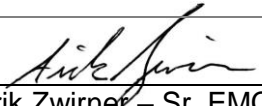
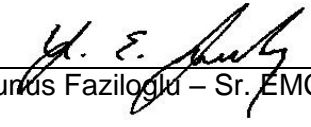




Test Report

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

Report No	ES1024-4
Client	ASSA ABLOY Inc.
Address	110 Sargent Drive New Haven, CT 06511
Phone	203-498-5686
Items tested	Aperio V3 iN100
FCC ID	U4A-SCYMCA1
IC	6982A-SCYMCA1
FRN	0016550824
Equipment Type	Digital Transmission System
Equipment Code	DTS
Emission Designator	2M77D1D
FCC/IC Rule Parts	CFR Title 47 FCC Part 15.247, ISSED Canada RSS-247 Issue 2
Test Dates	1/7/2019 to 1/10/2019
Results	As detailed within this report
Prepared by	 Arik Zwirner – Sr. EMC Engineer
Authorized by	 Yurcus Faziloglu – Sr. EMC Engineer
Issue Date	<u>2/25/2019</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.

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.



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



Contents

Contents.....	2
Summary and Test Methodology.....	3
Product Tested - Configuration Documentation	4
Modifications Required for Compliance	4
Test Results	5
<i>Radiated Spurious Emissions</i>	5
<i>AC Line Conducted Emissions</i>	15
Measurement Uncertainty.....	19
Conditions Of Testing.....	20

Form Final Report REV 12-07-15



Summary and Test Methodology

This test report supports an application for Class 2 Permissive Change for a transmitter operating pursuant to:

CFR Title 47 FCC Part 15.247, ISED Canada RSS-247 Issue 2

EUT is the Aperio V3 iN100. It operates in the 2405MHz to 2475MHz frequency range.

All testing was performed according to the following rules/procedures/documents;
CFR Title 47 FCC Part 15.247, ISED Canada RSS-247 Issue 2, ISED Canada RSS-Gen Issue 5, FCC KDB 558074 D01 15.247 Measurement Guidance v05 and ANSI C63.10-2013.

Radiated Emissions were maximized by rotating the device around its installation axes as well as varying the test antenna's height and polarity. EUT antenna is internal and cannot be maximized separately.

The EUT operating voltage is 9VDC from battery. Fresh batteries were used during testing. The environmental conditions during each test are detailed in the results tables for each section. Following bandwidths were used during radiated spurious and line conducted emissions testing.

Frequency	RBW	VBW
150kHz-30MHz	9kHz	30kHz
30MHz-1GHz	120kHz	1MHz
1-25GHz	1MHz	3MHz

EUT was tested for radiated spurious emissions and AC line conducted emissions and met the corresponding requirements. Test sample was received in good condition.

Product Tested - Configuration Documentation

EUT Configuration											
Work Order:	S1024										
Company:	Assa Abloy										
Company Address:	110 Sargent Drive										
	New Haven, CT 06511										
Contact:	Steve Morse										
	MN			PN			SN				
EUT:	iN100 (with New BT Module)			iN100			1				
EUT Description:	Aperio V3										
EUT Max Frequency:	2475 MHz										
EUT Min Frequency:	0.032 MHz										
Support Equipment	MN			SN							
AC/DC Brick	SYS1308-2424-W2			SW-241PR							
Laptop computer	dell										
Sargent 12V Supply	3521			Sample 1							
Sargent 24V Supply	3520			Sample 1							
Port Label	Port Type	# ports	# populated	cable type	shielded	ferrites	length (m)	in/out	under test	comment	
DC Power input	Power DC	1	1	Power DC	No	No	10	in	yes	*not used for emissions. emissions done with battery power	
USB setup port	USB	1	1	USB	Yes	No	1	in	yes	*used to setup the radio power and channels	
Software Operating Mode Description:											
Commands are given to the EUT over USB, setting up the radio parameters. Then the laptop and usb are disconnected and the EUT continues operating in that mode until battery power is removed.											

Clock Frequencies	
frequencies (MHz)	2475, 48, 32, 27.12, 18, 16, 13.56, 8, 0.125, 0.1, 0.032768, 0.03216, 0.032

Modifications Required for Compliance

None.

