

Testing Tomorrow's Technology

Application

For

Part 2, Subpart J, Paragraph 2.907 Equipment Authorization of Certification for an Intentional Radiator per Part 15, Subpart C, paragraphs 15.207, 15.209 and 15.249

For the

Sanitag Technologies Corporation

Model: AT-001-H, AT-002-H, AT-003-H

FCC ID: 2AMOW-AT00123H

UST Project: 17-0272

Issue Date: September 29, 2017

Total Pages in This Report: 29

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I certify that I am authorized to sign for the Test Agency and that all of the statements in this report and in the Exhibits attached hereto are true and correct to the best of my knowledge and belief:

US TECH (Agent Responsible For Test):

By: Alan Ghasiani

Name: 

Title: Compliance Engineer – President

Date September 29, 2017



TESTING
NVLAP LAB CODE 200162-0

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17-0272
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Sanitag Technologies Corp
AT-001-H, AT-002-H, AT-003-H

MEASUREMENT TECHNICAL REPORT

COMPANYS NAME: Sanitag Technologies Corp
MODEL: AT-001-H, AT-002-H, AT-003-H
FCC ID: 2AMOW-AT00123H
DATE: September 29, 2017

This report concerns (check one): Original grant ☒
Class II change

Equipment type: 2400 – 2483.5 MHz Transmitter Module

Deferred grant requested per 47 CFR 0.457(d)(1)(ii)? yes_____ No X

If yes, defer until: N/A
date

agrees to notify the Commission by N/A
date
of the intended date of announcement of the product so that the grant can be
issued on that date.

Report prepared by:

US Tech
3505 Francis Circle
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List of Attachments

Agency Agreement
Application Forms
Letter of Confidentiality
Equipment Label(s)
Block Diagram(s)
Schematic(s)
Test Configuration Photographs
Internal Photographs
External Photographs
Theory of Operation
User's Manual

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1 General Information

1.1 Purpose of this Report

This report is prepared as a means of conveying test results and information concerning the suitability of this exact product for public distribution according to the FCC Rules and Regulations Part 15, Section 249.

1.2 Characterization of Test Sample

The sample used for testing was received by US Tech on July 20, 2017 in good operating condition.

1.3 Product Description

The Equipment under Test (EUT) is the Sanitag Technologies Corporation Models AT-001-H, AT-002-H, AT-003-H. The EUT provides real-time location systems for the healthcare industry to track infants, patients, assets and staff. The intended users are hospitals, senior living centers and rehab centers.

Antenna: Trace Meander
Antenna Gain: 2.0 dBi
Protocol: IEEE 802.15.4 WPAN
Output Power: 2.5 dBm (rated)
Data Rate: 250 Kbps (rated)
Operating frequency band: 2400-2483.5 MHz

The three models listed are identical in all aspects except for the color scheme and markings. There are no electrical/electronic differences between the three samples. Model AT-003-H was tested as the representative sample for all models.

1.4 Configuration of Tested System

The Test Sample was tested per *ANSI C63.4:2014, Methods of Measurement of Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz (2014)*, and *ANSI C63.10.2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices*.

A list of EUT and Peripherals is found in Table 1 below. A block diagram of the tested system is shown in Figure 1. Test configuration photographs are provided in separate Appendices

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1.5 Test Facility

Testing was performed at US Tech's measurement facility at 3505 Francis Circle, Alpharetta, GA 30004. This site has been fully described and registered with the FCC. Its designation number is 186022. Additionally this site has also been fully described and submitted to Industry Canada (IC), and has been approved under file number 9900A-1.

1.6 Related Submittals

The EUT is subject to the following FCC authorizations:

- a) Certification under section 15.249 as a transmitter.
- b) Verification under 15.101 as a digital device and receiver.

The Verification requirement shares many common report elements with the Certification report. Therefore, though this report is mostly intended to provide data for the Certification process, the Verification authorization report (part 15.107 and 15.109) for the EUT is included herein.

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Table 1. EUT and Peripherals

PERIPHERAL MANUFACTURER	MODEL NUMBER	SERIAL NUMBER	FCC ID:	CABLES P/D
Patient Tag/ Sanitag Technologies Corp (EUT)	AT-001-H	65000761	2AMOW-AT00123H	N/A
Baby Tag/ Sanitag Technologies Corp (EUT)	AT-002-H	60000265	2AMOW-AT00123H	N/A
Asset Tag/ Sanitag Technologies Corp (EUT)	AT-003-H	70000661	2AMOW-AT00123H	N/A

U= Unshielded S= Shielded P= Power D= Data

Note: Asset tag (AT-003-H) tested as the representative sample.

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2 Tests and Measurements

2.1 Test Equipment

The table below lists test equipment used to evaluate this product. Model numbers, serial numbers and their calibration status are indicated.

