
Project #: PRJ0050267

Company: Swimmersive Co. dba Zygo

EUT Name: Zygo Underwater Communication Radio Transmitter
EUT Model: Zygo2T

FCC and Industry Canada

Wireless Test Report

Prepared for:

Swimmersive Co. dba Zygo
16854 Mooncrest Drive
Encino, CA, 91436

By

Nemko USA, Inc.
1601 North A.W. Grimes Blvd., Suite B
Round Rock, Texas 78665

August 30, 2024

Written by

Veer Patel
Wireless Engineer



Revision History

Revision Number	Description	Date
Draft01	Initial release for review	7/10/2024
Final01	Release to agency	8/2/2024
Final02	Added radiated band edge data for upper channel	8/30/2024

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NOTICE:

- (1) This Report must not be used to claim product endorsement, by ANAB, NIST, the FCC or any other Agency. This report also does not warrant certification by ANAB or NIST.
- (2) This report shall not be reproduced except in full, without the written approval of Nemko USA, Inc.
- (3) The significance of this report is dependent on the representative character of the test sample submitted for evaluation and the results apply only in reference to the sample tested. The manufacturer must continuously implement the changes shown herein to attain and maintain the required degree of compliance.

Compliance Certificate

FCC MRA Designation Number: US3166
ANAB Accreditation Number: AT-3165.01

Applicant	Device & Test Identification
Swimmersive Co. dba Zygo 16854 Mooncrest Drive Encino, CA, 91436	Model(s): Zygo2T FCC ID: 2APZQ- ZYGO2T IC ID: 23961- ZYGO2T Laboratory Project ID: PRJ0050267

The device named above was tested utilizing the following standards and found to follow the required criteria:

Test Requirements:

Requirement	Reference	Test Description
FCC 47 CFR Part 15 C	15.247	Operation within the bands 2400-2483.5 MHz
	15.207	Conducted emission limits
	15.209	Radiated emission limits; general requirements
	15.205	Restricted Bands of Operation
	15.203	Antenna requirement
FCC 47 CFR Part 1 I*	1.1310	Radiofrequency radiation exposure limits
RSS-247	Issue 3	Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices
RSS-Gen	Issue 5	General Requirements and Information for the Certification of Radio Apparatus
RSS-102	Issue 6	Radio Frequency (RF) Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)

*MPE is reported separately from this document.

**Corresponding RSS references are listed in the body of the report.

I, Larry Finn, for Nemko USA, Inc., being familiar with the above requirements and test procedures have reviewed the test setup, measured data, and this report. I believe them to be true and accurate.



Larry Finn
Laboratory Manager

This report has been reviewed and accepted by the Applicant. The undersigned is responsible for ensuring that this device will continue to comply with the requirements listed above.

Representative of Applicant

Test Result Summary

Test	FCC Part 15 Rule Paragraphs	IC RSS References	Test Results
AC Mains Conducted Emissions	15.207 (a)	RSS-Gen 7.2	Pass
Antenna Requirement	15.203	RSS-Gen 6.8	Pass
Fundamental Power	15.247 (b)(3)	RSS-247 5.4 (d)	Pass
Duty Cycle	15.247 (f)	RSS-247 5.3 (a)	Pass
Power Spectral Density	15.247 (e)	RSS-247 5.2 (b)	Pass
Occupied Bandwidth	15.247 (a)(2), 2.1049	RSS-247 5.2 (a)	Pass
Band Edge	15.247 (d); 15.205 (a)	RSS-247 5.5;	Pass
Transmitter Conducted Spurious Emissions	15.247 (d); 15.209 (a)	RSS-247 5.5; RSS-GEN 6.13	Pass
Transmitter Radiated Spurious Emissions	15.247 (d); 15.209 (a)	RSS-247 5.5; RSS-Gen 6.13 & 8.10	Pass
Receiver Radiated Spurious Emissions	15.109	RSS-Gen 7.3	Pass

1.0 Introduction

1.1 Scope

This report describes the extent to which the equipment under test (EUT) conformed to the intentional radiator requirements of the United States and Canada.

Nemko USA, Inc., follows the guidelines of National Institute of Standards and Technology (NIST) for all uncertainty calculations, estimates, and expressions thereof for electromagnetic compatibility testing.

1.2 EUT Description

Equipment Under Test	
EUT Name:	Zygo Underwater Communication Radio Transmitter
Model:	Zygo2T
Serial Number:	NA
Description:	Operating Frequency
	Modulation Type
	Data Rate
Input Power:	Battery

1.3 Support Equipment

Manufacturer	Model	Serial #	Description
None			

1.4 EUT Test Configuration

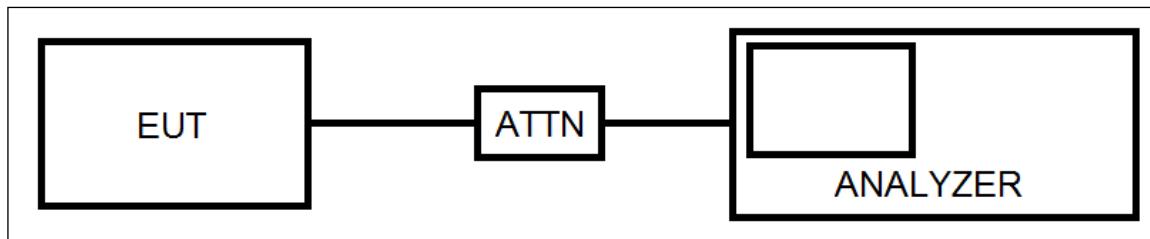
The EUT was exercised in a manner consistent with normal operations.

1.5 Modifications to Equipment

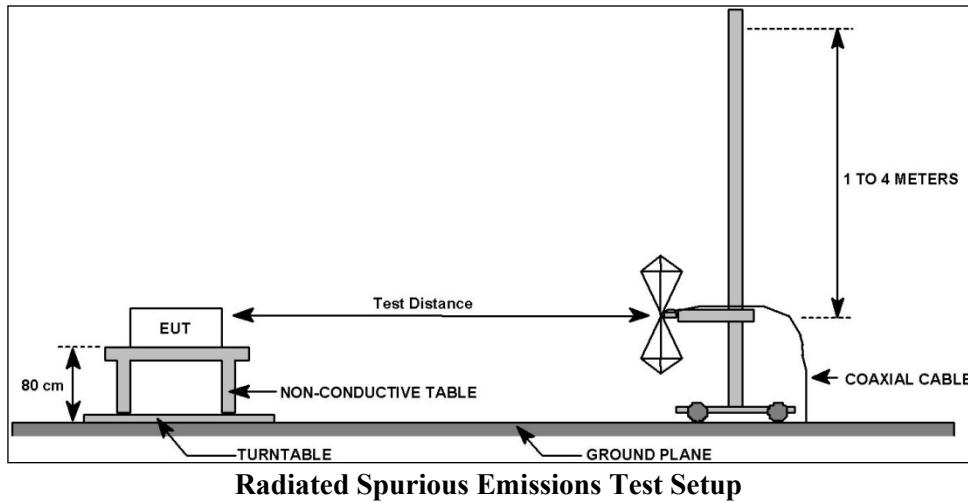
None.

1.6 Test Setup

Below are the examples test setup for Conducted and Radiated measurements.



Conducted Measurements at the Antenna Port Test Setup



1.7 Test Site

Measurements were made at the Nemko USA, Inc. semi-anechoic facility (FCC US3166, IC 3036B-1) in Round Rock, Texas. The site is registered with the FCC under Section 2.948 and Industry Canada per RSS-GEN, and is subsequently confirmed by laboratory accreditation (ANAB). The test site is located at 1601 North A.W. Grimes Boulevard, Suite B, Round Rock, Texas, 78665. CAB Identifier: US 0123.

1.8 Measurement Corrections

Parameter	From Sums Of
Radiated Field Strength	Raw Measured Level + Antenna Factor + Cable Losses – Amplifier Gain
Conducted Antenna Port	Raw Measured Level + Attenuator Factor + Cable Losses
Conducted Mains Port	Raw Measured Level + LISN Factor + Cable/Filter/Limiter Losses

Additionally, measurement distance extrapolation factors (such as $1/d$ above 30 MHz) are applied and documented where used.

1.9 Applicable Documents

Table 1.9.1: Applicable Documents

Document	Title
47 CFR	Part 15 – Radio Frequency Devices Subpart C -Intentional Radiators
RSS-247 Issue 3	Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices
RSS-102 Issue 6	Radio Frequency (RF) Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)
RSS-Gen Issue 5	General Requirements and Information for the Certification of Radio Apparatus
ANSI C63.10 2013	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices
KDB 558074 D01	GUIDANCE FOR COMPLIANCE MEASUREMENTS ON DIGITAL TRANSMISSION SYSTEM, FREQUENCY HOPPING SPREAD SPECTRUM SYSTEM, AND HYBRID SYSTEM DEVICES OPERATING UNDER SECTION 15.247 OF THE FCC RULES
KDB 412172 D01	GUIDELINES FOR DETERMINING THE EFFECTIVE RADIATED POWER (ERP) AND EQUIVALENT ISOTROPICALLY RADIATED POWER (EIRP) OF AN RF TRANSMITTING SYSTEM
KDB 447498 D04 V01	RF EXPOSURE PROCEDURES AND EQUIPMENT AUTHORIZATION POLICIES FOR MOBILE AND PORTABLE DEVICES – Interim Guidance
OET Bulletin 65 Edition 97-01	Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields

2.0 AC Power-line Conducted Emissions

2.1 Test Procedure

Measure emissions of the EUT from the AC mains network terminated into a standard line impedance network (LISN).

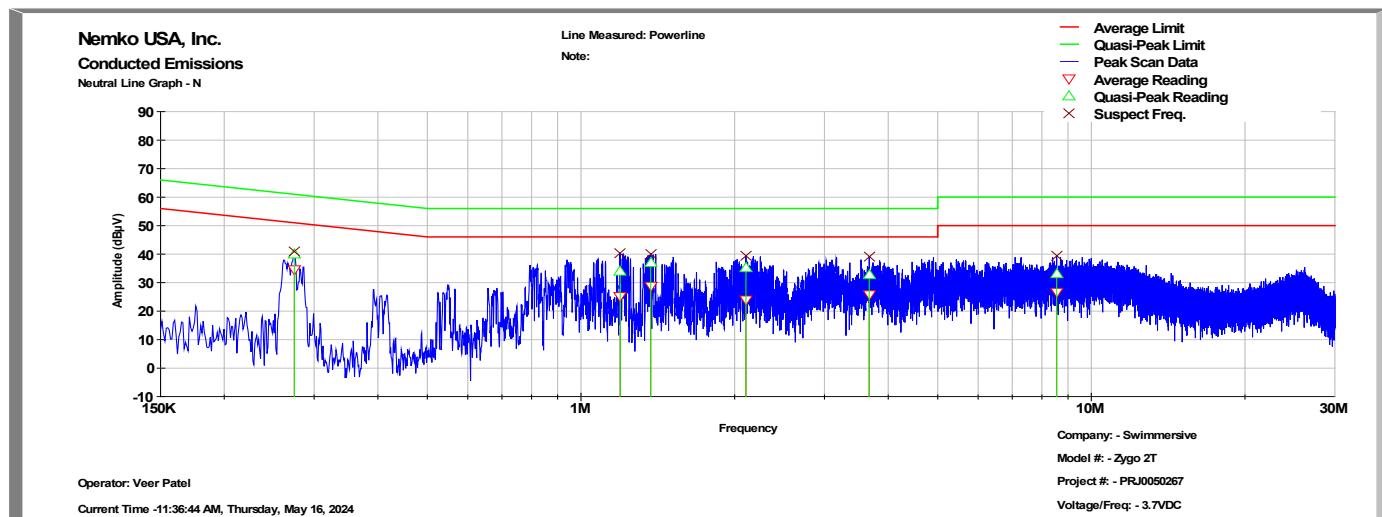
2.2 Test Criteria

AC Power-line Conducted Emissions Limit		
Frequency (MHz)	Quasi-Peak (dBuV)	Average (dBuV)
0.150 – 0.500	66 – 56 *	56 – 46 *
0.500 - 5	56	46
5 - 30	60	50

Note 1: * Decreases with the logarithm of the frequency.

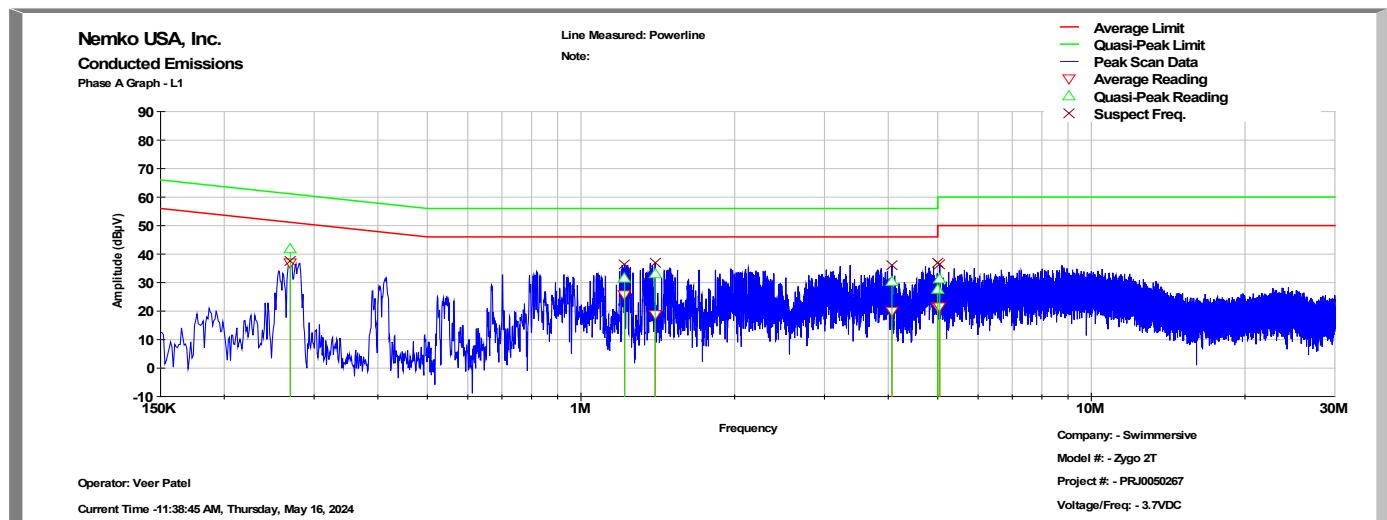
2.3 Test Results

Neutral Line Emissions Data



Frequency (MHz)	Quasi-peak Reading (dB μ V)	Quasi-peak Limit (dB μ V)	Quasi-peak Margin (dB)	Quasi-peak Results	Average Reading (dB μ V)	Average Limit (dB μ V)	Average Margin (dB)	Average Results	Peak Reading (dB μ V)
(MHz)	(dB μ V)	(dB μ V)	(dB)	(Pass/Fail)	(dB μ V)	(dB μ V)	(dB)	(Pass/Fail)	(dB μ V)
0.274	39.9	61.0	-21.1	PASS	34.5	51.0	-16.5	PASS	41.2
1.194	34.0	56.0	-22.0	PASS	25.2	46.0	-20.8	PASS	40.4
1.370	37.0	56.0	-19.0	PASS	28.9	46.0	-17.1	PASS	40.4
2.104	35.0	56.0	-21.0	PASS	23.8	46.0	-22.2	PASS	39.6
3.671	32.9	56.0	-23.1	PASS	25.9	46.0	-20.1	PASS	39.8
8.550	33.0	60.0	-27.0	PASS	26.7	50.0	-23.3	PASS	39.3

