FCC CFR47 PART 95H REQUIREMENT

CERTIFICATION TEST REPORT

FOR

MEDICAL TELEMETRY TRANSMITTER

MODEL: ZM-541PA

FCC ID: B6BZM-541PA

REPORT NUMBER: 10J13419-5, REVISION A

ISSUE DATE: OCTOBER 21, 2010

Prepared for
NIHON KOHDEN CORPORATION
1-31-4, NISHIOCHIAI SHINJUKU-KU
TOKYO 161-8560, JAPAN

Prepared by
COMPLIANCE CERTIFICATION SERVICES
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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
---	10/18/10	Initial Issue	T. Chan
A	10/21/10	Corrected Limit Typo on Page 10, Updated Data on Page 11, and Name Change UL CCS	T. Chan

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: NIHON KOHDEN CORPORATION
1-31-4, NISHIOCHIAI SHINJUKU-KU
TOKYO 161-8560, JAPAN

EUT DESCRIPTION: MEDICAL TELEMETRY TRANSMITTER

MODEL: ZM-541PA

SERIAL NUMBER: 00158

DATE TESTED: SEPTEMBER 27-28, 2010

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
FCC PART 95 SUBPART H	Pass

Compliance Certification Services (UL CCS) tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL CCS based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL CCS and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL CCS will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

Approved & Released For UL CCS By: Tested By:

THU CHAN
EMC MANAGER
UL CCS

CHIN PANG
EMC ENGINEER
UL CCS

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI/TIA-603-C-2004, FCC CFR 47 Part 2 and FCC CFR 47 Part 95.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 Benicia Street, Fremont, California, USA.

CCS is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at http://www.ccsemc.com.

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)

36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

4.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
Conducted Disturbance, 0.15 to 30 MHz	3.52 dB
Radiated Disturbance, 30 to 1000 MHz	4.94 dB

Uncertainty figures are valid to a confidence level of 95%.

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

a).	Type of EUT:	WMTS TRANSMITTER
b).	Brand Name:	NIHON KOHDEN
c).	Model No:	ZM-541PA
d).	FCC ID:	B6BZM-541PA
e).	Battery Type:	Three AA (R6)
f).	Channel Number:	1395.0250 MHz (channel number E002) to 1399.9750 MHz (channel number E390), and 1427.0250 MHz (channel number E502) to 1431.9750 MHz (channel number E898)
g).	Frequency Range:	1395.025-1399.975 MHz and 1427.025-1431.975 MHz bands
h).	RF Conducted Output Power:	5mW (factory default setting) or 1mW
i).	Channel Spacing:	50 KHz or 37.5 kHz (12.5 KHz when interleave)
j).	Modulation	Frequency Shift Keying
k).	Type of Modulation:	F1D
l).	Occupied Bandwidth	<20 kHz
m).	Antenna Type:	Internal

5.2. DESCRIPTION OF CLASS II PERMISSIVE CHANGE

The major change filed under this application is changing the antenna.

5.3. MAXIMUM OUTPUT POWER

The test measurement passed within ± 0.5dBm of the original output power.

5.4. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a Helical Monopole antenna, with a maximum gain of 0 dBi.

5.5. SOFTWARE AND FIRMWARE

The test utility software used during testing was Channel Writer, rev. 02-04.

5.6. WORST-CASE CONFIGURATION AND MODE

The worst-case channel is determined as the channel with the highest output power.

During emission tests the antenna orientations as X, Y, and Z were investigated to determine the worst-case. The outcome showed that X-orientation as the worst-case.

5.7. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Laptop	Lenovo	T61	L3-A1589	DoC
AC/DC Adapter	Lenovo	PA-1650-171	11S92P1160Z1ZBGH74LH2M	DoC
Channel Writer	Nihon Kohden	QI-901PK	28	N/A

