

FCC/ISED RF Test Report

Report No.: FCC_IC_RF_SL19110601-TCG001_900MHz

FCC ID: HBW9545

IC: 2666A-9545

Test Model: MYQ-G0401

Series Model: MYQ-G0401-E, 821LMC

Received Date: 12/20/2019

Test Date: 12/23/2019 - 01/24/2020

Issued Date: 01/29/2020

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

Test Location (1): 775 Montague Expressway, Milpitas, CA 95035

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



This report is for your exclusive use. Any copying or replication of this report to or for any other person or entity, or use of our name or trademark, is permitted only with our prior written permission. This report sets forth our findings solely with respect to the test samples identified herein. The results set forth in this report are not indicative or representative of the quality or characteristics of the lot from which a test sample was taken or any similar or identical product unless specifically and expressly noted. Our report includes all of the tests requested by you and the results thereof based upon the information that you provided to us. You have 60 days from date of issuance of this report to notify us of any material error or omission caused by our negligence, provided, however, that such notice shall be in writing and shall specifically address the issue you wish to raise. A failure to raise such issue within the prescribed time shall constitute your unqualified acceptance of the completeness of this report, the tests conducted and the correctness of the report contents. Unless specific mention, the uncertainty of measurement has been explicitly taken into account to declare the compliance or non-compliance to the specification. The report must not be used by the client to claim product certification, approval, or endorsement by A2LA or any government agencies.

Table of Contents

Release Control Record	3
1 Certificate of Conformity.....	4
2 Summary of Test Results	5
2.1 Measurement Uncertainty	5
2.2 Modification Record	5
3 General Information.....	6
3.1 General Description of EUT	6
3.2 Description of Test Modes	7
3.2.1 Test Mode Applicability and Tested Channel Detail	8
3.3 Description of Support Units	9
3.3.1 Configuration of System under Test	9
3.4 General Description of Applied Standards	9
4 Test Types and Results	10
4.1 Radiated Emission and Bandedge Measurement.....	10
4.1.1 Limits of Radiated Emission and Bandedge Measurement	10
4.1.2 Test Instruments	10
4.1.3 Test Procedures.....	12
4.1.4 Deviation from Test Standard	12
4.1.5 Test Setup.....	13
4.1.6 EUT Operating Conditions.....	14
4.1.7 Test Results	15
4.2 Field Strength of Fundamental Signal.....	Error! Bookmark not defined.
4.2.1 Limits of Field Strength of Fundamental Signal	Error! Bookmark not defined.
4.2.2 Test Instruments	Error! Bookmark not defined.
4.2.3 Test Procedures.....	Error! Bookmark not defined.
4.2.4 Deviation from Test Standard	Error! Bookmark not defined.
4.2.5 Test Setup.....	Error! Bookmark not defined.
4.2.6 EUT Operating Conditions.....	Error! Bookmark not defined.
4.2.7 Test Results	Error! Bookmark not defined.
4.3 Conducted Emissions Measurement	17
4.3.1 Limits of Conducted Emission Measurement.....	17
4.3.2 Test Instruments	17
4.3.3 Test Procedures.....	18
4.3.4 Deviation from Test Standard	18
4.3.5 Test Setup.....	18
4.3.6 EUT Operating Conditions.....	18
4.3.7 Test Results	19
4.4 20dB Channel Bandwidth & 99% Bandwidth Measurements	21
4.4.1 Limits of Emission Bandwidth.....	21
4.4.2 Test Setup.....	21
4.4.3 Test Procedure	21
4.4.4 Deviation from Test Standard	21
4.4.5 EUT Operating Condition	21
4.4.6 Test Results	22
5 Pictures of Test Arrangements.....	24
Appendix – Information on the Testing Laboratories	25

Release Control Record

Issue No.	Description	Date Issued
FCC_IC_RF_SL19110601-TCG001 _900MHz	Original Release	01/29/2020

1 Certificate of Conformity

Product: Smart Garage Control – C-Hub

Brand: Chamberlain

Test Model: MYQ-G0401, MYQ-G0401-E, 821LMC

Sample Status: Engineering Sample

Applicant: Chamberlain Group, Inc

Test Date: 12/23/2019 - 01/24/2020

Standards: 47 CFR FCC Part 15, Subpart C (Section 15.249)

ISED RSS-210 Issue 10

ISED 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: 01/29/2020

Yao-Wei Lee / Test Engineer

Approved by :



Date: 01/29/2020

Shuo Zhang / Engineer Reviewer

2 Summary of Test Results

47 CFR FCC Part 15, Subpart C (Section 15.249)/ISED RSS-247				
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(d)	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

