

**Antenna Description (47 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.

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

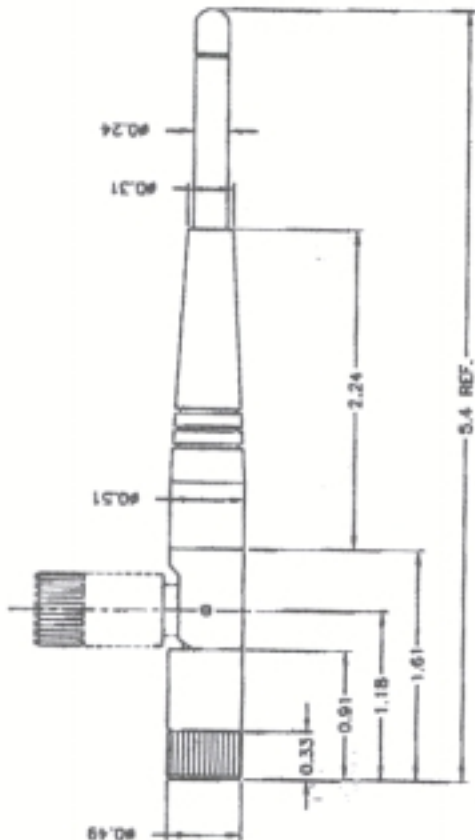
MANUFACTURER	MODEL	TYPE	CONNECTOR	GAIN dBi
Cushcraft	SL6081P48SMM	Patch	SMA	+2
Nearson Inc.	P-24A48G	Monopole*	SMA	0

\*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	INCH		
ANGLE	SCALE		
	1 : 1		
	DRG. NO. OEM161AM-60BS		A4
	<b>NovaComm™</b>		
	NEUSON, INC.		

**Frequency Range of Fundamental(s) (47 CFR 15.242(b))**

Under all conditions of operation, the fundamental emissions shall be contained within a single television broadcast channel and lie wholly within the frequency range of 174-216 MHz and 470-668 MHz.

The EUT is designed to operate within TV channel 37 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 15.242(c))**

Measurements were made using a peak detector. Field strength of the peak fundamental emission is shown in Tables 3a through 3c and Figures 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:** June 25, 2000  
**UST Project:** 00-0243  
**Customer:** VitalCom, Inc.  
**Model:** DR-10000

## Peak Measurement (Low Channel)

Highest Emission measured from Patch Antenna, RFA1 Port

FREQ. (MHz)	TEST DATA (dBm) @ 3m	ANTENNA FACTOR + CABLE ATTENUATION	RESULTS (uV/m) @ 3m	QP FCC LIMITS (uV/m) @ 3m
608.695	-34.1	25.1	79,195	200,000

## SAMPLE CALCULATIONS:

RESULTS uV/m @ 3m = Antilog  $((-34.1 + 25.1 + 107)/20)$  = 79,195

CONVERSION FROM dBm TO dBuV = 107 dB

Test Results

Reviewed By: \_\_\_\_\_

Name: Tim R. Johnson

**TABLE 3b**

**FIELD STRENGTH OF FUNDAMENTAL EMISSION**

Test Date: June 26, 2000  
 UST Project: 00-0243  
 Customer: VitalCom, Inc.  
 Model: DR-10000

Peak Measurement (Middle Channel)  
 Highest Emission measured from Omni Antenna, RFB1 Port

FREQ. (MHz)	TEST DATA (dBm) @ 3m*	ANTENNA FACTOR + CABLE ATTENUATION	RESULTS (uV/m) @ 3m	AVERAGE FCC LIMITS (uV/m) @ 3m
610.745	-32.5	25.1	95,663	200,000

**SAMPLE CALCULATIONS:**

RESULTS uV/m @ 3m = Antilog  $((-32.5 + 25.1 + 107)/20)$  = 95,663  
 CONVERSION FROM dBm TO dBuV = 107 dB

Test Results  
 Reviewed By: \_\_\_\_\_ Name: Tim R. Johnson

## TABLE 3c

## FIELD STRENGTH OF FUNDAMENTAL EMISSION

**Test Date:** June 26, 2000  
**UST Project:** 00-0243  
**Customer:** VitalCom, Inc.  
**Model:** DR-10000

## Peak Measurement (High Channel)

Highest Emission measured from Omni Antenna, RFB1 Port

FREQ. (MHz)	TEST DATA (dBm) @ 3m*	ANTENNA FACTOR + CABLE ATTENUATION	RESULTS (uV/m) @ 3m	AVERAGE FCC LIMITS (uV/m) @ 3m
612.805	-35.4	25.2	68,834	200,000

