



W66 N220 Commerce Court • Cedarburg, WI 53012
Phone: 262.375.4400 • Fax: 262.375.4248
www.lsr.com

ENGINEERING TEST REPORT #: 316171
LSR JOB #: C-2476

Compliance Testing of:

myCadian Watch

Test Date(s):

6/27/2016 7/07/2016 7/12/2016 8/9/2016 8/23/2016
6/29/2016 7/11/2016 8/4/2016 8/15/2016 8/31/2016

Prepared For:

CurAegis Technologies, Inc.
Attn: Matt Kenyon
1999 Mt. Read Blvd. Bldg. 3
Rochester, New York 14615

This Test Report is issued under the Authority of:


John Johnston, EMC Engineer I

Signature: 

Date: 8/24/16

Reviewed by:

Michael Hintzke, EMC Engineer III

Signature: 

Date: 9/9/16

Project Engineer:

John Johnston, EMC Engineer I

Signature: _____ Date: 8/24/16

This Test Report may not be reproduced, except in full, without written approval of LS Research, LLC.

TABLE OF CONTENTS

TABLE OF CONTENTS.....	2
1.0 Client Information	5
1.1 Equipment Under Test (EUT) Information	5
1.2 Product Information.....	5
1.3 Modifications Incorporated In the EUT for Compliance Purposes	5
1.4 Deviations & Exclusions from Test Specifications	6
1.5 Additional Information	7
1.6 Conditions of Test	7
1.7 Test Equipment.....	7
2.0 Conformance Summary	8
3.0 – RF Conducted Measurements	9
3.1 – RF Conducted – Fundamental Bandwidth.....	10
4.0 – RF Conducted – Fundamental Power and Spectral Density	14
5.0 – RF Conducted – Spurious Emissions/ Band Edges	18
6.0 – RF Conducted – Frequency Stability.....	25
7.0 – RF Conducted – Duty Cycle	27
8.0 – Radiated Emissions.....	30
8.1 – Transmitter Band-Edge Restricted Band	31
8.2 – Transmitter Radiated Spurious Emissions in Restricted Bands.....	34
9.0 – Conducted Emissions.....	46
Appendix A – Test Equipment	51
Appendix B - Uncertainty Summary	54
Appendix C - References	55

Prepared For: CurAegis Technologies, Inc.	Name: myCadian Watch
Report: TR 316171	Model: MA0001-02
LSR: C-2476	Serial: B001/B003

LS Research, LLC in Review

As an EMC Testing Laboratory, our Accreditation and Assessments are recognized through the following:



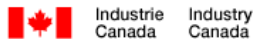
A2LA – American Association for Laboratory Accreditation

Accreditation based on ISO/IEC 17025: 2005 with Electrical (EMC) Scope of Accreditation
A2LA Certificate Number: 1255.01



Federal Communications Commission (FCC) – USA

Listing of two 3 Meter Semi-Anechoic Chamber based on Title 47 CFR – Part 2.948
FCC Registration Number: 90756



Industry Canada

On file, 3 Meter Semi-Anechoic Chamber based on RSS-GEN – Issue 4
File Number: IC 3088A-2
On file, 3 Meter Semi-Anechoic Chamber based on RSS-GEN – Issue 4
File Number: IC 3088A-3

Prepared For: CurAegis Technologies, Inc.	Name: myCadian Watch
Report: TR 316171	Model: MA0001-02
LSR: C-2476	Serial: B001/B003

Summary of Test Report

Between June 27, 2016 and August 23, 2016 the myCadian Watch, provided by CurAegis Technologies, was tested and MEETS the following requirements:

FCC and IC Paragraph	Test Requirements	Compliance (Yes/No)
FCC: 15.247 (a)(2) IC: RSS-247 sect. 5.2 (1) IC: RSS-Gen sect. 6.6	Minimum 6 dB Bandwidth / Occupied Bandwidth	Yes
FCC: 15.247 (b)(3) & 1.1310 IC: RSS-247 sect. 5.4 (4)	Maximum Output Power	Yes
FCC: 15.247 (e) IC: RSS-247 sect. 5.2 (2)	Power Spectral Density of a Digitally Modulated System	Yes
FCC: 15.247(d) IC: RSS-247 sect. 5.5	RF Conducted Spurious Emissions at the Transmitter Antenna Terminal	Yes
FCC: 15.209 & 15.205 IC: RSS-Gen sect 6.13	Transmitter Radiated Emissions	Yes
FCC: 2.1055 (d) IC: RSS Gen sect. 6.11	Frequency Stability	Yes
FCC : 15.207 IC : RSS Gen sect. 8.8	AC Power Line Conducted Emissions	Yes

Test Facilities

All testing was performed at:

LS Research, LLC
W66 N220 Commerce Court
Cedarburg, Wisconsin, 53012 USA

LS Research, LLC is accredited by A2LA (American Association for Laboratory Accreditation) to the requirements of ISO/IEC 17025, 2005 "General Requirements for the Competence of Calibration and Testing Laboratories".

LS Research, LLC's scope of accreditation includes all test methods listed herein, unless otherwise noted.

Prepared For: CurAegis Technologies, Inc.	Name: myCadian Watch
Report: TR 316171	Model: MA0001-02
LSR: C-2476	Serial: B001/B003

1.0 Client Information

Manufacturer Name:	CurAegis Technologies, Inc.
Address:	1999 Mt. Read Blvd. Bldg. 3 Rochester, New York 14615
Contact Person:	Matt Kenyon

1.1 Equipment Under Test (EUT) Information

The following information has been supplied by the applicant.

Product Name:	myCadian Watch
Model Number:	MA0001-02
Serial Number:	B001/B003

1.2 Product Information

The myCadian Watch is a wearable device consisting of physiological monitoring hardware. The myCadian Watch measures multiple metrics. The EUT also includes a battery cartridge and a 1 meter long, product specific, USB cable. The EUT includes a Cypress programmable system on chip (PSoC) 4 XX7 BLE radio.

1.3 Modifications Incorporated In the EUT for Compliance Purposes

To enable the myCadian Watch unit to charge when mounted to the charging station, the rear plastic shell cover of the myCadian Watch was removed, and solder was applied to the power terminals (i.e., first and fourth terminal illustrated in the four image of section 1.3, listed below). This modification allowed for more direct contact between the power terminals and the pads of the plastic shell terminal and, thus, enabled the myCadian Watch to charge when mounted to the charging station. Matt Kenyon authorized the aforementioned modifications.



Prepared For: CurAegis Technologies, Inc.	Name: myCadian Watch
Report: TR 316171	Model: MA0001-02
LSR: C-2476	Serial: B001/B003



1.4 Deviations & Exclusions from Test Specifications

None noted at time of test.

Prepared For: CurAegis Technologies, Inc.	Name: myCadian Watch
Report: TR 316171	Model: MA0001-02
LSR: C-2476	Serial: B001/B003

1.5 Additional Information

The EUT was programmed for continuous transmit (modulated or unmodulated) operation via a ribbon cable appended to a beta programming test board. The beta programming test board is serially connected to laptop computer utilizing the PuTTY open source terminal emulator via a serial to USB cable. The EUT is operable to continuously transmit without the beta programming test board after being programmed appropriately. Test channels include: Modulated (pseudorandom bit sequence (PRBS) Low Channel (2402 MHz), Modulated (PRBS) Mid Channel (2440 MHz), Modulated (PRBS) High Channel (2480 MHz), Unmodulated Low Channel Carrier (2402 MHz), Unmodulated Mid Channel Carrier (2440 MHz), and Unmodulated High Channel Carrier (2480 MHz).

Two myCadian Watch units were used during testing, one for radiated emission testing and one for conducted measurement testing. The unit conducted measurements were performed on, serial no. B003, includes an SMA connector cable that bypasses the unit's Yageo, 2.62 dBi gain antenna and, rather, serves to directly couple the unit's antenna port to the input of the spectrum analyzer (via a 10 dB attenuator). The unit radiated emission testing was performed on, serial no. B001, did not include such a connector but included the same Yageo, 2.62 dBi gain antenna.

The data represented within the following test report was obtained testing the following myCadian Watch model number: MA0001-02

1.6 Conditions of Test

Environmental:

Temperature: 20-25° C
Relative Humidity: 30-60%
Atmospheric Pressure: 86-106 kPa

1.7 Test Equipment

All test equipment is calibrated by a calibration laboratory accredited by A2LA to the requirements of ISO 17025. For a complete list of test equipment and calibration dates, see Appendix A. Unless otherwise noted, resolution bandwidth of measuring instrument used during testing for given frequency range, see below.

Frequency Range	Resolution Bandwidth
9 kHz – 150 kHz	200 Hz
150 kHz – 30 MHz	9 kHz
30 MHz – 1000 MHz	120 kHz
Above 1000 MHz	1 MHz

Prepared For: CurAegis Technologies, Inc.	Name: myCadian Watch
Report: TR 316171	Model: MA0001-02
LSR: C-2476	Serial: B001/B003

2.0 Conformance Summary

When tested on the specified dates, it was determined that the EUT was compliant with the requirements of FCC Title 47, CFR Part 15.247, 15.209, 15.207, and Industry Canada RSS-247, Issue 1 (2015), using the methods of ANSI C63.10 2013.

Any modifications made to the EUT after the specified test date(s) will invalidate the data herein.

If some measurements are seen to be within the uncertainty value, as listed in Appendix C there is a possibility that this unit may not meet the required limit specification if subsequently tested.

Prepared For: CurAegis Technologies, Inc.	Name: myCadian Watch
Report: TR 316171	Model: MA0001-02
LSR: C-2476	Serial: B001/B003

3.0 – RF Conducted Measurements

Manufacturer	CurAegis Technologies, Inc.
Test Location	LS Research, LLC
Rule Part	FCC Part 15.247 / RSS-247
General Measurement Procedure	FCC KDB 558074 D01 DTS Measurement Guidance v03r05 ANSI C63.10-2013
General Description of Measurement	A direct measurement of the transmitted signal was performed at the antenna port of the EUT via a cable connection to a spectrum analyzer. A 10 dB attenuator was placed in series with the cable to protect the spectrum analyzer. The attenuator was added on the analyzer as gain offset settings thereby allowing direct measurements, without the need for any further corrections. The EUT was configured to run in a continuous transmit mode, while being supplied with typical data as a modulation source.

Prepared For: CurAegis Technologies, Inc.	Name: myCadian Watch
Report: TR 316171	Model: MA0001-02
LSR: C-2476	Serial: B001/B003

3.1 – RF Conducted – Fundamental Bandwidth

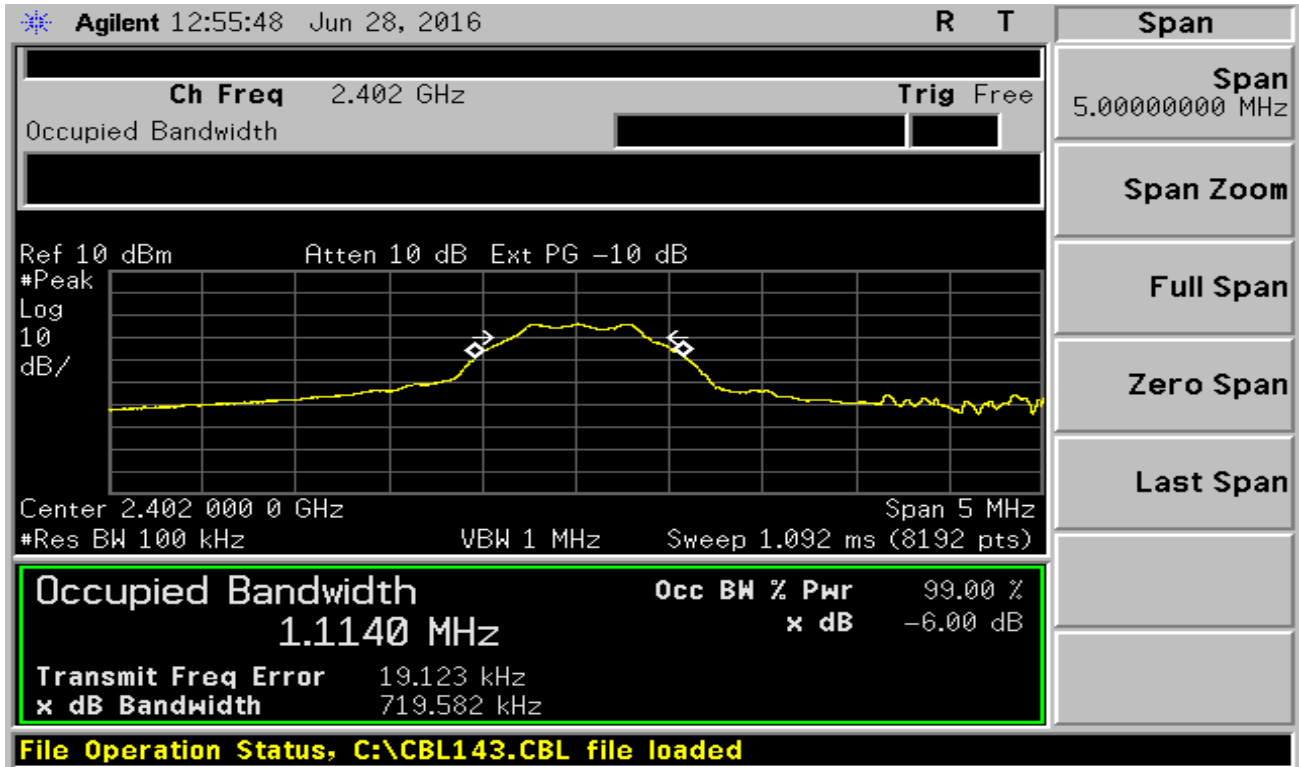
Manufacturer	CurAegis Technologies, Inc.
Date	6/28/2016 and 8/31/2016
Operator	Shane Dock and John Johnston
Temp. / R.H.	20 - 25° C / 30-60% R.H.
Rule Part	FCC Part 15.247 (a)(2) / RSS-247 sect. 5.2 (1)
Specific Measurement Procedure	FCC KDB 558074 Section 8.0 DTS bandwidth ANSI C63.10 2013 RSS-GEN Section 6.6
Additional Description of Measurement	Peak detector used
Additional Notes	1. Continuous transmit modulated used for this test.

Table

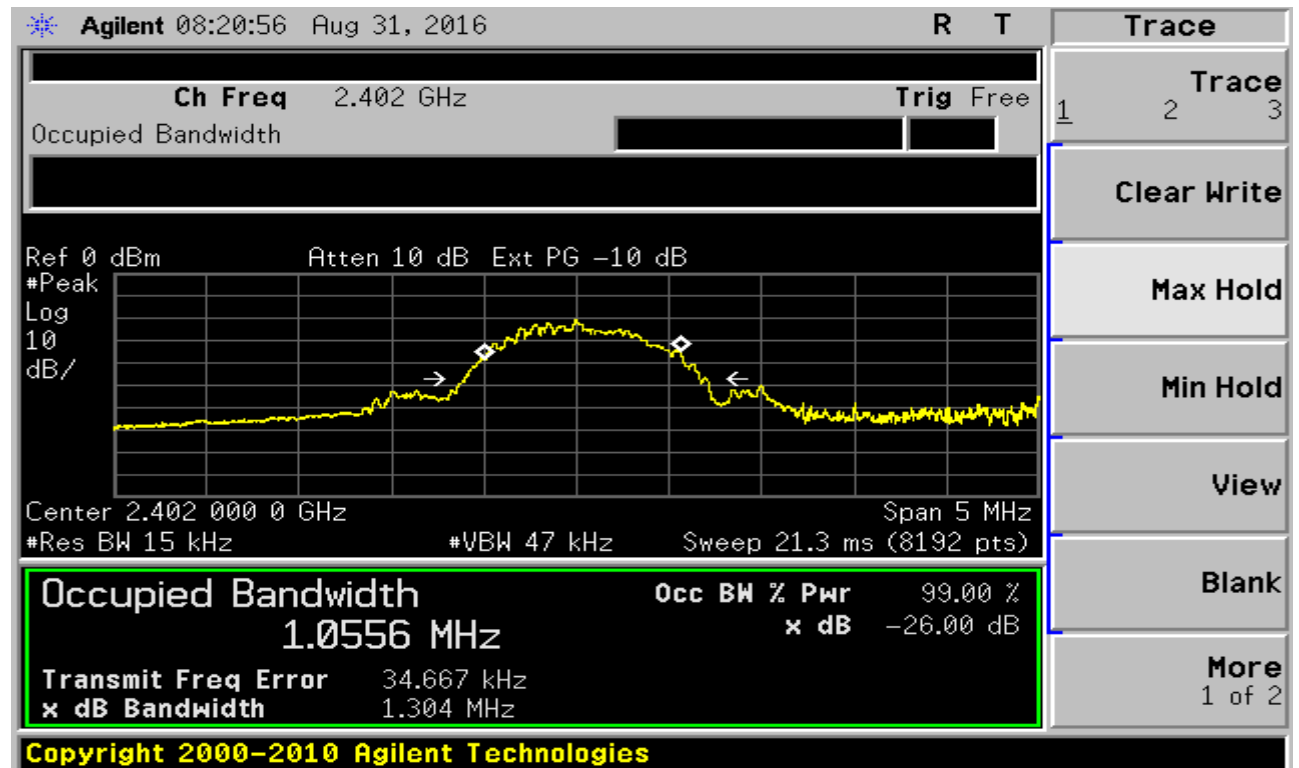
Frequency (MHz)	6 dB Bandwidth (MHz)	6 dB Bandwidth Minimum Limit (MHz)	99% OBW (MHz)
2402	0.720	0.5	1.056
2440	0.709	0.5	1.056
2480	0.704	0.5	1.056

Prepared For: CurAegis Technologies, Inc.	Name: myCadian Watch
Report: TR 316171	Model: MA0001-02
LSR: C-2476	Serial: B001/B003

Plots

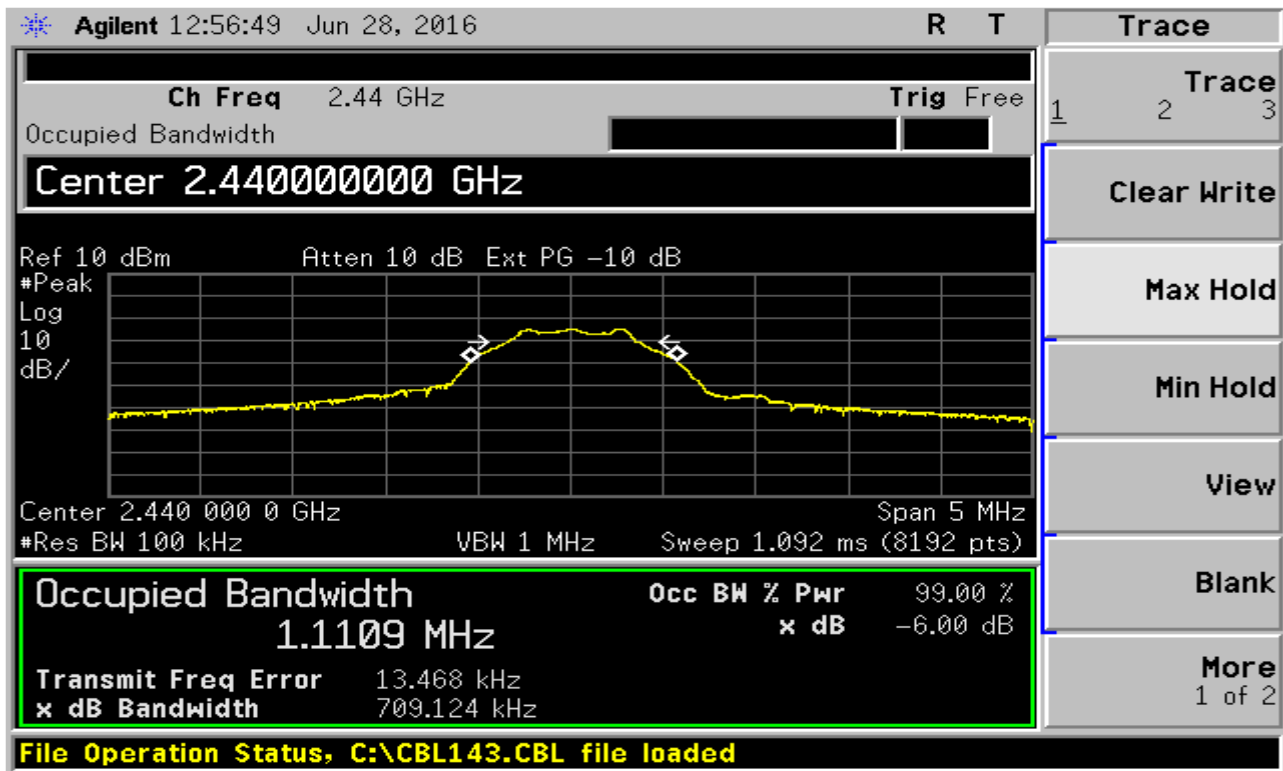


Low Channel - DTS (-6dB) BW

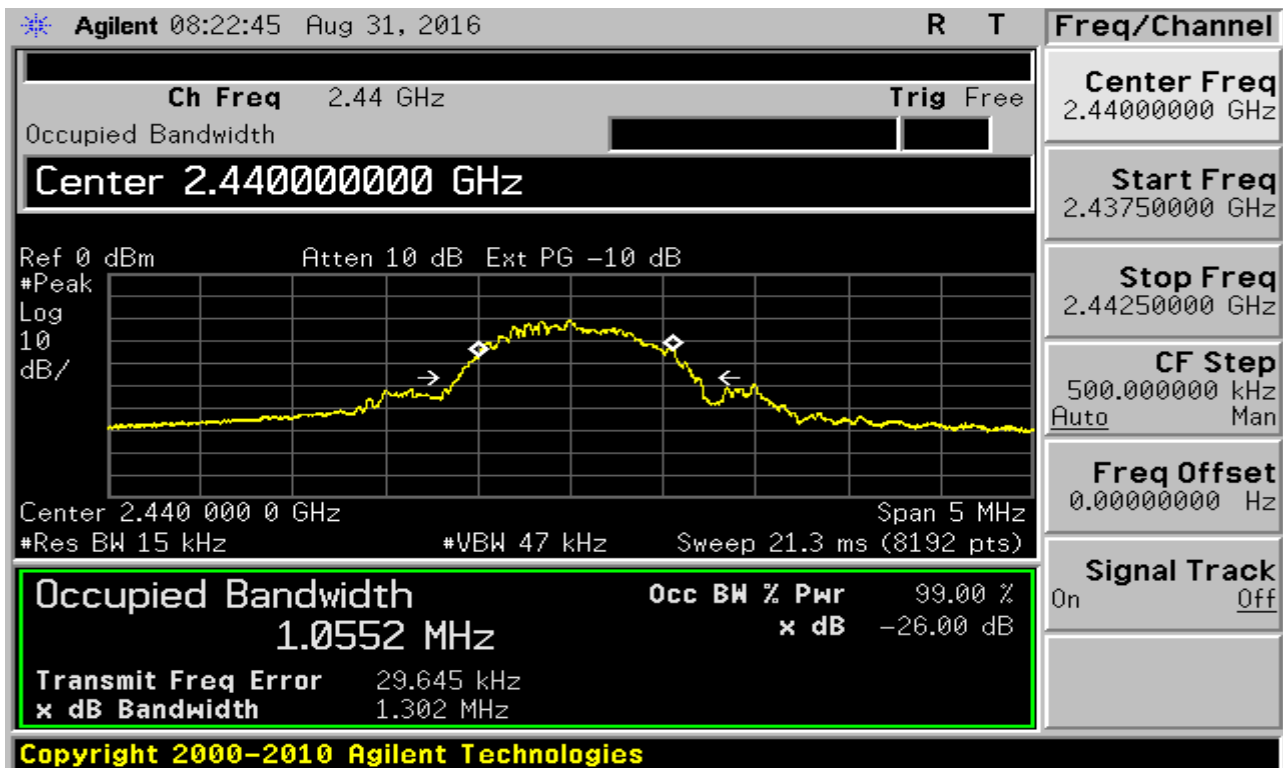


Low Channel - 99% BW

Prepared For: CurAegis Technologies, Inc.	Name: myCadian Watch
Report: TR 316171	Model: MA0001-02
LSR: C-2476	Serial: B001/B003

