

Radio Test Report

Report No.: STS2311343H02

Issued for

SARIANA LLC

7365 Mission Gorge Road Suite G San Diego, CA 92120,
USA

Product Name: SM1 Mechanical Keyboard

Brand Name: Satechi

Model Name: ST-KSM1LT-EN

Series Model(s): See page five, fourth line

FCC ID: ZE9-ST-KSM1

Test Standards: FCC 47CFR §2.1093

The test results presented in this report relate only to the object tested. This report shall not be reproduced, except in full, without the written approval of the ShenZhen STS Test Services Co., Ltd.

**TEST REPORT****Applicant's Name**.....: SARIANA LLC

Address: 7365 Mission Gorge Road Suite G San Diego, CA 92120, USA

Manufacturer's Name.....: SARIANA LLC

Address: 7365 Mission Gorge Road Suite G San Diego, CA 92120, USA

Product Description

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447498 D04 Interim General RF Exposure Guidance v01

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Date of Test.....:

Date of receipt of test item.....: 27 Dec.2023

Date (s) of performance of tests.....: 27 Dec.2023 ~ 07 Jan. 2024

Date of Issue.....: 07 Jan. 2024

Test Result.....: **Pass**

Testing Engineer :

(Aaron Bu)

Technical Manager :

(Chris Chen)

Authorized Signatory :

(Bovey Yang)





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Revision History

Rev.	Issue Date	Report No.	Effect Page	Contents
00	07 Jan. 2024	STS2311343H02	ALL	Initial Issue



1. GENERAL INFORMATION

1.1 GENERAL DESCRIPTION OF THE EUT

Product Name	SM1 Mechanical Keyboard	
Brand Name	Satechi	
Model Name	ST-KSM1LT-EN	
Series Model(s)	ST-KSM1DK-EN, ST-KSM1DK-CA, ST-KSM1LT-CA, ST-KSM1DK-CN, ST-KSM1LT-CN, ST-KSM1DK-KR, ST-KSM1LT-KR, ST-KSM1DK-CZ, ST-KSM1LT-CZ, ST-KSM1DK-HU, ST-KSM1LT-HU, ST-KSM1DK-QC, ST-KSM1LT-QC, ST-KSM1DK-UK, ST-KSM1LT-UK, ST-KSM1DK-ES, ST-KSM1LT-ES, ST-KSM1DK-FR, ST-KSM1LT-FR, ST-KSM1DK-DE, ST-KSM1LT-DE, ST-KSM1DK-IT, ST-KSM1LT-IT, ST-KSM1DK-NL, ST-KSM1LT-NL, ST-KSM1DK-PT, ST-KSM1LT-PT, ST-KSM1DK-SE, ST-KSM1LT-SE, ST-KSM1DK-NO, ST-KSM1LT-NO, ST-KSM1DK-DK, ST-KSM1LT-DK, ST-KSM1DK-FI, ST-KSM1LT-FI, ST-KSM1DK-PL, ST-KSM1LT-PL, ST-KSM1DK-GR, ST-KSM1LT-GR, ST-KSM1DK-RU, ST-KSM1LT-RU, ST-KSM1DK-TR, ST-KSM1LT-TR, ST-KSM1DK-AR, ST-KSM1LT-AR, ST-KSM1DK-HE, ST-KSM1LT-HE, ST-KSM1DK-MX, ST-KSM1LT-MX, ST-KSM1DK-BR, ST-KSM1LT-BR, ST-KSMYZZ-XX ("Y" is Arabian number 1, 2 or 3 and ZZ is English letter means color, XX means layout / country)	
Model Difference	Only the color and export country are different	
Product Description	The EUT is Router	
	Operation Frequency:	BLE:2402~2480 MHz 2.4G: 2403~2480 MHz
	Modulation Type:	GFSK
	Antenna gain:	BLE: -1dBi 2.4G: -1dBi
	Antenna Designation:	PCB
Power Rating	Input: DC 5V	
Battery	Rated Voltage: 3.85V Charge Limit Voltage: 4.35V Capacity: 2500mAH	
Hardware Version	AK-M01-BT983(US)VER1.0	
Software Version	V2.47	

1.2 TEST FACTORY

SHENZHEN STS TEST SERVICES CO., LTD

Add. : 101, Building B, Zhuoke Science Park, No.190 Chongqing Road, ZhanChengShequ, Fuhai Sub-District, Bao'an District, Shenzhen, Guang Dong, China

FCC test Firm Registration Number: 625569

IC test Firm Registration Number: 12108A

A2LA Certificate No.: 4338.01

2. FCC 47CFR §2.1093 REQUIREMENT

2.1 TEST STANDARDS

Follow the maximum permissible exposure (MPE) limits specified in 447498 D04 Interim General Radio Frequency Exposure Guidelines v01. The gain of the antenna used in the product was extracted from the supplied antenna data sheet and the maximum total power input to the antenna was also measured. Calculate the distance from the product to the MPE limit by the formula.

