NORTHWEST EMC

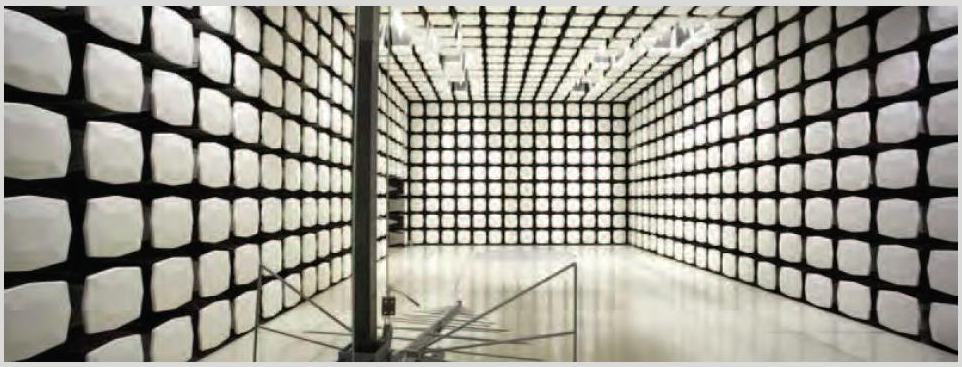
Cardiocom

CD310 Commander Flex

FCC 15.207:2014

FCC 15.249:2014

Report # CCOM0010



NVLAP Lab Code: 200881-0

CERTIFICATE OF TEST

NORTHWEST EMC
2014-12-10

Last Date of Test: January 02, 2015
Cardiocom
Model: CD310 Commander Flex

Radio Equipment Testing

Standards

Specification	Method
FCC 15.207:2014	ANSI C63.10:2009
FCC 15.249:2014	ANSI C63.10:2009

Results

Method Clause	Test Description	Applied	Results	Comments
6.2	Powerline Conducted Emissions	Yes	Pass	
6.5, 6.6	Field Strength of Fundamental	Yes	Pass	
6.5, 6.6	Field Strength of Harmonics and Spurious Radiated Emissions	Yes	Pass	

Deviations From Test Standards

None

Approved By:

Tim O'Shea, Operations Manager

Product compliance is the responsibility of the client; therefore, the tests and equipment modes of operation represented in this report were agreed upon by the client, prior to testing. The results of this test pertain only to the sample(s) tested. The specific description is noted in each of the individual sections of the test report supporting this certificate of test.

REVISION HISTORY

NORTHWEST EMC
REV 2014.10.14

Revision Number	Description	Date	Page Number
00	None		

ACCREDITATIONS AND AUTHORIZATIONS

REV 2014.10.08

United States

FCC - Designated by the FCC as a Telecommunications Certification Body (TCB). Certification chambers, Open Area Test Sites, and conducted measurement facilities are listed with the FCC.

A2LA - Accredited by A2LA to ISO / IEC Guide 65 as a product certifier. This allows Northwest EMC to certify transmitters to FCC and IC specifications.

NVLAP - Each laboratory is accredited by NVLAP to ISO 17025

Canada

IC - Recognized by Industry Canada as a Certification Body (CB). Certification chambers and Open Area Test Sites are filed with IC.

European Union

European Commission – Validated by the European Commission as a Conformity Assessment Body (CAB) under the EMC directive and as a Notified Body under the R&TTE Directive.

Australia/New Zealand

ACMA - Recognized by ACMA as a CAB for the acceptance of test data.

Korea

MSIP / RRA - Recognized by KCC's RRA as a CAB for the acceptance of test data.

Japan

VCCI - Associate Member of the VCCI. Conducted and radiated measurement facilities are registered.

Taiwan

BSMI – Recognized by BSMI as a CAB for the acceptance of test data.

NCC - Recognized by NCC as a CAB for the acceptance of test data.

Singapore

IDA – Recognized by IDA as a CAB for the acceptance of test data.

Israel

MOC – Recognized by MOC as a CAB for the acceptance of test data.

Hong Kong

OFTA – Recognized by OFTA as a CAB for the acceptance of test data.

Vietnam

MIC – Recognized by MIC as a CAB for the acceptance of test data.

SCOPE

For details on the Scopes of our Accreditations, please visit:
http://www.nwemc.com/accreditations/

MEASUREMENT UNCERTAINTY

TMU.2014.12.03

Measurement Uncertainty

When a measurement is made, the result will be different from the true or theoretically correct value. The difference is the result of tolerances in the measurement system that cannot be completely eliminated. To the extent that technology allows us, it has been our aim to minimize this error. Measurement uncertainty is a statistical expression of measurement error qualified by a probability distribution.

A measurement uncertainty estimation has been performed for each test per our internal quality document WP 342. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty (K=2) for each test is on each data sheet. Our measurement data meets or exceeds the measurement uncertainty requirements of the applicable specification; therefore, the test data can be compared directly to the specification limit to determine compliance. The calculations for estimating measurement uncertainty are based upon ETSI TR 100 028 (or CISPR 16-4-2 as applicable), and are available upon request.

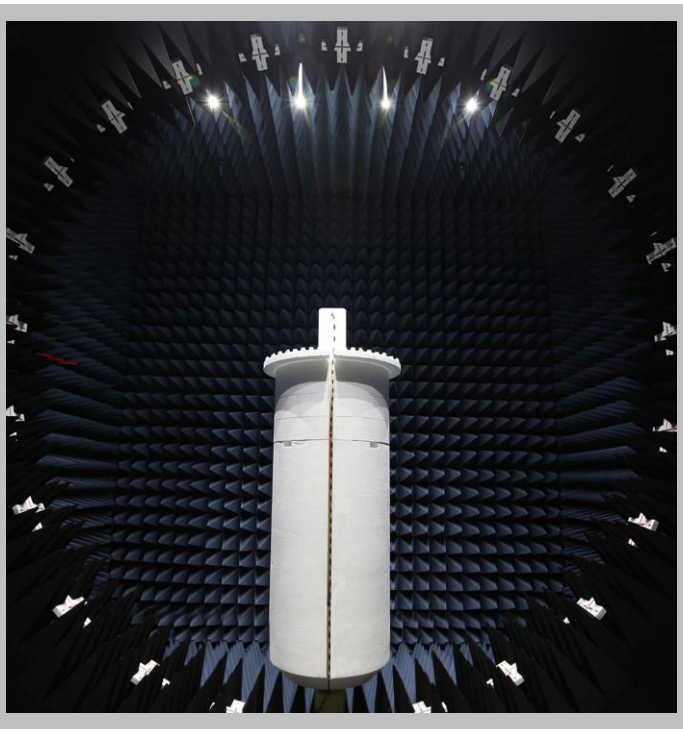
The following table represents the Measurement Uncertainty (MU) budgets for each of the tests that may be contained in this report.

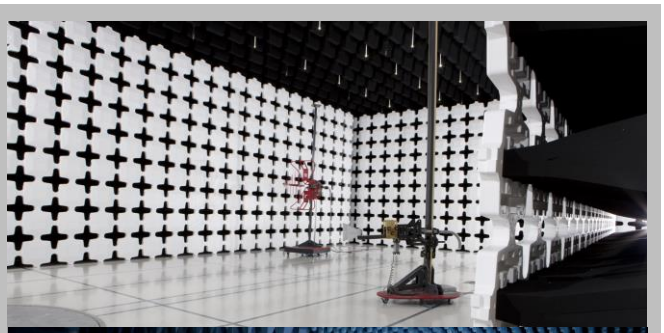
Test	+ MU	- MU
Frequency Accuracy (Hz)	0.0007%	-0.0007%
Amplitude Accuracy (dB)	1.2 dB	-1.2 dB
Conducted Power (dB)	0.3 dB	-0.3 dB
Radiated Power via Substitution (dB)	0.7 dB	-0.7 dB
Temperature (degrees C)	0.7°C	-0.7°C
Humidity (% RH)	2.5% RH	-2.5% RH
Voltage (AC)	1.0%	-1.0%
Voltage (DC)	0.7%	-0.7%
Field Strength (dB)	4.7 dB	-4.7 dB
AC Powerline Conducted Emissions (dB)	2.9 dB	-2.9 dB

