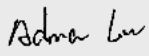
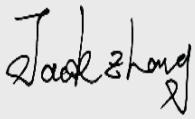
DEKRA Testing and Certification (Suzhou) Co., Ltd.
No.99 Hongye Rd., Suzhou Industrial Park, Suzhou, 215006, Jiangsu, China
TEL: +86-512-6251-5088 / FAX: +86-512-6251-5098

Test report No:
21B0246R-RF-US-P20V01

FCC & ISED Exposure TEST REPORT

Product Name	LED Device
Trademark	PHILIPS
Model and /or type reference	9290024227, 9290024228, 9290024229
FCC ID	2AGBW9290024227X(9290024227) 2AGBW9290024228X(9290024228) 2AGBW9290024229X(9290024229)
IC	20812-4227X(9290024227) 20812-4228X(9290024228) 20812-4229X(9290024229)
Applicant´s name / address	Signify (China) Investment Co., Ltd Building no.9, Lane 888, Tianlin Road, Minhang District, Shanghai, 200233, China
Test method requested, standard	KDB 447498D01V06 FCC Part1.1310 RSS-102: Issue 5, 2015
Verdict Summary	IN COMPLIANCE
Documented by (name / position & signature)	Adma Lu/Project Engineer 
Approved by (name / position & signature)	Jack Zhang/ Supervisor 
Date of issue	2022-02-17
Report template No	Template_FCC-MPE-RF-V1.0

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COMPETENCES AND GUARANTEES

DEKRA is a testing laboratory competent to carry out the tests described in this report.
In order to assure the traceability to other national and international laboratories, DEKRA has a calibration and maintenance program for its measurement equipment.

DEKRA guarantees the reliability of the data presented in this report, which is the result of the measurements and the tests performed to the item under test on the date and under the conditions stated in the report and it is based on the knowledge and technical facilities available at DEKRA at the time of performance of the test.

DEKRA is liable to the client for the maintenance of the confidentiality of all information related to the item under test and the results of the test.

The results presented in this Test Report apply only to the particular item under test established in this document.

IMPORTANT: No parts of this report may be reproduced or quoted out of context, in any form or by any means, except in full, without the previous written permission of DEKRA.

GENERAL CONDITIONS

Test Location	No. 99, Hongye Road, Suzhou Industrial Park Suzhou, 215006, P.R. China
Date(receive sample)	Nov. 12, 2021
Date (start test)	Nov. 13, 2021
Date (finish test)	Nov. 24, 2021

1. This report is only referred to the item that has undergone the test.
2. This report does not constitute or imply on its own an approval of the product by the Certification Bodies or Competent Authorities.
3. This document is only valid if complete; no partial reproduction can be made without previous written permission of DEKRA.
4. This test report cannot be used partially or in full for publicity and/or promotional purposes without previous written permission of DEKRA.

ENVIRONMENTAL CONDITIONS

The climatic conditions during the tests are within the limits specified by the manufacturer for the operation of the EUT and the test equipment. The climatic conditions during the tests were within the following limits:

Ambient temperature	15 °C – 35 °C
Relative Humidity air	30% - 60%

If explicitly required in the basic standard or applied product / product family standard the climatic values are recorded and documented separately in this test report.

POSSIBLE TEST CASE VERDICTS

Test case does not apply to test object	N/A
Test object does meet requirement	P (Pass) / PASS
Test object does not meet requirement	F (Fail) / FAIL
Not measured	N/M

ABBREVIATIONS

For the purposes of the present document, the following abbreviations apply:

EUT : Equipment Under Test
QP : Quasi-Peak
CAV : CISPR Average
AV : Average
CDN : Coupling Decoupling Network
SAC : Semi-Anechoic Chamber
OATS : Open Area Test Site
BW : Bandwidth
AM : Amplitude Modulation
PM : Pulse Modulation
HCP : Horizontal Coupling Plane
VCP : Vertical Coupling Plane
U_N : Nominal voltage
*T*x : Transmitter
*R*x : Receiver
N/A : Not Applicable
N/M : Not Measured

DOCUMENT HISTORY

Report No.	Version	Description	Issued Date
21B0246R-RF-US-P20V01	V1.0	Initial issue of report.	2021-12-23
21B0246R-RF-US-P20V01	V1.1	Page11 Modified test data	2022-02-17

REMARKS AND COMMENTS

1. The equipment under test (EUT) does meet the essential requirements of the stated standard(s)/test(s).
2. These test results on a sample of the device are for the purpose of demonstrating Compliance with KDB 447498 and FCC Part 1.1310, RSS-102: Issue 5, 2015.
3. The measurement result is considered in conformance with the requirement if it is within the prescribed limit, It is not necessary to account the uncertainty associated with the measurement result, unless the specification, standard or customer have special requirements
4. The test results relate only to the samples tested.
5. The test report shall not be reproduced without the written approval of DEKRA Testing and Certification (Suzhou) Co., Ltd.
6. This report will not be used for social proof function in China market.
7. DEKRA declines any responsibility with the following test data provided by customer that may affect the validity of result:

- Chapter 1.1 General Description of the Item(s);
- Chapter 1.2 Antenna Information;
- Chapter 1.3 Channel List.

