

# TEST RESULT SUMMARY

## FCC PART 15 Subpart C Section 15.249

MANUFACTURER'S NAME	Guidant Corporation
NAME OF EQUIPMENT	Renewal RF
TYPE OF EQUIPMENT	Implantable defibrillator
MODEL NUMBER	<b>CONTAK RENEWAL® 3 RF</b>
MANUFACTURER'S ADDRESS	4100 Hamline Ave. North St. Paul, MN 55112
TEST REPORT NUMBER	NC304698
TEST DATE	14 October 2003

According to testing performed at TÜV Product Service Inc, the above-mentioned unit is in compliance with the electromagnetic compatibility requirements defined in FCC Part 15 Subpart C Section 15.249.

It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical characteristics. Any modifications necessary for compliance made during testing on the above mentioned date(s) must be implemented in all production units for compliance to be maintained.

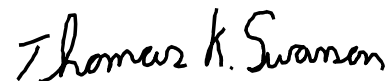
TÜV Product Service Inc, as an independent testing laboratory, declares that the equipment tested as specified above conforms to the requirements of FCC Part 15 Subpart C Section 15.249.

Date: 15 December 2003

Location: Taylors Falls MN  
USA



G. S. Jakubowski  
Test Technician



T. K. Swanson  
Test Technician

# EMC EMISSION - TEST REPORT

Test Report File No. : **NC304698** Date of issue: 15 December 2003

Model No. : **CONTAK RENEWAL® 3 RF**

Product Name : **Renewal RF**

Product Type : **Implantable defibrillator**

Applicant : **Guidant Corporation**

Manufacturer : **Guidant Corporation**

License holder : **Guidant Corporation**

Address : **4100 Hamline Ave. North**

: **St. Paul, MN 55112**

Test Result :  **Positive**  **Negative**

Test Project Number Reference(s) : **NC304698**

Total pages including Appendices : **26**

*TÜV Product Service Inc is a subcontractor to TÜV Product Service, GmbH according to the principles outlined in ISO/IEC Guide 25 and EN 45001.*

*TÜV Product Service Inc reports apply only to the specific samples tested under stated test conditions. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. TÜV Product Service Inc shall have no liability for any deductions, inferences or generalizations drawn by the client or others from TÜV Product Service Inc issued reports.*

*This report is the confidential property of the client. As a mutual protection to our clients, the public and ourselves, extracts from the test report shall not be reproduced except in full without our written approval. This report shall not be used by the client to claim product endorsement by NVLAP or any agency of the US government.*

*TÜV Product Service Inc and its professional staff hold government and professional organization certifications and are members of AAMI, ACIL, AEA, ANSI, IEEE, NVLAP, and VCCI*

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## EMISSIONS TEST REGULATIONS :

The emissions tests were performed according to following regulations:

- |  |   |                                    |
|--|---|------------------------------------|
| <input type="checkbox"/> - EN 50081-1 / 1991                               | <input type="checkbox"/> - Group 1                          | <input type="checkbox"/> - Group 2 |
| <input type="checkbox"/> - EN 55011 / 1991                                 | <input type="checkbox"/> - Class A                          | <input type="checkbox"/> - Class B |
| <input type="checkbox"/> - EN 55013 / 1990                                 | <input type="checkbox"/> - Household appliances and similar |                                    |
| <input type="checkbox"/> - EN 55014 / 1987                                 | <input type="checkbox"/> - Portable tools                   |                                    |
|  | <input type="checkbox"/> - Semiconductor devices            |                                    |
| <input type="checkbox"/> - EN 55014 / A2:1990                              | <input type="checkbox"/> - Household appliances and similar |                                    |
| <input type="checkbox"/> - EN 55014 / 1993                                 | <input type="checkbox"/> - Portable tools                   |                                    |
|  | <input type="checkbox"/> - Semiconductor devices            |                                    |
| <input type="checkbox"/> - EN 55015 / 1987                                 |   |                                    |
| <input type="checkbox"/> - EN 55015 / A1:1990                              |   |                                    |
| <input type="checkbox"/> - EN 55015 / 1993                                 |   |                                    |
| <input type="checkbox"/> - EN 55022 / 1987                                 | <input type="checkbox"/> - Class A                          | <input type="checkbox"/> - Class B |
| <input type="checkbox"/> - EN 55022 / 1994                                 | <input type="checkbox"/> - Class A                          | <input type="checkbox"/> - Class B |
| <input type="checkbox"/> - BS  |   |                                    |
| <input type="checkbox"/> - VCCI  | <input type="checkbox"/> - Class A                          | <input type="checkbox"/> - Class B |
| <input checked="" type="checkbox"/> - FCC Part 15 Subpart C Section 15.249 |   |                                    |
| <input type="checkbox"/> - AS 3548 (1992)                                  | <input type="checkbox"/> - Class A                          | <input type="checkbox"/> - Class B |
| <input type="checkbox"/> - CISPR 11 (1990)                                 | <input type="checkbox"/> - Group 1                          | <input type="checkbox"/> - Group 2 |
|  | <input type="checkbox"/> - Class A                          | <input type="checkbox"/> - Class B |
| <input type="checkbox"/> - CISPR 22 (1993)                                 | <input type="checkbox"/> - Class A                          | <input type="checkbox"/> - Class B |
| <input type="checkbox"/> - RSS-210 Issue 2 Rev. 1 Section 6.1.1 & 7.0      |   |                                    |