## SAMPLE CALCULATIONS:

RESULTS uV/m @ 3m = Antilog  $((-35.4 + 25.2 + 107)/20)$  = 68,834

CONVERSION FROM dBm TO dBuV = 107 dB

Test Results

Reviewed By: \_\_\_\_\_

Name: Tim R. Johnson

FIGURE 3a

FIELD STRENGTH OF FUNDAMENTAL EMISSION 15.242(c) - LOW CHANNEL

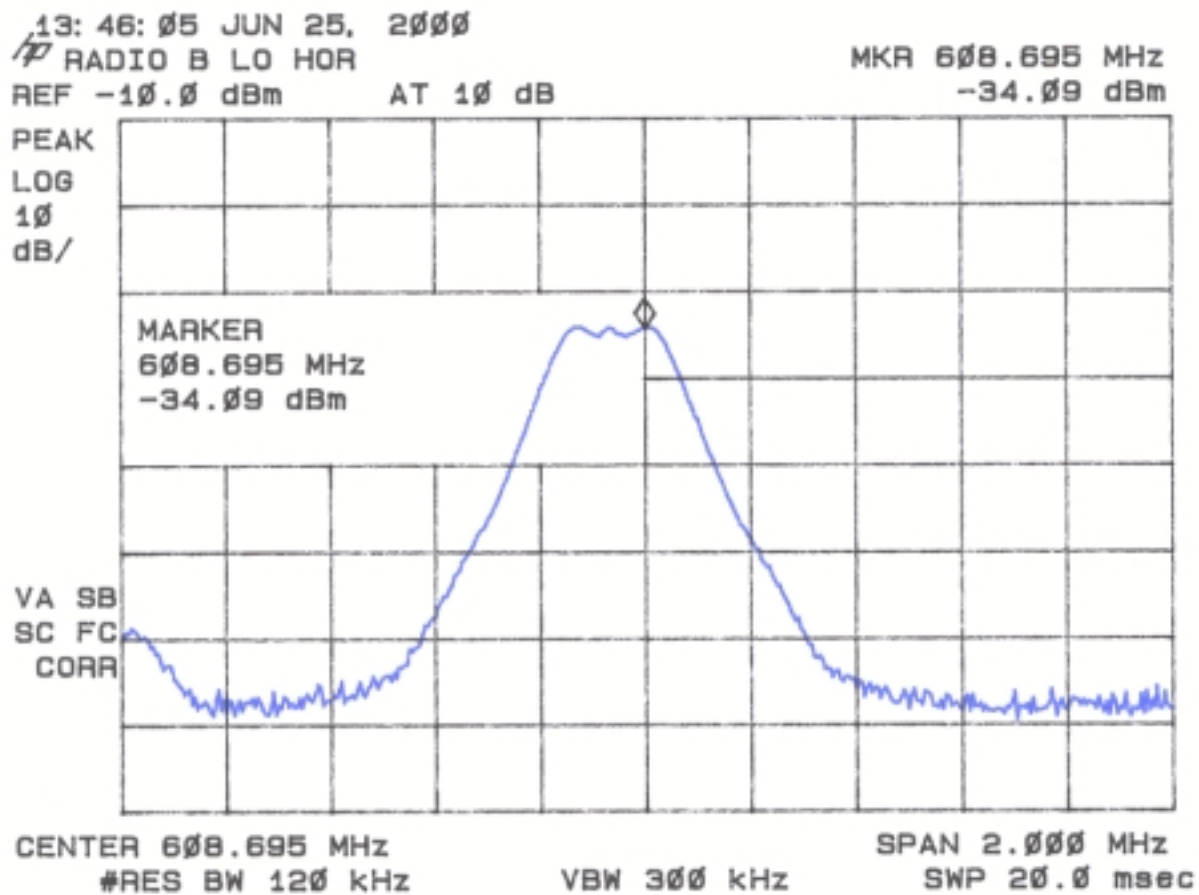




FIGURE 3b

FIELD STRENGTH OF FUNDAMENTAL EMISSION 15.242(c) - MIDDLE CHANNEL

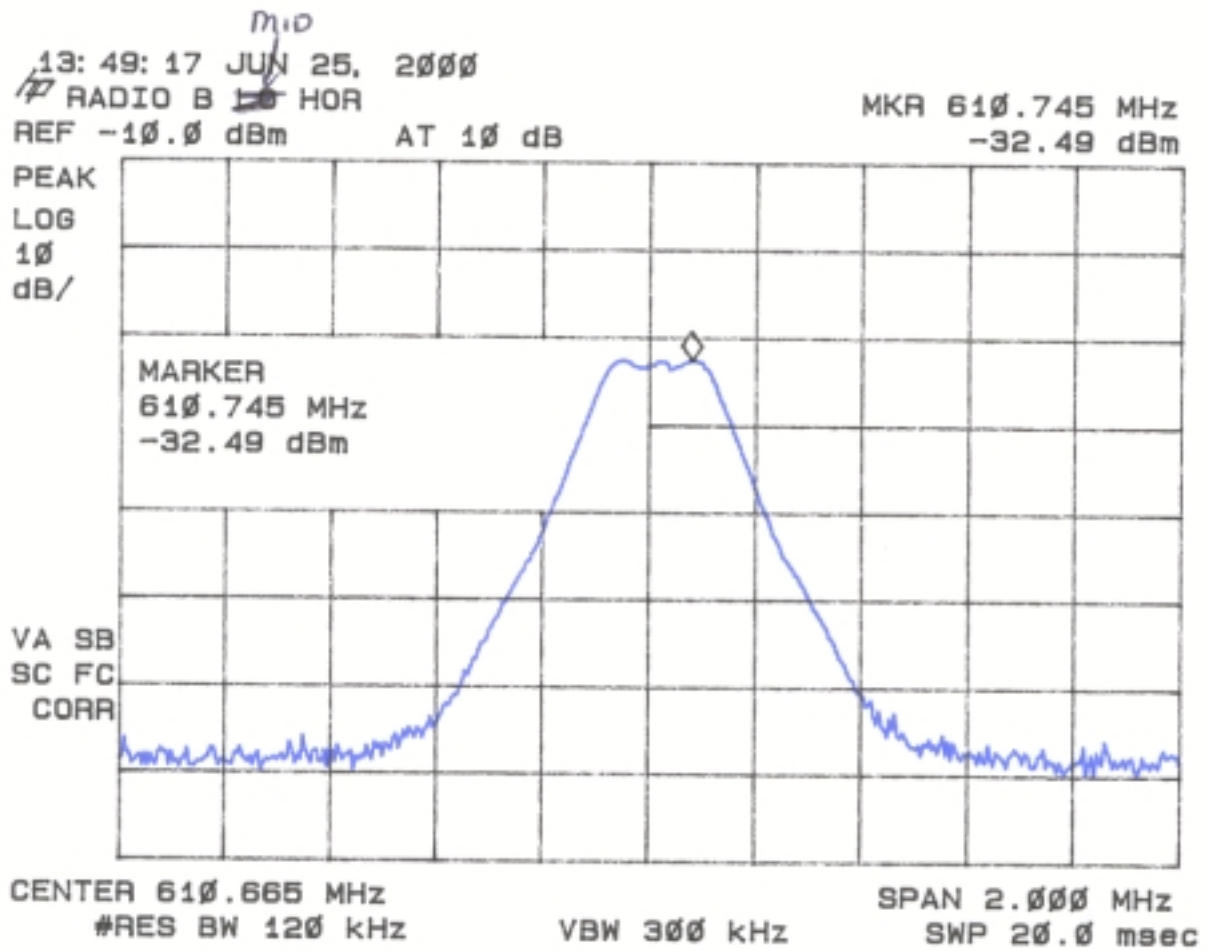
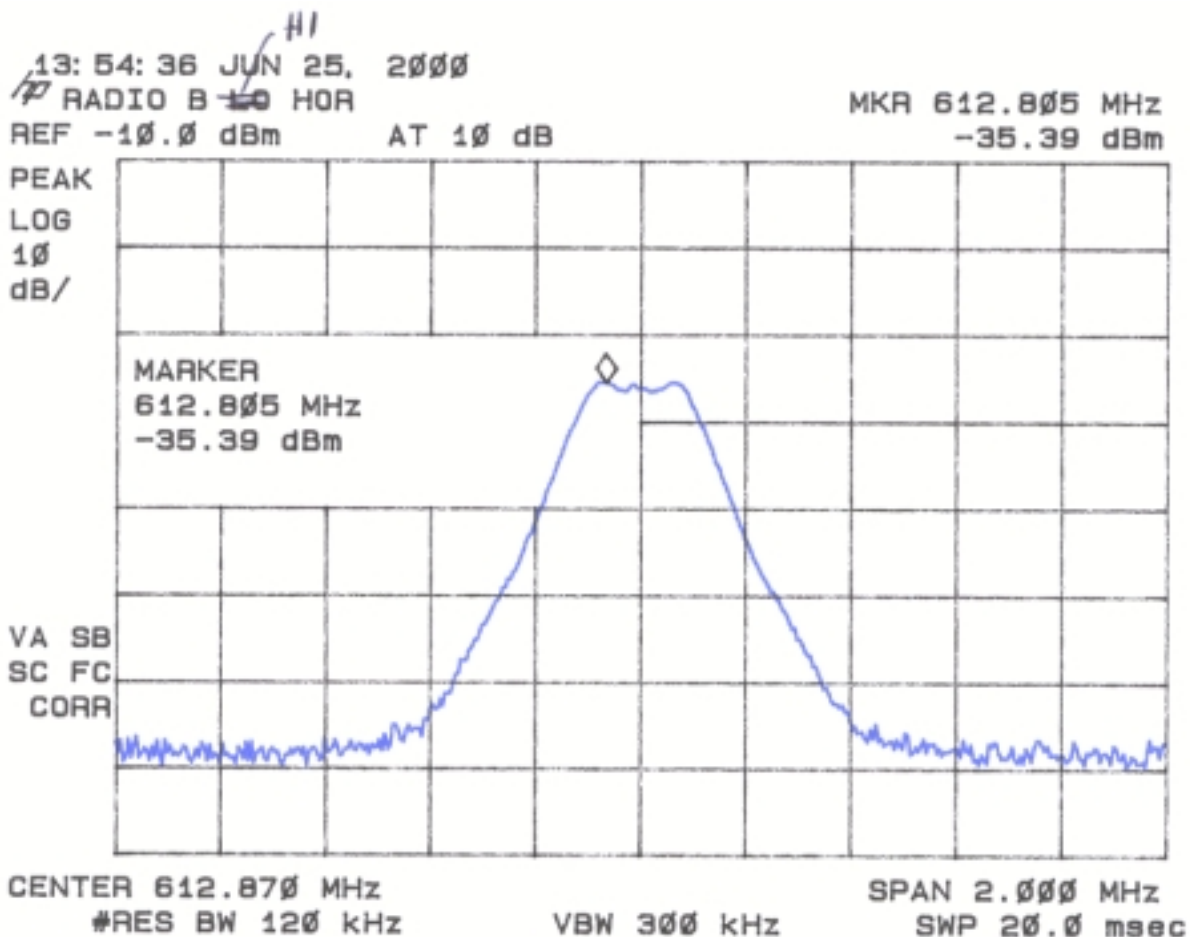


