

RADIATED EMISSIONS



Test Report #: WC602546 Run 1 Test Area: LTS

EUT Model #: RPT-910-3 Date: 5/5/2006

EUT Serial #: 00029 EUT Power: Internal Battery Temperature: 22.0 °C

Test Method: FCC - 15.249 Air Pressure: 99.0 kPa

Customer: DSI Rel. Humidity: 30.0 %

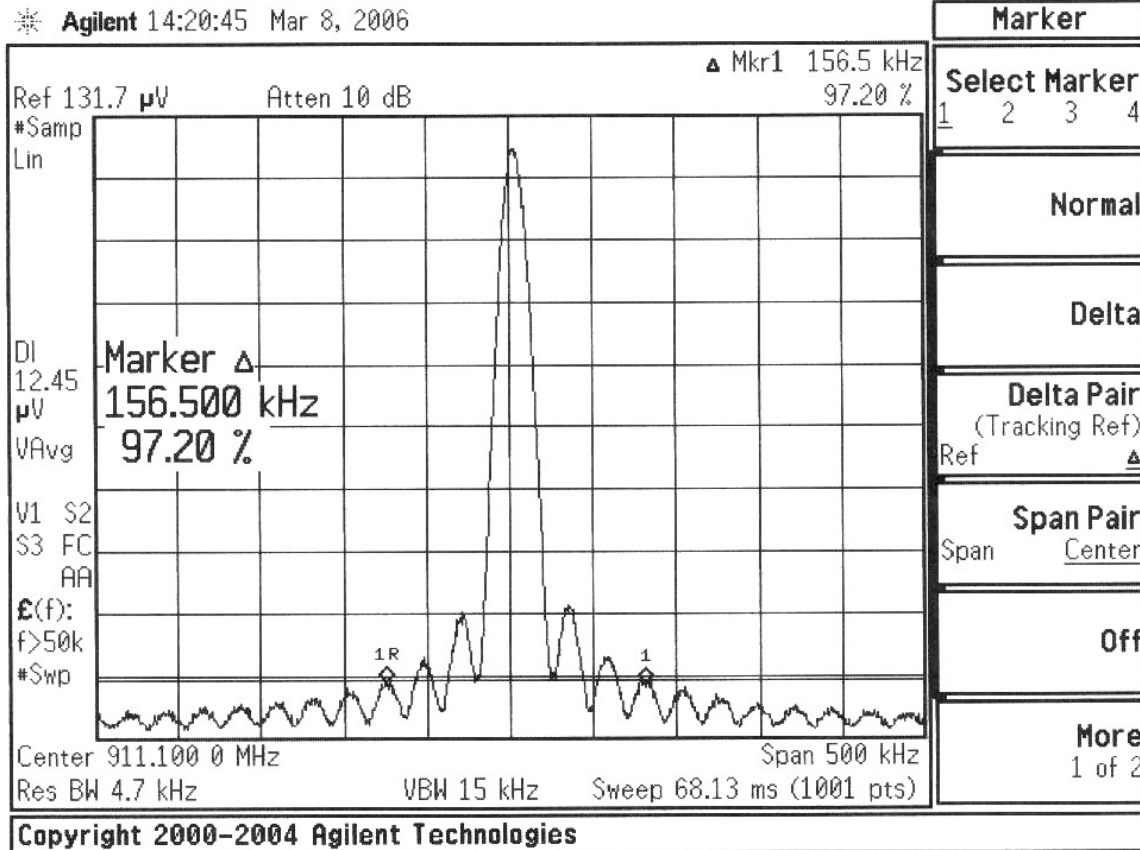
EUT Description: 911.1 MHz RF repeater. Primate Collar

Notes: Stand alone at maximum power output.

Data File Name: 2546.dat

Page: 5 of 5

Occupied Bandwidth



Tested by: J. C. Sausen

Printed

J. C. Sausen

Signature

Reviewed by: Greg Jakubowski

by:

Printed

G. Jakubowski

Signature

RADIATED EMISSIONS



Test Report #: WC602546 Run 2 Test Area: LTS

EUT Model #: RPT-980-3 Date: 5/5/2006

EUT Serial #: 00032 EUT Power: Internal Battery Temperature: 22.0 °C

Test Method: FCC - 15.249 Air Pressure: 99.0 kPa

Customer: DSI Rel. Humidity: 30.0 %

EUT Description: 918.1 MHz RF repeater. Primate Collar

Notes: Stand alone at maximum power output.

