

**Shenzhen Global Test Service Co.,Ltd.**

No.7-101 and 8A-104, Building 7 and 8, DCC Cultural and Creative Garden, No.98, Pingxin North Road, Shangmugu Community, Pinghu Street, Longgang District, Shenzhen, Guangdong

RF Exposure evaluation**Report Reference No.....: GTS20211014013-1-4****FCC ID.: 2ATKG-RAD78235**

Compiled by

(position+printed name+signature) : File administrators Peter Xiao

Supervised by

(position+printed name+signature) : Test Engineer Oliver Ou

Approved by

(position+printed name+signature) : Manager Simon Hu

Date of issue: Nov.04, 2021

Representative Laboratory Name.: Shenzhen Global Test Service Co.,Ltd.

Address: No.7-101 and 8A-104, Building 7 and 8, DCC Cultural and Creative Garden, No.98, Pingxin North Road, Shangmugu Community, Pinghu Street, Longgang District, Shenzhen, Guangdong

Applicant's name.....: Sutro Connect Inc.

Address: 181 2nd St.#21, San Francisco, California, 94105 United States

Test specificationStandard.....: **47CFR §1.1310 Basis and purpose**
47CFR §2.1091 Radiofrequency radiation exposure evaluation:
mobile devices**KDB447498 D01 General RF Exposure Guidance v06**

TRF Originator.....: Shenzhen Global Test Service Co.,Ltd.

Master TRF: Dated 2014-12

Shenzhen Global Test Service Co.,Ltd. All rights reserved.

This publication may be reproduced in whole or in part for non-commercial purposes as long as the Shenzhen Global Test Service Co.,Ltd. is acknowledged as copyright owner and source of the material. Shenzhen Global Test Service Co.,Ltd. takes no responsibility for and will not assume liability for damages resulting from the reader's interpretation of the reproduced material due to its placement and context.

Test item description: Sutro Hub+Charger

Trade Mark: SUTRO

Manufacturer: Sutro Connect Inc.

Model/Type reference: SHC-1

Listed Models: N/A

Hardware Version: V1.5

Software Version.....: V2.1.1

Rating: DC 5.0V by Adapter

Result: **PASS**

TEST REPORT

Test Report No. : GTS20211014013-1-4	Nov.04, 2021
	Date of issue

Equipment under Test : Sutro Hub+Charger

Model /Type : SHC-1

Listed model : N/A

Applicant : **Sutro Connect Inc.**

Address : 181 2nd St.#21, San Francisco, California, 94105 United States

Manufacturer : **Sutro Connect Inc.**

Address : 181 2nd St.#21, San Francisco, California, 94105 United States

Test Result:	PASS
---------------------	-------------

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.

Contents

1. SUMMARY 4

1.1 EUT CONFIGURATION..... 4

1.2 PRODUCT DESCRIPTION 4

2. TEST ENVIRONMENT 5

2.1 ADDRESS OF THE TEST LABORATORY 5

2.2 TEST FACILITY 5

2.3 ENVIRONMENTAL CONDITIONS 5

2.4 STATEMENT OF THE MEASUREMENT UNCERTAINTY 5

3. METHOD OF MEASUREMENT 6

3.1 APPLICABLE STANDARD..... 6

3.2 REQUIREMENT 6

3.3 LIMIT 6

3.4 MPE CALCULATION METHOD 7

3.5 ANTENNA INFORMATION 7

4. CONDUCTED POWER RESULTS..... 8

5. MANUFACTURING TOLERANCE 9

6. MEASUREMENT RESULTS 10

6.1 STANDALONE MPE EVALUATION..... 10

6.2 SIMULTANEOUS TRANSMISSION MPE 10

7. CONCLUSION 11

1. SUMMARY

1.1 EUT configuration

The following peripheral devices and interface cables were connected during the measurement:

● - supplied by the manufacturer

○ - supplied by the lab

●	/	Length (m) :	/
		Shield :	/
		Detachable :	/

1.2 Product Description

Product Name	Sutro Hub+Charger
Trade Mark	SUTRO
Model/Type reference	SHC-1
List Models	N/A
Model Declaration	N/A
Power supply:	DC 5.0V by Adapter
Sample ID	GTS20211014013-1-1# & GTS20211014013-1-2#
WIFI(2.4G Band)	
Frequency Range	2412MHz ~ 2462MHz
Channel Spacing	5MHz
Channel Number	11 Channel for 20MHz bandwidth(2412~2462MHz)
Modulation Type	802.11b: DSSS; 802.11g/n: OFDM
Antenna Description	FPC Antenna, 2.10dBi(Max.)
SRD	
Frequency Range	915MHz
Channel Number	1Channel
Modulation Type	2FSK
Antenna Description	FPC Antenna, 2.38dBi(Max.)
LTE	
LTE Operation Frequency Band	E-UTRA Band 2(1850 MHz -1910MHz) E-UTRA Band 4(1710 MHz -1755MHz) E-UTRA Band 12(699 MHz -716MHz)
LTE Release Version	R9
Type Of Modulation	QPSK/16QAM
Antenna Description	FPC Antenna; 3.68dBi (max.) For LTE Band 2; 3.68dBi (max.) For LTE Band 4; 3.68dBi (max.) For LTE Band 12;

2. TEST ENVIRONMENT

2.1 Address of the test laboratory

Shenzhen Global Test Service Co.,Ltd.

