MEASUREMENT AND TECHNICAL REPORT

ADVANCED BRAIN MONITORING INCORPORATED
2850 Pio Pico Drive, Suite A
Carlsbad, CA 92008

DATE: 24 January 2005

This Report Concerns:	Original Grant: X	Class II Change:
Equipment Type:	Sensor Headset, Model 603-B	
Deferred grant requested per 47 CFR 0.457(d)(1)(ii)?	Yes: **Defer until:**	No: X
Company Name **agrees to notify the Commission by:** **of the intended date of announcement of the product so that the grant can be issued on that date.**	N/A	
Transition Rules Request per 15.37?	Yes:	No: X*

(*) FCC Part 15, Paragraph(s) **15.247(a)(1), 15.247(a)(1)(ii), 15.247(b)(1), 15.247(c)**

Report Prepared by:

TÜV AMERICA, INC
10040 Mesa Rim Road
San Diego, CA 92121-2912
Phone: 858 678 1400
Fax: 858 546 0364

TÜV AMERICA

TABLE OF CONTENTS

TÜV AMERICA INC 10040 Mesa Rim Road San Diego, CA 92121-2912 Phone 858 678 1400 FAX 858 546 0364

1.0 GENERAL INFORMATION

1.1 Product Description

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

EUT Description: 6 Channel EEG Acquisition System

EUT Name: Sensor Headset

Model No.: Model 603-B Serial No.: --

Product Options: --

Configurations to be tested: Normal

EUT Specifications and Requirements

Length:	Head 4.5” Host 2.0”	Width:	2.3” 1.0”	Height:	1.0” 0.31”	Weight:	3.6oz. 0.25oz.

Power Requirements

Regulations require testing to be performed at typical power ratings in the countries of intended use. (i.e., European power is typically 230 VAC 50 Hz or 400 VAC 50 Hz, single and three phase, respectively)

Voltage: 2.4V, 2 NiMh battery (If battery powered, make sure battery life is sufficient to complete testing.)

# of Phases: --

Current (Amps/phase(max)): 70mA DC Current (Amps/phase(nominal)): --

Other: --

Other Special Requirements

Powere by 2 x AAA NiMh batteries

Typical Installation and/or Operating Environment

(ie. Hospital, Small Business, Industrial/Factory, etc.)
Hospital, clinic, workplace, or research facility

TÜV AMERICA INC 10040 Mesa Rim Road San Diego, CA 92121-2912 Phone 858 678 1400 FAX 858 546 0364

EUT Power Cable

☐ Permanent OR ☐ Removable Length (in meters): --
☐ Shielded OR ☐ Unshielded
■ Not Applicable

EUT Interface Ports and Cables

Interface				Shielding								
Type	Analog	Digital	Qty	Yes	No	Type	Termination	Connector Type	Port Termination	Length (in meters)	Removable	Permanent
EXAMPLE:												
RS232	☐	☒	*2*	☒	☐	*Foil over braid*	*Coaxial*	*Metallized 9-pin D-Sub*	*Characteristic Impedance*	*6*	☒	☐
USB integrated into Host Unit	☐	■	1	☐	■	Foil over braid		4 pin USB A		1	☐	■

EUT Software.

Revision Level: Firmware = 01.09.04 B-Alert Software = 01.05.04

Description: Firmware is stored in the microcontroller of the head units. The firmware controls data acquisition and transfers data at 115.2kBd to Bluetooth module. Transfer data over RF link is under BT module control. The ACQ program can control functions performed on the head unit via the host (BG dongle), including initiation of impedance monitoring and/or data acquisition.

EUT Operating Modes to be Tested -- list the operating modes to be used during test. It is recommended the equipment be tested while operating in a typical operation mode. FCC testing of personal computers and/or peripherals requires that a simple program generate a complete line of upper case H's. Provide a general description of all software, firmware, and PLD algorithms used in the equipment. List all code modules as described above, with the revision level used during testing. Consult with your TÜV Product Service Representative if additional assistance is required.

1. Acquisition mode - host unit (standard BT dongle) connected to PC, ACQ software operating on PC, and head unit within 20' of host unit.

EUT System Components -- List and describe all components which are part of the EUT. For FCC testing a minimum configuration is required. (ie. Mouse, Printer, Monitor, External Disk Drive, Motherboard, etc.)

Description	Model #	Serial #	FCC ID #
Head Unit	57-12	--	--
Sensor locator strip	Med-3-12	12-001	--

TÜV AMERICA INC 10040 Mesa Rim Road San Diego, CA 92121-2912 Phone 858 678 1400 FAX 858 546 0364

Support Equipment -- List and describe all support equipment which is not part of the EUT. (i.e. peripherals, simulators, etc)

Description	*Model #*	*Serial #*	*FCC ID #*
--			

Oscillator Frequencies

Frequency	*Derived Frequency*	*Component # / Location*	*Description of Use*
5.12 MHz	5.12 MHz	CSA309-5.120MABJ / RF board	Clock for microcontroller

Power Supply

Manufacturer	*Model #*	*Serial #*	*Type*
ABM	Internal DC/DC converter 2.4V to 3.6V	--	■ Switched-mode: (Frequency) 300kHz ☐ Linear ☐ Other: --

Power Line Filters

Manufacturer	*Model #*	*Location in EUT*
--		

Critical EMI Components (Capacitors, ferrites, etc.)

