TEST RESULT SUMMARY

FCC Part 15 Subpart C Section 15.209
IC RSS-210 Issue 6
IC RSS-Gen Issue 1

MANUFACTURER'S NAME	Data Sciences International
NAME OF EQUIPMENT	Quad ET Small Animal 18 MHz transmitter Quad ET Large Animal 18 MHz transmitter
MODEL NUMBER(S) TESTED	TM-S2 TM-L2
MANUFACTURER'S ADDRESS	4358 West Round Lake Rd. Arden Hills, MN 55112
TEST REPORT NUMBER	WC605350.3
TEST DATE(S)	19 September 2006

According to testing performed at TÜV America Inc, the above mentioned unit is in compliance with the applicable electromagnetic compatibility (EMC) portions of the requirements defined in FCC Part 15 Subpart C Section 15.209 and Industry Canada RSS-210 Issue 6 and RSS-Gen Issue 1.

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 America Inc, as an independent testing laboratory, declares that the equipment tested as specified above conforms to the applicable EMC requirements of FCC Part 15 Subpart C Section 15.209 *"Radiated emission limits; general requirements"* and IC RSS-210 Issue 6 *"Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment"* and IC RSS-Gen *"General Requirements and Information for the Certification of Radiocommunication Equipment".*

Date: 26 October 2006

Location: Taylors Falls MN
USA

Michael Schultz
EMC Technician

Joel Schneider
Sr. EMC Engineer

Not Transferable

EMC TEST REPORT

Test Report File No.	:	**WC605350.3**	Date of issue:	26 October 2006

Model / Serial No(s) Tested	:	TM-S2 / 6 TM-L2 / 24
Product Type	:	Quad ET Small Animal 18 MHz transmitter Quad ET Large Animal 18 MHz transmitter
Applicant	:	Data Sciences International
Manufacturer	:	Data Sciences International
License holder	:	Data Sciences International
Address	:	4358 West Round Lake Rd. Arden Hills, MN 55112

Test Result	:	■ **Positive**	☐ **Negative**
Test Project Number References	:	**WC605350.3**	
Total pages including Appendices	:	**26**	

TÜV America 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 America Inc shall have no liability for any deductions, inferences or generalizations drawn by the client or others from TÜV America 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, NIST, or any agency of the US government.

TÜV America Inc and its professional staff hold government and professional organization certifications and are members of AAMI, ACIL, AEA, ANSI, IEEE, NARTE, and VCCI.

DIRECTORY

Sign Explanations:
☐ - not applicable
■ - applicable

EMC TEST REGULATIONS:

The tests were performed according to the following regulations :

☐ - EN 50081-1 / 1991
☐ - EN 55014-2: 1997 + Amendment A1: 2001 - Category __
☐ - EN 55024: 1998 + Amendments A1: 2001 + A2: 2003
☐ - EN 60601-1-2: 2001
☐ - EN 61000-6-1: 2001
☐ - EN 61000-6-2: 2001
☐ - EN 61326: 1997 + Amendments A1: 1998 + A2: 2001 + A3: 2003
☐ - EN 61800-3: 1996 + Amendment A11: 2000
☐ - ETS 300 683: 1997
☐ - ETS 300 683: 1997
☐ - ETSI EN 301 489-3 V1.4.1: 2002
☐ - EN 300 220-3 V1.1.1
☐ - EN 300 330-2 V1.1.1
☐ - FCC Part 15 Subpart C Section 15.249
■ - FCC Part 15 Subpart C Section 15.209
■ - IC RSS-210 Issue 6
■ - IC RSS-Gen Issue 1
☐ - IC RSS-Gen Issue 1

ENVIRONMENTAL CONDITIONS IN THE LAB

	Actual
Temperature:	: 19 °C
Atmospheric pressure	: 98 kPa
Relative Humidity	: 40 %

POWER SUPPLY UTILIZED

Power supply system : 3.6 VDC Battery

General field strength limits 0.009 – 30 MHz
FCC 15.209(a), FCC 15.209(c), IC RSS-210 2.6

Test summary
The requirements are: ■ - MET ☐ - NOT MET
Minimum margin of compliance of the fundamental is 50.5 dB at 18 MHz
No unwanted emissions exceed the level of the fundamental