**Environmental conditions in the lab:**

	<u>Actual</u>
Temperature	: 18 °C
Relative Humidity	: 39 %
Atmospheric pressure	: 97.0 kPa
Power supply system	: Battery

**Sign Explanations:**

- not applicable
- applicable



**Emissions Test Conditions: CONDUCTED EMISSIONS (Interference Voltage)**

The *CONDUCTED EMISSIONS (INTERFERENCE VOLTAGE)* measurements were performed at the following test location:

- Test not applicable

- Wild River Lab Large Test Site (Open Area Test Site)
- Wild River Lab Small Test Site (Open Area Test Site)
- Oakwood Lab (Open Area Test Site)
- Wild River Lab Screen Room
- New Brighton Lab Shielded Room

**Test equipment used :**

**Emissions Test Conditions: RADIATED EMISSIONS (Magnetic Field)**

The *RADIATED EMISSIONS (MAGNETIC FIELD)* measurements were performed at the following test location:

- Test not applicable

- Wild River Lab Large Test Site (Open Area Test Site)
- Wild River Lab Small Test Site (Open Area Test Site)
- Oakwood Lab (Open Area Test Site)

**at a test distance of :**

- 3 meters
- 30 meters

### Emissions Test Conditions: RADIATED EMISSIONS (Electric Field)

The *RADIATED EMISSIONS (ELECTRIC FIELD)* measurements, in the frequency range of 30 MHz-1000 MHz, were tested in a horizontal and vertical polarization at the following test location:

- Test not applicable

- Wild River Lab Large Test Site (Open Area Test Site)
- Wild River Lab Small Test Site (Open Area Test Site) – NSA measurements made 2-03, due 2-04.
- Oakwood Lab (Open Area Test Site)

**at a test distance of :**

- 3 meters
- 10 meters
- 30 meters

**Test equipment used:**

	TUV ID	Model Number	Manufacturer	Description	Serial Number	Cal Due
<input checked="" type="checkbox"/> -	3959	ZHL-1042J	Mini-Circuits	Preamplifier	DP10150323	10-16-03
<input checked="" type="checkbox"/> -	8052	8566B	Hewlett-Packard	Spectrum Analyzer	2115a00853	12-02-03
<input checked="" type="checkbox"/> -	8051	85662A	Hewlett-Packard	Analyzer Display	2112A02220	12-02-03
<input checked="" type="checkbox"/> -	2680	85650A	Hewlett-Packard	Quasi-Peak Adapter	2043A00343	12-02-03
<input checked="" type="checkbox"/> -	3203	EM-6917B	Electro-Metrics	Biconicalog Periodic	106	3-18-04

All measurement instrumentation is traceable to the National Institute of Standards and Technology (NIST) and is calibrated annually.

### Emissions Test Conditions: INTERFERENCE POWER

The *INTERFERENCE POWER* measurements were performed by using the absorbing clamp on the mains and interface cables in the frequency range 30 MHz - 300 MHz at the following test location:

- Test not applicable

- Wild River Lab Large Test Site (Open Area Test Site)
- Wild River Lab Small Test Site (Open Area Test Site)
- Oakwood Lab (Open Area Test Site)
- Wild River Lab Screen Room
- New Brighton Lab Shielded Room

**Emissions Test Conditions: RADIATED EMISSIONS (Electric Field)**

The *EQUIVALENT RADIATED EMISSIONS* measurements in the frequency range 1 GHz – 9.14 GHz were performed in a horizontal and vertical polarization at the following test location:

- Test not applicable

- Wild River Lab Large Test Site (Open Area Test Site)
- Wild River Lab Small Test Site (Open Area Test Site)
- Oakwood Lab (Open Area Test Site)
- Wild River Lab Screen Room

**at a test distance of:**

- 1 meters
- 3 meters
- 10 meters

**Test equipment used :**

	TUV ID	Model Number	Manufacturer	Description	Serial Number	Cal Due
■-	3959	ZHL-1042J	Mini-Circuits	Preamplifier	DP10150323	10-16-03
■-	8052	8566B	Hewlett-Packard	Spectrum Analyzer	2115a00853	12-02-03
■-	8051	85662A	Hewlett-Packard	Analyzer Display	2112A02220	12-02-03
■	2680	85650A	Hewlett-Packard	Quasi-Peak Adapter	2043A00343	12-02-03
■-	3203	EM-6917B	Electro-Metrics	Biconicalog Periodic	106	3-18-04
■-	2075	3115	Electro-Mechanics (EMCO)	Ridge Guide Ant. 1-18 GHz	9001-3275	11-13-03
■-	3957	SL18B4020	Phase One Microwave	Preamplifier 2 – 18 GHz	0001	9-23-04

All measurement instrumentation is traceable to the National Institute of Standards and Technology (NIST) and is calibrated annually.



