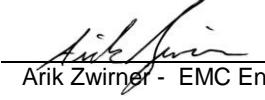




BUREAU
VERITAS

Bureau Veritas Consumer Products Services Inc.

Test Report

Report No	ET1058-1
Client	BlackBox Biometrics Inc.
Address	125 Tech Park Drive Rochester, NY 14623
Items tested	Blast Gauge (Models: Gen 7 0a and Gen 7 1a)
FCC ID	2AHN8BG711
IC	21433-BG711
Equipment Type	Digital Transmission System
Equipment Code	DTS
Emission Designator	1M05F1D
FCC/IC Rule Parts	CFR Title 47 FCC Part 15.247, ISED Canada RSS-247 Issue 2
Test Dates	July 9 thru August 14, 2019
Results	As detailed within this report
Prepared by	 Arik Zwirner - EMC Engineer
Authorized by	 Yunus Faziloglu - S. EMC Engineer
Issue Date	<u>9/10/2019</u>
Conditions of Issue	This Test Report is issued subject to the conditions stated in the 'Conditions of Testing' section on page 30 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

This test report supports an application for certification of a transmitter operating pursuant to:
CFR Title 47 FCC Part 15.247, ISED Canada RSS-247 Issue 2.

Equipment under test (EUT) is the Blast Gauge (Models: Gen 7 0a and Gen 7 1a). It's a Bluetooth Low Energy device that operates in the 2402 to 2480 MHz frequency range. It has an internal patch antenna with 2.5dBi peak gain.

Difference between models is the battery size. Model Gen 7 0a uses 1/6D cell battery and Model Gen 7 1a uses 2450 coin cell battery. EUT housing is slightly larger in Model Gen 7 0a to accommodate the larger 1/6D cell battery. Internal PCBs in both models are identical. All testing was performed on Model Gen 7 0a.

Client stated that the maximum transmission duty-cycle is 7.5% and this was used in determining the duty cycle correction factor for spurious emissions for harmonics of the fundamental.

We found that the product met the above requirements without modification.

Test samples were received in good condition.

Release Control Record

Issue No.	Reason for change	Date Issued
1	Original Release	September 16, 2019



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Test Methodology

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 three orthogonal planes (X, Y and Z) as well as varying the test antenna's height and polarity. Worst case orientation was found to be in Y orientation and all radiated emissions tests were performed in this orientation.

EUT antenna is internal and therefore it cannot be maximized separately.

EUT operating voltage: 3.6VDC from battery.

AC line conducted emissions testing does not apply

Environmental conditions are shown on the associated data tables.

Following bandwidths were used during radiated spurious emissions tests.

Frequency	RBW	VBW
30-1000MHz	120kHz	1MHz
1-25GHz	1MHz	3MHz



EUT Configuration

Statement of Conformity

RSS-GEN	RSP-100	RSS 247	Part 15	Comments
6.4			15.15(b)	There are no controls accessible to the user that varies the output power to operate in violation of the regulatory requirements.
	3.1		15.19	The label is shown in the label exhibit.
	3.2		15.21	Information to the user is shown in the instruction manual exhibit.
			15.27	No special accessories are required for compliance.
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	EUT has a patch antenna internal to the device (Peak gain: 2.5dBi). The antenna is connected to the PCB via IPEX MHF1 connector, which is considered unique.
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	N/A. EUT is battery powered only.
			15.247	The unit complies with the requirements of 15.247
		RSS 247		The unit complies with the requirements of RSS-247
6.7				99% occupied bandwidth measurements were performed.

Modifications Required for Compliance

None.



Test Results: Radiated Measurements

Radiated Band-edge

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)]

Data Table:

Radiated Emissions Table												Work Order: T1058																							
Date: 16-Jul-19			EUT Operating Voltage/Frequency: Battery																																
Engineer: AKZ		Temp: 22°C		Humidity: 54%		Pressure: 1010mbar		Measurement Distance: 3 m																											
Notes:																																			
Antenna Polarization (H / V)	Frequency (MHz)	Peak Reading (dB μ V)	Average Reading (dB μ V)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Peak Reading (dB μ V/m)	Adjusted Avg Reading (dB μ V/m)	FCC 15.209 High Frequency - Peak			FCC 15.209 High Frequency - Average																							
									Limit (dB μ V/m)	Margin (dB)	Result (Pass/Fail)	Limit (dB μ V/m)	Margin (dB)	Result (Pass/Fail)																					
Sample G				---	---	---	---	---	---	---	---	---	---	---																					
Low Channel: V	2390.0	23.9	13.1	0.0	28.0	3.2	55.1	44.3	74.0	-18.9	Pass	54.0	-9.7	Pass																					
High Channel: V	2483.5	24.9	13.3	0.0	28.2	3.3	56.4	44.8	74.0	-17.6	Pass	54.0	-9.2	Pass																					
Sample H				---	---	---	---	---	---	---	---	---	---	---																					
Low Channel: V	2390.0	24.3	13.1	0.0	28.0	3.2	55.5	44.3	74.0	-18.5	Pass	54.0	-9.7	Pass																					
High Channel: V	2483.5	24.6	13.2	0.0	28.2	3.3	56.1	44.7	74.0	-17.9	Pass	54.0	-9.3	Pass																					
Table Result:		Pass	by	-9.2 dB																															
Test Site: EMI Chamber 1			Cable 1: Asset #2585			Cable 2: Asset #2456			Cable 3: ---																										
Analyzer: ---			Preamp: None			Antenna: Orange Horn			Preselector: ---																										
CSsoft Radiated Emissions Calculator v1.017.215																																			
Adjusted Reading = Reading - Preamp Factor + Antenna Factor + Cable Factor																																			
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Test Equipment Used:

Rev. 7/15/2019

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
Antennas	Range	MN	Mfr	SN	Asset	Cat	Calibration Due
Orange Horn	1-18GHz	3115	EMCO	0004-6123	390	I	11/6/2020
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 #2659	1235C97	Control Company	181683830	2659	I	4/3/2020	
Cables	Range	Mfr		Cat	Calibration Due		
Asset #2456	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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Testing Cert. No. 1627-01

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)]

Description of Calculations:

Adjusted Reading(dB μ V/m) = Raw Reading(dB μ V) + Correction Factor(dB/m)

Correction Factor = Antenna Factor(dB/m) + Cable Factor(dB) - Preamp Factor(dB)

Margin(dB) = Adjusted Reading(dB μ V/m) - Limit(dB μ V/m)

Measurement Software Used:

ETS-LINDGREN TILE!™ 7.3.0.6



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MEASUREMENTS / RESULTS

30-1000MHz:

NOTE: For the range 30-1000MHz

Bureau Veritas Consumer Product Services Inc.	Work Order - T1058
Radiated Emissions Electric Field 3m Distance	EUT Power Input - Battery
Top Peaks Horizontal 30-1000MHz	Test Site - CH-2
Notes:	Conditions - 54°C; 22%RH; 1010mBar
Low Channel	Test Engineer - AKZ

Data Taken at 11:49:57 AM, Monday, July 15, 2019

Frequency (MHz)	Peak Reading (dB μ V)	Correction Factor (dB/m)	Adjusted Peak Amplitude (dB μ V/m)	Lim1: FCC_pt15_109_Class_B (dB μ V/m)	Lim1 Margin (dB)	Lim1 Test Results (Pass/Fail)	Worst Margin Lim1 (dB)	Lim2: FCC_pt15_209 (dB μ V/m)	Lim2 Margin (dB)	Lim2 Test Results (Pass/Fail)	Worst Margin Lim2 (dB)	Antenna Height (cm)	EUT Azimuth (degrees)
30.145	25	2.7	27.7	40	-12.3	PASS		40	-12.3	PASS		200	0
264.934	40.7	-4.9	35.8	46	-10.3	PASS	-10.3	46	-10.2	PASS	-10.2	200	180
268.426	37.5	-4.7	32.8	46	-13.2	PASS		46	-13.2	PASS		150	225
270.221	39.7	-4.6	35.1	46	-10.9	PASS		46	-10.9	PASS		150	180
466.354	33.7	-0.6	33.1	46	-12.9	PASS		46	-12.9	PASS		100	270
951.767	26.6	6.1	32.7	46	-13.3	PASS		46	-13.3	PASS		200	0

Bureau Veritas Consumer Product Services Inc.	Work Order - T1058
Radiated Emissions Electric Field 3m Distance	EUT Power Input - Battery
Top Peaks Vertical 30-1000MHz	Test Site - CH-2
Notes:	Conditions - 54°C; 22%RH; 1010mBar
Low Channel	Test Engineer - AKZ

Data Taken at 11:49:57 AM, Monday, July 15, 2019

Frequency (MHz)	Peak Reading (dB μ V)	Correction Factor (dB/m)	Adjusted Peak Amplitude (dB μ V/m)	Lim1: FCC_pt15_109_Class_B (dB μ V/m)	Lim1 Margin (dB)	Lim1 Test Results (Pass/Fail)	Worst Margin Lim1 (dB)	Lim2: FCC_pt15_209 (dB μ V/m)	Lim2 Margin (dB)	Lim2 Test Results (Pass/Fail)	Worst Margin Lim2 (dB)	Antenna Height (cm)	Turntable Azimuth (degrees)
60.07	42.7	-11.2	31.5	40	-8.5	PASS		40	-8.5	PASS		100	45
83.908	45.7	-11.1	34.6	40	-5.4	PASS		40	-5.4	PASS		150	135
799.792	33	4	37	46	-9	PASS		46	-9	PASS		150	225
810.292	32.2	4.1	36.4	46	-9.7	PASS		46	-9.6	PASS		150	225
841.066	32.7	4.3	37	46	-9.1	PASS		46	-9	PASS		100	225

Frequency (MHz)	Raw QP Reading (dB μ V)	Correction Factor (dB/m)	Adjusted QP Amplitude (dB μ V/m)	Lim1: FCC_pt15_109_Class_B (dB μ V/m)	Margin to Lim1 (dB)	Test Results Lim1 (Pass/Fail)	Worst Margin Lim1 (dB)	Lim2: FCC_pt15_209 (dB μ V/m)	Margin to Lim2 (dB)	Test Results Lim2 (Pass/Fail)	Worst Margin Lim2 (dB)	Antenna Height (cm)	EUT Azimuth (degrees)
56.399	46.2	-11.4	34.9	40	-5.1	PASS	-5.1	40	-5.1	PASS	-5.1	134	165



Bureau Veritas Consumer Product Services Inc. Radiated Emissions Electric Field 3m Distance Top Peaks Horizontal 30-1000MHz Notes: Mid Channel	Work Order - T1058 EUT Power Input - Battery Test Site - CH-2 Conditions - 54°C; 22%RH; 1010mBar Test Engineer - AKZ
--	--

