
**COMPLIANCE WORLDWIDE INC.
TEST REPORT 154-10**

In Accordance with the Requirements of
**Federal Communications Commission
CFR 47 Part 95, Subpart H**
Low Power Licensed Radio Communication Devices
Wireless Medical Telemetry Service Transceiver
In the bands 1395-1400 and 1427-1432 MHz

Issued to

**Philips Medical Systems
3000 Minuteman Drive
Andover, MA 01810
978-659-2800**

for

**TRx4841A 1.4 GHz Patient Worn Device
With Cost Reduced LP1 Radio Board, P/N 453564193531**

FCC ID: PQC-TRX4841A

Report Issued on March 12, 2010

Tested by



Brian F. Breault

Reviewed by



Larry K. Stillings

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1. Scope

This test report certifies that the Philips cost reduced LP1 radio board from RTX, P/N 453564193531, for the TRx4841A 1.4 GHz Patient Worn Device, using 1.9 GHz DECT technology, as tested, meets the Federal Communications Commission CFR 47, PART 95 requirement. The scope of this test report is limited to the test sample provided by the client, only in as much as that sample represents other production units. If any significant changes are made to the unit, the changes shall be evaluated and a retest may be required.

2. Product Details

- 2.1 Manufacturer: Philips Medical Systems
- 2.2 Model Number: TRx4841A (RTX 453564193531 Radio Module)
- 2.3 Serial Number: US94349615
- 2.4 Description of EUT: LP1 radio board from RTX for the IntelliVue Patient Worn Device (PWD)
- 2.5 Power Source: DC 3 volts – Two 1.5 VDC Alkaline AA Batteries
- 2.6 EMC Modifications: None

3. Product Configuration

3.1. Operational Characteristics & Software

The PWD provides a link from itself to the Access Point/Wireless Infrastructure and the Hospital LAN. The patient data is received by the IntelliVue Access Point and transmitted over the wireless LAN infrastructure to the IntelliVue Central Station. The performance of the PWD will be monitored on the Philips IntelliVue Information Center (PIIC) display, i.e. the Central Station. The system should maintain smooth scrolling patient waveforms and constant numeric readouts.

3.2. EUT Hardware

Blk Diag #	Manufactr	Model/Part # / Options	Serial Number	Input Voltage	Frq (Hz)	Description/Function
1	Philips	TRx4841A/862439/ABAAAMOSE02	US94349615	3 V	DC	Philips IntelliVue 1.4 GHz PWD-ECG/SpO2
	RTX	453564193531	N/A	N/A	N/A	RTX radio module-1.9 GHz DECT

3.3. EUT Hardware/Software/Firmware Revision Level

EUT Model#	PCA#	Description	HW	SW	FW
TRx4841A		1.4 GHz radio module			
TRx4841A		PWD		41G.37G	C.00.81

3. Product Configuration (continued)

3.4. EUT Cables/Transducers

Blk Diag Ltr	Manufacturer	Model/Part #	Length (m)	Shield Y/N	Description/Function
A	Philips	989803162941	1	Y	ECG single patient use leadset
B	Philips	M1191A	2	N	SpO2 patient transducer

3.5. Support Equipment

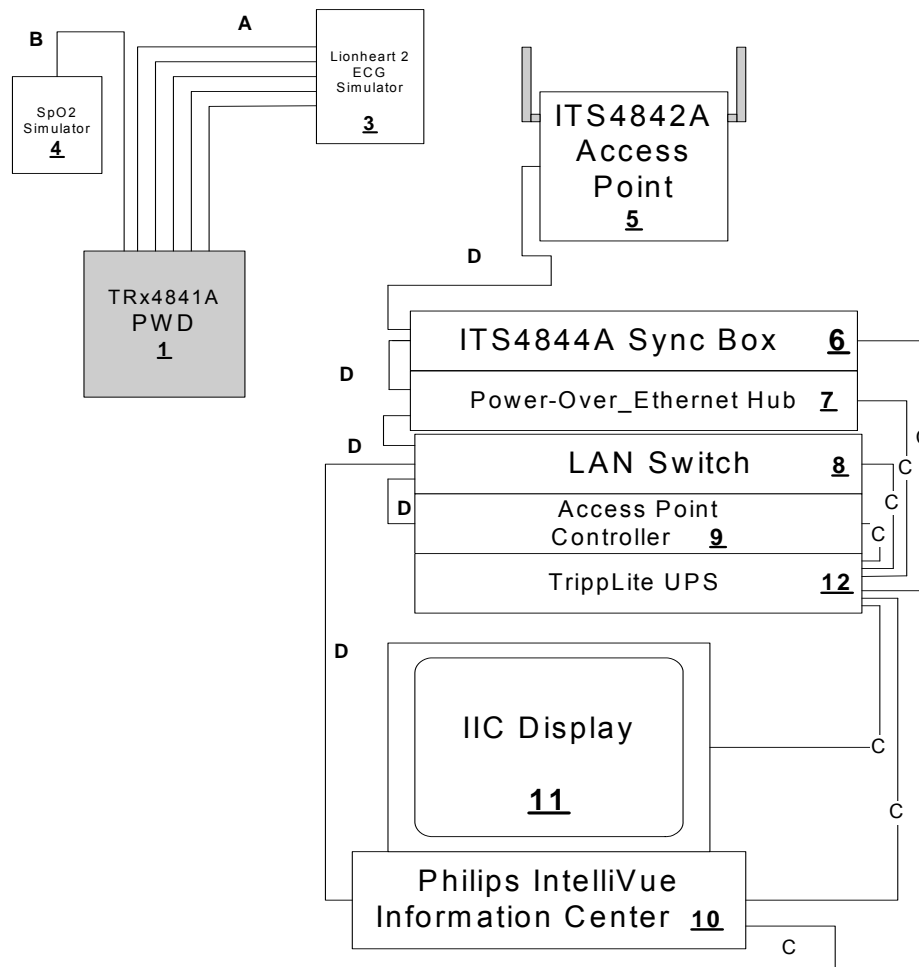
Blk Diag #	Manufactr	Model/Part # Options	Serial Number	Input Voltage	Input Frq.	Description/Function
3	Bio-Tek	Lionheart2	203833	9 VDC	DC	Multi-parameter patient simulator (Recal # 125354)
4	DNI	Oxitest7	DOS03100687	9 VDC	DC	SpO2 patient simulator (Recall #125864)
5	Philips	ITS4842A	US52400262	48	DC	1.4 GHz IntelliVue Core Access Point
6	Philips	ITS4844A/ 453563495101	USU42200058	100-240	50-60	Philips Telemetry II Synchronization Box
7	PowerDSine	Philips P/N- ITS4845A	Eng. Sample 1	100-240	50-60	Power-Over-Ethernet Hub- 6 port
8	Cisco	WS-C2950G-24	FOC0816X10J	100-240	50-60	24 port 10/100 Ethernet Switch
9	Proxim	756005G/ Philips PN ITS3171A	35200408	100-240	50-60	Access Point Controller
10	HP	HP PN- KB212UC#ABA Philips PN- 453564067761	2UA818128C	100-240	50-60	HP PC configured as a IntelliVue Information Center M3167-60002
11	HP	V7550	MY324WE270	100-240	50-60	Display for IntelliVue Information Center
12	Tripplite	SM5139	9338ALCSM15 13901271	100-120	60	Uninterruptible Power Supply