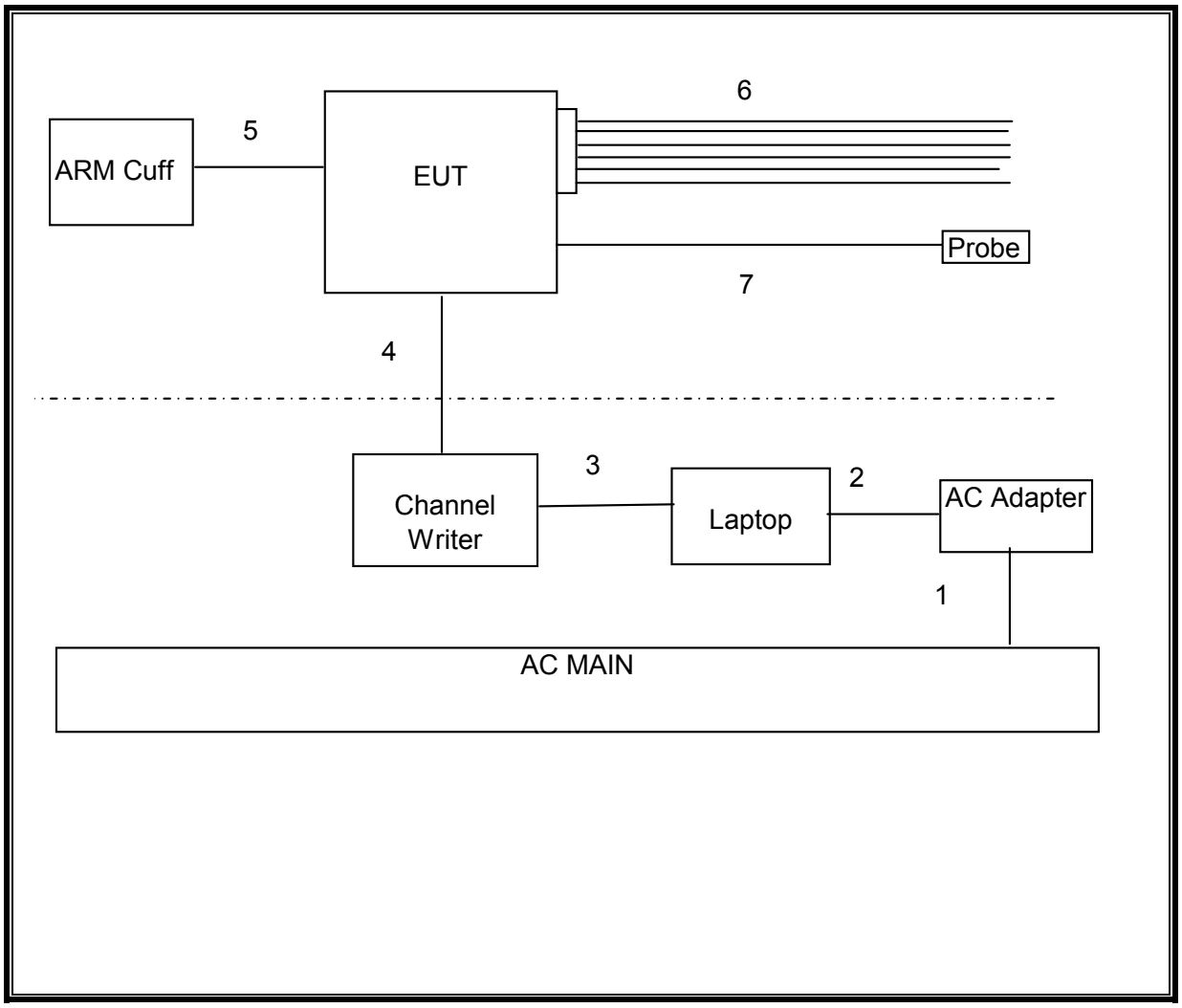
I/O CABLES

I/O CABLE LIST						
Cable No.	**Port**	**# of Identical Ports**	**Connector Type**	**Cable Type**	**Cable Length**	**Remarks**
1	AC	1	US 115V	Un-shielded	2m	Connect Arm Cuff
2	Video	1	DB15	Shielded	1m	N/A
3	USB	1	USB	Un-shielded	1.2m	N/A
4	ECG	1	Channel Writer	Un-shielded	0.3m	N/A
5	NIBP	1	NIBP socket	Rubber	0.3 m	Connect Arm Cuff
6	ECG	1	ECG	Un-shielded	0.7 m	N/A
7	Sp02	1	Sp02	Un-shielded	1.6 m	Probe

TEST SETUP

The EUT is standalone unit and just use a host laptop computer to configure the mode during the tests. Test software exercised the radio card.

SETUP DIAGRAM FOR TESTS (Radiated test)



6. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

TEST EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Asset**	**Cal Due**
Spectrum Analyzer, 26.5 GHz	Agilent / HP	E4440A	C01176	8/10/2011
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00778	1/16/2011
Antenna, Bilog, 2 GHz	Sunol Sciences	JB1	C01011	7/12/2011
Antenna, Horn, 18 GHz	EMCO	3115	C00783	6/29/2011
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C01063	7/14/2011

7. RADIATED EMISSION TEST RESULTS

LIMITS

§95.1115
(a) Field strength limits
(2) In the 1395–1400 MHz and 1427–1429.5 MHz bands, the maximum allowable field strength is 740 mV/m as measured at a distance of 3 meters, using measuring equipment with an averaging detector and a 1 MHz measurement bandwidth.

(b) Undesired emissions.
(1) Out-of-band emissions below 960 MHz are limited to 200 microvolts/meter, as measured at a distance of 3 meters, using measuring instrumentation with a CISPR quasi-peak detector.
(2) Out-of-band emissions above 960 MHz are limited to 500 microvolts/meter as measured at a distance of 3 meters, using measuring equipment with an averaging detector and a 1 MHz measurement bandwidth.

TEST PROCEDURE

ANSI/TIA-603-C-2004

RESULTS

7.1. FUNDAMENTAL OUTPUT POWER

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Company:	**Nihon Kohden**
EUT Description:	**Medical Telemetry Transmitter**
Project #:	**10J13419**
Date:	**09/24/10**
Test Engineer:	**Chin Pang**
Configuration:	**EUT Only**
Model:	**ZM-541PA**
Mode:	**TX**

f GHz	Dist (m)	Read Pk dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg Lim dBuV/m	Margin dB	Notes (V/H)
1.395	3.0	68.1	25.4	2.6	0.0	0.0	0.0	96.0	117.4	-21.4	V
1.395	3.0	68.9	25.4	2.6	0.0	0.0	0.0	96.8	117.4	-20.6	H
1.400	3.0	68.8	25.4	2.6	0.0	0.0	0.0	96.8	117.4	-20.6	V
1.400	3.0	70.4	25.4	2.6	0.0	0.0	0.0	98.3	117.4	-19.1	H
1.427	3.0	69.6	25.5	2.6	0.0	0.0	0.0	97.7	117.4	-19.7	V
1.427	3.0	71.5	25.5	2.6	0.0	0.0	0.0	99.6	117.4	-17.8	H
1.432	3.0	69.3	25.5	2.6	0.0	0.0	0.0	97.4	117.4	-20.0	V
1.432	3.0	70.7	25.5	2.6	0.0	0.0	0.0	98.8	117.4	-18.6	H

Rev. 07.22.09

f	Measurement Frequency	Amp	Preamp Gain	Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength	Margin vs. Peak Limit
CL	Cable Loss	HPF	High Pass Filter	

7.2. RADIATED EMISSIONS BELOW 960 MHz

Note 1: The measurements in this section show that Peak values are less than the Quasi-Peak limit.

Note 2: Plots in the range of 960 to 1000 MHz in this section are shown for reporting purposes only.

