



FCC OET BULLETIN 65 SUPPLEMENT C

SAR EVALUATION REPORT

FOR

TRANSMITTER FOR MEDICAL

MODEL: ZM-931PA

FCC ID: B6BZM-931PA

REPORT NUMBER: 08J12204-2

ISSUE DATE: NOVEMBER 14, 2008

Prepared for

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TOKYO 161-8560, JAPAN**

Prepared by

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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	November 14, 2008	Initial issue	--

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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:	TRANSMITTER FOR MEDICAL		
FCC ID:	B6BZM-931PA		
MODEL:	ZM-931PA		
DEVICE CATEGORY:	Portable		
EXPOSURE CATEGORY:	General Population/Uncontrolled Exposure		
DATE TESTED:	November 7, 2008		
THE HIGHEST SAR VALUES:	See Table below		
FCC Rule	Frequency Range [MHz]	The Highest SAR Values (1g_mW/g)	Limit (mW/g)
95 SUBPART H	1395 - 1400 MHz 1427 - 1429.5 MHz	0.013	1.6

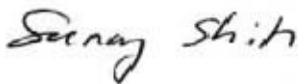
APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
FCC OET BULLETIN 65 SUPPLEMENT C	Pass

Compliance Certification Services, Inc. (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 CCS based on interpretations and/or observations of test results. 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 CCS and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by CCS will constitute fraud and shall nullify the document. No part of this report may be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any government agency.

Approved & Released For CCS By:

Tested By:




SUNNY SHIH
EMC SUPERVISOR
COMPLIANCE CERTIFICATION SERVICES

CAROL BAUMANN
SAR ENGINEER
COMPLIANCE CERTIFICATION SERVICES

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC OET Bulletin 65 Supplement C.

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.

5. MEASUREMENT UNCERTAINTY

Measurement uncertainty for 300 MHz – 3000 MHz

Uncertainty component	Tol. (±%)	Probe Dist.	Div.	Ci (1g)	Ci (10g)	Std. Unc.(±%)	
						Ui (1g)	Ui(10g)
Measurement System							
Probe Calibration	4.80	N	1	1	1	4.80	4.80
Axial Isotropy	4.70	R	1.732	0.707	0.707	1.92	1.92
Hemispherical Isotropy	9.60	R	1.732	0.707	0.707	3.92	3.92
Boundary Effects	1.00	R	1.732	1	1	0.58	0.58
Linearity	4.70	R	1.732	1	1	2.71	2.71
System Detection Limits	1.00	R	1.732	1	1	0.58	0.58
Readout Electronics	1.00	N	1	1	1	1.00	1.00
Response Time	0.80	R	1.732	1	1	0.46	0.46
Integration Time	2.60	R	1.732	1	1	1.50	1.50
RF Ambient Conditions - Noise	1.59	R	1.732	1	1	0.92	0.92
RF Ambient Conditions - Reflections	0.00	R	1.732	1	1	0.00	0.00
Probe Positioner Mechanical Tolerance	0.40	R	1.732	1	1	0.23	0.23
Probe Positioning With Respect to Phantom Shell	2.90	R	1.732	1	1	1.67	1.67
Extrapolation, interpolation, and integration algorithms for max. SAR evaluation	3.90	R	1.732	1	1	2.25	2.25
Test sample Related							
Test Sample Positioning	1.10	N	1	1	1	1.10	1.10
Device Holder Uncertainty	3.60	N	1	1	1	3.60	3.60
Power and SAR Drift Measurement	5.00	R	1.732	1	1	2.89	2.89
Phantom and Tissue Parameters							
Phantom Uncertainty	4.00	R	1.732	1	1	2.31	2.31
Liquid Conductivity - Target	5.00	R	1.732	0.64	0.43	1.85	1.24
Liquid Conductivity - Meas.	8.60	N	1	0.64	0.43	5.50	3.70
Liquid Permittivity - Target	5.00	R	1.732	0.6	0.49	1.73	1.41
Liquid Permittivity - Meas.	3.30	N	1	0.6	0.49	1.98	1.62
Combined Standard Uncertainty			RSS			11.44	10.49
Expanded Uncertainty (95% Confidence Interval)			K=2			22.87	20.98

Notes for table
 1. Tol. - tolerance in influence quantity
 2. N - Normal
 3. R - Rectangular
 4. Div. - Divisor used to obtain standard uncertainty
 5. Ci - is the sensitivity coefficient

