

Warner Bros. Home Entertainment Inc.

Application
For
Certification

FCC ID: 2ADL5-3000061482

ZEUS UNIVERSAL PORTAL

Model: 3000061482

13.56MHz Transceiver

Report No.: SZHH00925758-001

We hereby certify that the sample of the above item is considered to comply with the requirements of FCC Part 15, Subpart C for Intentional Radiator, mention 47 CFR [10-1-13]

Prepared and Checked by:

Approved by:

Sign on file

Jimmy Wen
Engineer

Andy Yan
Senior Project Engineer
Date: February 9, 2015

- The test results reported in this test report shall refer only to the sample actually tested and shall not refer or be deemed to refer to bulk from which such a sample may be said to have been obtained.
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TRF No.: FCC 15C_TX_b

INTERTEK TESTING SERVICES

GENERAL INFORMATION

Warner Bros. Home Entertainment Inc.
Model: 3000061482

Grantee:	Warner Bros. Home Entertainment Inc.
Grantee Address:	4000 Warner Blvd., Bldg 160 Burbank California United States
Contact Person:	Clarissa Weirick
Tel:	(818) 977-7727
Manufacturer:	Warner Bros. Home Entertainment Inc.
Manufacturer Address:	4000 Warner Blvd., Bldg 160 Burbank California United States
Model:	3000061482
Trademark:	N/A
FCC ID:	2ADL5-3000061482
Type of EUT:	13.56MHz Transceiver
Description of EUT:	ZEUS UNIVERSAL PORTAL
Date of Sample Submitted:	January 11, 2015
Date of Test:	January 21, 2015
Report No.:	SZHH00925758-001
Report Date:	February 9, 2015
Normal Environmental Conidtions:	Temperature: +10 to 40°C Humidity: 10 to 90%

Report No.: SZHH00925758-001

FCC ID: 2ADL5-3000061482

TRF No.: FCC 15C_TX_b

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SUMMARY OF TEST RESULT

Warner Bros. Home Entertainment Inc.
Model: 3000061482

TEST SPECIFICATION	REFERENCE	RESULTS
Maximum Peak Output Power	15.247(b), (c) / RSS-210 A8.4	N/A
Hopping Channel Carrier Frequencies Separation	15.247(e) / RSS-210 A8.1	N/A
20dB Bandwidth of the Hopping Channel	15.247(a) / RSS-210 A8.1	N/A
Number of Hopping Frequencies	15.247(e) / RSS-210 A8.1	N/A
Average Time of Occupancy of Hopping Frequency	15.247(e) / RSS-210 A8.1	N/A
Antenn Conducted Spurious Emissions	15.247(d) / RSS-210 A8.5	N/A
Radiated Spurious Emissions	15.247(d) / RSS-210 A8.5	N/A
RF Exposure Compliance	15.247(i) / RSS-Gen 5.5	N/A
Transmitter Power Line Conducted Emissions	15.207 / RSS-Gen 7.2.2	N/A
Transmitter Field Strength	15.225 / RSS-210 A2.6	Pass
Transmitter Field Strength	15.227 / RSS-310 3.8	N/A
Transmitter Field Strength	15.229 / RSS-210 A2.7	N/A
Transmitter Field Strength, Bandwidth and Timing Requirement	15.231(a) / RSS-210 A1.1.1	N/A
Transmitter Field Strength, Bandwidth and Timing Requirement	15.231(e) / RSS-210 A1.1.5	N/A
Transmitter Field Strength and Bandwidth Requirement	15.239 / RSS-210 A2.8	N/A
Transmitter Field Strength and Bandwidth Requirement	15.249 / RSS-210 A2.9	N/A
Transmitter Field Strength and Bandwidth Requirement	15.235 / RSS-310 3.9	N/A
Receiver / Digital Device Radiated Eissions	15.109 / ICES-003	N/A
Digital Device Conducted Emissions	15.107 / ICES-003	N/A

Note: 1. The EUT uses three integral antennas which, in accordance to section 15.203, is considered sufficient to comply with the provisions of this section.
2. Pursuant to FCC part 15 Section 15.215(c), the 20 dB bandwidth of the emission was contained within the frequency band designated (13.110–14.010 MHz) which the EUT operated. The effects, if any, from frequency sweeping, frequency hopping, other modulation techniques and frequency stability over expected variations in temperature and supply voltage were considered.

