

Test Report TR3703C

Equipment Under Test:	03ACCY0002
Requirement(s):	FCC 1.1310 ISED RSS-102
Test Date(s):	7/24/2023-7/27/2023
Prepared for:	Enovation Controls LLC Attn: Jim Fox 5311 S. 122 nd E. Ave Tulsa, OK 74146

Report Issued by: Anthony Smith, EMC Engineering Specialist	
Signature: 	Signature: 12/21/2023
Report Reviewed by: Adam Alger, Laboratory Manager	
Signature: 	Signature: 12/21/2023
Report Constructed by: Anthony Smith, EMC Engineering Specialist	
Signature: 	Signature: 8/31/2023

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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: Enovation Controls LLC	Page 3 of 16	Name: 03ACCY0002
Report: TR3703C		Model: 78060532K
Quote: NBO-10-2022-005468		Serial: Engineering Sample

1 TEST REPORT SUMMARY

During **7/24/2023-7/27/2023** the Equipment Under Test (EUT), **03ACCY0002**, as provided by **Enovation Controls LLC** was tested to the following requirements:

Portable Device

Requirements	Description	Method	Compliant
FCC 1.1310	Radiofrequency Radiation Exposure Limits	Distance $\leq$ 5mm 1g-SAR	Yes
ISED RSS-102	Radiofrequency Radiation Exposure Limits	Distance 15mm 1g-SAR	Yes

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	Enovation Controls LLC
Contact Person	Jim Fox
Address	5311 S. 122 nd E Ave Tulsa, OK 74146

2.1 Equipment Under Test (EUT) Information

The following information has been supplied by the client

Product Name	03ACCY0002
Model Number	78060532K
Serial Number	Engineering Sample
FCC ID	2A3FV-ECB02
IC ID	28102-ECB02

2.2 Product Description

USB Based Dongle for BT Extensibility.

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 Programming Information

Device programmed using CyBluetool ver 0.1.97.1. Bluetooth Classic using Basic Rate and Enhanced Data Rate on channels 0 (2402 MHz), 39 (2440 MHz), 78 (2480 MHz), and Hopping.

2.6 Antenna Gain

From “Enovation Antenna Summary” antenna has peak gain of -2.7 dBi.

Company: Enovation Controls LLC	Page 6 of 16	Name: 03ACCY0002
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3 REFERENCES

Publication	Edition	Date	AMD 1
FCC eCFR	-	2023	-
RSS-102	5	2015	2021
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

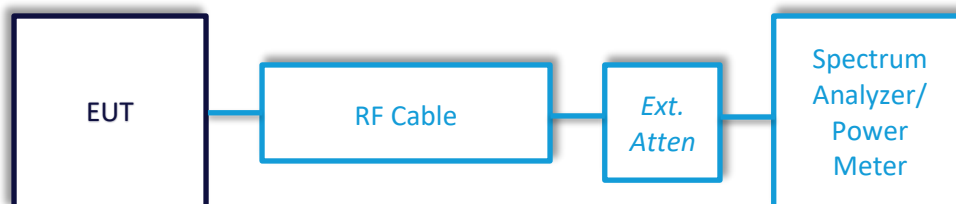
Parameter	ETSI U.C. $\pm$	U.C. $\pm$
Radio Frequency, from F0	1×10^{-7}	0.55×10^{-7}
Occupied Channel Bandwidth	5 %	2 %
RF conducted Power (Power Meter)	1.5 dB	1.2 dB
RF conducted emissions (Spectrum Analyzer)	3.0 dB	1.7 dB
All emissions, radiated	6.0 dB	5.3 dB
Temperature	1° C	0.65° C
Humidity	5 %	2.9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

5 TEST DATA

5.1 Antenna Port Conducted Emissions

Description of Measurement	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. The cable and attenuator factors are loaded into the analyzer or power meter allowing for direct measurement readings without the need for further corrections.
Example Calculations	Measurement (dBm) + Cable factor (dB) + External Attenuator (dB) = Corrected Reading (dBm) Margin (dB) = Limit (dBm) – Corrected Reading (dBm)

