Test Report

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

Report No	EM2608-1
Client	ZOOM Telephonics, Inc Paul Prohodski
Address	207 South Street Boston, MA 02111
Phone	617-753-0569
Items tested	8105 (ZoomGuard MultiSensor M) & 8106 (ZoomGuard MultiSensor H)
FCC ID	BDN0381WL
IC ID	1535A-0381
FRN	0009014168
Equipment Type	Low Power Communication Device
Equipment Code	DXX
Emission Designator	
Standards	47CFR 15.249, RSS 210 Issue 8 and RSS GEN Issue 3
Test Dates	August 8, 2012, September 4, 24, 2012, and October 3, 2012
Results	As detailed within this report
Prepared by	Chris Reynolds – Test Engineer
Authorized by	Mairaj Hussain – EMC Supervisor
Issue Date	11/13/12
Conditions of Issue	This Test Report is issued subject to the conditions stated in the '*Conditions of Testing*' section on page 17 of this report.

Contents

Form Final Report REV 2-16-07 (DW)

Product Tested - Configuration Documentation

EUT Configuration

Work Order: M2608
Company: Zoom Technologies
Company Address: 207 South Street
Boston, MA 02111
Contact: Paul Prohodski
Person Present: Paul Prohodski

	MN	PN	SN
EUT:	ThinCleint	-	Sample 2
EUT Description:	Sensor		
EUT Max Frequency:	26MHz		
EUT Tx Frequency:	908MHz - 919.9MHz		

Support Equipment:	**MN**	**SN**
AC - DC ADAPTER	TEKA006-0330200UK	Sample 1

EUT Ports:

Port Label	Port Type	No. of ports	No. Populated	Cable Type	Shielded	Ferrites	Length	Max Length	In/Out NEBS Type	Unpopulated Reason
DC	Power	1	1	2 wire DC	No	None	1 m	1 m	NA	
Mimi USB	I/O sensor	1	0	-	-	-	-	-	-	Not Functional

Software / Operating Mode Description:

Constantly transmittiing on one of the available channels.

Performance Criteria:

NA

Summary

This test report supports an application for certification of a transmitter operating pursuant to 47 CFR 15.249 and RSS-210. The products are the ZoomGuard MultiSensor M and the ZoomGuard MultiSensor H. ZoomGuard MultiSensor M is exactly the same board and BOM as the Multisensor H, with the exception that the PIR (Motion Detector) has been removed and replaced with a Passive Humidity Sensor. The radio components and layout, the plastic case and antenna are all exactly the same. The product is a transmitter that operates in the range 902-928 MHz. Testing was performed under work orders M1857 and M2608. Fundamental and spurious emissions were tested on both units. Worst case data is presented.

We found that the product met the above requirements with modification (see *Modifications Required for Compliance* section on page 5). The test sample was received in good condition.

Test Methodology

Radiated emission and AC Line conducted testing was performed according to the procedures specified in ANSI C63.4 (2009) and RSS-GEN. Radiated Emissions were maximized by rotating the device around three orthogonal axes as well as varying the test antenna's height and polarity. The device antenna was maximized separately.

The product was tested with modulation on and peak readings were compared against the limit presented in section CFR 15.249. AC mains conducted emissions were performed using 50uH/50Ω LISN.

The EUT operating voltage is 120V/60Hz.

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

Compliance Statement

The ZoomGuard MultiSensor has been found to conform to the following parts of 47 CFR and RSS 210 as detailed below:

RSS-GEN	RSS 210	Part 15	Comments
5.4		15.15(b)	There are no controls accessible to the user that vary the output power.
5.2		15.19	The label is shown in the label exhibit.
7.1.3		15.21	Information to the user is shown in the instruction manual exhibit.
		15.27	No special accessories are required for compliance.
7.1.2		15.203	The antenna for this device is hardwired to the PCB.
	2.5	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.
7.2.4		15.207	Passes by 5.8dB at 0.15MHz
	A2.9(a)	15.249(a)	The fundamental and harmonics meet the limits in 15.249(a)
	A2.9(b)	15.249(d)	Spurious emissions meet the limits in 15.209.
4.6.1			99% emissions bandwidth plot is provided.