No.7-101 and 8A-104, Building 7 and 8, DCC Cultural and Creative Garden, No.98, Pingxin North Road, Shangmugu Community, Pinghu Street, Longgang District, Shenzhen, Guangdong

2.2 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

CNAS (No. CNAS L8169)

Shenzhen Global Test Service Co., Ltd. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC 17025: 2019 General Requirements) for the Competence of Testing and Calibration Laboratories.

A2LA (Certificate No. 4758.01)

Shenzhen Global Test Service Co., Ltd. has been assessed by the American Association for Laboratory Accreditation (A2LA). Certificate No. 4758.01.

Industry Canada Registration Number. is 24189.

FCC Designation Number is CN1234.

FCC Registered Test Site Number is165725.

2.3 Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature:	15-35 ° C
Humidity:	30-60 %
Atmospheric pressure:	950-1050mbar

2.4 Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to TR-100028-01 "Electromagnetic compatibility and Radio spectrum Matters (ERM);Uncertainties in the measurement of mobile radio equipment characteristics; Part 1" and TR-100028-02 "Electromagnetic compatibility and Radio spectrum Matters (ERM);Uncertainties in the measurement of mobile radio equipment characteristics; Part 2 " and is documented in the Shenzhen Global Test Service Co.,Ltd quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for Shenzhen GTS laboratory is reported:

Test Items	Measurement Uncertainty	Notes
Transmitter power conducted	0.57 dB	(1)

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

3. METHOD OF MEASUREMENT

3.1 Applicable Standard

According to §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

According to §1.1310 and §2.1091 RF exposure is calculated.

KDB447498 D01 General RF Exposure Guidance v06: Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies

3.2 Requirement

Systems operating under the provisions of FCC 47 CFR section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as mobile device whereby a distance of 0.2m normally can be maintained between the user and the device, and below RF Permissible Exposure limit shall comply with.

In accordance with KDB447498 D01 General RF Exposure Guidance v06 for Simultaneous transmission MPE test exclusion applies when the sum of the MPE ratios for all simultaneous transmitting antennas incorporated in a host device, based on the calculated/estimated, numerically modeled or measured field strengths or power density, is ≤ 1.0 . The MPE ratio of each antenna is determined at the minimum test separation distance required by the operating configurations and exposure conditions of the host device, according to the ratio of field strengths or power density to MPE limit, at the test frequency. Either the maximum peak or spatially averaged results from measurements or numerical simulations may be used to determine the MPE ratios. Spatial averaging does not apply when MPE is estimated using simple calculations based on far-field plane-wave equivalent conditions. The antenna installation and operating requirements for the host device must meet the minimum test separation distances required by all antennas, in both standalone and simultaneous transmission operations, to satisfy compliance.

3.3 Limit

Limits for Maximum Permissible Exposure (MPE)/Controlled Exposure

Frequency Range(MHz)	Electric Field Strength(V/m)	Magnetic Field Strength(A/m)	Power Density (mW/cm ²)	Averaging Time (minute)
Limits for Occupational/Controlled Exposure				
0.3 – 3.0	614	1.63	(100) *	6
3.0 – 30	1842/f	4.89/f	(900/f ²)*	6
30 – 300	61.4	0.163	1.0	6
300 – 1500	/	/	f/300	6
1500 – 100,000	/	/	5	6

Limits for Maximum Permissible Exposure (MPE)/Uncontrolled Exposure

Frequency Range(MHz)	Electric Field Strength(V/m)	Magnetic Field Strength(A/m)	Power Density (mW/cm ²)	Averaging Time (minute)
Limits for Occupational/Controlled Exposure				
0.3 – 3.0	614	1.63	(100) *	30
3.0 – 30	824/f	2.19/f	(180/f ²)*	30
30 – 300	27.5	0.073	0.2	30
300 – 1500	/	/	f/1500	30
1500 – 100,000	/	/	1.0	30

F=frequency in MHz

*=Plane-wave equivalent power density

3.4 MPE Calculation Method

Predication of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = PG / 4\pi R^2$$

Where: S=power density

P=power input to antenna

G=power gain of the antenna in the direction of interest relative to an isotropic radiator

R=distance to the center of radiation of the antenna

As declared by the Applicant, the EUT transmits with the maximum source-based Duty Cycle of 100%-see the User manual, and the EUT is a wireless device used in a mobile application, at least 20 cm from any body part of the user or nearby persons; from the maximum EUT RF output power, the minimum mobile separation distance, $r = 20\text{cm}$, as well as the gain of the used antenna is 2.10dBi for WLAN, and the power drift from Turn-up Procedure provide by manufacturer as following states, the RF power density can be obtained.

