PCTEST ENGINEERING LABORATORY, INC

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CERTIFICATE OF COMPLIANCE

MANUFACTURER NAME & ADDRESS:
Philips Innovative Applications
Hoogveld 50
B-9200 Dendermonde,Belgium.

DATE & LOCATION OF TESTING:
Date(s) of Tests: February 6. 2006
Test Report S/N: 0602100080.TZG
Test Site: PCTEST Lab, Columbia, MD

FCC ID:	**TZGHTS9800W**
APPLICANT:	**Philips Innovative Applications**

SUMMARY:

Model No.:	HTS9800W
Equipment EUT Type:	Entertainment System Wireless Audio Transceiver
Max. Output Power:	0.0177 W (12.47 dBm) Conducted
Frequency Range:	2412 - 2462 MHz
FCC Classification:	Digital Transmission System (DTS)
FCC Rule Part(s):	Parts 15.247; ANSI C-63.4-2001;Canada RSS 210
Test Device Serial No.:	S/N: N/A

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C-63.4-2001. If the EUT contains any additional embedded transmitters, then those transmitters were active during all tests.

Grant Conditions: Power output is conducted. This device must not be co-located or operating with any other antenna or transmitter except those described in this filing. End-users must be provided with operating conditions for satisfying RF exposure compliance. This device is approved as a mobile device with respect to RF Exposure compliance.

I authorize and attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

PCTEST certifies that no party to this application has been denied the FCC benefits pursuant to Section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C. 862.

Alfred Cirwithian
Vice President Engineering

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Attestation Statements

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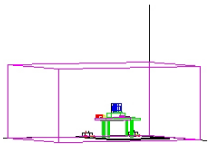

MEASUREMENT REPORT

A. General Information

APPLICANT	Philips Innovative Applications
APPLICANT ADDRESS	Hoogveld 50 B-9200 Dendermonde,Belgium.
TEST SITE	PCTEST ENGINEERING LABORATORY, INC.
TEST SITE ADDRESS	6660-B Dobbin Road, Columbia, MD 21045 USA
FCC RULE PART(S)	Parts 15.247; ANSI C-63.4-2001; Canada: RSS 210
MODEL NAME	HTS9800W
FCC ID	TZGHTS9800W
Test Device Serial No.:	S/N: N/A ☐ Production ☒ Pre-Production ☐ Engineering
FCC CLASSIFICATION	Digital Transmission System (DTS)
DATE(S) OF TEST	February 6, 2006
TESTS REPORT S/N:	0602100080.TZG

A.1 Test Facility / NVLAP Accreditation

Measurements were performed at PCTEST Engineering Lab in Columbia, MD 21045, U.S.A.

- PCTEST facility is an FCC registered (PCTEST Reg. No. 90864) test facility with the site description report on file and has met all the requirements specified in Section 2.948 of the FCC Rules and Industry Canada (IC 2451).
- PCTEST Lab is accredited by U.S. National Institute of Standards and Technology (NIST) under the National Voluntary Laboratory Accreditation Program (NVLAP) in EMC, Telecommunication, and FCC for satisfactory compliance with criteria established in Title 15, Part 285 Code of Federal Regulations. (NVLAP Lab code: 100431-0).
- PCTEST Lab is a recognized U.S. Conformity Assessment Body (CAB) in EMC and R&TTE (n.b. 0982) under the U.S.-EU Mutual Recognition Agreement (MRA).
- PCTEST TCB is a Telecommunication Certification Body (TCB) accredited to ISO/IEC Guide 65 by the American National Standards Institute (ANSI) in all scopes of FCC Rules.
- PCTEST facility is an IC registered (IC-2451) test laboratory with the site description on file at Industry Canada.

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1.0 INTRODUCTION

1.1 Evaluation Procedure

The measurement procedure described in the American National Standard for Methods of Measurement of Radio-Noise Emission from Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz to 40GHz (ANSI C63.4-2001) and FCC Public Notice dated July 12, 1995 entitled "Guidance on Measurement for Direct Sequence Spread Spectrum System" were used in the measurement of **Philips Entertainment System Audio Transceiver**

1.2 Scope

Measurement & determination of electromagnetic emissions (EMC) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission.

1.3 PCTEST Test Location

The map at the right shows the location of the PCTEST LABORATORY, its proximity to the FCC Laboratory, the Columbia vicinity are, the Baltimore-Washington Internt'l (BWI) airport, the city of Baltimore and the Washington, DC area. (see Figure 1.2-1).

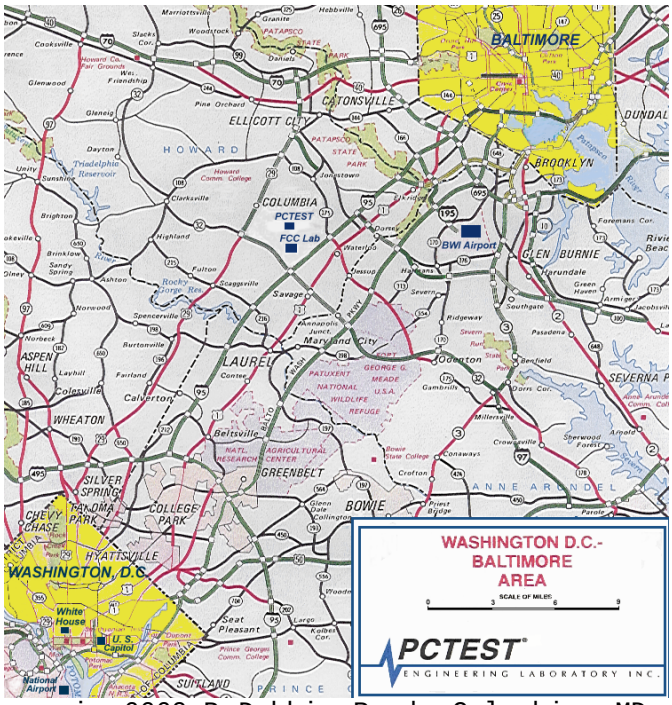

Figure 1.3-1. Map of the Greater Baltimore and Metropolitan Washington, D.C. area

These measurement tests were conducted at the PCTEST Engineering Laboratory, Inc. facility in New Concept Business Park, Guilford Industrial Park, Columbia, Maryland. The site address is 6660-B Dobbin Road, Columbia, MD 21045. The test site is one of the highest points in the Columbia area with an elevation of 390 feet above mean sea level. The site coordinates are 39° 11'15" N latitude and 76° 49'38" W longitude. The facility is 1.5 miles North of the FCC laboratory, and the ambient signal and ambient signal strength are approximately equal to those of the FCC laboratory. There are no FM or TV transmitters within 15 miles of the site. The

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detailed description of the measurement facility was found to be in compliance with the requirements of § 2.948 according to ANSI C63.4 on October 19, 2002.

