

# ELECTROMAGNETIC EMISSION COMPLIANCE REPORT FOR LOW-POWER, NON-LICENSED TRANSMITTER

**Test Report No.** : OT-201-RWD-045  
**AGR No.** : A19DA-403  
**Applicant** : Homecast CO., LTD.  
**Address** : 14F, Doosan Bldg, Eonju-ro, Gangnam-gu, Seoul, South Korea  
**Manufacturer** : Homecast CO., LTD.  
**Address** : 14F, Doosan Bldg, Eonju-ro, Gangnam-gu, Seoul, South Korea  
**Type of Equipment** : OTT BOX  
**FCC ID.** : 2AVNC-NUI-7050  
**Model Name** : NUI-7050  
**Multiple Model Name** : N/A  
**Serial number** : N/A  
**Total page of Report** : 9 pages (including this page)  
**Date of Incoming** : January 03, 2020  
**Date of issue** : January 31, 2020

## SUMMARY

The equipment complies with the regulation; **FCC PART 15 SUBPART C Section 15.247**

This test report only contains the result of a single test of the sample supplied for the examination.

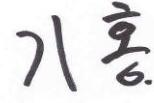
It is not a generally valid assessment of the features of the respective products of the mass-production.

Reviewed by:



Tae-Ho, Kim / Senior Manager  
ONETECH Corp.

Approved by:



Ki-Hong, Nam / General Manager  
ONETECH Corp.

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**Revision History**

Rev. No.	Issue Report No.	Issued Date	Revisions	Section Affected
0	OT-201-RWD-045	January 31, 2020	Initial Release	All

## 1. VERIFICATION OF COMPLIANCE

Applicant : Homecast CO., LTD.  
Address : 14F, Doosan Bldg, Eonju-ro, Gangnam-gu, Seoul, South Korea  
Contact Person : Seoung-Hyun LEE / Deputy General Manager  
Telephone No. : +82-2-3400-8475  
FCC ID : 2AVNC-NUI-7050  
Model Name : NUI-7050  
Serial Number : N/A  
Date : January 31, 2020

EQUIPMENT CLASS	DTS – DIGITAL TRANSMISSION SYSTEM
E.U.T. DESCRIPTION	OTT BOX
THIS REPORT CONCERNS	Original Grant
MEASUREMENT PROCEDURES	ANSI C63.10: 2013
TYPE OF EQUIPMENT TESTED	Pre-Production
KIND OF EQUIPMENT	Certification
AUTHORIZATION REQUESTED	
EQUIPMENT WILL BE OPERATED UNDER FCC RULES PART(S)	FCC PART 15 SUBPART C Section 15.247 558074 D01 15.247 Meas Guidance v05r02 662911 D01 Multiple Transmitter Output v02r01
Modifications on the Equipment to Achieve Compliance	None
Final Test was Conducted On	3 m, Semi Anechoic Chamber

- The above equipment was tested by ONETECH Corp. for compliance with the requirement set forth in the FCC Rules and Regulations. This said equipment in the configuration described in this report, shows the maximum emission levels emanating from equipment are within the compliance requirements.

## 2. GENERAL INFORMATION

### 2.1 Product Description

The Homecast CO., LTD., Model NUI-7050 (referred to as the EUT in this report) is a OTT BOX. Product specification information described herein was obtained from product data sheet or user's manual.

DEVICE TYPE	OTT BOX	
Operating Frequency	2 412 MHz ~ 2 462 MHz (802.11b/g/n(HT20)) 2 422 MHz ~ 2 452 MHz (802.11n(HT40))	
RF Output Power	Antenna 0	Wi-Fi 802.11b (12.91 dBm) Wi-Fi 802.11g (11.46 dBm) Wi-Fi 802.11n(HT20) (5.62 dBm) Wi-Fi 802.11n(HT40) (2.85 dBm)
	Antenna 1	Wi-Fi 802.11b (13.10 dBm) Wi-Fi 802.11g (11.83 dBm) Wi-Fi 802.11n(HT20) (5.75 dBm) Wi-Fi 802.11n(HT40) (3.74 dBm)
	Antenna 0 + Antenna 1	Wi-Fi 802.11n(HT20) (8.70 dBm) Wi-Fi 802.11n(HT40) (6.33 dBm)
Modulation Type	DSSS Modulation(DBPSK/DQPSK/CCK) OFDM Modulation(BPSK/QPSK/16QAM/64QAM)	
Temperature Range	0 °C ~ 50 °C	
Antenna Type	PCB Antenna	
Antenna Gain	3.50 dBi	
List of each Osc. or crystal Freq.(Freq. >= 1 MHz)	40 MHz, 54 MHz	

### 2.2 Alternative type(s)/model(s); also covered by this test report.

- None

## 3. EUT MODIFICATIONS

- None

## 4. MAXIMUM PERMISSIBLE EXPOSURE

### 4.1 RF Exposure Calculation

According to the FCC rule 1.1310 table 1B, the limit for the maximum permissible RF exposure for an uncontrolled environment are  $f/1500 \text{ mW/cm}^2$  for the frequency range between 300 MHz and 1 500 MHz and  $1.0 \text{ mW/cm}^2$  for the frequency range between 1 500 MHz and 100 000 MHz.

