

Test Report C-3614D

Equipment Under Test: Voltron20x

Requirement(s): FCC 1.1310
ISED RSS-102

Test Date(s): 8/30/2022


Prepared for: Husqvarna
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Report Issued by: Anthony Smith, EMC Engineering Specialist

Signature: 

Date: 11/16/2022

Report Reviewed by: Adam Alger, Laboratory Manager

Signature: 

Date: 11/16/2022

Report Constructed by: Anthony Smith, EMC Engineering Specialist

Signature: 

Date: 11/16/2022

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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: Husqvarna	Page 3 of 13	Name: Volttron20x
Report: TR3614D		Model: 599426001
Quote: 319494		Serial: Engineering Sample

1 TEST REPORT SUMMARY

During **8/30/2022** the Equipment Under Test (EUT), **Voltron**, as provided by **Husqvarna** was tested to the following requirements:

Requirements	Description	Method	Result
FCC: 1.1310 IC: RSS-102	Radiofrequency Radiation Exposure Limits	Distance \leq 5mm 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	Husqvarna
Contact Person	Matt Albinger
Address	9335 Harris Corners Parkway Suite 500 Charlotte, NC 28269

2.1 Equipment Under Test (EUT) Information

The following information has been supplied by the client

Product Name	Voltron20x
Model Number	599426001
Serial Number	Engineering Sample
FCC ID	2A8U7-VLTR01
IC ID	23218-VLTR01

2.2 Product Description

Connect to mobile devices and enable use of Husqvarna Connect app.

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

Channels used: 37 (Low 2402 MHz), 17 (Mid 2440 MHz), 39 (High 2480 MHz). Device powered with +12VDC via DC Variable Power Supply. Device radio controlled by HCI_Tester (Version 3.0.0.37) software through a USB-UART FTDI cable from a laptop computer.

3 REFERENCES

Publication	Edition	Date	AMD 1
FCC eCFR	-	2022	-
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

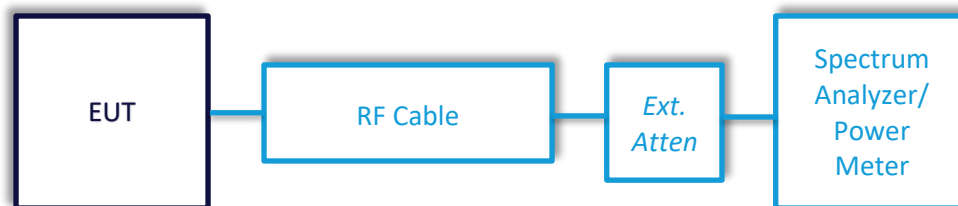
Parameter	ETSI U.C. \pm	U.C. \pm
Radio Frequency, from F0	1×10^{-7}	0.55×10^{-7}
Occupied Channel Bandwidth	5 %	2 %
RF conducted Power (Power Meter)	1.5 dB	1.2 dB
RF conducted emissions (Spectrum Analyzer)	3.0 dB	1.7 dB
All emissions, radiated	6.0 dB	5.3 dB
Temperature	1° C	0.65° C
Humidity	5 %	2.9 %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

5 TEST DATA

5.1 Antenna Port Conducted Emissions

Description of Measurement	<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	3/22/2022	3/22/2023	Active Verification
EE 960087	Analyzer - Spectrum	Agilent	N9010A	MY53400296	4/12/2022	4/12/2023	Active Calibration

5.1.1 Peak Output Power

Operator	Anthony Smith	QA	Adam Alger
Temperature	21.6°C	R.H. %	51.70%
Test Date	8/30/2022	Location	Conducted RF Bench
Requirement	FCC: 15.247 (b)(3) IC: RSS-247 5.4 (d)	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

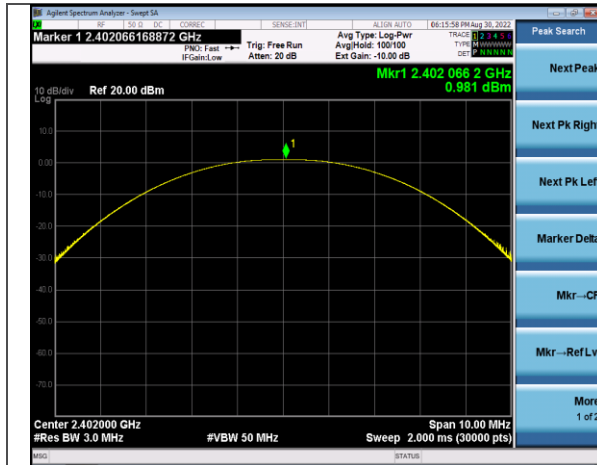
EUT Parameters

Input Power	12VDC	Mode	BLE Tx
Frequency	2402, 2440, 2480 MHz	Channel	37, 17, 39
Data Rate	BLE 1 Mbps		

