Test Report

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

Report No	EP3321-8
Client	Amazon Robotics LLC Joe Finlayson
Address	300 River Park Drive North Reading, MA 01864
Phone	(978) 276-2815
Items tested	Drive Unit Slow Radio (Left S-Drive) and Drive Unit Slow Radio (Right S-Drive)
FCC ID	2AEZR-DURSLOW
IC ID	10244A-DURSLOW
FRN	0024656845
Equipment Type Equipment Code	Low Power Communication Device Transmitter DXX
Standards	47CFR 15.249,RSS 210-Annex 2
Test Dates	Dec 1 and 9, 2015 and Jan 12, 2016
Results	As detailed within this report
Prepared by	Tuyen Truong – Test Engineer
Authorized by	Christopher Reynolds – EMC Supervisor
Issue Date	1/26/2016
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.

Curtis-Straus LLC is accredited by the American Association for Laboratory Accreditation for the specific scope of accreditation under Certificate Number 1627-01. This report may contain data which is not covered by the A2LA accreditation.

Contents

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

Product Tested - Configuration Documentation

EUT Configuration			
Work Order:	P3321		
Company:	Amazon Robotics LLC		
Company Address:	300 River Park Drive		
	North Reading, MA, 01864		
Contact:	Joe Finlayson		
	MN	**PN**	**SN**
EUT:	Drive Unit SLOW Radio	600-00889-NA (left side)	214150705209 (left side)
	Drive Unit SLOW Radio	600-00926-NA (right side)	214150705932 (right side)
EUT Description:	Slow Radio Left Corner Assembly DU/S, and Slow Radio Right Corner Assembly DU/S		
EUT TX Frequency:	925 MHz		

Support Equipment	**MN**	**SN**
Lenovo Laptop (set up only)	T510	21442
HP Power Supply	E3612A	00859

Port Label	**Port Type**	**# ports**	**# populated**	**cable type**	**shielded**	**ferrites**	**length (m)**	**max length (m)**	**in/out**	**under test**	**comment**
UI Ethernet	Ethernet	1	1	Ethernet	Yes	No	10	1	in	yes	

Software Operating Mode Description:

EUT is set to transmit at 925MHz. Firmware version 0.1-241-gb3dcaaa

Summary

This test report supports an application for certification of a transmitter operating pursuant to 47 CFR 15.249. The products are Drive Unit Slow Radios. They are transmitters that operate at 925 MHz.

We found that the products met the above requirements without modifications. The test samples were received in good condition.

Please note that two samples were tested; the left side Drive Unit Slow radio and the right side Drive Unit Slow radio. These radios are designed and limited for use by the grantee Amazon Robotics LLC and installed in the Atlas S Drive Unit product line. They are mirrored images of each other.

Test Methodology

Radiated emission testing was performed according to the procedures specified in ANSI C63.10 (2013) and RSS-GEN. Radiated Emissions were maximized in the orientation at final installation. Also the device antenna is integral so that it cannot be maximized separately.

AC Mains side of Supply - Conducted Emission was tested with a 50Ω/50μH because the EUT is DC powered.

The product was tested with modulation on and the readings were compared against the limit presented in section CFR 15.249.

The EUT operating voltage is 3.3Vdc powered.

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 Drive Unit Slow Radio has been found to conform to the following parts of 47 CFR and RSS 210 as detailed below:

RSS-GEN	RSP-100	RSS 210	Part 15	Comments
6.3			15.15(b)	There are no controls accessible to the user that vary the output power.
	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 integrated antenna with 3.32dBi gain.
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 is 3.3Vdc powered. AC side of a representative supply was tested
		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.
6.6				99% emissions bandwidth plot is provided.