SPURIOUS EMISSIONS 30 TO 960 MHz (DATA)

1395.025MHz

30-1000MHz Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

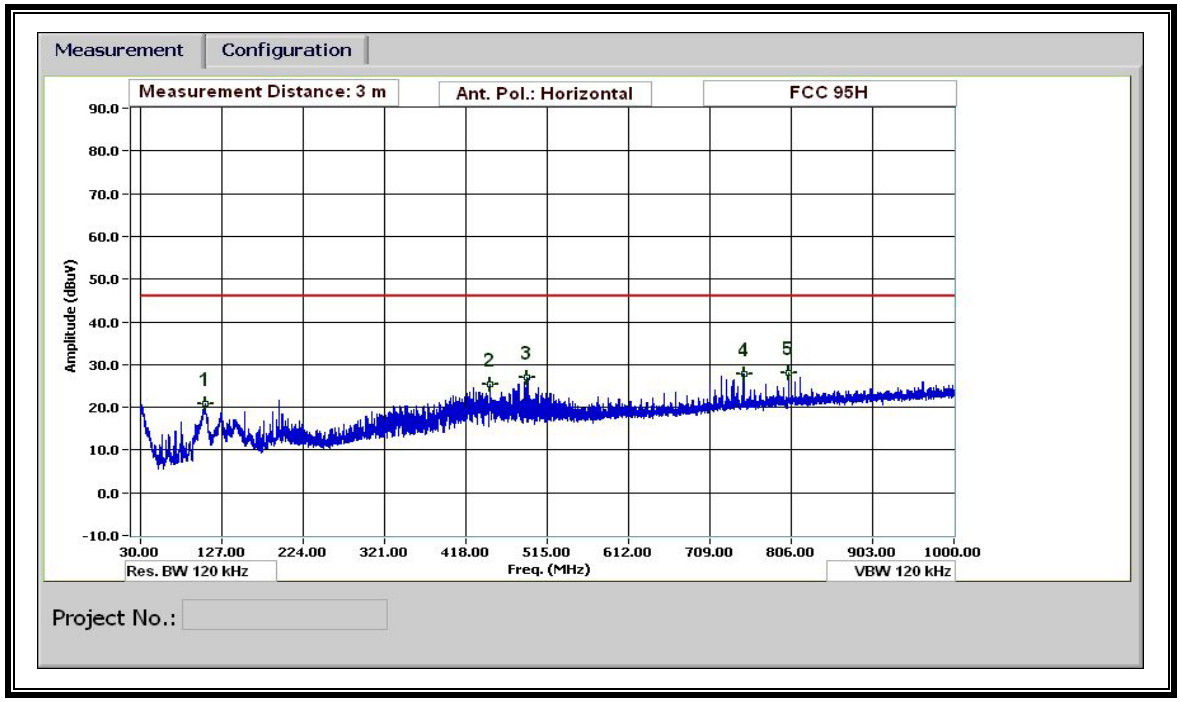
Company: Nihon Kohden
EUT Description: Medical Telemetry Transmitter
Project #: 10J13419
Date: 9/24/2010
Test Engineer: Chin Pang
Configuration: EUT Only
Model: ZM-541PA
Mode: TX, 1395.025MHz

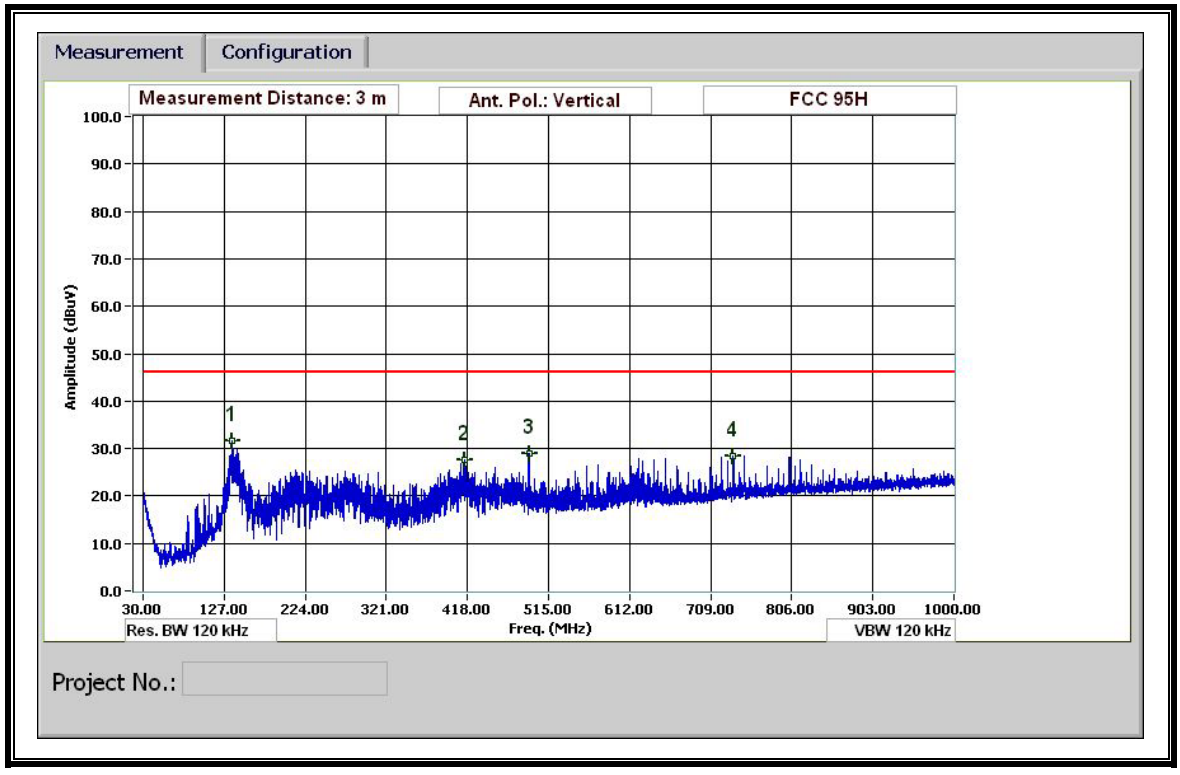
f	Measurement Frequency	Amp	Preamp Gain
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters
Read	Analyzer Reading	Filter	Filter Insert Loss
AF	Antenna Factor	Corr.	Calculated Field Strength
CL	Cable Loss	Limit	Field Strength Limit

Margin Margin vs. Limit

f MHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Pad dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
107.163	3.0	38.1	11.4	0.9	29.5	0.0	0.0	20.9	46.0	-25.1	H	P	
447.377	3.0	37.0	15.9	2.0	29.5	0.0	0.0	25.4	46.0	-20.6	H	P	
491.419	3.0	38.0	16.6	2.1	29.7	0.0	0.0	27.1	46.0	-18.9	H	P	
749.19	3.0	34.2	20.1	2.7	29.4	0.0	0.0	27.7	46.0	-18.3	H	P	
803.312	3.0	33.4	21.0	2.8	29.1	0.0	0.0	28.1	46.0	-17.9	H	P	
135.844	3.0	46.6	13.4	1.0	29.4	0.0	0.0	31.7	46.0	-14.3	V	P	
415.096	3.0	39.7	15.3	1.9	29.4	0.0	0.0	27.5	46.0	-18.5	V	P	
491.539	3.0	39.8	16.7	2.1	29.7	0.0	0.0	28.9	46.0	-17.1	V	P	
735.749	3.0	35.2	19.9	2.7	29.4	0.0	0.0	28.4	46.0	-17.6	V	P	