Data File Name: 2546.dat

Page: 1 of 4

List of measurements for run #: 2

FREQ	LEVEL (dBuV)	CABLE / ANT / PREAMP / ATTEN (dB)	FINAL (dBuV / m)	POL / HGT / AZ (m)(DEG)	15.249 LIMIT (dBμV/m)	DELTA
Emissions highest with EUT in horizontal position.						
All measurements maximized.						
918.1 MHz	64.4 Qp	2.52 / 22.44 / 0.0 / 0.0	89.36	H / 1.38 / 47	94	-4.64
918.1 MHz	55.7 Qp	2.52 / 22.44 / 0.0 / 0.0	80.66	V / 3.30 / 0	94	-13.34
Harmonic levels maximized, but azimuth and ht not recorded:						
1.836 GHz	45.32 Av	4.04 / 27.02 / 49.76 / 0.0	26.62	V / 1.00 / 0	54	-27.38
1.836 GHz	70.05 Pk	4.04 / 27.02 / 49.76 / 0.0	51.35	V / 1.00 / 0	74	-22.65
1.836 GHz	46.45 Av	4.04 / 27.02 / 49.76 / 0.0	27.75	H / 1.00 / 0	54	-26.25
1.836 GHz	87.05 Pk	4.04 / 27.02 / 49.76 / 0.0	68.35	H / 1.00 / 0	74	-5.65
2.754 GHz	43.72 Av	4.61 / 29.43 / 48.26 / 0.0	29.51	H / 1.00 / 0	54	-24.49
2.754 GHz	69.8 Pk	4.61 / 29.43 / 48.26 / 0.0	55.59	H / 1.00 / 0	74	-18.41
2.754 GHz	43.34 Av	4.61 / 29.43 / 48.26 / 0.0	29.13	V / 1.00 / 0	54	-24.87
2.754 GHz	62.8 Pk	4.61 / 29.43 / 48.26 / 0.0	48.59	V / 1.00 / 0	74	-25.41
3.672 GHz	40.44 Av	5.41 / 31.51 / 46.97 / 0.0	30.4	H / 1.00 / 0	54	-23.6
3.672 GHz	59.95 Pk	5.41 / 31.51 / 46.97 / 0.0	49.91	H / 1.00 / 0	74	-24.09
3.672 GHz	40.79 Av	5.41 / 31.51 / 46.97 / 0.0	30.75	V / 1.00 / 0	54	-23.25
3.672 GHz	59.85 Pk	5.41 / 31.51 / 46.97 / 0.0	49.81	V / 1.00 / 0	74	-24.19
No further harmonic emissions detected. Noise floor only.						
See run # 1 for noise floor measurements in the frequency range of each harmonic.						

