Test Report

Bureau Veritas Consumer Products Services Inc.

Report No	EU1037-2
Client	Onset Computer Corporation
Address	470 MacArthur Blvd. Bourne MA, 02532
Phone	508-759-950
Items tested FCC ID IC	InTemp® CX450 Temp/RH Logger WXF-ONST9 7936A-ONST9
Equipment Type Equipment Code	Digital Transmission System DTS
FCC/IC Rule Parts	CFR Title 47 FCC Part 15.247, ISED Canada RSS-247 Issue 2
Test Dates	August 21 – August 26, 2020
Results	As detailed within this report
Prepared by	Landu Nsalambi – EMC Engineer
Authorized by	Anna Vancheva- EMC Engineer
Issue Date	9/8/2020
Conditions of Issue	This Test Report is issued subject to the conditions stated in the '*Conditions of Testing*' section on page 20 of this report.

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Report REV Sep-08-2017 - YF

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

The product is InTemp® CX450 Temp/RH data logger. This Bluetooth® Smart-enabled logger operates in the 2402MHz– 2480MHz frequency range.

Antenna Type: Non-detachable SMT Ceramic Chip
Gain: 0.5dBi

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

Test samples were received in good condition.

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 3 orthogonal planes (X, Y and Z) as well as varying the test antenna's height and polarity.

EUT operating voltage is 3.3V DC from batteries, therefore AC line conducted emissions requirements are not applicable.

Following bandwidths were used during radiated spurious emissions testing.

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

Product Tested - Configuration Documentation

EUT Configuration			
Work Order:	U1037		
Company:	Onset Computer Corporation		
Company Address:	470 MacArthur Blvd.		
	Bourne, MA, 02532		
Contact:	John Araujo		
	MN	**PN**	**SN**
EUT:	CX450		20847956
EUT Description:	Bluetooth® Smart-enabled logger		
Support Equipment	**MN**		**SN**
Lab PC with nRFgo Studio	Latitude E5410		n/a
Ipad	A1893		F9FW587KJF8J
Software Operating Mode Description:			
Direct Test Mode via Nordic nRFgo Studio to change channels (Low 2402MHz, Mid 2440MHz and High 2480MHz) and transmit 37 bytes of PRBS9 packets continuously.			

Clock Frequencies

Clock Frequencies	
frequencies (MHz)	32, 2480

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.
	5		15.19	The label is shown in the label exhibit.
	7		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 non-detachable SMT ceramic chip antenna with 0.5dBi gain.
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.
			15.247	The unit complies with the requirements of 15.247
		RSS 247		The unit complies with the requirements of RSS-247
6.7				Occupied Bandwidth measurements were made.

Refer to Appendix A of this report for antenna port conducted measurements.

Test Results

Radiated Spurious Emissions

LIMITS

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

Radiated emissions were maximized by rotating the device around 3 orthogonal planes (X, Y and Z) and worst case emissions observed in Y orientation. All the results below are for the worst case orientation only.

MEASUREMENTS / RESULTS

30-1000MHz Low Channel

Bureau Veritas Consumer Product Services Inc.
Radiated Emissions Electric Field 3m Distance
Top Peaks Vertical 30-1000MHz
Notes:
BLE Low Channel 80cm Height

Work Order - U1037
EUT Power Input - 3 VDC
Test Site - CH-1
Conditions - 24°C; 51%RH; 1005mBar
Test Engineer - Landu Nsalambi
EUT Maximum Frequency - 2480MHz

Data Taken at 11:51:44 AM, Thursday, August 27, 2020

Frequency (MHz)	Peak Reading (dBµV)	Correction Factor (dB/m)	Adjusted Peak Amplitude (dBµV/m)	Lim1: FCC_pt15_209 (dBµV/m)	Lim1 Margin (dB)	Lim1 Test Results (Pass/Fail)	Worst Margin Lim1 (dB)	Antenna Height (cm)	Turntable Azimuth (degrees)
31.212	28.9	-4.2	24.8	40	-15.2	PASS		200	135
142.859	35.3	-10.7	24.7	43.5	-18.8	PASS		100	45
145.939	35.8	-10.9	24.9	43.5	-18.6	PASS		100	45
149.334	34.8	-11.1	23.7	43.5	-19.8	PASS		100	45
155.203	36.4	-11.3	25.1	43.5	-18.4	PASS		100	90
905.91	30.3	2.4	32.7	46	-13.3	PASS	-13.3	100	135

Bureau Veritas Consumer Product Services Inc.
Radiated Emissions Electric Field 3m Distance
Top Peaks Horizontal 30-1000MHz
Notes:
BLE Low Channel 80cm Height

Work Order - U1037
EUT Power Input - 3 VDC
Test Site - CH-1
Conditions - 24°C; 51%RH; 1005mBar
Test Engineer - Landu Nsalambi
EUT Maximum Frequency - 2480MHz

Data Taken at 11:51:44 AM, Thursday, August 27, 2020

Frequency (MHz)	Peak Reading (dBµV)	Correction Factor (dB/m)	Adjusted Peak Amplitude (dBµV/m)	Lim1: FCC_pt15_209 (dBµV/m)	Lim1 Margin (dB)	Lim1 Test Results (Pass/Fail)	Worst Margin Lim1 (dB)	Antenna Height (cm)	EUT Azimuth (degrees)
30.412	28.4	-3.6	24.9	40	-15.1	PASS		150	90
75.566	29.9	-16	13.8	40	-26.2	PASS		150	135
123.751	28.6	-8.9	19.8	43.5	-23.7	PASS		200	225
198.246	29.9	-10.8	19.1	43.5	-24.4	PASS		100	45
564.519	32.2	-3.6	28.5	46	-17.5	PASS		200	270
955.889	29.8	3.1	32.9	46	-13.1	PASS	-13.1	250	225

30-1000MHz Middle Channel

Bureau Veritas Consumer Product Services Inc.
Radiated Emissions Electric Field 3m Distance
Top Peaks Vertical 30-1000MHz
Notes:
BLE Mid Channel 80cm Height

Work Order - U1037
EUT Power Input - 3 VDC
Test Site - CH-1
Conditions - 24°C; 51%RH; 1005mBar
Test Engineer - Landu Nsalambi
EUT Maximum Frequency - 2480 MHz

Data Taken at 03:07:29 PM, Thursday, August 27, 2020

Frequency (MHz)	Peak Reading (dBµV)	Correction Factor (dB/m)	Adjusted Peak Amplitude (dBµV/m)	Lim1: FCC_pt15_209 (dBµV/m)	Lim1 Margin (dB)	Lim1 Test Results (Pass/Fail)	Worst Margin Lim1 (dB)	Antenna Height (cm)	Turntable Azimuth (degrees)
30.218	28	-3.5	24.5	40	-15.5	PASS		150	45
142.884	35.9	-10.7	25.2	43.5	-18.3	PASS		100	45
155.13	38.1	-11.3	26.8	43.5	-16.7	PASS		150	90
158.089	37.1	-11.3	25.8	43.5	-17.7	PASS		100	90
820.065	37.5	0.2	37.7	46	-8.3	PASS	-8.3	100	45
946.165	30	3	32.9	46	-13.1	PASS		150	180

Bureau Veritas Consumer Product Services Inc.
Radiated Emissions Electric Field 3m Distance
Top Peaks Horizontal 30-1000MHz
Notes:
BLE Mid Channel 80cm Height

Work Order - U1037
EUT Power Input - 3 VDC
Test Site - CH-1
Conditions - 24°C; 51%RH; 1005mBar
Test Engineer - Landu Nsalambi
EUT Maximum Frequency - 2480 MHz

Data Taken at 03:07:29 PM, Thursday, August 27, 2020

Frequency (MHz)	Peak Reading (dBµV)	Correction Factor (dB/m)	Adjusted Peak Amplitude (dBµV/m)	Lim1: FCC_pt15_209 (dBµV/m)	Lim1 Margin (dB)	Lim1 Test Results (Pass/Fail)	Worst Margin Lim1 (dB)	Antenna Height (cm)	EUT Azimuth (degrees)
30.897	28.5	-3.9	24.6	40	-15.4	PASS		200	90
123.168	28.8	-8.8	20	43.5	-23.5	PASS		150	0
204.018	30.8	-11.6	19.2	43.5	-24.3	PASS		150	45
564.567	32.9	-3.6	29.2	46	-16.8	PASS		200	90
699.761	36.9	-1.3	35.7	46	-10.3	PASS	-10.3	100	270
934.937	30	2.6	32.6	46	-13.4	PASS		200	90

30-1000MHz High Channel

Bureau Veritas Consumer Product Services Inc.
Radiated Emissions Electric Field 3m Distance
Top Peaks Vertical 30-1000MHz
Notes:
BLE High 80cm Height

Work Order - U1037
EUT Power Input - 3 VDC
Test Site - CH-1
Conditions - 24°C; 51%RH; 1005mBar
Test Engineer - Landu Nsalambi
EUT Maximum Frequency - 2480MHz

