



**BUREAU
VERITAS**

Test Report

Bureau Veritas Consumer Products Services, Inc.

Report No	ET1639-2
Client	ASSA ABLOY Inc.
Address	110 Sargent Drive New Haven, CT 06511
Phone	203-821-5724
Items tested	IN-BIKP (Model BLE9117K)
FCC ID	U4A-MODBLE9117K
IC	6982A-MODBLE9117K
FRN	0016550824
Equipment Type	Part 15 Low Power Transmitter Below 1705kHz
Equipment Code	DCD
Emission Designator	2K39A1D
Standards	CFR Title 47 FCC Part 15.209, RSS-210 Issue 9 Section 4.4
Test Dates	Jul 30 – Sep 3, 2019
Results	As detailed within this report
Prepared by	<u>Anna Vancheva</u> Anna Vancheva – EMC Engineer
Authorized by	<u>Y. E. Faziloglu</u> Yurus Faziloglu – Sr. Engineer
Issue Date	<u>9/23/2019</u>
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.

Bureau Veritas Consumer Products Services, Inc. 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.



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



Summary and Test Methodology

Between July 30 and Sep 3 2019 we tested the IN-BIKP (Model BLE9117K) for compliance with the following requirements:

CFR Title 47 FCC Part 15.209, RSS-210 Issue 9 Section 4.4

EUT transmits at 125 kHz. Emissions were measured with the EUT in its intended upright installation orientation. EUT has an internal non-detachable coil loop antenna.

Radiated emission testing was performed according to the procedures specified in ANSI C63.10-2013 and RSS-Gen Issue 5.

AC mains conducted emission testing was performed for both 24VDC and PoE(48VDC) configurations.

Following bandwidths were used during radiated and conducted spurious emissions testing.

Frequency	RBW	VBW
9kHz-150kHz	200Hz	1kHz
150kHz-30MHz	9kHz	30kHz
30MHz-1GHz	120kHz	1MHz

We found that the product met the above requirements with modification. See “Modifications Required for Compliance” section of this report. The test sample was received in good condition.

Product Tested - Configuration Documentation

EUT Configuration										
Work Order:		S1639								
Company:		Assa Abloy								
Company Address:		110 Sargent Drive New Haven, CT 06511								
Contact:		Dave DeBiase								
		Product Marketing Name			Model Number			SN		
EUT:		IN-BIKP			BLE9117K			1,2		
EUT Description:		Lock Controller								
EUT Tx Frequency:		125kHz (LF RFID), 13.56MHz (HF RFID), 2402-2480MHz (BLE)								
Port Label	Port Type	# ports	# populated	cable type	shielded	ferrites	length (m)	in/out	under test	comment
Ethernet Door	Ethernet	1	1	Ethernet	No	Yes	1.5	in	yes	
Power DC	Power DC	1	1	Power DC	No	No	5	in	yes	
Ethernet frame	Ethernet	1	1	Ethernet	Yes	No	4.5	in	yes	
Power AC	Power AC	1	1	Power DC	No	yes	5	in	yes	
Software Operating Mode Description:										
All radios are transmitting during testing.										



Compliance Statement

RSS-GEN	RSP-100	RSS 210	Part 15	Comments
6.4			15.15(b)	There are no controls accessible to the user that varies 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	See “Modifications Required for Compliance” section below.
3.2			15.31	The EUT was tested in accordance with the measurement standards in this section.
6.13.2			15.33	Frequency range was investigated according to this section, unless noted in specific rule section under which the equipment operates.
6.13.1			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.
6.8			15.203	The antenna for this device is an internal non-detachable coil loop antenna.
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	AC mains emissions met the requirements of 15.207
6.7				99% emissions bandwidth plot is provided.

Modifications Required for Compliance

PoE configuration for radiated emissions was tested with ferrite Laird 28B0473-200 on all four Ethernet pairs.

Test Results

Radiated Emissions

9-150kHz

Bureau Veritas Consumer Product Services Inc.	Work Order - T1639
Radiated Emissions, Electric Field, 3m Measurement	EUT Power Input - Battery
Top Peaks Parallel 9-150kHz	Test Site - CH1
Notes:	Conditions - 23.2°C; 54.7%RH; 1007mBar
	Test Engineer - AV
BLE Mid channel activ. Radios under test LF(125 kHz) and HF(13.56 MHz).Battery	

Data Taken at 12:06:15 PM, Tuesday, July 30, 2019

Frequency (MHz)	Raw Peak Reading (dBµV)	Correction Factor (dB/m)	Adjusted Peak Amplitude (dBµV/m)	Lim: FCC_pt15_2 09_dBµV/m (dBµV/m)	Peak Margin (dB)	Peak Test Results (Pass/Fail)	Worst Margin (dB)	EUT Azimuth (degrees)
0.028529	42.9	13.4	56.4	118.5	-62.1	PASS		135
0.046876	40.5	11.3	51.8	114.2	-62.4	PASS		300
0.077572	37.2	10.5	47.7	109.8	-62.1	PASS		255
0.092134	35.9	10.4	46.3	108.3	-62	PASS		105
0.124821	65.7	10.1	75.8	105.7	-29.9	PASS	-29.9	315
0.14302	32.4	10.1	42.4	104.5	-62.1	PASS		75

Bureau Veritas Consumer Product Services Inc.	Work Order - T1639
Radiated Emissions, Electric Field, 3m Measurement	EUT Power Input - Battery
Top Peaks Perpendicular 9-150kHz	Test Site - CH1
Notes:	Conditions - 23.2°C; 54.7%RH; 1007mBar
	Test Engineer - AV
BLE Mid channel activ. Radios under test LF(125 kHz) and HF(13.56 MHz).Battery	

