

TEST RESULT SUMMARY

FCC PART 15 Subpart C Section 15.249

MANUFACTURER'S NAME	Transoma Medical
NAME OF EQUIPMENT	LVP-1000
TYPE OF EQUIPMENT	ITD (T1201) Transmits Pressure Measurements to the Wand (R1201) at 916MHz
MODEL NUMBER	T1201
MANUFACTURER'S ADDRESS	4358 West Round Lake Rd. Arden Hills MN 55112
TEST REPORT NUMBER	WC405510
TEST DATE	01 December 2004

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: 14 January 2004



Location: Taylors Falls MN
USA

J. C. Sausen
Test Technician

T. K. Swanson
Test Technician

Not Transferable

EMC EMISSION - TEST REPORT

Test Report File No. : **WC405510** Date of issue: 14 January 2004

Model No. : **T1201**

Product Name : LVP-1000

Product Type : ITD (T1201) Transmits Pressure Measurements to the Wand (R1201) at 916MHz

Applicant : Transoma Medical

Manufacturer : Transoma Medical

License holder : Transoma Medical

Address : 4358 West Round Lake Rd.
: Arden Hills MN 55112

Test Result : ☒ **Positive** ☐ **Negative**

Test Project Number :
Reference(s) : **WC405510**

Total pages including
Appendices : **28**

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.

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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:

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

Environmental conditions in the lab:

	<u>Actual</u>
Temperature	: 21 °C
Relative Humidity	: 35 %
Atmospheric pressure	: 98.0 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) – NSA measurements made 8-04, due 8-06.
- ☐ - Wild River Lab Small Test Site (Open Area Test Site)
- ☐ - 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
■ -	3204	EM-6917B	Electro-Metrics	Biconicalog Periodic	102	21-Oct-05
■ -	3809	8566B	Hewlett-Packard	Spectrum Analyzer	3026A19165	20-Jan-05
■ -	3810	85662A	Hewlett-Packard	Analyzer Display	3014A06698	20-Jan-05
■	2682	85650A	Hewlett-Packard	Quasi-Peak Adapter	2811A01127	14-Aug-05
■ -	3962	ZHL-1042J	Mini-Circuits	Preamplifier	D120403-2	Code B 09-Feb-05

Cal Code B = Calibration verification performed internally.

Cal Code Y = Calibration not required when used with other calibrated equipment.

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 – 9.16 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
■ -	3809	8566B	Hewlett-Packard	Spectrum Analyzer	3026A19165	20-Jan-05
■ -	3810	85662A	Hewlett-Packard	Analyzer Display	3014A06698	20-Jan-05
■	2682	85650A	Hewlett-Packard	Quasi-Peak Adapter	2811A01127	14-Aug-05
■ -	3957	SL18B4020	Phase One Microwave	Preamplifier 1 – 18 GHz	0001	Code B 17-Oct-05
■ -	2075	3115	Electro-Mechanics (EMCO)	Ridge Guide Ant. 1-18 GHz	9001-3275	24-Nov-05

Cal Code B = Calibration verification performed internally. Cal Code Y = Calibration not required when used with other calibrated equipment.

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
- ☒ - ITD Transmitting PMT Data @916MHz.

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 : _____ |
| ☐ - _____ | 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 _____ 22 dB at _____ 916.4 MHz

Minimum margin of compliance for spurious _____ >10 dB at _____ MHz

Remarks: The fundamental was measured to be 71 dBuV/m (3548.1 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 – 9.16 GHz

The requirements are ☒ - MET ☐ - NOT MET

Minimum margin of compliance _____ 7 dB at _____ 1833.0 MHz

Maximum limit exceeding _____ dB at _____ MHz

Remarks: At 1833.0 MHz, average analyzer reading of 46.07 dBuV/m (201.1 uV/m), compared to an average limit of 54 dBuV/m (500 uV/m). The peak levels are less than 20 dB higher than the average levels.

DEVIATIONS FROM STANDARD:

None.

GENERAL REMARKS:

At the time of test, the EUT was identified as Model Number LVP-1000. Notification of a change in equipment identification to Model Number T1201 was received from the manufacturer and is on file with TÜV America.

The bandwidth of the fundamental is shown on page A7 demonstrating band edge compliance.