1 GENERAL INFORMATION

1.1 General Description of the Item(s)

Product Name.....:	LED Device
Model No. .....:	9290024227, 9290024228, 9290024229
FCC ID.....:	2AGBW9290024227X(9290024227) 2AGBW9290024228X(9290024228) 2AGBW9290024229X(9290024229)
IC .....:	20812-4227X(9290024227) 20812-4228X(9290024228) 20812-4229X(9290024229)
Manufacturter.....:	Signify (China) Investment Co., Ltd
Manufacturer Address .....:	Building no.9, Lane 888, Tianlin Road, Minhang District, Shanghai, 200233, China
Model difference .....:	All models have the same rated power, LED driver, RF module except different model name.

Note: Models 9290024227, 9290024228, 9290024229 only differs on the length of the LED device, three models has been pretested and DEKRA has found that model 9290024227 is the worst case. Test results for Model 9290024227, included in this report, are valid and representative for the three models 9290024227, 9290024228, 9290024229.

Wireless specifiction .....:	Bluetooth 5.0					
Operating frequency range(s)	2400~2483.5MHz					
Type of Modulation .....:	GFSK					
PHYs.....:	☒	LE 1M	☒	LE 2M	☒	LE Coded S=2/8
Data Rate.....:	☒	1Mbit/s	☒	2Mbit/s	☒	500/125 Kbit/s
Number of channel .....:	40					

Wireless specifiction .....:	Zigbee
Operating frequency range(s)	2400~2483.5MHz
Type of Modulation .....:	DSSS-OQPSK
Number of channel .....:	16
Date Rate.....:	250kbps

Rated power supply.....:	Voltage and Frequency	
	☐	AC: 220 – 240 V, 50/60 Hz
	☒	AC: 100 – 130 Vac, 50/60 Hz
	☐	DC: 3.2~4.2 Vdc
	☐	Battery: ……
Mounting position.....:	☐	Table top equipment
	☒	Wall/Ceiling mounted equipment
	☐	Floor standing equipment
	☐	Head-mounted equipment
	☐	Other: RF module

1.2 Antenna Information

Antenna model / type number .....:	N/A			
Antenna serial number.....:	N/A			
Antenna Delivery .....:	☒	1TX + 1RX		
	☐	2TX + 2RX		
Antenna technology.....:	☒	SISO		
	☐	MIMO	☐	CDD
			☐	Beam-forming
Antenna Type .....:	☐	External	☐	Dipole
			☐	Sectorized
	☒	Internal	☒	PIFA
			☐	PCB
			☐	Metal Monopole Antenna
			☐	Others……..
Antenna Gain.....:	2.08 dBi			

2 RF EXPOSURE EVALUATION

2.1 Limits

According to FCC 1.1310: The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in 1.1307(b)
LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm2)	Average Time (Minutes)
(A) Limits for Occupational/ Control Exposures				
300-1500	--	--	F/300	6
1500-100,000	--	--	5	6
(B) Limits for General Population/ Uncontrolled Exposures				
300-1500	--	--	F/1500	6
1500-100,000	--	--	1	30

F= Frequency in MHz

Friis Formula
Friis transmission formula: Pd = (Pout*G)/(4*pi*r2)

Where
Pd = power density in mW/cm2
Pout = output power to antenna in mW
G = gain of antenna in linear scale
Pi = 3.1416
R = distance between observation point and center of the radiator in cm

Pd is the limit of MPE, 1 mW/cm2. If we know the maximum gain of the antenna and the total power input to the antenna, through the calculation, we will know the distance r where the MPE limit is reached.

According to RSS 102 Issue 5: The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in RSS 102 Clause 4 LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency Range (MHz)	Electric Field (V/m rms)	Magnetic Field (A/m rms)	Power Density (W/m^2)	Reference Period (minutes)
$0.003\text{-}10^{21}$	83	90	-	Instantaneous*
0.1-10	-	$0.73/f$	-	6**
1.1-10	$87/f^{0.5}$	-	-	6**
10-20	27.46	0.0728	2	6
20-48	$58.07/f^{0.25}$	$0.1540/f^{0.25}$	$8.944/f^{0.5}$	6
48-300	22.06	0.05852	1.291	6
300-6000	$3.142f^{0.3417}$	$0.008335f^{0.3417}$	$0.02619f^{0.6834}$	6
6000-15000	61.4	0.163	10	6
15000-150000	61.4	0.163	10	$616000/f^{1.2}$
150000-300000	$0.158f^{0.5}$	$4.21 \times 10^{-4}f^{0.5}$	$6.67 \times 10^{-5}f$	$616000/f^{1.2}$

Note: f is frequency in MHz.
*Based on nerve stimulation (NS).
** Based on specific absorption rate (SAR).

2.2 Test Procedure

Software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel individually.

The temperature and related humidity: 18℃and 78％ RH.

2.3 Test Result of RF Exposure Evaluation

Product	:	LED Device
Test Item	:	RF Exposure Evaluation
Test Site	:	AC-6

Power Density:
The tune-up power is 1dB, so the maximum conducted power of BT we used to calculate RF exposure is 9.61dBm.
The tune-up power is 1dB, so the maximum conducted power of Zigbee we used to calculate RF exposure is 9.63dBm.

Test Mode	EIRP (dBm)	tune-up EIRP (dBm)	Power Density at R = 20 cm (mW/cm2)	Power Density Limit (mW/cm2)
BT	11.69	12.69	0.004	1
Zigbee	11.71	12.71	0.004	1

The maximum power density is 0.004mW/cm2 for LED Device without any other radio equipment.

The End