

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: T3US3C
Multiple Models: T2US1C, T2US2C,
T2US3C, T3US1C, T3US2C

Report Type: Original Report	Product Type: Wi-Fi Smart Wall Switch
Report Number:	DG1220422-15886E-22B
Report Date:	2022-06-27
Reviewed By:	Rocky Xiao RF Engineer
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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Product Name:	Wi-Fi Smart Wall Switch
EUT Model:	T3US3C
Multiple Models:	T2US1C, T2US2C, T2US3C, T3US1C, T3US2C
Model Difference:	Refer to Dos
Rated Input Voltage:	AC 100-240V 50/60Hz
Serial Number:	DG1220422-15886E-RF-S1/1
EUT Received Date:	2022.4.21
EUT Received Status:	Good

Technical Specification

Operation Frequency Range (MHz):	433.92
Max. RF Output Power (ERP) (dBm):	N/A (Receive only)
Antenna Gain (dBi)[▲]:	0
Modulation Type:	ASK

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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This report may contain data that are not covered by the accreditation scope and shall be marked with an asterisk “★”.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The system was configured for testing in Receiving mode, which was provided by manufacturer. One channel only.

The extreme conditions which were declared by the manufacturer and the normal conditions are as below:

Extreme test Temperature(°C)		Extreme test Voltage(Vac)	
NT, Normal Temperature:	25	NV, Normal Voltage:	230
LT, Low Temperature:	-10	LV, Low Voltage:	207
HT, High Temperature:	40	HV, High Voltage:	253

Equipment Modifications

No modification was made to the EUT.

EUT Exercise Software

N/A

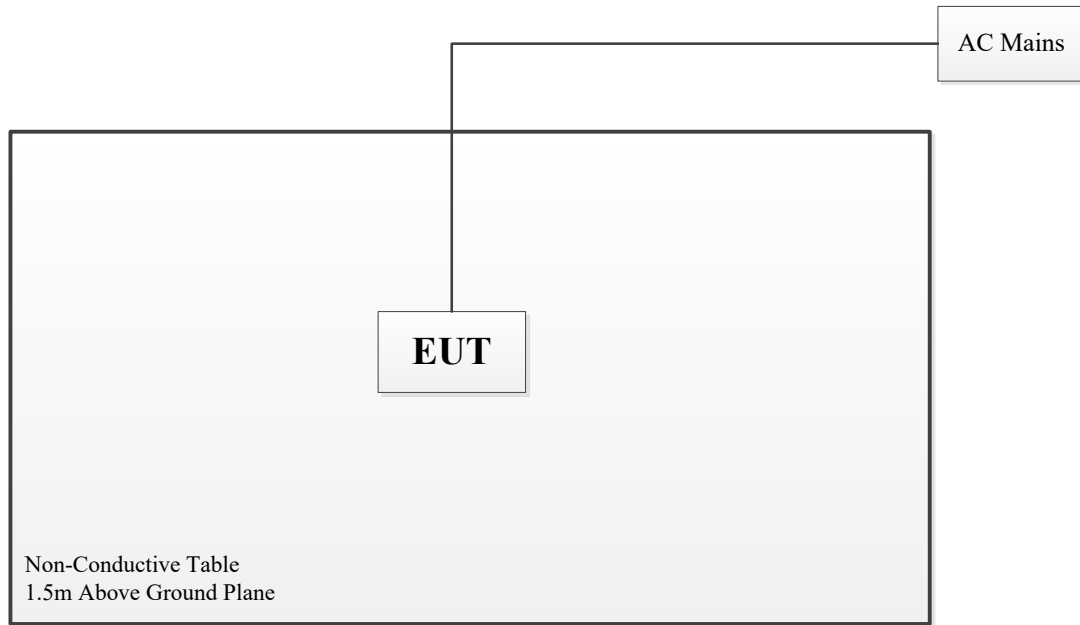
Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
/	/	/	/

Support Cable List and Details

Cable Description	Shielding Type	Ferrite Core	Length(m)	From Port	To
/	/	/	/	/	/

Block Diagram of Test Setup



Test Equipment List

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Radiated below 1GHz					
Sunol Sciences	Antenna	JB3	A060611-2	2020-08-25	2023-08-25
R&S	EMI Test Receiver	ESCI	100224	2021-10-26	2022-10-25
Unknown	Coaxial Cable	C-NJNJ-50	C-1000-01	2021-08-19	2022-08-18
Unknown	Coaxial Cable	C-NJNJ-50	C-0400-02	2021-08-19	2022-08-18
Unknown	Coaxial Cable	C-NJNJ-50	C-0530-01	2021-08-19	2022-08-18
Sonoma	Amplifier	310N	185914	2021-08-19	2022-08-18
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
Radiated above 1GHz					
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-SJSJ-50	C-0800-01	2021-09-04	2022-09-03
AH	Preamplifier	PAM-0118	469	2021-10-13	2022-10-12
TDK RF	Horn Antenna	HRN-0118	130 084	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

* 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

Test Item:	Radiated emissions
Temperature:	24.2~24.8℃
Relative Humidity:	62~64%
ATM Pressure:	100.3~100.8kPa
Tester:	Joe Li, Bill Yang
Test Date:	2022-05-15~2022-05-16

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	Not applicable to EUT with polite spectrum access where permitted in annex B, table B.1.
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 ≤ 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: The EUT works in Operational Frequency Band AA (Table C.1 of ETSI EN 300 220-2 V3.2.1 (2018-06)).