Table 2. Test Instruments

INSTRUMENT	MODEL NUMBER	MANUFACTURER	SERIAL NUMBER	CALIBRATION DUE DATE
SPECTRUM ANALYZER	8593E	HEWLETT-PACKARD	3205A00124	11/23/2017 Extended
SPECTRUM ANALYZER	DSA815	RIGOL	DSA8A180300 138	12/01//2017
SPECTRUM ANALYZER	E4407B	AGILENT	US41442935	6/22/2018
BICONICAL ANTENNA	3110B	EMCO	9306-1708	5/02/2019 2 yr
BICONICAL ANTENNA	3110B	EMCO	9307-1431	8/25/2017 2 yr
LOG PERIODIC ANTENNA	3146	EMCO	9110-3236	5/01/2019 2 yr
LOG PERIODIC ANTENNA	3146	EMCO	9305-3600	9/21/2018 2 yr
HORN ANTENNA	3115	EMCO	9107-3723	9/22/2018 2 yr
PRE-AMPLIFIER	8449B	HEWLETT-PACKARD	3008A00480	10/26/2017
PRE-AMPLIFIER	8447D	HEWLETT-PACKARD	1937A02980	3/07/2018

Note: The calibration interval of the above test instruments are 12 months unless stated otherwise and all calibrations are traceable to NIST/USA.

2.2 Modifications to EUT Hardware

No physical modifications were made by US Tech in order to bring the EUT into compliance with FCC Part 15, Subpart C Intentional Radiator Limits for the transmitter portion of the EUT or the Subpart B Unintentional Radiator Limits (Receiver and Digital Device) Requirements.

2.3 Number of Measurements for Intentional Radiators (15.31(m))

Measurements of intentional radiators or receivers shall be performed and reported for each band in which the device can be operated with the device operating at the number of frequencies in each band specified in Table 3 below.

Table 3. Number of Test Frequencies for Intentional Radiators

Frequency Range over which the device operates	Number of Frequencies	Location in the Range of operation
1 MHz or less	1	Middle
1 to 10 MHz	2	1 near the top 1 near the bottom
Greater than 10 MHz	3	1 near top 1 near middle 1 near bottom

Because the EUT operates at 2400 MHz to 2483.5 MHz, 3 test frequencies were used.

2.4 Frequency Range of Radiated Measurements (Part 15.33)

2.4.1 Intentional Radiator

The spectrum shall be investigated for the intentional radiator from the lowest RF signal generated in the EUT, without going below 9 kHz to the 10th harmonic of the highest fundamental frequency generated or 40 GHz, whichever is the lowest.

2.4.2 Unintentional Radiator

For the digital device, an unintentional radiator, the frequency range shall be 30 MHz to 1000 MHz, or to 5 times the highest internal clock frequency.

2.5 Measurement Detector Function and Bandwidth (CFR 15.35)

The radiated and conducted emissions limits shown herein are based on the following the parameters outlined following.

2.5.1 Detector Function and Associated Bandwidth

On frequencies below 1000 MHz, the limits herein are based upon measurement equipment employing a CISPR Quasi-peak detector function and related measurement bandwidths (i.e. 9 kHz from 150 kHz to 30 MHz and 120 kHz from 30 MHz to 1000 MHz). Alternatively, measurements may be made with equipment employing a peak detector function as long as the same bandwidths specified for the Quasi-peak device are used.

2.5.2 Corresponding Peak and Average Requirements

Above 1000 MHz, radiated limits are based on measuring instrumentation employing an average detector function. When average radiated emissions are specified there is also a corresponding Peak requirement, as measured using a peak detector, of 20 dB greater than the average limit. For all measurements above 1000 MHz the Resolution Bandwidth shall be at least 1 MHz.

2.5.3 Pulsed Transmitter Averaging

When the radiated emissions limit is expressed as an average value, and the transmitter is pulsed, the measured field strength shall be determined by applying a Duty Cycle Correction Factor based upon dividing the total ON time during the first 100 ms period by 100 ms (or by the period if less than 100 ms). The duty cycle may be expressed logarithmically in dB.

NOTE: If the transmitter was programmed to transmit at >98% duty cycle, then, wherever applicable (where the detection mode was AVG), the duty cycle factor calculated will be applied.

2.6 EUT Antenna Requirements (CFR 15.203)

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 shall be considered sufficient to comply with the provisions of this section. Only the antenna(s) listed in Table 4 will be used with this module.

Table 4. Allowed Antenna(s)

REPORT REFERENCE	MANUFACTURER	TYPE OF ANTENNA	MODEL	GAIN dB _i	TYPE OF CONNECTOR
1	Sanitag	Trace Antenna	Trace Antenna	2.0	PCB trace



Figure 1. Block Diagram of Test Configuration

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2.7 Restricted Bands of Operation (Part 15.205)

Only spurious emissions can fall in the frequency bands of CFR 15.205. The field strength of these spurious cannot exceed the limits of 15.209. Radiated harmonics and other Spurious are examined for this requirement; see test data presented below.