Data Taken at 12:06:15 PM, Tuesday, July 30, 2019

Frequency (MHz)	Raw Peak Reading (dBµV)	Correction Factor (dB/m)	Adjusted Peak Amplitude (dBµV/m)	Lim: FCC_pt15_2 09_dBµV/m (dBµV/m)	Peak Margin (dB)	Peak Test Results (Pass/Fail)	Worst Margin (dB)	EUT Azimuth (degrees)
0.051917	39.8	11	50.8	113.3	-62.5	PASS		345
0.063909	38.3	10.8	49.1	111.5	-62.4	PASS		30
0.087082	36.6	10.5	47.1	108.8	-61.8	PASS		240
0.111405	35.2	10.1	45.3	106.7	-61.4	PASS		240
0.124807	61.9	10.1	72	105.7	-33.7	PASS	-33.7	315
0.13614	33.3	10.1	43.3	104.9	-61.6	PASS		15



150-1000kHz

Bureau Veritas Consumer Product Services Inc. Work Order - T1639
 Radiated Emissions Magnetic Field 3m Distance EUT Power Input - Battery
 Top Peaks Parallel 150-1000kHz Test Site - CH1
 Notes: Conditions - 23.2°C; 54.7%RH; 1007mBar
 Test Engineer - AV
 BLE Mid channel activ. Radios under test LF(125 kHz) and HF(13.56 MHz).Battery

Data Taken at 02:27:10 PM, Tuesday, July 30, 2019

Frequency (MHz)	Raw Peak Reading (dBµV)	Correction Factor (dB/s)	Adjusted Peak Amplitude (dBµA/m)	Lim: FCC_pt15_2 09_dBµV/m (dBµA/m)	Peak Margin (dB)	Peak Test Results (Pass/Fail)	Worst Margin (dB)	EUT Azimuth (degrees)
0.372	42.5	9.9	52.4	96.2	-43.8	PASS		0
0.553	39.6	10.2	49.7	72.8	-23	PASS	-23	285
0.626	38.2	10.3	48.4	71.7	-23.3	PASS		330
0.767	34.9	10.4	45.3	69.9	-24.6	PASS		345
0.869	33.1	10.5	43.6	68.8	-25.2	PASS		285
0.968	31.8	10.6	42.4	67.9	-25.5	PASS		180

Bureau Veritas Consumer Product Services Inc. Work Order - T1639
 Radiated Emissions Magnetic Field 3m Distance EUT Power Input - Battery
 Top Peaks Perpendicular 150-1000kHz Test Site - CH1
 Notes: Conditions - 23.2°C; 54.7%RH; 1007mBar
 Test Engineer - AV
 BLE Mid channel activ. Radios under test LF(125 kHz) and HF(13.56 MHz).Battery

Data Taken at 02:34:32 PM, Tuesday, July 30, 2019

Frequency (MHz)	Raw Peak Reading (dBµV)	Correction Factor (dB/s)	Adjusted Peak Amplitude (dBµA/m)	Lim: FCC_pt15_2 09_dBµV/m (dBµA/m)	Peak Margin (dB)	Peak Test Results (Pass/Fail)	Worst Margin (dB)	EUT Azimuth (degrees)
0.54	38.7	10.2	48.9	73	-24.1	PASS		240
0.621	37.2	10.3	47.5	71.8	-24.2	PASS		60
0.679	37.5	10.3	47.8	71	-23.2	PASS	-23.2	330
0.79	34.6	10.5	45.1	69.7	-24.6	PASS		210
0.878	33.3	10.5	43.8	68.7	-24.9	PASS		240
0.969	32	10.6	42.6	67.9	-25.3	PASS		180



1-30MHz

Bureau Veritas Consumer Product Services Inc. Work Order - T1639
 Radiated Emissions Magnetic Field 3m Distance EUT Power Input - Battery
 Top Peaks Parallel 1-30MHz Test Site - CH1
 Notes: Conditions - 23.2°C; 54.7%RH; 1007mBar
Test Engineer - AV
 BLE Mid channel activ. Radios under test LF(125 kHz) and HF(13.56 MHz).Battery

Data Taken at 02:53:43 PM, Tuesday, July 30, 2019

Frequency (MHz)	Raw Peak Reading (dBµV)	Correction Factor (dB/s)	Adjusted Peak Amplitude (dBµA/m)	Lim: FCC_pt15_2 09_dBµV/m (dBµA/m)	Peak Margin (dB)	Peak Test Results (Pass/Fail)	Worst Margin (dB)	EUT Azimuth (degrees)
1.047	30	10.7	40.7	67.2	-26.5	PASS		330
2.325	22.6	10.6	33.2	69.5	-36.4	PASS		30
3.112	19.9	10.6	30.5	69.5	-39	PASS		210
12.921	24.2	11.2	35.3	69.5	-34.2	PASS		0
13.559	54.4	11.2	65.6	69.5	-4	PASS	-4	345
30	12.5	8.3	20.8	40	-19.2	PASS		0

Bureau Veritas Consumer Product Services Inc. Work Order - T1639
 Radiated Emissions Magnetic Field 3m Distance EUT Power Input - Battery
 Top Peaks Perpendicular 1-30MHz Test Site - CH1
 Notes: Conditions - 23.2°C; 54.7%RH; 1007mBar
Test Engineer - AV
 BLE Mid channel activ. Radios under test LF(125 kHz) and HF(13.56 MHz).Battery

