



# Retlif Testing Laboratories

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FCC Part 15 Report of Measurements  
on

Base Unit Transceiver  
FCC ID: AP8JEBOPF2

**Customer Name:** HBO/Time Warner

**Customer P.O.:** N/A

**Date of Report:** November 9, 2011

**Test Report No.:** R-5449N-2

**Test Start Date:** October 31, 2011

**Test Finish Date:** November 1, 2011

**Test Technician:** M. Seamans

**Branch Manager:** S. Wentworth

**Laboratory Supervisor:** T. Hannemann

**Report Prepared By:** J. Ramsey

**Government Source Inspection:** N/A

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## Certification and Signatures

We certify that these Test Results are true results obtained from the tests of the equipment stated, and relates only to the equipment tested. We further certify that the measurements shown in this Test Results package were made in accordance with the procedures indicated and vouch for the qualifications of all Retlif Testing Laboratories personnel taking them.



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Scott Wentworth  
Branch Manager  
NVLAP Approved Signatory



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Todd Hannamann  
Laboratory Supervisor  
NARTE Certified ATL-0255-T

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The testing services have been performed, findings obtained and reports prepared in accordance with generally accepted laboratory principles and practices. This warranty is in lieu of all others, either expressed or implied.

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Test Report No. R-5449N-2

## Revision History

Revisions to this document are listed below; the latest revised document supersedes all previous issues of this document.

<b>Revision</b>	<b>Date</b>	<b>Pages Affected</b>
-	November 9, 2011	Original Release



**Retlif Testing Laboratories**

Test Report No. R-5449N-2

## Test Program Summary

<b>Job Number:</b>	R-5449N-2
<b>Customer:</b>	Home Box Office, Inc.
<b>Address:</b>	1100 Avenue of the Americas New York, NY 10036-6712
<b>Test Sample:</b>	Base Unit Transceiver
<b>FCC ID:</b>	AP8JEHBOPF2
<b>Brand Name:</b>	Punchforce
<b>Model Number:</b>	Punchforce
<b>Antenna Type:</b>	Yagi – Luxul, Model XW-240-H10
<b>EUT Antenna Connector:</b>	Reverse Polarity SMA (meets 15.203)
<b>Power Requirements:</b>	5 VDC via USB of AC Powered Host
<b>Frequency Band of Operation:</b>	2.400 GHz to 2.4835 GHz
<b>Tested Frequencies:</b>	(3) Lowest channel, mid-band channel and highest channel

### Test Specification:

FCC Rules and Regulations Part 15, Subpart C, Paragraph 15.207 and 15.249

### Test Procedure:

ANSI C63.4:2003, American National Standard, Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz

### Purpose:

The purpose of this test program was to demonstrate compliance of the Base Station Transceiver to the technical requirements of FCC Part 15.207 &15.249.

### Test Methods:

The following table depicts the test methods that were performed on the EUT and the corresponding test results:

Testing Date(s)	Test Method	Test Results
October 31, 2011	15.207 (a) Conducted Emissions	Complied
November 1, 2011	15.249 (a) Fundamental & Harmonic Emissions	Complied
November 1, 2011	15.249 (d) Out of Band/Bandedge Emissions	Complied
November 1, 2011	15.249 (e) Peak Field Strength	Complied



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**Test Sample Description:**

The Punchforce Base Unit Interface is a USB-powered bridge which communicates via wireless link with one or more Punchforce Sensor Units. The Base Unit requests sensor readings from the Punchforce Sensor Units and relays the readings via USB to the host computer. The Punchforce Base Unit utilizes a Luxul, Model XW-240-H10 Yagi antenna which attaches via a reverse polarity sma connector. The reverse polarity sma connector satisfies the requirements of 15.203 for a unique antenna connector. A summary of the EUT cable configuration is below:

System Component/Connector	Length (Meters)	Type	Signal/Cable Description	Routed To
Base Unit /RP SMA	0.60	Shielded	RF/SMA	Antenna
Base Unit	1.0	Shielded	Serial Data/USB	Laptop

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**Test Sample/Test Results Summary:**