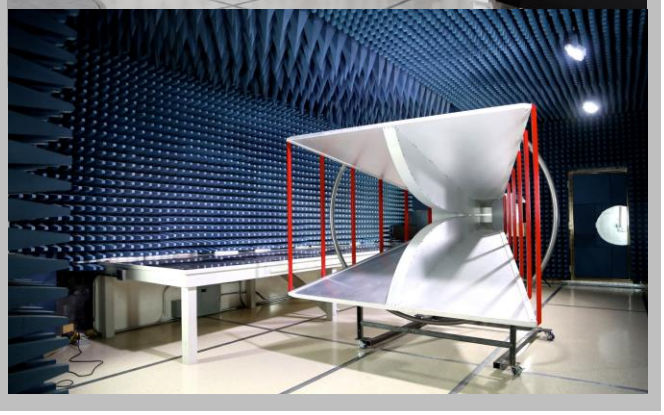
FACILITIES

REV 2015.1.05

California	Minnesota	New York	Oregon	Texas	Washington
Labs OC01-13 41 Tesla Irvine, CA 92618 (949) 861-8918	Labs MN01-08, MN10 9349 W Broadway Ave. Brooklyn Park, MN 55445 (612)-638-5136	Labs NY01-04 4939 Jordan Rd. Elbridge, NY 13060 (315) 685-0796	Labs EV01-12 22975 NW Evergreen Pkwy Hillsboro, OR 97124 (503) 844-4066	Labs TX01-09 3801 E Plano Pkwy Plano, TX 75074 (469) 304-5255	Labs NC01-05 19201 120th Ave NE Bothell, WA 9801 (425)984-6600
NVLAP					
NVLAP Lab Code: 200676-0	NVLAP Lab Code: 200881-0	NVLAP Lab Code: 200761-0	NVLAP Lab Code: 200630-0	NVLAP Lab Code:201049-0	NVLAP Lab Code: 200629-0
Industry Canada					
2834B-1, 2834B-3	2834E-1	N/A	2834D-1, 2834D-*2*	2834G-1	2834F-1
BSMI					
SL2-IN-E-1154R	SL2-IN-E-1152R	N/A	SL2-IN-E-1017	SL2-IN-E-1158R	SL2-IN-E-1153R
VCCI					
A-0029	A-0109	N/A	A-0108	A-0201	A-0110







PRODUCT DESCRIPTION

NORTHWEST EMC
2014-12-10

Client and Equipment Under Test (EUT) Information

Company Name:	Cardiocom
Address:	7980 Century Blvd
City, State, Zip:	Chanhassen, MN 55317
Test Requested By:	Viet Vuong
Model:	CD310 Commander Flex
First Date of Test:	December 30, 2014
Last Date of Test:	January 02, 2015
Receipt Date of Samples:	December 30, 2014
Equipment Design Stage:	Production Released
Equipment Condition:	No Damage

Information Provided by the Party Requesting the Test

Functional Description of the EUT:
The CD310 Commander Flex is the host/hub that collects bio-metric data and sends them to a centralized server.

Testing Objective:
Seeking to demonstrate compliance under FCC 15.249 for operation in the 2400 - 2483.5 MHz Band.

CONFIGURATIONS

NORTHWEST EMC 2014-12-10

Configuration CCOM0010- 1

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Bio-metric Data Hub	Cardiocom	CD310 Commander Flex	1000036633
DC Brick	Shenzen Fujia Appliance Co. LTD.	FJ-SW0701100U	None

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Scale	Cardiocom	SC100 Scale	None
Mouse	Dell	0X7636	None
Pulse Oximeter	Cardiocom	100027-001A	1P104033
Serial Cradle	nSpire Health, Inc	662114	None

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
DC Power	No	4.80m	Yes	DC Brick	Bio-metric Data Hub
Scale Cable	Yes	2.00m	No	Scale	Bio-metric Data Hub
3.5mm Phone (x2)	No	0.90m	No	Unterminated	Bio-metric Data Hub
3.5mm Phone	No	1.20m	No	Pulse Oximeter	Bio-metric Data Hub
PS/2 to 3.5mm Phone	Yes	0.90m	No	Unterminated	Bio-metric Data Hub
PS/2 to Serial	Yes	0.20m	No	Serial Cable	Bio-metric Data Hub
USB	Yes	1.80m	No	Mouse	Bio-metric Data Hub
Serial	Yes	1.50m	No	Serial Cradle	PS/2 to Serial Cable

MODIFICATIONS

NORTHWEST EMC
2014-12-10

Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	12/30/2014	Field Strength of Fundamental	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
2	12/30/2014	Field Strength of Harmonics and Spurious Radiated Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
3	1/2/2015	Powerline Conducted Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

POWERLINE CONDUCTED EMISSIONS

NORTHWEST EMC
WTD.2014.10.14
PSA-ESCI 2014.09.10, EmiR5 2014.11.10

TEST DESCRIPTION

Using the mode of operation and configuration noted within this report, conducted emissions tests were performed. The frequency range investigated (scanned), is also noted in this report. Conducted power line measurements are made, unless otherwise specified, over the frequency range from 150 kHz to 30 MHz to determine the line-to-ground radio-noise voltage that is conducted from the EUT power-input terminals that are directly (or indirectly via separate transformer or power supplies) connected to a public power network. Equipment is tested with power cords that are normally used or that have electrical or shielding characteristics that are the same as those cords normally used. Typically those measurements are made using a LISN (Line Impedance Stabilization Network), the 50 Ω measuring port is terminated by a 50 Ω EMI meter or a 50 Ω resistive load. All 50 Ω measuring ports of the LISN are terminated by 50Ω.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Receiver	Rohde & Schwarz	ESR7	ARI	05/06/2014	12 mo
LISN	Solar Electronics	9252-50-R-24-BNC	LIY	05/15/2014	12 mo
High Pass Filter	TTE	H97-100K-50-720B	HGN	05/23/2014	12 mo
Attenuator 20dB, BNC	Fairview Microwave	SA01B-20	AQP	07/22/2014	12 mo
MN03 Cables	ESM Cable Corp.	Conducted Cables	MNC	11/20/2014	12 mo

MEASUREMENT UNCERTAINTY

Description		
Expanded k=2	2.4 dB	-2.4 dB

CONFIGURATIONS INVESTIGATED

CCOM0010-1

MODES INVESTIGATED

Transmitting High Channel: 2478.5 MHz
Transmitting Low Channel: 2473.5 MHz
Transmitting Mid Channel: 2475.5 MHz

POWERLINE CONDUCTED EMISSIONS

NORTHWEST EMC
WTD.2014.10.14
PSA-ESCI 2014.09.10, EmiR5 2014.11.10

EUT:	CD310 Commander Flex	Work Order:	CCOM0010
Serial Number:	1000036633	Date:	01/02/2015
Customer:	Cardiocom	Temperature:	23.7°C
Attendees:	None	Relative Humidity:	15%
Customer Project:	None	Bar. Pressure:	1023 mb
Tested By:	Johnathan Lee	Job Site:	MN03
Power:	110VAC/60Hz	Configuration:	CCOM0010-1

