

SpaceLabs Medical, Inc.

91341-09

September 02, 2003

Report No. SPAC0344

Report Prepared By:



1-888-EMI-CERT

© 2003 Northwest EMC, Inc

Test Report



22975 NW Evergreen Parkway
Suite 400
Hillsboro, Oregon 97124

Certificate of Test
Issue Date: September 02, 2003
SpaceLabs Medical, Inc.
Model: 91341-09

Emissions

Description	Pass	Fail
FCC 95.1115(a) Field Strength of Fundamental	☒	☐
FCC 95.1115(b) Out of Band Emissions	☒	☐
FCC 95.1115(e) Frequency Stability	☒	☐
FCC 2.1049 Occupied Bandwidth	☒	☐

Modifications made to the product

- See the modifications page of the report

Test Facility

- The measurement facility used to collect the data is located at:
Northwest EMC, Inc.; 22975 NW Evergreen Parkway, Suite 400; Hillsboro, OR 97124
Phone: (503) 844-4066 Fax: 844-3826
This site has been fully described in a report filed with and accepted by the FCC (Federal Communications Commission) and Industry Canada.

Approved By:

Don Facteau, IS Manager

This report must not be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government of the United States of America.

Product compliance is the responsibility of the client, therefore the tests and equipment modes of operation represented in this report were agreed upon by the client, prior to testing. This Report may only be duplicated in its entirety. The results of this test pertain only to the sample(s) tested, the specific description is noted in each of the individual sections of the test report supporting this certificate of test.

Revision Number	Description	Date	Page Number
00	None		

FCC: The Open Area Test Sites, and conducted measurement facilities, have been fully described in reports filed with the FCC and accepted by the FCC in letters maintained in our files.



TCB: Northwest EMC has been accredited by ANSI to ISO/IEC Guide 65 as a product certifier. We have been designated by the FCC as a Telecommunications Certification Body (TCB). This allows Northwest EMC to certify transmitters to FCC specifications in accordance with 47 CFR 2.960 and 2.962.

NVLAP: Accreditation has been granted to Northwest EMC, Inc. to perform the Electromagnetic Compatibility (EMC) tests described in the Scope of Accreditation. Assessment performed to ISO/IEC 17025. Certificate Number: 200629-0, Certificate Number: 200630-0.



Australia/New Zealand: The National Association of Testing Authorities (NATA), Australia has been appointed by the ACA as an accreditation body to accredit test laboratories and competent bodies for EMC standards. Accredited test reports or assessments by competent bodies must carry the NATA logo. Test reports made by an overseas laboratory that has been accredited for the relevant standards by an overseas accreditation body that has a Mutual Recognition Agreement (MRA) with NATA are also accepted as technical grounds for product conformity. The report should be endorsed with the respective logo of the accreditation body. (A2LA)



TÜV Product Service: Included in TÜV Product Service Group's Listing of Recognized Laboratories. It qualifies in connection with the TÜV Certification after Recognition of Agent's Testing Program for the product categories and/or standards shown in TÜV's current Listing of CARAT Laboratories available from TÜV. A certificate was issued to represent that this laboratory continues to meet TÜV's CARAT Program requirements. Certificate No. USA0302C



TÜV Rheinland: Authorized to carryout EMC tests by order and under supervision of TÜV Rheinland. This authorization is based on "Conditions for EMC-Subcontractors" of November 1992.



NEMKO: Assessed and accredited by NEMKO (Norwegian testing and certification body) for European emissions and immunity testing. As a result of NEMKO's laboratory assessment, they will accept test results from Northwest EMC, Inc. for product certification (Authorization No. ELA 119).



Technology International: Assessed in accordance with ISO Guide 25 defining the general international requirements for the competence of calibration and testing laboratories and with ITI assessment criteria LACO196. Based upon that assessment Interference Technology International, Ltd., has granted approval for specifications implementing the EU Directive on EMC (89/336/EEC and amendments). The scope of the approval was provided on a Schedule of Assessment supplied with the certificate and is available upon request.



Industry Canada: Accredited by Industry Canada for performance of radiated measurements. Our open area test sites comply with RSP 100, Issue 7, section 3.3.



VCCI: Accepted as an Associate Member to the VCCI, Acceptance No. 564. Conducted and radiated measurement facilities have been registered in accordance with Regulations for Voluntary Control Measures, Article 8. (*Registration Nos. - Evergreen: C-1071 and R-1025, Trails End: C-694 and R-677, Sultan: C-905, R-871 and R-1172, North Sioux City C-1246, R-1185 and R-1217*)



BSMI: Northwest EMC has been designated by NIST and validated by C-Taipei (BSMI) as a CAB to conduct tests as described in the APEC Mutual Recognition Agreement. License No.SL2-IN-E-1017.



CAB: Designated by NIST and validated by the European Commission as a Conformity Assessment Body (CAB) to conduct tests and approve products to the EMC directive and transmitters to the R&TTE directive, as described in the U.S. - EU Mutual Recognition Agreement



GOST: Northwest EMC, Inc. has been assessed and accredited by the Russian Certification bodies Certinform VNIINMASH, CERTINFO, SAMTES, and Federal CHEC, to perform EMC and Hygienic testing for Information Technology Products. As a result of their laboratory assessment, they will accept test results from Northwest EMC, Inc. for product certification



	NVLAP	FCC	NIST	TUV PS	TUV Rheinland	Nemko	Technology International	Industry Canada	BSMI	VCCI	GOST	NATA
IEC 1000-4-2	✓			✓	✓	✓	✓					
IEC 1000-4-3	✓			✓	✓	✓	✓					
IEC 1000-4-4	✓			✓	✓	✓	✓					
IEC 1000-4-5	✓			✓	✓	✓	✓					
IEC 1000-4-6	✓			✓	✓	✓	✓					
IEC 1000-4-8	✓			✓	✓	✓	✓					
IEC 1000-4-11	✓			✓	✓	✓	✓					
IEC 1000-3-2	✓			✓	✓	✓	✓					
IEC 1000-3-3	✓			✓	✓	✓	✓					
AS/NZS 3548	✓											✓
CNS 13438	✓								✓			
ISO/IEC17025	✓			✓	✓	✓	✓		✓			
Radiated Emissions	✓			✓	✓	✓	✓	✓	✓	✓	✓	
Conducted Emissions	✓			✓	✓	✓	✓	✓	✓	✓	✓	
OATS Sites	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	
Hillsboro 5-Meter Chamber (EV01)	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	
TCB for Licensed Transmitters		✓										
TCB for un-Licensed Transmitters		✓										
Cab for R&TTE			✓									
CAB for EMC			✓									
This chart represents only a partial NVLAP Scope, please reference http://ts.nist.gov/ts/htdocs/210/214/214.htm for the full NVLAP Scope of Accreditation												

What is measurement uncertainty?

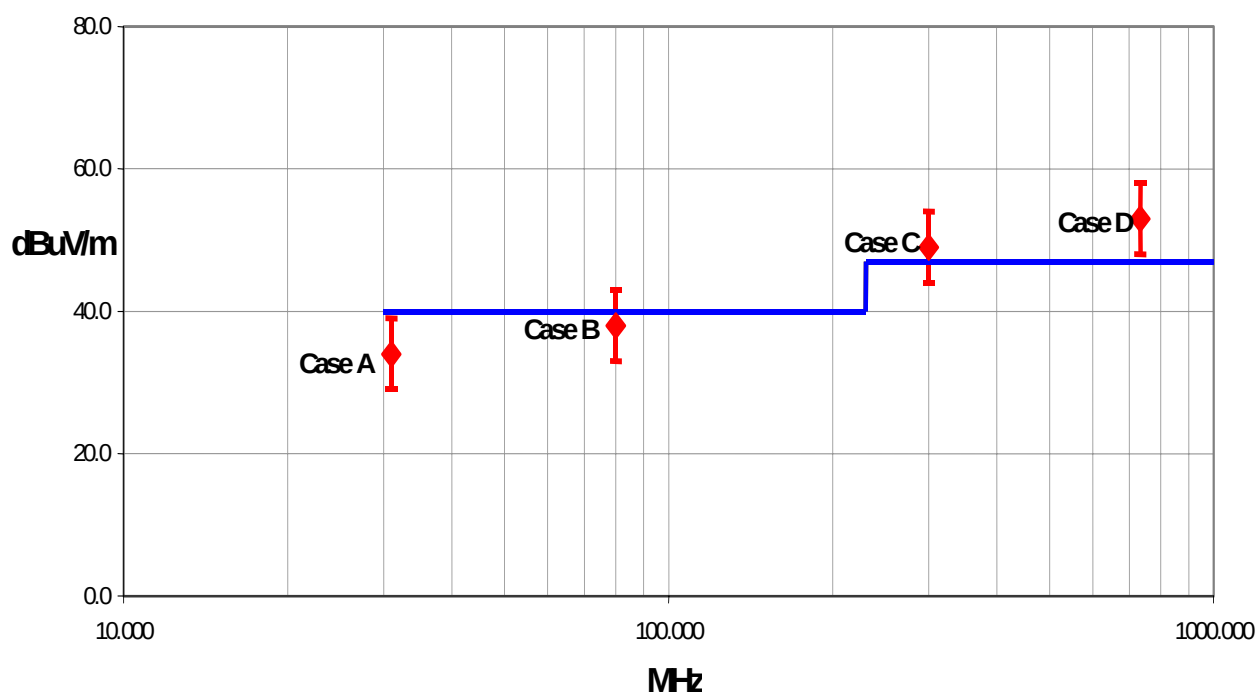
When a measurement is made, the result will be different from the true or theoretically correct value. The difference is the result of tolerances in the measurement system that cannot be completely eliminated. To the extent that technology allows us, it has been our aim to minimize this error. The following statement of measurement uncertainty is used to reflect the accuracy of the measured result as compared with its "true" value. In the case of transient tests (ESD, EFT, Surge, Voltage Dips and Interruptions), the test equipment has been demonstrated by calibration to provide at least a 95% confidence that it complies with the test specification requirements.