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2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **Philips Entertainment System Audio Transceiver.** The EUT consisted of the following components(s):

Table 2-1. EUT Equipment Description

Manufacturer / Model / Description	Serial Number
Philips Entertainment System Audio Transceiver	N/A

2.2 Enclosure

The EUT incorporates the following enclosure:

- none – The EUT is a modular devices and is designed to be installed within the enclosure of a host device.

2.3 EMI Suppression Device(s)/Modifications

EMI suppression device(s) added and/or modifications made during testing.

- none

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3.0 DESCRIPTION OF TEST

3.1 Conducted Emissions

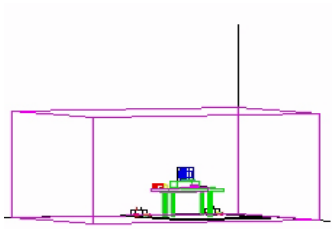

Figure 3.1-1. Shielded Enclosure Line-Conducted Test Facility

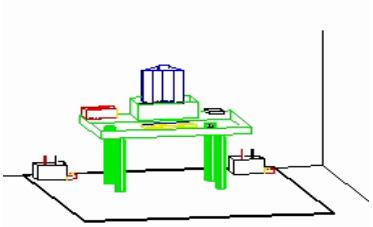

Figure 3.1-2. Line Conducted Emission Test Set-Up

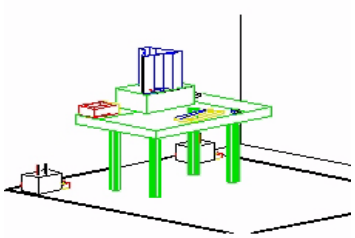

Figure 3.1-3. Wooden Table & Bonded LISNs

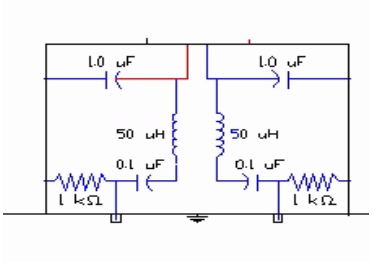

Figure 3.1-4. LISN Schematic Diagram

The line-conducted facility is located inside a 16'x20'x10' shielded enclosure. It is manufactured by Ray Proof Series 81 (see Figure 3.1-1). The shielding effectiveness of the shielded room is in accordance with MIL-Std-285 or NSA 65-5. A 1m x 1.5m wooden table 80cm high is placed 40cm away from the vertical wall and 1.5m away from the sidewall of the shielded room (see Figure 3.1-2). Solar Electronics and EMCO Model 3725/2 (10kHz-30MHz) 50Ω/50μH Line-Impedance Stabilization Networks (LISNs) are bonded to the shielded room (See Figure 3.1-3). The EUT is powered from the Solar LISN and the support equipment is powered from the EMCO LISN. Power to the LISNs are filtered by a high-current high-insertion loss Ray Proof power line filters (100dB 14Hz-10GHz). The purpose of the filter is to attenuate ambient signal interference and this filter is also bonded to the shielded enclosure. All electrical cables are shielded by braided tinned copper zipper tubing with an inner diameter of ½". If the EUT is a DC-powered device, power will be derived from the source power supply it normally will be powered from and this supply line(s) will be connected to the Solar LISN. The LISN schematic diagram is shown (See Figure 3.1-4). All interconnecting cables more than 1 meter were shortened by non-inductive bundling (serpentine fashion) to a 1-meter length. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The RF output of the LISN was connected to the spectrum analyzer to determine the frequency producing the maximum EME from the EUT. The spectrum was scanned from 150kHz to 30Mhz with a 20msec. sweep time. The frequencies producing the maximum level were re-examined using an EMI/Field Intensity Meter and Quasi-Peak adapter. The detector function was set to CISPR quasi-peak and average mode. The bandwidth of the receiver was set to 10kHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each EME emission. Each emission was maximized by: switching power lines; varying the mode of operation or resolution; clock or data exchange speed; scrolling H patter to the EUT and/or support equipment, and powering the monitor from the floor mounted outlet box and the computer aux AC outlet, if applicable; whichever determined the worst-case emission. Photographs of the worst-case emission can be seen in

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Exhibit M. Each EME reported was calibrated using the HP8640B signal generator.

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3.2 Radiated Emissions

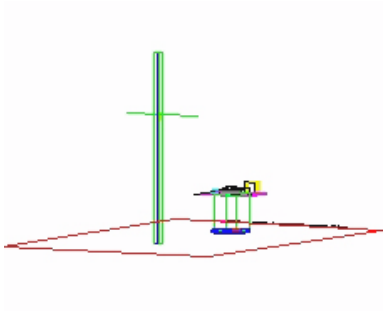

Figure 3.2-1. Meter Test Site

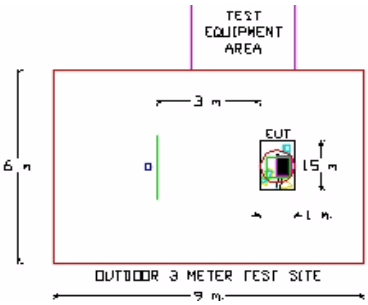

Figure 3.2-2. Dimensions of Outdoor Test Site

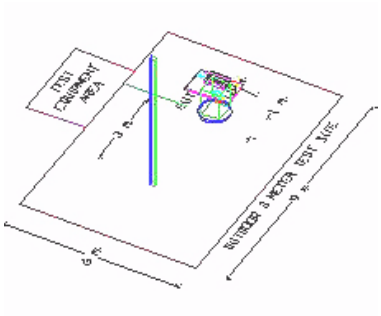

Figure 3.2-3. Turntable and System Setup

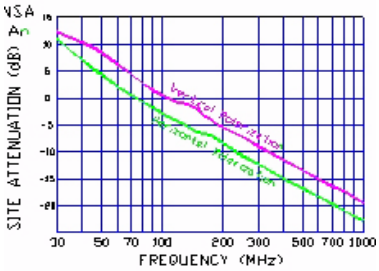

Figure 3.2-4. Normalized Site Attenuation Curves

Preliminary measurements were made indoors at 1 meter using broadband antennas, broadband amplifier, and spectrum analyzer to determine the frequency producing the maximum EME. Appropriate precaution was taken to ensure that all EME from the EUT were maximized and investigated. The system configuration, clock speed, mode of operation or video resolution, turntable azimuth with respect to the antenna was noted for each frequency found. The spectrum was scanned from 30 to 200 MHz using biconical antenna and from 200 to 1000 MHz using log-spiral antenna. Above 1 GHz, linearly polarized double ridge horn antennas were used.