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2014	ANSI C63.10:2009

TEST PARAMETERS

Run #:	4	Line:	High Line	Ext. Attenuation (dB):	20

COMMENTS

None

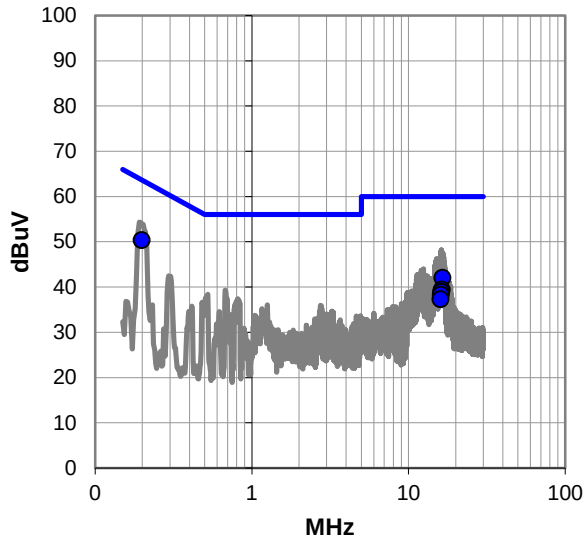
EUT OPERATING MODES

Transmitting Low Channel: 2473.5 MHz

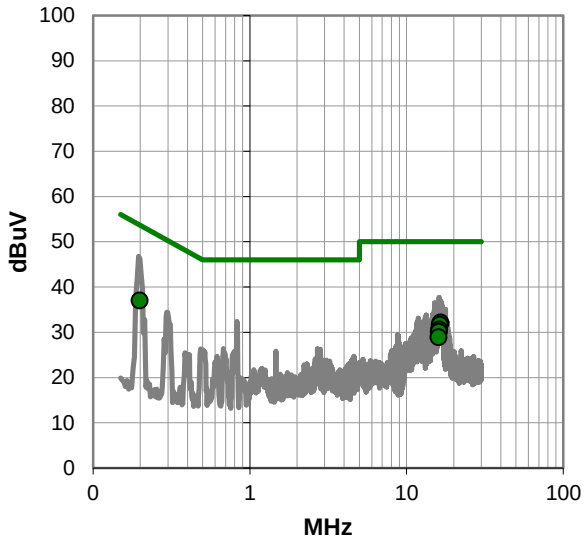
DEVIATIONS FROM TEST STANDARD

None

Quasi Peak Data - vs - Quasi Peak Limit



Average Data - vs - Average Limit



POWERLINE CONDUCTED EMISSIONS

NORTHWEST EMC

WTD.2014.10.14
PSA-ESCI 2014.09.10, EmiR5 2014.11.10

RESULTS - Run #4

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.198	30.2	20.1	50.3	63.7	-13.4
16.462	20.9	21.2	42.1	60.0	-17.9
16.336	18.3	21.1	39.4	60.0	-20.6
16.218	17.8	21.1	38.9	60.0	-21.1
16.127	17.2	21.1	38.3	60.0	-21.7
16.056	16.2	21.1	37.3	60.0	-22.7

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.198	16.9	20.1	37.0	53.7	-16.7
16.462	11.0	21.2	32.2	50.0	-17.8
16.336	10.5	21.1	31.6	50.0	-18.4
16.218	9.5	21.1	30.6	50.0	-19.4
16.127	9.0	21.1	30.1	50.0	-19.9
16.056	7.8	21.1	28.9	50.0	-21.1

CONCLUSION

Pass

Tested By

POWERLINE CONDUCTED EMISSIONS

NORTHWEST EMC
WTD.2014.10.14
PSA-ESCI 2014.09.10, EmiR5 2014.11.10

EUT:	CD310 Commander Flex	Work Order:	CCOM0010
Serial Number:	1000036633	Date:	01/02/2015
Customer:	Cardiocom	Temperature:	23.7°C
Attendees:	None	Relative Humidity:	15%
Customer Project:	None	Bar. Pressure:	1023 mb
Tested By:	Johnathan Lee	Job Site:	MN03
Power:	110VAC/60Hz	Configuration:	CCOM0010-1

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2014	ANSI C63.10:2009

TEST PARAMETERS

Run #:	5	Line:	Neutral	Ext. Attenuation (dB):	20

COMMENTS

None

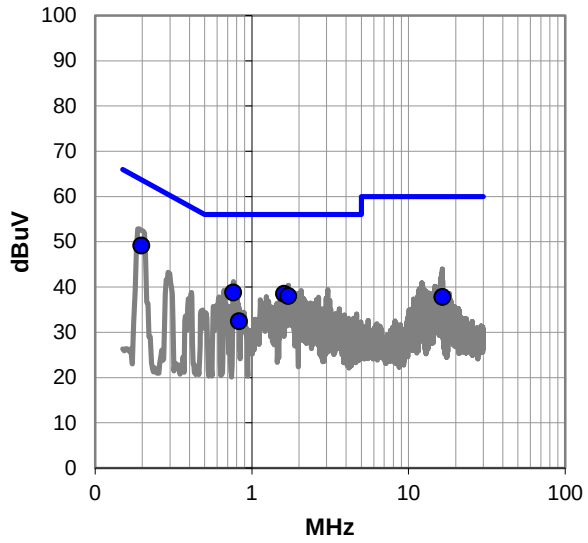
EUT OPERATING MODES

Transmitting Low Channel: 2473.5 MHz

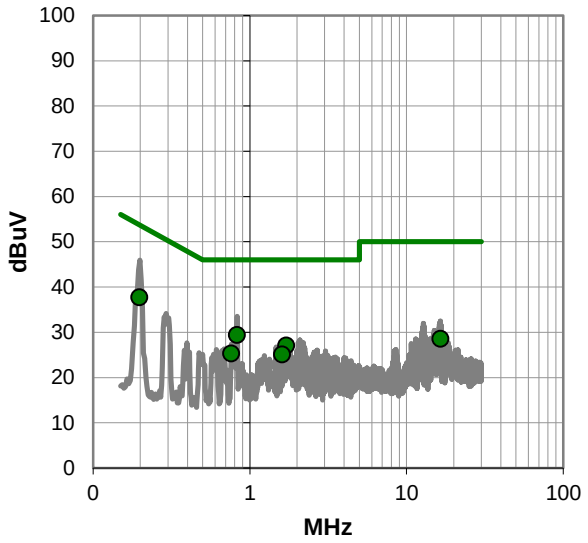
DEVIATIONS FROM TEST STANDARD

None

Quasi Peak Data - vs - Quasi Peak Limit



Average Data - vs - Average Limit



POWERLINE CONDUCTED EMISSIONS

NORTHWEST EMC
WTD.2014.10.14
PSA-ESCI 2014.09.10, EmiR5 2014.11.10

RESULTS - Run #5

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.198	29.0	20.1	49.1	63.7	-14.6
0.760	18.6	20.2	38.8	56.0	-17.2
1.610	18.2	20.3	38.5	56.0	-17.5
1.706	17.7	20.3	38.0	56.0	-18.0
16.473	16.6	21.2	37.8	60.0	-22.2
0.828	12.2	20.2	32.4	56.0	-23.6

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.198	17.6	20.1	37.7	53.7	-16.0
0.828	9.2	20.2	29.4	46.0	-16.6
1.706	6.8	20.3	27.1	46.0	-18.9
0.760	5.1	20.2	25.3	46.0	-20.7
1.610	4.8	20.3	25.1	46.0	-20.9
16.473	7.4	21.2	28.6	50.0	-21.4

CONCLUSION

Pass

Tested By

POWERLINE CONDUCTED EMISSIONS

NORTHWEST EMC
WTD.2014.10.14
PSA-ESCI 2014.09.10, EmiR5 2014.11.10

EUT:	CD310 Commander Flex	Work Order:	CCOM0010
Serial Number:	1000036633	Date:	01/02/2015
Customer:	Cardiocom	Temperature:	23.7°C
Attendees:	None	Relative Humidity:	15%
Customer Project:	None	Bar. Pressure:	1023 mb
Tested By:	Johnathan Lee	Job Site:	MN03
Power:	110VAC/60Hz	Configuration:	CCOM0010-1