The following documents were the basis for determining the uncertainty levels of our measurements:

- "ISO Guide to the Expression of Uncertainty in Measurements", October 1993
- "NIS81: The Treatment of Uncertainty in EMC Measurements", May 1994
- "IEC CISPR 16-3 A1 f1 Ed.1: Radio-interference measurements and statistical techniques", December 2000

How might measurement uncertainty be applied to test results?

If the diamond marks the measured value for the test and the vertical bars bracket the range of + and – measurement uncertainty, then test results can be interpreted from the diagram below.



Test Result Scenarios:

Case A: Product complies.

Case B: Product conditionally complies. It is not possible to say with 95% confidence that the product complies.

Case C: Product conditionally does not comply. It is not possible to say with 95% confidence that the product does not comply.

Case D: Product does not comply.

Radiated Emissions ≤ 1 GHz

Value (dB)

Test Distance	Probability Distribution	Biconical Antenna		Log Periodic Antenna		Dipole Antenna	
		3m	10m	3m	10m	3m	10m
Combined standard uncertainty $u_c(y)$	normal	+ 1.86 - 1.88	+ 1.82 - 1.87	+ 2.23 - 1.41	+ 1.29 - 1.26	+ 1.31 - 1.27	+ 1.25 - 1.25
Expanded uncertainty U (level of confidence $\approx 95\%$)	normal (k=2)	+ 3.72 - 3.77	+ 3.64 - 3.73	+ 4.46 - 2.81	+ 2.59 - 2.52	+ 2.61 - 2.55	+ 2.49 - 2.49

Radiated Emissions > 1 GHz

Value (dB)

Test Distance	Probability Distribution	Without High Pass Filter		With High Pass Filter	
		3m	10m	3m	10m
Combined standard uncertainty $u_c(y)$	normal	+ 1.29 - 1.25	+ 1.29 - 1.25	+ 1.38 - 1.35	+ 1.38 - 1.35
Expanded uncertainty U (level of confidence $\approx 95\%$)	normal (k=2)	+ 2.57 - 2.51	+ 2.57 - 2.51	+ 2.76 - 2.70	+ 2.76 - 2.70

Conducted Emissions

Test Distance	Probability Distribution	Value (+/- dB)
Combined standard uncertainty $u_c(y)$	normal	1.48
Expanded uncertainty U (level of confidence $\approx 95\%$)	normal (k = 2)	2.97

Radiated Immunity

Test Distance	Probability Distribution	Value (+/- dB)
Combined standard uncertainty $u_c(y)$	normal	1.05
Expanded uncertainty U (level of confidence $\approx 95\%$)	normal (k = 2)	2.11

Conducted Immunity

Test Distance	Probability Distribution	Value (+/- dB)
Combined standard uncertainty $u_c(y)$	normal	1.05
Expanded uncertainty U (level of confidence $\approx 95\%$)	normal (k = 2)	2.10

Legend

$u_c(y)$ = square root of the sum of squares of the individual standard uncertainties

U = combined standard uncertainty multiplied by the coverage factor: k . This defines an interval about the measured result that will encompass the true value with a confidence level of approximately 95%. If a higher level of confidence is required, then $k=3$ (CL of 99.7%) can be used. Please note that with a coverage factor of one, $u_c(y)$ yields a confidence level of only 68%.

**California****Orange County Facility**

41 Tesla Ave.
Irvine, CA 92618
(888) 364-2378
FAX (503) 844-3826

**Oregon****Evergreen Facility**

22975 NW Evergreen Pkwy.,
Suite 400
Hillsboro, OR 97124
(503) 844-4066
FAX (503) 844-3826

**Oregon****Trails End Facility**

30475 NE Trails End Lane
Newberg, OR 97132
(503) 844-4066
FAX (503) 537-0735

**South Dakota****North Sioux City Facility**

745 N. Derby Lane
P.O. Box 217
North Sioux City, SD 57049
(605) 232-5267
FAX (605) 232-3873

**Washington****Sultan Facility**

14128 339th Ave. SE
Sultan, WA 98294
(888) 364-2378
FAX (360) 793-2536

Party Requesting the Test

Company Name:	SpaceLabs Medical, Inc.
Address:	5150 220th Avenue SE
City, State, Zip:	Issaquah, WA 98027
Test Requested By:	Steve Cantwell
Model:	91341-09
First Date of Test:	08-12-2003
Last Date of Test:	08-19-2003
Receipt Date of Samples:	08-12-2003
Equipment Design Stage:	Production
Equipment Condition:	No visual damage.

Information Provided by the Party Requesting the Test

Clocks/Oscillators:	Not provided.
I/O Ports:	Patient Leads

Functional Description of the EUT (Equipment Under Test):

Wireless Medical Telemetry Service (WMTS) – 1400 MHz Body Worn Transmitter
--

Client Justification for EUT Selection:

Not Provided

Client Justification for Test Selection

These tests satisfy the requirements for FCC Wireless Medical Telemetry Service (WMTS).

Equipment modifications				
Item #	Test	Date	Modification	Note
1	Field Strength of Fundamental	08-12-2003	No EMI suppression devices were added or modified during this test.	Same configuration as delivered.
2	Field Strength of Spurious Emissions	08-14-2003	No EMI suppression devices were added or modified during this test.	Same configuration as in previous test.
3	Occupied Bandwidth	08-15-2003	No EMI suppression devices were added or modified during this test.	Same configuration as in previous test.
4	Frequency Stability	08-19-2003	No EMI suppression devices were added or modified during this test.	Same configuration as in previous test.

Justification

The individuals and/or the organization requesting the test provided the modes, configurations and settings available to evaluate. While scanning the radiated emissions, all of the EUT parameters listed below were investigated. This includes, but may not be limited to, antennas, tuned transmit frequency ranges, operating modes, and data rates.

Channels in Specified Band Investigated:

1395.025MHz
1399.975MHz
1427.025MHz
1431.475MHz

Operating Modes Investigated:

No Hop

Data Rates Investigated:

Maximum

Output Power Setting(s) Investigated:

Maximum

Power Input Settings Investigated:

Battery

Software\Firmware Applied During Test

Exercise software	N/A	Version	N/A
Description			
The system was tested without the need for software to exercise the functions of the device during the testing.			

EUT and Peripherals

Description	Manufacturer	Model/Part Number	Serial Number
EUT	SpaceLabs Medical	91341-09	P4-22
Shorting Bar	SpaceLabs Medical	N/A	N/A

Cables

Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
Patient cables	No	1.0	No	EUT	Shorting Bar
Patient cables	No	1.0	No	EUT	Shorting Bar
Patient cables	No	1.0	No	EUT	Shorting Bar
Patient cables	No	1.0	No	EUT	Shorting Bar

PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.

Measurement Equipment

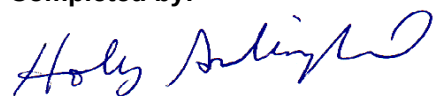
Description	Manufacturer	Model	Identifier	Last Cal	Interval
Antenna, Horn	EMCO	3115	AHC	08/12/2002	12 mo
Spectrum Analyzer	Hewlett-Packard	8566B	AAL	01/07/2003	12 mo
Quasi-Peak Adapter	Hewlett-Packard	85650A	AQF	01/07/2003	12 mo

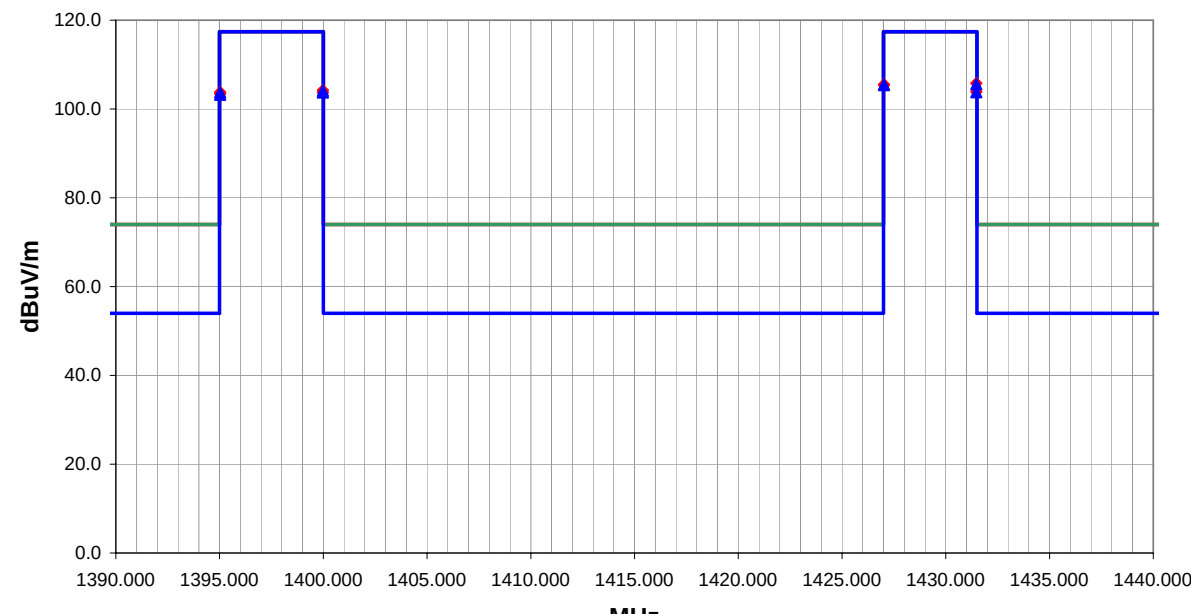
Test Description

Requirement: The field strength of the fundamental radiated emissions shall meet the limits as defined in 47 CFR 95.1115(a). In the 1395-1400 MHz and 1427-1431.5 MHz bands, the maximum allowable field strength is 740 mV/m, as measured at a distance of 3 meters, using measuring instrumentation with an averaging detector and a 1 MHz measurement bandwidth.

