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Test Report

Bureau Veritas Consumer Products Services, Inc.

Report No	ET1629-1
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	2M62D1D
FCC/IC Rule Parts	CFR Title 47 FCC Part 15.247, ISED Canada RSS-247 Issue 2
Test Dates	Jul 30 – Sep 13, 2019
Results	As detailed within this report
Prepared by	<u>Anna Vancheva</u> Anna Vancheva – Test Engineer
Authorized by	<u>Y. E. Faziloglu</u> Yunus Faziloglu – Sr. Engineer
Issue Date	<u>9/19/2019</u>
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.

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 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 2480MHz frequency range.

The specific change to the transmitter is the addition ZigBee Channel 26 (center frequency 2480MHz) to the channel plan. The previous version of the device used Channel 25 as its highest frequency.

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 v05r02 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. Since the EUT did not have an accessible antenna connector, all the measurements for Ch26 were done in a radiated setup.

The environmental conditions during each test are detailed in the results tables for each section. Following bandwidths were used during radiated spurious emissions testing.

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

EUT met the requirements above without modification. Test sample was received in good condition.

Product Tested - Configuration Documentation

EUT Configuration										
Work Order:	S1629									
Company:	Assa Abloy									
Company Address:	110 Sargent Drive New Haven, CT 06511									
Contact:	Steve Morse									
EUT:	MN	PMN	SN							
	V3	iN100	1							
EUT Description:	Aperio V3 iN100 RF Module									
EUT Max Frequency:	2480 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)	2480, 48, 32, 27.12, 18, 16, 13.56, 8, 0.125, 0.1, 0.032768, 0.03216, 0.032

Modifications Required for Compliance

None.



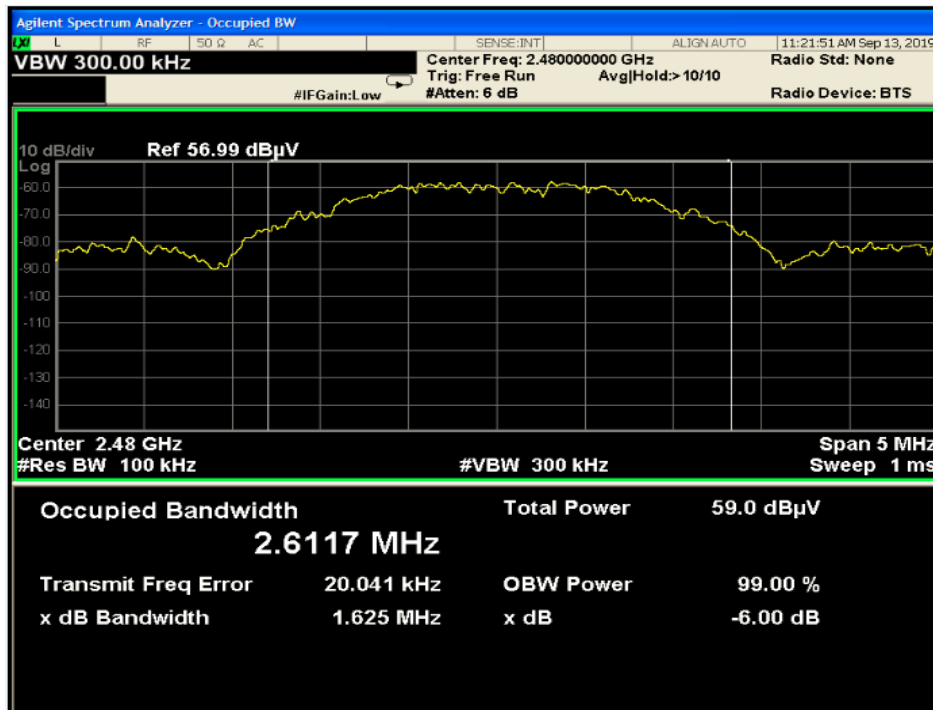
Test Results

DTS (6dB) Bandwidth

The minimum 6 dB bandwidth shall be at least 500 kHz. [15.247(a) (2)]

MEASUREMENTS / RESULTS

6dB DTS Bandwidth				
Date: 13-Sep-19		Humidity: 48%		Work Order: T1629
Engineer: Anna Vancheva		Pressure: 1025 mBar		EUT Operating Voltage/Frequency: Battery
Temp: 21.7°C		Measurement Distance: 3m		
Notes: Radiated setup		EUT Max Freq: 2480MHz		
Antenna Polarization (H/V)	Frequency (MHz)	6dB DTS BW (kHz)	Minimum Limit (kHz)	Test Result (Pass/Fail)
Horizontal	2480.0	1625.0	500.0	Pass
Table Result: Pass				
Test Site: CH1	Cable 1: Asset #2455	Cable 2: Asset #2606	Cable 3: ---	
Analyzer: 1170725	Preamp: none	Antenna: Blue Horn	Preselector: ---	
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99% Occupied Bandwidth