**Equipment Under Test (EUT) Test Operation Mode - Emission tests :**

The device under test was operated under the following conditions during emissions testing:

- Standby
- Test program (H - Pattern)
- Test program (color bar)
- Test program (customer specific)
- Practice operation
- Normal Operating Mode
- DDD

**Configuration of the device under test:**

- See Constructional Data Form in Appendix B - Page B2
- See Product Information Form in Appendix B - beginning on Page B3

**The following peripheral devices and interface cables were connected during the measurement:**

- \_\_\_\_\_ Type : \_\_\_\_\_
- \_\_\_\_\_ Type : \_\_\_\_\_
- \_\_\_\_\_ Type : \_\_\_\_\_
- \_\_\_\_\_ Type : \_\_\_\_\_
- \_\_\_\_\_ Type : \_\_\_\_\_
- \_\_\_\_\_ Type : \_\_\_\_\_
- \_\_\_\_\_ Type : \_\_\_\_\_
- \_\_\_\_\_ Type : \_\_\_\_\_
- unshielded power cable
- unshielded cables
- shielded cables                      MPS.No.: \_\_\_\_\_
- customer specific cables
- \_\_\_\_\_
- \_\_\_\_\_

### Emission Test Results:

#### Conducted emissions 10/150 kHz - 30 MHz

The requirements are  - MET  - NOT MET  - N/A

Minimum limit margin \_\_\_\_\_ dB at \_\_\_\_\_ MHz

Maximum limit exceeding \_\_\_\_\_ dB at \_\_\_\_\_ MHz

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

#### Radiated emissions (magnetic field) 10 kHz - 30 MHz

The requirements are  - MET  - NOT MET  - N/A

Minimum limit margin \_\_\_\_\_ dB at \_\_\_\_\_ MHz

Maximum limit exceeding \_\_\_\_\_ dB at \_\_\_\_\_ MHz

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

#### Radiated emissions (electric field) 30 MHz - 1000 MHz

The requirements are  - MET  - NOT MET

Minimum margin of compliance for fundamental \_\_\_\_\_ 9 dB at \_\_\_\_\_ 913.87 MHz

Minimum margin of compliance for spurious \_\_\_\_\_ >10 dB at \_\_\_\_\_ MHz

Remarks: The fundamental was measured to be 84.3 dBuV/m (16405.9 uV/m) in quasi-peak mode compared to a quasi-peak limit of 94.0 dBuV/m (50118 uV/m). No spurious emissions were detected from 30 to 1000 MHz.

#### Interference Power at the mains and interface cables 30 MHz - 300 MHz

The requirements are  - MET  - NOT MET  - N/A

Minimum limit margin \_\_\_\_\_ dB at \_\_\_\_\_ MHz

Maximum limit exceeding \_\_\_\_\_ dB at \_\_\_\_\_ MHz

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

#### Equivalent Radiated emissions 1 GHz – 9.14 GHz

The requirements are  - MET  - NOT MET

Minimum margin of compliance \_\_\_\_\_ 16 dB at \_\_\_\_\_ 1828.0 MHz

Maximum limit exceeding \_\_\_\_\_ dB at \_\_\_\_\_ MHz

Remarks: At 1828.0 MHz, average analyzer reading of 37.18 dBuV/m (72.3 uV/m), compared to an average limit of 54 dBuV/m (500 uV/m). The peak levels are 11 dB above the average levels (must be less than 20 dB higher).

**DEVIATIONS FROM STANDARD:**

None.

**GENERAL REMARKS:**

The bandwidth of the fundamental is shown on page A6 demonstrating band edge compliance.

**SUMMARY:**

The requirements according to the technical regulations are

- met
- **not** met.

The device under test does

- fulfill the general approval requirements mentioned on page 3.
- **not** fulfill the general approval requirements mentioned on page 3.

