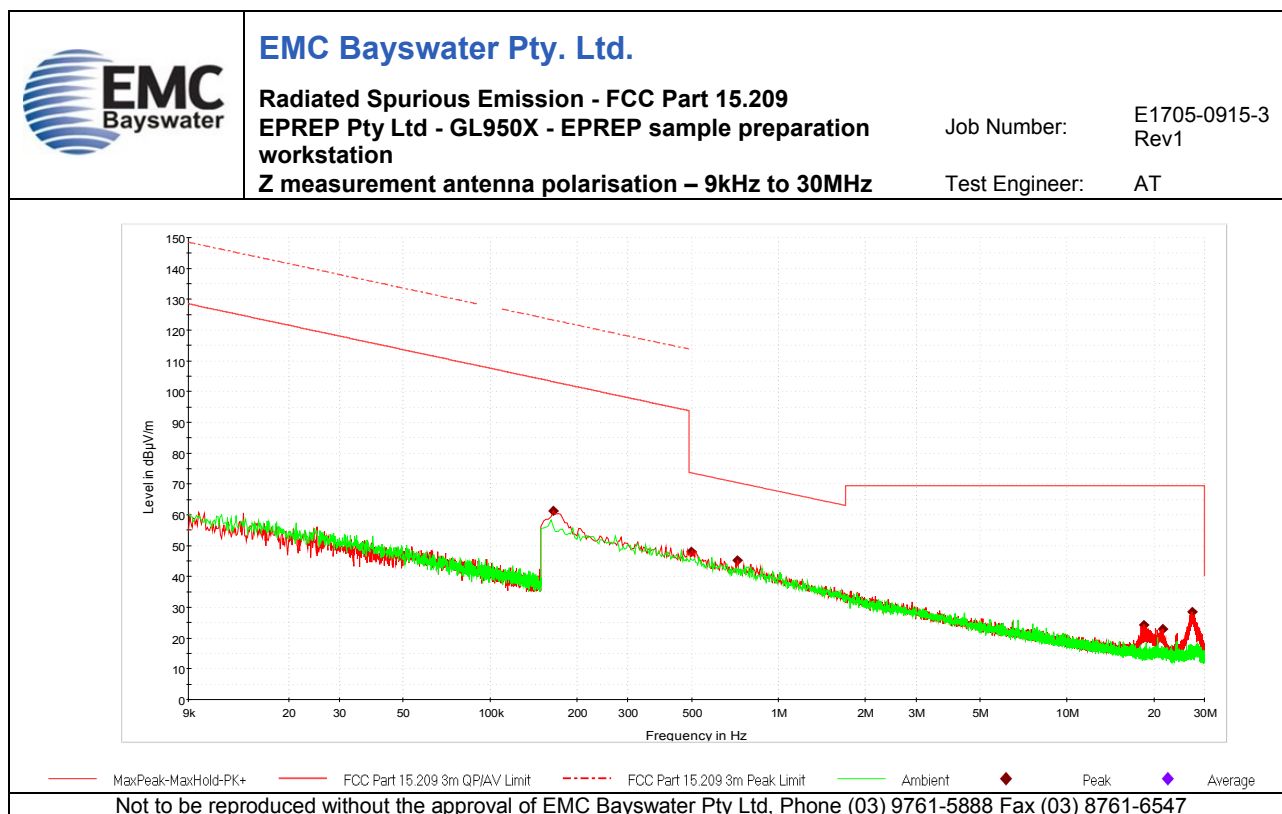
No.	Test	Graph Description
4	Radiated Spurious Emissions	X measurement antenna polarisation – 9kHz to 30MHz
5		Y measurement antenna polarisation – 9kHz to 30MHz
6		Z measurement antenna polarisation – 9kHz to 30MHz
7		Horizontal measurement antenna polarisation – 30MHz to 1GHz
8		Horizontal measurement antenna polarisation – 1GHz to 6GHz
9		Horizontal measurement antenna polarisation – 5.85GHz to 8.2GHz
10		Horizontal measurement antenna polarisation – 8.2GHz to 12.4GHz
11		Horizontal measurement antenna polarisation – 12.4GHz to 18GHz
12		Horizontal measurement antenna polarisation – 18GHz to 25GHz – position 1
13		Horizontal measurement antenna polarisation – 18GHz to 25GHz – position 2
14		Vertical measurement antenna polarisation – 30MHz to 1GHz
15		Vertical measurement antenna polarisation – 1GHz to 6GHz
16		Vertical measurement antenna polarisation – 5.85GHz to 8.2GHz
17		Vertical measurement antenna polarisation – 8.2GHz to 12.4GHz
18		Vertical measurement antenna polarisation – 12.4GHz to 18GHz
19		Vertical measurement antenna polarisation – 18GHz to 25GHz – position 1
20		Vertical measurement antenna polarisation – 18GHz to 25GHz – position 2