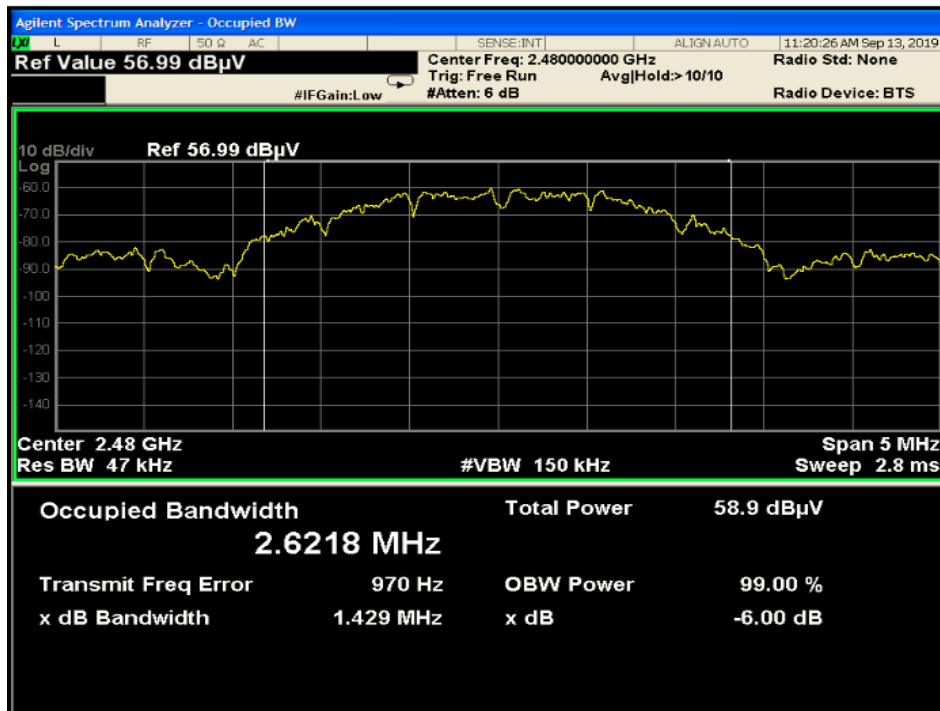
REQUIREMENT

When an occupied bandwidth is not specified in the applicable RSS, the transmitted signal bandwidth to be reported is its 99% emission bandwidth, as calculated or measured.

[RSS-GEN Issue 5 Section 6.7]

MEASUREMENTS / RESULTS

99% Occupied Bandwidth			
Date: 13-Sep-19		Work Order: T1629	
Engineer: Anna Vancheva		EUT Operating Voltage/Frequency: Battery	
Temp: 21.7°C	Humidity: 48%	Pressure: 1025 mBar	Measurement Distance: 3m
Notes: Radiated setup		EUT Max Freq: 2480MHz	
Antenna Polarization (H/V)	Frequency (MHz)	Measured 99% Occupied Bandwidth (kHz)	
Horizontal	2480.0	2621.8	
Test Site: CH1	Cable 1: Asset #2455	Cable 2: Asset #2606	Cable 3: ---
Analyzer: 1170725	Preamp: none	Antenna: Blue Horn	Preselector: ---
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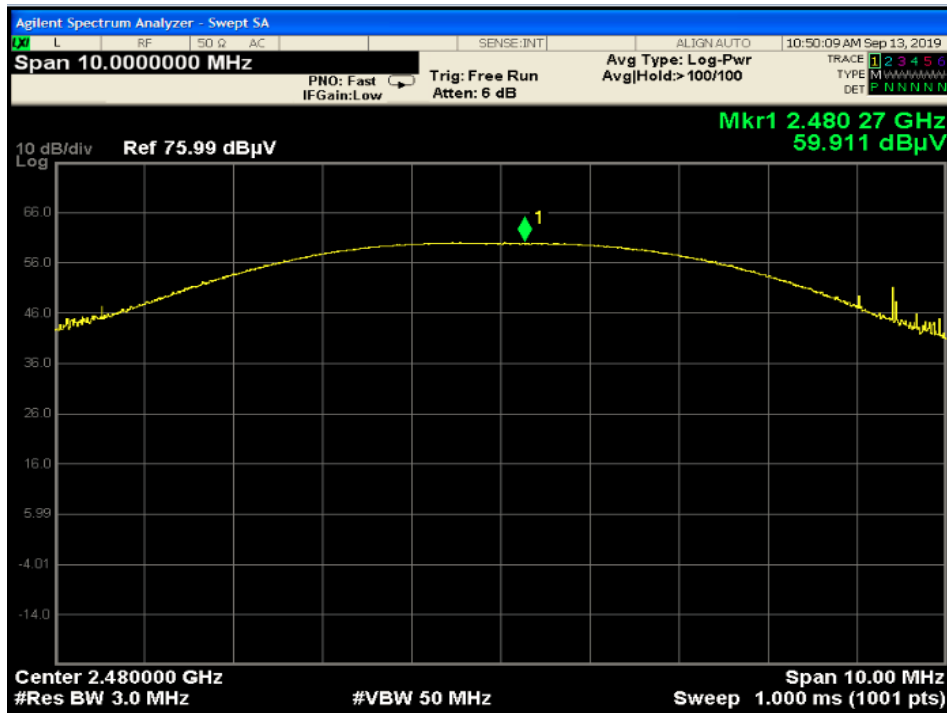
Peak Output Power