Data Taken at 02:47:14 PM, Tuesday, July 30, 2019

Frequency (MHz)	Raw Peak Reading (dBµV)	Correction Factor (dB/s)	Adjusted Peak Amplitude (dBµA/m)	Lim: FCC_pt15_2 09_dBµV/m (dBµA/m)	Peak Margin (dB)	Peak Test Results (Pass/Fail)	Worst Margin (dB)	EUT Azimuth (degrees)
1.218	28.1	10.7	38.8	65.9	-27.1	PASS		120
1.918	24.7	10.6	35.3	69.5	-34.2	PASS		285
2.438	21.3	10.6	31.9	69.5	-37.6	PASS		90
3.128	20.1	10.6	30.8	69.5	-38.8	PASS		0
13.559	50.2	11.2	61.4	69.5	-8.2	PASS	-8.2	45
30	11.8	8.3	20	40	-20	PASS		165

In 9kHz-30MHz range, no emissions were found in receive loop antenna's "ground-parallel" orientation.



30-1000MHz

Bureau Veritas Consumer Product Services Inc. Work Order - T1639
 Radiated Emissions Electric Field 3m Distance EUT Power Input - Ba
 Top Peaks Vertical 30-1000MHz Test Site - CH1
 Notes: Conditions - 23.2°C; 54.7%RH; 1007mBar
 Test Engineer - AV
 BLE Mid channel activ. Radios under test LF(125 kHz) and HF(13.56 MHz).Battery

Data Taken at 11:07:52 AM, Tuesday, July 30, 2019

Frequency (MHz)	Peak Reading (dBµV)	Correction Factor (dB/m)	Adjusted Peak Amplitude (dBµV/m)	Lim1: FCC_pt15_2 09 (dBµV/m)	Lim1 Margin (dB)	Lim1 Test Results (Pass/Fail)	Worst Margin Lim1 (dB)	Antenna Height (cm)	Turntable Azimuth (degrees)
30.364	33	-6.9	26.1	40	-13.9	PASS		150	270
40.646	38.6	-14.5	24.1	40	-15.9	PASS		100	270
257.635	48.5	-15.1	33.4	46	-12.6	PASS	-12.6	200	0
269.275	42.7	-13.9	28.8	46	-17.2	PASS		200	0
307.323	41.5	-13.1	28.5	46	-17.5	PASS		200	0
945.195	31.4	-1	30.4	46	-15.6	PASS		150	45

Bureau Veritas Consumer Product Services Inc. Work Order - T1639
 Radiated Emissions Electric Field 3m Distance EUT Power Input - Ba
 Top Peaks Horizontal 30-1000MHz Test Site - CH1
 Notes: Conditions - 23.2°C; 54.7%RH; 1007mBar
 Test Engineer - AV
 BLE Mid channel activ. Radios under test LF(125 kHz) and HF(13.56 MHz).Battery

Data Taken at 11:07:52 AM, Tuesday, July 30, 2019

Frequency (MHz)	Peak Reading (dBµV)	Correction Factor (dB/m)	Adjusted Peak Amplitude (dBµV/m)	Lim1: FCC_pt15_2 09 (dBµV/m)	Lim1 Margin (dB)	Lim1 Test Results (Pass/Fail)	Worst Margin Lim1 (dB)	Antenna Height (cm)	EUT Azimuth (degrees)
30.8	32.5	-7.2	25.3	40	-14.7	PASS		150	135
257.635	46.8	-15.1	31.7	46	-14.3	PASS		150	45
702.259	44.9	-5.1	39.8	46	-6.2	PASS	-6.2	150	45
703.519	39.1	-5.1	34	46	-12	PASS		200	45
937.484	31.8	-1.2	30.5	46	-15.5	PASS		100	135



Test Equipment Used

Rev. 7/24/2019

Spectrum Analyzers / Receivers / Preselectors	Range	MN	Mfr	SN	Asset	Cat	Calibration Due
2093 MXE EMI Receiver	20Hz-26.5GHz	N9038A	Agilent	MY51210181	2093	I	11/21/2019
Radiated Emissions Sites	FCC Code	IC Code	VCCI Code	Range	Asset	Cat	Calibration Due
EMI Chamber 1	719150	2762A-6	A-0015	30-1000MHz	1685	I	12/7/2020
Preamps / Couplers Attenuators / Filters	Range	MN	Mfr	SN	Asset	Cat	Calibration Due
2311 PA	1-1000MHz	PAM-103	COM-POWER	441174	2311	II	10/29/2019
Antennas	Range	MN	Mfr	SN	Asset	Cat	Calibration Due
Red-Black Bilog	30-2000MHz	JB1	Sunol	A091604-2	1106	I	4/26/2021
2615 Active Loop Antenna	9KHz-30MHz	6502	EMCO	2049	2615	I	10/30/2019
Meteorological Meters/Chambers	MN	Mfr	SN	Asset	Cat	Calibration Due	
Weather Clock (Pressure Only)	BA928	Oregon Scientific	C3166-1	831	I	5/15/2020	
Asset #2658	1235C97	Control Company	181683808	2658	I	4/3/2020	
Cables	Range	Mfr	Cat	Calibration Due			
Asset #2456	9KHz-18GHz	MegaPhase	II	10/31/2019			
Asset #2464	9KHz-18GHz	MegaPhase	II	10/31/2019			
Asset #2585	9KHz-18GHz	Pasternack	II	5/24/2020			

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

30-1000MHz PoE (48VDC)