Test Results

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: 01-Dec-15 **Company:** Amazon Robotics LLC **Work Order:** P3321
Engineer: Tuyen Truong **EUT Desc:** Slow Radio Right Corner Assembly DU/S **EUT Operating Voltage/Frequency:** 3.3Vdc
Temp: 21°C **Humidity:** 27% **Pressure:** 1020mBar
Frequency Range: Fundamental Frequency **Measurement Distance:** 3 m
Notes: 600-00926-NA (right side) TX power is 0 dBm **EUT Tx Freq:** 925 MHz

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 15.249 Limit (dBµV/m)	FCC 15.249 Margin (dB)	FCC 15.249 Result (Pass/Fail)
v	925.0	58.0	25.0	22.4	2.1	57.5	---	---	---	94.0	-36.5	Pass
h	925.0	55.7	25.0	22.4	2.1	55.2	---	---	---	94.0	-38.8	Pass

Table Result: Pass by -36.5 dB ***Worst Freq:*** 925.0 MHz

Test Site: EMI Chamber 1 **Cable 1:** Asset #2051 **Cable 2:** Asset #1784 **Cable 3:** ---
Analyzer: Asset #1327 **Preamp:** Red **Antenna:** Red-White **Preselector:** ---
CSsoft Radiated Emissions Calculator v 1.017.148
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Adjusted Reading = Reading - Preamp Factor + Antenna Factor + Cable Factor

Radiated Emissions Table

Date: 01-Dec-15 **Company:** Amazon Robotics LLC **Work Order:** P3321
Engineer: Tuyen Truong **EUT Desc:** Slow Radio Left Corner Assembly DU/S **EUT Operating Voltage/Frequency:** 3.3Vdc
Temp: 21°C **Humidity:** 27% **Pressure:** 1020mBar
Frequency Range: Fundamental Frequency **Measurement Distance:** 3 m
Notes: 600-00889-NA (left side) TX power is 0 dBm **EUT Tx Freq:** 925 MHz

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 15.249 Limit (dBµV/m)	FCC 15.249 Margin (dB)	FCC 15.249 Result (Pass/Fail)
v	925.0	56.8	25.0	22.4	2.1	56.3	---	---	---	94.0	-37.7	Pass
h	925.0	55.1	25.0	22.4	2.1	54.6	---	---	---	94.0	-39.4	Pass

Table Result: Pass by -37.7 dB ***Worst Freq:*** 925.0 MHz

Test Site: EMI Chamber 1 **Cable 1:** Asset #2051 **Cable 2:** Asset #1784 **Cable 3:** ---
Analyzer: Asset #1327 **Preamp:** Red **Antenna:** Red-White **Preselector:** ---
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Adjusted Reading = Reading - Preamp Factor + Antenna Factor + Cable Factor

Rev.11/30/2015

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**
Red	0.009-2000MHz	ZFL-1000-LN	CS	N/A	798	II	1/31/2016	1/31/2015
Antennas	**Range**	**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**	**Calibrated on**
Red-White Bilog	30-2000MHz	JB1	Sunol	A091604-1	1105	I	8/12/2017	8/12/2015
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 Spurious Emissions

LIMITS

15.249 (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: 01-Dec-15 **Company:** Amazon Robotics LLC **Work Order:** P3321
Engineer: Tuyen Truong **EUT Desc:** Slow Radio Right Corner Assembly DU/S **EUT Operating Voltage/Frequency:** 3.3Vdc
Temp: 21°C **Humidity:** 27% **Pressure:** 1020mBar
Frequency Range: 30 - 1000 MHz **Measurement Distance:** 3 m
Notes: 600-00926-NA (right side) TX power is 0 dBm **EUT Tx Freq:** 925 MHz

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	37.3	35.2	25.4	15.9	0.5	26.2	---	---	---	40.0	-13.8	Pass
v	50.05	38.1	25.4	7.9	0.6	21.2	---	---	---	40.0	-18.8	Pass
v	80.0	45.1	25.4	8.2	0.7	28.6	---	---	---	40.0	-11.4	Pass
h	80.0	36.5	25.4	8.2	0.7	20.0	---	---	---	40.0	-20.0	Pass
h	120.0	36.2	25.3	14.1	0.9	25.9	---	---	---	43.5	-17.6	Pass
h	150.0	36.7	25.3	12.6	1.0	25.0	---	---	---	43.5	-18.5	Pass
v	155.95	38.8	25.3	12.5	1.1	27.1	---	---	---	43.5	-16.4	Pass
v	180.0	44.4	25.3	11.3	1.0	31.4	---	---	---	43.5	-12.1	Pass
v	240.0	34.6	25.4	11.7	1.2	22.1	---	---	---	46.0	-23.9	Pass
h	240.0	37.6	25.4	11.7	1.2	25.1	---	---	---	46.0	-20.9	Pass
h	272.5	34.6	25.3	13.2	1.3	23.8	---	---	---	46.0	-22.2	Pass
h	713.9	33.2	24.0	20.4	2.0	31.6	---	---	---	46.0	-14.4	Pass
h	823.0	34.0	25.1	21.7	2.1	32.7	---	---	---	46.0	-13.3	Pass
v	837.5	35.0	25.2	21.7	2.0	33.5	---	---	---	46.0	-12.5	Pass

