

**ETSI EN 300 220-1 V3.1.1 (2017-02)**

**ETSI EN 300 220-2 V3.2.1 (2018-06)**

## TEST REPORT

For

**Shenzhen Sonoff Technologies Co.,Ltd.**

1001, BLDG8, Lianhua Industrial Park, Shenzhen, GD, China

**Tested Model: 4CHPROR3**

<b>Report Type:</b> Original Report	<b>Product Type:</b> 4-gang Wi-Fi Smart Switch with RF Control
<b>Report Number:</b>	DG1220420-15273E-22A
<b>Report Date:</b>	2022-06-11
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## TABLE OF CONTENTS

<b>GENERAL INFORMATION .....</b>	<b>3</b>
PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT) .....	3
TECHNICAL SPECIFICATION.....	3
OBJECTIVE .....	3
TEST METHODOLOGY.....	3
MEASUREMENT UNCERTAINTY .....	4
DECLARATIONS .....	4
<b>SYSTEM TEST CONFIGURATION .....</b>	<b>5</b>
DESCRIPTION OF TEST CONFIGURATION.....	5
EQUIPMENT MODIFICATIONS.....	5
EUT EXERCISE SOFTWARE .....	5
SUPPORT EQUIPMENT LIST AND DETAILS.....	5
BLOCK DIAGRAM OF TEST SETUP .....	6
<b>SUMMARY OF TEST RESULTS .....</b>	<b>8</b>
<b>4.2.1 – OPERATING FREQUENCY .....</b>	<b>9</b>
APPLICABLE STANDARD.....	9
LIMIT.....	9
RESULT .....	9
<b>4.2.2 – UNWANTED EMISSIONS IN THE SPURIOUS DOMAIN .....</b>	<b>10</b>
APPLICABLE STANDARD.....	10
LIMIT.....	10
METHOD OF MEASUREMENT .....	10
TEST DATA.....	11
<b>4.4.2 – BLOCKING.....</b>	<b>12</b>
APPLICABLE STANDARD.....	12
METHOD OF MEASUREMENT .....	12
TEST DATA.....	13
<b>EXHIBIT A - EUT PHOTOGRAPHS .....</b>	<b>14</b>
<b>EXHIBIT B - TEST SETUP PHOTOGRAPHS.....</b>	<b>15</b>
RE BELOW 1GHZ.....	15

## GENERAL INFORMATION

### Product Description for Equipment under Test (EUT)

<b>Product Name:</b>	4-gang Wi-Fi Smart Switch with RF Control
<b>Test Model:</b>	4CHPROR3
<b>Rated Input Voltage:</b>	DC 9-23V (Typical: DC 12V from adapter): output channels is in switching mode; AC 100-240V 50/60Hz: output channels is in switching & output mode
<b>Serial Number:</b>	DG1220420-15273E-RF -S1
<b>EUT Received Date:</b>	2022.4.21
<b>EUT Received Status:</b>	Good

Note: Manufacturer declared that AC & DC power supply are not compatible at the same time

### Technical Specification

<b>Operation Frequency (MHz):</b>	433.92
<b>Modulation Type:</b>	ASK

Note: For SRD, EUT only support RX function.

### Objective

The test report is prepared on behalf of the *Shenzhen Sonoff Technologies Co.,Ltd.* in accordance with ETSI EN 300 220-2 V3.2.1 (2018-06), Short Range Devices (SRD) operating in the frequency range 25 MHz to 1 000 MHz; Part 2: Harmonised Standard for access to radio spectrum for non specific radio equipment.

The objective is to determine the compliance of the EUT with ETSI EN 300 220-2 V3.2.1 (2018-06).

### Test Methodology

All measurements contained in this report were conducted with ETSI EN 300 220-1 V3.1.1 (2017-02).

