

## MEASUREMENT AND TECHNICAL REPORT

GE MEDICAL SYSTEMS - IT  
 15222 del Amo Avenue  
 Tustin, CA 92780

**DATE: 25 November 2002**

<b>This Report Concerns:</b>	Original Grant: <input checked="" type="checkbox"/>	Class II Change: <input type="checkbox"/>
<b>Equipment Type:</b>	DT-7001 Instrument Transceiver, Model DT-7001*	
	(*) Model numbers represent per customer: DT-7000 and DT-7001. DT-7001 deemed worst case.	
<b>Deferred grant requested per 47 CFR 0.457(d)(1)(ii)?</b>	Yes: <input type="checkbox"/> <b>Defer until:</b>	No: <input checked="" type="checkbox"/>
Company Name <b>agrees to notify the Commission by:</b> <b>of the intended date of announcement of the product so that the grant can be issued on that date.</b>	N/A	
<b>Transition Rules Request per 15.37?</b>	Yes: <input type="checkbox"/>	No: <input checked="" type="checkbox"/>
(*) FCC Parts 2 and 95, Paragraph(s) 2.1049, 2.1055 and 95.1115(a), 95.1115(b), 95.1115(e)		
<b>Report Prepared by:</b>	<b>TÜV AMERICA, INC</b> <b>10040 Mesa Rim Road</b> <b>San Diego, CA 92121-2912</b> <b>Phone: 858 546 3999</b> <b>Fax: 858 546 0364</b>	

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**1.0 GENERAL INFORMATION**

**1.1 Product Description**

**General Equipment Description -- NOTE: This information will be input into your test report as shown below.**

EUT Description: Instrument Transceiver

EUT Name: DT-7000 & DT-7001

Model No.: -- Serial No.: --

Product Options: With batteries (DT-7001) or without (DT-7000)

Configurations to be tested: DT-7001 (deemed worst case)

**Power Requirements**

**Regulations require testing to be performed at typical power ratings in the countries of intended use. (i.e., European power is typically 230 VAC 50 Hz or 400 VAC 50 Hz, single and three phase, respectively)**

Voltage: 115 (If battery powered, make sure battery life is sufficient to complete testing.)

# of Phases: 1

Current (Amps/phase(max)): 2 Current (Amps/phase(nominal)): 0.5

Other: Battery back-up (internal to device) will test on wall power

**Other Special Requirements**

--

**Typical Installation and/or Operating Environment**

(ie. Hospital, Small Business, Industrial/Factory, etc.)

Hospital or other fixed healthcare facility

**EUT Power Cable**

Permanent    OR     Removable    Length (in meters):    3 m  
 Shielded    OR     Unshielded  
 Not Applicable

**EUT Interface Ports and Cables**

Interface			Shielding									
Type	Analog	Digital	Qty	Yes	No	Type	Termination	Connector Type	Port Termination	Length (in meters)	Removable	Permanent
	<i><b>EXAMPLE:</b></i>											
RS232	<input type="checkbox"/>	<input checked="" type="checkbox"/>	2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Foil over braid	Coaxial	Metallized 9-pin D-Sub	Characteristic Impedance	6	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Data I/O	<input type="checkbox"/>	<input checked="" type="checkbox"/>	2	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Drain wire is present by not totally shielded	Multi-wire	Hirose	--	1	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Power	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Jerome brick	--	--	--	3	<input checked="" type="checkbox"/>	<input type="checkbox"/>

**EUT Software.**

Revision Level:    --  
 Description:    SW for the digital board; SW for the RF module

**EUT Operating Modes to be Tested** -- list the operating modes to be used during test. It is recommended the equipment be tested while operating in a typical operation mode. FCC testing of personal computers and/or peripherals requires that a simple program generate a complete line of upper case H's. Provide a general description of all software, firmware, and PLD algorithms used in the equipment. List all code modules as described above, with the revision level used during testing. Consult with your TÜV Product Service Representative if additional assistance is required.

- Expect to test per DA00-0075. As TUV AM directs, will test in FHSS mode or will adjust to stop at a specific frequency. The unit Only operates in FHSS when installed.

**EUT System Components** -- List and describe all components which are part of the EUT. For FCC testing a minimum configuration is required. (ie. Mouse, Printer, Monitor, External Disk Drive, Motherboard, etc.)