LIMIT

1 Watt [15.247(b) (3)]

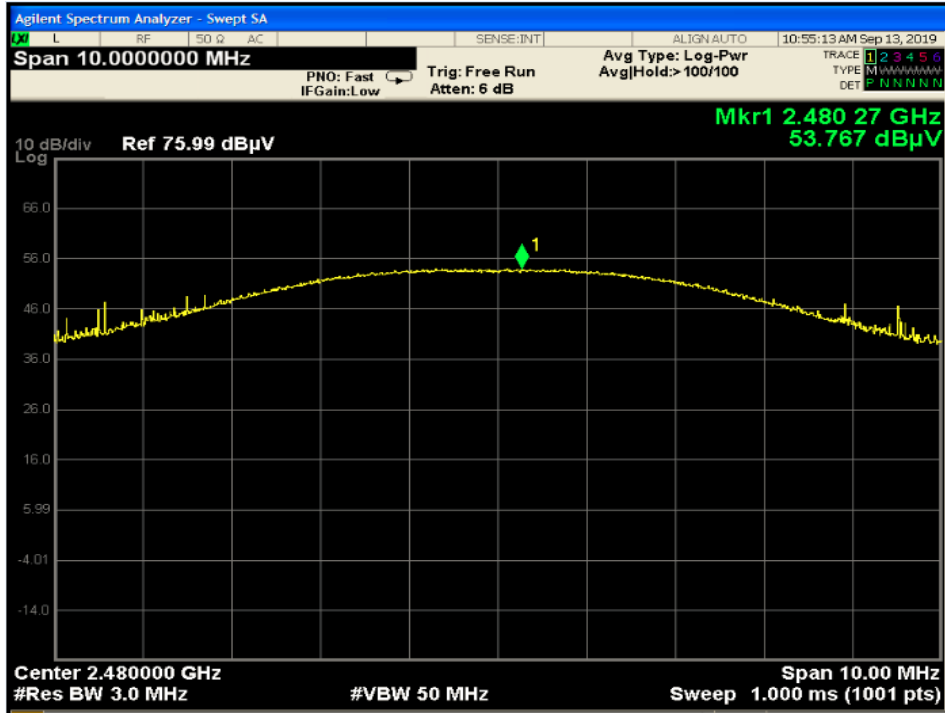
MEASUREMENTS / RESULTS

Peak Output Power												
Date: 13-Sep-19						Work Order: T1629						
Engineer: Anna Vancheva						EUT Operating Voltage/Frequency: Battery						
Temp: 21.7°C			Humidity: 48%			Pressure: 1025 mBar			Measurement Distance: 3 m			
Notes: Radiated setup						EUT Max Freq: 2480 MHz						
Antenna Polarization (H/V)	Frequency (MHz)	Peak Reading (dBµV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Field Strength (dBµV/m)	Adjusted ERP (dBm)	Antenna Gain (dBi)	Conducted Power (dBm)	FCC 15.247		
										Limit (dBm)	Margin (dB)	Result (Pass/Fail)
Hor	2480.0	59.9	0.0	32.4	3.5	95.8	0.6	4.5	-3.9	30.0	-33.9	Pass
Ver	2480.0	53.8	0.0	32.4	3.5	89.7	-5.6	4.5	-10.1	30.0	-40.1	Pass
Table Result: Pass by -33.9 dB										Worst Freq: 2480.0 MHz		
Test Site: CH1			Cable 1: Asset #2455			Cable 2: Asset #2606			Cable 3: ---			
Analyzer: 1170725			Preamp: none			Antenna: Blue Horn			Preselector: ---			
CSsoft Radiated Emissions Calculator v 1.017.215						Copyright Curtis-Straus LLC 2000						
Adjusted Field Strength = Peak Reading - Preamp Factor + Antenna Factor + Cable Factor												
Adjusted EIRP = Adjusted Field Strength + 20*log(3) - 104.77												
Conducted Power = Adjusted EIRP - Antenna Gain												



