

**Class II Permissive Change Test Report**

Job #: 3041794  
Test Report #: 30417942  
Date of Report: April 24, 2003

Test performed on the  
**Ambulatory ECG Monitor**  
Model: ViewPoint Telepack 2.4  
FCC ID: H9PLA3021-100

to  
**FCC Part 15.247**  
for  
**Symbol Technologies**



Warnock Hersey



A2LA Certificate Number: 1755-01



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**1.0 Introduction**

1.1 Justification

This is a Class 2 Permissive Change Report. The certified radio from Symbol Technologies, FCC ID: H9PLA3021-100, is installed in the Ambulatory ECG Monitor, model: ViewPoint Telepack 2.4 from Datascope. The radio is identical to the device originally granted on March 15, 2000.

There was a Class 2 Permissive Change granted on March 19, 2001 for the radio with an antenna for body-worn configuration and a chest-worn patient monitor. The device described in this Permissive Change filing is very much similar to the model: ViewPoint Telepack 2.4 from Datascope (the same Symbol radio and the same antenna).

No changes were made to the Symbol RF module and modulator, therefore no changes are expected in Power Output, 20 dB Bandwidth, Number of hopping channels, Channel occupancy time, Out-of-band Antenna Conducted Emission.

Only radiated emission test and SAR test were performed to confirm that the device is in compliance with FCC Part 15 requirements.

1.2 Summary of Tests

**FCC ID: H9PLA3021-100**

Test	Reference	Result
RF Power Output	15.247(b)	Complies
20 dB Bandwidth	15.247(a)(2)	Not Applicable *
Channel Separation	15.247(a)(1)	Not Applicable *
Number of Hopping Channels	15.247(a)(1)	Not Applicable *
Average Channel Occupancy Time	15.247(a)(1)	Not Applicable *
Out-of-band Antenna Conducted Emission	15.247(c)	Not Applicable *
Out-of-band Radiated Emission	15.247(c)	Not Applicable **
Radiated Emission in Restricted Bands	15.35(b)(c)	Complies
AC Conducted Emission	15.207	Not Applicable *
Radiated Emission from Digital Part	15.109	Complies
Radiated Emission from Receiver L.O.	15.109	Not Applicable ***
Antenna Requirement	15.203	Complies
RF Exposure Requirement	2.1093	Complies, see separate SAR report ****

\* There are no changes, which can affect these characteristics (See Section 1.1 for details).

\*\* The EUT passed Out-of-band Antenna Conducted Emission

\*\*\* The EUT operates above 960 MHz

\*\*\*\* Test was performed by CCS.

## 2.0 General Description

### 2.1 Product Description

The Symbol Technologies model H9PLA3021-100 is 2.4 GHz Spread Spectrum radio in the form of a PCMCIA card that is used for wireless communication.

### Overview of the EUT

Applicant	Symbol Technologies
Manufacturer	Symbol Technologies
Trade Name & Model No.	Symbol, LA3021
FCC Identifier	H9PLA3021-100
Use of Product	Wireless LAN communications
Type of Transmission	Frequency Hopping Spread Spectrum
Rated RF Output	112 mW
Frequency Range	2402 – 2480
Number of Channel(s)	79
Antenna(s) & Gain,	Omnidirectional from RangeStar, max Gain 0 dBi
Antenna Requirement	The EUT uses a permanently connected antenna.

**EUT receive date:** April 21, 2003

**EUT receive condition:** The prototype version of the EUT was received in good condition with no apparent damage. As declared by the Applicant it is identical to the production units.

**Test start date:** April 21, 2003

**Test completion date:** April 25, 2003

### 2.2 Related Submittal(s) Grants

None.

### 2.3 Test Methodology

Radiated emissions measurements were performed according to the procedures in ANSI C63.4 (1992). Radiated tests were performed at an antenna to the EUT distance of 3 meters, unless stated otherwise in the section 4.2 of this report. All other measurements were made in accordance with the procedures in part 2 of CFR 47.

