



Engineering Test Report No. 2301031-04

Report Date	July 18, 2023	
Manufacturer Name	The Chamberlain Group, Inc.	
Manufacturer Address	300 Windsor Dr Oak Brook, IL 60523	
Product Name Model No.	Industrial DC Operator JHDC7S1BMC	
Date Received	June 1, 2023	
Test Dates	June 2 – July 11, 2023	
Specifications	FCC "Code of Federal Regulations" Title 47, Part 15, Subpart B FCC "Code of Federal Regulations" Title 47 Part 15, Subpart C, Section 15.247 Innovation, Science, and Economic Development Canada, RSS-GEN Innovation, Science, and Economic Development Canada, RSS-247	
Test Facility	Elite Electronic Engineering, Inc. 1516 Centre Circle, Downers Grove, IL 60515	FCC Reg. Number: 269750 IC Reg. Number: 2987A CAB Identifier: US0107
Signature		
Tested by	Tylar Jozefczyk	
Signature		
Approved by	Raymond J. Klouda, Registered Professional Engineer of Illinois – 44894	
PO Number	4900090806	

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.

This report shall not be reproduced, except in full, without the written approval of Elite Electronic Engineering Inc.

Elite Electronic Engineering Incorporated certifies that the information contained in this report was obtained under conditions which meet or exceed those specified in the FCC "Code of Federal Regulations" Title 47 Part 15, Subpart C, Section 15.247 and Innovation, Science, and Economic Development Canada, RSS-247 test specifications. The data presented in this test report pertains to the EUT on the test dates specified. Any electrical or mechanical modifications made to the EUT subsequent to the specified test date will serve to invalidate the data and void this certification. This report must not be used to claim product certification, approval, or endorsement by A2LA, NIST, or any agency of the Federal Government.

Table of Contents

1.	Report Revision History	3
2.	Introduction	4
2.1.	Scope of Tests	4
2.2.	Purpose	4
2.3.	Identification of the EUT	4
3.	Power Input	5
4.	Grounding	5
5.	Support Equipment	5
6.	Interconnect Leads	5
7.	Modifications Made to the EUT	5
8.	Modes of Operation	5
9.	Test Specifications	5
10.	Test Plan	6
11.	Deviation, Additions to, or Exclusions from Test Specifications	6
12.	Laboratory Conditions	6
13.	Summary	6
14.	Sample Calculations	7
15.	Statement of Conformity	7
16.	Certification	7
17.	Photographs of EUT	8
18.	Equipment List	10
19.	Block Diagram of Test Setup	11
20.	Antenna Port Conducted Emissions Tests	12
21.	Radiated Emissions Tests	40
22.	Scope of Accreditation	79

**This report shall not be reproduced, except in full,
without the written approval of Elite Electronic Engineering Inc.**

1. Report Revision History

Revision	Date	Description
–	19 JUL 2023	Initial Release of Engineering Test Report No. 2301031-04

2. Introduction

2.1. Scope of Tests

This document presents the results of a series of RF emissions tests that were performed on The Chamberlain Group, Inc. Industrial DC Operator (hereinafter referred to as the Equipment Under Test (EUT)). The EUT was manufactured and submitted for testing by The Chamberlain Group, Inc. located in Oak Brook, IL.

2.2. Purpose

The test series was performed to determine if the EUT meets the RF emission requirements of the FCC "Code of Federal Regulations" Title 47, Part 15, Subpart C, §15.247 for a Digital Modulation intentional radiator operating within the 2400 – 2483.5MHz band.

The test series was also performed to determine if the EUT meets the RF emission requirements of the Innovation, Science, and Economic Development Canada Radio Standards Specification RSS-Gen and RSS-247 for a Digital Modulation intentional radiator operating within the 2400 – 2483.5MHz band.

Testing was performed in accordance with ANSI C63.10-2013.

2.3. Identification of the EUT

The EUT was identified as follows and used throughout the test series:

EUT Identification	
Product Description	Industrial DC Operator
Model/Part No.	JHDC7S1BMC
Serial No.	001
Size of EUT	10" x 22" x 12"
Software/Firmware Version	Ver 7.1
Device Type	Digitally Modulated Transmission Device
Band of Operation	2400 – 2483.5MHz
Modulation Type	802.11b/g/n
Antenna Type	Internal: inverted F PCB External: Terminal mount dipole
Antenna Gain (dBi) ¹	Internal: ±1 External: 5 (worst case with the antenna bent)
Conducted Output Power	802.11b: 18.9dBm 802.11g: 21.8dBm 802.11n: 20.6dBm
Rated Output Power	802.11b: 0.543W (27.35dBm) 802.11g: 1.1455W (30.59dBm) 802.11n: 0.88W (29.45dBm)
6dB Bandwidth	802.11b: 8.7MHz 802.11g: 16.55MHz 802.11n: 17.85MHz
Occupied Bandwidth (99% CBW)	802.11b: 14MHz 802.11g: 17.5MHz 802.11n: 18.25MHz
Emission Classification	G1D
FCC ID	FCC ID: HBW0635
ISED Certification Number	IC: 2666A-0635
Note 1 – Antenna gain is supplied by the manufacturer and Elite is not responsible for the accuracy of the antenna gain. Note 2 – The logic control board used in the EUTs is PCB # 003-0635-1. Note 3 – This report also covers the following model numbers: JDC7S1BMC, JDC7S4BMC, JHDC7S4BMC, TDC7S1BMC, TDC7S4BMC, JHDC12S1BMC, JHDC12S4BMC, JHDC12X1BMC, JHDC12X4BMC, TDC12S1BMC, TDC12S4BMC, TDC12X1BMC, TDC12X4BMC.	

3. Power Input

The EUT obtained 120VAC 60Hz power via a 3-wire, 1-meter, unshielded power cord.

4. Grounding

The EUT was connected to ground through the third wire of its input power cord.

5. Support Equipment

The EUT was submitted for testing along with the following support equipment:

Description	Model #	S/N
Photoelectric Safety Sensors	CPS-U	N/A
Floor Level Wall Controller	DCWALLCTL	N/A
Laptop	hp	N/A

6. Interconnect Leads

The following interconnect cables were submitted with the test item:

Item	Description
USB to Serial cable	Connects laptop to EUT for programming
4 wires (2 wires per Sensor)	Connects Safety Sensors to EUT
4 wires	Connects Wall Control to EUT

7. Modifications Made to the EUT

No modifications were made to the EUT during the testing.

8. Modes of Operation

The EUT and all peripheral equipment were energized. The unit was programmed to transmit in one of the following modes:

Mode	Description
802.11b (11Mbps) (Power Setting = 18dBm)	- 2412MHz - 2437MHz - 2462MHz
802.11g (54Mbps) (Power Setting = 15dBm)	- 2412MHz - 2437MHz - 2462MHz
802.11n (MCS7) (Power Setting = 14dBm)	- 2412MHz - 2437MHz - 2462MHz

9. Test Specifications

The tests were performed to selected portions of, and in accordance with, the test specifications.

- Federal Communications Commission "Code of Federal Regulations", Title 47, Chapter I, Subchapter A, Part 15, Subpart B – "Unintentional Radiators"
- Federal Communications Commission "Code of Federal Regulations", Title 47, Chapter I, Subchapter A, Part 15, Subpart C – "Intentional Radiators"

- ANSI C63.4-2014 – "American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz"
- ANSI C63.10-2013 – "American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices"
- KDB 558074 D01v05r02 (April 2, 2019) – "Guidance For Compliance Measurements On Digital Transmission System, Frequency Hopping Spread Spectrum System, and Hybrid System Devices Operating Under Section 15.247 of the FCC Rules"
- Radio Standard Specification RSS-Gen Issue 5, Amendment 2 (February 2021) – "General Requirements for Compliance of Radio Apparatus"
- Radio Standard Specification RSS-247 Issue 2, February 2017 – "Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSS) and License-Exempt Local Area Network (LE-LAN) Devices"

10. Test Plan

No test plan was provided. Instructions were provided by personnel from The Chamberlain Group, Inc. and used in conjunction with the FCC "Code of Federal Regulations" Title 47 Part 15, Subpart C, Section 15.247, Innovation, Science, and Economic Development Canada, RSS-247, and ANSI C63.10-2013 specifications.

11. Deviation, Additions to, or Exclusions from Test Specifications

There were no deviations, additions to, or exclusions from the test specifications during this test series.

12. Laboratory Conditions

The ambient parameters of the laboratory during testing were as follows:

Ambient Parameters	Value
Temperature	24.6°C
Relative Humidity	32%
Atmospheric Pressure	1012.4mb

13. Summary

The following EMC tests were performed, and the results are shown below:

Test Description	Requirements	Test Method	Result
6dB Bandwidth	FCC 15.107 ISED RSS-GEN	ANSI C63.10:2013	Conforms
99% Bandwidth	FCC 15.107 ISED RSS-GEN	ANSI C63.10:2013	---
Output Power	FCC 15.107 ISED RSS-GEN	ANSI C63.10:2013	Conforms
Power Spectral Density	FCC 15.247 ISED RSS-247	ANSI C63.10:2013	Conforms
Low Band Edge	FCC 15.247 ISED RSS-247	ANSI C63.10:2013	Conforms
EIRP	FCC 15.247 ISED RSS-247	ANSI C63.10:2013	Conforms
Spurious Radiated Emissions	FCC 15.247 ISED RSS-247	ANSI C63.10:2013	Conforms
High Band Edge	FCC 15.247 ISED RSS-247	ANSI C63.10:2013	Conforms

14. Sample Calculations

For Radiated Emissions:

The resultant field strength (FS) is a summation in decibels (dB) of the receiver meter reading (MTR), the antenna correction factor (AF), and the cable loss factor (CF). If an external preamplifier is used, the total is reduced by its gain (-PA). If a distance correction (DC) is required, it is added to the total.

$$\text{Formula 1: FS (dB}\mu\text{V/m)} = \text{MTR (dB}\mu\text{V)} + \text{AF (dB/m)} + \text{CF (dB)} + (-\text{PA (dB)}) + \text{DC (dB)}$$

To convert the Field Strength dB μ V/m term to μ V/m, the dB μ V/m is first divided by 20. The Base 10 AntiLog is taken of this quotient. The result is the Field Strength value in μ V/m terms.

$$\text{Formula 2: FS (}\mu\text{V/m)} = \text{AntiLog}[(\text{FS (dB}\mu\text{V/m)})/20]$$

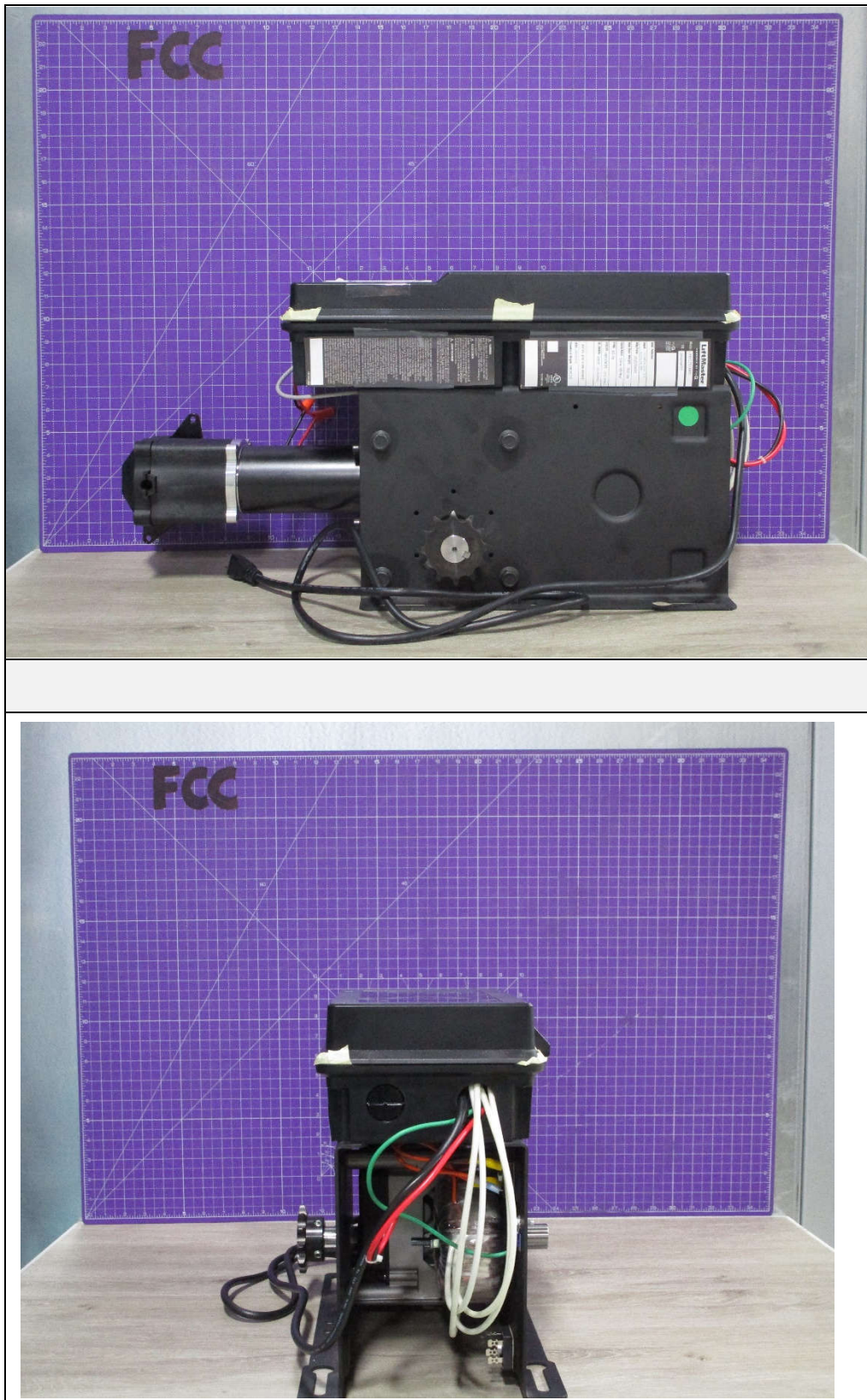
15. Statement of Conformity

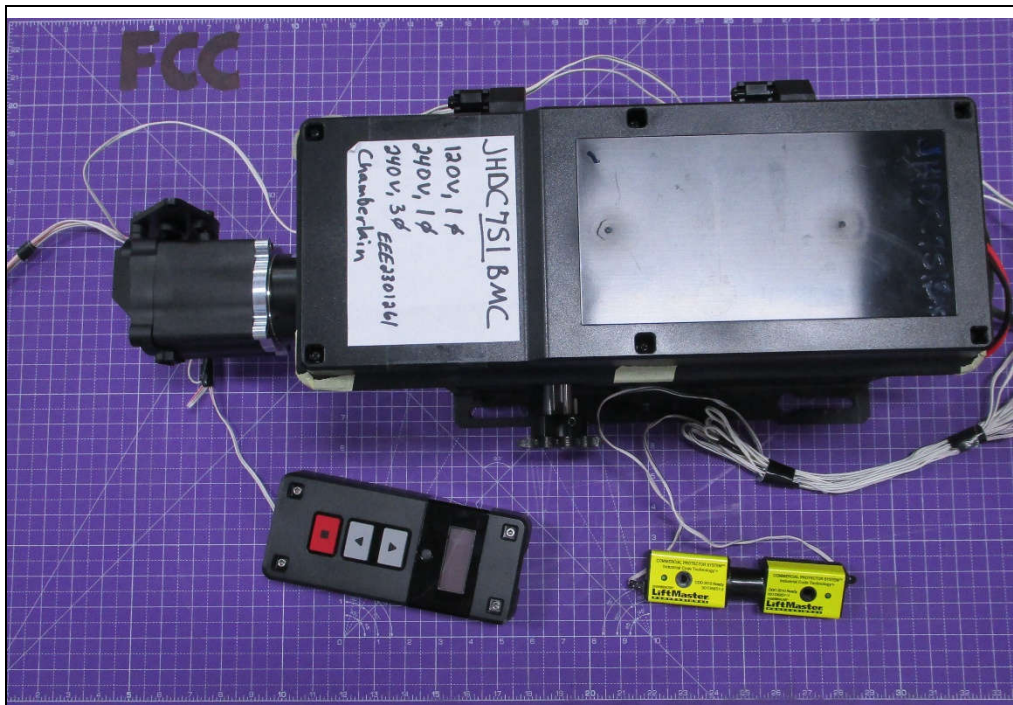
The Chamberlain Group, Inc. Industrial DC Operator (Model No. JHDC7S1BMC, Serial No. 001) did fully conform to the selected requirements of FCC "Code of Federal Regulations" Title 47 Part 15, Subpart C, Section 15.247 and Innovation, Science, and Economic Development Canada, RSS-247.

16. Certification

Elite Electronic Engineering Incorporated certifies that the information contained in this report was obtained under conditions which meet or exceed those specified in the FCC "Code of Federal Regulations" Title 47 Part 15, Subpart C, Section 15.247 and Innovation, Science, and Economic Development Canada, RSS-247 test specifications. The data presented in this test report pertains to the EUT on the test date specified. Any electrical or mechanical modifications made to the EUT subsequent to the specified test date will serve to invalidate the data and void this certification.

17. Photographs of EUT





18. Equipment List

Eq ID	Equipment Description	Manufacturer	Model No.	Serial No.	Frequency Range	Cal Date	Due Date
APW0	PREAMPLIFIER	PLANAR ELECTRONICS	PE2-30-20G20R6G	PL2926/0646	20GHZ-26.5GHZ	9/21/2022	9/21/2023
APW14	PREAMPLIFIER	PLANAR	PE2-35-120-5R0-10-12-SFF	PL22671	1-20GHZ	9/21/2022	9/21/2023
CDZ3	LAB WORKSTATION	ELITE	LWS-10		WINDOWS 10	CNR	
GSF0	VECTOR SIGNAL GENERATOR	ROHDE & SCHWARZ	SMBV100A	260452	9kHz to 6GHz	9/2/2022	9/2/2024
GSFB	OSP120 BASE UNIT	ROHDE & SCHWARZ	OSP120	101071	---	3/30/2023	3/30/2025
GSFE	OSP120	ROHDE & SCHWARZ	OSP120	101288	.01-40GHZ	4/4/2023	4/4/2025
NDQ0	TUNED DIPOLE ANTENNA	EMCO	3121C-DB4	311	400-1000MHZ	6/7/2022	6/7/2024
NHG1	STANDARD GAIN HORN ANTENNA	NARDA	638	---	18-26.5GHZ	NOTE 1	
NTA3	BILOG ANTENNA	TESEQ	6112D	32853	25-1000MHz	11/17/2022	11/17/2024
NWQ2	DOUBLE RIDGED WAVEGUIDE ANTENNA	ETS LINDGREN	3117	66659	1GHZ-18GHZ	4/27/2022	4/27/2024
R29F	3M ANECHOIC CHAMBER NSA	EMC TEST SYSTEMS	3M ANECHOIC		30MHZ-18GHZ	6/12/2023	6/12/2024
RBG2	EMI ANALYZER	ROHDE & SCHWARZ	ESW44	101591	2HZ-44GHZ	4/10/2023	4/10/2024
RBG4	EMI ANALYZER	ROHDE & SCHWARZ	ESW44	103007	2HZ-44GHZ	12/8/2022	12/8/2023
SES0	24VDC POWER SUPPLY	P-TRANS	FS-32024-1M	001	18-27VDC	NOTE 1	
WKA1	SOFTWARE, UNIVERSAL RCV EMI	ELITE	UNIV_RCV_EMI	1	---	I/O	
XPQ4	HIGH PASS FILTER	K&L MICROWAVE	11SH10-4800/X20000-O/O	1	4.8-20GHZ	9/7/2021	9/7/2023

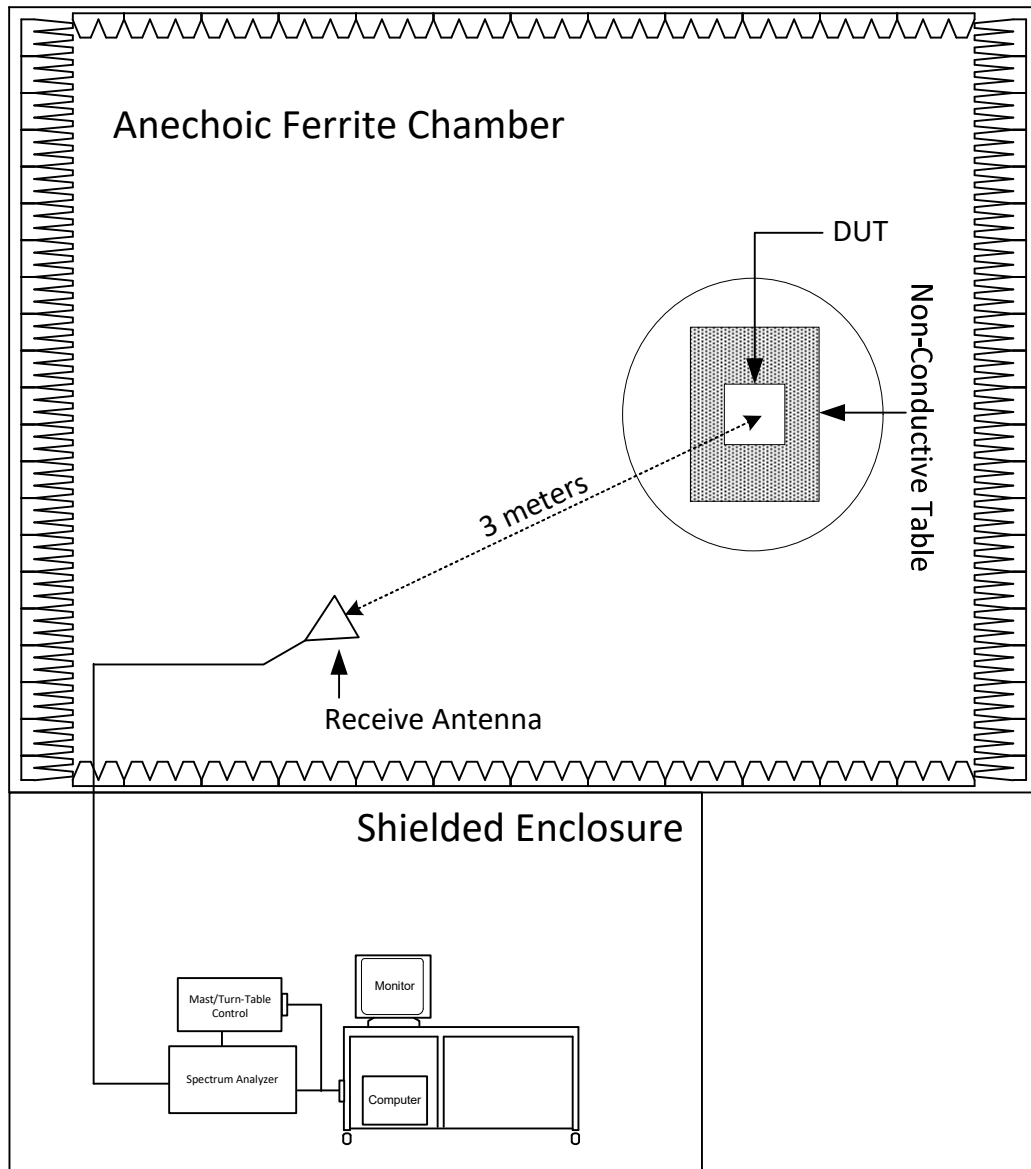
N/A: Not Applicable

I/O: Initial Only

CNR: Calibration Not Required

NOTE 1: For the purpose of this test, the equipment was calibrated over the specified frequency range, pulse rate, or modulation prior to the test or monitored by a calibrated instrument.

19. Block Diagram of Test Setup



Radiated Measurements Test Setup

20. Antenna Port Conducted Emissions Tests

Test Information	
Manufacturer	The Chamberlain Group, Inc.
Product	Industrial DC Operator
Model No.	JHDC7S1BMC
Serial No.	001
Mode	802.11b (11Mbps), 802.11g (54Mbps), 802.11n (MCS7)

Test Setup Details	
Setup Format	Tabletop
Height of Support	N/A
Type of Test Site	EMC Bench
Note	None

Measurement Uncertainty	
Measurement Type	Expanded Measurement Uncertainty
Occupied Channel Bandwidth	$\pm 224\text{kHz}$
Power Spectral Density	$\pm 0.372\text{Hz}$
RF Output Power, Conducted	$\pm 0.349\text{ dB}$
Unwanted Emissions, Conducted	$\pm 1.39\text{ dB}$
All Emissions Radiated Below 1GHz	$\pm 2.629\text{ dB}$
All Emissions Radiated Above 1GHz	$\pm 2.710\text{ dB}$
Temperature	$\pm 0.165^{\circ}\text{C}$
Humidity	$\pm 1.7\%\text{ RH}$
DC and Low Frequency Voltages	$\pm 0.115\text{ Volts}$
Time	$\pm 0.05\%$

Requirements
<u>6dB Bandwidth (DTS Bandwidth):</u> Per FCC 15.247 (a)(2) and ISSED RSS-247 Section 5.2(a), the minimum 6dB bandwidth shall be at least 500kHz for all systems using digital modulation techniques.
<u>99% Bandwidth:</u> RSS-Gen requires the measurement of the 99% bandwidth (Occupied Bandwidth). If measuring the maximum conducted (average) output power for FCC 15.247, the 99% bandwidth is used as the reference for power integration.
<u>Peak Conducted Output Power:</u> Per FCC 15.247(b)(3) and ISSED RSS-247 Section 5.4(d), for systems using digital modulation, the maximum peak conducted output power shall not exceed 1W.
<u>Peak Power Spectral Density:</u> Per FCC 15.247 (e), and ISSED RSS-247 Section 5.2(b), for digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3kHz band during any time interval of continuous transmission. If peak conducted output power was measured, the same method must be used to measure the power spectral density.
<u>Low Band Edge:</u> Per FCC 15.247(d) and ISSED RSS-247 Section 5.5, in any 100kHz bandwidth outside the frequency band in which the digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. Attenuation below the general limits specified in FCC 15.209(a) and ISSED RSS-Gen is not required.

