

VitalCom, Inc.
FCC Part 95 Application
Model DR-10000

August 13, 2001

MEASUREMENT/TECHNICAL REPORT

COMPANY NAME: VitalCom, Inc.

MODEL: DR-10000

FCC ID: BQI01DR-10000

DATE: August 13, 2001

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

Equipment type: **Low Power Transmitter (for Biomedical Applications)**

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

If yes, defer until:
date

N.A. 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.

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SECTION 1

GENERAL INFORMATION

GENERAL INFORMATION

Product Description

The Equipment Under Test (EUT) is a VitalCom, Inc., DR-10000. The DR-10000 is a wireless Access Point (AP) designed for use in medical monitoring applications. The DR-10000 receives patient monitoring data from similar radios (FCC ID: BQI00DT-4500) attached to the patients in that hospital. The DR-10000 is linked to other DR-10000's through a 10Base-T Ethernet backbone. This backbone allows the AP's to pass patient data back to the end user of the system - a nurses monitoring station. The DR-10000 is composed of two 608-614 MHz wireless transceivers and Ethernet conversion circuitry that passes data from these transceivers to the Ethernet backbone.

The DR-10000 may operate with two different types of antennas: a 0 dBi monopole to provide omni-directional coverage and a +2 dBi patch antenna to provide unidirectional coverage. The unit requires external DC power but has its own internal voltage regulation. The DR-10000 is self contained in a plastic package and is designed to be installed on the ceiling of a hospital hallway.

The EUT has been previously approved under FCC ID: BQI00DR-10000 by the FCC on 9/8/00 (original certification) and 12/28/00 (permissive change). For the permissive change application, the transmitter modules were modified as follows:

- 1) The SAW RF bandpass filter (reference designator F5 in the transmit chain has been replaced by a third order, top capacitively coupled LC filter. This change will result in increased yield.
- 2) The power amplifier transistor, HBFP450 (reference designator Q3) in the transmit chain has been replaced by transistor BFP450. The replacement transistor is the functional and performance equivalent of the original transistor. The change is in place to allow alternate supply to facilitate planning.

Since only a portion of the tests needed to be performed for the permissive change application, this application includes data from the both the original submittal and the permissive change application.

Related Submittal(s)/Grant(s)

The EUT has been previously approved under FCC ID: BQI00DR-10000 on September 8, 2000 under Part 15.242 and with a permissive change on December 28, 2000. The EUT is being resubmitted under FCC ID: BQI01DR-10000 to new requirements specified in Part 95 of the rules.

Additionally, the EUT will be used with other transceivers (already submitted and approved under FCC ID: BQI00DT-4500).

SECTION 2

TESTS AND MEASUREMENTS

TESTS AND MEASUREMENTS

Configuration of Tested System

The sample was tested per ANSI C63.4, Methods of Measurement from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz (1992). Conducted and radiated emissions data were taken with the test receiver or spectrum analyzer's resolution bandwidth adjusted to 9 kHz and 120 kHz, respectively. All measurements are peak unless stated otherwise. The video filter associated with the spectrum analyzer was off throughout the evaluation process. Interconnecting cables were manipulated as necessary to maximize emissions. A block diagram of the tested system is shown in Figure 1. Test configuration photographs for spurious and fundamental emissions are shown in Figure 2.

Test Facility

Testing was performed at US Tech's measurement facility at 3505 Francis Circle, Alpharetta, GA. This site has been fully described and submitted to the FCC, and accepted in their letter marked 31040/SIT. Additionally this site has also been fully described and submitted to Industry Canada (IC), and has been approved under file number IC2982.

Modifications

No modifications were made by US Tech, to bring the EUT into compliance with FCC Part 95 limits for the transmitter portion of the EUT or the Class A Digital Device Requirements.

Test Equipment

Table 2 describes test equipment used to evaluate this product.

