



RF Exposure Evaluation Report

Application No.: SZEM1911020085CR
Applicant: Surf Communication Solutions Ltd.
Address of Applicant: 7 Hamada Street, Yokneam Ilit20692, Israel.
Manufacturer: 1. Surf Communication Solutions Ltd.
 2. Dongguan Aomeijia Electronic Co., Ltd
Address of Manufacturer: 1. 7 Hamada St., P.O.B. 343 Yoqneam Hi-Tech Park 2069205 Yokneam, Israel
 2. Lefushan Industry Zone, Youganpu Vilage, Fenggang Town, Dongguan, Guangdong Province, P.R.China
Factory: Surf Communication Solutions Ltd.
Address of Factory: 7 Hamada St., P.O.B. 343 Yoqneam Hi-Tech Park 2069205 Yokneam, Israel
Product Name: Dash Camera
Model No.: AI-12, SF450 ♣
 ♣ Please refer to section 4.1 of this report which indicates which model was actually tested and which were electrically identical.
Trade Mark: Surfsight AI-12
FCC ID: 2ATWTAI-12S
 47 CFR Part 1.1307
Standards: 47 CFR Part 1.1310
 47 CFR Part 2.1091
Date of Receipt: 2019-11-12
Date of Test: 2019-11-13 to 2019-12-04
Date of Issue: 2019-12-09

Test Result :	PASS*
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* In the configuration tested, the EUT complied with the standards specified above.

Keny Xu
 EMC Laboratory Manager



3 Version

<i>Revision Record</i>				
<i>Version</i>	<i>Chapter</i>	<i>Date</i>	<i>Modifier</i>	<i>Remark</i>
01		2019-12-09		Original

Authorized for issue by:			
			
		<hr/> Edison Li /Project Engineer	
			
		<hr/> Eric Fu /Reviewer	



4 Contents

	Page
1 COVER.....	1
2 RF EXPOSURE EVALUATION REPORT.....	1
3 VERSION.....	2
4 CONTENTS.....	3
5 GENERAL INFORMATION.....	4
5.1 GENERAL DESCRIPTION OF EUT.....	4
5.2 TEST LOCATION.....	6
5.3 TEST FACILITY.....	6
5.4 DEVIATION FROM STANDARDS.....	6
5.5 ABNORMALITIES FROM STANDARD CONDITIONS.....	6
5.6 OTHER INFORMATION REQUESTED BY THE CUSTOMER.....	6
6 RF EXPOSURE EVALUATION.....	7
6.1 RF EXPOSURE COMPLIANCE REQUIREMENT.....	7
6.1.1 <i>Limits</i>	7
6.1.2 <i>Test Procedure</i>	7
6.1.3 <i>EUT RF Exposure Evaluation</i>	8-11



5 General Information

5.1 General Description of EUT

Power supply:	DC 3.7V, 550mAh rechargeable battery which charged by DC power port DC5V/2A from external power
Sample Type:	Fixed Device
For BLE:	
Frequency Range:	2402MHz to 2480MHz
Bluetooth Version:	V4.2
Modulation Type:	GFSK
Channel Spacing:	2MHz
Number of Channels:	40
Antenna Type:	Integral
Antenna Gain:	Antenna1: 1dBi
For 2.4G WiFi:	
Type of Modulation:	802.11b: DSSS (CCK, DQPSK, DBPSK) 802.11g: OFDM (64QAM, 16QAM, QPSK, BPSK) 802.11n (HT20/HT40): OFDM (64QAM, 16QAM, QPSK, BPSK)
Operating Frequency:	802.11b/g/n(HT20): 2412MHz to 2462MHz 802.11n(HT40): 2422MHz to 2452MHz
Channel Number:	802.11b/g/11n(HT20): 11 Channels 802.11n(HT40): 7 Channels
Channels Step:	Channels with 5MHz step
Antenna Type:	Integral
Antenna Gain:	Antenna1: 1dBi
For GSM/WCDMA/LTE:	
Operation Frequency Band:	GPRS850/GPRS1900/ WCDMA Band II/ WCDMA Band V; LTE FDD Band 2, 4, 5, 12
Modulation Type:	GMSK for GPRS/EGPRS; 8PSK for EGPRS; QPSK for WCDMA; QPSK, 16QAM for LTE;
GPRS Multi-slots Class:	33
EGPRS Multi-slots Class:	33
HSDPA UE Category:	13





HSUPA UE Category:	6
LTE Release Version:	R8
LTE Power Class:	Level 3
Antenna Type:	GSM/WCDMA/LTE: Integral
Antenna Gain:	Antenna2: 1dBi

Remark:

Model No.: AI-12, SF450

Only the model SF450 was tested, since the electrical circuit design, layout, components used, internal wiring and functions were identical for the above models, only different on model name.



