Electromagnetic Compatibility Test Report

Prepared in accordance with

FCC Part 15 Subpart B:2018

On

April 22, 2019

Prepared for:

The Chamberlain Group Incorporated
300 Windsor Drive
Oak Brook, IL 60523

FCC ID: HBW8522
IC ID: 2666A-8522

Prepared by:

TUV Rheinland of North America, Inc.
1279 Quarry Lane, Ste. A
Pleasanton, CA 94566 U.S.A.

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Revisions

Revision No.	Date	Reason for Change	Author
0	4/22/19	Original Document	AA/JS

Note: Latest revision report will replace all previous reports.

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ATTESTATION OF TEST RESULTS

Client:	The Chamberlain Group Incorporated, 300 Windsor Drive. Oak Brook IL 60523	Tel. (630) 279-3600	
Model Name:	MyQ B-Hub	***Serial Number:***	N/A
Model Numbers:	MyQ B-Hub	***Date(s) Tested:***	3/19/2019
Test Location:	TUV Rheinland of North America 1279 Quarry Lane, Ste. A Pleasanton, CA 94566 U.S.A. Tel. (925) 249-9123		
Test Specifications:	Emissions:	FCC Part 15 Subpart B:2018	
	Immunity:	N/A	
Test Result:	**The above product was found to be Compliant to the above test standard(s)**		

Prepared by:	***Reviewed by:***
04/22/2019 Josie Sabado	04/22/2019 David Spencer
Date Name Signature	***Date Name Signature***

Other aspects:	**None**

PLEASANTON

US1131	**Testing Cert #3331.02**	**INDUSTRY CANADA 2932M-1**	**1097 (A-0268)**

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1 General Information

1.1 Scope

This report is intended to document the status of conformance with the listed standards based on the results of testing performed on March 19, 2019 on the Chamberlain Remote Control, Model No MyQ B-Hub, manufactured by The Chamberlain Group Incorporated. This report only applies to the specific samples tested under the stated test conditions. It is the responsibility of the manufacturer to assure that additional production units of this model are manufactured with identical or EMI equivalent electrical and mechanical components. This report is further intended to document changes and modifications to the EUT throughout its life cycle. All documentation will be included as a supplement.

1.2 Purpose

Testing was performed to evaluate the EMC performance of the EUT (Equipment Under Test) in accordance with the applicable requirements, procedures, and criteria defined in the application of regulations and application of standards listed in this report.

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1.3 Summary of Test Results

Applicant	The Chamberlain Group Incorporate, 300 Windsor Drive. Oak Brook IL 60523
Contact	Adrian Perry
Tel.	(630) 279-3600
E-mail	adrian.perry@chamberlain.com
Description	Smart Garage Hub Bluetooth
Model Name	MyQ B-Hub
Model Number	MyQ B-Hub
Serial Number	001D9309-1
Input Power	2.0 to 3.8 VDC (3.3 VDC Nominal)
Test Date(s)	**3/19/19**

Standards	Description	Severity Level or Limit	Criteria	Test Result
FCC Part 15 Subpart B:2018	Radiated Emissions	Class B 30-18GHz	Limit	Complies
FCC Part 15 Subpart B:2018	Conducted Emissions	Class B 150 kHz - 30 MHz	Limit	N/A

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Laboratory Information

1.4 Accreditations & Endorsements

1.4.1 US Federal Communications Commission

TUV Rheinland of North America EMC test facilities located at 1279 Quarry Lane, Ste. A, Pleasanton, CA, 94566, and 5015 Brandin Ct, Fremont, CA 94538, are recognized by the Commission for performing testing services for the general public on a fee basis. These laboratory test facilities have been fully described in reports submitted to and accepted by the FCC. The laboratory Scopes of Accreditation include Title 47 CFR Parts 15, 18 and 90. The accreditations are updated every three years.

1.4.2 A2LA

TUV Rheinland of North America EMC test facilities are accredited by the American Association for Laboratory Accreditation (A2LA). The laboratories have been assessed and accredited by A2LA in accordance with ISO Standard 17025:2005 (Testing Certificate #3331.02). The Scope of Laboratory Accreditation includes emission and immunity testing. The accreditations are updated annually.

1.4.3 Industry Canada

The Pleasanton 5-meter Semi-Anechoic Chamber, Registration No. 2932M-1, has been accepted by Industry Canada to perform testing to 3 and 5 meters based on the test procedures described in ANSI C63.4-2009.

