


Test Report TR3609C

Equipment Under Test:	Latch PCB
Requirement(s):	FCC 1.1310
Test Date(s):	4/10/2023 - 4/13/2023
Prepared for:	Eberhard Attn: Rob Pliml 21944 Drake Road Strongsville, OH 44149

Report Issued by: Anthony Smith, EMC Engineering Specialist

Signature: 


Date: 12/11/2023

Report Reviewed by: Adam Alger, Laboratory Manager

Signature: 

Date: 12/11/2023

Report Constructed by: Anthony Smith, EMC Engineering Specialist

Signature: 

Date: 12/5/2023

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Laird Connectivity Test Services in Review

The Laird Connectivity LLC 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



**Government
of Canada**

Innovation, Science and Economic Development Canada

Accredited U.S. Identification Number: US0218

Recognition of two 3 meter Semi-Anechoic Chambers

Company: Eberhard	Page 3 of 12	Name: Latch PCB
Report: TR3609C		Model: 17240-25
Quote: NBO-04-2022-004907		Serial: Engineering Sample

1 TEST REPORT SUMMARY

During **April 10th, 2023 to April 13th, 2023** the Equipment Under Test (EUT), **Latch PCB**, as provided by **Eberhard** was tested to the following requirements:

Requirements	Description	Method	Result
FCC: 1.1310	Radiofrequency Radiation Exposure Limits	Distance \leq 5 mm 1g-SAR	Reported

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

Company Name	Eberhard
Contact Person	Rob Pliml
Address	21944 Drake Road Strongsville, OH 44149

2.1 Equipment Under Test (EUT) Information

The following information has been supplied by the client

Product Name	Latch PCB
Model Number	17240-25
Serial Number	Engineering Sample
FCC ID	2BATJ-1724058

2.2 Product Description

Latch PCB

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

Device programmed via USB micro to UART board to UART serial connection to PCB utilizing “YAT” terminal emulation software version 2.5.0. Device powered via 12V Battery. Device uses Bluetooth Low Energy with 1M data rate. Power Setting 2 used for final compliance.

Antenna is an “Inverted F” trace antenna with a peak gain of 3.2 dBi (see TR3609D).

3 REFERENCES

Publication	Edition	Date
FCC eCFR	-	2023
KDB 447498	-	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

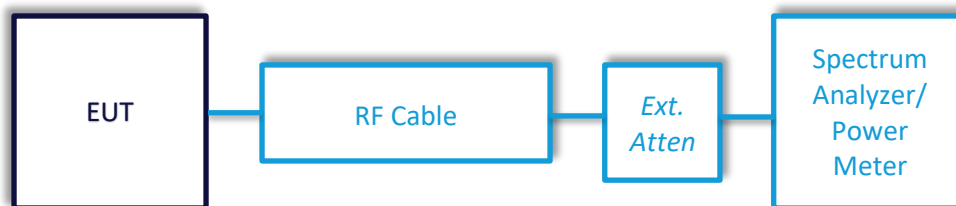
Parameter	ETSI U.C. \pm	U.C. \pm
Radio Frequency, from F0	1×10^{-7}	0.55×10^{-7}
Occupied Channel Bandwidth	5 %	2 %
RF conducted Power (Power Meter)	1.5 dB	1.2 dB
RF conducted emissions (Spectrum Analyzer)	3.0 dB	1.7 dB
All emissions, radiated	6.0 dB	5.3 dB
Temperature	1° C	0.65° C
Humidity	5 %	2.9 %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

5 TEST DATA

5.1 Antenna Port Conducted Emissions

Description of Measurement	<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>
Example Calculations	<p>Measurement (dBm) + Cable factor (dB) + External Attenuator (dB) = Corrected Reading (dBm)</p> <p>Margin (dB) = Limit (dBm) – Corrected Reading (dBm)</p>

Block Diagram



Instrumentation

Asset #	Description	Manufacturer	Model #	Serial #	Date	Due Date	Status
AA 960172	Cable	A.H. Systems, Inc.	SAC-26G-1	387	3/22/2023	3/22/2024	Active Verification
EE 960085	Analyzer - EMI Receiver	Agilent	N9038A	MY51210148	4/11/2023	4/11/2024	Active Calibration
EE 960203	Analyzer - EMI Receiver	Keysight	N9038A	MY56400072	4/13/2023	4/13/2024	Active Calibration

5.1.1 Antenna Port Conducted Emissions – Max Conducted Output Power

Operator	Anthony Smith	QA	Adam Alger
Temperature	21.9, 22.5, 22.9°C	R.H. %	31.8, 34.3, 39.9%
Test Date	4/10/2023, 4/12/2023, 4/13/2023	Location	Chamber 3
Requirement	FCC: 15.247 (b)(3)	Method	ANSI C63.10 §11.9