## Measurement Uncertainty

Parameter	Flab	Maximum allow uncertainty
Radio frequency	±0,5 ppm	±0,5 ppm
RF power, conducted	±0.73dB	±1.5dB
Conducted spurious emission of transmitter, valid up to 6 GHz	±1.6dB	±3dB
Conducted emission of receivers	±1.6dB	±3dB
Below 1GHz emissions, radiated	±4.75dB	±6dB
Above 1GHz emissions, radiated	±4.88dB	±6dB
RF level uncertainty for a given BER	±1.5dB	±1.5 dB
Occupied BandWidth	±5%	±5%
Temperature	±1 °C	±2,5 °C
Humidity	±1%	±10%

*Note: The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval. Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.*

## Declarations

BACL is not responsible for the authenticity of any test data provided by the applicant. Data included from the applicant that may affect test results are marked with a triangle symbol “▲”. Customer model name, addresses, names, trademarks etc. are not considered data.

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

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## SYSTEM TEST CONFIGURATION

### Description of Test Configuration

The product was configured for testing in engineering mode which provided by manufacturer.

### Equipment Modifications

No modification was made to the EUT.

### EUT Exercise Software

No software was used.

### Support Equipment List and Details

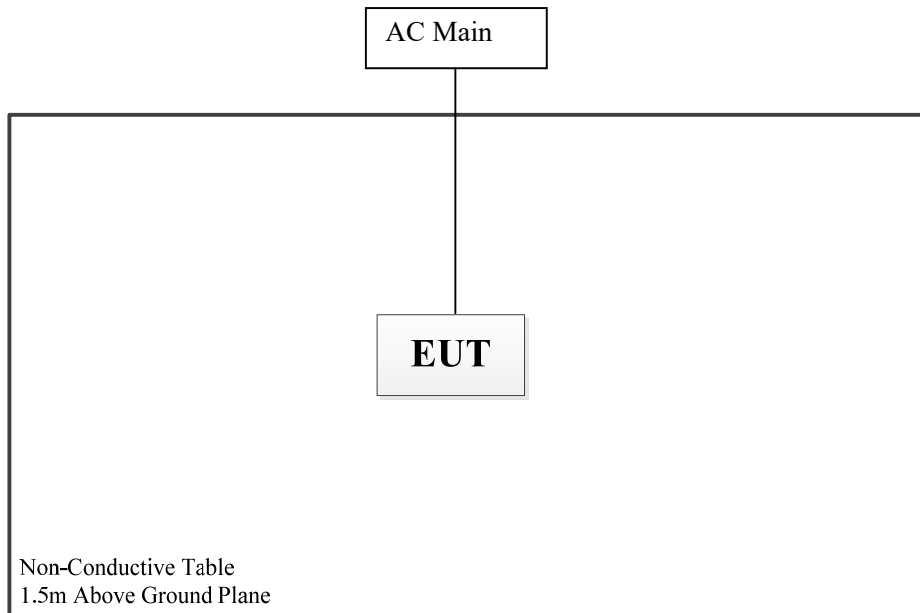
Manufacturer	Description	Model	Serial Number
SONOFF	Remote Control	RM433	8365001B7A
HEWEISHUN	Adapter	BN074	/

### Support Cable List and Details

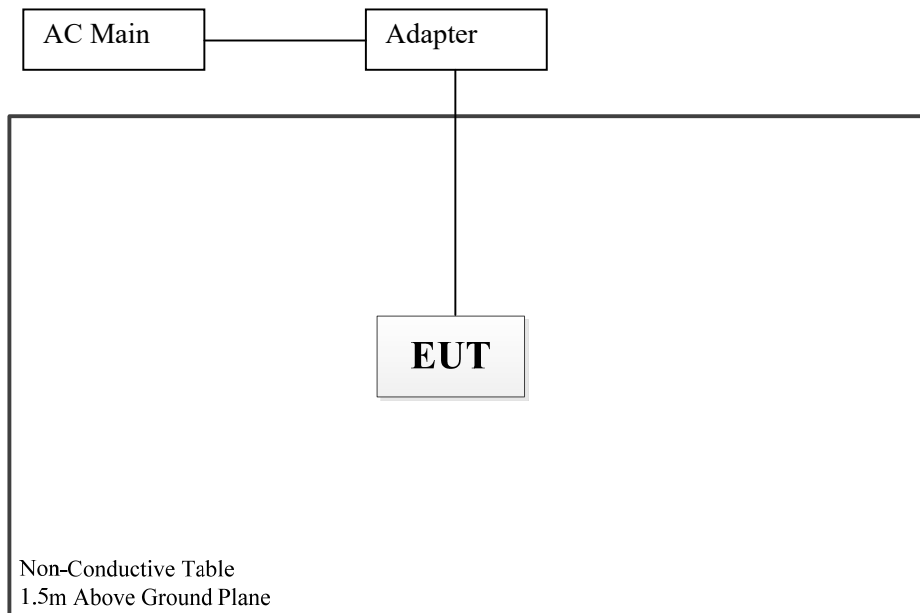
Cable Description	Shielding Cable	Ferrite Core	Length (m)	From Port	To
AC Cable	Yes	No	2	LISN	EUT
Adapter Cable	No	No	1.4	Adapter	EUT