Procedures

6dB Bandwidth (DTS Bandwidth):

C63.10-2013 Section 11.8 Option 1:

- a) The following settings were employed on the EMI Test Receiver:
 - Center Frequency = Transmit Frequency of the EUT
 - Frequency Span = 2 x Occupied Channel Bandwidth
 - RBW = 100kHz
 - VBW = 3 x RBW
 - Detector Mode = Max Peak
 - Trace Mode = Max Hold
- b) Allow the trace to stabilize and set the receiver marker to the highest level of the displayed trace (this is the reference value).
- c) Determine the 6dB down amplitude.
- d) Place two markers, one at the lowest frequency and the other at the highest frequency of the envelope trace, such that each marker is at or slightly below the 6dB down amplitude determined in Step (c). If a marker is below this 6dB down amplitude value, then it shall be as close as possible to this value. The occupied bandwidth is the frequency difference between the two markers.

99% Bandwidth:

C63.10-2013 section 6.9.3:

- a) The following settings were employed on the EMI Test Receiver:
 - Center Frequency = Transmit Frequency of the EUT
 - Frequency Span = Between 1.5 and 5 times the OBW
 - RBW = Between 1% to 5% of the OBW
 - VBW = Approximately 3 x RBW
 - Detector Mode = Max Peak
 - Trace Mode = Max Hold
- b) Allow the trace to stabilize and use the 99% power bandwidth function of the EMI receiver.

Peak Conducted Output Power:

C63.10-2013 section 11.9.1.1:

- a) The following settings were employed on the EMI Test Receiver:
 - Center Frequency = Transmit Frequency of the EUT
 - RBW = $\geq$ DTS Bandwidth
 - VBW = $\geq$ 3 x RBW
 - Span = $\geq$ 3 x RBW
 - Sweep Time = Auto couple
 - Detector Mode = Max Peak
 - Trace Mode = Max Hold
- b) Allow the trace to stabilize and use the peak marker function to determine the peak amplitude level.

Peak Power Spectral Density:

C63.10-20013 section 11.10.2:

- a) The following settings were employed on the EMI Test Receiver:

- Center Frequency = Transmit Frequency of the EUT
- Frequency Span = At least 1.5 times the OBW
- RBW = $3\text{kHz} \leq \text{RBW} \leq 100\text{kHz}$
- VBW = $\geq 3 \times \text{RBW}$
- Detector Mode = Max Peak
- Sweep Time = Auto Couple
- Trace Mode = Max Hold

- b) Allow the trace to stabilize and use the peak marker function to determine the maximum amplitude level within the RBW.
- c) If measured value exceeds requirement, then reduce RBW (but no less than 3kHz) and repeat.

Low Band Edge:

C63.10-2013 section 11.11:

a) Reference Level Measurement

- Start Frequency = 2400MHz
- Stop Frequency = 2483.5MHz
- RBW = 100kHz
- VBW = $\geq 3 \times \text{RBW}$
- Detector Mode = Max Peak
- Trace Mode = Max Hold
- Sweep Time = Auto

- b) Allow the trace to stabilize and use the peak marker function to determine the maximum level.

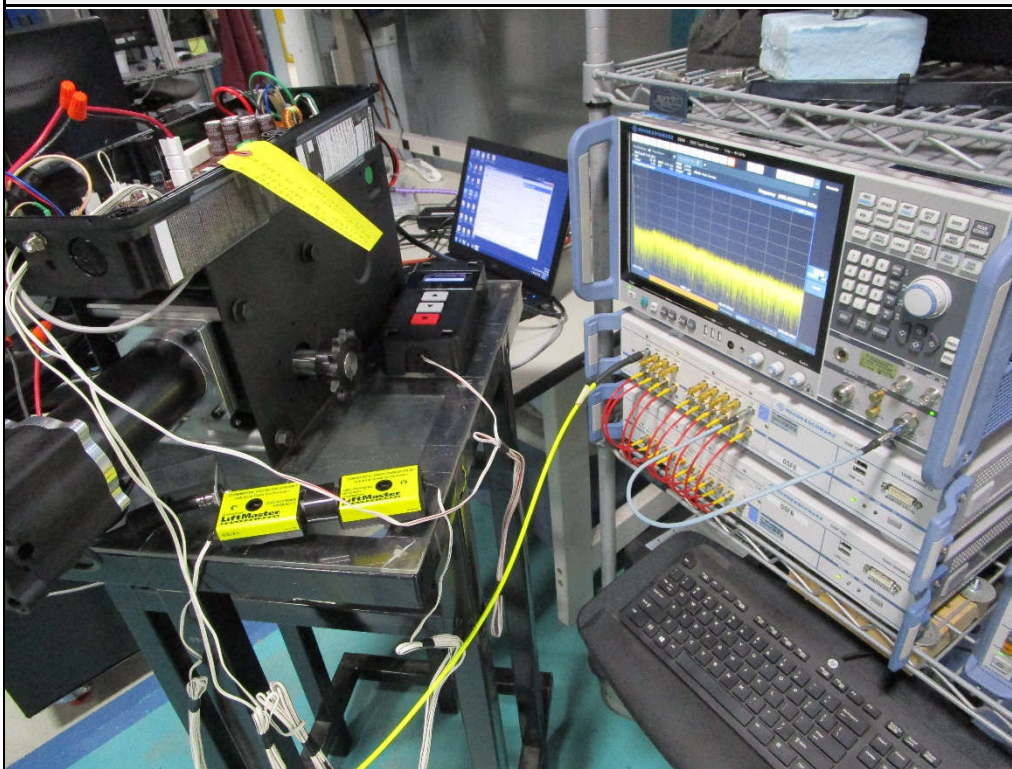
c) Emission Level Measurement

- Start Frequency = 2310MHz
- Stop Frequency = 2400MHz
- RBW = 100kHz
- VBW = $\geq 3 \times \text{RBW}$
- Detector Mode = Max Peak
- Trace Mode = Max Hold
- Sweep Time = Auto

- d) Allow the trace to stabilize and use the peak marker function to determine the maximum level.
- e) The two sweeps were combined and plotted.
- f) Ensure that the amplitude of all unwanted emissions is attenuated by at least 20dB.



Test Setup for Antenna Conducted Tests



Test Setup for Antenna Conducted Tests

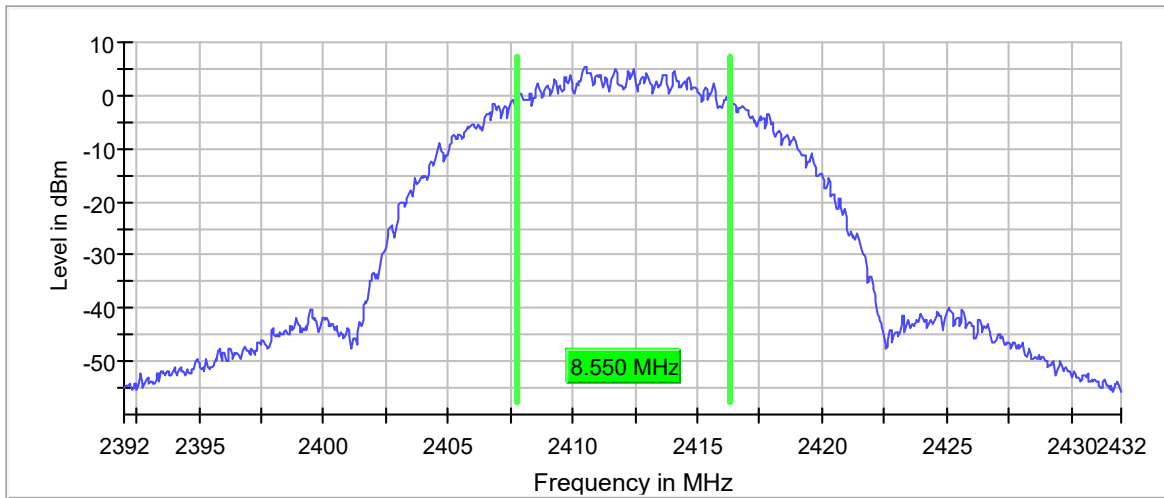
Minimum Emission Bandwidth 6dB

Test according to FCC title 47 part 15 §15.247(a), KDB 558074 D01 DTS Measurement Guidance v05 and ANSI C63.10-2013 11.8.1

6dB Bandwidth – 802.11B

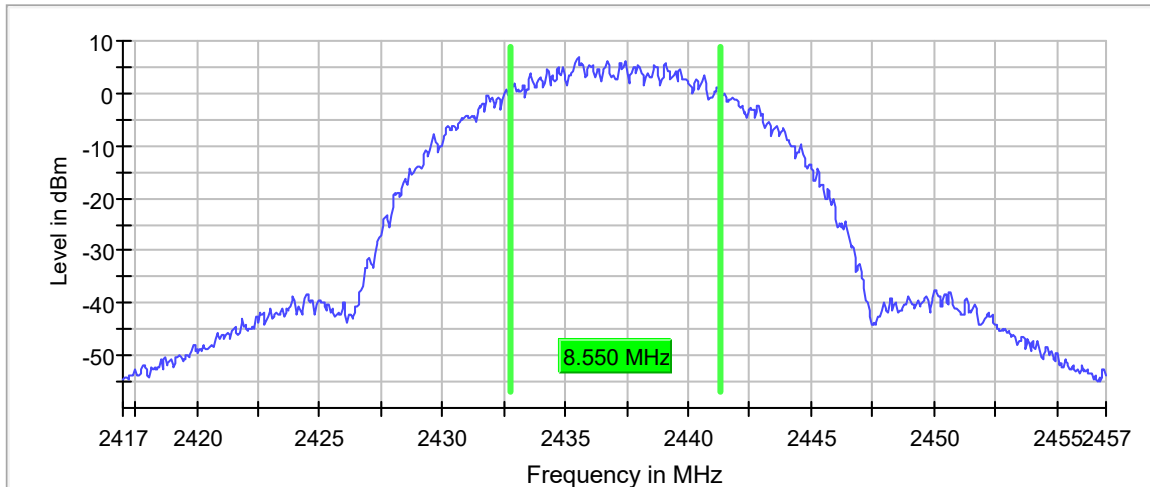
DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)	Max Level (dBm)	Result
2412.000000	8.550000	0.500000	---	2407.775000	2416.325000	5.4	PASS

6 dB Bandwidth



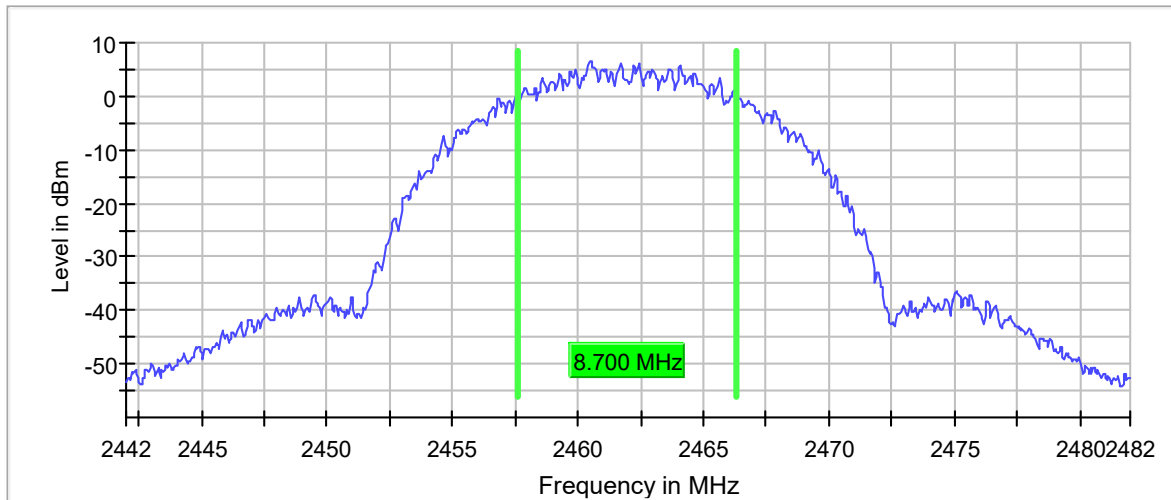
DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)	Max Level (dBm)	Result
2437.000000	8.550000	0.500000	---	2432.775000	2441.325000	6.7	PASS

6 dB Bandwidth



DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)	Max Level (dBm)	Result
2462.000000	8.700000	0.500000	---	2457.575000	2466.275000	6.5	PASS

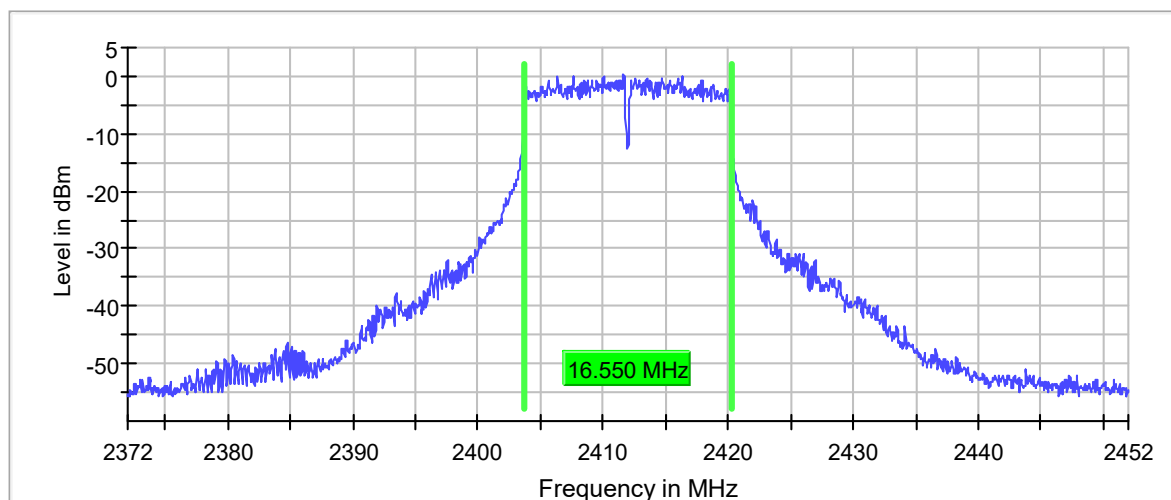
6 dB Bandwidth



6dB Bandwidth – 802.11G

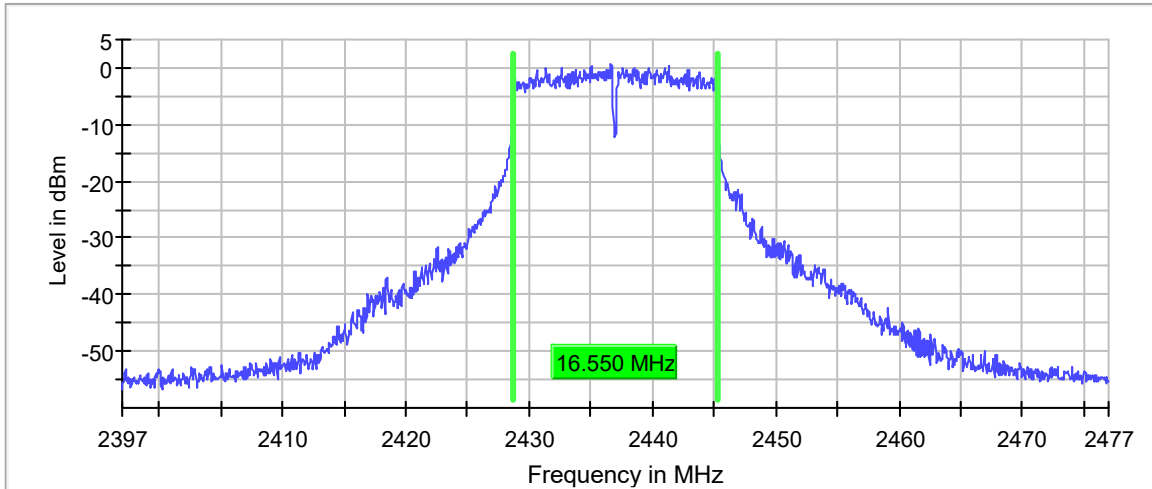
DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)	Max Level (dBm)	Result
2412.000000	16.550000	0.500000	---	2403.675000	2420.225000	0.3	PASS

6 dB Bandwidth



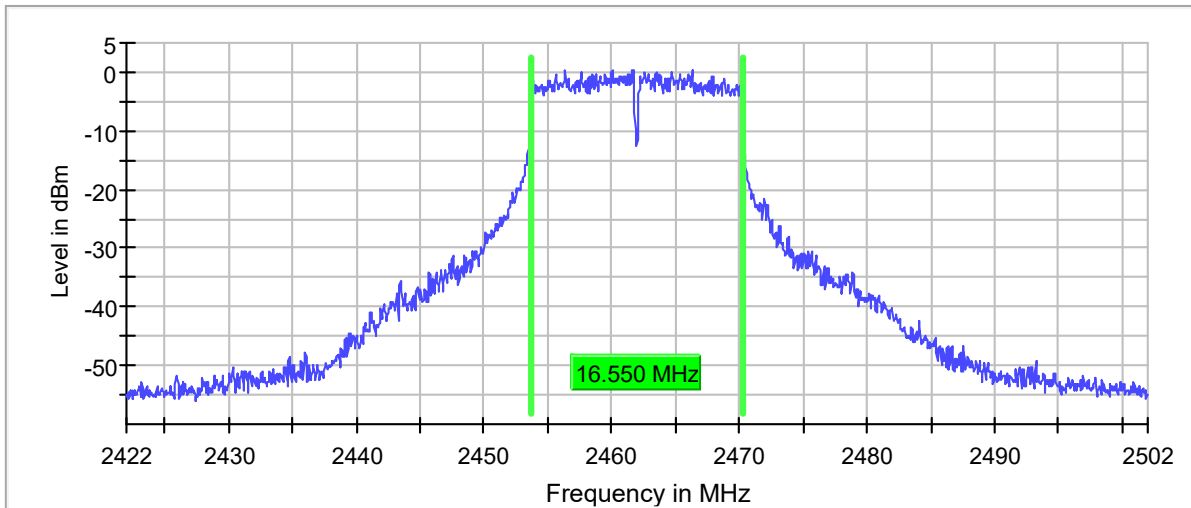
DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)	Max Level (dBm)	Result
2437.000000	16.550000	0.500000	---	2428.675000	2445.225000	0.6	PASS

6 dB Bandwidth



DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)	Max Level (dBm)	Result
2462.000000	16.550000	0.500000	---	2453.675000	2470.225000	0.5	PASS

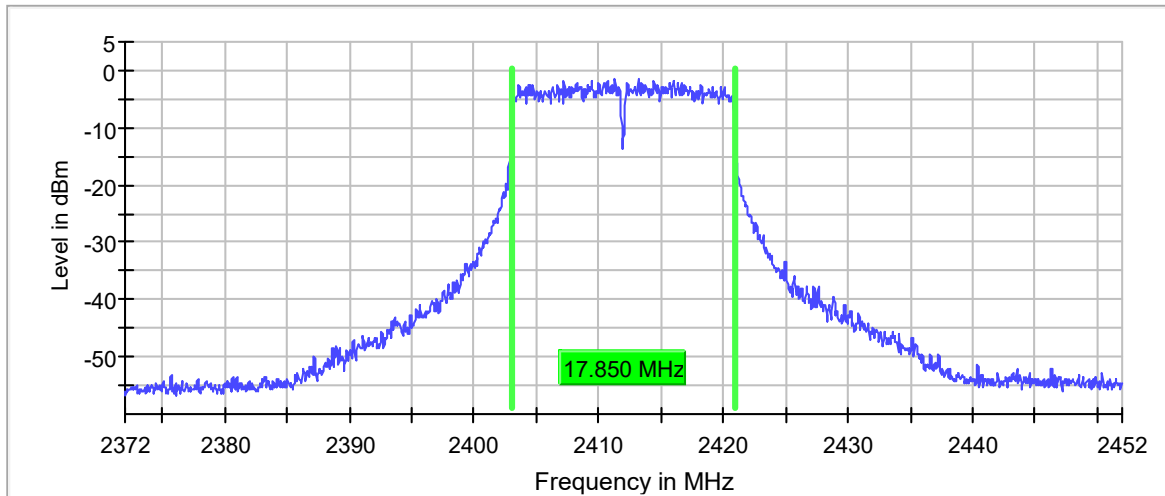
6 dB Bandwidth



6dB Bandwidth – 802.11N

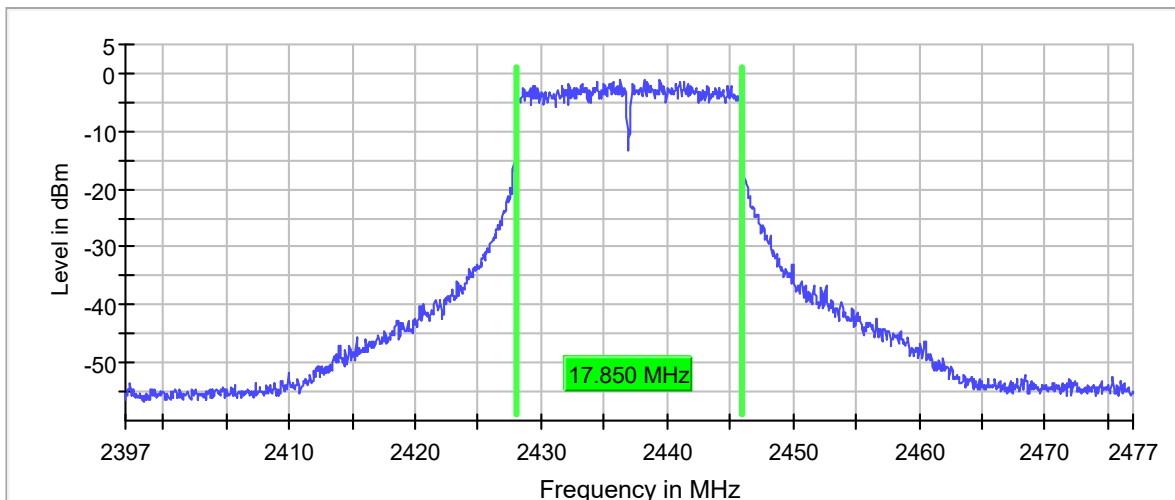
DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)	Max Level (dBm)	Result
2412.000000	17.850000	0.500000	---	2403.025000	2420.875000	-1.5	PASS

6 dB Bandwidth



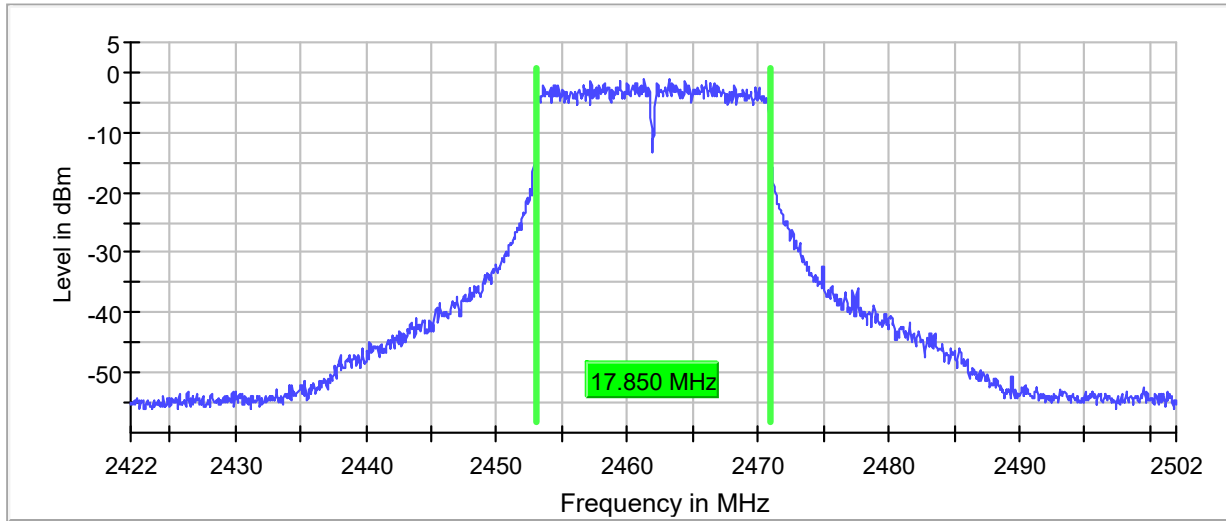
DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)	Max Level (dBm)	Result
2437.000000	17.850000	0.500000	---	2428.025000	2445.875000	-1.1	PASS

6 dB Bandwidth



DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)	Max Level (dBm)	Result
2462.000000	17.850000	0.500000	---	2453.025000	2470.875000	-1.2	PASS

6 dB Bandwidth



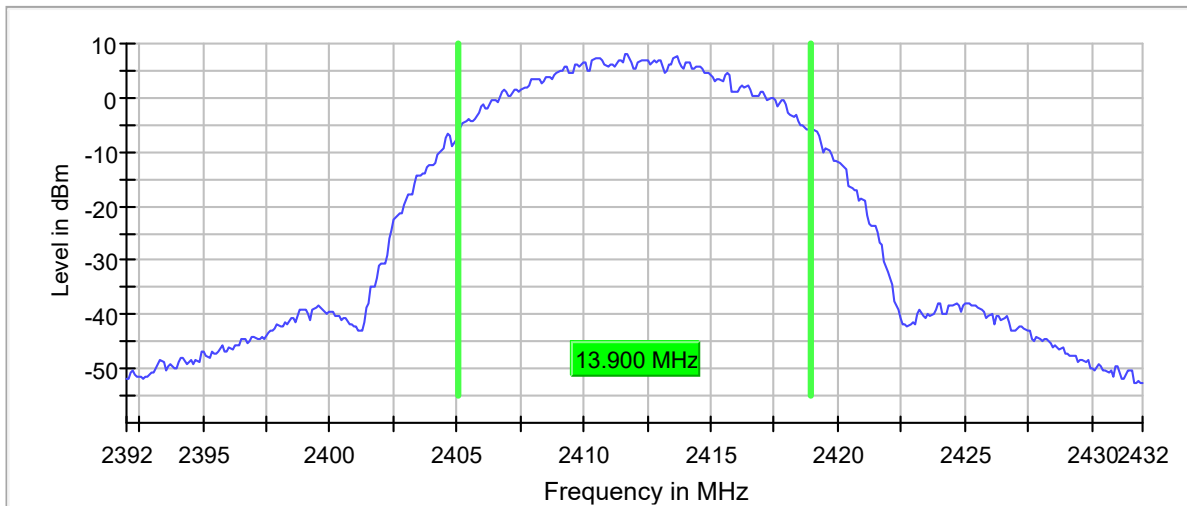
Occupied Channel Bandwidth 99%

Test according to FCC title 47 part 15 §15.247(a), KDB 558074 D01 DTS Measurement Guidance v05 and ANSI C63.10-2013 11.8.1.

