Integration Guide

Sona™ NX611 M.2 1218 With Chip Antenna Module

Application Note   *v0.1*

1   Introduction

This document describes key hardware aspects of Ezurio Connectivity's Sona™NX611 Wi-Fi6 / Bluetooth 5.4 modules, which are based on NXP's IW611 chipset. It serves as a preliminary supplement to the full module datasheet and is provided to assist in initial hardware integration.

Note: Data in this document is drawn from several sources and is subject to change.

Figure 1: Sona NX611 M.2 1218 Chip Antenna SMT Module

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2 Sona™ NX611 M.2 1218 Module

This section describes the hardware footprint, mechanical drawing and hardware pinout of the Sona NX611 M.2 1218 Chip Antenna module. It provides details and pin assignments critical to hardware integration of the module.

Detail drawings are shown in Figure 2 and Figure 3.

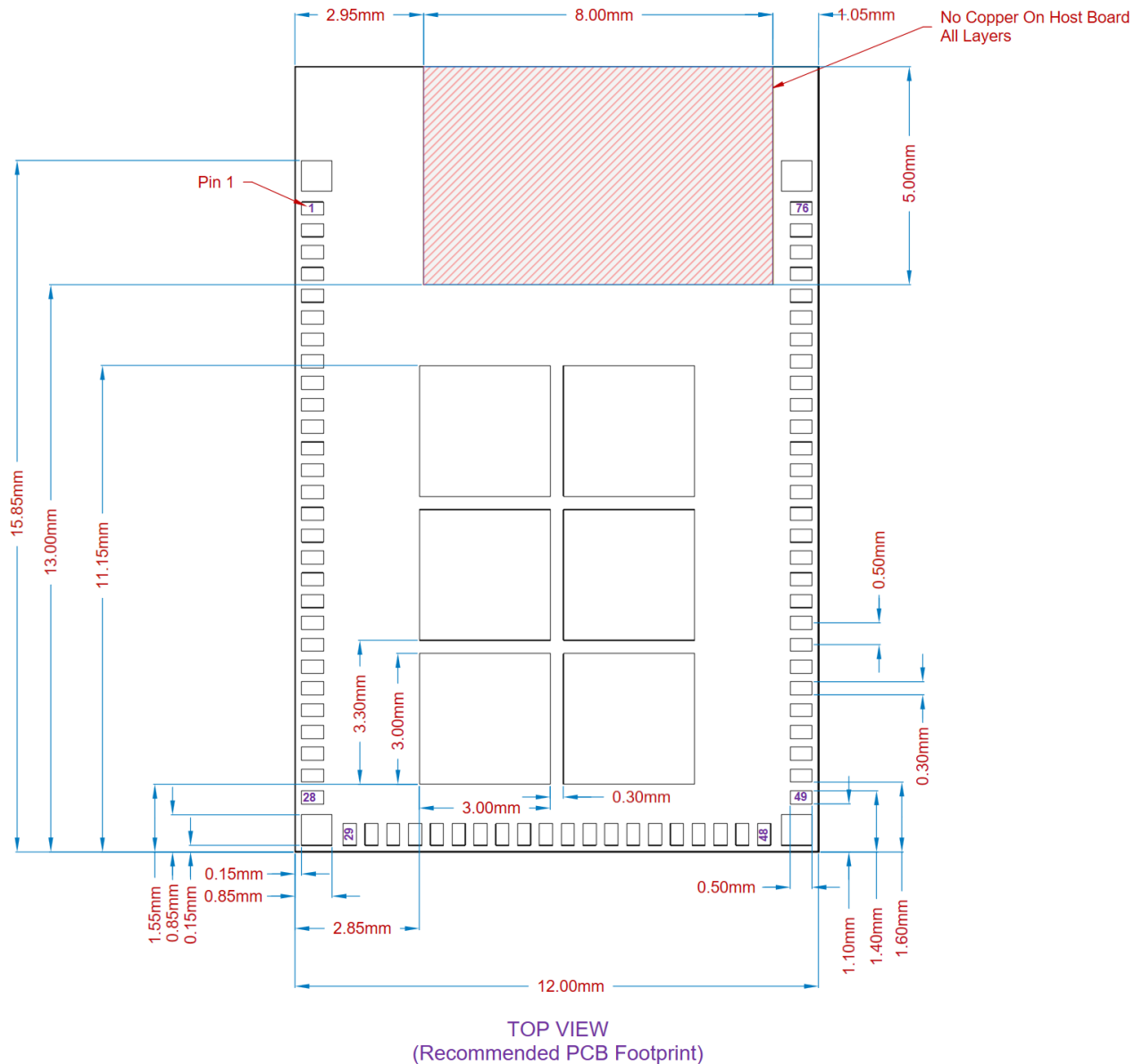## 2.1 SONA™ NX611 M.2 1218 Module PCB Footprint

