



# RADIO TEST REPORT

Applicant : SEIKO EPSON CORPORATION  
281 Fujimi, Fujimi-machi, Suwa-gun, Nagano-ken,  
399-0293, Japan

Type of Equipment : Heart Rate Activity Monitor

Model Number : PS-500

Trade Name : EPSON

FCC ID : BKMAP004

Standard : 47 CFR Part 15 Subpart C: 2013

Classification : Digital Transmission Systems (DTS)

Receipt Date of Sample : 2013-11-28

Date Tested : 2013-11-28 and 2013-12-02

Date Report Issued : 2014-01-15

Report Number : EMC13206

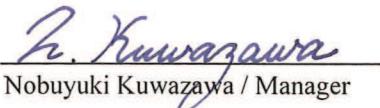
The measurements and tests covered by this document have been performed in accordance with the requirements of ISO/IEC 17025 and are traceable to national or international standards of measurement.

This report summarizes the result of a single investigation performed on the described test object and test results relate only to tested sample. The report shall not be reproduced except in full without the written approval of IPS Corporation.

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## 1 GENERAL INFORMATION

### 1.1 Product Description

The Equipment Under Test (EUT) Model: PS-500 is a Heart Rate Activity Monitor.

PS-500 is an activity monitor to measure the pulse rate of the watch-type. The optical sensor in the bottom plate of the watch captures a pulse rate and analyzes it. This function can guide combustion of effective fat from pulse rate. This product has a function to connect to a personal computer in USB interface. This product is equipped with a charge-type lithium-ion rechargeable battery.

This product was tested according to the standards below.

#### Condition of EUT

: Mass-production       : Pre-production       : Engineering prototype

### 1.2 Product Specification

- Power Supply Rating : DC3.7 V
- Dimensions : W 38 mm × D 55 mm × H 17 mm
- Weight : 0.04 kg
- Highest frequency used : 48 MHz

#### Radio Part

- Equipment Type : Transceiver
- Classification : Digital Transmission Systems
- Frequency range of operation : 2402 to 2480 MHz
- Bandwidth/Channel Spacing : 1 MHz / 2 MHz
- Type of Modulation : GFSK
- Antenna type : 1/4 λ chip antenna
- Antenna Connector Type : None
- ITU Code : FID
- Operation Temperature Range : - 5 to + 40 deg.C

#### Power source

AC/DC	Phases and Wires, or Volt		EUT
AC	Single Phase	: Without PE	<input type="checkbox"/>
		: With PE	<input type="checkbox"/>
	Three Phases	: Three wires with PE	<input type="checkbox"/>
		: Four wires with PE	<input type="checkbox"/>
DC	3.7 V from Lithium-ion Battery		<input checked="" type="checkbox"/>

### 1.3 Summary of Test Result

Standard	Measurement Frequency Range	Result
Code of Federal Regulation 47 Part 15 Subpart C: 2013, Intentional Radiators		
Section 15.209 Radiated Emission	9 kHz to 25 GHz	Pass
Section 15.247 Operation within the bands	2400 MHz to 2483.5 MHz	Pass
(a)(2) : 6 dB Bandwidth		
(b)(3) : Maximum Peak Conducted Output Power		
(d) : Conducted Spurious Emission		
(e) : Maximum Power Spectral Density		
Additional Test		
99% Occupied Bandwidth		-

### 1.4 Measurement Uncertainty

#### Emission Test

Conducted Emission Test	AMN	Frequency range	Polarization	U (dB)					
				Open Site	No3, 10 m Semi-Anechoic Chamber	No2, 3 m Semi-Anechoic Chamber			
Main port	LISN (ESH2-Z5, KNW-407, KNW-411)	9 kHz to 30 MHz	-	1.7	1.7	1.7			
Telecommunication port	ISN (ISN T8, ISN ST08)	150 kHz to 30 MHz	-	1.1	1.1	1.1			
	Probe (CVP 2200A, F-35A)	150 kHz to 30 MHz	-	1.2	1.2	1.2			
Radiated Emission Test	Antenna, Clamp	Frequency range	Polarization	U (dB)					
				Open Site	No3, 10 m Semi-Anechoic Chamber	No2, 3 m Semi-Anechoic Chamber			
				10 m	3 m	10 m	3 m		
Radiated Emission	Biconical (BBA9106)	30 MHz to 300 MHz	Horizontal	3.9	3.9	3.9	3.9	-	4.0
			Vertical	4.1	4.1	4.0	4.0	-	4.1
	Log.-Periodic (UHALP9108-A)	300 MHz to 1 GHz	Horizontal	4.1	4.1	4.1	4.1	-	4.1
			Vertical	4.2	4.1	4.1	4.1	-	4.1
	Dipole (VHA9103)	30 MHz to 300 MHz	Horizontal	3.9	3.9	3.8	3.8	-	3.8
			Vertical	4.0	4.1	4.0	4.0	-	4.0
	Dipole (UHA9105)	300 MHz to 1 GHz	Horizontal	3.9	3.9	3.8	3.8	-	3.8
			Vertical	4.1	4.1	4.0	4.0	-	4.0
	Bilog (CBL6111, CBL6112B)	30 MHz to 1 GHz	Horizontal	4.6	-	4.2	-	-	-
			Vertical	4.3	-	4.2	-	-	-
Magnetic Field Emission	Guide (EMCO3115, 3117)	1 GHz to 18 GHz	Horizontal & Vertical	-	2.6	-	2.6	-	2.6
	* (EMCO3116)	18 GHz to 40 GHz			-		-		-
	Loop (HLA6120)	9 kHz to 30 MHz	-	-	2.6	-	2.6	-	2.6
	Large loop (MLA2000-L)	9 kHz to 30 MHz	-	-	-	-	2.9	-	-
Disturbance Power	Absorbing (KT-10)	30 MHz to 300 MHz	-	-	-	-	3.5	-	3.5

Note : Coverage factor k=2

: \* Applied for Code of Federal Regulation 47 Part 15

## 1.5 Tested Systems Details

### EUT, PERIPHERALS, AND CABLES USED

#### EUT

Equipment		Manufacturer	Model No.	Serial No.	Note
ID	Name				
A1	Heart Rate Activity Monitor	EPSON	PS-500	ES50B00010	1)
A2	Heart Rate Activity Monitor	EPSON	PS-500	ES50B00014	2)

Note

- 1) Used for Radiated Emission test.
- 2) Used except for Radiated Emission test.

#### Peripherals

None

#### Interface Cables

None

## 1.6 Test Facility

The test facilities are located in following places of IPS Corporation.

- Nagano EMC Center  
1878-1, Ono, Tatsuno-machi, Kamiina-gun, Nagano-ken, 399-0601 Japan

The test site is registered to FCC pursuant to title 47 CFR §2.948 (e)(1)

- MRA; US-Japan MRA
- Test Firm Registration Number (MRA); 171180
- Designation Number; JP5085
- FCC Registration Number (FRN); 0006-2272-27

## 2 SYSTEM TEST CONFIGURATION

### 2.1 Justification

- Code of Federal Regulation 47 Part 15 Subpart C tests were performed without any deviation from the ANSI C63.10:2009.
- The system was configured for testing a typical fashion (as a customer would normally use it).
- Tests were performed in the following one mode.
  - Continuously Transmitting mode

Software: RF Test Progarm Ver 2.00

#### Worst Case

	Conducted Axis			
	9 kHz to 30 MHz	30 MHz to 1 GHz	1 GHz to 18 GHz	18 GHz to 25 GHz
2402 MHz (Low)	N/A	N/A	X, Y, Z	N/A
2440 MHz (Middle)	N/A	N/A	X, Y, Z	N/A
2480 MHz (High)	Y	Y	X, Y (*), Z	Y

(\*): Firstly, the carrier level and noise levels were confirmed the 3 axis and 3 tested frequency between 1 GHz to 18 GHz, and determined that worst case is Y axis of 2480 MHz.

Therefore required another frequency were measured Y axis of 2480 MHz.

### 2.2 EUT Exercise Software

The EUT exercise program used during all testing was designed to exercise the various system components in manner similar to a typical use.

### 2.3 Special Accessories

None.

### 2.4 Equipment Conditions

The condition at the time of receipt of EUT : Good

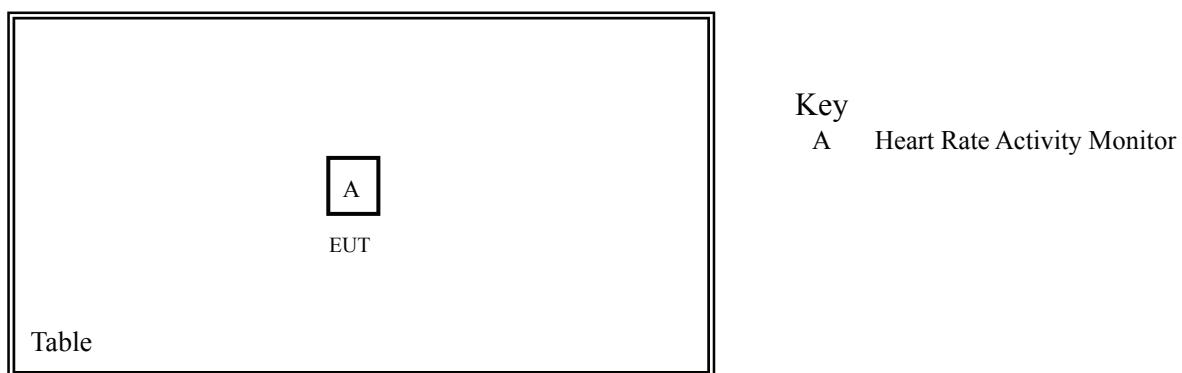
The condition at the time of return of EUT : Good

Limited conditions : None

No modification has been carried out by the test laboratory.

### 2.5 Configuration of Tested System

#### Figure



Note: This figure shows Radiated Emission Test as a representative figure. Refer to the figure/photos of each test for the actual test arrangement

### 3 RADIATED EMISSION TEST 9 kHz to 30 MHz

#### 3.1 Test Setup

The test setup was made according to ANSI C63.10: 2009.

The measurement distances were 3 m.

- The test was performed with frequency range 9 kHz to 30 MHz.
- The center of EUTs was aligned to the center of a non-conductive table.
- The table size was 0.8 m high  $\times$  1.5 m wide  $\times$  1.0 m deep.
- The dimension of Loop Antenna can be completely enclosed by a square having sides of 60 cm in length.
- The antenna was located at 3 m of distance horizontally from the boundary of the EUT. The antenna height was 1 m.

#### 3.2 Testing System

##### Instruments

Equipment	Manufacturer	Model	S/N	Calibration Date	Due	Note
Semi-Anechoic Chamber	Otsuka Science	10 m	No.3	2013-01-25	2014-01-31	
EMI Test Receiver	Rohde & Schwarz	ESCS30	836858/002	2013-04-11	2014-04-30	1)
EXA Signal Analyzer	Agilent Technologies	N9010A	MY52221120	2013-05-27	2014-05-31	2)
Loop Antenna	Chase	HLA6120	1131	2013-03-08	2014-03-31	
Cable System	IPS Corporation	RE (31)	N/A	2013-02-20	2014-02-28	

Note: 1) System Bandwidth=9 kHz, Detector Mode= Quasi-Peak

2) Detector Mode=Peak

##### Software:

Toyo Corporation, EP5/RE, Version 5.5.10

#### 3.3 Description of Measurement Procedure

##### 3.3.1 Exploratory Test

EUT is tested in all operating modes.

<Step1>

EUT and system are set up according to “IPS measurement procedures” and “ANSI C63.10:2009”.

<Step2>

The operator selects an antenna from among the following depending on the measurement frequency.

- Loop Antenna

<Step3>

The Spectrum analyzer is controlled by PC EMI software as follows:

- Set to Peak Detector mode and Max-Hold mode.
- Sweep measurement frequency range.

Following parameters are also controlled by PC EMI software:

- Turntable (rotate 0° to 360°)
- Antenna polarization (vertical: 0° and 90°, horizontal: not rotated)
- Antenna height (1 m)

### 3.3.1 Exploratory Test (Continued)

#### <Step4>

The operator performs following operations.

- Prints out the Spectrum chart from PC EMI software.
- Records frequency (ies) with minimum margin(s).
- Determines the operating mode where maximum emission is detected.

### 3.3.2 Final Test

#### <Step1>

EUT system is operated in the operation mode determined by Exploratory Test.

#### <Step2>

The operator selects an antenna from among the following depending on the measurement frequency.

- Loop Antenna

#### <Step3>

Following operation is performed by the operator:

EMC Test Receiver is set to the system bandwidth and detection mode specified by the test standard.

#### <Step4>

The operator controls turntable, antenna polarization and rotate to determine the combination where maximum emission was detected.

- Loop Antenna
  - The center of the loop antenna was 1 m above the ground.
  - Loop antenna was positioned with its plane vertical at the specified distance from the EUT and rotated about its vertical axis for maximum response at each azimuth position around the EUT.
  - Also, loop antenna was positioned with its plane horizontal at the specified distance from EUT.

#### <Step5>

The operator arranges the apparatus and the cables to determine the configuration where maximum emission was detected.

#### <Step6>

The operator enters the values displayed on EMC Test Receiver into PC EMI software.

The measurement result is calculated by PC EMI software.

The same operation is repeated for all modes that should be measured.

### 3.4 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$c.f. = AF + CL - AG$$

$$FS = RA + c.f.$$

Where	c.f.	= Correction Factor
	FS	= Field Strength (Emission Level - Result)
	RA	= Receiver Amplitude (Reading Level)
	AF	= Antenna Factor
	CL	= Cable Loss
	AG	= Amplifier Gain

Assume a receiver reading of 52.5 dB $\mu$ V is obtained. The Antenna Factor of 7.4 dB/m and a Cable Loss of 1.1 dB is added. The Amplifier Gain of 29.0 dB is subtracted, giving a field strength of 32.0 dB $\mu$ V/m.

The 32.0 dB $\mu$ V/m value was mathematically converted to its corresponding level in  $\mu$ V/m.

$$FS = 52.5 \text{ dB}\mu\text{V} + 7.4 \text{ dB/m} + 1.1 \text{ dB} - 29.0 \text{ dB} = 32.0 \text{ dB}\mu\text{V/m}$$

$$\text{Level in } \mu\text{V/m} = \text{Common Antilogarithm } [(32.0 \text{ dB}\mu\text{V/m})/20] = 39.8 \mu\text{V/m}$$

### 3.5 Test Details

For 2480 MHz (High): Axis; Y

Test Date: 2013-11-28

Test data: Refer to Section 10 of this report for spectrum chart.

(Spectrum chart is presented)

Test configuration photo: Refer to Section 11.1.1 and 11.1.2

## 4 RADIATED EMISSION TEST 30 MHz to 25 GHz

### 4.1 Test Setup

The test setup was made according to ANSI C63.10:2009.

The measurement distance was 3 m

- The test was performed with frequency range 30 MHz to 25 GHz.
- The center of EUTs was aligned to the center of a non-conductive table.
- The table size was 0.8 m high × 1.5 m wide × 1.0 m deep.
- Measurements were made with the antenna positioned in both the horizontal and vertical planes of polarization. The antenna was scanned in height from 1 m to 4 m.

### 4.2 Testing System

Instruments 1: For 30 MHz to 1 GHz

Equipment	Manufacturer	Model	S/N	Calibration Date	Calibration Due	Note
Semi-Anechoic Chamber	Otsuka Science	10 m	No. 3	2013-01-25	2014-01-31	
EMI Test Receiver	Rohde & Schwarz	ESCS30	836858/002	2013-04-11	2014-04-30	1)
EXA Signal Analyzer	Agilent Technologies	N9010A	MY52221120	2013-05-27	2014-05-31	2)
Biconical Antenna	Schwarzbeck	BBA9106	1513	2013-11-14	2014-11-30	3)
Log-Periodic Antenna	Schwarzbeck	UHALP9108-A	0715	2013-11-14	2014-11-30	4)
Cable System	IPS Corporation	RE (28)	N/A	2013-02-20	2014-02-28	

Note: 1) System Bandwidth=120 kHz, Detector Mode=Quasi-Peak.

2) Detector Mode=Peak

3) For 30 MHz to 300 MHz

4) For 300 MHz to 1 GHz

Software:

Toyo Corporation, EP5/RE, Version 5.5.10

Instruments 2: For 1 GHz to 25 GHz

Equipment	Manufacturer	Model	S/N	Calibration Date	Calibration Due	Note
Semi-Anechoic Chamber	Otsuka Science	10 m	No. 3	2013-01-25	2014-01-31	
EXA Signal Analyzer	Agilent Technologies	N9010A	MY52221120	2013-05-27	2014-05-31	1)
Guide Horn Antenna	EMCO	3115	9609-4953	2013-11-19	2014-11-30	2)
Guide Horn Antenna	EMCO	3116	9512-2277	2013-11-20	2014-11-30	3)
Cable System	IPS Corporation	RE (8)	N/A	2013-02-08	2014-02-28	2)
Cable System	IPS Corporation	RE (9)	N/A	2013-02-08	2014-02-28	3)

Note: 1) System Bandwidth=1 MHz, Detector Mode=Peak and Average.

