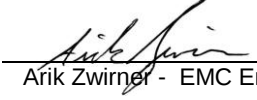
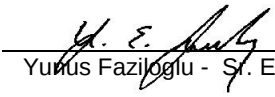




Test Report

Bureau Veritas Consumer Products Services Inc.

Report No	ET1058-1
Client	BlackBox Biometrics Inc.
Address	125 Tech Park Drive Rochester, NY 14623
Items tested FCC ID IC	Blast Gauge (Models: Gen 7 0a and Gen 7 1a) 2AHN8BG711 21433-BG711
Equipment Type Equipment Code Emission Designator	Digital Transmission System DTS 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 - Sr. EMC Engineer
Issue Date	9/10/2019
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.



Bureau Veritas Consumer Products Services Inc.
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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, ISSED 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

EUT Configuration											
Work Order:	T1058										
Company:	BlackBox Biometrics Inc.										
Company Address:	125 Tech Park Drive										
	Rochester, NY 14623										
Contact:	Joe Bridgeford										
	MN		PN		SN						
EUT:	Model Gen 7 0a		--		--						
	Model Gen 7 1a		--		--						
EUT Description:	Blast Gauge										
EUT Max Frequency:	48 MHz (associated circuitry)										
EUT Min Frequency:	0.032768 MHz (associated circuitry)										
EUT TX Frequency:	2402 to 2480 MHz										
Support Equipment	MN				SN						
Dell Laptop	Latitude				7F5L2Q1						
Port Label	Port Type	# ports	# populated	cable type	shielded	ferrites	length (m)	in/out	under test	comment	
USB Power	USB	1	1	USB	Yes	No	0.15	in	yes	USB 3M Ext. used for radiated setup only	
Software Operating Mode Description:											
EUT is set to transmit at Low (2402MHz), Middle (2440MHz) and High (2480MHz) channels.											

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																
Date: 16-Jul-19										Work Order: T1058						
Engineer: AKZ										EUT Operating Voltage/Frequency: Battery						
Temp: 22°C				Humidity: 54%				Pressure: 1010mbar								
Measurement Distance: 3 m																
Notes:																
Antenna Polarization (H/V)	Frequency (MHz)	Peak Reading (dBμV)	Average Reading (dBμV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Peak Reading (dBμV/m)	Adjusted Avg Reading (dBμV/m)	FCC 15.209 High Frequency - Peak			FCC 15.209 High Frequency - Average				
									Limit (dBμV/m)	Margin (dB)	Result (Pass/Fail)	Limit (dBμV/m)	Margin (dB)	Result (Pass/Fail)		
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		Worst Freq:				2483.5 MHz		
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 v 1.017.215																
Adjusted Reading = Reading - Preamp Factor + Antenna Factor + Cable Factor																
Copyright Curtis-Straus LLC 2000																

Test Equipment Used:

Rev. 7/15/2019

Spectrum Analyzers / Receivers / Preselectors

2093 MXE EMI Receiver

Range 20Hz-26.5GHz

MN N9038A

Mfr Agilent

SN MY51210181

Asset 2093

Cat I

Calibration Due 11/21/2019

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

EMI Chamber 1

FCC Code 719150

IC Code 2762A-6

VCCI Code A-0015

Range 1-18GHz

Asset 1685

Cat I

Calibration Due 12/7/2020

Antennas

Orange Horn

Range 1-18GHz

MN 3115

Mfr EMCO

SN 0004-6123

Asset 390

Cat I

Calibration Due 11/6/2020

Meteorological Meters/Chambers

Weather Clock (Pressure Only)

MN BA928

Mfr Oregon Scientific

SN C3166-1

Asset 831

Cat I

Calibration Due 5/15/2020

Asset #2659

1235C97

Control Company

181683830

2659

I

4/3/2020

Cables

Asset #2456

Range 9KHz-18GHz

Mfr MegaPhase

Cat II

Calibration Due 10/31/2019

Asset #2585

Range 9KHz-18GHz

Mfr Pasternack

Cat II

Calibration Due 5/24/2020

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



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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(dBμV/m) = Raw Reading(dBμV) + Correction Factor(dB/m)

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

Margin(dB) = Adjusted Reading(dBμV/m) - Limit(dBμV/m)

Measurement Software Used:

ETS-LINDGREN TILE!™ 7.3.0.6

MEASUREMENTS / RESULTS

30-1000MHz:

NOTE: For the range 30-1000MHz

Bureau Veritas Consumer Product Services Inc.
Radiated Emissions Electric Field 3m Distance
Top Peaks Horizontal 30-1000MHz
Notes:
Low Channel

Work Order - T1058
EUT Power Input - Battery
Test Site - CH-2
Conditions - 54°C; 22%RH; 1010mBar
Test Engineer - AKZ

Data Taken at 11:49:57 AM, Monday, July 15, 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: FCC_pt15_2 09 (dBμV/m)	Lim2 Margin (dB)	Lim2 Test Results (Pass/Fail)	Worst Margin Lim2 (dB)	Antenna Height (cm)	EUT Azimuth (degrees)
30.145	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. Radiated Emissions Electric Field 3m Distance Top Peaks Vertical 30-1000MHz Notes: Low Channel							Work Order - T1058 EUT Power Input - Battery Test Site - CH-2 Conditions - 54°C; 22%RH; 1010mBar Test Engineer - AKZ						
Data Taken at 11:49:57 AM, Monday, July 15, 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: FCC_pt15_2 09 (dBμV/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	Raw QP Reading	Correction Factor	Adjusted QP Amplitude	Lim1: FCC_pt15_109_Class_B	Margin to Lim1	Test Results Lim1	Worst Margin Lim1	Lim2: FCC_pt15_209	Margin to Lim2	Test Results Lim2	Worst Margin Lim2	Antenna Height	EUT Azimuth
(MHz)	(dBμV)	(dB/m)	(dBμV/m)	(dBμV/m)	(dB)	(Pass/Fail)	(dB)	(dBμV/m)	(dB)	(Pass/Fail)	(dB)	(cm)	(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 (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: FCC_pt15_2 09 (dBμV/m)	Lim2 Margin (dB)	Lim2 Test Results (Pass/Fail)	Worst Margin Lim2 (dB)	Antenna Height (cm)	EUT Azimuth (degrees)
30.752	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 (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: FCC_pt15_2 09 (dBμV/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 (dBμV)	Correction Factor (dB/m)	Adjusted QP Amplitude (dBμV/m)	Lim1: FCC_pt15_109_Class_B (dBμV/m)	Margin to Lim1 (dB)	Test Results Lim1 (Pass/Fail)	Worst Margin Lim1 (dB)	Lim2: FCC_pt15_209 (dBμV/m)	Margin to Lim2 (dB)	Test Results Lim2 (Pass/Fail)	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.
Radiated Emissions Electric Field 3m Distance
Top Peaks Horizontal 30-1000MHz
Notes:
High Channel

