



**FCC CFR47 PART 95H REQUIREMENT**

**CERTIFICATION TEST REPORT**

**FOR**

**MEDICAL TELEMETRY TRANSMITTER**

**MODEL: ZM-540PA**

**FCC ID: B6BZM-540PA**

**REPORT NUMBER: 10J13419-2, REVISION A**

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**Prepared for  
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1-31-4, NISHIOCHIAI SHINJUKU-KU  
TOKYO 161-8560, JAPAN**

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**NVLAP LAB CODE 200065-0**

Revision History

<u>Rev.</u>	<u>Issue Date</u>	<u>Revisions</u>	<u>Revised By</u>
---	10/18/10	Initial Issue	T. Chan
A	10/21/10	Corrected Limit Typo on Page 10 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-540PA

**SERIAL NUMBER:** 00169

**DATE TESTED:** SEPTEMBER 24-25 , 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:



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THU CHAN  
EMC MANAGER  
UL CCS

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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:

$$\begin{aligned} \text{Field Strength (dBuV/m)} &= \text{Measured Voltage (dBuV)} + \text{Antenna Factor (dB/m)} + \\ &\text{Cable Loss (dB)} - \text{Preamp Gain (dB)} \\ 36.5 \text{ dBuV} + 18.7 \text{ dB/m} + 0.6 \text{ dB} - 26.9 \text{ dB} &= 28.9 \text{ dBuV/m} \end{aligned}$$

### 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-540PA   |
| d). | FCC ID:                    | B6BZM-540PA  |
| e). | Battery Type:              | Three AA (R6)  |
| f). | Channel Number:            | 608.0250 MHz (channel number 9002)<br>613.9750 MHz (channel number 9478) |
| g). | Frequency Range:           | 608.025-613.975 MHz  |
| h). | RF Conducted Output Power: | 1mW  |
| i). | Channel Spacing:           | 50kHz or 37.5kHz (12.5kHz 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  $\pm 0.5$ dBm 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. 02-01.