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J C Sausen

Signature

Reviewed by: Greg Jakubowski

Printed

G Jakubowski

Signature

RADIATED EMISSIONS



Test Report #: WC602546 Run 2 Test Area: LTS

EUT Model #: RPT-980-3 Date: 5/5/2006

EUT Serial #: 00032 EUT Power: Internal Battery Temperature: 22.0 °C

Test Method: FCC - 15.249 Air Pressure: 99.0 kPa

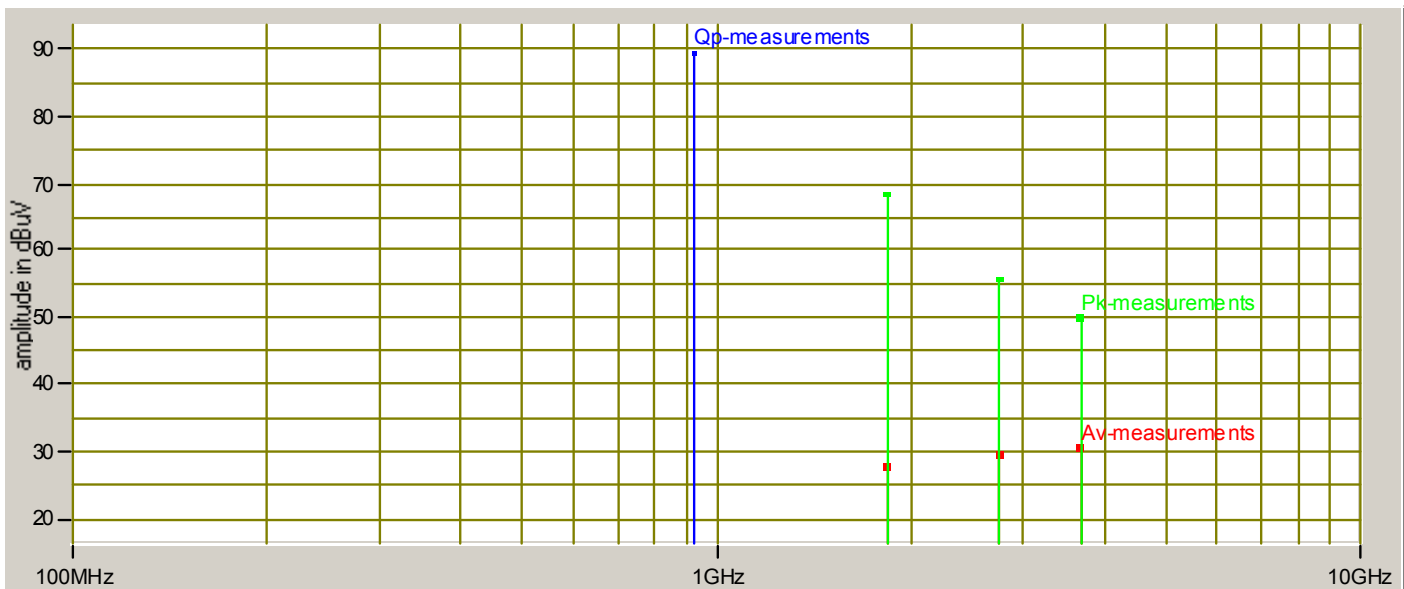
Customer: DSI Rel. Humidity: 30.0 %

EUT Description: 918.1 MHz RF repeater. Primate Collar

Notes: Stand alone at maximum power output.

Data File Name: 2546.dat Page: 2 of 4

Graph:



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RADIATED EMISSIONS



Test Report #: WC602546 Run 2 Test Area: LTS

EUT Model #: RPT-980-3 Date: 5/5/2006

EUT Serial #: 00032 EUT Power: Internal Battery Temperature: 22.0 °C

Test Method: FCC - 15.249 Air Pressure: 99.0 kPa

Customer: DSI Rel. Humidity: 30.0 %

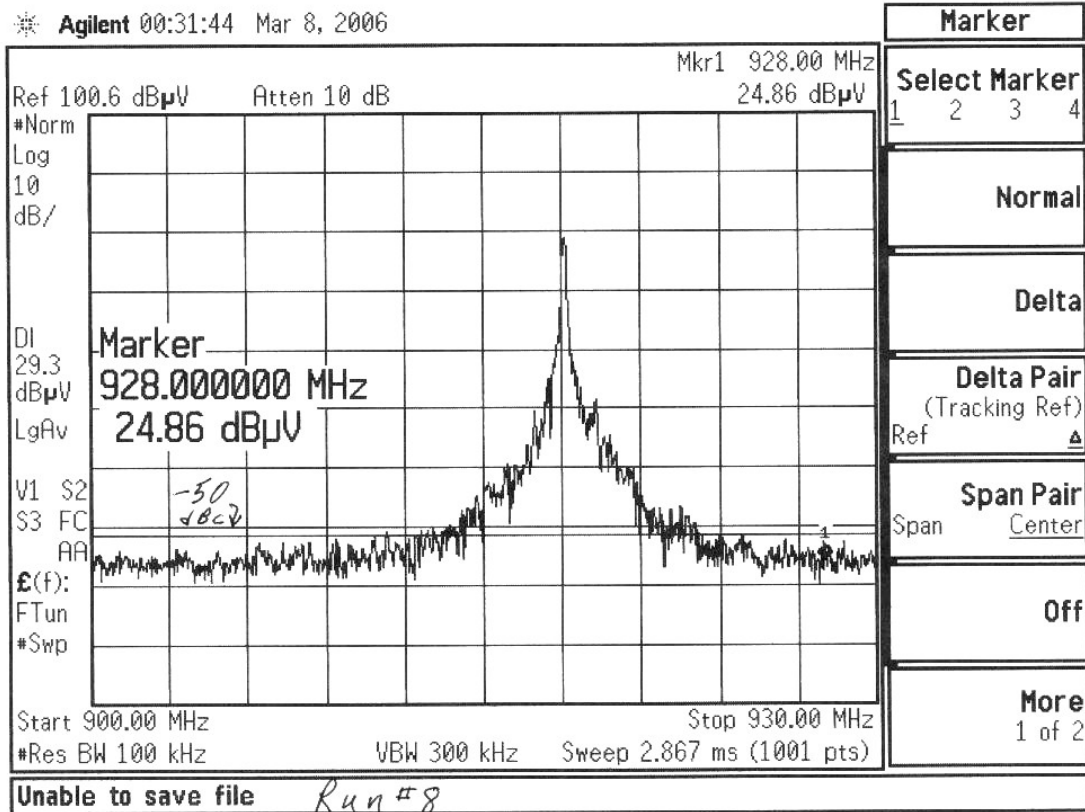
EUT Description: 918.1 MHz RF repeater. Primate Collar

