Vista Labs
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Phone: +1 (949) 393-1123
Web: www.vista-compliance.com
Email: info@vista-compliance.com

FCC EMC Test Report

Test Report Number	COS-23071762-LC-FCC-EMC
FCC ID	2BEZA-DWR4
Applicant	CoastalObsTechServices LLC
Applicant Address	3801 Shadow Lane, Virginia Beach, VA 23452
Product Name	Datawell Waverider
Model Number	DWR4
Date of Receipt	02/02/2024
Date of Test	02/12/2024- 02/13/2024
Report Issue Date	04/12/2024
Test Standards	47 CFR Part 15, Subpart B ANSI C63.4: 2014
Test Result	**PASS**

Issued by:

Vista Compliance Laboratories
1261 Puerta Del Sol, San Clemente, CA 92673 USA
www.vista-compliance.com

Minoush Niknam (Test Engineer)

David Zhang (Technical Manager)

REVISION HISTORY

Report Number	Version	Description	Issued Date
COS-23071762-LC-FCC-EMC	01	Initial report	04/12/2024

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1 Test Summary

Test Item	Test Requirement	Test Method	Result
Conducted Emissions	47 CFR Part 15, Subpart B	ANSI C63.4: 2014	N/A
Radiated Emissions Below 1GHz	47 CFR Part 15, Subpart B	ANSI C63.4: 2014	Pass
Radiated Emissions Above 1GHz	47 CFR Part 15, Subpart B	ANSI C63.4: 2014	Pass

Note:
Per § 15.107(d), measurements to demonstrate compliance with the conducted limits are not required for devices that only employ battery power for operation and which do not operate from the AC power lines or contain provisions for operation while connected to the AC power lines.

2 General Information

2.1 Applicant

Applicant	Coastalobstechservices, LLC
Applicant Address	3801 Shadow Lane, Virginia Beach, VA 23452
Manufacturer	Coastalobstechservices, LLC
Manufacturer Address	3801 Shadow Lane, Virginia Beach, VA 23452

2.2 Product information

Product Name	Datawell Waverider
Model Number	DWR4
Family Models	N/A
Serial Number	N/A
Frequency Band	5 Operating frequencies: 29.71MHz, 29.73MHz, 29.75MHz, 29.77MHz, 29.79MHz
Type of modulation	4FSK
Equipment Class	TNB
Antenna Information	¼ λ vertical monopole
Height of Antenna	Sea level
Antenna Gain	0 dBi (Dipole)
Clock Frequencies	N/A
Input Power	12V~30Vdc battery power (12Vdc used during the test)
Power Adapter Manufacturer/Model	N/A
Power Adapter SN	N/A
Hardware version	N/A
Software version	N/A
Additional Info	N/A

2.3 Test standard and method.

Test standard	47 CFR Part 15, Subpart B
Test method	ANSI C63.4: 2014

3 Test Site Information

Lab performing tests	Vista Laboratories, Inc.
Lab Address	1261 Puerta Del Sol, San Clemente, CA 92673 USA
Phone Number	+1 (949) 393-1123
Website	www.vista-compliance.com

Test Condition	Temperature	Humidity	Atmospheric Pressure
EMC Testing	23.5°C	58.2%	996 mbar

4 Modification of EUT / Deviations from Standards

N/A

5 Test Configuration and Operation

5.1 EUT Test Configuration

The EUT is in normal operation mode and no special software was used during the test.

The following software was used for testing and to monitor EUT performance.