Testing Start Date: 14 October 2003

Testing End Date: 14 October 2003

- TÜV PRODUCT SERVICE INC -

*Thomas K. Swanson*

T. K. Swanson  
Test Technician

*G. S. Jakubowski*

Tested by:  
G. S. Jakubowski

Test-setup photo(s):  
Radiated emission 30 MHz – 9.14 GHz



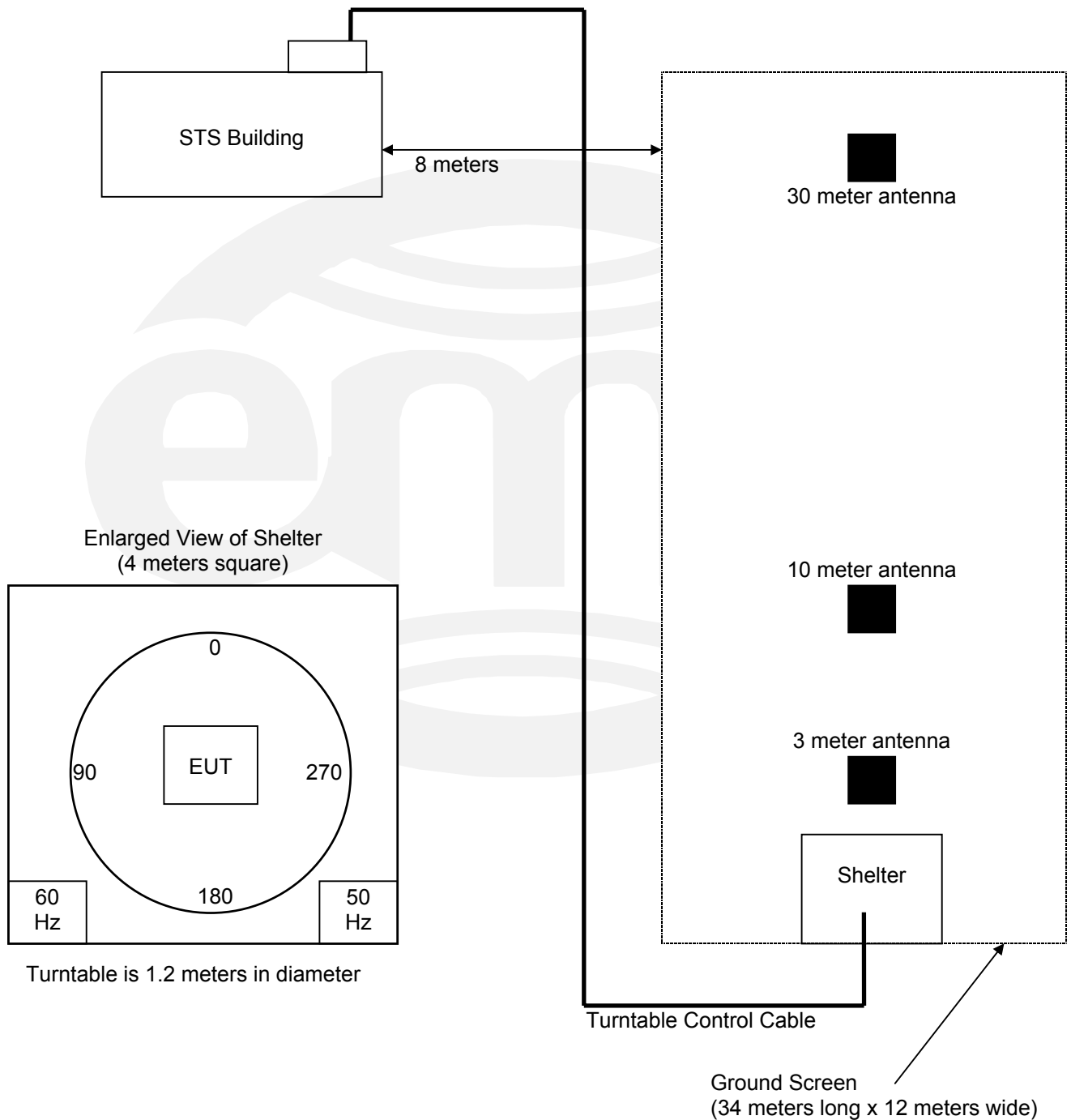
## Appendix A

Test Data Sheets  
and  
Test Setup Drawing(s)



**TEST SETUP FOR EMISSIONS TESTING**

WILD RIVER LAB  
Small Test Site (STS)



# RADIATED EMISSIONS



Test Report #: NC304698 Run 1                      Test Area: STS  
 EUT Model #: \_\_\_\_\_                                      Date: 10/14/03  
 EUT Serial #: 397302                                      EUT Power: DC                                      Temperature: 18.0 °C  
 Test Method: FCC B    Air Pressure: 97.0 kPa  
 Customer: \_\_\_\_\_    Rel. Humidity: 39.0 %

EUT Description: \_\_\_\_\_

Notes: Receiver is on while in transmit mode.