- The maximized worst case fundamental field strength did not exceed 50 m V/M (94dB $\mu$ V/M) at a test distance of 3 meters. The measured maximized average field strength was 1638.7 uV/M (64.29 dB $\mu$ V/M) at a frequency of 2453 MHz.
- The field strength of observed harmonic emissions did not exceed 500  $\mu$  V/M (54 dB $\mu$ V/M). The worst case harmonic emission was observed at 4906 MHz at a level of 67 uV/M (36.5 dB $\mu$ V/M).
- The field strength of non-harmonic out of band/bandedge emissions were attenuated more than 50dB below the level of the fundamental or to the limits of 15.209 as applicable. No out of band spurious emissions were observed within 10dB of the specified limit at 3 meter or 1 meter test distances.
- The maximized peak field strength of the emissions did not exceed the maximum permitted average field strength by more than 20 dB.

**Measurement Procedures:****15.249 (a/d) Field Strength of Fundamental, Harmonic and Out of Band/Band Edge Emissions (Radiated Emissions)**

The field strength of the fundamental, harmonic and out of band/bandedge emissions were measured in the frequency range of 30 MHz to 25 GHz. The EUT was plugged into the USB port of the host PC which was placed on a 80cm high wooden test stand located 3 meters from the test antenna on a FCC listed open area test site. Emissions from the EUT were maximized and the field strength of each observed emission was measured, recorded and compared to the specified limits of 15.249 (a)/(d)/(e)/15.209 as appropriate. Peak field strength of emissions were measured, recorded and verified to meet the specified limit (limit corresponds to 20dB above the maximum permitted average limit). When necessary, the marker/delta method was used to verify bandedge compliance.

**15.207 (a) AC Line Conducted Emissions**

The test sample was connected to the USB port of the host computer system and the system was placed on a 0.8m high wooden test stand above the floor of the test area (ground plane). The rear of the EUT was aligned flush with the rear of the test stand. The test stand was situated such that the EUT was located 0.4m from all other grounded surfaces. The AC Power Line of the host computer was connected to an artificial mains network (LISN). The spectrum analyzer was connected to the RF port of the LISN and peak/quasi-peak and average measurements were taken in the frequency range of 150 kHz to 30 MHz on the 120VAC, 60Hz Hot and Neutral Leads.

Test Results: The measured AC line conducted emissions met the limit specified in 15.207 (a).

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## Support Equipment

Description	Manufacturer	Model Number	Serial Number
Boxing Glove Sensor Unit	HBO	Punchforce	110
Laptop	Dell	PP18L	25721192989
Laptop Power Supply	Dell	LA90PSO-00	CN-ODF266-71615-8CH-OB5A
Mouse	Microsoft	N/A	N/A



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## **Test Setup Photographs**



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**Test Setup Photograph(s)  
Radiated Emissions**



Test Setup



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## Test Setup Photograph(s) Radiated Emissions



30 to 1000 MHz, Horizontal Antenna Polarization



30 to 1000 MHz, Vertical Antenna Polarization



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**Test Setup Photograph(s)  
Radiated Emissions**



1 to 18 GHz, Horizontal Antenna Polarization



1 to 18 GHz, Vertical Antenna Polarization



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## Test Setup Photograph(s) Radiated Emissions



18 to 26.5 GHz, Horizontal Antenna Polarization



18 to 26.5 GHz, Vertical Antenna Polarization



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## Test Photographs Conducted Emissions