2.8 Transmitter Duty Cycle (CFR 35 (c))

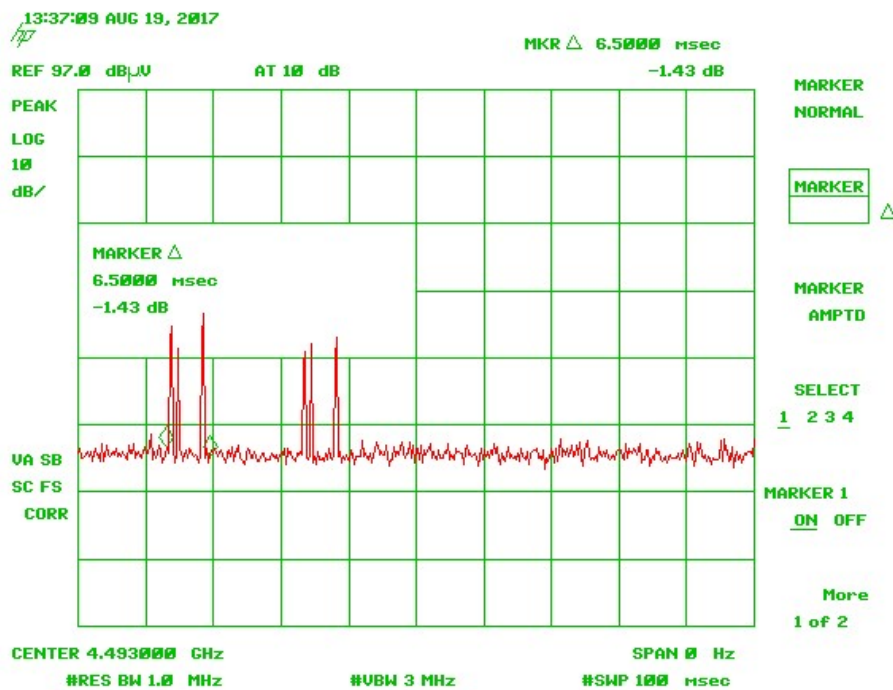


Figure 2. Measured Duty Cycle

Total Pulse Train from Figure 2 = 0.13 or 13% (13mS/100 mS)

$$\text{Duty Cycle} = 20 \log (0.13) = \boxed{-17.7 \text{ dB}}$$

NOTE: For testing performed with the EUT programmed for >98% duty cycle, the correction factor above may be applied.

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2.9 Intentional Radiator, Power Line Conducted Emissions (CFR 15.207)

Since the EUT is battery powered, this test was not applied. The EUT is powered by one Lithium Ion Polymer 3.7VDC 90mAh battery.

2.10 Intentional Radiator, Radiated Emissions (CFR 15.209, 15.249(a),(c))

Radiated Spurious measurements: the EUT was placed into a continuous transmit mode of operation (>98% duty cycle) and tested per FCC KDB Publication 558074 and ANSI C63.10:2013. A preliminary scan was performed on the EUT to find signal frequencies that were caused by the transmitter part of the device. To obtain worse case results the EUT was tested in X, Y and Z axes or in the orientation of normal operation if the device is designed to operation in a fixed position.

Radiated measurements were then conducted between the frequency range of 9 KHz (or lowest frequency used/generated by the device) up to the tenth harmonic of the device (no greater than 40 GHz). In the band below 30 MHz a resolution bandwidth (RBW) of 9 kHz was used; emissions below 1 GHz were tested with a RBW of 120 KHz and emissions above 1 GHz were tested with a RBW of 1 MHz. All video bandwidth settings were at least three times the RBW value.

The EUT was investigated to CFR 15.209, General requirements for unwanted spurious emissions.

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Table 5. Spurious Radiated Emissions below 30 MHz

9 kHz to 30 MHz, 15.209 limits							
Test: Radiated Emissions				Client: Sanitag Technologies Corp			
Project: 17-0272				Model: AT-001-H, AT-002-H, AT-003-H			
Frequency (MHz)	Test Data (dBuv)	AF+CA-AMP (dB/m)	Results (dBuV/m)	AVG Limits (dBuV/m)	Antenna Distance/ Polarization	Margin (dB)	Detector PK, or AVG
No emissions found greater than 20 dB below the applicable limit from the lowest clock frequency (9 kHz to 30 MHz).							

Sample Calculation: N/A

Date: August 4, 2017

Evaluated by

Signature:  Name: Robert K. Mills

Note: The spurious radiated emissions from 30 MHz to 12.5 GHz are placed in paragraph 2.14 of this report under part 15.109 rules to avoid redundancy.

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Table 6. Peak Radiated Fundamental & Harmonic Emissions

