

TEST REPORT

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Report Number : SZNS1220114-02176E

Test Standard (s)

EN 62479:2010
EN 50663:2017

Sample Description

Product: XIAO nRF52840 Sense
Trademark: Seeed Studio
Tested Model: XIAO-nRF52840 Sense
Multiple Product: XIAO nRF52840
Multiple Model: XIAO-nRF52840
Date Received: 2022-1-14
Date of Test: /
Report Date: 2022-02-10

Test Result:	Pass*
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* In the configuration tested, the EUT complied with the standards above.

Prepared and Checked By:



Ting Lü
EMC Engineer

Approved By:

Robert Li
EMC Manager

Note: This report may contain data that are not covered by the A2LA accreditation and are marked with an asterisk "★".

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TABLE OF CONTENTS

GENERAL INFORMATION	3
OBJECTIVE	3
TEST METHODOLOGY	3
EN 62479:2010 & EN 62479:2010 §4.1 & §4.2 - Maximum emitted average power	7
TEST PROCEDURE	7
TEST DATA	7
CONCLUSION:	7
EXHIBIT A - EUT PHOTOGRAPHS	8

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Product	XIAO nRF52840 Sense
Tested Model	XIAO-nRF52840 Sense
Multiple Product	XIAO nRF52840
Multiple Model	XIAO-nRF52840
Model Difference	The above models except for different name, everything else is the same.
Trademark	Seeed Studio
Voltage Range	DC 5V from USB port.
Date of Test	2022-01-26
Sample serial number	SZNS1220114-02176E -RF-S1
Received date	2022-01-14
Sample/EUT Status	Good condition

Objective

This test report is in accordance with EN 62479: 2010&BS EN 62479: 2010 Assessment of the compliance of low power electronic and electrical equipment with the basic restrictions related to human exposure to electromagnetic fields (10 MHz to 300 GHz); EN 50663:2017&BS EN 50663:2017 Generic standard for assessment of low power electronic and electrical equipment related to human exposure restrictions for electromagnetic fields (10 MHz - 300 GHz).

The objective is to determine the compliance of EUT with EN 62479: 2010, BS EN 62479: 2010, EN 50663:2017, BS EN 50663:2017.

Test Methodology

All measurements contained in this report were conducted with EN 62479: 2010&BS EN 62479: 2010.

RF Exposure Measurement

1. Introduction

This generic standard applies to low power electronic and electrical apparatus for which no dedicated product – or product family standard regarding human exposure to electromagnetic fields applies.

The frequency range covered is 10 MHz to 300 GHz.

The object of this standard is to demonstrate the compliance of such apparatus with the basic restrictions on exposure of the general public to electric, magnetic and electromagnetic fields and contact current.

2. Compliance Criteria

2.1 General considerations

Compliance of electromagnetic emissions from electronic and electrical equipment with the basic restrictions usually is determined by measurements and, in some cases, calculation of the exposure level. If the electrical power used by or radiated by the equipment is sufficiently low, the electromagnetic fields emitted will be incapable of producing exposures that exceed the basic restrictions. This standard provides simple EMF assessment procedures for this low power equipment.

Any relevant compliance assessment procedure which is consistent with the state of the art, reproducible and gives valid results can be used.

For transmitters intended for use with more than one antenna configuration option, the combination of transmitter and antenna(s) which generates the highest available antenna power and/or average total radiated power shall be assessed.

Four routes, which as described as follows, can be used to demonstrate compliance with this standard:

A Typical usage, installation and the physical characteristics of equipment make it inherently compliant with the applicable EMF exposure levels such as those listed in the bibliography. This low-power equipment includes unintentional (or non-intentional) radiators, for example incandescent light bulbs and audio/visual (A/V) equipment, information technology equipment (ITE) and multimedia equipment (MME) that does not contain radio transmitters. NOTE Equipment is described as A/V equipment, ITE or MME if its main use is playback/recording of music, voice or images, or processing of digital information.

B The input power level to electrical or electronic components that are capable of radiating electromagnetic energy in the relevant frequency range is so low that the available antenna power and/or the average total radiated power cannot exceed the low-power exclusion level defined in 2.2.

C The available antenna power and/or the average total radiated power are limited by product standards for transmitters to levels below the low-power exclusion level defined in 2.2.

D Measurements or calculations show that the available antenna power and/or the average total radiated power are below the low-power exclusion level defined in 2.2.