Peak Output Power – Horizontal





Peak Output Power – Vertical



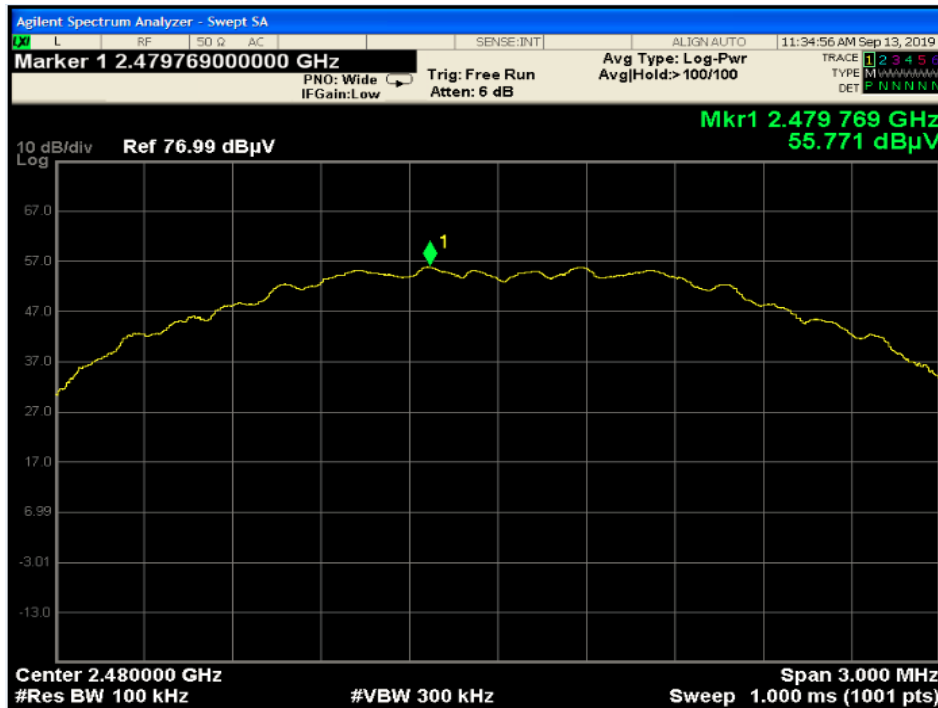
Peak Power Spectral Density

LIMIT

...the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3 kHz band during any time interval of continuous transmission. [15.247(e)]