Data Taken at 03:12:47 PM, Thursday, August 27, 2020

Frequency (MHz)	Peak Reading (dBµV)	Correction Factor (dB/m)	Adjusted Peak Amplitude (dBµV/m)	Lim1: FCC_pt15_209 (dBµV/m)	Lim1 Margin (dB)	Lim1 Test Results (Pass/Fail)	Worst Margin Lim1 (dB)	Antenna Height (cm)	Turntable Azimuth (degrees)
30.049	28.8	-3.3	25.5	40	-14.5	PASS		100	45
149.456	38.6	-11.1	27.4	43.5	-16.1	PASS		100	90
155.591	39.8	-11.3	28.5	43.5	-15	PASS		100	90
819.071	45.6	0.1	45.7	46	-0.3	PASS	-0.3	200	90
822.635	43.1	0.3	43.5	46	-2.5	PASS		100	180
950.118	30	2.9	32.9	46	-13.1	PASS		100	0

Data Taken at 03:12:47 PM, Thursday, August 27, 2020

Frequency (MHz)	Raw QP Reading (dBµV)	Correction Factor (dB/m)	Adjusted QP Amplitude (dBµV/m)	Lim1: FCC_pt15_209 (dBµV/m)	Margin to Lim1 (dB)	Test Results Lim1 (Pass/Fail)	Worst Margin Lim1 (dB)	Antenna Height (cm)	EUT Azimuth (degrees)
818.29	24.6	0.1	24.7	46	-16.5	PASS		172	57
822.364	24.5	0.3	24.8	46	-16.4	PASS	-16.4	400	1
962.249	24	3.4	27.4	54	-31.8	PASS		128	38

Bureau Veritas Consumer Product Services Inc.
Radiated Emissions Electric Field 3m Distance
Top Peaks Horizontal 30-1000MHz
Notes:
BLE High 80cm Height

Work Order - U1037
EUT Power Input - 3 VDC
Test Site - CH-1
Conditions - 24°C; 51%RH; 1005mBar
Test Engineer - Landu Nsalambi
EUT Maximum Frequency - 2480MHz

Data Taken at 03:12:47 PM, Thursday, August 27, 2020

Frequency (MHz)	Peak Reading (dBµV)	Correction Factor (dB/m)	Adjusted Peak Amplitude (dBµV/m)	Lim1: FCC_pt15_209 (dBµV/m)	Lim1 Margin (dB)	Lim1 Test Results (Pass/Fail)	Worst Margin Lim1 (dB)	Antenna Height (cm)	EUT Azimuth (degrees)
30.121	28.4	-3.4	25	40	-15	PASS		150	90
121.98	28.7	-9.1	19.6	43.5	-23.9	PASS		200	315
199.265	29.8	-10.7	19	43.5	-24.5	PASS		250	135
564.519	32.2	-3.6	28.5	46	-17.5	PASS		200	270
946.408	29.2	3	32.2	46	-13.8	PASS	-13.8	100	270

1-6GHz Low Channel

Bureau Veritas Consumer Product Services Inc.
Radiated Emissions Electric Field 3m Distance
Top Peaks Vertical 1-6GHz
Notes:
BLE Low Channel 80cm Height

Work Order - U1037
EUT Power Input - 3 VDC
Test Site - CH-1
Conditions - 24°C; 51%RH; 1005mBar
Test Engineer - Landu Nsalambi
EUT Maximum Frequency - 2480MHz

Data Taken at 10:17:53 AM, Monday, August 03, 2020

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)	Adjusted Avg Amplitude (dBµV/m)	Av Lim: FCC_pt15_209_Average (dBµV/m)	Avg Margin (dB)	Avg Results (Pass/Fail)	Worst Avg Margin (dB)	Antenna Height (cm)	EUT Azimuth (degrees)
1315.13	48.4	-4.6	43.8	74	-30.2	PASS		30.8	54	-23.2	PASS		108	227
2138.5	47.2	3	50.2	74	-23.8	PASS		50.2	54	-3.8	PASS	-3.8	100	0
3217.63	47.1	4.6	51.7	74	-22.3	PASS		38.6	54	-15.4	PASS		108	183
5633.38	46	8.7	54.8	74	-19.2	PASS	-19.2	42.4	54	-11.6	PASS		175	118

Bureau Veritas Consumer Product Services Inc.
Radiated Emissions Electric Field 3m Distance
Top Peaks Horizontal 1-6GHz
Notes:
BLE Low Channel 80cm Height

Work Order - U1037
EUT Power Input - 3 VDC
Test Site - CH-1
Conditions - 24°C; 51%RH; 1005mBar
Test Engineer - Landu Nsalambi
EUT Maximum Frequency - 2480MHz

Data Taken at 10:17:53 AM, Monday, August 03, 2020

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 Results (Pass/Fail)	Peak Limit Worst Margin (dB)	Adjusted Avg Amplitude (dBµV/m)	Av Lim: FCC_pt15_209_Average (dBµV/m)	Avg Margin (dB)	Avg Results (Pass/Fail)	Worst Average Margin (dB)	Antenna Height (cm)	EUT Azimuth (degrees)
1963.75	47.3	1.9	49.3	74	-24.7	PASS		37	54	-17	PASS		275	224
2911.13	47	4.7	51.7	74	-22.3	PASS		38.9	54	-15.1	PASS		299	1
5575.63	46.2	8.5	54.8	74	-19.2	PASS	-19.2	42.1	54	-11.9	PASS	-11.9	125	97

1-6GHz Middle Channel

Bureau Veritas Consumer Product Services Inc.
Radiated Emissions Electric Field 3m Distance
Top Peaks Vertical 1-6GHz
Notes:
BLE Mid Channel 80cm Height

Work Order - U1037
EUT Power Input - 3 VDC
Test Site - CH-1
Conditions - 24°C; 51%RH; 1005mBar
Test Engineer - Landu Nsalambi
EUT Maximum Frequency - 2480 MHz

Data Taken at 03:43:33 PM, Thursday, August 27, 2020

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)	Adjusted Avg Amplitude (dBµV/m)	Av Lim: FCC_pt15_209_Average (dBµV/m)	Avg Margin (dB)	Avg Results (Pass/Fail)	Worst Avg Margin (dB)	Antenna Height (cm)	EUT Azimuth (degrees)
1545.75	48.5	-4.2	44.3	74	-29.7	PASS		30.8	54	-23.2	PASS		175	117
2019.5	47	2.6	49.6	74	-24.4	PASS		37	54	-17	PASS		275	53
2601.63	48.1	-97.8	-49.7	74	-123.7	PASS		-61.7	54	-115.7	PASS		224	184
3201.63	46.5	4.8	51.3	74	-22.7	PASS		39.4	54	-14.6	PASS		108	47
5559.88	46	8.5	54.4	74	-19.6	PASS	-19.6	42	54	-12	PASS	-12	275	90

Bureau Veritas Consumer Product Services Inc.
Radiated Emissions Electric Field 3m Distance
Top Peaks Horizontal 1-6GHz
Notes:
BLE Mid Channel 80cm Height

Work Order - U1037
EUT Power Input - 3 VDC
Test Site - CH-1
Conditions - 24°C; 51%RH; 1005mBar
Test Engineer - Landu Nsalambi
EUT Maximum Frequency - 2480 MHz

Data Taken at 03:43:33 PM, Thursday, August 27, 2020

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 Results (Pass/Fail)	Peak Limit Worst Margin (dB)	Adjusted Avg Amplitude (dBµV/m)	Av Lim: FCC_pt15_209_Average (dBµV/m)	Avg Margin (dB)	Avg Results (Pass/Fail)	Worst Average Margin (dB)	Antenna Height (cm)	EUT Azimuth (degrees)
2177.13	46.5	3.2	49.7	74	-24.3	PASS		37.9	54	-16.1	PASS		281	223
2616	48.5	-97.7	-49.3	74	-123.3	PASS		-61.7	54	-115.7	PASS		187	7
3578.25	46.6	4.6	51.3	74	-22.7	PASS		38.3	54	-15.7	PASS		225	101
5301.63	55.8	7.9	63.7	74	-10.3	PASS	-10.3	40.4	54	-13.6	PASS	-13.6	100	16

1-6GHz High Channel

Bureau Veritas Consumer Product Services Inc.
Radiated Emissions Electric Field 3m Distance
Top Peaks Vertical 1-6GHz
Notes:
BLE High 80cm Height

Work Order - U1037
EUT Power Input - 3 VDC
Test Site - CH-1
Conditions - 24°C; 51%RH; 1005mBar
Test Engineer - Landu Nsalambi
EUT Maximum Frequency - 2480MHz

