

RF EXPOSURE REPORT

According to
 FCC Rules 47 CFR §2.1091 & FCC OET Bulletin 65 supplement C

Application No.: SHEM1203000254RF

Address of Applicant: ICP Electronics Inc.

Equipment Under Test (EUT):

NOTE: The following sample(s) submitted was/were identified on behalf of the client as

FCC ID: RFHWIFI-RT3593-DB

Fundamental Frequency : 2400~2483.5MHz, 5.15~5.35GHz, 5.47~5.725GHz and 5.725~5.850GHz

Trade Mark: 

Name: WIRELESS LAN MODULE

Model No.: WIFI-RT3593-DB

Standards: FCC OET Bulletin 65 supplement C: 2001

Date of Receipt: Mar. 12, 2012

Date of Test: Mar. 14, 2012 to Apr. 16, 2012

Date of Issue: Apr. 28, 2012

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



E&E Section Head
 SGS-CSTC(Shanghai) Co., Ltd.



E&E EMC Engineer
 SGS-CSTC(Shanghai) Co., Ltd.

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1 General Information

1.1 Client Information

Applicant: ICP Electronics Inc.
Address of Applicant: 3F., No.22, Zhongxing Rd., Xizhi Dist., New Taipei City 221, Taiwan, R.O.C
Manufacturer: Armorlink SH Corp.
Address of Manufacturer: 515.Shenfu Rd,Xinzhuang Industrial Development Zone,Minhang District,Shanghai,P.R.China

1.2 General Description of E.U.T.

Trade Mark: 

Name: WIRELESS LAN MODULE
Model No.: WIFI-RT3593-DB
Modulation Type: CCK, DQPSK, DBPSK for DSSS
64QAM, 16QAM, QPSK, BPSK for OFDM
Modulation Technology: DSSS, OFDM
For 15.407
802.11a & 802.11n: 5.18 ~ 5.24GHz, 5.26 ~ 5.32GHz,5.50 ~ 5.70GHz
Operating Frequency : **For 15.247**
802.11b & 802.11g & 802.11n: 2.412 ~ 2.462GHz
802.11a & 802.11n: 5.745 ~ 5.825GHz
Number of Channel : **For 15.407**
19 for 802.11a, 802.11n (20MHz)
9 for 802.11n (40MHz)
For 15.247(2.4GHz)
11 for 802.11b, 802.11g, 802.11n (20MHz)
7 for 802.11n (40MHz)
For 15.247(5GHz)
5 for 802.11a, 802.11n (20MHz)
2 for 802.11n (40MHz)

1.3 Details of E.U.T.

Hardware Version: N/A
Software Version: N/A
Power Supply: 3.3V/0.75A

Antenna Information:

Antenna Delivery: 3T3R



Antenna List:

There are two sets of antennas provided to this EUT, please refer to the following table:

Set 1:

Chains	Antenna Type	Manufacturer	Model No.	Antenna Gain (2.0 dBi)
Chain 100	Dipole	Exceltek Electronics (kunshan) Co., Ltd	C0255-ANG0018	<input checked="" type="checkbox"/> For 2.4GHz <input checked="" type="checkbox"/> For 5GHz:
Chain 010	Dipole		C0255-ANG0018	<input checked="" type="checkbox"/> For 2.4GHz: <input checked="" type="checkbox"/> For 5GHz:
Chain 001	Dipole		C0255-ANG0018	<input checked="" type="checkbox"/> For 2.4GHz: <input checked="" type="checkbox"/> For 5GHz:

Set 2:

Chains	Antenna Type	Manufacturer	Model No.	Antenna Gain (2.0 dBi)
Chain 100	PCB	Exceltek Electronics (kunshan) Co., Ltd	C0255-ANG0016	<input checked="" type="checkbox"/> For 2.4GHz: <input checked="" type="checkbox"/> For 5GHz:
Chain 010	PCB		C0255-ANG0016	<input checked="" type="checkbox"/> For 2.4GHz: <input checked="" type="checkbox"/> For 5GHz:
Chain 001	PCB		C0255-ANG0016	<input checked="" type="checkbox"/> For 2.4GHz: <input checked="" type="checkbox"/> For 5GHz:

Antenna Combination Mode:

Operation Mode	Chain(100)	Chain(010)	Chain(001)	Chain(111)*
802.11b	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
802.11g	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
802.11n(20MHz)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
802.11n(40MHz)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
802.11a	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

NOTE 1: * means transmitting simultaneously via these chains (Chain(100), Chain(010), Chain(001)).
 NOTE 2: The above information was declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.

1.4 Test Location

All tests were performed at SGS E&E EMC lab

SGS-CSTC EMC Laboratory, No.588 West Jindu Road,Songjiang District,Shanghai,China
 Tel:+86 21 6191 5666 Fax:+86 21 6191 5655

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1.5 Test Equipment Information

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due date
1	Spectrum Analyzer	Rohde & Schwarz	FSP-30	100324	2011-04-19	2012-04-18

1.6 Test Confident level

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

- **CNAS (No. CNAS L0599)**

CNAS has accredited SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing. Date of expiry: 2014-07-26.

- **FCC – Registration No.: 402683**

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. has been registered and fully described in a report filed with the Federal Communications Commission (FCC). The acceptance letter from the FCC is maintained in our files. Registration No.: 402683, Expiry Date: 2015-02-22.

