

FCC/ISED RF Test Report

Report No.: FCC_IC_SL20031001-TCG-002

FCC ID: HBW9545

IC: 2666A-9545

Test Model: MYQ-G0401

Series Model: MYQG0401-E, 821LMC

Received Date: 04/01/2020

Test Date: 04/15/2020 - 04/16/2020

Issued Date: 04/16/2020

Applicant: Chamberlain Group, Inc

Address: 300 Windsor Drive, Oakbrook, IL 60523

Manufacturer: Jabil, Inc.

Address: Jabil Circuit India Pvt. Ltd.

B -26, MIDC Industrial Area, Ranjangaon

Taluka Shirur, Pune - 412220,

Maharashtra, India

Issued By: Bureau Veritas Consumer Products Services, Inc.

Lab Address: 775 Montague Expressway, Milpitas, CA 95035

**FCC/IC Registration /
Designation Number:** 540430 / 4842D



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Release Control Record

Issue No.	Description	Date Issued
FCC_IC_SL20031001-TCG-002	Initial Release	04/16/2020

1 Certificate of Conformity

Product: Smart Garage Control – C-Hub

Brand: Chamberlain

Test Model: MYQ-G0401

Sample Status: Engineering Sample

Applicant: Chamberlain Group, Inc

Test Date: 04/15/2020 - 04/16/2020

Standards: FCC Part 15, Subpart C (15.231)

RSS-210 Issue 10, RSS-GEN Issue 5

ANSI C63.10-2013

The above equipment has been tested by **Bureau Veritas Consumer Products Services, Inc., Milpitas Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

Prepared by : 
_____, **Date:** 04/16/2020

Deon Dai / Test Engineer

Approved by : 
_____, **Date:** 04/16/2020

Shuo Zhang / Engineer Reviewer

2 Summary of Test Results

47 CFR FCC Part 15, Subpart C (Section 15.231)/ISED RSS-210

FCC Clause	RSS Section(s)	Test Item	Result	Remarks
15.207	RSS-Gen[8.8]	AC Power Conducted Emission	PASS*	Meet the requirement of limit.
15.205 &15.209 & 15.231(b)	RSS-Gen[8.9] RSS-210[A.1.1]	Radiated Emissions and Band Edge Measurement	PASS	Meet the requirement of limit.
15.231(b)	RSS-210 [A.1.2]	Field Strength of Fundamental Signal	PASS	Meet the requirement of limit
15.231(c)	RSS-210 [A.1.3]	20dB Bandwidth & 99% Bandwidth Measurement	PASS*	Meet the requirement of limit.
15.203		Antenna Requirement	PASS*	Antenna is permanently attached

Note: Pass* mean for details please see test report: FCC_IC_SL19110601-TCG-001 _300MHz Rev 1.0.

2.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Measurement	Frequency	Expanded Uncertainty (k=2) (±)
Conducted Emissions at mains ports	150kHz ~ 30MHz	3.51dB
Radiated Emissions up to 1 GHz	30MHz ~ 1GHz	3.73dB
Radiated Emissions above 1 GHz	1GHz ~ 6GHz	4.64dB
	6GHz ~ 18GHz	4.82dB
	18GHz ~ 40GHz	4.91dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	Smart Garage Control – C-Hub
Brand	Chamberlain
Test Model	MYQ-G0401
Series Model	MYQ-G0401-E, 821LMC
Identification No. of EUT	446195020226
Power Supply Rating	5.0VDC @ 1.5A
Modulation Type	FSK
Transfer Rate	256kbps
Operating Frequency	303 MHz, 318 MHz, 372.5 MHz
Number of Channel	3
Antenna Type	Monopole (wire), 5.19dBi gain
Antenna Connector	N/A

3.2 Description of Test Modes

Channel	Freq. (MHz)
1	303
2	318
3	372.5

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	RE \geq 1G	RE $<$ 1G	PLC	APCM	
-	✓	✓	✓	-	-

Where RE \geq 1G: Radiated Emission above 1GHz &
 Bandedge Measurement
PLC: Power Line Conducted Emission **APCM:** Antenna Port Conducted Measurement

NOTE: “-” means no effect.