Data File Name: 4698\_rev.dat

Page: 1 of 3

## List of measurements for run #: 1

FREQ	LEVEL (dBuV)	CABLE / ANT / PREAMP / ATTEN (dB)	FINAL (dBuV / m)	POL / HGT / AZ (m)(DEG)	DELTA1 FCC 15.249 (50 mv/m or 94 dBuV/m)	DELTA2 FCC 15.249 (500 uv/m or 54 dBuV/m)
3 Meter antenna distance						
FIRST EUT						
EUT SN 397302						
X EUT WITH HEADER UP ANTENNA VERITCAL						
913.868 MHz	84.7 Qp	4.61 / 22.68 / 27.7 / 0.0	84.29	V / 1.00 / 299	-9.71	n/a
913.862 MHz	74.1 Qp	4.61 / 22.68 / 27.7 / 0.0	73.69	H / 2.30 / 157	-20.31	n/a
EUT 2 SN 930812						
913.928 MHz	81.5 Qp	4.61 / 22.68 / 27.7 / 0.0	81.09	V / 1.10 / 280	-12.91	n/a
913.928 MHz	77.5 Qp	4.61 / 22.68 / 27.7 / 0.0	77.09	H / 2.40 / 197	-16.91	n/a
EUT SN 397302 WAS FOUND TO BE TX MORE SO IT IS USED FOR THE REMAINDER OF THE TEST						
Y EUT WITH HEADER FLAT ANTENNA HORIZONTAL						
913.868 MHz	78.55 Qp	4.61 / 22.68 / 27.7 / 0.0	78.14	V / 1.10 / 72	-15.86	n/a
913.868 MHz	83.85 Qp	4.61 / 22.68 / 27.7 / 0.0	83.44	H / 1.00 / 312	-10.56	n/a
Z EUT WITH HEADER 90 DEGREES ANTENNA HORIZONTAL						
913.868 MHz	80.6 Qp	4.61 / 22.68 / 27.7 / 0.0	80.19	V / 1.00 / 290	-13.81	n/a
913.868 MHz	80.75 Qp	4.61 / 22.68 / 27.7 / 0.0	80.34	H / 1.00 / 142	-13.66	n/a
1.828 GHz	30.43 Av	6.64 / 27.81 / 27.86 / 0.0	37.02	V / 1.00 / 312	n/a	-16.98
1.828 GHz	30.59 Av	6.64 / 27.81 / 27.86 / 0.0	37.18	H / 2.20 / 312	n/a	-16.82
Y EUT						
1.828 GHz	36.05 Pk	6.64 / 27.8 / 27.86 / 0.0	42.63	H / 2.20 / 312	n/a	n/a
1.827 GHz	25.36 Av	6.64 / 28.54 / 27.86 / 0.0	32.67	H / 1.00 / 71	n/a	-21.33
No other emissions detected above 1828MHz						
End scan 30MHz to 9.14GHz						

Tested by:                     KTHR

Printed

Signature

Reviewed by:                     TKS

Printed

Signature





# RADIATED EMISSIONS



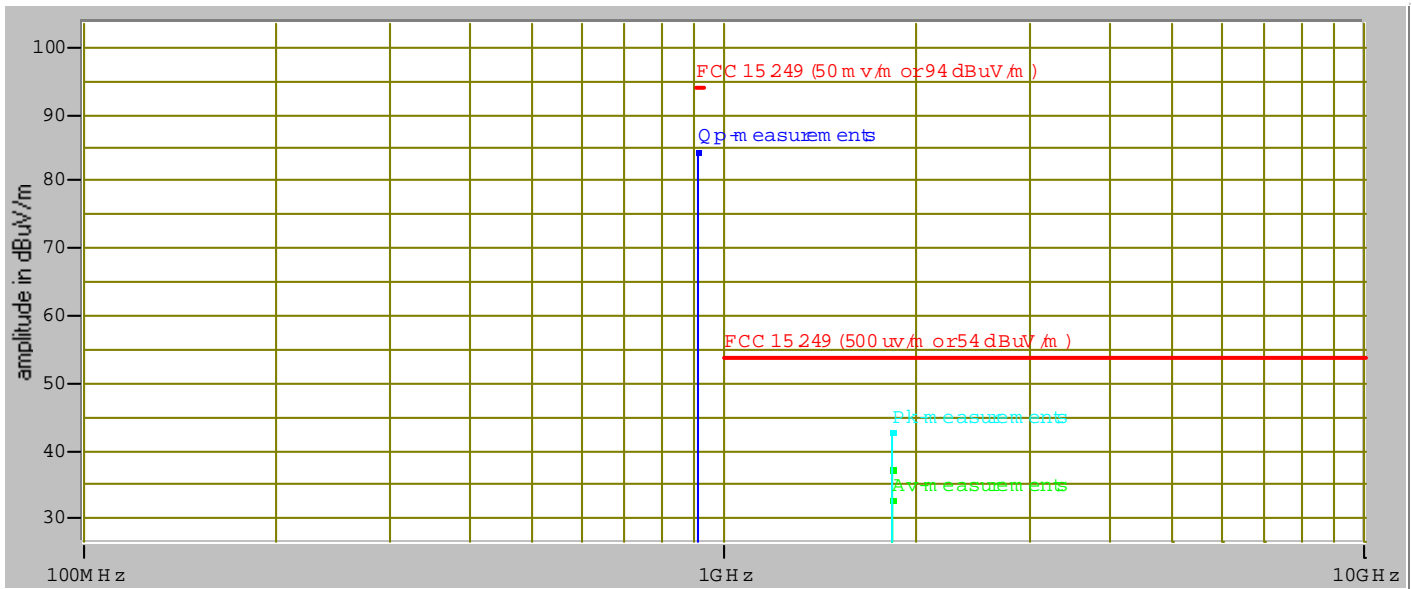
Test Report #: NC304698 Run 1 Test Area: STS  
EUT Model #: \_\_\_\_\_ Date: 10/14/03  
EUT Serial #: 397302 EUT Power: DC Temperature: 18.0 °C  
Test Method: FCC B Air Pressure: 97.0 kPa  
Customer: \_\_\_\_\_ Rel. Humidity: 39.0 %

EUT Description: \_\_\_\_\_

Notes: Receiver is on while in transmit mode.