### 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 Y-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

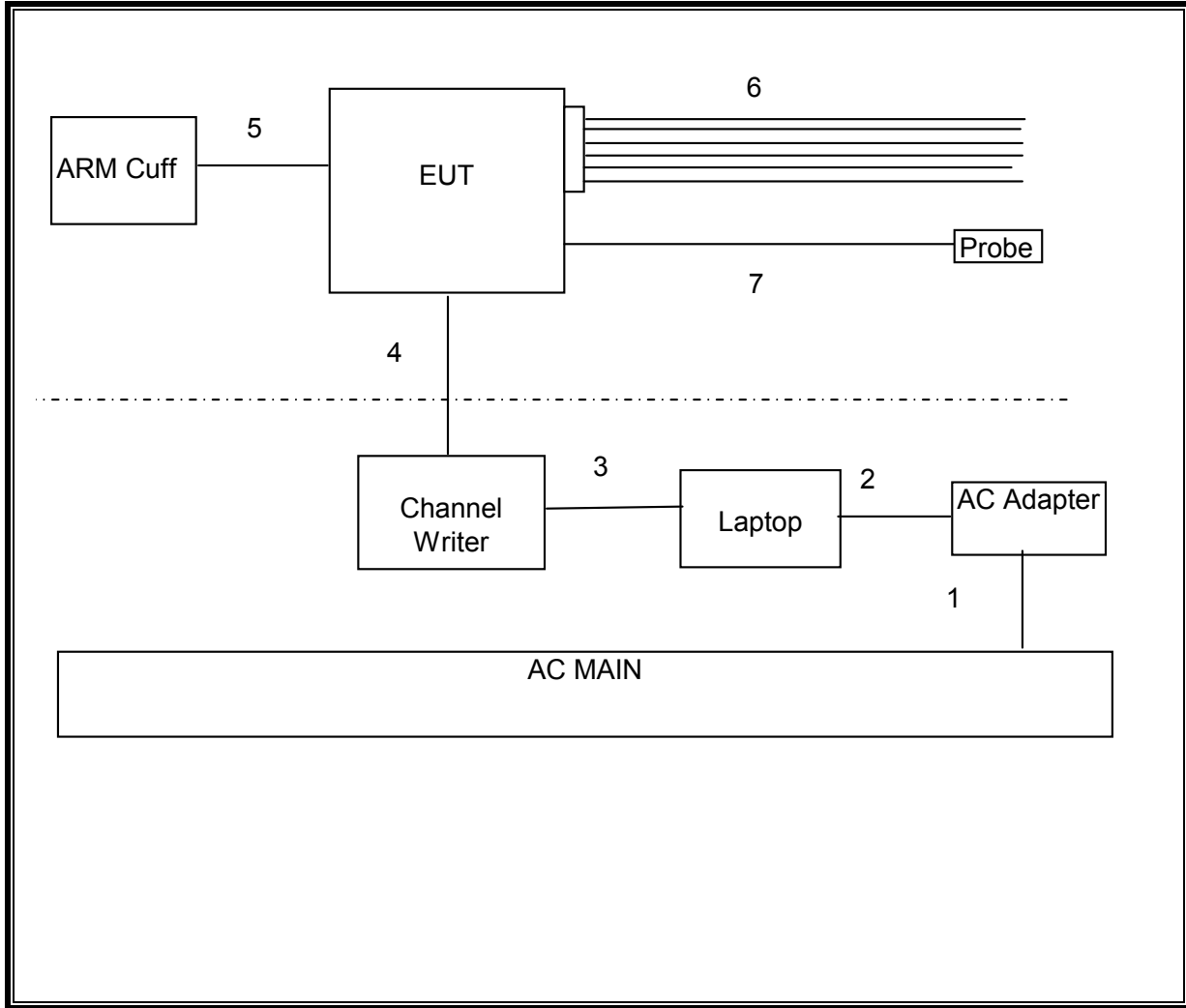
### I/O CABLES

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	SpO2	1	SpO2	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 RADIATED TESTS**





## 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

(1) In the 608–614 MHz band, the maximum allowable field strength is 200 mV/m, as measured at a distance of 3 meters, using measuring instrumentation with a CISPR quasi-peak detector.

(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

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											
Test Target:		FCC Part 15 95H											
Model:		ZM-540PA											
Mode:		TX											
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	Dist	Read	AF	CL	Amp	D Corr	Pad	Corr.	Limit	Margin	Ant. Pol.	Det.	Notes
MHz	(m)	dBuV	dB/m	dB	dB	dB	dB	dBuV/m	dBuV/m	dB	V/H	P/A/QP	
608.025	3.0	93.3	18.3	2.4	29.6	0.0	0.0	84.4	106.0	-21.6	V	P	
608.025	3.0	100.3	18.3	2.4	29.6	0.0	0.0	91.4	106.0	-14.6	H	P	
613.981	3.0	92.0	18.4	2.4	29.6	0.0	0.0	83.2	106.0	-22.8	V	P	
613.981	3.0	99.6	18.4	2.4	29.6	0.0	0.0	90.8	106.0	-15.2	H	P	

