



Radio Frequency Exposure Evaluation Report

FOR:
OpenTV

Model Name:
HW1872

Product Description:
Indoor Location Gateway

FCC ID: 2AYG4-HW1872-1

Per:

CFR Part Part1 (1.1307 &1.1310), Part 2 (2.1091),
FCC KDB 447498 D01 General RF Exposure Guidance v06

Report number: EMC_LOOMA-005-21001_FCC_ISED_MPE

DATE: 2022-01-25



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1 Assessment

This RF Exposure evaluation report provides evidence for compliance of the below identified device with the RF Exposure limits for mobile devices as defined in FCC CFR Part 1 (1.1307 &1.1310) and Part 2 (2.1091) under worst case conditions (measured or rated RF output power, antenna gain, distance towards human body, multiple transmitter information as presented by the applicant).

In addition, maximum antenna gain or minimum distance towards the human body is calculated respectively, where relevant.

The device meets the limits as stipulated by the above given FCC rule parts based on available specifications for worst case conditions at 20cm distance to the body.

Company	Description	Model Name
OpenTV	Indoor Location Gateway	HW1872

Report reviewed by: TCB Evaluator

2022-01-25	Compliance	Kevin Wang (Lab Manager)
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Date	Section	Name	Signature

Responsible for the Report:

2022-01-25	Compliance	Yuchan Lu (Test Engineer)
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Date	Section	Name	Signature

2 Administrative Data

2.1 Identification of the Testing Laboratory Issuing the Test Report

Company Name:	CETECOM Inc.
Department:	Compliance
Street Address:	411 Dixon Landing Road
City/Zip Code	Milpitas, CA 95035
Country	USA
Telephone:	+1 (408) 586 6200
Fax:	+1 (408) 586 6299
Lab Manager:	Kevin Wang
Responsible Project Leader:	Sangeetha Sivaraman

2.2 Identification of the Client / Manufacturer

Client's Name:	OpenTV
Street Address:	5090 North 40th St, Suite 450
City/Zip Code	Phoenix, AZ 85018
Country	USA

Identification of the Manufacturer

Manufacturer's Name:	OpenTV
Manufacturers Address:	5090 North 40th St, Suite 450
City/Zip Code	Phoenix, AZ 85018
Country	USA

3 Equipment under Assessment

Model Name:	HW1872
Marketing Name:	IZG
HW Version :	03-PVT
SW Version :	00.01.00
FCC-ID :	2AYG4-HW1872-1
Regulatory Band:	<ul style="list-style-type: none">❖ <u>Cellular Module:</u><ul style="list-style-type: none">▪ LTE Band 2: 1850 – 1910 MHz▪ LTE Band 4: 1710 – 1755 MHz▪ LTE Band 5: 824 – 849 MHz▪ LTE Band 12: 699 – 716 MHz▪ LTE Band 13: 777 – 787 MHz▪ LTE Band 25: 1850 – 1915 MHz▪ LTE Band 26: 814 – 849 MHz▪ LTE Band 66: 1710 – 1780 MHz❖ <u>WLAN:</u><ul style="list-style-type: none">▪ Nominal band: 2400 MHz – 2483.5 MHz;▪ Center to center: 2412 MHz (ch 1) – 2462 MHz (ch 11), 11 channels
Integrated Module Info:	<ul style="list-style-type: none">❖ <u>WiFi:</u><ul style="list-style-type: none">▪ Manufacture: Silicon Labs▪ Module name/number: RS9116-B00▪ FCC ID: XF6-B001P5V2P1❖ <u>LTE</u><ul style="list-style-type: none">▪ Module: NRF9160-SICA▪ FCC ID: 2ANPO00NRF9160
Antenna Type:	<ul style="list-style-type: none">❖ <u>Cellular:</u> PCB Antenna<ul style="list-style-type: none">▪ Low band peak gain: 2.2 dBi▪ High band peak gain: 4.8 dBi❖ <u>WLAN:</u> PCB Antenna<ul style="list-style-type: none">▪ Antenna gain: 3.1 dBi
Maximum Conducted Output Power:	<ul style="list-style-type: none">❖ <u>Cellular:</u> From Operational Description provided by customer [dBm]: LTE B2, B4, B5, B12, B13, B25, B26 and B66 : 24dBm❖ <u>WLAN:</u> From Operational Description provided by customer [dBm]: 23dBm

Power Supply/ Rated Operating Voltage Range:	Vmin: 4.5 VDC/ Vnom: 5 VDC / Vmax: 5.5 VDC
Operating Temperature Range:	-20°C to 70 °C
Sample Revision:	<input type="checkbox"/> Prototype Unit; <input type="checkbox"/> Production Unit; <input checked="" type="checkbox"/> Pre-Production

4 RF Exposure Limits and FCC and IC Basic Rules

For the specific described radio apparatus the following basic limits and rules apply for both, FCC and IC where not indicated differently.