Data File Name: 4698\_rev.dat Page: 3 of 3

## Graph:



Tested by: KTNR  
\_\_\_\_\_  
Printed

  
\_\_\_\_\_  
Signature

Reviewed by: TKS  
\_\_\_\_\_  
Printed

  
\_\_\_\_\_  
Signature

Band edge plot

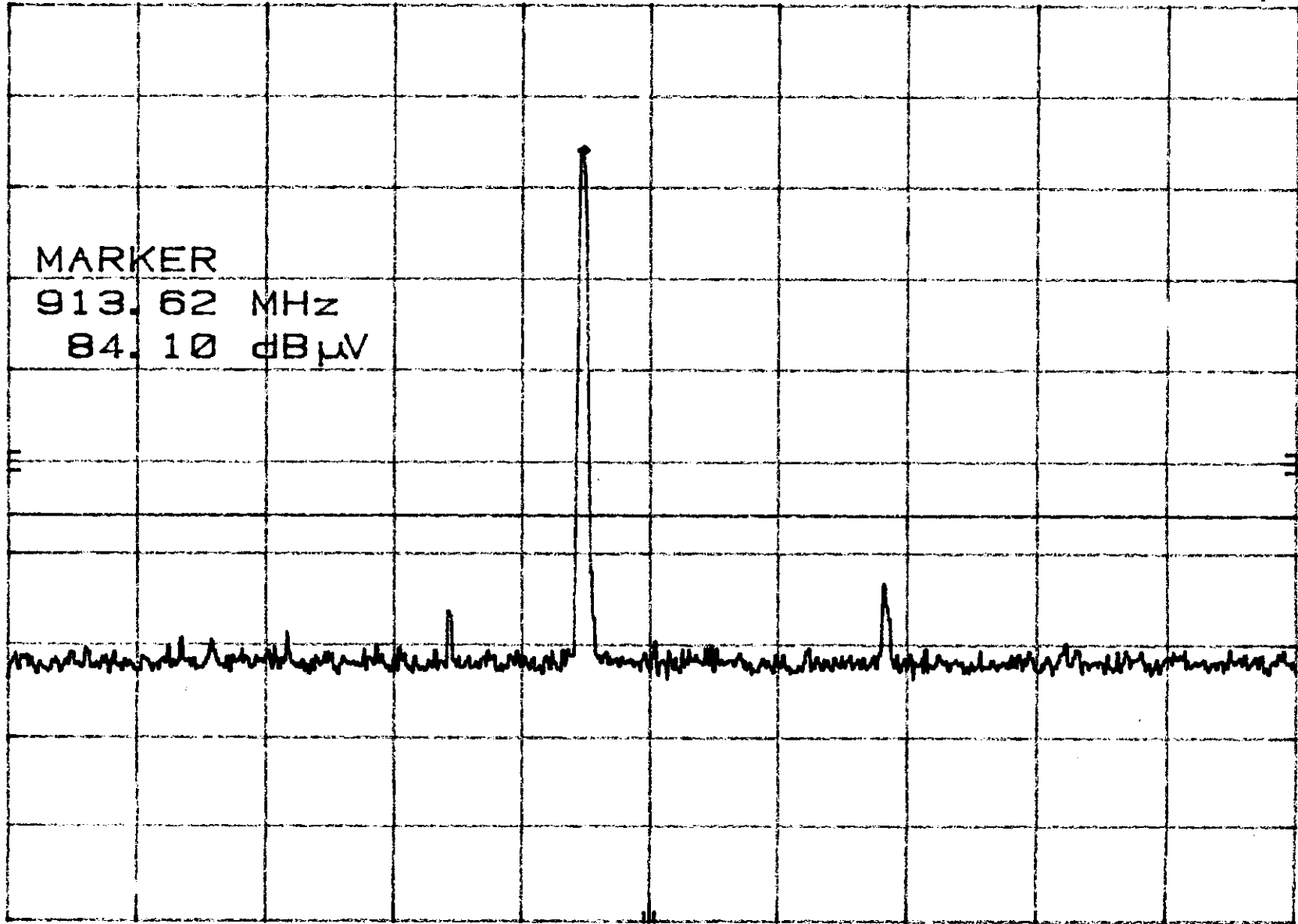
MKR 913.62 MHz  
84.10 dB $\mu$ V

REF 100.0 dB $\mu$ V ATTN 10 dB

10 dB/

DL  
44.1  
dB $\mu$ V

15.209 LIMIT



START 902.0 MHz

RES BW 100 kHz

VBW 300 kHz

STOP 928.0 MHz

SWP 20.0 msec

## Appendix B

Constructional Data Form



**EMC Test Plan and Constructional Data Form**

PLEASE COMPLETE THIS DOCUMENT IN FULL, ENTERING N/A IF THE FIELD IS NOT APPLICABLE.