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INTERTEK TESTING SERVICES

1.0 General Description

1.1 Product Description

The equipment under test (EUT) is a transceiver for a ZEUS UNIVERSAL PORTAL model: 3000061482 operating at 13.56 MHz. The EUT is powered by DC 5.0V USB port through host Unit. For more detail information pls. refer to the user manual.

Antenna Type: Integral antenna

Type of modulation: Pulse modulation

For electronic filing, the brief circuit description is saved with filename: descri.pdf.

1.2 Related Submittal(s) Grants

This is an application for certification of the RF ID function. And the digital transmission function is subjected to FCC Certification with Report No. SZHH00925758-002.

1.3 Test Methodology

Both AC mains line-conducted and radiated emission measurements were performed according to the procedures in ANSI C63.4 (2009). Radiated emission measurement was performed in Semi-anechoic chamber and conducted emission measurement was performed in shield room. For radiated emission measurement, preliminary scans were performed in the semi-anechoic chamber only to determine the worst case modes. All radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the "**Justification Section**" of this Application.

1.4 Test Facility

The Semi-anechoic chamber and shielding room used to collect the radiated data and conducted data are Intertek Test Services Shenzhen Ltd. Kejiyuan Branch and located at 6F, D Block, Huahan Building, Langshan Road, Nanshan District, Shenzhen, P. R. China. This test facility and site measurement data have been fully placed on file with the FCC (Registration Number: 242492).

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2.0 System Test Configuration

2.1 **Justification**

The system was configured for testing in a typical fashion (as a customer would normally use it), and in the confines as outlined in ANSI C63.4 (2009).

The EUT was powered by DC 5.0V USB Port through the notebook (the notebook was powered through AC 120V/60Hz) during test.

For maximizing emissions below 30 MHz, the EUT was rotated through 360°, the centre of the loop antenna was placed 1 meter above the ground, and the antenna polarization was changed. For maximizing emission at and above 30 MHz, the EUT was rotated through 360°, the antenna height was varied from 1 meter to 4 meters above the ground plane, and the antenna polarization was changed. This step by step procedure for maximizing emissions led to the data report in Exhibit 3.0.

The rear of unit shall be flushed with the rear of the table.

The equipment under test (EUT) was configured for testing in a typical fashion (as a customer would normally use it). The EUT was mounted to a plastic stand if necessary and placed on the wooden turntable, which enabled the engineer to maximize emissions through its placement in the three orthogonal axes.

2.2 **EUT Exercising Software**

The EUT exercise program (provided by client) used during radiated and conducted Test was designed to exercise the various system components in a manner similar to a typical use. The worst case configuration is used in all specified Test.

2.3 **Special Accessories**

There is no special accessories necessary for compliance of this product.

2.4 **Equipment Modification**

Any modifications installed previous to testing by Warner Bros. Home Entertainment Inc. will be incorporated in each production model sold/leased in the United States.

No modifications were installed by Intertek Testing Services Shenzhen Ltd Kejiyuan Branch.

2.5 **Measurement Uncertainty**

When determining of the test conclusion, the Measurement Uncertainty of test has been considered.

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2.6 Support Equipment List and Description

Description	Manufacturer	Model No.
Laptop	Lenovo	T420
Hard Disk	Smart.drive	HD-003
1394 Cable	Smart.drive	Unshielded, Length 180cm
USB Cable	Smart.drive	Unshielded, Length 120cm

3.0 Emission Results

Data is included of the worst case configuration (the configuration which resulted in the highest emission levels). A sample calculation, configuration photographs and data tables of the emissions are included.

3.1 Field Strength Calculation

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

$$FS = RA + AF + CF - AG - AV$$

where FS = Field Strength in $\text{dB}\mu\text{V}/\text{m}$

RA = Receiver Amplitude (including preamplifier) in $\text{dB}\mu\text{V}$

CF = Cable Attenuation Factor in dB

AF = Antenna Factor in dB

AG = Amplifier Gain in dB

AV = Average Factor in dB

In the following table(s), the reading shown on the data table reflects the preamplifier gain. An example for the calculations in the following table is as follows:

$$FS = RR + LF$$

where FS = Field Strength in $\text{dB}\mu\text{V}/\text{m}$

RR = $RA - AG - AV$ in $\text{dB}\mu\text{V}$

LF = $CF + AF$ in dB

Assume a receiver reading of 52.0 $\text{dB}\mu\text{V}$ is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB are added. The amplifier gain of 29 dB and average factor of 5 dB are subtracted, giving a field strength of 27 $\text{dB}\mu\text{V}/\text{m}$. This value in $\text{dB}\mu\text{V}/\text{m}$ was converted to its corresponding level in $\mu\text{V}/\text{m}$.

