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FCC Part 15 Report of Measurements on

Punchforce Boxing Glove Sensor Unit Transceiver
FCC ID: AP8JEHBOPF1

Customer Name: HBO/Time Warner

Customer P.O.: N/A

Date of Report: November 9, 2011

Test Report No.: R-5449N-1

Test Start Date: November 1, 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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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.



Scott Wentworth
Branch Manager
NVLAP Approved Signatory



Todd Hannamann
Laboratory Supervisor
NARTE Certified ATL-0255-T

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Test Report No. R-5449N-1

Revision History

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

Revision	Date	Pages Affected
-	November 9, 2011	Original Release



Retlif Testing Laboratories

Test Report No. R-5449N-1

Test Program Summary

Job Number: R-5449N-1
Customer: HBO/Time Warner
Address: 1100 Avenue of the Americas
New York, NY 10036-6712
Test Sample: Boxing Glove Sensor Unit Transceiver
FCC ID: AP8JEHBOPF1
Brand Name: Punchforce
Model Name: Punchforce
Antenna Type: PCB Chip Antenna
EUT Antenna Connector: None
Power Requirements: 3.7 VDC via Internal Battery
Frequency Band of Operation: 2.400 GHz to 2.4835 GHz
(3) Lowest channel, mid-band channel
and highest channel
Tested Frequencies:

Test Specification:

FCC Rules and Regulations Part 15, Subpart C, Paragraph 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 Punchforce Boxing Glove Sensor Unit Transceiver to the technical requirements of FCC Part 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
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

Test Sample Description:

The Punchforce Boxing Glove Sensor Unit Transceiver (EUT) is a self-contained, battery-powered, wireless inertial measurement and radio telemetry device which is placed in a boxing glove and used to send sensor readings (punch speed & force data) to the Base Station Interface during a boxing match. The EUT has no attached cables.



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Test Sample/Test Results Summary:

- The maximized worst case fundamental field strength did not exceed 50 m V/M (94dB μ V/M) at a test distance of 3 meters. The measured maximized average field strength was 605 μ V/M (55.6 B μ V/M) at a frequency of 2473 MHz.
- The field strength of observed harmonic emissions did not exceed 500 μ V/M. No harmonic emissions were observed within 10dB of the specified limit at 3 meter or 1 meter test distances.
- The field strength of non-harmonic out of band 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 field strength of bandedge emissions were attenuated more than 50dB below the level of the fundamental or to the limits of 15.209 as applicable.
- 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 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.

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Test Report No. R-5449N-1

Test Setup Photographs



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Test Report No. R-5449N-1

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 Report No. R-5449N-1

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 Report No. R-5449N-1

**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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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



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Test Report No. R-5449N-1

Test Data

RETLIF TESTING LABORATORIES

TABULAR DATA SHEET

Test Method:	Fundamental Field Strength & Harmonics		
Customer:	Home Box Office, Inc.	Job No:	R-5449N-1
Test Sample:	Boxing Glove Sensor Unit Transceiver		
Model No:	Punchforce	Serial No:	110
Test Specification:	FCC Part 15 Paragraph: 15.249 (a)		
Operating Mode:	Transmitting signal		
Technician:	M.Seamans	Date:	November 1, 2011
Notes:	Average Readings to Average Limits		

[illegible]

RETLIF TESTING LABORATORIES

TABULAR DATA SHEET

Test Method:	Fundamental Field Strength & Harmonics		
Customer:	Home Box Office, Inc.	Job No:	R-5449N-1
Test Sample:	Boxing Glove Sensor Unit Transceiver		
Model No:	Punchforce	Serial No:	110
Test Specification:	FCC Part 15 Paragraph: 15.249 (a)		
Operating Mode:	Transmitting signal		
Technician:	M.Seamans	Date:	November 1, 2011
Notes:	Average Readings to Average Limits		

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RETLIF TESTING LABORATORIES

TABULAR DATA SHEET

Test Method:	Fundamental Field Strength & Harmonics		
Customer:	Home Box Office, Inc.	Job No:	R-5449N-1
Test Sample:	Boxing Glove Sensor Unit Transceiver		
Model No:	Punchforce	Serial No:	110
Test Specification:	FCC Part 15 Paragraph: 15.249 (a)		
Operating Mode:	Transmitting signal		
Technician:	M.Seamans	Date:	November 1, 2011
Notes:	Average Readings to Average Limits		

[illegible]

RETLIF TESTING LABORATORIES

TABULAR DATA SHEET

Test Method:	Peak Field Strength		
Customer:	Home Box Office, Inc.	Job No:	R-5449N-1
Test Sample:	Boxing Glove Sensor Unit Transceiver		
Model No:	Punchforce	Serial No:	110
Test Specification:	FCC Part 15 Paragraph: 15.249 (e)		
Operating Mode:	Transmitting signal		
Technician:	M.Seamans	Date:	November 1, 2011
Notes:	Peak Readings to Peak Limits(20dB above average limits)		

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RETLIF TESTING LABORATORIES

TABULAR DATA SHEET

Test Method:	Peak Field Strength		
Customer:	Home Box Office, Inc.	Job No:	R-5449N-1
Test Sample:	Boxing Glove Sensor Unit Transceiver		
Model No:	Punchforce	Serial No:	110
Test Specification:	FCC Part 15 Paragraph: 15.249 (e)		
Operating Mode:	Transmitting signal		
Technician:	M.Seamans	Date:	November 1, 2011
Notes:	Peak Readings to Peak Limits(20dB above average limits)		

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RETLIF TESTING LABORATORIES

TABULAR DATA SHEET

Test Method:	Peak Field Strength		
Customer:	Home Box Office, Inc.	Job No:	R-5449N-1
Test Sample:	Boxing Glove Sensor Unit Transceiver		
Model No:	Punchforce	Serial No:	110
Test Specification:	FCC Part 15 Paragraph: 15.249 (e)		
Operating Mode:	Transmitting signal		
Technician:	M.Seamans	Date:	November 1, 2011
Notes:	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-5449N-1

Test Sample

Boxing Glove Sensor Unit Transceiver

Model No.

Punchforce

Serial No.

110

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

[illegible]

RETLIF TESTING LABORATORIES

TABULAR DATA SHEET

Test Method:	Band Edge		
Customer:	Home Box Office, Inc.	Job No:	R-5449N-1
Test Sample:	Boxing Glove Sensor Unit Transceiver		
Part No:	Punchforce	Serial No:	110
Test Specification:	FCC Part 15 Paragraph: 15.249 (d)		
Operating Mode:	Transmitting signal		
Technician:	M.Seamans	Date:	November 1, 2011
Notes:	Peak Readings Test Distance 3 Meters, The EUT was transmitting at the high and low channel frequencies during these measurements.		

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