Final measurements were made outdoors at 3-meter test range using Roberts™ Dipole antennas or horn antenna (see Figure 3.2-1). The test equipment was placed on a wooden and plastic bench situated on a 1.5 x 2 meter area adjacent to the measurement area (see Figure 3.2-2). Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. Each frequency found during pre-scan measurements was re-examined and investigated using EMI/Field Intensity Meter and Quasi-Peak Adapter. The detector function was set to CISPR quasi-peak mode and the bandwidth of the receiver was set to 100kHz or 1 MHz depending on the frequency or type of signal. Above 1GHz the detector function was set to CISPR average mode (RBW = 1MHz, VBW = 10Hz).

The half-wave dipole antenna was tuned to the frequency found during preliminary radiated measurements. The EUT, support equipment and interconnecting cables were re-configured to the set-up producing the maximum emission for the frequency and were placed on top of a 0.8-meter high non-metallic 1 x 1.5 meter table (see Figure 3.2-3). The EUT, support equipment, and interconnecting cables were re-arranged and manipulated to maximize each EME emission. The turntable containing the system was rotated; the antenna height was varied 1 to 4 meters and stopped at the azimuth or height producing the maximum emission. Each emission was maximized by: varying the mode of operation or resolution; clock or data exchange speed; scrolling H pattern to the EUT and/or support equipment, and powering the monitor from the floor mounted outlet box and the computer aux AC outlet, if applicable; and changing the polarity of the antenna, whichever determined the worst-case emission. Photographs of the worst-case emission can be seen in Exhibit E-G. Each EME reported was calibrated using the HP8640B signal generator. The Theoretical Normalized Site

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Attenuation Curves for both horizontal and vertical polarization are shown in Figure 3.2-4.

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4.0 ANTENNA REQUIREMENTS

An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the applicant can be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with this requirement.

The antenna is a **permanently attached antenna**.

There are no provisions for connection to an external antenna.

Conclusion:

The **Philips Entertainment System audio transceiver** unit complies with the antenna requirement of §15.203.

5.0 TEST EQUIPMENT CALIBRATION DATA

Test Equipment Calibration is traceable to the National Institute of Standards and Technology (NIST).

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TYPE	MODEL	CAL. DUE DATE	CAL. INTERVAL	SERIAL No.
Microwave Spectrum Analyzer	HP 8566 (100Hz–22GHz)	12/05/04	Annual	3638A08713
Microwave Spectrum Analyzer	HP 8566 (100Hz-22GHz)	04/17/05	Annual	2542A11898
Spectrum Analyzer/Tracking Generator	HP 8591A (9kHz-1.8GHz)	06/02/05	Annual	3144A02458
Spectrum Analyzer	HP 8591A (9kHz-1.8GHz)	10/15/04	Annual	3108A02053
Spectrum Analyzer	HP 8594A (9kHz-2.9GHz)	11/02/04	Annual	3051A00187
Signal Generator	HP 8650B (500Hz-1GHz)	06/02/05	Annual	2232A19558
Signal Generator	HP 8640B (500Hz-1GHz)	06/02/05	Annual	1851A09816
Signal Generator	Rohde & Schwarz (0.1-1GHz)	09/22/04	Annual	894215/012
Ailtech/Eaton Receiver	NM 37/57A-SL (30MHz-1GHz)	04/12/05	Annual	0792-03271
Ailtech/Eaton Receiver	NM 37/57A (30MHz-1GHz)	03/11/05	Annual	0805-03334
Ailtech/Eaton Receiver	NM 17/27A (0.1-32MHz)	09/17/04	Annual	0608-03241
Quasi-Peak Adapter	HP 85650A	08/09/04	Annual	2043A00301
Ailtech/Eaton Adapter	CCA-7 CISPR/ANSI QP Adapter	03/11/05	Annual	0194-04082
RG58 Coax Test Cable	No.167			n/a
Harmonic/Flicker Test System	HP 6841A (IEC 555-2/3)			3531A00115
Broadband Amplifier (2)	HP 8447D			1145A00470, 1937A03348
Broadband Amplifier	HP 8447F			2443A03784
Transient Limiter	HP 11947A (9kHz-200MHz)			2820A00300
Horn Antenna (2)	EMCO Model 3115 (1-18GHz)			9704-5182, 9205-3874
Horn Antenna	EMCO Model 3116 (18-40GHz)			9203-2178
Biconical Antenna (3)	Eaton 94455-1			1295, 1332, 1277
Log-Spiral Antenna (2)	Ailtech/Eaton 93490-1			0227, 1104
Log-Spiral Antenna	Singer 93490-1			147
Roberts Dipoles	Compliance Design (1 set) A100			5118
Ailtech Dipoles	DM-105A (1set)			33448-111
EMCO LISN (3)	3816/2, 3816/2, 3725/2			1077, 1079, 2099
50-ohm Terminator	n/a			n/a
Microwave Preamp 40dB Gain	HP 83017A (0.5-26.5GHz)			3123A00181
Microwave Cables	MicroCoax (1.0-26.5GHz)			n/a
Ailtech/Eaton Receiver	NM37/57A-SL			0792-03271
Spectrum Analyzer	HP 8591A			3034A01395
R & S Power Meter	NVRS			835360/ 079
Modulation Analyzer	HP 8901A			2432A03467
NTSC Pattern Generator	Leader 408			0377433
Noise Figure Meter	HP 8970B, Ailtech 7510			3106A02189, TE31700
Noise Generator	Ailtech 7010			1473
Microwave Survey Meter	Holaday Model 1501 (2.45GHz)			80931
Digital Thermometer	Extech Instruments 421305			426966
Attenuator	HP 8495A (0-70dB) DC-4GHz			
Bi-Directional Coax Coupler	Narda 3020A (50-1000MHz)			
Shielded Screen Room	RF Lindgren Model 26-2/2-0			6710 (PCT270)
Shielded Semi-Anechoic Chamber	Ray Proof Model S81			R2437 (PCT278)
Environmental Chamber	Associated Systems 1025			PCT285
OATS	n/a	12/31/2004	Tri-annual	

Table 5-1. Annual Test Equipment Calibration Schedule

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EXHIBIT A – Test Results

Summary

The intentional radiator has been tested in a simulated typical installation to demonstrate compliance with the relevant FCC performance and procedural standards.