Configuration: The antenna to be used with the EUT was tested. The EUT was transmitting while set at the lowest and highest channels available in each band. The spectrum was scanned from 1395 MHz to 1431.5 MHz. While scanning, emissions from the EUT were maximized by rotating the EUT, adjusting the measurement antenna height and polarization, and manipulating the EUT antenna in 3 orthogonal plane (per ANSI C63.4:1992).

Completed by:



NORTHWEST EMC										OATS DATA SHEET				REV d13.11 06/23/2003	
EUT: 91341-09						Work Order: SPAC0344									
Serial Number: P4-22						Date: 08/12/03									
Customer: SpaceLabs Medical, Inc.						Temperature: 75									
Attendees: Drop Off						Humidity: 40%									
Cust. Ref. No.:						Barometric Pressure: 30.04									
Tested by: Holly Ashkannejhad				Power: 9VDC Battery		Job Site: EV01									
TEST SPECIFICATIONS															
Specification: FCC 95_1115						Year: 2002									
Method: ANSI C63.4						Year: 1992									
SAMPLE CALCULATIONS															
Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation															
Conducted Emissions: Adjusted Level = Measured Level + Transducer Factor + Cable Attenuation Factor + External Attenuator															
COMMENTS															
EUT OPERATING MODES															
Continuous transmit															
DEVIATIONS FROM TEST STANDARD															
No deviations.															
RESULTS										Run #					
Pass										4					
Other															
										 Tested By:					
															
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Azimuth (degrees)	Height (meters)	Distance (meters)	External Attenuation (dB)	Polarity	Detector	Distance Adjustment (dB)	Adjusted dBuV/m	Spec. Limit dBuV/m	Compared to Spec. (dB)			
1395.025	74.6	29.1	116.0	1.0	3.0	0.0	H-Horn	AV	0.0	103.7	117.4	-13.7			
1395.025	74.1	29.1	82.0	1.0	3.0	0.0	V-Horn	AV	0.0	103.2	117.4	-14.2			
1399.975	75.0	29.1	116.0	1.0	3.0	0.0	H-Horn	AV	0.0	104.1	117.4	-13.3			
1399.975	74.6	29.1	103.0	1.0	3.0	0.0	V-Horn	AV	0.0	103.7	117.4	-13.7			
1427.025	76.2	29.2	107.0	1.0	3.0	0.0	V-Horn	AV	0.0	105.4	117.4	-12.0			
1427.025	76.2	29.2	115.0	1.0	3.0	0.0	H-Horn	AV	0.0	105.4	117.4	-12.0			
1431.475	76.4	29.2	0.0	1.3	3.0	0.0	H-Horn	AV	0.0	105.6	117.4	-11.8			
1431.475	74.6	29.2	80.0	1.0	3.0	0.0	V-Horn	AV	0.0	103.8	117.4	-13.6			
1395.025	74.7	29.1	116.0	1.0	3.0	0.0	H-Horn	PK	0.0	103.8	117.4	-13.6			
1395.025	74.3	29.1	82.0	1.0	3.0	0.0	V-Horn	PK	0.0	103.4	117.4	-14.0			
1399.975	75.1	29.1	116.0	1.0	3.0	0.0	H-Horn	PK	0.0	104.2	117.4	-13.2			
1399.975	74.6	29.1	103.0	1.0	3.0	0.0	V-Horn	PK	0.0	103.7	117.4	-13.7			
1427.025	76.3	29.2	115.0	1.0	3.0	0.0	H-Horn	PK	0.0	105.5	117.4	-11.9			
1427.025	76.2	29.2	107.0	1.0	3.0	0.0	V-Horn	PK	0.0	105.4	117.4	-12.0			
1431.475	76.6	29.2	0.0	1.3	3.0	0.0	H-Horn	PK	0.0	105.8	117.4	-11.6			
1431.475	74.7	29.2	80.0	1.0	3.0	0.0	V-Horn	PK	0.0	103.9	117.4	-13.5			



Justification

The individuals and/or the organization requesting the test provided the modes, configurations and settings available to evaluate. While scanning the radiated emissions, all of the EUT parameters listed below were investigated. This includes, but may not be limited to, antennas, tuned transmit frequency ranges, operating modes, and data rates.

Channels in Specified Band Investigated:

1395.025MHz
1399.975MHz
1427.025MHz
1431.475MHz

Operating Modes Investigated:

No Hop

Data Rates Investigated:

Maximum

Output Power Setting(s) Investigated:

Maximum

Power Input Settings Investigated:

Battery

Software\Firmware Applied During Test

Exercise software	N/A	Version	N/A
Description			
The system was tested without the need for software to exercise the functions of the device during the testing.			

EUT and Peripherals

Description	Manufacturer	Model/Part Number	Serial Number
EUT	SpaceLabs Medical	91341-09	P4-22
Shorting Bar	SpaceLabs Medical	N/A	N/A

Cables

Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
Patient cables	No	1.0	No	EUT	Shorting Bar
Patient cables	No	1.0	No	EUT	Shorting Bar
Patient cables	No	1.0	No	EUT	Shorting Bar
Patient cables	No	1.0	No	EUT	Shorting Bar

PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.

Measurement Equipment

Description	Manufacturer	Model	Identifier	Last Cal	Interval
Spectrum Analyzer	Hewlett-Packard	8566B	AAL	01/07/2003	12 mo
Quasi-Peak Adapter	Hewlett-Packard	85650A	AQF	01/07/2003	12 mo
Antenna, Horn	EMCO	3115	AHC	08/12/2002	15 mo
Antenna, Biconilog	EMCO	3141	AXE	12/31/2001	36 mo
Pre-Amplifier	Amplifier Research	LN1000A	APS	01/06/2003	12 mo
Pre-Amplifier	Miteq	AMF-4D-005180-24-10P	APJ	01/06/2003	12 mo
Antenna, Horn	EMCO	3160-08	AHK	06/20/2003	12 mo
Pre-Amplifier	Miteq	AMF-4D-005180-24-10P	APC	07/09/2002	15 mo
High Pass Filter	RLC Electronics	F-100-4000-5-R (HPF> 4GHz up to 18GHz)	HFF	05/01/2003	12 mo

Test Description

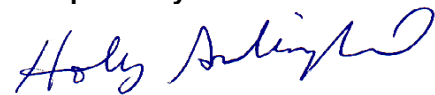
Requirement: The field strength of spurious radiated emissions shall meet the limits as defined in 47 CFR 95.1115. Field strength limits are specified at a distance of 3 meters. Below 960 MHz, measurements are made using instrumentation with a CISPR quasi-peak detector. Above 960 MHz, measurements are made using instrumentation with an averaging detector and a 1 MHz bandwidth.

Configuration: The antenna to be used with the EUT was testing. The EUT was transmitting while set at the lowest and highest channels available. The spectrum was scanned from 30 MHz to 15 GHz. While scanning, emissions from the EUT were maximized by rotating the EUT, adjusting the measurement antenna height and polarization, and manipulating the EUT antenna in 3 orthogonal plane (per ANSI C63.4:1992). A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.

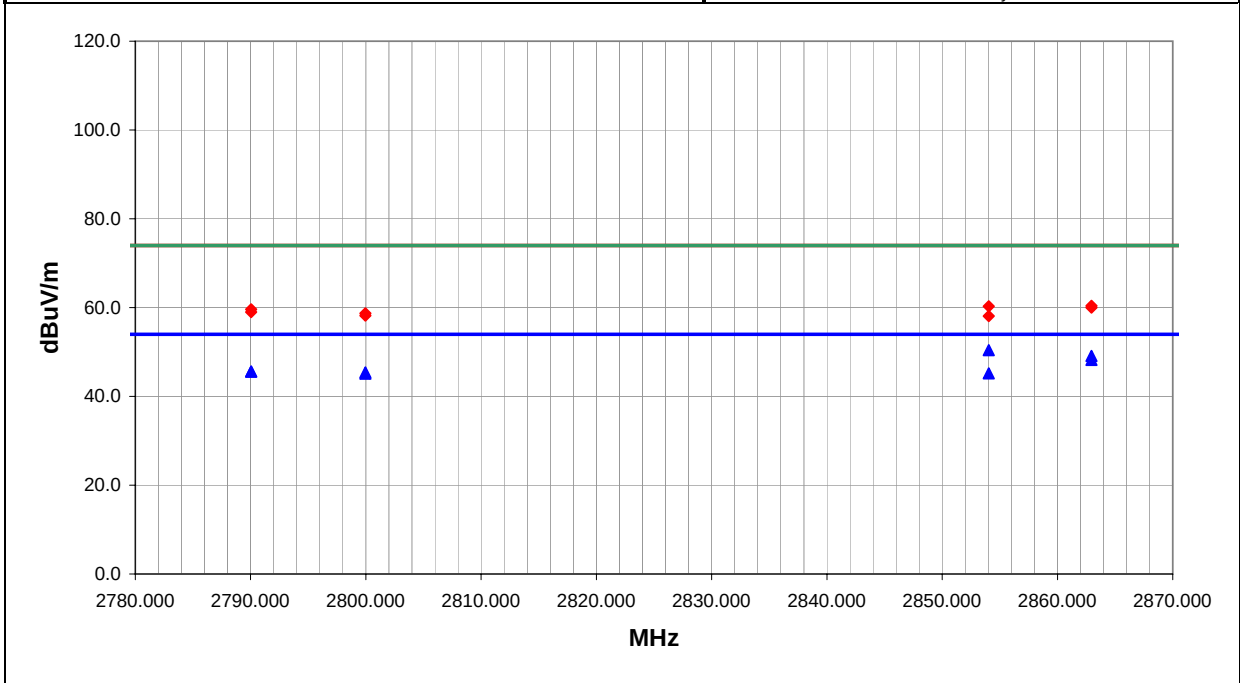
Bandwidths Used for Measurements

Frequency Range (MHz)	Peak Data (kHz)	Quasi-Peak Data (kHz)	Average Data (kHz)
0.01 – 0.15	1.0	0.2	0.2
0.15 – 30.0	10.0	9.0	9.0
30.0 – 960	100.0	120.0	120.0
Above 960	1000.0	N/A	1000.0
<i>Measurements were made using the bandwidths and detectors specified. No video filter was used.</i>			

