Testing Tomorrow's Technology

Permissive Change Application

For

Part 2, Subpart J, Paragraph 2.907 Equipment Authorization of Certification for an Intentional Radiator per Part 15, Subpart C, paragraphs 15.207, 15.209 and 15.247

Part 2, Subpart J, Section 2.902, Verification Per Part 15, Subpart B, for Unintentional Radiators, section 15.101, 15.107 and 15.109

And

Industry Canada RSS-Gen, Issue 4 and RSS-247, Issue 1

For the

Controlant EHF

Model: CO 13.02

FCC ID: 2AD9R-CO1301
IC: 20355-CO1301

UST Project: 16-0122
Issue Date: June 27, 2016

Total Pages in This Report: 23

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I certify that I am authorized to sign for the Test Agency and that all of the statements in this report and in the Exhibits attached hereto are true and correct to the best of my knowledge and belief:

US TECH (Agent Responsible For Test):

By: Alan Ghasiani

Name: 

Title: Compliance Engineer – President

Date June 27, 2016

NVLAP LAB CODE 200162-0

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MEASUREMENT TECHNICAL REPORT

COMPANY NAME: Controlant EHF

MODEL: CO 13.02

FCC ID: 2AD9R-CO1301

IC: 20355-CO1301

DATE: February 13, 2015

This report concerns (check one): Original grant [X]
Class II change

Equipment type: 903-927 MHz Transmitter Module

Deferred grant requested per 47 CFR 0.457(d)(1)(ii)? yes_____ No X

If yes, defer until: N/A
date

agrees to notify the Commission by N/A
date

of the intended date of announcement of the product so that the grant can be issued on that date.

Report prepared by:

US Tech
3505 Francis Circle
Alpharetta, GA 30004

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1 General Information

1.1 Purpose of this Report

The originally tested radio product has been modified to optimize the performance of the product. The following changes were made:

-Temperature and humidity sensor added
-Openings added to the product enclosure
-Add antenna ANT-916-CW-QW, 1.8 dBi (lesser gain than original)
-Add antenna ANT-916-OC-LG-RPS, 2.2 dBi (lesser gain than original)

The changes above do not affect the transmitter circuitry. That portion of the product remains identical to the originally tested product. To improve the transmitter signal performance two antenna options have been added. These are of the same type and less gain than the antenna used during the original testing. Due to the modifications this version of the product has been designated with the model number CO 13.02.

To show continued compliance with the relative subpart, the product was re-evaluated for both radiated intentional emissions and radiated unintentional emissions. No other test was deemed necessary. The test data is presented in this report for consideration. For more information regarding the modifications please see the attached Permissive Change cover letter.

1.2 Characterization of Test Sample

The sample used for testing was received by US Tech on May 13, 2016 in good operating condition.

1.3 Product Description

The Equipment Under Test (EUT) is the Controlant EHF Model CO 13.02. The CO 13.02 is updated version of the previously approved Model CO 13.01. The CO 13.02 is a wireless logger with a built in ambient temperature and humidity sensor. The logger transmits its data to a local transceiver which then collects the data to an online central database. The CO 13.02 is a hybrid system where both Frequency Hopping and Digital Modulation occur and is a wireless transmitter operating in the 900 MHz band. When trying to synch with a gateway/receiver the EUT will send a single packet out every 20 or more seconds. If the EUT receives an ACK, then it goes into frequency hopping mode, i.e. normal operation mode.

Antenna: Dipole
Max antenna gain (from original filing): 3 dBi
Modulation: GFSK (FHSS) and 2-FSK (DTS)
Maximum Output Power: 11 dBm (FHSS)
Symbol rate: 4.75 kbps (FHSS) and 475 bps (DTS)
Bit Rate: 38 kbps (FHSS) and 4 kbps (DTS)

1.4 Configuration of Tested System

The Test Sample was tested per *ANSI C63.4:2014, Methods of Measurement of Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz (2014)* for FCC subpart A Digital equipment Verification requirements and per FCC KDB Publication number 558074 for Digital Transmission Systems Operating Under section 15.247. Also, FCC, KDB Publication No. 558074 and FCC Public Notice DA 00-705 was used as a test procedure guide.