The radio was transmitting at full power on the specified channels and at a data rate(s) specified above. The channels tested are high, middle and low of the allocated bands.

Final system data was gathered in a mode that tended to maximize emissions by varying the orientation of the EUT, orientation of power and I/O cabling, antenna search height, and antenna polarization.

Test Date(s):	February 6, 2006
Test Engineer:	Al Cirwithian
Method/System:	Spread Spectrum Transceiver (DTS)
Data Rate(s) Tested:	1Mbps, 2Mbps, 5.5Mbps, 11Mbps

FCC Part Section(s)	RSS 210 Section	Test Description	Test Limit	Test Condition
TRANSMITTER MODE (TX)				
15.247(a)(2)	5.9.1	6dB Bandwidth	> 500kHz	CONDUCTED
15.247(b)	6.22(o)(a3)	Transmitter Output Power	< 1 Watt	
15.247(d)	6.2.2(o)(b)	Transmitter Power Spectral Density	< 8dBm / 3kHz	
15.247(c)	5.9.1 6.2.2(o) (e1)	Occupied Band Width Out-of-Band Emissions (Band Width at 20dB below)	Radiated <20dBc. Emissions in restricted bands must meet the radiated limits detailed in 15.209	
15.205 15.209	6.2.1 6.3	General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	< FCC 15.209 limits or < RSS-210 table 3 limits Emissions in restricted bands must meet the radiated limits detailed in 15.209	RADIATED (30MHz-1GHz) (1-25 GHz)
15.207	6.6	AC Conducted Emissions 150kHz – 30MHz	EN55022	Line Conducted
RECEIVER MODE (RX)				
15.207	7.4	AC Conducted Emissions 150kHz – 30MHz	EN55022	Line Conducted
15.209	7.3	General Field Strength Limits (Restricted Bands and Radiated Emissions Limits)	< FCC 15.209 limits or < RSS-210 table 3 limits	Radiated (30MHz-1GHz) (1-25 GHz
RF EXPOSURE (SAR or MPE)				
2.1093/2.1091	RSS-102	SAR Test or MPE	1.6 W/kg or mw/cm²	3 Channels

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Table A-1. Summary of Test Results

EXHIBIT A – Test Results (Cont.)

6dB Bandwidth Measurement

§15.247(a)(2)

The bandwidth at 6dB down from the highest in-band spectral density is measured with a spectrum analyzer connected to the antenna terminal while the EUT is operating in transmission mode at the appropriate frequencies.

Minimum Standard – The transmitter shall have a minimum 6dB bandwidth of 500kHz (0.5MHz)

The spectrum analyzer is set to:

RBW = 100 kHz (7dB/div)
VBW = 1 MHz
Span = 40 MHz
Ref. Level = 9.5 dBm
Sweep = 4.84 ms

Frequency (MHz)	Channel No.	Test Results	
		6dB Bandwidth (MHz)	Pass/Fail
2414	1	9.0	Pass
2444	6	8.0	Pass
2462	11	7.1	Pass

– See next pages for actual measured spectrum plots

Table A-2. Conducted Bandwidth Measurements

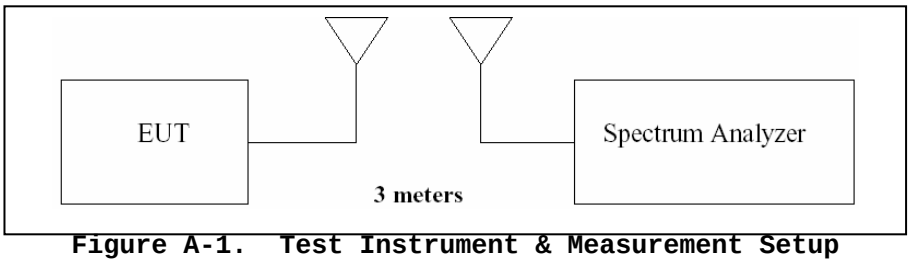

Figure A-1. Test Instrument & Measurement Setup

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Output Power Measurement

§15.247(b)

The antenna conducted tests cannot be performed on a device with the antenna replaced with a connector. Conducted tests show compliance with the peak output power limit specified in Section 15.247(b) and the spurious RF conducted emission limit specified in Section 15.247(c). Thus, both are acceptable.

Minimum Standard – The transmitter peak output power shall not exceed 1 watt.

Power out Calculation Example:

Frequency (MHz)	Channel No.	Test Results		
		Power Output (dBm)	Power Output (W)	Pass/Fail
2414	1	11.26	.0133	Pass
2444	6	10.48	.0111	Pass
2462	11	9.37	.009	Pass

Table A-3. Conducted Output Power Measurements

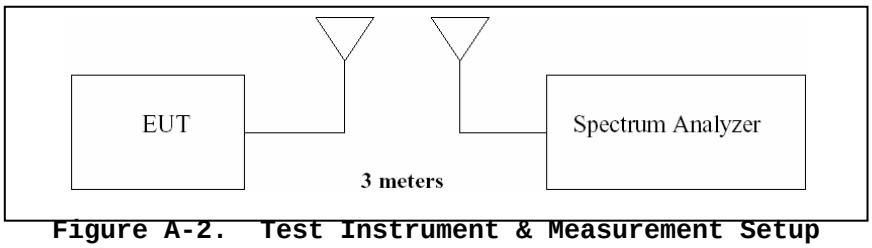

Figure A-2. Test Instrument & Measurement Setup

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EXHIBIT A – Test Results (Cont.)

Power Spectral Density

§15.247(d)

The peak power density is measured with a spectrum analyzer connected to the output connector while the EUT is operating in transmission mode at the appropriate frequencies.

Minimum Standard – The transmitter power density average over 1-second interval shall not be greater than 8dBm in any 3kHz BW.

