
FCC Part 15 Certification **Test Report**

910.5MHz – 918.5MHz Multi-Channel Transmitter

FCC ID: RPE1000-7315

FCC Rule Part: 15.249

ACS Report Number: 04-0038-15249

Manufacturer: VeriFiber, LLC.

Model: VT31XX

Model Variants: VT3100, VT3100X, VT3105,
VT3105X, VT3110, VT3115,
VT3120, VT3125, VT3130, VT3135

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This report contains 9 pages

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1.0 GENERAL

1.1 Introduction

The purpose of this report is to demonstrate compliance with 15.249 of the FCC's Code of Federal Regulations.

1.2 Product Description

The EUT is a 910.5MHz – 918.5MHz Three Channel Transmitter classified under Part 15.249 as a fixed, point to point transmitter. The VT31XX is a compact wireless transmitter device that sends information to a companion base station receiver.

The VT31XX operates from an internal battery and is designed to operate for up to five years.

The VT31XX Assembly is the basis of the following Wireless Sensor model numbers:

VT3100 – Wireless Temperature Sensor
VT3100X – Wireless Sensor with remote temperature sensor
VT3105– Wireless Humidity Sensor
VT3105X- Wireless Sensor with remote humidity sensor
VT3110– Wireless Switch Sensor
VT3115– Wireless Water Sensor
VT3120– Wireless Vibration Sensor
VT3125– Wireless Tilt Sensor
VT3130– Wireless Count Sensor
VT3135– Wireless Pressure Sensor

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

1.2.1 Intended Use

The VT31XX is designed for industrial or home use where wireless sensing is required.

2.0 LOCATION OF TEST FACILITY

All testing was performed by qualified ACS personnel located at the following address:

ACS, Inc.
5015 B.U. Bowman Drive
Buford, GA 30518

2.1 DESCRIPTION OF TEST FACILITY

Both the 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.

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

2.1.1 Open Area Test Site

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 2.1-1 below:

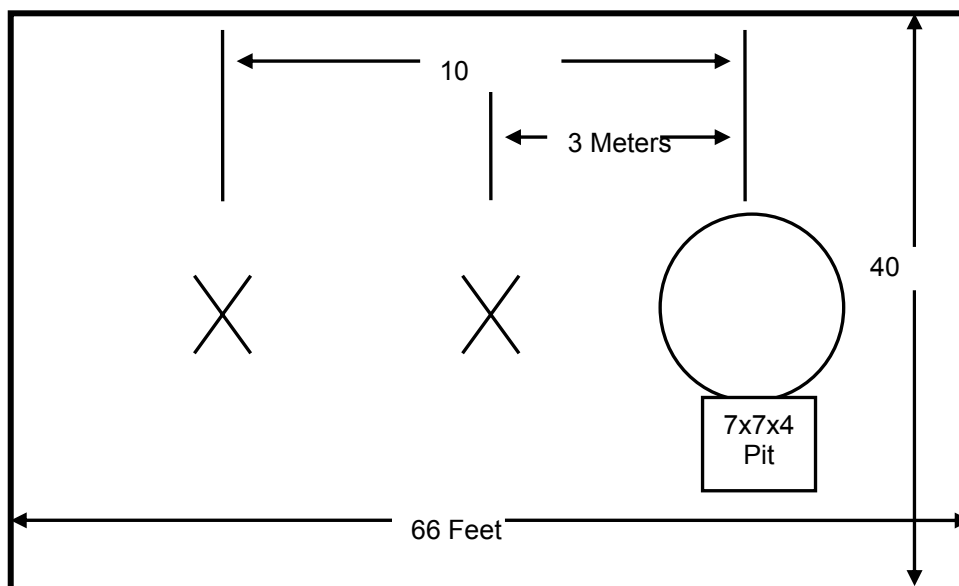


Figure 2.1-1: Open Area Test Site

2.1.2 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 2.1.2-1:

