Test Report

Curtis-Straus LLC, *a wholly owned subsidiary of BV CPS*

Report No	EP3491-2
Client	ecoVent Robert Kim
Address	24 Cambridge St, Suite 6 Charlestown, MA 02129
Phone	857-204-4466
Items tested	WALL SENSOR
FCC ID	2AFTLSS2
IC ID	20783-SS2
FRN	0024870743
Equipment Type	Part 15.247 Digitally Modulated
Equipment Code	DTS
FCC/IC Rule Parts	47 CFR 15.247, RSS-247 Issue 1
Test Dates	December 2 - 4, 7 and 9, 2015
Results	As detailed within this report
Prepared by	Tuyen A. Truong – Test Engineer
Authorized by	Christopher Reynolds – EMC Supervisor
Issue Date	1/18/2016
Conditions of Issue	This Test Report is issued subject to the conditions stated in the '*Conditions of Testing*' section on page 30 of this report.

Contents

Form Final Report REV 7-20-07 (DW)

Summary

This test report supports an application for certification of a transmitter operating pursuant to 47 CFR 15.247. The product is the WALL SENSOR. It is a digitally modulated transmitter that operates from 2402 to 2480 MHz frequency range. Product was tested with an on board antenna with a gain of +1.7dBi.

We found that the product met the above requirements with modification (see Modification Required for Compliance section on page 7 for details). The test samples were received in good condition.

Please note that the EUT also contained another radio which ran from 904 to 926 MHz frequency range. During testing, both radios were set to run simultaneously.

Issue No.	Reason for change	Date Issued
1	Original Release	January 22, 2016

Curtis-Straus LLC, a wholly owned subsidiary of BV CPS
One Distribution Center Circle, #1 ● Littleton, MA ● TEL (978) 486-8880 ● FAX (978) 486-8828

Test Methodology

Radiated emission testing was performed according to DTS guidance document 558074D01 v03r03 specified in FCC Guidance for performing compliance measurement on DTS operating under section 15.247, April 19, 2013 and ANSI C63.10 (2013). Radiated Emissions were maximized by rotating the device around its axes as well as varying the test antenna's height and polarity. The device antenna was not maximized separately.

Conducted emissions testing at the antenna port was performed, as required by rule section.

AC Mains conducted emissions testing was performed with a 50Ω/50µH.

Operating channel frequency = 2402 MHz
Operating channel frequency = 2440 MHz
Operating channel frequency = 2480 MHz

The following bandwidths were used during radiated spurious and line conducted emissions.

Frequency	RBW	VBW
0.15-30MHz	9kHz	30kHz
30-1000MHz	120kHz	1MHz
1-25GHz	1MHz	3MHz

Product Tested - Configuration Documentation

EUT Configuration			
Work Order:	P3491		
Company:	ecoVent		
Company Address:	24 Cambridge St, Suite 6		
	Charlestown, MA, 02129		
Contact:	Robert Kim		
	MN	**PN**	**SN**
EUT:	SS2	--	Sample 1 (Conducted Testing at Antenna port) and Sample 2 (Radiated testing)
EUT Description:	Wall Sensor		
EUT TX Frequency:	2404 - 2480 MHz		
EUT Max Frequency:	50 MHz		
EUT Min Frequency:	0.032768 MHz		

Support Equipment	**MN**	**SN**
None		

Port Label	Port Type	# ports	# populated	cable type	shielded	ferrites	length (m)	max length (m)	in/out	under test	comment
AC Output	Power AC	2	2	Power AC	Yes	No	1		in	yes	
AC prongs	Power AC	1	1	Power AC	No	No	0.05		in	yes	
USB	USB	2	2	USB	Yes	Yes	1	5	in	yes	

Software Operating Mode Description:

For FCC 15.247 testing: EUT is set to transmit at 2402, 2440 and 2480 MHz throughout the frequency range of 2400-2483.5 MHz. GFSK modulation with 100% duty cycle.

Statement of Conformity

The WALL SENSOR has been found to conform to the following parts of 47 CFR and as detailed below:

RSS-GEN	RSP-100	RSS 247	Part 15	Comments
6.3			15.15(b)	There are no controls accessible to the user that varies the output power to operate in violation of the regulatory requirements.
	3.1		15.19	The label is shown in the label exhibit.
	3.2		15.21	Information to the user is shown in the instruction manual exhibit.
			15.27	No special accessories are required for compliance.
6.1, 6.5			15.31	The EUT was tested in accordance with the measurement standards in this section.
			15.33	Frequency range was investigated according to this section, unless noted in specific rule section under which the equipment operates.
8.1			15.35	The EUT emissions were measured using the measurement detector and bandwidth specified in this section, unless noted in specific rule section under which the equipment operates.
8.3			15.203	The antenna for this device is an on board antenna with a gain of 1.7dBi
8.10			15.205 15.209	The fundamental is not in a Restricted band and the spurious and harmonic emissions in the Restricted bands comply with the general emission limits of 15.209 or RSS-Gen as applicable
8.8			15.207	EUT meets the AC Line conducted emissions requirements of this section.
			15.247	The unit complies with the requirements of 15.247
		RSS 247		The unit complies with the requirements of RSS-247
6.6				Occupied Bandwidth measurements were made.

Modifications Required for Compliance

Modifications were required for the following tests:

- Radiated Spurious Emissions - Restricted Bands (FCC 15.209): EUT transmit power was reduced from 11.6 dBm to 10.6 dBm for radio which operated in the 902 to 928 MHz frequency range. The power settings are fixed in firmware and therefore the user cannot change the power settings. Ecovent is taking care of the firmware and sets fixed power settings at the factory.
- AC Mains Conducted Emissions – (FCC 15.207): two full looped ferrites (FAIRITE VO, P/N: 0446164151) were added to the USB cables, one ferrite per USB cable. (see Modification photo exhibit)

Test Results

Bandwidth

LIMIT

The minimum 6 dB bandwidth shall be at least 500 kHz. [15.247(a) (2)]

MEASUREMENTS / RESULTS

6dB BANDWIDTH

Date: Dec 2 & 4, 2015 **Company:** ecoVent **Work Order:** P3491
Engineer: Tuyen Truong **EUT Desc:** Wall Sensor **EUT Operating Voltage/Frequency:** 120Vac/60Hz
Dec 2 -Temp: 22°C **Humidity:** 32% **Pressure:** 1005mbar
Dec 4 -Temp: 19°C **Humidity:** 33% **Pressure:** 1019mBar

Frequency Range: 2402-2480 MHz

Notes: GFSK modulation with 100% duty cycle

Frequency (MHz)	Reading (KHz)	6dB BW Limit (KHz)	6dB BW Margin (KHz)	6dB BW Result (Pass/Fail)
2402	691.158	≥500	+191.158	Pass
2440	688.178	≥500	+188.178	Pass
2480	693.001	≥500	+193.001	Pass

Test Site: CEMI2 and CEMI3 **Attenuation:** Asset#791
Analyzer: SA#1328 and GOLD

Rev. 11/30/2015

Spectrum Analyzers / Receivers /Preselectors	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
SA EMI Chamber (1328)	9kHz-13.2 GHz	E4405B	Agilent	MY44210241	1328	I	8/19/2016	8/19/2015
Gold	100Hz-26.5 GHz	E4407B	Agilent	MY45113816	1284	I	4/22/2016	4/22/2015

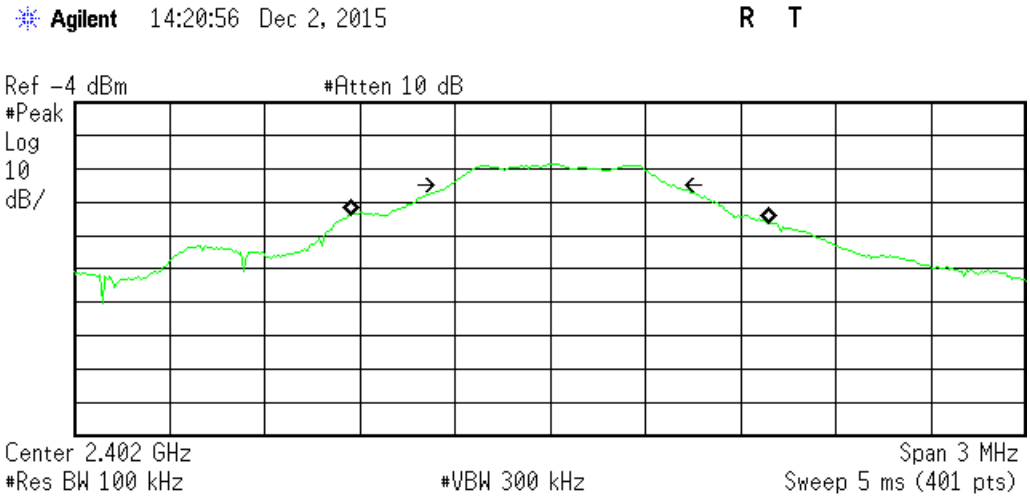
Preamps /Couplers Attenuators / Filters	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
HF 20dB 50W Attenuator	0.009-18 GHz	PE 7019-20	Pasternack	1	791	II	7/31/2016	7/31/2015

Conducted Test Sites (Mains / Telco)	FCC Code	VCCI Code	Cat	Calibration Due	Calibrated on
CEMI 3	719150	A-0015	III	NA	N/A
CEMI 2	719150	A-0015	III	NA	N/A

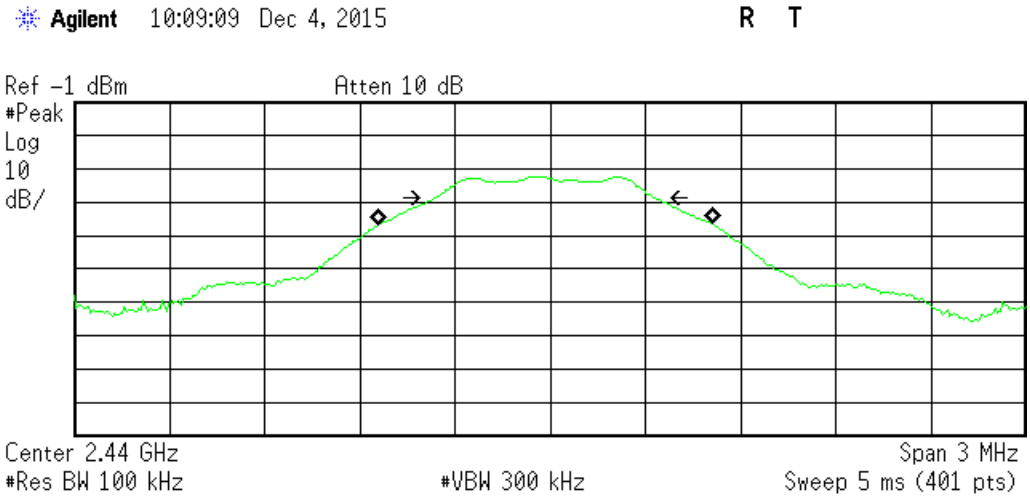
Meteorological Meters	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
Weather Clock (Pressure Only)	BA928	Oregon Scientific	C3166-1	831	I	3/19/2016	3/19/2014
TH A#2078	HTC-1	HDE		2078	II	4/2/2016	4/2/2015

All equipment is calibrated using standards traceable to NIST or other nationally recognized calibration standard.