Modifications Required for Compliance

Modifications were required for the following tests:

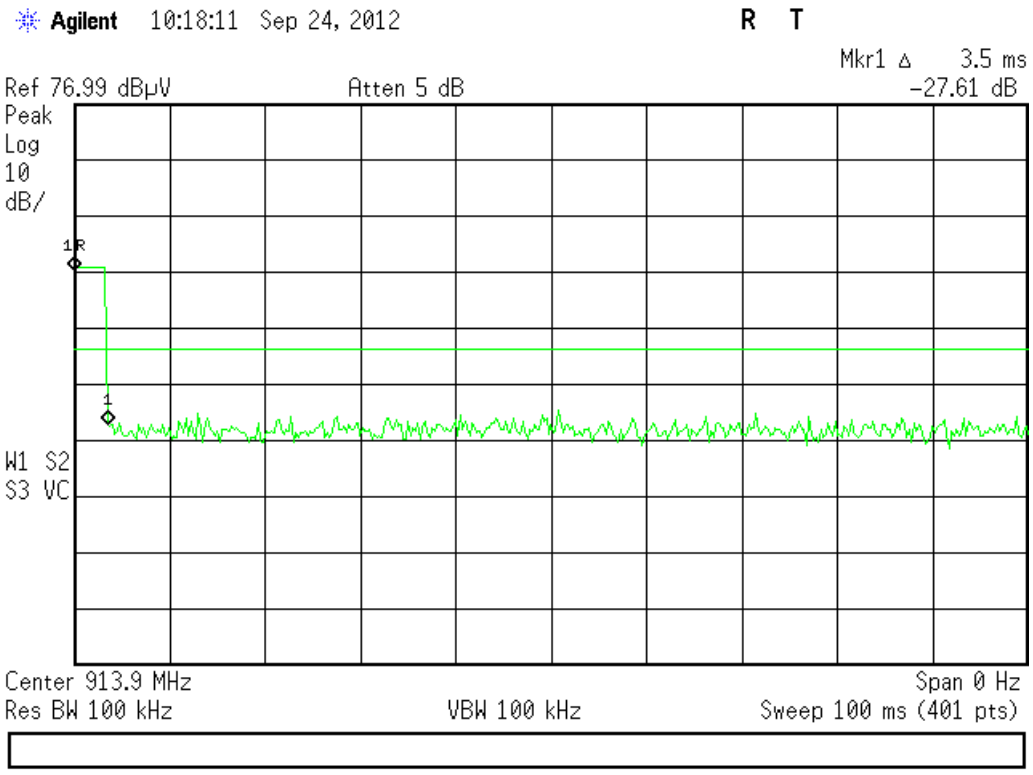
- Radiated Spurious Emissions

The inductor at location L20, was changed from a 5.6nH to a 12nH inductor

Test Results

Duty Cycle Correction Factor (DCCF)

In any 100ms time period, the product could be on for 3.5ms
DCCF = 20 x log (3.5/100)
DCCF = -29.12dB
A duty cycle correction factor of -29.12dB was applied



Fundamental Measurements

LIMITS

The field strength from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental Frequency	Field Strength of Fundamental (millivolts/meter)	Field Strength of Harmonics (microvolts/meter)
902 - 928 MHz	50	500
2400 - 2483.5 MHz	50	500
5725 - 5875 MHz	50	500
24.0 - 24.25 GHz	250	2500

[15.249(a)]

MEASUREMENTS / RESULTS

Radiated Emissions Table

Date: 03-Oct-12 **Company:** Zoom Telephonics Inc. **Work Order:** M2608
Engineer: Ahmed Ahmed **EUT Desc:** ThinClient **EUT Operating Voltage/Frequency:** 120VAC, 50Hz
Temp: 24°C **Humidity:** 35% **Pressure:** 1005mBar
Measurement Distance: 3 m