Measurement uncertainty for 3 GHz – 6 GHz

Uncertainty component	Tol. (±%)	Probe Dist.	Div.	Ci (1g)	Ci (10g)	Std. Unc.(±%)	
						Ui (1g)	Ui(10g)
Measurement System							
Probe Calibration	4.80	N	1	1	1	4.80	4.80
Axial Isotropy	4.70	R	1.732	0.707	0.707	1.92	1.92
Hemispherical Isotropy	9.60	R	1.732	0.707	0.707	3.92	3.92
Boundary Effects	1.00	R	1.732	1	1	0.58	0.58
Linearity	4.70	R	1.732	1	1	2.71	2.71
System Detection Limits	1.00	R	1.732	1	1	0.58	0.58
Readout Electronics	1.00	N	1	1	1	1.00	1.00
Response Time	0.80	R	1.732	1	1	0.46	0.46
Integration Time	2.60	R	1.732	1	1	1.50	1.50
RF Ambient Conditions - Noise	3.00	R	1.732	1	1	1.73	1.73
RF Ambient Conditions - Reflections	3.00	R	1.732	1	1	1.73	1.73
Probe Positioner Mechanical Tolerance	0.40	R	1.732	1	1	0.23	0.23
Probe Positioning With Respect to Phantom Shell	2.90	R	1.732	1	1	1.67	1.67
Extrapolation, interpolation, and integration algorithms for max. SAR evaluation	3.90	R	1.732	1	1	2.25	2.25
Test sample Related							
Test Sample Positioning	1.10	N	1	1	1	1.10	1.10
Device Holder Uncertainty	3.60	N	1	1	1	3.60	3.60
Power and SAR Drift Measurement	5.00	R	1.732	1	1	2.89	2.89
Phantom and Tissue Parameters							
Phantom Uncertainty	4.00	R	1.732	1	1	2.31	2.31
Liquid Conductivity - Target	5.00	R	1.732	0.64	0.43	1.85	1.24
Liquid Conductivity - Meas.	8.60	N	1	0.64	0.43	5.50	3.70
Liquid Permittivity - Target	5.00	R	1.732	0.6	0.49	1.73	1.41
Liquid Permittivity - Meas.	3.30	N	1	0.6	0.49	1.98	1.62
Combined Standard Uncertainty	RSS					11.66	10.73
Expanded Uncertainty (95% Confidence Interval)	K=2					23.32	21.46

Notes for table

1. Tol. - tolerance in influence quantity
2. N - Nomal
3. R - Rectangular
4. Div. - Divisor used to obtain standard uncertainty
5. Ci - is te sensitivity coefficient

