

## HEALTH TEST REPORT

For

Allterco Robotics

wifi smart plug

Test Model: Shelly Plug S

Additional Model No.: Please Refer to Page 7

Prepared for	: Allterco Robotics
Address	: 103 Cherni Vrah, Sofia, Bulgaria, Post Code: 1407
Prepared by	: Shenzhen LCS Compliance Testing Laboratory Ltd.
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Date of receipt of test sample	: September 24, 2019
Number of tested samples	: 1
Serial number	: Prototype
Date of Test	: September 24, 2019 ~ September 30, 2019
Date of Report	: October 15, 2019



**HEALTH TEST REPORT****EN 50663: 2017**

Assessment of electronic and electrical equipment related to human exposure restrictions for electromagnetic fields (0 Hz - 300 GHz)

**Report Reference No. .... : LCS190920057AEC****Date of Issue..... : October 15, 2019****Testing Laboratory Name ..... : Shenzhen LCS Compliance Testing Laboratory Ltd.**Address..... : 101, 601, Xingyuan Industrial Park, Gushu Community, Xixiang Street, Bao' an District, Shenzhen, Guangdong, China  
Full application of Harmonised standards ☒Testing Location/ Procedure ..... : Partial application of Harmonised standards ☐  
Other standard testing method ☐**Applicant's Name ..... : Allterco Robotics**

Address..... : 103 Cherni Vrah, Sofia, Bulgaria, Post Code: 1407

**Test Specification**

Standard..... : EN 50663: 2017

Test Report Form No. .... : LCSEMC-1.0

TRF Originator..... : Shenzhen LCS Compliance Testing Laboratory Ltd.

Master TRF ..... : Dated 2011-03

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**Test Item Description..... : wifi smart plug**

Trade Mark ..... : N/A

Model/ Type reference ..... : Shelly Plug S

Ratings ..... : 110-230V~, 10A, 50/60Hz

**Result ..... : Positive**

..

**Compiled by:***Jayden Zhuo*

Jayden Zhuo / Administrators

**Supervised by:***Aking Jin*

Aking Jin / Technique principal

**Approved by:**

Gavin Liang / Manager

**HEALTH --TEST REPORT****Test Report No. : LCS190920057AEC**October 15, 2019

Date of issue

Type / Model..... : Shelly Plug S

EUT..... : wifi smart plug

**Applicant..... : Alterco Robotics**

Address..... : 103 Cherni Vrah, Sofia, Bulgaria, Post Code: 1407

Telephone..... : /

Fax..... : /

**Manufacturer..... : Alterco Robotics**

Address..... : 103 Cherni Vrah, Sofia, Bulgaria, Post Code: 1407

Telephone..... : /

Fax..... : /

**Factory..... : Alterco Robotics**

Address..... : 103 Cherni Vrah, Sofia, Bulgaria, Post Code: 1407

Telephone..... : /

Fax..... : /

**Test Result****Positive**

The test report merely corresponds to the test sample.

It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

## Revision History

Revision	Issue Date	Revisions	Revised By
000	October 15, 2019	Initial Issue	Gavin Liang

## 1. GENERAL INFORMATION

### 1.1. Product Description for Equipment Under Test (EUT)

EUT : wifi smart plug  
 Test Model : Shelly Plug S  
 Power Supply : 110-230V~, 10A, 50/60Hz  
 Hardware Version : /  
 Software Version : /

#### 2.4G WLAN

Frequency Range : 2.412-2.472GHz  
 Channel Number : 13 Channels for WIFI 20MHz Bandwidth(802.11b/g/n-HT20)  
 Channel Spacing : 5MHz  
 Modulation Type : IEEE 802.11b: DSSS(CCK, DQPSK, DBPSK)  
 IEEE 802.11g: OFDM(64QAM, 16QAM, QPSK, BPSK)  
 IEEE 802.11n: OFDM (64QAM, 16QAM,QPSK,BPSK)

Antenna Description : Internal Antenna,1.5dBi (Max.)

### 1.2. Objective

According to its specifications, the EUT must comply with the requirements of the following standards:  
 EN 50663: 2017 –Assessment of electronic and electrical equipment related to human exposure restrictions for electromagnetic fields (0 Hz - 300 GHz)

### 1.3. Test Methodology

All measurements contained in this report were conducted with EN 50663: 2017.

### 1.4. Facilities

All measurement facilities used to collect the measurement data are located at 101, 601, Xingyuan Industrial Park, Gushu Community, Xixiang Street, Bao' an District, Shenzhen, Guangdong, China .