Data Taken at 11:49:32 AM, Monday, August 03, 2020

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)	Adjusted Avg Amplitude (dBµV/m)	Av Lim: FCC_pt15_209_Average (dBµV/m)	Avg Margin (dB)	Avg Results (Pass/Fail)	Worst Avg Margin (dB)	Antenna Height (cm)	EUT Azimuth (degrees)
1990.63	46.8	2.5	49.3	74	-24.7	PASS		37.1	54	-16.9	PASS		111	222
2613.5	48.1	-97.7	-49.6	74	-123.6	PASS		-61.7	54	-115.7	PASS		125	283
3171.25	46.8	4.6	51.3	74	-22.7	PASS		39.1	54	-14.9	PASS		275	292
5299.13	47.7	7.9	55.6	74	-18.4	PASS		40.3	54	-13.7	PASS		275	25
5321.5	49.7	8	57.6	74	-16.4	PASS	-16.4	40.3	54	-13.7	PASS		296	216
5749.38	45.6	8.9	54.5	74	-19.5	PASS		41.5	54	-12.5	PASS	-12.5	113	87

Bureau Veritas Consumer Product Services Inc.
Radiated Emissions Electric Field 3m Distance
Top Peaks Horizontal 1-6GHz
Notes:
BLE High 80cm Height

Work Order - U1037
EUT Power Input - 3 VDC
Test Site - CH-1
Conditions - 24°C; 51%RH; 1005mBar
Test Engineer - Landu Nsalambi
EUT Maximum Frequency - 2480MHz

Data Taken at 11:49:32 AM, Monday, August 03, 2020

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 Results (Pass/Fail)	Peak Limit Worst Margin (dB)	Adjusted Avg Amplitude (dBµV/m)	Av Lim: FCC_pt15_209_Average (dBµV/m)	Avg Margin (dB)	Avg Results (Pass/Fail)	Worst Average Margin (dB)	Antenna Height (cm)	EUT Azimuth (degrees)
2157.5	46.5	3.1	49.5	74	-24.5	PASS		37.7	54	-16.3	PASS		188	318
2598.5	47.8	-97.8	-50	74	-124	PASS		-61.7	54	-115.7	PASS		291	226
3204.13	46.5	4.7	51.3	74	-22.7	PASS		39.3	54	-14.7	PASS		201	113
5302.13	53.5	7.9	61.4	74	-12.6	PASS	-12.6	40.3	54	-13.7	PASS		125	164
5314.13	48	7.9	56	74	-18	PASS		40.3	54	-13.7	PASS		125	161
5903.88	45	9.3	54.2	74	-19.8	PASS		41.8	54	-12.2	PASS	-12.2	125	74

6-18GHz Low Channel

Bureau Veritas Consumer Product Services Inc.
Radiated Emissions Electric Field 1m Distance
Top Peaks Vertical 6-18GHz
Notes:
BLE Low Channel 80cm Height

Work Order - U1037
EUT Power Input - 3 VDC
Test Site - CH-1
Conditions - 24°C; 51%RH; 1005mBar
Test Engineer - Landu Nsalambi
EUT Maximum Frequency - 2480MHz

Data Taken at 03:12:38 PM, Monday, August 03, 2020

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)	Adjusted Avg Amplitude (dBµV/m)	Av Lim: FCC_pt15_209_Average (dBµV/m)	Avg Margin (dB)	Avg Results (Pass/Fail)	Worst Avg Margin (dB)	Antenna Height (cm)	EUT Azimuth (degrees)
10530.9	50.2	17	67.2	83.5	-16.3	PASS		50.8	63.5	-12.7	PASS		100	61
17964	47.3	27.5	74.8	83.5	-8.7	PASS	-8.7	62.2	63.5	-1.3	PASS	-1.3	100	16

Bureau Veritas Consumer Product Services Inc.
Radiated Emissions Electric Field 1m Distance
Top Peaks Horizontal 6-18GHz
Notes:
BLE Low Channel 80cm Height

Work Order - U1037
EUT Power Input - 3 VDC
Test Site - CH-1
Conditions - 24°C; 51%RH; 1005mBar
Test Engineer - Landu Nsalambi
EUT Maximum Frequency - 2480MHz

Data Taken at 03:12:38 PM, Monday, August 03, 2020

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)	Adjusted Avg Amplitude (dBµV/m)	Av Lim: FCC_pt15_209_Average (dBµV/m)	Avg Margin (dB)	Avg Test Results (Pass/Fail)	Worst Avg Margin (dB)	Antenna Height (cm)	EUT Azimuth (degrees)
10533	52.5	17	69.5	83.5	-14	PASS		50.7	63.5	-12.8	PASS		175	320
10582.2	49.4	16.8	66.2	83.5	-17.3	PASS		50.5	63.5	-13	PASS		110	171
17919.3	47.5	27.7	75.3	83.5	-8.2	PASS	-8.2	62.5	63.5	-1	PASS	-1	114	216

6-18GHz Middle Channel

Bureau Veritas Consumer Product Services Inc.
Radiated Emissions Electric Field 1m Distance
Top Peaks Vertical 6-18GHz
Notes:
BLE Mid Channel 80cm Height

Work Order - U1037
EUT Power Input - 3 VDC
Test Site - CH-1
Conditions - 24°C; 51%RH; 1005mBar
Test Engineer - Landu Nsalambi
EUT Maximum Frequency - 2480 MHz

Data Taken at 02:05:35 PM, Monday, August 03, 2020

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)	Adjusted Avg Amplitude (dBµV/m)	Av Lim: FCC_pt15_209_Average (dBµV/m)	Avg Margin (dB)	Avg Results (Pass/Fail)	Worst Avg Margin (dB)	Antenna Height (cm)	EUT Azimuth (degrees)
10532.7	49.1	17	66.1	83.5	-17.4	PASS		50.7	63.5	-12.8	PASS		119	150
12787.5	46.6	21.1	67.7	83.5	-15.8	PASS		54.3	63.5	-9.2	PASS		100	0
17915.7	47.6	27.8	75.3	83.5	-8.2	PASS	-8.2	62.5	63.5	-1	PASS	-1	200	276

Bureau Veritas Consumer Product Services Inc.
Radiated Emissions Electric Field 1m Distance
Top Peaks Horizontal 6-18GHz
Notes:
BLE Mid Channel 80cm Height

Work Order - U1037
EUT Power Input - 3 VDC
Test Site - CH-1
Conditions - 24°C; 51%RH; 1005mBar
Test Engineer - Landu Nsalambi
EUT Maximum Frequency - 2480 MHz

Data Taken at 02:05:35 PM, Monday, August 03, 2020

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)	Adjusted Avg Amplitude (dBµV/m)	Av Lim: FCC_pt15_209_Average (dBµV/m)	Avg Margin (dB)	Avg Test Results (Pass/Fail)	Worst Avg Margin (dB)	Antenna Height (cm)	EUT Azimuth (degrees)
10533	50.6	17	67.6	83.5	-15.9	PASS		50.7	63.5	-12.8	PASS		134	67
10582.8	49.4	16.8	66.2	83.5	-17.3	PASS		50.5	63.5	-13	PASS		125	223
12664.5	46.9	20.8	67.7	83.5	-15.8	PASS		54.2	63.5	-9.3	PASS		181	292
17911.8	47.2	27.8	75	83.5	-8.5	PASS	-8.5	62.5	63.5	-1	PASS	-1	150	19

6-18GHz High Channel

Bureau Veritas Consumer Product Services Inc.
Radiated Emissions Electric Field 1m Distance
Top Peaks Vertical 6-18GHz
Notes:
BLE High 80cm Height

Work Order - U1037
EUT Power Input - 3 VDC
Test Site - CH-1
Conditions - 24°C; 51%RH; 1005mBar
Test Engineer - Landu Nsalambi
EUT Maximum Frequency - 2480MHz

Data Taken at 01:15:39 PM, Monday, August 03, 2020

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)	Adjusted Avg Amplitude (dBµV/m)	Av Lim: FCC_pt15_209_Average (dBµV/m)	Avg Margin (dB)	Avg Results (Pass/Fail)	Worst Avg Margin (dB)	Antenna Height (cm)	EUT Azimuth (degrees)
10531.5	49.4	17	66.4	83.5	-17.1	PASS		50.6	63.5	-12.9	PASS		200	246
12746.4	46.3	21.2	67.5	83.5	-16	PASS		54.6	63.5	-8.9	PASS		117	85
17817.9	47.2	27.6	74.7	83.5	-8.8	PASS	-8.8	62.3	63.5	-1.2	PASS	-1.2	100	47

Bureau Veritas Consumer Product Services Inc.	Work Order - U1037
Radiated Emissions Electric Field 1m Distance	EUT Power Input - 3 VDC
Top Peaks Horizontal 6-18GHz	Test Site - CH-1
Notes:	Conditions - 24°C; 51%RH; 1005mBar
BLE High 80cm Height	Test Engineer - Landu Nsalambi
	EUT Maximum Frequency - 2480MHz