SUMMARY:

The requirements according to the technical regulations are

■ - met

□ - **not** met.

The device under test does

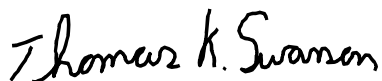
■ - fulfill the general approval requirements mentioned on page 3.

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

Testing Start Date: 01 December 2004

Testing End Date: 01 December 2004

- TÜV PRODUCT SERVICE INC -



T. K. Swanson
Test Technician



Tested by:
J. C. Sausen

Test-setup photo(s):
Radiated emission 30 MHz – 9.16 GHz



Test-setup photo(s):
Radiated emission 30 MHz – 9.16 GHz



Appendix A

Test Data Sheets
and
Test Setup Drawing(s)

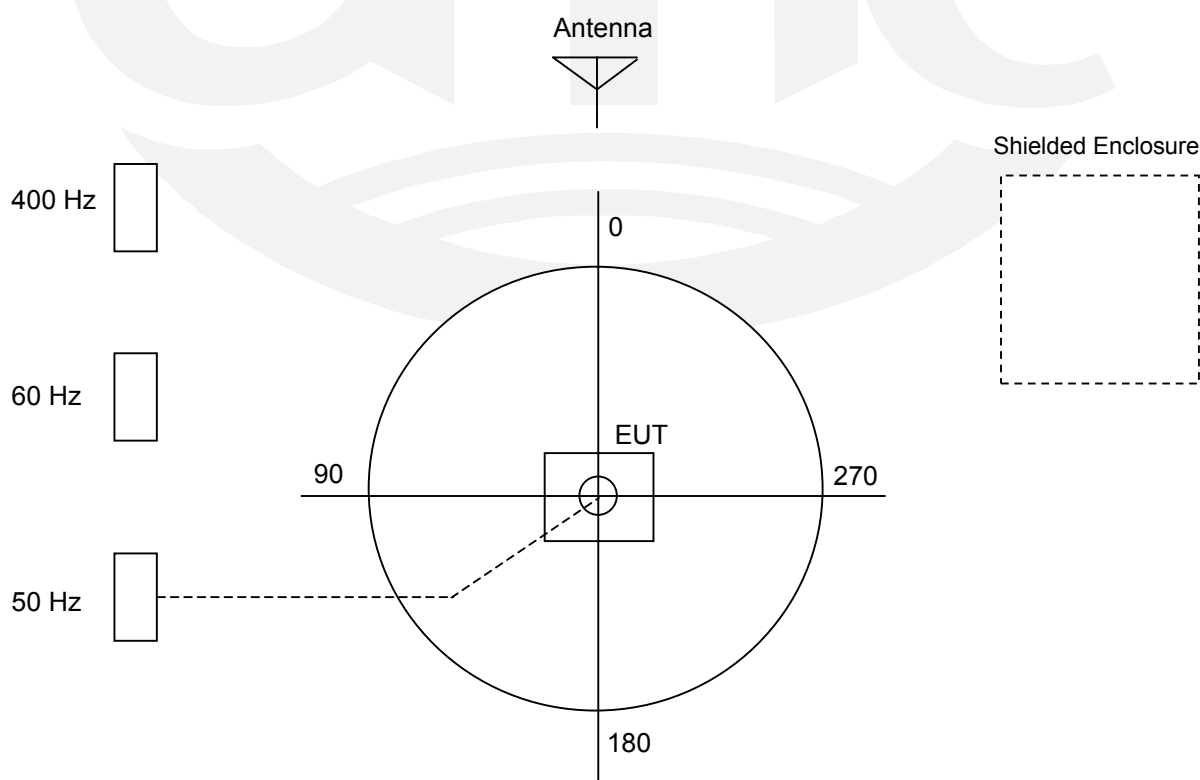


TEST SETUP FOR EMISSIONS TESTING

WILD RIVER LAB
Large Test Site

Notes:

1. Items shown in dotted lines are located on the floor below the test area. It is 5 meters vertically from the ground floor to the test area.
2. 50 Hz, 60 Hz, and 400 Hz are power panels for alternating current.
3. The antenna may be positioned horizontally 3, 10 or 30 meters from the center of the turntable.
4. The circle is a 6.7 meter diameter turntable.
5. A ground plane is in the plane of this sheet.
6. The test sample is shown in the azimuthal position representing zero degrees.