**Applicant -- NOTE: This information will be input into your test report as shown below.**  
**Press the F1 key at any time to get HELP for the current field selected.**

Company: Guidant Corporation  
 Address: 4100 Hamline Ave. North  
St. Paul, MN 55112  
 Contact: Michael Stilley Position: Engineer  
 Phone: 651 582-2853 Fax: \_\_\_\_\_  
 E-mail Address: mstilley@hotmail.com

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

EUT Description implantable defibrillator  
 EUT Name Renewal RF  
 Model No.: 3 Serial No.: \_\_\_\_\_  
 Product Options: \_\_\_\_\_  
 Configurations to be tested: DDD

**Test Objective**

- |   |  |
|---|--|
| <input type="checkbox"/> EMC Directive 89/336/EEC (EMC)<br>Std: _____                           | <input type="checkbox"/> FCC: Class <input type="checkbox"/> A <input type="checkbox"/> B Part _____ |
| <input type="checkbox"/> Machinery Directive 89/392/EEC (EMC)<br>Std: _____                     | <input type="checkbox"/> VCCI: Class <input type="checkbox"/> A <input type="checkbox"/> B           |
| <input checked="" type="checkbox"/> Medical Device Directive 93/42/EEC (EMC)<br>Std: _____      | <input type="checkbox"/> BSMI: Class <input type="checkbox"/> A <input type="checkbox"/> B           |
| <input type="checkbox"/> Vehicle Directive 72/245/EEC (EMC)<br>Std: _____                       | <input type="checkbox"/> Canada: Class <input type="checkbox"/> A <input type="checkbox"/> B         |
| <input type="checkbox"/> FDA Reviewers Guidance for Premarket<br>Notification Submissions (EMC) | <input type="checkbox"/> Australia: Class <input type="checkbox"/> A <input type="checkbox"/> B      |
|   | <input type="checkbox"/> Other: _____  |

**TÜV Product Service Certification Requested**

- |  |   |
|--|---|
| <input type="checkbox"/> Attestation of Conformity (AoC) | <input checked="" type="checkbox"/> EMC Certification (used with Octagon Mark)                        |
| <input type="checkbox"/> Certificate of Conformity (CoC) | <input type="checkbox"/> Compliance Document  |
| Protection Class (N/A for vehicles)                      | <input type="checkbox"/> Class I <input type="checkbox"/> Class II <input type="checkbox"/> Class III |
- (Press F1 when field is selected to show additional information on Protection Class.)

**Attendance**

Test will be:  Attended by the customer  Unattended by the customer

**EMC Test Plan and Constructional Data Form**

**Failure - Complete this section if testing will not be attended by the customer.**

If a failure occurs, TÜV Product Service should:

- Call contact listed above, if not available then stop testing. (After hrs phone): \_\_\_\_\_
- Continue testing to complete test series.
- Continue testing to define corrective action.
- Stop testing.

**EUT Specifications and Requirements**

Length 78mm                      Width: 63mm                      Height: 14mm                      Weight: 83grams  
: \_\_\_\_\_

**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: \_\_\_\_\_ (If battery powered, make sure battery life is sufficient to complete testing.)

# of Phases: \_\_\_\_\_

Current (Amps/phase(max)): \_\_\_\_\_ Current (Amps/phase(nominal)): \_\_\_\_\_

Other   battery  

**Other Special Requirements**

**Typical Installation and/or Operating Environment**

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

**EUT Power Cable**

- Permanent    OR     Removable                      Length (in meters): \_\_\_\_\_
- Shielded        OR     Unshielded
- Not Applicable

**EMC Test Plan and Constructional Data Form**

EUT Interface Ports and Cables														
Type	Analog	Digital	During Test		Qty	Shielding		Termination	Connector Type	Port Termination	Length tested (in meters)	Removable	Permanent	
			Active	Passive		Yes	No							Type
<b>EXAMPLE:</b> RS232	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input 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"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/>	<input type="checkbox"/>

**EMC Test Plan and Constructional Data Form**

**EUT Software.**

Revision Level: 0.3

Description: firmware

**Equipment Under Test (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.

1. DDD
  
- 2.
  
- 3.

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

Description	Model #	Serial #	FCC ID #
Renewal RF 3	H215	930811	
Renewal RF 3	H215	930812	
Renewal RF 4	H239	927817	

**EMC Test Plan and Constructional Data Form**

**Support Equipment** -- List and describe all support equipment which is not part of the EUT. (i.e. peripherals, simulators, etc)  
This information is required for FCC & Taiwan testing.

<i>Description</i>	<i>Model #</i>	<i>Serial #</i>	<i>FCC ID #</i>

**Oscillator Frequencies**

<i>Frequency</i>	<i>Derived Frequency</i>	<i>Component # / Location</i>	<i>Description of Use</i>
100KHz			clock

**Power Supply**

<i>Manufacturer</i>	<i>Model #</i>	<i>Serial #</i>	<i>Type</i>
			<input type="checkbox"/> Switched-mode: (Frequency) _____ <input type="checkbox"/> Linear <input type="checkbox"/> Other: _____
			<input type="checkbox"/> Switched-mode: (Frequency) _____ <input type="checkbox"/> Linear <input type="checkbox"/> Other: _____

**Power Line Filters**

<i>Manufacturer</i>	<i>Model #</i>	<i>Location in EUT</i>



**EMC Test Plan and Constructional Data Form**

<b>Critical EMI Components (Capacitors, ferrites, etc.)</b>				
<i>Description</i>	<i>Manufacturer</i>	<i>Part # or Value</i>	<i>Qty</i>	<i>Component # / Location</i>

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

(PLEASE INSERT "ELECTRONIC SIGNATURE" BELOW IF POSSIBLE)

**Authorization Signatures**

\_\_\_\_\_  
Customer authorization to perform tests according to this test plan.