### Block Diagram of Test Setup

Power by AC



Power by DC (Typical: DC 12V from adapter)



**Test Equipment List**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
<b>Radiated below 1GHz</b>					
Sunol Sciences	Antenna	JB3	A060611-1	2020-11-10	2023-11-10
R&S	EMI Test Receiver	ESR3	102453	2021-09-22	2022-09-21
Unknown	Coaxial Cable	C-NJNJ-50	C-0075-01	2021-07-19	2022-07-18
Unknown	Coaxial Cable	C-NJNJ-50	C-0400-01	2021-07-19	2022-07-18
Unknown	Coaxial Cable	C-NJNJ-50	C-1400-01	2021-07-19	2022-07-18
Sonoma	Amplifier	310N	372193	2021-07-18	2022-07-17
EMCO	Adjustable Dipole Antenna	3121C	9109-753	N/A	N/A
Unknown	Coaxial Cable	C-NJNJ-50	C-0200-02	2021-09-04	2022-09-03
Agilent	Signal Generator	E8247C	MY43321350	2022-04-01	2023-03-31
<b>Radiated above 1GHz</b>					
ETS-Lindgren	Horn Antenna	3115	000 527 35	2021-10-12	2024-10-11
Agilent	Spectrum Analyzer	E4440A	SG43360054	2021-07-22	2022-07-21
Unknown	Coaxial Cable	C-2.4J2.4J-50	C-0700-02	2021-06-27	2022-06-26
AH	Preamplifier	PAM-0118	469	2021-10-13	2022-10-12
ETS-Lindgren	Horn Antenna	3115	000 527 35	2021-10-12	2024-10-11
Unknown	Coaxial Cable	C-NJNJ-50	C-0200-02	2021-09-04	2022-09-03
Agilent	Signal Generator	E8247C	MY43321350	2022-04-01	2023-03-31
<b>RF Conducted</b>					
yzjingcheng	Coaxial Cable	KTRFBU-141-50	41005012	2021-09-04	2022-09-03
Unknown	Coaxial Cable	C-SJ00-0010	C0010/01	Each time	N/A
Agilent	MXG Vector Signal Generator	N5182B	MY51350142	2022-04-25	2023-04-24
Agilent	Signal Generator	E8247C	MY43321350	2022-04-01	2023-03-31

\* Statement of Traceability: Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

**Environmental Conditions**

<b>Test Item:</b>	Radiated emissions	RF Conducted
<b>Temperature:</b>	24.8~25.2°C	26.1°C
<b>Relative Humidity:</b>	64~66%	51%
<b>ATM Pressure:</b>	100.3~100.5kPa	100.4kPa
<b>Tester:</b>	Leo Yuan, Bill Yang	Carlos Wu
<b>Test Date:</b>	2022-05-13~2022-05-15	2022-05-15