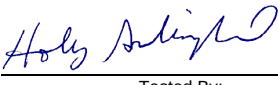
Completed by:

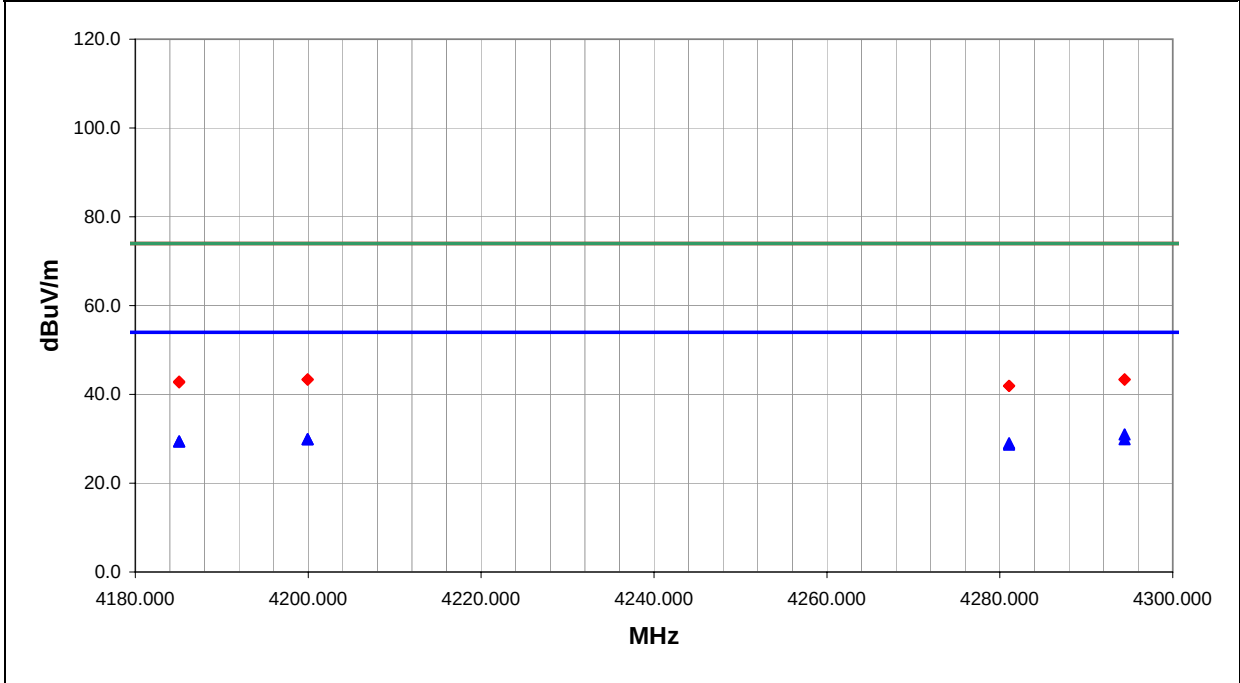


NORTHWEST		REV d/3.11 06/23/2003	
EMC		OATS DATA SHEET	
EUT: 91341-09		Work Order: SPAC0344	
Serial Number: P4-22		Date: 08/14/03	
Customer: SpaceLabs Medical, Inc.		Temperature: 79	
Attendees: Drop Off		Humidity: 37%	
Cust. Ref. No.:		Barometric Pressure: 30.05	
Tested by: Holly Ashkannejhad		Power: 9VDC Battery	
		Job Site: EV01	
TEST SPECIFICATIONS			
Specification: FCC 95_1115		Year: 2001	
Method: ANSI C63.4		Year: 1992	
SAMPLE CALCULATIONS			
Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation			
Conducted Emissions: Adjusted Level = Measured Level + Transducer Factor + Cable Attenuation Factor + External Attenuator			
COMMENTS			
EUT OPERATING MODES			
Continuous transmit			
DEVIATIONS FROM TEST STANDARD			
No deviations.			
RESULTS			Run #
Pass			6
Other			
		 Tested By:	



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Azimuth (degrees)	Height (meters)	Distance (meters)	External Attenuation (dB)	Polarity	Detector	Distance Adjustment (dB)	Adjusted dBuV/m	Spec. Limit dBuV/m	Compared to Spec. (dB)	Comments
2854.043	32.3	2.1	292.0	1.3	3.0	16.0	H-Horn	AV	0.0	50.4	54.0	-3.6	Tx Freq 1427.025MHz
2862.955	30.9	2.2	296.0	1.5	3.0	16.0	H-Horn	AV	0.0	49.1	54.0	-4.9	Tx Freq 1431.475MHz
2862.955	30.0	2.2	89.0	1.2	3.0	16.0	V-Horn	AV	0.0	48.2	54.0	-5.8	Tx Freq 1431.475MHz
2790.050	27.7	1.9	4.0	2.5	3.0	16.0	H-Horn	AV	0.0	45.6	54.0	-8.4	Tx Freq 1395.025MHz
2790.050	27.7	1.9	207.0	1.6	3.0	16.0	V-Horn	AV	0.0	45.6	54.0	-8.4	Tx Freq 1395.025MHz
2799.958	27.4	2.0	44.0	1.3	3.0	16.0	H-Horn	AV	0.0	45.4	54.0	-8.6	Tx Freq 1399.975MHz
2854.043	27.1	2.1	308.0	1.2	3.0	16.0	V-Horn	AV	0.0	45.2	54.0	-8.8	Tx Freq 1427.025MHz
2799.958	27.1	2.0	42.0	1.2	3.0	16.0	V-Horn	AV	0.0	45.1	54.0	-8.9	Tx Freq 1399.975MHz
2862.955	42.2	2.2	296.0	1.5	3.0	16.0	H-Horn	PK	0.0	60.4	74.0	-13.6	Tx Freq 1431.475MHz
2854.043	42.2	2.1	292.0	1.3	3.0	16.0	H-Horn	PK	0.0	60.3	74.0	-13.7	Tx Freq 1427.025MHz
2862.955	41.8	2.2	89.0	1.2	3.0	16.0	V-Horn	PK	0.0	60.0	74.0	-14.0	Tx Freq 1431.475MHz
2790.050	41.7	1.9	207.0	1.6	3.0	16.0	V-Horn	PK	0.0	59.6	74.0	-14.4	Tx Freq 1395.025MHz
2790.050	41.1	1.9	4.0	2.5	3.0	16.0	H-Horn	PK	0.0	59.0	74.0	-15.0	Tx Freq 1395.025MHz
2799.958	40.7	2.0	44.0	1.3	3.0	16.0	H-Horn	PK	0.0	58.7	74.0	-15.3	Tx Freq 1399.975MHz
2799.958	40.2	2.0	42.0	1.2	3.0	16.0	V-Horn	PK	0.0	58.2	74.0	-15.8	Tx Freq 1399.975MHz
2854.043	40.0	2.1	308.0	1.2	3.0	16.0	V-Horn	PK	0.0	58.1	74.0	-15.9	Tx Freq 1427.025MHz

NORTHWEST		REV d/3.11 06/23/2003	
EMC		OATS DATA SHEET	
EUT: 91341-09		Work Order: SPAC0344	
Serial Number: P4-22		Date: 08/14/03	
Customer: SpaceLabs Medical, Inc.		Temperature: 79	
Attendees: Drop Off		Humidity: 37%	
Cust. Ref. No.:		Barometric Pressure: 30.05	
Tested by: Holly Ashkannejhad		Power: 9VDC Battery	Job Site: EV01
TEST SPECIFICATIONS			
Specification: FCC 95_1115		Year: 2001	
Method: ANSI C63.4		Year: 1992	
SAMPLE CALCULATIONS			
Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation			
Conducted Emissions: Adjusted Level = Measured Level + Transducer Factor + Cable Attenuation Factor + External Attenuator			
COMMENTS			
EUT OPERATING MODES			
Continuous transmit			
DEVIATIONS FROM TEST STANDARD			
No deviations.			
RESULTS			Run #
Pass			7
Other			
		 Tested By:	