2) For 1 GHz to 18 GHz

3) For 18 GHz to 25 GHz

Software:

Toyo Corporation, EP5/RE, Version 5.5.10

## 4.3 Description of Measurement Procedure

### 4.3.1 Exploratory Test

EUT is tested in all operating modes.

<Step1>

EUT and system are set up according to “IPS measurement procedures” and “ANSI C63.10:2009”.

<Step2>

The operator selects an antenna from among the following depending on the measurement frequency.

- Broadband Antenna (This Antenna is used for 30 MHz to 1 GHz)
- Double Rigid Guide Antenna (This Antenna is used for over 1 GHz)

<Step3>

The Spectrum analyzer is controlled by PC EMI software as follows:

- Set to Peak Detector mode and Max-Hold mode.
- Sweep measurement frequency range.

Following parameters are also controlled by PC EMI software:

- Turntable (rotate 0° to 360°)
- Antenna polarization (horizontal and vertical)
- Antenna height (1 m to 4 m)

<Step4>

The operator performs following operations.

- Prints out the Spectrum chart from PC EMI software.
- Records frequency (ies) with minimum margin(s).
- Determines the operating mode where maximum emission is detected.

### 4.3.2 Final Test

<Step1>

EUT system is operated in the operation mode determined by Exploratory Test.

<Step2>

The operator selects an antenna from among the following depending on the measurement frequency.

- Broadband Antenna (This Antenna is used for 30 MHz to 1 GHz)
- Double Rigid Guide Antenna (This Antenna is used for over 1 GHz)

<Step3>

Following operation is performed by the operator:

EMC Test Receiver is set to the system bandwidth and detection mode specified by the test standard.

<Step4>

For 30 MHz to 1 GHz, the operator controls the turntable and antenna height and polarization to reproduce the combination where maximum emission was detected during the Exploratory Test.

For over 1 GHz, the operator controls the turntable and antenna height, polarization, azimuth and elevation to reproduce the combination where maximum emission was detected during the Exploratory Test.

#### 4.3.2 Final Test (Continued)

<Step5>

The operator arranges the apparatus and the cables to reproduce the configuration where maximum emission was detected during the Exploratory Test.

<Step6>

The operator enters the values displayed on EMC Test Receiver into PC EMI software.

The measurement result is calculated by PC EMI software.

The same operation is repeated for all modes that should be measured.

#### 4.4 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$c.f. = AF + CL - AG$$

$$FS = RA + c.f.$$

Where	c.f.	= Correction Factor
	FS	= Field Strength (Emission Level - Result)
	RA	= Receiver Amplitude (Reading Level)
	AF	= Antenna Factor
	CL	= Cable Loss
	AG	= Amplifier Gain

Assume a receiver reading of 52.5 dB $\mu$ V is obtained. The Antenna Factor of 7.4 dB/m and a Cable Loss of 1.1 dB is added. The Amplifier Gain of 29.0 dB is subtracted, giving a field strength of 32.0 dB $\mu$ V/m.

The 32.0 dB $\mu$ V/m value was mathematically converted to its corresponding level in  $\mu$ V/m.

$$FS = 52.5 \text{ dB}\mu\text{V} + 7.4 \text{ dB/m} + 1.1 \text{ dB} - 29.0 \text{ dB} = 32.0 \text{ dB}\mu\text{V/m}$$

$$\text{Level in } \mu\text{V/m} = \text{Common Antilogarithm } [(32.0 \text{ dB}\mu\text{V/m})/20] = 39.8 \mu\text{V/m}$$

## 4.5 Test Details

### 30 MHz to 1 GHz

Test Details 1; For 2480 MHz (High): Axis; Y

Test Date: 2013-11-26

Test data: Refer to Section 10 of this report for spectrum chart.  
(Spectrum chart is presented)

Test configuration photo: Refer to Section 11.1.1 and 11.1.2

### 1 GHz to 18 GHz

Test Details 2; For 2402 MHz (Low): Axis; X

Test Date: 2013-11-28

Test data: Refer to Section 10 of this report for test data and spectrum chart.  
(Spectrum chart is presented)

Summary of the measurement data (Worst measurement):

Vertical Polarization, 7206.019 MHz, 55.8 dB( $\mu$ V/m) Peak Value  
and it has 18.2 dB margin from the limit(74.0 dB( $\mu$ V/m)).

Vertical Polarization, 7206.019 MHz, 43.0 dB( $\mu$ V/m) Average Value  
and it has 11.0 dB margin from the limit(54.0 dB( $\mu$ V/m)).

Test configuration photo: Refer to Section 11.1.1 and 11.1.2

Test Details 3; For 2402 MHz (Low): Axis; Y

Test Date: 2013-11-28

Test data: Refer to Section 10 of this report for test data and spectrum chart.  
(Spectrum chart is presented)

Summary of the measurement data (Worst measurement):

Horizontal Polarization, 7206.019 MHz, 55.7 dB( $\mu$ V/m) Peak Value  
and it has 18.3 dB margin from the limit(74.0 dB( $\mu$ V/m)).

Horizontal Polarization, 7206.019 MHz, 43.4 dB( $\mu$ V/m) Average Value  
and it has 10.6 dB margin from the limit(54.0 dB( $\mu$ V/m)).

Test configuration photo: Refer to Section 11.1.1 and 11.1.2

## 4.5 Test Details (Continued)

Test Details 4; For 2402 MHz (Low): Axis; ZTest Date: 2013-11-28

Test data: Refer to Section 10 of this report for test data and spectrum chart.  
(Spectrum chart is presented)

Summary of the measurement data (Worst measurement):

Horizontal Polarization, 7206.001 MHz, 55.4 dB( $\mu$ V/m) Peak Value  
and it has 18.6 dB margin from the limit(74.0 dB( $\mu$ V/m)).

Horizontal Polarization, 7206.001 MHz, 43.3 dB( $\mu$ V/m) Average Value  
and it has 10.7 dB margin from the limit(54.0 dB( $\mu$ V/m)).

Test configuration photo: Refer to Section 11.1.1 and 11.1.2

Test Details 5; For 2440 MHz (Middle): Axis; XTest Date: 2013-11-28

Test data: Refer to Section 10 of this report for test data and spectrum chart.  
(Spectrum chart is presented)

Summary of the measurement data (Worst measurement):

Vertical Polarization, 7320.050 MHz, 58.2 dB( $\mu$ V/m) Peak Value  
and it has 15.8 dB margin from the limit(74.0 dB( $\mu$ V/m)).

Vertical Polarization, 7320.050 MHz, 45.0 dB( $\mu$ V/m) Average Value  
and it has 9.0 dB margin from the limit(54.0 dB( $\mu$ V/m)).

Test configuration photo: Refer to Section 11.1.1 and 11.1.2

Test Details 6; For 2440 MHz (Middle): Axis; YTest Date: 2013-11-28

Test data: Refer to Section 10 of this report for test data and spectrum chart.  
(Spectrum chart is presented)

Summary of the measurement data (Worst measurement):

Vertical Polarization, 7320.050 MHz, 58.2 dB( $\mu$ V/m) Peak Value  
and it has 15.8 dB margin from the limit(74.0 dB( $\mu$ V/m)).

Vertical Polarization, 7320.050 MHz, 45.0 dB( $\mu$ V/m) Average Value  
and it has 9.0 dB margin from the limit(54.0 dB( $\mu$ V/m)).

Test configuration photo: Refer to Section 11.1.1 and 11.1.2

## 4.5 Test Details (Continued)

Test Details 7; For 2440 MHz (Middle): Axis; ZTest Date: 2013-11-28

Test data: Refer to Section 10 of this report for test data and spectrum chart.  
(Spectrum chart is presented)

Summary of the measurement data (Worst measurement):

Horizontal Polarization, 7320.006 MHz, 57.7 dB( $\mu$ V/m) Peak Value  
and it has 16.3 dB margin from the limit(74.0 dB( $\mu$ V/m)).

Horizontal Polarization, 7320.006 MHz, 44.3 dB( $\mu$ V/m) Average Value  
and it has 9.7 dB margin from the limit(54.0 dB( $\mu$ V/m)).

Test configuration photo: Refer to Section 11.1.1 and 11.1.2

Test Details 8; For 2480 MHz (High): Axis; XTest Date: 2013-11-28

Test data: Refer to Section 10 of this report for test data and spectrum chart.  
(Spectrum chart is presented)

Summary of the measurement data (Worst measurement):

Vertical Polarization, 7439.900 MHz, 63.5 dB( $\mu$ V/m) Peak Value  
and it has 10.5 dB margin from the limit(74.0 dB( $\mu$ V/m)).

Vertical Polarization, 7439.900 MHz, 48.9 dB( $\mu$ V/m) Average Value  
and it has 5.1 dB margin from the limit(54.0 dB( $\mu$ V/m)).

Test configuration photo: Refer to Section 11.1.1 and 11.1.2

Test Details 9; For 2480 MHz (High): Axis; YTest Date: 2013-11-28

Test data: Refer to Section 10 of this report for test data and spectrum chart.  
(Spectrum chart is presented)

Summary of the measurement data (Worst measurement):

Horizontal Polarization, 7440.080 MHz, 63.6 dB( $\mu$ V/m) Peak Value  
and it has 10.4 dB margin from the limit(74.0 dB( $\mu$ V/m)).

Horizontal Polarization, 7440.080 MHz, 49.5 dB( $\mu$ V/m) Average Value  
and it has 4.5 dB margin from the limit(54.0 dB( $\mu$ V/m)).

Test configuration photo: Refer to Section 11.1.1 and 11.1.2

#### 4.5 Test Details (Continued)

##### Test Details 10; For 2480 MHz (High): Axis; Z

Test Date: 2013-11-28

Test data: Refer to Section 10 of this report for test data and spectrum chart.  
(Spectrum chart is presented)

Summary of the measurement data (Worst measurement):

Horizontal Polarization, 7439.250 MHz, 61.3 dB( $\mu$ V/m) Peak Value  
and it has 12.7 dB margin from the limit(74.0 dB( $\mu$ V/m)).

Vertical Polarization, 7440.050 MHz, 61.3 dB( $\mu$ V/m) Peak Value  
and it has 12.7 dB margin from the limit(74.0 dB( $\mu$ V/m)).

Horizontal Polarization, 7439.250 MHz, 49.2 dB( $\mu$ V/m) Average Value  
and it has 4.8 dB margin from the limit(54.0 dB( $\mu$ V/m)).

Test configuration photo: Refer to Section 11.1.1 and 11.1.2

##### 18 GHz to 25 GHz

##### Test Details 11; For 2480 MHz (High): Axis; Y

Test Date: 2013-11-28

Test data: Refer to Section 10 of this report for spectrum chart.  
(Spectrum chart is presented)

Test configuration photo: Refer to Section 11.1.1 and 11.1.2

## 5.6 dB BANDWIDTH

### 5.1 Test Procedures and Limits

- The test procedure is according to ANSI C63.10:2009.
- According to §15.247(a)(2), systems using digital modulation techniques may operate in the 902 - 928 MHz, 2400 - 2483.5 MHz, and 5725 - 5850 MHz bands. The minimum 6dB bandwidth shall be at least 500 kHz.

### 5.2 Testing System

#### Instruments

Equipment	Manufacturer	Model	S/N	Calibration Date	Calibration Due	Note
EXA Signal Analyzer	Agilent Technologies	N9010A	MY52221120	2013-05-27	2014-05-31	
Cable System	IPS Corporation	RE (42)	N/A	2013-11-29	2014-11-30	

### 5.3 Test Details

Test location: Testing Room (EMC Center)

Environmental Condition:

Test date: 2013-12-02 Temperature: 23.5 °C Humidity: 32 % Pressure: 920 hPa

Channel	Frequency(MHz)	Bandwidth(MHz)	Limit(kHz)
Low	2402	0.791	> 500
Middle	2440	0.786	> 500
High	2480	0.734	> 500

Test data: Refer to Section 10 of this report for test waveform.

Test configuration photo: Refer to Section 11.2

Operator: H. Fujimoto

## 6 MAXIMUM PEAK CONDUCTED OUTPUT POWER

### 6.1 Test Procedures and Limits

- The test procedure is according to ANSI C63.10:2009.
- The maximum peak output power of the intentional radiator shall not exceed the following:
  - According to §15.247(b)(3), for systems using digital modulation in the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz: 1 Watt.

### 6.2 Testing System

#### Instruments

Equipment	Manufacturer	Model	S/N	Calibration Date	Calibration Due	Note
Dual-channel Power Meter	Rohde & Schwarz	NRVD	101614	2013-08-23	2014-08-31	
Peak Power Sensor	Rohde & Schwarz	NRV-Z31	100312	2013-08-23	2014-08-31	
Cable System	IPS Corporation	RE (42)	N/A	2013-11-29	2014-11-30	

### 6.3 Test Details

Test location: Testing Room (EMC Center)

Environmental Condition:

Test date: 2013-12-02 Temperature: 23.5 °C Humidity: 32 % Pressure: 920 hPa

Channel	Frequency (MHz)	Reading (dBm)	Cable and Attenuator Loss(dB)	Result (dBm)	Result (mW)	Limit (dBm)	Margin (dB)
Low	2402	-11.24	11.77	0.53	1.13	30.00	29.47
Middle	2440	-11.64	11.78	0.14	1.03	30.00	29.86
High	2480	-12.71	11.80	-0.91	0.81	30.00	30.91

Test data: Refer to Section 10 of this report for test waveform.

Test configuration photo: Refer to Section 11.2

Operator: H. Fujimoto

## 7 CONDUCTED SPURIOUS EMISSION TEST

### 7.1 Test Procedures and Limits

- The test procedure is according to ANSI C63.10:2009.
- According to §15.247(d), in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.

### 7.2 Testing System

#### Instruments

Equipment	Manufacturer	Model	S/N	Calibration Date	Calibration Due	Note
EXA Signal Analyzer	Agilent Technologies	N9010A	MY52221120	2013-05-27	2014-05-31	
Cable System	IPS Corporation	RE (42)	N/A	2013-11-29	2014-11-30	

### 7.3 Test Details

Test location: Testing Room (EMC Center)

Environmental Condition:

Test date: 2013-12-02 Temperature: 23.5 °C Humidity: 32 % Pressure: 920 hPa

Test data: Refer to Section 10 of this report for test waveform.

Test configuration photo: Refer to Section 11.2

Operator: H. Fujimoto

## 8 MAXIMUM POWER SPECTRAL DENSITY

### 8.1 Test Procedures and Limits

- The test procedure is according to ANSI C63.10:2009.
- The test limits is according to FCC Part15C Section 15.247 (e).
  - According to §15.247(e), for digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

### 8.2 Testing System

#### Instruments

Equipment	Manufacturer	Model	S/N	Calibration Date	Calibration Due	Note
EXA Signal Analyzer	Agilent Technologies	N9010A	MY52221120	2013-05-27	2014-05-31	
Cable System	IPS Corporation	RE (42)	N/A	2013-11-29	2014-11-30	

### 8.3 Test Details

Test location: Testing Room (EMC Center)

Environmental Condition:

Test date: 2013-12-02 Temperature: 23.5 °C Humidity: 32 % Pressure: 920 hPa

Channel	Frequency (MHz)	Frequency Reading (dBm)	Reading (dBm)	Cable and Attenuator Loss(dB)	Result (dBm)	Limit (dBm)	Margin (dB)
Low	2402	2401.98	-23.89	11.77	-12.12	8.00	20.12
Middle	2440	2439.98	-25.03	11.78	-13.25	8.00	21.25
High	2480	2479.98	-25.42	11.80	-13.62	8.00	21.62

Test data: Refer to Section 10 of this report for test waveform.

Test configuration photo: Refer to Section 11.3

Operator: H. Fujimoto

## 9.99 % OCCUPIED BANDWIDTH

### 9.1 Test Procedures and Limits

- The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.
- Limits: None; for reporting purposes only.

### 9.2 Testing System

#### Instruments

Equipment	Manufacturer	Model	S/N	Calibration Date	Calibration Due	Note
EXA Signal Analyzer	Agilent Technologies	N9010A	MY52221120	2013-05-27	2014-05-31	
Cable System	IPS Corporation	RE (42)	N/A	2013-11-29	2014-11-30	

### 9.3 Test Details

Test location: Testing Room (EMC Center)

Environmental Condition:

Test date: 2013-12-02 Temperature: 23.5 °C Humidity: 32 % Pressure: 920 hPa

Channel	Frequency (MHz)	Occupied Bandwidth (MHz)
Low	2402	3.271
Middle	2440	3.649
High	2480	3.221

Test data: Refer to Section 10 of this report for test waveform.