### 2.4 Test Facility

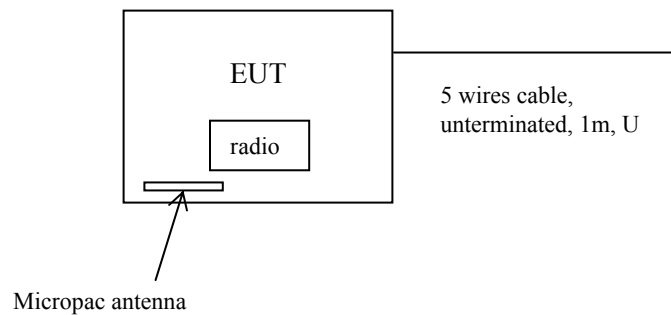
The open area test site and conducted measurement facility used to collect the radiated data is site 1 (10-m semi-anechoic chamber) located in Menlo Park, California. This test facility and site measurement data have been fully placed on file with the FCC.

### 3.0 System Test Configuration

#### 3.1 Support Equipment and description

No support equipment was used during the testing. A laptop computer was used to setup the transmitting frequency and after that was disconnected.

#### 3.2 Block Diagram of Test Setup



### 3.3 Justification

During testing, all cables were manipulated to produce worst-case emissions.

For radiated emission measurements the EUT is placed on the wooden turntable. The EUT is attached to peripherals and they are connected and operational (as typical as possible). The EUT is wired to transmit full power.

The signal is maximized through rotation and placement in the three orthogonal axes. The antenna height and polarization are varied during the search for maximum signal level. The antenna height is varied from 1 to 4 meters. Radiated emissions are taken at three meters unless the signal level is too low for measurement at that distance. If necessary, a pre-amplifier is used and/or the test is conducted at a closer distance. All readings are extrapolated back to the equivalent three-meter reading using inverse scaling with distance.

### 3.4 Software Exercise Program

The EUT exercise program used during radiated and conducted testing was designed to exercise the various system components in a manner similar to a typical use.

### 3.5 Mode of Operation During Test

As declared by the manufacturer, in normal operation the EUT transmit data with the highest duty factor no higher than 10%. However, to simplify the testing, the unit was setup to transmit continuously at the low, middle, and high frequencies (hopping was disabled).

### 3.6 Modifications Required for Compliance

The following modifications were installed during compliance testing in order to bring the product into compliance (Please note that this list does not include changes made specifically by the Applicant prior to compliance testing):

No modifications were installed by Intertek Testing Services.

**4.0 Measurement Results**

4.1 Conducted RF output power

The cable from the transmitter to the antenna was disconnected and transmitter output was connected to the power meter. The power meter reading was recorded on three fundamental frequencies

Frequency, MHz	Measured RF Output Power, mW
2402	111.9
2440	108.9
2480	87.9

The maximum RF output power measured equals to the granted power output.

4.2 Transmitter Radiated Emissions in Restricted Bands  
FCC Rule 15.35(b), (c):

Test Procedure

The EUT was powered from a fully charged battery (3V) and placed on the non-conductive turntable.

The measurement antenna was placed at a distance of 3 meters from the EUT (unless on the data sheet is stated a closer distance). During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The emissions were measured with the EUT placed on three orthogonal axes. The worst-case emissions was reported.

The frequency range up to tenth harmonic (25 GHz) of each of the three fundamental frequency (low, middle, and high channels) was investigated.

For radiated emission tests, the analyzer setting was as followings:

	<u>RES BW</u>	<u>VID BW</u>
Frequency <1 GHz	100 kHz	100 kHz
Frequency >1 GHz	1 MHz	1 MHz (Peak measurements)
	1 MHz	≤ 100 Hz (Average measurements)

Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CF - AG$$

Where FS = Field Strength in dBμV/m

RA = Receiver Amplitude (including preamplifier) in dB(μV)

CF = Cable Attenuation Factor in dB

AF = Antenna Factor in dB(1/m)

AG = Amplifier Gain in dB

In the following table(s), the reading shown on the data table reflects the preamplifier gain. An example for the calculations in the following table is as follows:

Assume a receiver reading of 52.0 dB(μV) is obtained. The antennas factor of 7.4 dB(1/m) and cable loss of 1.6 dB is added. The amplifier gain of 29 dB is subtracted, giving field strength of 32 dB(μV/m). This value in dB(μV/m) was converted to its corresponding level in μV/m.

$$RA = 52.0 \text{ dB}\mu\text{V}$$

$$AF = 7.4 \text{ dB}(1/m)$$

$$CF = 1.6 \text{ dB}$$

$$AG = 29.0 \text{ dB}$$

$$FS = 52.0 + 7.4 + 1.6 - 29.0 = 32 \text{ dB}\mu\text{V}/m$$



Level in  $\mu\text{V/m}$  = Common Antilogarithm  $[(32 \text{ dB}\mu\text{V/m})/20] = 39.8(\mu\text{V/m})$

The data on the following pages list the significant emission frequencies, the limit and the margin of compliance. Data is included of the worst-case configuration (the configuration which resulted in the highest emission levels).