4.1 Power Density Limits acc. to FCC 1.1310(e) / RSS-102 i5, cl. 4:

FCC

Frequency Range (MHz)	Power density (mW/cm ²)	Averaging time (minutes)
300 – 1500	$f \text{ (MHz)} / 1500$	30
1500 – 100000	1.0	30

IC

300 – 6000	$0.02619 \times f \text{ (MHz)}^{0.6834}$	6
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4.2 Routine Environmental Evaluation Categorical Exclusion Limits acc. to FCC 2.1091(c) / RSS-102, cl. 2.5 (rounded to 1 decimal point):

FCC

operating frequency < 1.5GHz: excluded if ERP < 1.5W / 31.8dBm (EIRP: 33.9 dBm);
operating frequency > 1.5GHz: excluded if ERP < 3.0W / 34.8dBm (EIRP: 36.9 dBm);

IC

300MHz <= operating frequency < 6 GHz: excluded if EIRP < $0.0131 \times f \text{ (MHz)}^{0.6834} \text{ W}$

4.3 RF Exposure Estimation (MPE Estimation)

Having available the source based average output power and peak antenna gain or the ERP/EIRP of the specified device and for a known minimum distance of its radiating structures from the body of persons according to its use cases (at least 20cm) the power density at that distance can be estimated by the following formula for plane-wave equivalent conditions (far-field conditions), when ground reflection is neglected.

$$S = \frac{PG}{4\pi R^2}$$

where: S = power density (mW/cm² or W/m²)

P = power input to the antenna (mW or W)

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna (cm or m)

5 Evaluations

5.1 Analysis of RF Exposure for simultaneous transmission

- Evaluations are based on worst case power density limits for Canada.
- Calculations are made for 20cm.
- Evaluations are based on ERP/EIRP measured or calculated from known gain and conducted output power.
- Cellular can transmit simultaneously with WLAN.

Radio	Freq [MHz]	Max Conducted power [W]	Gain [dBi]	Gain [lin]	EIRP [W]	IC Limit [W/m ²]	FCC Limit [W/m ²]	Actual [W/m ²] ²	How much of IC limit is used up	How much of FCC limit is used up
LTE 2	1850	0.251	4.8	3.02	0.759	4.476	10.000	1.509	33.71%	3.37%
LTE 4	1710	0.251	4.8	3.02	0.759	4.242	10.000	1.509	35.58%	3.55%
LTE 5	824	0.251	2.2	1.66	0.417	2.576	5.493	0.829	32.19%	5.84%
LTE 12	699	0.251	2.2	1.66	0.417	2.302	4.660	0.829	36.03%	7.73%
LTE 13	777	0.251	2.2	1.66	0.417	2.474	5.180	0.829	33.51%	6.47%
LTE 25	1850	0.251	4.8	3.02	0.759	4.476	10.000	1.509	33.71%	3.37%
LTE 26	814	0.251	2.2	1.66	0.417	2.554	5.427	0.829	32.46%	5.97%
LTE 66	1710	0.251	4.8	3.02	0.759	4.242	10.000	1.509	35.58%	3.55%
WLAN	2400	0.199	3.1	2.04	0.406	5.348	10.000	0.808	15.11%	1.51%

Note1: The calculation is based on the distance of 20cm

5.2 Conclusion:

The worst-case simultaneous transmission is LTE 12 simultaneous co-transmission with WLAN, which is using 51.14% of a limit of 100%. The equipment is passing RF exposure requirements for 20cm distance.

6 Revision History

Date	Report Name	Changes to report	Report prepared by
2022-01-25	EMC_LOOMA-005-21001_FCCISED_MPE	Initial Version	Yuchan Lu

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