SPURIOUS EMISSIONS 30 TO 960 MHz (PLOTS)





SPURIOUS EMISSIONS 30 TO 960 MHz (DATA)

1399.975MHz

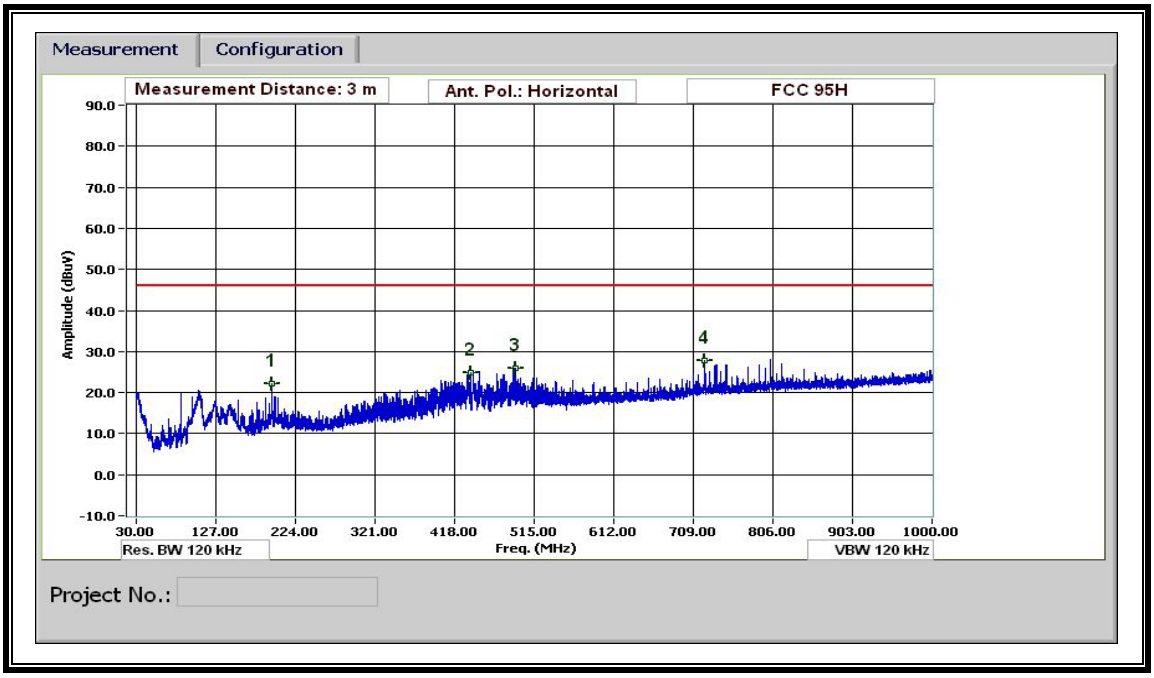
30-1000MHz Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

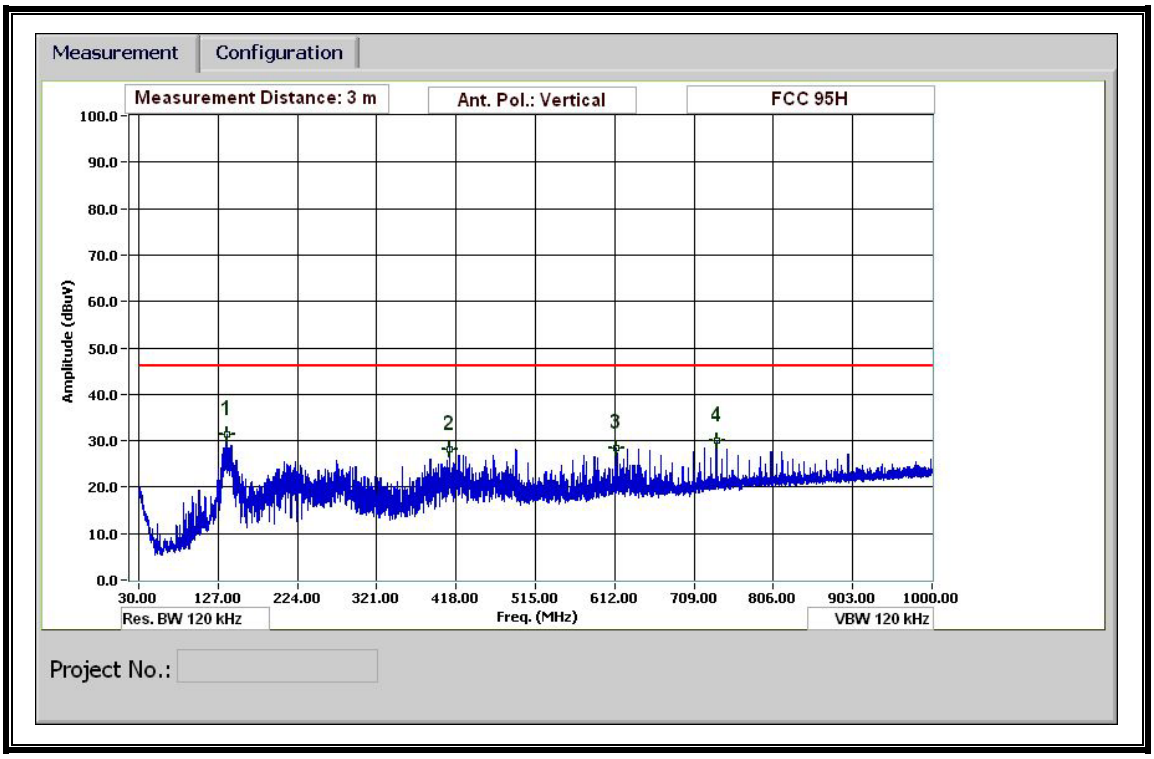
Test Engr: Nihon Kohden
Date: Medical Telemetry Transmitter
Project #: 10J13419
Company: #######
EUT Description: Chin Pang
Test Target: EUT Only
Model: ZM-541PA
Mode Oper: TX, 1399.975MHz