Table Result: Pass by -11.4 dB ***Worst Freq:*** 80.0 MHz

Test Site: EMI Chamber 1 **Cable 1:** Asset #2051 **Cable 2:** Asset #1784 **Cable 3:** ---
Analyzer: Asset #1327 **Preamp:** Red **Antenna:** Red-White **Preselector:** ---
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Adjusted Reading = Reading - Preamp Factor + Antenna Factor + Cable Factor

Radiated Emissions Table

Date: 01-Dec-15 **Company:** Amazon Robotics LLC **Work Order:** P3321
Engineer: Tuyen Truong **EUT Desc:** Slow Radio Left Corner Assembly DU/S **EUT Operating Voltage/Frequency:** 3.3Vdc
Temp: 21°C **Humidity:** 27% **Pressure:** 1020mBar
Frequency Range: 30 to 1000 MHz **Measurement Distance:** 3 m
Notes: 600-00889-NA (left side) TX power is 0 dBm **EUT Tx Freq:** 925 MHz

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	49.4	35.1	25.4	8.1	0.6	18.4	---	---	---	40.0	-21.6	Pass
v	80.0	44.9	25.4	8.2	0.7	28.4	---	---	---	40.0	-11.6	Pass
h	80.0	35.0	25.4	8.2	0.7	18.5	---	---	---	40.0	-21.5	Pass
v	119.7	34.3	25.3	14.1	0.9	24.0	---	---	---	43.5	-19.5	Pass
h	148.8	37.1	25.3	12.7	0.9	25.4	---	---	---	43.5	-18.1	Pass
v	151.3	40.5	25.3	12.6	1.0	28.8	---	---	---	43.5	-14.7	Pass
v	240.0	32.3	25.4	11.7	1.2	19.8	---	---	---	46.0	-26.2	Pass
h	240.0	35.8	25.4	11.7	1.2	23.3	---	---	---	46.0	-22.7	Pass
h	272.0	33.9	25.3	13.2	1.3	23.1	---	---	---	46.0	-22.9	Pass
h	837.5	35.4	25.2	21.7	2.0	33.9	---	---	---	46.0	-12.1	Pass

Table Result: Pass by -11.6 dB ***Worst Freq:*** 80.0 MHz

Test Site: EMI Chamber 1 **Cable 1:** Asset #2051 **Cable 2:** Asset #1784 **Cable 3:** ---
Analyzer: Asset #1327 **Preamp:** Red **Antenna:** Red-White **Preselector:** ---
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Adjusted Reading = Reading - Preamp Factor + Antenna Factor + Cable Factor

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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**
Red	0.009-2000MHz	ZFL-1000-LN	CS	N/A	798	II	1/31/2016	1/31/2015
Antennas	**Range**	**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**	**Calibrated on**
Red-White Bilog	30-2000MHz	JB1	Sunol	A091604-1	1105	I	8/12/2017	8/12/2015
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: 01-Dec-15 **Company:** Amazon Robotics LLC **Work Order:** P3321
Engineer: Tuyen Truong **EUT Desc:** Slow Radio Right Corner Assembly DU/S **EUT Operating Voltage/Frequency:** 3.3Vdc
Temp: 21°C **Humidity:** 27% **Pressure:** 1020mBar
Frequency Range: 1-6GHz **Measurement Distance:** 3 m
Notes: 600-00926-NA (right side) TX power is 0 dBm **EUT Tx Freq:** 925 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)	Peak Margin (dB)	Peak Result (Pass/Fail)	FCC 15.209 High Frequency - Average Limit (dBµV/m)	Average Margin (dB)	Average Result (Pass/Fail)
h	1725.0	50.43	34.0	39.8	26.7	3.7	41.0	24.6	74.0	-33.0	Pass	54.0	-29.4	Pass