Test Configuration



Test Setup



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## Equipment Lists

### Radiated Emissions

EN	Manufacturer	Description	Range	Model No.	Cal Date	Due Date
1232	AGILENT / HP	PRE-AMPLIFIER	1 - 26.5GHz	8449B	5/10/2011	5/10/2012
3258	EMCO	DOUBLE RIDGED GUIDE ANTENNA	1 GHZ - 18GHZ	3115	1/12/2011	1/12/2012
5070C	ANDREW	COAXIAL CABLE	10 kHz - 18 GHz	25'	10/26/2011	10/26/2012
5070J	ANDREW	COAXIAL CABLE		2'	10/26/2011	10/26/2012
R444	AGILENT / HP	SPECTRUM ANALYZER ANTENNA	100 Hz - 26.5 GHz	E7405A;A	6/4/2010	6/4/2012
3430	MCS	HORN ANTENNA	18 GHz - 26.5 GHz	K-5039	1/13/2011	1/13/2012
4029	RETLIF	OPEN AREA TEST SITE	3 / 10 Meters	RNH	8/21/2009	8/21/2012
5070	ROHDE & SCHWARZ	EMI TEST RECEIVER	20 Hz - 40 GHz	ESIB40	1/20/2011	1/20/2012
5152	GENERAL TECHNICS	Control Computer		INDUSTRIAL PC	No Calibration Required	
8165	EMCO	BICONILOG	26 - 2000 MHz	3142	6/13/2011	6/13/2012

### Conducted Emissions

EN	Manufacturer	Description	Range	Model No.	Cal Date	Due Date
4027	SOLAR ELECTRONICS	LINE IMPEDANCE STABILIZATION NETWORK	10KHZ-50MHZ	9252-50-R-24BNC	1/13/2011	1/13/2012
4028	ACME	ISOLATION TRANSFORMER		120X240	No Calibration Required	
5030B	NARDA	10DB ATTENUATOR	DC - 12.4 GHz	757C-10	1/11/2011	1/11/2012
5070	ROHDE & SCHWARZ	EMI TEST RECEIVER	20 Hz - 40 GHz	ESIB40	1/20/2011	1/20/2012
5152	GENERAL TECHNICS	Control Computer		INDUSTRIAL PC	No Calibration Required	



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## Test Data



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## RETLIF TESTING LABORATORIES

## TABULAR DATA SHEET

<b>Test Method:</b>	Fundamental Field Strength & Harmonics		
<b>Customer:</b>	Home Box Office, Inc.	<b>Job No:</b>	R-5449N-2
<b>Test Sample:</b>	Base Unit Transceiver		
<b>Model No:</b>	Punchforce	<b>Serial No:</b>	N/A
<b>Test Specification:</b>	FCC Part 15 Paragraph: 15.249 (a)		
<b>Operating Mode:</b>	Transmitting signal		
<b>Technician:</b>	M.Seamans	<b>Date:</b>	November 1, 2011
<b>Notes:</b>	Average Readings to Average Limits		

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## RETLIF TESTING LABORATORIES

## TABULAR DATA SHEET

<b>Test Method:</b>	Fundamental Field Strength & Harmonics		
<b>Customer:</b>	Home Box Office, Inc.	<b>Job No:</b>	R-5449N-2
<b>Test Sample:</b>	Base Unit Transceiver		
<b>Model No:</b>	Punchforce	<b>Serial No:</b>	N/A
<b>Test Specification:</b>	FCC Part 15 Paragraph: 15.249 (a)		
<b>Operating Mode:</b>	Transmitting signal		
<b>Technician:</b>	M.Seamans	<b>Date:</b>	November 1, 2011
<b>Notes:</b>	Average Readings to Average Limits		

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## RETLIF TESTING LABORATORIES

## TABULAR DATA SHEET

<b>Test Method:</b>	Fundamental Field Strength & Harmonics		
<b>Customer:</b>	Home Box Office, Inc.	<b>Job No:</b>	R-5449N-2
<b>Test Sample:</b>	Base Unit Transceiver		
<b>Model No:</b>	Punchforce	<b>Serial No:</b>	N/A
<b>Test Specification:</b>	FCC Part 15 Paragraph: 15.249 (a)		
<b>Operating Mode:</b>	Transmitting signal		
<b>Technician:</b>	M.Seamans	<b>Date:</b>	November 1, 2011
<b>Notes:</b>	Average Readings to Average Limits		

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## RETLIF TESTING LABORATORIES

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<b>Test Method:</b>	Peak Field Strength		
<b>Customer:</b>	Home Box Office, Inc.	<b>Job No:</b>	R-5449N-2
<b>Test Sample:</b>	Base Unit Transceiver		
<b>Model No:</b>	Punchforce	<b>Serial No:</b>	N/A
<b>Test Specification:</b>	FCC Part 15 Paragraph: 15.249 (e)		
<b>Operating Mode:</b>	Transmitting signal		
<b>Technician:</b>	M.Seamans	<b>Date:</b>	November 1, 2011
<b>Notes:</b>	Peak Readings to Peak Limits( 20dB above average limits )		

