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TEST REPORT

Application No.:	GZEM1102000413RF
Applicant:	TELE RADIO AB
FCC ID:	ONFC1101A
Product Name:	Receiver
Product Description:	433.92MHz Receiver
Model No:	T20-BOATLIFT(TigerShark), T20RX-04ADLB *
*	Please refer to section 3 of this report for more details.
Standards:	FCC PART 15 SUBPART B:2009
Date of Receipt:	2011-02-17
Date of Test:	2011-02-22 to 2011-03-22
Date of Issue:	2011-03-24
Test Result :	Pass*

In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:

201 (Mar.

Strong Yao Manager

The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards

The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government. All test results in this report can be traceable to National or International Standards.

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2 Version

Revision Record				
Version	Chapter	Date	Modifier	Remark
00		2011-03-24		Original

Authorized for issue by:		
Tested By	Rycm Yang (Ryan Yang) /Project Engineer	2011-02-22 to 2011-03-22 Date
Prepared By	Millie Li) /Clerk	2011-03-24 Date
Checked By	S-grong yao	2011-03-24
	(Strong Yao) /Reviewer	Date

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3 Test Summary

Electromagnetic Interference (EMI)					
Test	Test Requirement	Test Method	Class / Severity	Result	
Conducted Emission (150 KHz to 30 MHz)	FCC PART 15 SUBPART B:2009	ANSI C63.4:2009	Class B	PASS	
Radiated Emission (30 MHz to 1 GHz)	FCC PART 15 SUBPART B:2009	ANSI C63.4:2009	Class B	PASS	
Radiated Emission above 1 GHz	FCC PART 15 SUBPART B:2009	ANSI C63.4:2009	Class B	PASS	

Remark :

EUT: In this whole report EUT means Equipment Under Test.

Model No: T20-BOATLIFT(TigerShark), T20RX-04ADLB

According to the confirmation from the applicant, T20-BOATLIFT(TigerShark) and T2ORX-O4ADLB are different model No. that contains the same radio receiver.

T20-BOATLIFT(TigerShark) is product number for a completely assembled product that includes the radio receiver and transmitter which got FCC approval (FCC ID: ONFT20TX-0XNKL). T20RX-04ADLB is the product number for the radio receiver alone.

The electrical circuit design, layout and components used in the radio receiver for above models are identical. The differences between the two models has no impact on the RF power. Therefore only one model T20-BOATLIFT(TigerShark) was tested in this report.



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5 General Information

5.1 Client Information

Applicant:TELE RADIO ABAddress of Applicant:Datavägen 21, SE-436 32 Askim, Sweden

5.2 General Description of E.U.T.

Product Name:	Receiver
Product Description:	433.92MHz Receiver
Model No:	T20-BOATLIFT(TigerShark), T20RX-04ADLB

5.3 Details of E.U.T.

Power Supply:	AC 120/230/400V 3W+N+PE, 50-60Hz, 10A
Power Cord:	N/A

5.4 Description of Support Units

The EUT has been tested with ancillary transmitter that supplied by manufacturer.

5.5 Deviation from Standards

None.

5.6 Abnormalities from Standard Conditions

None.

5.7 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou EMC Laboratory, 198 Kezhu Road, Scientech Park, Guangzhou Economic & Technology Development District, Guangzhou, China 510663 Tel: +86 20 82155555 Fax: +86 20 82075059

No tests were sub-contracted.



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5.8 Test Facility

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

• NVLAP (Lab Code: 200611-0)

SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou EMC Laboratory is recognized under the National Voluntary Laboratory Accreditation Program (NVLAP/NIST). NVLAP Code: 200611-0.

• ACMA

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory can also perform testing for the Australian C-Tick mark as a result of our NVLAP accreditation.

SGS UK(Certificate No.: 32), SGS-TUV SAARLAND and SGS-FIMKO

Have approved SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory as a supplier of EMC TESTING SERVICES and SAFETY TESTING SERVICES.

• CNAS (Lab Code: L0167)

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been assessed and in compliance with CNAS-CL01:2006 accreditation criteria for testing laboratories (identical to ISO/IEC 17025:2005 General Requirements) for the Competence of Testing Laboratories.

