FCC Part 15 Subpart C
Transmitter Certification

Test Report

FCC ID: T15-0200011

FCC Rule Part: 15.249

ACS Report Number: 05-0288-15C

Manufacturer: Statcom
Model/Trade name: Wibut

Test Begin Date: August 2, 2005
Test End Date: August 15, 2005

Report Issue Date: August 17, 2005

FOR THE SCOPE OF ACCREDITATION UNDER LAB Code 200612

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This report contains 16 pages

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1.0 GENERAL

1.1 Purpose
The purpose of this report is to demonstrate compliance with Part 15, Subpart C of the FCC's Code of Federal Regulations.

1.2 Product Description

1.2.1 General
The Wibut ("Wireless Button") is a stand-alone wall mounted unit designed to send and receive information in a hospital environment. With a built in LCD display and keypad, the units can send key press information and display status information for users at any location in the hospital. Each unit has a built in 2.4GHz wireless transceiver for communications built around the IEEE 802.15.4 standard. Units are low power and spaced throughout the hospital to form a mesh network for communications.

Detailed photographs of the EUT are filed separately with this filing.

1.2.2 Intended Use
The intended use of the Wibut is in hospital environments.

1.2.3 Technical Specifications

Feature	**Description**
Dimensions	6"W x 7.85"H x 1.25"D
Operating Conditions	0^{o}C to +50^{o}C
Power	Three 1.5v-AAA alkaline batteries Optional 9VDC wall supply 150mA max at 9V
Mounting	Vertical wall mount
LCD Display	4 lines x 20 characters Software adjustable contrast Backlight available with DC wall power
Keypad	5 x 5 button matrix
Indicators	16 LED's, 8 red, 8 green
Radio	2.4GHz transceiver Rx sensitivity: -94dBm Tx power: 0dBm max
Interfaces	2 – RJ-11 Serial ports 2 – 2x17 Pin Receptacle (Ethernet interface) 1 – RJ-45 Ethernet port access 2 – 2x5 Pin Header (manufacturing test)

2.0 TEST FACILITIES

2.1 Location

The radiated and conducted emissions test sites are located at the following address:

Advanced Compliance Solutions
5015 B.U. Bowman Drive
Buford, GA 30518
Phone: (770) 831-8048
Fax: (770) 831-8598

2.2 Laboratory Accreditations/Recognitions/Certifications

The Semi-Anechoic Chamber Test Site, Open Area Test Site (OATS) and Conducted Emissions Site have been fully described, submitted to, and accepted by the FCC, Industry Canada and the Japanese Voluntary Control Council for Interference by information technology equipment. In addition, ACS is compliant to ISO 17025 as certified by the National Institute of Standards and Technology under their National Voluntary Laboratory Accreditation Program. The following certification numbers have been issued in recognition of these accreditations and certifications:

FCC Registration Number: 89450
Industry Canada Lab Code: IC 4175
VCCI Member Number: 1831

- VCCI OATS Registration Number R-1526
- VCCI Conducted Emissions Site Registration Number: C-1608

NVLAP Lab Code: 200612

2.3 Radiated Emissions Test Site Description

2.3.1 Semi-Anechoic Chamber Test Site

The Semi-Anechoic Chamber Test Site consists of a 20' x 30' x 18' shielded enclosure. The chamber is lined with Toyo Ferrite Grid Absorber, model number FFG-1000. The ferrite tile grid is 101 x 101 x 19mm thick and weighs approximately 550 grams. These tiles are mounted on steel panels and installed directly on the inner walls of the chamber.

The turntable is 150cm in diameter and is located 160cm from the back wall of the chamber. The chamber is grounded via 1 - 8' copper ground rod, installed at the center of the back wall, it is bound to the ground plane using 3/4" stainless steel braided cable.

The turntable is all steel, flush mounted table installed in an all steel frame. The table is remotely operated from inside the control room located 25' from the range. The turntable is electrically bonded to the surrounding ground plane via steel fingers installed on the edge of the turn table. The steel fingers make constant contact with the ground plane during operation.

Behind the turntable is a 3' x 6' x 4' deep shielded pit used for support equipment if necessary. The pit is equipped with 1 - 4" PVC chases from the turntable to the pit that allow for cabling to the EUT if necessary. The underside of the turntable can be accessed from the pit so cables can be supplied to the EUT from the pit.

A diagram of the Semi-Anechoic Chamber Test Site is shown in Figure 2.3-1 below:

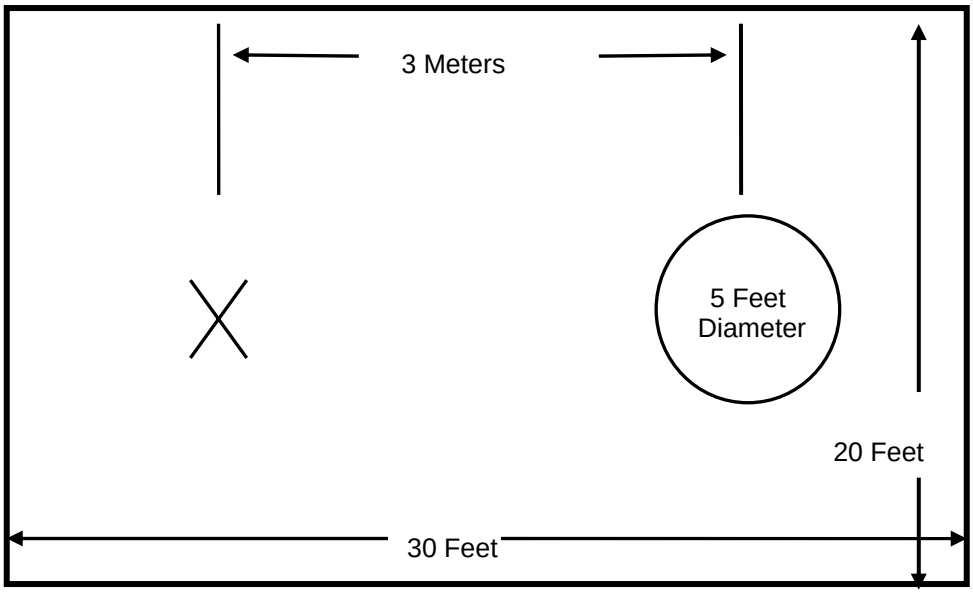

Figure 2.3-1: Semi-Anechoic Chamber Test Site

2.3.2 Open Area Tests Site (OATS)

The open area test site consists of a 40' x 66' concrete pad covered with a perforated electro-plated galvanized sheet metal. The perforations in the sheet metal are 1/8" holes that are staggered every 3/16". The individual sheets are placed to overlap each other by 1/4" and are riveted together to provide a continuous seam. Rivets are spaced every 3" in a 3 x 20 meter perimeter around the antenna mast and EUT area. Rivets in the remaining area are spaced as necessary to properly secure the ground plane and maintain the electrical continuity.