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<b>Test Method:</b>	Peak Field Strength		
<b>Customer:</b>	Home Box Office, Inc.	<b>Job No:</b>	R-5449N-2
<b>Test Sample:</b>	Base Unit Transceiver		
<b>Model No:</b>	Punchforce	<b>Serial No:</b>	N/A
<b>Test Specification:</b>	FCC Part 15 Paragraph: 15.249 (e)		
<b>Operating Mode:</b>	Transmitting signal		
<b>Technician:</b>	M.Seamans	<b>Date:</b>	November 1, 2011
<b>Notes:</b>	Peak Readings to Peak Limits( 20dB above average limits )		

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<b>Test Method:</b>	Peak Field Strength		
<b>Customer:</b>	Home Box Office, Inc.	<b>Job No:</b>	R-5449N-2
<b>Test Sample:</b>	Base Unit Transceiver		
<b>Model No:</b>	Punchforce	<b>Serial No:</b>	N/A
<b>Test Specification:</b>	FCC Part 15 Paragraph: 15.249 (e)		
<b>Operating Mode:</b>	Transmitting signal		
<b>Technician:</b>	M.Seamans	<b>Date:</b>	November 1, 2011
<b>Notes:</b>	Peak Readings to Peak Limits( 20dB above average limits )		

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# RETLIF TESTING LABORATORIES

## EMISSIONS DATA SHEET

Test Method:	Out of Band Radiated Emissions 30 MHz to 26.5 GHz		
Customer	Home Box Office, Inc.	Job No.	R-5449-2
Test Sample	Base Unit Transceiver		
Model No.	Punchforce	Serial No.	N/A
Test Specification:	FCC Part 15 Subpart C Paragraph: 15.249 (d)		
Operating Mode:	Transmitting signal		
Technician:	M.Seamans	Date:	November 1, 2011
Notes:	Test Distance: 3 Meters		

No EUT emissions were observed above the noisefloor of the test equipment which was a minimum of 10 dB below the specified limit.