RADIATED EMISSIONS



Test Report #: WC405510 Run 1 Test Area: LTS
EUT Model #: LVP 1000 Date: 12/1/2004
EUT Serial #: 643 EUT Power: battery Temperature: 21.0 °C
Test Method: _____ Air Pressure: 98.0 kPa
Customer: Transoma Rel. Humidity: 35.0 %
EUT Description: Left Ventricular Pressure transmitter

Notes: _____

Data File Name: 5510.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 Fundamental	DELTA2 FCC 15.249 Harmonics
916.45 MHz maxed:						
916.456 MHz	72.94 Qp	2.62 / 22.54 / 26.7 / 0.0	71.4	V / 1.49 / 2	-22.6	n/a
916.456 MHz	71.22 Qp	2.62 / 22.54 / 26.7 / 0.0	69.68	H / 1.75 / 345	-24.32	n/a
1.833 GHz	40.45 Av	3.82 / 28.1 / 26.7 / 0.0	45.67	H / 1.00 / 0	n/a	-8.33
1.833 GHz	40.85 Av	3.82 / 28.1 / 26.7 / 0.0	46.07	V / 1.00 / 0	n/a	-7.93
Noise floor measurement:						
9.164 GHz	38.62 Av	9.33 / 37.62 / 44.39 / 0.0	41.18	V / 1.00 / 0	n/a	-12.82
9.164 GHz	38.59 Av	9.33 / 37.62 / 44.39 / 0.0	41.15	H / 1.00 / 0	n/a	-12.85
End of measurements for fundamental and harmonic emissions.						

Tested by: J. C. Sausen

Printed

Signature

Reviewed by: TKS

Printed

Signature

RADIATED EMISSIONS



Test Report #: WC405510 Run 1 Test Area: LTS
EUT Model #: LVP 1000 Date: 12/1/2004
EUT Serial #: 643 EUT Power: battery Temperature: 21.0 °C
Test Method: _____ Air Pressure: 98.0 kPa
Customer: Transoma Rel. Humidity: 35.0 %
EUT Description: Left Ventricular Pressure transmitter

Notes: _____

Data File Name: 5510.dat

Page: 2 of 3

Measurement summary for limit1: FCC 15.249 Fundamental (Qp)

FREQ	LEVEL (dBuV)	CABLE / ANT / PREAMP / ATTEN (dB)	FINAL (dBuV / m)	POL / HGT / AZ (m)(DEG)	DELTA1 FCC 15.249 Fundamental
916.456 MHz	72.94 Qp	2.62 / 22.54 / 26.7 / 0.0	71.4	V / 1.49 / 2	-22.6

Measurement summary for limit2: FCC 15.249 Harmonics (Av)

FREQ	LEVEL (dBuV)	CABLE / ANT / PREAMP / ATTEN (dB)	FINAL (dBuV / m)	POL / HGT / AZ (m)(DEG)	DELTA2 FCC 15.249 Harmonics
1.833 GHz	40.85 Av	3.82 / 28.1 / 26.7 / 0.0	46.07	V / 1.00 / 0	-7.93

