

FCC RF EXPOSURE EVALUATION REPORT

Product Name: Computador de Bordo
Trade Mark: solinftec
Model No.: XBee PROS3B
Report Number: 180516002RFC-2
Test Standards: FCC 47 CFR Part 1 Subpart I
FCC ID: 2AQWE-XB900HP
Test Result: PASS
Date of Issue: March 12, 2019

Prepared for:

TECSOIL AUTOMACAO E SISTEMAS S.A.
RUA ABRAHAO VINHAS, 242, SALA 1 E 2, ARACATUBA, Brazil

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Version

Version No.	Date	Description
V1.0	October 16, 2018	Change FCC ID and model
V1.1	March 12, 2019	Class II Permissible Change

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1. GENERAL INFORMATION

1.1 CLIENT INFORMATION

Applicant:	TECSOIL AUTOMACAO E SISTEMAS S.A.
Address of Applicant:	RUA ABRAHAO VINHAS, 242, SALA 1 E 2, ARACATUBA, Brazil
Manufacturer:	TECSOIL AUTOMACAO E SISTEMAS S.A.
Address of Manufacturer:	RUA ABRAHAO VINHAS, 242, SALA 1 E 2, ARACATUBA, Brazil

1.2 EUT INFORMATION

Product Name:	Computador de Bordo	
Model No.:	XBee PROS3B	
Add. Model No.:	N/A	
Trade Mark:	solinftec	
DUT Stage:	Identical Prototype	
Host Supports Function:	UTRA Bands:	Band II/ Band IV/ Band V
	902-928MHz Band:	IEEE 802.14 (EUT)
Sample Received Date:	May 13, 2018	
Sample Tested Date:	May 13, 2018 to September 5, 2018	

1.3 PRODUCT SPECIFICATION SUBJECTIVE TO THIS STANDARD

For IEEE 802.14	
Frequency Range:	902 MHz to 928 MHz
Modulation Technique:	Frequency Hopping Spread Spectrum(FHSS)
Type of Modulation:	FSK (10 kbps and 20 kbps), GMSK (200 kbps)
Number of Channels:	64/ 84/ 64
Channel Separation:	400 KHz/ 300 KHz/ 400KHz
Type of Equipment:	915MHz Frequency Hopping
Antenna Type:	External Antenna
Antenna Gain:	6 dBi
Declared Nominal Output Power (EUT):	+24 dBm

For WCDMA in Host Device		
Support Networks:	WCDMA, HSDPA, HSUPA	
Type of Modulation:	WCDMA	BPSK
	HSDPA:	QPSK
	HSUPA:	QPSK
Frequency Range:	WCDMA Band V:	826.4-846.6 MHz
	WCDMA Band II:	1852.4-1907.6 MHz
	WCDMA Band IV:	1712.4-1752.6 MHz
Max RF Output Power:	WCDMA Band V:	22.86 dBm
	WCDMA Band II:	23.41dBm
	WCDMA Band IV:	22.38dBm
Antenna Type:	External Antenna	
Antenna Gain:	6 dBi	

1.4 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a RF product, according to the specifications of the manufacturers. It must comply with the requirements of the following standards:

FCC 47 CFR Part 1 Subpart I

All test items have been performed and recorded as per the above standards

1.5 TEST LOCATION

All tests were performed at:

Shenzhen UnionTrust Quality and Technology Co., Ltd.

Address: 16/F, Block A, Building 6, Baoneng Science and Technology Park, Qingxiang Road No.1, Longhua New District, Shenzhen, China 518109
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1.6 TEST FACILITY

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

CNAS-Lab Code: L9069

The measuring equipment utilized to perform the tests documented in this report has been calibrated once a year or in accordance with the manufacturer's recommendations, and is traceable under the ISO/IEC/EN 17025 to international or national standards. Equipment has been calibrated by accredited calibration laboratories.

IC-Registration No.: 21600-1

The 3m Semi-anechoic chamber of Shenzhen UnionTrust Quality and Technology Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 21600-1.

A2LA-Lab Certificate No.: 4312.01

Shenzhen UnionTrust Quality and Technology Co., Ltd. has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

FCC Accredited Lab.

Designation Number: CN1194
Test Firm Registration Number: 259480

1.7 DEVIATION FROM STANDARDS

None.

1.8 ABNORMALITIES FROM STANDARD CONDITIONS

None.

1.9 OTHER INFORMATION REQUESTED BY THE CUSTOMER

None.

2. EQUIPMENT LIST

Please refer to the RF test report.