A list of EUT and Peripherals is found in Table 1 below. A block diagram of the tested system is shown in Figure 1. Test configuration photographs are provided in separate Appendices.

1.5 Test Facility

Testing was performed at US Tech's measurement facility at 3505 Francis Circle, Alpharetta, GA 30004. This site has been fully described and registered with the FCC. Its designation number is 186022. Additionally this site has also been fully described and submitted to Industry Canada (IC), and has been approved under file number 9900A-1.

1.6 Related Submittals

1.6.1 The EUT is subject to the following FCC authorizations:

a) Certification under section 15.247 as a transmitter.
b) Verification under 15.101 as a digital device and receiver.

1.6.2 Verification of the Digital Apparatus

The Verification requirement shares many common report elements with the Certification report. Therefore, though this report is mostly intended to provide data for the Certification process, the Verification authorization report (part 15.107 and 15.109) for the EUT is included herein.

Table 1. EUT and Peripherals

PERIPHERAL MANUFACTURER.	MODEL NUMBER	SERIAL NUMBER	FCC/IC ID:	CABLES P/D
EUT Controlant EHF	CO 13.02	Engineering Sample	2AD9R-CO1301 IC: 20355-CO1301 (IC Pending)	None
Antenna See antenna details	--	--	--	--

U= Unshielded
S= Shielded
P= Power
D= Data

2 Tests and Measurements

2.1 Test Equipment

The table below lists test equipment used to evaluate this product. Model numbers, serial numbers and their calibration status are indicated.

Table 2. Test Instruments

TEST INSTRUMENT	MODEL NUMBER	MANUFACTURER	SERIAL NUMBER	DATE OF LAST CALIBRATION
SPECTRUM ANALYZER	8566B	HEWLETT-PACKARD	2747A05665	5/7/2015 Extended 90 days
SPECTRUM ANALYZER	E4407B	Agilent	US41442935	2/11/2016
PREAMP	8449B	HEWLETT-PACKARD	3008A00480	12/01/2015
PREAMP	8447D	HEWLETT-PACKARD	1145A00307	12/03/2015
PREAMP	8447D	HEWLETT-PACKARD	1937A02980	12/02/2015
LOOP ANTENNA	SAS-200/562	A. H. Systems	142	09/28/2015 2 yr
BICONICAL ANTENNA	3110B	EMCO	9306-1708	11/24/2014 2 yr
BICONICAL ANTENNA	3110B	EMCO	9307-1431	08/25/2015 2 yr
LOG PERIODIC ANTENNA	3146	EMCO	9110-3236	11/19/2014 2 yr
LOG PERIODIC ANTENNA	3146	EMCO	9305-3600	07/01/2014 2 yr
HORN ANTENNA	SAS-571	A. H. Systems	605	08/25/2015 2 yr
HORN ANTENNA	3115	EMCO	9107-3723	07/08/2014 2 yr

Note: The calibration interval of the above test instruments are 12 months unless stated otherwise and all calibrations are traceable to NIST/USA.

2.2 Modifications to EUT Hardware

No physical modifications were made by US Tech in order to bring the EUT into compliance with FCC Part 15, Subpart C Intentional Radiator Limits for the transmitter portion of the EUT or the Subpart B Unintentional Radiator Limits (Receiver and Digital Device) Requirements.

2.3 Number of Measurements for Intentional Radiators (15.31(m))

Measurements of intentional radiators or receivers shall be performed and reported for each band in which the device can be operated with the device operating at the number of frequencies in each band specified in Table 3 below.

Table 3. Number of Test Frequencies for Intentional Radiators

Frequency Range over which the device operates	Number of Frequencies	Location in the Range of operation
1 MHz or less	1	Middle
1 to 10 MHz	2	1 near the top 1 near the bottom
Greater than 10 MHz	3	1 near top 1 near middle 1 near bottom

Because the EUT operates at 903 MHz to 927 MHz, 3 test frequencies were used.