Work Order - T1058
EUT Power Input - Battery
Test Site - CH-2
Conditions - 54°C; 22%RH; 1010mBar
Test Engineer - AKZ
0

Data Taken at 02:55:11 PM, Monday, July 15, 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: FCC_pt15_2 09 (dBμV/m)	Lim2 Margin (dB)	Lim2 Test Results (Pass/Fail)	Worst Margin Lim2 (dB)	Antenna Height (cm)	EUT Azimuth (degrees)
30.606	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.
Radiated Emissions Electric Field 3m Distance
Top Peaks Vertical 30-1000MHz
Notes:
High Channel

Work Order - T1058
EUT Power Input - Battery
Test Site - CH-2
Conditions - 54°C; 22%RH; 1010mBar
Test Engineer - AKZ
0

Data Taken at 02:55:10 PM, Monday, July 15, 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: FCC_pt15_2 09 (dBμV/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 (dBμV)	Correction Factor (dB/m)	Adjusted QP Amplitude (dBμV/m)	Lim1: FCC_pt15_109_Class_B (dBμV/m)	Margin to Lim1 (dB)	Test Results Lim1 (Pass/Fail)	Worst Margin Lim1 (dB)	Lim2: FCC_pt15_209 (dBμV/m)	Margin to Lim2 (dB)	Test Results Lim2 (Pass/Fail)	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

1-6GHz:

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

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 (dBμV)	Correction Factor (dB/m)	Adjusted Peak Amplitude (dBμV/m)	Pk Lim: FCC_pt15_209_Peak (dBμV/m)	Margin to Peak Limit (dB)	Peak Limit Test Results (Pass/Fail)	Peak Limit Worst Margin (dB)	DCCF (dB)	Adjusted Average Amplitude (dBμV/m)	Av Lim: FCC_pt15_209_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)
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.

Radiated Emissions Electric Field 1m Distance

Top Peaks Vertical 6-18GHz

Notes:

Low Channel

G Version

Work Order - T1058

EUT Power Input - Battery

Test Site - CH-1

Conditions - 24°C; 51%RH; 1009mBar

DUTY CYCLE: 7.5%

DUTY CYCLE CORRECTION FACTOR (DCCF): -20dB

Data Taken at 02:37:05 PM, Tuesday, July 16, 2019

Frequency (MHz)	Raw Peak Reading (dBμV)	Correction Factor (dB/m)	Adjusted Peak Amplitude (dBμV/m)	Pk Lim: FCC_pt15_209 _Peak (dBμV/m)	Margin to Peak Limit (dB)	Peak Limit Test Results (Pass/Fail)	Peak Limit Worst Margin (dB)	DCCF (dB)	Adjusted Average Amplitude (dBμV/m)	Av Lim: FCC_pt15_209 _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)
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.

Radiated Emissions Electric Field 1m Distance

Top Peaks Horizontal 6-18GHz

Notes:

Mid channel

G Version

Work Order - T1058

EUT Power Input - Battery

Test Site - CH-1

Conditions - 22°C;54 %RH; 1010mBar

Test Engineer - AV

DUTY CYCLE: 7.5%

DUTY CYCLE CORRECTION FACTOR (DCCF): -20dB

Data Taken at 03:16:30 PM, Tuesday, July 16, 2019

Frequency (MHz)	Raw Peak Reading (dBμV)	Correction Factor (dB/m)	Adjusted Peak Amplitude (dBμV/m)	Pk Lim: FCC_pt15_209 _Peak (dBμV/m)	Margin to Peak Limit (dB)	Peak Limit Test Results (Pass/Fail)	Peak Limit Worst Margin (dB)	DCCF (dB)	Adjusted Average Amplitude (dBμV/m)	Av Lim: FCC_pt15_209 _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)
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



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 (dBμV)	Correction Factor (dB/m)	Adjusted Peak Amplitude (dBμV/m)	Pk Lim: FCC_pt15_209 _Peak (dBμV/m)	Margin to Peak Limit (dB)	Peak Limit Test Results (Pass/Fail)	Peak Limit Worst Margin (dB)	DCCF (dB)	Adjusted Average Amplitude (dBμV/m)	Av Lim: FCC_pt15_209 _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)
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 (dBμV)	Correction Factor (dB/m)	Adjusted Peak Amplitude (dBμV/m)	Pk Lim: FCC_pt15_209 _Peak (dBμV/m)	Margin to Peak Limit (dB)	Peak Limit Test Results (Pass/Fail)	Peak Limit Worst Margin (dB)	DCCF (dB)	Adjusted Average Amplitude (dBμV/m)	Av Lim: FCC_pt15_209 _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)
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.						Work Order - T1058									
Radiated Emissions Electric Field 1m Distance						EUT Power Input - Battery									
Top Peaks Vertical 6-18GHz						Test Site - CH-1									
Notes:						Conditions - 22°C;54 %RH; 1010mBar									
High Channel						DUTY CYCLE: 7.5%									
						DUTY CYCLE CORRECTION FACTOR (DCCF): -20dB									
G Version															
Data Taken at 04:23:34 PM, Tuesday, July 16, 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)	DCCF (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)
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								Measurement Distance: 0.1 m							
Notes: G Version and H Version Low, Mid, and High Channels															
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 LIMIT.					---	---	---	---	---	---	---	---	---	---	
Table Result:			PASS		by		n/a dB		Worst Freq:					n/a MHz	
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 1.017.215												
Adjusted Reading = Reading - Preamp Factor + Antenna Factor + Cable Factor															
Copyright Curtis-Straus LLC. 200															