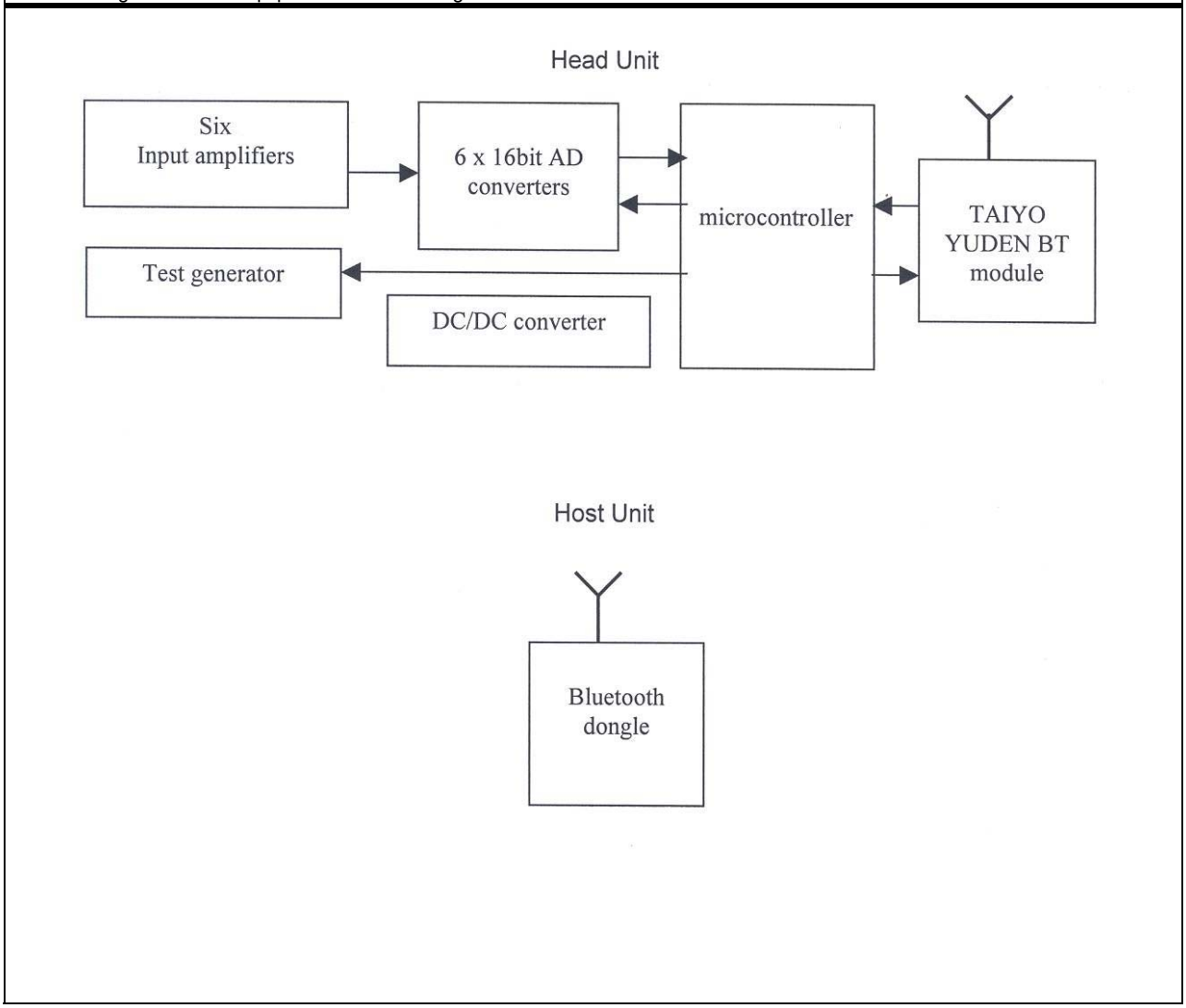
Description	*Manufacturer*	*Part # or Value*	*Qty*	*Component # / Location*
5.12 MHz	Citizen	CSA309-5.120MABJ	1	RF Board
100uF low esr tantal capacitor	AVX	TPSD107M010 R0065	1	RF Board
22uH inductor	API-DELEVAN	S1812-223K	1	RF Board

EMC Critical Detail -- Describe other EMC Design details used to reduce high frequency noise.

Crystal oscillator for 5.12 MHz clock,
DC-DC converter works on 300kHz internal clock

TÜV AMERICA INC 10040 Mesa Rim Road San Diego, CA 92121-2912 Phone 858 678 1400 FAX 858 546 0364

System Configuration Block Diagram -- Provide a line drawing identifying the EUT, simulators, support equipment, I/O cables, power cables, and any other pertinent components to be used during testing. Use a dashed line to separate the equipment in the testing field versus equipment outside testing field.