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	FHSS
Modulation Technology	FHSS
Transfer Rate	ISM: 256kbps
Operating Frequency	ISM: 902.25, 914.75, 926.75 MHz
Antenna Type	ISM: Monopole (wire), 5.19dBi gain
Antenna Connector	N/A

3.2 Description of Test Modes

9 Channels are provided for ISM bands:

Channel	Freq. (MHz)
Low	902.25
Mid	914.75
High	926.75

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
 RE<1G: Radiated Emission below 1GHz
 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 Technology	DATA RATE (kbps)
1 to 9	7,8,9	ISM	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 Technology	DATA RATE (kbps)
1 to 9	8	ISM	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 9	8	ISM	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	Yao Wei Lee
RE<1G	25deg. C, 65%RH	120Vac, 60Hz	Yao Wei Lee
PLC	25deg. C, 65%RH	120Vac, 60Hz	Yao Wei Lee
APCM	N/A	N/A	N/A

3.3 Description of Support Units

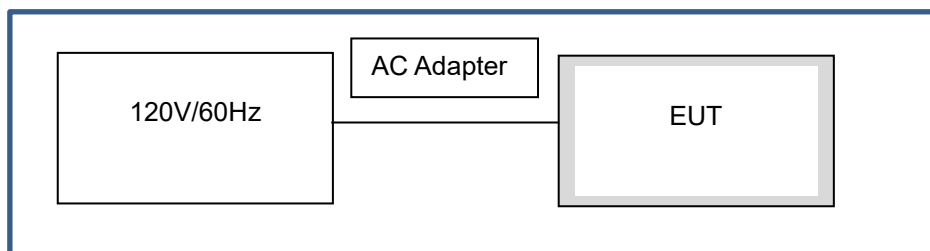
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Laptop	Dell	Latitude 3550	2MHWY32	N/A	Provided by Lab
B.	AC Adapter	QQJQ Power Supply	A912-050150W-US1	N/A	N/A	To Power Up EUT

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 (15.249)
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 Emission and Bandedge Measurement

4.1.1 Limits of Radiated Emission and Bandedge Measurement

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 20dB below the highest level of the desired power:

Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 ~ 0.490	2400/F(kHz)	300
0.490 ~ 1.705	24000/F(kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

NOTE:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. For frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

Per FCC part 15.249 (a)(c)(d)(e) the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

r FCC part 15.249 (a)(c)(d)(e) the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
Fundamental 902 – 928 MHz	94.0 dBμV/m	3
Fundamental 2.4 – 2.4835 GHz	94.0 dBμV/m	3
Harmonics	54.0 dBμV/m	3

4.1.2 Test Instruments

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
PXA Signal Analyzer KEYSIGHT	N9030B	MY57140584	03/05/2019	03/05/2020
Horn Antenna ETS-Lindgren	3117	218554	11/06/2019	11/06/2020
Biconilog Antenna Sunol	JB1	A030702	03/09/2018	03/09/2020
Preamplifier RF BAY INC	LPA-6-30	11170601	04/27/2019	04/27/2020

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:

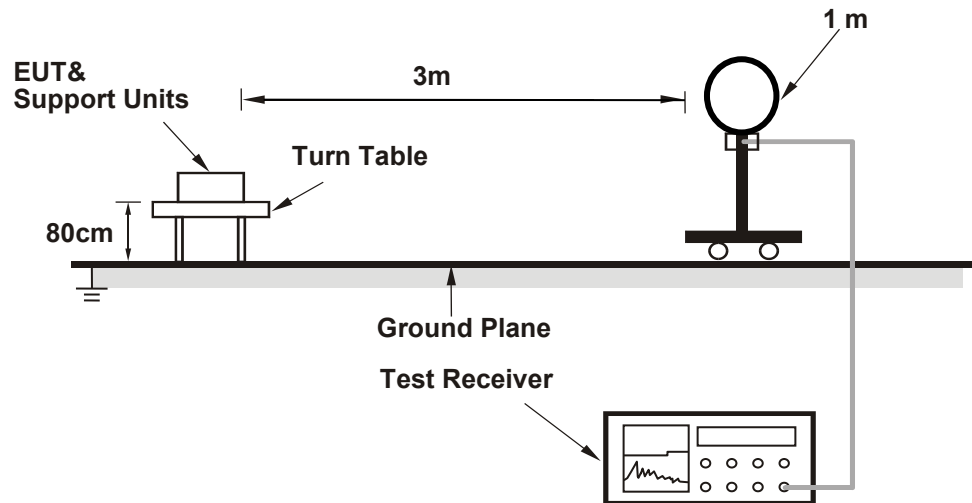
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
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