Tested by: J. C. Sausen

Printed

Signature

Reviewed by: TKS

Printed

Signature

RADIATED EMISSIONS



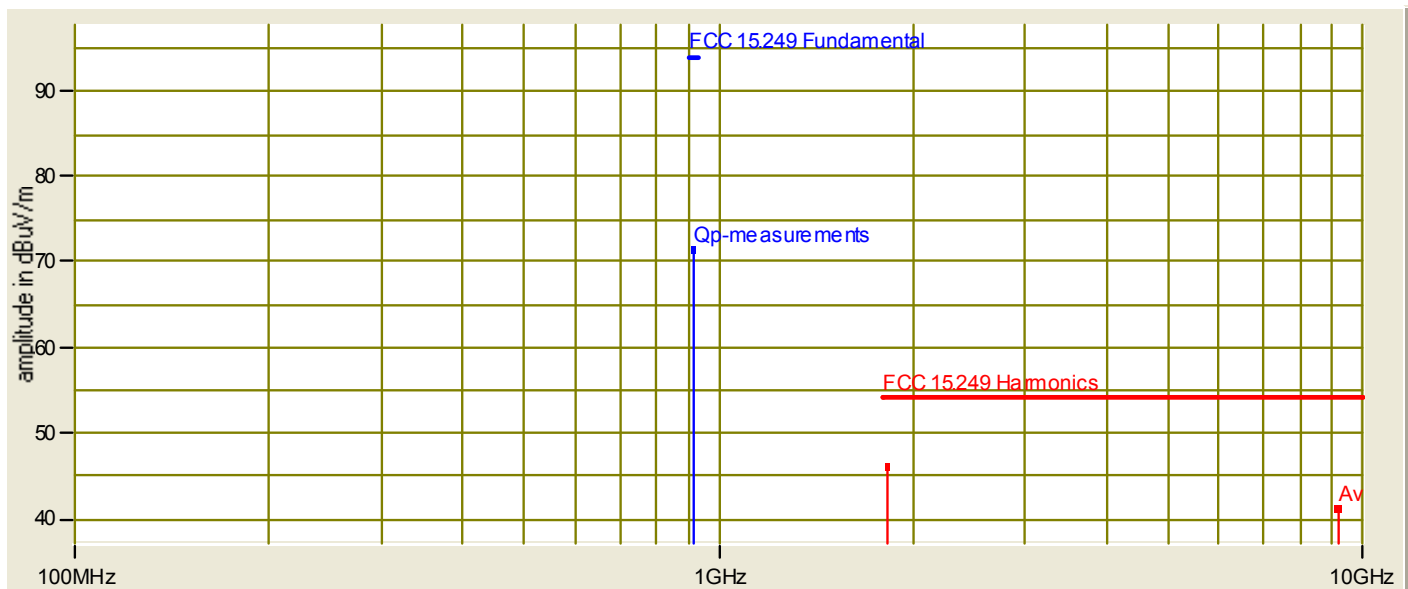
Test Report #: WC405510 Run 1 Test Area: LTS
EUT Model #: LVP 1000 Date: 12/1/2004
EUT Serial #: 643 EUT Power: battery Temperature: 21.0 °C
Test Method: _____ Air Pressure: 98.0 kPa
Customer: Transoma Rel. Humidity: 35.0 %
EUT Description: Left Ventricular Pressure transmitter

Notes: _____

Data File Name: 5510.dat

Page: 3 of 3

Graph:



Tested by: J. C. Sausen

Printed

Signature

Reviewed by: TKS

Printed

Signature

RADIATED EMISSIONS



Test Report #: WC405510 Run 2 Test Area: LTS
EUT Model #: LVP 1000 Date: 12/1/2004
EUT Serial #: 643 EUT Power: battery Temperature: 21.0 °C
Test Method: _____ Air Pressure: 98.0 kPa
Customer: Transoma Rel. Humidity: 35.0 %
EUT Description: Left Ventricular Pressure transmitter

Notes: _____

Data File Name: 5510.dat

Page: 1 of 1

List of measurements for run #: 2

FREQ	LEVEL (dBuV)	CABLE / ANT / PREAMP / ATTEN (dB)	FINAL (dBuV / m)	POL / HGT / AZ (m)(DEG)	DELTA1 FCC-B <1GHz 3m	DELTA2 FCC B >1GHz 3m
Spurious emissions:						
Noise floor:						
1.0 GHz	34.85 Av	2.74 / 24.97 / 38.61 / 0.0	23.96	V / 1.00 / 0	n/a	-30.04
5.0 GHz	38.51 Av	6.5 / 33.3 / 44.56 / 0.0	33.75	V / 1.00 / 0	n/a	-20.25
9.16 GHz	37.93 Av	9.33 / 37.61 / 44.39 / 0.0	40.49	V / 1.00 / 0	n/a	-13.51
30.0 MHz	27.7 Qp	0.42 / 20.3 / 25.9 / 0.0	22.52	V / 1.00 / 0	-17.48	n/a
60.6 MHz	27.95 Qp	0.6 / 11.4 / 25.9 / 0.0	14.05	V / 1.00 / 0	-25.95	n/a
120.0 MHz	27.2 Qp	0.9 / 9.07 / 25.96 / 0.0	11.21	V / 1.00 / 0	-32.29	n/a
240.0 MHz	26.2 Qp	1.3 / 11.32 / 26.3 / 0.0	12.52	V / 1.00 / 0	-33.48	n/a
480.0 MHz	25.95 Qp	1.88 / 16.83 / 27.02 / 0.0	17.64	V / 1.00 / 0	-28.36	n/a
960.0 MHz	25.75 Qp	2.68 / 22.61 / 26.51 / 0.0	24.53	V / 1.00 / 0	-21.47	n/a

No spurious emissions detected above noise floor, 30 MHz to 9.16 GHz, vert and hor ant.