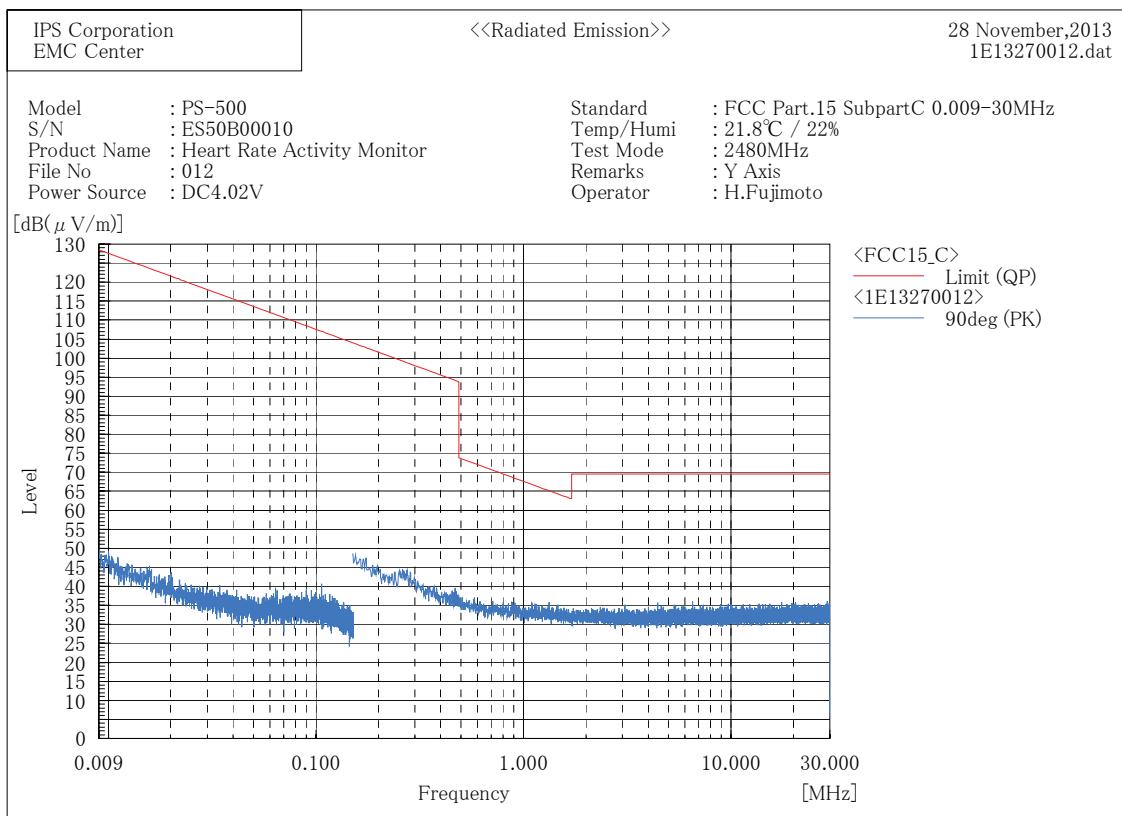
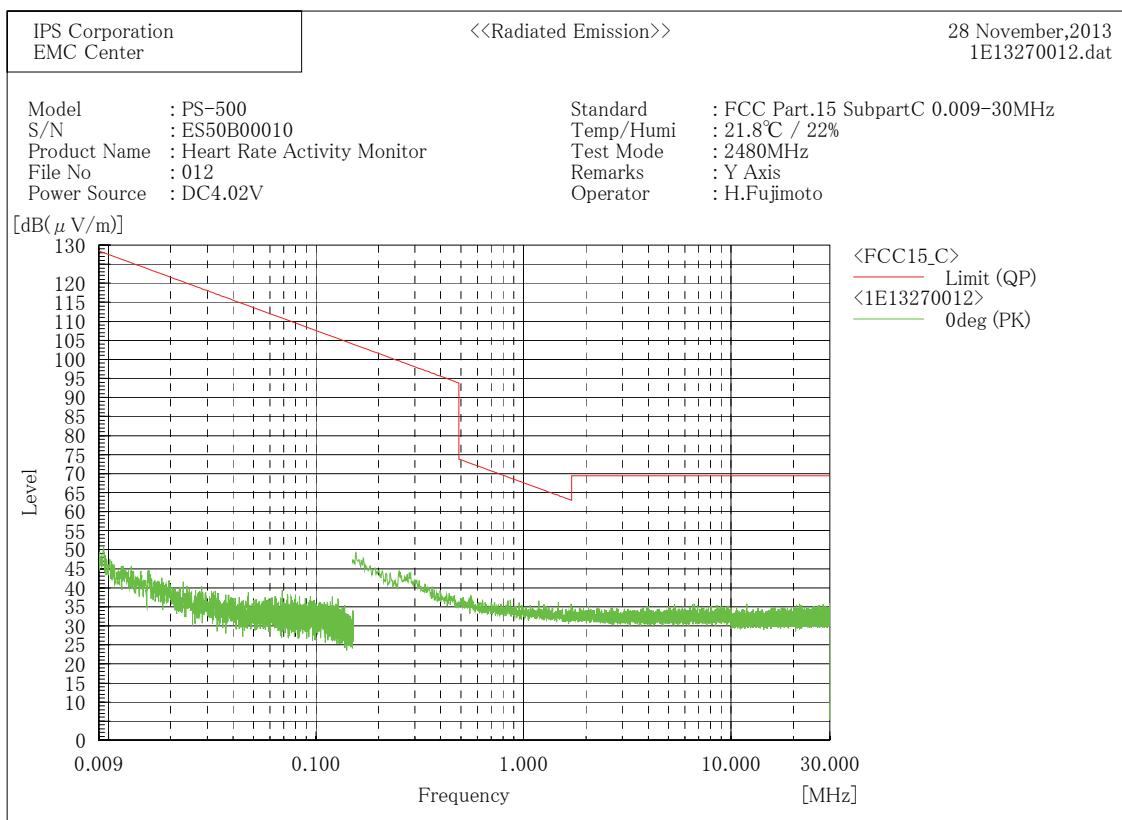
Test configuration photo: Refer to Section 11.2

Operator: H. Fujimoto

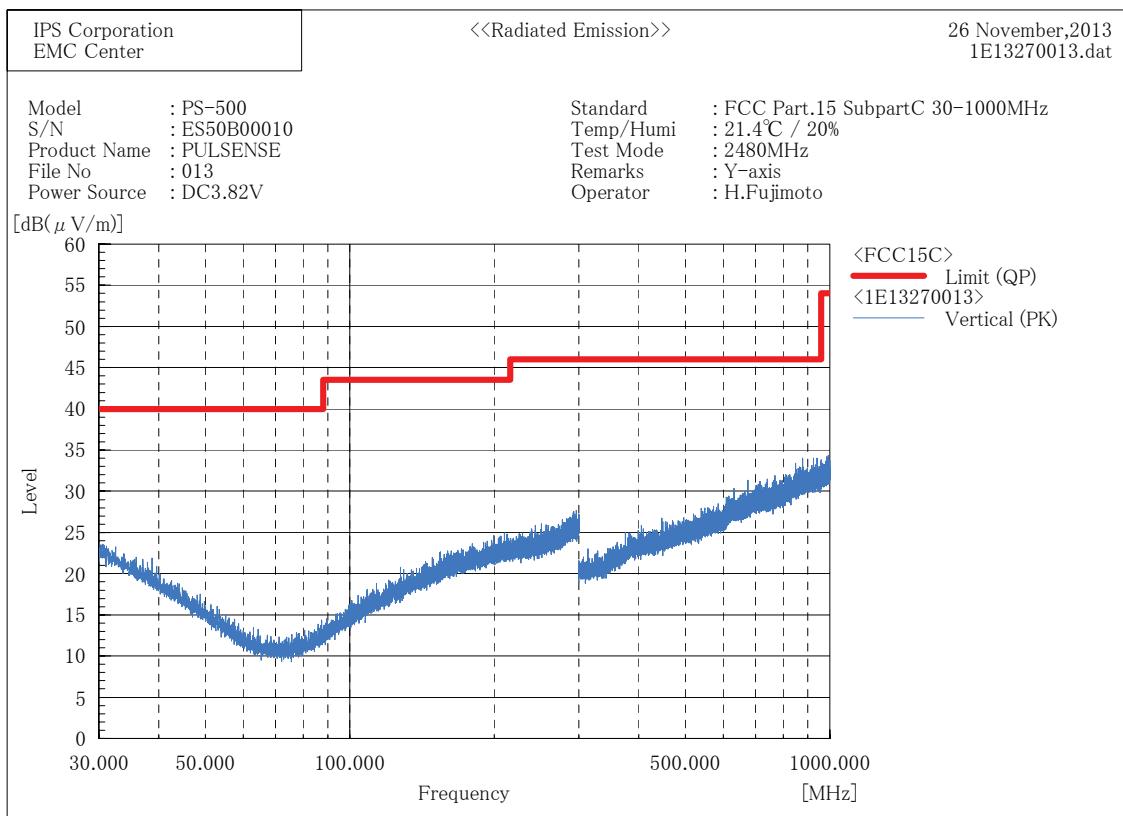
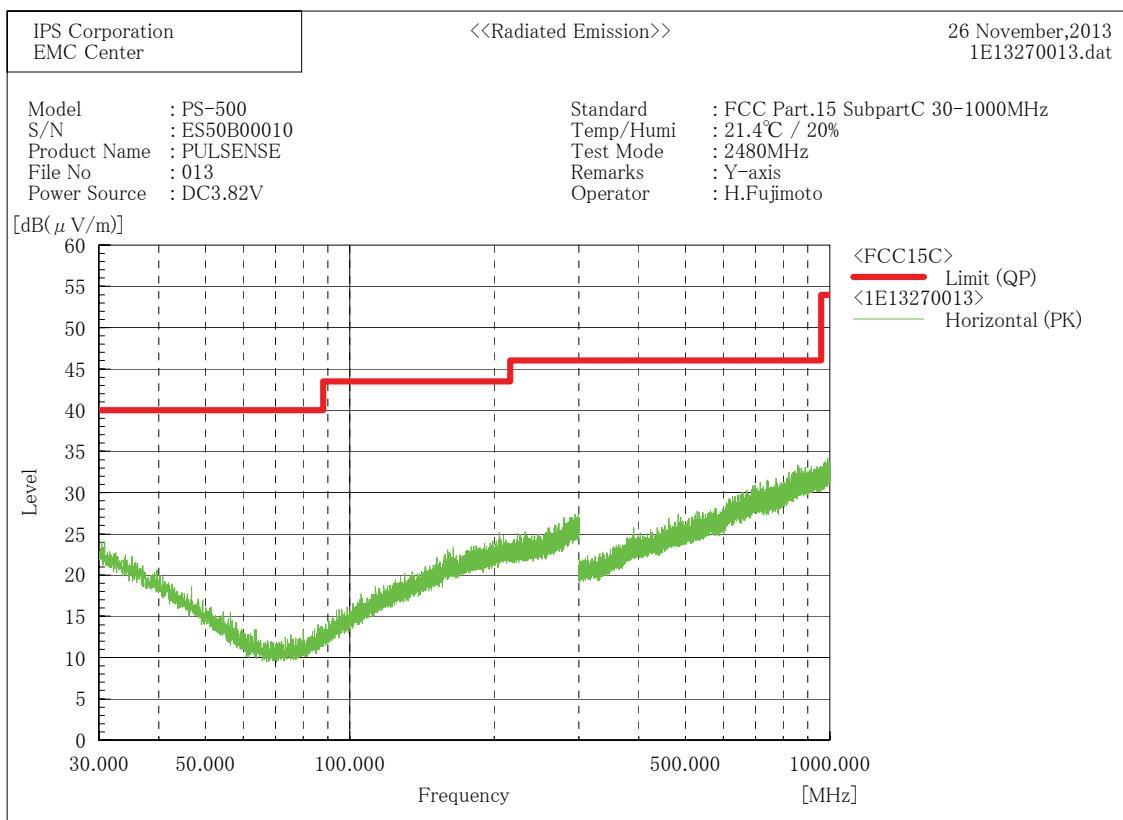
## 10 TEST DATA

- Radiated Emission Test Data 9 kHz to 30 MHz
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Radiated Emission Test Data 9 kHz to 30 MHz  
For 2480 MHz (High) Axis; Y



Radiated Emission Test Data 30 MHz to 1 GHz  
For 2480 MHz (High) Axis; Y



# Radiated Emission Test Data 1 GHz to 18 GHz

## For 2402 MHz (Low) Axis; X

\*\*\*\*\* IPS Corporation \*\*\*\*\*  
 <<Radiated Emission>> 28 November, 2013  
 1E13270008.dat

Standard : FCC Part15 SubpartC 1-40G  
 Model : PS-500  
 S/N : ES50B00010  
 Product Name : Heart Rate Activity Monitor  
 File No : 008  
 Power Source : DC3.97V  
 Temp /Humi : 19.8°C / 30%  
 Test Mode : 2402MHz  
 Remarks : X-axis  
 Operator : H.Fujimoto

\*\*\*\*\*  
 Final Result

### --- Horizontal Polarization (PK)---

No.	Frequency [MHz]	Reading [dB(μV)]	c.f. [dB(1/m)]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]	Height [cm]	Angle [°]
1	2390.000	39.5	4.2	43.7	74.0	30.3	131.8	183.0
2	2483.500	39.8	4.4	44.2	74.0	29.8	131.8	183.0
3	4804.005	42.1	9.4	51.5	74.0	22.5	100.0	7.0
4	7206.079	40.7	14.9	55.6	74.0	18.4	100.0	175.0

### --- Horizontal Polarization (CAV)---

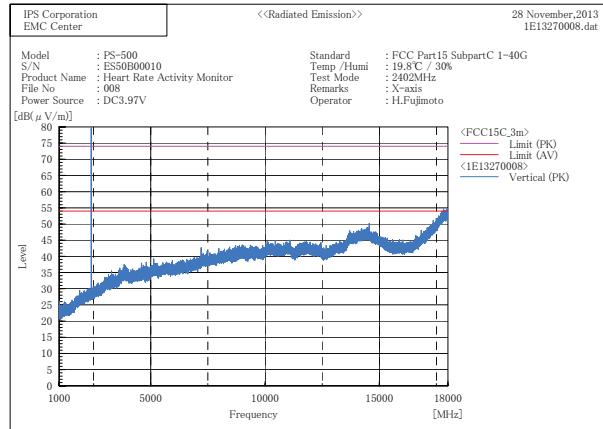
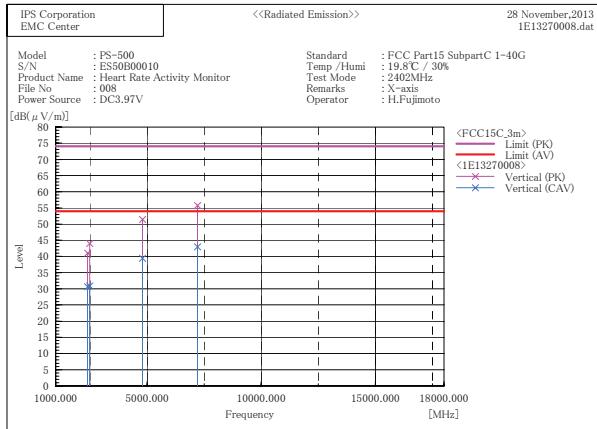
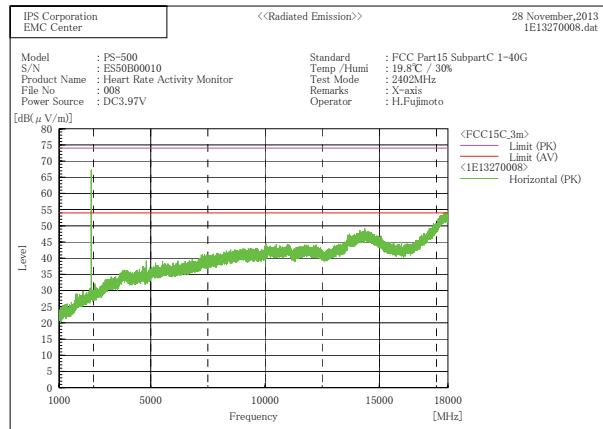
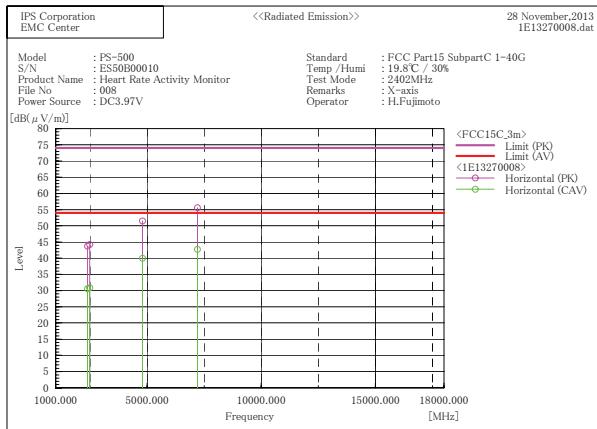
No.	Frequency [MHz]	Reading [dB(μV)]	c.f. [dB(1/m)]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]	Height [cm]	Angle [°]
1	2390.000	26.4	4.2	30.6	54.0	23.4	131.8	183.0
2	2483.500	26.5	4.4	30.9	54.0	23.1	131.8	183.0
3	4804.005	30.6	9.4	40.0	54.0	14.0	100.0	7.0
4	7206.079	27.8	14.9	42.7	54.0	11.3	100.0	175.0