99% Bandwidth – 802.11B

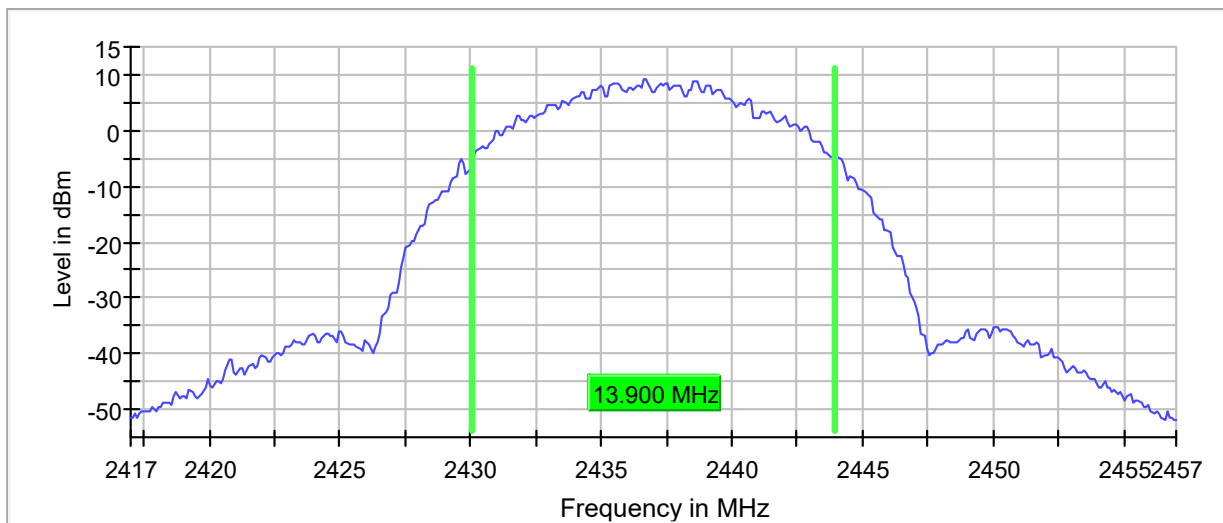
DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)	Result
2412.000000	13.900000	---	---	2405.050000	2418.950000	PASS

99 % Bandwidth



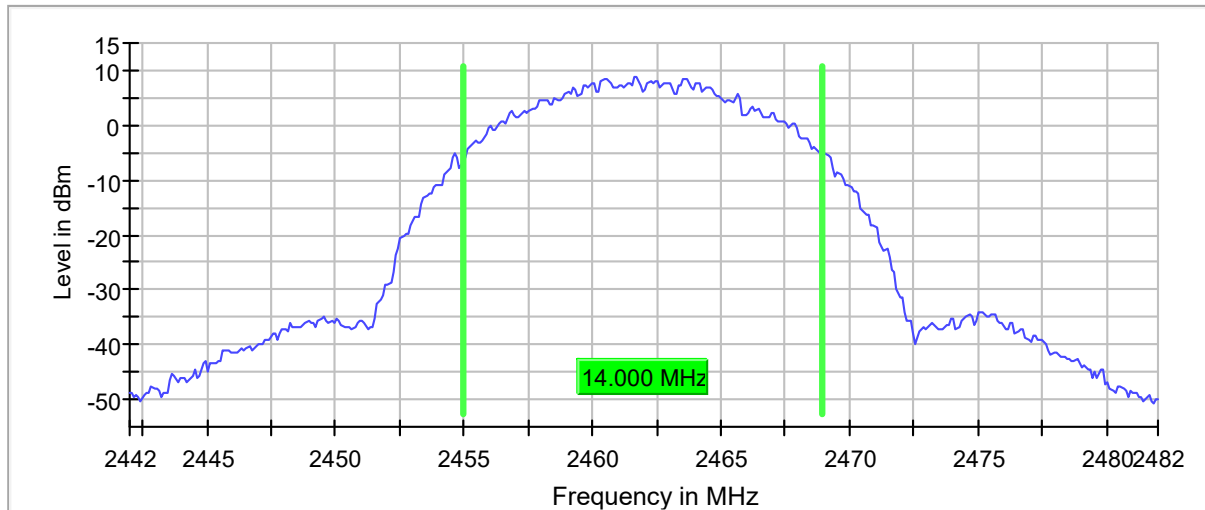
DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)	Result
2437.000000	13.900000	---	---	2430.050000	2443.950000	PASS

99 % Bandwidth



DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)	Result
2462.000000	14.000000	---	---	2454.950000	2468.950000	PASS

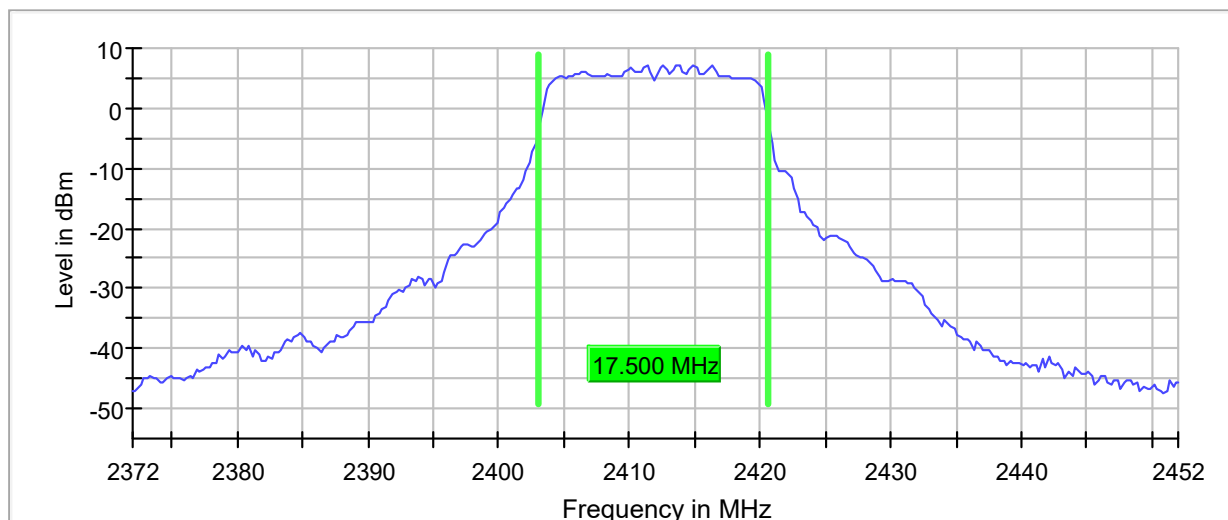
99 % Bandwidth



99% Bandwidth – 802.11G

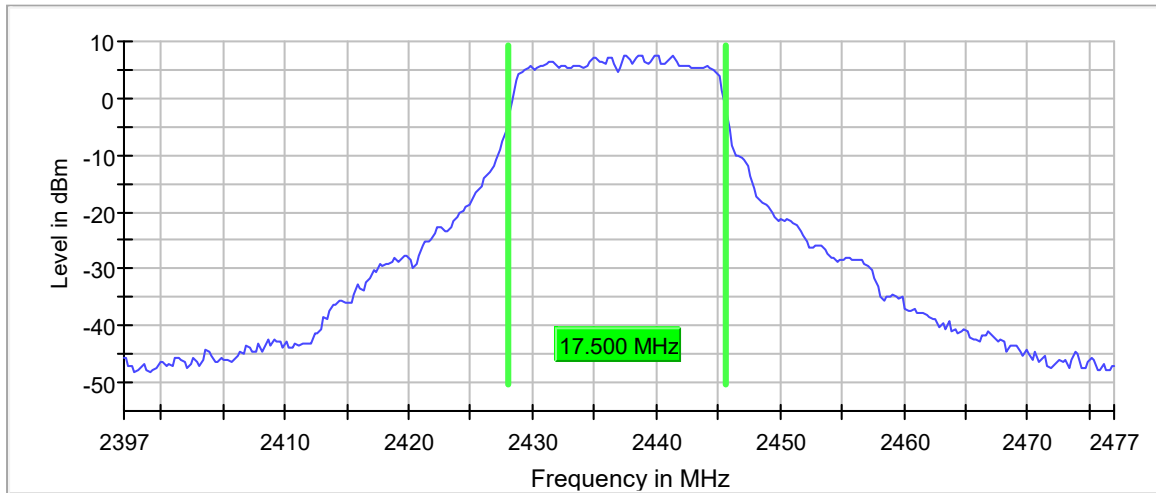
DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)	Result
2412.000000	17.500000	---	---	2403.125000	2420.625000	PASS

99 % Bandwidth



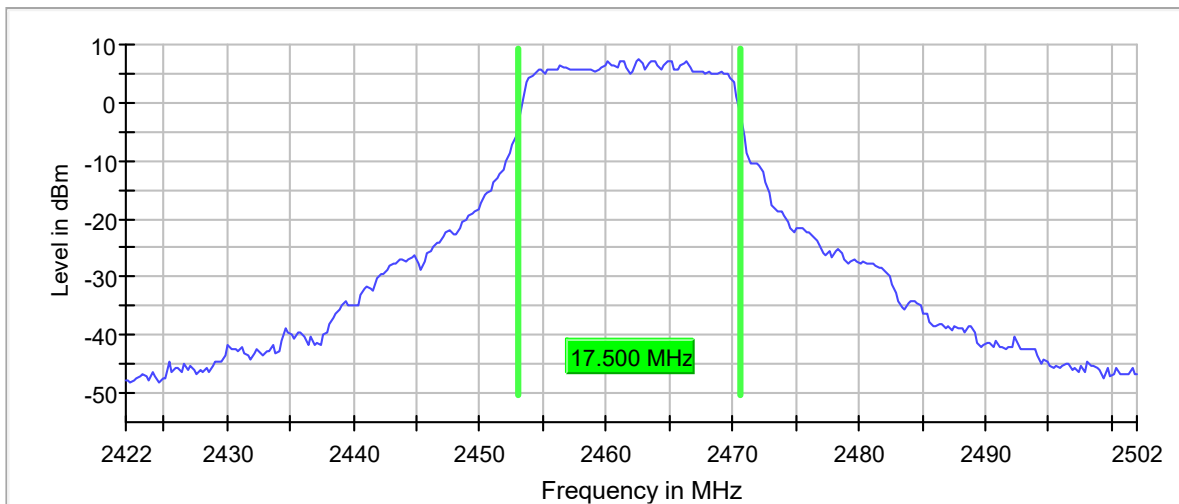
DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)	Result
2437.000000	17.500000	---	---	2428.125000	2445.625000	PASS

99 % Bandwidth



DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)	Result
2462.000000	17.500000	---	---	2453.125000	2470.625000	PASS

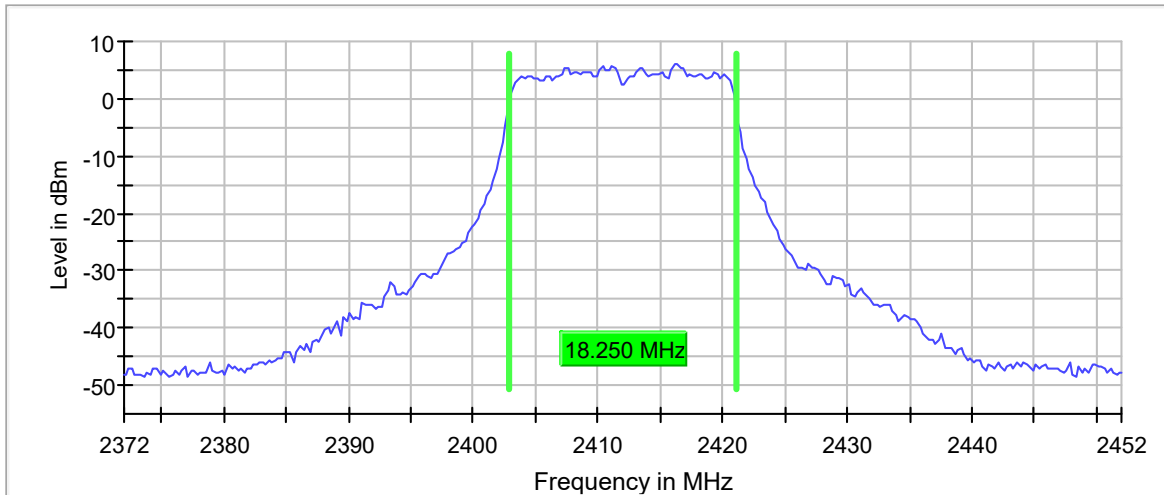
99 % Bandwidth



99% Bandwidth – 802.11N

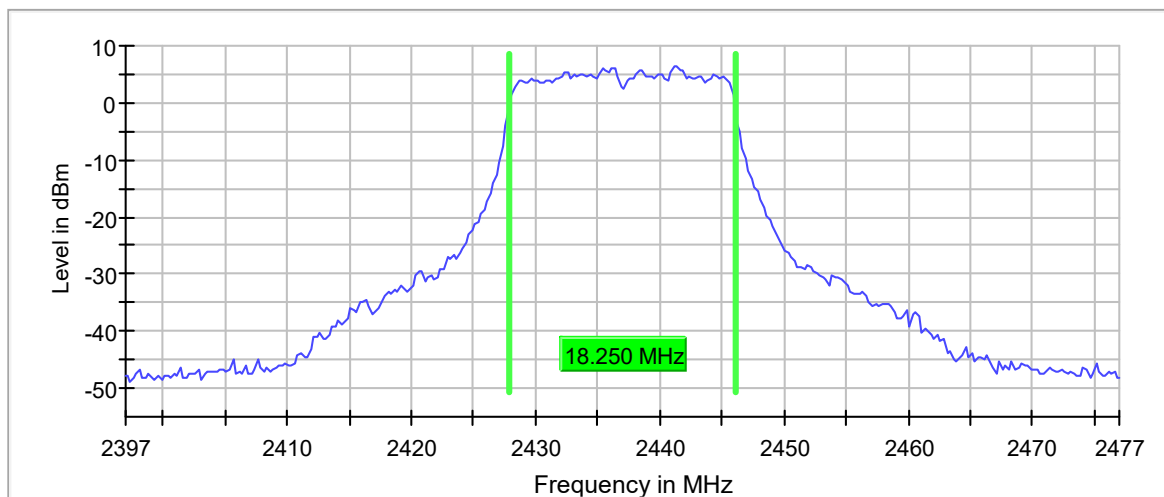
DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)	Result
2412.000000	18.250000	---	---	2402.875000	2421.125000	PASS

99 % Bandwidth



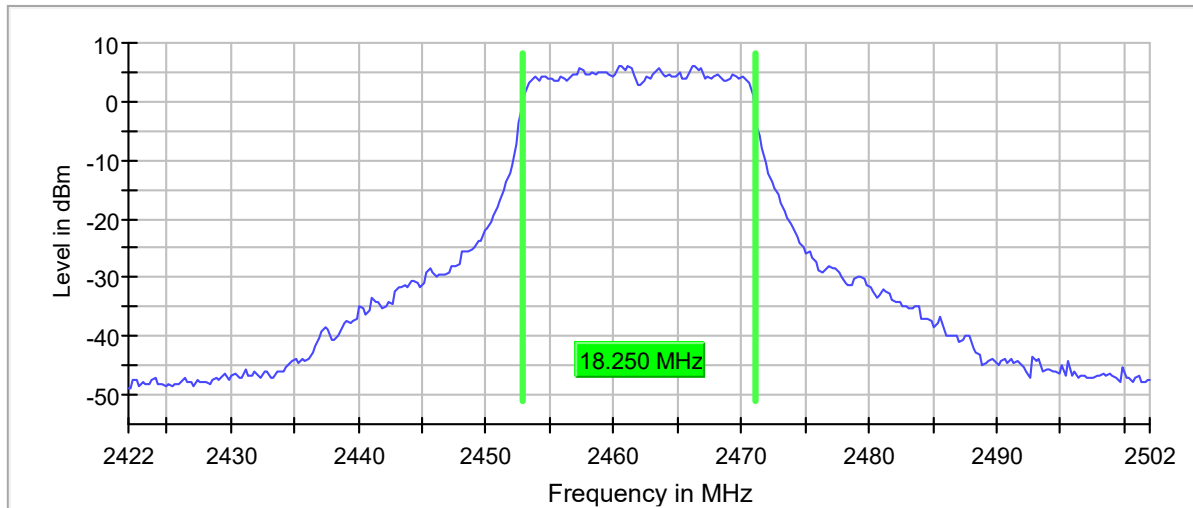
DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)	Result
2437.000000	18.250000	---	---	2427.875000	2446.125000	PASS

99 % Bandwidth



DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)	Result
2462.000000	18.250000	---	---	2452.875000	2471.125000	PASS

99 % Bandwidth

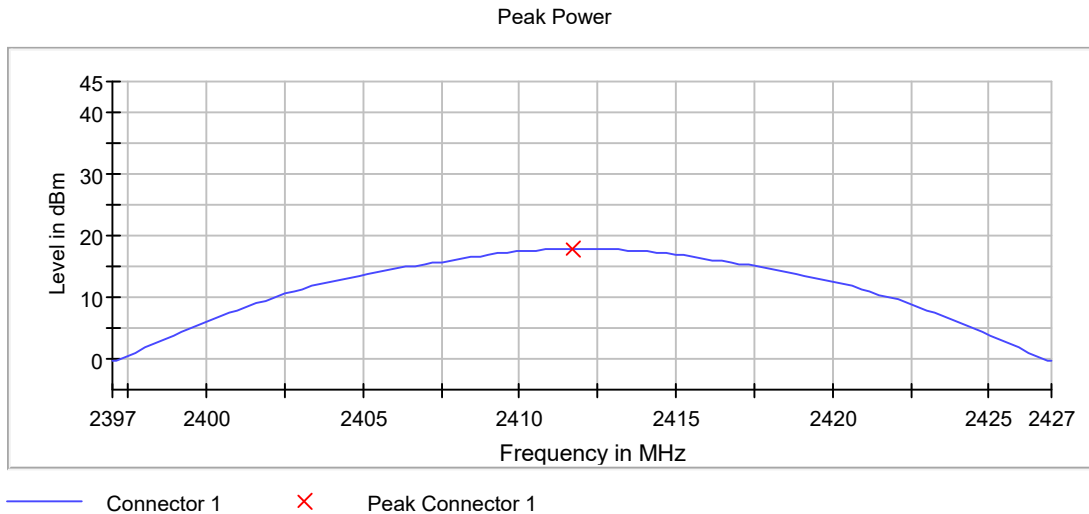


Peak Output Power Sweep – 802.11B

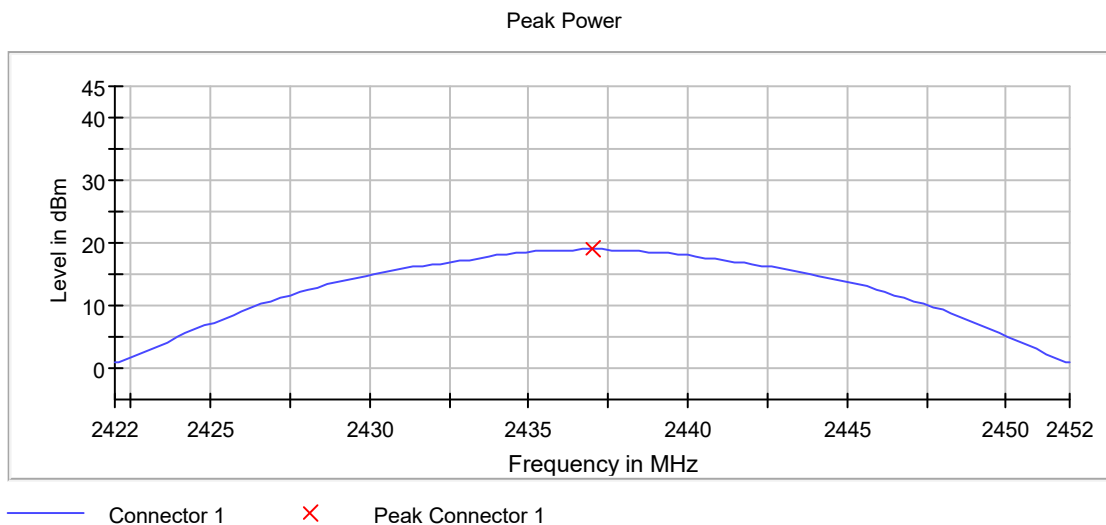
Test according to FCC title 47 part 15 §15.247(b), KDB 558074 D01 DTS Measurement Guidance v05 and ANSI C63.10-2013 11.9.1.1

Result – 802.11B

DUT Frequency (MHz)	Peak Power (dBm)	Limit Max (dBm)	Result
2412.000000	17.8	30.0	PASS

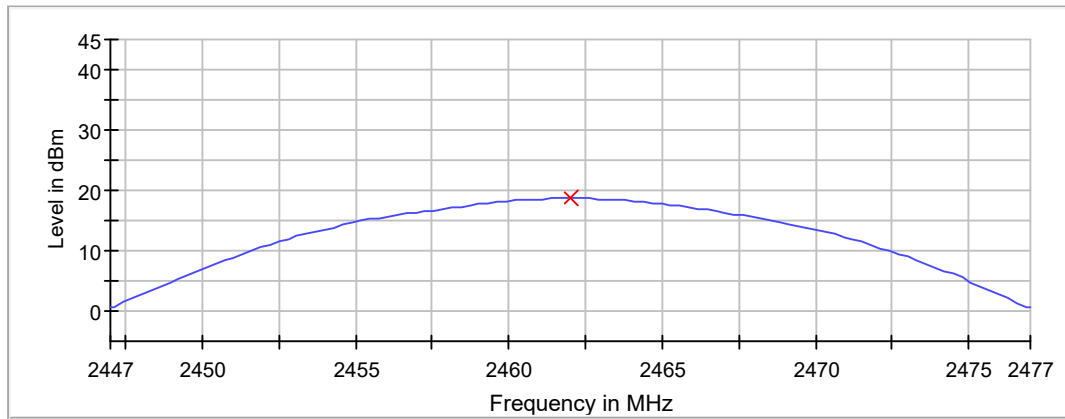


DUT Frequency (MHz)	Peak Power (dBm)	Limit Max (dBm)	Result
2437.000000	18.9	30.0	PASS



DUT Frequency (MHz)	Peak Power (dBm)	Limit Max (dBm)	Result
2462.000000	18.7	30.0	PASS