Notes: Fundamental Readings
SN#0382

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)	15.249 (a) Limit (dBµV/m)	15.249 (a) Margin (dB)	15.249 (a) Result (Pass/Fail)
EUT Laying Flat Antenna Up			---	---	---	---	---	---	---	---	---	---
v	908.6	85.8	22.0	22.1	1.8	87.7	---	---	---	94.0	-6.3	Pass
h	908.6	84.3	22.0	22.1	1.8	86.2	---	---	---	94.0	-7.8	Pass
EUT Vertical Antenna Up			---	---	---	---	---	---	---	---	---	---
v	908.6	88.8	22.0	22.1	1.8	90.7	---	---	---	94.0	-3.3	Pass
h	908.2	92.1	22.0	22.1	1.8	94.0	---	---	---	94.0	0.0	Pass
EUT Vertical Antenna Horizontal			---	---	---	---	---	---	---	---	---	---
v	908.2	88.7	22.0	22.1	1.8	90.6	---	---	---	94.0	-3.4	Pass
h	908.6	86.9	22.0	22.1	1.8	88.8	---	---	---	94.0	-5.2	Pass
EUT Flat Antenna Horizontal			---	---	---	---	---	---	---	---	---	---
v	908.2	85.8	22.0	22.1	1.8	87.7	---	---	---	94.0	-6.3	Pass
h	908.2	90.2	22.0	22.1	1.8	92.1	---	---	---	94.0	-1.9	Pass
EUT Laying Flat Antenna Up			---	---	---	---	---	---	---	---	---	---
v	913.8	86.3	22.0	22.1	1.9	88.3	---	---	---	94.0	-5.7	Pass
h	913.8	88.3	22.0	22.1	1.9	90.3	---	---	---	94.0	-3.7	Pass
EUT Vertical Antenna Up			---	---	---	---	---	---	---	---	---	---
v	914.2	88.1	22.0	22.1	1.9	90.1	---	---	---	94.0	-3.9	Pass
h	913.8	91.1	22.0	22.1	1.9	93.1	---	---	---	94.0	-0.9	Pass
EUT Vertical Antenna Horizontal			---	---	---	---	---	---	---	---	---	---
v	914.2	87.7	22.0	22.1	1.9	89.7	---	---	---	94.0	-4.3	Pass
h	913.8	89.9	22.0	22.1	1.9	91.9	---	---	---	94.0	-2.1	Pass
			---	---	---	---	---	---	---	---	---	---
EUT Flat Antenna Horizontal			---	---	---	---	---	---	---	---	---	---
v	914.2	85.3	22.0	22.1	1.9	87.3	---	---	---	94.0	-6.7	Pass
h	913.8	88.6	22.0	22.1	1.9	90.6	---	---	---	94.0	-3.4	Pass
			---	---	---	---	---	---	---	---	---	---
EUT Laying Flat Antenna Up			---	---	---	---	---	---	---	---	---	---
v	919.8	87.3	22.0	22.1	1.9	89.3	---	---	---	94.0	-4.7	Pass
h	919.8	88.0	22.0	22.1	1.9	90.0	---	---	---	94.0	-4.0	Pass
			---	---	---	---	---	---	---	---	---	---
EUT Vertical Antenna Up			---	---	---	---	---	---	---	---	---	---
v	919.8	89.0	22.0	22.1	1.9	91.0	---	---	---	94.0	-3.0	Pass
h	919.4	91.2	22.0	22.1	1.9	93.2	---	---	---	94.0	-0.8	Pass
			---	---	---	---	---	---	---	---	---	---
EUT Vertical Antenna Horizontal			---	---	---	---	---	---	---	---	---	---
v	919.8	88.3	22.0	22.1	1.9	90.3	---	---	---	94.0	-3.7	Pass
h	919.4	90.3	22.0	22.1	1.9	92.3	---	---	---	94.0	-1.7	Pass
			---	---	---	---	---	---	---	---	---	---
EUT Flat Antenna Horizontal			---	---	---	---	---	---	---	---	---	---
v	919.4	86.2	22.0	22.1	1.9	88.2	---	---	---	94.0	-5.8	Pass
h	919.4	88.4	22.0	22.1	1.9	90.4	---	---	---	94.0	-3.6	Pass

Table Result: Pass by 0.0 dB ***Worst Freq:*** 908.2 MHz

Test Site: EMI Chamber 1 **Cable 1:** Asset #1505 **Cable 2:** Asset #1522
Analyzer: Gold **Preamp:** Blue **Antenna:** Red-White

Rev. 11/5/2012

Spectrum Analyzers / Receivers /Preselectors	Range	MN	Mfr	SN	Asset	Cat	Calibration Due
Gold	100Hz-26.5 GHz	E4407B	Agilent	MY45113816	1284	I	2/3/2013

Radiated Emissions Sites	FCC Code	IC Code	VCCI Code	Cat	Calibration Due
EMI Chamber 1	719150	2762A-6	A-0015	II	2/16/2014

Preamps /Couplers Attenuators / Filters	Range	MN	Mfr	SN	Asset	Cat	Calibration Due
Blue	0.009-2000MHz	ZFL-1000-LN	CS	N/A	759	II	6/5/2013

Antennas	Range	MN	Mfr	SN	Asset	Cat	Calibration Due
Red-White Bilog	30-2000MHz	JB1	Sunol	A091604-1	1105	I	1/28/2013

Meteorological Meters	MN	Mfr	SN	Asset	Cat	Calibration Due
Weather Clock (Pressure Only)	BA928	Oregon Scientific	C3166-1	831	I	3/28/2013
CHAMBER1 Thermohygrometer	35519-044	Control Company	72457642	1345	II	8/19/2013

Cables	Range	Mfr	Cat	Calibration Due
Asset #1505	9kHz - 18GHz	Florida RF	II	2/9/2013
Asset #1522	9kHz - 26.5GHz	Florida RF	II	2/8/2013

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

Spurious Emissions

15.249 (2)(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in § 15.209, whichever is the lesser attenuation.

