

Compliance Certification Services (Kunshan) Inc. Shenzhen Branch

SZCCS-TRF-01 Rev. A/0 Aug01,2022

Report No.: FYCR220900036502

Page: 1 of 43

TEST REPORT

Application No.: FYCR2209000365ET (SGS SZ NO.: T52210310031EM)
Applicant: HYPER BICYCLES, INC.
Address of Applicant: 177 MALAGA PARK DRIVEMALAGA, NJ, 08328UNITED STATES
Manufacturer: HYPER BICYCLES, INC.
Manufacturer of Applicant: 177 MALAGA PARK DRIVEMALAGA, NJ, 08328UNITED STATES
Factory: Dongguan Hengxin Plastic Technology Co. Ltd.
Factory of Applicant: Building 1, No.33, Dongwai Ring Road, Dongken Town, DONGGUAN GD 523451 CN
Equipment Under Test (EUT):
EUT Name: HYPER RC PAVATI 2.0
Model No.: TGT-PVT-4100, HYP-PVT-4100 ♣
 ♣ Please refer to section 2 of this report which indicates which model was actually tested and which were electrically identical.
FCC ID: 2A8PMPVT4100-R
Standard(s) : 47 CFR Part 15, Subpart C 15.249
Date of Receipt: 2022-09-09
Date of Test: 2022-09-16 to 2022-11-09
Date of Issue: 2022-11-09

Test Result:	Pass*
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* In the configuration tested, the EUT complied with the standards specified above.

Winkey Wang

Winkey Wang
EMC Technical Manager



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SZCCS-TRF-01 Rev. A/0 Aug01,2022

Report No.: FYCR220900036502

Page: 2 of 43

Revision Record				
Version	Chapter	Date	Modifier	Remark
01		2022-11-09		Original

Authorized for issue by:				
		Tree Zhan		
		Tree Zhan/Project Engineer		
		Winkey Wang		
		Winkey Wang/Reviewer		



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Compliance Certification Services (Kunshan) Inc. Shenzhen Branch

SZCCS-TRF-01 Rev. A/0 Aug01,2022

Report No.: FYCR220900036502

Page: 3 of 43

2 Test Summary

Radio Spectrum Technical Requirement				
Item	Standard	Method	Requirement	Result
Antenna Requirement	47 CFR Part 15, Subpart C 15.249	N/A	47 CFR Part 15, Subpart C 15.203	Pass

Radio Spectrum Matter Part				
Item	Standard	Method	Requirement	Result
20dB Bandwidth	47 CFR Part 15, Subpart C 15.249	ANSI C63.10 (2013) Section 6.9	47 CFR Part 15, Subpart C 15.215	Pass
Field Strength of the Fundamental Signal (15.249(a))		ANSI C63.10 (2013) Section 6.5&6.6	47 CFR Part 15, Subpart C 15.249(a)	Pass
Restricted Band Around Fundamental Frequency		ANSI C63.10 (2013) Section 6.10.5	47 CFR Part 15, Subpart C 15.205 & 15.249(d) & 15.209	Pass
Radiated Emissions Below 1GHz		ANSI C63.10 (2013) Section 6.4&6.5	47 CFR Part 15, Subpart C 15.209 & 15.249 (a),(d)	Pass
Radiated Emissions Above 1GHz		ANSI C63.10 (2013) Section 6.6	47 CFR Part 15, Subpart C 15.209 & 15.249 (a),(d)	Pass

Declaration of EUT Family Grouping:

Model No.: TGT-PVT-4100, HYP-PVT-4100

Only the model TGT-PVT-4100 was tested, since according to the declaration from the applicant, the electrical circuit design, layout, components used, internal wiring and functions were identical for the above models, with only difference on model No., colors, out decoration and sticker color.



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3 Contents

	Page
1 COVER PAGE	1
2 TEST SUMMARY	3
3 CONTENTS	4
4 GENERAL INFORMATION	6
4.1 DETAILS OF E.U.T.	6
4.2 DESCRIPTION OF SUPPORT UNITS	7
4.3 MEASUREMENT UNCERTAINTY	7
4.4 TEST LOCATION.....	8
4.5 TEST FACILITY.....	8
4.6 DEVIATION FROM STANDARDS.....	8
4.7 ABNORMALITIES FROM STANDARD CONDITIONS	8
5 EQUIPMENT LIST.....	9
6 RADIO SPECTRUM TECHNICAL REQUIREMENT	12
6.1 ANTENNA REQUIREMENT	12
6.1.1 Test Requirement:	12
6.1.2 Conclusion	12
7 RADIO SPECTRUM MATTER TEST RESULTS.....	13
7.1 20DB BANDWIDTH	13
7.1.1 E.U.T. Operation	13
7.1.2 Test Mode Description	13
7.1.3 Test Setup Diagram	13
7.1.4 Measurement Procedure and Data.....	13
7.2 FIELD STRENGTH OF THE FUNDAMENTAL SIGNAL (15.249(A)).....	16
7.2.1 E.U.T. Operation	16
7.2.2 Test Mode Description	16
7.2.3 Test Setup Diagram	18
7.2.4 Measurement Procedure and Data.....	18
7.3 RESTRICTED BAND AROUND FUNDAMENTAL FREQUENCY	25
7.3.1 E.U.T. Operation	25
7.3.2 Test Mode Description	25
7.3.3 Test Setup Diagram	25
7.3.4 Measurement Procedure and Data.....	26
7.4 RADIATED EMISSIONS BELOW 1GHZ	31
7.4.1 E.U.T. Operation	31
7.4.2 Test Mode Description	31
7.4.3 Test Setup Diagram	31
7.4.4 Measurement Procedure and Data.....	32
7.5 RADIATED EMISSIONS ABOVE 1GHZ.....	35
7.5.1 E.U.T. Operation	35



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Compliance Certification Services (Kunshan) Inc. Shenzhen Branch

SZCCS-TRF-01 Rev. A/0 Aug01,2022

Report No.: FYCR220900036502

Page: 5 of 43

7.5.2	Test Mode Description	35
7.5.3	Test Setup Diagram	35
7.5.4	Measurement Procedure and Data.....	36
8	TEST SETUP PHOTO	43
9	EUT CONSTRUCTIONAL DETAILS (EUT PHOTOS)	43



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Compliance Certification Services (Kunshan) Inc. Shenzhen Branch

SZCCS-TRF-01 Rev. A/0 Aug01,2022

Report No.: FYCR220900036502

Page: 6 of 43

4 General Information

4.1 Details of E.U.T.

Power supply:	Rechargeable battery DC7.4V, 500mAh,3.7Wh for boat,charged by USB charger USB charger input:DC 5V,1A min, output:DC 8.4V,0.8A
Cable(s):	USB charger DC cable:35cm unshielded
Operation Frequency:	2420MHz-2462MHz
Modulation Type:	GFSK
Number of Channels:	43
Antenna Type:	Integral Antenna

Remark: The information in this section is provided by the applicant or manufacturer, CCS is not liable to the accuracy, suitability, reliability or/and integrity of the information.

Channel list:

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2420	16	2435	31	2450
2	2421	17	2436	32	2451
3	2422	18	2437	33	2452
4	2423	19	2438	34	2453
5	2424	20	2439	35	2454
6	2425	21	2440	36	2455
7	2426	22	2441	37	2456
8	2427	23	2442	38	2457
9	2428	24	2443	39	2458
10	2429	25	2444	40	2459
11	2430	26	2445	41	2460
12	2431	27	2446	42	2461
13	2432	28	2447	43	2462
14	2433	29	2448		
15	2434	30	2449		



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SZCCS-TRF-01 Rev. A/0 Aug01,2022

Report No.: FYCR220900036502

Page: 7 of 43

4.2 Description of Support Units

Description	Manufacturer	Model No.	Serial No.
--	--	--	--
The EUT has been tested as an independent unit.			

4.3 Measurement Uncertainty

Test Item	Measurement Uncertainty
20dB Bandwidth	$\pm 0.3\%$
Field Strength of the Fundamental Signal (15.249(a))	$\pm 3.1\text{dB}$ (Below 1GHz), $\pm 4.4\text{dB}$ (Above 1GHz)
Restricted Band Around Fundamental Frequency	$\pm 3.1\text{dB}$ (Below 1GHz), $\pm 4.4\text{dB}$ (Above 1GHz)
Radiated Emissions Below 1GHz	$\pm 3.1\text{dB}$ (Below 1GHz)
Radiated Emissions Above 1GHz	$\pm 4.4\text{dB}$ (Above 1GHz)



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SZCCS-TRF-01 Rev. A/0 Aug01,2022

Report No.: FYCR220900036502

Page: 8 of 43

4.4 Test Location

All tests were performed at:

Compliance Certification Services (Kunshan) Inc. Shenzhen branch.

Fuyong lab. Xinlong TechnoPark, Fengtang Road, Fuyong Subdistrict, Bao'an, Shenzhen, China

Tel: +86 755 8866 3988 Fax: +86 755 2671 0594

No tests were sub-contracted.

4.5 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

• A2LA (Certificate No. 6606.01)

Compliance Certification Services (Kunshan) Inc. Shenzhen branch is accredited by the American Association for Laboratory Accreditation (A2LA). Certificate No. 6606.01.

• FCC –Designation Number: CN1322

Compliance Certification Services (Kunshan) Inc. Shenzhen branch has been recognized as an accredited testing laboratory.

Designation Number: CN1322. Test Firm Registration Number: 718073

• Innovation, Science and Economic Development Canada

Compliance Certification Services (Kunshan) Inc. Shenzhen branch has been recognized by ISED as an accredited testing laboratory.

CAB identifier: CN0129.

IC#: 28189.

