Test Report

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

Report No	EM2102-3
Client	Balluff, Inc. Martin Franke
Address	8125 Holton Drive Florence, KY 41042
Phone	(859) 727 - 2200
Items tested	BIS M-300-001-S115
Standards	47 CFR FCC Part 15.225, 47 CFR FCC Part 15.209, 47 CFR FCC Part 15.207, RSS GEN Issue 4, RSS 210 Issue 8
Test Dates	May 13, June 7, July 12 and September 19, 2013
Results	As detailed within this report
Prepared by	Tuyen Truong – Test Engineer
Authorized by	Arik Zwirner – EMC Senior Engineer
Issue Date	4/14/16
Conditions of Issue	This Test Report is issued subject to the conditions stated in the '*Conditions of Testing*' section on page 20 of this report.

Contents

Form CPS Final Report REV 28-MAR-12 (KK)

Regulatory Information

FRN number	0006334478
FCC ID	HLH-BISM3XX
IC	12121A-BISM3XX1

Release Control Record

Issue No.	Reason for change	Date Issued
1	Original Release	May 20, 2014

Summary

On May 13, June 7, July 12 and September 19, 2013we tested the BIS M-300-001-S115 for compliance with the following requirements:

EMC Emissions:

- CFR 47 FCC Part 15.207 – Conducted limits
- CFR 47 FCC Part 15.209 - Radiated emission limits; general requirements
- CFR 47 FCC Part 15.225 - Radiated emission limits; general requirements
- RSS GEN - General Requirements and Information for the Certification of Radio Apparatus – Issue 4
- RSS 210 – License - exempt Radio Apparatus (All Frequency Bands): Category I Equipment -Issue 8

Test methods are compliant with ANSI C63.10-2009 and ANSI C63.10-2013.

Testing was performed according to procedures outlined in ANCI c63.4.

Product is an RFID system which operates at 13.56MHz. EUT emissions were maximized by rotating product around its axis and around 3 orthogonal axes. EUT antenna could not be maximized separately.

AC Mains conducted emissions was performed on AC side of AC/DC power supply (support equipment) power supply.

Release Control Record

Issue No.	Reason for change	Date Issued
1	Original Release	May 20, 2014

Product Tested - Configuration Documentation

EUT Configuration

Work Order: M2102
Company: Balluff, Inc.
Company Address: 8125 Holton Drive
Florence, KY 41042
Contact: Jim Ramler
Person Present: Claus Hoehn

	MN	SN
EUT:	BIS M-300-001-S115	Sample 1

EUT Description: Non-Contact Read/Write System
EUT Max Frequency: <108MHz
EUT TX Frequency: 13.56MHz

Support Equipment:	MN	SN
24Vdc Power Supply	E3612A	KP61304227
Balluff Com/Power Interface	BISM-6022-019-050-03-ST14	--
Tag	BIS C-150-32/A	--

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/COM	8-pin Power /COM	1	1	8 -wires	Yes	No	2m	na	Indoor	

Software / Operating Mode Description:

Powered on at 24VDC and constantly transmitting at 13.56MHz

Compliance Statement

RSS GEN	RSS 210	FCC §15.225		Compliant (Yes) / (No) / (NA)
	A2.6(a)	15.225(a)	The field strength of any emissions within the band 13.553-13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters.	Yes
	A2.6(b)	15.225(b)	Within the bands 13.410-13.553 MHz and 13.567-13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.	Yes
	A2.6(c)	15.225(c)	Within the bands 13.110-13.410 MHz and 13.710-14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.	Yes
	A2.6(d)	15.225(d)	The field strength of any emissions appearing outside of the 13.110-14.010 MHz band shall not exceed the general radiated emission limits in § 15.209.	Yes
		15.225(e)	The frequency tolerance of the carrier signal shall be maintained within ±0.01% of the operating frequency over a temperature variation of −20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.	Yes
8.7	A2.6	15.225(f)	In the case of radio frequency powered tags designed to operate with a device authorized under this section, the tag may be approved with the device or be considered as a separate device subject to its own authorization. Powered tags approved with a device under a single application shall be labeled with the same identification number as the device.	[1]NA
6.3		15.15(b)	There are no controls accessible to the user that varies the output power above specified limits.	Yes
		15.19	The label is shown in the label exhibit.	Yes
8.4		15.21	Information to the user is shown in the instruction manual.	Yes