1.4.4 Japan – VCCI

The Voluntary Control Council for Interference by Information Technology Equipment (VCCI) is a group that consists of Information Technology Equipment (ITE) manufacturers and EMC test laboratories. The purpose of the Council is to take voluntary control measures against electromagnetic interference from Information Technology Equipment, and thereby contribute to the development of a socially beneficial and responsible state of affairs in the realm of Information Technology Equipment in Japan. TUV Rheinland of North America EMC test facilities located at 1279 Quarry Lane, Ste. A, Pleasanton, CA, 94566, and 5015 Brandin Ct, Fremont, CA 94538, have been assessed and approved in accordance with the Regulations for Voluntary Control Measures.

VCCI Registration No. for Pleasanton: A-0268

VCCI Registration No. for Fremont: A-0268

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1.5 Test Facilities and EMC Software

Test facilities are located at 1279 Quarry Lane, Ste. A, Pleasanton, California 94566, U.S.A. and 5015 Brandin Ct. Fremont CA 94538 USA (Fremont is the Pleasanton Annex).

1.5.1 Emission Test Facility

The Semi-Anechoic Chambers and AC Line Conducted measurement facilities used to collect radiated and conducted emissions data have been constructed in accordance with ANSI C63.7:1992. The Fremont 10 meter semi-anechoic chamber has been measured in accordance with and verified to comply with the theoretical volumetric normalized site attenuation of ANSI C63.4:2014 and SVSWR requirements of CISPR 16-1-4 Consol. Ed. 3.0 (2010-04), at test distances of 3 and 10 meters. This site has been described in reports dated November 1st, 2006, submitted to the FCC, and accepted by letter dated November 28, 2006. The site is listed with the FCC and accredited by A2LA (Testing Certificate #3331.02). The Pleasanton 5 meter semi-anechoic chamber has been verified to comply with the theoretical volumetric normalized site attenuation of ANSI C63.4:2009 and SVSWR requirements of CISPR 16-1-4 Consol. Ed. 3.0 (2010-04) at a test distance of 3 meters. This site has been described in reports dated November 1st, 2006, submitted to the FCC, and accepted by letter dated November 28, 2006. The site is listed with the FCC and accredited by A2LA (Testing Certificate #3331.02).

1.5.2 EMC Software - Pleasanton

Manufacturer	Name	Version	Test Type
ETS-Lindgren	TILE	3.4.K.14 @ 4.0.A.5	Radiated & Conducted Emissions
EMISoft	Vasona	5.0	Radiated & Conducted Emissions
Agilent	Agilent MXE	A.11.02	Radiated & Conducted Emissions
ETS-Lindgren	TILE	3.4.K.14	Radiated & Conducted Immunity
Thermo Electron - Keytek	CEWare32	4.00	EFT/Surge/Voltage Dips & Interrupt
Voltech	IEC61000-3	1.21.07RC2	Harmonic & Flicker

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1.6 Measurement Uncertainty

Two types of measurement uncertainty are expressed in this report, per *ISO Guide To The Expression Of Uncertainty In Measurement*, 1st Edition, 1995.

The Combined Standard Uncertainty is the standard uncertainty of the result of a measurement when that result is obtained from the values of a number of other quantities, equal to the positive square root of a sum of terms, the terms being the variances or co-variances of these other quantities weighted according to how the measurement result varies with changes in these quantities. The term standard uncertainty is the result of a measurement expressed as a standard deviation.

The Expanded Uncertainty defines an interval about the result of a measurement that may be expected to encompass a large fraction of the distribution of values that could reasonably be attributed to the measurement and the fraction may be viewed as the coverage probability or level of confidence of the interval.

1.6.1 Sample Calculation – radiated & conducted emissions

The field strength is calculated by subtracting the Amplifier Gain and adding the Cable Loss and Antenna Correction Factor to the measured reading. The basic equation is as follows:

Field Strength (dBμV/m) = RAW - AMP + CBL + ACF

Where: RAW = Measured level before correction (dBμV)

AMP = Amplifier Gain (dB)

CBL = Cable Loss (dB)

ACF = Antenna Correction Factor (dB/m)

$$\mu V/m = 10^{\frac{dB\mu V/m}{20}}$$

Sample radiated emissions calculation @ 30 MHz

Measurement +Antenna Factor–Amplifier Gain+Cable loss=Radiated Emissions (dBuV/m)

25 dBuV/m + 17.5 dB – 20 dB + 1.0 dB = 23.5 dBuV/m

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1.6.2 Measurement Uncertainty Emissions

Per CISPR 16-4-2	U_{lab}	U_{cispr}
Radiated Disturbance @ 3 meters		
30 – 1,000 MHz	2.26 dB	4.52 dB
1 – 6 GHz	2.12 dB	4.25 dB
6 – 18 GHz	2.47 dB	4.93 dB
Conducted Disturbance @ Mains Terminals		
150 kHz – 30 MHz	1.09 dB	2.18 dB

1.7 Calibration Traceability

All measurement instrumentation is traceable to the National Institute of Standards and Technology (NIST). Measurement method complies with ANSI/NCSL Z540-1-1994 and ISO Standard 17025:2005. Equipment calibration records are kept on file at the test facility.