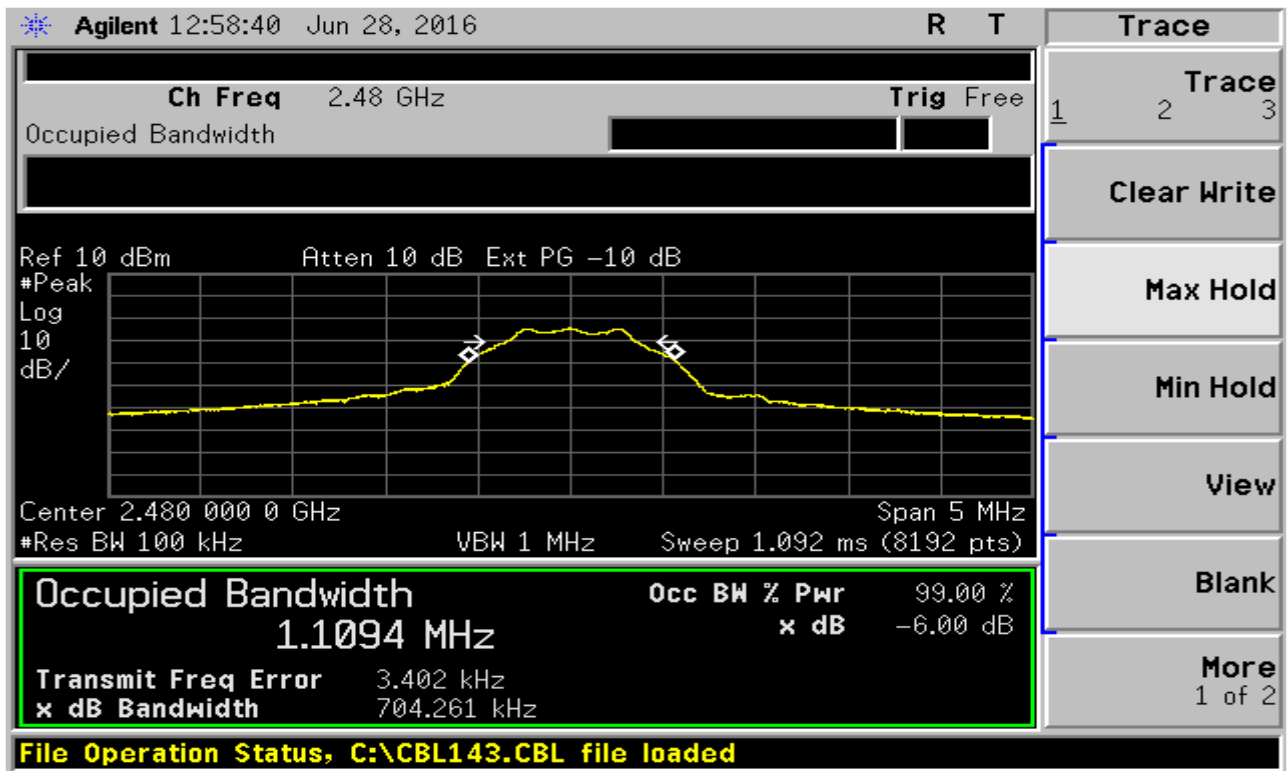


Mid Channel - DTS (-6dB) BW

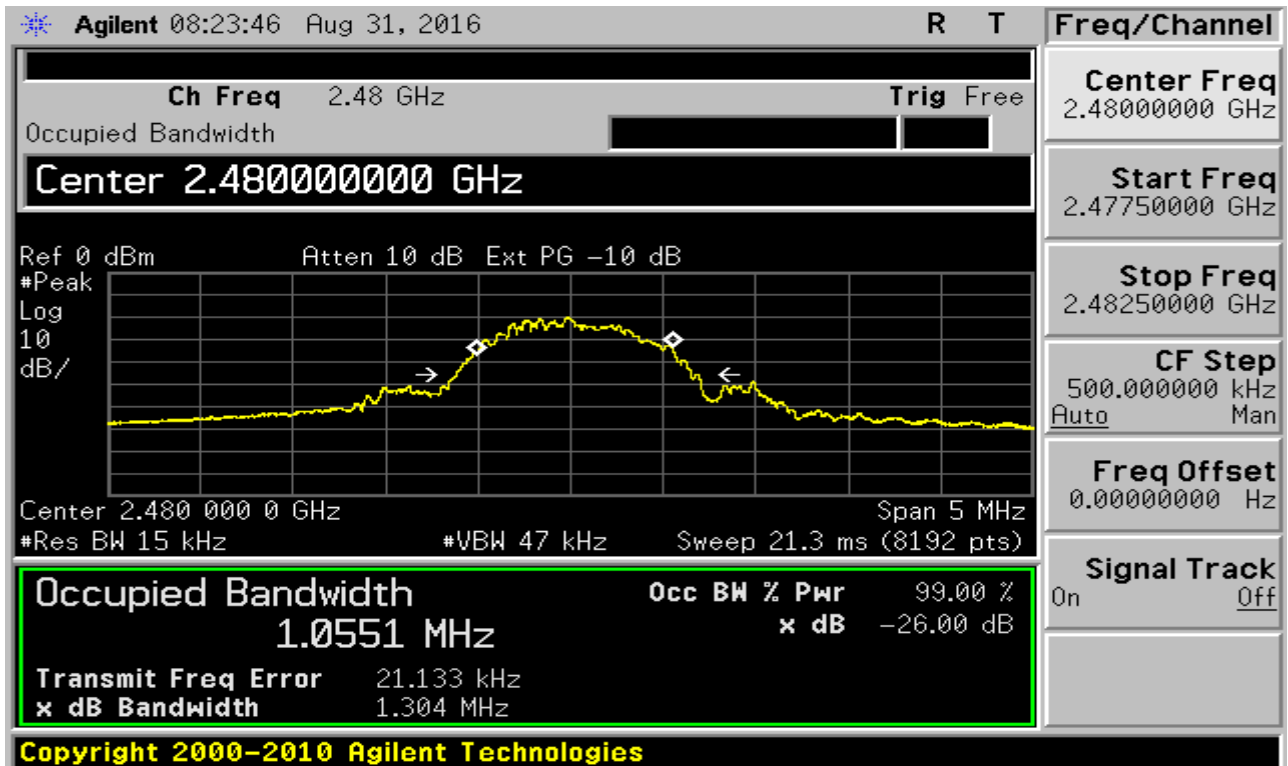


Mid Channel - 99% BW

Prepared For: CurAegis Technologies, Inc.	Name: myCadian Watch
Report: TR 316171	Model: MA0001-02
LSR: C-2476	Serial: B001/B003



High Channel - DTS (-6dB) BW



High Channel - 99% BW

Prepared For: CurAegis Technologies, Inc.	Name: myCadian Watch
Report: TR 316171	Model: MA0001-02
LSR: C-2476	Serial: B001/B003

4.0 – RF Conducted – Fundamental Power and Spectral Density

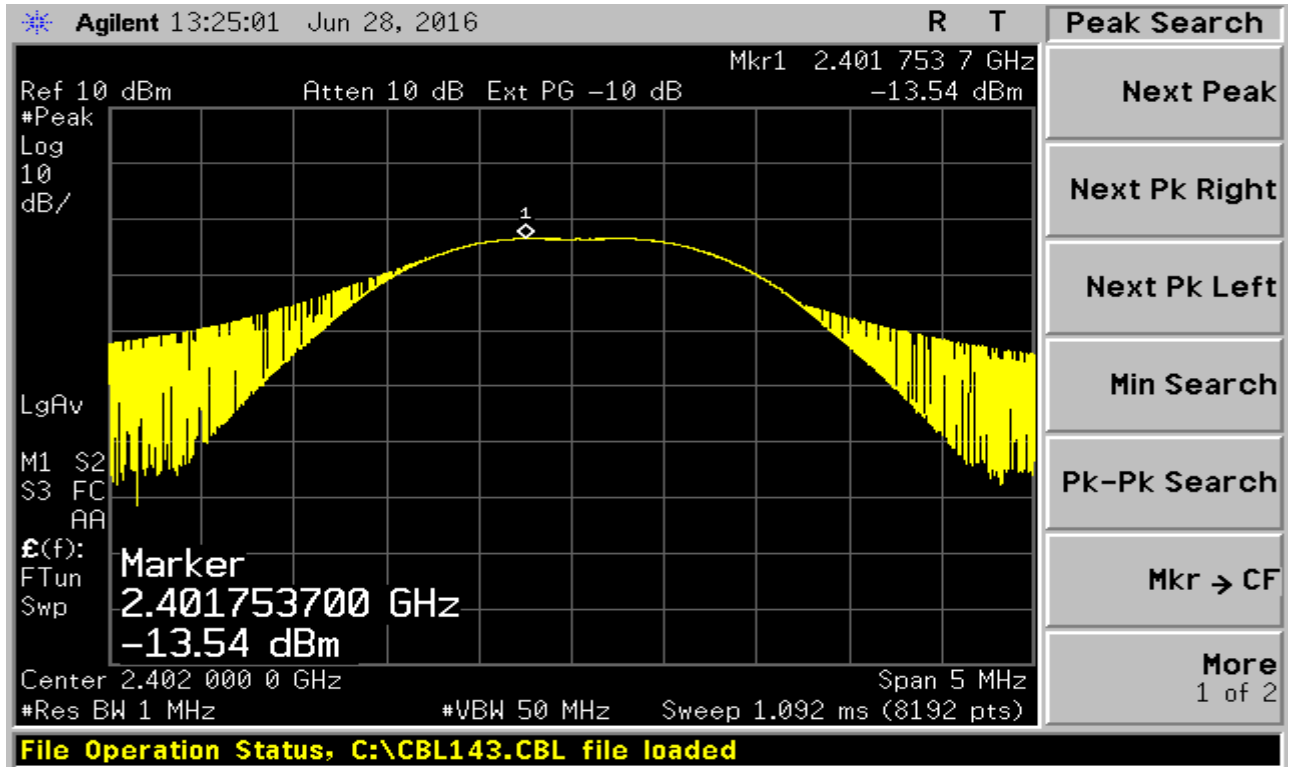
Manufacturer	CurAegis Technologies, Inc.
Date	6/28/2016
Operator	Shane Dock
Temp. / R.H.	20 - 25° C / 30-60% R.H.
Rule Part	FCC 15.247 / RSS-247
Specific Measurement Procedure	FCC KDB 558074 Section 9.1.1 (Power) / 10.2 (PSD) ANSI C63.10 Section 11.9 and 11.10
Additional Description of Measurement	Peak Output Power and Peak PSD methods utilized for measurement 100 kHz resolution bandwidth used for Peak Power Spectral Density measurement
Additional Notes	1. Continuous transmit modulated used for this test. Sample Calculation: Margin (dB) = Limit – Measured Level

Table

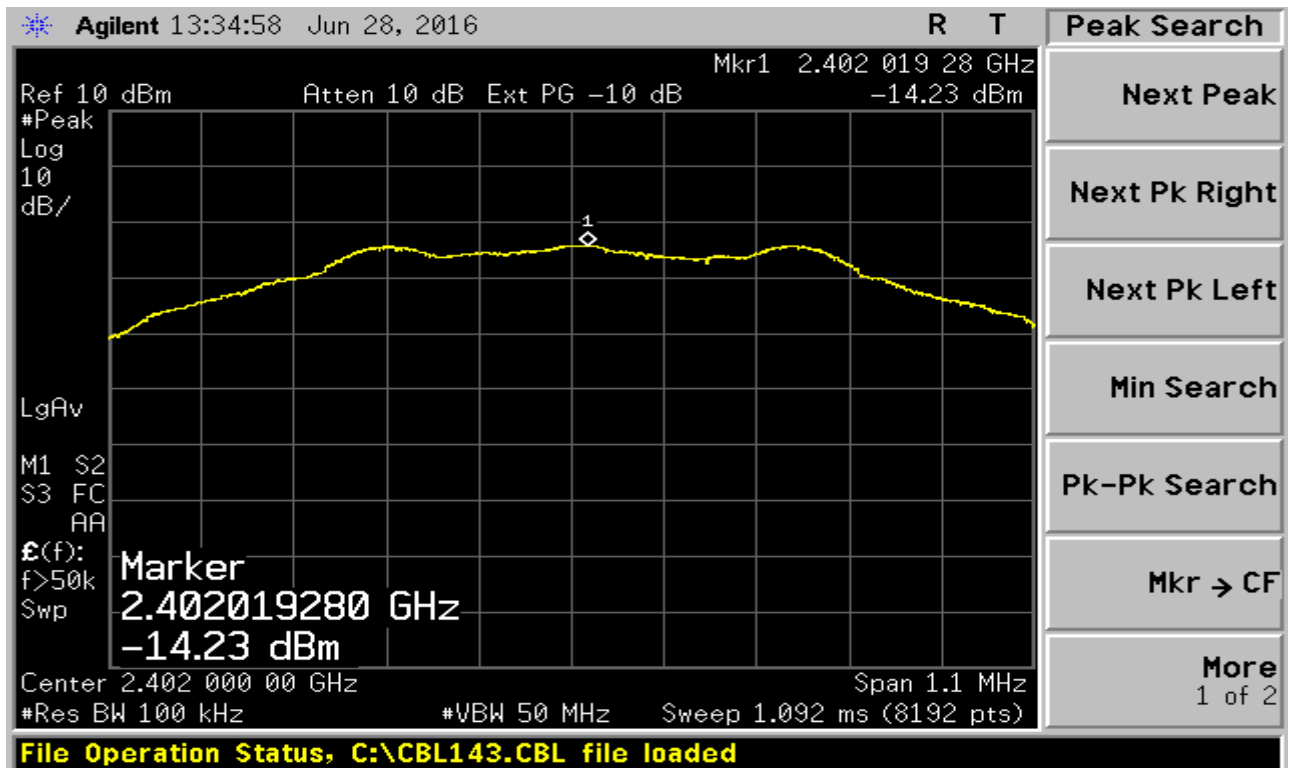
Frequency (MHz)	Max Peak Conducted Output Power (dBm)	Power Limit (dBm)	Power Margin (dB)	Peak PSD in 100 kHz RBW (dBm)	PSD Limit in 3kHz Band Limit (dBm)	PSD Margin (dBm)
2402	-13.54	30	43.97	-14.23	8	22.23
2440	-14.14	30	44.14	-14.78	8	22.78
2480	-13.97	30	43.54	-14.64	8	22.64

Prepared For: CurAegis Technologies, Inc.	Name: myCadian Watch
Report: TR 316171	Model: MA0001-02
LSR: C-2476	Serial: B001/B003

Plots

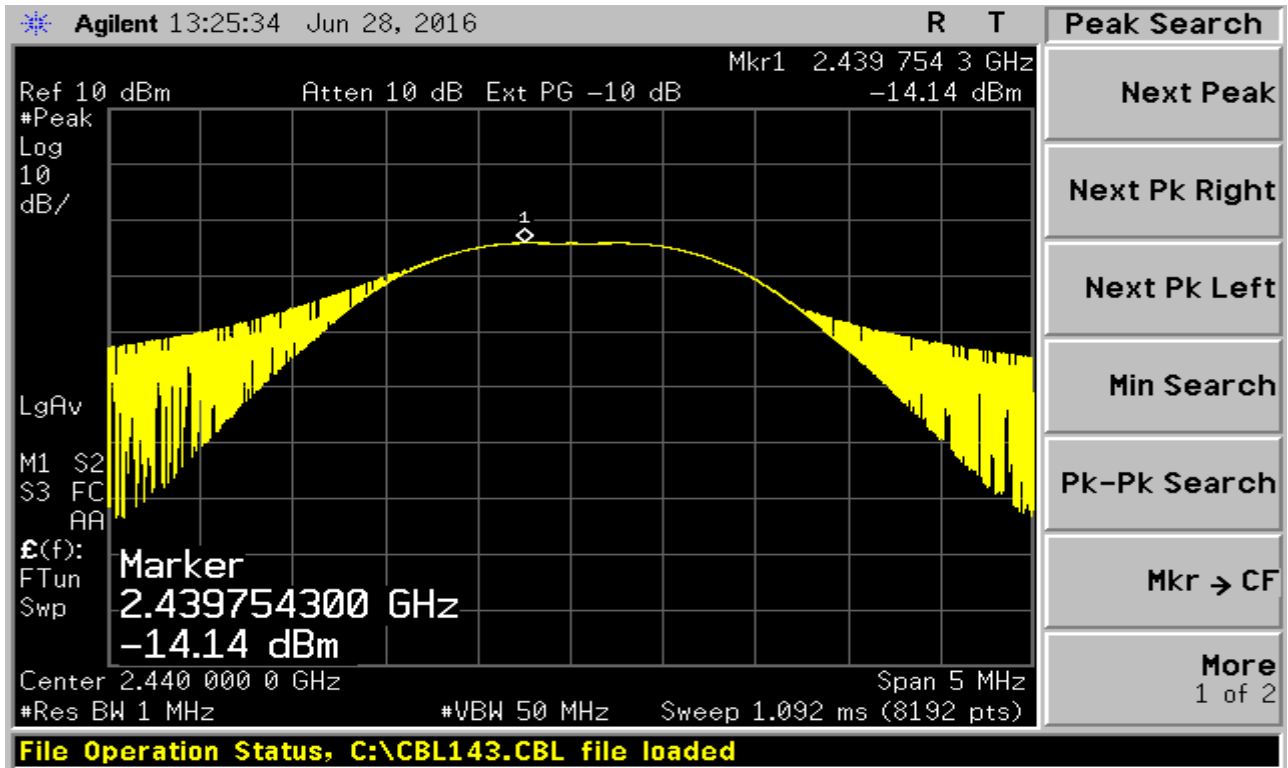


Low Channel – Peak Output Power

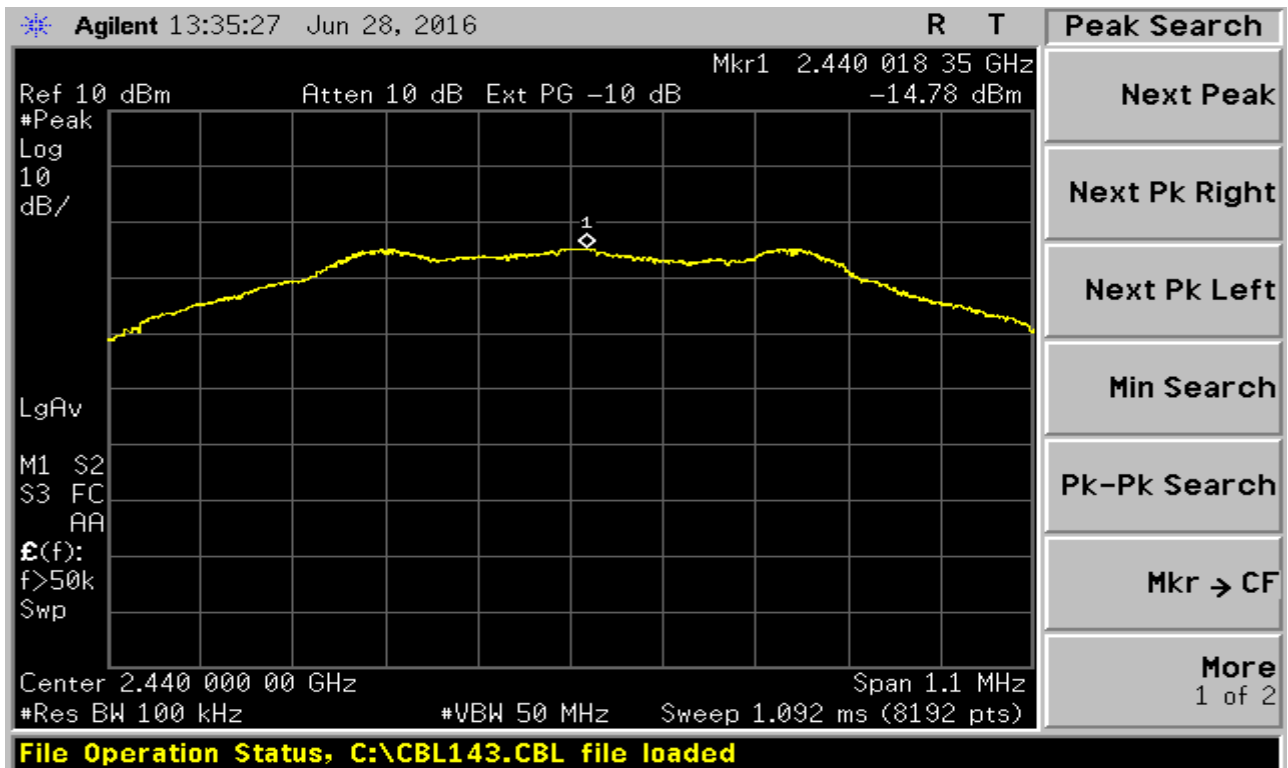


Low Channel – Peak Power Spectral Density

Prepared For: CurAegis Technologies, Inc.	Name: myCadian Watch
Report: TR 316171	Model: MA0001-02
LSR: C-2476	Serial: B001/B003