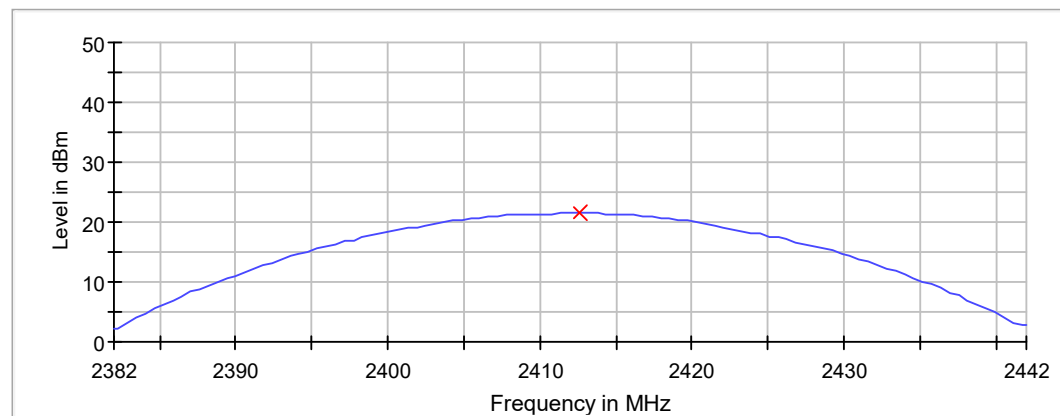
Peak Power



Result – 802.11G

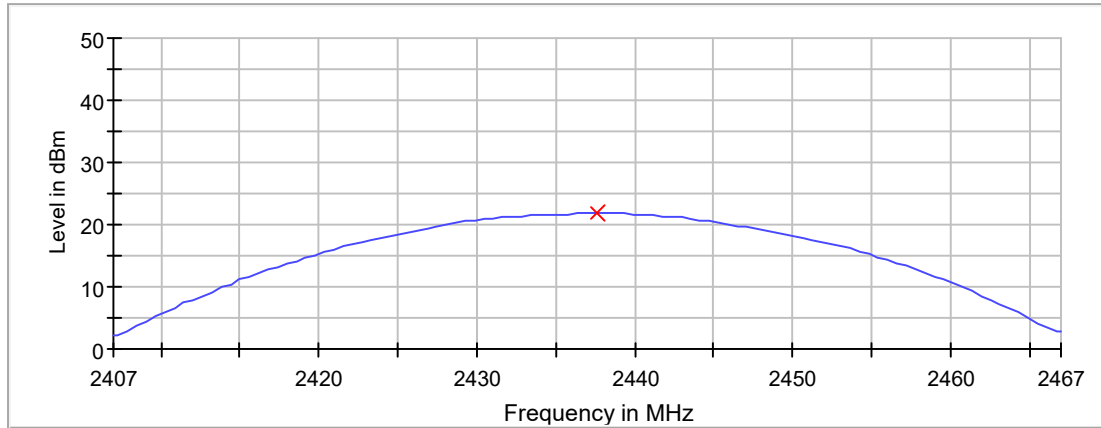
DUT Frequency (MHz)	Peak Power (dBm)	Limit Max (dBm)	Result
2412.000000	21.5	30.0	PASS

Peak Power



DUT Frequency (MHz)	Peak Power (dBm)	Limit Max (dBm)	Result
2437.000000	21.8	30.0	PASS

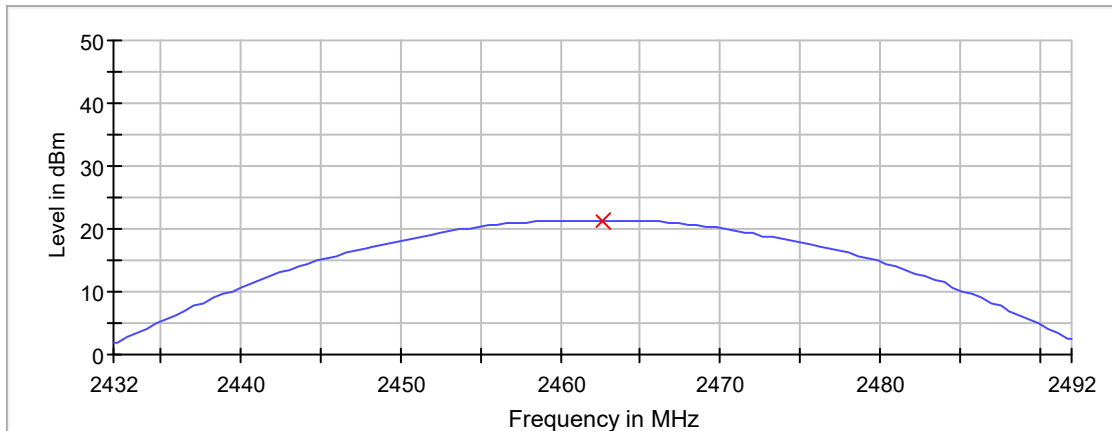
Peak Power



— Connector 1 × Peak Connector 1

DUT Frequency (MHz)	Peak Power (dBm)	Limit Max (dBm)	Result
2462.000000	21.4	30.0	PASS

Peak Power

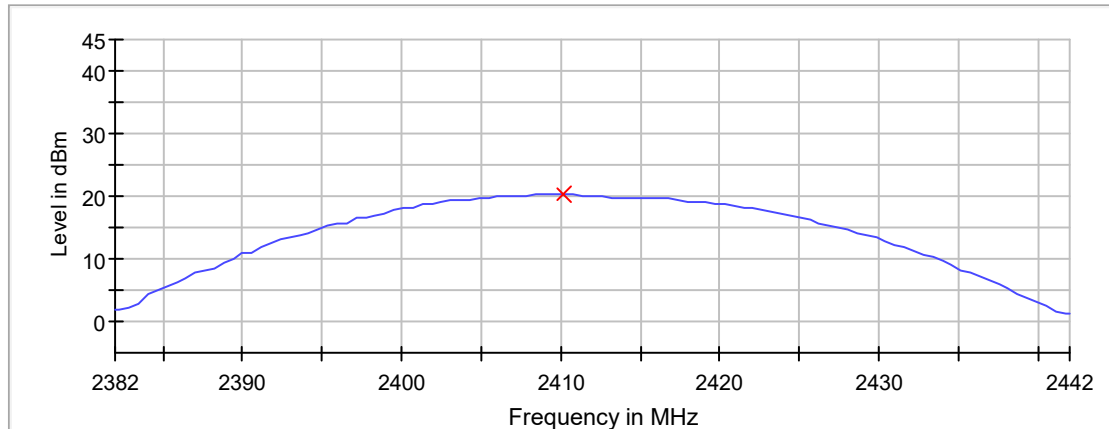


— Connector 1 × Peak Connector 1

Result – 802.11N

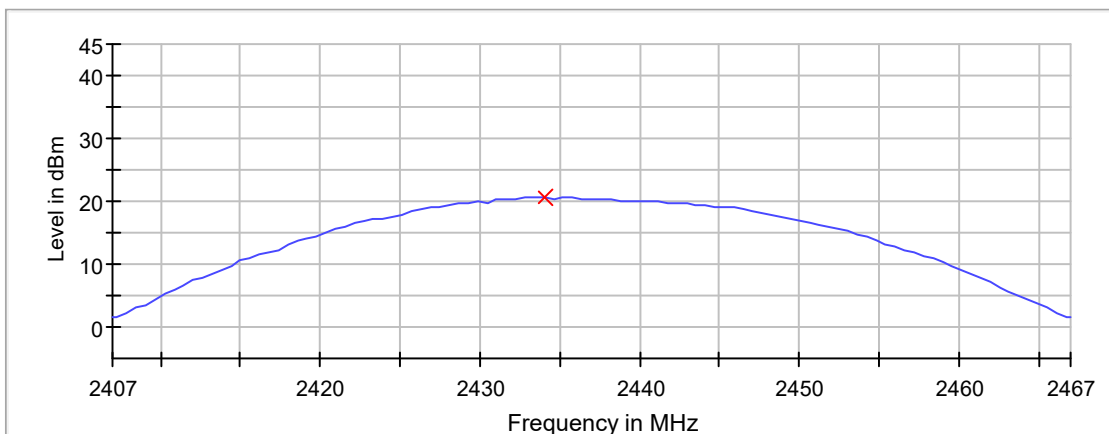
DUT Frequency (MHz)	Peak Power (dBm)	Limit Max (dBm)	Result
2412.000000	20.3	30.0	PASS

Peak Power



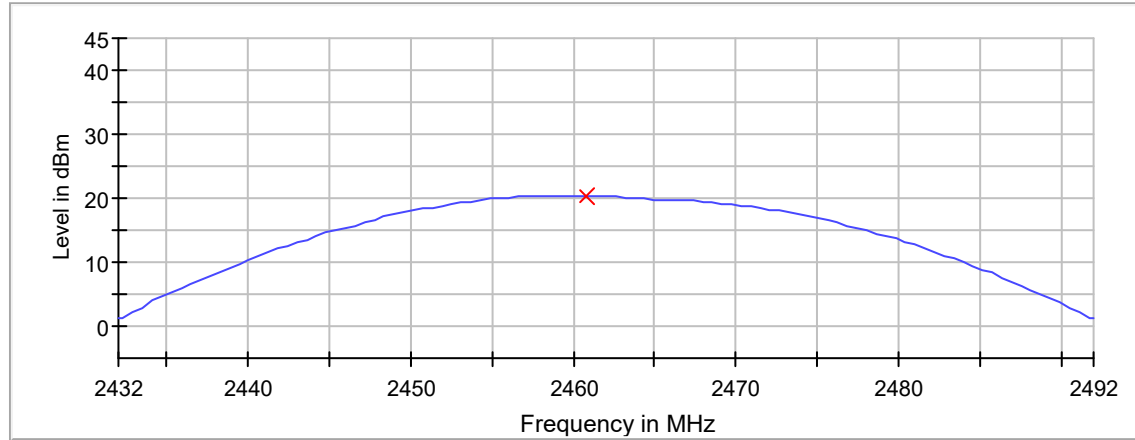
DUT Frequency (MHz)	Peak Power (dBm)	Limit Max (dBm)	Result
2437.000000	20.6	30.0	PASS

Peak Power



DUT Frequency (MHz)	Peak Power (dBm)	Limit Max (dBm)	Result
2462.000000	20.5	30.0	PASS

Peak Power



Connector 1 × Peak Connector 1

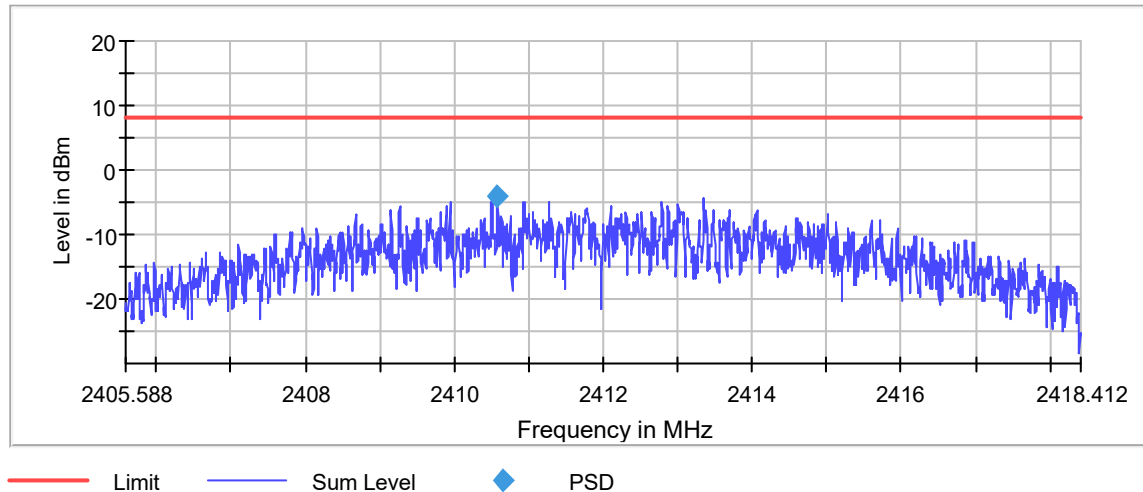
Peak Power Spectral Density

Test according to FCC title 47 part 15 §15.247(a),(e), KDB 558074 D01 DTS Meas Guidance v05r02 F and ANSI C63.10-2013.

Result – 802.11B

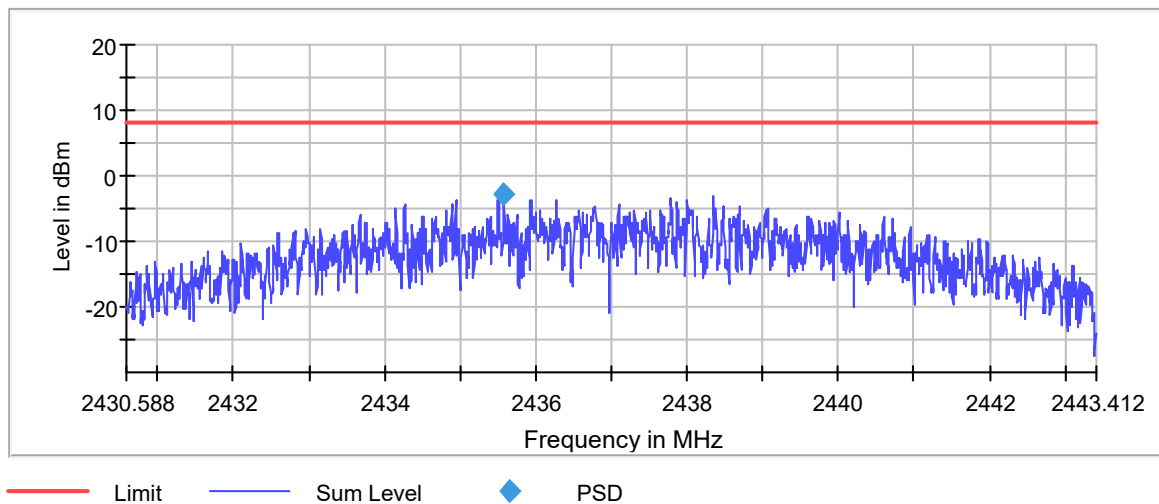
DUT Frequency (MHz)	Frequency (MHz)	PSD (dBm)	Limit Max (dBm)	Result
2412.000000	2410.580000	-4.131	8.0	PASS

Peak Power Spectral Density



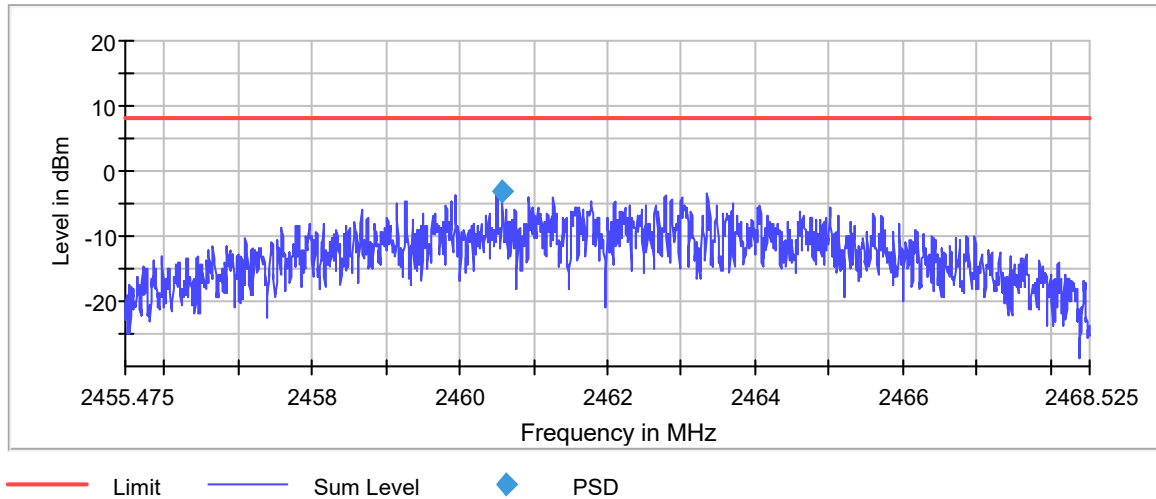
DUT Frequency (MHz)	Frequency (MHz)	PSD (dBm)	Limit Max (dBm)	Result
2437.000000	2435.580000	-2.937	8.0	PASS

Peak Power Spectral Density



DUT Frequency (MHz)	Frequency (MHz)	PSD (dBm)	Limit Max (dBm)	Result
2462.000000	2460.577500	-3.074	8.0	PASS

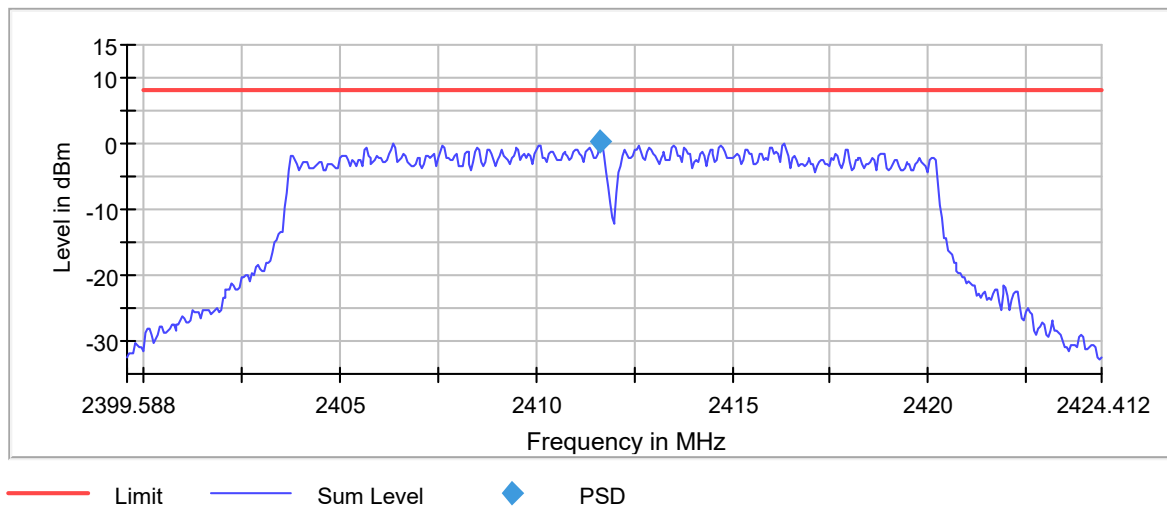
Peak Power Spectral Density



Result – 802.11G

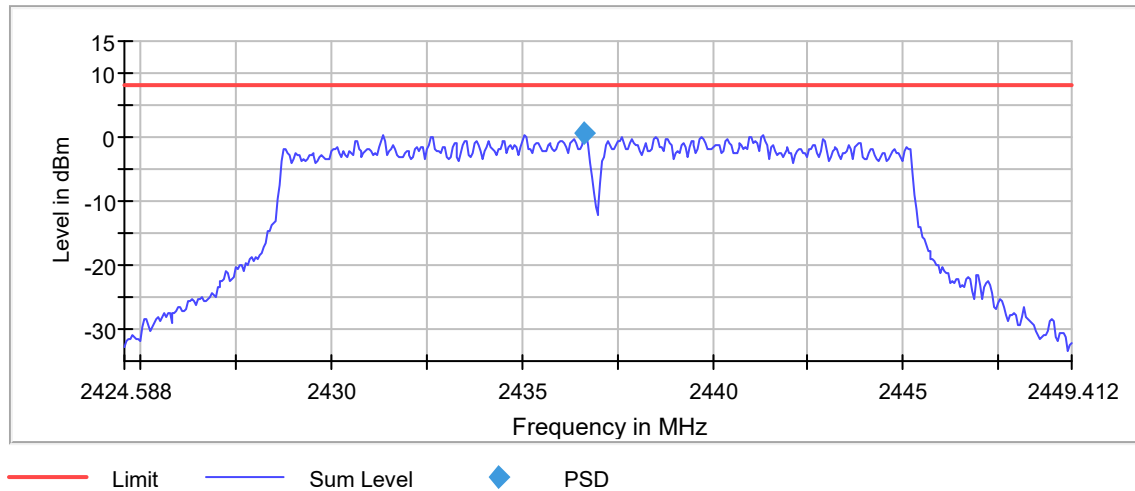
DUT Frequency (MHz)	Frequency (MHz)	PSD (dBm)	Limit Max (dBm)	Result
2412.000000	2411.624622	0.309	8.0	PASS

Peak Power Spectral Density



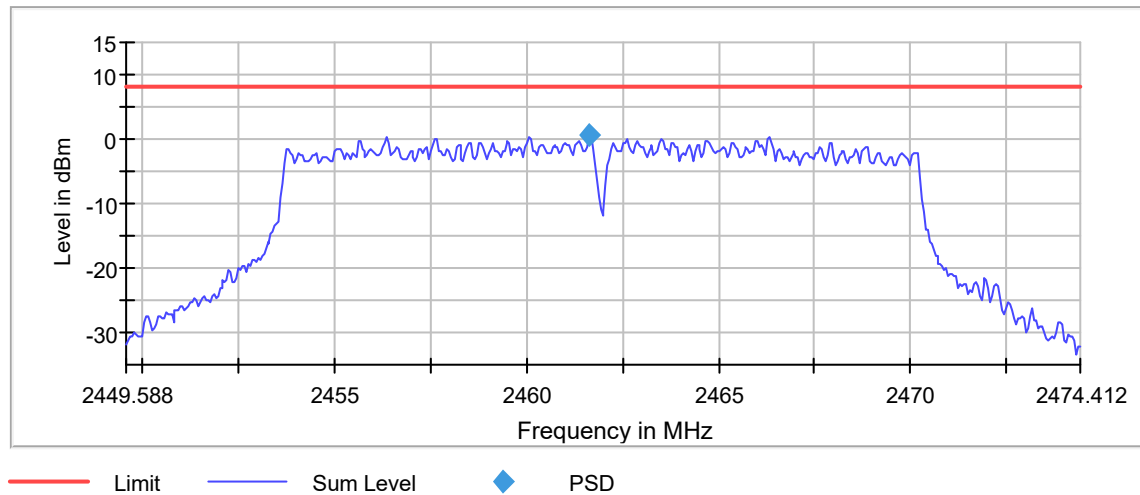
DUT Frequency (MHz)	Frequency (MHz)	PSD (dBm)	Limit Max (dBm)	Result
2437.000000	2436.624622	0.605	8.0	PASS

Peak Power Spectral Density



DUT Frequency (MHz)	Frequency (MHz)	PSD (dBm)	Limit Max (dBm)	Result
2462.000000	2461.624622	0.595	8.0	PASS

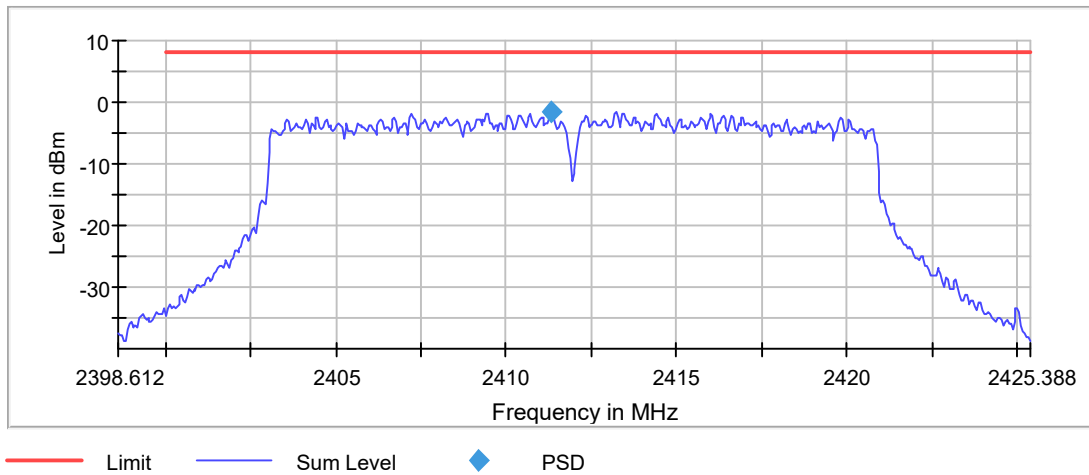
Peak Power Spectral Density



Result – 802.11N

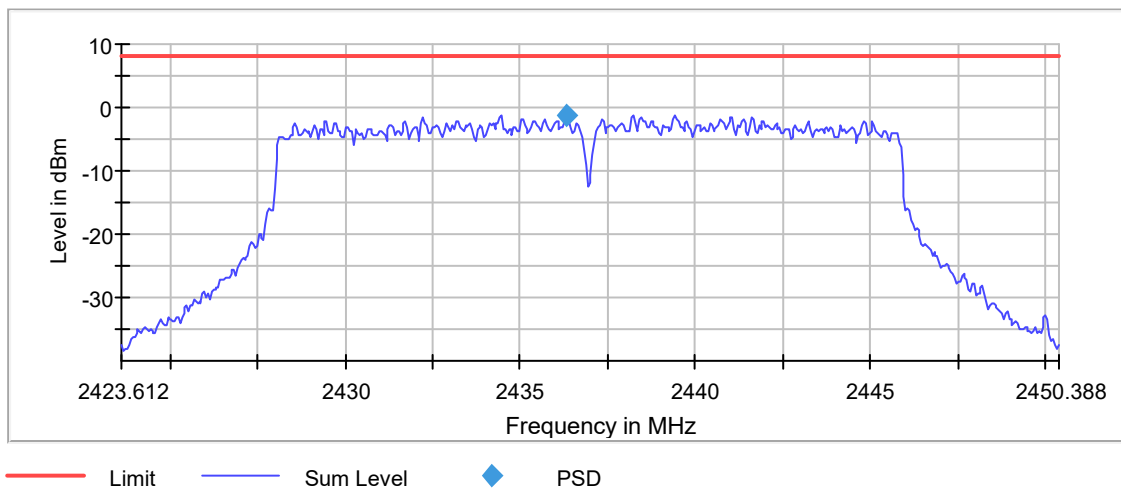
DUT Frequency (MHz)	Frequency (MHz)	PSD (dBm)	Limit Max (dBm)	Result
2412.000000	2411.325630	-1.477	8.0	PASS

