

TEST REPORT

Application No.: HKEM2107000711AT
Applicant: Webasto Charging Systems, Inc.
Address of Applicant: 1333 South Mayflower Avenue Monrovia, California 91016, USA
Equipment Under Test (EUT):
EUT Name: IPC Communication Board
Model No.: IPC COMM
FCC ID: 2AZ8SIPC
IC: 27507-IPC
HVIN: IPC COMM
Standard(s) : 47 CFR Part 1.1307
47 CFR Part 1.1310
47 CFR Part 2.1091
RSS-102 Issue 5 March 2015 Amendment 1
Date of Receipt: 2021-06-21
Date of Test: 2021-07-01 to 2021-08-23
Date of Issue: 2021-08-23

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

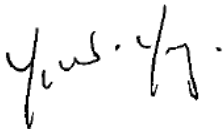



Law Man Kit
EMC Manager

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Revision Record				
Version	Chapter	Date	Modifier	Remark
01		2021-08-23		Original

Authorized for issue by:			
			
		Yung Yukwah /Project Engineer	Date: 2021-07-26
			
		Law Man Kit /Reviewer	Date: 2021-07-26

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2 Test Summary

Radio Spectrum Technical Requirement				
Item	Standard	Method	Requirement	Result
RF Exposure	47 CFR Part 1.1307 47 CFR Part 1.1310 47 CFR Part 2.1091	N/A	47 CFR Part 1.1307 47 CFR Part 1.1310 47 CFR Part 2.1091	PASS
RF Exposure	RSS-102 Issue 5 March 2015 Amendment 1	RSS-102 Section 2.5.2	RSS-102 Issue 5 March 2015 Amendment 1	PASS

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3 Contents

	Page
1 COVER PAGE	1
2 TEST SUMMARY	3
3 CONTENTS	4
4 GENERAL INFORMATION	5
4.1 DETAILS OF E.U.T.	5
4.2 TEST LOCATION.....	5
4.3 TEST FACILITY.....	6
4.4 DEVIATION FROM STANDARDS.....	6
4.5 ABNORMALITIES FROM STANDARD CONDITIONS	6
5 RADIO SPECTRUM TECHNICAL REQUIREMENT	6
5.1 RF EXPOSURE FOR FCC	6
5.1.1 <i>Limits</i>	6
5.1.2 <i>Test Procedure</i>	7
5.1.3 <i>Conclusion</i>	7
5.2 RF EXPOSURE FOR IC	9
5.2.1 <i>Test Requirement for ISED</i>	9
5.2.2 <i>Test Procedure</i>	10
5.2.3 <i>Conclusion</i>	10

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4 General Information

4.1 Details of E.U.T.

Power supply:	Input: DC 5.0 V, 1 A powered from Micro USB port
Test voltage:	AC 120 V, 60Hz
Cable:	99.5 cm unshielded 3-wire USB cable
Antenna Gain:	2 dBi
Antenna Type:	Dipole Antenna
For 2.4GHz Wifi	
Operation Frequency:	802.11b/g/n(HT20): 2412MHz to 2462MHz
Number of Channels:	802.11b/g/n(HT20): 11
Channel Spacing:	5MHz
Modulation Type:	802.11b: DSSS (CCK, DQPSK, DBPSK) 802.11g/n: OFDM (64QAM, 16QAM, QPSK, BPSK)
Data rate:	802.11b: 1Mbps, 2Mbps, 5.5Mbps, 11 Mbps 802.11g: 6Mbps, 9Mbps, 12Mbps, 18Mbps, 24Mbps, 36Mbps, 48Mbps, 54 802.11n: 6.5Mbps, 13Mbps, 19.5Mbps, 26Mbps, 39Mbps, 52Mbps, 58.5Mbps, 65Mbps
For BLE	
Bluetooth Version:	V5.0
Operation Frequency:	2402MHz to 2480MHz
Number of Channels:	40
Tested Channels:	2402MHz, 2440MHz, 2480MHz
Channel Spacing:	2MHz
Modulation Type:	GFSK
Data rate:	1Mbps
Series number:	IPC COM-001
FVIN:	V1.2
Hardware Version:	DVT1
Software Version:	V1.2
	Remark: Power level setting was not adjustable and fixed default through SW Version.

4.2 Test Location

All tests were performed at:

SGS Hong Kong Limited

Unit 2 and 3, G/F, Block A, Po Lung Centre,

11 Wang Chiu Road, Kowloon Bay, Kowloon, Hong Kong

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Tel: +852 2305 2570 Fax: +852 2756 4480

No tests were sub-contracted.