Test Equipment Used:

30-1000MHz:

Rev. 6/25/2019

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	30-1000MHz	1686	I	12/7/2020	12/7/2018
Preamps / Couplers Attenuators / Filters		Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
Green		0.009-2000MHz	ZFL-1000-LN	CS	N/A	802	II	9/30/2019	9/30/2018
Antennas		Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
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
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.

1-6GHz:

Rev. 6/25/2019

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	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
8449B HF Preamp		1-18GHz	8449B	Agilent	1149055		II	11/26/2019	11/26/2018
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 #1509		9kHz - 18GHz		Florida RF			II	10/9/2019	10/9/2018
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.



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	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
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
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 #2456	9KHz-18GHz		MegaPhase			II	10/31/2019	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	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
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
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
Asset #2659		1235C97	Control Company	1.82E+08	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 #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	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	AFS4-18002650-60-8P-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 #2659		1235C97	Control Company	181683830	2659	I	4/3/2020	4/3/2019
Cables	Range		Mfr			Cat	Calibration Due	Calibrated on
Asset #2324	1-26.5GHz	TM26-S1S1-120	MEGAPHASE	17139101 001	2324	II	7/24/2020	7/24/2019

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



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/Comparison 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		EPX-2H	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

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

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

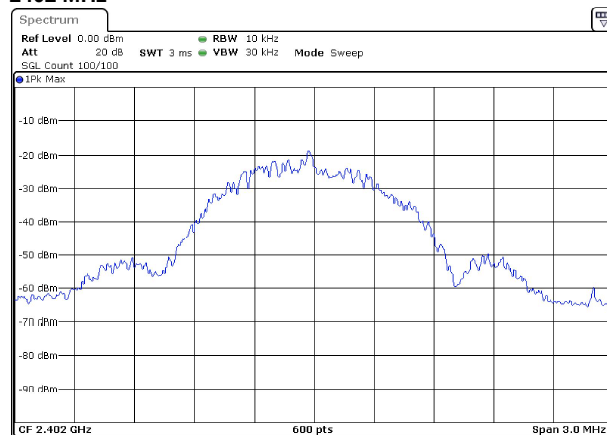
Peak Power Spectral Density

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.

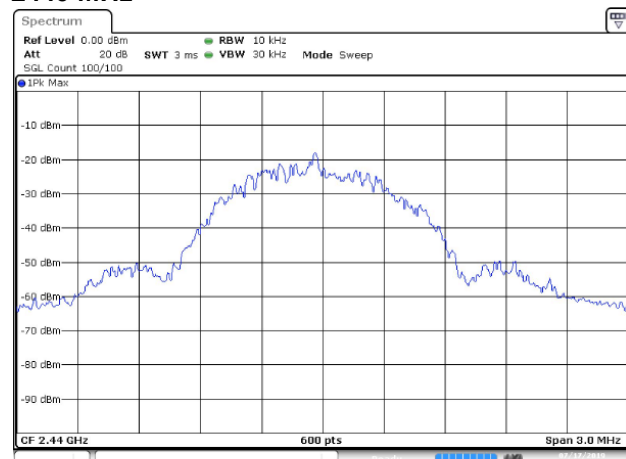
Channel	Frequency (MHz)	Peak PSD (dBm)	Limit Max (dBm)
0	2402	-6.640	8
19	2440	-6.057	8
39	2480	-6.752	8

2402 MHz



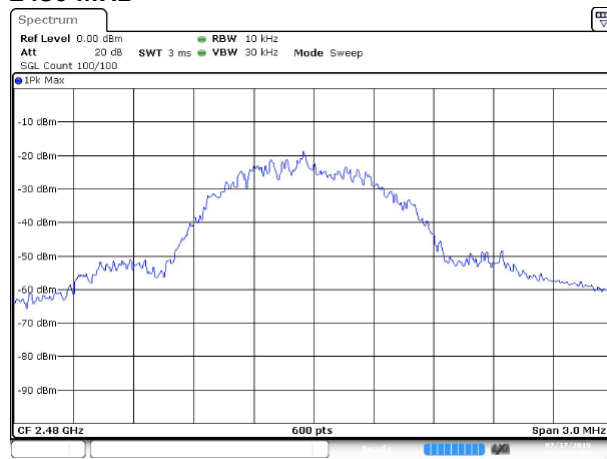
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2440 MHz