Data Taken at 02:11:38 PM, Monday, July 15, 2019

Frequency (MHz)	Peak Reading (dB μ V)	Correction Factor (dB/m)	Adjusted Peak Amplitude (dB μ V/m)	Lim1: FCC_pt15_1 09_Class_B (dB μ V/m)	Lim1 Margin (dB)	Lim1 Test Results (Pass/Fail)	Worst Margin Lim1 (dB)	Lim2: FCC_pt15_2 09 (dB μ V/m)	Lim2 Margin (dB)	Lim2 Test Results (Pass/Fail)	Worst Margin Lim2 (dB)	Antenna Height (cm)	EUT Azimuth (degrees)
30.752	24.9	2.4	27.3	40	-12.7	PASS		40	-12.7	PASS		200	135
264.231	36.6	-5	31.6	46	-14.4	PASS		46	-14.4	PASS		200	180
272.161	35.7	-4.5	31.2	46	-14.9	PASS		46	-14.8	PASS		200	180
366.469	34.1	-2.8	31.3	46	-14.7	PASS		46	-14.7	PASS		250	315
466.354	34.2	-0.6	33.6	46	-12.4	PASS		46	-12.4	PASS		100	270
939.181	27.9	5.9	33.8	46	-12.2	PASS	-12.2	46	-12.2	PASS	-12.2	150	0

Bureau Veritas Consumer Product Services Inc. Radiated Emissions Electric Field 3m Distance Top Peaks Vertical 30-1000MHz Notes: Mid Channel	Work Order - T1058 EUT Power Input - Battery Test Site - CH-2 Conditions - 54°C; 22%RH; 1010mBar Test Engineer - AKZ
--	--

Data Taken at 02:11:38 PM, Monday, July 15, 2019

Frequency (MHz)	Peak Reading (dB μ V)	Correction Factor (dB/m)	Adjusted Peak Amplitude (dB μ V/m)	Lim1: FCC_pt15_1 09_Class_B (dB μ V/m)	Lim1 Margin (dB)	Lim1 Test Results (Pass/Fail)	Worst Margin Lim1 (dB)	Lim2: FCC_pt15_2 09 (dB μ V/m)	Lim2 Margin (dB)	Lim2 Test Results (Pass/Fail)	Worst Margin Lim2 (dB)	Antenna Height (cm)	Turntable Azimuth (degrees)
51.025	41.6	-10.8	30.8	40	-9.2	PASS		40	-9.2	PASS		100	315
59.997	44.3	-11.2	33.1	40	-6.9	PASS		40	-6.9	PASS		100	315
86.939	41.7	-11.2	30.5	40	-9.5	PASS		40	-9.5	PASS		100	315
811.165	32	4.1	36.1	46	-9.9	PASS		46	-9.9	PASS		100	225

Frequency (MHz)	Raw QP Reading (dB μ V)	Correction Factor (dB/m)	Adjusted QP Amplitude (dB μ V/m)	Lim1: FCC_pt15_109_Class_B (dB μ V/m)	Margin to Lim1 (dB)	Test Results Lim1	Worst Margin Lim1 (dB)	Lim2: FCC_pt15_209 (dB μ V/m)	Margin to Lim2 (dB)	Test Results Lim2	Worst Margin Lim2 (dB)	Antenna Height (cm)	EUT Azimuth (degrees)
51.867	36.7	-10.9	25.7	40	-14.3	PASS		40	-14.3	PASS		160	137
83.893	40.5	-11.1	29.5	40	-10.5	PASS	-10.5	40	-10.5	PASS	-10.5	173	334



Bureau Veritas Consumer Product Services Inc.	Work Order - T1058
Radiated Emissions Electric Field 3m Distance	EUT Power Input - Battery
Top Peaks Horizontal 30-1000MHz	Test Site - CH-2
Notes:	Conditions - 54°C; 22%RH; 1010mBar
High Channel	Test Engineer - AKZ
	0

Data Taken at 02:55:11 PM, Monday, July 15, 2019

Frequency (MHz)	Peak Reading (dB μ V)	Correction Factor (dB/m)	Adjusted Peak Amplitude (dB μ V/m)	Lim1: FCC_pt15_1 09_Class_B (dB μ V/m)	Lim1 Margin (dB)	Lim1 Test Results (Pass/Fail)	Worst Margin Lim1 (dB)	Lim2: FCC_pt15_2 09 (dB μ V/m)	Lim2 Margin (dB)	Lim2 Test Results (Pass/Fail)	Worst Margin Lim2 (dB)	Antenna Height (cm)	EUT Azimuth (degrees)
30.606	25.3	2.5	27.8	40	-12.2	PASS	-12.2	40	-12.2	PASS	-12.2	200	45
265.807	36.9	-4.8	32.1	46	-13.9	PASS		46	-13.9	PASS		250	180
272.767	36.1	-4.5	31.6	46	-14.5	PASS		46	-14.4	PASS		100	180
466.403	33.7	-0.6	33.1	46	-12.9	PASS		46	-12.9	PASS		100	135
799.477	28.9	4	32.9	46	-13.2	PASS		46	-13.1	PASS		100	270
919.805	27.5	5.5	33	46	-13.1	PASS		46	-13	PASS		200	180

Bureau Veritas Consumer Product Services Inc.	Work Order - T1058
Radiated Emissions Electric Field 3m Distance	EUT Power Input - Battery
Top Peaks Vertical 30-1000MHz	Test Site - CH-2
Notes:	Conditions - 54°C; 22%RH; 1010mBar
High Channel	Test Engineer - AKZ
	0

Data Taken at 02:55:10 PM, Monday, July 15, 2019

Frequency (MHz)	Peak Reading (dB μ V)	Correction Factor (dB/m)	Adjusted Peak Amplitude (dB μ V/m)	Lim1: FCC_pt15_1 09_Class_B (dB μ V/m)	Lim1 Margin (dB)	Lim1 Test Results (Pass/Fail)	Worst Margin Lim1 (dB)	Lim2: FCC_pt15_2 09 (dB μ V/m)	Lim2 Margin (dB)	Lim2 Test Results (Pass/Fail)	Worst Margin Lim2 (dB)	Antenna Height (cm)	Turntable Azimuth (degrees)
51.122	41.4	-10.8	30.6	40	-9.4	PASS		40	-9.4	PASS		100	135
60.118	46.3	-11.2	35.1	40	-4.9	PASS		40	-4.9	PASS		100	180
809.468	33.5	4.2	37.6	46	-8.4	PASS		46	-8.4	PASS		100	225
850.717	32.7	4.3	37	46	-9	PASS		46	-9	PASS		100	270

Frequency (MHz)	Raw QP Reading (dB μ V)	Correction Factor (dB/m)	Adjusted QP Amplitude (dB μ V/m)	Lim1: FCC_pt15_109_Class_B (dB μ V/m)	Margin to Lim1 (dB)	Test Results Lim1	Worst Margin Lim1 (dB)	Lim2: FCC_pt15_209 (dB μ V/m)	Margin to Lim2 (dB)	Test Results Lim2	Worst Margin Lim2 (dB)	Antenna Height (cm)	EUT Azimuth (degrees)
56.668	46.3	-11.4	34.9	40	-5.1	PASS	-5.1	40	-5.1	PASS	-5.1	100	95
83.971	41.4	-11.1	30.3	40	-9.7	PASS		40	-9.7	PASS		120	324



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1-6GHz:

Radiated Emissions Table											Work Order: T1058													
Date: 09-Jul-19		Company: Black Box Biometrics					EUT Operating Voltage/Frequency: Battery																	
Antenna Polarization (H/V)	Frequency (MHz)	Peak Reading (dB μ V)	Average Reading (dB μ V)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Peak Reading (dB μ V/m)	Adjusted Avg Reading (dB μ V/m)	FCC 15.209 High Frequency - Peak			FCC 15.209 High Frequency - Average												
Temp: 22°C	Humidity: 43%	Pressure: 1013mbar	Frequency Range: 1-6GHz											Measurement Distance: 3 m										
Notes: G version																								
NO EMISSIONS WITHIN 20dB OF LIMIT.		---	---	---	---	---	---	---	---	---	---	---	---	---										
Table Result: PASS by n/a dB Worst Freq: n/a MHz																								
Test Site: EMI Chamber 2 Analyzer: 1170725	Cable 1: Asset #2606 Preamp: 8449				Cable 2: Asset #2455 Antenna: Asset #1861				Cable 3: Asset #1509 Preselector: ---															
CSsoft Radiated Emissions Calculator v 1.017.215	Copyright Curtis-Straus LLC 2000																							
Adjusted Reading = Reading - Preamp Factor + Antenna Factor + Cable Factor																								

6-18GHz:

Bureau Veritas Consumer Product Services Inc.	Work Order - T1058
Radiated Emissions Electric Field 1m Distance	EUT Power Input - Battery
Top Peaks Horizontal 6-18GHz	Test Site - CH-1
Notes:	Conditions - 24°C; 51%RH; 1009mBar
Low Channel	DUTY CYCLE: 7.5%
G Version	DUTY CYCLE CORRECTION FACTOR (DCCF): -20dB
Data Taken at 02:37:05 PM, Tuesday, July 16, 2019	

Frequency (MHz)	Raw Peak Reading (dB μ V)	Correction Factor (dB/m)	Adjusted Peak Amplitude (dB μ V/m)	Pk Lim: FCC_pt15_209 _Peak (dB μ V/m)	Margin to Peak Limit (dB)	Peak Limit Test Results (Pass/Fail)	Peak Limit Worst Margin (dB)	DCCF	Adjusted Average Amplitude (dB μ V/m)	Av Lim: FCC_pt15_209 _Average (dB μ V/m)	Margin to Avg Limit (dB)	Avg Limit Test Results (Pass/Fail)	Avg Limit Worst Margin (dB)	Antenna Height (cm)	EUT Azimuth (degrees)
7206.6	45.8	16.9	62.8	83.5	-20.7	PASS	-20	42.8	63.5	-20.7	PASS		125	85	
9606.9	46.4	18.5	64.9	83.5	-18.6	PASS	-18.6	-20	44.9	63.5	-18.6	PASS	-18.6	150	0

Bureau Veritas Consumer Product Services Inc.	Work Order - T1058
Radiated Emissions Electric Field 1m Distance	EUT Power Input - Battery
Top Peaks Vertical 6-18GHz	Test Site - CH-1
Notes:	Conditions - 24°C; 51%RH; 1009mBar
Low Channel	DUTY CYCLE: 7.5%
G Version	DUTY CYCLE CORRECTION FACTOR (DCCF): -20dB
Data Taken at 02:37:05 PM, Tuesday, July 16, 2019	