## **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.

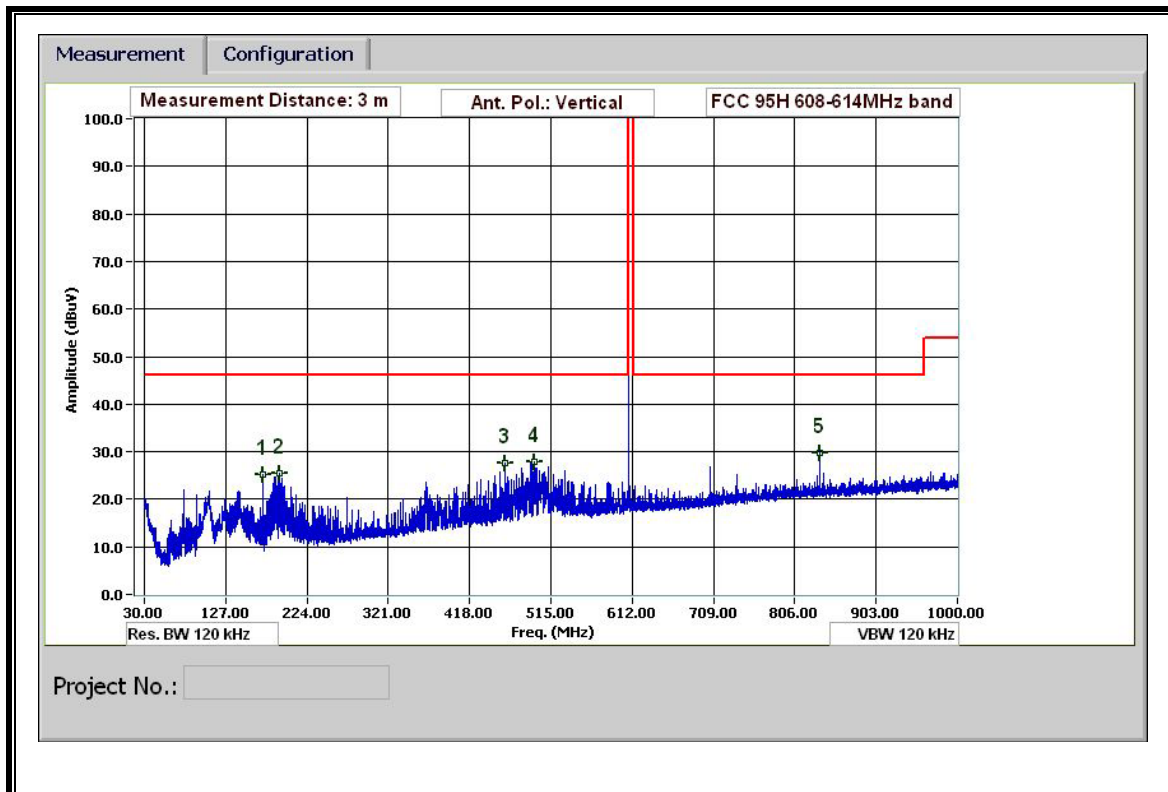
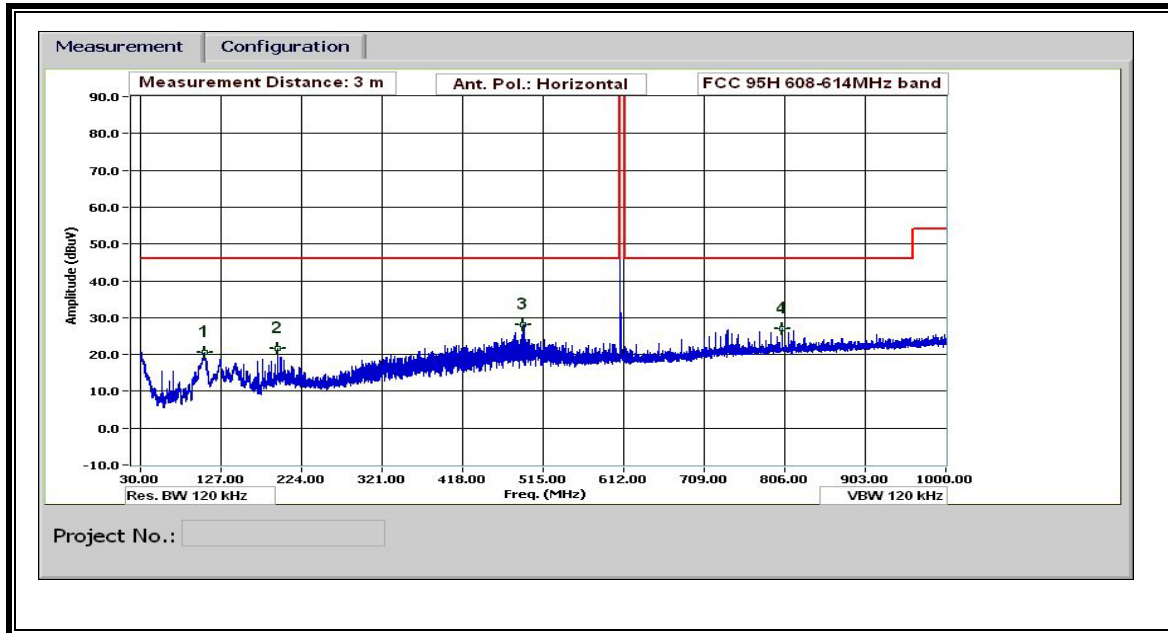
**SPURIOUS EMISSIONS 30 TO 960 MHz (DATA)**