2.4 Frequency Range of Radiated Measurements (Part 15.33)

2.4.1 Intentional Radiator

The spectrum shall be investigated for the intentional radiator from the lowest RF signal generated in the EUT, without going below 9 kHz to the 10th harmonic of the highest fundamental frequency generated or 40 GHz, whichever is the lowest.

2.4.2 Unintentional Radiator

For the digital device, an unintentional radiator, the frequency range shall be 30 MHz to 1000 MHz, or to 5 times the highest internal clock frequency.

2.5 Measurement Detector Function and Bandwidth (CFR 15.35)

The radiated and conducted emissions limits shown herein are based on the following:

2.5.1 Detector Function and Associated Bandwidth

On frequencies below 1000 MHz, the limits herein are based upon measurement equipment employing a CISPR Quasi-peak detector function and related measurement bandwidths (i.e. 9 kHz from 150 kHz to 30 MHz and 120 kHz from 30 MHz to 1000 MHz). Alternatively, measurements may be made with equipment employing a peak detector function as long as the same bandwidths specified for the Quasi-peak device are used.

2.5.2 Corresponding Peak and Average Requirements

Above 1000 MHz, radiated limits are based on measuring instrumentation employing an average detector function. When average radiated emissions are specified there is also a corresponding Peak requirement, as measured using a peak detector, of 20 dB greater than the average limit. For all measurements above 1000 MHz the Resolution Bandwidth shall be at least 1 MHz.

2.5.3 Pulsed Transmitter Averaging

When the radiated emissions limit is expressed as an average value, and the transmitter is pulsed, the measured field strength shall be determined by applying a Duty Cycle Correction Factor based upon dividing the total ON time during the first 100 ms period by 100 ms (or by the period if less than 100 ms). The duty cycle may be expressed logarithmically in dB.

NOTE: If the transmitter was programmed to transmit at >98% duty cycle, then, wherever applicable (where the detection mode was AVG) the duty cycle factor calculated will be applied.

2.6 EUT Antenna Requirements (CFR 15.203)

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. Only the antenna(s) listed in Table 4 will be used with this module.

Table 4. Allowed Antenna(s)

REPORT REFERENCE	MANUFACTURER	TYPE OF ANTENNA	MODEL	GAIN dB_i	TYPE OF CONNECTOR
Antenna 1 (original)	Asian Creation Communication CO., LTD	External Dipole	Q868-X AP	3.0	SMA reverse sex
Antenna 2 (original)	Asian Creation Communication CO., LTD	External Dipole	Q8019-900LW	2.5	SMA reverse sex
Antenna 3 (added)	Linx Technology	External Dipole	ANT-916-CW-QW	1.8	SMA reverse sex
Antenna 4 (added)	Linx Technology	External Dipole	ANT-916-OC-LG-RPS	2.2	SMA reverse sex

Note 1: antennas 1 & 2 can be operated in the 868/900 MHz band, the antenna with the highest gain (Q868-X- AP) was used for all testing.
Note 2: antennas 3 & 4 are used for optimizing operation in the 900-930 MHz band. The ANT-916-CW-QW was used for all testing.