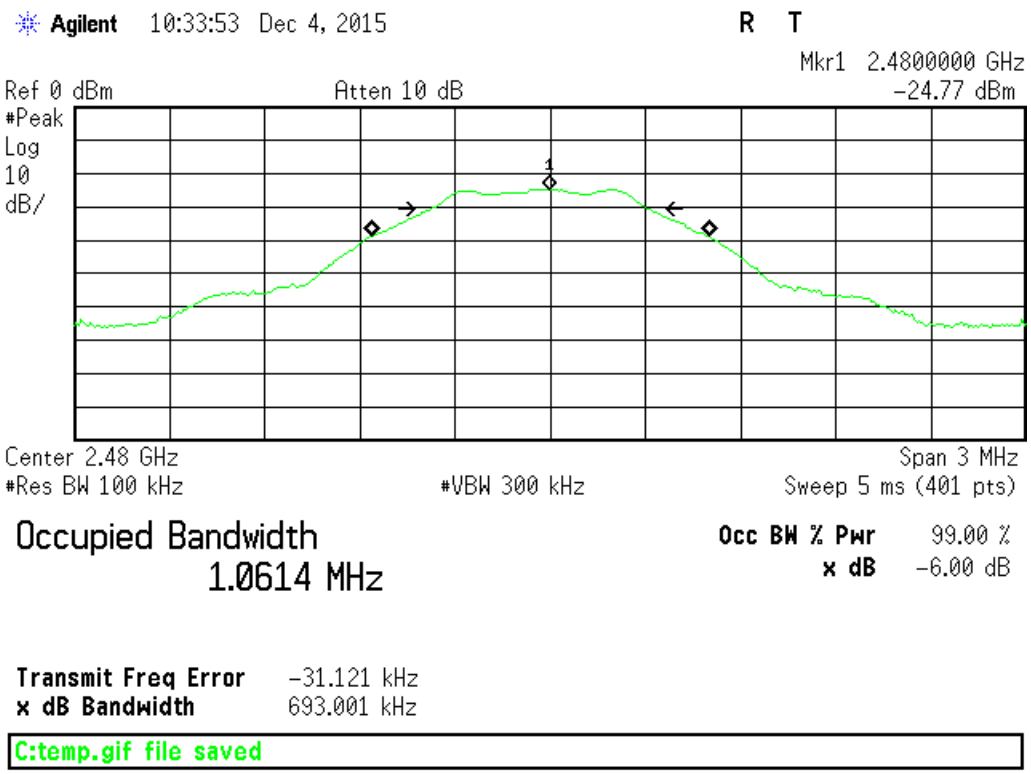
PLOT(s)



2402 MHz – 6dB Bandwidth



2440 MHz – 6dB Bandwidth



2480 MHz – 6dB Bandwidth

Fundamental Emission Output Power

LIMIT

Conducted Output Power
1 Watt
[15.247(b) (3)]

Per 558074 D01 DTS Measurement Guidance v0303 Section 9.1 (Maximum Peak Conducted Output Power)

MEASUREMENTS / RESULTS

Fundamental Emission Output Power

Date: 04-Dec-15 **Company:** ecoVent **Work Order:** P3491
Engineer: Tuyen Truong **EUT Desc:** Wall Sensor **EUT Operating Voltage/Frequency:** 120Vac/60Hz
Temp: 19°C **Humidity:** 33% **Pressure:** 1019mBar
Frequency Range: 2402-2480 MHz
Notes: GFSK modulation with 100% duty cycle

Frequency (MHz)	Reading (dBm)	Attenuation (dB)	Final Conducted Reading (dBm)	FCC 15.247 Limit (dBm)	Margin (dB)	Result (Pass/Fail)
2402	-21.32	19.86	-1.46	30.0	-31.46	Pass
2440	-21.88	19.86	-2.02	30.0	-32.02	Pass
2480	-22.61	19.86	-2.75	30.0	-32.75	Pass

Table Result: Pass by -31.46 dB ***Worst Freq:*** 2402.0 MHz

Test Site: CEMI2 **Attenuation:** Asset#791
Analyzer: GOLD

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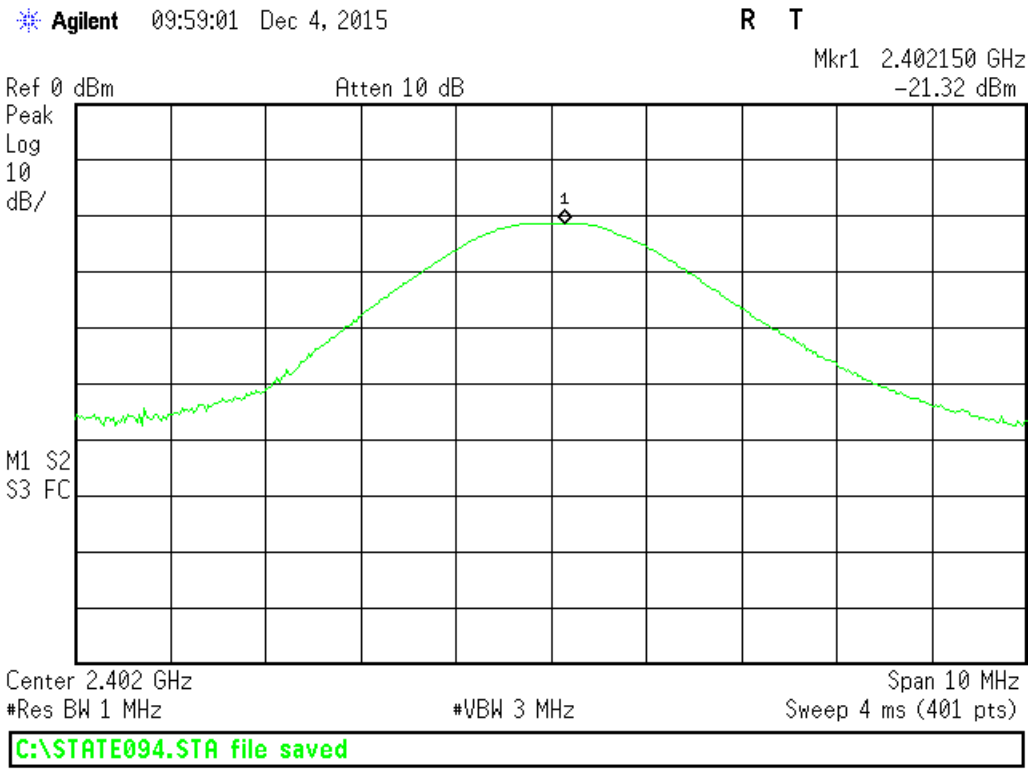
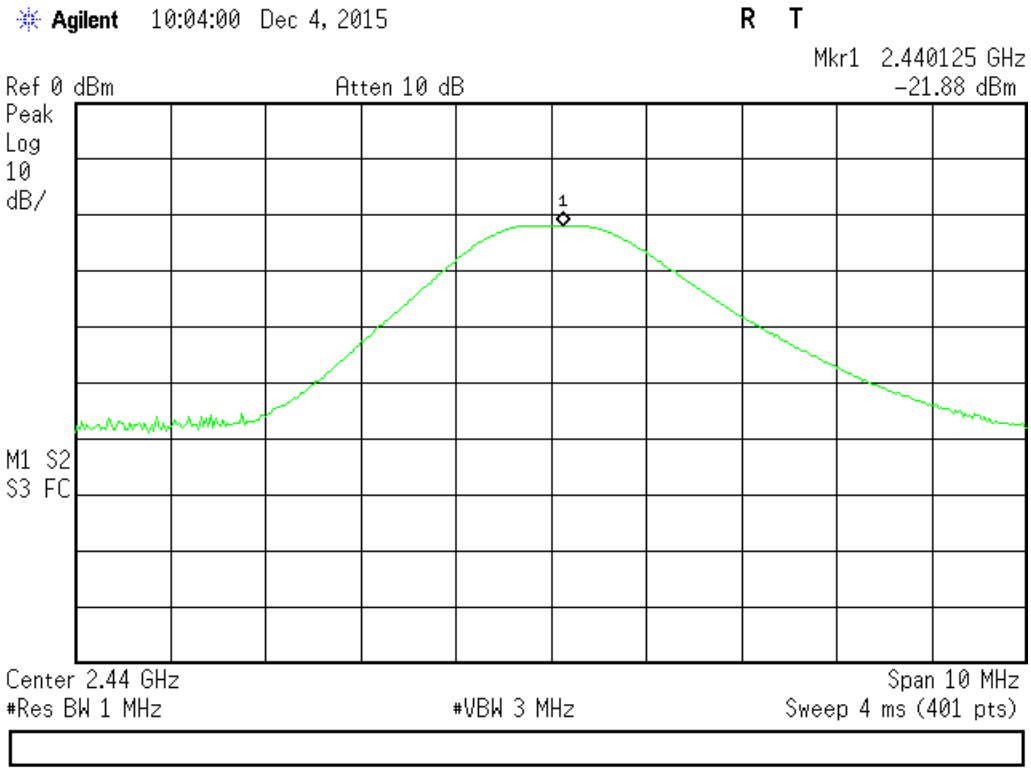
Spectrum Analyzers / Receivers /Preselectors	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
Gold	100Hz-26.5 GHz	E4407B	Agilent	MY45113816	1284	I	4/22/2016	4/22/2015
Preamps /Couplers Attenuators / Filters	**Range**	**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**	**Calibrated on**
HF 20dB 50W Attenuator	0.009-18 GHz	PE 7019-20	Pasternack	1	791	II	7/31/2016	7/31/2015
Conducted Test Sites (Mains / Telco)	**FCC Code**		**VCCI Code**			**Cat**	**Calibration Due**	**Calibrated on**
CEMI 2	719150		A-0015			III	NA	N/A
Meteorological Meters		**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**	**Calibrated on**
Weather Clock (Pressure Only)		BA928	Oregon Scientific	C3166-1	831	I	3/19/2016	3/19/2014
TH A#2078		HTC-1	HDE		2078	II	4/2/2016	4/2/2015

All equipment is calibrated using standards traceable to NIST or other nationally recognized calibration standard.

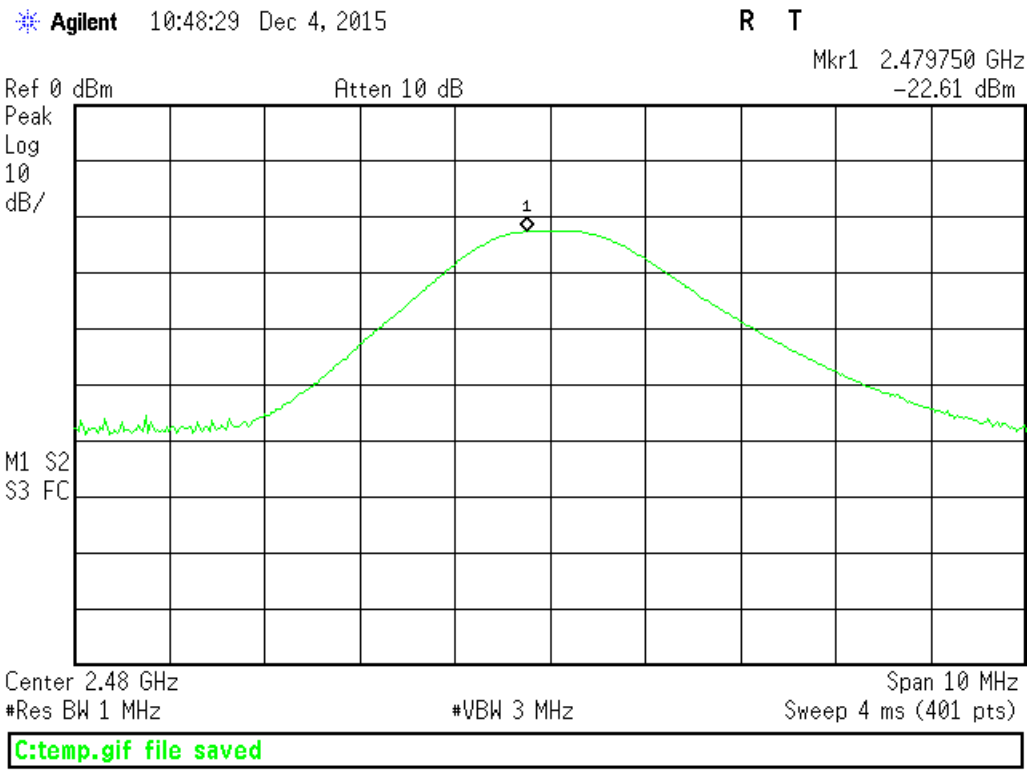
PLOTS



2402 MHz – Channel Power



2440 MHz – Channel Power



2480 MHz – Channel Power

Radiated Spurious Emissions

LIMITS

Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a).
[15.247(d)]