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2014	ANSI C63.10:2009

TEST PARAMETERS

Run #:	6	Line:	Neutral	Ext. Attenuation (dB):	20

COMMENTS

None

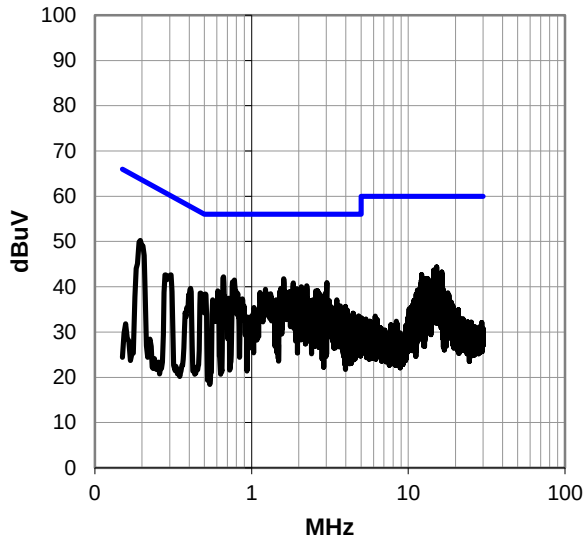
EUT OPERATING MODES

Transmitting Mid Channel: 2475.5 MHz

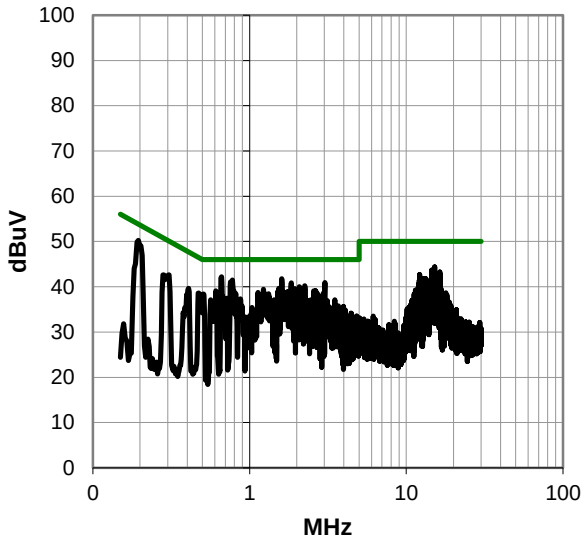
DEVIATIONS FROM TEST STANDARD

None

Peak Data - vs - Quasi Peak Limit



Peak Data - vs - Average Limit



POWERLINE CONDUCTED EMISSIONS

NORTHWEST EMC
WTD.2014.10.14
PSA-ESCI 2014.09.10, EmiR5 2014.11.10

RESULTS - Run #6

Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.195	30.1	20.1	50.2	63.8	-13.6
0.661	22.0	20.2	42.2	56.0	-13.8
1.605	21.5	20.3	41.8	56.0	-14.2
0.777	21.3	20.2	41.5	56.0	-14.5
0.754	20.9	20.2	41.1	56.0	-14.9
3.023	20.6	20.3	40.9	56.0	-15.1
1.844	20.6	20.3	40.9	56.0	-15.1
15.189	23.4	21.0	44.4	60.0	-15.6
2.254	19.9	20.3	40.2	56.0	-15.8
15.088	23.1	21.0	44.1	60.0	-15.9
2.079	19.7	20.3	40.0	56.0	-16.0
14.581	22.7	21.0	43.7	60.0	-16.3
1.538	19.4	20.3	39.7	56.0	-16.3
2.127	19.3	20.3	39.6	56.0	-16.4
1.948	19.3	20.3	39.6	56.0	-16.4
1.228	19.2	20.2	39.4	56.0	-16.6
16.349	22.1	21.1	43.2	60.0	-16.8
2.638	18.8	20.3	39.1	56.0	-16.9
2.564	18.8	20.3	39.1	56.0	-16.9
2.101	18.8	20.3	39.1	56.0	-16.9
0.609	18.9	20.2	39.1	56.0	-16.9
14.872	22.1	21.0	43.1	60.0	-16.9
14.752	22.1	21.0	43.1	60.0	-16.9
14.670	22.1	21.0	43.1	60.0	-16.9
15.312	22.0	21.0	43.0	60.0	-17.0
1.795	18.7	20.3	39.0	56.0	-17.0

Peak Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.195	30.1	20.1	50.2	53.8	-3.6
0.661	22.0	20.2	42.2	46.0	-3.8
1.605	21.5	20.3	41.8	46.0	-4.2
0.777	21.3	20.2	41.5	46.0	-4.5
0.754	20.9	20.2	41.1	46.0	-4.9
3.023	20.6	20.3	40.9	46.0	-5.1
1.844	20.6	20.3	40.9	46.0	-5.1
15.189	23.4	21.0	44.4	50.0	-5.6
2.254	19.9	20.3	40.2	46.0	-5.8
15.088	23.1	21.0	44.1	50.0	-5.9
2.079	19.7	20.3	40.0	46.0	-6.0
14.581	22.7	21.0	43.7	50.0	-6.3
1.538	19.4	20.3	39.7	46.0	-6.3
2.127	19.3	20.3	39.6	46.0	-6.4
1.948	19.3	20.3	39.6	46.0	-6.4
1.228	19.2	20.2	39.4	46.0	-6.6
16.349	22.1	21.1	43.2	50.0	-6.8
2.638	18.8	20.3	39.1	46.0	-6.9
2.564	18.8	20.3	39.1	46.0	-6.9
2.101	18.8	20.3	39.1	46.0	-6.9
0.609	18.9	20.2	39.1	46.0	-6.9
14.872	22.1	21.0	43.1	50.0	-6.9
14.752	22.1	21.0	43.1	50.0	-6.9
14.670	22.1	21.0	43.1	50.0	-6.9
15.312	22.0	21.0	43.0	50.0	-7.0
1.795	18.7	20.3	39.0	46.0	-7.0

CONCLUSION

Pass

Tested By

POWERLINE CONDUCTED EMISSIONS

NORTHWEST EMC
WTD.2014.10.14
PSA-ESCI 2014.09.10, EmiR5 2014.11.10

EUT:	CD310 Commander Flex	Work Order:	CCOM0010
Serial Number:	1000036633	Date:	01/02/2015
Customer:	Cardiocom	Temperature:	23.7°C
Attendees:	None	Relative Humidity:	15%
Customer Project:	None	Bar. Pressure:	1023 mb
Tested By:	Johnathan Lee	Job Site:	MN03
Power:	110VAC/60Hz	Configuration:	CCOM0010-1

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2014	ANSI C63.10:2009

TEST PARAMETERS

Run #:	7	Line:	High Line	Ext. Attenuation (dB):	20

COMMENTS

None

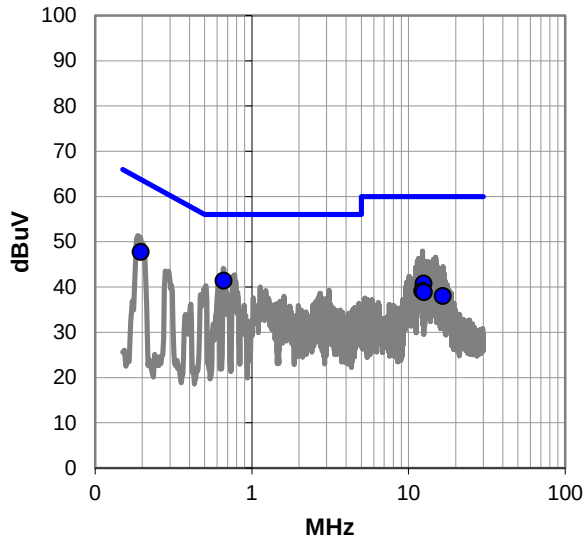
EUT OPERATING MODES

Transmitting Mid Channel: 2475.5 MHz

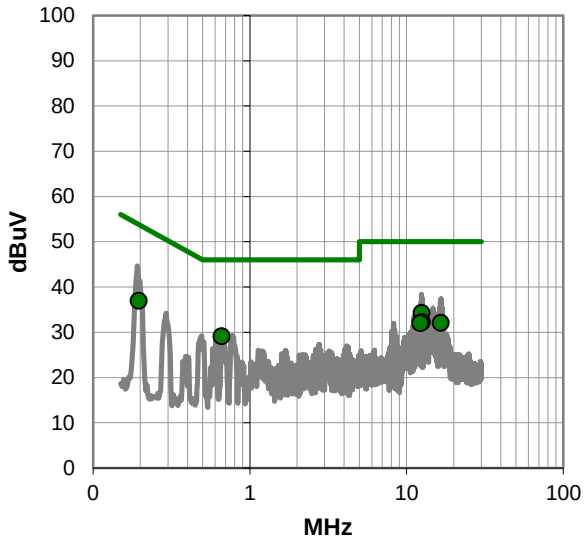
DEVIATIONS FROM TEST STANDARD

None

Quasi Peak Data - vs - Quasi Peak Limit



Average Data - vs - Average Limit



POWERLINE CONDUCTED EMISSIONS

NORTHWEST EMC
WTD.2014.10.14
PSA-ESCI 2014.09.10, EmiR5 2014.11.10

RESULTS - Run #7

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.662	21.2	20.2	41.4	56.0	-14.6
0.195	27.6	20.1	47.7	63.8	-16.1
12.488	19.9	20.8	40.7	60.0	-19.3
12.287	18.3	20.8	39.1	60.0	-20.9
12.531	18.0	20.8	38.8	60.0	-21.2
16.575	16.8	21.2	38.0	60.0	-22.0

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
12.488	13.4	20.8	34.2	50.0	-15.8
0.195	16.8	20.1	36.9	53.8	-16.9
0.662	8.9	20.2	29.1	46.0	-16.9
12.531	11.4	20.8	32.2	50.0	-17.8
16.575	10.9	21.2	32.1	50.0	-17.9
12.287	11.2	20.8	32.0	50.0	-18.0

CONCLUSION

Pass

Tested By

POWERLINE CONDUCTED EMISSIONS

NORTHWEST EMC
WTD.2014.10.14
PSA-ESCI 2014.09.10, EmiR5 2014.11.10

EUT:	CD310 Commander Flex	Work Order:	CCOM0010
Serial Number:	1000036633	Date:	01/02/2015
Customer:	Cardiocom	Temperature:	23.7°C
Attendees:	None	Relative Humidity:	15%
Customer Project:	None	Bar. Pressure:	1023 mb
Tested By:	Johnathan Lee	Job Site:	MN03
Power:	110VAC/60Hz	Configuration:	CCOM0010-1