Test location
☐ - Wild River Lab Large Test Site (Open Area Test Site)
■ - Wild River Lab Small Test Site (Open Area Test Site)

Test distance
■ - 0.3 meters
■ - 1.0 meters
☐- 3 meters

Test equipment

TUV ID	Model Number	Manufacturer	Description	Serial Number	Cal Due
3800	ESCS 30	Rohde & Schwarz	EMI Receiver	100312	07-Jul 07
2517	HFH2-Z2	Polorad	Loop Antenna	879285/036	30-May-07

Test limit

Frequency (MHz)	Field strength μV/m	Measurement distance (m)
0.009-0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30	30	30

At the 18 MHz fundamental, the limit is 29.5 dBμV/m at 30 meters

Test data
Quasi peak (dBμV/m)

Quad ET Small Animal 18 MHz transmitter

(MHz)	0.3 m	1.0 m	3.0 m	10.0m	30 m*
18	53	33	nf	-	-27*

Quad ET Large Animal 18 MHz transmitter

(MHz)	0.3 m	1.0 m	3.0 m	10.0m	30 m*
18	59	36	nf	-	-21*

* Extrapolated values using 40 dB per decade roll off
nf Noise floor

Radiated Emissions 30 - 1000 MHz
FCC 15.209(c), FCC 15.209(f), IC RSS-210 2.6

Test summary
The requirements are: ■ - MET ☐ - NOT MET
Minimum margin of compliance is >10dB below the limit from 30 – 1000 MHz
No emissions were detected from 30 – 1000 MHz
No unwanted emissions exceed the level of the fundamental

Test location
☐ - Wild River Lab Large Test Site (Open Area Test Site)
■ - Wild River Lab Small Test Site (Open Area Test Site)

Test distance
■ - 3 meters
☐ - 10 meters

Test Equipment

TUV ID	Model Number	Manufacturer	Description	Serial Number	Cal Due
3995	EM-6917B	Electro-Metrics	Biconicalog Periodic	151	31-Mar-07
2679	85650A	Hewlett-Packard	Quasi-Peak Adapter	2430A00550	23-Nov-06
8052	8566B	Hewlett-Packard	Spectrum Analyzer	2115A00853	28-Mar-07
8051	85662A	Hewlett-Packard	Analyzer Display	2112A02220	28-Mar-07
2665	ZHL-1042J	Mini-Circuits	Preamplifier 30 - 5000 MHz	32296	Code B

Cal Code B = Calibration verification performed internally.

Test limits

Frequncy (MHz)	Field strength (μV/m)	Field strength (dBμV/m)	Measurement distance (m)
30-88	100	40	3
88-216	150	43.5	3
216-960	200	46	3
Above 960	500	54	3

Test data
Pages 6 - 8

RADIATED EMISSIONS

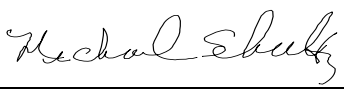
Test Report #:	WC605350 Run 2	Test Area:	STS		
EUT Model #:	QUAD ET 18 MHz Transmitters	Date:	9/19/2006		
EUT Serial #:	24 (large animal), 6 (small)	EUT Power:	3.6 V battery	Temperature:	19.0 °C
Test Method:	FCC B			Air Pressure:	98.0 kPa
Customer:	Transoma Medical			Rel. Humidity:	40.0 %
EUT Description:	(24 - Large Animal) (6 - Small Animal)				
Notes:	Testing 18 MHz				
Data File Name:	5350.dat			Page:	1 of 3

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
Checking S/N 24 Large Animal (18 MHz)						
Noise Floor						
40.0 MHz	30.7 Qp	1.02 / 16.13 / 28.37 / 0.0	19.48	V / 1.00 / 0	-20.52	n/a
No emissions detected 30-1000 MHz, 1-4 meters V/H, 360 degrees						
Checking S/N 6 Small Animal (18 MHz)						
Noise Floor						
40.0 MHz	30.8 Qp	1.02 / 16.13 / 28.37 / 0.0	19.58	V / 1.00 / 0	-20.42	n/a
No emissions detected 30-1000 MHz, 1-4 meters V/H, 360 degrees						