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

### 1.5. Host System Configuration List and Details

Manufacturer	Description	Model	Type	Certificate
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### 1.6. External I/O Cable

I/O Port Description	Quantity	Cable
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## 1.7. Equipment

Radiated emissions are measured with one or more of the following types of linearly polarized antennas: tuned dipole, bi-conical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements. Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers.

Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

## 1.8. Laboratory Accreditations And Listings

### Site Description

EMC Lab. : FCC Registration Number is 254912.  
 Industry Canada Registration Number is 9642A-1.  
 EMSD Registration Number is ARCB0108.  
 UL Registration Number is 100571-492.  
 TUV SUD Registration Number is SCN1081.  
 TUV RH Registration Number is UA 50296516-001.  
 NVLAP Accreditation Code is 600167-0.  
 FCC Designation Number is CN5024.  
 CAB identifier: CN0071.

Name of Firm : Shenzhen LCS Compliance Testing Laboratory Ltd.

Site Location : 101, 601, Xingyuan Industrial Park, Gushu Community, Xixiang Street,  
 Bao' an District, Shenzhen, Guangdong, China

## 1.9. Measurement Uncertainty

Test Item		Uncertainty
Radio Frequency	:	$0.9 \times 10^{-4}$
Total RF Power, Conducted	:	1.0 dB
RF Power Density, Conducted	:	1.8 dB
Spurious Emissions, Conducted	:	1.8 dB
All Emissions, Radiated	:	3.1 dB
Temperature	:	0.5 °C
Humidity	:	1 %
DC And Low Frequency Voltages	:	1 %

## 2. HUMAN EXPOSURE TO THE ELECTROMAGNETIC FIELDS

### 2.1 Basic Restrictions Reference levels

Council Recommendation 1999/519/EC Annex II

Basic restrictions for electric, magnetic and electromagnetic fields (0Hz to 300GHz)

Frequency range	Magnetic flux density (mT)	Current density (Ma/m <sup>2</sup> ) (rms)	Whole body average SAR (W/kg)	Localised SAR (head and trunk) (W/kg)	Localised SAR (limbs) (W/kg)	Power density (W/m <sup>2</sup> )
0Hz	40	-	-	-	-	-
>0-1Hz	-	8	-	-	-	-
1-4Hz	-	8/f	-	-	-	-
4-1000Hz	-	2	-	-	-	-
1000Hz-100kHz	-	f/500	-	-	-	-
100kHz-10MHz	-	f/500	0.08	2	4	-
10MHz-10GHz	-	-	0.08	2	4	-
10-300GHz	-	-	-	-	-	10

Note:

1. f is the frequency in Hz.
2. The basic restriction on the current density is intended to protect against acute exposure effects on central nervous system tissues in the head and trunk of the body and includes a safety factor. The basic restrictions for ELF fields are based on established adverse effects on the central nervous system. Such acute effects are essentially instantaneous and there is no scientific justification to modify the basic restrictions for exposure of short duration. However, since the basic restriction refers to adverse effects on the central nervous system, this basic restriction may permit higher current densities in body tissues other than the central nervous system under the same exposure conditions.
3. Because of electrical inhomogeneity of the body, current densities should be averaged over a cross section of 1cm<sup>2</sup> perpendicular to the current direction.
4. For frequencies up to 100 kHz, peak current density values can be obtained by multiplying the rms value by  $\sqrt{2}$  (=1.414). For pulses of duration  $t_p$  the equivalent frequency to apply in the basic restrictions should be calculated as  $f = 1/(2t_p)$ .
5. For frequencies up to 100kHz and for pulsed magnetic fields, the maximum current density associated with the pulses can be calculated from the rise/fall times and the maximum rate of change of magnetic flux density. The induced current density can then be compared with the appropriate basic restriction.
6. All SAR values are to be averaged over any six-minute period.
7. Localised SAR averaging mass is any 10g of contiguous tissue; the maximum SAR so obtained should be the value used for the estimation of exposure. These 10g of tissue are intended to be a mass of contiguous tissue with nearly homogeneous electrical properties. In specifying a contiguous mass of tissue, it is recognised that this concept can be used in computational dosimetry but may present difficulties for direct physical measurements. A simple geometry such as cubic tissue mass can be used provided that the calculated dosimetric quantities have conservation values relative to the exposure guidelines.

8. For pulses of duration  $t_p$  the equivalent frequency to apply in the basic restrictions should be calculated as  $=1/(2t_p)$ . Additionally, for pulsed exposures, in the frequency range 0,3 to 10GHz and for localised exposure of the head, in order to limit and avoid auditory effects caused by thermoelastic expansion, an additional basic restriction is recommended. This is that SA should not exceed 2mJ kg-1 averaged over 10g of tissue.