The entire ground plane extends 12' beyond the turntable edge and 16' beyond the antenna mast when set to a 10 meter measurement distance. The ground plane is grounded via 4 - 8' copper ground rods, each installed at a corner of the ground plane and bound to the ground plane using 3/4" stainless steel braided cable.

The turntable is an all aluminum 10' flush mounted table installed in an all aluminum frame. The table is remotely operated from inside the control room located 40' from the range. The turntable is electrically bonded to the surrounding ground plane via steel fingers installed on the edge of the turn table. The steel fingers make constant contact with the ground plane during operation.

Adjacent to the turntable is a 7' x 7' square and 4' deep concrete pit used for support equipment if necessary. The pit is equipped with 5 - 4" PVC chases from the pit to the control room that allow for cabling to the EUT if necessary. The underside of the turntable can be accessed from the pit so cables can be supplied to the EUT from the pit. The pit is covered with 2 sheets of 1/4" diamond style re-enforced steel sheets. The sheets are painted to match the perforated steel ground plane; however the underside edges have been masked off to maintain the electrical continuity of the ground plane. All reflecting objects are located outside of the ellipse defined in ANSI C63.4.

A diagram of the Open Area Test Site is shown in Figure 2.3-2 below:

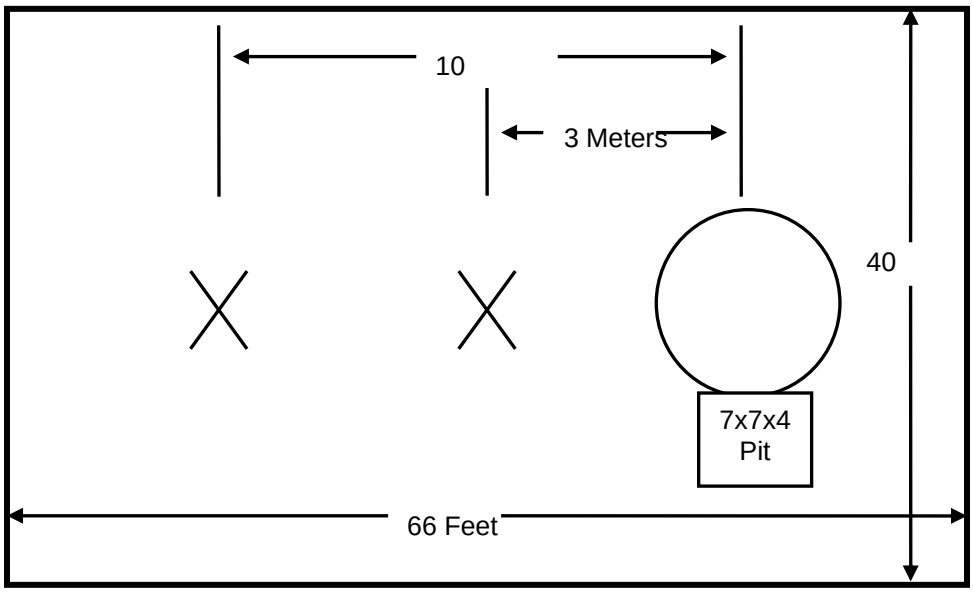

Figure 2.3-2: Open Area Test Site

2.4 Conducted Emissions Test Site Description
The AC mains conducted EMI site is a shielded room with the following dimensions:

- Height: 3.0 Meters
- Width: 3.6 Meters
- Length: 4.9 Meters

The room is manufactured by Rayproof Corporation and installed by Panashield, Inc. Earth ground is provided to the room via an 8' copper ground rod. Each panel of the room is connected electrically at intervals of 4".

Power to the room is filtered to prevent ambient noise from coupling to the EUT and measurement equipment. Filters are models 1B42-60P manufactured by Rayproof Corporation.

The room is of sufficient size to test table top and floor standing equipment in accordance with section 6.1.4 of ANSI C63.4.

A diagram of the room is shown below in figure 2.4-1:

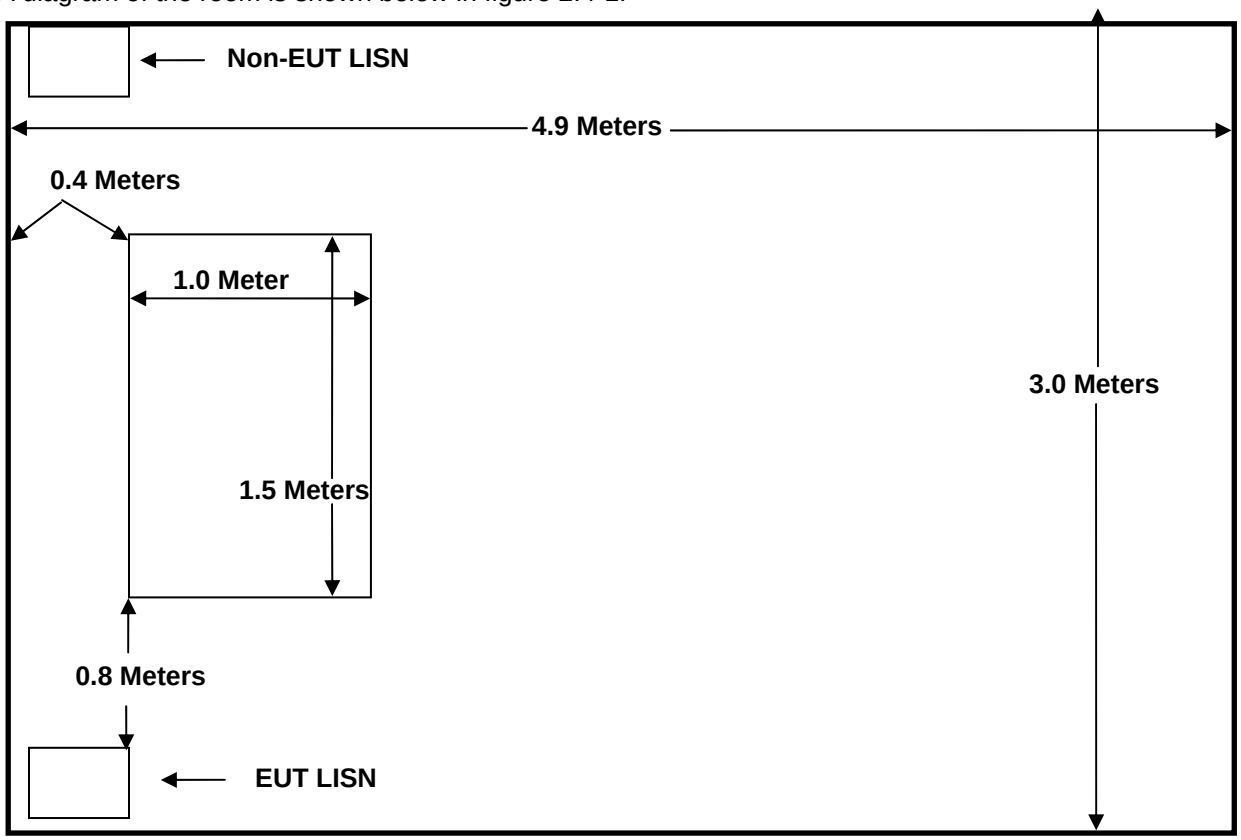

Figure 2.4-1: AC Mains Conducted EMI Site

3.0 APPLICABLE STANDARD REFERENCES
The following standards were used:

1 - ANSI C63.4-2003: Method of Measurements of Radio-Noise Emissions from Low-Voltage Electrical And Electronic Equipment in the 9 KHz to 40GHz
2 - US Code of Federal Regulations (CFR): Title 47, Part 15, Subpart C: Radio Frequency Devices, Intentional Radiators (October 2004)

4.0 LIST OF TEST EQUIPMENT

All test equipment used for regulatory testing is calibrated yearly or according to manufacturer's specifications.

Table 4.0-1: Test Equipment

Equipment Calibration Information					
ACS#	**Mfg.**	**Eq. type**	**Model**	**S/N**	**Cal. Due**
☒ 26	Chase	Bi-Log Antenna	CBL6111	1044	10/15/05
☒ 152	EMCO	LISN	3825/2	9111-1905	01/18/06
☒ 165	ACS	Conducted EMI Cable Set	RG8	165	01/06/06
☒ 22	Agilent	Pre-Amplifier	8449B	3008A00526	05/06/06
☒ 73	Agilent	Pre-Amplifier	8447D	272A05624	05/18/06
☒ 30	Spectrum Technologies	Horn Antenna	DRH-0118	970102	05/09/06
☒ 105	Microwave Circuits	High Pass Filter	H1G810G1	2123-01 DC0225	06/09/06
☒ 1	Rohde & Schwarz	Receiver Display	804.8932.52	833771/007	03/07/06
☒ 2	Rohde & Schwarz	ESMI Receiver	1032.5640.53	839587/003	03/07/06
☒ 3	Rohde & Schwarz	Receiver Display	804.8932.52	839379/011	12/15/05
☒ 4	Rohde & Schwarz	ESMI Receiver	1032.5640.53	833827/003	12/15/05
☒ 168	Hewlett Packard	Pulse Limiter	11947A	3107A02268	01/06/06
☒ 204	ACS	Cable	RG8	204	12/29/05
☒ 6	Harbour Industries	HF RF Cable	LL-335	00006	03/16/06
☒ 7	Harbour Industries	HF RF Cable	LL-335	00007	03/16/06
☒ 208	Harbour Industries	HF RF Cable	LL142	00208	60/24/06
☒ 167	ACS	Chamber EMI Cable Set	RG6	167	12/29/05

5.0 SUPPORT EQUIPMENT

Table 5.0-1: Support Equipment

Item	Equipment Type	Manufacturer	Model Number	Serial Number/Part Number	FCC ID
1	EUT	Statcom	Wibut	NA	T15-0200011
2	Power Supply	Globtek Inc.	GTM21089-1506-W3	WR92B2500LCP-Y-MED	NA
3	Power Supply	FRIWO	FW7333M06	15.1568.500-00	NA