4.6 Deviation from Standards

None

4.7 Abnormalities from Standard Conditions

None



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SZCCS-TRF-01 Rev. A/0 Aug01,2022

Report No.: FYCR220900036502

Page: 9 of 43

5 Equipment List

20dB Bandwidth					
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
MXA Signal Analyzer	KEYSIGHT	N9020A	SEM004-25	2022/5/30	2023/5/29
Attenuator	Huber+Suhner	6620_SMA-50-1	SEM021-09	2022/7/12	2023/7/11
Measurement Software	TST PASS	TST PASS V2.0	N/A	N/A	N/A

Field Strength of the Fundamental Signal (15.249(a))					
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
3m Anechoic Chamber	CRT	N/A	SEM001-13	2021/7/13	2024/7/12
Trilog-Broadband Antenna	Schwarzbeck	VULB9168	SEM003-33	2021/9/25	2024/9/24
Biconical Antenna	Schwarzbeck	VUBA9117	SEM003-35	2021/12/26	2024/12/25
Loop Antenna	ETS-LINDGREN	6502	SEM003-36	2021/9/26	2024/9/25
MXE EMI receiver	Agilent	N9038A	SEM004-05	2022/7/12	2023/7/11
Pre-amplifier	HP	8447D	SEM005-02	2022/7/12	2023/7/11
Broad-Band Horn Antenna	Schwarzbeck	BBHA 9170	SEM003-15	2021/7/11	2024/7/10
Broad-Band Horn Antenna	Schwarzbeck	BBHA 9120D	SEM003-32	2021/9/26	2024/9/25
Double-ridged waveguide horn	ETS-LINDGREN	3117	SEM003-34	2021/9/25	2024/9/24
Spectrum Analyzer	Rohde & Schwarz	101288	SEM004-08	2022/7/12	2023/7/11
Low Noise Amplifier	CLAVIIO	BDLNA-0118-352810	SEM005-05	2022/7/12	2023/7/11
Pre-amplifier	Compliance Directions Systems Inc.	PAP-2640-50	SEM005-08	2022/7/12	2023/7/11
Pre-amplifier	Rohde & Schwarz	CH14-H052	SEM005-17	2022/7/12	2023/7/11
Pre-amplifier	TST PASS	LNA04080G30	SEM005-27	2022/4/15	2023/4/14
Pre-amplifier	TST PASS	LNA10180G45	SEM005-28	2022/4/15	2023/4/14
Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A



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SZCCS-TRF-01 Rev. A/0 Aug01,2022

Report No.: FYCR220900036502

Page: 10 of 43

Restricted Band Around Fundamental Frequency					
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
3m Anechoic Chamber	CRT	N/A	SEM001-13	2021/7/13	2024/7/12
Trilog-Broadband Antenna	Schwarzbeck	VULB9168	SEM003-33	2021/9/25	2024/9/24
Biconical Antenna	Schwarzbeck	VUBA9117	SEM003-35	2021/12/26	2024/12/25
Loop Antenna	ETS-LINDGREN	6502	SEM003-36	2021/9/26	2024/9/25
MXE EMI receiver	Agilent	N9038A	SEM004-05	2022/7/12	2023/7/11
Pre-amplifier	HP	8447D	SEM005-02	2022/7/12	2023/7/11
Broad-Band Horn Antenna	Schwarzbeck	BBHA 9170	SEM003-15	2021/7/11	2024/7/10
Broad-Band Horn Antenna	Schwarzbeck	BBHA 9120D	SEM003-32	2021/9/26	2024/9/25
Double-ridged waveguide horn	ETS-LINDGREN	3117	SEM003-34	2021/9/25	2024/9/24
Spectrum Analyzer	Rohde & Schwarz	101288	SEM004-08	2022/7/12	2023/7/11
Low Noise Amplifier	CLAVIO	BDLNA-0118-352810	SEM005-05	2022/7/12	2023/7/11
Pre-amplifier	Compliance Directions Systems Inc.	PAP-2640-50	SEM005-08	2022/7/12	2023/7/11
Pre-amplifier	Rohde & Schwarz	CH14-H052	SEM005-17	2022/7/12	2023/7/11
Pre-amplifier	TST PASS	LNA04080G30	SEM005-27	2022/4/15	2023/4/14
Pre-amplifier	TST PASS	LNA10180G45	SEM005-28	2022/4/15	2023/4/14
Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A



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SZCCS-TRF-01 Rev. A/0 Aug01,2022

Report No.: FYCR220900036502

Page: 11 of 43

Radiated Emissions					
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
3m Anechoic Chamber	CRT	N/A	SEM001-13	2021/7/13	2024/7/12
Trilog-Broadband Antenna	Schwarzbeck	VULB9168	SEM003-33	2021/9/25	2024/9/24
Biconical Antenna	Schwarzbeck	VUBA9117	SEM003-35	2021/12/26	2024/12/25
Loop Antenna	ETS-LINDGREN	6502	SEM003-36	2021/9/26	2024/9/25
MXE EMI receiver	Agilent	N9038A	SEM004-05	2022/7/12	2023/7/11
Pre-amplifier	HP	8447D	SEM005-02	2022/7/12	2023/7/11
Broad-Band Horn Antenna	Schwarzbeck	BBHA 9170	SEM003-15	2021/7/11	2024/7/10
Broad-Band Horn Antenna	Schwarzbeck	BBHA 9120D	SEM003-32	2021/9/26	2024/9/25
Double-ridged waveguide horn	ETS-LINDGREN	3117	SEM003-34	2021/9/25	2024/9/24
Spectrum Analyzer	Rohde & Schwarz	101288	SEM004-08	2022/7/12	2023/7/11
Low Noise Amplifier	CLAVIO	BDLNA-0118-352810	SEM005-05	2022/7/12	2023/7/11
Pre-amplifier	Compliance Directions Systems Inc.	PAP-2640-50	SEM005-08	2022/7/12	2023/7/11
Pre-amplifier	Rohde & Schwarz	CH14-H052	SEM005-17	2022/7/12	2023/7/11
Pre-amplifier	TST PASS	LNA04080G30	SEM005-27	2022/4/15	2023/4/14
Pre-amplifier	TST PASS	LNA10180G45	SEM005-28	2022/4/15	2023/4/14
Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A

General used equipment					
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
Humidity/ Temperature Indicator	Mingle	TH607	SEM002-22	2022-07-12	2023-07-11
Humidity/ Temperature Indicator	Mingle	TH607	SEM002-23	2022-07-12	2023-07-11
Barometer	DUMAI	DYM3	SEM002-24	2022-07-12	2023-07-11



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6 Radio Spectrum Technical Requirement

6.1 Antenna Requirement

6.1.1 Test Requirement:

47 CFR Part 15, Subpart C 15.203

6.1.2 Conclusion

15.203 requirement:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

EUT Antenna:

The antenna is integrated on the main PCB and no consideration of replacement.

Antenna location: Refer to Appendix(internal photos).



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7 Radio Spectrum Matter Test Results

7.1 20dB Bandwidth

Test Requirement 47 CFR Part 15, Subpart C 15.215

Test Method: ANSI C63.10 (2013) Section 6.9

7.1.1 E.U.T. Operation

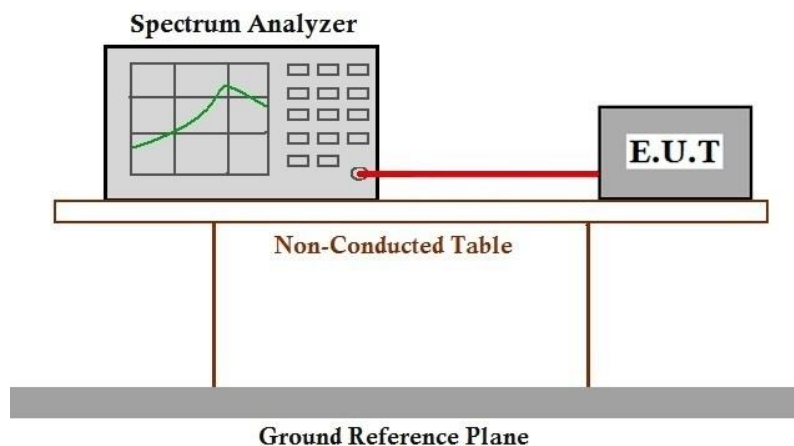
Operating Environment:

Temperature: 22.3 °C Humidity: 52.3 % RH Atmospheric Pressure: 1020 mbar

7.1.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	03	TX mode_Keep the EUT(boat) in transmitting with modulation mode.

7.1.3 Test Setup Diagram



7.1.4 Measurement Procedure and Data

Test channel	99% bandwidth (MHz)	Results
Lowest	6.651	Pass
Middle	6.290	Pass
Highest	5.291	Pass



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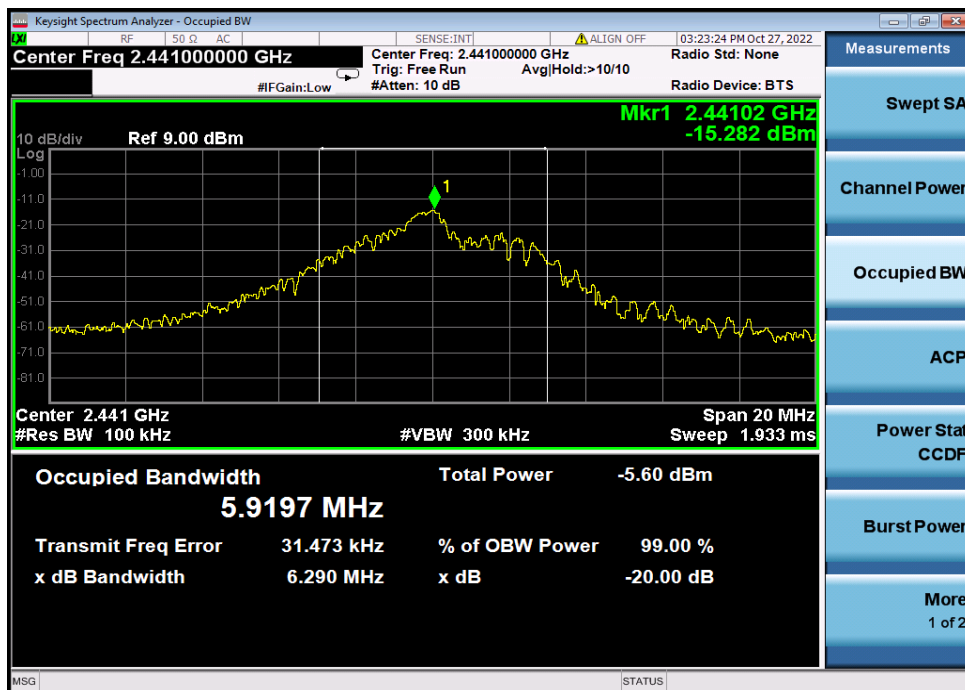
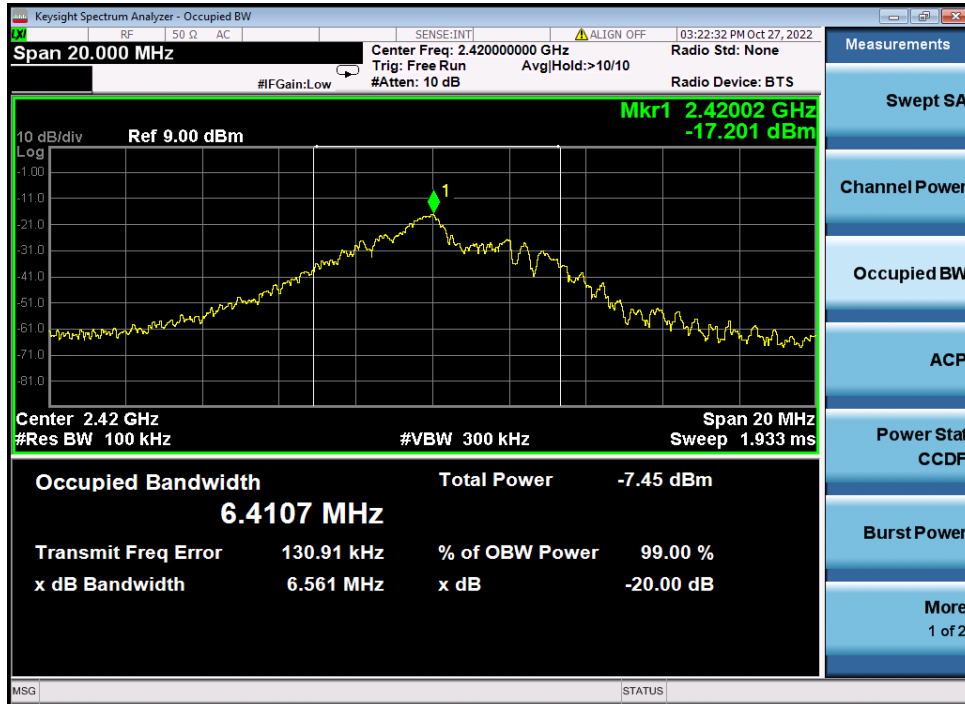
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Report No.: FYCR220900036502