3.6. Support Equipment Cables/Transducers

Blk Diag Ltr	Manufactr	Model/Part #	Length (m)	Shield Y/N	Description/Function
C	Unknown	NA	2	N	AC Power cords, quantity 6
D	Unknown	NA	Various	N	CAT 5 UTP LAN cable

3. Product Configuration (continued)

3.7. Block Diagram



4. Measurements Parameters

4.1. Measurement Equipment Used to Perform Tests

Device	Manufacturer	Model No.	Serial No.	Cal Due
EMI Receiver	Hewlett Packard	8546A	MY4510449	10/28/2010
Spectrum Analyzer	Hewlett Packard	8593E	3330A00115	10/28/2010
Microwave Preamp	Hewlett Packard	8449B	3008A01323	9/22/2010
LISN	EMCO	3825/2	9109-1860	7/7/2010
Bilog Antenna	Com-Power	AC-220	25509	8/6/2010
Horn Antenna	Electro-Metrics	EM-6961	6337	7/22/2010

4. Measurements Parameters

4.2. Measurement & Equipment Setup

Test Date:	Feb 22, 2010 to March 8, 2010
Test Engineer:	Brian Breault
Normal Site Temperature (15 - 35°C):	21.7
Relative Humidity (20 -75%RH):	33%
Frequency Range:	30 MHz to 15 GHz
Measurement Distance:	3 Meters
EMI Receiver IF Bandwidth:	120 kHz - 30 MHz to 1 GHz 1 MHz - Above 1 GHz
EMI Receiver Avg Bandwidth:	300 kHz - 30 MHz to 1 GHz 3 MHz - Above 1 GHz
Detector Function:	Peak, QP - 30 MHz to 1 GHz Peak, Avg - Above 1 GHz Unless otherwise specified.

4.3. Measurement Procedure

All references to CFR 47 PART 95, Subpart H - Wireless Medical Telemetry Service (WMTS) - refer to the 2009 edition.

The test methods used to generate the data in this test report is in accordance with ANSI C63.4: 2003, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz

In accordance with ANSI C63.4-2003, section 13.1.4.1, c), the device under test was rotated through three orthogonal axes to determine which attitude produced the highest emission relative to the limit. The attitude that produced the highest emission relative to the limit was used for all radiated emission measurements.

4.4. Measurement Uncertainty

The following uncertainties are expressed for an expansion/coverage factor of K=2.

RF Frequency	$\pm 1 \times 10^{-8}$
Radiated Emission of Transmitter	± 4.55 dB
Radiated Emission of Receiver	± 4.55 dB
Temperature	$\pm 0.91^{\circ}$ C
Humidity	$\pm 5\%$

5. Choice of Equipment for Test Suits

5.1 Choice of Model

This test report is based on the test samples supplied by the manufacturer and are reported by the manufacturer to be equivalent to the production units.

5.2 Presentation

This test sample was tested complete with all required ancillary equipment. Refer to Section 3 of this report for product equipment configuration.

5.3 Choice of Operating Frequencies

The TRx4841A 1.4 GHz Patient Worn Device operates on a total of 6 channels:

WMTS Channel Frequencies in the Band 1395 to 1400MHz		
Channel 1	1395.9MHz	Primary WMTS Channel
Channel 2	1397.5MHz	Primary WMTS Channel
Channel 3	1399.1MHz	Primary WMTS Channel
WMTS Channel Frequencies in the Band 1427 to 1432MHz		
Channel 4	1427.9MHz	Primary WMTS Channel
Channel 5	1429.5MHz	Secondary Channel, only available if not in use
Channel 6	1431.1MHz	Secondary Channel, only available if not in use

The choice of operating frequencies selected for the testing outlined in this report was based on the lowest and highest operating frequencies in each of the two bands utilized by the device under test. The frequencies selected were 1395.9 MHz, 1399.1 MHz, 1427.9 MHz and 1431.1 MHz.