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2014	ANSI C63.10:2009

TEST PARAMETERS

Run #:	8	Line:	High Line	Ext. Attenuation (dB):	20

COMMENTS

None

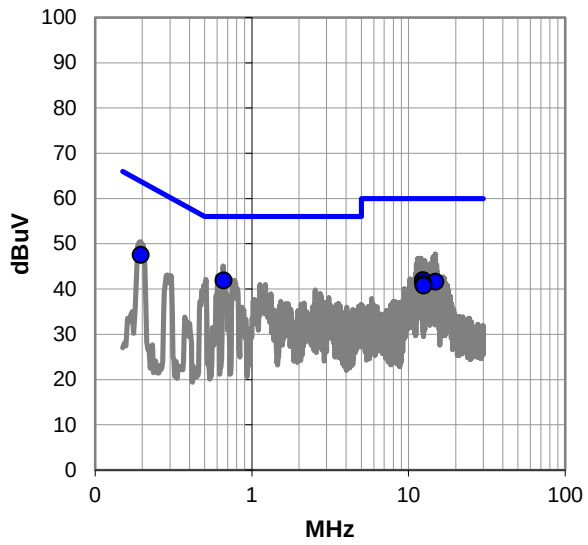
EUT OPERATING MODES

Transmitting High Channel: 2478.5 MHz

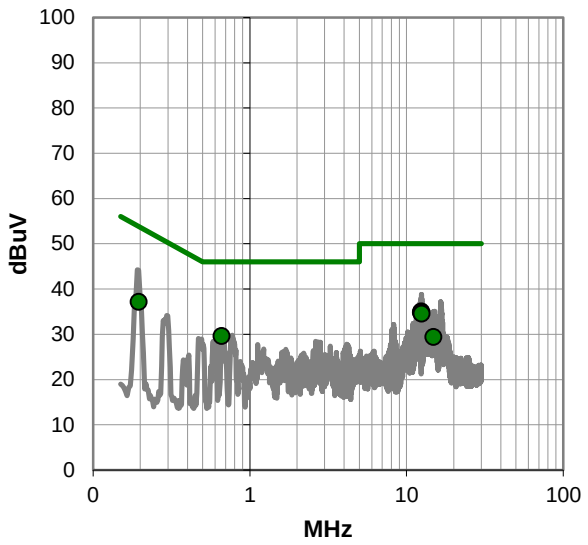
DEVIATIONS FROM TEST STANDARD

None

Quasi Peak Data - vs - Quasi Peak Limit



Average Data - vs - Average Limit



POWERLINE CONDUCTED EMISSIONS

NORTHWEST EMC
WTD.2014.10.14
PSA-ESCI 2014.09.10, EmiR5 2014.11.10

RESULTS - Run #8

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.661	21.7	20.2	41.9	56.0	-14.1
0.195	27.4	20.1	47.5	63.8	-16.3
12.400	21.1	20.8	41.9	60.0	-18.1
14.843	20.6	21.0	41.6	60.0	-18.4
12.449	20.4	20.8	41.2	60.0	-18.8
12.495	19.9	20.8	40.7	60.0	-19.3

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
12.449	14.2	20.8	35.0	50.0	-15.0
12.400	14.0	20.8	34.8	50.0	-15.2
12.495	13.7	20.8	34.5	50.0	-15.5
0.661	9.4	20.2	29.6	46.0	-16.4
0.195	17.0	20.1	37.1	53.8	-16.7
14.843	8.4	21.0	29.4	50.0	-20.6

CONCLUSION

Pass

Tested By

POWERLINE CONDUCTED EMISSIONS

NORTHWEST EMC
WTD.2014.10.14
PSA-ESCI 2014.09.10, EmiR5 2014.11.10

EUT:	CD310 Commander Flex	Work Order:	CCOM0010
Serial Number:	1000036633	Date:	01/02/2015
Customer:	Cardiocom	Temperature:	23.7°C
Attendees:	None	Relative Humidity:	15%
Customer Project:	None	Bar. Pressure:	1023 mb
Tested By:	Johnathan Lee	Job Site:	MN03
Power:	110VAC/60Hz	Configuration:	CCOM0010-1

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2014	ANSI C63.10:2009

TEST PARAMETERS

Run #:	9	Line:	Neutral	Ext. Attenuation (dB):	20

COMMENTS

None

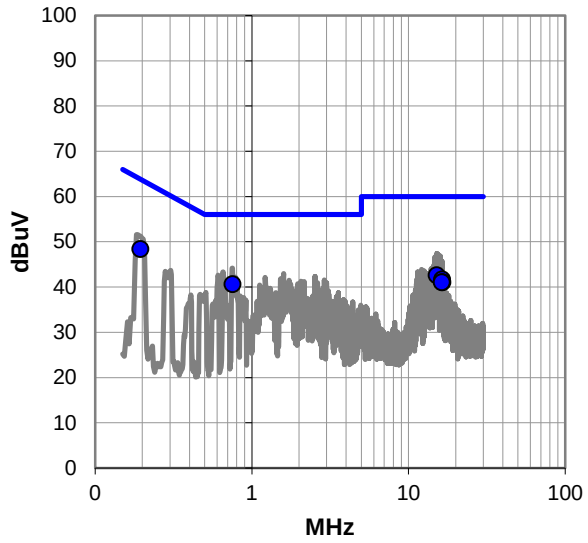
EUT OPERATING MODES

Transmitting High Channel: 2478.5 MHz

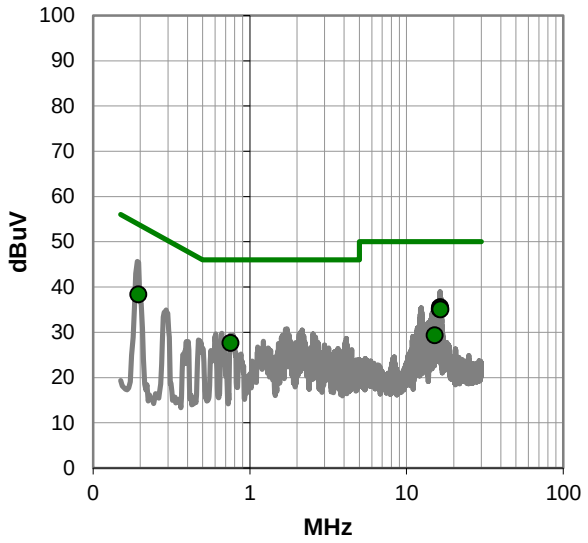
DEVIATIONS FROM TEST STANDARD

None

Quasi Peak Data - vs - Quasi Peak Limit



Average Data - vs - Average Limit



POWERLINE CONDUCTED EMISSIONS

NORTHWEST EMC
WTD.2014.10.14
PSA-ESCI 2014.09.10, EmiR5 2014.11.10

RESULTS - Run #9

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.753	20.4	20.2	40.6	56.0	-15.4
0.195	28.2	20.1	48.3	63.8	-15.5
15.186	21.6	21.0	42.6	60.0	-17.4
16.404	20.5	21.1	41.6	60.0	-18.4
16.500	19.9	21.2	41.1	60.0	-18.9
16.305	19.9	21.1	41.0	60.0	-19.0

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
16.404	14.4	21.1	35.5	50.0	-14.5
16.305	14.0	21.1	35.1	50.0	-14.9
16.500	13.9	21.2	35.1	50.0	-14.9
0.195	18.2	20.1	38.3	53.8	-15.5
0.753	7.4	20.2	27.6	46.0	-18.4
15.186	8.3	21.0	29.3	50.0	-20.7

CONCLUSION

Pass

Tested By

FIELD STRENGTH OF FUNDAMENTAL

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

MODES OF OPERATION

Transmitting Low Channel (2473.5 MHz), Mid Channel (2475.5), High channel (2478.5 MHz)

POWER SETTINGS INVESTIGATED

110VAC/60Hz

CONFIGURATIONS INVESTIGATED

CCOM0010 - 1

FREQUENCY RANGE INVESTIGATED

Start Frequency	2400 MHz	Stop Frequency	2483.5 MHz

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Spectrum Analyzer	Agilent	N9010A	AFI	1/27/2013	24 mo
MN05 Cables	ESM Cable Corp.	Double Ridge Guide Horn Cables	MNI	3/14/2014	12 mo
Antenna, Horn	ETS	3115	AJA	6/3/2014	24 mo