MEASUREMENTS / RESULTS

Radiated Emissions Table - Band Edge

Date: 09-Dec-15 **Company:** ecoVent **Work Order:** P3491
Engineer: Tuyen Truong **EUT Desc:** Wall Sensor **EUT Operating Voltage/Frequency:** 120Vac/60Hz
Temp: 24°C **Humidity:** 23% **Pressure:** 1014mBar
Frequency Range: Band Edges **Measurement Distance:** 3 m
Notes: TX on both 915MHz and BLE 2.4 GHz radio **EUT Max Freq:** 2402-2480 MHz
* Performed using Marker Delta Method

Antenna Polarization (H / V)	Frequency (MHz)	Peak Reading (dBµV)	Average Reading (dBµV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Peak Reading (dBµV/m)	Adjusted Avg Reading (dBµV/m)	FCC 15.209 High Frequency - Peak Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)	FCC 15.209 High Frequency - Average Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)
h	2390.0	35.93	25.2	19.9	32.3	3.7	52.0	41.3	74.0	-22.0	Pass	54.0	-12.7	Pass
h*	2400.0	18.7	17.8	19.9	32.3	3.7	34.8	33.9	74.0	-39.2	Pass	54.0	-20.1	Pass
h	2483.5	35.25	25.0	20.2	32.4	3.9	51.4	41.1	74.0	-22.6	Pass	54.0	-12.9	Pass

Table Result: Pass by -12.7 dB ***Worst Freq:*** 2390.0 MHz

Test Site: EMI Chamber 1 **Cable 1:** Asset #2051 **Cable 2:** Asset #1784 **Cable 3:** ---
Analyzer: Asset #1327 **Preamp:** Asset #1517 **Antenna:** Blue Horn **Preselector:** ---
CSsoft Radiated Emissions Calculator v 1.017.148

Adjusted Reading = Reading - Preamp Factor + Antenna Factor + Cable Factor

Rev.12/7/2015

Spectrum Analyzers / Receivers /Preselectors	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
SA EMI Chamber (1327)	9kHz-13.2 GHz	E4405B	Agilent	MY45103416	1327	I	7/10/2016	7/10/2015
Radiated Emissions Sites	**FCC Code**	**IC Code**	**VCCI Code**	**Range**		**Cat**	**Calibration Due**	**Calibrated on**
EMI Chamber 1	719150	2762A-6	A-0015	30-1000MHz		II	3/21/2017	3/21/2015
Preamps /Couplers Attenuators / Filters	**Range**	**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**	**Calibrated on**
1517 HF Preamp	1-20GHz	CS	CS	N/A	1517	II	8/6/2016	8/6/2015
Antennas	**Range**	**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**	**Calibrated on**
Blue Horn	1-18Ghz	3117	ETS	157647	1861	I	2/8/2017	2/8/2015
Cables	**Range**		**Mfr**			**Cat**	**Calibration Due**	**Calibrated on**
Asset #2051	9kHz - 18GHz		Florida RF			II	3/8/2016	3/8/2015
Asset #1784	9kHz - 18GHz		Florida RF			II	3/20/2016	3/20/2015
Meteorological Meters		**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**	**Calibrated on**
Weather Clock (Pressure Only)		BA928	Oregon Scientific	C3166-1	831	I	3/19/2016	3/19/2014
TH A#2080		HTC-1	HDE		2080	II	4/2/2016	4/2/2015

All equipment is calibrated using standards traceable to NIST or other nationally recognized calibration standard.

Radiated Emissions Table

Date: 07-Dec-15 **Company:** ecoVent **Work Order:** P3491
Engineer: Ryan Brown **EUT Desc:** Wall Sensor **EUT Operating Voltage/Frequency:** 120V/60Hz
Temp: 22.8°C **Humidity:** 25% **Pressure:** 1007 mBar
Frequency Range: 30-1000 MHz **Measurement Distance:** 3 m
Notes: HPF A# 1288 **EUT Tx Freq:** 2402-2480 MHz
TX 926MHz & 2402MHz 904-926 MHz

							---			FCC 15.209		
Antenna Polarization (H / V)	Frequency (MHz)	Reading (dBµV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Reading (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)	Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)
V	63.01	49.2	25.4	7.7	1.4	32.9	---	---	---	40.0	-7.1	Pass
V	49.0	48.3	25.4	8.6	1.3	32.8	---	---	---	40.0	-7.2	Pass
V	97.45	44.9	25.3	9.5	1.6	30.7	---	---	---	43.5	-12.8	Pass
V	171.3	42.1	24.4	11.5	2.5	31.7	---	---	---	43.5	-11.8	Pass
V	290.0	35.5	25.2	13.5	2.6	26.4	---	---	---	46.0	-19.6	Pass
V	856.25	28.7	25.7	21.8	6.1	30.9	---	---	---	46.0	-15.1	Pass
H	64.68	45.0	25.4	7.9	1.4	28.9	---	---	---	40.0	-11.1	Pass
H	97.68	45.0	25.3	9.6	1.6	30.9	---	---	---	43.5	-12.6	Pass
H	208.0	40.2	25.2	10.6	3.0	28.6	---	---	---	43.5	-14.9	Pass
H	184.05	38.3	24.3	11.0	2.9	27.9	---	---	---	43.5	-15.6	Pass
H	353.0	39.7	25.0	14.4	2.9	32.0	---	---	---	46.0	-14.0	Pass
H	831.25	34.2	25.5	21.8	5.1	35.6	---	---	---	46.0	-10.4	Pass

Table Result: Pass by -7.1 dB ***Worst Freq:*** 63.01 MHz

Test Site: EMI Chamber 2 **Cable 1:** Asset #2053 **Cable 2:** Asset #2052 **Cable 3:** ---
Analyzer: Gold **Preamp:** Blue-Blk **Antenna:** Red-Brown **Preselector:** Asset #1512
CSsoft Radiated Emissions Calculator v 1.017.148

Adjusted Reading = Reading - Preamp Factor + Antenna Factor + Cable Factor

Note: per evaluation, Low channel (2402 MHz) was determined to be the worst case channel setting.

Rev. 12/7/2015

Spectrum Analyzers / Receivers /Preselectors	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
Gold	100Hz-26.5 GHz	E4407B	Agilent	MY45113816	1284	I	4/22/2016	4/22/2015
Radiated Emissions Sites	**FCC Code**	**IC Code**	**VCCI Code**	**Range**		**Cat**	**Calibration Due**	**Calibrated on**
EMI Chamber 2	719150	2762A-7	A-0015	30-1000MHz		II	3/22/2017	3/22/2015
Preamps /Couplers Attenuators / Filters	**Range**	**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**	**Calibrated on**
Blue-Black	0.009-2000MHz	ZFL-1000-LN	CS	N/A	800	II	12/26/2015	12/26/2014
Antennas	**Range**	**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**	**Calibrated on**
Red-Brown Bilog	30-2000MHz	JB1	Sunol	A0032406	1218	I	12/4/2016	12/4/2014
Cables	**Range**		**Mfr**			**Cat**	**Calibration Due**	**Calibrated on**
Asset #2053	9kHz - 18GHz		Florida RF			II	3/8/2016	3/8/2015
Asset #2052	9kHz - 18GHz		Florida RF			II	3/8/2016	3/8/2015
Meteorological Meters		**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**	**Calibrated on**
Weather Clock (Pressure Only)		BA928	Oregon Scientific	C3166-1	831	I	3/19/2016	3/19/2014
TH A#2081		HTC-1	HDE		2081	II	4/2/2016	4/2/2015

All equipment is calibrated using standards traceable to NIST or other nationally recognized calibration standard.

Radiated Emissions Table

Date: 07-Dec-15 **Company:** ecoVent **Work Order:** P3491
Engineer: Ryan Brown **EUT Desc:** Wall Sensor **EUT Operating Voltage/Frequency:** 120V/60Hz
Temp: 22.8°C **Humidity:** 25% **Pressure:** 1007 mBar
Frequency Range: 1-6GHz **Measurement Distance:** 3 m
Notes: HPF A# 1288 **EUT Tx Freq:** 2402-2480 MHz
TX AT 926MHz and 2402MHz 904-926 MHz

Antenna Polarization (H / V)	Frequency (MHz)	Peak Reading (dBµV)	Average Reading (dBµV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Peak Reading (dBµV/m)	Adjusted Avg Reading (dBµV/m)	FCC 15.209 High Frequency - Peak Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)	FCC 15.209 High Frequency - Average Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)
TX 2402MHz &926MHz														
H	4632.0	41.14	32.6	17.9	32.6	6.0	61.8	53.3	74.0	-12.2	Pass	54.0	-0.7	Pass
V	5592.0	35.07	23.4	17.6	34.3	7.4	59.2	47.5	74.0	-14.8	Pass	54.0	-6.5	Pass
H	2777.0	43.66	35.5	20.1	29.1	4.8	57.5	49.3	74.0	-16.5	Pass	54.0	-4.7	Pass
V	3155.0	37.16	24.2	19.8	31.1	5.3	53.8	40.8	74.0	-20.2	Pass	54.0	-13.2	Pass
V	1747.0	35.12	23.4	18.8	26.8	3.6	46.7	35.0	74.0	-27.3	Pass	54.0	-19.0	Pass
V	1852.0	40.8	34.2	18.8	27.3	4.0	53.3	46.7	74.0	-20.7	Pass	54.0	-7.3	Pass
TX 2480MHz &904MHz Changed power level at 904MHz to +10.6dbm														
H	4520.0	40.34	31.0	17.9	32.3	6.1	60.8	51.5	74.0	-13.2	Pass	54.0	-2.5	Pass
V	1809.0	39.47	31.9	18.8	27.1	3.8	51.6	44.0	74.0	-22.4	Pass	54.0	-10.0	Pass
V	1747.0	35.87	23.5	18.8	26.8	3.6	47.5	35.1	74.0	-26.5	Pass	54.0	-18.9	Pass
V	3155.0	38.0	24.1	19.8	31.1	5.3	54.6	40.7	74.0	-19.4	Pass	54.0	-13.3	Pass
H	2712.0	41.56	33.4	20.3	29.2	4.8	55.3	47.1	74.0	-18.7	Pass	54.0	-6.9	Pass
V	5592.0	34.96	23.4	17.6	34.3	7.4	59.1	47.5	74.0	-14.9	Pass	54.0	-6.5	Pass
				---	---	---	---	---	---	---	---	---	---	---
TX at 915MHz Reduced power to +10.6 dBm and TX at 2440MHz						---	---	---	---	---	---	---	---	---
H	4575.0	39.7	31.0	17.9	32.5	6.1	60.4	51.7	74.0	-13.6	Pass	54.0	-2.3	Pass
V	1830.0	38.94	28.9	18.8	27.2	3.9	51.2	41.2	74.0	-22.8	Pass	54.0	-12.8	Pass
V	1747.0	37.14	24.3	18.8	26.8	3.6	48.7	35.9	74.0	-25.3	Pass	54.0	-18.1	Pass
V	3155.0	37.11	23.9	19.8	31.1	5.3	53.7	40.5	74.0	-20.3	Pass	54.0	-13.5	Pass
H	2745.0	40.82	33.1	20.2	29.1	4.8	54.5	46.8	74.0	-19.5	Pass	54.0	-7.2	Pass
V	5592.0	34.23	23.3	17.6	34.3	7.4	58.3	47.4	74.0	-15.7	Pass	54.0	-6.6	Pass