TÜV AMERICA INC 10040 Mesa Rim Road San Diego, CA 92121-2912 Phone 858 678 1400 FAX 858 546 0364

1.2 Related Submittal Grant

None

1.3 Tested System Details

The FCC ID's for all equipment, plus descriptions of all cables used in the tested system are:

None

1.4 Test Methodology

Purpose of Test: To demonstrate compliance with the following tests.

Test Summary					
Test Description	Paragraph Number	Summary of Results			Pass/Fail
		Low Channel	Mid Channel	High Channel	
Bandwidth	15.247(a)(1)(i)		10.8kHz		Pass
Channel Separation	15.247(a)(1)		1.023MHz		Pass
Time of Occupancy	15.247(a)(1)(i)		18mSec*		Pass
Number of Hopping Channels	15.247(a)(1)(i)		80		Pass
RF Conducted Spurious	15.247(c)	Not Performed	Not Performed	Not Performed	N/A
Radiated Spurious Emissions – Restricted Bands (1GHz to 25GHz)	15.247(c)/ 15.209(a)	No Emissions Found	No Emissions Found	No Emissions Found	Pass
Radiated Emissions (30 to 1000 MHz)	15.209(a)	No Emissions Found	No Emissions Found	No Emissions Found	Pass
RF Output Power	15.247(b)	.36uW	.15uW	.32uW	Pass
Receiver Spurious Emissions	15.109(a)	No emissions found	No emissions found	No emissions found	Pass
FIELD STRENGTH (measured in μV per meter @ 3 meters if the antenna is integral to the device or conducted RF Power if the antenna is detachable		1096.5uV/m (pk) 177uV/m (avg)	707.9uV/m (pk) 350.8uV/m (avg)	1035.1uV/m (pk) 543.3uV/m (avg)	Pass

Testing was performed according to the procedures in FCC/ANSI C63.4 and CSA 108.8-M1983.

(*) Clarity of Time of Occupancy could not be satisfied using a 1 MHz resolution bandwidth. The resolution bandwidth was reduced in order to perform measurement.

1.5 Test Facility

The open area test site and conducted measurement data were tested by:

TÜV AMERICA, INC
10040 Mesa Rim Road
San Diego, CA 92121-2912
Phone: 858 678 1400
Fax: 858 546 0364

The Test Site Data and performance comply with ANSI C63.4 and are registered with the FCC, 7435 Oakland Mills Road, Columbia Maryland 21046. All Measurement Data is acquired according to the content of FCC Measurement Procedure and ANSI C63.4, unless supplemented with additional requirements as noted in the test report.

2.0 SYSTEM TEST CONFIGURATION

2.1 Justification

The EUT was initially tested for FCC emissions in the following configuration:

See Test Setup Photos Exhibit

2.2 EUT Exercise Software

None

2.3 Special Accessories

None

2.4 Equipment Modifications

None

2.5 Configuration of Test System

See Test Setup Photos Exhibit

3.0 CHANNEL SEPARATION EQUIPMENT/DATA
NUMBER OF HOPPING FREQUENCIES EQUIPMENT/DATA
20 dB BANDWIDTH MEASUREMENT EQUIPMENT/DATA
TIME OF OCCUPANCY EQUIPMENT/DATA
PEAK OUTPUT POWER EQUIPMENT/DATA
RADIATED SPURIOUS EQUIPMENT/DATA

Test Conditions: CHANNEL SEPARATION 15.247(a)(1)
NUMBER OF HOPPING FREQUENCIES 15.247(a)(1)(ii)
20 dB BANDWIDTH MEASUREMENT 15.247(a)(1)(ii)
TIME OF OCCUPANCY 15.247(a)(1)(ii)
PEAK OUTPUT POWER 15.247(b)(1)
RADIATED SPURIOUS 15.247(c)

The following measurements were performed at the San Diego Testing Facility:

☐ **- Test not applicable**

■ - Roof (Small Open Area Test Site)
■ - Canyon #2 (3- and 10-Meter Open Area Test Site), Carroll Canyon, San Diego