Page: 14 of 43



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Page: 15 of 43



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SZCCS-TRF-01 Rev. A/0 Aug01,2022

Report No.: FYCR220900036502

Page: 16 of 43

7.2 Field Strength of the Fundamental Signal (15.249(a))

Test Requirement 47 CFR Part 15, Subpart C 15.249(a)

Test Method: ANSI C63.10 (2013) Section 6.5&6.6

Measurement Distance: 3m

Limit:

Fundamental frequency(MHz)	Field strength of fundamental(millivolts/meter)	Field strength of harmonics(microvolts/meter)
902-928	50	500
2400-2483.5	50	500
5725-5875	50	500
24000-24250	250	2500

Remark: The frequencies above 1000MHz are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

For fundamental frequency in "902-928MHz", the field strength of fundamental is based on Quasi-Peak.

7.2.1 E.U.T. Operation

Operating Environment:

Temperature: 22.2 °C Humidity: 51.3 % RH Atmospheric Pressure: 1020 mbar

7.2.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	03	TX mode_Keep the EUT(boat) in transmitting with modulation mode.

Average value:

Calculate Formula:	Average value=Peak value + PDCF
	PDCF=20 log(Duty cycle)
	Duty cycle= T on time / T period
Test data:	Ton time =0.76ms
	T period =32ms
	Duty cycle=2.38%
	PDCF value= -32.49dB



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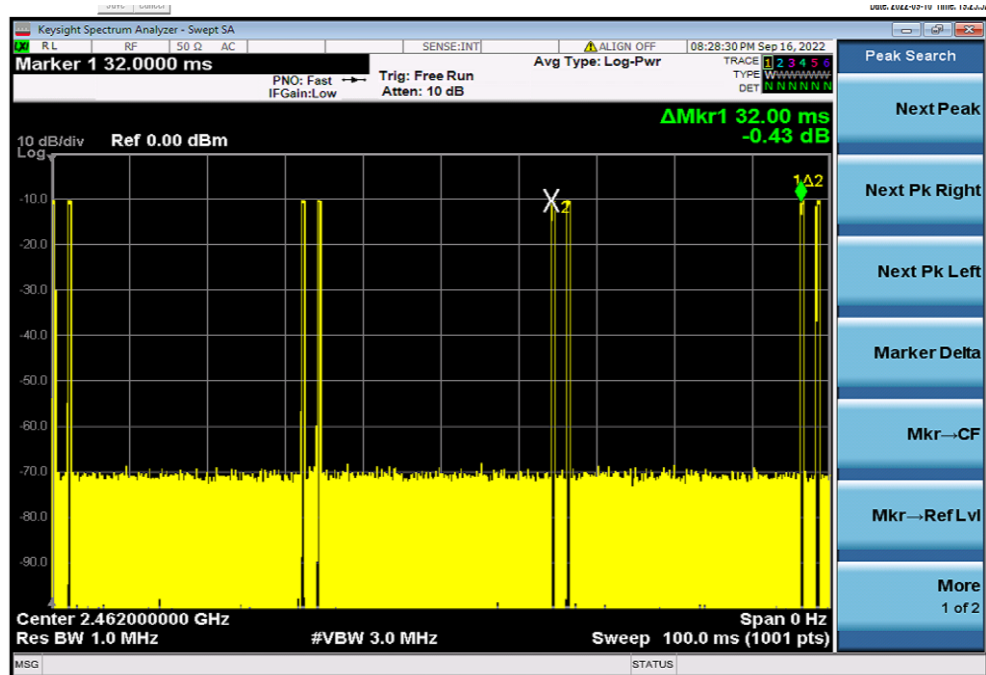
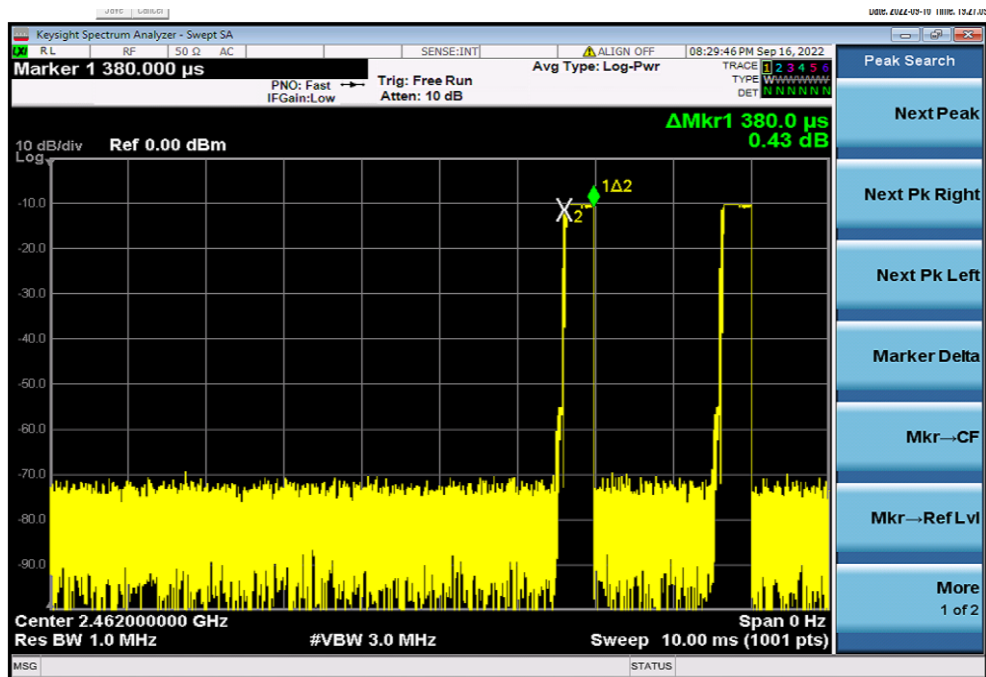
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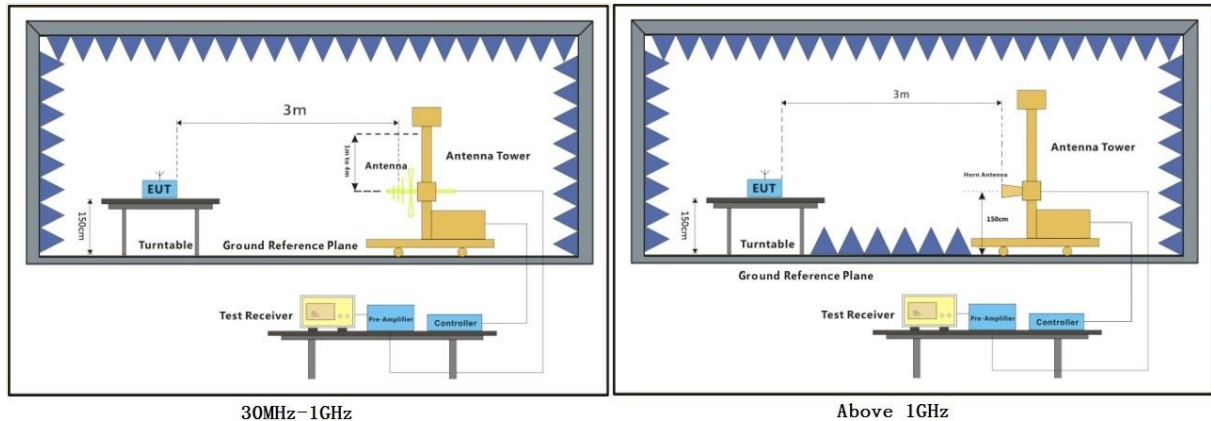
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7.2.3 Test Setup Diagram



7.2.4 Measurement Procedure and Data

- For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
- Test the EUT in the lowest channel, the middle channel, the Highest channel.
- The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.
- Repeat above procedures until all frequencies measured was complete.

Remark: Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor



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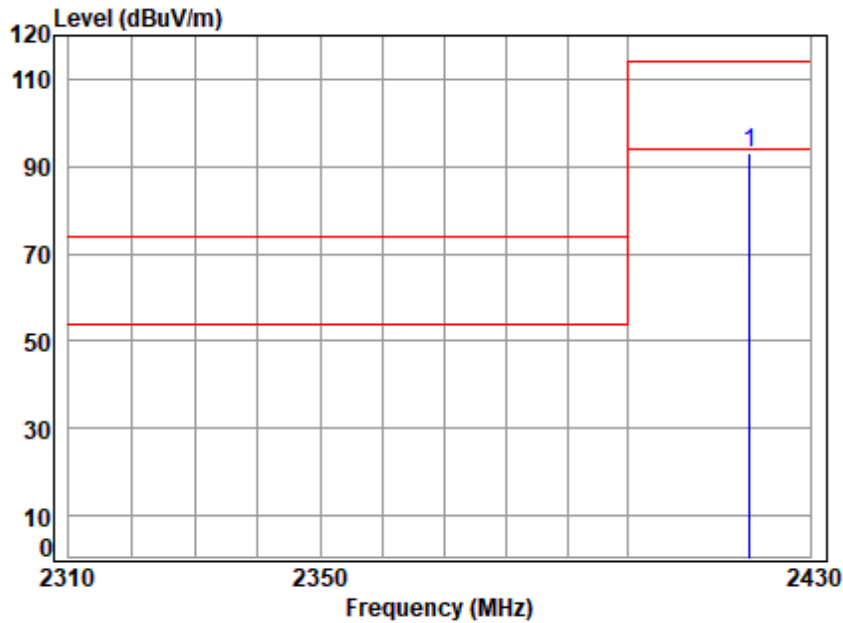
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SZCCS-TRF-01 Rev. A/0 Aug01,2022