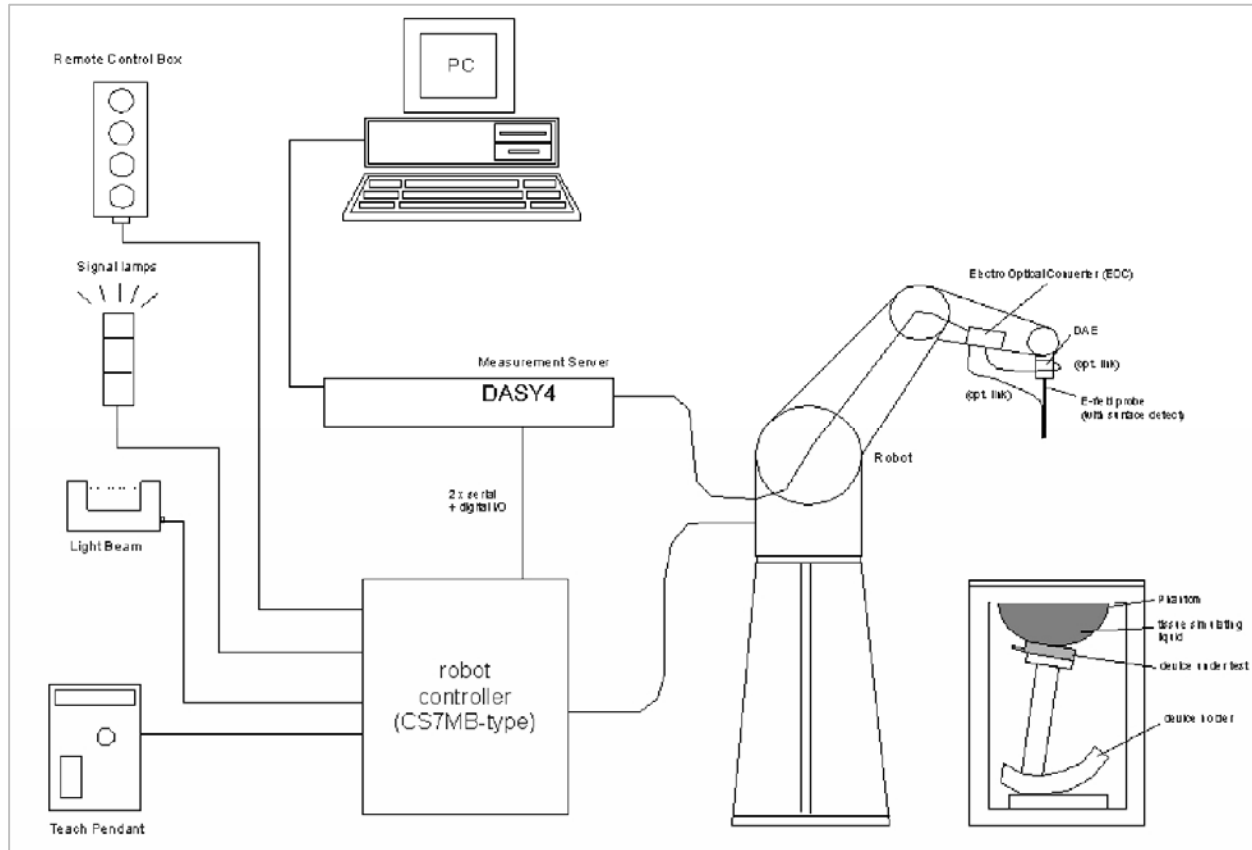
6. TEST EQUIPMENT LIST

Name of Equipment	Manufacturer	Type/Model	Serial Number	Cal. Due date		
				MM	DD	Year
Robot - Six Axes	Stäubli	RX90BL	N/A			N/A
Robot Remote Control	Stäubli	CS7MB	3403-91535			N/A
DASY4 Measurement Server	SPEAG	SEUMS001BA	1041			N/A
Probe Alignment Unit	SPEAG	LB (V2)	261			N/A
SAM Phantom (SAM1)	SPEAG	QD000P40CA	1185			N/A
SAM Phantom (SAM2)	SPEAG	QD000P40CA	1050			N/A
Oval Flat Phantom (ELI 4.0)	SPEAG	QD OVA001 B	1003			N/A
Electronic Probe kit	HP	85070C	N/A			N/A
S-Parameter Network Analyzer	Agilent	8753ES-6	MY40001647	11	14	2008
E-Field Probe	SPEAG	EX3DV3	3531	4	23	2009
Thermometer	ERTCO	639-1S	1718	5	28	2009
Data Acquisition Electronics	SPEAG	DAE3 V1	500	11	16	2008
System Validation Dipole	SPEAG	D1450V2	1020	11	19	2009
Signal Generator	R&S	SMP 04	DE34210	2	16	2009
Power Meter	Giga-tronics	8651A	8651404	1	11	2010
Power Sensor	Giga-tronics	80701A	1834588	1	11	2010
Amplifier	Mini-Circuits	ZVE-8G	90606			N/A
Amplifier	Mini-Circuits	ZHL-42W	D072701-5			N/A

7. DEVICE UNDER TEST (DUT) DESCRIPTION**WMTS TRANSMITTER**

Model No: ZM-931PA
Normal Operation: Worn on body
Duty Cycle: 100%
Battery Type: Two AA (R6)
Frequency Range: 1395.025-1399.975 MHz and 1427.025-1431.975 MHz bands
Antenna Type: Internal
Channel Number: 1395.0250 MHz (Ch. no E002) to 1399.9750 MHz (Ch. no E398)
1427.0250 MHz (Ch. no E502) to 1431.9750 MHz (Ch. no E898)

8. SYSTEM DESCRIPTION



The DASY4 system for performing compliance tests consists of the following items:

- A standard high precision 6-axis robot (Stäubli RX family) with controller, teach pendant and software. An arm extension for accommodating the data acquisition electronics (DAE).
- A dosimetric probe, i.e., an isotropic E-field probe optimized and calibrated for usage in tissue simulating liquid. The probe is equipped with an optical surface detector system.
- A data acquisition electronics (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.
- The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- A probe alignment unit which improves the (absolute) accuracy of the probe positioning.
- A computer operating Windows 2000 or Windows XP.
- DASY4 software.
- Remote controls with teach pendant and additional circuitry for robot safety such as warning lamps, etc.
- The SAM twin phantom enabling testing left-hand and right-hand usage.
- The device holder for handheld mobile phones.
- Tissue simulating liquid mixed according to the given recipes.
- Validation dipole kits allowing to validate the proper functioning of the system.

8.1. COMPOSITION OF INGREDIENTS FOR TISSUE SIMULATING LIQUIDS

The following tissue formulations are provided for reference only as some of the parameters have not been thoroughly verified. The composition of ingredients may be modified accordingly to achieve the desired target tissue parameters required for routine SAR evaluation.

Ingredients (% by weight)	Frequency (MHz)									
	450		835		915		1900		2450	
Tissue Type	Head	Body	Head	Body	Head	Body	Head	Body	Head	Body
Water	38.56	51.16	41.45	52.4	41.05	56.0	54.9	40.4	62.7	73.2
Salt (NaCl)	3.95	1.49	1.45	1.4	1.35	0.76	0.18	0.5	0.5	0.04
Sugar	56.32	46.78	56.0	45.0	56.5	41.76	0.0	58.0	0.0	0.0
HEC	0.98	0.52	1.0	1.0	1.0	1.21	0.0	1.0	0.0	0.0
Bactericide	0.19	0.05	0.1	0.1	0.1	0.27	0.0	0.1	0.0	0.0
Triton X-100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	36.8	0.0
DGBE	0.0	0.0	0.0	0.0	0.0	0.0	44.92	0.0	0.0	26.7
Dielectric Constant	43.42	58.0	42.54	56.1	42.0	56.8	39.9	54.0	39.8	52.5
Conductivity (S/m)	0.85	0.83	0.91	0.95	1.0	1.07	1.42	1.45	1.88	1.78