TEST DESCRIPTION

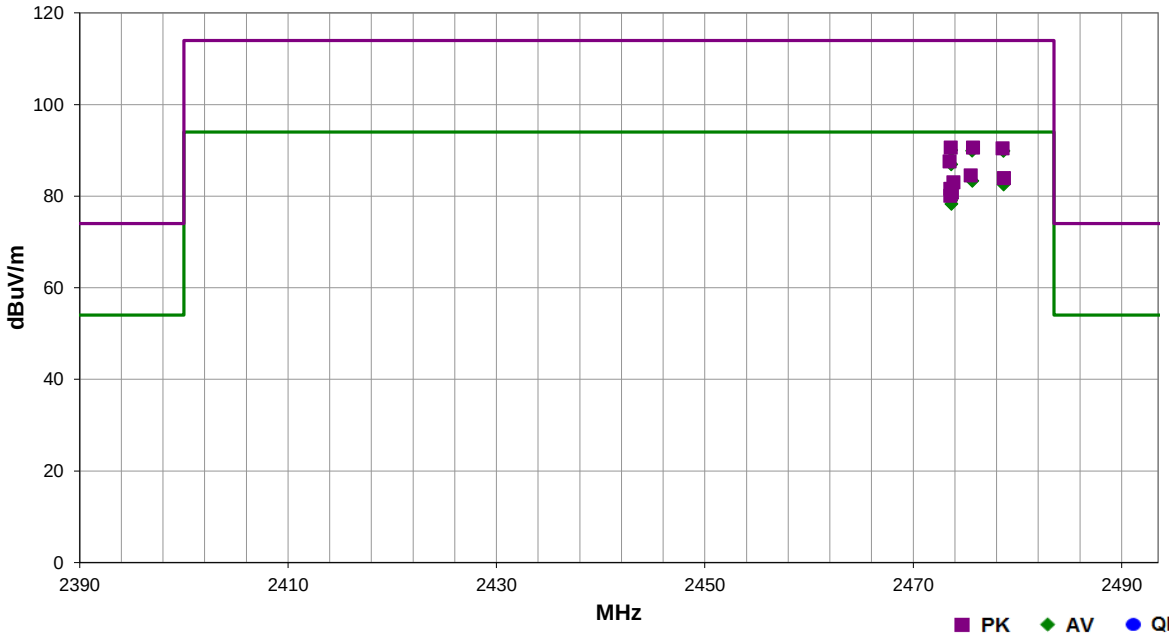
The antennas to be used with the EUT were tested. The EUT was transmitting and while set at the lowest channel, a middle channel, and the highest channel available. While scanning, emissions from the EUT were maximized by rotating the EUT, adjusting the measurement antenna height and polarization, and manipulating the EUT and EUT antenna in 3 orthogonal planes (per ANSI C63.10:2009).

FIELD STRENGTH OF FUNDAMENTAL

Work Order:	CCOM0010	**Date:**	12/30/14		
Project:	None	**Temperature:**	23.4 °C		
Job Site:	MN05	**Humidity:**	13% RH		
Serial Number:	1000036633	**Barometric Pres.:**	1043.6 mbar	**Tested by:**	Johnathan Lee
EUT:	CD310 Commander Flex				
Configuration:	1				
Customer:	Cardiocom				
Attendees:	None				
EUT Power:	110VAC/60Hz				
Operating Mode:	Transmitting Low Channel (2473.5 MHz), Mid Channel (2475.5), High channel (2478.5 MHz)				
Deviations:	None				
Comments:	None				

Test Specifications	**Test Method**
FCC 15.249:2014	ANSI C63.10:2009

Run #	0	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
2473.658	54.9	35.1	1.0	297.0	3.0	0.0	Vert	AV	0.0	90.0	94.0	-4.0	EUT On Side, Low Ch
2475.650	54.8	35.1	1.0	297.0	3.0	0.0	Vert	AV	0.0	89.9	94.0	-4.1	EUT On Side, Mid Ch
2478.658	54.7	35.1	1.0	297.0	3.0	0.0	Vert	AV	0.0	89.8	94.0	-4.2	EUT On Side, High Ch
2473.650	51.8	35.1	1.0	15.1	3.0	0.0	Horz	AV	0.0	86.9	94.0	-7.1	EUT Horz, Low Ch
2475.675	48.2	35.1	1.0	15.1	3.0	0.0	Horz	AV	0.0	83.3	94.0	-10.7	EUT Horz, Mid Ch
2478.683	47.4	35.1	1.0	15.1	3.0	0.0	Horz	AV	0.0	82.5	94.0	-11.5	EUT Horz, High Ch
2473.667	46.6	35.1	1.0	8.1	3.0	0.0	Horz	AV	0.0	81.7	94.0	-12.3	EUT Vertical, Low Ch
2473.625	45.1	35.1	1.0	125.0	3.0	0.0	Horz	AV	0.0	80.2	94.0	-13.8	EUT On Side, Low Ch
2473.650	44.0	35.1	1.0	256.0	3.0	0.0	Vert	AV	0.0	79.1	94.0	-14.9	EUT Vertical, Low Ch
2473.675	43.2	35.1	1.0	78.0	3.0	0.0	Vert	AV	0.0	78.3	94.0	-15.7	EUT Horz, Low Ch
2475.742	55.5	35.1	1.0	297.0	3.0	0.0	Vert	PK	0.0	90.6	114.0	-23.4	EUT On Side, Mid Ch
2473.592	55.5	35.1	1.0	297.0	3.0	0.0	Vert	PK	0.0	90.6	114.0	-23.4	EUT On Side, Low Ch
2478.567	55.3	35.1	1.0	297.0	3.0	0.0	Vert	PK	0.0	90.4	114.0	-23.6	EUT On Side, High Ch
2473.483	52.5	35.1	1.0	15.1	3.0	0.0	Horz	PK	0.0	87.6	114.0	-26.4	EUT Horz, Low Ch
2475.508	49.4	35.1	1.0	15.1	3.0	0.0	Horz	PK	0.0	84.5	114.0	-29.5	EUT Horz, Mid Ch
2478.708	48.8	35.1	1.0	15.1	3.0	0.0	Horz	PK	0.0	83.9	114.0	-30.1	EUT Horz, High Ch
2473.850	47.9	35.1	1.0	8.1	3.0	0.0	Horz	PK	0.0	83.0	114.0	-31.0	EUT Vertical, Low Ch
2473.567	46.5	35.1	1.0	125.0	3.0	0.0	Horz	PK	0.0	81.6	114.0	-32.4	EUT On Side, Low Ch
2473.708	45.7	35.1	1.0	256.0	3.0	0.0	Vert	PK	0.0	80.8	114.0	-33.2	EUT Vertical, Low Ch
2473.558	45.0	35.1	1.0	78.0	3.0	0.0	Vert	PK	0.0	80.1	114.0	-33.9	EUT Horz, Low Ch

FIELD STRENGTH OF HARMONICS AND SPURIOUS RADIATED EMISSIONS

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

MODES OF OPERATION

Transmitting Low Channel (2473.5 MHz), Mid Channel (2475.5), High channel (2478.5 MHz)

POWER SETTINGS INVESTIGATED

110VAC/60Hz

CONFIGURATIONS INVESTIGATED

CCOM0010 - 1

FREQUENCY RANGE INVESTIGATED

Start Frequency	30 MHz	Stop Frequency	26000 MHz

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
High Pass Filter	Micro-Tronics	HPM50111	HGQ	5/15/2014	12 mo
Attenuator, 20 dB, 'SMA'	SM Electronics	SA6-20	REO	5/15/2014	12 mo
Pre-Amplifier	Miteq	JSD4-18002600-26-8P	APU	10/3/2014	12 mo
MN05 Cable	N/A	18-26GHz Standard Gain Horn Cable	MNP	10/3/2014	12 mo
Antenna, Horn	ETS	3160-09	AHG	NCR	0 mo
Pre-Amplifier	Miteq	AMF-6F-12001800-30-10P	AVW	3/14/2014	12 mo
Antenna, Horn	ETS Lindgren	3160-08	AIQ	NCR	0 mo
Spectrum Analyzer	Agilent	N9010A	AFI	1/27/2013	24 mo
MN05 Cables	ESM Cable Corp.	Standard Gain Horn Cables	MNJ	3/14/2014	12 mo
Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	AVV	3/14/2014	12 mo
Antenna, Horn	ETS	3160-07	AXP	NCR	0 mo
Pre-Amplifier	Miteq	AMF-3D-00100800-32-13P	AVX	3/14/2014	12 mo
MN05 Cables	ESM Cable Corp.	Double Ridge Guide Horn Cables	MNI	3/14/2014	12 mo
Antenna, Horn	ETS	3115	AJA	6/3/2014	24 mo
Pre-Amplifier	Miteq	AM-1616-1000	PAD	3/14/2014	12 mo
MN05 Cables	ESM Cable Corp.	Bilog Cables	MNH	3/14/2014	12 mo
Antenna, Biconilog	Teseq	CBL 6141B	AYD	12/17/2013	24 mo