MEASUREMENTS / RESULTS

Radiated Emissions Table

Date: 23-Aug-12 **Company:** Zoom Telephonics Inc. **Work Order:** M1857
Engineer: Chris Bramley **EUT Desc:** ThinClient **EUT Operating Voltage/Frequency:** 120VAC, 50Hz
Temp: 24.8℃ **Humidity:** 33% **Pressure:** 1013mBar
Frequency Range: 902-928Mhz **Measurement Distance:** 3 m
Notes: Band-Edge Readings **EUT Max Freq:** 919.9MHz

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)	FCC Class B Limit (dBµV/m)	FCC Class B Margin (dB)	FCC Class B Result (Pass/Fail)
Band-Edge			---	---	---	---	---	---	---	---	---	---
v	902.0	24.2	22.0	22.2	8.5	32.9	---	---	---	46.0	-13.1	Pass
h	902.0	24.4	22.0	22.2	8.5	33.1	---	---	---	46.0	-12.9	Pass
Band-Edge			---	---	---	---	---	---	---	---	---	---
v	928.0	24.0	22.0	22.2	8.4	32.6	---	---	---	46.0	-13.4	Pass
h	928.0	24.1	22.0	22.2	8.4	32.7	---	---	---	46.0	-13.3	Pass

Table Result: Pass by -12.9 dB ***Worst Freq:*** 902.0 MHz

Test Site: 1DCC-OATS-3M-I **Cable 1:** EMIR-18
Analyzer: Rental SA#2 **Preamp:** Blue **Antenna:** Red-Black

Rev.8/20/2012

	Range	MN	Mfr	SN	Asset	Cat	Calibration Due
Spectrum Analyzers / Receivers /Preselectors							
Rental SA #2	9kHz-26.5 GHz	E7405A	Agilent	MY45104194	rental	I	1/5/2013
Radiated Emissions Sites	**FCC Code**	**IC Code**	**VCCI Code**			**Cat**	**Calibration Due**
1DCC-OATS-3M-I	719150	2762A-8	A-0015			II	9/7/2012
Preamps /Couplers Attenuators / Filters	**Range**	**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**
Blue	0.009-2000MHz	ZFL-1000-LN	CS	N/A	759	II	6/5/2013
Antennas	**Range**	**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**
Red-Black Bilog	30-2000MHz	JB1	Sunol	A091604-2	1106	I	12/3/2012
Cables	**Range**		**Mfr**			**Cat**	**Calibration Due**
REMI-18	9kHz - 2GHz		C-S			II	1/27/2013
Meteorological Meters		**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**
Weather Clock (Pressure Only)		BA928	Oregon Scientific	C3166-1	831	I	3/28/2013
1DCC-OATS-3M-I Thermohygrometer		35519-044	Control Company	72457635	1334	II	8/19/2013

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

Note: Spurious emissions 30MHz-1000MHz were checked for model 8105 and 8106.

Radiated Emissions Table

Date: 25-Jul-12 **Company:** Zoom Telephonics Inc. **Work Order:** M1857
Engineer: Chris Reynolds **EUT Desc:** ThinClient (Model 8105) **EUT Operating Voltage/Frequency:** 120VAC, 50Hz
Temp: 24.7℃ **Humidity:** 30% **Pressure:** 1003mBar
Frequency Range: 30-1000MHz **Measurement Distance:** 3 m
Notes: Spurious Emissions

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)	FCC Class B Limit (dBµV/m)	FCC Class B Margin (dB)	FCC Class B Result (Pass/Fail)
vbb	38.35	40.6	25.5	15.5	0.4	31.0	---	---	---	40.0	-9.0	Pass
vbb	50.75	49.3	25.5	8.1	0.5	32.4	---	---	---	40.0	-7.6	Pass
vbb	66.4	48.1	25.5	8.0	0.5	31.1	---	---	---	40.0	-8.9	Pass
vbb	148.2	43.1	25.5	12.8	0.7	31.1	---	---	---	43.5	-12.4	Pass
v	492.6	42.7	25.6	17.7	1.3	36.1	---	---	---	46.0	-9.9	Pass
h	544.0	40.3	25.6	18.1	1.5	34.3	---	---	---	46.0	-11.7	Pass
v	596.6	44.1	25.7	18.2	1.5	38.1	---	---	---	46.0	-7.9	Pass