**SUMMARY OF TEST RESULTS**

Rules	Description of Test	Result	Condition
4.2.1	Operating frequency	Compliant	/
4.2.2	Unwanted emissions in the spurious domain	Compliant	/
4.3.1	Effective radiated power	Not Applicable	/
4.3.2	Maximum e.r.p. spectral density	Not Applicable	Applies to EUT using annex B band I. Applies to EUT using DSSS or wideband techniques other than FHSS modulation, using annex C band W, AA or AC.
4.3.3	Duty cycle	Not Applicable	$\leq 0,1$ % duty cycle or polite spectrum access
4.3.4	Occupied Bandwidth	Not Applicable	/
4.3.5	Tx Out of Band Emissions	Not Applicable	Applies to EUT with OCW $> 25$ kHz.
4.3.6	Transient Power	Not Applicable	/
4.3.7	Adjacent channel power	Not Applicable	Applies to EUT with OCW $\leq 25$ kHz.
4.3.8	TX behaviour under Low Voltage Conditions	Not Applicable	Applies to battery powered EUT.
4.3.9	Adaptive Power Control	Not Applicable	Applies to EUT with adaptive power control using annex C band AF.
4.3.10	FHSS equipment	Not Applicable	Applies to FHSS EUT using the band 863 MHz to 870 MHz.
4.3.11	Short term behaviour	Not Applicable	Applies to EUT using annex C bands AD, AE, AF, AG, AH, or AI.
4.4.1	RX sensitivity	Not Applicable	Applies to EUT employing polite spectrum access.
4.4.2	Blocking	Compliant	/
4.5.2	Clear Channel Assessment threshold	Not Applicable	Applies to EUT employing polite spectrum access.
4.5.3	Polite spectrum access timing parameters	Not Applicable	Applies to EUT employing polite spectrum access.
4.5.4	Adaptive Frequency Agility	Not Applicable	Applies to EUT with AFA.

Note:

Not Applicable: EUT only support RX function.



## 4.2.1 – OPERATING FREQUENCY

### Applicable Standard

According to ETSI EN 300 220-1 V3.1.1 (2017-02) clause 5.1.1, the nominal operating frequency is the centre of a channel of width OCW.

### Limit

The manufacturer may declare either one or more operating frequencies and operating channels. Operating channel(s) shall be entirely within operational frequency bands allowed by annexes B, C or any NRI

The below information shall be recorded in the test report

Value	Note
Operational Frequency band or bands	Declared by the manufacturer
Nominal Operating Frequency or Frequencies	Declared by the manufacturer
Operating Channel width(s) - OCW	Declared by the manufacturer

### Result

The operational frequency band or bands, nominal operating frequency or Frequencies and operating channel width(s) – OCW are declared by the manufacturer

Operating Frequency Band	Operating Frequency (MHz)	Operating Channel Width <sup>▲</sup> (kHz)
H	433.050-434.790 MHz	433.99
		25

**Compliance**, which is declared by the manufacturer.

### 4.2.2 – UNWANTED EMISSIONS IN THE SPURIOUS DOMAIN

#### Applicable Standard

According to ETSI EN 300 220-1 V3.1.1 (2017-02) clause 5.9.1.

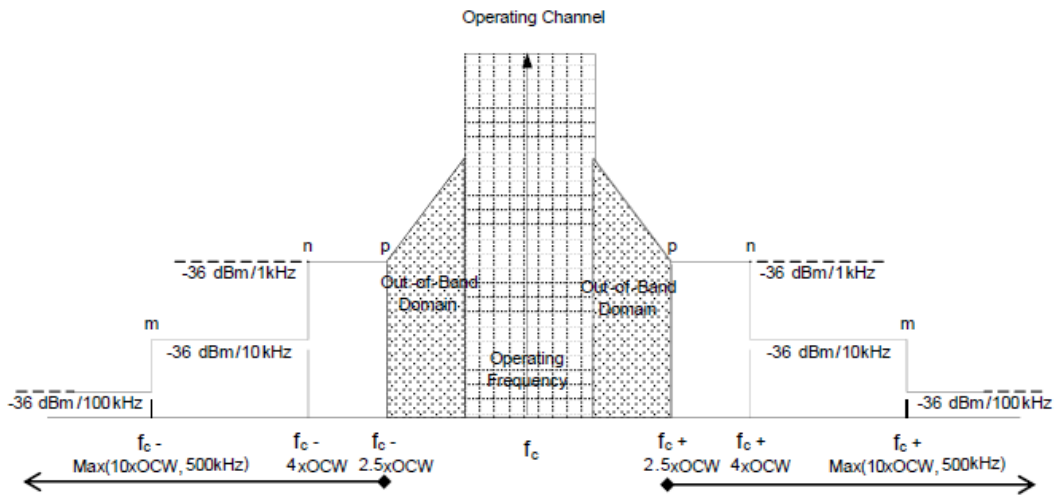


Figure 7: Spectrum Mask for Unwanted Emissions in the Spurious Domain with reference BW

