

# **FCC Maximum Permissible RF Exposure (MPE) Estimation Report**

**In accordance with the requirements of  
FCC 47 CFR Part 2(2.1091), ANSI/IEEE C95.1-1992 and  
KDB 447498 D01**

**Product Name:** Stick Logger

**Trademark:** N/A

**Model Name:** LSW-4-C

**Family Model:** LSW-4XXXX-C/LSW-4/LSW-4XXXX

**Report No.:** S19123101102001

**FCC ID:** 2AEPW-LSW-4-C

**Prepared for**

IGEN TECH CO.,Ltd.

A2-B-4, Tianan iPrk, No.228, Linghu Avenue, Wuxi, Jiangsu, China

**Prepared by**

Shenzhen NTEK Testing Technology Co., Ltd.

1/F, Building E, Fenda Science Park, Sanwei Community, Xixiang Street, Bao'an District,  
Shenzhen 518126 P.R.China.

Tel.: +86-755-6115 9388 Fax.: +86-755-6115 6599

Website: <http://www.ntek.org.cn>

## TEST RESULT CERTIFICATION

**Applicant's name** ..... : IGEN TECH CO.,Ltd.

**Address** ..... : A2-B-4, Tianan iPrk, No.228, Linghu Avenue, Wuxi, Jiangsu, China

**Manufacturer's Name** ..... : IGEN TECH CO.,Ltd.

**Address** ..... : A2-B-4, Tianan iPrk, No.228, Linghu Avenue, Wuxi, Jiangsu, China

### Product description

**Product name** ..... : Stick Logger

**Trademark** ..... : N/A

**Model and/or type reference** : LSW-4-C

**Family Model** ..... : LSW-4XXXX-C/LSW-4/LSW-4XXXX

FCC 47 CFR Part 1(1.1310)

FCC 47 CFR Part 2(2.1091)

**Standards** ..... : ANSI/IEEE C95.1-1992

KDB 447498 D01

This device described above has been tested by Shenzhen NTEK. Testing has shown that this device is capable of compliance with MPE specified in FCC 47 CFR Part 2(2.1091) and ANSI/IEEE C95.1-1992. The test results in this report apply only to the tested sample of the stated device/equipment. Other similar device/equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

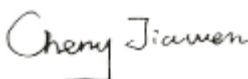
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### Date of Test

**Date (s) of performance of tests**..... : 16 Jan. 2020 ~ 12 Mar. 2020

**Date of Issue** ..... : 12 Mar. 2020

**Test Result** ..... : **Pass**

Prepared By :   
 (Test Engineer) :  
 (Cheng Jiawen)

Approved By :   
 (Lab Manager) :  
 (Sam Chen)

※ ※ Revision History ※ ※

| REV.    | DESCRIPTION                 | ISSUED DATE  | REMARK       |
|---------|-----------------------------|--------------|--------------|
| Rev.1.0 | Initial Test Report Release | 12 Mar. 2020 | Cheng Jiawen |
|         |                             |              |              |
|         |                             |              |              |
|         |                             |              |              |

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## 1 General Information

### 1.1 RF Exposure Requirements

#### 1.1.1 RF Exposure Limits

**Table - 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> ) | Averaging time (minutes) |
|--------------------------------------------------------------|-------------------------------|-------------------------------|-------------------------------------|--------------------------|
| (A) Limits for Occupational/Controlled Exposure              |                               |                               |                                     |                          |
| 0.3-3.0                                                      | 614                           | 1.63                          | *100                                | 6                        |
| 3.0-30                                                       | 1842/f                        | 4.89/f                        | *900/f <sup>2</sup>                 | 6                        |
| 30-300                                                       | 61.4                          | 0.163                         | 1.0                                 | 6                        |
| 300-1,500                                                    |                               |                               | f/300                               | 6                        |
| 1,500-100,000                                                |                               |                               | 5                                   | 6                        |
| (B) Limits for General Population/Uncontrolled Exposure      |                               |                               |                                     |                          |
| 0.3-1.34                                                     | 614                           | 1.63                          | *100                                | 30                       |
| 1.34-30                                                      | 824/f                         | 2.19/f                        | *180/f <sup>2</sup>                 | 30                       |
| 30-300                                                       | 27.5                          | 0.073                         | 0.2                                 | 30                       |
| 300-1,500                                                    |                               |                               | f/1500                              | 30                       |
| 1,500-100,000                                                |                               |                               | 1.0                                 | 30                       |
| f = frequency in MHz * = Plane-wave equivalent power density |                               |                               |                                     |                          |

A rough estimation of the expected exposure in power flux density on a given point can be made with the following equation:

$$S = \frac{P_t * G_t}{4 * \pi * R^2}$$

Where:

S = Power density (mW/cm<sup>2</sup>)

P<sub>t</sub> = Conducted output power (dBm)

G<sub>t</sub> = numeric gain of the antenna in the direction of interest relative to an isotropic radiator (dBi)

R = distance to the centre of radiation of the antenna (cm)

EIRP = P<sub>t</sub> \* G<sub>t</sub>

The antenna of the product, under normal use condition is at least 20 cm away from the body of the user. Warning statement to the user for keeping at least 20cm separation distance and the prohibition of operating to a person has been printed on the user's manual. Therefore, the S of the device is calculated with R=20cm, and if it is below the limit S, then we can conclude the device complies with the rules.