FIGURE 3c

FIELD STRENGTH OF FUNDAMENTAL EMISSION 15.242(c) - HIGH CHANNEL



**Field Strength Of Spurious Emissions (47 CFR 15.242(c))**

Measurements were made using a peak detector. Field strength of Spurious Emissions are shown in Tables 4a through 4b and Figures 4a through 4d. For comparison to the average limits, duty cycle corrections were made as shown below. Any emission less than 1000 MHz and falling within the restricted bands of 15.205 were not adjusted for averaging and the limits of 15.209 were applied.

Both Radios were checked (one radio with patch antennas and the other with monopoles). The results from each radio were similar, but preliminary data showed that the Radio with the monopole antennas to be worse case. Therefore all results shown are for the radio configured with the monopole antennas (for a low and high channel).

**Duty Cycle Correction During 100 msec:**

The system is designed that the system hops at 35 msec per channel. The system will only be on one channel in any 100 msec period of time. During this 35 msec per channel, each transmitter is allotted only a small duration of this period (5 msec max).

Therefore the worse case duty cycle is:

$$\text{Duty Cycle Correction} = 20 \log (0.05) = -26.0 \text{ dB}$$

TABLE 5a

## FIELD STRENGTH OF SPURIOUS EMISSIONS

Test Date: July 23, 2000  
 UST Project: 00-0243  
 Customer: VitalCom, Inc.  
 Model: DR-10000

## Peak Measurements (Low Channel)

FREQ. (MHz.)	TEST DATA (dBm) @ 1m	ANTENNA FACTOR + CABLE ATTENUATION	RESULTS (uV/m) @ 3m	PEAK FCC LIMITS (uV/m) @ 3m
1.148	-66.9	28.4	887.2	5000
1.215	-65.9	28.7	1030.4	5000

## Peak Measurements (High Channel)

FREQ. (MHz.)	TEST DATA (dBm) @ 1m	ANTENNA FACTOR + CABLE ATTENUATION	RESULTS (uV/m) @ 3m	PEAK FCC LIMITS (uV/m) @ 3m
1.153	-66.9	28.4	887.2	5000
1.226	-64.1	28.7	1267.7	5000

\* - To achieve better dynamic range, all measurements were made a 1 meter

## SAMPLE CALCULATIONS:

RESULTS uV/m @ 3m = Antilog  $((-66.9 - 9.54 + 28.4 + 107)/20)$  = 887.2

CONVERSION FROM dBm TO dBuV = 107 dB

CONVERSION FROM 1m TO 3m =  $20 \log(1/3)$  = -9.54 dB

Test Results

Reviewed By: \_\_\_\_\_

Name: Tim R. Johnson

TABLE 5b

## FIELD STRENGTH OF SPURIOUS EMISSIONS

Test Date: July 23, 2000  
 UST Project: 00-0243  
 Customer: VitalCom, Inc.  
 Model: DR-10000

## Average Measurements (Low Channel)

FREQ. (MHz.)	TEST DATA (dBm) @ 1m	ANTENNA FACTOR + CABLE ATTENUATION	RESULTS (uV/m) @ 3m	AVERAGE FCC LIMITS (uV/m) @ 3m
1.148	-92.9	28.4	44.5	500
1.215	-91.9	28.7	51.6	500

## Average Measurements (High Channel)

FREQ. (MHz.)	TEST DATA (dBm) @ 1m	ANTENNA FACTOR + CABLE ATTENUATION	RESULTS (uV/m) @ 3m	AVERAGE FCC LIMITS (uV/m) @ 3m
1.153	-92.9	28.4	44.5	500
1.226	-90.1	28.7	63.5	500