1.8 Measurement Equipment Used

Equipment	Manufacturer	Model #	Serial/Inst #	Last Cal mm/dd/yy	Next Cal mm/dd/yy	Test
Antenna, Bilog	Sunol Sciences	JB3	A102606	11/20/2017	11/20/2019	RE
Antenna,Horn	Sunol Sciences	3115	A040806	05/16/2018	05/16/2019	RE
Amplifier	Miteq	TTA1800-30-HG	2020728	01/15/2019	01/15/2020	RE
Amplifier	Sonoma Instaments	310N	213221	01/14/2019	01/14/2020	RE
Receiver	Rohde & Schwarz	ESI40	832427/002	01/22/2019	01/22/2020	RE

Note: CE=Conducted Emissions, CI=Conducted Immunity, DP=Disturbance Power, EFT=Electrical Fast Transients, ESD=Electrostatic Discharge, FLI=Flicker, HAR=Harmonics, MF=Magnetic Field Immunity, NCR=No Calibration Required, RE=Radiated Emissions, RI=Radiated Immunity, SI=Surge Immunity, VDSI=Voltage Dips and Short Interruptions

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2 Product Information

2.1 Product Description

See Section 6.4.

2.2 Equipment Modifications

No modifications were needed to bring product into compliance.

2.3 Test Plan

The EUT product information, test configuration, mode of operation, test types, test procedures, test levels, pass/failure criteria, in this report were carried out per the product test plan located in Appendix A of this report.

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Figure 1 - External Photo of EUT

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Figure 2 - Internal Photo of EUT

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3 Emissions

3.1 Radiated Emissions

This test measures the electromagnetic levels of spurious signals generated by the EUT that radiated from the EUT and may affect the performance of other nearby electronic equipment.

3.1.1 Overview of Test

Results	**Compliant** (as tested per this report)			**Test Date(s)**		March 19, 2019	
Standard	FCC Part 15 Subpart B:2018						
Model Number	MyQ B-Hub			**Serial #**			
Configuration	Unintentional Radiated Emissions						
Test Setup	Tested in the 5-meter chamber, placed on table: see test plan for details.						
EUT Powered By	120V Block Adapter						
Environmental Conditions	March 19, 2019	**Temp**	26.1º C	**Humidity**	36.8%	**Pressure**	28.65 mbar
Frequency Range	30 MHz to 18 GHz						
Perf. Criteria	Class B			**Perf. Verification**		Readings under limit	
Mod. to EUT	None			**Test Performed By**		Abraham Avalos	

3.1.2 Test Procedure

Unintentional Radiated emissions tests were performed using the procedures of ANSI C63.4:2014 including methods for signal maximizations and EUT configuration. The photos included with the report show the EUT in its maximized configuration.

The frequency range from 30 MHz to 18 GHz was investigated for radiated emissions.

3.1.3 Deviations

There were no deviations from the test methodology listed in the test plan for the radiated emission test.

3.1.4 Final Test

All final radiated emissions measurements were below the specification limits.