Report No.: FYCR220900036502

Page: 19 of 43

Test Mode: 03; Polarity: Horizontal; Modulation:GFSK; Channel:Low



Site : chamber
Condition: 3m HORIZONTAL
Job No : 00365ET
Mode : 2420MHz
: boat

	Cable	Ant	Preamp	Read	Limit	Over	
Freq	Loss	Factor	Factor	Level	Level	Line	Limit Remark
MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1 2420.0000	5.07	27.23	32.50	93.27	93.07	114.00	-20.93 peak



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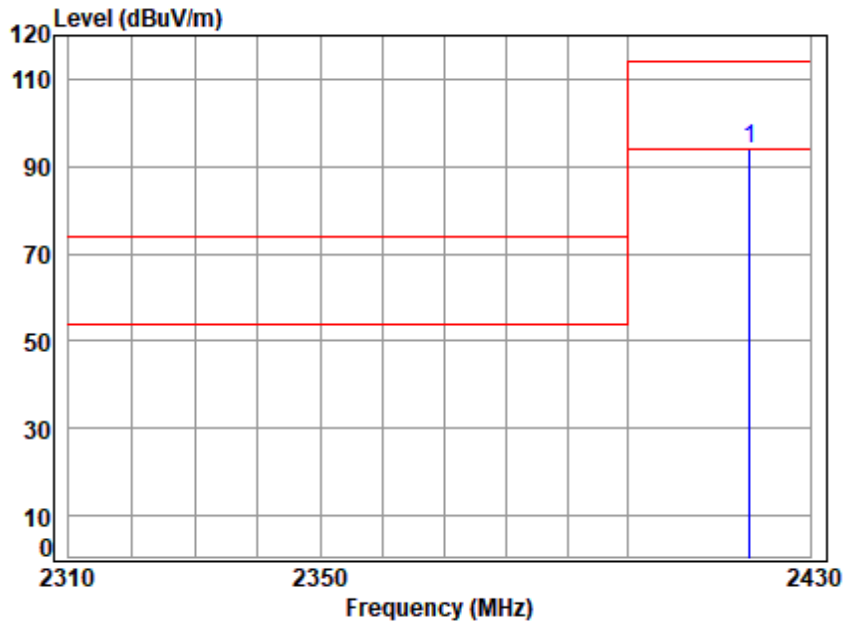
Compliance Certification Services (Kunshan) Inc. Shenzhen Branch

SZCCS-TRF-01 Rev. A/0 Aug01,2022

Report No.: FYCR220900036502

Page: 20 of 43

Test Mode: 03; Polarity: Vertical; Modulation:GFSK; Channel:Low



Site : chamber
Condition: 3m VERTICAL
Job No : 00365ET
Mode : 2420MHz
: boat

	Cable	Ant	Preamp	Read	Limit	Over	
Freq	Loss	Factor	Factor	Level	Level	Line	Limit Remark
MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1 2420.0000	5.07	27.23	32.50	93.99	93.79	114.00	-20.21 peak



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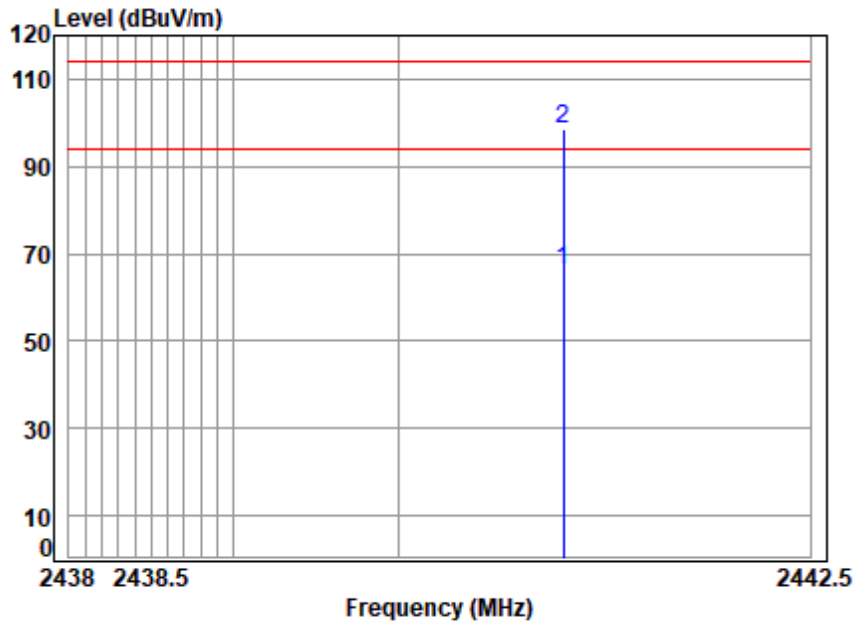
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SZCCS-TRF-01 Rev. A/0 Aug01,2022

Report No.: FYCR220900036502

Page: 21 of 43

Test Mode: 03; Polarity: Horizontal; Modulation:GFSK; Channel:middle



Site : chamber
Condition: 3m HORIZONTAL
Job No : 00365ET
Mode : 2441MHz
: boat

		Cable	Ant	Preamp	Read	Limit	Over	
Freq		Loss	Factor	Factor	Level	Level	Line	Limit Remark
MHz		dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	2441.0000	5.09	27.27	32.50	66.35	66.21	94.00	-27.79 Average
2	2441.0000	5.09	27.27	32.50	98.84	98.70	114.00	-15.30 Peak



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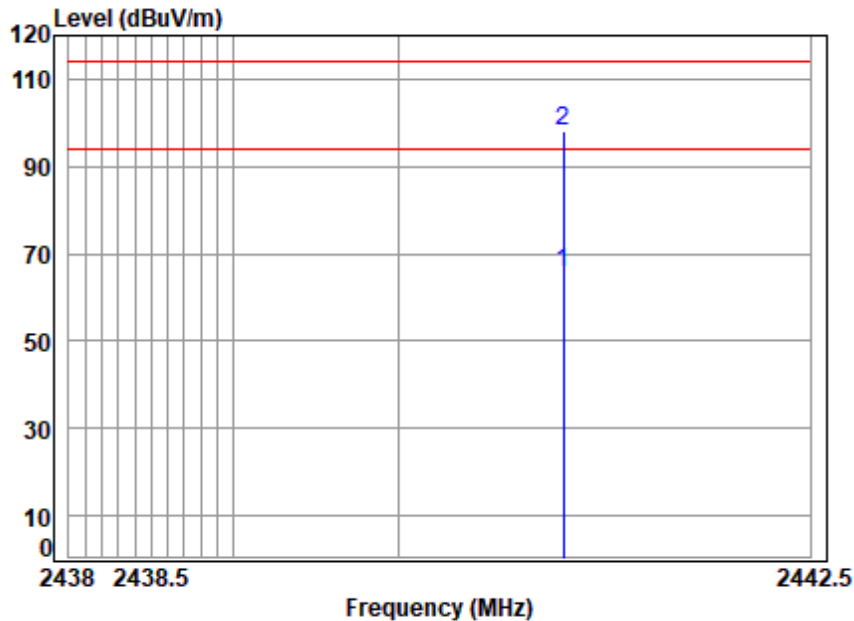
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Report No.: FYCR220900036502

Page: 22 of 43

Test Mode: 03; Polarity: Vertical; Modulation:GFSK; Channel:middle



Site : chamber
Condition: 3m VERTICAL
Job No : 00365ET
Mode : 2441MHz
: boat

		Cable	Ant	Preamp	Read	Limit	Over	
Freq		Loss	Factor	Factor	Level	Level	Line	Limit Remark
MHz		dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	2441.0000	5.09	27.27	32.50	65.96	65.82	94.00	-28.18 Average
2	2441.0000	5.09	27.27	32.50	98.45	98.31	114.00	-15.69 Peak



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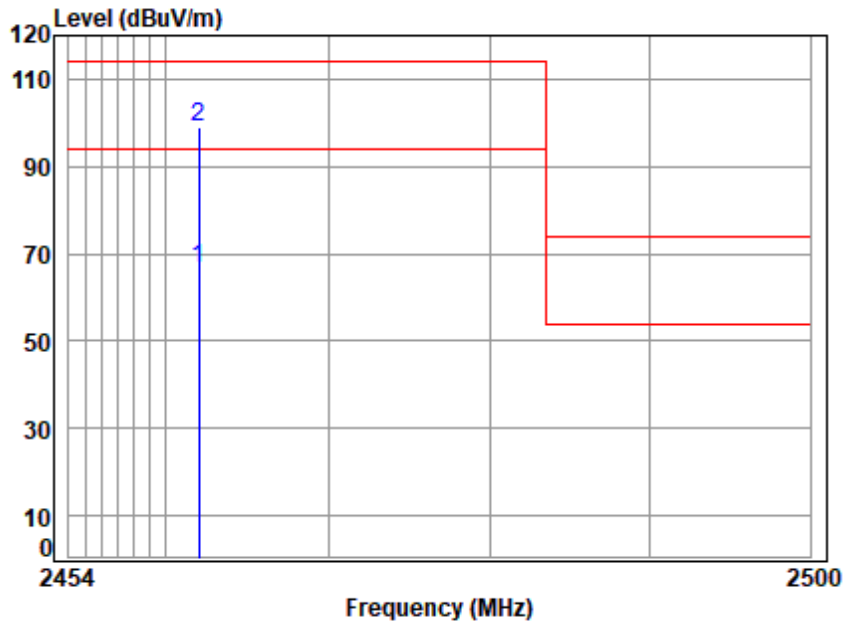
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SZCCS-TRF-01 Rev. A/0 Aug01,2022

Report No.: FYCR220900036502

Page: 23 of 43

Test Mode: 03; Polarity: Horizontal; Modulation:GFSK; Channel:High



Site : chamber
Condition: 3m HORIZONTAL
Job No : 00365ET
Mode : 2462MHz
: boat

		Cable	Ant	Preamp	Read	Limit	Over	
Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark
MHz	dB		dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	2462.0000	5.10	27.32	32.50	66.67	66.59	94.00	-27.41 Average
2	2462.0000	5.10	27.32	32.50	99.16	99.08	114.00	-14.92 peak