Description	Model #	Serial #	FCC #
DT-7001	--	--	--
Power brick	--	--	--
I/O Cable	--	--	--
Programming box and laptop to exit FHSS mode	--	--	--

**Support Equipment** -- List and describe all support equipment which is not part of the EUT. (i.e. peripherals, simulators, etc)

Description	Model #	Serial #	FCC ID #
--			

**Oscillator Frequencies**

Frequency	Derived Frequency	Component # / Location	Description of Use
10 MHz	9600 kbps	Oscillator on digital board	I/O communication rate
7.3728 MHz	608-614 MHz	Crystal on RF module	RF transmission

**Power Supply**

Manufacturer	Model #	Serial #	Type		
Jerome	--	--	<input type="checkbox"/> Switched-mode	(Frequency)	60 Hz
			<input checked="" type="checkbox"/> Linear	<input type="checkbox"/> Other	--

**Power Line Filters**

Manufacturer	Model #	Location in EUT
--		

**Critical EMI Components (Capacitors, ferrites, etc.)**

Description	Manufacturer	Part # or Value	Qty	Component # / Location
ESD coating	Cybershield (alternate vendors being considered)	--	--	Inside enclosure

**EMC Critical Detail -- Describe other EMC Design details used to reduce high frequency noise.**

--

**1.2 Related Submittal Grant**

None

**1.3 Tested System Details**

The FCC ID's for all equipment, plus descriptions of all cables used in the tested system are:

None

**1.4 Test Methodology**

Purpose of Test: To demonstrate compliance with the following tests.

TEST	FCC CFR 47#	PASS/FAIL
Field Strength of Fundamental	95.1115(a)	Pass
Field Strength of Out of Band Emissions	95.1115(b)	Pass
Frequency Stability vs. Voltage	95.1115(e); 2.1055	Pass
Occupied Bandwidth	2.1049	Pass

Both Conducted and Radiated testing were performed according to the procedures in FCC/ANSI C63.4 and CSA 108.8-M1983. Radiated testing was performed at an antenna-to-EUT distance of 3 meters (1 - 25 GHz).

**1.5 Test Facility**

The open area test site and conducted measurement data were tested by:

TÜV AMERICA, INC  
 10040 Mesa Rim Road  
 San Diego, CA 92121-2912  
 Phone: 858 546 3999  
 Fax: 858 546 0364

The Test Site Data and performance comply with ANSI C63.4 and are registered with the FCC, 7435 Oakland Mills Road, Columbia Maryland 21046. All Measurement Data is acquired according to the content of FCC Measurement Procedure and ANSI C63.4, unless supplemented with additional requirements as noted in the test report.

## 1.6 Part 2 Requirements

Applicant: Data Critical Corporation  
15222 Del Amo Avenue  
Tustin, CA 92780

Manufacturer: GE Medical Systems Information Technologies  
8200 W. Tower Avenue  
Milwaukee, WI 53223

R&D: GE Medical Systems Information Technologies  
15222 Del Amo Avenue  
Tustin, CA 92780

Note that Data Critical Corporation is an operating entity of GE Medical Systems Information Technologies.

frequency range: 608-614 MHz (frequency range tested 608.72 - 612.80)  
tolerance: 50 ppm (per CCM2 Crystal.pdf for temp, per testing at TUV for voltage)  
microprocessor: not applicable

Maximum power rating: 200 mV/m at 3m

EUT input power can range from 4.25 – 25 VDC. Internally, voltages are regulated to provide 3.0 VDC to the digital circuits and 4.2 VDC to the RF module.

Tune-up procedure - not applicable.

See operating description and schematics for description of the modulation system and of the modulating wavetrain.

- RF module voltage = 4.2 VDC. Overall power input to the DT-700X can range from 4.25 VDC to 25 VDC (from external power supply, medical bedside device, or internal batteries). Regardless of source, the DT-700X digital board provides a regulated 4.2 VDC to the RF module. The rest of the DT-700X digital board runs at a regulated 3.0 VDC.
- Miscellaneous technical info
  - o Frequency tolerance = 50 ppm
  - o Emissions = frequency hopping spread spectrum (FHSS)
  - o TDMA was on during all testing (frequency hopping was stopped as required by test procedures)
  - o Modulation = GFSK (Gaussian pulse shaped Frequency Shift Keying)



## **2.0 SYSTEM TEST CONFIGURATION**

### **2.1 Justification**

The EUT was initially tested for FCC emissions in the following configuration:

See Block Diagram

### **2.2 EUT Exercise Software**

None

### **2.3 Special Accessories**

None

### **2.4 Equipment Modifications**

None

### **2.5 Configuration of Test System**

See Block Diagram

Report No. SC205752-03

**3.0 FIELD STRENGTH OF FUNDAMENTAL EQUIPMENT/DATA  
OCCUPIED BANDWIDTH  
FIELD STRENGTH OF OUT OF BAND EMISSIONS EQUIPMENT/DATA  
FREQUENCY STABILITY VS VOLTAGE EQUIPMENT/DATA**

See following page(s).