		15.27	No special accessories are required for compliance.	Yes
		15.31	The EUT was tested in accordance with the measurement standards in this section.	Yes
		15.33	Frequency range was investigated according to this section, unless noted in specific rule section under which the equipment operates.	Yes
		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.	Yes
8.3		15.203	EUT employs an integral antenna.	Yes
	2.6	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.	Yes
8.8		15.207	EUT meets the AC Line conducted emissions requirements of	yes
6.6			Occupied Bandwidth measurements were made	yes

Test Results

AC Mains Conducted Emissions

Test Method

Per ANSI c63.4 (2009)

Test Data

AC Conducted Emissions Data Table

Date: 19-Sep-13 **Company:** Balluff, Inc. **Work Order:** M2102
Engineer: Doug Cormier **EUT Desc:** BIS M-300-001-S115
Temp: 20.4 ºC **Humidity:** 46% **Pressure:** 1012 mBar
Notes: Added Shield Ground
Frequency Range: .15-30MHz **EUT Input Voltage/Frequency:** 24Vdc

Frequency (MHz)	Quasi-Peak Readings QP1 (dBµV)	QP2 (dBµV)	Average Readings AVG1 (dBµV)	AVG2 (dBµV)	LISN Factors L1 (dB)	L2 (dB)	Cable Factor (dB)	ATTN Factor (dB)	FCC 15.207 QP Limit (dBµV)	Margin (dB)	Result (Pass/Fail)	FCC 15.207 AVG Limit (dBµV)	Margin (dB)	Result (Pass/Fail)
0.21	9.7	6.1	3.2	7.8	0.0	0.0	-0.2	-20.2	63.0	-32.9	Pass	53.0	-24.8	Pass
1.22	8.3	5.1	1.9	6.6	0.0	0.0	-0.2	-20.2	56.0	-27.3	Pass	46.0	-19.0	Pass
3.20	6.6	3.8	0.9	6.3	0.0	0.0	-0.2	-20.2	56.0	-29.0	Pass	46.0	-19.2	Pass
10.44	2.5	1.8	-1.5	-1.1	-0.1	-0.1	-0.3	-20.2	60.0	-37.0	Pass	50.0	-30.5	Pass
13.56	8.4	15.8	6.1	14.9	-0.1	-0.1	-0.3	-20.2	60.0	-23.6	Pass	50.0	-14.5	Pass
27.10	6.6	8.2	3.6	5.9	-0.1	-0.1	-0.3	-20.2	60.0	-31.1	Pass	50.0	-23.4	Pass

Result: Pass ***Worst Margin:*** -14.5 dB ***Frequency:*** 13.560 MHz

Measurement Device: LISN ASSET 1729(Line 1) LISN ASSET 1730(Line 2) **Cable:** CEMI-02 **Spectrum Analyzer:** Blue
Attenuator: 20dB ATTEN-03 **Site:** CEMI 3

C-S CEMI Calculator Version 3.0.12 *Equipment Factor Sheet rev: 9/11/2013*

Rev.9/10/2013

Spectrum Analyzers / Receivers /Preselectors	Range	MN	Mfr	SN	Asset	Cat	Calibration Due
Blue	0.009-2000MHz	ZFL-1000-LN	CS	N/A	759	II	5/31/2014

LISNs/Measurement Probes	Range	MN	Mfr	SN	Asset	Cat	Calibration Due
LISN Asset 1729	150kHz-30MHz	LI-150A	Com-Power	201085	1729	I	1/28/2014
LISN Asset 1730	150kHz-30MHz	LI-150A	Com-Power	201090	1730	I	2/14/2014

Conducted Test Sites (Mains / Telco)	FCC Code	VCCI Code	Cat	Calibration Due
CEMI-03	9kHz - 2GHz	C-S	II	10/13/2013

Cables	Range	Mfr	Cat	Calibration Due
CEMI-02	9kHz - 2GHz	C-S	II	3/26/2014

Attenuators	Range	MN	Mfr	SN	Asset	Cat	Calibration Due
20dB ATTEN-03	9kHz-2GHz			N/A		II	12/3/2013

Meteorological Meters	MN	Mfr	SN	Asset	Cat	Calibration Due
Temp./Humidity/Atm. Pressure Gauge	7400 Perception II	Davis	N/A	965	I	5/29/2014

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

AC Mains Setup Pictures

See exhibit for test setup pictures.