TOP VIEW
(Recommended PCB Footprint)

Figure 2: PCB Footprint (Top View) – NX611 M.2 1218 Module
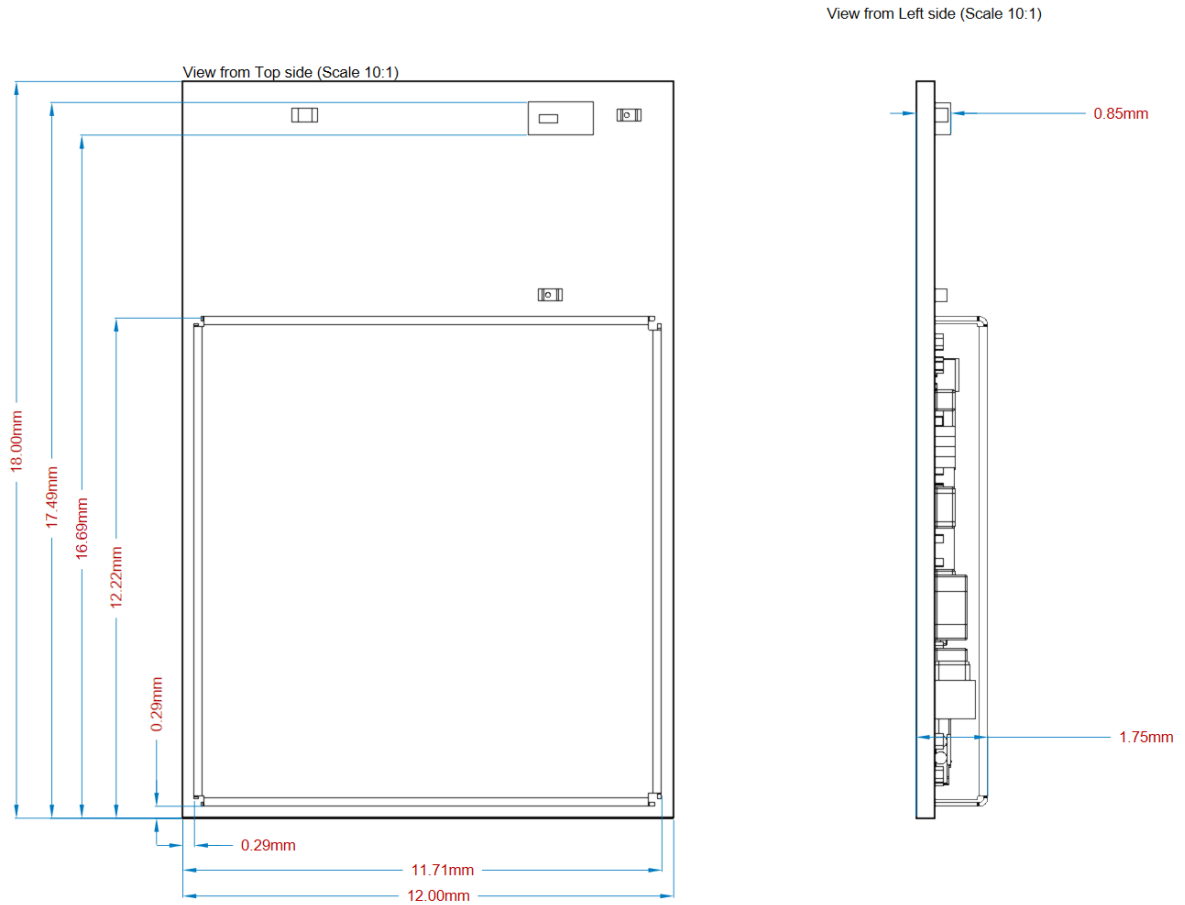
2.2   SONA™ NX611 M.2 1218 Module Mechanical Drawing

Figure 3: Mechanical Drawing – NX611 M.2 1218 Chip Antenna module.