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 (kHz)
H	433.05 – 434.79	433.92	25

Note: **Compliant**, 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.

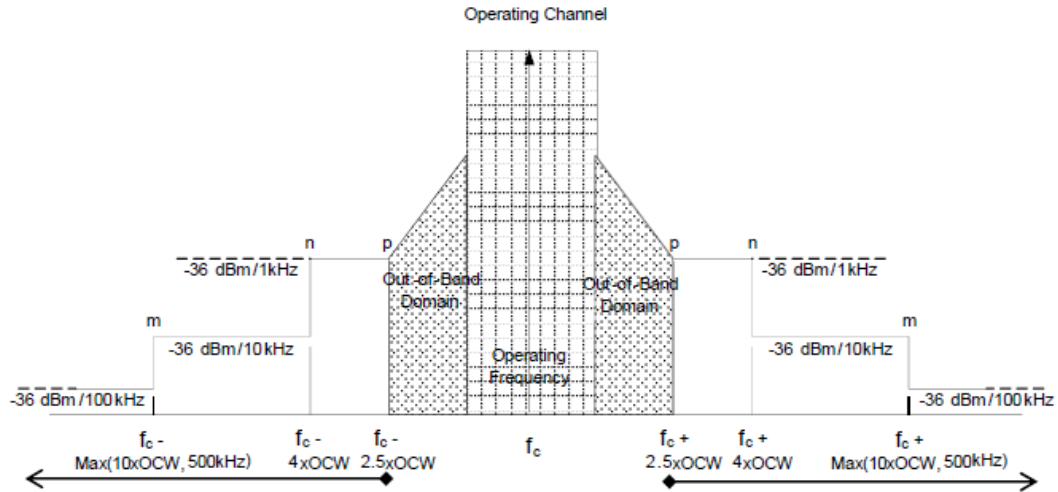


Figure 7: Spectrum Mask for Unwanted Emissions in the Spurious Domain with reference BW

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	Other frequencies below 1 000 MHz	Frequencies above 1 000 MHz
State	470 MHz to 790 MHz		
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.*

RX Mode

433.92MHz

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)			
1875.24	H	50.65	-66.18	11.63	0.94	-55.49	-47.00	8.49
1649.20	V	50.84	-67.86	10.44	0.71	-58.13	-47.00	11.13
209.36	H	35.84	-74.20	0.00	0.20	-74.40	-57.00	17.40
320.00	V	43.94	-62.48	0.00	0.32	-62.80	-57.00	5.80

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 [1], clause 5.18.2.

NOTE: After December 31st, 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

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

Frequency Channel	Frequency offset (MHz)	Test result (dBm)	Limit (dBm)	Result
Low Channel (F_{Low})	-2 MHz from OC edge flow	-55	≥ -69	Compliant
	+2 MHz from OC edge fhigh	-57	≥ -69	Compliant
	-10 MHz from OC edge flow	-38	≥ -44	Compliant
	+10 MHz from OC edge fhigh	-36	≥ -44	Compliant
	-5 % of Centre Frequency	-29	≥ -44	Compliant
	+5 % of Centre Frequency	-32	≥ -44	Compliant

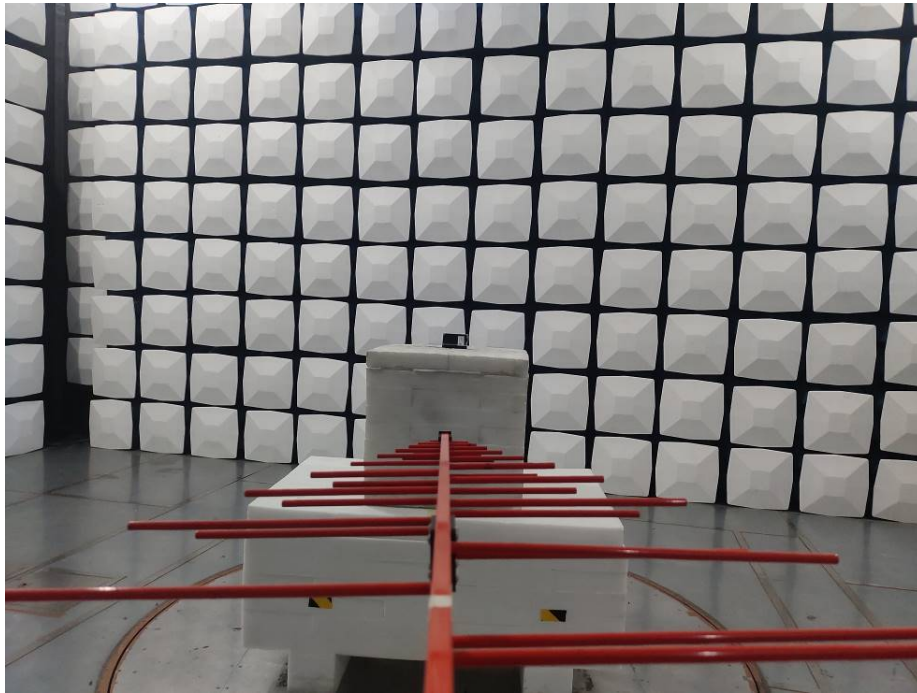
Note: The manufacturer declared that the receiver category for the EUT is 2