Tested by: Michael Schultz

Printed



Signature

Reviewed by: Greg Jakubowski

Printed

Signature

RADIATED EMISSIONS

Test Report #:	WC605350 Run 2	Test Area:	STS			
EUT Model #:	QUAD ET 18 MHz Transmitters	Date:	9/19/2006			
EUT Serial #:	24 (large animal), 6 (small)	EUT Power:	3.6 V battery	Temperature:	19.0	°C
Test Method:	FCC B			Air Pressure:	98.0	kPa
Customer:	Transoma Medical			Rel. Humidity:	40.0	%
EUT Description:	(24 - Large Animal) (6 - Small Animal)					
Notes:	Testing 18 MHz					
Data File Name:	5350.dat			Page:	2 of 3	

Measurement summary for limit1: FCC-B <1GHz 3m (Qp)

FREQ	LEVEL (dBuV)	CABLE / ANT / PREAMP / ATTEN (dB)	FINAL (dBuV / m)	POL / HGT / AZ (m)(DEG)	DELTA1 FCC-B <1GHz 3m
40.0 MHz	30.8 Qp	1.02 / 16.13 / 28.37 / 0.0	19.58	V / 1.00 / 0	-20.42

Tested by: Michael Schultz

Printed | Signature

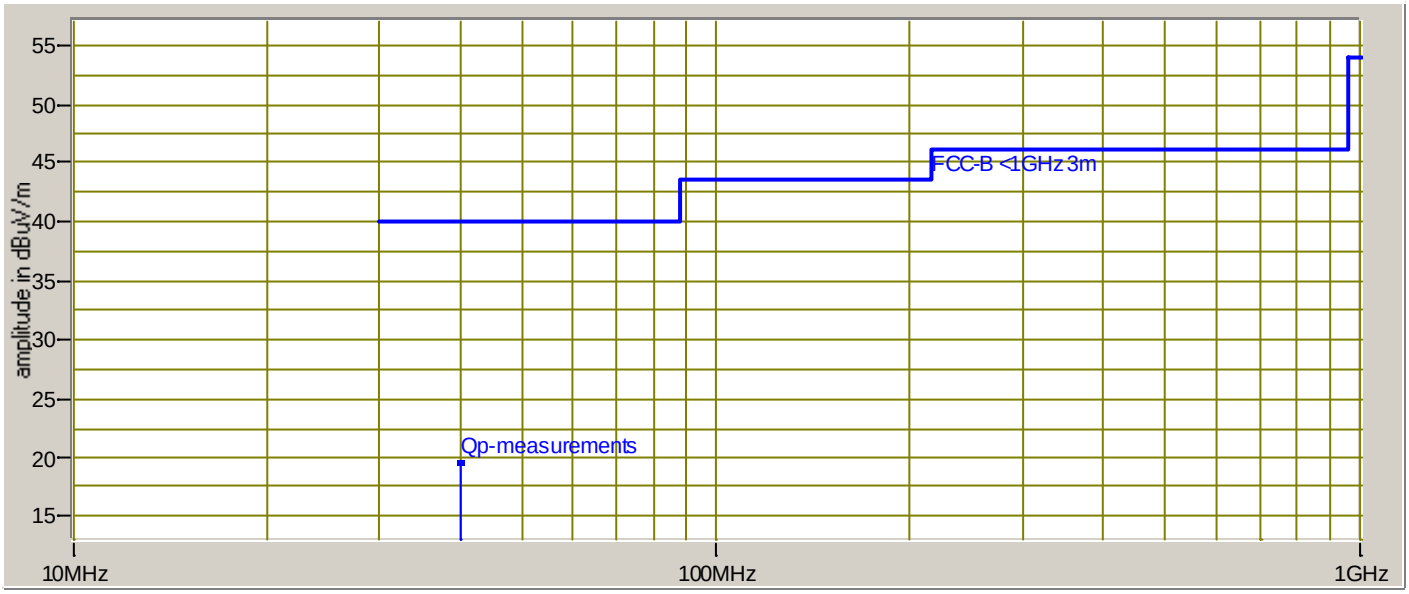
Reviewed by: Greg Jakubowski

Printed | Signature

RADIATED EMISSIONS

Test Report #:	WC605350 Run 2	Test Area:	STS		
EUT Model #:	QUAD ET 18 MHz Transmitters	Date:	9/19/2006		
EUT Serial #:	24 (large animal), 6 (small)	EUT Power:	3.6 V battery	Temperature:	19.0 °C
Test Method:	FCC B			Air Pressure:	98.0 kPa
Customer:	Transoma Medical			Rel. Humidity:	40.0 %
EUT Description:	(24 - Large Animal) (6 - Small Animal)				
Notes:	Testing 18 MHz				
Data File Name:	5350.dat			Page:	3 of 3