Test: FCC Part 15, Para 15.209, 15.249(a)					Client: Sanitag Technologies Corp			
Project: 17-0272					Model: AT-001-H, AT-002-H, AT-003-H			
Frequency (MHz)	Test Data (dBuV)	Factor (dB)	AF+CA -AMP (dB/m)	Results (dBuV/m)	Limits (dBuV/m)	Antenna Distance/ Polarization	Margin (dB)	Detector Mode
Low - Channel								
2405.45	63.00	--	33.21	96.21	114.0	3.0m./HORZ	17.8	PK
4802.00	59.38	--	9.63	69.01	74.0	3.0m./HORZ	5.0	PK
7208.30	44.32	--	20.96	65.28	74.0	3.0m./HORZ	8.7	PK
9615.40	41.35	--	22.45	63.80	74.0	3.0m./HORZ	10.2	PK
Mid - Channel								
2439.60	61.22	--	33.21	94.43	114.0	3.0m./HORZ	19.5	PK
4880.55	59.33	--	9.63	68.97	74.0	3.0m./HORZ	5.0	PK
7317.55	44.25	--	21.35	65.60	74.0	3.0m./HORZ	8.4	PK
9756.25	44.42	--	22.98	67.40	74.0	3.0m./HORZ	6.6	PK
High - Channel								
2479.60	60.02	--	33.21	93.23	114.0	3.0m./HORZ	20.7	PK
4957.90	50.55	--	10.56	61.11	74.0	3.0m./HORZ	12.9	PK
7435.30	42.58	--	21.45	64.03	74.0	3.0m./HORZ	10.0	PK
9927.00	43.47	--	23.31	66.78	74.0	3.0m./HORZ	7.2	PK

Notes:

1. No other signals detected within 20 dB of specification limit. Harmonics investigated up to the 10th harmonic
2. Measurements taken at 1 meter were extrapolated to 3 meters using a factor of (-9.5 dB).
3. The EUT was placed in three orthogonal positions and the transmitter was in constant broadcast mode. The emissions were measured with the receive antenna in vertical and horizontal polarizations. The data listed in the above table was worst case.

Sample Calculation at 2405.45 MHz:

Magnitude of Measured Frequency	63.00	dBuV
+Antenna Factor + Cable Loss - Amplifier Gain	33.21	dB/m
Corrected Result	96.21	dBuV/m

Test Date: August 4, 2017

Tested By

Signature:  Name: Robert K. Mills

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Table 7. Average Radiated Fundamental & Harmonic Emissions

Test: FCC Part 15, Para 15.209, 15.249(a)					Client: Sanitag Technologies Corp			
Project: 17-0272					Model: AT-001-H, AT-002-H, AT-003-H			
Frequency (MHz)	Test Data (dBuV)	Factor (dB)	AF+CA -AMP (dB/m)	Results (dBuV/m)	Limits (dBuV/m)	Antenna Distance/ Polarization	Margin (dB)	Detector Mode
Low - Channel								
2405.45	19.84	--	33.21	53.05	94.0	3.0m./HORZ	40.9	AVG
4802.00	29.07	--	9.63	38.70	54.0	3.0m./HORZ	15.3	AVG
7208.30	29.00	--	20.96	49.96	54.0	3.0m./HORZ	4.0	AVG
9615.40	28.69	--	22.45	51.14	54.0	3.0m./HORZ	2.9	AVG
Mid - Channel								
2439.60	19.88	--	33.21	53.09	94.0	3.0m./HORZ	40.9	AVG
4880.55	28.77	--	9.63	38.40	54.0	3.0m./HORZ	15.6	AVG
7317.55	28.85	--	21.35	50.20	54.0	3.0m./HORZ	3.8	AVG
9756.25	29.10	--	22.98	52.08	54.0	3.0m./HORZ	1.9	AVG
High - Channel								
2479.60	19.99	--	33.21	53.20	94.0	3.0m./HORZ	40.8	AVG
4957.90	29.15	--	10.56	39.71	54.0	3.0m./HORZ	14.3	AVG
7435.30	28.24	--	21.45	49.69	54.0	3.0m./HORZ	4.3	AVG
9927.00	28.85	--	23.31	52.16	54.0	3.0m./HORZ	1.8	AVG

Notes:

1. No other signals detected within 20 dB of specification limit. Harmonics investigated up to the 10th harmonic
2. Measurements taken at 1 meter were extrapolated to 3 meters using a factor of (-9.5 dB).
3. The EUT was placed in three orthogonal positions and the transmitter was in constant broadcast mode. The emissions were measured with the receive antenna in vertical and horizontal polarizations. The data listed in the above table was worst case.

Sample Calculation at 2405.45 MHz:

Magnitude of Measured Frequency	19.84	dBuV
+Antenna Factor + Cable Loss+ Amplifier Gain + corrections	33.21	dB/m
+Duty Cycle Correction Factor	N/A	dB
Corrected Result	53.05	dBuV/m

Test Date: August 4, 2017

Tested By
 Signature:  Name: Robert K. Mills

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2.11 Restricted Band Measurements – (CFR 15.249 (d))

Restricted band measurements are made following the guidelines in ANSI C63.10-2013 with the EUT initially operating on the Lowest Channel and then operating on the Highest Channel within its band of operation. Radiated measurements are performed to demonstrate compliance with the requirement of 15.249(d) that all emissions outside of the band edges be attenuated by at least 50 dB or 15.209 limits, when compared to its highest in-band value (contained in a 100 kHz band).

In this case the 15.209 limits were applied.