f	Measurement Frequency	Amp	Preamp Gain	Margin	Margin vs. Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters		
Read	Analyzer Reading	Filter	Filter Insert Loss		
AF	Antenna Factor	Corr.	Calculated Field Strength		
CL	Cable Loss	Limit	Field Strength Limit		

f MHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Pad dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
195.367	3.0	38.2	11.6	1.3	28.9	0.0	0.0	22.1	46.0	-23.9	H	P	
437.417	3.0	36.7	15.7	2.0	29.5	0.0	0.0	25.0	46.0	-21.0	H	P	
491.539	3.0	36.8	16.7	2.1	29.7	0.0	0.0	25.8	46.0	-20.2	H	P	
722.309	3.0	34.9	19.6	2.6	29.5	0.0	0.0	27.7	46.0	-18.3	H	P	
138.244	3.0	46.3	13.3	1.1	29.4	0.0	0.0	31.2	46.0	-14.8	V	P	
409.936	3.0	40.2	15.2	1.9	29.3	0.0	0.0	28.0	46.0	-18.0	V	P	
614.304	3.0	37.2	18.4	2.4	29.6	0.0	0.0	28.4	46.0	-17.6	V	P	
737.189	3.0	36.8	19.9	2.7	29.4	0.0	0.0	30.0	46.0	-16.0	V	P	

SPURIOUS EMISSIONS 30 TO 960 MHz (PLOTS)





SPURIOUS EMISSIONS 30 TO 960 MHz (DATA)

1427.025MHz

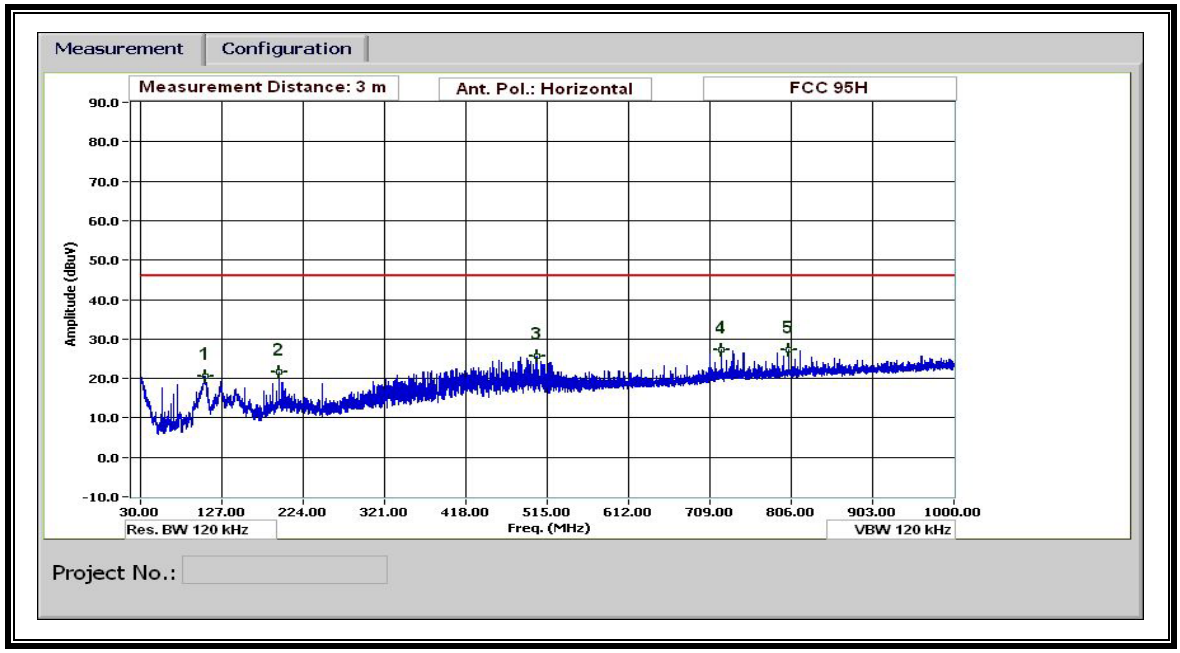
30-1000MHz Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

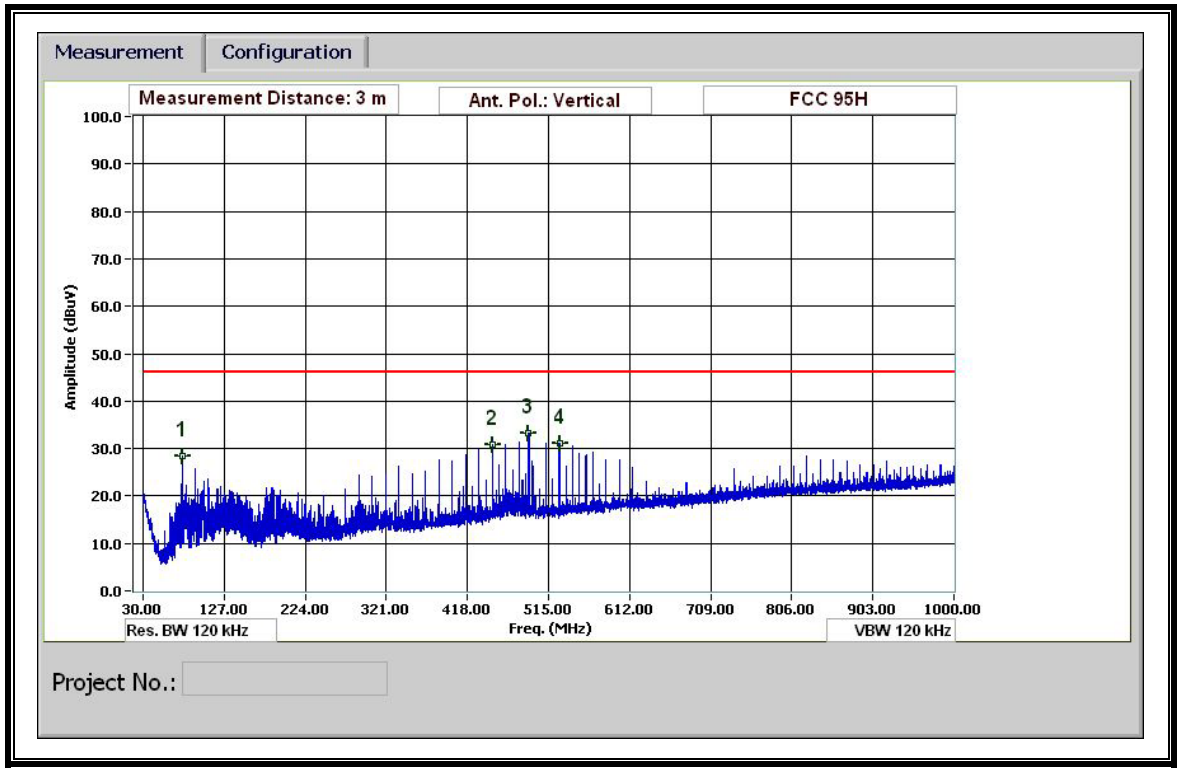
Test Engr: Nihon Kohden
Date: Medical Telemetry Transmitter
Project #: 10J13419
Company: #######
EUT Description: Chin Pang
Test Target: EUT Only
Model: ZM-541PA
Mode Oper: TX, 1427.025MHz