Date: 17 JUL 2019 10:34:50

2480 MHz



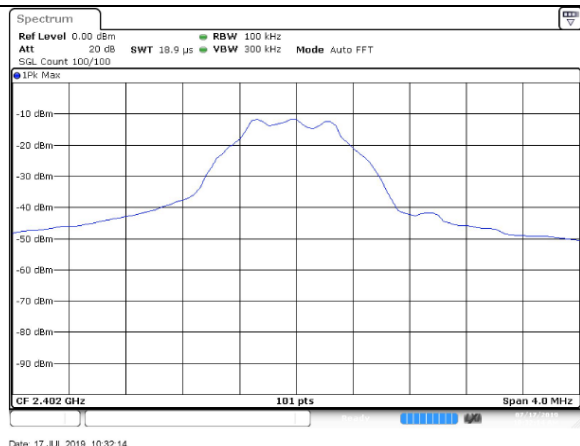
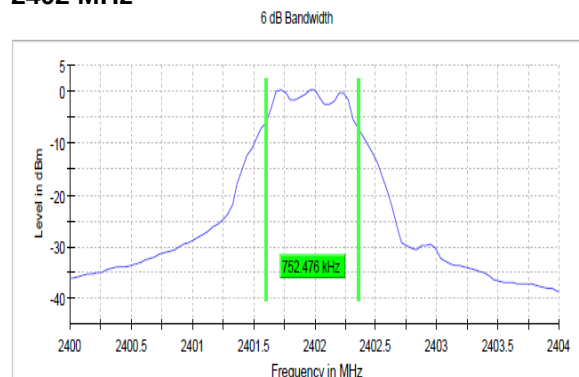
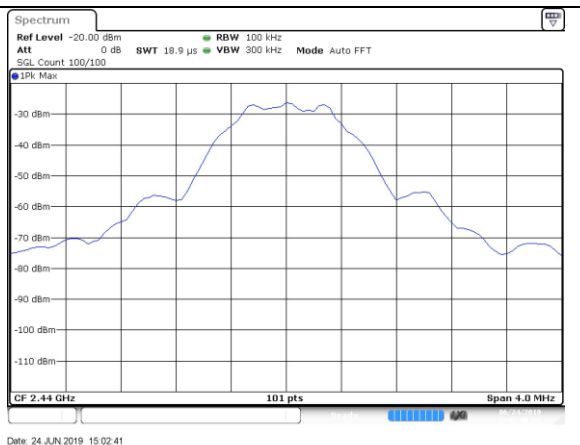
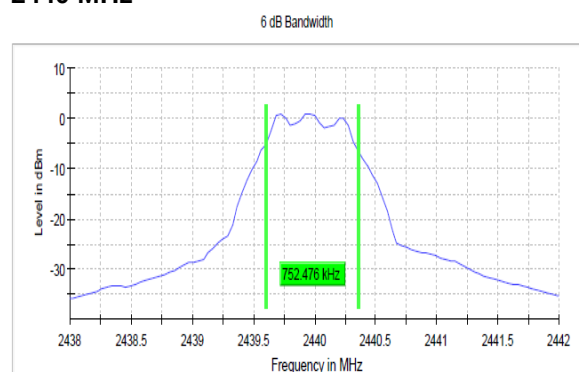
Date: 17 JUL 2019 10:36:07

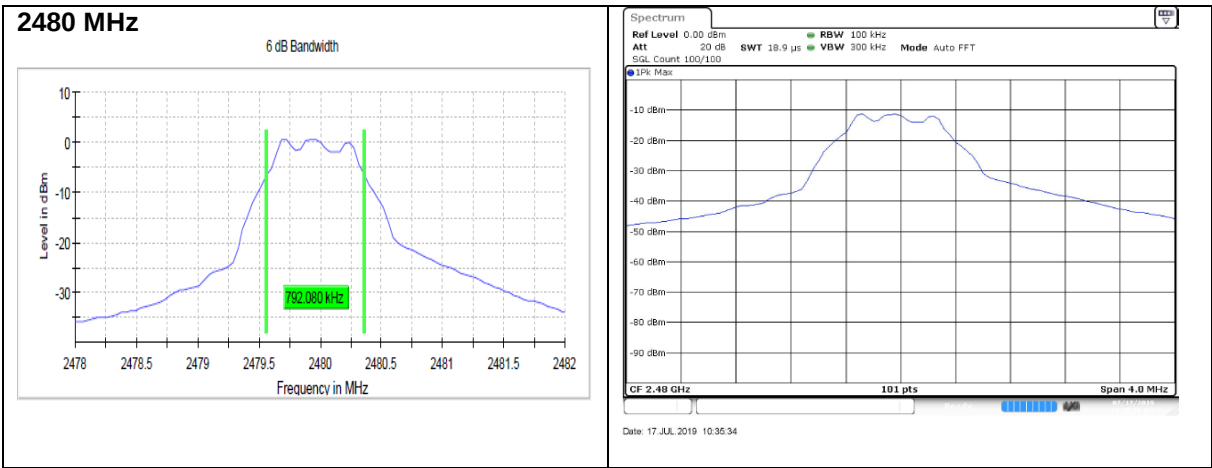
DTS Bandwidth (6dB)

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

2402 MHz**2440 MHz**



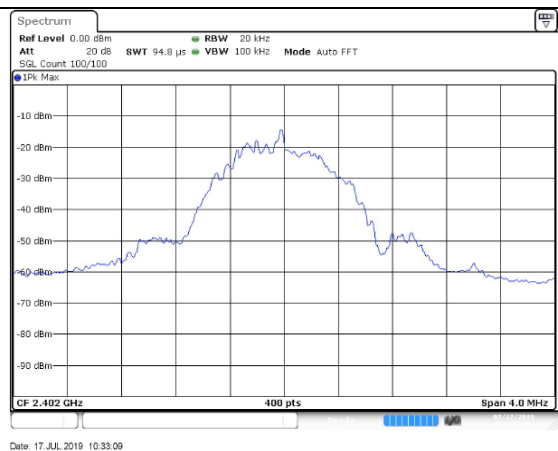
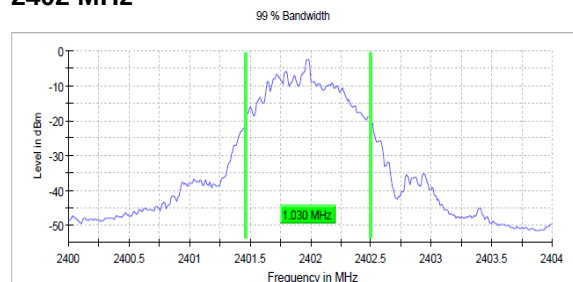
Occupied Channel Bandwidth 99%