Graph:



Tested by: Michael Schultz

Printed | Signature

Reviewed by: Greg Jakubowski

Printed | Signature

Occupied bandwidth
RSS-Gen 4.4.1

Test summary
The requirements are: ■ - MET ☐ - NOT MET
Maximum occupied bandwidth = 527 kHz

Test location
☐ - Wild River Lab Large Test Site (Open Area Test Site)
■ - Wild River Lab Small Test Site (Open Area Test Site)

Test equipment

TUV ID	Model Number	Manufacturer	Description	Serial Number	Cal Due
3367	E4440A	Agilent	Spectrum Analyzer	MY42510439	14 Sep 07
	7405-901	EMCO	Near field probe	na	Code Y

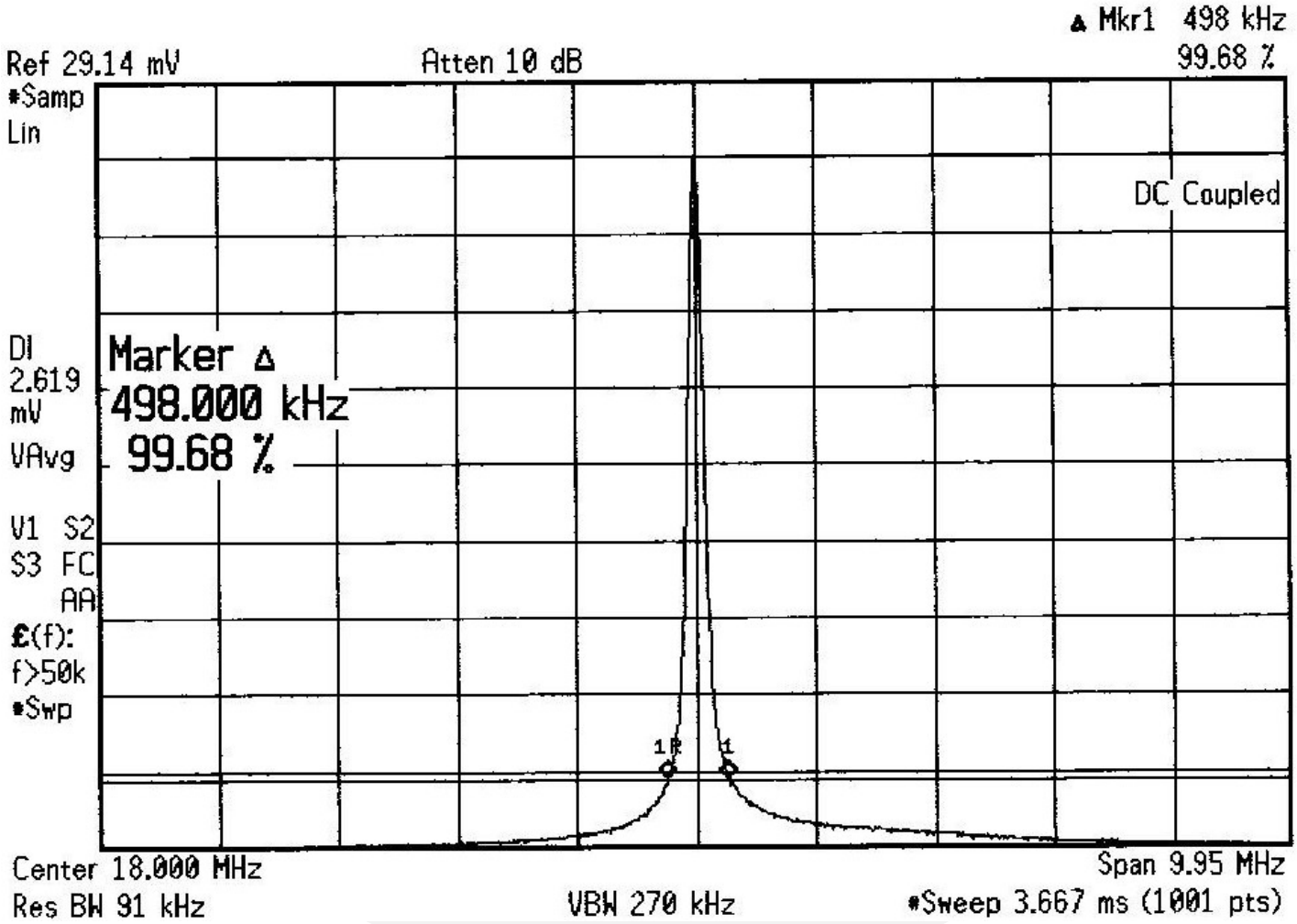
Cal Code B = Calibration verification performed internally. Cal Code Y = Calibration not required when used with other calibrated equipment.