Test Conditions: Part 95.1115

Report No. SC205752

Photos taken?  Yes Nov. 12, 2002

GE Medical Systems IT  
 Model DT-7001  
 sn K22Y0009GP w/ RF Module 201990 in CS33 case

**Test Equipment Used:**

Model Number	Prop. #	Description	Manufacturer	Serial No.	Cal. Due Dates
For Part 95.1115(a) Field Strength of Fundamental					
For Part 95.1115(b) Field Strength of Out of Band Emissions > 1000 MHz					
For Part 2.1049 Occupied Bandwidth					
<input checked="" type="checkbox"/> Roof, 3-meter open site					
<input checked="" type="checkbox"/> hp8566B	407	Spectrum Analyzer	Hewlett Packard	2311A02209	11/13/02
<input checked="" type="checkbox"/> 85650A	408	Quasipeak Adapter	Hewlett Packard	2811A01325	n.c.r.
<input checked="" type="checkbox"/> 3115	251	Antenna, Horn	Electro Mechanics Co	2595	10/20/02
<input checked="" type="checkbox"/> 3146	243/6641	Antenna, Log Per.	Electro Mechanics Co	106X	4/11/03
<input checked="" type="checkbox"/> PreAmp 2-20 GHZ	719	PreAmp	TUV PS	na	n.c.r.
<input checked="" type="checkbox"/> Cable 1	732	30' cable	United Microwave Products	na	n.c.r.
<input checked="" type="checkbox"/> Cable 2	6788	3' cable	United Microwave Products	na	n.c.r.
<input checked="" type="checkbox"/> FF 6548-2	777	900 MHz High Pass Filter	Sage	006	n.c.r.
to verify cable losses:					
<input checked="" type="checkbox"/> 437B	572	Power Meter	Hewlett Packard	3125O19308	4/26/03
<input checked="" type="checkbox"/> 8482A	574	Power Sensor	Hewlett Packard	3318A27679	4/11/03
<input checked="" type="checkbox"/> 8350B	6706	Sweep Signal Generator	Hewlett Packard	2749A09420	n.c.r.
For Part 95.1115(b) Field Strength of Out of Band Emissions < 1000 MHz					
<input checked="" type="checkbox"/> Canyon 2, 3- meter OATS					
<input checked="" type="checkbox"/> LPB 2520 A	6722/739	Antenna, Bilog	Antenna Research	1170	5/3/03
<input checked="" type="checkbox"/> ESVS30	466	EMC Receiver	Rhode & Schwartz	833825/003	3/30/03
For Part 2.1055 Frequency Stability Vs. Voltage					
<input checked="" type="checkbox"/> SR 2, Shielded Room, 12' x 24' x 10', Metal Chamber					
<input checked="" type="checkbox"/> hp8568B	187	Spectrum Analyzer	Hewlett Packard	2304A92500	3/28/03
<input checked="" type="checkbox"/> Variac	6006	Variable Transformer	Technopower	n/a	n.c.r.
<input checked="" type="checkbox"/> 34401A	776	Digital Multimeter	Hewlett Packard	U536086974	11/26/02
<input checked="" type="checkbox"/> 7405	6437	Antenna, Probe Kit	EMC Test Systems	9812-4261	n.c.r.

Remarks: \_\_\_\_\_

GE Medical Systems IT  
 Model DT-7001  
 sn K22Y0009GP w/ RF Module 201990 in CS33 case

CFR 47, Part 2, Paragraphs 2.1049 and 2.1055  
 CFR 47 Part 95 Section H

95.1115 General Technical Requirements

95.1115 (a)(1) Quasipeak 608-614 MHz 200 mV/m @ 3 meters  
 $200 \text{ mV/m} = .2 \text{ V/m} = 106 \text{ dBuV/m}$   
 Measured:  
     608.72 MHz      **103.4**      dBuV/m  
     612.80 MHz      **105.3**      dBuV/m  
 see data sheet

95.1115(b) (1) Out of band emissions < 960 MHz < 200 uV/m Quasipeak @ 3 meters  
 $200 \text{ uV/m} = 46.02 \text{ dBuV/m}$   
 Maximum Measured: @ 614 MHz      43.0      dBuV/m  
 see data sheet

95.1115(b) (2) Out of band emissions > 960 MHz < 500 uV/m average RBW 1MHz @ 3 meters  
 $500 \text{ uV/m} = 53.98 \text{ dBuV/m}$   
 Maximum Measured: @ 3226.1 MHz      40.76      dBuV/m  
 see data sheet

95.1115(c) Emission types: any but not video or voice.  
 TDMA

95.1115(d) (2) Channel use -- 1.5 MHz:  
 See operating description exhibit.