Test Results

Radiated Spurious Emissions

LIMITS

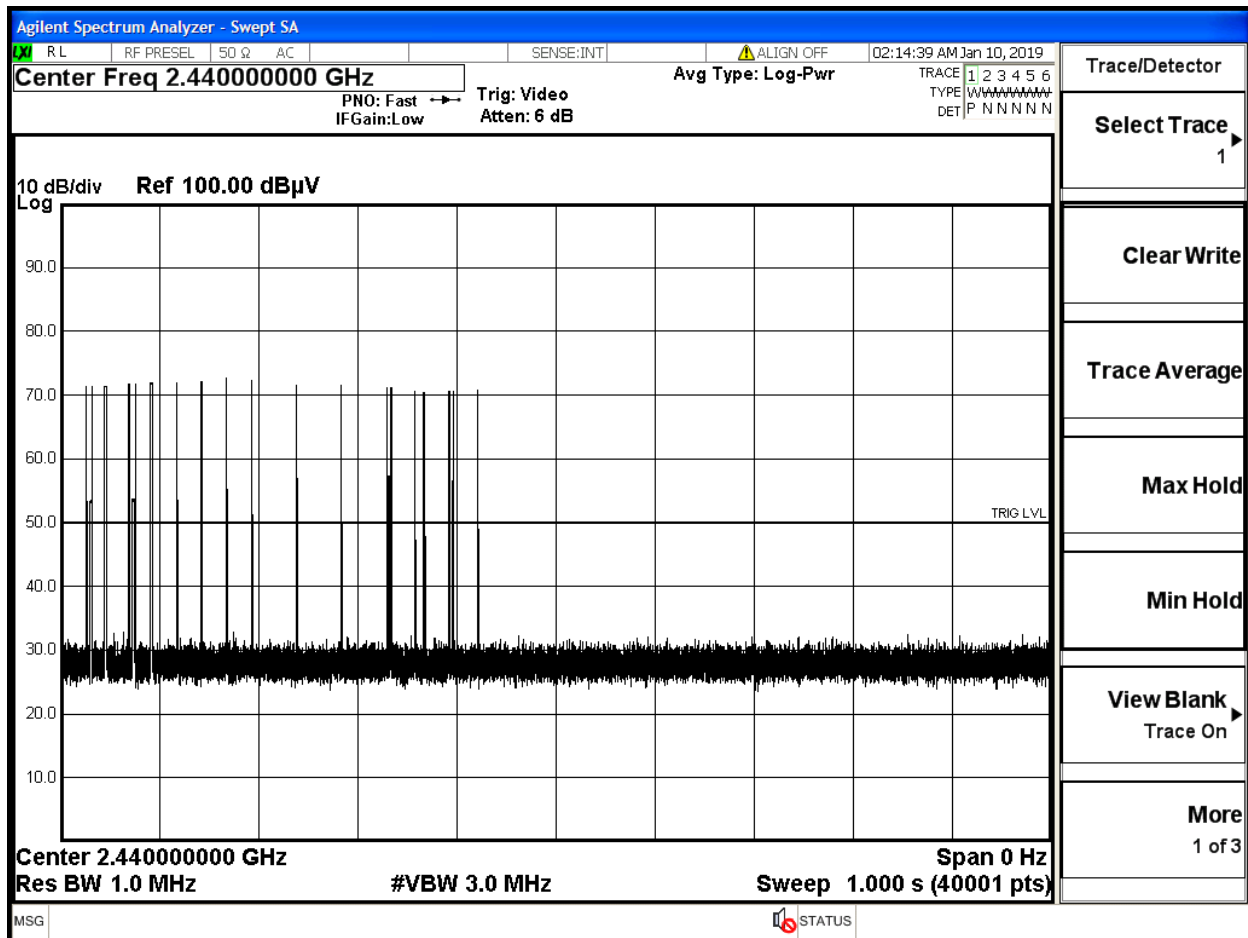
Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a).

[15.247(d)]

For the 2nd harmonic of the transmitter, duty-cycle correction factor was used to compute average values from peak values.

Worst Case 100ms duty-cycle is 13.75% (calculated from trace data via software)

DCCF = $20 \cdot \log(13.75/100) = -17.2\text{dB}$



Curtis Straus - a Bureau Veritas Company
 Radiated Emissions Electric Field 3m Distance
 Top Peaks Horizontal 30-1000MHz
 Operator: AKZ
 Notes:
 ZigBee Channel 11

Work Order - S1024
 EUT Power Input - Battery
 Test Site - CH-1
 Conditions - 23°C; 21%RH; 1023mBar

Data Taken at 11:35:42 AM, Monday, January 07, 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)
30.412	32	-7.7	24.2	40	-15.8	PASS		40.5	-16.3	PASS	-16.3	150	135
162.284	35.4	-15.9	19.5	43.5	-24.1	PASS		40.5	-21	PASS		250	45
946.189	32.3	-1.9	30.4	46	-15.6	PASS	-15.6	47.5	-17.1	PASS		200	270

Curtis Straus - a Bureau Veritas Company
 Radiated Emissions Electric Field 3m Distance
 Top Peaks Vertical 30-1000MHz
 Operator: AKZ
 Notes:
 ZigBee Channel 11

Work Order - S1024
 EUT Power Input - Battery
 Test Site - CH-1
 Conditions - 23°C; 21%RH; 1023mBar

Data Taken at 11:35:42 AM, Monday, January 07, 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)
30.388	33.2	-7.7	25.5	40	-14.5	PASS	-14.5	40.5	-15	PASS	-15	100	315
162.211	39.9	-15.9	23.9	43.5	-19.6	PASS		40.5	-16.6	PASS		100	225
165.267	38.7	-16.1	22.6	43.5	-20.9	PASS		40.5	-17.9	PASS		150	225
440.067	34.2	-10.2	24	46	-22	PASS		47.5	-23.5	PASS		100	180
920.46	32.3	-2.1	30.2	46	-15.8	PASS		47.5	-17.3	PASS		100	270
985.111	31.8	-1.3	30.5	54	-23.5	PASS		47.5	-17	PASS		200	225

30-1000MHz Low channel

Curtis Straus - a Bureau Veritas Company
 Radiated Emissions Electric Field 3m Distance
 Top Peaks Horizontal 30-1000MHz
 Operator: AKZ
 Notes:
 ZigBee Channel 18

Work Order - S1024
 EUT Power Input - Battery
 Test Site - CH-1
 Conditions - 23°C; 21%RH; 1023mBar