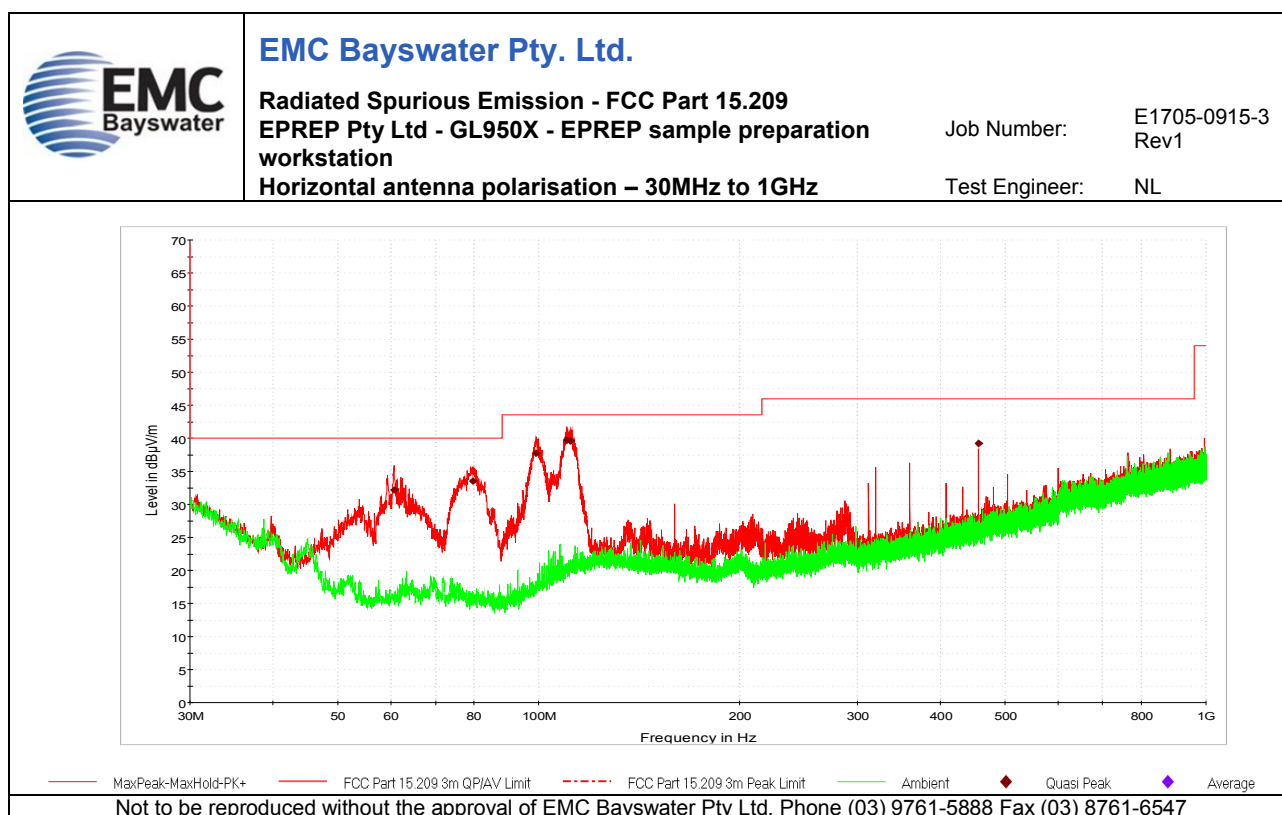
Graph 4



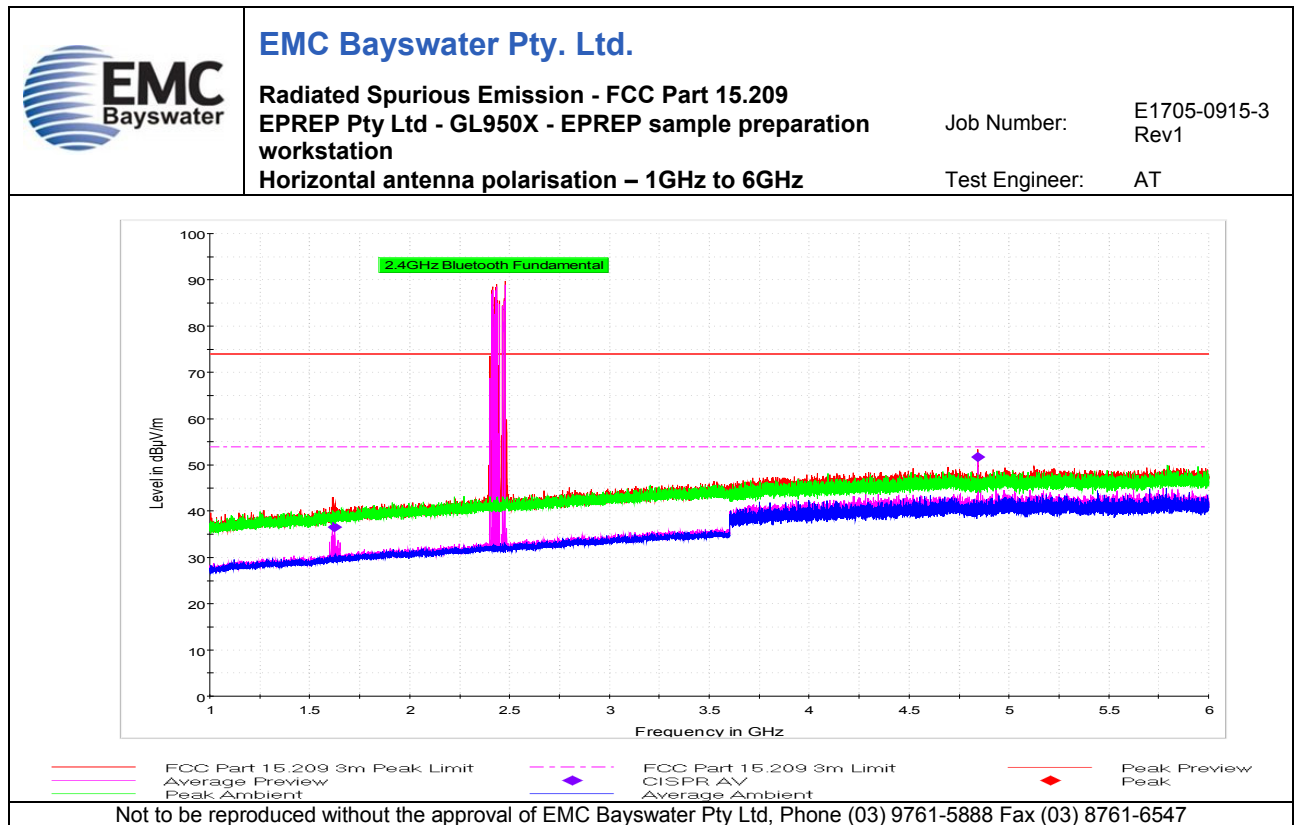
Graph 5



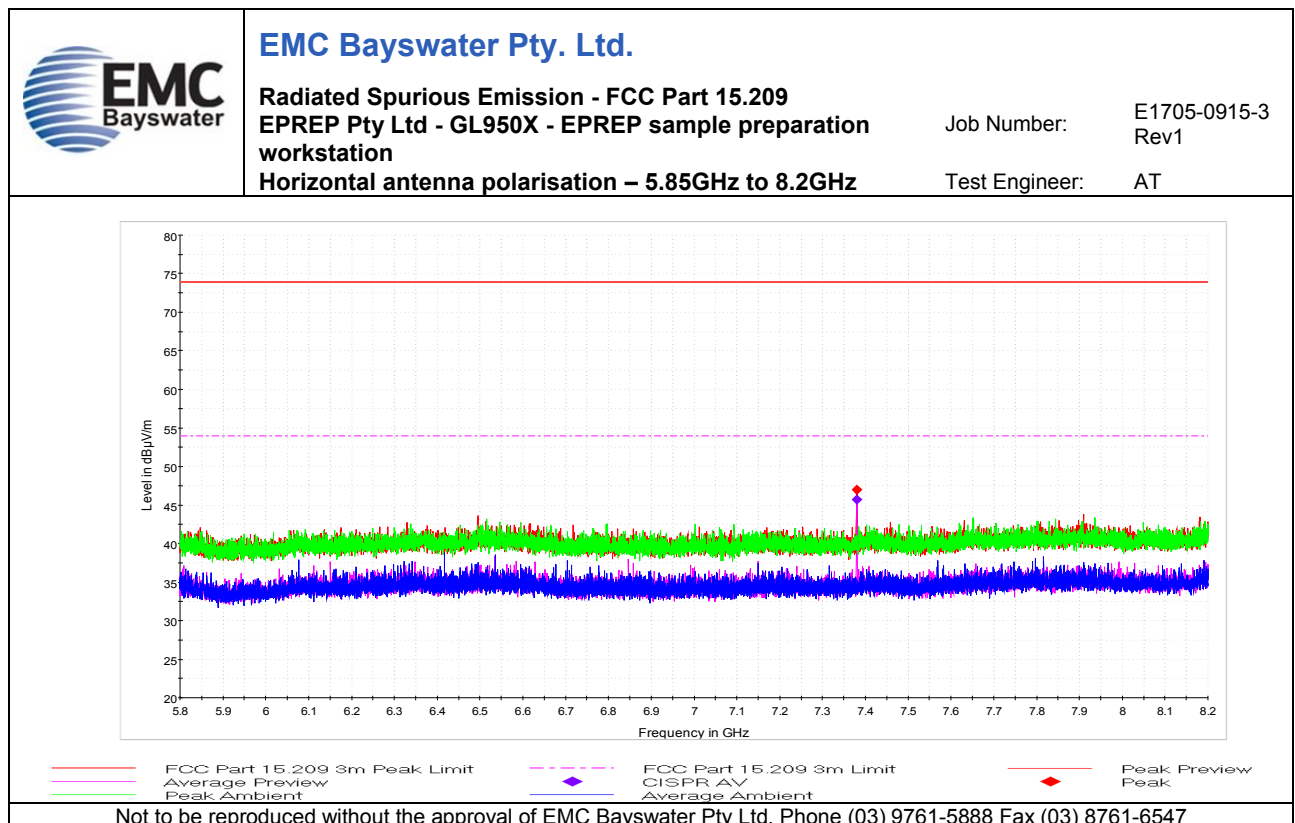
Graph 6



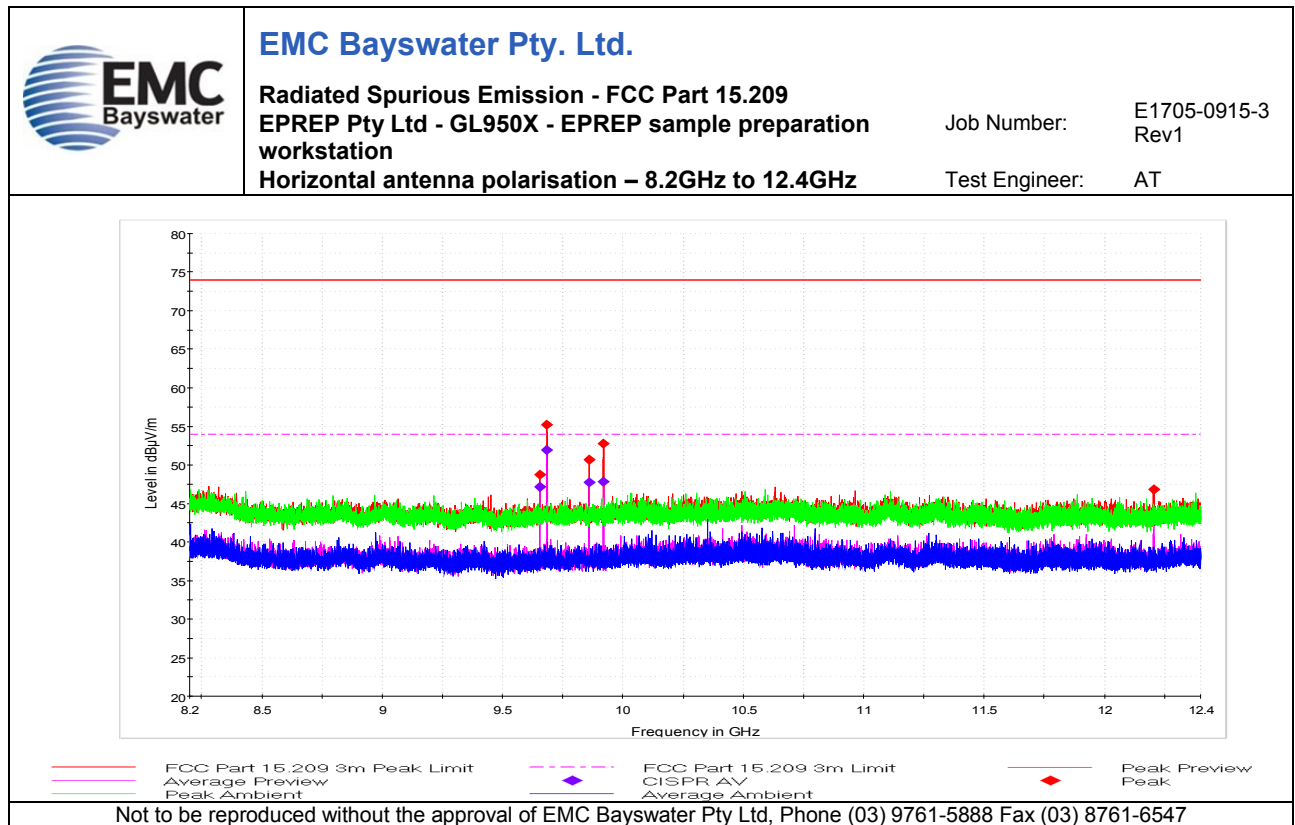
Graph 7



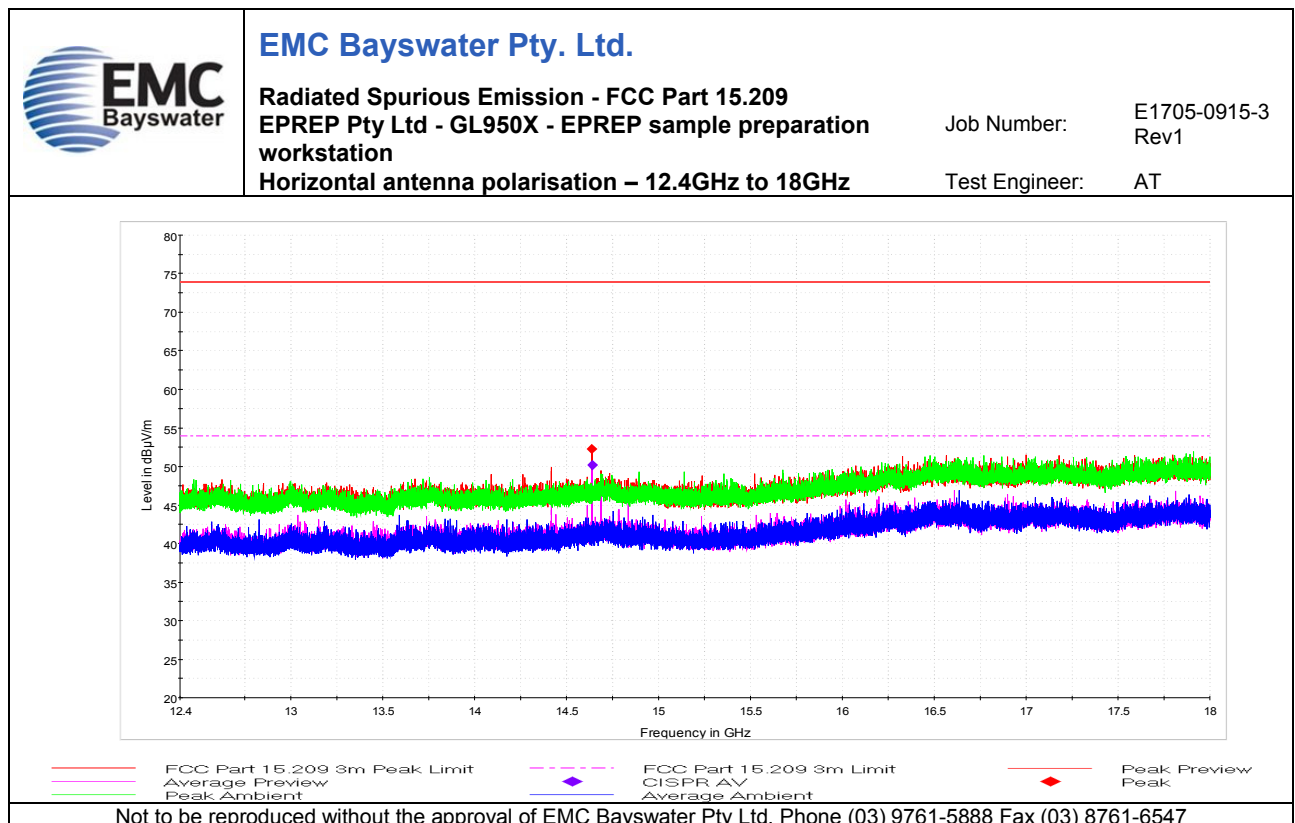
Graph 8



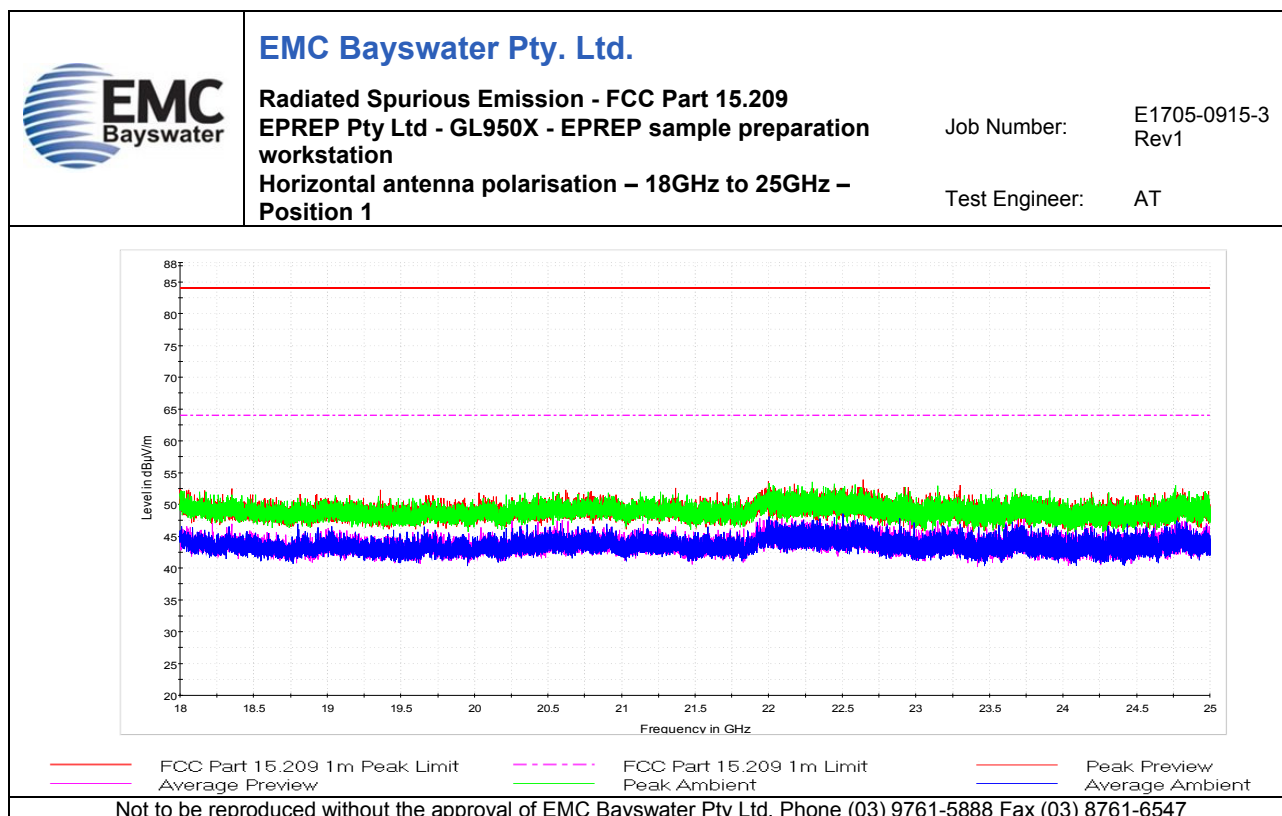
Graph 9



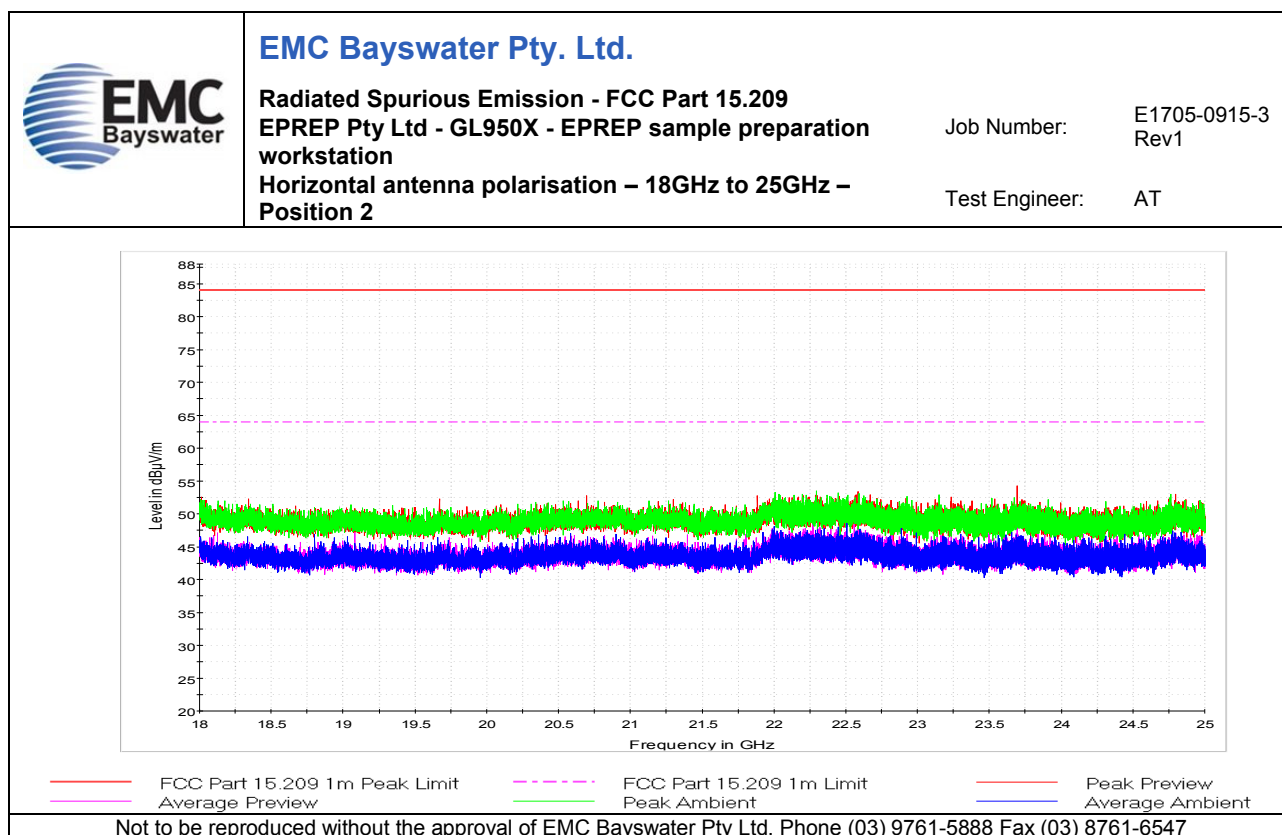
Graph 10



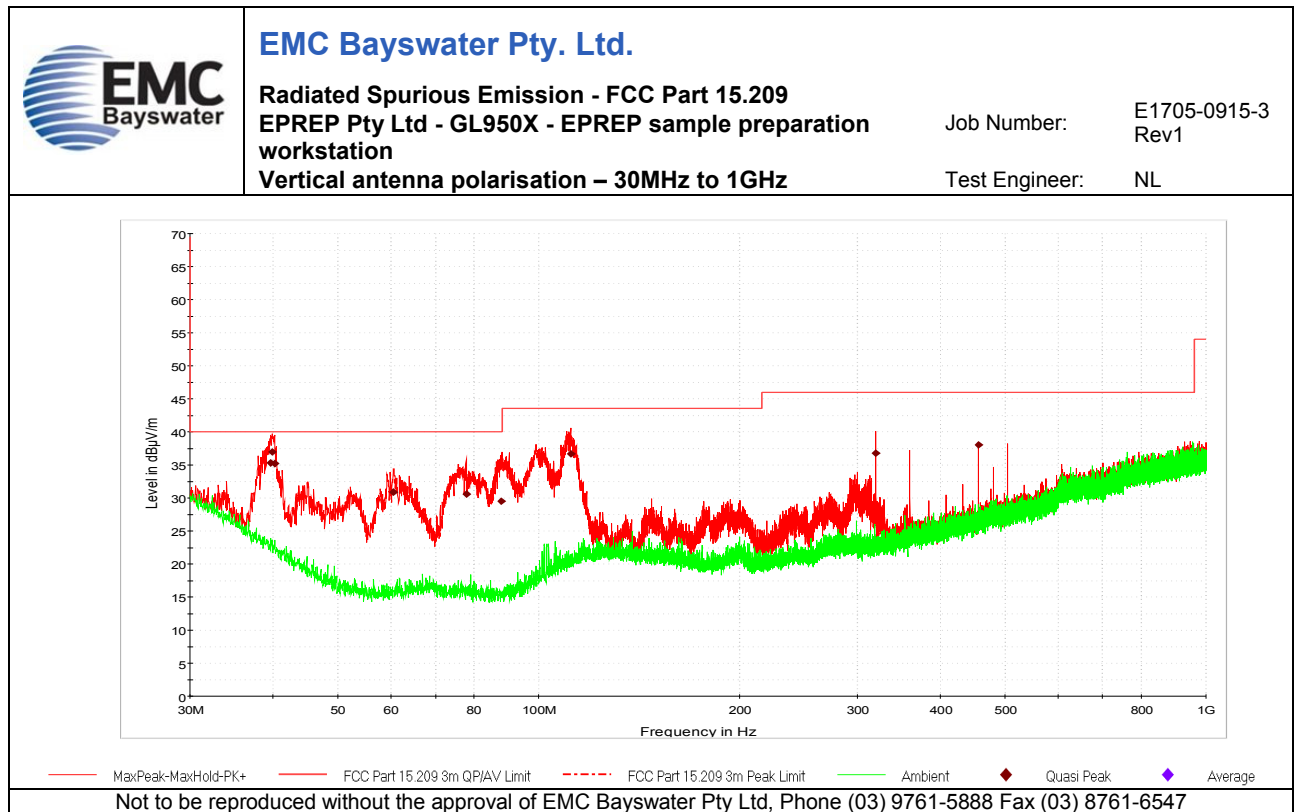
Graph 11



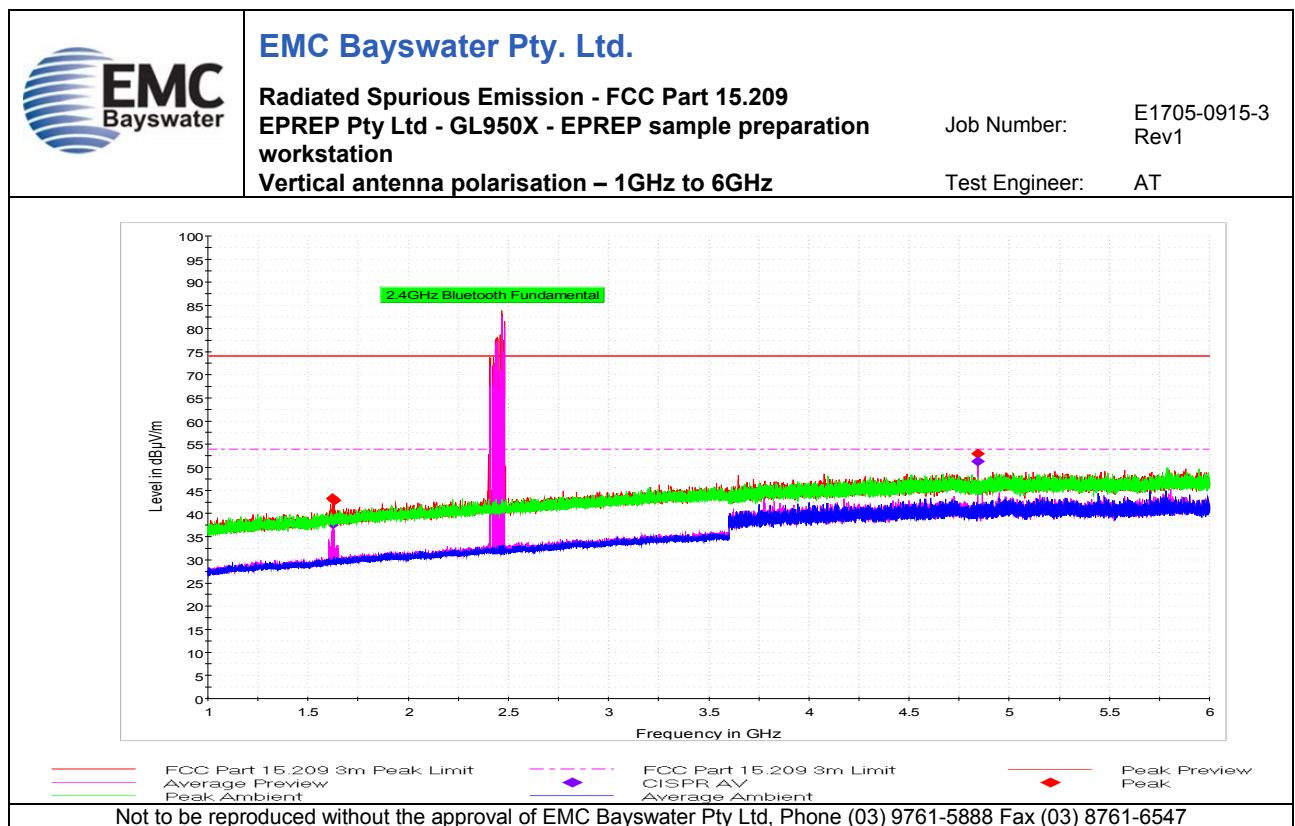
Graph 12



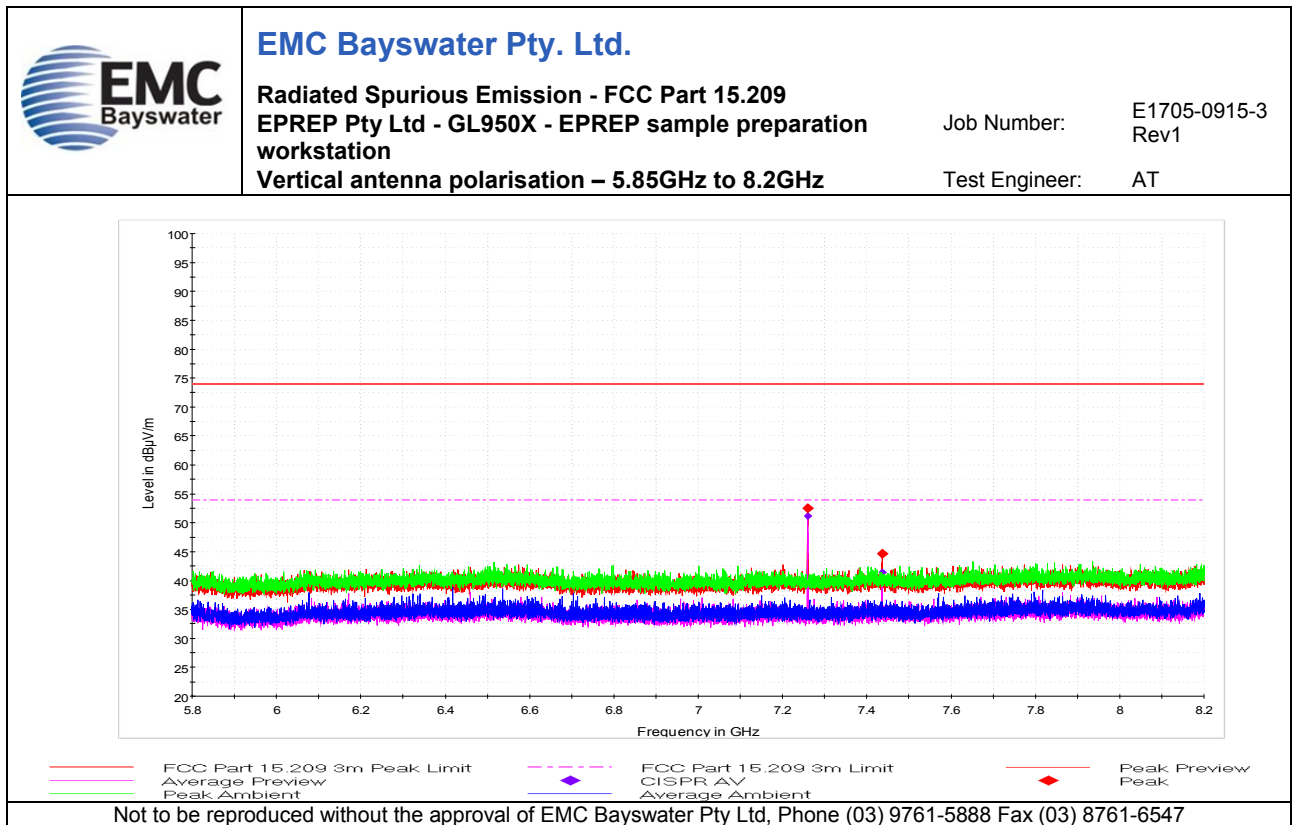
Graph 13



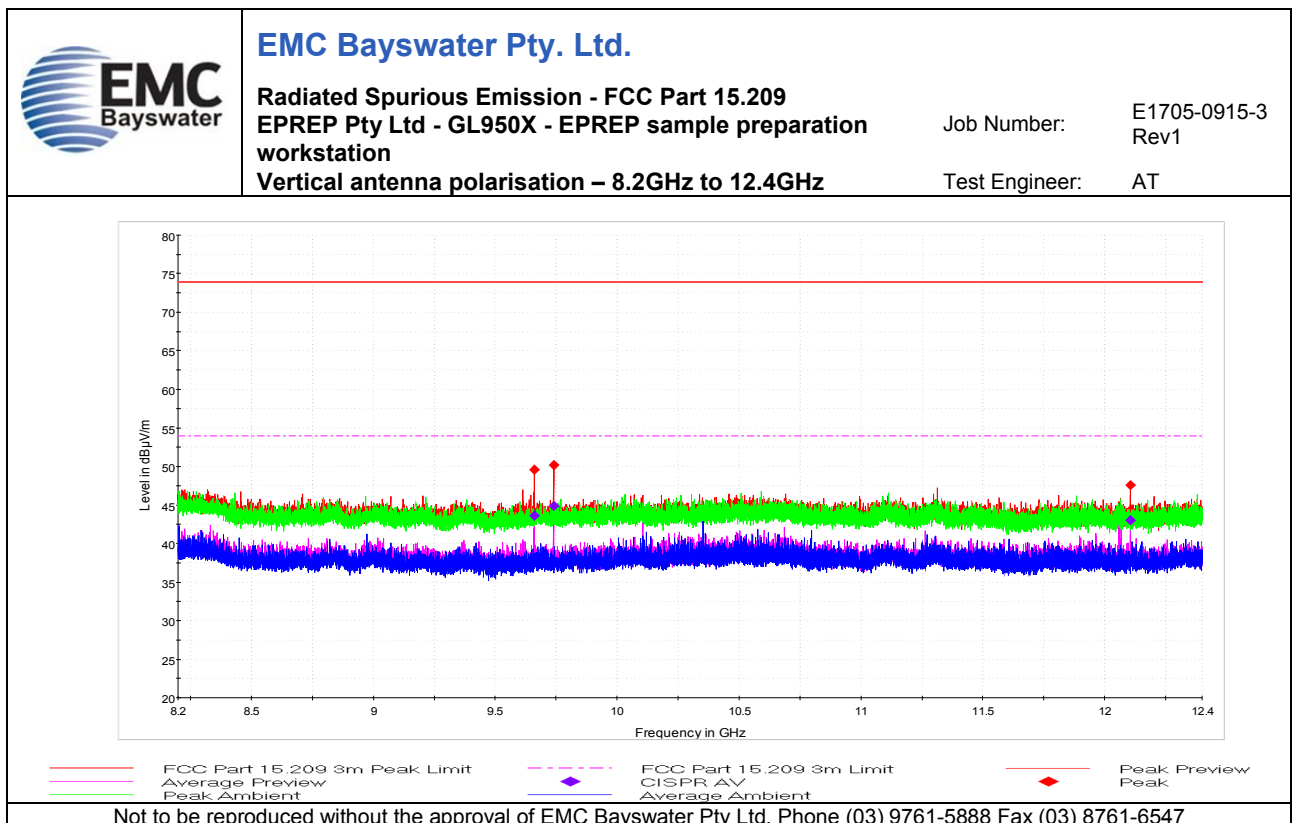
Graph 14



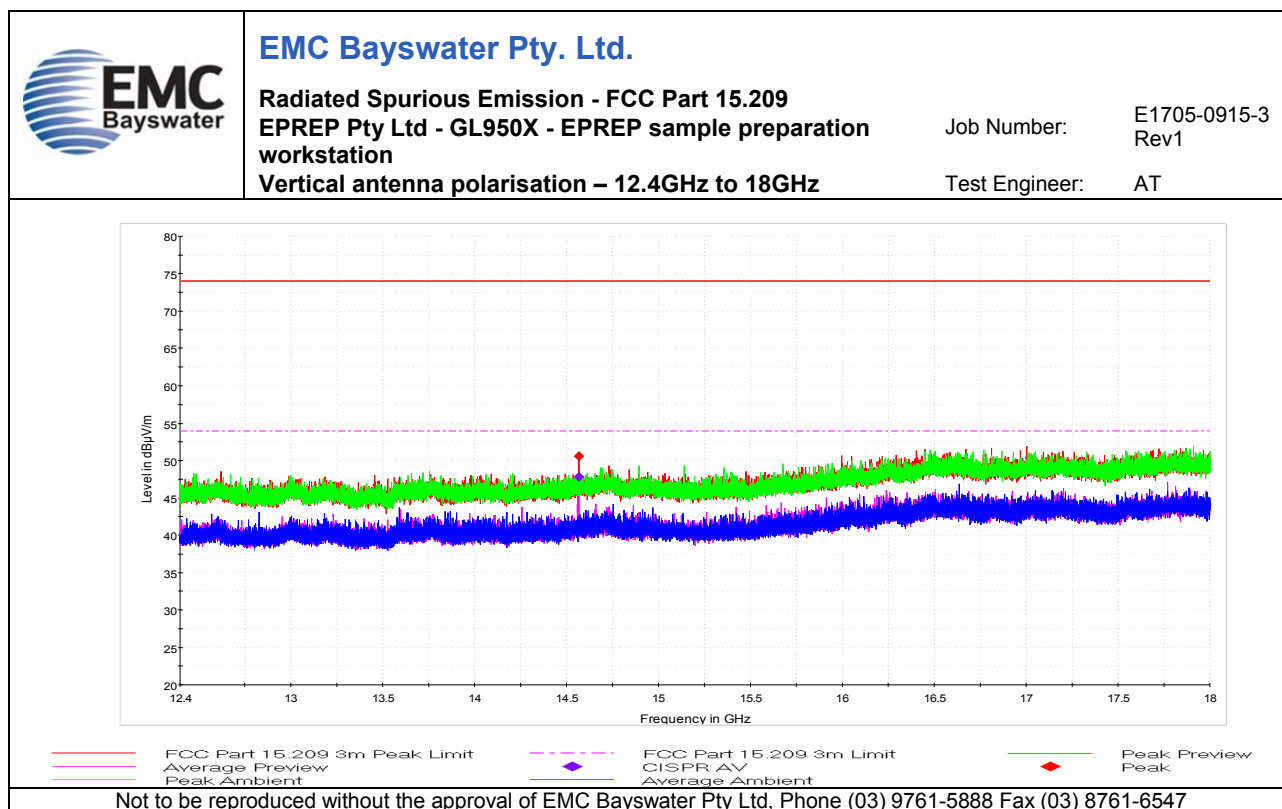
Graph 15



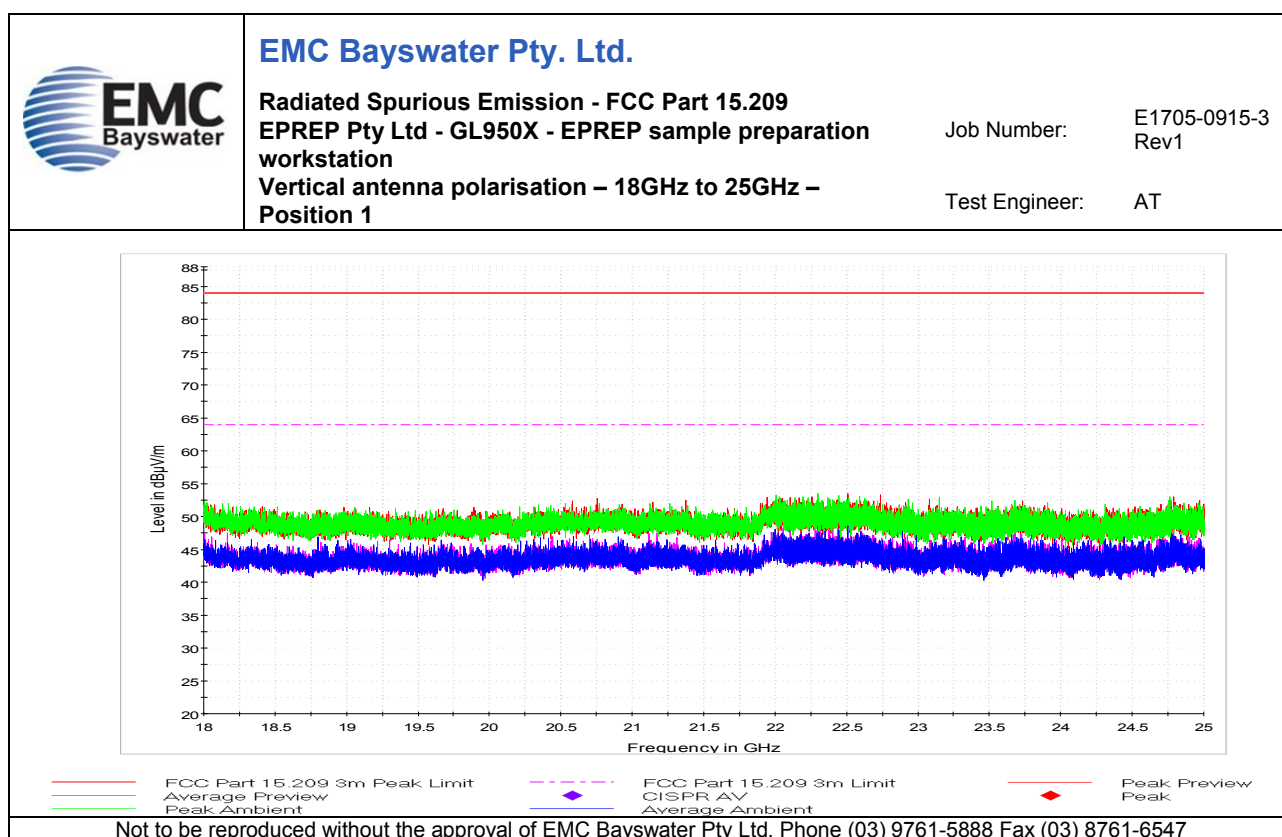
Graph 16



Graph 17



Graph 18



Graph 19

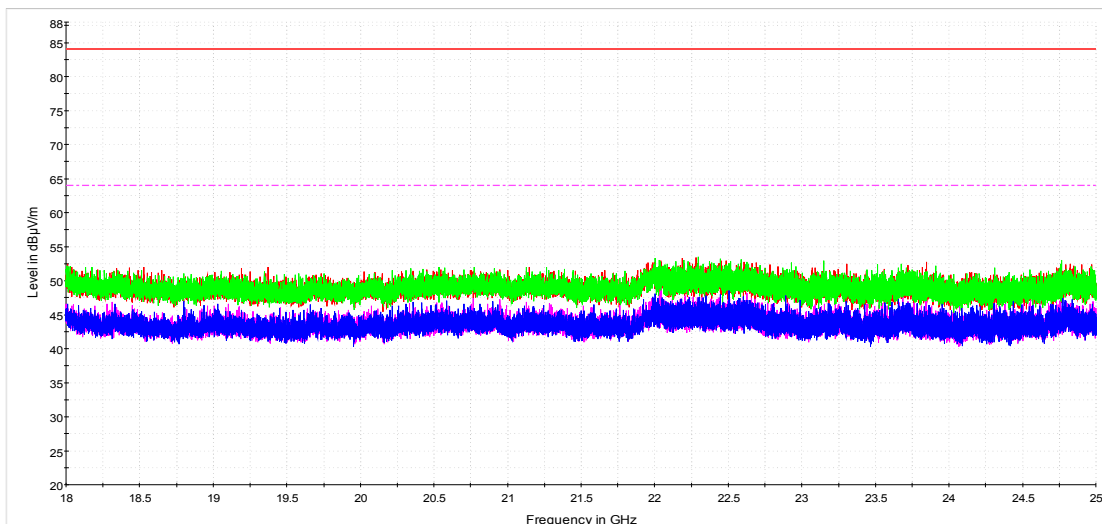


EMC Bayswater Pty. Ltd.

Radiated Spurious Emission - FCC Part 15.209
EPREP Pty Ltd - GL950X - EPREP sample preparation