Table Result: Pass by -29.4 dB ***Worst Freq:*** 1725.0 MHz

Test Site: EMI Chamber 1 **Cable 1:** Asset #2051 **Cable 2:** Asset #1784 **Cable 3:** Asset #1522
Analyzer: Asset #1327 **Preamp:** Asset #2111 **Antenna:** Black Horn **Preselector:** ---
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Adjusted Reading = Reading - Preamp Factor + Antenna Factor + Cable Factor

Radiated Emissions Table

Date: 01-Dec-15 **Company:** Amazon Robotics LLC **Work Order:** P3321
Engineer: Tuyen Truong **EUT Desc:** Slow Radio Left Corner Assembly DU/S **EUT Operating Voltage/Frequency:** 3.3Vdc
Temp: 21°C **Humidity:** 27% **Pressure:** 1020mBar
Frequency Range: 1-6GHz **Measurement Distance:** 3 m
Notes: 600-00889-NA (left side) TX power is 0 dBm **EUT Tx Freq:** 925 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)	Peak Margin (dB)	Peak Result (Pass/Fail)	FCC 15.209 High Frequency - Average Limit (dBµV/m)	Average Margin (dB)	Average Result (Pass/Fail)
v	1725.0	53.3	35.6	39.8	26.7	3.7	43.9	26.2	74.0	-30.1	Pass	54.0	-27.8	Pass

Table Result: Pass by -27.8 dB ***Worst Freq:*** 1725.0 MHz

Test Site: EMI Chamber 1 **Cable 1:** Asset #2051 **Cable 2:** Asset #1784 **Cable 3:** Asset #1522
Analyzer: Asset #1327 **Preamp:** Asset #2111 **Antenna:** Black Horn **Preselector:** ---
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Adjusted Reading = Reading - Preamp Factor + Antenna Factor + Cable Factor

Radiated Emissions Table

Date: 01-Dec-15 **Company:** Amazon Robotics LLC **Work Order:** P3321
Engineer: Tuyen Truong **EUT Desc:** Slow Radio Right Corner Assembly DU/S **EUT Operating Voltage/Frequency:** 3.3Vdc
Temp: 21°C **Humidity:** 27% **Pressure:** 1020mBar
Frequency Range: 6 to 10 GHz **Measurement Distance:** 1 m
Notes: 600-00926-NA (right side) TX power is 0 dBm **EUT Tx Freq:** 925 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)	Peak Margin (dB)	Peak Result (Pass/Fail)	FCC 15.209 High Frequency - Average Limit (dBµV/m)	Average Margin (dB)	Average Result (Pass/Fail)
v	7400.0	52.76	49.1	40.0	37.9	7.8	58.5	54.8	83.5	-25.0	Pass	63.5	-8.7	Pass

Table Result: Pass by -8.7 dB ***Worst Freq:*** 7400.0 MHz

Test Site: EMI Chamber 1 **Cable 1:** Asset #2051 **Cable 2:** Asset #1784 **Cable 3:** Asset #1522
Analyzer: Asset #1327 **Preamp:** Asset #2111 **Antenna:** Black Horn **Preselector:** ---
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Adjusted Reading = Reading - Preamp Factor + Antenna Factor + Cable Factor

Radiated Emissions Table

Date: 01-Dec-15 **Company:** Amazon Robotics LLC **Work Order:** P3321
Engineer: Tuyen Truong **EUT Desc:** Slow Radio Left Corner Assembly DU/S **EUT Operating Voltage/Frequency:** 3.3Vdc
Temp: 21°C **Humidity:** 27% **Pressure:** 1020mBar
Frequency Range: 6 to 10 GHz **Measurement Distance:** 1 m
Notes: 600-00889-NA (left side) **EUT Tx Freq:** 925 MHz
TX power is 0 dBm

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	7400.0	51.68	47.5	40.0	37.9	7.8	57.4	53.2	83.5	-26.1	Pass	63.5	-10.3	Pass