Radiated Emission Test (Above 1GHz):

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (kbps)
1 to 3	1,2,3	OOK	256

Radiated Emission Test (Below 1GHz):

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (kbps)
1 to 3	1,2,3	OOK	256

Power Line Conducted Emission Test:

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE	DATA RATE (Mbps)
1 to 3	3	OOK	256

Antenna Port Conducted Measurement:

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

Test Condition:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE \geq 1G	25deg. C, 65%RH	120Vac, 60Hz	Deon Dai
RE<1G	25deg. C, 65%RH	120Vac, 60Hz	Deon Dai
PLC	25deg. C, 65%RH	120Vac, 60Hz	N/A
APCM	N/A	N/A	N/A

3.3 Description of Support Units

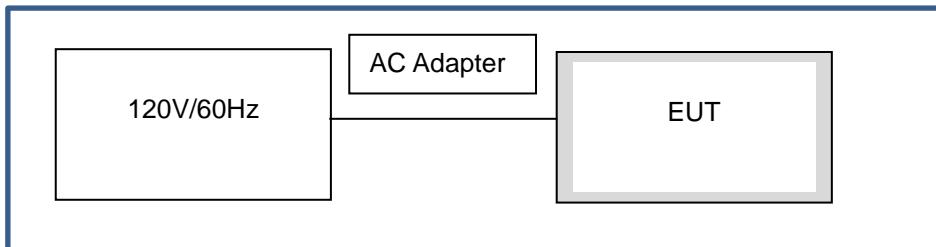
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	AC Adapter	QQJQ Power Supply	A912-050150W-US1	N/A	N/A	To Power Up EUT
B.						

Note: The core(s) is (are) originally attached to the cable(s).

3.3.1 Configuration of System under Test

Test Chamber



3.4 General Description of Applied Standards

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC Part 15, Subpart C (15.231)

RSS-210 Issue 10

RSS-GEN Issue 5

ANSI C63.10-2013

All test items have been performed and recorded as per the above standards.

4 Test Types and Results

4.1 Radiated Fundamental and Spurious Emission

4.1.1 Limits of Fundamental and Spurious Emission

FCC §15.205, §15.209, §15.231 (b)

According to FCC §15.231(b), the field strength of emissions from intentional radiators operated under this section shall not exceed the following:

Frequencies (MHz)	Field Strength of fundamental (microvolts/meter)	Field strength of spurious emission (microvolts/meters)
40.66 ~ 40.70	2250	225
70 ~ 130	1250	125
130 ~ 174	1250 to 3750 **	125 to 375 **
174 ~ 260	3750	375
260 ~ 470	3750 to 12500 **	375 to 1250**
Above 470	12500	1250

Note: ** means Linear interpolations

(1) The above field strength limits are specified at a distance of 3 meters. The tighter limits apply at the band edges.

(2) Intentional radiators operating under the provisions of this section shall demonstrate compliance with the limits on the field strength of emissions, as shown in the above table, based on the average value of the measured emissions. As an alternative, compliance with the limits in the above table may be based on the use of measurement instrumentation with a CISPR quasi-peak detector. The specific method of measurement employed shall be specified in the application for equipment authorization. If average emission measurements are employed, the provisions in §15.35 for averaging pulsed emissions and for limiting peak emissions apply. Further, compliance with the provisions of §15.205 shall be demonstrated using the measurement instrumentation specified in that section.

(3) The limits on the field strength of the spurious emissions in the above table are based on the fundamental frequency of the intentional radiator. Spurious emissions shall be attenuated to the average (or, alternatively, CISPR quasi-peak) limits shown in this table or to the general limits shown in §15.209, whichever limit permits a higher field strength.

4.1.2 Test Instruments

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
EMI Test Receiver ROHDE & SCHWARZ	ESW 44	100179	08/30/2019	08/30/2020
Horn Antenna ETS-Lindgren	3117	218554	11/06/2019	11/06/2020
Hybrid Antenna SUNAR	JB6	A111717	03/09/2020	03/09/2021
Preamplifier RF-BAY	LPA-6-30	11170602	05/06/2019	05/06/2020

NOTE:

1. The horn antenna and HP preamplifier (model: 3117) are used only for the measurement of emission frequency above 1GHz if tested.

4.1.3 Test Procedures

For Radiated emission below 30MHz

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. Parallel, perpendicular, and ground-parallel orientations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Quasi-Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

NOTE:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9kHz at frequency below 30MHz.