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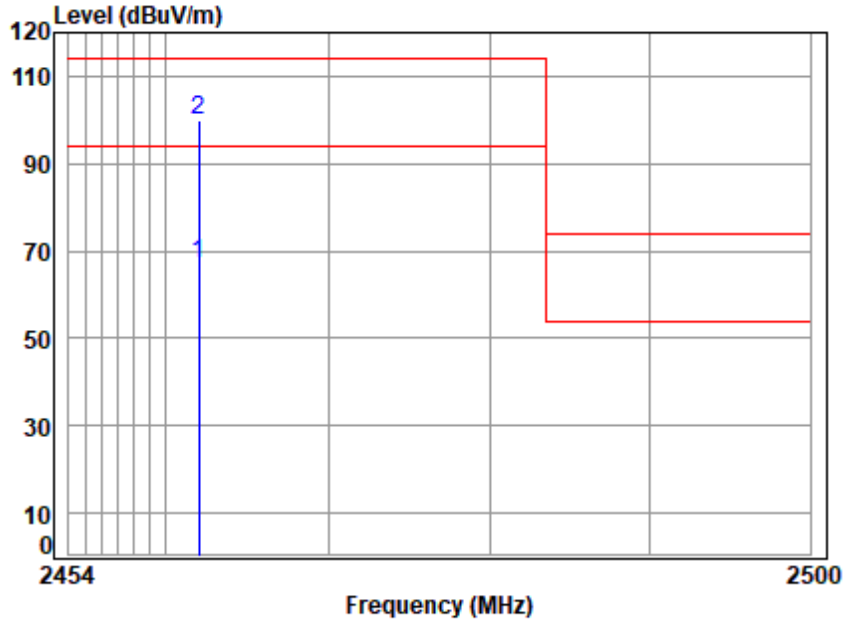
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SZCCS-TRF-01 Rev. A/0 Aug01,2022

Report No.: FYCR220900036502

Page: 24 of 43

Test Mode: 03; Polarity: Vertical; Modulation:GFSK; Channel:High



Site : chamber
Condition: 3m VERTICAL
Job No : 00365ET
Mode : 2462MHz
: boat

	Cable	Ant	Preamp	Read		Limit	Over	
Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark
MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1 2462.0000	5.10	27.32	32.50	67.33	67.25	94.00	-26.75	Average
2 2462.0000	5.10	27.32	32.50	99.82	99.74	114.00	-14.26	peak

Remark:

- The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:
Final Test Level = Receiver Reading + Antenna Factor + Cable Factor – Preamplifier Factor
- The peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20dB under any condition of modulation. So, only the above measurement data were shown in the report.



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SZCCS-TRF-01 Rev. A/0 Aug01,2022

Report No.: FYCR220900036502

Page: 25 of 43

7.3 Restricted Band Around Fundamental Frequency

Test Requirement 47 CFR Part 15, Subpart C 15.205 & 15.249(d) & 15.209

Test Method: ANSI C63.10 (2013) Section 6.10.5

Measurement Distance: 3m

Limit:

Frequency	Limit (dBuV/m @3m)	Remark
30MHz-88MHz	40.0	Quasi-peak Value
88MHz-216MHz	43.5	Quasi-peak Value
216MHz-960MHz	46.0	Quasi-peak Value
960MHz-1GHz	54.0	Quasi-peak Value
Above 1GHz	54.0	Average Value
Above 1GHz	74.0	Peak Value

Emission radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.

7.3.1 E.U.T. Operation

Operating Environment:

Temperature: 22.2 °C

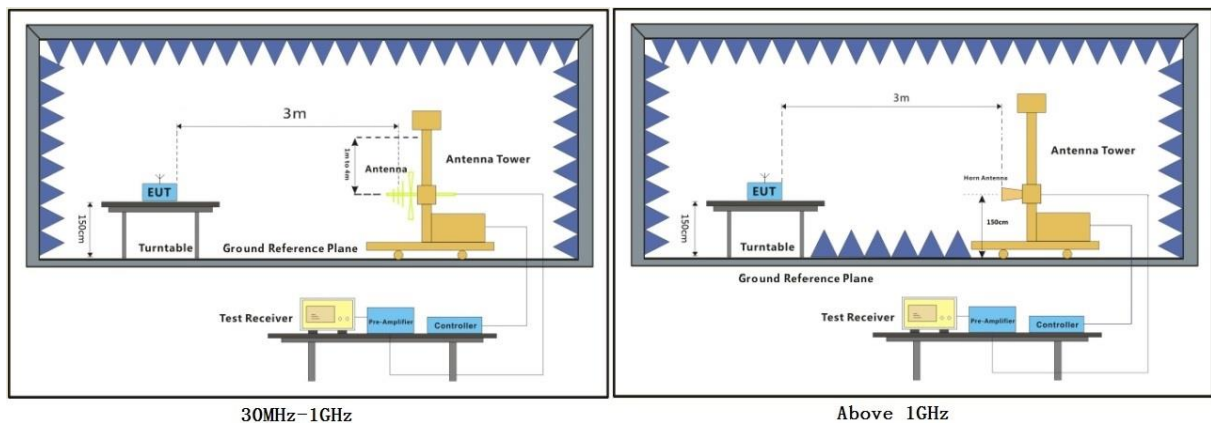
Humidity: 51.4 % RH

Atmospheric Pressure: 1020 mbar

7.3.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	03	TX mode_Keep the EUT(boat) in transmitting with modulation mode.

7.3.3 Test Setup Diagram



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Compliance Certification Services (Kunshan) Inc. Shenzhen Branch

SZCCS-TRF-01 Rev. A/0 Aug01,2022

Report No.: FYCR220900036502

Page: 26 of 43

7.3.4 Measurement Procedure and Data

- a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- c. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- d. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- e. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- g. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
- h. Test the EUT in the lowest channel, the middle channel, the Highest channel.
- i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.
- j. Repeat above procedures until all frequencies measured was complete.

Remark: Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor



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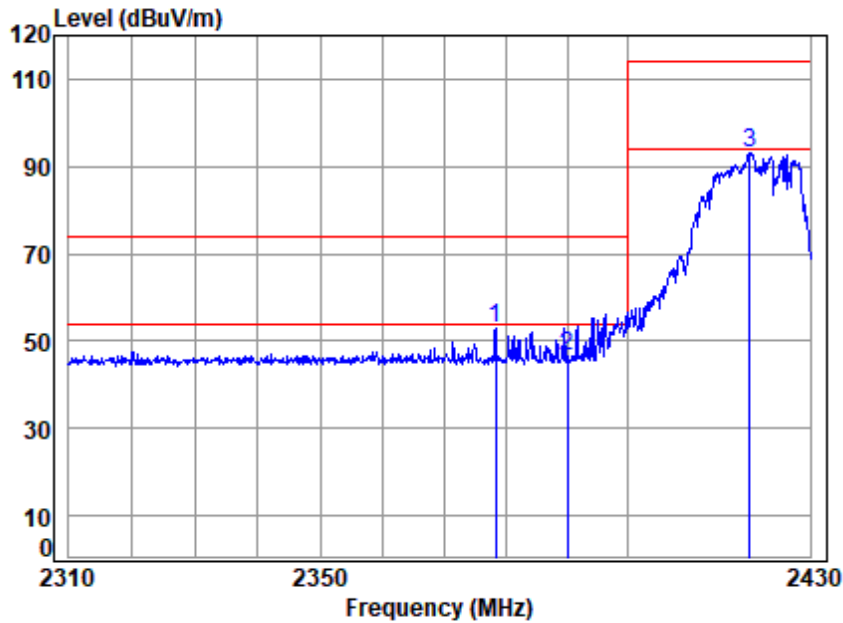
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SZCCS-TRF-01 Rev. A/0 Aug01,2022

Report No.: FYCR220900036502

Page: 27 of 43

Test Mode: 03; Polarity: Horizontal; Modulation:GFSK; Channel:Low



Site : chamber
Condition: 3m HORIZONTAL
Job No : 00365ET
Mode : 2420 Band edge
: boat

		Cable	Ant	Preamp	Read	Limit	Over	
Freq		Loss	Factor	Factor	Level	Level	Line	Limit Remark
MHz		dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	2378.3770	5.05	27.13	32.50	53.35	53.03	74.00	-20.97 peak
2	2390.0000	5.05	27.16	32.50	46.67	46.38	74.00	-27.62 peak
3	2420.0000	5.07	27.23	32.50	93.27	93.07	114.00	-20.93 peak



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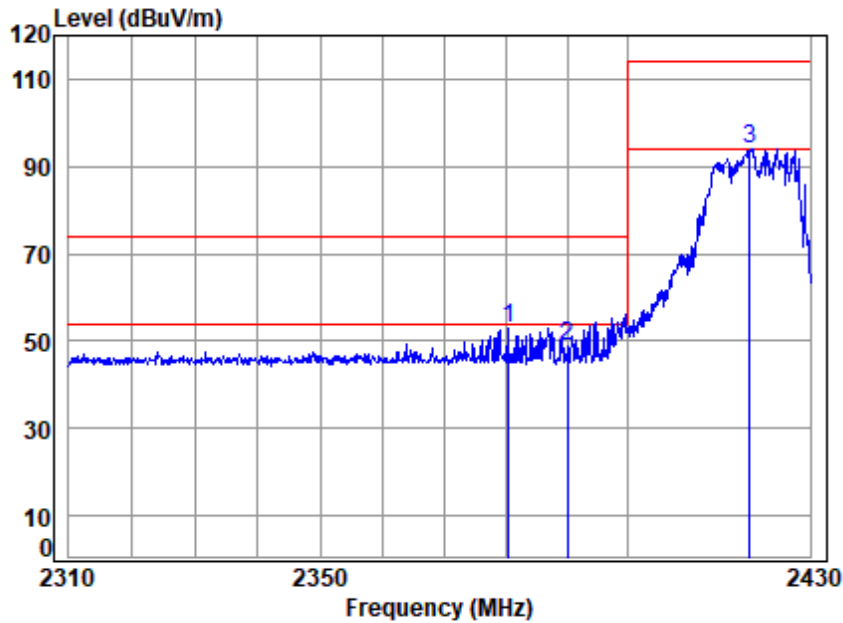
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SZCCS-TRF-01 Rev. A/0 Aug01,2022

Report No.: FYCR220900036502

Page: 28 of 43

Test Mode: 03; Polarity: Vertical; Modulation:GFSK; Channel:Low



Site : chamber
Condition: 3m VERTICAL
Job No : 00365ET
Mode : 2420 Band edge
: boat

		Cable	Ant	Preamp	Read	Limit	Over	
Freq		Loss	Factor	Factor	Level	Level	Line	Limit Remark
MHz		dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	2380.4260	5.05	27.14	32.50	53.35	53.04	74.00	-20.96 peak
2	2390.0000	5.05	27.16	32.50	49.28	48.99	74.00	-25.01 peak
3	2420.0000	5.07	27.23	32.50	93.99	93.79	114.00	-20.21 peak