Block Diagram



5.1.1 Antenna Port Conducted Emissions

Operator	Anthony Smith	QA	Adam Alger
Temperature	21.5°C, 21.6°C, 21.5°C	R.H. %	46.9, 45.9, 48.4
Test Date	7/24/2023-7/27/2023	Location	Conducted Bench
Requirement	FCC 15.247	Method	ANSI C63.10

Limits:

Maximum Conducted Output Power: 30 dBm

Instrumentation

Asset #	Description	Manufacturer	Model #	Serial #	Date	Due Date	Status
AA 960173	Cable	A.H. Systems, Inc.	SAC-26G-1	388	6/13/2023	6/12/2024	Active Verification
EE 960087	Analyzer - Spectrum	Agilent	N9010A	MY53400296	4/11/2023	4/11/2024	Active Calibration

Maximum Conducted Output Power

Test Parameters

Frequency	2400-2483.5 MHz	Setup	Conducted
RBW	3 MHz	VBW	50 MHz
Detector(s)	Peak Max Hold	Span	10 MHz

EUT Parameters

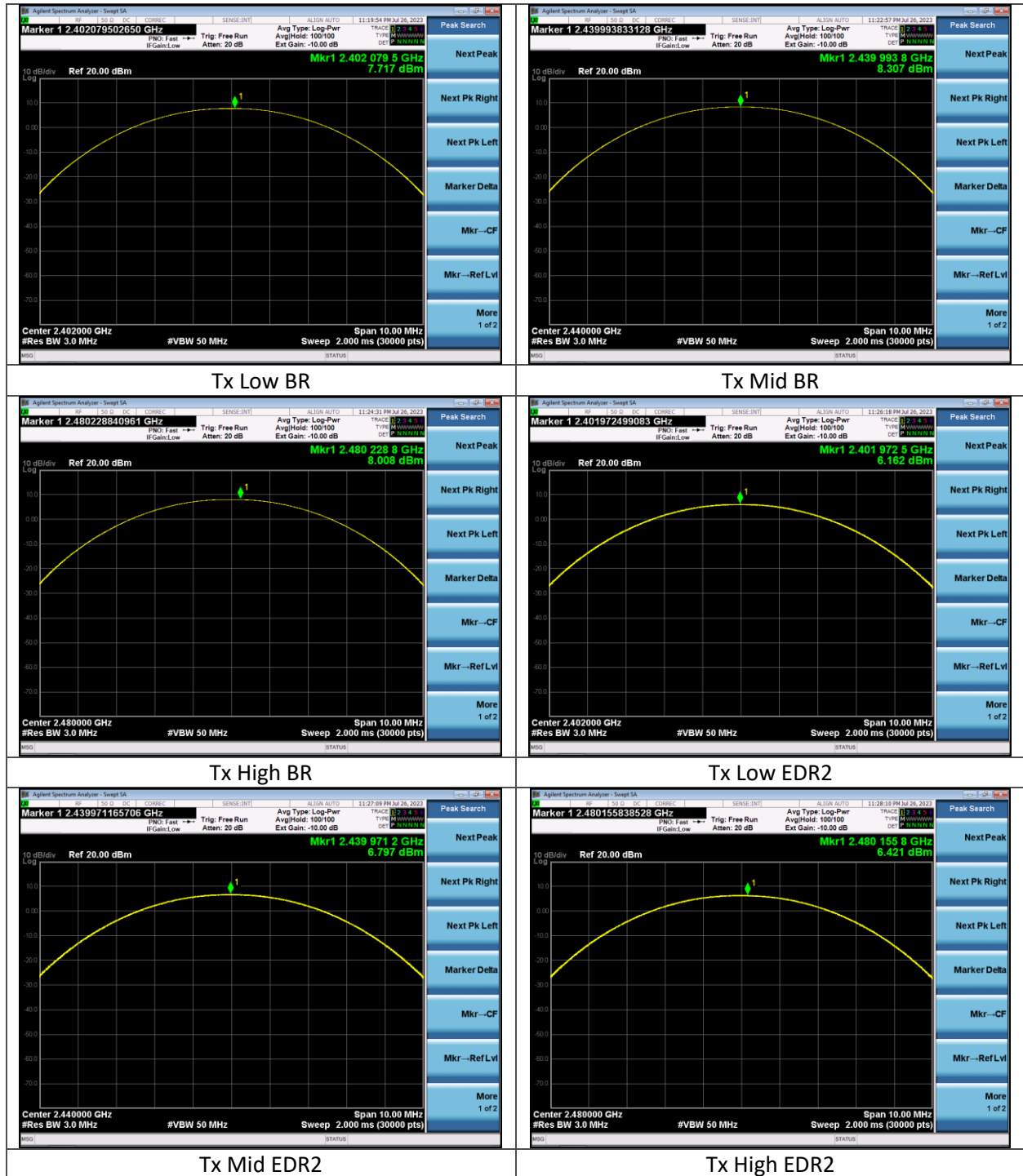
Input Power	USB	Mode	Bluetooth Classic Single Channel BR, EDR2, EDR3
Frequency	2402-2480 MHz	Channel	0, 39, 78