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2.3 SONA™ NX611 M.2 1218 Module Pinout

Table 1: Sona NX611 M.2 1218 Chip Antenna Module Pinout

Pin Number	PCIe M.2 Name	Pin Name NX611	Description
1	UIM_POWER_SRC/GPIO1	UNUSED	
2	UIM_POWER_SNK	UNUSED	
3	UIM_SWP	UNUSED	
4	3.3V	3.3V	
5	3.3V	3.3V	
6	GND	Ground	Ground
7	RESERVED	UNUSED	
8	ALERT#	NC	
9	I2C_CLK	NC	
10	I2C_DATA	NC	
11	COEX_RXD	COEX_RXD	
12	COEX_TXD	COEX_TXD	
13	COEX3	UNUSED	
14	SYSCLK/GNSS_0	UNUSED	
15	TX_BLANKING/GNSS_1	UNUSED	
16	RESERVED	UNUSED	
17	GND	Ground	Ground
18	RESERVED	UNUSED	
19	RESERVED	NC	
20	GND	Ground	Ground
21	PETn1	UNUSED	
22	PETp1	UNUSED	
23	GND	Ground	
24	PERn1	UNUSED	
25	PERp1	UNUSED	
26	GND	Ground	
27	SUSCLK(32kHz)	UNUSED	
28	W_DISABLE1#	PDn	
29	PEWAKE#	UNUSED	
30	CLKREQ#	UNUSED	
31	PERST#	UNUSED	
32	GND	Ground	Ground
33	REFCLKn0	UNUSED	
34	REFCLKp0	UNUSED	
35	GND	Ground	Ground
36	PETn0	UNUSED	
37	PETp0	UNUSED	

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38	GND	Ground	Ground
39	PERn0	UNUSED	
40	PERp0	UNUSED	
41	GND	Ground	Ground
42	VENDOR DEFINED	EXT_PRI	
43	VENDOR DEFINED	BT_WAKE_IN	
44	VENDOR DEFINED	WL_WAKE_IN	
45	SDIO RESET#	IND_RST_WL	
46	SDIO WAKE#	WL_WAKE_OUT	
47	SDIO DATA3	SDIO DATA3	
48	SDIO DATA2	SDIO DATA2	
49	SDIO DATA1	SDIO DATA1	
50	SDIO DATA0	SDIO DATA0	
51	SDIO CMD	SDIO CMD	
52	SDIO CLK	SDIO CLK	
53	UART WAKE#	BT_WAKE_OUT	
54	UART CTS	UART CTS	
55	UART Tx	UART Tx	
56	UART Rx	UART Rx	
57	UART RTS	UART RTS	
58	PCM_SYNC/I2S_WS	PCM_SYNC/I2S_WS	
59	PCM_IN/I2S_SD_IN	PCM_IN/I2S_SD_IN	
60	PCM_OUT/I2S_SD_OUT	PCM_OUT/I2S_SD_OUT	
61	PCM_CLK/I2S_SCK	PCM_CLK/I2S_SCK	
62	GND	Ground	Ground
63	W_DISABLE2#	IND_RST_BT	
64	LED_2#	UNUSED	
65	LED_1#	UNUSED	
66	RESERVED/VIO_1.8	VIO_1.8	
67	RESERVED	UNUSED	
68	GND	Ground	Ground
69	USB_D-	UNUSED	
70	USB_D+	UNUSED	
71	GND	Ground	Ground
72	3.3V	3.3V	
73	3.3V	3.3V	
74	GND	Ground	Ground
75	GND	Ground	Ground
76	GND/VIO_CFG	NC	

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3 Host PCB Requirements

The Sona NX611 1218 Chip Antenna Module has been certified by the FCC and Industry Canada (IC) as a Modular Radio. The end user is authorized to integrate this module into an end-product and is solely responsible for the Unintentional Emissions levels produced by the end-product.

To uphold the Modular Radio certifications, the integrator of the module must abide by the PCB layout recommendations outlined in the following paragraphs. Any divergence from these recommendations will invalidate the modular radio certifications and require the integrator to re-certify the module and/or end-product.