Line 1 Emissions Data



Frequency (MHz)	Quasi-peak Reading (dBμV)	Quasi-peak Limit (dBμV)	Quasi-peak Margin (dB)	Quasi-peak Results	Average Reading (dBμV)	Average Limit (dBμV)	Average Margin (dB)	Average Results	Peak Reading (dBμV)
(MHz)	(dBμV)	(dBμV)	(dB)	(Pass/Fail)	(dBμV)	(dBμV)	(dB)	(Pass/Fail)	(dBμV)
0.269	41.8	61.1	-19.4	PASS	36.9	51.1	-14.3	PASS	43.2
1.218	31.7	56.0	-24.3	PASS	25.8	46.0	-20.2	PASS	36.7
1.398	33.1	56.0	-22.9	PASS	18.8	46.0	-27.2	PASS	37.3
4.066	30.2	56.0	-25.8	PASS	20.0	46.0	-26.0	PASS	36.5
5.001	27.5	60.0	-32.5	PASS	21.4	50.0	-28.6	PASS	36.1
5.046	31.2	60.0	-28.8	PASS	21.6	50.0	-28.4	PASS	38.2

3.0 Occupied Bandwidth

3.1 Test Procedure

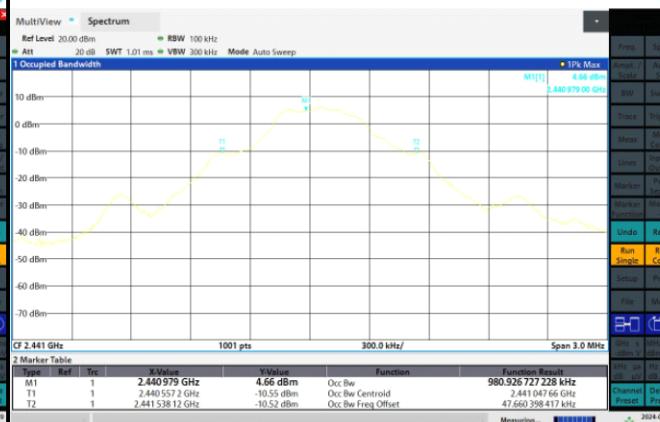
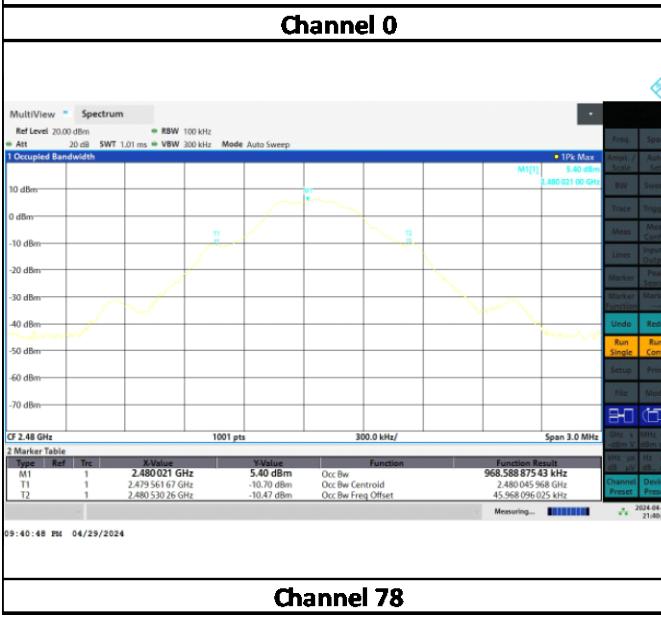
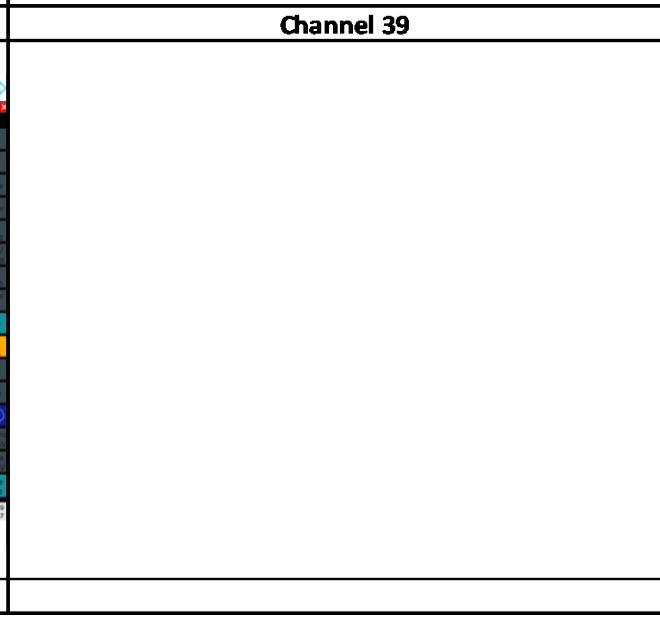
The radio was connected directly to the spectrum analyzer with an attenuator for the measurements. Low, mid, and high channels were measured. ANSI C63.10-2013, section 11.8.2, procedure is used for the measurements

3.2 Test Criteria

47 CFR (USA)	
Section Reference	Limit
15.247(a)(2), 2.1049 // RSS-247 5.2(a)	Minimum 6 dB Bandwidth shall be 500 kHz 99% (all methods)

In cases where the software function fails to find/mark the correct edge of the modulated envelope, a manual measurement (marker-delta over display line) is taken with the same spectrum analyzer settings.

3.3 Test Results

Occupied Bandwidth - Conducted Test Data																			
Environmental Conditions:		Temperature		22.3	°C	Humidity	32%	RH	Barometric Pressure										
Measurement Parameters:		RBW	100 kHz	VBW		300 kHz	Span		10 MHz	Detector	Peak								
Measurement Bandwidth:				-6	dB														
Channel	Frequency		Measured Bandwidth			Limit: >500kHz													
	(MHz)		(kHz)			(kHz)													
0	2.402		959.76			959.76													
39	2.441		980.92																
78	2.48		968.58																
 																			
 																			

The EUT met the requirements.

4.0 Fundamental Power

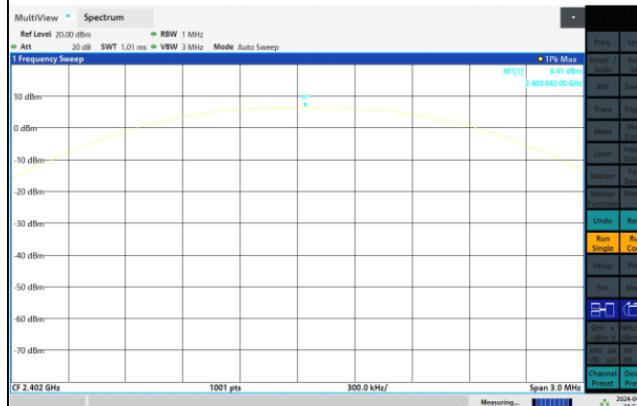
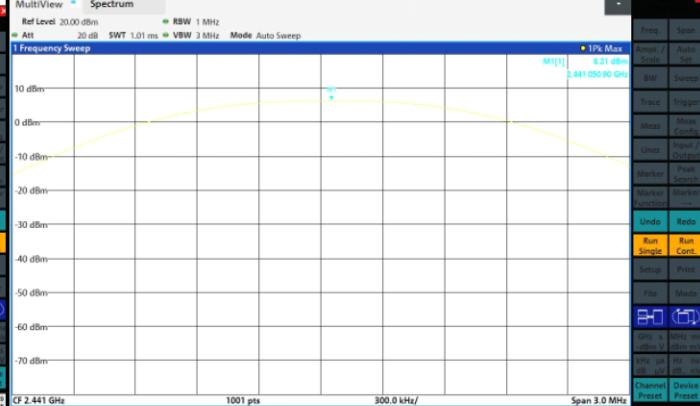
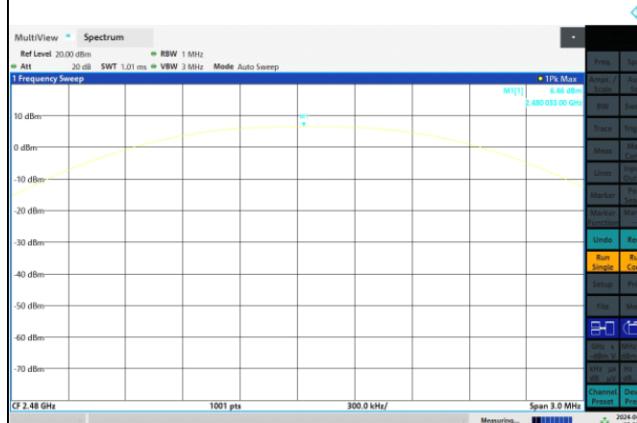
4.1 Test Procedure

The EUT was connected directly to the spectrum analyzer with an attenuator for the measurements. Low, mid, and high channels were measured. ANSI C63.10-2013, section 11.9.1, procedure is used for the measurements.

4.2 Test Criteria

47 CFR (USA) // IC (Canada)	
Section Reference	Power Limit
15.247(b)(3) // RSS-247 5.4 (d)	1 W peak (+30dBm) Limit Restated as Field: 125.23 dB μ V/m @ 3 m

4.3 Test Results

Conducted Output Power											
Environmental Conditions:			Temperature	22.3	°C	Humidity	32%	RH	Barometric Pressure	30.42	in Hg
EUT (6 dB) Bandwidth:			959.76	kHz							
Measurement Parameters:			RBW	3	MHz	VBW	10	MHz	Span	10	MHz
Channel	Frequency	Measured Power		Attenuator Factor		Corrected Power			Limit		Test Result
		(MHz)	(dBm)	(dB)		(dBm)		(dBm)			
		0	2.402	6.41	0	6.41		30			Pass
		39	2.441	6.21	0	6.21		30			Pass
		78	2.48	6.46	0	6.46		30			Pass
 											
Channel 0						Channel 39					
											
Channel 78											

The requirements were satisfied.

5.0 Power Spectral Density

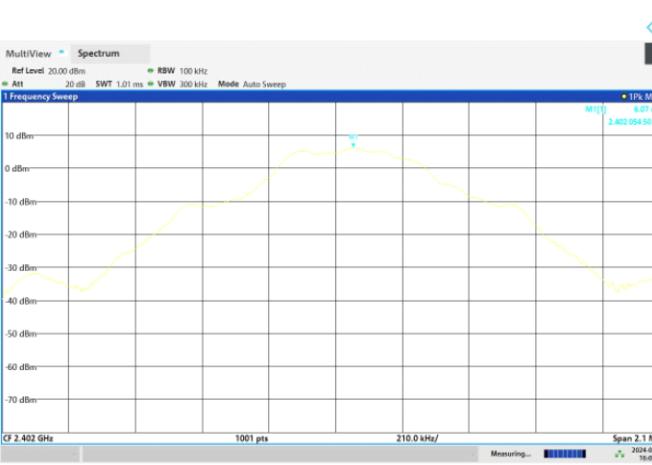
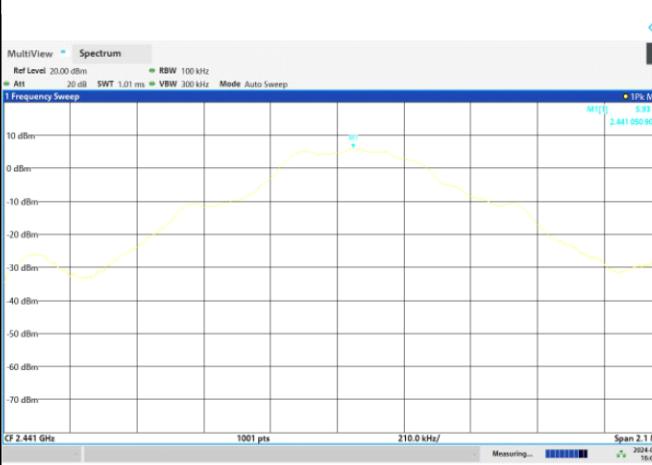
5.1 Test Procedure

The EUT was connected directly to the spectrum analyzer with an attenuator for the measurements. Low, mid, and high channel were measured. ANSI C63.10-2013, section 11.10.2, procedure is used for the measurements.

5.2 Test Criteria

47 CFR (USA) // IC (Canada)	
Section Reference	Power Spectral Density, Conducted Limit
15.247(e) // RSS-247 5.2 (b)	8 dBm / 3 kHz Restated as field strength: 103.23 dB μ V/m at 3 m

5.3 Test Results

Power Spectral Density - Conducted Test Data											
Environmental Conditions:			Temperature	22.3	°C	Humidity	32%	RH	Barometric Pressure	30.42	in Hg
EUT Channel Bandwidth:			1.38	MHz							
Measurement Parameters:			RBW	100 kHz	VBW	300 kHz	Span	2.1 MHz	Detector	Peak	
Channel	Frequency	Measured Power		Attenuator Factor		Corrected Power		Limit		Test Result	
		(MHz)	(dBm)	(dB)		(dBm)		(dBm)			
	0	2.402	6.06	0		6.06		8		Pass	
39	2.441	5.93	0			5.93		8		Pass	
78	2.48	6.23	0			6.23		8		Pass	
 											
Channel 0					Channel 39						
											
Channel 78											

The requirements were satisfied.

6.0 Duty Cycle

Measurement is based on intervals not to exceed 100 msec. Maximum transmitter on time is divided by the lesser of 100 msec or the actual measured minimum transmitter interval time. The result is converted to dB and applied as needed to peak measurements of transmitter artifacts to determine average power. This is not a pass/fail measurement. ANSI C63.10-2013, section 11.6, procedure is used for the measurements.