5.2 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch

No. 1 Workshop, M-10, Middle section, Science & Technology Park, Shenzhen, Guangdong, China
518057

Telephone: +86 (0) 755 2601 2053 Fax: +86 (0) 755 2671 0594

No tests were sub-contracted.

5.3 Test Facility

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

- **A2LA (Certificate No. 3816.01)**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 3816.01.

- **VCCI**

The 3m Fully-anechoic chamber for above 1GHz, 10m Semi-anechoic chamber for below 1GHz, Shielded Room for Mains Port Conducted Interference Measurement and Telecommunication Port Conducted Interference Measurement of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-20026, R-14188, C-12383 and T-11153 respectively.

- **FCC –Designation Number: CN1178**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized as an accredited testing laboratory.

Designation Number: CN1178. Test Firm Registration Number: 406779.

- **Innovation, Science and Economic Development Canada**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized by ISED as an accredited testing laboratory.

CAB identifier: CN0006.

IC#: 4620C.

5.4 Deviation from Standards

None.

5.5 Abnormalities from Standard Conditions

None.

5.6 Other Information Requested by the Customer

None.



6 RF Exposure Evaluation

6.1 RF Exposure Compliance Requirement

6.1.1 Limits

According to FCC Part1.1310: 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 part1.1307(b)

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
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
(B) Limits for General Population/Uncontrolled Exposure				
0.3–1.34	614	1.63	*(100)	30
1.34–30	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

Friis Formula

Friis transmission formula: $P_d = (P_{out} * G) / (4 * \pi * R^2)$

Where

P_d = power density in mW/cm²

P_{out} = output power to antenna in mW

G = gain of antenna in linear scale

π = 3.1416

For Uncontrolled Environment, the MPE limit of 300MHz to 1500MHz is f/1500 mW/cm², the MPE limit of 1500MHz to 100000MHz is 1.0 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.

6.1.2 Test Procedure

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



6.1.3 EUT RF Exposure Evaluation

1) Test Results

Note: The 2.4G WiFi and GSM/WCDMA/LTE module can synchronous transmission at the same time.
The 2.4G WiFi and BLE module cannot synchronous transmission at the same time.

For BLE:

The max tune-up tolerance power Into Antenna & RF Exposure Evaluation Distance:

Antenna	Max Antenna Gain (dBi)	Max Antenna Gain (Numeric)	Max tune-up tolerance power (dBm)	Max tune-up Tolerance power to Antenna (mW)	Power Density at R = 30 cm (mW/cm ²)	Limit (mW/cm ²)	MPE Ratios	Result
Ant1	1	1.26	4.5	2.82	0.0003	1	0.0003	PASS

Note: Refer to report No. SZEM191102008502 or EUT test Max Conducted Peak Output Power value.
The distancer (4th column) calculated from the Fries transmission formula is far greater than 30 cm separation requirement.

For 2.4G WiFi:

The max tune-up tolerance power Into Antenna & RF Exposure Evaluation Distance:

Antenna	Max Antenna Gain (dBi)	Max Antenna Gain (Numeric)	Max tune-up tolerance power (dBm)	Max tune-up Tolerance power to Antenna (mW)	Power Density at R = 30 cm (mW/cm ²)	Limit (mW/cm ²)	MPE Ratios	Result
Ant1	1	1.26	19.5	89.13	0.0099	1	0.0099	PASS

Note: Refer to report No. SZEM191102008503 or EUT test Max Conducted Peak Output Power value.
The distancer (4th column) calculated from the Fries transmission formula is far greater than 30 cm separation requirement.



For GSM 850:

The max tune-up tolerance power Into Antenna & RF Exposure Evaluation Distance:

Antenna	Max Antenna Gain (dBi)	Max Antenna Gain (Numeric)	Max tune-up tolerance power (dBm)	Max tune-up Tolerance power to Antenna (mW)	Power Density at R = 30 cm (mW/cm ²)	Limit (mW/cm ²)	MPE Ratios	Result
Ant2	1	1.26	33	1995.26	0.2221	0.5495	0.4042	PASS

Note: Refer to report No. SZEM191102008504 or EUT test Max Conducted Peak Output Power value.

The distancer (4th column) calculated from the Fries transmission formula is far greater than 30 cm separation requirement.

For GSM 1900:

The max tune-up tolerance power Into Antenna & RF Exposure Evaluation Distance:

Antenna	Max Antenna Gain (dBi)	Max Antenna Gain (Numeric)	Max tune-up tolerance power (dBm)	Max tune-up Tolerance power to Antenna (mW)	Power Density at R = 30 cm (mW/cm ²)	Limit (mW/cm ²)	MPE Ratios	Result
Ant2	1	1.26	30	1000	0.1113	1	0.1113	PASS

Note: Refer to report No. SZEM191102008504 or EUT test Max Conducted Peak Output Power value.

The distancer (4th column) calculated from the Fries transmission formula is far greater than 30 cm separation requirement.