Table Result: Pass by -10.3 dB ***Worst Freq:*** 7400.0 MHz

Test Site: EMI Chamber 1 **Cable 1:** Asset #2051 **Cable 2:** Asset #1784 **Cable 3:** Asset #1522
Analyzer: Asset #1327 **Preamp:** Asset #2111 **Antenna:** Black Horn **Preselector:** ---
CSsoft Radiated Emissions Calculator v 1.017.148
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Adjusted Reading = Reading - Preamp Factor + Antenna Factor + Cable Factor

Rev.11/30/2015

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
A#2111 HF Preamp	0.5-18GHz	PAM-118A	COM-POWER	551063	2111	II	11/20/2016	

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 #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
Asset #1522	9kHz - 18GHz	Florida RF	II	2/15/2016	2/15/2015

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.

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 DC Power Supply Conducted Emissions Data Table

Date: 12-Jan-16 **Company:** Amazon Robotics LLC **Work Order:** P3321
Engineer: Tuyen Truong **EUT Desc:** Slow Radio Right Corner Assembly DU/S
Temp: 18.9 ºC **Humidity:** 32% **Pressure:** 1008 mBar
Notes: EUT SN: 214150705932 (right side) - EUT is powered by support HP Power Supply (MN: E3612A, SN: 00859) at 120Vac/60Hz
Frequency Range: 0.15 - 30 MHz **EUT Input Voltage/Frequency:** 3.3Vdc

	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	14.7	19.3	14.7	19.3	-0.1	-0.1	-0.1	-20.0	66.0	-26.6	Pass	56.0	-16.6	Pass
2.91	17.0	19.5	5.9	7.5	0.0	-0.1	-0.1	-20.0	56.0	-16.4	Pass	46.0	-18.4	Pass
5.00	19.5	24.0	14.9	12.3	0.0	-0.1	-0.1	-20.0	56.0	-11.9	Pass	46.0	-11.0	Pass
9.85	13.3	14.8	13.3	14.8	-0.1	-0.1	-0.2	-20.0	60.0	-25.0	Pass	50.0	-15.0	Pass
18.66	13.5	14.3	13.5	14.3	-0.1	-0.1	-0.3	-20.0	60.0	-25.3	Pass	50.0	-15.3	Pass
24.18	12.5	12.6	12.5	12.6	-0.1	-0.1	-0.3	-20.0	60.0	-27.0	Pass	50.0	-17.0	Pass

Result: Pass ***Worst Margin:*** -11.0 dB ***Frequency:*** 5.000 MHz

Measurement Device: LISN ASSET 1732(Line 1) LISN ASSET 1733(Line 2) **Cable:** CEMI-09 **Spectrum Analyzer:** SA#2
Attenuator: 20dB Attenuator-05 **Site:** CEMI 3

Rev. 1/8/2016

Spectrum Analyzers / Receivers /Preselectors	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
SA #2 (1860)	9kHz-26.5 GHz	E7405A	Agilent	MY45104916	1860	I	12/23/2016	12/23/2015

LISNs/Measurement Probes	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
LISN Asset 1732	150kHz-30MHz	LI-150A	Com-Power	201094	1732	I	2/12/2016	2/12/2015
LISN Asset 1733	150kHz-30MHz	LI-150A	Com-Power	201095	1733	I	2/12/2016	2/12/2015

Conducted Test Sites (Mains / Telco)	FCC Code	VCCI Code	Cat	Calibration Due	Calibrated on
CEMI 3	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#2084	HTC-1	HDE		2084	II	4/2/2016	4/2/2015

Cables	Range	Mfr	Cat	Calibration Due	Calibrated on
CEMI-09	9kHz - 2GHz	C-S	II	5/3/2016	5/3/2015

Attenuators	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
20dB Attenuator-05	9kHz-2GHz	2	Aeroflex/Weinschel	BS9092		II	7/29/2016	7/29/2015