Spurious Radiated Emissions

Test Method

Per ANSI c63.4 (2009)

Test Data

Radiated Emissions Table

Date: 10-May-13 **Company:** Balluff, Inc. **Work Order:** M2102
Engineer: Doug Cormier **EUT Desc:** BIS M-300-001-S115 **EUT Operating Voltage/Frequency:** 24VDC
Temp: 23.3°C **Humidity:** 25% **Pressure:** 1016mBar

Frequency Range: 13.56 MHz **Measurement Distance:** 3 m

Notes: Powered on at 24VDC and constantly transmitting at 13.56MHz. **EUT Max Freq:** 13.56MHz

Antenna Polarization (0° - 90°)	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 15.225 Limit (dBµV/m)	FCC 15.225 Margin (dB)	FCC 15.225 Result (Pass/Fail)
			---	---	---	---	---	---	---	---	---	---
0	13.56	37.3	25.6	39.0	0.3	51.0	---	---	---	123.9	-72.9	Pass
90	13.56	36.9	25.6	39.0	0.3	50.6	---	---	---	123.9	-73.3	Pass
			---	---	---	---	---	---	---	---	---	---
UUT vert			---	---	---	---	---	---	---	---	---	---
90	13.56	31.4	25.5	39.0	0.5	45.4	---	---	---	123.9	-78.8	Pass
0	13.56	28.8	25.5	39.0	0.5	42.8	---	---	---	123.9	-81.4	Pass

Table Result: Pass by -72.9 dB ***Worst Freq:*** 13.56 MHz

Test Site: EMI Chamber 1 **Cable 1:** Asset #1785 **Cable 2:** Asset #1781 **Cable 3:** ---
Analyzer: Rental SA#2 **Preamp:** Red **Antenna:** Sm Loop (high) **Preselector:** ---

Rev. 5/4/2013

Spectrum Analyzers / Receivers /Preselectors	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
Rental SA #1 (Brown)	9kHz-26.5GHz	E4407B	Agilent	SG44210511	1510	I	4/15/2014	4/15/2013
Radiated Emissions Sites	**FCC Code**	**IC Code**	**VCCI Code**	**Range**		**Cat**	**Calibration Due**	**Calibrated on**
EMI Chamber 1	719150	2762A-6	A-0015			II	2/16/2014	2/16/2012
Preamps /Couplers Attenuators / Filters	**Range**	**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**	**Calibrated on**
Red	0.009-2000MHz	ZFL-1000-LN	CS	N/A	798	II	2/2/2014	2/2/2013
Antennas	**Range**	**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**	**Calibrated on**
Small Loop	10kHz-30MHz	PLA-130/A	ARA	1024	755	I	4/27/2014	4/27/2012
Meteorological Meters		**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**	**Calibrated on**
Temp./Humidity/Atm. Pressure Gauge		7400 Perception II	Davis	N/A	965	I	4/4/2013	4/4/2011
CHAMBER1 Thermohygrometer		35519-044	Control Company	72457642	1345	II	8/19/2013	8/19/2011
Cables	**Range**		**Mfr**			**Cat**	**Calibration Due**	**Calibrated on**
Asset #1785	9kHz - 18GHz		Florida RF			II	3/14/2014	3/14/2013

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

Radiated Emissions Table

Date: 10-May-13 **Company:** Balluff, Inc. **Work Order:** M2102
Engineer: Doug Cormier **EUT Desc:** BIS M-300-001-S115 **EUT Operating Voltage/Frequency:** 24VDC
Temp: 23.3°C **Humidity:** 26% **Pressure:** 1016mBar
Frequency Range: 30-1000MHz **Measurement Distance:** 3 m
Notes: Powered on at 24VDC and constantly transmitting at 13.56MHz. **EUT Max Freq:** 13.56MHz

