

Prüfbericht-Nr.: Test report no.:	SE22MW8X-001	Auftrags-Nr.: Order no.:	0290100212	Seite 1 von 8 Page 1 of 8	
Kunden-Referenz-Nr.: Client reference no.:	2458172	Auftragsdatum: Order date:	2022.09.29		
Auftraggeber: Client:	Nomono AS				
Prüfgegenstand: Test item:	Lavalieri microphone with wireless communication				
Bezeichnung / Typ-Nr.: Identification / Type no.:	Stellar Mic / FCC ID: 2A9CX-MIC1				
Auftrags-Inhalt: Order content:	RF Exposure Evaluation				
Prüfgrundlage: Test specification:	FCC 47 CFR 2.1093				
Wareneingangsdatum: Date of sample receipt:	N/A				
Prüfmuster-Nr.: Test sample no.:	N/A				
Prüfzeitraum: Testing period:	N/A -				
Ort der Prüfung: Place of testing:	Lund, Sweden				
Prüflaboratorium: Testing laboratory:	TÜV Rheinland Sweden				
Prüfergebnis*: Test result*:	Bitte wählen / Please select...				
überprüft von: reviewed by:	genehmigt von: authorized by:				
Datum: 2023.04.20 Date:	Datum: 2023.04.20 Date:				
Stellung / Position: Senior Technical Expert	Stellung / Position: Lab Manager				
Sonstiges / Other:					
Zustand des Prüfgegenstandes bei Anlieferung: Condition of the test item at delivery:					
Prüfmuster vollständig und unbeschädigt Test item complete and undamaged					
* Legende:	1 = sehr gut P(ass) = entspricht o.g. Prüfgrundlage(n)	2 = gut F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	3 = befriedigend F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	4 = ausreichend N/A = nicht anwendbar	5 = mangelhaft N/T = nicht getestet
* Legend:	1 = very good P(ass) = passed a.m. test specification(s)	2 = good F(ail) = failed a.m. test specification(s)	3 = satisfactory F(ail) = failed a.m. test specification(s)	4 = sufficient N/A = not applicable	5 = poor N/T = not tested
Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens. <i>This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts.</i>					

V05

Revision HistorySE22MW8X-001SE22MW8X-001

Revision	Date	Remarks	Author
001	2023.04.20	First release	Niall Forrester
Note: Latest revision report will replace all previous reports			
This report based on RF Exposure FCC 47CFR 2-1093 Template version 1.0			

Statement of Compliance

Evaluation was performed based on FCC 47 CFR 2.1093 for portable devices.

The calculations below show that the Stellar Mic / FCC ID: 2A9CX-MIC1 device is fulfils the requirements for exclusion of SAR testing.

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1. GENERAL INFORMATION

1.1 Test Site

Test Facility:	TÜV Rheinland Sweden AB
Address:	Mobilvägen 10
	223 62 Lund
	Sweden
Swedac Registration Number:	10325
FCC Test Firm Registration Number:	517458
ISED Test Site Registration Number:	24753

1.2 Client Information

Company Name:	Nomono AS
Address:	Strandveien 43
	7067 Trondheim
	Norway
Contact Person:	Kristine Snyder / Sindre Georgsen
Contact e-Mail / Telephone	compliance@nomono.co +47 40 44 00 40 / +47 93 42 48 42

2. PRODUCT INFORMATION

2.1 General Description

Model name:	Stellar Mic
Manufacturer:	Nomono
Model number / Marketing name:	Stellar Mic
FCC ID:	2A9CX-MIC1
Description:	Lavalier microphone with wireless communication
Ancillary Equipment:	See section

2.2 Device Usage and Evaluation Distance

The device can be attached to the user's clothes using a built-in clip and hence an evaluation against the requirements of FCC 47 CFR 12.1093 with a minimum separation distance of 5mm has been applied.

2.3 Wireless Technologies and Bands Supported by the EUT

Technology	Band	Frequency Range (Tx)	Evaluation Performed
Bluetooth Low Energy (nRF5340)	2.4 GHz	2402 MHz - 2480 MHz	N/A

2.4 Simultaneous Transmission Configurations

No simultaneous transmissions configurations are supported by the device

2.5 Conducted Power and Antenna Gain

Technology	Band	Max. Conducted Output Power (dBm)	Max. Time-Averaged Output Power (dBm)*	Antenna Gain (dBi)
Bluetooth Low Energy	2.4 GHz	-0.48	-0.48	3.60

*Assuming a 100% duty cycle

3. TEST METHODS

3.1 Test Standards

Testing was performed according to the following standards / references

Standard	Version	Description
47 CFR 2.1093	-	Radiofrequency radiation exposure evaluation: portable devices.