Salt: 99+% Pure Sodium Chloride

Sugar: 98+% Pure Sucrose

Water: De-ionized, 16 MΩ+ resistivity

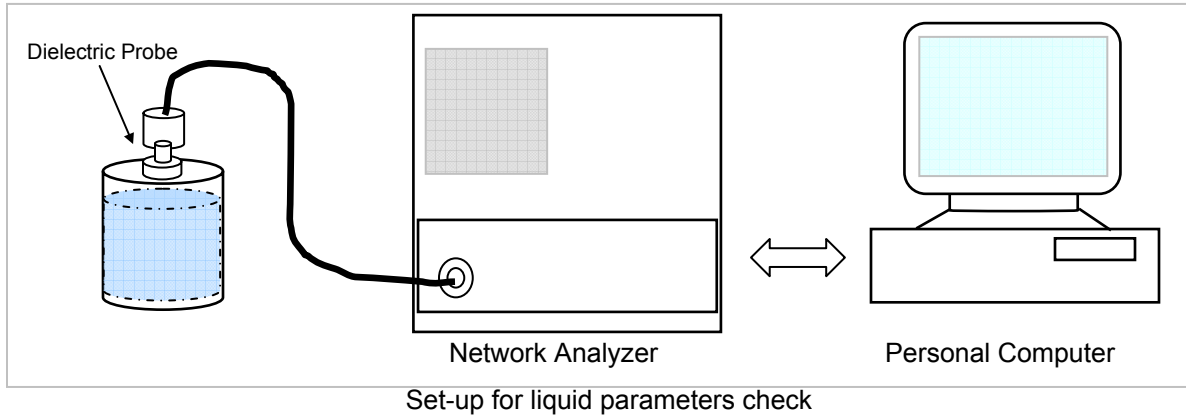
HEC: Hydroxyethyl Cellulose

DGBE: 99+% Di(ethylene glycol) butyl ether, [2-(2-butoxyethoxy)ethanol]

Triton X-100 (ultra pure): Polyethylene glycol mono [4-(1,1, 3, 3-tetramethylbutyl)phenyl]ether

9. SIMULATING LIQUID PARAMETERS CHECK

The simulating liquids should be checked at the beginning of a series of SAR measurements to determine of the dielectric parameters are within the tolerances of the specified target values. The relative permittivity and conductivity of the tissue material should be within $\pm 5\%$ of the values given in the table below.



Reference Values of Tissue Dielectric Parameters for Head and Body Phantom (for 150 – 3000 MHz and 5800 MHz)

The head tissue dielectric parameters recommended by the IEEE SCC-34/SC-2 in IEEE Standard 1528 have been incorporated in the following table. These head parameters are derived from planar layer models simulating the highest expected SAR for the dielectric properties and tissue thickness variations in a human head. Other head and body tissue parameters that have not been specified in P1528 are derived from the tissue dielectric parameters computed from the 4-Cole-Cole equations and extrapolated according to the head parameters specified in IEEE Standard 1528.

Target Frequency (MHz)	Head		Body	
	ϵ_r	σ (S/m)	ϵ_r	σ (S/m)
150	52.3	0.76	61.9	0.80
300	45.3	0.87	58.2	0.92
450	43.5	0.87	56.7	0.94
835	41.5	0.90	55.2	0.97
900	41.5	0.97	55.0	1.05
915	41.5	0.98	55.0	1.06
1450	40.5	1.20	54.0	1.30
1610	40.3	1.29	53.8	1.40
1800 – 2000	40.0	1.40	53.3	1.52
2450	39.2	1.80	52.7	1.95
3000	38.5	2.40	52.0	2.73
5800	35.3	5.27	48.2	6.00

(ϵ_r = relative permittivity, σ = conductivity and $\rho = 1000 \text{ kg/m}^3$)

9.1. SIMULATING LIQUID PARAMETER CHECK RESULT

Simulating Liquid Dielectric Parameters Check Result @ Muscle 1450 MHz

Room Ambient Temperature = 25°C; Relative humidity = 42%

Measured by: Carol Baumann

Simulating Liquid			Parameters		Measured	Target	Deviation (%)	Limit (%)	
f (MHz)	Temp. (°C)	Depth (cm)							
1450	24	15	e'	52.8389	Relative Permittivity (ε _r):	52.8389	54.0	-2.15	± 5
			e''	16.8355	Conductivity (σ):	1.35804	1.30	4.46	± 5

Liquid Check

Ambient temperature: 25 deg. C; Liquid temperature: 24 deg. C

November 07, 2008 10:11 AM

Frequency	e'	e''
1380000000.	52.9868	16.9005
1385000000.	52.9893	16.9087
1390000000.	52.9943	16.9071
1395000000.	52.9874	16.9368
1400000000.	52.9573	16.9411
1405000000.	52.9561	16.9273
1410000000.	52.9562	16.9087
1415000000.	52.9397	16.9006
1420000000.	52.9209	16.8822
1425000000.	52.9264	16.8640
1430000000.	52.9238	16.8511
1435000000.	52.9113	16.8405
1440000000.	52.8908	16.8351
1445000000.	52.8494	16.8512
1450000000.	52.8389	16.8355
1455000000.	52.7724	16.8409
1460000000.	52.7707	16.8313
1465000000.	52.7314	16.8349
1470000000.	52.7106	16.8185
1475000000.	52.6883	16.8343
1480000000.	52.6682	16.8410

The conductivity (σ) can be given as:

$$\sigma = \omega \epsilon_0 e'' = 2 \pi f \epsilon_0 e''$$

where $f = \text{target } f * 10^6$

$$\epsilon_0 = 8.854 * 10^{-12}$$

10. SYSTEM PERFORMANCE CHECK

The system performance check is performed prior to any usage of the system in order to guarantee reproducible results. The system performance check verifies that the system operates within its specifications of $\pm 10\%$.

