EMC TEST REPORT

Test Report File No.   :   **WC704462 Rev A**   Date of issue: 18 July 2008

Model / Serial No(s) Tested   :   MSR-154-200 / 1000

Product Type   :   Modular Sensor Radio (MSR)
                                     802.15.4 Transmitter (channel 20 only, 2450MHz)

Applicant   :   Healthsense Incorporated

Manufacturer   :   Healthsense Incorporated

License holder   :   Healthsense Incorporated

Address   :   1250 Northland Drive Suite 110
                                       Mendota Heights MN 55120

Test Result   :   ■ **Positive**   □ **Negative**

Test Project Number
References   :   **WC704462 Rev A**

Total pages including
Appendices   :   **34**

D I R E C T O R Y

Sign Explanations:
□ - not applicable
■ - applicable

REVISION RECORD

REVISION	TOTAL NUMBER OF PAGES	DATE	DESCRIPTION
	34	28 December 2007	Initial Release
	34	18 July 2008	Revisions Include: ▪ Pages 4, 6, 8, 14, and 16: Added KDB Publication No. 558074. ▪ Appendix B: Revised

EMC TEST REGULATIONS:

The tests were performed according to the following regulations :

☐ - EN 50081-1 / 1991
☐ - EN 55014-2: 1997 + Amendment A1: 2001 - Category __
☐ - EN 55024: 1998 + Amendments A1: 2001 + A2: 2003
☐ - EN 60601-1-2: 2001
☐ - EN 61000-6-1: 2001
☐ - EN 61000-6-2: 2001
☐ - EN 61326: 1997 + Amendments A1: 1998 + A2: 2001 + A3: 2003
☐ - EN 61800-3: 1996 + Amendment A11: 2000
☐ - ETS 300 683: 1997
☐ - ETS 300 683: 1997
☐ - ETSI EN 301 489-3 V1.4.1: 2002
☐ - EN 300 220-3 V1.1.1
☐ - EN 300 330-2 V1.1.1
☐ - FCC Part 15 Subpart C Section 15.207
☐ - FCC Part 15 Subpart C Section 15.209
■ - FCC Part 15 Subpart C Section 15.247
☐ - FCC Part 15 Subpart C Section 15.249
■ - IC RSS-210 Issue 7
☐ - IC RSS-Gen Issue 2
☐ - IC RSS-Gen Issue 1

ENVIRONMENTAL CONDITIONS IN THE LAB

	Actual
Temperature:	: 21-23 °C
Atmospheric pressure	: 98 kPa
Relative Humidity	: 23-24 %

POWER SUPPLY UTILIZED
Power supply system   : 3 VDC

6 dB Bandwidth
FCC 15.247(a)(2), IC RSS-210 A8.2(a)

Test summary
The requirements are: ■ - MET   □ - NOT MET
Test was performed in accordance with the test procedure of FCC KDB Publication 558074
The minimum 6 dB bandwidth = 1.605 MHz

Test location
□ - Wild River Lab Large Test Site (Open Area Test Site)
□ - Wild River Lab Small Test Site (Open Area Test Site)
■ - Wild River Lab Tech Area, conducted measurement

Test equipment

TUV ID	Model Number	Manufacturer	Description	Serial Number	Cal Due
10435	E4440A	Agilent	Spectrum Analyzer	MY44304483	27 Feb 08

Test limit
Minimum 500 kHz

Test data
See following pages

6 dB Bandwidth

△ Mkr1 1.605 MHz
           −0.19 dB

Ref 2 dBm   Atten 20 dB

Norm
Log
2
dB/
Offst
1.81
dB

DI
−4.6
dBm

LgAv

V1 S2
S3 FC
    AA
£(f):
f>50k
#Swp

Center 2.450 000 GHz   Span 5 MHz
#Res BW 100 kHz   VBW 300 kHz   Sweep 1 ms (1001 pts)
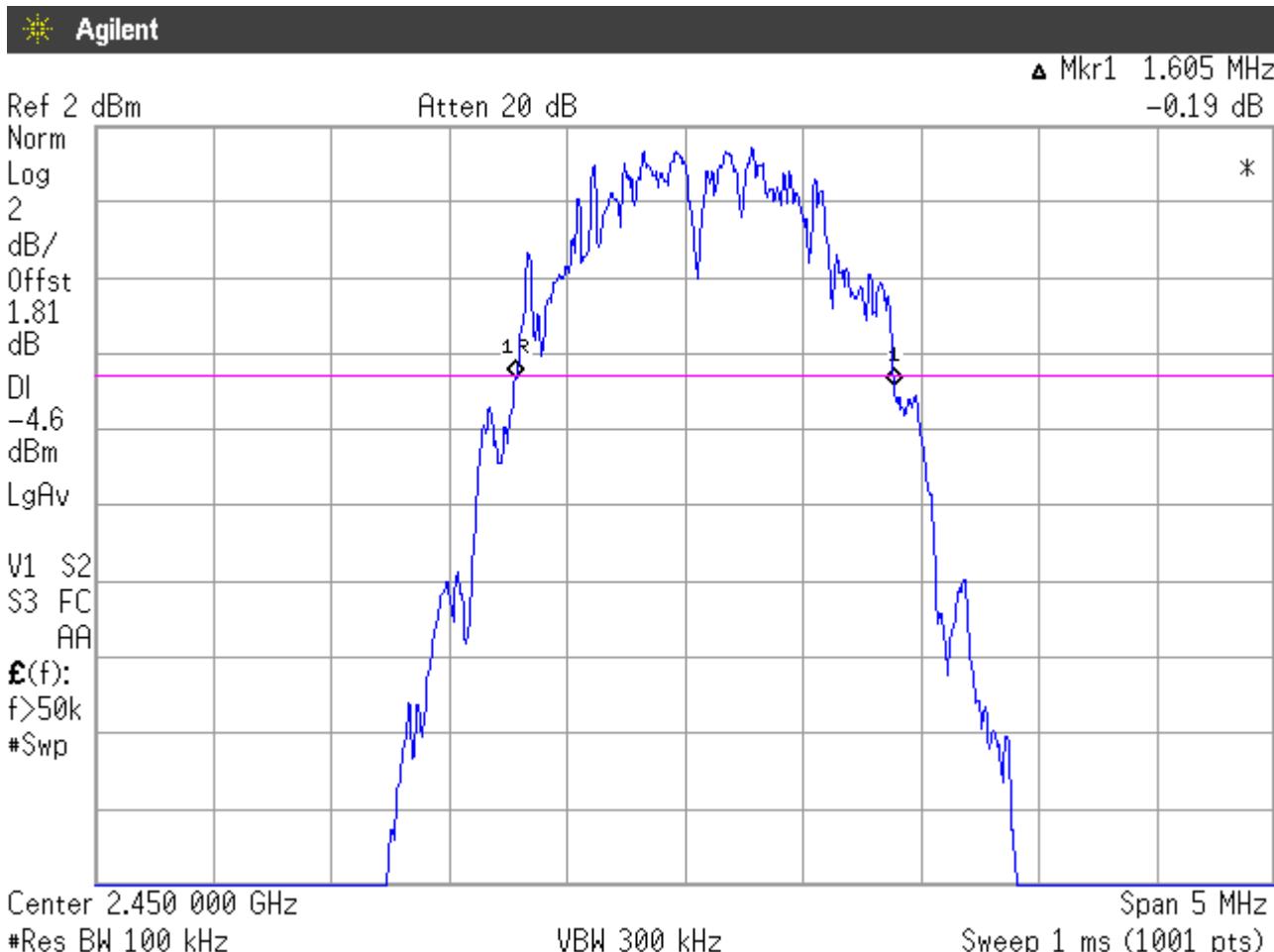
Maximum peak output power
FCC 15.247(b)(3), IC RSS-210 A8.4(4)

Test summary
The requirements are: ■ - MET ☐ - NOT MET
Test was performed in accordance with the test procedure of FCC KDB Publication 558074
Maximum peak output power is 8.76 dBm or 7.52 mW

Test location
☐ - Wild River Lab Large Test Site (Open Area Test Site)
☐ - Wild River Lab Small Test Site (Open Area Test Site)
■ - Wild River Lab Tech Area, conducted measurement

Test equipment

| TUV ID	Model Number	Manufacturer	Description	Serial Number	Cal Due
10435	E4440A	Agilent	Spectrum Analyzer	MY44304483	27 Feb 08

