



RF Test Report

Applicant: Tag-N-Trac Inc.
Address: 4250 Executive Sq, #675, La Jolla, California, United States, 92037
Product: Sense Stream Tag - Single Use
Model No.: ST100-SU
Brand Name: Tag-N-Trac
FCC ID: 2A24I-V02G15J18
Standards: 47 CFR Part 24
47 CFR Part 27
Report No.: PD20240022RF01
Issue Date: 2024/03/13
Test Result: PASS *

* The above equipment has been tested and compliance with the requirement of the relative standards by Hefei Panwin Technology Co., Ltd.

Reviewed By: Jerry Zhang

Approved By: Alec Yang

Hefei Panwin Technology Co., Ltd.

Floor 1, Zone E, Plant 2#, Mingzhu Industrial Park, No.106 Chuangxin Avenue, High-tech Zone, Hefei City, Anhui Province, China
TEL: +86-0551-63811775

Revision History

Report No.	Version	Description	Issue Date	Note
PD20240022RF01	1	Initial Report	2024/03/13	Valid

Remark:

This testing report only tested Radiated Spurious Emission data, please refer to the module report for other testing items.(Model No.: **BG95-M1**, Report No.: **R2004A0250-R2V3**, **R2004A0250-R3V3**)

CONTENTS

1 Test Laboratory	8
1.1 Notes of the Test Report	8
1.2 Test Facility	8
1.3 Testing Laboratory	8
2 General Description of Equipment under Test	8
2.1 Details of Application	8
2.2 Details of EUT	9
2.3 Maximum Conducted power and Emission Designator	10
2.4 Frequency List of Low/Middle/High Channels	11
2.5 Applied Standards	13
3 Test Condition	14
3.1 Test Environmental Conditions	14
3.2 Test Configuration	14
3.3 Equipment List	15
3.4 Test Uncertainty	16
4 Test Items Description	17
4.1 Radiated Spurious Emission	17
Appendixes	19

Test Summary

LTE Band 2

No.	Test Case	FCC Rules	Limit	Verdict
1	RF Output Power & Effective Radiated Power	§2.1046, §24.232(c)	EIRP ≤2 Watt	Reference report R2004A0250-R2V3
2	Peak-to-Average Ratio	§24.232(d)	≤13 dB	Reference report R2004A0250-R2V3
3	Occupied Bandwidth	§2.1049	No limit.	Reference report R2004A0250-R2V3
4	Conducted Band Edge Measurement	§2.1051, §24.238(a)	≤ -13 dBm/1%*EBW, in 1 MHz bands immediately outside and adjacent to the frequency block.	Reference report R2004A0250-R2V3
5	Spurious Emissions at Antenna Terminals	§2.1051, §24.238(a)	≤ -13 dBm/1 MHz, from 9 kHz to 10 th harmonics but outside authorized operating frequency ranges.	Reference report R2004A0250-R2V3
6	Radiated Spurious Emission	§2.1053, §24.238(a)	≤ -13 dBm/1 MHz.	PASS
7	Frequency Stability	§2.1055 §24.235	Within authorized bands of operation/frequency block.	Reference report R2004A0250-R2V3

LTE Band 4

No.	Test Case	FCC Rules	Limit	Verdict
1	RF Output Power & Effective Radiated Power	§2.1046, §27.50(d)(4)	EIRP ≤ 1 Watt	Reference report R2004A0250-R3V3
2	Peak-to-Average Ratio	§27.50(d)(5)	≤13 dB	Reference report R2004A0250-R3V3
3	Occupied Bandwidth	§2.1049	No limit.	Reference report R2004A0250-R3V3
4	Conducted Band Edge Measurement	§2.1051, §27.53(h)	≤ -13 dBm/1%*EBW, in 1 MHz bands immediately outside and adjacent to the frequency block.	Reference report R2004A0250-R3V3
5	Spurious Emissions at Antenna Terminals	§2.1051, §27.53(h)	≤ -13 dBm/1 MHz, from 9 kHz to 10 th harmonics but outside authorized operating frequency ranges.	Reference report R2004A0250-R3V3
6	Radiated Spurious Emission	§2.1053, §27.53(h)	≤ -13 dBm/1 MHz.	PASS
7	Frequency Stability	§2.1055 §27.54	Within authorized bands of operation/frequency block.	Reference report R2004A0250-R3V3