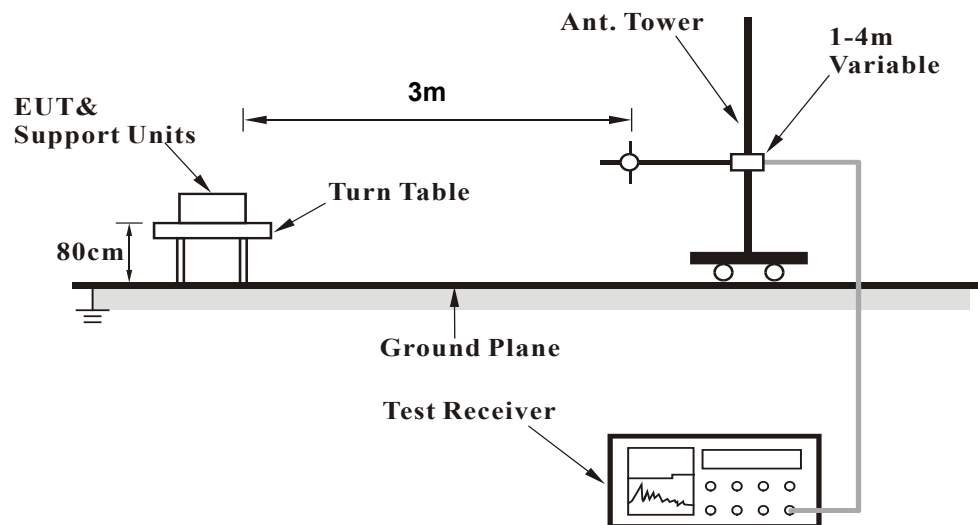
No deviation.

4.1.5 Test Setup

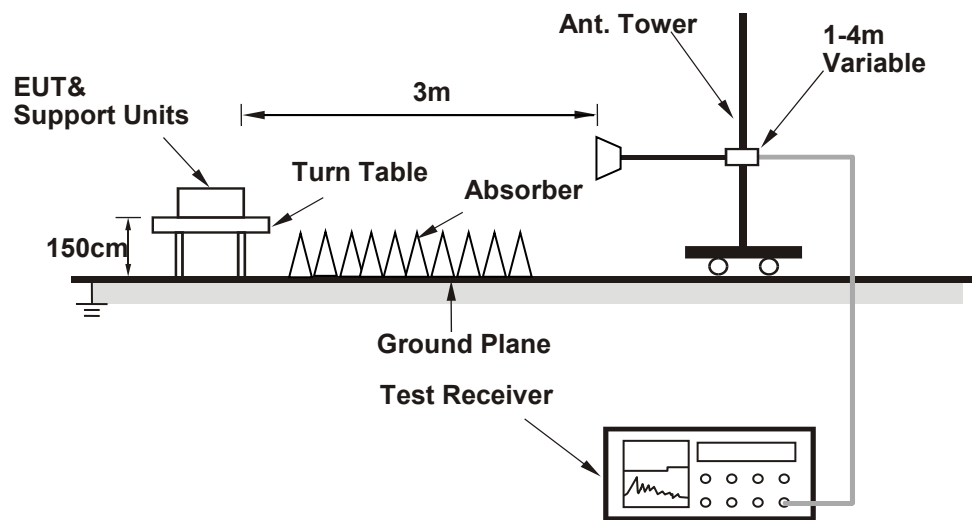
For Radiated emission below 30MHz



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 connecting to an AC power source.
- Controlling software has been activated to set the EUT on specific status.

4.1.7 Test Results

Correction Factor Measurement Result

Maximum transmit time on any frequency in a 100ms period
 = 2 network packets + 1 command packet
 = 1.25ms*2 + 3ms
 = 5.5ms

Modulation Correction Factor = $20 \log (5.5/100) = -25.2 \text{ dB}$ (This is the systems worst case condition)

EMISSION WORST-CASE DATA:

Freq (MHz)	Reading (dBuV/m)	Angle (Deg)	Height (m)	Polar H/V	Factors (dB)	CF	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Comment
1804.5	82.58	257	186	H	-10.9	-	71.68	74	2.32	Peak
1804.5	-	-	-	H	-	-25.2	46.48	54	7.52	Average
1804.5	78.21	265	178	V	-10.8	-	67.41	74	6.59	Peak
1804.5	-	-	-	V	-	-25.2	42.21	54	11.79	Average
1829.5	81.22	207	182	H	-11	-	70.22	74	3.78	Peak
1829.5	-	-	-	H	-	-25.2	45.02	54	8.98	Average
1829.5	80.58	34	205	V	-11.1	-	69.48	74	4.52	Peak
1829.5	-	-	-	V	-	-25.2	44.28	54	9.72	Average
1853.5	81.99	222	178	H	-11.1	-	70.89	74	3.11	Peak
1853.5	-	-	-	H	-	-25.2	45.69	54	8.31	Average
1853.5	82.36	28	159	V	-11.1	-	71.26	74	2.74	Peak
1853.5	-	-	-	V	-	-25.2	46.06	54	7.94	Average
2706.75	79.5	158	161	H	-9	-	70.5	74	3.5	Peak
2706.75	-	-	-	H	-	-25.2	45.3	54	8.7	Average
2706.75	70.66	237	184	V	-9	-	61.66	74	12.34	Peak
2706.75	-	-	-	V	-	-25.2	36.46	54	17.54	Average
2744.25	81.02	68	171	H	-9.1	-	71.92	74	2.08	Peak
2744.25	-	-	-	H	-	-25.2	46.72	54	7.28	Average
2744.25	74.48	112	198	V	-9.1	-	65.38	74	8.62	Peak
2744.25	-	-	-	V	-	-25.2	40.18	54	13.82	Average
2780.25	82.01	96	183	H	-9.3	-	72.71	74	1.29	Peak
2780.25	-	-	-	H	-	-25.2	47.51	54	6.49	Average
2780.25	80.7	178	192	V	-9.3	-	71.4	74	2.6	Peak
2780.25	-	-	-	V	-	-25.2	46.2	54	7.8	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. The emission levels of other frequencies were less than 20dB margin against the limit.
5. Margin value = Emission level – Limit value.

Field Strength of Fundamental Signal

Freq (MHz)	Reading (dBuV/m)	Angle (Deg)	Height (m)	Polar H/V	Factors (dB)	CF	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Comment
902.25	75.37	185	171	H	31.1	-	106.47	114	7.53	Peak
902.25	-	-	-	H	-	-25.2	81.27	94	12.73	Average
902.25	66.81	139	166	V	31	-	97.81	114	16.19	Peak
902.25	-	-	-	V	-	-25.2	72.61	94	21.39	Average
914.75	77.82	265	183	H	30.3	-	108.12	114	5.88	Peak
914.75	-	-	-	H	-	-25.2	82.92	94	11.08	Average
914.75	66.49	79	184	V	30.3	-	96.79	114	17.21	Peak
914.75	-	-	-	V	-	-25.2	71.59	94	22.41	Average
926.75	79.42	243	172	H	30.7	-	110.12	114	3.88	Peak
926.75	-	-	-	H	-	-25.2	84.92	94	9.08	Average
926.75	59.59	311	189	V	30.7	-	90.29	114	23.71	Peak
926.75	-	-	-	V	-	-25.2	65.09	94	28.91	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. The emission levels of other frequencies were less than 20dB margin against the limit.
5. Margin value = Emission level – Limit value.

4.2 Conducted Emissions Measurement

4.2.1 Limits of Conducted Emission Measurement

Frequency (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15 - 0.5	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30.0	60	50

Note: 1. The lower limit shall apply at the transition frequencies.

2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

4.2.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Date Of Calibration	Due Date Of Calibration
EMI Test Receiver ROHDE & SCHWARZ	ESIB 40	100179	08/28/2018	08/28/2020
Transient Limiter ELECTRO-METRICS	EM-7600-5	106	07/30/2019	07/30/2020
LISN EMCO	3816/2NM	214372	01/14/2020	01/14/2021

4.2.3 Test Procedures

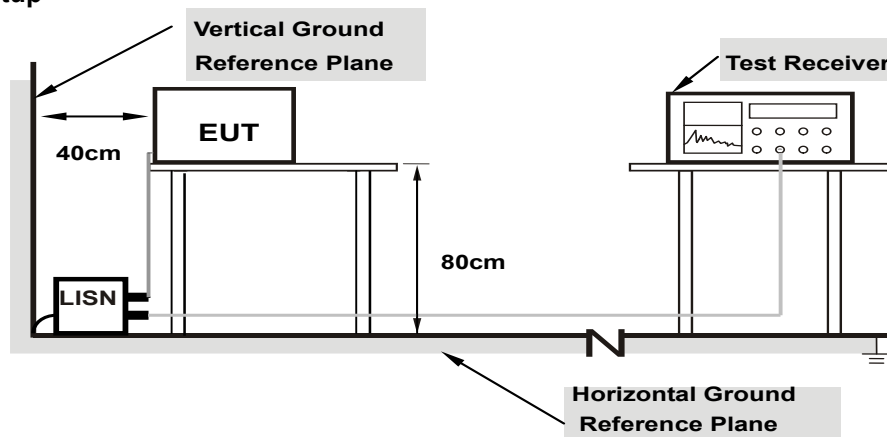
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- The frequency range from 150 kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

NOTE: The resolution bandwidth and video bandwidth of test receiver is 9 kHz for quasi-peak detection (QP) and average detection (AV) at frequency 0.15MHz-30MHz.