The field strength at the Band-edge frequencies was calculated as  $E_F = E_o - \Delta$ .

Where:

$E_F$  = Field Strength of Band-edge Frequency

$E_o$  = Field Strength of Fundamental Frequency

$\Delta$  = Delta between the level of conducted emission at a Fundamental Frequency and the level of conducted emission at a Band-edge Frequency

Average Field strength at High Channel 2480.0 MHz = 116.1 dB( $\mu\text{V/m}$ )

Average Field strength at Band-edge 2483.5 MHz =  $116.1 - 73.0 = 43.1 \text{ dB}(\mu\text{V/m})$ , where the  $\Delta=73.0 \text{ dB}$ , as shown on the attached plot 1 which was extracted from original application.

The EUT passed by 1.8 dB (in continuously transmitting mode). If the duty factor is taken into account, the emissions are well below the limit.

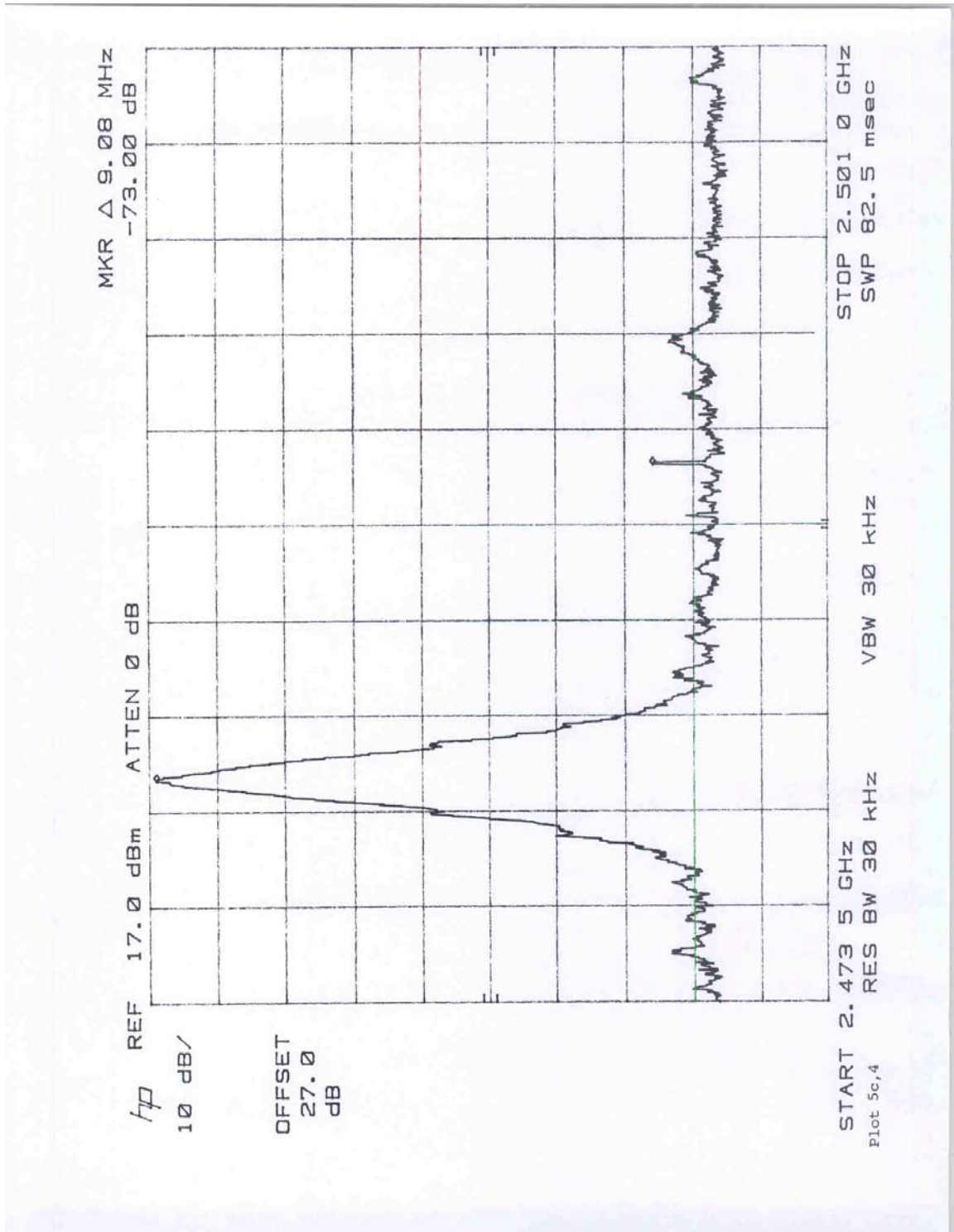
Test Result										
FCC Part 15.247 Radiated Emission in restricted bands										
Temperature: 20.0 C					Company: DataScope					
Humidity: 40 %					Model: ViewPoint Telepak 2.4					
Test distance = 3 m, unless stated otherwise.										
Test date: 21 April 2003										
Frequency MHz	Polarit y	Detector	SA reading dB(uV )	Cabl e loss dB	Pre- amp gain dB	Ant. factor dB(1/m)	D.C.F dB	Field Strength dB(uV/m)	Limit dB(uV/m)	Margin dB