Software	Description
EMISoft Vasona	EMC/RF Spurious emission test software used during testing

5.2 EUT Operating frequency

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	29.71	4	29.77
2	29.73	5	29.79
3	29.75	-	-

5.3 Supporting Equipment

N/A

6 Uncertainty of Measurement

Test item	Measurement Uncertainty (dB)
AC Conducted Emissions (150K-30MHz)	±3.5 dB
Radiated Emission (30MHz-1GHz)	±4.6 dB
Radiated Emission (1-18GHz)	±4.9 dB
Radiated Emission (18-40GHz)	±3.5 dB

6.1 Radiated Emissions

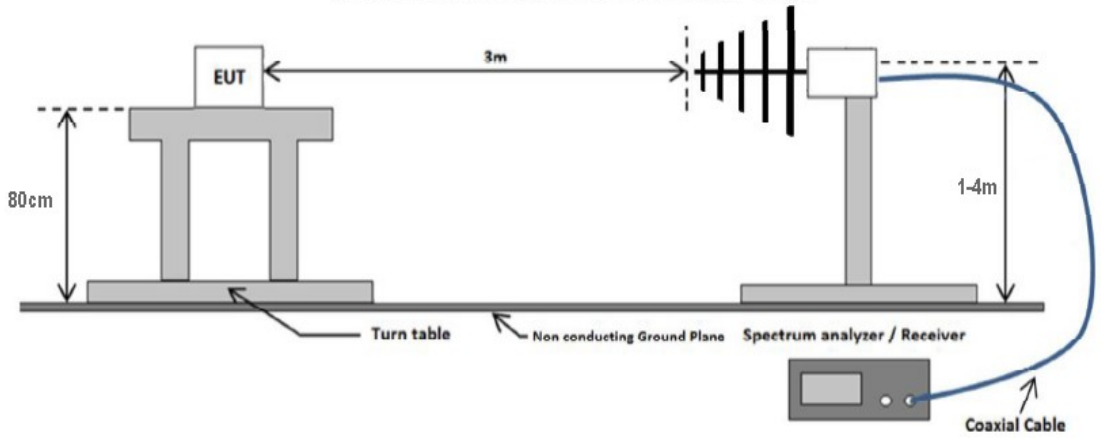
6.1.1 Requirement

Per § 15.109 (a), Except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

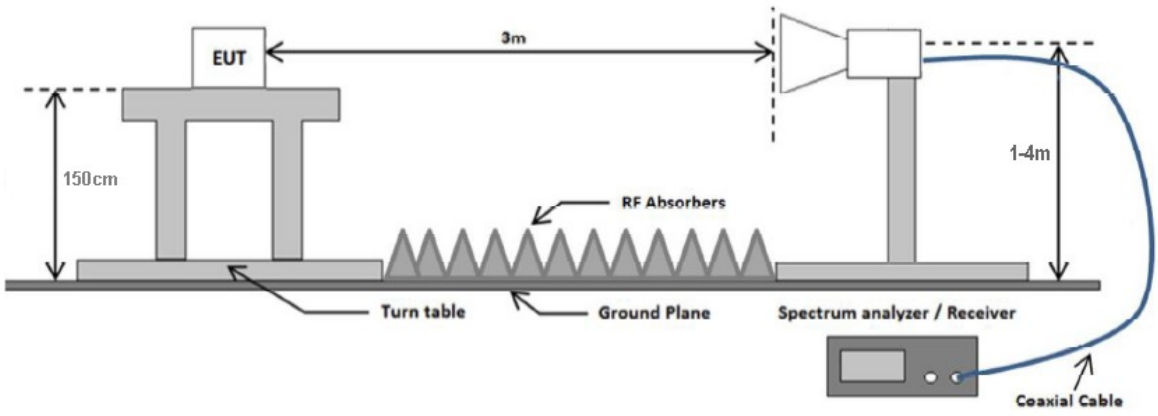
Frequency range (MHz)	Field Strength (μV/m)
30 – 88	100
88 – 216	150
216 960	200
Above 960	500

6.1.2 Test Setup

Radiated emissions test setup 30 MHz - 1 GHz



Radiated emissions test setup above 1 GHz



6.1.3 Test Procedure

The procedure is according to ANSI C63.4: 2014. The following are the steps.