$$RA = 52.0 \text{ dB}\mu\text{V}/\text{m}$$

$$AF = 7.4 \text{ dB}$$

$$RR = 18.0 \text{ dB}\mu\text{V}$$

$$CF = 1.6 \text{ dB}$$

$$LF = 9.0 \text{ dB}$$

$$AG = 29.0 \text{ dB}$$

$$AV = 5.0 \text{ dB}$$

$$FS = RR + LF$$

$$FS = 18 + 9 = 27 \text{ dB}\mu\text{V}/\text{m}$$

$$\text{Level in } \mu\text{V}/\text{m} = \text{Common Antilogarithm } [(27 \text{ dB}\mu\text{V}/\text{m})/20] = 22.4 \mu\text{V}/\text{m}$$

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3.2 Radiated Emission Configuration Photograph

For electronic filing, the worst case radiated emission configuration photographs are saved with filename: radiated photos.pdf.

3.3 Radiated Emission Data

Worst Case Radiated Emission at 40.670 MHz

The data on the following page lists the significant emission frequencies, the limit and the margin of compliance. Numbers with a minus sign are below the limit.

Judgment: Passed by 6.1 dB

INTERTEK TESTING SERVICES

Applicant: Warner Bros. Home Entertainment Inc.

Date of test: January 21, 2015

Model: 3000061482

Test worst case mode: Transmit with three antennas

Table 1

Fundamental & Spurious Emission Below 30MHz

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB μ V/m)	Limit at 3m (dB μ V/m)	Margin (dB)
Vertical	13.560	69.3	0.0	10.8	80.1	124.0	-43.9
Vertical	27.120	42.3	20.0	9.5	31.8	69.5	-37.7

Table 2

Spurious emission (30MHz ~ 1GHz)

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB μ V/m)	Limit at 3m (dB μ V/m)	Margin (dB)
Horizontal	54.240	28.3	20.0	16.8	25.1	40.0	-14.9
Horizontal	121.665	28.1	20.0	20.8	28.9	43.5	-14.6
Horizontal	242.430	30.1	20.0	22.7	32.8	46.0	-13.2
Vertical	40.670	37.1	20.0	16.8	33.9	40.0	-6.1
Vertical	94.990	24.1	20.0	20.8	24.9	43.5	-18.6
Vertical	110.025	25.0	20.0	22.7	27.7	43.5	-15.8

NOTES:

1. Peak Detector Data unless otherwise stated.
2. All measurements were made at 3 meter. Harmonic emissions not detected at the 3-meter distances were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.
3. Negative sign in the column shows value below limit.
4. Loop antenna is used for the emissions below 30 MHz.
5. Limits at 3 meter for radiated emissions below 30 MHz is converted from the limits at 30 meter according to the formula as below:
$$\text{Limits at 3 meter (dB}\mu\text{V/m)} = \text{Limits at 30 meter (dB}\mu\text{V/m)} + 40 \log(30/3)$$

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3.4 Conducted Emission at Mains Terminal

3.4.1 Conducted Emissions Configuration Photograph

For electronic filing, the worst case conducted emission configuration photograph is saved with filename: conducted photos.pdf.

3.4.2 Conducted Emissions

Worst Case Conducted Configuration
at
13.562 MHz

Judgement: Passed by 7.1 dB margin

TEST PERSONNEL:

Sign on file

Jimmy Wen Engineer
Typed/Printed Name

January 21, 2015

Date

INTERTEK TESTING SERVICES

Applicant: Warner Bros. Home Entertainment Inc.