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 15.209 Limit (dBµV/m)	FCC 15.209 Margin (dB)	FCC 15.209 Result (Pass/Fail)
v	40.66	40.1	25.5	13.2	1.7	29.5	---	---	---	40.0	-10.5	Pass
v	43.67	43.9	25.5	11.2	1.6	31.2	---	---	---	40.0	-8.8	Pass
v	96.0	38.8	25.1	9.0	2.0	24.7	---	---	---	43.5	-18.8	Pass
v	192.0	48.3	25.1	11.0	2.9	37.1	---	---	---	43.5	-6.4	Pass
v	192.0	47.8	25.1	11.0	2.9	36.6	---	---	---	43.5	-6.9	Pass
v	240.0	51.0	25.1	11.6	3.3	40.8	---	---	---	46.0	-5.2	Pass
v	311.8	42.2	25.1	13.6	3.6	34.3	---	---	---	46.0	-11.7	Pass
v	474.6	32.6	25.5	17.5	4.2	28.8	---	---	---	46.0	-17.2	Pass
v	527.96	39.5	25.5	17.8	3.6	35.4	---	---	---	46.0	-10.6	Pass
v	813.6	35.2	25.2	21.4	4.5	35.9	---	---	---	46.0	-10.1	Pass
h	240.0	54.8	25.1	11.6	3.3	44.6	---	---	---	46.0	-1.4	Pass
h	325.4	45.7	25.1	13.9	3.6	38.1	---	---	---	46.0	-7.9	Pass
h	339.0	47.0	25.1	13.9	3.5	39.3	---	---	---	46.0	-6.7	Pass
h	393.2	42.0	25.3	15.1	3.7	35.5	---	---	---	46.0	-10.5	Pass
h	528.0	42.2	25.5	17.8	3.6	38.1	---	---	---	46.0	-7.9	Pass
h	813.6	39.3	25.2	21.4	4.5	40.0	---	---	---	46.0	-6.0	Pass
h	786.5	37.4	24.8	21.2	4.7	38.5	---	---	---	46.0	-7.5	Pass
h	867.8	36.0	25.3	21.8	4.6	37.1	---	---	---	46.0	-8.9	Pass

Table Result: Pass by -1.4 dB ***Worst Freq:*** 240.0 MHz

Test Site: EMI Chamber 1 **Cable 1:** Asset #1781 **Cable 2:** Asset #1785 **Cable 3:** Asset #1522
Analyzer: Rental SA#2 **Preamp:** Red **Antenna:** Red-Black **Preselector:** Asset #1511

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Spectrum Analyzers / Receivers /Preselectors	Range	MN	Mfr	SN	Asset	Cat	Calibration Due
Rental SA #2	9kHz-26.5 GHz	E7405A	Agilent	MY45104194	rental	I	12/8/2013
EMI Chamber Preselector	9kHz-1.8GHz	EM-2701	Electro-Metrics	539	1511	II	8/4/2013

Radiated Emissions Sites	FCC Code	IC Code	VCCI Code	Range		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
Red	0.009-2000MHz	ZFL-1000-LN	CS	N/A	798	II	2/2/2014

Antennas	Range	MN	Mfr	SN	Asset	Cat	Calibration Due
Red-Black Bilog	30-2000MHz	JB1	Sunol	A091604-2	1106	I	1/28/2015

Cables	Range	Mfr			Cat	Calibration Due
Asset #1781	9kHz - 18GHz	Florida RF			II	3/6/2014
Asset #1785	9kHz - 18GHz	Florida RF			II	3/14/2014
Asset #1522	9kHz - 18GHz	Florida RF			II	2/2/2014

Meteorological Meters		MN	Mfr	SN	Asset	Cat	Calibration Due
Weather Clock (Pressure Only)		BA928	Oregon Scientific	C3166-1	831	I	3/20/2014
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.

Spurious Radiated Emissions Setup Pictures

See exhibit for test setup pictures.

Frequency Stability

Test Method

Per ANSI c63.4 (2009)

Test Data

15.225(e): Frequency tolerance

Work Order: M2102
Date(s): 6/7/2013
Engineer(s): Chris Reynolds

EUT: BIS M-300-001-S115
Company: Balluff, Inc.