Test limit
1 watt

Test data
See following pages

Peak output power
1.81 dB offset compensates for coax loss
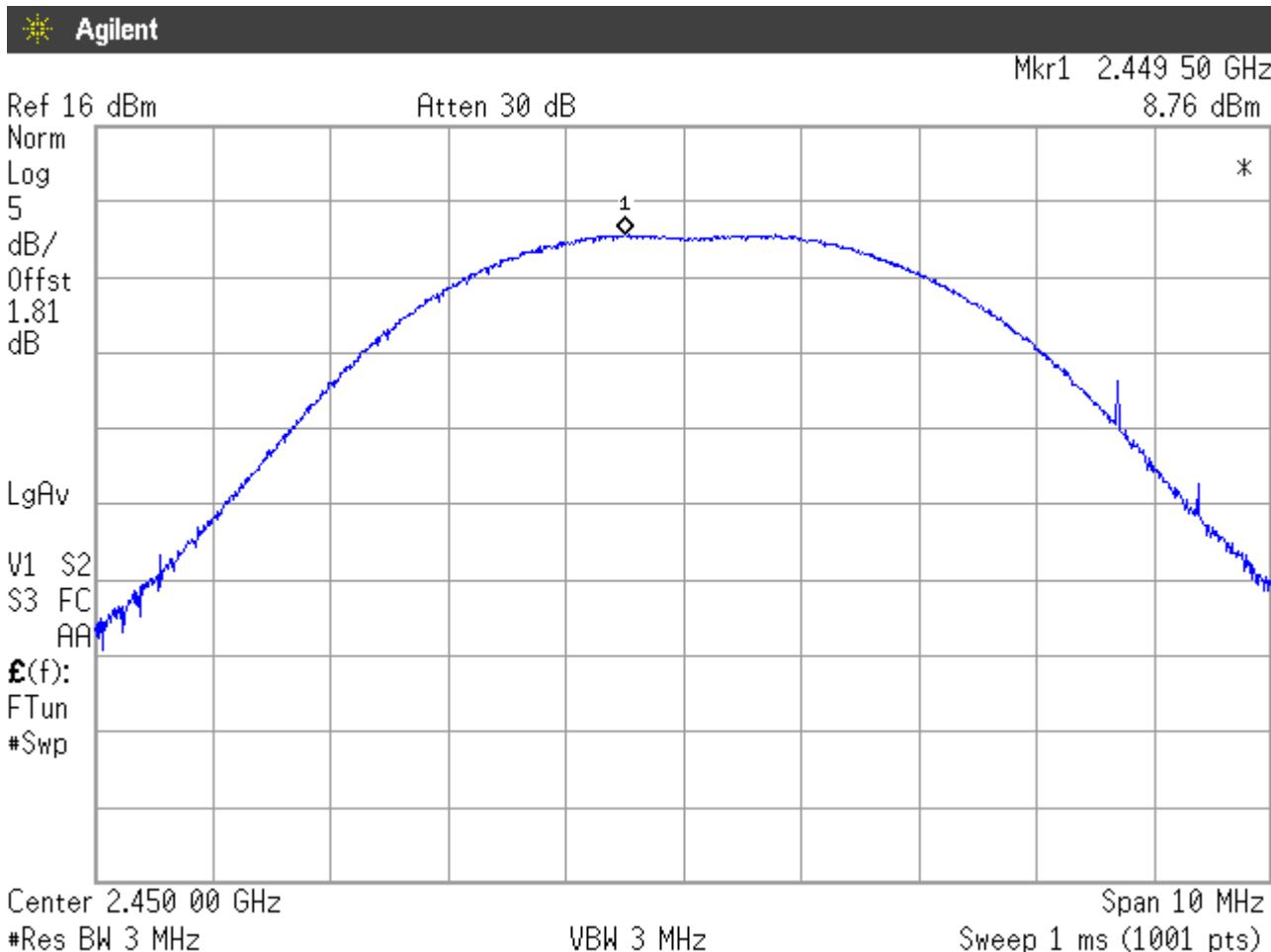
Spurious emissions
FCC 15.247(d), IC RSS-210 A8.5

Test summary
The requirements are: ■ - MET   □ - NOT MET
Test was performed in accordance with the test procedure of FCC KDB Publication 558074
Maximum spurious emission is -55 dBc at 4.9 GHz

Test location
■ - Wild River Lab Large Test Site (Open Area Test Site)
□ - Wild River Lab Small Test Site (Open Area Test Site)
■ - Wild River Lab Tech Area, conducted measurement

Test equipment

TUV ID	Model Number	Manufacturer	Description	Serial Number	Cal Due
10435	E4440A	Agilent	Spectrum Analyzer	MY44304483	27 Feb 08
3294	8566B	Hewlett-Packard	Spectrum Analyzer	2349A03098	16-May-08
3295	85662A	Hewlett-Packard	Analyzer Display	2349A06144	16-May-08
2681	85650A	Hewlett-Packard	Quasi-Peak Adapter	2430A00562	23-Mar-08
2075	3115	EMCO	Ridge Guide Ant. 1-18 GHz	9001-3275	12-Jan-08
3958	SL18B4020	Phase One Microwave	Preamplifier 1 – 18 GHz	0002	Code B
3997	EWT-14-0066	EWT	2.4 GHz Notch filter	E2	Code B
2003	F550B1	Acronetics	4 – 8 GHz Bandpass Filter	010	Code B
3933	F551B-1	Acronetics	8 – 12 GHz Bandpass Filter	010	Code B
3202	EM-6917B	Electro-Metrics	Biconicalog Periodic	101	10-May-08
3847	ZHL-1042J	Mini-Circuits	Preamplifier 10 - 3000 MHz	0607	Code B

Cal Code B = Calibration verification performed internally.

Test limit - conducted
-20 dBc

Test limit within restricted bands per 15.205 - radiated

Frequncy (MHz)	Field strength (μV/meter)	Field strength (dBμV/meter)
30 - 88	100, QP	40.0
88 - 216	150, QP	43.5
216 - 960	200, QP	46.0
Above 960	500, QP	54.0
> 1000	500, AV	54.0
	5000, PK	74.0

Test data
See following pages

Spurious emissions - conducted

Mkr1 2.45 GHz
0.54 dBm

Ref 4 dBm   Atten 20 dB

Norm
Log
10
dB/
Offst
1.81
dB

DI
-19.5
dBm
LgAv

V1 S2
S3 FC
AA
£(f):
FTun
#Swp

-20 dBc

-55 dBc

Start 30 MHz   Stop 24.50 GHz
#Res BW 100 kHz   VBW 300 kHz   Sweep 2.339 s (1001 pts)
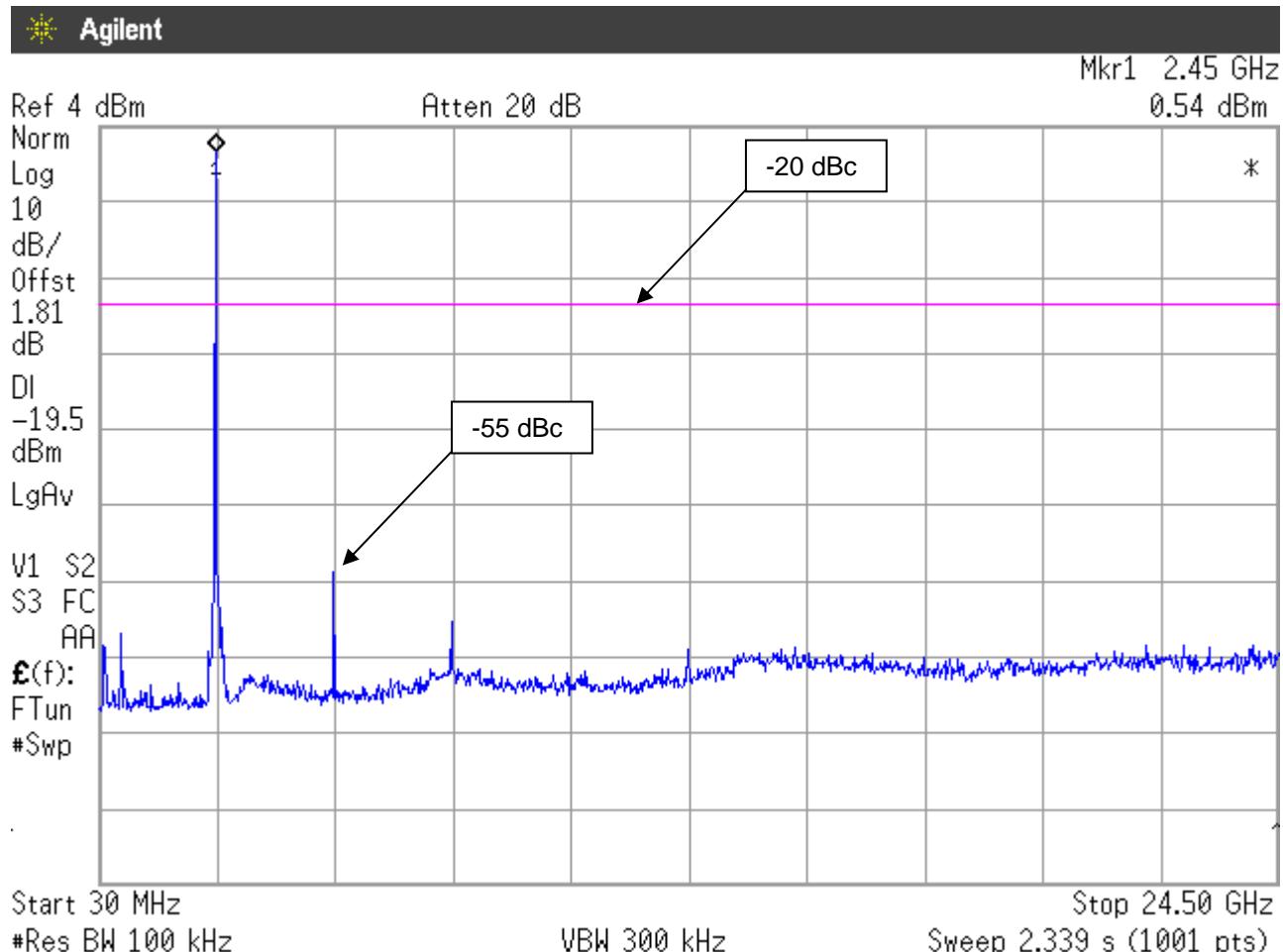
Band edge low, conducted
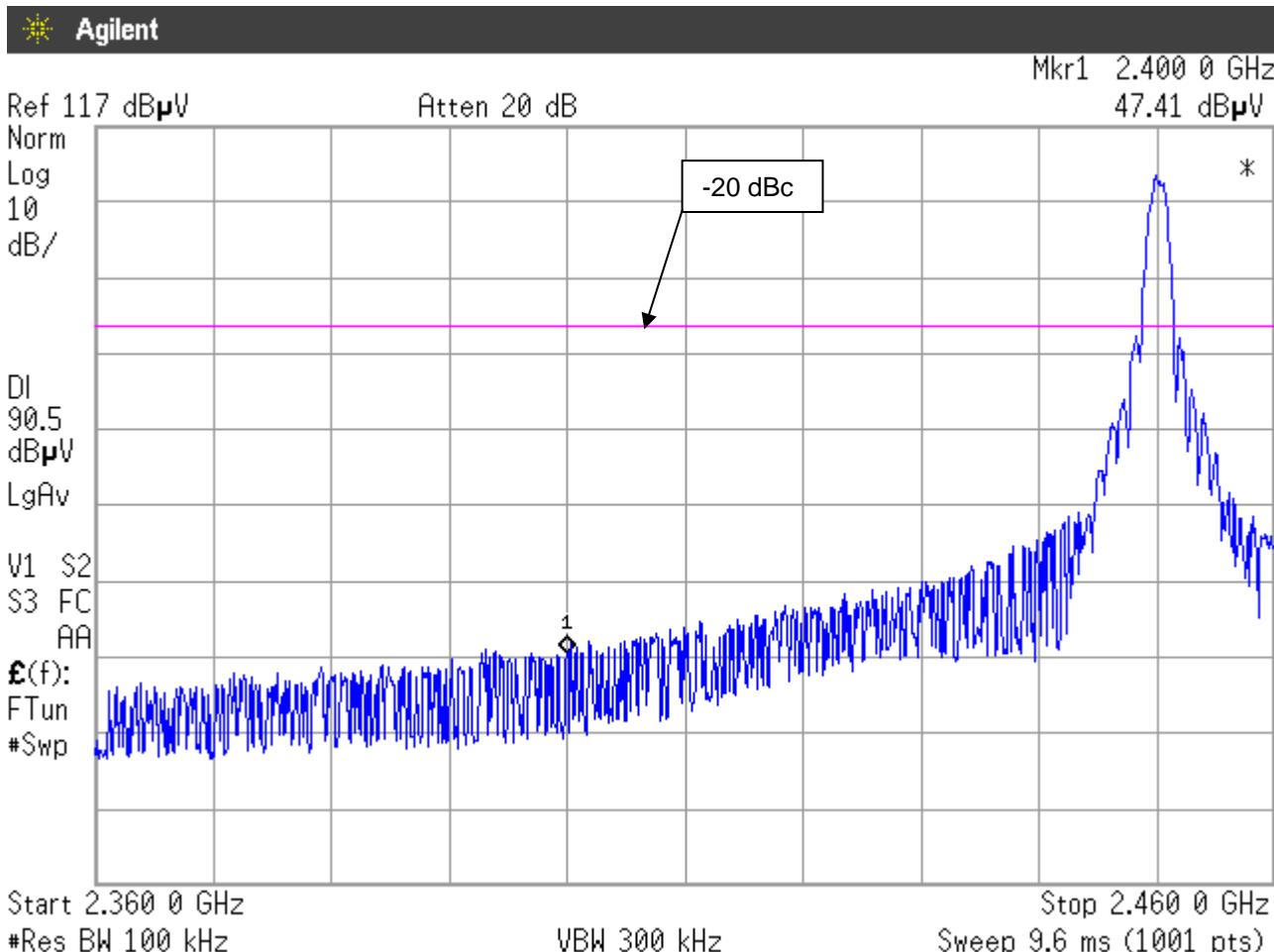
Band edge high, conducted