6.0 EQUIPMENT UNDER TEST SETUP BLOCK DIAGRAM

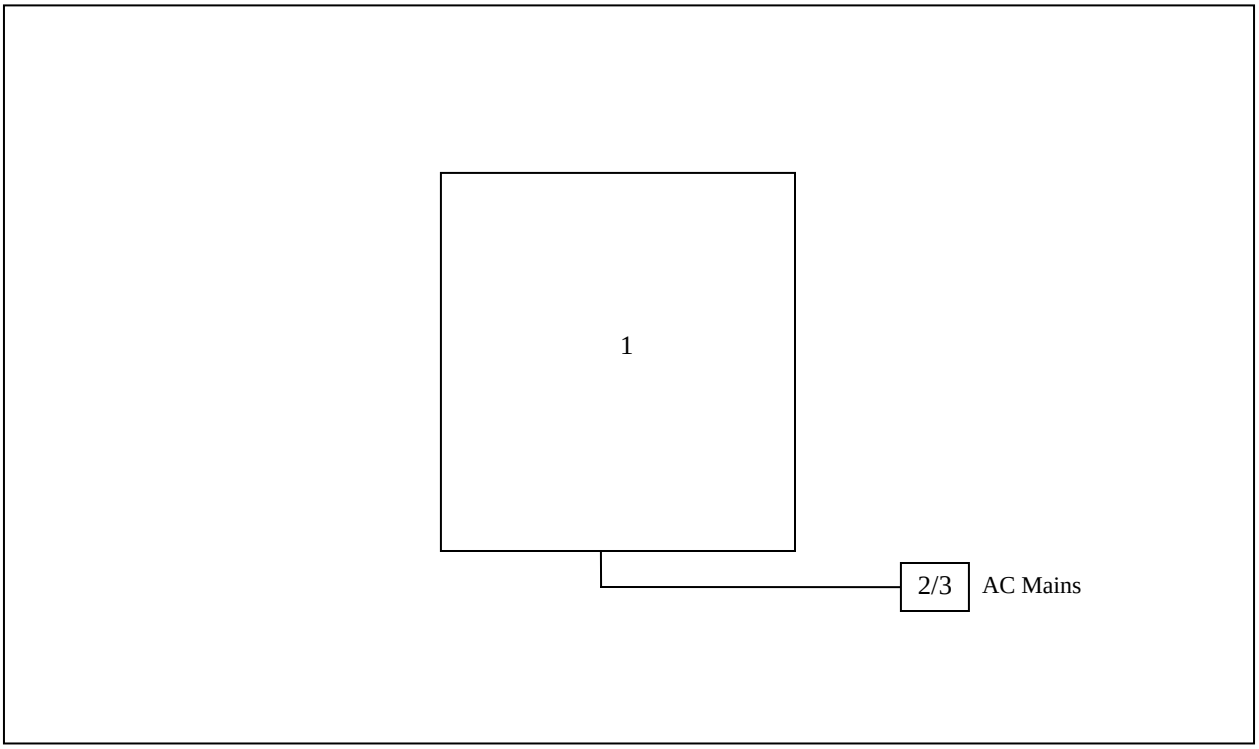

Figure 6.0-1: EUT Test Setup

7.0 SUMMARY OF TESTS

Along with the tabular data shown below, plots were taken of all signals deemed important enough to document.

7.1 Antenna Requirement - FCC Section 15.203

The EUT employs an integrated antenna with peak gain of 3.0 dBi typical.

7.2 Power Line Conducted Emissions - FCC Section 15.207

7.2.1 Test Methodology

Conducted emissions were performed from 150kHz to 30MHz with the spectrum analyzer's resolution bandwidth set to 9kHz and the video bandwidth set to 30kHz. The calculation for the conducted emissions is as follows:

Corrected Reading = Analyzer Reading + LISN Loss + Cable Loss
Margin = Applicable Limit - Corrected Reading

Measurements were made using a peak detector for comparison to the average limits. Results of the test are shown below in and Tables 7.2.2-1 through 7.2.2-4 and Figure 7.2.2-1 through 7.2.2-4

7.2.2 Test Results

Globtek Inc. Model: GTM21089-1506-W3

Table 7.2.2-1: Line 1 Conducted EMI Results (Peak)

Frequency MHz	Level dBµV	Transducer dB	Limit dBµV	Margin dB	Line	PE
0.150	42.61	10.1	56.0	13.4	L1	GRD
0.183	43.31	10.1	54.3	11.0	L1	GRD
0.912	28.60	10.1	46.0	17.4	L1	GRD
1.079	26.94	10.1	46.0	19.1	L1	GRD
1.410	24.91	10.1	46.0	21.1	L1	GRD
1.643	26.74	10.1	46.0	19.3	L1	GRD
2.737	28.70	10.1	46.0	17.3	L1	GRD
2.870	29.76	10.1	46.0	16.2	L1	GRD
3.268	29.20	10.1	46.0	16.8	L1	GRD
3.434	29.18	10.1	46.0	16.8	L1	GRD

Table 7.2.2-2: Line 2 Conducted EMI Results (Peak)

Frequency MHz	Level dBµV	Transducer dB	Limit dBµV	Margin dB	Line	PE
0.150	40.07	10.1	56.0	15.9	L2	GRD
0.183	44.78	10.1	54.3	9.6	L2	GRD
.349	33.09	10.1	49.0	15.9	L2	GRD
.912	28.82	10.1	46.0	17.2	L2	GRD
1.078	27.63	10.1	46.0	18.4	L2	GRD
1.576	28.32	10.1	46.0	17.7	L2	GRD
2.372	29.81	10.1	46.0	16.2	L2	GRD
2.737	31.57	10.1	46.0	14.4	L2	GRD
2.836	30.04	10.1	46.0	16.0	L2	GRD
3.400	30.75	10.1	46.0	15.3	L2	GRD