95.1115(e) Frequency Stability vs. Voltage  
 Stable within bands assigned under all of the manufacturer's specifications  
 Manufacturer's limit = **50 ppm**

	Endpoint	Deviation
External Vdc source	4.25 V	6.1 ppm
	25.01 V	8.5 ppm
Internal Vdc source -- 3 Lithium Cells in series	2.81 V	3.1 ppm
(low battery alarm)	3.50 V	5.4 ppm
	4.20 V	5.9 ppm
External 120 Vac source -- power brick	Vac - 15% = 102.1 Vac	6.6 ppm
	Vac + 15% = 138.0 Vac	23.0 ppm

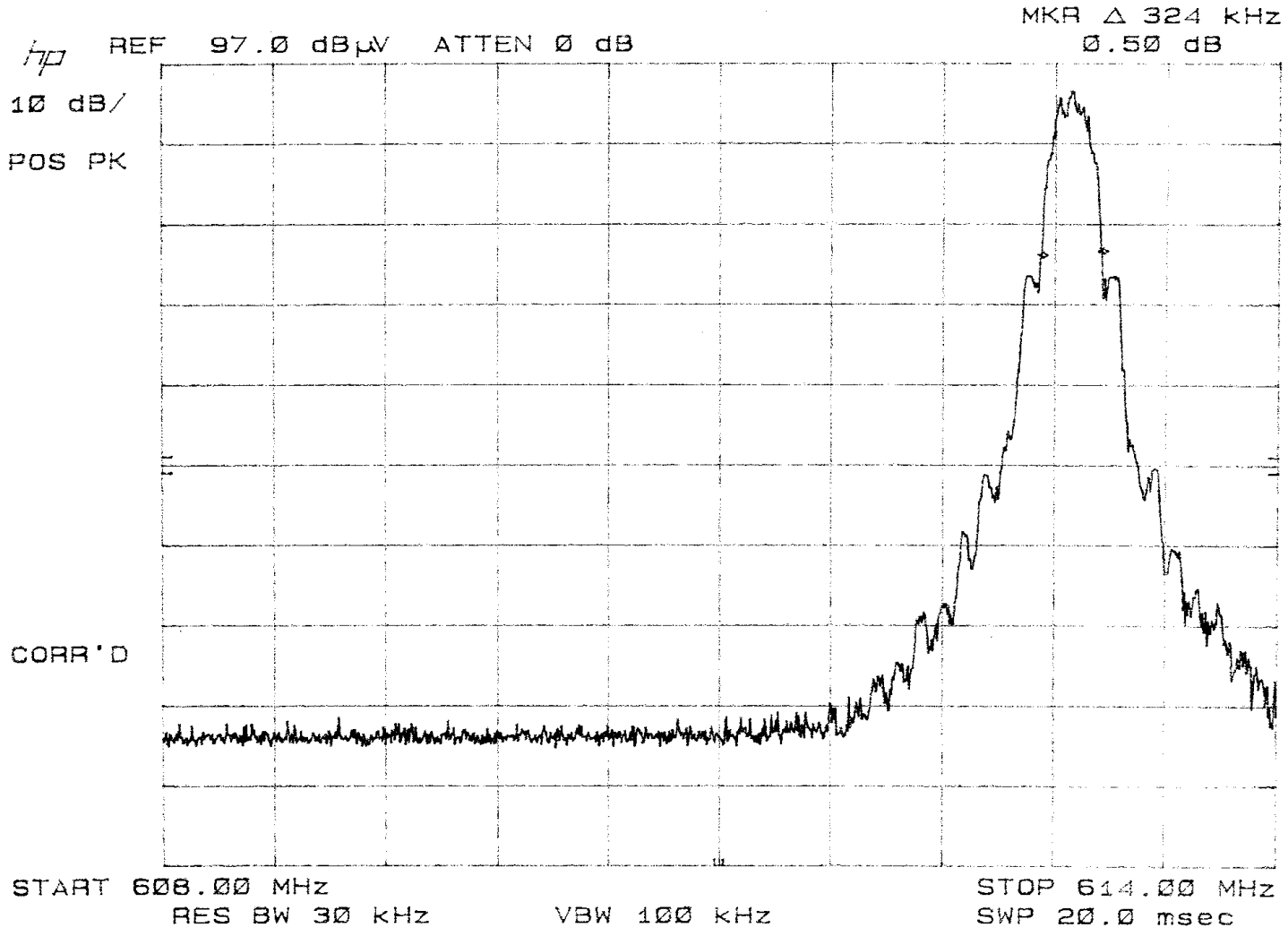
Tested 11-13-02 in SR2 by A. Laudani  
 Spectrum Analyzer hp8568AB (Span = 50 kHz, Mode = Frequency Counter)  
 1 minute sample Maximum and Minimum recorded.