Agilent

Mkr1 2.483 5 GHz
          51.79 dBµV

Ref 117 dBµV   Atten 20 dB

Norm
Log
10
dB/

-20 dBc

DI
90.5
dBµV

LgAv

V1 S2
S3 FC
    AA

£(f):
FTun
#Swp

Start 2.430 0 GHz   Stop 2.530 0 GHz
#Res BW 100 kHz   VBW 300 kHz   Sweep 9.6 ms (1001 pts)
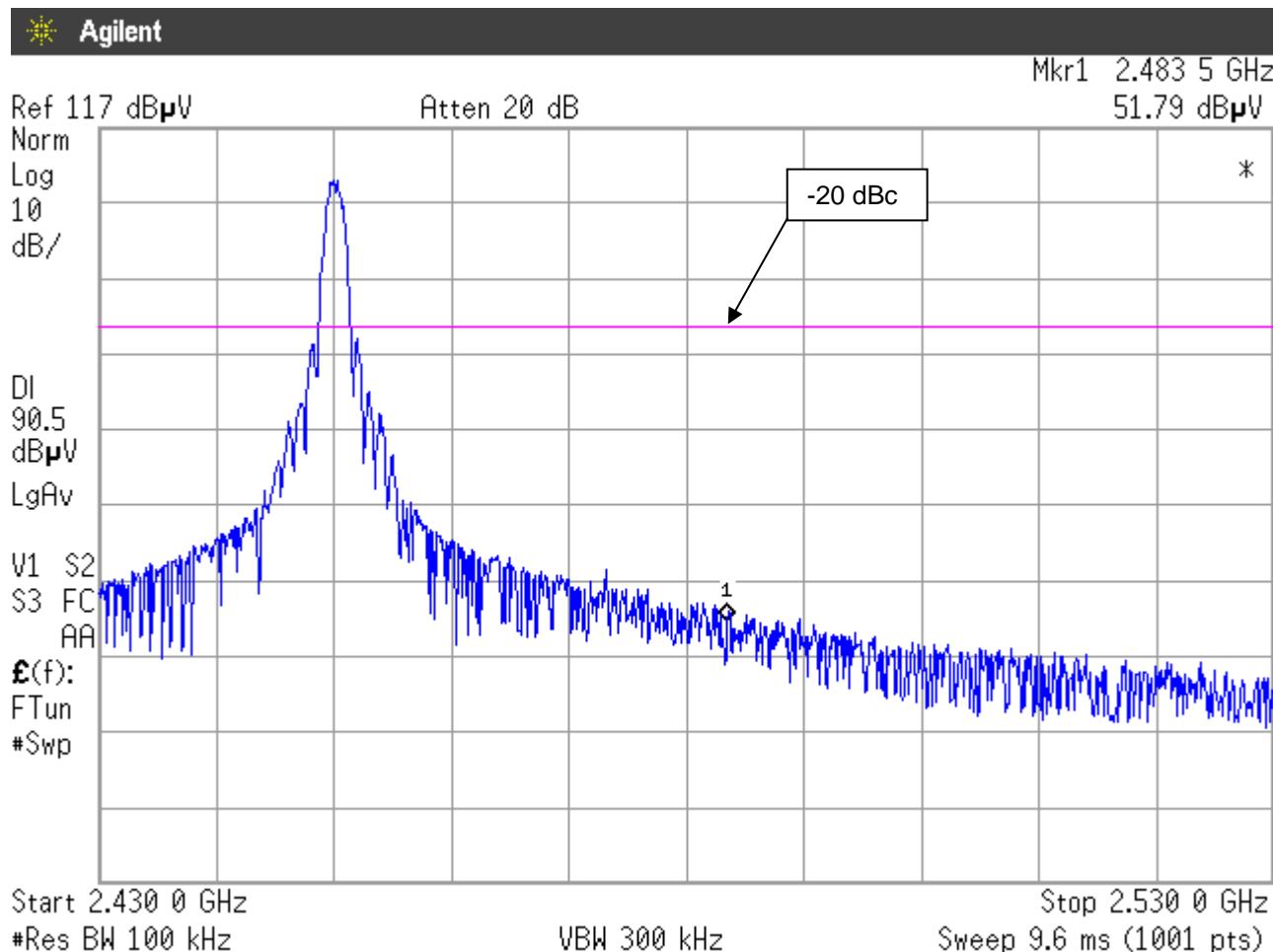
Bandedge low, radiated

RBW 100 kHz   VBW 300 kHz
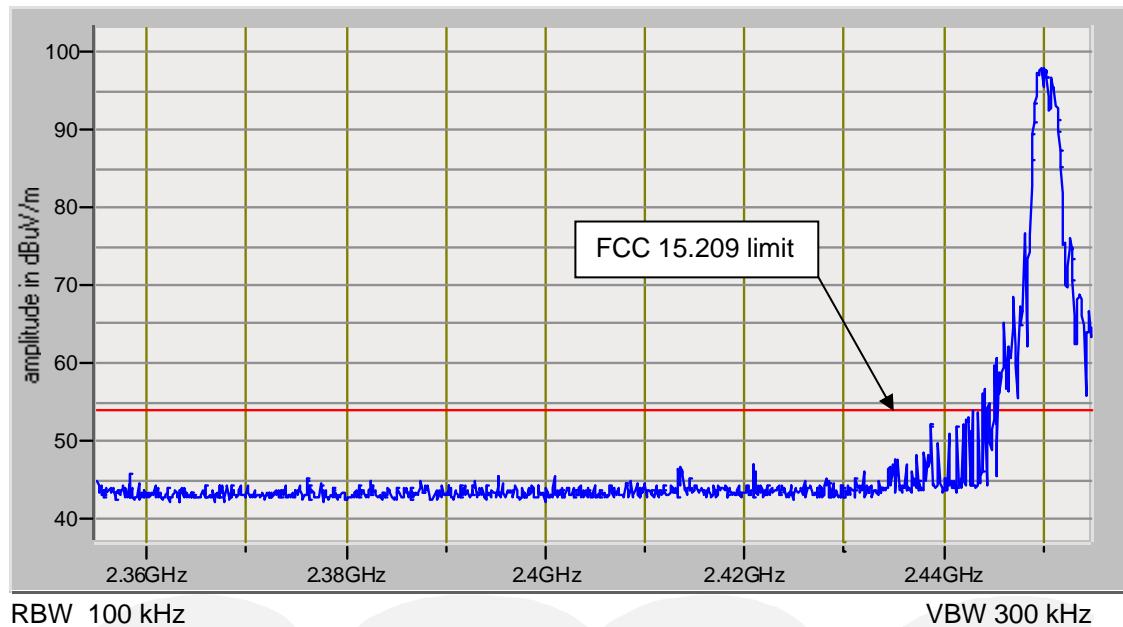
Bandedge high, radiated
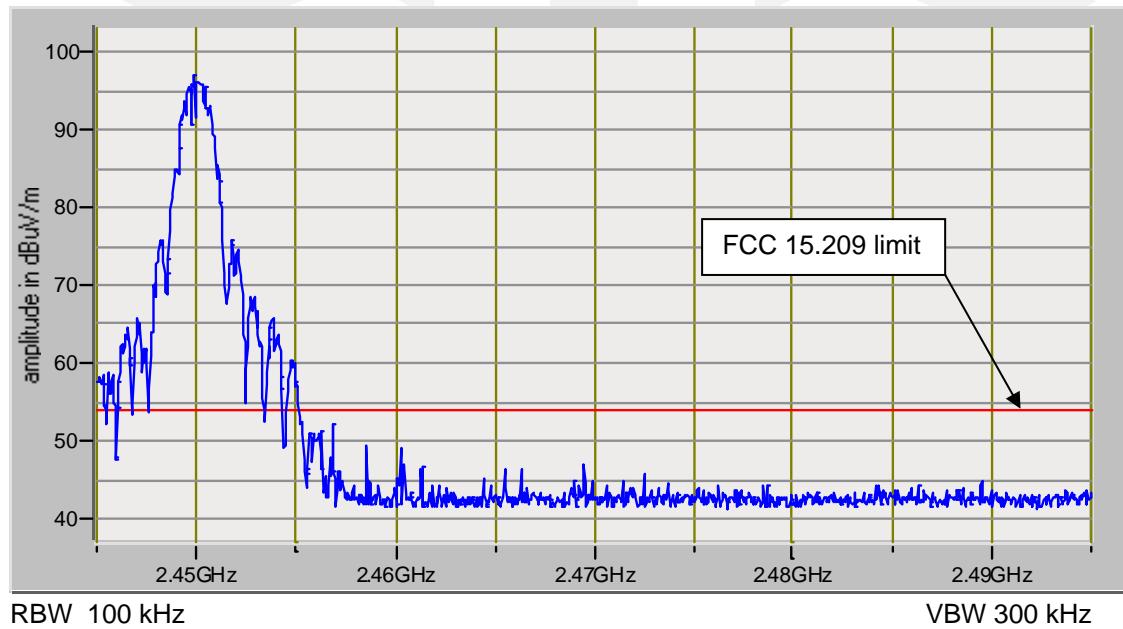
RBW 100 kHz   VBW 300 kHz