1. The EUT was switched on and allowed to warm up to its normal operating condition.
2. The test was carried out at the selected frequency points obtained from the EUT characterization. Maximization of the emissions, was carried out by rotating the EUT, changing the antenna polarization, and adjusting the antenna height in the following manner:
    a. Vertical or horizontal polarization (whichever gave the higher emission level over a full rotation of the EUT) was chosen.
    b. The EUT was then rotated to the direction that gave the maximum emission.
    c. Finally, the antenna height was adjusted to the height that gave the maximum emission.
3. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-Peak detection at frequency below 1GHz.
4. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz with Peak detection for Peak measurement at frequency above 1GHz.

    The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz with Peak detection for Average Measurement as below at frequency above 1GHz.

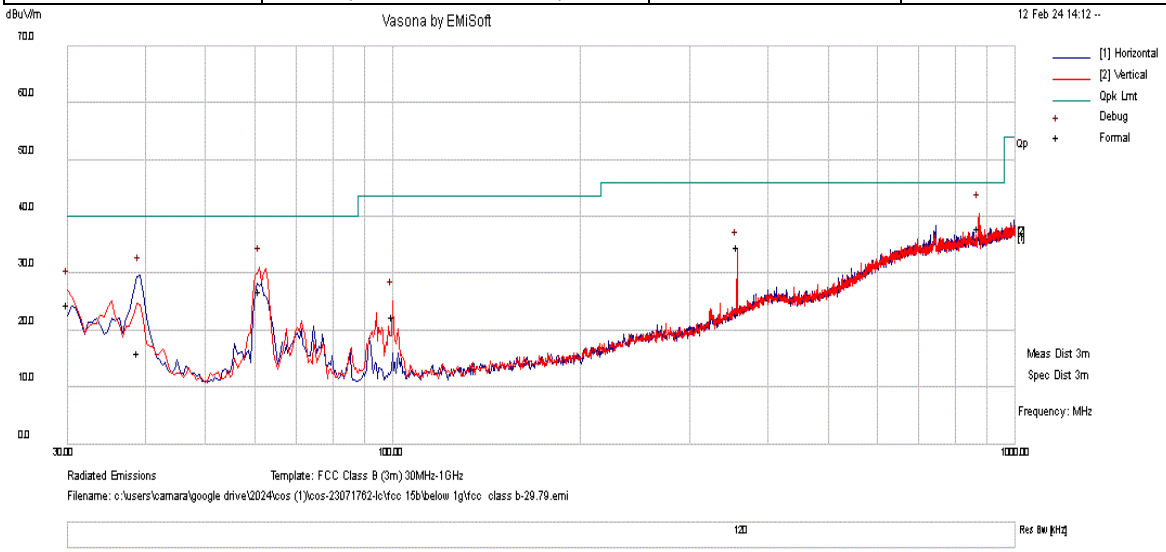
5. Steps 2 and 3 were repeated for the next frequency point, until all selected frequency points were measured.

    The frequency range covered was from 30MHz to 40GHz. A broadband antenna was used from 30MHz to 1GHz and a horn antenna above 1GHz.

6.1.4 Test Result

RADIATED EMISSIONS BELOW 1 GHZ

Test Standard:	§15.109	Mode:	Normal mode
Frequency Range:	30 MHz - 1 GHz	Test Date:	02/12/2024
Antenna Type/Polarity:	Bi-Log/Hor & Ver	Test Personnel:	Minoush Niknam
Remark:	Normal operation (with CH5, 29.79 MHz)	Test Result:	Pass