• FCC (Registration No.: 282399)

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 282399, May 31, 2002.

Industry Canada (Registration No.: 4620B-1)

The 3m/10m Alternate Semi-anechoic chamber of SGS-CSTC Standards Technical Services Co., Ltd. has been registered by Certification and Engineering of Industry Canada for radio equipment testing with Registration No. 4620B-1.

• VCCI (Registration No.: R-2460 and C-2584)

The 10m Semi-anechoic chamber and Shielded Room of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-2460 and C-2584 respectively.

• CBTL (Lab Code: TL129)

SGS-CSTC Standards Technical Services Co., Ltd., E&E Laboratory has been assessed and fully comply with the requirements of ISO/IEC 17025:2005, the Basic Rules, IECEE 01:2006-10 and Rules of procedure IECEE 02:2006-10, and the relevant IECEE CB-Scheme Operational documents.



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6 Equipment Used during Test

Conducted Emission					
Na	To at Environment	Manufashuran	Model No.	Corrige No.	Cal.Due date
NO.	rest Equipment	Manufacturer		Serial No.	(YYYY-MM-DD)
EMC0306	Shielding Room	Zhong Yu	8 x 3 x 3.8 m ³	N/A	N/A
EMC0118	Two-line v-netwok	R&S	ENV216	100359	2011-09-25
EMC0506	EMI Test Receiver	Rohde & Schwarz	ESCS30	100085	2011-11-24
EMC0107	Coaxial Cable	SGS	2m	N/A	2011-07-18
EMC0106	Voltage Probe	SGS	N/A	N/A	N/A
EMC0120	8 Line ISN	Fischer Custom Communications Inc.	FCC-TLISN-T8-02	20550	2012-01-17
EMC0121	4 Line ISN	Fischer Custom Communications Inc.	FCC-TLISN-T4-02	20549	2012-01-17
EMC0122	2 Line ISN	Fischer Custom Communications Inc.	FCC-TLISN-T2-02	20548	2012-01-17

RE in Chamber					
No	Toot Equipment	Manufaaturar	MedalNa	Sorial No.	Cal.Due date
NO.	rest Equipment	Manufacturer	Model No.	Serial No.	(YYYY-MM-DD)
EMC0525	Compact Semi- Anechoic Chamber	ChangZhou ZhongYu	N/A	N/A	2011-09-06
EMC0522	EMI Test Receiver	Rohde & Schwarz	ESIB26	100283	2012-01-17
EMC0056	EMI Test Receiver	Rohde & Schwarz	ESCI	10036	2011-06-02
N/A	EMI Test Software	Audix	E3	N/A	N/A
EMC0514	Coaxial cable	SGS	N/A	N/A	2011-12-08
EMC0524	Bi-log Type Antenna	Schaffner -Chase	CBL6112B	2966	2011-12-20
EMC0519	Bilog Type Antenna	Schaffner -Chase	CBL6143	5070	2011-12-20
EMC0518	Horn Antenna	Rohde & Schwarz	HF906	100096	2011-09-11
EMC0521	1-26.5 GHz Pre-Amplifier	Agilent	8449B	3008A01649	2012-01-17
EMC0049	Amplifier	Agilent	8447D	2944A10862	2011-04-21
EMC0075	310N Amplifier	Sonama	310N	272683	2011-10-25
EMC0523	Active Loop Antenna	EMCO	6502	42963	2011-11-17
EMC0530	10m Semi- Anechoic Chamber	ETS	N/A	N/A	2011-05-17

General used equipment					
No Toot Equipm	Tost Equipmont	Manufacturer	Model No.	Serial No.	Cal.Due date
NO.	rest Equipment				(YYYY-MM-DD)
EMC0006	DMM	Fluke	73	70681569	2011-12-16
EMC0007	DMM	Fluke	73	70671122	2011-12-16

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7 Emission Test Results

7.1 Conducted Emissions Mains Terminals, 150 KHz to 30MHz

Class B

Test Requirement:	FCC Part15 B
Test Method:	ANSI C63.4
Test Voltage:	120V AC, 60Hz
Test Date:	2011-02-22
Frequency Range:	150KHz to 30MHz
Detector:	Peak for pre-scan
	Quasi-Peak and Average at frequency with maximum peak
	(9 kHz resolution bandwidth)