RADIATED EMISSIONS

|		
Test Report #:	WC704462 Run 2	Test Area: LTS
EUT Model #:	MSR-154-200	Date: 11/14/2007
EUT Serial #:	N/A	EUT Power: 3VDC Temperature: 23.0 °C
Test Method:	FCC 15.247	Air Pressure: 98.0 kPa
Customer:	Healthsense	Rel. Humidity: 24.0 %

EUT Description: Modular signal radio, 802.15.4 Transmitter

Notes: Device operates on channel 20 only, 2450MHz

Data File Name: 4462.dat   Page: 1 of 2

List of measurements for run #: 2

FREQ	LEVEL (dBuV)	CABLE / ANT / PREAMP / ATTEN (dB)	FINAL (dBuV / m)	POL / HGT / AZ (m)(DEG)	DELTA1 FCC-B <1GHz 3m	DELTA2 FCC B >1GHz 3m
NO SPURIOUS EMISSIONS DETECTED ABOVE 1GHz WITH V OR H POLARIZATIONS AT ALL AZIMUTHS.						
START OF SCAN 30 - 1000MHz.						
NO SIGNIFICANT EMISSIONS DETECTED WITH V OR H POLARIZATION AT ALL AZIMUTHS 1-4 METERS.						
END OF SCAN 30 - 24.5GHz						

Tested by: R. M. Johnson

Printed   Signature

Reviewed by: J. T. Schneider

Printed   Signature

RADIATED EMISSIONS

Test Report #:	WC704462 Run 2		Test Area:	LTS		
EUT Model #:	MSR-154-200		Date:	11/14/2007		
EUT Serial #:	N/A		EUT Power:	3VDC	Temperature:	23.0 °C
Test Method:	FCC 15.247				Air Pressure:	98.0 kPa
Customer:	Healthsense				Rel. Humidity:	24.0 %
EUT Description:	Modular signal radio, 802.15.4 Transmitter					
Notes:	Device operates on channel 20 only, 2450MHz					
Data File Name:	4462.dat				Page:	2 of 2

Graph:
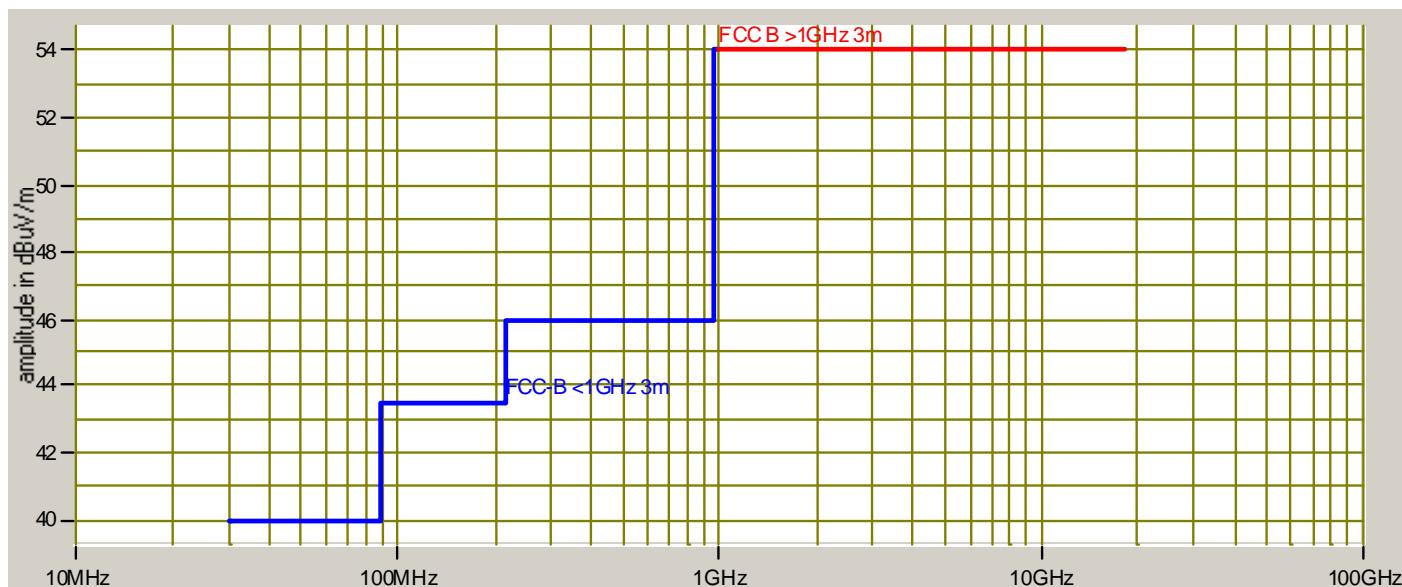
Tested by: R. M. Johnson

Printed   Signature

Reviewed by: J. T. Schneider

Printed   Signature

Power spectral density
FCC 15.247(e), IC RSS-210 A8.2(b)

Test summary
The requirements are: ■ - MET □ - NOT MET
Test was performed in accordance with the test procedure of FCC KDB Publication 558074
Maximum power spectral density is –5.36 dBm / 3 kHz.

Test location
□ - Wild River Lab Large Test Site (Open Area Test Site)
□ - Wild River Lab Small Test Site (Open Area Test Site)
■ - Wild River Lab Tech Area, conducted measurement

Test equipment

TUV ID	Model Number	Manufacturer	Description	Serial Number	Cal Due
10435	E4440A	Agilent	Spectrum Analyzer	MY44304483	27 Feb 08

Test limit
No greater than 8 dBm in any 3 kHz band

Test data
See following pages.

Power spectral density

```
 ☀ Agilent
                                                        Mkr1  2.450 141 GHz
 Ref 8 dBm              Atten 20 dB                            -5.36 dBm
 Norm
 Log                                                                 *
 10
 dB/
 Offst
 1.81
 dB


 LgAv

 V1 S2
 S3 FC
    AA
 £(f):
 f>50k
 #Swp



 Center 2.450 000 GHz                                    Span 2 MHz
 #Res BW 3 kHz              VBW 10 kHz          #Sweep 667 s (667 pts)
```
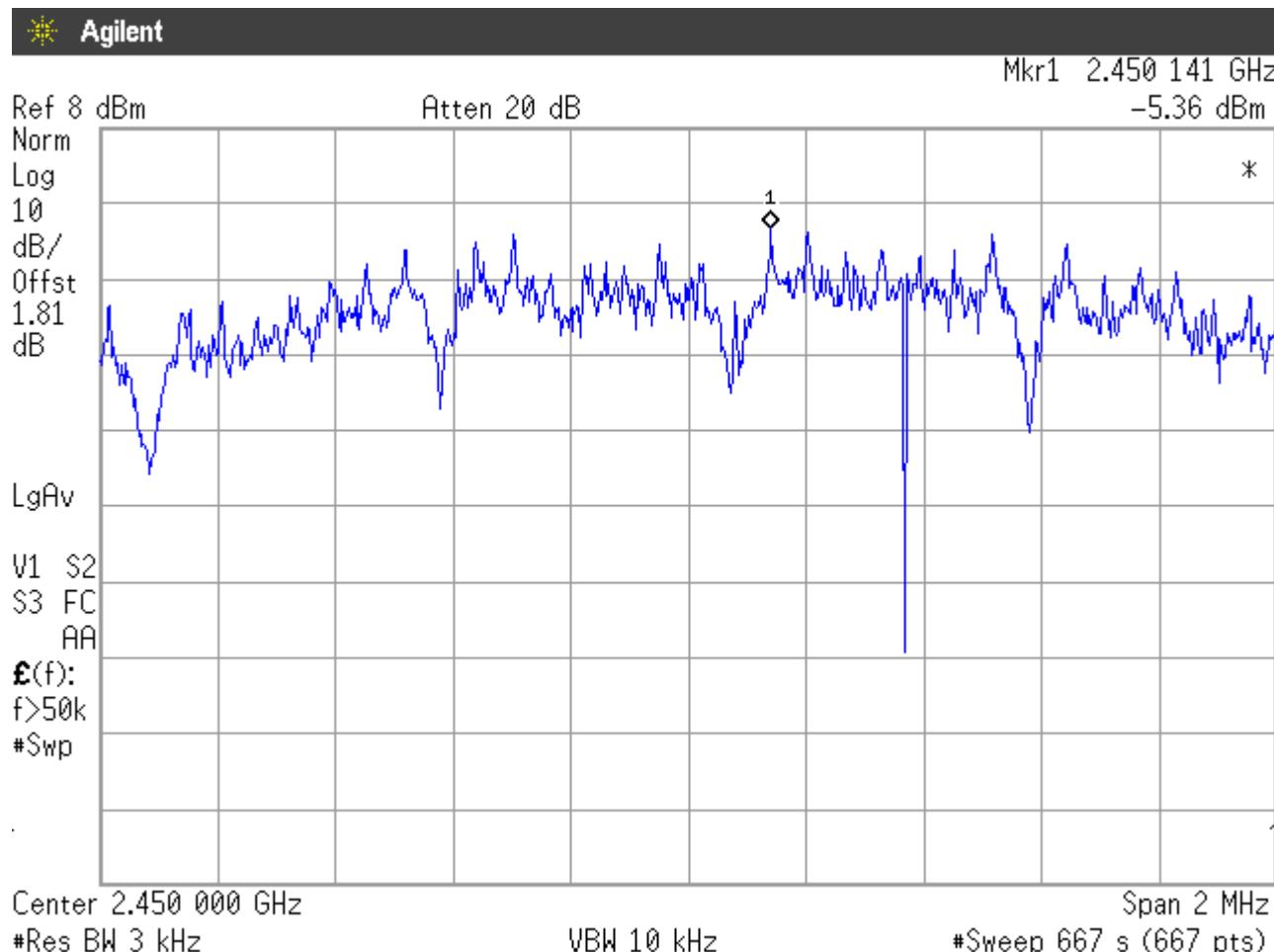
Bandwidth of Momentary Signals
IC RSS-210 A1.1.3