Tx@ 2.402 GHz										
4804.0	V	Peak	45.5	11.5	35.9	34.8	0	55.9	74.0	-18.1
4804.0	V	Aver	39.0	11.5	35.9	34.8	0	49.4	54.0	-4.6
12010.0**	H/V	Peak	43.2*	5.3	37.2	41.9	-9.5	43.7	74.0	-30.3
12010.0**	H/V	Aver	31.7*	5.3	37.2	41.9	-9.5	32.2	54.0	-21.8
Tx@ 2.440 GHz										
4880.0	V	Peak	44.0	12.3	35.9	35.0	0	55.4	74.0	-18.6
4880.0	V	Aver.	36.0	12.3	35.9	35.0	0	47.4	54.0	-6.6
7320.0	V	Peak	43.0*	12.6	35.4	37.7	0	57.9	74.0	-16.1
7320.0	V	Aver	32.0*	12.6	35.4	37.7	0	46.9	54.0	-7.1
12200.0**	H/V	Peak	43.0*	5.3	37.1	42.1	-9.5	43.8	74.0	-30.2
12200.0**	H/V	Aver	31.3*	5.3	37.1	42.1	-9.5	32.1	54.0	-21.9
Tx@ 2.480 GHz										
2480.0	H	Aver	77.4	8.2	0	30.5	0	116.1	-	-
4960.0	V	Peak	45.2	13.2	35.8	35.2	0	57.8	74.0	-16.2
4960.0	V	Aver	39.6	13.2	35.8	35.2	0	52.2	54.0	-1.8
7440.0	V	Peak	43.5*	13.6	35.4	37.9	0	59.6	74.0	-14.4
7440.0	V	Aver	32.1*	13.6	35.4	37.9	0	48.2	54.0	-5.8
12400.0**	H/V	Peak	41.8*	5.4	37.1	42.2	-9.5	42.8	74.0	-31.2
12400.0**	H/V	Aver	31.5*	5.4	37.1	42.2	-9.5	32.5	54.0	-21.5
22300.0**	H/V	Peak	41.7*	8.7	24.0	40.3	-9.5	57.2	74.0	-16.8
22300.0**	H/V	Aver	31.0*	8.7	24.0	40.3	-9.5	46.5	54.0	-7.5