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

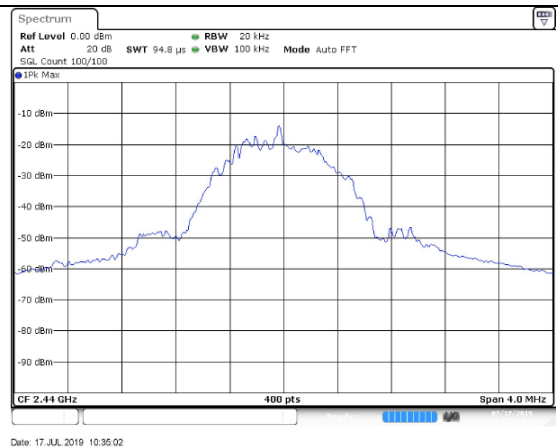
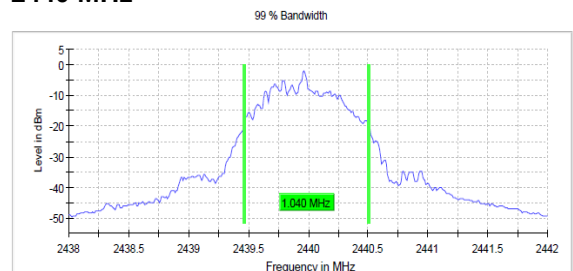
Measurement uncertainty calculated in accordance with ETSI TR 100 028-1. Expanded Uncertainty (K=2) < 2%

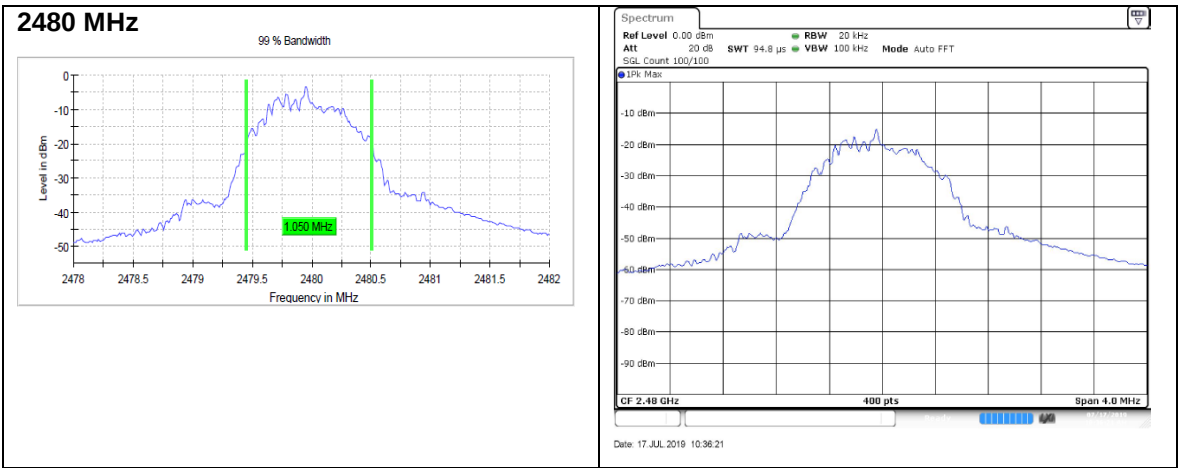
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)
0	2402	1.030
19	2440	1.040
39	2480	1.050