Data Taken at 01:15:39 PM, Monday, August 03, 2020

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)	Adjusted Avg Amplitude (dBµV/m)	Av Lim: FCC_pt15_209_Average (dBµV/m)	Avg Margin (dB)	Avg Test Results (Pass/Fail)	Worst Avg Margin (dB)	Antenna Height (cm)	EUT Azimuth (degrees)
10533.3	50.6	17	67.6	83.5	-15.9	PASS		50.7	63.5	-12.8	PASS		194	70
10582.5	48.4	16.8	65.2	83.5	-18.3	PASS		50.5	63.5	-13	PASS		200	93
17836.8	48.5	27.5	76.1	83.5	-7.4	PASS	-7.4	62.5	63.5	-1	PASS	-1	200	209

Rev. 8/27/2020								
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	11/30/2020	5/30/2019
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**
2116 BRF	0.009-18000MHz	BRM50702	Micro-Tronics	G226	2116	II	11/11/2020	11/11/2019
8449B HF Preamp	1-18GHz	8449B	Agilent	1149055		II	11/24/2020	11/24/2019
Antennas	**Range**	**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**	**Calibrated on**
Red-Black Bilog	30-2000MHz	JB1	Sunol	A091604-2	1106	I	4/26/2021	4/26/2019
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	11/15/2020	5/15/2018
Asset #2658		1235C97	Control Company	181683808	2658	I	10/3/2020	4/3/2019
Cables	**Range**		**Mfr**			**Cat**	**Calibration Due**	**Calibrated on**
Asset #2456	9KHz-18GHz		MegaPhase			II	11/2/2020	11/2/2019
Asset #2467	9KHz-18GHz		MegaPhase			II	11/2/2020	11/2/2019
Asset #2682	9KHz-18GHz		Pasternack			II	1/31/2021	1/31/2020
All equipment is calibrated using standards traceable to NIST or other nationally recognized calibration standard.								

Test Equipment Used

18-25GHz All channels

Radiated Emissions Table

Date: 28-Jul-20 **Work Order:** U1037
Engineer: LN **EUT Operating Voltage/Frequency:** Battery 3V
Temp: 24.0°C **Humidity:** 51% **Pressure:** 1005mbar
Frequency Range: 18-26.5GHz **Measurement Distance:** 0.1 m
Notes: BLE all channels, Horizontal and Vertical antenna orientation **EUT Max Freq:** 2480MHz

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 found														

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

Test Site: EMI Chamber 1 **Cable 1:** Asset #2456 **Cable 2:** #2682 **Cable 3:** ---
Analyzer: SA 1170725 **Preamp:** None **Antenna:** **Preselector:** ---
CSsoft Radiated Emissions Calculator v 1.017.215 18-26.5 GHz Horn Antenna
Adjusted Reading = Reading - Preamp Factor + Antenna Factor + Cable Factor

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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	11/15/2020	5/15/2018
Asset #2658		1235C97	Control Company	181683808	2658	I	10/3/2020	4/3/2019
Cables	**Range**		**Mfr**			**Cat**	**Calibration Due**	**Calibrated on**
Asset #2456	9KHz-18GHz		MegaPhase			II	11/2/2020	11/2/2019
Asset #2682	9KHz-18GHz		Pasternack			II	1/31/2021	1/31/2020
Asset #2323	1-26.5GHz	TM26-S1S1-120	MEGAPHASE	17139101 002		II	8/26/2021	8/26/2020
Asset #2324	1-26.5GHz	TM26-S1S1-120	MEGAPHASE	17139101 001		II	8/26/2020	8/26/2020
Spectrum Analyzers / Receivers /Preselectors	**Range**	**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**	**Calibrated on**
Brown	9kHz-26.5GHz	E4407B	Agilent	SG44210511	1510	I	10/22/2020	4/22/2019

Test Equipment Used

Radiated Band Edge

Radiated Emissions Table

Date: 25-Aug-20 **Work Order:** U1037
Engineer: AV **EUT Operating Voltage/Frequency:** Battery 3V
Temp: 24.4°C **Humidity:** 49% **Pressure:** 1002mBar
Frequency Range: **Measurement Distance:** 3 m
Notes: BLE band edges **EUT Max Freq:** 2480MHz

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)
High Channel														
H	2483.5	33.041	32.002	38.9	32.4	3.1	29.6	28.6	74.0	-44.4	Pass	54.0	-25.4	Pass
V	2483.5	34.009	32.437	38.9	32.4	3.1	30.6	29.0	74.0	-43.4	Pass	54.0	-25.0	Pass
Low Channel														
H	2390.0	32.002	32.002	38.9	32.4	3.1	28.6	28.6	74.0	-45.4	Pass	54.0	-25.4	Pass
V	2390.0	32.437	32.437	38.9	32.4	3.1	29.0	29.0	74.0	-45.0	Pass	54.0	-25.0	Pass
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Table Result: Pass by -9.5 dB ***Worst Freq:*** 2483.5 MHz

Test Site: EMI Chamber 1 **Cable 1:** Asset #2456 **Cable 2:** 2682 **Cable 3:** ---
Analyzer: SA 1170725 **Preamp:** None **Antenna:** Blue Horn **Preselector:** ---
CSsoft Radiated Emissions Calculator v 1.017.215

Adjusted Reading = Reading - Preamp Factor + Antenna Factor + Cable Factor

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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	11/30/2020	5/30/2019
Radiated Emissions Sites	**FCC Code**	**IC Code**	**VCCI Code**	**Range**	**Asset**	**Cat**	**Calibration Due**	**Calibrated on**
EMI Chamber 1	719150	2762A-6	A-0015	1-18GHz	1685	I	12/7/2020	12/7/2018
Preamps /Couplers Attenuators / Filters	**Range**	**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**	**Calibrated on**
8449B HF Preamp	1-18GHz	8449B	Agilent	1149055		II	11/24/2020	11/24/2019
Antennas	**Range**	**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**	**Calibrated on**
Blue Horn	1-18Ghz	3117	ETS	157647	1861	I	3/9/2021	3/9/2019
Meteorological Meters/Chambers		**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**	**Calibrated on**
Weather Clock (Pressure Only)		BA928	Oregon Scientific	C3166-1	831	I	11/15/2020	5/15/2018
Asset #2658		1235C97	Control Company	181683808	2658	I	10/3/2020	4/3/2019
Cables	**Range**		**Mfr**			**Cat**	**Calibration Due**	**Calibrated on**
Asset #2456	9KHz-18GHz		MegaPhase			II	11/2/2020	11/2/2019
Asset #2682	9KHz-18GHz		Pasternack			II	1/31/2021	1/31/2020

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

Test Equipment Used

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 CISPR	 5.6dB 4.6dB	 N/A 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 CISPR	 3.9dB 3.6dB	 N/A 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 CURTIS-STRAUS** (collectively, the "Marks") are and shall remain the sole property of the Company or its affiliates and shall not be used by Client except solely to the extent that Client obtains the prior written approval of the Company and then only in the manner prescribed by the Company. Client shall not contest the validity of the Marks or take any action that might impair the value or goodwill associated with the Marks or the image or reputation of the Company or its affiliates.
6. Payment in full shall be due 30 days after the date of invoice. Interest shall be due on overdue amounts from the due date until paid at an interest rate of 1.5% per month or, if less, the maximum rate permitted by law. The Company reserves the right, at any time and from time to time, to revoke any credit extended to Client. Client shall reimburse the Company for any costs it incurs in collecting past due amounts, including court costs and fees and expenses of attorneys and collection agencies. The Test Report may not be used or relied upon by Client if and for so long as Client fails to pay when due any invoice issued by the Company or any affiliate of it to Client or any affiliate or subsidiary of Client together with interest and penalties, if any, accrued thereon.
7. The Company disclaims any and all responsibility or liability arising out of or in connection with e-mail transmissions of such information.
8. Client understands and agrees that the Company is neither an insurer nor a guarantor, that the Company does not take the place of Client or any designer, manufacturer, agent, buyer, distributor or transportation or shipping company, and that the Company disclaims all liability in such capacities. Client further understands that if it seeks assurance against loss or damage, it should obtain appropriate insurance.
9. Client agrees that the Company, by providing the services, does not take the place of Client nor any third party, nor does the Company release them from any of their obligations, nor does the Company otherwise assume, abridge, abrogate or undertake to discharge any duty of any third party to Client or any duty of Client or any third party to any other third party, and Client will not release any third party from its obligations and duties with respect to the tested goods.
10. Client shall, on a timely basis, (a) provide adequate instructions to the Company in order to enable the Company to perform properly its services, (b) provide, or cause Client's suppliers and contractors to provide, the Company with all documents necessary to enable the Company to perform its services, (c) furnish the Company with all relevant information regarding Client's intended use and purposes of the tested goods, (d) advise the Company of essential dates and deadlines relevant to the tested goods and (e) fully exercise all rights and remedies available to Client against third parties in respect of the tested goods.
11. The Company shall undertake due care and ordinary skill in the performance of its services to Client, and the Company shall accept responsibility only 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.