Frequency (MHz)	Raw Peak Reading (dB μ V)	Correction Factor (dB/m)	Adjusted Peak Amplitude (dB μ V/m)	Pk Lim: FCC_pt15_209 _Peak (dB μ V/m)	Margin to Peak Limit (dB)	Peak Limit Test Results (Pass/Fail)	Peak Limit Worst Margin (dB)	DCCF	Adjusted Average Amplitude (dB μ V/m)	Av Lim: FCC_pt15_209 _Average (dB μ V/m)	Margin to Avg Limit (dB)	Avg Limit Test Results (Pass/Fail)	Avg Limit Worst Margin (dB)	Antenna Height (cm)	EUT Azimuth (degrees)
7205.1	48.9	16.9	65.9	83.5	-17.6	PASS	-17.6	-20	45.9	63.5	-17.6	PASS	-17.6	125	8
9606.9	43.5	18.5	62	83.5	-21.5	PASS		-20	42	63.5	-21.5	PASS		175	48
12030.6	35.2	21.1	56.3	83.5	-27.2	PASS		-20	36.3	63.5	-27.2	PASS		100	191

Bureau Veritas Consumer Product Services Inc.	Work Order - T1058
Radiated Emissions Electric Field 1m Distance	EUT Power Input - Battery
Top Peaks Horizontal 6-18GHz	Test Site - CH-1
Notes:	Conditions - 22°C; 54% RH; 1010mBar
Mid channel	Test Engineer - AV
G Version	DUTY CYCLE: 7.5%
Data Taken at 03:16:30 PM, Tuesday, July 16, 2019	

Frequency (MHz)	Raw Peak Reading (dB μ V)	Correction Factor (dB/m)	Adjusted Peak Amplitude (dB μ V/m)	Pk Lim: FCC_pt15_209 _Peak (dB μ V/m)	Margin to Peak Limit (dB)	Peak Limit Test Results (Pass/Fail)	Peak Limit Worst Margin (dB)	DCCF	Adjusted Average Amplitude (dB μ V/m)	Av Lim: FCC_pt15_209 _Average (dB μ V/m)	Margin to Avg Limit (dB)	Avg Limit Test Results (Pass/Fail)	Avg Limit Worst Margin (dB)	Antenna Height (cm)	EUT Azimuth (degrees)
7319.1	45	17.2	62.3	83.5	-21.2	PASS		-20	42.3	63.5	-21.2	PASS		150	229
9760.8	48.6	18.6	67.3	83.5	-16.2	PASS	-16.2	-20	47.3	63.5	-16.2	PASS	-16.2	150	0



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Bureau Veritas Consumer Product Services Inc. Radiated Emissions Electric Field 1m Distance Top Peaks Vertical 6-18GHz Notes: Mid channel G Version							Work Order - T1058 EUT Power Input - Battery Test Site - CH-1 Conditions - 22°C; 54% RH; 1010mBar DUTY CYCLE: 7.5% DUTY CYCLE CORRECTION FACTOR (DCCF): -20dB								
Data Taken at 03:11:14 PM, Tuesday, July 16, 2019															
Frequency (MHz)	Raw Peak Reading (dB μ V)	Correction Factor (dB/m)	Adjusted Peak Amplitude (dB μ V/m)	Pk Lim: FCC_pt15_209_Peak (dB μ V/m)	Margin to Peak Limit (dB)	Peak Limit Test Results (Pass/Fail)	Peak Limit Worst Margin (dB)	DCCF	Adjusted Average Amplitude (dB μ V/m)	Av Lim: FCC_pt15_209_Average (dB μ V/m)	Margin to Avg Limit (dB)	Avg Limit Test Results (Pass/Fail)	Avg Limit Worst Margin (dB)	Antenna Height (cm)	EUT Azimuth (degrees)
7319.1	49	17.2	66.3	83.5	-17.2	PASS	-17.2	-20	46.3	63.5	-17.2	PASS	-17.2	125	10
9759	44.4	18.7	63.1	83.5	-20.4	PASS		-20	43.1	63.5	-20.4	PASS		150	33

Bureau Veritas Consumer Product Services Inc. Radiated Emissions Electric Field 1m Distance Top Peaks Horizontal 6-18GHz Notes: High Channel G Version							Work Order - T1058 EUT Power Input - Battery Test Site - CH-1 Conditions - 22°C; 54% RH; 1010mBar DUTY CYCLE: 7.5% DUTY CYCLE CORRECTION FACTOR (DCCF): -20dB								
Data Taken at 03:54:40 PM, Tuesday, July 16, 2019															
Frequency (MHz)	Raw Peak Reading (dB μ V)	Correction Factor (dB/m)	Adjusted Peak Amplitude (dB μ V/m)	Pk Lim: FCC_pt15_209_Peak (dB μ V/m)	Margin to Peak Limit (dB)	Peak Limit Test Results (Pass/Fail)	Peak Limit Worst Margin (dB)	DCCF	Adjusted Average Amplitude (dB μ V/m)	Av Lim: FCC_pt15_209_Average (dB μ V/m)	Margin to Avg Limit (dB)	Avg Limit Test Results (Pass/Fail)	Avg Limit Worst Margin (dB)	Antenna Height (cm)	EUT Azimuth (degrees)
7439.1	50.1	17.2	67.3	83.5	-16.2	PASS	-16.2	-20	47.3	63.5	-16.2	PASS	-16.2	150	307
9921	47.2	19.1	66.3	83.5	-17.2	PASS		-20	46.3	63.5	-17.2	PASS		150	0
12401.1	42.7	21.3	64	83.5	-19.5	PASS		-20	44	63.5	-19.5	PASS		175	9

Bureau Veritas Consumer Product Services Inc. Radiated Emissions Electric Field 1m Distance Top Peaks Vertical 6-18GHz Notes: High Channel G Version							Work Order - T1058 EUT Power Input - Battery Test Site - CH-1 Conditions - 22°C; 54% RH; 1010mBar DUTY CYCLE: 7.5% DUTY CYCLE CORRECTION FACTOR (DCCF): -20dB								
Data Taken at 04:23:34 PM, Tuesday, July 16, 2019															
Frequency (MHz)	Raw Peak Reading (dB μ V)	Correction Factor (dB/m)	Adjusted Peak Amplitude (dB μ V/m)	Pk Lim: FCC_pt15_209_Peak (dB μ V/m)	Margin to Peak Limit (dB)	Peak Limit Test Results (Pass/Fail)	Peak Limit Worst Margin (dB)	DCCF	Adjusted Average Amplitude (dB μ V/m)	Av Lim: FCC_pt15_209_Average (dB μ V/m)	Margin to Avg Limit (dB)	Avg Limit Test Results (Pass/Fail)	Avg Limit Worst Margin (dB)	Antenna Height (cm)	EUT Azimuth (degrees)
7439.1	50.4	17.2	67.6	83.5	-15.9	PASS	-15.9	-20	47.6	63.5	-15.9	PASS	-15.9	100	0
9920.7	42.6	19.1	61.8	83.5	-21.7	PASS		-20	41.8	63.5	-21.7	PASS		125	48
12398.4	41.3	21.3	62.6	83.5	-20.9	PASS		-20	42.6	63.5	-20.9	PASS		175	243

18-25GHz:

Radiated Emissions Table																									
Date: 07-Aug-19		Company: Black Box Biometrics					Work Order: T1058																		
Engineer: AKZ							EUT Operating Voltage/Frequency: Battery																		
Temp: 23°C		Humidity: 49%					Pressure: 1000mbar																		
Frequency Range: 18-25GHz																									
Notes: G Version and H Version Low, Mid, and High Channels																									
Antenna Polarization (H/V)		Frequency (MHz)	Peak Reading (dB μ V)	Average Reading (dB μ V)	Preamplifier Factor (dB)	Antenna Factor (dB/rl)	Cable Factor (dB)	Adjusted Peak Reading (dB μ V/m)	Adjusted Avg Reading (dB μ V/m)	FCC Class B High Frequency - Peak			FCC Class B High Frequency - Average												
NO EMISSIONS WITHIN 20dB OF LIMIT.		---	---	---	---	---	---	---	---	Limit (dB μ V/m)	Margin (dB)	Result (Pass/Fail)	Limit (dB μ V/m)	Margin (dB)	Result (Pass/Fail)										
Table Result: PASS by n/a dB																									
Test Site: EMI Chamber 1		Cable 1: Asset #2324					Worst Freq: n/a MHz																		
Analyzer: Gold		Preamp: 18-26.5GHz					Cable 2: ---																		
CSsoft Radiated Emissions Calculator v 1.017.215		Antenna: 18-26.5GHz Horn					Cable 3: ---																		
Adjusted Reading = Reading - Preamp Factor + Antenna Factor + Cable Factor																									
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Test Equipment Used:

30-1000MHz:

Rev. 6/25/2019

	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 EMI Chamber 2	FCC Code 719150	IC Code 2762A-7	VCCI Code A-0015	Range 30-1000MHz	Asset 1686	Cat I	Calibration Due 12/7/2020	Calibrated on 12/7/2018
Preamps/Couplers Attenuators / Filters Green	Range 0.009-2000MHz	MN ZFL-1000-LN	Mfr CS	SN N/A	Asset 802	Cat II	Calibration Due 9/30/2019	Calibrated on 9/30/2018
Antennas Red-Brown Biolog	Range 30-2000MHz	MN JB1	Mfr Sunol	SN A0032406	Asset 1218	Cat I	Calibration Due 3/11/2021	Calibrated on 3/11/2019
Meteorological Meters/Chambers Weather Clock (Pressure Only) Asset #2656	MN BA928 1235C97	Mfr Oregon Scientific Control Company	SN C3166-1 181683818	Asset 831 2656	Cat I I	Calibration Due 5/15/2020 4/3/2020	Calibrated on 5/15/2018 4/3/2019	
Cables Asset #2455 Asset #2606	Range 9KHz-18GHz 9KHz-18GHz		Mfr MegaPhase MegaPhase		Cat II II	Calibration Due 10/29/2019 4/2/2020	Calibrated on 10/29/2018 4/2/2019	

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

1-6GHz:

Rev. 6/25/2019

	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 EMI Chamber 2 EMI Chamber 2	FCC Code 719150 719150	IC Code 2762A-7 2762A-7	VCCI Code A-0015 A-0015	Range 30-1000MHz 1-18GHz	Asset 1686 1686	Cat I I	Calibration Due 12/7/2020 12/7/2020	Calibrated on 12/7/2018 12/7/2018
Preamps /Couplers Attenuators / Filters 8449B HF Preamp	Range 1-18GHz	MN 8449B	Mfr Agilent	SN 1149055	Asset	Cat II	Calibration Due 11/26/2019	Calibrated on 11/26/2018
Antennas Blue Horn	Range 1-18GHz	MN 3117	Mfr ETS	SN 157647	Asset 1861	Cat I	Calibration Due 3/9/2021	Calibrated on 3/9/2019
Meteorological Meters/Chambers Weather Clock (Pressure Only) Asset #2659	MN BA928 1235C97	Mfr Oregon Scientific Control Company	SN C3166-1 181683830	Asset 831 2659	Cat I I	Calibration Due 5/15/2020 4/3/2020	Calibrated on 5/15/2018 4/3/2019	
Cables Asset #1509 Asset #2455 Asset #2606	Range 9kHz - 18GHz 9KHz-18GHz 9KHz-18GHz		Mfr Florida RF MegaPhase MegaPhase		Cat II II II	Calibration Due 10/9/2019 10/29/2019 4/2/2020	Calibrated on 10/9/2018 10/29/2018 4/2/2019	