2402 MHz



2440 MHz

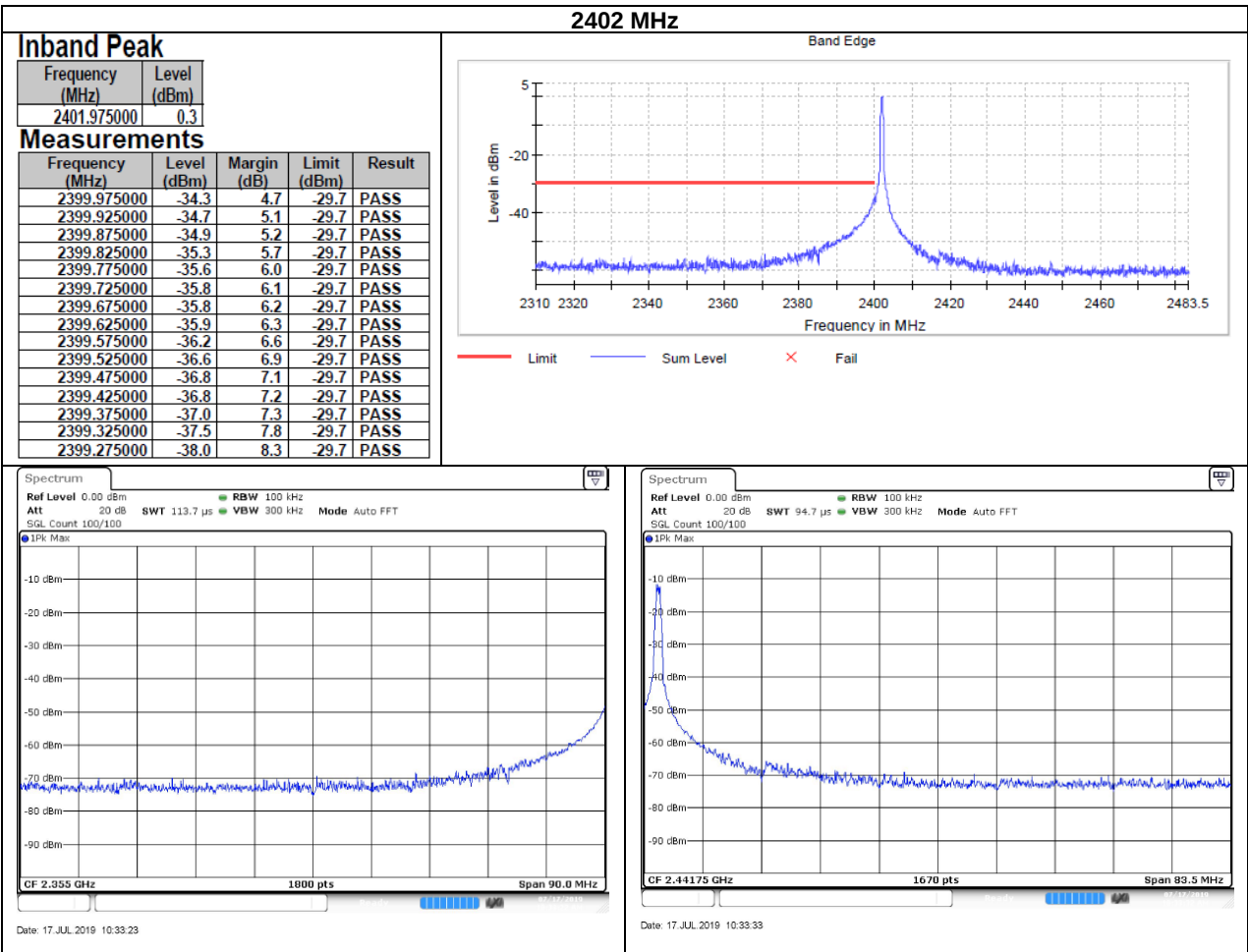




Conducted Band Edge Low

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



Spectrum

Ref Level 0.00 dBm RBW 100 kHz
Att 20 dB SWT 113.7 μs VBW 300 kHz Mode Auto FFT
SigL Count 100/100

1Pk Max

CF 2.355 GHz 1800 pts Span 90.0 MHz

Date: 17 JUL 2019 10:33:23

Spectrum

Ref Level 0.00 dBm RBW 100 kHz
Att 20 dB SWT 94.7 μs VBW 300 kHz Mode Auto FFT
SigL Count 100/100

1Pk Max

CF 2.44175 GHz 1670 pts Span 89.5 MHz

Date: 17 JUL 2019 10:33:33



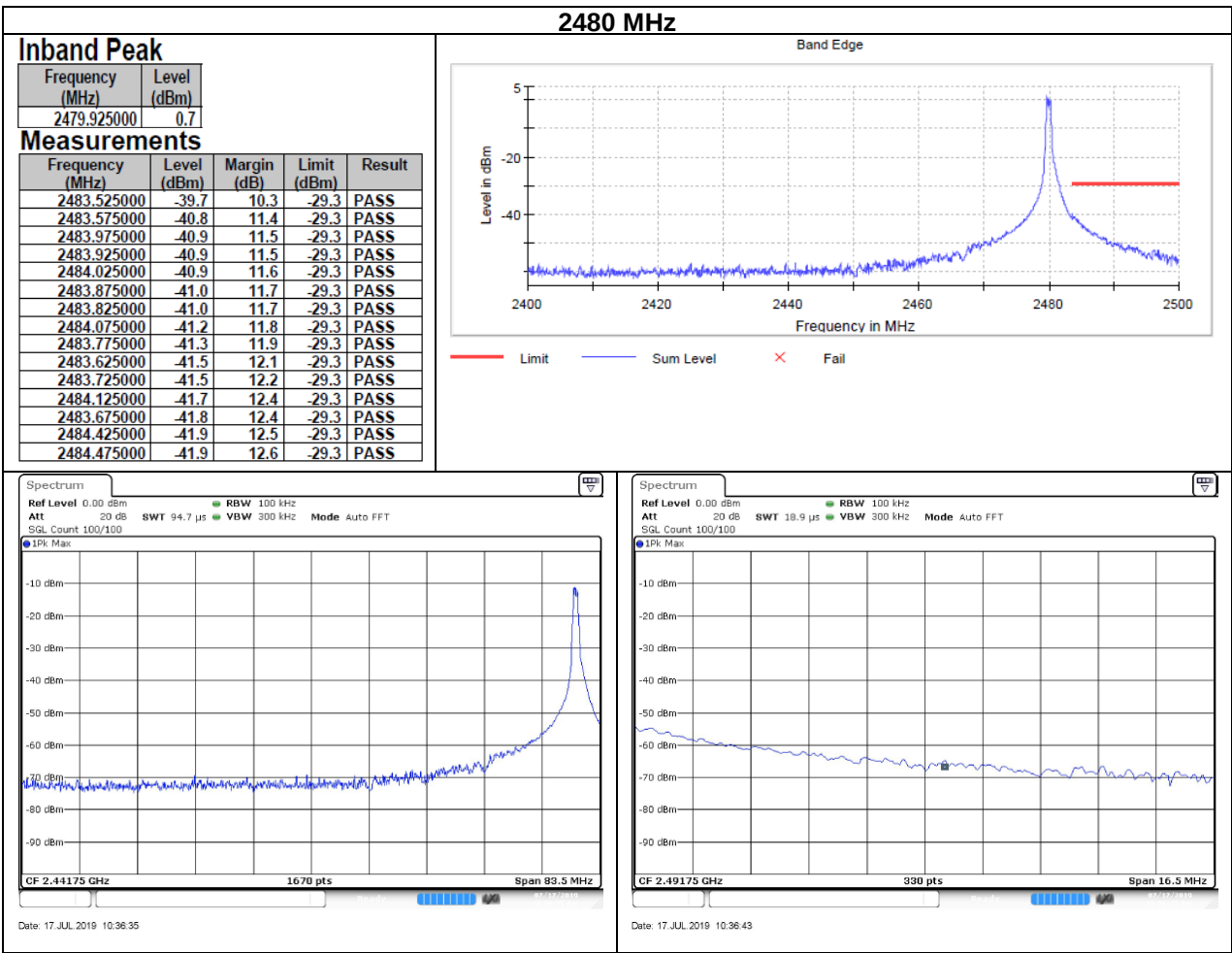
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Conducted Band Edge High