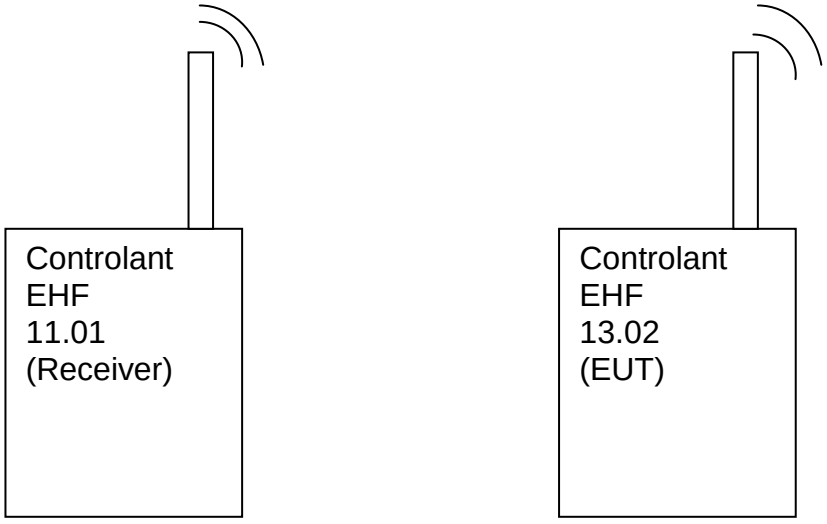


Figure 1. Block Diagram of Test Configuration

2.7 Restricted Bands of Operation (Part 15.205)

Only spurious emissions can fall in the frequency bands of CFR 15.205. The field strength of these spurious cannot exceed the limits of 15.209. Radiated harmonics and other Spurious are examined for this requirement see paragraph 2.10 of the test report.

2.8 Transmitter Duty Cycle (CFR 15.35 (c))

When the radiated emissions limits are expressed in terms of the average value of the emission, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value. The exact method of calculating the average field strength shall be submitted with any application for certification.

In this case the EUT duty cycle did not change from what was originally tested. The total ON time in a period of 0.1 seconds is 0.06 seconds. The duty cycle correction factor is as follow:

(0.06 s Total Time On)/(0.100 s Time period) = 0.60 Numeric Duty Cycle
Duty Cycle = 20 Log (0.60) = -4.4 dB

Duty Cycle reported in this test report is -4.4 dB.

2.9 Intentional Radiator, Power Line Conducted Emissions (CFR 15.207)

The EUT is powered by a 3.6 VDC Lithium battery**.** Since the EUT is battery powered, this test was not applicable.

2.10 Intentional Radiator, Radiated Emissions (CFR 15.209, 15.247(d))

Radiated Spurious measurements: The EUT was placed into a continuous transmit mode of operation (>98%) duty cycle) and tested per ANSI C63.10:2013. A preliminary scan was performed on the EUT to find signal frequencies that were caused by the transmitter part of the device. A preliminary scan was performed on the EUT to find the worse case results the EUT was tested in X, Y, and Z axes or in the orientation of normal operation if the device is designed to operate in a fixed position. The EUT was placed in the FHSS modulation because the output power of the FHSS modulation was larger than the DTS modulation output power and the normal mode of operation is when the EUT is frequency hopping.

Radiated measurements were then conducted between the frequency range of 9 kHz (or lowest frequency used/generated by the device) up to the tenth harmonic of the device (not greater than 40 GHz). In the band below 30 MHz, a resolution bandwidth (RBW) of 9 kHz was used; emissions below 1 GHz were tested with a RBW of 100/120 kHz and emissions above 1 GHz were tested with a RBW of 1 MHz. All video bandwidth settings were at least three times the RBW value.

The EUT was investigated per CFR 15.209, General requirements for unwanted spurious emissions. The conducted spurious method as described below was used to investigate all other emissions emanating from the antenna port.

Conducted spurious measurements: This test was not re-evaluated. The transmitter circuit did not change.

Table 5. Intentional Radiator, Spurious Radiated Emissions (CFR 15.209), 9 kHz to 30 MHz

9 kHz to 30 MHz							
Test: Radiated Emissions				**Client:** Controlant EHF			
Project: 16-0122				**Model:** CO 13.02			
Frequency (MHz)	**Test Data (dBuv)**	**AF+CA-AMP (dB/m)**	**Results (dBuV/m)**	**QP Limits (dBuV/m)**	**Antenna Distance/ Polarization**	**Margin (dB)**	**Detector PK, or QP**
Based on original test results, no emissions were detected below 30 Mhz; therefore this test was not performed for the Permissive Change Model. Radiated emissions were investigated starting at 30 MHz.							