\* - To achieve better dynamic range, all measurements were made a 1 meter

\*\* - Readings adjusted by duty cycle =  $20 \log (0.05) = -26.0$  dB

## SAMPLE CALCULATIONS:

RESULTS uV/m @ 3m =  $\text{Antilog} ((-92.9 - 9.54 + 28.4 + 107)/20) = 44.5$

CONVERSION FROM dBm TO dBuV = 107 dB

Test Results

Reviewed By: \_\_\_\_\_

Name: Tim R. Johnson

FIGURE 6a

SPURIOUS EMISSIONS 15.242(c)

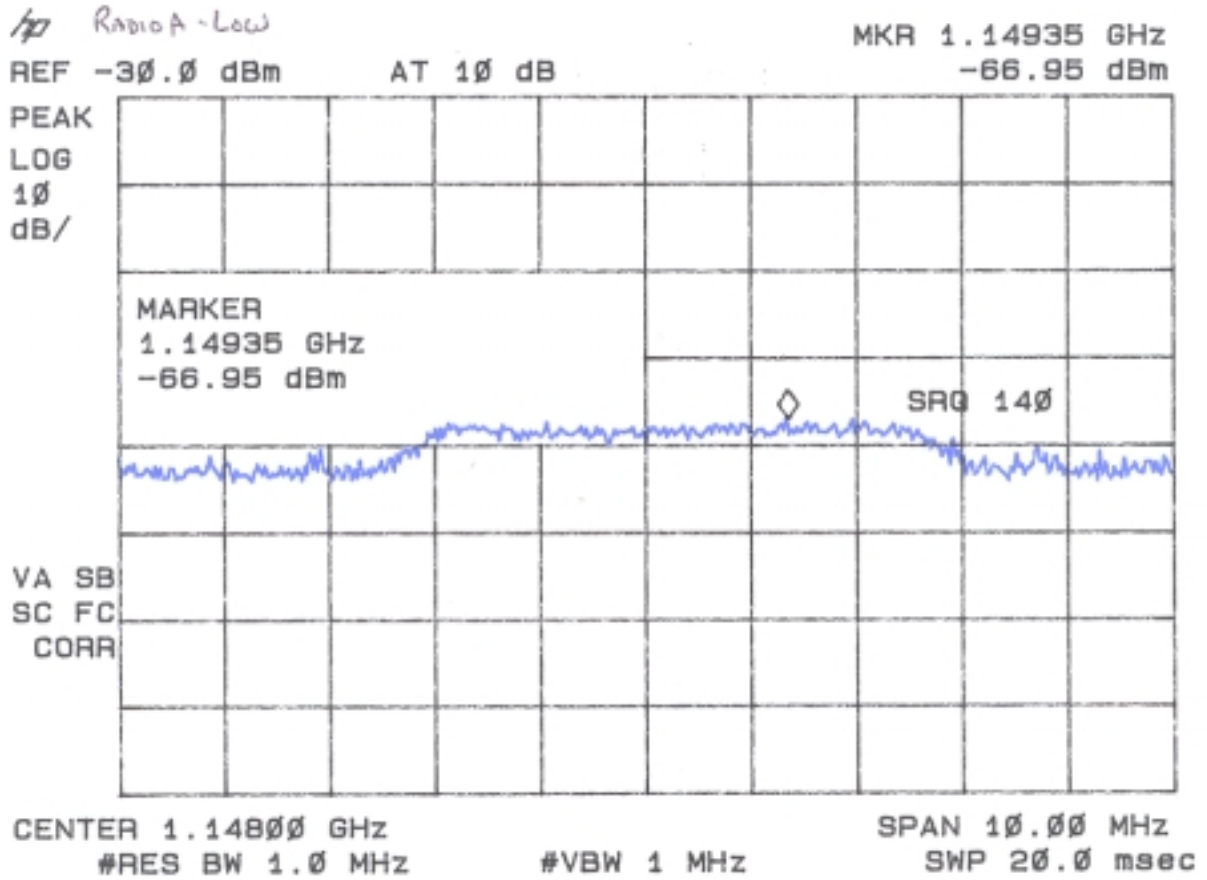


FIGURE 6b

SPURIOUS EMISSIONS 15.242(c)