### --- Vertical Polarization (PK)---

No.	Frequency [MHz]	Reading [dB(μV)]	c.f. [dB(1/m)]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]	Height [cm]	Angle [°]
1	2390.000	36.8	4.2	41.0	74.0	33.0	112.8	358.0
2	2483.500	39.6	4.4	44.0	74.0	30.0	112.8	358.0
3	4804.020	42.1	9.4	51.5	74.0	22.5	100.0	349.0
4	7206.019	40.9	14.9	55.8	74.0	18.2	100.0	141.0

### --- Vertical Polarization (CAV)---

No.	Frequency [MHz]	Reading [dB(μV)]	c.f. [dB(1/m)]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]	Height [cm]	Angle [°]
1	2390.000	26.5	4.2	30.7	54.0	23.3	112.8	358.0
2	2483.500	26.5	4.4	30.9	54.0	23.1	112.8	358.0
3	4804.020	30.1	9.4	39.5	54.0	14.5	100.0	349.0
4	7206.019	28.1	14.9	43.0	54.0	11.0	100.0	141.0



# Radiated Emission Test Data 1 GHz to 18 GHz

## For 2402 MHz (Low) Axis; Y

\*\*\*\*\* IPS Corporation \*\*\*\*\*  
 <<Radiated Emission>> 28 November, 2013  
 1E13270009.dat

Standard : FCC Part15 SubpartC 1-40G  
 Model : PS-500  
 S/N : ES50B00010  
 Product Name : Heart Rate Activity Monitor  
 File No : 009  
 Power Source : DC3.97V  
 Temp /Humi : 19.8°C / 30%  
 Test Mode : 2402MHz  
 Remarks : Y-axis  
 Operator : H.Fujimoto

\*\*\*\*\*  
 Final Result

### --- Horizontal Polarization (PK)---

No.	Frequency [MHz]	Reading [dB(μV)]	c. f. [dB(1/m)]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]	Height [cm]	Angle [°]
1	2390.000	39.6	4.2	43.8	74.0	30.2	119.1	2.0
2	2483.500	39.4	4.4	43.8	74.0	30.2	119.1	2.0
3	4804.020	43.1	9.4	52.5	74.0	21.5	100.0	40.0
4	7206.019	40.8	14.9	55.7	74.0	18.3	100.0	207.0

### --- Horizontal Polarization (CAV)---

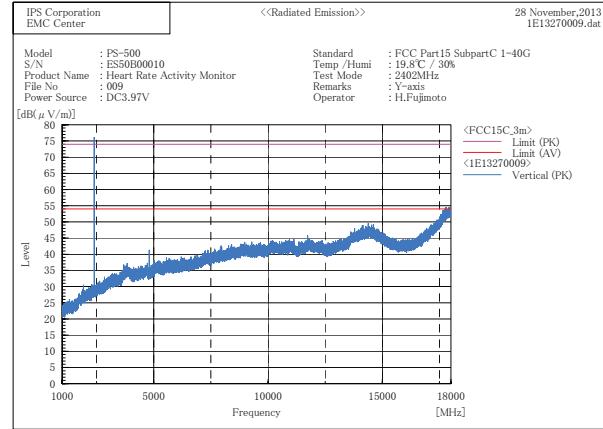
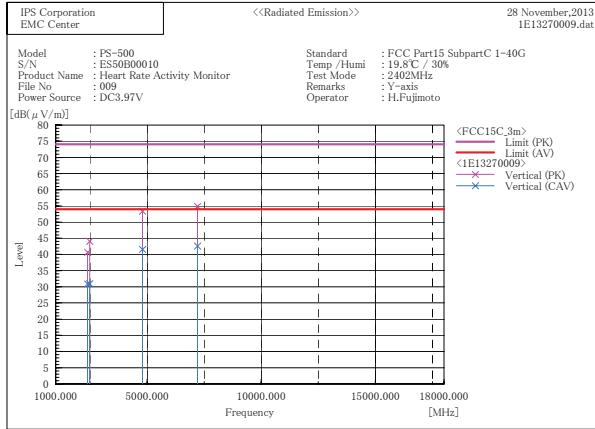
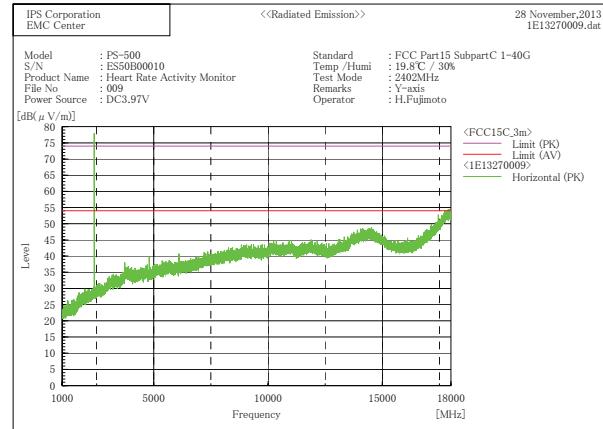
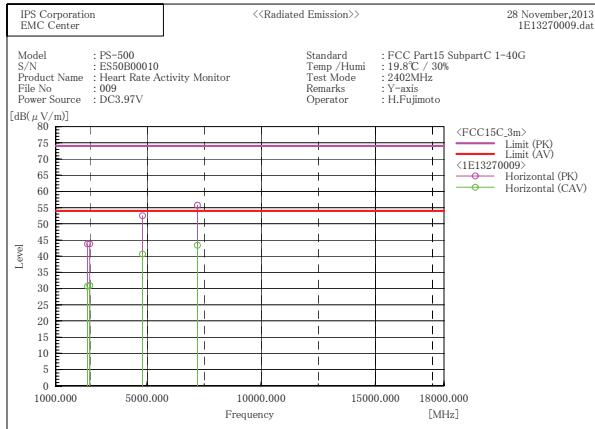
No.	Frequency [MHz]	Reading [dB(μV)]	c. f. [dB(1/m)]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]	Height [cm]	Angle [°]
1	2390.000	26.5	4.2	30.7	54.0	23.3	119.1	2.0
2	2483.500	26.6	4.4	31.0	54.0	23.0	119.1	2.0
3	4804.020	31.3	9.4	40.7	54.0	13.3	100.0	40.0
4	7206.019	28.5	14.9	43.4	54.0	10.6	100.0	207.0

### --- Vertical Polarization (PK)---

No.	Frequency [MHz]	Reading [dB(μV)]	c. f. [dB(1/m)]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]	Height [cm]	Angle [°]
1	2390.000	36.5	4.2	40.7	74.0	33.3	121.7	208.0
2	2483.500	39.7	4.4	44.1	74.0	29.9	121.7	208.0
3	4804.005	44.0	9.4	53.4	74.0	20.6	111.0	171.0
4	7206.008	40.0	14.9	54.9	74.0	19.1	100.0	199.0

### --- Vertical Polarization (CAV)---

No.	Frequency [MHz]	Reading [dB(μV)]	c. f. [dB(1/m)]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]	Height [cm]	Angle [°]
1	2390.000	26.7	4.2	30.9	54.0	23.1	121.7	208.0
2	2483.500	26.6	4.4	31.0	54.0	23.0	121.7	208.0
3	4804.005	32.2	9.4	41.6	54.0	12.4	111.0	171.0
4	7206.008	27.7	14.9	42.6	54.0	11.4	100.0	199.0



# Radiated Emission Test Data 1 GHz to 18 GHz

## For 2402 MHz (Low) Axis; Z

\*\*\*\*\* IPS Corporation \*\*\*\*\*  
 <<Radiated Emission>> 28 November, 2013  
 1E13270010.dat

Standard : FCC Part15 SubpartC 1-40G  
 Model : PS-500  
 S/N : ES50B00010  
 Product Name : Heart Rate Activity Monitor  
 File No : 010  
 Power Source : DC3.97V  
 Temp /Humi : 19.8°C / 30%  
 Test Mode : 2402MHz  
 Remarks : Z-axis  
 Operator : H.Fujimoto

\*\*\*\*\*  
 Final Result

### --- Horizontal Polarization (PK)---

No.	Frequency [MHz]	Reading [dB(μV)]	c. f. [dB(1/m)]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]	Height [cm]	Angle [°]
1	2390.000	39.1	4.2	43.3	74.0	30.7	137.1	179.0
2	2483.500	39.1	4.4	43.5	74.0	30.5	137.1	179.0
3	4804.013	42.7	9.4	52.1	74.0	21.9	100.0	25.0
4	7206.001	40.5	14.9	55.4	74.0	18.6	100.0	189.0

### --- Horizontal Polarization (CAV)---

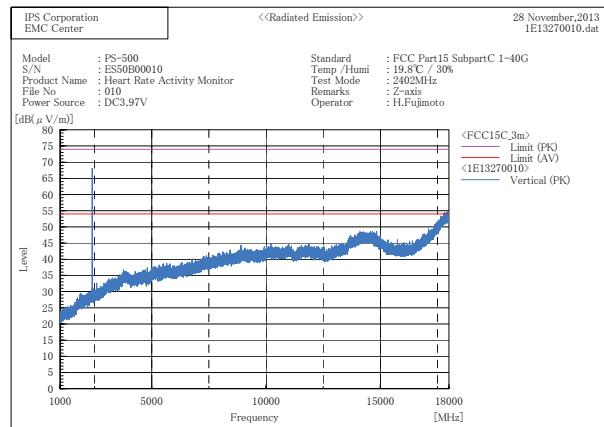
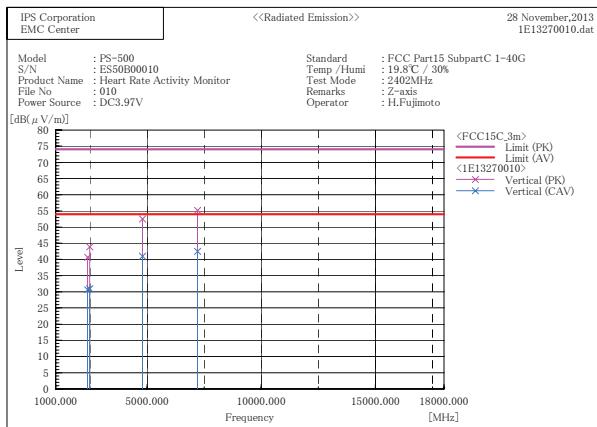
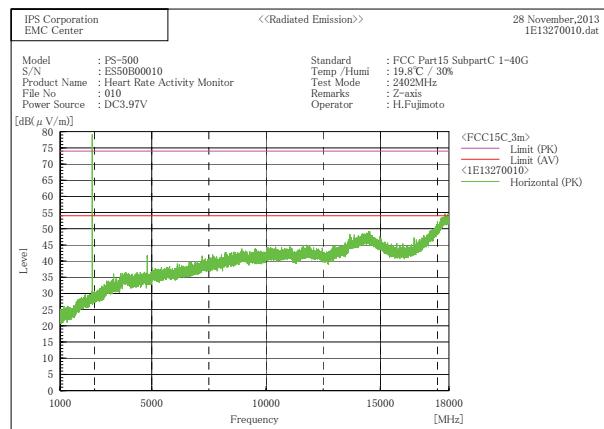
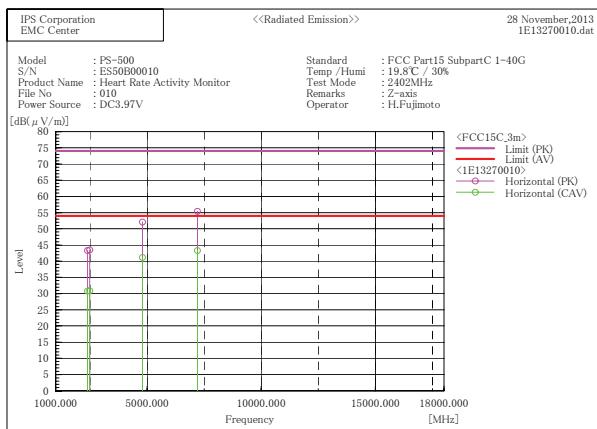
No.	Frequency [MHz]	Reading [dB(μV)]	c. f. [dB(1/m)]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]	Height [cm]	Angle [°]
1	2390.000	26.6	4.2	30.8	54.0	23.2	137.1	179.0
2	2483.500	26.5	4.4	30.9	54.0	23.1	137.1	179.0
3	4804.013	31.8	9.4	41.2	54.0	12.8	100.0	25.0
4	7206.001	28.4	14.9	43.3	54.0	10.7	100.0	189.0

### --- Vertical Polarization (PK)---

No.	Frequency [MHz]	Reading [dB(μV)]	c. f. [dB(1/m)]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]	Height [cm]	Angle [°]
1	2390.000	36.5	4.2	40.7	74.0	33.3	136.7	167.0
2	2483.500	39.5	4.4	43.9	74.0	30.1	136.7	167.0
3	4804.010	43.2	9.4	52.6	74.0	21.4	111.0	189.0
4	7206.008	40.3	14.9	55.2	74.0	18.8	100.0	22.0

### --- Vertical Polarization (CAV)---

No.	Frequency [MHz]	Reading [dB(μV)]	c. f. [dB(1/m)]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]	Height [cm]	Angle [°]
1	2390.000	26.5	4.2	30.7	54.0	23.3	136.7	167.0
2	2483.500	26.6	4.4	31.0	54.0	23.0	136.7	167.0
3	4804.010	31.6	9.4	41.0	54.0	13.0	111.0	189.0
4	7206.008	27.6	14.9	42.5	54.0	11.5	100.0	22.0



# Radiated Emission Test Data 1 GHz to 18 GHz

## For 2440 MHz (Middle) Axis; X

\*\*\*\*\* IPS Corporation \*\*\*\*\*  
 <<Radiated Emission>> 28 November, 2013  
 1E13270005.dat

Standard : FCC Part15 SubpartC 1-40G  
 Model : PS-500  
 S/N : ES50B00010  
 Product Name : Heart Rate Activity Monitor  
 File No : 005  
 Power Source : DC3.97V  
 Temp /Humi : 19.8°C / 30%  
 Test Mode : 2440MHz  
 Remarks : X-axis  
 Operator : H.Fujimoto

\*\*\*\*\*  
 Final Result

### --- Horizontal Polarization (PK)---

No.	Frequency [MHz]	Reading [dB(μV)]	c. f. [dB(1/m)]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]	Height [cm]	Angle [°]
1	2390.000	39.1	4.2	43.3	74.0	30.7	121.0	7.0
2	2483.500	40.3	4.4	44.7	74.0	29.3	121.0	7.0
3	4880.060	41.1	9.7	50.8	74.0	23.2	100.0	21.0
4	7320.060	39.2	15.6	54.8	74.0	19.2	100.0	207.0

### --- Horizontal Polarization (CAV)---

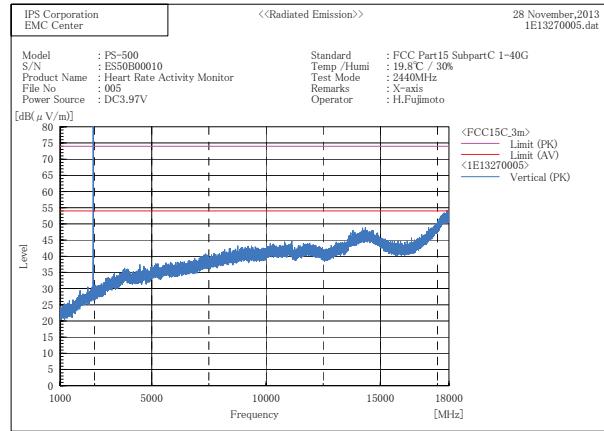
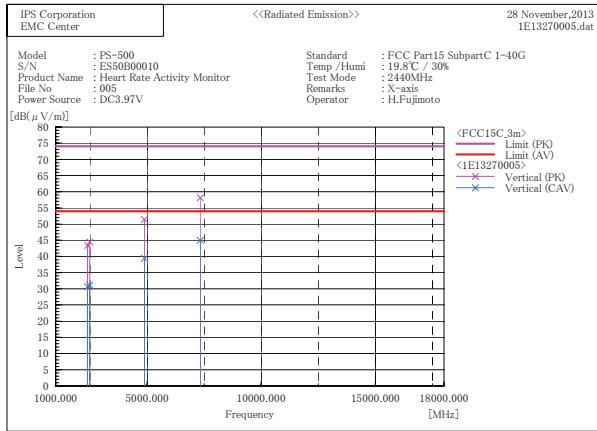
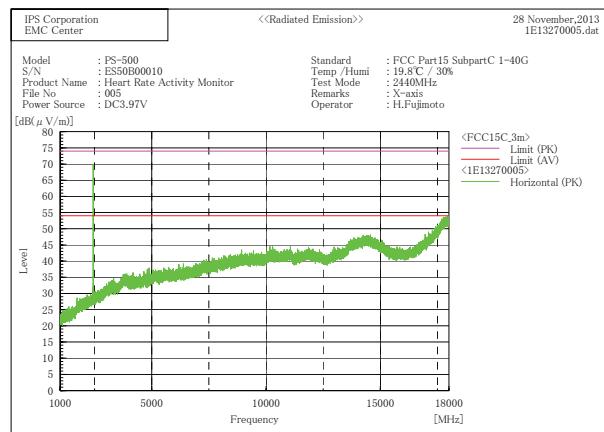
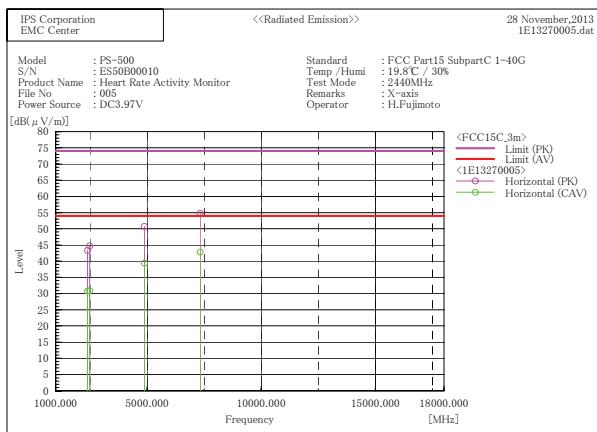
No.	Frequency [MHz]	Reading [dB(μV)]	c. f. [dB(1/m)]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]	Height [cm]	Angle [°]
1	2390.000	26.6	4.2	30.8	54.0	23.2	121.0	7.0
2	2483.500	26.5	4.4	30.9	54.0	23.1	121.0	7.0
3	4880.060	29.7	9.7	39.4	54.0	14.6	100.0	21.0
4	7320.060	27.2	15.6	42.8	54.0	11.2	100.0	207.0