6. Measurement Summary

Transmitter Test Requirement	FCC Requirement	Test Report Section	Result	Comment
Product Labeling	95.1109(b)	N/A	N/A	See exhibits FCC label sample and label location.
Specific Frequencies or Frequency Range(s) Used	95.1111(a)(1)	5.3	Compliant	
Modulation Scheme & Occupied Bandwidth	95.1111(a)(2)	7.1	Compliant	
Radiated Field Strength of Fundamental	95.1115(a)(2)	7.2	Compliant	
Radiated Field Strength of Harmonics	95.1115(b)(2)	7.3	Compliant	
Band Edge Measurements	95.1115(b)(2)	7.4	Compliant	
Spurious Radiated Emissions	95.1115(b)(2)	7.5	Compliant	
Emission Type	95.1115(c)	N/A	N/A	Transmits Data and ECG Waveforms
Channel Use	95.1115(d)	5.3	N/A	Reference Part 2.106 (2)(1) 1427-1432 MHz: Medical Operations Band
Frequency Stability	95.1115(e)	7.6	Compliant	
Conducted Emissions	N/A	N/A	N/A	Battery Operated Device
RF Safety	95.1125	7.7	Compliant	
Determination of Average Factor	N/A	N/A	N/A	

7. Measurement Data (continued)

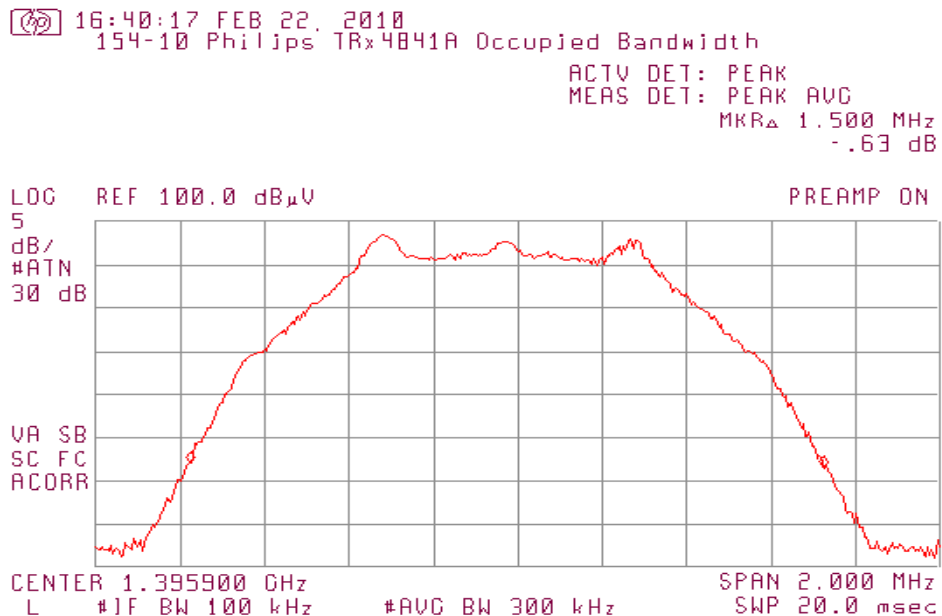
7.1. Occupied Bandwidth

Requirement: Subpart H, Section 95.1111: Frequency coordination requires the occupied bandwidth to be disclosed.

The modulation scheme used by the TRx4841A 1.4 GHz Patient Worn Device is GFSK. This information is supplied by the manufacturer. The occupied bandwidths of the measured emissions are detailed in the following tables and screen captures.

Channel	Freq (MHz)	Occupied Bandwidth (MHz)	Channel	Freq (MHz)	Occupied Bandwidth (MHz)
1	1395.9	1.500	4	1427.9	1.480
3	1399.1	1.495	6	1431.1	1.490

7.1.1. Channel 1, 1395.9 MHz

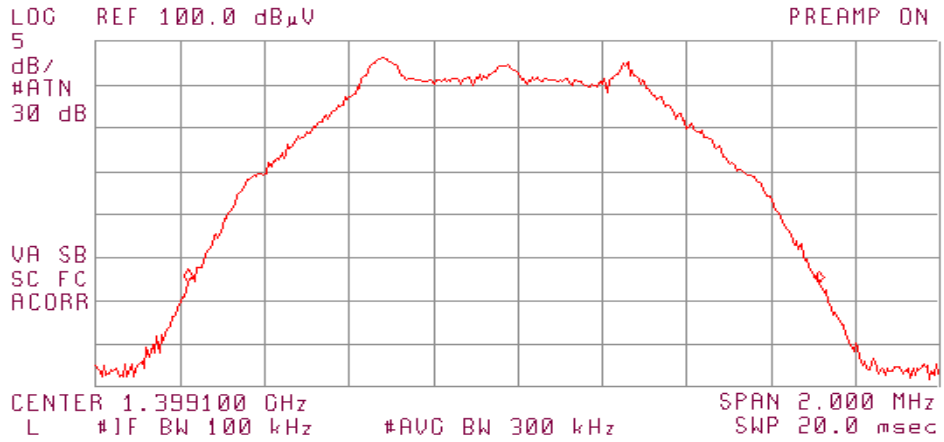


7. Measurement Data (continued)

7.1. Occupied Bandwidth

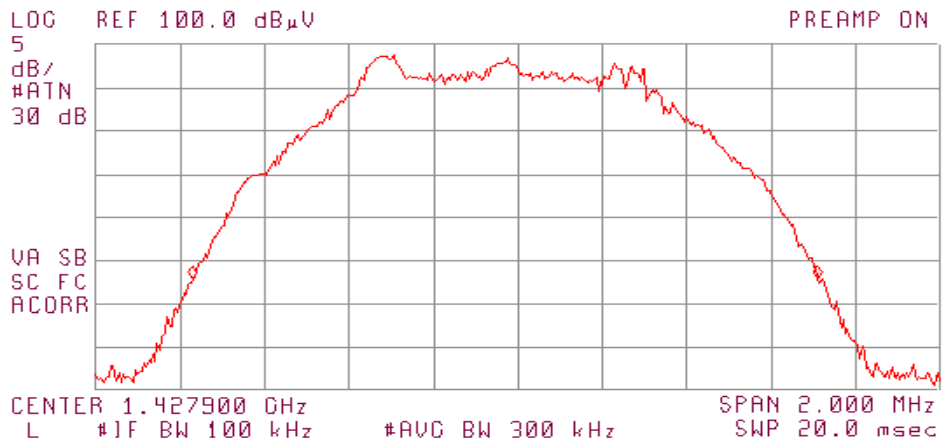
7.1.2. Channel 3, 1399.1 MHz

16:48:15 FEB 22, 2010
154-10 Philips TRx4841A Occupied Bandwidth
ACTV DET: PEAK
MEAS DET: PEAK AVG
MKRΔ 1.495 MHz
-.19 dB