Table Result: Pass by -0.7 dB ***Worst Freq:*** 4632.0 MHz

Test Site: EMI Chamber 2 **Cable 1:** Asset #2052 **Cable 2:** Asset #2053 **Cable 3:** Asset #1787
Analyzer: Gold **Preamp:** Asset #1517 **Antenna:** Black Horn **Preselector:** ---
CSsoft Radiated Emissions Calculator v 1.017.148

Adjusted Reading = Reading - Preamp Factor + Antenna Factor + Cable Factor

Radiated Emissions Table

Date: 07-Dec-15 **Company:** ecoVent **Work Order:** P3491
Engineer: Ryan Brown **EUT Desc:** Wall Sensor **EUT Operating Voltage/Frequency:** 120V/60Hz
Temp: 22.8°C **Humidity:** 25% **Pressure:** 1007 mBar
Frequency Range: 6-18GHz **Measurement Distance:** 1 m
Notes: HPF A# 1288 **EUT Tx Freq:** 2402-2480 MHz
TX 926MHz & 2402MHz 904-926 MHz

Antenna Polarization (H / V)	Frequency (MHz)	Peak Reading (dBµV)	Average Reading (dBµV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Peak Reading (dBµV/m)	Adjusted Avg Reading (dBµV/m)	FCC 15.209 High Frequency - Peak Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)	FCC 15.209 High Frequency - Average Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)
No Emissions Found In this Range				---	---	---	---	---	---	---	---	---	---	---
				---	---	---	---	---	---	---	---	---	---	---

Table Result: --- by --- dB ***Worst Freq:*** --- MHz

Test Site: EMI Chamber 2 **Cable 1:** Asset #2052 **Cable 2:** Asset #2053 **Cable 3:** Asset #1787
Analyzer: Gold **Preamp:** Asset #1517 **Antenna:** Black Horn **Preselector:** ---
CSsoft Radiated Emissions Calculator v 1.017.148

Adjusted Reading = Reading - Preamp Factor + Antenna Factor + Cable Factor
Note: per evaluation, Low channel (2402 MHz) was determined to be the worst case channel setting.

Rev.12/7/2015

Spectrum Analyzers / Receivers /Preselectors	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
Gold	100Hz-26.5 GHz	E4407B	Agilent	MY45113816	1284	I	4/22/2016	4/22/2015
Radiated Emissions Sites	**FCC Code**	**IC Code**	**VCCI Code**	**Range**		**Cat**	**Calibration Due**	**Calibrated on**
EMI Chamber 2	719150	2762A-7	A-0015	30-1000MHz		II	3/22/2017	3/22/2015
Preamps /Couplers Attenuators / Filters	**Range**	**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**	**Calibrated on**
1517 HF Preamp	1-20GHz	CS	CS	N/A	1517	II	8/6/2016	8/6/2015
Antennas	**Range**	**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**	**Calibrated on**
Black Horn	1-18GHz	3115	EMCO	9703-5148	56	I	8/21/2016	8/21/2014
Cables	**Range**		**Mfr**			**Cat**	**Calibration Due**	**Calibrated on**
Asset #2052	9kHz - 18GHz		Florida RF			II	3/8/2016	3/8/2015
Asset #2053	9kHz - 18GHz		Florida RF			II	3/8/2016	3/8/2015
Asset #1787	9kHz - 18GHz		Florida RF			II	3/21/2016	3/21/2015
Meteorological Meters		**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**	**Calibrated on**
Weather Clock (Pressure Only)		BA928	Oregon Scientific	C3166-1	831	I	3/19/2016	3/19/2014
TH A#2081		HTC-1	HDE		2081	II	4/2/2016	4/2/2015

All equipment is calibrated using standards traceable to NIST or other nationally recognized calibration standard.

Radiated Emissions Table

Date: 07-Dec-15 **Company:** ecoVent **Work Order:** P3491
Engineer: Ryan Brown **EUT Desc:** Wall Sensor **EUT Operating Voltage/Frequency:** 120V/60Hz
Temp: 22.8°C **Humidity:** 25% **Pressure:** 1007 mBar
Frequency Range: 18-25GHz **Measurement Distance:** 0.1 m
Notes: HPF A# 1288 **EUT Tx Freq:** 2402-2480 MHz
TX 926MHz & 2402MHz 904-926 MHz

Antenna Polarization (H / V)	Frequency (MHz)	Peak Reading (dBµV)	Average Reading (dBµV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Peak Reading (dBµV/m)	Adjusted Avg Reading (dBµV/m)	FCC 15.209 High Frequency - Peak			FCC 15.209 High Frequency - Average		
									Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)	Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)
V	21307.0	66.53	58.0	41.8	40.2	6.0	70.9	62.4	103.5	-32.6	Pass	83.5	-21.1	Pass
H	21307.0	58.82	50.9	41.8	40.2	6.0	63.2	55.3	103.5	-40.3	Pass	83.5	-28.2	Pass
V	22218.5	69.66	50.1	41.8	40.5	6.3	74.7	55.1	103.5	-28.8	Pass	83.5	-28.4	Pass
H	22218.5	55.03	49.6	41.8	40.5	6.3	60.0	54.6	103.5	-43.5	Pass	83.5	-28.9	Pass

Table Result: Pass by -21.1 dB ***Worst Freq:*** 21307.0 MHz

Test Site: EMI Chamber 2 **Cable 1:** EMIR-HIGH-06 **Cable 2:** --- **Cable 3:** ---
Analyzer: Gold **Preamp:** 18-26.5GHz **Antenna:** 18-26.5GHz Horn **Preselector:** ---
CSsoft Radiated Emissions Calculator v 1.017.148

Adjusted Reading = Reading - Preamp Factor + Antenna Factor + Cable Factor

Note: per evaluation, Low channel (2402 MHz) was determined to be the worst case channel setting.

Rev.12/7/2015

Spectrum Analyzers / Receivers /Preselectors	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
Gold	100Hz-26.5 GHz	E4407B	Agilent	MY45113816	1284	I	4/22/2016	4/22/2015
Radiated Emissions Sites	**FCC Code**	**IC Code**	**VCCI Code**	**Range**		**Cat**	**Calibration Due**	**Calibrated on**
EMI Chamber 2	719150	2762A-7	A-0015	30-1000MHz		II	3/22/2017	3/22/2015
Preamps /Couplers Attenuators / Filters	**Range**	**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**	**Calibrated on**
HF (Yellow)	18-26.5GHz	AFS4-18002650-60-8P-4	CS	467559	1266	II	3/13/2016	3/13/2015
Antennas	**Range**	**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**	**Calibrated on**
HF (White) Horn	18-26.5GHz	801-WLM	Waveline	758	758	III	Verify before Use	date of test
Cables	**Range**		**Mfr**			**Cat**	**Calibration Due**	**Calibrated on**
REMI-High-06	1 - 26.5GHz	TRU-21B0707-120	TRU			II	8/7/2016	8/7/2015
Meteorological Meters		**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**	**Calibrated on**
Weather Clock (Pressure Only)		BA928	Oregon Scientific	C3166-1	831	I	3/19/2016	3/19/2014
TH A#2081		HTC-1	HDE		2081	II	4/2/2016	4/2/2015

All equipment is calibrated using standards traceable to NIST or other nationally recognized calibration standard.

Conducted Spurious Emissions

LIMITS

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth that contains the highest level of desired power based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB …
[15.247(d)]

MEASUREMENTS / RESULTS

Band Edge

Date: Dec 2 & 4, 2015 **Company:** ecoVent **Work Order:** P3491
Engineer: Tuyen Truong **EUT Desc:** Wall Sensor **EUT Operating Voltage/Frequency:** 120Vac/60Hz
Dec 2 -Temp: 22°C **Humidity:** 32% **Pressure:** 1005mbar
Dec 4 -Temp: 19°C **Humidity:** 33% **Pressure:** 1019mBar

Frequency Range: 2402-2480 MHz

Notes: GFSK modulation with 100% duty cycle
The Limit here is set to -23.07 dBm from the max in-band peak PSD level in 100kHz RBW (Attenuation factor included or 19.86dB)

Frequency (MHz)	Reading (dBm)	Attenuation (dB)	Final Conducted Reading (dBm)	FCC 15.247 Limit (dBm)	Margin (dB)	Result (Pass/Fail)
2389.3	-63.87	19.86	-44.01	-23.07	-20.94	Pass
2390.0	-75.11	19.86	-55.25	-23.07	-32.18	Pass
2400.0	-61.99	19.86	-42.13	-23.07	-19.06	Pass
2483.5	-77.08	19.86	-57.22	-23.07	-34.15	Pass
2500.0	-78.59	19.86	-58.73	-23.07	-35.66	Pass

Table Result: Pass by -19.06 dB ***Worst Freq:*** 2400.0 MHz

Test Site: CEMI2 and CEMI3 **Attenuation:** Asset#791
Analyzer: SA#1328 and GOLD

Rev. 11/30/2015

Spectrum Analyzers / Receivers /Preselectors	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
SA EMI Chamber (1328)	9kHz-13.2 GHz	E4405B	Agilent	MY44210241	1328	I	8/19/2016	8/19/2015
Gold	100Hz-26.5 GHz	E4407B	Agilent	MY45113816	1284	I	4/22/2016	4/22/2015

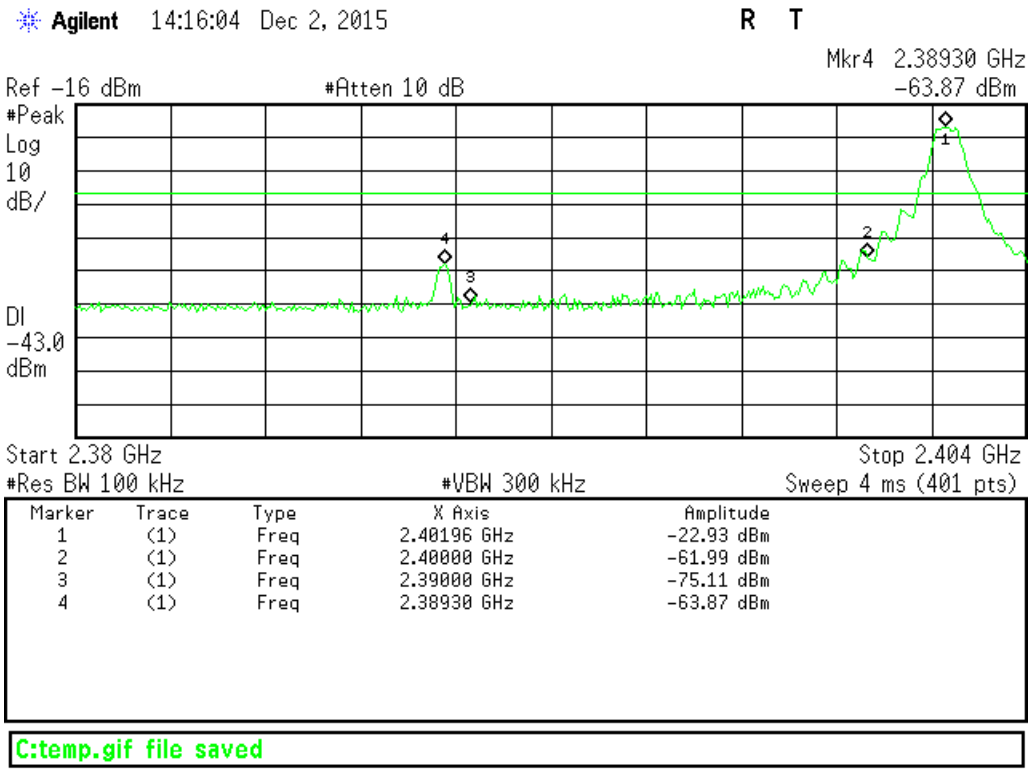
Preamps /Couplers Attenuators / Filters	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
HF 20dB 50W Attenuator	0.009-18 GHz	PE 7019-20	Pasternack	1	791	II	7/31/2016	7/31/2015