Duty Cycle - Conducted Test Data													
Environmental Conditions: Temperature 22.3 °C			Humidity 32% RH		Barometric Pressure 30.42 in Hg								
Measurement Parameters:		RBW	1 MHz	VBW	3 MHz	Span	0 Hz	Detector	Peak				
Measured On Time (ms)	Max On Time Allowed (ms)	On Time Result	Measured Time Interval (ms)	Duty Cycle Factor (dB) (20 * Log(On time/Interval))				RF Exposure Correction Factor (dB)					
0.37229	400	Pass	1.25646	-10.57				-5.28					
													
Transmit Event Time					Time Interval (Return to channel time)								
09:18:24 PM 04/30/2024					09:18:53 PM 04/30/2024								

7.0 Band Edge

7.1 Test Procedure

The radio was connected directly to the spectrum analyzer with an attenuator for the measurements. EUT is placed into normal transmit operation on the nearest band edge channel. The spectrum analyzer is approximately centered on the band edge frequency with span sufficient to include the peak of the adjacent fundamental signal. Measurement includes at least two standard bandwidths from the respective band edge. If required, the band-edge marker-delta method is utilized. ANSI C63.10-2013, section 11.13.2, procedure is used for the measurements.

7.2 Test Criteria

47 CFR (USA) // IC (Canada)	
Section Reference	Unwanted Emissions
15.247 (d), 15.205 (a) // RSS-247 5.5, RSS-Gen 6.13	Emissions Adjacent to Authorized Band

7.3 Test Results

Measurements included fundamental with 2 standard bandwidths (standard bandwidth 1 MHz) beyond the band edges to provide a clear view of the fundamental and the declining emission levels. Beyond this point, the general emission limits are applied in the radiated emission tests reported elsewhere in the report.

This is a conducted measurement with limits derived from the general emission field strength limits. The far field path loss equation is utilized to convert the field strength limits to EIRP limits in dBm as follows:

$$\text{Given EIRP} = E_{\text{dB}\mu\text{V/m}} + 20\text{Log}_{10}(d) - 104.8$$

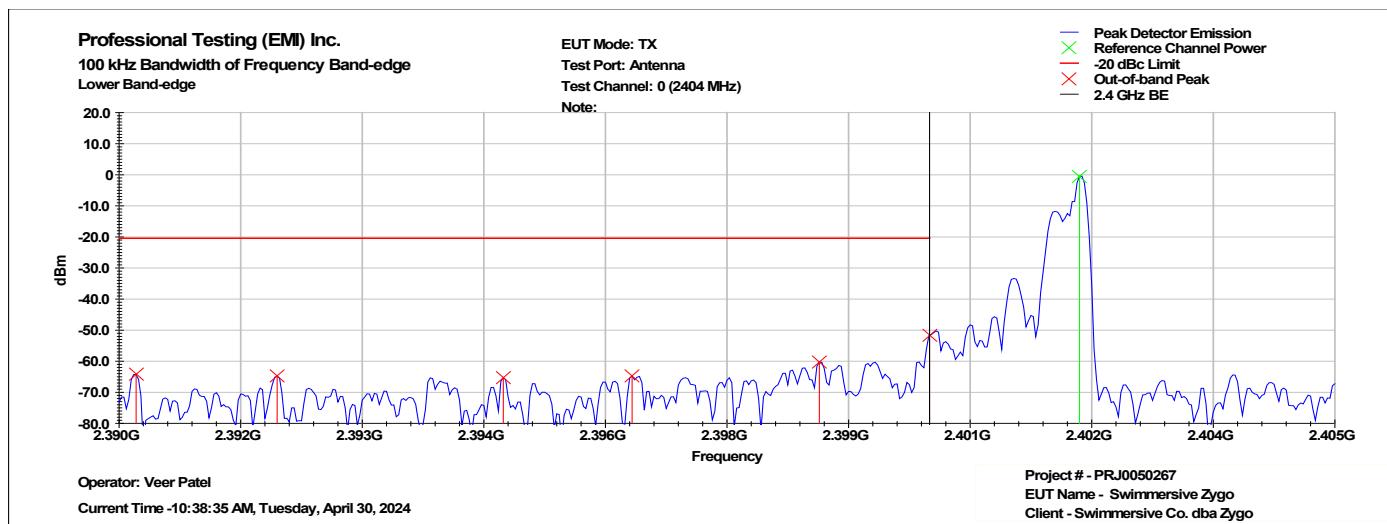
$$\text{EIRP} = 54 \text{ dB}\mu\text{V/m} + 20\text{Log}_{10}(3 \text{ m}) - 104.8 \text{ dB} = -41.25 \text{ dBm} \text{ (commonly -41 dBm is applied)}$$

Emissions below band measured with peak detection in 100 kHz RBW.

Emissions above band measured with peak detection and 1 Hz video average in 1 MHz RBW if the peak emission exceeds the average limit.

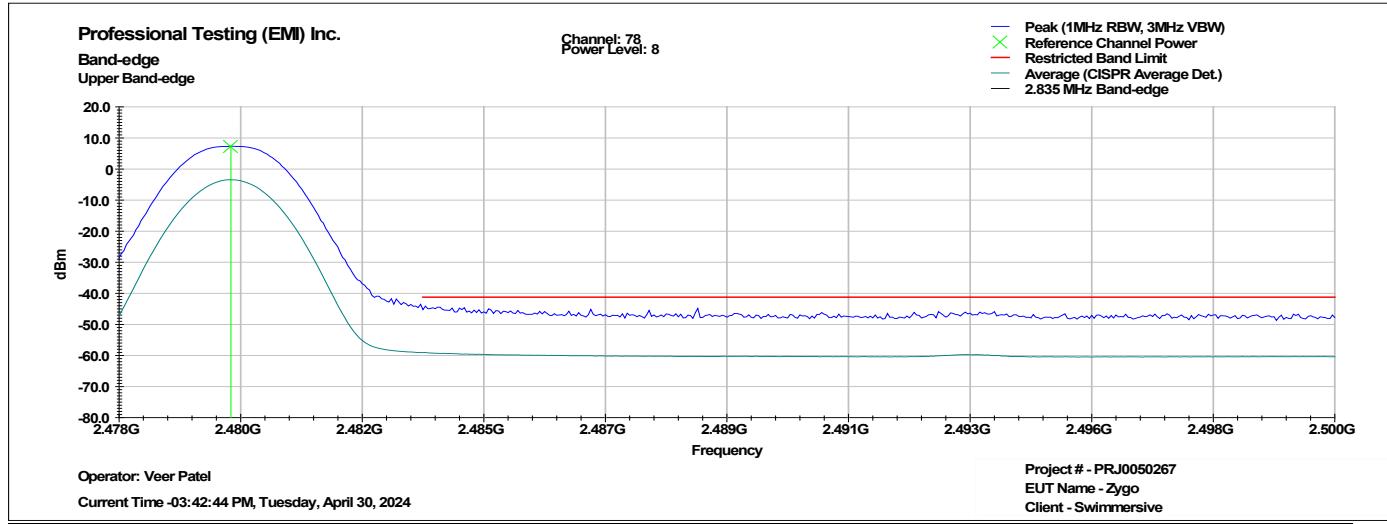
The requirement was satisfied. Test plots and tabular data are presented on the following page.

Lower Band-edge (Conducted)



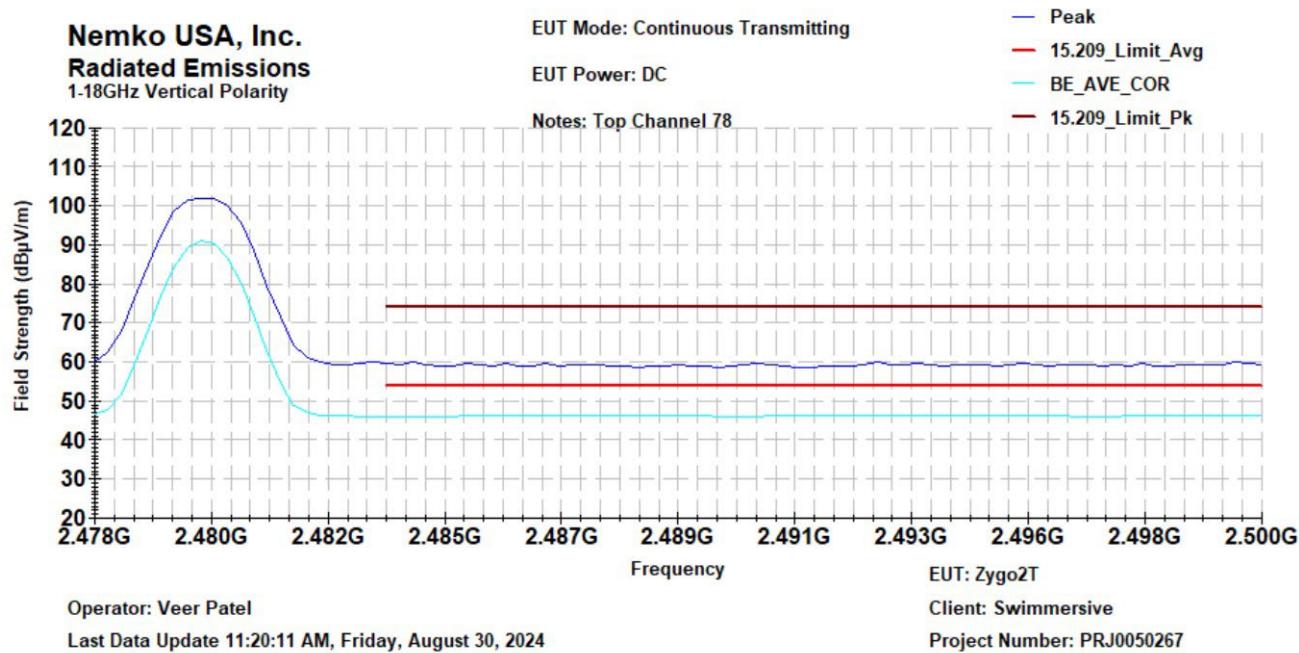
Frequency (MHz)	Corrected Reading (dBm)	Limit -20 dBc (dBm)	Margin (dB)	Results
2390.210	-64.291	-20.452	-43.839	PASS
2391.950	-64.851	-20.452	-44.399	PASS
2394.740	-65.309	-20.452	-44.857	PASS
2396.330	-64.799	-20.452	-44.347	PASS
2398.640	-60.337	-20.452	-39.885	PASS
2400.000	-51.715	-20.452	-31.263	PASS

Upper Band-edge (Conducted)



Frequency (MHz)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)	Results
2483.544	-59.079	-41.250	-17.829	PASS
2484.688	-59.720	-41.250	-18.470	PASS
2485.700	-59.958	-41.250	-18.708	PASS
2486.756	-60.130	-41.250	-18.880	PASS
2487.944	-60.217	-41.250	-18.967	PASS
2493.356	-59.709	-41.250	-18.459	PASS

Upper Band-edge (Radiated)



For radiated band edge measurements, the EUT was adjusted in position to produce the highest emissions level. Both polarizations were evaluated to product the highest signal. 1MHz RBW used for measurements for compliance to 15.209 limits.

8.0 Conducted Antenna Port Spurious Emissions, Transmit Mode

8.1 Test Procedure

The radio was connected directly to the spectrum analyzer with an attenuator for the measurements. Conducted antenna port emissions are measured with the EUT transmitting on Low, Mid, and High channels. ANSI C63.10-2013, section 11.12.2, procedure is used for the measurements.

8.2 Test Criteria

47 CFR (USA) // IC (Canada)	
Section Reference	Unwanted Emissions
15.247 (d), 15.209 (a) // RSS-247 5.5, RSS-Gen 6.13	Antenna Port Conducted Spurious/Harmonic Emissions Transmit Mode

8.3 Test Results

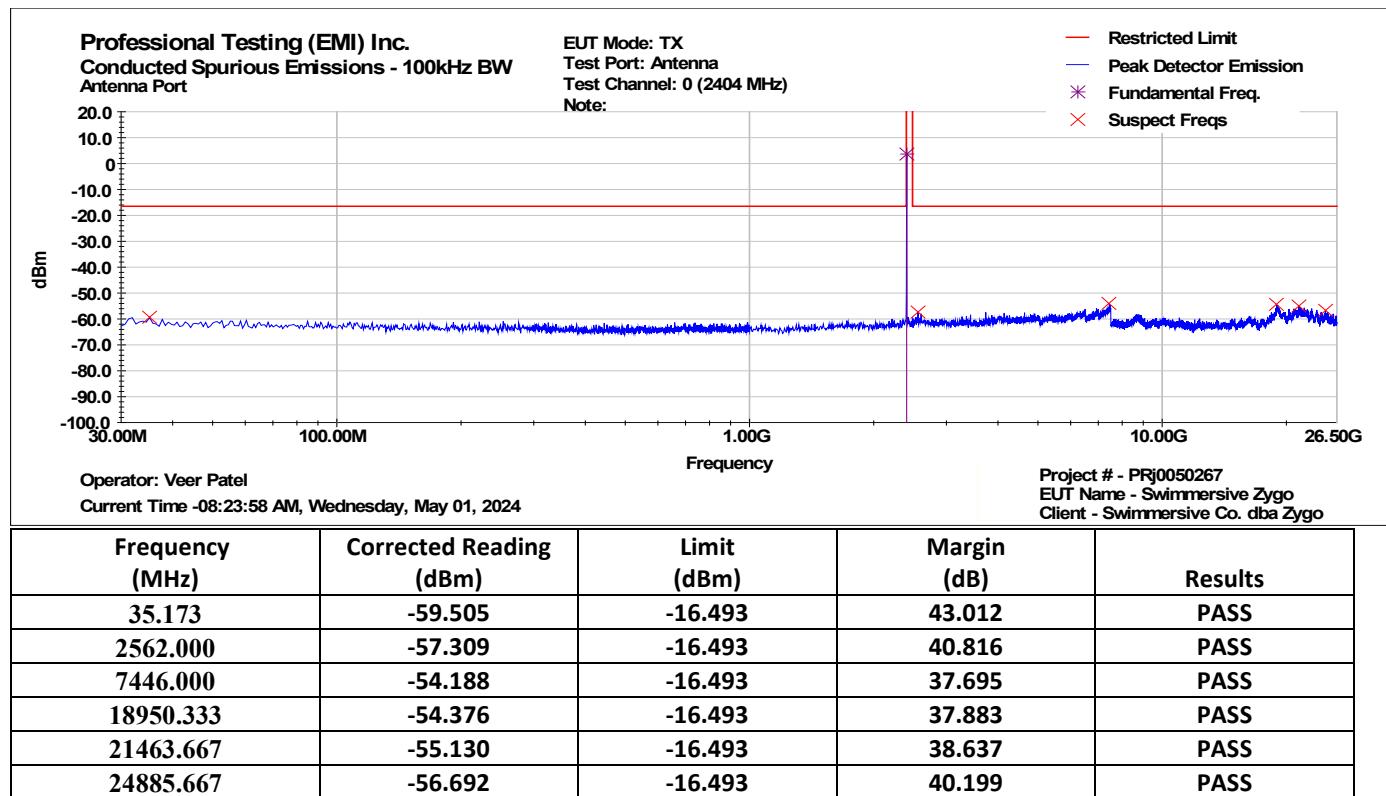
Three channels were tested. EUT was transmitting continuously and modulated.