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



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Testing Cert. No. 1627-01

6-18GHz:

Rev. 7/10/2019

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								
EMI Chamber 2	FCC Code 719150	IC Code 2762A-7	VCCI Code A-0015	Range 30-1000MHz	Asset 1686	Cat I	Calibration Due 12/7/2020	Calibrated on 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								
8449B HF Preamp	Range 1-18GHz	MN 8449B	Mfr Agilent	SN 1149055	Asset G226	Cat II	Calibration Due 11/26/2019	Calibrated on 11/26/2018
2116 BRF	0.009-18000MHz	BRM50702	Micro-Tronics	2116	II	11/8/2019	11/8/2018	
Antennas								
Orange Horn	Range 1-18GHz	MN 3115	Mfr EMCO	SN 0004-6123	Asset 390	Cat I	Calibration Due 11/6/2020	Calibrated on 11/6/2018
Meteorological Meters/Chambers								
Weather Clock (Pressure Only)	MN BA928	Mfr Oregon Scientific	SN C3166-1	Asset 831	Cat I	Calibration Due 5/15/2020	Calibrated on 5/15/2018	
Asset #2659	1235C97	Control Company	181683830	2659	I	4/3/2020	4/3/2019	
Cables								
Asset #2456	Range 9KHz-18GHz	Mfr MegaPhase	Cat II	Calibration Due 10/31/2019	Calibrated on 10/31/2018			
Asset #2585	9KHz-18GHz	Pasternack	II	5/24/2020	5/24/2019			

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

Rev. 7/24/2019

Spectrum Analyzers / Receivers /Preselectors	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
Rental MXE EMI Receiver(1170725)	20Hz-26.5GHz	N9038A	Agilent	MY5121015	1170725	I	5/30/2020	5/30/2019
Radiated Emissions Sites								
EMI Chamber 2	FCC Code 719150	IC Code 2762A-7	VCCI Code A-0015	Range 10-1000MHz	Asset 1686	Cat I	Calibration Due 12/7/2020	Calibrated on 12/7/2018
Preamps /Couplers Attenuators / Filters								
8449B HF Preamp	Range 1-18GHz	MN 8449B	Mfr Agilent	SN 1149055	Asset	Cat II	Calibration Due 11/26/2019	Calibrated on 11/26/2018
Antennas								
Blue Horn	Range 1-18GHz	MN 3117	Mfr ETS	SN 157647	Asset 1861	Cat I	Calibration Due 3/9/2021	Calibrated on 3/9/2019
Meteorological Meters/Chambers								
Asset #2659	1235C97	Mfr Oregon Scientific	SN 1.82E+08	Asset 2659	Cat I	Calibration Due 4/3/2020	Calibrated on 4/3/2019	
Cables								
Asset #2455	Range 9KHz-18GHz	Mfr MegaPhase	Cat II	Calibration Due 10/29/2019	Calibrated on 10/29/2018			
Asset #2466	9KHz-18GHz	MegaPhase	II	10/31/2019	10/31/2018			
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.

18-25GHz:

Rev. 7/30/2019

Spectrum Analyzers / Receivers /Preselectors	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
Gold	100Hz-26.5 GHz	E4407B	Agilent	MY45113816	1284	I	5/20/2020	5/20/2019
Radiated Emissions Sites								
EMI Chamber 1	FCC Code 719150	IC Code 2762A-6	VCCI Code A-0015	Range 30-1000MHz	Asset 1685	Cat I	Calibration Due 12/7/2020	Calibrated on 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								
HF (Yellow)	Range 18-26.5GHz	MN AFS4-18002650-60-8P-4	Mfr CS	SN 467559	Asset 1266	Cat II	Calibration Due 10/24/2019	Calibrated on 10/24/2018
Antennas								
HF (White) Horn	Range 18-26.5GHz	MN 801-WLM	Mfr Waveline	SN 758	Asset 758	Cat III	Calibration Due Verify before Use	Calibrated on date of test
Meteorological Meters/Chambers								
Weather Clock (Pressure Only)	MN BA928	Mfr Oregon Scientific	SN C3166-1	Asset 831	Cat I	Calibration Due 5/15/2020	Calibrated on 5/15/2018	
Asset #2659	1235C97	Control Company	181683830	2659	I	4/3/2020	4/3/2019	
Cables								
Asset #2324	Range 1-26.5GHz	TM26-S1S1-120	Mfr MEGAPHASE	17139101 001	2324	Cat II	Calibration Due 7/24/2020	Calibrated on 7/24/2019

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Appendix A: Conducted Antenna Ports Tests

ET1058-1 Appendix A CFR Title 47 FCC Part §15.247 and ISED Canada RSS-247 Issue 2

DUT Information

Model Number: Gen 7 0a
 Manufacturer: BlackBox Biometrics Inc.
 Serial Number: Not listed

40 channels are provided for BLE:

Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)
0	2402	10	2422	20	2442	30	2462
1	2404	11	2424	21	2444	31	2464
2	2406	12	2426	22	2446	32	2466
3	2408	13	2428	23	2448	33	2468
4	2410	14	2430	24	2450	34	2470
5	2412	15	2432	25	2452	35	2472
6	2414	16	2434	26	2454	36	2474
7	2416	17	2436	27	2456	37	2476
8	2418	18	2438	28	2458	38	2478
9	2420	19	2440	29	2460	39	2480

Notes: Channels indicated above in bold were selected as representative test channels.

Modulation	Data Rate
GFSK	1Mbps

Antenna type	Internal patch
Antenna gain	2.5dBi peak
Number of transmit chains	1
Equipment type	Digital Transmission System



Test Equipment Used

Rev. 04/10/2019									
Spectrum Analyzers / Receivers/Preselectors	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on	
FSV40 Signal/Spectrum Analyzer	10Hz-40GHz	FSV40	ROHDE & SCHWARZ	101551	2200	I	10/1/2019	10/1/2018	
Signal Generators/Comparaison Noise Emitter	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on	
SMBV100A Vector Signal Generator	9KHz-6GHz	SMBV100A	ROHDE & SCHWARZ	261919	2201	I	10/1/2019	10/1/2018	
SMB100A Signal Generator	100KHz-40GHz	SMB100A	ROHDE & SCHWARZ	179884	2557	I	10/1/2019	10/1/2018	
Power/Noise Meters	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on		
OSP - open switch and control platform	30MHz-18GHz	OSP-B157W8	ROHDE & SCHWARZ	1527.1144.02-100955-Ck	2558	I	3/14/2020	3/14/2019	
Cables	Range	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on		
DUT1	30MHz-40GHz	Micro-Coax	UFB142A-1-0787-200200	2593	I	3/13/2020	3/13/2019		
DUT2	30MHz-40GHz	Micro-Coax	UFB142A-1-0787-200200	2594	I	3/13/2020	3/13/2019		
DUT3	30MHz-40GHz	Micro-Coax	UFB142A-1-0787-200200	2595	I	3/13/2020	3/13/2019		
DUT4	30MHz-40GHz	Micro-Coax	UFB142A-1-0787-200200	2596	I	3/13/2020	3/13/2019		
Attenuators / Couplers	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on	
10dB Attenuator-01 Brown	30MHz-18GHz	Mini Circuits	BW-S10W2+		I	3/13/2020	3/13/2019		
10dB Attenuator-02 Yellow	30MHz-18GHz	Mini Circuits	BW-S10W2+		I	3/13/2020	3/13/2019		
10dB Attenuator-03 Red	30MHz-18GHz	Mini Circuits	BW-S10W2+		I	3/13/2020	3/13/2019		
10dB Attenuator-04 orange	30MHz-18GHz	Mini Circuits	BW-S10W2+		I	3/13/2020	3/13/2019		
API - 30dB 20W Attenuator	9KHz-40GHz	89-30-11	API Weinschel	703	2121	II	3/23/2020	3/23/2019	
Directional Coupler	0.5GHz-18GHz	UDC	AA MCS	001040	2434	I	8/8/2019	8/9/2018	
Communication Tester	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on	
CMW270 Wideband Radio Communication Tester	DC to 6GHz	CMW270	ROHDE & SCHWARZ	1201.0002K75-101066-MV	2559	I	2/14/2020	2/14/2019	
Meteorological Meters/Chambers		MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on	
Temp/Humidity Chamber #18		EPX2H	Espec	137664	1645	I	1/2/2020	1/2/2019	
Weather Clock (Pressure only)		BA928	Oregon Scientific	C3166-1	831	I	5/15/2020	5/15/2018	
TH A#2086		HTC-1	HDE		2086	II	3/23/2020	3/23/2019	

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

Rohde&Schwarz Test System TS8997						
Test Equipment	Manufacturer	Model Number	Serial Number	Firmware Version		Software Version
Spectrum Analyzer	Rohde&Schwarz	FSV40	101551	3.40		N/A
Signal Generator	Rohde&Schwarz	SMB100A	179884	3.20.390.24 / Drv:Rev 2.21.0, 07/2016, CVI 2015		N/A
Vector Signal Generator	Rohde&Schwarz	SMBV100A	261919	3.1.19.15 - 3.50.082.47		N/A
Switching Platform	Rohde&Schwarz	OSP-B157W	1527.1144	1.23.0.2		N/A
Wireless Connectivity Tester	Rohde&Schwarz	CMW270	101066	3.7		N/A
Test Software	Rohde&Schwarz	WMS32	N/A	N/A		V10.50.00



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Testing Cert. No. 1627-01

Summary

Test	Frequency (MHz)	Result
Average Output Power	2402 / 2440 / 2480	PASS
Peak Power Spectral Density	2402 / 2440 / 2480	PASS
DTS Bandwidth (6dB)	2402 / 2440 / 2480	PASS
Occupied Channel Bandwidth 99%	2402 / 2440 / 2480	PASS
Conducted Band Edges	2402 / 2480	PASS
Conducted Spurious Emissions	2402 / 2440 / 2480	PASS