Notes: \* Noise floor

\*\* 1 meter test distance

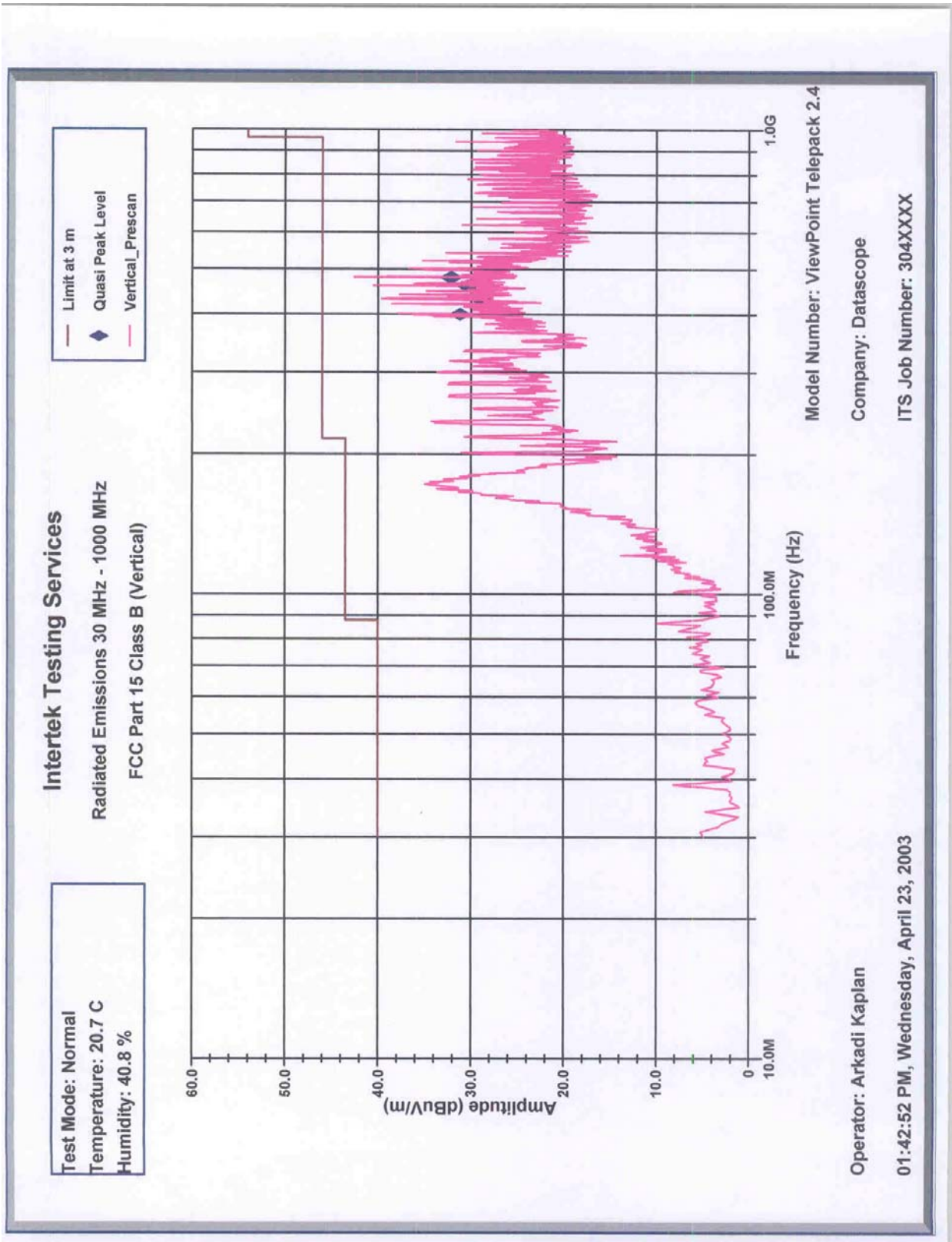
All other emissions not reported (including emission in the band 2310-2390 MHz) at least 10 dB below the limit