Data Taken at 02:45:20 PM, Monday, January 07, 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)
30.267	32.4	-7.6	24.8	40	-15.2	PASS	-15.2	40.5	-15.7	PASS	-15.7	150	90
127.194	32.9	-14.2	18.7	43.5	-24.8	PASS		40.5	-21.8	PASS		250	0
959.721	32	-1.9	30.1	46	-16	PASS		47.5	-17.4	PASS		250	270

Curtis Straus - a Bureau Veritas Company
 Radiated Emissions Electric Field 3m Distance
 Top Peaks Vertical 30-1000MHz
 Operator: AKZ
 Notes:
 ZigBee Channel 18

Work Order - S1024
 EUT Power Input - Battery
 Test Site - CH-1
 Conditions - 23°C; 21%RH; 1023mBar

Data Taken at 02:45:19 PM, Monday, January 07, 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)
30.703	32.8	-8	24.8	40	-15.2	PASS	-15.2	40.5	-15.7	PASS	-15.7	100	180
162.09	39	-15.9	23.1	43.5	-20.5	PASS		40.5	-17.4	PASS		150	225
165.315	39.8	-16.1	23.7	43.5	-19.9	PASS		40.5	-16.8	PASS		100	225
554.431	33.6	-8.2	25.3	46	-20.7	PASS		47.5	-22.2	PASS		200	315
695.371	33.7	-5.9	27.8	46	-18.2	PASS		47.5	-19.7	PASS		150	180
927.371	32.4	-2	30.4	46	-15.7	PASS		47.5	-17.1	PASS		200	315

30-1000MHz Middle channel

Curtis Straus - a Bureau Veritas Company
 Radiated Emissions Electric Field 3m Distance
 Top Peaks Horizontal 30-1000MHz
 Operator: AKZ
 Notes:
 ZigBee Channel 25

Work Order - S1024
 EUT Power Input - Battery
 Test Site - CH-1
 Conditions - 23°C; 21%RH; 1023mBar

Data Taken at 03:38:21 PM, Monday, January 07, 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)
30.461	32.4	-7.8	24.6	40	-15.4	PASS	-15.4	40.5	-15.9	PASS	-15.9	250	225
133.548	33.4	-14.4	18.9	43.5	-24.6	PASS		40.5	-21.6	PASS		250	0
162.308	36.4	-15.9	20.5	43.5	-23	PASS		40.5	-20	PASS		200	45
921.115	31.9	-2.1	29.8	46	-16.2	PASS		47.5	-17.7	PASS		200	135
972.112	32.2	-1.7	30.5	54	-23.4	PASS		47.5	-17	PASS		150	270

Curtis Straus - a Bureau Veritas Company
 Radiated Emissions Electric Field 3m Distance
 Top Peaks Vertical 30-1000MHz
 Operator: AKZ
 Notes:
 ZigBee Channel 25

Work Order - S1024
 EUT Power Input - Battery
 Test Site - CH-1
 Conditions - 23°C; 21%RH; 1023mBar

Data Taken at 03:38:21 PM, Monday, January 07, 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)
30.703	33.1	-8	25.1	40	-14.9	PASS	-14.9	40.5	-15.4	PASS	-15.4	150	315
162.041	39.8	-15.9	23.9	43.5	-19.6	PASS		40.5	-16.6	PASS		100	225
165.267	40.7	-16.1	24.6	43.5	-18.9	PASS		40.5	-15.9	PASS		150	225
168.249	38.8	-16.3	22.5	43.5	-21	PASS		40.5	-18	PASS		100	225
778.84	33	-4.2	28.7	46	-17.3	PASS		47.5	-18.8	PASS		100	0
947.523	32.1	-1.9	30.2	46	-15.8	PASS		47.5	-17.3	PASS		100	180

30-1000MHz High channel



BUREAU
VERITAS

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



Curtis Straus - a Bureau Veritas Company
 Radiated Emissions Electric Field 3m Distance
 1-6GHz Horizontal Data
 Operator: AKZ
 Notes:
 ZigBee Channel 11, BLE Channel 19

Work Order - S1024
 EUT Power Input - Battery
 Test Site - CH-1
 Conditions - 24°C; 21%RH; 1001mBar
 DCCF: -17.2dB

Data Taken at 11:20:17 AM, Wednesday, January 09, 2019

Frequency (MHz)	Raw Peak Reading (dBμV)	Correction Factor (dB/m)	Adjusted Peak Amplitude (dBμV/m)	Pk Lim: FCC_pt15_2 09_Peak (dBμV/m)	Peak Margin (dB)	Peak Results (Pass/Fail)	Worst Peak Margin (dB)	DCCF (dB)	Adjusted Avg Amplitude (dBμV/m)	Av Lim: FCC_pt15_2 09_Average (dBμV/m)	Avg Margin (dB)	Avg Results (Pass/Fail)	Antenna Height (cm)	EUT Azimuth (degrees)
4810	57.7	-1.3	56.3	74	-17.7	PASS	-17.7	-17.2	39.1	54	-14.9	PASS	220	53

Curtis Straus - a Bureau Veritas Company
 Radiated Emissions Electric Field 3m Distance
 1-6GHz Vertical Data
 Operator: AKZ
 Notes:
 ZigBee Channel 11, BLE Channel 19

Work Order - S1024
 EUT Power Input - Battery
 Test Site - CH-1
 Conditions - 24°C; 21%RH; 1001mBar
 0
 0