Bureau Veritas Consumer Product Services Inc.	Work Order - T1639
Radiated Emissions Electric Field 3m Distance	EUT Power Input - POE (48Vdc)
Top Peaks Horizontal 30-1000MHz	Test Site - CH-1
Notes:	Conditions - 23.7°C; 56%RH; 1008mBar
BLE9117K, with ferrite: Laird 28B0473-200 on all four Ethernet pairs;	
with metal escutcheon	Test Engineer - AKZ

Data Taken at 02:28:01 PM, Wednesday, July 31, 2019

Frequency (MHz)	Peak Reading (dBµV)	Correction Factor (dB/m)	Adjusted Peak Amplitude (dBµV/m)	Lim1: FCC_pt15_1 09_Class_B (dBµV/m)	Lim1 Margin (dB)	Lim1 Test Results (Pass/Fail)	Worst Margin Lim1 (dB)	Lim2: Cspr_Class_B (dBµV/m)	Lim2 Margin (dB)	Lim2 Test Results (Pass/Fail)	Worst Margin Lim2 (dB)	Antenna Height (cm)	EUT Azimuth (degrees)
289.499	50.2	-13.5	36.7	46	-9.4	PASS		47.5	-10.8	PASS		100	225
292.506	50.3	-13.5	36.8	46	-9.2	PASS		47.5	-10.7	PASS		100	90
294.543	49.9	-13.5	36.4	46	-9.7	PASS		47.5	-11.1	PASS		100	90
297.526	50.6	-13.5	37.1	46	-8.9	PASS		47.5	-10.4	PASS		100	225

Data Taken at 02:28:01 PM, Wednesday, July 31, 2019

Frequency (MHz)	Raw QP Reading (dBµV)	Correction Factor (dB/m)	Adjusted QP Amplitude (dBµV/m)	Lim1: FCC_pt15_1 09_Class_B (dBµV/m)	Margin to Lim1 (dB)	Test Results Lim1 (Pass/Fail)	Worst Margin Lim1 (dB)	Lim2: Cspr_Class_B (dBµV/m)	Margin to Lim2 (dB)	Test Results Lim2 (Pass/Fail)	Worst Margin Lim2 (dB)	Antenna Height (cm)	EUT Azimuth (degrees)
375.013	52.2	-11.1	41	46	-5	PASS		47.5	-6.5	PASS		100	79
625.036	48.8	-6.3	42.5	46	-3.6	PASS	-3.6	47.5	-5	PASS	-5	136	57



Bureau Veritas Consumer Product Services Inc. Work Order - T1639
 Radiated Emissions Electric Field 3m Distance EUT Power Input - POE (48Vdc)
 Top Peaks Vertical 30-1000MHz Test Site - CH-1
 Notes: Conditions - 23.7°C; 56%RH; 1008mBar
 BLE9117K, with ferrite: Laird 28B0473-200 on all four Ethernet pairs;
 with metal escutcheon Test Engineer - AKZ

Data Taken at 02:28:01 PM, Wednesday, July 31, 2019

Frequency (MHz)	Peak Reading (dBµV)	Correction Factor (dB/m)	Adjusted Peak Amplitude (dBµV/m)	Lim1: FCC_pt15_1 09_Class_B (dBµV/m)	Lim1 Margin (dB)	Lim1 Test Results (Pass/Fail)	Worst Margin Lim1 (dB)	Lim2: Cspr_Class_B (dBµV/m)	Lim2 Margin (dB)	Lim2 Test Results (Pass/Fail)	Worst Margin Lim2 (dB)	Antenna Height (cm)	Turntable Azimuth (degrees)
34.608	47	-10	37	40	-3	PASS	-3	40.5	-3.5	PASS	-3.5	100	270
36.135	45.8	-11.1	34.6	40	-5.4	PASS		40.5	-5.9	PASS		100	225
37.348	43.4	-12	31.4	40	-8.6	PASS		40.5	-9.1	PASS		100	315
375.029	47.5	-11.1	36.3	46	-9.7	PASS		47.5	-11.2	PASS		100	135
625.022	46.4	-6.3	40	46	-6	PASS		47.5	-7.5	PASS		100	270
750.055	41.6	-4.2	37.4	46	-8.6	PASS		47.5	-10.1	PASS		150	225

Data Taken at 02:37:48 PM, Wednesday, July 31, 2019

Frequency (MHz)	Raw QP Reading (dBµV)	Correction Factor (dB/m)	Adjusted QP Amplitude (dBµV/m)	Lim1: FCC_pt15_1 09_Class_B (dBµV/m)	Margin to Lim1 (dB)	Test Results Lim1 (Pass/Fail)	Worst Margin Lim1 (dB)	Lim2: Cspr_Class_B (dBµV/m)	Margin to Lim2 (dB)	Test Results Lim2 (Pass/Fail)	Worst Margin Lim2 (dB)	Antenna Height (cm)	EUT Azimuth (degrees)
34.645	46.5	-10	36.5	40	-3.5	PASS	-3.5	40.5	-4	PASS	-4	101	169

30-1000MHz 24VDC

Bureau Veritas Consumer Product Services Inc. Work Order - T1639
 Radiated Emissions Electric Field 3m Distance EUT Power Input - 24V DC
 Top Peaks Horizontal 30-1000MHz Test Site - CH-1
 Notes: Conditions - 23.7°C; 56%RH; 1008mBar
 BLE9117K with hard-wired 24V DC power Test Engineer - AKZ