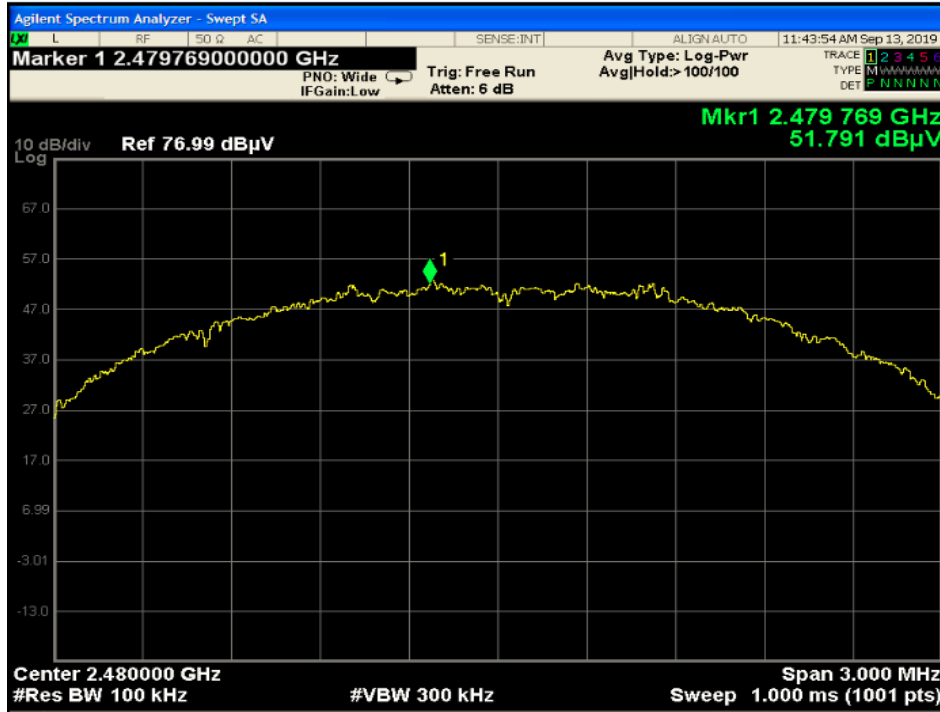
MEASUREMENTS / RESULTS

Peak Power Spectral Density												
Date: 13-Sep-19						Work Order: T1629						
Engineer: Anna Vancheva						EUT Operating Voltage/Frequency: Battery						
Temp: 21.7°C			Humidity: 48%			Pressure: 1025 mBar			Measurement Distance: 3 m			
Notes: Radiated setup						EUT Max Freq: 2480MHz						
Antenna Polarization (H/V)	Frequency (MHz)	Peak Reading (dBµV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Field Strength (dBµV/m)	Adjusted EIRP PSD (dBm)	Antenna Gain (dBi)	Conducted PSD (dBm)	FCC 15.247		
										Limit (dBm)	Margin (dB)	Result (Pass/Fail)
Hor	2480.0	55.8	0.0	32.4	3.5	91.7	-3.6	4.5	-8.1	8.0	-16.1	Pass
Ver	2480.0	51.8	0.0	32.4	3.5	87.7	-7.5	4.5	-12.0	8.0	-20.0	Pass
Table Result: Pass by -16.1 dB										Worst Freq: 2480.0 MHz		
Test Site: CH1		Cable 1: Asset #2455			Cable 2: Asset #2606			Cable 3: ---				
Analyzer: 1170725		Preamp: none			Antenna: Blue Horn			Preselector: ---				
CSsoft Radiated Emissions Calculator v 1.017.215 Adjusted Field Strength = Peak Reading - Preamp Factor + Antenna Factor + Cable Factor Adjusted EIRP PSD = Adjusted Field Strength + 20*log(3) - 104.77 Conducted PSD = Adjusted EIRP PSD - Antenna Gain												
											Copyright Curtis-Straus LLC 2000	



Peak PSD - Horizontal





Peak PSD - Vertical

Test Equipment Used

Rev. 7/30/2019

Category	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
Spectrum Analyzers / Receivers / Preselectors								
Rental MXE EMI Receiver(1170725)	20Hz-26.5GHz	N9038A	Agilent	MY51210151	1170725	I	5/30/2020	5/30/2019
Radiated Emissions Sites	FCC Code	IC Code	VCCI Code	Range	Asset	Cat	Calibration Due	Calibrated on
EMI Chamber 2	719150	2762A-7	A-0015	1-18GHz	1686	I	12/7/2020	12/7/2018
Antennas	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
Blue Horn	1-18Ghz	3117	ETS	157647	1861	I	3/9/2021	3/9/2019
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 #2659		1235C97	Control Company	181683830	2659	I	4/3/2020	4/3/2019
Cables	Range		Mfr			Cat	Calibration Due	Calibrated on
Asset #2455	9KHz-18GHz		MegaPhase			II	10/29/2019	10/29/2018
Asset #2606	9KHz-18GHz		MegaPhase			II	4/2/2020	4/2/2019

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



Radiated Band Edge

MEASUREMENTS / RESULTS

Radiated Band Edge														
Date: 13-Sep-19										Work Order: T1629				
Engineer: Anna Vancheva										EUT Operating Voltage/Frequency: Battery				
Temp: 21.7°C					Humidity: 48%					Pressure: 1025 mBar				
Notes: High band edge only. Operating channel = 2480MHz										Measurement Distance: 3 m				
Antenna (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)
H	2483.5	56.4	44.0	38.9	32.4	3.5	53.4	41.0	74.0	-20.6	Pass	54.0	-13.0	Pass
V	2483.5	50.7	40.9	38.9	32.4	3.5	47.7	37.9	74.0	-26.3	Pass	54.0	-16.1	Pass
Table Result:		Pass		by		-13.0 dB						Worst Freq: 2483.5 MHz		
Test Site: EMI Chamber 2					Cable 1: 2455					Cable 2: 2606				
Analyzer: 1170725					Preamp: 8449B					Cable 3: ---				
CSsoft Radiated Emissions Calculator v 1.017.215					Antenna: Blue Horn					Preselector: ---				
Adjusted Reading = Reading - Preamp Factor + Antenna Factor + Cable Factor														