The electric field generated for a  $1 \text{ mW/cm}^2$  exposure is calculated as follows:

$$E = \sqrt{(30 * P * G) / d}, \text{ and } S = E^2 / Z = E^2 / 377, \text{ because } 1 \text{ mW/cm}^2 = 10 \text{ W/m}^2$$

Where

$S$  = Power density in  $\text{mW/cm}^2$ ,  $Z$  = Impedance of free space,  $377 \Omega$

$E$  = Electric field strength in  $\text{V/m}$ ,  $G$  = Numeric antenna gain, and  $d$  = distance in meter

Combining equations and rearranging the terms to express the distance as a function of the remaining variable

$$d = \sqrt{(30 * P * G) / (377 * 10 S)}$$

Changing to units of mW and cm, using  $P (\text{mW}) = P (\text{W}) / 1000$ ,  $d (\text{cm}) = 0.01 * d (\text{m})$

$$d = 0.282 * \sqrt{(P * G) / S}$$

Where

$d$  = distance in cm,  $P$  = Power in mW,  $G$  = Numeric antenna gain, and  $S$  = Power density in  $\text{mW/cm}^2$

### 4.2 EUT Description

Kind of EUT	OTT BOX
Device Category	<input type="checkbox"/> Portable (< 20 cm separation) <input type="checkbox"/> Mobile (> 20 cm separation) <input checked="" type="checkbox"/> Others
Exposure	<input checked="" type="checkbox"/> MPE
Evaluation Applied	<input type="checkbox"/> SAR <input type="checkbox"/> N/A

## 4.3 Test data

### 4.3.1 Calculated MPE Safe Distance for Antenna 0

According to above equation, the following result was obtained.

Operating Freq. Band (MHz)	Operating Mode	Target Power W/tolerance	Max tune up power		Antenna Gain		Safe Distance (cm)	Power Density (mW/cm <sup>2</sup> ) @ 20 cm Separation	Limit (mW/cm <sup>2</sup> )
		(dBm)	(dBm)	(mW)	Log	Linear			
2 400 ~ 2 483.5	802.11b	13.0 ± 1.0	14.00	25.12	3.50	2.24	2.11	0.011 2	1.00
	802.11g	11.0 ± 1.0	12.00	15.85			1.68	0.007 1	1.00
	802.11n_ HT20	5.0 ± 1.0	6.00	3.98			0.84	0.001 8	1.00
	802.11n_ HT40	2.5 ± 1.0	3.50	2.24			0.63	0.001 0	1.00

According to above table, for 2 400 ~ 2 483.5 MHz Band(802.11b), safe distance,

$$D = 0.282 * \sqrt{(25.12 * 2.24) / 1.00} = 2.11 \text{ cm}$$

For getting power density at 20 cm separation in above table, following formula was used.

$$S = P * G / (4\pi * R^2) = 25.12 * 2.24 / (4 * 3.14 * 20^2) = 0.011 2$$

Where:

S = Power Density,

P = Power input to the external antenna (Output power from the EUT antenna port (dBm) – cable loss (dB)),

G = Gain of Transmit Antenna (linear gain), R = Distance from Transmitting Antenna



Tested by: Hyung-Kwon, Oh / Assistant Manager

#### 4.3.2 Calculated MPE Safe Distance for Antenna 1

According to above equation, the following result was obtained.

Operating Freq. Band (MHz)	Operating Mode	Target Power W/tolerance	Max tune up power		Antenna Gain		Safe Distance (cm)	Power Density (mW/cm <sup>2</sup> ) @ 20 cm Separation	Limit (mW/cm <sup>2</sup> )
		(dBm)	(dBm)	(mW)	Log	Linear			
2 400 ~ 2 483.5	802.11b	13.0 ± 1.0	14.00	25.12	3.50	2.24	2.11	0.011 2	1.00
	802.11g	12.0 ± 1.0	13.00	19.95			1.88	0.008 9	1.00
	802.11n_ HT20	5.5 ± 1.0	6.50	4.47			0.89	0.002 0	1.00
	802.11n_ HT40	3.5 ± 1.0	4.50	2.82			0.71	0.001 3	1.00

According to above table, for 2 400 ~ 2 483.5 MHz Band(802.11b), safe distance,

$$D = 0.282 * \sqrt{(25.12 * 2.24) / 1.00} = 2.11 \text{ cm}$$

For getting power density at 20 cm separation in above table, following formula was used.

$$S = P * G / (4\pi * R^2) = 25.12 * 2.24 / (4 * 3.14 * 20^2) = 0.011 2$$

Where:

S = Power Density,

P = Power input to the external antenna (Output power from the EUT antenna port (dBm) – cable loss (dB)),

G = Gain of Transmit Antenna (linear gain), R = Distance from Transmitting Antenna



Tested by: Hyung-Kwon, Oh / Assistant Manager

### 4.3.3 Calculated MPE Safe Distance for Multiple Trasnmit

According to above equation, the following result was obtained.

Operating Freq. Band (MHz)	Operating Mode	Target Power W/tolerance	Max tune up power		Antenna Gain		Safe Distance (cm)	Power Density (mW/cm <sup>2</sup> ) @ 20 cm Separation	Combined Power Density (mW/cm <sup>2</sup> ) @ 20 cm Separation	Limit (mW/cm <sup>2</sup> )
		(dBm)	(dBm)	(mW)	Log	Linear				
2 400	802.11n_ HT20 Antenna 0	5.0 ± 1.0	6.00	3.98	3.50	2.24	0.84	0.001 8	0.003 8	1.00
	802.11n_ HT20 Antenna 1	5.5 ± 1.0	6.50	4.47			0.89	0.002 0		1.00
	802.11n_ HT40 Antenna 0	5.0 ± 1.0	6.00	3.98			0.63	0.001 0	0.002 3	1.00
	802.11n_ HT40 Antenna 1	3.5 ± 1.0	4.50	2.82			0.71	0.001 3		1.00



Tested by: Hyung-Kwon, Oh / Assistant Manager