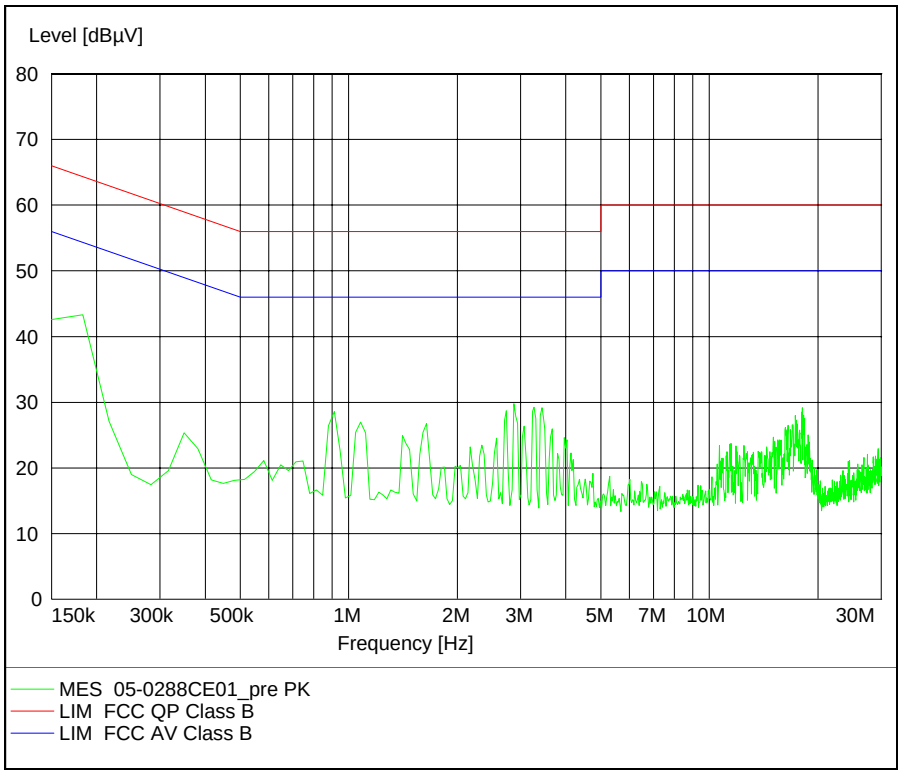

Figure 7.2.2-1: Conducted Emissions Graph – Line 1

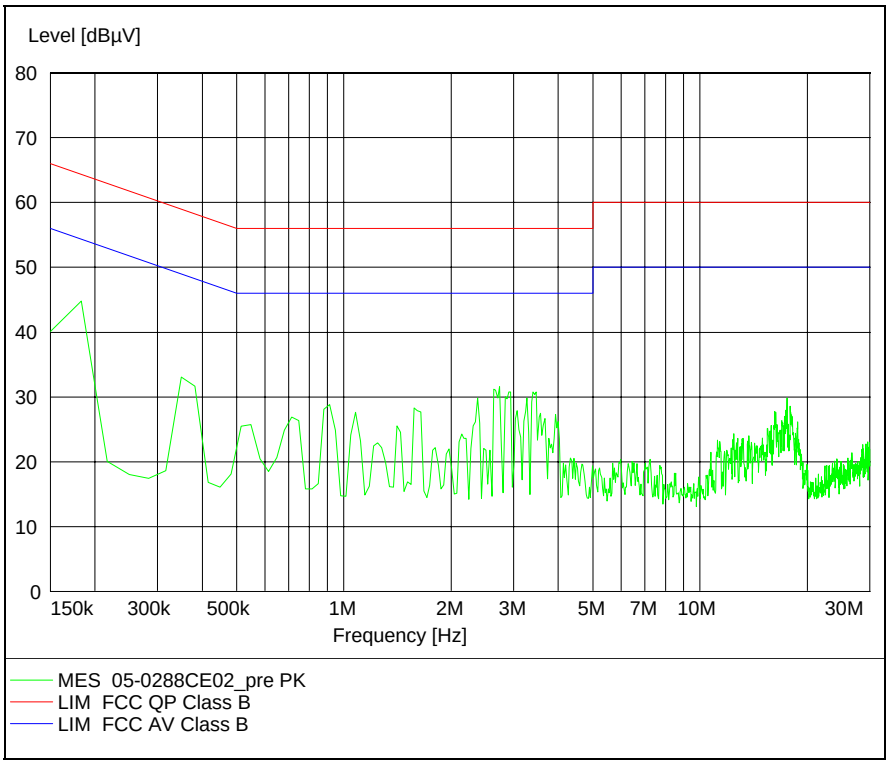

Figure 7.2.2-2: Conducted Emissions Graph – Line 2

FRIWO Model: FW7333M06

Table 7.2.2-3: Line 1 Conducted EMI Results (Peak)

Frequency MHz	Level dBµV	Transducer dB	Limit dBµV	Margin dB	Line	PE
0.150	38.17	10.1	56.0	17.8	L1	FLO
0.183	33.33	10.1	54.3	21.0	L1	FLO
0.216	32.46	10.1	53.0	20.5	L1	FLO
1.344	28.80	10.1	46.0	17.2	L1	FLO
1.841	30.22	10.1	46.0	15.8	L1	FLO
2.040	30.22	10.1	46.0	15.8	L1	FLO
2.272	30.52	10.1	46.0	15.5	L1	FLO
2.571	31.11	10.1	46.0	14.9	L1	FLO
2.770	30.93	10.1	46.0	15.1	L1	FLO
3.267	31.59	10.1	46.0	14.4	L1	FLO

Table 7.2.2-4: Line 2 Conducted EMI Results (Peak)

Frequency MHz	Level dBµV	Transducer dB	Limit dBµV	Margin dB	Line	PE
0.150	37.20	10.1	56.0	18.8	L2	FLO
0.183	33.30	10.1	54.3	21.0	L2	FLO
0.216	29.41	10.1	53.0	23.6	L2	FLO
0.548	26.96	10.1	46.0	19.0	L2	FLO
1.110	25.85	10.1	46.0	20.2	L2	FLO
1.310	26.56	10.1	46.0	19.4	L2	FLO
1.600	27.27	10.1	46.0	18.7	L2	FLO
2.070	28.70	10.1	46.0	17.3	L2	FLO
2.270	29.08	10.1	46.0	16.9	L2	FLO
3.030	30.07	10.1	46.0	15.9	L2	FLO