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
Radiated Emissions Sites	FCC Code	IC Code	VCCI Code	Range	Asset	Cat	Calibration Due	Calibrated on
EMI Chamber 2	719150	2762A-7	A-0015	1-18GHz	1686	I	12/7/2020	12/7/2018
Antennas	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
Blue Horn	1-18Ghz	3117	ETS	157647	1861	I	3/9/2021	3/9/2019
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 #2659		1235C97	Control Company	181683830	2659	I	4/3/2020	4/3/2019
Cables	Range		Mfr			Cat	Calibration Due	Calibrated on
Asset #2455	9KHz-18GHz		MegaPhase			II	10/29/2019	10/29/2018
Asset #2606	9KHz-18GHz		MegaPhase			II	4/2/2020	4/2/2019

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

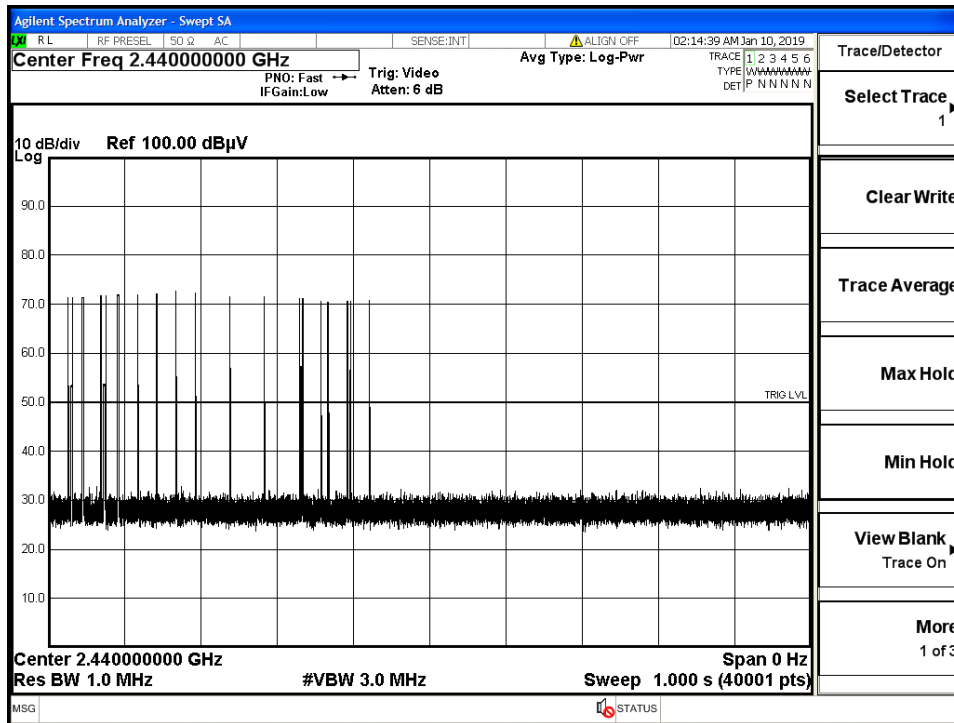


Radiated Spurious Emissions

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 and 3rd harmonics of the transmitter, duty-cycle correction factor was used to compute average values from peak values when needed.

Worst Case 100ms duty-cycle is 13.75% (calculated from trace data via software)
 DCCF = 20*log(13.75/100) = -17.2dB



Bureau Veritas Consumer Product Services Inc.	Work Order - T1629
Radiated Emissions Electric Field 3m Distance	EUT Power Input - Battery
Top Peaks Vertical 30-1000MHz	Test Site - CH1
Notes:	Conditions - 22.7°C; 49%RH; 1017mBar
Ch26	Test Engineer - AV

Data Taken at 10:30:29 AM, Monday, September 09, 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)	Lim2: FCC_pt15_2 09 (dBμV/m)	Lim2 Margin (dB)	Lim2 Test Results (Pass/Fail)	Worst Margin Lim2 (dB)	Antenna Height (cm)	Turntable Azimuth (degrees)
30.509	27.2	-4.1	23.1	40	-16.9	PASS		40	-16.9	PASS		150	180
146.788	31.7	-12.4	19.3	43.5	-24.2	PASS		43.5	-24.2	PASS		100	45
149.698	32	-12.4	19.5	43.5	-24	PASS		43.5	-24	PASS		150	315
152.802	34.8	-12.5	22.3	43.5	-21.2	PASS		43.5	-21.2	PASS		100	315
155.906	31.8	-12.5	19.3	43.5	-24.2	PASS		43.5	-24.2	PASS		100	315
947.911	29.3	0.6	29.9	46	-16.1	PASS	-16.1	46	-16.1	PASS	-16.1	200	135