Test summary

The requirements are: ■ - MET   □ - NOT MET

Test was performed in accordance with "A Discussion on the Measurement of Occupied Bandwidth" by Brian Kasper.

99% Bandwidth = 2.09 MHz

Test location

□ - Wild River Lab Large Test Site (Open Area Test Site)

□ - Wild River Lab Small Test Site (Open Area Test Site)

■ - Wild River Lab Tech Area, conducted measurement

Test equipment

TUV ID	Model Number	Manufacturer	Description	Serial Number	Cal Due
10435	E4440A	Agilent	Spectrum Analyzer	MY44304483	27 Feb 08
2075	3115	EMCO	Ridge Guide Ant. 1-18 GHz	9001-3275	12-Jan-08

Test limit

No wider than 0.5% of the centre frequency or 12.25 MHz

Test data

See following pages.

Reference level established using max rbw

Mkr1 2.450 00 GHz
359.90 mV

Ref 1.121 V   Atten 30 dB

Norm
Log
10
dB/

1

LgAv

V1 S2
S3 FC
    AA
£(f):
FTun
#Swp

Center 2.450 00 GHz   Span 12 MHz
#Res BW 3 MHz   VBW 3 MHz   Sweep 1 ms (1001 pts)
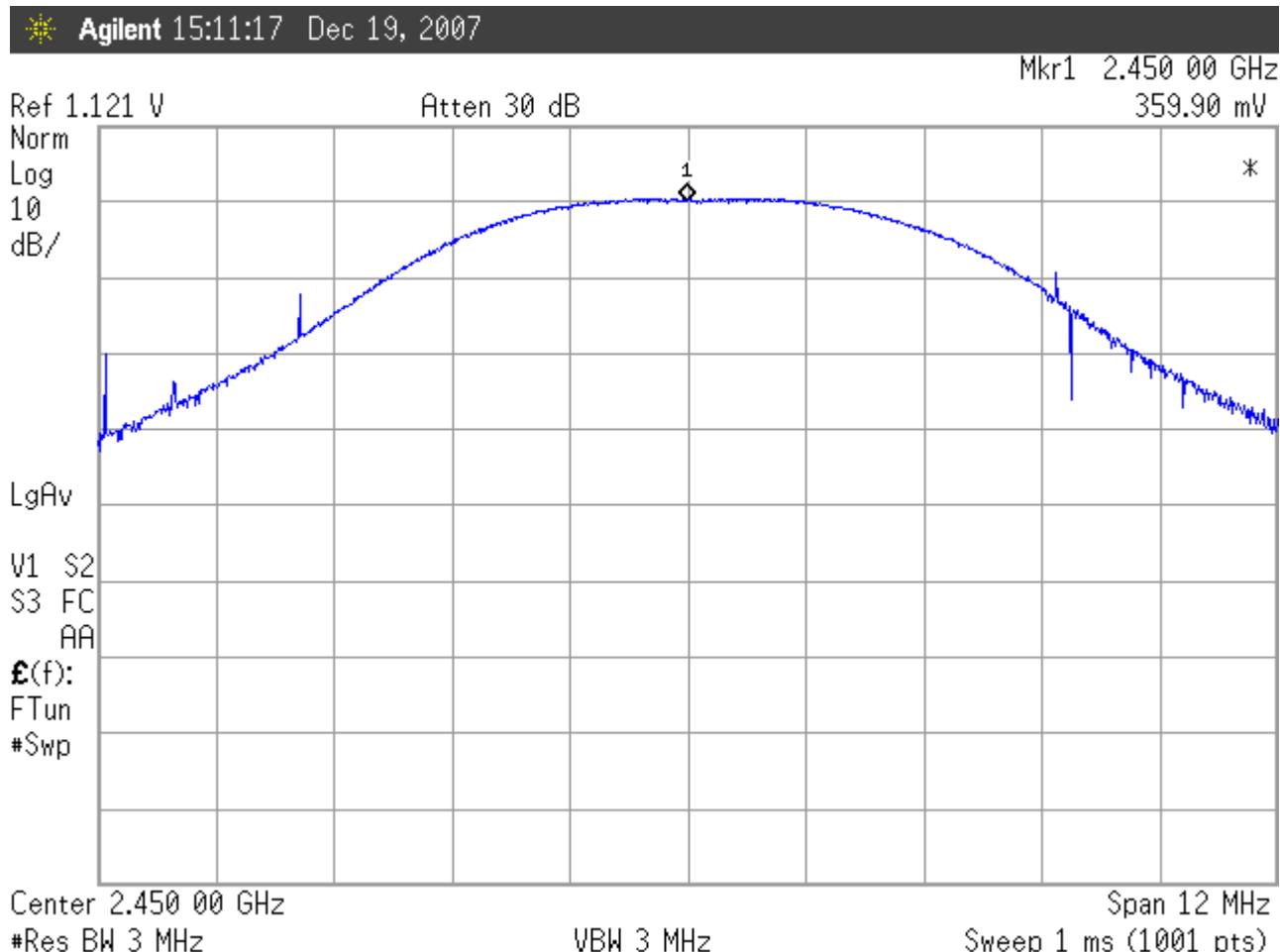
rbw reduced to 1% of the estimated emission bandwidth. vbw ~3 times the rbw. Markers at -20 dB points from the previously established reference level.
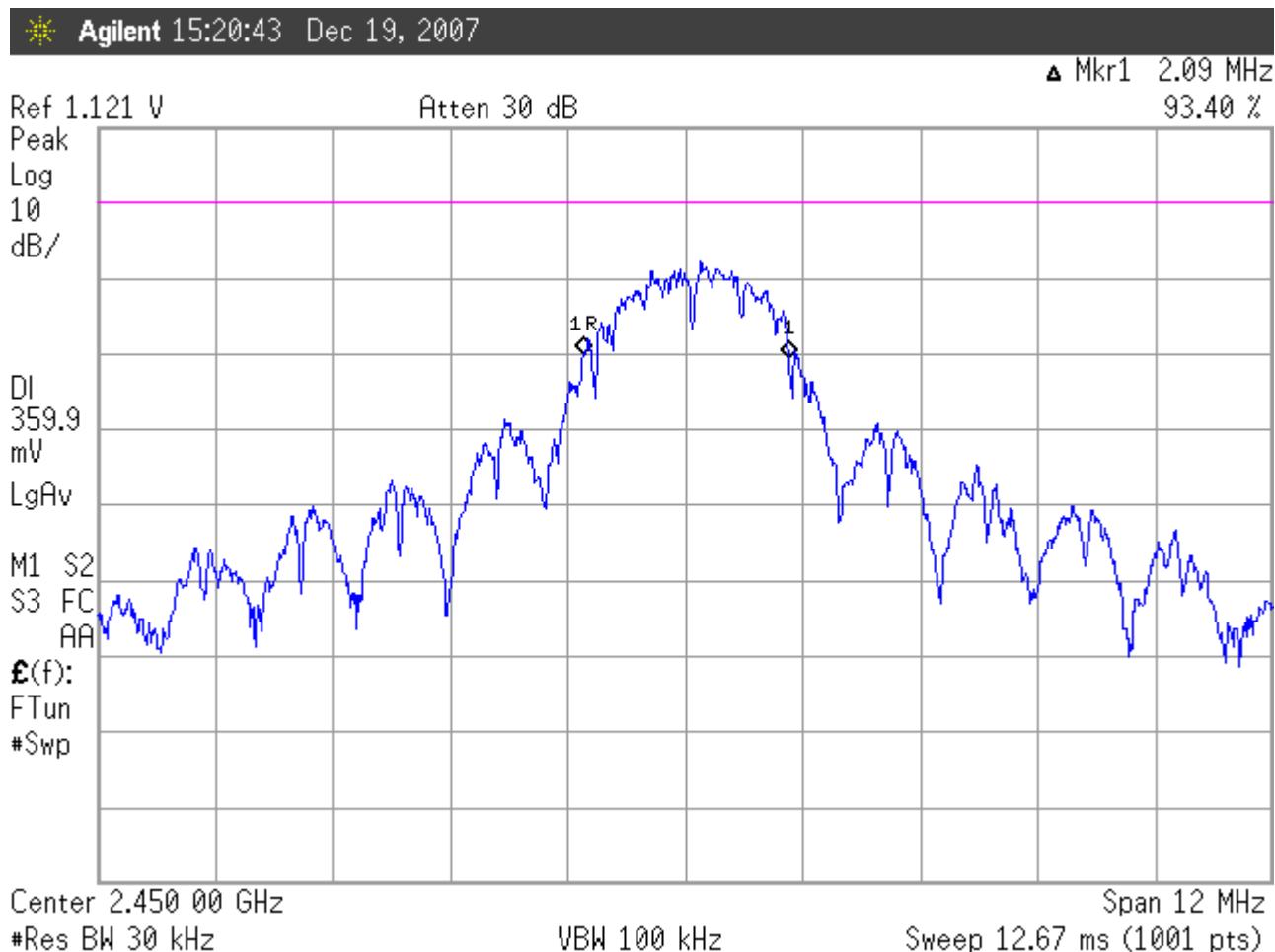
TEST SETUP FOR EMISSIONS TESTING

WILD RIVER LAB
Large Test Site

Notes:
1. Items shown in dotted lines are located on the floor below the test area. It is 5 meters vertically from the ground floor to the test area.