Conducted Test Sites (Mains / Telco)	FCC Code	VCCI Code	Cat	Calibration Due	Calibrated on
CEMI 3	719150	A-0015	III	NA	N/A
CEMI 2	719150	A-0015	III	NA	N/A

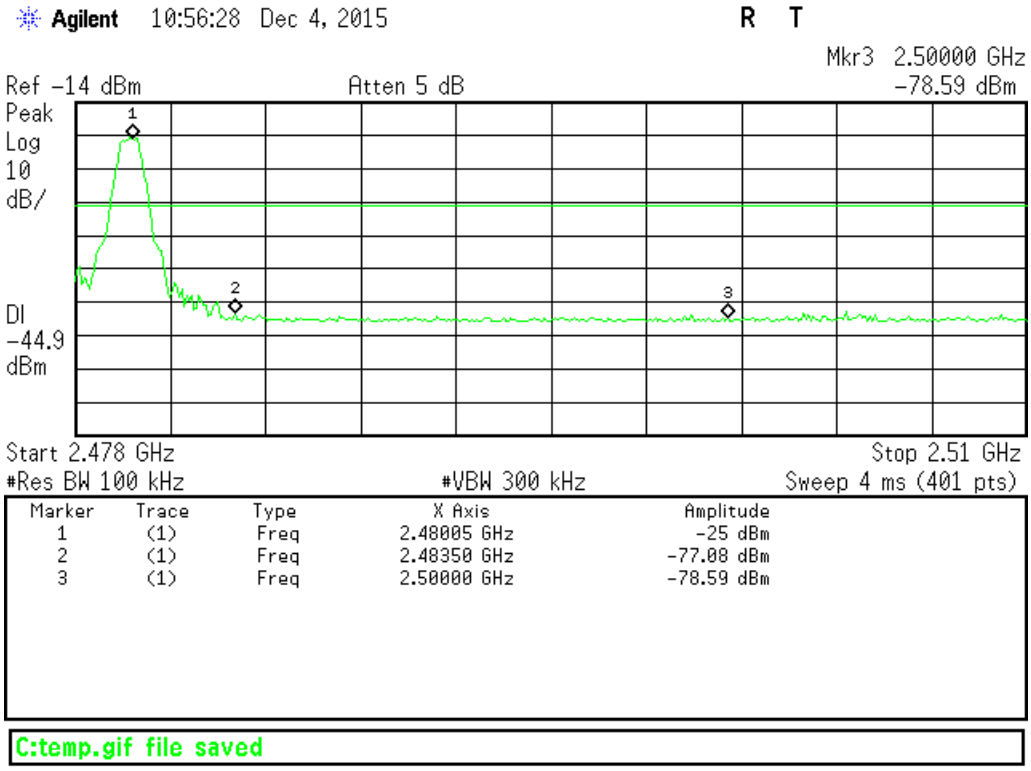
Meteorological Meters	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
Weather Clock (Pressure Only)	BA928	Oregon Scientific	C3166-1	831	I	3/19/2016	3/19/2014
TH A#2078	HTC-1	HDE		2078	II	4/2/2016	4/2/2015

All equipment is calibrated using standards traceable to NIST or other nationally recognized calibration standard.

Plot(s)



Lower Channel – Band-edge (<-20dBm)



Upper Channel – Band-edge (<-20dBm)

Conducted Spurious Emission

Conducted Spurious Emissions at the Antenna Port:

For these scans, the spectrum analyzer was set to the following:

Span: 400MHz or lower
Resolution Bandwidth: 100 KHz
Video Bandwidth: 300 KHz
Points per sweep: 8001

The frequency range 30MHz-25GHz was tested at EUT antenna port and no emissions were found within 10dB of the limit, which was set at 20dB below the power of the transmit frequency. The low, mid, and high channels were tested.

Spurious Conducted Emissions - Maximum Peak PSD in 100 KHz RBW

Date: 02-Dec-15 **Company:** ecoVent **Work Order:** P3491
Engineer: Tuyen Truong **EUT Desc:** Wall Sensor **EUT Operating Voltage/Frequency:** 120Vac/60Hz
Temp: 22°C **Humidity:** 32% **Pressure:** 1005mbar

Frequency Range: 2402 MHz

Notes: Maximum Peak PSD in 100 KHz RBW

Frequency (MHz)	Reading (dBm)	Attenuation (dB)	Adjusted Reading (dBm)
2402	-24.11	21.64	-2.47

Test Site: CEMI3 **Attenuation:** Asset#791
Analyzer: SA#1328

Spurious Conducted Emissions

Date: 04-Dec-15 **Company:** ecoVent **Work Order:** P3491
Engineer: Tuyen Truong **EUT Desc:** Wall Sensor **EUT Operating Voltage/Frequency:** 120Vac/60Hz
Temp: 19°C **Humidity:** 33% **Pressure:** 1019mBar

Frequency Range: 30-25000 MHz

Notes: Limit is -22.47 dBm or -20 dB down from the maximum in band Peak PSD level in 100 KHz RBW (worst case attenuation factor included)
TX on 2402 MHz

Frequency (MHz)	Reading (dBm)	Attenuation (dB)	Adjusted Reading (dBm)	FCC 15.247 Limit (dBm)	Margin (dB)	Result (Pass/Fail)
30	-79.82	21.64	-58.18	-22.47	-35.7	Pass
4804	-64.93	21.64	-43.29	-22.47	-20.8	Pass
7206	-74.49	21.64	-52.85	-22.47	-30.4	Pass
9608	-79.71	21.64	-58.07	-22.47	-35.6	Pass
12010	-79.74	21.64	-58.10	-22.47	-35.6	Pass
14412	-79.39	21.64	-57.75	-22.47	-35.3	Pass
16814	-78.44	21.64	-56.80	-22.47	-34.3	Pass
19216	-80.35	21.64	-58.71	-22.47	-36.2	Pass
21618	-79.33	21.64	-57.69	-22.47	-35.2	Pass
24020	-78.79	21.64	-57.15	-22.47	-34.7	Pass

Table Result: Pass by -20.8 dB ***Worst Freq:*** 4804.0 MHz

Test Site: CEMI2 **Attenuation:** Asset#791
Analyzer: GOLD

Spurious Conducted Emissions

Date: 04-Dec-15 **Company:** ecoVent **Work Order:** P3491
Engineer: Tuyen Truong **EUT Desc:** Wall Sensor **EUT Operating Voltage/Frequency:** 120Vac/60Hz
Temp: 19°C **Humidity:** 33% **Pressure:** 1019mBar

Frequency Range: 30-25000 MHz

Notes: Limit is -22.47 dBm or -20 dB down from the maximum in band Peak PSD level in 100 KHz RBW (worst case attenuation factor included)
TX on 2440 MHz

Frequency (MHz)	Reading (dBm)	Attenuation (dB)	Adjusted Reading (dBm)	FCC 15.247 Limit (dBm)	Margin (dB)	Result (Pass/Fail)
30	-79.84	21.64	-58.20	-22.47	-35.7	Pass
4880	-70.12	21.64	-48.48	-22.47	-26.0	Pass
7320	-73.40	21.64	-51.76	-22.47	-29.3	Pass
9760	-78.84	21.64	-57.20	-22.47	-34.7	Pass
12200	-79.68	21.64	-58.04	-22.47	-35.6	Pass
14640	-79.68	21.64	-58.04	-22.47	-35.6	Pass
17080	-79.60	21.64	-57.96	-22.47	-35.5	Pass
19520	-78.21	21.64	-56.57	-22.47	-34.1	Pass
21960	-78.53	21.64	-56.89	-22.47	-34.4	Pass
24400	-79.02	21.64	-57.38	-22.47	-34.9	Pass

Table Result: Pass by -26.0 dB ***Worst Freq:*** 4880.0 MHz

Test Site: CEMI2 **Attenuation:** Asset#791
Analyzer: GOLD

Spurious Conducted Emissions

Date: 04-Dec-15 **Company:** ecoVent **Work Order:** P3491
Engineer: Tuyen Truong **EUT Desc:** Wall Sensor **EUT Operating Voltage/Frequency:** 120Vac/60Hz
Temp: 19°C **Humidity:** 33% **Pressure:** 1019mBar

Frequency Range: 30-25000 MHz

Notes: Limit is -22.47 dBm or -20 dB down from the maximum in band Peak PSD level in 100 KHz RBW (worst case attenuation factor included)
TX on 2480 MHz

Frequency (MHz)	Reading (dBm)	Attenuation (dB)	Adjusted Reading (dBm)	FCC 15.247 Limit (dBm)	Margin (dB)	Result (Pass/Fail)
30	-79.78	21.64	-58.14	-22.47	-35.7	Pass
4960	-76.65	21.64	-55.01	-22.47	-32.5	Pass
7440	-76.50	21.64	-54.86	-22.47	-32.4	Pass
9920	-79.06	21.64	-57.42	-22.47	-35.0	Pass
12400	-79.76	21.64	-58.12	-22.47	-35.7	Pass
14880	-75.33	21.64	-53.69	-22.47	-31.2	Pass
17360	-78.91	21.64	-57.27	-22.47	-34.8	Pass
19840	-80.01	21.64	-58.37	-22.47	-35.9	Pass
22320	-79.35	21.64	-57.71	-22.47	-35.2	Pass
24805.6	-73.74	21.64	-52.10	-22.47	-29.6	Pass

Table Result: Pass by -29.6 dB ***Worst Freq:*** 24805.6 MHz

Test Site: CEMI2 **Attenuation:** Asset#791
Analyzer: GOLD

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Spectrum Analyzers / Receivers /Preselectors	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
Gold	100Hz-26.5 GHz	E4407B	Agilent	MY45113816	1284	I	4/22/2016	4/22/2015

Preamps /Couplers Attenuators / Filters	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
HF 20dB 50W Attenuator	0.009-18 GHz	PE 7019-20	Pasternack	1	791	II	7/31/2016	7/31/2015

Conducted Test Sites (Mains / Telco)	FCC Code	VCCI Code	Cat	Calibration Due	Calibrated on
CEMI 2	719150	A-0015	III	NA	N/A

Meteorological Meters	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
Weather Clock (Pressure Only)	BA928	Oregon Scientific	C3166-1	831	I	3/19/2016	3/19/2014
TH A#2078	HTC-1	HDE		2078	II	4/2/2016	4/2/2015

All equipment is calibrated using standards traceable to NIST or other nationally recognized calibration standard.