Date of Test: January 21, 2015

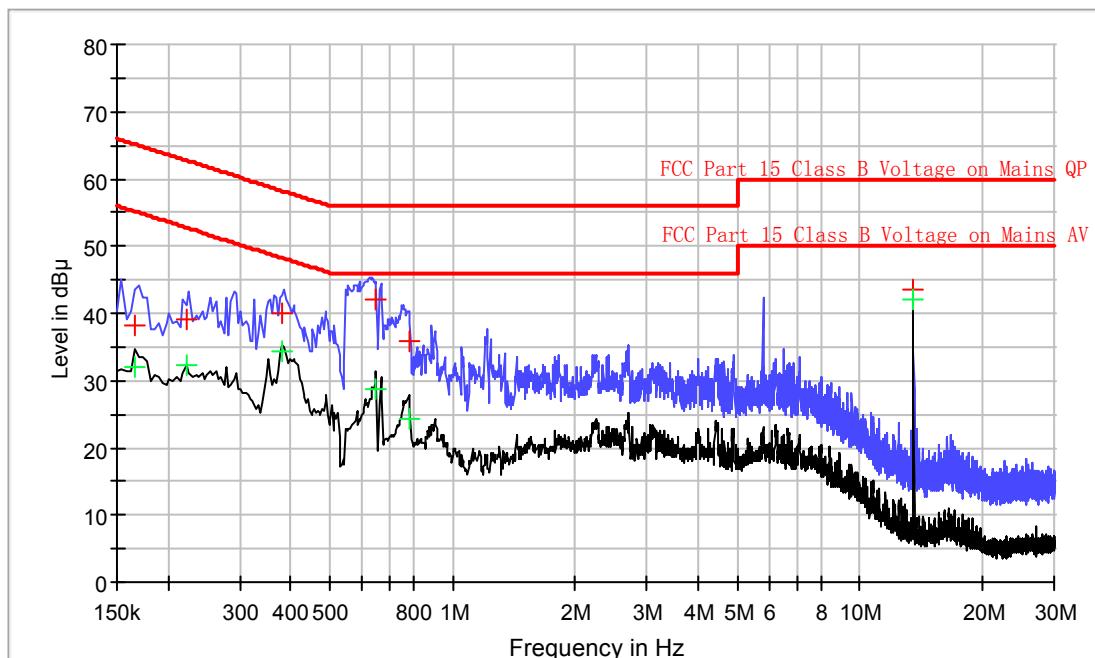
Model: 3000061482

Sample: 1/1

Test worst case mode: Transmit with three antennas

Conducted Emission Test – FCC

Pursuant to 15.207 Emissions Requirement



Result Table QP

Frequency (MHz)	QuasiPeak (dB μ V)	Line	Margin (dB)	Limit (dB μ V)
0.166000	38.1	L1	27.1	65.2
0.222000	39.2	L1	23.5	62.7
0.382000	40.1	L1	18.1	58.2
0.650000	42.1	L1	13.9	56.0
0.782000	35.9	L1	20.1	56.0
13.562000	43.6	L1	16.4	60.0

Result Table AV

Frequency (MHz)	Average (dB μ V)	Line	Margin (dB)	Limit (dB μ V)
0.166000	32.0	L1	23.2	55.2
0.222000	32.4	L1	20.3	52.7
0.382000	34.4	L1	13.8	48.2
0.650000	28.8	L1	17.2	46.0
0.782000	24.3	L1	21.7	46.0
13.562000	42.1	L1	7.9	50.0

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TRF No.: FCC 15C_TX_b

INTERTEK TESTING SERVICES

Applicant: Warner Bros. Home Entertainment Inc.