workstation
Vertical antenna polarisation – 18GHz to 25GHz –
Position 2

Job Number: E1705-0915-3
Rev1

Test Engineer: AT



— FCC Part 15.209 3m Peak Limit
 - - - FCC Part 15.209 3m Limit
 — Average Preview
 — CISPR AV
 ◆ Peak Preview Peak

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Graph 20

Appendix C.3 – Conducted Emissions - EPREP sample preparation workstation

No.	Test	Graph Description
21	Conducted Emissions	Active Line - RFID/Bluetooth TX mode
22		Neutral Line - RFID/Bluetooth TX mode

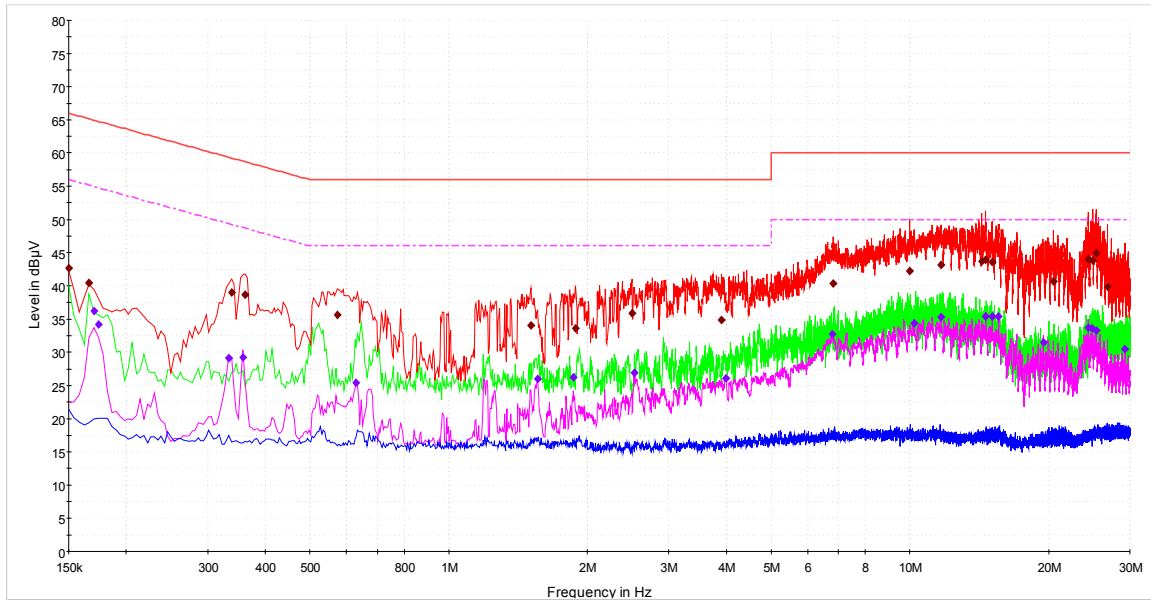


EMC Bayswater Pty. Ltd.

Conducted Emissions – RFID/Bluetooth TX mode
EPREP Pty Ltd - GL950X - EPREP sample preparation
workstation
Active Line

Job Number: E1705-0915-3
Rev1

Test Engineer: FD



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Graph 21

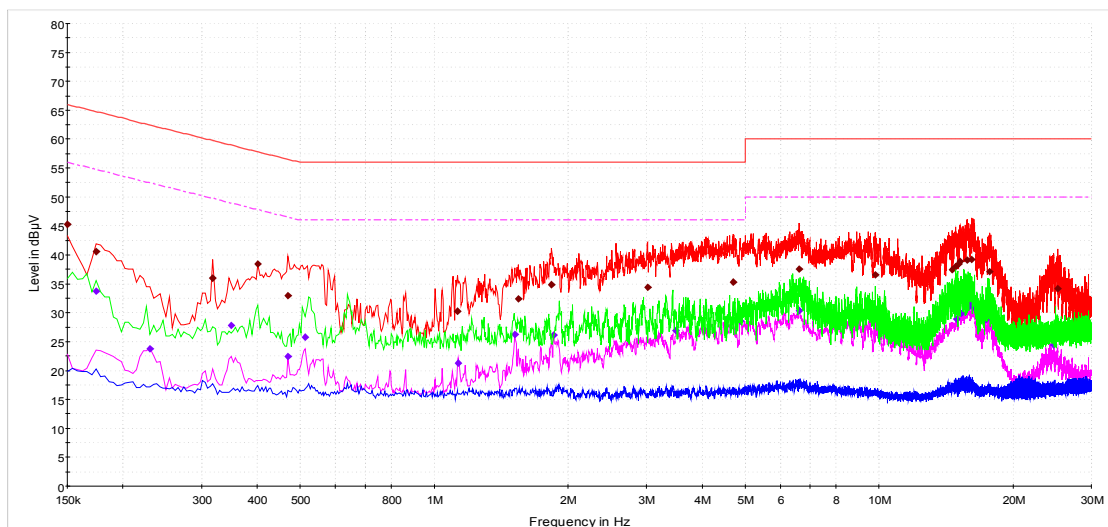


EMC Bayswater Pty. Ltd.