FIGURE 1
TEST CONFIGURATION

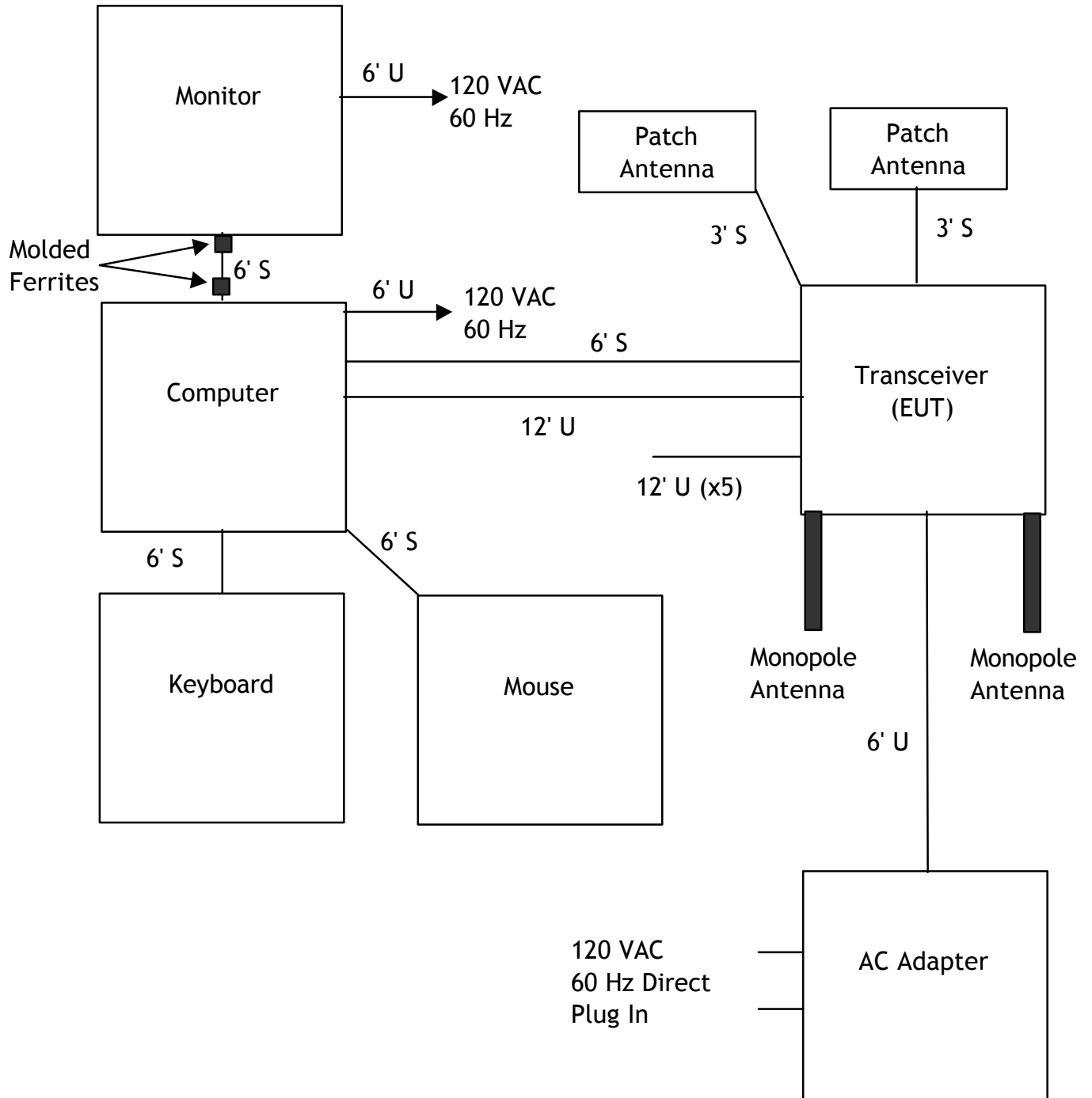


FIGURE 2a

Photograph(s) for Fundamental, Spurious and Digital Devices Emissions



FIGURE 2b

Photograph(s) for Fundamental, Spurious and Digital Devices Emissions

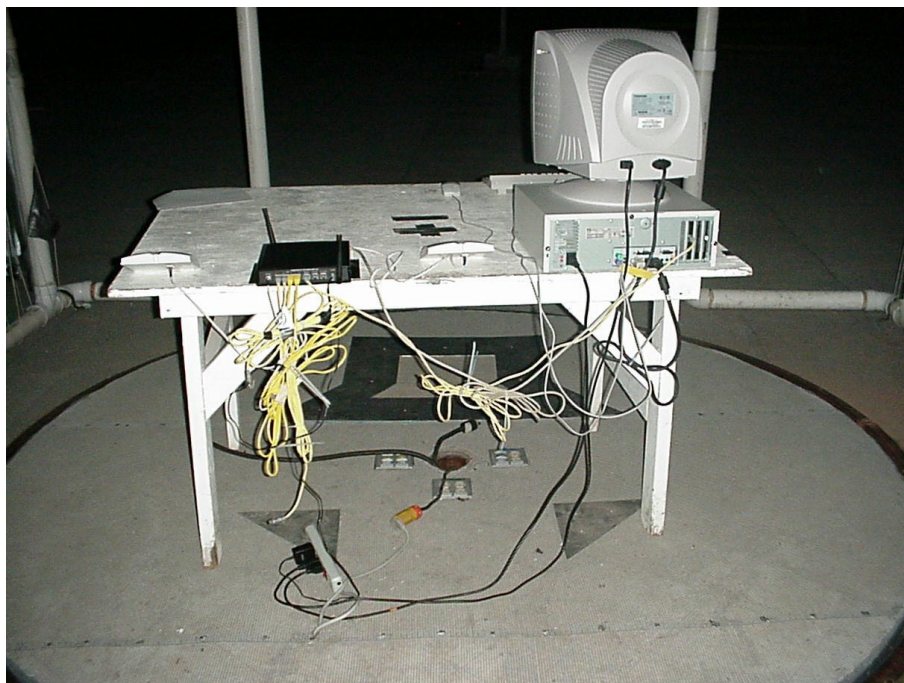


FIGURE 2c

Photograph(s) for Conducted Emissions



TABLE 1

EUT and Peripherals

PERIPHERAL MANUFACTURER	MODEL NUMBER	SERIAL NUMBER	FCC ID:	CABLES P/D
Transmitter VitalCom, Inc. (EUT)	DR-10000	None	BQI00DR-10000 (Previously approved)	6' S 12' U 5 @ 12' U
Antenna (x2) Cushcraft	SL6081 (Patch, +2 dBi)	None	None	3' S each
Antenna (x2) Nearson, Inc.	P-24A48G (Monopole, 0 dBi)	None	None	None
AC Adapter Volgen	SPU10R-2	00172142	N/A	6' U
Computer Hewlett Packard	Vectra VE17DT	US92702722	DoC Approved	6' U Power Cord
Monitor Toshiba	TekBright 510V	89035633	EWBOC15DB06	6' S 6' U Power Cord
Keyboard Hewlett Packard	SK-2502C	C990608784	DoC Approved	6' S
Mouse Hewlett Packard	M-S34	LZE92123016	DZL211029	6' S