Data Taken at 11:20:17 AM, Wednesday, January 09, 2019

Frequency (MHz)	Raw Peak Reading (dBμV)	Raw Avg Reading (dBμV)	Correction Factor (dB/m)	Adjusted Peak Amplitude (dBμV/m)	Pk Lim: FCC_pt15_2 09_Peak (dBμV/m)	Peak Margin (dB)	Peak Results (Pass/Fail)	Worst Peak Margin (dB)	Adjusted Avg Amplitude (dBμV/m)	Av Lim: FCC_pt15_2 09_Average (dBμV/m)	Avg Margin (dB)	Avg Results (Pass/Fail)	Worst Avg Margin (dB)	Antenna Height (cm)	EUT Azimuth (degrees)
2122.4	44.5	35.4	-5	39.4	74	-34.6	PASS		30.4	54	-23.6	PASS		275	71
4810	50.5	47.8	-1.3	49.2	74	-24.8	PASS	-24.8	46.5	54	-7.5	PASS	-7.5	125	327
5481.3	42.2	32.7	1.1	43.3	74	-30.7	PASS		33.8	54	-20.2	PASS		105	230

1-6GHz Low Channel

Curtis Straus - a Bureau Veritas Company
 Radiated Emissions Electric Field 3m Distance
 1-6GHz Horizontal Data
 Operator: AKZ
 Notes:
 ZigBee Channel 18, BLE Channel 19

Work Order - S1024
 EUT Power Input - Battery
 Test Site - CH-1
 Conditions - 24°C; 21%RH; 1001mBar
 DCCF: -17.2dB

Data Taken at 01:16:05 PM, Wednesday, January 09, 2019

Frequency (MHz)	Raw Peak Reading (dBμV)	Correction Factor (dB/m)	Adjusted Peak Amplitude (dBμV/m)	Pk Lim: FCC_pt15_2 09_Peak (dBμV/m)	Peak Margin (dB)	Peak Results (Pass/Fail)	Worst Peak Margin (dB)	DCCF (dB)	Adjusted Avg Amplitude (dBμV/m)	Av Lim: FCC_pt15_2 09_Average (dBμV/m)	Avg Margin (dB)	Avg Results (Pass/Fail)	Antenna Height (cm)	EUT Azimuth (degrees)
4880.1	59.4	-0.7	58.8	74	-15.2	PASS	-15.2	-17.2	41.6	54	-12.4	Pass	225	48

Curtis Straus - a Bureau Veritas Company
 Radiated Emissions Electric Field 3m Distance
 Top Peaks Vertical 1-6GHz
 Operator: AKZ
 Notes:
 ZigBee Channel 18, BLE Channel 19

Work Order - S1024
 EUT Power Input - Battery
 Test Site - CH-1
 Conditions - 24°C; 21%RH; 1001mBar

Data Taken at 01:16:05 PM, Wednesday, January 09, 2019

Frequency (MHz)	Raw Peak Reading (dBμV)	Correction Factor (dB/m)	Adjusted Peak Amplitude (dBμV/m)	Pk Lim: FCC_pt15_2 09_Peak (dBμV/m)	Margin to Peak Limit (dB)	Peak Limit Test Results (Pass/Fail)	Peak Limit Worst Margin (dB)	Av Lim: FCC_pt15_2 09_Average (dBμV/m)	Margin to Average Limit (dB)	Average Limit Test Result (Pass/Fail)	Average Limit Worst Margin (dB)	Antenna Height (cm)	EUT Azimuth (degrees)
2131.25	47.8	-5	42.8	74	-31.2	PASS		54	-11.2	PASS		300	47
4880	48.2	-0.7	47.6	74	-26.4	PASS		54	-6.4	PASS		100	47
5762.75	47.2	0.9	48	74	-26	PASS	-26	54	-6	PASS	-6	200	146

1-6GHz Mid Channel



BUREAU
VERITAS

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



Curtis Straus - a Bureau Veritas Company
 Radiated Emissions Electric Field 3m Distance
 1-6GHz Horizontal Data
 Operator: AKZ
 Notes:
 ZigBee Channel 25, BLE Channel 19

Work Order - S1024
 EUT Power Input - Battery
 Test Site - CH-1
 Conditions - 24°C; 21%RH; 1001mBar
 DCCF: -17.2dB

Data Taken at 01:46:25 PM, Wednesday, January 09, 2019

Frequency (MHz)	Raw Peak Reading (dBμV)	Correction Factor (dB/m)	Adjusted Peak Amplitude (dBμV/m)	Pk Lim: FCC_pt15_2 09_Peak (dBμV/m)	Peak Margin (dB)	Peak Results (Pass/Fail)	Worst Peak Margin (dB)	DCCF (dB)	Adjusted Avg Amplitude (dBμV/m)	Av Lim: FCC_pt15_2 09_Average (dBμV/m)	Avg Margin (dB)	Avg Results (Pass/Fail)	Antenna Height (cm)	EUT Azimuth (degrees)
4950.1	58.2	-0.3	57.9	74	-16.1	PASS	-16.1	-17.2	40.7	54	-13.3	Pass	211	18

Curtis Straus - a Bureau Veritas Company
 Radiated Emissions Electric Field 3m Distance
 Top Peaks Vertical 1-6GHz
 Operator: AKZ
 Notes:
 ZigBee Channel 25, BLE Channel 19

Work Order - S1024
 EUT Power Input - Battery
 Test Site - CH-1
 Conditions - 24°C; 21%RH; 1001mBar