LTE Band 13

No.	Test Case	FCC Rules	Limit	Verdict
1	RF Output Power & Effective Radiated Power	§2.1046, §27.50(b)(10)	ERP ≤ 3 Watt	Reference report R2004A0250-R3V3
2	Peak-to-Average Ratio	--	≤13 dB	Reference report R2004A0250-R3V3
3	Occupied Bandwidth	§2.1049	No limit.	Reference report R2004A0250-R3V3
4	Conducted Band Edge Measurement	§2.1051, §27.53(c)	≤ -13 dBm/1%*EBW, in 1 MHz bands immediately outside and adjacent to the frequency block.	Reference report R2004A0250-R3V3
5	Spurious Emissions at Antenna Terminals	§2.1051, §27.53(c) §27.53(f)	FCC: ≤ -13 dBm/100 kHz, from 9 kHz to 10 th harmonics but outside authorized operating frequency ranges. On all frequencies between 763–775 MHz and 793–805 MHz, by a factor not less than 65 + 10 log (P) dB in a 6.25 kHz band segment, for mobile and portable stations; For operations in the 746–758 MHz, 775–788 MHz, and 805–806 MHz bands, emissions in the band 1559–1610 MHz shall be limited to -70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and -80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth.	Reference report R2004A0250-R3V3
6	Radiated Spurious Emission	§2.1053, §27.53(c) §27.53(f)	FCC: ≤ -13 dBm/100 kHz. For operations in the 746–758 MHz, 775–788 MHz, and 805–806 MHz bands, emissions in the band 1559–1610 MHz shall be limited to -70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and -80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth.	PASS
7	Frequency Stability	§2.1055 §27.54	Within authorized bands of operation/frequency block.	Reference report R2004A0250-R3V3

LTE Band 12

No.	Test Case	FCC Rules	Limit	Verdict
1	RF Output Power & Effective Radiated Power	§2.1046, §27.50(c)(10)	ERP ≤ 3 Watt	Reference report R2004A0250-R3V3
2	Peak-to-Average Ratio	--	≤13 dB	Reference report R2004A0250-R3V3
3	Occupied Bandwidth	§2.1049	No limit.	Reference report R2004A0250-R3V3
4	Conducted Band Edge Measurement	§2.1051, §27.53(g)	≤ -13 dBm/1%*EBW, in 1 MHz bands immediately outside and adjacent to the frequency block.	Reference report R2004A0250-R3V3
5	Spurious Emissions at Antenna Terminals	§2.1051, §27.53(g)	FCC: ≤ -13 dBm/100 kHz, from 9 kHz to 10 th harmonics but outside authorized operating frequency ranges.	Reference report R2004A0250-R3V3
6	Radiated Spurious Emission	§2.1053, §27.53(g)	FCC: ≤ -13 dBm/100 kHz.	PASS
7	Frequency Stability	§2.1055 §27.54	Within authorized bands of operation/frequency block.	Reference report R2004A0250-R3V3

Radiated detection date: 2024/02/28 to 2024/03/11

Date of Sample Received: 2024/02/27

- We, Hefei Panwin Technology Co., Ltd., would like to declare that the tested sample has been evaluated in accordance with the procedures given in applied standard(s) in **Section 2.5** of this report and shown compliance with the applicable technical standards.
- All indications of PASS/FAIL in this report are based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only.

1 Test Laboratory

1.1 Notes of the Test Report

This report is invalid without signature of auditor and approver or with any alterations. The report shall not be partially reproduced without written approval of the testing company. Entrusted test results are only responsible for incoming samples. If there is any objection to the testing report, it shall be raised to the testing company within 15 days from the date of receiving the report. In the test results, "NA" means "not applicable", and the test items marked with "Δ" are subcontracted projects.

1.2 Test Facility

FCC (Designation Number: CN1361, Test Firm Registration Number: 473156)

Hefei Panwin Technology Co., Ltd. has been listed on the US Federal Communications Commission list of test facilities recognized to perform measurements.

A2LA (Certificate Number: 6849.01)

Hefei Panwin Technology Co., Ltd. has been listed by American Association for Laboratory Accreditation to perform measurement.