## RETLIF TESTING LABORATORIES

## TABULAR DATA SHEET

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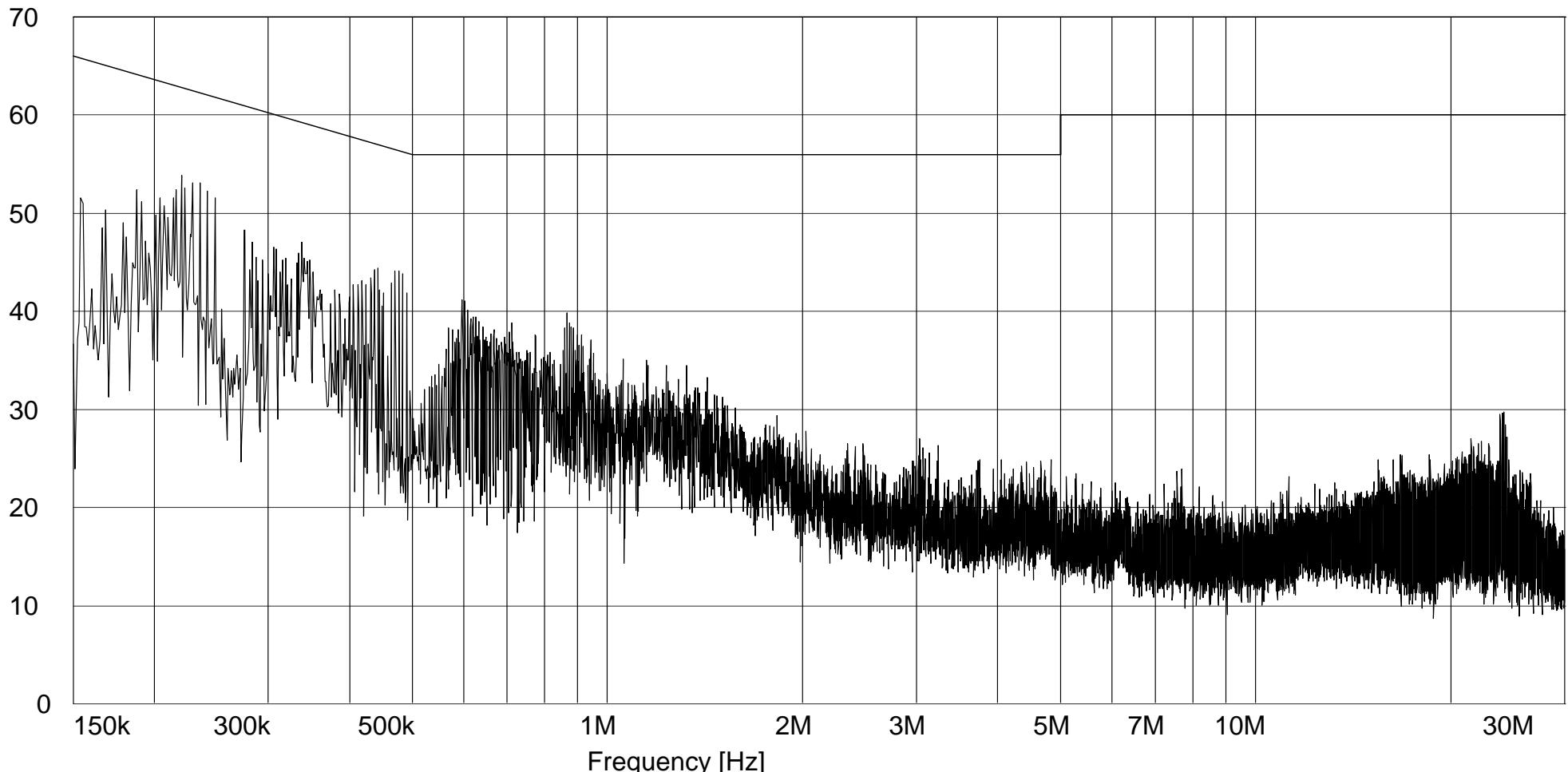
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# RETLIF TESTING LABORATORIES

## EMISSIONS DATA SHEET

Test Method:	Conducted Emissions 150 kHz to 30 MHz		
Customer:	Home Box Office, Inc.	Test Sample:	Base Unit Transceiver
Model No:	Punchforce	Serial No:	N/A
Test Specification:	FCC Part 15 Subpart C		
Operating Mode:	Transmitting and receiving signal		
Notes:	Lead Tested: 120 VAC 60 Hz Hot Peak Readings to Quasi-Peak Limits.		

Level [dB $\mu$ V]