If none of these routes can be used, then the equipment is deemed to be out of the scope of this standard and EMF assessment for conformity assessment purposes shall be made according to other standards, such as IEC 62311 or other EMF product standards.

2.2 Low-power exclusion level (P_{max})

Low-power electronic and electrical equipment is deemed to comply with the provisions of this standard if it can be demonstrated using routes B, C or D that the available antenna power and/or the average total radiated power is less than or equal to the applicable low-power exclusion level P_{max} .

Annex A contains example values for P_{max} derived from existing exposure limits listed in the bibliography, such as the ICNIRP guidelines [1], IEEE Std C95.1-1999 [2], and IEEE Std C95.1-2005 [3].

For wireless devices operated close to a person's body with available antenna powers and/or average total radiated powers higher than the P_{max} values given in Annex A, the alternative P_{max} values (called P_{max}'), described in Annex B can also be used.

For low power equipment using pulsed signals, other limits may apply in addition to those considered in Annex A and Annex B. Both ICNIRP guidelines [1] and IEEE standards [2], [3] have specific restrictions on exposures to pulsed fields, and the requirements of those standards with respect to exposure to pulses shall be met. Annex C discusses this topic further.

2.3 Exposure to multiple transmitting sources

If equipment under test (EUT) is equipped with multiple intentional radiators, the overall conformity assessment might require more than just the assessment of conformity of each one of the radiators separately. The effect of multiple intentional radiators should be considered in the conformity assessment process.

Technical Report IEC 62630 [8] provides generic guidance on how to assess the EMFs generated by multiple intentional radiators.

3. Limit

3.1 Annex A

Table A.1 – Example values of SAR-based P_{max} for some cases described by ICNIRP, IEEE Std C95.1-1999 and IEEE Std C95.1-2005

Guideline / Standard	SAR limit, SAR_{max} W/kg	Averaging mass, m g	P_{max} mW	Exposure tier ^a	Region of body ^a
ICNIRP [1]	2	10	20	General public	Head and trunk
	4	10	40	General public	Limbs
	10	10	100	Occupational	Head and trunk
	20	10	200	Occupational	Limbs
IEEE Std C95.1-1999 [2]	1,6	1	1,6	Uncontrolled environment	Head, trunk, arms, legs
	4	10	40	Uncontrolled environment	Hands, wrists, feet and ankles
	8	1	8	Controlled environment	Head, trunk, arms, legs
	20	10	200	Controlled environment	Hands, wrists, feet and ankles
IEEE Std C95.1-2005 [3]	2	10	20	Action level	Body except extremities and pinnae
	4	10	40	Action level	Extremities and pinnae
	10	10	100	Controlled environment	Body except extremities and pinnae
	20	10	200	Controlled environment	Extremities and pinnae

^a Consult the appropriate standard for more information and definitions of terms.

3.2 Annex B

$$P_{\max}' = \exp[A_s - B_s^2 + C \ln(BW) + D] \quad (\text{B.1})$$

For compliance with the SAR limit of $SAR_{\max} = 2 \text{ W/kg}$ averaged over $m = 10 \text{ g}$ in ICNIRP Guidelines [1] and IEEE Std C95.1-2005 [3], use Equations (B.2) to (B.5) in Equation (B.1):

$$A = (-0,4588f^3 + 4,407f^2 - 6,112f + 2,497)/100 \quad (\text{B.2})$$

$$B = (0,1160f^3 - 1,402f^2 + 3,504f - 0,4367)/1000 \quad (\text{B.3})$$

$$C = (-0,1333f^3 + 11,89f^2 - 110,8f + 301,4)/1000 \quad (\text{B.4})$$

$$D = -0,03540f^3 + 0,5023f^2 - 2,297f + 6,104 \quad (\text{B.5})$$

EN 62479:2010 & EN 62479:2010 §4.1 & §4.2 - Maximum emitted average power**Test Procedure**

Refer to EN 62479:2010 §4.1 & §4.2

Test Data**Environmental Conditions**

Temperature:	25 °C
Relative Humidity:	55 %
ATM Pressure:	101.0 kPa

The testing was performed by Ting Lü on 2022-01-26.

Test Mode: Transmitting

Maximum Tune Up ERP (dBm)	Maximum Tune Up ERP (mW)	Limit (mW)	Result
8	6.31	20	Pass

Conclusion:

The RF Exposure is compliance.

EXHIBIT A - EUT PHOTOGRAPHS

Please refer to the Attachment.

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