

# Supra, A Division of UTCFS Model: iBox BT LE

Report No. SUPR0100.4 FCC 2.1091: Maximum Permissible Exposure Level



Report Prepared By Northwest EMC Inc.

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### **Certificate of Evaluation**

Date of Evaluation January 31, 2013 Supra, A Division of UTCFS Model: iBox BT LE

### **Emissions**

Description of Evaluation	Specification	Evaluation Method	Pass/Fail	
Maximum Permissible Exposure	FCC 2.1091:2013	OET Bulletin 65, Supplement C Ed 01-01	Pass	

Approved By:

Don Facteau, IS Manager

NVLAP Lab Code: 200630-0

This report must not be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government of the United States of America.

Product compliance is the responsibility of the client, therefore the tests and equipment modes of operation represented in this report were agreed upon by the client, prior to testing. This Report may only be duplicated in its entirety. The results of this test pertain only to the sample(s) tested. The specific description is noted in each of the individual sections of the test report supporting this certificate of test.

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# **REVISION HISTORY**

Revision Number	Description	Date	Page Number
00 None			

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# ACCREDITATIONS AND AUTHORIZATIONS

### **United States**

**FCC** - Designated by the FCC as a Telecommunications Certification Body (TCB). Certification chambers, Open Area Test Sites, and conducted measurement facilities are listed with the FCC.

**A2LA** - Accredited by A2LA to ISO / IEC Guide 65 as a product certifier. This allows Northwest EMC to certify transmitters to FCC and IC specifications.

NVLAP - Each laboratory is accredited by NVLAP to ISO 17025

### Canada

IC - Recognized by Industry Canada as a Certification Body (CB). Certification chambers and Open Area Test Sites are filed with IC.

### **European Union**

**European Commission** – Validated by the European Commission as a Conformity Assessment Body (CAB) under the EMC directive and as a Notified Body under the R&TTE Directive.

### Australia/New Zealand

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### Korea

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### Japan

VCCI - Associate Member of the VCCI. Conducted and radiated measurement facilities are registered.

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NCC - Recognized by NCC as a CAB for the acceptance of test data.

### Singapore

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### Hong Kong

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### Vietnam

MIC – Recognized by MIC as a CAB for the acceptance of test data.

### Russia

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### SCOPE

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## **LOCATIONS**





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**California** Labs OC01-13 41 Tesla Irvine, CA 92618 (949) 861-8918 New York Labs WA01-04 4939 Jordan Rd. Elbridge, NY 13060 (315) 685-0796 Minnesota Labs MN01-08 9349 W Broadway Ave. Brooklyn Park, MN 55445 (763) 425-2281 **Washington**Labs NC01-05,SU02,SU07
19201 120<sup>th</sup> Ave. NE
Bothell, WA 98011
(425) 984-6600

# VCCI A-0108 A-0029 A-0109 A-0110 Industry Canada

 2834D-1, 2834D-2
 2834B-1, 2834B-2, 2834B-3
 2834E-1
 2834C-1







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# PRODUCT DESCRIPTION

### **Client and Equipment Under Test (EUT) Information**

Company Name:	Supra, A Division of UTCFS			
Address:	4001 Fairview Industrial Drive SE			
City, State, Zip:	Salem, OR 97302			
Test Requested By:	equested By: Adam Purdue			
Model:	iBox BT LE			

### **Information Provided by the Party Requesting the Test**

### **Functional Description of the EUT (Equipment Under Test):**

The radio in the iBox BT LE is a 2.4 GHz Bluetooth 4.0 radio module with single PCB trace, meander line antenna.

### **Testing Objective:**

To demonstrate compliance with FCC requirements for RF exposure for 2.1091 mobile devices

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### **Maximum Permissible Exposure (MPE)**

#### **OVERVIEW**

Human exposure to RF emissions from mobile devices (47 CFR §2.1091) may be evaluated based on the MPE limits adopted by the FCC for electric and magnetic field strength and/or power density, as appropriate, since exposures are assumed to occur at distances of 20 cm or more from persons. ANSI C95.1-1992 specifies a minimum separation distance of 20 cm for performing reliable field measurements to determine adherence to MPE limits. If the minimum separation distance between a transmitter and nearby persons is more than 20 cm under normal operating conditions, compliance with MPE limits may be determined at such distance from the transmitter. When applicable, operation instructions and prominent warning labels may be used to alert the exposed persons to maintain a specified distance from the transmitter or to limit their exposure durations and usage conditions to ensure compliance. If the use of warning labels on a transmitter is not effective or desirable, the alternative of performing SAR evaluation with the device at its closest range to persons under normal operating conditions may be used. The field strength and power density limits adopted by the FCC are based on whole-body averaged exposure and the assumption of RF field levels relate most accurately to estimating whole-body averaged SAR. This means some local values of exposures exceeding the stated field strength and power density limits may not necessarily imply non-compliance if the spatial average of spatially averaged RF fields over the exposed portions of a person's body does not exceed the limits.

