Test Report 3620 A MPE

Equipment Under Test:	DSU840
Requirement(s):	FCC Part 15.249, 1.1310 ISED Canada RSS-210 Annex B.10, RSS-102
Test Date(s):	November 3, 4, 30 and December 1, 15, 2022
Prepared for:	Delphian Systems LLC Attn: George Garifalis 720 Dartmouth Ln Buffalo Grove, IL 60089

Report Issued by: Adam Alger, Laboratory Manager

Signature:  Date: 02/23/2023

Report Reviewed by: Anthony Smith, EMC Engineering Specialist

Signature:  Date: 12/19/2022

Report Constructed by: Adam Alger, Laboratory Manager

Signature:  Date: 12/2/2022

CONTENTS

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:

Certificate #1255.01

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

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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

1 TEST REPORT SUMMARY

During **November 3 to December 15, 2022,** the Equipment Under Test (EUT), **DSU840**, as provided by **Delphian Systems LLC** was tested to the following **FCC and ISED Canada** requirements:

Requirements	Description	Method	Compliant
FCC: 1.1310 IC: RSS-102	Radiofrequency Radiation Exposure Limits	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	Delphian Systems LLC
Contact Person	George Garifalis
Address	720 Dartmouth Ln. Buffalo Grove, IL 60089

2.1 Equipment Under Test (EUT) Information

The following information has been supplied by the client

Product Name	DSU840
Model Number	DSU840
Serial Number	201-180112
FCC ID:	2AEHJDSU840
IC:	20053-DSU840

2.2 Product Description

ANT protocol device

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 Setup

EVK powered 5 VDC from laboratory PC running teraterm for programming

2.6 Antenna Information

Laird FlexPIFA 001-0022

2.7 Channels

Low (2402 MHz), Mid (2440 MHz), High (2480 MHz)

3 REFERENCES

Publication	Edition	Date	AMD 1	AMD 2
FCC eCFR Title 47	-	2022		
ANSI C63.10	-	2013		
RSS-210	10	12/2019	04/2020	
RSS-GEN	5	04/2018	03/2019	02/2021
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 ±
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. ±	U.C. ±
Radio Frequency, from F0	$1x10^{-7}$	$0.55x10^{-7}$
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 FCC 1-G SAR Test Exclusion Calculations

Power Calculations

Maximum Field Strength = 103.5 dBµV/m @ 3m

EIRP = 103.5 dBµV/m @ 3m – 95.2 = 8.3 dBm

Tune Up Tolerance = 1 dB

Total EIRP = 9.3 dBm = 8.5 mW = 9 mW

Distance ≤5 mm

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

$$\left(\frac{9\ mW}{5\ mm}\right) x\ (\sqrt{2}.402) \leq 3.0$$

$$1.8\ x\ 1.549 \leq 3.0$$

$$2.8 \leq 3.0$$

Result

The EUT is excluded from routine SAR testing at a distance of 5mm.

6 IC EXEMPTION CALCULATION FOR ROUTINE SAR EVALUATION

Power Calculations

Maximum Field Strength = 103.5 dBµV/m @ 3m

EIRP = 103.5 dBµV/m @ 3m – 95.2 = 8.3 dBm

Tune Up Tolerance = 1 dB

Total EIRP = 9.3 dBm = 8.5 mW = 9 mW

Distance 15 mm

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 2402 and 15 mm the exemption limit is 15.2 mW.

SAR Test Exclusion Limit

9.0 mW ≤ 15.2 mW

Result

The EUT is excluded from routine SAR testing at a separation distance of 15mm.

7 REVISION HISTORY

Version	Date	Notes	Person
0	12-2-2022	Initial Draft	Adam Alger
1	12-19-2022	Draft	Adam Alger
1	12-19-2022	Final	Adam Alger
2	02-23-2023	Extracted MPE section to separate report	Adam Alger

END OF REPORT