95.1115(e) Frequency Stability vs. Frequency  
 Stable within bands assigned under all of the manufacturer's specifications  
 Manufacturer's limit = 50 ppm  
 See end of test report - data supplied by customer.



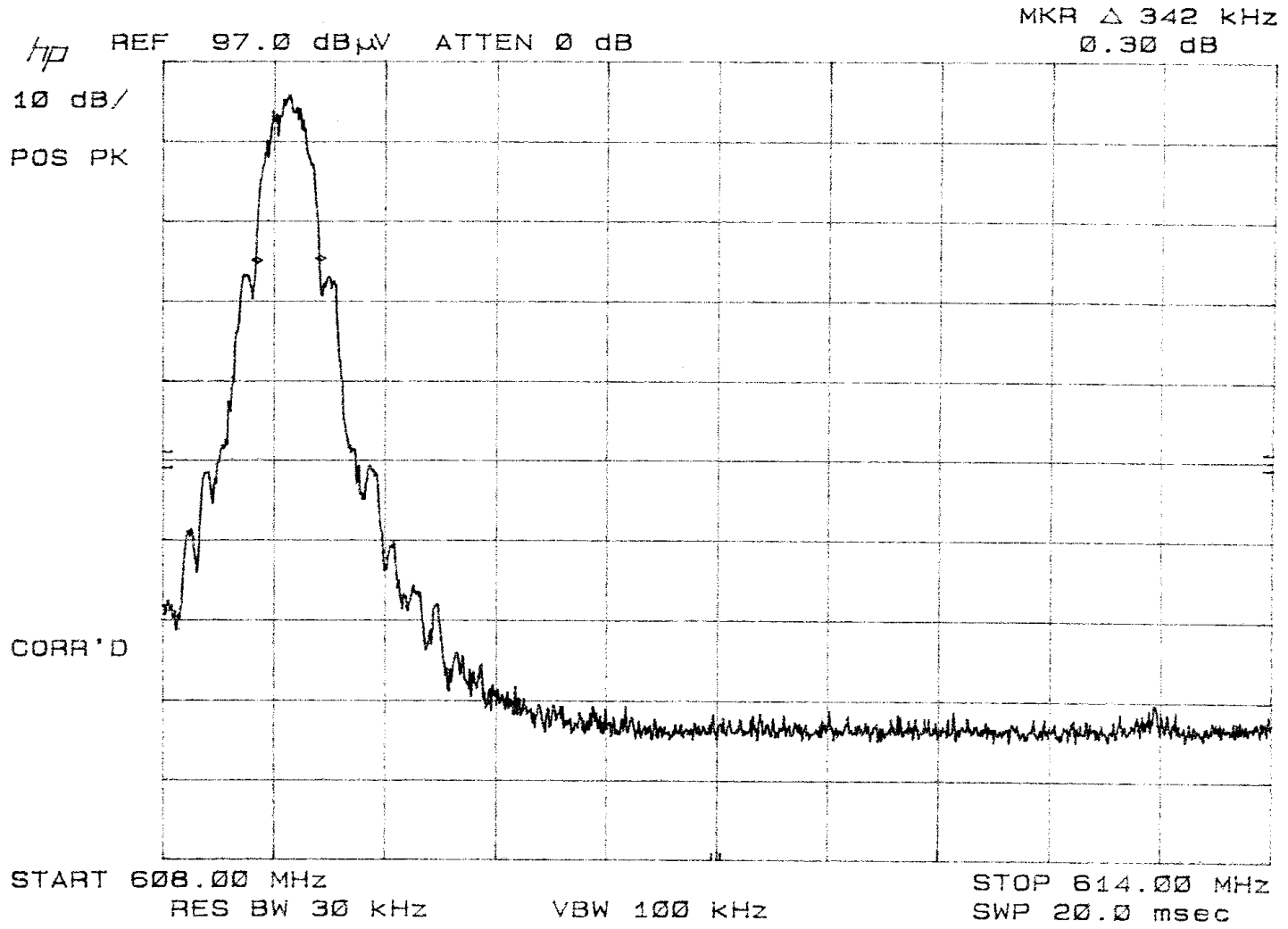
GE Medical Systems IT Model DT-7001 sn K22Y0009GP w/ RF Module 201990 in CS33 case  
FCC Part 2.1049 Occupied Bandwidth  
SC205752 TUV Roof 3-meter site