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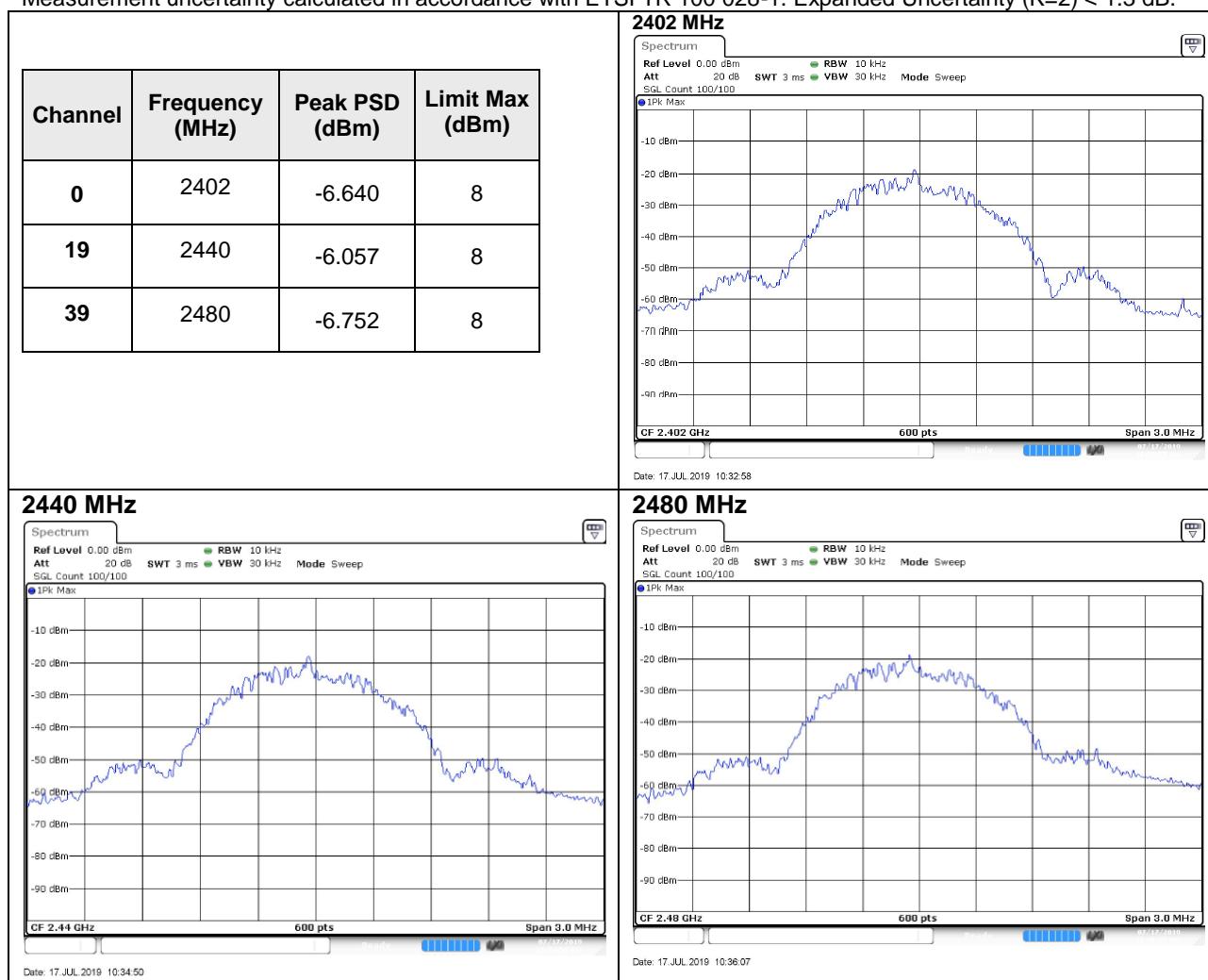
Average Output Power

Test procedure in accordance with ANSI C63.10-2013 Section 11.9.2.3.2 Method AVGPM-G.
 Measurement uncertainty calculated in accordance with ETSI TR 100 028-1.
 Expanded Combined Uncertainty of absolute Level Measurement (K=2) < 1 dB

Channel	Frequency (MHz)	Gated RMS (dBm)	Limit Max (dBm)
0	2402	1.871	30
19	2440	2.000	30
39	2480	1.740	30

Peak Power Spectral Density

Test procedure in accordance with ANSI C63.10-2013 Section 11.10.2 Method PKPSD.
 Measurement uncertainty calculated in accordance with ETSI TR 100 028-1. Expanded Uncertainty (K=2) < 1.3 dB.

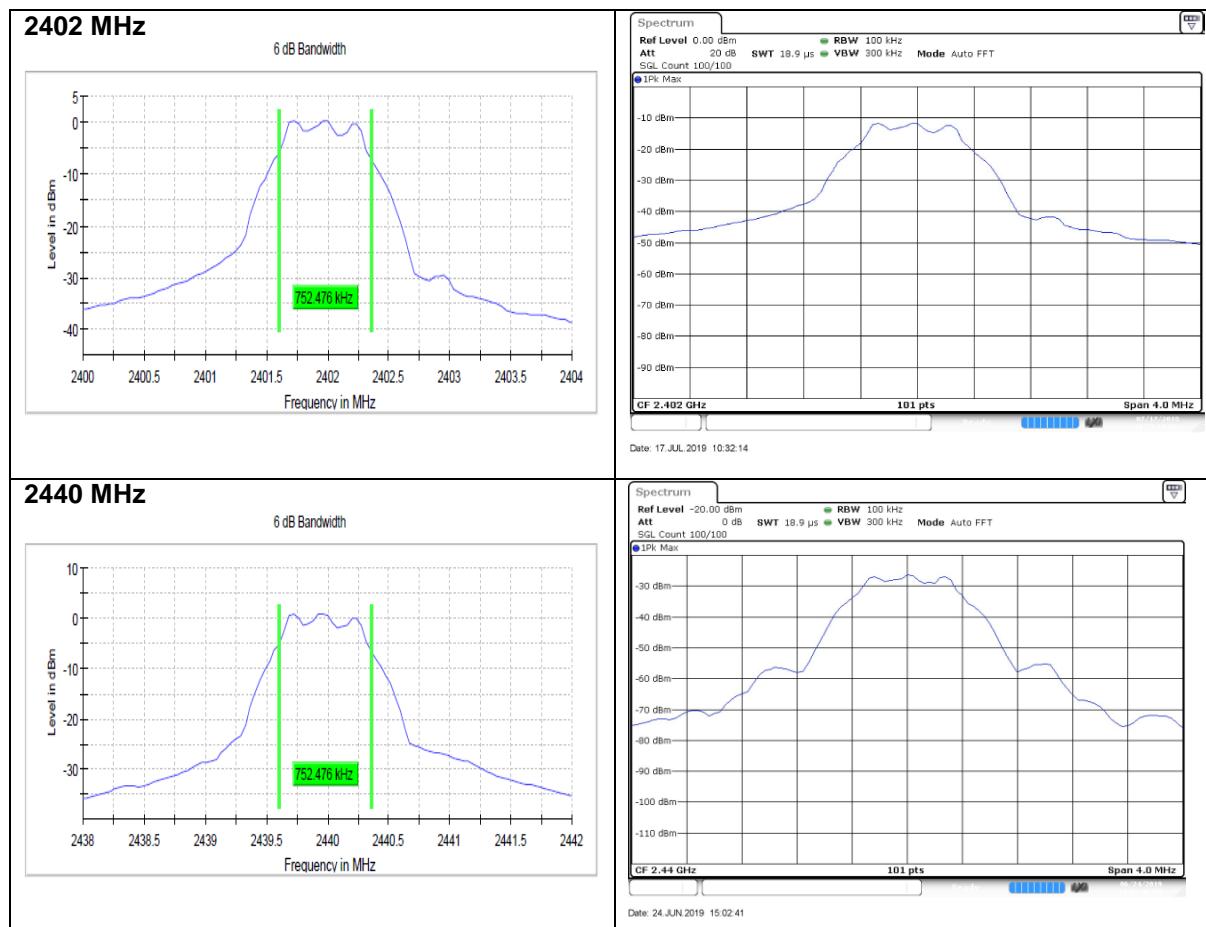


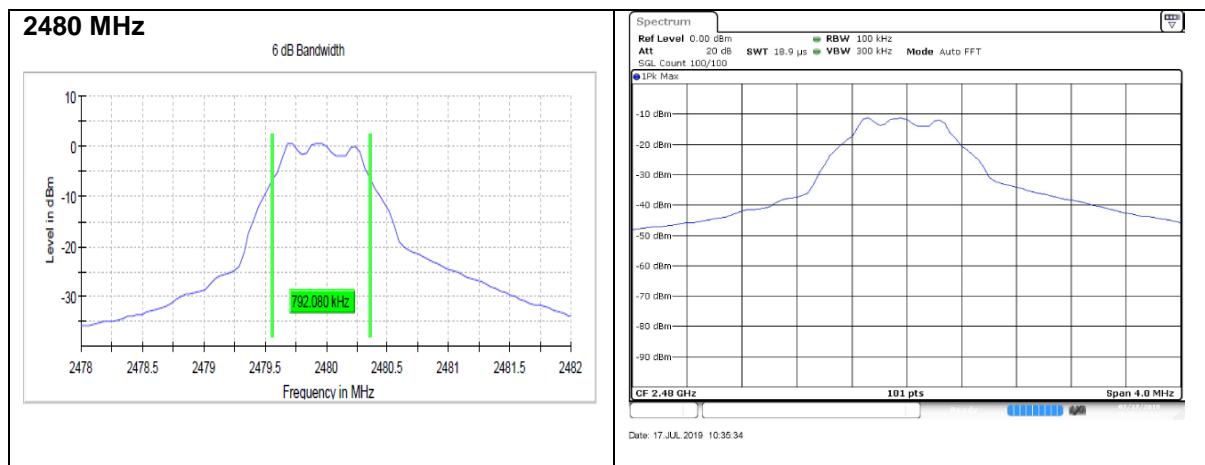
DTS Bandwidth (6dB)

Test procedure in accordance with ANSI C63.10-2013 Section 11.8.

Measurement uncertainty calculated in accordance with ETSI TR 100 028-1. Expanded Uncertainty (K=2) < 2%

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)	Result
0	2402	0.752476	> 0.5	Pass
19	2440	0.752476	> 0.5	Pass
39	2480	0.792080	> 0.5	Pass