Data Taken at 04:28:17 PM, Wednesday, July 31, 2019

Frequency (MHz)	Peak Reading (dBµV)	Correction Factor (dB/m)	Adjusted Peak Amplitude (dBµV/m)	Lim1: FCC_pt15_1 09_Class_B (dBµV/m)	Lim1 Margin (dB)	Lim1 Test Results (Pass/Fail)	Worst Margin Lim1 (dB)	Lim2: Cspr_Class_B (dBµV/m)	Lim2 Margin (dB)	Lim2 Test Results (Pass/Fail)	Worst Margin Lim2 (dB)	Antenna Height (cm)	EUT Azimuth (degrees)
381.091	53.8	-11.2	42.6	46	-3.4	PASS		47.5	-4.9	PASS		100	135
382.183	53.3	-11.2	42.2	46	-3.9	PASS		47.5	-5.3	PASS		100	135
386.184	52.5	-11.2	41.3	46	-4.7	PASS		47.5	-6.2	PASS		100	135
388.124	53.8	-11.2	42.6	46	-3.4	PASS		47.5	-4.9	PASS		100	135
397.218	52.1	-10.9	41.2	46	-4.8	PASS		47.5	-6.3	PASS		100	135

Data Taken at 04:28:17 PM, Wednesday, July 31, 2019

Frequency (MHz)	Raw QP Reading (dBµV)	Correction Factor (dB/m)	Adjusted QP Amplitude (dBµV/m)	Lim1: FCC_pt15_1 09_Class_B (dbµV/m)	Margin to Lim1 (dB)	Test Results Lim1 (Pass/Fail)	Worst Margin Lim1 (dB)	Lim2: Cspr_Class_B (dBµV/m)	Margin to Lim2 (dB)	Test Results Lim2 (Pass/Fail)	Worst Margin Lim2 (dB)	Antenna Height (cm)	EUT Azimuth (degrees)
390.662	37.5	-11.1	26.4	46	-19.6	PASS	-19.6	47.5	-21.1	PASS	-21.1	100	108



Bureau Veritas Consumer Product Services Inc. Work Order - T1639
 Radiated Emissions Electric Field 3m Distance EUT Power Input - 24V DC
 Top Peaks Vertical 30-1000MHz Test Site - CH-1
 Notes: Conditions - 23.7°C; 56%RH; 1008mBar
 BLE9117K with hard-wired 24V DC power Test Engineer - AKZ

Data Taken at 04:28:17 PM, Wednesday, July 31, 2019

Frequency (MHz)	Peak Reading (dBµV)	Correction Factor (dB/m)	Adjusted Peak Amplitude (dBµV/m)	Lim1: FCC_pt15_1 09_Class_B (dBµV/m)	Lim1 Margin (dB)	Lim1 Test Results (Pass/Fail)	Worst Margin Lim1 (dB)	Lim2: Cspr_Class_B (dBµV/m)	Lim2 Margin (dB)	Lim2 Test Results (Pass/Fail)	Worst Margin Lim2 (dB)	Antenna Height (cm)	Turntable Azimuth (degrees)
380.194	51.1	-11.2	39.9	46	-6.1	PASS		47.5	-7.6	PASS		100	225
381.213	51.4	-11.2	40.2	46	-5.8	PASS		47.5	-7.3	PASS		100	225
387.178	51.9	-11.2	40.7	46	-5.3	PASS		47.5	-6.8	PASS		100	225
390.185	52.7	-11.1	41.6	46	-4.4	PASS		47.5	-5.9	PASS		100	225
391.204	51.6	-11.1	40.5	46	-5.5	PASS		47.5	-7	PASS		100	225

Bureau Veritas Consumer Product Services Inc. Work Order - T1639
 Radiated Emissions Electric Field 3m Distance EUT Power Input - 24V DC
 30-1000MHz Vertical Data Test Site - CH-1
 Notes: Conditions - 23.7°C; 56%RH; 1008mBar
 BLE9117K with hard-wired 24V DC power Test Engineer - AKZ

Data Taken at 04:28:17 PM, Wednesday, July 31, 2019

Frequency (MHz)	Raw QP Reading (dBµV)	Correction Factor (dB/m)	Adjusted QP Amplitude (dBµV/m)	Lim1: FCC_pt15_1 09_Class_B (dBµV/m)	Margin to Lim1 (dB)	Test Results Lim1 (Pass/Fail)	Worst Margin Lim1 (dB)	Lim2: Cspr_Class_B (dBµV/m)	Margin to Lim2 (dB)	Test Results Lim2 (Pass/Fail)	Worst Margin Lim2 (dB)	Antenna Height (cm)	EUT Azimuth (degrees)
174.687	46.6	-16.3	30.3	43.5	-13.2	PASS		40.5	-10.2	PASS	-10.2	152	29
390.032	45.4	-11.1	34.3	46	-11.7	PASS	-11.7	47.5	-13.2	PASS		144	260

Test Equipment Used

Rev. 7/30/2019

Spectrum Analyzers / Receivers /Preselectors	Range	MN	Mfr	SN	Asset	Cat	Calibration Due
2093 MXE EMI Receiver	20Hz-26.5GHz	N9038A	Agilent	MY51210181	2093	I	11/21/2019

Radiated Emissions Sites	FCC Code	IC Code	VCCI Code	Range	Asset	Cat	Calibration Due
EMI Chamber 1	719150	2762A-6	A-0015	30-1000MHz	1685	I	12/7/2020
EMI Chamber 1	719150	2762A-6	A-0015	1-18GHz	1685	I	12/7/2020