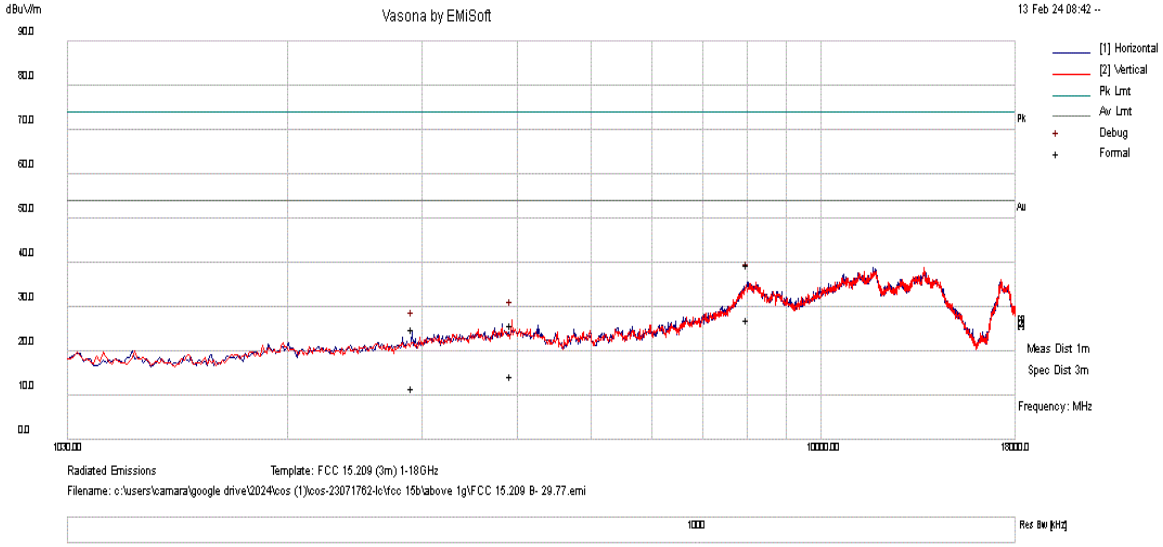
No.	Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail
1	873.25	29.95	7.52	0.68	38.15	Quasi Max	V	100	270	46.00	-7.85	Pass
2	61.12	44.90	3.02	-20.97	26.95	Quasi Max	V	143	272	40.00	-13.05	Pass
3	38.97	30.17	2.51	-16.56	16.12	Quasi Max	H	308	261	40.00	-23.88	Pass
4	357.46	38.49	6.10	-9.93	34.66	Quasi Max	V	103	14	46.00	-11.34	Pass
5	30.0	33.95	2.22	-11.54	24.64	Quasi Max	V	0	0	40.00	-15.36	Pass
6	100.03	38.49	3.56	-19.59	22.46	Quasi Max	V	389	186	43.50	-21.04	Pass

Remarks:

1. Level (dBuV) = Raw (dBuV) + Cable loss(dB) + AF (dB).
2. AF (dB) = Antenna Factor (dB) - Preamplifier Gain (dB)
3. Margin = Level (dBuV/m) - Limit value(dBuV/m)

Radiated Emissions Above 1 GHz

Test Standard:	§15.109	Mode:	Normal mode
Frequency Range:	1 GHz - 18 GHz	Test Date:	02/13/2024
Antenna Type/Polarity:	Horn/Hor & Ver	Test Personnel:	Minoush Niknam
Remark:	Normal operation (with CH4:29.77 MHz)	Test Result:	Pass



No.	Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail
1	8032.41	18.90	14.26	6.29	39.45	Peak Max	H	127	184	74.00	-34.55	Pass
2	3934.28	20.40	9.66	-4.09	25.97	Peak Max	V	395	3	74.00	-48.03	Pass
3	2917.63	24.82	7.44	-7.42	24.84	Peak Max	H	168	245	74.00	-49.16	Pass
4	8032.41	6.56	14.26	6.29	27.11	Average Max	H	127	184	54.00	-26.89	Pass
5	3934.28	8.78	9.66	-4.09	14.35	Average Max	V	395	3	54.00	-39.65	Pass
6	2917.63	11.58	7.44	-7.42	11.60	Average Max	H	168	245	54.00	-42.40	Pass

Remarks:

1. Level (dBuV) = Raw (dBuV) + Cable loss(dB) + AF (dB).
2. AF (dB) = Antenna Factor (dB) - Preamplifier Gain (dB)
3. Margin = Level (dBuV/m) - Limit value(dBuV/m)

Radiated Emission between 18GHz – 40GHz test result.