For WCDMA Band V:

The max tune-up tolerance power Into Antenna & RF Exposure Evaluation Distance:

Antenna	Max Antenna Gain (dBi)	Max Antenna Gain (Numeric)	Max tune-up tolerance power (dBm)	Max tune-up Tolerance power to Antenna (mW)	Power Density at R = 30 cm (mW/cm ²)	Limit (mW/cm ²)	MPE Ratios	Result
Ant2	1	1.26	24	251.19	0.0280	0.5509	0.0508	PASS

Note: Refer to report No. SZEM191102008504 or EUT test Max Conducted Peak Output Power value.

The distancer (4th column) calculated from the Fries transmission formula is far greater than 30 cm separation requirement.



For WCDMA Band II:

The max tune-up tolerance power Into Antenna & RF Exposure Evaluation Distance:

Antenna	Max Antenna Gain (dBi)	Max Antenna Gain (Numeric)	Max tune-up tolerance power (dBm)	Max tune-up Tolerance power to Antenna (mW)	Power Density at R = 30 cm (mW/cm ²)	Limit (mW/cm ²)	MPE Ratios	Result
Ant2	1	1.26	24	251.19	0.0280	1	0.0280	PASS

Note: Refer to report No. SZEM191102008504 or EUT test Max Conducted Peak Output Power value. The distancer (4th column) calculated from the Fries transmission formula is far greater than 30 cm separation requirement.

For LTE Band 2(1850MHz-1910MHz):

The max tune-up tolerance power Into Antenna & RF Exposure Evaluation Distance:

Antenna	Max Antenna Gain (dBi)	Max Antenna Gain (Numeric)	Max tune-up tolerance power (dBm)	Max tune-up Tolerance power to Antenna (mW)	Power Density at R = 30 cm (mW/cm ²)	Limit (mW/cm ²)	MPE Ratios	Result
Ant2	1	1.26	24	251.19	0.0280	1	0.0280	PASS

Note: Refer to report No. SZEM191102008505 or EUT test Max Conducted Peak Output Power value. The distancer (4th column) calculated from the Fries transmission formula is far greater than 30 cm separation requirement.

For LTE Band 4(1710MHz-1755MHz):

The max tune-up tolerance power Into Antenna & RF Exposure Evaluation Distance:

Antenna	Max Antenna Gain (dBi)	Max Antenna Gain (Numeric)	Max tune-up tolerance power (dBm)	Max tune-up Tolerance power to Antenna (mW)	Power Density at R = 30 cm (mW/cm ²)	Limit (mW/cm ²)	MPE Ratios	Result
Ant2	1	1.26	24	251.19	0.0280	1	0.0280	PASS

Note: Refer to report No. SZEM191102008505 or EUT test Max Conducted Peak Output Power value. The distancer (4th column) calculated from the Fries transmission formula is far greater than 30 cm separation requirement.



For LTE Band 5(824MHz-849MHz):

The max tune-up tolerance power Into Antenna & RF Exposure Evaluation Distance:

Antenna	Max Antenna Gain (dBi)	Max Antenna Gain (Numeric)	Max tune-up tolerance power (dBm)	Max tune-up Tolerance power to Antenna (mW)	Power Density at R = 30 cm (mW/cm ²)	Limit (mW/cm ²)	MPE Ratios	Result
Ant2	1	1.26	24	251.19	0.0280	0.5493	0.0509	PASS

Note: Refer to report No. SZEM191102008505 or EUT test Max Conducted Peak Output Power value.

The distancer (4th column) calculated from the Fries transmission formula is far greater than 30 cm separation requirement.

For LTE Band 12(699MHz-716MHz):

The max tune-up tolerance power Into Antenna & RF Exposure Evaluation Distance:

Antenna	Max Antenna Gain (dBi)	Max Antenna Gain (Numeric)	Max tune-up tolerance power (dBm)	Max tune-up Tolerance power to Antenna (mW)	Power Density at R = 30 cm (mW/cm ²)	Limit (mW/cm ²)	MPE Ratios	Result
Ant2	1	1.26	24	251.19	0.0280	0.4660	0.0600	PASS

Note: Refer to report No. SZEM191102008505 or EUT test Max Conducted Peak Output Power value.

The distancer (4th column) calculated from the Fries transmission formula is far greater than 30 cm separation requirement.

The simultaneous transmission result between of 2.4G WiFi and GSM/WCDMA/LTE:

The SAR Exclusion Threshold Level:

$$= \text{CPD1} / \text{LPD1} + \text{CPD2} / \text{LPD2}$$

(CPD = Calculation power density, LPD = Limit of power density)

$$= (0.0099/1) + (0.2221/0.5495) = 0.4141 < 1$$

Since the SAR Exclusion Threshold Level is well below the SAR low threshold level, so the EUT is considered to comply with SAR requirement without testing.

End of Report