1.3 Testing Laboratory

Company Name	Hefei Panwin Technology Co., Ltd.
Address	Floor 1, Zone E, Plant 2#, Mingzhu Industrial Park, No.106 Chuangxin Avenue, High-tech Zone, Hefei City, Anhui Province, China
Telephone	+86-0551-63811775
Post Code	230031

2 General Description of Equipment under Test

2.1 Details of Application

Applicant	Tag-N-Trac Inc.
Applicant Address	4250 Executive Sq, #675, La Jolla, California, United States, 92037
Manufacturer	AOVX WIRELESS SOLUTIONS CO. LTD
Manufacturer Address	Room 501, BlockA1, ZhongAn Valley, 900 Wangjiang West Road, High-tech Zone, HeFei, China 230088
Factory	Anhui Sharetronic Data Technology Co., Ltd
Factory Address	Hefei Sharetronic Technology Industrial Park, intersection of Innovation Avenue and Chang'an Road, High-tech Zone, Hefei, Anhui China, 230088

2.2 Details of EUT

Product		Sense Stream Tag - Single Use							
Model		ST100-SU							
Hardware Version		V2.1							
Software Version		/							
SN		/							
E-UTRA Specification									
Single Band		FDD Band: 2, 4, 12, 13							
Power Class for LTE		PC3							
LTE Category		M1							
Type of Modulation		UL: QPSK, 16QAM							
Antenna Type		<input checked="" type="checkbox"/> Internal <input type="checkbox"/> External							
Antenna Gain		LTE Band 2: 2.69dBi LTE Band 4: 2.67dBi LTE Band 12: -0.20dBi LTE Band 13: -1.14dBi							
Frequency Band(s)	SISO Band	Supported Channel Bandwidth (MHz)						Tx (MHz)	Rx (MHz)
		1.4	3	5	10	15	20		
	LTE Band 2	v	v	v	v	v	v	1850 to 1910	1930 to 1990
	LTE Band 4	v	v	v	v	v	v	1710 to 1755	2110 to 2155
	LTE Band 12	v	v	v	v	-	-	699 to 716	729 to 746
LTE Band 13	-	-	v	v	-	-	777 to 787	746 to 756	
Note: The declared of product specification for EUT and/or Antenna presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.									

Support Equipment				
Equipment	Manufacturer	Description	Model	Serial Number
USB cable	/	1m	/	/
Internal Antenna	SUNNYWAY	/	SY-ST100-SU-MAIN-V2.0	/

2.3 Maximum Conducted power and Emission Designator

E-UTRA:	Bandwidth (MHz)	QPSK		16QAM	
		Max Power (W)	Designator	Max Power (W)	Designator
LTE Band 2	1.4	Reference report R2004A0250-R2V3			
	3				
	5				
	10				
	15				
	20				
LTE Band 4	1.4	Reference report R2004A0250-R3V3			
	3				
	5				
	10				
	15				
	20				
LTE Band 12	1.4	Reference report R2004A0250-R3V3			
	3				
	5				
	10				
LTE Band 13	5	Reference report R2004A0250-R3V3			
	10				

2.4 Frequency List of Low/Middle/High Channels

LTE Band 2 Channel and Frequency List				
BW [MHz]	Channel/Frequency(MHz)	Lowest	Middle	Highest
1.4	Channel	18607	18900	19193
	Frequency	1850.7	1880	1909.3
3	Channel	18615	18900	19185
	Frequency	1851.5	1880	1908.5
5	Channel	18625	18900	19175
	Frequency	1852.5	1880	1907.5
10	Channel	18650	18900	19150
	Frequency	1855	1880	1905
15	Channel	18675	18900	19125
	Frequency	1857.5	1880	1902.5
20	Channel	18700	18900	19100
	Frequency	1860	1880	1900

LTE Band 4 Channel and Frequency List				
BW [MHz]	Channel/Frequency(MHz)	Lowest	Middle	Highest
1.4	Channel	19957	20175	20393
	Frequency	1710.7	1732.5	1754.3
3	Channel	19965	20175	20385
	Frequency	1711.5	1732.5	1753.5
5	Channel	19975	20175	20375
	Frequency	1712.5	1732.5	1752.5
10	Channel	20000	20175	20350
	Frequency	1715	1732.5	1750
15	Channel	20025	20175	20325
	Frequency	1717.5	1732.5	1747.5
20	Channel	20050	20175	20300
	Frequency	1720	1732.5	1745

LTE Band 12 Channel and Frequency List				
BW [MHz]	Channel/Frequency(MHz)	Lowest	Middle	Highest
1.4	Channel	23017	23095	23173
	Frequency	699.7	707.5	715.3
3	Channel	23025	23095	23165
	Frequency	700.5	707.5	714.5
5	Channel	23035	23095	23155
	Frequency	701.5	707.5	713.5
10	Channel	23060	23095	23130
	Frequency	704	707.5	711

LTE Band 13 Channel and Frequency List				
BW [MHz]	Channel/Frequency(MHz)	Lowest	Middle	Highest
5	Channel	23025	23230	23255
	Frequency	779.5	782	784.5
10	Channel	23230	23230	23230
	Frequency	782	782	782

2.5 Applied Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

47 CFR Part 2

47 CFR Part 24

47 CFR Part 27

ANSI C63.26-2015

FCC KDB 971168 D01 Power Meas License Digital Systems v03r01

FCC KDB 412172 D01 Determining ERP and EIRP v01r01

Remark: All test items were verified and recorded according to the standards and without any deviation during the test.