Tested from 9 kHz to 30 MHz

SAMPLE CALCULATION: N/A

Test Date: June 1, 2016
Tested By
Signature: _____ Name: George Yang

Table 6. Peak Radiated Fundamental & Harmonic Emissions

Test: FCC Part 15, Para 15.209, 15.247(d)				**Client:** Controlant EHF			
Project: 16-0122				**Model:** CO 13.02			
Frequency (MHz)	**Test Data (dBuv)**	**AF+CA-AMP (dB/m)**	**Results (dBuV/m)**	**Limits (dBuV/m)**	**Antenna Distance/ Polarization**	**Margin (dB)**	**Detector Mode**
Low Channel – PEAK							
903.02	85.93	25.59	111.52		3m./VERT		**PK**
1803.00	59.20	-1.77	57.43	91.5*	3.0m./VERT	34.1	**PK**
2708.00	51.83	1.94	53.77	74.0	3.0m./VERT	20.2	**PK**
3612.00	50.51	7.59	58.10	74.0	3.0m./VERT	15.9	**PK**
Mid Channel – PEAK							
915.04	85.49	25.59	111.08		3m./VERT		**PK**
1830.00	60.26	-1.87	58.39	91.1*	3.0m./VERT	32.7	**PK**
2745.00	51.88	2.30	54.18	74.0	3.0m./VERT	19.8	**PK**
3660.00	49.23	8.22	57.45	74.0	3.0m./VERT	16.5	**PK**
High Channel - PEAK							
927.01	85.57	25.49	111.06		3m./VERT		**PK**
1854.00	60.38	0.54	60.92	91.1*	3.0m./VERT	30.1	**PK**
2781.00	50.98	2.33	53.31	74.0	3.0m./VERT	20.7	**PK**
3708.00	50.14	8.79	58.93	74.0	3.0m./VERT	15.0	**PK**

1. (*) Falls outside the restricted bands of CFR 15.205. Limits based on CFR15.209 & 20 dB relaxation for **peak** measurements of CFR 15.35.
2. No other signals detected within 20 dB of specification limit. Harmonics investigated up to the 10th harmonic
3. (~) Measurements taken at 1 meter were extrapolated to 3 meters using a factor of (-9.5 dB).
4. The EUT was placed in three orthogonal positions and the transmitter was in constant broadcast mode, with a duty cycle of greater than 98%. The emissions were measured with the receive antenna in vertical and horizontal polarizations. The data listed in the above table was worst case.

Sample Calculation at 1803.00 MHz:

Magnitude of Measured Frequency	59.20	dBuV
+Antenna Factor + Cable Loss+ Amplifier Gain	-1.77	dB/m
Corrected Result	57.43	dBuV/m

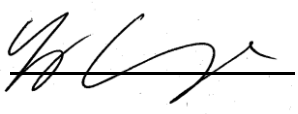
Test Date: June 1, 2016
Tested By
Signature:  Name: George Yang

Table 7. Average Radiated Fundamental & Harmonic Emissions

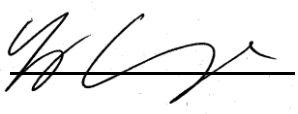
Test: FCC Part 15, Para 15.209, 15.247(d)				**Client:** Controlant EHF			
Project: 16-0122				**Model:** CO 13.02			
Frequency (MHz)	**Test Data (dBuv)**	**AF+CA-AMP (dB/m)**	**Results (dBuV/m)**	**Limits (dBuV/m)**	**Antenna Distance/ Polarization**	**Margin (dB)**	**Detector Mode**
Low Channel – AVERAGE							
903.02	85.82	25.59	111.41		3m./VERT		**QP**
1806.00	55.55	-1.77	53.78	91.4*	3.0m./VERT	37.6	**AVG**
2708.00	42.62	1.94	44.56	54.0	3.0m./VERT	9.4	**AVG**
3612.00	34.36	7.59	41.95	54.0	3.0m./VERT	12.0	**AVG**
Mid Channel – AVERAGE							
915.04	85.23	25.59	110.82		3m./VERT		**QP**
1830.00	57.73	-1.87	55.86	90.8*	3.0m./VERT	35.0	**AVG**
2745.00	40.80	2.30	43.10	54.0	3.0m./VERT	10.9	**AVG**
3660.00	34.40	8.22	42.62	54.0	3.0m./VERT	11.4	**AVG**
High Channel – AVERAGE							
927.01	85.32	25.49	110.81		3m./VERT		**QP**
1854.00	57.55	0.54	58.09	90.8*	3.0m./VERT	32.7	**AVG**
2781.00	38.58	2.33	40.91	54.0	3.0m./VERT	13.1	**AVG**
3708.00	37.67	8.79	46.46	54.0	3.0m./VERT	7.5	**AVG**