## 2.2 Reference Levels

Council Recommendation 1999/519/EC Annex II

Basic restrictions for electric, magnetic and electromagnetic fields (0Hz to 300GHz)

Frequency range	E-field strength (V/m)	H-field strength (A/m)	B-field (μT)	Equivalent plane wave power density Seq (W/m2)
0-1Hz	-	$3,2 \times 10^4$	$4 \times 10^4$	-
1-8Hz	1000	$3,2 \times 10^4 / f^2$	$4 \times 10^4 / f^2$	-
8-25Hz	1000	$4000 / f$	$5000 / f$	-
0.025Hz-0,8kHz	$250 / f$	$4 / f$	$5 / f$	-
0,8-3kHz	$250 / f$	5	6,25	-
3-150kHz	87	5	6,25	-
0,15-1MHz	87	$0,73 / f$	$0,92 / f$	-
1-10MHz	$87 / f^{1/2}$	$0,73 / f$	$0,92 / f$	-
10-400MHz	28	0.073	0,092	2
400-2000MHz	$1,375 f^{1/2}$	$0,0037 f^{1/2}$	$0,0046 f^{1/2}$	$f / 200$
2-300GHz	61	0,16	0,20	10

Note:

1.  $f$  is the frequency in Hz.
2. The basic restriction on the current density is intended to protect against acute exposure effects on central nervous system tissues in the head and trunk of the body and includes a safety factor. The basic restrictions for ELF fields are based on established adverse effects on the central nervous system. Such acute effects are essentially instantaneous and there is no scientific justification to modify the basic restrictions for exposure of short duration. However, since the basic restriction refers to adverse effects on the central nervous system, this basic restriction may permit higher current densities in body tissues other than the central nervous system under the same exposure conditions.
3. Because of electrical inhomogeneity of the body, current densities should be averaged over a cross section of 1cm<sup>2</sup> perpendicular to the current direction.
4. For frequencies up to 100 kHz, peak current density values can be obtained by multiplying the rms value by  $\sqrt{2}$  ( $=1.414$ ). For pulses of duration  $t_p$  the equivalent frequency to apply in the basic restrictions should be calculated as  $=1/(2t_p)$
5. For frequencies up to 100kHz and for pulsed magnetic fields, the maximum current density associated with the pulses can be calculated from the rise/fall times and the maximum rate of change of magnetic flux density. The induced current density can then be compared with the appropriate basic restriction.
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7. Localised SAR averaging mass is any 10g of contiguous tissue; the maximum SAR so obtained should be the value used for the estimation of exposure. These 10g of tissue are intended to be a mass of contiguous tissue with nearly homogeneous electrical properties. In specifying a contiguous mass of tissue, it is recognised that this concept can be used in computational dosimetry but may present difficulties for direct physical measurements. A simple geometry such as cubic tissue mass can be used



provided that the calculated dosimetric quantities have conservation values relative to the exposure guidelines.

8. For pulses of duration  $t_p$  the equivalent frequency to apply in the basic restrictions should be calculated as  $f = 1/(2t_p)$ . Additionally, for pulsed exposures, in the frequency range 0.3 to 10GHz and for localised exposure of the head, in order to limit and avoid auditory effects caused by thermoelastic expansion, an additional basic restriction is recommended. This is that SA should not exceed 2mJ kg<sup>-1</sup> averaged over 10g of tissue.

#### Classification of the assessment methods

The antenna of the product, under normal use condition is at least 20cm away from the body of the user. Warning statement on the user for keeping 20cm separation distance and the prohibition of operating to a person has been printed on the user manual. So, this product under normal use is located on electromagnetic far field between the human body.

#### Far Field Calculation Formula

$$E = \frac{\sqrt{30 \times G \times TP}}{D}$$

Where

$G$ : numerical gain of transmitting antenna;

$TP$ : Transmitted power in watt;

$D$ : distance from the transmitting antenna in meter.

### 2.3. Test Results

According to the radio test report (LCS190920057AEB):

Mode	Output Power To Antenna (dBm)	Antenna Gain (dBi)	Minimum Distance in Meter (m)	E-field Strength (V/m)	E-field Strength Limit (V/m)	Result
2.4G WLAN	14.71	1.5	0.2	5.5948	61.00	Pass

This proves that the unit complies with the EN 50663 for RF exposure requirement.

-----THE END OF TEST REPORT-----