System Performance Check Measurement Conditions

- The measurements were performed in the flat section of the SAM twin phantom filled with Body simulating liquid of the following parameters.
- The DASY4 system with an Isotropic E-Field Probe EX3DV3-SN: 3531 was used for the measurements.
- The dipole was mounted on the small tripod so that the dipole feed point was positioned below the center marking of the flat phantom section and the dipole was oriented parallel to the body axis (the long side of the phantom). The standard measuring distance was 10 mm (above 1 GHz) and 15 mm (below 1 GHz) from dipole center to the simulating liquid surface.
- The coarse grid with a grid spacing of 15 mm was aligned with the dipole.
For 5 GHz band - The coarse grid with a grid spacing of 10 mm was aligned with the dipole.
- Special 7x7x7 (2.4 GHz) fine cube was chosen for cube integration and Special 8x8x10 (5 GHz) fine cube was chosen for cube integration
- Distance between probe sensors and phantom surface was set to 3 mm.
For 5 GHz band - Distance between probe sensors and phantom surface was set to 2.5mm
- The dipole input power (forward power) was 250 mW $\pm 3\%$.
- The results are normalized to 1 W input power.

450 to 2450 MHz Reference SAR Values for body-tissue

In the table below, the numerical reference SAR values of a SPEAG validation dipoles placed below the flat phantom filled with body-tissue simulating liquid are given. The reference SAR values were calculated using the finite-difference time-domain method and the geometry parameters.

Dipole Type	Distance (mm)	Frequency (MHz)	SAR (1g) [W/kg]	SAR (10g) [W/kg]	SAR (peak) [W/kg]
D450V2	15	450	5.01	3.36	7.22
D835V2	15	835	9.71	6.38	14.1
D900V2	15	900	11.1	7.17	16.3
D1450V2	10	1450	29.6	16.6	49.8
D1800V2	10	1800	38.5	20.3	67.5
D1900V2	10	1900	39.8	20.8	69.6
D2000V2	10	2000	40.9	21.2	71.5
D2450V2	10	2450	51.2	23.7	97.6

Note: All SAR values normalized to 1 W forward power.

10.1. SYSTEM PERFORMANCE CHECK RESULTS

System Validation Dipole: D1450V2 SN: 1020

Date: November 7, 2008

Room Ambient Temperature = 25°C; Relative humidity = 42%

Measured by: Carol Baumann

Body Simulating Liquid			SAR (mW/g)	Normalized to 1 W	Target	Deviation (%)	Limit (%)	
f (MHz)	Temp. (°C)	Depth (cm)						
1450	24	15	1g	7.16	28.64	29.6	-3.24	± 10
			10g	4.02	16.08	16.6	-3.13	± 10

11. OUTPUT POWER VERIFICATION

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 9.6 dB (including 9.6 dB pad) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Output Power (dBm)
E002	1395.025	5.90
E398	1399.975	6.14
E502	1427.025	7.09
E898	1431.975	7.18

12. SAR TEST RESULTS

12.1. FACE UP POSITION

Band	Channel	f (MHz)	1g SAR (mW/g)	Limit (mW/g)
Low	E002	1395.025	0.00895	1.6
	E398	1399.975	0.011	
High	E502	1427.025	0.013	
	E898	1431.975	0.013	

Note:

- 1) Setup Photo: Refer to Section 14 SETUP PHOTOS

12.2. FACE DOWN POSITION

This position was skipped due to low SAR values.

SAR Plots & Data (Ch no E002 / 1395.025 MHz)

Date/Time: 11/7/2008 3:41:50 PM

Test Laboratory: Compliance Certification Services

Body Worn Face Up Low Band

DUT: Wireless Medical Telemetry ECG Transmitter; Type: ZM-931PA; Serial: N/A

Communication System: Low Band; Frequency: 1395.03 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 1395.03$ MHz; $\sigma = 1.31$ mho/m; $\epsilon_r = 53$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Room Ambient Temperature: 25.0 deg. C; Liquid Temperature: 24.0 deg. C

DASY4 Configuration:

- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV3 - SN3531; ConvF(9.33, 9.33, 9.33); Calibrated: 4/23/2008
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn500; Calibrated: DAE not calibrated
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:XXXX
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Low Band Ch E002/Area Scan (8x11x1): Measurement grid: dx=15mm, dy=15mm[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.012 mW/g

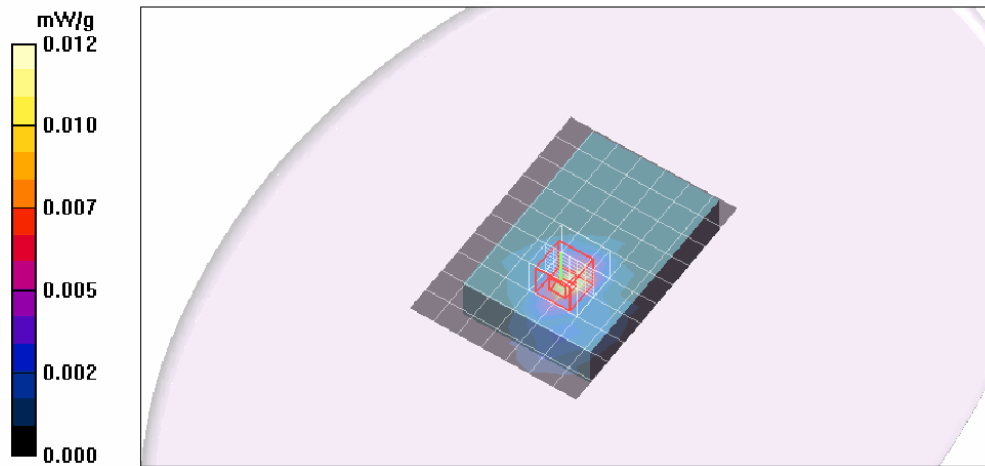
Low Band Ch E002/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=3mm