MEASUREMENT BANDWIDTHS

Frequency Range (MHz)	Peak Data (kHz)	Quasi-Peak Data (kHz)	Average Data (kHz)
0.01 - 0.15	1.0	0.2	0.2
0.15 - 30.0	10.0	9.0	9.0
30.0 - 1000	100.0	120.0	120.0
Above 1000	1000.0	N/A	1000.0

TEST DESCRIPTION

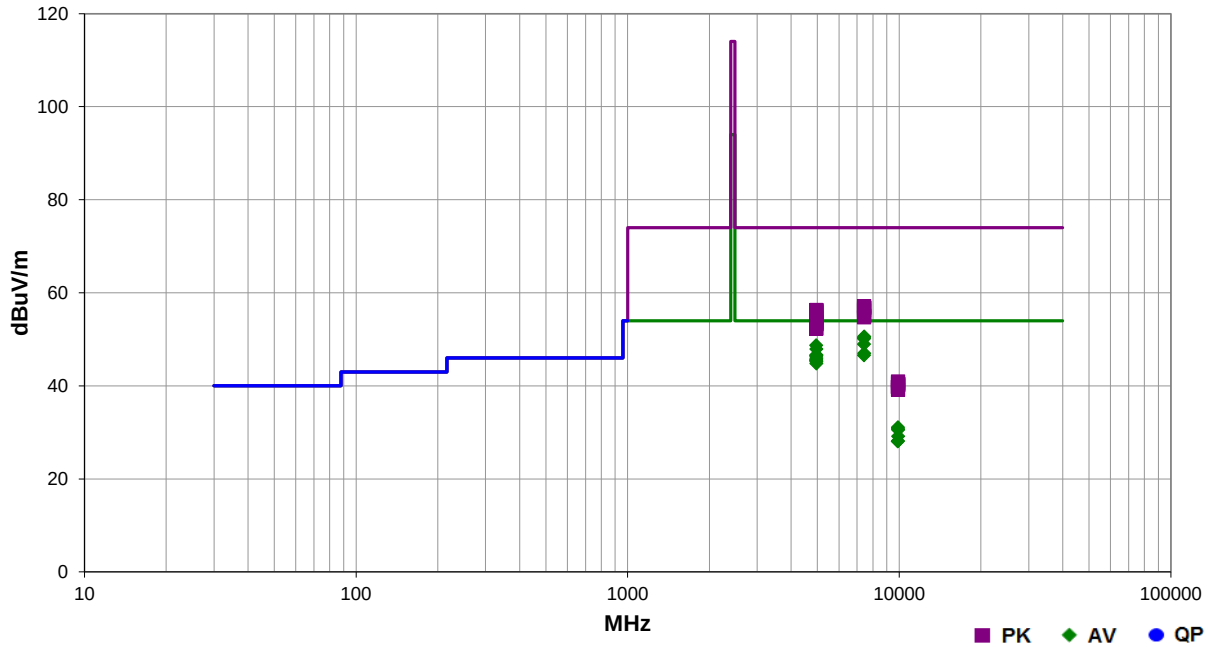
The antennas to be used with the EUT were tested. The EUT was transmitting and receiving while set at the lowest channel, a middle channel, and the highest channel available. While scanning, emissions from the EUT were maximized by rotating the EUT, adjusting the measurement antenna height and polarization, and manipulating the EUT antenna in 3 orthogonal planes (per ANSI C63.10:2009). A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.

FIELD STRENGTH OF HARMONICS AND SPURIOUS RADIATED EMISSIONS

Work Order:	CCOM0010	**Date:**	12/30/14		
Project:	None	**Temperature:**	23.4 °C		
Job Site:	MN05	**Humidity:**	23.8% RH		
Serial Number:	1000036633	**Barometric Pres.:**	1046 mbar	**Tested by:**	Johnathan Lee
EUT:	CD310 Commander Flex				
Configuration:	1				
Customer:	Cardiocom				
Attendees:	None				
EUT Power:	110VAC/60Hz				
Operating Mode:	Transmitting Low Channel (2473.5 MHz), Mid Channel (2475.5), High channel (2478.5 MHz)				
Deviations:	None				
Comments:	None				

Test Specifications	**Test Method**
FCC 15.249:2014	ANSI C63.10:2009

Run #	12	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
7435.950	37.6	13.0	1.0	303.0	3.0	0.0	Horz	AV	0.0	50.6	54.0	-3.4	EUT Horz, High Ch
7426.942	37.4	12.9	1.3	300.0	3.0	0.0	Horz	AV	0.0	50.3	54.0	-3.7	EUT Horz, Mid Ch
7420.925	37.2	12.9	1.0	301.9	3.0	0.0	Horz	AV	0.0	50.1	54.0	-3.9	EUT Horz, Low Ch
7421.000	36.0	12.9	1.9	229.0	3.0	0.0	Vert	AV	0.0	48.9	54.0	-5.1	EUT On Side, Low Ch
4951.383	43.8	4.9	1.2	43.0	3.0	0.0	Horz	AV	0.0	48.7	54.0	-5.3	EUT Horz, Mid Ch
4957.358	43.0	4.9	1.0	45.0	3.0	0.0	Horz	AV	0.0	47.9	54.0	-6.1	EUT Horz, High Ch
7435.942	34.0	13.0	1.0	299.0	3.0	0.0	Vert	AV	0.0	47.0	54.0	-7.0	EUT On Side, High Ch
4957.375	41.7	4.9	1.5	93.0	3.0	0.0	Vert	AV	0.0	46.6	54.0	-7.4	EUT On Side, High Ch
4957.258	41.7	4.9	1.2	307.9	3.0	0.0	Horz	AV	0.0	46.6	54.0	-7.4	EUT Vertical, High Ch
7427.025	33.6	12.9	1.0	293.9	3.0	0.0	Vert	AV	0.0	46.5	54.0	-7.5	EUT On Side, Mid Ch
4947.317	41.5	4.9	1.2	326.9	3.0	0.0	Horz	AV	0.0	46.4	54.0	-7.6	EUT Horz, Low Ch
4957.417	41.0	4.9	1.0	50.0	3.0	0.0	Vert	AV	0.0	45.9	54.0	-8.1	EUT Horz, High Ch
4951.283	40.7	4.9	1.5	88.1	3.0	0.0	Vert	AV	0.0	45.6	54.0	-8.4	EUT On Side, Mid Ch
4947.258	40.5	4.9	1.5	87.1	3.0	0.0	Vert	AV	0.0	45.4	54.0	-8.6	EUT On Side, Low Ch
4957.392	40.3	4.9	1.0	134.1	3.0	0.0	Vert	AV	0.0	45.2	54.0	-8.8	EUT Vertical, High Ch
4957.350	39.9	4.9	1.0	229.0	3.0	0.0	Horz	AV	0.0	44.8	54.0	-9.2	EUT On Side, High Ch
7426.917	44.2	12.9	1.3	300.0	3.0	0.0	Horz	PK	0.0	57.1	74.0	-16.9	EUT Horz, Mid Ch
7436.083	43.8	13.0	1.0	303.0	3.0	0.0	Horz	PK	0.0	56.8	74.0	-17.2	EUT Horz, High Ch
7421.117	43.8	12.9	1.0	301.9	3.0	0.0	Horz	PK	0.0	56.7	74.0	-17.3	EUT Horz, Low Ch
4949.342	51.4	4.9	1.2	326.9	3.0	0.0	Horz	PK	0.0	56.3	74.0	-17.7	EUT Horz, Low Ch