Power Spectral Density

LIMIT

…the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3 kHz band during any time interval of continuous transmission. [15.247(e)]

Per 558074 D01 DTS Measurement Guidance v0303 Section 10.2 (Peak PSD)

MEASUREMENTS / RESULTS

Fundamental Emission Output Power

Date: 04-Dec-15 **Company:** ecoVent **Work Order:** P3491
Engineer: Tuyen Truong **EUT Desc:** Wall Sensor **EUT Operating Voltage/Frequency:** 120Vac/60Hz
Temp: 19°C **Humidity:** 33% **Pressure:** 1019mBar
Frequency Range: 2402-2480 MHz
Notes: GFSK modulation with 100% duty cycle

Frequency (MHz)	Reading (dBm)	Attenuation (dB)	Final Conducted Reading (dBm)	FCC 15.247 Limit (dBm)	Margin (dB)	Result (Pass/Fail)
2402	-32.68	19.86	-12.82	8.0	-20.82	Pass
2440	-33.28	19.86	-13.42	8.0	-21.42	Pass
2480	-32.65	19.86	-12.79	8.0	-20.79	Pass

Table Result: Pass by -20.79 dB ***Worst Freq:*** 2480.0 MHz

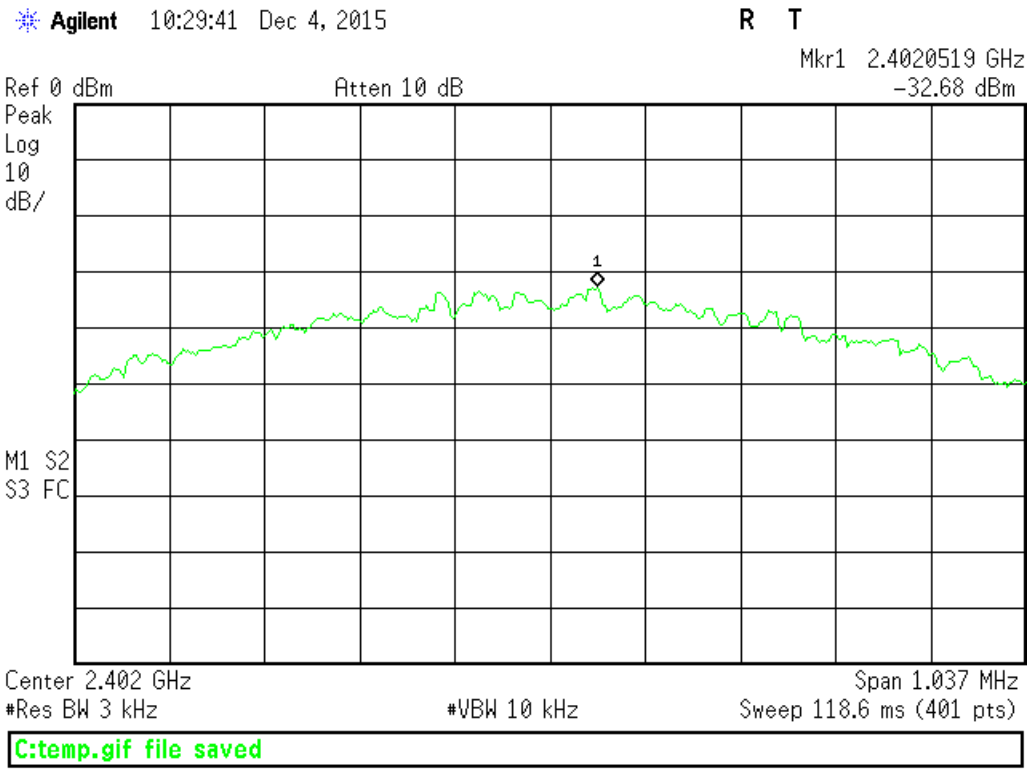
Test Site: CEMI2 **Attenuation:** Asset#791
Analyzer: GOLD

Rev. 11/30/2015

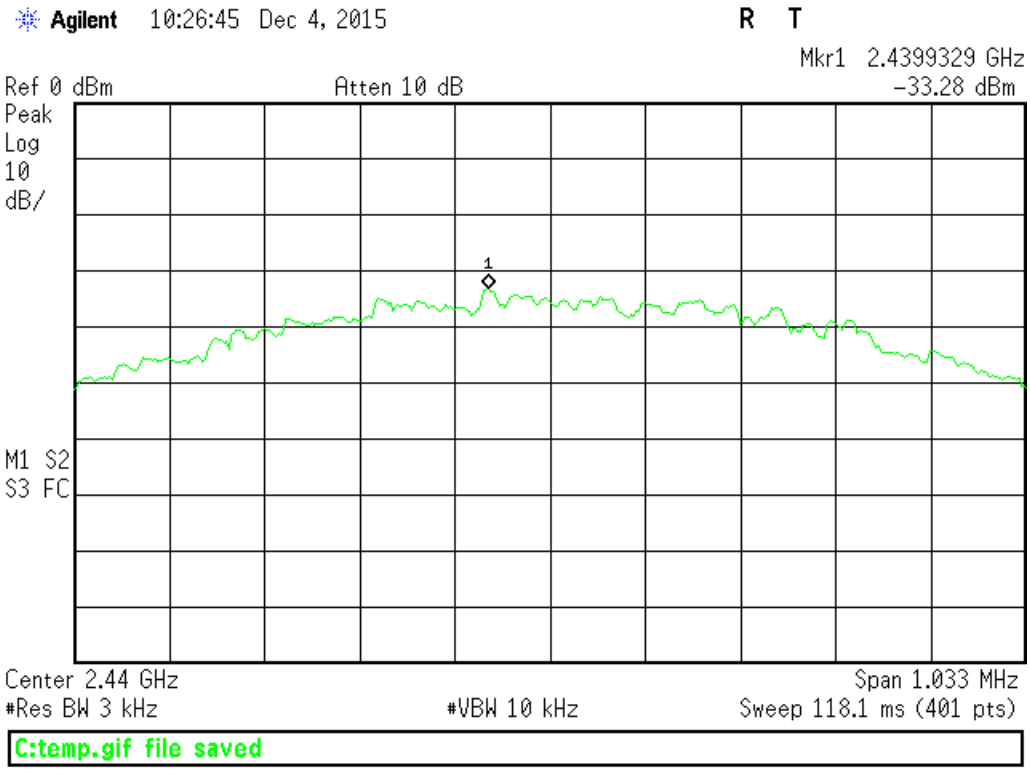
Spectrum Analyzers / Receivers /Preselectors	**Range**	**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**	**Calibrated on**
Gold	100Hz-26.5 GHz	E4407B	Agilent	MY45113816	1284	I	4/22/2016	4/22/2015
Preamps /Couplers Attenuators / Filters	**Range**	**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**	**Calibrated on**
HF 20dB 50W Attenuator	0.009-18 GHz	PE 7019-20	Pasternack	1	791	II	7/31/2016	7/31/2015
Conducted Test Sites (Mains / Telco)	**FCC Code**		**VCCI Code**			**Cat**	**Calibration Due**	**Calibrated on**
CEMI 2	719150		A-0015			III	NA	N/A
Meteorological Meters		**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**	**Calibrated on**
Weather Clock (Pressure Only)		BA928	Oregon Scientific	C3166-1	831	I	3/19/2016	3/19/2014
TH A#2078		HTC-1	HDE		2078	II	4/2/2016	4/2/2015

All equipment is calibrated using standards traceable to NIST or other nationally recognized calibration standard.

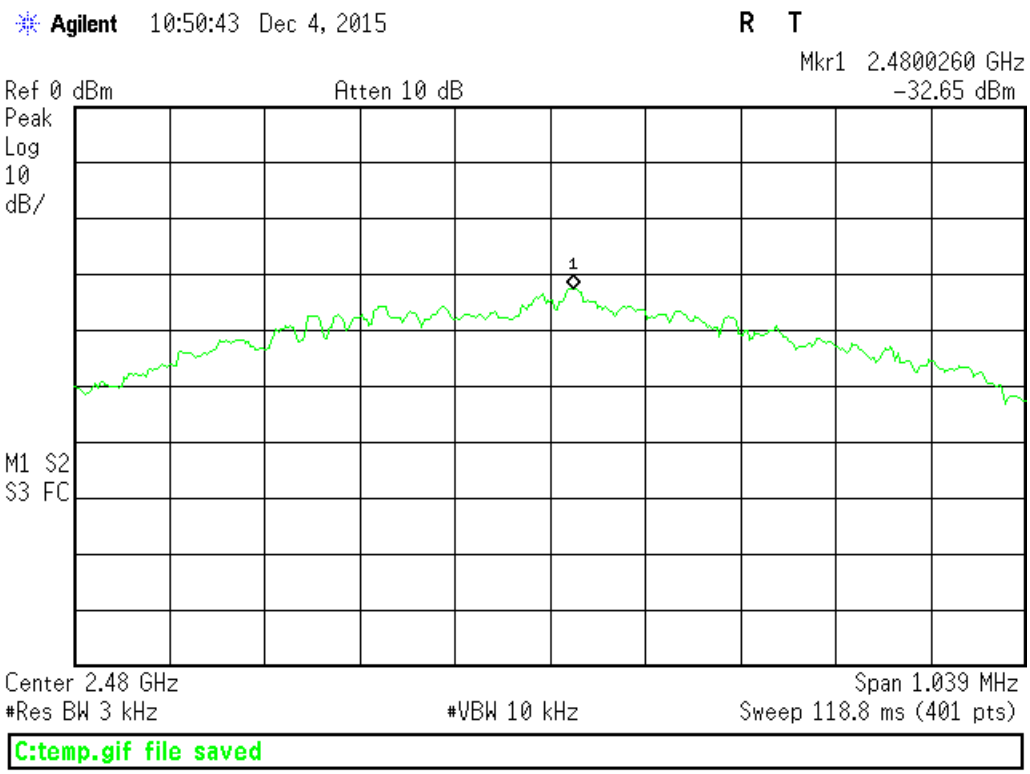
PLOTS



2402 MHz – PSD



2440 MHz – PSD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R T
Mkr1 2.4800260 GHz
Ref 0 dBm
Atten 10 dB
-32.65 dBm
Peak
Log
10
dB/
1
M1 S2
S3 FC
Center 2.48 GHz
Span 1.039 MHz
#Res BW 3 kHz
#VBW 10 kHz
Sweep 118.8 ms (401 pts)
C:temp.gif file saved

2480 MHz – PSD

AC Line Conducted Emissions

LIMITS

Frequency of emission (MHz)	Quasi-peak limit (dBµV)	Average limit (dBµV)
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.

[47 CFR 15.207(a)]

MEASUREMENTS / RESULTS

AC Conducted Emissions Data Table

Date: 04-Dec-15 **Company:** ecoVent **Work Order:** P3491
Engineer: Tuyen Truong **EUT Desc:** Wall Sensor
Temp: 19.0 ºC **Humidity:** 33% **Pressure:** 1019mBar
Notes: Both 900 MHz and 2.4 GHz BLE radio running
Frequency Range: 0.15-30 MHz **EUT Input Voltage/Frequency:** 120Vac/60Hz

	Quasi-Peak Readings		Average Readings		LISN Factors		Cable	ATTN	FCC 15.207			FCC 15.207		
Frequency (MHz)	QP1 (dBµV)	QP2 (dBµV)	AVG1 (dBµV)	AVG2 (dBµV)	L1 (dB)	L2 (dB)	Factor (dB)	Factor (dB)	QP Limit (dBµV)	Margin (dB)	Result (Pass/Fail)	AVG Limit (dBµV)	Margin (dB)	Result (Pass/Fail)
0.15	10.3	11.5	1.7	2.1	-0.1	-0.1	-0.1	-19.7	66.0	-34.7	Pass	56.0	-34.1	Pass
10.75	27.1	17.4	19.8	6.3	-0.1	-0.1	-0.2	-19.6	60.0	-13.0	Pass	50.0	-10.3	Pass
12.24	27.5	15.9	20.0	5.4	-0.1	-0.1	-0.2	-19.6	60.0	-12.6	Pass	50.0	-10.1	Pass
14.04	28.6	17.3	21.1	3.9	-0.1	-0.1	-0.2	-19.6	60.0	-11.4	Pass	50.0	-9.0	Pass
16.94	32.7	20.9	25.7	11.8	-0.1	-0.1	-0.2	-19.7	60.0	-7.3	Pass	50.0	-4.3	Pass
20.52	33.7	16.6	25.4	7.1	-0.1	-0.1	-0.3	-19.7	60.0	-6.2	Pass	50.0	-4.5	Pass

Result: Pass ***Worst Margin:*** -4.3 dB ***Frequency:*** 16.940 MHz

Measurement Device: LISN ASSET 1726(Line 1) LISN ASSET 1727(Line 2) **Cable:** CEMI-01 **Spectrum Analyzer:** Gold
Attenuator: 20dB Attenuator-74 **Site:** CEMI 2

Rev.11/30/2015

Spectrum Analyzers / Receivers /Preselectors	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
Gold	100Hz-26.5 GHz	E4407B	Agilent	MY45113816	1284	I	4/22/2016	4/22/2015
LISNs/Measurement Probes	**Range**	**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**	**Calibrated on**
LISN Asset 1726	150kHz-30MHz	LI-150A	Com-Power	201092	1726	I	1/23/2016	1/23/2015
LISN Asset 1727	150kHz-30MHz	LI-150A	Com-Power	201093	1727	I	1/23/2016	1/23/2015
Conducted Test Sites (Mains / Telco)	**FCC Code**		**VCCI Code**			**Cat**	**Calibration Due**	**Calibrated on**
CEMI 2	719150		A-0015			III	NA	N/A
Cables	**Range**		**Mfr**			**Cat**	**Calibration Due**	**Calibrated on**
CEMI-01	9kHz - 2GHz		C-S			II	9/11/2016	9/11/2015
Attenuators	**Range**	**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**	**Calibrated on**
20dB Attenuator-74	9kHz-2GHz			N/A		II	7/29/2016	7/29/2015
Meteorological Meters		**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**	**Calibrated on**
Weather Clock (Pressure Only)		BA928	Oregon Scientific	C3166-1	831	I	3/19/2016	3/19/2014
TH A#2078		HTC-1	HDE		2078	II	4/2/2016	4/2/2015

All equipment is calibrated using standards traceable to NIST or other nationally recognized calibration standard.