Frequency range	Class B Limits dB (μV)			
MHZ	Quasi-peak	Average		
0.15 to 0.50	66 to 56	56 to 46		
0.50 to 5	56	46		
5 to 30	60	50		
NOTE 1 :The limit decreases linearly with the logarithm of the frequency in the range				
0.15 MHz to 0.50 MHz.				
NOTE 2: The lower limit is ap	NOTE 2: The lower limit is applicable at the transition frequency.			

7.1.1 E.U.T. Operation

Class / Limit:

Operating Environment:

Temperature:23.0 °CHumidity:52 %RHAtmospheric Pressure:1003mbarEUT Operation:Test the EUT in operating mode.

Remark: The receiver tested with ancillary transmitter which supplied by manufacturer, the transmitter transmits a 433.92MHz signal with FSK modulation to the EUT and keeps continuous communication between them.



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Shielding Room Test Receiver FUT AE UI UI

7.1.2 Test Setup and Procedure

- 1. The mains terminal disturbance voltage test was conducted in a shielded room.
- 2. The EUT was connected to nominal power supply through a LISN 1 (Line Impedance Stabilization Network) which provides a 50Ω/50µH + 5Ω linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.
- 3. The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane, but separated from metallic contact with the ground reference plane by 0.1m of insulation.
- 4. The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2.



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7.1.3 Measurement Data

Pre-scan was performed with peak detected on both live and neutral cable. Quasi-peak & average measurements were performed at the frequencies which maximum peak emission level was detected. Please see the attached Quasi-peak and Average test results.

Live Line:

Peak Scan: Level (dBµV)



Quasi-peak and Average measurement

Freq	Read Level	Cable Loss	LISN Factor	Level	Limit Line	Over Limit	Remark
MHz	dBuV	dB	dB	dBuV	dBuV	dB	
0.601	-0.20	0.05	9.62	9.47	56.00	-46.53	QP
0.601	-1.25	0.05	9.62	8.42	46.00	-37.58	AVERAGE
1.065	-0.18	0.02	9.62	9.46	56.00	-46.54	QP
1.065	-1.33	0.02	9.62	8.31	46.00	-37.69	AVERAGE
1.317	-1.33	0.02	9.63	8.32	46.00	-37.68	AVERAGE
1.317	-0.28	0.02	9.63	9.37	56.00	-46.63	QP
1.671	-0.38	0.02	9.63	9.27	56.00	-46.73	QP
1.671	-1.25	0.02	9.63	8.40	46.00	-37.60	AVERAGE
2.664	-0.30	0.10	9.64	9.44	56.00	-46.56	QP
2.664	-1.25	0.10	9.64	8.49	46.00	-37.51	AVERAGE
4.454	-0.32	0.15	9.64	9.47	56.00	-46.53	QP
4.454	-1.25	0.15	9.64	8.54	46.00	-37.46	AVERAGE



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Quasi-peak and Average measurement:

Freq	Read Level	Cable Loss	LISN Factor	Level	Limit Line	Over Limit	Remark
MHz	dBuV	dB	dB	dBuV	dBuV	dB	
0.544	0.08	0.05	9.62	9.75	56.00	-46.25	QP
0.544	-1.33	0.05	9.62	8.34	46.00	-37.66	AVERAGE
0.933	-0.34	0.04	9.63	9.33	56.00	-46.67	QP
0.933	-1.42	0.04	9.63	8.25	46.00	-37.75	AVERAGE
1.269	-0.54	0.02	9.65	9.13	56.00	-46.87	QP
1.269	-1.42	0.02	9.65	8.25	46.00	-37.75	AVERAGE
2.297	-0.08	0.08	9.67	9.67	56.00	-46.33	QP
2.297	-1.42	0.08	9.67	8.33	46.00	-37.67	AVERAGE
2,962	-1.33	0.12	9.68	8.47	46.00	-37.53	AVERAGE
2,962	-0.10	0.12	9.68	9.70	56.00	-46.30	QP
4.136	-1.25	0.14	9.69	8.59	46.00	-37.41	AVERAGE
4.136	-0.04	0.14	9.69	9.80	56.00	-46.20	QP

Level = Read Level + LISN Factor + Cable Loss.