Bureau Veritas Consumer Product Services Inc. Work Order - T1629
 Radiated Emissions Electric Field 3m Distance EUT Power Input - Battery
 Top Peaks Horizontal 30-1000MHz Test Site - CH1
 Notes: Conditions - 22.7°C; 49%RH; 1017mBar
 Ch26 Test Engineer - AV

Data Taken at 10:30:30 AM, Monday, September 09, 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)	Lim2: FCC_pt15_2 09 (dBµV/m)	Lim2 Margin (dB)	Lim2 Test Results (Pass/Fail)	Worst Margin Lim2 (dB)	Antenna Height (cm)	EUT Azimuth (degrees)
30.34	28.4	-4	24.3	40	-15.7	PASS	-15.7	40	-15.7	PASS	-15.7	150	45
146.667	30.7	-12.3	18.4	43.5	-25.1	PASS		43.5	-25.1	PASS		250	45
956.956	29.1	0.8	29.9	46	-16.1	PASS		46	-16.1	PASS		100	0

Bureau Veritas Consumer Product Services Inc. Work Order - T1629
 Radiated Emissions Electric Field 3m Distance EUT Power Input - Battery
 Top Peaks Vertical 1-6GHz Test Site - CH-2
 Notes: Conditions - 22°C; 57%RH; 1015mBar
 Channel 26 Test Engineer - AKZ

Data Taken at 12:16:52 PM, Tuesday, July 30, 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)
1319.88	49.4	-7.1	42.2	74	-31.8	PASS		54	-11.8	PASS		200	127
1865.38	48.8	-3.8	45	74	-29	PASS		54	-9	PASS		100	46
2164	47.5	-1.4	46.1	74	-27.9	PASS		54	-7.9	PASS		300	77
2942.25	46.9	-0.7	46.2	74	-27.8	PASS		54	-7.8	PASS		200	315
4960.88	49.6	1	50.7	74	-23.3	PASS		54	-3.3	PASS		200	315
5275.88	49.4	1.5	50.9	74	-23.1	PASS	-23.1	54	-3.1	PASS	-3.1	100	190

Bureau Veritas Consumer Product Services Inc. Work Order - T1629
 Radiated Emissions Electric Field 3m Distance EUT Power Input - Battery
 Top Peaks Horizontal 1-6GHz Test Site - CH-2
 Notes: Conditions - 22°C; 57%RH; 1015mBar
 Channel 26 Test Engineer - AKZ

Data Taken at 12:16:52 PM, Tuesday, July 30, 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 Results (Pass/Fail)	Peak Limit Worst Margin (dB)	Duty Cycle Correction Factor (dB)	Adjusted Average Amplitude (dBµV/m)	Av Lim: FCC_pt15_2 09_Average (dBµV/m)	Margin to Avg Limit (dB)	Avg Limit Results (Pass/Fail)	Avg Limit Worst Margin (dB)	Antenna Height (cm)	EUT Azimuth (degrees)
1337.75	48.8	-6.9	41.8	74	-32.2	PASS				54	-12.2	PASS		200	152
2181.63	46.6	-1.2	45.4	74	-28.6	PASS				54	-8.6	PASS		300	164
4960.88	55.9	1	56.9	74	-17.1	PASS	-17.1	-17.2	39.7	54	-14.3	PASS		200	10
5838.25	46.4	2.3	48.7	74	-25.3	PASS				54	-5.3	PASS	-5.3	100	0



Bureau Veritas Consumer Product Services Inc. Work Order - T1629
 Radiated Emissions Electric Field 1m Distance EUT Power Input - Battery
 Top Peaks Vertical 6-18GHz Test Site - CH-2
 Notes: Conditions - 22°C; 57%RH; 1015mBar
 Channel 26 Test Engineer - AKZ

Data Taken at 11:49:07 AM, Tuesday, July 30, 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)	Duty Cycle Correction Factor (dB)	Adjusted Average Amplitude (dBµV/m)	Av Lim: FCC_pt15_2 09_Average (dBµV/m)	Margin to Avg Limit (dB)	Avg Limit Test Results (Pass/Fail)	Avg Limit Worst Margin (dB)	Antenna Height (cm)	EUT Azimuth (degrees)
7441.5	62.8	3.8	66.6	83.5	-16.9	PASS	-16.9	-17.2	49.4	63.5	-14.1	PASS		200	0
12675.3	47.1	10	57.2	83.5	-26.3	PASS				63.5	-6.3	PASS		150	141
17967.3	47.5	15.2	62.7	83.5	-20.8	PASS				63.5	-0.8	PASS	-0.8	100	284