Occupied Bandwidth

REQUIREMENT

When an occupied bandwidth is not specified in the applicable RSS, the transmitted signal bandwidth to be reported is to be its 99% emission bandwidth, as calculated or measured. [RSS-GEN 6.6]

MEASUREMENTS / RESULTS

99% OCCUPIED BANDWIDTH

Date: Dec 2 & 4, 2015 **Company:** ecoVent **Work Order:** P3491
Engineer: Tuyen Truong **EUT Desc:** Wall Sensor **EUT Operating Voltage/Frequency:** 120Vac/60Hz
Dec 2 -Temp: 22°C **Humidity:** 32% **Pressure:** 1005mbar
Dec 4 -Temp: 19°C **Humidity:** 33% **Pressure:** 1019mBar

Frequency Range: 2402-2480 MHz

Notes: GFSK modulation with 100% duty cycle

Frequency (MHz)	Occupied Bandwidth Reading (KHz)
2402	**1038.2000**
2440	**977.3181**
2480	**992.2028**

Test Site: CEMI2 and CEMI3 **Attenuation:** Asset#791
Analyzer: SA#1328 and GOLD

Rev. 11/30/2015

Spectrum Analyzers / Receivers /Preselectors	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
SA EMI Chamber (1328)	9kHz-13.2 GHz	E4405B	Agilent	MY44210241	1328	I	8/19/2016	8/19/2015
Gold	100Hz-26.5 GHz	E4407B	Agilent	MY45113816	1284	I	4/22/2016	4/22/2015

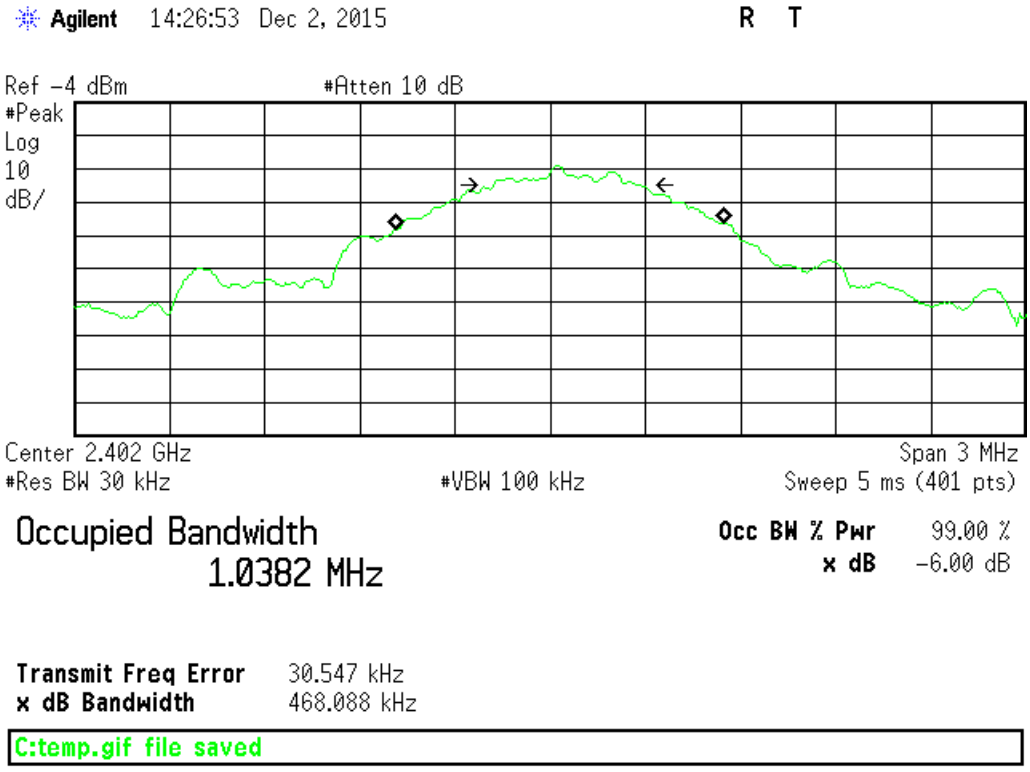
Preamps /Couplers Attenuators / Filters	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
HF 20dB 50W Attenuator	0.009-18 GHz	PE 7019-20	Pasternack	1	791	II	7/31/2016	7/31/2015

Conducted Test Sites (Mains / Telco)	FCC Code	VCCI Code	Cat	Calibration Due	Calibrated on
CEMI 3	719150	A-0015	III	NA	N/A
CEMI 2	719150	A-0015	III	NA	N/A

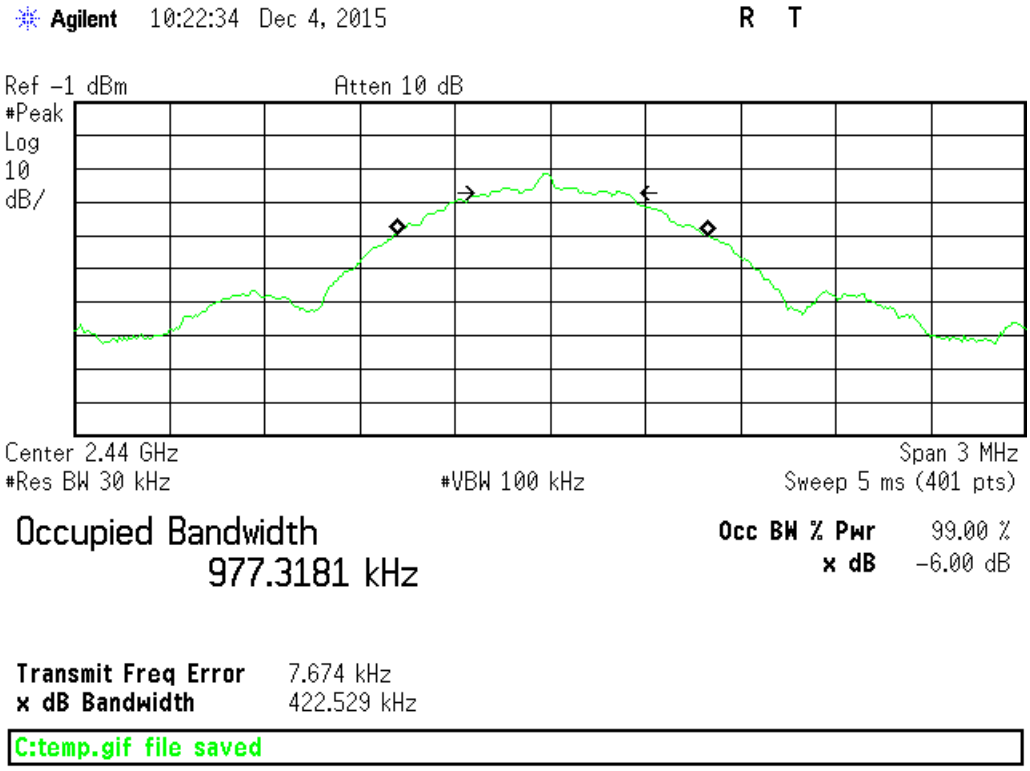
Meteorological Meters	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
Weather Clock (Pressure Only)	BA928	Oregon Scientific	C3166-1	831	I	3/19/2016	3/19/2014
TH A#2078	HTC-1	HDE		2078	II	4/2/2016	4/2/2015

All equipment is calibrated using standards traceable to NIST or other nationally recognized calibration standard.

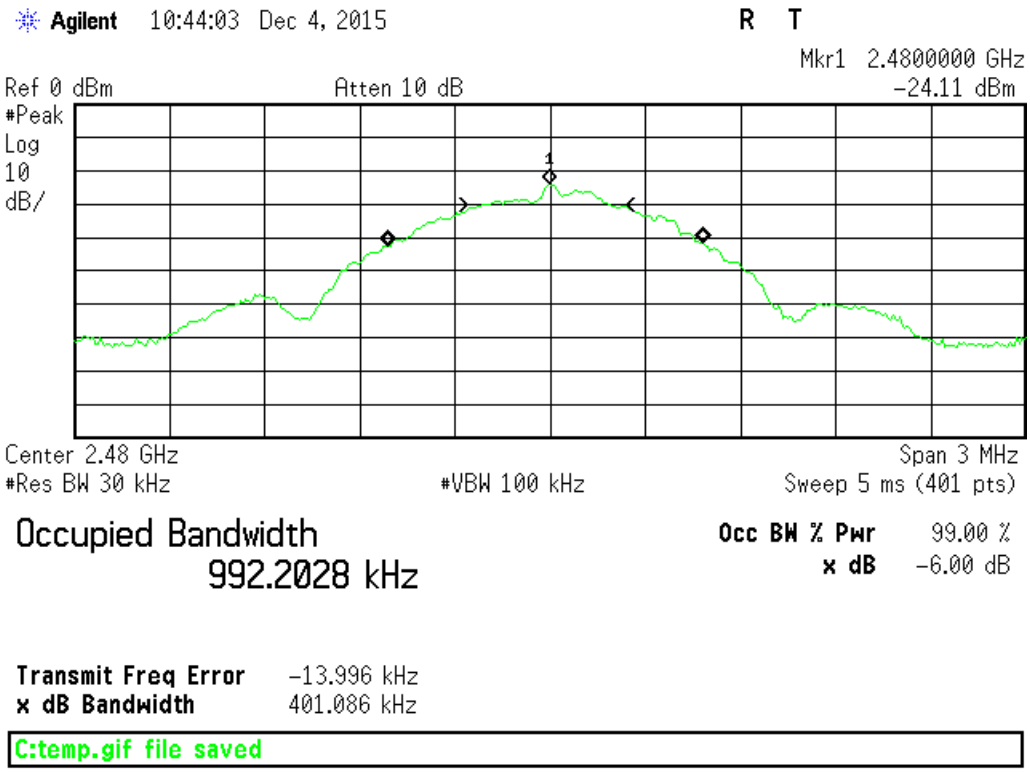
Plot(s)



2402 MHz – Occupied Bandwidth



2440 MHz – Occupied Bandwidth



2480 MHz – Occupied Bandwidth

Measurement Uncertainty

The listed uncertainties are the worst case uncertainty for the entire range of measurement. Please note that the uncertainty values are provided for informational purposes only and are not used in determining the PASS/FAIL results.