7.1.3. Channel 4, 1427.9 MHz

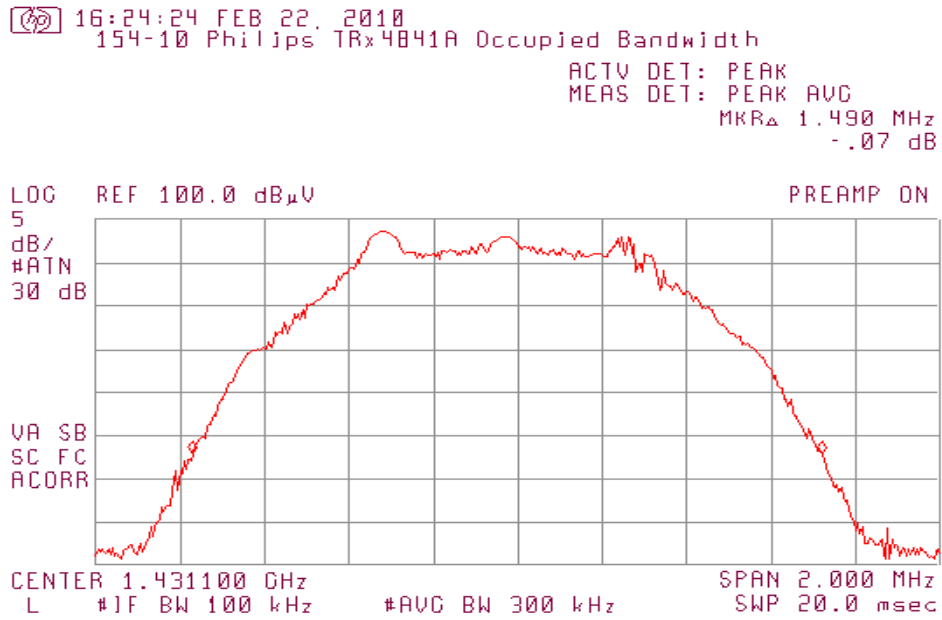
16:29:35 FEB 22, 2010
154-10 Philips TRx4841A Occupied Bandwidth
ACTV DET: PEAK
MEAS DET: PEAK AVG
MKRΔ 1.480 MHz
-.04 dB



7. Measurement Data (continued)

7.1. Occupied Bandwidth

7.1.4. Channel 6, 1431.1 MHz



7.2. Radiated Field Strength of Fundamental (95.115(a)(2))

Requirement: In the 1395–1400 MHz and 1427–1429.5 MHz bands, the maximum allowable field strength is 740 mV/m (117.4 dBμV/m), as measured at a distance of 3 meters, using measuring equipment with an averaging detector and a 1 MHz measurement bandwidth.

Channel	Freq (MHz)	Peak Field Strength (dBμV/m)	Avg Field Strength (dBμV/m)	Avg Limit (dBμV/m)	Avg Margin (dB)
1	1395.9	99.5	63.9	117.4	-53.5
3	1399.1	99.3	63.5	117.4	-53.9
4	1427.9	99.3	63.3	117.4	-54.1
6	1431.1	99.6	63.5	117.4	-53.9

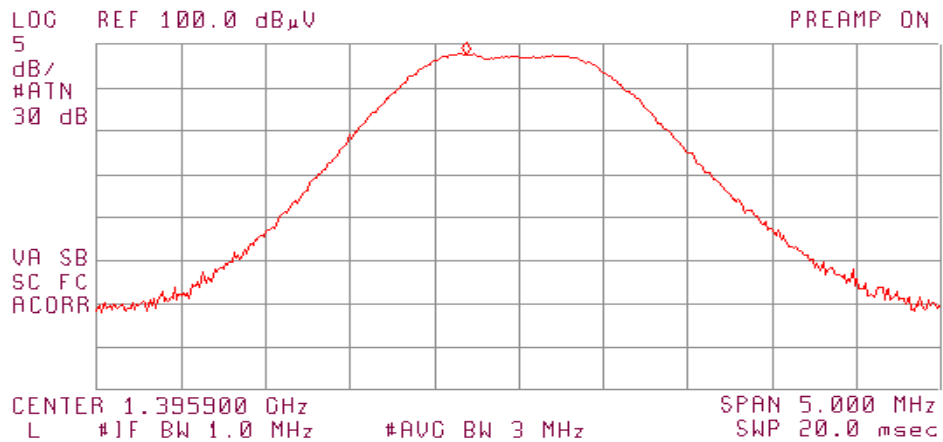
7. Measurement Data (continued)