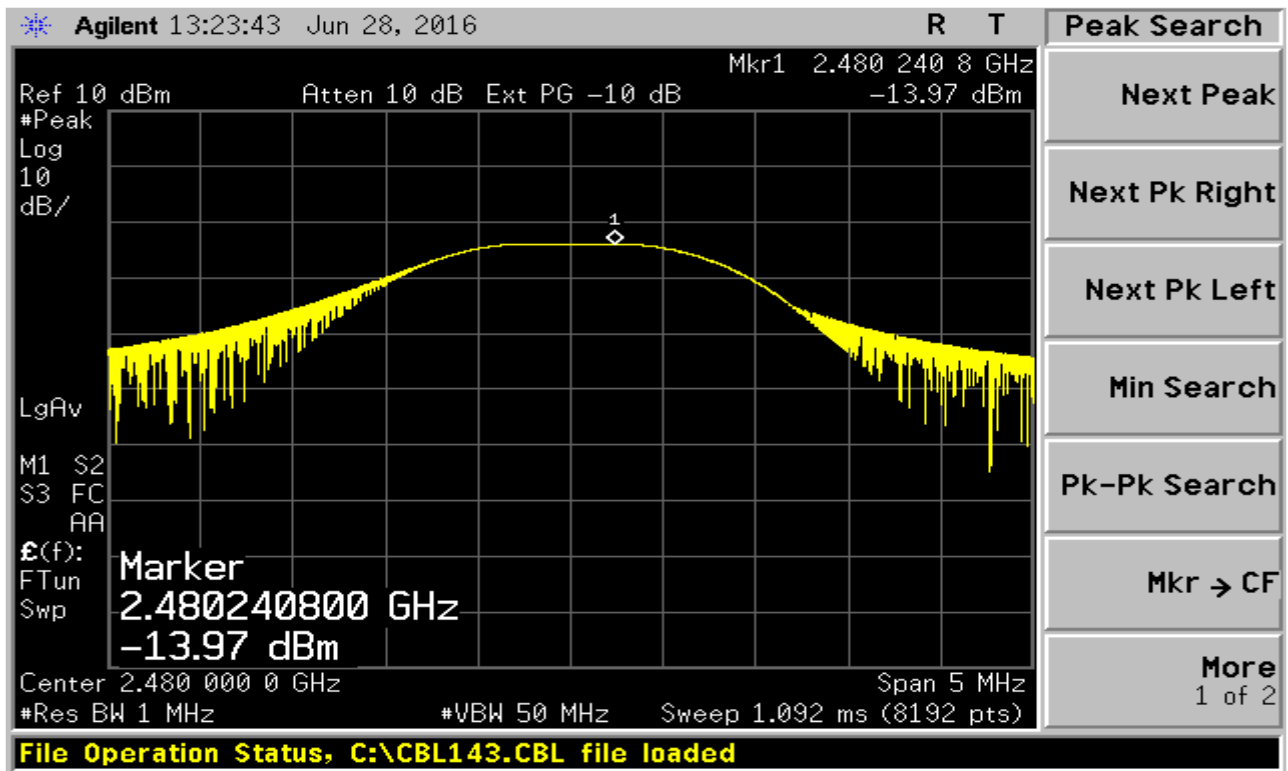


Mid Channel – Peak Output Power

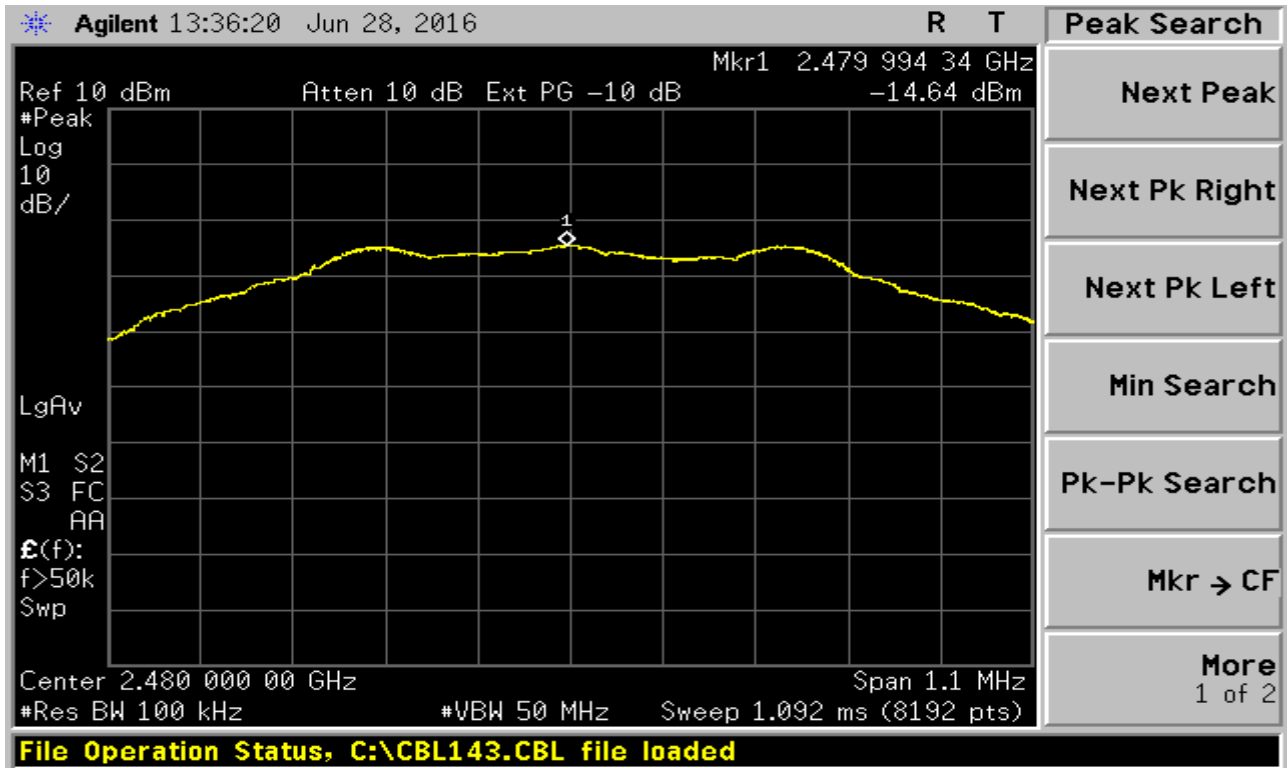


Mid Channel – Peak Power Spectral Density

Prepared For: CurAegis Technologies, Inc.	Name: myCadian Watch
Report: TR 316171	Model: MA0001-02
LSR: C-2476	Serial: B001/B003



High Channel – Peak Output Power



High Channel – Peak Power Spectral Density

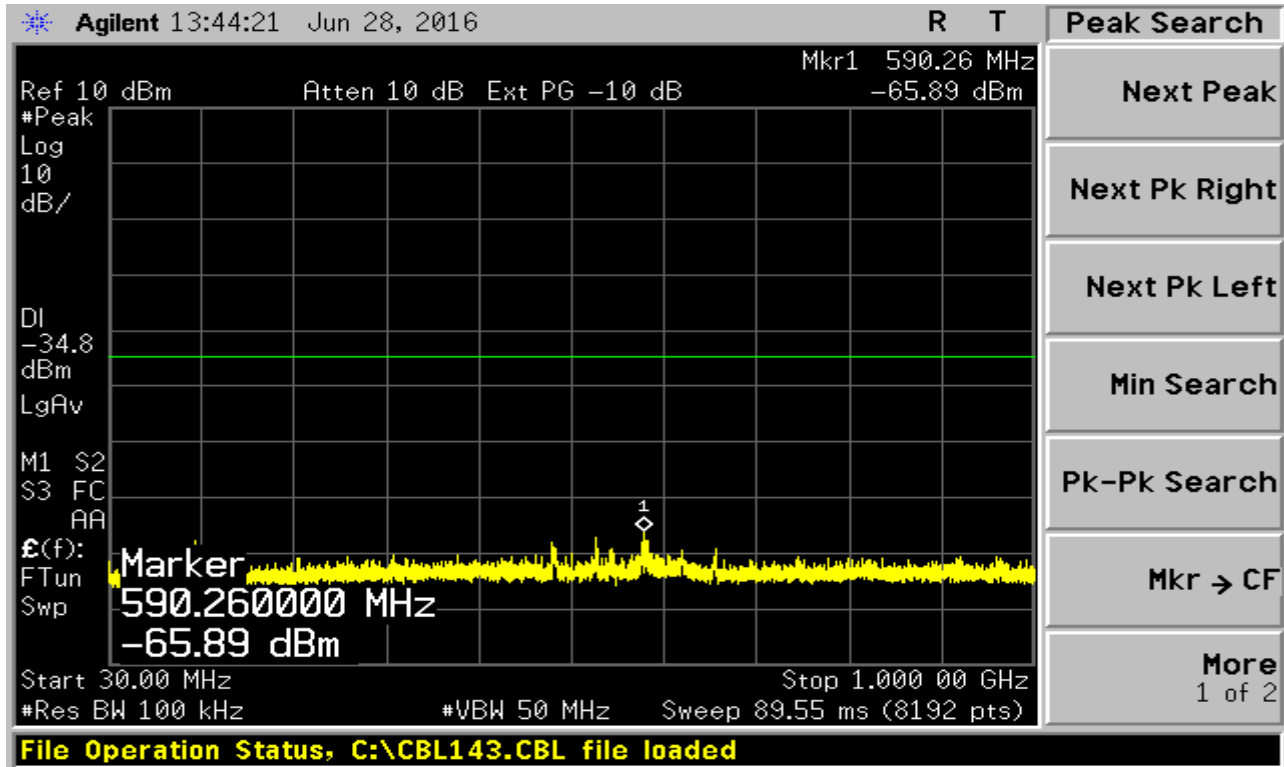
Prepared For: CurAegis Technologies, Inc.	Name: myCadian Watch
Report: TR 316171	Model: MA0001-02
LSR: C-2476	Serial: B001/B003

5.0 – RF Conducted – Spurious Emissions/ Band Edges

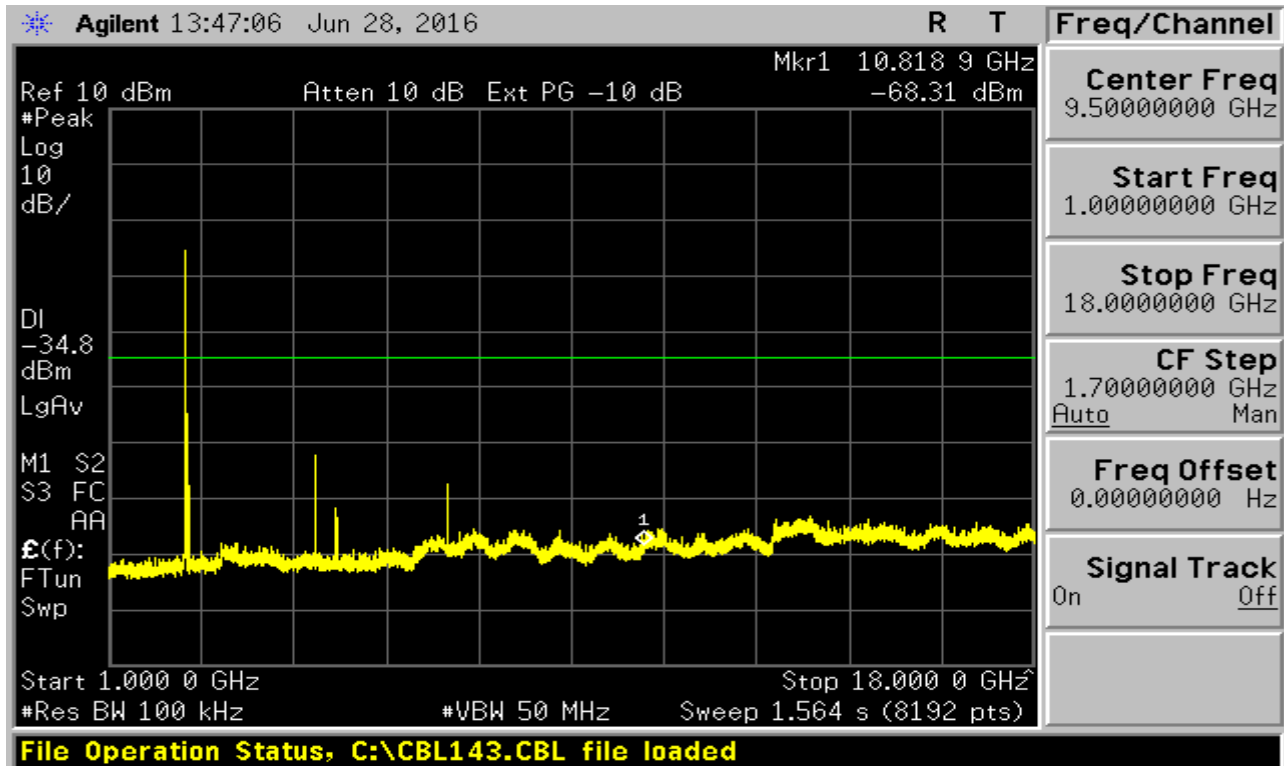
Manufacturer	CurAegis Technologies, Inc.
Date	6/28/2016 and 7/7/2016
Operator	Shane Dock and John Johnston
Temp. / R.H.	20 - 25° C / 30-60% R.H.
Rule Part	FCC 15.247 (d) / RSS-247 sect. 5.5
Specific Measurement Procedure	FCC KDB 558074 Section 11.0 – Emissions in non-restricted frequency bands ANSI C63.10 Section 11.11
Additional Description of Measurement	Peak output power measured in any 100 kHz band outside the authorized frequency band shall be attenuated by at least 20 dBc.
Additional Notes	<ol style="list-style-type: none"> 1. Continuous transmit modulated used for this test. 2. See DTS BW plots for 100 kHz reference 3. See PSD plots for maximum in-band PSD level 4. The green display line shown in the screen captures below is representative of the lowest fundamental amplitude measured in a 100 kHz resolution bandwidth minus 20 dB, for each channel.

Prepared For: CurAegis Technologies, Inc.	Name: myCadian Watch
Report: TR 316171	Model: MA0001-02
LSR: C-2476	Serial: B001/B003

Plots

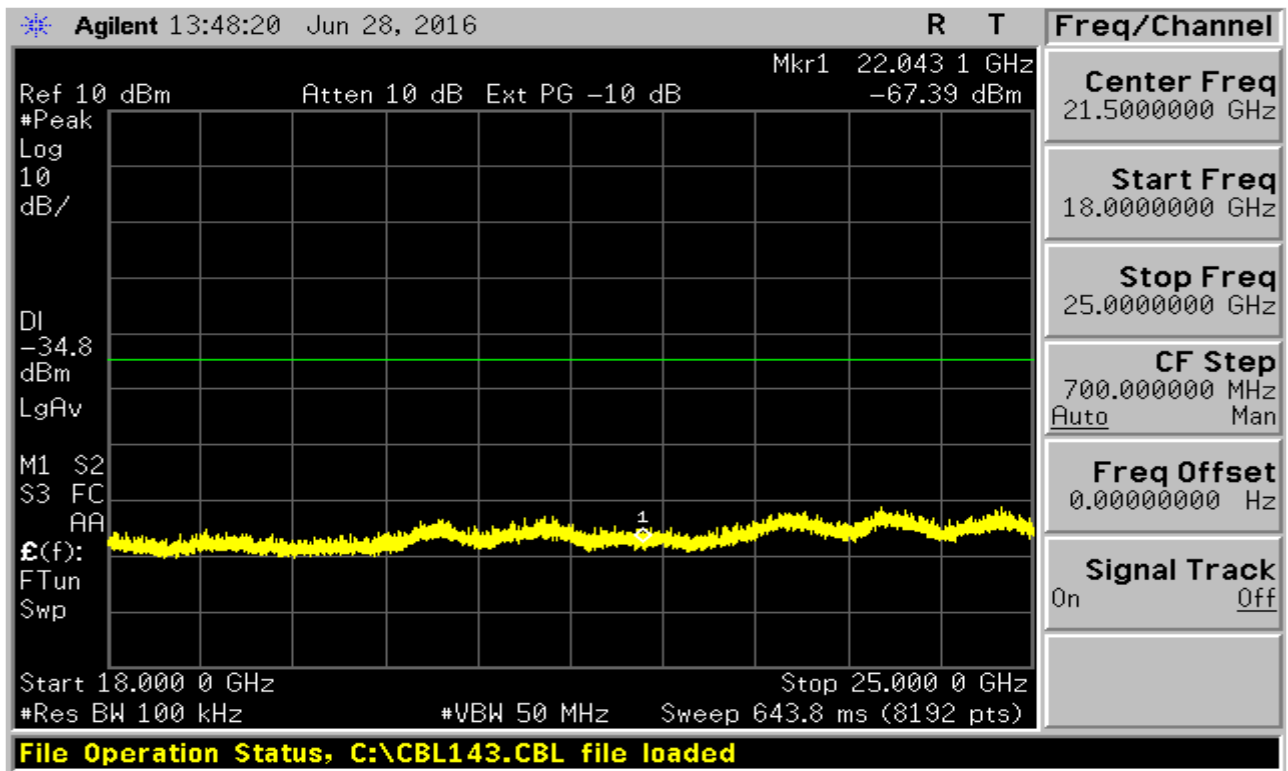


Low Channel: 30 MHz – 1 GHz

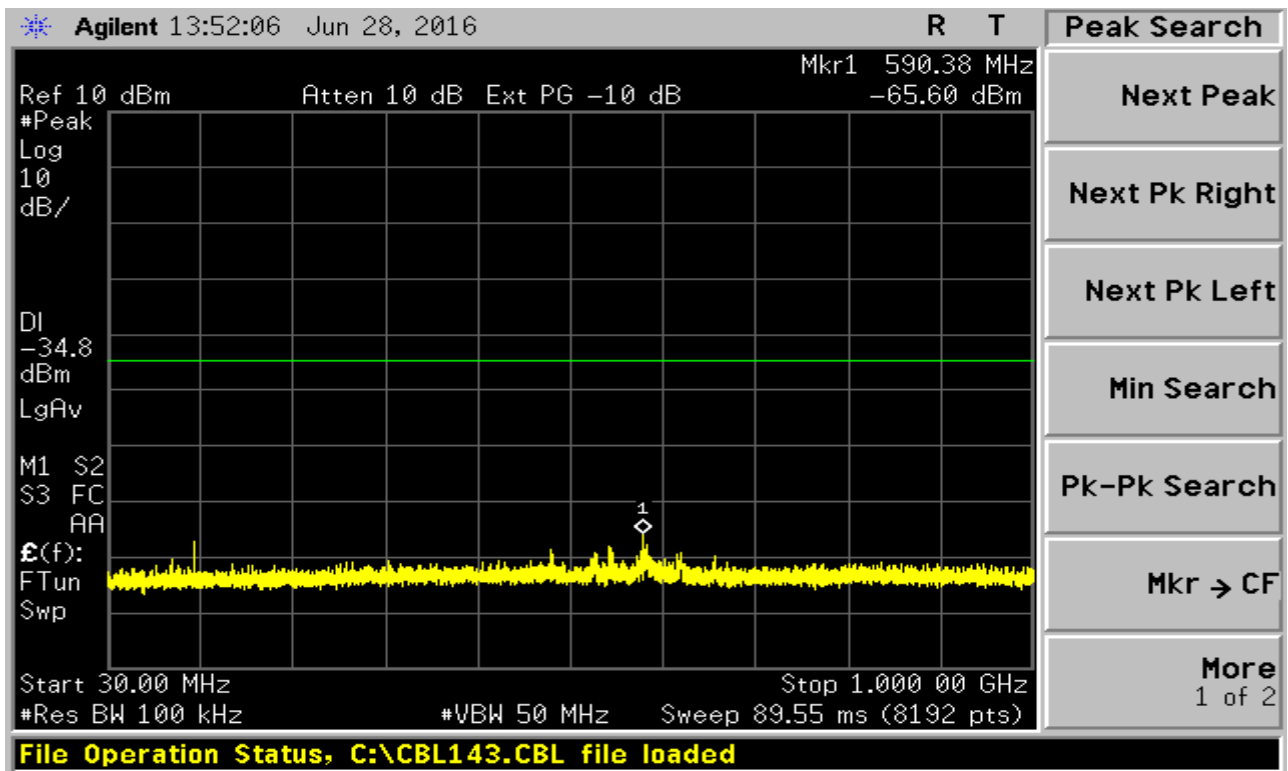


Low Channel: 1 GHz – 18 GHz

Prepared For: CurAegis Technologies, Inc.	Name: myCadian Watch
Report: TR 316171	Model: MA0001-02
LSR: C-2476	Serial: B001/B003

