

# Test Report C-3770 B

<b>Equipment Under Test:</b>	SaBLE-x-R2DAK
<b>Requirement(s):</b>	FCC: 1.1307, 1.1310 ISED: RSS-102
<b>Test Date(s):</b>	February 20-21, 2024
<b>Prepared for:</b>	Daktronics, Inc. Attn: Jason Boeve 201 Daktronics Drive Brookings, SD 57006

<b>Report Issued by:</b> Adam Alger, Manager EMC Laboratory	
Signature: <i>Adam Alger</i>	Date: 03/13/2025
<b>Report Reviewed by:</b> Dylan Rosenfeldt, EMC Engineer	
Signature: <i>Dylan Rosenfeldt</i>	Date: 03/13/2025
<b>Report Constructed by:</b> Adam Alger, Manager EMC Laboratory	
Signature: <i>Adam Alger</i>	Date: 02/21/2024

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Report: TR 3770 B		Model: SaBLE-x-R2DAK
Quote: NBO-10-2023-006734-1		Serial: Eng Sample

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### Ezurio Test Services in Review

The Ezurio laboratory located at W66 N220 Commerce Court Cedarburg, Wisconsin, 53012 USA is recognized through the following organizations:



#### **A2LA – American Association for Laboratory Accreditation**

*Accreditation based on ISO/IEC 17025:2017 with Electrical (EMC) Scope*

*A2LA Certificate Number: 1255.01*

*Scope of accreditation includes all test methods listed herein unless otherwise noted*



#### **Federal Communications Commission (FCC) – USA**

*Accredited Test Firm Registration Number: 953492*

*Recognition of two 3 meter Semi-Anechoic Chambers*



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

*Accredited U.S. Identification Number: US0218*

*Recognition of two 3 meter Semi-Anechoic Chambers*

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# 1 TEST REPORT SUMMARY

During **February 20-21, 2024** the Equipment Under Test (EUT), **SaBLE-x-R2DAK**, as provided by **Daktronics** was tested to the following requirements:

## FCC 15.247 | RSS-247 – DTS Bluetooth Low Energy

Requirements	Description	Method	Compliant
FCC Part 1.1310, 2.1091	Radio Frequency Radiation Exposure Evaluation	KDB 447498 D01	Yes
ISED RSS-102	Radio Frequency Exposure Compliance of Radiocommunication Apparatus	RSS-102	Yes

Note: Class 2 permissive change testing to add an antenna.

### Notice:

The results relate only to the item tested as configured and described in this report. Any additional configurations, modes of operation, or modifications made to the equipment under test after the specified test date(s) are at the decision of the client and may not apply to the data seen in this test report.

The decision rule for Pass / Fail assessment to the specification or standard listed in this test report has been agreed upon by the client and laboratory to be as follows:

Measurement Type	Rule
Emissions – Amplitude	1 dB below specified limit
Emissions – Frequency	1% less than the specification
Immunity	Tested at specified level

## 2 CLIENT INFORMATION

<b>Company Name</b>	Daktronics, Inc.
<b>Contact Person</b>	Jason Boeve
<b>Address</b>	201 Daktronics Drive Brookings, SD 57006

### 2.1 Equipment Under Test (EUT) Information

*The following information has been supplied by the client*

<b>Product Name</b>	SaBLE-x-R2DAK
<b>Model Number</b>	SaBLE-x-R2DAK
<b>Serial Number</b>	Eng. Sample
<b>FCC ID</b>	2A4GK-DAKT041000
<b>IC ID</b>	28286-DAKT041000

### 2.2 Product Description

Bluetooth Low Energy module

### 2.3 Modifications Incorporated for Compliance

None noted at time of test

### 2.4 Deviations and Exclusions from Test Specifications

None noted at time of test

### 2.5 Additional Information

3.3 VDC powered module on dev board connected to Taoglas WCM.01.0151 antenna tested on a representative ground plane on low (2402 MHz), Mid (2440 MHz), and High (2480 MHz) channels at 1 Mbps and 2 Mbps data rates.

Antenna ground plane dimensions: 610mm x 210mm x 1.6mm

Antenna cables: SMA to RP-SMA 308cm + 15cm u.fl to SMA

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### 3 REFERENCES

Publication	Edition	Date	AMD 1	AMD 2
eCFR	-	2024	-	-
RSS-102	6	2023	-	-
KDB 447498 D01	v06	2015	-	-

## 4 UNCERTAINTY SUMMARY

Using the guidance of the following publications the calculated measurement uncertainty represents an expanded uncertainty expressed at approximately the 95 % confidence level, using a coverage factor of  $k = 2$ .