### --- Vertical Polarization (PK)---

No.	Frequency [MHz]	Reading [dB(μV)]	c. f. [dB(1/m)]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]	Height [cm]	Angle [°]
1	2390.000	39.2	4.2	43.4	74.0	30.6	100.0	186.0
2	2483.500	40.1	4.4	44.5	74.0	29.5	100.0	186.0
3	4879.910	41.8	9.7	51.5	74.0	22.5	100.0	174.0
4	7320.050	42.6	15.6	58.2	74.0	15.8	162.6	294.0

### --- Vertical Polarization (CAV)---

No.	Frequency [MHz]	Reading [dB(μV)]	c. f. [dB(1/m)]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]	Height [cm]	Angle [°]
1	2390.000	26.5	4.2	30.7	54.0	23.3	100.0	186.0
2	2483.500	26.8	4.4	31.2	54.0	22.8	100.0	186.0
3	4879.910	29.8	9.7	39.5	54.0	14.5	100.0	174.0
4	7320.050	29.4	15.6	45.0	54.0	9.0	162.6	294.0



# Radiated Emission Test Data 1 GHz to 18 GHz

## For 2440 MHz (Middle) Axis; Y

\*\*\*\*\* IPS Corporation \*\*\*\*\*  
 <<Radiated Emission>> 28 November, 2013  
 1E13270006.dat

Standard : FCC Part15 SubpartC 1-40G  
 Model : PS-500  
 S/N : ES50B00010  
 Product Name : Heart Rate Activity Monitor  
 File No : 006  
 Power Source : DC3.97V  
 Temp /Humi : 19.8°C / 30%  
 Test Mode : 2440MHz  
 Remarks : Y-axis  
 Operator : H.Fujimoto

\*\*\*\*\*  
 Final Result

### --- Horizontal Polarization (PK)---

No.	Frequency [MHz]	Reading [dB(μV)]	c. f. [dB(1/m)]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]	Height [cm]	Angle [°]
1	2390.000	39.3	4.2	43.5	74.0	30.5	116.2	183.0
2	2483.500	39.6	4.4	44.0	74.0	30.0	116.2	183.0
3	4880.060	41.1	9.7	50.8	74.0	23.2	100.0	21.0
4	7320.060	39.2	15.6	54.8	74.0	19.2	100.0	207.0

### --- Horizontal Polarization (CAV)---

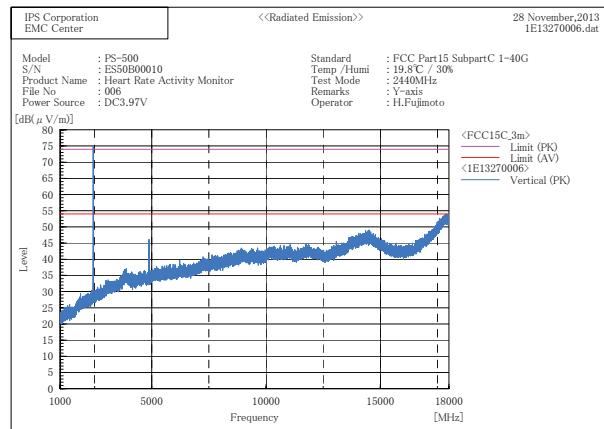
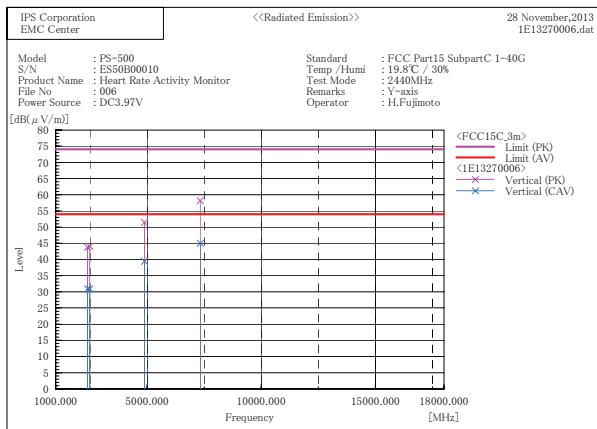
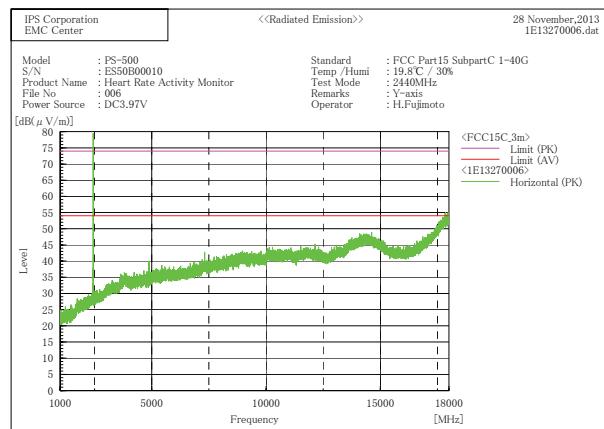
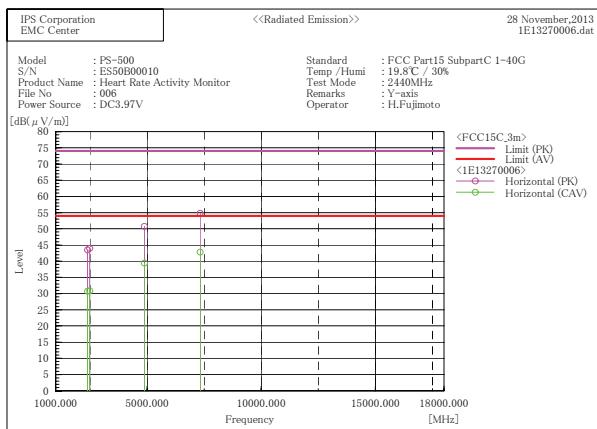
No.	Frequency [MHz]	Reading [dB(μV)]	c. f. [dB(1/m)]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]	Height [cm]	Angle [°]
1	2390.000	26.5	4.2	30.7	54.0	23.3	116.2	183.0
2	2483.500	26.5	4.4	30.9	54.0	23.1	116.2	183.0
3	4880.060	29.7	9.7	39.4	54.0	14.6	100.0	21.0
4	7320.060	27.2	15.6	42.8	54.0	11.2	100.0	207.0

### --- Vertical Polarization (PK)---

No.	Frequency [MHz]	Reading [dB(μV)]	c. f. [dB(1/m)]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]	Height [cm]	Angle [°]
1	2390.000	39.6	4.2	43.8	74.0	30.2	100.0	21.0
2	2483.500	39.7	4.4	44.1	74.0	29.9	100.0	21.0
3	4879.910	41.8	9.7	51.5	74.0	22.5	100.0	174.0
4	7320.050	42.6	15.6	58.2	74.0	15.8	162.6	294.0

### --- Vertical Polarization (CAV)---

No.	Frequency [MHz]	Reading [dB(μV)]	c. f. [dB(1/m)]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]	Height [cm]	Angle [°]
1	2390.000	26.7	4.2	30.9	54.0	23.1	100.0	21.0
2	2483.500	26.5	4.4	30.9	54.0	23.1	100.0	21.0
3	4879.910	29.8	9.7	39.5	54.0	14.5	100.0	174.0
4	7320.050	29.4	15.6	45.0	54.0	9.0	162.6	294.0



# Radiated Emission Test Data 1 GHz to 18 GHz

## For 2440 MHz (Middle) Axis; Z

\*\*\*\*\* IPS Corporation \*\*\*\*\*  
 <<Radiated Emission>> 28 November, 2013  
 1E13270007.dat

Standard : FCC Part15 SubpartC 1-40G  
 Model : PS-500  
 S/N : ES50B00010  
 Product Name : Heart Rate Activity Monitor  
 File No : 007  
 Power Source : DC3.97V  
 Temp /Humi : 19.8°C / 30%  
 Test Mode : 2440MHz  
 Remarks : Z-axis  
 Operator : H.Fujimoto

\*\*\*\*\*  
 Final Result

### --- Horizontal Polarization (PK)---

No.	Frequency [MHz]	Reading [dB(μV)]	c.f. [dB(1/m)]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]	Height [cm]	Angle [°]
1	2390.000	39.7	4.2	43.9	74.0	30.1	123.4	181.0
2	2483.500	39.5	4.4	43.9	74.0	30.1	123.4	181.0
3	4880.060	40.6	9.7	50.3	74.0	23.7	100.0	182.0
4	7320.006	42.1	15.6	57.7	74.0	16.3	100.0	50.0

### --- Horizontal Polarization (CAV)---

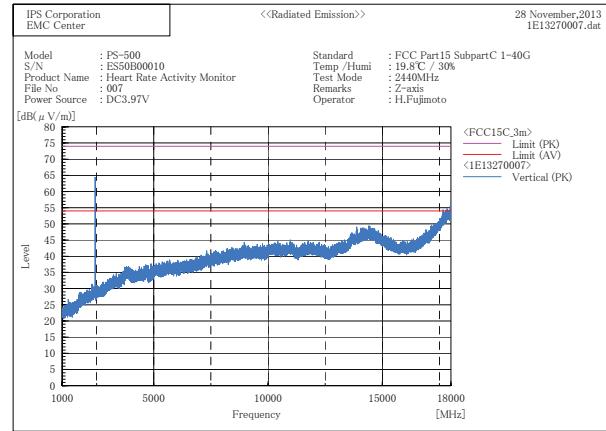
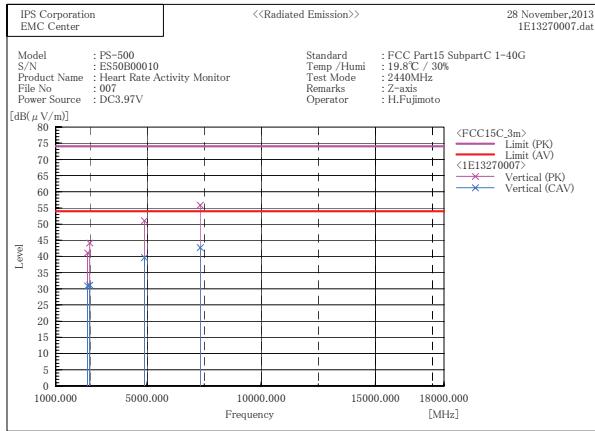
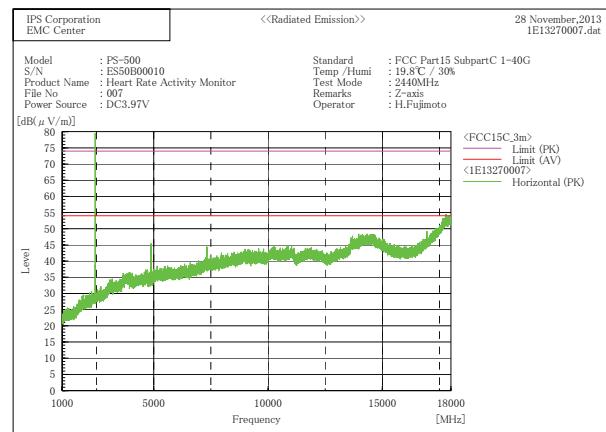
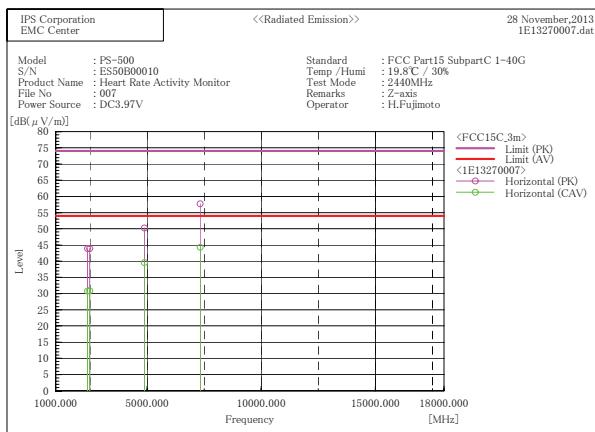
No.	Frequency [MHz]	Reading [dB(μV)]	c.f. [dB(1/m)]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]	Height [cm]	Angle [°]
1	2390.000	26.6	4.2	30.8	54.0	23.2	123.4	181.0
2	2483.500	26.5	4.4	30.9	54.0	23.1	123.4	181.0
3	4880.060	29.9	9.7	39.6	54.0	14.4	100.0	182.0
4	7320.006	28.7	15.6	44.3	54.0	9.7	100.0	50.0

### --- Vertical Polarization (PK)---

No.	Frequency [MHz]	Reading [dB(μV)]	c.f. [dB(1/m)]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]	Height [cm]	Angle [°]
1	2390.000	36.9	4.2	41.1	74.0	32.9	127.5	124.0
2	2483.500	39.8	4.4	44.2	74.0	29.8	127.5	124.0
3	4879.910	41.4	9.7	51.1	74.0	22.9	100.0	16.0
4	7320.050	40.3	15.6	55.9	74.0	18.1	100.0	11.0

### --- Vertical Polarization (CAV)---

No.	Frequency [MHz]	Reading [dB(μV)]	c.f. [dB(1/m)]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]	Height [cm]	Angle [°]
1	2390.000	26.7	4.2	30.9	54.0	23.1	127.5	124.0
2	2483.500	26.8	4.4	31.2	54.0	22.8	127.5	124.0
3	4879.910	30.0	9.7	39.7	54.0	14.3	100.0	16.0
4	7320.050	27.2	15.6	42.8	54.0	11.2	100.0	11.0



# Radiated Emission Test Data 1 GHz to 18 GHz

## For 2480 MHz (High) Axis; X

\*\*\*\*\* IPS Corporation \*\*\*\*\*  
 <<Radiated Emission>> 28 November, 2013  
 1E13270002.dat

Standard : FCC Part15 SubpartC 1-40G  
 Model : PS-500  
 S/N : ES50B00010  
 Product Name : Heart Rate Activity Monitor  
 File No : 002  
 Power Source : DC4.07V  
 Temp /Humi : 19.8°C / 30%  
 Test Mode : 2480MHz  
 Remarks : X-axis  
 Operator : H.Fujimoto  
 \*\*\*\*\*  
 Final Result

### --- Horizontal Polarization (PK)---

No.	Frequency [MHz]	Reading [dB(μV)]	c.f. [dB(1/m)]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]	Height [cm]	Angle [°]
1	2390.000	36.5	4.2	40.7	74.0	33.3	112.0	188.0
2	2483.500	43.2	4.4	47.6	74.0	26.4	112.0	188.0
3	4959.990	41.2	10.0	51.2	74.0	22.8	100.0	323.0
4	7440.005	35.6	15.7	51.3	74.0	22.7	100.0	18.5

