RF Exposure Exemption Report

Silicon Laboratories Finland Oy

Main Model: SiW917Y1GA
Series Model: SiW917Y1GN

In accordance with FCC CFR 47 Pt 1.1307

Add value.
Inspire trust.

Prepared for: Silicon Laboratories Finland Oy
Bertel Jungin Aukio 3
Alberga Business Park
02600 Espoo
Finland

COMMERCIAL-IN-CONFIDENCE

FCC ID: QOQ-917AC

Document 75960833-09 Issue: 01

SIGNATURE			
S. Mah			
NAME	**JOB TITLE**	**RESPONSIBLE FOR**	**ISSUE DATE**
Steve Marshall	Senior Engineer	Authorised Signatory	22 August 2024

Signatures in this approval box have checked this document in line with the requirements of TÜV SÜD document control rules.

FCC Accreditation
294497/UK2010 Octagon House, Fareham Test Laboratory

EXECUTIVE SUMMARY
The wireless devices described within this report are compliant with the exemption criteria related to human exposure to electromagnetic fields laid out in FCC CFR Title 47 Part 1.1307.

TÜV SÜD
is a trading name of TUV SUD Ltd
Registered in Scotland at East Kilbride,
Glasgow G75 0QF, United Kingdom
Registered number: SC215164

TUV SUD Ltd is a
TÜV SÜD Group Company

Phone: +44 (0) 1489 558100
Fax: +44 (0) 1489 558101
www.tuvsud.com/en

TÜV SÜD
Octagon House
Concorde Way
Fareham
Hampshire PO15 5RL
United Kingdom

Contents

1 Report Summary

1.1 Report Modification Record

Alterations and additions to this report will be issued to the holders of each copy in the form of a complete document.

Issue	Description of Change	Date of Issue
1	First Issue	22-August-2024

Table 1

1.2 Introduction

Applicant	Silicon Laboratories Finland Oy
Manufacturer	Silicon Laboratories Finland Oy
Model Number(s)	Main Model SiW917Y1GA Series Model: SiW917Y1GN
Hardware Version(s)	1.0
Software Version(s)	Stack's "Connectivity Firmware" version 2.10.1.2.0.4 (WLAN) Stack's "Connectivity Firmware" version 2.12.1.0.0.1 (BLE)
Specification/Issue/Date	FCC 47 CFR Part 1.1307: 2022
Order Number Date	PTP ~ 6000530772 08-March-2024
Related Document(s)	• KDB 447498 D04 v01 • FCC 47 CFR Part 2.1091: 2023 (Mobile Mode) • FCC 47 CFR Part 2.1093: 2023 (Portable Mode)

1.3 Brief Summary of Results

The wireless devices described within this report are compliant with the exemption criteria related to human exposure to electromagnetic fields laid out in FCC CFR Title 47 Part 1.1307.

The calculations shown in this report were made in accordance with the procedures specified in the applied test specification(s).

The report has two test tables for the device in a “Mobile Mode” at distances greater than 20 cm and “Portable Mode” at distances lower than 20 cm.

Portable mode calculations have been performed to FCC 1.1307(b)(3)(i)(B) Option B (SAR Based Exemption).

Mobile mode calculations have been performed to FCC 1.1307(b)(3)(i)(C) ‘Option C’ (MPE Based Exemption).

1.4 Application Form

Equipment Description

Technical Description: *(Please provide a brief description of the intended use of the equipment)*	Bluetooth Low Energy (LE), and Wi-Fi 802.11b/g/n/ax wireless radio module
Manufacturer:	Silicon Laboratories Finland Oy
Model:	Main Model: SiW917Y1GA (with integral antenna) Series Model: SiW917Y1GN (with no integral antenna but RF pin)
Part Number:	Not Applicable

If more than one frequency band is supported, please confirm which combinations of bands are capable of Simultaneous Transmit.	