Reference Value = 1.11 V/m; Power Drift = 0.165 dB

Peak SAR (extrapolated) = 0.018 W/kg

SAR(1 g) = 0.00895 mW/g; SAR(10 g) = 0.00424 mW/g[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.011 mW/g



SAR Plots & Data (Ch no E398 / 1399.975 MHz)

Date/Time: 11/7/2008 4:30:40 PM

Test Laboratory: Compliance Certification Services

Body Worn Face Up Low Band

DUT: Wireless Medical Telemetry ECG Transmitter; Type: ZM-931PA; Serial: N/A

Communication System: Low Band; Frequency: 1399.97 MHz; Duty Cycle: 1:1
 Medium parameters used: $f = 1400$ MHz; $\sigma = 1.32$ mho/m; $\epsilon_r = 53$; $\rho = 1000$ kg/m³
 Phantom section: Flat Section

Room Ambient Temperature: 25.0 deg. C; Liquid Temperature: 24.0 deg. C

DASY4 Configuration:

- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV3 - SN3531; ConvF(9.33, 9.33, 9.33); Calibrated: 4/23/2008
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn500; Calibrated: DAE not calibrated
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:XXXX
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

Low Band Ch E398/Area Scan (8x11x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.011 mW/g

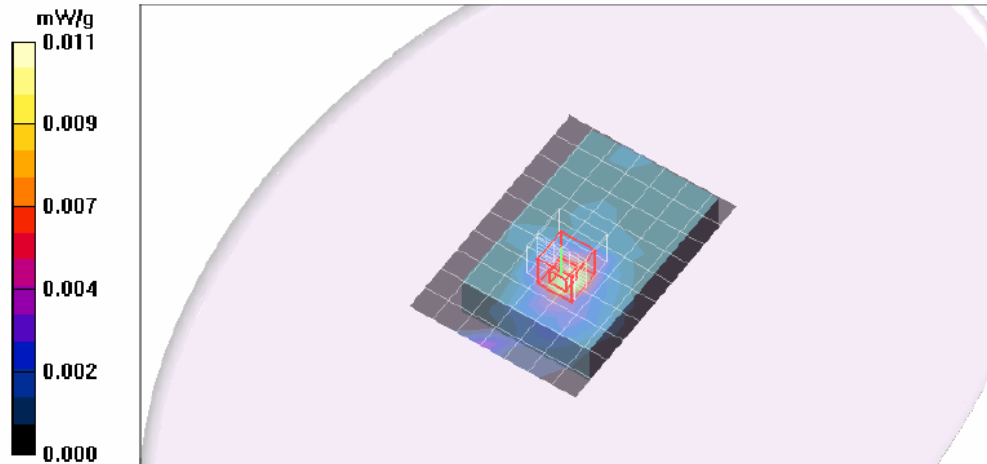
Low Band Ch E398/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=3mm

Reference Value = 1.01 V/m; Power Drift = 0.883 dB

Peak SAR (extrapolated) = 0.026 W/kg

SAR(1 g) = 0.011 mW/g; SAR(10 g) = 0.00315 mW/g

Maximum value of SAR (measured) = 0.014 mW/g



SAR Plots & Data (Ch no E502 / 1427.025 MHz)

Date/Time: 11/7/2008 5:04:22 PM

Test Laboratory: Compliance Certification Services

Body Worn Face Up High Band

DUT: Wireless Medical Telemetry ECG Transmitter; Type: ZM-931PA; Serial: N/A

Communication System: High Band; Frequency: 1427.03 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 1427.03$ MHz; $\sigma = 1.34$ mho/m; $\epsilon_r = 52.9$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Room Ambient Temperature: 25.0 deg. C; Liquid Temperature: 24.0 deg. C

DASY4 Configuration:

- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV3 - SN3531; ConvF(9.33, 9.33, 9.33); Calibrated: 4/23/2008
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn500; Calibrated: DAE not calibrated
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:XXXX
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

High Band Ch E502/Area Scan (8x11x1): Measurement grid: dx=15mm, dy=15mm[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.015 mW/g

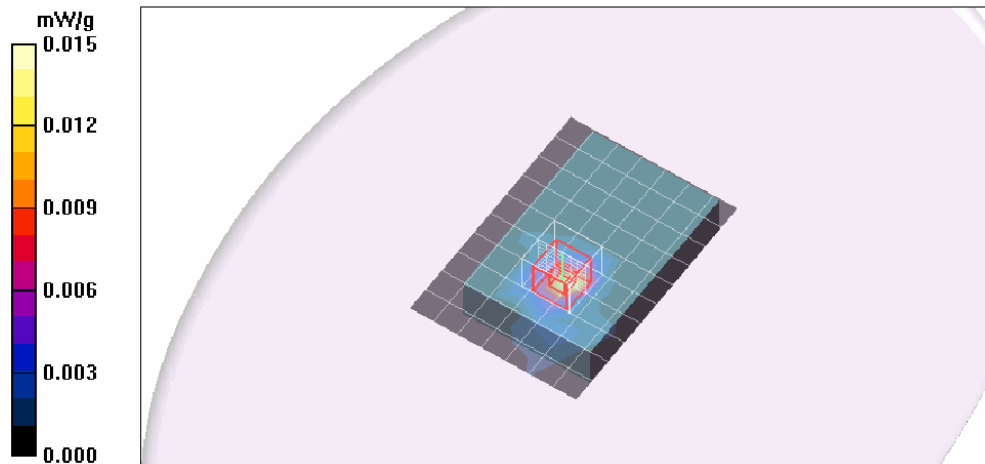
High Band Ch E502/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=3mm