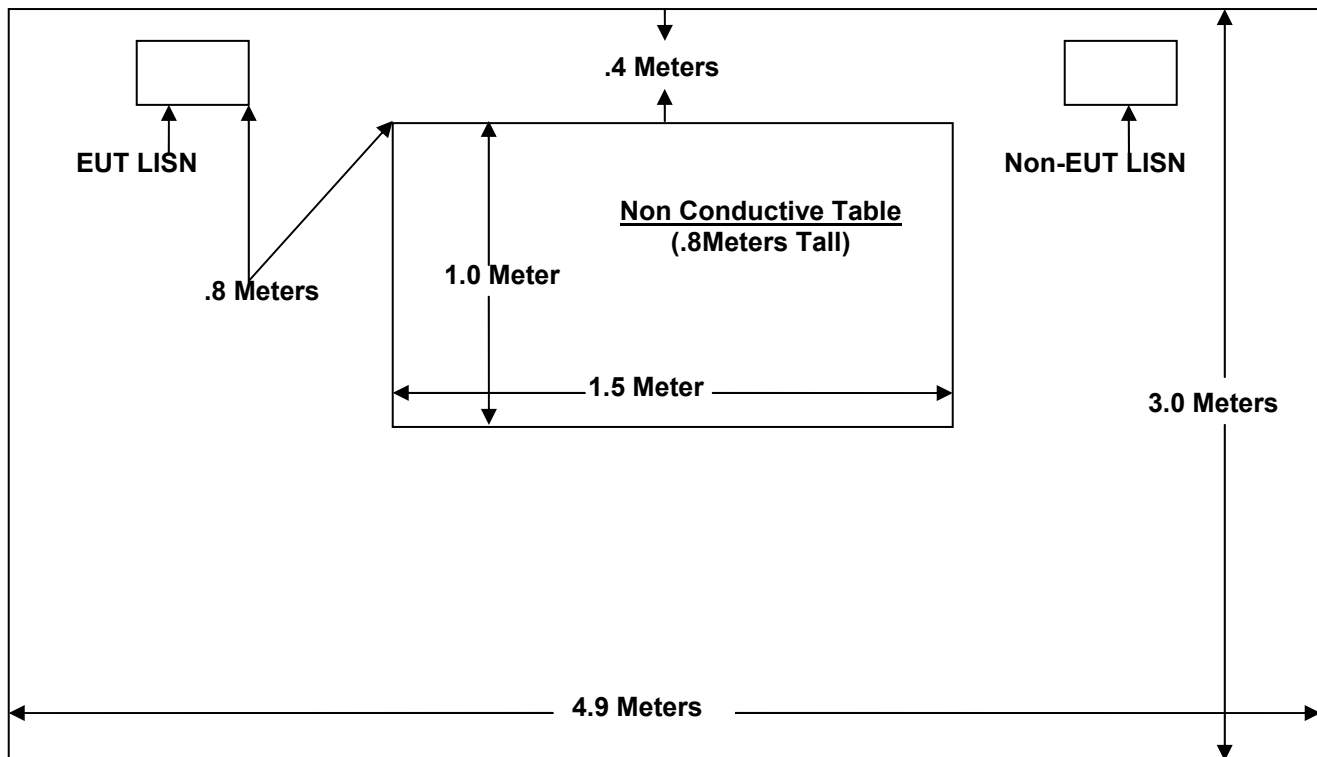


Figure 2.1.2-1: AC Mains Conducted EMI Site

3.0 APPLICABLE STANDARD REFERENCES

The following standards were used:

- ❖ ANSI C63.4-: Method of Measurements of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the 9KHz to 40GHz
- ❖ US Code of Federal Regulations (CFR): Title 47, Part 2, Subpart J: Equipment Authorization Procedures (October 2002)
- ❖ US Code of Federal Regulations (CFR): Title 47, Part 15, Subpart C: Radio Frequency Devices, Intentional Radiators (October 2002)
- ❖ FCC OET Bulletin 65 Appendix C - Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields
- ❖ ANSI/TIA/EIA – 603 – A – 2001: Land Mobile or PM Communications Equipment and Performance Standards (August 15, 2001)