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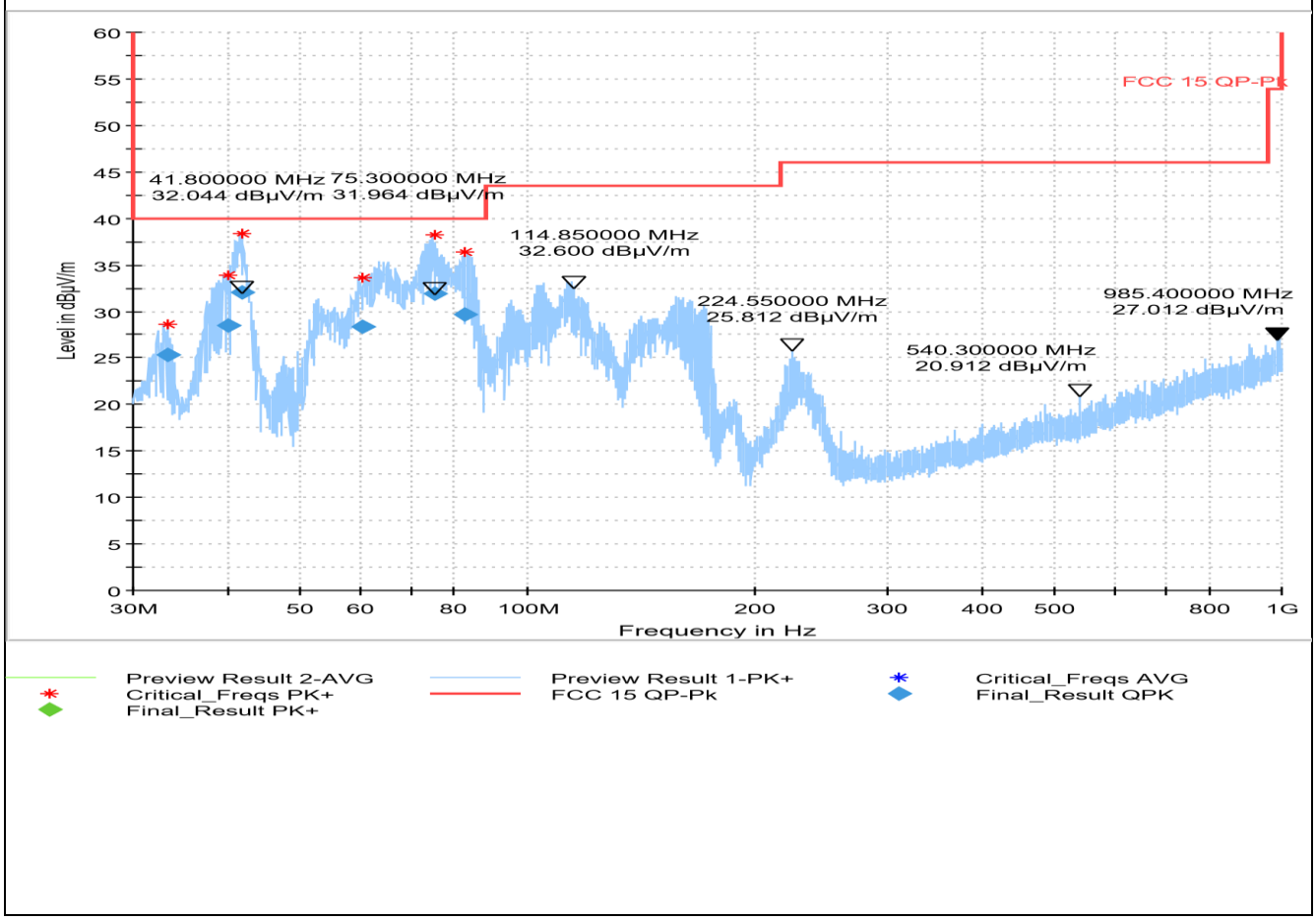
3.1.5 Plots

NOTES:

Radiated Emissions Full Scan
30 MHz – 1000 MHz
Vertical / Horizontal

Frequency (MHz)	Quasi Peak (dBµV/m)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
41.450000	31.99	---	40.00	8.01	2.0	120.000	100.0	V	334.0
41.650000	32.03	---	40.00	7.97	2.0	120.000	100.0	V	330.0
41.700000	32.06	---	40.00	7.94	2.0	120.000	100.0	V	325.0
42.000000	31.13	---	40.00	8.87	2.0	120.000	100.0	V	328.0
74.800000	32.05	---	40.00	7.95	2.0	120.000	100.0	V	0.0