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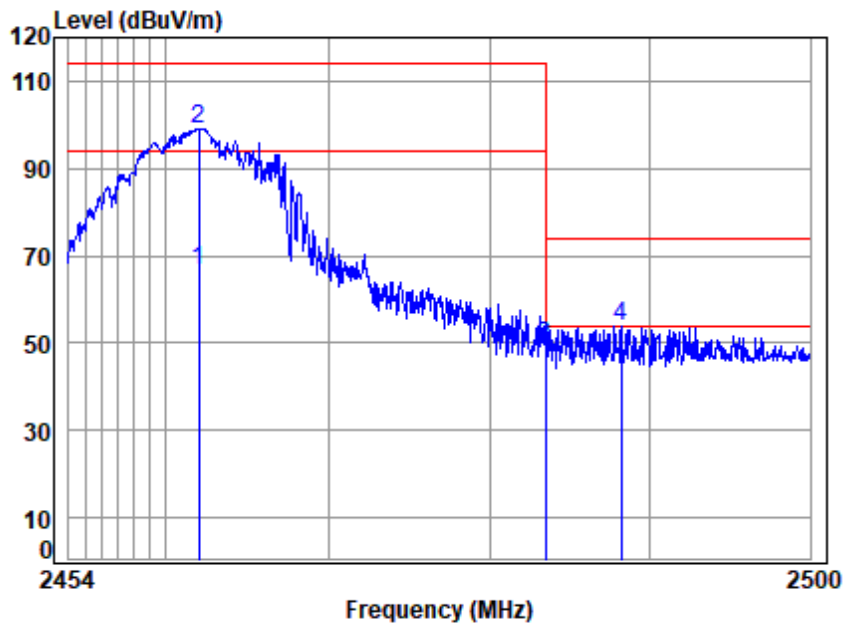
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SZCCS-TRF-01 Rev. A/0 Aug01,2022

Report No.: FYCR220900036502

Page: 29 of 43

Test Mode: 03; Polarity: Horizontal; Modulation:GFSK; Channel:High



Site : chamber
Condition: 3m HORIZONTAL
Job No : 00365ET
Mode : 2462 Band edge
: boat

		Cable	Ant	Preamp	Read	Limit	Over	
Freq		Loss	Factor	Factor	Level	Level	Line	Limit Remark
MHz		dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	2462.0000	5.10	27.32	32.50	66.67	66.59	94.00	-27.41 Average
2	2462.0000	5.10	27.32	32.50	99.16	99.08	114.00	-14.92 peak
3	2483.5000	5.12	27.36	32.50	49.31	49.29	74.00	-24.71 peak
4	2488.1890	5.12	27.37	32.50	53.75	53.74	74.00	-20.26 Peak



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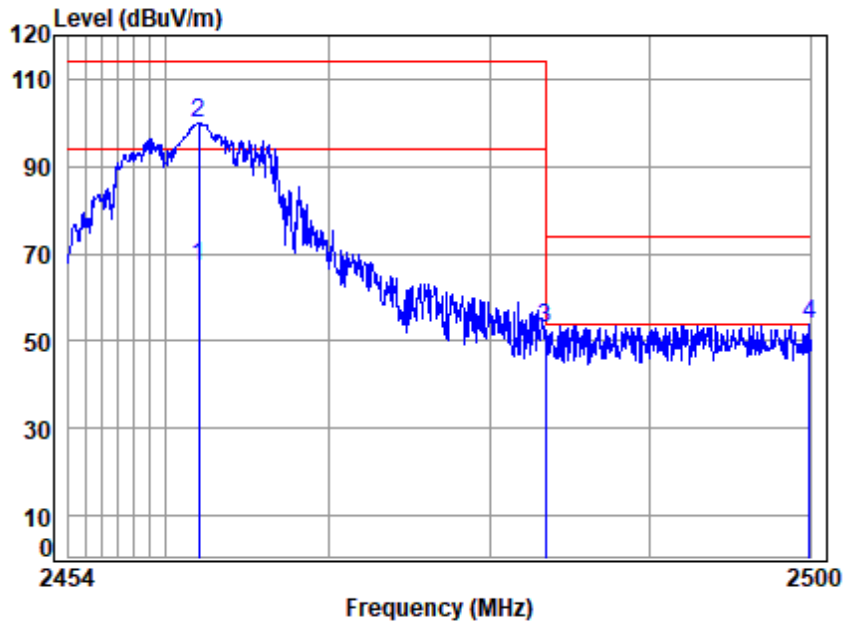
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SZCCS-TRF-01 Rev. A/0 Aug01,2022

Report No.: FYCR220900036502

Page: 30 of 43

Test Mode: 03; Polarity: Vertical; Modulation:GFSK; Channel:High



Site : chamber
Condition: 3m VERTICAL
Job No : 00365ET
Mode : 2462 Band edge
: boat

		Cable	Ant	Preamp	Read	Limit	Over	
Freq		Loss	Factor	Factor	Level	Level	Line	Limit Remark
MHz		dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	2462.0000	5.10	27.32	32.50	67.33	67.25	94.00	-26.75 Average
2	2462.0000	5.10	27.32	32.50	99.82	99.74	114.00	-14.26 peak
3	2483.5000	5.12	27.36	32.50	52.80	52.78	74.00	-21.22 peak
4	2499.9540	5.13	27.40	32.50	53.65	53.68	74.00	-20.32 Peak



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SZCCS-TRF-01 Rev. A/0 Aug01,2022

Report No.: FYCR220900036502

Page: 31 of 43

7.4 Radiated Emissions Below 1GHz

Test Requirement 47 CFR Part 15, Subpart C 15.209 & 15.249 (a),(d)

Test Method: ANSI C63.10 (2013) Section 6.4&6.5

Measurement Distance: 3m

Limit:

Frequency(MHz)	Field strength(microvolts/meter)	Measurement distance(meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
960-1000	500	3

7.4.1 E.U.T. Operation

Operating Environment:

Temperature: 23.5 °C

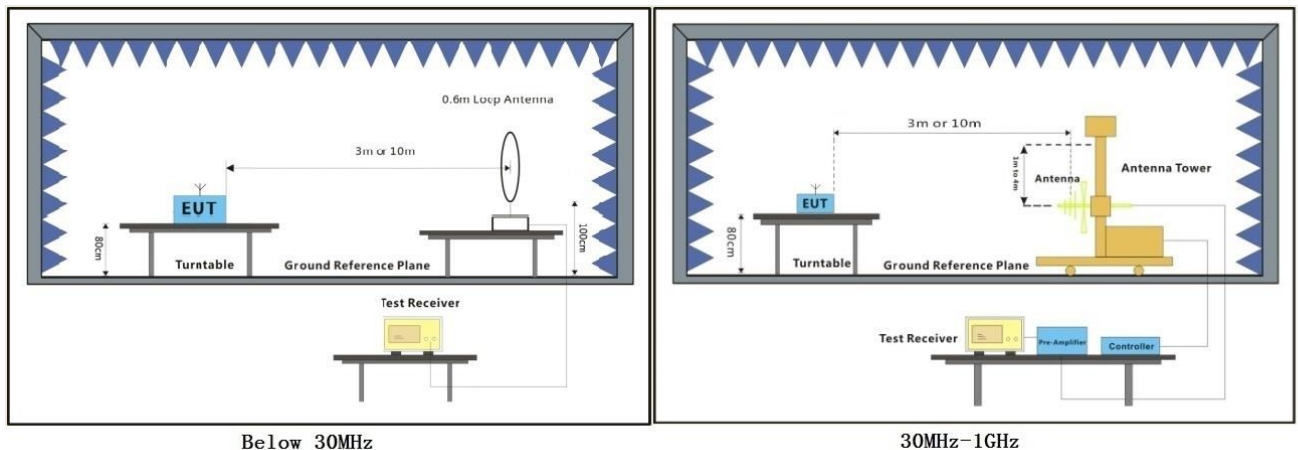
Humidity: 52.9 % RH

Atmospheric Pressure: 1020 mbar

7.4.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	03	TX mode_Keep the EUT(boat) in transmitting with modulation mode.

7.4.3 Test Setup Diagram



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Compliance Certification Services (Kunshan) Inc. Shenzhen Branch

SZCCS-TRF-01 Rev. A/0 Aug01,2022

Report No.: FYCR220900036502

Page: 32 of 43

7.4.4 Measurement Procedure and Data

- a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using quasi-peak method as specified and then reported in a data sheet.
- g. Test the EUT in the lowest channel, the middle channel, the Highest channel.
- h. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.
- i. Repeat above procedures until all frequencies measured was complete.

Remark:

1. Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor
2. Scan from 9kHz to 30MHz, the disturbance below 30MHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.
3. The disturbance below 1GHz was very low and the harmonics were the highest point could be found when testing, so only the above harmonics had been displayed.



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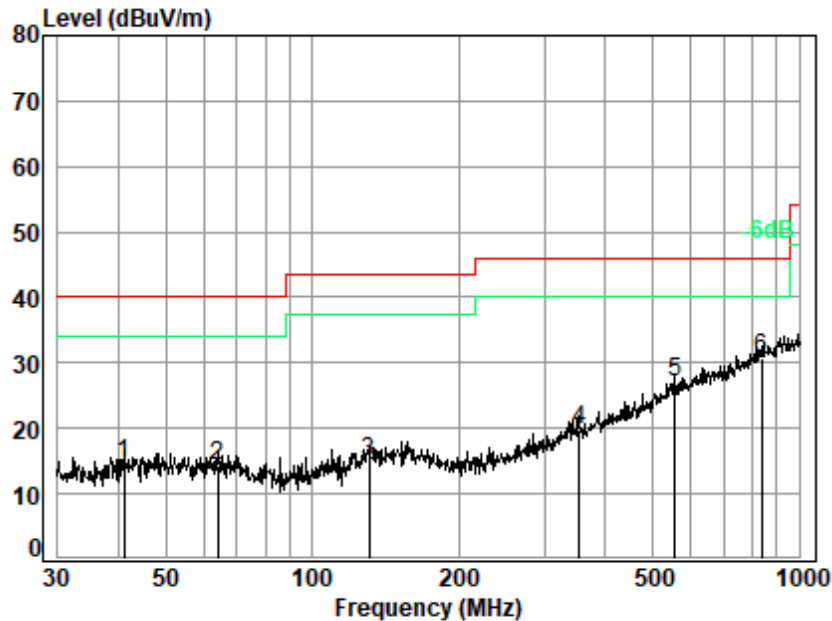
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SZCCS-TRF-01 Rev. A/0 Aug01,2022

Report No.: FYCR220900036502

Page: 33 of 43

Test Mode: 03; Polarity: Horizontal



Site : chamber
Condition: 3m HORIZONTAL
Job No : 00365ET
Mode : 03

		Cable	Ant	Preamp	Read	Limit	Over	
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	40.9881	0.21	16.95	26.01	23.43	14.58	40.00	-25.42 QP
2	63.9828	0.26	16.62	25.90	23.32	14.30	40.00	-25.70 QP
3	130.8369	0.97	16.69	25.55	22.94	15.05	43.50	-28.45 QP
4	352.9434	1.53	19.75	25.43	24.02	19.87	46.00	-26.13 QP
5	556.7744	1.92	23.89	25.20	26.43	27.04	46.00	-18.96 QP
6	836.2443	2.73	27.78	24.16	24.24	30.59	46.00	-15.41 QP