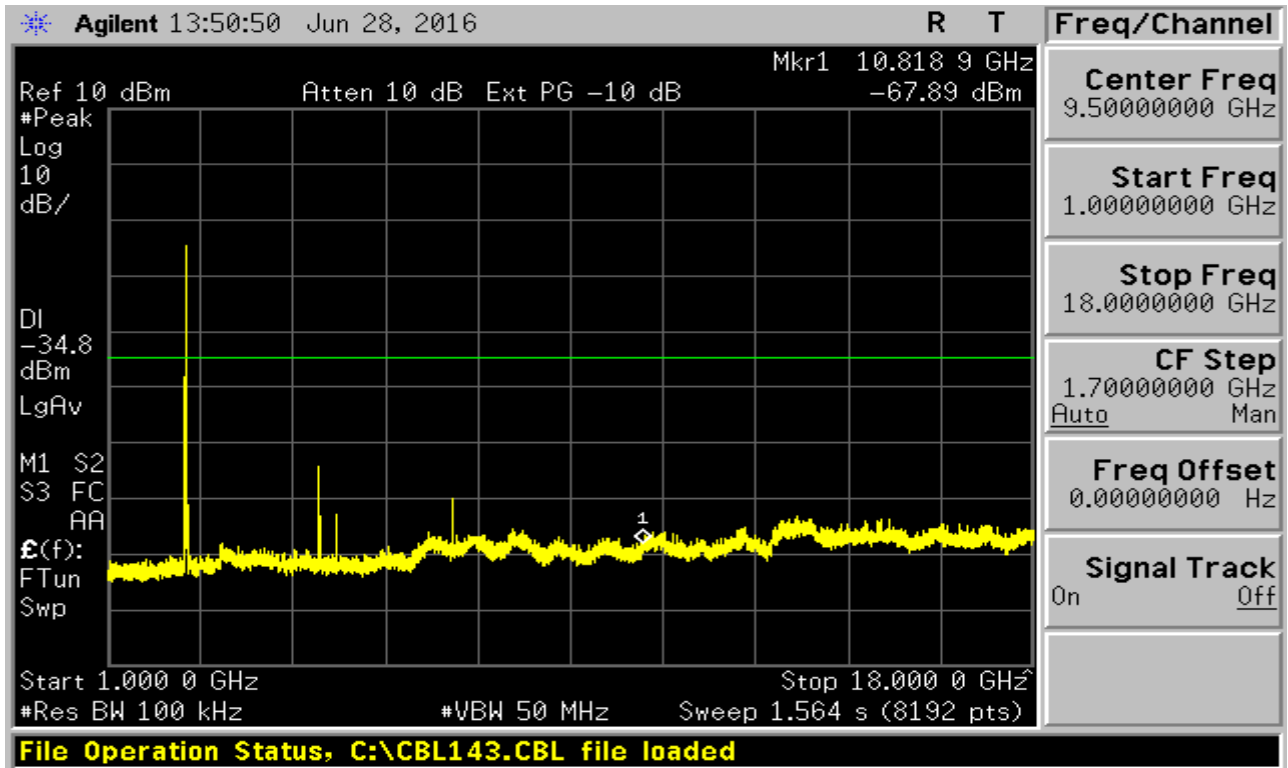


Low Channel: 18 GHz – 25 GHz

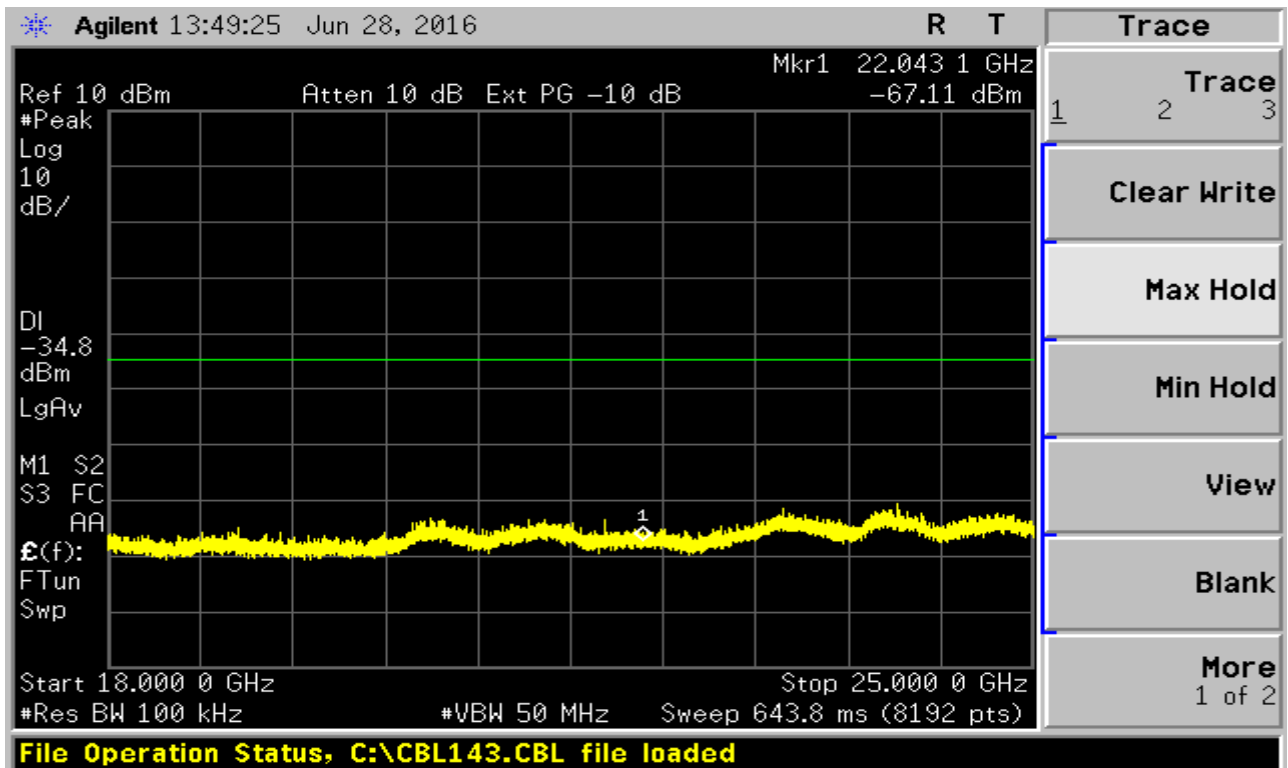


Mid Channel: 30 MHz – 1 GHz

Prepared For: CurAegis Technologies, Inc.	Name: myCadian Watch
Report: TR 316171	Model: MA0001-02
LSR: C-2476	Serial: B001/B003

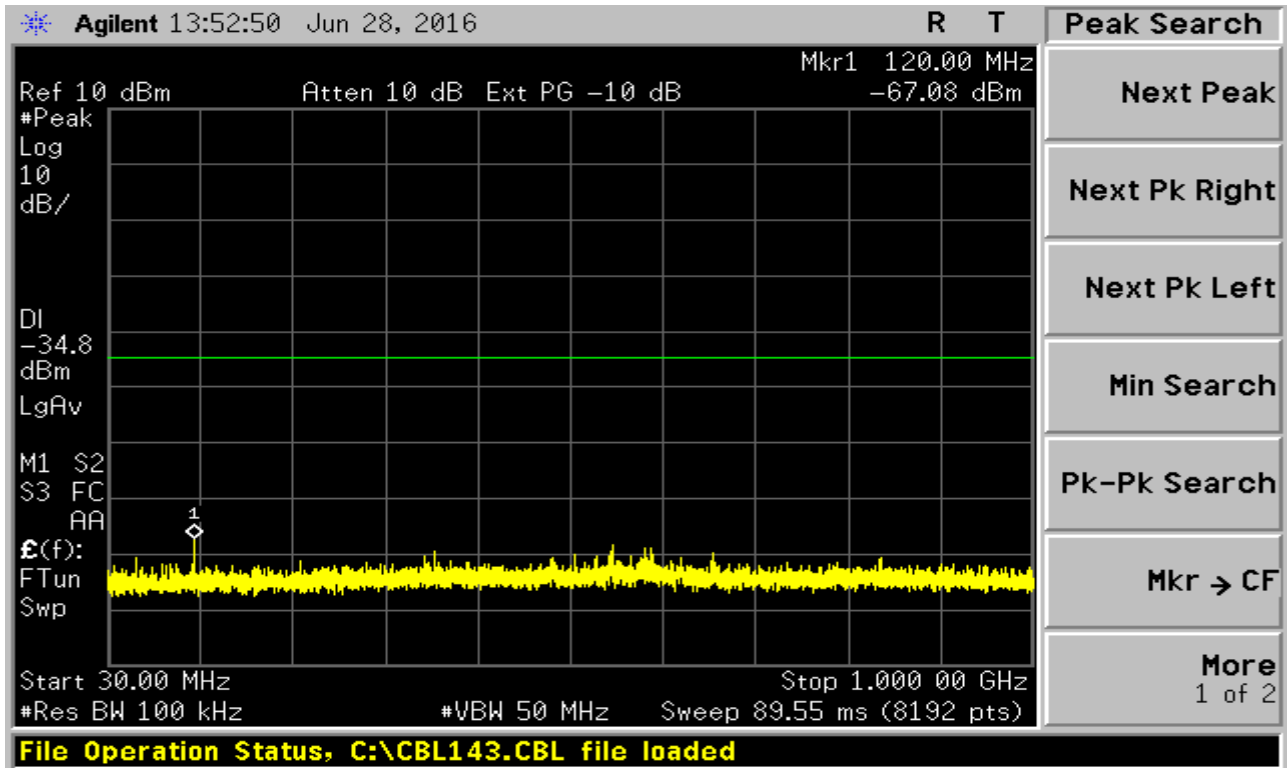


Mid Channel: 1 GHz – 18 GHz

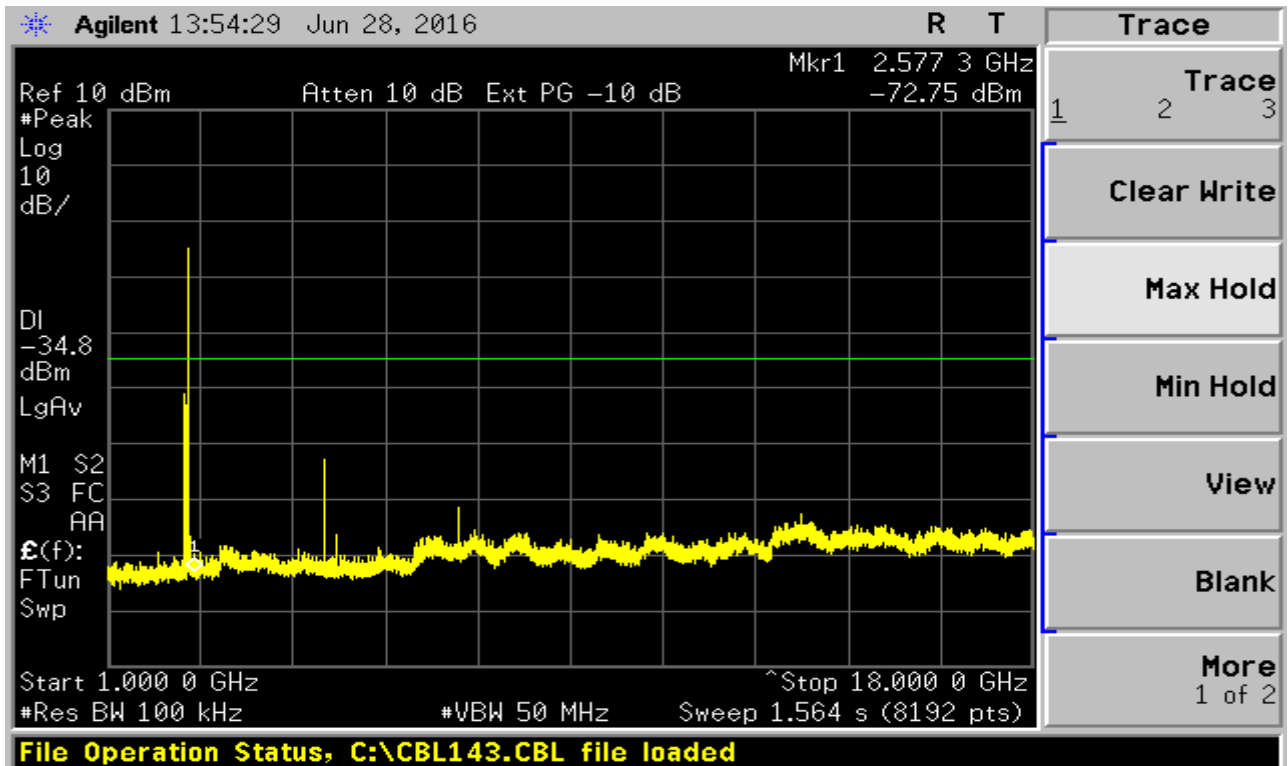


Mid Channel: 18 GHz – 25 GHz

Prepared For: CurAegis Technologies, Inc.	Name: myCadian Watch
Report: TR 316171	Model: MA0001-02
LSR: C-2476	Serial: B001/B003

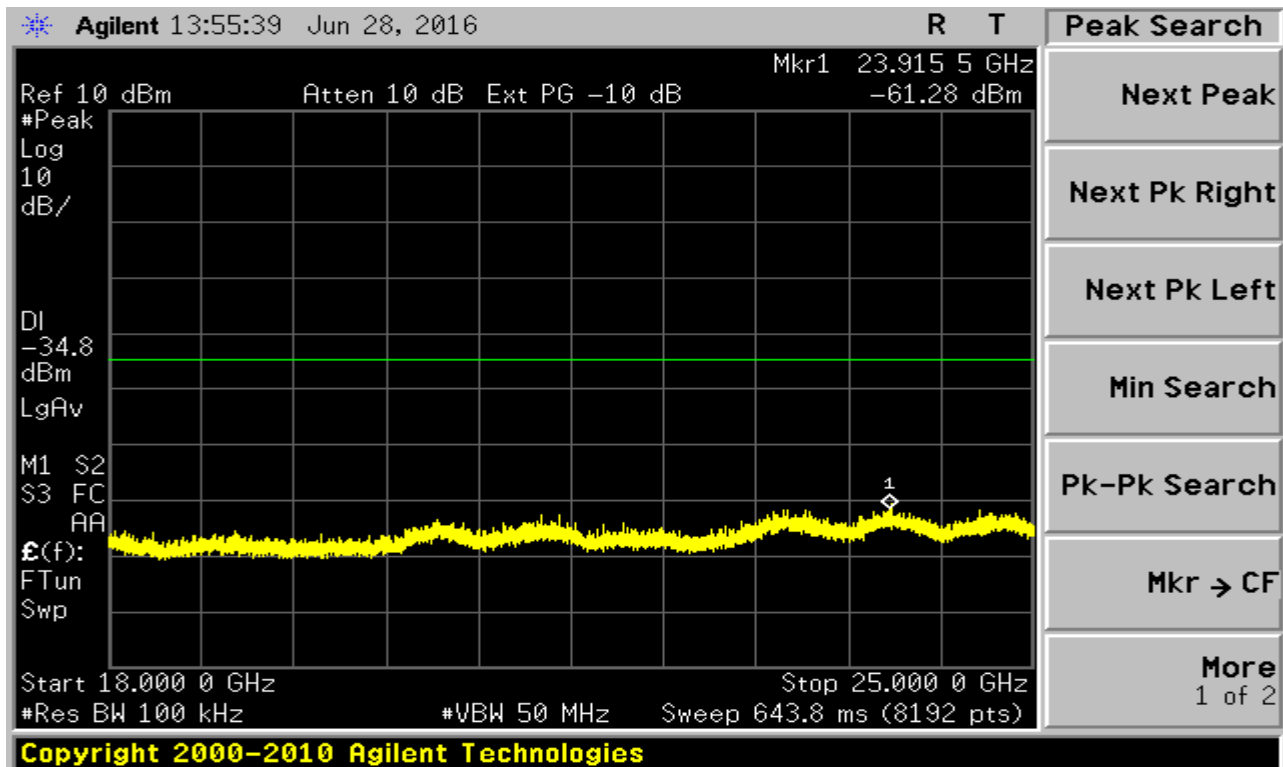


High Channel - 30 MHz - 1 GHz

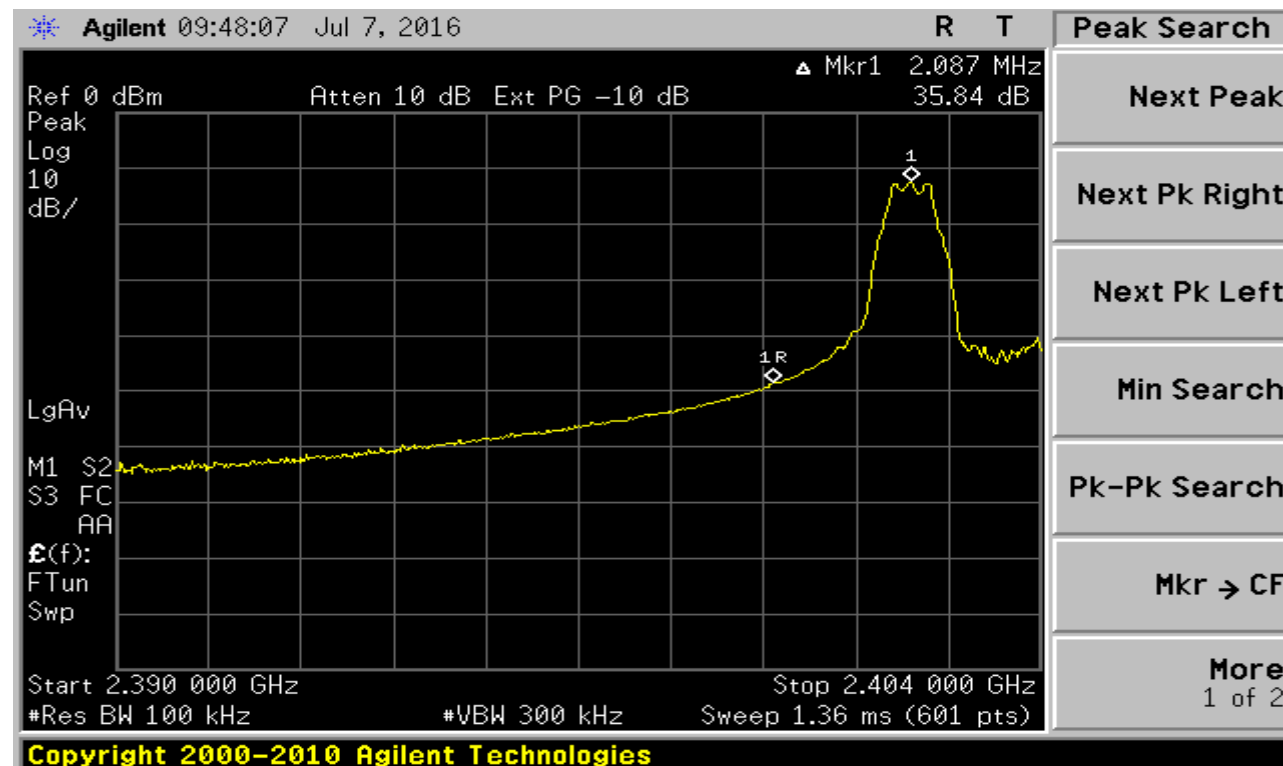


High Channel: 1 GHz - 18 GHz

Prepared For: CurAegis Technologies, Inc.	Name: myCadian Watch
Report: TR 316171	Model: MA0001-02
LSR: C-2476	Serial: B001/B003