### **COMPLIANCE WITH 2.1091**

"Mobile devices that operate in the Cellular Radiotelephone Service, the Personal Communications Services, the Satellite Communications Services, the General Wireless Communications Service, the Wireless Communications Service, the Maritime Services and the Specialized Mobile Radio Service authorized under subpart H of part 22 of this chapter, parts 24, 25, 26 and 27 of this chapter, part 80 of this chapter (ship earth stations devices only) and part 90 of this chapter are subject to routine environmental evaluation for RF exposure prior to equipment authorization or use if they operate at frequencies of 1.5 GHz or below and their effective radiated power (ERP) is 1.5 watts or more, or if they operate at frequencies above 1.5 GHz and their ERP is 3 watts or more. Unlicensed personal communications service devices, unlicensed millimeter wave devices and unlicensed NII devices authorized under §§15.253, 15.255, and 15.257, and subparts D and E of part 15 of this chapter are also subject to routine environmental evaluation for RF exposure prior to equipment authorization or use if their ERP is 3 watts or more or if they meet the definition of a portable device as specified in §2.1093(b) requiring evaluation under the provisions of that section. All other mobile and unlicensed transmitting devices are categorically excluded from routine environmental evaluation for RF exposure prior to equipment authorization or use, except as specified in §§1.1307(c) and 1.1307(d) of this chapter. Applications for equipment authorization of mobile and unlicensed transmitting devices subject to routine environmental evaluation must contain a statement confirming compliance with the limits specified in paragraph (d) of this section as part of their application."

The EUT will only be used with a separation distance of 20 centimeters or greater between the antenna and the body of the user or nearby persons and can therefore be considered a mobile transmitter per 47 CFR 2.1091(b). Per 47 CFR 1.1310, the EUT meets the General Population / Uncontrolled exposure limits listed in Table 1.

### COMPLIANCE WITH FCC KDB 447498 D01 General RF Exposure Guidance V05

The Bluetooth 4.0 radio (2.4 GHz) installed in the iBox BT LE is a mobile transmitter that operates through its own PCB trace antenna. It is not co-located with any other radio.

"KDB 447498 D01 General RF Exposure Guidance v05" provides the procedures, requirements, and authorization policies for mobile and portable devices. Section 7.1 best fits the exposure condition described in this report. Since this mobile device is categorically excluded from routine evaluation; simple calculations may be used to estimate the power density to demonstrate compliance with 47 CFR 1.1310 requirements. The attached estimate shows MPE limits are met at a 20 cm boundary.

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## **Maximum Permissible Exposure (MPE)**

### **FCC LIMITS FOR MPE**

Limits for General Population /Uncontrolled Exposure: 47 CFR 1.1310

	Electric Field	Magnetic Field		
Frequency Range	Strength	Strength	Power Density	Averaging Time
(MHz)	(V/m)	(A/m)	(mW/cm <sup>2</sup> )	(minutes)
0.3 - 1.34	614	1.63	*(100)	30
1.34 - 30	824/f	2.19/f	*(180/f <sup>2</sup> )	30
30 - 300	27.5	0.073	0.2	30
300 - 1500			f/1500	30
1500 - 100000			1	30

f = frequency in MHz

### **METHOD OF EVALUATION**

The exposure level for the radio is evaluated at a 20 cm distance from the radio's transmitting antenna using the general equation:

$$S = \frac{P * G}{4 * \pi * R^{2}}$$

Where: S = power density (mW/cm2)

P = power input to the antenna (mW)

G = numeric power gain relative to an isotropic radiator

R = distance to the center of the radiation of the antenna (20 cm = limit for MPE estimates)

P\*G = EIRP

Solving for S, the maximum power density 20 cm from the transmitting antenna is determined.

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<sup>\* =</sup> Plane-wave equivalent power density



## **Maximum Permissible Exposure (MPE)**

EUT:	iBox BT LE	Work Order:	SUPR0100		
Serial Number:	See FCC test report SUPR0	Date:	1/31/13		
Customer:	Supra, A Division of UTC	Temperature (°C):	NA		
Attendees: N/A		Rel. Humidity (%):	NA		
Customer Project:	N/A	Bar. Pres. (mb):	NA		
Evaluated By:	Rod Peloquin	Power: NA	Job Site:	NA	

### **TEST SPECIFICATIONS**

Specification:	Method:
FCC 2.1091:2013	OET Bulletin 65, Supplement C Ed 01-01

### **COMMENTS**

See Product Description

### **DEVIATIONS FROM TEST STANDARD**

None

Signature

### **MPE Estimates for Individual Devices**

Radio	Antenna Type	Antenna Manufacturer	Antenna Part No.	Frequency	Max Peak Conducted Output Power	Duty Cycle	Duty Cycle Corrected Output Power		Minimum Antenna Cable Loss	_	Limit from 1.1310	Ratio of Power Density to the Exposure Limit
				(MHz)	(mW)		(mW)	(dBi)	(dB)	(mW/cm <sup>2</sup> )	(mW/cm <sup>2</sup> )	
2.4 GHz Bluetooth	PCB Trace	Supra, UTCFS	none	2480	11.07	1	11.07	4.5	0	0.006	1.000	0.00621

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