Test limit
No limit specified

Test data
Pages 10 - 11

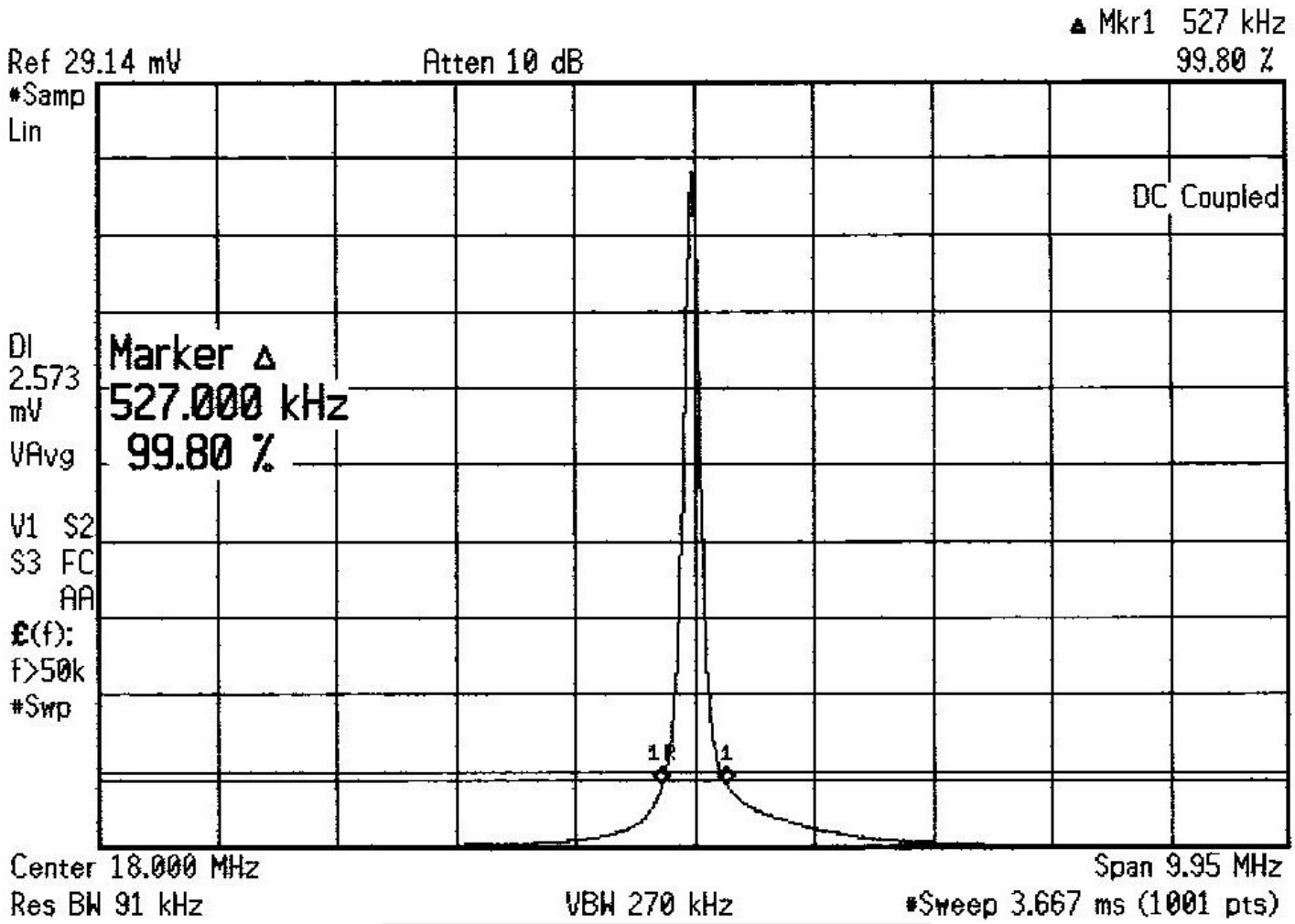
Occupied Bandwidth

Quad ET Small Animal 18 MHz transmitter