The spectrum analyzer is set to:

RBW = 3 kHz
VBW = 3 kHz
Span = 5 kHz
Ref. Level = 9.5 dBm
Sweep = 5 sec

Table A-4. Conducted Power Density Measurements

Frequency (MHz)	Channel No.	Test Results	
		Power Density dBm/3kHz	Pass/Fail
2414	1	3.62 dBm	Pass
2444	6	2.88 dBm	Pass
2462	11	1.93 dBm	Pass

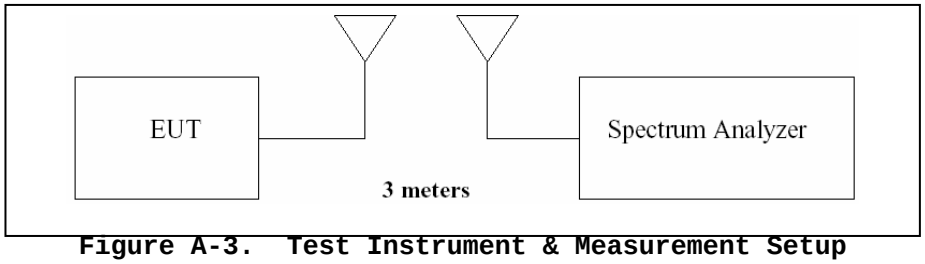

Figure A-3. Test Instrument & Measurement Setup

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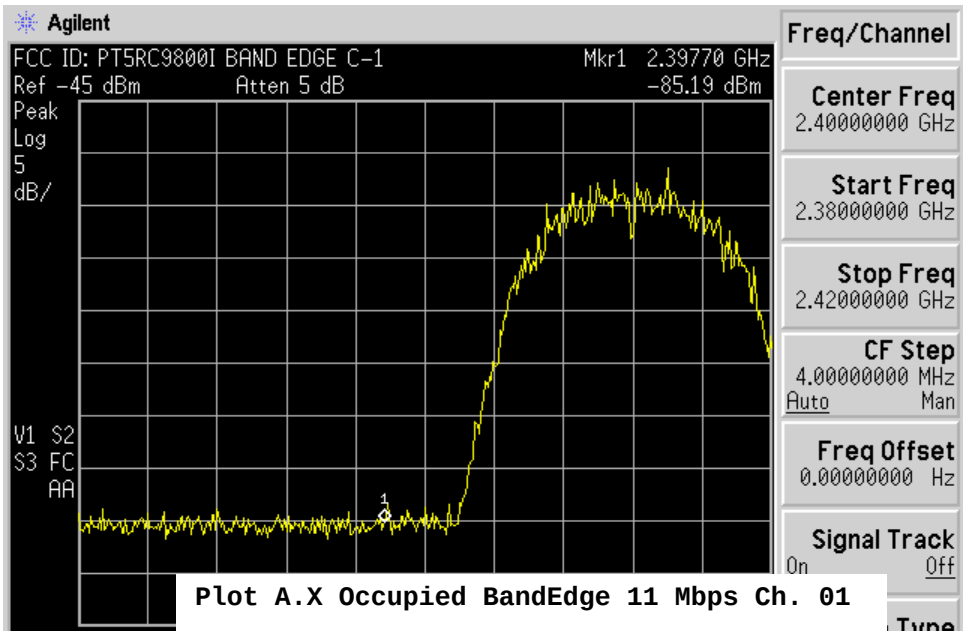
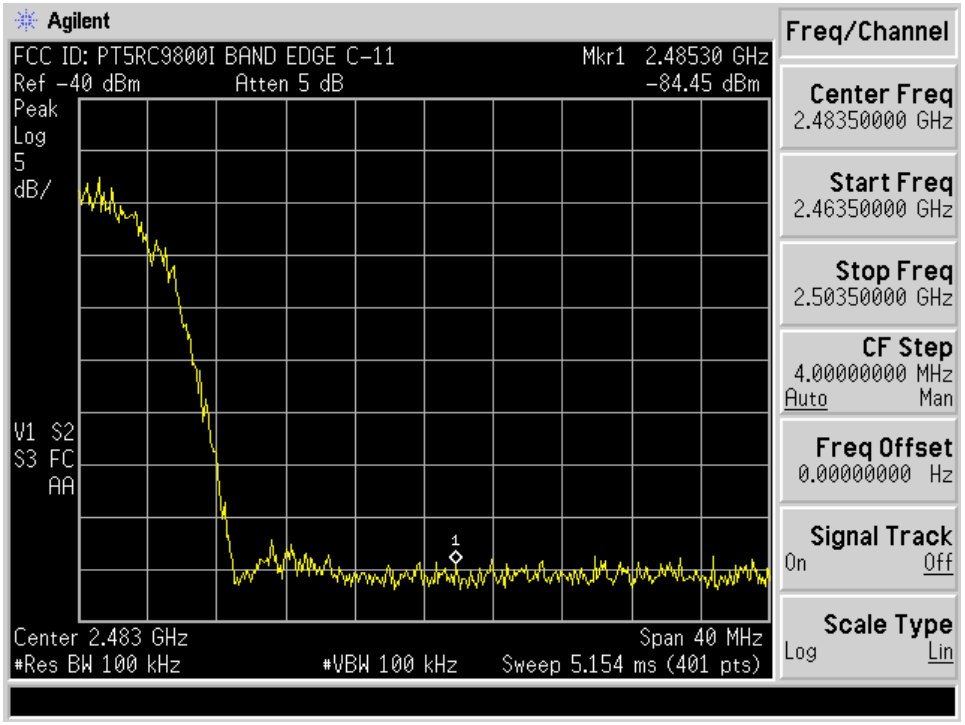
EXHIBIT A – Test Results (Cont.)

Occupied BandEdge /BandEdge at 20dB below, & Out of Band Emissions



Plot A.X Occupied BandEdge 11 Mbps Ch. 01



Plot A.X Occupied BandEdge 11 Mbps Ch. 11

FREQ [MHz]		ljusted Limit BµV/m]	Margin [dBµV/m]
4828		54	-8.500
7242		105	-77.100
9656		105	-81.300
12070		54	-19.900

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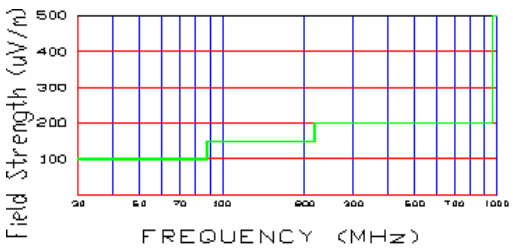

Figure A-5. Radiated limits at 3 meters.