Preamps /Couplers Attenuators / Filters	Range	MN	Mfr	SN	Asset	Cat	Calibration Due
2311 PA	1-1000MHz	PAM-103	COM-POWER	441174	2311	II	10/29/2019

Antennas	Range	MN	Mfr	SN	Asset	Cat	Calibration Due
Red-Black Bilog	30-2000MHz	JB1	Sunol	A091604-2	1106	I	4/26/2021

Meteorological Meters/Chambers	MN	Mfr	SN	Asset	Cat	Calibration Due
Weather Clock (Pressure Only)	BA928	Oregon Scientific	C3166-1	831	I	5/15/2020
Asset #2658	1235C97	Control Company	181683808	2658	I	4/3/2020

Cables	Range	Mfr	Cat	Calibration Due
Asset #2456	9KHz-18GHz	MegaPhase	II	10/31/2019
Asset #2464	9KHz-18GHz	MegaPhase	II	10/31/2019
Asset #2585	9KHz-18GHz	Pasternack	II	5/24/2020

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

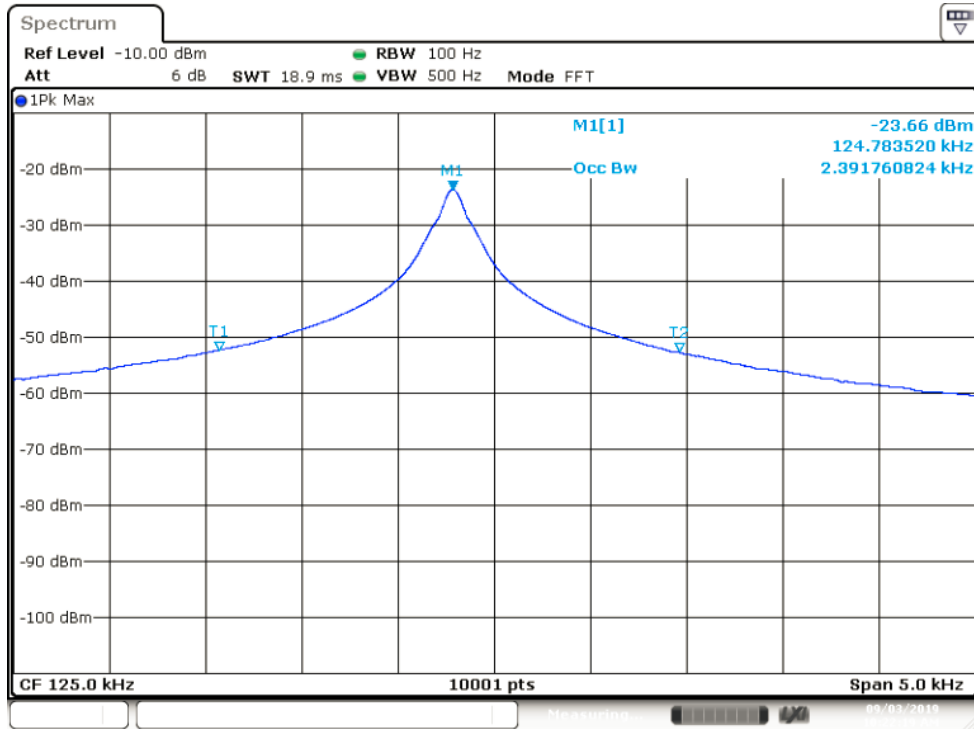


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Occupied Bandwidth 99%



Date: 3.SEP.2019 10:22:19

99% OBW = 2.39kHz

Test Equipment Used

Rev. 7/30/2019

Spectrum Analyzers / Receivers / Preselectors		Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
Rental MXE EMI Receiver(1170725)		20Hz-26.5GHz	N9038A	Agilent	MY51210151	1170725	I	5/30/2020	5/30/2019
FSV40 Signal Analyzer		10Hz-40GHz	FSV40	ROHDE & SCHWARZ	101551	2200	I	10/1/2019	10/1/2018
Meteorological Meters/Chambers			MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
Temp/Humidity Chamber #18			EPX-2H	Espec	137664	1645	I	1/2/2020	1/2/2019
Cables		Range		Mfr		Asset	Cat	Calibration Due	Calibrated on
Asset #2595		9KHz-40GHz		Carlisle		2595	II	3/13/2020	3/13/2019
Antennas		Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
2615 Active Loop Antenna		9KHz-30MHz	6502	EMCO	2049	2615	I	10/30/2019	10/30/2018

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



Conducted Emissions

Bureau Veritas Consumer Product Services Inc. Conducted Emissions per CISPR 16-2-1 Peak Detector Data Notes: EUT Line tested: Line Phase EUT Mode of Operation: 24 VDC	Work Order # - T1639 EUT Power Input - 24VDC Test Site - CEMI-2 Conditions: - 22.5°C; 48.8%RH; 1009mBar Test Engineer - AV
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Data Taken at 12:38:55 PM, Monday, August 05, 2019

Frequency (MHz)	Raw Pk Reading (dBµV)	Correction Factor (dB)	Adjusted Pk Amplitude (dBµV)	QP Lim: Mains_FCC&CISPR_QP_Class_B (dBµV)	Margin to the QP Limit (dB)	Pk to QP Limit Results (Pass/Fail)	Worst Margin (QP Limit) (dB)
0.158	38.8	20.2	59	65.6	-6.5	PASS	-6.5
0.194	34.3	20.2	54.4	63.9	-9.4	PASS	
0.219	35.1	20.2	55.3	62.8	-7.5	PASS	
0.247	32.2	20.3	52.4	61.9	-9.4	PASS	
0.375	28.4	20.1	48.5	58.4	-9.9	PASS	
13.559	30.4	20.5	50.9	60	-9.1	PASS	