7.2. Radiated Field Strength of Fundamental (95.115(a)(2)) (continued)

7.2.1. Channel 1, 1395.9 MHz

15:51:39 FEB 22, 2010
154-10 Philips TRx4041A Field Strength - Vertical

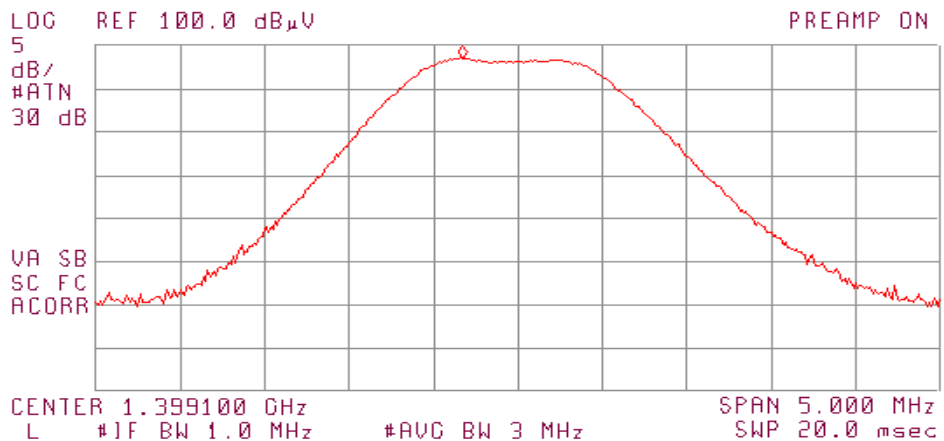
FREQ 1.396 GHz
PEAK 99.5 dB μ V
QP NOT SELECTED
AVG 63.9 dB μ V



7.2.2. Channel 3 1399.1 MHz

15:49:09 FEB 22, 2010
154-10 Philips TRx4041A Field Strength - Vertical

FREQ 1.399 GHz
PEAK 99.3 dB μ V
QP NOT SELECTED
AVG 63.5 dB μ V



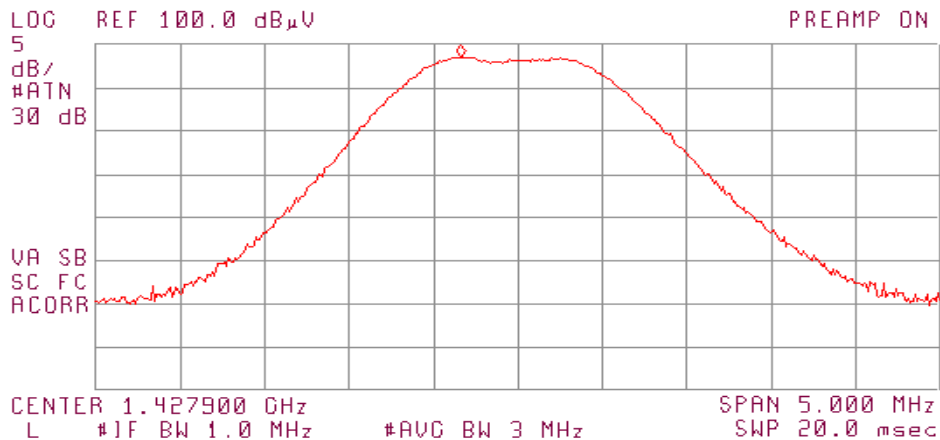
7. Measurement Data (continued)

7.2. Radiated Field Strength of Fundamental (95.115(a)(2)) (continued)

7.2.3. Channel 4, 1427.9 MHz

16:01:58 FEB 22, 2010
154-10 Philips TRx4841A Field Strength - Vertical

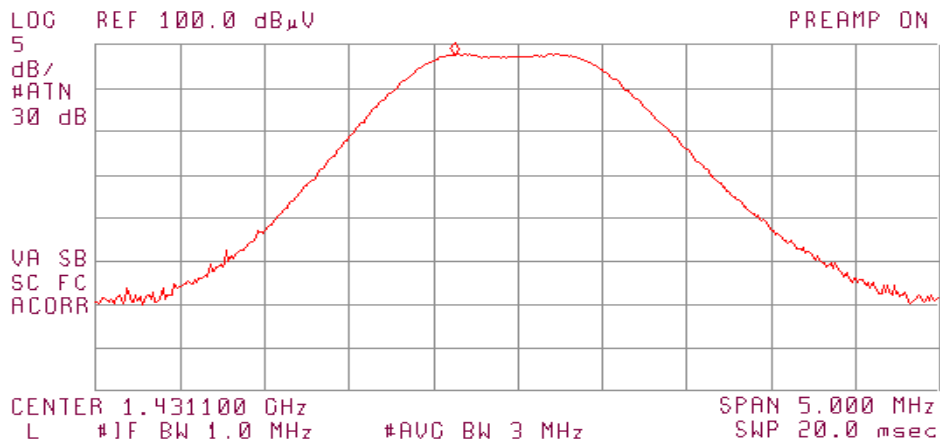
FREQ 1.428 GHz
PEAK 99.3 dB μ V
QP NOT SELECTED
AVG 63.3 dB μ V