4.2.4 Deviation from Test Standard

No deviation.

4.2.5 Test Setup



Note: 1.Support units were connected to second LISN.

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

4.2.6 EUT Operating Conditions

- EUT is powered by connecting an AC power source.
- Controlling software has been activated to set the EUT on specific status.

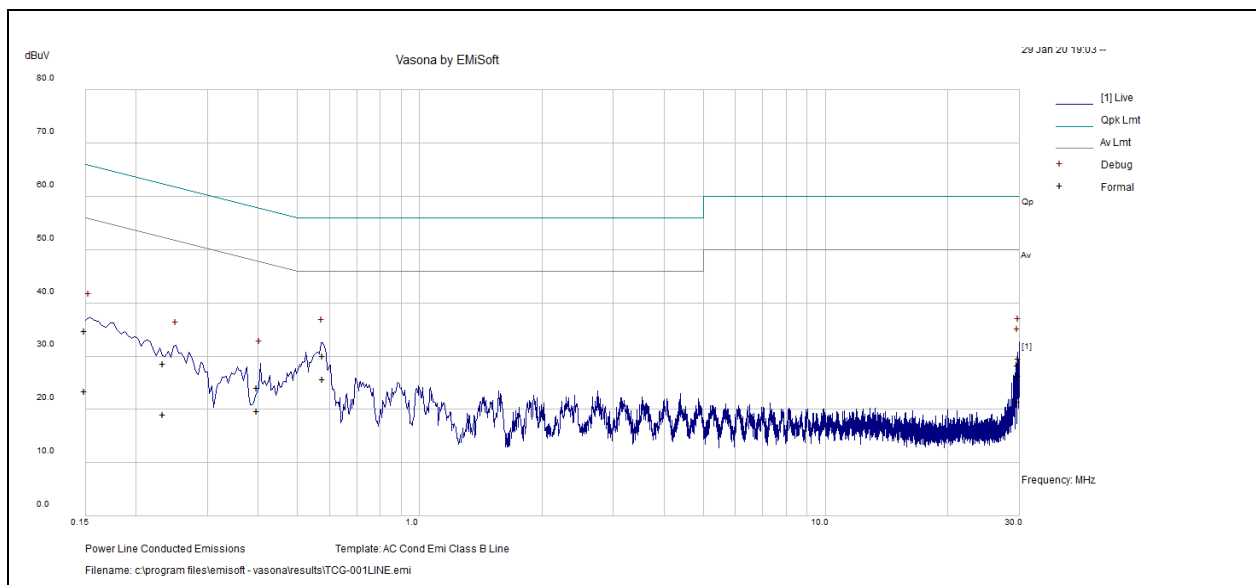
4.2.7 Test Results

Phase	Line (L)	Detector Function	Quasi-Peak / Average
-------	----------	-------------------	----------------------

No	Frequency (MHz)	Reading Value (dBuV)	Cable Loss (dB)	Insertion Loss (dB)	Emission Level Corrected (dBuV)	Measurement Type	Line/ Neutral	Limit (dBuV)	Margin (dB)	Pass/Fail
1	0.578141	20.55	9.46	0.04	30.04	Quasi Peak	Live	56	-25.96	Pass
2	29.9978	18.98	9.95	0.66	29.59	Quasi Peak	Live	60	-30.41	Pass
3	0.15	25.43	9.29	0.04	34.76	Quasi Peak	Live	66	-31.24	Pass
4	0.397756	14.54	9.44	0.04	24.02	Quasi Peak	Live	57.9	-33.88	Pass
5	29.78703	17.66	9.95	0.66	28.26	Quasi Peak	Live	60	-31.74	Pass
6	0.233976	19.11	9.41	0.04	28.57	Quasi Peak	Live	62.31	-33.74	Pass
7	0.578141	16.17	9.46	0.04	25.66	Average	Live	46	-20.34	Pass
8	29.9978	15.79	9.95	0.66	26.4	Average	Live	50	-23.6	Pass
9	0.15	14.05	9.29	0.04	23.38	Average	Live	56	-32.62	Pass
10	0.397756	10.3	9.44	0.04	19.78	Average	Live	47.9	-28.12	Pass
11	29.78703	10.82	9.95	0.66	21.43	Average	Live	50	-28.57	Pass
12	0.233976	9.57	9.41	0.04	19.03	Average	Live	52.31	-33.28	Pass

REMARKS:

1. The emission levels of other frequencies were very low against the limit.
2. Margin value = Emission level - Limit value
3. Emission Level = Correction Factor + Raw Value + Factors Value.

