

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	CONTAK RENEWAL® 3 RF
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.

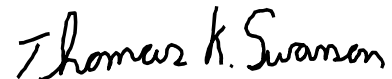
TÜV Product Service Inc, as an independent testing laboratory, declares that the equipment tested as specified above conforms to the requirements of FCC Part 15 Subpart C Section 15.249.

Date: 15 December 2003

Location: Taylors Falls MN
USA



G. S. Jakubowski
Test Technician



T. K. Swanson
Test Technician

EMC EMISSION - T E S T R E P O R T

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
■ -	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	Biconicallog 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:

- | | |
|---|----------------|
| <input type="checkbox"/> - _____ | Type : _____ |
| <input type="checkbox"/> - _____ | Type : _____ |
| <input type="checkbox"/> - _____ | Type : _____ |
| <input type="checkbox"/> - _____ | Type : _____ |
| <input type="checkbox"/> - _____ | Type : _____ |
| <input type="checkbox"/> - _____ | Type : _____ |
| <input type="checkbox"/> - _____ | Type : _____ |
| <input type="checkbox"/> - _____ | Type : _____ |
| <input type="checkbox"/> - _____ | Type : _____ |
| <input type="checkbox"/> - unshielded power cable | |
| <input type="checkbox"/> - unshielded cables | |
| <input type="checkbox"/> - shielded cables | MPS.No.: _____ |
| <input type="checkbox"/> - customer specific cables | |
| <input type="checkbox"/> - _____ | |
| <input type="checkbox"/> - _____ | |

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

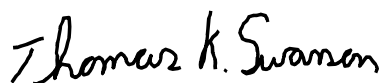
■ - fulfill the general approval requirements mentioned on page 3.