3.5 Antenna Information

SHC-1 can only use antennas certificated as follows provided by manufacturer;

Internal Identification	Antenna Identification in Internal photos	Antenna type and antenna number	Operate frequency band	Maximum antenna gain
Antenna 0	SRD ANT 0	FPC antenna	900 – 1000 MHz	2.38dBi(Max.)
Antenna 1	WLAN ANT 1	FPC antenna	2.4 – 2.5 GHz	2.10dBi(Max.)
Antenna 2	LTE ANT 2	FPC antenna	650 – 1000 MHz 1.0 – 3.0 GHz	3.68dBi(Max.)

4. Conducted Power Results

SRD

Mode	Channel	Frequency (MHz)	Peak Conducted Output Power (dBm)
2FSK	01	915	11.02

2.4GWLAN

Mode	Channel	Frequency (MHz)	AV Conducted Output Power (dBm)
802.11b	01	2412	9.14
	06	2437	9.23
	11	2462	9.15
802.11g	01	2412	8.75
	06	2437	8.37
	11	2462	8.85
802.11n(HT20)	01	2412	8.33
	06	2437	8.25
	11	2462	8.14

<LTE Max Conducted Power>

Test Mode		Channel	Frequency (MHz)	Max Conducted Power (dBm)
LTE	Band 2	LCH	1850.70	22.24
		MCH	1880.00	22.34
		HCH	1909.30	22.15
	Band 4	LCH	1710.70	21.89
		MCH	1732.50	21.75
		HCH	1754.30	21.92
	Band 12	LCH	699.7	22.65
		MCH	707.5	22.36
		HCH	715.3	22.43

5. Manufacturing Tolerance

SRD

915M (Peak)			
Channel	Channel 1	/	/
Target (dBm)	11.0	/	/
Tolerance $\pm$ (dB)	1.0	/	/

2.4GWLAN

IEEE 802.11b (AV)			
Channel	Channel 01	Channel 06	Channel 11
Target (dBm)	9.0	9.0	9.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0
IEEE 802.11g (AV)			
Channel	Channel 01	Channel 06	Channel 11
Target (dBm)	8.0	8.0	8.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0
IEEE 802.11n HT20 (AV)			
Channel	Channel 01	Channel 06	Channel 11
Target (dBm)	8.0	8.0	8.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0

LTE

Mode	Target Power
LTE BAND 2	22 ± 1.0 dBm
LTE BAND 4	21 ± 1.0 dBm
LTE BAND 12	22 ± 1.0 dBm

6. Measurement Results

6.1 Standalone MPE Evaluation

As declared by the Applicant, the EUT is a wireless device used in a fix application, at least 20 cm from any body part of the user or nearby persons; from the maximum EUT RF output power, the minimum separation distance, $r = 20\text{cm}$, as well as the gain of the used antenna refer to antenna information, the RF power density can be obtained.

SRD

Modulation Type	Output power		Antenna Gain (dBi)	Antenna Gain (linear)	MPE (mW/cm^2)	MPE Limits (mW/cm^2)
	dBm	mW				
2FSK	12.00	15.8489	2.38	1.7298	0.0055	1.0000

2.4GWLAN

Modulation Type	Output power		Antenna Gain (dBi)	Antenna Gain (linear)	MPE (mW/cm^2)	MPE Limits (mW/cm^2)
	dBm	mW				
802.11b	10.00	10.0000	2.10	1.6218	0.0032	1.0000
802.11g	9.00	7.9433	2.10	1.6218	0.0026	1.0000
802.11n(HT20)	9.00	7.9433	2.10	1.6218	0.0026	1.0000

LTE

Modulation Type	Output power		Antenna Gain (dBi)	Antenna Gain (linear)	MPE (mW/cm^2)	MPE Limits (mW/cm^2)
	dBm	mW				
LTE Band 2	23.00	199.5262	3.68	2.3335	0.0926	0.4660
LTE Band 4	22.00	158.4893	3.68	2.3335	0.0736	1.0000
LTE Band 12	23.00	199.5262	3.68	2.3335	0.0926	1.0000

Remark:

1. Output power including tune-up tolerance;
2. MPE evaluate distance is 20cm from user manual provide by manufacturer;

6.2 Simultaneous Transmission MPE

The sample support one Bluetooth & WLAN modular, one GSM<E modular, and one Bluetooth & WLAN antenna, and one GSM<E antenna, Need consider simultaneous transmission ;

According to KDB447498 D01 General RF Exposure Guidance v06 for Transmitters used in mobile exposure conditions for simultaneous transmission operations;

$\sum$ of MPE ratios ≤ 1.0

6.2.1 Summary simultaneous transmission results

Maximum Simultaneous transmission MPE Ratios for 2.4GWLAN, SRD, LTE Band 2 .

Maximum MPE ratio 2.4GWLAN	Maximum MPE ratio SRD	Maximum MPE ratio LTE	$\sum$ MPE ratios	Limit	Results
0.0032	0.0055	0.1987	0.2074	1.0	PASS

7. Conclusion

The measurement results comply with the FCC Limit per 47 CFR 2.1091 for the uncontrolled RF Exposure and SAR Exclusion Threshold per KDB447498 D01 General RF Exposure Guidance v06, No SAR is required.

.....End of Report.....