The top, middle, and bottom channels were tested. Testing was conducted with 100 kHz RBW with 20 dBc Limit, and with 15.209 limits with required resolution/video bandwidths.

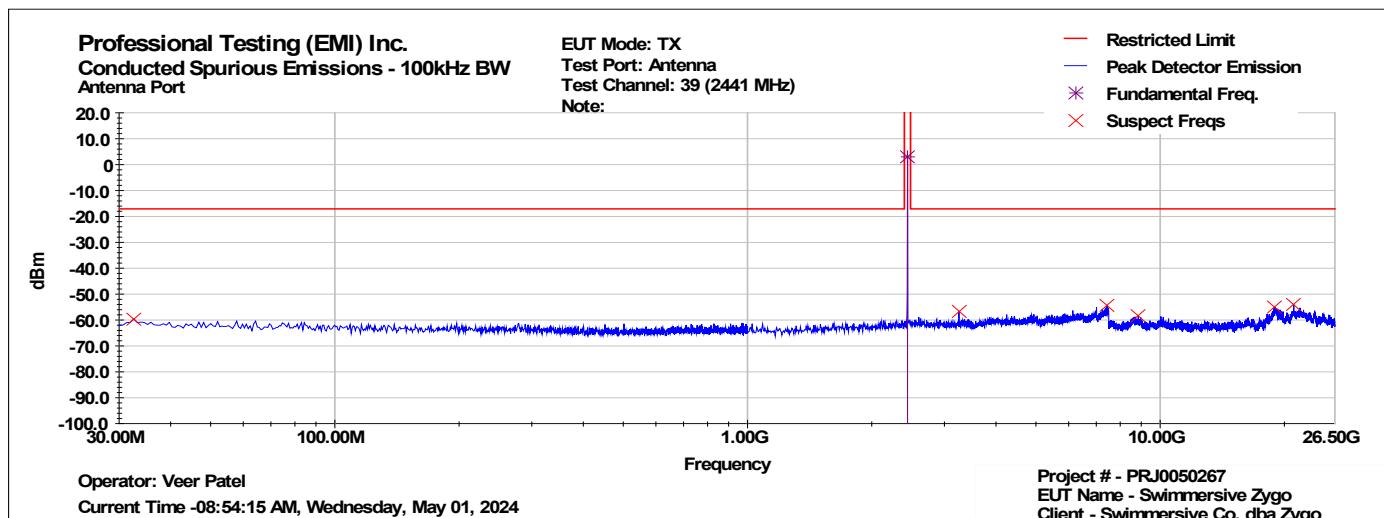
The EUT satisfied the requirements. Test plots and tabular data are presented on the following page.

8.3.1 100 kHz Bandwidth Test data

Bottom Channel: 100 kHz Bandwidth

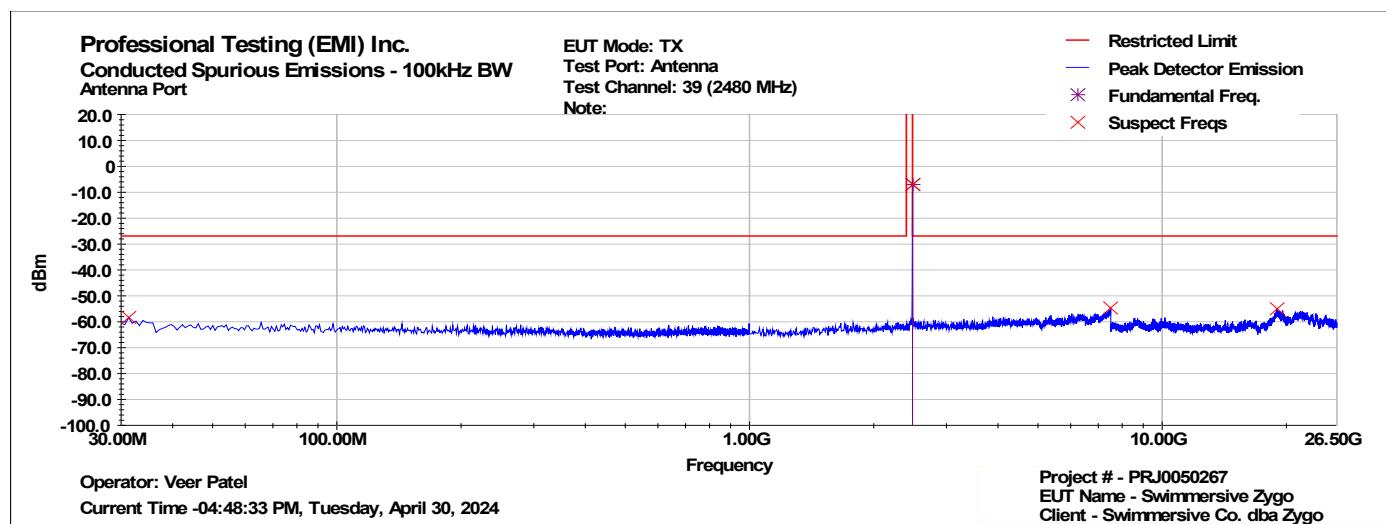


Middle Channel: 100 kHz Bandwidth



Frequency (MHz)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)	Results
32.587	-59.565	-17.103	42.462	PASS
3252.800	-56.816	-17.103	39.713	PASS
7437.200	-54.507	-17.103	37.404	PASS
8849.600	-58.263	-17.103	41.160	PASS
18921.333	-55.152	-17.103	38.049	PASS
21077.000	-54.001	-17.103	36.898	PASS

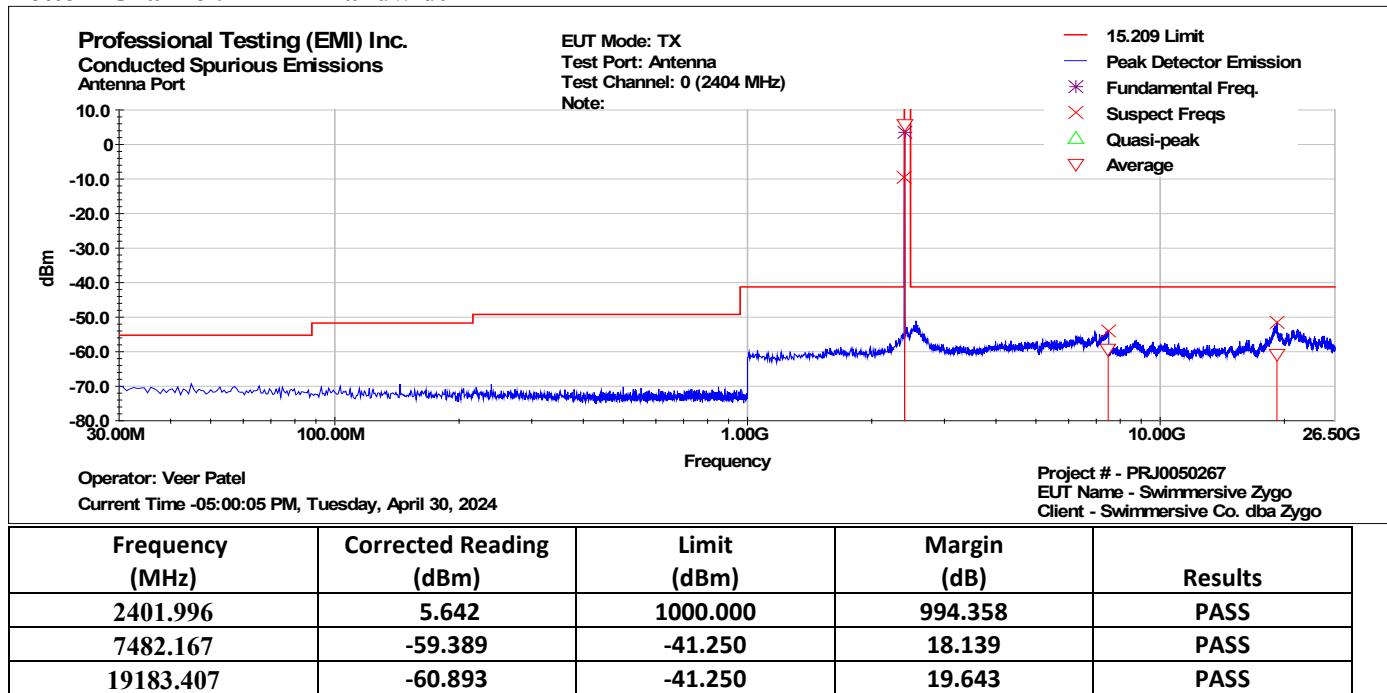
Top Channel: 100 kHz Bandwidth



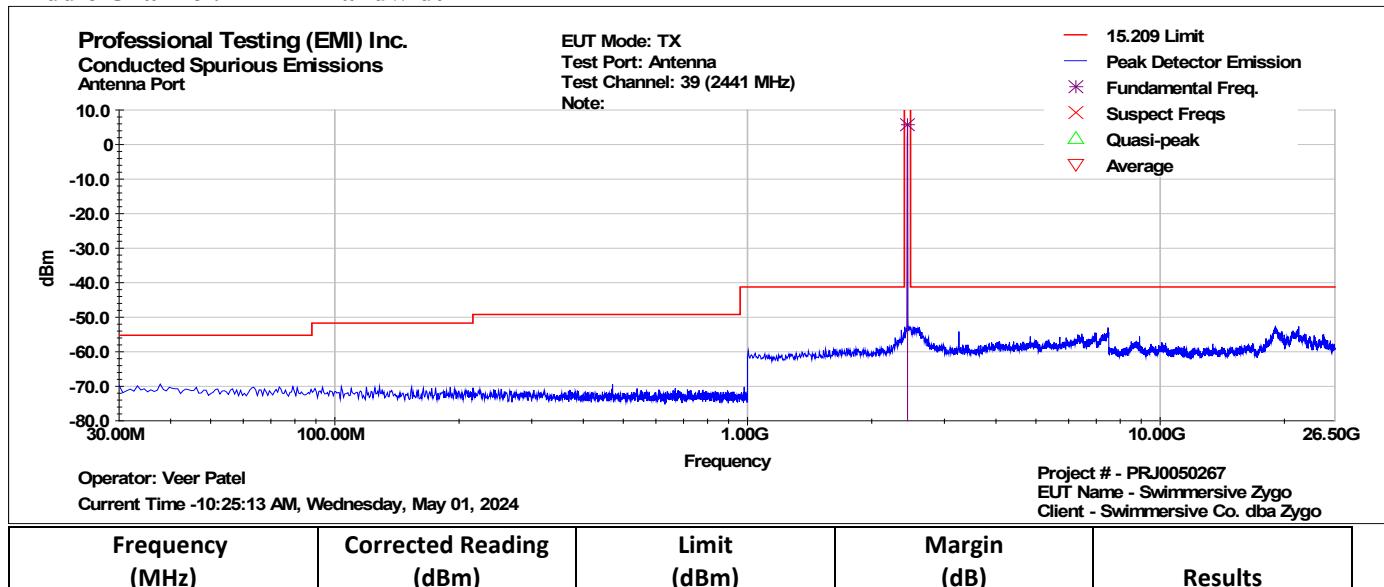
Frequency (MHz)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)	Results
31.293	-58.486	-26.908	31.578	PASS
2482.800	-6.908	993.092	1000.000	PASS
7503.200	-54.826	-26.908	27.918	PASS
18998.667	-55.049	-26.908	28.141	PASS

8.3.2 1 MHz Bandwidth Test data

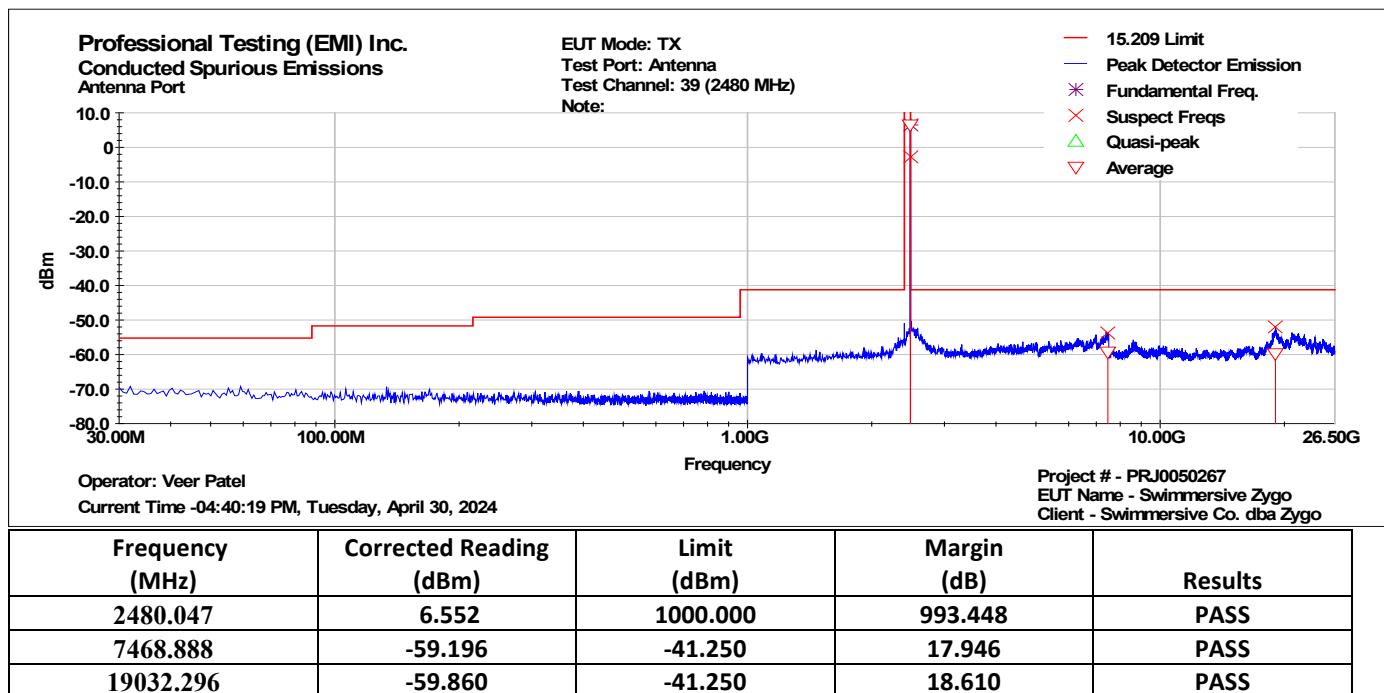
Bottom Channel: 1 MHz Bandwidth



Middle Channel: 1 MHz Bandwidth



Top Channel: 1 MHz Bandwidth



9.0 Transmitter Radiated Spurious Emissions

9.1 Test Procedure

Radiated emissions are measured with the EUT in normal operation transmitting on normal hopping channels. ANSI C63.10-2013, section 6.3, 6.5 and 6.6, procedure is used for the measurements.