4.3 Test Facility

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

- **HOKLAS (Lab Code: 009)**

SGS HONG KONG Limited has been accepted by HKAS Executive, on the recommendation of the Accreditation Advisory Board, as a HOKLAS Accredited Laboratory, this laboratory meets the requirements of ISO/IEC 17025:2017 and it has been accredited for performing specific test as listed in the scope of accreditation within the test category of Electrical and Electronic Products.

- **IAS Accreditation (Lab Code: TL-817)**

SGS HONG KONG Limited has met the requirements of AC89, IAS Accreditation Criteria for Testing Laboratories, and has demonstrated compliance with ISO/IEC Standard 17025:2017, General requirements for the competence of testing and calibration laboratories. This organization is accredited to provide the services specified in the scope of accreditation maintained on the IAS website (www.iasonline.org).

The report must not be used by the client to claim product certification, approval, or endorsement by IAS, NIST, or any agency of the Federal Government.

- **FCC Recognized Accredited Test Firm (CAB Registration No.: 514599)**

SGS HONG KONG Limited has been accredited and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Designation Number: HK0015, Test Firm Registration Number: 514599.

- **Industry Canada (Site Registration No.: 26103; CAB Identifier No.: HK0015)**

SGS HONG KONG Limited has been recognized by Department of Innovation, Science and Economic Development (ISED) Canada as a wireless testing laboratory. The acceptance letter from the ISED is maintained in our files. CAB Identifier No: HK0015, Site Registration Number: 26103.

4.4 Deviation from Standards

None

4.5 Abnormalities from Standard Conditions

None

5 Radio Spectrum Technical Requirement

5.1 RF Exposure for FCC

5.1.1 Limits

According to FCC Part 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

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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

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.

5.1.2 Test Procedure

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

5.1.3 Conclusion

For BLE:

Antenna Gain: 2dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 1.58 in linear scale.

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Output Power Into Antenna & RF Exposure Evaluation Distance:

Frequency (MHz)	Antenna	Max Conducted Peak Output Power (dBm)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)	Limit	Result
2480	1	6.131	4.103	0.001	1.0	PASS

Note: Refer to report No. HKEM210700071102 for EUT test Max Conducted Peak Output Power value.

The distance r (4th column) calculated from the Fries transmission formula is far greater than 20 cm separation requirement.

For 2.4GHz Wifi:

Antenna Gain: 2dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 1.58 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance:

Frequency (MHz)	Antenna	Max Conducted Peak Output Power (dBm)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)	Limit	Result
2442	1	17.70	58.88	0.019	1.0	PASS

Note: Refer to report No. HKEM210700071101 for EUT test Max Conducted Peak Output Power value.

The distance r (4th column) calculated from the Fries transmission formula is far greater than 20 cm separation requirement.

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5.2 RF Exposure for IC

5.2.1 Test Requirement for ISED

RSS-102

Limit:

According to RSS-102 :

RF exposure evaluation is required if the separation distance between the user and/or bystander and the device's radiating element is greater than 20 cm, except when the device operates as follows:

- below 20 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 1W (adjusted for tune-up tolerance);
- at or above 20 MHz and below 48 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $4.49/f^{0.5}W$ (adjusted for tune-up tolerance), where f is in MHz;
- at or above 48 MHz and below 300 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 0.6 W (adjusted for tune-up tolerance);
- at or above 300 MHz and below 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $1.31 \times 10^{-2} f^{0.6834}W$ (adjusted for tune-up tolerance), where f is in MHz;
- at or above 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 5 W (adjusted for tune-up tolerance).

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5.2.2 Test Procedure

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

5.2.3 Conclusion

For BLE:

Antenna Gain: 2dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 1.58 in linear scale.

Antenna	Test Channel	Conduct power (including Tune-up tolerance) (dBm)	E.I.R.P. (mW)	Limit (W)	Result
1	2480	6.131	6.503	2.74	Pass

Note:

1. Refer to report No. HKEM210700071102 for EUT test EIRP value.
2. RF exposure was evaluated for the maximum power level and the correspondent channel.

For 2.4GHz Wifi:

Antenna Gain: 2dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 1.58 in linear scale.

Antenna	Test Channel	Conduct power (including Tune-up tolerance) (dBm)	E.I.R.P. (mW)	Limit (W)	Result
1	2442	17.70	93.33	2.71	Pass

Note:

1. Refer to report No. HKEM210700071101 for EUT test EIRP value.
2. RF exposure was evaluated for the maximum power level and the correspondent channel.

- End of the Report -

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