3.2 Additional references

Standard	Version	Description
47 CFR 1.1307	-	Actions that may have a significant environmental effect, for which Environmental Assessments (EAs) must be prepared
KDB 447498 D01	v06	RF Exposure Procedures and Equipment Authorization Policies for Mobile and Portable Devices
KDB 447498 D04	v01	RF Exposure Procedures and Equipment Authorization Policies for Mobile and Portable Devices

3.3 Limits

Extract from FCC 47 CFR 2.1093 (c)

- (1) Evaluation of compliance with the exposure limits in 1.1310 of this chapter, and preparation of an EA if the limits are exceeded, is necessary for portable devices having single RF sources with more than an available maximum time-averaged power of 1 mW, more than the ERP listed in Table 1 to 1.1307(b)(3)(i)(C), or more than the P_{th} in the following formula, whichever is greater. The following formula shall only be used in conjunction with portable devices not exempt by 1.1307(b)(3)(i)(C) at distances from 0.5 centimeters to 20 centimeters and frequencies from 0.3 GHz to 6 GHz.

$$P_{th}(mw) = ERP_{20cm}(d/20cm)^x \quad \text{for } d \leq 20cm$$

$$P_{th}(mw) = ERP_{20cm} \quad \text{for } 20cm \leq d \leq 40cm$$

Where $x = -\log_{10} \left(\frac{60}{ERP_{20cm}\sqrt{f}} \right)$

$$ERP_{20cm}(mW) = 2040f \quad \text{for } 0.3GHz \leq f \leq 1.5GHz$$

$$ERP_{20cm}(mW) = 3060 \quad \text{for } 1.5GHz \leq f \leq 6GHz$$

d = the minimum separation distance (cm) in any direction from any part of the device antenna(s) or radiating structure(s) to the body of the device user.

f = the frequency in GHz

Table 1 from 1.1307(b)(3)(i)(C),

RF Source Frequency (MHz)	Threshold ERP (W)
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	$19.2 R^2$

Where R = separation distance in m
 f = frequency in MHz

- (2) For multiple mobile or portable RF sources within a device operating in the same time averaging period, evaluation is required if the formula in 1.1307(b)(3)(ii)(B) of this chapter is applied to determine the exemption ratio and the result is greater than 1.

Equation from FCC 47 CFR 1.1307(b)(3)(ii)(B):

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

Where:

a = number of fixed, mobile, or portable RF sources claiming exemption using paragraph (b)(3)(i)(B) of this section 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 this section 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 $\lambda/2\pi$ according to the applicable formula of paragraph (b)(3)(i)(C) of this section.

$Evaluated_k$ = 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 of this chapter.

- (3) Unless otherwise specified in this chapter, any other single portable or multiple mobile and portable RF source(s) associated with a device is exempt from routine environmental evaluation for RF exposure prior to equipment authorization or use, except as specified in 1.1307(c) and (d) of this chapter.

4. EVALUATION DETAILS

4.1 SAR Exclusion Evaluation for Each Band and Technology

The maximum e.r.p of the device is >1mW, so the ERP threshold is calculated:

Based on Table 1 from 1.1307(b)(3)(i)(C) above, the threshold ERP would be:

$$19.2 \times (0.005)^2 = 0.00048W = 0.48mW$$

The maximum e.r.p. of the device is > 0.48mW, so the additional equation from FCC 47 CFR 2.1093 (c) (1) is used:

The threshold value P_{th} for each band/technology is calculated and compared with the conducted power and effective radiated power (e.r.p.):

Technology	Band	Freq* (GHz)	Min.** Separation (cm)	Max. Conducted Power (dBm)	Max . Conducted Power (mW)	Antenna Gain (dBI)	Max e.r.p (mW)	Threshold P_{th} (mW)
Bluetooth Low Energy (nRF5340)	2.4 GHz	2.48	0.5	-0.48	0.90	3.60	1.25	2.7

* The highest frequency in each band has been chosen, to give the most conservative limit

** For distances less than 0.5cm, a value of 0.5 m is used

Based on this calculation, the maximum conducted power and maximum effective radiated power are both below the threshold P_{th} and further evaluation is not required.