Note: no substantial emission is found other than the noise floor. Different modes have been verified.

7 EUT and Test Setup Photos

Refer to FCC exhibits

8 Test Instrument List

Equipment	Manufacturer	Model	Instrument Number	Cal. Date	Cal. Due
Semi-Anechoic Chamber	ETS-Lindgren	10M	VL001	10/18/2022	10/18/2024
Shielding Control Room	ETS-Lindgren	Series 81	VL006	N/A1)	N/A1)
Spectrum Analyzer	Keysight	N9020A	MY50110074	06/09/2023	06/09/2024
EMC Test Receiver	R&S	ESL6	100230	06/07/2023	06/07/2024
LISN (9KHz – 30MHz)	EMCO	3816/2	9705-1066	07/12/2023	07/12/2024
Bi-Log Antenna	ETS-Lindgren	3142E	217921	07/19/2023	07/19/2024
Horn Antenna (1-18GHz)	Electro-Metrics	EM-6961	6292	07/21/2023	07/21/2024
Horn Antenna (18-40GHz)	Com-Power	AH-840	101109	07/21/2023	07/21/2024
Preamplifier	RF Bay, Inc.	LPA-10-20	11180621	07/16/2023	07/16/2024
Temp / Humidity / Pressure Meter	PCE Instruments	PCE-THB 40	R062028	06/07/2023	06/07/2024
RF Attenuator	Pasternack	PE7005-3	VL061	07/16/2023	07/16/2024
Preamplifier 100KHz - 40GHz	Aeroflex	33711-392-77150-11	064	07/16/2023	07/16/2024
EM Center Control	ETS-Lindgren	7006-001	160136	N/A1)	N/A1)
Turn Table	ETS-Lindgren	2181-3.03	VL002	N/A1)	N/A1)
Boresight Antenna Tower	ETS-Lindgren	2171B	VL003	N/A1)	N/A1)
Loop Antenna (9k-30MHz)	Com-Power	AL-130	121012	06/09/2023	06/09/2024
RE test cable (below 6GHz)	Vista	RE-6GHz-01	RE-6GHz-01	07/16/2023	07/16/2024
RE test cable (1-18GHz)	PhaseTrack	II-240	RE-18GHz-01	07/16/2023	07/16/2024
RE test cable (>18GHz)	Sucoflex	104	344903/4	07/16/2023	07/16/2024
Pulse limiter	Com-Power	LIT-930A	531727	07/16/2023	07/16/2024
CE test cable #1	FIRST RF	FRF-C-1002-001	CE-6GHz-01	07/16/2023	07/16/2024
CE test cable#2	FIRST RF	FRF-C-1002-001	CE-6GHz-02	07/16/2023	07/16/2024
USB RF Power Sensor	ETS-Lindgren	7002-006	SN 00151268	06/07/2023	06/07/2024
Agilent Signal Generator	MXG N5182A	N5182A	US47080548	06/07/2023	06/07/2024
Power Splitter/Combiner	Mini-Circuits	ZFSC-2-9G+	VL052	N/A1)	N/A1)
Power Splitter/Combiner	Mini-Circuits	ZFSC-2-9G+	VL053	N/A1)	N/A1)
Power Splitter/Combiner	Mini-Circuits	ZFSC-2-9G+	VL054	N/A1)	N/A1)
Power Splitter/Combiner	Mini-Circuits	ZFSC-2-9G+	VL055	N/A1)	N/A1)

Note:

1) This equipment is not for measurement purpose and only require functional verification. Calibration is not required.

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