-

1. (*) Falls outside the restricted bands of CFR 15.205. Limits based on CFR15.209 & 20 dB relaxation for peak measurements of CFR 15.35.
2. No other signals detected within 20 dB of specification limit. Harmonics investigated up to the 10th harmonic
3. (~) Measurements taken at 1 meter were extrapolated to 3 meters using a factor of (-9.5 dB).
4. The EUT was placed in three orthogonal positions and the transmitter was in constant broadcast mode, with a duty cycle of greater than 98%. The emissions were measured with the receive antenna in vertical and horizontal polarizations. The data listed in the above table was worst case.

Sample Calculation at 1806.00 MHz:

Magnitude of Measured Frequency	55.55	dBuV
+Antenna Factor + Cable Loss+ Amplifier Gain	-1.77	dB/m
Corrected Result	53.78	dBuV/m

Test Date: June 1, 2016
Tested By
Signature:  Name: George Yang

2.11 Unintentional and Intentional Radiator, Powerline Emissions (CFR 15.107/15.207)

The power line conducted voltage emission measurements have been carried out in accordance with CFR 15.107, per ANSI C63.4:2014, Paragraph 7, with a spectrum analyzer connected to a LISN and the EUT placed into a continuous mode of transmission. Additionally the transmitter was turned ON and the test was repeated with the intentional transmitter circuit ON. The worst case mode of operation is with the transmitter circuit ON. That test data is presented below to show compliance to both parts.

The EUT was battery powered; therefore this test was not applicable.

Table 8. Power Line Conducted Emissions Test Data, Part 15.107, 15.207

150KHz to 30 MHz with Class B Limits						
Test: Power Line Conducted Emissions				**Client:** Controlant EHF		
Project: 16-0122				**Model:** CO 13.02		
Frequency (MHz)	**Test Data (dBuv)**	**LISN+CL-PA (dB)**	**Results (dBuV)**	**AVG Limits (dBuV)**	**Margin (dB)**	**Detector PK, QP, or AVG**
The EUT is battery powered therefore this test was not applicable.						

SAMPLE CALCULATION: N/A

Test Date: June 1, 2016
Tested By
Signature: _____ Name: George Yang

2.12 Unintentional and Intentional Radiator, Radiated Emissions (CFR 15.109, 15.209)

Radiated emissions disturbance measurements were performed with the transmitter turned OFF and the test was repeated with the intentional transmitter circuit ON. The worst case mode of operation is with the transmitter circuit ON. That test data is presented below to show compliance to both parts.

An instrument having both peak and quasi-peak detectors was used to perform the test over the frequency range of 30 MHz to five times the highest clock frequency. Measurements of the radiated emissions were made with the receiver antenna at a distance of 3 m from the boundary of the test unit.

The test antenna was varied from 1 m to 4 m in height while watching the analyzers' display for the maximum magnitude of the signal at the test frequency. The antenna polarization (horizontal or vertical) and test sample azimuth were varied during the measurements to find the maximum field strength readings to record.

The worst-case radiated emission in the range of 30 MHz to 1 GHz was 16.2 dB below the limit at 835.00 MHz. This signal is found in data table below. All other radiated emissions were 18.0 dB or more below the limit.

The worst-case radiated emission in the range of 1 GHz to 6 GHz was 4.3 dB below the limit at 2500.00 MHz. This signal is found in the second data table presented below. All other radiated emissions were 4.6 dB or more below the limit.