Bureau Veritas Consumer Product Services Inc. Conducted Emissions per CISPR 16-2-1, CISPR Average Detector Final Average Detector Data Notes: EUT Line tested: Line Phase EUT Mode of Operation: 24 VDC	Work Order # - T1639 EUT Power Input - 24VDC Test Site - CEMI-2 Conditions: - 22.5°C; 48.8%RH; 1009mBar Test Engineer - AV
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Data Taken at 12:38:55 PM, Monday, August 05, 2019

Frequency (MHz)	Raw Avg Reading (dBµV)	Correction Factor (dB)	Adjusted Avg Amplitude (dBµV)	Av Lim: Mains_FCC&CISPR_Avg_Class_B (dBµV)	Avg Margin (dB)	Avg Results (Pass/Fail)	Worst Avg Margin (dB)
0.149	2.4						
0.155	15.2	20.1	35.3	55.7	-20.4	PASS	
0.168	15.1	20.1	35.3	55	-19.8	PASS	
0.175	15.2	20.3	35.5	54.7	-19.2	PASS	
0.218	13.5	20.2	33.7	52.9	-19.2	PASS	
0.393	10.2	20	30.2	48	-17.8	PASS	-17.8
0.574	7.3	19.9	27.1	46	-18.9	PASS	



Bureau Veritas Consumer Product Services Inc.
 Conducted Emissions per CISPR 16-2-1
 Peak Detector Data
 Notes:
 EUT: Neutral
 EUT Mode of Operation: 24V DC

Work Order # - T1639
 EUT Power Input - 24VDC
 Test Site - CEMI-2
 Conditions: - 22.5°C; 48.8%RH; 1009mBar
 Test Engineer - AV

Data Taken at 12:19:42 PM, Monday, August 05, 2019

Frequency (MHz)	Raw Pk Reading (dBµV)	Correction Factor (dB)	Adjusted Pk Amplitude (dBµV)	QP Lim: Mains_FCC&CISPR_QP_Class_B (dBµV)	Margin to the QP Limit (dB)	Pk to QP Limit Results (Pass/Fail)	Worst Margin (QP Limit) (dB)
0.207	31.1	20.3	51.4	63.3	-11.9	PASS	
0.251	29.2	20.3	49.5	61.7	-12.2	PASS	
0.278	29.8	20.2	50	60.9	-10.8	PASS	
0.336	30.4	20.2	50.5	59.3	-8.8	PASS	-8.8
0.419	26.5	20.1	46.7	57.5	-10.8	PASS	
13.56	30.6	20.5	51.1	60	-8.9	PASS	

Bureau Veritas Consumer Product Services Inc.
 Conducted Emissions per CISPR 16-2-1, CISPR Average Detector
 Final Average Detector Data
 Notes:
 EUT: Neutral
 EUT Mode of Operation: 24V DC

Work Order # - T1639
 EUT Power Input - 24VDC
 Test Site - CEMI-2
 Conditions: - 22.5°C; 48.8%RH; 1009mBar
 Test Engineer - AV

Data Taken at 12:19:42 PM, Monday, August 05, 2019

Frequency (MHz)	Raw Avg Reading (dBµV)	Correction Factor (dB)	Adjusted Avg Amplitude (dBµV)	Av Lim: Mains_FCC&CISPR_Avg_Class_B (dBµV)	Avg Margin (dB)	Avg Results (Pass/Fail)	Worst Avg Margin (dB)
0.189	13.3	20.2	33.5	54.1	-20.6	PASS	
0.225	11.6	20.2	31.8	52.6	-20.8	PASS	
0.235	11.4	20.2	31.7	52.3	-20.6	PASS	
0.264	13.5	20.2	33.8	51.3	-17.6	PASS	
0.379	10.4	20	30.4	48.3	-17.9	PASS	
13.557	20.5	20.5	41	50	-9	PASS	-9

Bureau Veritas Consumer Product Services Inc. Work Order # - T1639
 Conducted Emissions per CISPR 16-2-1 EUT Power Input - PoE (48VDC)
 Peak Detector Data Test Site - CEMI-2
 Notes: Conditions: - 22.5°C; 48.8%RH; 1009mBar
 EUTBLE9117K: Line Test Engineer - AV
 EUT Mode of Operation: PoE

Data Taken at 04:39:44 PM, Monday, August 05, 2019

Frequency (MHz)	Raw Pk Reading (dBµV)	Correction Factor (dB)	Adjusted Pk Amplitude (dBµV)	QP Lim: Mains_FCC&CISPR_QP_Class_B (dBµV)	Margin to the QP Limit (dB)	Pk to QP Limit Results (Pass/Fail)	Worst Margin (QP Limit) (dB)
0.184	37.3	20.3	57.5	64.3	-6.8	PASS	
0.213	34.9	20.2	55.1	63.1	-8	PASS	
0.269	29.3	20.2	49.5	61.2	-11.7	PASS	
0.629	26.8	20.2	47	56	-9	PASS	
0.734	26.6	19.9	46.5	56	-9.5	PASS	
Frequency (MHz)	Raw QP Reading (dBµV)	Factor (dB)	Amplitude (dBµV)	Mains_FCC&CISPR (dBµV)	Limit (dB)	QP Limit Results (Pass/Fail)	(QP Limit) (dB)
10.975	18.271	20.5	38.8	60	-21.2	PASS	-21.2