TABLE 2**TEST INSTRUMENTS**

TYPE	MANUFACTURER	MODEL	SN.
SPECTRUM ANALYZER	HEWLETT-PACKARD	8593E	3205A00124
SPECTRUM ANALYZER	HEWLETT-PACKARD	8558B	2332A09900
S A DISPLAY	HEWLETT-PACKARD	853A	2404A02387
COMB GENERATOR	HEWLETT-PACKARD	8406A	1632A01519
RF PREAMP	HEWLETT-PACKARD	8447D	1937A03355
RF PREAMP	HEWLETT-PACKARD	8449B	3008A00480
HORN ANTENNA	EMCO	3115	3723
BICONICAL ANTENNA	EMCO	3110	9307-1431
LOG PERIODIC ANTENNA	EMCO	3146	9110-3600
LISN	SOLAR ELE.	8028	910495 & 910494
THERMOMETER	FLUKE	52	5215250
MULTIMETER	FLUKE	85	53710469
PLOTTER	HEWLETT-PACKARD	7475A	2325A65394

Antenna Description (47 CFR 15.203)

The Model DR-10000 may be used with the following antennas.

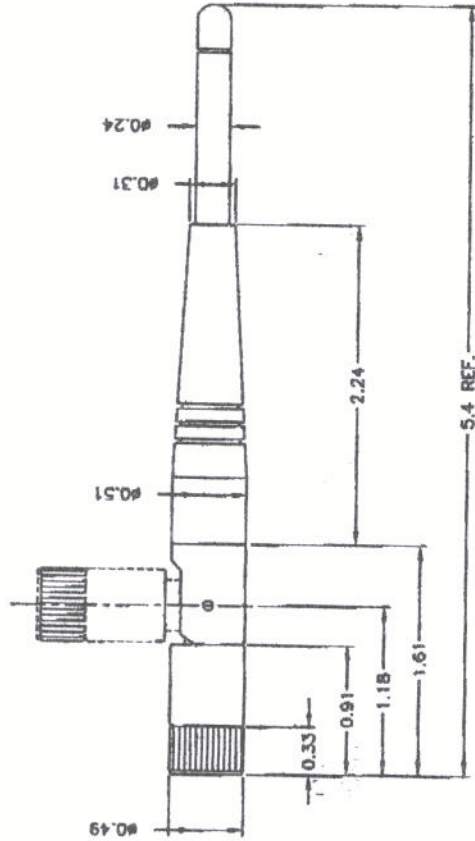
MANUFACTURER	MODEL	TYPE	CONNECTOR	GAIN dBi
Cushcraft	SL6081P48SMM	Patch	SMA	+2
Nearson Inc.	P-24A48G	Monopole*	SMA	0

*For antenna specifications, please see the following pages.

The EUT and antenna incorporate standard SMA connectors. Due to the type of installation, this unit will only be professionally installed.

The DR-10000 has been designed exclusively for VitalCom, Inc. VitalCom, Inc. designs and markets medical monitoring equipment to be used in hospital environments and is the only marketer of this product and is the sole installer. The units will not be marketed to the general public.

The DR-10000 are to be installed in the hallway ceilings of hospitals. These units will receive monitoring data from similar radios (FCC ID: BQI OODT-4500) that are attached to patients in the hospital. The system is very complicated and expensive (generally greater than \$100k for a complete installation) and relies on professional installation and upkeep. Trained VitalCom, Inc. personnel will be installing these units and will be solely responsible for their operation.



Electrical Properties:

Frequency Range: 608-614 MHz
 Impedance: 50 ohms nominal
 VSWR: < 2.0:1
 Gain: 0 dBi
 Radiation: Toroidal
 Polarization: Vertical
 Wave: 1/4 wave

Mechanical Properties:

Connector: SMA Plug
 Material: Whip: Polyurethane-BASF C95(Black)
 Swivel Mechanism: Polycarbonate-BAYER Makrolon(Black)
 Connector: Brass with black nickel plating
 Operation temp. : -20°C to +65°C
 Storage temp. : -30°C to +75°C

TOLERANCE	TITLE	DATE	SHEET
.X	608-614MHz Swivel Antenna		1 OF 1
.XX	UNIT		
.XXX	DWG. NO.	OEM181AM-608S	A4
ANGLE	SCALE	Nova Comm™	
		NEARSON INC.	