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

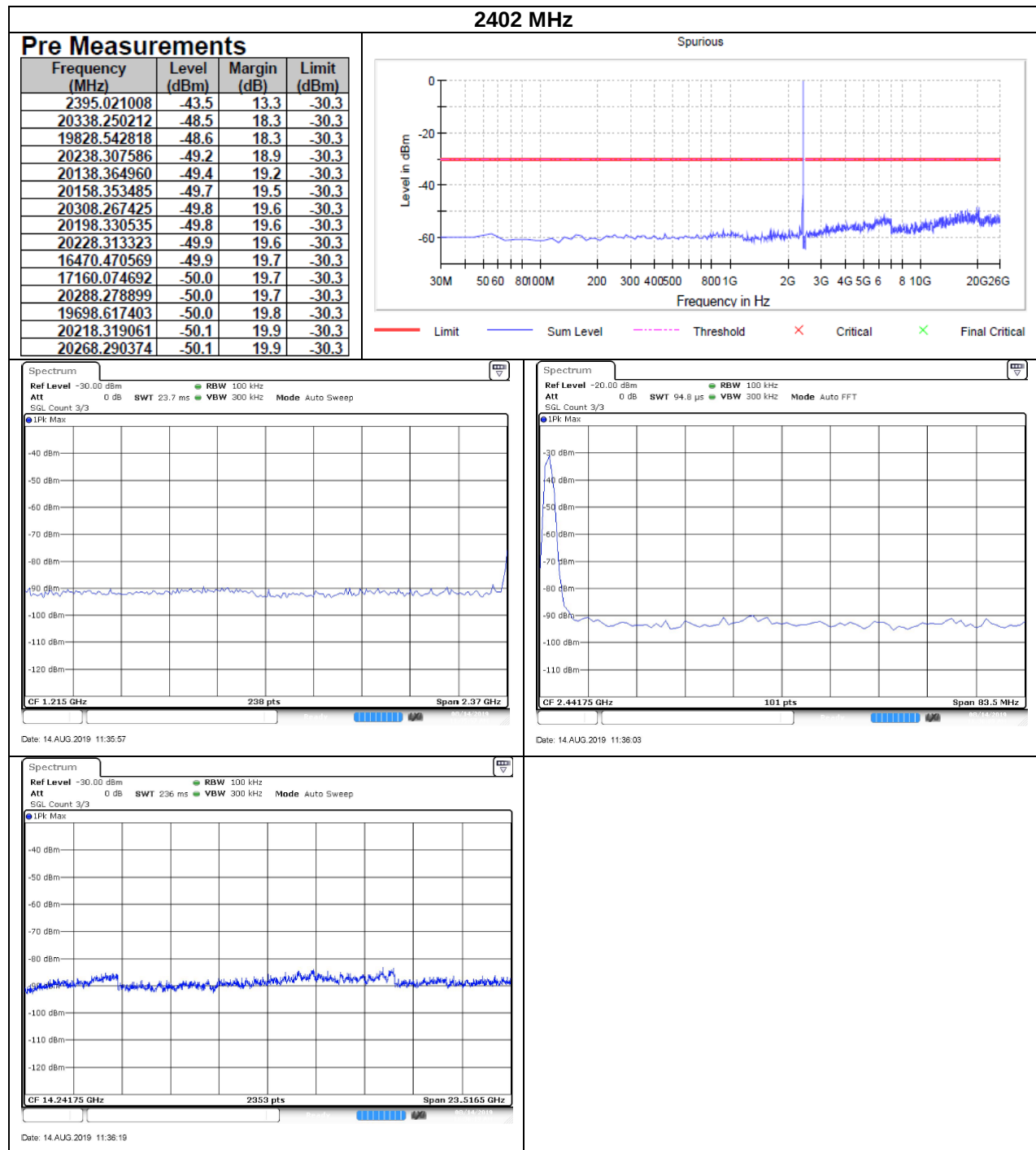
Measurement uncertainty calculated in accordance with ETSI TR 100 028-1. Expanded Uncertainty (K=2) < 0.8 dB



Conducted Spurious Emissions

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

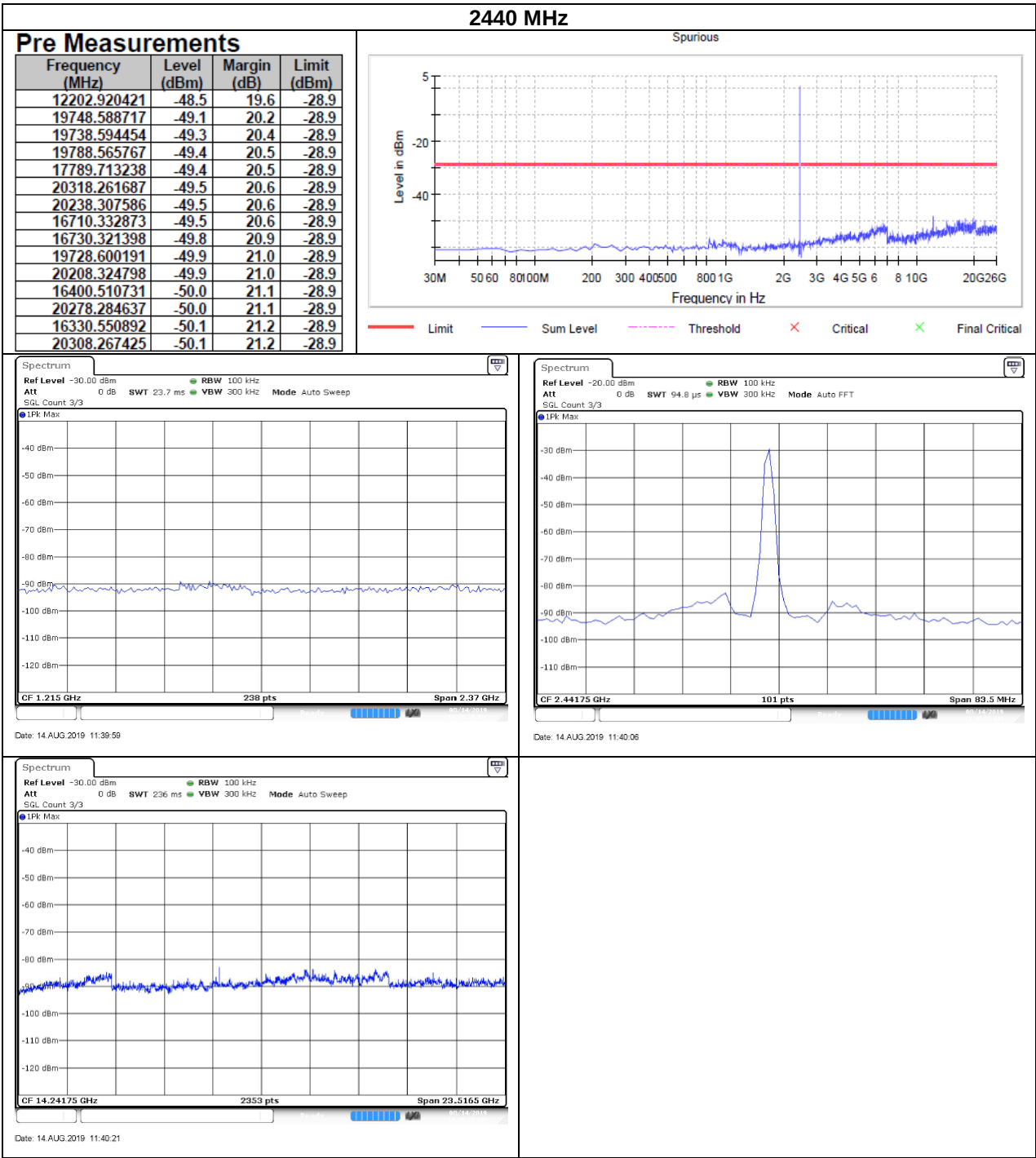
Measurement uncertainty calculated in accordance with ETSI TR 100 028-1. Expanded Uncertainty (K=2) < 1.8 dB