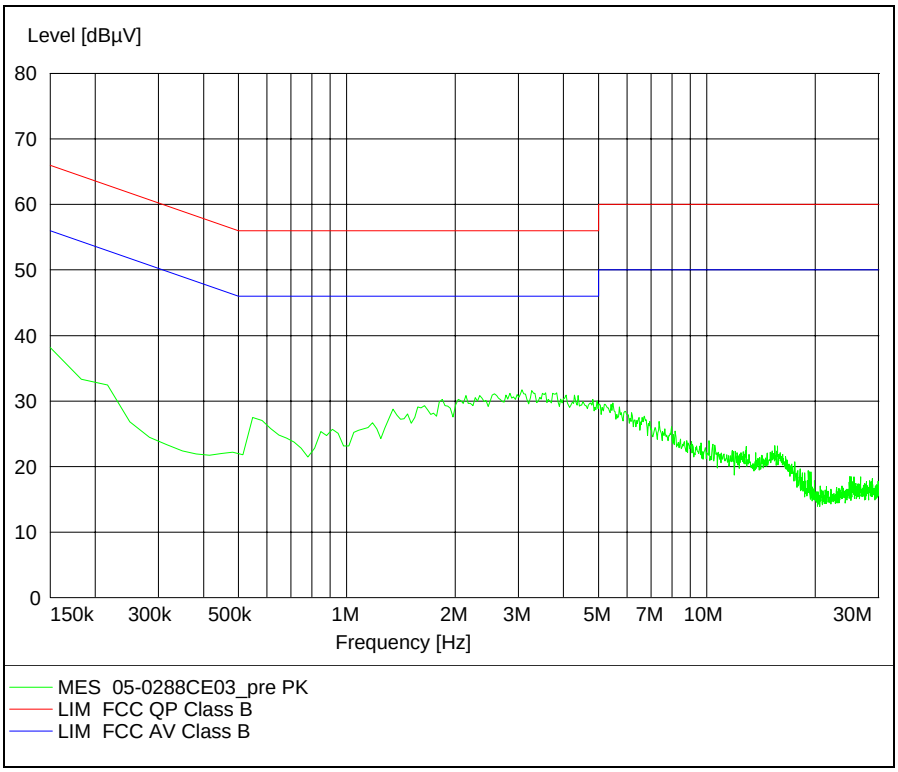

Figure 7.2.2-3: Conducted Emissions Graph – Line 1

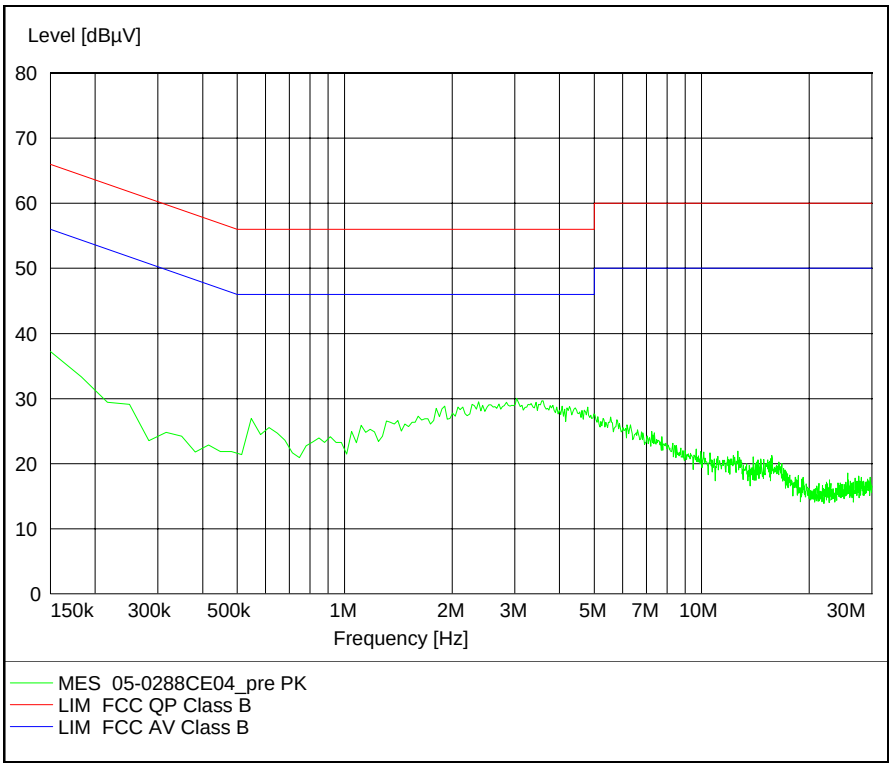

Figure 7.2.2-4: Conducted Emissions Graph – Line 2

7.3 Radiated Emissions - FCC Section 15.109(Unintentional Radiation)

7.3.1 Test Methodology

Radiated emissions tests were performed over the frequency range of 30MHz to 1 GHz. Measurements of the radiated field strength were made at a distance of 3m from the boundary of the equipment under test (EUT) and the receiving antenna. The antenna height was varied from 1m to 4m so that the maximum radiated emissions level would be detected. Radiated measurements were made with the Spectrum Analyzer's resolution bandwidth set to 120 KHz for measurements above 30MHz. Average measurements are taken with the RBW and VBW were set to 1MHz and 10 Hz respectively for measurements above 1000MHz.

7.3.2 Test Results

Results of the test are given below in Table 7.3.2-1:

Frequency (MHz)	Uncorrected Reading (dBµV/m)	Antenna Polarity (H/V)	Antenna Height (cm)	Turntable Azimuth (°)	Total Correction Factor (dB)	Corrected Reading (dBµV/m)	Limit (dBµV/m)	Margin (dB)
38.6	42.9	v	100	0	-9.87	33.03	40	7.0
95.4	30.3	v	100	0	-11.55	18.75	43.5	24.8
97.1	35	v	100	271	-11.21	23.79	43.5	19.7
133	23.1	h	100	0	-10.06	13.04	43.5	30.5
233	25.9	h	100	0	-9.60	16.30	46	29.7
240	36.9	h	111	84	-8.83	28.07	46	17.9
248	37.5	h	108	238	-8.41	29.09	46	16.9
495	23.32	v	100	0	-0.58	22.74	46	23.3
670	24.4	v	100	0	1.84	26.24	46	19.8
959	25.1	v	100	0	7.02	32.12	46	13.9

Table 7.3.2-1: Radiated Emissions

Note: All emissions above 959 MHz were attenuated at least 20 dB below the permissible limit.
* Emissions reports were at or below the noise floor of the measurement equipment.

7.4 Band-Edge Compliance and Spurious Emissions - FCC Section 15.249

7.4.1 Radiated Spurious Emissions - FCC Section 15.249

7.4.1.1 Test Methodology

Radiated emissions tests were made over the frequency range of 30MHz to 25GHz, 10 times the highest fundamental frequency. Emission measurements were also performed at the band-edge and compared to the general radiated emission limits of Part 15.209.

The EUT was rotated through 360° and the receive antenna height was varied from 1m to 4m so that the maximum radiated emissions level would be detected. For frequencies below 1000MHz, quasi-peak measurements were made using a resolution bandwidth (RBW) of 120 kHz and a video bandwidth (VBW) of 300 kHz. For frequencies above 1000MHz, average measurements were calculated based on the peak measurements made with RBW of 1 MHz and a VBW of 1 MHz. The average emissions were calculated by applying the duty cycle correction of the EUT to the peak measurements for comparison to the average limit.

7.4.1.2 Duty Cycle Correction

For average radiated measurements, the measured level was reduced by a factor 22.95 dB to account for the duty cycle of the EUT. The duty cycle was determined to be 7.12% or 7.12ms with a 100ms period. The duty cycle correction factor is determined using the formula: 20log (0.0712) = -22.95 dB.