Table A-6. Peak Radiated Measurements @ 3 meters

NOTES:

1. All harmonics in the restricted bands specified in §15.205 are below the limit shown in Table A-19. (Note: * = Restricted Band measured frequency)

2. All harmonics/spurs are at least 20 dB below the highest emission in the authorized band using RBW = 100kHz

3. Average Measurements > 1GHz using RBW = 1 MHz VBW = 10 Hz

4. The peak emissions above 1 GHz are not more than 20 dB above the average limit.

5. The antenna is manipulated through typical positions, polarity and length during the tests.

6. The EUT is supplied with nominal AC voltage or/and a new/fully-recharged battery.

7. The spectrum is measured from 9kHz to the 10th harmonic and the worst-case emissions are reported.

8. < - 135 dBm are below the analyzer floor level.

9. Above 1 GHz, the limit is 500 µV/m (54dBµ/m) at 3 meters radiated.

EXHIBIT A – Test Results (Cont.)

Radiated Measurements (Cont.)

§15.247(b) / §15.205 & §15.209

Transfer Rate: 11 Mbps

Distance of Measurements: 3 Meters

Channel: 06

FREQ [MHz]	LEVEL [dBm]	AFCL [dBm]	POL	Field Strength [dBµV/m]	Corrected Field Strength [dBµV/m]	Field Strength [µV/m]	In Restricted Band?	Adjusted Limit [dBµV/m]	Margin [dBµV/m]
4888	-103.7	40.5	V	43.8	43.80	154.88166	Yes	54	-10.200
7332	-125	47.3	V	29.3	29.30	29.17427	Yes	54	-24.700
9776	-125	50.05	V	32.05	32.05	40.040547	No	105	-73.900
12185	-125	52.5	V	34.5	34.50	53.088444	Yes	54	-19.500

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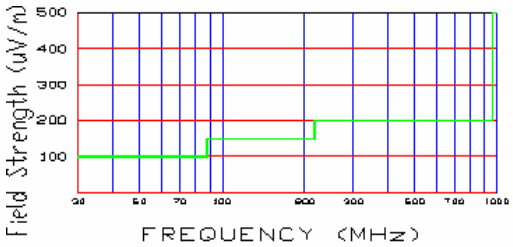

Figure A-6. Radiated limits at 3 meters.

Table A-7. Peak Radiated Measurements @ 3 meters

NOTES:

1. All harmonics in the restricted bands specified in §15.205 are below the limit shown in Table A-19. (Note: * = Restricted Band measured frequency)

2. All harmonics/spurs are at least 20 dB below the highest emission in the authorized band using RBW = 100kHz

3. Average Measurements > 1GHz using RBW = 1 MHz VBW = 10 Hz

4. The peak emissions above 1 GHz are not more than 20 dB above the average limit.

5. The antenna is manipulated through typical positions, polarity and length during the tests.

6. The EUT is supplied with nominal AC voltage or/and a new/fully-recharged battery.

7. The spectrum is measured from 9kHz to the 10th harmonic and the worst-case emissions are reported.

8. < - - 135 dBm are below the analyzer floor level.

9. Above 1 GHz, the limit is 500 µV/m (54dBµ/m) at 3 meters radiated.

EXHIBIT A – Test Results (Cont.)

Radiated Measurements (Cont.)

§15.247(b) / §15.205 & §15.209

Transfer Rate: 11 Mbps

Distance of Measurements: 3 Meters

Channel: 11

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FREQ [MHz]	LEVEL [dBm]	AFCL [dBm]	POL	Field Strength [dBμV/m]	Corrected Field Strength [dBμV/m]	Field Strength [μV/m]	In Restricted Band?	Adjusted Limit [dBμV/m]	Margin [dBμV/m]
4924	-100.8	40.6	V	46.8	46.80	218.77616	Yes	54	-7.200
7386	-125	45.9	V	27.9	27.90	24.831331	Yes	54	-26.100
9848	-125	49.39	V	31.39	31.39	37.110773	No	-105	-73.610
12310	-125	53.35	V	35.35	35.35	58.546374	Yes	54	-18.650

Table A-8. Peak Radiated Measurements @ 3 meters

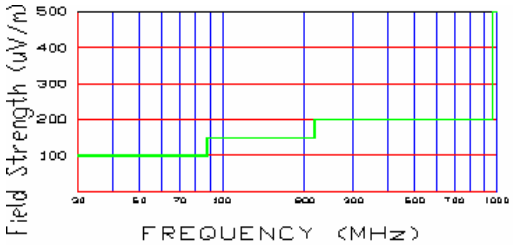

Figure A-7. Radiated limits at 3 meters.

NOTES:

1. All harmonics in the restricted bands specified in §15.205 are below the limit shown in Table A-19. (Note: * = Restricted Band measured frequency)

2. All harmonics/spurs are at least 20 dB below the highest emission in the authorized band using RBW = 100kHz

3. Average Measurements > 1GHz using RBW = 1 MHz VBW = 10 Hz

4. The peak emissions above 1 GHz are not more than 20 dB above the average limit.

5. The antenna is manipulated through typical positions, polarity and length during the tests.

6. The EUT is supplied with nominal AC voltage or/and a new/fully-recharged battery.

7. The spectrum is measured from 9kHz to the 10th harmonic and the worst-case emissions are reported.

8. < - - 135 dBm are below the analyzer floor level.

9. Above 1 GHz, the limit is 500 μV/m (54dBμ/m) at 3 meters radiated.

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EXHIBIT A – Test Results (Cont.)