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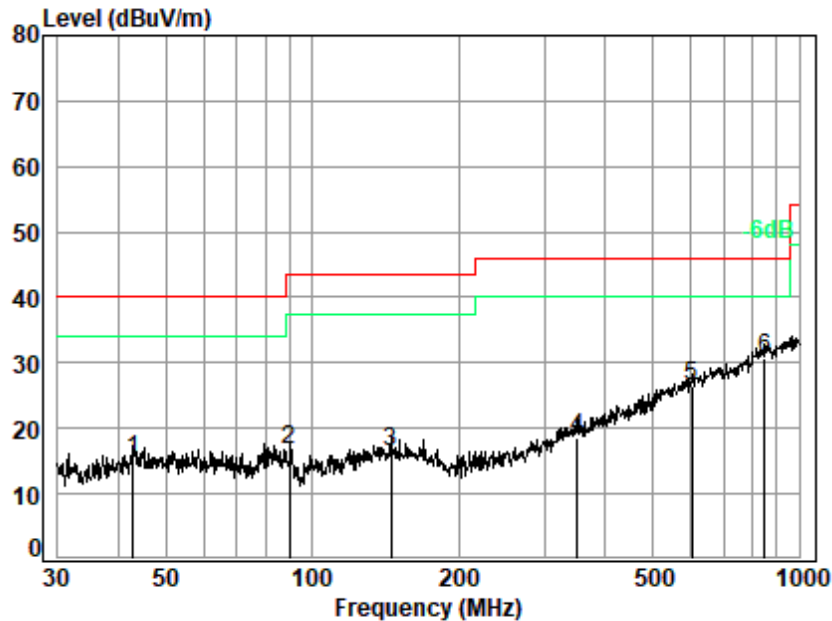
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SZCCS-TRF-01 Rev. A/0 Aug01,2022

Report No.: FYCR220900036502

Page: 34 of 43

Test Mode: 03; Polarity: Vertical



Site : chamber
Condition: 3m VERTICAL
Job No : 00365ET
Mode : 03

		Cable	Ant	Preamp	Read		Limit	Over	
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	42.8998	0.22	17.22	26.01	23.82	15.25	40.00	-24.75	QP
2	89.9047	0.67	13.61	25.70	28.30	16.88	43.50	-26.62	QP
3	144.8418	0.94	17.44	25.53	23.68	16.53	43.50	-26.97	QP
4	350.4768	1.52	19.80	25.43	22.72	18.61	46.00	-27.39	QP
5	603.5392	2.26	24.41	24.98	24.66	26.35	46.00	-19.65	QP
6	848.0563	2.96	27.72	24.15	24.22	30.75	46.00	-15.25	QP



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SZCCS-TRF-01 Rev. A/0 Aug01,2022

Report No.: FYCR220900036502

Page: 35 of 43

7.5 Radiated Emissions Above 1GHz

Test Requirement 47 CFR Part 15, Subpart C 15.209 & 15.249 (a),(d)

Test Method: ANSI C63.10 (2013) Section 6.6

Measurement Distance: 3m

Limit:

Frequency(MHz)	Field strength(microvolts/meter)	Measurement distance(meters)
Above 1000	500	3

7.5.1 E.U.T. Operation

Operating Environment:

Temperature: 22.2 °C

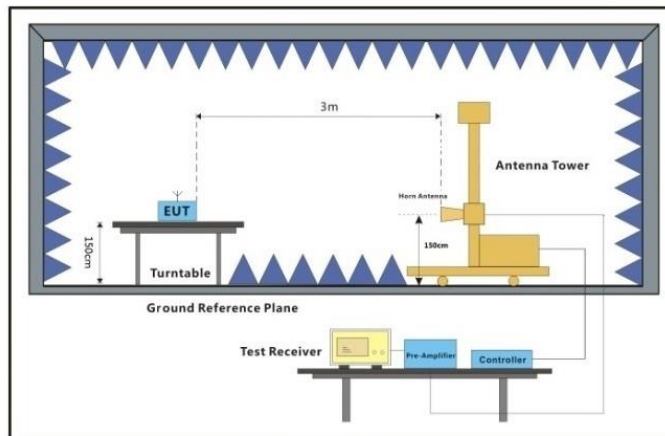
Humidity: 51.6 % RH

Atmospheric Pressure: 1020 mbar

7.5.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	03	TX mode_Keep the EUT(boat) in transmitting with modulation mode.

7.5.3 Test Setup Diagram



Above 1GHz



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SZCCS-TRF-01 Rev. A/0 Aug01,2022

Report No.: FYCR220900036502

Page: 36 of 43

7.5.4 Measurement Procedure and Data

- a. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak or average method as specified and then reported in a data sheet.
- g. Test the EUT in the lowest channel, the middle channel, the Highest channel.
- h. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.
- i. Repeat above procedures until all frequencies measured was complete.

Remark:

1. Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor
2. Scan from 18GHz to 40GHz, the disturbance above 18GHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.
3. As shown in this section, for frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report.
4. The disturbance above 18GHz were very low and the harmonics were the highest point could be found when testing, so only the above harmonics had been displayed.



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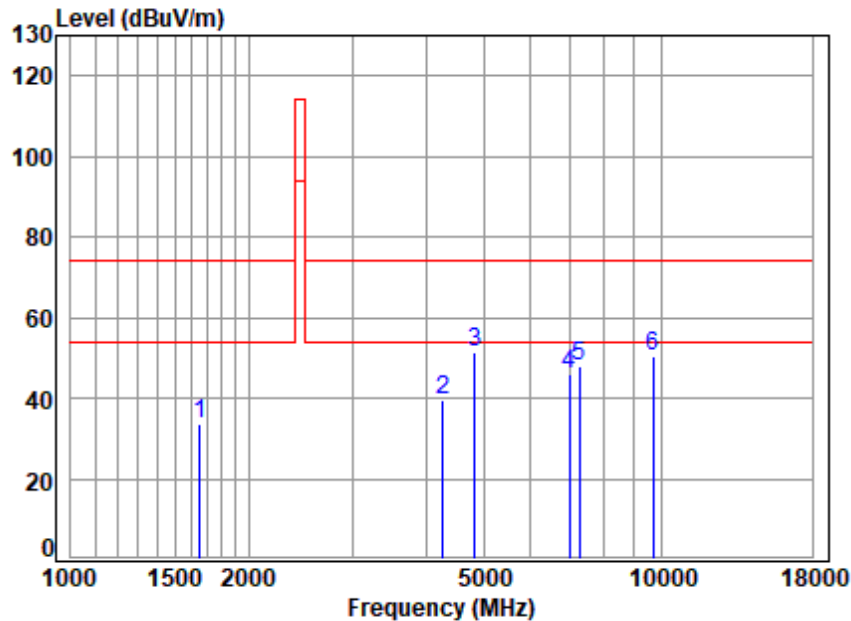
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SZCCS-TRF-01 Rev. A/0 Aug01,2022

Report No.: FYCR220900036502

Page: 37 of 43

Test Mode: 03; Polarity: Horizontal; Modulation:GFSK; Channel:Low



Site : chamber
Condition: 3m HORIZONTAL
Job No : 00365ET
Mode : 2420 TX RSE
: boat

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1653.5500	4.10	24.91	52.94	57.41	33.48	74.00	-40.52	peak
2	4267.2370	7.48	29.88	52.89	54.97	39.44	74.00	-34.56	peak
3	4840.0000	8.04	31.03	53.06	65.33	51.34	74.00	-22.66	peak
4	6974.9820	8.17	35.74	53.48	55.68	46.11	74.00	-27.89	peak
5	7260.0000	8.32	36.12	53.53	57.25	48.16	74.00	-25.84	peak
6	9680.0000	11.35	37.69	53.51	54.72	50.25	74.00	-23.75	peak



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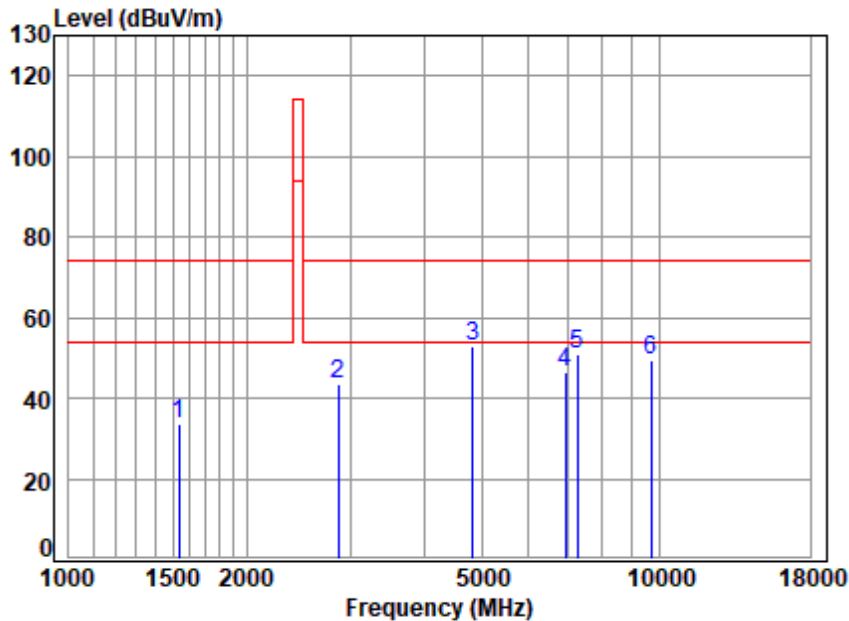
Compliance Certification Services (Kunshan) Inc. Shenzhen Branch

SZCCS-TRF-01 Rev. A/0 Aug01,2022

Report No.: FYCR220900036502

Page: 38 of 43

Test Mode: 03; Polarity: Vertical; Modulation:GFSK; Channel:Low



Site : chamber
Condition: 3m VERTICAL
Job No : 00365ET
Mode : 2420 TX RSE
: boat

		Cable	Ant	Preamp	Read		Limit	Over	
Freq		Loss	Factor	Factor	Level	Level	Line	Limit	Remark
MHz		dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1538.2810	3.86	24.62	52.87	57.78	33.39	74.00	-40.61	peak
2	2855.3800	5.56	28.27	53.10	63.01	43.74	74.00	-30.26	Peak
3	4840.0000	8.04	31.03	53.06	67.12	53.13	74.00	-20.87	peak
4	6934.7780	8.13	35.65	53.46	56.03	46.35	74.00	-27.65	peak
5	7260.0000	8.32	36.12	53.53	60.06	50.97	74.00	-23.03	peak
6	9680.0000	11.35	37.69	53.51	53.74	49.27	74.00	-24.73	peak