7.2.4. Channel 6, 1431.1 MHz

16:17:35 FEB 22, 2010
154-10 Philips TRx4841A Field Strength - Vertical

FREQ 1.431 GHz
PEAK 99.6 dB μ V
QP NOT SELECTED
AVG 63.5 dB μ V



7. Measurement Data (continued)

7.3. Radiated Field Strength of Harmonics

Frequency (MHz)	Amplitude (dB μ V)		Corr. Fact. (dB)	Amplitude (dB μ V/m)		Avg Limit	Margin (dB)	Ant Pol	Ant Ht	TT Pos	Result
	Peak	Avg		Peak	Avg			H/V	cm	Deg	
2791.800	51.48	34.89	-3.47	48.01	31.42	54.00	-22.58	V	105	268	Compliant
2798.200	57.81	34.74	-3.49	54.32	31.25	54.00	-22.75	V	105	180	Compliant
2855.800	49.62	35.09	-3.52	46.10	31.57	54.00	-22.43	V	100	180	Compliant
2862.200	48.35	35.23	-3.45	44.90	31.78	54.00	-22.22	H	100	180	Compliant
4187.700	47.03	33.12	0.09	47.12	33.21	54.00	-20.79	H	104	192	Compliant
4197.300	46.65	32.20	0.08	46.73	32.28	54.00	-21.72	H	102	180	Compliant
4283.700	45.76	32.28	0.14	45.90	32.42	54.00	-21.58	V	100	180	Compliant
4293.300	45.94	35.20	0.12	46.06	35.32	54.00	-18.68	V	100	182	Compliant
8375.400	48.09	34.46	5.44	53.53	39.90	54.00	-14.10	H	100	184	Compliant
8394.600	47.77	34.33	5.44	53.21	39.77	54.00	-14.23	H	102	180	Compliant
11167.200	48.13	34.44	8.96	57.09	43.40	54.00	-10.60	H	100	180	Compliant
11192.800	48.01	34.55	8.94	56.95	43.49	54.00	-10.51	V	105	180	Compliant
11423.200	48.67	34.14	9.07	57.74	43.21	54.00	-10.79	H	102	180	Compliant
11448.800	48.66	34.22	9.07	57.73	43.29	54.00	-10.71	H	102	180	Compliant
12563.100	46.80	34.81	10.71	57.51	45.52	54.00	-8.48	H	100	180	Compliant
12591.900	47.67	33.64	10.84	58.51	44.48	54.00	-9.52	V	105	180	Compliant

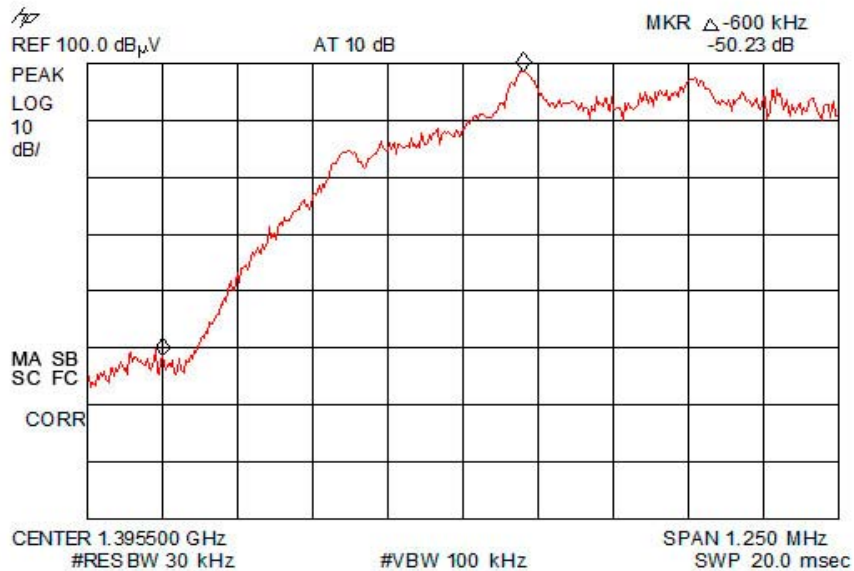
7. Measurement Data (continued)

7.4. Band Edge

Requirement: The band edge measurements were made in accordance with FCC Publication Number 913591: Measurement of Radiated Emissions at the Edge of the Band for a Part 15 RF Device.

Channel	Signal Peak			Band Edge		
	Freq (MHz)	Peak Amp (dBµV/m)	Avg Amp (dBµV/m)	Freq (MHz)	Delta Value (dB)	Avg Amp (dBµV/m)
1	1395.9	99.5	63.9	1395	-50.23	13.67
3	1399.1	99.3	63.5	1400	-50.40	13.10
4	1427.9	99.3	63.3	1427	-51.35	11.95
6	1431.1	99.6	63.5	1432	-39.14	24.36