Conducted Emissions – RFID/Bluetooth TX mode
EPREP Pty Ltd - GL950X - EPREP sample preparation
workstation
Neutral Line

Job Number: E1705-0915-3
Rev1

Test Engineer: FD



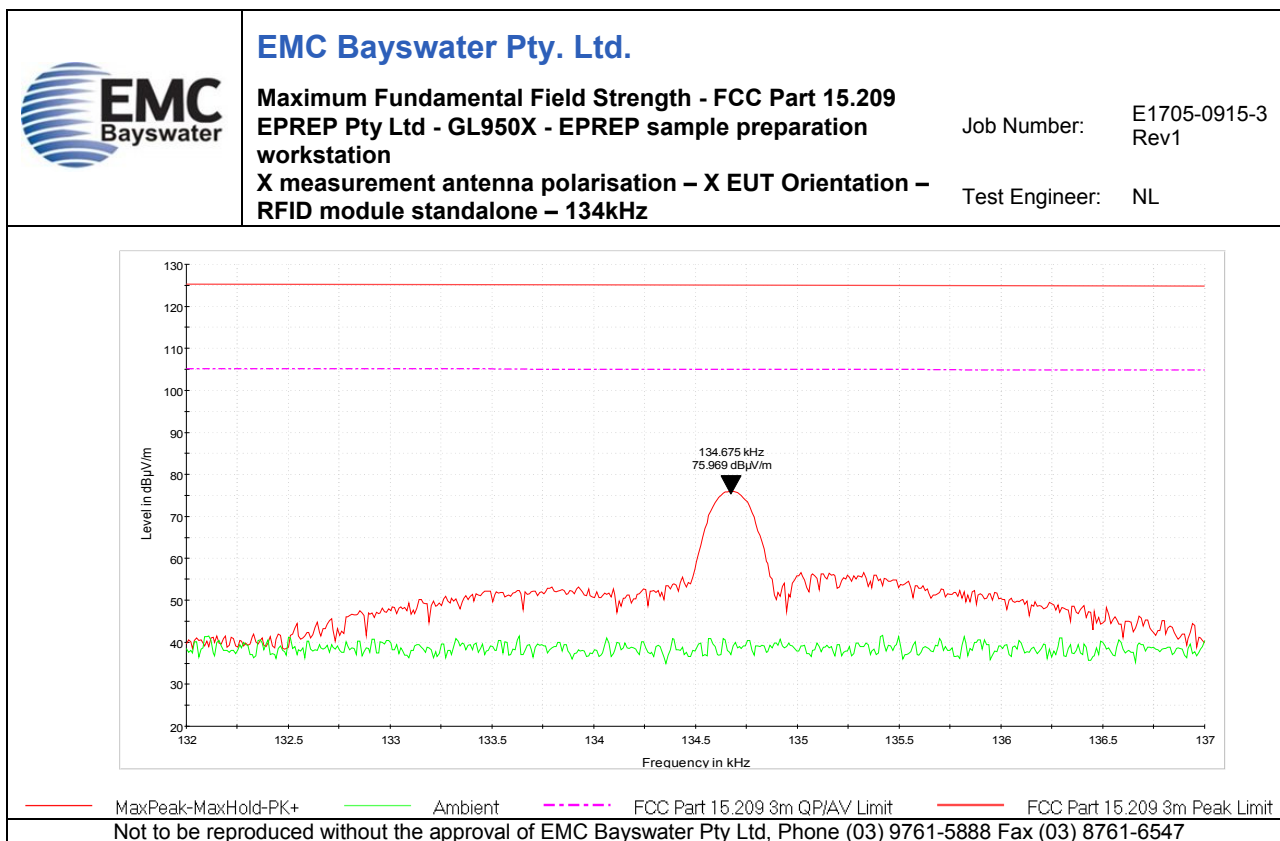
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Graph 22

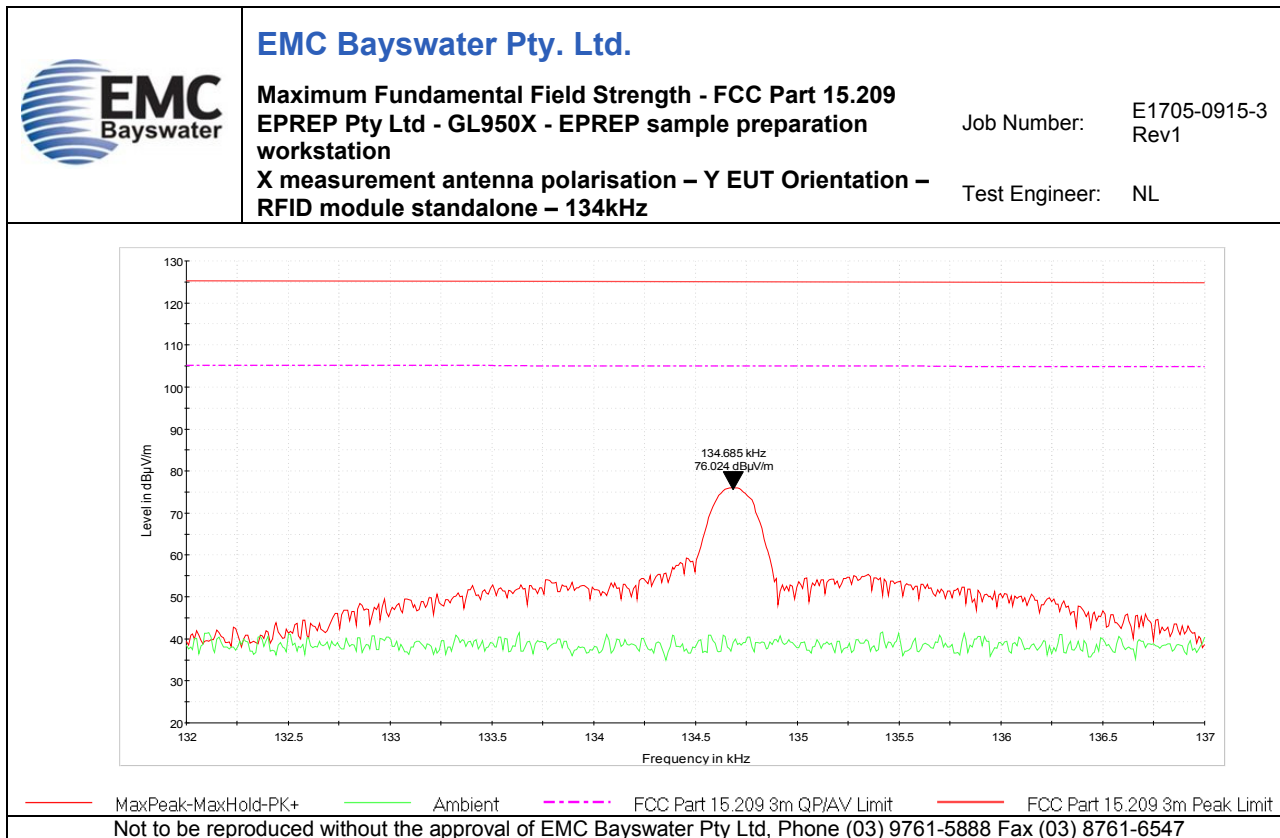
Appendix D – Measurement Graphs – RFID Module with 134kHz coil antenna standalone

Appendix D.1 - Maximum Fundamental Field Strength

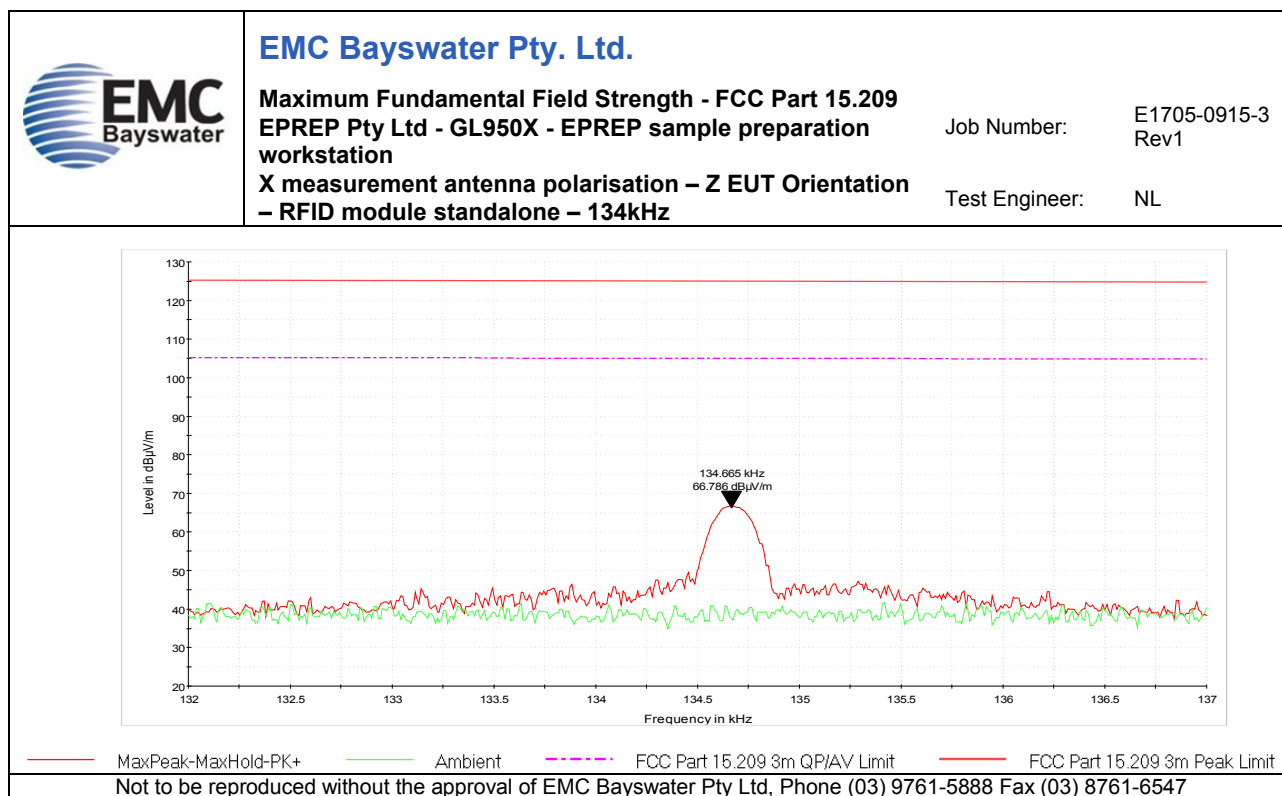
No.	Test	Graph Description
23	Maximum Fundamental Field Strength	X measurement antenna polarisation – X EUT orientation
24		X measurement antenna polarisation – Y EUT orientation
25		X measurement antenna polarisation – Z EUT orientation
26		Y measurement antenna polarisation – X EUT orientation
27		Y measurement antenna polarisation – Y EUT orientation
28		Y measurement antenna polarisation – Z EUT orientation
29		Z measurement antenna polarisation – X EUT orientation
30		Z measurement antenna polarisation – Y EUT orientation
31		Z measurement antenna polarisation – Z EUT orientation