□ - **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 -



T. K. Swanson
Test Technician



Tested by:
G. S. Jakubowski

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



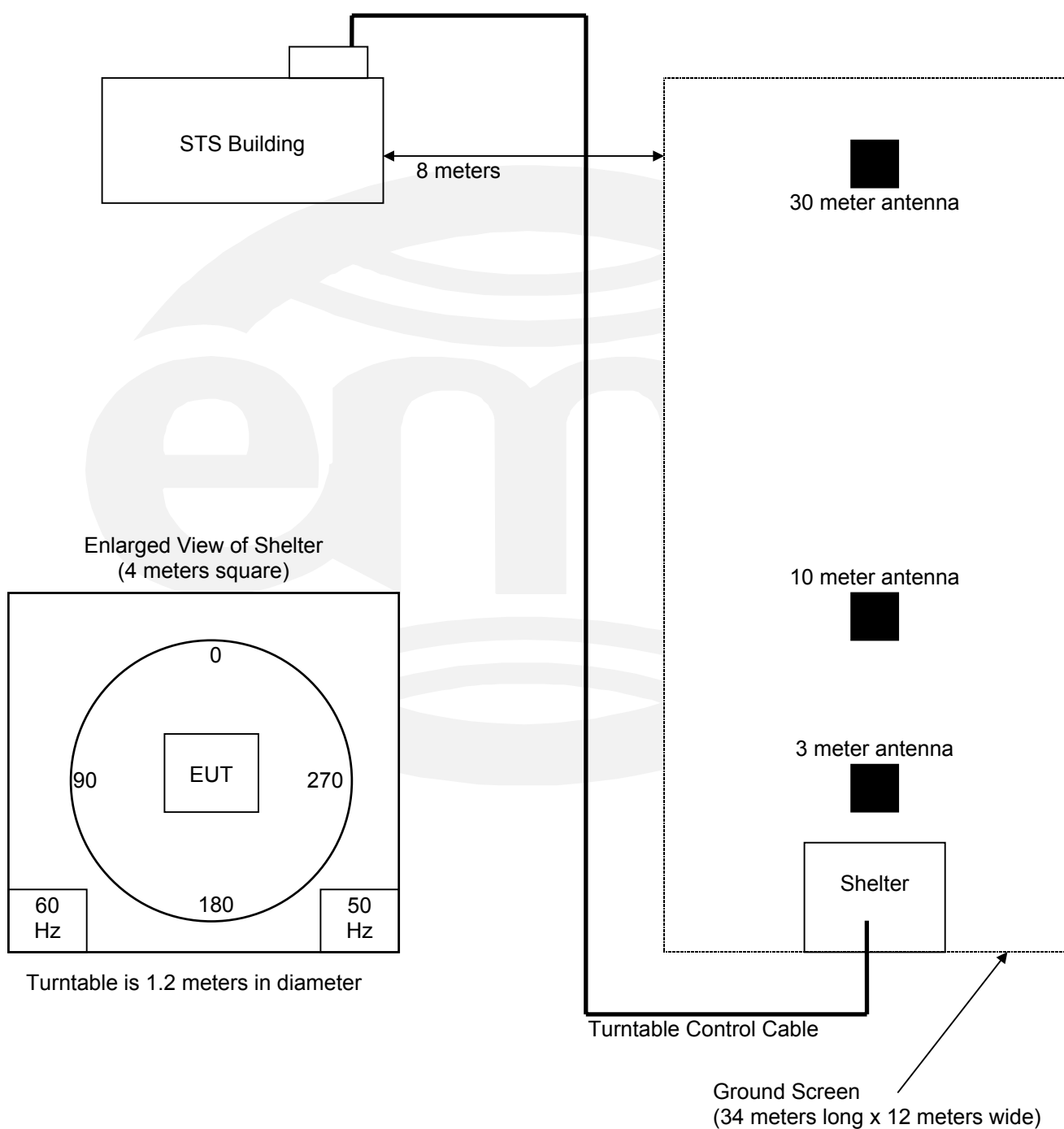
Appendix A

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: 2 of 3

Measurement summary for limit1: FCC 15.249 (50 mv/m or 94 dBuV/m) (Qp)

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)
913.868 MHz	84.7 Qp	4.61 / 22.68 / 27.7 / 0.0	84.29	V / 1.00 / 299	-9.71

Measurement summary for limit2: FCC 15.249 (500 uv/m or 54 dBuV/m) (Av)

FREQ	LEVEL (dBuV)	CABLE / ANT / PREAMP / ATTEN (dB)	FINAL (dBuV / m)	POL / HGT / AZ (m)(DEG)	DELTA2 FCC 15.249 (500 uv/m or 54 dBuV/m)
1.828 GHz	30.59 Av	6.64 / 27.81 / 27.86 / 0.0	37.18	H / 2.20 / 312	-16.82

Tested by: KTHR

Printed

Signature

Reviewed by: TKS

Printed

Signature

RADIATED EMISSIONS



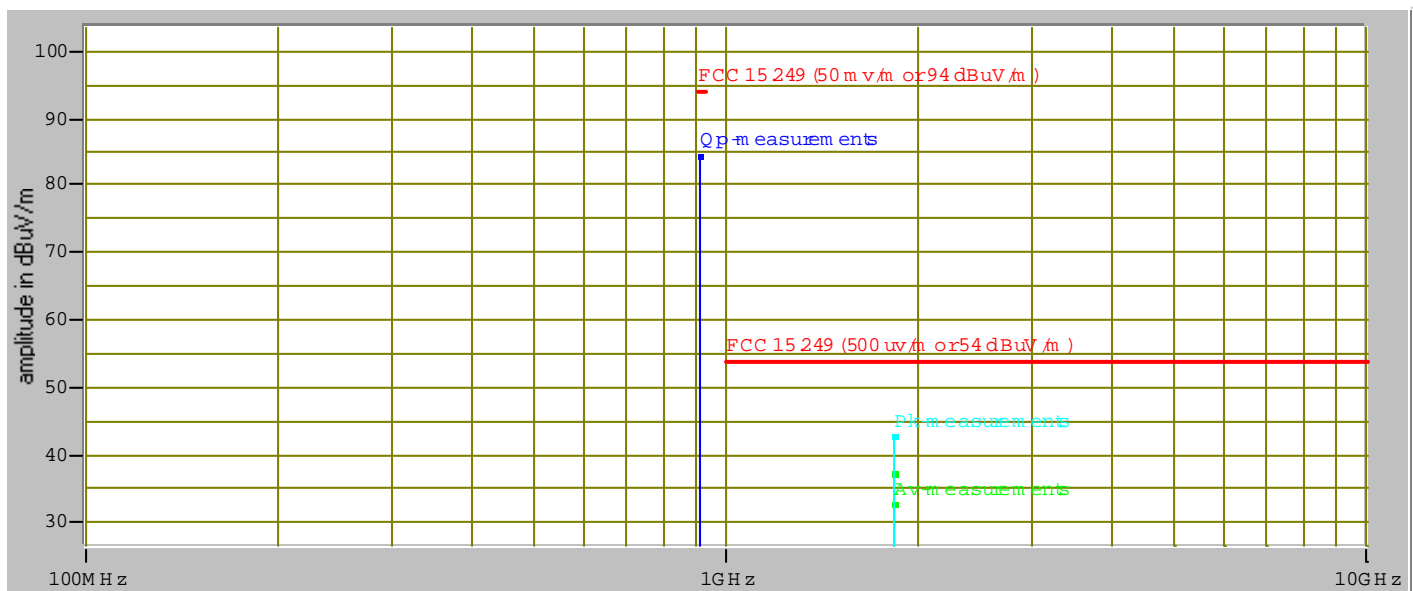
Test Report #: NC304698 Run 1 Test Area: STS
EUT Model #: _____ Date: 10/14/03
EUT Serial #: 397302 EUT Power: DC Temperature: 18.0 °C
Test Method: FCC B Air Pressure: 97.0 kPa
Customer: _____ Rel. Humidity: 39.0 %

EUT Description: _____

Notes: Receiver is on while in transmit mode.