Testing Location: Littleton Distribution Center, One Distribution Center Circle, #1 - Littleton, MA 01460

Test Equipment Used:

Spectrum Analyzers / Receivers /Preselectors	**Range**	**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**
Gold	100Hz-26.5 GHz	E4407B	Agilent	MY45113816	1284	I	3/18/2014
Antennas	**Range**	**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**
Small Loop	10kHz-30MHz	PLA-130/A	ARA	1024	755	I	4/27/2014
RMS Voltmeters/Current Clamp		**MN**	**Mnfr**	**SN**	**Asset**	**Cat**	**Calibration Due**
D+I Verification DMM		115	Fluke	94470393	1295	I	5/23/2014
Cables	**Range**		**Mfr**			**Cat**	**Calibration Due**
REMI-05	9kHz - 2GHz		C-S			II	10/15/2013
Preamps /Couplers Attenuators / Filters	**Range**	**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**
Blue	0.009-2000MHz	ZFL-1000-LN	CS	N/A	759	II	7/5/2013
Meteorological Meters		**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**
Temp./Humidity/Atm. Pressure Gauge		7400 Perception II	Davis	N/A	965	I	5/29/2014
CEMI2 Thermohygrometer		35519-044	Control Company	72436083	1336	II	8/19/2013
Chambers and Stripline		**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**
Environmental (Safety)		SGTH-31S	B-M-A Inc.	2245	321	I	11/19/2013

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

Atmospheric Conditions:

Temp: 20.1°C **Humidity:** 22% **Pressure:** 1010mbar

Results:

Temperature (°C)	Voltage (Vdc)	Carrier signal tolerance (kHz)	Δ (kHz)	Result
-20	120	±1.356	0.125	Pass
50	120	±1.356	0.025	Pass
20	102	±1.356	0.075	Pass
20	138	±1.356	0.125	Pass

Frequency Stability Setup Pictures

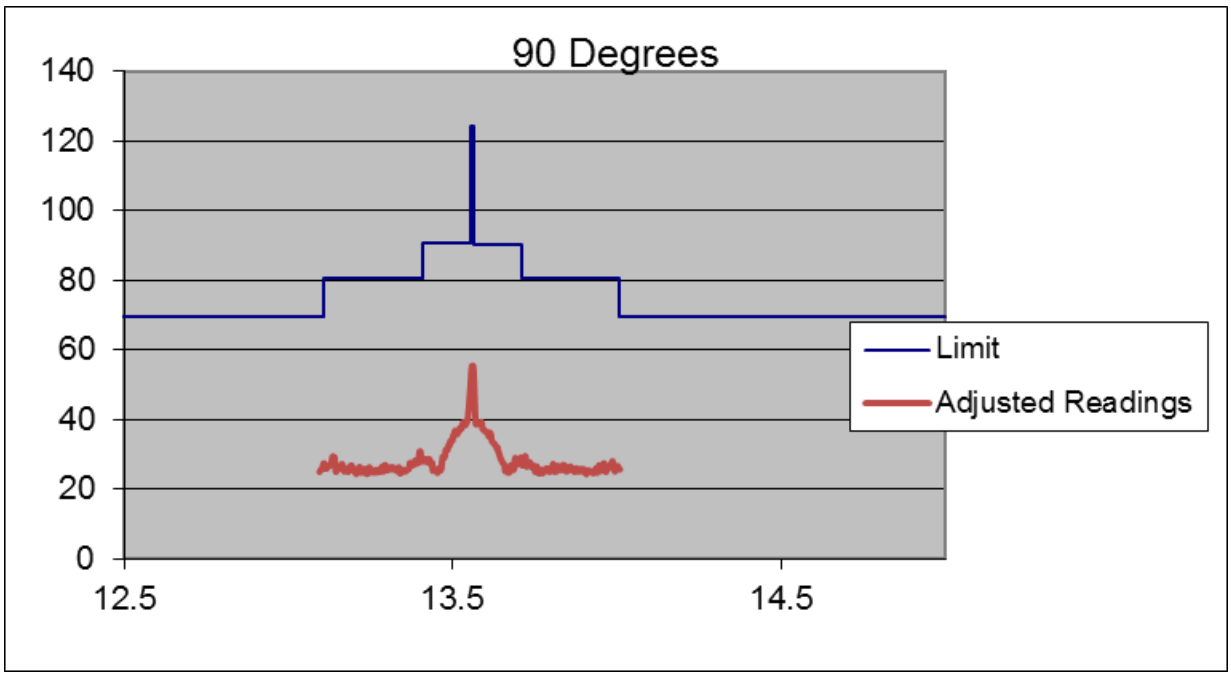
See exhibit for test setup pictures.