Peak Power Spectral Density



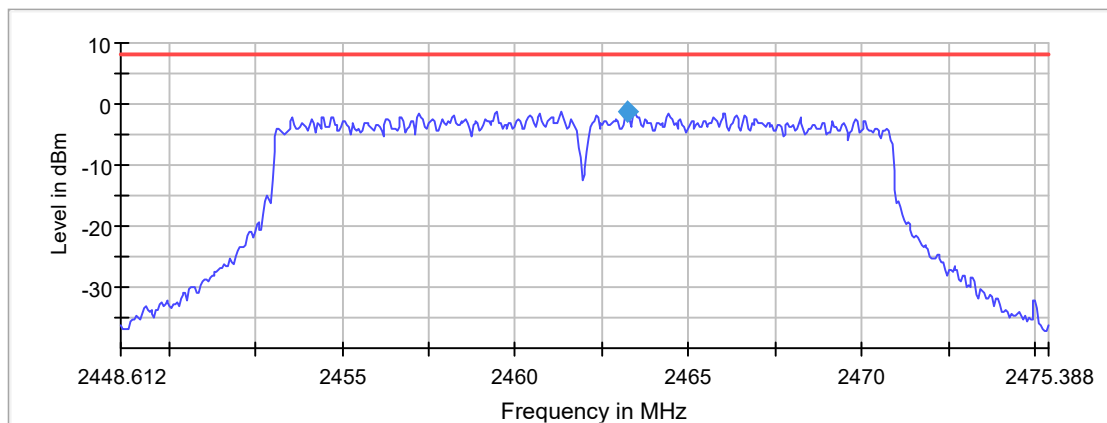
DUT Frequency (MHz)	Frequency (MHz)	PSD (dBm)	Limit Max (dBm)	Result
2437.000000	2436.325630	-1.101	8.0	PASS

Peak Power Spectral Density



DUT Frequency (MHz)	Frequency (MHz)	PSD (dBm)	Limit Max (dBm)	Result
2462.000000	2463.223857	-1.239	8.0	PASS

Peak Power Spectral Density



— Limit — Sum Level ◆ PSD

Band Edge Low

Test according to FCC title 47 part 15 §15.247(d), KDB 558074 D01 DTS Measurement Guidance v05 8.7 and ANSI C63.10-2013

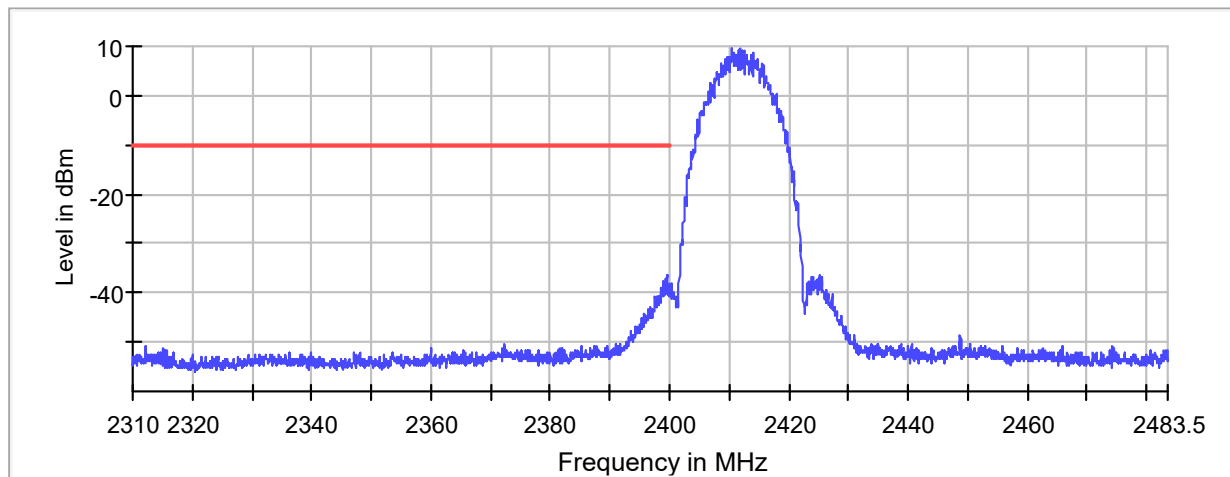
Result – 802.11B

DUT Frequency (MHz)	Result
2412.000000	PASS

Measurements – 802.11B

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2399.525000	-36.5	26.2	-10.3	PASS
2399.475000	-36.6	26.3	-10.3	PASS
2399.425000	-37.3	27.0	-10.3	PASS
2399.375000	-37.3	27.0	-10.3	PASS
2399.575000	-37.5	27.2	-10.3	PASS
2399.675000	-37.5	27.2	-10.3	PASS
2399.625000	-37.7	27.4	-10.3	PASS
2398.875000	-37.8	27.5	-10.3	PASS
2398.925000	-37.8	27.5	-10.3	PASS
2399.975000	-38.0	27.7	-10.3	PASS
2399.925000	-38.4	28.1	-10.3	PASS
2399.725000	-38.6	28.3	-10.3	PASS
2399.325000	-38.8	28.5	-10.3	PASS
2398.975000	-38.9	28.6	-10.3	PASS
2398.675000	-39.0	28.7	-10.3	PASS

Band Edge



— Limit — Sum Level × Fail

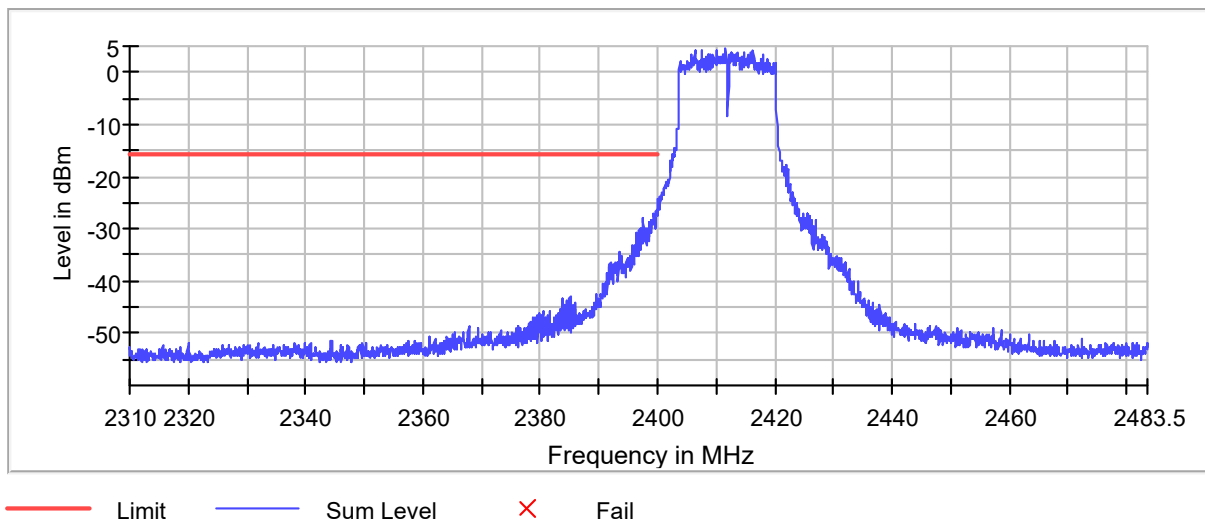
Result – 802.11G

DUT Frequency (MHz)	Result
2412.000000	PASS

Measurements – 802.11G

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2399.825000	-26.3	10.7	-15.6	PASS
2399.775000	-26.8	11.2	-15.6	PASS
2399.875000	-27.0	11.4	-15.6	PASS
2399.925000	-27.0	11.4	-15.6	PASS
2399.375000	-27.1	11.5	-15.6	PASS
2399.325000	-27.2	11.6	-15.6	PASS
2399.975000	-27.4	11.8	-15.6	PASS
2399.425000	-27.5	11.9	-15.6	PASS
2397.575000	-27.8	12.2	-15.6	PASS
2399.675000	-28.0	12.4	-15.6	PASS
2399.625000	-28.1	12.5	-15.6	PASS
2399.725000	-28.1	12.5	-15.6	PASS
2399.125000	-28.3	12.7	-15.6	PASS
2399.475000	-28.4	12.8	-15.6	PASS
2398.875000	-28.5	12.9	-15.6	PASS

Band Edge



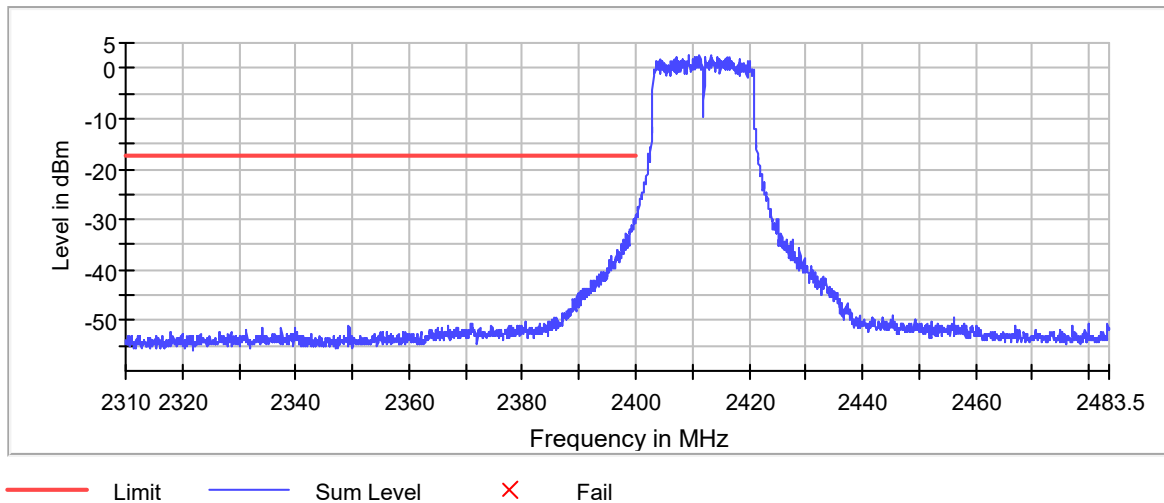
Result – 802.11N

DUT Frequency (MHz)	Result
2412.000000	PASS

Measurements – 802.11N

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2399.975000	-29.6	12.3	-17.3	PASS
2399.925000	-29.6	12.3	-17.3	PASS
2399.725000	-29.8	12.5	-17.3	PASS
2399.675000	-30.6	13.3	-17.3	PASS
2399.875000	-30.6	13.3	-17.3	PASS
2399.775000	-30.7	13.4	-17.3	PASS
2399.825000	-30.7	13.4	-17.3	PASS
2399.225000	-31.2	14.0	-17.3	PASS
2399.625000	-31.2	14.0	-17.3	PASS
2399.275000	-31.3	14.0	-17.3	PASS
2399.575000	-31.5	14.3	-17.3	PASS
2399.325000	-31.6	14.3	-17.3	PASS
2399.375000	-31.8	14.5	-17.3	PASS
2399.125000	-31.9	14.6	-17.3	PASS
2399.425000	-31.9	14.6	-17.3	PASS

Band Edge



21. Radiated Emissions Tests

EUT Information	
Manufacturer	The Chamberlain Group, Inc.
Product	Industrial DC Operator
Model No.	JHDC7S1BMC
Serial No.	001
Mode	802.11b (11Mbps)

Test Setup Details	
Setup Format	Tabletop
Height of Support	N/A
Type of Test Site	Semi-Anechoic Chamber
Test Site Used	R29F
Type of Antennas Used	1 – 18GHz: Double-Ridged Waveguide (or equivalent) Above 18GHz: Horn (or equivalent)
Notes	N/A

Measurement Uncertainty	
Measurement Type	Expanded Measurement Uncertainty
Radiated disturbance (electric field strength on an open area test site or alternative test site) (30 MHz – 1000 MHz)	4.3
Radiated disturbance (electric field strength on an open area test site or alternative test site) (1 GHz – 6 GHz)	3.1
Radiated disturbance (electric field strength on an open area test site or alternative test site) (6 GHz – 18 GHz)	3.2
Radiated disturbance (electric field strength on an open area test site or alternative test site) (18 GHz – 26.5 GHz)	3.3

Requirements
<u>Peak EIRP:</u> Per FCC 15.247, Section (b)(3) and ISSED RSS-247, Section 5.4(d), for systems using digital modulation, the maximum peak conducted output power shall not exceed 1 watt. Per FCC 15.247, Section (b)(4), and ISSED RSS-247, Section 5.4(d), the conducted output power limit is based on the use of antennas with directional gains that do not exceed 6dBi. If transmitting antennas of directional gain greater than 6dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values, by the amount in dB that the directional gain of the antenna exceeds 6dBi.
<u>Radiated Emissions in Non-Restricted Bands:</u> Per FCC 15.247, Section (d), and ISSED RSS-247, Section 5.5, in any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated emissions measurement. Attenuation below the general limits specified in §15.209(a) is not required. <u>Radiated Emissions in Restricted Bands:</u> Per 15.247, Section (d), radiated emissions which fall in the restricted bands, as defined in FCC 15.205, Section (a), must comply with the radiated emission limits specified in FCC 15.209, Section (a). Per ISSED RSS-247, Section 3.3, radiated emissions which fall in the restricted bands, as defined in ISSED RSS-Gen, Section 8.10, must comply with the radiated emission limits specified in RSS-Gen, Section 8.9.
<u>High Band Edge:</u> Per 15.247, Section (d), radiated emissions which fall in the restricted band beginning at 2483.5MHz, as defined in FCC 15.205, Section (a), must comply with the radiated emission limits specified in FCC 15.209, Section (a). Per ISSED RSS-247, Section 3.3, radiated emissions which fall in the restricted band beginning at 2483.5MHz, as defined in ISSED RSS-Gen, Section 8.10, must comply with the radiated emission limits specified in RSS-Gen, Section 8.9.

Procedures
<u>Peak EIRP:</u>
C63.10 Annex G and Section 11.9.1.1:
The EUT was placed on a 1.5-meter-high non-conductive stand and set to transmit. A double ridged waveguide antenna was placed at a test distance of 3 meters from the EUT.
a) The following settings were employed on the EMI Test Receiver:
1) Center Frequency = Transmit frequency of EUT
2) Span = $\geq 3 \times \text{RBW}$
3) RBW = $\geq \text{DTS Bandwidth}$
4) VBW = $\geq 3 \times \text{RBW}$
5) Number of points in sweep = $\geq (2 \times \text{span} / \text{RBW})$
6) Sweep time = Auto
7) Detector = Peak
8) Trace = Max hold

- b) Allow trace to stabilize and use peak marker function to determine the peak amplitude level.
- c) The equivalent power was determined using equation G.1 in C63.10 to convert field intensity levels measured at 3 meters into EIRP readings.

Radiated Emissions in Non-Restricted Bands:

C63.10-2013 Section 11.11

Radiated measurements were performed in a 32ft. x 20ft. x 14ft. high shielded enclosure. The shielded enclosure prevents emissions from other sources, such as radio and TV stations from interfering with the measurements. All powerlines and signal lines entering the enclosure pass through filters on the enclosure wall. The powerline filters prevent extraneous signals from entering the enclosure on these leads.

Preliminary radiated emissions tests were performed to determine the emission characteristics of the EUT. For the preliminary test, a broadband measuring antenna was positioned at a 3-meter distance from the EUT. The entire frequency range from 30MHz to 25GHz was investigated using a peak detector function.

The final radiated emission tests were then manually performed over the frequency range of 30MHz to 25GHz.

- 1) The field strength of the fundamental was measured using a double ridged waveguide antenna. The waveguide antenna was positioned at a 3-meter distance from the EUT. The EUT was placed on a 1.5-meter-high non-conductive stand and set to transmit. A peak detector with a resolution bandwidth of 100kHz was used on the spectrum analyzer.
- 2) The field strengths of all of the harmonics not in the restricted band were then measured using a double-ridged waveguide antenna. The waveguide antenna was positioned at a 3-meter distance from the EUT. The EUT was placed on a 1.5-meter-high non-conductive stand and set to transmit. A peak detector with a resolution bandwidth of 100kHz was used on the spectrum analyzer.
- 3) To ensure that maximum or worst-case emission levels at the fundamental and harmonics were measured, the following steps were taken when measuring the fundamental emissions and the spurious emissions:
 - a) The EUT was rotated so that all of its sides were exposed to the receiving antenna.
 - b) Since the measuring antenna is linearly polarized, both horizontal and vertical field components were measured.
 - c) The measuring antenna was raised and lowered for each antenna polarization to maximize the readings.
 - d) In instances where it was necessary to use a shortened cable between the measuring antenna and the spectrum analyzer, the measuring antenna was not raised or lowered to ensure maximized readings. Instead, the EUT was rotated through all axis to ensure the maximum readings were recorded for the EUT.
- 4) All harmonics not in the restricted bands must be at least 20dB below levels measured at the fundamental. However, attenuation below the general limits specified in §15.209(a) is not required.

Radiated Emissions in Restricted Bands:

C63.10-2013 Section 11.12

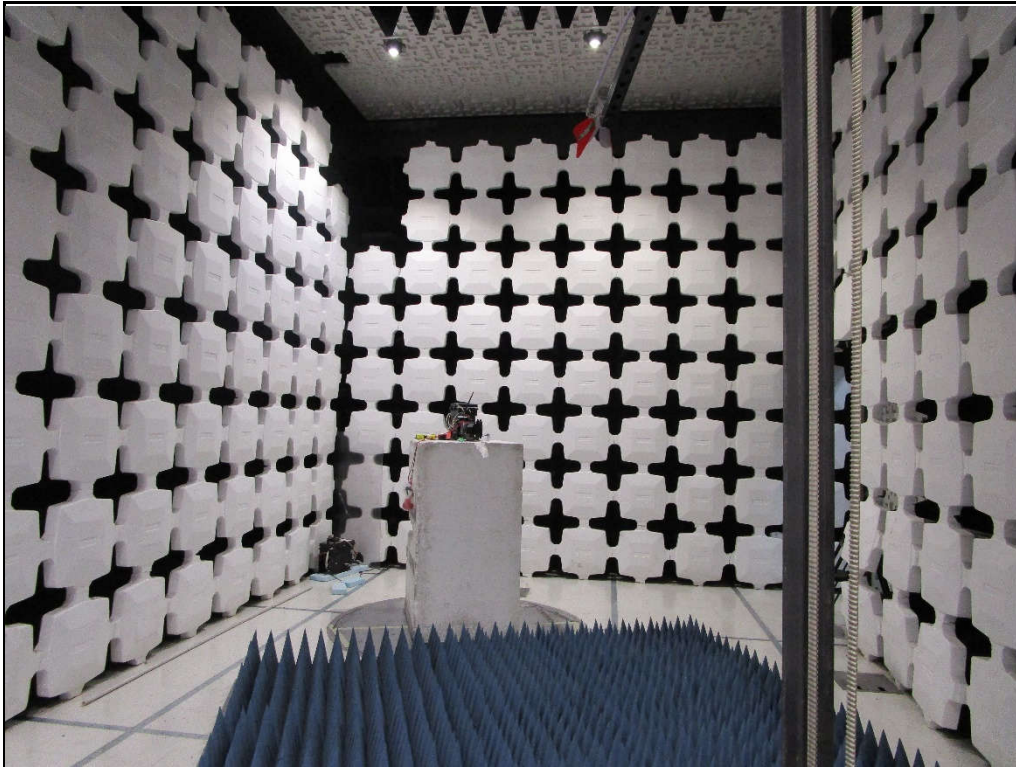
- 1) The field strengths of all emissions above 1 GHz were measured using a double-ridged waveguide antenna. The waveguide antenna was positioned at a 3-meter distance from the EUT. The EUT was placed on a 1.5-meter-high non-conductive stand and set to transmit. A peak detector with a resolution bandwidth of 1 MHz was used on the spectrum analyzer.

- 2) To ensure that maximum or worst-case emission levels were measured, the following steps were taken when taking all measurements:
 - a) The EUT was rotated so that all of its sides were exposed to the receiving antenna.
 - b) Since the measuring antenna is linearly polarized, both horizontal and vertical field components were measured.
 - c) The measuring antenna was raised and lowered for each antenna polarization to maximize the readings.
 - d) In instances where it was necessary to use a shortened cable between the measuring antenna and the spectrum analyzer, the measuring antenna was not raised or lowered to ensure maximized readings. Instead, the EUT was rotated through all axis to ensure the maximum readings were recorded for the EUT.
- 3) For all radiated emissions measurements below 1GHz, if the peak reading is below the limits listed in 15.209(a), no further measurements are required. If, however, the peak readings exceed the limits listed in 15.209(a), then the emissions are remeasured using a quasi-peak detector.
- 4) For all radiated emissions measurements above 1GHz, the peak readings must comply with the 15.35(b) limits. 15.35(b) states that when average radiated emissions measurements are specified, there also is a limit on the peak level of the radiated emissions. The limit on the peak radio frequency emissions is 20dB above the maximum permitted average emission limit applicable to the equipment under test. Therefore, all peak readings above 1GHz must be no greater than 20dB above the limits specified in 15.209(a).

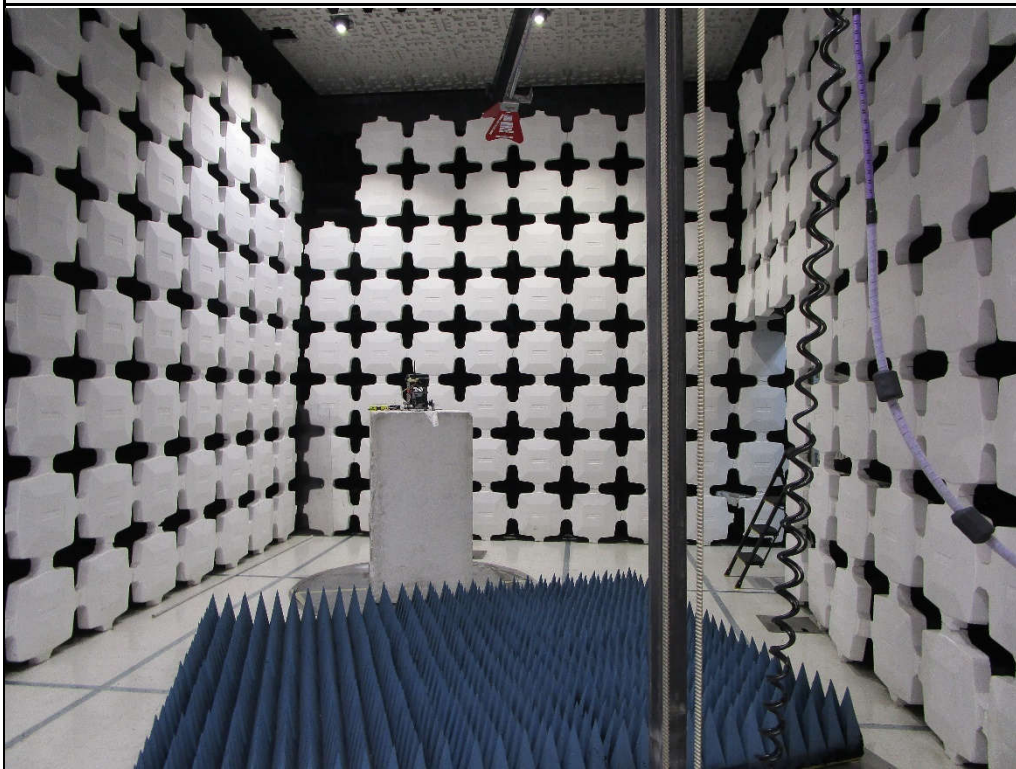
High Band Edge:

C63.10-2013 section 6.10.5:

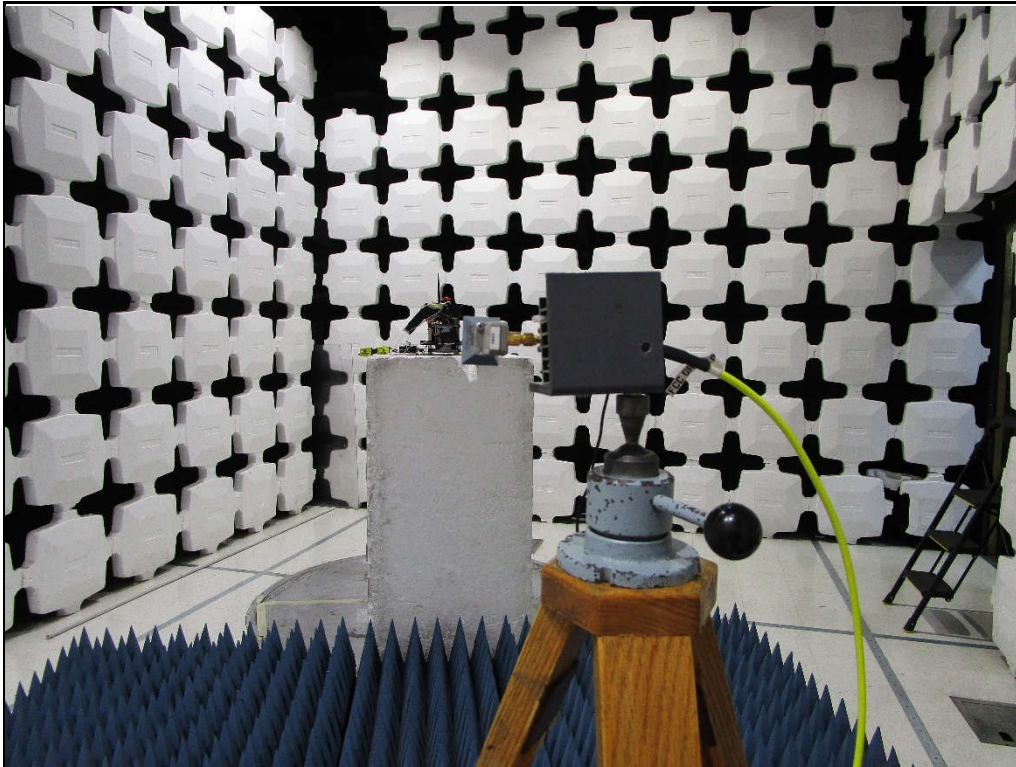
- 1) The EUT was set to transmit continuously at the channel closest to the high band-edge.
- 2) The waveguide antenna was positioned at a 3-meter distance from the EUT. The EUT was placed on a 1.5-meter-high non-conductive stand and set to transmit. A peak detector with a resolution bandwidth of 1 MHz was used on the spectrum analyzer.
- 3) To ensure that maximum or worst-case emission levels were measured, the following steps were taken when taking all measurements:
 - a) The EUT was rotated so that all of its sides were exposed to the receiving antenna.
 - b) Since the measuring antenna is linearly polarized, both horizontal and vertical field components were measured.
 - c) The measuring antenna was raised and lowered for each antenna polarization to maximize the readings.
- 4) The peak readings must comply with the 15.35(b) limits. 15.35(b) states that when average radiated emissions measurements are specified, there also is a limit on the peak level of the radiated emissions. The limit on the peak radio frequency emissions is 20 dB above the maximum permitted average emission limit applicable to the equipment under test. Therefore, all peak readings above 1 GHz must be no greater than 20 dB above the limits specified in 15.209(a).