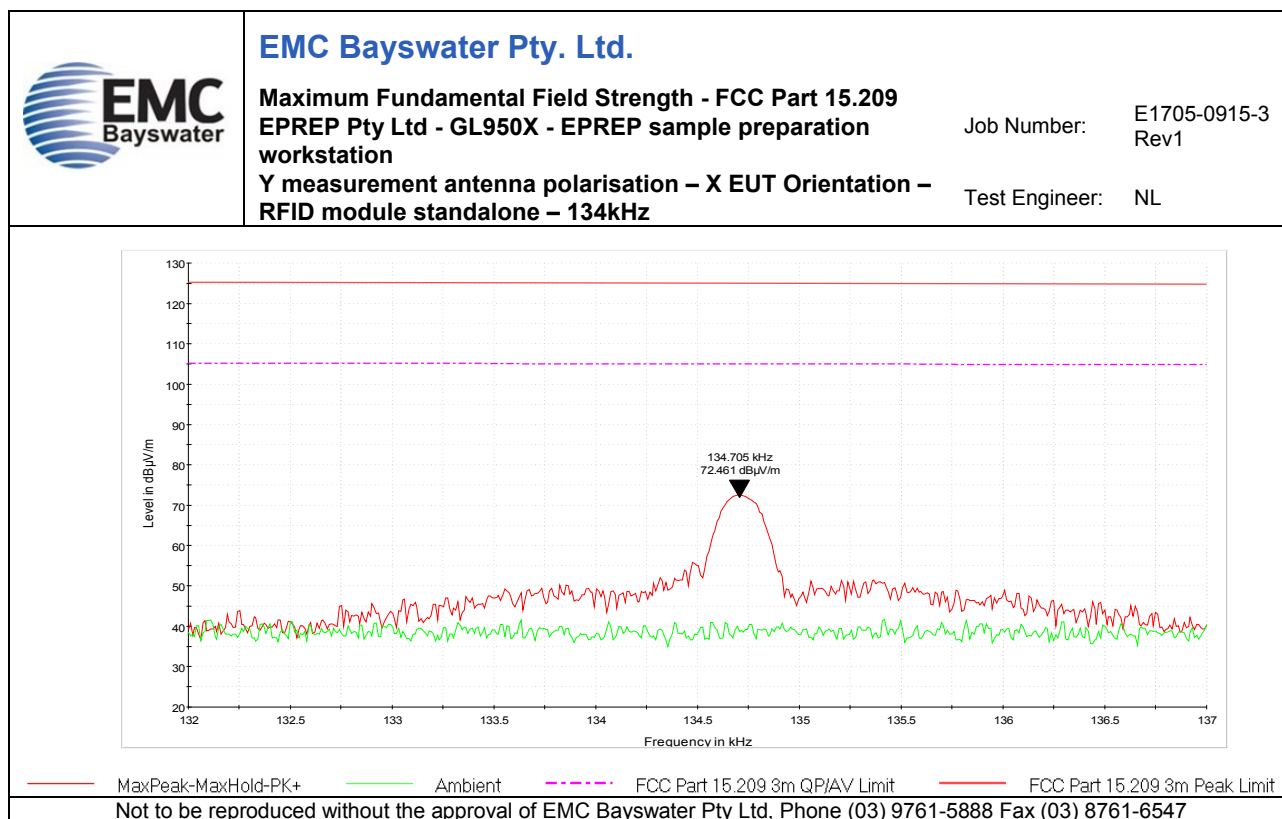
Graph 23



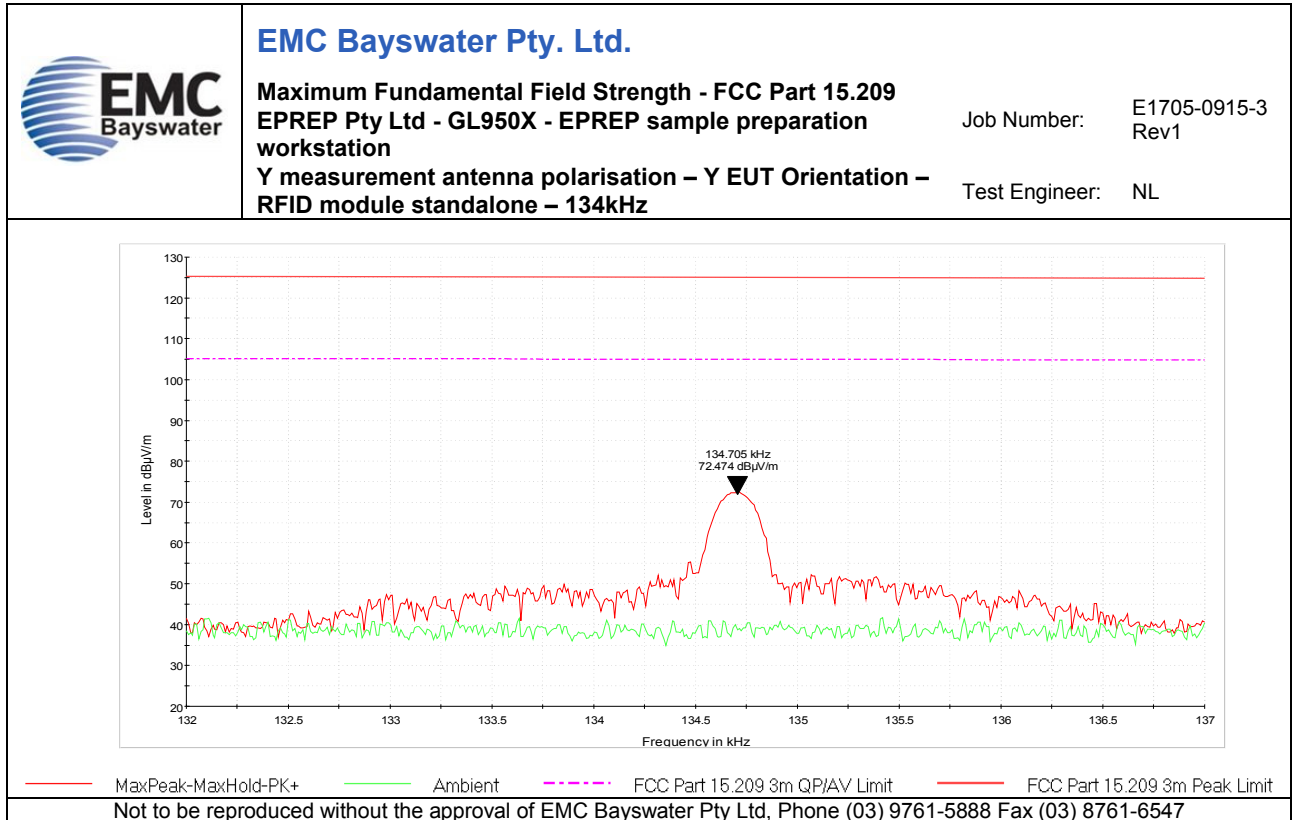
Graph 24



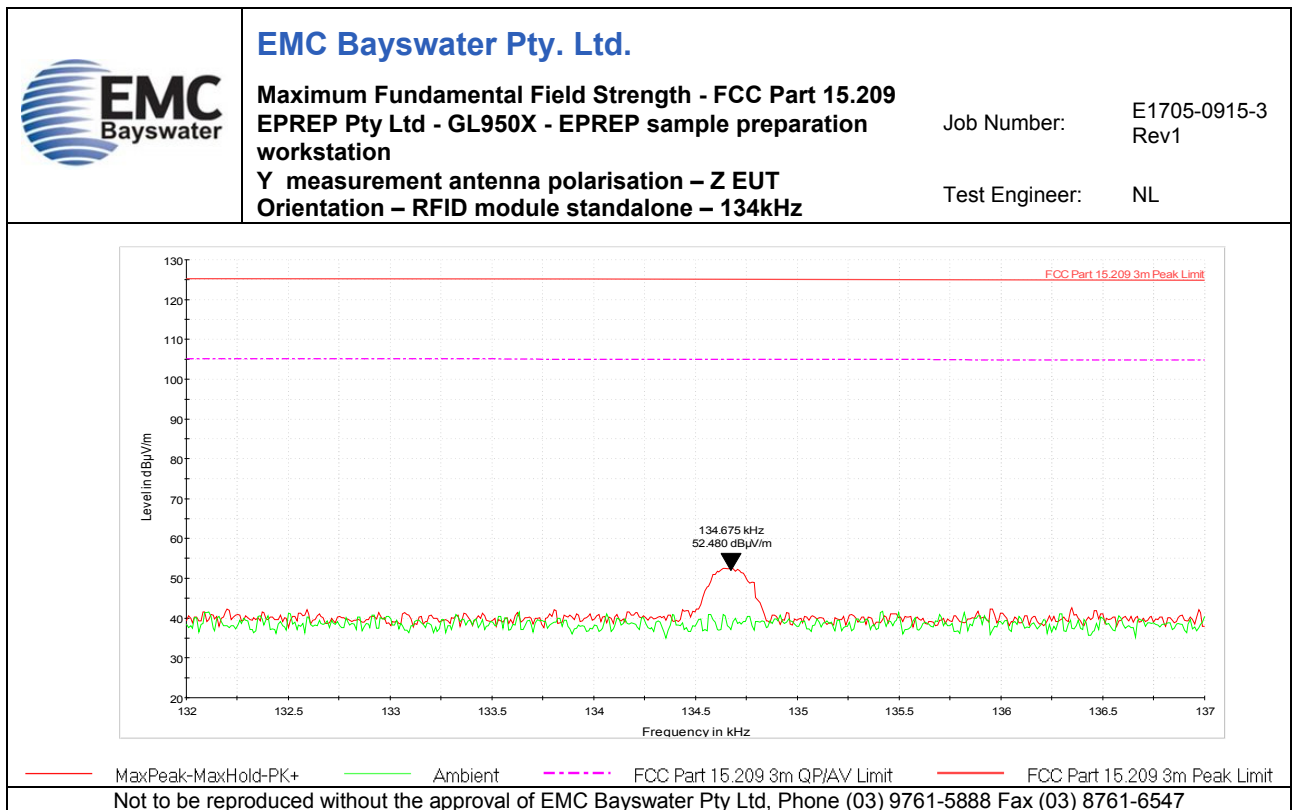
Graph 25



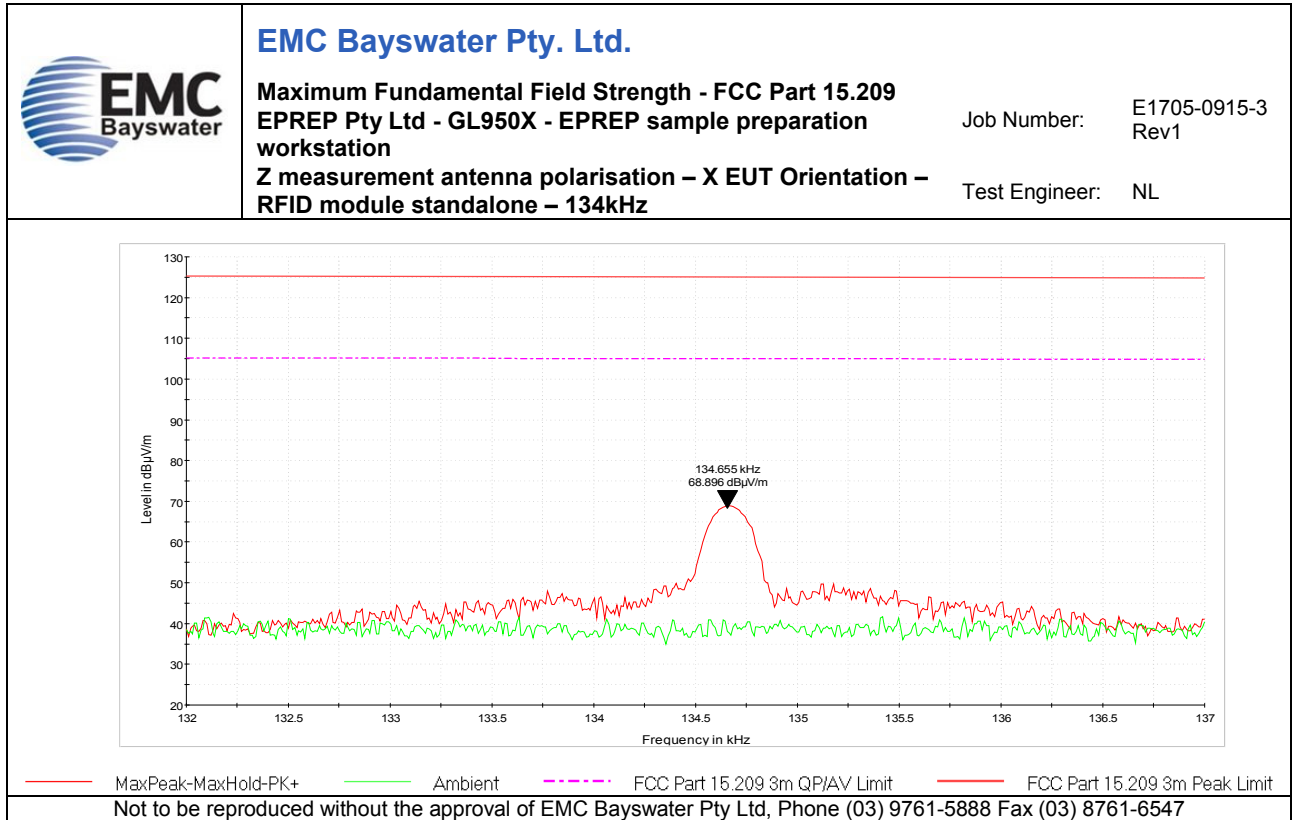
Graph 26



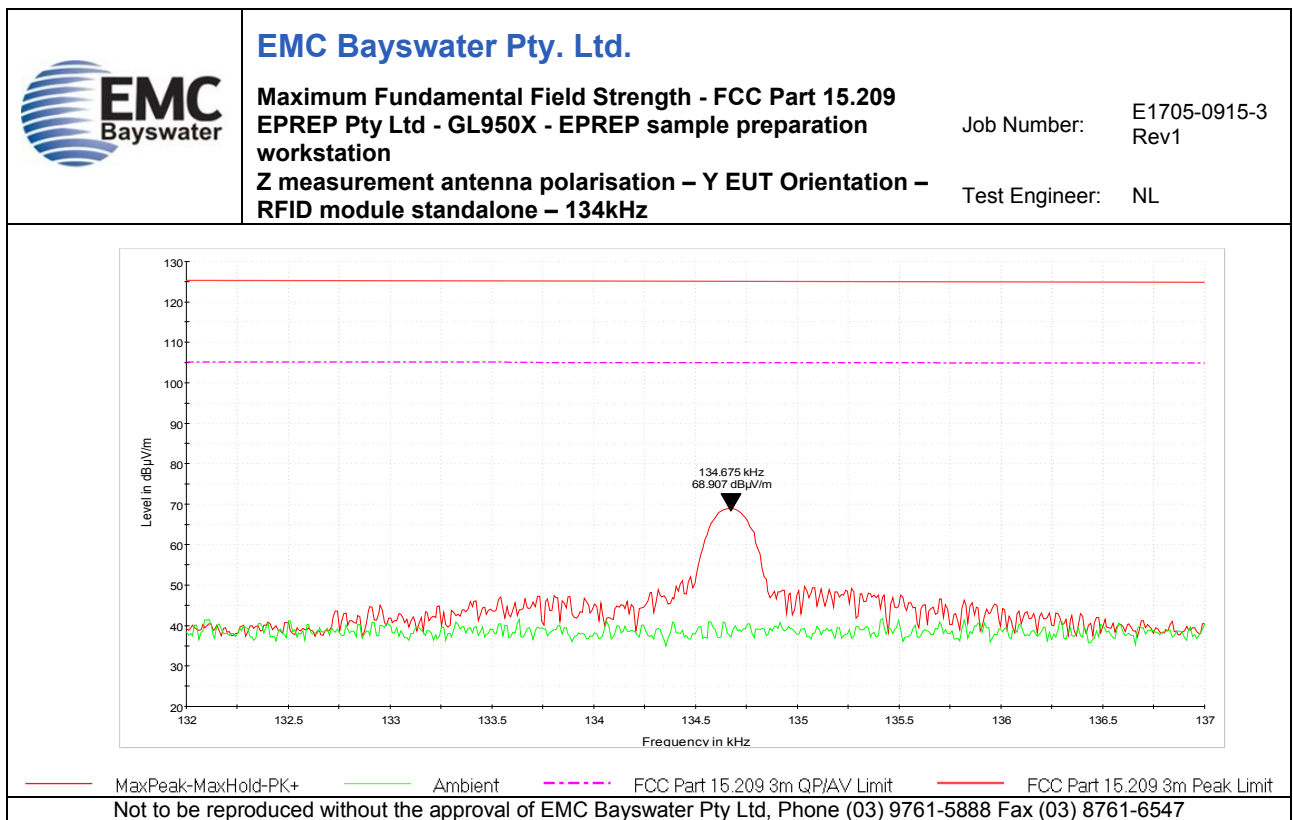
Graph 27



Graph 28



Graph 29



Graph 30

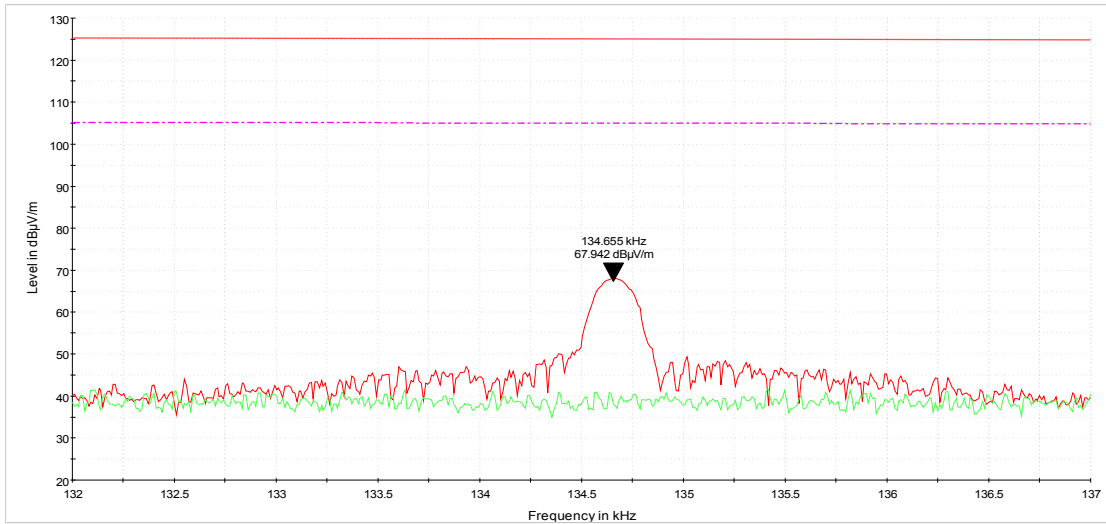


EMC Bayswater Pty. Ltd.

Maximum Fundamental Field Strength - FCC Part 15.209
EPREP Pty Ltd - GL950X - EPREP sample preparation
workstation
Z measurement antenna polarisation – Z EUT Orientation
– RFID module standalone – 134kHz

Job Number: E1705-0915-3
Rev1

Test Engineer: NL



MaxPeak-MaxHold-PK+ Ambient FCC Part 15.209 3m QP/AV Limit FCC Part 15.209 3m Peak Limit

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Graph 31

Appendix D.2 – Radiated Spurious Emissions

No.	Test	Graph Description
32	Radiated Spurious Emissions	RFID Module standalone – 134kHz – 9kHz to 30MHz

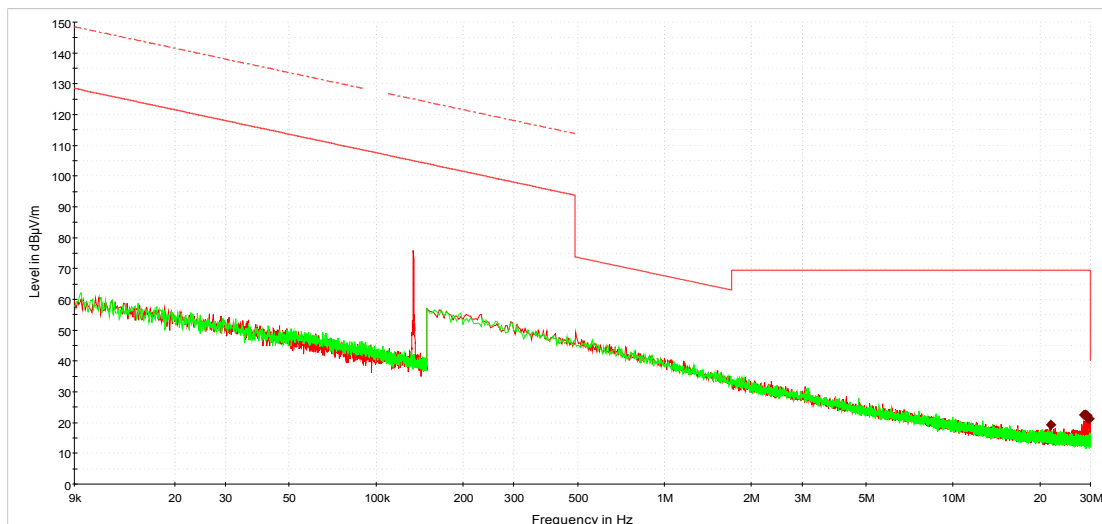


EMC Bayswater Pty. Ltd.

Radiated Spurious Emission - FCC Part 15.209
EPREP Pty Ltd - GL950X - EPREP sample preparation
workstation
X measurement antenna polarisation – 9kHz to 30MHz
RFID module standalone – 134kHz

Job Number: E1705-0915-3
Rev1

Test Engineer: NL



MaxPeak-MaxHold-PK+ FCC Part 15.209 3m QP/AV Limit FCC Part 15.209 3m Peak Limit Ambient Peak Average

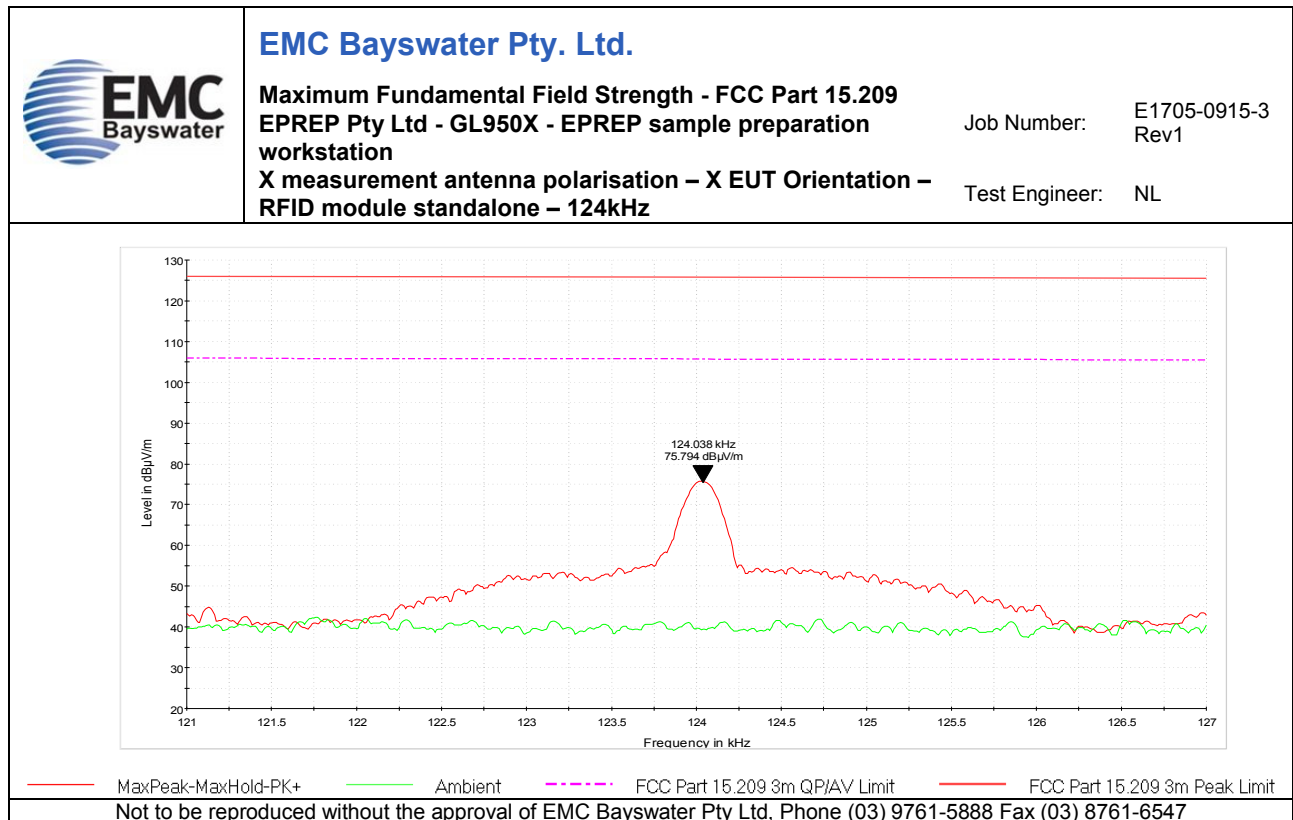
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Graph 32

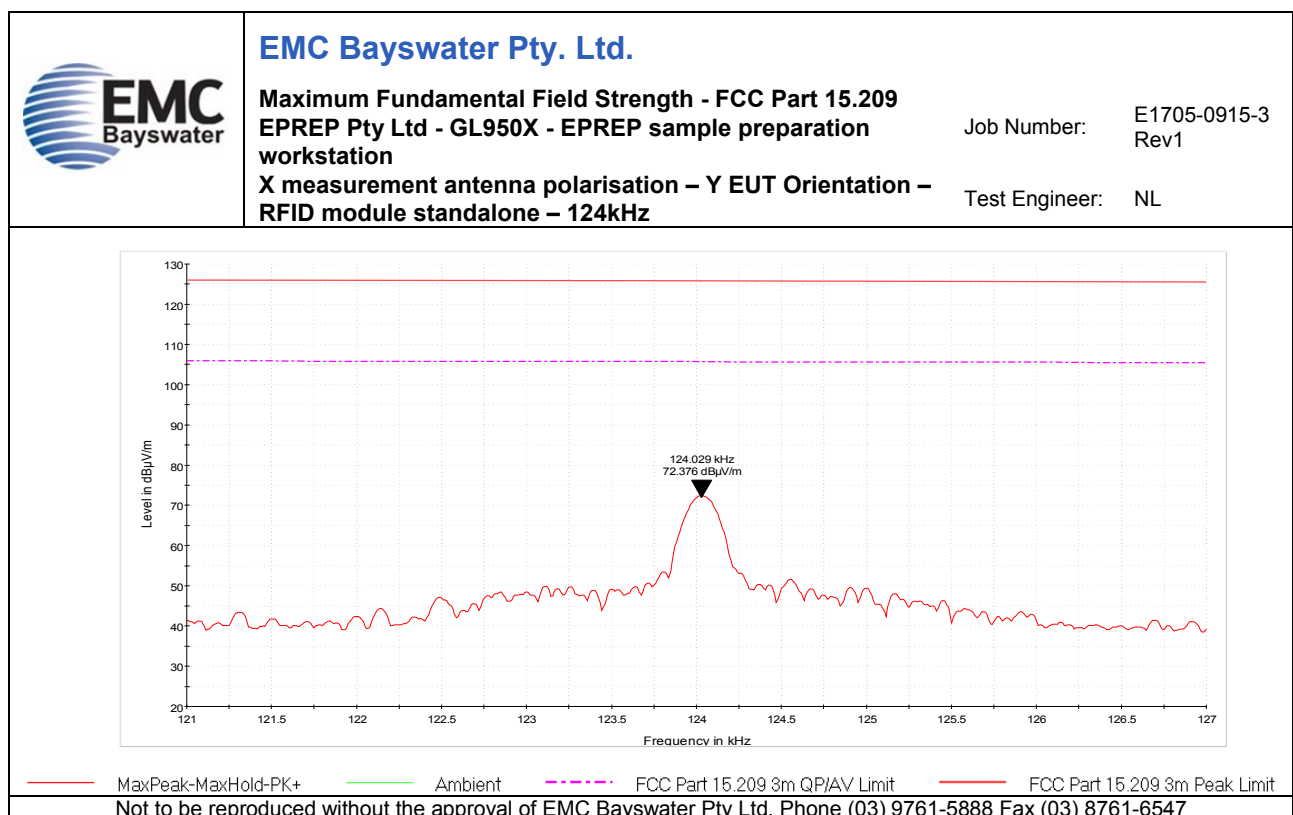
Appendix E – Measurement Graphs – RFID Module with 124kHz coil antenna standalone