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Signature:



Name: Robert K. Mills

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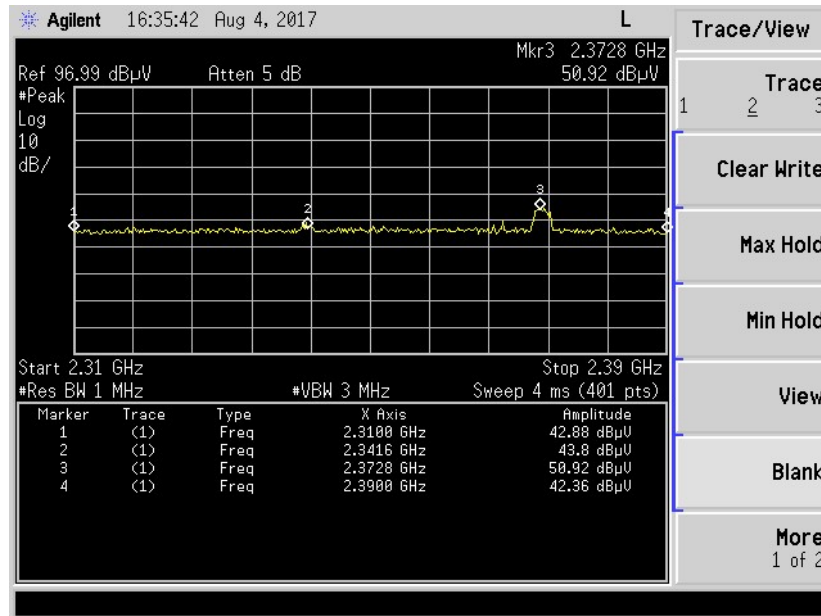


Figure 3. Radiated Restricted Band 2310 MHz to 2390 MHz, Peak

Table 8. Radiated Restricted Band 2310 MHz to 2390 MHz, Peak

2310 MHz to 2390 MHz Restricted Band Peak Measurements							
Test: Radiated Emissions				Client: Sanitag Technologies Corp			
Project: 17-0272				Model: AT-001-H, AT-002-H, AT-003-H			
Frequency (MHz)	Test Data (dBuV)	AF+CA-AMP (dB/m)	Results (dBuV/m)	PK Limits (dBuV/m)	Antenna Distance/ Polarization	Margin (dB)	Detector PK, or AVG
2310.00	42.88	-0.60	42.28	74.0	3.0m./HORZ	31.7	PK
2341.60	43.80	-0.60	43.20	74.0	3.0m./HORZ	30.8	PK
2372.80	50.92	-0.60	50.32	74.0	3.0m./HORZ	23.7	PK
2390.00	42.36	-0.60	41.76	74.0	3.0m./HORZ	32.2	PK

Table 9. Radiated Restricted Band 2310 MHz to 2390 MHz, Average

2310 MHz to 2390 MHz Restricted Band Average Measurements							
Test: Radiated Emissions				Client: Sanitag Technologies Corp			
Project: 17-0272				Model: AT-001-H, AT-002-H, AT-003-H			
Frequency (MHz)	Test Data (dBuV)	AF+CA-AMP (dB/m)	Results (dBuV/m)	AVG Limits (dBuV/m)	Antenna Distance/ Polarization	Margin (dB)	Detector PK, or AVG
2310.00	42.88	-0.60	42.28	54.0	3.0m./HORZ	11.7	AVG
2341.60	43.80	-0.60	43.20	54.0	3.0m./HORZ	10.8	AVG
2372.80	50.92	-0.60	50.32	54.0	3.0m./HORZ	3.7	AVG
2390.00	42.36	-0.60	41.76	54.0	3.0m./HORZ	12.2	AVG

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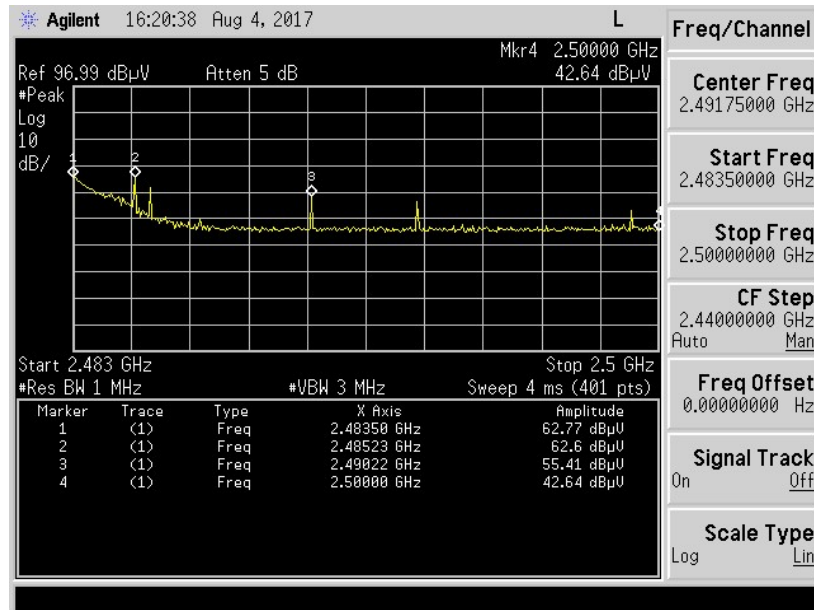