**608.025MHz**

30-1000MHz Frequency Measurement													
Compliance Certification Services, Fremont 5m Chamber													
Test Engr:		Chin Pang											
Date:		09/24/10											
Project #:		10J13419											
Company:		Nihon Kohden											
EUT Description:		Medical Telemetry Transmitter											
Test Targets:		FCC 95H											
Model:		ZM-540PA											
Mode Oper:		TX, 608.025MHz											
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	Dist	Read	AF	CL	Amp	D Corr	Pad	Corr.	Limit	Margin	Ant. Pol.	Det.	Notes
MHz	(m)	dBuV	dB/m	dB	dB	dB	dB	dBuV/m	dBuV/m	dB	V/H	P/A/QP	
vert													
171.126	3.0	43.1	10.1	1.2	29.2	0.0	0.0	25.2	46.0	-20.8	V	P	
191.047	3.0	42.0	11.3	1.2	29.0	0.0	0.0	25.5	46.0	-20.5	V	P	
460.818	3.0	39.0	16.1	2.1	29.6	0.0	0.0	27.6	46.0	-18.4	V	P	
495.979	3.0	38.7	16.7	2.1	29.7	0.0	0.0	27.8	46.0	-18.2	V	P	
836.433	3.0	34.6	21.2	2.9	28.9	0.0	0.0	29.8	46.0	-16.2	V	P	
106.923	3.0	37.9	11.3	0.9	29.5	0.0	0.0	20.7	46.0	-25.3	H	P	
195.367	3.0	37.7	11.6	1.3	28.9	0.0	0.0	21.6	46.0	-24.4	H	P	
491.419	3.0	39.1	16.6	2.1	29.7	0.0	0.0	28.2	46.0	-17.8	H	P	
803.192	3.0	32.4	21.0	2.8	29.1	0.0	0.0	27.1	46.0	-18.9	H	P	