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Azimuth (degrees)	Height (meters)	Distance (meters)	External Attenuation (dB)	Polarity	Detector	Distance Adjustment (dB)	Adjusted dBuV/m	Spec. Limit dBuV/m	Compared to Spec. (dB)	Comments
4294.425	25.9	5.1	97.0	1.6	3.0	0.0	H-Horn	AV	0.0	31.0	54.0	-23.0	Tx Freq 1431.475MHz
4199.925	24.8	5.1	335.0	3.3	3.0	0.0	H-Horn	AV	0.0	29.9	54.0	-24.1	Tx Freq 1399.975MHz
4199.925	24.8	5.1	327.0	1.2	3.0	0.0	V-Horn	AV	0.0	29.9	54.0	-24.1	Tx Freq 1399.975MHz
4294.425	24.8	5.1	346.0	3.0	3.0	0.0	V-Horn	AV	0.0	29.9	54.0	-24.1	Tx Freq 1431.475MHz
4185.075	24.3	5.1	146.0	1.3	3.0	0.0	H-Horn	AV	0.0	29.4	54.0	-24.6	Tx Freq 1395.025MHz
4185.075	24.3	5.1	219.0	1.1	3.0	0.0	V-Horn	AV	0.0	29.4	54.0	-24.6	Tx Freq 1395.025MHz
4281.075	23.8	5.2	274.0	1.2	3.0	0.0	V-Horn	AV	0.0	29.0	54.0	-25.0	Tx Freq 1427.025MHz
4281.075	23.5	5.2	184.0	3.6	3.0	0.0	H-Horn	AV	0.0	28.7	54.0	-25.3	Tx Freq 1427.025MHz
4199.925	38.3	5.1	335.0	3.3	3.0	0.0	H-Horn	PK	0.0	43.4	74.0	-30.6	Tx Freq 1399.975MHz
4294.425	38.3	5.1	346.0	3.0	3.0	0.0	V-Horn	PK	0.0	43.4	74.0	-30.6	Tx Freq 1431.475MHz
4199.925	38.2	5.1	327.0	1.2	3.0	0.0	V-Horn	PK	0.0	43.3	74.0	-30.7	Tx Freq 1399.975MHz
4294.425	38.2	5.1	97.0	1.6	3.0	0.0	H-Horn	PK	0.0	43.3	74.0	-30.7	Tx Freq 1431.475MHz
4185.075	37.8	5.1	219.0	1.1	3.0	0.0	V-Horn	PK	0.0	42.9	74.0	-31.1	Tx Freq 1395.025MHz
4185.075	37.6	5.1	146.0	1.3	3.0	0.0	H-Horn	PK	0.0	42.7	74.0	-31.3	Tx Freq 1395.025MHz
4281.075	36.7	5.2	184.0	3.6	3.0	0.0	H-Horn	PK	0.0	41.9	74.0	-32.1	Tx Freq 1427.025MHz
4281.075	36.7	5.2	274.0	1.2	3.0	0.0	V-Horn	PK	0.0	41.9	74.0	-32.1	Tx Freq 1427.025MHz



Justification

The individuals and/or the organization requesting the test provided the modes, configurations and settings available to evaluate. While scanning the radiated emissions, all of the EUT parameters listed below were investigated. This includes, but may not be limited to, antennas, tuned transmit frequency ranges, operating modes, and data rates.

Channels in Specified Band Investigated:

1395.025MHz

1399.975MHz

1427.025MHz

1431.475MHz

Operating Modes Investigated:

No Hop

Data Rates Investigated:

Maximum

Output Power Setting(s) Investigated:

Maximum

Power Input Settings Investigated:

Battery

Software\Firmware Applied During Test

Exercise software

N/A

Version

N/A

Description

The system was tested without the need for software to exercise the functions of the device during the testing.

EUT and Peripherals

Description	Manufacturer	Model/Part Number	Serial Number
EUT	SpaceLabs Medical	91341-09	P4-22
Shorting Bar	SpaceLabs Medical	N/A	N/A

Cables

Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
Patient cables	No	1.0	No	EUT	Shorting Bar
Patient cables	No	1.0	No	EUT	Shorting Bar
Patient cables	No	1.0	No	EUT	Shorting Bar
Patient cables	No	1.0	No	EUT	Shorting Bar

PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.

Measurement Equipment

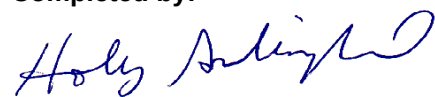
Description	Manufacturer	Model	Identifier	Last Cal	Interval
Spectrum Analyzer	Tektronix	2784	AAO	02/26/2003	24 mo
Near Field Probe	EMCO	7405	IPD	NCR	NA

Test Description

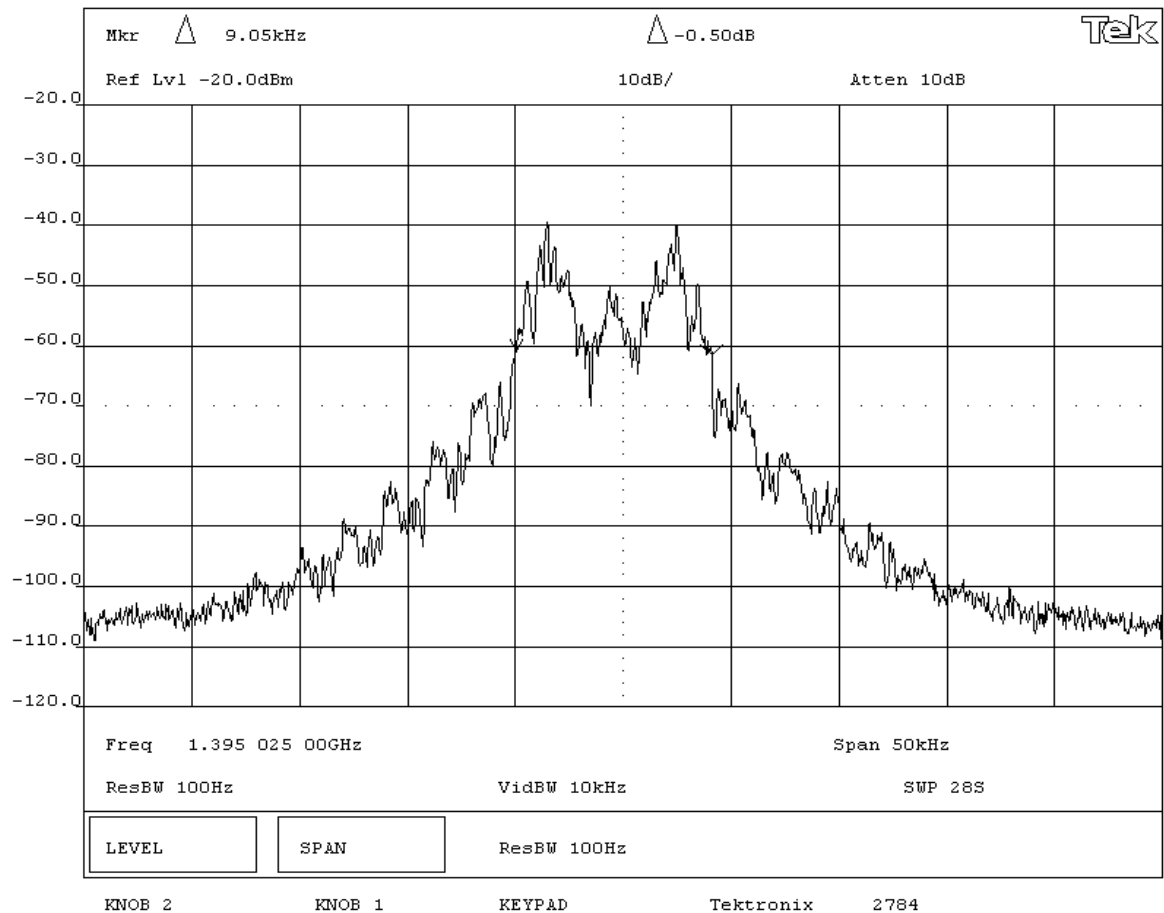
Requirement: Per 47 CFR 2.1049, the 20 dB occupied bandwidth was measured.

Configuration: The antenna is integral to the EUT, so a radiated measurement was made using a spectrum analyzer and a near field probe. A 100Hz resolution bandwidth with no video filtering and a peak detector were used. The RBW was sufficiently narrow to plot the actual bandwidth of the signal and not the filter response curve of the spectrum analyzer.

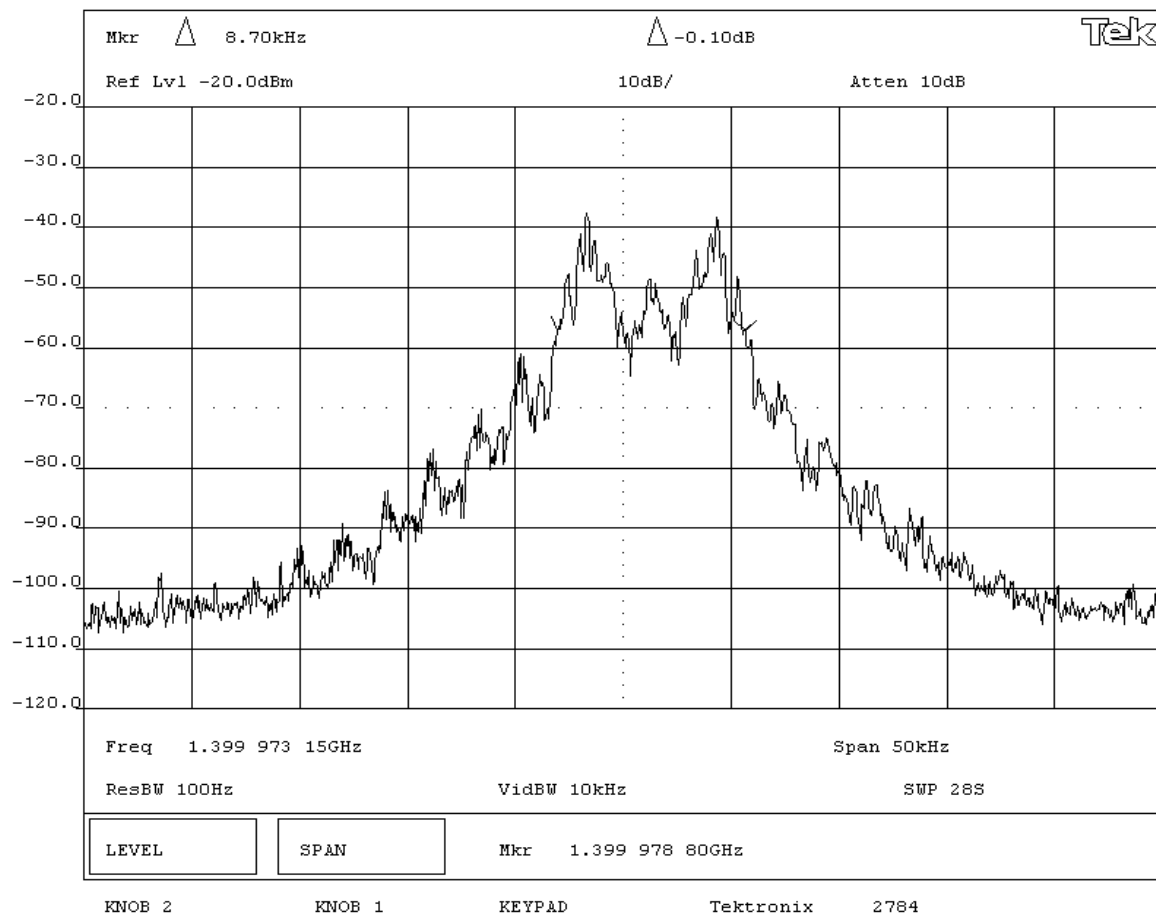
Completed by:



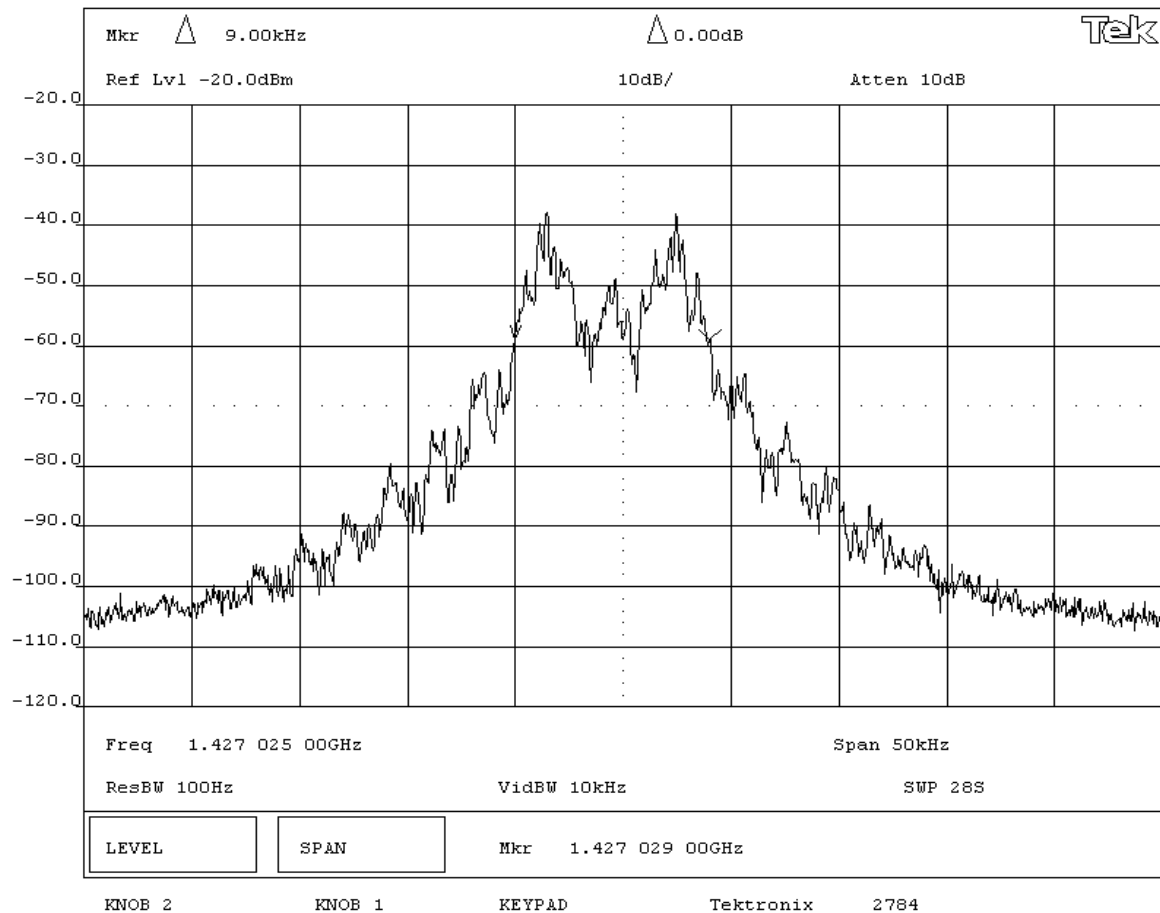
NORTHWEST EMC		EMISSIONS DATA SHEET		Rev BETA 01/30/01	
EUT: 91341-09		Work Order: SPAC0344			
Serial Number: P4-22		Date: 08/15/03			
Customer: SpaceLabs Medical, Inc.		Temperature: 73 degrees F			
Attendees: Drop Off		Tested by: Holly Ashkannejhad		Humidity: 45%	
Customer Ref. No.: N/A		Power: 9V Battery		Job Site: EV06	
TEST SPECIFICATIONS					
Specification: 47 CFR 2.1049		Year: 2003		Method: TIA/EIA - 603	
				Year: 1993	
SAMPLE CALCULATIONS					
COMMENTS					
EUT OPERATING MODES					
Continuous Transmit 1395.025 MHz					
DEVIATIONS FROM TEST STANDARD					
None					
REQUIREMENTS					
RESULTS					
				BANDWIDTH	
Pass				9.05 kHz	
SIGNATURE					
Tested By: <i>Holly Ashkannejhad</i>					
DESCRIPTION OF TEST					
Occupied Bandwidth - Low Channel					



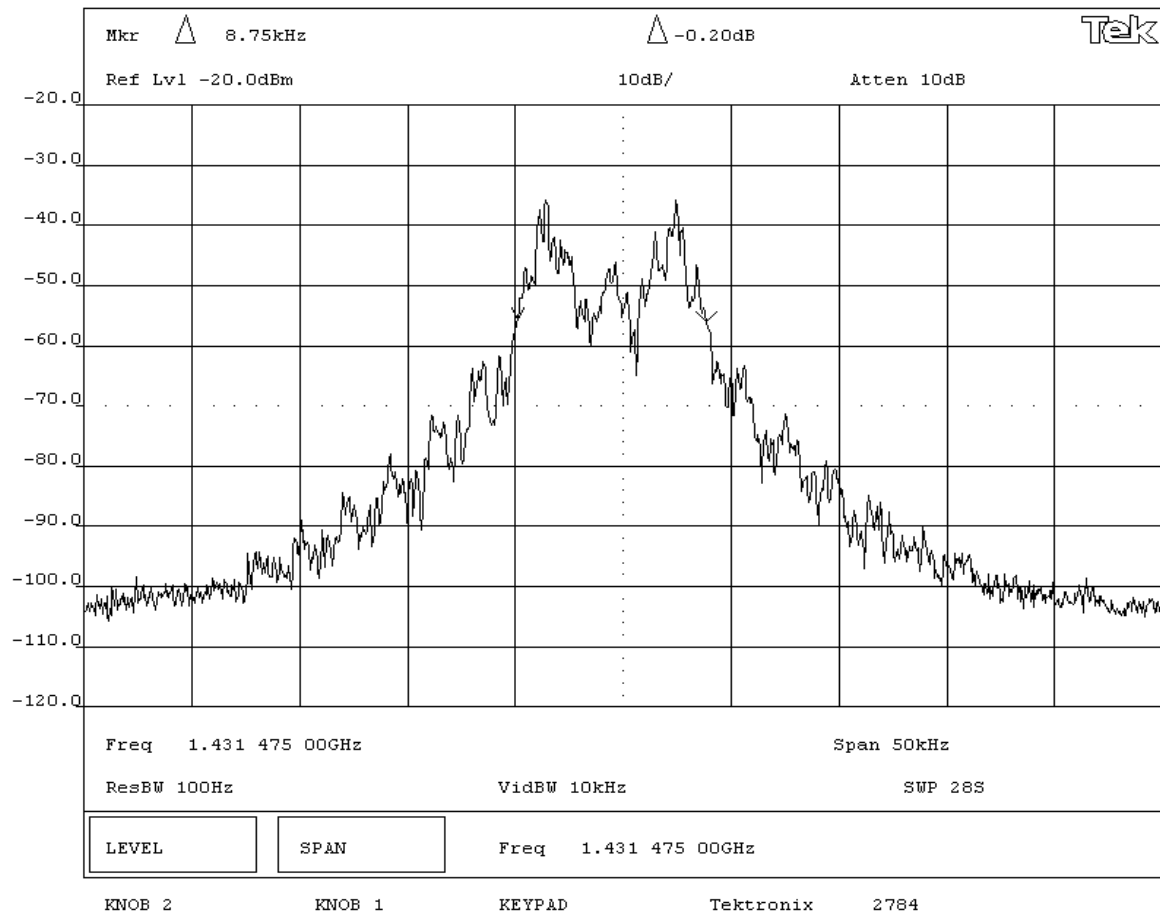
NORTHWEST EMC				EMISSIONS DATA SHEET				Rev BETA 01/30/01	
EUT: 91341-09				Work Order: SPAC0344					
Serial Number: P4-22				Date: 08/15/03					
Customer: SpaceLabs Medical, Inc.				Temperature: 73 degrees F					
Attendees: Drop Off				Tested by: Holly Ashkannejhad				Humidity: 45%	
Customer Ref. No.: N/A				Power: 9V Battery				Job Site: EV06	
TEST SPECIFICATIONS									
Specification: 47 CFR 2.1049			Year: 2003		Method: TIA/EIA - 603			Year: 1993	
SAMPLE CALCULATIONS									
COMMENTS									
EUT OPERATING MODES									
Continuous Transmit 1399.975 MHz									
DEVIATIONS FROM TEST STANDARD									
None									
REQUIREMENTS									
RESULTS									
Pass				BANDWIDTH 8.70kHz					
SIGNATURE									
Tested By: <u>Holly Ashkannejhad</u>									
DESCRIPTION OF TEST									
Occupied Bandwidth - High Channel									