Tested by: J. C. Sausen

Printed

Signature

Reviewed by: TKS

Printed

Signature

hp

REF 70.0 dB μ V ATTEN 10 dB

MKR 916.38 MHz
68.10 dB μ V

5 dB/

POS PK

MARKER

916.38 MHz

68.10 dB μ V

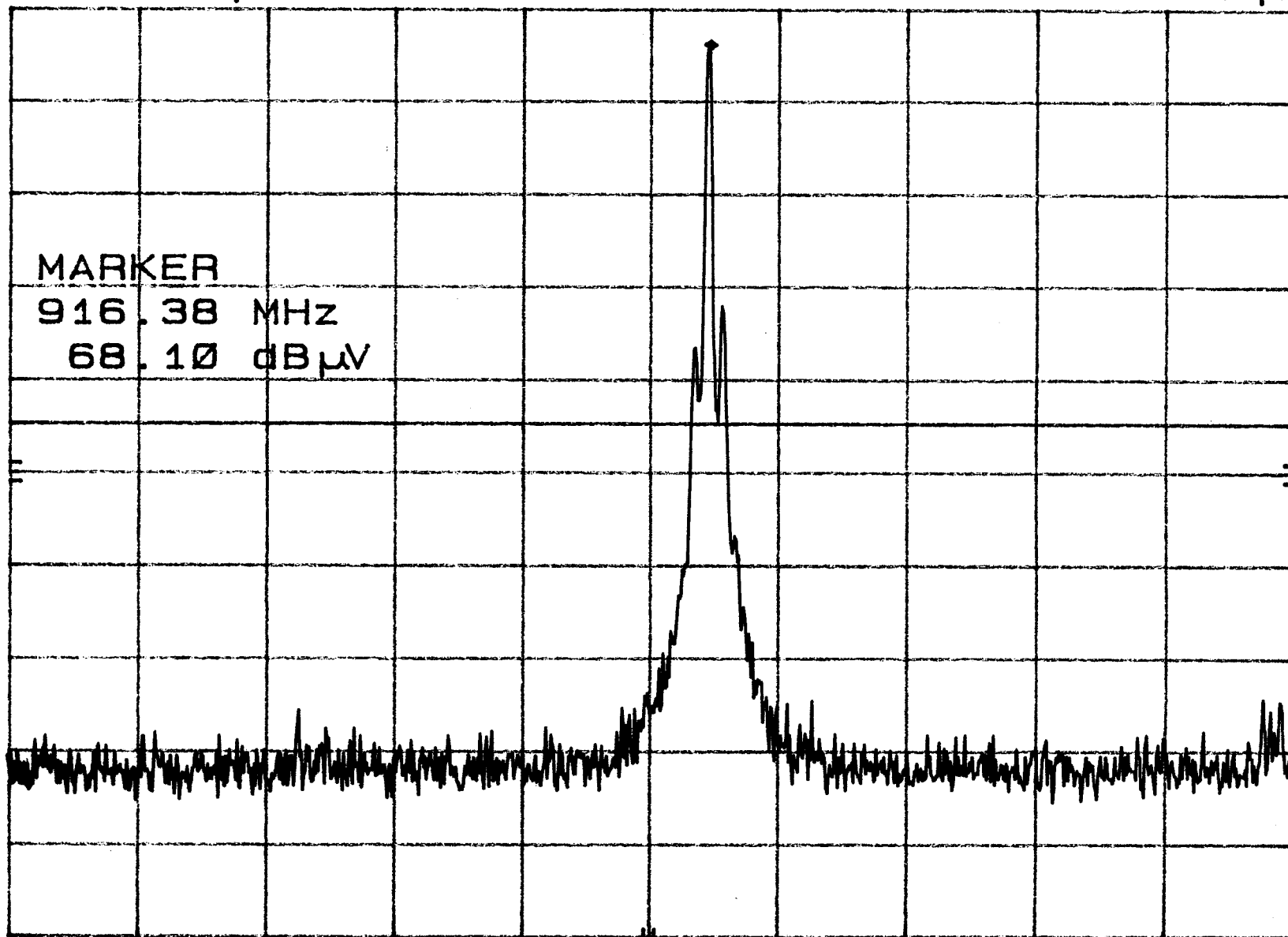
DL

47.6

dB μ V

15.209

Limit



START 900.0 MHz

OFFS-76 KHz

STOP 930.0 MHz

RES BW 100 KHz

VBW 1 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: Transoma Medical

Address: 4358 West Round Lake Rd.

Contact: Luke Strawn Position: Electrical Design Engineer

Phone: 651-481-7410 ext.2318 Fax: 651-481-7416

E-mail Address: lstrawn@transomamedical.com

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

EUT Description ITD Transmits Pressure Measurements to the Wand at 916MHz

EUT Name LVP-1000

Model No.: Remote Transceiver R1201 Serial No.: ITD # 643
ITD - T1201

Product Options: _____

Configurations to be tested: Transmitting HF

Test Objective

- | | |
|---|--|
| ☐ EMC Directive 89/336/EEC (EMC)
Std: _____ | ☒ FCC: Class ☐ A ☒ B Part _____ |
| ☐ Machinery Directive 89/392/EEC (EMC)
Std: _____ | ☐ VCCI: Class ☐ A ☐ B |
| ☐ Medical Device Directive 93/42/EEC (EMC)
Std: _____ | ☐ BSMI: Class ☐ A ☐ B |
| ☐ Vehicle Directive 72/245/EEC (EMC)
Std: _____ | ☐ Canada: Class ☐ A ☐ B |
| ☐ FDA Reviewers Guidance for Premarket
Notification Submissions (EMC) | ☐ Australia: Class ☐ A ☐ B |
| | ☐ Other: _____ |

TÜV Product Service Certification Requested

- | | |
|---|--|
| ☐ Attestation of Conformity (AoC) | ☐ EMC Certification (used with Octagon Mark) |
| ☒ Certificate of Conformity (CoC) | ☐ Compliance Document |
| Protection Class (N/A for vehicles) | ☐ Class I ☒ Class II ☐ Class III |
- (Press **F1** when field is selected to show additional information on Protection Class.)

EMC Test Plan and Constructional Data Form**Attendance**Test will be: ☒ Attended by the customer ☐ Unattended by the customer**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 ITD 2" Width: ITD 2" Height: ITD .5" Weight: ITD .25lbs