### --- Horizontal Polarization (CAV)---

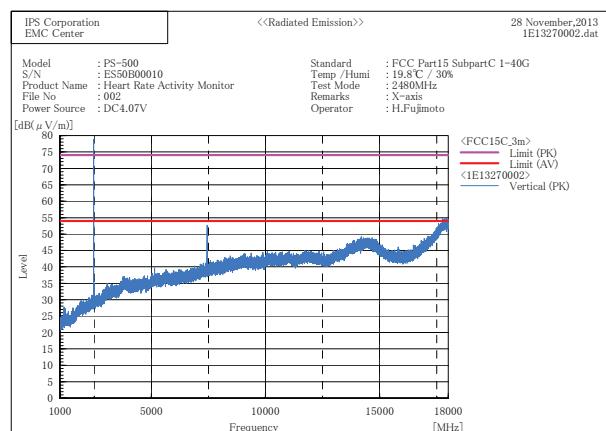
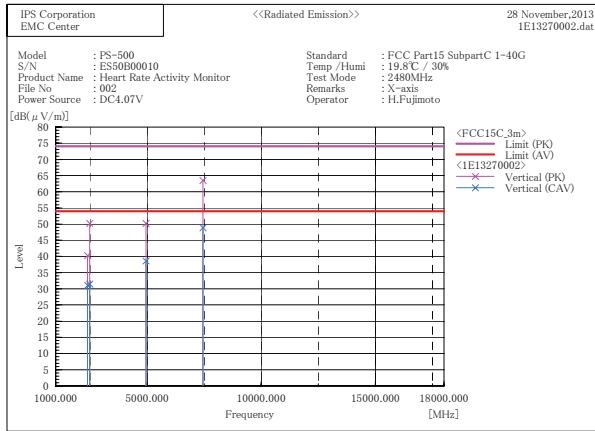
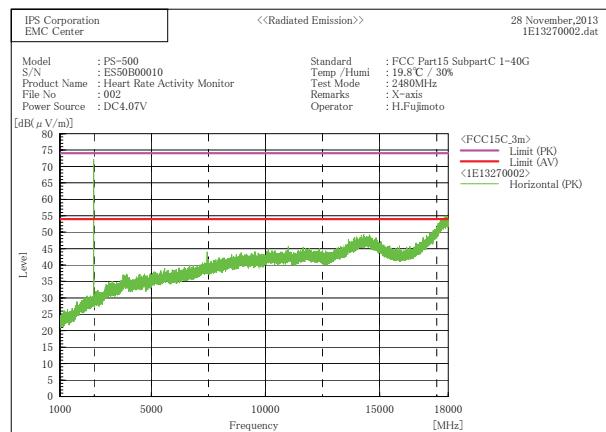
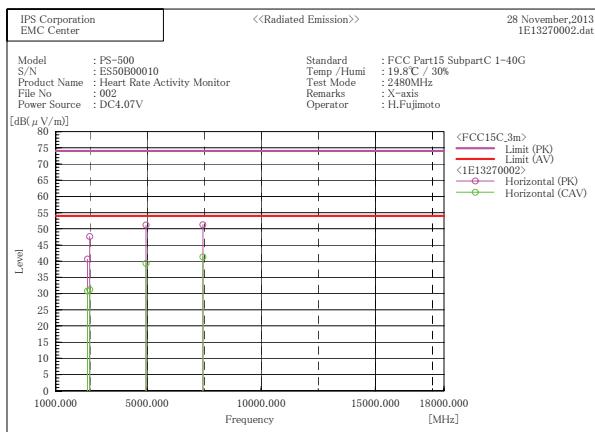
No.	Frequency [MHz]	Reading [dB(μV)]	c.f. [dB(1/m)]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]	Height [cm]	Angle [°]
1	2390.000	26.6	4.2	30.8	54.0	23.2	112.0	188.0
2	2483.500	26.8	4.4	31.2	54.0	22.8	112.0	188.0
3	4959.990	29.3	10.0	39.3	54.0	14.7	100.0	323.0
4	7440.005	25.6	15.7	41.3	54.0	12.7	100.0	18.5

### --- Vertical Polarization (PK)---

No.	Frequency [MHz]	Reading [dB(μV)]	c.f. [dB(1/m)]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]	Height [cm]	Angle [°]
1	2390.000	36.1	4.2	40.3	74.0	33.7	110.6	1.0
2	2483.500	45.8	4.4	50.2	74.0	23.8	110.6	1.0
3	4960.008	40.2	10.0	50.2	74.0	23.8	100.0	70.0
4	7439.900	47.8	15.7	63.5	74.0	10.5	156.7	130.0

### --- Vertical Polarization (CAV)---

No.	Frequency [MHz]	Reading [dB(μV)]	c.f. [dB(1/m)]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]	Height [cm]	Angle [°]
1	2390.000	26.9	4.2	31.1	54.0	22.9	110.6	1.0
2	2483.500	27.1	4.4	31.5	54.0	22.5	110.6	1.0
3	4960.008	28.6	10.0	38.6	54.0	15.4	100.0	70.0
4	7439.900	33.2	15.7	48.9	54.0	5.1	156.7	130.0



# Radiated Emission Test Data 1 GHz to 18 GHz

## For 2480 MHz (High) Axis; Y

\*\*\*\*\* IPS Corporation \*\*\*\*\*  
 <<Radiated Emission>> 28 November, 2013  
 1E13270003.dat

Standard : FCC Part15 SubpartC 1-40G  
 Model : PS-500  
 S/N : ES50B00010  
 Product Name : Heart Rate Activity Monitor  
 File No : 003  
 Power Source : DC4.07V  
 Temp /Humi : 19.8°C / 30%  
 Test Mode : 2480MHz  
 Remarks : Y-axis  
 Operator : H.Fujimoto  
 \*\*\*\*\*  
 Final Result

### --- Horizontal Polarization (PK)---

No.	Frequency [MHz]	Reading [dB(μV)]	c.f. [dB(1/m)]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]	Height [cm]	Angle [°]
1	2390.000	39.1	4.2	43.3	74.0	30.7	116.0	1.0
2	2483.500	47.5	4.4	51.9	74.0	22.1	116.0	1.0
3	4959.500	42.1	10.0	52.1	74.0	21.9	100.0	14.0
4	7440.080	47.9	15.7	63.6	74.0	10.4	115.0	155.0

### --- Horizontal Polarization (CAV)---

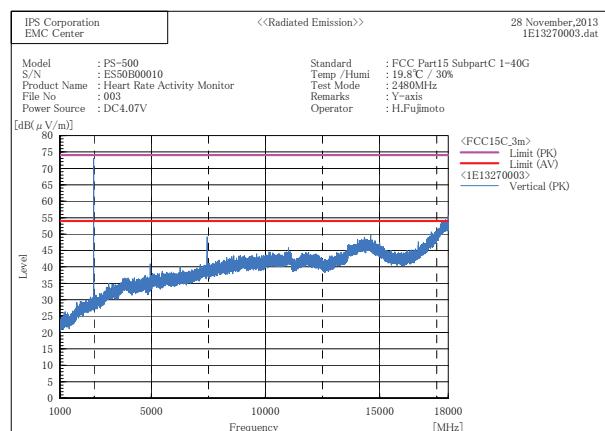
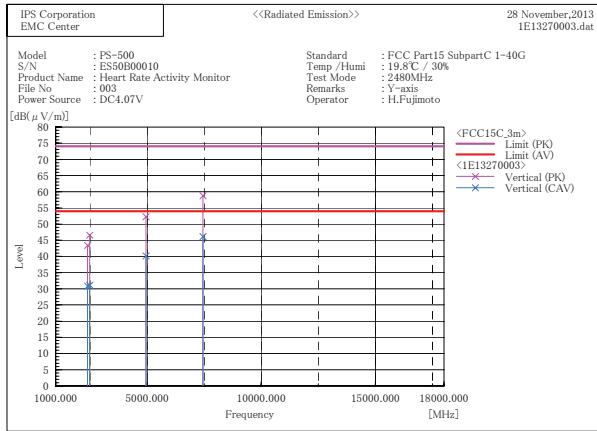
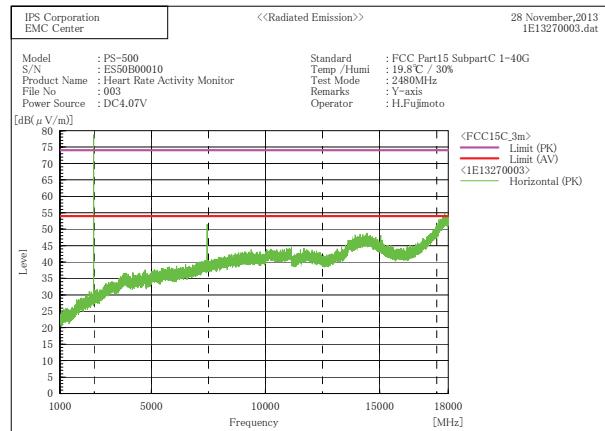
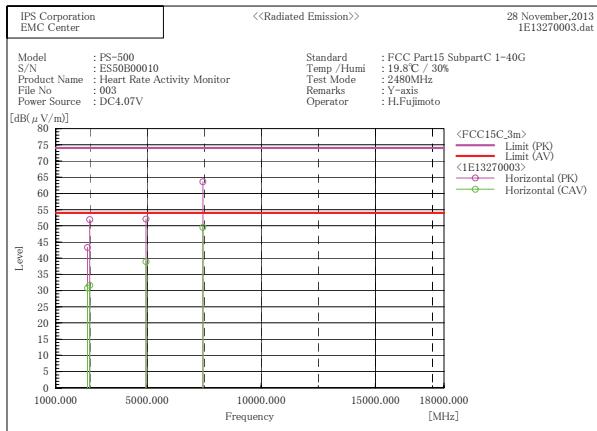
No.	Frequency [MHz]	Reading [dB(μV)]	c.f. [dB(1/m)]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]	Height [cm]	Angle [°]
1	2390.000	26.6	4.2	30.8	54.0	23.2	116.0	1.0
2	2483.500	27.2	4.4	31.6	54.0	22.4	116.0	1.0
3	4959.500	28.9	10.0	38.9	54.0	15.1	100.0	14.0
4	7440.080	33.8	15.7	49.5	54.0	4.5	115.0	155.0

### --- Vertical Polarization (PK)---

No.	Frequency [MHz]	Reading [dB(μV)]	c.f. [dB(1/m)]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]	Height [cm]	Angle [°]
1	2390.000	39.2	4.2	43.4	74.0	30.6	103.0	12.0
2	2483.500	42.2	4.4	46.6	74.0	27.4	103.0	12.0
3	4959.670	42.3	10.0	52.3	74.0	21.7	100.0	149.0
4	7440.800	43.1	15.7	58.8	74.0	15.2	106.1	29.0

### --- Vertical Polarization (CAV)---

No.	Frequency [MHz]	Reading [dB(μV)]	c.f. [dB(1/m)]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]	Height [cm]	Angle [°]
1	2390.000	26.6	4.2	30.8	54.0	23.2	103.0	12.0
2	2483.500	26.8	4.4	31.2	54.0	22.8	103.0	12.0
3	4959.670	30.2	10.0	40.2	54.0	13.8	100.0	149.0
4	7440.800	30.5	15.7	46.2	54.0	7.8	106.1	29.0



# Radiated Emission Test Data 1 GHz to 18 GHz

## For 2480 MHz (High) Axis; Z

\*\*\*\*\* IPS Corporation \*\*\*\*\*  
 <<Radiated Emission>> 28 November, 2013  
 1E13270004.dat

Standard : FCC Part15 SubpartC 1-40G  
 Model : PS-500  
 S/N : ES50B00010  
 Product Name : Heart Rate Activity Monitor  
 File No : 004  
 Power Source : DC4.07V  
 Temp /Humi : 19.8°C / 30%  
 Test Mode : 2480MHz  
 Remarks : Z-axis  
 Operator : H.Fujimoto  
 \*\*\*\*\*  
 Final Result

### --- Horizontal Polarization (PK)---

No.	Frequency [MHz]	Reading [dB(μV)]	c.f. [dB(1/m)]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]	Height [cm]	Angle [°]
1	2390.000	39.2	4.2	43.4	74.0	30.6	123.1	29.0
2	2483.500	45.6	4.4	50.0	74.0	24.0	130.1	29.0
3	4959.500	41.8	10.0	51.8	74.0	22.2	100.0	22.0
4	7439.250	45.6	15.7	61.3	74.0	12.7	100.0	215.0

### --- Horizontal Polarization (CAV)---

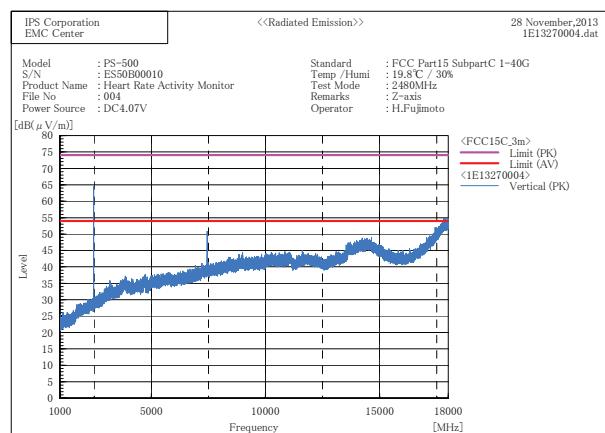
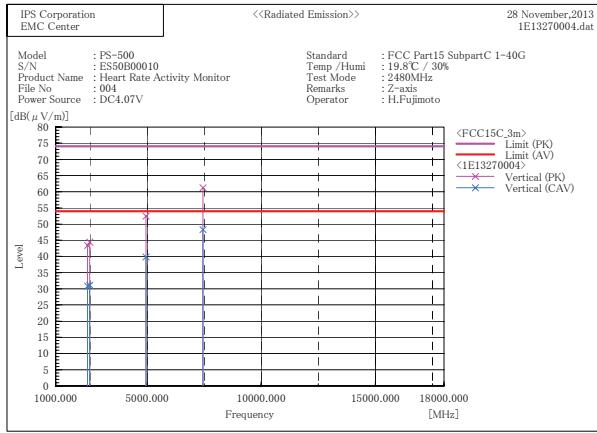
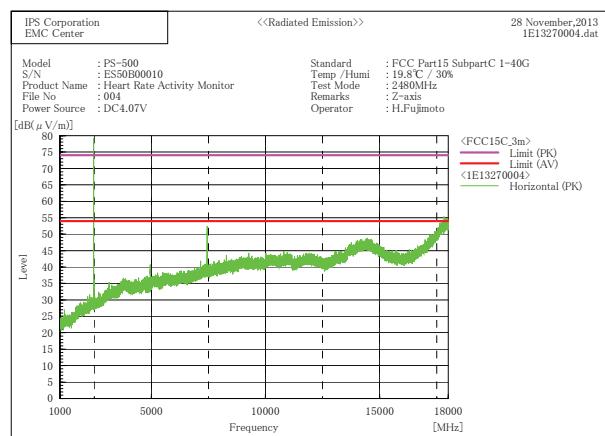
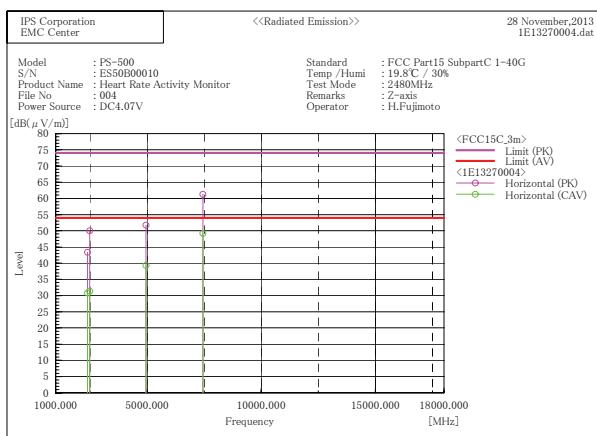
No.	Frequency [MHz]	Reading [dB(μV)]	c.f. [dB(1/m)]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]	Height [cm]	Angle [°]
1	2390.000	26.6	4.2	30.8	54.0	23.2	123.1	29.0
2	2483.500	27.0	4.4	31.4	54.0	22.6	130.1	29.0
3	4959.500	29.3	10.0	39.3	54.0	14.7	100.0	22.0
4	7439.250	33.5	15.7	49.2	54.0	4.8	100.0	215.0

### --- Vertical Polarization (PK)---

No.	Frequency [MHz]	Reading [dB(μV)]	c.f. [dB(1/m)]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]	Height [cm]	Angle [°]
1	2390.000	39.2	4.2	43.4	74.0	30.6	110.0	293.0
2	2483.500	40.0	4.4	44.4	74.0	29.6	110.0	293.0
3	4959.670	42.5	10.0	52.5	74.0	21.5	100.0	163.0
4	7440.050	45.6	15.7	61.3	74.0	12.7	100.0	196.0