References
CISPR 16-4-1
CISPR 16-4-2
CISPR 32
ANSI C63.23
A2LA P103
A2LA P103c
ETSI TR 100-028

Measurement Type	Configuration	Uncertainty $\pm$
Radiated Emissions	Biconical Antenna	5.0 dB
Radiated Emissions	Log Periodic Antenna	5.3 dB
Radiated Emissions	Horn Antenna	4.7 dB
AC Line Conducted Emissions	Artificial Mains Network	3.4 dB
Telecom Conducted Emissions	Asymmetric Artificial Network	4.9 dB
Disturbance Power Emissions	Absorbing Clamp	4.1 dB
Radiated Immunity	3 Volts/meter	2.2 dB
Conducted Immunity	CDN/EM/BCI	2.4/3.5/3.4 dB
EFT Burst/Surge	Peak pulse voltage	164 volts
ESD Immunity	15 kV level	1377 Volts

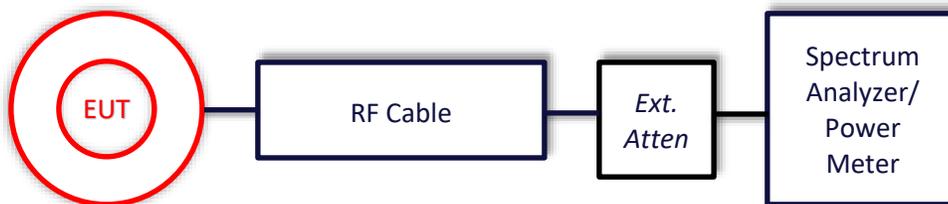
Parameter	ETSI U.C. $\pm$	U.C. $\pm$
Radio Frequency, from F0	$1 \times 10^{-7}$	$0.55 \times 10^{-7}$
Occupied Channel Bandwidth	5 %	2 %
RF conducted Power (Power Meter)	1.5 dB	1.2 dB
RF conducted emissions (Spectrum Analyzer)	3.0 dB	1.7 dB
All emissions, radiated	6.0 dB	5.3 dB
Temperature	1° C	0.65° C
Humidity	5 %	2.9 %
Supply voltages	3 %	1 %

## 5 TEST DATA

### 5.1 Antenna Port Conducted Emissions

<b>Description of Measurement</b>	<p>The direct measurement of emissions at the antenna port of the EUT is achieved by use of a RF connection to a spectrum analyzer or power meter.</p> <p>The cable and attenuator factors are loaded into the analyzer or power meter allowing for direct measurement readings without the need for further corrections.</p>
<b>Example Calculations</b>	<p>Measurement (dBm) + Cable factor (dB) + External Attenuator (dB) = Corrected Reading (dBm)</p> <p>Margin (dB) = Limit (dBm) – Corrected Reading (dBm)</p>

#### Block Diagram



### 5.1.1 Antenna Port Conducted Emissions

<b>Operator</b>	Nicole Sedmak	<b>QA</b>	Dylan Rosenfeldt
<b>Temperature</b>	22.8°C	<b>R.H. %</b>	27.70%
<b>Test Date</b>	2/21/2024	<b>Location</b>	Bench
<b>Requirement</b>	15.247, RSS-247	<b>Method</b>	ANSI C63.10

Limits: 30 dBm

#### Test Parameters

<b>Frequency</b>	2402, 2440, 2480 MHz	<b>Setup</b>	Antenna port
<b>RBW</b>	3 MHz	<b>VBW</b>	50 MHz
<b>Detector(s)</b>	Peak	<b>Settings</b>	Peak, max hold

#### Instrumentation

Asset #	Description	Manufacturer	Model #	Serial #	Date	Due Date	Status
AA 960172	Cable	A.H. Systems, Inc.	SAC-26G-1	387	6/13/2023	6/12/2024	Active Verification
EE 960087	Analyzer - Spectrum	Agilent	N9010A	MY53400296	4/10/2023	4/10/2024	Active Calibration