Nov. 11, 2002  
TECH/ENGR: AAL *AAL*



GE Medical Systems IT Model DT-7001 sn K22Y0009GP w/ RF Module 201990 in CS33 case  
FCC Part 2.1049 Occupied Bandwidth  
SC205752 TUV Roof 3-meter site

Nov. 11, 2002  
TECH/ENGR: AAL *AAL*



Report No. SC205752-03

REPORT No: SC205752 SPEC: FCC Part 15 para 95.1115(b)  
 CUSTOMER: GE Medical Systems IT TEST DIST: 3 Meters  
 E U T: Model DT-7001 TEST SITE: 2  
 sn K22Y0009GP w/ RF Module 201990 in CS33 case  
 EUT MODE: Transmit BICONICAL: 739  
 DATE: Nov. 11, 2002 TESTED BY: A. Laudani *ML* LOG PERIODIC: 739  
 NOTES: Quasi-Peak with 120 KHz measurement bandwidth. RCVR: 6723  
 EUT Programmed Power = 76

EUT powered by 120 Vac  
 Temperature: 26 Relative Humidity: 45%

EUT MARGIN			ver 1.9					
-3.0 dB at 614 MHz								
FREQUENCY (MHz)	VERTICAL measured (dBuV)	HORIZONTAL measured (dBuV)	CORRECTION FACTOR (dB/m)	MAXIMUM CORRECTED (dBuV/m)	SPECIFIED LIMIT (dBuV/m)	EUT MARGIN (dB)	EUT ROTATION (degrees)	ANTENNA HEIGHT (meters)
113.40	15.4	15.5	14.1	<b>29.6</b>	46	-16.4	34	1
608.00	12.5	7.8	25.3	<b>37.8</b>	46	-8.2	350	1
614.00	17.7	15.0	25.3	<b>43.0</b>	46	-3.0	0	1



REPORT No: SC205752      TESTER: Alan Laudani <sup>AKG</sup>      SPEC: FCC Part 95.1115(b)(2)

CUSTOMER: GE Medical Systems IT      TEST DIST: 3 Meters

E U T: Model DT-7001      TEST SITE: Roof  
 sn K22Y0009GP w/ RF Module 201990 in CS33 case