Spurious emissions are unwanted emissions in the spurious domain at frequencies other than those of the Operating Channel and its Out Of Band Domain. The relevant spurious domain is shown in Figure 7.

#### Limit

The power of any unwanted emission in the spurious domain shall not exceed the values given in Table 19.

Table 19: Spurious domain emission limits

Frequency	47 MHz to 74 MHz 87,5 MHz to 118 MHz 174 MHz to 230 MHz 470 MHz to 790 MHz	Other frequencies below 1 000 MHz	Frequencies above 1 000 MHz
State			
TX mode	-54 dBm	-36 dBm	-30 dBm
RX and all other modes	-57 dBm	-57 dBm	-47 dBm

#### Method of Measurement

According to ETSI EN 300 220-1 V3.1.1 (2017-02) clause 5.9.3.

**Test Data**

**Test result:** *Compliant. Please refer to the following tables.*

**Radiated spurious emissions:**

Note: Pre-scan two power supply modes, worst case is Power by DC (typical is DC 12V from adapter).

**RX Mode Low channel 433.92 MHz**

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBµV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
1840.26	H	50.47	-66.83	11.38	0.82	-56.27	-47.00	9.27
1946.05	V	50.69	-67.09	11.89	1.07	-56.27	-47.00	9.27
252.56	H	49.66	-66.22	0.00	0.51	-66.73	-57.00	9.73
49.63	V	58.92	-47.66	-15.26	0.21	-63.13	-57.00	6.13

Note 1: The unit of antenna gain is dBd for frequency below 1GHz and is dBi for frequency above 1GHz.

Note 2:

Absolute Level = Substituted Level - Cable loss + Antenna Gain

Margin = Limit - Absolute Level

## 4.4.2 – BLOCKING

### Applicable Standard

According to ETSI EN 300 220-1 V3.1.1 (2017-02) clause 5.18.1.

Limit: The blocking level shall be better or equal to category 3 reference limits level defined in ETSI EN 300 220-1, clause 5.18.2.

NOTE: After December 31<sup>st</sup>, 2018, the receiver category 3 will be withdrawn, therefore receiver category 2 will be the minimum applicable level.

### Method of measurement

Signal generator A shall be set to an appropriate modulated test signal at the operating frequency of the EUT receiver.

Signal generator B shall be unmodulated.

Measurements shall be carried out at frequencies of the unwanted signal at approximately the frequency(ies) offset(s) defined in technical requirement avoiding those frequencies at which spurious responses occur. Additional measurement points may be requested by technical requirements clause.

If several operational frequency bands are used by the equipment, at least one blocking measurement by bands has to be performed.

**Step 1:** Signal generator B shall be powered off. Signal generator A shall be set to the minimum level which gives the wanted performance criterion of EUT or the reference level in Table 32, whichever is the higher. The output level of generator A shall then be increased by 3 dB unless otherwise specified in technical requirement.

**Step 2:** Signal generator B is powered on and set to operate at the nominal operating frequency - offset frequency. Signal generator B is then switched on and the signal amplitude is adjusted to the minimum level at which the wanted performance criterion is not achieved.

With signal generator B settings unchanged, the receiver shall be replaced with a suitable RF power measuring equipment. The power into the measuring equipment shall be measured and noted.

The blocking level is then the conducted power received from generator B at the EUT antenna connector.

This can either be measured on the antenna connector for conducted test or be calculated for radiated test (see clause C.5.4).

The blocking level shall be higher or equal to the blocking power level requested in the technical requirement clause.