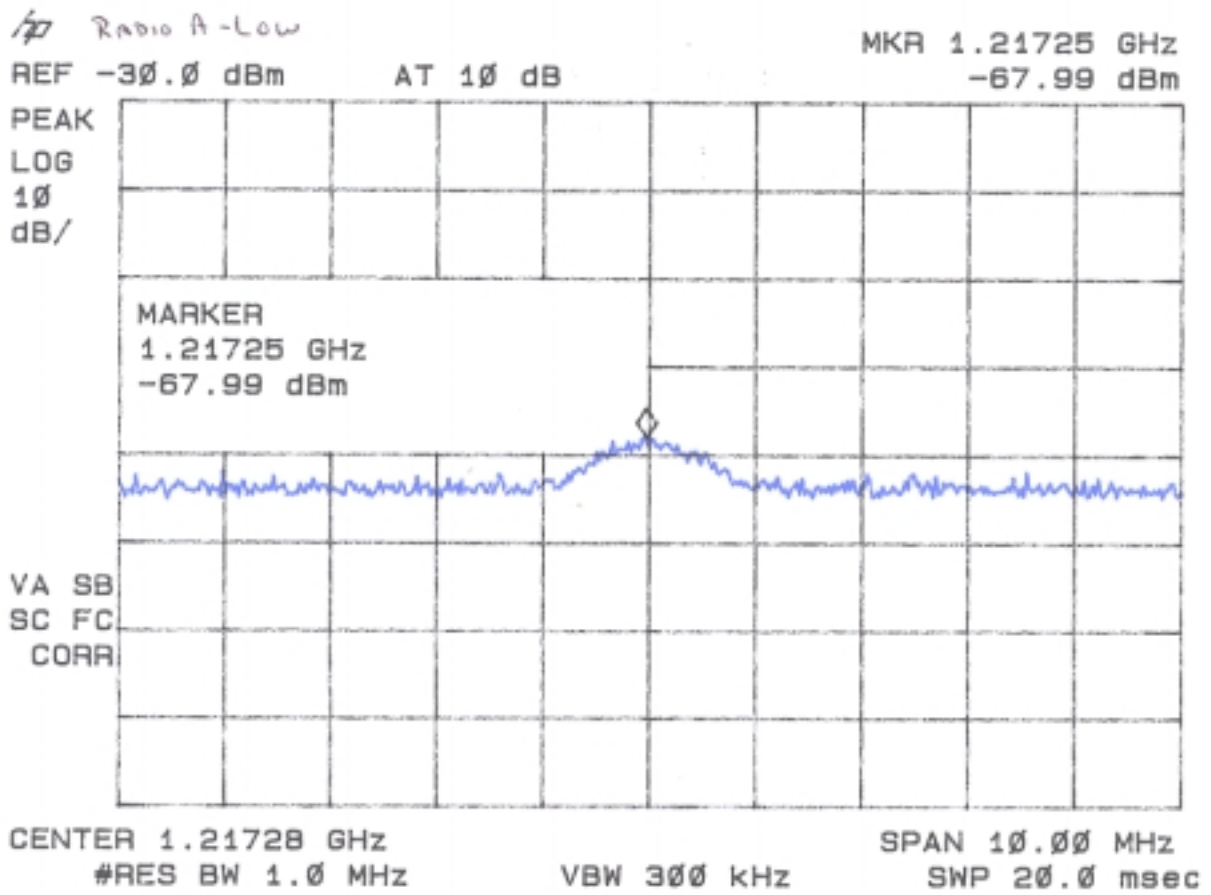


FIGURE 6c

SPURIOUS EMISSIONS 15.242(c)