Measurement	Expanded Uncertainty k=2	Maximum allowable uncertainty
Radiated Emissions (30-1000MHz) NIST CISPR	 5.6dB 4.6dB	 N/A 5.2dB (Ucispr)
Radiated Emissions (1-26.5GHz)	4.6dB	N/A
Radiated Emissions (above 26.5GHz)	4.9dB	N/A
Magnetic Radiated Emissions	5.6dB	N/A
Conducted Emissions NIST CISPR	 3.9dB 3.6dB	 N/A 3.6dB (Ucispr)
Telco Conducted Emissions (Current)	2.9dB	N/A
Telco Conducted Emissions (Voltage)	4.4dB	N/A
Electrostatic Discharge	11.5%	N/A
Radiated RF Immunity (Uniform Field)	1.6dB	N/A
Electrical Fast Transients	23.1%	N/A
Surge	23.1%	N/A
Conducted RF Immunity	3dB	N/A
Magnetic Immunity	12.8%	N/A
Dips and Interrupts	2.3V	N/A
Harmonics	3.5%	N/A
Flicker	3.5%	N/A
Radio frequency (@ 2.4GHz)	3.23×10^{-8}	1×10^{-7}
RF power, conducted	0.40dB	0.75dB
Maximum frequency deviation: • Within 300Hz and 6kHz of audio frequency / Within 6kHz and 25kHz of audio frequency	 3.4% 0.3dB	 5% 3dB
Adjacent channel power	1.9dB	3dB
Conducted spurious emission of transmitter, valid up to 12.75GHz	2.39dB	3dB
Conducted emission of receivers	1.3dB	3dB
Radiated emission of transmitter, valid up to 26.5GHz	3.9dB	6dB
Radiated emission of transmitter, valid up to 80GHz	3.3dB	6dB
Radiated emission of receiver, valid up to 26.5GHz	3.9dB	6dB
Radiated emission of receiver, valid up to 80GHz	3.3dB	6dB
Humidity	2.37%	5%
Temperature	0.7°C	1.0°C
Time	4.1%	10%
RF Power Density, Conducted	0.4dB	3dB
DC and low frequency voltages	1.3%	3%
Voltage (AC, <10kHz)	1.3%	2%
Voltage (DC)	0.62%	1%
The above reflects a 95% confidence level		

Conditions Of Testing

[Bureau Veritas Consumer Products Services, Inc., a Massachusetts corporation], and/or its affiliates (collectively, the "Company") will conduct, at the request of the Submitter ("Client"), the tests specified on the submitted Test Request Form or equivalent in accordance with, and subject to, the following terms and conditions (collectively, "Conditions"):

1. All orders for tests are subject to acceptance by the Company, and no order will constitute a binding commitment of the Company unless and until such order is accepted by it, as evidenced by the issuance of a written report ("Test Report") by the Company. The Test Report is issued solely by the Company, is intended for the exclusive use of Client and shall not be published, used for advertising purposes, copied or replicated for distribution to any other person or entity or otherwise publicly disclosed without the prior written consent of the Company. By submitting a request for services to the Company, Client consents to the disclosure to accreditation bodies of those records of Client relevant to the accreditation body's assessment of the Company's competence and compliance with relevant accreditation criteria. The Company shall not be liable for any loss or damage whatsoever resulting from the failure of the Company to provide its services within any time period for completion estimated by the Company. If Client anticipates using the Test Report in any legal proceeding, arbitration, dispute resolution forum or other proceeding, it shall so notify the Company prior to submitting the Test Report in such proceeding. The Company has no obligation to provide a fact or expert witness at such proceeding unless the Company agrees in advance to do so for a separate and additional fee.
2. The Test Report will set forth the findings of the Company solely with respect to the test samples identified therein. Unless specifically and expressly indicated in the Test Report, the results set forth in such Test Report are not intended to be indicative or representative of the quality or characteristics of the lot from which a test sample is taken, and Client shall not rely upon the Test Report as being so indicative or representative of the lot or of the tested product in general. The Test Report will reflect the findings of the Company at the time of testing only, and the Company shall have no obligation to update the Test Report after its issuance. The Test Report will set forth the results of the tests performed by the Company based upon the written information provided to the Company. The Test Report will be based solely on the samples and written information submitted to the Company by Client, and the Company shall not be obligated to conduct any independent investigation or inquiry with respect thereto.
3. The Company may, in its sole discretion, destroy samples which have been furnished to the Company for testing and which have not been destroyed in the course of testing. The Company may delegate the performance of all or a portion of the services contemplated hereunder to an affiliate, agent or subcontractor of the Company, and Client consents to such delegation.
4. These Conditions and the Test Report represent the entire understanding of the parties hereto with respect to the subject matter hereof and of the Test Report, and no modification, variance or extrapolation with respect thereto shall be permitted without the prior written consent of the Company.
5. The names, service marks, trademarks and copyrights of the Company and its affiliates, including the names "**BUREAU VERITAS," "BUREAU VERITAS CONSUMER PRODUCTS SERVICES," "BVCPS", "MTL", "ACTS", "MTL-ACTS" and CURTIS-STRAUS** (collectively, the "Marks") are and shall remain the sole property of the Company or its affiliates and shall not be used by Client except solely to the extent that Client obtains the prior written approval of the Company and then only in the manner prescribed by the Company. Client shall not contest the validity of the Marks or take any action that might impair the value or goodwill associated with the Marks or the image or reputation of the Company or its affiliates.
6. Payment in full shall be due 30 days after the date of invoice. Interest shall be due on overdue amounts from the due date until paid at an interest rate of 1.5% per month or, if less, the maximum rate permitted by law. The Company reserves the right, at any time and from time to time, to revoke any credit extended to Client. Client shall reimburse the Company for any costs it incurs in collecting past due amounts, including court costs and fees and expenses of attorneys and collection agencies. The Test Report may not be used or relied upon by Client if and for so long as Client fails to pay when due any invoice issued by the Company or any affiliate of it to Client or any affiliate or subsidiary of Client together with interest and penalties, if any, accrued thereon.
7. The Company disclaims any and all responsibility or liability arising out of or in connection with e-mail transmissions of such information.
8. Client understands and agrees that the Company is neither an insurer nor a guarantor, that the Company does not take the place of Client or any designer, manufacturer, agent, buyer, distributor or transportation or shipping company, and that the Company disclaims all liability in such capacities. Client further understands that if it seeks assurance against loss or damage, it should obtain appropriate insurance.
9. Client agrees that the Company, by providing the services, does not take the place of Client nor any third party, nor does the Company release them from any of their obligations, nor does the Company otherwise assume, abridge, abrogate or undertake to discharge any duty of any third party to Client or any duty of Client or any third party to any other third party, and Client will not release any third party from its obligations and duties with respect to the tested goods.
10. Client shall, on a timely basis, (a) provide adequate instructions to the Company in order to enable the Company to perform properly its services, (b) provide, or cause Client's suppliers and contractors to provide, the Company with all documents necessary to enable the Company to perform its services, (c) furnish the Company with all relevant information regarding Client's intended use and purposes of the tested goods, (d) advise the Company of essential dates and deadlines relevant to the tested goods and (e) fully exercise all rights and remedies available to Client against third parties in respect of the tested goods.
11. The Company shall undertake due care and ordinary skill in the performance of its services to Client, and the Company shall accept responsibility only were such skill has not been exercised and, even in such event, only to the extent of the limitation of liability set forth herein.
12. If Client desires to assert a claim arising from or relating to (i) the performance, purported performance or non-performance of any services by the Company or (ii) the sale, resale, manufacture, distribution or use of any tested goods, it must submit that claim to the Company in a writing that sets forth with particularity the basis for such claim within 60 days from discovery of the potential claim and not more than six months after the date of issuance of the Test Report to Client. Client waives any and all such claims including, without limitation, claims that the Test Report is inaccurate, incomplete or misleading or that additional or different testing is required, unless and then only to the extent that Client submits a written claim to the Company within both such time periods.
13. CLIENT SHALL, EXCEPT TO THE EXTENT OF COMPANY'S LIABILITY TO CLIENT HEREUNDER (WHICH IN NO EVENT SHALL EXCEED THE LIMITATION OF LIABILITY HEREIN), HOLD HARMLESS AND INDEMNIFY THE COMPANY, ITS AFFILIATES AND THEIR RESPECTIVE DIRECTORS, OFFICERS, EMPLOYEES, AGENTS AND SUBCONTRACTORS AGAINST ALL ACTUAL OR ALLEGED THIRD PARTY CLAIMS FOR LOSS, DAMAGE OR EXPENSE OF WHATSOEVER NATURE AND HOWSOEVER ARISING FROM OR RELATING TO (i) THE PERFORMANCE, PURPORTED PERFORMANCE OR NON-PERFORMANCE OF ANY SERVICES BY THE COMPANY OR (ii) THE SALE, RESALE, MANUFACTURE, DISTRIBUTION OR USE OF ANY TESTED GOODS.
14. EXCEPT AS MAY OTHERWISE BE EXPRESSLY AGREED TO IN WRITING BY THE COMPANY AND NOTWITHSTANDING ANY PROVISION TO THE CONTRARY CONTAINED HEREIN OR IN ANY TEST REPORT, NO WARRANTY OR GUARANTEE, EXPRESS OR IMPLIED, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR USE, IS MADE.

15. (A) IN NO EVENT WHATSOEVER SHALL THE COMPANY BE LIABLE FOR ANY CONSEQUENTIAL, SPECIAL, INCIDENTAL, EXEMPLARY OR PUNITIVE DAMAGES IN CONNECTION WITH, RELATING TO OR ARISING OUT OF THE TEST REPORT OR THE SERVICES PROVIDED BY THE COMPANY HEREUNDER, INCLUDING WITHOUT LIMITATION LOSS OF OR DAMAGE TO PROPERTY; LOSS OF INCOME, PROFIT OR USE; OR ANY CLAIMS OR DEMANDS MADE AGAINST CLIENT OR ANY OTHER PERSON BY ANY THIRD PARTY IN CONNECTION WITH, RELATING TO OR ARISING OUT OF THE SERVICES PROVIDED BY THE COMPANY HEREUNDER.

(B)NOTWITHSTANDING ANY PROVISION TO THE CONTRARY CONTAINED HEREIN, AND IN RECOGNITION OF THE RELATIVE RISKS AND BENEFITS TO CLIENT AND THE COMPANY ASSOCIATED WITH THE TESTING SERVICES CONTEMPLATED HEREBY, THE RISKS HAVE BEEN ALLOCATED SUCH THAT UNDER NO CIRCUMSTANCES WHATSOEVER SHALL THE LIABILITY OF THE COMPANY TO CLIENT OR ANY THIRD PARTY IN RESPECT OF ANY CLAIM FOR LOSS, DAMAGE OR EXPENSE, OF WHATSOEVER NATURE OR MAGNITUDE, AND HOWSOEVER ARISING, EXCEED AN AMOUNT EQUAL TO FIVE (5) TIMES THE AMOUNT OF THE FEES PAID TO THE COMPANY FOR THE SPECIFIC SERVICES WHICH GAVE RISE TO SUCH CLAIM OR U.S.$10,000, WHICHEVER IS THE LESSER AMOUNT.

16. The Company shall not be liable for any loss or damage resulting from any delay or failure in performance of its obligations hereunder resulting directly or indirectly from any event of force majeure or any event outside the control of the Company. If any such event occurs, the Company may immediately cancel or suspend its performance hereunder without incurring any liability whatsoever to Client.

17. Company's services, including these Conditions, shall be governed by, and construed in accordance with, the local laws of the country where the Company performs the tests or, in the case of tests performed in the United States of America, the laws of Massachusetts without regard to conflicts of laws principles. If any aspect(s) of these Conditions is found to be illegal or unenforceable, the validity, legality and enforceability of all remaining aspects of these Conditions shall not in any way be affected or impaired thereby. Any proceeding related to the subject matter hereof shall be brought, if at all, in the courts of the country where the Company performs the tests or, in the case of tests performed in the United States of America, in the courts of Massachusetts. Client waives the right to interpose any counterclaim or setoffs of any nature in any litigation arising hereunder.

The complete list of the Approved Subcontractors Curtis-Straus may use to delegate the performance of work can be provided upon request.
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