For Radiated emission above 30MHz

- a. The EUT was placed on the top of a rotating table 0.8 meters (for 30MHz ~ 1GHz) / 1.5 meters (for above 1GHz) above the ground at 3-meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- f. The test-receiver system was set to peak and average detects function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Note:

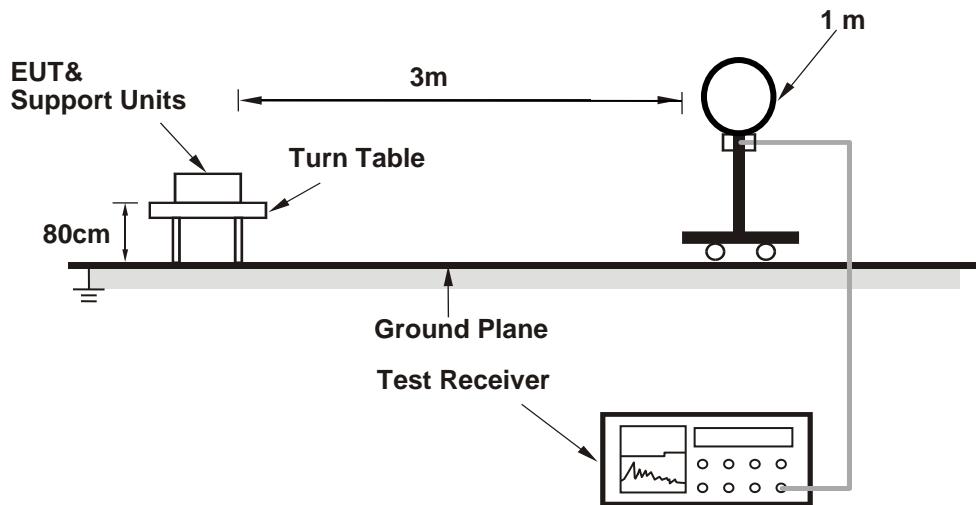
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is $\geq 1/T$ (Duty cycle < 98%) or 10Hz (Duty cycle $\geq 98\%$) for Average detection (AV) at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

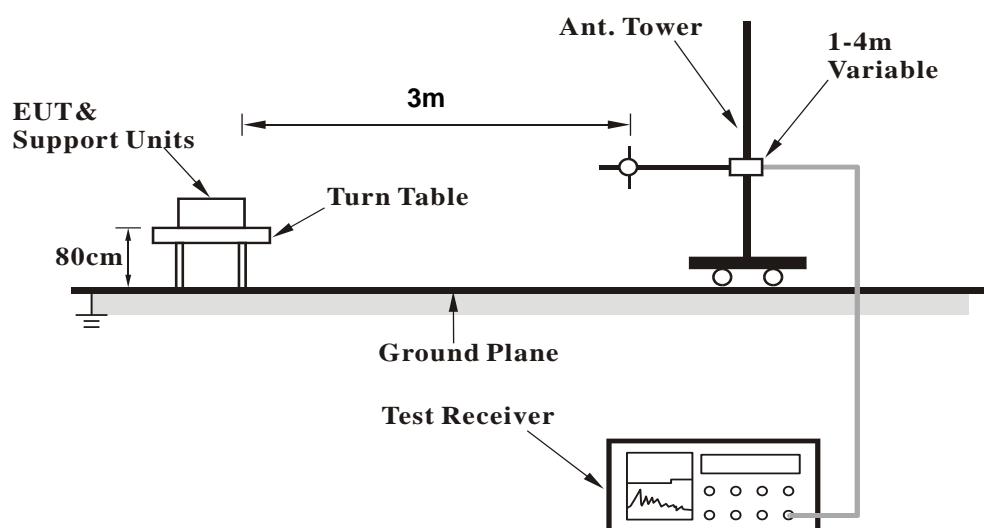
No deviation.