Frequency Range of Fundamental(s) (47 CFR 95.630 & 95.1115(d))

The EUT may operate in the frequency bands specified below:

608-614 MHz
1395-1400 MHz
1429-1432 MHz

The EUT is designed to operate on the following frequency list:

608.6656
608.802133
608.938667
609.0752
609.211733
609.348267
609.4848
609.621333
609.757867
609.8944
610.030933
610.167467
610.304
610.440533
610.577067
610.7136
610.850133
610.986667
611.1232
611.259733
611.396267
611.5328
611.669333
611.805867
611.9424
612.078933
612.215467
612.352
612.488533
612.625067
612.7616
612.898133

Field Strength of Fundamental Emission (47 CFR 95.639(g) & 95.1115(a))

Measurements were made using a peak detector. Field strength of the peak fundamental emission is shown in Tables 3a through 3c. Both Radios were checked (one radio with patch antennas and the other with monopoles). Only the worse case results are shown for each low, middle, and high transmit channel.

TABLE 3a

FIELD STRENGTH OF FUNDAMENTAL EMISSION

Test Date: October 16, 2000
 UST Project: 01-0406
 Customer: VitalCom, Inc.
 Model: DR-10000

QP Measurement (Low Channel)
 Highest Emission measured from Radio A

FREQ. (MHz)	TEST DATA (Dbm) @ 3m	ANTENNA FACTOR + CABLE ATTENUATION	RESULTS (uV/m) @ 3m	QP FCC LIMITS (uV/m) @ 3m
608.695	-34.0*	25.1	80,352.6	200,000

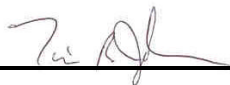
* - Quasi-Peak Measurement

SAMPLE CALCULATIONS:

RESULTS uV/m @ 3m = Antilog $((-34.0 + 25.1 + 107)/20) = 80,352.6$

CONVERSION FROM dBm TO dBuV = 107 dB

Test Results

Reviewed By: 

Name: Tim R. Johnson

TABLE 3b

FIELD STRENGTH OF FUNDAMENTAL EMISSION

Test Date: October 16, 2000
 UST Project: 01-0406
 Customer: VitalCom, Inc.
 Model: DR-10000

QP Measurement (Middle Channel)
 Highest Emission measured from Radio A

FREQ. (MHz)	TEST DATA (dBm) @ 3m*	ANTENNA FACTOR + CABLE ATTENUATION	RESULTS (uV/m) @ 3m	QP FCC LIMITS (uV/m) @ 3m
610.745	-34.0*	25.1	80,352.6	200,000

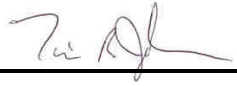
* - Quasi-Peak Measurement

SAMPLE CALCULATIONS:

RESULTS uV/m @ 3m = Antilog $((-34.0 + 25.1 + 107)/20)$ = 80,352.6

CONVERSION FROM dBm TO dBuV = 107 dB

Test Results

Reviewed By: 

Name: Tim R. Johnson

TABLE 3c

FIELD STRENGTH OF FUNDAMENTAL EMISSION

Test Date: October 16, 2000
 UST Project: 01-0406
 Customer: VitalCom, Inc.
 Model: DR-10000

QP Measurement (High Channel)
 Highest Emission measured from Radio A

FREQ. (MHz)	TEST DATA (dBm) @ 3m*	ANTENNA FACTOR + CABLE ATTENUATION	RESULTS (uV/m) @ 3m	QP FCC LIMITS (uV/m) @ 3m
612.805	-34.0*	25.2	81,283.1	200,000

* - Quasi-Peak Measurement

SAMPLE CALCULATIONS:

RESULTS uV/m @ 3m = Antilog $((-34.0 + 25.2 + 107)/20)$ = 81,283.1
 CONVERSION FROM dBm TO dBuV = 107 dB

Test Results
 Reviewed By:



Name: Tim R. Johnson