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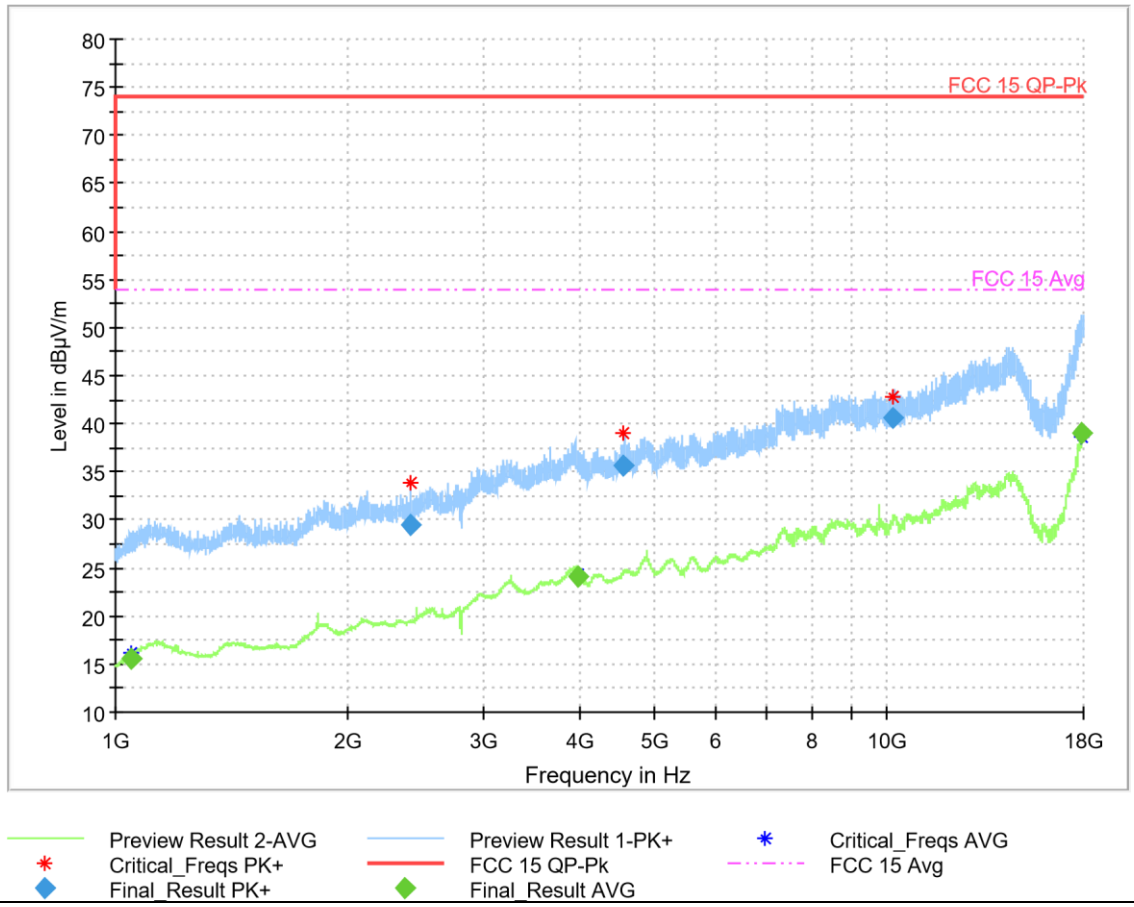
NOTES:

Radiated Emissions Full Scan
1 GHz – 18 GHz
Vertical / Horizontal

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
1049.500000	---	15.60	54.00	38.40	2.0	1000.000	400.0	H	198.0
2411.500000	29.49	---	74.00	44.51	2.0	1000.000	157.0	H	318.0
3980.500000	---	24.20	54.00	29.80	2.0	1000.000	254.0	V	51.0
4564.000000	35.56	---	74.00	38.44	2.0	1000.000	339.0	V	230.0
10201.500000	40.69	---	74.00	33.31	2.0	1000.000	214.0	V	104.0
17932.500000	---	39.03	54.00	14.97	2.0	1000.000	159.0	V	114.0