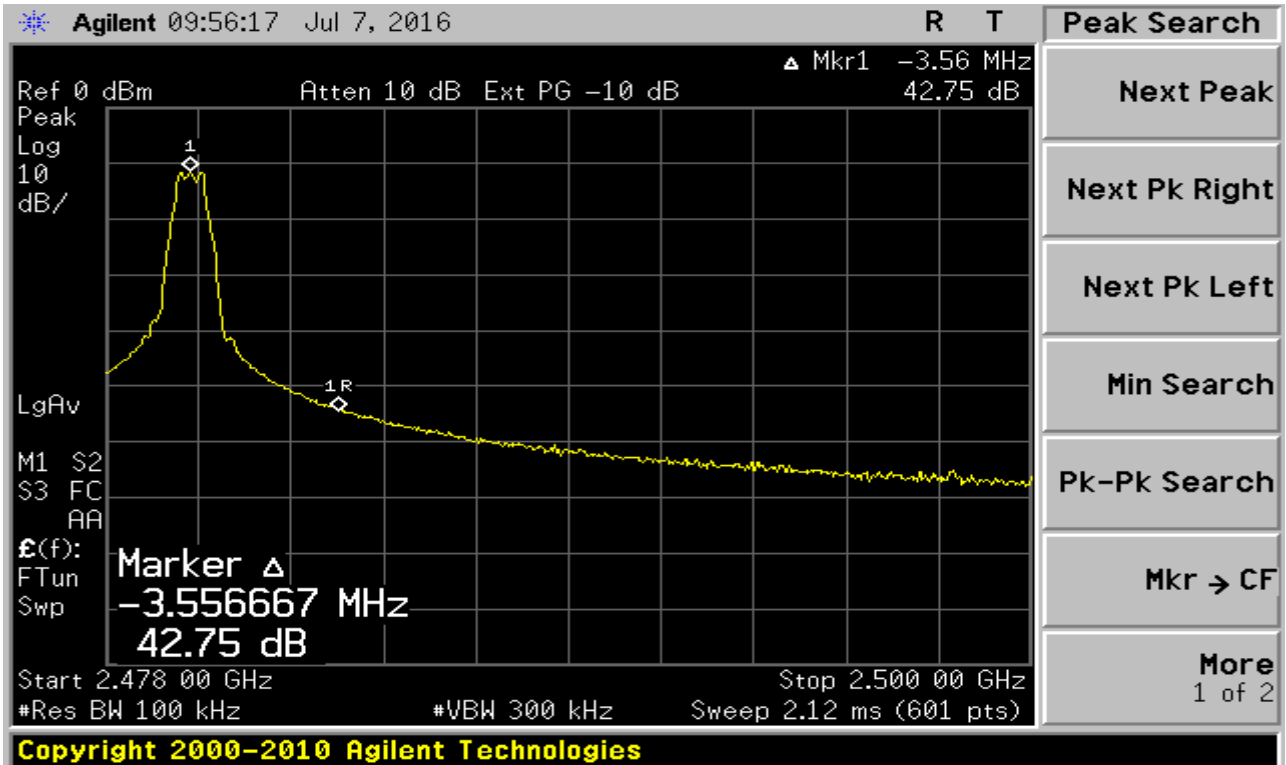


High Channel: 18 GHz – 25 GHz



Low Channel – Lower Band Edge

Prepared For: CurAegis Technologies, Inc.	Name: myCadian Watch
Report: TR 316171	Model: MA0001-02
LSR: C-2476	Serial: B001/B003



High Channel - Upper Band Edge

Prepared For: CurAegis Technologies, Inc.	Name: myCadian Watch
Report: TR 316171	Model: MA0001-02
LSR: C-2476	Serial: B001/B003

6.0 – RF Conducted – Frequency Stability

Manufacturer	CurAegis Technologies, Inc.
Date	7/7/2016
Operator	John Johnston
Temp. / R.H.	20 - 25° C / 30-60% R.H.
Rule Part	FCC 15.247 and 2.1055 / RSS-247
Specific Measurement Procedure	ANSI C63.10 Section 6.8
Additional Description of Measurement	RF Conducted Measurement
Additional Notes	<ol style="list-style-type: none"> 1. Continuous transmit unmodulated used for this test. 2. EUT Voltage Ratings – Nominal: 5 V; Minimum: 3 V; Maximum 5.5 V. The EUT was tested at 85% and 115% of its nominal voltage.

Tables

Frequency Stability f = 2402 MHz				
Supply Voltage (VDC)	Frequency (Hz)	Deviation		
		Hz	Limit (Hz)	Margin (Hz)
4.2	2402000000	2402016293	240200	223907
5	2402000000	2402016011	240200	224189
5.50	2402000000	2402016037	240200	224163

Low Channel

Frequency Stability f = 2440 MHz				
Supply Voltage (VDC)	Frequency (Hz)	Deviation		
		Hz	Limit (Hz)	Margin (Hz)
4.2	2440000000	2440015864	244000	228136
5	2440000000	2440015741	244000	228259
5.50	2440000000	2440015812	244000	228188

Mid Channel

Prepared For: CurAegis Technologies, Inc.	Name: myCadian Watch
Report: TR 316171	Model: MA0001-02
LSR: C-2476	Serial: B001/B003

Frequency Stability f = 2480 MHz				
Supply Voltage (VDC)	Frequency (Hz)	Deviation		
		Hz	Limit (Hz)	Margin (Hz)
4.2	2480000000	2480016693	248000	231307
5	2480000000	2480016573	248000	231427
5.50	2480000000	2480016503	248000	231497

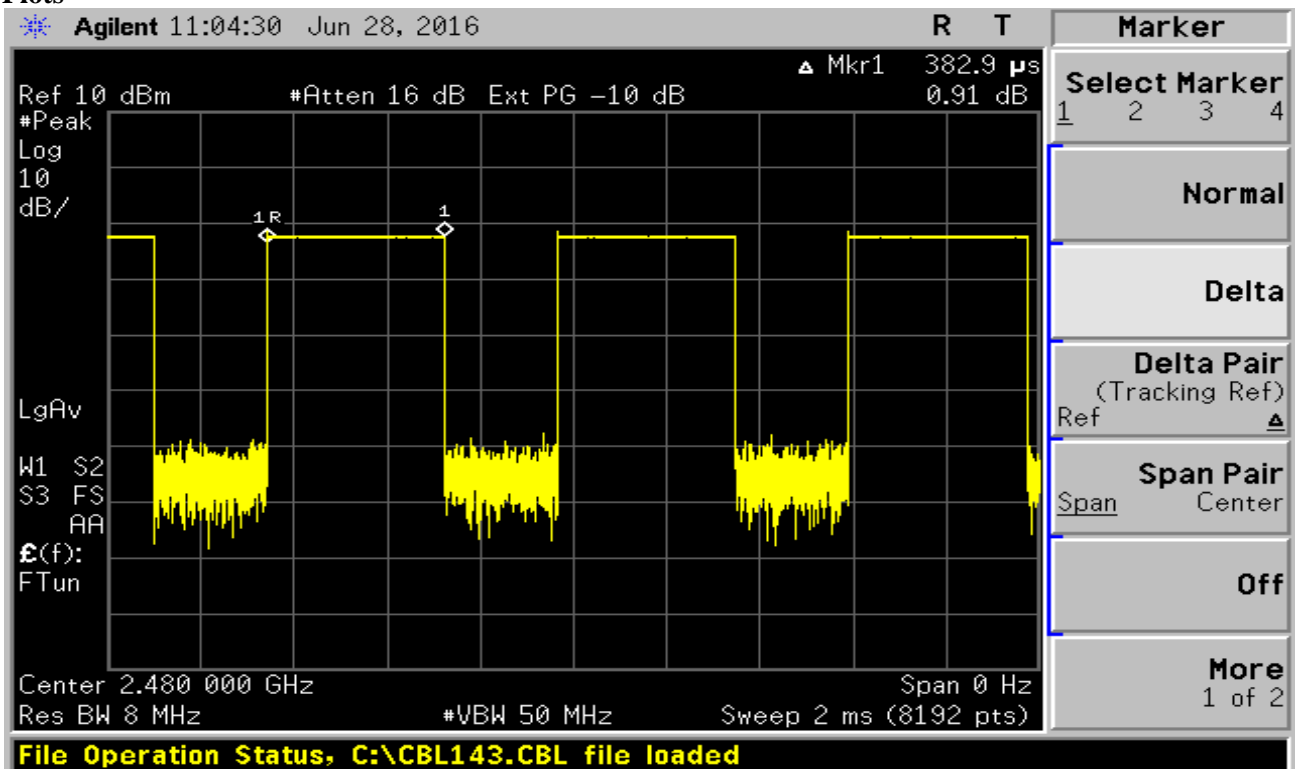
High Channel

Prepared For: CurAegis Technologies, Inc.	Name: myCadian Watch
Report: TR 316171	Model: MA0001-02
LSR: C-2476	Serial: B001/B003

7.0 – RF Conducted – Duty Cycle

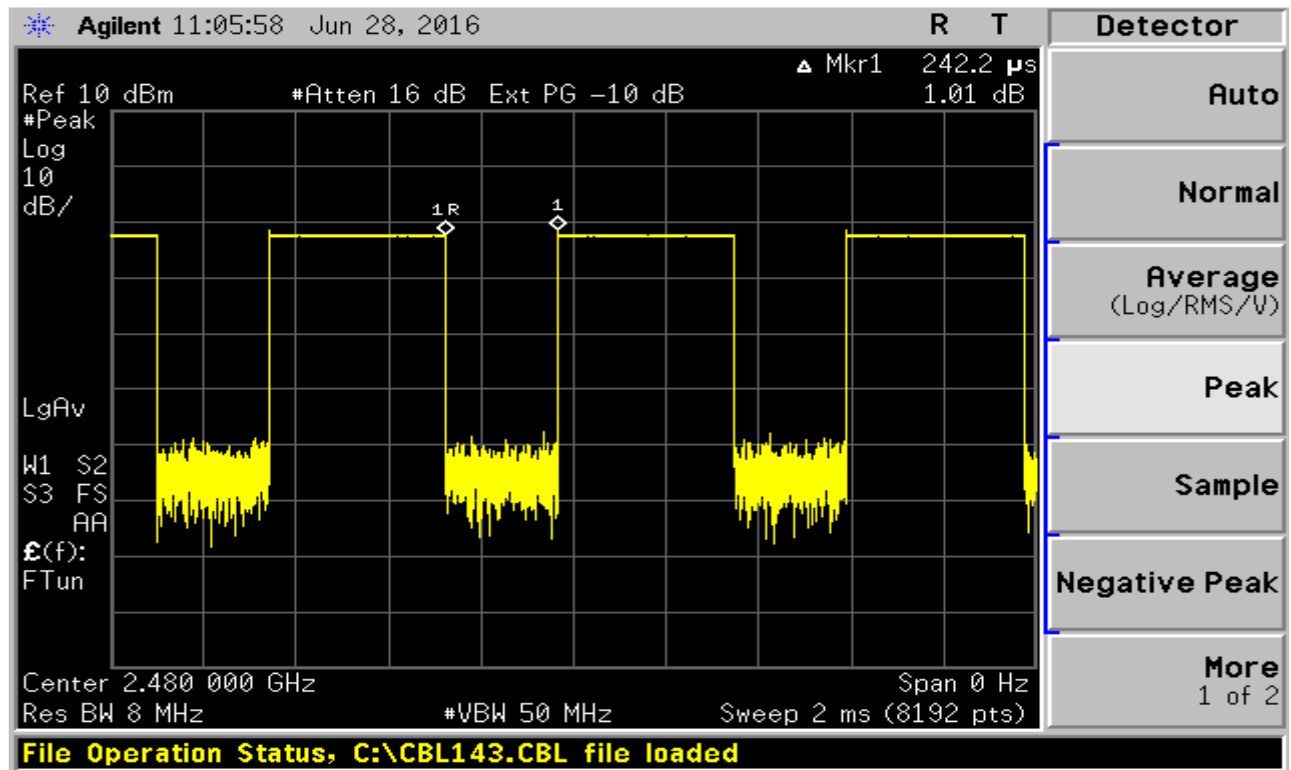
Manufacturer	CurAegis Technologies, Inc.
Date	6/28/2016
Operator	John Johnston
Temp. / R.H.	20 - 25° C / 30-60% R.H.
Rule Part	15.247 / RSS-247
Specific Measurement Procedure	FCC KDB 558074 ANSI C63.10 Section 11.6
Additional Description of Measurement	RF Conducted Measurement
Additional Notes	<ol style="list-style-type: none"> 1. Continuous transmit modulated used for this test. 2. Measurement used to determine VBW used for average measurements in transmitter radiated measurements

Plots



Note: The transmitter on time in the above screen capture is representative of all channels.

Prepared For: CurAegis Technologies, Inc.	Name: myCadian Watch
Report: TR 316171	Model: MA0001-02
LSR: C-2476	Serial: B001/B003

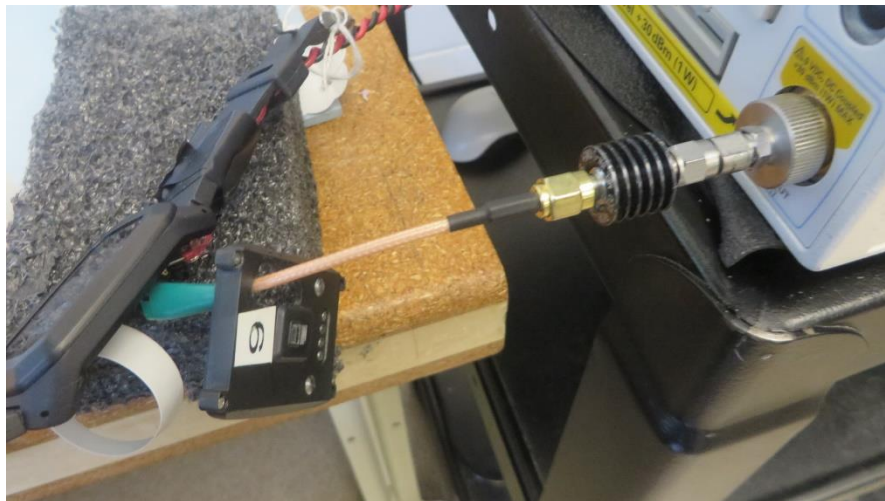
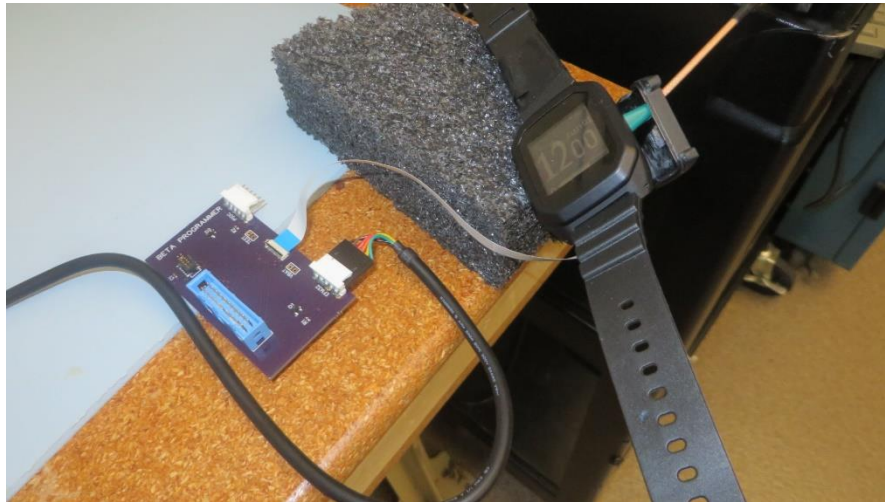
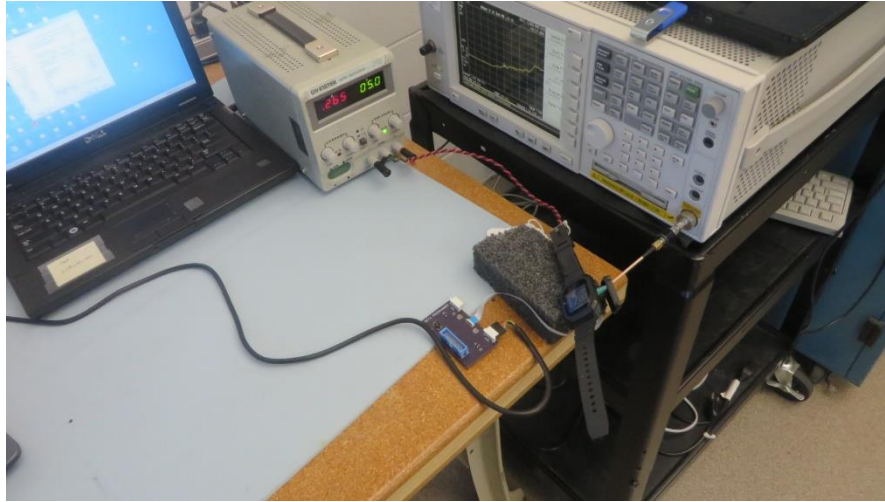


Note: The transmitter off time in the above screen capture is representative of all channels.

$$\text{Duty Cycle} = [t_{\text{on}} / (t_{\text{off}} + t_{\text{on}})] * 100 = [382.9 \mu\text{s} / (242.2 \mu\text{s} + 382.9 \mu\text{s})] * 100 = 61.25\%$$

Prepared For: CurAegis Technologies, Inc.	Name: myCadian Watch
Report: TR 316171	Model: MA0001-02
LSR: C-2476	Serial: B001/B003

Set Up Photos



Prepared For: CurAegis Technologies, Inc.	Name: myCadian Watch
Report: TR 316171	Model: MA0001-02
LSR: C-2476	Serial: B001/B003

8.0 – Radiated Emissions

Rule Part(s)	FCC: 15.247 / 15.205 / 15.209 IC: RSS-247 / RSS-Gen			
Measurement Procedure	ANSI C63.10 2013 FCC KDB 558074 D01 DTS Meas Guidance v03r05			
Test Location	LS Research, LLC - FCC Listed 3 meter Semi-Anechoic Chamber			
Test Distance	3 meters			
EUT Placement	Transmitter Mode: Below 1 GHz: 80 cm height Above 1 GHz: 150 cm height			
Frequency Range of Measurement	Biconical: 30-200 MHz	Log Periodic Dipole Array: 200-1000 MHz	Double-Ridged Waveguide Horn: 1-18 GHz	Small Horn: 18-26 GHz
Measurement Detectors	30-1000MHz RBW: 120 kHz VBW: ≥ 300 kHz		1 – 25 GHz: RBW : 1MHz VBW: 3 MHz (Transmitter Peak Measurements); 2.7 kHz (Transmitter Average Measurements)	
Measurement Description	<p>The antenna, cable, pre-amp, and other necessary measurement system correction factors are loaded onto the EMI receiver / spectrum analyzer before the measurements are performed. Data is gathered and reported as corrected values.</p> <p>The EUT is placed on a non-conductive pedestal <u>made of expanded polyethylene foam</u> centered on a turn-table in the test location with the antenna at the 3m test distance from the EUT.</p> <p>Maximum radiated RF emissions are determined by rotation of azimuth and scanning the sense antenna between 1 and 4 meters in height using both horizontal and vertical antenna polarities. Maximized levels are manually noted at degree values of azimuth and at sense antenna height.</p> <p>The EUT remained within the measurement antenna's cone of radiation for all measurements taken above 1 GHz.</p>			
Example Calculations	Reported Measurement data = Raw receiver measurement + Antenna Correction Factor + Cable factor (dB) - amplification factor (when applicable) + Additional factor (when applicable)			

Prepared For: CurAegis Technologies, Inc.	Name: myCadian Watch
Report: TR 316171	Model: MA0001-02
LSR: C-2476	Serial: B001/B003

FCC Part 15.209 / IC RSS-247 sect 8.9 limits:

Frequency (MHz)	3 m Limit ($\mu\text{V/m}$)	3 m Limit ($\text{dB}\mu\text{V/m}$)	Detector Type
30-88	100	40.0	Quasi-Peak
88-216	150	43.5	Quasi-Peak
216-960	200	46.0	Quasi-Peak
Above 960	500	54.0	Quasi-Peak/Peak

8.1 – Transmitter Band-Edge Restricted Band

Manufacturer	CurAegis Technologies, Inc.	
Date	6/27/2016 and 8/23/2016	
Operator	John Johnston	
Temp. / R.H.	20 - 25° C / 30-60% R.H.	
Rule Part	FCC 15.247/ 15.205 / 15.209	
Measurement Procedure	ANSI C63.10 - 2013 Section 6.10	
Test Distance	3 meters	
EUT Placement	150 cm height non-conductive table centered on turn-table	
Detectors	Peak: RBW = 1 MHz VBW \geq 3 MHz	Average: RBW = 1 MHz VBW : 3 MHz (peak); 2.7 kHz (average)
Additional Notes	<ol style="list-style-type: none"> 1) Tested in continuous transmit modulated mode with EUT rotated in three orientations. 2) EUT maximized in azimuth and antenna height with maximum results reported. 3) Video bandwidth greater than $[1/(\text{minimum transmitter on time})]$ 4) A 6 dB attenuator was used to perform measurement in the 30-200 MHz range with the biconical antenna. 5) A generic (i.e., not part of the EUT) AC/DC adapter was used to provide the battery cartridge with 5V. 	