Figure 4. Radiated Restricted Band 2483.5 MHz to 2500 MHz, Peak

Table 10. Radiated Restricted Band 2483.5 MHz to 2500 MHz, Peak

2483.5 MHz to 2500 MHz Restricted Band Peak Measurements							
Test: Radiated Emissions				Client: Sanitag Technologies Corp			
Project: 17-0272				Model: AT-001-H, AT-002-H, AT-003-H			
Frequency (MHz)	Test Data (dBuV)	AF+CA-AMP (dB/m)	Results (dBuV/m)	PK Limits (dBuV/m)	Antenna Distance/ Polarization	Margin (dB)	Detector PK, or AVG
2483.50	62.77	-0.44	62.33	74.0	3.0m./HORZ	11.7	PK
2485.23	62.60	-0.44	62.16	74.0	3.0m./HORZ	11.8	PK
2490.22	55.41	-0.44	54.97	74.0	3.0m./HORZ	19.0	PK
2500.00	42.64	0.83	43.47	74.0	3.0m./HORZ	30.5	PK

Table 11. Radiated Restricted Band 2483.5 MHz to 2500 MHz, Average

2483.5 MHz to 2500 MHz Restricted Band Average Measurements							
Test: Radiated Emissions				Client: Sanitag Technologies Corp			
Project: 17-0272				Model: AT-001-H, AT-002-H, AT-003-H			
Frequency (MHz)	Test Data (dBuV)	AF+CA-AMP+Duty Cycle (dB/m)	Results (dBuV/m)	AVG Limits (dBuV/m)	Antenna Distance/ Polarization	Margin (dB)	Detector PK, or AVG
2483.50	62.77	-18.14	44.63	54.0	3.0m./HORZ	9.4	AVG
2485.23	62.60	-18.14	44.46	54.0	3.0m./HORZ	9.5	AVG
2490.22	55.41	-18.14	37.27	54.0	3.0m./HORZ	16.7	AVG
2500.00	42.64	-16.87	25.77	54.0	3.0m./HORZ	28.2	AVG

Note: (*) = The Duty Cycle Correction factor was added to the test data Average.

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2.12 99% Occupied Bandwidth

These measurements were performed while the EUT was in a constant transmit mode. A method similar to the marker delta method was used to capture the points. The RBW was set to approximately 1/100 of the manufacturers claimed RBW and with the VBW $\geq$ RBW. The results of this test are given in Table 12 and Figures 10-12.

Table 12. 20 dB Bandwidth and 99% Occupied Bandwidth

Frequency (MHz)	99% Occupied Bandwidth (MHz)
2405.00	2.3365
2440.00	2.3538
2480.00	2.3883

Test Date: August 4, 2017

Tested By

Signature:



Name: Robert K. Mills

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Customer:
Model:

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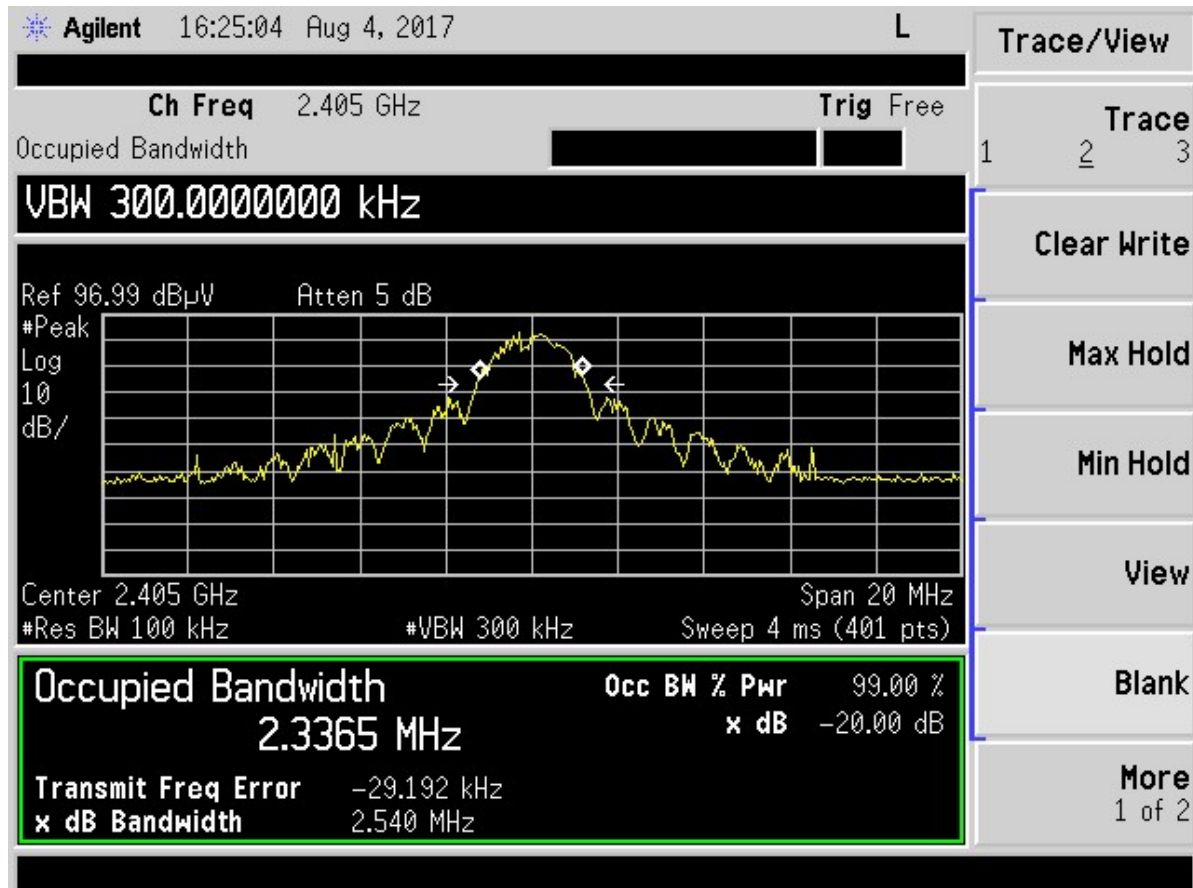