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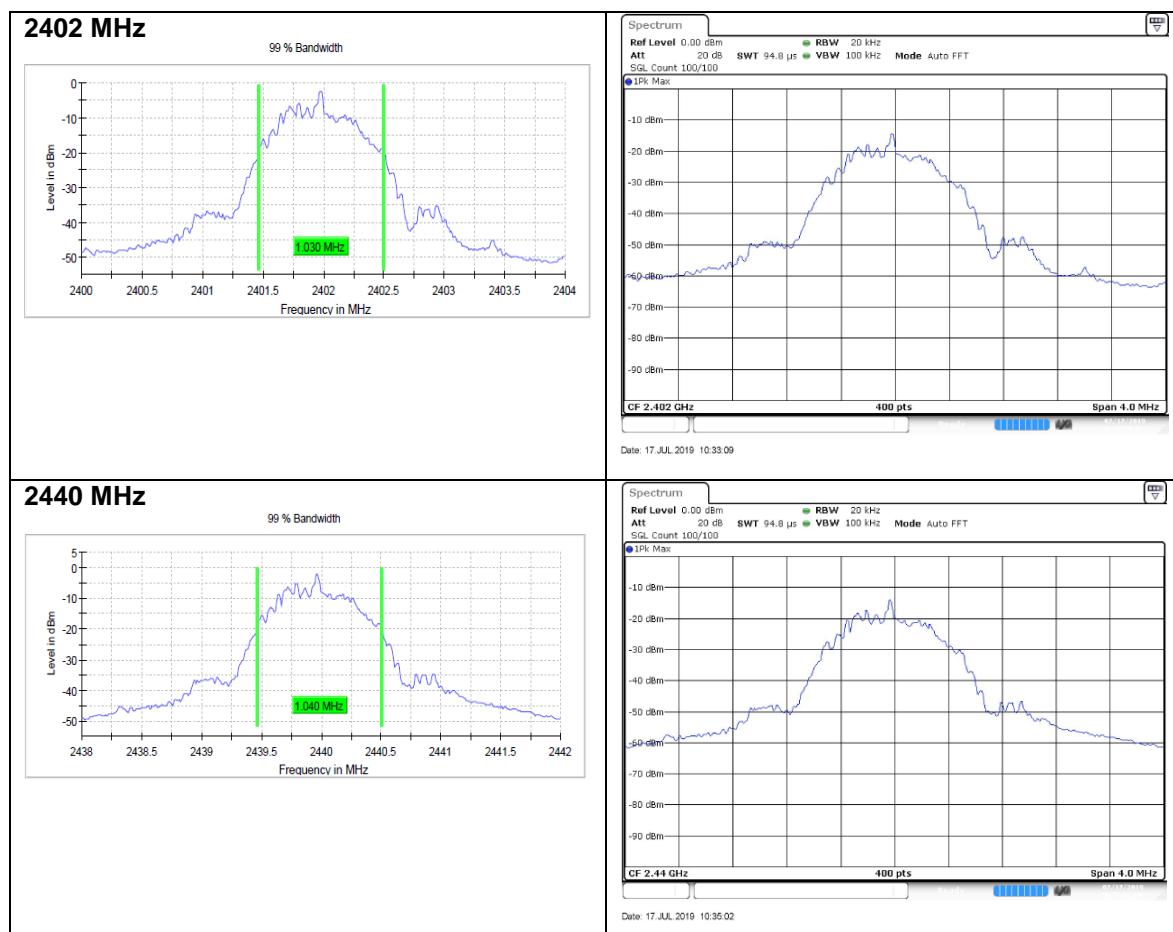
Testing Cert. No. 1627-01

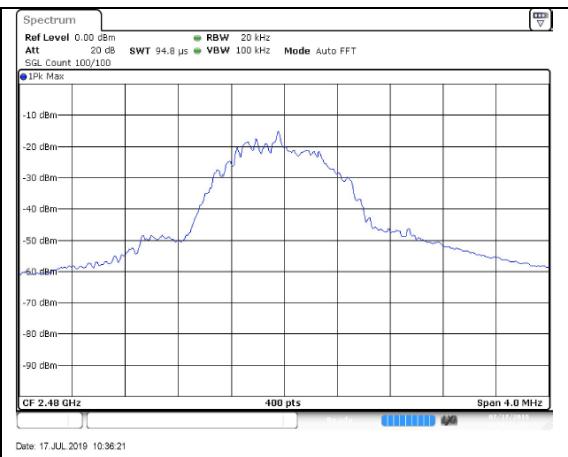
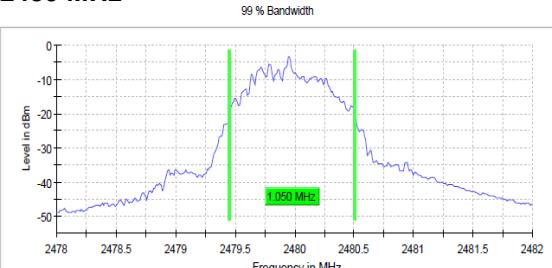
Occupied Channel Bandwidth 99%

Test procedure in accordance with RSS-Gen Issue 5 Section 6.7.

Measurement uncertainty calculated in accordance with ETSI TR 100 028-1. Expanded Uncertainty (K=2) < 2%

Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)
0	2402	1.030
19	2440	1.040
39	2480	1.050



2480 MHz

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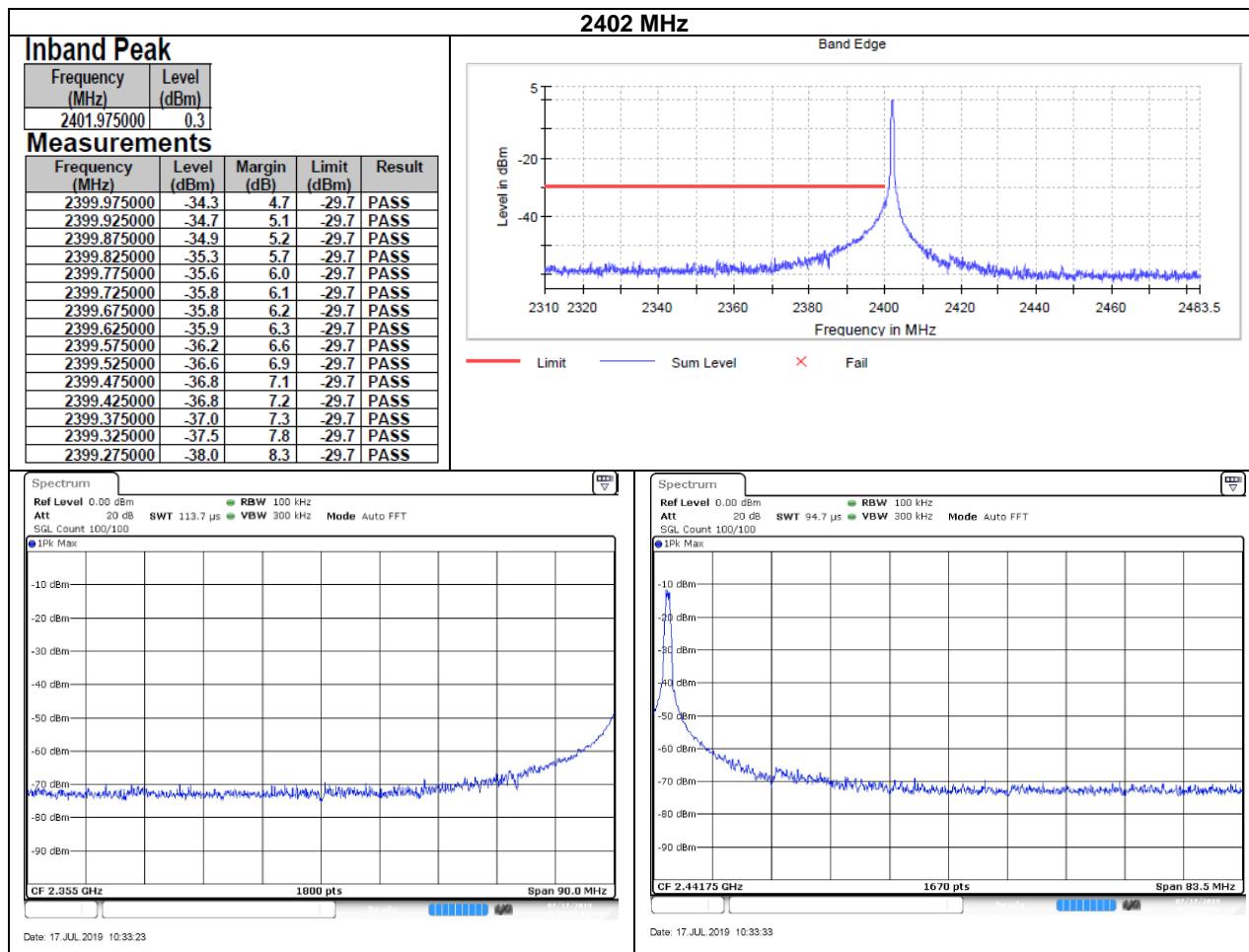
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Conducted Band Edge Low

Test procedure in accordance with ANSI C63.10-2013 Section 11.11.

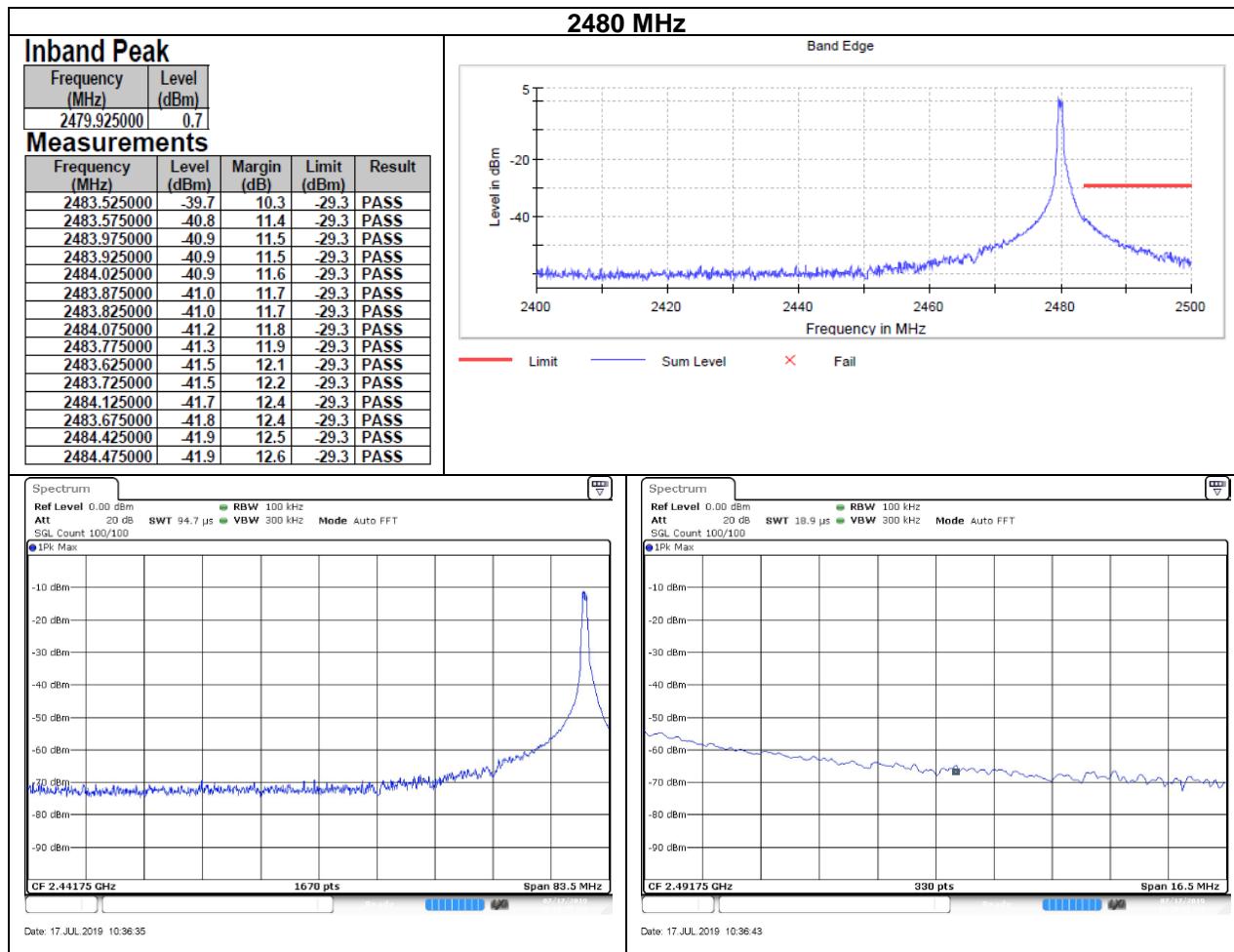
Measurement uncertainty calculated in accordance with ETSI TR 100 028-1. Expanded Uncertainty (K=2) < 0.8 dB



Conducted Band Edge High

Test procedure in accordance with ANSI C63.10-2013 Section 11.11.