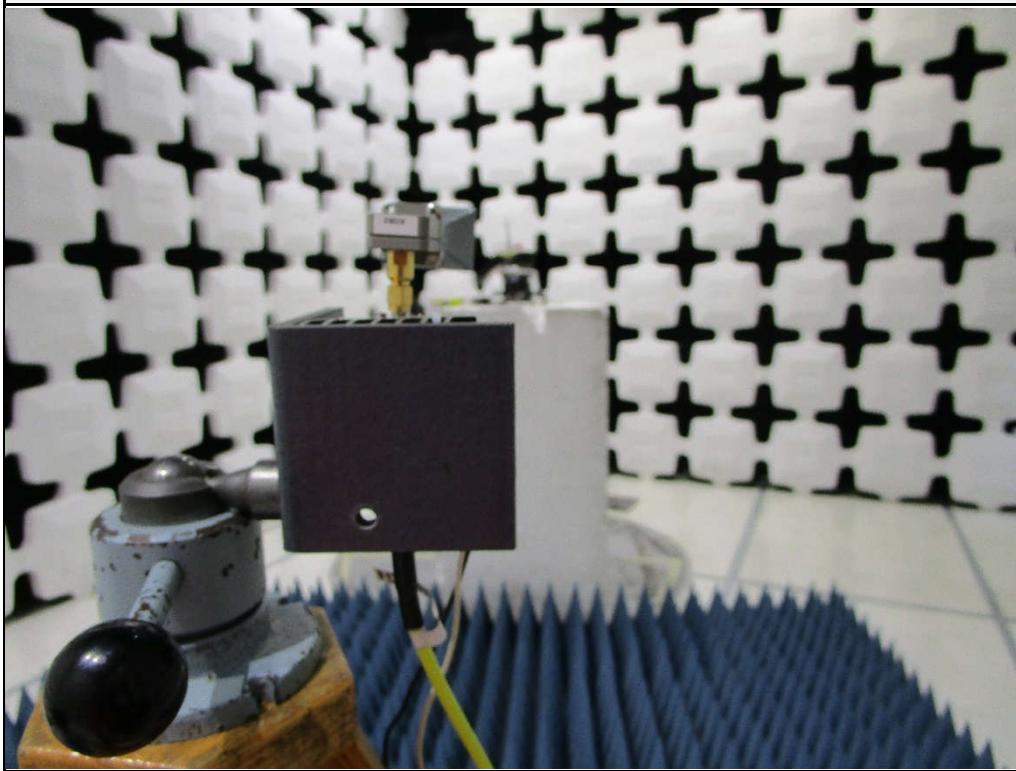
Test Setup for Spurious Radiated Emissions, 1 – 18GHz – Antenna Polarization
Horizontal



Test Setup for Spurious Radiated Emissions, 1 – 18GHz – Antenna Polarization
Vertical



Test Setup for Spurious Radiated Emissions, Above 18GHz – Antenna Polarization Horizontal



Test Setup for Spurious Radiated Emissions, Above 18GHz – Antenna Polarization Vertical

Test Details	
Manufacturer	The Chamberlain Group, Inc.
EUT	Industrial DC Operator
Model No.	JHDC7S1BMC
Serial No.	001
Mode	802.11b (11Mbps)
Result	Max EIRP = 0.543W (27.35dBm)
Notes	

Freq (MHz)	Ant Pol	Wide BW Meter Reading (dBμV)	Cable Factor (dB)	Antenna Factor (dB/m)	Pre Amp (dB)	Peak Total (dBμV/m)	EIRP (dBm)	Limit (dBm)	Margin (dB)
2412.00	H	74.97	3.39	32.59	0.00	110.94	15.64	36.00	-20.36
	V	84.60	3.39	32.59	0.00	120.57	25.27	36.00	-10.73
2437.00	H	78.50	3.39	32.63	0.00	114.52	19.22	36.00	-16.78
	V	86.28	3.39	32.63	0.00	122.30	27.00	36.00	-9.00
2462.00	H	74.82	3.39	32.67	0.00	110.88	15.58	36.00	-20.42
	V	86.59	3.39	32.67	0.00	122.65	27.35	36.00	-8.65

Peak Total (dBμV/m) = Meter Reading (dBμV) + CBL Fac (dB) + Ant Fac (dB/m) + Pre-Amp (dB)

EIRP (dBm) = Peak Total (dBμV/m) – 95dB

Test Details	
Manufacturer	The Chamberlain Group, Inc.
EUT	Industrial DC Operator
Model No.	JHDC7S1BMC
Serial No.	001
Mode	802.11g (54Mbps)
Result	Max EIRP = 1.1455W (30.59dBm)
Notes	

Freq (MHz)	Ant Pol	Wide BW Meter Reading (dBμV)	Cable Factor (dB)	Antenna Factor (dB/m)	Pre Amp (dB)	Peak Total (dBμV/m)	EIRP (dBm)	Limit (dBm)	Margin (dB)
2412.00	H	77.21	3.39	32.59	0.00	113.18	17.88	36.00	-18.12
	V	88.40	3.39	32.59	0.00	124.37	29.07	36.00	-6.93
2437.00	H	79.20	3.39	32.63	0.00	115.22	19.92	36.00	-16.08
	V	88.90	3.39	32.63	0.00	124.92	29.62	36.00	-6.38
2462.00	H	77.98	3.39	32.67	0.00	114.04	18.74	36.00	-17.26
	V	89.83	3.39	32.67	0.00	125.89	30.59	36.00	-5.41

Peak Total (dBμV/m) = Meter Reading (dBμV) + CBL Fac (dB) + Ant Fac (dB/m) + Pre-Amp (dB)

EIRP (dBm) = Peak Total (dBμV/m) – 95dB

Test Details	
Manufacturer	The Chamberlain Group, Inc.
EUT	Industrial DC Operator
Model No.	JHDC7S1BMC
Serial No.	001
Mode	802.11n (MCS7)
Result	Max EIRP = 0.88W (29.45dBm)
Notes	

Freq (MHz)	Ant Pol	Wide BW Meter Reading (dBμV)	Cable Factor (dB)	Antenna Factor (dB/m)	Pre Amp (dB)	Peak Total (dBμV/m)	EIRP (dBm)	Limit (dBm)	Margin (dB)
2412.00	H	76.64	3.39	32.59	0.00	112.61	17.31	36.00	-18.69
	V	87.33	3.39	32.59	0.00	123.30	28.00	36.00	-8.00
2437.00	H	77.19	3.39	32.63	0.00	113.21	17.91	36.00	-18.09
	V	87.83	3.39	32.63	0.00	123.85	28.55	36.00	-7.45
2462.00	H	75.78	3.39	32.67	0.00	111.84	16.54	36.00	-19.46
	V	88.69	3.39	32.67	0.00	124.75	29.45	36.00	-6.55

Peak Total (dBμV/m) = Meter Reading (dBμV) + CBL Fac (dB) + Ant Fac (dB/m) + Pre-Amp (dB)

EIRP (dBm) = Peak Total (dBμV/m) – 95dB

Test Details	
Manufacturer	The Chamberlain Group, Inc.
EUT	Industrial DC Operator
Model No.	JHDC7S1BMC
Serial No.	001
Test	Peak Measurements in the Restricted Bands
Mode	802.11b (11Mbps)
Frequency Tested	2412MHz
Notes	

Freq (MHz)	Ant Pol	Meter Reading (dBμV)	Ambient	Cable Factor (dB)	Antenna Factor (dB/m)	Pre Amp (dB)	Peak Total at 3m (dBμV/m)	Peak Total at 3m (μV/m)	Peak Limit at 3m (μV/m)	Margin (dBm)
4824.00	H	53.98		4.87	34.28	-39.65	53.48	471.96	5000.00	-20.50
	V	57.57		4.87	34.28	-39.65	57.07	713.52	5000.00	-16.91
12060.00	H	48.64	Ambient	7.05	38.83	-38.97	55.55	598.77	5000.00	-18.43
	V	48.15	Ambient	7.05	38.83	-38.97	55.06	565.92	5000.00	-18.92
14472.00	H	48.17	Ambient	7.43	39.42	-38.59	56.42	662.13	5000.00	-17.56
	V	47.98	Ambient	7.43	39.42	-38.59	56.23	647.80	5000.00	-17.75
19296.00	H	29.05	Ambient	2.21	40.38	-27.87	43.78	154.50	5000.00	-30.20
	V	30.31	Ambient	2.21	40.38	-27.87	45.04	178.61	5000.00	-28.94

Test Details	
Manufacturer	The Chamberlain Group, Inc.
EUT	Industrial DC Operator
Model No.	JHDC7S1BMC
Serial No.	001
Test	Average Measurements in the Restricted Bands
Mode	802.11b (11Mbps)
Frequency Tested	2412MHz
Notes	

Freq (MHz)	Ant Pol	Meter Reading (dBμV)	Ambient	CBL Fac (dB)	Ant Fac (dB/m)	Pre Amp (dB)	Duty Cycle Factor (dB)	Average Total at 3m (dBμV/m)	Average Total at 3m (μV/m)	Average Limit at 3m (μV/m)	Margin (dB)
4824.00	H	40.03		4.87	34.28	-39.65	0.00	39.53	94.71	500.00	-14.45
	V	43.96		4.87	34.28	-39.65	0.00	43.46	148.90	500.00	-10.52
12060.00	H	33.54	Ambient	7.05	38.83	-38.97	0.00	40.45	105.26	500.00	-13.53
	V	33.47	Ambient	7.05	38.83	-38.97	0.00	40.38	104.41	500.00	-13.60
14472.00	H	32.89	Ambient	7.43	39.42	-38.59	0.00	41.14	114.01	500.00	-12.84
	V	32.89	Ambient	7.43	39.42	-38.59	0.00	41.14	114.01	500.00	-12.84
19296.00	H	14.95	Ambient	2.21	40.38	-27.87	0.00	29.68	30.47	500.00	-24.30
	V	14.94	Ambient	2.21	40.38	-27.87	0.00	29.67	30.44	500.00	-24.31

Test Details	
Manufacturer	The Chamberlain Group, Inc.
EUT	Industrial DC Operator
Model No.	JHDC7S1BMC
Serial No.	001
Test	Peak Measurements in the Non-Restricted Bands
Mode	802.11b (11Mbps)
Frequency Tested	2412MHz
Notes	

Freq (MHz)	Ant Pol	Meter Reading (dBμV)	Ambient	Cable Factor (dB)	Antenna Factor (dB/m)	Pre Amp (dB)	Peak Total at 3m (dBμV/m)	Peak Total at 3m (μV/m)	Peak Limit at 3m (μV/m)	Margin (dBm)
2412.00	H	62.59		3.39	32.59	0.00	98.56	84767.15		
	V	71.78		3.39	32.59	0.00	107.75	244189.82		
7236.00	H	37.75	Ambient	5.87	36.27	-39.66	40.23	102.66	24418.98	-47.53
	V	37.52	Ambient	5.87	36.27	-39.66	40.00	99.98	24418.98	-47.76
9648.00	H	38.38		6.30	37.18	-39.29	42.56	134.23	24418.98	-45.20
	V	40.49		6.30	37.18	-39.29	44.67	171.14	24418.98	-43.09
16884.00	H	37.18	Ambient	7.73	42.27	-37.37	49.81	309.55	24418.98	-37.94
	V	37.34	Ambient	7.73	42.27	-37.37	49.97	315.31	24418.98	-37.78
21708.00	H	19.52	Ambient	2.23	40.56	-28.69	33.63	48.03	24418.98	-54.12
	V	20.03	Ambient	2.23	40.56	-28.69	34.14	50.94	24418.98	-53.61
24120.00	H	19.35	Ambient	2.24	40.62	-29.36	32.85	43.89	24418.98	-54.91
	V	19.17	Ambient	2.24	40.62	-29.36	32.67	42.99	24418.98	-55.09

Test Details	
Manufacturer	The Chamberlain Group, Inc.
EUT	Industrial DC Operator
Model No.	JHDC7S1BMC
Serial No.	001
Test	Peak Measurements in the Restricted Bands
Mode	802.11b (11Mbps)
Frequency Tested	2437MHz
Notes	

Freq (MHz)	Ant Pol	Meter Reading (dBμV)	Ambient	Cable Factor (dB)	Antenna Factor (dB/m)	Pre Amp (dB)	Peak Total at 3m (dBμV/m)	Peak Total at 3m (μV/m)	Peak Limit at 3m (μV/m)	Margin (dBm)
4874.00	H	55.04		4.99	34.21	-39.62	54.62	538.51	5000.00	-19.36
	V	57.44		4.99	34.21	-39.62	57.02	709.89	5000.00	-16.96
7311.00	H	48.12		5.84	36.27	-39.63	50.60	338.73	5000.00	-23.38
	V	48.28		5.84	36.27	-39.63	50.76	345.03	5000.00	-23.22
12185.00	H	47.76	Ambient	7.13	38.85	-38.89	54.84	552.34	5000.00	-19.14
	V	47.39	Ambient	7.13	38.85	-38.89	54.47	529.31	5000.00	-19.51
19496.00	H	28.39	Ambient	2.22	40.39	-27.75	43.25	145.42	5000.00	-30.73
	V	29.48	Ambient	2.22	40.39	-27.75	44.34	164.86	5000.00	-29.64

Test Details	
Manufacturer	The Chamberlain Group, Inc.
EUT	Industrial DC Operator
Model No.	JHDC7S1BMC
Serial No.	001
Test	Average Measurements in the Restricted Bands
Mode	802.11b (11Mbps)
Frequency Tested	2437MHz
Notes	

Freq (MHz)	Ant Pol	Meter Reading (dBμV)	Ambient	CBL Fac (dB)	Ant Fac (dB/m)	Pre Amp (dB)	Duty Cycle Factor (dB)	Average Total at 3m (dBμV/m)	Average Total at 3m (μV/m)	Average Limit at 3m (μV/m)	Margin (dB)
4874.00	H	40.87		4.99	34.21	-39.62	0.00	40.45	105.36	500.00	-13.53
	V	42.95		4.99	34.21	-39.62	0.00	42.53	133.87	500.00	-11.45
7311.00	H	33.89		5.84	36.27	-39.63	0.00	36.37	65.82	500.00	-17.61
	V	35.57		5.84	36.27	-39.63	0.00	38.05	79.87	500.00	-15.93
12185.00	H	33.95	Ambient	7.13	38.85	-38.89	0.00	41.03	112.64	500.00	-12.95
	V	33.95	Ambient	7.13	38.85	-38.89	0.00	41.03	112.64	500.00	-12.95
19496.00	H	13.43	Ambient	2.22	40.39	-27.75	0.00	28.29	25.98	500.00	-25.69
	V	14.01	Ambient	2.22	40.39	-27.75	0.00	28.87	27.77	500.00	-25.11

Test Details	
Manufacturer	The Chamberlain Group, Inc.
EUT	Industrial DC Operator
Model No.	JHDC7S1BMC
Serial No.	001
Test	Peak Measurements in the Non-Restricted Bands
Mode	802.11b (11Mbps)
Frequency Tested	2437MHz
Notes	

Freq (MHz)	Ant Pol	Meter Reading (dBμV)	Ambient	Cable Factor (dB)	Antenna Factor (dB/m)	Pre Amp (dB)	Peak Total at 3m (dBμV/m)	Peak Total at 3m (μV/m)	Peak Limit at 3m (μV/m)	Margin (dBm)
2437.00	H	66.24		3.39	32.63	0.00	102.26	129649.85		
	V	73.36		3.39	32.63	0.00	109.38	294287.65		
9748.00	H	37.91	Ambient	6.36	37.22	-39.27	42.22	129.10	29428.76	-47.16
	V	40.56		6.36	37.22	-39.27	44.87	175.15	29428.76	-44.51
14622.00	H	38.03	Ambient	7.30	39.49	-38.62	46.20	204.18	29428.76	-43.18
	V	37.01	Ambient	7.30	39.49	-38.62	45.18	181.56	29428.76	-44.20
17059.00	H	35.06	Ambient	7.66	42.43	-37.37	47.78	244.82	29428.76	-41.60
	V	35.35	Ambient	7.66	42.43	-37.37	48.07	253.13	29428.76	-41.31
21933.00	H	20.02	Ambient	2.21	40.58	-28.90	33.91	49.58	29428.76	-55.47
	V	20.33	Ambient	2.21	40.58	-28.90	34.22	51.38	29428.76	-55.16
24370.00	H	19.52	Ambient	2.23	40.63	-29.36	33.02	44.75	29428.76	-56.36
	V	19.99	Ambient	2.23	40.63	-29.36	33.49	47.24	29428.76	-55.89

Test Details	
Manufacturer	The Chamberlain Group, Inc.
EUT	Industrial DC Operator
Model No.	JHDC7S1BMC
Serial No.	001
Test	Peak Measurements in the Restricted Bands
Mode	802.11b (11Mbps)
Frequency Tested	2462MHz
Notes	

Freq (MHz)	Ant Pol	Meter Reading (dBμV)	Ambient	Cable Factor (dB)	Antenna Factor (dB/m)	Pre Amp (dB)	Peak Total at 3m (dBμV/m)	Peak Total at 3m (μV/m)	Peak Limit at 3m (μV/m)	Margin (dBm)
4924.00	H	53.08		5.12	34.16	-39.64	52.72	432.74	5000.00	-21.25
	V	55.80		5.12	34.16	-39.64	55.44	591.87	5000.00	-18.53
7386.00	H	48.94	Ambient	5.87	36.30	-39.59	51.53	377.02	5000.00	-22.45
	V	50.18		5.87	36.30	-39.59	52.77	434.88	5000.00	-21.21
12310.00	H	47.74	Ambient	7.25	38.85	-38.82	55.03	564.06	5000.00	-18.95
	V	47.72	Ambient	7.25	38.85	-38.82	55.01	562.76	5000.00	-18.97
19696.00	H	29.48	Ambient	2.23	40.40	-28.04	44.06	159.67	5000.00	-29.91
	V	30.22	Ambient	2.23	40.40	-28.04	44.80	173.87	5000.00	-29.17
22158.00	H	32.10	Ambient	2.21	40.58	-28.73	46.16	203.34	5000.00	-27.81
	V	31.33	Ambient	2.21	40.58	-28.73	45.39	186.09	5000.00	-28.58

Test Details	
Manufacturer	The Chamberlain Group, Inc.
EUT	Industrial DC Operator
Model No.	JHDC7S1BMC
Serial No.	001
Test	Average Measurements in the Restricted Bands
Mode	802.11b (11Mbps)
Frequency Tested	2462MHz
Notes	

Freq (MHz)	Ant Pol	Meter Reading (dBμV)	Ambient	CBL Fac (dB)	Ant Fac (dB/m)	Pre Amp (dB)	Duty Cycle Factor (dB)	Average Total at 3m (dBμV/m)	Average Total at 3m (μV/m)	Average Limit at 3m (μV/m)	Margin (dB)
4924.00	H	39.25		5.12	34.16	-39.64	0.00	38.89	88.05	500.00	-15.08
	V	41.08		5.12	34.16	-39.64	0.00	40.72	108.70	500.00	-13.25
7386.00	H	33.70	Ambient	5.87	36.30	-39.59	0.00	36.29	65.22	500.00	-17.69
	V	34.13		5.87	36.30	-39.59	0.00	36.72	68.53	500.00	-17.26
12310.00	H	32.96	Ambient	7.25	38.85	-38.82	0.00	40.25	102.88	500.00	-13.73
	V	32.99	Ambient	7.25	38.85	-38.82	0.00	40.28	103.23	500.00	-13.70
19696.00	H	14.84	Ambient	2.23	40.40	-28.04	0.00	29.42	29.60	500.00	-24.55
	V	14.98	Ambient	2.23	40.40	-28.04	0.00	29.56	30.08	500.00	-24.41
22158.00	H	16.93	Ambient	2.21	40.58	-28.73	0.00	30.99	35.46	500.00	-22.98
	V	16.94	Ambient	2.21	40.58	-28.73	0.00	31.00	35.50	500.00	-22.97

Test Details	
Manufacturer	The Chamberlain Group, Inc.
EUT	Industrial DC Operator
Model No.	JHDC7S1BMC
Serial No.	001
Test	Peak Measurements in the Non-Restricted Bands
Mode	802.11b (11Mbps)
Frequency Tested	2462MHz
Notes	

Freq (MHz)	Ant Pol	Meter Reading (dBμV)	Ambient	Cable Factor (dB)	Antenna Factor (dB/m)	Pre Amp (dB)	Peak Total at 3m (dBμV/m)	Peak Total at 3m (μV/m)	Peak Limit at 3m (μV/m)	Margin (dBm)
2462.00	H	62.60		3.39	32.67	0.00	98.66	85747.78		
	V	74.30		3.39	32.67	0.00	110.36	329778.90		
9848.00	H	37.85		6.42	37.20	-39.25	42.22	129.10	32977.89	-48.15
	V	40.83		6.42	37.20	-39.25	45.20	181.94	32977.89	-45.17
14772.00	H	38.09	Ambient	7.49	39.70	-38.64	46.64	214.69	32977.89	-43.73
	V	38.07	Ambient	7.49	39.70	-38.64	46.62	214.19	32977.89	-43.75
17234.00	H	36.71	Ambient	7.52	42.49	-37.38	49.35	293.28	32977.89	-41.02
	V	36.40	Ambient	7.52	42.49	-37.38	49.04	282.99	32977.89	-41.33
24620.00	H	21.32	Ambient	2.22	40.64	-29.01	35.16	57.31	32977.89	-55.20
	V	20.52	Ambient	2.22	40.64	-29.01	34.36	52.27	32977.89	-56.00

Test Details	
Manufacturer	The Chamberlain Group, Inc.
EUT	Industrial DC Operator
Model No.	JHDC7S1BMC
Serial No.	001
Test	Peak Measurements in the Restricted Bands
Mode	802.11g (54Mbps)
Frequency Tested	2412MHz
Notes	

Freq (MHz)	Ant Pol	Meter Reading (dBμV)	Ambient	Cable Factor (dB)	Antenna Factor (dB/m)	Pre Amp (dB)	Peak Total at 3m (dBμV/m)	Peak Total at 3m (μV/m)	Peak Limit at 3m (μV/m)	Margin (dBm)
4824.00	H	52.96		4.87	34.28	-39.65	52.46	419.67	5000.00	-21.52
	V	55.22		4.87	34.28	-39.65	54.72	544.38	5000.00	-19.26
12060.00	H	49.01	Ambient	7.05	38.83	-38.97	55.92	624.82	5000.00	-18.06
	V	48.96	Ambient	7.05	38.83	-38.97	55.87	621.24	5000.00	-18.11
14472.00	H	48.41	Ambient	7.43	39.42	-38.59	56.66	680.68	5000.00	-17.32
	V	48.48	Ambient	7.43	39.42	-38.59	56.73	686.19	5000.00	-17.25
19296.00	H	29.82	Ambient	2.21	40.38	-27.87	44.55	168.82	5000.00	-29.43
	V	30.10	Ambient	2.21	40.38	-27.87	44.83	174.35	5000.00	-29.15

Test Details	
Manufacturer	The Chamberlain Group, Inc.
EUT	Industrial DC Operator
Model No.	JHDC7S1BMC
Serial No.	001
Test	Average Measurements in the Restricted Bands
Mode	802.11g (54Mbps)
Frequency Tested	2412MHz
Notes	

Freq (MHz)	Ant Pol	Meter Reading (dBμV)	Ambient	CBL Fac (dB)	Ant Fac (dB/m)	Pre Amp (dB)	Duty Cycle Factor (dB)	Average Total at 3m (dBμV/m)	Average Total at 3m (μV/m)	Average Limit at 3m (μV/m)	Margin (dB)
4824.00	H	38.05		4.87	34.28	-39.65	0.00	37.55	75.41	500.00	-16.43
	V	40.45		4.87	34.28	-39.65	0.00	39.95	99.40	500.00	-14.03
12060.00	H	34.74	Ambient	7.05	38.83	-38.97	0.00	41.65	120.85	500.00	-12.33
	V	34.66	Ambient	7.05	38.83	-38.97	0.00	41.57	119.75	500.00	-12.41
14472.00	H	34.21	Ambient	7.43	39.42	-38.59	0.00	42.46	132.72	500.00	-11.52
	V	34.17	Ambient	7.43	39.42	-38.59	0.00	42.42	132.11	500.00	-11.56
19296.00	H	15.14	Ambient	2.21	40.38	-27.87	0.00	29.87	31.15	500.00	-24.11
	V	14.96	Ambient	2.21	40.38	-27.87	0.00	29.69	30.51	500.00	-24.29