Figure 5. 99% Bandwidth – Low Channel

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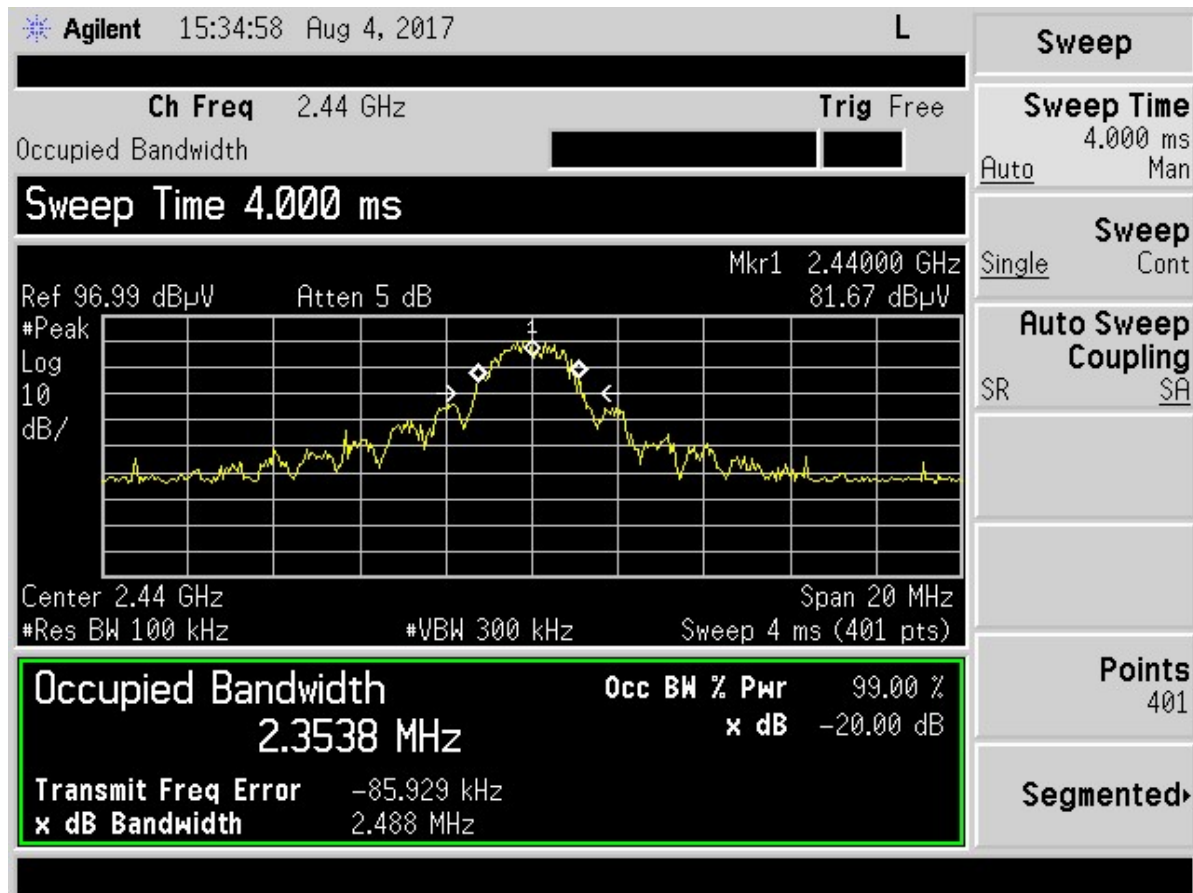


Figure 6. 99% Bandwidth – Mid Channel

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 FCC ID:
 Test Report Number:
 Issue Date:
 Customer:
 Model:

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Figure 7. 99% Bandwidth – High Channel

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2.13 Unintentional Radiator, Powerline Emissions (CFR 15.107)

The power line conducted voltage emission measurements have been carried out in accordance with CFR 15.107, per ANSI C63.4:2014, Paragraph 7, with a spectrum analyzer connected to a LISN and the EUT placed into a continuous mode of transmission.