Bureau Veritas Consumer Product Services Inc. Work Order # - T1639
 Conducted Emissions per CISPR 16-2-1, CISPR Average Detector EUT Power Input - PoE (48 VDC)
 Final Average Detector Data Test Site - CEMI-2
 Notes: Conditions: - 22.5°C; 48.8%RH; 1009mBar
 EUTBLE9117K: Line Test Engineer - AV
 EUT Mode of Operation: PoE

Data Taken at 04:39:44 PM, Monday, August 05, 2019

Frequency (MHz)	Raw Avg Reading (dBµV)	Correction Factor (dB)	Adjusted Avg Amplitude (dBµV)	Av Lim: Mains_FCC&CISPR_Avg_Class_B (dBµV)	Avg Margin (dB)	Avg Results (Pass/Fail)	Worst Avg Margin (dB)
0.157	15.1	20.2	35.3	55.6	-20.4	PASS	
0.159	15.2	20.2	35.3	55.5	-20.2	PASS	
0.231	19.9	20.2	40.1	52.4	-12.3	PASS	
0.629	25.2	20.2	45.4	46	-0.6	PASS	-0.6
0.733	25.2	19.9	45.1	46	-0.9	PASS	
13.56	19.2	20.5	39.7	50	-10.3	PASS	



Bureau Veritas Consumer Product Services Inc. Work Order # - T1639
 Conducted Emissions per CISPR 16-2-1 EUT Power Input - PoE (48 VDC)
 Peak Detector Data Test Site - CEMI-2
 Notes: Conditions: - 22.5°C; 48.8%RH; 1009mBar
 EUT:BLE9117K Neutral Test Engineer - AV
 EUT Mode of Operation: PoE

Data Taken at 04:21:25 PM, Monday, August 05, 2019

Frequency (MHz)	Raw Pk Reading (dBµV)	Correction Factor (dB)	Adjusted Pk Amplitude (dBµV)	QP Lim: Mains_FCC&CISPR_QP_Class_B (dBµV)	Margin to the QP Limit (dB)	Pk to QP Limit Results (Pass/Fail)	Worst Margin (QP Limit) (dB)
0.157	33	20.2	53.2	65.6	-12.4	PASS	
0.419	27	20.1	47.2	57.5	-10.3	PASS	
0.522	30.9	20	50.9	56	-5.1	PASS	
0.73	29.7	20	49.7	56	-6.3	PASS	
0.837	23.3	20.2	43.5	56	-12.5	PASS	
Frequency (MHz)	Raw QP Reading (dBµV)	Factor (dB)	Amplitude (dBµV)	Mains_FCC&CISPR (dBµV)	Limit (dB)	QP Limit Results (Pass/Fail)	(QP Limit) (dB)
0.63	24.738	20.2	44.9	56	-11.1	PASS	-11.1

Bureau Veritas Consumer Product Services Inc. Work Order # - T1639
 Conducted Emissions per CISPR 16-2-1, CISPR Average Detector EUT Power Input - PoE (48 VDC)
 Final Average Detector Data Test Site - CEMI-2
 Notes: Conditions: - 22.5°C; 48.8%RH; 1009mBar
 EUT:BLE9117K Neutral Test Engineer - AV
 EUT Mode of Operation: PoE

Data Taken at 04:21:25 PM, Monday, August 05, 2019

Frequency (MHz)	Raw Avg Reading (dBµV)	Correction Factor (dB)	Adjusted Avg Amplitude (dBµV)	Av Lim: Mains_FCC&CISPR_Avg_Class_B (dBµV)	Avg Margin (dB)	Avg Results (Pass/Fail)	Worst Avg Margin (dB)
0.524	16.7	20	36.7	46	-9.3	PASS	
0.629	23.9	20.2	44.1	46	-1.9	PASS	-1.9
0.734	24.1	19.9	44	46	-2	PASS	



Test Equipment Used

Rev. 7/30/2019

Spectrum Analyzers / Receivers /Preselectors	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
Rental MXE EMI Receiver(1168255)	20Hz-8.4GHz	N9038A	Agilent	MY53290009	1168255	I	8/23/2019	8/23/2018
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	3/19/2020	3/19/2019
LISN Asset 1733	150kHz-30MHz	LI-150A	Com-Power	201095	1733	I	3/19/2020	3/19/2019
Conducted Test Sites (Mains / Telco)	FCC Code		VCCI Code			Cat	Calibration Due	Calibrated on
CEMI 2	719150		A-0015			III	NA	NA
Meteorological Meters/Chambers		MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
Weather Clock (Pressure Only)		BA928	Oregon Scientific	C3166-1	831	I	5/15/2020	5/15/2018
Asset #2655		1235C97	Control Company	181683829	2655	I	4/3/2020	4/3/2019
Cables	Range		Mfr			Cat	Calibration Due	Calibrated on
CEMI-02	9kHz - 2GHz		C-S			II	4/10/2020	4/10/2019

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



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	5.6dB	N/A
CISPR [no table (i.e. floor standing)]	4.6dB	5.2dB (Ucisprr)
CISPR[table present]	6.0dB	
Radiated Emissions (1-26.5GHz) [no table (i.e. floor standing)]	4.6dB	N/A
Radiated Emissions (1-26.5GHz) [table present]	6.3dB	N/A
Radiated Emissions (above 26.5GHz)	4.9dB	N/A
Magnetic Radiated Emissions	5.6dB	N/A
Conducted Emissions		
NIST	3.9dB	N/A
CISPR	3.6dB	3.6dB (Ucisprr)
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^{-6}	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 where 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.



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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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