EUT MODE: Transmit      BICONICAL: N/A

DATE: Nov. 11, 2002      LOG: N/A

NOTES: OTHER: 251

above 1GHz: RBW & VBW 1 MHz for Pk; RBW 1MHz and VBW 10Hz for AVG

CF = Antenna Factor + Cable Loss - Preamplifier Gain

v.beta1a

FREQ (MHz)	VERTICAL (dBuv)		HORIZONTAL (dBuv)		CF (dB/m)	MAX LEVEL (dBuV/m)		SPEC LIMIT (dBuV/m)		MARGIN (dB)		Rotation EUT	Antenna Height
	pk	av	pk	av		pk	av	pk	av	pk	av		
608.72	92.9		88.6										
1217.44	55.2	26.3	54.3	27.4	-12.3475	<b>42.85</b>	<b>15.1</b>	74	54	-31.1	-38.9	131	1.5
1826.16	47.5	34.8	36.3	26.4	-7.91688	<b>39.58</b>	<b>26.9</b>	74	54	-34.4	-27.1		
2434.88	36.3	22.9	38.1	22.9	-4.61258	<b>33.49</b>	<b>18.3</b>	74	54	-40.5	-35.7		
3043.6	34.4	23	38.4	22.9	-2.43432	<b>35.97</b>	<b>20.6</b>	74	54	-38	-33.4		
3652.32	34.5	23.2	35	23.5	-0.2735	<b>34.73</b>	<b>23.2</b>	74	54	-39.3	-30.8		
4261.04	35.2	24	36.7	24.6	0.12571	<b>36.83</b>	<b>24.7</b>	74	54	-37.2	-29.3		
4869.76	37.1	24.5	36.1	24.6	0.48742	<b>37.59</b>	<b>25.1</b>	74	54	-36.4	-28.9		
5478.48	31.6	22.6	33	22.8	4.34075	<b>37.34</b>	<b>27.1</b>	74	54	-36.7	-26.9		
613	95.5		84.9										
1226	63.2	26.7	53	25.9	-12.2824	<b>50.92</b>	<b>14.4</b>	74	54	-23.1	-39.6	130	1.1
1839	46.3	30.6	37.5	26	-7.827	<b>38.47</b>	<b>22.8</b>	74	54	-35.5	-31.2		
2452	43.5	27.9	41.8	26.7	-4.5304	<b>38.97</b>	<b>23.4</b>	74	54	-35	-30.6		
3065	34.2	23.5	34.2	23.6	-2.353	<b>31.85</b>	<b>21.2</b>	74	54	-42.2	-32.8		
3678	36	24.8	35	24.1	-0.2016	<b>35.8</b>	<b>24.6</b>	74	54	-38.2	-29.4		
4291	35.7	24.2	35.2	24.4	0.0598	<b>35.76</b>	<b>24.5</b>	74	54	-38.2	-29.5		
4904	35.5	24.5	35.6	24.5	0.5696	<b>36.17</b>	<b>25.1</b>	74	54	-37.8	-28.9		
5517	35.2	23.3	36.1	23.5	4.5442	<b>40.64</b>	<b>28</b>	74	54	-33.4	-26		
6130	33.8	23.4	35.6	23.5	5.722	<b>41.32</b>	<b>29.2</b>	74	54	-32.7	-24.8		
Spurious with 608.9 MHz TX													
3226.1	42.2	37.4	36.5	28	-1.74082	<b>40.46</b>	<b>35.7</b>	74	54	-33.5	-18.3	273	1
5376.7	37.1	26.4	34.9	24.5	3.58758	<b>40.69</b>	<b>30</b>	74	54	-33.3	-24	352	1.1
Spurious with 613 MHz TX													
No Other Emissions Found													

### FREQUENCY STABILITY

SHEET 1 OF 1



TEST REPORT # SC205752

TEST AREA SR2

DATE Nov. 13, 2002

EUT MODEL# DT-7001 TEMPERATURE 22 °C

SPECIFICATION(S):

EUT SERIAL# K22Y0009GP HUMIDITY 35 %

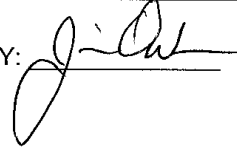
FCC Part 95.1115(e) Part 2.1055

EUT DESCRIPTION Instrument Transceiver AIR PRESSURE 100.6 kPa

TEST LEVEL		Frequency PPM	Voltage VOLTS	COMPLIES		REMARKS
FREQUENCY MINIMUM (MHz)	FREQUENCY MAXIMUM (MHz)			YES	NO	
608.6815	608.6852	6.1	4.25	√		External Vdc endpoint
608.6770	608.6822	8.5	25.01	√		External Vdc endpoint
608.6828	608.6847	3.1	2.81	√		Battery endpoint
608.6824	608.6857	5.4	3.50	√		Low Battery alarm
608.6821	608.6857	5.9	4.20	√		Battery endpoint
608.6801	608.6841	6.6	102.1	√		120 Vac - 15%
608.6786	608.6800	23.0	138.0	√		120 Vac + 15%

NOTES: Span = 50 kHz, Maximum / Minimum frequency recorded within one minute.  
Limit = 50 ppm = 30,434 Hz.