Appendix E.1 - Maximum Fundamental Field Strength

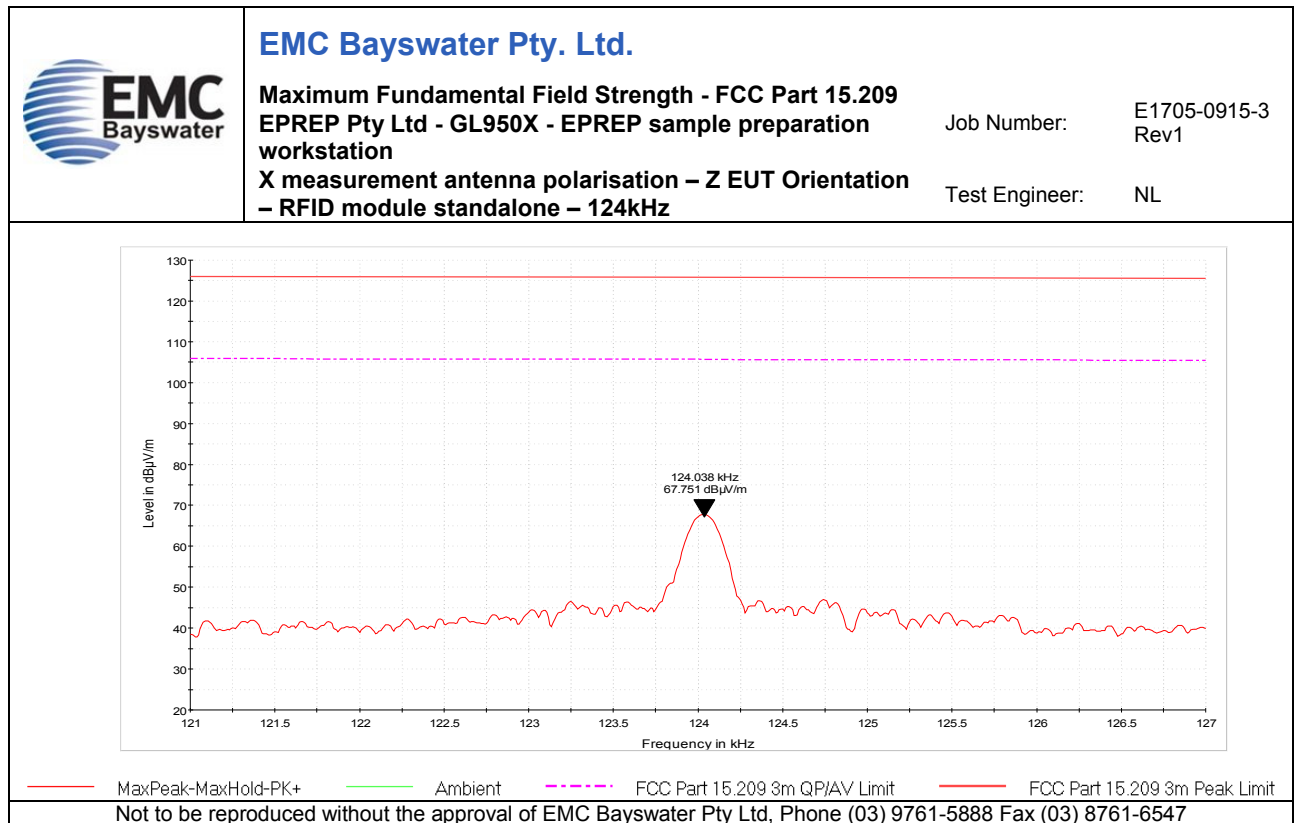
No.	Test	Graph Description
33	Maximum Fundamental Field Strength	X measurement antenna polarisation – X EUT orientation
34		X measurement antenna polarisation – Y EUT orientation
35		X measurement antenna polarisation – Z EUT orientation
36		Y measurement antenna polarisation – X EUT orientation
37		Y measurement antenna polarisation – Y EUT orientation
38		Y measurement antenna polarisation – Z EUT orientation
39		Z measurement antenna polarisation – X EUT orientation
40		Z measurement antenna polarisation – Y EUT orientation
41		Z measurement antenna polarisation – Z EUT orientation



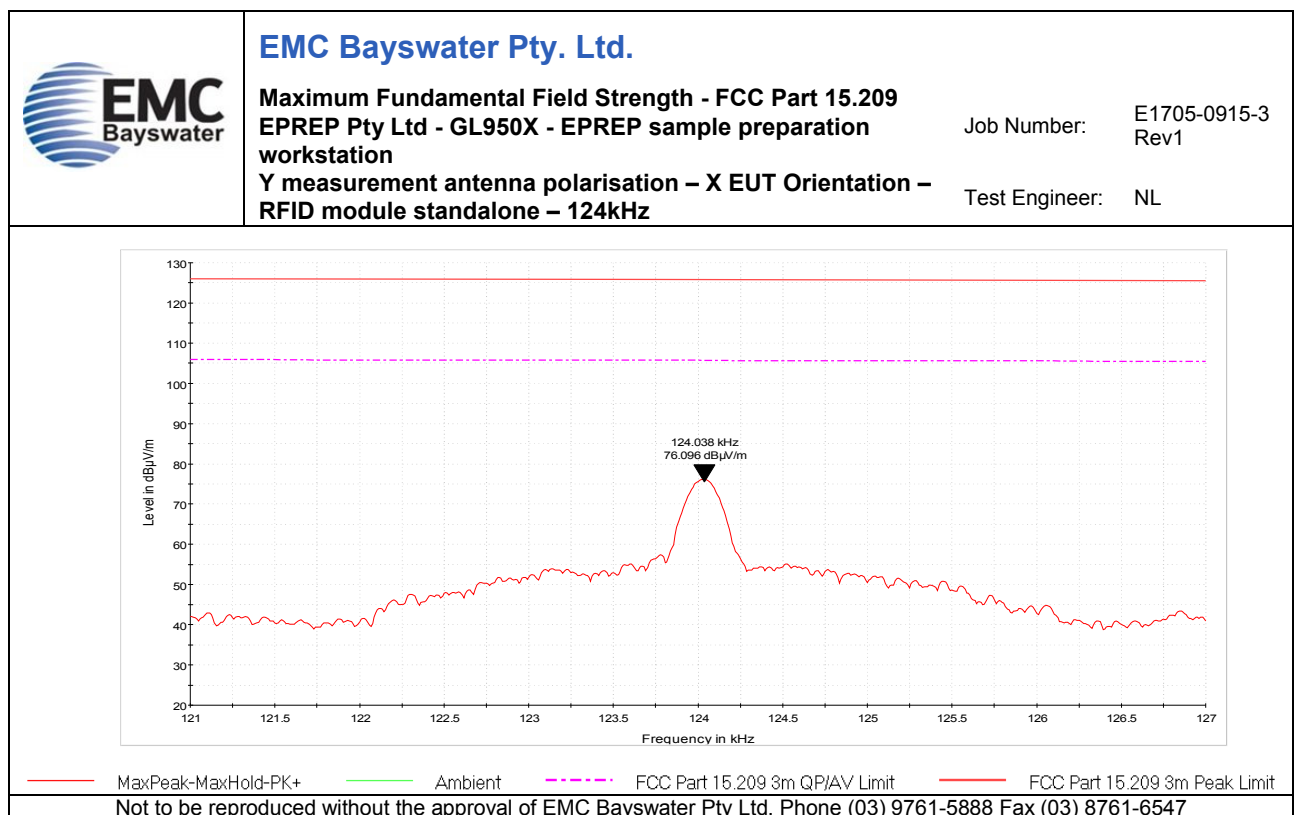
Graph 33



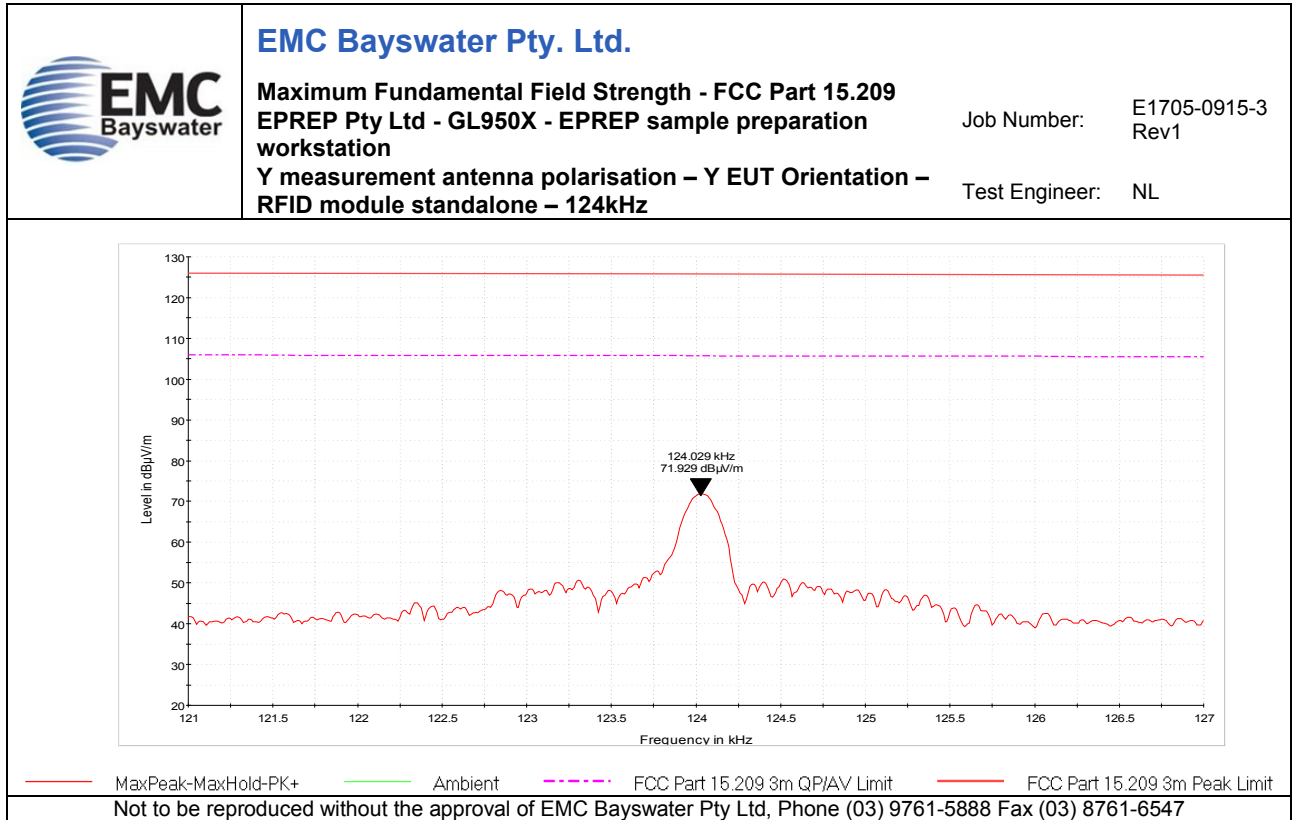
Graph 34



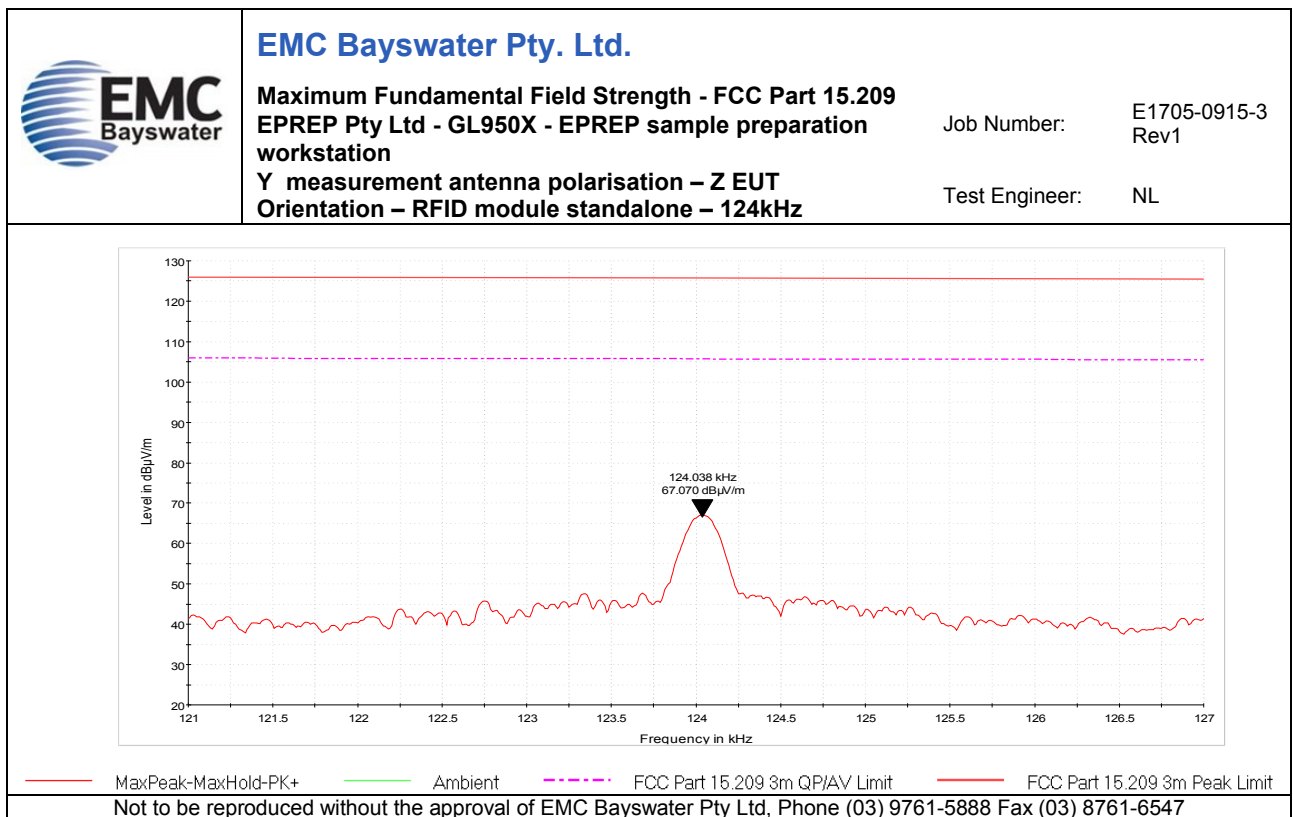
Graph 35



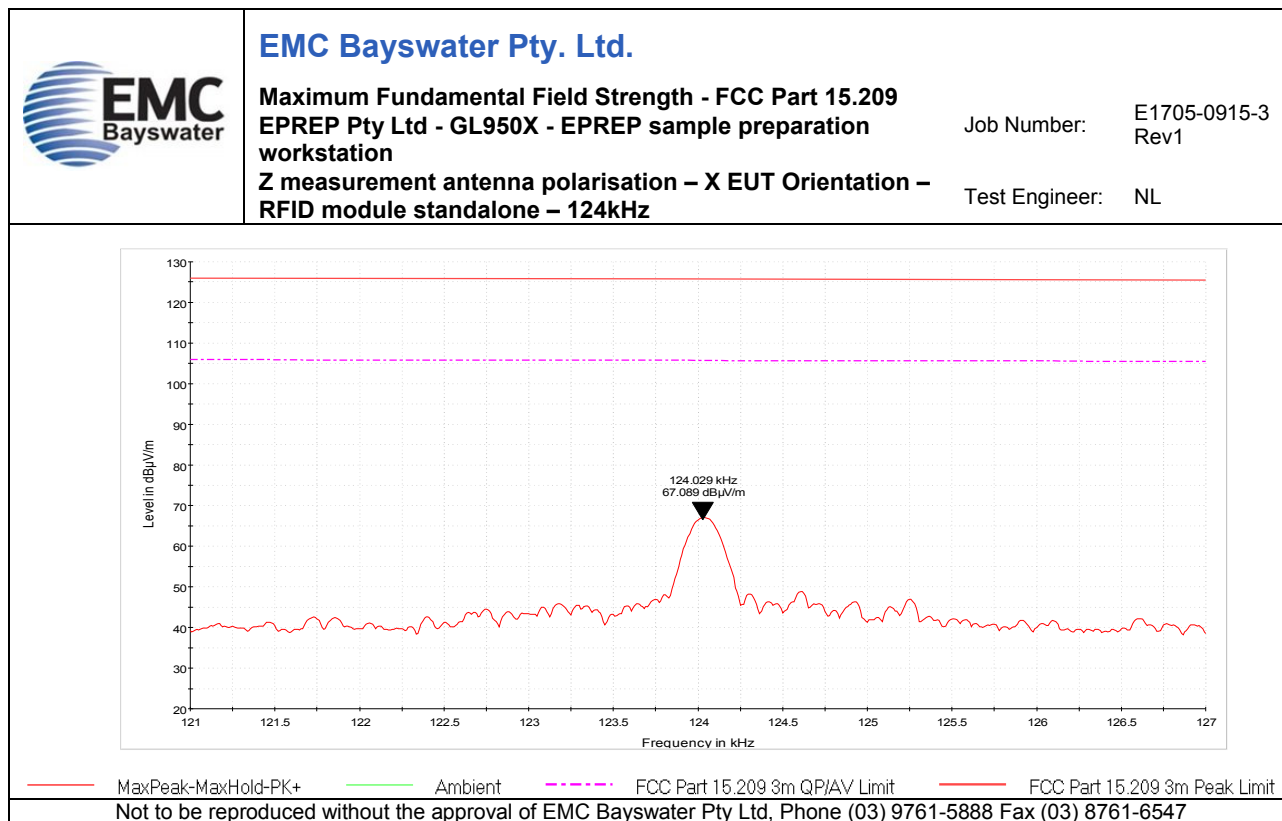
Graph 36



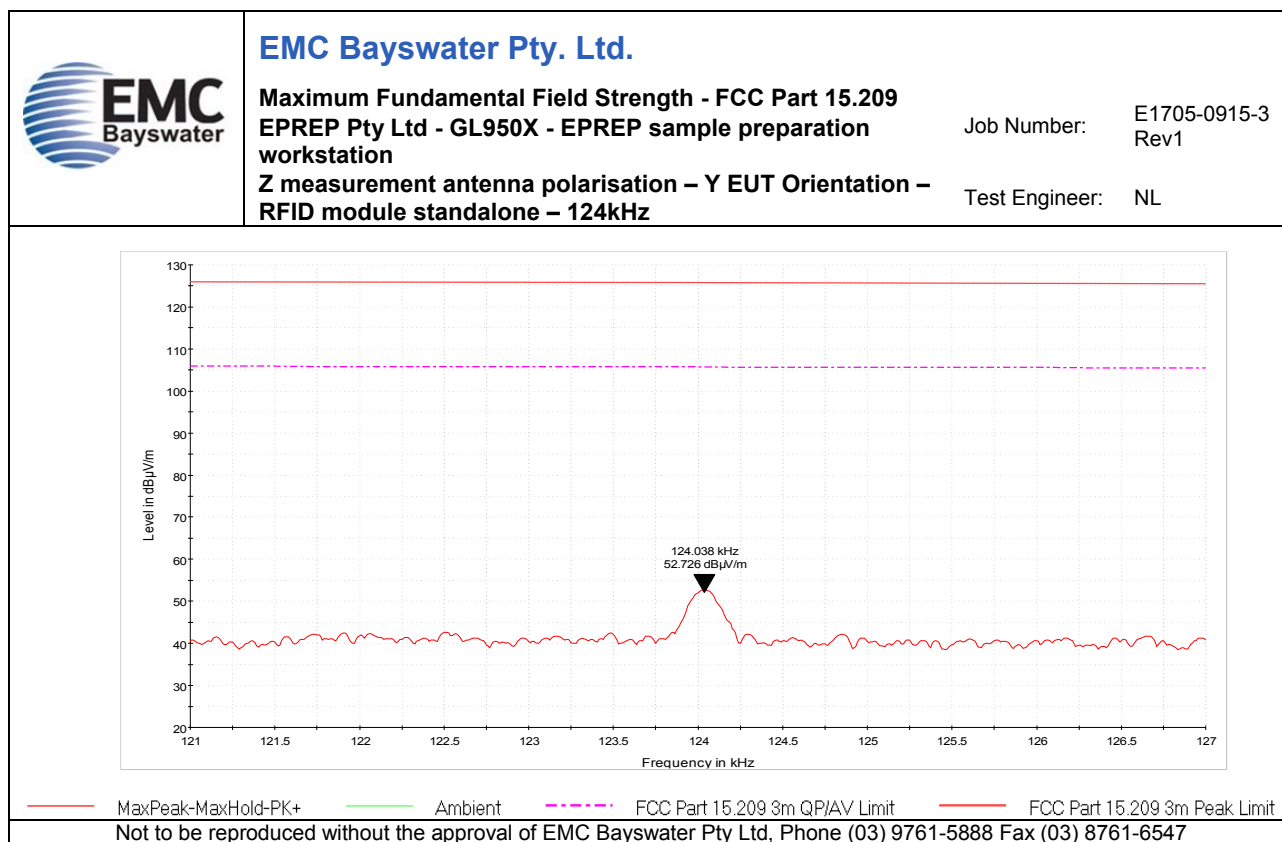
Graph 37



Graph 38



Graph 39



Graph 40



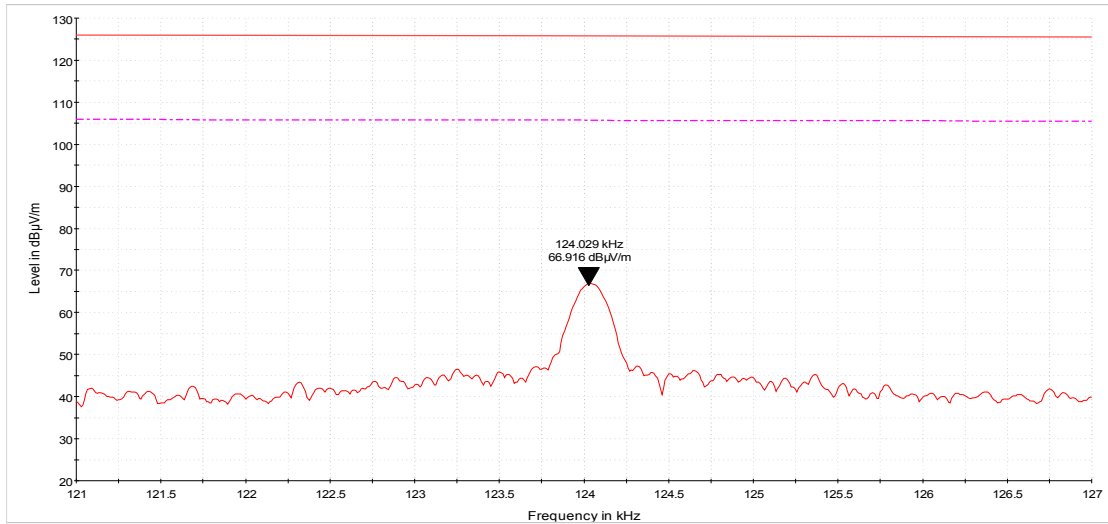
EMC Bayswater Pty. Ltd.