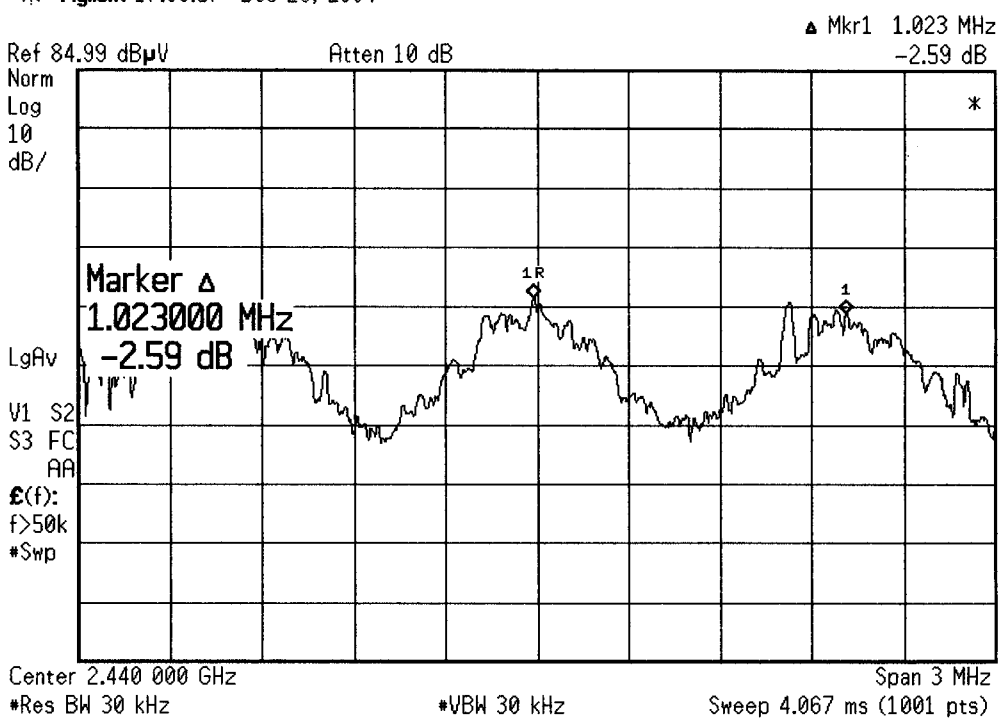
Test Equipment Used:

Model No.	Prop. No.	Description	Manufacturer	Serial No.	Date Cal'ed
E4440A	7500	Spectrum Analyzer	Hewlett Packard	MY43362168	12/04
3115	251	Double Ridge Horn Antenna	EMCO	2495	01/04
3146	244	Antenna, Log Periodic Dipole	EMCO	1063	07/04
LPB 2520/A	739	Antenna, Bilog	Antenna Research	1170	05/04
ESVS 30	6732	EMI Test Receiver	Rhode & Schwarz	833825/003	05/04

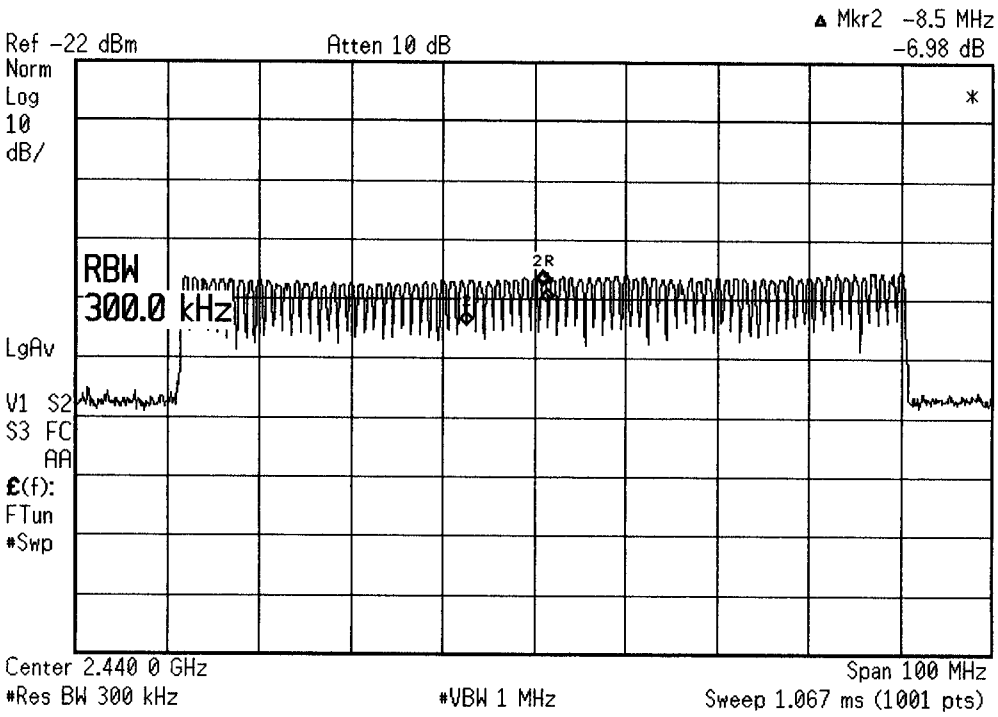
Remarks: One year calibration cycle for all test equipment and sites.