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3.1.6 Photos

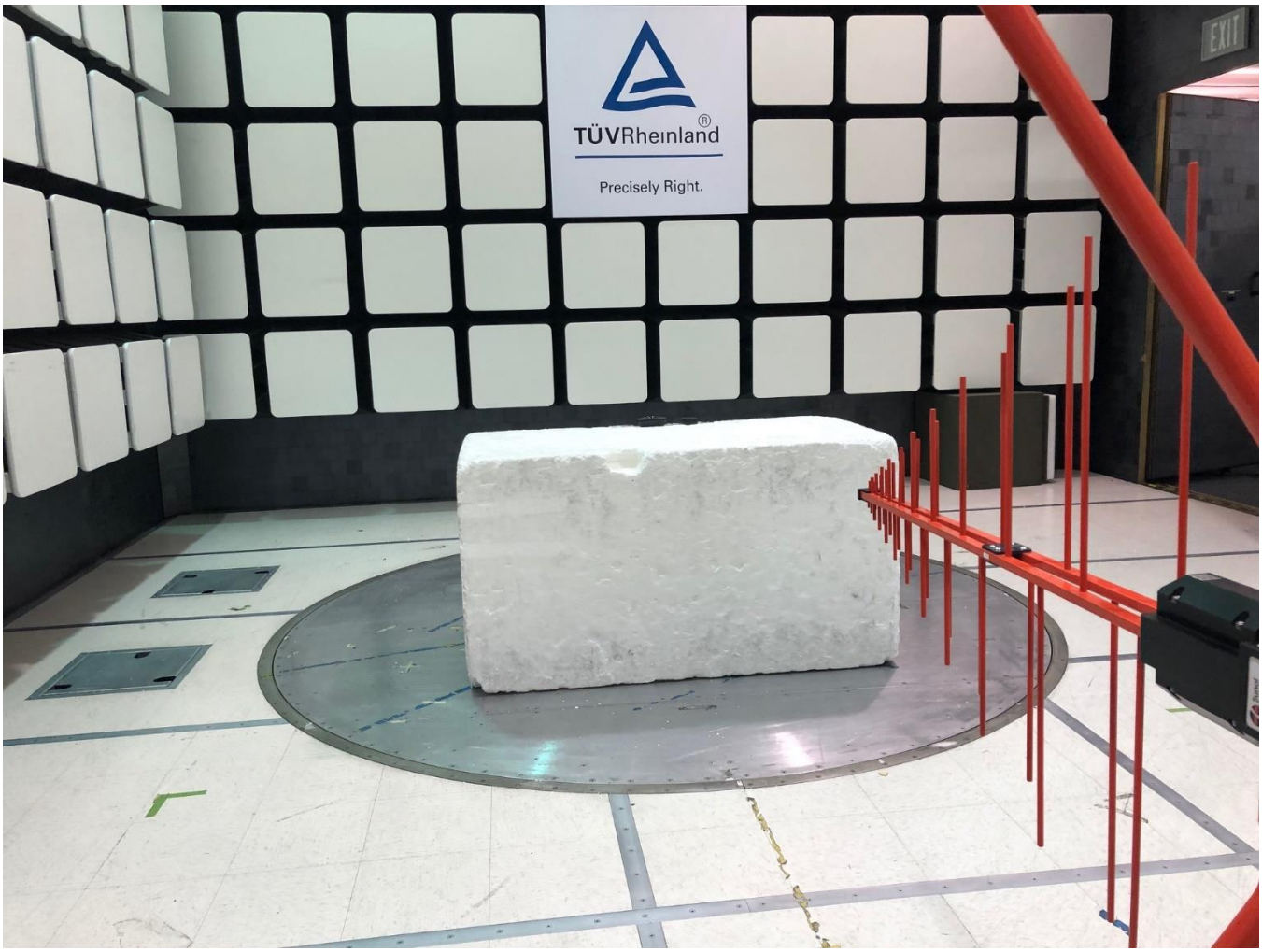

Figure 3 - Radiated Emissions Test Setup 30 - 1000 MHz - Front

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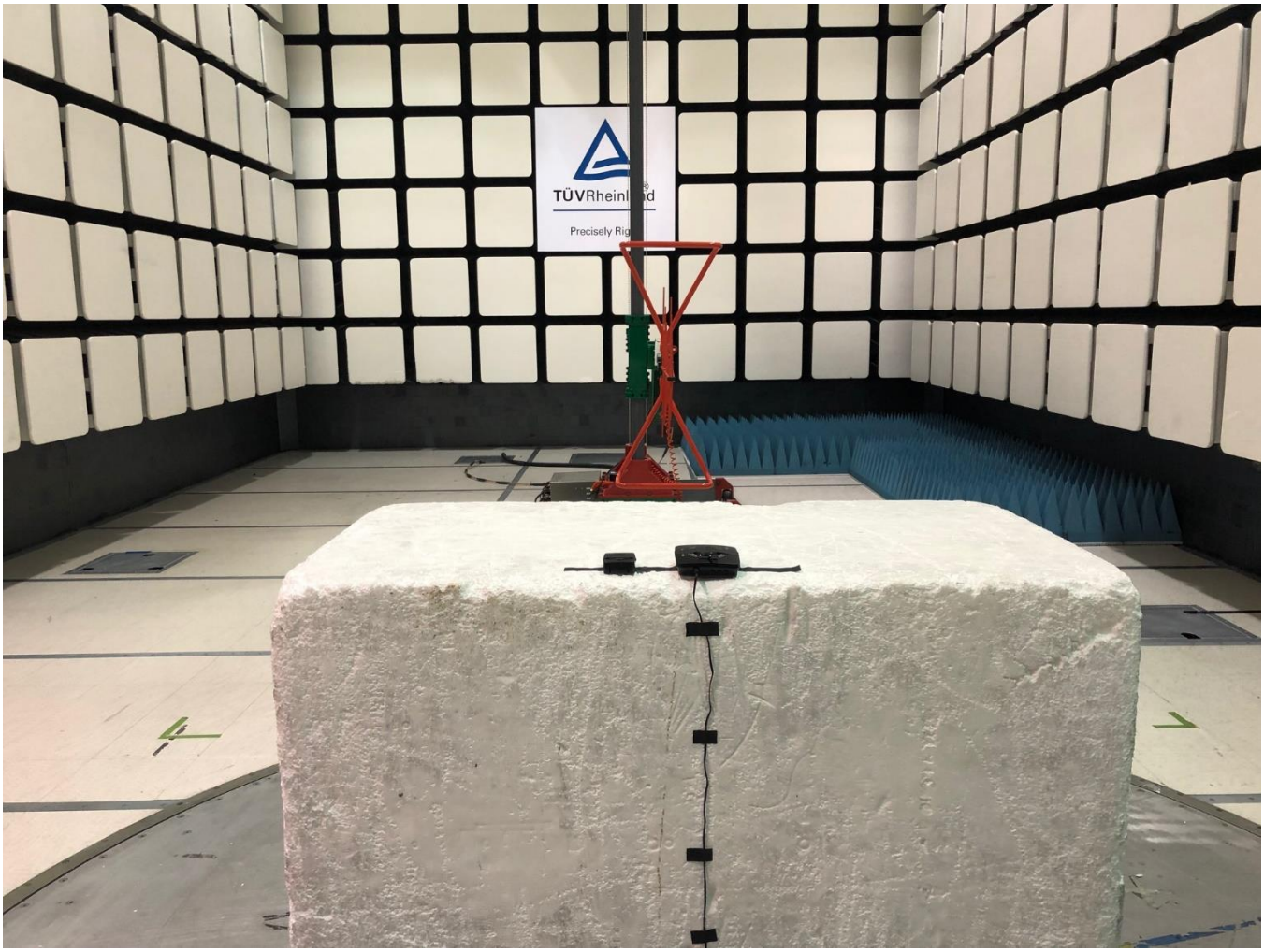