**Step 3:** The measurement in steps 1 to 3 shall be repeated with signal offsets at required frequencies.

**Step 4:** The information shown in Table 44 shall be recorded in the test report for each measured signal level and unwanted signal offset.

**Table 44: Information Recorded in the Test Report**

Value	Notes
Operating Frequency	Nominal centre frequency of the receiver
Signal generator A	Power level of signal generator A
Blocking level	Power level of signal generator B

**Table 44: Information Recorded in the Test Report**

Value	Notes
Operating Frequency	Nominal centre frequency of the receiver
Signal generator A	Power level of signal generator A
Blocking level	Power level of signal generator B

For equipment using CCA whatever is the receiver category, steps 1 to 4 shall be repeated with signal generator A level adjusted +13 dB higher than in the measurements in clause 5.18.6.4

**Test Data**

**Test result:** *Compliant. Please refer to the following tables.*

Frequency (MHz)	Frequency offset (MHz)	Test result (dBm)	Limit (dBm)	Result
433.99	-2 MHz from OC edge flow	-60	≥-69	Compliance
	+2 MHz from OC edge fhigh	-63	≥-69	Compliance
	-10 MHz from OC edge flow	-40	≥-44	Compliance
	+10 MHz from OC edge fhigh	-38	≥-44	Compliance
	-5 % of Centre Frequency	-37	≥-44	Compliance
	+5 % of Centre Frequency	-35	≥-44	Compliance

Note:

1. The manufacturer declared that the receiver category for the EUT is 2.
2. Link with the remote control and observe the connection condition.

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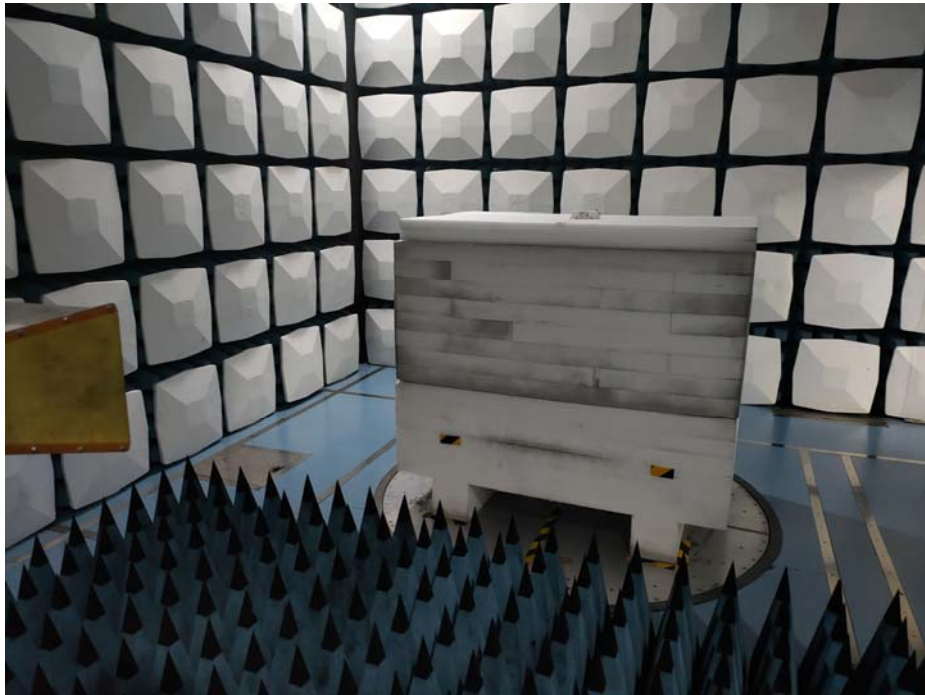
**EXHIBIT A - EUT PHOTOGRAPHS**

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For photos in this section, please refer to report No.: DG1220420-15273E-02 EXHIBIT A.

**EXHIBIT B - TEST SETUP PHOTOGRAPHS**

RE Below 1GHz



**\*\*\*\*\* END OF REPORT \*\*\*\*\***