TÜV AMERICA INC 10040 Mesa Rim Road San Diego, CA 92121-2912 Phone 858 678 1400 FAX 858 546 0364

FCC Part 15.247(a)(1) Channel Separation

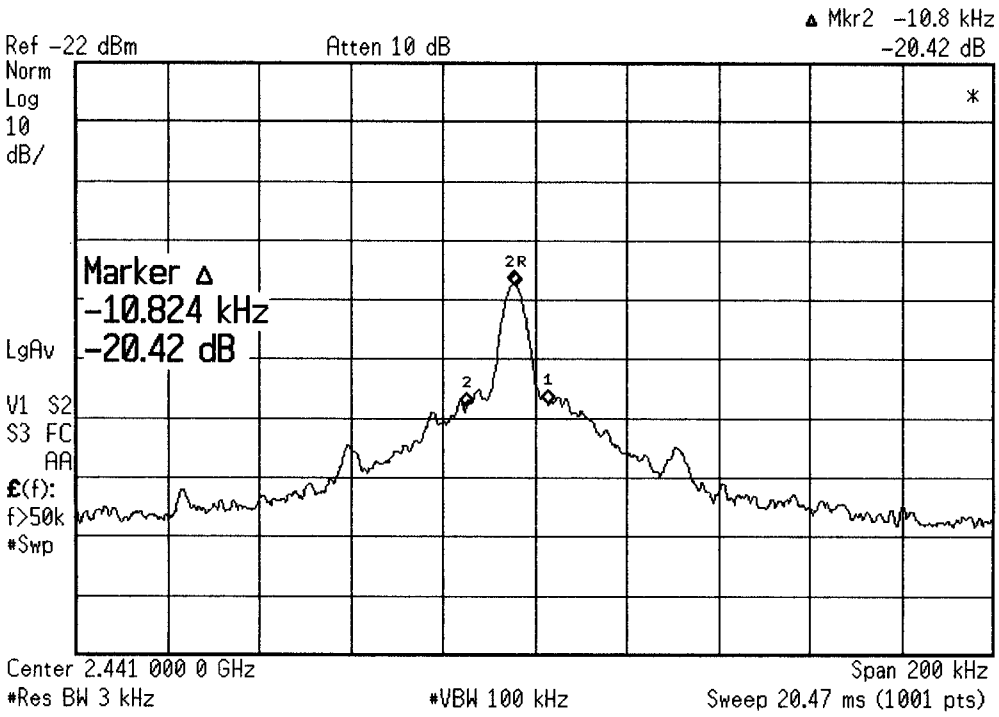


FCC Part 15.247(a)(1)(ii) Number of Hopping Frequencies >75 Hopping Channels

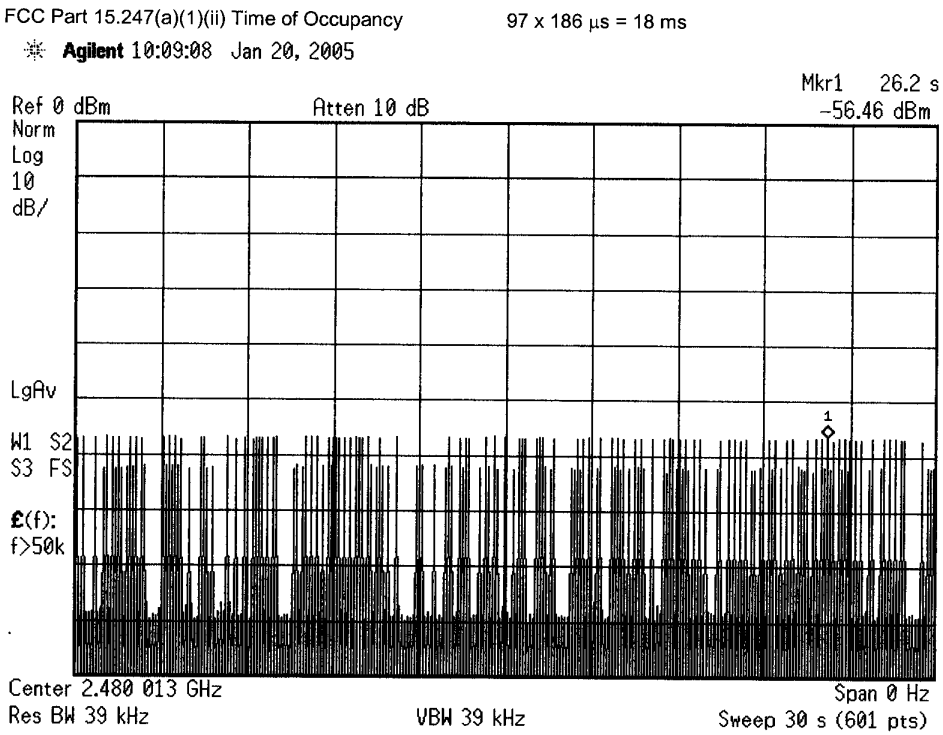


TÜV AMERICA INC 10040 Mesa Rim Road San Diego, CA 92121-2912 Phone 858 678 1400 FAX 858 546 0364

FCC Part 15.247(a)(1)(ii) 20 dB Bandwidth Measurement 10.8 kHz BW_{20dB}



TÜV AMERICA INC 10040 Mesa Rim Road San Diego, CA 92121-2912 Phone 858 678 1400 FAX 858 546 0364