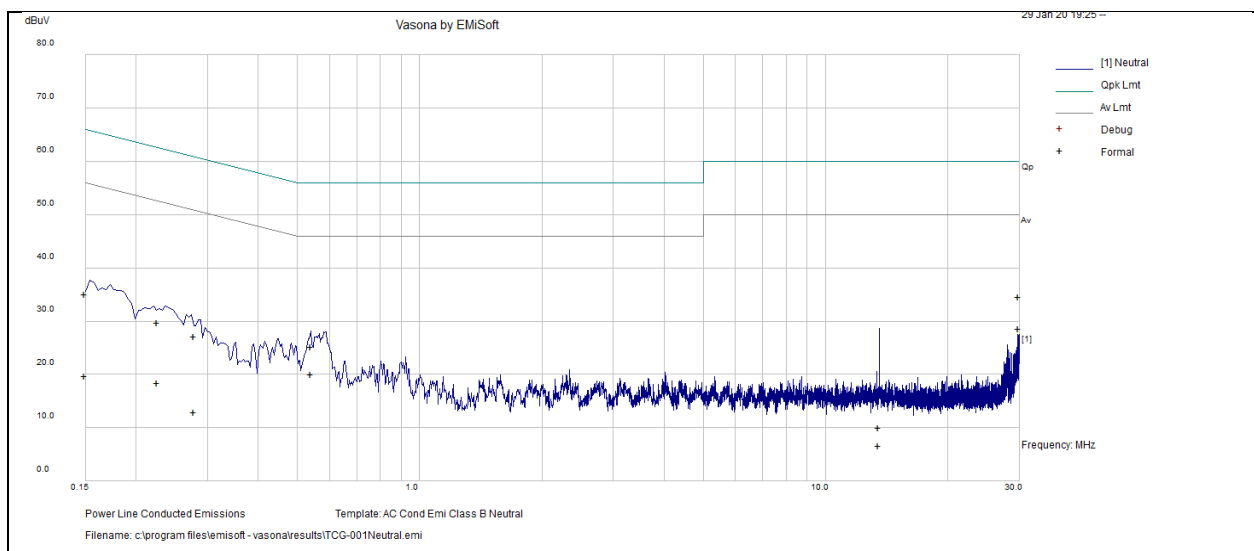


Phase	Neutral (N)	Detector Function	Quasi-Peak / Average
-------	-------------	-------------------	----------------------

No	Frequency (MHz)	Reading Value (dBUV)	Cable Loss (dB)	Insertion Loss (dB)	Emission Level Corrected (dBUV)	Measurement Type	Line/ Neutral	Limit (dBUV)	Margin (dB)	Pass/ Fail
1	0.541467	15.81	9.45	0.03	25.3	Quasi Peak	Neutral	56	-30.7	Pass
2	0.15	25.82	9.29	0.03	35.15	Quasi Peak	Neutral	66	-30.85	Pass
3	0.225727	20.26	9.4	0.03	29.69	Quasi Peak	Neutral	62.61	-32.91	Pass
4	13.567389	-0.01	9.68	0.3	9.97	Quasi Peak	Neutral	60	-50.03	Pass
5	0.278634	17.7	9.44	0.03	27.16	Quasi Peak	Neutral	60.86	-33.69	Pass
6	30	23.87	9.95	0.78	34.6	Quasi Peak	Neutral	60	-25.4	Pass
7	0.541467	10.57	9.45	0.03	20.06	Average	Neutral	46	-25.94	Pass
8	0.15	10.4	9.29	0.03	19.72	Average	Neutral	56	-36.28	Pass
9	0.225727	8.94	9.4	0.03	18.38	Average	Neutral	52.61	-34.23	Pass
10	13.567389	-3.31	9.68	0.3	6.67	Average	Neutral	50	-43.33	Pass
11	0.278634	3.41	9.44	0.03	12.88	Average	Neutral	50.86	-37.98	Pass
12	30	17.85	9.95	0.78	28.58	Average	Neutral	50	-21.42	Pass

REMARKS:

1. The emission levels of other frequencies were very low against the limit.
2. Margin value = Emission level - Limit value
3. Emission Level = Correction Factor + Raw Value + Factors Value.