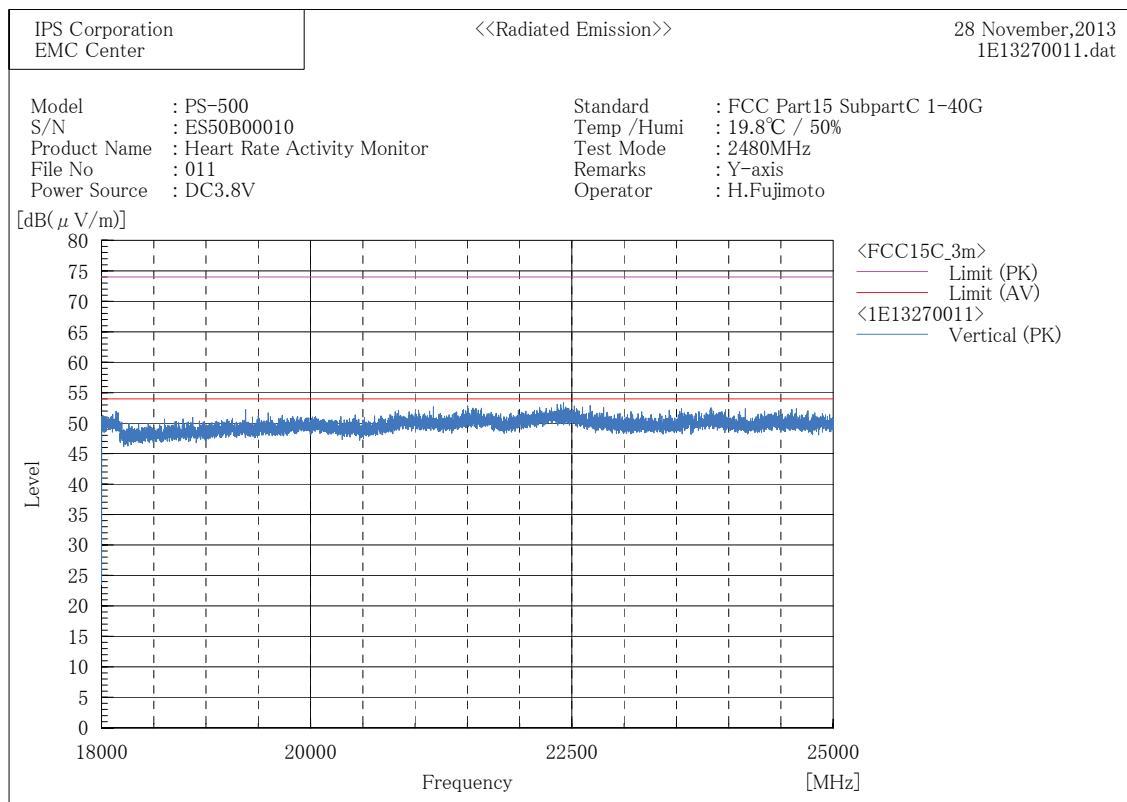
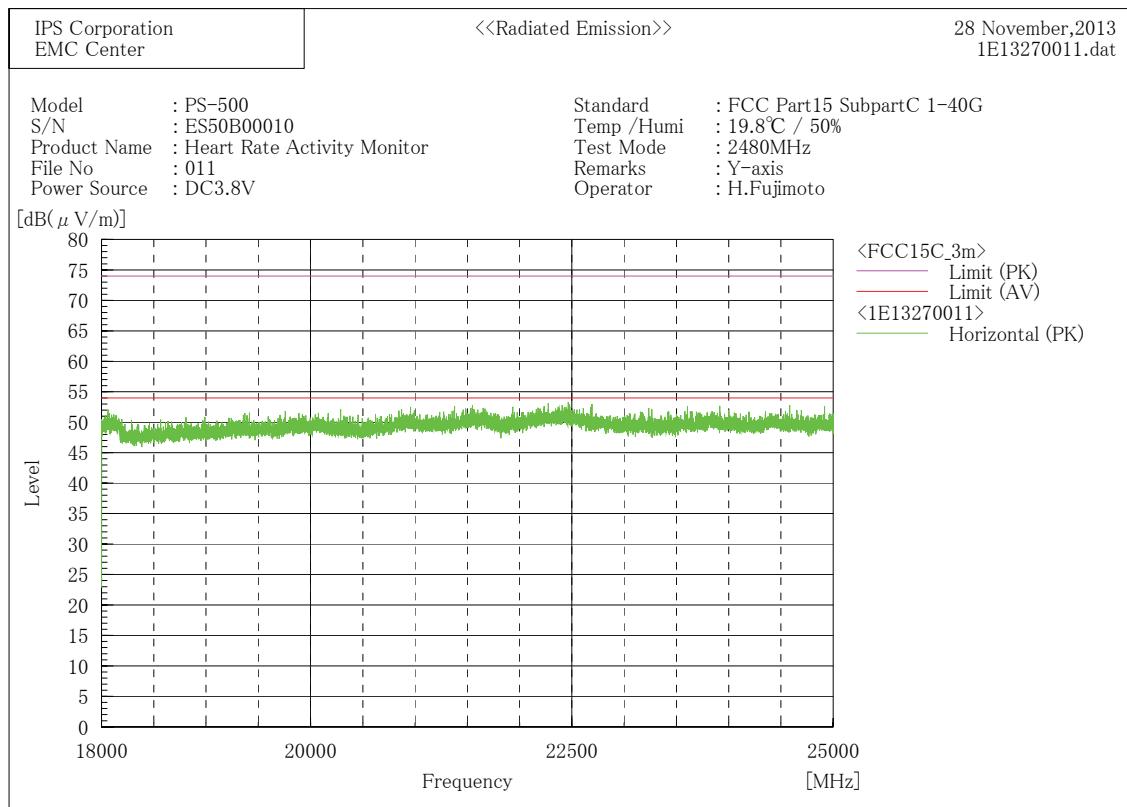
### --- Vertical Polarization (CAV)---

No.	Frequency [MHz]	Reading [dB(μV)]	c.f. [dB(1/m)]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]	Height [cm]	Angle [°]
1	2390.000	26.6	4.2	30.8	54.0	23.2	110.0	293.0
2	2483.500	26.8	4.4	31.2	54.0	22.8	110.0	293.0
3	4959.670	29.9	10.0	39.9	54.0	14.1	100.0	163.0
4	7440.050	32.6	15.7	48.3	54.0	5.7	100.0	196.0



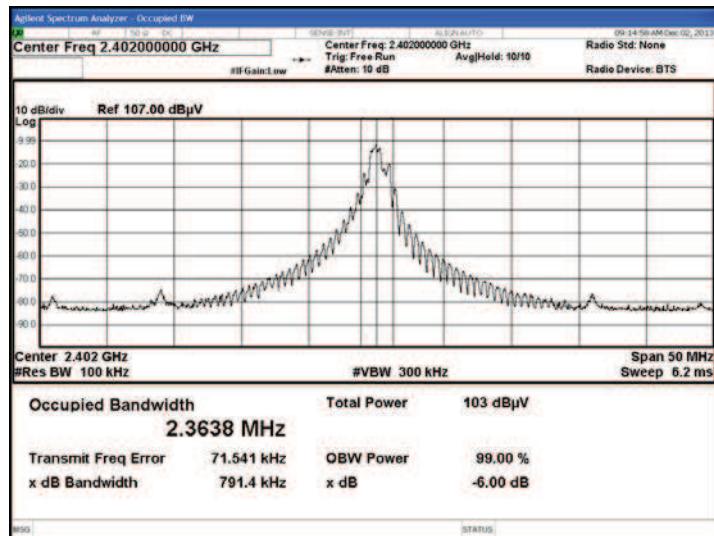
## Radiated Emission Test Data 18 GHz to 25 GHz

For 2480 MHz (High) Axis; Y

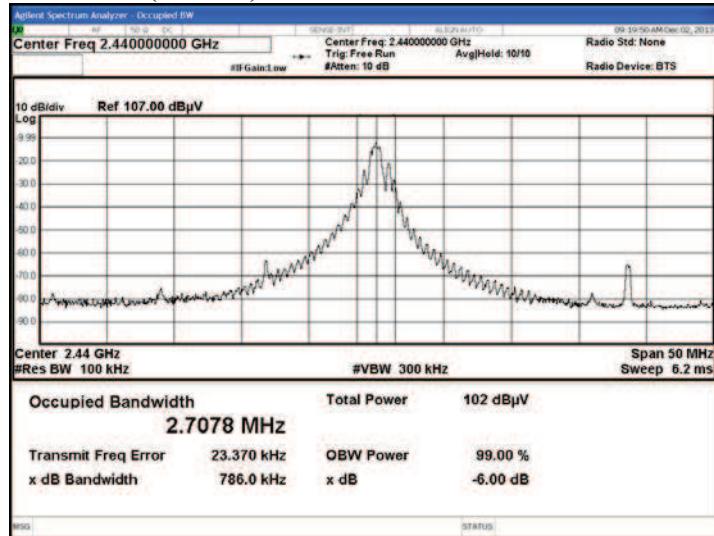


6 dB Bandwidth

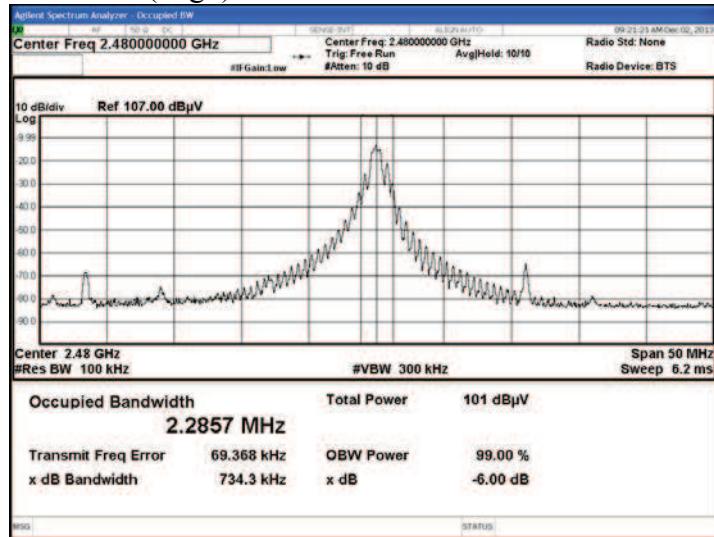
## 2402 MHz (Low)



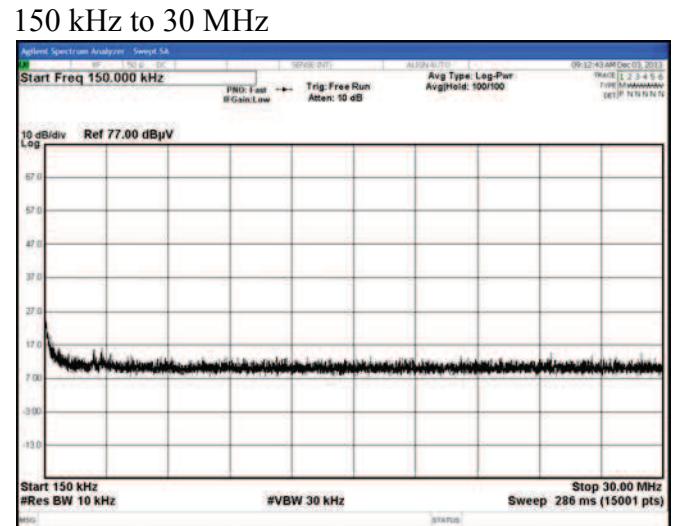
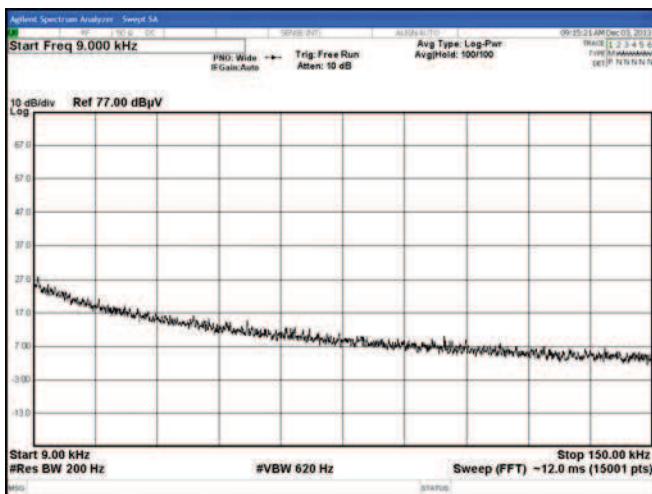
## 2440 MHz (Middle)



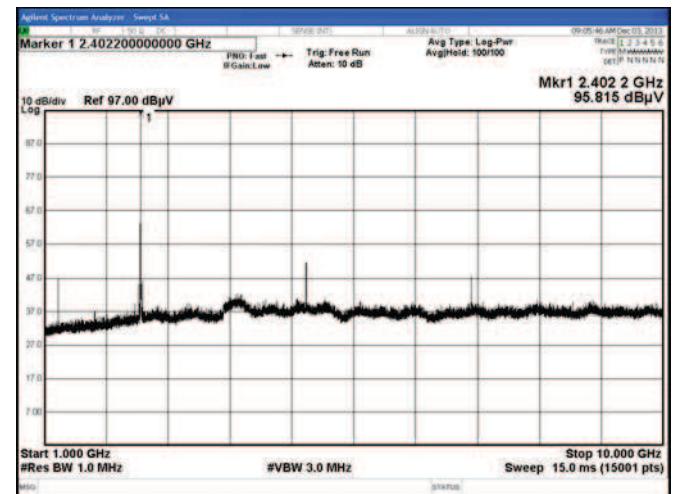
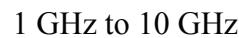
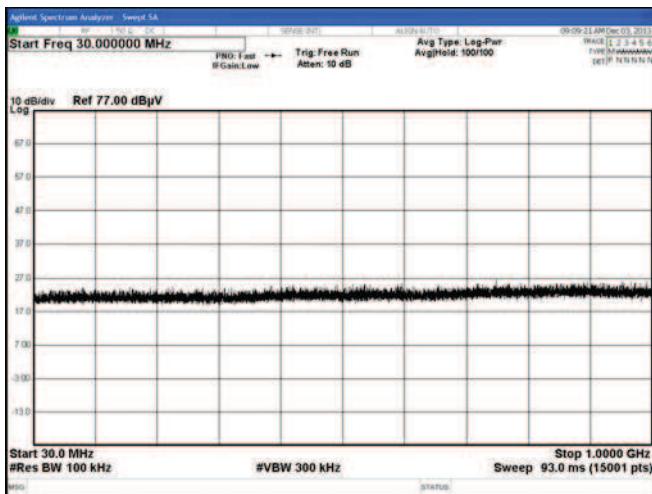
## 2480 MHz (High)



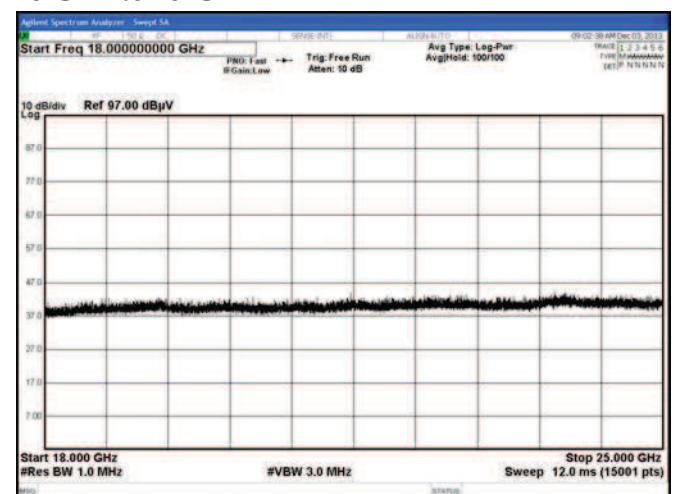
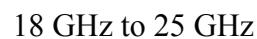
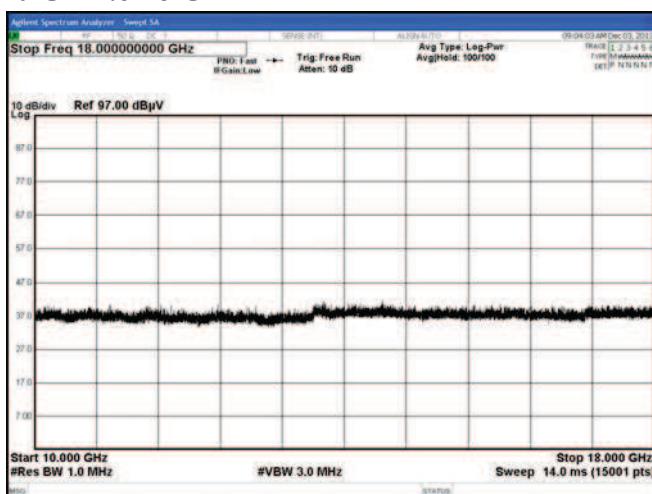
Conducted Spurious Emission Test  
2402 MHz (Low)  
9 kHz to 150 kHz