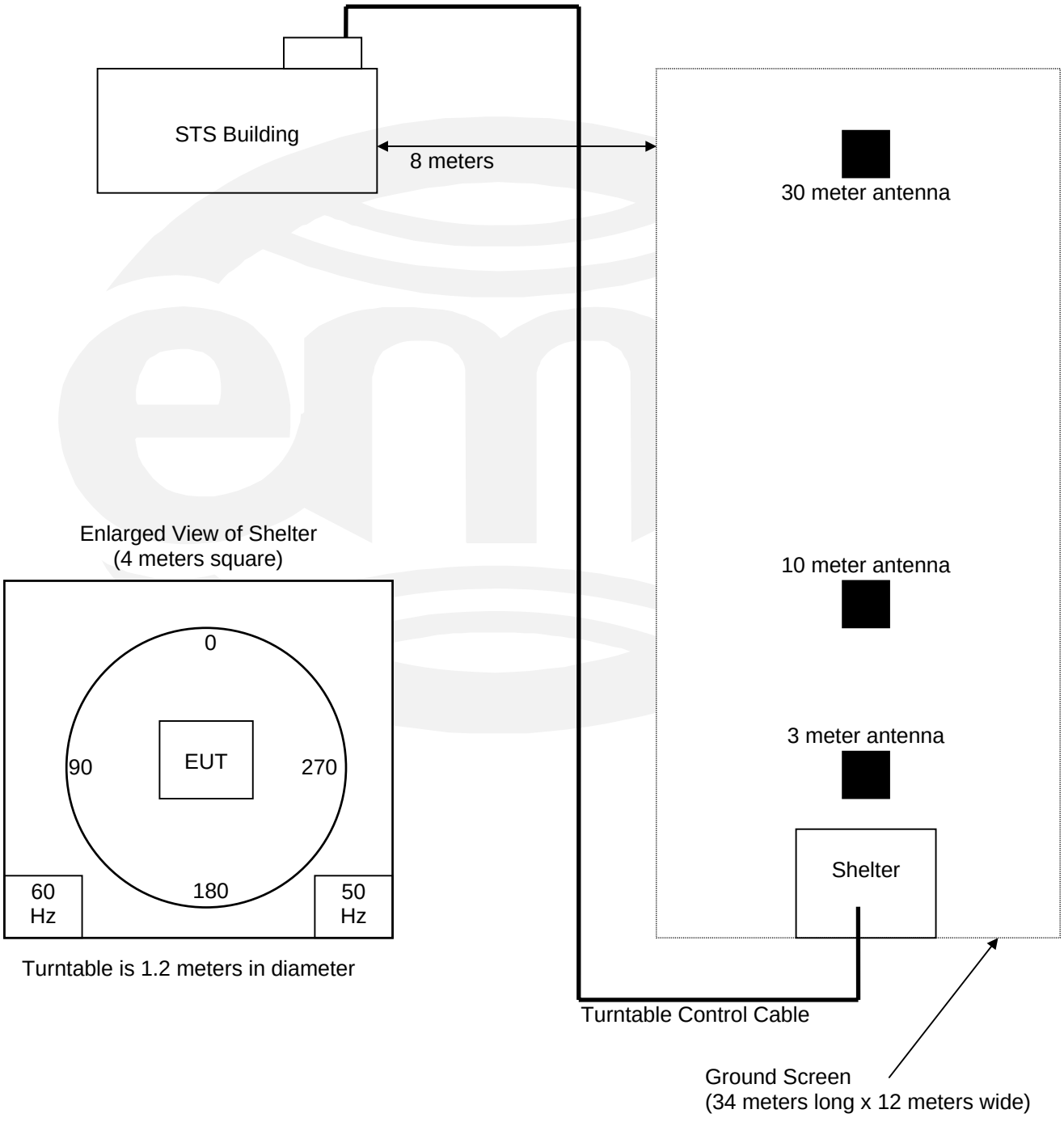
Occupied Bandwidth

Quad ET Large Animal 18 MHz transmitter



TEST SETUP FOR EMISSIONS TESTING

WILD RIVER LAB
Small Test Site (STS)