Data Taken at 01:46:25 PM, Wednesday, January 09, 2019

Frequency (MHz)	Raw Peak Reading (dBμV)	Correction Factor (dB/m)	Adjusted Peak Amplitude (dBμV/m)	Pk Lim: FCC_pt15_2 09_Peak (dBμV/m)	Margin to Peak Limit (dB)	Peak Limit Test Results (Pass/Fail)	Peak Limit Worst Margin (dB)	Av Lim: FCC_pt15_2 09_Average (dBμV/m)	Margin to Average Limit (dB)	Average Limit Test Result (Pass/Fail)	Average Limit Worst Margin (dB)	Antenna Height (cm)	EUT Azimuth (degrees)
2107.25	47.5	-5.2	42.3	74	-31.7	PASS		54	-11.7	PASS		100	315
2883.38	47.8	-3.2	44.6	74	-29.4	PASS		54	-9.4	PASS		200	315
3972.88	45.7	-1.3	44.4	74	-29.6	PASS		54	-9.6	PASS		300	218
4949.88	50.1	-0.3	49.8	74	-24.2	PASS	-24.2	54	-4.2	PASS	-4.2	100	315
5413.13	45.5	1.1	46.6	74	-27.4	PASS		54	-7.4	PASS		200	146

1-6GHz High Channel



BUREAU
VERITAS

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



Curtis Straus - a Bureau Veritas Company
 Radiated Emissions Electric Field 1m Distance
 Top Peaks Horizontal 6-18GHz
 Operator: AKZ
 Notes:
 ZigBee Channel 11, BLE Channel 19

Work Order - S1024
 EUT Power Input - Battery
 Test Site - CH-1
 Conditions - 24°C; 21%RH; 1001mBar

Data Taken at 03:34:07 PM, Wednesday, January 09, 2019

Frequency (MHz)	Raw Peak Reading (dBμV)	Correction Factor (dB/m)	Adjusted Peak Amplitude (dBμV/m)	Pk Lim: FCC_pt15_2 09_Peak (dBμV/m)	Margin to Peak Limit (dB)	Peak Limit Test Results (Pass/Fail)	Peak Limit Worst Margin (dB)	Av Lim: FCC_pt15_2 09_Average (dBμV/m)	DCCF -17.2dB	Margin to Avg Limit (dB)	Avg Limit Test Results (Pass/Fail)	Avg Limit Worst Margin (dB)	Antenna Height (cm)	EUT Azimuth (degrees)
7215	60.1	5.1	65.1	83.5	-18.4	PASS	-18.4	63.5	-17.2	-15.6	PASS		200	22
7320.3	53.5	5	58.5	83.5	-25	PASS		63.5		-5	PASS		200	292
9620.1	54.3	6.8	61.1	83.5	-22.4	PASS		63.5		-2.4	PASS	-2.4	200	71
12024.9	50.7	9.4	60.1	83.5	-23.4	PASS		63.5		-3.4	PASS		200	47
14007.9	45.3	13.8	59.1	83.5	-24.4	PASS		63.5		-4.4	PASS		100	97

Curtis Straus - a Bureau Veritas Company
 Radiated Emissions Electric Field 1m Distance
 Top Peaks Vertical 6-18GHz
 Operator: AKZ
 Notes:
 ZigBee Channel 11, BLE Channel 19

Work Order - S1024
 EUT Power Input - Battery
 Test Site - CH-1
 Conditions - 24°C; 21%RH; 1001mBar

Data Taken at 03:34:07 PM, Wednesday, January 09, 2019

Frequency (MHz)	Raw Peak Reading (dBμV)	Correction Factor (dB/m)	Adjusted Peak Amplitude (dBμV/m)	Pk Lim: FCC_pt15_2 09_Peak (dBμV/m)	Margin to Peak Limit (dB)	Peak Limit Test Results (Pass/Fail)	Peak Limit Worst Margin (dB)	Av Lim: FCC_pt15_2 09_Average (dBμV/m)	DCCF -17.2dB	Margin to Avg Limit (dB)	Avg Limit Test Results (Pass/Fail)	Avg Limit Worst Margin (dB)	Antenna Height (cm)	EUT Azimuth (degrees)
7215	62.3	5.1	67.3	83.5	-16.2	PASS	-16.2	63.5	-17.2	-13.4	PASS		175	0
7320.3	51.8	5	56.9	83.5	-26.6	PASS		63.5		-6.6	PASS		200	23
9620.1	53.9	6.8	60.7	83.5	-22.8	PASS		63.5		-2.8	PASS	-2.8	150	47
14376.3	46.9	13	59.9	83.5	-23.6	PASS		63.5		-3.6	PASS		150	195

6-18GHz Low Channel

Curtis Straus - a Bureau Veritas Company
 Radiated Emissions Electric Field 1m Distance
 Top Peaks Horizontal 6-18GHz
 Operator: AKZ
 Notes:
 ZigBee Channel 18, BLE Channel 19

Work Order - S1024
 EUT Power Input - Battery
 Test Site - CH-1
 Conditions - 24°C; 21%RH; 1001mBar