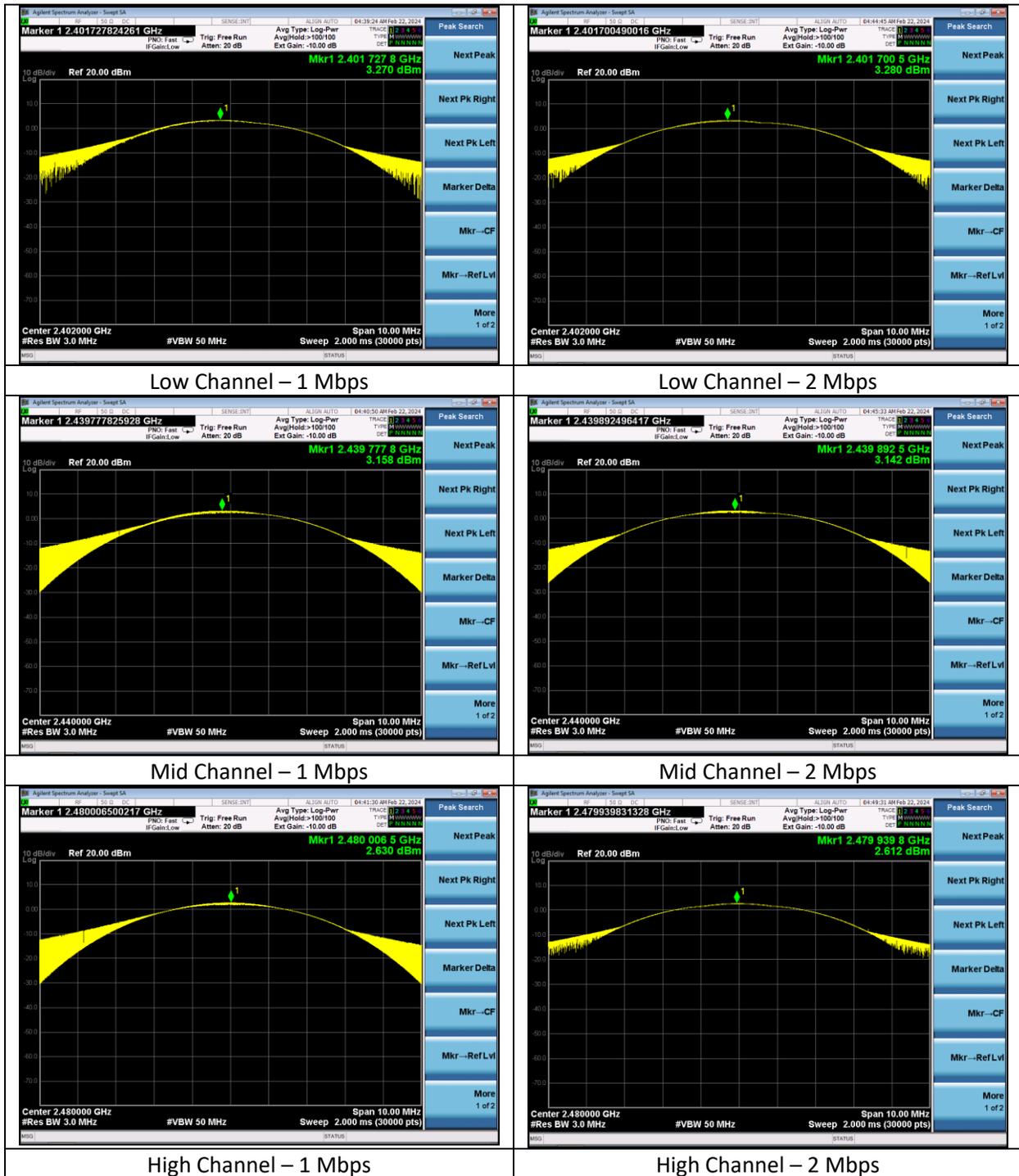
#### EUT Parameters

<b>Input Power</b>	3.3 VDC	<b>Mode</b>	Continuous Transmit Modulated
<b>Frequency</b>	2402, 2440, 2480 MHz	<b>Channel</b>	Low, Mid, High

Table

Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)	Channel	Data rate
2401.7	3.27	30.0	26.7	Low	1Mbps
2439.8	3.16	30.0	26.8	Mid	1Mbps
2480.0	2.63	30.0	27.4	High	1Mbps
<b>2401.7</b>	<b>3.28</b>	30.0	26.7	Low	2Mbps
2439.9	3.14	30.0	26.9	Mid	2Mbps
2479.9	2.61	30.0	27.4	High	2Mbps

Plots



## 6 FCC MPE CALCULATION

### FCC Mobile Exposure evaluation

Power Density (S) =  $P * G / (4 * \pi * R^2) = 1.0 \text{ mW/cm}^2$  (limit)

### Distance

20 cm

### Power Calculation

Max Power of Channel = 3.3 dBm

Tune-up Tolerance = 1.00 dB

Antenna Gain = 5.4 dBi

Total Power = 3.3 dBm + Tune-up Tolerance + Gain = 9.7 dBm = 9.3 mW

### Mobile Exposure evaluation

$S = 0.0018511 \text{ mW/cm}^2 < 1.0 \text{ mW/cm}^2$  (limit)

### Result

The EUT meets the power density limit of 1 mW/cm<sup>2</sup>

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## 7 ISED FIELD REFERENCE LEVEL EXPOSURE CALCULATION

### Field reference level exposure exemption limits

$1.31 \times 10^{-2} f^{0.6834} \text{ W}$  (adjusted for tune-up tolerance), where f is in MHz

### Distance

20 cm

### Power Calculation

Max Power of Channel = 3.3 dBm

Tune-up Tolerance = 1.00 dB

Antenna Gain = 5.4 dBi

Total Power = 3.3 dBm + Tune-up Tolerance + Gain = 9.7 dBm = 9.3 mW

### Field reference level exposure exemption limits

The exemption limit at 2402 MHz is 2.67 W

### Result

The EUT meets the field reference level exposure exemption limits since 9.3 mW is less than 2.67 W.

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## 8 REVISION HISTORY

Version	Date	Notes	Person
0	02/21/2024	Initial Draft	Adam Alger
1	01/07/2025	Final Draft	Adam Alger
2	03/13/2025	TCB Comments – Change to Mobile	Adam Alger

**END OF REPORT**

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