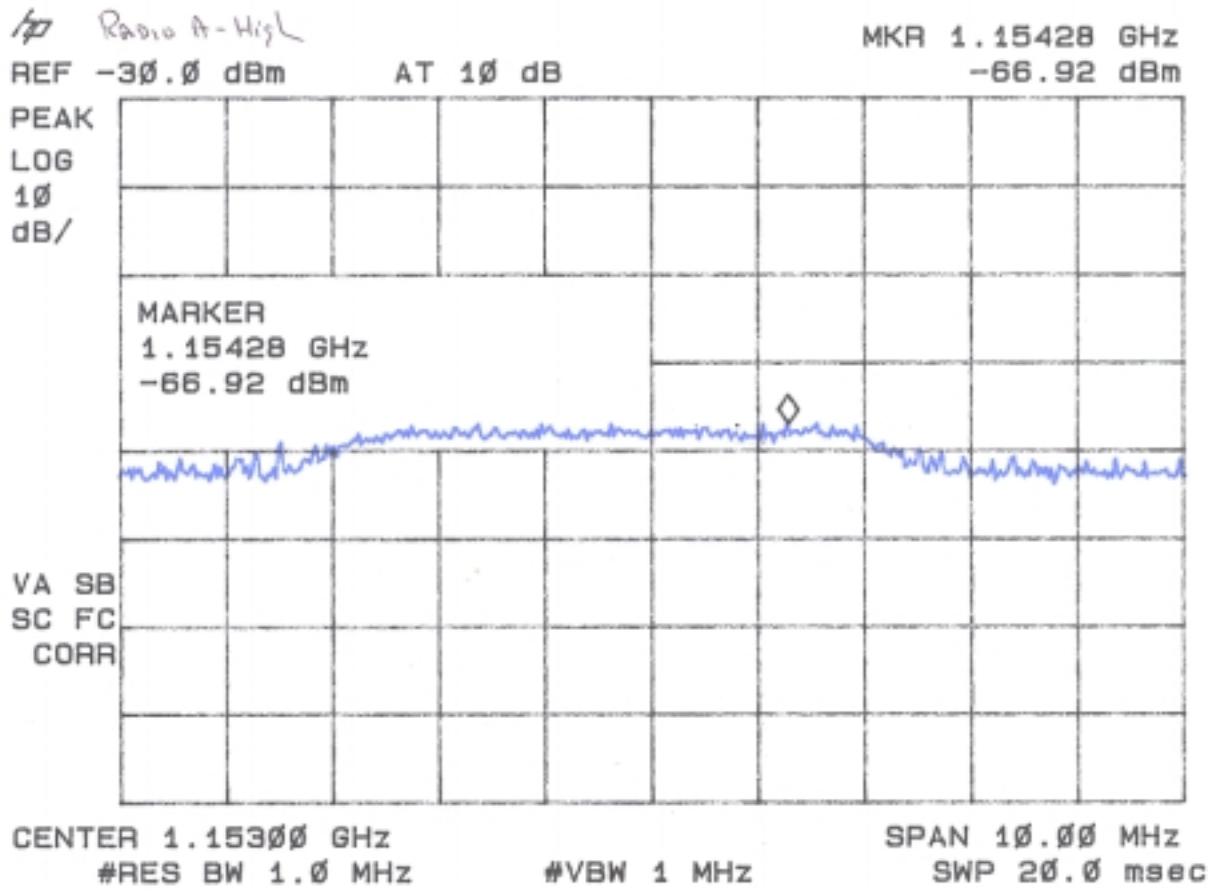
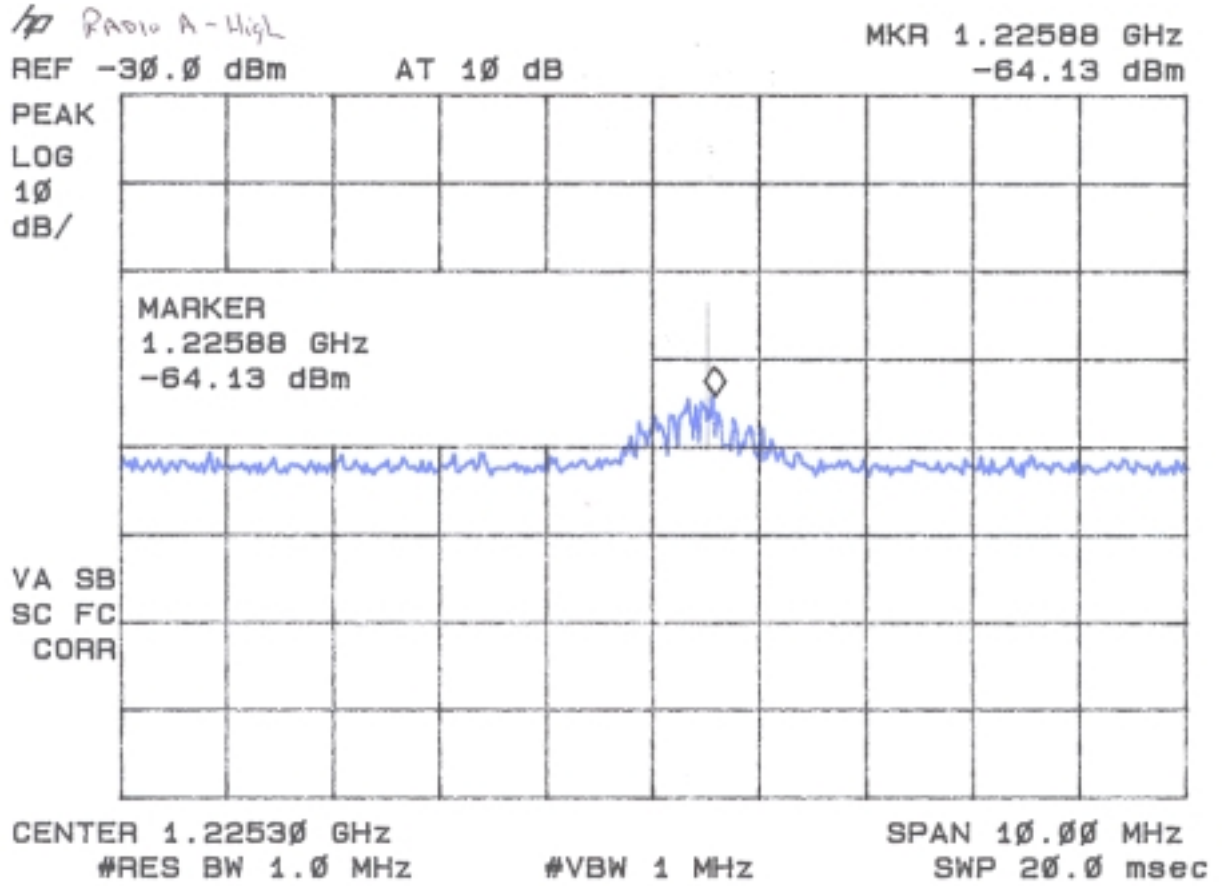




FIGURE 6d

SPURIOUS EMISSIONS 15.242(c)



## **Radiated Digital Device Emissions (47 CFR 15.109a)**

Radiated emissions were evaluated from 30 MHz to 6.5 GHz with the EUT set to a receive mode of operation. Measurements were made with the analyzer's bandwidth set to 120 kHz for measurements below 1 GHz and 1 MHz for measurements above greater than or equal to 1 GHz. Results of these emissions are shown in Tables 5a and 5b.