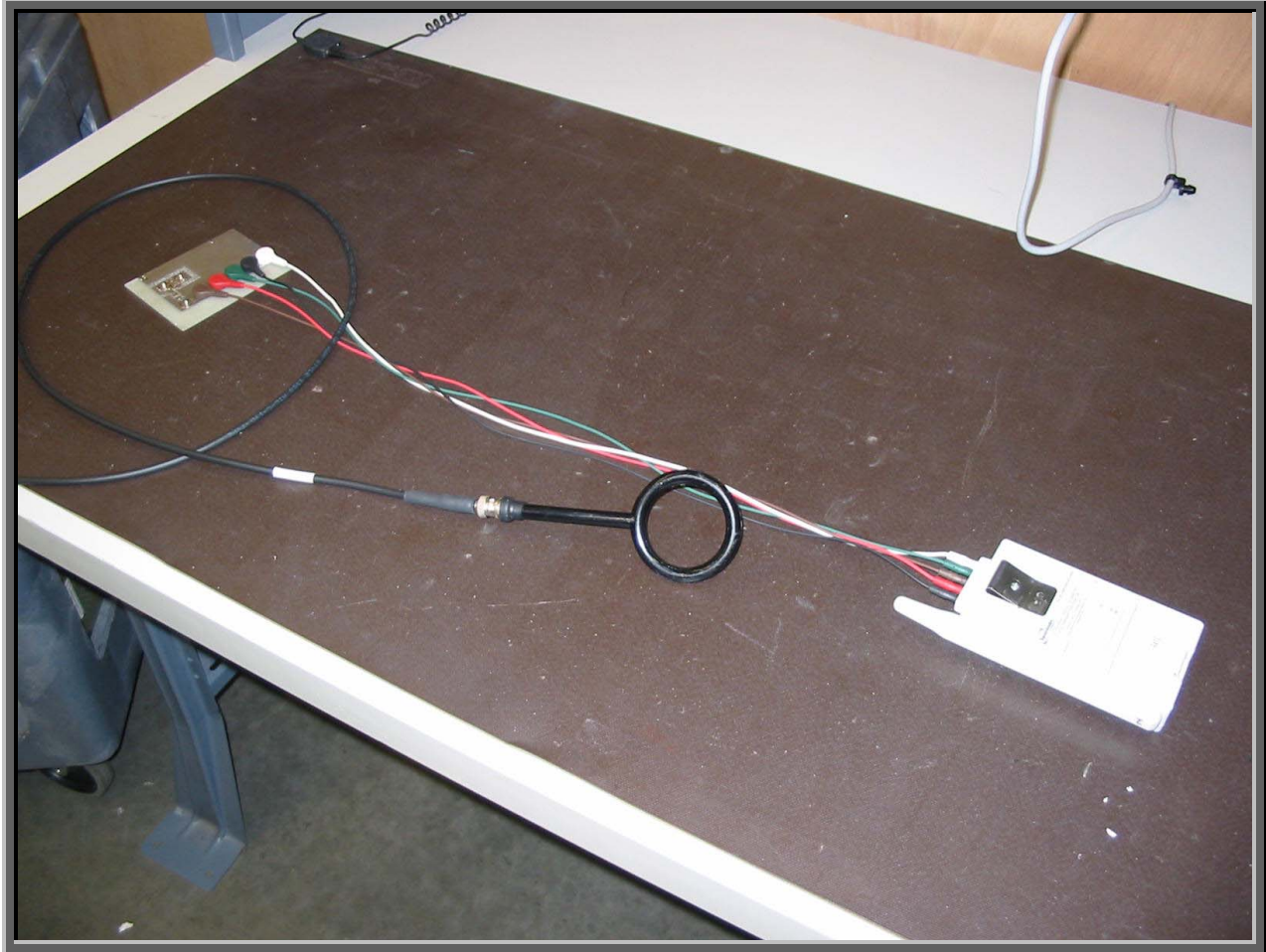


NORTHWEST EMC				EMISSIONS DATA SHEET				Rev BETA 01/30/01	
EUT: 91341-09				Work Order: SPAC0344					
Serial Number: P4-22				Date: 08/15/03					
Customer: SpaceLabs Medical, Inc.				Temperature: 73 degrees F					
Attendees: Drop Off				Tested by: Holly Ashkannejhad				Humidity: 45%	
Customer Ref. No.: N/A				Power: 9V Battery				Job Site: EV06	
TEST SPECIFICATIONS									
Specification: 47 CFR 2.1049			Year: 2003		Method: TIA/EIA - 603			Year: 1993	
SAMPLE CALCULATIONS									
COMMENTS									
EUT OPERATING MODES									
Continuous Transmit 1427.025 MHz									
DEVIATIONS FROM TEST STANDARD									
None									
REQUIREMENTS									
RESULTS									
Pass				BANDWIDTH 9.00kHz					
SIGNATURE									
Tested By: <u>Holly Ashkannejhad</u>									
DESCRIPTION OF TEST									
Occupied Bandwidth - Low Channel - 6 Mbit									



NORTHWEST EMC				EMISSIONS DATA SHEET				Rev BETA 01/30/01	
EUT: 91341-09				Work Order: SPAC0344					
Serial Number: P4-22				Date: 08/15/03					
Customer: SpaceLabs Medical, Inc.				Temperature: 73 degrees F					
Attendees: Drop Off				Tested by: Holly Ashkannejhad				Humidity: 45%	
Customer Ref. No.: N/A				Power: 9V Battery				Job Site: EV06	
TEST SPECIFICATIONS									
Specification: 47 CFR 2.1049			Year: 2003		Method: TIA/EIA - 603			Year: 1993	
SAMPLE CALCULATIONS									
COMMENTS									
EUT OPERATING MODES									
Continuous Transmit 1431.475 MHz									
DEVIATIONS FROM TEST STANDARD									
None									
REQUIREMENTS									
RESULTS									
Pass				BANDWIDTH 8.75kHz					
SIGNATURE									
Tested By: <i>Holly Ashkannejhad</i>									
DESCRIPTION OF TEST									
Occupied Bandwidth - High Channel - 6 Mbit									





Justification

The individuals and/or the organization requesting the test provided the modes, configurations and settings available to evaluate. While scanning the radiated emissions, all of the EUT parameters listed below were investigated. This includes, but may not be limited to, antennas, tuned transmit frequency ranges, operating modes, and data rates.

Channels in Specified Band Investigated:

Low channel of lower allowable band
High channel of lower allowable band
Low channel of upper allowable band
High channel of upper allowable band

Operating Modes Investigated:

Typical

Power Input Settings Investigated:

9V Battery

Software\Firmware Applied During Test

Exercise software	Standard Production Software	Version	Unknown
Description			
The system was tested using standard operating production software to exercise the functions of the device during the testing.			

EUT and Peripherals

Description	Manufacturer	Model/Part Number	Serial Number
EUT - ECG Transmitter	SpaceLabs Medical	91341-09	P4-22
Shorting bar	SpaceLabs Medical	N/A	N/A

Cables

Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
ECG Leads (5)	PA	0.6	PA	EUT	Shorting bar

PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.

Measurement Equipment

Description	Manufacturer	Model	Identifier	Last Cal	Interval
Spectrum Analyzer	Hewlett Packard	8593E	AAP	02/26/2003	12 mo
Near Field Probe	EMCO	7405	IPD	No Cal Required	N/A
Digital Multimeter	Tektronix	DMM912	MMH	06/02/2003	12 mo
DC Power Supply	Topward	TPS-2000	TPD	No Cal Required	N/A
Temperature / Humidity Chamber	Cincinnati Sub-Zero	ZH-32-2-H/AC	TBA	09/20/2002	12 mo

Test Description

Requirement: Per 47 CFR 2.1055, and 95.1115 (e), the frequency stability shall be measured with variation of ambient temperature and primary supply voltage. A spectrum analyzer or frequency counter can be used to measure the frequency stability. If using a spectrum analyzer, it must have a precision frequency reference that exceeds the stability requirement of the transmitter. A temperature / humidity chamber is required.

Configuration:

Variation of Supply Voltage

The primary supply voltage was varied from 85% to 115% of nominal. The EUT can only be battery operated, so a DC lab supply was used to vary the supply voltage up to 115% of 9V and down to the EUT's voltage end point.

Variation of Ambient Temperature

Using a temperature chamber, the transmit frequency was recorded at the extremes of the specified temperature range (-30° to +50° C) and at 10°C intervals.

The antenna is integral to the EUT, so a radiated measurement was made using a spectrum analyzer and a near field probe. The spectrum analyzer is equipped with a precision frequency reference that exceeds the stability requirement of the EUT.