Radiated TX Spurious Measurements

§15.209

FREQ (MHz)	Level (dBm)	AFCL (dB/m)	POL (H/V)	Height (m)	Azimuth (° angle)	F/S (uV/M)	Margin (dB)
34.30	-84.83	-0.17	H	1.3	315	12.64	-18.0
102.70	-89.07	9.87	V	2.6	45	24.60	-15.7
125.20	-93.26	11.86	V	2.2	180	19.10	-17.9
132.90	-94.13	12.43	H	1.4	60	18.46	-18.2
153.70	-95.45	13.86	V	2.3	315	18.67	-18.1
188.10	-94.30	15.91	V	2.0	270	26.97	-14.9

Radiated RX Spurious Measurements

§15.109

FREQ (MHz)	Level (dBm)	AFCL (dB/m)	POL (H/V)	Height (m)	Azimuth (° angle)	F/S (uV/M)	Margin (dB)
34.30	-84.63	-0.17	V	2.5	180	12.93	-17.8
68.70	-91.41	6.12	V	2.3	315	12.21	-18.3
85.70	-92.52	8.13	H	1.6	90	13.54	-17.4
119.70	-93.07	11.47	V	2.4	45	18.67	-18.1
180.90	-97.24	15.55	V	2.0	270	18.46	-18.2
188.50	-93.72	15.93	V	2.1	315	28.89	-14.3

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FREQ (MHz)	Level (dBm)	AFCL (dB/m)	POL (H/V)	Height (m)	Azimuth (° angle)	F/S (uV/M)	Margin (dB)
24.9	-82.5	4.0	H	2.8	30	26.7	-7.2
153.6	-84.6	13.9	H	2.5	190	65.3	-6.1
175.5	-84.5	13.5	V	2.3	190	63.3	-8.5
187.5	-86.9	15.9	H	1.6	170	63.2	-6.5
434.6	-94.8	24.5	V	1.3	180	68.4	-5.2
473.0	-97.4	25.5	H	1.1	200	56.7	-3.8

Table A-18. Radiated Measurements at 3-meters

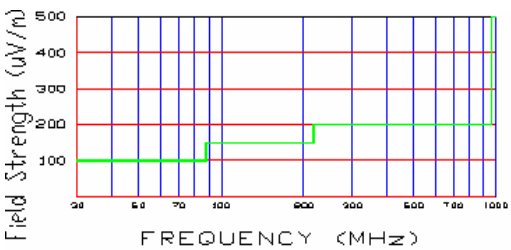

Figure A-17. Radiated limits at 3 meters

NOTES:

1. All emissions were investigated and the worst-case emissions are reported.

2. For hand-held devices, the EUT is rotated through three orthogonal axes to determine which configuration produces the maximum emissions.

3. The EUT is supplied with the minimal AC voltage or/and a new/fully re-charged battery.

4. The EUT was tested up to the 10th harmonic (25GHz) and no significant emission was found.

5. Above 1 GHz the limit is 500µV/m at 3 meters radiated.

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EXHIBIT A – Test Results (Cont.)

Radiated Restricted Band Measurements

§15.205 / §15.209

Special attention is made for the EUT's harmonic and spurious radiated emission in the restricted bands of operations. The EUT was tested from 9kHz and up to the tenth harmonic of the fundamental frequency of the transmitter using CISPR quasi peak detector below 1GHZ. Above 1 GHz, average measurement was used, using RBW 1MHz – VBW 10Hz and linearly polarized horn antennas. All harmonics/spurs are at least 20dB below the highest emission in the authorized band using RBW = 100kHz. In addition, peak measurements were taken to ensure that the peak levels are not more than 20dB above the average limit. All out of band emissions, other than those created by the spreading sequence, data sequence, and the carrier modulation must not exceed the limits show in Table G-1 per Section 15.209.

Frequency	F/S (µV/m)	Measured Distance (Meters)
0.009 – 0.490 MHz	2400/F (kHz)	300
0.490 – 1.705 MHz	24000/F (kHz)	30
1.705 – 30.00 MHz	30	30
30.00 – 88.00 MHz	100	3
88.00 – 216.0 MHz	150	3
216.0 – 960.0 MHz	200	3
Above 960.0 MHz	500	3

Table A-19. Re stricted Band Limits

TEST MEASUREMENT EQUIPMENT

Agilent E4448A	PSA Spectrum Analyzer 3 Hz - 50GHz
HP 8566B	Spectrum Analyzer 100Hz – 22GHz
HP 83017A	Microwave Analyzer 40dB Gain (0.5 – 26.5GHz)
HP 3784A	Digital Transmission Analyzer
EMCO 3115	Horn Antenna (1 – 18GHz)
HP 8495A	20dB Attenuator (DC-40GHz) 0 –70dB
HP 8493B	10dB Attenuator
MicroCoax Cables	Low Loss Microwave Cables (1 – 26.5GHz)
CDI Dipoles	Dipole Antennas (30 – 1000MHz)
EMCO 3116	Horn Antenna (18 – 40GHz)

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EXHIBIT A – Test Results (Cont.)

Radiated Restricted Band Measurements at Upper Channel Edge(Cont.)

§15.205 /§15.209 courtesy

Operating Frequency: 2462 MHz
Distance of Measurements: 3 Meters

FREQ [MHz]	LEVEL [dBm]	AFCL [dBm]	POL	Field Strength [dBμV/m]	Corrected Field Strength [dBμV/m]	Field Strength [μV/m]	In Restricted Band?	Adjusted Limit [dBμV/m]	Margin [dBμV/m]
2483.5	-99.7	32.9	V	40.2	--------	102.66	yes	54	13.8

FREQ (MHz)	Level (dBm)	AFCL (dB/m)	POL (H/V)	F/S (dBμV/m)	F/S (uV/M)	Margin (dB)
2483.7	-98.3	33.0	V	41.7	121.6	-12.3
2484.0	-95.4	33.0	V	44.6	169.8	-9.4
2484.2	-96.0	33.1	V	44.1	160.3	-9.9
2485.1	-95.3	33.1	V	44.8	173.8	-9.2
2493.0	-99.2	33.2	V	41.0	112.2	-13.0
2493.5	-96.0	33.2	V	44.2	162.2	-9.8

Table A-20. Radiated Restricted Band Measurements at 3-meters

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NOTES:

1. The antenna is manipulated through typical positions, polarity and length during the testing.

2. The EUT is supplied with the minimal AC voltage or/and a new/fully re-charged battery.

3. The spectrum is measured from 9kHz up to the 10th harmonic and the worst-case emissions are reported.

4. The conducted limits are shown on Figure A-14. Above 1 GHz the limit is 500µV/m.

5. < -135 dBm is below the analyzer measurement floor level.