Reference Value = 1.17 V/m; Power Drift = 0.169 dB

Peak SAR (extrapolated) = 0.027 W/kg

SAR(1 g) = 0.013 mW/g; SAR(10 g) = 0.00592 mW/g[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.017 mW/g



SAR Plots & Data (Ch no E898/1431.975MHz)

Date/Time: 11/7/2008 5:35:18 PM

Test Laboratory: Compliance Certification Services

Body Worn Face Up High Band

DUT: Wireless Medical Telemetry ECG Transmitter; Type: ZM-931PA; Serial: N/A

Communication System: High Band; Frequency: 1431.97 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 1431.97$ MHz; $\sigma = 1.34$ mho/m; $\epsilon_r = 52.9$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Room Ambient Temperature: 25.0 deg. C; Liquid Temperature: 24.0 deg. C

DASY4 Configuration:

- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV3 - SN3531; ConvF(9.33, 9.33, 9.33); Calibrated: 4/23/2008
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn500; Calibrated: DAE not calibrated
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:XXXX
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

High Band Ch E898/Area Scan (8x11x1): Measurement grid: dx=15mm, dy=15mm[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.015 mW/g

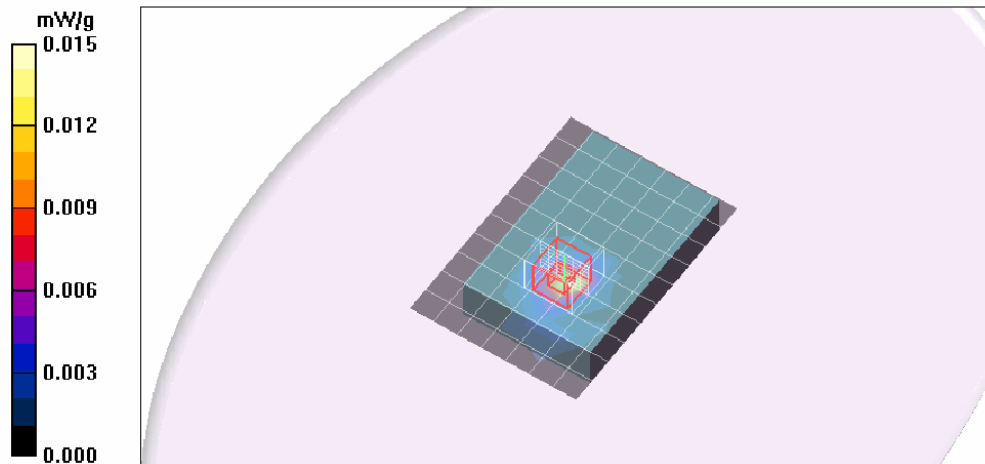
High Band Ch E898/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=3mm

Reference Value = 0.449 V/m; Power Drift = 5.11 dB

Peak SAR (extrapolated) = 0.028 W/kg

SAR(1 g) = 0.013 mW/g; SAR(10 g) = 0.00597 mW/g[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.017 mW/g

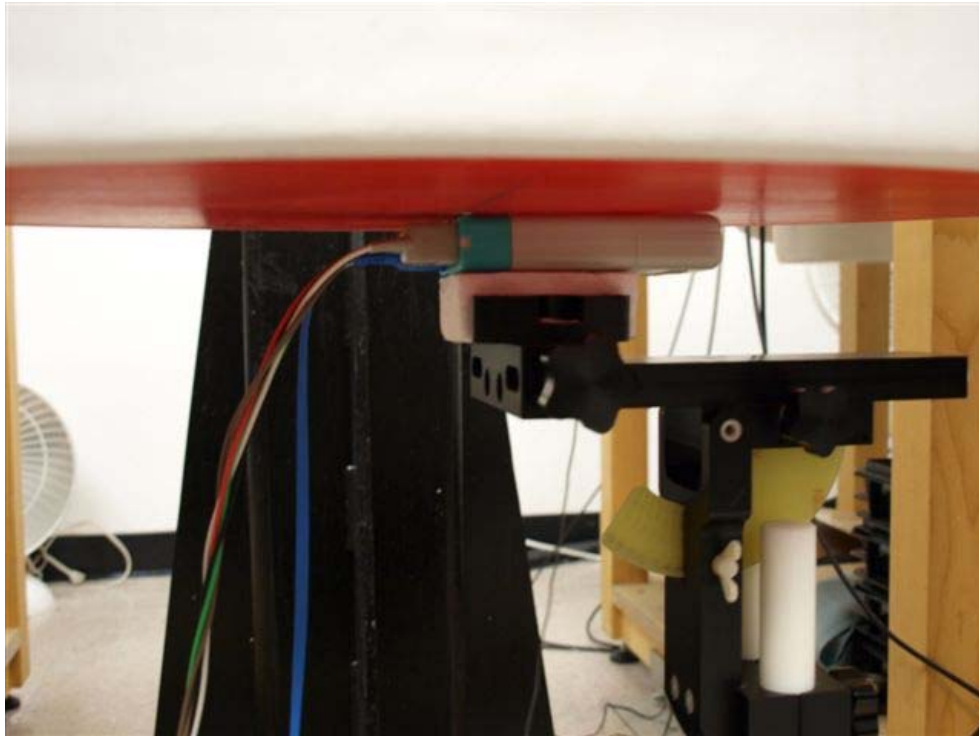


13. ATTACHMENTS

No.	Contents	No. Of Pages
1	System Performance Check Plots	2
2	Certificate of E-Field Probe - EX3DV3SN3531	10
3	Certificate of System Validation Dipole – D1450V2 SN 1020	9