Figure 4 - Radiated Emissions Test Setup 30 - 1000 MHz - Back

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Figure 5 - Radiated Emissions Test Setup 1 GHz – 18GHz Front

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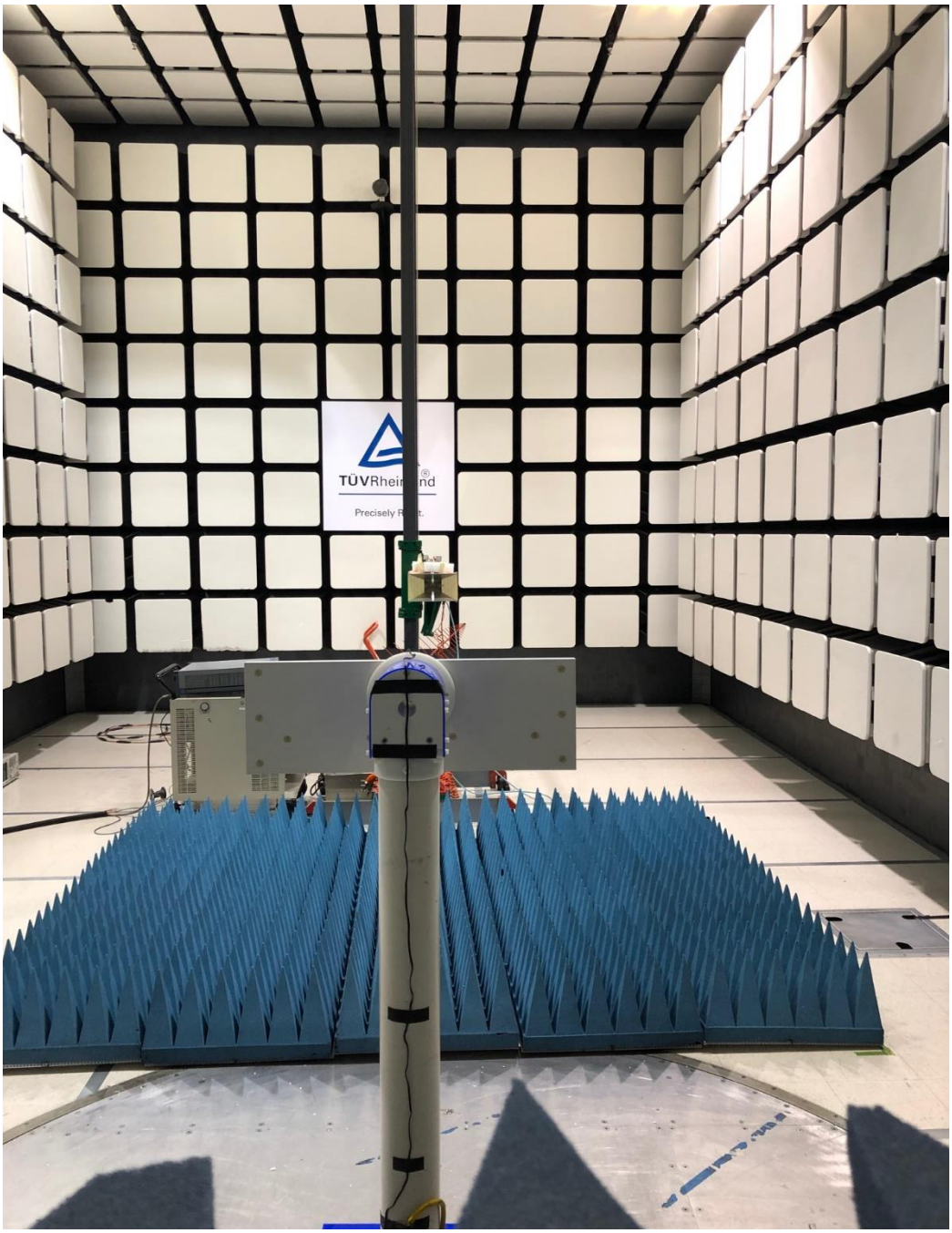

Figure 6 - Radiated Emissions Test Setup 1 GHz – 18GHz Back

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Appendix A

4 Test Plan

This test report is intended to follow this test plan outlined here in unless otherwise stated in this here report. The following test plan will give details on product information, standards to be used, test set ups and refer to TUV test procedures. The test procedures will give the steps to be taken when performing the stated test. The product information below came via client, product manual, product itself and or the internet.