Additionally, the size of the host PCB and positioning of the Module greatly affects tuning and performance of the module antenna. The Sona NX611 1218 Chip Antenna Module has been tuned and matched to the size and position on the Host Development board shown below. Because tuning for the antenna is integrated into the module, if the reference design board size is not followed, performance of the antenna will be degraded.
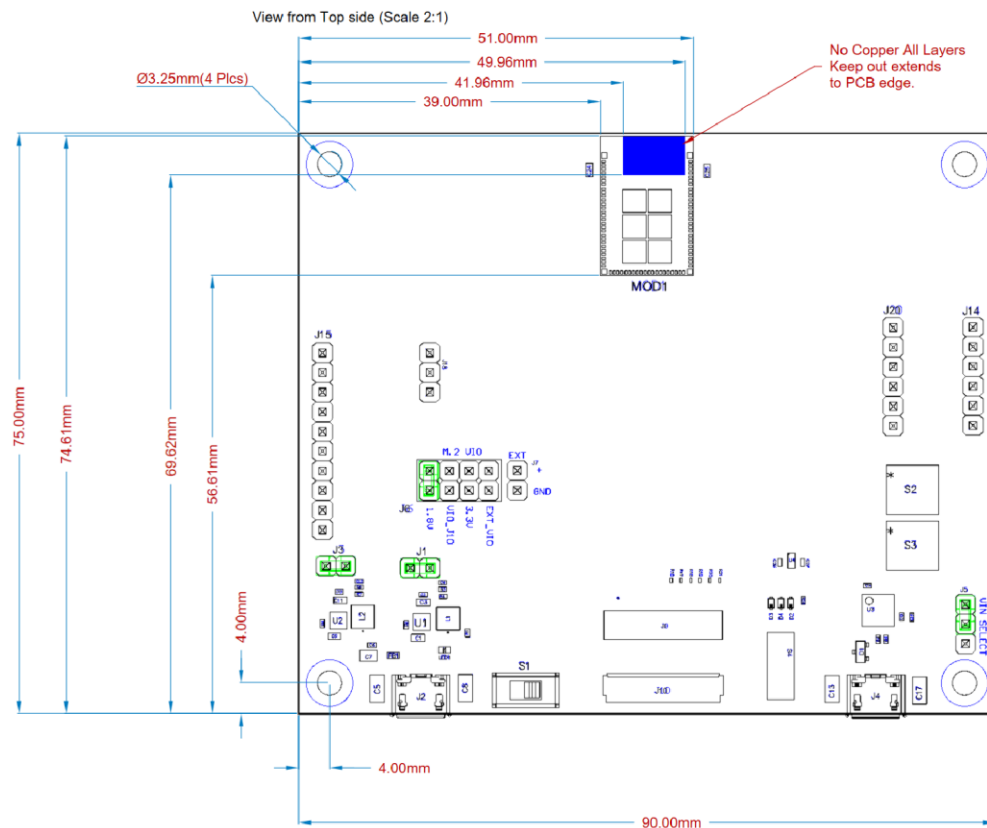

Figure 4: Sona NX611 M.2 1218 Chip Antenna Reference Board.

Note: Please use the latest CAD files from the Ezurio web site when incorporating the Sona™ 1218 module into a new design. CAD files are provided in native Altium as well as Gerber and PDF formats.

3.1 Sona NX611 Integrated Antenna module RF Layout Guidelines

The following is a list of RF layout design guidelines and recommendation when installing an Ezurio radio into your device.

- Do not run any cables directly above or directly below the radio.
- Do not place any parts or run any high-speed digital lines below the radio.
- Ensure that there is the maximum allowable spacing separating the antenna connectors on the Ezurio radio from the antenna. In addition, do not place antennas directly above or directly below the radio.
- Ezurio recommends the use of a double-shielded cable for the connection between the radio and the antenna elements.
- Be sure to put a 10uF/16V/0603 capacitor on EACH 3.3V power pin. Also, place that capacitor as close as possible to the pin to make sure the internal PMU is working correctly.

- Use proper electro-static-discharge (ESD) procedures when installing the Ezurio radio module. To avoid negatively impacting Tx power and receiver sensitivity, do not cover the antennas with metallic objects or components.
- Ezurio's surface mount modules are designed to conform to all major manufacturing guidelines. This application note is intended to provide additional guidance beyond the information that is presented in the user manual. This application note is considered a living document and will be updated as new information is presented.
- The modules are designed to meet the needs of commercial and industrial applications. They are easy to manufacture and conform to current automated manufacturing processes.
- The Sona NX611 Integrated antenna variant should be located at the center of the Host PCB and surrounded by ground on three sides. The antenna keep out region as defined in Figure 4 must be kept clear of copper on all layers of the host PCB.

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4 Revision History

Version	Date	Notes	Contributor(s)	Approver
0.1	11 June 2023	Preliminary release.	Peter Scharpf	Andy Ross

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