Test Distance, Table Height, and Detection Method

30 MHz to 1 GHz	1 GHz to 18 GHz	18 GHz to 26.5 GHz
10 m, 80 cm	3 m, 1.5 m	1 m, 1.5 m
Quasi-peak	Peak & Average	Peak & Average

9.2 Test Criteria

47 CFR (USA) // IC (Canada)	
Section Reference	Parameter
15.247(d), 15.209 (a) // RSS-247 5.5, RSS-Gen 6.13 & 8.10	Field Strength of Radiated Spurious/Harmonic Emissions Transmit Mode

9.3 Test Results

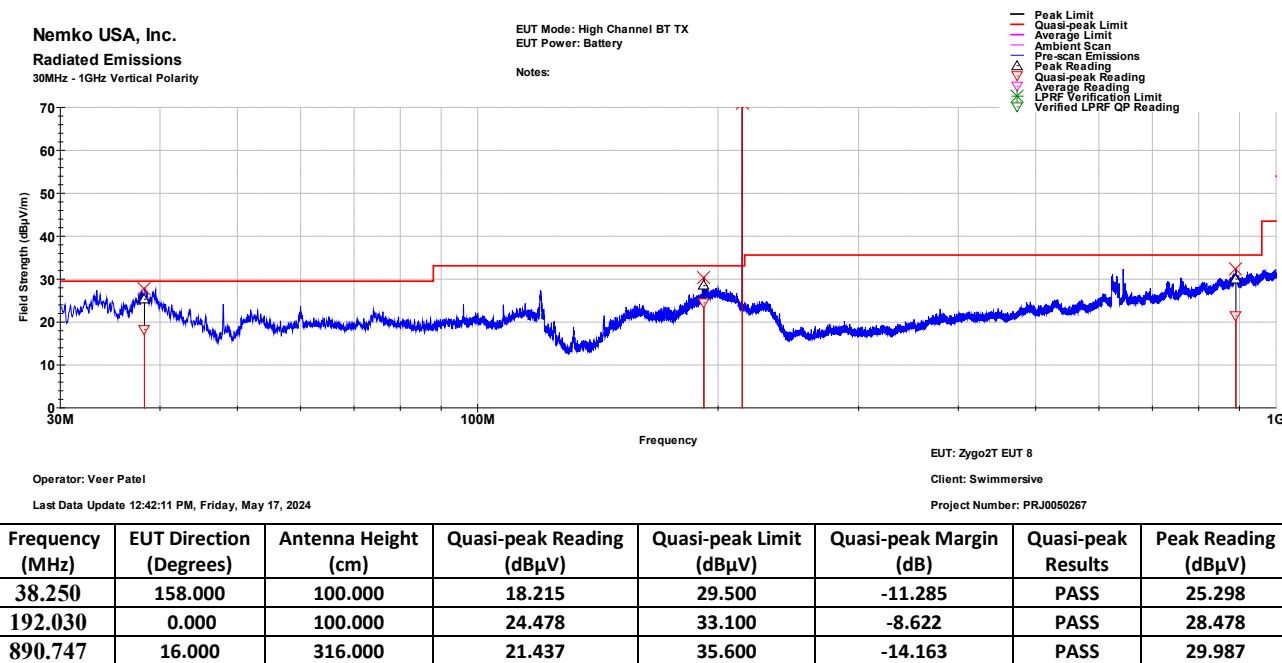
EUT was tested in normal operation and transmitting continuously modulated. Device tested in normal operational orientation. Filters used to remove fundamental during testing.

The EUT satisfied the requirement. Test plots and tabular data are presented on the following page.

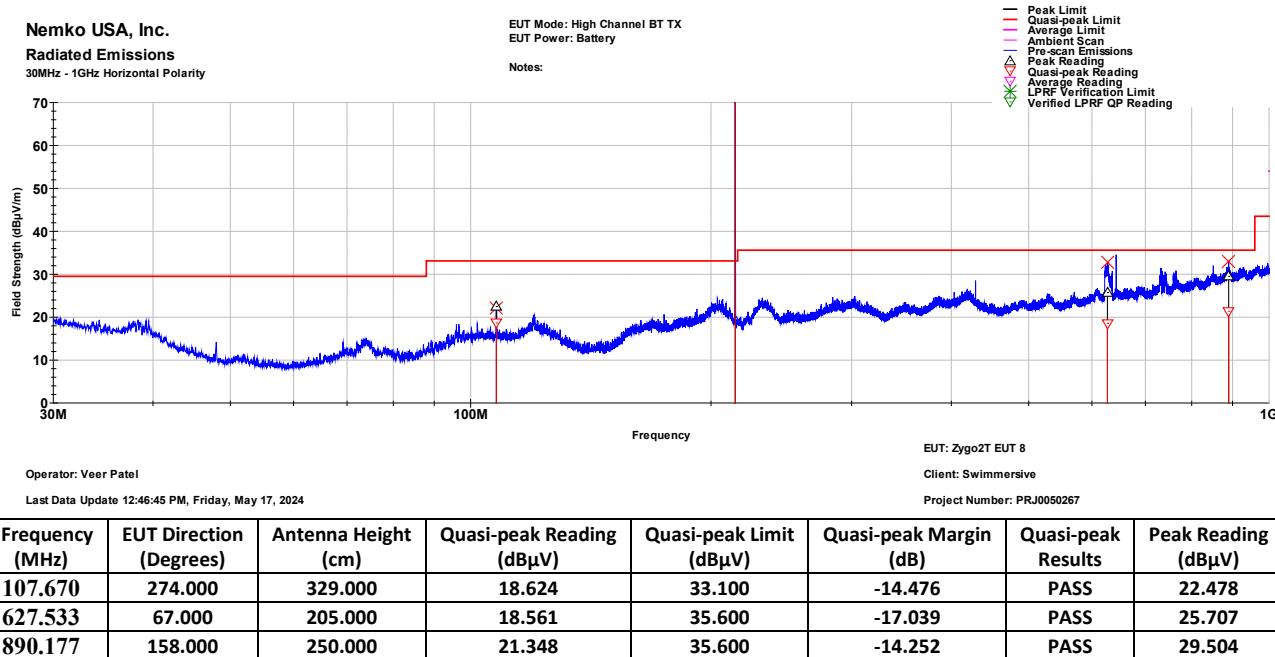
9.3.1 Test Data

High Channel

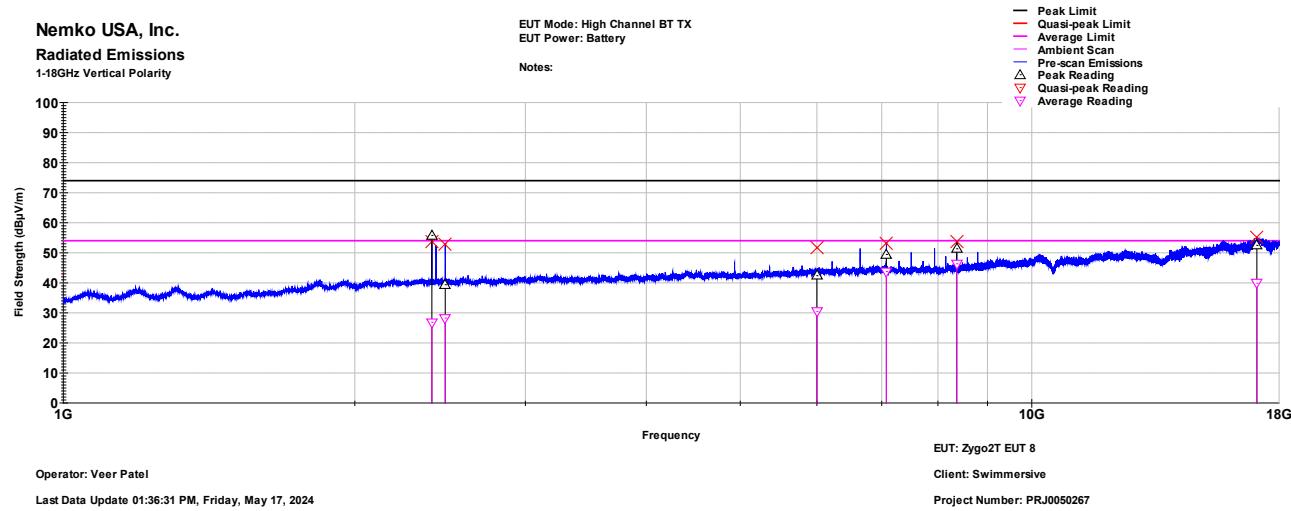
30MHz - 1GHz Vertical Polarity Measured Emissions Data



30MHz - 1GHz Horizontal Polarity Measured Emissions Data

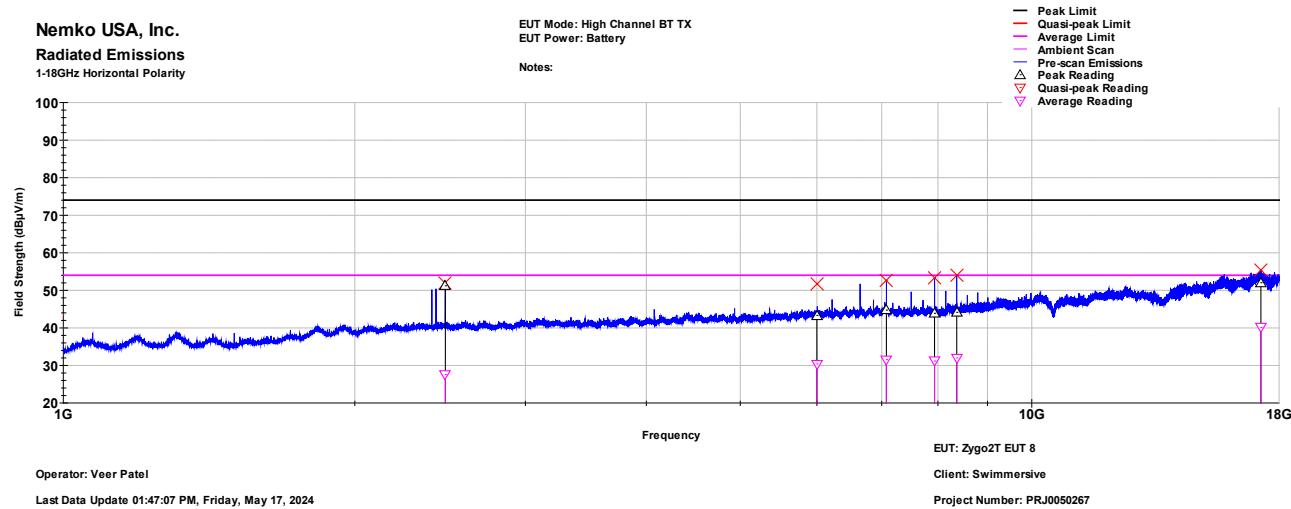


1GHz - 18GHz Vertical Polarity Measured Emissions Data:



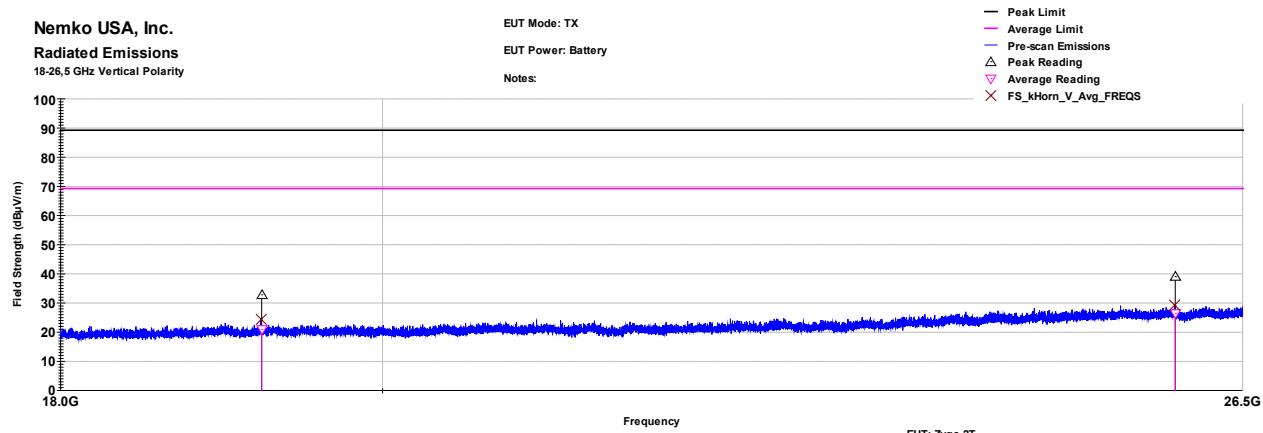
Frequency (MHz)	EUT Direction (Degrees)	Antenna Height (cm)	Peak Reading (dB μ V)	Peak Limit (dB μ V)	Peak Margin (dB)	Peak Results	Average Reading (dB μ V)	Average Limit (dB μ V)	Average Margin (dB)	Average Results
2402.00	90	188	55.758	74.000	-18.242	PASS	26.831	54.000	-27.169	PASS
2479.75	59	163	39.341	74.000	-34.659	PASS	28.231	54.000	-25.769	PASS
6000.00	301	314	42.347	74.000	-31.653	PASS	30.400	54.000	-23.600	PASS
7078.50	251	100	49.422	74.000	-24.578	PASS	43.726	54.000	-10.274	PASS
8365.50	211	274	51.313	74.000	-22.687	PASS	46.307	54.000	-7.693	PASS
17075.75	229	151	52.456	74.000	-21.544	PASS	39.860	54.000	-14.140	PASS

1GHz - 18GHz Horizontal Polarity Measured Emissions Data



Frequency (MHz)	EUT Direction (Degrees)	Antenna Height (cm)	Peak Reading (dB μ V)	Peak Limit (dB μ V)	Peak Margin (dB)	Peak Results	Average Reading (dB μ V)	Average Limit (dB μ V)	Average Margin (dB)	Average Results
2480.25	47	311	51.213	74.000	-22.787	PASS	27.577	54.000	-26.423	PASS
6000.00	48	361	43.305	74.000	-30.695	PASS	30.405	54.000	-23.595	PASS
7078.42	140	163	44.713	74.000	-29.287	PASS	31.525	54.000	-22.475	PASS
7936.50	291	324	43.868	74.000	-30.132	PASS	31.172	54.000	-22.828	PASS
8365.50	168	249	44.117	74.000	-29.883	PASS	31.994	54.000	-22.006	PASS
17239.00	251	374	52.030	74.000	-21.970	PASS	40.106	54.000	-13.894	PASS