4.1 General Information

Client	The Chamberlain Group Incorporated
Address	The Chamberlain Group Incorporated 300 Windsor Drive Oak Brook IL 60523
Contact Person	Adrian Perry
Telephone	(630) 279-3600
e-mail	adrian.perry@chamberlain.com

4.2 EUT Designation

Model Name	MyQ B-Hub
Model Number(s)	MyQ B-Hub

4.3 EUT Description

Garage Remote Control

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4.4 Equipment Under Test (EUT) Description

The Chamberlain MyQ B-Hub is a remote control.

4.5 Product Environment(s)

☒	**Domestic/Residential**	☐	**Hospital**
☐	**Light Industrial/Commercial**	☐	**Small Clinic**
☐	**Industrial**	☐	**Doctor's office**
☐	**Telecommunications Center**	☐	**Other than Telecommunications Center**
☐	**Other**		

*Check all that apply

4.6 Applicable Documents

Standards	Description
FCC Part 15 Subpart B:2018	Radiated Emissions
FCC Part 15 Subpart B:2018	Conducted Emissions

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4.7 EUT Clock/Oscillator Frequencies

Reference Designation	Speed (MHz)	Type
Transceiver	310 – 390	☐ Oscillator ☐ Microprocessor ☒ Intentional Radiator
Transceiver	902 – 928	☐ Oscillator ☐ Microprocessor ☒ Intentional Radiator
Wi-Fi Transceiver	2412 – 2462	☐ Oscillator ☐ Microprocessor ☒ Intentional Radiator
Bluetooth LE Transceiver	2402 – 2480	☐ Oscillator ☐ Microprocessor ☒ Intentional Radiator
300 MHz/900 MHz Transceiver IC	30	☒ Oscillator ☐ Microprocessor ☐ Intentional Radiator
300 MHz/900 MHz Transceiver IC	0.032	☒ Oscillator ☐ Microprocessor ☐ Intentional Radiator
Wi-Fi Transceiver IC	38.4	☒ Oscillator ☐ Microprocessor ☐ Intentional Radiator

4.7.1 Radiated Emissions, Upper Frequency

	Max Oscillator Frequency	Max Radiated Spurious Emissions Measurement Frequency
☐	**Less than 108 MHz**	**Scan to 1 GHz**
☐	**Less than 500 MHz**	**Scan to 2 GHz**
☐	**Less than 1000 MHz**	**Scan to 5 GHz**
☒	**Greater than 1000 MHz**	**Scan to 5th Harmonic**

4.8 EUT Test Program

None

4.9 EUT Modes of Operation

The EUT is set to idle mode with no transmission

4.10 Monitoring of EUT during Testing

The EUT will be monitored by visual observation using a spectrum analyzer.

Prior to each tests the EUT is set to idle mode with no transmission.

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4.11 EUT Configuration

4.11.1 Description

Configuration	Description
Tabletop	EUT is a standalone equipment placed on tabletop
Notes	

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4.12 Emissions

4.12.1 Radiated Emissions

4.12.1.1 Preliminary Radiated Emissions Test Setup

Standard	FCC Part 15 Subpart B:2018			**Procedure**	QP090715
Limit	Class B	**Emissions Verification**		Emissions Under Limit	
Frequency Range	30 MHz – 18 GHz				
Scan #1	Pre-scan 30 – 1000 MHz	**Antenna Distance**	3m	**Detector**	Max Peak
Scan #2	Pre-scan 1 – 1 8GHz	**Antenna Distance**	3m	**Detector**	Max Peak
Notes	None				

4.12.1.2 Final Radiated Emissions Test Setup

Standard	FCC Part 15 Subpart B:2018			**Procedure**	QP090715
Limit	Class B	**Emissions Verification**		Emissions Under Limit	
Frequency Range	30 MHz – 18 GHz				
Scan #1	Final Scan 30 – 1000 MHz	**Antenna Distance**	3m	**Detector**	Quasi Peak
Scan #2	Final Scan 1 – 18 GHz	**Antenna Distance**	3m	**Detector**	Max Peak, Average
Notes	None				

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END OF REPORT

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