Frequency Band 1: 2.4 GHz WLAN

Antenna Model 1:	Integral Antenna	
Antenna length 1:	1.4	cm
Antenna Model 2:	ANT-2.4-CW-CT-SMA-RPS by TE Connectivity	
Antenna length 2:	14.2	cm
Bottom frequency:	2412	MHz
Middle frequency:	2437	MHz
Top frequency:	2462	MHz

Maximum power (input to the antenna including a tolerance):	20.69	dBm
Antenna gain 1 (or maximum gain allowed):	2.26	dBi
Antenna gain 2 (or maximum gain allowed):	2.80	dBi

Or

Field Strength Measurement:		dBµA/M
Measurement Distance:		cm

Separation distance from antenna to the user/bystander (Mobile Mode)	20	cm
Separation distance from antenna to the user/bystander (Portable Mode)	3.9	cm
Transmitter Duty Cycle:	100	%

Frequency Band 2: 2.4 GHz BLE

Antenna Model 1:	Integral Antenna	
Antenna length 1:	1.4	cm
Antenna Model 2:	ANT-2.4-CW-CT-SMA-RPS by TE Connectivity	
Antenna length 2:	14.2	cm
Bottom frequency:	2402	MHz
Middle frequency:	2444	MHz
Top frequency:	2480	MHz

Maximum power (input to the antenna including a tolerance):	16.18	dBm
Antenna gain 1 (or maximum gain allowed):	2.26	dBi
Antenna gain 2 (or maximum gain allowed):	2.80	dBi

Or

Field Strength Measurement:		dBµA/M
Measurement Distance:		cm

Separation distance from antenna to the user/bystander (Mobile Mode)	20	cm
Separation distance from antenna to the user/bystander (Portable Mode)	2.3	cm
Transmitter Duty Cycle:	100	%

Data in the tables above is provided by the Manufacturer.

1.5 Product Information

1.5.1 Technical Description

Bluetooth Low Energy (LE), and Wi-Fi 802.11b/g/n/ax wireless radio module.

1.5.2 Transmitter Description

The following radio access technologies and frequency bands are supported by the equipment under test.

Radio Access Technology	Frequency Band (MHz)	Minimum Frequency (MHz)	Output Power (dBm)	Duty Cycle (%)
BLE	2402 – 2480	2402	16.18	100
WLAN	2412 – 2462	2412	20.69	100

Table 2 – Transmitter Description- FCC

Note: Transmitter power includes upper bounds of uncertainty therefore maximum values are used.

1.5.3 Antenna Description

The following antennas are supported by the equipment under test.

Antenna Model	Gain (dBi)	Antenna length (cm)
Integral Antenna	2.26	1.4
ANT-2.4-CW-CT-SMA-RPS by TE Connectivity	2.80	14.2

Table 3 – Antenna description

In the case of more than one type of antenna being supported by the equipment, the calculation is based on the maximum of the antenna gains. If other antennas can be used that have greater gains, the minimum separation distances will need to be recalculated.

Note: Antenna gain includes upper bounds of uncertainty therefore maximum values are used.

1.5.4 Equipment Configuration

Single Transmitter, simultaneous transmission of BLE and WLAN is not supported.