18GHz – 26.5GHz Vertical Polarity Measured Emissions Data



Operator: Veer Patel

Last Data Update 02:49:31 PM, Wednesday, May 22, 2024

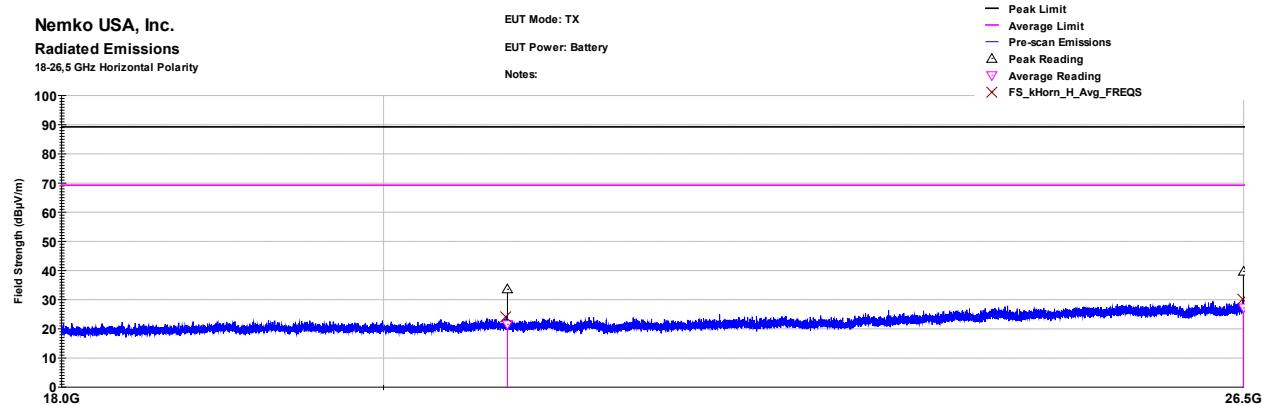
EUT: Zygote 2T

Client: Swimmersive

Project Number: PRJ0050267

Frequency (MHz)	EUT Direction (Degrees)	Antenna Height (cm)	Peak Reading (dB μ V)	Peak Limit (dB μ V)	Peak Margin (dB)	Peak Results	Average Reading (dB μ V)	Average Limit (dB μ V)	Average Margin (dB)	Average Results
19224.39	290	100.000	32.795	89.230	-56.435	PASS	20.854	69.230	-48.376	PASS
25922.56	315	100.000	38.998	89.230	-50.232	PASS	26.412	69.230	-42.818	PASS

18GHz - 26.5GHz Horizontal Polarity Measured Emissions Data



Operator: Veer Patel

Last Data Update 02:47:31 PM, Wednesday, May 22, 2024

EUT: Zygote 2T

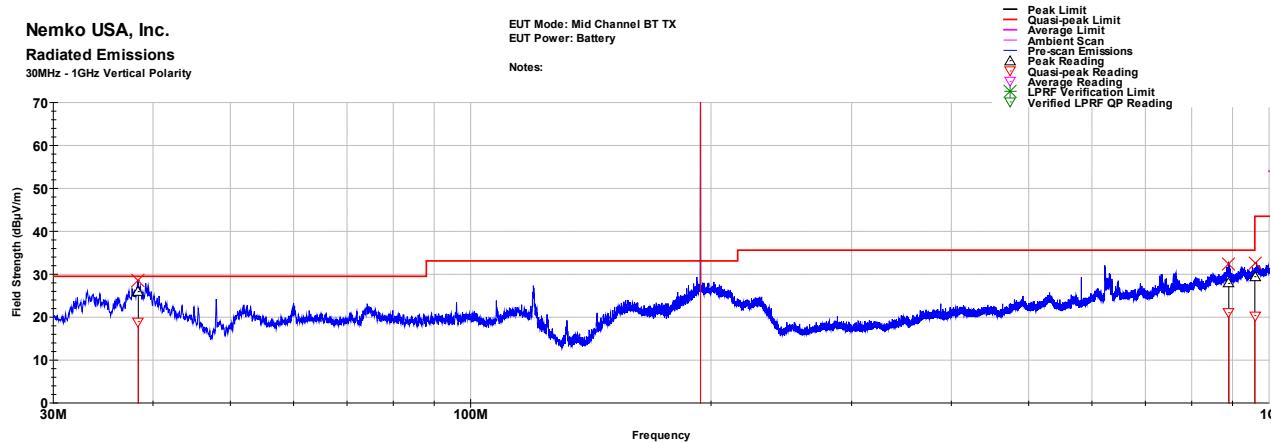
Client: Swimmersive

Project Number: PRJ0050267

Frequency (MHz)	EUT Direction (Degrees)	Antenna Height (cm)	Peak Reading (dB μ V)	Peak Limit (dB μ V)	Peak Margin (dB)	Peak Results	Average Reading (dB μ V)	Average Limit (dB μ V)	Average Margin (dB)	Average Results
20827.73	50	100.000	33.539	89.230	-55.691	PASS	21.570	69.230	-47.660	PASS
26498.33	290	100.000	39.703	89.230	-49.527	PASS	27.144	69.230	-42.086	PASS

Mid Channel

30MHz - 1GHz Vertical Polarity Measured Emissions Data



Operator: Veer Patel

Last Data Update 12:12:37 PM, Friday, May 17, 2024

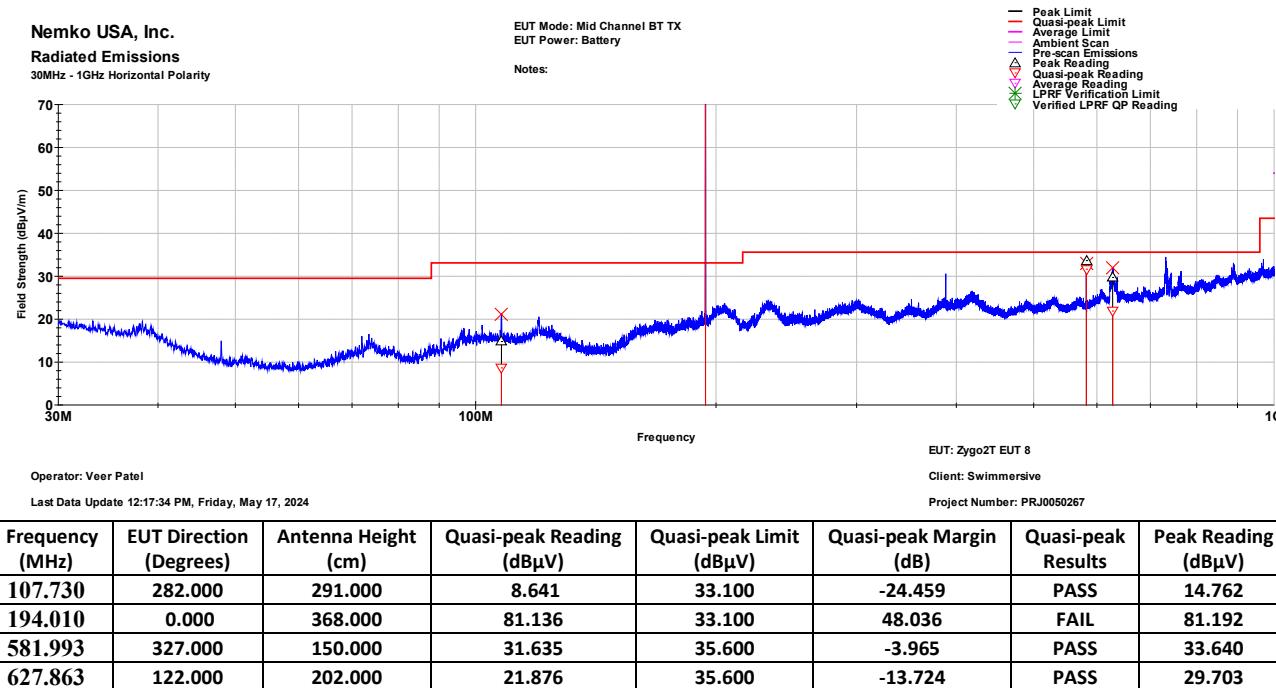
EUT: Zygote2T EUT 8

Client: Swimmersive

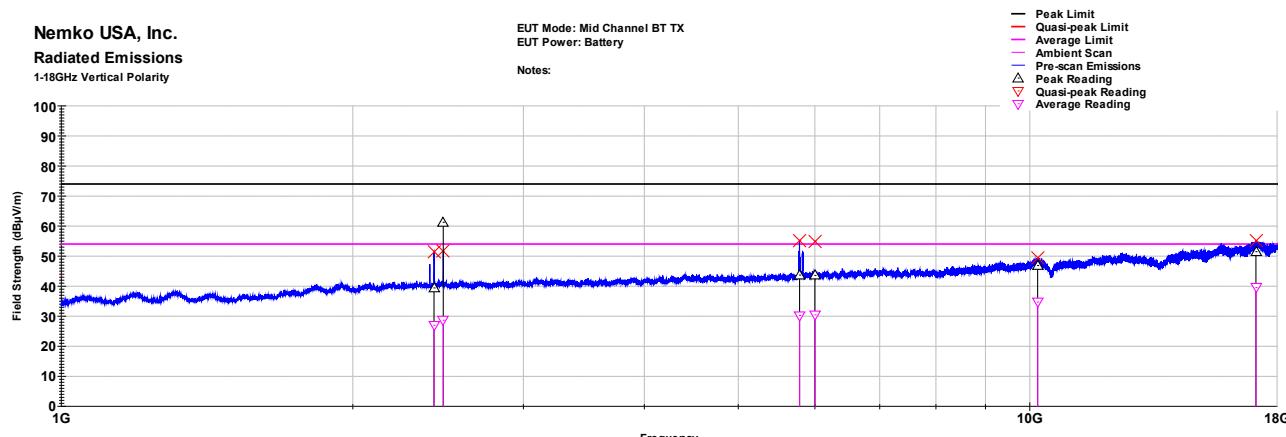
Project Number: PRJ0050267

Frequency (MHz)	EUT Direction (Degrees)	Antenna Height (cm)	Quasi-peak Reading (dB μ V)	Quasi-peak Limit (dB μ V)	Quasi-peak Margin (dB)	Quasi-peak Results	Peak Reading (dB μ V)
38.340	158.000	100.000	18.945	29.500	-10.555	PASS	25.926
194.010	0.000	100.000	73.262	33.100	40.162	FAIL	73.358
890.567	248.000	382.000	21.041	35.600	-14.559	PASS	27.847
960.000	78.000	231.000	20.362	35.600	-15.238	PASS	29.440

30MHz - 1GHz Horizontal Polarity Measured Emissions Data



1GHz - 18GHz Vertical Polarity Measured Emissions Data:



Operator: Veer Patel

Last Data Update 02:27:29 PM, Friday, May 17, 2024

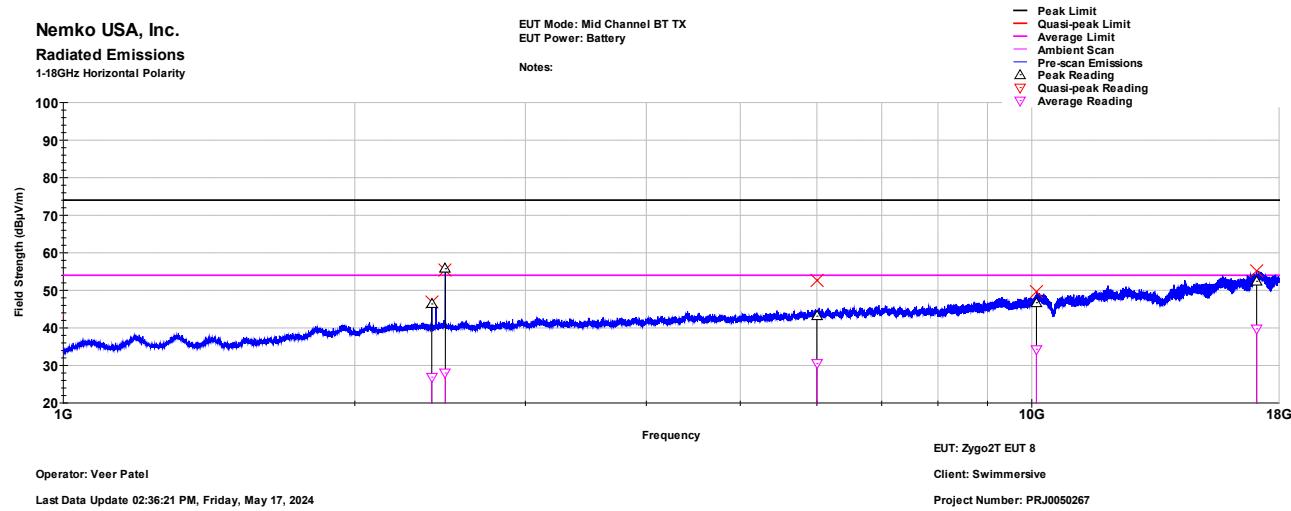
EUT: Zygote2T EUT 8

Client: Swimmersive

Project Number: PRJ0050267

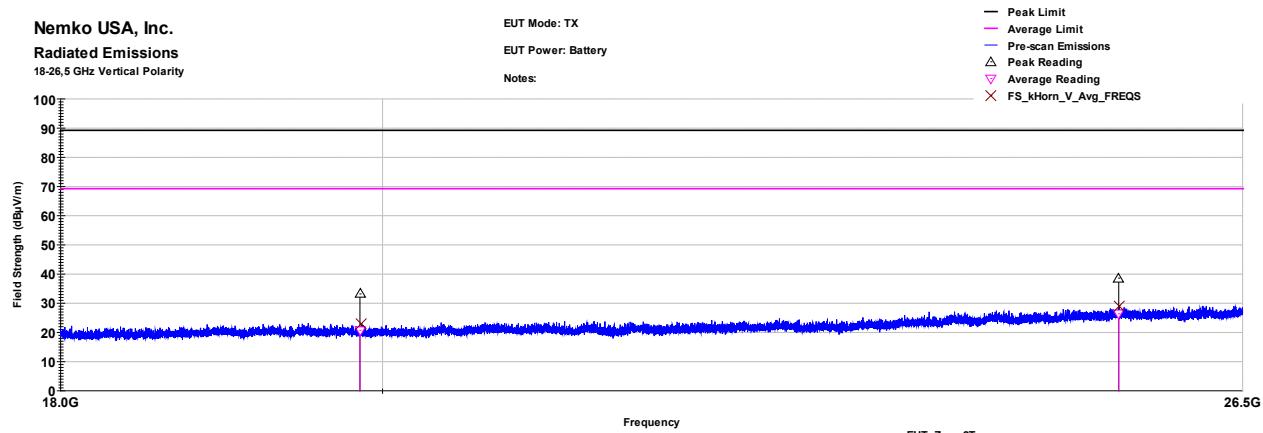
Frequency (MHz)	EUT Direction (Degrees)	Antenna Height (cm)	Peak Reading (dB μ V)	Peak Limit (dB μ V)	Peak Margin (dB)	Peak Results	Average Reading (dB μ V)	Average Limit (dB μ V)	Average Margin (dB)	Average Results
2425.75	150	225	39.388	74.000	-34.612	PASS	26.975	54.000	-27.025	PASS
2479.75	60	163	61.249	74.000	-12.751	PASS	28.617	54.000	-25.383	PASS
5784.75	241	151	43.657	74.000	-30.343	PASS	30.237	54.000	-23.763	PASS
6000.00	189	286	43.572	74.000	-30.428	PASS	30.433	54.000	-23.567	PASS
10187.50	88	274	46.855	74.000	-27.145	PASS	34.688	54.000	-19.312	PASS
17118.75	191	361	51.448	74.000	-22.552	PASS	39.534	54.000	-14.466	PASS