4.1.5 Test Setup

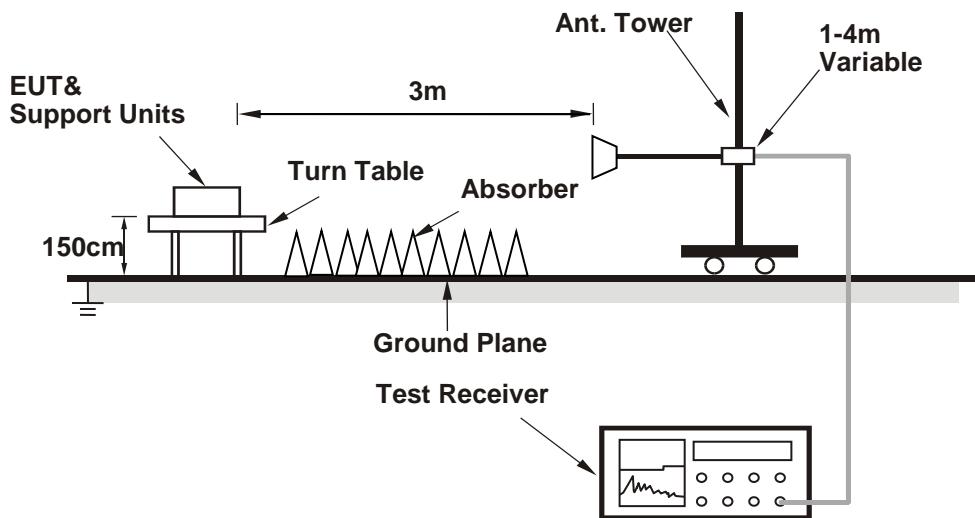
For Radiated emission below 30MHz



For Radiated emission 30MHz to 1GHz



For Radiated emission above 1GHz



For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.1.6 EUT Operating Conditions

- EUT is powered by a DC adapter and doesn't have to be connected to Notebook Computer while being tested.

4.1.7 Test Results

Correction Factor Measurement Result:

Declared by manufacturer

Our Billion Code consists of a sync pulse (1msec), 10 trinary numbers (4msec each), blank time (39msec each), synch pulse (3msec), 10 trinary numbers (4msec each) & blank time (37 msec). Looking at a worst-case coding scheme, the worst case ON time over 100msec is 46 msec.

20 log (46/100) = -6.74dB.

EMISSION WORST-CASE DATA:
Chanel 1

Freq (MHz)	Reading (dBuV/m)	Angle (Deg)	Height (m)	Polar H/V	Factors (dB)	CF	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Comment
606	25.35	222	198	H	26.2	-	51.55	74.9	-23.35	Peak
606	-	-	-	H	-	-6.74	44.81	54.9	-10.09	Average
606	26.43	285	109	V	26.2	-	52.63	74.9	-22.27	Peak
606	-	-	-	V	-	-6.74	45.89	54.9	-9.01	Average
909	27.38	274	280	H	30.1	-	57.48	74.9	-17.42	Peak
909	-	-	-	H	-	-6.74	50.74	54.9	-4.16	Average
909	28.11	129	102	V	30.1	-	58.21	74.9	-16.69	Peak
909	-	-	-	V	-	-6.74	51.47	54.9	-3.43	Average
1212	65.48	102	199	H	-14.8	-	50.68	74	-23.32	Peak
1212	-	-	-	H	-	-6.74	43.94	54	-10.06	Average
1212	67.23	231	121	V	-14.8	-	52.43	74	-21.57	Peak
1212	-	-	-	V	-	-6.74	45.69	54	-8.31	Average

Chanel 2

Freq (MHz)	Reading (dBuV/m)	Angle (Deg)	Height (m)	Polar H/V	Factors (dB)	CF	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Comment
636	26.3	122	211	H	27	-	53.3	75.8	-22.5	Peak
636	-	-	-	H	-	-6.74	46.56	55.8	-9.24	Average
636	26.89	139	123	V	27	-	53.89	75.8	-21.91	Peak
636	-	-	-	V	-	-6.74	47.15	55.8	-8.65	Average
954	26.39	33	148	H	31.2	-	57.59	75.8	-18.21	Peak
954	-	-	-	H	-	-6.74	50.85	55.8	-4.95	Average
954	28.38	109	128	V	31.2	-	59.58	75.8	-16.22	Peak
954	-	-	-	V	-	-6.74	52.84	55.8	-2.96	Average
1272	67.48	309	209	H	-14.2	-	53.28	74	-20.72	Peak
1272	-	-	-	H	-	-6.74	46.54	54	-7.46	Average
1272	68.27	355	163	V	-14.2	-	54.07	74	-19.93	Peak
1272	-	-	-	V	-	-6.74	47.33	54	-6.67	Average

REMARKS:

1. Peak Emission level (dBuV/m) = Reading Value (dBuV) + Factors (dB)
2. Average Emission level (dBuV/m) = Peak Emission level (dBuV/m) + Correction Factor (CF)
3. Frequency range is up to 4GHz.
4. Margin value = Emission level – Limit value.

