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RF EXPOSURE EVALUATION Maximum Permissible Exposure (MPE)

Applicant Name:

Skylark Wireless, LLC
4011 Garrott St
Houston, TX 77006
USA

Date of Testing:

05/08/2023 – 05/19/2023

Test Report Issue Date:

08/03/2023

Test Site/Location:

Element Lab. Columbia, MD, USA

Test Report Serial No.:

1M2308230095-03.2AS22

FCC ID:

2AS22-LUMACH2

APPLICANT:

Skylark Wireless, LLC

EUT Type:

CBRS Radio Module

FCC Classification:

Category B Citizens Band Radio Service Devices (CBSD)

FCC Rule Part:

FCC Part 1 (§1.1310) and Part 2 (§2.1091)

Test Procedure(s):

KDB 447498 D01

Class II Permissive Change:

Please see change document

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in FCC KDB 447498 D01. Test results reported herein relate only to the item(s) tested.

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

RJ Ortanez
Executive Vice President



FCC ID: 2AS22-LUMACH2	MAXIMUM PERMISSIBLE EXPOSURE REPORT Class II Permissive Change		Approved by: Technical Manager
Test Report S/N: 1M2308230095-03.2AS22	Test Dates: 05/08/2023 – 05/19/2023	EUT Type: CBRS Radio Module	Page 1 of 6

V 9.0 02/01/2019

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T A B L E O F C O N T E N T S

1.0	RF EXPOSURE EVALUATION – MAXIMUM PERMISSIBLE EXPOSURE (MPE)	3
1.1	Introduction	3
1.2	EUT Description.....	3
1.3	Procedure	4
2.0	CONCLUSION	6

FCC ID: 2AS22-LUMACH2	MAXIMUM PERMISSIBLE EXPOSURE REPORT Class II Permissive Change		Approved by: Technical Manager
Test Report S/N: 1M2308230095-03.2AS22	Test Dates: 05/08/2023 – 05/19/2023	EUT Type: CBRS Radio Module	Page 2 of 6

V 9.0 02/01/2019

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1.0 RF EXPOSURE EVALUATION – MAXIMUM PERMISSIBLE EXPOSURE (MPE)

1.1 Introduction

This document is prepared to show compliance with the RF Exposure requirements as required in §1.1310 of the FCC Rules and Regulations and RSS-102 of Industry Canada.

The limit for Maximum Permissible Exposure (MPE), specified in FCC §1.1310, is listed in Table 1-1. According to FCC §1.1310 and RSS-102: 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).

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 (f = frequency)				
30-300	61.4	0.163	1.0	6
300-1500	...	...	f/300	6
1500-100,000	...	...	5.0	6
(B) Limits For General Population / Uncontrolled Exposure (f = frequency)				
30-300	27.5	0.073	0.2	30
300-1500	...	...	f/1500	30
1500-100,000	...	...	1.0	30

Table 1-1. Limits for Maximum Permissible Exposure (MPE)

1.2 EUT Description

The **Skylark Wireless, LLC FCC ID: 2AS22-LUMACH2** is a certified CBRS Radio Module. It has two antenna ports which transmit simultaneously with cross-polarized antennas in the 3550 – 3700 MHz band. This RF exposure analysis in this report is for the operation of seven modules integrated in a single host and operating simultaneously. Only the highest power mode is assessed for compliance. The EUT is installed in a dedicated chassis and can only operate in the dedicated chassis.

FCC ID: 2AS22-LUMACH2	MAXIMUM PERMISSIBLE EXPOSURE REPORT Class II Permissive Change		Approved by: Technical Manager
Test Report S/N: 1M2308230095-03.2AS22	Test Dates: 05/08/2023 – 05/19/2023	EUT Type: CBRS Radio Module	Page 3 of 6

1.3 Procedure

The procedure used to determine the RF power density was based upon a calculation for determining compliance with the MPE requirements.

The power generated by each transmitter used in this product was initially measured by a power meter or spectrum analyzer and the powers were recorded. Through use of the Friis transmission formula and knowledge of the maximum antenna gain to be used, the power density level is calculated at a distance of 20cm.