Notes: Stand alone at maximum power output.

Data File Name: 2546.dat

Page: 3 of 4

Band edge



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RADIATED EMISSIONS



Test Report #: WC602546 Run 2 Test Area: LTS

EUT Model #: RPT-980-3 Date: 5/5/2006

EUT Serial #: 00032 EUT Power: Internal Battery Temperature: 22.0 °C

Test Method: FCC - 15.249 Air Pressure: 99.0 kPa

Customer: DSI Rel. Humidity: 30.0 %

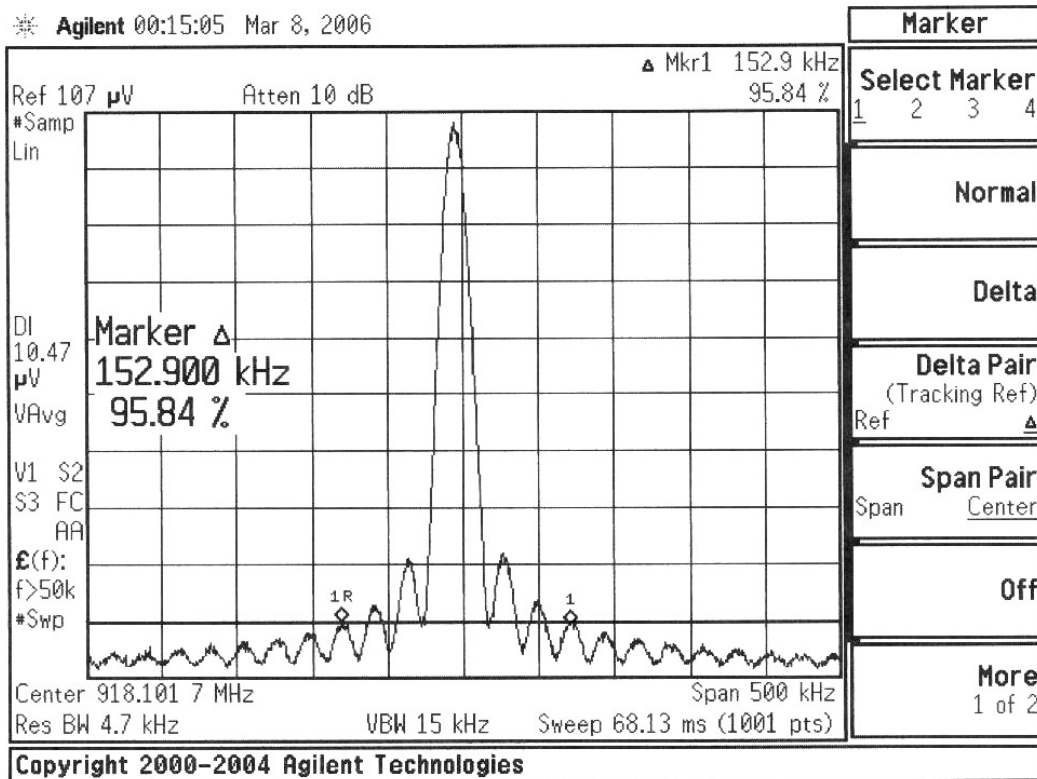
EUT Description: 918.1 MHz RF repeater. Primate Collar

Notes: Stand alone at maximum power output.