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

AC Side of DC Power Supply Conducted Emissions Data Table

Date: 12-Jan-16 **Company:** Amazon Robotics LLC **Work Order:** P3321
Engineer: Tuyen Truong **EUT Desc:** Slow Radio Left Corner Assembly DU/S
Temp: 18.9 ºC **Humidity:** 32% **Pressure:** 1008 mBar
Notes: EUT SN: 214150705209 (left side) - EUT is powered by support HP Power Supply (MN: E3612A, SN: 00859) at 120Vac/60Hz
Frequency Range: 0.15 - 30 MHz **EUT Input Voltage/Frequency:** 3.3Vdc

	Quasi-Peak Readings		Average Readings		LISN Factors				FCC 15.207			FCC 15.207		
Frequency (MHz)	QP1 (dBµV)	QP2 (dBµV)	AVG1 (dBµV)	AVG2 (dBµV)	L1 (dB)	L2 (dB)	Cable Factor (dB)	ATTN Factor (dB)	QP Limit (dBµV)	Margin (dB)	Result (Pass/Fail)	AVG Limit (dBµV)	Margin (dB)	Result (Pass/Fail)
0.15	18.9	17.4	18.9	17.4	-0.1	-0.1	-0.1	-20.0	66.0	-27.0	Pass	56.0	-17.0	Pass
3.21	15.5	19.7	10.1	8.5	0.0	-0.1	-0.1	-20.0	56.0	-16.2	Pass	46.0	-15.8	Pass
4.70	24.0	22.4	16.4	12.9	0.0	-0.1	-0.1	-20.0	56.0	-11.9	Pass	46.0	-9.5	Pass
13.81	13.7	13.0	13.7	13.0	-0.1	-0.1	-0.3	-20.0	60.0	-26.0	Pass	50.0	-16.0	Pass
17.54	14.1	13.6	14.1	13.6	-0.1	-0.1	-0.3	-20.0	60.0	-25.6	Pass	50.0	-15.6	Pass
22.61	13.0	13.0	13.0	13.0	-0.1	-0.1	-0.3	-20.0	60.0	-26.5	Pass	50.0	-16.5	Pass

Result: Pass ***Worst Margin:*** -9.5 dB ***Frequency:*** 4.700 MHz

Measurement Device: LISN ASSET 1732(Line 1) LISN ASSET 1733(Line 2) **Cable:** CEMI-09 **Spectrum Analyzer:** SA#2
Attenuator: 20dB Attenuator-05 **Site:** CEMI 3

Rev. 1/8/2016

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Conducted Test Sites (Mains / Telco)	FCC Code	VCCI Code	Cat	Calibration Due	Calibrated on
CEMI 3	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#2084	HTC-1	HDE		2084	II	4/2/2016	4/2/2015

Cables	Range	Mfr	Cat	Calibration Due	Calibrated on
CEMI-09	9kHz - 2GHz	C-S	II	5/3/2016	5/3/2015

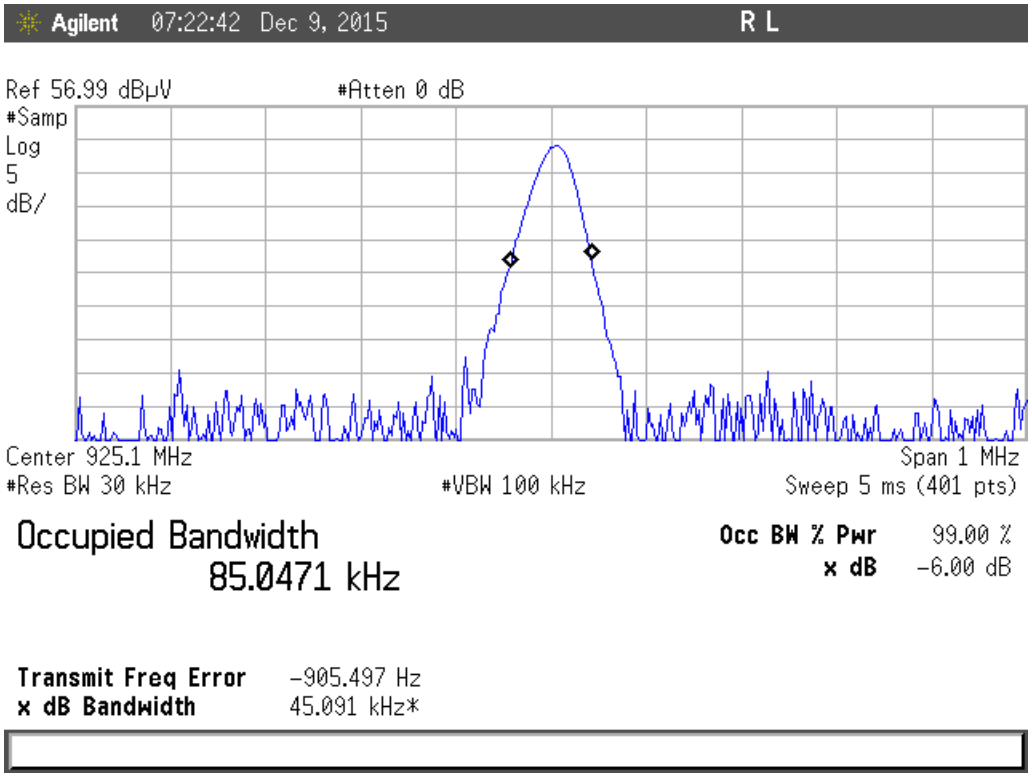
Attenuators	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
20dB Attenuator-05	9kHz-2GHz	2	Aeroflex/Weinschel	BS9092		II	7/29/2016	7/29/2015