Table Result: Pass by -7.6 dB ***Worst Freq:*** 50.75 MHz

Test Site: EMI Chamber 1 **Cable 1:** Asset #1505 **Cable 2:** Asset #1522 **Cable 3:** ---
Analyzer: Asset #1327 **Preamp:** Orange **Antenna:** Red-White **Preselector:** ---

Radiated Emissions Table

Date: 03-Oct-12 **Company:** Zoom Telephonics Inc. **Work Order:** M2608
Engineer: Ahmed Ahmed **EUT Desc:** ThinClient (Model 8106) **EUT Operating Voltage/Frequency:** 120VAC, 50Hz
Temp: 24℃ **Humidity:** 35% **Pressure:** 1005mBar
Frequency Range: 30-1000MHz **Measurement Distance:** 3 m
Notes: Spurious Emissions SN#0382 **EUT Max Freq:**

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)	FCC Class B Limit (dBµV/m)	FCC Class B Margin (dB)	FCC Class B Result (Pass/Fail)
Vbb	39.1	44.1	22.5	14.8	0.4	36.8	---	---	---	40.0	-3.2	Pass
Vbb	44.5	46.5	22.5	11.2	0.4	35.6	---	---	---	40.0	-4.4	Pass
Vbb	68.435	45.0	22.5	8.1	0.5	31.1	---	---	---	40.0	-8.9	Pass
Vbb	71.76	46.4	22.5	8.2	0.5	32.6	---	---	---	40.0	-7.4	Pass
V	169.0	47.0	22.6	12.0	0.8	37.2	---	---	---	43.5	-6.3	Pass
V	492.23	39.0	22.4	17.7	1.3	35.6	---	---	---	46.0	-10.4	Pass
V	544.6	39.0	22.2	18.1	1.5	36.4	---	---	---	46.0	-9.6	Pass
H	596.23	35.0	22.2	18.2	1.5	32.5	---	---	---	46.0	-13.5	Pass
V	596.6	40.0	22.2	18.2	1.5	37.5	---	---	---	46.0	-8.5	Pass

Table Result: Pass by -3.2 dB ***Worst Freq:*** 39.1 MHz

Test Site: EMI Chamber 1 **Cable 1:** Asset #1505 **Cable 2:** Asset #1522
Analyzer: Gold **Preamp:** Blue **Antenna:** Red-White

Rev.7/25/2012

Spectrum Analyzers / Receivers /Preselectors	Range	MN	Mfr	SN	Asset	Cat	Calibration Due
SA EMI Chamber (1327)	9kHz-13.2 GHz	E4405B	Agilent	MY45103416	1327	I	5/30/2013
Radiated Emissions Sites	**FCC Code**	**IC Code**	**VCCI Code**			**Cat**	**Calibration Due**
EMI Chamber 1	719150	2762A-6	A-0015			II	2/16/2014
Preamps /Couplers Attenuators / Filters	**Range**	**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**
Orange	0.009-2000MHz	ZFL-1000-LN	CS	N/A	765	II	12/10/2012
Antennas	**Range**	**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**
Red-White Bilog	30-2000MHz	JB1	Sunol	A091604-1	1105	I	1/28/2013
Cables	**Range**		**Mfr**			**Cat**	**Calibration Due**
Asset #1505	9kHz - 18GHz		Florida RF			II	8/19/2012
Asset #1522	9kHz - 26.5GHz		Florida RF			II	9/21/2012
Meteorological Meters		**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**
Weather Clock (Pressure Only)		BA928	Oregon Scientific	C3166-1	831	I	3/28/2013
CHAMBER1 Thermohygrometer		35519-044	Control Company	72457642	1345	II	8/19/2013

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

Radiated Emissions Table

Date: 23-Aug-12 **Company:** Zoom Telephonics Inc. **Work Order:** M1857
Engineer: Chris Bramley **EUT Desc:** ThinClient **EUT Operating Voltage/Frequency:** 120VAC, 50Hz
Temp: 24.8°C **Humidity:** 33% **Pressure:** 1013mBar
Frequency Range: 1 -5GHz **Measurement Distance:** 3 m
Notes: Duty cycle 10ms (max DC in 100ms window 10ms per client) **EUT Max Freq:** 919.9MHz
Duty cycle factor = 29.1dB Testing on Channel 1