3 Test Condition

3.1 Test Environmental Conditions

During testing, environmental conditions are described below.

Normal Configuration		Extreme Configuration		
Voltage	3.0Vdc	Voltage	High: /	Low: /

3.2 Test Configuration

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture). The worst cases were recorded in this report.

Radiated measurements are performed by rotating the EUT in three different orthogonal test planes (Z, X, Y axis), receiver antenna polarization (horizontal and vertical), the worst emission was found in ' Z ' position and the worst case was recorded.

3.3 Equipment List

Instrument	Manufacturer	Model	Asset No.	Cal. Interval	Cal. Due Date
Receiver	R&S	ESR7	PWB0023	1 Year	2024/10/11
Spectrum Analyzer	R&S	FSV3044	PWB0024	1 Year	2024/10/11
TRILOG Broadband Antenna	Schwarzbeck	VULB9162	PWB0029	1 Year	2024/10/14
Double-Ridged Guide Antenna	ETS-Lindgren	3117	PWB0031	1 Year	2024/10/12
Loop Antenna	R&S	HFH2-Z2E	PWB0026	1 Year	2024/10/21
k Type Horn Antenna	Steatite Antennas	QMS-00880	PWB0035	1 Year	2024/10/17
Horn Antenna	Steatite Antennas	QMS-00208	PWB0033	1 Year	2024/10/21
Pre-Amplifier	R&S	SCU08F1	PWB0030	1 Year	2024/10/11
Pre-Amplifier	R&S	SCU40F1	PWB0036	1 Year	2024/10/11
Pre-Amplifier	R&S	OSP220 (OSP-B155G)	PWB0042	1 Year	2024/10/13
Pre-Amplifier	R&S	SCU18F	PWB0034	1 Year	2024/10/11
Pre-Amplifier	COM-MW	DLNA8	PWB0094	1 Year	2024/11/08
Anechoic Chamber	ETS.LINDGREN	Fact 3-2m	PWB0003	3 Years	2026/06/05
Test Software	R&S	ELEKTRA 4.20.2	/	/	/

3.4 Test Uncertainty

No.	Parameter	Uncertainty
1	Radiated Spurious Emission	30MHz-18GHz: 4.46 dB 18GHz-40GHz: 4.46 dB
2	Temperature	3°C
3	Humidity	1.3 %
4	Supply voltages	0.006 V

4 Test Items Description

Ambient condition

Anechoic Chamber

Temperature [°C]	20.1 to 25.1
Humidity [%RH]	41 to 49
Pressure [kPa]	100.7 to 102.8