Spectrum Mask

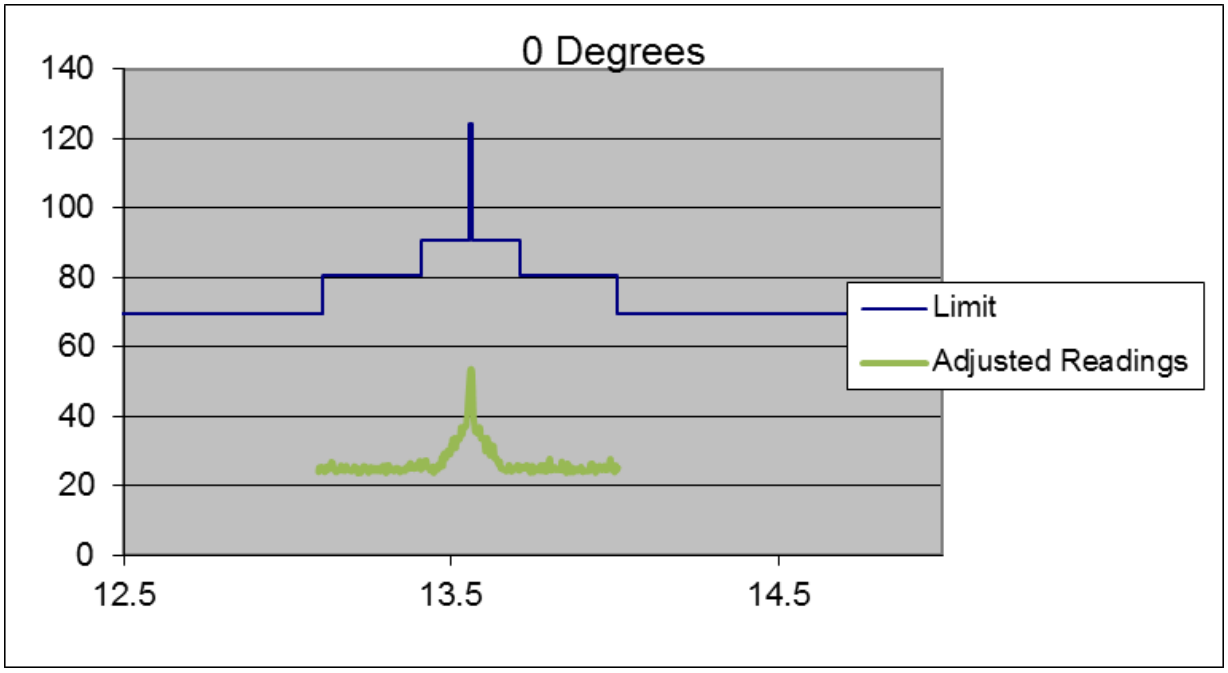
Test Method

Per ANSI c63.4 (2009)

Plots



EUT vertical, loop antenna at 90 degrees.



EUT horizontal, loop antenna at 0 degrees.

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Spectrum Analyzers / Receivers /Preselectors	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
Rental SA #2	9kHz-26.5 GHz	E7405A	Agilent	MY45104194	rental	I	12/8/2013	
EMI Chamber Preselector	9kHz-1.8GHz	EM-2701	Electro-Metrics	539	1511	II	8/4/2013	8/4/2012
Radiated Emissions Sites	**FCC Code**	**IC Code**	**VCCI Code**	**Range**		**Cat**	**Calibration Due**	**Calibrated on**
EMI Chamber 1	719150	2762A-6	A-0015			II	2/16/2014	2/16/2012
Preamps /Couplers Attenuators / Filters	**Range**	**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**	**Calibrated on**
Red	0.009-2000MHz	ZFL-1000-LN	CS	N/A	798	II	2/2/2014	2/2/2013
Antennas	**Range**	**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**	**Calibrated on**
Small Loop	10kHz-30MHz	PLA-130/A	ARA	1024	755	I	4/27/2014	4/27/2012
Cables	**Range**		**Mfr**			**Cat**	**Calibration Due**	**Calibrated on**
Asset #1522	9kHz - 18GHz		Florida RF			II	2/2/2014	2/2/2013
Asset #1781	9kHz - 18GHz		Florida RF			II	3/6/2014	3/6/2013
Asset #1785	9kHz - 18GHz		Florida RF			II	3/14/2014	3/14/2013