Completed by:



NORTHWEST EMC		EMISSIONS DATA SHEET		Rev BETA 01/30/01	
EUT: 91341-09			Work Order: SPAC0344		
Serial Number: P4-22			Date: 08/19/03		
Customer: SpaceLabs Inc.			Temperature: see below		
Attendees: N/A		Tested by: Rod Peloquin		Humidity: 30% RH	
Customer Ref. No.: N/A		Power: See below		Job Site: EV09	
TEST SPECIFICATIONS					
Specification: 47 CFR 2.1055		Year: Most Current		Method: TIA/EIA - 603	
				Year: 1993	
SAMPLE CALCULATIONS					
COMMENTS					
EUT OPERATING MODES					
Transmitting					
DEVIATIONS FROM TEST STANDARD					
None					
REQUIREMENTS					
The frequency stability shall be measured with variation of ambient temperature and primary supply voltage.					
RESULTS					
MINIMUM FREQUENCY STABILITY					
Pass 1.00 ppm					
SIGNATURE					
Tested By: _____					
DESCRIPTION OF TEST					
Frequency Stability					

Frequency Stability with Variation of Ambient Temperature (Primary Supply = 9VDC)

Temp (°C)	Assigned Frequency (MHz)	Measured Frequency (MHz)	Tolerance (ppm)	Specification (ppm)
-30	1395.025000	1395.024170	0.59	n/a
-20	1395.025000	1395.023740	0.90	n/a
-10	1395.025000	1395.023600	1.00	n/a
0	1395.025000	1395.024210	0.57	n/a
10	1395.025000	1395.024150	0.61	n/a
20	1395.025000	1395.024210	0.57	n/a
30	1395.025000	1395.024430	0.41	n/a
40	1395.025000	1395.024180	0.59	n/a
50	1395.025000	1395.024130	0.62	n/a

Frequency Stability with Variation of Battery Voltage (Ambient Temperature = 25°C)

Voltage (VDC)	Assigned Frequency (MHz)	Measured Frequency (MHz)	Tolerance (ppm)	Specification (ppm)
10.35 (115%)	1395.025000	1395.024430	0.41	n/a
9.9 (110%)	1395.025000	1395.024430	0.41	n/a
9.45 (105%)	1395.025000	1395.024430	0.41	n/a
9 (100%)	1395.025000	1395.024430	0.41	n/a
8.55 (95%)	1395.025000	1395.024430	0.41	n/a
8.1 (90%)	1395.025000	1395.024430	0.41	n/a
7.65 (85%)	1395.025000	1395.024430	0.41	n/a
5.5 (end point)	1395.025000	1395.024430	0.41	n/a

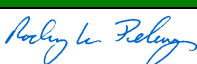
NORTHWEST EMC		EMISSIONS DATA SHEET		Rev BETA 01/30/01	
EUT: 91341-09			Work Order: SPAC0344		
Serial Number: P4-22			Date: 08/19/03		
Customer: SpaceLabs Inc.			Temperature: see below		
Attendees: N/A		Tested by: Rod Peloquin		Humidity: 30% RH	
Customer Ref. No.: N/A		Power: See below		Job Site: EV09	
TEST SPECIFICATIONS					
Specification: 47 CFR 2.1055		Year: Most Current		Method: TIA/EIA - 603	
				Year: 1993	
SAMPLE CALCULATIONS					
COMMENTS					
EUT OPERATING MODES					
Transmitting					
DEVIATIONS FROM TEST STANDARD					
None					
REQUIREMENTS					
The frequency stability shall be measured with variation of ambient temperature and primary supply voltage.					
RESULTS					
MINIMUM FREQUENCY STABILITY					
Pass 1.56 ppm					
SIGNATURE					
Tested By: _____					
DESCRIPTION OF TEST					
Frequency Stability					

Frequency Stability with Variation of Ambient Temperature (Primary Supply = 9VDC)

Temp (°C)	Assigned Frequency (MHz)	Measured Frequency (MHz)	Tolerance (ppm)	Specification (ppm)
-30	1399.975000	1399.972820	1.56	n/a
-20	1399.975000	1399.973950	0.75	n/a
-10	1399.975000	1399.974000	0.71	n/a
0	1399.975000	1399.973960	0.74	n/a
10	1399.975000	1399.974380	0.44	n/a
20	1399.975000	1399.974300	0.50	n/a
30	1399.975000	1399.974420	0.41	n/a
40	1399.975000	1399.974160	0.60	n/a
50	1399.975000	1399.974130	0.62	n/a

Frequency Stability with Variation of Battery Voltage (Ambient Temperature = 25°C)

Voltage (VDC)	Assigned Frequency (MHz)	Measured Frequency (MHz)	Tolerance (ppm)	Specification (ppm)
10.35 (115%)	1399.975000	1399.974420	0.41	n/a
9.9 (110%)	1399.975000	1399.974420	0.41	n/a
9.45 (105%)	1399.975000	1399.974420	0.41	n/a
9 (100%)	1399.975000	1399.974420	0.41	n/a
8.55 (95%)	1399.975000	1399.974420	0.41	n/a
8.1 (90%)	1399.975000	1399.974420	0.41	n/a
7.65 (85%)	1399.975000	1399.974420	0.41	n/a
5.5 (end point)	1399.975000	1399.974420	0.41	n/a

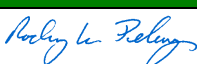
NORTHWEST EMC		EMISSIONS DATA SHEET		Rev BETA 01/30/01	
EUT: 91341-09			Work Order: SPAC0344		
Serial Number: P4-22			Date: 08/19/03		
Customer: SpaceLabs Inc.			Temperature: see below		
Attendees: N/A		Tested by: Rod Peloquin		Humidity: 30% RH	
Customer Ref. No.: N/A		Power: See below		Job Site: EV09	
TEST SPECIFICATIONS					
Specification: 47 CFR 2.1055		Year: Most Current		Method: TIA/EIA - 603	
				Year: 1993	
SAMPLE CALCULATIONS					
COMMENTS					
EUT OPERATING MODES					
Transmitting					
DEVIATIONS FROM TEST STANDARD					
None					
REQUIREMENTS					
The frequency stability shall be measured with variation of ambient temperature and primary supply voltage.					
RESULTS					
MINIMUM FREQUENCY STABILITY					
Pass 1.64 ppm					
SIGNATURE					
 Tested By: _____					
DESCRIPTION OF TEST					
Frequency Stability					

Frequency Stability with Variation of Ambient Temperature (Primary Supply = 9VDC)

Temp (°C)	Assigned Frequency (MHz)	Measured Frequency (MHz)	Tolerance (ppm)	Specification (ppm)
-30	1427.025000	1427.022680	1.63	n/a
-20	1427.025000	1427.022940	1.44	n/a
-10	1427.025000	1427.024020	0.69	n/a
0	1427.025000	1427.024020	0.69	n/a
10	1427.025000	1427.024000	0.70	n/a
20	1427.025000	1427.024350	0.46	n/a
30	1427.025000	1427.024400	0.42	n/a
40	1427.025000	1427.024120	0.62	n/a
50	1427.025000	1427.024110	0.62	n/a

Frequency Stability with Variation of Battery Voltage (Ambient Temperature = 25°C)

Voltage (VDC)	Assigned Frequency (MHz)	Measured Frequency (MHz)	Tolerance (ppm)	Specification (ppm)
10.35 (115%)	1427.025000	1427.024400	0.42	n/a
9.9 (110%)	1427.025000	1427.024400	0.42	n/a
9.45 (105%)	1427.025000	1427.024400	0.42	n/a
9 (100%)	1427.025000	1427.024400	0.42	n/a
8.55 (95%)	1427.025000	1427.024400	0.42	n/a
8.1 (90%)	1427.025000	1427.024400	0.42	n/a
7.65 (85%)	1427.025000	1427.024400	0.42	n/a
5.25 (end point)	1427.025000	1427.024400	0.42	n/a

NORTHWEST EMC		EMISSIONS DATA SHEET		Rev BETA 01/30/01	
EUT: 91341-09			Work Order: SPAC0344		
Serial Number: P4-22			Date: 08/19/03		
Customer: SpaceLabs Inc.			Temperature: see below		
Attendees: N/A		Tested by: Rod Peloquin	Humidity: 30% RH		
Customer Ref. No.: N/A		Power: See below	Job Site: EV09		
TEST SPECIFICATIONS					
Specification: 47 CFR 2.1055		Year: Most Current	Method: TIA/EIA - 603	Year: 1993	
SAMPLE CALCULATIONS					
COMMENTS					
EUT OPERATING MODES					
Transmitting					
DEVIATIONS FROM TEST STANDARD					
None					
REQUIREMENTS					
The frequency stability shall be measured with variation of ambient temperature and primary supply voltage.					
RESULTS					
MINIMUM FREQUENCY STABILITY					
Pass 1.56 ppm					
SIGNATURE					
 Tested By: _____					
DESCRIPTION OF TEST					
Frequency Stability					

Frequency Stability with Variation of Ambient Temperature (Primary Supply = 9VDC)

Temp (°C)	Assigned Frequency (MHz)	Measured Frequency (MHz)	Tolerance (ppm)	Specification (ppm)
-30	1431.475000	1431.472760	1.56	n/a
-20	1431.475000	1431.473250	1.22	n/a
-10	1431.475000	1431.474170	0.58	n/a
0	1431.475000	1431.474070	0.65	n/a
10	1431.475000	1431.474370	0.44	n/a
20	1431.475000	1431.474320	0.48	n/a
30	1431.475000	1431.474440	0.39	n/a
40	1431.475000	1431.474140	0.60	n/a
50	1431.475000	1431.474110	0.62	n/a

Frequency Stability with Variation of Battery Voltage (Ambient Temperature = 25°C)

Voltage (VDC)	Assigned Frequency (MHz)	Measured Frequency (MHz)	Tolerance (ppm)	Specification (ppm)
10.35 (115%)	1431.475000	1431.474380	0.43	n/a
9.9 (110%)	1431.475000	1431.474380	0.43	n/a
9.45 (105%)	1431.475000	1431.474440	0.39	n/a
9 (100%)	1431.475000	1431.474440	0.39	n/a
8.55 (95%)	1431.475000	1431.474440	0.39	n/a
8.1 (90%)	1431.475000	1431.474440	0.39	n/a
7.65 (85%)	1431.475000	1431.474440	0.39	n/a
5.25 (end point)	1431.475000	1431.474400	0.42	n/a