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7.2 Radiated Emissions, 30MHz to 1GHz

Test Requirement:	FCC Part15 B
Test Method:	ANSI C63.4
Test Voltage:	120V AC, 60Hz
Test Date:	2011-02-22
Frequency Range:	30MHz to 1GHz
Measurement Distance:	3 m
Detector:	Peak for pre-scan
	Quasi-Peak if maximised peak within 6dB of limit
	(120 kHz resolution bandwidth)
Class / Limit:	Class B

Frequency range	Quasi-peak limits
MHz	dB (µV/m)
30 to 88	40
88 to 216	43.5
216 to 960	46
Above 960	54
At transitional frequencies the lower limit applies.	

7.2.1 E.U.T. Operation

Operating Environment:

Temperature: 21.0 °C Humidity: 53 %RH Atmospheric Pressure: 1007 mbar EUT Operation: Test the EUT in operating mode.

Remark: The receiver tested with ancillary transmitter which supplied by manufacturer, the transmitter transmits a 433.92MHz signal with FSK modulation to the EUT and keeps continuous communication between them.



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7.2.2 Test Setup and Procedure



- 1. The radiated emissions test was conducted in a semi-anechoic chamber.
- 2. Biconical and log periodic antenna was used for the frequency range from 30MHz to 1GHz
- 3. The EUT was connected to nominal power supply through a mains power outlet which was bonded to the ground reference plane; The mains cables were draped to the ground reference plane. The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane, but separated from metallic contact with the ground reference plane by 0.1m of insulation.
- 4. Before final measurements of radiated emissions, a pre-scan was performed in the spectrum mode with the peak detector to find out the maximum emissions spectrum plots of the EUT.
- 5. The frequencies of maximum emission were determined in the final radiated emissions measurement. At each frequency, the EUT was rotated 360°, and the antenna was raised and lowered from 1 to 4 meters in order to determine the maximum disturbance. Measurements were performed for both horizontal and vertical antenna polarization.

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7.2.3 Measurement Data

Vertical: Peak scan Level (dBµV/m)



Quasi-peak measurement

	ReadAntenna		Cable	Preamp		Limit	Over		
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Remark	
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
67.830	32.27	4.55	0.80	27.80	9.82	40.00	-30.18	QP	
260.860	27.75	12.50	1.50	27.13	14.62	46.00	-31.38	QP	
380.170	28.30	15.50	1.70	27.65	17.86	46.00	-28.14	QP	
560.590	30.58	18.40	2.10	28.25	22.82	46.00	-23.18	QP	
750.710	30.12	20.27	2.40	27.75	25.04	46.00	-20.96	QP	
849.650	28.86	20.50	2.60	27.18	24.78	46.00	-21.22	QP	

Level = Read Level + Antenna Factor + Cable Loss – Preamp Factor.



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Quasi-peak measurement

	ReadAntenna		Cable Preamp		Limit		Over	
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
133.790	27.88	11.70	1.00	27.49	13.09	43.50	-30.41	QP
249.220	26.65	11.50	1.40	27.15	12.40	46.00	-33.60	QP
531.490	27.58	17.96	2.00	28.15	19.39	46.00	-26.61	QP
627.520	28.49	18.70	2.30	28.23	21.26	46.00	-24.74	QP
780.780	28.13	19.80	2.50	27.67	22.76	46.00	-23.24	QP
901.060	28.38	20.70	2.60	26.73	24.95	46.00	-21.05	QP

Level = Read Level + Antenna Factor + Cable Loss – Preamp Factor.