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

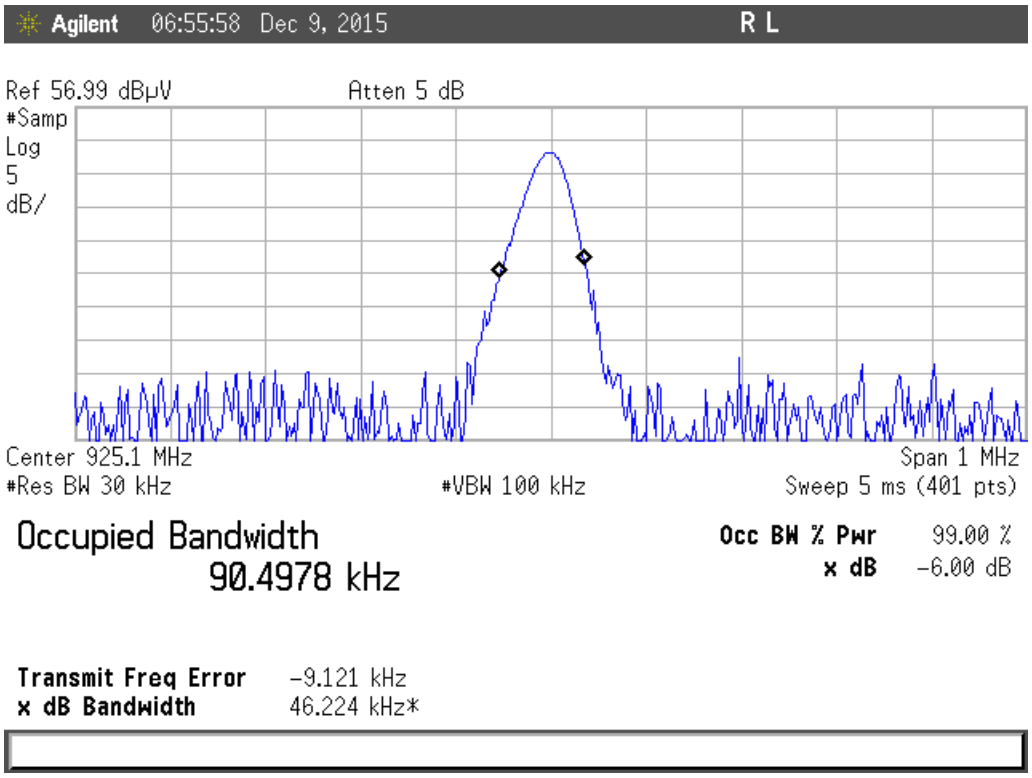
Occupied Bandwidth

REQUIREMENT

When an occupied bandwidth is no 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]



Occupied Bandwidth – DU Slow Radio (Right side)



Occupied Bandwidth – DU Slow Radio (Left side)

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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