**TABLE 5a**

**CLASS A**

**RADIATED EMISSIONS**

Test Date: June 17, 2000  
 UST Project: 00-0243  
 Customer: VitalCom, Inc.  
 Model: DR-10000

Measurements 30 MHz – 1 GHz

FREQ. (MHz)	TEST DATA (dBm) @ 10m	ANTENNA FACTOR + CABLE ATTEN.	RESULTS (uV/m) @ 10m	LIMITS (uV/m) @ 10m	MARGIN BELOW LIMIT (dB)
240.0	-85.0	14.9	69.8	210.0	9.6
400.0	-87.0	19.8	97.7	210.0	6.6
420.0	-90.0	20.2	72.4	210.0	9.2
440.0	-90.0	20.7	76.9	210.0	8.7
450.0	-88.0	21.0	100.0	210.0	6.4
520.0	-88.0	22.8	123.3	210.0	4.6
540.0	-90.0	22.9	99.1	210.0	6.5

**SAMPLE CALCULATIONS:**

RESULTS uV/m @ 10m =

Antilog  $((-85.0 + 14.9 + 107)/20) = 69.8$

CONVERSION FROM dBm TO dBuV = 107 dB

Test Results

Reviewed By: \_\_\_\_\_ Name: Tim R. Johnson

## TABLE 5b

CLASS A  
RADIATED EMISSIONS

Test Date: June 19, 2000  
 UST Project: 00-0243  
 Customer: VitalCom, Inc.  
 Model: DR-10000

## Peak Measurements &gt;1 GHz

FREQ. (GHz)	TEST DATA (dBm) @ 3m	AMP GAIN (dB)	ANT. FACTOR (dB)	CABLE LOSS (dB)	RESULTS (uV/m) @ 10m	FCC LIMITS (uV/m) @ 10m	MARGIN BELOW LIMIT (dB)
1.000	-48.8	35.9	25.2	2.3	92.7	300.0	10.2
1.064	-53.1	35.8	25.4	2.4	58.7	300.0	14.1
1.620	-53.1	35.2	27.5	3.1	87.2	300.0	10.7
3.248	-55.0	34.8	32.6	4.7	160.7	300.0	5.4

## SAMPLE CALCULATIONS:

RESULTS uV/m @ 10m =

Antilog  $((-48.8 - 35.9 + 25.2 + 2.3 - 10.46 + 107)/20) = 92.7$ 

CONVERSION FROM dBm TO dBuV = 107 dB

CONVERSION FROM 3m to 10m = -10.46

Test Results

Reviewed By

Signature: \_\_\_\_\_ Name: Tim R. Johnson

**Power Line Conducted Emissions for Digital Device, Transmitter, and Receiver  
FCC Section 15.107 & 15.207**

The conducted voltage measurements have been carried out in accordance with FCC Section 15.107, with a spectrum analyzer connected to a LISN and the EUT placed into an idle condition or a continuous mode of receive. The results are given in Table 6.

**TABLE 6**  
**CONDUCTED EMISSIONS DATA**  
**CLASS B**

Test Date: June 12, 2000  
 UST Project: 00-0243  
 Customer: VitalCom, Inc.  
 Model: DR-10000

FREQ. (MHz)	TEST DATA (dBm)		RESULTS (uV)		FCC LIMITS (uV)	MARGIN BELOW LIMIT (dB) PHASE	MARGIN BELOW LIMIT (dB) NEUTRAL
	PHASE	NEUTRAL	PHASE	NEUTRAL			
0.93	-73.5	-72.4	47.3	53.7	250.0	14.5	13.3
4.0	-66.1	-74.4	110.9	42.7	250.0	7.1	15.4
8.2	-70.6	-75.4	66.1	38.0	250.0	11.6	16.4
11.2	-73.2	-75.6	49.0	37.2	250.0	14.2	16.5
27.9	-77.5	-78.8	29.9	25.7	250.0	18.4	19.8

**SAMPLE CALCULATIONS:**

RESULTS uV =

Antilog  $((-73.5 + 107)/20) = 47.3$ 

CONVERSION FROM dBm TO dBuV = 107 dB

Tested Results

Reviewed By

Signature: \_\_\_\_\_ Name: Tim R. Johnson