Maximum Fundamental Field Strength - FCC Part 15.209
EPREP Pty Ltd - GL950X - EPREP sample preparation
workstation

Z measurement antenna polarisation – Z EUT Orientation
– RFID module standalone – 124kHz

Job Number: E1705-0915-3
Rev1

Test Engineer: NL



MaxPeak-MaxHold-PK+ Ambient FCC Part 15.209 3m QP/AV Limit FCC Part 15.209 3m Peak Limit

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Graph 41

Appendix E.2 – Radiated Spurious Emissions

No.	Test	Graph Description
42	Radiated Spurious Emissions	RFID Module standalone – 124kHz – 9kHz to 30MHz

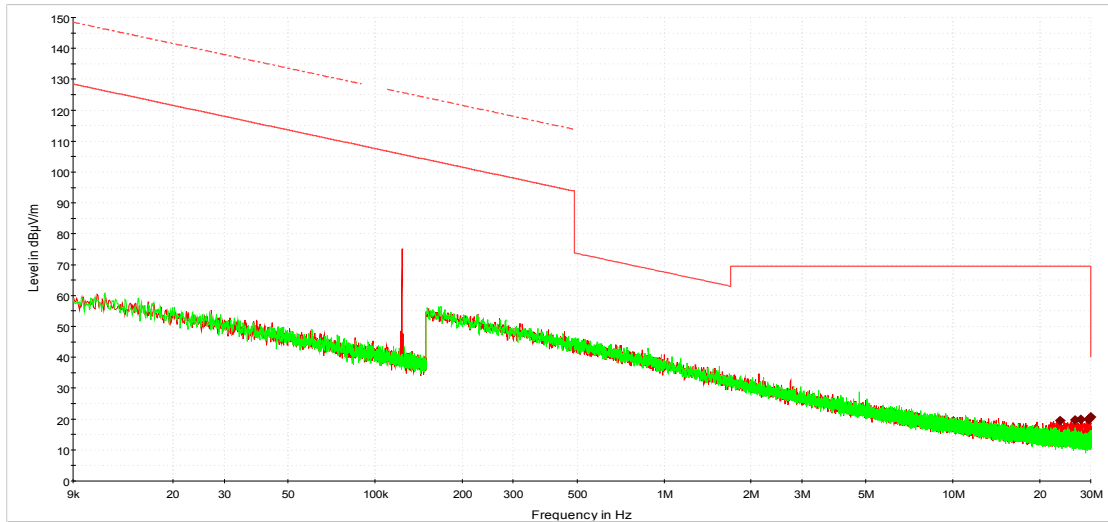


EMC Bayswater Pty. Ltd.

Radiated Spurious Emission - FCC Part 15.209
EPREP Pty Ltd - GL950X - EPREP sample preparation
workstation
X measurement antenna polarisation – 9kHz to 30MHz
RFID module standalone – 124kHz

Job Number: E1705-0915-3
Rev1

Test Engineer: NL



MaxPeak-MaxHold-PK+ FCC Part 15.209 3m QP/AV Limit FCC Part 15.209 3m Peak Limit Ambient Peak Average

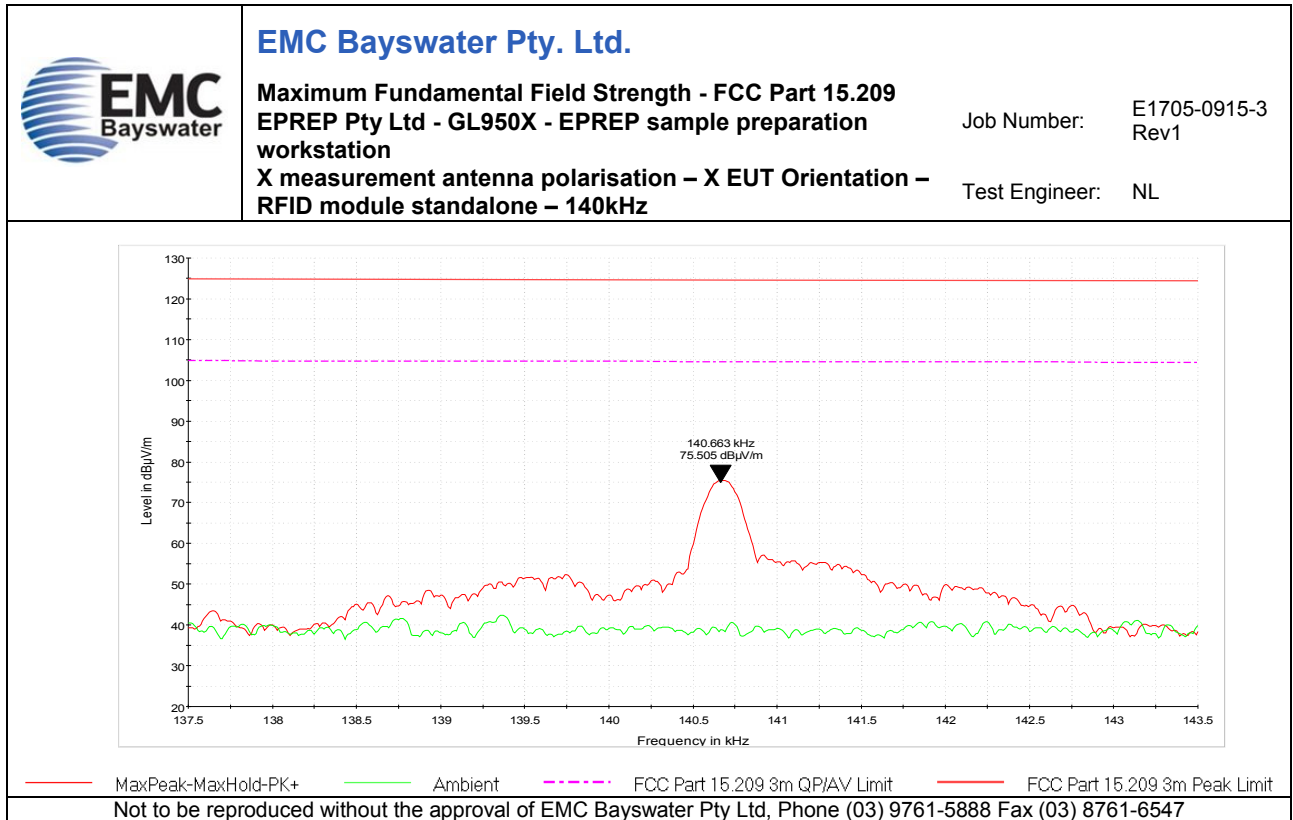
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Graph 42

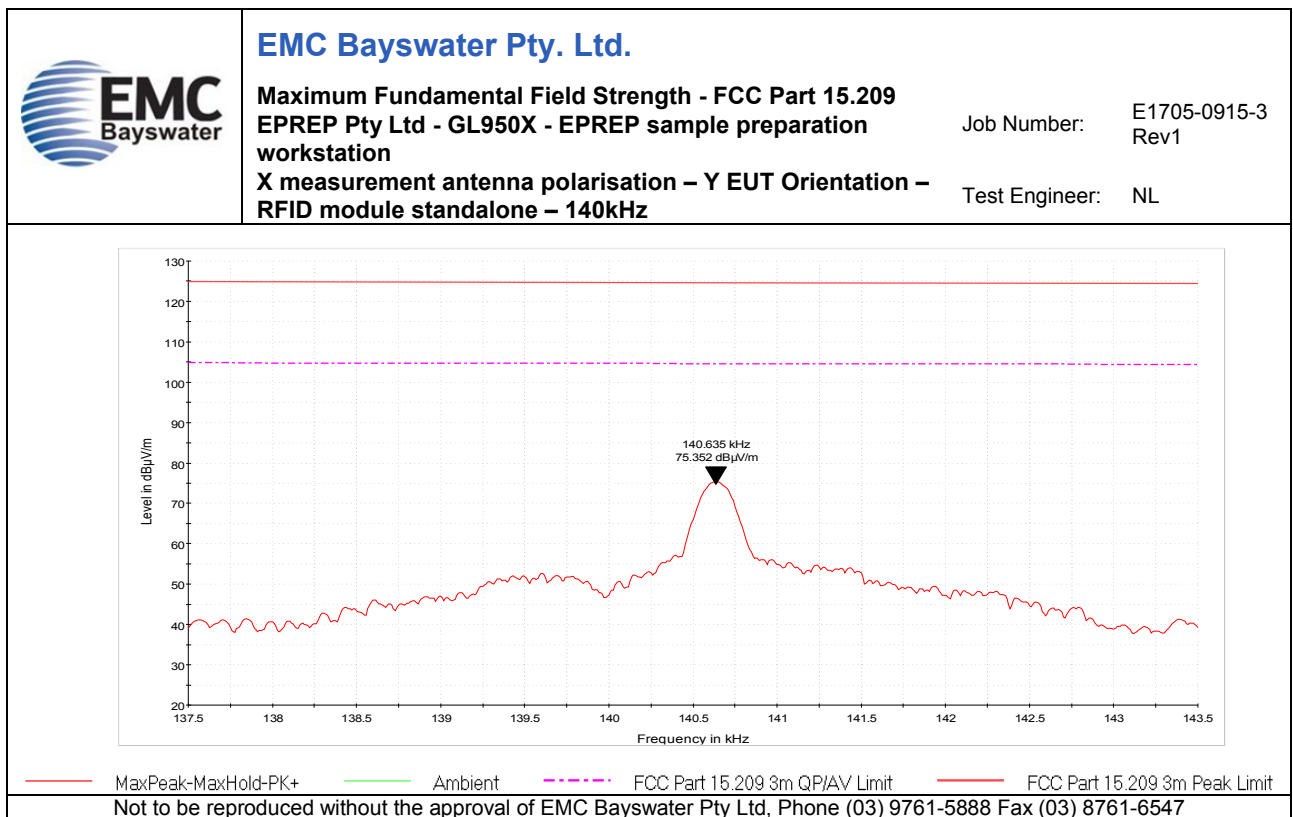
Appendix F – Measurement Graphs – RFID Module with 140kHz coil antenna standalone

Appendix F.1 - Maximum Fundamental Field Strength

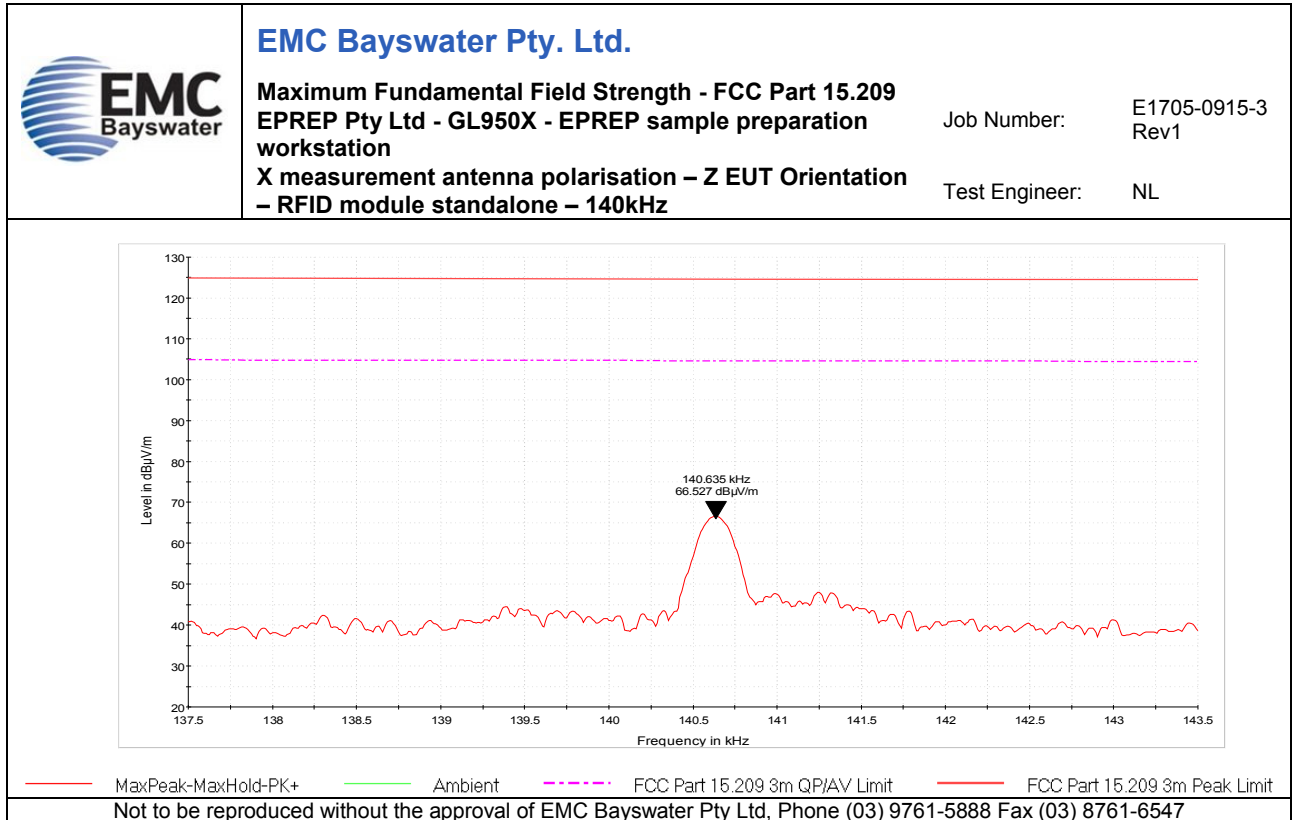
No.	Test	Graph Description
43	Maximum Fundamental Field Strength	X measurement antenna polarisation – X EUT orientation
44		X measurement antenna polarisation – Y EUT orientation
45		X measurement antenna polarisation – Z EUT orientation
46		Y measurement antenna polarisation – X EUT orientation
47		Y measurement antenna polarisation – Y EUT orientation
48		Y measurement antenna polarisation – Z EUT orientation
49		Z measurement antenna polarisation – X EUT orientation
50		Z measurement antenna polarisation – Y EUT orientation
51		Z measurement antenna polarisation – Z EUT orientation