Data Taken at 04:34:34 PM, Wednesday, January 09, 2019

Frequency (MHz)	Raw Peak Reading (dBμV)	Correction Factor (dB/m)	Adjusted Peak Amplitude (dBμV/m)	Pk Lim: FCC_pt15_2 09_Peak (dBμV/m)	Margin to Peak Limit (dB)	Peak Limit Test Results (Pass/Fail)	Peak Limit Worst Margin (dB)	Av Lim: FCC_pt15_2 09_Average (dBμV/m)	DCCF -17.2dB	Margin to Avg Limit (dB)	Avg Limit Test Results (Pass/Fail)	Avg Limit Worst Margin (dB)	Antenna Height (cm)	EUT Azimuth (degrees)
7320	62.1	5	67.1	83.5	-16.4	PASS	-16.4	63.5	-17.2	-13.6	PASS		200	300
9760.2	54.5	7.3	61.7	83.5	-21.8	PASS		63.5		-1.8	PASS	-1.8	200	55
13971.3	46.4	13.5	59.8	83.5	-23.7	PASS		63.5		-3.7	PASS		125	74

Curtis Straus - a Bureau Veritas Company
 Radiated Emissions Electric Field 1m Distance
 Top Peaks Vertical 6-18GHz
 Operator: AKZ
 Notes:
 ZigBee Channel 18, BLE Channel 19

Work Order - S1024
 EUT Power Input - Battery
 Test Site - CH-1
 Conditions - 24°C; 21%RH; 1001mBar

Data Taken at 04:34:34 PM, Wednesday, January 09, 2019

Frequency (MHz)	Raw Peak Reading (dBμV)	Correction Factor (dB/m)	Adjusted Peak Amplitude (dBμV/m)	Pk Lim: FCC_pt15_2 09_Peak (dBμV/m)	Margin to Peak Limit (dB)	Peak Limit Test Results (Pass/Fail)	Peak Limit Worst Margin (dB)	Av Lim: FCC_pt15_2 09_Average (dBμV/m)	DCCF -17.2dB	Margin to Avg Limit (dB)	Avg Limit Test Results (Pass/Fail)	Avg Limit Worst Margin (dB)	Antenna Height (cm)	EUT Azimuth (degrees)
7320	64	5	69	83.5	-14.5	PASS	-14.5	63.5	-17.2	-11.7	PASS		175	0
9760.2	52.1	7.3	59.4	83.5	-24.1	PASS		63.5		-4.1	PASS		175	72
14257.8	46.3	13.1	59.4	83.5	-24.1	PASS		63.5		-4.1	PASS	-4.1	150	145

6-18GHz Mid Channel



Curtis Straus - a Bureau Veritas Company
 Radiated Emissions Electric Field 1m Distance
 6-18GHz Horizontal Data
 Operator: AKZ
 Notes:
 ZigBee Channel 25, BLE Channel 19

Work Order - S1024
 EUT Power Input - Battery
 Test Site - CH-1
 Conditions - 24°C; 21%RH; 1001mBar

Data Taken at 09:59:41 AM, Thursday, January 10, 2019

Frequency (MHz)	Raw Peak Reading (dBμV)	Raw Avg Reading (dBμV)	Correction Factor (dB/m)	Adjusted Peak Amplitude (dBμV/m)	Pk Lim: FCC_pt15_2 09_Peak (dBμV/m)	Peak Margin (dB)	Peak Test Results (Pass/Fail)	Worst Peak Margin (dB)	Adjusted Avg Amplitude (dBμV/m)	Av Lim: FCC_pt15_2 09_Average (dBμV/m)	Avg Margin (dB)	Avg Test Results (Pass/Fail)	Worst Avg Margin (dB)	Antenna Height (cm)	EUT Azimuth (degrees)
7425	58.3	56.9	5.6	63.9	83.5	-19.6	PASS	-19.6	62.5	63.5	-1	PASS	-1	199	18
17868.7	42.9	34.2	19.8	62.7	83.5	-20.8	PASS		54	63.5	-9.5	PASS		100	333

Curtis Straus - a Bureau Veritas Company
 Radiated Emissions Electric Field 1m Distance
 6-18GHz Vertical Data
 Operator: AKZ
 Notes:
 ZigBee Channel 25, BLE Channel 19

Work Order - S1024
 EUT Power Input - Battery
 Test Site - CH-1
 Conditions - 24°C; 21%RH; 1001mBar

Data Taken at 09:59:41 AM, Thursday, January 10, 2019

Frequency (MHz)	Raw Peak Reading (dBμV)	Raw Avg Reading (dBμV)	Correction Factor (dB/m)	Adjusted Peak Amplitude (dBμV/m)	Pk Lim: FCC_pt15_2 09_Peak (dBμV/m)	Peak Margin (dB)	Peak Test Results (Pass/Fail)	Worst Peak Margin (dB)	Adjusted Avg Amplitude (dBμV/m)	Av Lim: FCC_pt15_2 09_Average (dBμV/m)	Avg Margin (dB)	Avg Test Results (Pass/Fail)	Worst Avg Margin (dB)	Antenna Height (cm)	EUT Azimuth (degrees)
7425	42.8	32.7	5.6	48.4	83.5	-35.1	PASS		38.3	63.5	-25.2	PASS		200	218
17852.1	43.7	34.3	19.9	63.6	83.5	-19.9	PASS	-19.9	54.2	63.5	-9.3	PASS	-9.3	200	340