Bureau Veritas Consumer Product Services Inc. Work Order - T1629
 Radiated Emissions Electric Field 1m Distance EUT Power Input - Battery
 Top Peaks Horizontal 6-18GHz Test Site - CH-2
 Notes: Conditions - 22°C; 57%RH; 1015mBar
 Channel 26 Test Engineer - AKZ

Data Taken at 11:49:07 AM, Tuesday, July 30, 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)	Duty Cycle Correction Factor (dB)	Adjusted Average Amplitude (dBµV/m)	Av Lim: FCC_pt15_2 09_Average (dBµV/m)	Margin to Avg Limit (dB)	Avg Limit Test Results (Pass/Fail)	Avg Limit Worst Margin (dB)	Antenna Height (cm)	EUT Azimuth (degrees)
7438.8	58.7	3.8	62.5	83.5	-21	PASS	-21	-17.2	45.3	63.5	-18.2	PASS		200	22
12412.8	47.3	10	57.3	83.5	-26.2	PASS				63.5	-6.2	PASS		200	0
17971.8	47.2	15.2	62.4	83.5	-21.1	PASS				63.5	-1.1	PASS	-1.1	125	9

Radiated Emissions Table

Date: 30-Jul-19 Company: Assa Abloy Work Order: T1629
 Engineer: AKZ EUT Operating Voltage/Frequency: Battery
 Temp: 22°C Humidity: 57% Pressure:
 Frequency Range: 18-25GHz Measurement Distance: 0.1 m
 Notes: Channel 26

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 WERE FOUND IN THIS RANGE.									---	---	---	---	---	---	---

Table Result: Pass by N/A dB **Worst Freq:** N/A MHz

Test Site: EMI Chamber 2 Cable 1: Asset #2324 Cable 2: --- Cable 3: ---
 Analyzer: Gold Preamp: 18-26.5GHz Antenna: 18-26.5GHz Horn Presetector: ---
 CSsoft Radiated Emissions Calculator v 1.017.215 Copyright Curtis-Straus LLC. 2000
 Adjusted Reading = Reading - Preamp Factor + Antenna Factor + Cable Factor



Test Equipment Used:

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Spectrum Analyzers / Receivers / Preselecto	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
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 2	719150	2762A-7	A-0015	30-1000MHz	1686	I	12/7/2020	12/7/2018
EMI Chamber 2	719150	2762A-7	A-0015	1-18GHz	1686	I	12/7/2020	12/7/2018
EMI Chamber 1	719150	2762A-6	A-0015	30-1000MHz	1685	I	12/7/2020	12/7/2019

Antennas	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
Blue Horn	1-18Ghz	3117	ETS	157647	1861	I	3/9/2021	3/9/2019
Red-Brown Bilog	30-2000MHz	JB1	Sunol	A0032406	1218	I	3/11/2021	3/11/2019

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 #2656	1235C97	Control Company	181683818	2656	I	4/3/2020	4/3/2019
Asset #2658	1235C97	Control Company	181683808	2658	I	4/3/2020	4/3/2019

Cables	Range	Mfr	Cat	Calibration Due	Calibrated on
Asset #2455	9KHz-18GHz	MegaPhase	II	10/29/2019	10/29/2018
Asset #2606	9KHz-18GHz	MegaPhase	II	4/2/2020	4/2/2019
Asset #2466	9KHz-18GHz	MegaPhase	II	10/31/2019	10/31/2018
Asset #2456	9KHz-18GHz	MegaPhase	II	10/31/2019	10/31/2018
Asset #2585	9KHz-18GHz	Pastemack	II	5/24/2020	5/24/2019

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
185710 Rental PA	9KHz-1GHz	310	NOMA INSTRUME	185710		II	4/16/2020	4/16/2019

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

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Spectrum Analyzers / Receivers / Preselectors	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
Gold	100Hz-26.5 GHz	E4407B	Agilent	MY45113816	1284	I	5/20/2020	5/20/2019

Radiated Emissions Sites	FCC Code	IC Code	VCCI Code	Range	Asset	Cat	Calibration Due	Calibrated on
EMI Chamber 2	719150	2762A-7	A-0015	30-1000MHz	1686	I	12/7/2020	12/7/2018
EMI Chamber 2	719150	2762A-7	A-0015	1-18GHz	1686	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	AFS4-18002650-60-8P-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
Asset #2656	1235C97	Control Company	181683818	2656	I	4/3/2020	4/3/2019

Cables	Range	Mfr	Cat	Calibration Due	Calibrated on
Asset #2324	1-26.5GHz	TM26-S1S1-120	II	7/24/2020	7/24/2019

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	4.6dB	5.2dB (Ucisprr)
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 (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^{-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 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.



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.
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