Chanel 3

Freq (MHz)	Reading (dBuV/m)	Angle (Deg)	Height (m)	Polar H/V	Factors (dB)	CF	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Comment
745	24.28	309	189	H	28.5	-	52.78	78.5	-25.72	Peak
745	-	-	-	H	-	-6.74	46.04	58.5	-12.46	Average
745	25.57	90	142	V	28.5	-	54.07	78.5	-24.43	Peak
745	-	-	-	V	-	-6.74	47.33	58.5	-11.17	Average
1117.5	68.29	287	144	H	-15.1	-	53.19	74.0	-20.81	Peak
1117.5	-	-	-	H	-	-6.74	46.45	54.0	-7.55	Average
1117.5	70.21	224	184	V	-15.1	-	55.11	74.0	-18.89	Peak
1117.5	-	-	-	V	-	-6.74	48.37	54.0	-5.63	Average
1490	65.27	99	182	H	-13.1	-	52.17	74	-21.83	Peak
1490	-	-	-	H	-	-6.74	45.43	54	-8.57	Average
1490	66.35	307	174	V	-13.1	-	53.25	74	-20.75	Peak
1490	-	-	-	V	-	-6.74	46.51	54	-7.49	Average

REMARKS:

1. Peak Emission level (dBuV/m) = Reading Value (dBuV) + Factors (dB)
2. Average Emission level (dBuV/m) = Peak Emission level (dBuV/m) + Correction Factor (CF)
3. Frequency range is up to 4GHz.
4. Margin value = Emission level – Limit value.

Field Strength of Fundamental Signal

Channel 1

Freq (MHz)	Reading (dBuV/m)	Angle (Deg)	Height (m)	Polar H/V	Factors (dB)	CF	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Comment
303	45.23	2	199	H	19.8	-	65.03	94.9	-29.87	Peak
303	-	-	-	H	-	-6.74	58.29	74.9	-16.61	Average
303	47.38	209	122	V	19.8	-	67.18	94.9	-27.72	Peak
303	-	-	-	V	-	-6.74	60.44	74.9	-14.46	Average

Channel 2

Freq (MHz)	Reading (dBuV/m)	Angle (Deg)	Height (m)	Polar H/V	Factors (dB)	CF	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Comment
318	48.17	318	202	H	20.9	-	69.07	95.8	-26.73	Peak
318	-	-	-	H	-	-6.74	62.33	75.8	-13.47	Average
318	50.27	176	132	V	20.9	-	71.17	95.8	-24.63	Peak
318	-	-	-	V	-	-6.74	64.43	75.8	-11.37	Average

Channel 3

Freq (MHz)	Reading (dBuV/m)	Angle (Deg)	Height (m)	Polar H/V	Factors (dB)	CF	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Comment
372.5	46.28	128	199	H	22.1	-	68.38	98.5	-30.12	Peak
372.5	-	-	-	H	-	-6.74	61.64	78.5	-16.86	Average
372.5	51.29	120	120	V	22.1	-	73.39	98.5	-25.11	Peak
372.5	-	-	-	V	-	-6.74	66.65	78.5	-11.85	Average

REMARKS:

1. Peak Emission level (dBuV/m) = Reading Value (dBuV) + Factors (dB)
2. Average Emission level (dBuV/m) = Peak Emission level (dBuV/m) + Correction Factor (CF)
3. Margin value = Emission level – Limit value.

5 Pictures of Test Arrangements

Please refer to the attached file (Test Setup Photo).

Appendix – Information on the Testing Laboratories

Bureau Veritas is a global leader in testing, inspection and certification (TIC) services. We help businesses improve safety, sustainability and productivity; and our clients include the majority of leading brands in retail, manufacturing and other industries. With a presence in every major country around the world, our quality assurance and compliance solutions are vital in helping our customers enhance product quality and concept-to-consumer journeys. We also assist with increasing speed to market, profitability and brand equity throughout the supply chain. Bureau Veritas is a leading wireless/IoT testing, inspection, audit and certification provider, with a global network of test laboratories to support the IoT industry in areas of connectivity, security, interoperability as well as quality, health & safety, and environmental/chemical requirements.

If you have any comments, please feel free to contact us at the following:

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Email: sales.eaw@us.bureauveritas.com
Web Site: www.cpsusa-bureauveritas.com

The address and road map of all our labs can be found in our web site also.

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