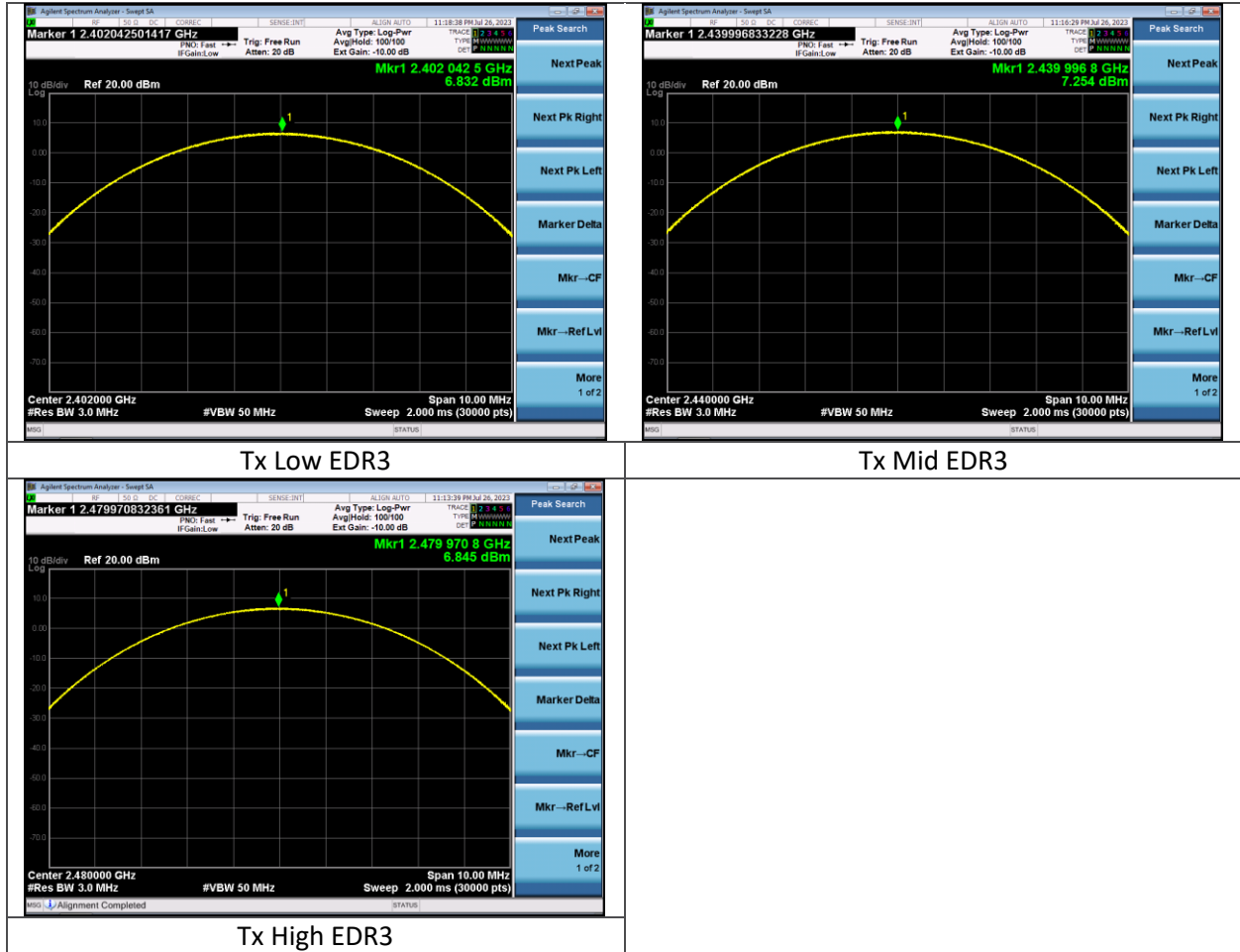
Data

Table

Frequency (MHz)	Data Rate	Peak Output Power (dBm)	Limit (dBm)	Margin (dB)
2402	BR	7.7	30.0	22.3
2440	BR	8.3	30.0	21.7
2480	BR	8.0	30.0	22.0
2402	EDR	6.2	30.0	23.8
2440	EDR	6.8	30.0	23.2
2480	EDR	6.4	30.0	23.6
2402	EDR3	6.8	30.0	23.2
2440	EDR3	7.3	30.0	22.7
2480	EDR3	6.8	30.0	23.2

Plots





6 FCC 1-G SAR TEST EXCLUSION CALCULATIONS

6.1 Power Calculations

Max Power of Channel = 8.3 dBm

Tune Up Tolerance = 1 dB

Total Channel Power = 9.3 dBm = 8.5mW = 9mW

6.2 Distance

≤5 mm

6.3 SAR Test Exclusion Calculation

$[(\text{Maximum power of channel, including tune-up tolerance, mW}) / (\text{Minimum test separation distance, mm})] * [\sqrt{f(\text{GHz})}] \leq 3$ 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

$$\begin{aligned} (9 \text{ mW} / 5 \text{ mm}) \times (\sqrt{2.48}) &\leq 3.0 \\ 1.8 \times 1.575 &\leq 3.0 \\ 2.8 &\leq 3.0 \end{aligned}$$

6.4 Result

The EUT is excluded from routine SAR testing as 2.8 is less than 3.0.

7 IC EXEMPTION CALCULATION FOR ROUTINE SAR EVALUATION

7.1 Power Calculations

Max Power of Channel = 8.3 dBm