1GHz - 18GHz Horizontal Polarity Measured Emissions Data



Frequency (MHz)	EUT Direction (Degrees)	Antenna Height (cm)	Peak Reading (dB μ V)	Peak Limit (dB μ V)	Peak Margin (dB)	Peak Results	Average Reading (dB μ V)	Average Limit (dB μ V)	Average Margin (dB)	Average Results
2401.75	0	361	46.360	74.000	-27.640	PASS	26.850	54.000	-27.150	PASS
2480.25	48	249	55.723	74.000	-18.277	PASS	27.953	54.000	-26.047	PASS
6000.00	130	237	43.092	74.000	-30.908	PASS	30.473	54.000	-23.527	PASS
10112.67	110	175	46.703	74.000	-27.297	PASS	34.303	54.000	-19.697	PASS
17068.08	359	324	52.379	74.000	-21.621	PASS	39.745	54.000	-14.255	PASS

18GHz – 26.5GHz Vertical Polarity Measured Emissions Data



Operator: Veer Patel

Last Data Update 03:16:11 PM, Wednesday, May 22, 2024

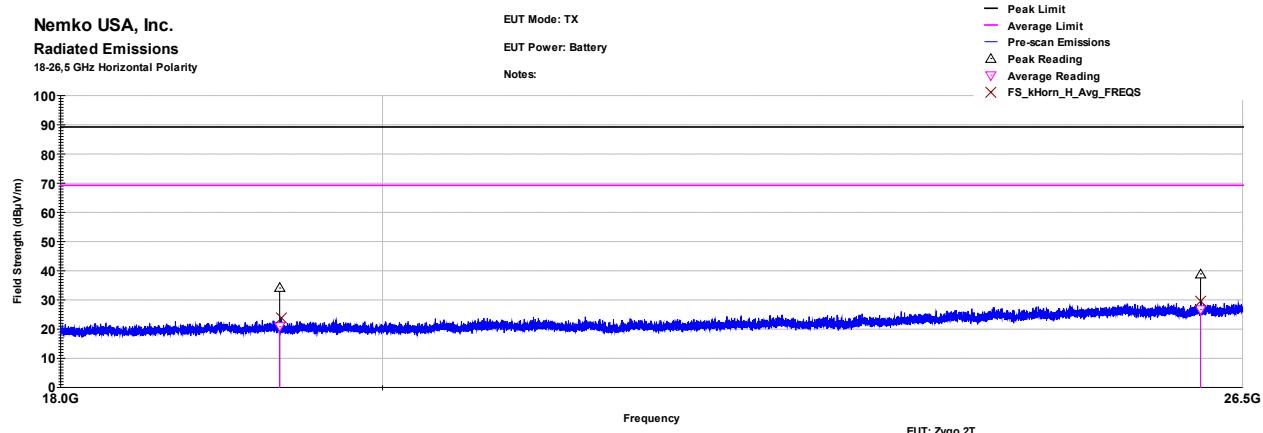
EUT: Zygote 2T

Client: Swimmersive

Project Number: PRJ0050267

Frequency (MHz)	EUT Direction (Degrees)	Antenna Height (cm)	Peak Reading (dB μ V)	Peak Limit (dB μ V)	Peak Margin (dB)	Peak Results	Average Reading (dB μ V)	Average Limit (dB μ V)	Average Margin (dB)	Average Results
19852.88	359	100.000	33.146	89.230	-56.084	PASS	20.723	69.230	-48.507	PASS
25447.92	45	100.000	38.560	89.230	-50.670	PASS	26.386	69.230	-42.844	PASS

18GHz - 26.5GHz Horizontal Polarity Measured Emissions Data



Operator: Veer Patel

Last Data Update 03:11:10 PM, Wednesday, May 22, 2024

EUT: Zyg0 2T

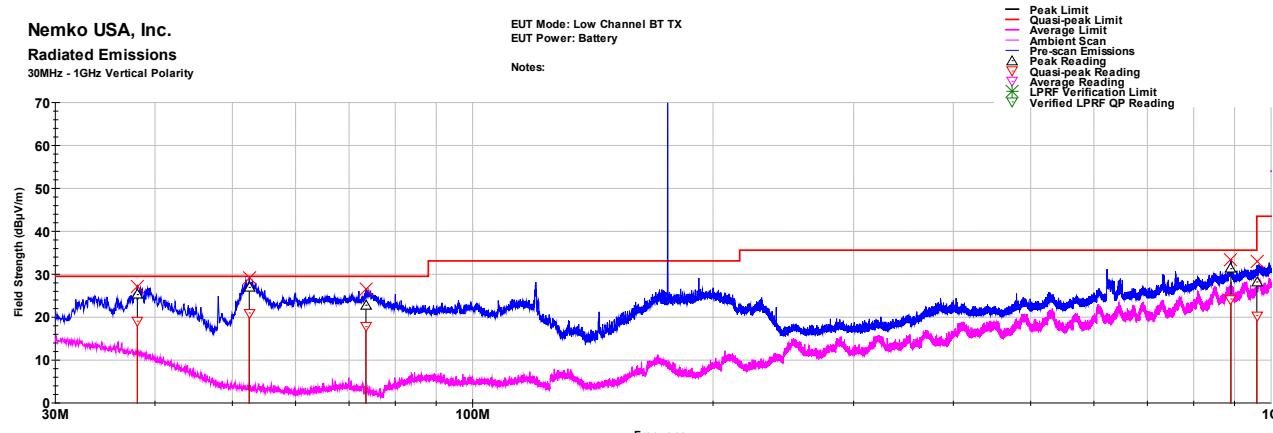
Client: Swimmersive

Project Number: PRJ0050267

Frequency (MHz)	EUT Direction (Degrees)	Antenna Height (cm)	Peak Reading (dB μ V)	Peak Limit (dB μ V)	Peak Margin (dB)	Peak Results	Average Reading (dB μ V)	Average Limit (dB μ V)	Average Margin (dB)	Average Results
19338.08	215	100.000	34.058	89.230	-55.172	PASS	20.826	69.230	-48.404	PASS
26138.07	260	100.000	38.902	89.230	-50.328	PASS	26.657	69.230	-42.573	PASS

Low Channel

30MHz - 1GHz Vertical Polarity Measured Emissions Data



Operator: Veer Patel

Last Data Update 11:39:03 AM, Friday, May 17, 2024

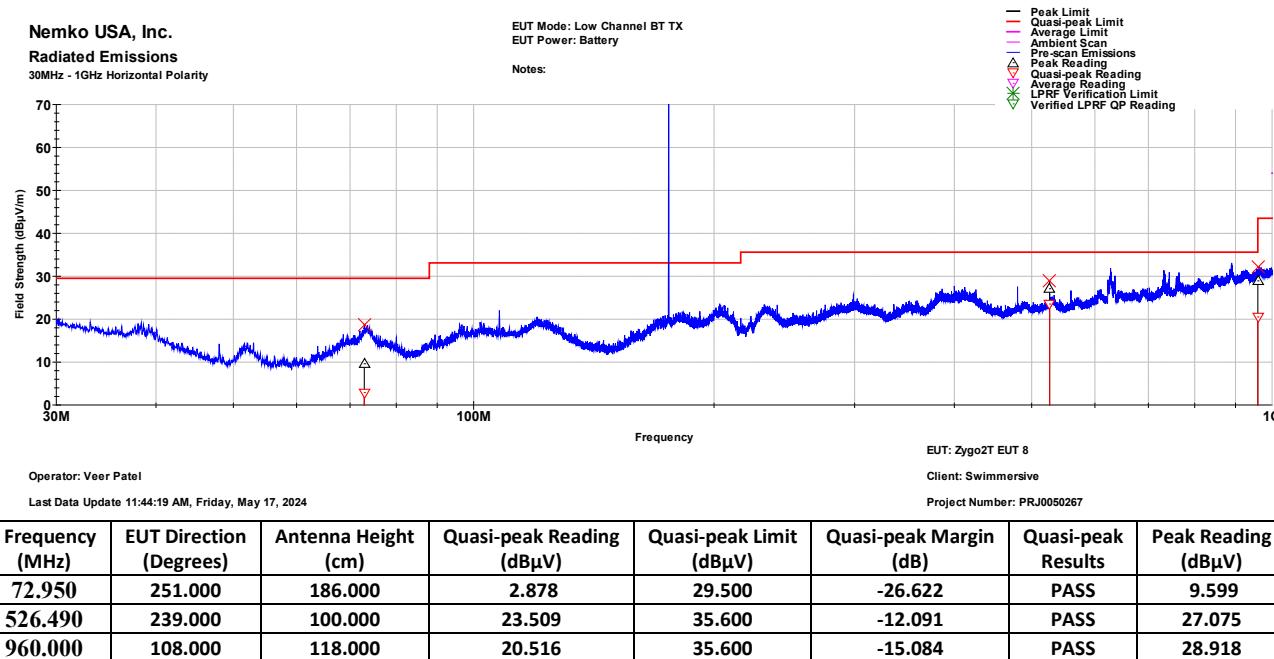
EUT: Zygote2T EUT 8

Client: Swimmersive

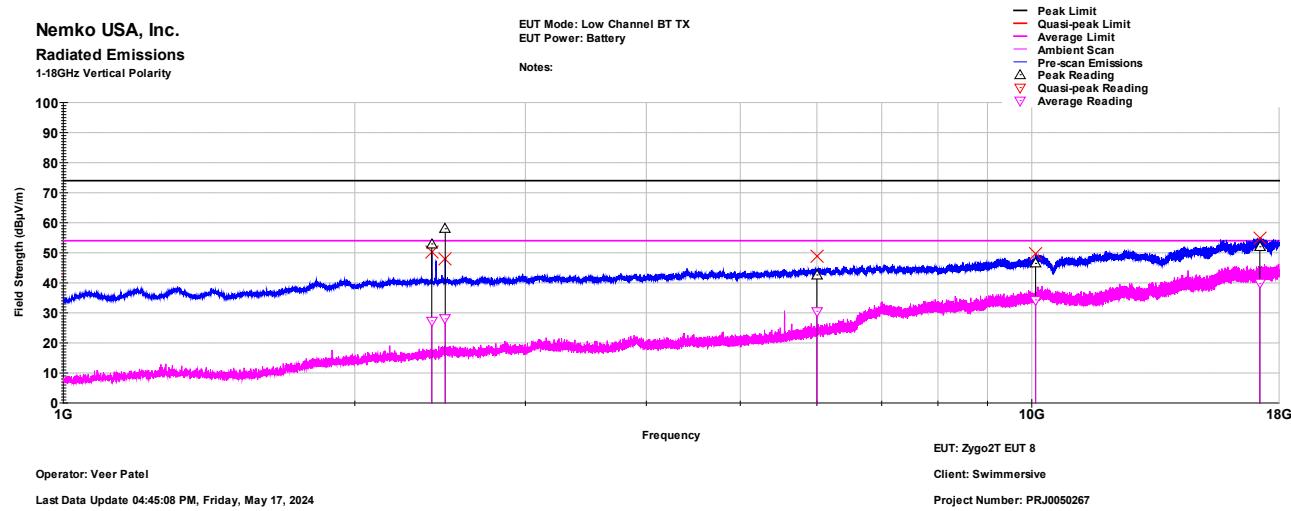
Project Number: PRJ0050267

Frequency (MHz)	EUT Direction (Degrees)	Antenna Height (cm)	Quasi-peak Reading (dB μ V)	Quasi-peak Limit (dB μ V)	Quasi-peak Margin (dB)	Quasi-peak Results	Peak Reading (dB μ V)
38.010	167.000	100.000	19.061	29.500	-10.439	PASS	25.236
52.500	309.000	118.000	20.966	29.500	-8.534	PASS	26.933
73.500	41.000	400.000	17.809	29.500	-11.691	PASS	22.766
890.687	292.000	250.000	24.201	35.600	-11.399	PASS	31.283
960.000	108.000	100.000	20.364	35.600	-15.236	PASS	28.179

30MHz - 1GHz Horizontal Polarity Measured Emissions Data

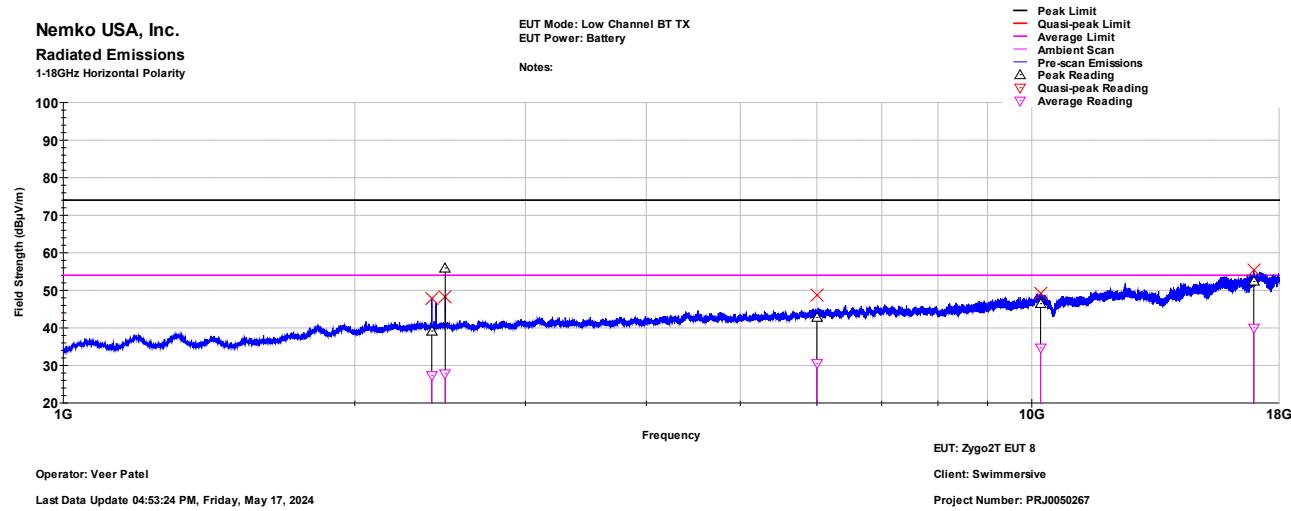


1GHz - 18GHz Vertical Polarity Measured Emissions Data:



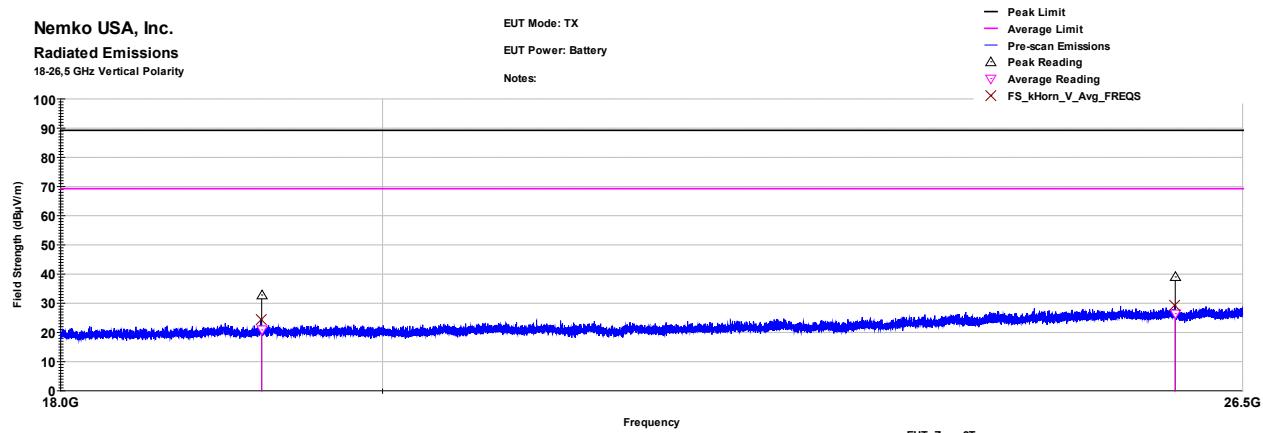
Frequency (MHz)	EUT Direction (Degrees)	Antenna Height (cm)	Peak Reading (dB μ V)	Peak Limit (dB μ V)	Peak Margin (dB)	Peak Results	Average Reading (dB μ V)	Average Limit (dB μ V)	Average Margin (dB)	Average Results
2401.75	302	151	52.953	74.000	-21.047	PASS	27.311	54.000	-26.689	PASS
2479.75	68	349	57.960	74.000	-16.040	PASS	28.012	54.000	-25.988	PASS
6000.00	11	114	42.614	74.000	-31.386	PASS	30.525	54.000	-23.475	PASS
10090.92	281	237	46.435	74.000	-27.565	PASS	34.287	54.000	-19.713	PASS
17197.50	0	249	51.966	74.000	-22.034	PASS	39.772	54.000	-14.228	PASS

1GHz - 18GHz Horizontal Polarity Measured Emissions Data



Frequency (MHz)	EUT Direction (Degrees)	Antenna Height (cm)	Peak Reading (dB μ V)	Peak Limit (dB μ V)	Peak Margin (dB)	Peak Results	Average Reading (dB μ V)	Average Limit (dB μ V)	Average Margin (dB)	Average Results
2401.75	281	200	39.152	74.000	-34.848	PASS	27.308	54.000	-26.692	PASS
2479.75	69	299	55.921	74.000	-18.079	PASS	27.873	54.000	-26.127	PASS
6000.00	332	153	42.764	74.000	-31.236	PASS	30.496	54.000	-23.504	PASS
10211.75	348	274	46.438	74.000	-27.562	PASS	34.672	54.000	-19.328	PASS
16949.75	78	386	52.329	74.000	-21.671	PASS	40.023	54.000	-13.977	PASS

18GHz – 26.5GHz Vertical Polarity Measured Emissions Data



Operator: Veer Patel

Last Data Update 02:49:31 PM, Wednesday, May 22, 2024

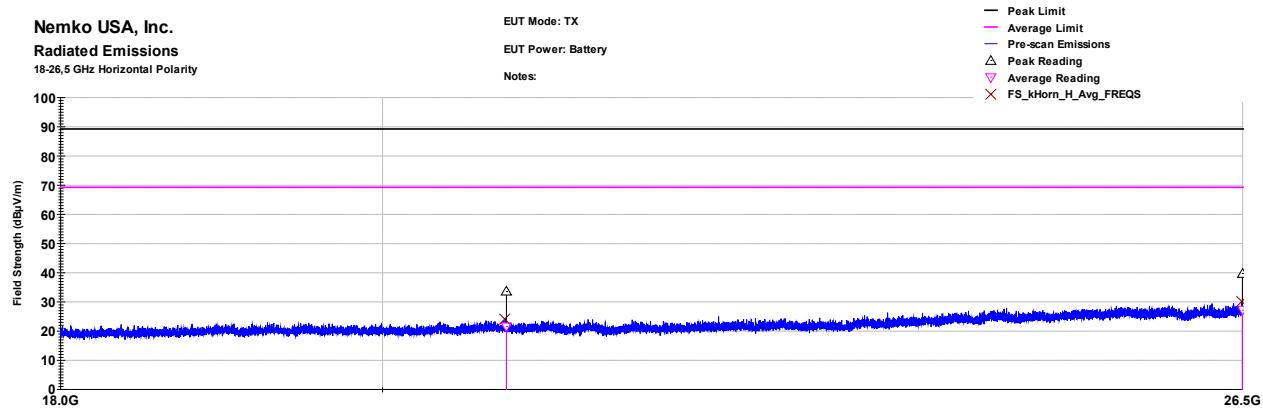
EUT: Zygote 2T

Client: Swimmersive

Project Number: PRJ0050267

Frequency (MHz)	EUT Direction (Degrees)	Antenna Height (cm)	Peak Reading (dBµV)	Peak Limit (dBµV)	Peak Margin (dB)	Peak Results	Average Reading (dBµV)	Average Limit (dBµV)	Average Margin (dB)	Average Results
19224.39	290	100.000	32.795	89.230	-56.435	PASS	20.854	69.230	-48.376	PASS
25922.56	315	100.000	38.998	89.230	-50.232	PASS	26.412	69.230	-42.818	PASS

18GHz - 26.5GHz Horizontal Polarity Measured Emissions Data



Operator: Veer Patel

Last Data Update 02:47:31 PM, Wednesday, May 22, 2024

EUT: Zyg0 2T

Client: Swimmersive

Project Number: PRJ0050267

Frequency (MHz)	EUT Direction (Degrees)	Antenna Height (cm)	Peak Reading (dB μ V)	Peak Limit (dB μ V)	Peak Margin (dB)	Peak Results	Average Reading (dB μ V)	Average Limit (dB μ V)	Average Margin (dB)	Average Results
20827.73	50	100.000	33.539	89.230	-55.691	PASS	21.570	69.230	-47.660	PASS
26498.33	290	100.000	39.703	89.230	-49.527	PASS	27.144	69.230	-42.086	PASS

10.0 Measurement Bandwidths

Radiated Emissions Spectrum Analyzer Bandwidth and Measurement Time - Peak Scan				
Frequency Band Start (MHz)	Frequency Band Stop (MHz)	6 dB Bandwidth (kHz)	Number of Ranges Used	Measurement Time per Range
0.009	0.15	0.3	2	Multiple Sweeps
0.15	30	9	6	Multiple Sweeps
30	1000	120	2	Multiple 800 mS Sweeps
1000	6000	1000	2	Multiple Sweeps
6000	18000	1000	2	Multiple Sweeps
18000	26500	1000	2	Multiple Sweeps

*Notes:

1. The settings above are specifically calculated for the E4440A series of spectrum analyzers, which have 8,000 data points per range.
2. The measurement receiver resolution bandwidth setting was 300 Hz for quasi-peak measurements from 9-150 kHz.
3. The measurement receiver resolution bandwidth setting was 9 kHz for quasi-peak measurements from 0.15-30 MHz.
4. The measurement receiver resolution bandwidth setting was 120 kHz for quasi-peak measurements from 30-1000 MHz.
5. The measurement receiver resolution bandwidth setting was 1 MHz for average measurements from 1-18 GHz.

11.0 Test Equipment

11.1 Conducted Measurements at the Antenna Port

Manufacturer	Model	Equipment Nomenclature	Serial Number	Calibration Due Date
Rohde & Schwarz	FSV3044	Analyzer, Signal, 44GHz	101602	2/9/2025
MCE/Weinschel	34-20-34	Attenuator,20dB 25W, DC-4GHz	BP7921	4/11/2025
MCE/Weinschel	34-20-34	Attenuator,20dB 25W, DC-4GHz	BP7923	4/11/2025

11.1 Conducted Emissions

Manufacturer	Model	Equipment Nomenclature	Serial Number	Calibration Due Date
Rohde & Schwarz	ESU-26	Test Receiver, ESU / EMI Test Receiver 20 Hz - 26.5 GHz	100027	6/5/2024
Coleman Cable	RG-58A/U	Cable, BNC-BNC, 0.914m Black	None	3/12/2026
PTI	100k HPF	Filter, High Pass, 100kHz	none	2/16/2026
PTI	PTI-ALF4	Attenuator Limiter Filter	none	2/28/2025
Rohde & Schwarz	ESH2-Z5	LISN, 9kHz-30MHz, 3Phase 32A	829535/001	4/15/2025
EMCO	3825/2	LISN, 10kHz-100MHz	1235	4/14/2025

11.2 Radiated Emissions

Manufacturer	Model	Equipment Nomenclature	Serial Number	Calibration Due Date
Keysight	E4440A-AYZ	PSA Spectrum Analyzer	MY46186204	7/14/2024
Agilent	11713A	Switch Driver	MY44321972	NCR
ETS-Lindgren	3142C	Antenna, Biconilog, 26 MHz-3GHz	49383	4/17/2025
HP	8447D	Preamp, .1-1300MHz	1937A02800	10/28/2024
Miteq	AFS44-00101800-2S-10P-44	Amplifier, 40dB, 100MHz-18GHz	None	1/26/2025
ETS-Lindgren	3117	Antenna, Double Ridged Guide Horn, 1 - 18 GHz	99232	10/12/2024
evissaP	eP7123R-432	Cable, RF, N-N, 36', DC-18GHz	None	2/15/2026
evissaP	eP7123R-384	Cable, RF, N-N, 32', DC-18GHz	None	2/14/2026
evissaP	eP7031R-22FT	Cable, RF, N-N, 22', DC-18GHz	None	3/1/2026
evissaP	eP7031R-30FT	Cable, RF, N-N, 30', DC-18GHz	None	3/1/2026
evissaP	eP7101R-12	Cable, RF, SMA-SMA, 12", 2.92mm, DC-40GHz	None	3/1/2026
TDK	254	Enclosure, Shielded, RFI/EMI, NSA, 3m & 10m, 30MHz - 1 GHz	23177	2/3/2026
evissaP	eP7033R-6FT	Cable, RF, SMA-N, 6', DC-18GHz	None	3/1/2026
evissaP	eP7101R-12	Cable, RF, SMA-SMA, 12", 2.92mm, DC-40GHz	None	3/1/2026
evissaP	eP7033R-6FT	Cable, RF, SMA-N, 6', DC-18GHz	None	3/1/2026
evissaP	eP7033R-6FT	Cable, RF, SMA-N, 6', DC-18GHz	None	3/1/2026

Appendix: Policy, Rationale, and Evaluation of EMC Measurement Uncertainty

All uncertainty calculations, estimates and expressions thereof shall be in accordance with ANAB policy. Since Nemko USA, Inc. operates in accordance with ANAB Document Number AR 2250: 2021/06/16, all instrumentation having an effect on the accuracy or validity of tests shall be periodically calibrated or verified traceable to national standards by a competent calibration laboratory. The certificates of calibration or verification on this instrumentation shall include estimates of uncertainty as required by ANAB Document Number AR 2250.

1. Rationale and Summary of Expanded Uncertainty.

Each piece of instrumentation at Nemko USA that is used in making measurements for determining conformance to a standard (or limit), shall be assessed to evaluate its contribution to the overall uncertainty of the measurement in which it is used. The assessment of each item will be based on either a type A evaluation or a type B evaluation. Most of the evaluations will be type B, since they will be based on the manufacturer's statements or specifications of the calibration tolerances, or uncertainty will be stated along with a brief rationale for the type of evaluation and the resulting stated uncertainties.

The individual uncertainties included in the combined standard uncertainty for a specific test result will depend on the configuration in which the item of instrumentation is used. The combination will always be based on the law of propagation of uncertainty. Any systematic effects will be accommodated by including their uncertainties, in the calculation of the combined standard uncertainty; except that if the direction and amount of the systematic effect cannot be determined and separated from its uncertainty, the whole effect will be treated as uncertainty and combined along with the other elements of the test setup.

Type A evaluations of standard uncertainty will usually be based on calculating the standard deviation of the mean of a series of independent observations, but may be based on a least-squares curve fit or the analysis of variance for unusual situations. Type B evaluations of standard uncertainty will usually be based on manufacturer's specifications, data provided in calibration reports, and experience. The type of probability distribution used (normal, rectangular, a priori, or u-shaped) will be stated for each Type B evaluation.

In the evaluation of the uncertainty of each type of measurement, the uncertainty caused by the operator will be estimated. One notable operator contribution to measurement uncertainty is the manipulation of cables to maximize the measured values of radiated emissions. The operator contribution to measurement uncertainty is evaluated by having several operators independently repeat the same test. This results in a Type A evaluation of operator-contributed measurement uncertainty.

A summary of the expanded uncertainties of Nemko USA's measurements is shown as Table 1. These are the worst-case uncertainties considering all operative influence factors.

Table 1: Summary of Measurement Uncertainties

Type of Measurement	Frequency Range	Meas. Dist.	Expanded Uncertainty U, dB (k=2)
Mains Conducted Emissions	150 kHz to 30 MHz	N/A	2.82
Telecom Conducted Emissions	150 kHz to 30 MHz	N/A	3.48
Radiated Emissions	30 to 1,000 MHz	10 m	4.82
	1 to 18 GHz	3 m	5.09
	18 to 26 GHz	3 m	4.42
	26 to 40 GHz	0.1 m	5.97

End of Report