f	Measurement Frequency	Amp	Preamp Gain	Margin	Margin vs. Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters		
Read	Analyzer Reading	Filter	Filter Insert Loss		
AF	Antenna Factor	Corr.	Calculated Field Strength		
CL	Cable Loss	Limit	Field Strength Limit		

f MHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Pad dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Notes
76.802	3.0	49.4	7.8	0.8	29.6	0.0	0.0	28.4	46.0	-17.6	V	P	
447.977	3.0	42.6	15.9	2.0	29.5	0.0	0.0	31.0	46.0	-15.0	V	P	
491.419	3.0	44.3	16.6	2.1	29.7	0.0	0.0	33.4	46.0	-12.6	V	P	
528.021	3.0	41.3	17.2	2.2	29.7	0.0	0.0	31.0	46.0	-15.0	V	P	
106.563	3.0	37.9	11.3	0.9	29.5	0.0	0.0	20.6	46.0	-25.4	H	P	
195.367	3.0	37.8	11.6	1.3	28.9	0.0	0.0	21.7	46.0	-24.3	H	P	
502.819	3.0	36.4	16.8	2.1	29.7	0.0	0.0	25.7	46.0	-20.3	H	P	
722.309	3.0	34.5	19.6	2.6	29.5	0.0	0.0	27.3	46.0	-18.7	H	P	
803.192	3.0	32.6	21.0	2.8	29.1	0.0	0.0	27.3	46.0	-18.7	H	P	

SPURIOUS EMISSIONS 30 TO 960 MHz (PLOTS)





SPURIOUS EMISSIONS 30 TO 960 MHz (DATA)

1431.975MHz

30-1000MHz Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

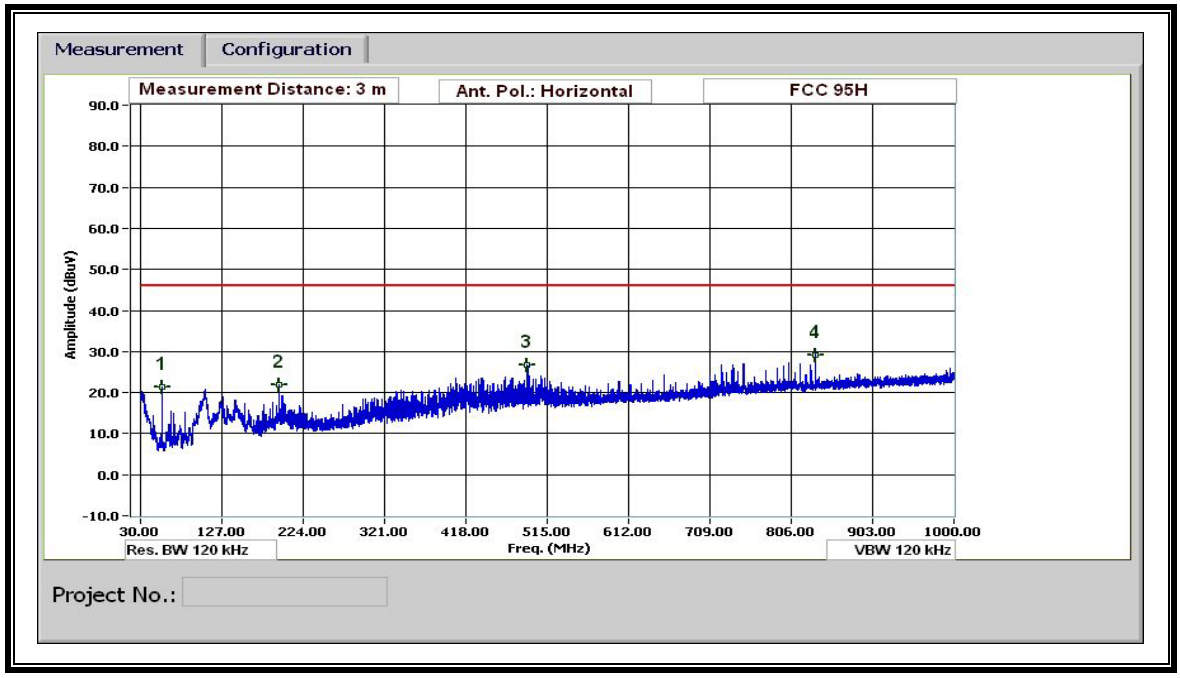
Test Engr: Nihon Kohden
Date: Medical Telemetry Transmitter
Project #: 10J13419
Company: #######
EUT Description: Chin Pang
Test Target: EUT Only
Model: ZM-541PA
Mode Oper: TX, 1431.975MHz