Example Calculations:

Radiated Emissions Limits:

FCC 15.209 Average Limit @ 3 meter ($\text{dB}\mu\text{V/m}$) – Average Reading ($\text{dB}\mu\text{V/m}$) = Margin

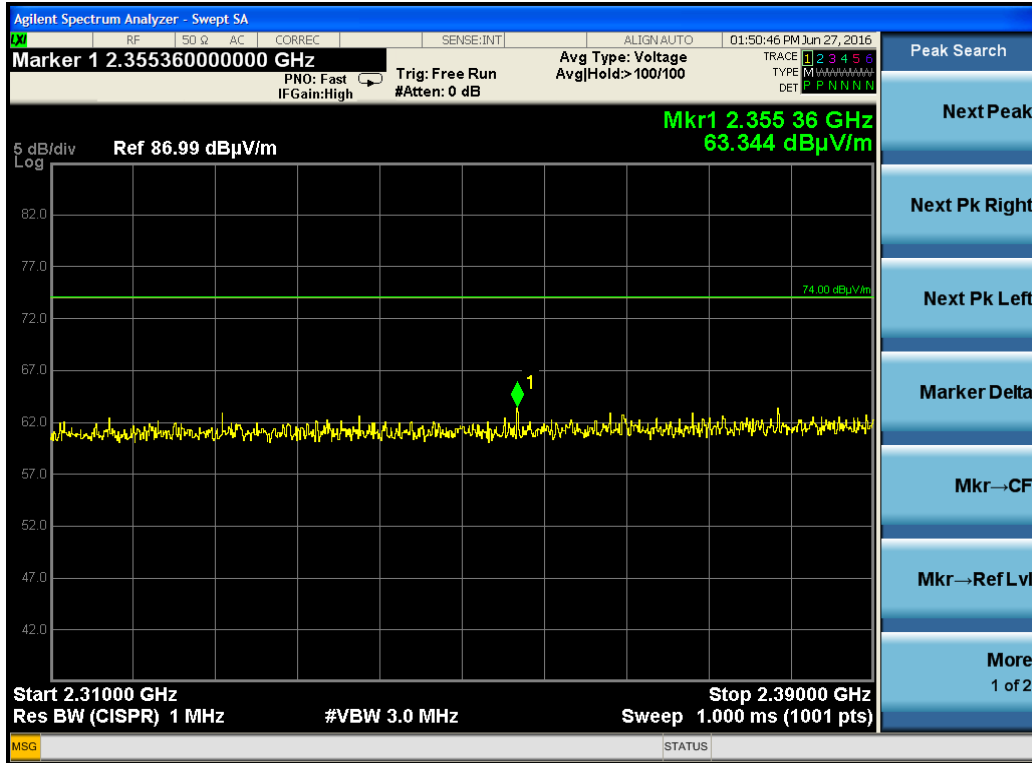
FCC 15.209 Peak Limit @ 3 meter ($\text{dB}\mu\text{V/m}$) – Peak Reading ($\text{dB}\mu\text{V/m}$) = Margin

Video Bandwidth:

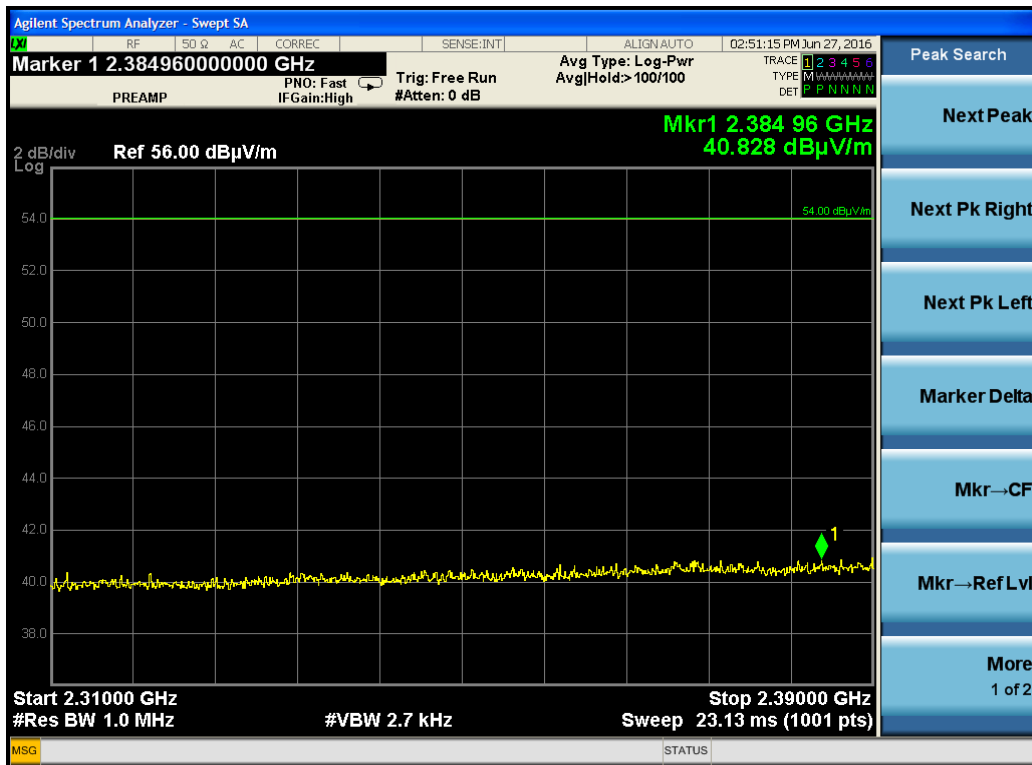
$$1/382.9 \mu\text{s} = 2.611 \text{ kHz}$$

Prepared For: CurAegis Technologies, Inc.	Name: myCadian Watch
Report: TR 316171	Model: MA0001-02
LSR: C-2476	Serial: B001/B003

Plots



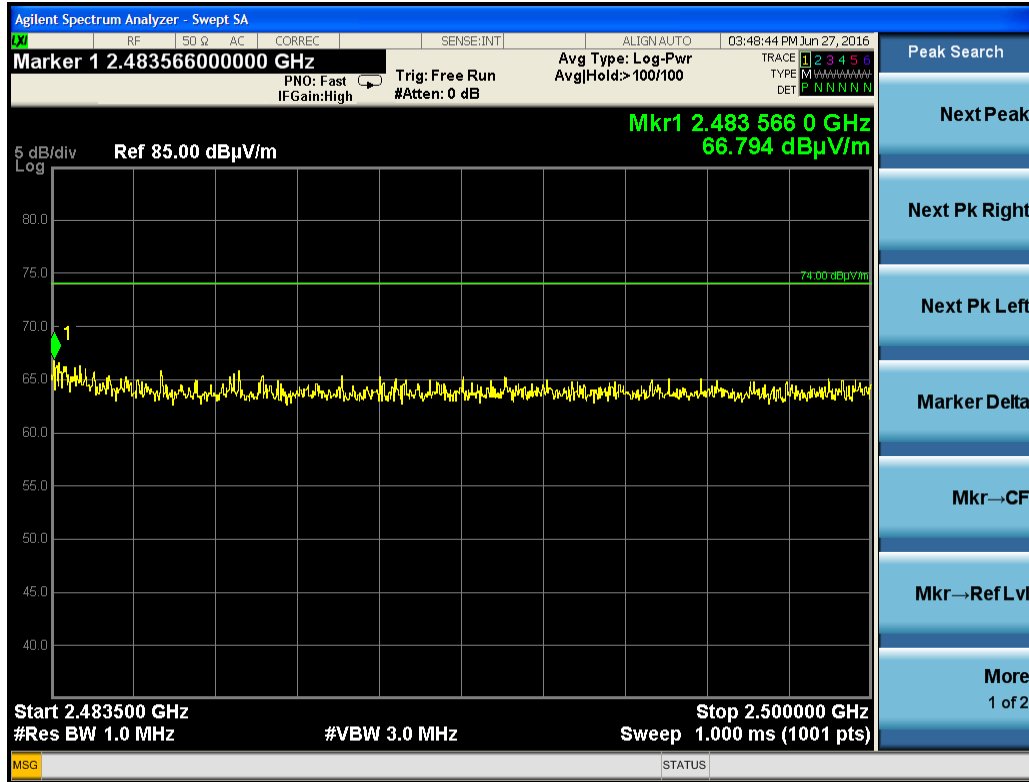
Low Channel – Restricted Band -Peak



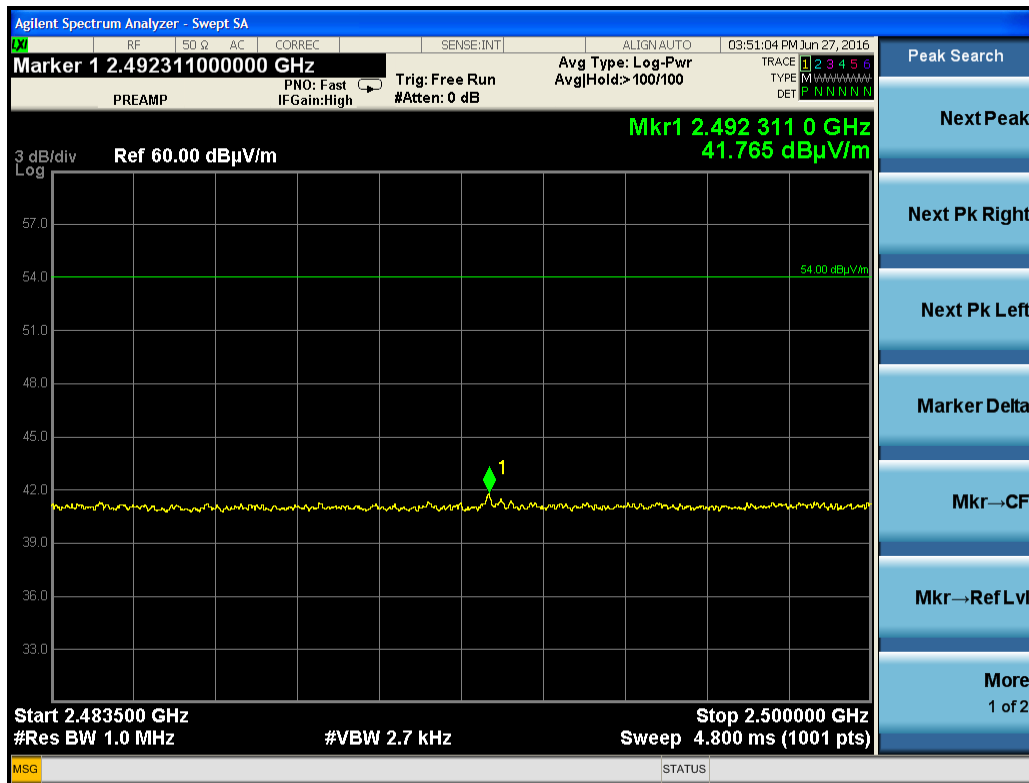
Low Channel – Restricted Band -Average

Prepared For: CurAegis Technologies, Inc.	Name: myCadian Watch
Report: TR 316171	Model: MA0001-02
LSR: C-2476	Serial: B001/B003

Plots



High Channel – Restricted Band - Peak



High Channel – Restricted Band -Average

Prepared For: CurAegis Technologies, Inc.	Name: myCadian Watch
Report: TR 316171	Model: MA0001-02
LSR: C-2476	Serial: B001/B003

8.2 – Transmitter Radiated Spurious Emissions in Restricted Bands

Manufacturer	CurAegis Technologies, Inc.		
Date	6/27/2016, 6/28/2016, 7/11/2016, 7/12/2016, 8/4/2016, 8/5/2016, 8/15/2016, and 8/23/2016		
Operator	John Johnston		
Temp. / R.H.	20 - 25° C / 30-60% R.H.		
Rule Part	15.247/ 15.205 / 15.209		
Measurement Procedure	ANSI C63.10 - 2013 Sections 6.3, 6.5, and 6.6 FCC KDB 558074 v03r05 Section 12.2.7 Radiated spurious emission test		
Test Distance	3 meters		
EUT Placement	Below 1 GHz: 80 cm height non-conductive table centered on turn-table Above 1 GHz: 150 cm height non-conductive table centered on turn-table		
Detectors Above 1 GHz	Quasi-Peak: RBW: 120 kHz VBW: ≥ 300 kHz	Peak: RBW = 1 MHz VBW ≥ 3 MHz	Average: RBW = 1 MHz VBW = 2.7 kHz
Additional Notes	<ol style="list-style-type: none"> 1) Tested in continuous transmit modulated mode on three channels in three orientations. 2) EUT maximized in azimuth and antenna height with maximum results reported. 3) Video bandwidth greater than [1/(minimum transmitter on time)] 4) A generic (i.e., not part of the EUT) AC/DC adapter was used to provide the battery cartridge with 5V. 		

Example Calculation:

FCC 15.209 Quasi-Peak Limit @ 3 meter (dBμV/m) – Peak Reading (dBμV/m) = Margin
 FCC 15.209 Average Limit @ 3 meter (dBμV/m) – Average Reading (dBμV/m) = Margin
 FCC 15.209 Peak Limit @ 3 meter (dBμV/m) – Peak Reading (dBμV/m) = Margin

Prepared For: CurAegis Technologies, Inc.	Name: myCadian Watch
Report: TR 316171	Model: MA0001-02
LSR: C-2476	Serial: B001/B003

Tables

Below 1 GHz

Frequency (MHz)	Height (m)	Azimuth (degree)	Quasi Peak Reading (dB μ V/m)	Quasi Peak Limit (dB μ V/m)	Margin (dB)	Antenna Polarity	EUT orientation
77.8	1.00	185	32.08	40.0	7.9	V	F
77.8	1.00	167	31.64	40.0	8.4	V	V
78.0	1.00	198	31.63	40.0	8.4	V	S
496.0	1.94	0	34.92	46.0	11.1	H	F
486.3	2.23	30	31.9	46.0	14.1	H	V
501.8	2.06	31	35.48	46.0	10.5	H	V
515.2	2.06	121	30.59	46.0	15.4	H	S
499.1	1.00	151	33.06	46.0	12.9	V	S
505.3	1.99	15	33.62	46.0	12.4	H	F
496.1	1.85	225	33.8	46.0	12.2	H	S

Note: “F” denotes flat orientation, “V” denotes vertical orientation, and “S” denotes side orientation (see images below). Emission traces were similar across all transmission channels and were highly dependent on the cable configuration.

Above 4 GHz¹

Frequency (MHz)	Height (m)	Azimuth (degree)	Peak Reading (dB μ V/m)	Avg Reading (dB μ V/m)	Avg Limit (dB μ V/m)	Margin (dB)	Antenna Polarity	EUT Orientation	Tx Channel
4804	1.40	60	45.9	38.3	54	15.7	H	F	Low
4880	1.00	310	44.3	36.1	54	17.9	H	S	Mid
7320	1.00	229	47.2	39.6	54	14.4	V	F	Mid
4960	1.70	221	43.8	36	54	18	V	V	High
7440	1.00	285	48.2	40.6	54	13.4	V	F	High

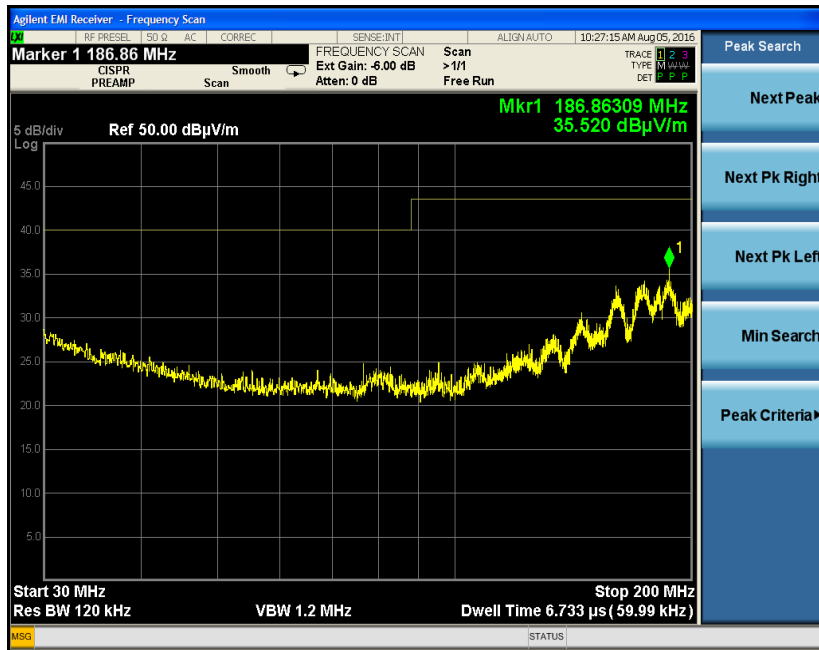
Note: “F” denotes flat orientation, “V” denotes vertical orientation, and “S” denotes side orientation (see images below).

¹ The table represents the highest harmonic emissions recorded at each transmitting channel across all EUT orientations and antenna polarizations.

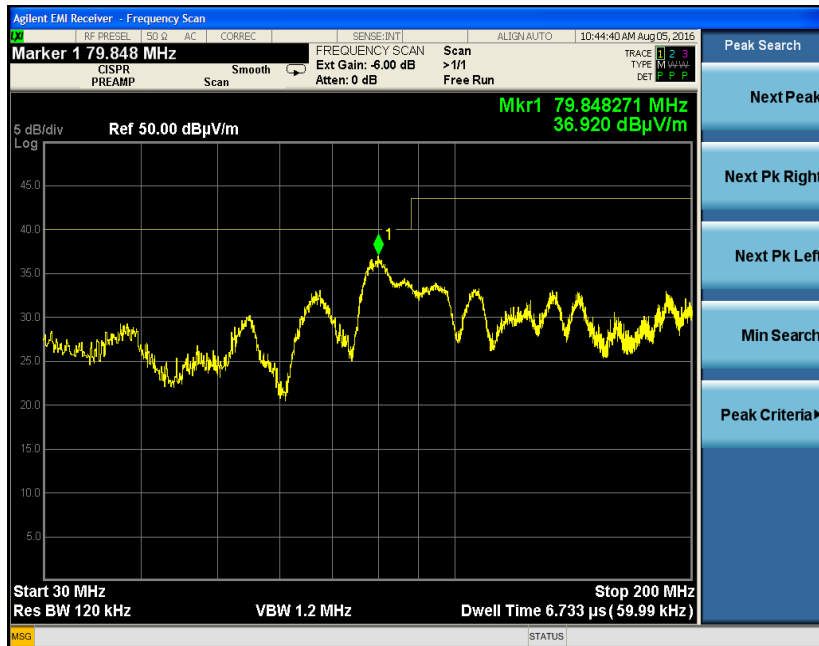
Prepared For: CurAegis Technologies, Inc.	Name: myCadian Watch
Report: TR 316171	Model: MA0001-02
LSR: C-2476	Serial: B001/B003

Plots

30 MHz – 200 MHz Horizontal Polarity²



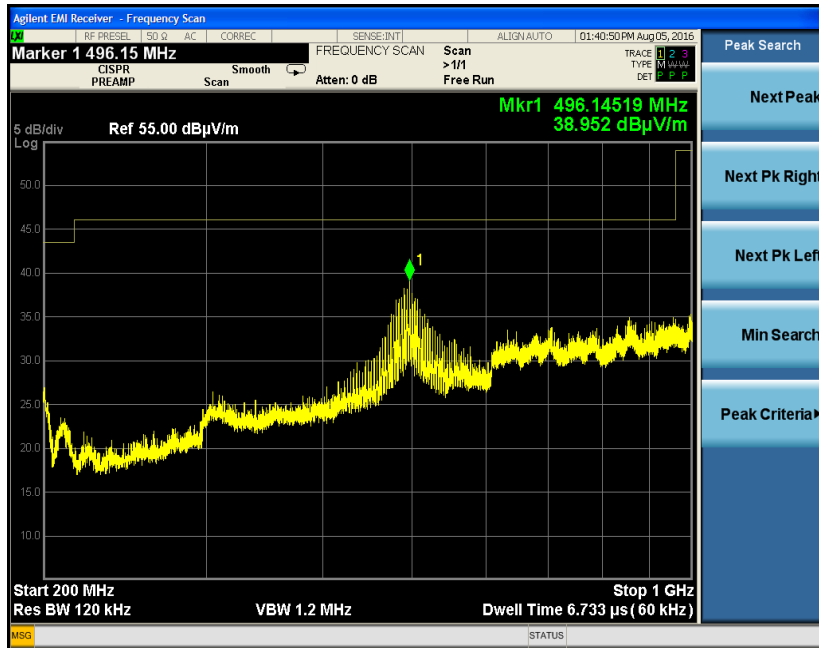
30 MHz – 200 MHz Vertical Polarity²



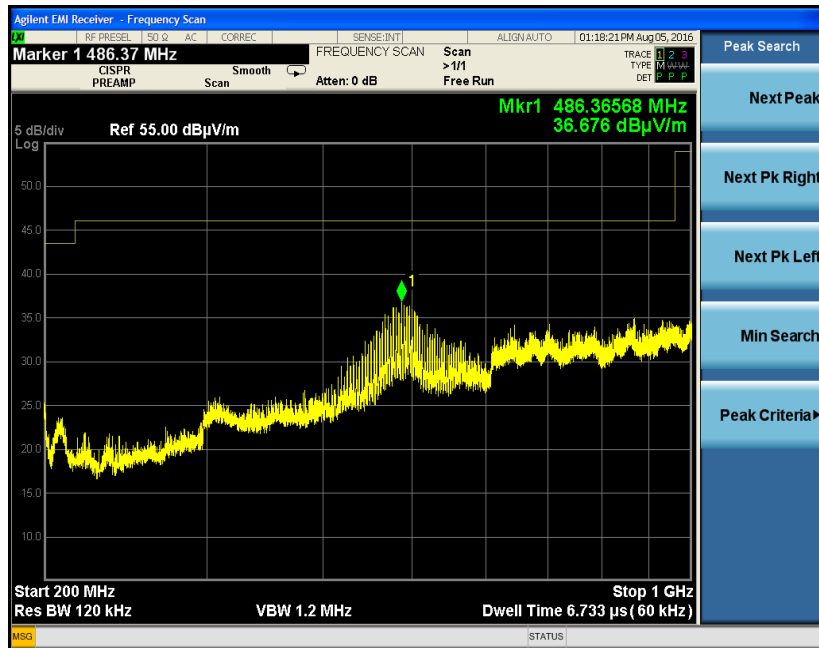
² The emission traces between 30-1000 MHz are substantially similar across all transmit channels (0, 19, and 39) and orientations (vertical, flat, and side). The worst-case traces for each antenna polarization are shown in the report.