Data File Name: 2546.dat

Page: 4 of 4

Occupied bandwidth



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Printed

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Signature

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Printed

G Jakubowski

Signature

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. 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.co
m

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

EUT Description The battery powered telemetry repeater retransmits low power signals received from transmitters (455KHz) implanted in laboratory animals at higher frequencies for extended range . The data is transferred to a repeater receiver (RMC-910 (910.1 MHZ) or RMC-980(918.1MHz)). The telemetry data is received by "source input devices" (receivers) processed by the Data Exchange Matrix (DEM). The data is then sent to the computer. The focus of these tests will be the repeaters developed to receive signals from 455KHz center frequencies and retransmit them at higher frequencies comprised of eight channels spaced between 910.1MHz (RPT-910-3) and 918.1MHz (RPT 980-3).

EUT Name Primate Repeater

Model No.: RPT-910-3 Serial No.: 00029
RPT-980-3 00032

Product Options: N/A

Configurations to be tested: The Primate Repeaters RPT-910-3 (455 KHz RX/911.1MHz TX) and RPT-980-3 (455 KHz RX/918.1MHz TX) will be tested as intentional radiators. These devices represent the lowest and highest frequencies of the Eight frequency channels which are equally spaced within this band. The other six channel devices within this band are identical in design with the exception of their channel frequencies will not be tested. The repeater receivers are powered by a Data Exchange Matrix and Data Exchange Matrix power supply which have been tested previously.

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: _____



EMC Test Plan and Constructional Data Form

America

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

☐ EMC Directive 89/336/EEC (EMC) Std: _____	☒ FCC: Class ☐ A ☒ B Part 15
☐ 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: _____

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

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

Form



EMC Test Plan and Constructional Data Form

America

Typical Installation and/or Operating Environment

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

EUT Power Cable

☐ Permanent	OR	☐ Removable	Length (in meters): _____
☐ Shielded	OR	☐ Unshielded	
☒ Not Applicable			



EMC Test Plan and Constructional Data Form

America

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	☒	☐
	☐	☐	☐	☐		☐	☐						☐	☐
	☐	☐	☐	☐		☐	☐						☐	☐
	☐	☐	☐	☐		☐	☐						☐	☐
	☐	☐	☐	☐		☐	☐						☐	☐
	☐	☐	☐	☐		☐	☐						☐	☐
	☐	☐	☐	☐		☐	☐						☐	☐
	☐	☐	☐	☐		☐	☐						☐	☐
	☐	☐	☐	☐		☐	☐						☐	☐
	☐	☐	☐	☐		☐	☐						☐	☐
	☐	☐	☐	☐		☐	☐						☐	☐
	☐	☐	☐	☐		☐	☐						☐	☐
	☐	☐	☐	☐		☐	☐						☐	☐

**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 #



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>
455 KHz Transmitter	TSS-1		

Oscillator Frequencies

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

Power Supply

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

Power Line Filters

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

**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 (Signature Required for Certifications checked on pg 1)

Customer authorization to perform tests
according to this test plan.