4.0 LIST OF TEST EQUIPMENT

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

Table 4-1: Test Equipment

Equipment Calibration Information					
ACS #	Mfg.	Eq. type	Model	S/N	Cal. Due
---	Agilent	Spectrum Analyzer	E7402A	US40240259	11/08/04
---	Agilent	Spectrum Analyzer	8563EC	4111A01283	10/10/04
26	Chase	Bi-Log Antenna	CBL6111	1044	10/14/04
152	EMCO	LISN	3825/2	9111-1905	1/08/05
153	EMCO	LISN	3825/2	9411-2268	12/11/04
193	ACS	OATS Cable Set	RG8	193	1/09/05
167	ACS	Conducted EMI Cable Set	RG8	167	1/09/05
24	ACS	Cable	Helix	24	04/07/04
5	ACS	Cable	LL-335	None	8/20/04
6	ACS	Cable	LL-335	None	8/6/04
22	Agilent	Pre-Amplifier	8449B	3008A00526	9/18/04
73	Agilent	Pre-Amplifier	8447D	272A05624	04/15/04
30	Spectrum Technologies	Horn Antenna	DRH-0118	970102	5/8/04
105	Microwave Circuits	High Pass Filter	H1G810G1	2123-01 DC0225	6/17/04
40	EMCO	Biconical Antenna	3104	3211	9/19/04

5.0 SYSTEM BLOCK DIAGRAM

Table 5.0: System Block Diagram

Diagram Number	Manufacturer	Equipment Type	Model Number	Serial Number	FCC ID
1	VeriFiber	EUT	VT31XX	None	RPE1000-7315
2	VeriFiber	Sensor	VT3100	None	N/A

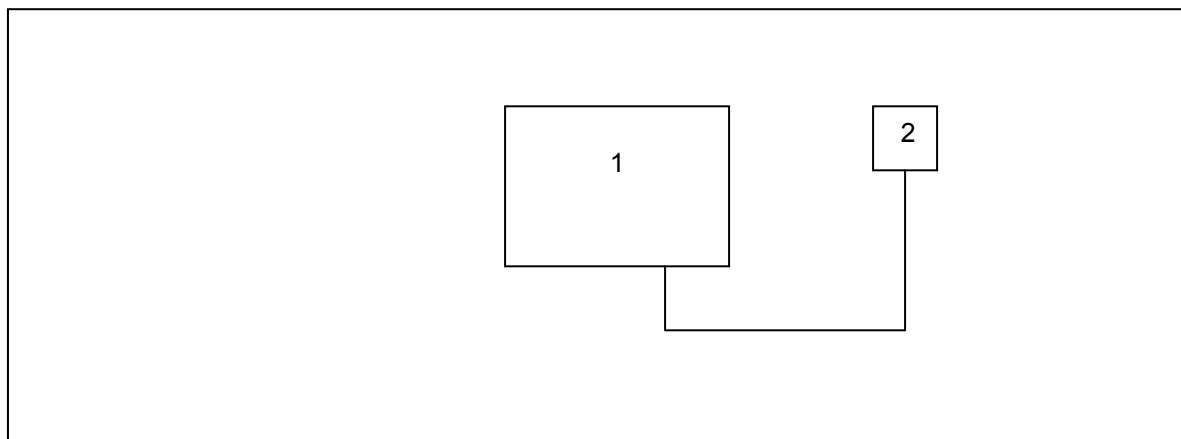


Figure 5.0-1: EUT Test Setup

6.0 SUMMARY OF TESTS

6.1 Power Line Conducted Emissions - FCC Section 15.207

6.1.1 Test Methodology

ANSI C63.4 sections 6 and 7 were the guiding documents for this evaluation. 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.

6.1.2 Test Results

The EUT is powered from an internal battery. There is no connection to the AC mains, therefore this requirement is not applicable to the EUT.

6.2 Radiated Emissions - FCC Section 15.209(Unintentional Radiation)

6.2.1 Test Methodology

ANSI C63.4 Sections 6 and 8 were the guiding documents for this evaluation. Radiated emissions tests were performed over the frequency range of 30MHz to 1000. 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 120KHz for measurements above 30MHz.

The EUT was caused to go into a Standby mode for this test.