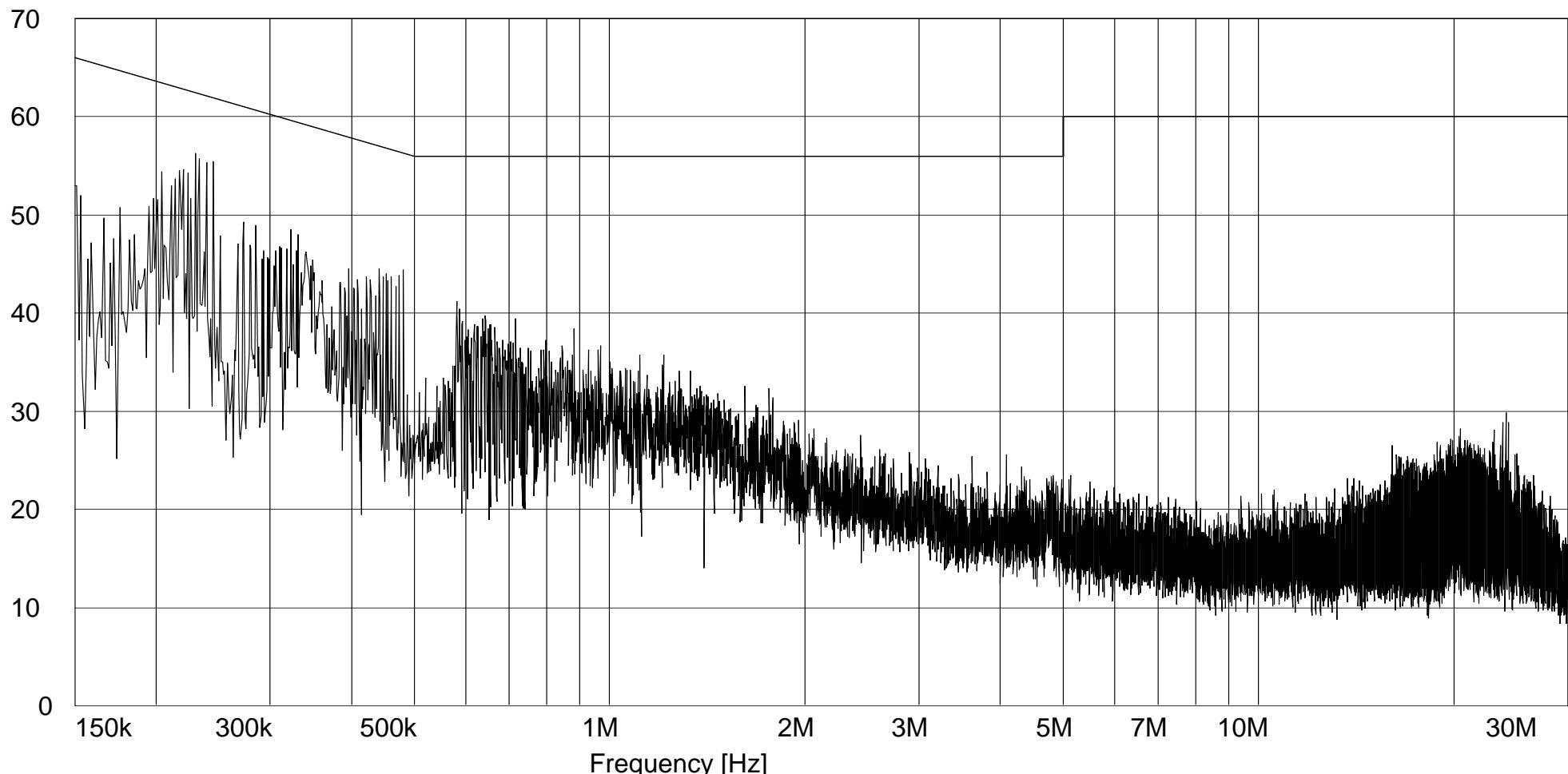


# RETLIF TESTING LABORATORIES

## EMISSIONS DATA SHEET

Test Method:	Conducted Emissions 150 kHz to 30 MHz		
Customer:	Home Box Office, Inc.	Test Sample:	Base Unit Transceiver
Model No:	Punchforce	Serial No:	N/A
Test Specification:	FCC Part 15 Subpart C		
Operating Mode:	Transmitting and receiving signal		
Notes:	Lead Tested: 120 VAC 60 Hz Neutral Peak Readings to Quasi-Peak Limits.		

Level [dB $\mu$ V]