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

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

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

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

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

Appendix A

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

DUT Information

Model Number:	CX450
Manufacturer:	Onset Computer Corporation
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 manufacturer	Johanson Technology
Antenna Part#	2450AT18B100
Antenna type	Non-detachable SMT Ceramic Chip
Antenna gain	0.5 dBi
Number of transmit chains	1
Equipment type	Digital Transmission System

Test Equipment Used

Rev. 6/04/2020								
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	10/16/2020	10/16/2019
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	10/16/2020	10/16/2019
SMB100A Signal Generator	100kHz-40GHz	SMB100A	ROHDE & SCHWARZ	179884	2557	I	10/16/2020	10/16/2019
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	4/16/2021	4/16/2020
Cables	**Range**		**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**	**Calibrated on**
DUT1	30MHz-40GHz		Micro-Coax	UFB142A-1-0787-200200	2593	I	3/7/2021	3/7/2020
DUT2	30MHz-40GHz		Micro-Coax	UFB142A-1-0787-200200	2594	I	3/7/2021	3/7/2020
Attenuators / Couplers	**Range**	**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**	**Calibrated on**
10dB Attenuator-01 Brown	30MHz-18GHz		Mini Curcuits	BW-S10W2+		I	3/7/2021	3/7/2020
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	4/6/2021	4/6/2020
Meteorological Meters/Chambers		**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**	**Calibrated on**
Temp/Humidity Chamber #18		EPX-2H	Espec	137664	1645	I	1/3/2021	1/3/2020
Weather Clock (Pressure only)		BA928	Oregon Scientific	C3166-1	831	I	5/15/2022	5/15/2020
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

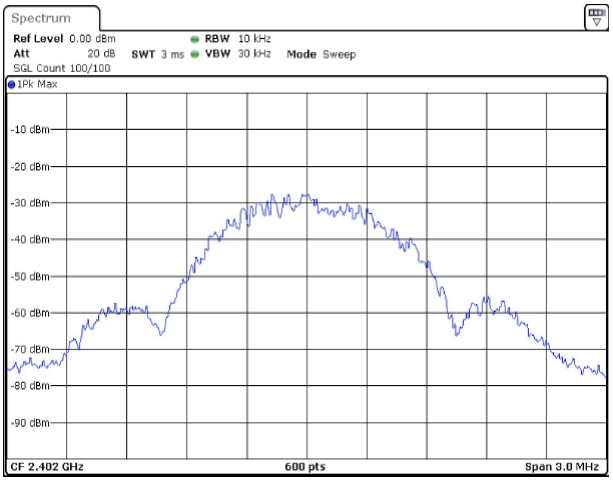
Channel	Frequency (MHz)	Gated RMS (dBm)	Limit Max (dBm)
0	2402	**-5.9**	30
19	2440	-6.2	30
39	2480	-7.2	30

Peak Power Spectral Density

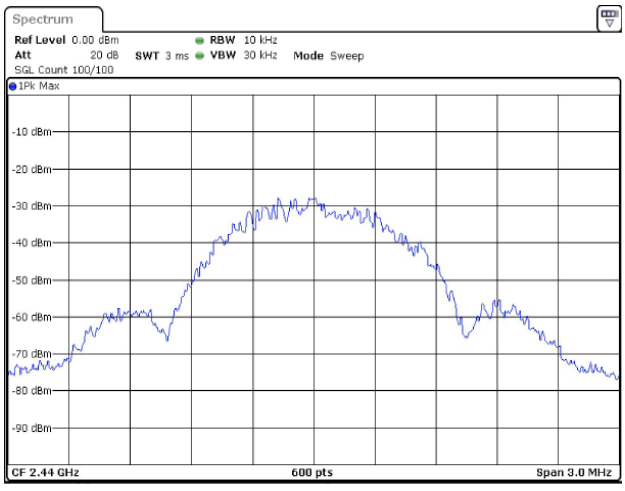
Test procedure in accordance with ANSI C63.10-2013 Section 11.10.2 Method PKPSD.
Measurement uncertainty calculated in accordance with ETSI TR 100 028-1. Expanded Uncertainty (K=2) < 1.3 dB.

Channel	Frequency (MHz)	Peak PSD (dBm)	Limit Max (dBm)
0	2402	-15.875	8
19	2440	-16.100	8
39	2480	-17.076	8

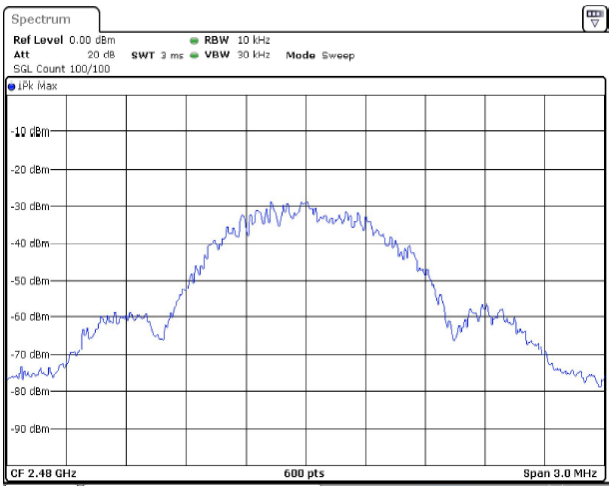
2402 MHz



2440 MHz



2480 MHz

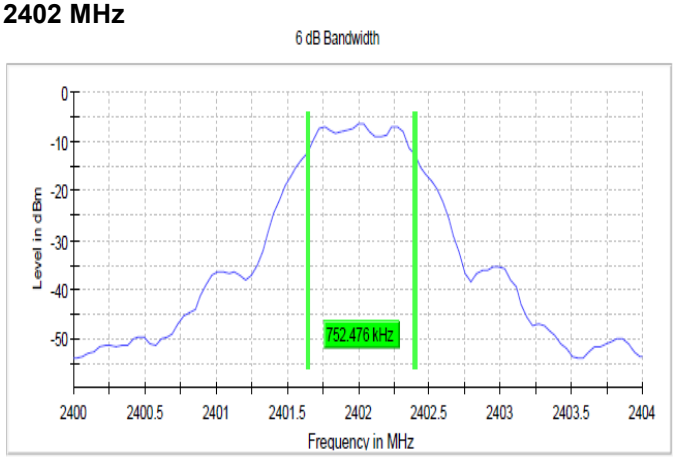


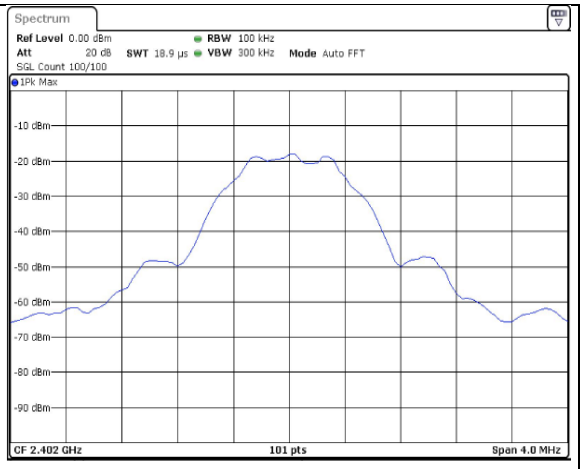
DTS Bandwidth (6dB)

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%

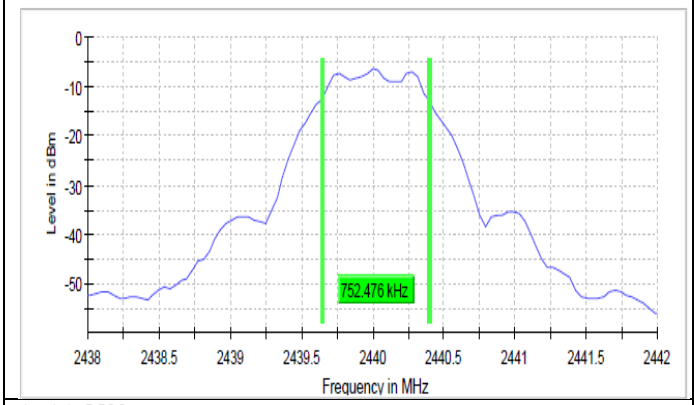
Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)	Result
0	2402	0.752476	> 0.5	Pass
19	2440	0.752476	> 0.5	Pass
39	2480	0.752476	> 0.5	Pass