6.2.2 Test Results

Results of the test are given in Table 6.2.2-1 below:

Table 6.2.2-1: Radiated Emissions Tabulated Data (Unintentional Radiators)

Frequency (MHz)	Uncorrected Reading (dBμV)	Antenna Polarity (H/V)	Antenna Height (cm)	Turntable Position (°)	Total Correction Factor (dB)	Corrected Reading (dBμV)	Limit (dBμV)	Margin (dB)	Results
44.01	13.7	V	100	0	13.04	26374	40.0	13.3	Pass
96.40	11.26	V	100	0	10.90	22.16	43.5	21.3	Pass
292.97	43.30	V	100	0	-11.86	31.44	46.0	14.6	Pass
296.22	39.68	V	100	0	-11.83	27.85	46.0	18.2	Pass
299.45	40.72	V	100	0	-11.80	28.92	46.0	17.1	Pass
406.15	28.13	V	100	0	-8.09	20.04	46.0	26.0	Pass
703.626	20.58	V	100	0	-1.38	19.20	46.0	26.8	Pass
903.00	27.49	V	100	0	0.18	27.67	46.0	18.3	Pass

6.3 FCC Section 15.249 (a) – Field Strength of Emissions

6.3.1 Test Requirement

In addition to the provisions of Section 15.205, the field strength of emissions from intentional radiators operated under this Section shall not exceed the following:

Fundamental Frequency	Field Strength of Fundamental (millivolts/meter)	Field Strength of Harmonics (microvolts/meter)
902 - 928 MHz	50	500
2400 - 2483.5 MHz	50	500
5725 - 5875 MHz	50	500
24.0 - 24.25 GHz	250	2500

6.4.2 Test Methodology

ANSI C63.4 Sections 6 and 8 were the guiding documents for this evaluation. Radiated emissions tests were performed over the frequency range of 30MHz to 10000MHz. 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 120KHz for measurements below 1000MHz and 1Mhz for measurements above 1000MHz. All measurements were made using a CISPR Quasi Peak Detector as allowed by 15.249.

The EUT was caused to go into a "CW" mode of operation for this test.

6.4.3 Test Results

The results are shown in the table 6.4.3-1 below.

Table 6.4.3-1: Fundamental Field Strength Radiated Measurements

Channel	Low	Mid	High
Fundamental Freq (MHz):	910.5	916.5	918.55
Fund. Field Strength (dBuV):	85	92.24	82
Limit(dBuV/m)	93.97	93.97	93.97
Margin:	8.2	1.73	11.0
Result:	Pass	Pass	Pass

Table 6.4.3-2: Radiated Spurious Emissions Measurements

Frequency (MHz)	Level (dBuV)	Detector (P/A)	Antenna Polarity (H/V)	Turntable Position (o)	Correction Factors (dB)	Corrected Level (dBuV)	Limit (dBuV)	Margin (dB)
Low Channel								
2731.00	47	p	v	100	6.45	53.45	74	20.5
2731	41.7	a	v	100	6.45	48.15	54	5.8
3642	36.5	p	v	100	10.20	46.70	74	27.3
3642	28.5	a	v	100	10.20	38.70	54	15.3
4552	38	p	v	100	13.70	51.70	74	22.3
4552	28.5	a	v	100	13.70	42.20	54	11.8
Mid Channel								
2749	56.83	p	v	136	0.74	57.57	74.00	16.43
2749	52.67	a	v	136	0.74	53.41	54.00	0.59
3666	48.67	p	v	159	7.71	56.38	74.00	17.62
3666	40.17	a	v	159	7.71	47.88	54.00	6.12
High Channel								
2755	48.33	p	v	125	6.54	54.87	74	19.1
2755	44.5	a	v	125	6.54	51.04	54	3.0
3674	37.2	p	v	100	10.35	47.55	74	26.5
3674	27.2	a	v	100	10.35	37.55	54	16.5

7.0 CONCLUSION

In the opinion of ACS, Inc. the VT31XX, manufactured by VeriFiber meets the relevant requirements of FCC Part 15.249 as required.