The time to transmit the largest packet is 3.56 msec The maximum transmit capability of a Wibut is 2 packets in any given 100 msec period.

Calculation

Transmit max packet #1	3.56 msec
Acknowledge response (min)	10 msec
Debounce for next human input	50 msec
Transmit max packet #2	3.56 msec
TOTAL min. Period	67.12 msec

The next packet would be transmitted a minimum 60 msec after packet #2 (10 msec response latency + 50 msec for debounce)

100msec Duty cycle calculation:

2 maximum packets = 2 x 3.56 msec = 7.12 msec in any 100 msec period = 7.12 / 100 = 7.12% Duty Cycle

7.4.1.3 Test Results

Radiated spurious emissions found in the band of 30MHz to 25GHz and band-edge emissions are reported in Table 7.4.1.2-1 and Figures 7.4.1.2-1 through 7.4.1.2-4.

Frequency (MHz)	Level (dBuV)		Antenna Polarity (H/V)	Correction Factors (dB)	Corrected Level (dBuV/m)		Limit (dBuV/m)		Margin (dB)	
	pk	avg			pk	avg	pk	avg	pk	avg
Fundamental Frequency										
2405	95.90	91.70	V	0.19	96.09	68.94	114	94	17.91	25.06
2440	97.30	93.70	V	0.34	97.64	71.09	114	94	16.36	22.91
2480	97.90	94.10	H	0.52	98.42	71.67	114	94	15.58	22.33
Band-edge Emissions										
2400.0	59.60	47.50	H	1.19	60.79	25.74	74	54	13.21	28.26
2483.5	69.12	58.93	H	0.52	69.64	36.50	74	54	4.36	17.50
Spurious Emissions										
2399	59.60	47.50	V	0.52	60.12	48.02	74	54	13.88	5.98
2552	46.10	46.10	H	0.16	46.26	46.26	74	54	27.74	7.74
4810	47.10	38.20	H	8.91	56.01	24.16	74	54	17.99	29.84
4880	47.50	39.20	H	8.22	55.72	24.47	74	54	18.28	29.53
4960	47.40	40.20	H	8.58	55.98	25.83	74	54	18.02	28.17