6. Average Measurements > 1GHz using RBW = 1 MHz VBW = 10 Hz

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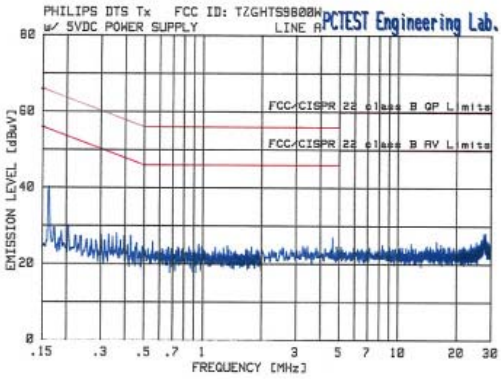
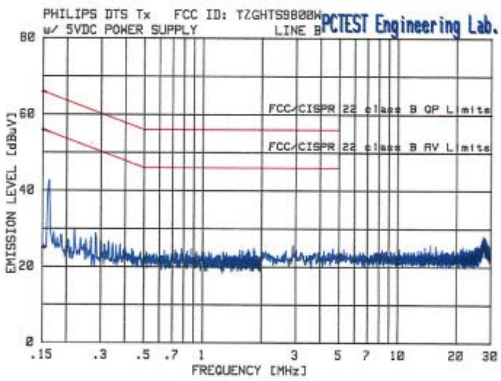
EXHIBIT A – Test Results (Cont.)

Line-Conducted TX Test Data

§15.207



No.	Freq. [MHz]	Quasi-Pk [dBuV]	Limit [dBuV]	Margin [dB]	Average [dBuV]	Limit [dBuV]	Margin [dB]
1	.150	34.90	65.98	-31.08	28.15	55.83	-27.68
2	4.542	25.86	56.00	-30.14	22.69	46.00	-23.31
3	.418	29.31	57.48	-28.17	22.82	47.50	-24.68
4	.535	29.29	56.00	-26.71	22.73	46.00	-23.27
5	.376	29.59	58.36	-28.77	22.85	47.90	-25.05
6	.343	30.66	59.13	-28.47	22.97	48.90	-25.93
7	.949	27.28	56.00	-28.72	22.62	46.00	-23.38
8	.981	27.22	56.00	-28.78	22.59	46.00	-23.41
9	1.322	26.68	56.00	-29.32	22.60	46.00	-23.40
10	3.174	25.87	56.00	-30.13	22.61	46.00	-23.39



No.	Freq. [MHz]	Quasi-Pk [dBuV]	Limit [dBuV]	Margin [dB]	Average [dBuV]	Limit [dBuV]	Margin [dB]
1	.150	35.32	65.98	-30.66	27.48	55.57	-28.09
2	2.908	26.08	56.00	-29.92	22.62	46.00	-23.38
3	1.812	26.17	56.00	-29.83	22.60	46.00	-23.40
4	4.580	25.81	56.00	-30.19	22.61	46.00	-23.39
5	.763	27.95	56.00	-28.05	22.65	46.00	-23.35
6	.854	27.70	56.00	-28.30	22.62	46.00	-23.38
7	1.698	26.43	56.00	-29.57	22.60	46.00	-23.40
8	.724	28.10	56.00	-27.90	22.69	46.00	-23.31
9	1.561	26.63	56.00	-29.37	22.60	46.00	-23.40
10	.633	28.44	56.00	-27.56	22.71	46.00	-23.29

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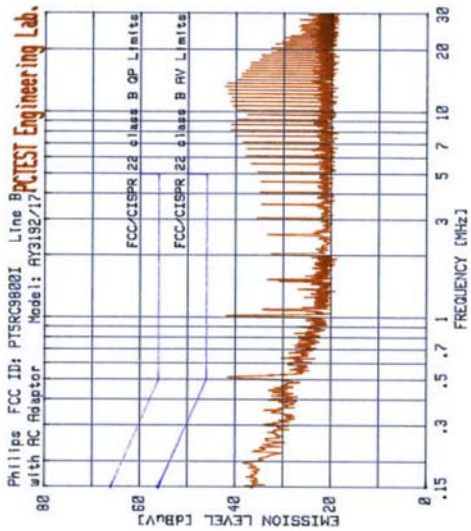
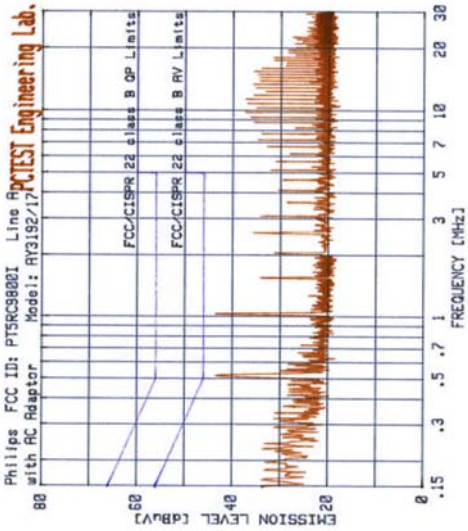
Line-Conducted RX Test Data

§15.107



No.	Freq. [MHz]	Quasi-Pk [dBuV]	Limit [dBuV]	Margin [dB]	Average [dBuV]	Limit [dBuV]	Margin [dB]
1	1.015	40.48	56.00	-15.52	34.77	46.00	-11.23
2	.506	40.10	56.00	-15.90	34.66	46.00	-11.34
3	13.228	40.52	60.00	-19.48	35.77	50.00	-14.23
4	13.737	40.27	60.00	-19.73	36.28	50.00	-13.72
5	12.211	40.67	60.00	-19.33	36.91	50.00	-13.09
6	12.715	36.70	60.00	-23.30	34.44	50.00	-15.56
7	11.194	40.54	60.00	-19.46	36.39	50.00	-13.61
8	8.142	39.13	60.00	-20.87	34.76	50.00	-15.24
9	8.651	39.69	60.00	-20.31	30.51	50.00	-19.49
10	11.704	40.32	60.00	-19.68	31.27	50.00	-18.73



No.	Freq. [MHz]	Quasi-Pk [dBuV]	Limit [dBuV]	Margin [dB]	Average [dBuV]	Limit [dBuV]	Margin [dB]
1	1.024	43.07	56.00	-12.93	40.79	46.00	-5.21
2	.511	42.84	56.00	-13.16	40.82	46.00	-5.18
3	2.567	34.86	56.00	-21.14	33.27	46.00	-12.73
4	3.079	32.79	56.00	-23.21	30.25	46.00	-15.75
5	1.536	33.17	56.00	-22.83	17.28	46.00	-28.72
6	9.809	21.09	60.00	-38.91	16.99	50.00	-33.01
7	11.269	32.30	60.00	-27.70	17.08	50.00	-32.92
8	10.755	34.90	60.00	-25.10	17.02	50.00	-32.98
9	9.357	21.06	60.00	-38.94	17.10	50.00	-32.90
10	13.496	21.17	60.00	-38.83	17.21	50.00	-32.79

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