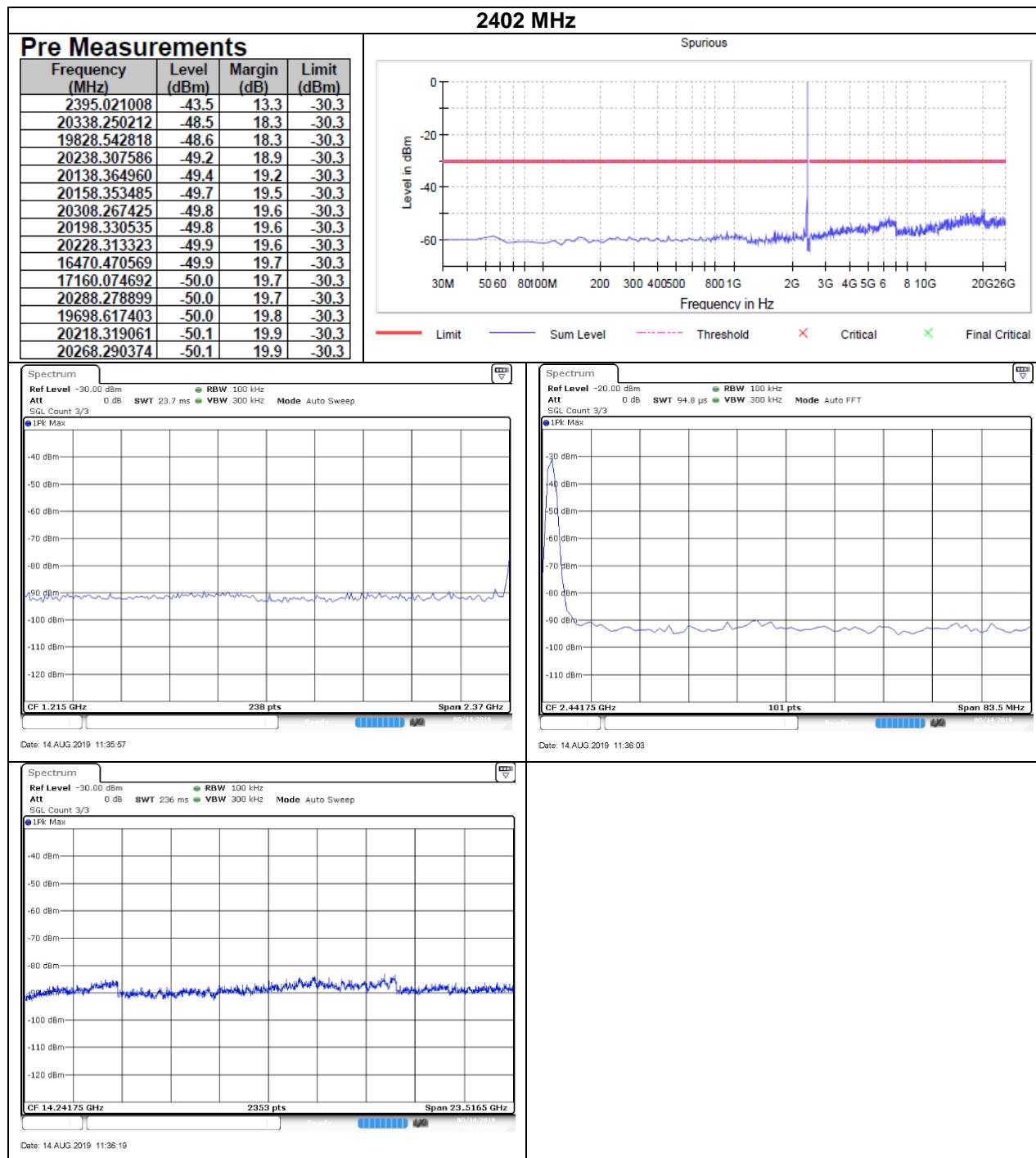
Measurement uncertainty calculated in accordance with ETSI TR 100 028-1. Expanded Uncertainty (K=2) < 0.8 dB

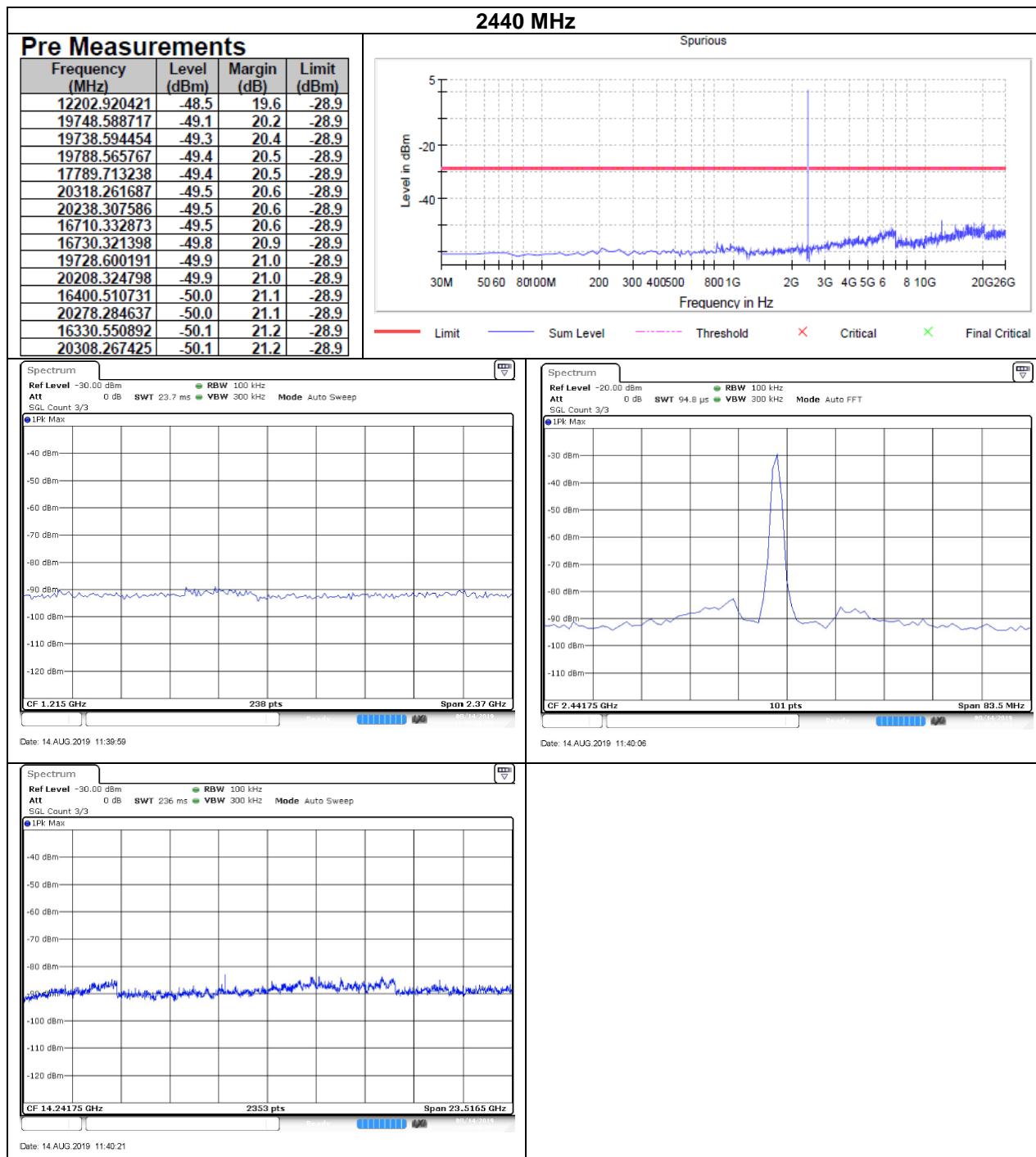


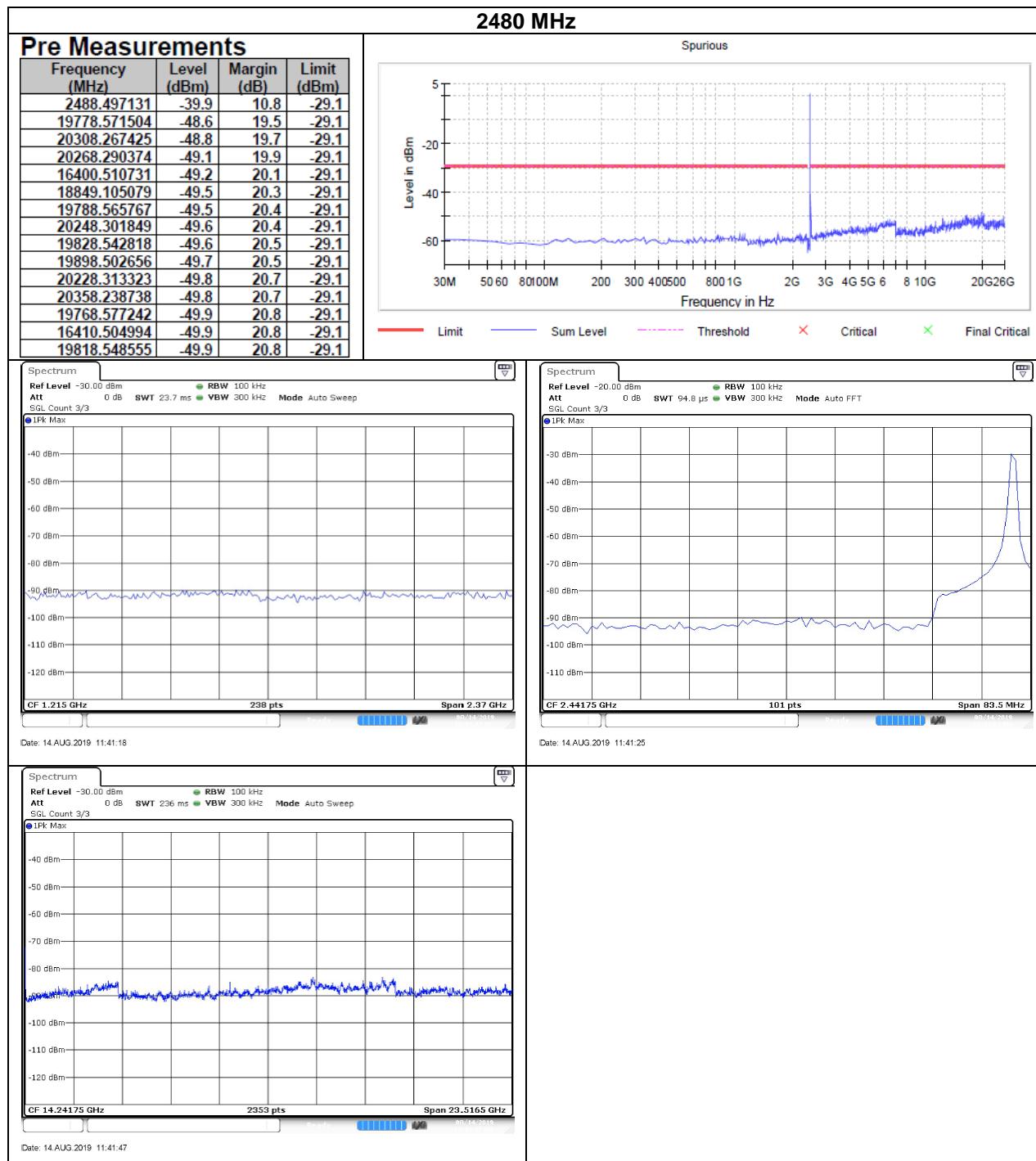
Conducted Spurious Emissions

Test procedure in accordance with ANSI C63.10-2013 Section 11.11.