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

Spectrum Mask Setup Pictures

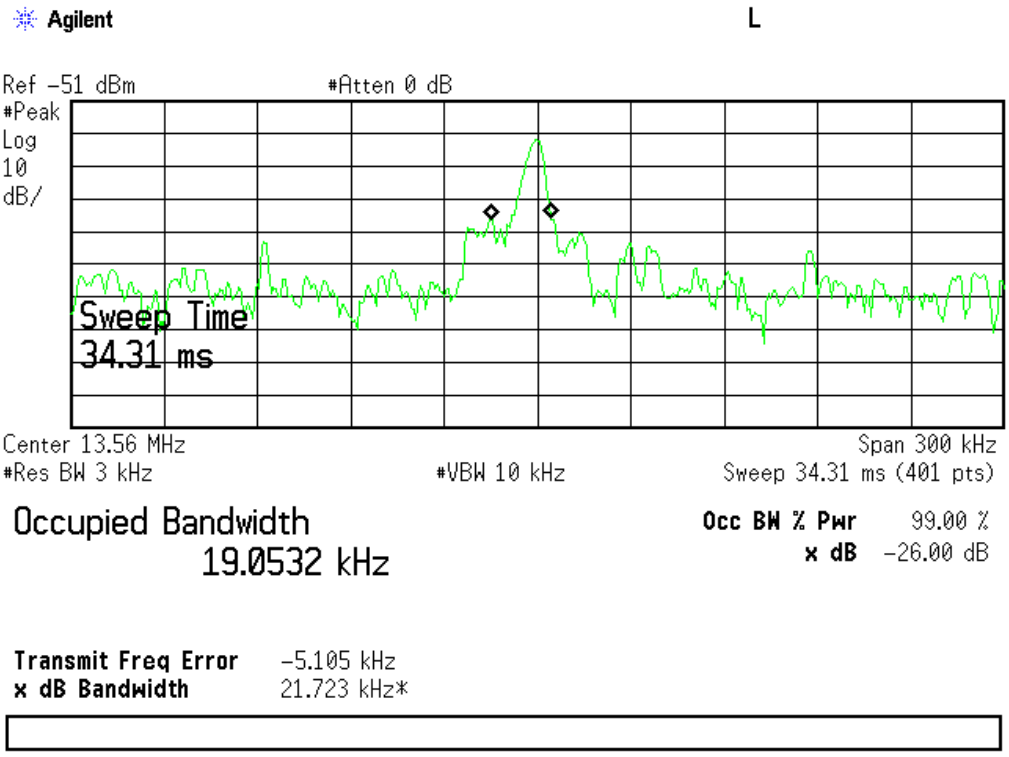
See exhibit for test setup pictures.

Occupied Bandwidth

Test Method

Per RSS GEN – Issue 3

Plots



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		

Jurisdictional Labeling and Required Instruction Manual Inserts

FCC Requirements

FCC Required labeling for Verified Devices 47 CFR Part 15.19

Verified devices must have the following label permanently affixed in a location accessible to the user:

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

No distinction is made between Class A or Class B devices on the label.

When the device is so small or for such use that it is not practicable to place label on it, the information may be shall be placed in a prominent location in the instruction manual supplied to the user or, alternatively, shall be placed on the container in which the device is marketed.