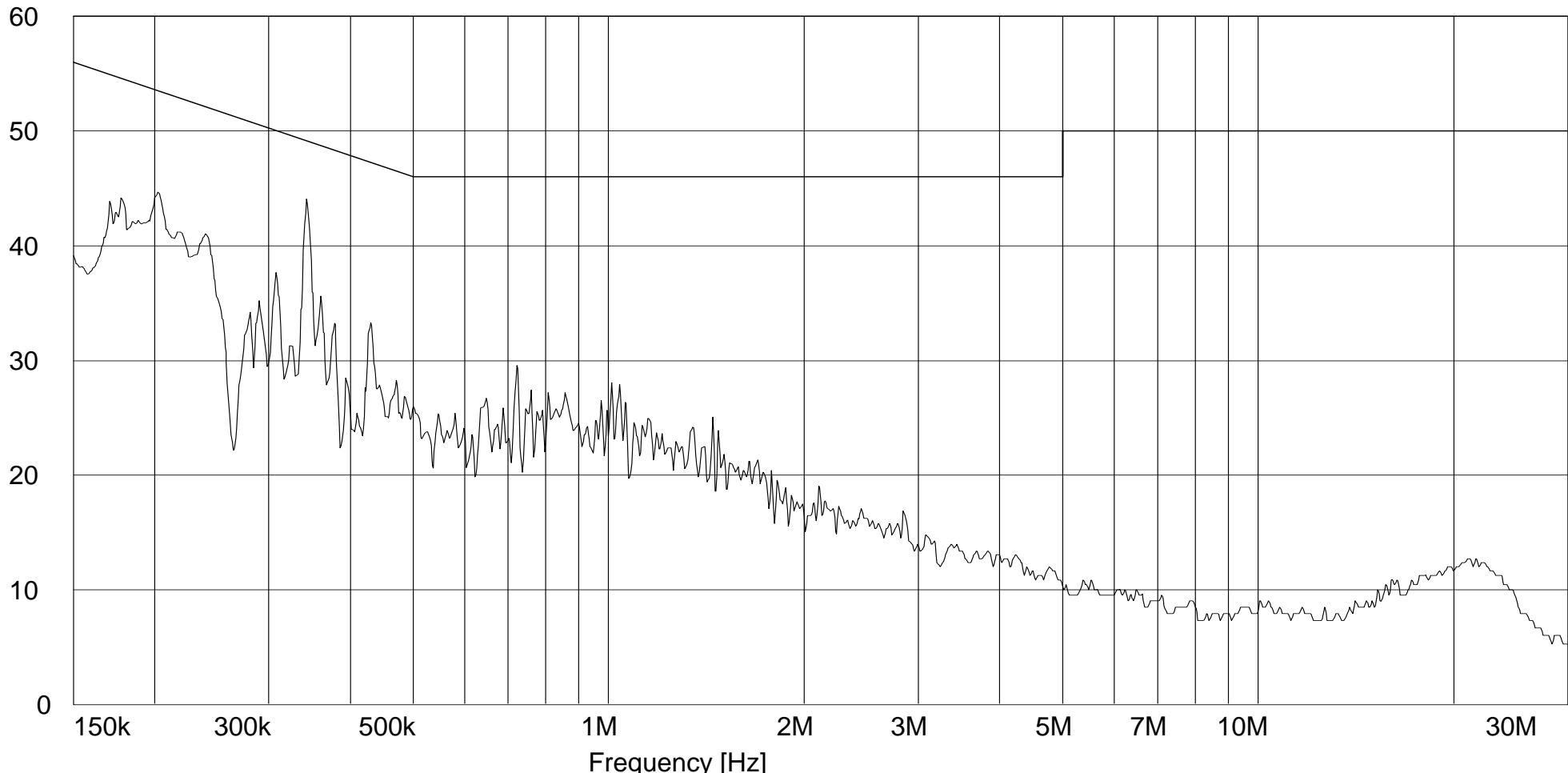


# RETLIF TESTING LABORATORIES

## EMISSIONS DATA SHEET

Test Method:	Conducted Emissions 150 kHz to 30 MHz		
Customer:	Home Box Office, Inc.	Test Sample:	Base Unit Transceiver
Model No:	Punchforce	Serial No:	N/A
Test Specification:	FCC Part 15 Subpart C		
Operating Mode:	Transmitting and receiving signal		
Notes:	Lead Tested: 120 VAC 60 Hz Hot Average Readings to Average Limits.		

Level [dB $\mu$ V]



# RETLIF TESTING LABORATORIES

## EMISSIONS DATA SHEET

Test Method:	Conducted Emissions 150 kHz to 30 MHz		
Customer:	Home Box Office, Inc.	Test Sample:	Base Unit Transceiver
Model No:	Punchforce	Serial No:	N/A
Test Specification:	FCC Part 15 Subpart C		
Operating Mode:	Transmitting and receiving signal		
Notes:	Lead Tested: 120 VAC 60 Hz Neutral    Average Readings to Average Limits.		

Level [dB $\mu$ V]