Measurement uncertainty calculated in accordance with ETSI TR 100 028-1. Expanded Uncertainty (K=2) < 1.8 dB







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 (Ucispr)
Radiated Emissions (1-26.5GHz)	4.6dB	N/A
Radiated Emissions (above 26.5GHz)	4.9dB	N/A
Magnetic Radiated Emissions	5.6dB	N/A
Conducted Emissions		
NIST	3.9dB	N/A
CISPR	3.6dB	3.6dB (Ucispr)
Telco Conducted Emissions (Current)	2.9dB	N/A
Telco Conducted Emissions (Voltage)	4.4dB	N/A
Electrostatic Discharge	11.5%	N/A
Radiated RF Immunity (Uniform Field)	1.6dB	N/A
Electrical Fast Transients	23.1%	N/A
Surge	23.1%	N/A
Conducted RF Immunity	3dB	N/A
Magnetic Immunity	12.8%	N/A
Dips and Interrupts	2.3V	N/A
Harmonics	3.5%	N/A
Flicker	3.5%	N/A
Radio frequency (@ 2.4GHz)	3.23×10^{-8}	1×10^{-7}
RF power, conducted	0.40dB	0.75dB
Maximum frequency deviation:		
• Within 300Hz and 6kHz of audio frequency / Within 6kHz and 25kHz of audio frequency	3.4% 0.3dB	5% 3dB
Adjacent channel power	1.9dB	3dB
Conducted spurious emission of transmitter, valid up to 12.75GHz	2.39dB	3dB
Conducted emission of receivers	1.3dB	3dB
Radiated emission of transmitter, valid up to 26.5GHz	3.9dB	6dB
Radiated emission of transmitter, valid up to 80GHz	3.3dB	6dB
Radiated emission of receiver, valid up to 26.5GHz	3.9dB	6dB
Radiated emission of receiver, valid up to 80GHz	3.3dB	6dB
Humidity	2.37%	5%
Temperature	0.7°C	1.0°C
Time	4.1%	10%
RF Power Density, Conducted	0.4dB	3dB
DC and low frequency voltages	1.3%	3%
Voltage (AC, <10kHz)	1.3%	2%
Voltage (DC)	0.62%	1%
The above reflects a 95% confidence level		



Conditions Of Testing

[Bureau Veritas Consumer Products Services, Inc., a Massachusetts corporation], and/or its affiliates (collectively, the "Company") will conduct, at the request of the Submitter ("Client"), the tests specified on the submitted Test Request Form or equivalent in accordance with, and subject to, the following terms and conditions (collectively, "Conditions"):

1. All orders for tests are subject to acceptance by the Company, and no order will constitute a binding commitment of the Company unless and until such order is accepted by it, as evidenced by the issuance of a written report ("Test Report") by the Company. The Test Report is issued solely by the Company, is intended for the exclusive use of Client and shall not be published, used for advertising purposes, copied or replicated for distribution to any other person or entity or otherwise publicly disclosed without the prior written consent of the Company. By submitting a request for services to the Company, Client consents to the disclosure to accreditation bodies of those records of Client relevant to the accreditation body's assessment of the Company's competence and compliance with relevant accreditation criteria. The Company shall not be liable for any loss or damage whatsoever resulting from the failure of the Company to provide its services within any time period for completion estimated by the Company. If Client anticipates using the Test Report in any legal proceeding, arbitration, dispute resolution forum or other proceeding, it shall so notify the Company prior to submitting the Test Report in such proceeding. The Company has no obligation to provide a fact or expert witness at such proceeding unless the Company agrees in advance to do so for a separate and additional fee.
2. The Test Report will set forth the findings of the Company solely with respect to the test samples identified therein. Unless specifically and expressly indicated in the Test Report, the results set forth in such Test Report are not intended to be indicative or representative of the quality or characteristics of the lot from which a test sample is taken, and Client shall not rely upon the Test Report as being so indicative or representative of the lot or of the tested product in general. The Test Report will reflect the findings of the Company at the time of testing only, and the Company shall have no obligation to update the Test Report after its issuance. The Test Report will set forth the results of the tests performed by the Company based upon the written information provided to the Company. The Test Report will be based solely on the samples and written information submitted to the Company by Client, and the Company shall not be obligated to conduct any independent investigation or inquiry with respect thereto.
3. The Company may, in its sole discretion, destroy samples which have been furnished to the Company for testing and which have not been destroyed in the course of testing. The Company may delegate the performance of all or a portion of the services contemplated hereunder to an affiliate, agent or subcontractor of the Company, and Client consents to such delegation.
4. These Conditions and the Test Report represent the entire understanding of the parties hereto with respect to the subject matter hereof and of the Test Report, and no modification, variance or extrapolation with respect thereto shall be permitted without the prior written consent of the Company.
5. The names, service marks, trademarks and copyrights of the Company and its affiliates, including the names "**BUREAU VERITAS**," "**BUREAU VERITAS CONSUMER PRODUCTS SERVICES**," "**BVCPs**," "**MTL**," "**ACTS**," "**MTL-ACTS**" and **Bureau Veritas Consumer Products Services Inc.** (collectively, the "Marks") are and shall remain the sole property of the Company or its affiliates and shall not be used by Client except solely to the extent that Client obtains the prior written approval of the Company and then only in the manner prescribed by the Company. Client shall not contest the validity of the Marks or take any action that might impair the value or goodwill associated with the Marks or the image or reputation of the Company or its affiliates.
6. Payment in full shall be due 30 days after the date of invoice. Interest shall be due on overdue amounts from the due date until paid at an interest rate of 1.5% per month or, if less, the maximum rate permitted by law. The Company reserves the right, at any time and from time to time, to revoke any credit extended to Client. Client shall reimburse the Company for any costs it incurs in collecting past due amounts, including court costs and fees and expenses of attorneys and collection agencies. The Test Report may not be used or relied upon by Client if and for so long as Client fails to pay when due any invoice issued by the Company or any affiliate of it to Client or any affiliate or subsidiary of Client together with interest and penalties, if any, accrued thereon.
7. The Company disclaims any and all responsibility or liability arising out of or in connection with e-mail transmissions of such information.
8. Client understands and agrees that the Company is neither an insurer nor a guarantor, that the Company does not take the place of Client or any designer, manufacturer, agent, buyer, distributor or transportation or shipping company, and that the Company disclaims all liability in such capacities. Client further understands that if it seeks assurance against loss or damage, it should obtain appropriate insurance.
9. Client agrees that the Company, by providing the services, does not take the place of Client nor any third party, nor does the Company release them from any of their obligations, nor does the Company otherwise assume, abridge, abrogate or undertake to discharge any duty of any third party to Client or any duty of Client or any third party to any other third party, and Client will not release any third party from its obligations and duties with respect to the tested goods.
10. Client shall, on a timely basis, (a) provide adequate instructions to the Company in order to enable the Company to perform properly its services, (b) provide, or cause Client's suppliers and contractors to provide, the Company with all documents necessary to enable the Company to perform its services, (c) furnish the Company with all relevant information regarding Client's intended use and purposes of the tested goods, (d) advise the Company of essential dates and deadlines relevant to the tested goods and (e) fully exercise all rights and remedies available to Client against third parties in respect of the tested goods.
11. The Company shall undertake due care and ordinary skill in the performance of its services to Client, and the Company shall accept responsibility only were such skill has not been exercised and, even in such event, only to the extent of the limitation of liability set forth herein.
12. If Client desires to assert a claim arising from or relating to (i) the performance, purported performance or non-performance of any services by the Company or (ii) the sale, resale, manufacture, distribution or use of any tested goods, it must submit that claim to the Company in a writing that sets forth with particularity the basis for such claim within 60 days from discovery of the potential claim and not more than six months after the date of issuance of the Test Report to Client. Client waives any and all such claims including, without limitation, claims that the Test Report is inaccurate, incomplete or misleading or that additional or different testing is required, unless and then only to the extent that Client submits a written claim to the Company within both such time periods.
13. CLIENT SHALL, EXCEPT TO THE EXTENT OF COMPANY'S LIABILITY TO CLIENT HEREUNDER (WHICH IN NO EVENT SHALL EXCEED THE LIMITATION OF LIABILITY HEREIN), HOLD HARMLESS AND INDEMNIFY THE COMPANY, ITS AFFILIATES AND THEIR RESPECTIVE DIRECTORS, OFFICERS, EMPLOYEES, AGENTS AND SUBCONTRACTORS AGAINST ALL ACTUAL OR ALLEGED THIRD PARTY CLAIMS FOR LOSS, DAMAGE OR EXPENSE OF WHATSOEVER NATURE AND HOWSOEVER ARISING FROM OR RELATING TO (i) THE PERFORMANCE, PURPORTED PERFORMANCE OR NON-PERFORMANCE OF ANY SERVICES BY THE COMPANY OR (ii) THE SALE, RESALE, MANUFACTURE, DISTRIBUTION OR USE OF ANY TESTED GOODS.
14. EXCEPT AS MAY OTHERWISE BE EXPRESSLY AGREED TO IN WRITING BY THE COMPANY AND NOTWITHSTANDING ANY PROVISION TO THE CONTRARY CONTAINED HEREIN OR IN ANY TEST REPORT, NO WARRANTY OR GUARANTEE, EXPRESS OR IMPLIED, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR USE, IS MADE.



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



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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 Bureau Veritas Consumer Products Services Inc. may use to delegate the performance of work can be provided upon request.

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