EXHIBIT A - EUT PHOTOGRAPHS

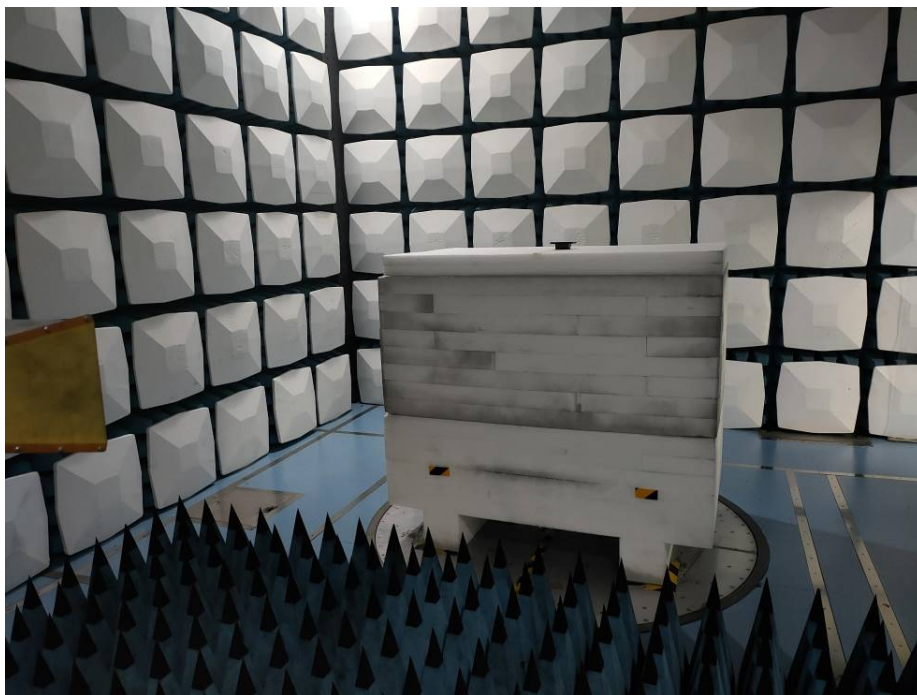
For photos in this section, please refer to report No.: DG1220422-15886E-02 EXHIBIT A.

EXHIBIT B - TEST SETUP PHOTOGRAPHS

RE Below 1GHz



RE Above 1GHz



DECLARATION LETTER

Shenzhen Sonoff Technologies Co., Ltd.
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 E-mail: hongbo.liu@itead.cc

DECLARATION OF SIMILARITY

Date: 2022-06-14
 To Whom It May Concern

Dear Sir or Madam:

We, Shenzhen Sonoff Technologies Co., Ltd., hereby declare that product: Wi-Fi Smart In-wall Light Switch, Model number: T0US1C, T0US2C, T0US3C, T2US1C, T2US2C, T2US3C, T3US1C, T3US2C, T3US3C. They have same structure, PCB, Material and WIFI function. Their difference as follows:

Model	With 433MHz Receiver Module	Gang(s)	Color
T0US1C	no	one	white
T0US2C	no	two	white
T0US3C	no	Three	white
T2US1C	yes	one	white
T2US2C	yes	two	white
T2US3C	yes	three	white
T3US1C	yes	one	black
T3US2C	yes	two	black
T3US3C	yes	three	black

PCB Item Number	Manufacturer	Type/Model	Technical Data
K1,K2,K3 (T0US3C, T2US3C, T3US3C)	Zhejiang Fanhar Electronics Co., Ltd.	W11-1A2STLE-H-DC5V	DC5V 10A 250VAC
	Shenzhen Golden Electrical Appliance Co Ltd.	GI-1A-5LH DC5V	10A 250VAC
K1,K2 (T0US2C, T2US2C, T3US2C)	Zhejiang Fanhar Electronics Co., Ltd.	W11-1A2STLE-H-DC5V	DC5V 10A 250VAC
	Shenzhen Golden Electrical Appliance Co Ltd.	GI-1A-5LH DC5V	10A 250VAC
K1 (T0US1C, T2US1C, T3US1C)	Zhejiang Fanhar Electronics Co., Ltd.	W11-1A2STLE-H-DC5V	DC5V 10A 250VAC

	Shenzhen Golden Electrical Appliance Co Ltd.	GI-1A-5LH DC5V	10A 250VAC
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Except the differences above, we declare the products are electrically identical. We guarantee all the information provided above is true, and notice that we'll bear all the consequences caused by any false information or concealing.

Please contact me should there be need for any additional clarification or information.

Best Regards,
Signature *hongbo liu*

Name: hongbo.liu
Title: Manager

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