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 Class B High Frequency - Peak Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)	FCC Class B High Frequency - Average Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)
h	2724.0	59.61	30.5	21.9	28.9	2.2	68.8	39.7	74.0	-5.2	Pass	54.0	-14.3	Pass
v	2725.0	60.3	31.2	21.9	28.9	2.2	69.5	40.4	74.0	-4.5	Pass	54.0	-13.6	Pass
h	3633.0	53.43	24.3	21.2	31.8	2.7	66.7	37.6	74.0	-7.3	Pass	54.0	-16.4	Pass
v	3633.0	54.72	25.6	21.2	31.8	2.7	68.0	38.9	74.0	-6.0	Pass	54.0	-15.1	Pass
h	4541.0	44.79	15.7	20.1	32.5	3.3	60.5	31.4	74.0	-13.5	Pass	54.0	-22.6	Pass
v	4541.0	47.61	18.5	20.1	32.5	3.3	63.3	34.2	74.0	-10.7	Pass	54.0	-19.8	Pass
h	5449.0	42.12	13.0	20.6	34.2	3.5	59.2	30.1	74.0	-14.8	Pass	54.0	-23.9	Pass
v	5452.0	42.15	13.1	20.6	34.2	3.5	59.3	30.2	74.0	-14.7	Pass	54.0	-23.9	Pass

Table Result: Pass by -4.5 dB ***Worst Freq:*** 2725.0 MHz

Test Site: 1DCC-OATS-3M-I **Cable 1:** EMIR-HIGH-13
Analyzer: Rental SA#2 **Preamp:** Asset #1517 **Antenna:** Orange Horn

Rev.8/20/2012

Spectrum Analyzers / Receivers /Preselectors	**Range**	**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**
Rental SA #2	9kHz-26.5 GHz	E7405A	Agilent	MY45104194	rental	I	1/5/2013
Radiated Emissions Sites	**FCC Code**	**IC Code**	**VCCI Code**			**Cat**	**Calibration Due**
1DCC-OATS-3M-I	719150	2762A-8	A-0015			II	9/7/2012
Preamps /Couplers Attenuators / Filters	**Range**	**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**
1517 HF Preamp	1-20GHz	CS	CS	N/A	1517	II	4/17/2013
Antennas	**Range**	**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**
Orange Horn	1-18GHz	3115	EMCO	0004-6123	390	I	7/27/2013
Cables	**Range**		**Mfr**			**Cat**	**Calibration Due**
REMI-High-13	9kHz - 26.5GHz		C-S			II	1/31/2013
Meteorological Meters		**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**
Weather Clock (Pressure Only)		BA928	Oregon Scientific	C3166-1	831	I	3/28/2013
1DCC-OATS-3M-I Thermohygrometer		35519-044	Control Company	72457635	1334	II	8/19/2013

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

Radiated Emissions Table

Date: 24-Sep-12 **Company:** Zoom Telephonics **Work Order:** M1857
Engineer: Chris Reynolds **EUT Desc:** Thin Sensor 2 **EUT Operating Voltage/Frequency:** 120VAC, 60Hz
Temp: 24.8°C **Humidity:** 32% **Pressure:** 1011mBar
Frequency Range: 5-10GHz **Measurement Distance:** 1 m
Notes:

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 Class B High Frequency - Peak Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)	FCC Class B High Frequency - Average Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)
v	6357.5	50.27	21.2	20.5	35.6	5.9	71.3	42.2	83.5	-12.2	Pass	63.5	-21.3	Pass
h	6357.75	55.15	26.0	20.5	35.6	5.9	76.2	47.0	83.5	-7.3	Pass	63.5	-16.5	Pass
v	7265.8	46.07	17.0	20.3	37.6	6.5	69.9	40.8	83.5	-13.6	Pass	63.5	-22.7	Pass
h	7270.0	48.12	19.0	20.3	37.6	6.4	71.8	42.7	83.5	-11.7	Pass	63.5	-20.8	Pass
h	8176.5	44.66	15.5	20.3	38.5	7.0	69.9	40.7	83.5	-13.6	Pass	63.5	-22.8	Pass
v	8177.35	45.29	16.2	20.3	38.5	7.0	70.5	41.4	83.5	-13.0	Pass	63.5	-22.1	Pass
h	9085.0	41.33	12.2	20.0	38.8	7.4	67.5	38.4	83.5	-16.0	Pass	63.5	-25.1	Pass
v	9085.75	44.13	15.0	20.0	38.8	7.4	70.3	41.2	83.5	-13.2	Pass	63.5	-22.3	Pass

Table Result: Pass by -7.3 dB ***Worst Freq:*** 6357.75 MHz

Test Site: EMI Chamber 2 **Cable 1:** EMIR-HIGH-22 **Cable 2:** --- **Cable 3:** ---
Analyzer: Gold **Preamp:** Asset #1517 **Antenna:** Yellow Horn **Filter:** 1311