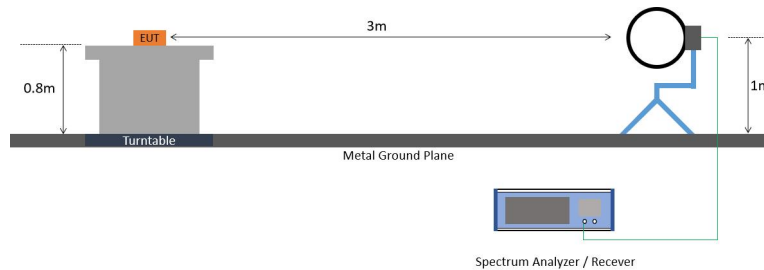
4.1 Radiated Spurious Emission

Methods of Measurement

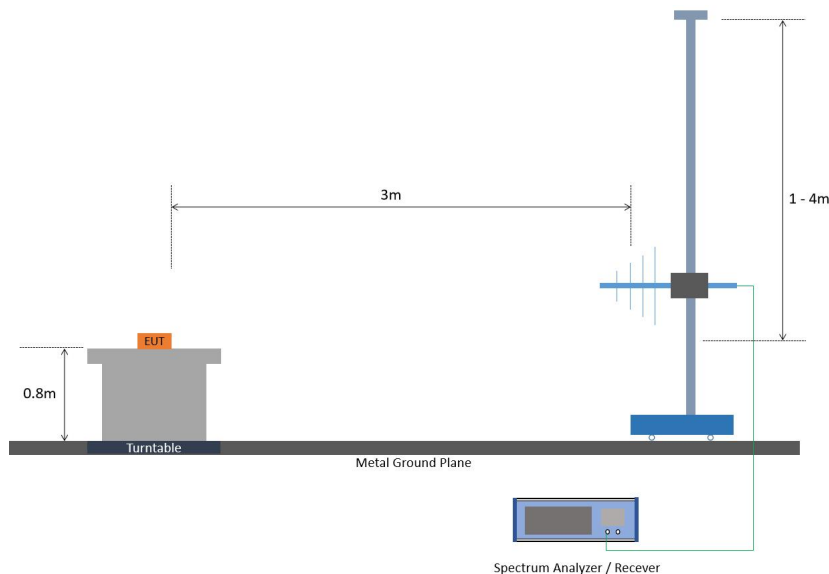
The radiated spurious emission was measured by substitution method according to ANSI C63.26. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitter power (P) by a factor of at least $43 + 10 \log (P)$ dB.

The spectrum is scanned from 30 MHz up to a frequency including its 10th harmonic.

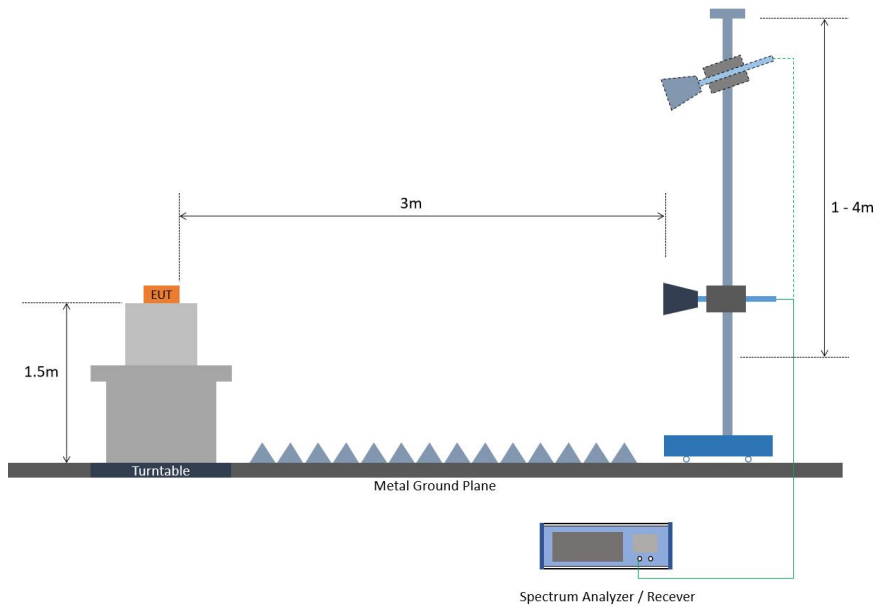
Test Setup



For radiated test below 30MHz



For radiated test from 30MHz to 1GHz



For radiated test above 1GHz

- 1.The testing follows ANSI C63.26 Section 5.5
- 2.The EUT was placed on a turntable with 0.8 meter height for frequency below 1GHz and 1.5 meter height for frequency above 1GHz respectively above ground.
- 3.The EUT was set 3 meters from the receiving antenna mounted on the antenna tower.
- 4.The table was rotated 360 degrees to determine the position of the highest spurious emission.
- 5.The height of the receiving antenna is varied between 1m to 4m to search the maximum spurious emission for both horizontal and vertical polarizations.
- 6.During the measurement, the system simulator parameters were set to force the EUT transmitting at maximum output power.
- 7.Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, taking the record of maximum spurious emission.
- 8.A horn antenna was substituted in place of the EUT and was driven by a signal generator.
- 9.Tune the output power of signal generator to the same emission level with EUT maximum spurious emission.
- 10.EIRP (dBm) = S.G. Power – Tx Cable Loss + Tx Antenna Gain
- 11.ERP (dBm) = EIRP - 2.15
- 12.The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

Remark: The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line was not reported.

Appendixes

External Photograph	Refer to "Attachment A.1: External Photograph" file.
Internal Photograph	Refer to "Attachment A.2: Internal Photograph" file.
Test Setup Photograph	Refer to "Attachment A.4: RF Test Setup Photograph" file.

Test Results of Radiated Test

All LTE Bands	Refer to "Attachment B" file.
---------------	-------------------------------

***** End of the Report *****