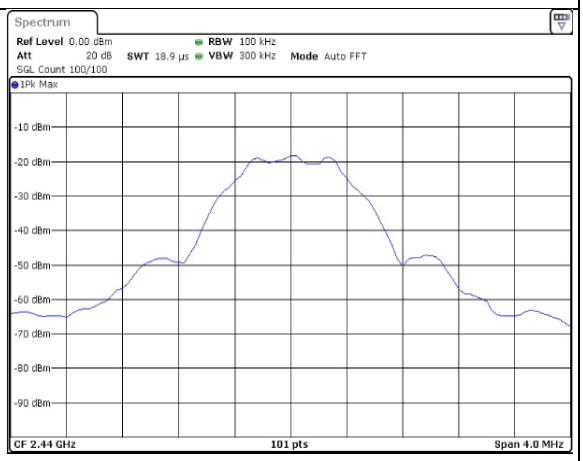
2402 MHz



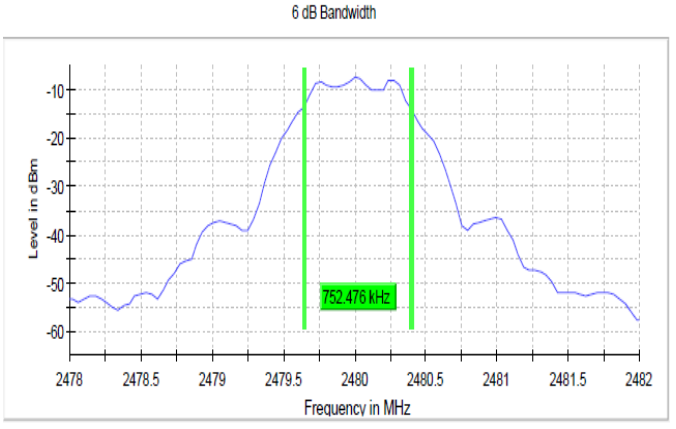


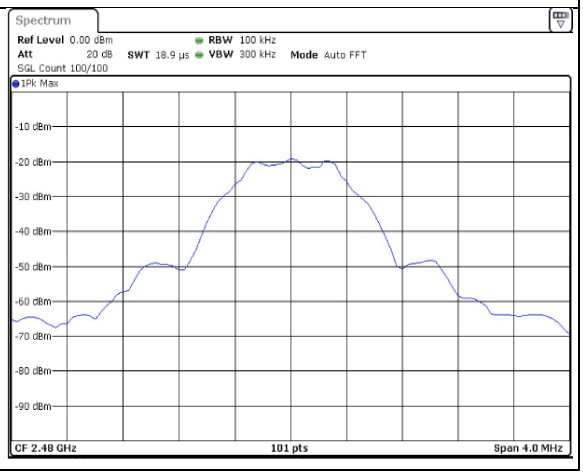
2440 MHz





2480 MHz



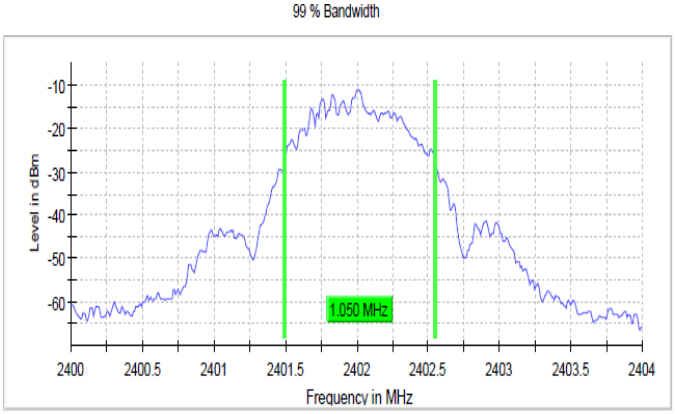


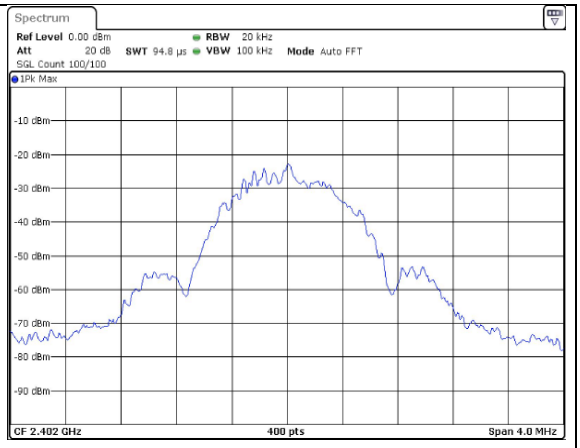
Occupied Channel Bandwidth 99%

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%

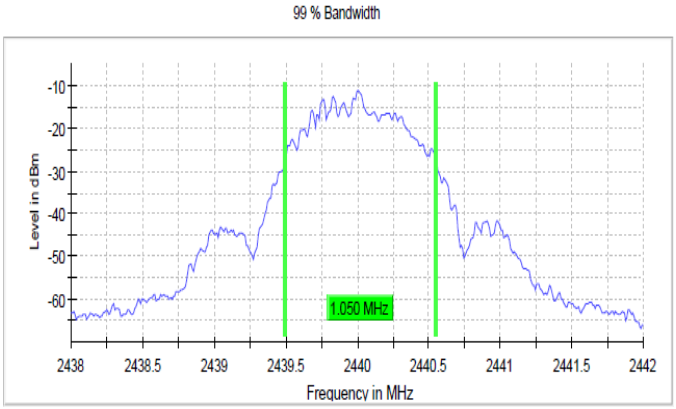
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)
0	2402	1.050
19	2440	1.050
39	2480	1.050