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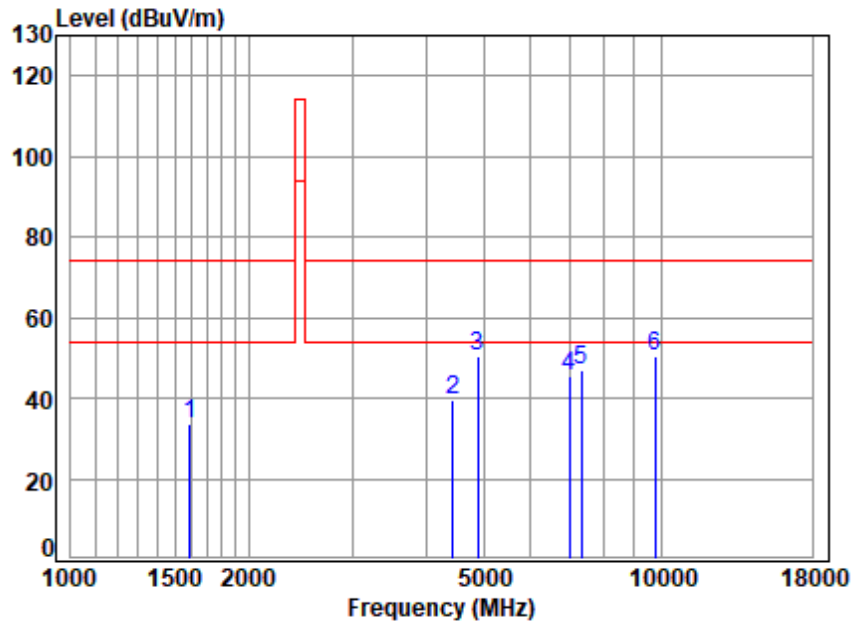
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SZCCS-TRF-01 Rev. A/0 Aug01,2022

Report No.: FYCR220900036502

Page: 39 of 43

Test Mode: 03; Polarity: Horizontal; Modulation:GFSK; Channel:middle



Site : chamber
Condition: 3m HORIZONTAL
Job No : 00365ET
Mode : 2441 TX RSE
: boat

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1592.5710	3.97	24.78	52.90	57.76	33.61	74.00	-40.39	peak
2	4443.4530	7.47	30.12	52.94	54.96	39.61	74.00	-34.39	peak
3	4882.0000	8.11	31.13	53.07	64.45	50.62	74.00	-23.38	peak
4	6974.9820	8.17	35.74	53.48	55.26	45.69	74.00	-28.31	peak
5	7323.0000	8.35	36.19	53.53	56.01	47.02	74.00	-26.98	peak
6	9764.0000	11.29	37.88	53.43	54.61	50.35	74.00	-23.65	peak



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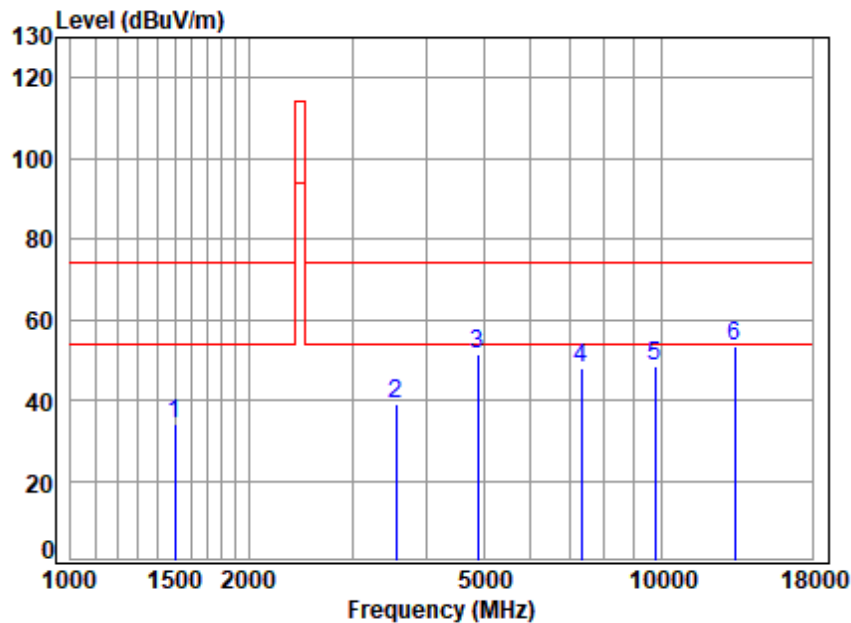
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SZCCS-TRF-01 Rev. A/0 Aug01,2022

Report No.: FYCR220900036502

Page: 40 of 43

Test Mode: 03; Polarity: Vertical; Modulation:GFSK; Channel:middle



Site : chamber
Condition: 3m VERTICAL
Job No : 00365ET
Mode : 2441 TX RSE
: boat

		Cable	Ant	Preamp	Read		Limit	Over	
Freq		Loss	Factor	Factor	Level	Level	Line	Limit	Remark
MHz		dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1498.7810	3.77	24.51	52.85	58.72	34.15	74.00	-39.85	peak
2	3556.8430	7.05	28.80	52.92	56.28	39.21	74.00	-34.79	peak
3	4882.0000	8.11	31.13	53.07	65.34	51.51	74.00	-22.49	peak
4	7323.0000	8.35	36.19	53.53	56.96	47.97	74.00	-26.03	peak
5	9764.0000	11.29	37.88	53.43	52.88	48.62	74.00	-25.38	peak
6	13326.750	12.23	40.30	54.07	55.14	53.60	74.00	-20.40	Peak



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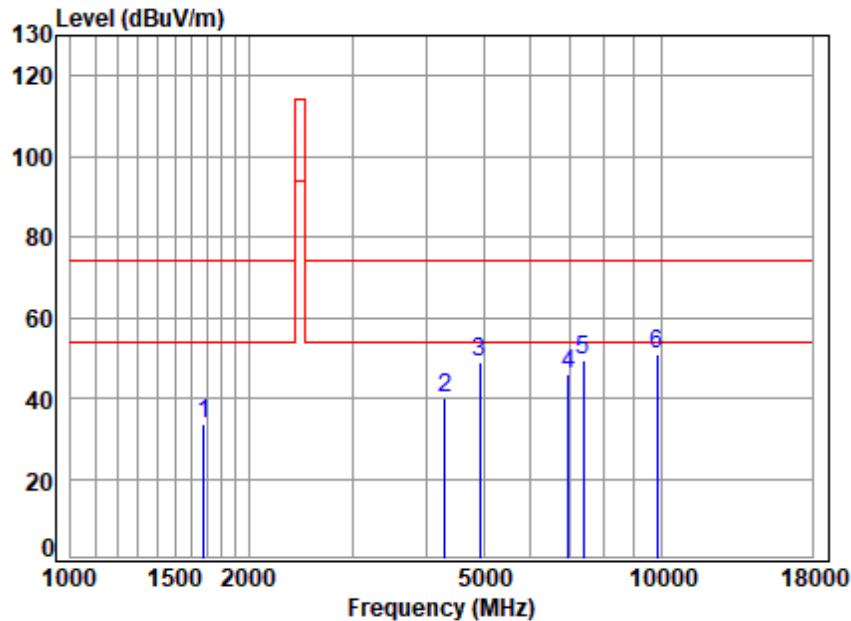
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SZCCS-TRF-01 Rev. A/0 Aug01,2022

Report No.: FYCR220900036502

Page: 41 of 43

Test Mode: 03; Polarity: Horizontal; Modulation:GFSK; Channel:High



Site : chamber
Condition: 3m HORIZONTAL
Job No : 00365ET
Mode : 2462 TX RSE
: boat

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1682.4770	4.16	24.97	52.95	57.25	33.43	74.00	-40.57	peak
2	4304.4000	7.48	29.94	52.90	55.48	40.00	74.00	-34.00	peak
3	4924.0000	8.18	31.23	53.08	62.54	48.87	74.00	-25.13	peak
4	6954.8520	8.15	35.70	53.47	55.52	45.90	74.00	-28.10	peak
5	7386.0000	8.38	36.27	53.54	58.31	49.42	74.00	-24.58	peak
6	9848.0000	11.23	38.07	53.35	55.11	51.06	74.00	-22.94	peak



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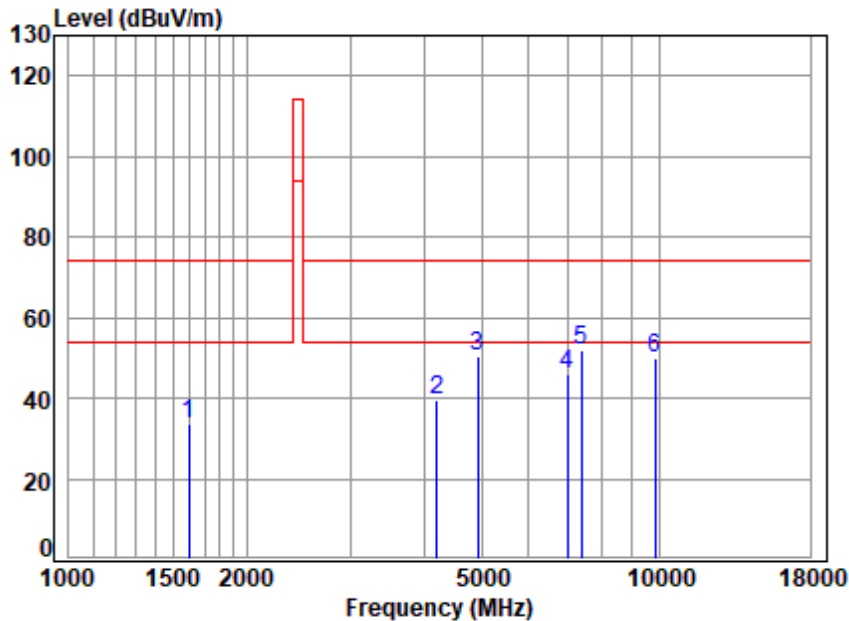
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SZCCS-TRF-01 Rev. A/0 Aug01,2022

Report No.: FYCR220900036502

Page: 42 of 43

Test Mode: 03; Polarity: Vertical; Modulation:GFSK; Channel:High



Site : chamber
Condition: 3m VERTICAL
Job No : 00365ET
Mode : 2462 TX RSE
: boat

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1597.1810	3.98	24.79	52.91	57.78	33.64	74.00	-40.36	peak
2	4206.0110	7.48	29.80	52.87	55.17	39.58	74.00	-34.42	peak
3	4924.0000	8.18	31.23	53.08	64.18	50.51	74.00	-23.49	peak
4	6974.9820	8.17	35.74	53.48	55.57	46.00	74.00	-28.00	peak
5	7386.0000	8.38	36.27	53.54	60.57	51.68	74.00	-22.32	peak
6	9848.0000	11.23	38.07	53.35	53.93	49.88	74.00	-24.12	peak



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SZCCS-TRF-01 Rev. A/0 Aug01,2022

Report No.: FYCR220900036502

Page: 43 of 43

8 Test Setup Photo

Refer to Appendix - Test Setup Photo for FYCR2209000365ET(boat).

9 EUT Constructional Details (EUT Photos)

Refer to external and internal photos for FYCR2209000365ET(boat).

- End of the Report -



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