TESTED BY: A. Laudani 

REVIEWED BY: 

#### 4.0 ATTESTATION STATEMENT

##### GENERAL REMARKS:

##### SUMMARY:

All tests were performed per CFR 47, Part(s) 2 and 95, Paragraphs 2.1049, 2.1055 and 95.1115(a), 95.1115(b), 95.1115(e)

■ - Performed

The Equipment Under Test

■ - **Fulfills** the requirements of CFR 47, Part(s) 2 and 95, Paragraphs 2.1049, 2.1055 and 95.1115(a), 95.1115(b), 95.1115(e)

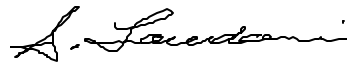
##### - TÜV AMERICA, INC. -

Responsible Engineer:



Jim Owen  
(EMC Chief Engineer)

Responsible Engineer:



Alan Laudani  
(EMC Engineer)



**GE Medical Systems**  
Information Technologies

*GE Medical Systems Information Technologies  
Mobile Care and Wireless Center of Excellence  
15222 Del Amo Avenue, Tustin, CA 92780*

*Tel: (714) 546-0147 FAX (714) 546-0084*

## **Frequency Stability with Temperature for DT-700X**

**Document Number: 2011272-019**

Rev	Date	Author	Change
A	12-6-2002	C. Ruther	Initial Release

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# 1 Purpose

This report details the stability of the frequency output of the DT-700X over the range of operation. As the RF module in the DT-700X is used in several PatientNet devices, this report also applies to the ambulatory transceivers and access points.

## 2 Test Set-up

### 2.1 EUT

As the DT-7000 and DT-7001 use the same RF module, testing need only be done on one sample. Testing was performed on:

Model Number – DT-7001  
Serial Number – K22Y0013GP  
Main Board – 0013 rev. 6F (artwork 4E)  
RF Module – 201866  
RF Firmware – revision 5.2  
Enclosure – CS33

The unit was set using HyperTerminal running on a standard laptop computer. To ensure repeatability the following parameters were used for testing:

KM1 – modulation off (facilitates measurements)  
PW6 – packet width of 6 as required in FCC test protocol  
WQ76 – power set as required to meet FCC limits  
KB1 – EUT acting as base (constant transmission)

### 2.2 Other Equipment

Device Type	Manufacturer	Model	Serial No.
Spectrum Analyzer	Anritsu	MS2711A	202089
Temperature Chamber	Cincinnati Sub-Zero	ZH-16-2-H/AC	ZI9532255
Temperature Monitor	Honeywell	DR4200	8924Y836649000004

## 3 Test Set-up and Results

The PatientNet Operators' Manual (10001001 rev. B) limits the operating temperature to +5 to +40 C. The chamber was set to a temperature to ensure the full range of operating temperatures is addressed. To ensure that entire EUT was at the set temperature, the EUT was allowed to rest in the chamber at temperature for at least 30 minutes. As the main concern is to ensure that the operating frequency range is not exceeded (608-614 MHz per 47 CFR 95H, WMTS requirements), only the frequency edges were measured.

At high resolution, the transmission peak has about a 1 kHz width. To ensure worst case values are reported, the edge of the peak closest to the FCC limit (608 MHz on the low side and 614 MHz on the high side) was measured as the center frequency ( $f_{center}$ ). The  $-20\text{dB}$  point ( $f_{20\text{dB}}$ ) was also measured on the side of the band closest to the FCC limit.

The frequency settings selected for review are the band edges, WC0 for low and WC1F for high. These settings correspond to 608.6656 MHz and 612.8980 MHz, respectively.

Time	Temp (C)	Freq setting	fcenter (MHz)	$f_{20\text{dB}}$ (MHz)	Comment
8:05	24	WC0 (608.7)	608.672 530	608.656 010	--
8:10	24	WC1F (612.9)	612.904 880	612.913 150	highest frequency overall
12 :00	3	--	--	--	chamber at temp
13:00	3	WC0 (608.7)	608.665 610	608.647 590	--
13:20	49.5	--	--	--	chamber at temp
14:30	52.5	WC0 (608.7)	608.660 370	608.665 110	lowest frequency overall
14:50	52.5	WC1F (612.9)	612.902 626	612.907 886	--
15:10	5	--	--	--	chamber at temp
16:10	3	WC1F (612.9)	612.897 360	612.906 390	--

Data Summary:

Minimum value (closest to 608 MHz) = 608.660 370

Maximum value (closest to 614 MHz) = 612.904 880

Maximum frequency change = 750 Hz (0.1 ppm)\*

\* specification sheet for crystal indicates it should be accurate to at least 50 ppm (30,650Hz at 612.9 MHz) from  $-10\text{C}$  to  $+60\text{C}$

## 4 Conclusion

Over the range of allowed operating temperatures, the EUT RF output ranges from 608.660 - 612.905 MHz. This is well within the 47 CFR 95H limits for WMTS of 608 – 614 MHz. Further, the EUT operates within the 50 ppm variation expected based on the specification of the crystal used in the EUT's RF module.

The EUT will operate within 47 CFR 95H limits for WMTS.