**SPURIOUS EMISSIONS 30 TO 960 MHz (PLOTS)**

**608.025MHz**



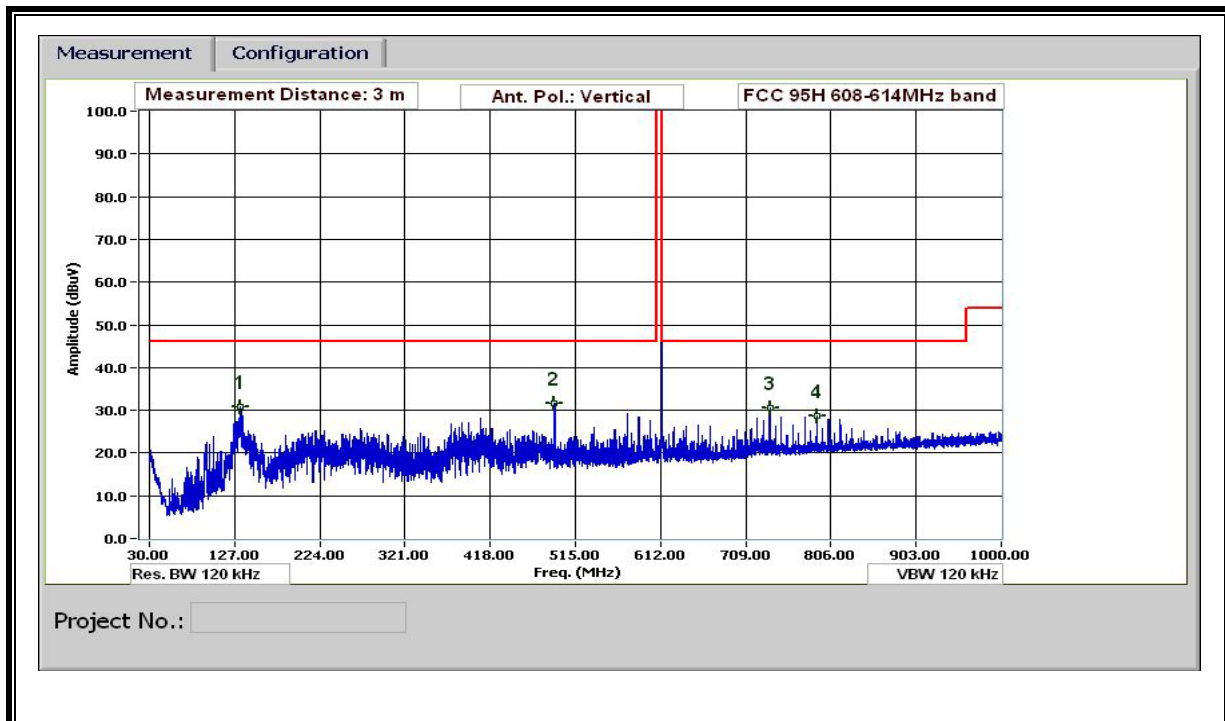
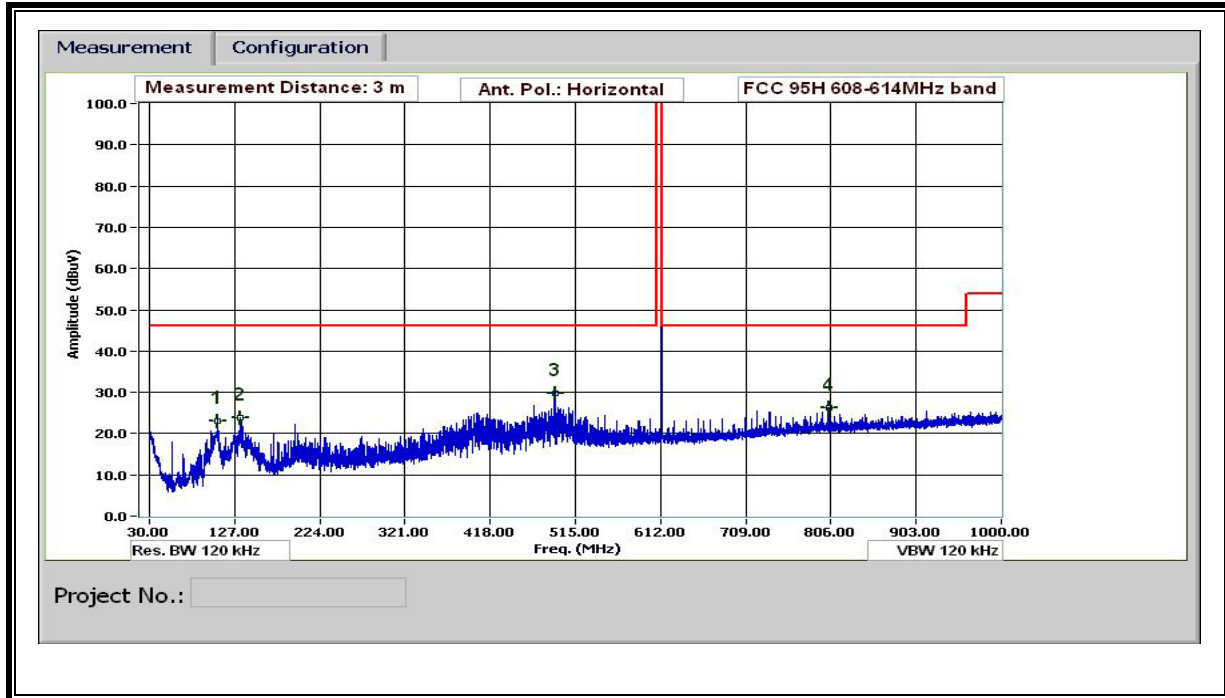
**SPURIOUS EMISSIONS 30 TO 960 MHz**