6-18GHz High Channel

Radiated Emissions Table

Date: 10-Jan-19		Company: Assa Abloy				Work Order: S1024									
Engineer: AKZ						EUT Operating Voltage/Frequency: Battery									
Temp: 24°C		Humidity: 21%				Pressure: 991mbar									
Frequency Range: 18-25GHz						Measurement Distance: 0.1 m									
Notes: ZigBee Channels 11, 18, & 25. BLE Channel 19															
Antenna Polarization (H/V)	Frequency (MHz)	Peak Reading (dBμV)	Average Reading (dBμV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Peak Reading (dBμV/m)	Adjusted Avg Reading (dBμV/m)	FCC Class B High Frequency - Peak			FCC Class B High Frequency - Average			
									Limit (dBμV/m)	Margin (dB)	Result (Pass/Fail)	Limit (dBμV/m)	Margin (dB)	Result (Pass/Fail)	
									NO EMISSIONS WITHIN 20dB OF THE LIMIT.						---
Test Site: EMI Chamber 1		Cable 1: Asset #2324				Cable 2: ---				Cable 3: ---					
Analyzer: Gold		Preamp: 18-26.5GHz				Antenna: 18-26.5GHz Horn				Preselector: ---					
CSsoft Radiated Emissions Calculator v 1.017.211												Copyright Curtis-Straus LLC 2000			
Adjusted Reading = Reading - Preamp Factor + Antenna Factor + Cable Factor															

18-25GHz All Channels

Rev. 1/5/2019

Spectrum Analyzers / Receivers / Preselectors	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
2093 MXE EMI Receiver	20Hz-26.5GHz	N9038A	Agilent	MY51210181	2093	I	11/21/2019	11/21/2018
Radiated Emissions Sites	FCC Code	IC Code	VCCI Code	Range	Asset	Cat	Calibration Due	Calibrated on
EMI Chamber 1	719150	2762A-6	A-0015	30-1000MHz	1685	I	12/7/2020	12/7/2018
EMI Chamber 1	719150	2762A-6	A-0015	1-18GHz	1685	I	12/7/2020	12/7/2018
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
TH A#2082		HTC-1	HDE		2082	II	3/23/2019	3/23/2018
Cables	Range		Mfr			Cat	Calibration Due	Calibrated on
Asset #2456	9KHz-18GHz		MegaPhase			II	10/31/2019	10/31/2018
Asset #2464	9KHz-18GHz		MegaPhase			II	10/31/2019	10/31/2018
Asset #2480	9KHz-18GHz		MegaPhase			II	10/29/2019	10/29/2018
2489(6dB)	9KHz-18GHz					II	11/27/2019	11/27/2018

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

Rev. 2/5/2019

Spectrum Analyzers / Receivers / Preselectors	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
2093 MXE EMI Receiver	20Hz-26.5GHz	N9038A	Agilent	MY51210181	2093	I	11/21/2019	11/21/2018
Radiated Emissions Sites	FCC Code	IC Code	VCCI Code	Range	Asset	Cat	Calibration Due	Calibrated on
EMI Chamber 1	719150	2762A-6	A-0015	30-1000MHz	1685	I	12/7/2020	12/7/2018
EMI Chamber 1	719150	2762A-6	A-0015	1-18GHz	1685	I	12/7/2020	12/7/2018
Preamps / Couplers Attenuators / Filters	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
8449B HF Preamp	1-18GHz	8449B	Agilent	1149055		II	11/26/2019	11/26/2018
2116 BRF	0.009-18000MHz	BRM50702	Micro-Tronics	G226	2116	II	11/8/2019	11/8/2018
Antennas	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
Orange Horn	1-18GHz	3115	EMCO	0004-6123	390	I	11/6/2020	11/6/2018
Meteorological Meters/Chambers		MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
TH A#2077		HTC-1	HDE		2077	II	3/23/2019	3/23/2018
TH A#2082		HTC-1	HDE		2082	II	3/23/2019	3/23/2018
Cables	Range		Mfr			Cat	Calibration Due	Calibrated on
Asset #2464	9KHz-18GHz		MegaPhase			II	10/31/2019	10/31/2018
Asset #2465	9KHz-18GHz		MegaPhase			II	10/31/2019	10/31/2018
Asset #2480	9KHz-18GHz		MegaPhase			II	10/29/2019	10/29/2018

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

Rev. 2/5/2019

Spectrum Analyzers / Receivers / Preselectors	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
Gold	100Hz-26.5 GHz	E4407B	Agilent	MY45113816	1284	I	3/19/2019	3/19/2018
Radiated Emissions Sites	FCC Code	IC Code	VCCI Code	Range	Asset	Cat	Calibration Due	Calibrated on
EMI Chamber 1	719150	2762A-6	A-0015	30-1000MHz	1685	I	12/7/2020	12/7/2018
EMI Chamber 1	719150	2762A-6	A-0015	1-18GHz	1685	I	12/7/2020	12/7/2018
Preamps / Couplers Attenuators / Filters	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
HF (Yellow)	18-26.5GHz	AFS4-18002850-60-8P-4	CS	467559	1266	II	10/24/2019	10/24/2018
Antennas	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
HF (White) Horn	18-26.5GHz	801-WLM	Waveline	758	758	III	Verify before Use	date of test
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
TH A#2082		HTC-1	HDE		2082	II	3/23/2019	3/23/2018
Cables	Range		Mfr			Cat	Calibration Due	Calibrated on
Asset #2324	1-26.5GHz	TM26-S1S1-120	MEGAPHASE	17139101 001	2324	II	8/9/2019	8/9/2018