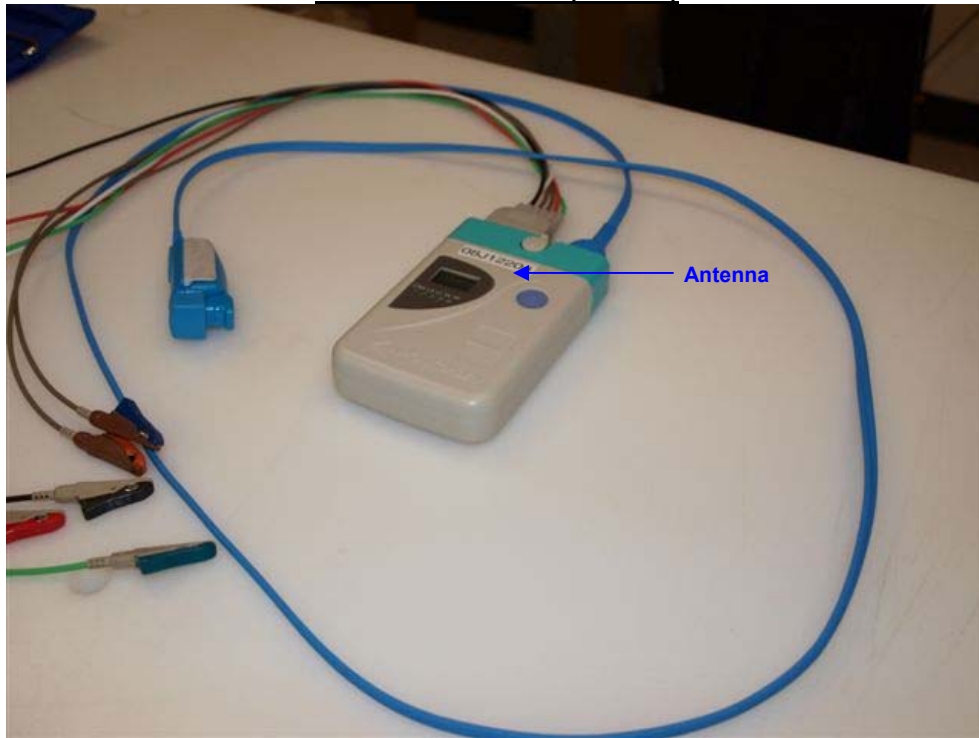
14. SETUP PHOTO

FACE UP

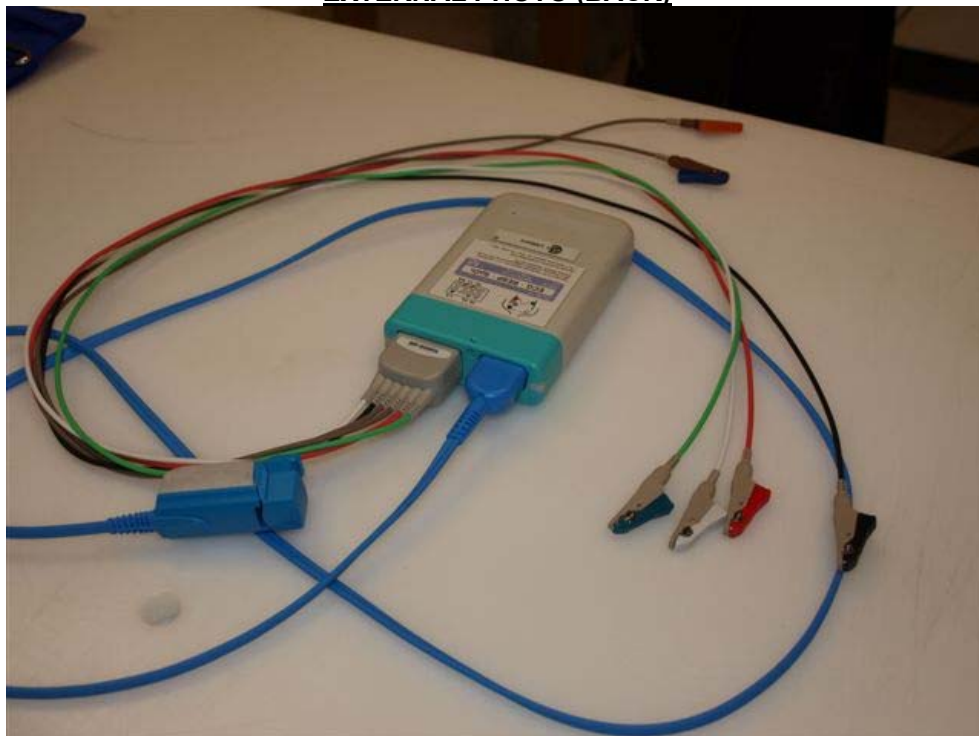


15. EUT PHOTOS

EXTERNAL PHOTO (FRONT)



EXTERNAL PHOTO (BACK)



END OF REPORT