### 1.1.2 Additional Description

An estimation of MPE in this application for product is used to ensure if it complies to the rules of the standard in the regulation list above.

Maximum permissible exposure (MPE) refers to the RF energy that is acceptable for human exposure. It is broken down into two categories, Occupational/controlled and General population/uncontrolled.

Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.

General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or cannot exercise control over their exposure.

We analysis if it comply with the limits for General population/uncontrolled exposure. The FCC's MPE limits for field strength and power density are given in 47CFR 1.1310(Table below).These limits are generally based on recommended exposure guidelines published by the National Council on Radiation Protection and Measurements (NCRP), and also partly based on guidelines recommended by the American National Standards Institute (ANSI) in Section 4.1 of ANSI/IEEE C95.1.

## 1.2 EUT Description

| Device Information              |                                               |           |          |
|---------------------------------|-----------------------------------------------|-----------|----------|
| Product Name                    | Stick Logger                                  |           |          |
| Trade Name                      | N/A                                           |           |          |
| Model Name                      | LSW-4-C                                       |           |          |
| Family Model                    | LSW-4XXXX-C/LSW-4/LSW-4XXXX                   |           |          |
| FCC ID                          | 2AEPW-LSW-4-C                                 |           |          |
| Device Phase                    | Identical Prototype                           |           |          |
| Exposure Category               | General population / Uncontrolled environment |           |          |
| Antenna Type                    | Rod antenna                                   |           |          |
| Antenna Gain                    | 5.0dBi                                        |           |          |
| Device Operating Configurations |                                               |           |          |
| Supporting Mode(s)              | WLAN 2.4G/5.2G/5.8G                           |           |          |
| Test Modulation                 | WLAN(DSSS/OFDM)                               |           |          |
| Operating Frequency Range(s)    | Band                                          | Tx (MHz)  | Rx (MHz) |
|                                 | WLAN 2.4G                                     | 2412-2462 |          |
|                                 | WLAN 5.2G                                     | 5180-5240 |          |
|                                 | WLAN 5.8G                                     | 5745-5825 |          |

## 1.3 Test specification(s)

|                                             |
|---------------------------------------------|
| FCC 47 CFR Part 1(1.1310)                   |
| FCC 47 CFR Part 2(2.1091)                   |
| ANSI/IEEE C95.1-1992                        |
| KDB 447498 D01 General RF Exposure Guidance |

## 1.4 Ambient Condition

|                     |             |
|---------------------|-------------|
| Ambient temperature | 20°C – 24°C |
| Relative Humidity   | 30% – 70%   |

2 RF Output Power

2.4Gwifi

| Condition | Mode          | Frequency (MHz) | Antenna | Conducted Power (dBm) | Limit (dBm) | Verdict |
|-----------|---------------|-----------------|---------|-----------------------|-------------|---------|
| NVNT      | 802.11b       | 2412            | Ant 1   | 11.92                 | 30          | Pass    |
| NVNT      | 802.11b       | 2437            | Ant 1   | 11.7                  | 30          | Pass    |
| NVNT      | 802.11b       | 2462            | Ant 1   | 10.47                 | 30          | Pass    |
| NVNT      | 802.11g       | 2412            | Ant 1   | 11.95                 | 30          | Pass    |
| NVNT      | 802.11g       | 2437            | Ant 1   | 11.95                 | 30          | Pass    |
| NVNT      | 802.11g       | 2462            | Ant 1   | 10.51                 | 30          | Pass    |
| NVNT      | 802.11n(HT20) | 2412            | Ant 1   | 12.17                 | 30          | Pass    |
| NVNT      | 802.11n(HT20) | 2437            | Ant 1   | 12.3                  | 30          | Pass    |
| NVNT      | 802.11n(HT20) | 2462            | Ant 1   | 10.72                 | 30          | Pass    |
| NVNT      | 802.11n(HT40) | 2422            | Ant 1   | 11.75                 | 30          | Pass    |
| NVNT      | 802.11n(HT40) | 2437            | Ant 1   | 11.04                 | 30          | Pass    |
| NVNT      | 802.11n(HT40) | 2452            | Ant 1   | 10.48                 | 30          | Pass    |