\_\_\_\_\_  
Date

\_\_\_\_\_  
Test Plan/CDF Prepared By (please print)

\_\_\_\_\_  
Date

## Appendix C

### MEASUREMENT PROTOCOL

#### GENERAL INFORMATION

##### Measurement Uncertainty

The test system for conducted emissions is defined as the LISN, tuned receiver or spectrum analyzer, and coaxial cable. The test system for radiated emissions is defined as the antenna, the pre-amplifier, the spectrum analyzer and the coaxial cable. These test systems have a measurement uncertainty of  $\pm 4.5$  dB. The equipment comprising the test systems are calibrated on an annual basis.

##### Justification

The Equipment Under Test (EUT) is configured in a typical user arrangement in accordance with the manufacturer's instructions. A cable is connected to each available port and either terminated with a peripheral into its characteristic impedance or left unterminated. When appropriate, the cables are manually manipulated with respect to each other to obtain maximum emissions from the unit.

#### CONDUCTED EMISSIONS

The final level, expressed in  $\text{dB}\mu\text{V}$ , is arrived at by taking the reading directly from the EMI receiver. This level is compared directly to the FCC limit.

To convert between  $\text{dB}\mu\text{V}$  and  $\mu\text{V}$ , the following conversions apply:

$$\text{dB}\mu\text{V} = 20(\log \mu\text{V})$$

$$\mu\text{V} = \text{Inverse log}(\text{dB}\mu\text{V}/20)$$

#### RADIATED EMISSIONS

The final level, expressed in  $\text{dB}\mu\text{V}/\text{m}$ , is arrived at by taking the reading from the spectrum analyzer (Level  $\text{dB}\mu\text{V}$ ) and adding the antenna correction factor and cable loss factor (Factor dB) to it, then subtracting the preamp gain. This result then has the FCC limit subtracted from it to provide the Delta which gives the tabular data as shown in the data sheets in Attachment A.

Example:

FREQ (MHz)	LEVEL ( $\text{dB}\mu\text{V}$ )	CABLE/ANT/PREAMP (dB)	FINAL ( $\text{dB}\mu\text{V}/\text{m}$ )	POL/HGT/AZ (m) (deg)	DELTA1 LIMIT
60.80	42.5Qp	+ 1.2 + 10.9 - 25.5 =	29.1	V 1.0 0.0 -	-10.9

## DETAILS OF TEST PROCEDURES

### General Standard Information

The test methods used comply with ANSI C63.4-1992 - "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz."

### Conducted Emissions

Conducted emissions on the 60 Hz power interface of the EUT are measured in the frequency range of 450 kHz to 30 MHz. The measurements are performed using a receiver, which has CISPR characteristic bandwidth and quasi-peak detection, and a Line Impedance Stabilization Network (LISN), with 50  $\Omega$ /50  $\mu$ H (CISPR 16) characteristics. Table top equipment is placed on a non-conducting table 80 centimeters above the floor and is positioned 40 centimeters from the vertical ground plane (wall) of the screen room. In some cases, a pre-scan using a spectrum analyzer is initially performed on the units comprising the system under test to locate the highest emissions. If the minimum passing margin appears to be less than 20 dB with a peak mode measurement, the emissions are re-measured using a tuned receiver or spectrum analyzer with quasi-peak and average detection and recorded on the data sheets.

### Radiated Emissions

Radiated emissions from the EUT are measured in the frequency range of 30 to 9140 MHz using a spectrum analyzer and appropriate broadband linearly polarized antennas. Measurements between 30 MHz and 1000 MHz are made with 120 kHz/6 dB bandwidth and quasi-peak detection and measurements above 1000 MHz are made with a 1 MHz/6 dB bandwidth and peak detection. Average detection measurements above 1 GHz are obtained by maintaining a 1 MHz resolution bandwidth but changing the video bandwidth to 10 Hz. Table top equipment is placed on a 1.0 X 1.5 meter non-conducting table 80 centimeters above the ground plane. Floor standing equipment is placed directly on the turntable/ground plane. Interface cables that are closer than 40 centimeters to the ground plane are bundled in the center in a serpentine fashion so they are at least 40 centimeters from the ground plane. Cables to simulators/testers (if used in this test) are routed through the center of the table and to a screen room located outside the test area. The antenna is positioned 3 meters horizontally from the EUT. To locate maximum emissions from the test sample the antenna is varied in height from 1 to 4 meters, measurement scans are made with both horizontal and vertical antenna polarizations and the EUT are rotated 360 degrees. Intentional radiators are rotated through three orthogonal axes to determine the attitude that maximizes the emissions.