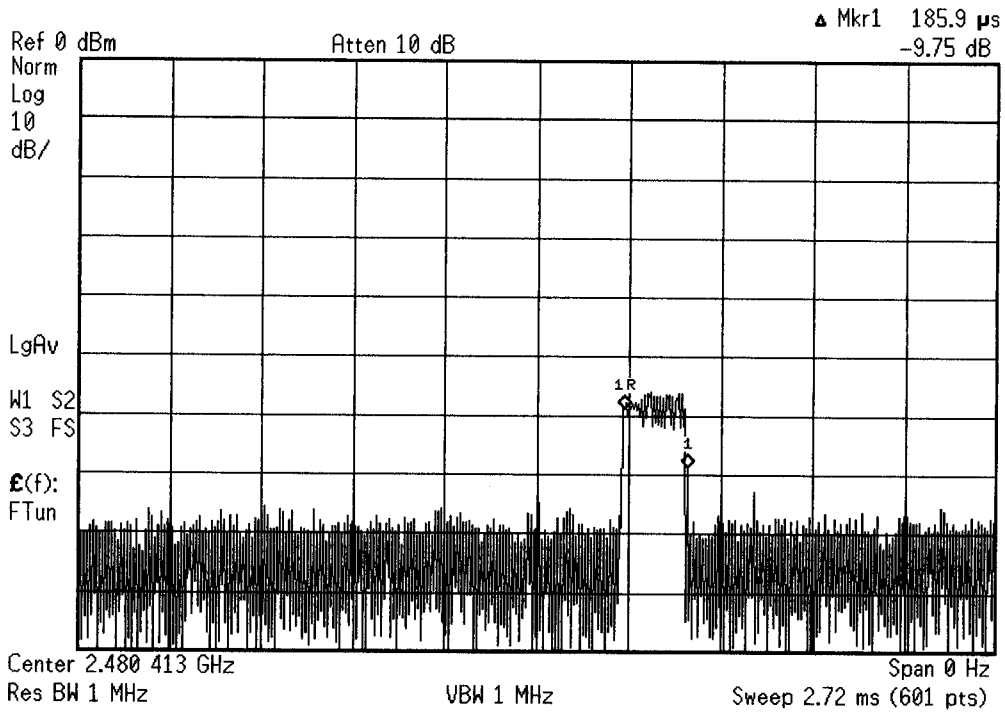


NOTE: (*) Clarity of Time of Occupancy could not be satisfied using a 1 MHz resolution bandwidth. The resolution bandwidth was reduced in order to perform measurement.

TÜV AMERICA INC 10040 Mesa Rim Road San Diego, CA 92121-2912 Phone 858 678 1400 FAX 858 546 0364

TÜV AMERICA INC 10040 Mesa Rim Road San Diego, CA 92121-2912 Phone 858 678 1400 FAX 858 546 0364

FCC Part 15.247(a)(1)(ii) Time of Occupancy



TÜV AMERICA INC 10040 Mesa Rim Road San Diego, CA 92121-2912 Phone 858 678 1400 FAX 858 546 0364

REPORT No: SC404781 TESTER: Alan Laudani SPEC: FCC Part 15 para 15.247 (b)(1)