Rev. 11/5/2012

Cables	Range		Mfr			Cat	Calibration Due
REMI-High-22	9kHz - 15GHz		C-S			II	1/31/2013
Spectrum Analyzers / Receivers /Preselectors	**Range**	**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**
Gold	100Hz-26.5 GHz	E4407B	Agilent	MY45113816	1284	I	2/3/2013
Radiated Emissions Sites	**FCC Code**	**IC Code**	**VCCI Code**			**Cat**	**Calibration Due**
EMI Chamber 2	719150	2762A-7	A-0015			II	2/15/2014
Preamps /Couplers Attenuators / Filters	**Range**	**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**
1517 HF Preamp	1-20GHz	CS	CS	N/A	1517	II	4/17/2013
High Pass Filter	0.03-14.5 GHz	11SH10-3000/T9000-0/0	K&L	1	1311	II	1/2/2013
Antennas	**Range**	**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**
Yellow Horn	1-18GHz	3115	EMCO	9608-4898	37	I	6/17/2013
Meteorological Meters		**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**
Weather Clock (Pressure Only)		BA928	Oregon Scientific	C3166-1	831	I	3/28/2013
CHAMBER2 Thermohygrometer		35519-044	Control Company	72457639	1347	II	8/19/2013

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

Rev. 9/24/2012

Spectrum Analyzers / Receivers /Preselectors	**Range**	**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**
Gold	100Hz-26.5 GHz	E4407B	Agilent	MY45113816	1284	I	2/3/2013
Radiated Emissions Sites	**FCC Code**	**IC Code**	**VCCI Code**			**Cat**	**Calibration Due**
EMI Chamber 2	719150	2762A-7	A-0015			II	2/15/2014
Preamps /Couplers Attenuators / Filters	**Range**	**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**
1517 HF Preamp	1-20GHz	CS	CS	N/A	1517	II	4/17/2013
High Pass Filter	0.03-14.5 GHz	11SH10-3000/T9000-0/0	K&L	1	1311	II	1/2/2013
Antennas	**Range**	**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**
Yellow Horn	1-18GHz	3115	EMCO	9608-4898	37	I	6/17/2013
Cables	**Range**		**Mfr**			**Cat**	**Calibration Due**
REMI-High-22	9kHz - 15GHz		C-S			II	1/31/2013
Meteorological Meters		**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**
Weather Clock (Pressure Only)		BA928	Oregon Scientific	C3166-1	831	I	3/28/2013
CHAMBER2 Thermohygrometer		35519-044	Control Company	72457639	1347	II	8/19/2013

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

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 Side of a DC Supply Conducted Emissions

Date: 04-Sep-12 **Company:** Zoom Technologies **Work Order:** M1857
Engineer: Chris Reynolds **EUT Desc:** ThinClient
Temp: 24.7 ºC **Humidity:** 36% **Pressure:** 1010 mBar
Notes:
Frequency Range: 0.15-30MHz **EUT Input Voltage/Frequency:** 120VAC, 60Hz

	Quasi-Peak Readings		Average Readings		LISN Factors				FCC/CISPR Class B			FCC/CISPR Class B		
Frequency (MHz)	QP1 (dBuV)	QP2 (dBuV)	AVG1 (dBuV)	AVG2 (dBuV)	L1 (dB)	L2 (dB)	Cable Factor (dB)	ATTN Factor (dB)	QP Limit (dB)	Margin (dB)	Result (Pass/Fail)	AVG Limit (dB)	Margin (dB)	Result (Pass/Fail)
0.15	20.7	20.3	3.4	3.9	-0.3	0.1	-0.1	-20.8	66.0	-24.2	Pass	56.0	-31.3	Pass
5.00	5.2	5.1	0.6	0.9	0.0	0.0	-0.1	-20.8	60.0	-33.9	Pass	50.0	-28.3	Pass
10.00	3.6	3.4	-1.1	-1.1	0.0	0.1	-0.2	-20.8	60.0	-35.4	Pass	50.0	-30.1	Pass
15.00	3.1	2.9	-1.4	-1.8	-0.1	0.1	-0.2	-20.8	60.0	-35.8	Pass	50.0	-30.3	Pass
19.53	6.7	3.9	1.2	-0.4	-0.1	0.1	-0.2	-20.8	60.0	-32.2	Pass	50.0	-27.6	Pass
20.00	6.0	4.0	0.7	-0.4	-0.1	0.1	-0.3	-20.8	60.0	-32.9	Pass	50.0	-28.2	Pass
25.00	4.3	3.4	0.0	-0.9	-0.2	0.0	-0.3	-20.8	60.0	-34.5	Pass	50.0	-28.8	Pass