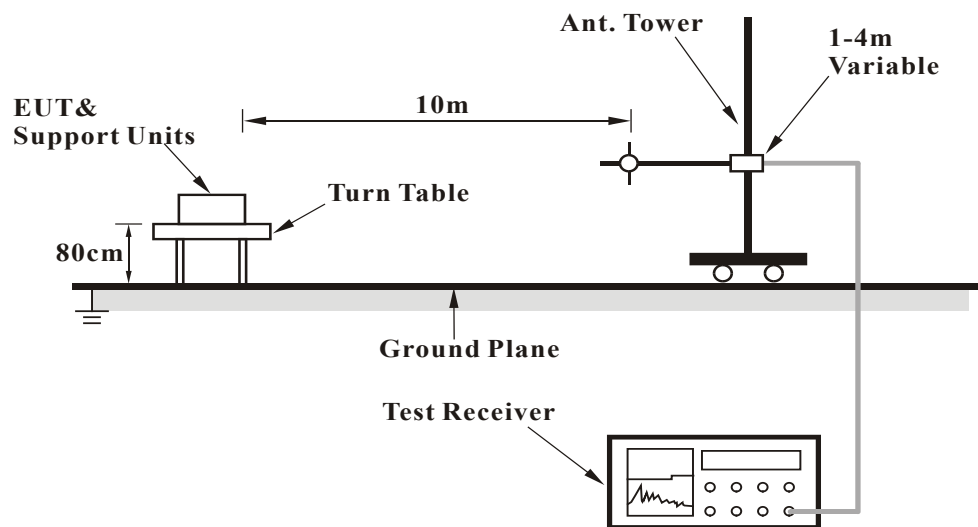


4.3 20dB Channel Bandwidth & 99% Bandwidth Measurements

4.3.1 Limits of Emission Bandwidth

The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

4.3.2 Test Setup



4.3.3 Test Procedure

- Turn on the EUT and set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
- Connect a dipole antenna to the measurement instrument. Make sure waveform is received by test antenna which is connected to the spectrum analyzer. Plot the 20 dB bandwidth

4.3.4 Deviation from Test Standard

No Deviation.