Since the EUT is battery powered, this test was not applied. The EUT is powered by one Lithium Ion Polymer 3.7v 90mAh battery.

Table 13. Transmitter Power Line Conducted Emissions Test Data, Part 15.107

150KHz to 30 MHz with Class B Limits						
Test: Power Line Conducted Emissions				Client: Sanitag Technologies Corp		
Project: 17-0272				Model: AT-001-H, AT-002-H, AT-003-H		
Frequency (MHz)	Test Data (dBuV)	LISN+CL-PA (dB)	Results (dBuV)	AVG Limits (dBuV)	Margin (dB)	Detector PK, QP, or AVG
The EUT is battery powered: therefore this test is not applicable.						

SAMPLE CALCULATION: N/A

Date: August 4, 2017

Evaluated by
Signature:  Name: Robert K. Mills

NOTE: The test data provided in this section is to support the Verification requirement for the digital apparatus and the radios within.

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Model:

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2.14 Unintentional Radiator, Radiated Emissions (CFR 15.109, 15.209)

Radiated emissions disturbance Measurements were performed with an instrument having both peak and quasi-peak detectors over the frequency range of 30 MHz to 5 times the highest clock frequency generated or used by the EUT. In this case the highest clock frequency is 2.4 GHz, therefore testing was performed up to 12.5 GHz. Measurements of the radiated emissions were made with the receiver antenna at a distance of 3 m from the boundary of the test unit.

During testing the transmitter was turn ON in a continuous transmit mode to test the EUT in worst case condition.

The test antenna was varied from 1 m to 4 m in height while watching the analyzers' display for the maximum magnitude of the signal at the test frequency. The antenna polarization (horizontal or vertical) and test sample azimuth were varied during the measurements to find the maximum field strength readings to record.

The worst-case radiated emissions in the range of 30 MHz to 12.5 GHz are more than 20 dB below the limit.

**Table 14. Unintentional Radiator, Peak Radiated Emissions (CFR 15.109, 15.209),
30 MHz to 1000 MHz**

30 MHz to 1000 MHz with Class B Limits							
Test: Radiated Emissions				Client: Sanitag Technologies Corp			
Project: 17-0272				Model: AT-001-H, AT-002-H, AT-003-H			
Frequency (MHz)	Test Data (dBuV)	AF+CA-AMP (dB/m)	Results (dBuV/m)	QP Limits (dBuV/m)	Antenna Distance/ Polarization	Margin (dB)	Detector PK, or QP
No emissions seen greater than 20 dB below the applicable limit.							

Note: The UWB transmitter was ON and active during this. No contribution were seen from the UWB transmitter circuits.

SAMPLE CALCULATION: N/A

Date: August 1, 2017

Evaluated by
Signature:  Name: Robert K. Mills

US Tech Test Report:
FCC ID:
Test Report Number:
Issue Date:
Customer:
Model:

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**Table 15. Unintentional Radiator, Peak Radiated Emissions (CFR 15.109),
1 GHz to 12.5 GHz**

1 GHz to 12.5 GHz with Class B Limits							
Test: Radiated Emissions				Client: Sanitag Technologies Corp			
Project: 17-0272				Model: AT-001-H, AT-002-H, AT-003-H			
Frequency (MHz)	Test Data (dBuV)	AF+CA-AMP (dB/m)	Results (dBuV/m)	AVG Limits (dBuV/m)	Antenna Distance/ Polarization	Margin (dB)	Detector PK, or AVG
No emissions seen greater than 20 dB below the applicable limit.							

SAMPLE CALCULATION: N/A

Date: August 2, 2017

Evaluated by

Signature: 

Name: John Freeman

NOTE: The test data provided in this section is to support the Verification requirement for the digital apparatus and the radios within.

2.15 Measurement Uncertainty

The measurement uncertainties given were calculated using the method detailed in CISPR 16-4-2:2011. A coverage factor of $k=2$ was used to give a level of confidence of approximately 95%.

2.15.1 Conducted Emissions Measurement Uncertainty

Measurement Uncertainty (within a 95% confidence level) for this test is ± 2.85 dB.

This EUT is battery powered; therefore this tested was deemed not applicable.

2.15.2 Radiated Emissions Measurement Uncertainty

For a measurement distance of 3 m the measurement uncertainty (with a 95% confidence level) for this test using a Biconical Antenna (30 MHz to 200 MHz) is ± 5.40 dB. This value includes all elements of measurement.

The measurement uncertainty (with a 95% confidence level) for this test using a Log Periodic Antenna (200 MHz to 1000 MHz) is ± 5.19 dB.

The measurement uncertainty (with a 95% confidence level) for this test using a Horn Antenna is ± 5.08 dB.

The data listed in this test report does have sufficient margin to negate the effects of uncertainty. Therefore, the EUT unconditionally meets this requirement.

3 Test Results

The EUT is deemed to have met all the applicable requirements for this evaluation.