Tune Up tolerance = 1 dB

Peak Antenna Gain = -2.7 dBi (0 will be used in calculations)

Total Channel Power = 9.3 dBm = 8.5 mW EIRP

7.2 Distance

15 mm

7.3 Exemption Limits

Table 1: SAR evaluation — Exemption limits for routine evaluation based on frequency and separation distance ^{4,5}					
Frequency (MHz)	Exemption Limits (mW)				
	At separation distance of ≤5 mm	At separation distance of 10 mm	At separation distance of 15 mm	At separation distance of 20 mm	At separation distance of 25 mm
≤300	71 mW	101 mW	132 mW	162 mW	193 mW
450	52 mW	70 mW	88 mW	106 mW	123 mW
835	17 mW	30 mW	42 mW	55 mW	67 mW
1900	7 mW	10 mW	18 mW	34 mW	60 mW
2450	4 mW	7 mW	15 mW	30 mW	52 mW
3500	2 mW	6 mW	16 mW	32 mW	55 mW
5800	1 mW	6 mW	15 mW	27 mW	41 mW

At 15 mm and 2450 MHz the limit is 15.0 mW

7.4 SAR Test Exclusion Calculation

8.5 mW ≤ 15.0 mW

7.5 Result

The EUT is excluded from routine SAR testing at 15mm as 8.5 mW is less than 15.0 mW.

8 REVISION HISTORY

Version	Date	Notes	Person
1	8/29/2023	Initial Draft	Anthony Smith
2	8/31/2023	Revised Draft	Anthony Smith
3	12/21/2023	EUT Name/Model # Revision	Anthony Smith

END OF REPORT