Result: Pass ***Worst Margin:*** -24.2 dB ***Frequency:*** 0.15 MHz

Measurement Device: LISN ASSET 1726(Line 1) LISN ASSET 1730(Line 2) **Cable:** CEMI-03 **Spectrum Analyzer:** Rental SA #2
Attenuator: 20dB Atten-4 **Site:** CEMI 5

Rev.9/2/2012

Spectrum Analyzers / Receivers /Preselectors	Range	MN	Mfr	SN	Asset	Cat	Calibration Due
Rental SA #2	9kHz-26.5 GHz	E7405A	Agilent	MY45104194	rental	I	1/5/2013
LISNs/Measurement Probes	**Range**	**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**
LISN Asset 1726	150kHz-30MHz	LI-150A	Com-Power	201092	1726	I	12/30/2012
LISN Asset 1730	150kHz-30MHz	LI-150A	Com-Power	201090	1730	I	12/30/2012
Conducted Test Sites (Mains / Telco)	**FCC Code**		**VCCI Code**			**Cat**	**Calibration Due**
CEMI 5	719150		A-0015			III	NA
Cables	**Range**		**Mfr**			**Cat**	**Calibration Due**
CEMI-03	9kHz - 2GHz		C-S			II	9/16/2012
Attenuators	**Range**	**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**
20dB Atten-4	9kHz-2GHz			N/A		II	12/6/2013
Meteorological Meters		**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**
Weather Clock (Pressure Only)		BA928	Oregon Scientific	C3166-1	831	I	3/28/2013
CEMI5 Thermohygrometer		35519-044	Control Company	72457633	1341	II	8/19/2013

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

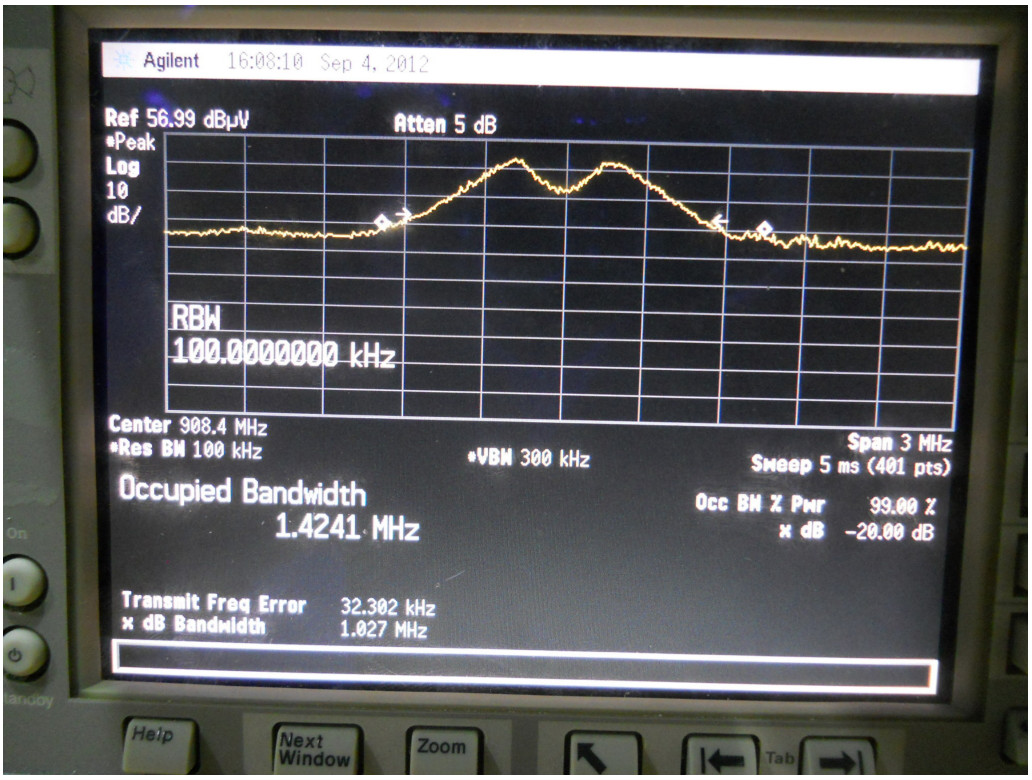
Occupied Bandwidth

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 4.6.1]

Engineer:	Chris Reynolds
Date:	9/24/12

24.8℃, 32%, 1011mBar



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.

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