Table 7.4.1.2-1: Radiated Spurious Emissions

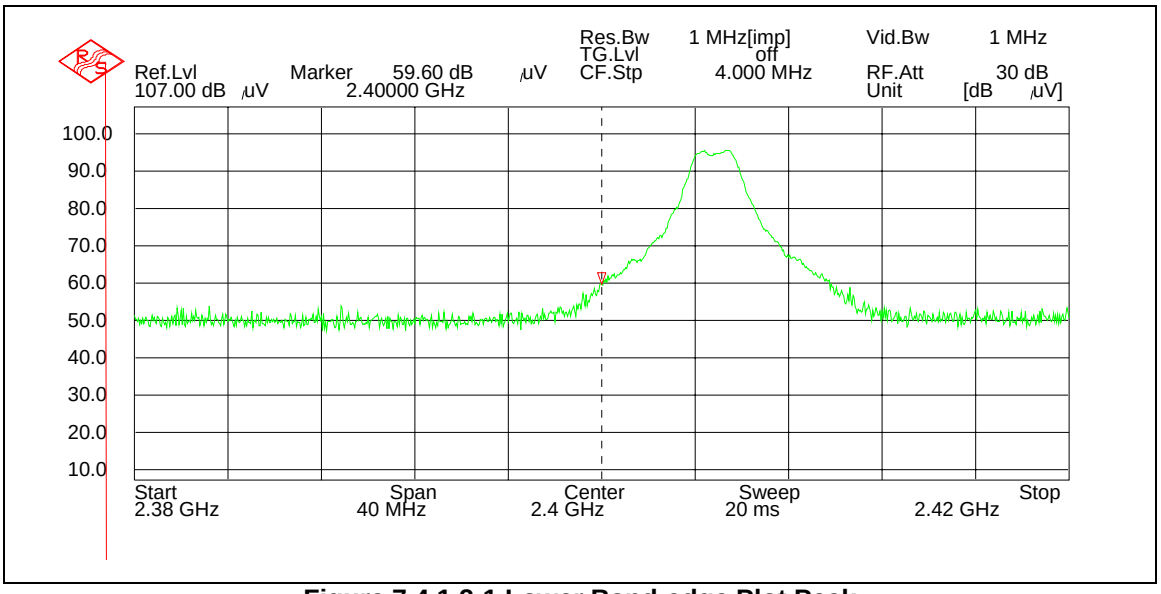

Figure 7.4.1.2-1 Lower Band-edge Plot Peak

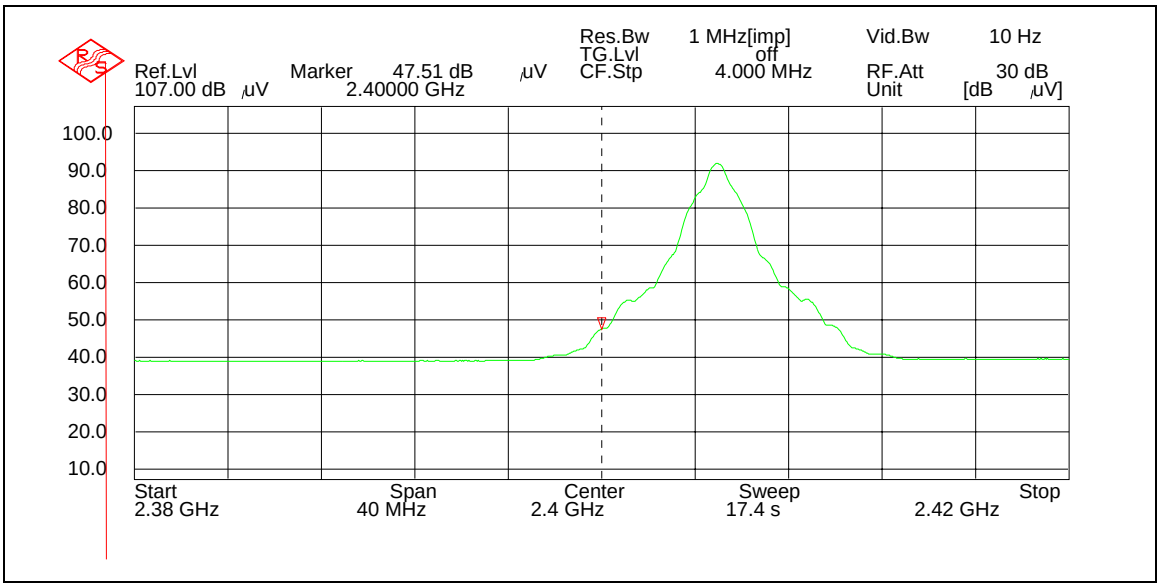

Figure 7.4.1.2-2 Lower Band-edge Plot Average

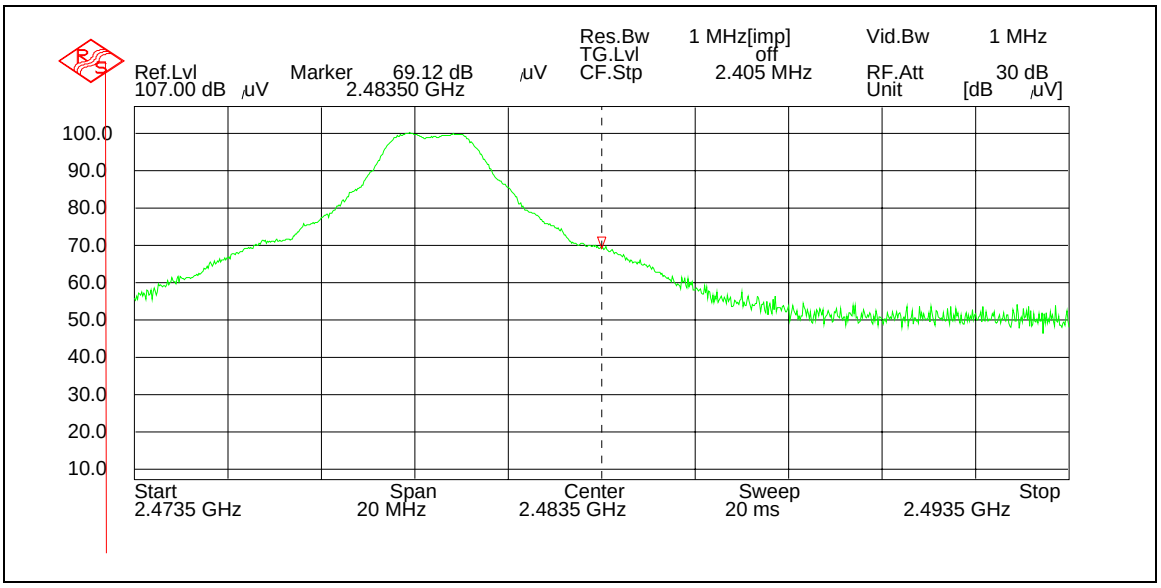

Figure 7.4.1.2-3 Upper Band-edge Plot Peak

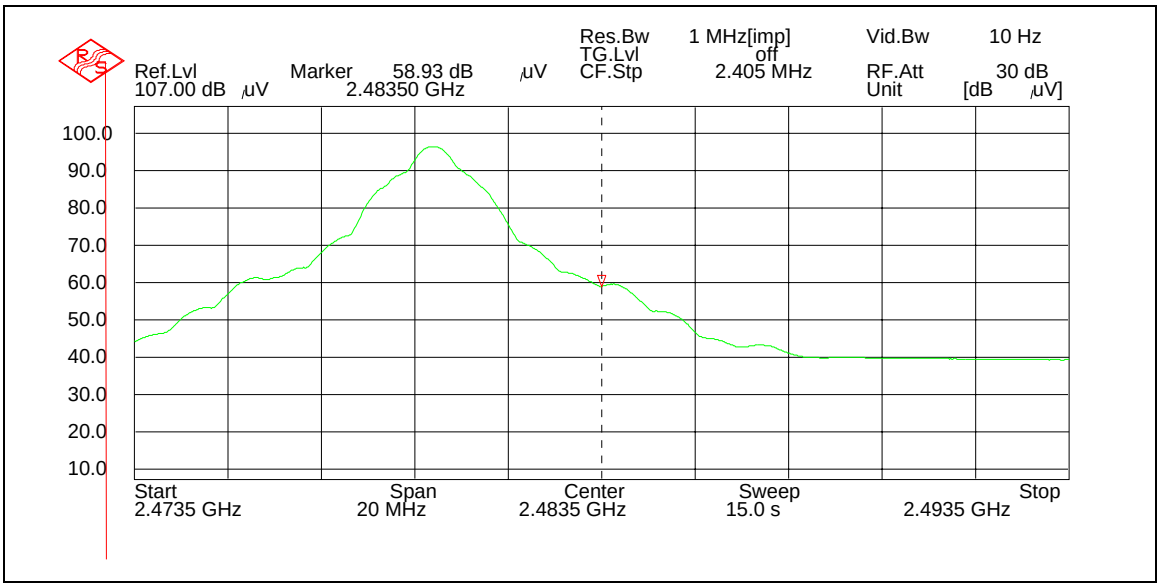

Figure 7.4.1.2-4 Lower Band-edge Plot Average

7.4.1.4 Sample Calculation:

$R_C = R_U + CF_T$

Where:

CF_T	=	Total Correction Factor (AF+CA+AG)-DC (Average Measurements Only)
R_U	=	Uncorrected Reading
R_C	=	Corrected Level
AF	=	Antenna Factor
CA	=	Cable Attenuation
AG	=	Amplifier Gain
DC	=	Duty Cycle Correction Factor

Example Calculation: Peak

Corrected Level: 95.90 + 0.19 = 96.09 dBuV
Margin: 114dBuV – 96.09 dBuV = 17.91 dB

Example Calculation: Average

Corrected Level: 91.70 + 0.19 -22.95 = 68.94 dBuV
Margin: 94dBuV – 68.94 dBuV = 25.06 dB

8.0 CONCLUSION

In the opinion of ACS, Inc. the Wibut manufactured by Statcom, does meet the requirements of FCC Part 15 subpart C.