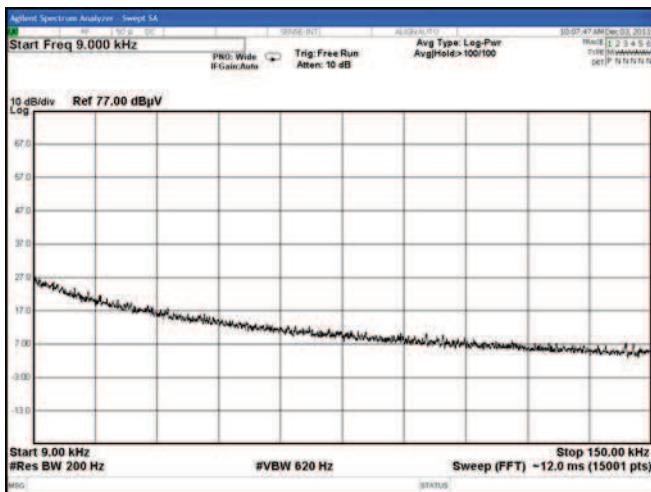
30 MHz to 1 GHz



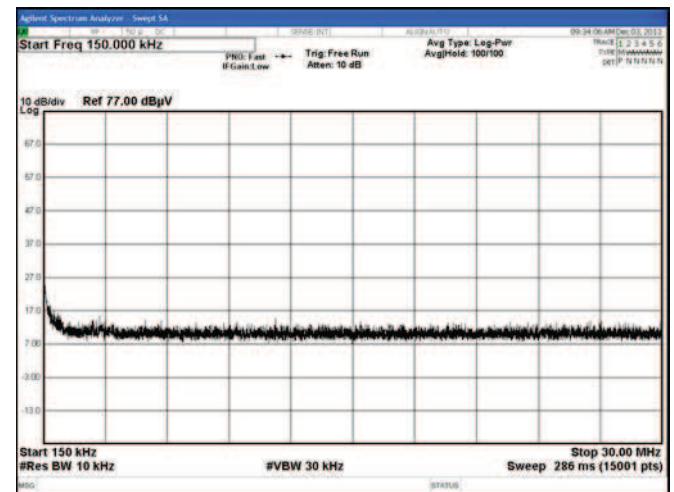
10 GHz to 18 GHz



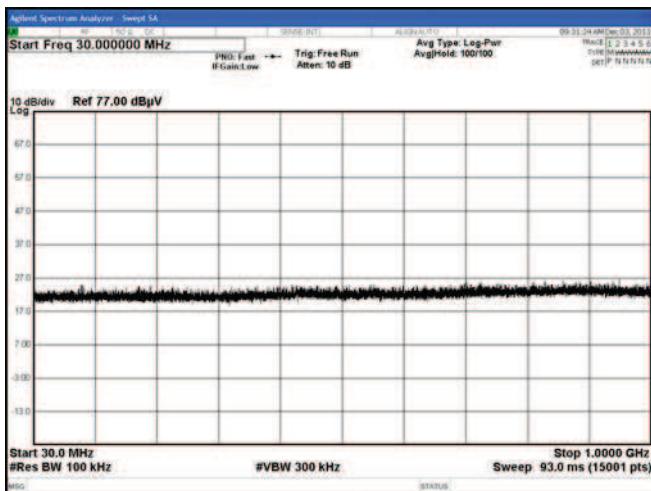
Conducted Spurious Emission Test  
2440 MHz (Middle)  
9 kHz to 150 kHz



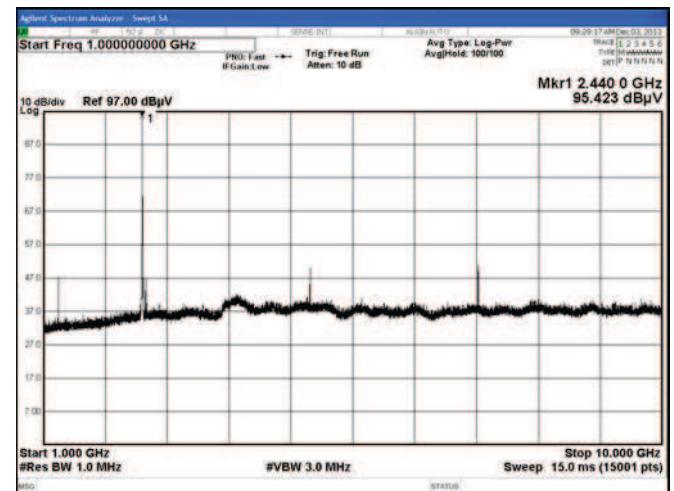
## 150 kHz to 30 MHz



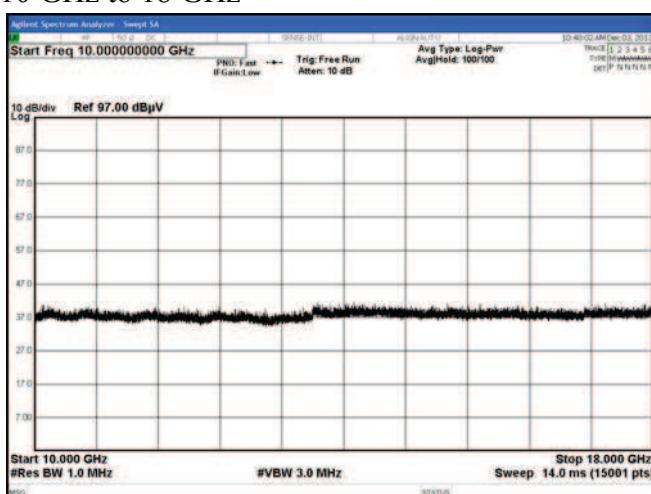
## 30 MHz to 1 GHz



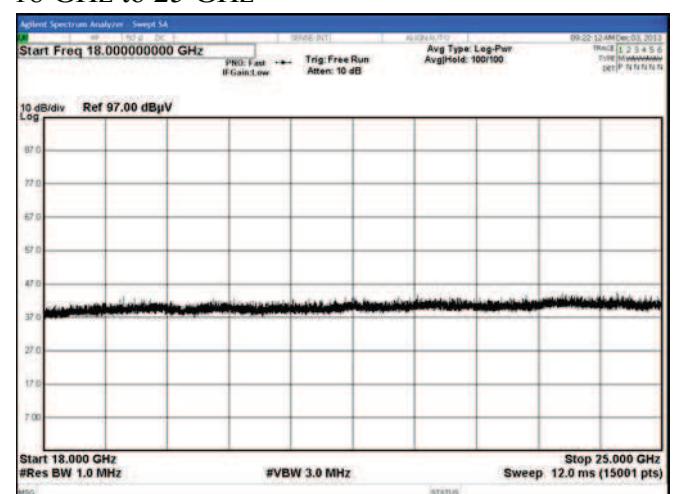
## 1 GHz to 10 GHz



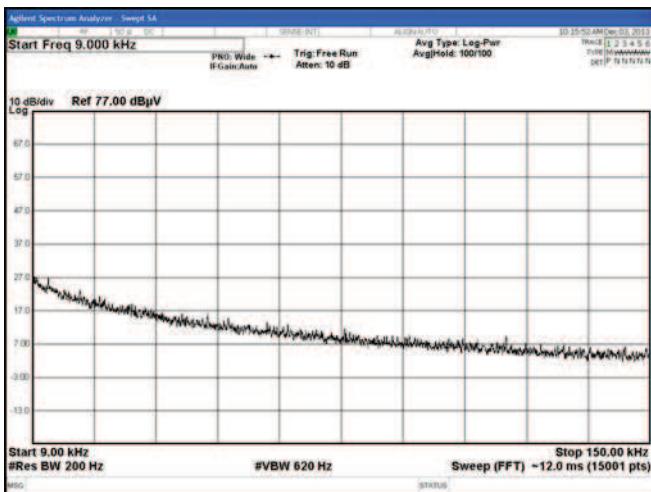
## 10 GHz to 18 GHz



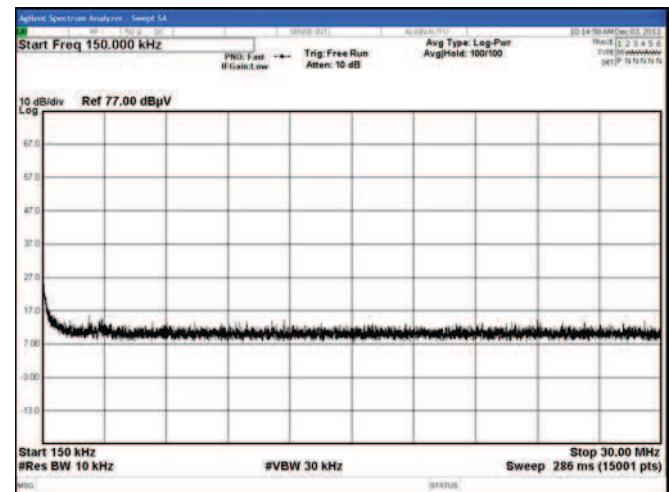
## 18 GHz to 25 GHz



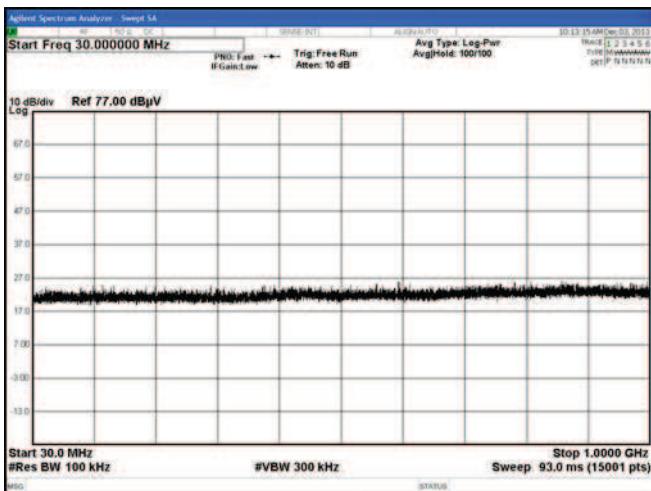
Conducted Spurious Emission Test  
2480 MHz (High)  
9 kHz to 150 kHz



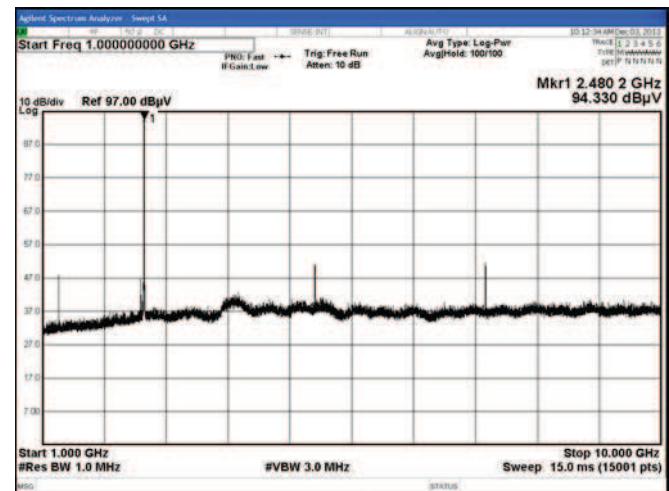
## 150 kHz to 30 MHz



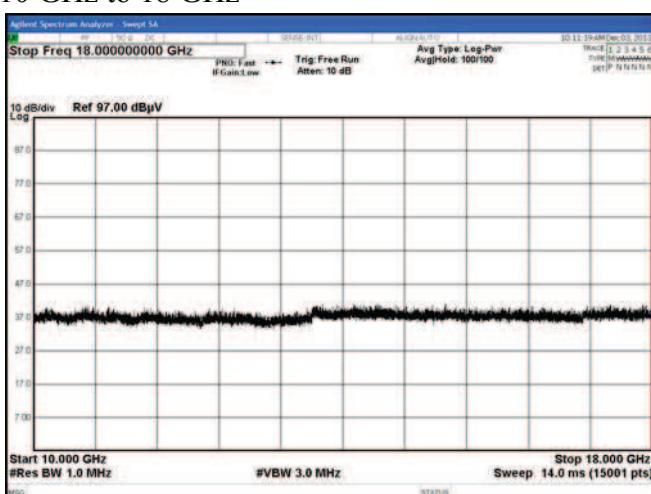
## 30 MHz to 1 GHz



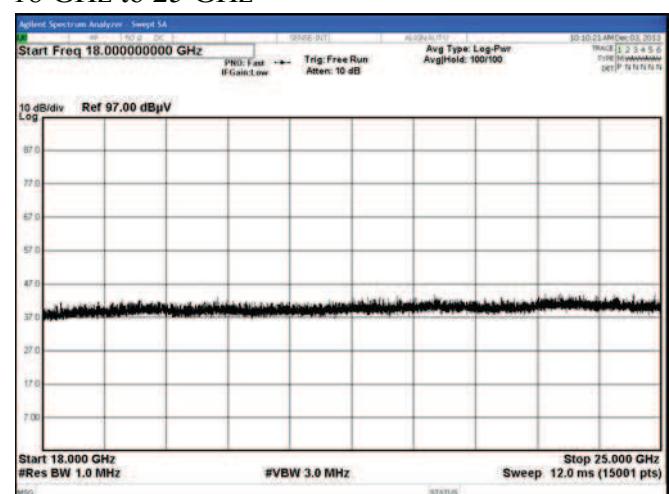
## 1 GHz to 10 GHz



## 10 GHz to 18 GHz

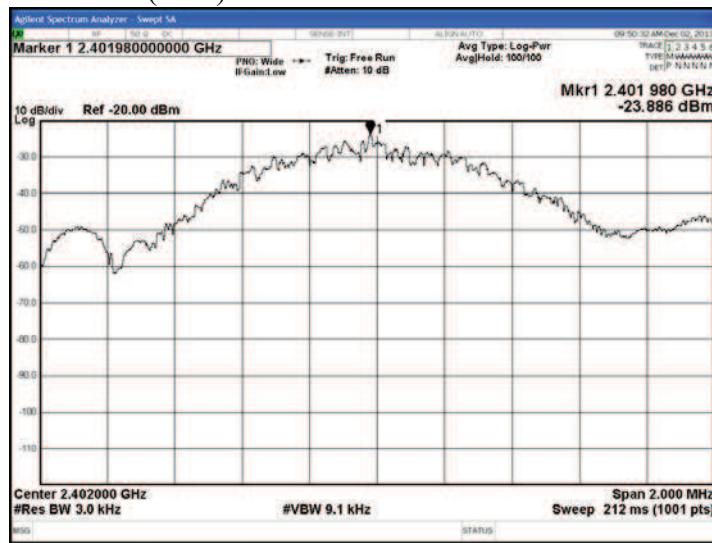


## 18 GHz to 25 GHz

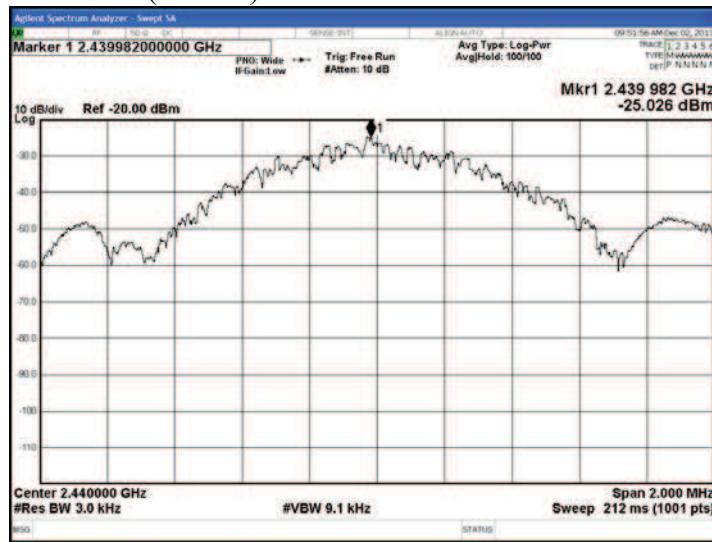


## Maximum Power Spectral Density

## 2402 MHz (Low)



## 2440 MHz (Middle)

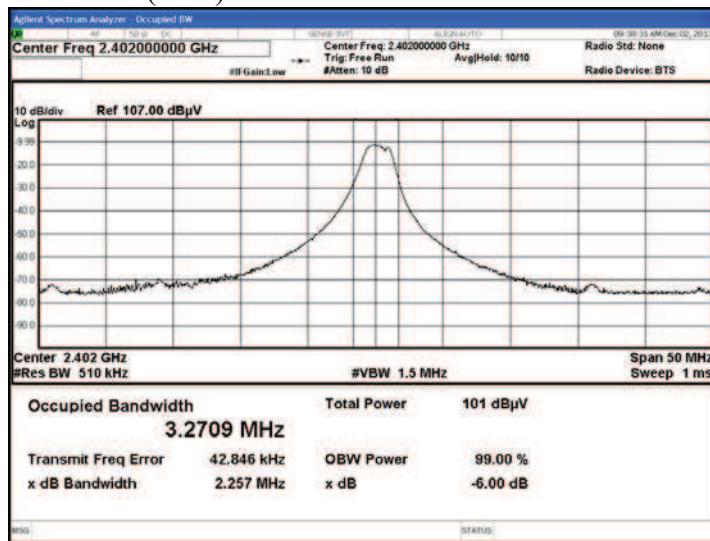


## 2480 MHz (High)

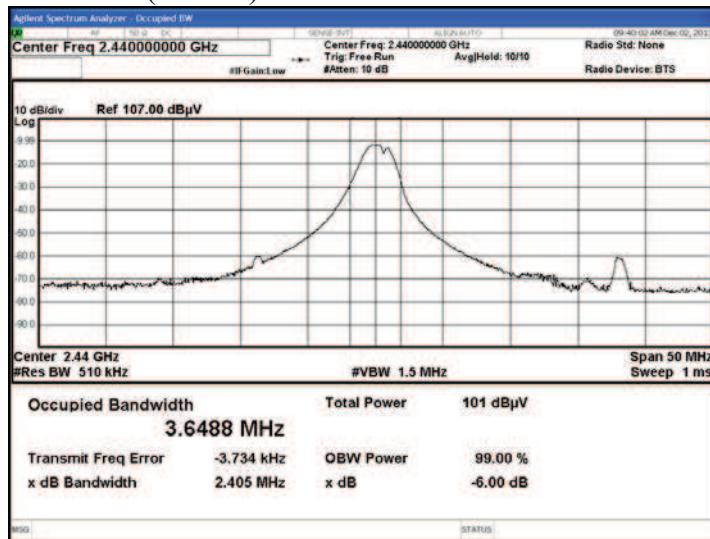


99 % Occupied Bandwidth

2402 MHz (Low)



2440 MHz (Middle)



2480 MHz (High)

