

## RF Exposure Evaluation declaration

Product Name	HD Streaming Player
Model No.	2500X
FCC ID	TC2R1001

Applicant	Roku, Inc.
Address	12980 Saratoga Avenue Suite #D Saratoga California United States 95070

Date of Receipt	Dec. 22, 2011
Date of Declaration	Jan. 06, 2012
Report No.	11C408R-RFUSP29V01

The declaration results relate only to the samples calculated.

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## 1. RF Exposure Evaluation

### 1.1. Limits

According to FCC 1.1310: The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in 1.1307(b)

#### LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm <sup>2</sup> )	Average Time (Minutes)
(A) Limits for Occupational/ Control Exposures				
300-1500	--	--	F/300	6
1500-100,000	--	--	5	6
(B) Limits for General Population/ Uncontrolled Exposures				
300-1500	--	--	F/1500	6
1500-100,000	--	--	1	30

F= Frequency in MHz

Friis Formula

Friis transmission formula:  $P_d = (P_{out} * G) / (4 * \pi * r^2)$

Where

$P_d$  = power density in mW/cm<sup>2</sup>

$P_{out}$  = output power to antenna in mW

G = gain of antenna in linear scale

$\pi$  = 3.1416

R = distance between observation point and center of the radiator in cm

$P_d$  is the limit of MPE, 1 mW/cm<sup>2</sup>. If we know the maximum gain of the antenna and the total power input to the antenna, through the calculation, we will know the distance r where the MPE limit is reached.

### 1.2. Test Procedure

Software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel individually.

The temperature and related humidity: 18°C and 78% RH.

### 1.3. Test Result of RF Exposure Evaluation

Product : HD Streaming Player  
Test Item : RF Exposure Evaluation  
Test Site : No.3 OATS

#### Antenna Gain

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 3.74 dBi in logarithm scale.

#### 802.11b

##### Output Power Into Antenna & RF Exposure Evaluation Distance (3.74 dBi):

Channel	Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm <sup>2</sup> )
1	2412.00	85.1138	0.040062
6	2437.00	87.2971	0.041089
11	2462.00	90.5733	0.042631

#### 802.11g

##### Output Power Into Antenna & RF Exposure Evaluation Distance (3.74 dBi):

Channel	Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm <sup>2</sup> )
1	2412.00	237.6840	0.111874
6	2437.00	254.6830	0.119876
11	2462.00	262.4219	0.123518

#### 802.11n-20M

##### Output Power Into Antenna & RF Exposure Evaluation Distance (3.74 dBi):

Channel	Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm <sup>2</sup> )
1	2412.00	243.2204	0.114480
6	2437.00	237.6840	0.111874
11	2462.00	252.3481	0.118776

The distance r (4<sup>th</sup> column) calculated from the Fries transmission formula is far shorter than 20 cm separation requirement.