Test Details	
Manufacturer	The Chamberlain Group, Inc.
EUT	Industrial DC Operator
Model No.	JHDC7S1BMC
Serial No.	001
Test	Peak Measurements in the Non-Restricted Bands
Mode	802.11g (54Mbps)
Frequency Tested	2412MHz
Notes	

Freq (MHz)	Ant Pol	Meter Reading (dBμV)	Ambient	Cable Factor (dB)	Antenna Factor (dB/m)	Pre Amp (dB)	Peak Total at 3m (dBμV/m)	Peak Total at 3m (μV/m)	Peak Limit at 3m (μV/m)	Margin (dBm)
2412.00	H	55.58		3.39	32.59	0.00	91.55	37820.53		
	V	66.79		3.39	32.59	0.00	102.76	137476.21		
7236.00	H	37.11	Ambient	5.87	36.27	-39.66	39.59	95.37	13747.62	-43.18
	V	37.65	Ambient	5.87	36.27	-39.66	40.13	101.49	13747.62	-42.64
9648.00	H	39.24		6.30	37.18	-39.29	43.42	148.20	13747.62	-39.35
	V	40.06		6.30	37.18	-39.29	44.24	162.87	13747.62	-38.53
16884.00	H	36.71	Ambient	7.73	42.27	-37.37	49.34	293.25	13747.62	-33.42
	V	36.15	Ambient	7.73	42.27	-37.37	48.78	274.94	13747.62	-33.98
21708.00	H	20.42	Ambient	2.23	40.56	-28.69	34.53	53.28	13747.62	-48.23
	V	20.33	Ambient	2.23	40.56	-28.69	34.44	52.73	13747.62	-48.32
24120.00	H	19.43	Ambient	2.24	40.62	-29.36	32.93	44.29	13747.62	-49.84
	V	19.52	Ambient	2.24	40.62	-29.36	33.02	44.75	13747.62	-49.75

Test Details	
Manufacturer	The Chamberlain Group, Inc.
EUT	Industrial DC Operator
Model No.	JHDC7S1BMC
Serial No.	001
Test	Peak Measurements in the Restricted Bands
Mode	802.11g (54Mbps)
Frequency Tested	2437MHz
Notes	

Freq (MHz)	Ant Pol	Meter Reading (dBμV)	Ambient	Cable Factor (dB)	Antenna Factor (dB/m)	Pre Amp (dB)	Peak Total at 3m (dBμV/m)	Peak Total at 3m (μV/m)	Peak Limit at 3m (μV/m)	Margin (dBm)
4874.00	H	52.09		4.99	34.21	-39.62	51.67	383.43	5000.00	-22.31
	V	54.52		4.99	34.21	-39.62	54.10	507.21	5000.00	-19.88
7311.00	H	48.44	Ambient	5.84	36.27	-39.63	50.92	351.45	5000.00	-23.06
	V	49.79		5.84	36.27	-39.63	52.27	410.54	5000.00	-21.71
12185.00	H	48.11	Ambient	7.13	38.85	-38.89	55.19	575.05	5000.00	-18.79
	V	47.27	Ambient	7.13	38.85	-38.89	54.35	522.04	5000.00	-19.63
19496.00	H	29.86	Ambient	2.22	40.39	-27.75	44.72	172.23	5000.00	-29.26
	V	30.15	Ambient	2.22	40.39	-27.75	45.01	178.08	5000.00	-28.97

Test Details	
Manufacturer	The Chamberlain Group, Inc.
EUT	Industrial DC Operator
Model No.	JHDC7S1BMC
Serial No.	001
Test	Average Measurements in the Restricted Bands
Mode	802.11g (54Mbps)
Frequency Tested	2437MHz
Notes	

Freq (MHz)	Ant Pol	Meter Reading (dBμV)	Ambient	CBL Fac (dB)	Ant Fac (dB/m)	Pre Amp (dB)	Duty Cycle Factor (dB)	Average Total at 3m (dBμV/m)	Average Total at 3m (μV/m)	Average Limit at 3m (μV/m)	Margin (dB)
4874.00	H	36.84		4.99	34.21	-39.62	0.00	36.42	66.25	500.00	-17.56
	V	38.58		4.99	34.21	-39.62	0.00	38.16	80.95	500.00	-15.82
7311.00	H	32.99	Ambient	5.84	36.27	-39.63	0.00	35.47	59.34	500.00	-18.51
	V	33.19		5.84	36.27	-39.63	0.00	35.67	60.72	500.00	-18.31
12185.00	H	33.00	Ambient	7.13	38.85	-38.89	0.00	40.08	100.97	500.00	-13.90
	V	33.01	Ambient	7.13	38.85	-38.89	0.00	40.09	101.09	500.00	-13.89
19496.00	H	14.65	Ambient	2.22	40.39	-27.75	0.00	29.51	29.90	500.00	-24.47
	V	14.27	Ambient	2.22	40.39	-27.75	0.00	29.13	28.62	500.00	-24.85

Test Details	
Manufacturer	The Chamberlain Group, Inc.
EUT	Industrial DC Operator
Model No.	JHDC7S1BMC
Serial No.	001
Test	Peak Measurements in the Non-Restricted Bands
Mode	802.11g (54Mbps)
Frequency Tested	2437MHz
Notes	

Freq (MHz)	Ant Pol	Meter Reading (dBμV)	Ambient	Cable Factor (dB)	Antenna Factor (dB/m)	Pre Amp (dB)	Peak Total at 3m (dBμV/m)	Peak Total at 3m (μV/m)	Peak Limit at 3m (μV/m)	Margin (dBm)
2437.00	H	57.59		3.39	32.63	0.00	93.61	47893.00		
	V	67.23		3.39	32.63	0.00	103.25	145302.15		
9748.00	H	39.21		6.36	37.22	-39.27	43.52	149.94	14530.21	-39.73
	V	40.71		6.36	37.22	-39.27	45.02	178.20	14530.21	-38.23
14622.00	H	38.27	Ambient	7.30	39.49	-38.62	46.44	209.90	14530.21	-36.81
	V	38.70	Ambient	7.30	39.49	-38.62	46.87	220.55	14530.21	-36.38
17059.00	H	36.70	Ambient	7.66	42.43	-37.37	49.42	295.70	14530.21	-33.83
	V	36.29	Ambient	7.66	42.43	-37.37	49.01	282.07	14530.21	-34.24
21933.00	H	20.87	Ambient	2.21	40.58	-28.90	34.76	54.68	14530.21	-48.49
	V	20.84	Ambient	2.21	40.58	-28.90	34.73	54.49	14530.21	-48.52
24370.00	H	19.96	Ambient	2.23	40.63	-29.36	33.46	47.08	14530.21	-49.79
	V	20.13	Ambient	2.23	40.63	-29.36	33.63	48.01	14530.21	-49.62

Test Details	
Manufacturer	The Chamberlain Group, Inc.
EUT	Industrial DC Operator
Model No.	JHDC7S1BMC
Serial No.	001
Test	Peak Measurements in the Restricted Bands
Mode	802.11g (54Mbps)
Frequency Tested	2462MHz
Notes	

Freq (MHz)	Ant Pol	Meter Reading (dBμV)	Ambient	Cable Factor (dB)	Antenna Factor (dB/m)	Pre Amp (dB)	Peak Total at 3m (dBμV/m)	Peak Total at 3m (μV/m)	Peak Limit at 3m (μV/m)	Margin (dBm)
4924.00	H	49.78		5.12	34.16	-39.64	49.42	295.96	5000.00	-24.55
	V	53.75		5.12	34.16	-39.64	53.39	467.44	5000.00	-20.58
7386.00	H	47.71	Ambient	5.87	36.30	-39.59	50.30	327.24	5000.00	-23.68
	V	49.31		5.87	36.30	-39.59	51.90	393.43	5000.00	-22.08
12310.00	H	47.88	Ambient	7.25	38.85	-38.82	55.17	573.22	5000.00	-18.81
	V	47.67	Ambient	7.25	38.85	-38.82	54.96	559.53	5000.00	-19.02
19696.00	H	29.32	Ambient	2.23	40.40	-28.04	43.90	156.75	5000.00	-30.07
	V	29.68	Ambient	2.23	40.40	-28.04	44.26	163.39	5000.00	-29.71
22158.00	H	31.90	Ambient	2.21	40.58	-28.73	45.96	198.71	5000.00	-28.01
	V	31.28	Ambient	2.21	40.58	-28.73	45.34	185.02	5000.00	-28.63

Test Details	
Manufacturer	The Chamberlain Group, Inc.
EUT	Industrial DC Operator
Model No.	JHDC7S1BMC
Serial No.	001
Test	Average Measurements in the Restricted Bands
Mode	802.11g (54Mbps)
Frequency Tested	2462MHz
Notes	

Freq (MHz)	Ant Pol	Meter Reading (dBμV)	Ambient	CBL Fac (dB)	Ant Fac (dB/m)	Pre Amp (dB)	Duty Cycle Factor (dB)	Average Total at 3m (dBμV/m)	Average Total at 3m (μV/m)	Average Limit at 3m (μV/m)	Margin (dB)
4924.00	H	35.18		5.12	34.16	-39.64	0.00	34.82	55.11	500.00	-19.15
	V	37.55		5.12	34.16	-39.64	0.00	37.19	72.40	500.00	-16.78
7386.00	H	32.90	Ambient	5.87	36.30	-39.59	0.00	35.49	59.48	500.00	-18.49
	V	33.05		5.87	36.30	-39.59	0.00	35.64	60.52	500.00	-18.34
12310.00	H	32.80	Ambient	7.25	38.85	-38.82	0.00	40.09	101.00	500.00	-13.89
	V	32.76	Ambient	7.25	38.85	-38.82	0.00	40.05	100.54	500.00	-13.93
19696.00	H	14.85	Ambient	2.23	40.40	-28.04	0.00	29.43	29.63	500.00	-24.54
	V	15.03	Ambient	2.23	40.40	-28.04	0.00	29.61	30.25	500.00	-24.36
22158.00	H	17.44	Ambient	2.21	40.58	-28.73	0.00	31.50	37.60	500.00	-22.47
	V	16.92	Ambient	2.21	40.58	-28.73	0.00	30.98	35.42	500.00	-22.99

Test Details	
Manufacturer	The Chamberlain Group, Inc.
EUT	Industrial DC Operator
Model No.	JHDC7S1BMC
Serial No.	001
Test	Peak Measurements in the Non-Restricted Bands
Mode	802.11n (MCS7)
Frequency Tested	2462MHz
Notes	

Freq (MHz)	Ant Pol	Meter Reading (dBμV)	Ambient	Cable Factor (dB)	Antenna Factor (dB/m)	Pre Amp (dB)	Peak Total at 3m (dBμV/m)	Peak Total at 3m (μV/m)	Peak Limit at 3m (μV/m)	Margin (dBm)
2462.00	H	56.23		3.39	32.67	0.00	92.29	41183.46		
	V	68.57		3.39	32.67	0.00	104.63	170499.40		
9848.00	H	38.65		6.42	37.20	-39.25	43.02	141.55	17049.94	-41.62
	V	39.49		6.42	37.20	-39.25	43.86	155.93	17049.94	-40.78
14772.00	H	37.78	Ambient	7.49	39.70	-38.64	46.33	207.16	17049.94	-38.31
	V	37.08	Ambient	7.49	39.70	-38.64	45.63	191.12	17049.94	-39.01
17234.00	H	37.23	Ambient	7.52	42.49	-37.38	49.87	311.37	17049.94	-34.77
	V	36.71	Ambient	7.52	42.49	-37.38	49.35	293.28	17049.94	-35.29
24620.00	H	21.16	Ambient	2.22	40.64	-29.01	35.00	56.26	17049.94	-49.63
	V	20.65	Ambient	2.22	40.64	-29.01	34.49	53.06	17049.94	-50.14

Test Details	
Manufacturer	The Chamberlain Group, Inc.
EUT	Industrial DC Operator
Model No.	JHDC7S1BMC
Serial No.	001
Test	Peak Measurements in the Restricted Bands
Mode	802.11n (MCS7)
Frequency Tested	2412MHz
Notes	

Freq (MHz)	Ant Pol	Meter Reading (dBμV)	Ambient	Cable Factor (dB)	Antenna Factor (dB/m)	Pre Amp (dB)	Peak Total at 3m (dBμV/m)	Peak Total at 3m (μV/m)	Peak Limit at 3m (μV/m)	Margin (dBm)
4824.00	H	49.34	Ambient	4.87	34.28	-39.65	48.84	276.63	5000.00	-25.14
	V	52.59		4.87	34.28	-39.65	52.09	402.17	5000.00	-21.89
12060.00	H	47.82	Ambient	7.05	38.83	-38.97	54.73	544.83	5000.00	-19.25
	V	48.45	Ambient	7.05	38.83	-38.97	55.36	585.81	5000.00	-18.62
14472.00	H	47.79	Ambient	7.43	39.42	-38.59	56.04	633.79	5000.00	-17.94
	V	47.86	Ambient	7.43	39.42	-38.59	56.11	638.91	5000.00	-17.87
19296.00	H	28.99	Ambient	2.21	40.38	-27.87	43.72	153.43	5000.00	-30.26
	V	29.80	Ambient	2.21	40.38	-27.87	44.53	168.43	5000.00	-29.45

Test Details	
Manufacturer	The Chamberlain Group, Inc.
EUT	Industrial DC Operator
Model No.	JHDC7S1BMC
Serial No.	001
Test	Average Measurements in the Restricted Bands
Mode	802.11n (MCS7)
Frequency Tested	2412MHz
Notes	

Freq (MHz)	Ant Pol	Meter Reading (dBμV)	Ambient	CBL Fac (dB)	Ant Fac (dB/m)	Pre Amp (dB)	Duty Cycle Factor (dB)	Average Total at 3m (dBμV/m)	Average Total at 3m (μV/m)	Average Limit at 3m (μV/m)	Margin (dB)
4824.00	H	34.06	Ambient	4.87	34.28	-39.65	0.00	33.56	47.63	500.00	-20.42
	V	38.31		4.87	34.28	-39.65	0.00	37.81	77.70	500.00	-16.17
12060.00	H	33.91	Ambient	7.05	38.83	-38.97	0.00	40.82	109.84	500.00	-13.16
	V	33.92	Ambient	7.05	38.83	-38.97	0.00	40.83	109.97	500.00	-13.15
14472.00	H	33.36	Ambient	7.43	39.42	-38.59	0.00	41.61	120.35	500.00	-12.37
	V	33.26	Ambient	7.43	39.42	-38.59	0.00	41.51	118.97	500.00	-12.47
19296.00	H	14.83	Ambient	2.21	40.38	-27.87	0.00	29.56	30.06	500.00	-24.42
	V	14.89	Ambient	2.21	40.38	-27.87	0.00	29.62	30.26	500.00	-24.36

Test Details	
Manufacturer	The Chamberlain Group, Inc.
EUT	Industrial DC Operator
Model No.	JHDC7S1BMC
Serial No.	001
Test	Peak Measurements in the Non-Restricted Bands
Mode	802.11n (MCS7)
Frequency Tested	2412MHz
Notes	

Freq (MHz)	Ant Pol	Meter Reading (dBμV)	Ambient	Cable Factor (dB)	Antenna Factor (dB/m)	Pre Amp (dB)	Peak Total at 3m (dBμV/m)	Peak Total at 3m (μV/m)	Peak Limit at 3m (μV/m)	Margin (dBm)
2412.00	H	54.75		3.39	32.59	0.00	90.72	34373.80		
	V	65.00		3.39	32.59	0.00	100.97	111873.59		
7236.00	H	37.23	Ambient	5.87	36.27	-39.66	39.71	96.70	11187.36	-41.27
	V	37.37	Ambient	5.87	36.27	-39.66	39.85	98.27	11187.36	-41.13
9648.00	H	38.63		6.30	37.18	-39.29	42.81	138.15	11187.36	-38.17
	V	39.74		6.30	37.18	-39.29	43.92	156.98	11187.36	-37.06
16884.00	H	36.86	Ambient	7.73	42.27	-37.37	49.49	298.36	11187.36	-31.48
	V	36.28	Ambient	7.73	42.27	-37.37	48.91	279.08	11187.36	-32.06
21708.00	H	19.97	Ambient	2.23	40.56	-28.69	34.08	50.59	11187.36	-46.89
	V	19.52	Ambient	2.23	40.56	-28.69	33.63	48.03	11187.36	-47.34
24120.00	H	19.89	Ambient	2.24	40.62	-29.36	33.39	46.70	11187.36	-47.59
	V	19.08	Ambient	2.24	40.62	-29.36	32.58	42.54	11187.36	-48.40

Test Details	
Manufacturer	The Chamberlain Group, Inc.
EUT	Industrial DC Operator
Model No.	JHDC7S1BMC
Serial No.	001
Test	Peak Measurements in the Restricted Bands
Mode	802.11n (MCS7)
Frequency Tested	2437MHz
Notes	

Freq (MHz)	Ant Pol	Meter Reading (dBμV)	Ambient	Cable Factor (dB)	Antenna Factor (dB/m)	Pre Amp (dB)	Peak Total at 3m (dBμV/m)	Peak Total at 3m (μV/m)	Peak Limit at 3m (μV/m)	Margin (dBm)
4874.00	H	49.48		4.99	34.21	-39.62	49.06	283.92	5000.00	-24.92
	V	52.36		4.99	34.21	-39.62	51.94	395.54	5000.00	-22.04
7311.00	H	47.60	Ambient	5.84	36.27	-39.63	50.08	319.05	5000.00	-23.90
	V	47.95	Ambient	5.84	36.27	-39.63	50.43	332.17	5000.00	-23.55
12185.00	H	48.32	Ambient	7.13	38.85	-38.89	55.40	589.13	5000.00	-18.58
	V	47.72	Ambient	7.13	38.85	-38.89	54.80	549.80	5000.00	-19.18
19496.00	H	28.60	Ambient	2.22	40.39	-27.75	43.46	148.98	5000.00	-30.52
	V	29.03	Ambient	2.22	40.39	-27.75	43.89	156.54	5000.00	-30.09

Test Details	
Manufacturer	The Chamberlain Group, Inc.
EUT	Industrial DC Operator
Model No.	JHDC7S1BMC
Serial No.	001
Test	Average Measurements in the Restricted Bands
Mode	802.11n (MCS7)
Frequency Tested	2437MHz
Notes	

Freq (MHz)	Ant Pol	Meter Reading (dBμV)	Ambient	CBL Fac (dB)	Ant Fac (dB/m)	Pre Amp (dB)	Duty Cycle Factor (dB)	Average Total at 3m (dBμV/m)	Average Total at 3m (μV/m)	Average Limit at 3m (μV/m)	Margin (dB)
4874.00	H	35.73		4.99	34.21	-39.62	0.00	35.31	58.30	500.00	-18.67
	V	37.66		4.99	34.21	-39.62	0.00	37.24	72.81	500.00	-16.74
7311.00	H	33.86	Ambient	5.84	36.27	-39.63	0.00	36.34	65.59	500.00	-17.64
	V	33.92	Ambient	5.84	36.27	-39.63	0.00	36.40	66.05	500.00	-17.58
12185.00	H	33.91	Ambient	7.13	38.85	-38.89	0.00	40.99	112.13	500.00	-12.99
	V	33.90	Ambient	7.13	38.85	-38.89	0.00	40.98	112.00	500.00	-13.00
19496.00	H	14.04	Ambient	2.22	40.39	-27.75	0.00	28.90	27.87	500.00	-25.08
	V	14.15	Ambient	2.22	40.39	-27.75	0.00	29.01	28.22	500.00	-24.97

Test Details	
Manufacturer	The Chamberlain Group, Inc.
EUT	Industrial DC Operator
Model No.	JHDC7S1BMC
Serial No.	001
Test	Peak Measurements in the Non-Restricted Bands
Mode	802.11n (MCS7)
Frequency Tested	2437MHz
Notes	

Freq (MHz)	Ant Pol	Meter Reading (dBμV)	Ambient	Cable Factor (dB)	Antenna Factor (dB/m)	Pre Amp (dB)	Peak Total at 3m (dBμV/m)	Peak Total at 3m (μV/m)	Peak Limit at 3m (μV/m)	Margin (dBm)
2437.00	H	55.22		3.39	32.63	0.00	91.24	36456.25		
	V	66.03		3.39	32.63	0.00	102.05	126552.88		
9748.00	H	39.10		6.36	37.22	-39.27	43.41	148.05	12655.29	-38.64
	V	40.08		6.36	37.22	-39.27	44.39	165.74	12655.29	-37.66
14622.00	H	38.37	Ambient	7.30	39.49	-38.62	46.54	212.33	12655.29	-35.51
	V	38.59	Ambient	7.30	39.49	-38.62	46.76	217.78	12655.29	-35.29
17059.00	H	36.28	Ambient	7.66	42.43	-37.37	49.00	281.74	12655.29	-33.05
	V	36.10	Ambient	7.66	42.43	-37.37	48.82	275.96	12655.29	-33.23
21933.00	H	20.28	Ambient	2.21	40.58	-28.90	34.17	51.09	12655.29	-47.88
	V	20.35	Ambient	2.21	40.58	-28.90	34.24	51.50	12655.29	-47.81
24370.00	H	20.06	Ambient	2.23	40.63	-29.36	33.56	47.62	12655.29	-48.49
	V	20.48	Ambient	2.23	40.63	-29.36	33.98	49.98	12655.29	-48.07

Test Details	
Manufacturer	The Chamberlain Group, Inc.
EUT	Industrial DC Operator
Model No.	JHDC7S1BMC
Serial No.	001
Test	Peak Measurements in the Restricted Bands
Mode	802.11n (MCS7)
Frequency Tested	2462MHz
Notes	

Freq (MHz)	Ant Pol	Meter Reading (dBμV)	Ambient	Cable Factor (dB)	Antenna Factor (dB/m)	Pre Amp (dB)	Peak Total at 3m (dBμV/m)	Peak Total at 3m (μV/m)	Peak Limit at 3m (μV/m)	Margin (dBm)
4924.00	H	49.43		5.12	34.16	-39.64	49.07	284.27	5000.00	-24.90
	V	51.20		5.12	34.16	-39.64	50.84	348.52	5000.00	-23.13
7386.00	H	47.89	Ambient	5.87	36.30	-39.59	50.48	334.09	5000.00	-23.50
	V	48.01	Ambient	5.87	36.30	-39.59	50.60	338.74	5000.00	-23.38
12310.00	H	47.51	Ambient	7.25	38.85	-38.82	54.80	549.32	5000.00	-19.18
	V	47.50	Ambient	7.25	38.85	-38.82	54.79	548.69	5000.00	-19.19
19696.00	H	29.41	Ambient	2.23	40.40	-28.04	43.99	158.39	5000.00	-29.98
	V	29.97	Ambient	2.23	40.40	-28.04	44.55	168.94	5000.00	-29.42
22158.00	H	31.36	Ambient	2.21	40.58	-28.73	45.42	186.74	5000.00	-28.55
	V	31.76	Ambient	2.21	40.58	-28.73	45.82	195.54	5000.00	-28.15

Test Details	
Manufacturer	The Chamberlain Group, Inc.
EUT	Industrial DC Operator
Model No.	JHDC7S1BMC
Serial No.	001
Test	Average Measurements in the Restricted Bands
Mode	802.11n (MCS7)
Frequency Tested	2462MHz
Notes	

Freq (MHz)	Ant Pol	Meter Reading (dBμV)	Ambient	CBL Fac (dB)	Ant Fac (dB/m)	Pre Amp (dB)	Duty Cycle Factor (dB)	Average Total at 3m (dBμV/m)	Average Total at 3m (μV/m)	Average Limit at 3m (μV/m)	Margin (dB)
4924.00	H	34.11		5.12	34.16	-39.64	0.00	33.75	48.72	500.00	-20.22
	V	36.35		5.12	34.16	-39.64	0.00	35.99	63.06	500.00	-17.98
7386.00	H	33.10	Ambient	5.87	36.30	-39.59	0.00	35.69	60.86	500.00	-18.29
	V	33.19	Ambient	5.87	36.30	-39.59	0.00	35.78	61.50	500.00	-18.20
12310.00	H	33.12	Ambient	7.25	38.85	-38.82	0.00	40.41	104.79	500.00	-13.57
	V	33.16	Ambient	7.25	38.85	-38.82	0.00	40.45	105.27	500.00	-13.53
19696.00	H	14.81	Ambient	2.23	40.40	-28.04	0.00	29.39	29.49	500.00	-24.58
	V	14.98	Ambient	2.23	40.40	-28.04	0.00	29.56	30.08	500.00	-24.41
22158.00	H	16.87	Ambient	2.21	40.58	-28.73	0.00	30.93	35.22	500.00	-23.04
	V	16.90	Ambient	2.21	40.58	-28.73	0.00	30.96	35.34	500.00	-23.01

Test Details	
Manufacturer	The Chamberlain Group, Inc.
EUT	Industrial DC Operator
Model No.	JHDC7S1BMC
Serial No.	001
Test	Peak Measurements in the Non-Restricted Bands
Mode	802.11n (MCS7)
Frequency Tested	2462MHz
Notes	