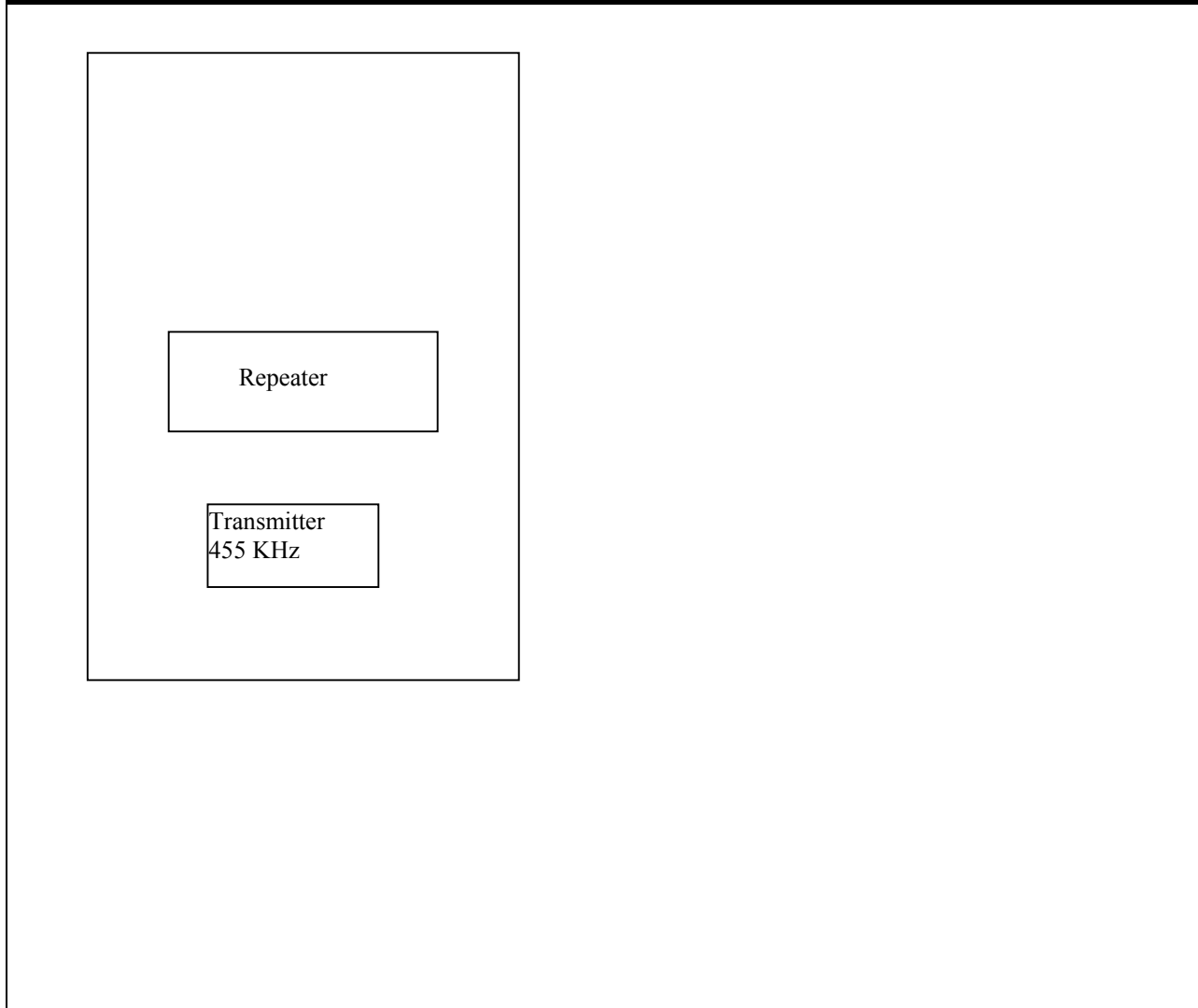
Date

Test Plan/CDF Prepared By (please print)

Date

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.



A large rectangular box containing a smaller rectangular box. Inside the smaller box, there are two smaller boxes stacked vertically. The top box is labeled "Repeater" and the bottom box is labeled "Transmitter 455 KHz".

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



MEASUREMENT PROTOCOL

Environmental conditions in the lab, (TUV)

Temperature: 20 - 22° C

Relative Humidity: 20 - 30 %

Atmospheric pressure: 99.0 kPa

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.

Radiated Emissions

Radiated emissions from the EUT are measured in the frequency range of 30 to 1000 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 resolution/video bandwidths and quasi-peak, average or peak detection. Measurements above 1000 MHz are made with a 1 MHz/6 dB resolution bandwidth, and a peak (1 MHz vbw)/average (10 Hz vbw) detection. Tabletop 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.

The final level, in dB μ V/m, equals the reading from the spectrum analyzer (Level dB μ V), 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 (dB μ V)	CABLE/ANT/PREAMP (dB)	FINAL (dB μ V/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.