**613.975MHz**

30-1000MHz Frequency Measurement													
Compliance Certification Services, Fremont 5m Chamber													
Test Engr:		Chin Pang											
Date:		09/24/10											
Project #:		10J13419											
Company:		Nihon Kohden											
EUT Description:		Medical Telemetry Transmitter											
Test Target:		FCC 95H											
Model:		ZM-540PA											
Mode Oper:		TX, 613.975MHz											
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	Dist	Read	AF	CL	Amp	D Corr	Pad	Corr.	Limit	Margin	Ant. Pol	Det.	Notes
MHz	(m)	dBuV	dB/m	dB	dB	dB	dB	dBuV/m	dBuV/m	dB	V/H	P/A/QP	
<b>horiz</b>													
107.763	3.0	40.2	11.5	0.9	29.5	0.0	0.0	23.1	46.0	-22.9	H	P	
133.684	3.0	38.8	13.5	1.0	29.4	0.0	0.0	24.0	46.0	-22.0	H	P	
491.539	3.0	40.7	16.7	2.1	29.7	0.0	0.0	29.8	46.0	-16.2	H	P	
803.192	3.0	31.6	21.0	2.8	29.1	0.0	0.0	26.3	46.0	-19.7	H	P	
134.044	3.0	45.7	13.5	1.0	29.4	0.0	0.0	30.9	46.0	-15.1	V	P	
491.299	3.0	42.6	16.6	2.1	29.7	0.0	0.0	31.6	46.0	-14.4	V	P	
737.309	3.0	37.3	19.9	2.7	29.4	0.0	0.0	30.4	46.0	-15.6	V	P	
789.751	3.0	34.4	20.8	2.8	29.2	0.0	0.0	28.8	46.0	-17.2	V	P	

**SPURIOUS EMISSIONS 30 TO 960 MHz (PLOTS)**

**613.975MHz**





### 7.3. RADIATED EMISSIONS ABOVE 960 MHz

#### HARMONICS AND TX SPURIOUS EMISSIONS ABOVE 960 MHz

**High Frequency Measurement**  
 Compliance Certification Services, Fremont 5m Chamber

Test Engineer: Chin Pang  
 Company: Nihon Kohden  
 EUT Description: Medical Telemetry Transmitter  
 Project #: 10J13419  
 Date: 09/24/10  
 Test Target: FCC 95H  
 Model: ZM-540PA  
 Mode: TX

**Test Equipment:**

Hom 1-18GHz	Pre-amplifier 1-26GHz	Pre-amplifier 26-40GHz	Hom >18GHz	Limit
T59; S/N: 3245 @3m	T145 Agilent 3008A005E			FCC 95H

Hi Frequency Cables

3' cable 22807700	12' cable 22807600	20' cable 22807500	HPF	Reject Filter	Peak Measurements RBW=VBW=1MHz
3' cable 22807700	12' cable 22807600	20' cable 22807500			Average Measurements RBW=1MHz; VBW=10Hz