Equipment Under Test (EUT) Test Operation Mode:

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

☐ - Standby

☐ - Test program (H - Pattern)

☐ - Test program (color bar)

☐ - Test program (customer specific)

☐ - Practice operation

■ - Normal operating mode

Configuration of the device under test:

■ - See Appendix A and test setup photo

☐ - See Product Information Form(s) in Appendix B

DEVIATIONS FROM STANDARD:

None.

GENERAL REMARKS:

Modifications required to pass:

■ None

☐ As indicated on the data sheet(s)

Test Specification Deviations: Additions to or Exclusions from:

■ None

☐ As indicated in the Test Plan

SUMMARY:

The requirements according to the technical regulations are

■ - met and the device under test does fulfill the general approval requirements.

☐ - **not** met and the device under test does **not** fulfill the general approval requirements..

EUT Received Date:	19 September 2006
Condition of EUT:	Normal
Testing Start Date:	19 September 2006
Testing End Date:	19 September 2006

TÜV AMERICA INC

Michael Schultz
EMC Technician

Joel Schneider
Sr. EMC Engineer

Appendix A

Constructional Data Form

and

Block Diagram

Form

EMC Test Plan and Constructional Data Form

PLEASE COMPLETE THIS DOCUMENT IN FULL, ENTERING N/A IF THE FIELD IS NOT APPLICABLE. IF TESTING RESULTS IN MODIFICATIONS TO THE EQUIPMENT, PLEASE SUBMIT A REVISED TP/CDF INDICATING THOSE MODIFICATIONS.
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:	Data Sciences Internstionsl		
Address:	4358 West Round Lake Rd.		
	Arden Hills, MN 55112		
Contact:	Tom Bredemus	Position:	Senior Designer
Phone:	651-481-7410 x2335	Fax:	651-481-7416
E-mail Address:	tbredemus@transomamedical.com		

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

EUT Description	Transmitter The battery powered transmitter when enabled transmits telemetry data at 18 MHz
EUT Name	Quad ET Small Animal 18 MHz transmitter; Quad ET Large Animal 18 MHz transmitter
Model No.:	TM-S2 TM-L2
Serial No.:	6 24
Product Options:	
Configurations to be tested:	Small animal and large animal 18 MHz transmitters. A 4NET sensor module will be attached to the Telemetry Module providing for highest data rate conditions.

Equipment Modification (*If applicable, indicate modifications since EUT was last tested. If modifications are made during this testing, submit revised TP/CDF after testing is complete.)*

Modifications since last test:

Modifications made during test:

Test Objective(s): ***Please indicate the tests to be performed, entering the applicable standard(s) where noted.***

- ☐ EMC Directive 89/336/EEC (EMC) Std:
- ☐ Machinery Directive 89/392/EEC (EMC Std:
- ☐ Medical Device Directive 93/42/EEC (EMC) Std:
- ☐ Vehicle Directive 72/245/EEC (EMC) Std:
- ☐ FDA Reviewers Guidance for Premarket Notification Submissions (EMC)

- ☒ FCC: Class ☐ A ☒ B Part 15
- ☐ VCCI: Class ☐ A ☐ B
- ☐ BSMI: Class ☐ A ☐ B
- ☒ Canada: Class ☐ A ☐ B
- ☐ Australia: Class ☐ A ☐ B
- ☐ Other:

EMC Test Plan and Constructional Data Form

Third Party Certification, if applicable (*Signature on Page 6 Required)

- ☐ Attestation of Conformity (AoC)*
- ☐ Certificate of Conformity (CoC)*
- ☐ EMC Certification (used with Octagon Mark)*
- ☒ 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.)

- ☐ FCC / TCB Certification
- ☐ E-Mark Certification
- ☐ Industry Canada / FCB Certification
- ☐ Taiwan Certification

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 America 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: _____ Width: _____ Height: _____ Weight: _____

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: 3.6V (If battery powered, make sure battery life is sufficient to complete testing.)