Limits: <30 dBm

Test Parameters

Frequency	2402, 2440, 2480 MHz	Setup	Conducted
RBW	3 MHz	VBW	50 MHz
Detector(s)	Max Peak Hold	Sweep Time	Auto

EUT Parameters

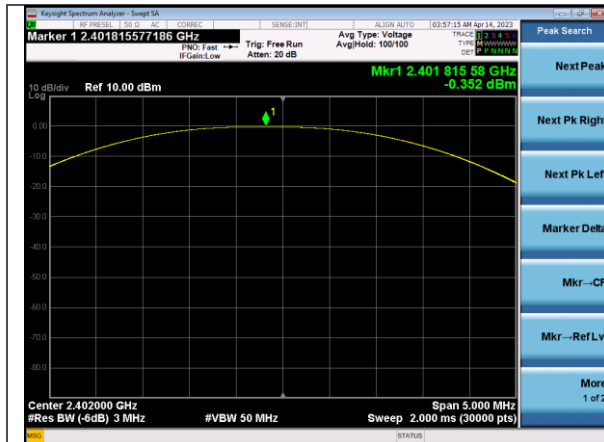
Input Power	12VDC (Battery)	Mode	BLE Transmit
Frequency	2402, 2440, 2480 MHz	Channel	37, 17, 39
Data Rate / Modulation	BLE 1Mbps	Transmit Power Setting	2

Data

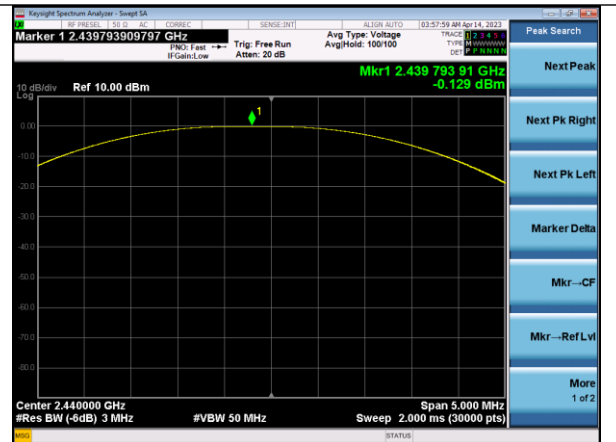
Table

Channel	Data Rate	Transmit Power Setting	Peak Output Power (dBm)	Limit (dBm)	Margin (dB)
37	BLE 1Mbps	2	-0.4	30.0	30.4
17	BLE 1Mbps	2	-0.1	30.0	30.1
39	BLE 1Mbps	2	0.1	30.0	29.9

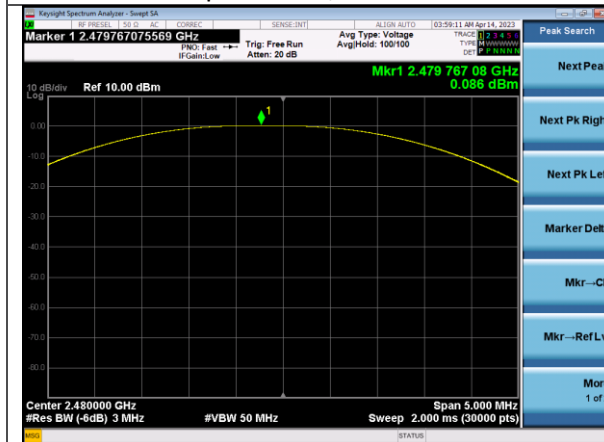
Plots



Output Power, Channel 37



Output Power, Channel 17



Output Power, Channel 39

6 FCC 1-G SAR TEST EXCLUSION CALCULATIONS

6.1 Power Calculations

Max Power of Channel = 0.1 dBm

Tune Up Tolerance = 1 dB

Total Channel Power = 1.1 dBm = 1.3 mW = 1 mW

6.2 Distance

≤5 mm

6.3 SAR Test Exclusion Calculation

[(Maximum power of channel, including tune-up tolerance, mW) / (Minimum test separation distance, mm)] * [√f(GHz)] ≤ 3 for 1-g SAR

Where:

- F(GHz) is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation
- The result is rounded to one decimal place for comparison
- The value 3.0 is referred to as numeric thresholds

$$\left(\frac{1mW}{5mm}\right) \times (\sqrt{2.48}) \leq 3.0$$

$$0.2 \times 1.575 \leq 3.0$$

$$0.3 \leq 3.0$$

6.4 Result

The EUT is excluded from routine SAR testing as 0.3 is less than 3.0.

7 REVISION HISTORY

Version	Date	Notes	Person
0	5/10/2023	Initial Draft	Anthony Smith
1	8/2/2023	Revised Draft	Anthony Smith
2	8/17/2023	Revised Draft	Anthony Smith
3	12/5/2023	Revised Draft	Anthony Smith

END OF REPORT