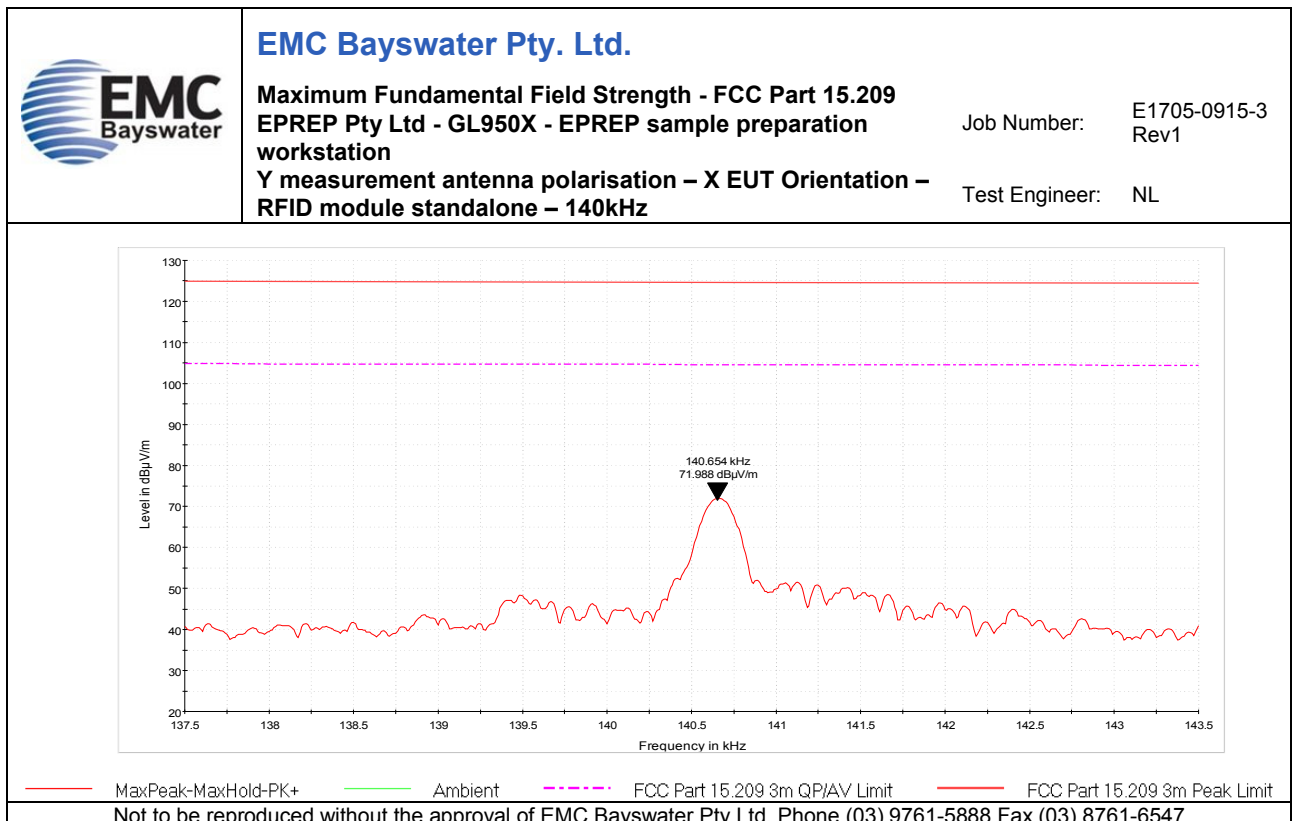
Graph 43



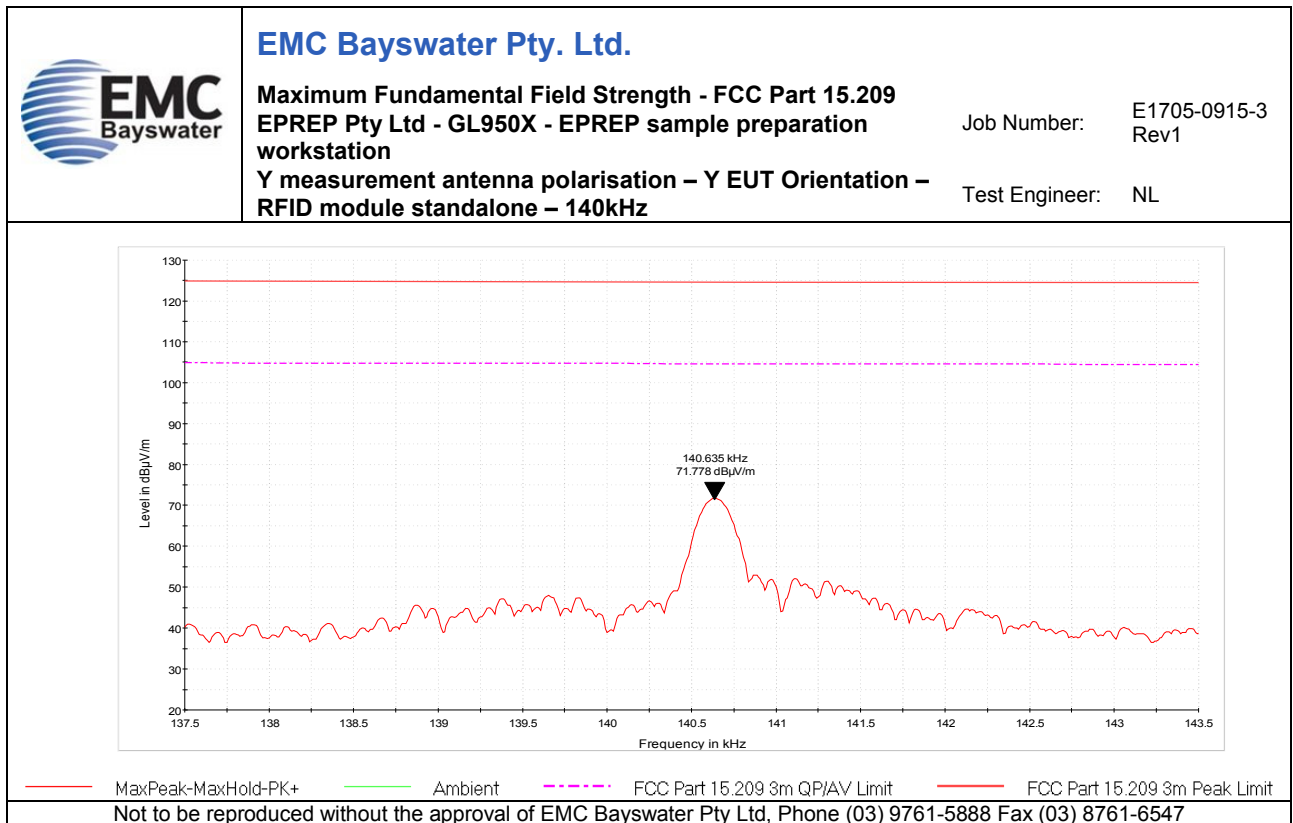
Graph 44



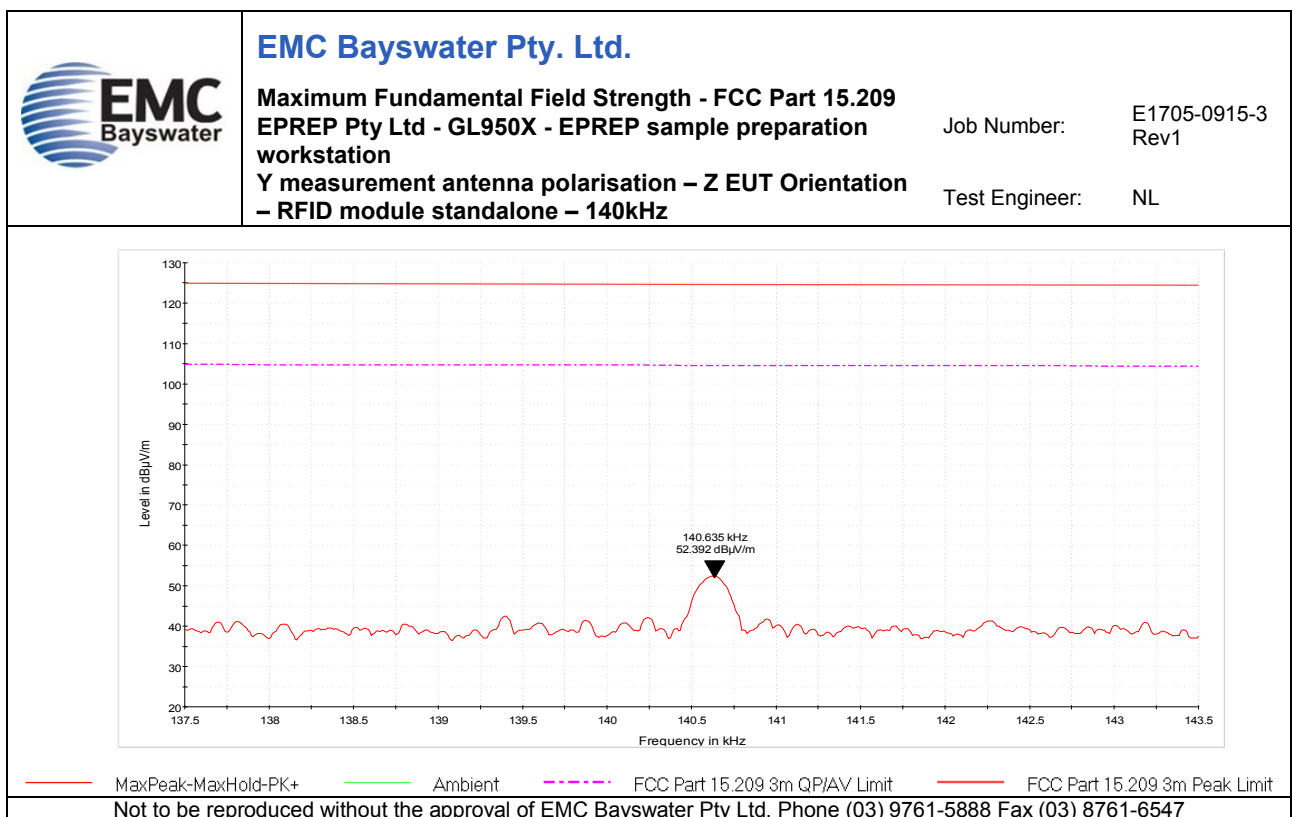
Graph 45



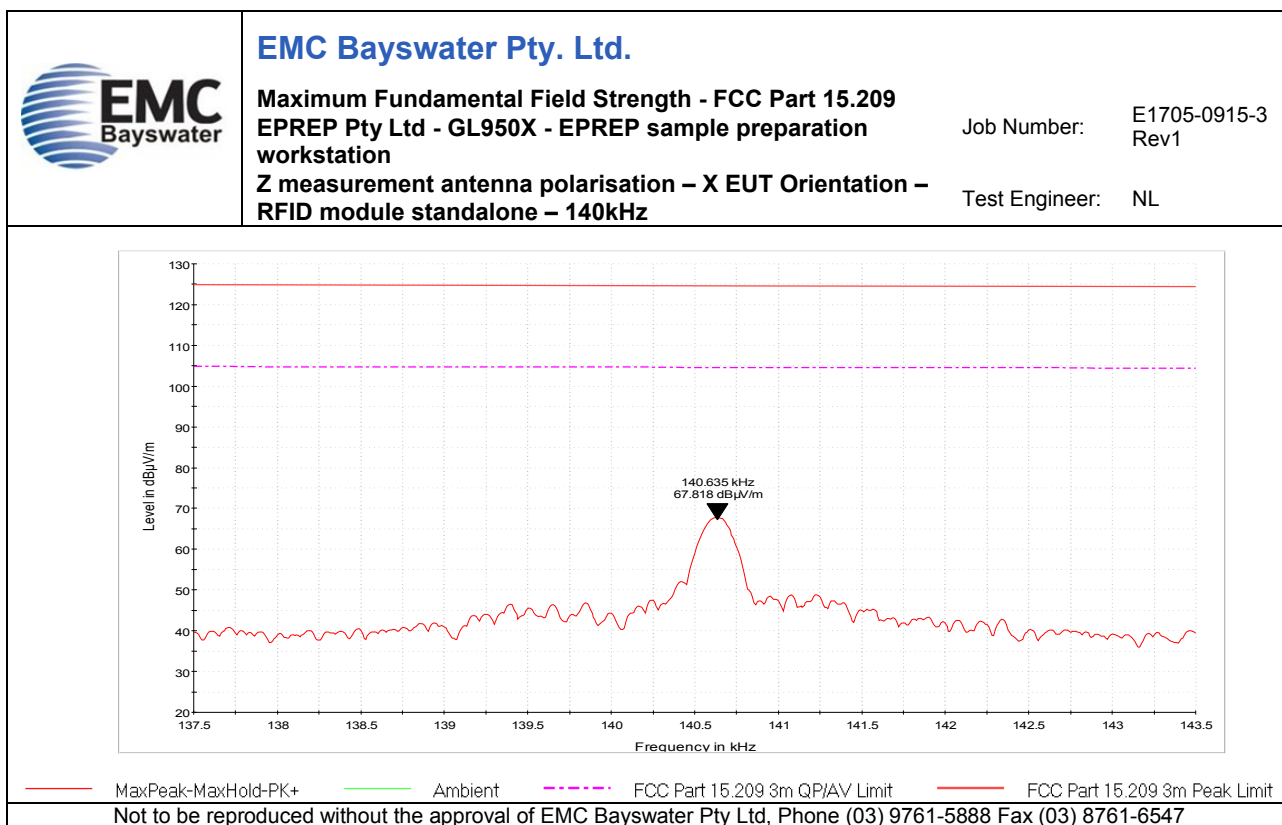
Graph 46



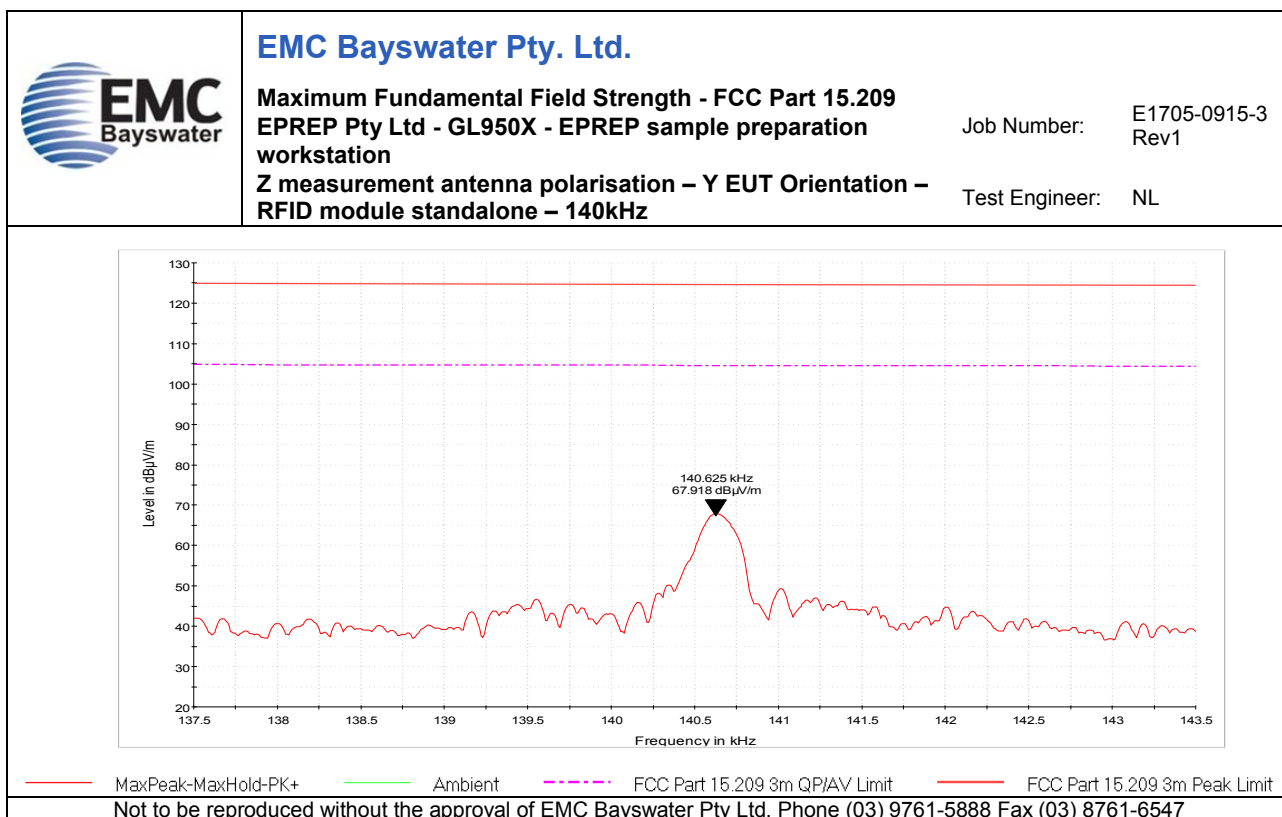
Graph 47



Graph 48



Graph 49



Graph 50



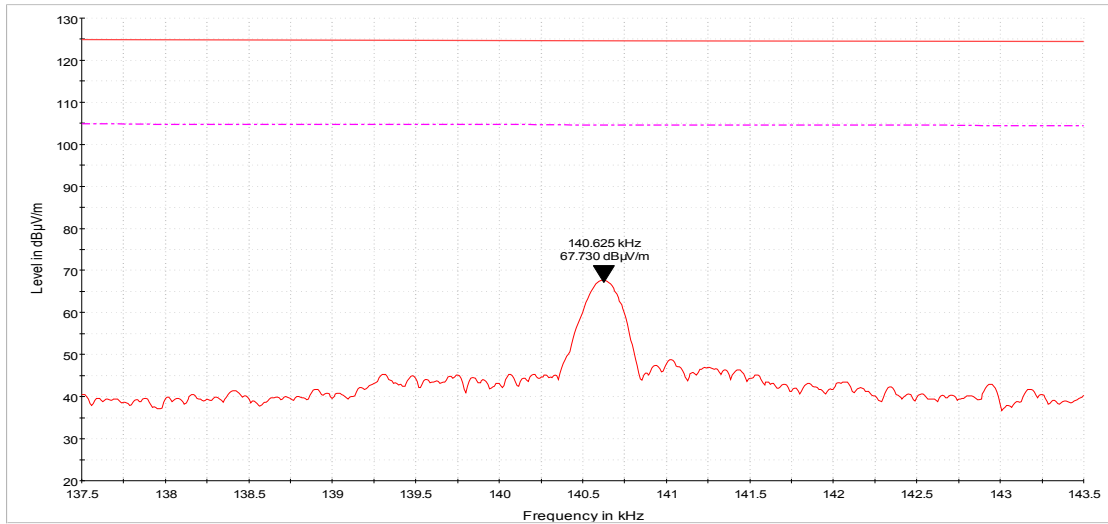
EMC Bayswater Pty. Ltd.

Maximum Fundamental Field Strength - FCC Part 15.209
EPREP Pty Ltd - GL950X - EPREP sample preparation
workstation

Z measurement antenna polarisation – Z EUT Orientation
– RFID module standalone – 140kHz

Job Number: E1705-0915-3
Rev1

Test Engineer: NL



MaxPeak-MaxHold-PK+ Ambient FCC Part 15.209 3m QP/AV Limit FCC Part 15.209 3m Peak Limit

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Graph 51

Appendix F.2 – Radiated Spurious Emissions

No.	Test	Graph Description
52	Radiated Spurious Emissions	RFID Module standalone – 140kHz – 9kHz to 30MHz

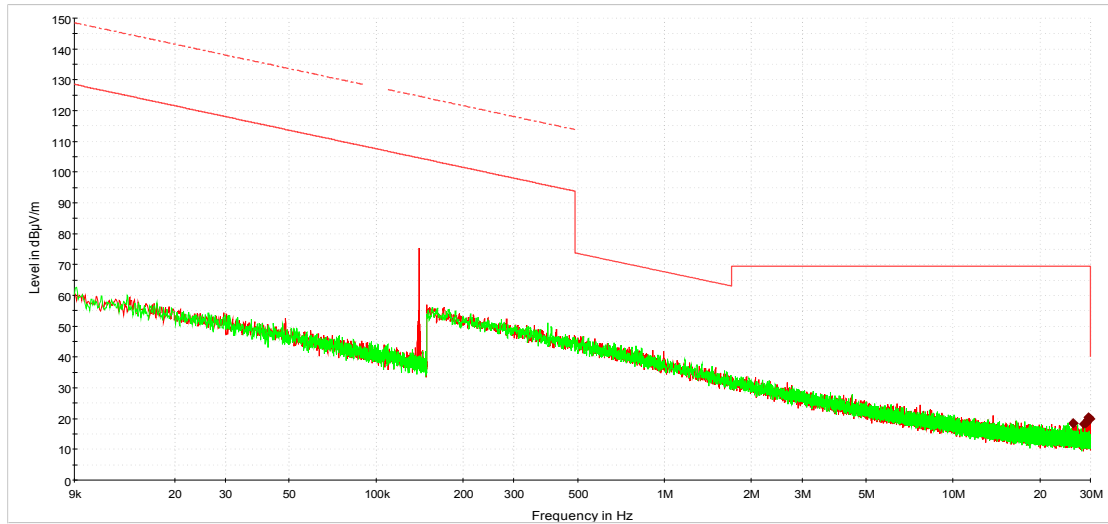


EMC Bayswater Pty. Ltd.

Radiated Spurious Emission - FCC Part 15.209
EPREP Pty Ltd - GL950X - EPREP sample preparation
workstation
X measurement antenna polarisation – 9kHz to 30MHz
RFID module standalone – 140kHz

Job Number: E1705-0915-3
Rev1

Test Engineer: NL



MaxPeak-MaxHold-PK+ FCC Part 15.209 3m QP/AV Limit FCC Part 15.209 3m Peak Limit Ambient Peak Average

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Graph 52