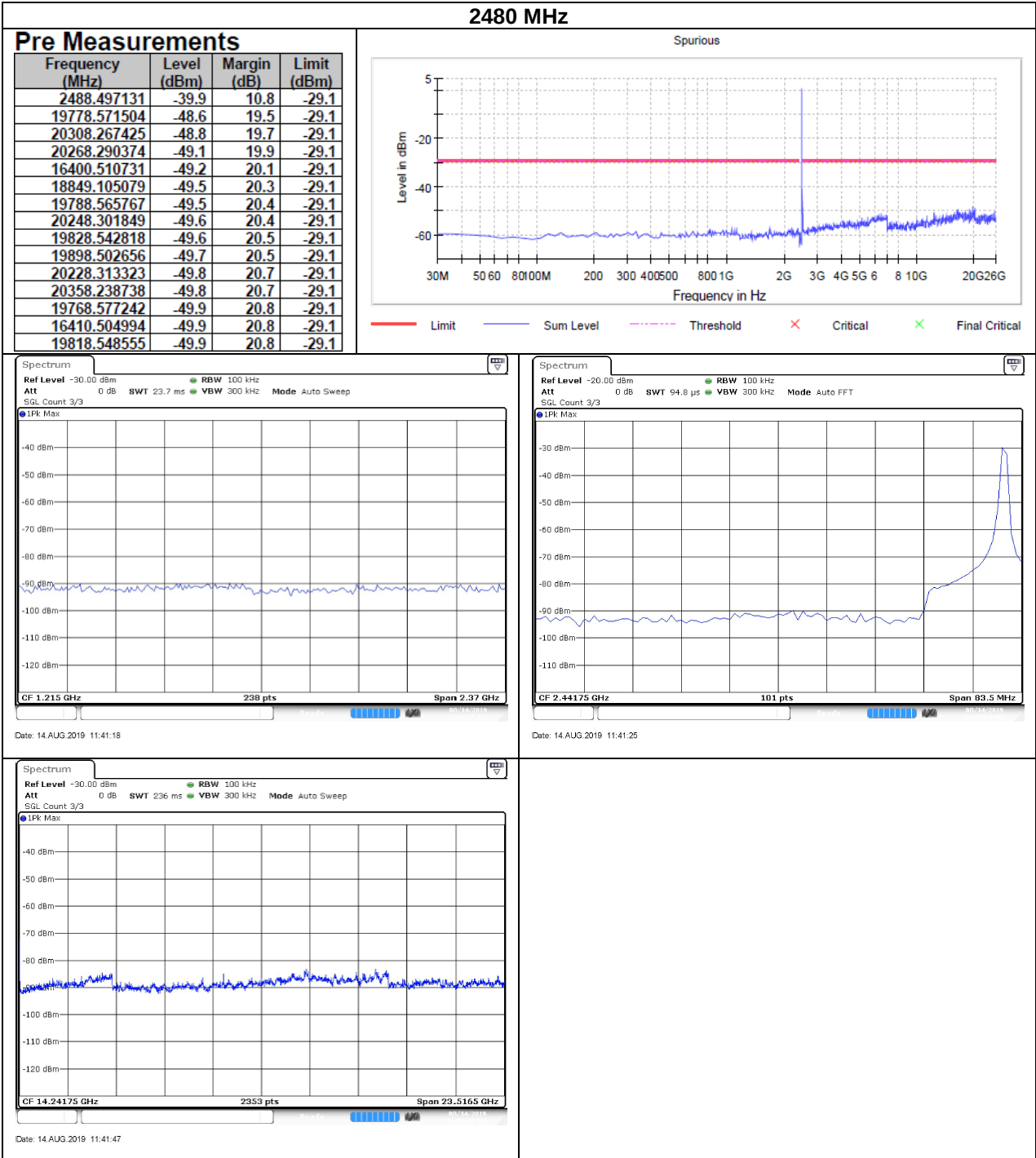


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Measurement Uncertainty

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 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 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.



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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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