Prepared For: CurAegis Technologies, Inc.	Name: myCadian Watch
Report: TR 316171	Model: MA0001-02
LSR: C-2476	Serial: B001/B003

200 MHz – 1000 MHz Horizontal Polarity

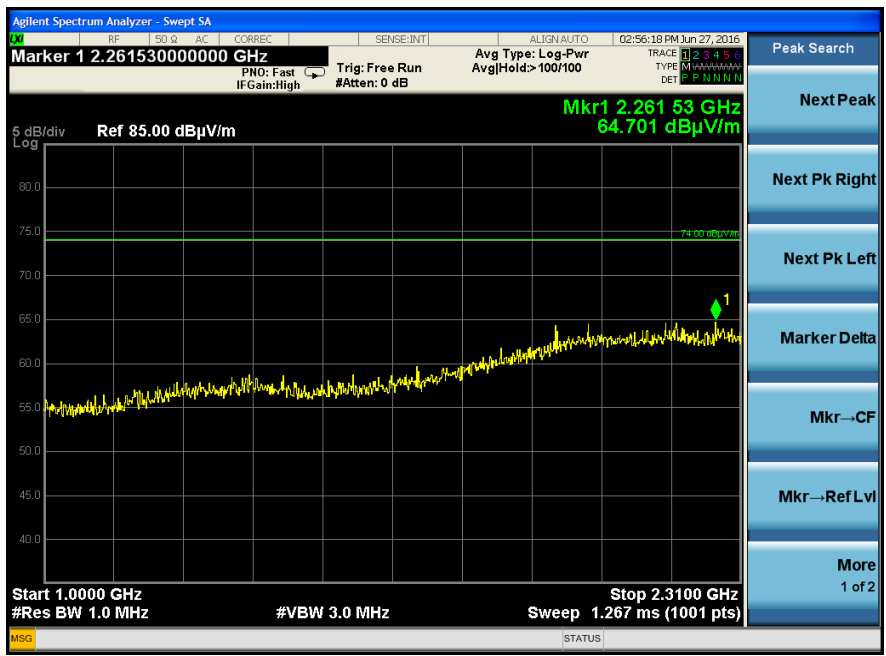


200 MHz – 1000 MHz Vertical Polarity

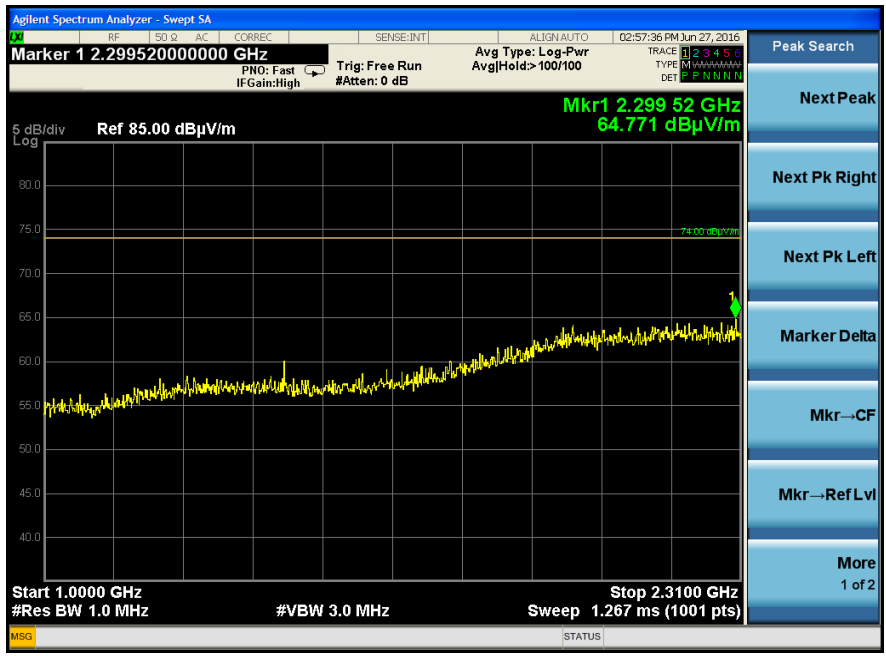


Prepared For: CurAegis Technologies, Inc.	Name: myCadian Watch
Report: TR 316171	Model: MA0001-02
LSR: C-2476	Serial: B001/B003

1000 MHz – 2310 MHz, Horizontal Polarity

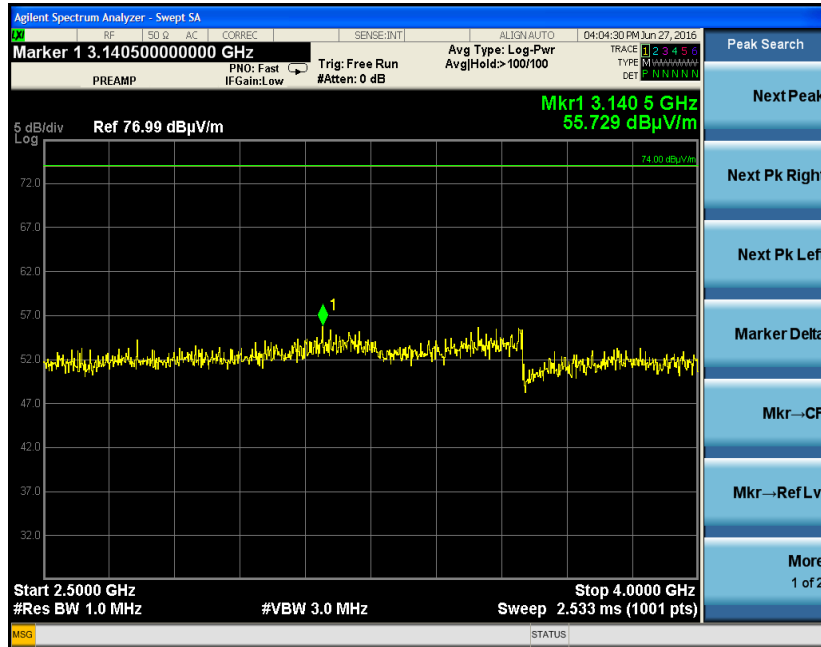


1000 MHz – 2310 MHz, Vertical Polarity

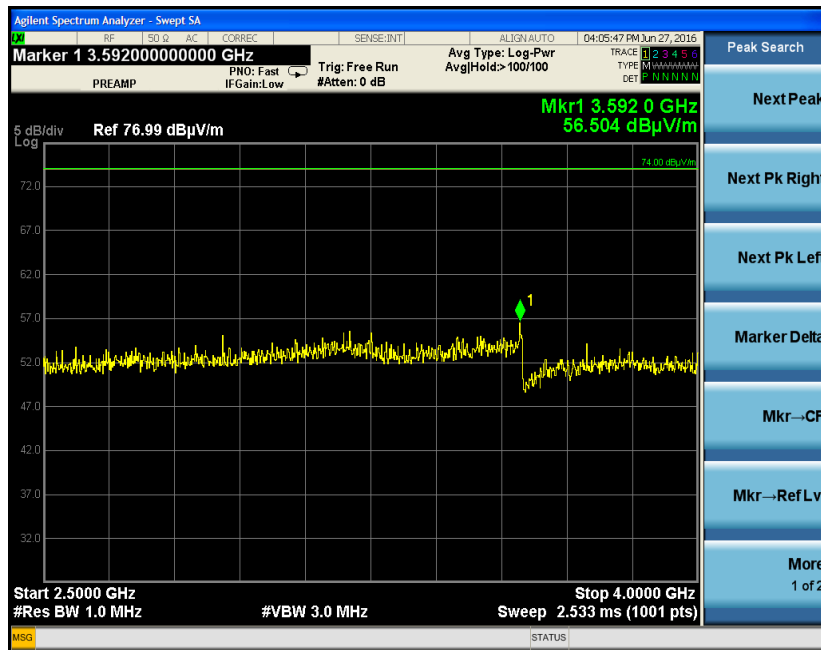


Prepared For: CurAegis Technologies, Inc.	Name: myCadian Watch
Report: TR 316171	Model: MA0001-02
LSR: C-2476	Serial: B001/B003

2500 MHz – 4000 MHz, Horizontal Polarity

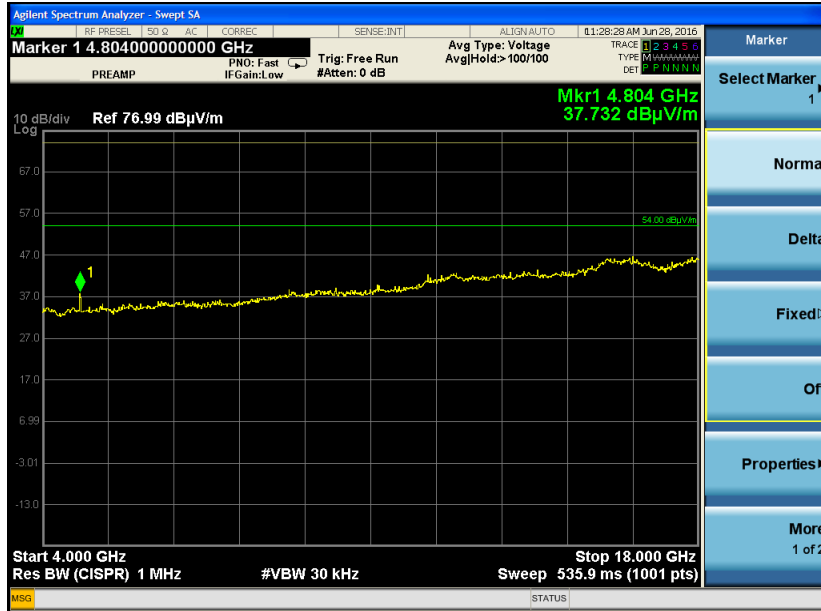


2500 MHz – 4000 MHz Peak, Vertical Polarity

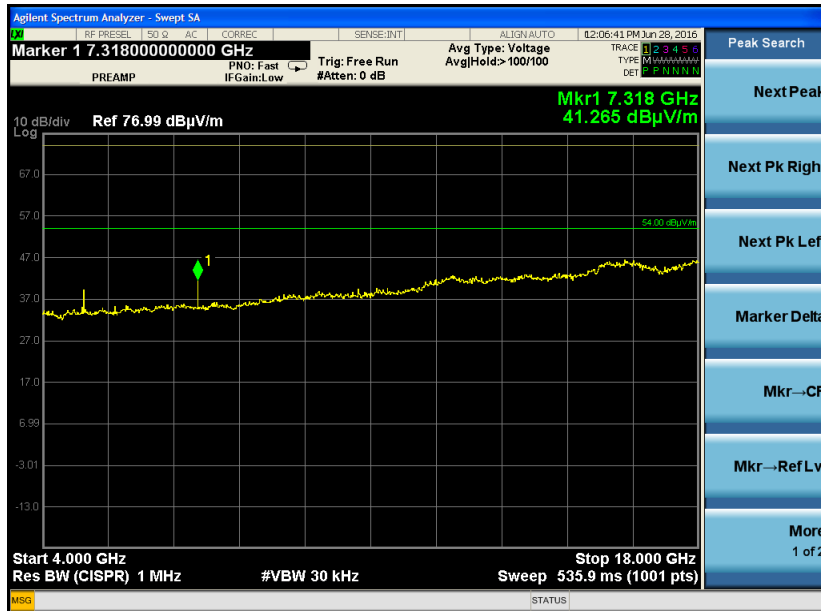


Prepared For: CurAegis Technologies, Inc.	Name: myCadian Watch
Report: TR 316171	Model: MA0001-02
LSR: C-2476	Serial: B001/B003

4 GHz – 18 GHz Reduced VBW, Low Channel³



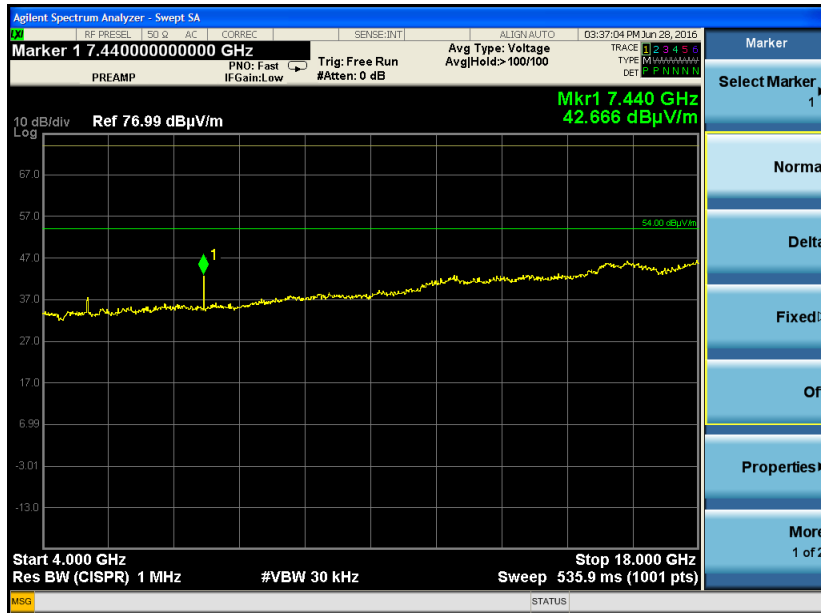
4 GHz – 18 GHz Reduced VBW, Mid Channel



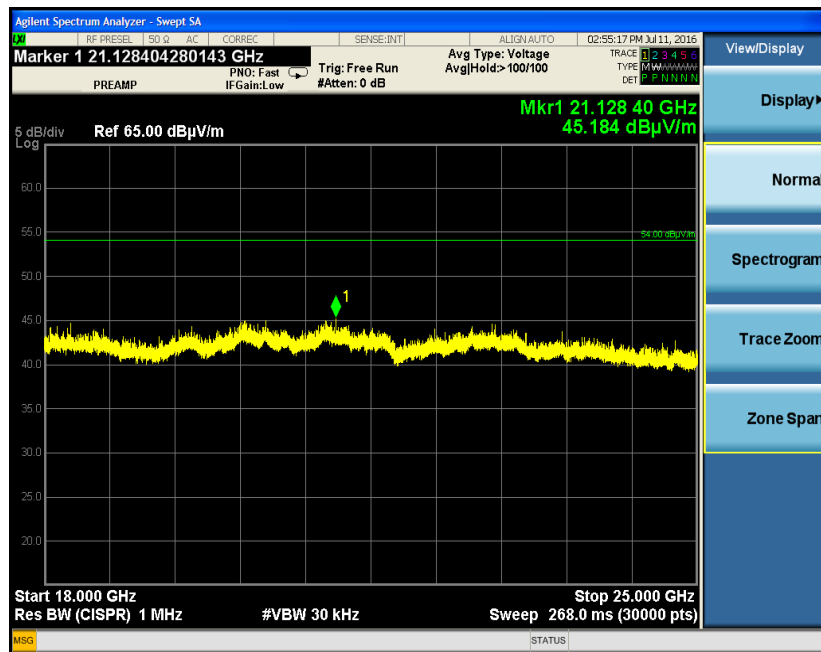
³ The worst-case emission traces in the 4-18 GHz range are shown across all EUT orientations and antenna polarizations

Prepared For: CurAegis Technologies, Inc.	Name: myCadian Watch
Report: TR 316171	Model: MA0001-02
LSR: C-2476	Serial: B001/B003

4 GHz – 18 GHz Reduced VBW, High Channel



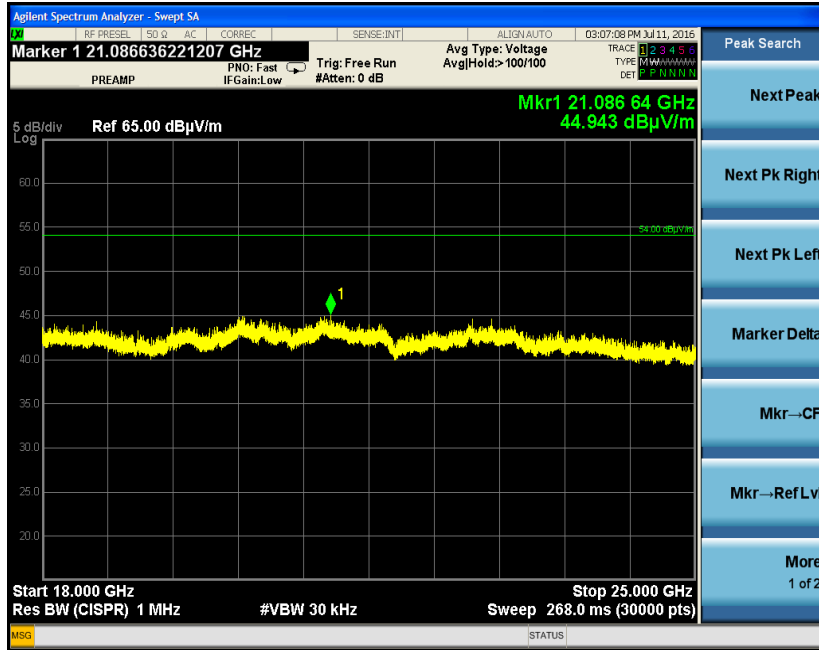
18 GHz – 25 GHz, Reduced VBW, Low Channel⁴



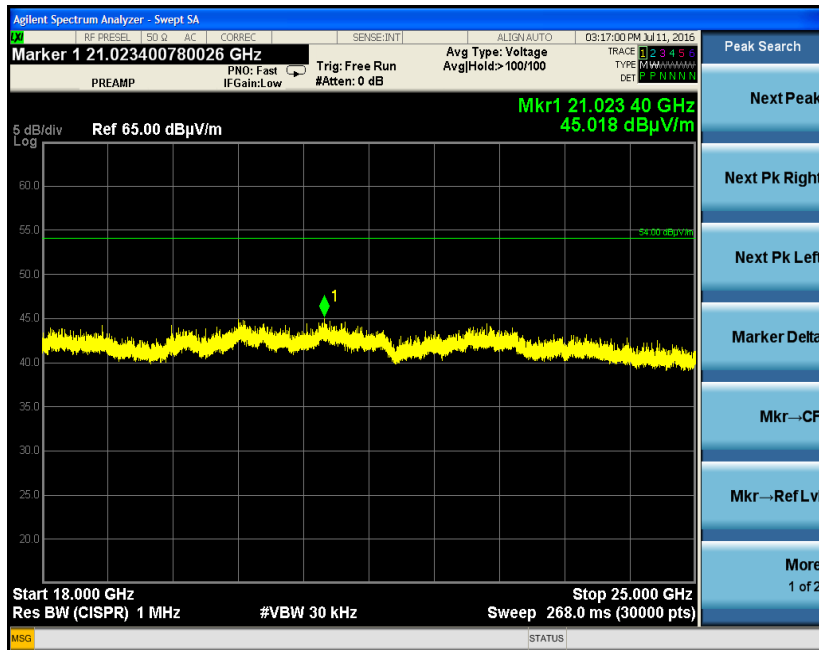
⁴ The worst-case emission traces in the 18-25 GHz range are shown across all EUT orientations and antenna polarizations. No harmonic emissions were detected in this frequency range.