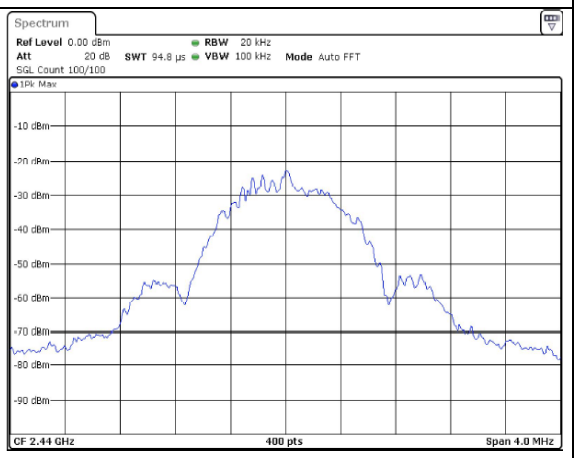
2402 MHz



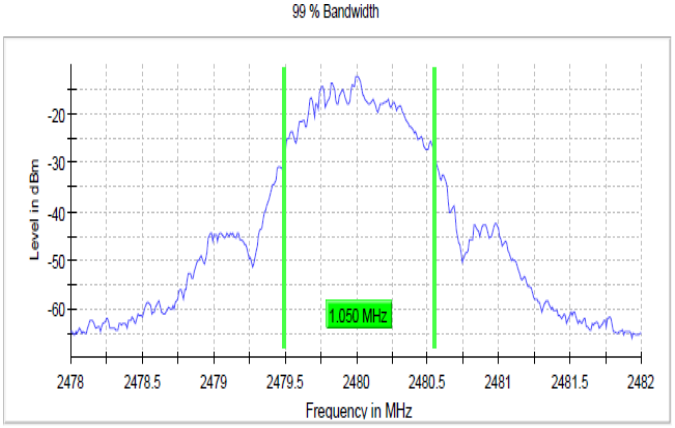


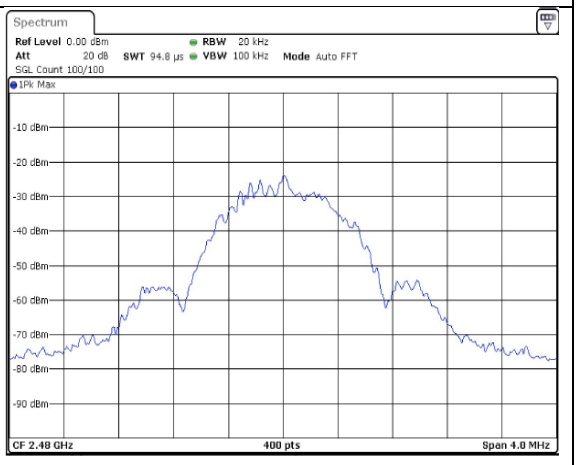
2440 MHz





2480 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

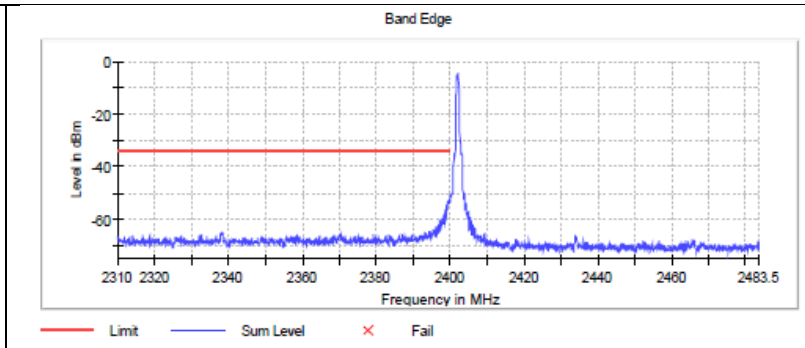
2402 MHz

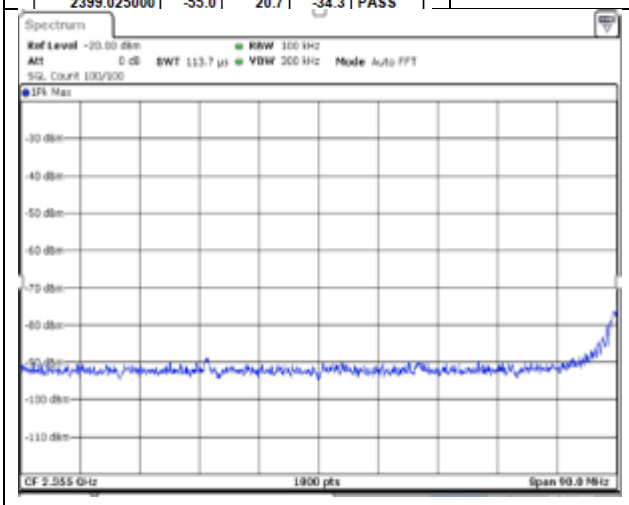
Inband Peak

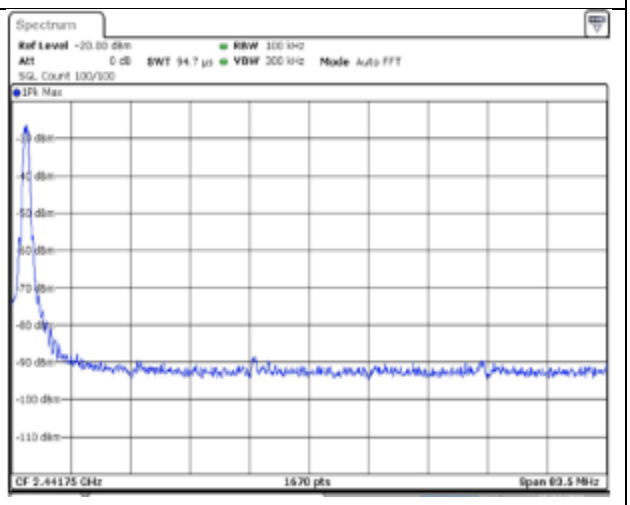
Frequency (MHz)	Level (dBm)
2402.025000	-6.1

Measurements

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2399.975000	-50.4	16.1	-34.3	PASS
2399.925000	-51.7	17.4	-34.3	PASS
2399.625000	-52.4	18.1	-34.3	PASS
2399.525000	-52.5	18.1	-34.3	PASS
2399.675000	-52.5	18.2	-34.3	PASS
2399.575000	-52.5	18.2	-34.3	PASS
2399.725000	-52.6	18.2	-34.3	PASS
2399.475000	-52.7	18.4	-34.3	PASS
2399.875000	-52.9	18.5	-34.3	PASS
2399.425000	-53.2	18.9	-34.3	PASS
2399.825000	-53.3	19.0	-34.3	PASS
2399.375000	-53.3	19.0	-34.3	PASS
2399.325000	-53.7	19.4	-34.3	PASS
2399.775000	-53.8	19.5	-34.3	PASS
2399.025000	-55.0	20.7	-34.3	PASS







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

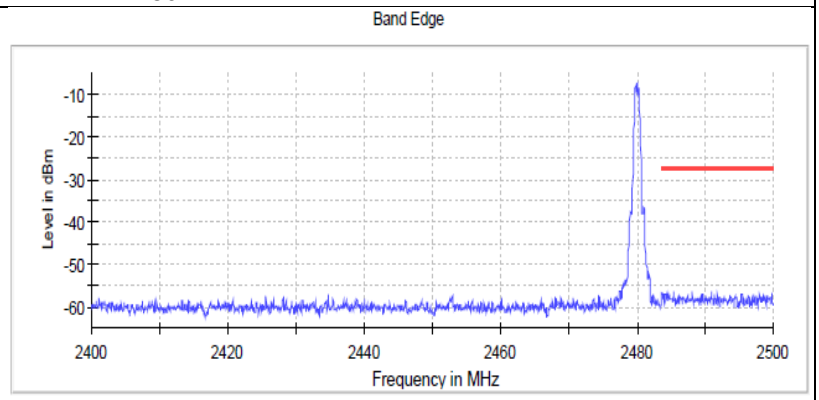
2480 MHz

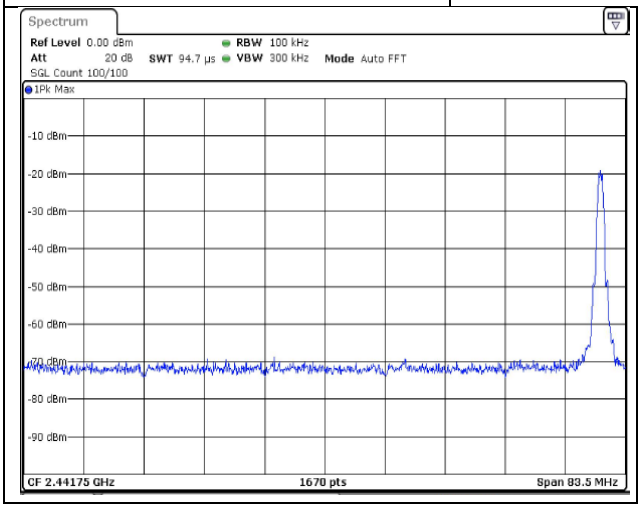
Inband Peak

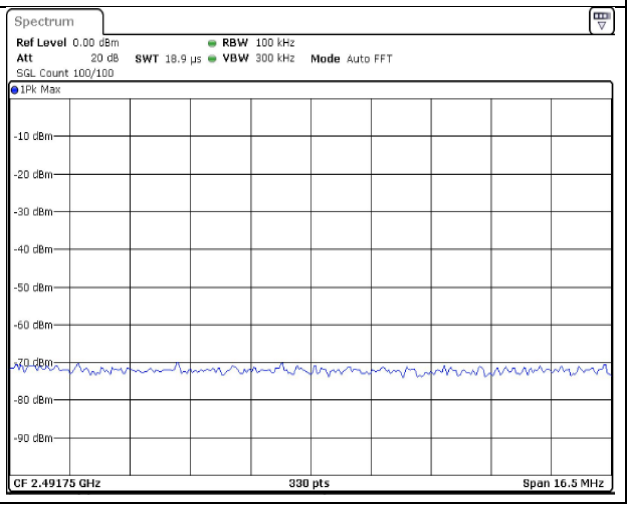
Frequency (MHz)	Level (dBm)
2480.025000	-7.4

Measurements

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2488.125000	-56.3	28.9	-27.4	PASS
2488.075000	-56.4	29.0	-27.4	PASS
2490.975000	-56.5	29.1	-27.4	PASS
2485.425000	-56.5	29.1	-27.4	PASS
2485.375000	-56.6	29.2	-27.4	PASS
2490.925000	-56.6	29.2	-27.4	PASS
2499.825000	-56.9	29.5	-27.4	PASS
2483.825000	-56.9	29.5	-27.4	PASS
2483.675000	-56.9	29.5	-27.4	PASS
2483.725000	-57.0	29.5	-27.4	PASS
2499.775000	-57.0	29.6	-27.4	PASS
2491.375000	-57.0	29.6	-27.4	PASS
2484.175000	-57.0	29.6	-27.4	PASS
2484.775000	-57.0	29.6	-27.4	PASS
2498.025000	-57.1	29.7	-27.4	PASS