2. 50 Hz, 60 Hz, and 400 Hz are power panels for alternating current.

3. The antenna may be positioned horizontally 3, 10 or 30 meters from the center of the turntable.

4. The circle is a 6.7 meter diameter turntable.

5. A ground plane is in the plane of this sheet.

6. The test sample is shown in the azimuthal position representing zero degrees.
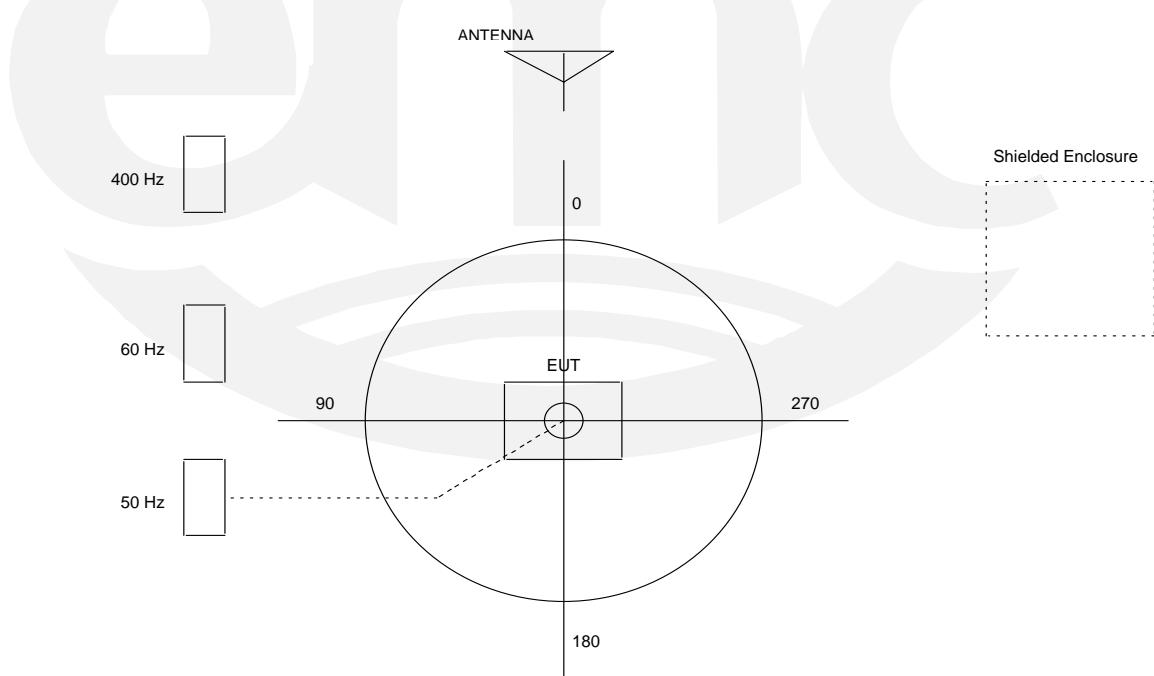
Test-setup photo(s):
Conducted measurements

Test-setup photo(s):
Radiated measurements
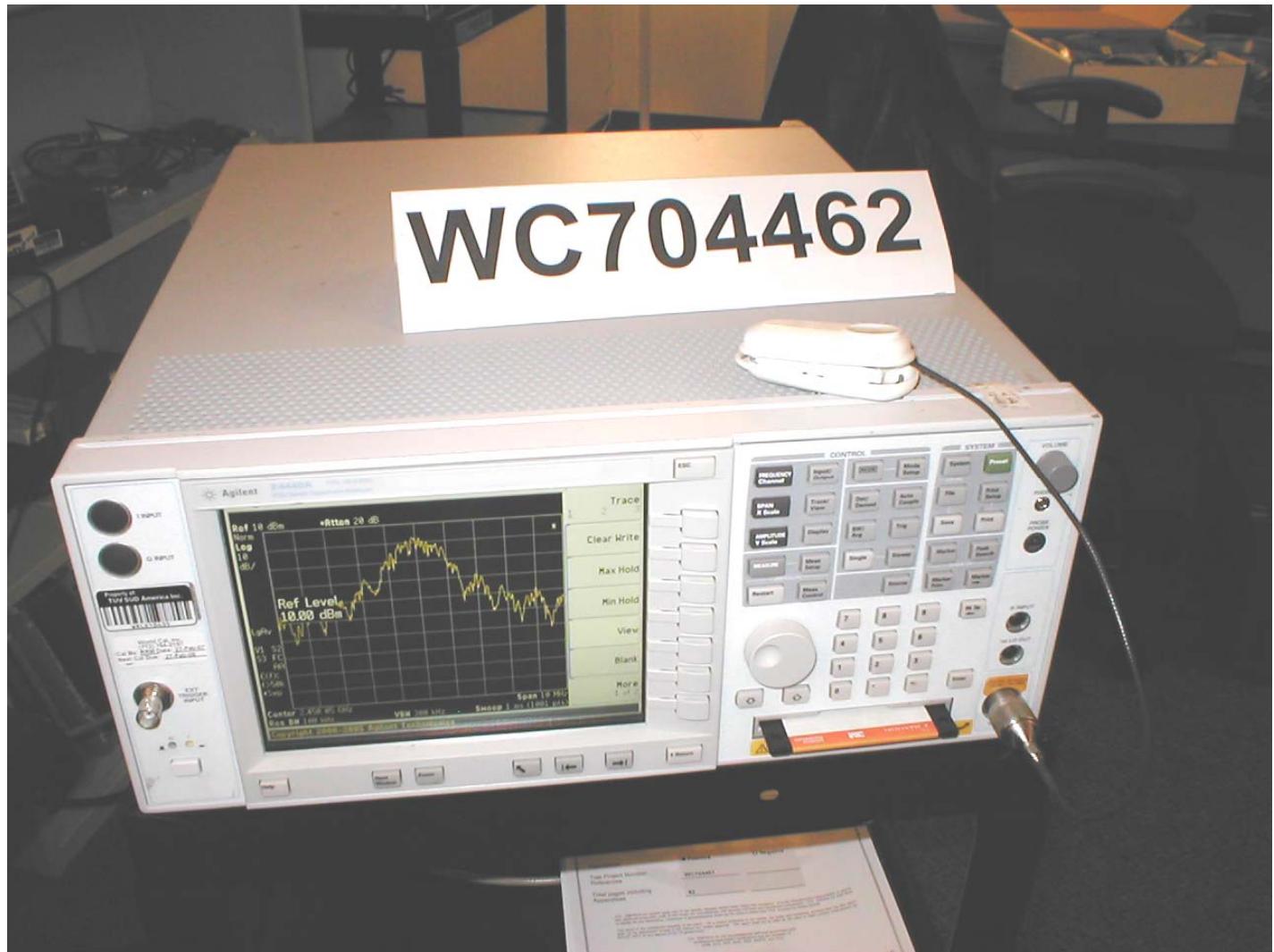
Test-setup photo(s):
Radiated measurements
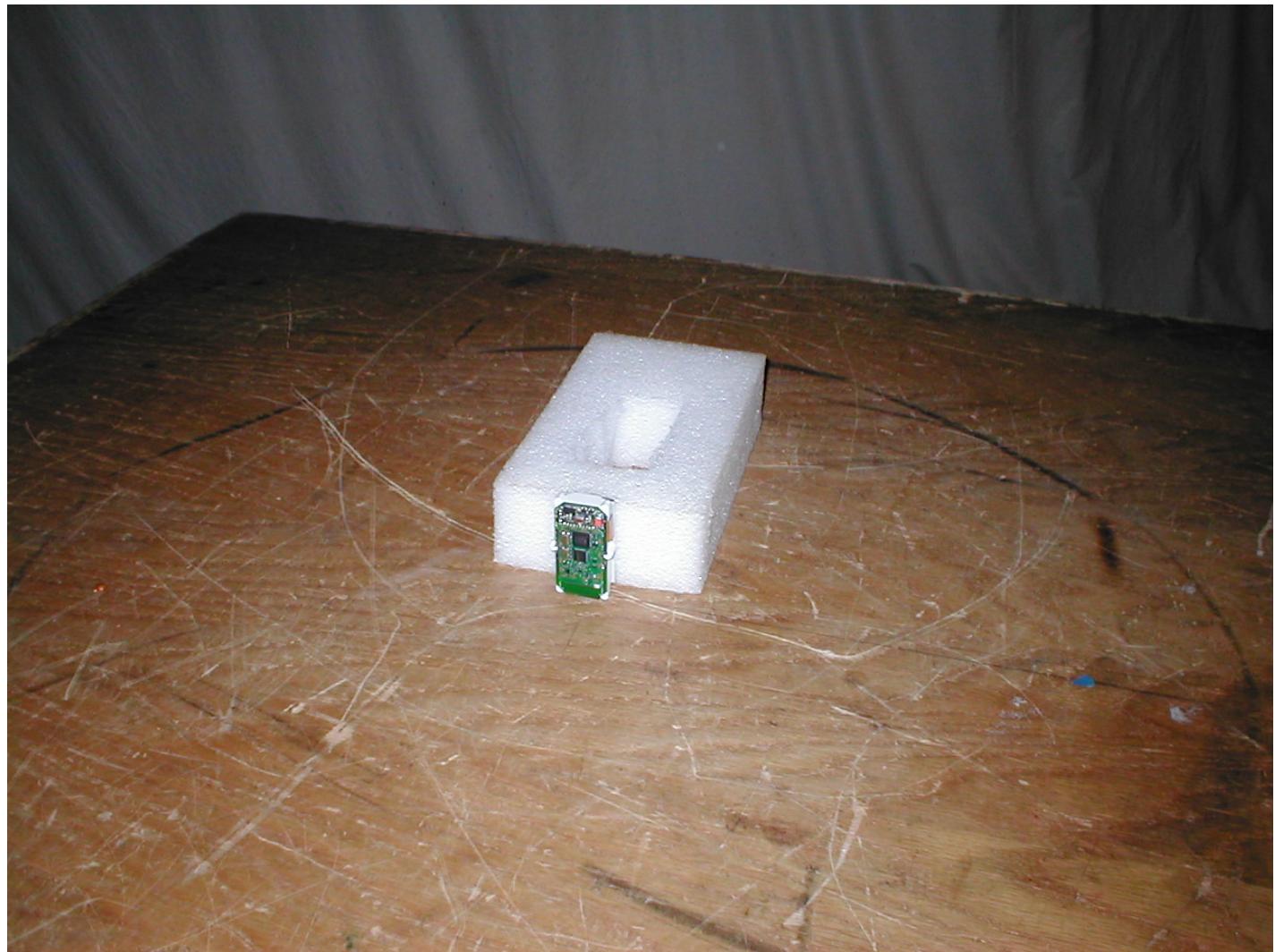
Equipment Under Test (EUT) Test Operation Mode:

The device under test was operated under the following conditions during immunity testing :

☐ - Standby

☐ - Test program (H - Pattern)

☐ - Test program (color bar)

☐ - Test program (customer specific)

☐ - Practice operation

☐ - Normal operating mode

■ - Heartbeat test at 1 second intervals. This simulates an emergency button press & heartbeat message sequence at a faster rate. The call pendant application interfaces to the Embernet radio firmware.

Configuration of the device under test:

■ - See Appendix A and test setup photo(s)

☐ - See Product Information Form(s) in Appendix B

DEVIATIONS FROM STANDARD:
None.

GENERAL REMARKS:
None

Modifications required to pass:
■ None
☐ As indicated on the data sheet(s)

Test Specification Deviations: Additions to or Exclusions from:
■ None
☐ As indicated in the Test Plan

SUMMARY:
The requirements according to the technical regulations are
■ - met and the device under test does fulfill the general approval requirements.
☐ - **not** met and the device under test does **not** fulfill the general approval requirements..

EUT Received Date:	13 November 2007
Condition of EUT:	Normal
Testing Start Date:	13 November 2007
Testing End Date:	14 November 2007

TÜV AMERICA INC

Greg Jakubowski
Senior EMC Technician
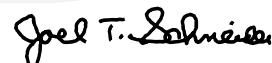
Joel Schneider
Senior EMC Engineer

Appendix A

Constructional Data Form

and

Block Diagram
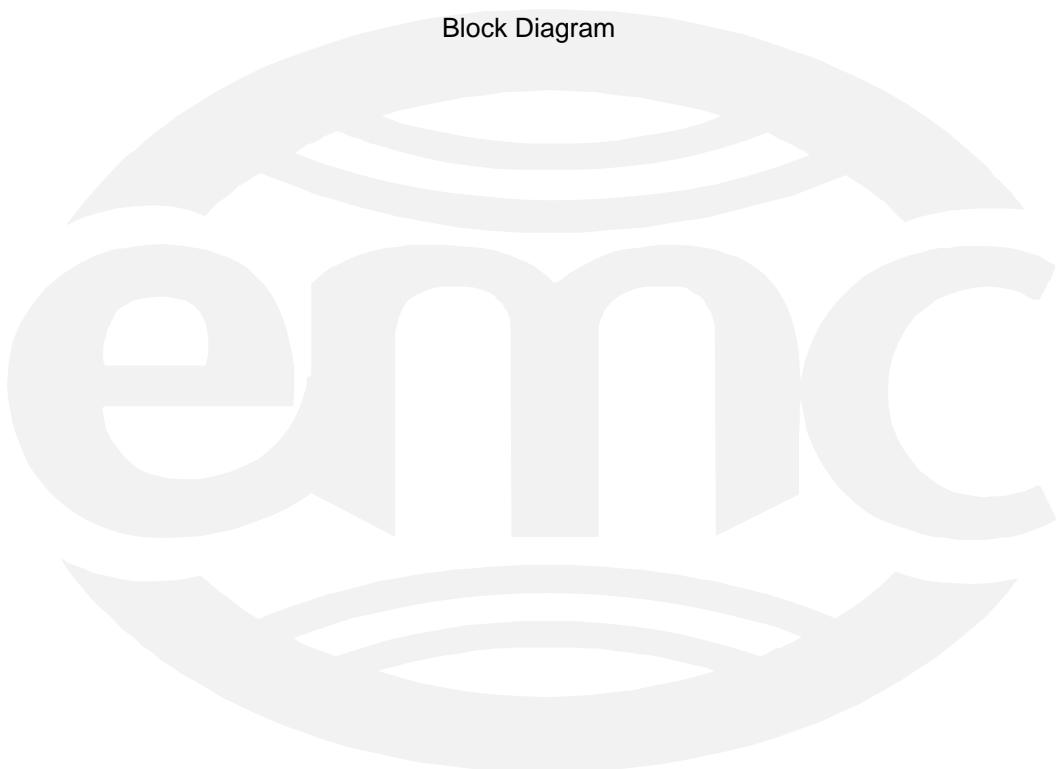
Form

EMC Test Plan and Constructional Data Form

PLEASE COMPLETE THIS DOCUMENT IN FULL, ENTERING N/A IF THE FIELD IS NOT APPLICABLE. IF TESTING RESULTS IN MODIFICATIONS TO THE EQUIPMENT, PLEASE SUBMIT A REVISED TP/CDF INDICATING THOSE MODIFICATIONS.
NOTE: This information will be input into your test report as shown below. Press the F1 key at any time to get HELP for the current field selected.

Company:	Healthsense Inc.
Address:	1250 Northland Drive
	Suite 110
	Mendota Heights, MN 55120

Contact:	Dan Vatland	Position:	VP R&D
Phone:	952.400.7302	Fax:	952.400.0210
E-mail Address:	dan_vatland@healthsense.com		

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

EUT Description	Wireless 802.15.4 Module		
EUT Name	Mouldualr Sensor Radio (MSR)		
Model No.:	MSR-154-200	Serial No.:	1000
Product Options:	N/A		
Configurations to be tested:	Standard heartbeat and alerts		

Equipment Modification (*If applicable, indicate modifications since EUT was last tested. If modifications are made during this testing, submit revised TP/CDF after testing is complete.***)**

Modifications since last test:	N/A
Modifications made during test:	N/A

Test Objective(s): *Please indicate the tests to be performed, entering the applicable standard(s) where noted.*

☐ EMC Directive 2004/108/EC (EMC)   ☒ FCC: Class ☐ A ☒ B Part 15
   Std: _____   ☐ VCCI: Class ☐ A ☐ B
☐ Machinery Directive 89/392/EEC (EMC)   ☐ BSMI: Class ☐ A ☐ B
   Std: _____   ☒ Canada: Class ☐ A ☒ B
☐ Medical Device Directive 93/42/EEC (EMC)   ☐ Australia: Class ☐ A ☐ B
   Std: _____   ☒ Other: Subpart C and RSS 10 Canada
☐ Vehicle Directive: ☐ 2001/3/EC (EMC)   ☐ 2004/104/EC (EMC)
   ☐ Other Vehicle Std: _____
☐ FDA Reviewers Guidance for Premarket
    Notification Submissions (EMC)

Third Party Certification, if applicable (*Signature on Page 6 Required)

☐ Attestation of Conformity (AoC)*   ☐ EMC Certification (used with Octagon Mark)*
☐ Certificate of Conformity (CoC)*   ☐ Compliance Document*
   Protection Class   (N/A for vehicles)   ☐ Class I   ☐ Class II   ☐ Class III
   (Press **F1** when field is selected to show additional information on Protection Class.)
☐ FCC / TCB Certification   ☐ Industry Canada / FCB Certification
☐ E-Mark Certification   ☐ Taiwan Certification

Form

EMC Test Plan and Constructional Data Form

| **Attendance** |
| Test will be: ☒   Attended by the customer   ☐   Unattended by the customer |

| **Failure - *Complete this section if testing will not be attended by the customer.*** |
| If a failure occurs, TÜV America should:
☐   Call contact listed above, if not available then stop testing.   (After hrs phone): _____
☐   Continue testing to complete test series.
☐   Continue testing to define corrective action.
☐   Stop testing. |

| **EUT Specifications and Requirements** |
| Length: _1.625 in_   Width: _0.0625_   Height: _0.875_   Weight: _0.2 Ounces_ |

| **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: _3 volts_   (If battery powered, make sure battery life is sufficient to complete testing.)