CUSTOMER: Advanced Brain Monitoring Systems TEST DIST: 3 Meters

E U T: EEG with BTH device TEST SITE: Roof

EUT MODE: Host device tranmitting BICONICAL: N/A

DATE: January 11, 2004 LOG: 244

NOTES: OTHER: 251

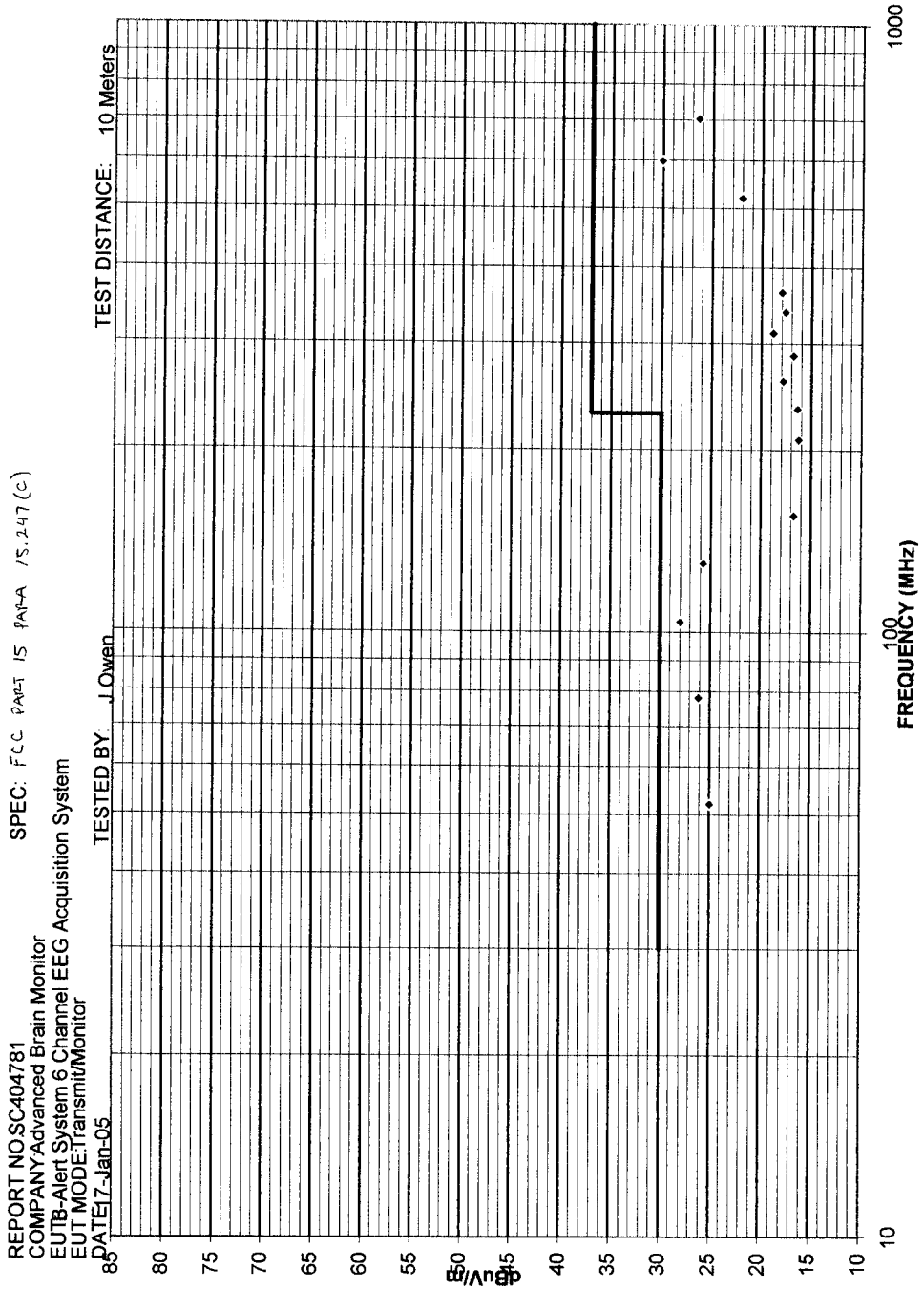
above 1GHz: RBW & VBW 1 MHz for Pk; RBW 1MHz and VBW 10Hz for AVG

below 1GHz: RBW & VBW 100 kHz for Pk; RBW 100kHz and VBW 10Hz for AVG

CF = Antenna Factor + Cable Loss - Preamplifier Gain + Preselector Loss

v.beta1a

FREQ (MHz)	VERTICAL (dBuv) pk	VERTICAL (dBuv) av	HORIZONTAL (dBuv) pk	HORIZONTAL (dBuv) av	CF (dB/m)	MAX LEVEL (dBuV/m) pk	MAX LEVEL (dBuV/m) av	SPEC LIMIT (dBuV/m) pk	SPEC LIMIT (dBuV/m) av	MARGIN (dB) pk	MARGIN (dB) av	EUT Rotation	Antenna Height	Notes
2441	26.01	10.25	20.35	7.21	34.8	**60.8**	**45.0**	79.5	59.5	-18.7	-14.5	90	107	.36 mW
2402	22.45	8.31	17.91	16.35	34.6	**57.0**	**50.9**	79.5	59.5	-22.5	-8.56	90	107	.15 mW
2480	25.39	19.77	22.39	8.36	34.9	**60.3**	**54.7**	79.5	59.5	-19.2	-4.81	90	107	.37 mW


REPORT NO:SC404781
COMPANY:Advanced Brain Monitor
EUT:B-Alert System 6 Channel EEG Acquisition System
EUT MODE:Transmit/Monitor
DATE:17-Jan-05
SPEC: FCC PART 15 PARA 15.247(c)
TESTED BY: J Owen
TEST DISTANCE: 10 Meters
dBuV/m
FREQUENCY (MHz)
85
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
10
100
1000

REPORT No: SC404781 SPEC: FCC PART 15 PARA 15.247(c)