2 Assessment Details

2.1 Single RF Source options for determination of exemption.

Option	Reference	RF Exposure Test Exemptions for Single Source
A (1-mW Test Exemption)	FCC 1.1307(b)(3)(i)(A)	The available maximum time averaged power is no more than 1 mW, regardless of separation distance.
B (SAR-Based Exemption)	FCC 1.1307(b)(3)(i)(B)	The available maximum timeaveraged power or effective radiated power (ERP), whichever is greater, is less than or equal to the threshold Pth (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). Pth is given by: $$P_{th}\ (\text{mW}) = \begin{cases} ERP_{20\,cm}(d/20\ \text{cm})^{x} & d \le 20\ \text{cm} \\ ERP_{20\,cm} & 20\ \text{cm} < d \le 40\ \text{cm} \end{cases}$$ Where $$x = -\log_{10}\left(\frac{60}{ERP_{20\,cm}\sqrt{f}}\right)$$ and f is in GHz; and $$ERP_{20\,cm}\ (\text{mW}) = \begin{cases} 2040f & 0.3\ \text{GHz} \le f < 1.5\ \text{GHz} \\ 3060 & 1.5\ \text{GHz} \le f \le 6\ \text{GHz} \end{cases}$$ d = the separation distance (cm);
C (MPE-Based Exemption)	FCC 1.1307(b)(3)(i)(C)	Or using Table 1 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 λ/2π, 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 λ/4 or if the antenna gain is less than that of a half-wave dipole (1.64 linear value). TABLE 1 TO § 1.1307(b)(3)(i)(C)—SINGLE RF SOURCES SUBJECT TO ROUTINE ENVIRONMENTAL EVALUATION 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^2f. 1,500–100,000 ..... 19.2R^2.

2.2 Individual Antenna Port Exposure Results

2.2.1 Single Source Calculation of Exposure at Specified Separation Distance FCC 1.1307(b)(3)(i)(B) 'Option B' (SAR Based Exemption)

The following calculations are for when the device is being used in a "Portable Mode".

RAT	Frequency (MHz)	Conducted Power Output mW	Duty Cycle %	Time Average Conducted Power Output mW	Antenna Gain Ratio	Maximum Power (EIRP) mW	Maximum Power (ERP) mW	Minimum Antenna to User Separation Distance (mm)	Pth (mW) 1.1307 (b)(3)(i)(B)	Greater of Max time averaged conducted power or ERP?	1.1307(b)(3)(i)(B) Exemption (Yes/No) (300 MHz to 6 GHz, 0.5 cm to 20 cm)
BLE (ext. ant.)	2402	41.5	100	41.5	1.905	79.0575	48.21	23	50.5	ERP	Yes
WLAN (ext. ant.)	2412	117.2	100	117.2	1.905	223.266	136.14	39	137.3	ERP	Yes
BLE (int. ant.)	2402	41.5	100	41.5	1.683	69.8445	42.59	22	46.4	ERP	Yes
WLAN (int. ant.)	2412	117.2	100	117.2	1.683	197.2476	120.27	37	124.2	ERP	Yes

Table 4 –Transmitter Result

The calculations show that the individual transmitters comply with FCC 1.1307(b)(3)(i)(B) SAR-based exemption at a minimum distance of 37 mm with the internal PCB antenna, and 39 mm with the external reference antenna.

2.2.2 Single Source Calculation of Exposure at Specified Separation Distance FCC 1.1307(b)(3)(i)(C) 'Option C' (MPE Based Exemption)

The following calculations are for when the device is being used in a "Mobile Mode".

RAT	Frequency (MHz)	Conducted Power Output (mW)	Duty Cycle %	Time Average Conducted Power Output (mW)	Antenna Gain Ratio	Maximum Power (EIRP) mW	Maximum Power (ERP) mW	Minimum separation distance for MPE evaluation λ/2 π mm	Actual Distance (mm)	Threshold ERP (mW)	1.1307(b)(3)(i)(C) Exemption (Yes/No) (300 kHz to 100 GHz)
BLE (ext. ant.)	2402	41.5	100	41.5	1.905	79.0575	48.21	19.9	200	768.0	Yes
WLAN (ext. ant.)	2412	117.2	100	117.2	1.905	223.266	136.14	19.8	200	768.0	Yes
BLE (int. ant.)	2402	41.5	100	41.5	1.683	69.8445	42.59	19.9	200	768.0	Yes
WLAN (int. ant.)	2412	117.2	100	117.2	1.683	197.2476	120.27	19.8	200	768.0	Yes

Table 5 –Transmitter Result

The calculations show that the individual transmitters comply with FCC 1.1307(b)(3)(i)(C) MPE-based exception at a minimum distance of 200 mm.