# of Phases: _DC_

Current
(Amps/phase(max)): _300 mA_   Current
(Amps/phase(nominal)): _20 µA_

Other _____

| **Other Special Requirements** |
| |

| **Typical Installation and/or Operating Environment** |
| (ie. Hospital, Small Business, Industrial/Factory, etc.)
Independent Senior Care, Assisted Senior Care, Hospital, Group Homes, Small and Large Businesses, Industrial |

| **EUT Power Cable** |
| ☐ Permanent   OR   ☐ Removable   Length (in meters): _____
☐ Shielded   OR   ☐ Unshielded
☒ Not Applicable |

Form

EMC Test Plan and Constructional Data Form

EUT Interface Ports and Cables

Type	Analog	Digital	Active	Passive	Qty	Yes	No	Type	Termination	Connector Type	Port Termination	Length tested (in meters)	Removable	Permanent
			During Test			Shielding								
EXAMPLE: *RS232*	☐	☒	☒	☐	*2*	☒	☐	*Foil over braid*	*Coaxial*	*Metallized 9-pin D-Sub*	*Characteristic Impedance*	*6*	☒	☐
N/A	☐	☐	☐	☐		☐	☐						☐	☐
	☐	☐	☐	☐		☐	☐						☐	☐
	☐	☐	☐	☐		☐	☐						☐	☐
	☐	☐	☐	☐		☐	☐						☐	☐
	☐	☐	☐	☐		☐	☐						☐	☐
	☐	☐	☐	☐		☐	☐						☐	☐
	☐	☐	☐	☐		☐	☐						☐	☐
	☐	☐	☐	☐		☐	☐						☐	☐
	☐	☐	☐	☐		☐	☐						☐	☐
	☐	☐	☐	☐		☐	☐						☐	☐
	☐	☐	☐	☐		☐	☐						☐	☐

Form

EMC Test Plan and Constructional Data Form

EUT Software.

Revision Level: 1.2

Description: Embernet Radio Control Firmwarel

Equipment Under Test (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.   Heartbeat test at 1 second intervals. This simultes an ermegency button press & hearbeat message sequence at a faster rate. The call pendant application interfaces to the Embernet radio firmware.

2.

3.

Equipment Under Test (EUT) System Components -- List and describe all components which are part of the EUT. For FCC & Taiwan testing a minimum configuration is required. (ie. Mouse, Printer, Monitor, External Disk Drive, Motherboard, etc)			
Description	**Model #**	**Serial #**	**FCC ID #**
MSR	MSR-154-200	1000	NA

Form

EMC Test Plan and Constructional Data Form

Support Equipment -- List and describe all support equipment which is not part of the EUT. (i.e. peripherals, simulators, etc) This information is required for FCC & Taiwan testing.

Description	Model #	Serial #	FCC ID #
Healthsense (Eaton)	HHB	SIJ00F616992	Q87-WRT54GC

Oscillator Frequencies

Manufacturer	Frequency	Derived Frequency	Component # / Location	Description of Use
Fox	32.768KHz	NA	Y2	Serial Baud Generator
ABRACON	16.000 MHz	2.4 Ghz	Y1 (Radio section)	15.4 Base Clk
ILSI	8.000MHz	NA	Y3	Processor Clock

Power Supply

Manufacturer	Model #	Serial #	Type
			☐ Switched-mode:　(Frequency) _____ ☐ Linear　☐ Other: _____
			☐ Switched-mode:　(Frequency) _____ ☐ Linear　☐ Other: _____

Power Line Filters

Manufacturer	Model #	Location in EUT

Form

EMC Test Plan and Constructional Data Form

Critical EMI Components (Capacitors, ferrites, etc.)				
Description	*Manufacturer*	*Part # or Value*	*Qty*	*Component # / Location*
Power Amp	CALIFORNIA EASTERN LABS	UPG2301TQ-E1-A	1	U19
Antenna	Johanson	2450AT18A100	2	ANT1
Bandpass	Johanson	2450LP14B100	1	CF1
Cap	Various	1nF, 3pF, 10pF	5	C2,C77,C79,C81,

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

Critical tuning of bandpass and filter caps to maximize power

(PLEASE INSERT "**ELECTRONIC SIGNATURE**" BELOW IF POSSIBLE)

Authorization Signatures (Signature Required for Certifications checked on pg 1)

Customer authorization to perform tests
according to this test plan.   Date

Test Plan/CDF Prepared By (please print)   Date

Form

EMC Block Diagram Form

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.
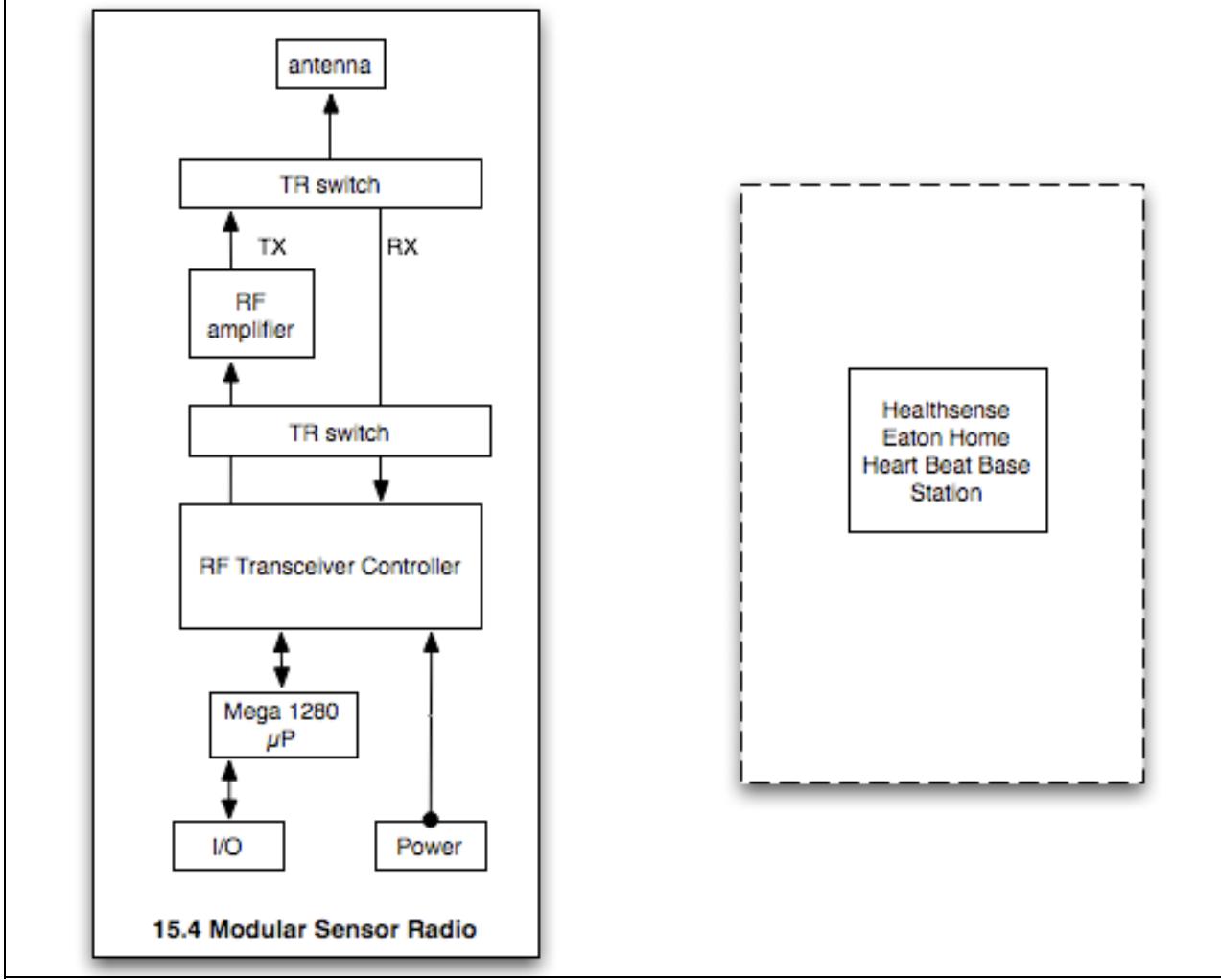
Authorization Signatures

Customer authorization to perform tests
according to this test plan.

Date

Test Plan/CDF Prepared By (please print)

Date

Appendix B

Measurement Protocol

MEASUREMENT PROTOCOL
GENERAL INFORMATION

Test Methodology
Test was performed in accordance with the test procedure of FCC KDB Publication 558074. Conducted tests were performed with the spectrum analyzer connected directly via coaxial cable soldered to the transmitter rf output. Radiated tests were performed with the transmitter module, with its intrinsic antenna in place, rotated through 3 orthogonal axes to determine the test position yielding the maximum emission levels.

Conducted Emissions
The final level equals the spectrum analyzer level plus the cable loss.

Radiated Emissions
The final level, in dBμV/m, equals the reading from the spectrum analyzer (Level dBμV), adding the antenna correction factor and cable loss factor (Factor dB) to it, and subtracting the preamp gain (and duty cycle correction factor, if applicable). This result then has the limit subtracted from it to provide the Delta, which gives the tabular data as shown in the data sheets in Attachment A. Intentional radiators are rotated through 3 orthogonal axes to determine the test position yielding the maximum emission levels.

Example:

FREQ (MHz)	LEVEL (dBuV)	CABLE/ANT/PREAMP (dB) (dB/m) (dB)	FINAL (dBuV/m)	POL/HGT/AZ (m) (deg)	DELTA1
60.80	42.5Qp +	1.2 + 10.9 - 25.5 =	29.1	V 1.0 0.0	-10.9

Test Equipment
All measurement instrumentation is traceable to the National Institute of Standards and Technology and is calibrated according to internal procedure.

Radiated Emissions
Radiated emissions from the EUT are measured in the frequency range of 30 to 24500 MHz using a spectrum analyzer and appropriate broadband linearly polarized antennas. Measurements between 30 MHz and 1000 MHz are made with 120 kHz/6 dB bandwidth and quasi-peak detection and measurements above 1000 MHz are made with a 1 MHz/6 dB bandwidth and peak/average detection. Average detection is indicated by using 1 MHz rbw/ 10 Hz vbw. Tabletop equipment is placed on a 1.0 X 1.5 meter non-conducting table 80 centimeters above the ground plane. Floor standing equipment is placed directly on the turntable/ground plane. Interface cables that are closer than 40 centimeters to the ground plane are bundled in the center in a serpentine fashion so they are at least 40 centimeters from the ground plane. Cables to simulators/testers (if used in this test) are routed through the center of the table and to a screen room located outside the test area. The antenna is positioned 3, 10 or 30 meters horizontally from the EUT. To locate maximum emissions from the test sample the antenna is varied in height from 1 to 4 meters, measurement scans are made with both horizontal and vertical antenna polarizations and the EUT are rotated 360 degrees. ANSI C63.4:2003 is reference document used.