CUSTOMER: Advanced Brain Monitor TEST DIST: 10 Meters

E U T: B-Alert System 6 Channel EEG Acquisition System TEST SITE: 2

EUT MODE: Transmit/Monitor BICONICAL: 739

DATE: 17-Jan-05 TESTED BY: J Owen LOG PERIODIC: 739

NOTES: Quasi-Peak with 120 KHz measurement bandwidth. RCVR: 6732

Low/mid/high

Temperature: 24 Relative Humidity: 40%

EUT MARGIN -2.0 dB at 104 MHz ver 1.8b

FREQUENCY (MHz)	VERTICAL measured (dBuv)	HORIZONTAL measured (dBuV)	CORRECTION FACTOR (dB/m)	MAXIMUM CORRECTED (dBuV/m)	SPECIFIED LIMIT (dBuV/m)	EUT MARGIN (dB)	EUT ROTATION (degrees)	ANTENNA HEIGHT (meters)	NOTE
52.00	8.2	8.2	16.7	**24.9**	30	-5.1			ambient
78.00	16	6.9	10.1	**26.1**	30	-3.9			ambient
104.00	15	2.6	13.0	**28.0**	30	-2.0			ambient
130.00	12.4	0.3	13.3	**25.7**	30	-4.3			ambient
156.00	5.3	0.2	11.4	**16.7**	30	-13.3			ambient
208.00	2.4	0.9	13.9	**16.3**	30	-13.7			ambient
234.00	0.5	-0.3	15.9	**16.4**	37	-20.6			ambient
260.00	0.9	-2.4	16.9	**17.8**	37	-19.2			ambient
286.00	-0.2	-1.1	17.0	**16.8**	37	-20.2			ambient
312.00	1.1	-1.3	17.7	**18.8**	37	-18.2			ambient
338.00	-1.3	-1.7	18.9	**17.6**	37	-19.4			ambient
364.00	-1.6	-1.8	19.6	**18.0**	37	-19.0			ambient
520.00	-2	-2	24.0	**22.0**	37	-15.0			ambient
598.00	-0.7	4.7	25.4	**30.1**	37	-7.0			ambient
702.00	-1.7	-1.7	28.1	**26.4**	37	-10.6			ambient

REPORT No: SC404781 TESTER: Bryan McWatters SPEC: FCC PART 15 PARA 15.247(C)

CUSTOMER: Advanced brain Monitoring Systems TEST DIST: 3 Meters

E U T: Host (EEG) TEST SITE: Roof

EUT MODE: Transmitting BICONICAL: N/A

DATE: January 12, 2005 LOG: 244

NOTES: OTHER: 251

above 1GHz: RBW & VBW 1 MHz for Pk; RBW 1MHz and VBW 10Hz for AVG

below 1GHz: RBW & VBW 100 kHz for Pk; RBW 100kHz and VBW 10Hz for AVG

CF = Antenna Factor + Cable Loss - Preamplifier Gain + Preselector Loss

No Emission Detected above fundamental

v.beta1a

FREQ (MHz)	VERTICAL (dBuv) pk	VERTICAL (dBuv) av	HORIZONTAL (dBuv) pk	HORIZONTAL (dBuv) av	CF (dB/m)	MAX LEVEL (dBuV/m) pk	MAX LEVEL (dBuV/m) av	SPEC LIMIT (dBuV/m) pk	SPEC LIMIT (dBuV/m) av	MARGIN (dB) pk	MARGIN (dB) av	EUT Rotation	Antenna Height	Notes
														2.48 Ghz Hamonics
4996	15.66	2.95			40.7888	**56.45**	**43.7**	74	54	-17.6	-10.2612			Ambient
7440	15.08	4.93			44.756	**59.84**	**49.7**	74	54	-14.2	-4.314			Ambient
9920	12.14	3.57			46.92	**59.06**	**50.5**	74	54	-14.9	-3.51			Ambient
12400	12.47				50.78	**63.25**	**50.8**	74	54	-10.8	-3.22			Ambient
														2.441 Ghz Harmonics
4882	10.98	3.15			40.4696	**51.45**	**43.6**	74	54	-22.6	-10.3804			Ambient
7323	18.16	9.02			44.4752	**62.64**	**53.5**	74	54	-11.4	-0.5048			Ambient
9764	12.26	3.8			46.764	**59.02**	**50.6**	74	54	-15	-3.436			Ambient
12205	12.9				50.546	**63.45**	**50.5**	74	54	-10.6	-3.454			Ambient
														2.402 Ghz Harmonics
4804	11.06	3.62			40.2512	**51.31**	**43.9**	74	54	-22.7	-10.1288			Ambient
7206	13.06	4.79			44.1944	**57.25**	**49**	74	54	-16.7	-5.0156			Ambient
9600	11.14	4.07			46.6	**57.74**	**50.7**	74	54	-16.3	-3.33			Ambient
12010	14.53				50.312	**64.84**	**50.3**	74	54	-9.16	-3.688			Ambient

4.0 ATTESTATION STATEMENT

GENERAL REMARKS:

SUMMARY:

All tests were performed per CFR 47, Part(s) 15.247(a)(1), 15.247(a)(1)(ii), 15.247(b)(1), 15.247(c)

■ - Performed

The Equipment Under Test

■ - **Fulfills** the requirements of CFR 47, Part(s) 15.247(a)(1), 15.247(a)(1)(ii), 15.247(b)(1), 15.247(c)

Testing Start Date: 28 December 2004

Testing End Date: 20 January 2005

- TÜV AMERICA, INC. -

Responsible Engineer:

Jim Owen
(EMC Manager)

TÜV AMERICA INC 10040 Mesa Rim Road San Diego, CA 92121-2912 Phone 858 678 1400 FAX 858 546 0364