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 (dB μ V)	Average limit (dB μ V)
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

Curtis Straus - a Bureau Veritas Company Conducted Emissions per CISPR 16-2-1 Peak Detector Data Notes: EUT Line tested: 120VAC/60Hz; Neutral (line 0)	Work Order # - S1024 EUT Power Input - 120VAC/ 60Hz Test Site - CEMI-3 Conditions: - 19.4°C; 35%RH; 1003mBar Test Engineer - Patrick Crozier Witnessed by - Steve Morse
--	--

Data Taken at 05:03:45 PM, Friday, January 11, 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)
0.15	36	20.7	56.7	66.0	-9.3	PASS	
0.167	33.8	20.8	54.6	65.1	-10.5	PASS	
0.213	29.9	20.8	50.7	63.1	-12.4	PASS	
0.251	32.8	20.8	53.5	61.7	-8.2	PASS	-8.2
0.315	26.6	20.8	47.3	59.8	-12.5	PASS	
0.51	20.1	20.8	40.8	56.0	-15.2	PASS	

Curtis Straus - a Bureau Veritas Company Conducted Emissions per CISPR 16-2-1, CISPR Average Detector Quick Average Detector Data Notes: EUT Line tested: 120VAC/60Hz; Neutral (line 0)	Work Order # - S1024 EUT Power Input - 120VAC/ 60Hz Test Site - CEMI-3 Conditions: - 19.4°C; 35%RH; 1003mBar Test Engineer - Patrick Crozier Witnessed by - Steve Morse
---	--

Data Taken at 05:03:45 PM, Friday, January 11, 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)
0.155	26.2	20.7	46.9	55.7	-8.8	PASS	
0.251	22.9	20.8	43.6	51.7	-8.1	PASS	-8.1
0.312	20.5	20.8	41.2	49.9	-8.7	PASS	
0.337	18.5	20.8	39.2	49.3	-10.1	PASS	
0.505	12.3	20.8	33.1	46.0	-12.9	PASS	
0.582	12.2	20.8	32.9	46.0	-13.1	PASS	

Curtis Straus - a Bureau Veritas Company

Conducted Emissions per CISPR 16-2-1

Peak Detector Data

Notes:

EUT Line tested: 120VAC/60Hz; Phase (line 1)

Work Order # - S1024

EUT Power Input - 120VAC/ 60Hz

Test Site - CEMI-3

Conditions: - 19.4°C; 35%RH; 1003mBar

Test Engineer - Patrick Crozier

Witnessed by - Steve Morse

Data Taken at 04:43:22 PM, Friday, January 11, 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)
0.153	37	20.7	57.8	65.8	-8.0	PASS	-8.0
0.184	31.5	20.8	52.2	64.3	-12.1	PASS	
0.25	28.5	20.7	49.3	61.8	-12.5	PASS	
0.332	24.7	20.7	45.4	59.4	-14.0	PASS	
0.508	19.2	20.8	40	56.0	-16.0	PASS	
0.617	19	20.8	39.7	56.0	-16.3	PASS	

Curtis Straus - a Bureau Veritas Company

Conducted Emissions per CISPR 16-2-1, CISPR Average Detector

Quick Average Detector Data

Notes:

EUT Line tested: 120VAC/60Hz; Phase (line 1)

Work Order # - S1024

EUT Power Input - 120VAC/ 60Hz

Test Site - CEMI-3

Conditions: - 19.4°C; 35%RH; 1003mBar

Test Engineer - Patrick Crozier

Witnessed by - Steve Morse

Data Taken at 04:43:22 PM, Friday, January 11, 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)
0.15	26.7	20.7	47.4	56.0	-8.6	PASS	
0.253	23.4	20.7	44.1	51.7	-7.6	PASS	-7.6
0.306	21	20.7	41.8	50.1	-8.3	PASS	
0.513	12.3	20.8	33	46.0	-13.0	PASS	
0.546	11.9	20.8	32.7	46.0	-13.3	PASS	
0.602	11.4	20.8	32.1	46.0	-13.9	PASS	

Rev. 1/5/2019								
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 2092	9KHz-30MHz	NNLK 8121	Schwarzbeck	NNLK 8121-66	2092	I	7/31/2019	7/31/2018
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/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
TH A#2077		HTC-1	HDE		2077	II	3/23/2019	3/23/2018
Cables	Range		Mfr			Cat	Calibration Due	Calibrated on
CEMI-18	9kHz - 2GHz		C-S			II	11/5/2019	11/5/2018
Attenuators	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
20dB Attenuator-64	9kHz-2GHz			N/A		II	11/15/2019	11/15/2018
All equipment is calibrated using standards traceable to NIST or other nationally recognized calibration standard.								



BUREAU
VERITAS

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

One Distribution Center Circle, #1 • Littleton, MA • TEL (978) 486-8880 • FAX (978) 486-8828



Testing Cert. No. 1627-01

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	4.6dB	5.2dB (Ucisp)
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	3.9dB	N/A
CISPR	3.6dB	3.6dB (Ucisp)
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		



BUREAU
VERITAS

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



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.

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.



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

One Distribution Center Circle, #1 • Littleton, MA • TEL (978) 486-8880 • FAX (978) 486-8828



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

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

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

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

The complete list of the Approved Subcontractors Curtis-Straus may use to delegate the performance of work can be provided upon request.
Rev.160009121(2)_#684340 v14CS