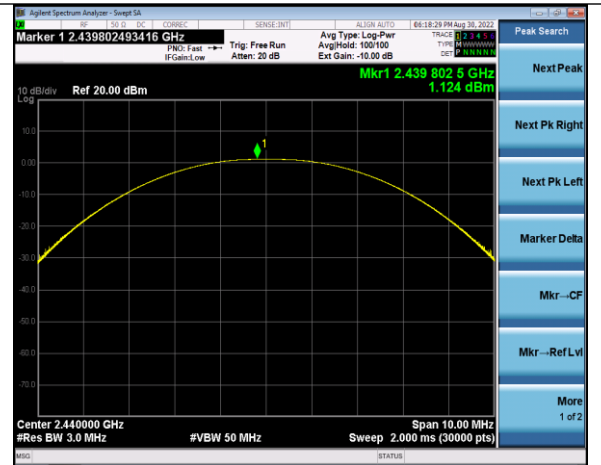
Data Table

Channel	Peak Output Power (dBm)	Limit (dBm)	Margin (dB)
37	1.0	30	29.0
17	1.1	30	28.9
39	0.8	30	29.2

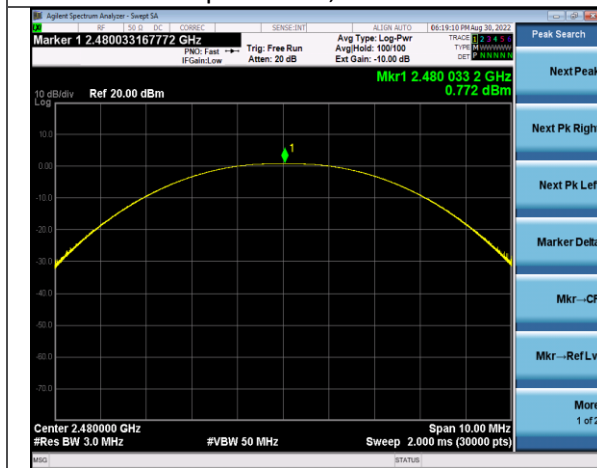
Plots



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 = 1.1 dBm

Tune Up Tolerance = 1 dB

Total Channel Power = 2.1 dBm = 1.6 mW = 2 mW

6.2 Distance

≤5 mm

6.3 SAR Test Exclusion Calculation

$[(\text{Maximum power of channel, including tune-up tolerance, mW}) / (\text{Minimum test separation distance, mm})] \times [f(\text{GHz})] \leq 3$ for 1-g SAR

Where:

- $f(\text{GHz})$ 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

$$\left(\frac{2 \text{ mW}}{5 \text{ mm}}\right) \times (\sqrt{2.48}) \leq 3.0$$

$$0.4 \times 1.562 \leq 3.0$$

$$0.6 \leq 3.0$$

6.4 Result

The EUT is excluded from routine SAR testing as 0.6 is less than 3.0.

7 IC EXEMPTION CALCULATION FOR ROUTINE SAR EVALUATION

7.1 Power Calculations

Max Power of Channel = 1.1 dBm

Tune Up Tolerance = 1 dB

Peak Antenna Gain = 3.5 dBi

Total Channel Power = 5.6 dBm = 3.6 mW EIRP

7.2 Distance

≤ 5 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

Interpolated Limit at 2480 MHz

$$4 + (2480 - 2450) \times \left(\frac{2 - 4}{3500 - 2450} \right) = 3.9$$

At 2480 and 5 mm the exemption limit is 3.9 mW

7.4 SAR Test Exclusion Calculation

3.6 mW ≤ 3.9 mW

7.5 Result

The EUT is excluded from routine SAR testing at ≤5 mm as 3.6 mW is less than 3.9 mW.

8 REVISION HISTORY

Version	Date	Notes	Person
0.0	11/16/2022	Initial Draft	Anthony Smith

END OF REPORT