f GHz	Dist (m)	Read dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Filtr dB	Corr. dBuV/m	Avg Lim dBuV/m	Det. P/A/QP	Margin dB	Notes (V/H)
<b>Low CH 608.025 MHz</b>												
1.216	3.0	45.0	24.7	2.6	-36.0	0.0	0.0	36.4	54	A	-17.6	V
1.824	3.0	44.2	27.0	3.3	-35.5	0.0	0.0	38.9	54	A	-15.1	V
3.040	3.0	43.6	30.1	4.4	-35.2	0.0	0.0	42.9	54	A	-11.1	V
1.216	3.0	45.5	24.7	2.6	-36.0	0.0	0.0	36.9	54	A	-17.1	H
1.824	3.0	43.4	27.0	3.3	-35.5	0.0	0.0	38.1	54	A	-15.9	H
3.040	3.0	44.4	30.1	4.4	-35.2	0.0	0.0	43.7	54	A	-10.3	H
<b>High Ch. 613.975 MHz</b>												
1.228	3.0	44.6	24.8	2.6	-36.0	0.0	0.0	36.0	54	A	-18.0	V
1.842	3.0	43.6	27.0	3.3	-35.5	0.0	0.0	38.4	54	A	-15.6	V
1.228	3.0	44.3	24.8	2.6	-36.0	0.0	0.0	35.7	54	A	-18.3	H
1.842	3.0	43.7	27.0	3.3	-35.5	0.0	0.0	38.5	54	A	-15.5	H

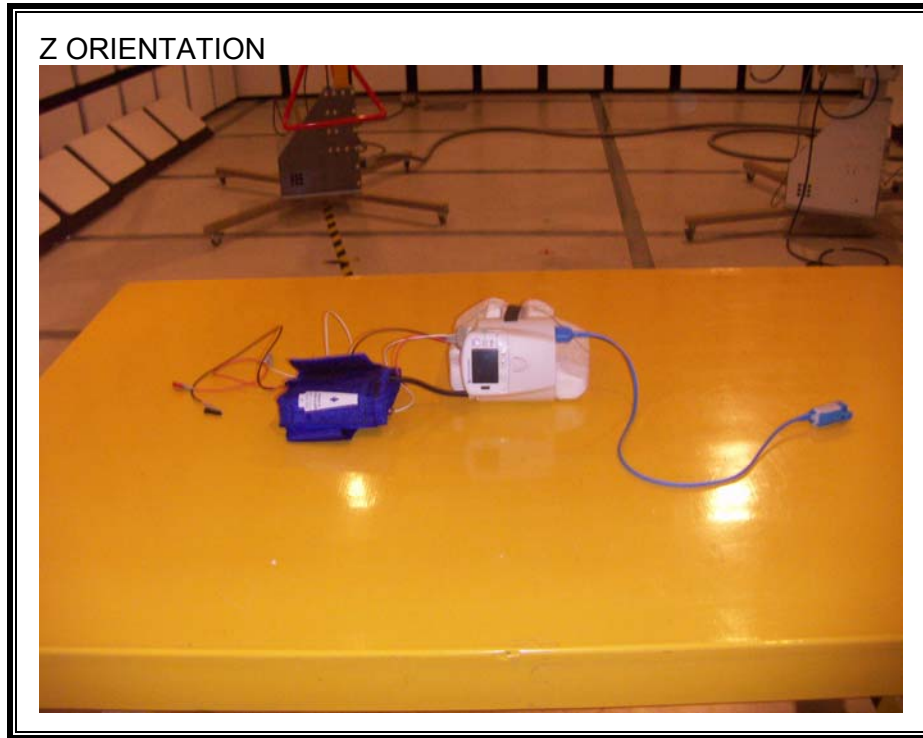
Note: No other emissions were detected above the system noise floor.  
 Rev. 11.10.08

f	Amp	Preamp Gain	Avg Lim	Average Field Strength Limit
Dist	D Corr	Distance Correct to 3 meters	Pk Lim	Peak Field Strength Limit
Read	Avg	Average Field Strength @ 3 m	Avg Mar	Margin vs. Average Limit
AF	Peak	Calculated Peak Field Strength	Pk Mar	Margin vs. Peak Limit
CL	HPF	High Pass Filter		

## 8. SETUP PHOTOS

### RADIATED EMISSION FOR PORTABLE CONFIGURATION





END OF REPORT