Table 9. Unintentional and Intentional Radiator, Spurious Radiated Emissions (CFR 15.109, 15.209) 30 MHz to 1000 MHz

30 MHz to 1000 MHz with Class B Limits							
Test: Radiated Emissions				**Client:** Controlant EHF			
Project: 16-0122				**Model:** CO 13.02			
Frequency (MHz)	**Test Data (dBuv)**	**AF+CA-AMP (dB/m)**	**Results (dBuV/m)**	**QP Limits (dBuV/m)**	**Antenna Distance/ Polarization**	**Margin (dB)**	**Detector PK, or QP**
835.00	29.90	-1.90	28.00	46.0	3m./VERT	18.0	**PK**
835.00	31.00	-1.20	29.80	46.0	3m./HORZ	16.2	**PK**
All other detected emissions in this range had a margin of greater than 20 dB from the limit.							

Tested from 30 MHz to 1 GHz

SAMPLE CALCULATION at 835.00 MHz:

Magnitude of Measured Frequency	29.90	dBuV
+ Cable Loss+Antenna Factor-Amp Gain	-1.90	dB
=Corrected Result	28.00	dBuV
Limit	40.00	dBuV
-Corrected Result	28.00	dBuV
Margin	18.00	dB

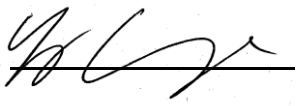
Test Date: June 1, 2016
Tested By
Signature:  Name: George Yang

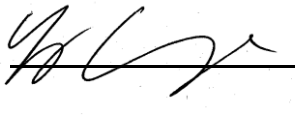
Table 10. Unintentional and Intentional Radiator, Spurious Radiated Emissions (CFR 15.109, 15.209) 1 GHz to 6 GHz

1 GHz to 6 GHz with Class B Limits							
Test: Radiated Emissions				**Client:** Controlant EHF			
Project: 16-0122				**Model:** CO 13.02			
Frequency (MHz)	**Test Data (dBuv)**	**AF+CA-AMP (dB/m)**	**Results (dBuV/m)**	**AVG Limits (dBuV/m)**	**Antenna Distance/ Polarization**	**Margin (dB)**	**Detector PK, or AVG**
1547.00	50.91	-5.35	45.56	54.0	3.0m./VERT	8.4	**PK**
2500.00	49.96	-0.31	49.65	54.0	3.0m./VERT	4.3	**PK**
1547.00	50.75	-5.48	45.27	54.0	3.0m./HORZ	8.7	**PK**
2500.00	49.80	-0.38	49.42	54.0	3.0m./HORZ	4.6	**PK**

Tested from 1 GHz to 6 GHz

SAMPLE CALCULATION at 1547.00 MHz:

Magnitude of Measured Frequency	50.91	dBuV
+ Cable Loss+ LISN Loss	-5.35	dB
=Corrected Result	45.56	dBuV
Limit	54.00	dBuV
-Corrected Result	45.56	dBuV
Margin	8.40	dB

Test Date: June 1, 2016
Tested By
Signature:  Name: George Yang

2.13 Measurement Uncertainty

The measurement uncertainties given were calculated using the method detailed in CISPR 16-4. A coverage factor of k=2 was used to give a level of confidence of approximately 95%.

2.13.1 Conducted Emissions Measurement Uncertainty

Measurement Uncertainty (within a 95% confidence level) for this test is ± 2.78 dB.

This test was not performed. The EUT is a battery operated device and does not connect to the AC mains either directly or indirectly.

2.13.2 Radiated Emissions Measurement Uncertainty

For a measurement distance of 3 m the measurement uncertainty (with a 95% confidence level) for this test using a Biconical Antenna (30 MHz to 200 MHz) is ± 5.39 dB. This value includes all elements of measurement.

The measurement uncertainty (with a 95% confidence level) for this test using a Log Periodic Antenna (200 MHz to 1000 MHz) is ± 5.18 dB.

The measurement uncertainty (with a 95% confidence level) for this test using a Horn Antenna is ± 5.21dB.

The data listed in this test report does not have sufficient margin to negate the effects of uncertainty. Therefore, the EUT conditionally meets this requirement.