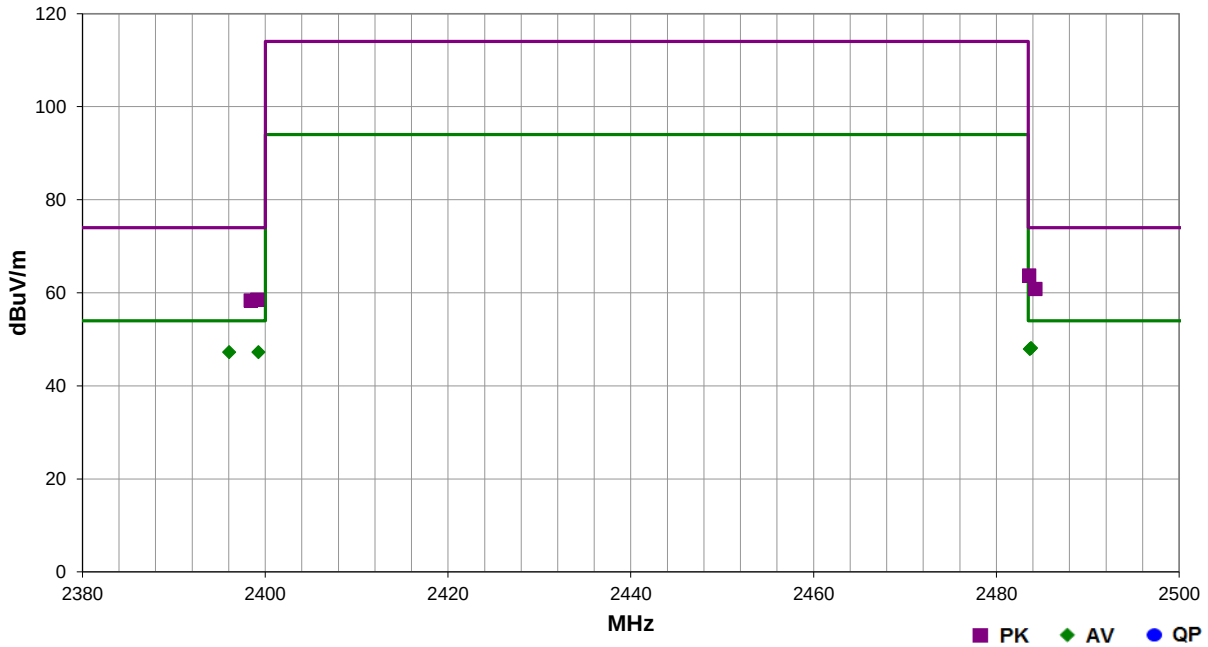
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
4951.500	51.4	4.9	1.2	43.0	3.0	0.0	Horz	PK	0.0	56.3	74.0	-17.7	EUT Horz, Mid Ch
7421.242	43.3	12.9	1.9	229.0	3.0	0.0	Vert	PK	0.0	56.2	74.0	-17.8	EUT On Side, Low Ch
4956.292	51.3	4.9	1.2	307.9	3.0	0.0	Horz	PK	0.0	56.2	74.0	-17.8	EUT Vertical, High Ch
4957.292	50.9	4.9	1.0	45.0	3.0	0.0	Horz	PK	0.0	55.8	74.0	-18.2	EUT Horz, High Ch
7435.792	42.1	13.0	1.0	299.0	3.0	0.0	Vert	PK	0.0	55.1	74.0	-18.9	EUT On Side, High Ch
7426.800	41.8	12.9	1.0	293.9	3.0	0.0	Vert	PK	0.0	54.7	74.0	-19.3	EUT On Side, Mid Ch
4958.758	49.8	4.9	1.5	93.0	3.0	0.0	Vert	PK	0.0	54.7	74.0	-19.3	EUT On Side, High Ch
4947.325	48.8	4.9	1.5	87.1	3.0	0.0	Vert	PK	0.0	53.7	74.0	-20.3	EUT On Side, Low Ch
4949.258	48.7	4.9	1.5	88.1	3.0	0.0	Vert	PK	0.0	53.6	74.0	-20.4	EUT On Side, Mid Ch
4957.175	48.5	4.9	1.0	50.0	3.0	0.0	Vert	PK	0.0	53.4	74.0	-20.6	EUT Horz, High Ch
4957.400	48.3	4.9	1.0	134.1	3.0	0.0	Vert	PK	0.0	53.2	74.0	-20.8	EUT Vertical, High Ch
4956.425	47.4	4.9	1.0	229.0	3.0	0.0	Horz	PK	0.0	52.3	74.0	-21.7	EUT On Side, High Ch
9902.608	38.7	-7.6	1.3	66.1	3.0	0.0	Horz	AV	0.0	31.1	54.0	-22.9	EUT Horz, Mid Ch
9902.525	38.4	-7.6	1.0	232.9	3.0	0.0	Vert	AV	0.0	30.8	54.0	-23.2	EUT On Side, Mid Ch
9914.550	38.2	-7.7	1.3	25.0	3.0	0.0	Horz	AV	0.0	30.5	54.0	-23.5	EUT Horz, High Ch
9914.575	36.8	-7.7	1.0	282.0	3.0	0.0	Vert	AV	0.0	29.1	54.0	-24.9	EUT On Side, High Ch
9894.625	35.8	-7.6	1.0	120.1	3.0	0.0	Horz	AV	0.0	28.2	54.0	-25.8	EUT Horz, Low Ch
9893.100	35.7	-7.6	1.0	76.1	3.0	0.0	Vert	AV	0.0	28.1	54.0	-25.9	EUT On Side, Low Ch
9903.492	48.6	-7.6	1.3	66.1	3.0	0.0	Horz	PK	0.0	41.0	74.0	-33.0	EUT Horz, Mid Ch
9901.983	48.2	-7.6	1.0	232.9	3.0	0.0	Vert	PK	0.0	40.6	74.0	-33.4	EUT On Side, Mid Ch
9914.692	48.1	-7.7	1.3	25.0	3.0	0.0	Horz	PK	0.0	40.4	74.0	-33.6	EUT Horz, High Ch
9912.350	47.8	-7.7	1.0	282.0	3.0	0.0	Vert	PK	0.0	40.1	74.0	-33.9	EUT On Side, High Ch
9892.667	47.4	-7.6	1.0	76.1	3.0	0.0	Vert	PK	0.0	39.8	74.0	-34.2	EUT On Side, Low Ch
9894.767	46.8	-7.6	1.0	120.1	3.0	0.0	Horz	PK	0.0	39.2	74.0	-34.8	EUT Horz, Low Ch

FIELD STRENGTH OF HARMONICS AND SPURIOUS RADIATED EMISSIONS

Work Order:	CCOM0010	**Date:**	12/30/14		
Project:	None	**Temperature:**	23.4 °C		
Job Site:	MN05	**Humidity:**	23.8% RH		
Serial Number:	1000036633	**Barometric Pres.:**	1046 mbar	**Tested by:**	Johnathan Lee
EUT:	CD310 Commander Flex				
Configuration:	1				
Customer:	Cardiocom				
Attendees:	None				
EUT Power:	110VAC/60Hz				
Operating Mode:	Transmitting Low Channel (2473.5 MHz), High Channel, (2478.5 MHz)				
Deviations:	None				
Comments:	None				

Test Specifications	**Test Method**
FCC 15.249:2014	ANSI C63.10:2009

Run #	16	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
2483.808	31.1	-3.0	1.0	267.0	3.0	20.0	Vert	AV	0.0	48.1	54.0	-5.9	EUT On Side, High Ch
2483.675	30.9	-3.0	1.0	340.9	3.0	20.0	Horz	AV	0.0	47.9	54.0	-6.1	EUT Horz, High Ch
2396.067	30.6	-3.4	1.0	54.0	3.0	20.0	Horz	AV	0.0	47.2	54.0	-6.8	EUT Horz, Low Ch
2399.258	30.6	-3.4	1.0	347.0	3.0	20.0	Vert	AV	0.0	47.2	54.0	-6.8	EUT On Side, Low Ch
2483.583	46.7	-3.0	1.0	267.0	3.0	20.0	Vert	PK	0.0	63.7	74.0	-10.3	EUT On Side, High Ch
2484.275	43.8	-3.0	1.0	340.9	3.0	20.0	Horz	PK	0.0	60.8	74.0	-13.2	EUT Horz, High Ch
2399.125	41.9	-3.4	1.0	54.0	3.0	20.0	Horz	PK	0.0	58.5	74.0	-15.5	EUT Horz, Low Ch
2398.417	41.7	-3.4	1.0	347.0	3.0	20.0	Vert	PK	0.0	58.3	74.0	-15.7	EUT On Side, Low Ch