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

Graph:



Tested by: KTHR

Printed

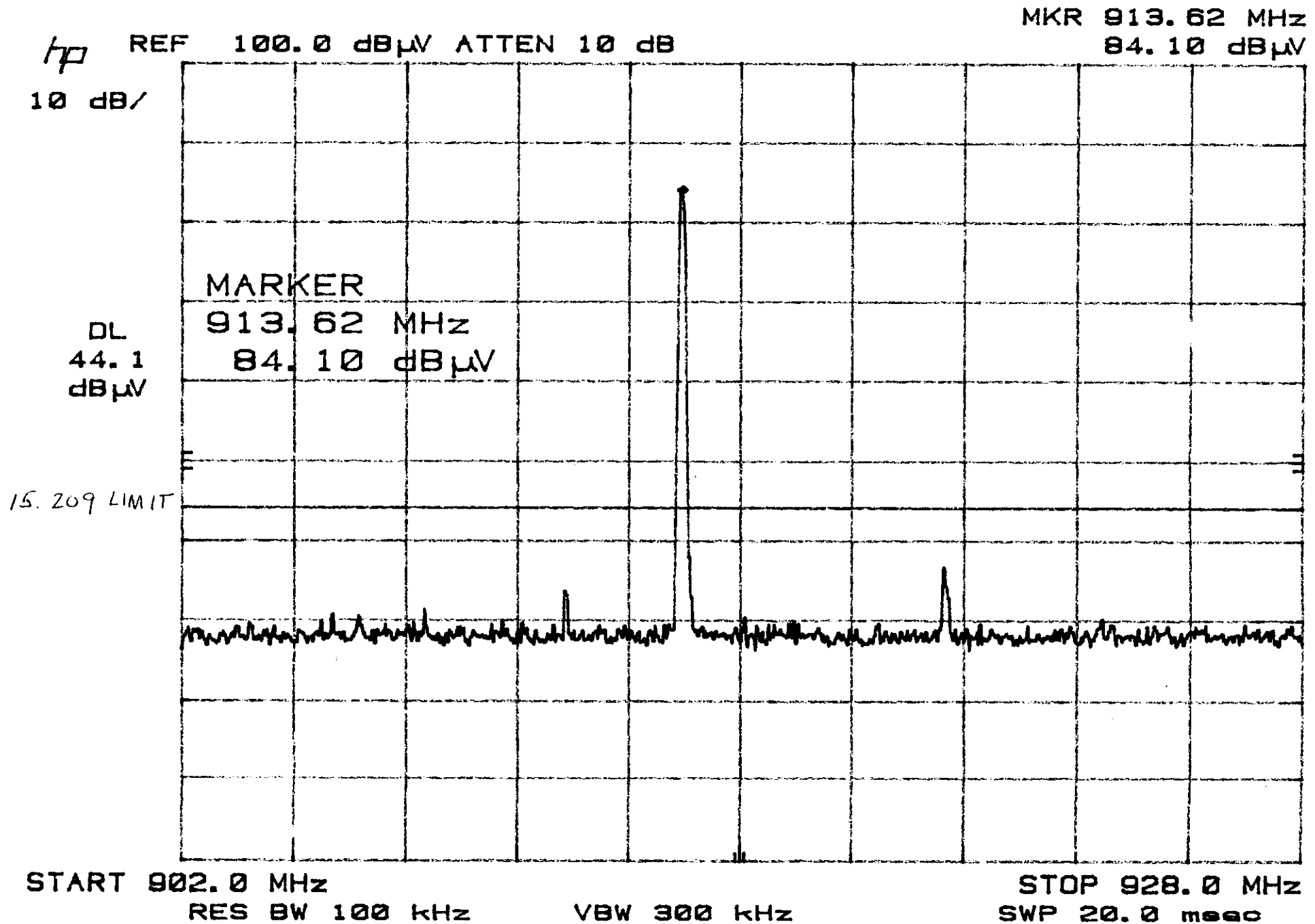
Signature

Reviewed by: TKS

Printed

Signature

Band edge plot



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)
Std: _____ | <input type="checkbox"/> FCC: Class <input type="checkbox"/> A <input type="checkbox"/> B Part _____ |
| <input type="checkbox"/> Machinery Directive 89/392/EEC (EMC)
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)
Std: _____ | <input type="checkbox"/> BSMI: Class <input type="checkbox"/> A <input type="checkbox"/> B |
| <input type="checkbox"/> Vehicle Directive 72/245/EEC (EMC)
Std: _____ | <input type="checkbox"/> Canada: Class <input type="checkbox"/> A <input type="checkbox"/> B |
| <input type="checkbox"/> FDA Reviewers Guidance for Premarket
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
EXAMPLE: 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"/>
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	<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	

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

Manufacturer	Model #	Serial #	Type
			<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: _____

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

Form



EMC Test Plan and Constructional Data Form

Critical EMI Components (Capacitors, ferrites, etc.)

<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 ± 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 it's 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 dB μ 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 dB μ V and μ 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 dB μ V/m, is arrived at by taking the reading from the spectrum analyzer (Level dB μ 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 (dB μ V)	CABLE/ANT/PREAMP				FINAL	POL/HGT/AZ			DELTA1
		(dB)	(dB/m)	(dB)	(dB)	(dB μ V/m)	(m)	(deg)		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 Ω /50 μ 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.