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7.3 Radiated Emissions above 1 GHz

Test Requirement:	FCC Part15 B
Test Method:	ANSI C63.4
Test Voltage:	120V AC, 60Hz
Test Date:	2011-03-22
Frequency Range:	1 GHz to 2 GHz
Measurement Distance:	3 m
Detector:	Peak for pre-scan
	Peak and Average if maximised peak within 6 dB of limit
	(1 MHz resolution bandwidth)
Class / Limit:	Class B

For Class B

F	Class B Limits			
	dΒ (μV)			
	Quasi-peak	Average		
Above 1000	74	54		

7.3.1 E.U.T. Operation

Operating Environment:

Temperature:25.0 °CHumidity:45 %RHAtmospheric Pressure:1008mbarEUT Operation:Test the EUT in operating mode.

Remark: The receiver tested with ancillary transmitter which supplied by manufacturer, the transmitter transmits a 433.92MHz signal with FSK modulation to the EUT and keeps continuous communication between them.



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7.3.2 Test Setup and Procedure



- 1. The radiated emissions test was conducted in a fully-anechoic chamber.
- 2. Horn antenna was used for the frequency above 1GHz
- 3. The EUT was connected to nominal power supply through a mains power outlet which was bonded to the ground reference plane; The mains cables were draped to the ground reference plane. The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane, but separated from metallic contact with the ground reference plane by 0.1m of insulation.
- 4. Before final measurements of radiated emissions, a pre-scan was performed in the spectrum mode with the peak detector to find out the maximum emission spectrum plots of the EUT.
- 5. The frequencies of maximum emission were determined in the final radiated emissions measurement. At each frequency, the EUT was rotated 360°, and the antenna was raised and lowered from 1 to 4 meters in order to determine the maximum disturbance. Measurements were performed for both horizontal and vertical antenna polarization.

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7.3.3 Measurement Data



Peak and Average measurement:

	ReadAntenn		Cable	Preamp	Limit		Over	
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1117.500	38.31	24.54	2.95	36.28	29.52	54.00	-24.48	Average
1117.500	49.31	24.54	2.95	36.28	40.52	74.00	-33.48	Peak
1305.500	35.90	25.52	3.20	36.10	28.53	54.00	-25.47	Average
1305.500	48.90	25.52	3.20	36.10	41.53	74.00	-32.47	Peak
1411.250	49.22	25.38	3.33	36.00	41.93	74.00	-32.07	Peak
1411.250	38.22	25.38	3.33	36.00	30.93	54.00	-23.07	Average
1552.250	37.70	25.08	3.50	35.87	30.41	54.00	-23.59	Average
1552.250	49.40	25.08	3.50	35.87	42.11	74.00	-31.89	Peak
1681.500	36.89	24.98	3.67	35.79	29.75	54.00	-24.25	Average
1681.500	48.89	24.98	3.67	35.79	41.75	74.00	-32.25	Peak
1834.250	34.17	25.45	3.80	35.69	27.73	54.00	-26.27	Average
1834.250	48.17	25.45	3.80	35.69	41.73	74.00	-32.27	Peak

Level = Read Level + Antenna Factor + Cable Loss – Preamp Factor.

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Peak and Average	measurement:
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	ReadÀntenna		Cable	Preamp		Limit		
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1035.250	36.25	24.49	2.80	36.38	27.17	54.00	-26.83	Average
1035.250	49.25	24.49	2.80	36.38	40.17	74.00	-33.83	Peak
1164.500	34.86	24.82	3.03	36.25	26.47	54.00	-27.53	Average
1164.500	48.86	24.82	3.03	36.25	40.47	74.00	-33.53	Peak
1305.500	36.77	25.52	3.20	36.10	29.40	54.00	-24.60	Average
1305.500	49.77	25.52	3.20	36.10	42.40	74.00	-31.60	Peak
1493.500	36.12	25.22	3.40	35.93	28.82	54.00	-25.18	Average
1493.500	49.12	25.22	3.40	35.93	41.82	74.00	-32.18	Peak
1587.500	36.99	25.01	3.50	35.85	29.65	54.00	-24.35	Average
1587.500	47.99	25.01	3.50	35.85	40.65	74.00	-33.35	Peak
1787.250	48.33	25.24	3.80	35.73	41.65	74.00	-32.35	Peak
1787.250	37.33	25.24	3.80	35.73	30.65	54.00	-23.35	Average

Level = Read Level + Antenna Factor + Cable Loss – Preamp Factor.

--End of Report--

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