

Lumi United Technology Co., Ltd.

CE TEST REPORT

SCOPE OF WORK:

Article 3.1a health of RE directive (2014/53/EU) – EMF report

Model:

HM1S-G01

REPORT NUMBER

200702409SHA-005+A1

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Summary

The equipment complies with the requirements according to the following standard(s) or Specification:

1999/519/EC: COUNCIL RECOMMENDATION of 12 July 1999 on the limitation of exposure of the general public to electromagnetic fields (0 Hz to 300 GHz)

EN IEC 62311:2020: Assessment of electronic and electrical equipment related to human exposure restrictions for electromagnetic fields (0 Hz to 300 GHz)

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Revision History

Report No.	Version	Description	Issued Date
200702409SHA-005+A1	Rev. 01	<p>This report is based on the original report 200702409SHA-005 for amendment on 2021-07-20 to include the following changes:</p> <ol style="list-style-type: none"> 1. Added one alternative source for plastic enclosure and plug holder 2. Added one alternative source for Transformer, 3. Added one alternative source for CM choke, 4. Added one alternative source for Y1 capacitor, 5. Changed design of ventilation openings, 6. Remove the HomeKit chip <p>These changes have no effect on the RF function, only the EMC tests were conducted.</p>	July 20, 2021

1.1 Measurement Uncertainty

Item No.	Assessment Items	Relative uncertainty
1	Power density	22%

Note: the assessed relative uncertainty is less than the permissible maximum uncertainty (30%), and therefore the calculated value shall be compared directly with the applicable limit for the evaluation of compliance.

Appendix I

According to assessment method & relevant limit showed in Appendix III of this report, the MPE limit for the frequency higher than 2GHz is 10W/m² (namely 1mW/cm²).

Power density (S) is calculated according to the formula:

$$S = P / (4\pi R^2)$$

Where S = power density in mW/cm²

P = Radiated transmit power in mW

G = numeric gain of transmit antenna

R = distance (cm)

As we can see from the test report 200702409SHA-001&200702409SHA-002:

Mode	Frequency Bands (MHz)	P (dBm)	P (mW)	R (cm)	S (mW/cm ²)	Limit (mW/cm ²)
WIFI	2400~2483.5	17.12	51.52	20	0.0103	1
Zigbee	2400~2483.5	9.57	9.06	20	0.0018	1

Consider all radio transmitters co-located with each module may increase the RF exposure level, the worst configuration is the WIFI+Zigbee, then the max S (power density) is 0.0103+0.0005= 0.0121 mW/cm².

Conclusion: This device complies with requirements of 2014/53/EU (Article 3.1a, human exposure to Electromagnetic Fields).

Appendix II

Definition below must be outlined in the User Manual:

To satisfy RF exposure requirements, a separation distance of **20 cm** or more should be maintained between this device and persons during device operation.

To ensure compliance, operations at closer than this distance is not recommended. The antenna used for this transmitter must not be co-located in conjunction with any other antenna or transmitter

Appendix III

Assessment methods & Limit for Electromagnetic Exposure Evaluation

Assessment methods:

- Far field calculation
- Near field calculation
- Simulation with/without a phantom
- Numerical modeling
- Body/limb current
- SAR
- E and H measurement
- Source modeling
- Direct measurement of physical properties: Contact current

Reference levels for electric, magnetic and electromagnetic fields (Table 2 of 1999/519/EC)

Frequency range	E-field strength (V/m)	H-field strength (A/m)	B-field (uT)	Equivalent plane wave power density S_{eq} (W/m ²)
0-1 Hz	-	$3,2 \times 10^4$	4×10^4	-
1-8 Hz	10 000	$3,2 \times 10^4/f^2$	$4 \times 10^4/f^2$	-
8-25 Hz	10 000	$4\ 000/f$	$5\ 000/f$	-
0,025-0,8 kHz	$250/f$	$4/f$	$5/f$	-
0,8-3 kHz	$250/f$	5	6,25	-
3-150 kHz	87	5	6,25	-
0,15-1 MHz	87	$0,73/f$	$0,92/f$	-
1-10 MHz	$87/f^{1/2}$	$0,73/f$	$0,92/f$	-
10-400 MHz	28	0,073	0,092	2
400-2 000 MHz	$1,375 f^{1/2}$	$0,0037 f^{1/2}$	$0,0046 f^{1/2}$	$f/200$
2-300 GHz	61	0,16	0,20	10

Notes:

1. *f* as indicated in the frequency range column.
2. For frequencies between 100 kHz and 10 GHz, S_{eq} , E^2 , H^2 , and B^2 are to be averaged over any six-minute period.
3. For frequencies exceeding 10 GHz, S_{eq} , E^2 , H^2 , and B^2 are to be averaged over any $68/f^{1.05}$ - minute period (*f* in GHz).
4. No E-field value is provided for frequencies < 1 Hz, which are effectively static electric fields. For most people the annoying perception of surface electric charges will not occur at field strengths less than 25 kV/m. Spark discharges causing stress or annoyance should be avoided.
5. The shading grid stands for the applied limit in this report.

***** END *****