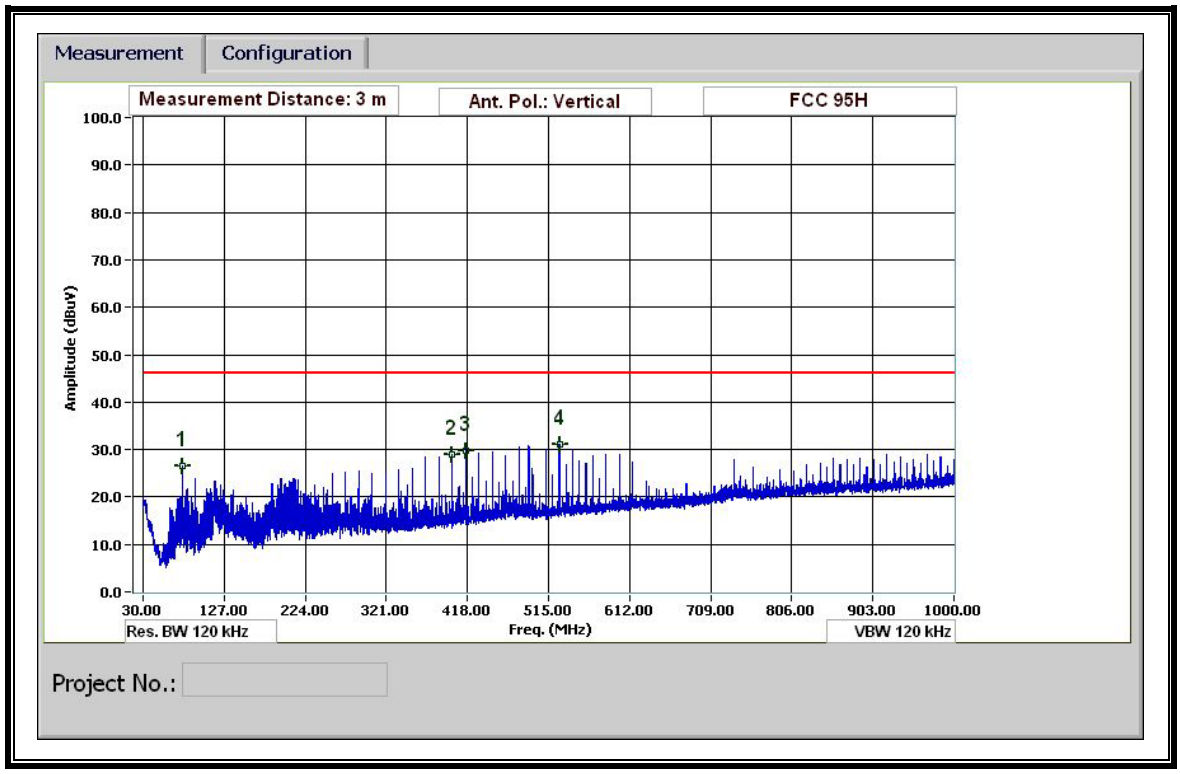
f	Measurement Frequency	Amp	Preamp Gain
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters
Read	Analyzer Reading	Filter	Filter Insert Loss
AF	Antenna Factor	Corr.	Calculated Field Strength
CL	Cable Loss	Limit	Field Strength Limit

Margin Margin vs. Limit

f MHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Pad dB	Corr. dBuV/m	Limit dBuV/m	Margin dB	Ant. Pol. V/H	Det. P/A/QP	Table Angle Degree	Notes
55.201	3.0	42.3	7.9	0.6	29.6	0.0	0.0	21.2	46.0	-24.8	H	P		
195.367	3.0	37.8	11.6	1.3	28.9	0.0	0.0	21.8	46.0	-24.2	H	P		
491.299	3.0	37.7	16.6	2.1	29.7	0.0	0.0	26.8	46.0	-19.2	H	P		
834.753	3.0	33.9	21.2	2.9	29.0	0.0	0.0	29.0	46.0	-17.0	H	P		
76.802	3.0	47.5	7.8	0.8	29.6	0.0	0.0	26.5	46.0	-19.5	V	P		
399.975	3.0	41.3	15.0	1.9	29.3	0.0	0.0	28.9	46.0	-17.1	V	P		
416.056	3.0	41.8	15.3	1.9	29.4	0.0	0.0	29.7	46.0	-16.4	V	P		
528.021	3.0	41.5	17.2	2.2	29.7	0.0	0.0	31.2	46.0	-14.8	V	P		

SPURIOUS EMISSIONS 30 TO 960 MHz (PLOTS)





7.3. RADIATED EMISSIONS ABOVE 960 MHz

HARMONICS AND TX SPURIOUS EMISSIONS ABOVE 960 MHz

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Company:	Nihon Kohden
EUT Description:	Medical Telemetry Transmitter
Project #:	10J13419
Date:	09/24/10
Test Engineer:	Chin Pang
Configuration:	EUT Only
Model:	ZM-541PA
Mode:	TX

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Hom > 18GHz	Limit
T59; S/N: 3245 @3m	T145 Agilent 3008A005E			FCC 15.209

Hi Frequency Cables

3' cable 22807700	12' cable 22807600	20' cable 22807500	HPF	Reject Filter
3' cable 22807700	12' cable 22807600	20' cable 22807500	HPF_1GHz	