: _____

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: ITD 2.8 V (If battery powered, make sure battery life is sufficient to complete testing.)
Battery
Powered

of Phases: _____

Current Current
(Amps/phase(max)): ITD 1.6mA (Amps/phase(nominal)): ITD 25uA

Other _____

Other Special Requirements**Typical Installation and/or Operating Environment**

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

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	☐	☒	☒	☐	2	☒	☐	Foil over braid	Coaxial	Metallized 9-pin D-Sub	Characteristic Impedance	6	☒	☐
	☐	☐	☐	☐		☐	☐						☐	☐
	☐	☐	☐	☐		☐	☐						☐	☐
	☐	☐	☐	☐		☐	☐						☐	☐
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	☐	☐	☐	☐		☐	☐						☐	☐

EMC Test Plan and Constructional Data Form**EUT Software.**

Revision Level:

Description:

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. ITD Transmitting PMT Data @916MHz
- 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 #
ITD	T1201	643	

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.			
Description	Model #	Serial #	FCC ID #

<i>Frequency</i>	<i>Derived Frequency</i>	<i>Component # / Location</i>	<i>Description of Use</i>
32.768kHz		Crystal Located in ITD	Input to Microcontroller
2MHz		Located in ITD	Micro Clock

Manufacturer	Model #	Serial #	Type
			☐ Switched-mode: (Frequency) _____ ☐ Linear ☐ Other: _____
			☐ Switched-mode: (Frequency) _____ ☐ Linear ☐ Other: _____

Manufacturer	Model #	Location in EUT

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 ± 4.8 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 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 C63.4-2001 - "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 9160 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.