4.3.5 EUT Operating Condition

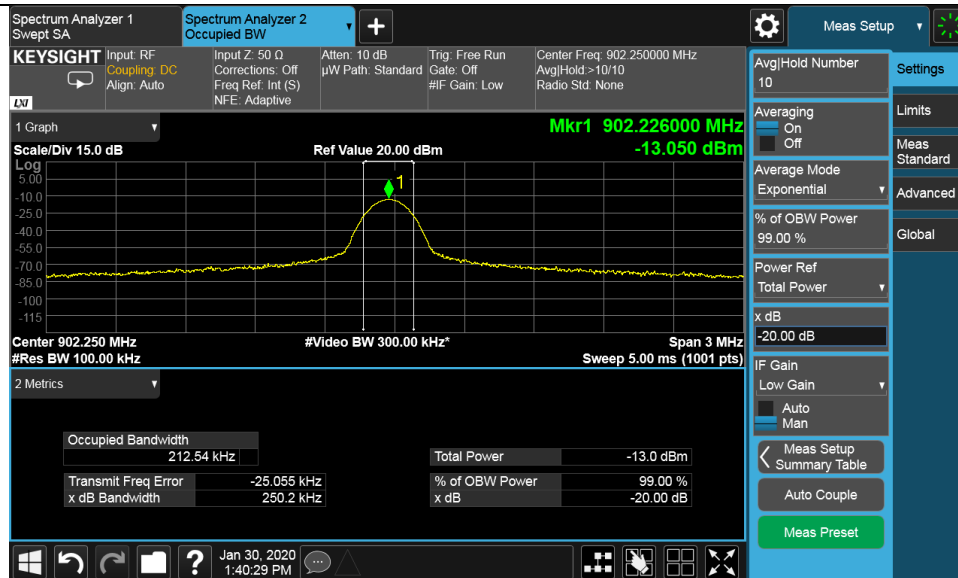
Same as 4.2.6

4.3.6 Test Results

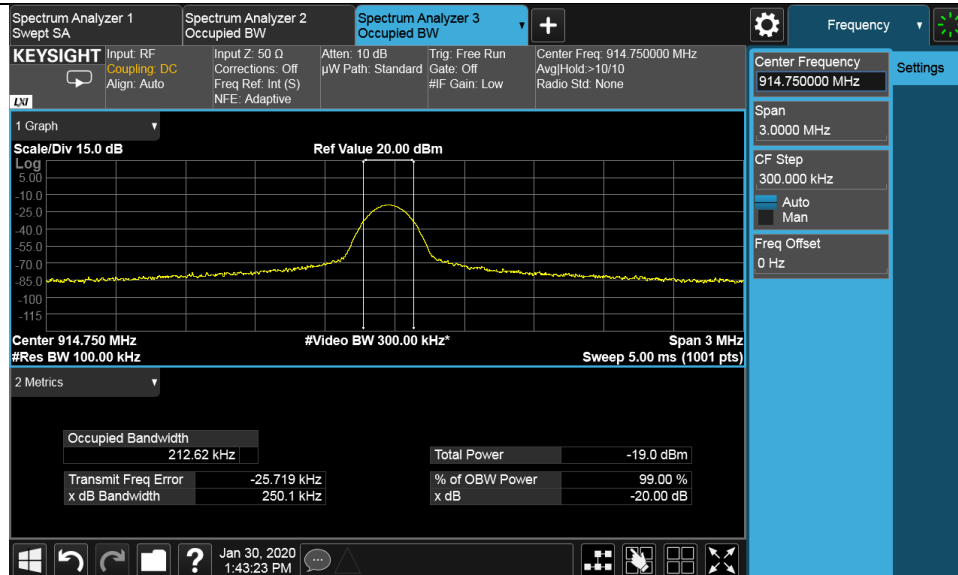
Channel	Frequency(MHz)	20 dB Bandwidth(kHz)	99% OBW(kHz)	Limit(kHz)	Results
7	902.25	250.2	212.54	4573.75	Pass
8	914.75	250.1	212.62	4573.75	Pass
9	926.75	250.4	212.45s	4573.75	Pass

Note: Limit = 0.5% * 914.75 MHz = 4573.75 kHz

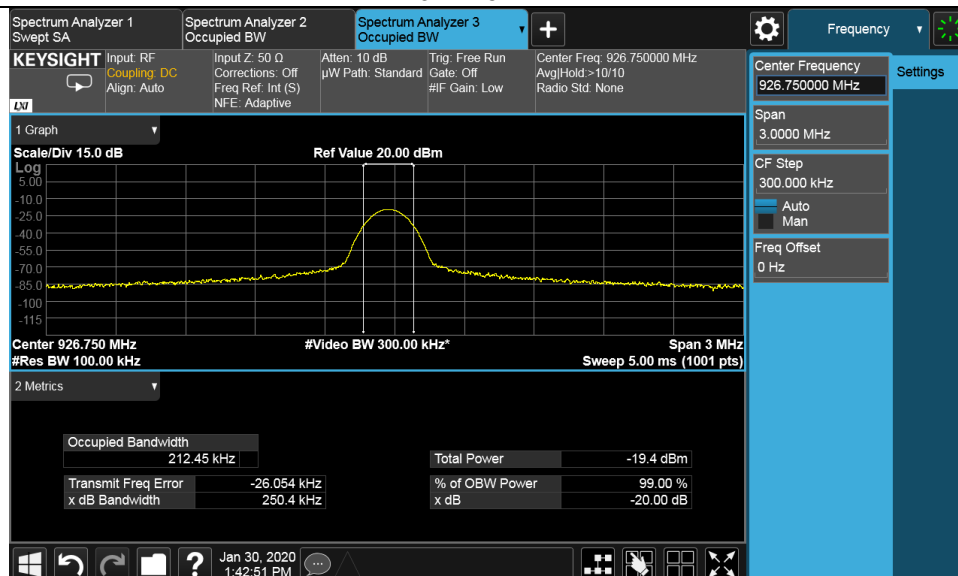
Test Plots:



902.25 MHz



914.75 MHz



926.75 MHz

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:

Milpitas EMC/RF/Safety/Telecom Lab

775 Montague Expressway, Milpitas, CA 95035
Tel: +1 408 526 1188

Sunnyvale OTA/Bluetooth Lab

1293 Anvilwood Avenue, Sunnyvale, CA 94089
Tel: +1 669 600 5293

Littleton EMC/RF/Safety/Environmental Lab

1 Distribution Center Cir #1, Littleton, MA 01460
Tel: +1 978 486 8880

Irvine OTA/PTCRB/Bluetooth/V2X Lab

15 Musick, Irvine, CA 92618
Tel: +1 949 716 6512

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.

--- END ---