Peak Measurements
RBW=VBW=1MHz
Average Measurements
RBW=1MHz ; VBW=10Hz

f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Corr. dBuV/m	Limit dBuV/m	Det. P/A/QP	Margin dB	Notes (V/H)
1395.025MHz												
2.791	3.0	38.7	29.4	4.2	-35.2	0.0	0.6	37.6	54	A	-16.4	V
5.580	3.0	38.3	33.6	6.3	-35.0	0.0	0.5	43.7	54	A	-10.3	V
6.975	3.0	38.6	34.7	7.1	-34.7	0.0	0.6	46.3	54	A	-7.7	V
2.791	3.0	38.3	29.4	4.2	-35.2	0.0	0.6	37.3	54	A	-16.7	V
4.185	3.0	38.5	32.3	5.3	-34.8	0.0	0.6	41.9	54	A	-12.1	H
5.580	3.0	36.7	33.6	6.3	-35.0	0.0	0.5	42.1	54	A	-11.9	H
1399.975MHz												
2.800	3.0	38.8	29.4	4.2	-35.2	0.0	0.6	37.8	54	A	-16.2	V
4.200	3.0	38.5	32.3	5.3	-34.8	0.0	0.6	41.9	54	A	-12.1	V
5.600	3.0	38.9	33.6	6.3	-35.0	0.0	0.5	44.3	54	A	-9.7	V
2.800	3.0	39.2	29.4	4.2	-35.2	0.0	0.6	38.2	54	A	-15.8	H
4.200	3.0	38.0	32.3	5.3	-34.8	0.0	0.6	41.4	54	A	-12.6	H
5.600	3.0	37.5	33.6	6.3	-35.0	0.0	0.5	42.9	54	A	-11.1	H
1427.025MHz												
2.854	3.0	40.1	29.6	4.2	-35.2	0.0	0.6	39.3	54	A	-14.7	V
4.281	3.0	38.0	32.3	5.4	-34.8	0.0	0.6	41.5	54	A	-12.5	V
5.708	3.0	39.0	33.7	6.4	-35.1	0.0	0.5	44.4	54	A	-9.6	V
2.854	3.0	39.3	29.6	4.2	-35.2	0.0	0.6	38.5	54	A	-15.5	H
4.281	3.0	37.8	32.3	5.4	-34.8	0.0	0.6	41.3	54	A	-12.7	H
5.708	3.0	39.5	33.7	6.4	-35.1	0.0	0.5	44.9	54	A	-9.1	H
1431.975MHz												
2.864	3.0	43.0	29.6	4.2	-35.2	0.0	0.6	42.2	54	A	-11.8	V
4.296	3.0	38.0	32.4	5.4	-34.8	0.0	0.6	41.6	54	A	-12.4	V
5.728	3.0	41.1	33.7	6.4	-35.1	0.0	0.5	46.5	54	A	-7.5	V
7.160	3.0	38.9	35.0	7.2	-34.7	0.0	0.6	47.0	54	A	-7.0	V
2.864	3.0	42.9	29.6	4.2	-35.2	0.0	0.6	42.1	54	A	-11.9	H
4.296	3.0	37.5	32.4	5.4	-34.8	0.0	0.6	41.1	54	A	-12.9	H
5.728	3.0	40.6	33.7	6.4	-35.1	0.0	0.5	46.0	54	A	-8.0	H
7.160	3.0	39.0	35.0	7.2	-34.7	0.0	0.6	47.1	54	A	-6.9	H

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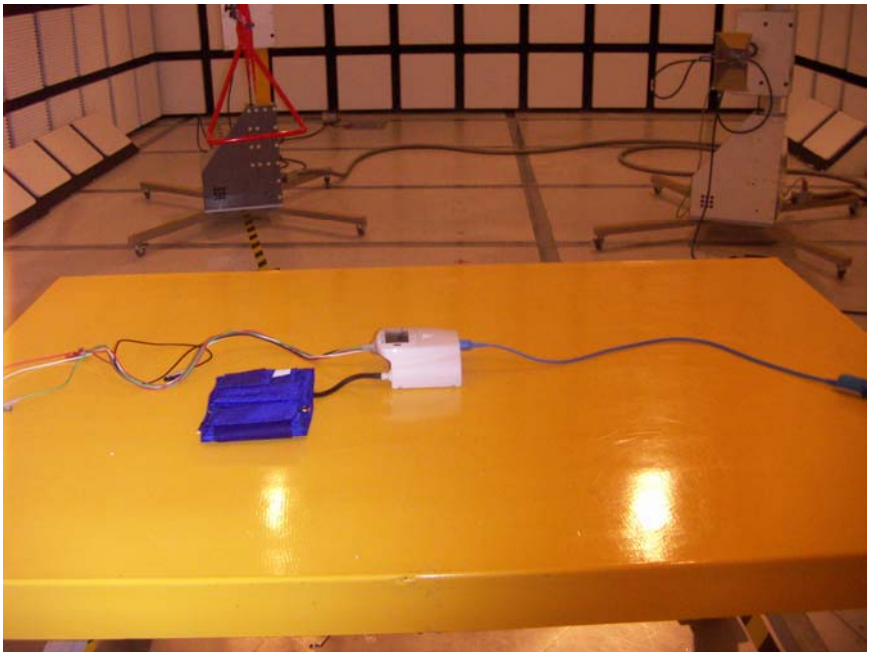
Note: No other emissions were detected above the system noise floor.

8. SETUP PHOTOS

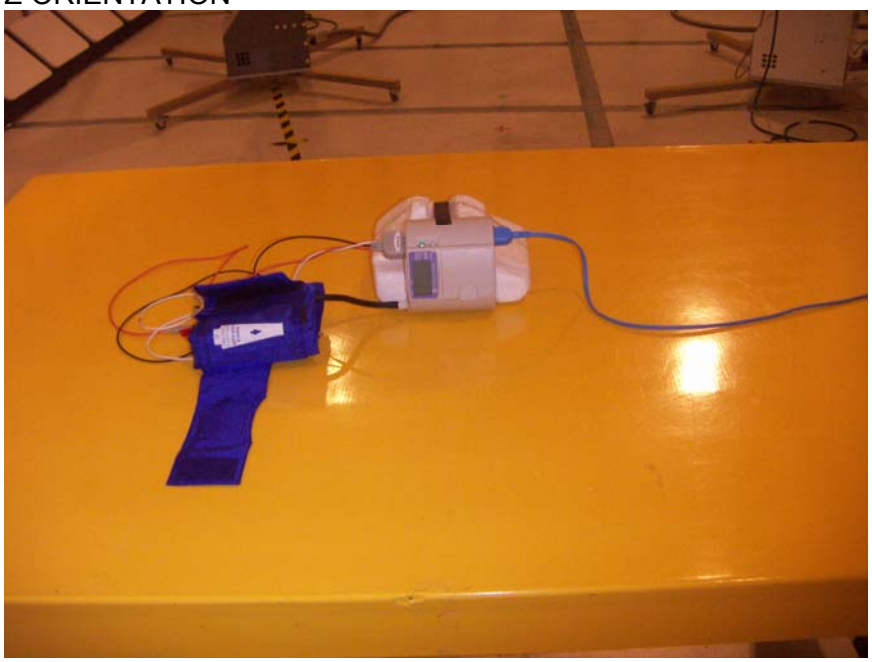
RADIATED EMISSION FOR PORTABLE CONFIGURATION

X ORIENTATION



Y ORIENTATION

Z ORIENTATION



END OF REPORT