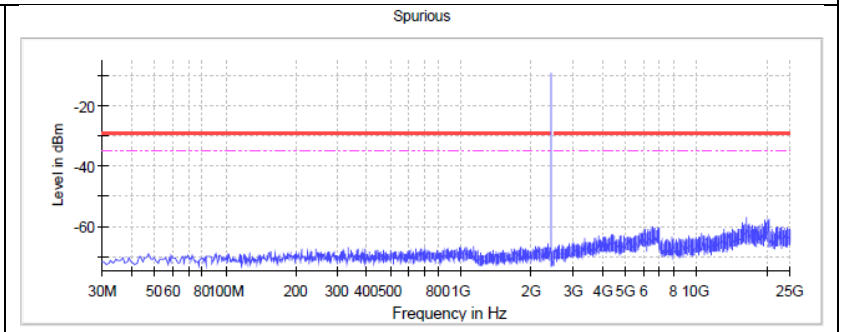
Conducted Spurious Emissions

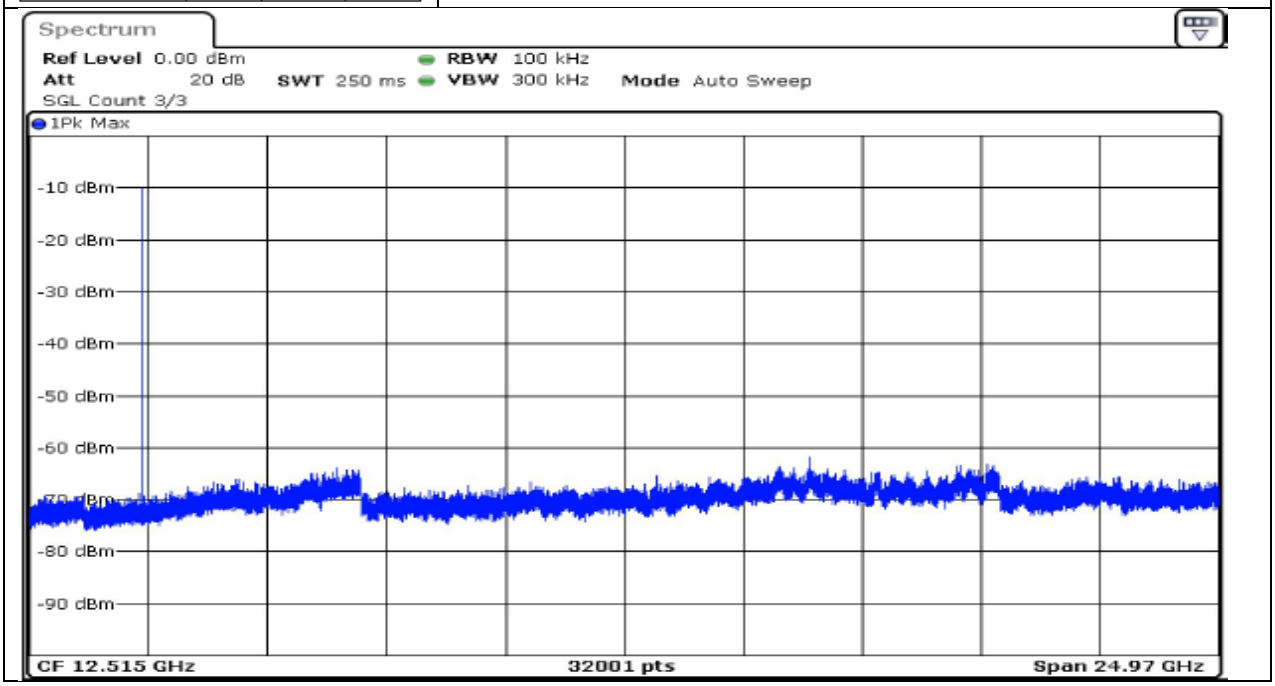
Test procedure in accordance with ANSI C63.10-2013 Section 11.11.
Measurement uncertainty calculated in accordance with ETSI TR 100 028-1. Expanded Uncertainty (K=2) < 1.8 dB

2402 MHz

Pre Measurements

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)
2399.344864	-56.2	27.3	-28.9
16397.713665	-57.1	28.3	-28.9
2398.564576	-57.4	28.5	-28.9
20134.513453	-57.9	29.0	-28.9
20245.314365	-57.9	29.0	-28.9
19553.198806	-58.0	29.1	-28.9
19493.896909	-58.4	29.5	-28.9
20224.246586	-58.6	29.7	-28.9
15768.801444	-58.8	29.9	-28.9
19742.808818	-58.8	29.9	-28.9
20140.755758	-58.8	29.9	-28.9
20268.723009	-58.8	29.9	-28.9
20234.390332	-58.9	30.0	-28.9
15762.559139	-58.9	30.0	-28.9
20241.412925	-58.9	30.0	-28.9

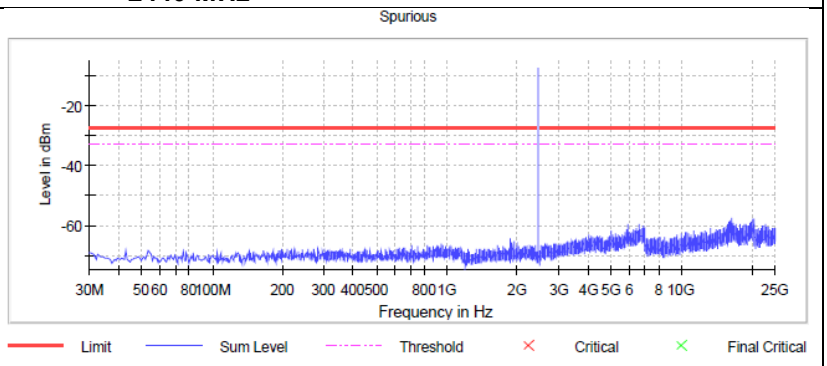


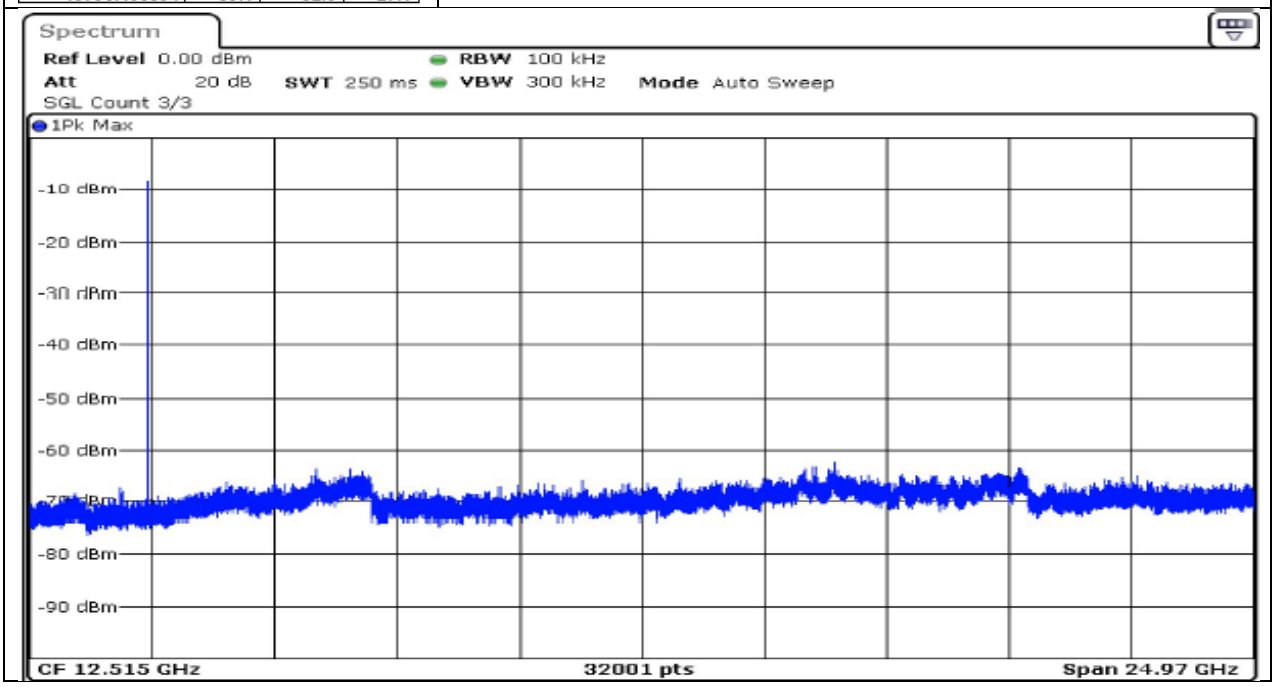


2440 MHz

Pre Measurements

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)
16425.804037	-57.7	30.5	-27.1
20198.497078	-57.9	30.8	-27.1
20236.731196	-58.1	31.0	-27.1
16055.167182	-58.5	31.3	-27.1
20259.359551	-58.5	31.4	-27.1
15988.842692	-58.6	31.4	-27.1
20257.798975	-58.8	31.7	-27.1
15834.345645	-58.8	31.7	-27.1
20231.269179	-58.9	31.8	-27.1
19770.899191	-58.9	31.8	-27.1
20168.846130	-59.0	31.9	-27.1
16317.343989	-59.1	32.0	-27.1
20167.285554	-59.1	32.0	-27.1
19844.246274	-59.1	32.0	-27.1
19790.406394	-59.1	32.0	-27.1





2480 MHz

Pre Measurements

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)
20300.714821	-57.8	30.2	-27.6
20224.246586	-57.9	30.3	-27.6
20218.004281	-58.0	30.4	-27.6
19801.330427	-58.3	30.7	-27.6
19479.071435	-58.6	31.0	-27.6
20125.149995	-58.6	31.0	-27.6
20331.146058	-58.8	31.2	-27.6
16413.319428	-58.8	31.2	-27.6
20313.979719	-58.9	31.3	-27.6
19727.983344	-58.9	31.3	-27.6
19487.654605	-59.0	31.4	-27.6
20196.936502	-59.0	31.4	-27.6
20179.770163	-59.0	31.5	-27.6
20125.930283	-59.1	31.5	-27.6
19781.823224	-59.1	31.5	-27.6