Ampt, LLC
RF Exposure Exhibit

SCOPE OF WORK
EMC TESTING – String Optimizer, Model Tested: I50

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RF Exposure Exhibit
(Mobile Devices)

Report Number: 105267899MPK-014
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Report Issue Date: June 29, 2023

Product Designation: String Optimizer
Model Tested: I50

to

47CFR 2.1091
RSS-102 Issue 5

for

Ampt, LLC

Tested by:
Intertek
1365 Adams Court
Menlo Park, CA 94025 USA

Client:
Ampt, LLC
4850 Innovation Drive
Fort Collins, CO 80525 USA

Report prepared by:

Kenneth Roque / EMC Project Engineer

Report reviewed by:

Anderson Soungpanya / EMC Team Lead

Report No. 105267899MPK-014	
Equipment Under Test:	String Optimizer
Model(s) Tested:	I50
Applicant:	Ampt, LLC
Contact:	Robin Richardson
Address:	Ampt, LLC 4850 Innovation Drive Fort Collins, CO 80525
Country:	USA
Tel. Number:	1 (970) 372-6960
Email:	robin.richardson@ampt.com
Applicable Regulation:	47CFR 2.1091 RSS-102 Issue 5

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1.0 RF Exposure Summary

Test	Reference FCC	Reference Industry Canada	Result
Radio frequency Radiation Exposure Evaluation	47 CFR§2.1091	RSS-102 Issue 5	Complies

2.0 RF Exposure Limits

In this document, we evaluate the RF Exposure to human body due the intentional transmission from the transmitter (EUT). The limits for Maximum Permissible Exposure (MPE) specified in FCC 1.1310 and RSS-102 are followed.

2.1 FCC Limits

According to FCC 1.1310 table 1: The criteria listed in the following table shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in 1.1307(b)

LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm^2)	Average Time (minutes)
(A)Limits For Occupational / Control Exposures				
0.3 – 3.0	614	1.63	*100	6
3.0 – 30	1842/f	4.89/f	$*900/f^2$	6
30-300	61.4	0.163	1.0	6
300 - 1500	…	…	F/300	6
1500 - 100,000	…	…	5	6
(B)Limits For General Population / Uncontrolled Exposure				
0.3 – 1.34	614	1.63	*100	30
1.34 – 30	824/f	2.19/f	$*180/f^2$	30
30 – 300	27.5	0.073	0.2	30
300 - 1500	…	…	F/1500	30
1500 - 100,000	…	…	1.0	30

F = Frequency in MHz

* = plane wave equivalent density

2.2 Industry Canada Limits

According to RSS-102, Industry Canada has adopted the SAR and RF field strength limits established in Health Canada's RF exposure guideline, Safety Code 6.

Table 4: RF Field Strength Limits for Devices Used by the General Public (Uncontrolled Environment)

Frequency Range (MHz)	Electric Field (V/m rms)	Magnetic Field (A/m rms)	Power Density (W/m^2)	Reference Period (minutes)
0.003-10	83	90	-	Instantaneous*
0.1-10	-	0.73/ ƒ	-	6**
1.1-10	87/ $ƒ^{0.5}$	-	-	6**
10-20	27.46	0.0728	2	6
20-48	58.07/ $ƒ^{0.25}$	0.1540/ $ƒ^{0.25}$	8.944/ ƒ0.5	6
48-300	22.06	0.05852	1.291	6
300-6000	3.142 $ƒ^{0.3417}$	0.008335 $ƒ^{0.3417}$	0.02619 $ƒ^{0.6834}$	6
6000-15000	61.4	0.163	10	6
15000-150000	61.4	0.163	10	616000/ $ƒ^{1.2}$
150000-300000	0.158 $ƒ^{0.5}$	4.21 x 10-4 $ƒ^{0.5}$	6.67 x 10^{-5} ƒ	616000/$ƒ^{1.2}$

Note: ƒ is frequency in MHz.
* Based on nerve stimulation (NS).
** Based on specific absorption rate (SAR).

3.0 Test Results (Mobile Configuration)

3.1 Classification

Radio is installed inside a mobile host device. The antenna of the product, under normal use condition, is at least 20 cm away from the body of the user and accessible to the end user. Warning statement to the user for keeping at least 20 cm or more separation distance with the antenna should be included in user's manual.

3.2 EIRP calculations

The String Optimizer, Model: I50 consists of one 2.4 GHz radio. For RF exposure compliance refer report # 105267899MPK-002.

3.3 Maximum RF Power

Frequency Range (MHz)	RF Output (dBm)	Antenna Gain[1] (dBi)	Note
2410-2474.5	2.65	4	Conducted power measurements were taken from report # 105267899MPK-002.

[1]As provided by the client. Intertek takes no responsibility for the accuracy of this information. s declared by the manufacturer.

3.4 RF Exposure Calculation

3.4.1 RF Exposure Calculation for 2.4 GHz:

Frequency (MHz)	Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP (mW)	PD (mW/cm²)	FCC PD Limits (mW/cm²)	MPE Ratio FCC
2410-2474.5	2.65	4	6.65	4.62	0.0009	1	0.0009

Note: Antenna gains below 0 are considered as 0dBi.

Frequency (MHz)	Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP (mW)	PD (W/m²)	ISED PD Limits (W/m²)	MPE Ratio ISED
2410-2474.5	2.65	4	6.65	4.62	0.0092	5.36	0.0017

Note: Antenna gains below 0 are considered as 0dBi.

Appendix A: Power Density Calculation

The Power Density can be calculated using the formula

$$S = EIRP/ 4\pi D^2$$

Where: S is Power Density in mW/cm^2
D is the distance from the antenna in cm.

4.0 Document History

Revision/ Job Number	Writer Initials	Reviewers Initials	Date	Change
1.0/ G105267899	KRQ	AS	June 29, 2023	Original document