Friis Transmission Formula

Friis transmission formula: $P_d = (P_{out} * G) / (4\pi r^2)$

Where,

P_d = Power Density (mW/cm²)

π = 3.1416

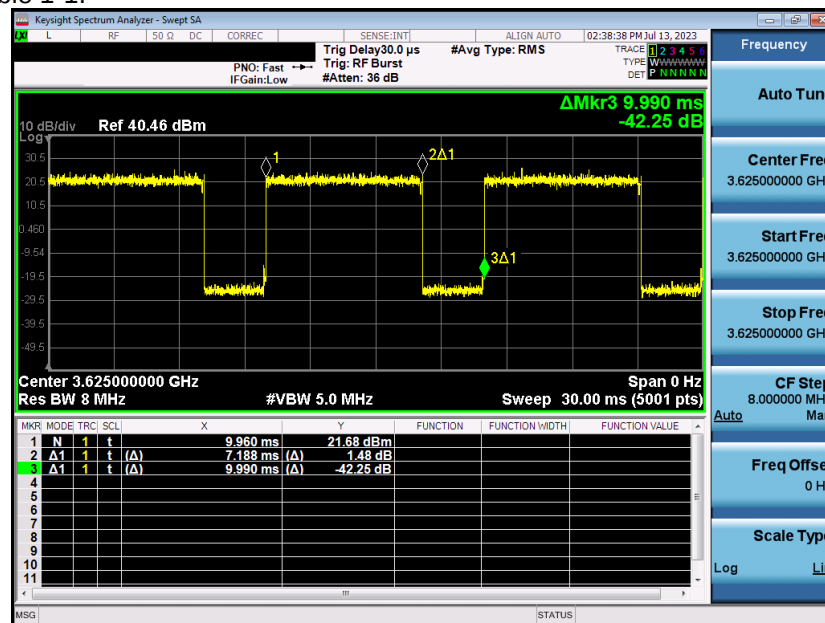
P_{out} = output power to antenna (mW)

r = distance between observation point and center of the radiator (cm)

G = gain of antenna in linear scale

Calculated MPE

The power density limit for General Population/Uncontrolled Exposure at each frequency is determined based on the information in Table 1-1.



Plot 1.1 Duty Cycle Plot

$$\text{Duty Cycle} = \text{Pulse Width} / \text{Period} = 7.188\text{ms} / 9.990\text{ms} = 71.95\%$$

$$\begin{aligned} \text{Time Averaged Power} &= \text{Max Power} + \text{Antenna Gain} + \text{Duty Cycle Correction} \\ &= 21\text{dBm} + 10.16\text{dBi} + 10\log(0.7195) \\ &= 21\text{dBm} + 10.13\text{dBi} - 1.43\text{dB} = 29.70\text{dBm} \end{aligned}$$

$$\begin{aligned} \text{Directional Gain} &= 10*\log(\# \text{ of modules}) - 10*\log(\# \text{ of spatial streams}) + \text{Antenna Gain} \\ &= 10*\log(7) - 10*\log(16) + 13.75 = 10.16\text{dBi} \end{aligned}$$

FCC ID: 2AS22-LUMACH2	MAXIMUM PERMISSIBLE EXPOSURE REPORT Class II Permissive Change		Approved by: Technical Manager
Test Report S/N: 1M2308230095-03.2AS22	Test Dates: 05/08/2023 – 05/19/2023	EUT Type: CBRS Radio Module	Page 4 of 6

Frequency	3625	MHz
FCC Limit	1.000	mW/cm ²
Distance	20	cm
Max Power	20.00	dBm
Duty Cycle	71.95	%
Duty Cycle Correction	-1.43	dB
Power	100.00	mW
Max FCC Tx Ant Gain	10.16	dBi
Time-Averaged Power	28.73	dBm
Time-Averaged Power	746.50	mW
FCC Power Density	0.14851	mW/cm ²

Table 1-2. Calculated MPE Data for CBRS Band

FCC ID: 2AS22-LUMACH2	MAXIMUM PERMISSIBLE EXPOSURE REPORT Class II Permissive Change		Approved by: Technical Manager
Test Report S/N: 1M2308230095-03.2AS22	Test Dates: 05/08/2023 – 05/19/2023	EUT Type: CBRS Radio Module	Page 5 of 6

V 9.0 02/01/2019

2.0 CONCLUSION

The device meets the mobile RF exposure limit at a 20cm separation distance as specified in §2.1091 of the FCC Rules and Regulations. An appropriate RF exposure compliance statement will be placed in the user's manual.

FCC ID: 2AS22-LUMACH2	MAXIMUM PERMISSIBLE EXPOSURE REPORT Class II Permissive Change		Approved by: Technical Manager
Test Report S/N: 1M2308230095-03.2AS22	Test Dates: 05/08/2023 – 05/19/2023	EUT Type: CBRS Radio Module	Page 6 of 6