- **Industry Canada (IC) – IC Assigned Code: 8617A**

The 3m Semi-anechoic chamber of SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 8617A. Expiry Date: 2014-09-20.

- **VCCI (Member No.: 3061)**

The 3m Semi-anechoic chamber and Shielded Room of SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-3172 and C-3514 respectively. Date of Registration: 2009-11-30. Date of Expiry: 2012-03-17.

2 Test Standards and Limits

The Equipment under Test (EUT) has been tested at SGS's (own or subcontracted) laboratories.

The following table summarizes the specific reference documents such as harmonized standards or test specifications which were used for testing as SGS's (own or subcontracted) laboratories.



Identity	Document Title	Version
FCC Rules 47 CFR§2.1091	Radiofrequency radiation exposure evaluation:mobile devices	-
FCC OET Bulletin 65 supplement C	Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields	2001

In the configuration tested, the EUT complied with the standards specified above.

FCC LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

(B) Limits for General Population/Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm ²)	Averaging Time E ² , H ² or S (minutes)
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 *Plane-wave equivalent power density

2.1 MPE CALCULATION FORMULA

$Pd = (Pout \cdot G) / (4 \cdot \pi \cdot r^2)$

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

Note:

1) $P \text{ (Watts)} = 10^{\frac{dBm}{10}} / 1000$

2) $G \text{ (Antenna gain in numeric)} = 10^{\text{(Antenna gain in dBi / 10)}}$

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2.2 EUT Operating condition

The software provided by Manufacturer enabled the EUT to transmit and receive data at lowest, middle and highest channel individually.

2.3 CLASSIFICATION

The antenna of this product, under normal use condition, is at least 20cm away from the body of the user. So, this device is classified as Mobile Device.

2.4 Output Power Into Antenna & RF Exposure value at distance 20cm:

For 15.247(2.4GHz) :

802.11b:

Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density (mW/cm ²)	Limit of Power Density (mW/cm ²)	Result
1	2412	64.9	0.020	1.0	PASS
6	2437	55.7	0.018	1.0	PASS
11	2462	58.1	0.018	1.0	PASS

802.11g:

Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density (mW/cm ²)	Limit of Power Density (mW/cm ²)	Result
1	2412	76.2	0.024	1.0	PASS
6	2437	77.4	0.024	1.0	PASS
11	2462	81.1	0.025	1.0	PASS

802.11n (20MHz):

Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density (mW/cm ²)	Limit of Power Density (mW/cm ²)	Result
1	2412	199.1	0.063	1.0	PASS
6	2437	232.8	0.073	1.0	PASS
11	2462	234.4	0.074	1.0	PASS

802.11n (40MHz):

Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density (mW/cm ²)	Limit of Power Density (mW/cm ²)	Result
1	2422	226.5	0.071	1.0	PASS
4	2437	211.8	0.067	1.0	PASS
7	2452	412.1	0.130	1.0	PASS

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For 15.247(5GHz) :
802.11a:

Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density (mW/cm ²)	Limit of Power Density (mW/cm ²)	Result
149	5745	125.3	0.039	1.0	PASS
157	5785	100.9	0.032	1.0	PASS
165	5825	75.3	0.024	1.0	PASS

802.11n (20MHz):

Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density (mW/cm ²)	Limit of Power Density (mW/cm ²)	Result
149	5745	124.2	0.039	1.0	PASS
157	5785	122.2	0.032	1.0	PASS
165	5825	86.5	0.024	1.0	PASS

802.11n (40MHz):

Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density (mW/cm ²)	Limit of Power Density (mW/cm ²)	Result
151	5755	107.6	0.034	1.0	PASS
159	5795	90.6	0.028	1.0	PASS

For 15.407(5GHz):
802.11a:

Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density (mW/cm ²)	Limit of Power Density (mW/cm ²)	Result
36	5180	40.5	0.013	1.0	PASS
40	5200	21.5	0.007	1.0	PASS
48	5240	41.4	0.013	1.0	PASS
52	5260	19.7	0.006	1.0	PASS
60	5300	20.5	0.006	1.0	PASS
64	5320	40.6	0.013	1.0	PASS
100	5500	26.4	0.008	1.0	PASS
120	5600	25.2	0.008	1.0	PASS
140	5700	12.3	0.004	1.0	PASS

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802.11n (20MHz):

Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density (mW/cm ²)	Limit of Power Density (mW/cm ²)	Result
36	5180	29.4	0.009	1.0	PASS
40	5200	21.7	0.007	1.0	PASS
48	5240	35.2	0.011	1.0	PASS
52	5260	19.5	0.006	1.0	PASS
60	5300	19.2	0.006	1.0	PASS
64	5320	27.1	0.009	1.0	PASS
100	5500	30.3	0.010	1.0	PASS
120	5600	29.0	0.009	1.0	PASS
140	5700	9.5	0.003	1.0	PASS

802.11n (40MHz):

Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density (mW/cm ²)	Limit of Power Density (mW/cm ²)	Result
38	5190	46.5	0.015	1.0	PASS
46	5230	38.5	0.012	1.0	PASS
54	5270	12.6	0.004	1.0	PASS
62	5310	48.1	0.015	1.0	PASS
102	5510	30.1	0.009	1.0	PASS
118	5590	24.9	0.008	1.0	PASS
134	5670	18.6	0.006	1.0	PASS

THE END OF REPORT

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