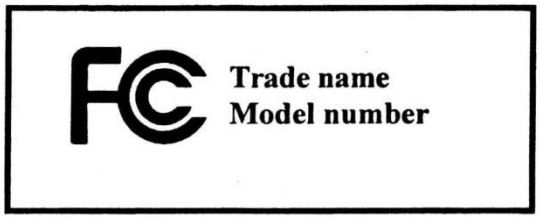
Where a device is constructed in two or more sections connected by wires and marketed together, the label is only required to be affixed to the main control unit.

FCC Required labeling for Class B Personal Computers and Peripherals Devices 47 CFR Part 15.19 subject to Declaration of Conformity

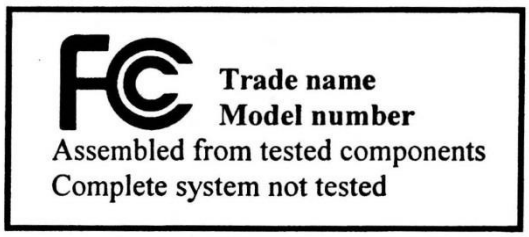
Personal computers and peripherals subject to authorization under a Declaration of Conformity shall be labeled as follows:

(1) The label shall be located in a conspicuous location on the device and shall contain the unique identification described in Section 2.1074 and the following logo:

(i) If the product is authorized based on testing of the product or system:



(ii) If the product is authorized based on assembly using separately authorized components and the resulting product is not separately tested:



(2) When the device is so small or for such use that it is not practicable to place the statement specified under paragraph (b)(1) of this section on it, such as for a CPU board or a plug-in circuit board peripheral device, the text associated with the logo may be placed in a prominent location in the instruction manual or pamphlet supplied to the user. However, the unique identification (trade name and model number) and the logo must be displayed on the device.

(3) The label shall not be a stick-on, paper label. The label on these products shall be permanently affixed to the product and shall be readily visible to the purchaser at the time of purchase, as described in Section 2.925(d). "Permanently affixed" means that the label is etched, engraved, stamped, silk-screened, indelibly printed, or otherwise permanently marked on a permanently attached part of the equipment or on a nameplate of metal, plastic, or other material fastened to the equipment by welding, riveting, or a permanent adhesive. The label must be designed to last the expected lifetime of the equipment in the environment in which the equipment may be operated and must not be readily detachable.

FCC Required Instruction Manual Inserts CFR 47 Part 15.21 and 15.105

The user's manual must caution the user that changes or modifications not expressly approved by the manufacturer could void the user's FCC granted authority to operate the equipment. In addition the following information should be inserted:

(a) For a Class A digital device or peripheral, the instructions furnished the user shall include the following or similar statement, placed in a prominent location in the text of the manual:

Note: this equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

(b) For a Class B digital device or peripheral, the instructions furnished the user shall include the following or similar statement, placed in a prominent location in the text of the manual:

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- *Reorient or relocate the receiving antenna.*
- *Increase the separation between the equipment and receiver.*
- *Connect the equipment into an outlet on a circuit different from that to which the receiver*

is connected.
- *Consult the dealer or an experienced radio/TV technician for help.*

(c) The provisions of paragraphs (a) and (b) of this section do not apply to digital devices exempted from the technical standards under the provisions of § 15.103.

(d) For systems incorporating several digital devices, the statement shown in paragraph (a) or (b) of this section needs to be contained only in the instruction manual for the main control unit.

Canadian Requirements

Digital products and ISM products must be labeled by a notice in French and English. The notice **must** take the form of a label on the product. As an alternative, where it is not feasible to label the product due to product size or other consideration, the notice must be reproduced in the manual. Note that considerations such as product appearance are not considered to meet the feasibility test. The notice must state that the product is in compliance with Canadian Interference-Causing Equipment regulations and may be in your own words. A suggested text is:

For ITE products:

This Class A or B digital apparatus complies with Canadian ICES-003.
Cet appareil numerique de la classe A or B est conforme a la norme NMB-003 du Canada.

Although the ITE limits are different from the FCC in some minor ways, equipment which complies with the FCC limits is considered by Industry Canada to be compliant with the Canadian rules. For ITE, equipment in compliance with either FCC Part 15 or CISPR 22 is considered to meet ICES-003. Reports must be kept on file for review by the appropriate Canadian Minister for a period of five years.

Our facility codes can be found in the *Test Equipment Used* Section starting on page 15.

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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