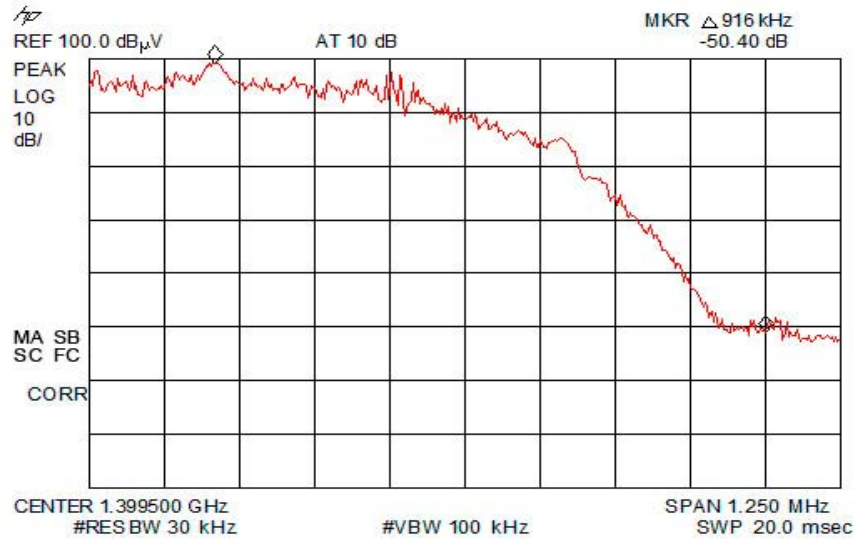
7.4.1. Channel 1, 1395.9 MHz



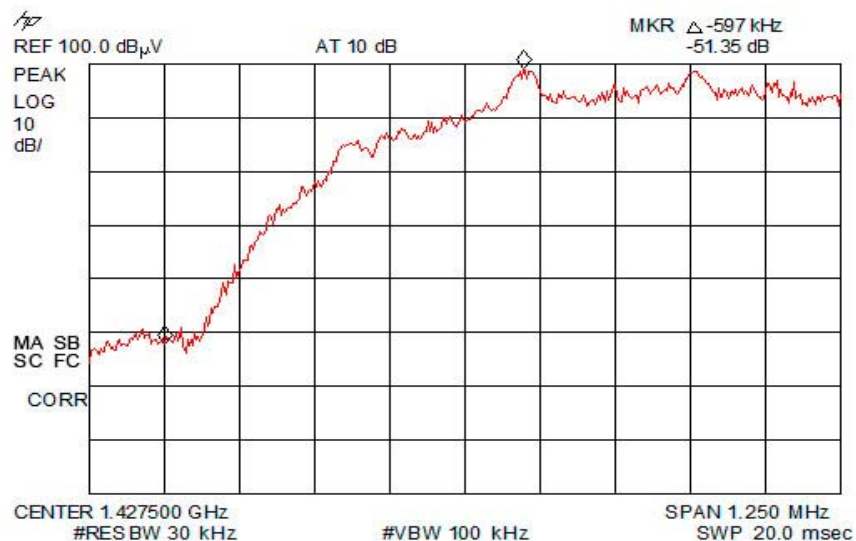
7. Measurement Data (continued)

7.4. Band Edge (continued)

7.4.2. Channel 3, 1399.1 MHz



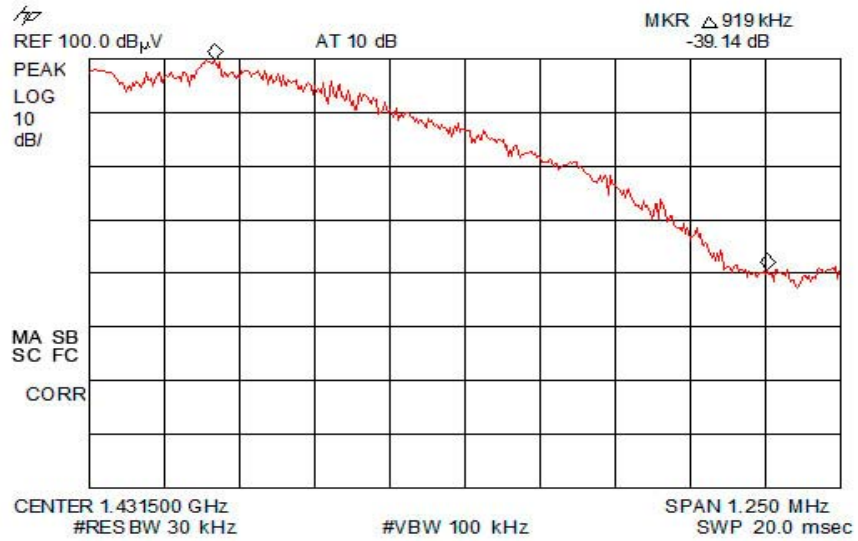
7.4.3. Channel 4, 1427.9 MHz



7. Measurement Data (continued)

7.4. Band Edge (continued)

7.4.4. Channel 6, 1431.1 MHz



7. Measurement Data (continued)**7.5. Spurious Radiated Emissions**

7.5.1. Regulatory Limit: FCC Part 15, Class B, Quasi-Peak

Frequency Range (MHz)	Distance (Meters)	Limit (dB μ V/m)
30 to 88	3	40.0
88 to 216	3	43.5
216 to 960	3	46.0
960 to 1000	3	54.0

7.5.2. Test Procedure

Test measurements were made in accordance with ANSI C63.4-2003, Standard Methods of Measurement of Radio Noise Emissions from Low-Voltage Electrical and Electronics Equipment in the Range of 9 kHz to 40 GHz.

7.5.3. Note: Radiated Emissions > 1 GHz

There were no measurable emissions above 1 GHz other than the harmonic emissions outlined in Section 7.3.

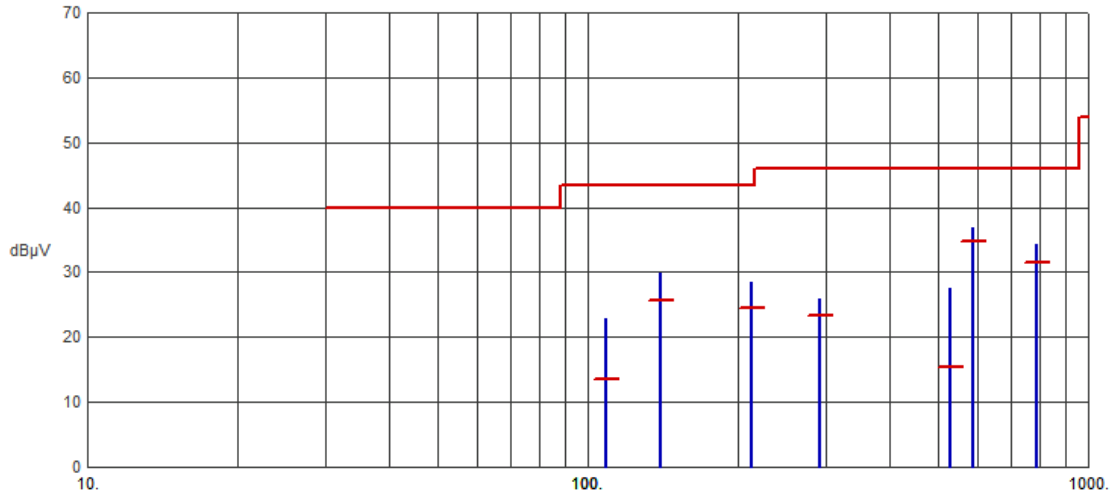
7. Measurement Data (continued)