2.2 LIMIT

For single RF sources (i.e., any single fixed RF source, mobile device, or portable device, as defined in paragraph (b)(2) of this section): A single RF source is exempt if:

(A) The available maximum time-averaged power is no more than 1 mW, regardless of separation distance. This exemption may not be used in conjunction with other exemption criteria other than those in paragraph (b)(3)(ii)(A) of Part 1.1307. Medical implant devices may only use this exemption and that in paragraph (b)(3)(ii)(A);

(B) Or the available maximum time-averaged power or effective radiated power (ERP), whichever is greater, is less than or equal to the threshold P_{th} (mW) described in the following formula. This method shall only be used at separation distances (cm) from 0.5 centimeters to 40 centimeters and at frequencies from 0.3 GHz to 6 GHz (inclusive). P_{th} is given by:

$$P_{th} \text{ (mW)} = \begin{cases} ERP_{20 \text{ cm}} (d/20 \text{ cm})^x & d \leq 20 \text{ cm} \\ ERP_{20 \text{ cm}} & 20 \text{ cm} < d \leq 40 \text{ cm} \end{cases}$$

Where

$$x = -\log_{10} \left(\frac{60}{ERP_{20 \text{ cm}} \sqrt{f}} \right) \text{ and } f \text{ is in GHz;}$$

and

$$ERP_{20 \text{ cm}} \text{ (mW)} = \begin{cases} 2040f & 0.3 \text{ GHz} \leq f < 1.5 \text{ GHz} \\ 3060 & 1.5 \text{ GHz} \leq f \leq 6 \text{ GHz} \end{cases}$$

d = the separation distance (cm);

(C) Or using below table and the minimum separation distance (R in meters) from the body of a nearby person for the frequency (f in MHz) at which the source operates, the ERP (watts) is no more than the calculated value prescribed for that frequency. For the exemption in Table 1 to apply, R must be at least $\lambda/2\pi$, where λ is the free-space operating wavelength in meters. If the ERP of a single RF source is not easily obtained, then the available maximum time-averaged power may be used in lieu of ERP if the physical dimensions of the radiating structure(s) do not exceed the electrical length of $\lambda/4$ or if the antenna gain is less than that of a half-wave dipole (1.64 linear value).

RF Source frequency (MHz)	Threshold ERP(watts)
0.3-1.34	$1,920 R^2$.
1.34-30	$3,450 R^2/f^2$.
30-300	$3.83 R^2$.
300-1,500	$0.0128 R^2 f$.
1,500-100,000	$19.2 R^2$.

For multiple RF sources: Multiple RF sources are exempt if:

(A) The available maximum time-averaged power of each source is no more than 1 mW and there is a separation distance of two centimeters between any portion of a radiating structure operating and the nearest portion of any other radiating structure in the same device, except if the sum of multiple sources is less than 1 mW during the time-averaging period, in which case they may be treated as a single source (separation is not required). This exemption may not be used in conjunction with other exemption criteria other than those in paragraph (b)(3)(i)(A) of Part 1.1307. Medical implant devices may only use this exemption and that in paragraph (b)(3)(i)(A).

(B) in the case of fixed RF sources operating in the same time-averaging period, or of multiple mobile or portable RF sources within a device operating in the same time averaging period, if the sum of the fractional contributions to the applicable thresholds is less than or equal to 1 as indicated in the following equation.

$$\sum_{i=1}^a \frac{P_i}{P_{th,i}} + \sum_{j=1}^b \frac{ERP_j}{ERP_{th,j}} + \sum_{k=1}^c \frac{Evaluated_k}{Exposure Limit_k} \leq 1$$

Where:

a = number of fixed, mobile, or portable RF sources claiming exemption using paragraph (b)(3)(i)(B) of Part 1.1307 for P_{th}, including existing exempt transmitters and those being added.

b = number of fixed, mobile, or portable RF sources claiming exemption using paragraph (b)(3)(i)(C) of Part 1.1307 for Threshold ERP, including existing exempt transmitters and those being added.

c = number of existing fixed, mobile, or portable RF sources with known evaluation for the specified minimum distance including existing evaluated transmitters.

P_i = the available maximum time-averaged power or the ERP, whichever is greater, for fixed, mobile, or portable RF source i at a distance between 0.5 cm and 40 cm (inclusive).

P_{th,i} = the exemption threshold power (P_{th}) according to paragraph (b)(3)(i)(B) of this section for fixed, mobile, or portable RF source i.

ERP_j = the ERP of fixed, mobile, or portable RF source j.

ERP_{th,j} = exemption threshold ERP for fixed, mobile, or portable RF source j, at a distance of at least λ/2π according to the applicable formula of paragraph (b)(3)(i)(C) of Part 1.1307.

Evaluated_k = the maximum reported SAR or MPE of fixed, mobile, or portable RF source k either in the device or at the transmitter site from an existing evaluation at the location of exposure.

Exposure Limit_k = either the general population/uncontrolled maximum permissible exposure (MPE) or specific absorption rate (SAR) limit for each fixed, mobile, or portable RF source k, as applicable from § 1.1310.



2.3 TEST RESULT

Turn up

Mode	Detector	Turn up Power
2.4G	PK	$-14 \pm 1\text{dBm}$
BLE	AV	$0 \pm 1\text{dBm}$

Protocol	Fre. (GHz)	Separation distance (cm)	Max Turn up power (dBm)	ANT Gain (dBi)	Max Turn up power (mW)	Limit (mW)	Ratio	Result
BLE	2.402	0.5	1	-1	1.26	2.79	0.358723	Pass

Protocol	Fre. (GHz)	Separation distance (cm)	Max Turn up power (dBm)	Max EIRP (mW)	Limit (mW)	Ratio	Result
2.4G	2.48	0.5	-13	0.050119	2.7172146	0.0184449	Pass

Multiple transmission:

Note: 1. Calculated formula: $\text{EIRP(dBm)} = 80.22(\text{dBuV/m}) - 95.2$

2. The Maximum power is less than the limit, complies with the exemption requirements.
3. The 2.4G and BLE cannot be transmitted together.

*****END OF THE REPORT*****