Prepared For: CurAegis Technologies, Inc.	Name: myCadian Watch
Report: TR 316171	Model: MA0001-02
LSR: C-2476	Serial: B001/B003

18 GHz – 25 GHz, Reduced VBW, Mid Channel



18 GHz – 25 GHz, Reduced VBW, High Channel



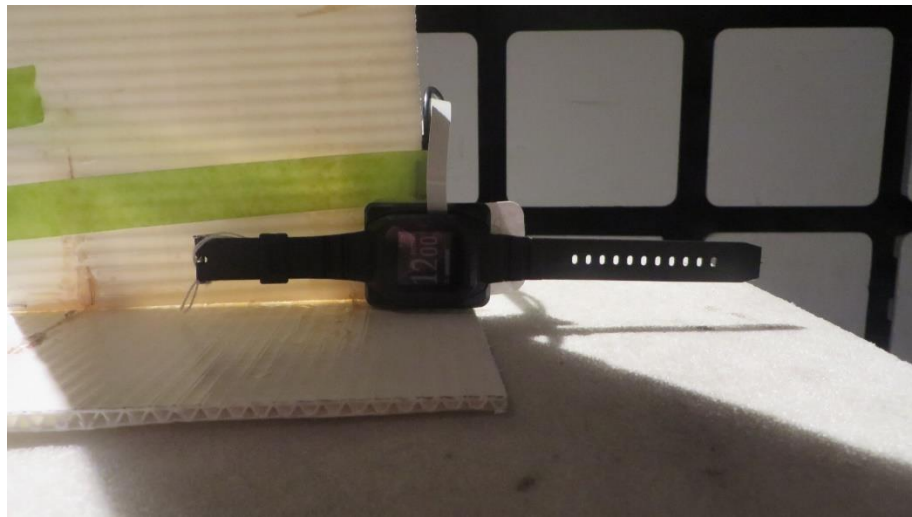
Prepared For: CurAegis Technologies, Inc.	Name: myCadian Watch
Report: TR 316171	Model: MA0001-02
LSR: C-2476	Serial: B001/B003

Photos

EUT Flat Orientation

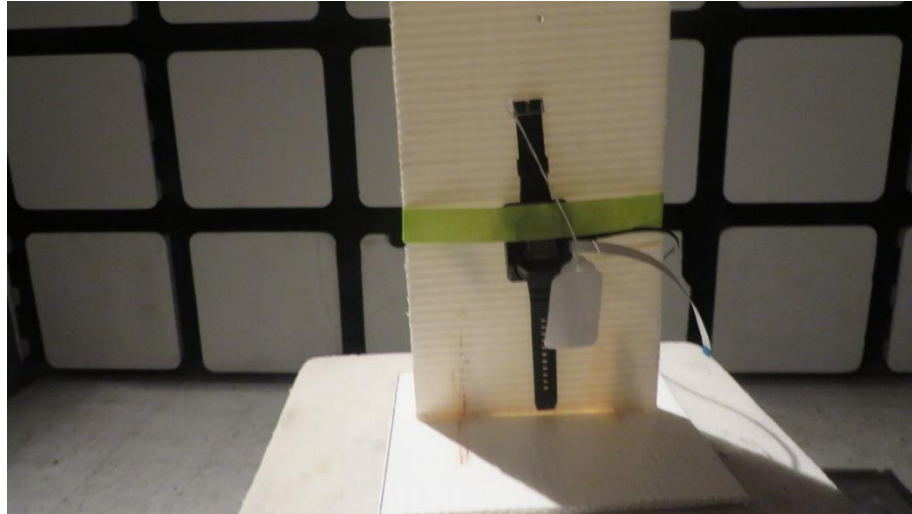


EUT Side Orientation



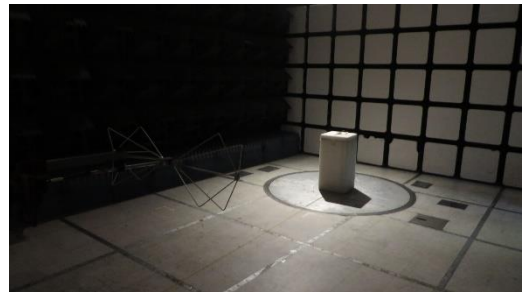
Prepared For: CurAegis Technologies, Inc.	Name: myCadian Watch
Report: TR 316171	Model: MA0001-02
LSR: C-2476	Serial: B001/B003

EUT Vertical Orientation



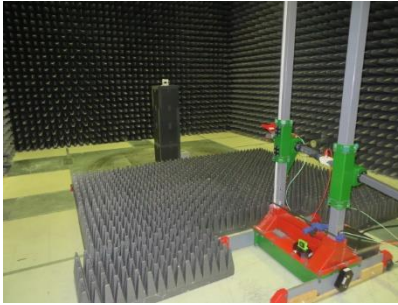
Radiated Emissions

30 MHz – 1000 MHz



Prepared For: CurAegis Technologies, Inc.	Name: myCadian Watch
Report: TR 316171	Model: MA0001-02
LSR: C-2476	Serial: B001/B003

1 GHz – 25 GHz



Generic AC/DC Adapter



Prepared For: CurAegis Technologies, Inc.	Name: myCadian Watch
Report: TR 316171	Model: MA0001-02
LSR: C-2476	Serial: B001/B003

9.0 – Conducted Emissions

Rule Part(s)	FCC: 15.207 IC: RSS-Gen Section 8.8
Measurement Procedure	ANSI C63.10 2013
Test Location	Conducted Emissions
EUT Placement	80 cm height 40 cm from vertical ground plane
Frequency Range of Measurement	150 kHz to 30 MHz
Measurement Detectors	Quasi-Peak and Average Detectors
Measurement Description	The necessary measurement system correction factors are loaded onto the EMI receiver before the measurements are performed. Data is gathered and reported as corrected values. The EUT is placed on a non-conductive pedestal <u>made of expanded polyethylene foam</u> . Maximum conducted RF emissions are determined on Line 1 and Line 2.
Example Calculations	Reported Measurement data = Raw receiver measurement + Cable factor (dB) - amplification factor (when applicable) + Additional factor (when applicable)

Prepared For: CurAegis Technologies, Inc.	Name: myCadian Watch
Report: TR 316171	Model: MA0001-02
LSR: C-2476	Serial: B001/B003

Conducted Emission Limits

The 47 CFR Part 15 Section 207 and RSS-GEN Section 8.8 AC conducted emission limits are provided in the table below:

Frequency of emission (MHz)	Conducted limit (dB μ V)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency

Prepared For: CurAegis Technologies, Inc.	Name: myCadian Watch
Report: TR 316171	Model: MA0001-02
LSR: C-2476	Serial: B001/B003

9.1 – Conducted Emissions Test Set-Up

Manufacturer	CurAegis Technologies, Inc.
Date	8/9/2016
Operator	John Johnston
Temp. / R.H.	20 - 25° C / 30-60% R.H.
Rule Part	FCC 15.207 and RSS-GEN Section 8.8
Measurement Procedure	ANSI C63.10 (2013) Section 6.2
Additional Notes	1) Tested with EUT in continuous transmit modulated mode 2) A generic (i.e., not part of the EUT) AC/DC adapter was used to provide the battery cartridge with 5V.

Transmitter Mode Test Results

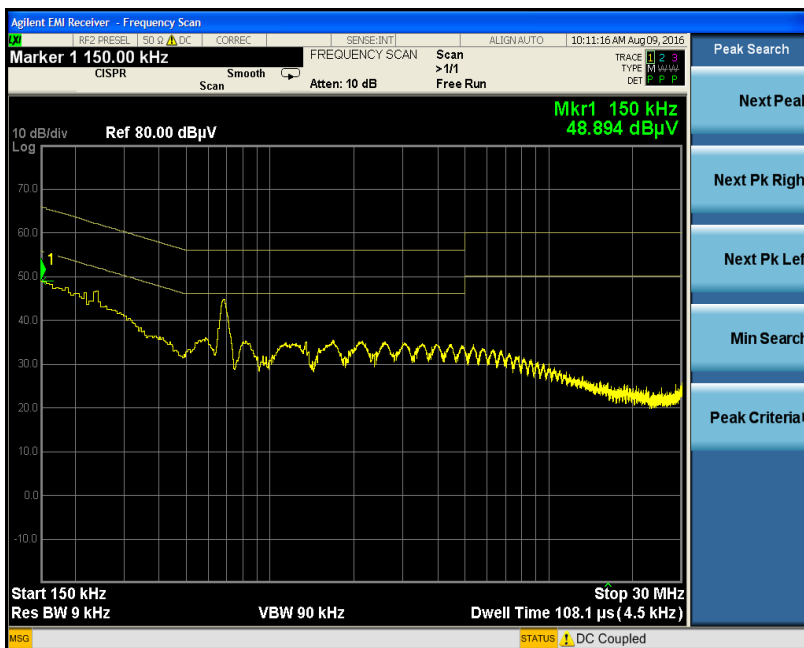
Line	Frequency (MHz)	Quasi-Peak Measurement (dBuV)	Quasi-Peak Limit (dBuV)	Margin (dB)	Average Measurement (dBuV)	Average Limit (dBuV)	Margin (dB)	Notes
1	0.679	43.4	56	12.6	38.1	46	7.9	Tx - Channel 0
2	0.679	36.3	56	19.7	31.4	46	14.6	Tx - Channel 0
1	0.678	43.4	56	12.6	38.1	46	7.9	Tx - Channel 19
2	0.678	45.8	56	10.2	41.4	46	4.6	Tx - Channel 19
1	0.681	43.4	56	12.6	35.5	46	10.5	Tx - Channel 39
2	0.683	44.2	56	11.8	39.3	46	6.7	Tx - Channel 39

Prepared For: CurAegis Technologies, Inc.	Name: myCadian Watch
Report: TR 316171	Model: MA0001-02
LSR: C-2476	Serial: B001/B003

Screen Captures

Transmit Mode – Channel 0

Line 1

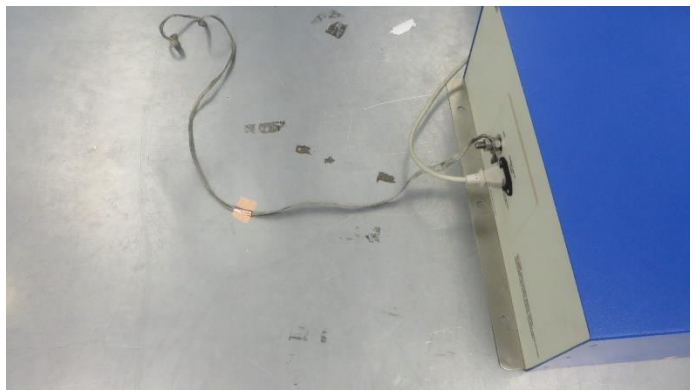
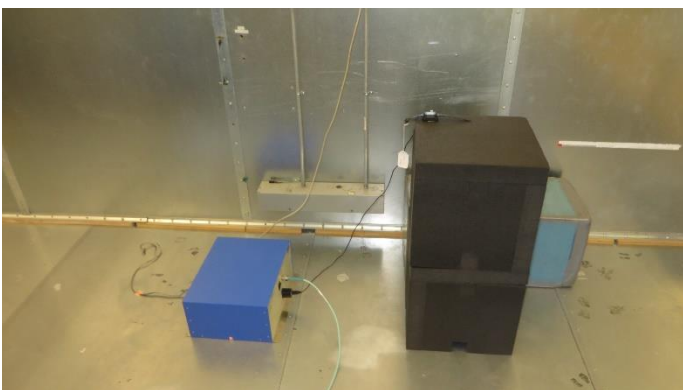
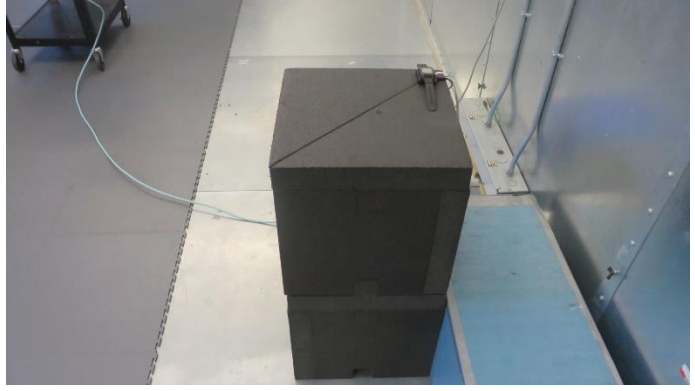
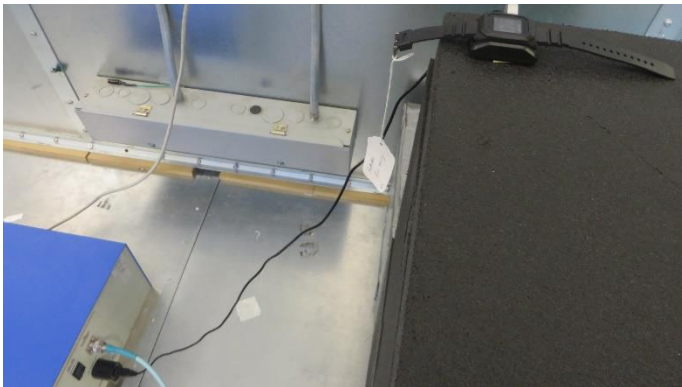


Line 2



Prepared For: CurAegis Technologies, Inc.	Name: myCadian Watch
Report: TR 316171	Model: MA0001-02
LSR: C-2476	Serial: B001/B003

Set-Up Photos



Prepared For: CurAegis Technologies, Inc.	Name: myCadian Watch
Report: TR 316171	Model: MA0001-02
LSR: C-2476	Serial: B001/B003

Appendix A – Test Equipment



Date : 28-Jun-2016 Type Test : Power Spectral Density Job # : C-2476
 Prepared By: Shane Dock Customer : Torvec, Inc. Quote # : 316171

No.	Asset #	Description	Manufacturer	Model #	Serial #	Cal Date	Cal Due Date	Equipment Status
1	EE 960073	Spectrum Analyzer	Agilent	E4446A	US45300564	10/29/2015	10/29/2016	Active Calibration

Project Engineer: *John Johnston* Quality Assurance: *Adam O'Alge*



Date : 28-Jun-2016 Type Test : Conducted Power Output Job # : C-2476
 Prepared By: Shane Dock Customer : Torvec, Inc. Quote # : 316171

No.	Asset #	Description	Manufacturer	Model #	Serial #	Cal Date	Cal Due Date	Equipment Status
1	EE 960073	Spectrum Analyzer	Agilent	E4446A	US45300564	10/29/2015	10/29/2016	Active Calibration

Project Engineer: *John Johnston* Quality Assurance: *Adam O'Alge*



Date : 28-Jun-2016 and 30-Aug-2016 Type Test : Occupied Bandwidth (6dB & 99%) Job # : C-2476
 Prepared By: Shane Dock and John Johnston Customer : Torvec, Inc. Quote # : 316171

No.	Asset #	Description	Manufacturer	Model #	Serial #	Cal Date	Cal Due Date	Equipment Status
1	EE 960073	Spectrum Analyzer	Agilent	E4446A	US45300564	10/29/2015	10/29/2016	Active Calibration

Project Engineer: *John Johnston* Quality Assurance: *Adam O'Alge*



Date : 28-Jun-2016 Type Test : BLE 100 kHz Spurious Emissions Job # : C-2476
 Prepared By: Shane Dock Customer : Torvec, Inc. Quote # : 316171

No.	Asset #	Description	Manufacturer	Model #	Serial #	Cal Date	Cal Due Date	Equipment Status
1	EE 960073	Spectrum Analyzer	Agilent	E4446A	US45300564	10/25/2015	10/25/2016	Active Calibration

Project Engineer: *John Johnston* Quality Assurance: *Adam O'Alge*

Prepared For: CurAegis Technologies, Inc.	Name: myCadian Watch
Report: TR 316171	Model: MA0001-02
LSR: C-2476	Serial: B001/B003



Date : 28-Jun-2016

Type Test : Frequency Stability

Job # : C-2476

Prepared By: John Johnston

Customer : Torvec, Inc.

Quote # : 316171

No.	Asset #	Description	Manufacturer	Model #	Serial #	Cal Date	Cal Due Date	Equipment Status
1	EE 960073	Spectrum Analyzer	Agilent	E4446A	US45300564	10/25/2015	10/25/2016	Active Calibration

Project Engineer:

Quality Assurance:



Date : 24-Jun-2016

Type Test : Radiated Emissions

Job # : C-2476

Prepared By: John Johnston

Customer : Torvec, Inc.

Quote # : 316171

No.	Asset #	Description	Manufacturer	Model #	Serial #	Cal Date	Cal Due Date	Equipment Status
1	EE 960085	N9038A MXE 26.5GHz Receiver	Agilent	N9038A	MY51210148	5/12/2016	5/12/2017	Active Calibration
2	AA 960158	Double Ridge Horn Antenna	ETS Lindgren	3117	109300	2/4/2016	2/4/2017	Active Calibration
3	EE 960159	0.8 - 21GHz LNA	Mini-Circuits	ZVA-213X-S+	40201429	2/4/2016	2/4/2017	Active Calibration
4	AA 960171	Cable - low loss 1m	A.H. Systems, Inc.	SAC-26G-6	386	3/31/2016	3/31/2017	Active Calibration
5	AA 960153	2.4GHz High Pass Filter	KWM	HPF-L-14186	7272-04	4/29/2016	4/29/2017	Active Calibration
6	EE 960087	44GHz EXA Spectrum Analyzer	Agilent	N9010A	MY53400296	12/18/2015	12/18/2016	Active Calibration
7	AA 960174	Small Horn Antenna 18-40 GHz	ETS-Lindgren	3116C-PA	00206880	4/23/2016	4/23/2017	Active Calibration
8	EE 960088	8GHz MXE Spectrum Analyzer	Agilent	N9038A	MY51210138	2/24/2016	2/24/2017	Active Calibration
9	AA 960005	Biconical Antenna	EMCO	93110B	9601-2280	1/14/2016	1/14/2017	Active Calibration
10	AA 960004	Log Periodic Antenna	EMCO	93146	9512-4276	8/19/2015	8/19/2016	Active Calibration
11	AA 960078	Log Periodic Antenna	EMCO	93146	9701-4855	3/31/2016	3/31/2017	Active Calibration

Project Engineer:

Quality Assurance:



Date : 24-Jun-2016

Type Test : Tx Band-Edge

Job # : C-2476

Prepared By: John Johnston

Customer : Torvec, Inc.

Quote # : 316171

No.	Asset #	Description	Manufacturer	Model #	Serial #	Cal Date	Cal Due Date	Equipment Status
1	EE 960085	N9038A MXE 26.5GHz Receiver	Agilent	N9038A	MY51210148	5/12/2016	5/12/2017	Active Calibration
2	AA 960158	Double Ridge Horn Antenna	ETS Lindgren	3117	109300	2/4/2016	2/4/2017	Active Calibration

Project Engineer:

Quality Assurance:

Prepared For: CurAegis Technologies, Inc.

Name: myCadian Watch

Report: TR 316171

Model: MA0001-02

LSR: C-2476

Serial: B001/B003



Date : 9-Aug-2016

Type Test : Conducted Emissions


Job # : C-2476

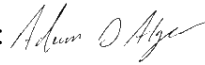
Prepared By: John Johnston

Customer : Torvec, Inc.

Quote #: 316171

No.	Asset #	Description	Manufacturer	Model #	Serial #	Cal Date	Cal Due Date	Equipment Status
1	EE 960085	N9038A MXE 26.5GHz Receiver	Agilent	N9038A	MY51210148	5/12/2016	5/12/2017	Active Calibration
2	EE 960089	LISN - 15A	COM-POWER	LI-215A	191943	3/8/2016	3/8/2017	Active Calibration

Project Engineer: 

Quality Assurance: 

Prepared For: CurAegis Technologies, Inc.	Name: myCadian Watch
Report: TR 316171	Model: MA0001-02
LSR: C-2476	Serial: B001/B003

Appendix B - Uncertainty Summary

This uncertainty represents an expanded uncertainty expressed at approximately the 95 % confidence level, using a coverage factor of k=2.

<i>Measurement Type</i>	<i>Particular Configuration</i>	<i>Uncertainty Values</i>
<i>Radiated Emissions</i>	<i>Biconical Antenna</i>	<i>4.82 dB</i>
<i>Radiated Emissions</i>	<i>Log Periodic Antenna</i>	<i>4.88 dB</i>
<i>Radiated Emissions</i>	<i>Horn Antenna</i>	<i>4.85 dB</i>
<i>Absolute Conducted Emissions</i>	<i>PSA Series</i>	<i>1.38 dB</i>
<i>AC Line Conducted Emissions</i>	<i>LISN</i>	<i>3.20 dB</i>
<i>Radiated Immunity</i>	<i>3 Volts/Meter</i>	<i>2.05 V/m</i>
<i>Conducted Immunity</i>	<i>3 Volts rms</i>	<i>2.33 V</i>
<i>EFT Burst, Surge, VDI</i>	<i>230 VAC</i>	<i>54.4 V</i>
<i>ESD Immunity</i>	<i>Discharge at 15kV</i>	<i>3200 V</i>
<i>Temperature/Humidity</i>	<i>Thermo-hygrometer</i>	<i>0.64° C / 2.88 % R.H.</i>

Prepared For: CurAegis Technologies, Inc.	Name: myCadian Watch
Report: TR 316171	Model: MA0001-02
LSR: C-2476	Serial: B001/B003

Appendix C - References

Publication	Year	Title
FCC CFR Parts 0-15	2016	Code of Federal Regulations – Telecommunications
ANSI C63.10	2013	American National Standard for Testing Unlicensed Wireless Devices
RSS-247 Issue 1	2015	Digital Transmission System (DTSs), Frequency Hopping System (FHSs) and License-Exempt Local Area Network (LE-LAN) Devices
RSS-Gen Issue 4	2014	General Requirements and Information for the Certification of Radio Apparatus
FCC KDB 558074 D01 DTS Meas Guidance v03r05	2016	Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247

Prepared For: CurAegis Technologies, Inc.	Name: myCadian Watch
Report: TR 316171	Model: MA0001-02
LSR: C-2476	Serial: B001/B003