Date of Test: January 21, 2015

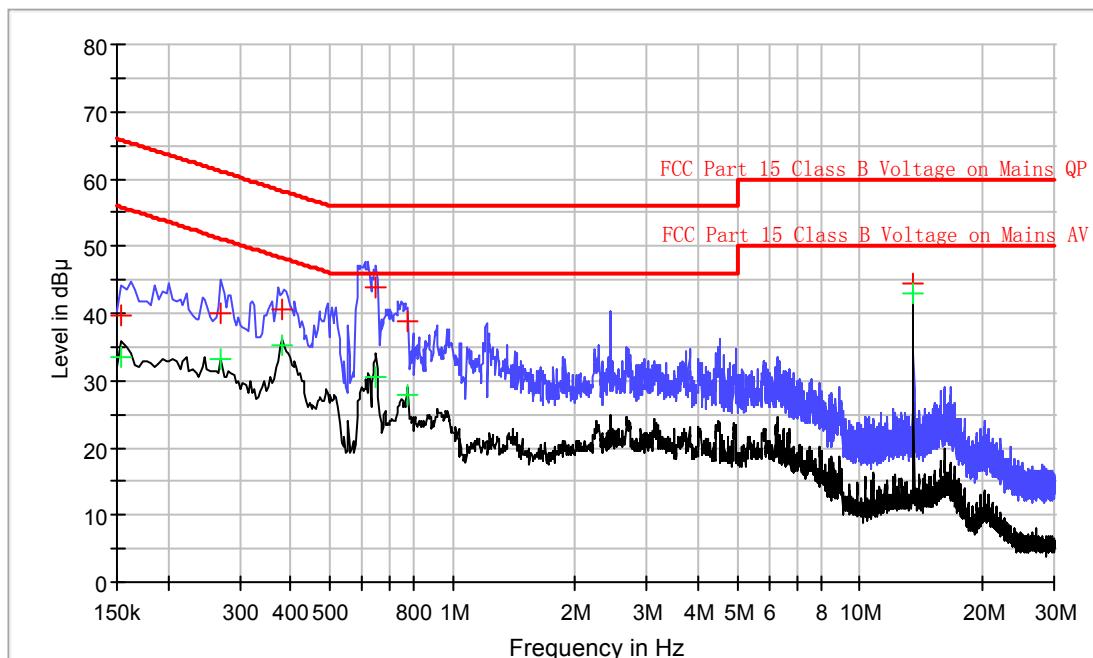
Model: 3000061482

Sample: 1/1

Test worst case mode: Transmit with three antennas

Conducted Emission Test – FCC

Pursuant to 15.207 Emissions Requirement



Result Table QP

Frequency (MHz)	QuasiPeak (dB μ V)	Line	Margin (dB)	Limit (dB μ V)
0.154000	39.8	N	26.0	65.8
0.270000	40.0	N	21.1	61.1
0.382000	40.7	N	17.5	58.2
0.650000	43.9	N	12.1	56.0
0.778000	38.8	N	17.2	56.0
13.562000	44.4	N	15.6	60.0

Result Table AV

Frequency (MHz)	Average (dB μ V)	Line	Margin (dB)	Limit (dB μ V)
0.154000	33.6	N	22.2	55.8
0.270000	33.1	N	18.0	51.1
0.382000	35.1	N	13.1	48.2
0.650000	30.4	N	15.6	46.0
0.778000	27.9	N	18.1	46.0
13.562000	42.9	N	7.1	50.0

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3.5 Frequency Stability

Procedure: 15.225(e), Part 2.1055.

If required, the operating or transmitting frequency of an intentional radiator should be measured in accordance with the following procedure to ensure that the device operates outside certain precluded frequency bands and within the frequency range. No modulation needs to be supplied to the intentional radiator during these tests, unless modulation is required to produce an output, e.g., single-sideband suppressed carrier transmitters.

The frequency stability of the transmitter is measured by:

- a) Temperature: The temperature is varied from -20°C to + 50°C using an environmental chamber.
- b) for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20°C.

The frequency tolerance of the carrier signal shall be maintained within +/- 0.01% of the operating frequency.

Measurement Result:

Voltage (%)	Power	Temperature (°C)	Frequency (MHz)	Limit	Result
100	120Vac	-20	13.559761	$\pm 0.01\%$ ($\pm 1356\text{Hz}$)	Pass
		-10	13.559735		Pass
		0	13.559760		Pass
		10	13.559790		Pass
		20	13.559994		Pass
		30	13.560048		Pass
		40	13.560100		Pass
		50	13.560029		Pass

Temperature (°C)	Power	Voltage (%)	Frequency (MHz)	Limit	Result
20	120Vac	85	13.560061	$\pm 0.01\%$ ($\pm 1356\text{Hz}$)	Pass
		90	13.559935		Pass
		95	13.559960		Pass
		100	13.560030		Pass
		105	13.559994		Pass
		110	13.560048		Pass
		115	13.559990		Pass

Note: The EUT is supplied with DC 5V with Power by USB host Unit.

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4.0 Equipment Photographs

For electronic filing, the photographs are saved with filename: external photos.pdf and internal photos.pdf.

5.0 Product Labelling

For electronics filing, the FCC ID label artwork and the label location are saved with filename: label.pdf.

6.0 Technical Specifications

For electronic filing, the block diagram and schematic of the tested EUT are saved with filename: block.pdf and circuit.pdf respectively.

7.0 Instruction Manual

For electronic filing, a preliminary copy of the Instruction Manual is saved with filename: manual.pdf.

This manual will be provided to the end-user with each unit sold/leased in the United States.

8.0 Miscellaneous Information

This miscellaneous information includes details of the measured bandwidth.