7.5. Spurious Radiated Emissions (continued)

7.5.4. Horizontal Polarity

Test No.: 154-10, Radiated Emissions - Horizontal Polarity

FCC, Class B



Frequency (MHz)	Pk Amp (dBµV/m)	QP Amp (dBµV/m)	QP Limit (dBµV/m)	Margin (dB)	Ant Ht (cm)	Table (Deg)	Comments
109.0191	22.87	13.61	43.50	-29.89	N/A	N/A	
139.6459	29.82	25.64	43.50	-17.86	N/A	N/A	
211.9709	28.55	24.54	43.50	-18.96	N/A	N/A	
291.8227	25.90	23.23	46.00	-22.77	N/A	N/A	
529.9344	27.43	15.50	46.00	-30.50	N/A	N/A	
589.8249	36.96	34.79	46.00	-11.21	N/A	N/A	
786.4329	34.19	31.47	46.00	-14.53	N/A	N/A	

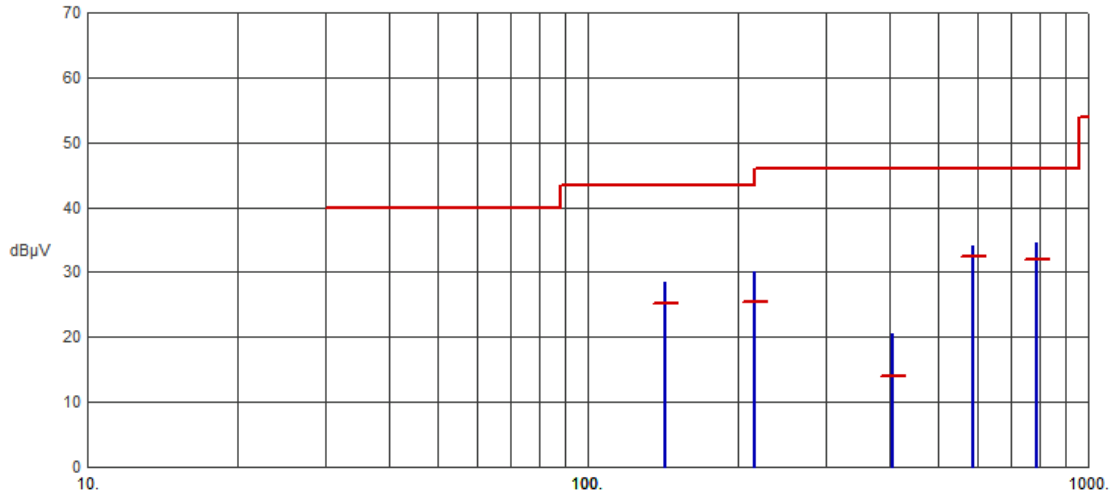
7. Measurement Data (continued)

7.5. Spurious Radiated Emissions (continued)

7.5.5. Vertical Polarity

Test No.: 154-10, Radiated Emissions - Vertical Polarity

FCC, Class B



Frequency (MHz)	Pk Amp (dBµV/m)	QP Amp (dBµV/m)	QP Limit (dBµV/m)	Margin (dB)	Ant Ht (cm)	Table (Deg)	Comments
142.3457	28.41	25.27	43.50	-18.23	N/A	N/A	
216.0587	30.02	25.51	46.00	-20.49	N/A	N/A	
405.2650	20.64	13.98	46.00	-32.02	N/A	N/A	
589.8294	34.03	32.54	46.00	-13.46	N/A	N/A	
786.4286	34.48	31.88	46.00	-14.12	N/A	N/A	

7. Measurement Data (continued)

7.6. RF Safety (Public Exposure to Radio Frequency Energy Levels (95.1125, 1.1307 (b)(1)))

Requirement: Portable devices as defined in § 2.1093(b) of this chapter operating in the WMTS are subject to radio frequency radiation exposure requirements as specified in §§ 1.1307(b) and 2.1093 of this chapter.

Test Note: Due to the product configuration, it was not possible to directly connect the device under test to the measurement equipment. The output power of the device was derived from the peak field strength measurements using the following formula:

$$P = \frac{(E \times d)^2}{(30 \times G)}$$

P = the power in Watts.

E = the measured maximum field in V/m

G = the numeric gain of the transmitting antenna over an isotropic radiator.

d = the distance in meters of the field strength measurement.

Channel	Frequency	Peak Field Strength	Meas. Distance	Antenna Gain ¹	Output Power
	(MHz)	(dBµV/m)	(m)	(dBi)	(mW)
1	1395.9	99.50	3.0	-8.0	16.8702398
3	1399.1	99.30	3.0	-8.0	16.1109539
4	1427.9	99.30	3.0	-8.0	16.1109539
6	1431.1	99.60	3.0	-8.0	17.2631981

7. Measurement Data (continued)

7.8. RF Safety (Public Exposure to Radio Frequency Energy Levels (95.1125, 1.1307 (b)(1)) (continued)

The following results are based on the power values derived in the table on the previous page:

Channel	MPE Distance (cm)	DUT Output Power (dBm)	DUT Antenna Gain (dBi)	Power Density (mW/cm ²)	Limit (mW/cm ²)	Result
	(1)	(2)	(3)	(4)	(5)	
1	20	12.2712125	-8.0	0.0005319	0.93	Compliant
3	20	12.0712125	-8.0	0.0005080	0.93	Compliant
4	20	12.0712125	-8.0	0.0005080	0.95	Compliant
6	20	12.3712125	-8.0	0.0005443	0.95	Compliant

$$PD = \frac{OP + AG}{(4 \times \pi \times d^2)}$$

PD = Power Density (mW/cm²)

OP = DUT Output Power (dBm)

AG = DUT Antenna Gain (dBi)

d = MPE Distance (cm)

1. Reference CFR 2.1093(b): For purposes of this section, a portable device is defined as a transmitting device designed to be used so that the radiating structure(s) of the device is/are within 20 centimeters of the body of the user.
2. Sections 7.8.1 and 7.8.2 of this test report.
3. Antenna manufacturer's data sheets.
4. Power density is calculated from field strength measurement and antenna gain.
5. Reference CFR 1.1310, Table 1: Limits for Maximum Permissible Exposure (MPE), Section (B): Limits for General Population/Uncontrolled Exposure.