Freq (MHz)	Ant Pol	Meter Reading (dBμV)	Ambient	Cable Factor (dB)	Antenna Factor (dB/m)	Pre Amp (dB)	Peak Total at 3m (dBμV/m)	Peak Total at 3m (μV/m)	Peak Limit at 3m (μV/m)	Margin (dBm)
2462.00	H	53.42		3.39	32.67	0.00	89.48	29800.45		
	V	66.92		3.39	32.67	0.00	102.98	141001.22		
9848.00	H	38.79		6.42	37.20	-39.25	43.16	143.85	14100.12	-39.83
	V	40.68		6.42	37.20	-39.25	45.05	178.82	14100.12	-37.94
14772.00	H	36.15	Ambient	7.49	39.70	-38.64	44.70	171.71	14100.12	-38.29
	V	37.18	Ambient	7.49	39.70	-38.64	45.73	193.33	14100.12	-37.26
17234.00	H	36.57	Ambient	7.52	42.49	-37.38	49.21	288.59	14100.12	-33.78
	V	35.92	Ambient	7.52	42.49	-37.38	48.56	267.78	14100.12	-34.43
24620.00	H	20.40	Ambient	2.22	40.64	-29.01	34.24	51.55	14100.12	-48.74
	V	20.70	Ambient	2.22	40.64	-29.01	34.54	53.36	14100.12	-48.44

Test Details	
Manufacturer	The Chamberlain Group, Inc.
EUT	Industrial DC Operator
Model No.	JHDC7S1BMC
Serial No.	001
Test	High Band-Edge – Peak and Average Readings
Mode	802.11b (11Mbps)
Frequency Tested	2462MHz
Notes	

Freq. (MHz)	Ant Pol	Meter Reading (dBμV)	Ambient	CBL Fac (dB)	Ant Fac (dB/m)	Pre Amp (dB)	Peak Total dBμV/m at 3m	Peak Total μV/m at 3 m	Peak Limit μV/m at 3 m	Margin (dB)
2483.50	H	23.78		3.40	32.72	0.00	59.89	987.89	5000.00	-14.09
	V	25.90		3.40	32.72	0.00	62.01	1260.98	5000.00	-11.97

Freq. (MHz)	Ant Pol	Meter Reading (dBμV)	Ambient	CBL Fac (dB)	Ant Fac (dB/m)	Pre Amp (dB)	Duty Cycle (dB)	Average Total dBμV/m at 3m	Average Total μV/m at 3 m	Average Limit μV/m at 3 m	Margin (dB)
2483.50	H	10.32		3.40	32.72	0.00	0.00	46.43	209.75	500.00	-7.55
	V	10.58		3.40	32.72	0.00	0.00	46.69	216.13	500.00	-7.29

Test Details	
Manufacturer	The Chamberlain Group, Inc.
EUT	Industrial DC Operator
Model No.	JHDC7S1BMC
Serial No.	001
Test	High Band-Edge – Peak and Average Readings
Mode	802.11g (54Mbps)
Frequency Tested	2462MHz
Notes	

Freq (MHz)	Ant Pol	Meter Reading (dBμV)	Ambient	Cable Factor (dB)	Antenna Factor (dB/m)	Pre Amp (dB)	Peak Total at 3m (dBμV/m)	Peak Total at 3m (μV/m)	Peak Limit at 3m (μV/m)	Margin (dBm)
2483.50	H	24.99		3.40	32.72	0.00	61.10	1135.55	5000.00	-12.88
	V	37.80		3.40	32.72	0.00	73.91	4962.57	5000.00	-0.07

Freq (MHz)	Ant Pol	Meter Reading (dBμV)	Ambient	CBL Fac (dB)	Ant Fac (dB/m)	Pre Amp (dB)	Duty Cycle Factor (dB)	Average Total at 3m (dBμV/m)	Average Total at 3m (μV/m)	Average Limit at 3m (μV/m)	Margin (dB)
2483.50	H	9.52		3.40	32.72	0.00	0.00	45.63	191.30	500.00	-8.35
	V	17.85		3.40	32.72	0.00	0.00	53.96	499.12	500.00	-0.02

Test Details	
Manufacturer	The Chamberlain Group, Inc.
EUT	Industrial DC Operator
Model No.	JHDC7S1BMC
Serial No.	001
Test	High Band-Edge – Peak and Average Readings
Mode	802.11n (MCS7)
Frequency Tested	
Notes	

Freq (MHz)	Ant Pol	Meter Reading (dBμV)	Ambient	Cable Factor (dB)	Antenna Factor (dB/m)	Pre Amp (dB)	Peak Total at 3m (dBμV/m)	Peak Total at 3m (μV/m)	Peak Limit at 3m (μV/m)	Margin (dBm)
2483.50	H	26.52		3.40	32.72	0.00	62.63	1354.28	5000.00	-11.35
	V	37.34		3.40	32.72	0.00	73.45	4706.60	5000.00	-0.53

Freq (MHz)	Ant Pol	Meter Reading (dBμV)	Ambient	CBL Fac (dB)	Ant Fac (dB/m)	Pre Amp (dB)	Duty Cycle Factor (dB)	Average Total at 3m (dBμV/m)	Average Total at 3m (μV/m)	Average Limit at 3m (μV/m)	Margin (dB)
2483.50	H	11.19		3.40	32.72	0.00	0.00	47.30	231.85	500.00	-6.68
	V	17.61		3.40	32.72	0.00	0.00	53.72	485.52	500.00	-0.26

22. Scope of Accreditation

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

ELITE ELECTRONIC ENGINEERING, INC.
1516 Centre Circle
Downers Grove, IL 60515
Robert Bugielski (QA Manager) Phone: 630 495 9770 ext. 168
Email: rbugielski@elitetest.com
Craig Fanning (EMC Lab Manager) Phone: 630 495 9770 ext. 112
Email: cfanning@elitetest.com
Brandon Lugo (Automotive Team Leader) Phone: 630 495 9770 ext. 163
Email: blugo@elitetest.com
Richard King (FCC/Commercial Team Leader) Phone: 630 495 9770 ext. 123
Email: reking@elitetest.com
Website: www.elitetest.com

ELECTRICAL

Valid To: August 31, 2023

Certificate Number: 1786.01

In recognition of the successful completion of the A2LA Accreditation Program evaluation process, accreditation is granted to this laboratory to perform the following automotive electromagnetic compatibility and other electrical tests:

Test Technology:**Test Method(s) ¹:*****Transient Immunity***

ISO 7637-2 (including emissions); ISO 7637-3;
ISO 16750-2:2012, Sections 4.6.3 and 4.6.4;
CS-11979, Section 6.4; CS.00054, Section 5.9;
EMC-CS-2009.1 (CI220); FMC1278 (CI220, CI221, CI222);
GMW 3097, Section 3.5; SAE J1113-11; SAE J1113-12;
ECE Regulation 10.06 Annex 10

Electrostatic Discharge (ESD)

ISO 10605 (2001, 2008);
CS-11979 Section 7.0; CS.00054, Section 5.10;
EMC-CS-2009.1 (CI 280); FMC1278 (CI280); SAE J1113-13;
GMW 3097 Section 3.6

Conducted Emissions

CISPR 25 (2002, 2008), Sections 6.2 and 6.3;
CISPR 25 (2016), Sections 6.3 and 6.4;
CS-11979, Section 5.1; CS.00054, Sections 5.6.1 and 5.6.2;
GMW 3097, Section 3.3.2;
EMC-CS-2009.1 (CE 420); FMC1278 (CE420, CE421)

Radiated Emissions Anechoic

CISPR 25 (2002, 2008), Section 6.4;
CISPR 25 (2016), Section 6.5;
CS-11979, Section 5.3; CS.00054, Section 5.6.3;
GMW 3097, Section 3.3.1;
EMC-CS-2009.1 (RE 310); FMC1278 (RE310);

(A2LA Cert. No. 1786.01) Revised 06/07/2023



Page 1 of 8

<u>Test Technology:</u>	<u>Test Method(s) ¹:</u>
<i>Vehicle Radiated Emissions</i>	CISPR 12; CISPR 36; ICES-002; ECE Regulation 10.06 Annex 5
<i>Bulk Current Injection (BCI)</i>	ISO 11452-4; CS-11979, Section 6.1; CS.00054, Section 5.8.1; GMW 3097, Section 3.4.1; SAE J1113-4; EMC-CS-2009.1 (RI112); FMC1278 (RI112); ECE Regulation 10.06 Annex 9
<i>Radiated Immunity Anechoic (Including Radar Pulse)</i>	ISO 11452-2; ISO 11452-5; CS-11979, Section 6.2; CS.00054, Section 5.8.2; GMW 3097, Section 3.4.2; EMC-CS-2009.1 (RI114); FMC1278 (RI114); SAE J1113-21; ECE Regulation 10.06 Annex 9
<i>Radiated Immunity Magnetic Field</i>	ISO 11452-8
<i>Radiated Immunity Reverb</i>	ISO/IEC 61000-4-21; GMW 3097, Section 3.4.3; EMC-CS-2009.1 (RI114); FMC1278 (RI114); ISO 11452-11
<i>Radiated Immunity (Portable Transmitters)</i>	ISO 11452-9; EMC-CS-2009.1 (RI115); FMC1278 (RI115)
<i>Vehicle Radiated Immunity (ALSE)</i>	ISO 11451-2; ECE Regulation 10.06 Annex 6
<i>Vehicle Product Specific EMC Standards</i>	EN 14982; EN ISO 13309; ISO 13766; EN 50498; EC Regulation No. 2015/208; EN 55012
<i>Electrical Loads</i>	ISO 16750-2
Emissions Radiated and Conducted (3m Semi-anechoic chamber, up to 40 GHz)	47 CFR, FCC Part 15 B (using ANSI C63.4:2014); 47 CFR, FCC Part 18 (using FCC MP-5:1986); ICES-001; ICES-003; ICES-005; IEC/CISPR 11, Ed. 4.1 (2004-06); AS/NZS CISPR 11 (2004); IEC/CISPR 11 Ed 5 (2009-05) + A1 (2010); KN 11 (2008-5) with RRL Notice No. 2008-3 (May 20, 2008); CISPR 11; EN 55011; KS C 9811; CNS 13803 (1997, 2003); CISPR 14-1; EN 55014-1; AS/NZS CISPR 14.1; CISPR 16-2-1 (2008); CISPR 16-2-1; KS C 9814-1; KN 14-1; IEC/CISPR 22 (1997); EN 55022 (1998) + A1(2000); EN 55022 (1998) + A1(2000) + A2(2003); EN 55022 (2006); IEC/CISPR 22 (2008-09); AS/NZS CISPR 22 (2004); AS/NZS CISPR 22, 3rd Edition (2006); KN 22 (up to 6 GHz); CNS 13438 (up to 6 GHz); VCCI V-3 (up to 6 GHz); CISPR 32; EN 55032; KS C 9832; KN 32; ECE Regulation 10.06 Annex 7 (Broadband); ECE Regulation 10.06 Annex 8 (Narrowband); ECE Regulation 10.06 Annex 14 (Conducted)

Test Technology:
Test Method(s) ¹:
Emissions (cont'd)

Cellular Radiated Spurious Emissions

ETSI TS 151 010-1 GSM; 3GPP TS 51.010-1, Sec 12;
ETSI TS 134 124 UMTS; 3GPP TS 34.124;
ETSI TS 136 124 LTE; E-UTRA; 3GPP TS 36.124

Current Harmonics

IEC 61000-3-2; IEC 61000-3-12;
EN 61000-3-2; KN 61000-3-2;
KS C 9610-3-2; ECE Regulation 10.06 Annex 11

Flicker and Fluctuations

IEC 61000-3-3; IEC 61000-3-11;
EN 61000-3-3; KN 61000-3-3;
KS C 9610-3-3; ECE Regulation 10.06 Annex 12

Immunity

Electrostatic Discharge

IEC 61000-4-2, Ed. 1.2 (2001);
IEC 61000-4-2 (1995) + A1(1998) + A2(2000);
EN 61000-4-2 (1995); EN 61000-4-2 (2009-05);
KN 61000-4-2 (2008-5);
RRL Notice No. 2008-4 (May 20, 2008);
IEC 61000-4-2; EN 61000-4-2; KN 61000-4-2;
KS C 9610-4-2; IEEE C37.90.3 2001

Radiated Immunity

IEC 61000-4-3 (1995) + A1(1998) + A2(2000);
IEC 61000-4-3, Ed. 3.0 (2006-02);
IEC 61000-4-3, Ed. 3.2 (2010);
KN 61000-4-3 (2008-5);
RRL Notice No. 2008-4 (May 20, 2008);
IEC 61000-4-3; EN 61000-4-3; KN 61000-4-3;
KS C 9610-4-3; IEEE C37.90.2 2004

Electrical Fast Transient/Burst

IEC 61000-4-4, Ed. 2.0 (2004-07);
IEC 61000-4-4, Ed. 2.1 (2011);
IEC 61000-4-4 (1995) + A1(2000) + A2(2001);
KN 61000-4-4 (2008-5);
RRL Notice No. 2008-5 (May 20, 2008);
IEC 61000-4-4; EN 61000-4-4; KN 61000-4-4;
KS C 9610-4-4; ECE Regulation 10.06 Annex 15

Surge

IEC 61000-4-5 (1995) + A1(2000);
IEC 61000-4-5, Ed 1.1 (2005-11);
EN 61000-4-5 (1995) + A1(2001);
KN 61000-4-5 (2008-5);
RRL Notice No. 2008-4 (May 20, 2008);
IEC 61000-4-5; EN 61000-4-5; KN 61000-4-5;
KS C 9610-4-5;
IEEE C37.90.1 2012; IEEE STD C62.41.2 2002;
ECE Regulation 10.06 Annex 16

Test Technology:
Test Method(s) ¹:
Immunity (cont'd)
Conducted Immunity

IEC 61000-4-6 (1996) + A1(2000);
IEC 61000-4-6, Ed 2.0 (2006-05);
IEC 61000-4-6 Ed. 3.0 (2008);
KN 61000-4-6 (2008-5);
RRL Notice No. 2008-4 (May 20, 2008);
EN 61000-4-6 (1996) + A1(2001); IEC 61000-4-6;
EN 61000-4-6; KN 61000-4-6; KS C 9610-4-6

Power Frequency Magnetic Field Immunity (Down to 3 A/m)

IEC 61000-4-8 (1993) + A1(2000); IEC 61000-4-8 (2009);
EN 61000-4-8 (1994) + A1(2000);
KN 61000-4-8 (2008-5);
RRL Notice No. 2008-4 (May 20, 2008);
IEC 61000-4-8; EN 61000-4-8; KN 61000-4-8; KS C 9610-4-8

Voltage Dips, Short Interrupts, and Line Voltage Variations

IEC 61000-4-11, Ed. 2 (2004-03);
KN 61000-4-11 (2008-5);
RRL Notice No. 2008-4 (May 20, 2008);
IEC 61000-4-11; EN 61000-4-11; KN 61000-4-11;
KS C 9610-4-11

Ring Wave

IEC 61000-4-12, Ed. 2 (2006-09);
EN 61000-4-12:2006;
IEC 61000-4-12; EN 61000-4-12; KN 61000-4-12;
IEEE STD C62.41.2 2002

Generic and Product Specific EMC Standards

IEC/EN 61000-6-1; AS/NZS 61000-6-1; KN 61000-6-1;
KS C 9610-6-1; IEC/EN 61000-6-2; AS/NZS 61000-6-2;
KN 61000-6-2; KS C 9610-6-2; IEC/EN 61000-6-3;
AS/NZS 61000-6-3; KN 61000-6-3; KS C 9610-6-3;
IEC/EN 61000-6-4; AS/NZS 61000-6-4; KN 61000-6-4;
KS C 9610-6-4; EN 50130-4; EN 61326-1; EN 50121-3-2;
EN 12895; EN 50270; EN 50491-1; EN 50491-2; EN 50491-3;
EN 55015; EN 60730-1; EN 60945; IEC 60533;
EN 61326-2-6; EN 61800-3; IEC/CISPR 14-2; EN 55014-2;
AS/NZS CISPR 14.2; KN 14-2; KS C 9814-2;
IEC/CISPR 24; AS/NZS CISPR 24; EN 55024; KN 24;
IEC/CISPR 35; AS/NZS CISPR 35; EN 55035; KN 35;
KS C 9835; IEC 60601-1-2; JIS T0601-1-2

TxRx EMC Requirements

EN 301 489-1; EN 301 489-3; EN 301 489-9;
EN 301 489-17; EN 301 489-19; EN 301 489-20

Test Technology:
Test Method(s) ¹:
European Radio Test Standards

ETSI EN 300 086-1; ETSI EN 300 086-2;
ETSI EN 300 113-1; ETSI EN 300 113-2;
ETSI EN 300 220-1; ETSI EN 300 220-2;
ETSI EN 300 220-3-1; ETSI EN 300 220-3-2;
ETSI EN 300 330-1; ETSI EN 300 330-2;
ETSI EN 300 440-1; ETSI EN 300 440-2;
ETSI EN 300 422-1; ETSI EN 300 422-2;
ETSI EN 300 328; ETSI EN 301 893;
ETSI EN 301 511; ETSI EN 301 908-1;
ETSI EN 908-2; ETSI EN 908-13;
ETSI EN 303 413; ETSI EN 302 502;
EN 303 340; EN 303 345-2; EN 303 345-3; EN 303 345-4

Canadian Radio Tests

RSS-102 measurement (RF Exposure Evaluation);
RSS-102 measurement (Nerve Stimulation);
SPR-002; RSS-111; RSS-112; RSS-117; RSS-119; RSS-123;
RSS-125; RSS-127; RSS-130; RSS-131; RSS-132; RSS-133;
RSS-134; RSS-135; RSS-137; RSS-139; RSS-140; RSS-141;
RSS-142; RSS-170; RSS-181; RSS-182; RSS-191; RSS-192;
RSS-194; RSS-195; RSS-196; RSS-197; RSS-199; RSS-210;
RSS-211; RSS-213; RSS-215; RSS-216; RSS-220; RSS-222;
RSS-236; RSS-238; RSS-243; RSS-244; RSS-247; RSS-248;
RSS-251; RSS-252; RSS-287; RSS-288; RSS-310; RSS-GEN

Mexico Radio Tests

IFT-008-2015; NOM-208-SCFI-2016

Japan Radio Tests

Radio Law No. 131, Ordinance of MPT No. 37, 1981,
MIC Notification No. 88:2004, Table No. 22-11;
ARIB STD-T66, Regulation 18

Taiwan Radio Tests

LP-0002 (July 15, 2020)

Australia/New Zealand Radio Tests

AS/NZS 4268; Radiocommunications (Short Range Devices)
Standard (2014)

Hong Kong Radio Tests

HKCA 1039 Issue 6; HKCA 1042; HKCA 1033 Issue 7;
HKCA 1061; HKCA 1008; HKCA 1043; HKCA 1057;
HKCA 1073

Korean Radio Test Standards

KN 301 489-1; KN 301 489-3; KN 301 489-9;
KN 301 489-17; KN 301 489-52; KS X 3124; KS X 3125;
KS X 3130; KS X 3126; KS X 3129

Vietnam Radio Test Standards

QCVN 47:2015/BTTTT; QCVN 54:2020/BTTTT;
QCVN 55:2011/BTTTT; QCVN 65:2013/BTTTT;
QCVN 73:2013/BTTTT; QCVN 74:2020/BTTTT;
QCVN 112:2017/BTTTT; QCVN 117:2020/BTTTT

Vietnam EMC Test Standards

QCVN 18:2014/BTTTT; QCVN 86:2019/BTTTT;
QCVN 96:2015/BTTTT; QCVN 118:2018/BTTTT

Test Technology:
Test Method(s) ¹:

Unlicensed Radio Frequency Devices
(3 Meter Semi-Anechoic Room)

47 CFR FCC Part 15C, 15D, 15E, 15F, 15G, 15H
(using ANSI C63.10:2013, ANSI C63.17:2013 and
FCC KDB 905462 D02 (v02))

Licensed Radio Service Equipment

47 CFR FCC Parts 20, 22, 24, 25, 27, 30, 73, 74, 80, 87,
90, 95, 96, 97, 101 (using ANSI/TIA-603-E,
TIA-102.CAAA-E, ANSI C63.26:2015)

OIA (Over the Air) Performance

GSM, GPRS, EGPRS
UMTS (W-CDMA)
LTE including CAT M1
A-GPS for UMTS/GSM
LTS A-GPS, A-GLONASS,
SIB8/SIB16
Large Device/Laptop/Tablet Testing
Integrated Device Testing
WiFi 802.11 a/b/g/n/a

CTIA Test Plan for Wireless Device Over-the-Air
Performance (Method for Measurement for Radiated Power
and Receiver Performance) V3.8.2;
CTIA Test Plan for RF Performance Evaluation of WiFi
Mobile Converged Devices V2.1.0

***Electrical Measurements and
Simulation***
AC Voltage / Current

(1mV to 5kV) 60 Hz
(0.1V to 250V) up to 500 MHz
(1μA to 150A) 60 Hz

FAA AC 150/5345-10H

FAA AC 150/5345-43J

FAA AC 150/5345-44K

DC Voltage / Current

(1mV to 15-kV) / (1μA to 10A)

FAA AC 150/5345-46E

FAA AC 150/5345-47C

Power Factor / Efficiency / Crest Factor

(Power to 30kW)

FAA EB 67D

Resistance

(1mΩ to 4000MΩ)

Surge

(Up to 10 kV / 5 kA) (Combination
Wave and Ring Wave)

On the following products and materials:

Telecommunications Terminal Equipment (TTE), Radio Equipment, Network Equipment, Information Technology Equipment (ITE), Automotive Electronic Equipment, Automotive Hybrid Electronic Devices, Maritime Navigation and Radio Communication Equipment and Systems, Vehicles, Boats and Internal Combustion Engine Driven Devices, Automotive, Aviation, and General Lighting Products, Medical Electrical Equipment, Motors, Industrial, Scientific and Medical (ISM) Radio-Frequency Equipment, Household Appliances, Electric Tools, Low-voltage Switchgear and Control gear, Programmable Controllers, Electrical Equipment for Measurement, Control and Laboratory Use, Base Materials, Power and Data Transmission Cables and Connectors

¹ When the date, edition, version, etc. is not identified in the scope of accreditation, laboratories may use the version that immediately precedes the current version for a period of one year from the date of publication of the standard measurement method, per part C., Section 1 of A2LA R101 - General Requirements- Accreditation of ISO-IEC 17025 Laboratories.

Testing Activities Performed in Support of FCC Certification in Accordance with 47 Code of Federal Regulations and FCC KDB 974614, Appendix A, Table A.1²

Rule Subpart/Technology	Test Method	Maximum Frequency (MHz)
<u>Unintentional Radiators</u> Part 15B	ANSI C63.4:2014	40000
<u>Industrial, Scientific, and Medical Equipment</u> Part 18	FCC MP-5 (February 1986)	40000
<u>Intentional Radiators</u> Part 15C	ANSI C63.10:2013	40000
<u>Unlicensed Personal Communication Systems Devices</u> Part 15D	ANSI C63.17:2013	40000
<u>U-NII without DFS Intentional Radiators</u> Part 15E	ANSI C63.10:2013	40000
<u>U-NII with DFS Intentional Radiators</u> Part 15E	FCC KDB 905462 D02 (v02)	40000
<u>UWB Intentional Radiators</u> Part 15F	ANSI C63.10:2013	40000
<u>BPL Intentional Radiators</u> Part 15G	ANSI C63.10:2013	40000
<u>White Space Device Intentional Radiators</u> Part 15H	ANSI C63.10:2013	40000
<u>Commercial Mobile Services (FCC Licensed Radio Service Equipment)</u> Parts 22 (cellular), 24, 25 (below 3 GHz), and 27	ANSI/TIA-603-E; TIA-102.CAAA-E; ANSI C63.26:2015	40000
<u>General Mobile Radio Services (FCC Licensed Radio Service Equipment)</u> Parts 22 (non-cellular), 90 (below 3 GHz), 95, 97, and 101 (below 3 GHz)	ANSI/TIA-603-E; TIA-102.CAAA-E; ANSI C63.26:2015	40000
<u>Citizens Broadband Radio Services (FCC Licensed Radio Service Equipment)</u> Part 96	ANSI/TIA-603-E; TIA-102.CAAA-E; ANSI C63.26:2015	40000

(A2LA Cert. No. 1786.01) Revised 06/07/2023

 Page 7 of 8

Testing Activities Performed in Support of FCC Certification in Accordance with 47 Code of Federal Regulations and FCC KDB 974614, Appendix A, Table A.1²

Rule Subpart/Technology	Test Method	Maximum Frequency (MHz)
<u>Maritime and Aviation Radio Services</u> Parts 80 and 87	ANSI/TIA-603-E; ANSI C63.26:2015	40000
<u>Microwave and Millimeter Bands Radio Services</u> Parts 25, 30, 74, 90 (above 3 GHz), 97 (above 3 GHz), and 101	ANSI/TIA-603-E; TIA-102.CAAA-E; ANSI C63.26:2015	40000
<u>Broadcast Radio Services</u> Parts 73 and 74 (below 3 GHz)	ANSI/TIA-603-E; TIA-102.CAAA-E; ANSI C63.26:2015	40000
<u>Signal Boosters</u> Part 20 (Wideband Consumer Signal Boosters, Provider-specific signal boosters, and Industrial Signal Boosters) Section 90.219	ANSI C63.26:2015	40000

² Accreditation does not imply acceptance to the FCC equipment authorization program. Please see the FCC website (<https://apps.fcc.gov/oetcf/eas/>) for a listing of FCC approved laboratories.



Accredited Laboratory

A2LA has accredited

ELITE ELECTRONIC ENGINEERING INC.

Downers Grove, IL

for technical competence in the field of

Electrical Testing

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 *General requirements for the competence of testing and calibration laboratories*. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communiqué dated April 2017).



Presented this 19th day of May 2021.



Mr. Trace McInturff, Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 1786.01
Valid to August 31, 2023
Revised June 7, 2023

For the tests to which this accreditation applies, please refer to the laboratory's Electrical Scope of Accreditation.