8.1 **Measured Bandwidth**

The plot of bandwidth which shows the fundamental emission is confined in the specified band. The emission of the fundamental is 80.1dB_V/m at 3m and it is below the limit of 90.5dB_V/m in the range of (13.410-13.553MHz and 13.567-13.710MHz) and the limit of 80.5dB_V/m in the frequency range of (13.110-13.410MHz and 13.710-14.010MHz). We cannot find any emission higher than the fundamental emission. Therefore they meet the requirement of Section 15.225(a), (b), (c).

A plot of the worst-case bandwidth as detected in this manner are saved with filename: bw.pdf. And it also shows that the emission is at least 36.01 dB below the carrier level at the band edge (13.110–14.010 MHz). It meets the requirement of Section 15.225 (d).

Pursuant to FCC part 15 Section 15.215(c), the 20dB bandwidth of the emission was contained within the frequency band designated (13.110–14.010 MHz) which the EUT operated. The effects, if any, from frequency sweeping, frequency hopping, other modulation techniques and frequency stability over excepted variations in temperature and supply voltage were considered.

INTERTEK TESTING SERVICES

8.2 Emissions Test Procedures

The following is a description of the test procedure used by Intertek Testing Services in the measurements of transmitters operating under Part 15, Subpart C rules.

The test set-up and procedures described below are designed to meet the requirements of ANSI C63.4 - 2009.

The transmitting equipment under test (EUT) is placed on a wooden turntable which is four feet in diameter and approximately one meter in height above the ground plane. During the radiated emissions test, the turntable is rotated and any cables leaving the EUT are manipulated to find the configuration resulting in maximum emissions. The EUT is adjusted through all three orthogonal axes to obtain maximum emission levels. The antenna height and polarization are varied during the testing to search for maximum signal levels.

Detector function for radiated emissions is in peak mode. Detector function for conducted emissions are in QP & AV mode and IFBW setting is 9kHz from the frequency band 150kHz to 30MHz.

The frequency range scanned is from the lowest radio frequency signal generated in the device which is greater than 9 kHz up to the 1GHz. For line-conducted emissions, the range scanned is 150kHz to 30MHz.

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8.2 Emissions Test Procedures (cont'd)

The EUT is warmed up for 15 minutes prior to the test.

AC power to the unit is varied from 85% to 115% nominal and variation in the fundamental emission field strength is recorded. If battery powered, a new, fully charged battery is used.

Conducted measurements are made as described in ANSI C63.4 - 2009.

The IF bandwidth used for measurement of radiated signal strength was 10 kHz for emission below 30 MHz and 120 kHz for emission from 30 MHz to 1000 MHz. Where pulsed transmissions of short enough pulse duration warrant, a greater bandwidth is selected according to the recommendations of Hewlett Packard Application Note 150-2. A discussion of whether pulse desensitivity is applicable to this unit is included in this report (See Exhibit 8.2).

Transmitter measurements are normally conducted at a measurement distance of three meters. However, to assure low enough noise floor in the restricted bands, signals are acquired at a distance of one meter or less. All measurements are extrapolated to three meters using inverse scaling, but those measurements taken at a closer distance are so marked.

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9.0 Equipment List

Equipment No.	Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Due Date
SZ061-03	BiConiLog Antenna	ETS	3142C	00066460	28-Jun-2014	28-Jun-2015
SZ185-01	EMI Receiver	R&S	ESCI	100547	10-Mar-2014	10-Mar-2015
SZ061-06	Active Loop Antenna	Electro-Metrics	EM-6876	217	29-Apr-2014	29-Apr-2015
SZ188-01	Anechoic Chamber	ETS	RFD-F/A-100	4102	19-Apr-2014	19-Apr-2015
SZ062-02	RF Cable	RADIALL	RG 213U	--	03-Jan-2015	03-Jan-2016
SZ062-05	RF Cable	RADIALL	0.04-26.5GHz	--	09-Oct-2014	09-Apr-2015
SZ062-12	RF Cable	RADIALL	0.04-26.5GHz	--	09-Oct-2014	09-Apr-2015
SZ185-02	EMI Test Receiver	R&S	ESCI	100692	01-Nov-2014	01-Nov-2015
SZ187-01	Two-Line V-Network	R&S	ENV216	100072	01-Nov-2014	01-Nov-2015
SZ187-02	Two-Line V-Network	R&S	ENV216	100073	16-Jun-2014	16-Jun-2015
SZ188-03	Shielding Room	ETS	RFD-100	4100	23-Aug-2014	23-Aug-2015