Plot 1, High Channel 2480 MHz

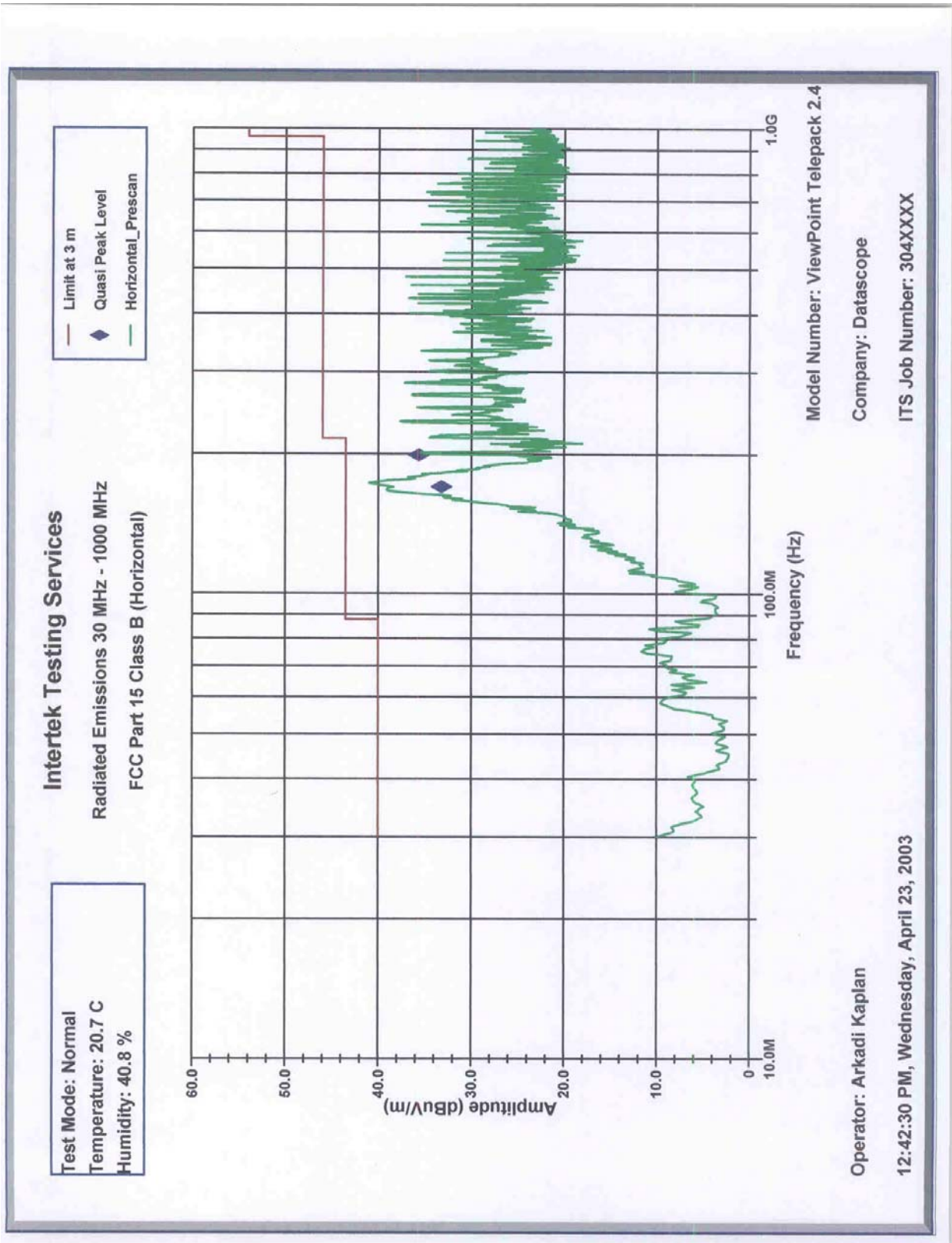


4.2 Radiated Emissions from Digital Section of Transceiver  
FCC Ref: 15.109

Test results are attached. The EUT passed by 7.8 dB.











**5.0 Test Equipment**

Equipment	Manufacturer	Model/Type	Serial #	Cal Int	Cal Due
BI-Log Antenna	EMCO	3143	9509-1160	12	9/19/03
Horn Antenna	EMCO	3115	9170-3712	12	6/02/03
Horn Antenna	EMCO	3160-09	ITS51	#	#
Pre-Amplifier	ITS	ITSPA-1	44156	12	10/06/03
Pre-amplifier	CTT	ACO/400	47526	12	10/05/03
Pre-Amplifier	Avantek	AFT-18855	8723H705	12	10/05/03
Power Meter	Hewlett Packard	8900D	3607U00673	12	1/02/04
Spectrum Analyzer w/85650 QP Adapter	Hewlett Packard	8566B	2416A00317 2043A00251	12	5/06/03
RF Filter Section	Hewlett Packard	85460A	3448A00267	12	7/16/03
EMI Receiver	Hewlett Packard	8546A	3710A00373	12	7/16/03

# No Calibration required