3. MPE EVALUATION

3.1 REFERENCE DOCUMENTS FOR EVALUATION

No.	Identity	Document Title
1	FCC 47 CFR Part 1 Subpart I	PROCEDURES IMPLEMENTING THE NATIONAL ENVIRONMENTAL POLICY ACT OF 1969
2	KDB 447498 D01 General RF Exposure Guidance v06	RF EXPOSURE PROCEDURES AND EQUIPMENT AUTHORIZATION POLICIES FOR MOBILE AND PORTABLE DEVICES

3.2 MPE COMPLIANCE REQUIREMENT

3.2.1 Limits

According to §1.1307(b)(1), system operating under the provisions of this section shall be operating in a manner that the public is not exposed to radio frequency energy level in excess limit for maximum permissible exposure.

Limits for Occupational / Controlled Exposure

Frequency range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm ²)	Averaging Times E ² , H ² or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842/f	4.89/f	(900/f)*	6
30-300	61.4	0.163	1.0	6
300-1500	/	/	F/300	6
1500-100000	/	/	5	6

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 Times 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)*	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	F/1500	30
1500-100000	/	/	1	30

Note: f = frequency in MHz: * = Plane-wave equivalents power density.

3.2.2 Test Procedure

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

3.3 MPE CALCULATION METHOD

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

S = power density (in appropriate units, e.g., mW/cm²)

P = power input to the antenna (in appropriate units, e.g., mW)

G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor is normally numeric gain.

R = distance to the center of radiation of the antenna (in appropriate units, e.g., cm)

3.4 MPE CALCULATION RESULTS

Note: For the test results, the EUT had been tested with all conditions. But only the worst case was shown in

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test report.

3.4.1 For 802.14

For Wi-Fi function, operating at 902 MHz to 928 MHz

3.4.1.1 Antenna Type:

Chain 0: External Antenna

3.4.1.2 Antenna Gain:

Chain 0: 6 dBi

3.4.1.3 Results for WLAN

Operating Mode	Freq.	Declared maximum conducted average output power	Max. positive tolerance according manufacturer	Antenna Gain	Calculated maximum EIRP	Declared maximum EIRP	MPE Limit	MPE Value
	(MHz)	(dBm)	(dB)	(dBm)	(dBm)	(mW)	(mw/cm ²)	
802.14	902-928	24	1	6	31	1000	0.6013	0.2506

3.4.2 For WWAN

For WCDMA function, operating at Band II/ IV/ V for BPSK and QPSK

3.4.2.1 Antenna Type:

Chain 0: External Antenna

3.4.2.2 Antenna Gain:

Chain 0: 6 dBi

WCDMA FDD Band	Freq.	Declared maximum conducted output power	Max. positive tolerance according manufacturer	Antenna Gain	Calculated maximum EIRP	Duty cycle	Equivalent EIRP	MPE Limit	MPE Value
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(%)	(mW)	(mw/cm ²)	
II	1852.4-1907.6	22	2	6	30	100	1000.0000	1	0.1989
IV	1712.4-1752.6	23	2	6	31	100	1258.9254	1	0.2504
V	826.4-846.6	22	2	6	30	100	1000.0000	0.5493	0.1989

Note 1: Calculated maximum EIRP = Declared maximum conducted output power + Max. positive tolerance according manufacturer + Antenna Gain.

Note 2: Declared maximum EIRP = $10^{\frac{\text{Calculated maximum EIRP}}{10}}$.

Note 3: Equivalent EIRP = Declared maximum EIRP * Duty cycle.

Note 4: Margin = MPE Limit - MPE Value.

3.4.3 Simultaneous Multi-band Transmission MPE Analysis

3.4.3.1 List of Mode for Simultaneous Multi-band Transmission

No.	Configurations	Support/Not Support
1	802.14 + WWAN	Support

3.4.3.2 Results for transmit simultaneously

No.	Configurations	Maximum MPE Value (mw/cm ²)		Transmit simultaneously (Ratio)	Limits (Ratio)
		WWAN	802.14		
1	802.14 + WCDMA Band II	0.1989	0.2506	0.6156	1
2	802.14 + WCDMA Band IV	0.2504	0.2506	0.6671	1
3	802.14 + WCDMA Band V	0.1989	0.2506	0.7788	1

Note 1: According to KDB 447498 D01 General RF Exposure Guidance v06, At the transmit simultaneously calculation method is as follows:

$$\text{Transmit simultaneously MPE} = \sum \text{of MPE ratios}$$

$$\text{MPE ratios} = \text{Field strengths or power density} / \text{MPE limit at the test frequency}$$

APPENDIX 1 PHOTOS OF TEST SETUP

N/A

APPENDIX 2 PHOTOS OF EUT CONSTRUCTIONAL DETAILS

Refer to Appendix 2 for EUT external and internal photos.

*** End of Report ***

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