## 5.2G wifi

| Condition | Mode          | Frequency (MHz) | Antenna | Conducted Power (dBm) | Duty Factor (dB) | Total Power (dBm) | Limit (dBm) | Verdict |
|-----------|---------------|-----------------|---------|-----------------------|------------------|-------------------|-------------|---------|
| NVNT      | 802.11a       | 5180            | Ant 1   | 7.91                  | 0                | 7.91              | 23.98       | Pass    |
| NVNT      | 802.11a       | 5200            | Ant 1   | 7.5                   | 0                | 7.5               | 23.98       | Pass    |
| NVNT      | 802.11a       | 5240            | Ant 1   | 7.74                  | 0                | 7.74              | 23.98       | Pass    |
| NVNT      | 802.11ac20    | 5180            | Ant 1   | 7.43                  | 0                | 7.43              | 23.98       | Pass    |
| NVNT      | 802.11ac20    | 5200            | Ant 1   | 7.23                  | 0                | 7.23              | 23.98       | Pass    |
| NVNT      | 802.11ac20    | 5240            | Ant 1   | 7.17                  | 0                | 7.17              | 23.98       | Pass    |
| NVNT      | 802.11ac40    | 5190            | Ant 1   | 4.71                  | 0                | 4.71              | 23.98       | Pass    |
| NVNT      | 802.11ac40    | 5230            | Ant 1   | 4.84                  | 0                | 4.84              | 23.98       | Pass    |
| NVNT      | 802.11n(HT20) | 5180            | Ant 1   | 7.83                  | 0                | 7.83              | 23.98       | Pass    |
| NVNT      | 802.11n(HT20) | 5200            | Ant 1   | 7.27                  | 0                | 7.27              | 23.98       | Pass    |
| NVNT      | 802.11n(HT20) | 5240            | Ant 1   | 7.21                  | 0                | 7.21              | 23.98       | Pass    |
| NVNT      | 802.11n(HT40) | 5190            | Ant 1   | 5.18                  | 0                | 5.18              | 23.98       | Pass    |
| NVNT      | 802.11n(HT40) | 5230            | Ant 1   | 5.3                   | 0                | 5.3               | 23.98       | Pass    |

## 5.8G wifi

| Condition | Mode          | Frequency (MHz) | Antenna | Conducted Power (dBm) | Duty Factor (dB) | Total Power (dBm) | Limit (dBm) | Verdict |
|-----------|---------------|-----------------|---------|-----------------------|------------------|-------------------|-------------|---------|
| NVNT      | 802.11a       | 5745            | Ant 1   | 9.31                  | 0                | 9.31              | 30          | Pass    |
| NVNT      | 802.11a       | 5785            | Ant 1   | 9.47                  | 0                | 9.47              | 30          | Pass    |
| NVNT      | 802.11a       | 5825            | Ant 1   | 9.48                  | 0                | 9.48              | 30          | Pass    |
| NVNT      | 802.11ac20    | 5745            | Ant 1   | 8.41                  | 0                | 8.41              | 30          | Pass    |
| NVNT      | 802.11ac20    | 5785            | Ant 1   | 8.87                  | 0                | 8.87              | 30          | Pass    |
| NVNT      | 802.11ac20    | 5825            | Ant 1   | 8.46                  | 0                | 8.46              | 30          | Pass    |
| NVNT      | 802.11ac40    | 5755            | Ant 1   | 8.73                  | 0                | 8.73              | 30          | Pass    |
| NVNT      | 802.11ac40    | 5795            | Ant 1   | 8.52                  | 0                | 8.52              | 30          | Pass    |
| NVNT      | 802.11n(HT20) | 5745            | Ant 1   | 9.15                  | 0                | 9.15              | 30          | Pass    |
| NVNT      | 802.11n(HT20) | 5785            | Ant 1   | 9.47                  | 0                | 9.47              | 30          | Pass    |
| NVNT      | 802.11n(HT20) | 5825            | Ant 1   | 9.27                  | 0                | 9.27              | 30          | Pass    |
| NVNT      | 802.11n(HT40) | 5755            | Ant 1   | 9.37                  | 0                | 9.37              | 30          | Pass    |
| NVNT      | 802.11n(HT40) | 5795            | Ant 1   | 9.51                  | 0                | 9.51              | 30          | Pass    |

### 3 RF Exposure Evaluation

#### 3.1 Operation in WLAN 2.4G

| Antenna | Maximum output power (dBm) | Gain (dBi) | EIRP (dBm) | EIRP (mW) | R(cm) | S (mW/cm <sup>2</sup> ) | MPE Limit (mW/cm <sup>2</sup> ) | Conclusion |
|---------|----------------------------|------------|------------|-----------|-------|-------------------------|---------------------------------|------------|
| Ant 1   | 12.3                       | 5          | 17.3       | 53.7      | 20    | 0.0107                  | 1                               | Pass       |

#### 3.2 Operation in WLAN 5G

| Antenna | Maximum output power (dBm) | Gain (dBi) | EIRP (dBm) | EIRP (mW) | R(cm) | S (mW/cm <sup>2</sup> ) | MPE Limit (mW/cm <sup>2</sup> ) | Conclusion |
|---------|----------------------------|------------|------------|-----------|-------|-------------------------|---------------------------------|------------|
| Ant 1   | 9.51                       | 5          | 14.51      | 28.25     | 20    | 0.0056                  | 1                               | Pass       |

This product does not support the requirements under multiple sources.

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