# of Phases: _____

Current (Amps/phase(max)): _____ Current (Amps/phase(nominal)): _____

Other _____

Other Special Requirements

Typical Installation and/or Operating Environment

(ie. Hospital, Small Business, Industrial/Factory, etc.)
Research lab, universty labs

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			During Test		Qty	Shielding			Termination	Connector Type	Port Termination	Length tested (in meters)	Removable	Permanent
	Analog	Digital	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.

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 #
Quad ET Small Animal 18 MHz TX	TM-S2	6	
Quad ET Large Animal 18 MHz TX	TM-L2	24	

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.

Description	*Model #*	*Serial #*	*FCC ID #*
DSI Quad ET Sensor Module	4NET	008	

Oscillator Frequencies

Frequency	*Derived Frequency*	*Component # / Location*	*Description of Use*

Power Supply

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

Power Line Filters

Manufacturer	*Model #*	*Location in EUT*

EMC Test Plan and Constructional Data Form

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

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

(PLEASE INSERT "**ELECTRONIC SIGNATURE**" BELOW IF POSSIBLE)

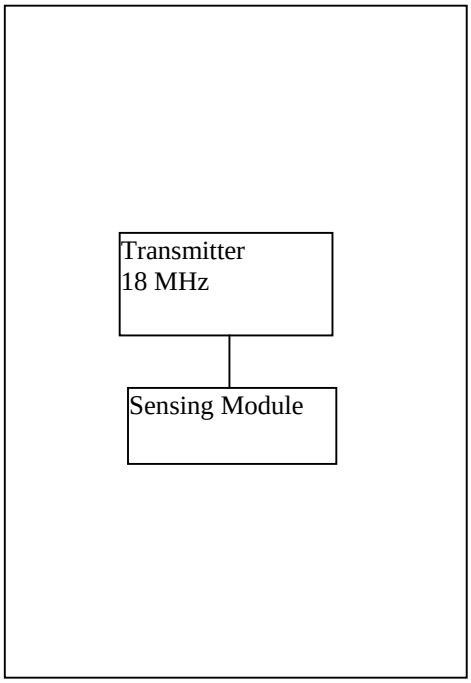
Authorization Signatures (Signature Required for Certifications checked on pg 1)

Customer authorization to perform tests according to this test plan.	Date
Test Plan/CDF Prepared By (please print)	Date

Form

EMC Block Diagram Form

System Configuration Block Diagram -- Provide a line drawing identifying the EUT, simulators, support equipment, I/O cables, power cables, and any other pertinent components to be used during testing. Use a dashed line to separate the equipment in the testing field versus equipment outside testing field.



Authorization Signatures

Customer authorization to perform tests according to this test plan. Date

Test Plan/CDF Prepared By (please print) Date

Appendix B

Measurement Protocol

MEASUREMENT PROTOCOL

GENERAL INFORMATION

Test Methodology

Emissions testing is performed according to the procedures in ANSI C63.4-2003.

Measurement Uncertainty

The test system for conducted emissions is defined as the LISN, tuned receiver or spectrum analyzer, and coaxial cable. The test system has a measurement uncertainty of ±1.8 dB. The test system for radiated emissions is defined as the antenna, the pre-amplifier, the spectrum analyzer and the coaxial cable. The test system has a measurement uncertainty of ±4.8 dB. The equipment comprising the test systems is 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, in dBμV, equals the EMI receiver level plus the cable loss and LISN factor.

Radiated Emissions

The final level, in dBμV/m, equals the reading from the spectrum analyzer (Level dBμV), adding the antenna correction factor and cable loss factor (Factor dB) to it, and subtracting the preamp gain (and duty cycle correction factor, if applicable). This result then has the 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 (dBuV)		CABLE/ANT/PREAMP (dB)	(dB/m)	(dB)	FINAL (dBuV/m)		POL/HGT/AZ (m)	(deg)	DELTA1
60.80	42.5Qp	+	1.2	+ 10.9	- 25.5 =	29.1	V	1.0	0.0	-10.9

Test Equipment

All measurement instrumentation is traceable to the National Institute of Standards and Technology and is calibrated according to internal procedure.